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**CERTIFICATION TEST REPORT** 

FOR

EA544D\_2 ETHERNET ADAPTER CARD- 2.4 / 5 GHz DFS APPLICATIONS

MODEL NUMBER: 65-VN663-P2

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|     | 11.4.2.   |  | F RADAR WAVEFORMS AND WLAN TRAFFIC  |  |
|     | 11.4.3.   |  |   |  |
|     | 11.4.4.<br>11.4.5.  |  | PPING CHANNEL TESTS   |  |
|     | 11.4.6.   |  | CUPANCY PERIOD  |  |
|     | 11.4.7.   | DETECTI  | ON BANDWIDTH  | 332  |
|     | 11.4.8.   | IN-SERVI   | CE MONITORING   | 334  |
|     |   | -  | E CONFIGURATION IN 40 MHz BANDWIDTH   | -  |

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| - | 11.6. MOVE AND CLOSING TIME<br>11.6.1. SLAVE NON-OCCUPANCY |    |
|---|--|----|
|   | 12. MAXIMUM PERMISSIBLE EXPOSURE                           | 12 |
|   | 13. SETUP PHOTOS   | 13 |

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# **1. ATTESTATION OF TEST RESULTS**

| COMPANY NAME: | QUALCOMM, INC.        |
|---------------|-----------------------|
|               | 3165 KIFER RD         |
|               | SANTA CLARA, CA 95051 |
|               | U.S.A.                |

**EUT DESCRIPTION:** EA544D\_2 ETHERNET ADAPTER CARD- 2.4 / 5 GHz DFS APPLICATIONS

MODEL: 65-VN663-P2

SERIAL NUMBER: 7813, 8286, 9021, 8263, and 9086 FOR ANTENNA PORT, 7908 and 9021 FOR RADIATED EMISSIONS, and 7901 FOR DFS

**DATE TESTED:** JUNE 24, 2009 – MARCH 23, 2010

| APPLICABLE STANDARDS                    |              |  |  |  |
|---|--------------|--|--|--|
| STANDARD                                | TEST RESULTS |  |  |  |
| CFR 47 Part 15 Subpart E                | Pass         |  |  |  |
| INDUSTRY CANADA RSS-210 Issue 7 Annex 9 | Pass         |  |  |  |
| INDUSTRY CANADA RSS-GEN Issue 2         | Pass         |  |  |  |

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

FRANK IBRAHIM EMC SUPERVISOR COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, RSS-GEN Issue 2, and RSS-210 Issue 7.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.

# 4. CALIBRATION AND UNCERTAINTY

# 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

# 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

# 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                             | UNCERTAINTY |
|---------------------------------------|-------------|
| Conducted Disturbance, 0.15 to 30 MHz | 3.52 dB     |
| Radiated Disturbance, 30 to 1000 MHz  | 4.94 dB     |

Uncertainty figures are valid to a confidence level of 95%.

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# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g/n WLAN transceiver module for 2.4 / 5 GHz Applications that include DFS bands. It is equipped with four identical transmitter / receiver chains and an Ethernet port.

## 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

| Frequency Range | Mode         | Output Power | Output Power |
|-----------------|--------------|--------------|--------------|
| (MHz)           |              | (dBm)        | (mW)         |
| 5.2 GHz BAND    | •            |              |              |
| 5180 - 5240     | 802.11a      | 12.10        | 16.22        |
| 5180 - 5240     | 802.11n HT20 | 13.67        | 23.28        |
| 5190 - 5230     | 802.11n HT40 | 16.73        | 47.10        |
| 5.3 GHz BAND    | •            | -            |              |
| 5260 - 5320     | 802.11a      | 18.62        | 72.78        |
| 5260 - 5320     | 802.11n HT20 | 20.50        | 112.20       |
| 5270 - 5310     | 802.11n HT40 | 23.62        | 230.14       |
| 5.6 GHz BAND    |              |              |              |
| 5500 - 5700     | 802.11a      | 19.76        | 94.62        |
| 5500 - 5700     | 802.11n HT20 | 20.60        | 114.82       |
| 5510 - 5670     | 802.11n HT40 | 23.89        | 244.91       |

# 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dual band omni monopole (4 identical) antenna, each with a maximum gain of 3 dBi in the 5 GHz bands.

For the 802.11a legacy mode only two chains are transmitting, therefore the effective legacy antenna gain is:

| Antenna Gain | 10 Log (# Tx Chains) | Effective Legacy Gain |  |
|--------------|----------------------|-----------------------|--|
| (dBi)        | (dB)                 | (dBi)                 |  |
| 3            | 3.01                 | 6.01                  |  |

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# 5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Keyspan, rev. 3.7.0.2.

The test utility software used during testing was PTT GUI, rev. 5.1.

# 5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was tested as an external module connected to a host Laptop PC via a test fixture.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

802.11a Mode (20 MHz BW operation): 6 Mbps, OFDM. 802.11n MIMO HT20 Mode: MCS31, 260 Mbps, 4 Spatial Streams. 802.11n MIMO HT40 Mode: MCS31, 540 Mbps, 4 Spatial Streams.

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 11n HT40, high channel.

For 26 dB BW measurement preliminary testing showed that there is no significant difference among different chains, so the measurement was performed using Chain 0.

For conducted spurious measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore, final measurement was performed using combiner for all channels and modes.

For PPSD measurement preliminary testing showed that combiner is worst-case compared to individual chains; therefore, final measurement was performed using combiner for all channels and modes.

For Radiated Band Edge measurements preliminary testing showed that the worst case was vertical polarization, so final measurements were performed with vertical polarization.

# 5.6. MODIFICATIONS

The EUT was modified during the project, as follows:

A shield was added to the bottom side of the PCB to meet ETSI receiver spurious limits. This shield was subsequently incorporated into all versions of this radio module.

The DFS capabilities of the EUT were changed from Master Device only to either Master Device or Slave Device without Radar Detection.

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# 5.7. TEST RESULTS FOR MODIFIED SAMPLE

As a result of the shield modification, the original data was analyzed to find worst-case modes and margins, then preliminary tests were performed to determine where additional final testing was required. This report is updated with all new final measurements that show degraded performance compared to the original configuration.

As a result of both the shield modification and the DFS modification, full DFS testing appropriate to the final device capabilities was performed on a sample with the new shield. This report is updated with the new DFS results.

# 5.8. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST |              |              |                |        |  |  |
|-----------------------------------|--------------|--------------|----------------|--------|--|--|
| Description                       | Manufacturer | Model        | Serial Number  | FCC ID |  |  |
|                                   |              |              |                |        |  |  |
| Laptop                            | IBM          | T43 ThinkPad | L3-F9978 05/06 | DoC    |  |  |
| AC Adapter                        | IBM          | 08K8208      | 11S08K8208Z1Z6 | DoC    |  |  |
| AC Adapter                        | Phihong      | PSA15R-050P  | N/A            | N/A    |  |  |
| Serial (DB9)/USB                  | Keyspan      | N/A          | N/A            | N/A    |  |  |
| Test Fixture                      | N/A          | N/A          | N/A            | N/A    |  |  |

## I/O CABLES

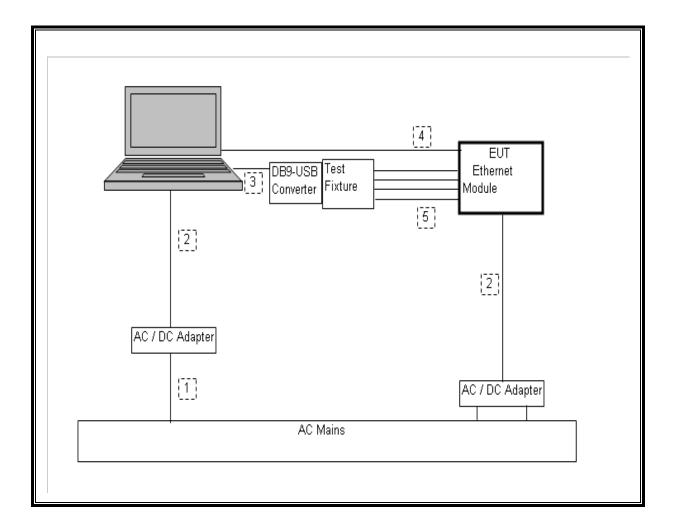
|              | I/O CABLE LIST |                            |                  |               |                 |                              |  |
|--------------|----------------|----------------------------|------------------|---------------|-----------------|------------------------------|--|
| Cable<br>No. | Port           | # of<br>Identical<br>Ports | Connecto<br>Type | Cable<br>Type | Cable<br>Length | Remarks                      |  |
| 1            | AC             | 2                          | US 115V          | Shielded      | 1m              | For laptop & EUT             |  |
| 2            | DC             | 2                          | DC               | Un-shielded   | 2m              | For laptop & EUT             |  |
| 3            | USB            | 1                          | USB              | Shielded      | .8m             | From laptop to USB Converter |  |
| 4            | Ethernet       | 1                          | RJ45             | Un-shielded   | 1 m             | From laptop to EUT           |  |
| 5            | Cable          | 1                          | Riibon           | Un-shielded   | .4 m            | Test Fixture to EUT          |  |

## TEST SETUP

The EUT is installed in a host laptop computer via test fixture during the tests. Test software exercised the radio card.

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### **SETUP DIAGRAM FOR TESTS**



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# 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUIPMENT LIST       |                |                  |        |          |          |
|---------------------------|----------------|------------------|--------|----------|----------|
| Description               | Manufacturer   | Model            | Asset  | Cal Date | Cal Due  |
| Spectrum Analyzer, 44 GHz | Agilent / HP   | E4446A           | C01069 | 01/05/09 | 01/05/10 |
| Antenna, Bilog, 2 GHz     | Sunol Sciences | JB1              | C01011 | 01/14/09 | 01/14/10 |
| Antenna, Horn, 18 GHz     | EMCO           | 3115             | C00945 | 04/22/09 | 04/22/10 |
| Antenna, Horn, 26.5 GHz   | ARA            | MWH-1826/B       | C00589 | 09/29/08 | 11/28/09 |
| Antenna, Horn, 40 GHz     | ARA            | MWH-2640B        | C00981 | 05/21/09 | 05/21/10 |
| Preamplifier, 40 GHz      | Miteq          | NSP4000-SP2      | C00990 | 10/11/08 | 10/11/09 |
| Preamplifier, 1300 MHz    | Agilent / HP   | 8447D            | C00885 | 03/31/09 | 03/31/10 |
| Preamplifier, 1-26GHz     | Agilent / HP   | 8449B            | C01052 | 08/05/08 | 08/05/09 |
| Peak Power Meter          | Boonton        | 4541             | C01186 | 01/19/09 | 01/19/10 |
| Peak Power Sensor         | Boonton        | 4541             | C01189 | 01/15/09 | 01/15/10 |
| LISN, 30 MHz              | FCC            | LISN-50/250-25-2 | N02625 | 10/29/08 | 10/29/09 |
| EMI Test Receiver, 30 MHz | R&S            | ESHS 20          | N02396 | 02/06/08 | 08/06/09 |

The following test and measurement equipment was utilized for the additional tests with the modified shield:

| TEST EQUIPMENT LIST       |              |        |        |          |          |
|---------------------------|--------------|--------|--------|----------|----------|
| Description               | Manufacturer | Model  | Asset  | Cal Date | Cal Due  |
| Spectrum Analyzer, 44 GHz | Agilent / HP | E4446A | C01069 | 01/05/10 | 03/05/11 |
| Antenna, Horn, 18 GHz     | EMCO         | 3115   | C00945 | 04/22/09 | 04/22/10 |
| Preamplifier, 1-26GHz     | Agilent / HP | 8449B  | C01052 | 02/04/09 | 02/04/10 |
| Peak Power Meter          | Boonton      | 4541   | C01186 | 01/19/09 | 01/19/10 |
| Peak Power Sensor         | Boonton      | 4541   | C01189 | 01/15/09 | 01/15/10 |

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# 7. ANTENNA PORT TEST RESULTS

# 7.1. 5.2 GHz BAND CHANNEL TESTS FOR 802.11a MODE

## 7.1.1. 26 dB and 99% BANDWIDTH

### <u>LIMITS</u>

None; for reporting purposes only.

### TEST PROCEDURE

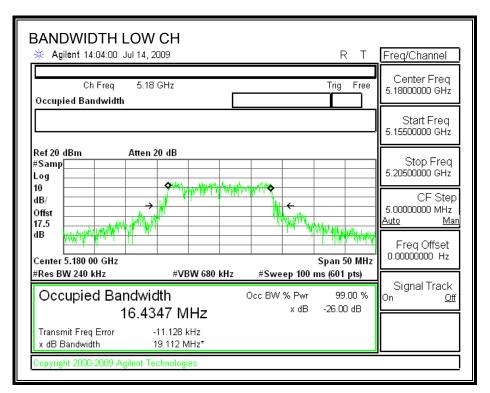
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

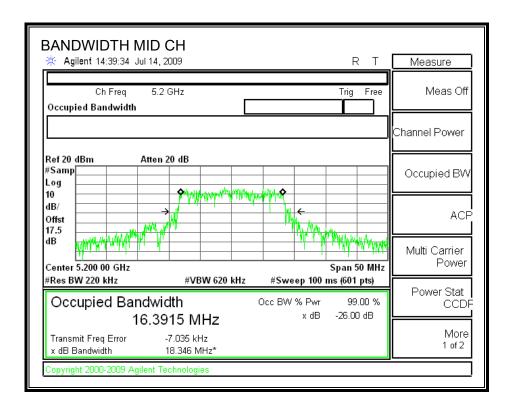
#### RESULTS

| Channel | Frequency | 26 dB Bandwidth | 99% Bandwidth |
|---------|-----------|-----------------|---------------|
|         | (MHz)     | (MHz)           | (MHz)         |
| Low     | 5180      | 19.1120         | 16.4340       |
| Middle  | 5200      | 18.3460         | 16.3915       |
| High    | 5240      | 18.6980         | 16.4054       |

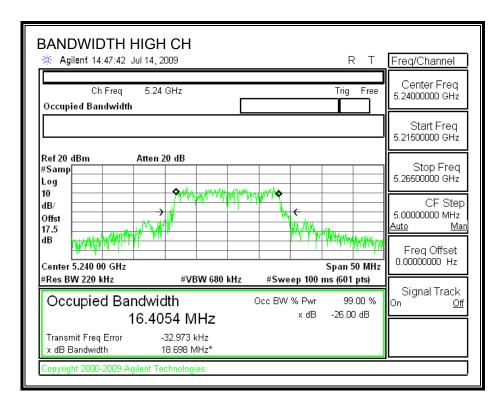
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#### 26 dB and 99% BANDWIDTH





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## 7.1.2. OUTPUT POWER

### <u>LIMITS</u>

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Antenna gain of Chain 1 = antenna gain of Chain 2.

| Antenna Gain<br>(dBi) | • • • • | Effective Legacy Gain<br>(dBi) |
|-----------------------|---------|--------------------------------|
| 3                     | 3.01    | 6.01                           |

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

#### **RESULTS**

| Channel | Frequency | Fixed | В       | 4 + 10 Log B | Effective    | Limit |
|---------|-----------|-------|---------|--------------|--------------|-------|
|         |           | Limit |         | Limit        | Antenna Gain |       |
|         | (MHz)     | (dBm) | (MHz)   | (dBm)        | (dBi)        | (dBm) |
| Low     | 5180      | 17    | 19.1120 | 16.81        | 6.01         | 16.80 |
| Mid     | 5200      | 17    | 18.3460 | 16.64        | 6.01         | 16.63 |
| High    | 5240      | 17    | 18.6980 | 16.72        | 6.01         | 16.71 |

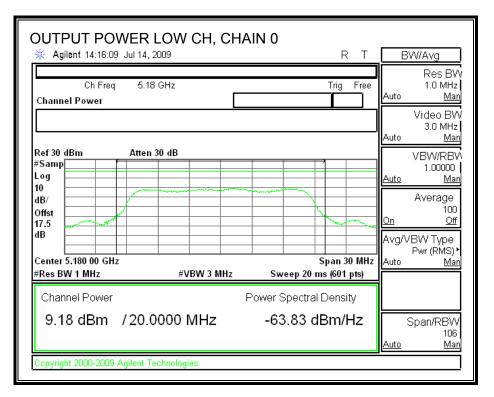
## Limit

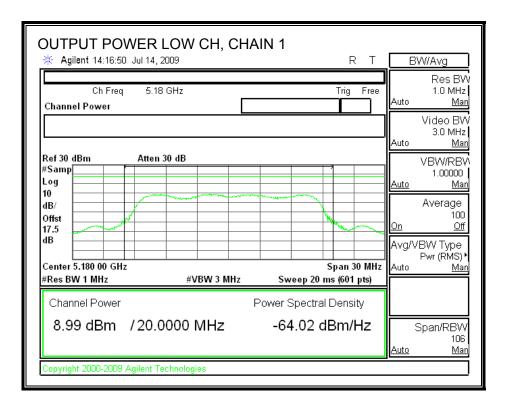
#### Individual Chain Results

| Channel | Frequency | Chain 0 | Chain 1 | Total | Limit | Margin |
|---------|-----------|---------|---------|-------|-------|--------|
|         |           | Power   | Power   | Power |       |        |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5180      | 9.18    | 8.99    | 12.10 | 16.80 | -4.71  |
| Mid     | 5200      | 9.11    | 8.99    | 12.06 | 16.63 | -4.56  |
| High    | 5240      | 9.15    | 8.96    | 12.07 | 16.71 | -4.64  |

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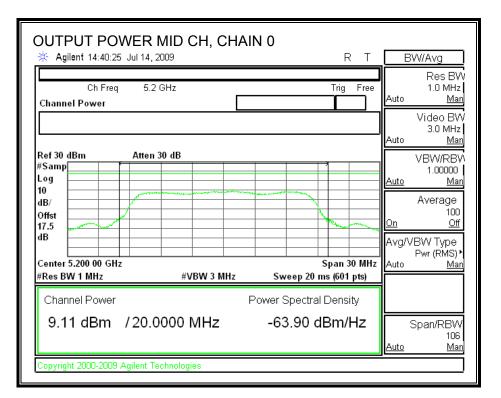
#### **OUTPUT POWER, LOW CHANNEL**

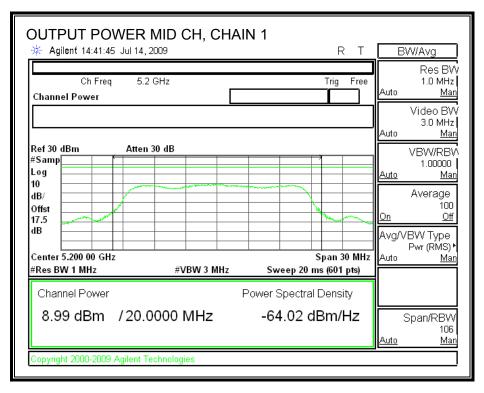




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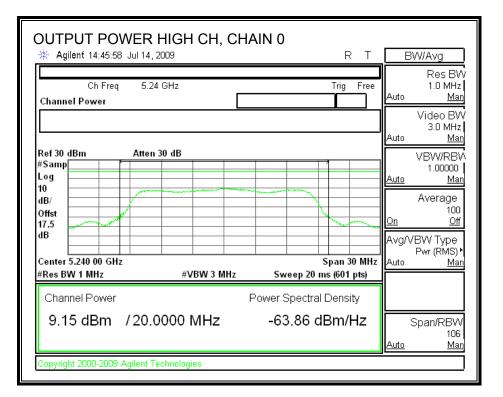
#### **OUTPUT POWER, MID CHANNEL**

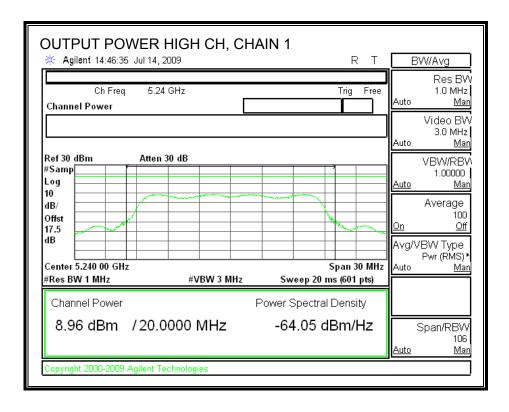




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#### **OUTPUT POWER, HIGH CHANNEL**





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## 7.1.3. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a power meter.

#### RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency | Chain 0 | Chain 1 | Total |
|---------|-----------|---------|---------|-------|
|         |           | Power   | Power   | Power |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm) |
| Low     | 5180      | 9.15    | 8.89    | 12.03 |
| Middle  | 5200      | 9.10    | 8.98    | 12.05 |
| High    | 5240      | 9.09    | 8.93    | 12.02 |

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## 7.1.4. PEAK POWER SPECTRAL DENSITY

### LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Use this table if antenna gain for Chain 1 = antenna gain for Chain 2

| Antenna Gain | 10 Log (# Tx Chains) | Effective Legacy Gain |
|--------------|----------------------|-----------------------|
| (dBi)        | (dB)                 | (dBi)                 |
| 3            | 3.01                 | 6.01                  |

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is less than or equal to 6.01 dBi, therefore the limit is 3.99 dBm.

### TEST PROCEDURE

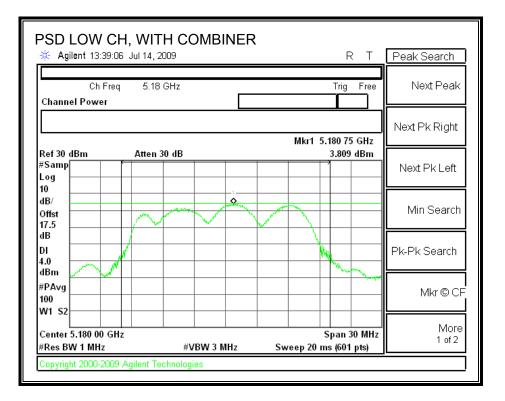
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

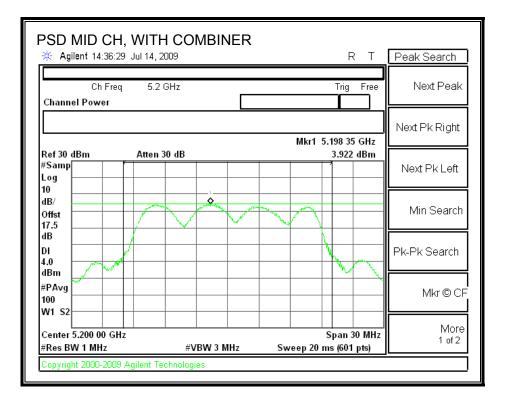
#### **RESULTS**

| Channel | Frequency | PPSD With Combiner | Limit | Margin |
|---------|-----------|--------------------|-------|--------|
|         | (MHz)     | (dBm)              | (dBm) | (dB)   |
| Low     | 5180      | 3.81               | 3.99  | -0.18  |
| Middle  | 5200      | 3.92               | 3.99  | -0.07  |
| High    | 5240      | 3.86               | 3.99  | -0.13  |

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#### POWER SPECTRAL DENSITY WITH COMBINER





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| PSD HIGH CH, WI                            |            |                      | RТ                    | В                | W/Avg                             |
|--|------------|----------------------|-----------------------|------------------|-----------------------------------|
| Ch Freq 5.24<br>Channel Power              | GHz        | T                    | rig Free              | Auto             | Res BV<br>1.0 MHz<br><u>Mar</u>   |
|  |            | Mkr1 5.23            |                       | Auto             | Video BV<br>3.0 MHz<br><u>Mar</u> |
| Ref 30 dBm Atten 3<br>#Samp Log<br>10      | 30 dB      | 3.                   | 858 dBm               | <u>Auto</u>      | VBW/RB\<br>1.00000<br><u>Mar</u>  |
| 10<br>dB/<br>Offst<br>17.5                 |            |                      |                       | <u>On</u>        | Average<br>100<br><u>Off</u>      |
| dB 01 04.0 04.0 04.0 04.0 04.0 04.0 04.0 0 |            |                      | $\overline{\nabla}$   | Avg/V<br>Auto    | BW Type<br>Pwr (RMS)<br><u>Ma</u> |
| #PAvg<br>100<br>W1 S2                      |            |                      |                       |                  |                                   |
| Center 5.240 00 GHz<br>#Res BW 1 MHz       | #VBW 3 MHz | Spa<br>Sweep 20 ms ( | an 30 MHz<br>601 pts) | <<br><u>Auto</u> | Span/RBW<br>106<br><u>Ma</u> i    |

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## 7.1.5. PEAK EXCURSION

### LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

#### TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

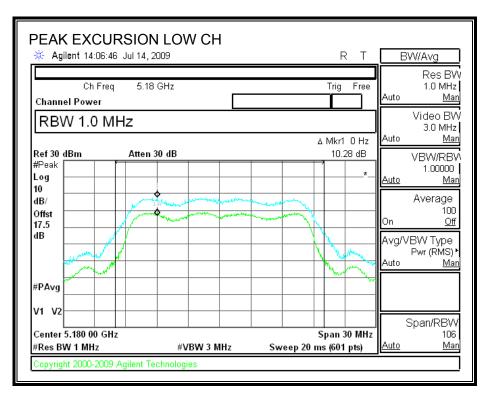
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

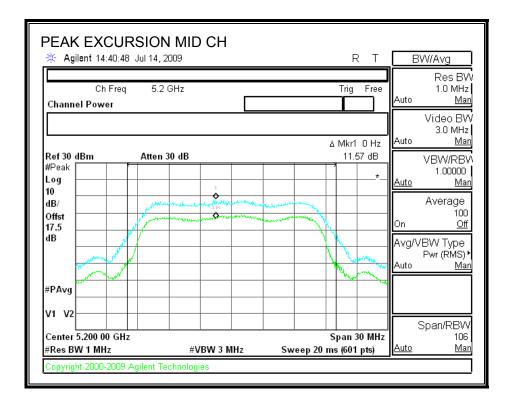
#### **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5180      | 10.28          | 13    | -2.72  |
| Middle  | 5200      | 11.57          | 13    | -1.43  |
| High    | 5240      | 10.22          | 13    | -2.78  |

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#### PEAK EXCURSION





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| 🔆 Agilent 14:48:51 Jul 14             | , 2009                          | RT                                  | BW/Avg                                       |
|---------------------------------------|---------------------------------|-------------------------------------|--|
| Ch Freq 5.2<br>Channel Power          | 24 GHz                          | Trig Fre                            | Res BV<br>e 1.0 MHz<br>Auto <u>Mar</u>       |
| RBW 1.0 MHz                           |                                 | ∆ Mkr1 0 H;                         | Video BV<br>3.0 MHz<br>Auto <u>Mar</u>       |
| Ref 30 dBm Atte<br>#Peak<br>Log<br>10 | n 30 dB                         | 10.22 dB                            |  |
| 0<br>dB/<br>0ffst<br>17.5             | Maria and a second and a second |                                     | Average<br>100<br>On <u>Off</u>              |
| dB                                    |                                 |                                     | Avg/VBW Type<br>Pwr (RMS)<br>Auto <u>Mar</u> |
| #PAvg                                 |                                 |                                     | ~  |
| V1 V2                                 |                                 |                                     | Span/RBW                                     |
| Center 5.240 00 GHz<br>#Res BW 1 MHz  | #VBW 3 MHz                      | Span 30 MH<br>Sweep 20 ms (601 pts) |  |

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## 7.1.6. CONDUCTED SPURIOUS EMISSIONS

### LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

#### TEST PROCEDURE

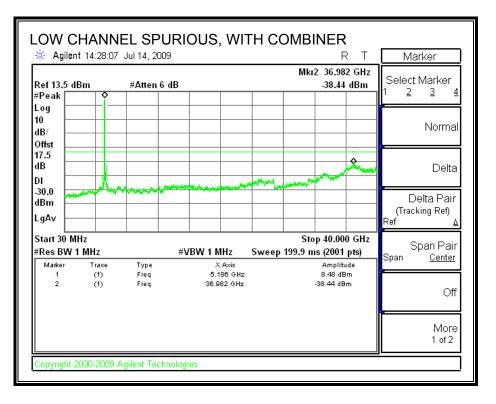
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

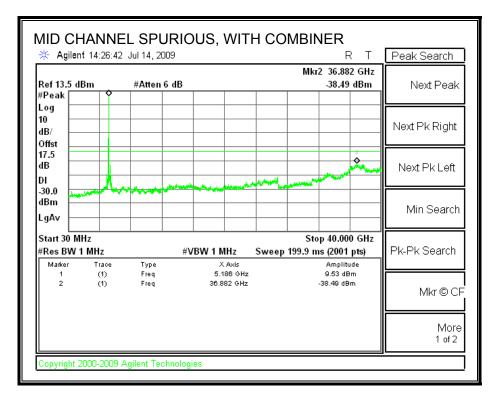
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

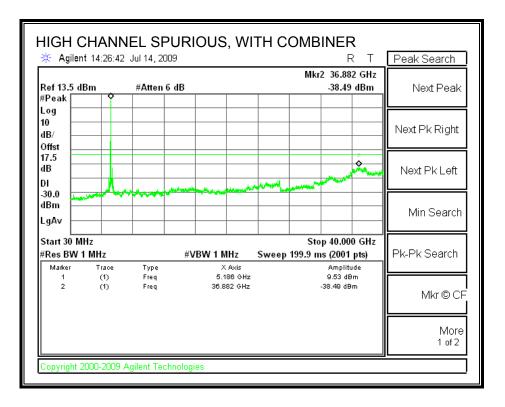
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#### SPURIOUS EMISSIONS WITH COMBINER





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## 7.2. 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

## 7.2.1. 99% & 26 dB BANDWIDTH

#### <u>LIMITS</u>

None; for reporting purposes only.

### TEST PROCEDURE

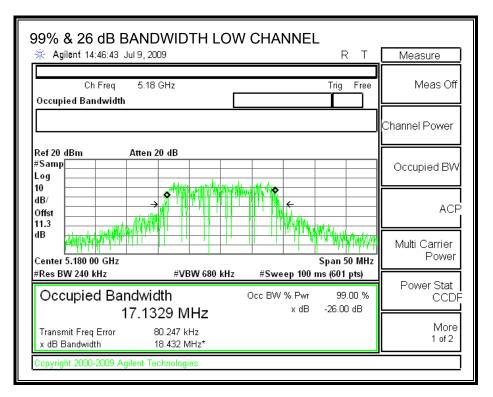
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

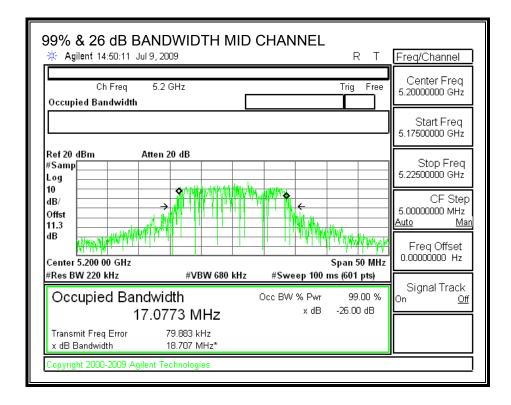
#### **RESULTS**

| Channel | Frequency | 99% OBW | 26 dB BW |  |
|---------|-----------|---------|----------|--|
|         | (MHz)     | (MHz)   | (MHz)    |  |
| Low     | 5180      | 17.1329 | 18.432   |  |
| Middle  | 5200      | 17.0773 | 18.707   |  |
| High    | 5240      | 17.3831 | 19.172   |  |

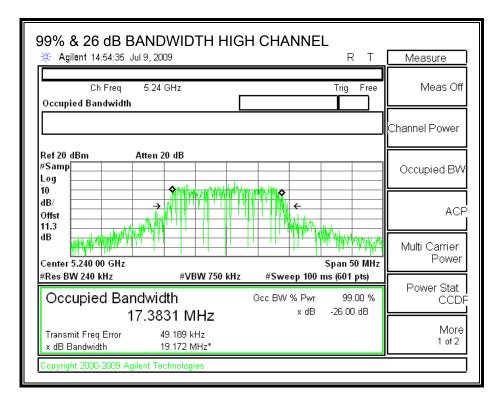
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#### 99% & 26 dB BANDWIDTH





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## 7.2.2. OUTPUT POWER

### <u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

## <u>RESULTS</u>

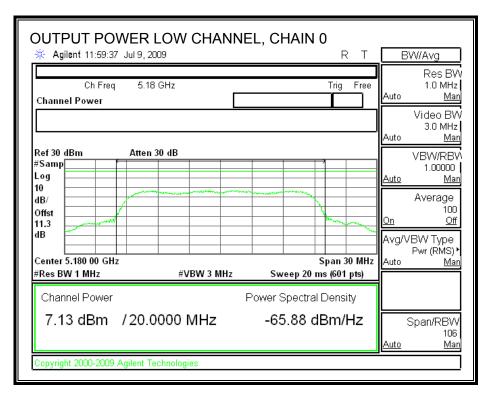
Limit

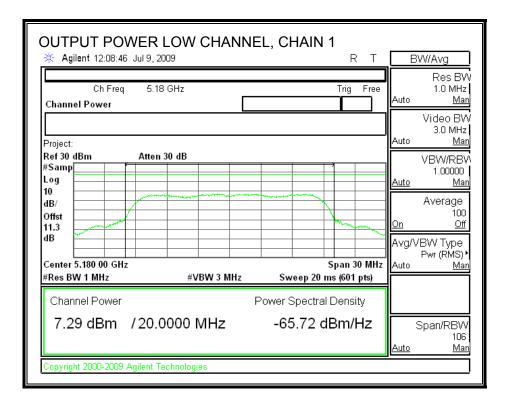
| Channel | Freq  | Fixed | В      | 4 + 10 Log B | Antenna | Limit |
|---------|-------|-------|--------|--------------|---------|-------|
|         |       | Limit |        | Limit        | Gain    |       |
|         | (MHz) | (dBm) | (MHz)  | (dBm)        | (dBi)   | (dBm) |
| Low     | 5180  | 17    | 18.432 | 16.66        | 3       | 16.66 |
| Mid     | 5200  | 17    | 18.707 | 16.72        | 3       | 16.72 |
| High    | 5240  | 17    | 19.172 | 16.83        | 3       | 16.83 |

#### Individual Chain Results

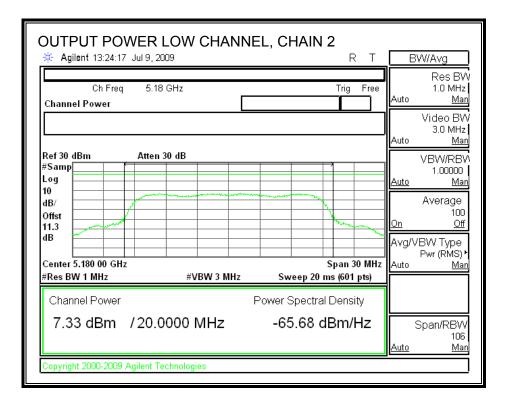
| Channel | Freq  | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Total | Limit | Margin |
|---------|-------|---------|---------|---------|---------|-------|-------|--------|
|         |       | Power   | Power   | Power   | Power   | Power |       |        |
|         | (MHz) | (dBm)   | (dBm)   | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5180  | 7.13    | 7.29    | 7.33    | 7.33    | 13.29 | 16.66 | -3.36  |
| Mid     | 5200  | 7.19    | 7.58    | 7.47    | 7.65    | 13.50 | 16.72 | -3.22  |
| High    | 5240  | 7.22    | 7.86    | 7.85    | 7.65    | 13.67 | 16.83 | -3.15  |

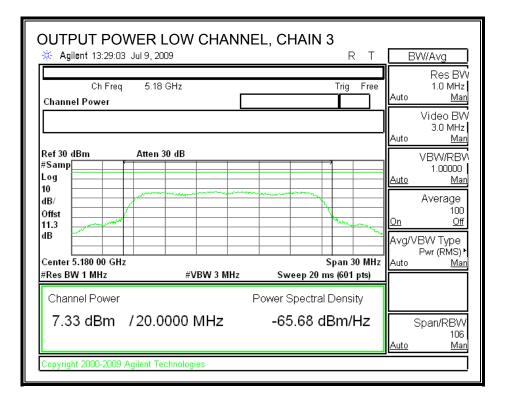
#### **OUTPUT POWER, LOW CHANNEL**





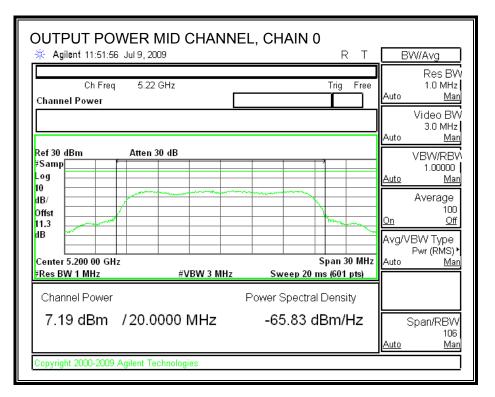
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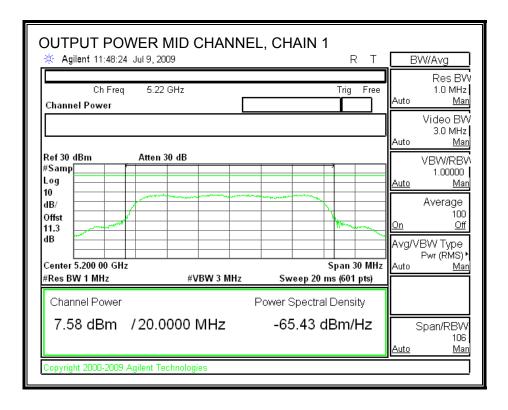




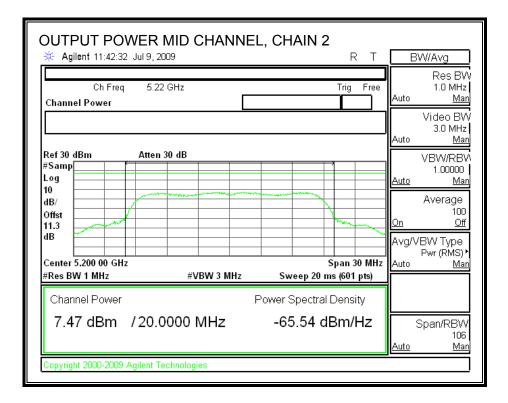
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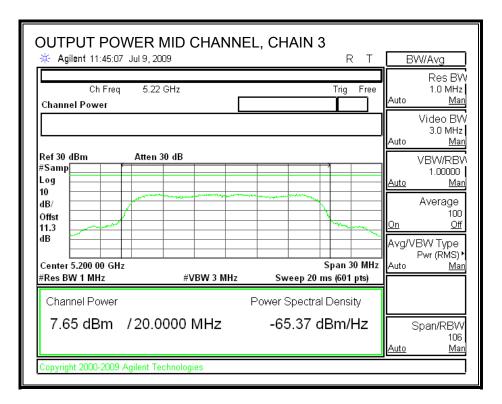
### **OUTPUT POWER, MID CHANNEL**





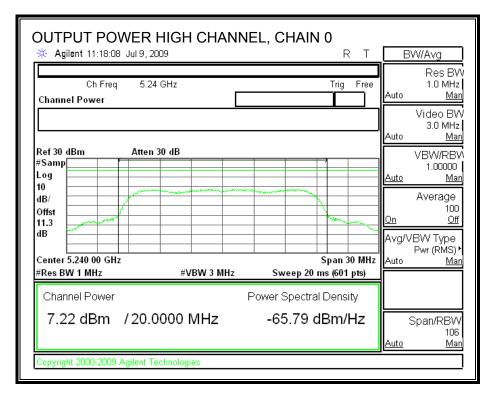
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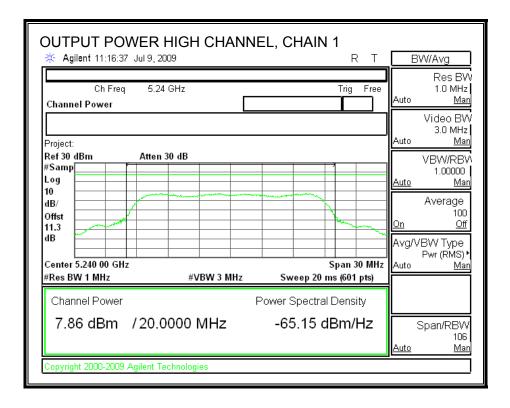




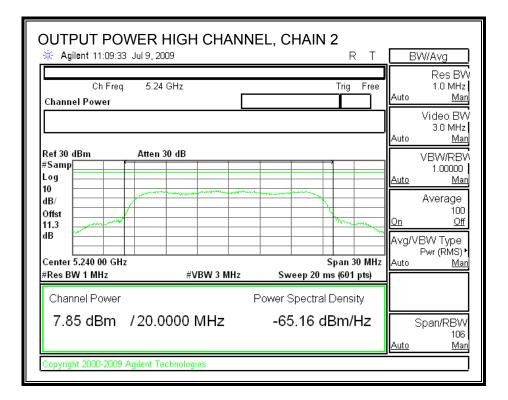
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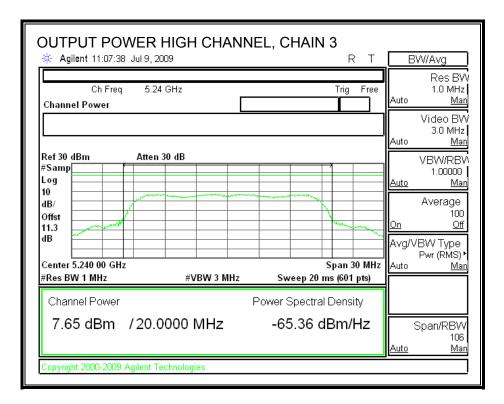
### **OUTPUT POWER, HIGH CHANNEL**





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# 7.2.3. AVERAGE POWER

## LIMITS

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### RESULTS

| Channel | Frequency | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
|---------|-----------|---------|---------|---------|---------|
|         |           | Power   | Power   | Power   | Power   |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm)   | (dBm)   |
| Low     | 5180      | 7.41    | 7.51    | 7.69    | 7.89    |
| Middle  | 5200      | 7.11    | 8.23    | 8.01    | 8.05    |
| High    | 5240      | 7.82    | 7.85    | 8.04    | 8.11    |

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# 7.2.4. PEAK POWER SPECTRAL DENSITY

# LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi, therefore the limit is 4 dBm.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

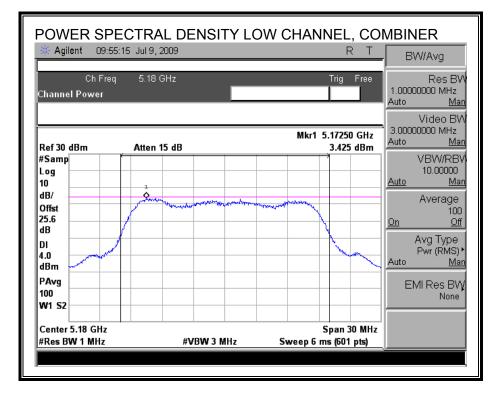
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

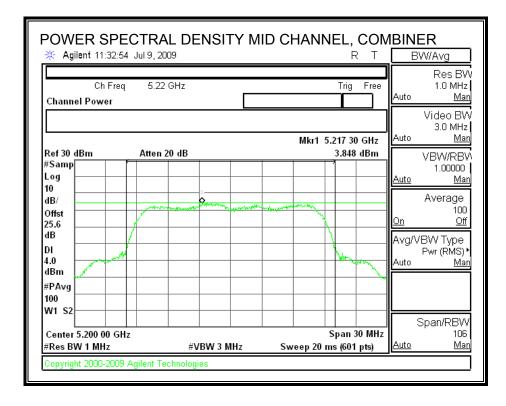
| Channel | Frequency | PSD with Combiner | Limit | Margin |
|---------|-----------|-------------------|-------|--------|
|         | (MHz)     | (dBm)             | (dBm) | (dB)   |
| Low     | 5180      | 3.43              | 4     | -0.58  |
| Middle  | 5200      | 3.85              | 4     | -0.15  |
| High    | 5240      | 3.65              | 4     | -0.35  |

## RESULTS

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### **POWER SPECTRAL DENSITY**





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| POWER SPECTR/                                 |                       | IIGH CHANI | NEL, CO<br>R T                     |             | NIAVg  |
|---|-----------------------|------------|------------------------------------|-------------|--|
| Ch Freq 5.24<br>Channel Power                 | 1 GHz                 |            | Trig Free                          | Auto        | Res BV<br>1.0 MHz<br><u>Mar</u><br>Video BV<br>3.0 MHz |
|   | 20 dB                 | Mkr1 5.3   | 242 40 GHz<br>3.652 dBm            | Auto        | Mar<br>VBW/RB\   |
| #Samp<br>Log<br>10                            |                       | 1          |                                    | <u>Auto</u> | 1.00000<br><u>Mar</u>                                  |
| dB/<br>Offst<br>25.6                          | and the second second |            |                                    | <u>On</u>   | Average<br>100<br><u>Off</u>                           |
| dB<br>DI<br>4.0<br>dBm                        |                       |            | manny                              |             | BW Type<br>Pwr (RMS)<br><u>Ma</u>                      |
| #PAvg   |                       |            |                                    |             |  |
| W1 S2<br>Center 5.240 00 GHz<br>#Res BW 1 MHz | #VBW 3 MHz            | Sweep 20 m | 5pan 30 MHz<br>s <i>(</i> 601 nts) | S<br>Auto   | )pan/RBV<br>106<br>Mai                                 |
| Copyright 2000-2009 Agilent T                 |                       | 5466p 20 m | o (oo i praj                       |             |  |

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# 7.2.5. PEAK EXCURSION

# <u>LIMITS</u>

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

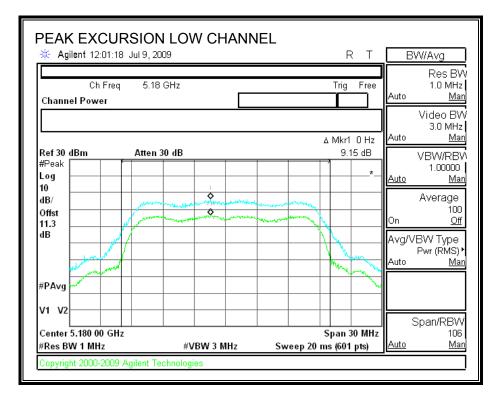
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

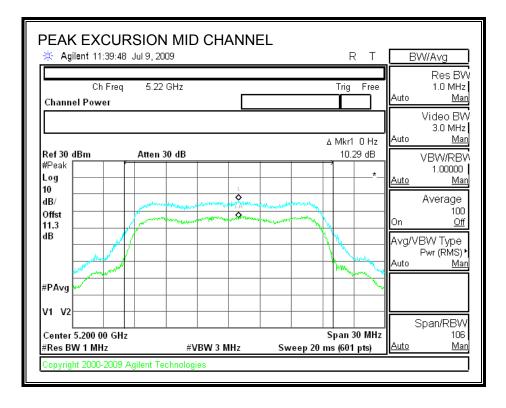
## **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5180      | 9.15           | 13    | -3.85  |
| Middle  | 5200      | 10.29          | 13    | -2.71  |
| High    | 5240      | 11.12          | 13    | -1.88  |

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#### PEAK EXCURSION





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| 🔆 Agilent 11:20:19 Jul 9, 2              | 009        |  | RΤ                   | B             | W/Avg                                 |
|--|------------|--|----------------------|---------------|---------------------------------------|
| Ch Freq 5.24<br>Channel Power            | GHz        | T  | rig Free             | Auto          | Res BV<br>1.0 MHz<br><u>Mar</u>       |
|  |            | ΔM   | kr1 0 Hz             | Auto          | Video BV<br>3.0 MHz<br><u>Mar</u>     |
| Ref 30 dBm         Atten           #Peak | 30 dB      |  | 11.12 dB             | <u>Auto</u>   | VBW/RB\<br>1.00000<br><u>Mar</u>      |
| dB/<br>Offst<br>11.3                     |            | warman warma |                      | On            | Average<br>100<br><u>Off</u>          |
| dB                                       |            |  | A long to            | A∨g/∖<br>Auto | /BW Type<br>Pwr (RMS) '<br><u>Mar</u> |
| #PAvg                                    |            |  |                      |               |                                       |
| V1 V2                                    |            |  |                      |               | Span/RBW                              |
| Center 5.240 00 GHz<br>#Res BW 1 MHz     | #VBW 3 MHz | Spa<br>Sweep 20 ms (   | n 30 MHz<br>501 pts) | Auto          | 106<br><u>Mai</u>                     |

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# 7.2.6. CONDUCTED SPURIOUS EMISSIONS

# LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

## TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

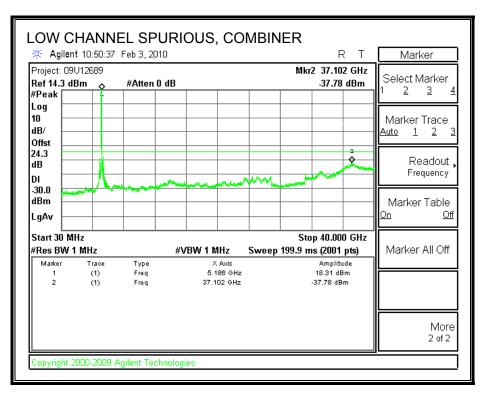
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

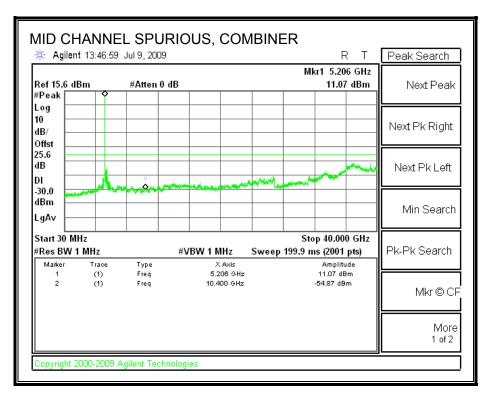
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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### LOW CHANNEL SPURIOUS EMISSIONS

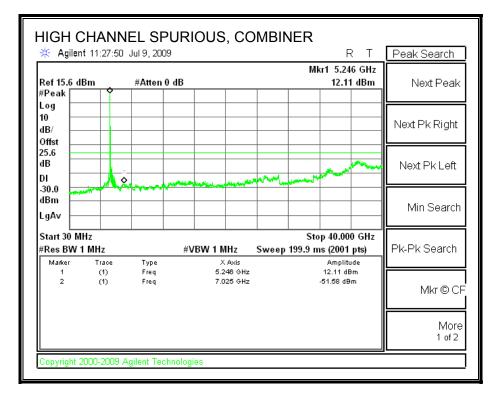


#### MID CHANNEL SPURIOUS EMISSIONS



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#### **HIGH CHANNEL SPURIOUS EMISSIONS**



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# 7.3. 5.2 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

# 7.3.1. 99% & 26 dB BANDWIDTH

### <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

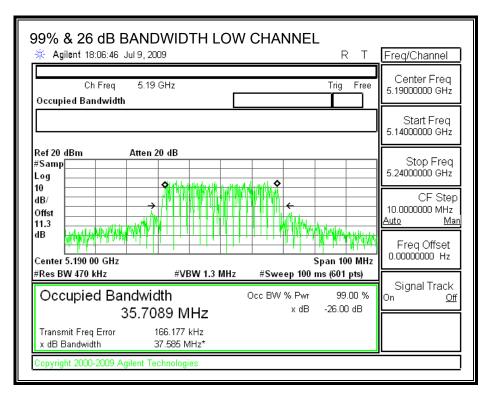
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

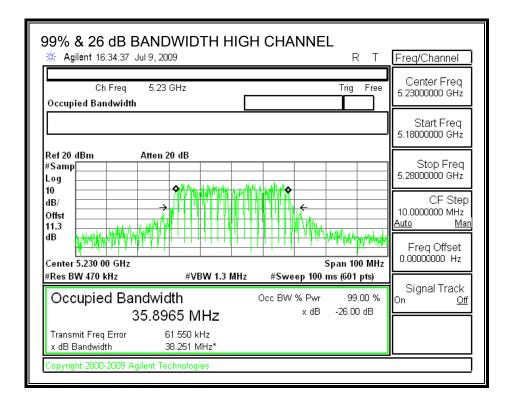
## **RESULTS**

| Channel | Frequency | 99% OBW | 26 dB BW |
|---------|-----------|---------|----------|
|         | (MHz)     | (MHz)   | (MHz)    |
| Low     | 5190      | 35.7089 | 37.585   |
| High    | 5230      | 35.8965 | 38.251   |

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#### 99% & 26 dB BANDWIDTH





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# 7.3.2. OUTPUT POWER

## **LIMITS**

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

#### <u>RESULTS</u>

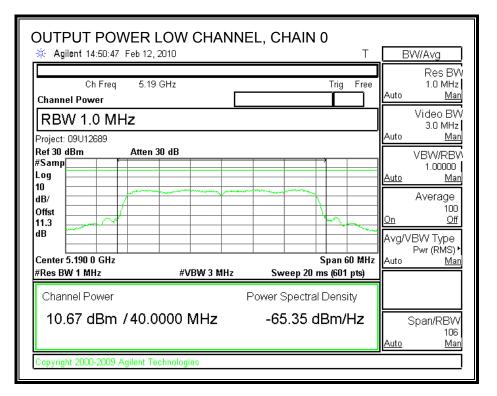
Limit

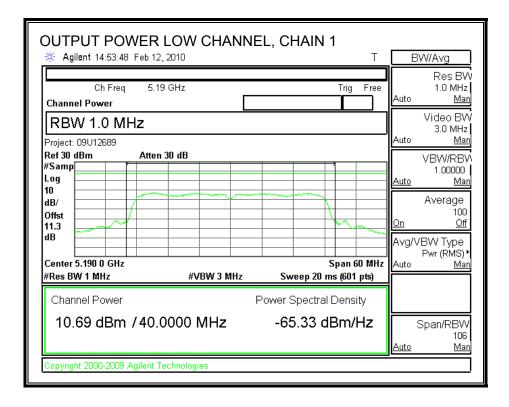
| Channel | Freq  | Fixed | В      | 4 + 10 Log B | Antenna | Limit |
|---------|-------|-------|--------|--------------|---------|-------|
|         |       | Limit |        | Limit        | Gain    |       |
|         | (MHz) | (dBm) | (MHz)  | (dBm)        | (dBi)   | (dBm) |
| Low     | 5190  | 17    | 37.585 | 19.75        | 3       | 17.00 |
| High    | 5230  | 17    | 38.251 | 19.83        | 3       | 17.00 |

#### Individual Chain Results

| Channel | Freq  | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Total | Limit | Margin |
|---------|-------|---------|---------|---------|---------|-------|-------|--------|
|         |       | Power   | Power   | Power   | Power   | Power |       |        |
|         | (MHz) | (dBm)   | (dBm)   | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5190  | 10.67   | 10.69   | 10.27   | 10.58   | 16.58 | 17.00 | -0.42  |
| High    | 5230  | 10.47   | 10.82   | 10.71   | 10.84   | 16.73 | 17.00 | -0.27  |

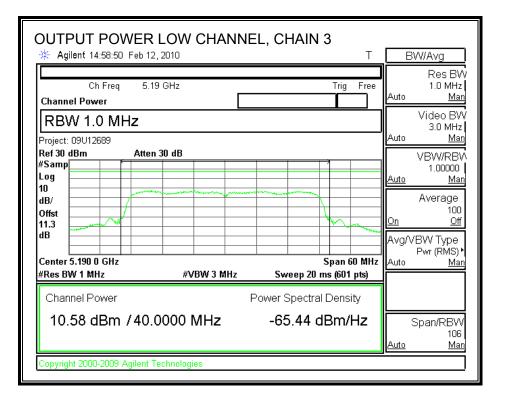
### **OUTPUT POWER, LOW CHANNEL**





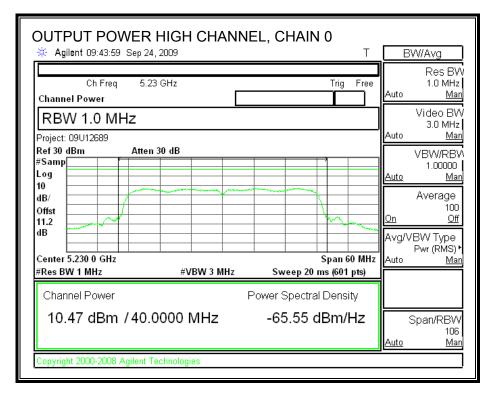
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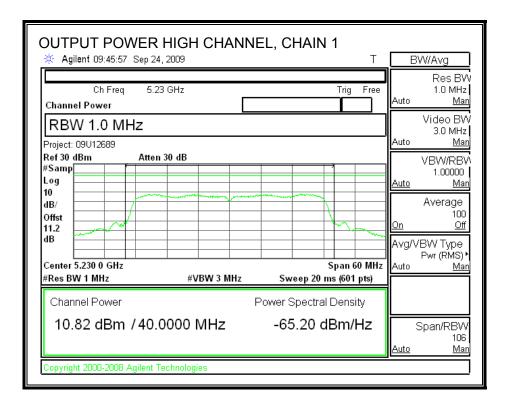
| Agilent 14:56:14 Feb 12,         | 2010       |                        | T BW/Avg   |
|----------------------------------|------------|------------------------|--|
| Ch Freq 5.19<br>Channel Power    | GHz        | Trig Fr                | Res B\<br>ee 1.0 MH:<br>Auto <u>Ma</u><br>Video B\ |
| RBW 1.0 MHz<br>Project: 09U12689 |            |                        | 3.0 MH:<br>Auto <u>Ma</u>                          |
| Ref 30 dBm Atten 3 #Samp Log     | 30 dB      |                        | VBW/RB<br>1.00000<br>Auto Ma                       |
| 10<br>dB/<br>Offst<br>11.3       |            |                        | Average<br>100<br><u>On Of</u>                     |
| dB                               |            | Span 60 M              | Avg/VBW Type<br>Pwr (RMS)<br>IHz Auto Ma           |
| #Res BW 1 MHz                    | #VBW 3 MHz | Sweep 20 ms (601 pts)  | <u></u>  |
| Channel Power                    | F          | Power Spectral Density |  |
| 10.27 dBm /40.0                  | 000 MHz    | -65.75 dBm/Hz          | Span/RBV<br>108<br>Auto Ma                         |



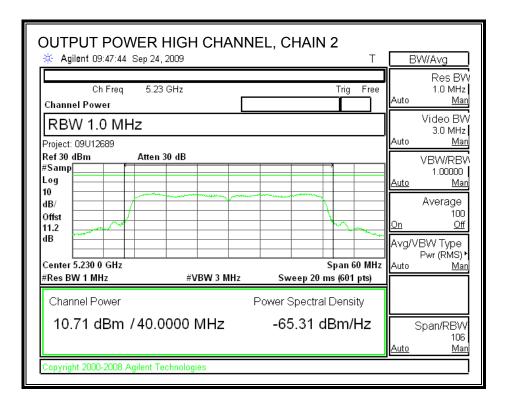
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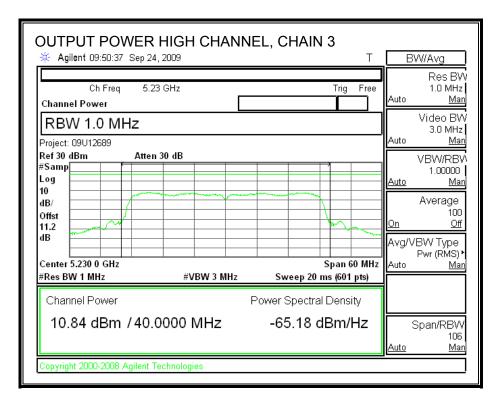
### **OUTPUT POWER, HIGH CHANNEL**





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# 7.3.3. AVERAGE POWER

## LIMITS

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

## **RESULTS**

| Channel | Frequency | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
|---------|-----------|---------|---------|---------|---------|
|         |           | Power   | Power   | Power   | Power   |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm)   | (dBm)   |
| Low     | 5190      | 10.40   | 9.90    | 9.60    | 10.30   |
| High    | 5230      | 10.98   | 11.25   | 11.31   | 11.40   |

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# 7.3.4. PEAK POWER SPECTRAL DENSITY

# LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.15-5.25 GHz band, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi, therefore the limit is 4 dBm.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

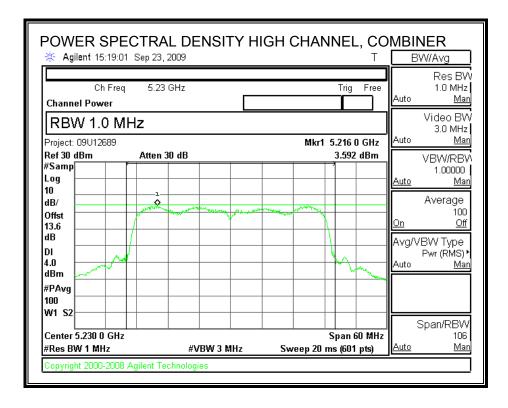
## **RESULTS**

| Channel | Frequency | PSD with Combiner | Limit | Margin |
|---------|-----------|-------------------|-------|--------|
|         | (MHz)     | (dBm)             | (dBm) | (dB)   |
| Low     | 5190      | 3.56              | 4     | -0.44  |
| High    | 5230      | 3.59              | 4     | -0.41  |

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### POWER SPECTRAL DENSITY

| POWER SPECTRAL                      | DENSITY LOW (  | CHANNEL, CO                         | MBI           | NER                                   |
|-------------------------------------|--|-------------------------------------|---------------|---------------------------------------|
| 🔆 Agilent 15:29:30 Sep 23, 2009     | 9  | Т                                   |               | 3VV/Avg                               |
| Ch Freq 5.19 GHz<br>Channel Power   | <u>.</u>   | Trig Free                           | Auto          | Res BW<br>1.0 MHz<br><u>Man</u>       |
| RBW 1.0 MHz<br>Project: 09U12689    |  | Mkr1 5.175 2 GHz                    | Auto          | Video BW<br>3.0 MHz<br><u>Man</u>     |
| Ref 30 dBm Atten 30 d<br>#Samp Log  | B  | 3.558 dBm                           | Auto          | VBW/RBV<br>1.00000<br><u>Man</u>      |
| 0ffst<br>13.6                       | water and a start and a start and a start a st |                                     | <u>On</u>     | Average<br>100<br><u>Off</u>          |
| dB                                  |  |                                     | A∨g/\<br>Auto | /BW Type<br>Pwr (RMS) ►<br><u>Man</u> |
| #PAvg                               |  |                                     |               |                                       |
| Center 5.190 0 GHz<br>#Res BW 1 MHz | #VBW 3 MHz Sw  | Span 60 MHz<br>veep 20 ms (601 pts) | <u>Auto</u>   | Span/RBW<br>106<br><u>Man</u>         |
| Copyright 2000-2008 Agilent Techno  | logies   |                                     |               |                                       |



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# 7.3.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

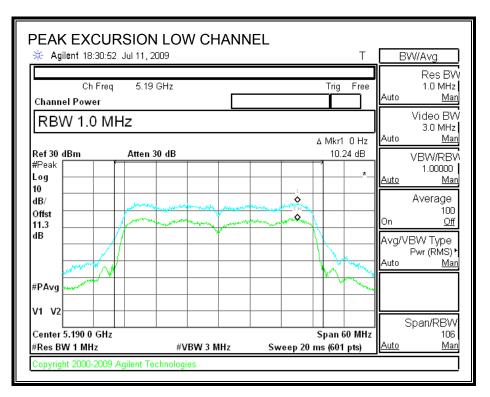
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

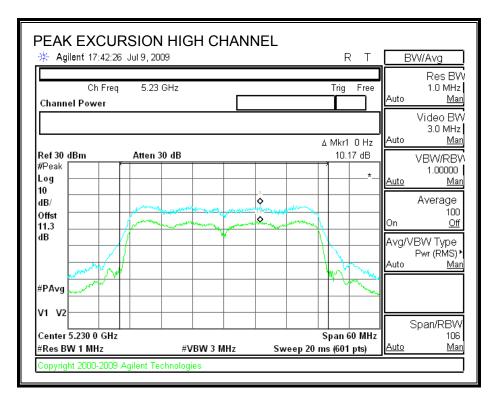
## **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5190      | 10.24          | 13    | -2.76  |
| High    | 5230      | 10.17          | 13    | -2.83  |

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### PEAK EXCURSION





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# 7.3.6. CONDUCTED SPURIOUS EMISSIONS

# LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

## TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

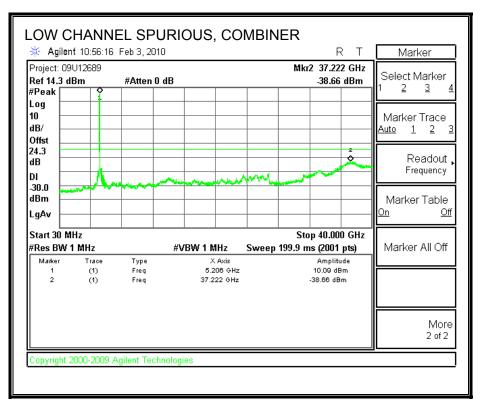
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

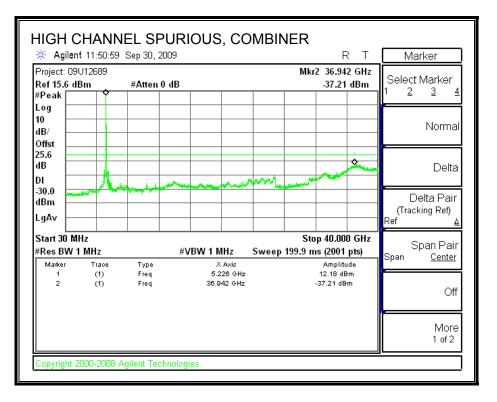
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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### LOW CHANNEL SPURIOUS EMISSIONS



### HIGH CHANNEL SPURIOUS EMISSIONS



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# 7.4. 5.3 GHz BAND CHANNEL TESTS FOR 802.11a MODE

# 7.4.1. 26 dB and 99% BANDWIDTH

## <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

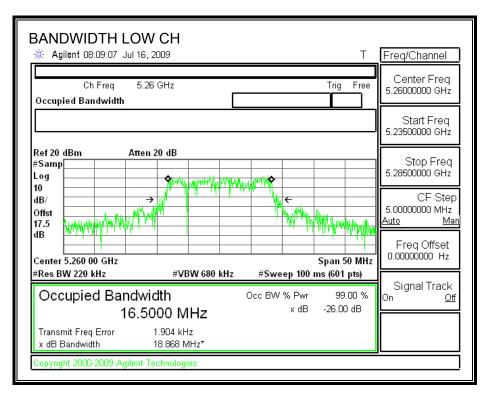
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

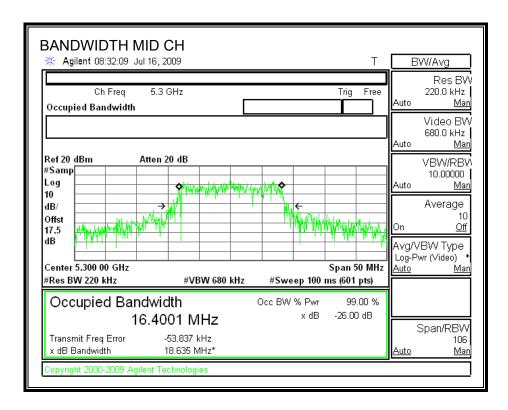
## **RESULTS**

| Channel | Frequency | 26 dB Bandwidth | 99% Bandwidth |
|---------|-----------|-----------------|---------------|
|         | (MHz)     | (MHz)           | (MHz)         |
| Low     | 5260      | 18.8680         | 16.5000       |
| Middle  | 5300      | 18.6350         | 16.4001       |
| High    | 5320      | 18.5070         | 16.4536       |

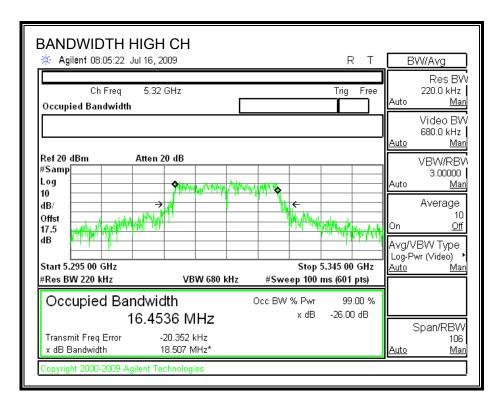
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### 26 dB and 99% BANDWIDTH





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# 7.4.2. OUTPUT POWER

## <u>LIMITS</u>

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Antenna gain of Chain 1 = antenna gain of Chain 2.

| Antenna Gain 10 Log (# Tx Chains) |      | Effective Legacy Gain |  |
|-----------------------------------|------|-----------------------|--|
| (dBi) (dB)                        |      | (dBi)                 |  |
| 3                                 | 3.01 | 6.01                  |  |

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

# TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

## **RESULTS**

Limit

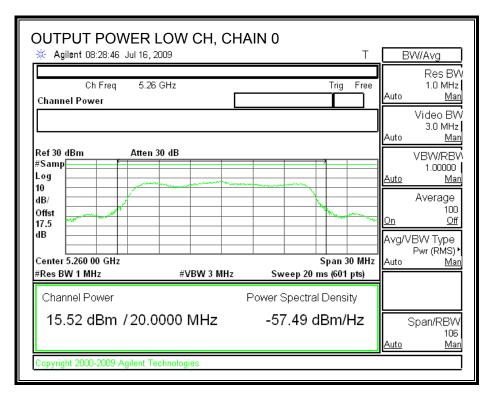
| Channel | Frequency | Fixed | В       | 11 + 10 Log B | Effective | Limit |
|---------|-----------|-------|---------|---------------|-----------|-------|
|         |           | Limit |         | Limit         | Ant Gain  |       |
|         | (MHz)     | (dBm) | (MHz)   | (dBm)         | (dBi)     | (dBm) |
| Low     | 5260      | 24    | 18.8680 | 23.76         | 6.01      | 23.75 |
| Mid     | 5300      | 24    | 18.6350 | 23.70         | 6.01      | 23.69 |
| High    | 5320      | 24    | 18.5070 | 23.67         | 6.01      | 23.66 |

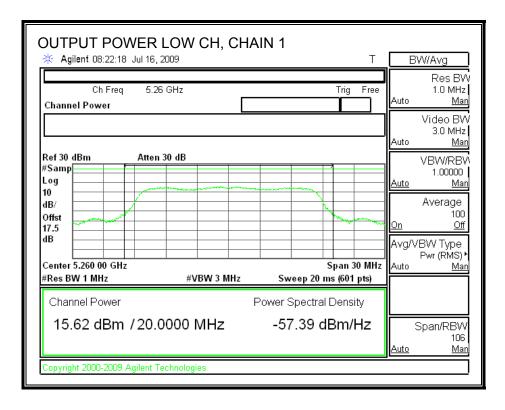
## Individual Chain Results

| Channel | Frequency | Chain 0 | Chain 1 | Total | Limit | Margin |
|---------|-----------|---------|---------|-------|-------|--------|
|         |           | Power   | Power   | Power |       |        |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5260      | 15.52   | 15.62   | 18.58 | 23.75 | -5.17  |
| Mid     | 5300      | 15.53   | 15.58   | 18.57 | 23.69 | -5.13  |
| High    | 5320      | 15.55   | 15.66   | 18.62 | 23.66 | -5.05  |

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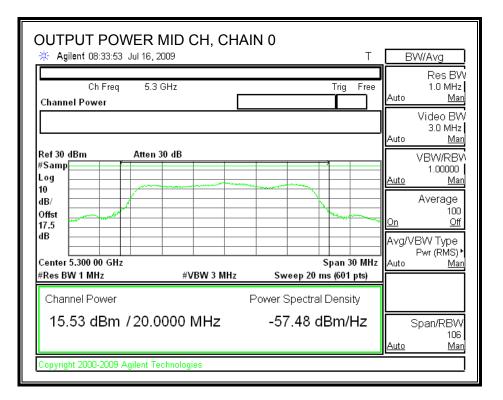
### **OUTPUT POWER, LOW CHANNEL**

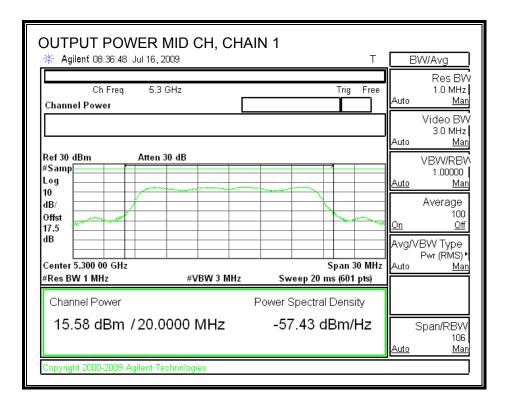




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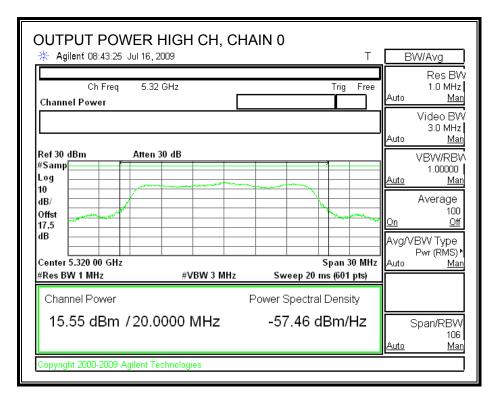
#### **OUTPUT POWER, MID CHANNEL**

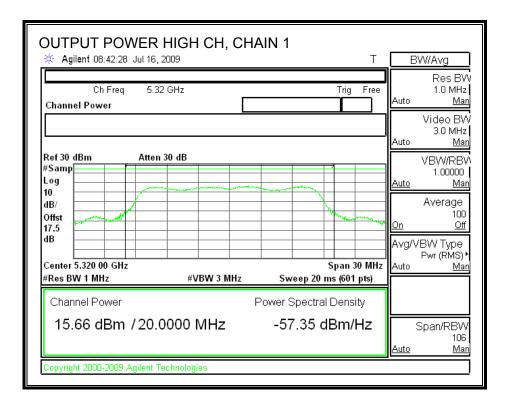




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### **OUTPUT POWER, HIGH CHANNEL**





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# 7.4.3. AVERAGE POWER

## **LIMITS**

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

## RESULTS

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency | Chain 0 | Chain 1 | Total |
|---------|-----------|---------|---------|-------|
|         |           | Power   | Power   | Power |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm) |
| Low     | 5260      | 15.33   | 15.55   | 18.45 |
| Middle  | 5300      | 15.57   | 15.55   | 18.57 |
| High    | 5320      | 15.61   | 15.52   | 18.58 |

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## 7.4.4. PEAK POWER SPECTRAL DENSITY

## LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Use this table if antenna gain for Chain 1 = antenna gain for Chain 2

|   | 10 Log (# Tx Chains)<br>(dB) | Effective Legacy Gain<br>(dBi) |
|---|------------------------------|--------------------------------|
| 3 | 3.01                         | 6.01                           |

For the 5.25–5.35 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is 6.01 dBi, therefore the limit is 10.99 dBm.

## TEST PROCEDURE

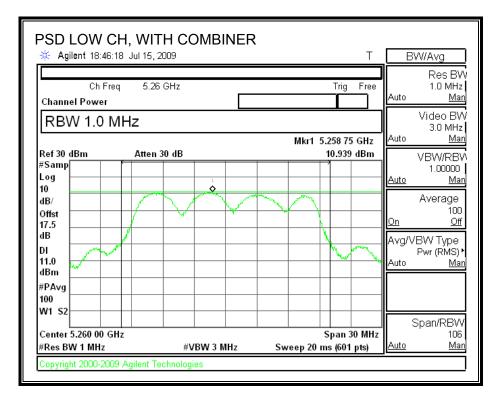
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

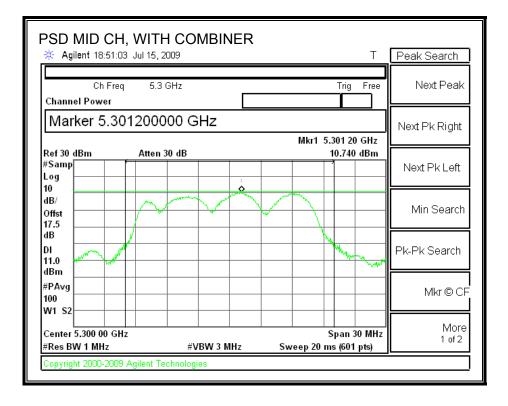
## **RESULTS**

| Channel | Frequency | PPSD With Combiner | Limit | Margin |
|---------|-----------|--------------------|-------|--------|
|         | (MHz)     | (dBm)              | (dBm) | (dB)   |
| Low     | 5260      | 10.94              | 10.99 | -0.05  |
| Middle  | 5300      | 10.74              | 10.99 | -0.25  |
| High    | 5320      | 10.85              | 10.99 | -0.14  |

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#### POWER SPECTRAL DENSITY WITH COMBINER





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| 🔆 Agilent 08:40:41 Jul 16, 20                                 | 009        | 7                                   | - BW/Avg   |
|---|------------|-------------------------------------|--|
| Ch Freq 5.32<br>Channel Power                                 | GHz        | Trig Fre                            | Res BV<br>2e 1.0 MHz<br>Auto <u>Ma</u>                       |
| RBW 1.0 MHz   |            | Mkr1 5.326 25 GH                    | Video BV<br>3.0 MHz<br>z Auto <u>Ma</u>                      |
| Ref 30 dBm         Atten 3           #Samp                    |            | 10.851 dBr                          | n VBW/RB\<br>1.00000<br><u>Auto Mai</u><br>Average<br>100    |
| 17.5<br>dB<br>DI<br>11.0<br>dBm                               |            |                                     | <u>On Off</u><br>Avg/VBW Type<br>Pwr (RMS)<br>Auto <u>Ma</u> |
| #PAvg<br>100<br>W1 S2<br>Center 5.320 00 GHz<br>#Res BW 1 MHz | #VBW 3 MHz | Span 30 Mi<br>Sweep 20 ms (601 pts) | Hz Span/RBW<br>Auto Ma                                       |

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## 7.4.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

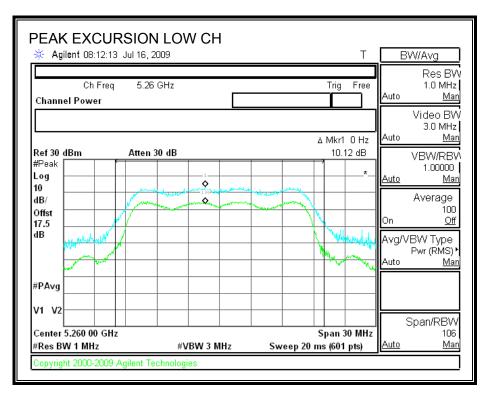
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

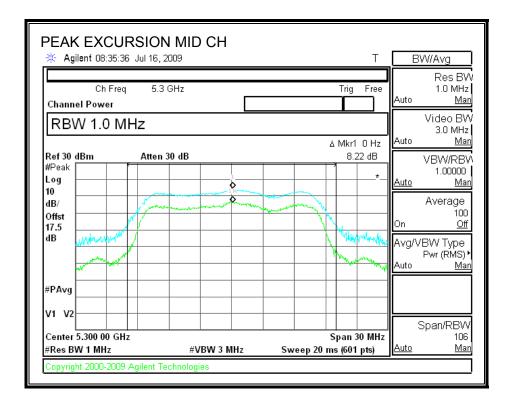
### **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5260      | 10.12          | 13    | -2.88  |
| Middle  | 5300      | 8.22           | 13    | -4.78  |
| High    | 5320      | 9.77           | 13    | -3.23  |

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### PEAK EXCURSION





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| 🔆 Agilent 08:06:24 Jul 16,           | 2009       |                  | Т                         | B٧             | W/Avg                                |
|--------------------------------------|------------|------------------|---------------------------|----------------|--------------------------------------|
| Ch Freq 5.3;<br>Channel Power        | 2 GHz      |                  | Trig Free                 | Auto           | Res BV<br>1.0 MHz<br><u>Mar</u>      |
| RBW 1.0 MHz                          |            | ۵                | Mkr1 0 Hz                 | Auto           | Video BV<br>3.0 MHz<br><u>Mar</u>    |
| #Peak Log                            | 30 dB      |                  | 9.77 dB                   | <u>Auto</u>    | VBW/RB\<br>1.00000<br><u>Mar</u>     |
| 10<br>dB/<br>Offst<br>17.5           |            | Margare and A    |                           | On             | Average<br>100<br><u>Off</u>         |
| dB                                   |            |                  |                           | Avg/VI<br>Auto | BW Type<br>Pwr (RMS) '<br><u>Mar</u> |
| #PAvg                                |            |                  |                           |                |                                      |
| V1 V2                                |            |                  |                           | S              | pan/RBV                              |
| Center 5.320 00 GHz<br>#Res BW 1 MHz | #VBW 3 MHz | S<br>Sweep 20 ms | pan 30 MHz<br>s (601 pts) | <u>Auto</u>    | 106 <u>Mar</u>                       |

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## 7.4.6. CONDUCTED SPURIOUS EMISSIONS

## LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

## TEST PROCEDURE

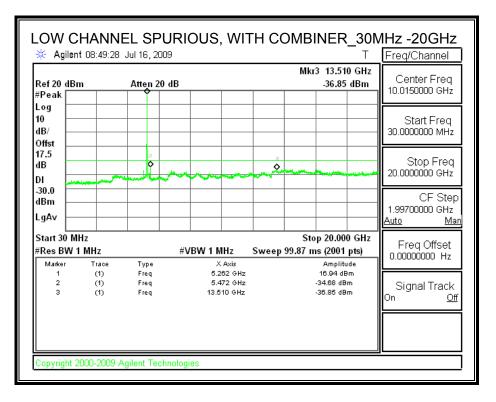
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

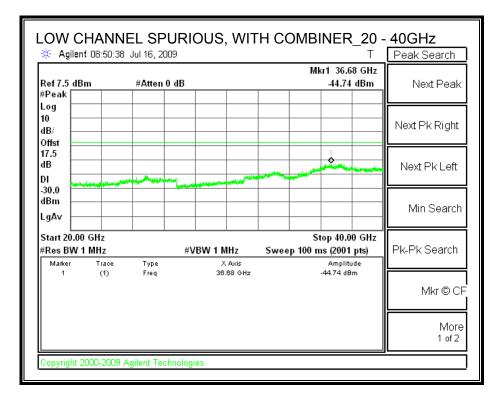
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

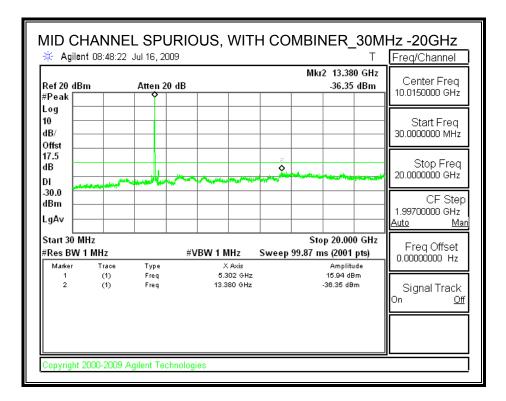
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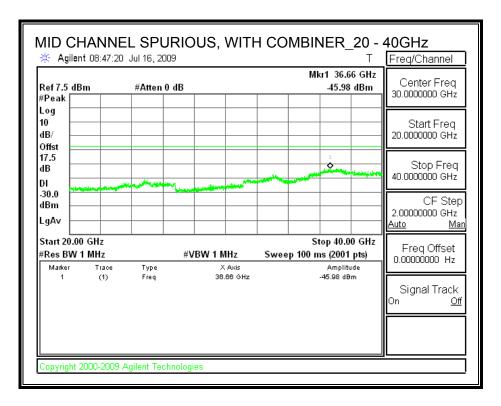
### SPURIOUS EMISSIONS WITH COMBINER



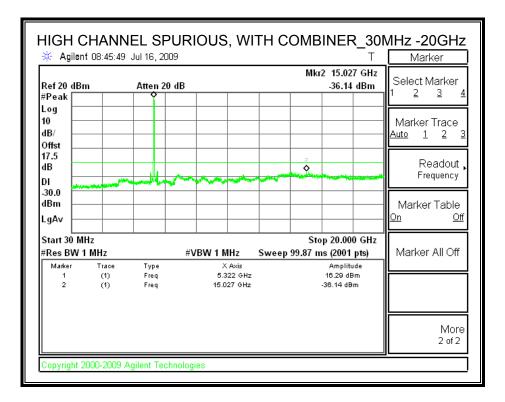


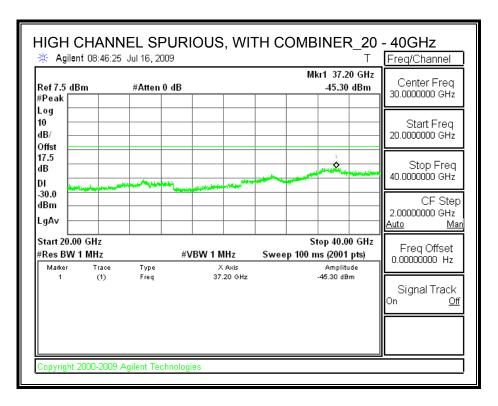
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# 7.5. 5.3 GHz BAND CHANNEL TESTS FOR 802.11n HT20 MODE

## 7.5.1. 99% & 26 dB BANDWIDTH

## <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

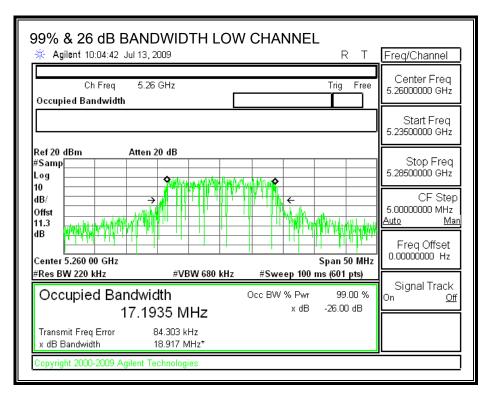
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

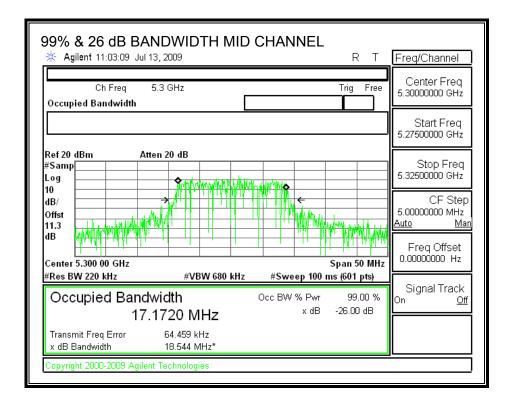
## **RESULTS**

| Channel | Frequency | 99% OBW | 26 dB BW |
|---------|-----------|---------|----------|
|         | (MHz)     | (MHz)   | (MHz)    |
| Low     | 5260      | 17.1935 | 18.917   |
| Middle  | 5300      | 17.172  | 18.544   |
| High    | 5320      | 17.44   | 19.006   |

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### 99% & 26 dB BANDWIDTH





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| 99% & 26 dB BANDWIDTH   | HIGH CHANNEL         | RТ                         | Freq/Channel  |
|---|----------------------|----------------------------|---|
| Ch Freq 5.32 GHz<br>Occupied Bandwidth  |                      | Trig Free                  | Center Freq<br>5.32000000 GHz   |
|   |                      |                            | Start Freq<br>5.29500000 GHz  |
| Ref 20 dBm         Atten 20 dB           #Samp                                      |                      |                            | Stop Freq<br>5.34500000 GHz<br>CF Step<br>5.0000000 MHz<br><u>Auto Man</u><br>Freq Offset |
| Center 5.320 00 GHz<br>#Res BW 220 kHz #VBW 68                                      |                      | ipan 50 MHz<br>s (601 pts) | 0.00000000 Hz   |
| Occupied Bandwidth<br>17.4401 MHz   | Occ BW % Pwr<br>x dB | 99.00 %<br>-26.00 dB       | Signal Track<br>On <u>Off</u>   |
| Transmit Freq Error         28.814 kHz           x dB Bandwidth         19.006 MHz* |                      |                            |   |
| Copyright 2000-2009 Agilent Technologies  |                      |                            |   |

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## 7.5.2. OUTPUT POWER

## **LIMITS**

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

### **RESULTS**

Limit

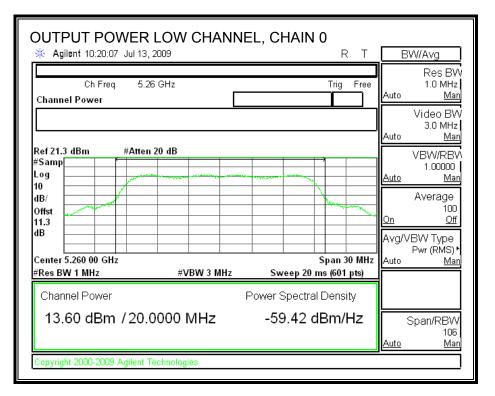
| Channel | Freq  | Fixed | В      | 11 + 10 Log B | Antenna | Limit |
|---------|-------|-------|--------|---------------|---------|-------|
|         |       | Limit |        | Limit         | Gain    |       |
|         | (MHz) | (dBm) | (MHz)  | (dBm)         | (dBi)   | (dBm) |
| Low     | 5260  | 24    | 18.917 | 23.77         | 3       | 23.77 |
| Mid     | 5300  | 24    | 18.544 | 23.68         | 3       | 23.68 |
| High    | 5320  | 24    | 19.006 | 23.79         | 3       | 23.79 |

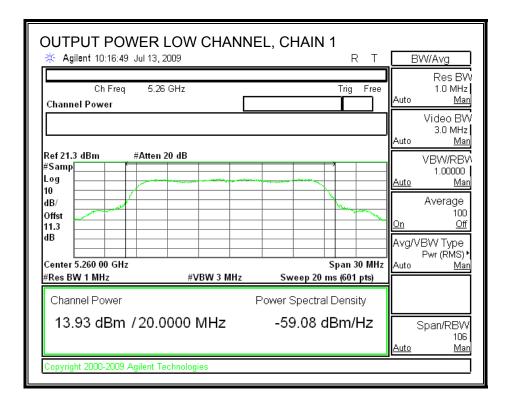
#### Individual Chain Results

| Channel | Freq  | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Total | Limit | Margin |
|---------|-------|---------|---------|---------|---------|-------|-------|--------|
|         |       | Power   | Power   | Power   | Power   | Power |       |        |
|         | (MHz) | (dBm)   | (dBm)   | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5260  | 13.60   | 13.93   | 14.04   | 13.85   | 19.88 | 23.77 | -3.89  |
| Mid     | 5300  | 14.18   | 14.15   | 14.58   | 14.54   | 20.39 | 23.68 | -3.29  |
| High    | 5320  | 14.36   | 14.57   | 14.42   | 14.58   | 20.50 | 23.79 | -3.28  |

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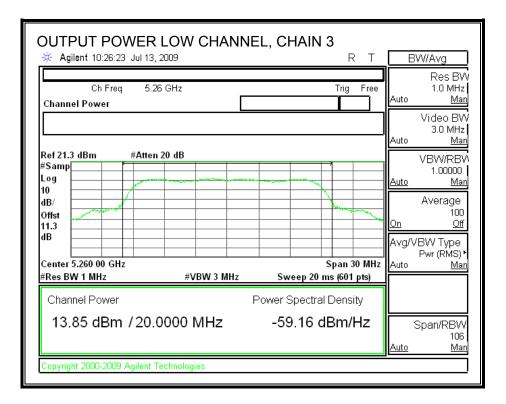
## **OUTPUT POWER, LOW CHANNEL**





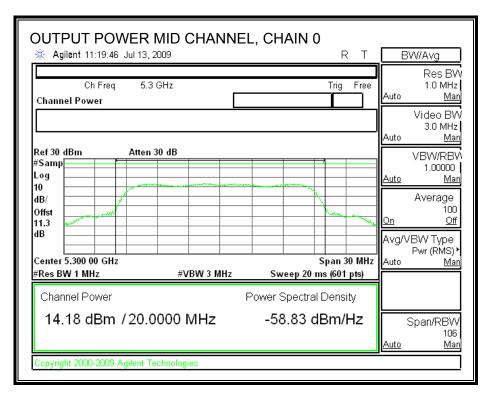
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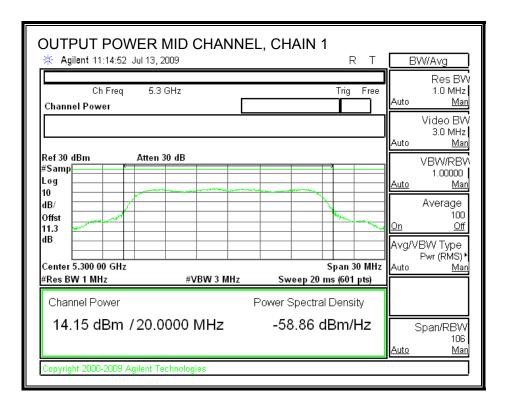
| Agilent 10:21:38 Jul 13,                | 2009       |                  | R T                        | BV          | WAvg                                    |
|---|------------|------------------|----------------------------|-------------|---|
| Ch Freq 5.2<br>Channel Power            | 6 GHz      |                  | Trig Free                  | Auto        | Res B\<br>1.0 MH:<br><u>Ma</u>          |
|   |            |                  |                            | Auto        | Video B\<br>3.0 MH:<br><u>Ma</u>        |
| Ref 21.3 dBm #Atten<br>Samp<br>.og<br>0 |            |                  |                            | <u>Auto</u> | VBW/RB<br>1.00000<br><u>Ma</u>          |
| IB/                                     |            |                  |                            | <u>On</u>   | Average<br>100<br><u>Of</u><br>3VV Type |
| Center 5.260 00 GHz<br>Res BW 1 MHz     | #VBW 3 MHz | Sweep 20 m       | ipan 30 MHz<br>s (601 pts) |             | Pwr (RMS)<br><u>Ma</u>                  |
| Channel Power                           |            | ⊃ower Spectral [ | Density                    |             |   |
| 14.04 dBm /20.0                         | 0000 MHz   | -58.97 dE        | 3m/Hz                      | S<br>Auto   | pan/RBV<br>100<br>Ma                    |



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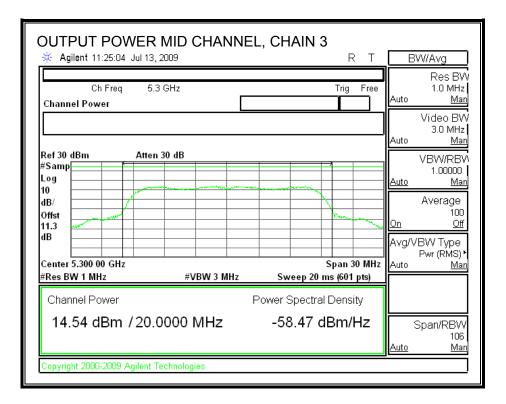
### **OUTPUT POWER, MID CHANNEL**





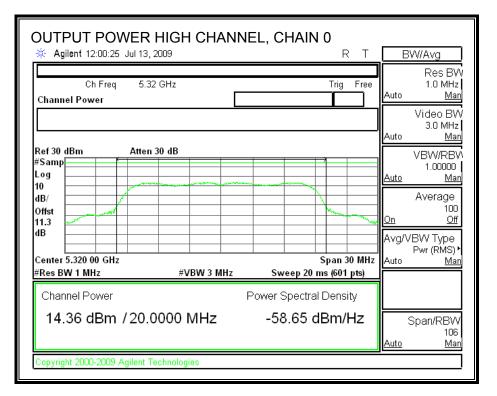
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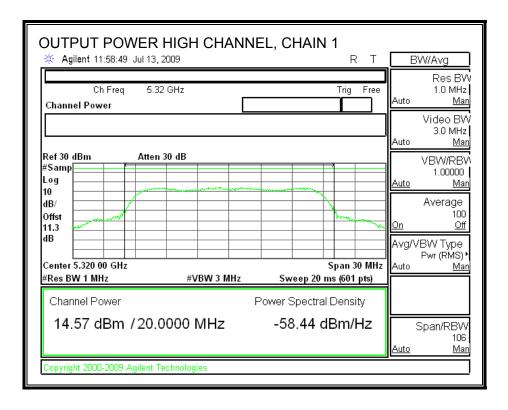
| Ch Freq         5.3 GHz         Trig         Free         1.0 MHz           Channel Power         Image: Channel Power | OUTPUT POWER                     |            | L, CHAIN 2<br>R | T BW/Avg                               |
|--|----------------------------------|------------|-----------------|--|
| 3.0 MHz           Auto         Mar           Auto         Mar           Auto         Mar           Auto         Mar           Jog         Mar           Jog         Mar           Jog         Mar           Mar         Mar           Auto         Mar           Jog         Mar           Jog         Mar           Jog         Mar           Average         100           On         Offst           J1.3         Average           Average         Neg/VBW Type           Pwr (RMS) <sup>4</sup> Average   |                                  | GHz        | Trig Fr         |  |
| #Samp<br>Log<br>10<br>dB/<br>0ffst<br>11.3<br>dB   |                                  |            | •<br>•          | Video BV<br>3.0 MHz<br>Auto <u>Mar</u> |
| dB/<br>Offst<br>11.3<br>dB         ////////////////////////////////////  | #Samp Log                        | 0 dB       |                 |  |
| Avg/VBVV Type<br>Pwr (RMS)   | dB/<br>Offst                     |            | Mungan          | 100                                    |
|  |                                  |            | Span 30 M       | Pwr (RMS)                              |
|  | Channel Power<br>14.58 dBm /20.0 |            |                 | 106                                    |
| 14.58 dBm / 20.0000 MHz -58.43 dBm/Hz Span/RBW<br>106  | Copyright 2000-2009 Agilent Te   | chnologies |                 | <u>Auto Ma</u>                         |



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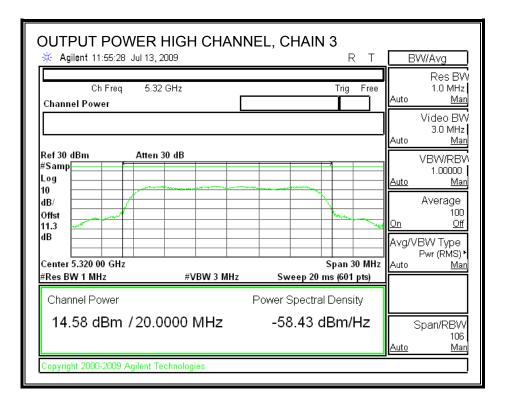
## **OUTPUT POWER, HIGH CHANNEL**





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| 🌾 Agilent 11:56:51 Jul 13, :            | 2009       | R T                    | BW/Avg  |
|---|------------|------------------------|---|
| Ch Freq 5.32<br>Channel Power           | GHz        | Trig Free              | Res B\<br>1.0 MH;<br>Auto <u>Ma</u>                   |
|   |            |                        | Video BV<br>3.0 MH:<br>Auto <u>Ma</u>                 |
| Ref 30 dBm         Atten           Samp | 30 dB      |                        | VBW/RB<br>1.00000<br><u>Auto Ma</u><br>Average<br>100 |
| Center 5.320 00 GHz                     |            | Span 30 MHz            | Avg/VBW Type<br>Pwr (RMS)<br>Auto <u>Ma</u>           |
| Res BW 1 MHz                            | #VBW 3 MHz | Sweep 20 ms (601 pts)  |   |
| Channel Power                           | ł          | Power Spectral Density |   |
| 14.42 dBm / 20.0                        | 0000 MHz   | -58.59 dBm/Hz          | Span/RBV<br>108<br>Auto Ma                            |



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## 7.5.3. AVERAGE POWER

## LIMITS

None; for reporting purposes only.

## TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

## **RESULTS**

| Channel | Frequency | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
|---------|-----------|---------|---------|---------|---------|
|         |           | Power   | Power   | Power   | Power   |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm)   | (dBm)   |
| Low     | 5260      | 14.08   | 14.42   | 14.24   | 14.19   |
| Middle  | 5300      | 14.21   | 14.50   | 14.75   | 14.60   |
| High    | 5320      | 14.12   | 14.41   | 14.42   | 14.26   |

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## 7.5.4. PEAK POWER SPECTRAL DENSITY

## LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi, therefore the limit is 11 dBm.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

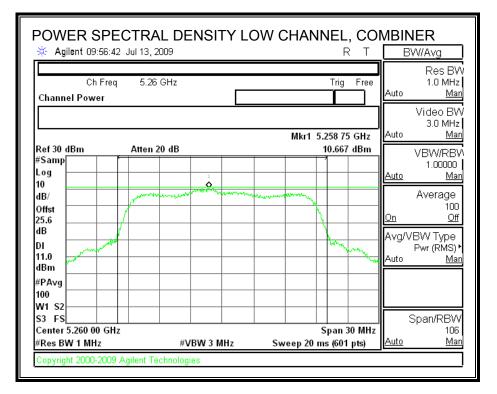
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

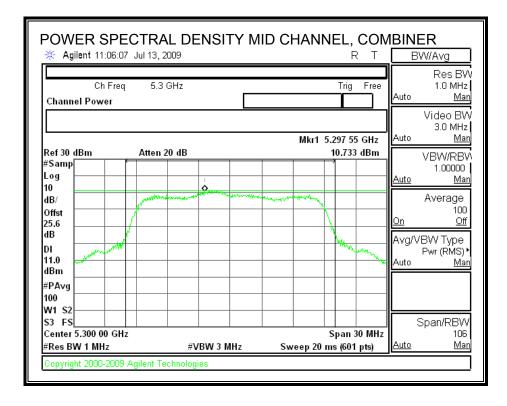
| Channel | Frequency | PSD with Combiner | Limit | Margin |
|---------|-----------|-------------------|-------|--------|
|         | (MHz)     | (dBm)             | (dBm) | (dB)   |
| Low     | 5260      | 10.67             | 11.00 | -0.33  |
| Middle  | 5300      | 10.73             | 11.00 | -0.27  |
| High    | 5320      | 10.52             | 11.00 | -0.48  |

## **RESULTS**

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### **POWER SPECTRAL DENSITY**





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| POWER SPECTRA                                   |                          | GH CHANNEL, CC                  |  |
|---|--------------------------|---------------------------------|--|
|   | GHz                      | Trig Free                       | Res BV<br>1.0 MHz<br>Auto <u>Mar</u><br>Video BV               |
| Ref 30 dBm Atten 2                              | 20 dB                    | Mkr1 5.318 05 GHz<br>10.520 dBm | 3.0 MHz<br>Auto <u>Mar</u><br>VBW/RBV                          |
|   |                          |                                 | 1.00000<br><u>Auto Mar</u><br>Average                          |
| Offst<br>25.6<br>dB<br>DI                       |                          | - Norman                        | 100<br><u>On Off</u><br>Avg/VBW Type<br>Pwr (RMS) <sup>1</sup> |
| 11.0 dBm  |                          |                                 | Auto <u>Ma</u>   |
| W1 S2<br>S3 FS<br>Center 5.320 00 GHz           |                          | Span 30 MHz                     | Span/RBV   |
| #Res BW 1 MHz<br>Copyright 2000-2009 Agilent Te | #VBW 3 MHz<br>chnologies | Sweep 20 ms (601 pts)           | <u>Auto Mar</u>  |

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## 7.5.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

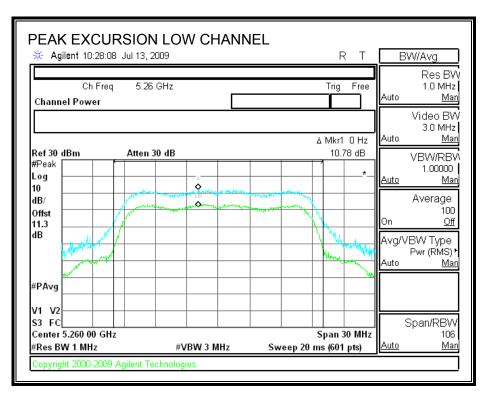
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

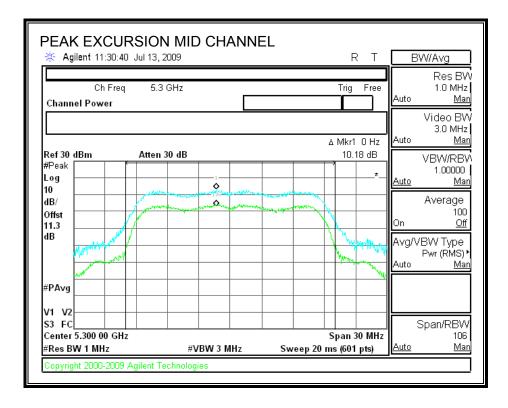
## **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5260      | 10.78          | 13    | -2.22  |
| Middle  | 5300      | 10.18          | 13    | -2.82  |
| High    | 5320      | 9.33           | 13    | -3.67  |

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### PEAK EXCURSION





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| 🔆 Agilent 12:12:53 Jul 13,             | 2009       |   | RΤ                        | В             | W/Avg                                 |
|--|------------|---|---------------------------|---------------|---------------------------------------|
| Ch Freq 5.3.<br>Channel Power          | 2 GHz      |   | Trig Free                 | Auto          | Res BV<br>1.0 MHz<br><u>Mar</u>       |
| RBW 1.0 MHz                            |            | ۵   | Mkr1 0 Hz                 | Auto          | Video BV<br>3.0 MHz<br><u>Mar</u>     |
| Ref 30 dBm Atten<br>#Peak<br>Log<br>10 | 30 dB      |   | 9.33 dB                   | <u>Auto</u>   | VBW/RBV<br>1.00000<br><u>Mar</u>      |
| dB/<br>Offst<br>11.3                   |            | A Company and a company an<br>a company and a c | 4,                        | On            | Average<br>100<br><u>Off</u>          |
| dB                                     |            |   | March 1944                | A∨g/∖<br>Auto | /BW Type<br>Pwr (RMS) •<br><u>Mar</u> |
| #PAvg                                  |            |   |                           |               |                                       |
| V1 V2<br>S3 FC                         |            |   |                           |               | Span/RBW                              |
| Center 5.320 00 GHz<br>#Res BW 1 MHz   | #VBW 3 MHz | S<br>Sweep 20 ms  | pan 30 MHz<br>s (601 pts) | <u>Auto</u>   | 106<br><u>Mar</u>                     |

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## 7.5.6. CONDUCTED SPURIOUS EMISSIONS

## LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

## TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

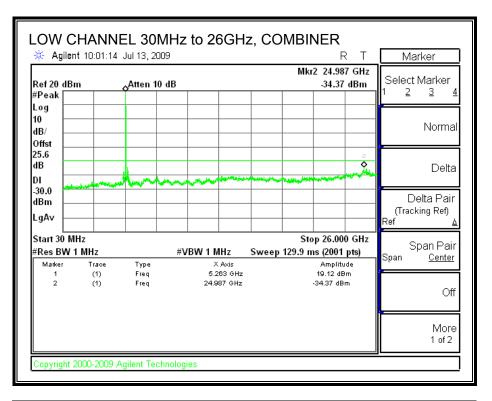
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

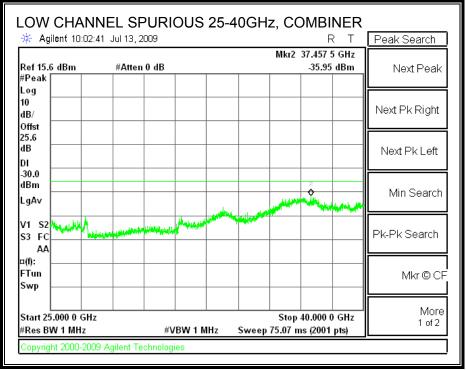
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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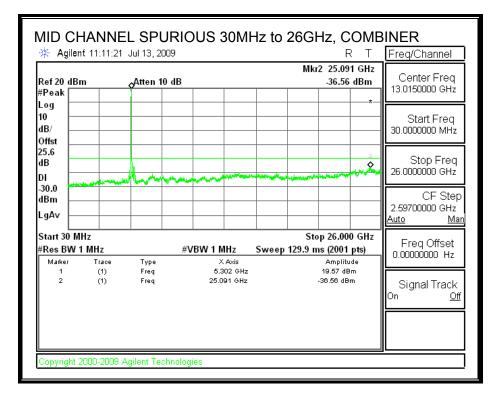
### LOW CHANNEL SPURIOUS EMISSIONS

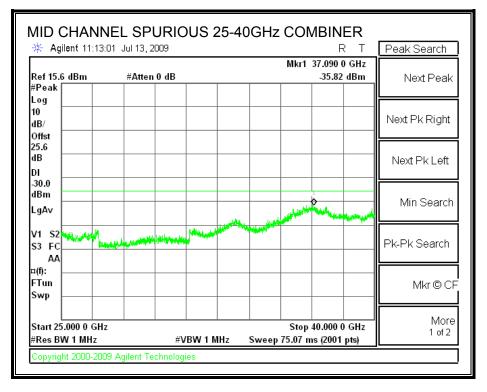




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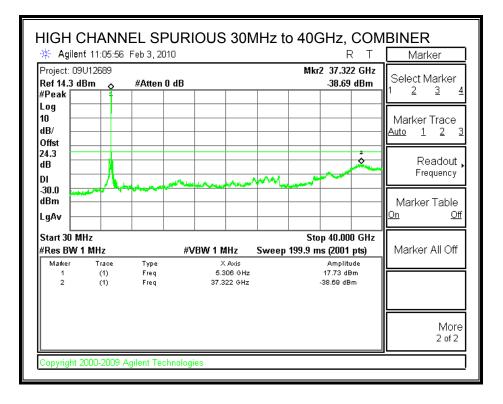
### MID CHANNEL SPURIOUS EMISSIONS





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#### **HIGH CHANNEL SPURIOUS EMISSIONS**



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# 7.6. 5.3 GHz BAND CHANNEL TESTS FOR 802.11n HT40 MODE

## 7.6.1. 99% & 26 dB BANDWIDTH

## <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

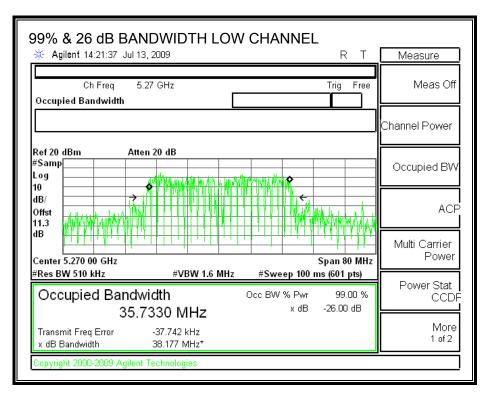
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

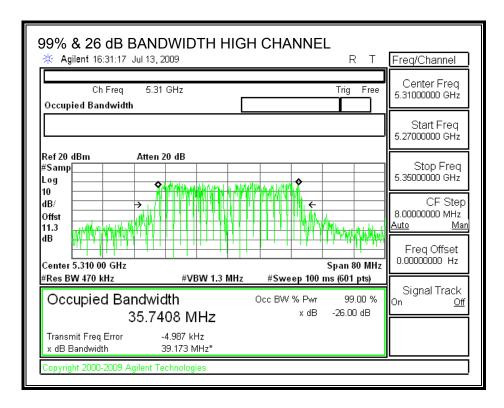
## **RESULTS**

| Channel | Frequency | 99% OBW | 26 dB BW |  |
|---------|-----------|---------|----------|--|
|         | (MHz)     | (MHz)   | (MHz)    |  |
| Low     | 5270      | 35.733  | 38.177   |  |
| High    | 5310      | 35.7408 | 39.174   |  |

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### 99% & 26 dB BANDWIDTH





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## 7.6.2. OUTPUT POWER

## **LIMITS**

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

### **RESULTS**

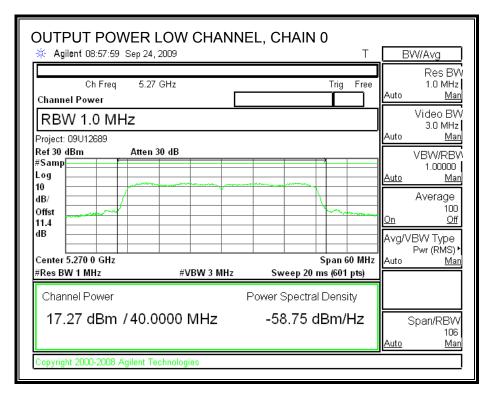
Limit

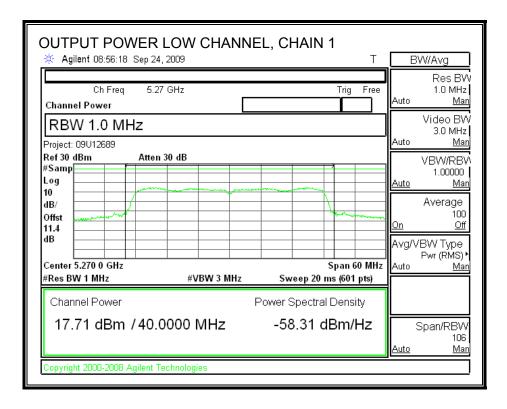
| Channel | Freq  | Fixed | В      | 11 + 10 Log B | Antenna | Limit |
|---------|-------|-------|--------|---------------|---------|-------|
|         |       | Limit |        | Limit         | Gain    |       |
|         | (MHz) | (dBm) | (MHz)  | (dBm)         | (dBi)   | (dBm) |
| Low     | 5270  | 24    | 38.177 | 26.82         | 3       | 24.00 |
| High    | 5310  | 24    | 39.174 | 26.93         | 3       | 24.00 |

#### Individual Chain Results

| Channel | Freq  | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Total | Limit | Margin |
|---------|-------|---------|---------|---------|---------|-------|-------|--------|
|         |       | Power   | Power   | Power   | Power   | Power |       |        |
|         | (MHz) | (dBm)   | (dBm)   | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5270  | 17.27   | 17.71   | 17.53   | 17.88   | 23.62 | 24.00 | -0.38  |
| High    | 5310  | 12.35   | 12.69   | 12.30   | 12.78   | 18.56 | 24.00 | -5.44  |

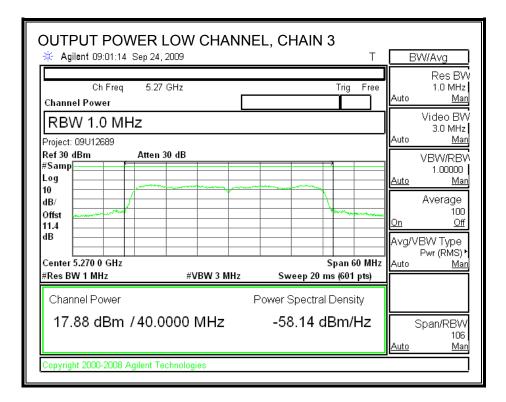
### **OUTPUT POWER, LOW CHANNEL**





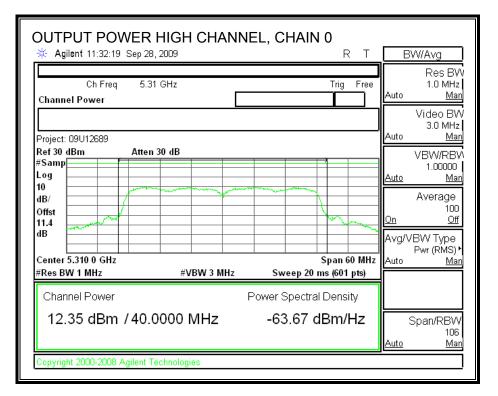
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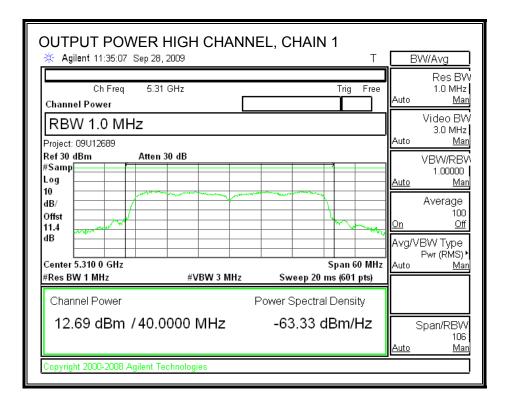
| 🔆 Agilent 08:59:34 Sep 24,                   | 2009       | L                                  | BW/Avg                              |
|--|------------|------------------------------------|-------------------------------------|
| Ch Freq 5.27<br>Channel Power<br>RBW 1.0 MHz | GHz        | Trig Fr                            | Auto <u>Ma</u><br>Video BV          |
| Project: 09U12689<br>Ref 30 dBm Atten        | 30 dB      |                                    | 3.0 MH;<br>Auto <u>Ma</u><br>       |
| #Samp  |            |                                    | VBVWRB<br>1.00000<br><u>Auto Ma</u> |
| dB/<br>Offst                                 |            |                                    | Average<br>100<br>0n 0f             |
| dB   |            |                                    | Avg/VBW Type<br>Pwr (RMS)           |
| Center 5.270 0 GHz<br>#Res BW 1 MHz          | #VBW 3 MHz | Span 60 M<br>Sweep 20 ms (601 pts) |                                     |
| Channel Power                                |            | Power Spectral Density             |                                     |
| 17.53 dBm /40.0                              | 000 MHz    | -58.49 dBm/Hz                      | Span/RBV<br>100<br>Auto Ma          |



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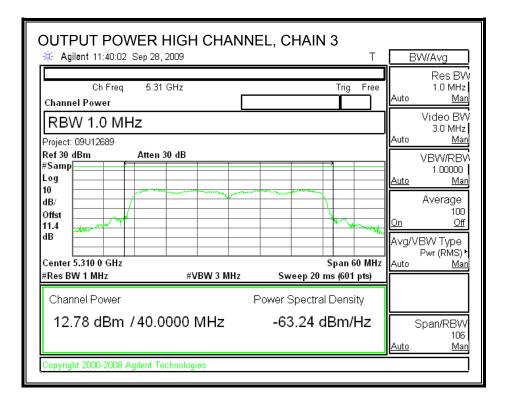
### **OUTPUT POWER, HIGH CHANNEL**





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| OUTPUT POWER   |             | EL, CHAIN 2                          | BW/Avg   |
|--|-------------|--------------------------------------|--|
| Channel Power  | 1 GHz       | Trig Free                            | Res BW<br>1.0 MHz<br>Auto Man                  |
| RBW 1.0 MHz<br>Project: 09U12689<br>Ref 30 dBm Atter | 30 dB       |                                      | Video BV<br>3.0 MHz<br>Auto <u>Man</u>         |
| #Samp<br>Log<br>10                                   |             |                                      | VBW/RBV<br>1.00000<br><u>Auto Man</u>          |
| dB/<br>Offst<br>11.4<br>dB                           |             |                                      |  |
| Center 5.310 0 GHz<br>#Res BW 1 MHz                  | #VBW 3 MHz  | Span 60 MHz<br>Sweep 20 ms (601 pts) | Avg/VBW Type<br>Pwr (RMS) •<br>Auto <u>Mar</u> |
| Channel Power  | F           | <sup>o</sup> ower Spectral Density   |  |
| 12.30 dBm /40.                                       | 0000 MHz    | -63.72 dBm/Hz                        | Span/RBW<br>106<br><u>Auto Mar</u>             |
| Copyright 2000-2008 Agilent 1                        | echnologies |                                      |  |



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# 7.6.3. AVERAGE POWER

### **LIMITS**

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### **RESULTS**

| Channel | Frequency | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
|---------|-----------|---------|---------|---------|---------|
|         |           | Power   | Power   | Power   | Power   |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm)   | (dBm)   |
| Low     | 5270      | 16.69   | 16.82   | 17.03   | 17.57   |
| High    | 5310      | 12.65   | 12.52   | 12.53   | 12.72   |

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# 7.6.4. PEAK POWER SPECTRAL DENSITY

## LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.25–5.35 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi, therefore the limit is 11 dBm.

### TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

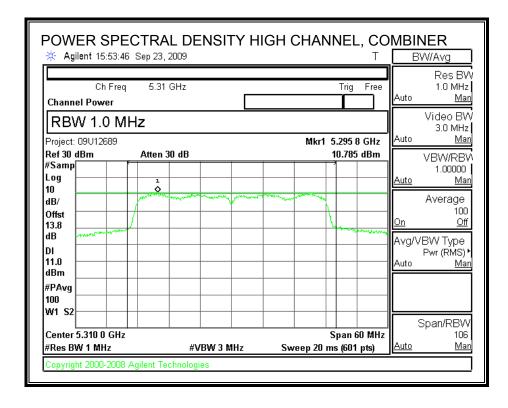
### **RESULTS**

| Channel | Frequency | PSD with Combiner | Limit | Margin |
|---------|-----------|-------------------|-------|--------|
|         | (MHz)     | (dBm)             | (dBm) | (dB)   |
| Low     | 5270      | 10.69             | 11.00 | -0.31  |
| High    | 5310      | 10.79             | 11.00 | -0.21  |

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#### POWER SPECTRAL DENSITY

|  |             | DW CHANNEL, CC                       |  |
|--|-------------|--------------------------------------|--|
| ☆ Agilent 15:46:51 Sep 23,   | 2009        |                                      | BVV/Avg  |
| Ch Freq 5.27<br>Channel Power  | GHz         | Trig Free                            | Res BW<br>1.0 MHz<br>Auto <u>Man</u>           |
| RBW 1.0 MHz<br>Project: 09U12689                                       |             | Mkr1 5.254 9 GHz                     | Video BW<br>3.0 MHz<br>Auto Man                |
| Ref 30 dBm Atten<br>#Samp Log 1  | 30 dB       | 10.689 dBm                           | VBW/RBV<br>1.00000<br>Auto Man                 |
| 10<br>dB/<br>Offst<br>13.8<br>dB / / / / / / / / / / / / / / / / / / / |             |                                      | Average<br>100<br>On Off                       |
| DI<br>11.0<br>dBm  |             |                                      | Avg/VBW Type<br>Pwr (RMS) •<br>Auto <u>Man</u> |
| #PAvg<br>100<br>W1 S2  |             |                                      | <br>Span/RBW                                   |
| Center 5.270 0 GHz<br>#Res BW 1 MHz                                    | #VBW 3 MHz  | Span 60 MHz<br>Sweep 20 ms (601 pts) |  |
| Copyright 2000-2008 Agilent Te   | echnologies |                                      |  |



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# 7.6.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

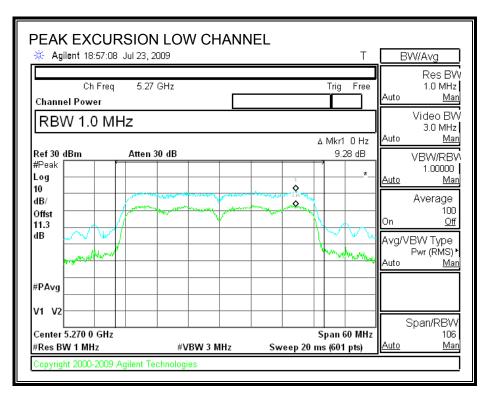
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

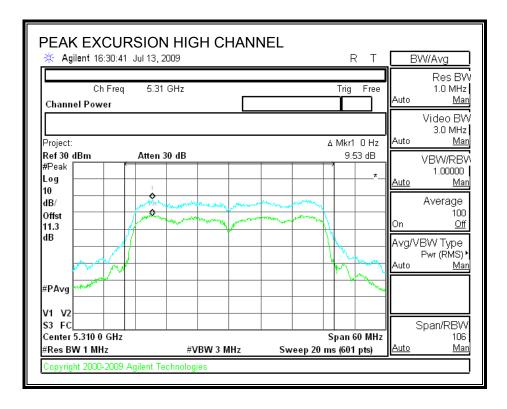
### <u>RESULTS</u>

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5270      | 9.28           | 13    | -3.72  |
| High    | 5310      | 9.53           | 13    | -3.47  |

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#### PEAK EXCURSION





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# 7.6.6. CONDUCTED SPURIOUS EMISSIONS

## LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.25-5.35 GHz band shall not exceed an EIRP of -27 dBm / MHz.

Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

### TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

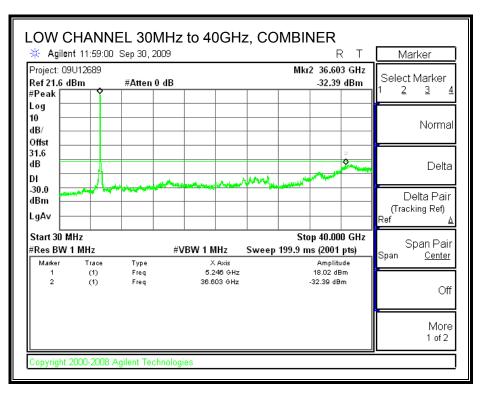
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

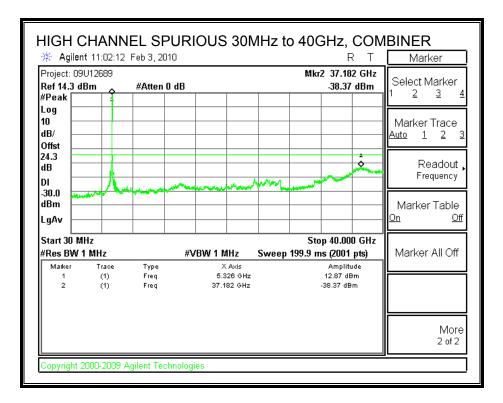
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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#### LOW CHANNEL SPURIOUS EMISSIONS



#### HIGH CHANNEL SPURIOUS EMISSIONS



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# 7.7. 5.6GHz BAND CHANNEL TESTS FOR 802.11a MODE

## 7.7.1. 26 dB and 99% BANDWIDTH

### <u>LIMITS</u>

None; for reporting purposes only.

### TEST PROCEDURE

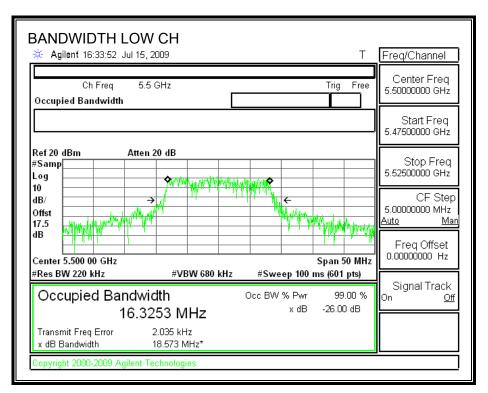
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

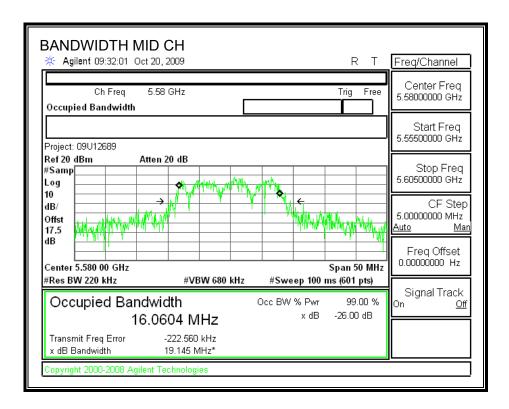
### **RESULTS**

| Channel | Frequency | 26 dB Bandwidth | 99% Bandwidth |
|---------|-----------|-----------------|---------------|
|         | (MHz)     | (MHz)           | (MHz)         |
| Low     | 5500      | 18.573          | 16.3253       |
| Middle  | 5580      | 19.145          | 16.0604       |
| High    | 5700      | 19.048          | 16.4891       |

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#### 26 dB and 99% BANDWIDTH





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| BANDWIDTH HIGH CH<br>Agilent 11:27:31 Jul 15, 2009       |                               | T F         | Freq/Channel                                 |
|--|-------------------------------|-------------|--|
| Ch Freq 5.7 GHz<br>Occupied Bandwidth                    | Trig                          | Free        | Center Freq<br>5.70000000 GHz                |
|  |                               |             | Start Freq<br>5.67500000 GHz                 |
| Ref 20 dBm Atten 20 dB<br>#Samp                          | P4494498                      |             | Stop Freq<br>5.72500000 GHz                  |
| dB/ → w<br>Offst<br>17.5                                 |                               |             | CF Step<br>5.00000000 MHz<br><u>suto Man</u> |
| Center 5.700 00 GHz                                      | Span 5                        |             | Freq Offset<br>0.00000000 Hz                 |
|  | 3W 680 kHz #Sweep 100 ms (601 | pts)        | Signal Track                                 |
| Occupied Bandwidth<br>16.4891 N                          |                               | <b>••••</b> | )n <u>Off</u>                                |
| Transmit Freq Error -50.367 I<br>x dB Bandwidth 19.048 N |                               |             |  |
| Copyright 2000-2009 Agilent Technolog                    | es                            |             |  |

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# 7.7.2. OUTPUT POWER

## <u>LIMITS</u>

FCC §15.407 (a) (1) IC RSS-210 A9.2 (1)

Antenna gain of Chain 1 = antenna gain of Chain 2.

| Antenna Gain<br>(dBi) |      | Effective Legacy Gain<br>(dBi) |
|-----------------------|------|--------------------------------|
| 3                     | 3.01 | 6.01                           |

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

### **RESULTS**

Limit

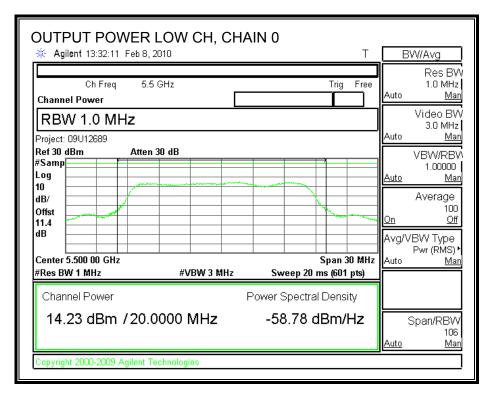
| Channel | Frequency | Fixed | В      | 11 + 10 Log B | Effective | Limit |
|---------|-----------|-------|--------|---------------|-----------|-------|
|         |           | Limit |        | Limit         | Ant Gain  |       |
|         | (MHz)     | (dBm) | (MHz)  | (dBm)         | (dBi)     | (dBm) |
| Low     | 5500      | 24    | 18.573 | 23.69         | 6.01      | 23.68 |
| Mid     | 5580      | 24    | 19.145 | 23.82         | 6.01      | 23.81 |
| High    | 5700      | 24    | 19.048 | 23.80         | 6.01      | 23.79 |

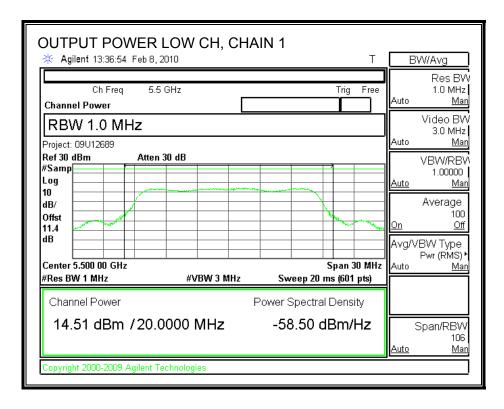
### Individual Chain Results

| Channel | Frequency | Chain 0 | Chain 1 | Total | Limit | Margin |
|---------|-----------|---------|---------|-------|-------|--------|
|         |           | Power   | Power   | Power |       |        |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5500      | 14.23   | 14.51   | 17.38 | 23.68 | -6.30  |
| Mid     | 5580      | 16.57   | 16.92   | 19.76 | 23.81 | -4.05  |
| High    | 5700      | 13.13   | 13.23   | 16.19 | 23.79 | -7.60  |

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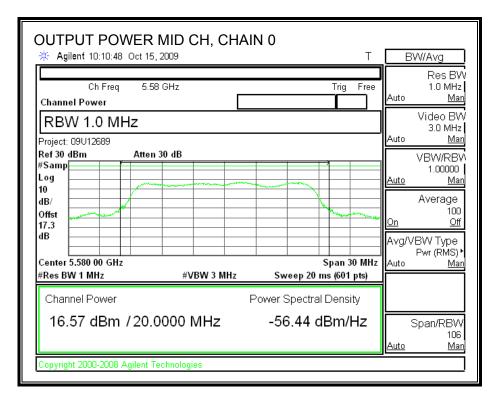
### **OUTPUT POWER, LOW CHANNEL**





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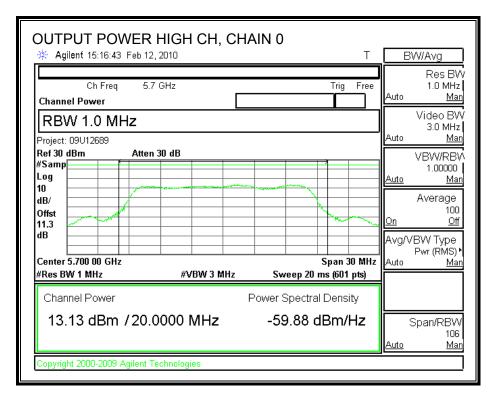
#### **OUTPUT POWER, MID CHANNEL**

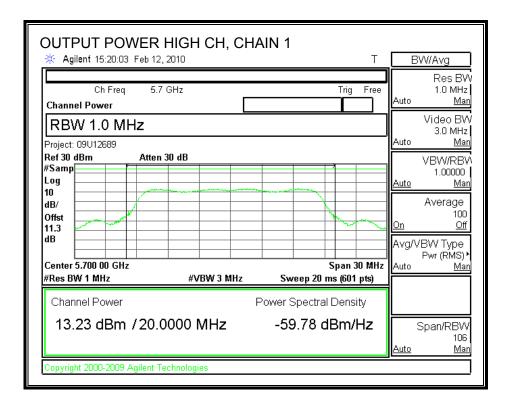


| OUTPUT POWER  | -          | I <mark>N 1</mark>                      | BW/Avg   |
|---|------------|---|--|
| Ch Freq 5.58<br>Channel Power   | GHz        | Trig Free                               | Res BW<br>1.0 MHz<br>Auto <u>Man</u><br>Video BW   |
| RBW 1.0 MHz           Project: 09U12689           Ref 30 dBm         Atten:           #Samp | 30 dB      |   | 3.0 MHz<br>Auto <u>Man</u><br>VBW/RBW<br>1.00000<br>Auto <u>Man</u><br>Average<br>100<br>On <u>Off</u> |
| I7.3         dB           Center 5.580 00 GHz         #Res BW 1 MHz                         | #VBW 3 MHz | Span 30 MHz<br>Sweep 20 ms (601 pts)    | Avg/VBW Type<br>Pwr (RMS) •  |
| Channel Power<br>16.92 dBm /20.0<br>Copyright 2000-2008 Agilent Te                          | 000 MHz    | Power Spectral Density<br>-56.09 dBm/Hz | Span/RBW<br>106<br><u>Auto Man</u>   |

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#### **OUTPUT POWER, HIGH CHANNEL**





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# 7.7.3. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### RESULTS

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency | Chain 0 | Chain 1 | Total |
|---------|-----------|---------|---------|-------|
|         |           | Power   | Power   | Power |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm) |
| Low     | 5500      | 14.20   | 14.30   | 17.26 |
| Middle  | 5580      | 16.97   | 16.68   | 19.84 |
| High    | 5700      | 12.30   | 12.40   | 15.36 |

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# 7.7.4. PEAK POWER SPECTRAL DENSITY

## LIMITS

FCC §15.407 (a) (1)

IC RSS-210 A9.2 (1)

Use this table if antenna gain for Chain 0 = antenna gain for Chain 1

| Antenna Gain<br>(dBi) |      | Effective Legacy Gain<br>(dBi) |  |
|-----------------------|------|--------------------------------|--|
| 3                     | 3.01 | 6.01                           |  |

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum effective antenna gain is 6.01 dBi, therefore the limit is 10.99 dBm.

## TEST PROCEDURE

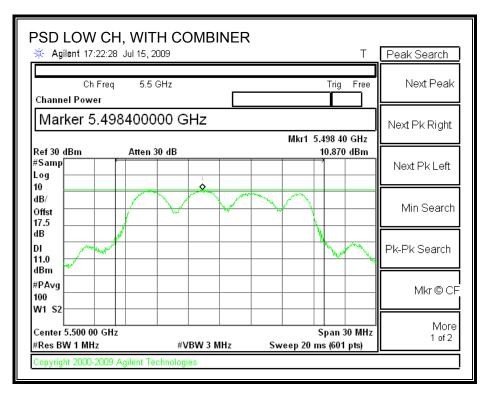
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

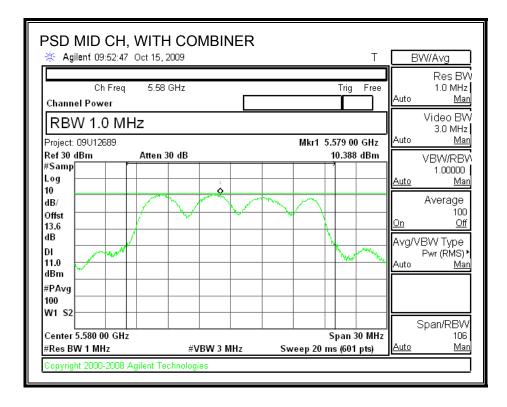
### **RESULTS**

| Channel | Frequency | PPSD With Combiner | Limit | Margin |
|---------|-----------|--------------------|-------|--------|
|         | (MHz)     | (dBm)              | (dBm) | (dB)   |
| Low     | 5500      | 10.870             | 10.99 | -0.12  |
| Middle  | 5580      | 10.388             | 10.99 | -0.60  |
| High    | 5700      | 10.215             | 10.99 | -0.78  |

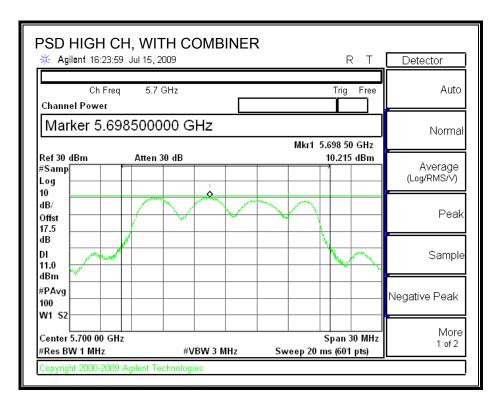
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### POWER SPECTRAL DENSITY WITH COMBINER





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# 7.7.5. PEAK EXCURSION

## <u>LIMITS</u>

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

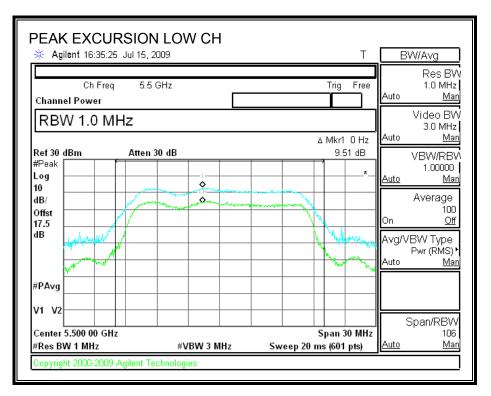
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

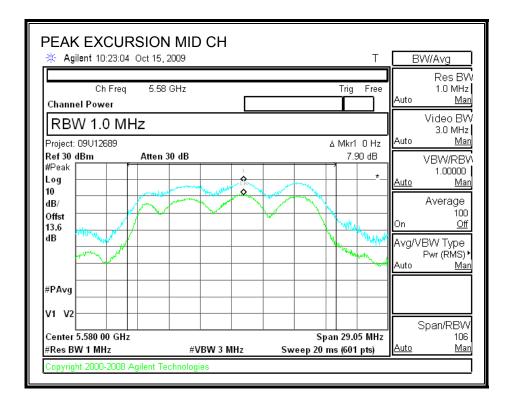
### **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5500      | 9.51           | 13    | -3.49  |
| Middle  | 5580      | 7.90           | 13    | -5.10  |
| High    | 5700      | 7.97           | 13    | -5.03  |

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#### PEAK EXCURSION





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| PEAK EXCURSION                       |            |                         | Т                | B             | ///Avg                              |
|--------------------------------------|------------|-------------------------|------------------|---------------|-------------------------------------|
| Ch Freq 5.7<br>Channel Power         | GHz        | Triç<br>1               | Free             | Auto          | Res BV<br>1.0 MHz<br><u>Man</u>     |
| RBW 1.0 MHz                          |            | ے۔<br>۸ Mki             | 1 O Hz           | Auto          | Video BW<br>3.0 MHz<br><u>Man</u>   |
| Ref 30 dBm Atten 3<br>#Peak Log 10   | 0 dB       | 7                       | .97 dB           | <u>Auto</u>   | VBW/RBV<br>1.00000<br><u>Man</u>    |
| 10<br>dB/<br>Offst<br>17.5           |            |                         |                  | On            | Average<br>100<br><u>Off</u>        |
| dB                                   |            |                         |                  | Avg/V<br>Auto | BW Type<br>Pwr (RMS)≛<br><u>Man</u> |
| #PAvg                                |            |                         |                  |               |                                     |
| V1 V2                                |            |                         |                  |               | Span/RBW                            |
| Center 5.700 00 GHz<br>#Res BW 1 MHz | #VBW 3 MHz | Span<br>Sweep 20 ms (60 | 30 MHz<br>1 pts) | <u>Auto</u>   | 106<br><u>Man</u>                   |

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# 7.7.6. CONDUCTED SPURIOUS EMISSIONS

## LIMITS

FCC §15.407 (b) (1)

IC RSS-210 A9.3 (1)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

### TEST PROCEDURE

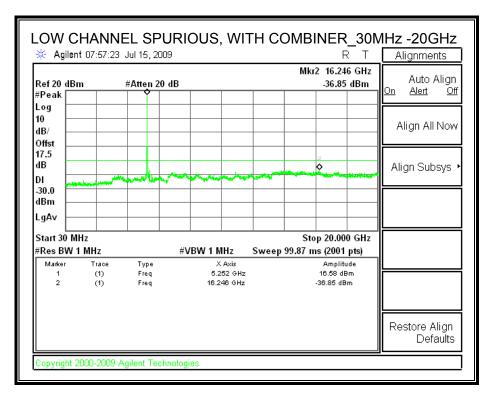
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

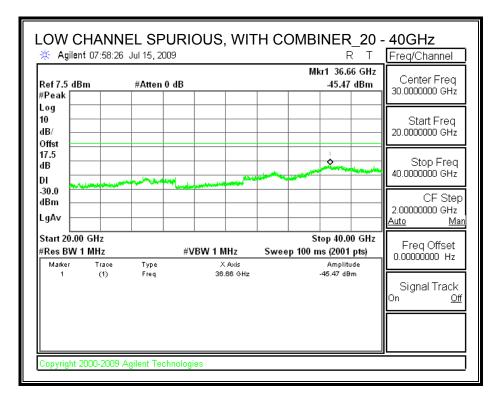
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

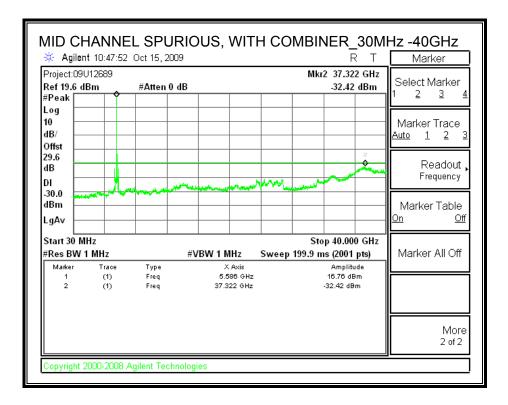
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#### SPURIOUS EMISSIONS WITH COMBINER

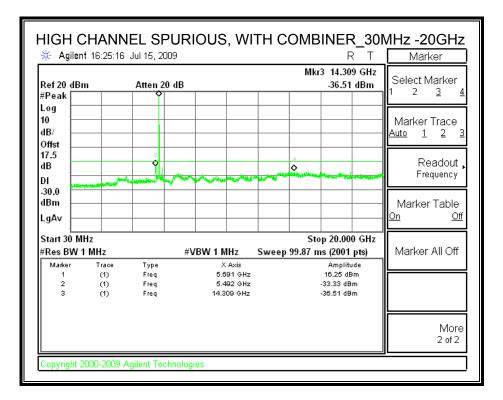


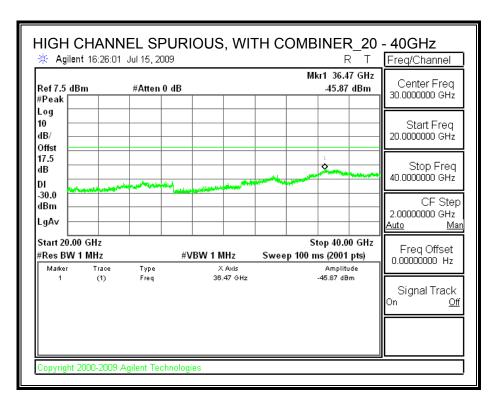


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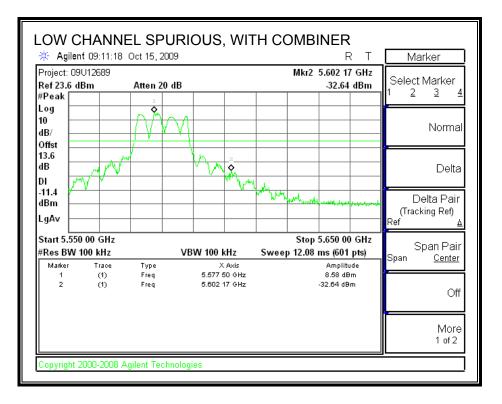
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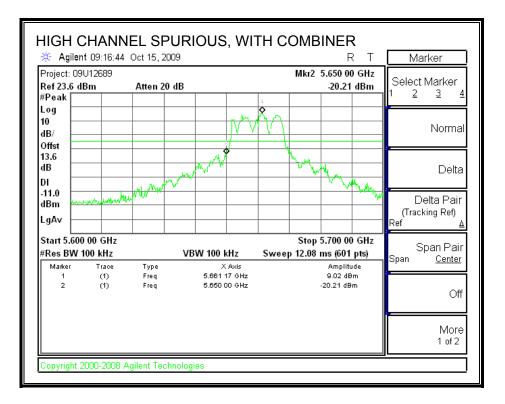




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# 7.7.7. CONDUCTED SPURIOUS (-20 dBc)





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# 7.8. 5.6 GHz BAND CHANNEL TESTS FOR 802.11HT20 MODE

## 7.8.1. 99% & 26 dB BANDWIDTH

#### <u>LIMITS</u>

None; for reporting purposes only.

### TEST PROCEDURE

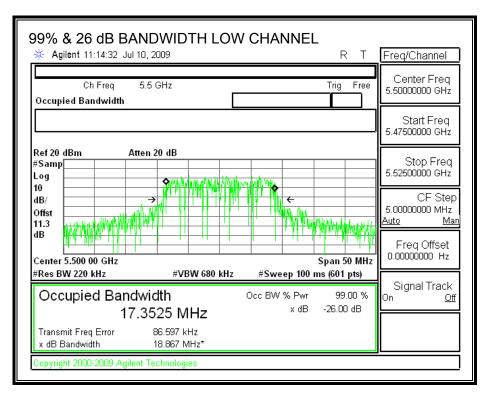
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

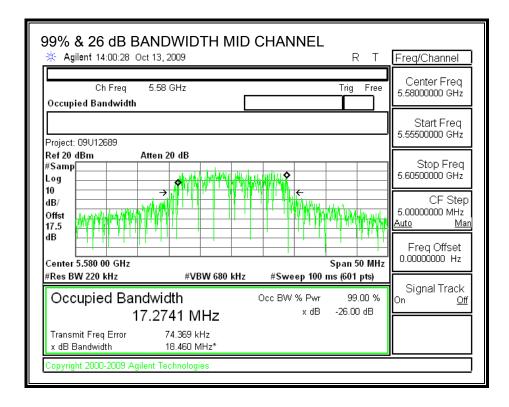
### **RESULTS**

| Channel | Frequency | 99% OBW | 26 dB BW |
|---------|-----------|---------|----------|
|         | (MHz)     | (MHz)   | (MHz)    |
| Low     | 5500      | 17.3525 | 18.867   |
| Middle  | 5580      | 17.2741 | 18.460   |
| High    | 5700      | 17.4728 | 18.394   |

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#### 99% & 26 dB BANDWIDTH





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| 99% & 26 dB BANDWIDTH   | HIGH CHANNEL | RТ                                       | Freq/Channel                                |
|---|--------------|--|---|
| Ch Freq 5.7 GHz<br>Occupied Bandwidth                           |              | Trig Free                                | Center Freq<br>5.70000000 GHz               |
|   |              |  | Start Freq<br>5.67500000 GHz                |
| Ref 20 dBm Atten 20 dB<br>#Samp Log<br>10 Structure Atten 20 dB |              |  | Stop Freq<br>5.72500000 GHz                 |
| dB/<br>Offst<br>11.3  |              | n an | CF Step<br>5.0000000 MHz<br><u>Auto Man</u> |
| dB<br>Center 5.700 00 GHz<br>#Res BW 220 kHz #VBW 6             | SF           | an 50 MHz                                | Freq Offset<br>0.00000000 Hz                |
| Occupied Bandwidth<br>17.4728 MHz                               | Occ BW % Pwr |  | Signal Track<br>On <u>Off</u>               |
| Transmit Freq Error 72.384 kHz<br>x dB Bandwidth 18.394 MHz*    |              |  |   |
| Copyright 2000-2009 Agilent Technologies                        |              |  |   |

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# 7.8.2. OUTPUT POWER

## <u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

#### **RESULTS**

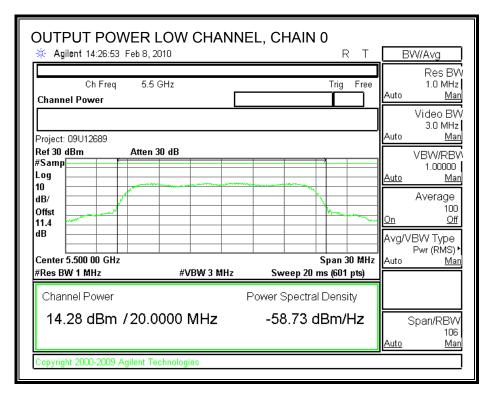
#### Limit

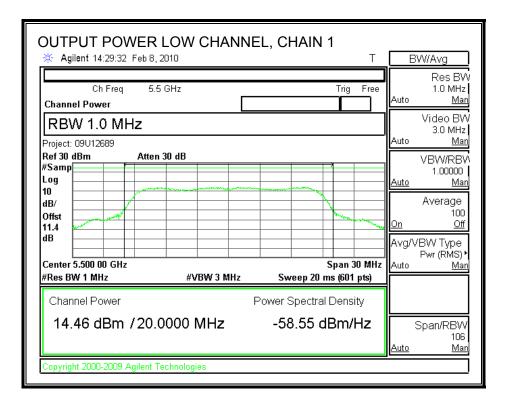
| Channel | Freq  | Fixed | В      | 11 + 10 Log B | Antenna | Limit |
|---------|-------|-------|--------|---------------|---------|-------|
|         |       | Limit |        | Limit         | Gain    |       |
|         | (MHz) | (dBm) | (MHz)  | (dBm)         | (dBi)   | (dBm) |
| Low     | 5500  | 24    | 18.867 | 23.76         | 3       | 23.76 |
| Mid     | 5580  | 24    | 18.460 | 23.66         | 3       | 23.66 |
| High    | 5700  | 24    | 18.394 | 23.65         | 3       | 23.65 |

#### Individual Chain Results

| Channel | Freq  | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Total | Limit | Margin |
|---------|-------|---------|---------|---------|---------|-------|-------|--------|
|         |       | Power   | Power   | Power   | Power   | Power |       |        |
|         | (MHz) | (dBm)   | (dBm)   | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5500  | 14.28   | 14.46   | 15.11   | 14.43   | 20.60 | 23.76 | -3.15  |
| Mid     | 5580  | 13.19   | 14.55   | 14.58   | 13.38   | 19.99 | 23.66 | -3.67  |
| High    | 5700  | 12.46   | 13.54   | 13.31   | 13.22   | 19.17 | 23.65 | -4.48  |

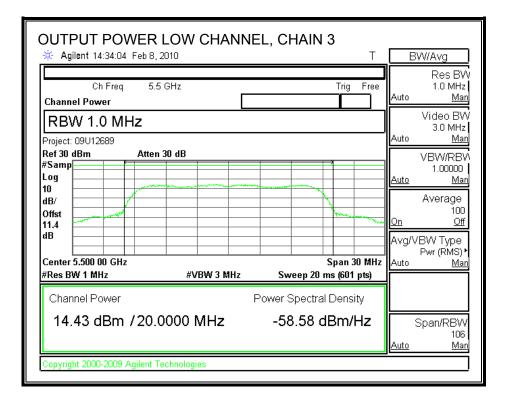
### **OUTPUT POWER, LOW CHANNEL**





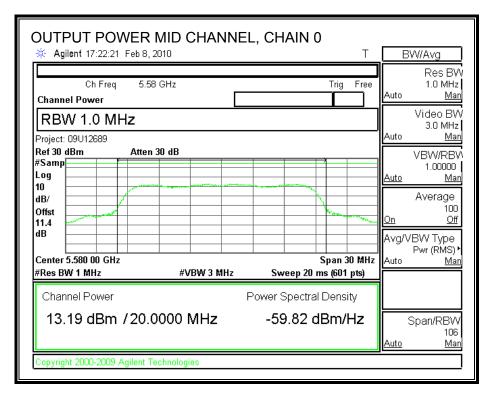
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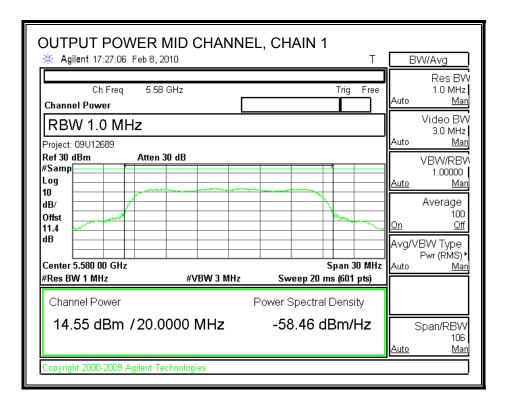
| OUTPUT POWER LOW CHANNEL, CHAIN 2   | BW/Avg  |
|---|---|
| Ch Freq 5.5 GHz Trig Free Channel Power RBW 1.0 MHz   | Res BW<br>1.0 MHz<br>Auto <u>Man</u><br>Video BW  |
| CDVV         I.U IVINZ           Project:         09U12689           Ref 30 dBm         Atten 30 dB           #Samp         Image: Comparison of the second sec | 3.0 MHz<br>Auto <u>Man</u><br>VBW/RBW<br>1.00000<br><u>Auto Man</u><br>Average<br>100<br>On Off |
| II.4       dB       Center 5.500 00 GHz       #Res BW 1 MHz       #VBW 3 MHz       Sweep 20 ms (601 pts)  | Avg/VBW Type<br>Pwr (RMS) ►<br>Auto <u>Man</u>  |
| Channel Power       Power Spectral Density         15.11 dBm / 20.0000 MHz       -57.90 dBm/Hz  | Span/RBW<br>106<br><u>Auto Man</u>  |
| Copyright 2000-2009 Agilent Technologies  |   |



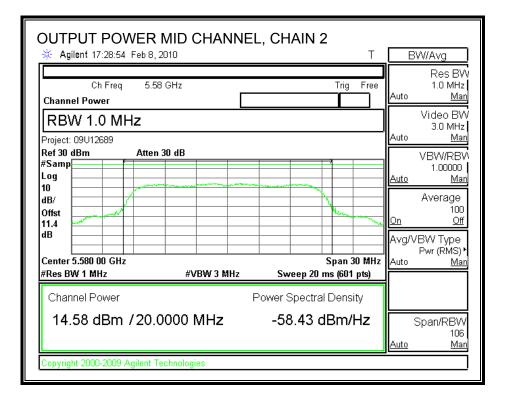
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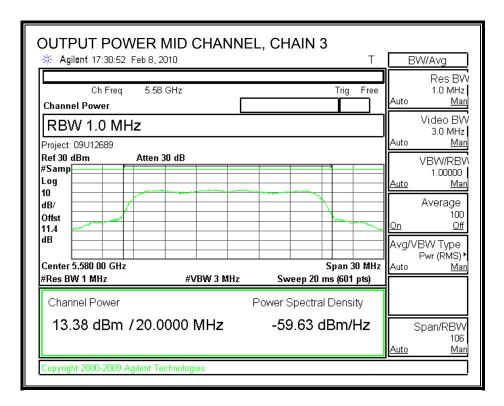
#### **OUTPUT POWER, MID CHANNEL**





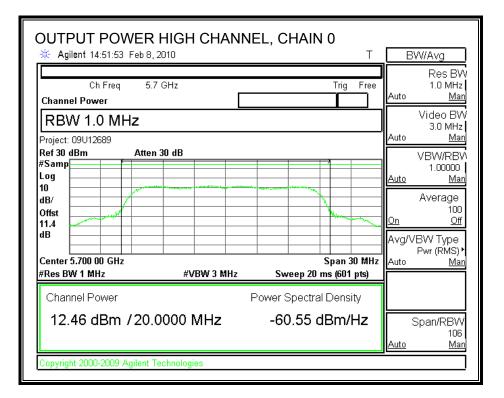
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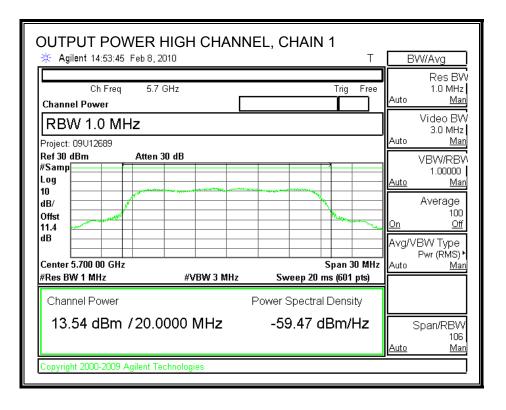




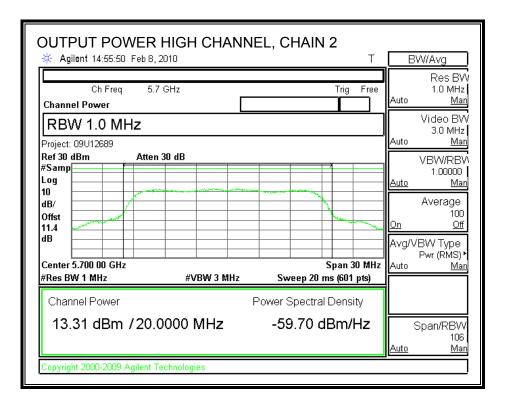
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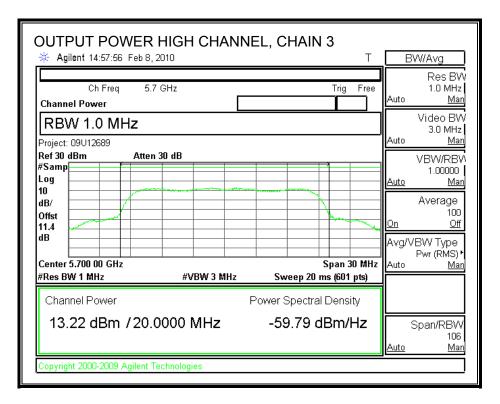
#### **OUTPUT POWER, HIGH CHANNEL**





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# 7.8.3. AVERAGE POWER

## LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

### **RESULTS**

| Channel | Frequency | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
|---------|-----------|---------|---------|---------|---------|
|         |           | Power   | Power   | Power   | Power   |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm)   | (dBm)   |
| Low     | 5500      | 13.60   | 14.10   | 14.90   | 14.30   |
| Middle  | 5580      | 12.90   | 14.00   | 14.30   | 12.90   |
| High    | 5700      | 12.30   | 13.10   | 13.00   | 13.00   |

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## 7.8.4. PEAK POWER SPECTRAL DENSITY

## LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi, therefore the limit is 11 dBm.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

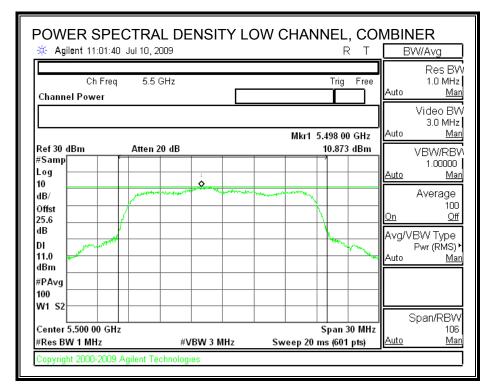
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

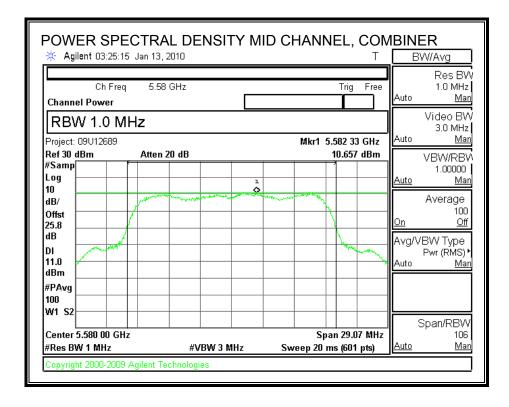
| Channel | Frequency | PSD with Combiner | Limit | Margin |
|---------|-----------|-------------------|-------|--------|
|         | (MHz)     | (dBm)             | (dBm) | (dB)   |
| Low     | 5500      | 10.873            | 11.00 | -0.13  |
| Middle  | 5580      | 10.657            | 11.00 | -0.34  |
| High    | 5700      | 10.423            | 11.00 | -0.58  |

### **RESULTS**

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#### **POWER SPECTRAL DENSITY**





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| POWER SPECTRA                                   |   | IGH CHANNEL, CC                 |  |
|---|---|---------------------------------|--|
| Ch Freq 5.7                                     |   | Trig Free                       | Res BW<br>1.0 MHz<br>Auto <u>Man</u>               |
| Ref 30 dBm Atten 2                              | 20 dB                                   | Mkr1 5.697 95 GHz<br>10.423 dBm | Video BW<br>3.0 MHz<br>Auto <u>Man</u><br>VBW/RBV  |
| #Samp<br>Log<br>10<br>dB/                       | I A A A A A A A A A A A A A A A A A A A |                                 | 1.00000<br><u>Auto Man</u><br>Average              |
| Offst<br>25.6<br>dB                             |   |                                 | 100<br><u>On Off</u><br>Avg/VBW Type<br>Pwr (RMS)► |
| 11.0 ###################################        |   |                                 | Auto <u>Man</u>                                    |
| 100<br>W1 S2<br>Center 5.700 00 GHz             |   | Span 30 MHz                     | Span/RBW   |
| #Res BW 1 MHz<br>Copyright 2000-2009 Agilent Te | #VBW 3 MHz<br>chnologies                | Sweep 20 ms (601 pts)           | <u>Auto Man</u>                                    |

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## 7.8.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

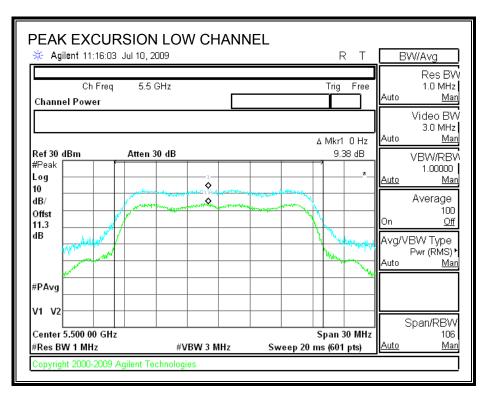
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

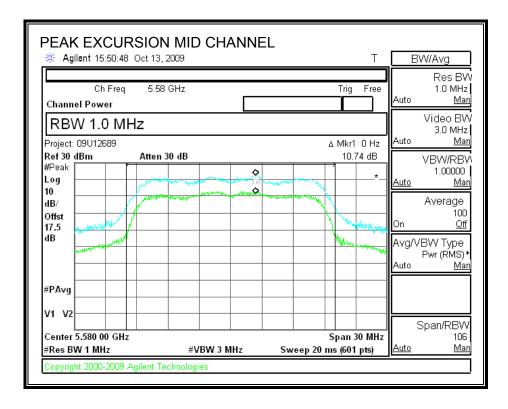
### **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5500      | 9.38           | 13    | -3.62  |
| Middle  | 5580      | 10.74          | 13    | -2.26  |
| High    | 5700      | 10.70          | 13    | -2.30  |

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#### PEAK EXCURSION





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| 🔆 Agilent 14:36:25 Jul 10,             | 2009       |             | RΤ         | E             | W/Avg                               |
|--|------------|-------------|------------|---------------|-------------------------------------|
| Ch Freq 5.7<br>Channel Power           | ′ GHz      |             | Trig Free  | Auto          | Res BV<br>1.0 MHz<br><u>Mar</u>     |
| RBW 1.0 MHz                            |            | ۵           | Mkr1 0 Hz  | Auto          | Video BV<br>3.0 MHz<br><u>Mar</u>   |
| Ref 30 dBm Atten<br>#Peak<br>Log<br>10 | 1 30 dB    | ,           | 10.70 dB   | <u>Auto</u>   | VBW/RBV<br>1.00000<br><u>Mar</u>    |
| dB/<br>Offst<br>11.3                   |            |             | Yı,        | On            | Average<br>100<br><u>Off</u>        |
| dB                                     |            |             | Mildrendy  | A∨g/\<br>Auto | /BW Type<br>Pwr (RMS)<br><u>Mar</u> |
| #PAvg                                  |            |             |            |               |                                     |
| V1 V2                                  |            |             | pan 30 MHz |               | Span/RBW                            |
| #Res BW 1 MHz                          | #VBW 3 MHz | Sweep 20 ms | -          | Auto          | Mar                                 |

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## 7.8.6. CONDUCTED SPURIOUS EMISSIONS

## LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

### TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

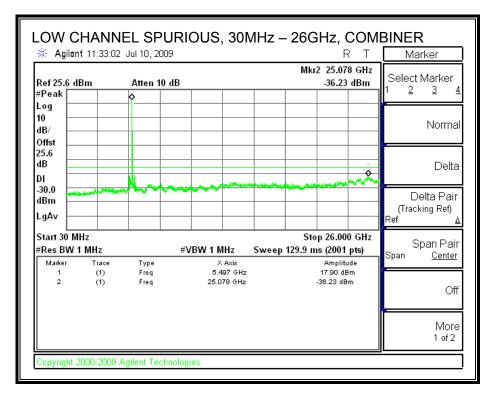
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

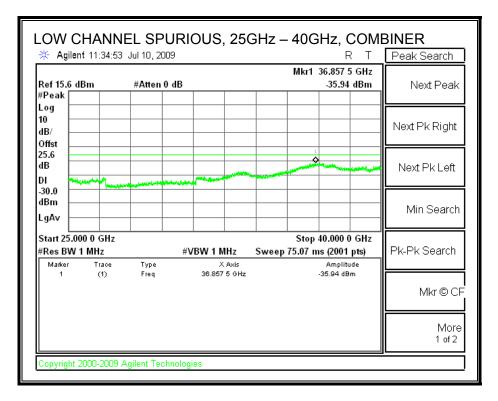
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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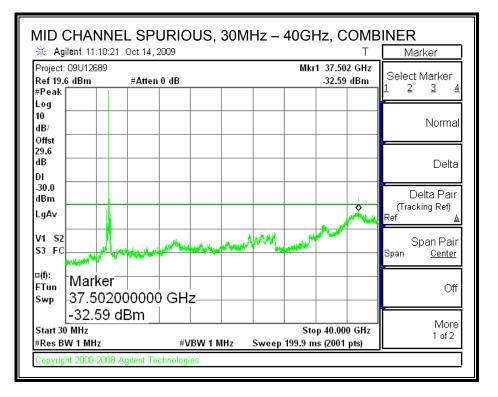
#### LOW CHANNEL SPURIOUS EMISSIONS





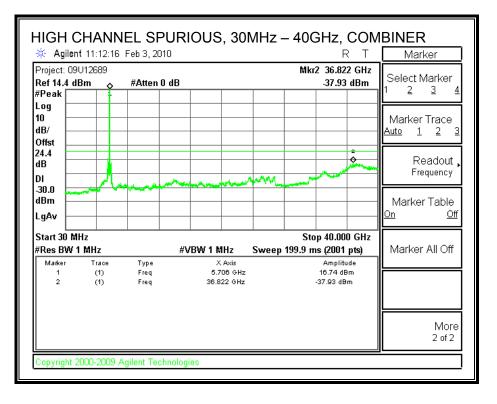
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#### MID CHANNEL SPURIOUS EMISSIONS



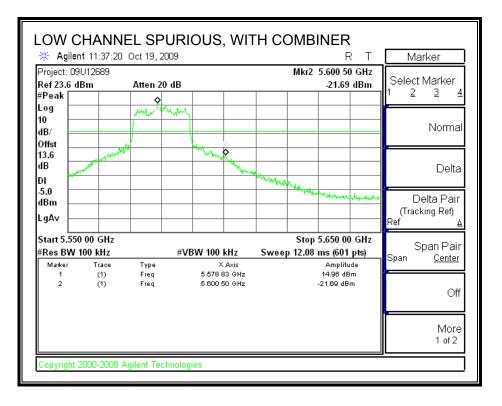
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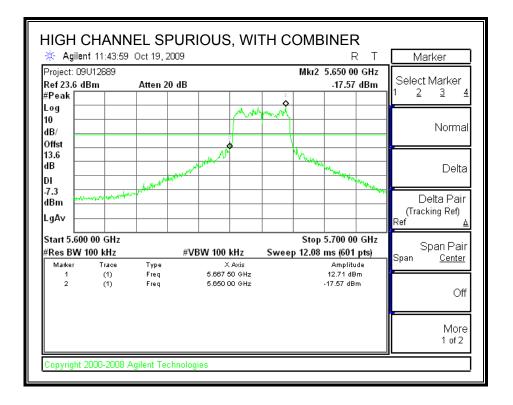
#### **HIGH CHANNEL SPURIOUS EMISSIONS**



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# 7.8.7. CONDUCTED SPURIOUS (-20 dBc)





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# 7.9. 5.6 Hz BAND CHANNEL TESTS FOR 802.11HT40 MODE

## 7.9.1. 99% & 26 dB BANDWIDTH

### <u>LIMITS</u>

None; for reporting purposes only.

## TEST PROCEDURE

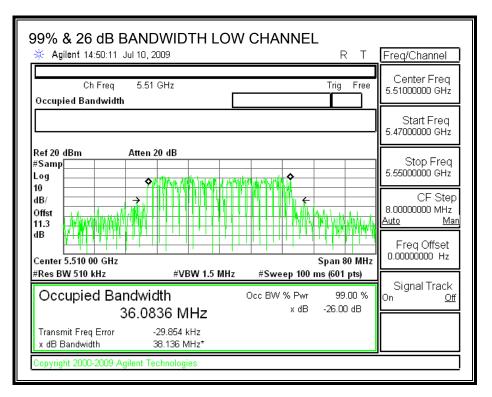
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

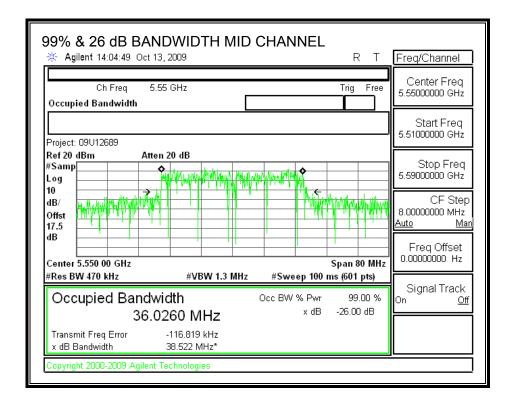
### **RESULTS**

| Channel | Frequency | 99% OBW | 26 dB BW |  |
|---------|-----------|---------|----------|--|
|         | (MHz)     | (MHz)   | (MHz)    |  |
| Low     | 5510      | 36.0836 | 38.136   |  |
| Middle  | 5550      | 36.0260 | 38.522   |  |
| High    | 5670      | 35.9928 | 38.24    |  |

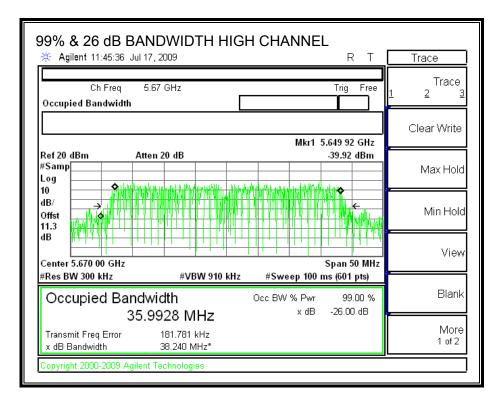
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#### 99% & 26 dB BANDWIDTH





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# 7.9.2. OUTPUT POWER

## <u>LIMITS</u>

FCC §15.407 (a) (2) IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

### **RESULTS**

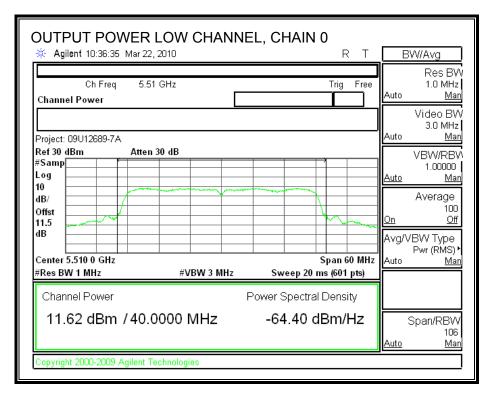
#### Limit

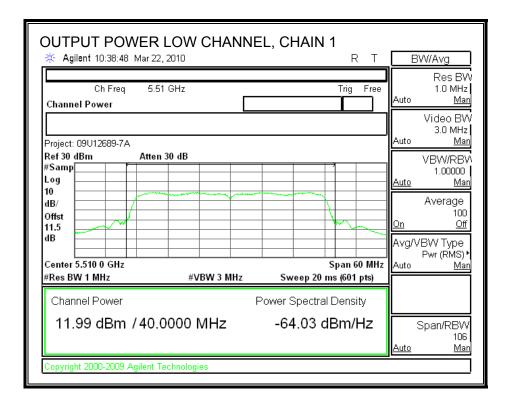
| Channel | Freq  | Fixed | В      | 11 + 10 Log B | Antenna | Limit |
|---------|-------|-------|--------|---------------|---------|-------|
|         |       | Limit |        | Limit         | Gain    |       |
|         | (MHz) | (dBm) | (MHz)  | (dBm)         | (dBi)   | (dBm) |
| Low     | 5510  | 24    | 38.136 | 26.81         | 3       | 24.00 |
| Mid     | 5550  | 24    | 38.522 | 26.86         | 3       | 24.00 |
| High    | 5670  | 24    | 38.24  | 26.83         | 3       | 24.00 |

#### Individual Chain Results

| Channel | Freq  | Chain 0 | Chain 1 | Chain 2 | Chain 3 | Total | Limit | Margin |
|---------|-------|---------|---------|---------|---------|-------|-------|--------|
|         |       | Power   | Power   | Power   | Power   | Power |       |        |
|         | (MHz) | (dBm)   | (dBm)   | (dBm)   | (dBm)   | (dBm) | (dBm) | (dB)   |
| Low     | 5510  | 11.62   | 11.99   | 11.88   | 11.59   | 17.79 | 24.00 | -6.21  |
| Mid     | 5550  | 17.96   | 17.78   | 17.77   | 17.95   | 23.89 | 24.00 | -0.11  |
| High    | 5670  | 12.86   | 13.44   | 13.57   | 12.63   | 19.16 | 24.00 | -4.84  |

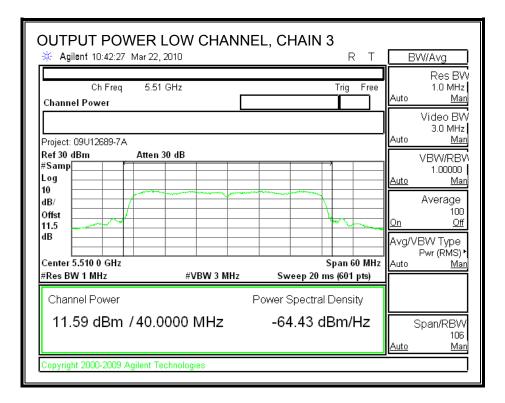
#### **OUTPUT POWER, LOW CHANNEL**





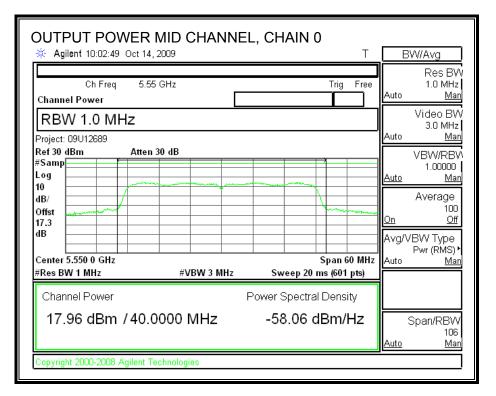
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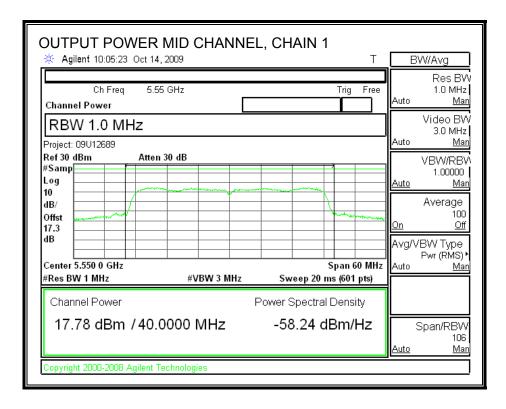
| Agilent 10:41:03 Mar 22,                 | 2010       | R T                                 | BW/Avg   |
|--|------------|-------------------------------------|--|
| Ch Freq 5.51<br>Channel Power            | GHz        | Trig Free                           | Res BN<br>4 1.0 MH;<br>Auto <u>Ma</u><br>Video BN<br>3.0 MH; |
| Project: 09U12689-7A<br>Ref 30 dBm Atten | 30 dB      |                                     | Auto <u>Ma</u><br>VBW/RB                                     |
| #Samp<br>Log                             |            |                                     | V BVV/RB<br>1.00000<br><u>Auto Ma</u>                        |
| dB/<br>Offst                             |            |                                     | Average  |
| dB                                       |            |                                     | Avg/VBW Type<br>Pwr (RMS)                                    |
| Center 5.510 0 GHz<br>#Res BW 1 MHz      | #VBW 3 MHz | Span 60 MH<br>Sweep 20 ms (601 pts) |  |
| Channel Power                            | F          | <sup>o</sup> ower Spectral Density  | 7  |
| 11.88 dBm /40.0                          | 000 MHz    | -64.15 dBm/Hz                       | Span/RBV<br>108<br>Auto Ma                                   |



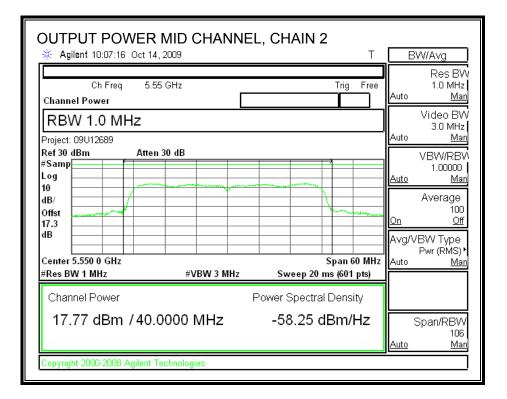
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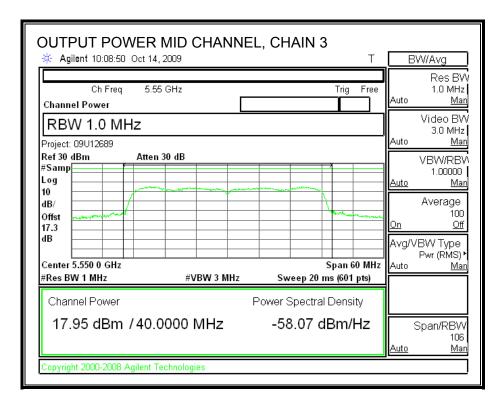
#### **OUTPUT POWER, MID CHANNEL**





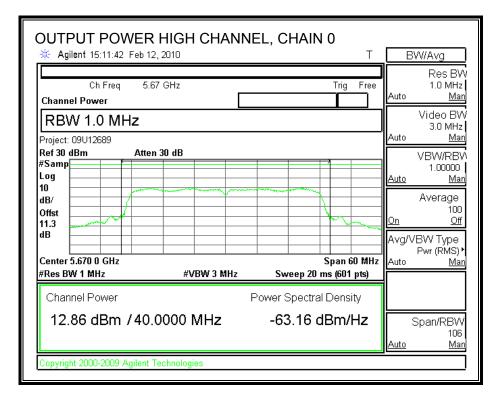
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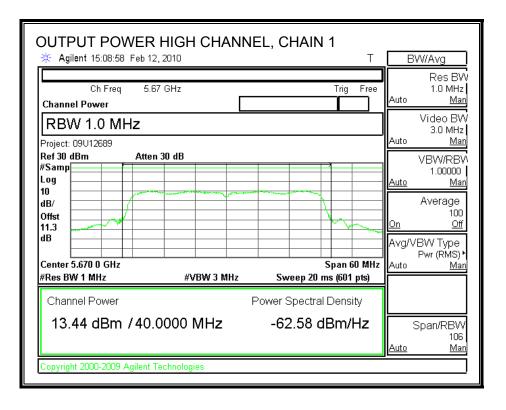




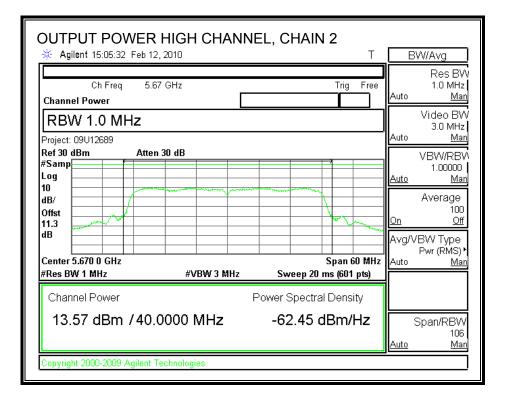
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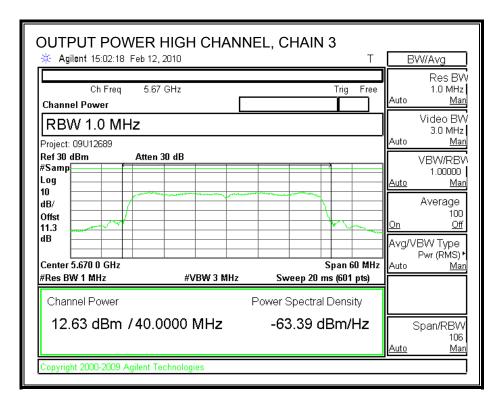
#### **OUTPUT POWER, HIGH CHANNEL**





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## 7.9.3. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

### **RESULTS**

| Channel | Frequency | Chain 0 | Chain 1 | Chain 2 | Chain 3 |
|---------|-----------|---------|---------|---------|---------|
|         |           | Power   | Power   | Power   | Power   |
|         | (MHz)     | (dBm)   | (dBm)   | (dBm)   | (dBm)   |
| Low     | 5510      | 11.50   | 11.77   | 11.71   | 11.59   |
| Middle  | 5550      | 17.96   | 18.03   | 17.56   | 18.12   |
| High    | 5700      | 12.30   | 13.00   | 13.00   | 12.20   |

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## 7.9.4. PEAK POWER SPECTRAL DENSITY

## LIMITS

FCC §15.407 (a) (2)

IC RSS-210 A9.2 (2)

For the 5.47-5.725 GHz band, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than 6 dBi, therefore the limit is 11 dBm.

## TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

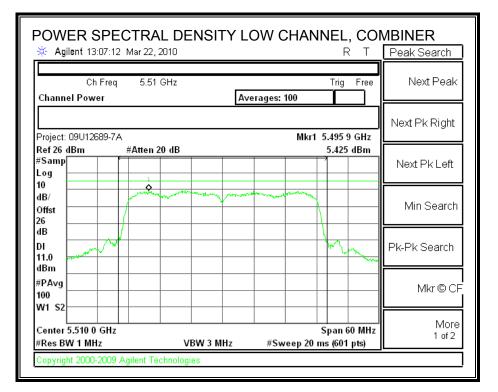
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

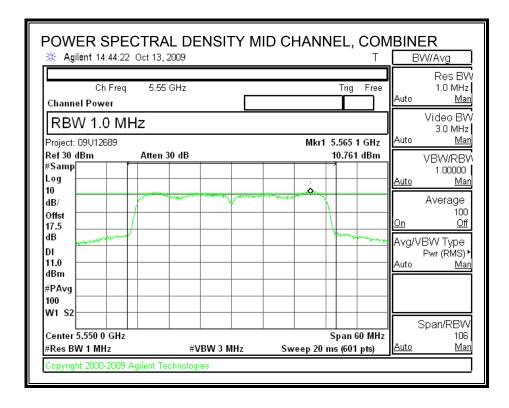
| Channel | Frequency | PSD with Combiner | Limit | Margin |
|---------|-----------|-------------------|-------|--------|
|         | (MHz)     | (dBm)             | (dBm) | (dB)   |
| Low     | 5510      | 5.425             | 11.00 | -5.58  |
| Middle  | 5550      | 10.761            | 11.00 | -0.24  |
| High    | 5670      | 9.038             | 11.00 | -1.96  |

### **RESULTS**

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#### POWER SPECTRAL DENSITY





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| POWER SPECTRA                       |            | GH CHANNEL, CO                       |  |
|-------------------------------------|------------|--------------------------------------|--|
|                                     | GHz        | Trig Free                            | Res BW<br>1.0 MHz<br>Auto Man                    |
| RBW 1.0 MHz                         | 20.10      | Mkr1 5.683 5 GHz                     | Video BW<br>3.0 MHz<br>Auto <u>Man</u>           |
| Ref 30 dBm Atten 2<br>#Samp Log 10  |            | 9.038 dBm                            | VBW/RBW<br>1.00000<br><u>Auto Man</u>            |
| dB/<br>Offst<br>25.6<br>dB          |            |                                      | Average<br>100<br><u>On Off</u>                  |
| DI<br>11.0<br>dBm                   |            | hin junitika                         | Avg/VBW Type<br>Pwr (RMS) •<br>« Auto <u>Man</u> |
| #PAvg<br>100<br>W1 S2               |            |                                      |  |
| Center 5.670 0 GHz<br>#Res BW 1 MHz | #VBW 3 MHz | Span 60 MHz<br>Sweep 20 ms (601 pts) | Span/RBW<br>106<br><u>Auto Man</u>               |
| Copyright 2000-2009 Agilent Te      | chnologies |                                      |  |

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## 7.9.5. PEAK EXCURSION

## LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

### TEST PROCEDURE

The transmitter outputs are connected to the spectrum analyzer via a combiner.

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

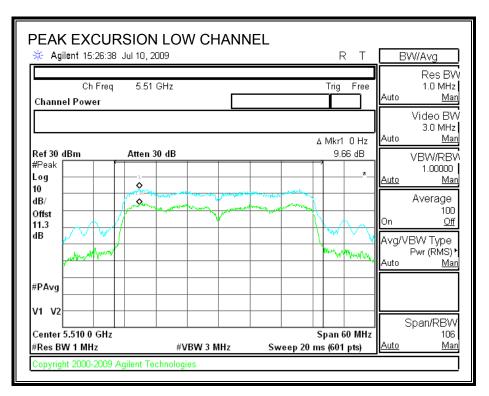
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

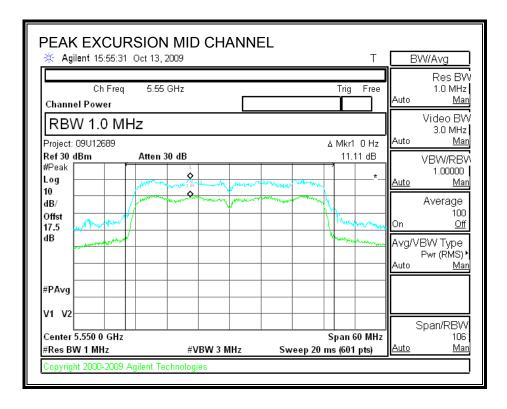
### **RESULTS**

| Channel | Frequency | Peak Excursion | Limit | Margin |
|---------|-----------|----------------|-------|--------|
|         | (MHz)     | (dB)           | (dB)  | (dB)   |
| Low     | 5510      | 9.66           | 13    | -3.34  |
| Middle  | 5550      | 11.11          | 13    | -1.89  |
| High    | 5670      | 10.26          | 13    | -2.74  |

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#### PEAK EXCURSION





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| 🔆 Agilent 13:19:40 Jul 17           | 2009       |              | RТ                      | BW/Avg        |                                       |
|-------------------------------------|------------|--------------|-------------------------|---------------|---------------------------------------|
| Ch Freq 5.8<br>Channel Power        | i7 GHz     |              | Trig Free               | Auto          | Res BV<br>1.0 MHz<br><u>Mar</u>       |
|                                     |            | ۵            | Mkr1 0 Hz               | Auto          | Video BV<br>3.0 MHz<br><u>Mar</u>     |
| #Peak                               | n 30 dB    |              | 10.26 dB                | <u>Auto</u>   | VBW/RBV<br>1.00000<br><u>Mar</u>      |
| dB/<br>Offst<br>11.3                |            | and a second |                         | On            | Average<br>100<br><u>Off</u>          |
| dB                                  |            |              | with the second         | Avg/v<br>Auto | /BW Type<br>Pwr (RMS) •<br><u>Mar</u> |
| #PAvg                               |            |              |                         |               |                                       |
| V1 V2                               |            |              |                         |               | Span/RBW                              |
| Center 5.670 0 GHz<br>#Res BW 1 MHz | #VBW 3 MHz | Sweep 20 ms  | pan 60 MHz<br>(601 pts) | Auto          | 106<br>Mar                            |

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## 7.9.6. CONDUCTED SPURIOUS EMISSIONS

## LIMITS

FCC §15.407 (b) (3)

IC RSS-210 A9.3 (3)

For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

### TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

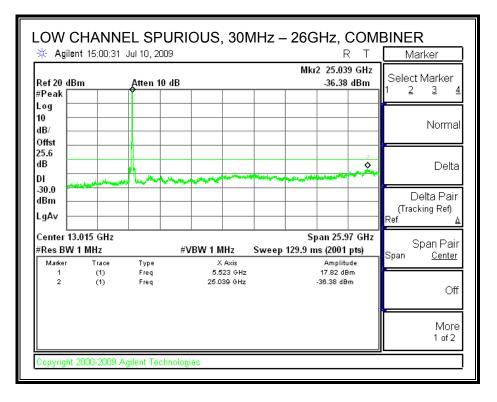
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

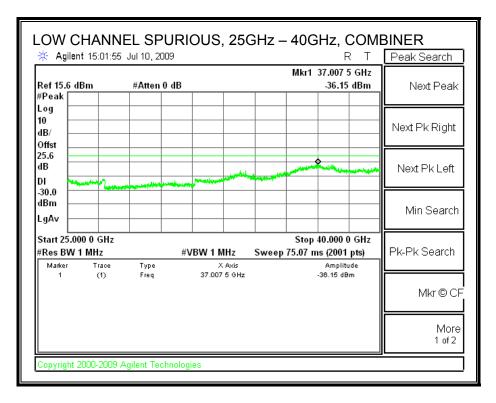
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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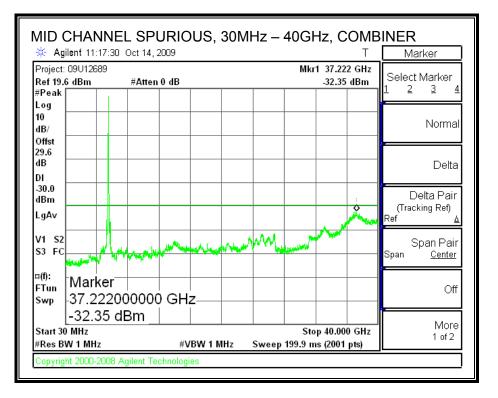
#### LOW CHANNEL SPURIOUS EMISSIONS





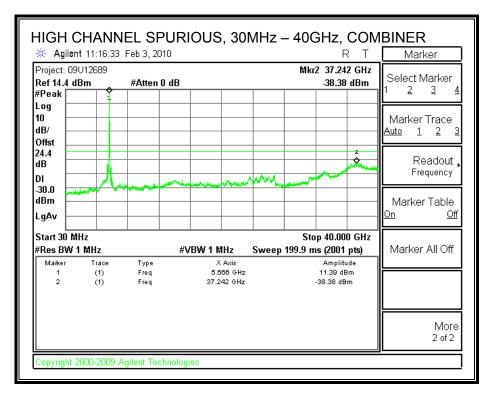
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#### MID CHANNEL SPURIOUS EMISSIONS



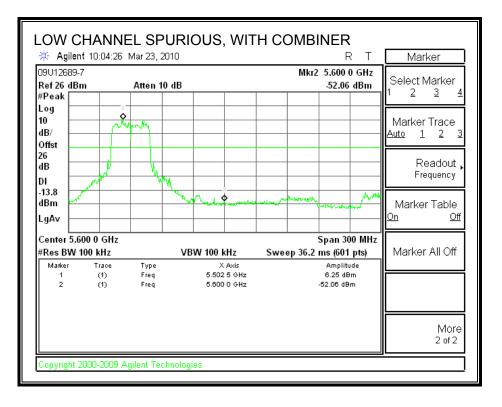
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#### **HIGH CHANNEL SPURIOUS EMISSIONS**

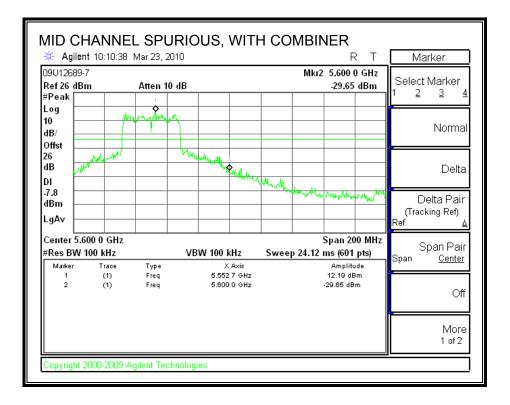


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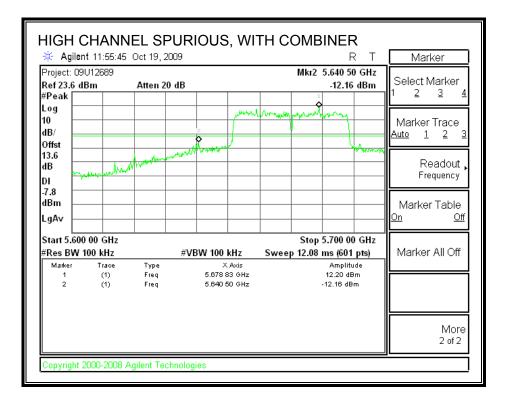
# 7.9.7. CONDUCTED SPURIOUS (-20 dBc)



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# 8. RECEIVER CONDUCTED SPURIOUS EMISSIONS

### <u>LIMITS</u>

IC RSS-GEN 7.2.3.1

Antenna Conducted Measurement: Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts (-57 dBm) in the band 30-1000 MHz, or 5 nanowatts (-53 dBm) above 1 GHz.

### TEST PROCEDURE

IC RSS-GEN 4.10, Conducted Method

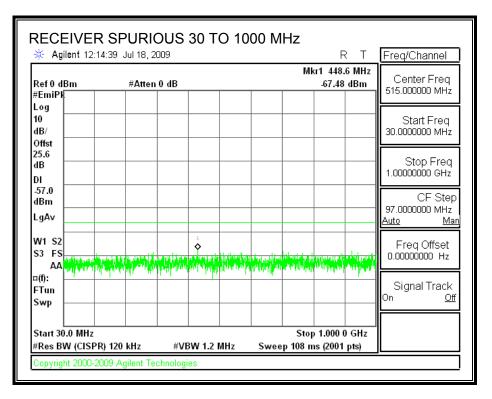
The receiver antenna port is connected to a spectrum analyzer.

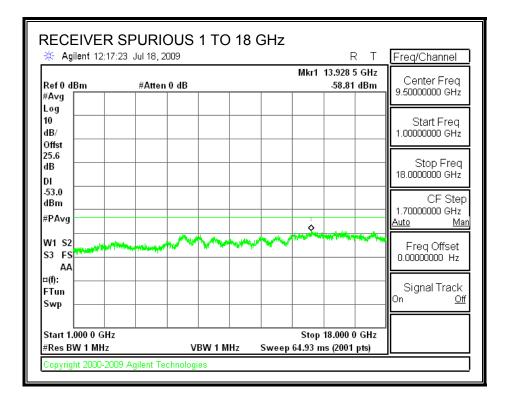
The spectrum from 30 MHz to 18 GHz is investigated with the receiver set to the middle channel of each 5 GHz band.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

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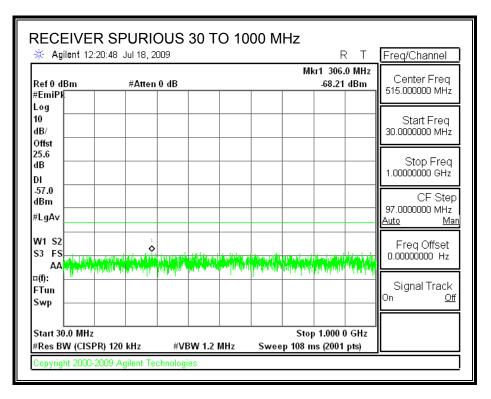
### **RECEIVER SPURIOUS EMISSIONS IN THE 5.2 GHz BAND**

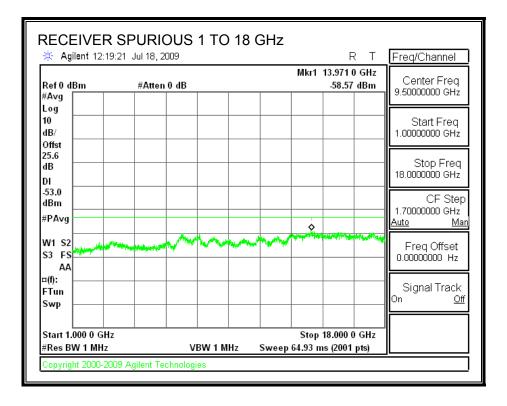




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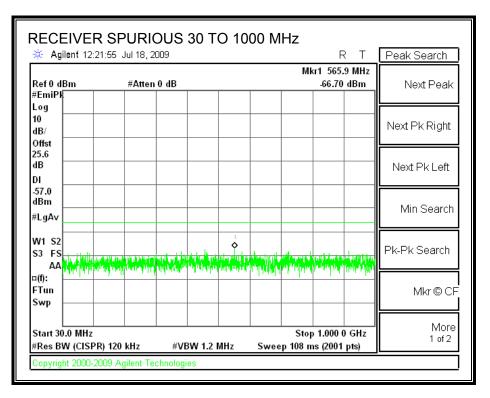
### **RECEIVER SPURIOUS EMISSIONS IN THE 5.3 GHz BAND**

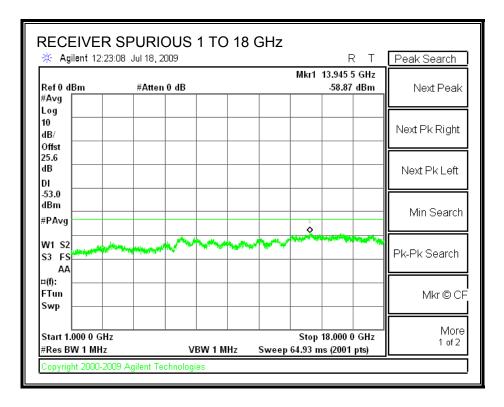




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### **RECEIVER SPURIOUS EMISSIONS IN THE 5.5 GHz BAND**





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# 9. RADIATED TEST RESULTS

## 9.1. LIMITS AND PROCEDURE

### LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

| Frequency Range<br>(MHz) | Field Strength Limit<br>(uV/m) at 3 m | Field Strength Limit<br>(dBuV/m) at 3 m |
|--------------------------|---------------------------------------|---|
| 30 - 88                  | 100                                   | 40                                      |
| 88 - 216                 | 150                                   | 43.5                                    |
| 216 - 960                | 200                                   | 46                                      |
| Above 960                | 500                                   | 54                                      |

### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

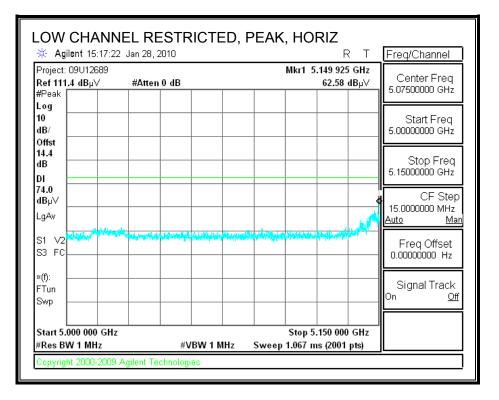
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## 9.2. TRANSMITTER ABOVE 1 GHz

### 9.2.1. 802.11a MODE IN 5.2 GHz BAND

#### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

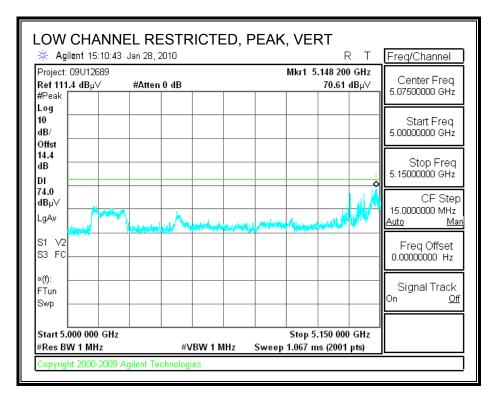


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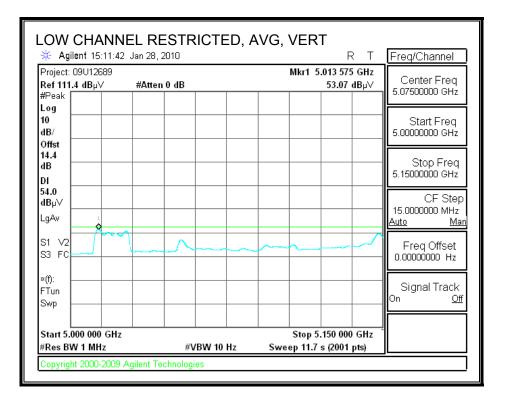
| 🔆 Agilent 15:18:17 Jan                                  | RESTRICTED, A<br>28, 2010 | R T   | Freq/Channel                                 |
|---|---------------------------|---|--|
| Project: 09∪12689<br><b>Ref 111.4 dB</b> µ∨ #A<br>#Peak | tten 0 dB                 | Mkr1 5.148 050 GHz<br>44.06 dBµ∨              | Center Freq<br>5.07500000 GHz                |
| Log<br>10<br>dB/<br>Offst                               |                           |   | Start Freq<br>5.00000000 GHz                 |
| dB  |                           |   | Stop Freq<br>5.15000000 GHz                  |
| 54.0<br>dBµ√<br>LgAv                                    |                           |   | CF Step<br>15.0000000 MHz<br><u>Auto Man</u> |
| S1 V2   |                           |   | Freq Offset<br>0.00000000 Hz                 |
| »(f):<br>FTun<br>Swp                                    |                           |   | Signal Track<br>On <u>Off</u>                |
| Start 5.000 000 GHz<br>#Res BW 1 MHz                    | #VBW 10 Hz                | Stop 5.150 000 GHz<br>Sweep 11.7 s (2001 pts) |  |

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### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



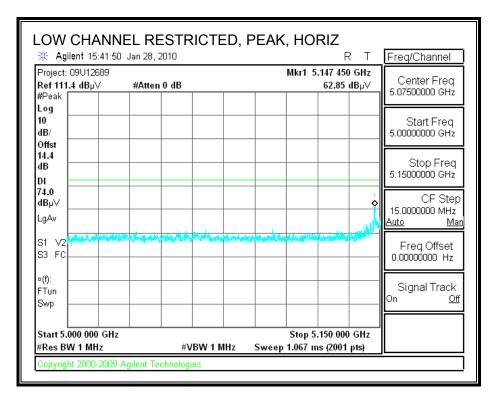
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### 9.2.2. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.2 GHz BAND

### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

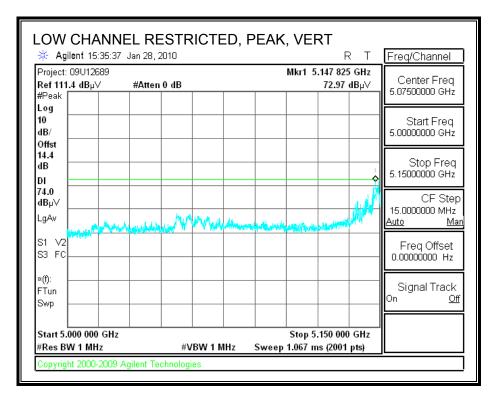


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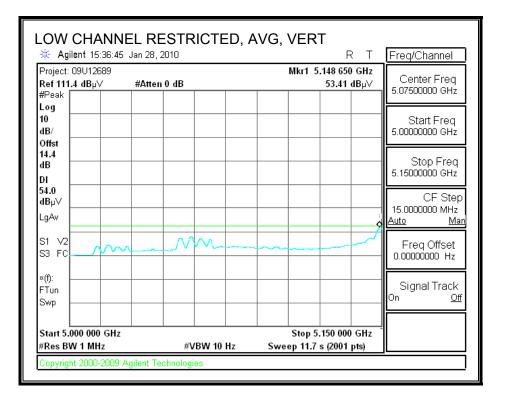
| 🔆 Agilent 15:43:18 Jan                                  | RESTRICTED, <i>J</i> 28, 2010 | R T   | Peak Search    |
|---|-------------------------------|---|----------------|
| Project: 09∪12689<br><b>Ref 111.4 dB</b> µ∨ #/<br>#Peak | Atten 0 dB                    | Mkr1 5.150 000 GHz<br>43.26 dBµ∨              | Next Peak      |
| Log<br>10<br>dB/  |                               |   | Next Pk Right  |
| Offst<br>14.4<br>dB                                     |                               |   | Next Pk Left   |
| 54.0<br>dBμV  |                               |   | Min Search     |
| S1 V2<br>S3 FC  |                               |   | Pk-Pk Search   |
| «(f):<br>FTun<br>Swp                                    |                               |   | Mkr © CF       |
| Start 5.000 000 GHz<br>#Res BW 1 MHz                    | #VBW 10 Hz                    | Stop 5.150 000 GHz<br>Sweep 11.7 s (2001 pts) | More<br>1 of 2 |

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### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



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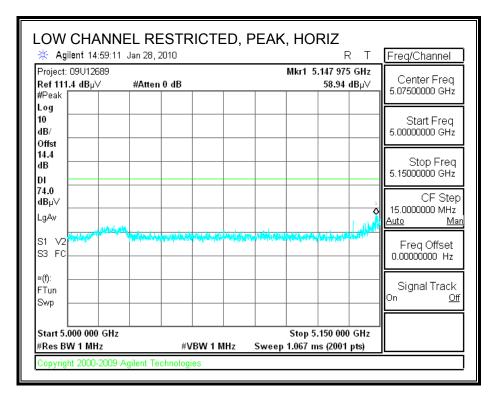
### HARMONICS AND SPURIOUS EMISSIONS

| Test Engr           |      | Thanh N   | lguyen    |  |  |           |          |          |        |               |              |        |          |             |       |
|---------------------|------|-----------|-----------|--|--|-----------|----------|----------|--------|---------------|--------------|--------|----------|-------------|-------|
| Date:               | •    | 07/15/09  |           |  |  |           |          |          |        |               |              |        |          |             |       |
| Project #:          |      | 09U1265   |           |  |  |           |          |          |        |               |              |        |          |             |       |
| Company             |      | QualCo    | -         |  |  |           |          |          |        |               |              |        |          |             |       |
|                     |      | Etherne   |           |  |  |           |          |          |        |               |              |        |          |             |       |
| EUT M/N:            | -    | 65-VN66   | 3-P2      |  |  |           |          |          |        |               |              |        |          |             |       |
| Test Targ           | et:  | FCC 15.   | 247/15.4  | 407  |  |           |          |          |        |               |              |        |          |             |       |
| Mode Op             | er:  | Transmi   |           |  |  |           |          |          |        |               |              |        |          |             |       |
|                     | f    | Measurer  | nent Fred | quency                                       |  | Preamp G  |          |          |        |               | Field Stren; |        |          |             |       |
|                     | Dist | Distance  |           |  | $D \; Corr$                                  | Distance  |          |          |        |               | ld Strength  |        |          |             |       |
|                     | Read | Analyzer  | ~         | ;  | Avg  | Average I |          | ~ ~      | ~      |               | vs. Average  |        |          |             |       |
|                     | AF   | Antenna   |           |  | Peak   | Calculate |          |          | ength  | Margin v      | rs. Peak Lir | nit    |          |             |       |
|                     | CL   | Cable Lo: | 55        |  | HPF  | High Pass | s Filter | :        |        |               |              |        |          |             |       |
| f                   | Dist | Read      | AF        | CL   | Amp  | D Corr    | Fltr     | Corr.    | Limit  | Margin        | Ant. Pol.    | Det.   | AntHigh  | Table Angle | Notes |
| GHz                 | (m)  | dBuV      | dB/m      | :  | dB   | dB        | :        | 1        | dBuV/m |               | V/H          | P/A/QP | cm       | Degree      |       |
| Low ch 51           | 80   |           |           |  |  |           |          |          |        |               |              |        |          |             |       |
| 15.540              | 3.0  | 35.8      | 38.7      |  | -34.8  | 0.0       | 0.7      | 51.7     | 74.0   | -22.3         | V            | Р      | 147.8    | 304.8       |       |
| 15.540              | 3.0  | 23.7      | 38.7      | ·  | -34.8  | 0.0       | 0.7      | 39.6     | 54.0   | -14.4         | V            | A      | 147.8    | 304.8       |       |
| 15.540              | 3.0  | 34.6      | 38.7      |  | -34.8  | 0.0       | 0.7      | 50.7     | 74.0   | -24.7         | H            | P      | 156.5    | 346.0       |       |
| 15.540              | 3.0  | 21.3      | 38.7      | 11.3   | -34.8  | 0.0       | 0.7      | 37.2     | 54.0   | - <b>16.3</b> | H            | A      | 156.5    | 346.0       |       |
| Mid ch 52<br>15.600 | 3.0  | 37.1      | 38.5      | 114  | -34.8  | 0.0       | 0.7      | 52.9     | 74.0   | -21.1         | v            | Р      | 147.8    | 296.5       |       |
| 15.600              | 3.0  | 24.4      | 38.5      | 11.4   |  | 0.0       | 0.7      | 40.2     | 54.0   | -13.8         | v            | Ă      | 147.8    | 296.5       |       |
| 15.600              | 3.0  | 37.1      | 38.5      |  | -34.8  | 0.0       | 0.7      | 52.9     | 74.0   | -21.1         | Ĥ            | P      | 150.5    | 300.0       |       |
| 15.600              | 3.0  | 23.4      | 38.5      |  | -34.8  | 0.0       | 0.7      | 39.4     | 54.0   | -14.6         | H            | A      | 150.5    | 300.0       |       |
| High ch 🗄           | 240  | 1         |           | 1  | [  | 1         |          |          |        | <u> </u>      |              |        | <u> </u> |             |       |
| 15.720              | 3.0  | 36.6      | 38.2      | 11.4   |  | 0.0       | 0.7      | 52.2     | 74.0   | -21.8         | V            | Р      | 166.9    | 200.0       |       |
| 15.720              | 3.0  | 25.5      |           |  | -34.7  | 0.0       | 0.7      | 41.2     | 54.0   | -12.8         | V            | A      | 166.9    | 200.0       |       |
| 15.720              | 3.0  | 36.4      |           |  | -34.7  | 0.0       | 0.7      | 52.1     | 74.0   | -21.9         | H            | P      | 140.6    | 310.0       |       |
| 15.720              | 3.0  | 24.2      | 38.2      | 11.4   | -34.7  | 0.0       | 0.7      | 39.8     | 54.0   | -14.2         | H            | A      | 140.6    | 310.0       |       |
|                     |      | +         |           | <u> </u>                                     |  | +         |          |          |        |               |              |        |          |             |       |
| Rev. 4.1.2          | .7   | :         | :         | <u>.                                    </u> | <u>.                                    </u> |           |          |          | :      |               |              |        | :        |             |       |
|                     |      |           |           |  |  |           |          | e floor. |        |               |              |        |          |             |       |

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### 9.2.3. 802.11n HT20 MODE IN 5.2 GHz BAND

### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

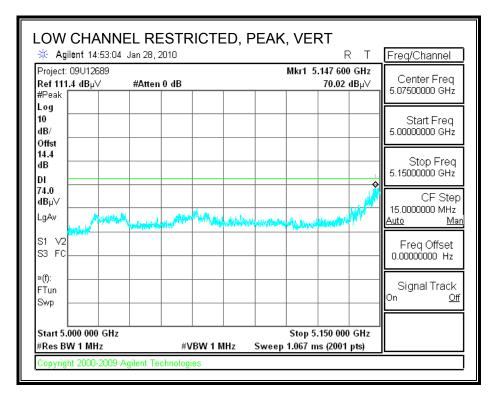


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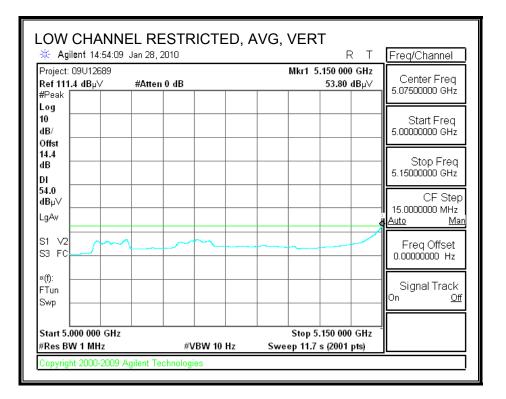
| Project:         09/12689         Mkr1 5.150 000 GHz         Center Freq<br>5.07500000 GHz           #Peak         43.89 dBµV         Center Freq<br>5.07500000 GHz         Start Freq<br>5.0000000 GHz           10<br>dB/<br>dB/<br>dB/<br>dB/<br>dB/<br>dB/<br>dB/<br>dB/<br>common db/<br>dB/<br>dB/<br>dB/<br>dB/<br>common db/<br>dB/<br>dB/<br>dB/<br>dB/<br>dB/<br>dB/<br>common db/<br>dB/<br>dB/<br>dB/<br>common db/<br>dB/<br>dB/<br>common db/<br>dB/<br>dB/<br>common db/<br>dB/<br>common db/<br>common db/<br>commond | LOW CHANNEL R                        |            | AVG, HORIZ                                    | Freq/Channel                 |
|---|--------------------------------------|------------|---|------------------------------|
| Ref 111.4 dBµ√         #Atten 0 dB         43.89 dBµ√         Center Freq<br>5.07500000 GHz           #Peak   |                                      | , 2010     |   |                              |
| 10         dB/         Start Freq           0 dB/         0 ffst         5.0000000 GHz           14.4         dB         Stop Freq           10         0         0           14.4         0         0           14.4         0         0           14.4         0         0           10         0         0           11         0         0           11         0         0           11         0         0           12         0         0           13         0         0           14.4         0         0           10         0         0           11         0         0           14         0         0           15         0         0           15         0         0           15         0         0           15         0         0           15         0         0           16         0         0           17         0         0           18         0         0           17         0         0   | Ref 111.4 dBµ∨ #Atte                 | n0dB       |   |                              |
| 14.4<br>dB<br>dB<br>DI<br>54.0<br>dBµV       Stop Freq<br>5.15000000 GHz         LgAv       CF Step<br>15.0000000 MHz<br>Auto         S1 V2<br>S3 FC       Freq Offset<br>0.0000000 Hz         *(f):<br>FTun<br>Swp       Stop 5.150 000 GHz         Start 5.000 000 GHz       Stop 5.150 000 GHz   | 10 dB/                               |            |   |                              |
| 54.0<br>dBµ√         CF Step           LgAv         CF Step           S1 V2         Stop 5.150 000 GHz  | 14.4<br>dB                           |            |   |                              |
| S3 FC Freq Oilset<br>s():<br>FTun<br>Swp Swp Signal Track<br>On<br>Start 5.000 000 GHz Stop 5.150 000 GHz   | 54.0<br>dBµ∨                         |            |   | 15.0000000 MHz               |
| FTun<br>Swp         Signal Track<br>On         Signal Track<br>On           Start 5.000 000 GHz         Stop 5.150 000 GHz         Stop 5.150 000 GHz   | - · · · -                            |            |   | Freq Offset<br>0.00000000 Hz |
|   | FTun                                 |            |   |                              |
| #Res DW T WITZ #VBW 10 HZ Sweep 11.7 s (2001 pts)   | Start 5.000 000 GHz<br>#Res BW 1 MHz | #VBW 10 Hz | Stop 5.150 000 GHz<br>Sweep 11.7 s (2001 pts) |                              |

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### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

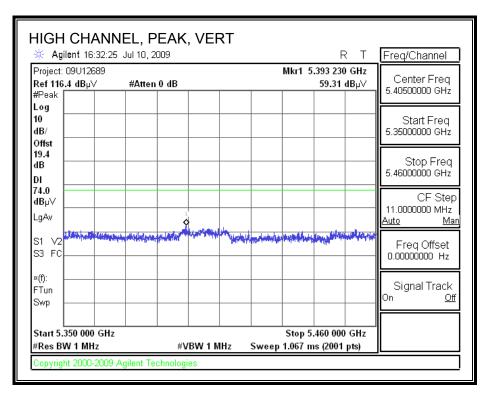


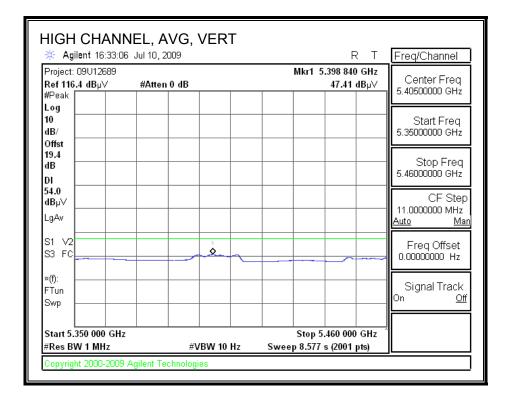
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### AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





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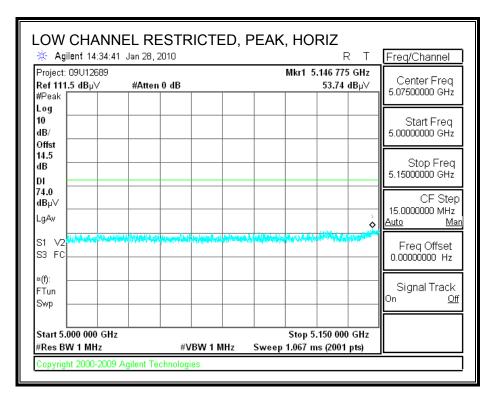
#### HARMONICS AND SPURIOUS EMISSIONS

| Complis           | ~                     |                         | y Measurem<br>Services, Fr |              | 5m Ch        | amber          |            |            |              |              |          |           |                |                               |                                    |
|-------------------|-----------------------|-------------------------|----------------------------|--------------|--------------|----------------|------------|------------|--------------|--------------|----------|-----------|----------------|-------------------------------|------------------------------------|
| -                 |                       |                         | Services, FI               | emont        | on on        | anoei          |            |            |              |              |          |           |                |                               |                                    |
|                   | iy: Qual              |                         |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
|                   | #: 09U<br>7/13/09     | 12689                   |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
|                   |                       | Doug And                | erson                      |              |              |                |            |            |              |              |          |           |                |                               |                                    |
|                   |                       |                         | port Notebo                | ok           |              |                |            |            |              |              |          |           |                |                               |                                    |
| Mode: 1           | Tx / HT               | 20                      |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| Fest Eq           | uipmen                | <u>t:</u>               |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| ш                 | orn 1                 | 18GHz                   | Pre-ar                     | nnlifer      | 1.260        | 247            | Pre-am     | nlifer     | 26-40GH      | 17           | н        | orn > 18( | 247            |                               | Limit                              |
|                   |                       |                         |                            | · ·          |              |                | T TC-am    | piner      | 20-4001      |              |          |           | 5112           |                               | FCC 15.205                         |
| 1/3; 9            | S/N: 671              | /@3m                    | ▼ 1144 M                   | /liteq 30    | 08A009       | )31            |            |            |              | •            |          |           |                | •                             | FCC 15.205                         |
| Hi Free           | quency Ca             | bles                    |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| 3' (              | cable 2               | 2807700                 | 12' c                      | able 2       | 28076        | 500            | 20' ca     | ble 22     | 2807500      |              | HPF      | Re        | ject Filte     |                               | <u>« Measurements</u>              |
| 3' -              | able 228              | 207700                  | 421                        | LL- 220      | 07606        |                | 20' cab    | 10 2204    | 07500        |              | F_7.6GHz |           |                | RB                            | W=VBW=1MHz<br>ge Measurements      |
| 3 6               | abre ZZG              | 01100                   | ▼ 12° ca                   | nble 228     | 07600        | •              | 20 cab     | 16 2200    | •1300        |              | _7.00HZ  | <b>•</b>  |                |                               | 1MHz ; VBW=10Hz                    |
| f                 | Dist                  | Read Pl                 | Read Avg.                  | AF           | CL           | Amp            | D Corr     | Fltr       | Peak         | Avg          | Pk Lim   | Avg Lim   | Pk Mar         | Avg Mar                       | Notes                              |
| GHz               | (m)                   | dBuV                    | dBuV                       | dB/m         | dB           | dB             | dB         | dB         |              |              | dBuV/m   | dBuV/m    | dB             | dB                            | (V/H)                              |
|                   |                       |                         | İ.                         |              |              |                |            |            |              |              |          | -         |                |                               |                                    |
| Low Ch.:          | <u>5180 (Pe</u>       | wer = 14 dBr            | <u>n)</u>                  |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| 15.540            | 3.0                   | 43.5                    | 29.7                       | 38.7         | 113          | -34.8          | 0.0        | 0.7        | 59.4         | 45.7         | 74       | 54        | -14.6          | -8.3                          | V (Noise Floor)                    |
| 15.540            | 3.0                   | 43.4                    | 29.7                       | 38.7         | 113          | -34.8          | 0.0        | 0.7        | 59.3         | 45.6         | 74       | 54        | -14.7          | - <b>8</b> .4                 | H (Noise Floor)                    |
|                   | 5000 0                | 1                       | İ.,                        |              |              |                |            |            |              |              | *        |           |                |                               |                                    |
|                   | <u>5200 (Pc</u>       | wer = 14 dB             | <u>m)</u>                  |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| 5.600             | 3.0                   | 43.1                    | 29.4                       | 38.5         | 11.4         | -34.8          | 0.0        | 0.7        | 58.9         | 45.2         | 74       | 54        | -15.1          | -8.8                          | V (Noise Floor)                    |
| 15.600            | 3.0                   | 43.1                    | 31.9                       | 38.5         | 11.4         | -34.8          | 0.0        | 0.7        | 58.9         | 47.8         | 74       | 54        | -15.1          | -6.2                          | H (Noise Floor)                    |
| т. <u>.</u> 1. сч | 5040 0                | ower = 14 dB            | 1                          |              |              |                |            |            |              |              |          |           |                |                               |                                    |
|                   | : <del>5</del> 240 (P | Ĭ                       |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| 15.720<br>15.720  | 3.0<br>3.0            | 42.3<br>43.0            | 31.4<br>29.0               | 38.2<br>38.2 | 11.4<br>11.4 | -34.7<br>-34.7 | 0.0<br>0.0 | 0.7<br>0.7 | 58.0<br>58.6 | 47.0<br>44.6 | 74<br>74 | 54<br>54  | -16.0<br>-15.4 | -7.0<br>-9.4                  | V (Noise Floor)<br>H (Noise Floor) |
| 2.740             |                       | 43.0                    | 27.0                       | 304          | 11.4         |                | 0.0        | 0./        |              | 44.0         |          |           | -104           | -7.4                          | 11(10156 11001)                    |
| Rev. 11.10        | 0.00                  |                         |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
| (ev. 11.10        | 5.08                  |                         |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |
|                   |                       |                         |                            |              |              |                | <b>r</b>   | a .        |              |              |          |           |                |                               |                                    |
|                   | f<br>Dist             | Measurem<br>Distance to | ent Frequency              | У            |              | Amp<br>D.Corr  | Preamp (   |            | ct to 3 met  |              |          | -         | -              | Field Strengt<br>d Strength L |                                    |
|                   |                       | Analyzer R              |                            |              |              | Avg            |            |            | Strength @   |              |          |           |                | : Average L                   |                                    |
|                   | AF                    | Antenna Fa              |                            |              |              | Peak           | -          |            | k Field Stre |              |          | -         | -              | . Peak Limit                  |                                    |
|                   | CL                    | Cable Los:              | s                          |              |              | HPF            | High Pas   | s Filter   |              |              |          |           | _              |                               |                                    |
|                   |                       |                         |                            |              |              |                |            |            |              |              |          |           |                |                               |                                    |

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### 9.2.4. 802.11n HT40 MODE IN 5.2 GHz BAND

### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

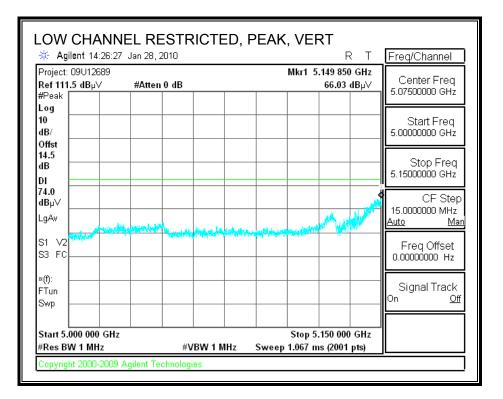


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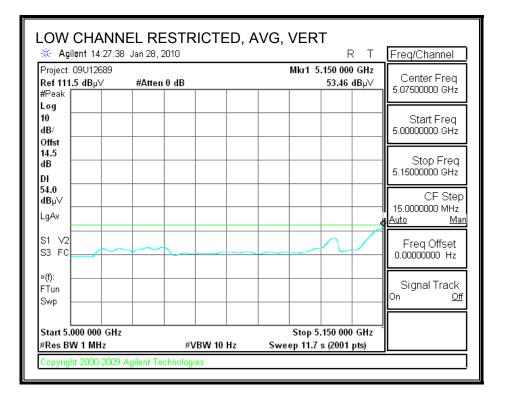
| ★ Agilent 14:36:02 Jan                                  | RESTRICTED, A<br>28, 2010 | R T   | Freq/Channel                                |
|---|---------------------------|---|---|
| Project: 09U12689<br><b>Ref 111.5 dB</b> µ∨ #A<br>#Peak | tten 0 dB                 | Mkr1 5.150 000 GHz<br>42.54 dBµ∨              | Center Freq<br>5.07500000 GHz               |
| Log<br>10<br>dB/<br>Offst                               |                           |   | Start Freq<br>5.00000000 GHz                |
| dB  |                           |   | Stop Freq<br>5.15000000 GHz                 |
| 54.0<br>dBμV<br>LgAv                                    |                           |   | CF Step<br>15.000000 MHz<br><u>Auto Mar</u> |
| S1 V2<br>S3 FC  |                           |   | Freq Offset<br>0.00000000 Hz                |
| »(f):<br>FTun<br>Swp                                    |                           |   | Signal Track<br>On <u>Off</u>               |
| Start 5.000 000 GHz<br>#Res BW 1 MHz                    | #VBW 10 Hz                | Stop 5.150 000 GHz<br>Sweep 11.7 s (2001 pts) | Å   |

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### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

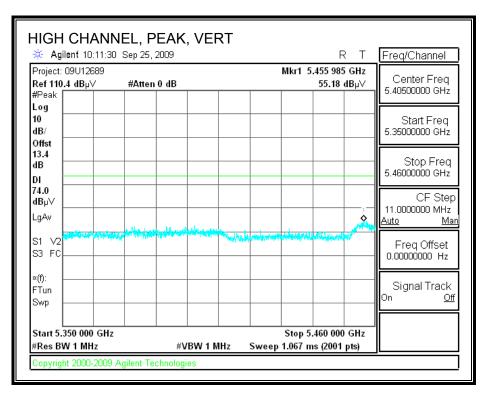


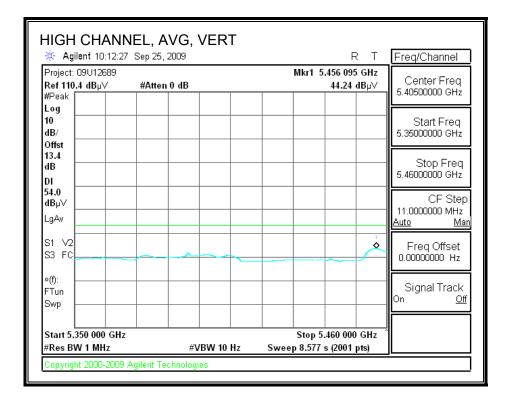
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### AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





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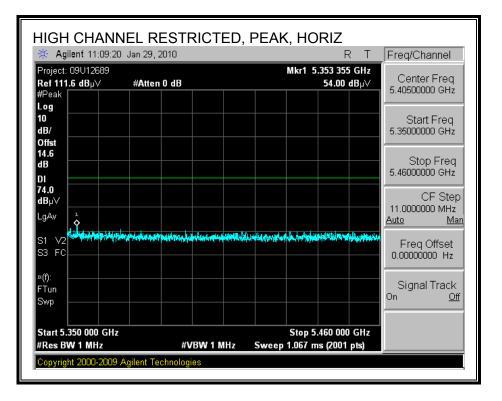
### HARMONICS AND SPURIOUS EMISSIONS

| Cest Engr:<br>Date:<br>Project #:<br>Company<br>Configurs<br>Mode Ope | :<br>ation:                   | William<br>09/25/09<br>09U1268<br>Qualcon<br>EUT w/St<br>Tx HT40 | 19<br>nm<br>upport P                    | -      | ook       |            |                             |                           |        |                      |  |                |          |             |       |
|---|-------------------------------|--|---|--------|-----------|------------|-----------------------------|---------------------------|--------|----------------------|--|----------------|----------|-------------|-------|
|   | f<br>Dist<br>Read<br>AF<br>CL | Measuren<br>Distance<br>Analyzer<br>Antenna<br>Cable Los         | to Anter<br>Reading<br>Factor           | nna    |           | -          | Correc<br>Field S<br>I Peak | trength @<br>: Field Stre | 3 m    | Peak Fie<br>Margin v | Field Stren,<br>ld Strength<br>75. Average<br>75. Peak Lir | Limit<br>Limit |          |             |       |
| f   | Dist                          | Read   | AF                                      | CL     | Amp       | D Corr     | Fltr                        | Corr.                     | Limit  | Margin               | Ant. Pol.  | Det.           | Ant.High | Table Angle | Notes |
| GHz   | (m)                           | dBuV   | dB/m                                    |        | dB        | dB         |                             | : :                       | dBuV/m | dB                   | V/H  | P/A/QP         | cm       | Degree      |       |
| 190MHz  | Power                         | Setting=   | 12 dBm                                  |        | 1         |            |                             |                           |        |                      |  |                |          |             |       |
| 5.570   | 3.0                           | 35.5   | 38.6                                    | 11.4   | -34.8     | 0.0        | 0.7                         | 51.3                      | 74.0   | -22.7                | V  | Р              | 170.4    | 360.0       |       |
| 5.570   | 3.0                           | 23.1   | 38.6                                    | 11.4   | -34.8     | 0.0        | 0.7                         | 39.0                      | 54.0   | -15.0                | V  | A              | 170.4    | 360.0       |       |
| 5.570   | 3.0                           | 35.0   | 38.6                                    | 11.4   | -34.8     | 0.0        | 0.7                         | 50.9                      | 74.0   | - <b>23.1</b>        | H  | Р              | 122.4    | 156.9       |       |
| 5.570   | 3.0                           | 23.0   | 38.6                                    | 11.4   | -34.8     | 0.0        | 0.7                         | 38.9                      | 54.0   | -15.1                | H  | A              | 122.4    | 156.9       |       |
| 230MHz  | , Power                       | Setting=   | 12 dBm                                  |        |           |            |                             |                           |        |                      |  |                |          |             |       |
| 5.690   | 3.0                           | 35.2   | 38.3                                    | 11.4   | -34.7     | 0.0        | 0.7                         | 50.9                      | 74.0   | -23.1                | V  | Р              | 121.6    | 357.2       |       |
| 5.690   | 3.0                           | 22.8   | • | 11.4   |           | 0.0        | 0.7                         | 38.5                      | 54.0   | -15.5                | V  | A              | 121.6    | 357.2       |       |
| 5.690   | 3.0                           | 36.2   |   |        | -34.7     | 0.0        | 0.7                         | 51.9                      | 74.0   | -22.1                | H  | Р              | 100.0    | 87.3        |       |
| 5.690   | 3.0                           | 22.8   | 38.3                                    | 11.4   | -34.7     | 0.0        | 0.7                         | 38.5                      | 54.0   | -15.5                | Н  | A              | 100.0    | 87.3        |       |
| lote: No  | other e                       | missions ·   | were de                                 | tected | l above i | the syster | n nois                      | se floor.                 |        |                      |  |                |          |             |       |

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### 9.2.5. 802.11a MODE IN 5.3 GHz BAND

### **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

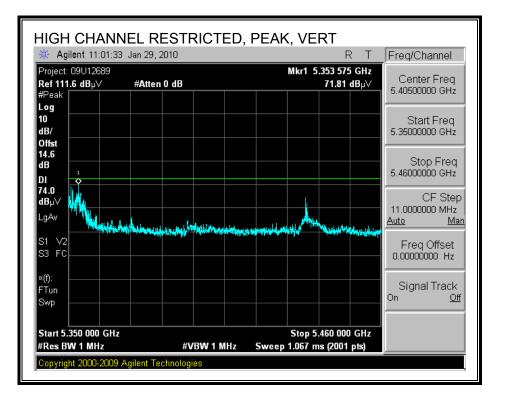


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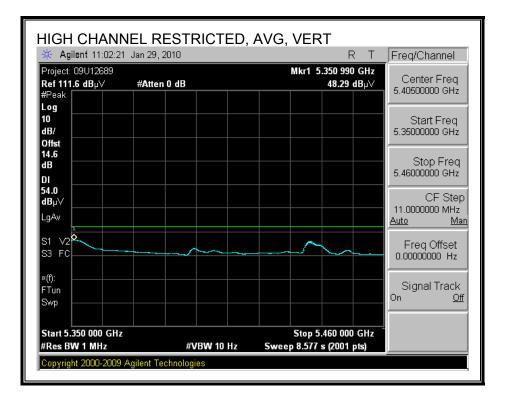
| 🔆 Agilent 11:10:13 -                                 | Jan 29, 2010 | R T  | Freq/Channel                             |
|--|--------------|--|--|
| Project: 09U12689<br><b>Ref 111.6 dB</b> µV<br>#Peak | #Atten 0 dB  | Mkr1 5.350 000 GHz<br>41.11 dBµ∨               | Center Freq<br>5.40500000 GHz            |
| Log<br>10<br>dB/<br>Offst                            |              |  | Start Freq<br>5.35000000 GHz             |
| 14.6<br>dB<br>DI                                     |              |  | Stop Freq<br>5.46000000 GHz              |
| 54.0<br>dBµ√<br>LgAv                                 |              |  | CF Step<br>11.0000000 MHz                |
| S1 V2.<br>S3 F00                                     |              |  | Auto Man<br>Freq Offset<br>0.00000000 Hz |
| *(f):<br>FTun<br>Swp                                 |              |  | Signal Track<br>On <u>Off</u>            |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                 | #VBW 10 Hz   | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) |  |

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### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



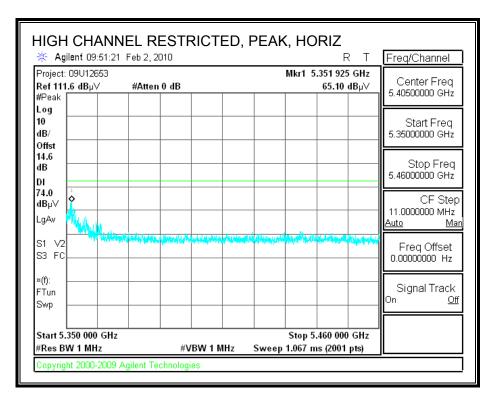
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### 9.2.6. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.3 GHz BAND

### **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

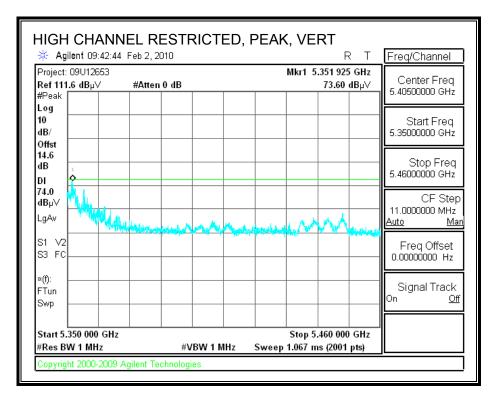


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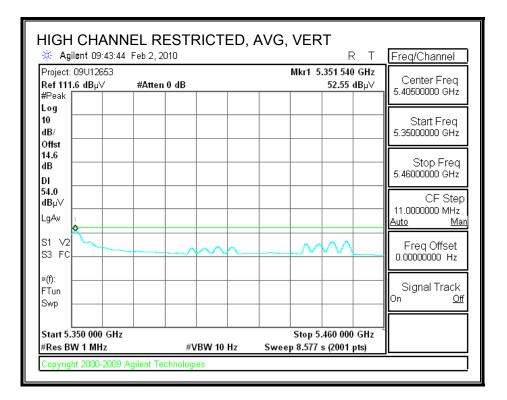
| HIGH CHANNEL R  |            | AVG, HORIZ                                     | Freq/Channel                                 |
|---|------------|--|--|
| Project: 09∪12653<br><b>Ref 111.6 dB</b> µ∨ #Atter<br>#Peak |            | Mkr1 5.351 210 GHz<br>45.30 dBµ∀               | Center Freq<br>5.40500000 GHz                |
| Log<br>10<br>dB/<br>Offst                                   |            |  | Start Freq<br>5.35000000 GHz                 |
| 14.6<br>dB  |            |  | Stop Freq<br>5.46000000 GHz                  |
| 54.0<br>dBμV<br>LgAv  |            |  | CF Step<br>11.0000000 MHz<br><u>Auto Man</u> |
| S1 V2<br>S3 FC  |            |  | Freq Offset<br>0.00000000 Hz                 |
| ×(f):<br>FTun<br>Swp  |            |  | Signal Track<br>On <u>Off</u>                |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                        | #VBW 10 Hz | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) |  |

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### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



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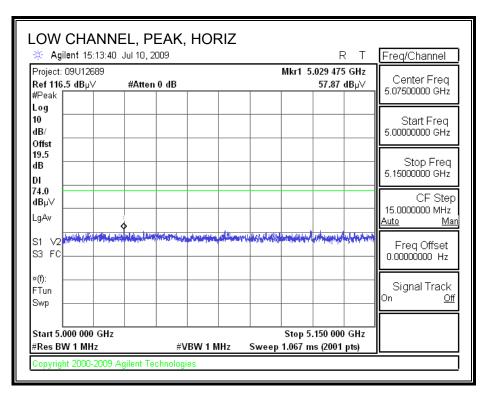
### HARMONICS AND SPURIOUS EMISSIONS

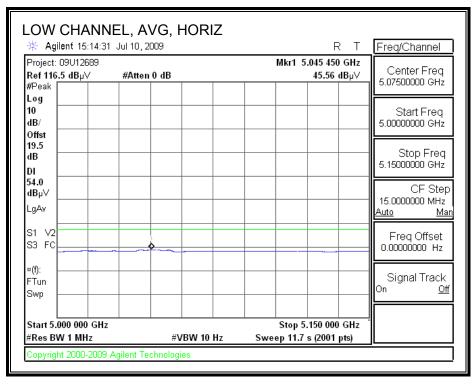
|                           |                      |  | 2689             | oto          | Natak       | alt                                 |            |                              |  |              |          |                   |                         |  |                                 |
|---------------------------|----------------------|--|------------------|--------------|-------------|-------------------------------------|------------|------------------------------|--|--------------|----------|-------------------|-------------------------|--|---------------------------------|
| Mode:                     | ration.              |  | 2 chains, 11a    |              | Notes       | 00K                                 |            |                              |  |              |          |                   |                         |  |                                 |
| Fest Eq                   | uipmen               | <u>t:</u>  |                  |              |             |                                     |            |                              |  |              |          |                   |                         |  |                                 |
| н                         | lorn 1-              | 18GHz  | Pre-ar           | mplifer      | 1-260       | GHz                                 | Pre-am     | plifer                       | 26-40GH                                    | z            | н        | orn > 18          | GHz                     |  | Limit                           |
| 173; 9                    | S/N: 6717            | 7 @3m  | ▼ T144 №         | Miteq 30     | 08A009      | J31 🖵                               |            |                              |  | -            |          |                   |                         | -  | FCC 15.205 🗸                    |
| I<br>┌─ Hi Free           | quency Cal           | bles   |                  |              |             |                                     |            |                              |  |              |          |                   |                         |  |                                 |
| 3'                        | cable 2              | 2807700  | 12' c            | able 2       | 28076       | 500                                 | 20' cal    | ble 22                       | 2807500                                    |              | HPF      | Re                | ject Filte              |  | <u>k Measurements</u>           |
|                           | able 228             |  | 12' 67           | able 228     | 07600       |                                     | 20' cab    | le 228/                      | 07500                                      |              | F_7.6GHz |                   |                         | RB   | 3W=VBW=1MHz<br>age Measurements |
|                           |                      |  |                  | DIG LLG      | 11000       | •                                   |            |                              |  |              |          |                   |                         |  | =1MHz; VBW=10Hz                 |
| f                         | Dist                 | Read Pk  | Read Avg.        | AF           | CL          | Amp                                 | D Corr     | Fltr                         | Peak                                       | Avg          | Pk Lim   | Avg Lim           | Pk Mar                  | Avg Mar  | Notes                           |
| GHz                       | (m)                  | dBuV   | dBuV             | dB/m         | dB          | dB                                  | dB         | dB                           | dBuV/m                                     | dBuV/m       | dBuV/m   | dBuV/m            | dB                      | dB   | (V/H)                           |
|                           | 5260Mhz              |  |                  |              |             |                                     | ļ          | ļ                            |  | ļ            |          |                   |                         |  |                                 |
| 15.780<br>15.780          | 3.0<br>3.0           | 41.4<br>38.3   | 28.4<br>26.4     | 38.0<br>38.0 | 115<br>115  | -34.6<br>-34.6                      | 0.0<br>0.0 | 0.7<br>0.7                   | 56.9<br>53.8                               | 43.9<br>41.9 | 74<br>74 | 54<br>54          | -17.1<br>-20.2          | -10.1<br>-12.1   | V<br>H                          |
| Mid. Ch.:                 | <u>5300</u>          |  |                  | ••••••••     |             |                                     |            |                              |  | •            |          |                   | •                       |  |                                 |
| 10.600<br>15.900          | 3.0<br>3.0           | 38.2<br>39.3   | 28.4<br>28.2     | 37.7<br>37.7 | 9.0<br>11.5 | -36.6<br>-34.6                      | 0.0<br>0.0 | 0.8                          | 49.2<br>54.7                               | 39.3<br>43.6 | 74<br>74 | 54<br>54          | -24.8<br>-19.3          | -14.7<br>-10.4   | V<br>V (Noise Floor)            |
| 10.600                    | 3.0                  | 38.6   | 26.2             | 37.7         | 9.0         | -36.6                               | 0.0        | 0.8                          | 49.5                                       | 37.2         | 74       | 54                | -24.5                   | - <b>16.8</b>  | Н                               |
| 15,900                    | 3.0                  | 38.5   | 26.4             | 37.7         | 11.5        | -34.6                               | 0.0        | 0.7                          | 53.8                                       | 41.7         | 74       | 54                | -20.2                   | -12.3  | H (Noise Floor)                 |
| <u>High Ch.</u><br>10.640 | <u>: 5320</u><br>3.0 | 46.7   | 35.6             | 37.7         | 9.1         | -36.6                               | 0.0        | 0.8                          | 57.7                                       | 46.6         | 74       | 54                | -16.3                   | -7.4   | v                               |
| 15.960                    | 3.0                  | 42.4   | 29.1             | 37.5         | 115         | -34.5                               | 0.0        | 0.7                          | 57.7                                       | 44.4         | 74       | 54                | -16.3                   | -9.6   | V (Noise Floor)                 |
| 10.640                    | 3.0                  | 38.3   | 26.2             | 37.7         | 9.1         | -36.6                               | 0.0        | 0.8                          | 49.3                                       | 37.2         | 74       | 54                | -24.7                   | - <b>16.8</b>  | Н                               |
| 15.960                    | 3.0                  | 41.1   | 28.7             | 37.5         | 11.5        | -34.5                               | 0.0        | 0.7                          | 56.4                                       | 43.9         | 74       | 54                | -17.6                   | -10.1  | H (Noise Floor)                 |
| Rev. 11.10                | f<br>Dist            | Measureme<br>Distance to<br>Analyzer R<br>Antenna Fa<br>Cable Loss | leading<br>actor | y            |             | Amp<br>D Corr<br>Avg<br>Peak<br>HPF | Average    | Correc<br>Field S<br>ed Peak | ct to 3 mete<br>Strength @<br>k Field Stre | 3 m          |          | Pk Lim<br>Avg Mar | Peak Field<br>Margin vs | Field Strengt<br>d Strength L<br>. Average L<br>. Peak Limit | .imit<br>.imit                  |

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# 9.2.7. 802.11n HT20 MODE IN 5.3GHz BAND

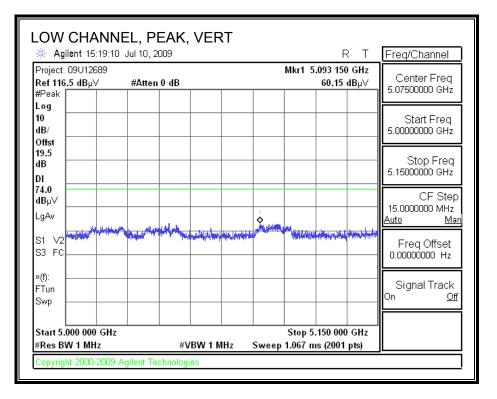
#### AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)

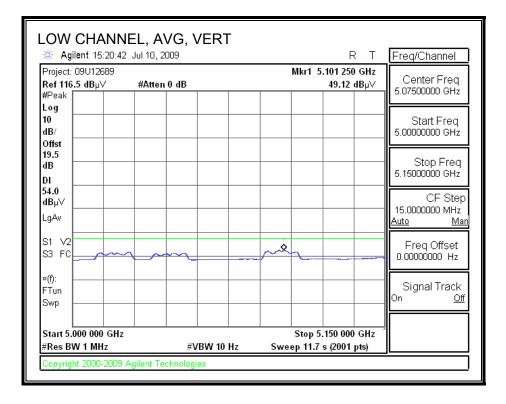




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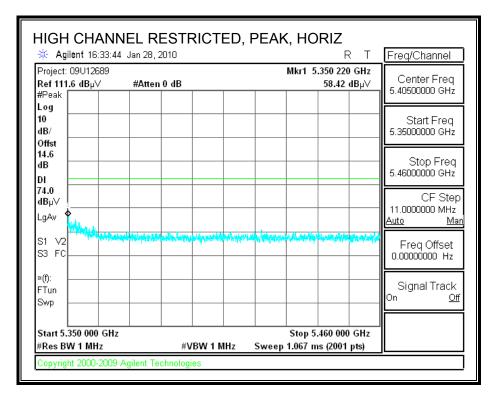
## AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)





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## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

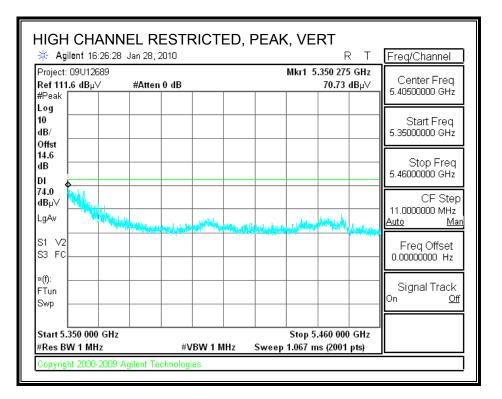


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| HIGH CHANNEL R                       |            | AVG, HORIZ                                     | Freq/Channel                                 |
|--------------------------------------|------------|--|--|
| #Peak                                | n 0 dB     | Mkr1 5.350 000 GHz<br>42.91 dBµ∨               | Center Freq<br>5.40500000 GHz                |
| Log<br>10<br>dB/<br>Offst            |            |  | Start Freq<br>5.35000000 GHz                 |
| 14.6<br>dB                           |            |  | Stop Freq<br>5.46000000 GHz                  |
| 54.0<br>dBµ∨<br>LgAv                 |            |  | CF Step<br>11.0000000 MHz<br><u>Auto Man</u> |
| S1 V2<br>S3 FC                       |            |  | Freq Offset<br>0.00000000 Hz                 |
| ×(f):<br>FTun<br>Swp                 |            |  | Signal Track<br>On <u>Off</u>                |
| Start 5.350 000 GHz<br>#Res BW 1 MHz | #VBW 10 Hz | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) |  |

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## **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



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| HIGH CHANNEL R<br>Agilent 16:27:52 Jan 28,          | ,          | R T  | Freq/Channel                                 |
|---|------------|--|--|
| Project: 09∪12689<br>Ref 111.6 dBµ∨ #Atten<br>#Peak | n0dB       | Mkr1 5.350 000 GHz<br>52.72 dBµ∨               | Center Freq<br>5.40500000 GHz                |
| Log<br>10<br>dB/<br>Offst                           |            |  | Start Freq<br>5.35000000 GHz                 |
| 14.6<br>dB<br>DI                                    |            |  | Stop Freq<br>5.46000000 GHz                  |
| 54.0<br>dBµ∨<br>LgAv                                |            |  | CF Step<br>11.0000000 MHz<br><u>Auto Man</u> |
| S1 V2<br>S3 FC                                      |            |  | Freq Offset<br>0.00000000 Hz                 |
| »(f):<br>FTun<br>Swp                                |            |  | Signal Track<br>On <u>Off</u>                |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                | #VBW 10 Hz | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) | Å  |

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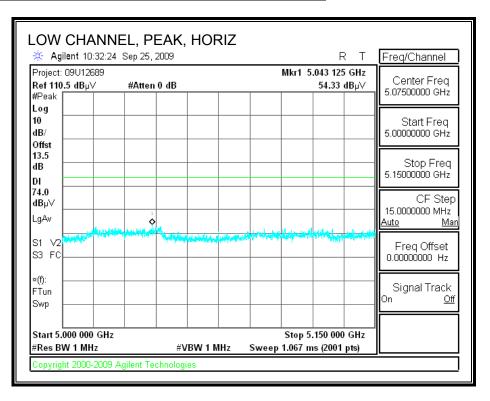
#### HARMONICS AND SPURIOUS EMISSIONS

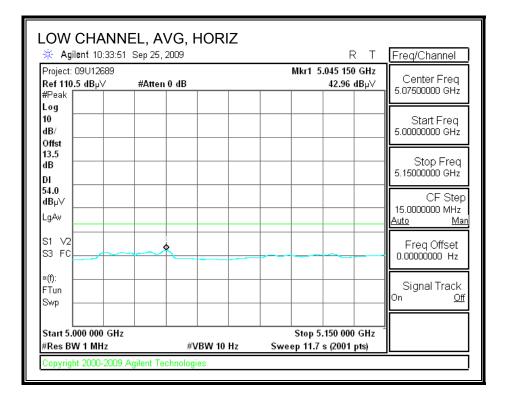
|                | -                 |                           | 7 Measurem        |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
|----------------|-------------------|---------------------------|-------------------|--------------|-------------|----------------|--------------|---------------|----------------------------|---------------|------------------|-----------|----------------|-------------------------------|-------------------------------|
| omplia         | nce Ce            | ertification              | Services, Fr      | emont        | 5m Ch       | amber          |              |               |                            |               |                  |           |                |                               |                               |
| ompan          | y: Qua            | lcomm                     |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
| oject i        | #: 09U            |                           |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
|                | 7/10/09<br>dinaar | Doug And                  | orcon             |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
|                |                   |                           | port Notebo       | ok           |             |                |              |               |                            |               |                  |           |                |                               |                               |
| Iode: 7        | Tx / HT           | 20                        |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
| est Eq         | uipmen            | ıt:                       |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
|                |                   | _                         | _                 |              |             |                | _            |               |                            |               |                  |           |                |                               |                               |
| н              | orn 1-            | 18GHz                     | Pre-ar            | nplifer      | 1-260       | SHZ            | Pre-am       | plifer        | 26-40GH                    | z             | н                | orn > 18( | GHz            |                               | Limit                         |
| 173; S         | 5/N: 671          | 7 @3m                     | ▼ T144 M          | /liteq 30    | 08A009      | 31 🗸           |              |               |                            | -             |                  |           |                | -                             | FCC 15.205                    |
| Hi Freq        | uency Ca          | bles                      |                   |              |             | _              |              |               |                            |               |                  |           |                |                               |                               |
| 3' d           | able 2            | 22807700                  | 12' c             | able 2       | 28076       | 00             | 20' ca       | ble 22        | 807500                     |               | HPF              | Re        | ject Filte     |                               | <u> Measurements</u>          |
| 2'             | able 22           | 207700                    | 401               |              | 07000       |                | 20' cab      | 1. 2200       | 7500                       |               | F_7.6GHz         |           | ,              | RB                            | W=VBW=1MHz<br>ge Measurements |
| 36             | able 22           | 507700                    | ▼ 12° ca          | nble 228     | 07600       | •              | 20 Cab       | 1e 2200       | •                          |               | F_7.6GH2         | <b>-</b>  |                |                               | 1MHz; VBW=10Hz                |
|                |                   | -                         | - ,<br>           |              | ar          |                | D d          | <b>T</b> TD - |                            |               | -                |           |                |                               |                               |
| f<br>GHz       | Dist<br>(m)       | dBuV                      | Read Avg.<br>dBuV | AF<br>dB/m   | dB<br>dB    | Amp<br>dB      | D Corr<br>dB | Fltr<br>dB    | Peak<br>dBuV/m             | Avg<br>dBuV/m | Pk Lim<br>dBuV/m | -         | PK Mar<br>dB   | Avg Mar<br>dB                 | Notes<br>(V/H)                |
|                |                   |                           |                   |              |             |                |              |               |                            |               |                  |           |                | -                             | (                             |
| w Ch.: :       | <u>5260</u>       |                           |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
| .780           | 3.0               | 35.2                      | 24.5              | 38.0         | 11.5        | -34.6          | 0.0          | 0.7           | 50.7                       | 40.1          | 74               | 54        | -23.3          | -13.9                         | V (Noise Floor)               |
| .780           | 3.0               | 36.8                      | 24.1              | 38.0         | 11.5        | -34.6          | 0.0          | 0.7           | 52.3                       | 39.7          | 74               | 54        | -21.7          | -14.3                         | H (Noise Floor)               |
| id. Ch.:       | £200              |                           |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
|                |                   |                           |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
| 0.600<br>5.900 | 3.0<br>3.0        | 46.4<br>42.6              | 39.3<br>29.1      | 37.7<br>37.7 | 9.0<br>11.5 | -36.6<br>-34.6 | 0.0<br>0.0   | 0.8<br>0.7    | 57.3<br>57.9               | 50.2<br>44.5  | 74<br>74         | 54<br>54  | -16.7<br>-16.1 | -3.8<br>-9.5                  | V<br>V (Noise Floor)          |
| ).600          | 3.0               | 42.0                      | 29.0              | 37.7         | 9.0         | -34.0          | 0.0          | 0.8           | 53.1                       | 44.5          | 74               | 54<br>54  | -20.9          | -14.0                         | H                             |
| 5.780          | 3.0               | 43.0                      | 29.0              | 38.0         | 11.5        | -34.6          | 0.0          | 0.7           | 58 <i>.</i> 5              | 44.6          | 74               | 54        | -15.5          | -9.4                          | H (Noise Floor)               |
| igh Ch.:       | <u>5320</u>       |                           |                   |              |             |                |              |               | •                          |               |                  |           |                |                               |                               |
| 0.640          | 3.0               | 45.0                      | 37.2              | 37.7         | 9.1         | -36.6          | 0.0          | 0.8           | 56.0                       | 48.2          | 74               | 54        | -18.0          | -5.8                          | v                             |
| 960            | 3.0               | 42.5                      | 28.9              | 37.5         | 115         | -34.5          | 0.0          | 0.7           | 57.7                       | 44.2          | 74               | 54        | -16.3          | - <b>9.8</b>                  | V (Noise Floor)               |
| 0.640          | 3.0               | 44.1                      | 33.6              | 37.7         | 9.1         | -36.6          | 0.0          | 0.8           | 55.1                       | 44.6          | 74               | 54        | -18.9          | -9.4                          | H                             |
| 5.960          | 3.0               | 42.1                      | 29.3              | 37.5         | 115         | -34.5          | 0.0          | 0.7           | 57.4                       | 44.6          | 74               | 54        | -16.6          | -9.4                          | H (Noise Floor)               |
| v. 11.10       | .08               |                           |                   |              |             |                |              |               |                            |               |                  |           |                |                               |                               |
|                | f                 |                           | ent Frequency     | у            |             | Amp            | Preamp (     |               |                            |               |                  |           |                | Field Strengt                 |                               |
|                | Dist<br>Read      | Distance to<br>Analyzer R |                   |              |             | D Corr<br>Avg  |              |               | ct to 3 mete<br>Strength @ |               |                  |           |                | d Strength L:<br>. Average L: |                               |
|                | AF                | Antenna Fa                |                   |              |             | Avg<br>Peak    |              |               | c Field Stre               |               |                  |           |                | . Average Li<br>. Peak Limit  |                               |
|                | CL                | Cable Loss                |                   |              |             | HPF            | High Pas     |               |                            |               |                  |           | 2.200 801 00   | . 2 our Lalille               |                               |
|                |                   |                           |                   |              |             |                | 0            |               |                            |               |                  |           |                |                               |                               |

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# 9.2.8. 802.11n HT40 MODE IN 5.3GHz BAND

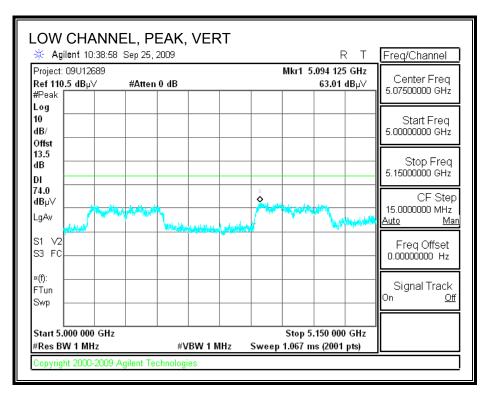
#### AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)

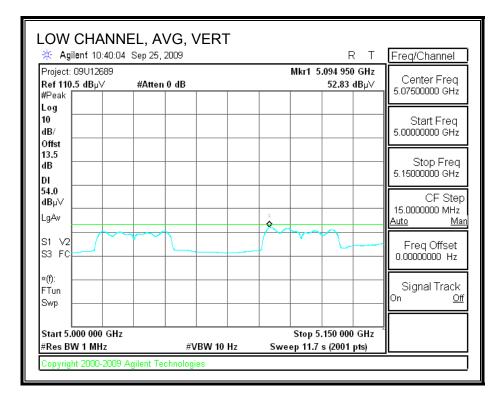




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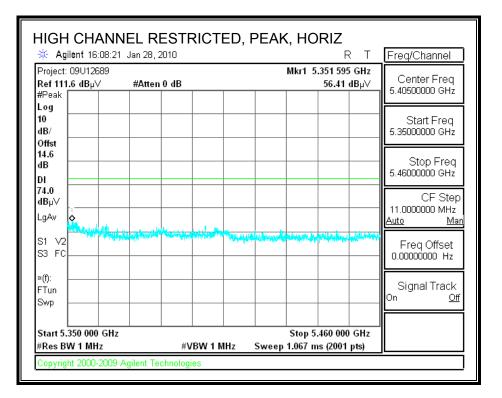
## AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)





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## **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

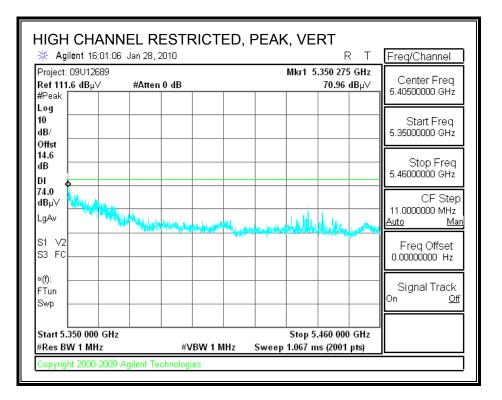


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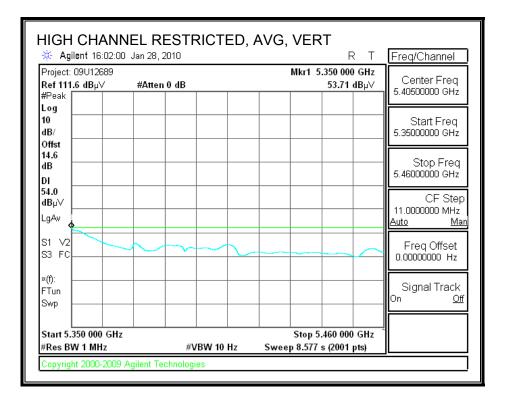
| HIGH CHANNEL R<br>Agilent 16:09:07 Jan 28,                 |            | AVG, HORIZ                                     | Freq/Channel                                 |
|--|------------|--|--|
| Project: 09∪12689<br><b>Ref 111.6 dB</b> µ∨ #Atte<br>#Peak | n 0 dB     | Mkr1 5.350 000 GHz<br>44.39 dBµ∀               | Center Freq<br>5.40500000 GHz                |
| Log<br>10<br>dB/<br>Offst                                  |            |  | Start Freq<br>5.35000000 GHz                 |
| 14.6<br>dB   |            |  | Stop Freq<br>5.46000000 GHz                  |
| 54.0<br>dBμ√<br>LgAv                                       |            |  | CF Step<br>11.0000000 MHz<br><u>Auto Man</u> |
| S1 V2<br>S3 FC   |            |  | Freq Offset<br>0.00000000 Hz                 |
| ×(f):<br>FTun<br>Swp                                       |            |  | Signal Track<br>On <u>Off</u>                |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                       | #VBW 10 Hz | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) |  |

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## **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**



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#### HARMONICS AND SPURIOUS EMISSIONS

#### Low channel:

|             | William  |  | g  |  |   |   |   |  |   |   |  |   |  |   |
|-------------|--|--|--|--|---|---|---|--|---|---|--|---|--|---|
|             | 09/25/09<br>09U1268  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             | Qualcon  |  |  |  |   |   |   |  |   |   |  |   |  |   |
| :<br>ation: | EUT w/Su   |  | Jotoho   | ak   |   |   |   |  |   |   |  |   |  |   |
|             |  |  | 101201   | -on  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
| f           | Measuren   | nent Fred  | piency   | Amp  | Preamp (  | Fain  |   |  | Average   |   |  |   |  |   |
| Dist        |  |  |  | D Corr   |   |   |   |  | Peak Field Strength Limit   |   |  |   |  |   |
| Read        | Analyzer Reading Avg   |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   | ngth   | Margin v  | rs. Peak Li   | mit  |   |  |   |
| CL          | Cable Los  | 55   |  | HPF  | High Pass   | Filter  | r   |  |   |   |  |   |  |   |
| Dist        | Read   | AF   | CL   | Amp  |   |   | Corr.   | Limit  |   |   |  |   |  | Notes   |
|             |  |  |  | -  | +   |   | · · ·   |  | +   | :   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             |  |  |  |  |   |   |   |  |   |   |  |   |  |   |
|             | Dist<br>Read<br>AF<br>CL<br>Dist<br>(m)<br>3.0<br>3.0<br>3.0<br>3.0<br>7 | f Measurer<br>Dist Distance<br>Read Analyzer<br>AF Antenna<br>CL Cable Lo:<br>Dist Read<br>(m) dBuV<br>3.0 36.6<br>3.0 24.4<br>3.0 36.0<br>3.0 23.2<br>7 | f Measurement Free<br>Dist Distance to Anten<br>Read Analyzer Reading<br>AF Antenna Factor<br>CL Cable Loss<br>Dist Read AF<br>(m) dBuV dB/m<br>3.0 36.6 37.9<br>3.0 23.2 37.9<br>7. | f Measurement Frequency<br>Dist Distance to Antenna<br>Read Analyzer Reading<br>AF Antenna Factor<br>CL Cable Loss<br>Dist Read AF CL<br>(m) dBuV dB/m dB<br>3.0 36.6 37.9 11.5<br>3.0 24.4 37.9 11.5<br>3.0 36.0 37.9 11.5<br>3.0 23.2 37.9 11.5<br>7 | f       Measurement Frequency Amp         Dist       Distance to Antenna       D Corr         Read       Analyzer Reading       Avg         AF       Antenna Factor       Peak         CL       Cable Loss       HPF         Dist       Read       AF       CL         (m)       dBuV       dB/m       dB       dB         3.0       36.6       37.9       11.5       -34.6         3.0       23.2       37.9       11.5       -34.6         3.0       23.2       37.9       11.5       -34.6 | f         Measurement Frequency         Amp         Preamp O           Dist         Distance to Antenna         D Corr         Distance           Read         Analyzer Reading         Avg         Average I           AF         Antenna Factor         Peak         Calculate           CL         Cable Loss         HPF         High Pass           Dist         Read         AF         CL         Amp         D Corr           (m)         dBuV         dB/m         dB         dB         dB           3.0         36.6         37.9         11.5         -34.6         0.0           3.0         36.0         37.9         11.5         -34.6         0.0           3.0         23.2         37.9         11.5         -34.6         0.0 | f       Measurement Frequency Amp       Preamp Gain         Dist       Distance to Antenna       D Corr       Distance Corree         Read       Analyzer Reading       Avg       Average Field S         AF       Antenna Factor       Peak       Calculated Peal         CL       Cable Loss       HPF       High Pass Filte         Dist       Read       AF       CL       Amp       D Corr       Filte         0.0       3.0       36.6       37.9       11.5       -34.6       0.0       0.7         3.0       24.4       37.9       11.5       -34.6       0.0       0.7         3.0       23.2       37.9       11.5       -34.6       0.0       0.7         3.0       23.2       37.9       11.5       -34.6       0.0       0.7 | f       Measurement Frequency       Amp       Preamp Gain         Dist       Distance to Antenna       D Corr       Distance Correct to 3 met         Read       Analyzer Reading       Avg       Average Field Strength @         AF       Antenna Factor       Peak       Calculated Peak Field Strength @         CL       Cable Loss       HPF       High Pass Filt         Dist       Read       AF       CL       Amg       D Corr       Fltr       Corr.         (m)       dBuV       dB/m       dB       dB       dB       dB       dB       dBuV/mt         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       52.9         3.0       23.0       37.9       11.5       -34.6       0.0       0.7       51.6         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       38.7 | f       Measurement Frequency Amp       Preamp Gain         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m         AF       Antenna Factor       Peak       Calculated Peak Field Strength         CL       Cable Loss       HPF       High Pass Filter         Dist       Read       AF       CL       Amp       D Corr       Ftr       Corr.       Limit         (m)       dBuV       dB/m       dB       dB       dB       dBuV/m dBuV/m dBuV/m         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       38.7       54.0 | f       Measurement Frequency Amp       Preamp Gain       Average         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field         Read       Analyzer Reading       Aver       Average Field Strength @ 3 m       Margin v         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin v         CL       Cable Loss       HPF       High Pass Filter       Margin v         Dist       Read       AF       CL       Amp       D Corr       Fltr       Corr.       Limit       Margin v         (m)       dBuV       dB/m       dB       dB       dB       dB       dB       u       dBuV/m       dB       dB         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       52.2       74.0       -21.8         3.0       24.4       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       58.7       54.0       -16.3         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       38.7 | f       Measurement Frequency Amp       Preamp Gain       Average Field Strength         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength         Read       Analyzer Reading       Avg       Average Field Strength       @ 3 m       Margin vs. Average         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak Li         CL       Cable Loss       HPF       High Pass Filter       Margin Ant. Pol.         (m)       dBuV       dB/m       dB       dB       dB       dBuV/m       dB V/H         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -22.4       H         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       38.7       54.0       -15.3       H         7       7       74.0       -22.4       H       3.0       36.0       37.9       11.5       -34.6       0.0       0.7       38.7       54.0       -15.3       H       7 </td <td>f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit       Margin vs. Peak Limit         MBuV       dB/m       dB       dB       dB       dB uV/metage       Margin vs. Peak Limit       Det.         (m)       dBuV       dB/m       dB       dB       dB       dB uV/metage       V/H       P/A/QP         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P         3.0       23.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -22.4       H       P</td> <td>f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit         Dist       Read       AF       CL       Amp       D Corr       Filt       Corr.       Limit       Margin vs. Peak Limit         (m)       dBuV       dB/m       dB       dB       dB       dB dB uV/mg       dB       V/H       P/A/QP         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P       106.8         3.0       26.4       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P       106.8         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       <td< td=""><td>f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Average Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit         Dist       Read       AF       CL       Amp       D Corr       Filt       Corr.       Limit       Margin vs. Peak Limit         (m)       dBuV       dB/m       dB       dB       dB       dB       dB       Margin vs. Peak Limit         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       52.2       74.0       -21.8       V       P       106.8       63.8         3.0       24.4       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -22.4       H       P       173.3       166.5         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6</td></td<></td> | f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit       Margin vs. Peak Limit         MBuV       dB/m       dB       dB       dB       dB uV/metage       Margin vs. Peak Limit       Det.         (m)       dBuV       dB/m       dB       dB       dB       dB uV/metage       V/H       P/A/QP         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P         3.0       23.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -22.4       H       P | f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Peak Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit         Dist       Read       AF       CL       Amp       D Corr       Filt       Corr.       Limit       Margin vs. Peak Limit         (m)       dBuV       dB/m       dB       dB       dB       dB dB uV/mg       dB       V/H       P/A/QP         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P       106.8         3.0       26.4       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -21.8       V       P       106.8         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6       74.0 <td< td=""><td>f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Average Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit         Dist       Read       AF       CL       Amp       D Corr       Filt       Corr.       Limit       Margin vs. Peak Limit         (m)       dBuV       dB/m       dB       dB       dB       dB       dB       Margin vs. Peak Limit         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       52.2       74.0       -21.8       V       P       106.8       63.8         3.0       24.4       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -22.4       H       P       173.3       166.5         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6</td></td<> | f       Measurement Frequency       Amp       Preamp Gain       Average Field Strength Limit         Dist       Distance to Antenna       D Corr       Distance Correct to 3 meters       Peak Field Strength Limit         Read       Analyzer Reading       Avg       Average Field Strength @ 3 m       Margin vs. Average Limit         AF       Antenna Factor       Peak       Calculated Peak Field Strength       Margin vs. Average Limit         CL       Cable Loss       HFF       High Pass Filter       Margin vs. Peak Limit         Dist       Read       AF       CL       Amp       D Corr       Filt       Corr.       Limit       Margin vs. Peak Limit         (m)       dBuV       dB/m       dB       dB       dB       dB       dB       Margin vs. Peak Limit         3.0       36.6       37.9       11.5       -34.6       0.0       0.7       52.2       74.0       -21.8       V       P       106.8       63.8         3.0       24.4       37.9       11.5       -34.6       0.0       0.7       51.6       74.0       -22.4       H       P       173.3       166.5         3.0       23.2       37.9       11.5       -34.6       0.0       0.7       51.6 |

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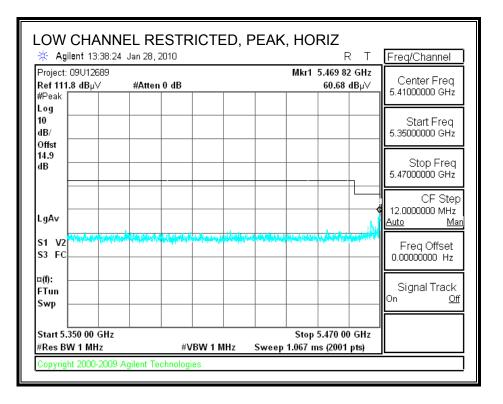
## High channel:

| Y   | cy Measure:  | ment         |              |         |            |            |              |              |                |              |            |                |                |       |
|---|--------------|--------------|--------------|---------|------------|------------|--------------|--------------|----------------|--------------|------------|----------------|----------------|-------|
| Jompilance C                              | ertification | Service      | s, Frei      | mont 5n | n Chambe   | r          |              |              |                |              |            |                |                |       |
| est Engr:                                 | William      | ı Zhuan      | æ            |         |            |            |              |              |                |              |            |                |                |       |
| Date:                                     | 09/25/09     |              |              |         |            |            |              |              |                |              |            |                |                |       |
| roject #:                                 | 09U126       | 39           |              |         |            |            |              |              |                |              |            |                |                |       |
| Company:                                  | Qualco       | mm           |              |         |            |            |              |              |                |              |            |                |                |       |
| Configuration                             | : EUT w/S    | upport l     | lotebo       | ok      |            |            |              |              |                |              |            |                |                |       |
| Iode Oper:                                | Tx HT40      | I            |              |         |            |            |              |              |                |              |            |                |                |       |
| f   | M            | nent Fred    |              |         | Preamp (   |            |              |              | <b>A</b>       | Field Stren; | -+1. T :i+ |                |                |       |
| ı<br>Dist                                 |              | to Anter     |              |         | Distance   |            | t to 3 me    | tors         | -              | ld Strength  | -          |                |                |       |
| Read                                      |              | Reading      |              | Avg     | Average I  |            |              |              |                | 75. Average  |            |                |                |       |
| AF  | Antenna      | -            |              | Peak    | Calculated |            |              |              | -              | rs. Peak Lir |            |                |                |       |
| CL  | Cable Lo     |              |              | HPF     | High Pass  |            |              |              |                |              |            |                |                |       |
| f Di                                      | st Read      | AF           | CL           | Amp     | D Corr     | Fltr       | Согт.        | Limit        | Margin         | Ant. Pol.    | Det.       | Ant.High       | Table Angle    | Notes |
| GHz (m                                    | ı) dBuV      | dB/m         | dB           | dB      | dB         |            | dBuV/m       | dBuV/m       |                | V/H          | P/A/QP     | cm             | Degree         |       |
| 0.620 3.0                                 | 0 44.8       | 37.7         | 9.1          | -36.6   | 0.0        | 0.8        | 55.8         | 74.0         | -18.2          | v            | Р          | 133.4          | 86.5           |       |
| 0.620 3.0                                 |              | 37.7         | 9.1          | -36.6   | 0.0        | 0.8        | 51.6         | 54.0         | -2.4           | V            | A          | 133.4          | 86.5           |       |
| 0.620 3.0                                 |              | 37.7         | 9.1          | -36.6   | 0.0        | 0.8        | 48.2         | 74.0         | -25.8          | H            | P          | 143.9          | 199.0          |       |
| 0.620 3.0                                 |              | 37.7         | 9.1          | -36.6   | 0.0        | 0.8        | 40.2         | 54.0         | -13.8          | H            | <u>A</u>   | 143.9          | 199.0          |       |
| 5.930 3.0<br>5.930 3.0                    |              | 37.6<br>37.6 | 11.5<br>11.5 |         | 0.0<br>0.0 | 0.7<br>0.7 | 50.4<br>39.1 | 74.0<br>54.0 | -23.6<br>-14.9 | v<br>v       | P          | 197.2<br>197.2 | 188.8<br>188.8 |       |
| 5.930 3.0                                 |              | 37.6         | 11.5         |         | 0.0        | 0.7        | 59.1<br>50.0 | 74.0         | -14.9          | ч<br>Н       | A<br>P     | 157.2          | 35.2           |       |
| 5.930 3.0                                 |              |              | 11.5         |         | 0.0        | 0.7        | 38.0         | 54.0         | -16.0          | H            | Ā          | 158.9          | 35.2           |       |
|   |              |              |              |         |            |            |              |              |                |              |            |                |                |       |
| 5.930 3.0<br>ev. 4.1.2.7<br>ote: No other |              |              |              |         |            |            |              | 54.0         | -16.0          | H            | Α          | 158.9          | 35.2           |       |

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# 9.2.9. 802.11a MODE IN 5.6 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

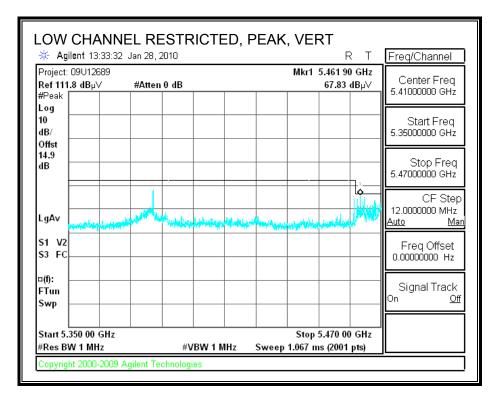


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| 🔆 Agilent 13:39:09 Jan 2                                  | RESTRICTED, A | R T  | Freq/Channel                                 |
|---|---------------|--|--|
| Project: 09U12689<br><b>Ref 111.8 dB</b> µ∨ #Att<br>#Peak | ten 0 dB      | Mkr1 5.372 605 GHz<br>41.24 dBµ∨               | Center Freq<br>5.40500000 GHz                |
| Log   |               |  | Start Freq<br>5.35000000 GHz                 |
| dB  |               |  | Stop Freq<br>5.46000000 GHz                  |
| 54.0<br>dBµ∨<br>LgAv                                      |               |  | CF Step<br>11.0000000 MHz<br><u>Auto Mar</u> |
| S1 V2<br>S3 FC  |               |  | Freq Offset<br>0.00000000 Hz                 |
| *(f):<br>FTun<br>Swp                                      |               |  | . Signal Track<br>On <u>Off</u>              |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                      | #VBW 10 Hz    | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) |  |

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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

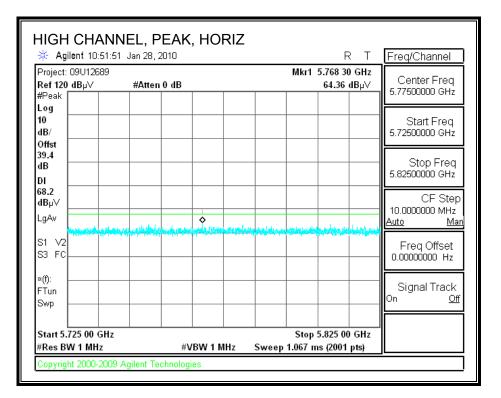


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| 🔆 Agilent 13:34:29 Ja                                | an 28, 2010 | RT   | Freq/Channel                                  |
|--|-------------|--|---|
| Project: 09∪12689<br><b>Ref 111.8 dB</b> µ∨<br>#Peak | #Atten 0 dB | Mkr1 5.381 295 GHz<br>51.28 dBµ∨               | Center Freq<br>5.40500000 GHz                 |
| Log<br>10<br>dB/                                     |             |  | Start Freq<br>5.35000000 GHz                  |
| Offst<br>14.9<br>dB<br>DI                            |             |  | Stop Freq<br>5.4600000 GHz                    |
| 54.0<br>dBµ∨<br>LgAv                                 | L           |  | CF Step<br>11.0000000 MHz<br><u>Auto Ma</u> i |
| S1 V2<br>S3 FC                                       | - <b>^</b>  |  | Freq Offset<br>0.00000000 Hz                  |
| »(f):<br>FTun<br>Swp                                 |             |  | Signal Track<br>On <u>Off</u>                 |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                 | #VBW 10 Hz  | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) |   |

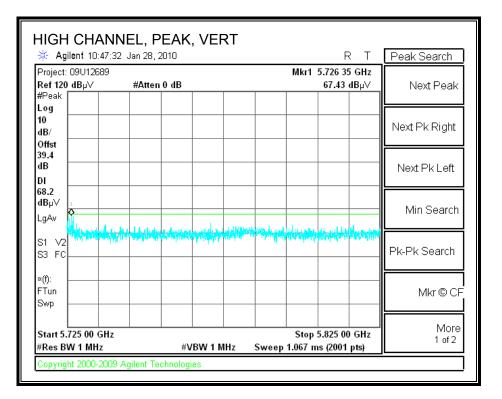
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## AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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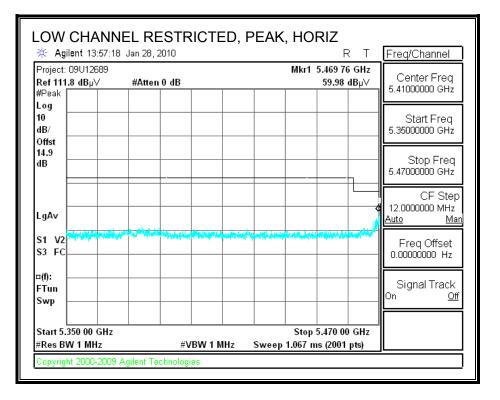
## AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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# 9.2.10. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.6 GHz BAND

## **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

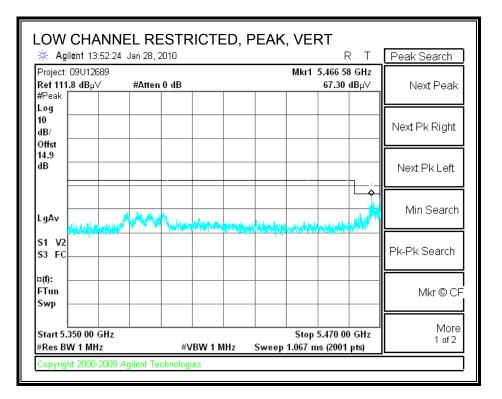


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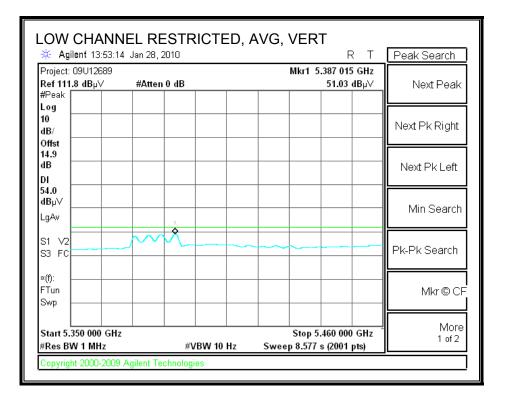
| 🔆 Agilent 13:58:04 J                                 |             | ED, AVG, HORIZ                                   | T Freq/Channel                               |
|--|-------------|--|--|
| Project: 09U12689<br><b>Ref 111.8 dB</b> µ∨<br>#Peak | #Atten 0 dB | Mkr1 5.378 820 GI<br>42.56 dB <sub>l</sub>       | Contor Frog                                  |
| Log<br>10<br>dB/<br>Offst                            |             |  | Start Freq<br>5.35000000 GHz                 |
| 14.9<br>dB   |             |  | Stop Freq                                    |
| DI   |             |  | CF Step<br>11.0000000 MHz<br><u>Auto Man</u> |
| S1 V2<br>S3 FC                                       | 1.<br>Q     |  | Freq Offset<br>0.00000000 Hz                 |
| ×(f):<br>FTun<br>Swp                                 |             |  | Signal Track                                 |
| Start 5.350 000 GHz<br>#Res BW 1 MHz                 | #VBW 10     | Stop 5.460 000 Gl<br>Hz Sweep 8.577 s (2001 pts) |  |

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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

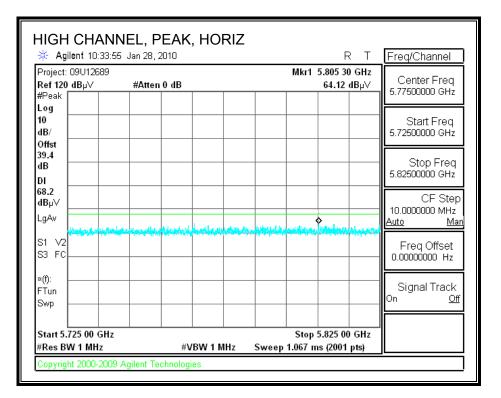


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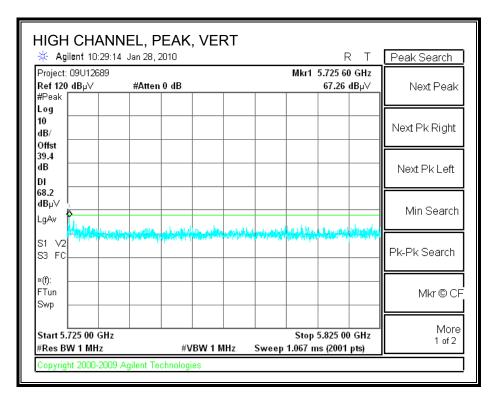
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## AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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## AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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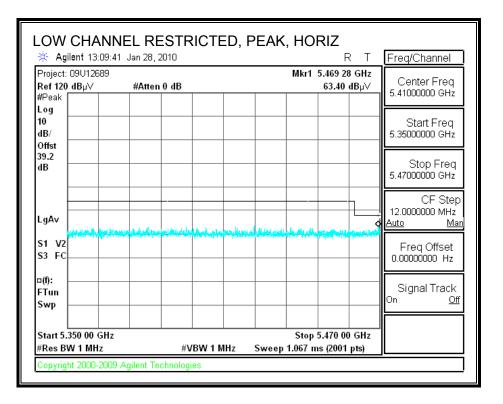
#### HARMONICS AND SPURIOUS EMISSIONS

| Date: _        |            | Thanh N<br>07/15/09 | •••          |            |   |                              |             |              |              |                          |              |           |                |                |       |
|----------------|------------|---------------------|--------------|------------|---|------------------------------|-------------|--------------|--------------|--------------------------|--------------|-----------|----------------|----------------|-------|
| Project #:     |            | 09U1268             | :7           |            |   |                              |             |              |              |                          |              |           |                |                |       |
| -<br>Company   |            | QualCo              | mm           |            |   |                              |             |              |              |                          |              |           |                |                |       |
|                |            | Etherne             |              |            |   |                              |             |              |              |                          |              |           |                |                |       |
| UT M/N:        | -          | 65-VN66             | 3-P1         |            |   |                              |             |              |              |                          |              |           |                |                |       |
| lest Targe     | et:        | FCC15.2             | 247/15.4     | 07         |   |                              |             |              |              |                          |              |           |                |                |       |
| Mode Ope       | er:        | Transmi             | it 2x4       |            |   |                              |             |              |              |                          |              |           |                |                |       |
| -              | f          | Measuren            | nent Fred    | puency     | Amp                                     | Preamp (                     | Gain        |              |              | Average                  | Field Stren  | gth Limit |                |                |       |
|                | Dist       |                     |              |            |   | Distance                     | Correc      | t to 3 me    | ters         | Peak Fie                 | ld Strength  | Limit     |                |                |       |
|                | Read       | Analyzer            | Reading      |            | Avg                                     | Average Field Strength @ 3 m |             |              |              | Margin vs. Average Limit |              |           |                |                |       |
|                | AF         | Antenna             | -            |            | Peak                                    |                              |             | : Field Stre |              |                          | rs. Peak Liz |           |                |                |       |
|                | CL         | Cable Los           | 55           |            | HPF                                     | High Pas                     |             |              | Č.           | Ť                        |              |           |                |                |       |
| f              | Dist       | Read                | AF           | CL         | Amp                                     | D Corr                       | Fltr        | Corr.        | Limit        | Margin                   | Ant. Pol.    | Det.      | AntHigh        | Table Angle    | Notes |
| GHz            | (m)        | dBuV                | dB/m         | dB         | aB                                      | dB                           | dB          | dBuV/m       | dBuV/m       | dB                       | V/H          | P/A/OP    | cm             | Degree         |       |
| low ch 55      | 00MTH-     |                     | <u>.</u>     |            |   |                              |             |              |              |                          |              |           |                |                |       |
| 1.000          | 3.0        | 39.6                | 37.9         | 9.2        | -36.3                                   | 0.0                          | 0.7         | 51.1         | 74.0         | -22.9                    | v            | Р         | 172.9          | 139.5          |       |
| 1.000          | 3.0        | 33.2                | 37.9         | 9.2        | -36.3                                   | 0.0                          | 0.7         | 44.8         | 54.0         | -9.2                     | v            | A         | 172.9          | 139.5          |       |
| 1.000          | 3.0        | 37.7                | 37.9         | 9.2        | -36.3                                   | 0.0                          | 0.7         | 49.3         | 74.0         | -24.7                    | Н            | Р         | 139.5          | 199.3          |       |
| 1.000          | 3.0        | 29.2                | 37.9         | 9.2        | -36.3                                   | 0.0                          | 0.7         | 40.8         | 54.0         | - <b>13.2</b>            | H            | A         | 139.5          | 199.3          |       |
| Aid ch 55      | 80         |                     |              | ļ          |   |                              |             |              |              |                          |              |           |                |                |       |
| 1.160          | 3.0        | 38.8                | 38.1         | 9.3        | -36.1                                   | 0.0                          | 0.7         | 50.9         | 74.0         | -23.1                    | V            | Р         | 181.5          | 207.7          |       |
| 1.160          | 3.0        | 32.1                | 38.1         | 9.3        | -36.1                                   | 0.0                          | 0.7         | 44.1         | 54.0         | - <b>9.9</b>             | V            | A         | 181.5          | 207.7          |       |
| 1.160          | 3.0        | 37.9                | 38.1         | 9.3        | -36.1                                   | 0.0                          | 0.7         | 50.0         | 74.0         | -24.0                    | H            | Р         | 162.7          | 204.2          |       |
| 1.160          | 3.0        | 31.3                | 38.1         | 9.3        | -36.1                                   | 0.0                          | 0.7         | 43.3         | 54.0         | - <b>10.7</b>            | H            | A         | 162.7          | 204.2          |       |
| ligh ch 5      |            |                     |              |            |   |                              |             |              |              |                          |              | -         |                |                |       |
| 1.400          | 3.0        | 40.5                | 38.3         | 9.4        | • | 0.0                          | 0.7         | 53.0         | 74.0         | -21.0                    | V            | P         | 129.5          | 252.8          |       |
| 1.400<br>1.400 | 3.0<br>3.0 | 35.7<br>36.0        | 38.3<br>38.3 | 9.4<br>9.4 | ·                                       | 0.0<br>0.0                   | 0.7<br>10.0 | 48.3<br>57.8 | 54.0<br>74.0 | -5.8<br>-16.2            | V<br>H       | A<br>P    | 129.5<br>142.1 | 252.8<br>230.6 |       |
| 1.400          | 3.0        | 30.0<br>23.8        | 38.3         | 9.4<br>9.4 | • | 0.0                          | 10.0        |              | 74.0<br>54.0 | -10.2<br>-8.4            | п<br>Н       | P<br>A    | 142.1          | 230.6          |       |
| 1.400          | J.U        | £J.0                | J            |            | -32.7                                   | 0.0                          | 10.0        | 47.0         | 2%U          | -0.4                     |              | <u>а</u>  | 145.1          | 230.0          |       |
|                |            |                     |              | •          | +                                       | +                            |             |              |              | ti                       |              |           |                |                |       |
|                |            |                     | 1            | ·          | ·                                       | <u>.</u>                     |             |              |              | 1                        |              |           |                |                |       |
| Rev. 4.1.2     |            |                     |              |            |   |                              |             |              |              | •                        |              |           |                |                |       |
|                |            | missions            | wara da      | teste      | l abour                                 | the system                   | m no:-      | a floor      |              |                          |              |           |                |                |       |
| 1016.110       |            | 112210112           | were ue      | LET LET    |   | uie sysiei                   | 10 110 12   | е цоот.      |              |                          |              |           |                |                |       |
|                |            |                     |              |            |   |                              |             |              |              |                          |              |           |                |                |       |

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# 9.2.11. 802.11n HT20 MODE 5.6 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

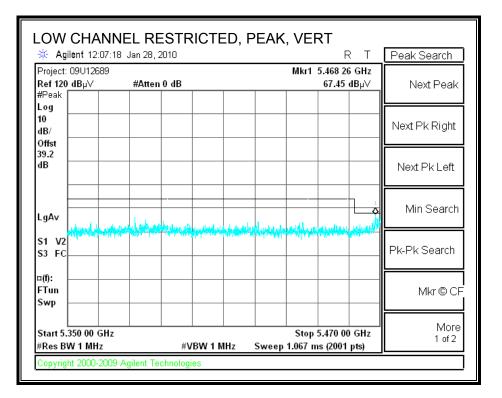


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| Agilent 13:10:27 Jan 2                          | RESTRICTED, .<br>8, 2010 | AVG, HORIZ                                     | Freq/Channel                                |
|---|--------------------------|--|---|
| Project: 09U12689<br>Ref 120 dBµ∨ #And<br>#Peak | ten 0 dB                 | Mkr1 5.393 890 GHz<br>51.30 dBµ∀               | Center Freq<br>5.40500000 GHz               |
| Log<br>10<br>dB/<br>Offst                       |                          |  | Start Freq<br>5.35000000 GHz                |
| 39.2<br>dB                                      |                          |  | Stop Freq<br>5.4600000 GHz                  |
| DI<br>54.0<br>dBµ∨<br>LgAv                      |                          |  | CF Step<br>11.000000 MHz<br><u>Auto Mar</u> |
| S1 V2   |                          |  | Freq Offset<br>0.00000000 Hz                |
| ×(f):<br>FTun<br>Swp                            |                          |  | Signal Track<br>On <u>Off</u>               |
| Start 5.350 000 GHz<br>#Res BW 1 MHz            | #VBW 10 Hz               | Stop 5.460 000 GHz<br>Sweep 8.577 s (2001 pts) | Å   |

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## **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

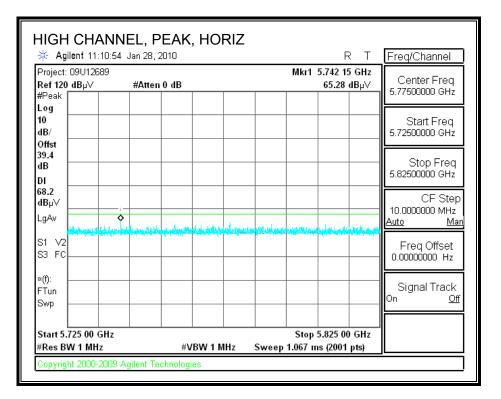


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| 🔆 Agilent 12:08:04    | Jan 28, 2010 | R T                        | Peak Search   |  |  |  |  |
|-----------------------|--------------|----------------------------|---------------|--|--|--|--|
| Project: 09U12689     |              | Mkr1 5.386 355 GHz         |               |  |  |  |  |
| Ref 120 dBµ∨<br>#Peak | #Atten 0 dB  | 53.34 dBµ∨                 | Next Peak     |  |  |  |  |
| Log                   |              |                            |               |  |  |  |  |
| 10                    |              |                            | Next Pk Right |  |  |  |  |
| dB/                   |              |                            |               |  |  |  |  |
| Offst<br>39.2         |              |                            |               |  |  |  |  |
| dB                    |              |                            | Next Pk Left  |  |  |  |  |
| DI                    |              |                            |               |  |  |  |  |
| 54.0<br>dBµ∀          |              |                            |               |  |  |  |  |
| LgAv                  |              |                            | Min Search    |  |  |  |  |
|                       |              |                            |               |  |  |  |  |
| S1 V2                 |              |                            |               |  |  |  |  |
| S3 FC                 |              |                            | Pk-Pk Search  |  |  |  |  |
| »(f):                 |              |                            |               |  |  |  |  |
| FTun                  |              |                            | Mkr@CF        |  |  |  |  |
| Swp                   |              |                            |               |  |  |  |  |
|                       |              |                            | More          |  |  |  |  |
| Start 5.350 000 GHz   |              | Stop 5.460 000 GHz         |               |  |  |  |  |
| #Res BW 1 MHz         | #VBW 10 H    | z Sweep 8.577 s (2001 pts) | 1 of 2        |  |  |  |  |

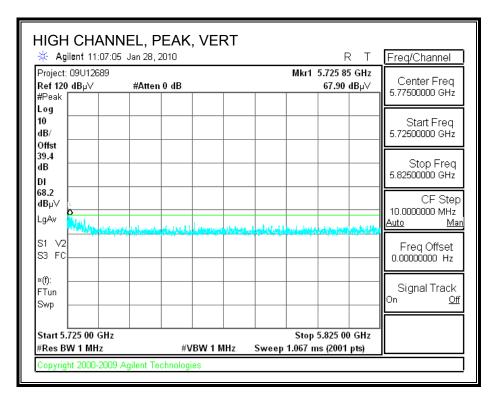
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## AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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## AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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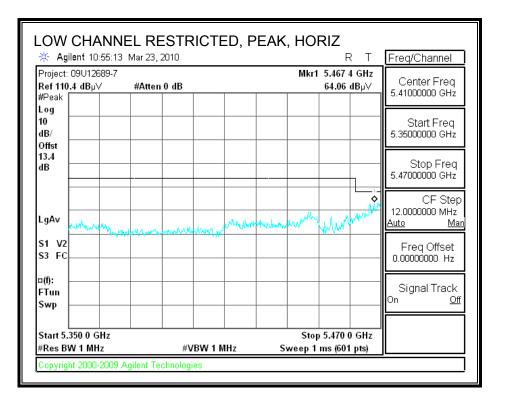
#### HARMONICS AND SPURIOUS EMISSIONS

| Compan<br>Project                  | #: 09U       |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
|------------------------------------|--------------|---------------------------|----------------------|--------------|------------------------|-----------------|-----------------------|------------|----------------------------|---|--------------|----------|----------------|---------------------------------|-----------------|
|                                    | 7/06/09      | Dama Aral                 |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
|                                    |              | Doug And<br>EUT w/Sup     | erson<br>port Notebo | ok           |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
| fode: 1                            | Γx / HT      | 20                        | -                    |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
| est Eq                             | uipmen       | .t:                       |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
|                                    |              |                           |                      |              |                        | 211-7           | Pre-amplifer 26-40GHz |            |                            |   | Horn > 18GHz |          |                | Limit                           |                 |
| Horn 1-18GHz Pre-amplifer 1-26GH:  |              |                           |                      |              | Fre-ampilier 20-40GHZ  |                 |                       |            |                            |   |              |          | FCC 15.205     |                                 |                 |
| 173; 5                             | 5/N: 671     | /@03m                     | - 1144 N             | nited 30     | 08A009                 | 31 <del>-</del> |                       |            |                            | -   |              |          |                | -                               | PCC 15.205      |
|                                    | quency Ca    |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
| 3' cable 22807700 12' cable 228076 |              |                           |                      | 00           | 20' cable 22807500 HPF |                 |                       |            |                            | Reject Filter Peak Measurements<br>RBW=VBW=1MHz |              |          |                |                                 |                 |
| 3' c                               | able 22      | 307700                    | - 12' ca             | ble 228      | 07600                  | •               | 20' cab               | le 2280    | 7500 🗸                     | HP  | F_7.6GHz     | -        |                |                                 | ge Measurements |
| I                                  |              | _                         |                      |              |                        |                 |                       |            | _                          |   |              |          |                | RBW=I                           | MHz; VBW=10Hz   |
| f                                  | Dist         |                           | Read Avg.            | AF           | CL                     | Amp             | D Corr                | Fltr       | Peak                       | Avg   | Pk Lim       |          |                | Avg Mar                         | Notes           |
| GHz                                | (m)          | dBuV                      | dBuV                 | dB/m         | dB                     | dB              | dB                    | dB         | dBuV/m                     | dBuV/m  | dBuV/m       | dBuV/m   | dB             | dB                              | (V/H)           |
| w Ch.:                             | <u>5500</u>  |                           |                      |              |                        |                 |                       |            | •                          |   |              |          |                |                                 |                 |
| 1.000                              | 3.0          | 47.0                      | 40.8                 | 37.9         | 9.2                    | -36.3           | 0.0                   | 0.7        | 58.5                       | 52.4  | 74           | 54       | -15.5          | -1.6                            | v               |
| 1.000                              | 3.0          | 41.9                      | 29.0                 | 37.9         | 9.2                    | -36.3           | 0.0                   | 0.7        | 53.5                       | 40.6  | 74           | 54       | -20.5          | -13.4                           | H               |
| /lid Ch.: :                        | 5500         |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
|                                    | 1            |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
| 1.160                              | 3.0<br>3.0   | 44.6<br>44.3              | 35.2<br>34.4         | 38.0<br>38.0 | 93<br>93               | -36.1<br>-36.1  | 0.0<br>0.0            | 0.7<br>0.7 | 56.5<br>56.2               | 47.1<br>46.4                                    | 74<br>74     | 54<br>54 | -17.5<br>-17.8 | -6.9<br>-7.6                    | V<br>н          |
|                                    |              |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
| ligh Ch.:                          | 5700         |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
| 1.400                              | 3.0          | 41.3                      | 35.3                 | 38.3         | 9.4                    | -35.9           | 0.0                   | 0.7        | 53.8                       | 47.8  | 74           | 54       | -20.2          | -6.2                            | v               |
| 1.400                              | 3.0          | 43.9                      | 28.0                 | 38.3         | 9.4                    | -35.9           | ۵٥                    | 0.7        | 56.4                       | 40.5  | 74           | 54       | - <b>17.6</b>  | -13.5                           | H               |
|                                    |              |                           |                      | L            |                        |                 | <u></u>               | L          | <u> </u>                   |   | <u> </u>     |          | L              | L                               |                 |
| Rev. 11.10                         | 80.0         |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
|                                    |              |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |
|                                    | f            |                           | ent Frequency        | 7            |                        | Amp             | Preamp (              |            |                            |   |              | -        | -              | Field Strength                  |                 |
|                                    | Dist<br>Read | Distance to<br>Analyzer R |                      |              |                        | D Corr<br>Avg   |                       |            | ct to 3 mete<br>Strength @ |   |              |          |                | d Strength Lir<br>. Average Lir |                 |
|                                    | AF           | Antenna Fa                | 0                    |              |                        | Peak.           | -                     |            | c Field Stre               |   |              | -        | -              | . Peak Limit                    |                 |
|                                    | CL           | Cable Loss                |                      |              |                        | HPF             | High Pas              | s Filter   |                            |   |              |          |                |                                 |                 |
|                                    |              |                           |                      |              |                        |                 |                       |            |                            |   |              |          |                |                                 |                 |

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## 9.2.12. 802.11n HT40 MODE 5.6 GHz BAND

#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

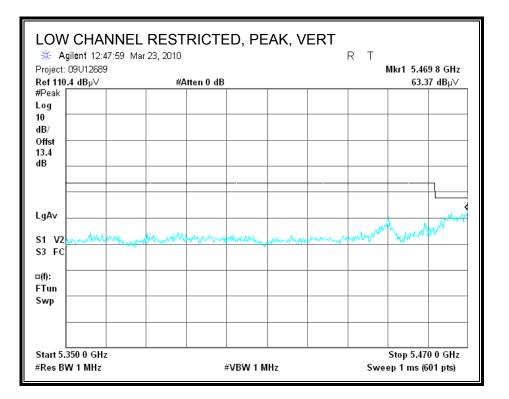


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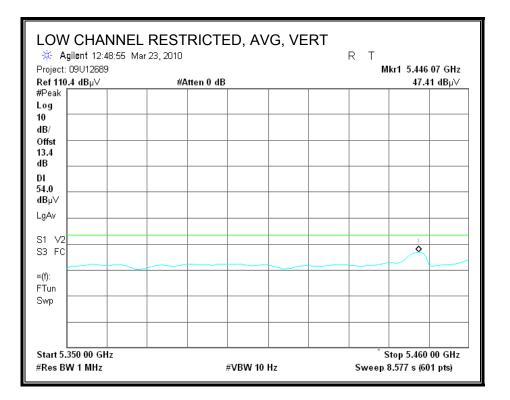
| 🔆 Agilent 11:06:10 M                                   |             | D, AVG, HORIZ                                | Freq/Channel                          |
|--|-------------|--|---------------------------------------|
| Project: 09U12689-7<br><b>Ref 110.4 dB</b> μ∨<br>#Peak | #Atten 0 dB | Mkr1 5.460 00 GHz<br>40.96 dBμ∀              | Center Freq<br>5.40500000 GHz         |
| Log<br>10<br>dB/<br>Offst                              |             |  | Start Freq<br>5.35000000 GHz          |
| 13.4<br>dB   |             |  | Stop Freq<br>5.46000000 GHz           |
| 54.0<br>dBµ∀<br>LgAv                                   |             |  | CF Step<br>11.0000000 MHz<br>Auto Man |
| S1 V2<br>S3 FC   |             |  | Freq Offset                           |
| ×(f):<br>FTun<br>Swp                                   |             |  | Signal Track<br>On <u>Off</u>         |
| Start 5.350 00 GHz<br>#Res BW 1 MHz                    | #VBW 10 Hz  | Stop 5.460 00 GHz<br>Sweep 8.577 s (601 pts) |                                       |

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#### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

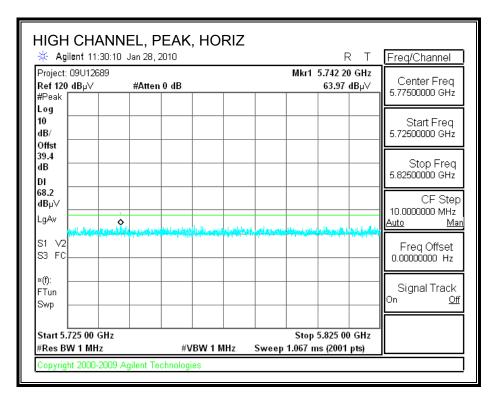


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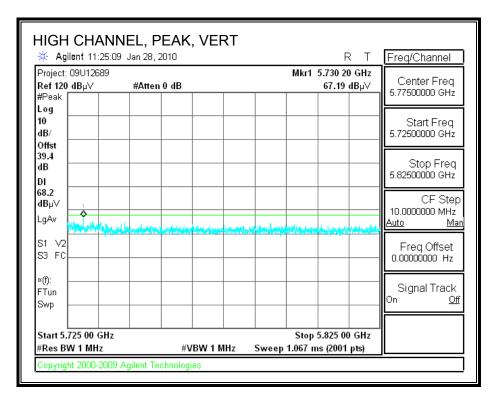
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#### AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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#### AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



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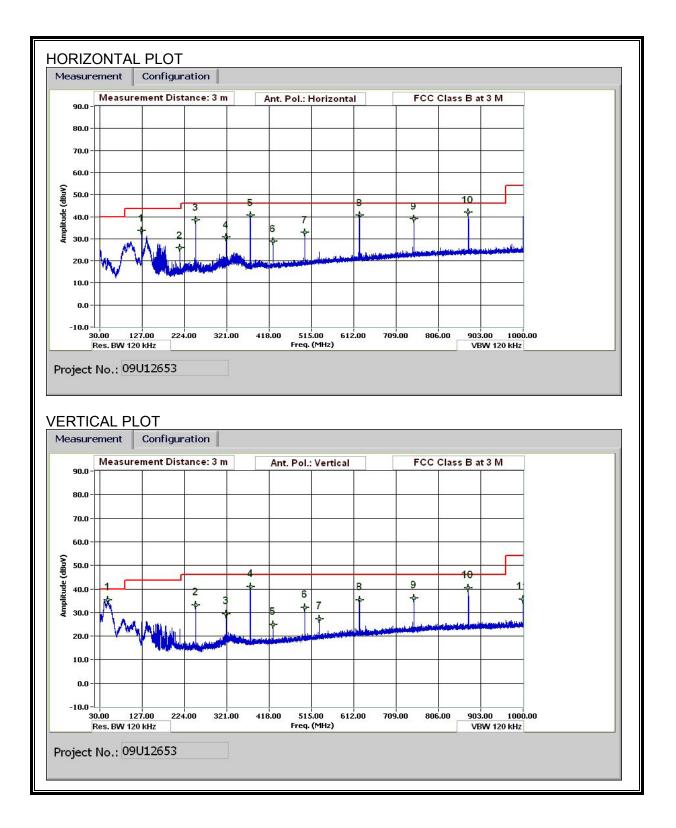
#### HARMONICS AND SPURIOUS EMISSIONS

| 0.00 2.       | quipmen             | <u>t:</u>                |                   |                                    |          |             |                       |            |                |        |              |                  |           |               |                |  |
|---------------|---------------------|--------------------------|-------------------|------------------------------------|----------|-------------|-----------------------|------------|----------------|--------|--------------|------------------|-----------|---------------|----------------|--|
|               | lorn 1-<br>S/N: 671 |                          |                   | m <mark>plifer</mark><br>Aiteq 300 |          |             | Pre-am                | plifer     | 26-40GH        | z<br>T |              | H                | orn > 180 | GHz           | -              | Limit<br>FCC 15.205                              |
| - Hi Fre      | quency Ca           | bles                     |                   |                                    |          |             |                       |            |                |        |              |                  |           |               |                |  |
| 3'            | cable 2             | 2807700                  | 12' c             | able 22                            | 28076    | 00          | 20' ca                | ble 22     | 807500         |        |              | HPF              | Re        | ject Filte    |                | <u>Measurements</u><br>W=VBW=1MHz                |
| 3, 0          | able 228            | 07700                    | ▼ 12' ca          | nble 2280                          | )7600    | -           | 20' cab               | le 2280    | 7500           |        | HPF          | 7.6GHz           | -         |               |                | <b>ge <u>Measurements</u></b><br>1MHz ; VBW=10Hz |
| f<br>GHz      | Dist<br>(m)         | Read Pk<br>dBuV          | Read Avg.<br>dBuV | AF<br>dB/m                         | CL<br>dB | Amp<br>dB   | D Corr<br>dB          | Fltr<br>dB | Peak<br>dBuV/m |        | Avg<br>BuV/m | Pk Lim<br>dBuV/m |           | Pk Mar<br>dB  | Avg Mar<br>dB  | Notes<br>(V/H)                                   |
| w Ch.<br>.020 | 5510MHz<br>3.0      | 45.4                     | 36.7              | 37.9                               | 9.2      | -36.3       | 0.0                   | 0.7        | 57.0           |        | 48.3         | 74               | 54        | -17.0         | -5.7           | v  |
| .020<br>4 Ch  | 3.0<br>5550MHz      | 41.2                     | 27.2              | 37.9                               | 9.2      | -36.3       | 0.0                   | 0.7        | 52.8           |        | 38.8         | 74               | 54        | -21.2         | -15.2          | Н  |
| .100          | 3.0                 | 41.5                     | 27.4              | 38.0                               | 9.3      | -36.2       | 0.0                   | 0.7        | 53.3           |        | 39.2         | 74               | 54        | - <b>20.7</b> | -14.8          | v  |
| .100<br>vh Ch | 3.0<br>.5670MH      | 41.1                     | 29.8              | 38.0                               | 93       | -36.2       | 0.0                   | 0.7        | 52.9           |        | 41.7         | 74               | 54        | -21.1         | -12.3          | H  |
| .340          | 3.0                 | 45.5                     | 35.5              | 38.2                               | 9.4      | -36.0       | 0.0                   | 0.7        | 57.9           |        | 47.8         | 74               | 54        | - <b>16.1</b> | -6.2           | V  |
| .340          | 3.0                 | 41.9                     | 28.4              | 38.2                               | 9.4      | -36.0       | 0.0                   | 0.7        | 54.3           | L      | 40.8         | 74               | 54        | -19.7         | -13.2          | H  |
|               | f                   | Measurem                 | ent Frequency     | v                                  |          | Amp         | Preamp (              | Gain       |                |        |              |                  | Avg Lim   | Average H     | Field Strength | 1 Limit  |
|               |                     | Distance to              |                   |                                    |          | D Corr      |                       |            | ct to 3 mete   |        |              |                  |           |               | d Strength Li  |  |
|               |                     | Analyzer R               | -                 |                                    |          | Avg         | -                     |            | Strength @     |        |              |                  | -         | -             | . Average Li   | mit  |
|               | AF<br>CL            | Antenna F:<br>Cable Los: |                   |                                    |          | Peak<br>HPF | Calculate<br>High Pas |            | c Field Stre   | engt   | h            |                  | Pk Mar    | Margin vs     | . Peak Limit   |  |
|               |                     | 04010 200                |                   |                                    |          |             |                       |            |                |        |              |                  |           |               |                |  |

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## 9.3. WORST-CASE BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



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#### EMISSIONS DATA

| Test Engr:<br>Date:<br>Project #:<br>Company<br>EUT Descr<br>EUT M/N:<br>Test Targe<br>Mode Ope | iption:<br>t: | Vien Trat<br>06/26/09<br>09U12653<br>Qualcom<br>802.11n 4<br>Non-DFS<br>FCC Clas<br>Tx HT20 1 | 3<br>m<br>1x4 WLA<br>:65-VN66<br>ss B | 63-P1      |                 | apter      |             |              |        |              |            |          |       |  |  |  |
|---|---------------|---|---------------------------------------|------------|-----------------|------------|-------------|--------------|--------|--------------|------------|----------|-------|--|--|--|
|   | f             | ฟ้องการพ  | ont From                              | oncuz      | Amp             | Preamp (   | Tain        |              |        | Margin       | Margin vs. | Limit    |       |  |  |  |
|   |               |   |                                       | -          | -               |            | to 3 meters |              | marent | maigut vs.   |            |          |       |  |  |  |
| Read Analyzer Reading   |               |   | ~                                     | Filter     | Filter Ins      |            | to 5 meters |              |        |              |            |          |       |  |  |  |
|   | AF            | Analyzer I<br>Antenna F   |                                       |            | Filter<br>Corr. |            |             |              |        |              |            |          |       |  |  |  |
|   | AF<br>CL      | Cable Loss  |                                       |            | Corr.<br>Limit  | Calculate  |             |              |        |              |            |          |       |  |  |  |
|   | CL.           | Cable Loss  | ,                                     |            | Limit           | Field Stre | ngtn LB     | tut          |        |              |            |          |       |  |  |  |
| f   | Dist          | Read  | AF                                    | CL         | Amp             | D Corr     | Filter      | Corr.        | Limit  | Margin       | Ant. Pol.  | Det.     | Notes |  |  |  |
| MHz   | (m)           | dBuV  | dB/m                                  | dB         | dB              | dB         | dB          | dBuV/m       | dBuV/m | dB           | V/H        | P/A/QP   |       |  |  |  |
| 5805MHz   |               | · · · · · · · · · · · · · · · · · · ·   |                                       |            |                 |            |             |              |        |              |            |          |       |  |  |  |
| 125.044   | 3.0           | 47.3  | 13.7                                  | 1.1        | 28.3            | 0.0        | 0.0         | 33.7         | 43.5   | - <b>9.8</b> | H          | EP       |       |  |  |  |
| 213.368   | 3.0           | 40.9  | 11.9                                  | 1.3        | 28.2            | 0.0        | 0.0         | 25.9         | 43.5   | -17.6        | H          | EP       |       |  |  |  |
| 249.969   | 3.0           | 53.5  | 11.8                                  | 1.4        | 28.2            | 0.0        | 0.0         | 38.5         | 46.0   | -7.5         | H          | EP       |       |  |  |  |
| 319.932   | 3.0           | 43.6  | 13.7                                  | 1.6        | 28.1            | 0.0        | 0.0         | 30.8         | 46.0   | -15.2        | H          | EP       |       |  |  |  |
| 375.014   | 3.0           | 52.5  | 14.5                                  | 1.7        | 28.1            | 0.0        | 0.0         | 40.7         | 46.0   | -5.3         | H          | EP       |       |  |  |  |
| 426.616   | 3.0           | 39.5  | 15.4                                  | 1.9        | 28.0            | 0.0        | 0.0         | 28.8         | 46.0   | -17.2        | H          | EP       |       |  |  |  |
| 499.939   | 3.0           | 41.9  | 16.7                                  | 2.0        | 27.8            | 0.0        | 0.0         | 32.9         | 46.0   | -13.1        | H          | EP       |       |  |  |  |
| 624.985   | 3.0           | 47.2  | 18.7                                  | 2.3        | 27.4            | 0.0        | 0.0         | 40.7         | 46.0   | -5.3         | H          | EP       |       |  |  |  |
| 749.910   | 3.0           | 43.5  | 20.3                                  | 2.5        | 27.3            | 0.0        | 0.0         | 39.0         | 46.0   | -7.0         | H          | EP       |       |  |  |  |
| 874.955   | 3.0           | 45.4  | 21.6                                  | 2.8        | 27.7            | 0.0        | 0.0         | 42.1         | 46.0   | - <b>3.9</b> | H          | EP       |       |  |  |  |
| 5805MHz   |               |   |                                       |            |                 |            |             |              | 40.0   |              |            | FD       |       |  |  |  |
| 48.001  | 3.0           | 53.6  | 9.3                                   | 0.6        | 28.4            | 0.0        | 0.0         | 35.2         | 40.0   | -4.8         | V          | EP       |       |  |  |  |
| 249.969   | 3.0           | 48.3  | 11.8                                  | 1.4        | 28.2            | 0.0        | 0.0         | 33.2         | 46.0   | -12.8        | V          | EP       |       |  |  |  |
| 320.052   | 3.0           | 42.2  | 13.7                                  | 1.6        | 28.1            | 0.0        | 0.0         | 29.4         | 46.0   | -16.6        | V          | EP       |       |  |  |  |
| 375.014   | 3.0           | 52.8  | 14.5                                  | 1.7        | 28.1            | 0.0        | 0.0         | 41.0         | 46.0   | -5.0         | V          | EP       |       |  |  |  |
| 426.736   | 3.0           | 35.5  | 15.4                                  | 1.9        | 28.0            | 0.0        | 0.0         | 24.8         | 46.0   | -21.2        | V          | EP       |       |  |  |  |
| 499.939   | 3.0           | 41.2  | 16.7                                  | 2.0        | 27.8            | 0.0        | 0.0         | 32.1         | 46.0   | -13.9        | V          | EP<br>EP |       |  |  |  |
| 533.301   | 3.0           | 35.7  | 17.3                                  | 2.1        | 27.7            | 0.0        | 0.0         | 27.3         | 46.0   | -18.7        | V          | ·····    |       |  |  |  |
| CO 4 00E  | 3.0           | 41.8  | 18.7                                  | 2.3        | 27.4            | 0.0        | 0.0         | 35.4         | 46.0   | -10.6        | V          | EP       |       |  |  |  |
|   | 3.0           | 40.6<br>43.7  | 20.3<br>21.6                          | 2.5<br>2.8 | 27.3            | 0.0        | 0.0         | 36.1<br>40.4 | 46.0   | -9.9         | V          | EP<br>EP |       |  |  |  |
| 749.910   | 20            |   |                                       |            | 27.7            | 0.0        | 0.0         |              | 46.0   | -5.6         | V          | EP       |       |  |  |  |
| 624.985<br>749.910<br>874.955<br>999.880  | 3.0<br>3.0    | 37.9  | 22.5                                  | 3.0        | 27.9            | 0.0        | 0.0         | 35.4         | 54.0   | -18.6        | v          | EP       |       |  |  |  |

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# **10. AC POWER LINE CONDUCTED EMISSIONS**

#### LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

| Frequency of Emission (MHz) | Conducted Limit (dBuV) |            |  |  |  |
|-----------------------------|------------------------|------------|--|--|--|
|                             | Quasi-peak             | Average    |  |  |  |
| 0.15-0.5                    | 66 to 56 *             | 56 to 46 * |  |  |  |
| 0.5-5                       | 56                     | 46         |  |  |  |
| 5-30                        | 60                     | 50         |  |  |  |

\* Decreases with the logarithm of the frequency.

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

**RESULTS** 

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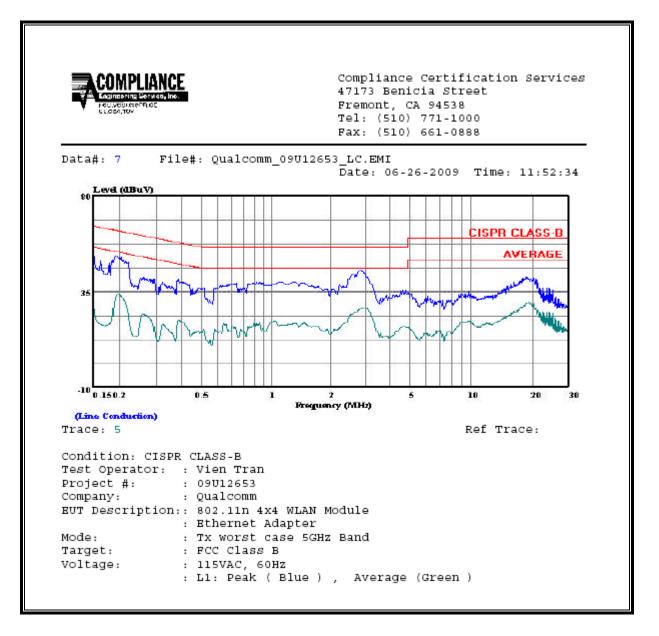
1

#### 6 WORST EMISSIONS

|           | CONDUCTED EMISSIONS DATA (115VAC 60Hz) |           |           |       |       |       |         |        |        |  |  |  |  |
|-----------|--|-----------|-----------|-------|-------|-------|---------|--------|--------|--|--|--|--|
| Freq.     | Reading                                |           |           | Closs | Limit | FCC_B | Margin  |        | Remark |  |  |  |  |
| (MHz)     | PK (dBuV)                              | QP (dBuV) | AV (dBuV) | (dB)  | QP    | AV    | QP (dB) | AV(dB) | L1/L2  |  |  |  |  |
| 0.19      | 51.41                                  |           | 33.87     | 0.00  | 63.86 | 53.86 | -12.45  | -19.99 | L1     |  |  |  |  |
| 2.95      | 44.80                                  |           | 27.60     | 0.00  | 56.00 | 46.00 | -11.20  | -18.40 | L1     |  |  |  |  |
| 19.12     | 41.71                                  |           | 30.40     | 0.00  | 60.00 | 50.00 | -18.29  | -19.60 | L1     |  |  |  |  |
| 0.19      | 51.34                                  |           | 33.94     | 0.00  | 63.86 | 53.86 | -12.52  | -19.92 | L2     |  |  |  |  |
| 2.95      | 44.13                                  |           | 27.56     | 0.00  | 56.00 | 46.00 | -11.87  | -18.44 | L2     |  |  |  |  |
| 19.12     | 40.89                                  |           | 29.56     | 0.00  | 60.00 | 50.00 | -19.11  | -20.44 | L2     |  |  |  |  |
|           |  |           |           |       |       |       |         |        |        |  |  |  |  |
| 6 Worst I | Data                                   |           |           |       |       |       |         |        |        |  |  |  |  |
|           |  |           |           |       |       |       |         |        |        |  |  |  |  |

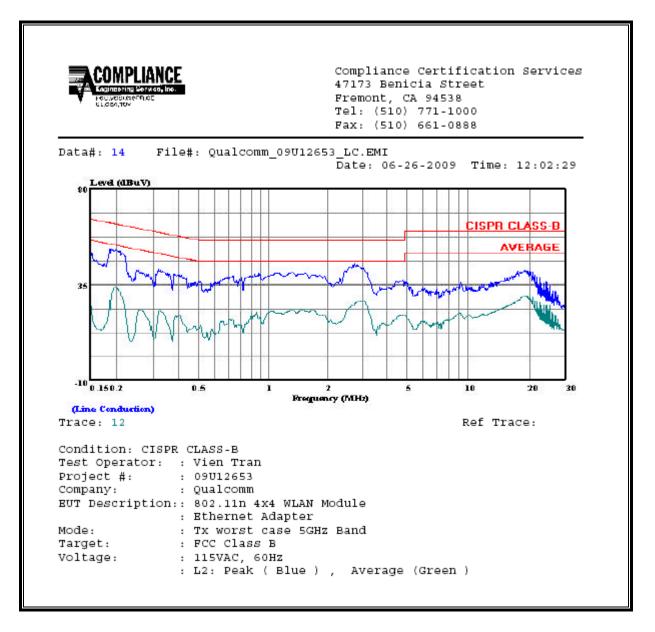
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#### LINE 1 RESULTS



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#### LINE 2 RESULTS



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# 11. DYNAMIC FREQUENCY SELECTION

# 11.1. OVERVIEW

## 11.1.1. LIMITS

#### INDUSTRY CANADA

IC RSS-210 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-210 Issue 7 A9.4 (b) (ii) Channel Availability Check Time: ...

Additional requirements for the band 5600-5650 MHz: Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650 MHz, so that Environment Canada weather radars operating in this band are protected.

RSS-210 Issue 7 A9.4 (b) (iv) **Channel closing time:** the maximum channel closing time is 260 ms.

#### <u>FCC</u>

§15.407 (h) and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

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## Table 1: Applicability of DFS requirements prior to use of a channel

| Requirement                     | Operational Mode |                                  |                               |  |  |
|---------------------------------|------------------|----------------------------------|-------------------------------|--|--|
|                                 | Master           | Client (without radar detection) | Client (with radar detection) |  |  |
| Non-Occupancy Period            | Yes              | Not required                     | Yes                           |  |  |
| DFS Detection Threshold         | Yes              | Not required                     | Yes                           |  |  |
| Channel Availability Check Time | Yes              | Not required                     | Not required                  |  |  |
| Uniform Spreading               | Yes              | Not required                     | Not required                  |  |  |

#### Table 2: Applicability of DFS requirements during normal operation

| Requirement                       | Operational | Operational Mode |            |  |  |  |  |  |
|-----------------------------------|-------------|------------------|------------|--|--|--|--|--|
|                                   | Master      | Client           | Client     |  |  |  |  |  |
|                                   |             | (without DFS)    | (with DFS) |  |  |  |  |  |
| DFS Detection Threshold           | Yes         | Not required     | Yes        |  |  |  |  |  |
| Channel Closing Transmission Time | Yes         | Yes              | Yes        |  |  |  |  |  |
| Channel Move Time                 | Yes         | Yes              | Yes        |  |  |  |  |  |

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# Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

| Maximum Transmit Power  | Value                          |  |  |  |  |  |
|---|--------------------------------|--|--|--|--|--|
|   | (see note)                     |  |  |  |  |  |
| ≥ 200 milliwatt   | -64 dBm                        |  |  |  |  |  |
| < 200 milliwatt   | -62 dBm                        |  |  |  |  |  |
| Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna |                                |  |  |  |  |  |
| Note 2: Throughout these test procedures an additional 1 dB h                           | as been added to the amplitude |  |  |  |  |  |
| of the test transmission waveforms to account for variations in                         | measurement equipment. This    |  |  |  |  |  |
| will ensure that the test signal is at or above the detection three                     | shold level to trigger a DFS   |  |  |  |  |  |
| response.   |                                |  |  |  |  |  |

| Parameter   | Value   |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|
| Non-occupancy period                                | 30 minutes  |  |  |  |  |  |  |
| Channel Availability Check Time                     | 60 seconds  |  |  |  |  |  |  |
| Channel Move Time                                   | 10 seconds  |  |  |  |  |  |  |
| Channel Closing Transmission Time                   | 200 milliseconds +<br>approx. 60 milliseconds<br>over remaining 10 second<br>period |  |  |  |  |  |  |
| The instant that the Channel Move Time and the Char | nel Closina Transmission Time begins is   |  |  |  |  |  |  |

## Table 4: DFS Response requirement values

The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows:

For the Short pulse radar Test Signals this instant is the end of the Burst.

For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated.

For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission.

The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

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#### Table 5 – Short Pulse Radar Test Waveforms

| Radar        | Pulse Width      | PRI            | Pulses | Minimum       | Minimum |
|--------------|------------------|----------------|--------|---------------|---------|
| Туре         | (Microseconds)   | (Microseconds) |        | Percentage of | Trials  |
| -            |                  |                |        | Successful    |         |
|              |                  |                |        | Detection     |         |
| 1            | 1                | 1428           | 18     | 60%           | 30      |
| 2            | 1-5              | 150-230        | 23-29  | 60%           | 30      |
| 3            | 6-10             | 200-500        | 16-18  | 60%           | 30      |
| 4            | 11-20            | 200-500        | 12-16  | 60%           | 30      |
| Aggregate (F | Radar Types 1-4) |                |        | 80%           | 120     |

#### Table 6 – Long Pulse Radar Test Signal

| Radar<br>Waveform | Bursts | Pulses<br>per<br>Burst | Pulse<br>Width<br>(µsec) | Chirp<br>Width<br>(MHz) | PRI<br>(µsec) | Minimum<br>Percentage<br>of Successful<br>Detection | Minimum<br>Trials |
|-------------------|--------|------------------------|--------------------------|-------------------------|---------------|---|-------------------|
| 5                 | 8-20   | 1-3                    | 50-100                   | 5-20                    | 1000-<br>2000 | 80%   | 30                |

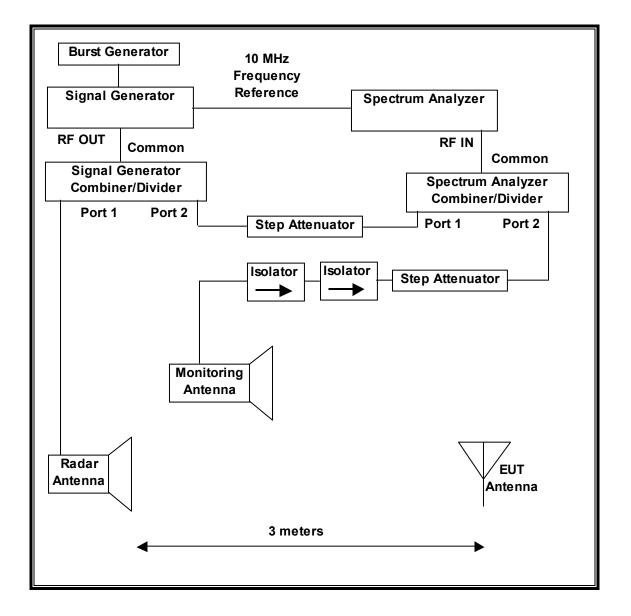
#### Table 7 – Frequency Hopping Radar Test Signal

| Radar<br>Waveform | Pulse<br>Width | PRI<br>(usec)                         | Burst<br>Length | Pulses<br>per | Hopping<br>Rate | Minimum<br>Percentage of | Minimum<br>Trials |
|-------------------|----------------|---------------------------------------|-----------------|---------------|-----------------|--------------------------|-------------------|
|                   | (µsec)         | , , , , , , , , , , , , , , , , , , , | (ms)            | Нор           | (kHz)           | Successful<br>Detection  |                   |
| 6                 | 1              | 333                                   | 300             | 9             | .333            | 70%                      | 30                |

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## 11.1.2. TEST AND MEASUREMENT SYSTEM

#### RADIATED METHOD SYSTEM BLOCK DIAGRAM



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#### SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at runtime.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from  $F_L$  to  $F_H$  for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer set to display 8001 bins on the horizontal axis. The time-domain resolution is 2 msec / bin with a 16 second sweep time, meeting the 10 second short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

#### SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. Measure the amplitude and calculate the difference from –64 dBm. Adjust the Reference Level Offset of the spectrum analyzer to this difference.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

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#### ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

#### TEST AND MEASUREMENT EQUIPMENT

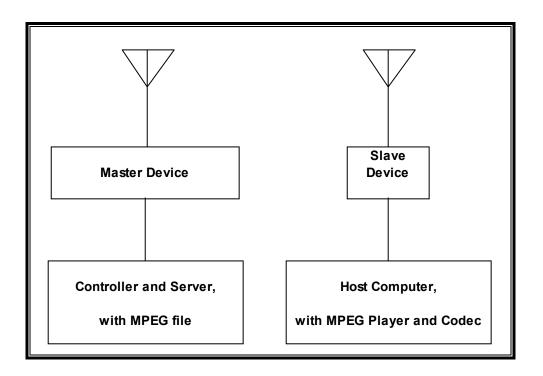
The following test and measurement equipment was utilized for the DFS tests documented in this report:

| TEST EQUIPMENT LIST            |              |        |              |          |  |  |
|--------------------------------|--------------|--------|--------------|----------|--|--|
| Description                    | Manufacturer | Model  | Asset Number | Cal Due  |  |  |
| Spectrum Analyzer, 26.5 GHz    | Agilent / HP | E4446A | C00996       | 04/20/10 |  |  |
| Vector signal generator, 20GHz | Agilent / HP | E8267C | C01066       | 11/16/10 |  |  |
| Arbitrary Waveform Generator   | Agilent / HP | 33220A | C01146       | 05/04/10 |  |  |

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## 11.1.3. SETUP OF EUT

#### RADIATED METHOD EUT TEST SETUP



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#### SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

#### MASTER CONFIGURATION:

|                        | PERIPHERAL    | SUPPORT EQUIF | MENT LIST      |              |
|------------------------|---------------|---------------|----------------|--------------|
| Description            | Manufacturer  | Model         | Serial Number  | FCC ID       |
|                        |               |               |                |              |
| AC Adapter (EUT)       | Phihong       | PSA15R-050P   | P93824329A3    | DoC          |
| Notebook PC (Host)     | HP            | Compaq 6710b  | CNUL032TY1     | DoC          |
| AC Adapter (Host PC)   | HP            | PA-1900-18HN  | 9406310104     | DoC          |
| USB to RS-232 Adapter  | Keyspan       | USA-19HS      | 02300          | DoC          |
| Notebook PC (Client)   | IBM           | Type 2668-46U | L3-XDLW 06/02  | DoC          |
| AC Adapter (Client PC) | IBM           | 02K6749       | 11S02K6749ZJ1M | DoC          |
|                        |               |               | N328Z9DE       |              |
| Dual Band Wireless     | Linksys/Cisco | WUSB600N      | 001C10EB00CB   | Q87-WUSB600N |
| USB Network Adapter    |               |               |                |              |
| (Slave Device)         |               |               |                |              |

## SLAVE CONFIGURATION:

|                        | PERIPHERAL   | SUPPORT EQ    | JIPMENT LIST         |           |
|------------------------|--------------|---------------|----------------------|-----------|
| Description            | Manufacturer | Model         | Serial Number        | FCC ID    |
|                        |              |               |                      |           |
| AC Adapter (EUT)       | Phihong      | PSA15R-050P   | P93824329A3          | DoC       |
| Wireless Access Point  | Cisco        | AIR-AP1252AG  | FTX120690N2          | LDK102061 |
| (Master Device)        |              | A-K9          |                      |           |
|                        |              |               |                      |           |
| AC Adapter (AP)        | Delta        | EADP-45BB B   | DTH112490BD          | DoC       |
|                        | Electronics  |               |                      |           |
| Notebook PC (Host)     | Dell         | PP18L         | 10657517255          | DoC       |
| AC Adapter (Host PC)   | Lite On      | LA65SN0-00    | CN-ODF263-71615-687- | DoC       |
| Notebook PC (Client)   | Lenovo       | Type 2668-46U | L3-XDVV 06/02        | DoC       |
| AC Adapter (Client PC) | Delta        | 02K6749       | 11S02K6749ZJ1MN328   | DoC       |
| USB to RS-232 Adapter  | Keyspan      | USA-19HS      | 02300                | DoC       |

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## 11.1.4. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges, excluding channels that have emissions falling within 5600 to 5650 MHz range.

The EUT can be configured as a Master Device or a Slave Device without Radar Detection.

The highest power level within these bands is 26.62 dBm EIRP in the 5250-5350 MHz band and 26.89 dBm EIRP in the 5470-5725 MHz band.

The only antenna assembly utilized with the EUT has a gain of 3 dBi; in the 802.11a legacy mode it has an effective transmit antenna gain of 6.01 dBi.

Four identical antennas are utilized to meet the diversity and MIMO operational requirement, except in the 802.11a mode where two identical antennas are active for the transmitter and four identical antennas are active for the receiver.

The EUT uses four transmitter/receiver chains, each connected to a 50-ohm coaxial antenna port. All antenna ports are connected to an antenna to perform radiated tests.

The rated output power of the EUT is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

WLAN traffic is generated by streaming the video file TestFile.mp2 "6 ½ Magic Hours" from the Master to the Slave in full motion video mode using the media player with the V2.61 Codec package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The software installed in the access point under test is revision 5.0.301.66.

#### MANUFACTURER'S STATEMENT REGARDING UNIFORM CHANNEL SPREADING

This statement is in a separate document.

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# OVERVIEW OF MASTER DEVICE UTILIZED FOR SLAVE CONFIGURATION, WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

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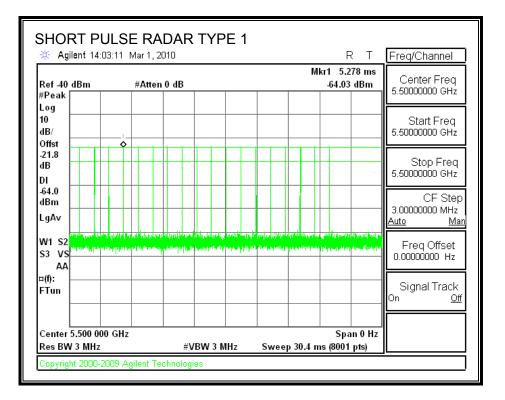
# 11.2. MASTER DEVICE CONFIGURATION IN 20 MHz BANDWIDTH

## 11.2.1. TEST CHANNEL

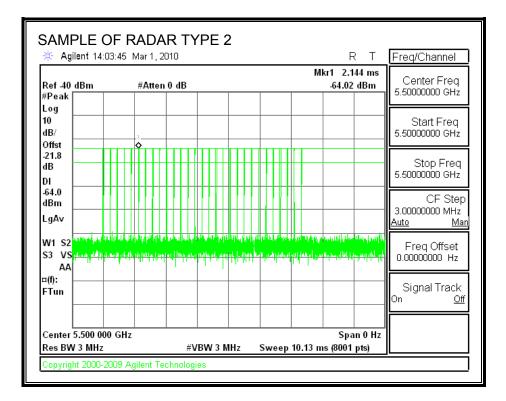
All tests were performed at a channel center frequency of 5500 MHz.

## 11.2.2. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

#### PLOTS OF RADAR WAVEFORMS



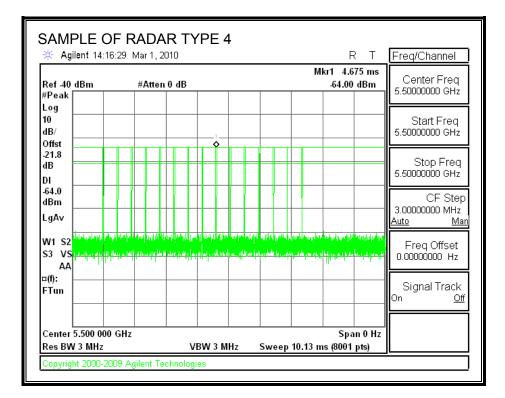
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| Ref-40 dBm                     |                                       | #Atten                                | 0 dB                          |                        |    |                               | M                                     | kr1 8.4<br>-64.02     |                               | Center Freq                                |
|--------------------------------|---------------------------------------|---------------------------------------|-------------------------------|------------------------|----|-------------------------------|---------------------------------------|-----------------------|-------------------------------|--|
| #Peak                          |                                       |                                       |                               |                        |    |                               |                                       | 0.1102                |                               | 5.50000000 GHz                             |
| Log<br>10<br>dB/<br>Offst      |                                       |                                       |                               |                        | 11 |                               |                                       |                       |                               | Start Freq<br>5.5000000 GHz                |
| -21.8<br>dB                    |                                       |                                       |                               |                        | Ť  |                               |                                       |                       |                               | Stop Freq<br>5.5000000 GHz                 |
| DI<br>-64.0<br>dBm<br>LgAv     |                                       |                                       |                               |                        |    |                               |                                       |                       |                               | CF Step<br>3.0000000 MHz<br><u>Auto Ma</u> |
| W1 S2<br>S3 VS                 | ni pri anc<br>bi <sub>li</sub> na dhi | a panala panana<br>Janala panana<br>J | ene era sisar<br>Maka, kaseda | TTERVET<br>Albert Byla |    | a ne i në pre<br>A të për pas | A TRANSFORME (MA<br>19.46.00.2020.001 | niy nimmen<br>Maharak | All Contropo<br>S Madda ag Al |  |
| ¤(f):<br>FTun                  |                                       |                                       |                               |                        |    |                               |                                       |                       |                               | Signal Track<br>On <u>Of</u>               |
| Center 5.500 0<br>Res BW 3 MHz |                                       |                                       |                               | BW 3 M                 |    | Sweep                         | 45 47                                 |                       | in 0 Hz                       |  |

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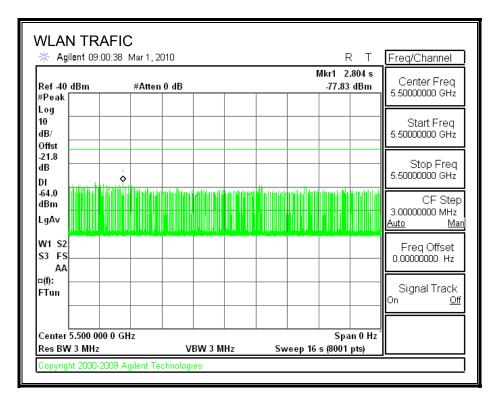
| 🔆 Agilent 14:2                   | 1:20 Mar 1 | 2010    |         |    |    |          | F                 | ₹ T            | Freq/Channel                                 |
|----------------------------------|------------|---------|---------|----|----|----------|-------------------|----------------|--|
| Ref -40 dBm<br>#Peak             | #Att       | en 0 dB |         |    |    | MI       | kr1 4.4<br>-64.00 |                | Center Freq<br>5.50000000 GHz                |
| Log<br>10<br>dB/<br>Offst        |            |         |         | 1  |    |          |                   |                | Start Freq<br>5.50000000 GHz                 |
| -21.8<br>dB                      |            |         |         |    |    |          |                   |                | Stop Freq<br>5.5000000 GHz                   |
| -64.0<br>dBm<br>LgAv             |            |         |         |    |    |          |                   |                | CF Step<br>3.0000000 MHz<br><u>Auto Ma</u> i |
| W1 S2<br>S3 VS                   |            |         |         |    |    |          |                   |                | Freq Offset<br>0.00000000 Hz                 |
| ¤(f):<br>FTun                    |            |         |         |    |    |          |                   |                | Signal Track<br>On <u>Off</u>                |
| Center 5.500 000<br>Res BW 3 MHz | ) GHz      |         | 3W 3 MH | łz | Sw | reep 8 n | •                 | n 0 Hz<br>pts) |  |

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| 🔆 Agilent 14:2                  | 21:55 Mar 1, 2010     |         |   |           | RT                         | Freq/Channel                                |
|---------------------------------|-----------------------|---------|---|-----------|----------------------------|---|
| Ref -40 dBm<br>#Peak            | #Atten 0              | IB      |   | M         | kr1 2.665 ms<br>_64.03 dBm | Center Freq<br>5.5000000 GHz                |
| Log<br>10<br>dB/                |                       |         | 1 |           |                            | Start Freq<br>5.5000000 GHz                 |
| -21.8<br>dB                     |                       |         |   |           |                            | Stop Freq<br>5.50000000 GHz                 |
| -64.0<br>dBm<br>LgA∨            |                       |         |   |           |                            | CF Step<br>3.0000000 MHz<br><u>Auto Mar</u> |
|                                 | na salah na harang sa |         |   |           |                            |   |
| ¤(f):<br>FTun                   |                       |         |   |           |                            | Signal Track<br>On <u>Off</u>               |
| Center 5.500 00<br>Res BW 3 MHz | 0 GHz                 | VBW 3 M |   | Sweep 5 r | Span 0 Hz<br>ns (8001 pts) |   |

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#### PLOT OF WLAN TRAFFIC FROM MASTER



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## 11.2.3. CHANNEL AVAILABILITY CHECK TIME

#### PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

#### PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

#### **QUANTITATIVE RESULTS**

## No Radar Triggered

| Timing of | Timing of        | Total Power-up | Initial Power-up |
|-----------|------------------|----------------|------------------|
| Reboot    | Start of Traffic | Cycle Time     | Cycle Time       |
| (sec)     | (sec)            | (sec)          | (sec)            |
| 30.75     | 170.4            | 139.7          | 79.7             |

#### **Radar Near Beginning of CAC**

| Timing of | Timing of   | Radar Relative | Radar Relative  |
|-----------|-------------|----------------|-----------------|
| Reboot    | Radar Burst | to Reboot      | to Start of CAC |
| (sec)     | (sec)       | (sec)          | (sec)           |
| 30.38     | 110.7       | 80.4           | 0.7             |

#### Radar Near End of CAC

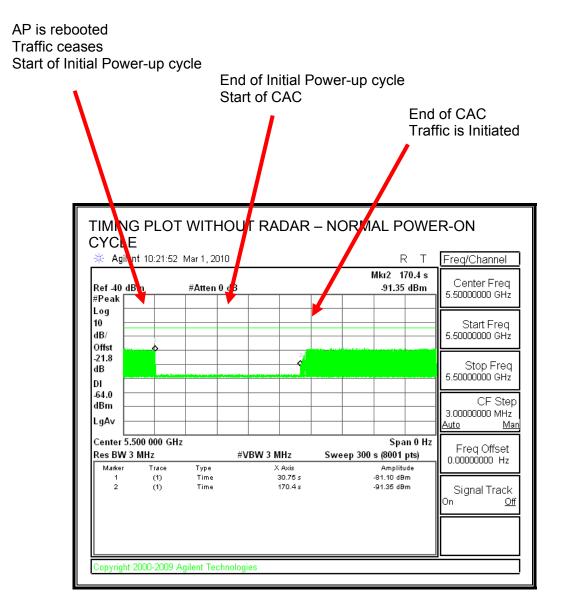
| Timing of | Timing of   | Radar Relative | Radar Relative  |
|-----------|-------------|----------------|-----------------|
| Reboot    | Radar Burst | to Reboot      | to Start of CAC |
| (sec)     | (sec)       | (sec)          | (sec)           |
| 29.48     | 168.6       | 139.1          | 59.5            |

#### **QUALITATIVE RESULTS**

| Timing of<br>Radar Burst | Display on Control<br>Computer | Spectrum Analyzer Display       |
|--------------------------|--------------------------------|---------------------------------|
| No Radar                 | EUT marks Channel as active    | Transmissions begin on channel  |
| Triggered                |                                | after completion of the initial |
|                          |                                | power-up cycle and the CAC      |
| Within 0 to 6            | EUT indicates radar detected   | No transmissions on channel     |
| second window            |                                |                                 |
| Within 54 to 60          | EUT indicates radar detected   | No transmissions on channel     |
| second window            |                                |                                 |

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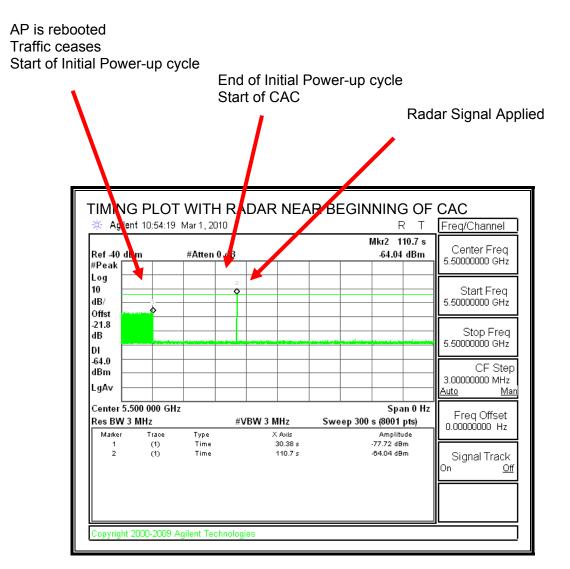
#### TIMING PLOT WITHOUT RADAR DURING CAC



Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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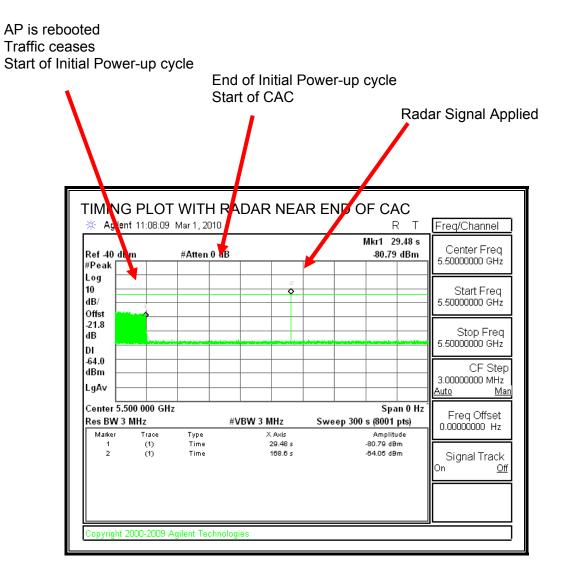
#### TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC



No EUT transmissions were observed after the radar signal.

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#### TIMING PLOT WITH RADAR NEAR END OF CAC



No EUT transmissions were observed after the radar signal.

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## 11.2.4. OVERLAPPING CHANNEL TESTS

### **RESULTS**

These tests are not applicable.

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## 11.2.5. MOVE AND CLOSING TIME

#### REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) \* (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

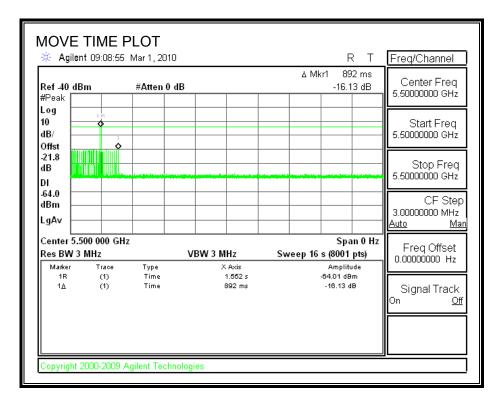
### **RESULTS**

| Agency   | Channel Move Time | Limit |
|----------|-------------------|-------|
|          | (sec)             | (sec) |
| FCC / IC | 0.892             | 10    |

| Agency | Aggregate Channel Closing Transmission Time | Limit  |
|--------|---|--------|
|        | (msec)                                      | (msec) |
| FCC    | 18.0  | 60     |
| IC     | 24.0  | 260    |

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#### MOVE TIME



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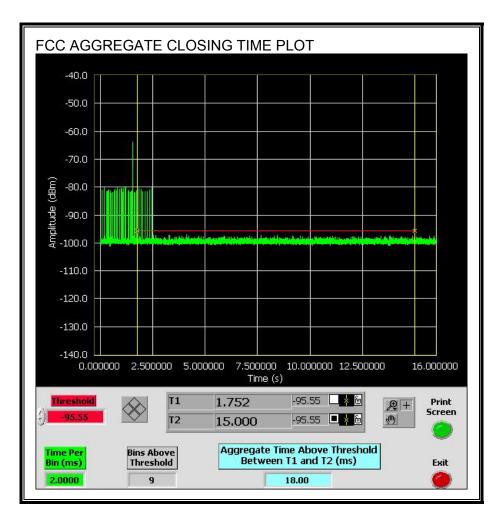
### **CHANNEL CLOSING TIME**



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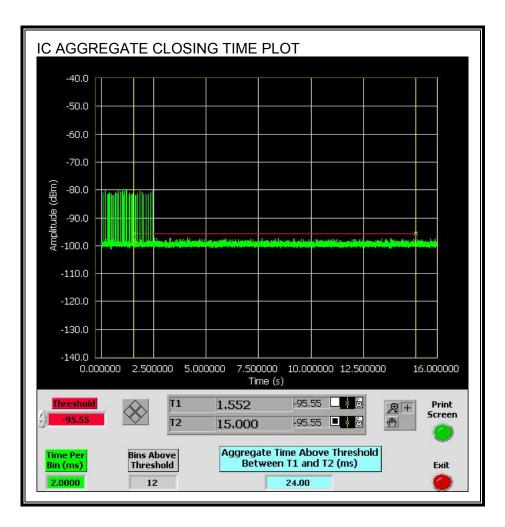
#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the FCC aggregate monitoring period.



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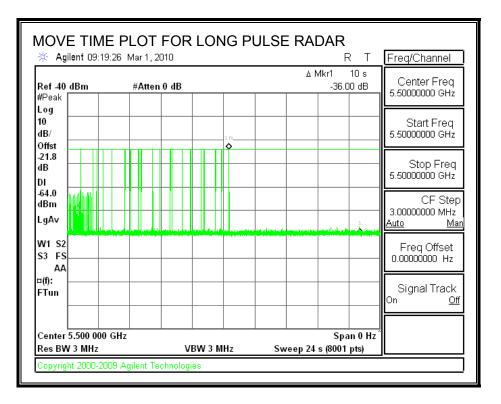
Only intermittent transmissions are observed during the IC aggregate monitoring period.



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#### LONG PULSE CHANNEL MOVE TIME

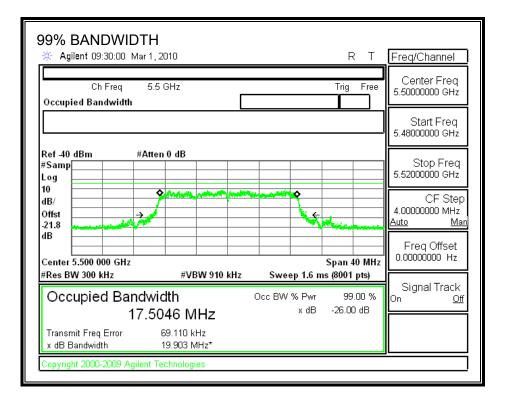
The traffic ceases prior to 10 seconds after the end of the radar waveform.



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## 11.2.6. DETECTION BANDWIDTH

#### **REFERENCE PLOT OF 99% POWER BANDWIDTH**



#### **RESULTS**

| FL    | FH    | Detection | 99% Power | Ratio of        | Minimum |
|-------|-------|-----------|-----------|-----------------|---------|
|       |       | Bandwidth | Bandwidth | Detection BW to | Limit   |
|       |       |           |           | 99% Power BW    |         |
| (MHz) | (MHz) | (MHz)     | (MHz)     | (%)             | (%)     |
| 5492  | 5508  | 16        | 17.505    | 91.4            | 80      |

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## DETECTION BANDWIDTH PROBABILITY

| DETECTION E        | ETECTION BANDWIDTH PROBABILITY RESULTS  |                 |     |      |  |  |  |  |
|--------------------|---|-----------------|-----|------|--|--|--|--|
|                    | Detection Bandwidth Test Results<br>FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst |                 |     |      |  |  |  |  |
| Frequence<br>(MHz) |   | Number Detected |     | Mark |  |  |  |  |
| 5492               | 10  | 10              | 100 | FL   |  |  |  |  |
| 5493               | 10  | 10              | 100 |      |  |  |  |  |
| 5494               | 10  | 10              | 100 |      |  |  |  |  |
| 5495               | 10  | 10              | 100 |      |  |  |  |  |
| 5496               | 10  | 10              | 100 |      |  |  |  |  |
| 5497               | 10  | 10              | 100 |      |  |  |  |  |
| 5498               | 10  | 10              | 100 |      |  |  |  |  |
| 5499               | 10  | 10              | 100 |      |  |  |  |  |
| 5500               | 10  | 10              | 100 |      |  |  |  |  |
| 5501               | 10  | 10              | 100 |      |  |  |  |  |
| 5502               | 10  | 10              | 100 |      |  |  |  |  |
| 5503               | 10  | 10              | 100 |      |  |  |  |  |
| 5504               | 10  | 10              | 100 |      |  |  |  |  |
| 5505               | 10  | 10              | 100 |      |  |  |  |  |
| 5506               | 10  | 10              | 100 |      |  |  |  |  |
| 5507               | 10  | 10              | 100 |      |  |  |  |  |
| 5508               | 10  | 10              | 100 | FH   |  |  |  |  |

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# 11.2.7. IN-SERVICE MONITORING

#### RESULTS

| CC Radar Test Summ     |                  |           |       |           |
|------------------------|------------------|-----------|-------|-----------|
| Signal Type            | Number of Trials | Detection | Limit | Pass/Fail |
|                        |                  | (%)       | (%)   |           |
| FCC Short Pulse Type 1 | 30               | 100.00    | 60    | Pass      |
| FCC Short Pulse Type 2 | 30               | 96.67     | 60    | Pass      |
| FCC Short Pulse Type 3 | 30               | 93.33     | 60    | Pass      |
| FCC Short Pulse Type 4 | 30               | 100.00    | 60    | Pass      |
| Aggregate              |                  | 97.50     | 80    | Pass      |
| FCC Long Pulse Type 5  | 30               | 100.00    | 80    | Pass      |
| FCC Hopping Type 6     | 34               | 100.00    | 70    | Pass      |

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#### TYPE 1 DETECTION PROBABILITY

|       | Data Sheet for FCC Short Pulse Radar Type 1<br>1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst |  |  |  |  |
|-------|---|--|--|--|--|
| Trial | Successful Detection  |  |  |  |  |
| THA   | (Yes/No)  |  |  |  |  |
| 1     | Yes   |  |  |  |  |
| 2     | Yes   |  |  |  |  |
| 3     | Yes   |  |  |  |  |
| 4     | Yes   |  |  |  |  |
| 5     | Yes   |  |  |  |  |
| 6     | Yes   |  |  |  |  |
| 7     | Yes   |  |  |  |  |
| 8     | Yes   |  |  |  |  |
| 9     | Yes   |  |  |  |  |
| 10    | Yes   |  |  |  |  |
| 11    | Yes   |  |  |  |  |
| 12    | Yes   |  |  |  |  |
| 13    | Yes   |  |  |  |  |
| 14    | Yes   |  |  |  |  |
| 15    | Yes   |  |  |  |  |
| 16    | Yes   |  |  |  |  |
| 17    | Yes   |  |  |  |  |
| 18    | Yes   |  |  |  |  |
| 19    | Yes   |  |  |  |  |
| 20    | Yes   |  |  |  |  |
| 21    | Yes   |  |  |  |  |
| 22    | Yes   |  |  |  |  |
| 23    | Yes   |  |  |  |  |
| 24    | Yes   |  |  |  |  |
| 25    | Yes   |  |  |  |  |
| 26    | Yes   |  |  |  |  |
| 27    | Yes   |  |  |  |  |
| 28    | Yes   |  |  |  |  |
| 29    | Yes   |  |  |  |  |
| 30    | Yes   |  |  |  |  |
|       |   |  |  |  |  |

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### TYPE 2 DETECTION PROBABILITY

| Naveform | Pulse Width | PRI    | Pulses Per Burst | Successful Detection |
|----------|-------------|--------|------------------|----------------------|
|          | (us)        | (us)   |                  | (Yes/No)             |
| 2001     | 3.7         | 229.00 | 29               | Yes                  |
| 2002     | 2.8         | 151.00 | 29               | Yes                  |
| 2003     | 1.9         | 224.00 | 28               | Yes                  |
| 2004     | 4.7         | 167.00 | 28               | Yes                  |
| 2005     | 2.2         | 188.00 | 29               | Yes                  |
| 2006     | 3.4         | 214.00 | 24               | Yes                  |
| 2007     | 4.8         | 169.00 | 24               | Yes                  |
| 2008     | 3.8         | 163.00 | 26               | Yes                  |
| 2009     | 1.5         | 226.00 | 28               | Yes                  |
| 2010     | 1.7         | 164.00 | 28               | Yes                  |
| 2011     | 1.7         | 156.00 | 24               | Yes                  |
| 2012     | 2           | 196.00 | 27               | Yes                  |
| 2013     | 2.4         | 173.00 | 27               | Yes                  |
| 2014     | 3.8         | 221.00 | 28               | Yes                  |
| 2015     | 2.3         | 189.00 | 27               | Yes                  |
| 2016     | 5           | 188.00 | 28               | Yes                  |
| 2017     | 3.5         | 189.00 | 23               | Yes                  |
| 2018     | 4.5         | 175.00 | 23               | Yes                  |
| 2019     | 1.7         | 153.00 | 24               | Yes                  |
| 2020     | 2.4         | 172.00 | 26               | Yes                  |
| 2021     | 2.9         | 191.00 | 24               | Yes                  |
| 2022     | 2.2         | 190.00 | 29               | Yes                  |
| 2023     | 2.3         | 155.00 | 25               | No                   |
| 2024     | 1           | 226.00 | 28               | Yes                  |
| 2025     | 4.1         | 185.00 | 27               | Yes                  |
| 2026     | 3           | 225.00 | 26               | Yes                  |
| 2027     | 4.1         | 193.00 | 24               | Yes                  |
| 2028     | 3.7         | 191.00 | 26               | Yes                  |
| 2029     | 1.9         | 156.00 | 23               | Yes                  |

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### TYPE 3 DETECTION PROBABILITY

| Naveform | Pulse Width | PRI    | Pulses Per Burst | Successful Detection |
|----------|-------------|--------|------------------|----------------------|
|          | (us)        | (us)   |                  | (Yes/No)             |
| 3001     | 6.5         | 464.00 | 17               | Yes                  |
| 3002     | 7.2         | 467.00 | 16               | Yes                  |
| 3003     | 6           | 282.00 | 16               | Yes                  |
| 3004     | 6.6         | 350.00 | 18               | Yes                  |
| 3005     | 8.4         | 349.00 | 16               | Yes                  |
| 3006     | 8.5         | 379.00 | 17               | Yes                  |
| 3007     | 7.2         | 306.00 | 16               | Yes                  |
| 3008     | 5.4         | 306.00 | 18               | Yes                  |
| 3009     | 9.1         | 377.00 | 17               | No                   |
| 3010     | 8.1         | 423.00 | 17               | Yes                  |
| 3011     | 9.2         | 353.00 | 16               | Yes                  |
| 3012     | 8.2         | 274.00 | 16               | Yes                  |
| 3013     | 7           | 339.00 | 16               | Yes                  |
| 3014     | 8.1         | 455.00 | 16               | Yes                  |
| 3015     | 5.2         | 362.00 | 16               | Yes                  |
| 3016     | 7.1         | 442.00 | 16               | Yes                  |
| 3017     | 7.2         | 307.00 | 18               | Yes                  |
| 3018     | 5.3         | 493.00 | 16               | Yes                  |
| 3019     | 6.6         | 335.00 | 18               | Yes                  |
| 3020     | 7.4         | 356.00 | 16               | Yes                  |
| 3021     | 6.3         | 266.00 | 18               | No                   |
| 3022     | 9           | 358.00 | 18               | Yes                  |
| 3023     | 8.5         | 425.00 | 17               | Yes                  |
| 3024     | 6.7         | 443.00 | 18               | Yes                  |
| 3025     | 5.5         | 296.00 | 17               | Yes                  |
| 3026     | 6.3         | 286.00 | 17               | Yes                  |
| 3027     | 6.3         | 303.00 | 18               | Yes                  |
| 3028     | 9.1         | 448.00 | 16               | Yes                  |
| 3029     | 8.5         | 419    | 17               | Yes                  |
| 3030     | 8.7         | 311    | 17               | Yes                  |

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### **TYPE 4 DETECTION PROBABILITY**

| 4001 | (us) | PRI<br>(us) | Pulses Per Burst | Successful Detection<br>(Yes/No) |
|------|------|-------------|------------------|----------------------------------|
| 4001 | 19   | 458.00      | 15               | Yes                              |
| 4002 | 14.8 | 424.00      | 14               | Yes                              |
| 4003 | 11.4 | 398.00      | 15               | Yes                              |
| 4004 | 17.4 | 385.00      | 13               | Yes                              |
| 4005 | 19.5 | 482.00      | 13               | Yes                              |
| 4006 | 17.9 | 317.00      | 16               | Yes                              |
| 4007 | 13.4 | 356.00      | 14               | Yes                              |
| 4008 | 11.1 | 273.00      | 14               | Yes                              |
| 4009 | 15.1 | 326.00      | 16               | Yes                              |
| 4010 | 12   | 442.00      | 12               | Yes                              |
| 4011 | 20   | 376.00      | 13               | Yes                              |
| 4012 | 18.8 | 325.00      | 13               | Yes                              |
| 4013 | 18.8 | 428.00      | 14               | Yes                              |
| 4014 | 18.9 | 387.00      | 14               | Yes                              |
| 4015 | 18.1 | 350.00      | 13               | Yes                              |
| 4016 | 17.3 | 446.00      | 16               | Yes                              |
| 4017 | 16.5 | 373.00      | 14               | Yes                              |
| 4018 | 16.8 | 319.00      | 15               | Yes                              |
| 4019 | 16.9 | 456.00      | 13               | Yes                              |
| 4020 | 18   | 296.00      | 15               | Yes                              |
| 4021 | 17.8 | 299.00      | 14               | Yes                              |
| 4022 | 16   | 417.00      | 15               | Yes                              |
| 4023 | 11.5 | 262.00      | 16               | Yes                              |
| 4024 | 17.7 | 491.00      | 12               | Yes                              |
| 4025 | 14.3 | 283.00      | 15               | Yes                              |
| 4026 | 11.2 | 321.00      | 12               | Yes                              |
| 4027 | 13.6 | 483.00      | 16               | Yes                              |
| 4028 | 10.7 | 389.00      | 15               | Yes                              |
| 4029 | 16.2 | 273.00      | 12               | Yes                              |

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#### TYPE 5 DETECTION PROBABILITY

| Trial | Long Pulse Radar Type 5<br>Successful Detection |
|-------|---|
|       | (Yes/No)  |
| 1     | Yes   |
| 2     | Yes   |
| 3     | Yes   |
| 4     | Yes   |
| 5     | Yes   |
| 6     | Yes   |
| 7     | Yes   |
| 8     | Yes   |
| 9     | Yes   |
| 10    | Yes   |
| 11    | Yes   |
| 12    | Yes   |
| 13    | Yes   |
| 14    | Yes   |
| 15    | Yes   |
| 16    | Yes   |
| 17    | Yes   |
| 18    | Yes   |
| 19    | Yes   |
| 20    | Yes   |
| 21    | Yes   |
| 22    | Yes   |
| 23    | Yes   |
| 24    | Yes   |
| 25    | Yes   |
| 26    | Yes   |
| 27    | Yes   |
| 28    | Yes   |
| 29    | Yes   |
| 30    | Yes   |

Note: The Type 5 randomized parameters are shown in a separate document.

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#### TYPE 6 DETECTION PROBABILITY

| us Puls | e Width, 333 us PRI, S            | 9 Pulses per Burst,                    | 1 Burst per Hop             | •                                   |
|---------|-----------------------------------|--|-----------------------------|-------------------------------------|
| TIA Aug | just 2005 Hopping Se              | quence                                 |                             |                                     |
| Trial   | Starting Index<br>Within Sequence | Signal Generator<br>Frequency<br>(MHz) | Hops within<br>Detection BW | Successful<br>Detection<br>(Yes/No) |
| 1       | 279                               | 5492                                   | 5                           | Yes                                 |
| 2       | 754                               | 5493                                   | 3                           | Yes                                 |
| 3       | 1229                              | 5494                                   | 4                           | Yes                                 |
| 4       | 1704                              | 5495                                   | 5                           | Yes                                 |
| 5       | 2179                              | 5496                                   | 2                           | Yes                                 |
| 6       | 2654                              | 5497                                   | 5                           | Yes                                 |
| 7       | 3129                              | 5498                                   | 4                           | Yes                                 |
| 8       | 3604                              | 5499                                   | 5                           | Yes                                 |
| 9       | 4079                              | 5500                                   | 2                           | Yes                                 |
| 10      | 4554                              | 5501                                   | 4                           | Yes                                 |
| 11      | 5029                              | 5502                                   | 2                           | Yes                                 |
| 12      | 5504                              | 5503                                   | 4                           | Yes                                 |
| 13      | 5979                              | 5504                                   | 3                           | Yes                                 |
| 14      | 6454                              | 5505                                   | 5                           | Yes                                 |
| 15      | 6929                              | 5506                                   | 4                           | Yes                                 |
| 16      | 7404                              | 5507                                   | 3                           | Yes                                 |
| 17      | 7879                              | 5508                                   | 2                           | Yes                                 |
| 18      | 8354                              | 5492                                   | 2                           | Yes                                 |
| 19      | 8829                              | 5493                                   | 3                           | Yes                                 |
| 20      | 9304                              | 5494                                   | 4                           | Yes                                 |
| 21      | 9779                              | 5495                                   | 3                           | Yes                                 |
| 22      | 10254                             | 5496                                   | 4                           | Yes                                 |
| 23      | 10729                             | 5497                                   | 4                           | Yes                                 |
| 24      | 11204                             | 5498                                   | 3                           | Yes                                 |
| 25      | 11679                             | 5499                                   | 3                           | Yes                                 |
| 26      | 12154                             | 5500                                   | 3                           | Yes                                 |
| 27      | 12629                             | 5501                                   | 2                           | Yes                                 |
| 28      | 13104                             | 5502                                   | 4                           | Yes                                 |
| 29      | 13579                             | 5503                                   | 3                           | Yes                                 |
| 30      | 14054                             | 5504                                   | 5                           | Yes                                 |
| 31      | 14529                             | 5505                                   | 6                           | Yes                                 |
| 32      | 15004                             | 5506                                   | 2                           | Yes                                 |
| 33      | 15479                             | 5507                                   | 4                           | Yes                                 |
| 34      | 15954                             | 5508                                   | 7                           | Yes                                 |

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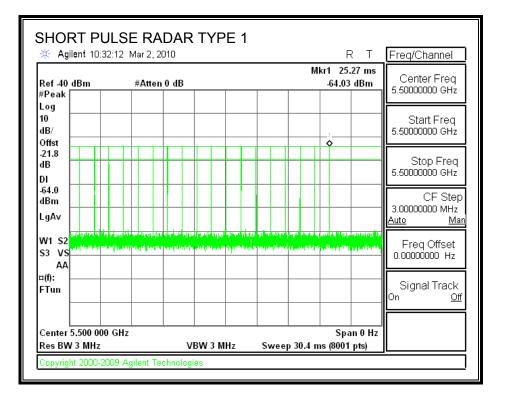
## 11.3. SLAVE DEVICE CONFIGURATION IN 20 MHz BANDWIDTH

## 11.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

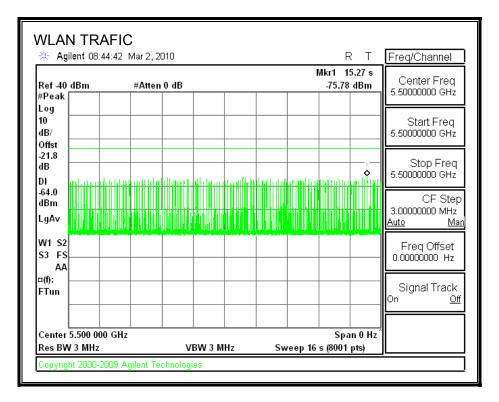
## 11.3.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

### PLOTS OF RADAR WAVEFORM



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#### PLOT OF WLAN TRAFFIC



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## 11.3.3. MOVE AND CLOSING TIME

#### REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) \* (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

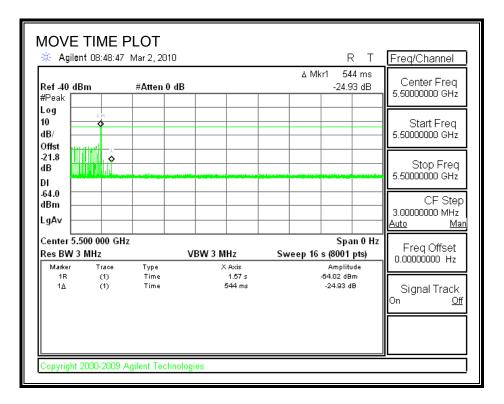
#### **RESULTS**

| Agency   | Channel Move Time | Limit |
|----------|-------------------|-------|
|          | (sec)             | (sec) |
| FCC / IC | 0.544             | 10    |

| Agency | Aggregate Channel Closing Transmission Time | Limit  |
|--------|---|--------|
|        | (msec)                                      | (msec) |
| FCC    | 10.0  | 60     |
| IC     | 18.0  | 260    |

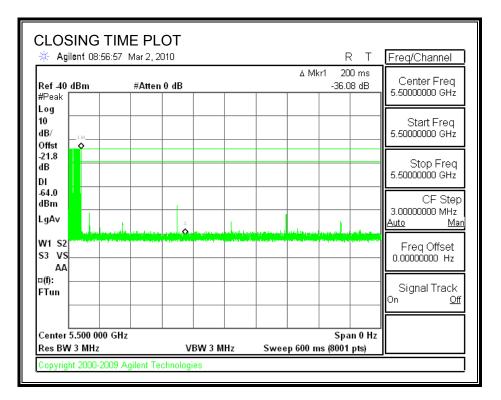
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#### MOVE TIME



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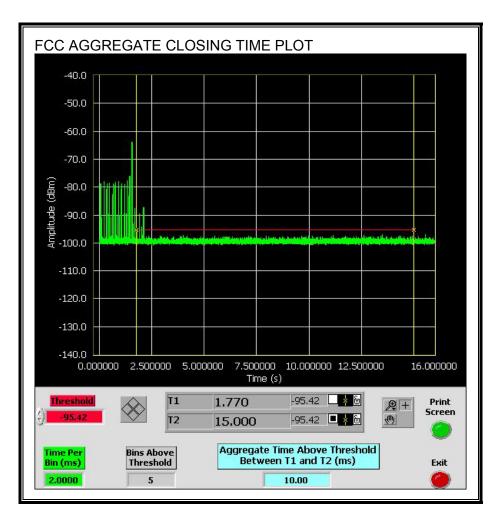
### **CHANNEL CLOSING TIME**



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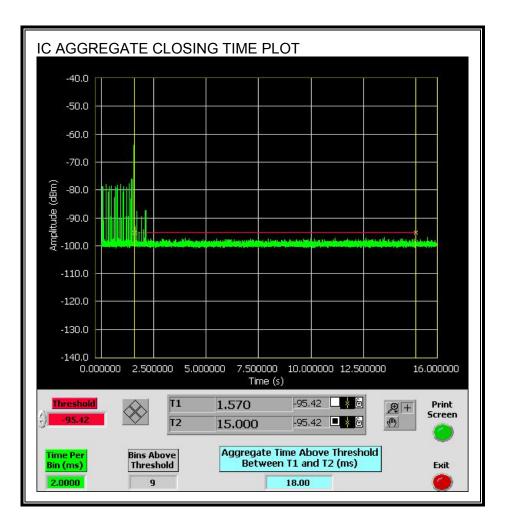
#### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the FCC aggregate monitoring period.



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Only intermittent transmissions are observed during the IC aggregate monitoring period.



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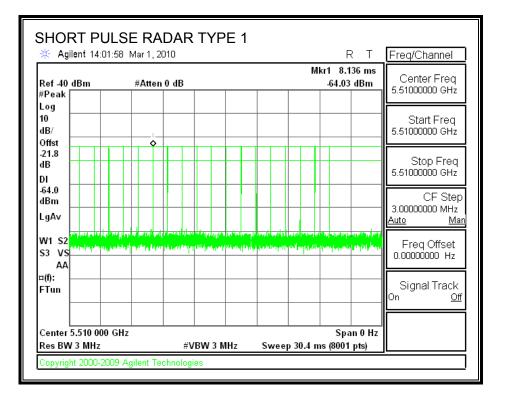
## 11.4. MASTER DEVICE CONFIGURATION IN 40 MHz BANDWIDTH

## 11.4.1. TEST CHANNEL

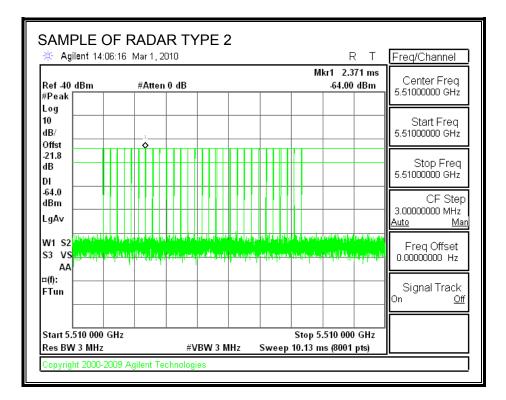
All tests were performed at a channel center frequency of 5510 MHz.

## 11.4.2. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

### PLOTS OF RADAR WAVEFORMS



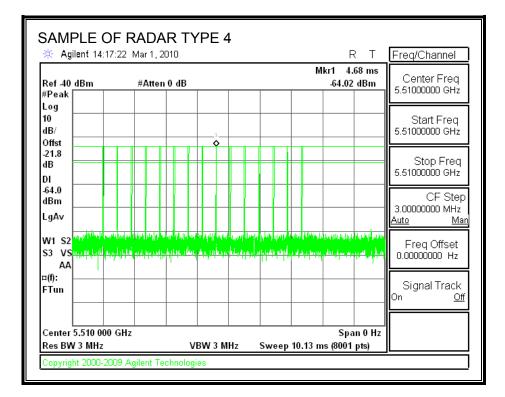
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| Ref -40 dBm                     | +  | Atten 0 | dB |        |           | M                  | cr1 2.8<br>-63.99 | <br>Center Freq                         |
|---------------------------------|--|---------|----|--------|-----------|--------------------|-------------------|---|
| #Peak                           |  | Aucho   |    |        |           |                    | -05.55            | 5.51000000 GHz                          |
| Log<br>10<br>dB/<br>Offst       | 1  |         |    |        |           |                    |                   | Start Freq<br>5.5100000 GHz             |
| -21.8<br>dB                     |  |         |    |        |           |                    |                   | Stop Freq<br>5.51000000 GHz             |
| -64.0<br>dBm                    |  |         |    |        |           |                    |                   | <br>CF Step<br>3.00000000 MHz           |
| Ŭ I                             | ryn yny diwyd yn y<br>w y <sub>ny</sub> iddiwlei y ydd |         |    |        |           |                    |                   | Auto Ma<br>Freq Offset<br>0.00000000 Hz |
| ¤(f):<br>FTun                   |  |         |    |        |           |                    |                   | Signal Track<br>On <u>Off</u>           |
| Start 5.510 000<br>Res BW 3 MHz |  |         | #1 | BW 3 1 | <br>Swaan | Stop 5.<br>15.47 m |                   |   |

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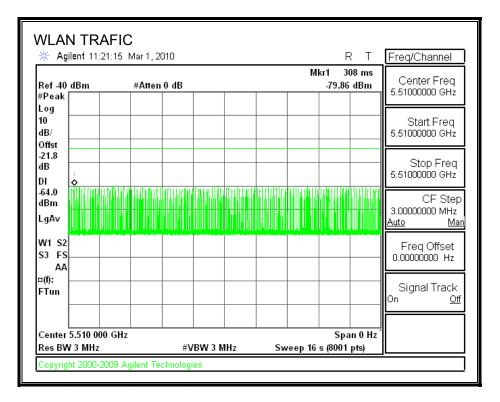
| Agilent 14:20:                     |  | URST OF | RADAR | R T                        | Freq/Channel                                 |
|------------------------------------|--|---------|-------|----------------------------|--|
| Ref -40 dBm<br>#Peak               | #Atten 0 dB  |         | M     | kr1 2.523 ms<br>-64.00 dBm | Center Freq<br>5.51000000 GHz                |
| Log<br>10<br>dB/<br>Offst          | 1  |         |       |                            | Start Freq<br>5.51000000 GHz                 |
| -21.8<br>dB                        |  |         |       |                            | Stop Freq<br>5.5100000 GHz                   |
| -64.0<br>dBm<br>LgAv               |  |         |       |                            | CF Step<br>3.00000000 MHz<br><u>Auto Mar</u> |
| W1 S2<br>S3 VS<br>AA               | ti tu unu unu i jula di<br>mun plant ti tu unu i plant                         |         |       |                            |  |
| ¤(f):<br>FTun                      |  |         |       |                            | Signal Track<br>On <u>Off</u>                |
| Center 5.510 000 (<br>Res BW 3 MHz | Center 5.510 000 GHz Span 0 Hz<br>Res BW 3 MHz VBW 3 MHz Sweep 8 ms (8001 pts) |         |       |                            |  |

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|                                  | JRST OF<br>2:38 Mar 1, 20 |      |       | LU    | RT   | Freq/Channel                          |
|----------------------------------|---------------------------|------|-------|-------|--|---------------------------------------|
| Ref -40 dBm<br>#Peak             | #Atten                    | ) dB |       |       | Mkr1 2.332 ms<br>-64.02 dBm  | Center Freq<br>5.51000000 GHz         |
| Log<br>10<br>dB/<br>Offst        |                           |      | _1    |       |  | Start Freq<br>5.51000000 GHz          |
| -21.8<br>dB                      |                           |      | ¥     |       |  | Stop Freq<br>5.51000000 GHz           |
| -64.0<br>dBm<br>LgAv             |                           |      |       |       |  | CF Step<br>3.00000000 MHz<br>Auto Mar |
|                                  |                           |      |       |       | the office of the first state of the second st | Erea Offset                           |
| ¤(f):<br>FTun                    |                           |      |       |       |  | Signal Track<br>On <u>Off</u>         |
| Center 5.510 000<br>Res BW 3 MHz | GHz                       | VBW  | 3 MHz | Sweep | Span 0 Hz<br>5 ms (8001 pts)   |                                       |

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#### PLOT OF WLAN TRAFFIC FROM MASTER



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## 11.4.3. CHANNEL AVAILABILITY CHECK TIME

#### PROCEDURE TO DETERMINE INITIAL POWER-UP CYCLE TIME

A link was established on channel then the EUT was rebooted. The time from the cessation of traffic to the re-initialization of traffic was measured as the time required for the EUT to complete the total power-up cycle. The time to complete the initial power-up period is 60 seconds less than this total power-up time.

#### PROCEDURE FOR TIMING OF RADAR BURST

With a link established on channel, the EUT was rebooted. A radar signal was triggered within 0 to 6 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

The Non-Occupancy list was cleared. With a link established on channel, the EUT was rebooted. A radar signal was triggered within 54 to 60 seconds after the initial power-up period, and transmissions on the channel were monitored on the spectrum analyzer.

### **QUANTITATIVE RESULTS**

### No Radar Triggered

| Timing of | Timing of        | Total Power-up | Initial Power-up |
|-----------|------------------|----------------|------------------|
| Reboot    | Start of Traffic | Cycle Time     | Cycle Time       |
| (sec)     | (sec)            | (sec)          | (sec)            |
| 31.24     | 170.9            | 139.7          | 79.7             |

#### **Radar Near Beginning of CAC**

| Timing of | Timing of   | Radar Relative | Radar Relative  |
|-----------|-------------|----------------|-----------------|
| Reboot    | Radar Burst | to Reboot      | to Start of CAC |
| (sec)     | (sec)       | (sec)          | (sec)           |
| 30        | 111.2       | 81.2           | 1.5             |

#### Radar Near End of CAC

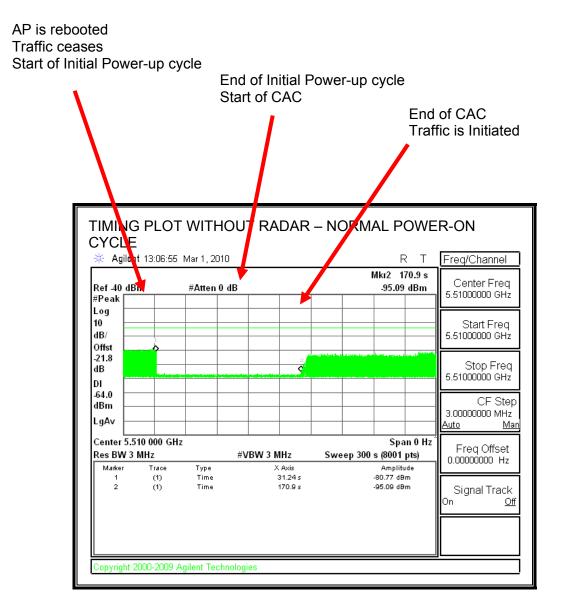
| Timing of | Timing of   | Radar Relative | Radar Relative  |
|-----------|-------------|----------------|-----------------|
| Reboot    | Radar Burst | to Reboot      | to Start of CAC |
| (sec)     | (sec)       | (sec)          | (sec)           |
| 30.26     | 169.0       | 138.7          | 59.1            |

### **QUALITATIVE RESULTS**

| Timing of<br>Radar Burst | Display on Control<br>Computer | Spectrum Analyzer Display       |
|--------------------------|--------------------------------|---------------------------------|
| No Radar                 | EUT marks Channel as active    | Transmissions begin on channel  |
| Triggered                |                                | after completion of the initial |
|                          |                                | power-up cycle and the CAC      |
| Within 0 to 6            | EUT indicates radar detected   | No transmissions on channel     |
| second window            |                                |                                 |
| Within 54 to 60          | EUT indicates radar detected   | No transmissions on channel     |
| second window            |                                |                                 |

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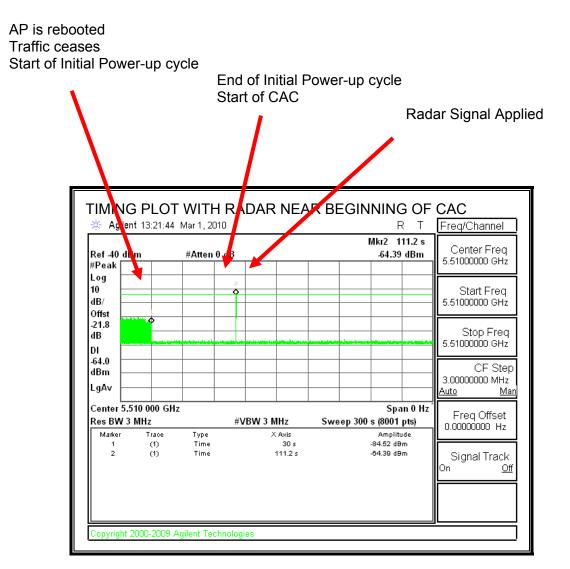
#### TIMING PLOT WITHOUT RADAR DURING CAC



Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

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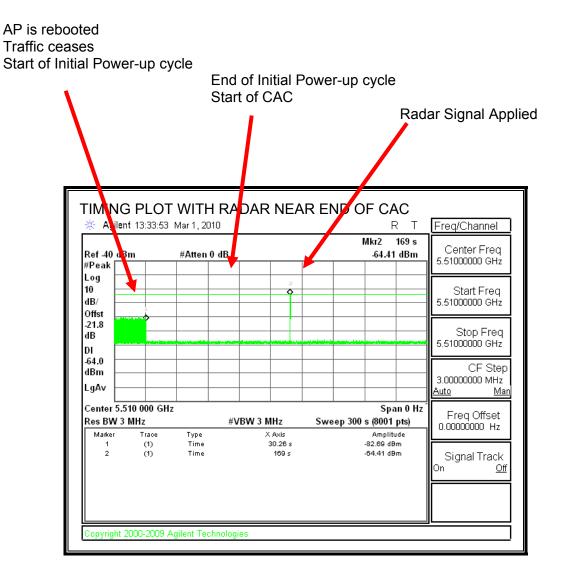
#### TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC



No EUT transmissions were observed after the radar signal.

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#### TIMING PLOT WITH RADAR NEAR END OF CAC



No EUT transmissions were observed after the radar signal.

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## 11.4.4. OVERLAPPING CHANNEL TESTS

### **RESULTS**

These tests are not applicable.

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# 11.4.5. MOVE AND CLOSING TIME

### REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) \* (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

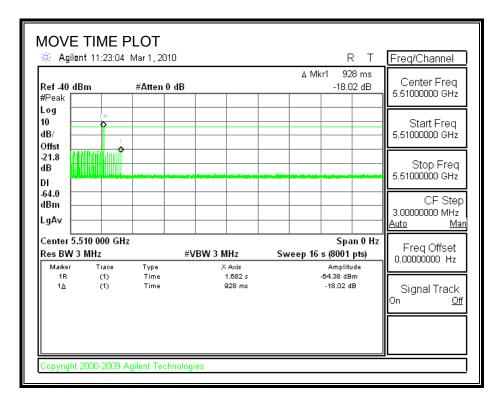
### **RESULTS**

| Agency   | Channel Move Time | Limit |
|----------|-------------------|-------|
|          | (sec)             | (sec) |
| FCC / IC | 0.928             | 10    |

| Agency | Aggregate Channel Closing Transmission Time | Limit  |
|--------|---|--------|
|        | (msec)                                      | (msec) |
| FCC    | 20.0  | 60     |
| IC     | 26.0  | 260    |

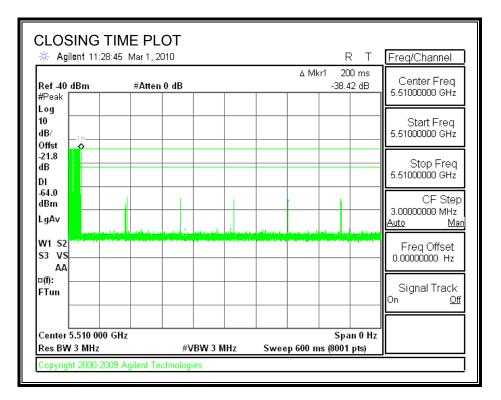
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#### MOVE TIME



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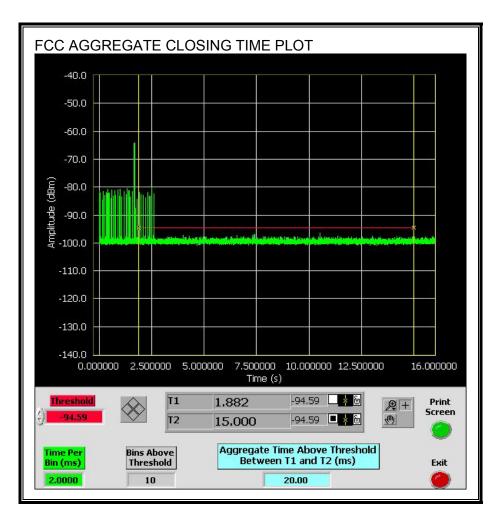
### **CHANNEL CLOSING TIME**



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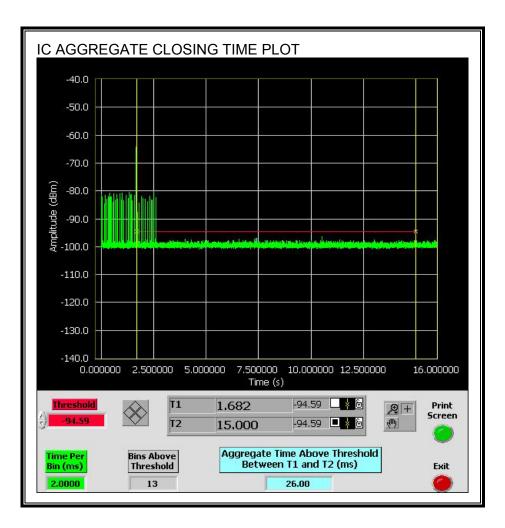
### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the FCC aggregate monitoring period.



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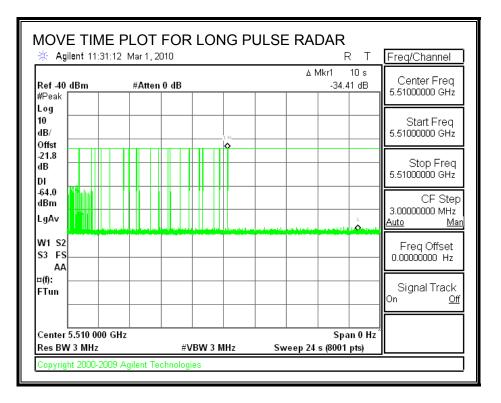
Only intermittent transmissions are observed during the IC aggregate monitoring period.



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### LONG PULSE CHANNEL MOVE TIME

The traffic ceases prior to 10 seconds after the end of the radar waveform.



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# 11.4.6. NON-OCCUPANCY PERIOD

### **RESULTS**

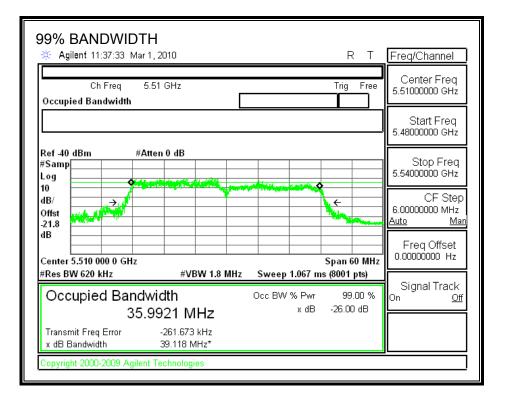
No EUT transmissions were observed on the test channel during the 30-minute observation time.

| enter 5.510 000 (<br>es BW 3 MHz |             | VBW 3 MHz | Sweep 2 | Span 0 Hz Î<br>ks (8001 pts) |  |
|----------------------------------|-------------|-----------|---------|------------------------------|--|
| (f):<br>Tun                      |             |           |         |                              | Signal Track<br>On <u>O</u>              |
| /1 S2<br>3 FS<br>AA              |             |           |         |                              | Freq Offset<br>0.00000000 Hz             |
| 4.0<br>Bm<br>gAv                 |             |           |         | 1.<br>1.                     | CF Ste<br>3.0000000 MHz<br><u>Auto M</u> |
| 1.8<br>B<br>I                    |             |           |         |                              | Stop Frec<br>5.5100000 GHz               |
| og<br>)<br>B/⊥R<br>ffst ♢        |             |           |         |                              | Start Freq<br>5.51000000 GHz             |
| ef-40 dBm<br><sup>⊃eak</sup>     | #Atten 0 dB |           | ۵ ۸     | /kr1 1.8 ks<br>-33.80 dB     | Center Freq<br>5.51000000 GHz            |
| Agilent 12:51:                   | -           | RIOD PLC  | , I     | RТ                           | Freq/Channel                             |

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# 11.4.7. DETECTION BANDWIDTH

### **REFERENCE PLOT OF 99% POWER BANDWIDTH**



#### RESULTS

| FL    | FH    | Detection | 99% Power | Ratio of        | Minimum |
|-------|-------|-----------|-----------|-----------------|---------|
|       |       | Bandwidth | Bandwidth | Detection BW to | Limit   |
|       |       |           |           | 99% Power BW    |         |
| (MHz) | (MHz) | (MHz)     | (MHz)     | (%)             | (%)     |
| 5492  | 5528  | 36        | 35.992    | 100.0           | 80      |

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### DETECTION BANDWIDTH PROBABILITY

| ETECTION BANE      | OWIDTH PROBABI       | LITY RESULTS          |                  |       |
|--------------------|----------------------|-----------------------|------------------|-------|
| Detection Bandy    | width Test Results   |                       |                  |       |
| FCC Type 1 Wav     | veform: 1 us Pulse V | Vidth, 1428 us PRI, 1 | 8 Pulses per l   | Burst |
| Frequency<br>(MHz) | Number of Trials     | Number Detected       | Detection<br>(%) | Mark  |
| 5492               | 10                   | 10                    | 100              | FL    |
| 5493               | 10                   | 10                    | 100              |       |
| 5494               | 10                   | 10                    | 100              |       |
| 5495               | 10                   | 10                    | 100              |       |
| 5496               | 10                   | 10                    | 100              |       |
| 5497               | 10                   | 10                    | 100              |       |
| 5498               | 10                   | 10                    | 100              |       |
| 5499               | 10                   | 10                    | 100              |       |
| 5500               | 10                   | 10                    | 100              |       |
| 5501               | 10                   | 10                    | 100              |       |
| 5502               | 10                   | 10                    | 100              |       |
| 5503               | 10                   | 10                    | 100              |       |
| 5504               | 10                   | 10                    | 100              |       |
| 5505               | 10                   | 10                    | 100              |       |
| 5506               | 10                   | 10                    | 100              |       |
| 5507               | 10                   | 10                    | 100              |       |
| 5508               | 10                   | 10                    | 100              |       |
| 5509               | 10                   | 10                    | 100              |       |
| 5510               | 10                   | 10                    | 100              |       |
| 5511               | 10                   | 10                    | 100              |       |
| 5512               | 10                   | 10                    | 100              |       |
| 5513               | 10                   | 10                    | 100              |       |
| 5514               | 10                   | 10                    | 100              |       |
| 5515               | 10                   | 10                    | 100              |       |
| 5516               | 10                   | 10                    | 100              |       |
| 5517               | 10                   | 10                    | 100              |       |
| 5518               | 10                   | 10                    | 100              |       |
| 5519               | 10                   | 10                    | 100              |       |
| 5520               | 10                   | 10                    | 100              |       |
| 5521               | 10                   | 10                    | 100              |       |
| 5522               | 10                   | 10                    | 100              |       |
| 5523               | 10                   | 10                    | 100              |       |
| 5524               | 10                   | 10                    | 100              |       |
| 5525               | 10                   | 10                    | 100              |       |
| 5526               | 10                   | 10                    | 100              |       |
| 5527               | 10                   | 10                    | 100              |       |
| 5528               | 10                   | 10                    | 100              | FH    |

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# 11.4.8. IN-SERVICE MONITORING

### RESULTS

| CC Radar Test Summ     | ary              |                  |              |           |
|------------------------|------------------|------------------|--------------|-----------|
| Signal Type            | Number of Trials | Detection<br>(%) | Limit<br>(%) | Pass/Fail |
| FCC Short Pulse Type 1 | 30               | 100.00           | 60           | Pass      |
| FCC Short Pulse Type 2 | 30               | 100.00           | 60           | Pass      |
| FCC Short Pulse Type 3 | 30               | 100.00           | 60           | Pass      |
| FCC Short Pulse Type 4 | 30               | 100.00           | 60           | Pass      |
| Aggregate              |                  | 100.00           | 80           | Pass      |
| FCC Long Pulse Type 5  | 30               | 100.00           | 80           | Pass      |
| FCC Hopping Type 6     | 37               | 100.00           | 70           | Pass      |

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### TYPE 1 DETECTION PROBABILITY

|       | Data Sheet for FCC Short Pulse Radar Type 1<br>1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst |  |  |  |  |
|-------|---|--|--|--|--|
| Trial | Successful Detection  |  |  |  |  |
| inai  | (Yes/No)  |  |  |  |  |
| 1     | Yes   |  |  |  |  |
| 2     | Yes   |  |  |  |  |
| 3     | Yes   |  |  |  |  |
| 4     | Yes   |  |  |  |  |
| 5     | Yes   |  |  |  |  |
| 6     | Yes   |  |  |  |  |
| 7     | Yes   |  |  |  |  |
| 8     | Yes   |  |  |  |  |
| 9     | Yes   |  |  |  |  |
| 10    | Yes   |  |  |  |  |
| 11    | Yes   |  |  |  |  |
| 12    | Yes   |  |  |  |  |
| 13    | Yes   |  |  |  |  |
| 14    | Yes   |  |  |  |  |
| 15    | Yes   |  |  |  |  |
| 16    | Yes   |  |  |  |  |
| 17    | Yes   |  |  |  |  |
| 18    | Yes   |  |  |  |  |
| 19    | Yes   |  |  |  |  |
| 20    | Yes   |  |  |  |  |
| 21    | Yes   |  |  |  |  |
| 22    | Yes   |  |  |  |  |
| 23    | Yes   |  |  |  |  |
| 24    | Yes   |  |  |  |  |
| 25    | Yes   |  |  |  |  |
| 26    | Yes   |  |  |  |  |
| 27    | Yes   |  |  |  |  |
| 28    | Yes   |  |  |  |  |
| 29    | Yes   |  |  |  |  |
| 30    | Yes   |  |  |  |  |

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## TYPE 2 DETECTION PROBABILITY

| Naveform | Pulse Width | PRI    | Pulses Per Burst | Successful Detection |
|----------|-------------|--------|------------------|----------------------|
|          | (us)        | (us)   |                  | (Yes/No)             |
| 2001     | 3.7         | 229.00 | 29               | Yes                  |
| 2002     | 2.8         | 151.00 | 29               | Yes                  |
| 2003     | 1.9         | 224.00 | 28               | Yes                  |
| 2004     | 4.7         | 167.00 | 28               | Yes                  |
| 2005     | 2.2         | 188.00 | 29               | Yes                  |
| 2006     | 3.4         | 214.00 | 24               | Yes                  |
| 2007     | 4.8         | 169.00 | 24               | Yes                  |
| 2008     | 3.8         | 163.00 | 26               | Yes                  |
| 2009     | 1.5         | 226.00 | 28               | Yes                  |
| 2010     | 1.7         | 164.00 | 28               | Yes                  |
| 2011     | 1.7         | 156.00 | 24               | Yes                  |
| 2012     | 2           | 196.00 | 27               | Yes                  |
| 2013     | 2.4         | 173.00 | 27               | Yes                  |
| 2014     | 3.8         | 221.00 | 28               | Yes                  |
| 2015     | 2.3         | 189.00 | 27               | Yes                  |
| 2016     | 5           | 188.00 | 28               | Yes                  |
| 2017     | 3.5         | 189.00 | 23               | Yes                  |
| 2018     | 4.5         | 175.00 | 23               | Yes                  |
| 2019     | 1.7         | 153.00 | 24               | Yes                  |
| 2020     | 2.4         | 172.00 | 26               | Yes                  |
| 2021     | 2.9         | 191.00 | 24               | Yes                  |
| 2022     | 2.2         | 190.00 | 29               | Yes                  |
| 2023     | 2.3         | 155.00 | 25               | Yes                  |
| 2024     | 1           | 226.00 | 28               | Yes                  |
| 2025     | 4.1         | 185.00 | 27               | Yes                  |
| 2026     | 3           | 225.00 | 26               | Yes                  |
| 2027     | 4.1         | 193.00 | 24               | Yes                  |
| 2028     | 3.7         | 191.00 | 26               | Yes                  |
| 2029     | 1.9         | 156.00 | 23               | Yes                  |
| 2030     | 1.1         | 194.00 | 23               | Yes                  |

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### TYPE 3 DETECTION PROBABILITY

| Vaveform | Pulse Width<br>(us) | PRI<br>(us) | Pulses Per Burst | Successful Detection<br>(Yes/No) |
|----------|---------------------|-------------|------------------|----------------------------------|
| 3001     | 6.5                 | 464.00      | 17               | Yes                              |
| 3002     | 7.2                 | 467.00      | 16               | Yes                              |
| 3003     | 6                   | 282.00      | 16               | Yes                              |
| 3004     | 6.6                 | 350.00      | 18               | Yes                              |
| 3005     | 8.4                 | 349.00      | 16               | Yes                              |
| 3006     | 8.5                 | 379.00      | 17               | Yes                              |
| 3007     | 7.2                 | 306.00      | 16               | Yes                              |
| 3008     | 5.4                 | 306.00      | 18               | Yes                              |
| 3009     | 9.1                 | 377.00      | 17               | Yes                              |
| 3010     | 8.1                 | 423.00      | 17               | Yes                              |
| 3011     | 9.2                 | 353.00      | 16               | Yes                              |
| 3012     | 8.2                 | 274.00      | 16               | Yes                              |
| 3013     | 7                   | 339.00      | 16               | Yes                              |
| 3014     | 8.1                 | 455.00      | 16               | Yes                              |
| 3015     | 5.2                 | 362.00      | 16               | Yes                              |
| 3016     | 7.1                 | 442.00      | 16               | Yes                              |
| 3017     | 7.2                 | 307.00      | 18               | Yes                              |
| 3018     | 5.3                 | 493.00      | 16               | Yes                              |
| 3019     | 6.6                 | 335.00      | 18               | Yes                              |
| 3020     | 7.4                 | 356.00      | 16               | Yes                              |
| 3021     | 6.3                 | 266.00      | 18               | Yes                              |
| 3022     | 9                   | 358.00      | 18               | Yes                              |
| 3023     | 8.5                 | 425.00      | 17               | Yes                              |
| 3024     | 6.7                 | 443.00      | 18               | Yes                              |
| 3025     | 5.5                 | 296.00      | 17               | Yes                              |
| 3026     | 6.3                 | 286.00      | 17               | Yes                              |
| 3027     | 6.3                 | 303.00      | 18               | Yes                              |
| 3028     | 9.1                 | 448.00      | 16               | Yes                              |
| 3029     | 8.5                 | 419         | 17               | Yes                              |

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### **TYPE 4 DETECTION PROBABILITY**

| Naveform | Pulse Width | PRI    | Pulses Per Burst | Successful Detection |
|----------|-------------|--------|------------------|----------------------|
|          | (us)        | (us)   |                  | (Yes/No)             |
| 4001     | 19          | 458.00 | 15               | Yes                  |
| 4002     | 14.8        | 424.00 | 14               | Yes                  |
| 4003     | 11.4        | 398.00 | 15               | Yes                  |
| 4004     | 17.4        | 385.00 | 13               | Yes                  |
| 4005     | 19.5        | 482.00 | 13               | Yes                  |
| 4006     | 17.9        | 317.00 | 16               | Yes                  |
| 4007     | 13.4        | 356.00 | 14               | Yes                  |
| 4008     | 11.1        | 273.00 | 14               | Yes                  |
| 4009     | 15.1        | 326.00 | 16               | Yes                  |
| 4010     | 12          | 442.00 | 12               | Yes                  |
| 4011     | 20          | 376.00 | 13               | Yes                  |
| 4012     | 18.8        | 325.00 | 13               | Yes                  |
| 4013     | 18.8        | 428.00 | 14               | Yes                  |
| 4014     | 18.9        | 387.00 | 14               | Yes                  |
| 4015     | 18.1        | 350.00 | 13               | Yes                  |
| 4016     | 17.3        | 446.00 | 16               | Yes                  |
| 4017     | 16.5        | 373.00 | 14               | Yes                  |
| 4018     | 16.8        | 319.00 | 15               | Yes                  |
| 4019     | 16.9        | 456.00 | 13               | Yes                  |
| 4020     | 18          | 296.00 | 15               | Yes                  |
| 4021     | 17.8        | 299.00 | 14               | Yes                  |
| 4022     | 16          | 417.00 | 15               | Yes                  |
| 4023     | 11.5        | 262.00 | 16               | Yes                  |
| 4024     | 17.7        | 491.00 | 12               | Yes                  |
| 4025     | 14.3        | 283.00 | 15               | Yes                  |
| 4026     | 11.2        | 321.00 | 12               | Yes                  |
| 4027     | 13.6        | 483.00 | 16               | Yes                  |
| 4028     | 10.7        | 389.00 | 15               | Yes                  |
| 4029     | 16.2        | 273.00 | 12               | Yes                  |

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### TYPE 5 DETECTION PROBABILITY

| Trial | Long Pulse Radar Type 5<br>Successful Detection |
|-------|---|
|       | (Yes/No)  |
| 1     | Yes   |
| 2     | Yes   |
| 3     | Yes   |
| 4     | Yes   |
| 5     | Yes   |
| 6     | Yes   |
| 7     | Yes   |
| 8     | Yes   |
| 9     | Yes   |
| 10    | Yes   |
| 11    | Yes   |
| 12    | Yes   |
| 13    | Yes   |
| 14    | Yes   |
| 15    | Yes   |
| 16    | Yes   |
| 17    | Yes   |
| 18    | Yes   |
| 19    | Yes   |
| 20    | Yes   |
| 21    | Yes   |
| 22    | Yes   |
| 23    | Yes   |
| 24    | Yes   |
| 25    | Yes   |
| 26    | Yes   |
| 27    | Yes   |
| 28    | Yes   |
| 29    | Yes   |
| 30    | Yes   |

Note: The Type 5 randomized parameters are shown in a separate document.

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### TYPE 6 DETECTION PROBABILITY

|       | t for FCC Hopping Rada<br>e Width, 333 us PRI, : |                  | 1 Burst per Hop | )          |
|-------|--|------------------|-----------------|------------|
|       | ust 2005 Hopping Se                              |                  |                 |            |
|       | Starting Index                                   | Signal Generator | Hops within     | Successful |
| Trial | Within Sequence                                  | Frequency        | Detection BW    | Detection  |
|       |  | (MHz)            |                 | (Yes/No)   |
| 1     | 149  | 5492             | 6               | Yes        |
| 2     | 624  | 5493             | 11              | Yes        |
| 3     | 1099   | 5494             | 8               | Yes        |
| 4     | 1574   | 5495             | 5               | Yes        |
| 5     | 2049   | 5496             | 5               | Yes        |
| 6     | 2524   | 5497             | 7               | Yes        |
| 7     | 2999   | 5498             | 7               | Yes        |
| 8     | 3474   | 5499             | 8               | Yes        |
| 9     | 3949   | 5500             | 8               | Yes        |
| 10    | 4424   | 5501             | 8               | Yes        |
| 11    | 4899   | 5502             | 10              | Yes        |
| 12    | 5374   | 5503             | 9               | Yes        |
| 13    | 5849   | 5504             | 10              | Yes        |
| 14    | 6324   | 5505             | 5               | Yes        |
| 15    | 6799   | 5506             | 6               | Yes        |
| 16    | 7274   | 5507             | 9               | Yes        |
| 17    | 7749   | 5508             | 8               | Yes        |
| 18    | 8224   | 5509             | 11              | Yes        |
| 19    | 8699   | 5510             | 8               | Yes        |
| 20    | 9174   | 5511             | 10              | Yes        |
| 21    | 9649   | 5512             | 6               | Yes        |
| 22    | 10124  | 5513             | 5               | Yes        |
| 23    | 10599  | 5514             | 3               | Yes        |
| 24    | 11074  | 5515             | 7               | Yes        |
| 25    | 11549  | 5516             | 8               | Yes        |
| 26    | 12024  | 5517             | 9               | Yes        |
| 27    | 12499  | 5518             | 7               | Yes        |
| 28    | 12974  | 5519             | 11              | Yes        |
| 29    | 13449  | 5520             | 9               | Yes        |
| 30    | 13924  | 5521             | 2               | Yes        |
| 31    | 14399  | 5522             | 9               | Yes        |
| 32    | 14874  | 5523             | 11              | Yes        |
| 33    | 15349  | 5524             | 7               | Yes        |
| 34    | 15824  | 5525             | 5               | Yes        |
| 35    | 16299  | 5526             | 4               | Yes        |
| 36    | 16774  | 5527             | 6               | Yes        |

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# 11.5. SLAVE DEVICE CONFIGURATION IN 40 MHz BANDWIDTH

# 11.5.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

# 11.6. MOVE AND CLOSING TIME

### **REPORTING NOTES**

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) \* (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

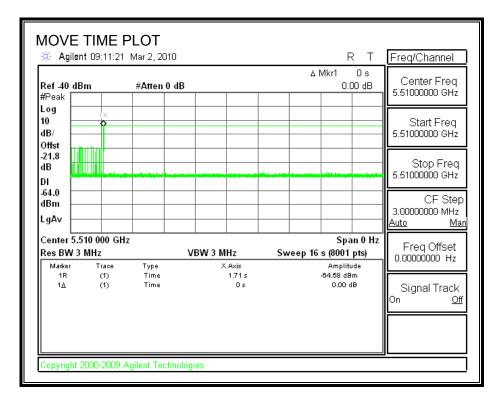
# <u>RESULTS</u>

| Agency   | Channel Move Time | Limit |
|----------|-------------------|-------|
|          | (sec)             | (sec) |
| FCC / IC | 0.0               | 10    |

| Agency | Aggregate Channel Closing Transmission Time | Limit  |
|--------|---|--------|
|        | (msec)                                      | (msec) |
| FCC    | 0.0   | 60     |
| IC     | 0.0   | 260    |

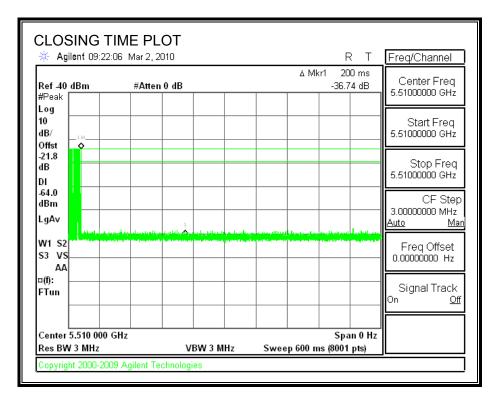
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### MOVE TIME



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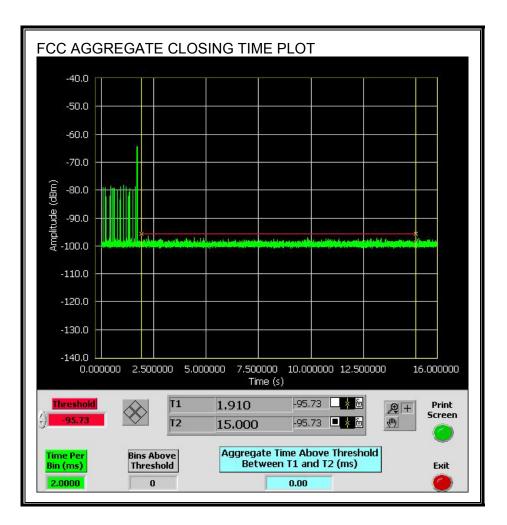
### **CHANNEL CLOSING TIME**



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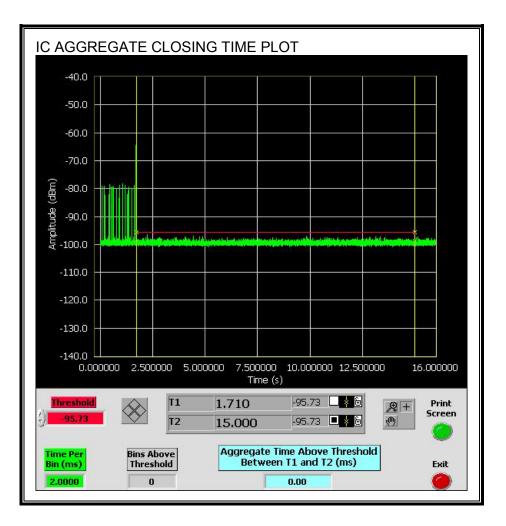
### AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



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No transmissions are observed during the IC aggregate monitoring period.



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# 11.6.1. SLAVE NON-OCCUPANCY

### TEST PROCEDURE

The spectrum analyzer is monitoring the emissions from the Slave.

The AP and Slave are linked in a 40 MHz bandwidth mode, with streaming video. The spectrum analyzer trace is started, then the radar is triggered, and the channel is monitored for > 30 minutes.

### **RESULTS**

No EUT transmissions were observed on the test channel during the 30-minute observation time.

| 🔆 Agilent 10:03                  | :20 Mar 2, 2010  | R T                                | Freq/Channel                                |
|----------------------------------|------------------|------------------------------------|---|
| Ref -40 dBm<br>#Peak             | #Atten 0 dB      | ∆ Mkr1 1.8 ks<br>-34.11 dB         | Center Freq<br>5.51000000 GHz               |
| Log<br>10<br>dB/<br>Offst        |                  |                                    | Start Freq<br>5.51000000 GHz                |
| -21.8<br>dB                      |                  |                                    | Stop Freq<br>5.51000000 GHz                 |
| -64.0<br>dBm<br>LgAv             |                  |                                    | CF Step<br>3.00000000 MHz<br><u>Auto Ma</u> |
| W1 S2<br>S3 FS<br>AA             |                  |                                    | Freq Offset<br>0.00000000 Hz                |
| ¤(f):<br>FTun                    |                  |                                    | Signal Track<br>On <u>Off</u>               |
| Center 5.510 000<br>Res BW 3 MHz | GHz<br>VBW 3 MHz | Span 0 H:<br>Sweep 2 ks (8001 pts) | z   |

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#### 12. MAXIMUM PERMISSIBLE EXPOSURE

### FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

| Frequency range<br>(MHz)                                | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm²)                | Averaging time<br>(minutes) |  |  |  |  |
|---|-------------------------------------|-------------------------------------|--|-----------------------------|--|--|--|--|
| (A) Limits for Occupational/Controlled Exposures        |                                     |                                     |  |                             |  |  |  |  |
| 0.3–3.0<br>3.0–30<br>30–300<br>300–1500<br>1500–100,000 | 614<br>1842/f<br>61.4               | 1.63<br>4.89/F<br>0.163             | *(100)<br>*(900/f²)<br>1.0<br>f/300<br>5 | 6<br>6<br>6<br>6            |  |  |  |  |
| (B) Limits  | for General Populati                | on/Uncontrolled Exp                 | oosure                                   |                             |  |  |  |  |
| 0.3–1.34<br>1.34–30                                     | 614<br>824/f                        | 1.63<br>2.19/f                      | *(100)<br>*(180/f²)                      | 30<br>30                    |  |  |  |  |

#### TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

#### TABLE 1-LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)-Continued

| Frequency range<br>(MHz)           | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm²) | Averaging time<br>(minutes) |
|------------------------------------|-------------------------------------|-------------------------------------|---------------------------|-----------------------------|
| 30–300<br>300–1500<br>1500–100.000 | 27.5                                | 0.073                               | 0.2<br>f/1500<br>1.0      | 30<br>30<br>30              |

f = frequency in MHz

\* = Plane-wave equivalent power density NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occu-tions where a transient through a location where occu-

pational/controlled limits apply provided he or she is made aware of the potential for exposure. NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be ex-posed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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# IC RULES

IC Safety Code 6, Section 2.2.1 (a) A person other than an RF and microwave exposed worker shall not be exposed to electromagnetic radiation in a frequency band listed in Column 1 of Table 5, if the field strength exceeds the value given in Column 2 or 3 of Table 5, when averaged spatially and over time, or if the power density exceeds the value given in Column 4 of Table 5, when averaged spatially and over time.

# Table 5

| Exposure Limits for Persons Not Classed As RF and Microwave Ex- |
|---|
| posed Workers (Including the General Public)                    |

| 1<br>Frequency<br>(MHz) | 2<br>Electric Field<br>Strength; rms<br>(V/m) | 3<br>Magnetic Field<br>Strength; rms<br>(A/m) | 4<br>Power<br>Density<br>(W/m <sup>2</sup> ) | 5<br>Averaging<br>Time<br>(min) |
|-------------------------|---|---|--|---------------------------------|
| 0.003–1                 | 280   | 2.19  |  | 6                               |
| 1–10                    | 280/f   | 2.19/ <i>f</i>                                |  | 6                               |
| 10–30                   | 28  | 2.19/f  |  | 6                               |
| 30–300                  | 28  | 0.073   | 2*   | 6                               |
| 300–1 500               | 1.585 <i>f</i> <sup>0.5</sup>                 | 0.0042f <sup>0.5</sup>                        | f/150  | 6                               |
| 1 500–15 000            | 61.4  | 0.163   | 10   | 6                               |
| 15 000–150 000          | 61.4  | 0.163   | 10   | 616 000 /f <sup>1.2</sup>       |
| 150 000–300 000         | 0.158 <i>f</i> <sup>0.5</sup>                 | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup>      | 6.67 x 10 <sup>-5</sup> f                    | 616 000 /f <sup>1.2</sup>       |

\* Power density limit is applicable at frequencies greater than 100 MHz.

Notes: 1. Frequency, f, is in MHz.

- 2. A power density of 10 W/m<sup>2</sup> is equivalent to  $1 \text{ mW/cm}^2$ .
- A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

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## EQUATIONS

Power density is given by:

S = EIRP / (4 \* Pi \* D^2)

where

S = Power density in W/m<sup>2</sup> EIRP = Equivalent Isotropic Radiated Power in W D = Separation distance in m

Power density in units of W/m<sup>2</sup> is converted to units of mWc/m<sup>2</sup> by dividing by 10.

Distance is given by:

D = SQRT (EIRP / (4 \* Pi \* S))

where

D = Separation distance in m EIRP = Equivalent Isotropic Radiated Power in W S = Power density in W/m<sup>2</sup>

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

# <u>LIMITS</u>

From FCC 1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm<sup>2</sup> From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m<sup>2</sup>

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## **RESULTS**

(MPE distance equals 20 cm)

| Band    | Mode                | Separation | Output | Antenna | IC Power | FCC Power |
|---------|---------------------|------------|--------|---------|----------|-----------|
|         |                     | Distance   | Power  | Gain    | Density  | Density   |
|         |                     | (m)        | (dBm)  | (dBi)   | (W/m^2)  | (mW/cm^2) |
| 5.2 GHz | 11a (2 Chains)      | 0.20       | 12.10  | 6.01    | 0.13     | 0.013     |
| 5.2 GHz | 11n HT20 (4 Chains) | 0.20       | 13.67  | 3.0     | 0.09     | 0.009     |
| 5.2 GHz | 11n HT40 (4 Chains) | 0.20       | 16.73  | 3.0     | 0.19     | 0.019     |
| 5.3 GHz | 11a (2 Chains)      | 0.20       | 18.62  | 6.01    | 0.58     | 0.058     |
| 5.3 GHz | 11n HT20 (4 Chains) | 0.20       | 20.50  | 3.0     | 0.45     | 0.045     |
| 5.3 GHz | 11n HT40 (4 Chains) | 0.20       | 23.62  | 3.0     | 0.91     | 0.091     |
| 5.6 GHz | 11a (2 Chains)      | 0.20       | 19.76  | 6.01    | 0.75     | 0.075     |
| 5.6 GHz | 11n HT20 (4 Chains) | 0.20       | 20.60  | 3.0     | 0.46     | 0.046     |
| 5.6 GHz | 11n HT40 (4 Chains) | 0.20       | 23.89  | 3.0     | 0.97     | 0.097     |

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