FCC CFR47 PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 7

CERTIFICATION TEST REPORT

FOR

EA544D_2 ETHERNET ADAPTER CARD- 2.4 / 5 GHz DFS APPLICATIONS

MODEL NUMBER: 65-VN663-P2

FCC ID: J9C-EA544D2
IC: 2723A-EA544D2

REPORT NUMBER: 09U12689-7, Revision A

ISSUE DATE: MARCH 24, 2010

Prepared for
QUALCOMM, INC.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/26/09	Initial Issue	F. Ibrahim
A	03/24/10	Updated test results for modifications of EUT	F. Ibrahim

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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

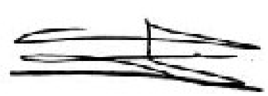
APPLICABLE STANDARDS

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

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 http://www.ccsemc.com.

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%.

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 (MHz)	Mode	Output Power (dBm)	Output Power (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 (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (dBi)
3	3.01	6.01

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.

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

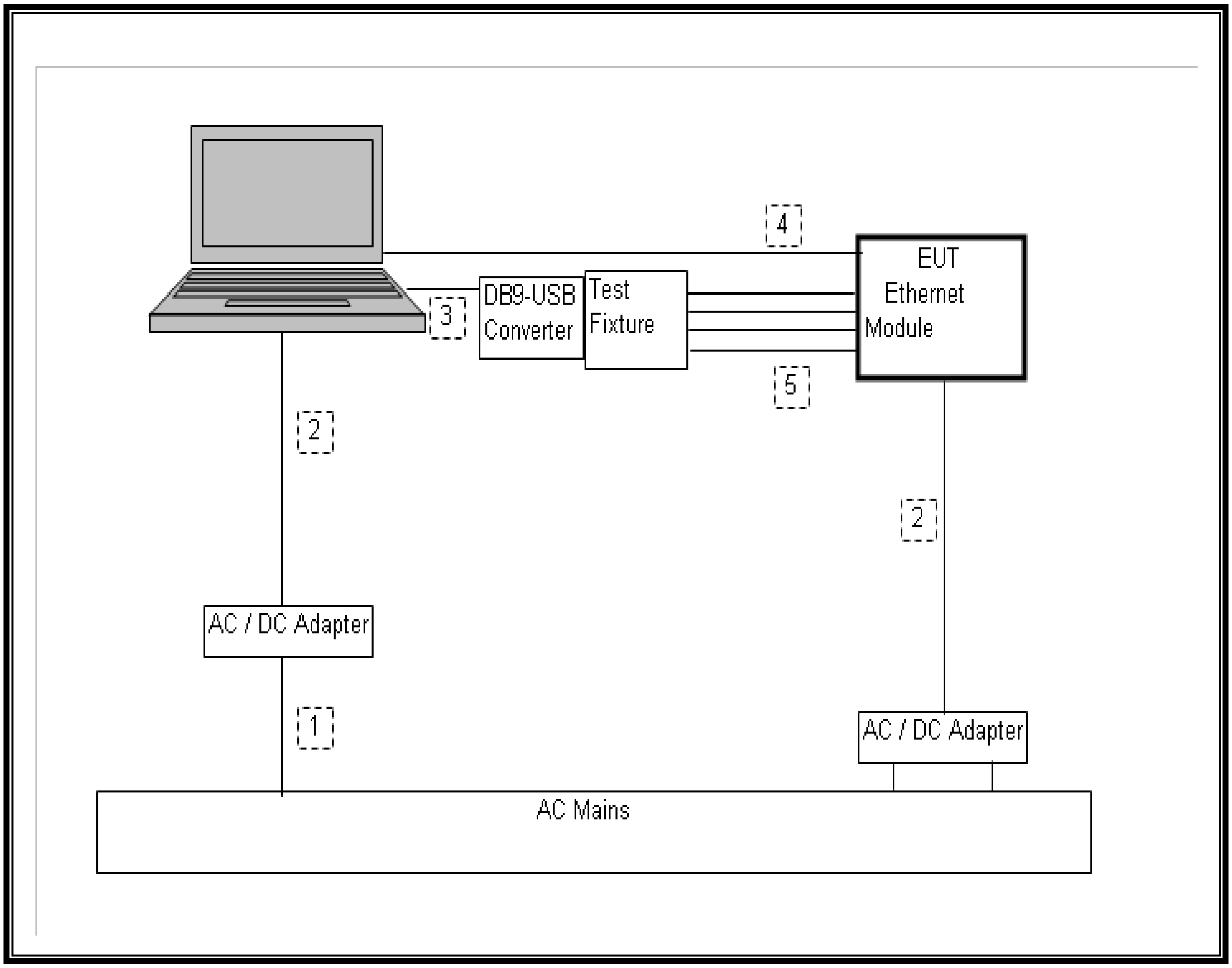
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connecto Type**	**Cable Type**	**Cable 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.

SETUP DIAGRAM FOR TESTS



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

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

LIMITS

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

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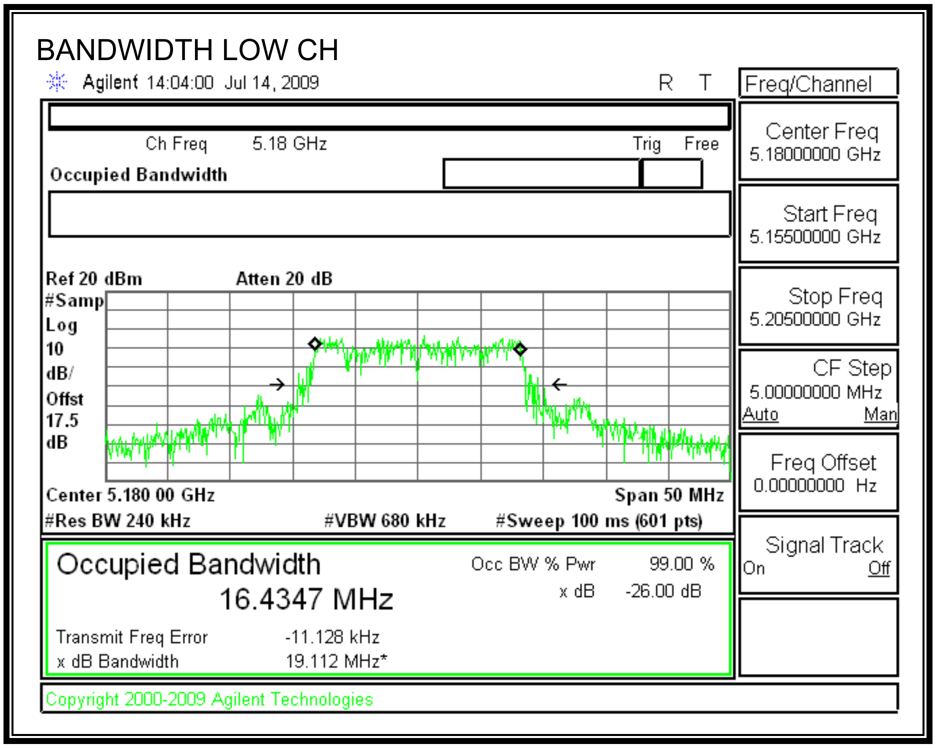
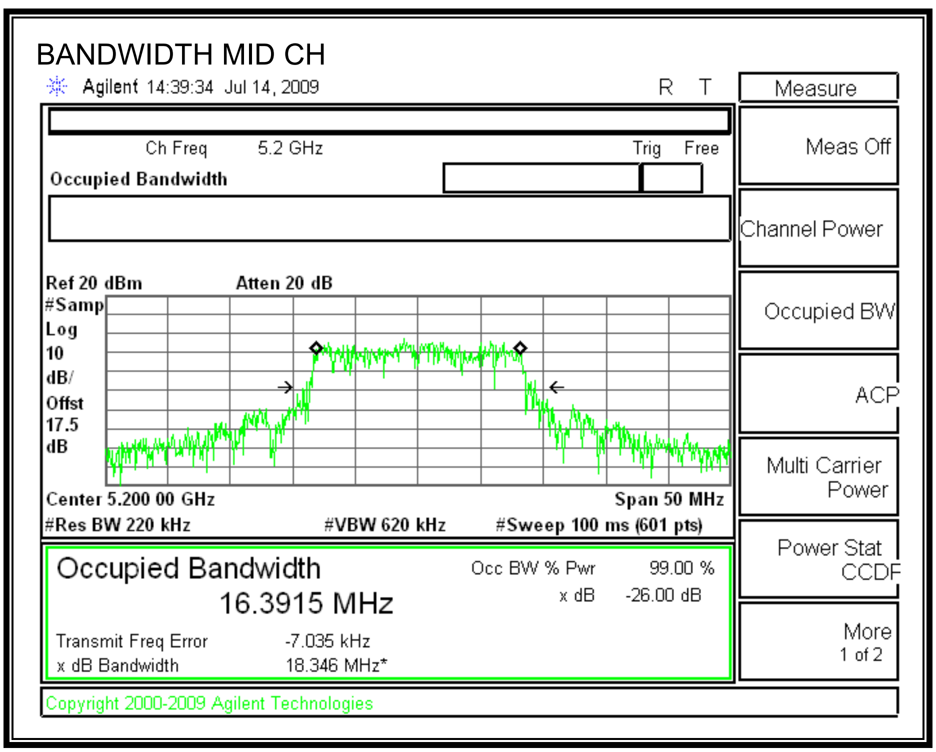
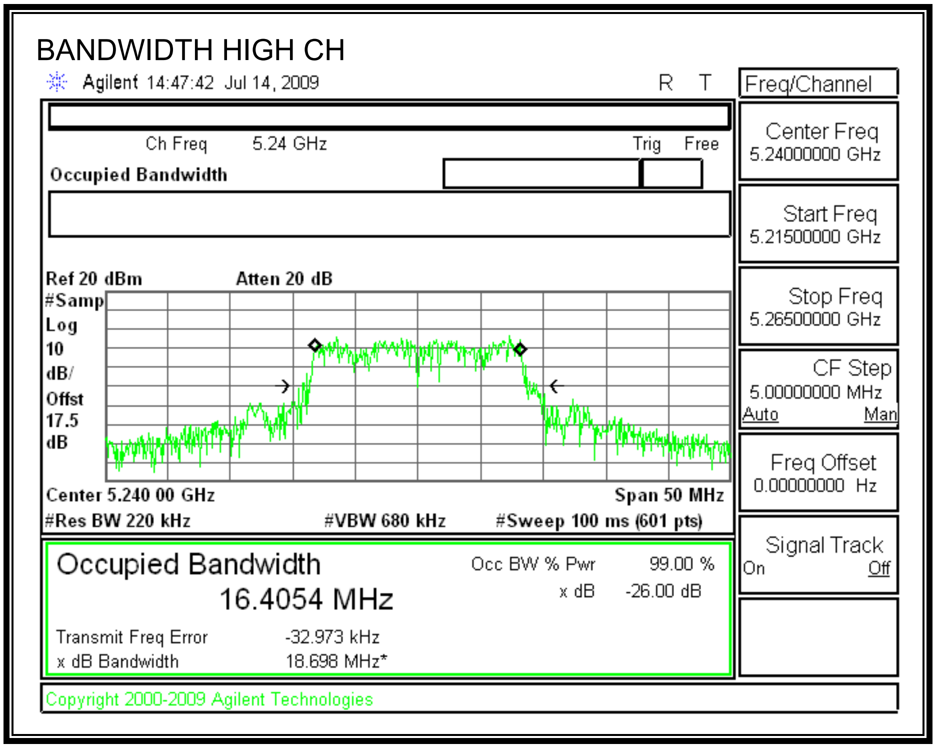
26 dB and 99% BANDWIDTH






BANDWIDTH HIGH CH
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R T
Freq/Channel
Ch Freq 5.24 GHz
Trig Free
Occupied Bandwidth
Center Freq
5.24000000 GHz
Start Freq
5.21500000 GHz
Stop Freq
5.26500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Ref 20 dBm Atten 20 dB
#Samp
Log
10
dB/
Offst
17.5
dB
Center 5.240 00 GHz
Span 50 MHz
#Res BW 220 kHz
#VBW 680 kHz
#Sweep 100 ms (601 pts)
Occupied Bandwidth
16.4054 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -32.973 kHz
x dB Bandwidth 18.698 MHz*
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7.1.2. OUTPUT POWER

LIMITS

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

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

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (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

Limit

Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Effective Antenna Gain (dBi)	Limit (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

Individual Chain Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (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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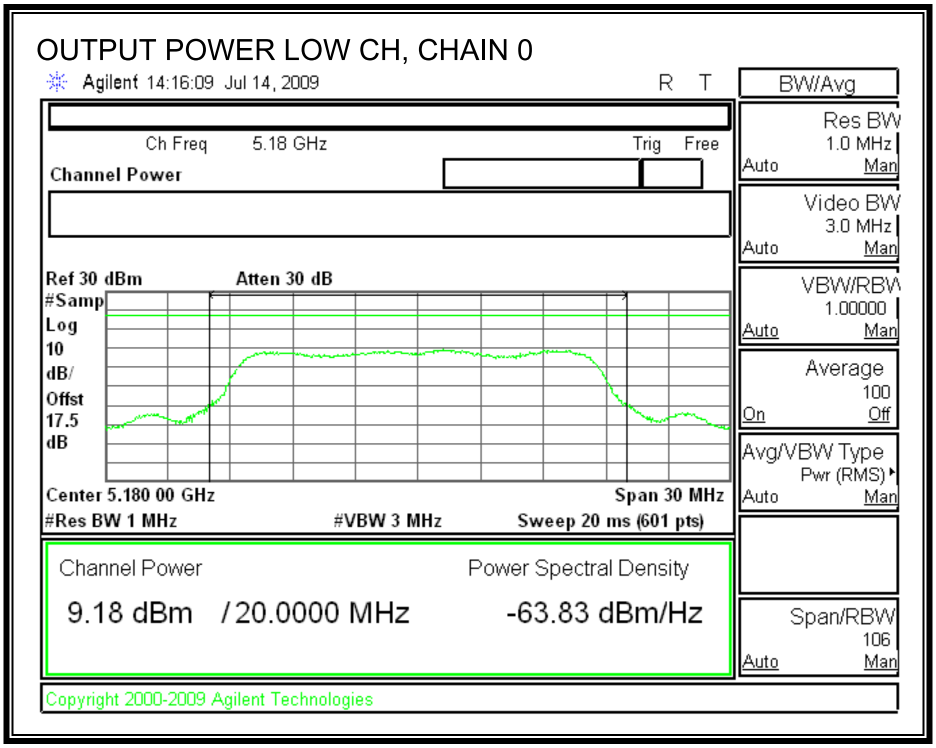
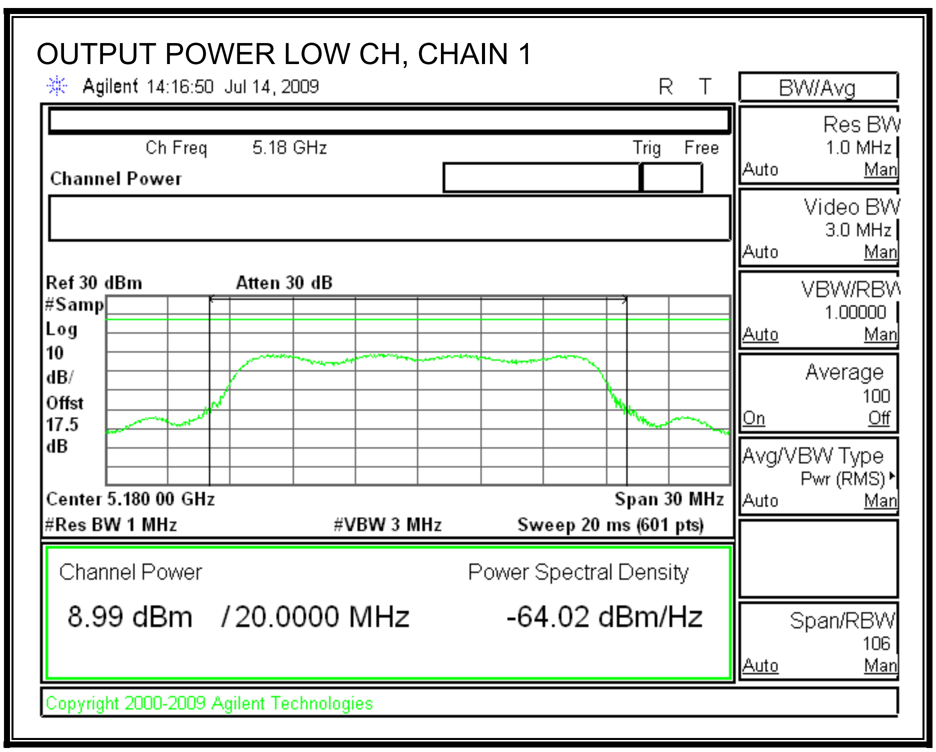
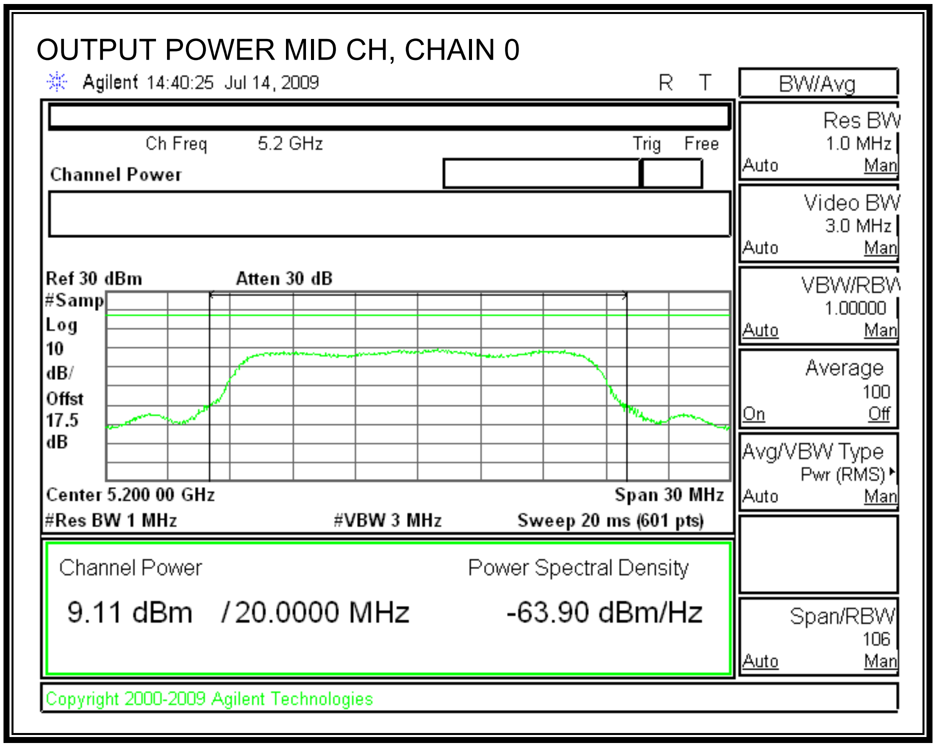
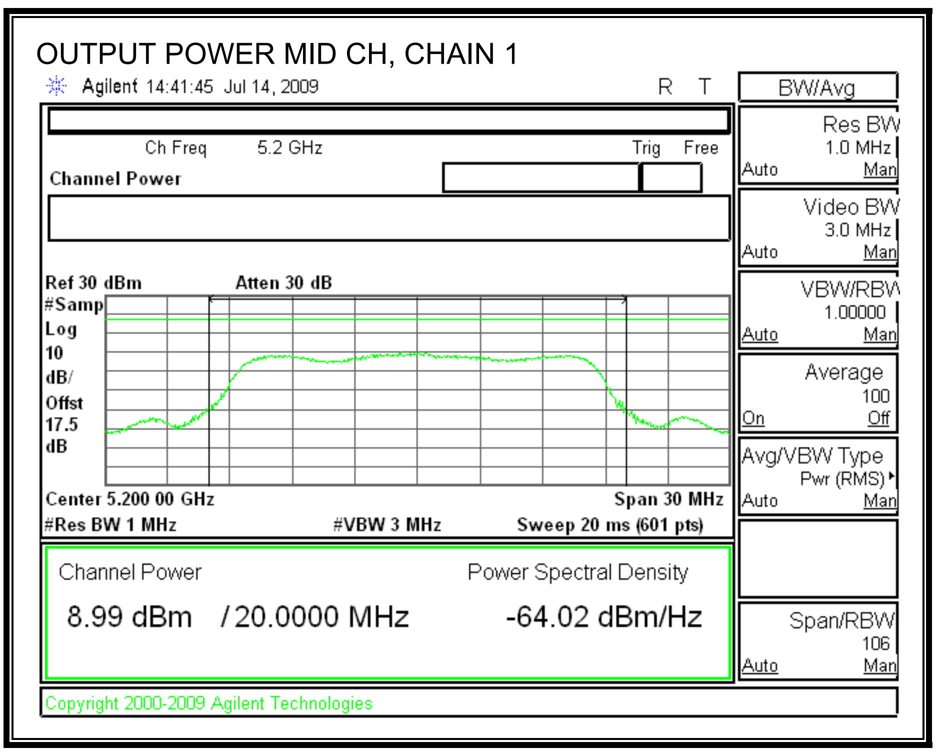
OUTPUT POWER, LOW CHANNEL



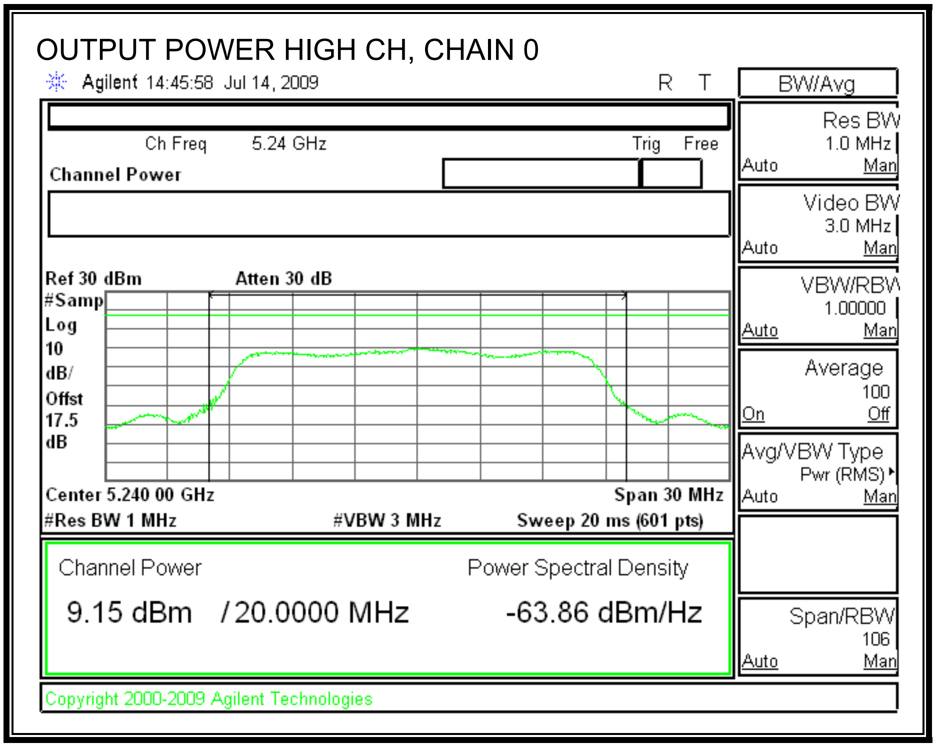


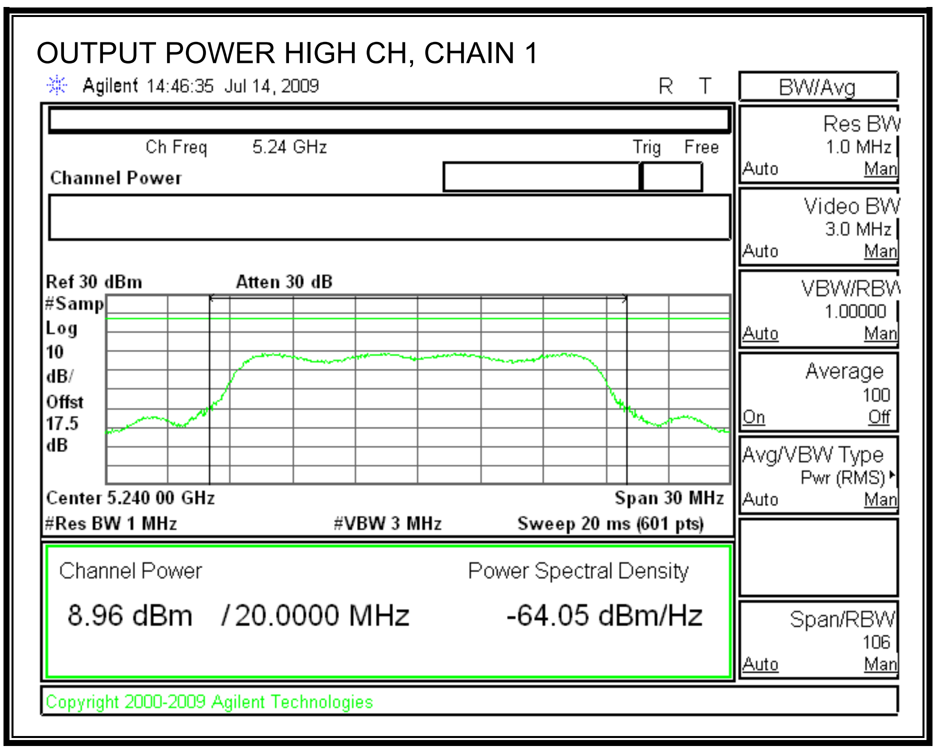
OUTPUT POWER, MID CHANNEL





OUTPUT POWER, HIGH CHANNEL





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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (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

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 (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (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.

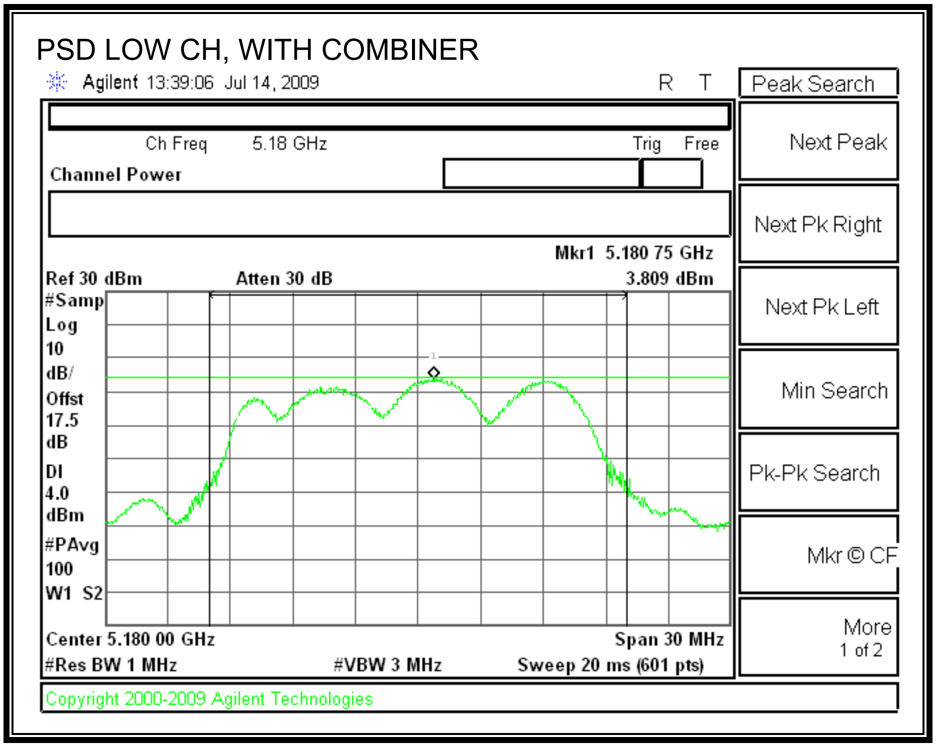
TEST PROCEDURE

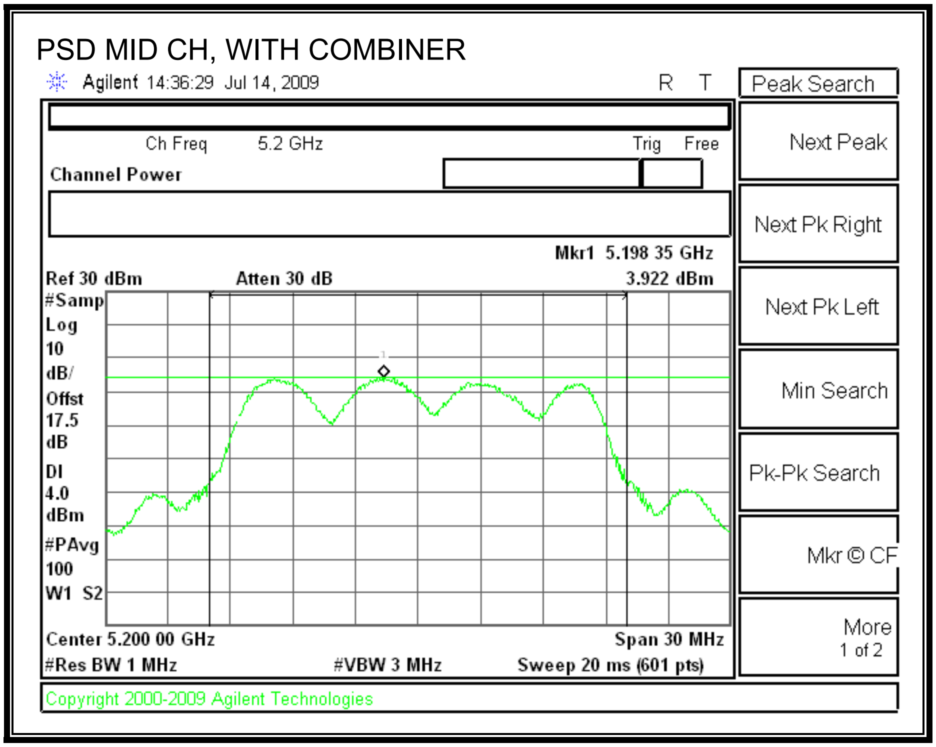
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

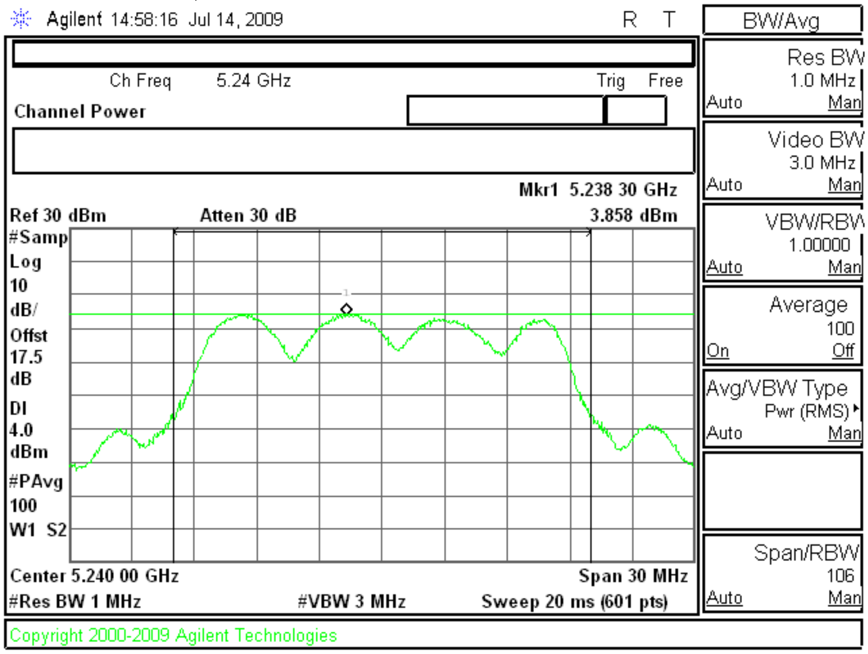
Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	**5180**	**3.81**	**3.99**	**-0.18**
Middle	**5200**	**3.92**	**3.99**	**-0.07**
High	**5240**	**3.86**	**3.99**	**-0.13**

POWER SPECTRAL DENSITY WITH COMBINER





PSD HIGH CH, WITH COMBINER



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 (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (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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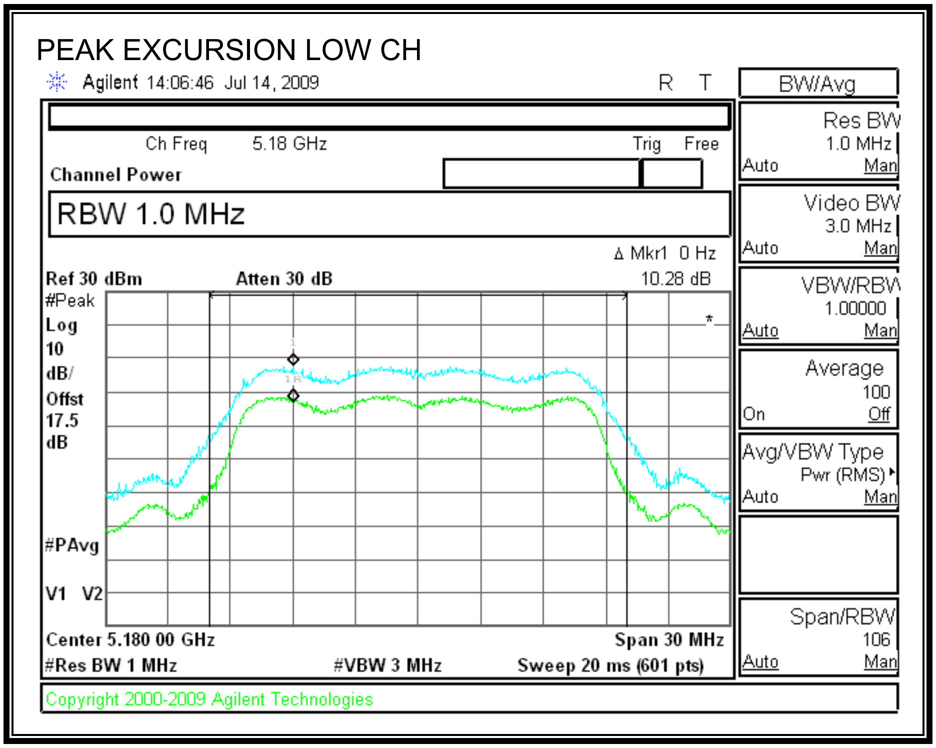
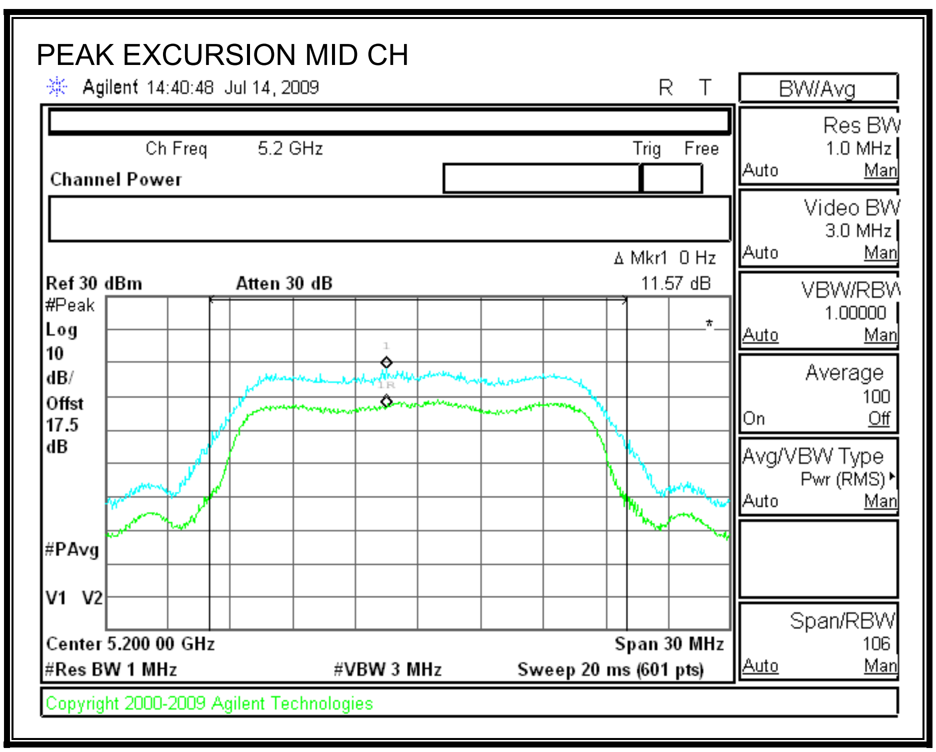
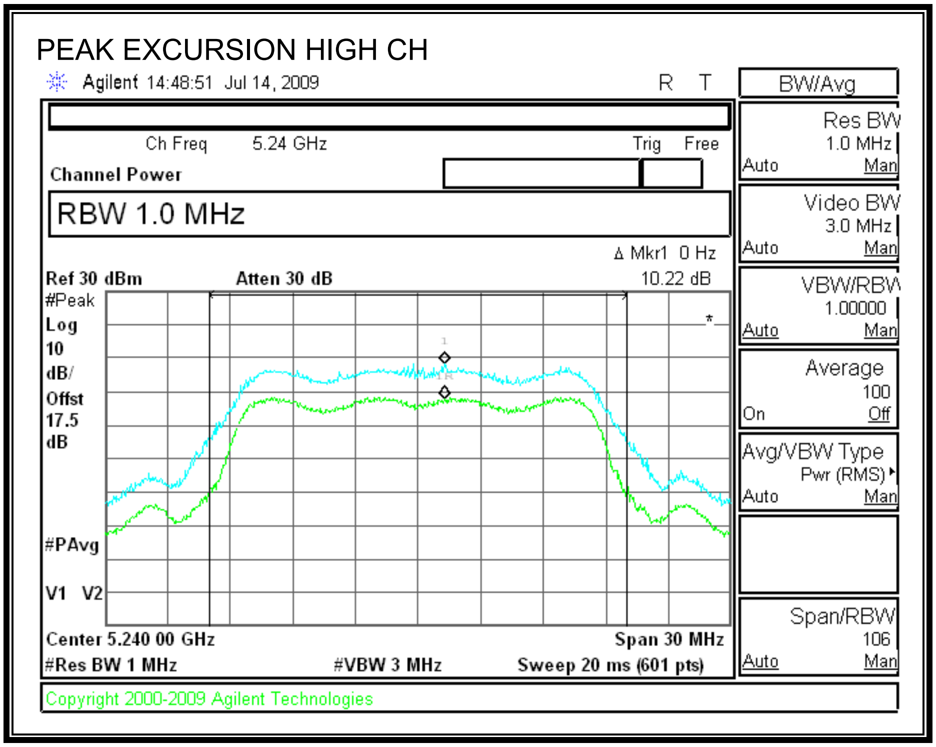
PEAK EXCURSION






PEAK EXCURSION HIGH CH
Agilent 14:48:51 Jul 14, 2009
R T
BW/Avg
Ch Freq 5.24 GHz
Trig Free
Channel Power
RBW 1.0 MHz
Δ Mkr1 0 Hz
10.22 dB
Ref 30 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
17.5
dB
#PAvg
V1 V2
Center 5.240 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Res BW
1.0 MHz
Auto Man
Video BW
3.0 MHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Pwr (RMS)
Auto Man
Span/RBW
106
Auto Man
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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.

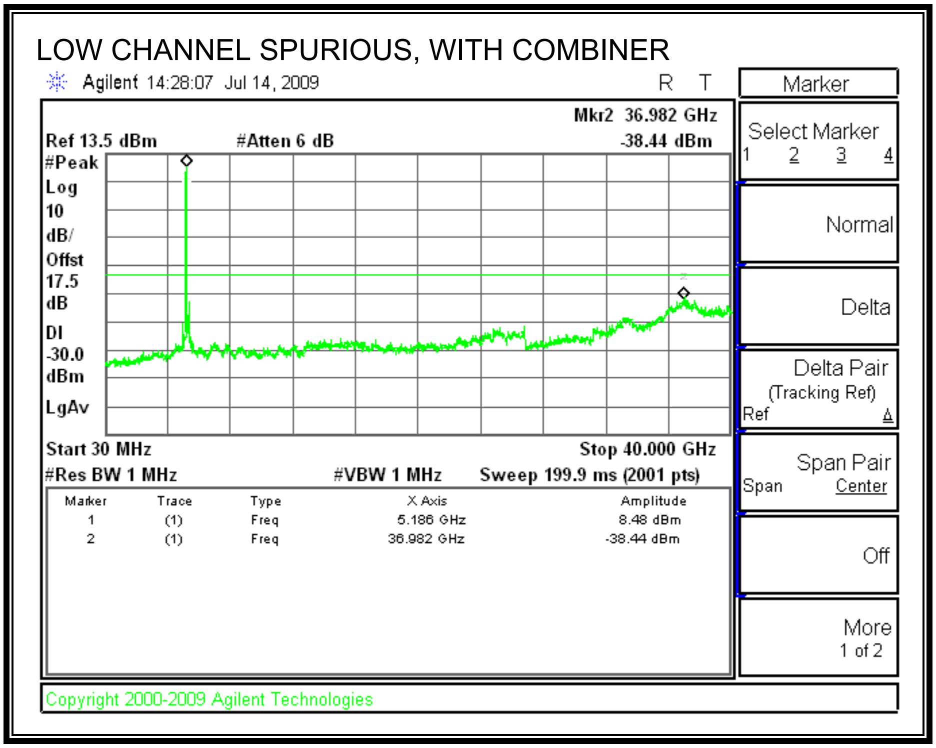
TEST PROCEDURE

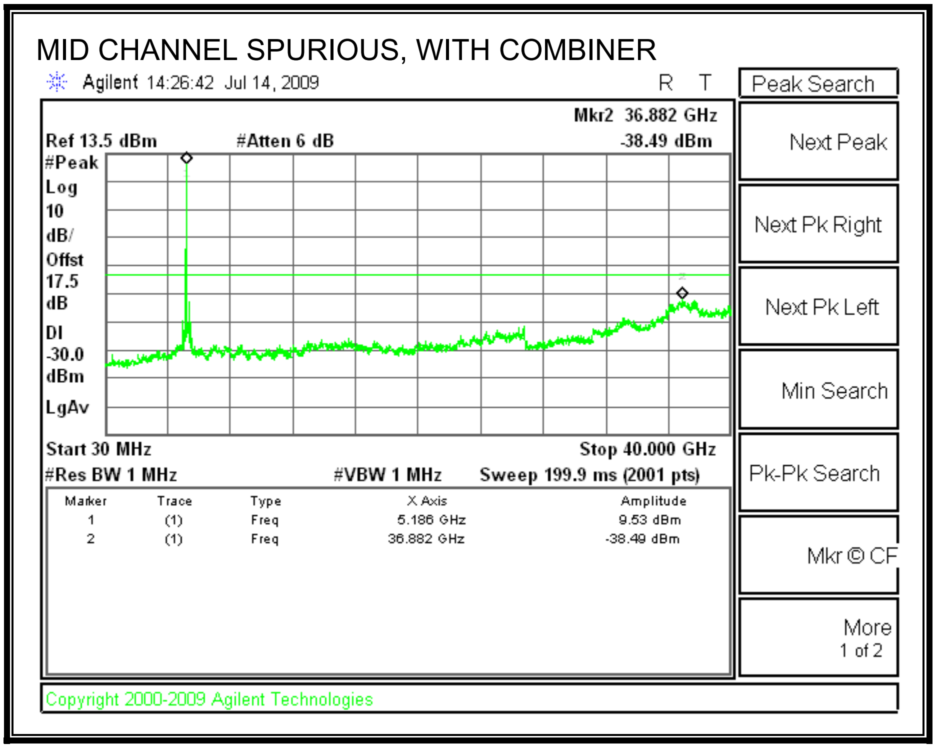
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

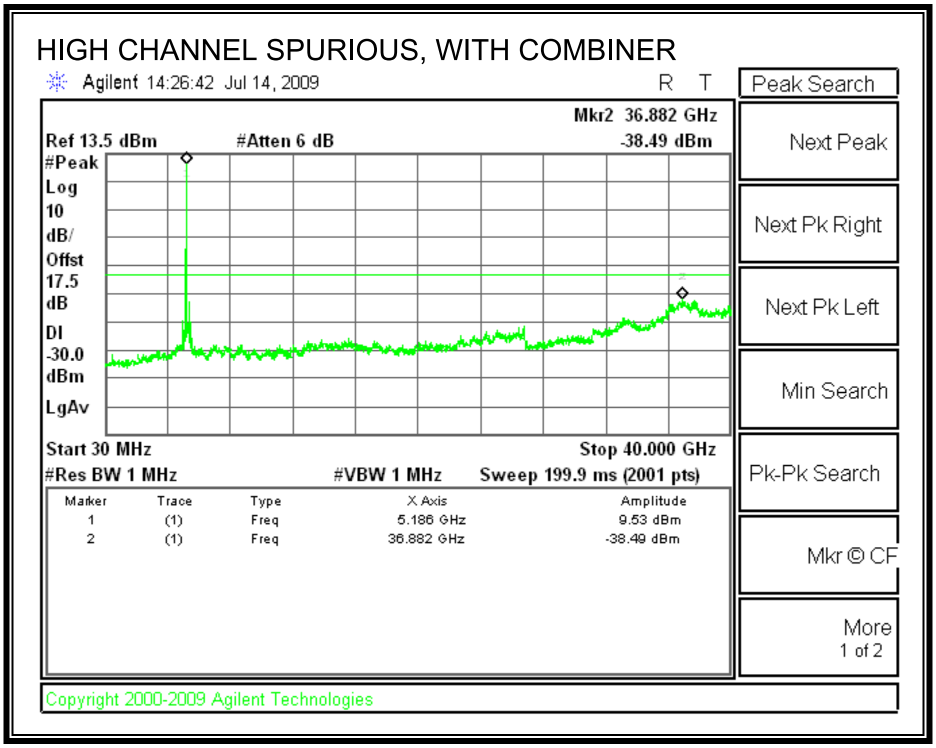
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

SPURIOUS EMISSIONS WITH COMBINER






HIGH CHANNEL SPURIOUS, WITH COMBINER
Agilent 14:26:42 Jul 14, 2009
R T
Peak Search
Mkr2 36.882 GHz
Ref 13.5 dBm
#Atten 6 dB
-38.49 dBm
#Peak
Log
10
dB/
Offst
17.5
dB
Dl
-30.0
dBm
LgAv
Start 30 MHz
Stop 40.000 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 199.9 ms (2001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 5.186 GHz 9.53 dBm
2 (1) Freq 36.882 GHz -38.49 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr © CF
More
1 of 2
Copyright 2000-2009 Agilent Technologies

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

7.2.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

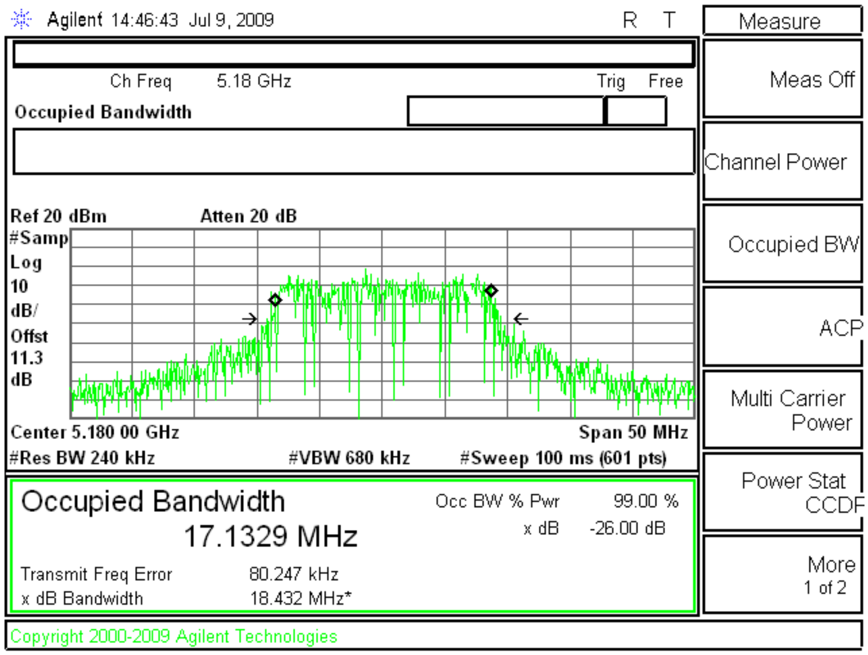
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

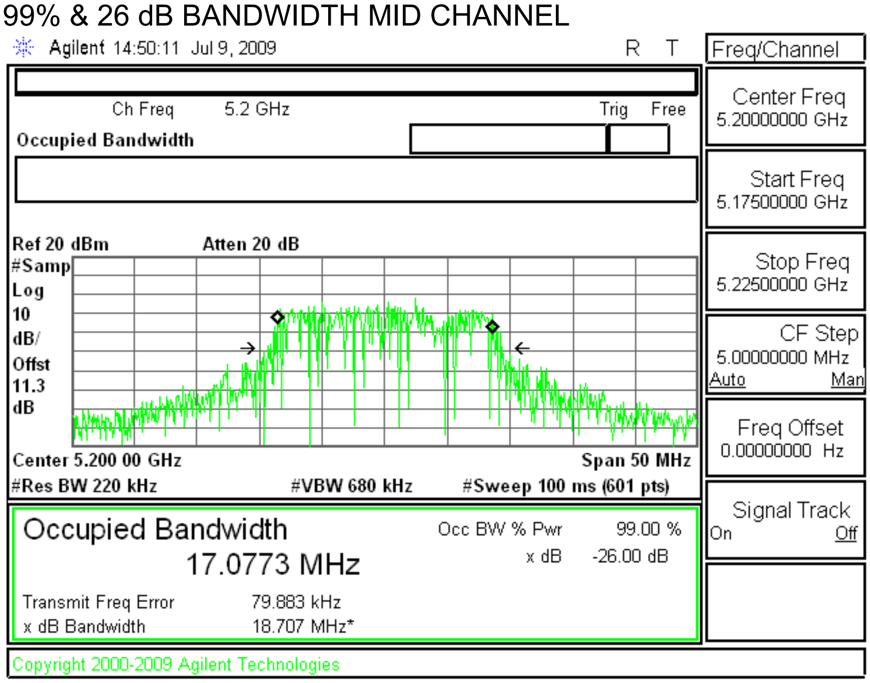
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	5180	17.1329	18.432
Middle	5200	17.0773	18.707
High	5240	17.3831	19.172

99% & 26 dB BANDWIDTH

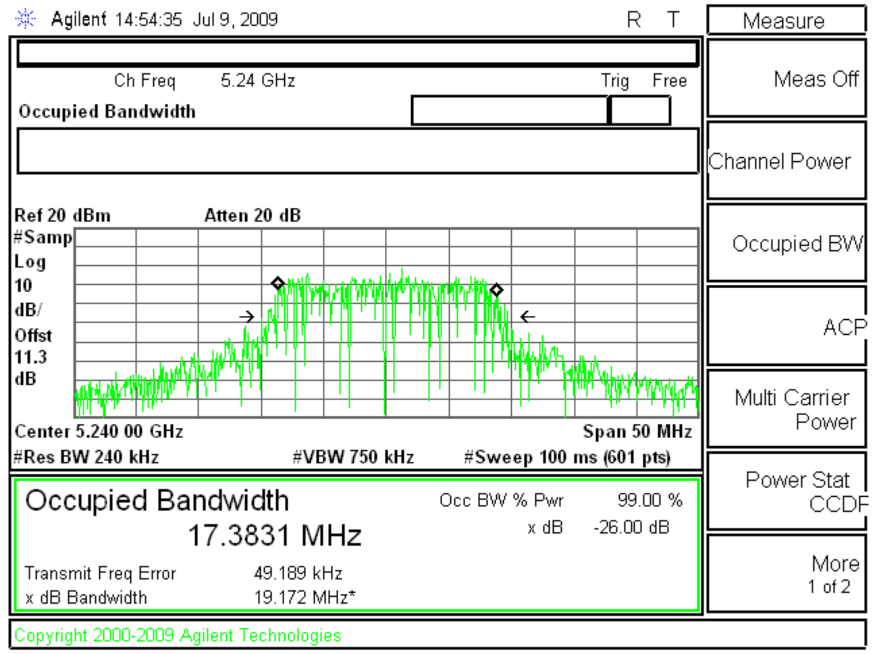
99% & 26 dB BANDWIDTH LOW CHANNEL



99% & 26 dB BANDWIDTH MID CHANNEL



99% & 26 dB BANDWIDTH HIGH CHANNEL



7.2.2. 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.

RESULTS

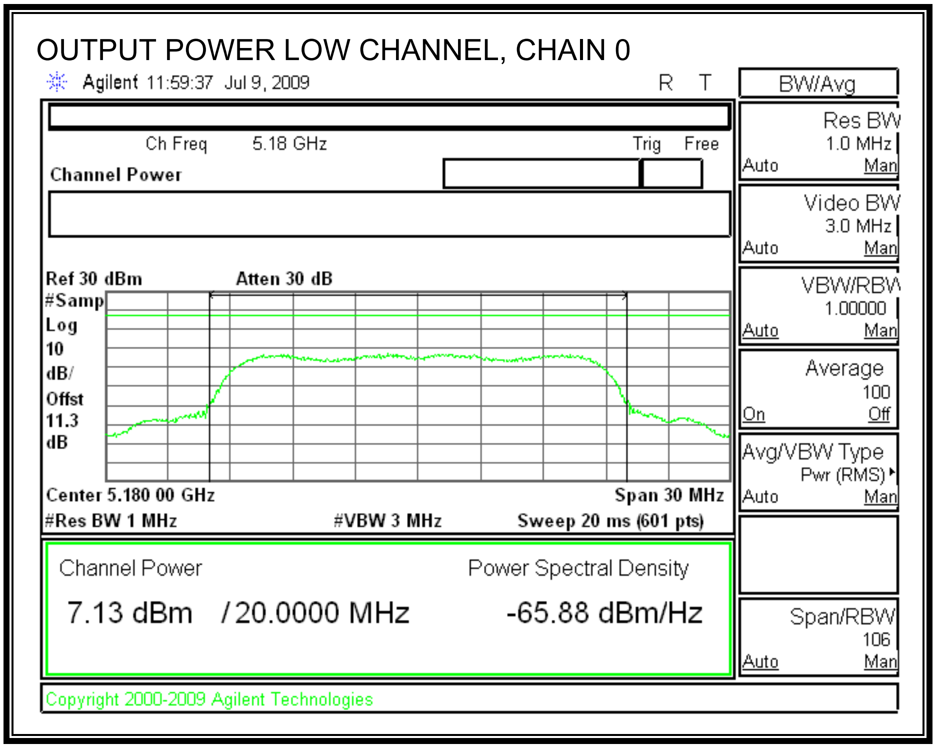
Limit

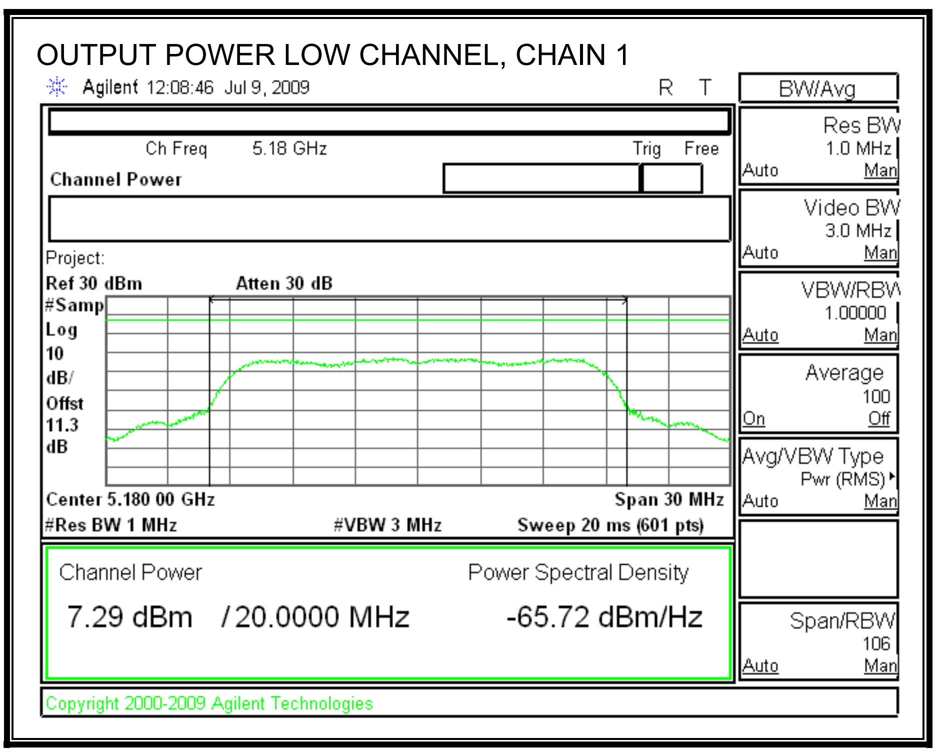
Channel	Freq (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5180	17	18.432	16.66	3	16.66
Mid	5200	17	18.707	16.72	3	16.72
High	5240	17	19.172	16.83	3	16.83

Individual Chain Results

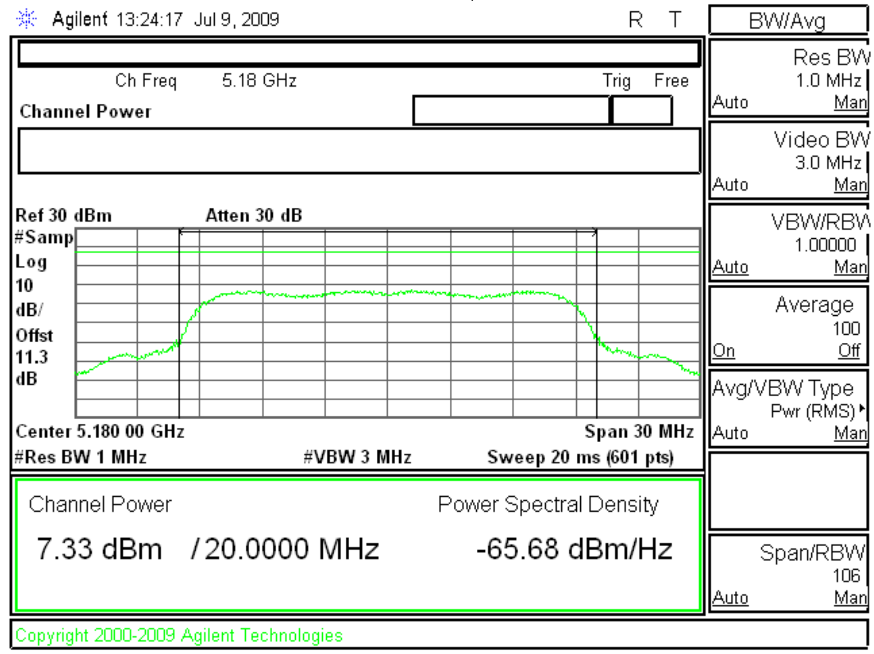
Channel	Freq (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	7.13	7.29	7.33	7.33	13.29	16.66	-3.36
Mid	5200	7.19	7.58	7.47	7.65	13.50	16.72	-3.22
High	5240	7.22	7.86	7.85	7.65	13.67	16.83	-3.15

OUTPUT POWER, LOW CHANNEL

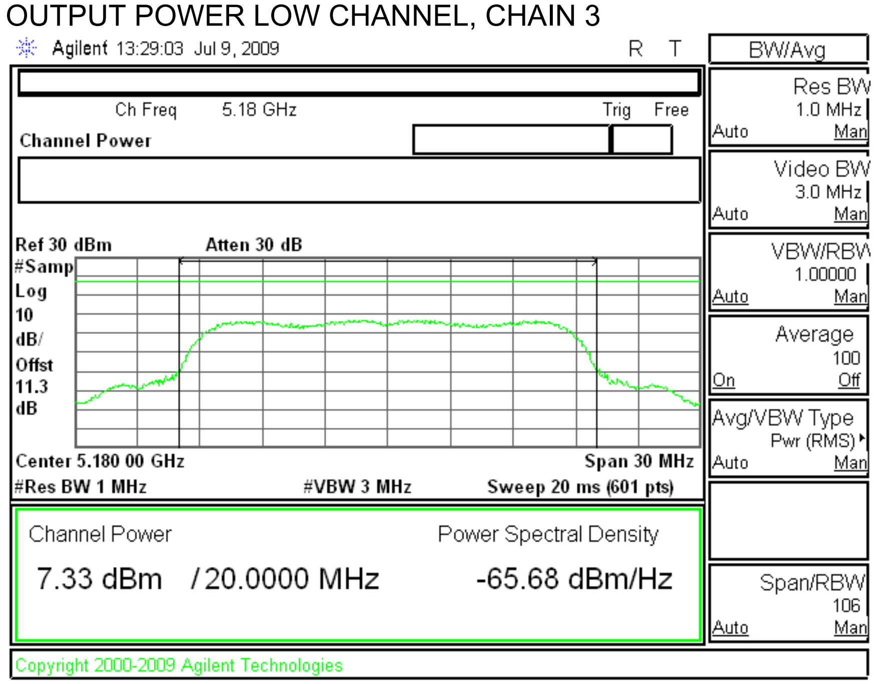




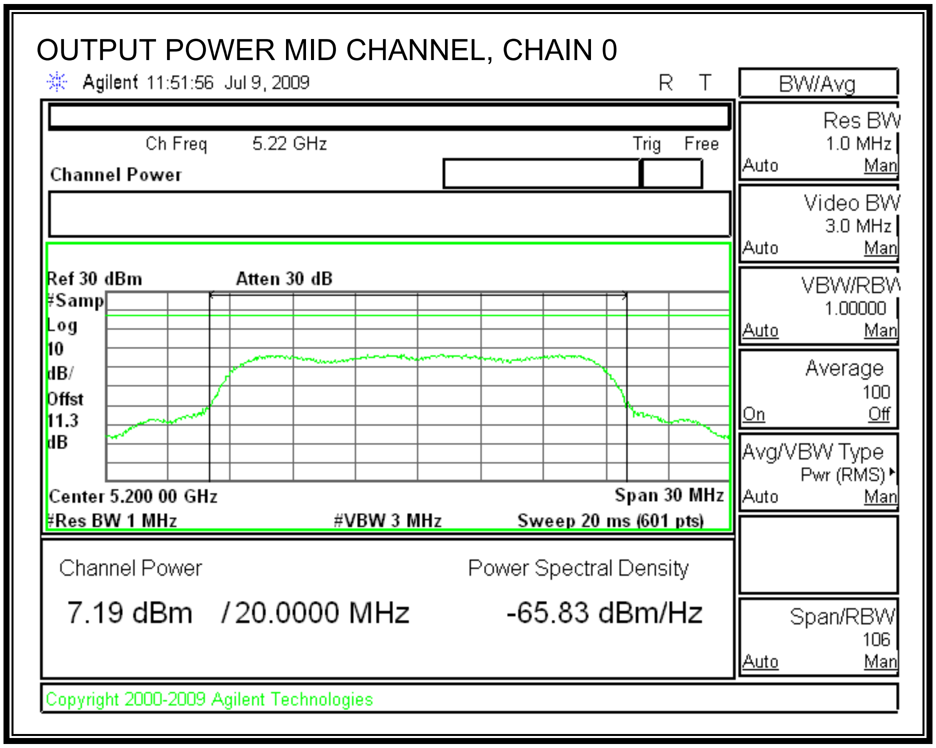
OUTPUT POWER LOW CHANNEL, CHAIN 2

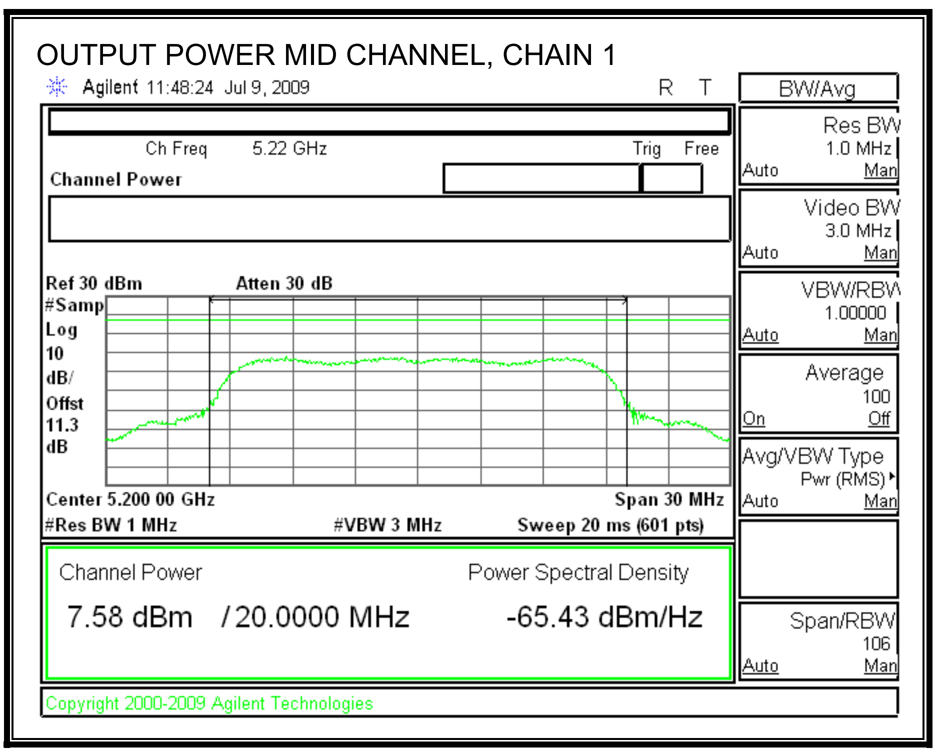


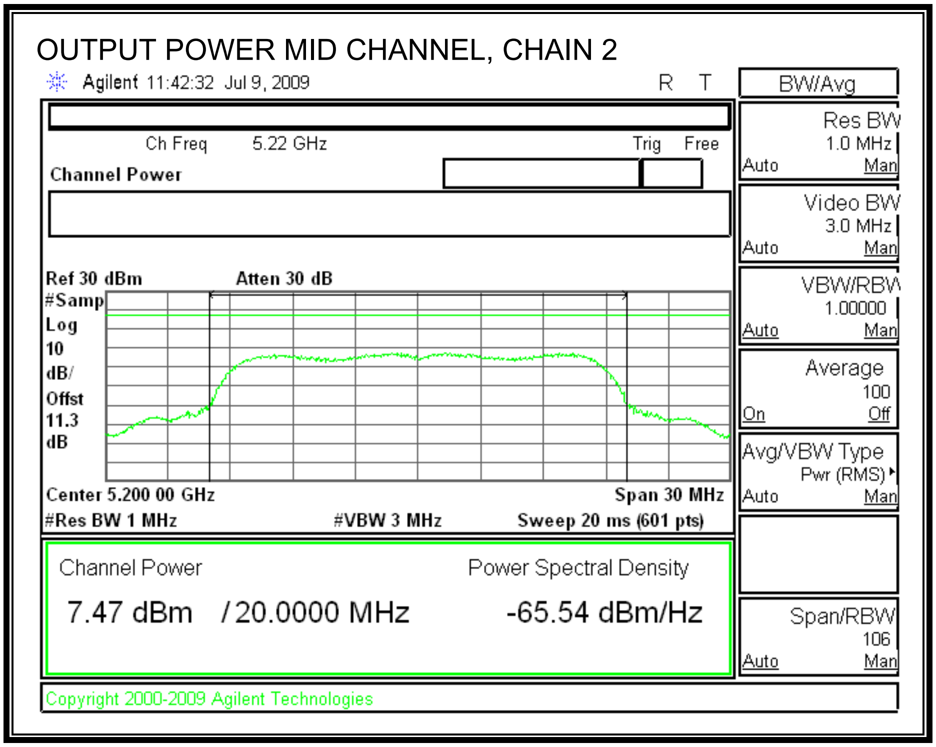
OUTPUT POWER LOW CHANNEL, CHAIN 3

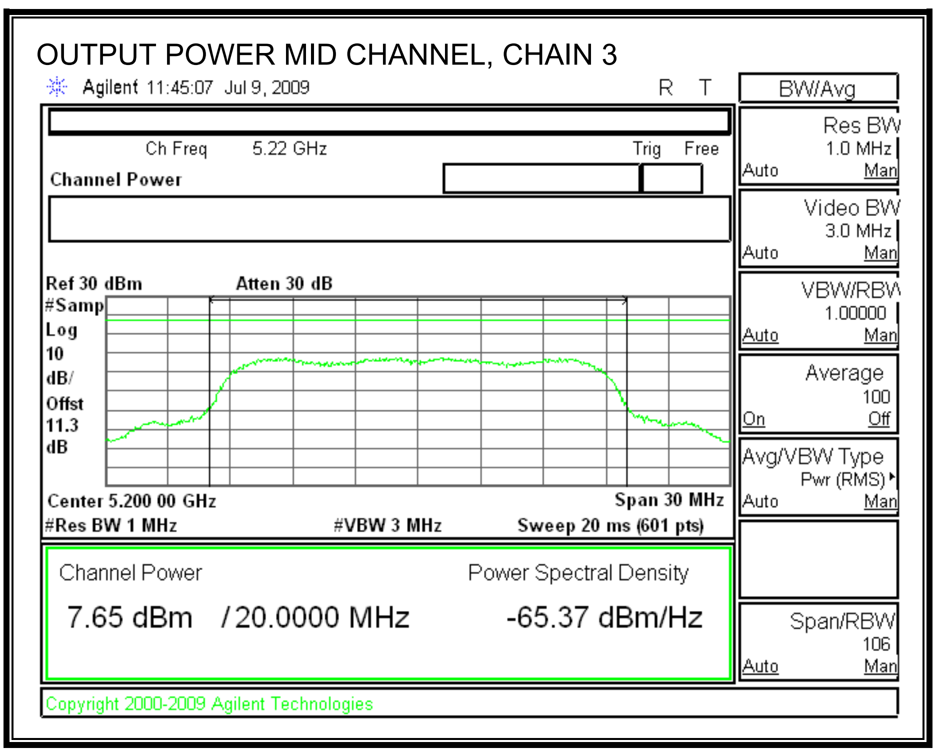


OUTPUT POWER, MID CHANNEL

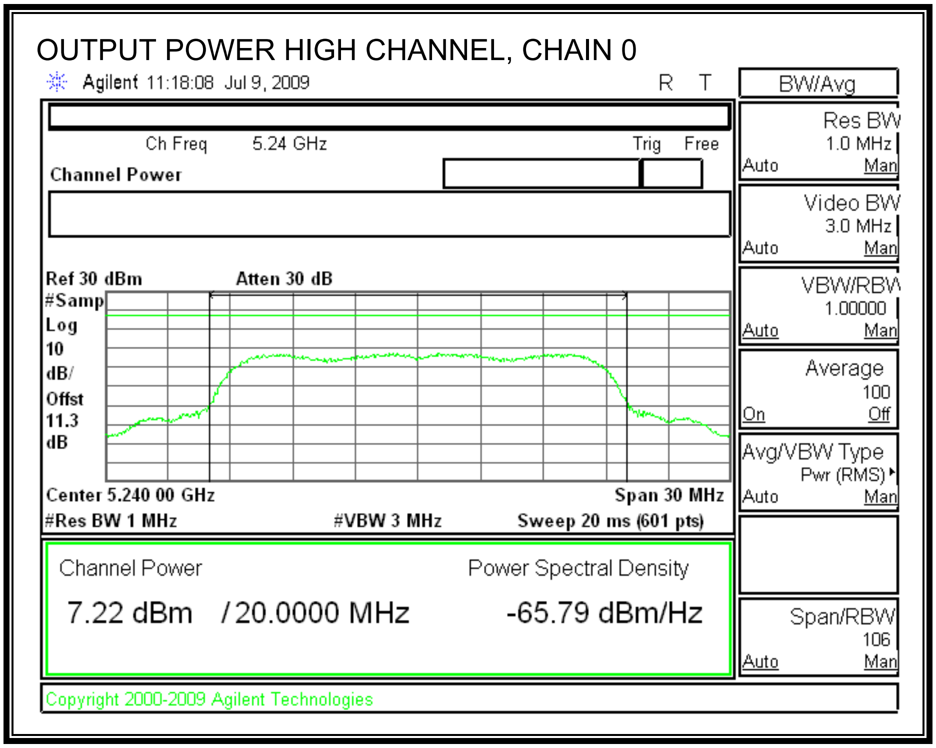


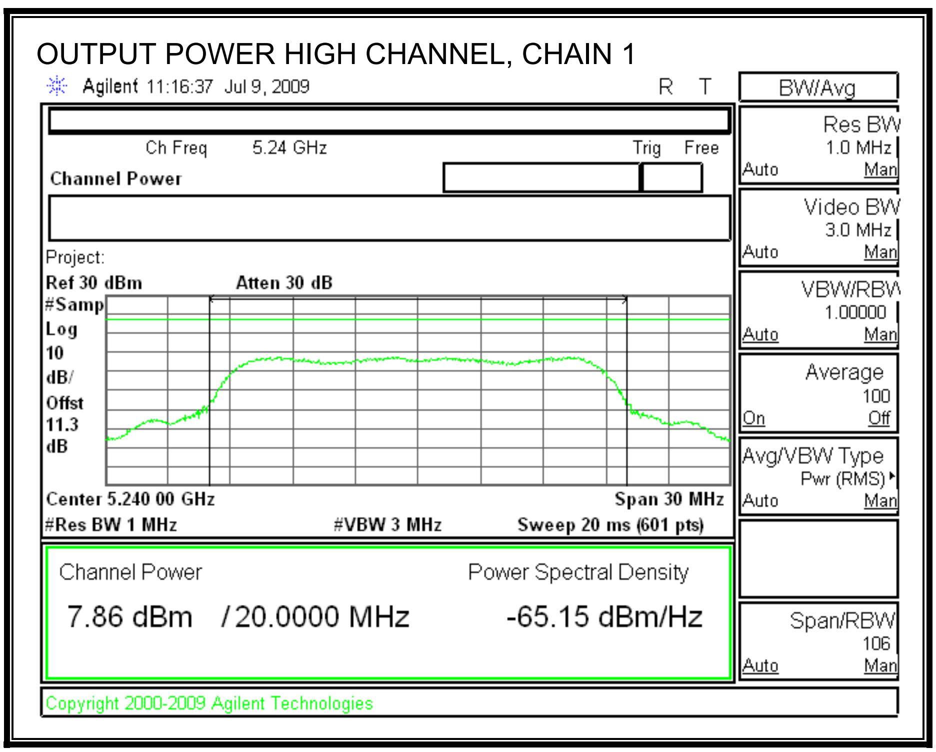



OUTPUT POWER MID CHANNEL, CHAIN 2
Agilent 11:42:32 Jul 9, 2009
R T
BW/Avg
Ch Freq 5.22 GHz
Trig Free
Channel Power
Res BW 1.0 MHz
Auto Man
Video BW 3.0 MHz
Auto Man
Ref 30 dBm
Atten 30 dB
#Samp
Log
10
dB/
Offst
11.3
dB
VBW/RBW 1.00000
Auto Man
Average 100
On Off
Avg/VBW Type Pwr (RMS)
Auto Man
Center 5.200 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Channel Power
Power Spectral Density
7.47 dBm /20.0000 MHz
-65.54 dBm/Hz
Span/RBW 106
Auto Man
Copyright 2000-2009 Agilent Technologies

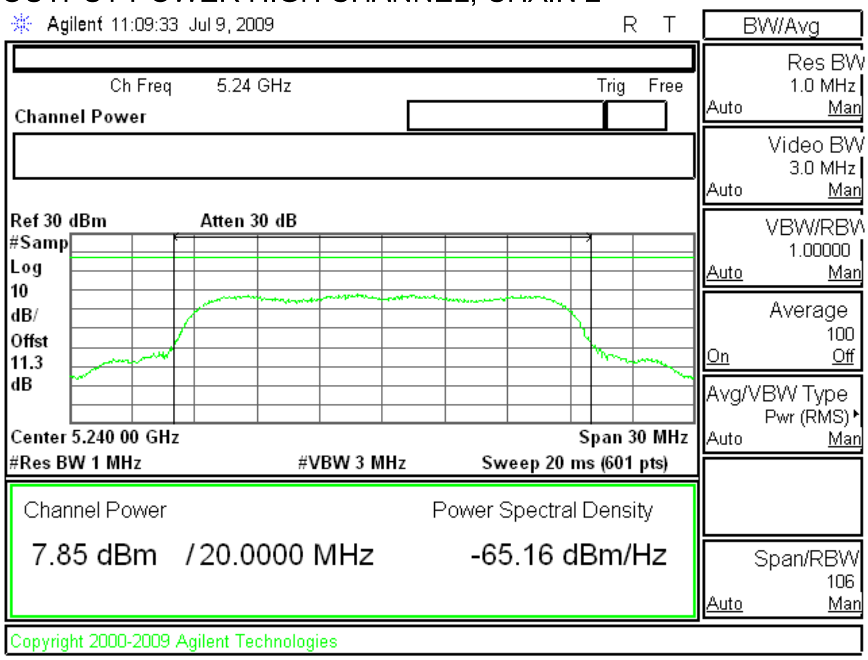

OUTPUT POWER MID CHANNEL, CHAIN 3
Agilent 11:45:07 Jul 9, 2009
R T
BW/Avg
Ch Freq 5.22 GHz
Trig Free
Channel Power
Res BW 1.0 MHz
Auto Man
Video BW 3.0 MHz
Auto Man
Ref 30 dBm
Atten 30 dB
#Samp
Log
10
dB/
Offst
11.3
dB
VBW/RBW 1.00000
Auto Man
Average 100
On Off
Avg/VBW Type Pwr (RMS)
Auto Man
Center 5.200 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Channel Power
Power Spectral Density
7.65 dBm /20.0000 MHz
-65.37 dBm/Hz
Span/RBW 106
Auto Man
Copyright 2000-2009 Agilent Technologies

OUTPUT POWER, HIGH CHANNEL

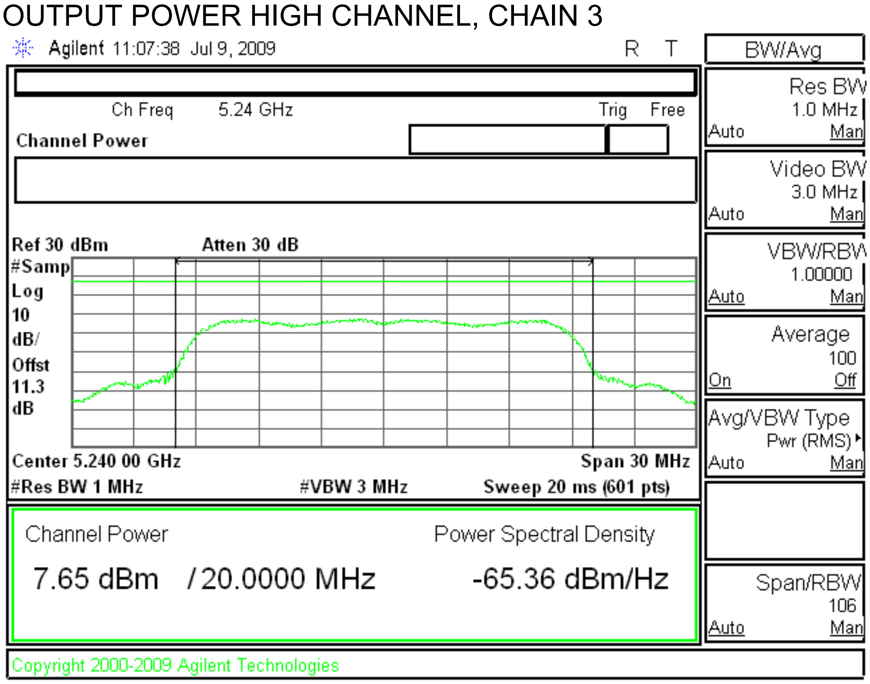




OUTPUT POWER HIGH CHANNEL, CHAIN 2



OUTPUT POWER HIGH CHANNEL, CHAIN 3



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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (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

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.

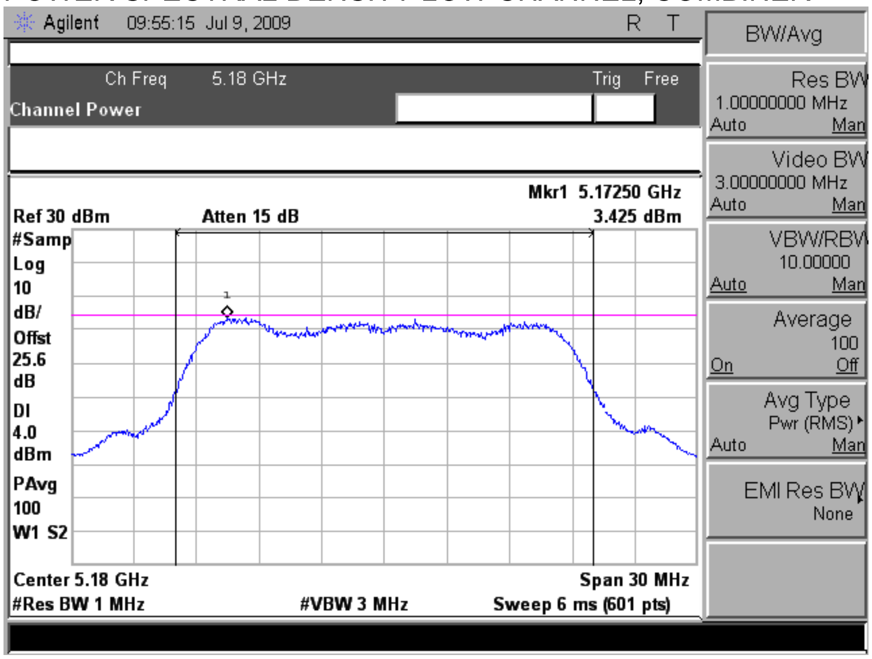
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

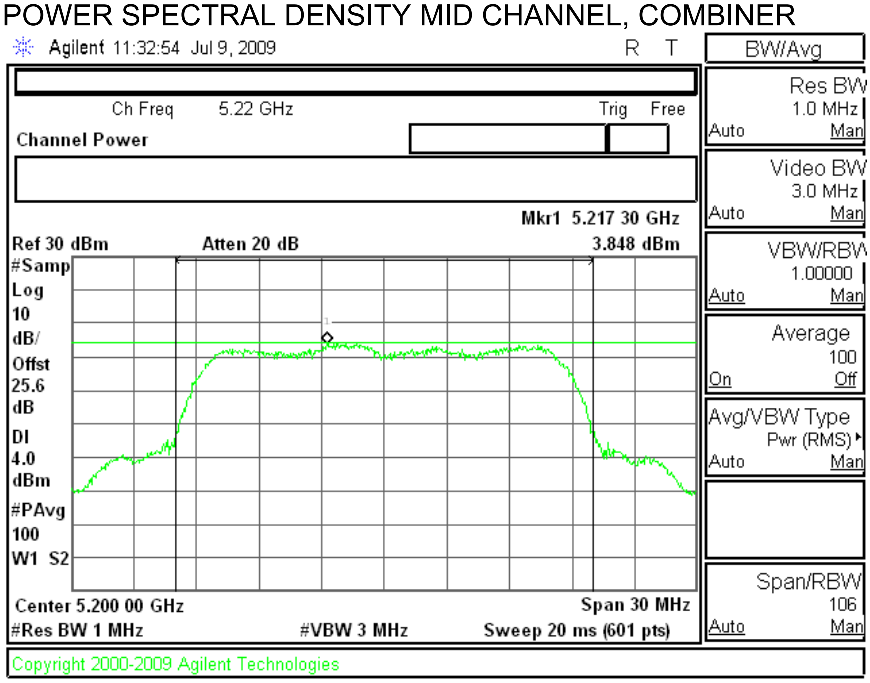
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.43	4	-0.58
Middle	5200	3.85	4	-0.15
High	5240	3.65	4	-0.35

POWER SPECTRAL DENSITY

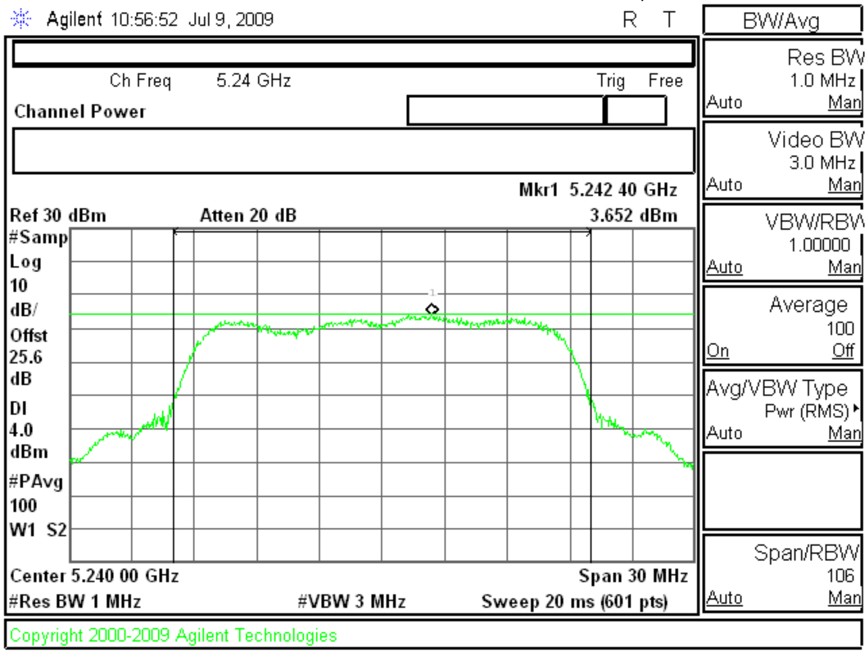
POWER SPECTRAL DENSITY LOW CHANNEL, COMBINER



POWER SPECTRAL DENSITY MID CHANNEL, COMBINER



POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER



7.2.5. 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.

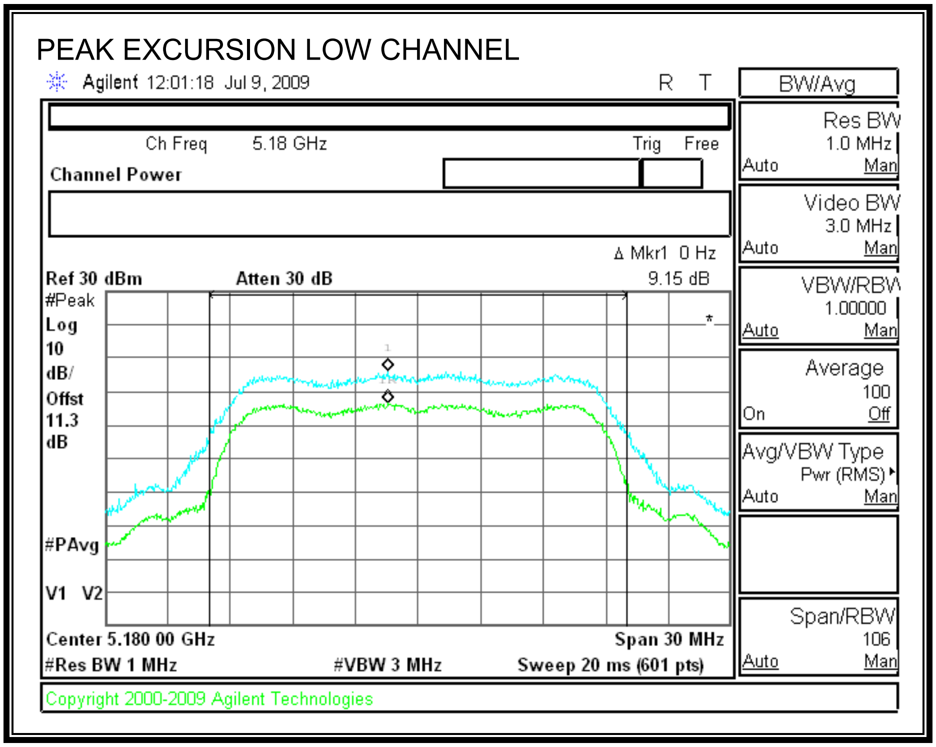
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

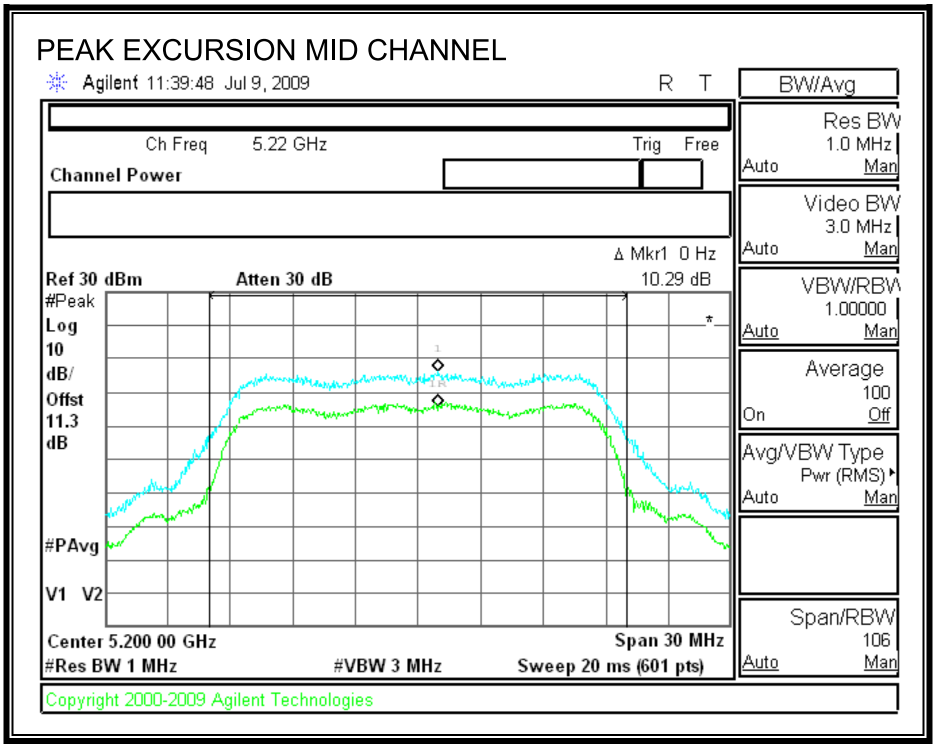
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

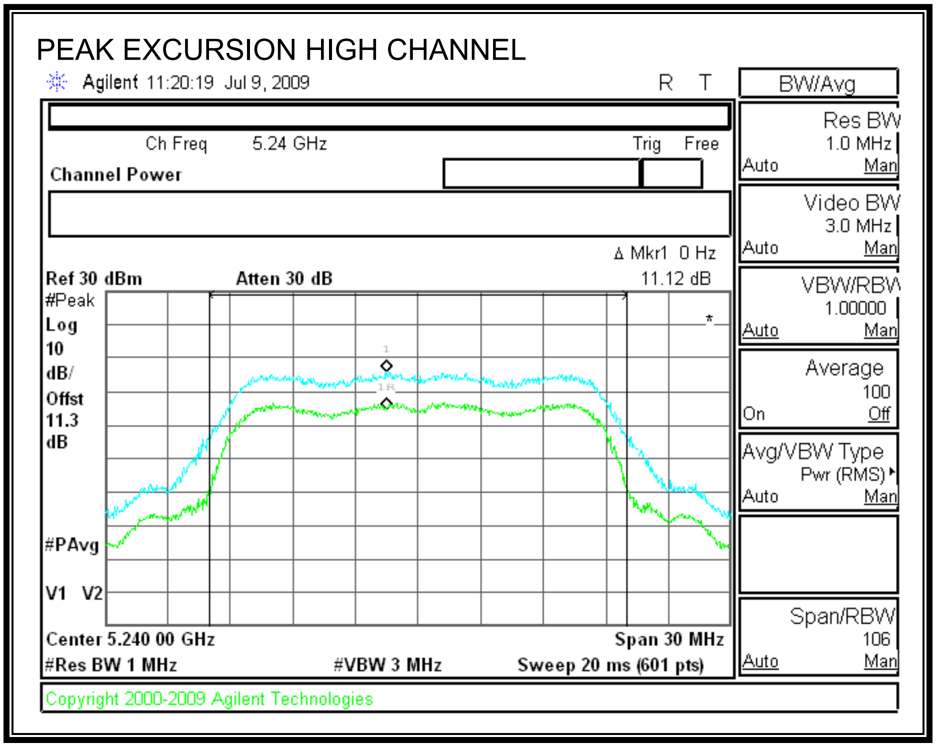
RESULTS

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

PEAK EXCURSION






PEAK EXCURSION HIGH CHANNEL
Agilent 11:20:19 Jul 9, 2009
R T
BW/Avg
Ch Freq 5.24 GHz
Trig Free
Channel Power
Δ Mkr1 0 Hz
Ref 30 dBm
Atten 30 dB
11.12 dB
#Peak
Log
10
dB/
Offst
11.3
dB
#PAvg
V1 V2
Center 5.240 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Res BW
1.0 MHz
Auto Man
Video BW
3.0 MHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Pwr (RMS)
Auto Man
Span/RBW
106
Auto Man
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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

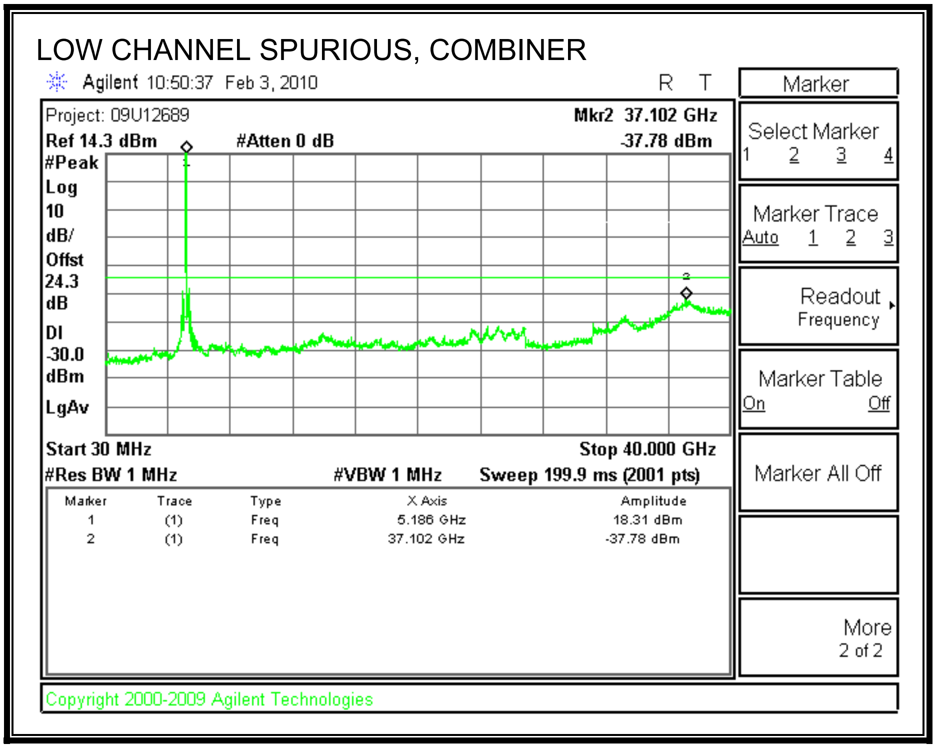
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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.

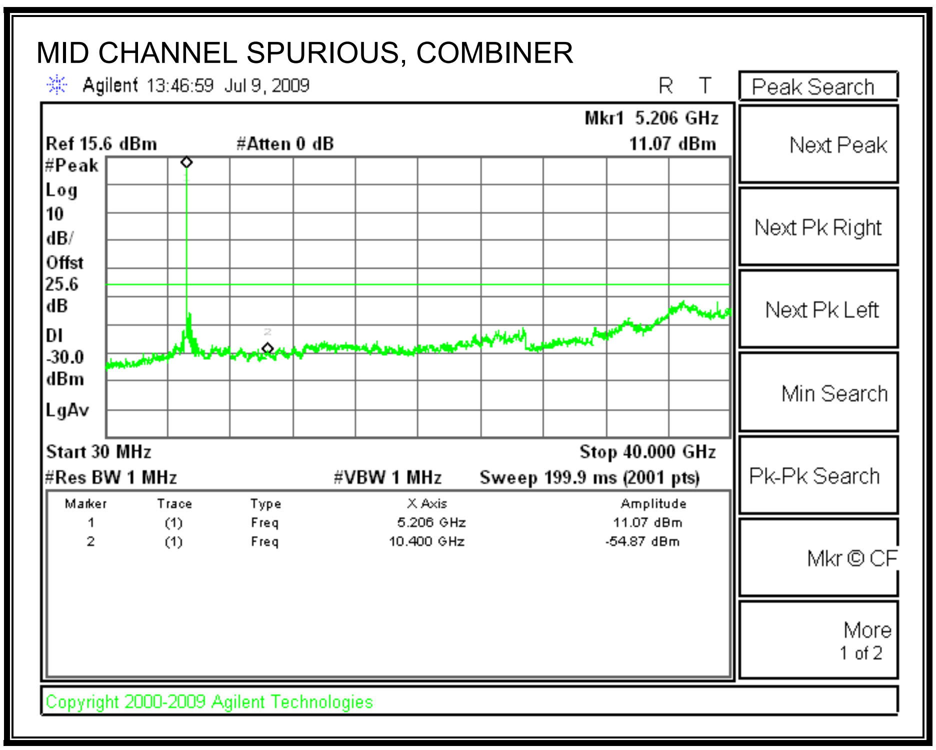
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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.

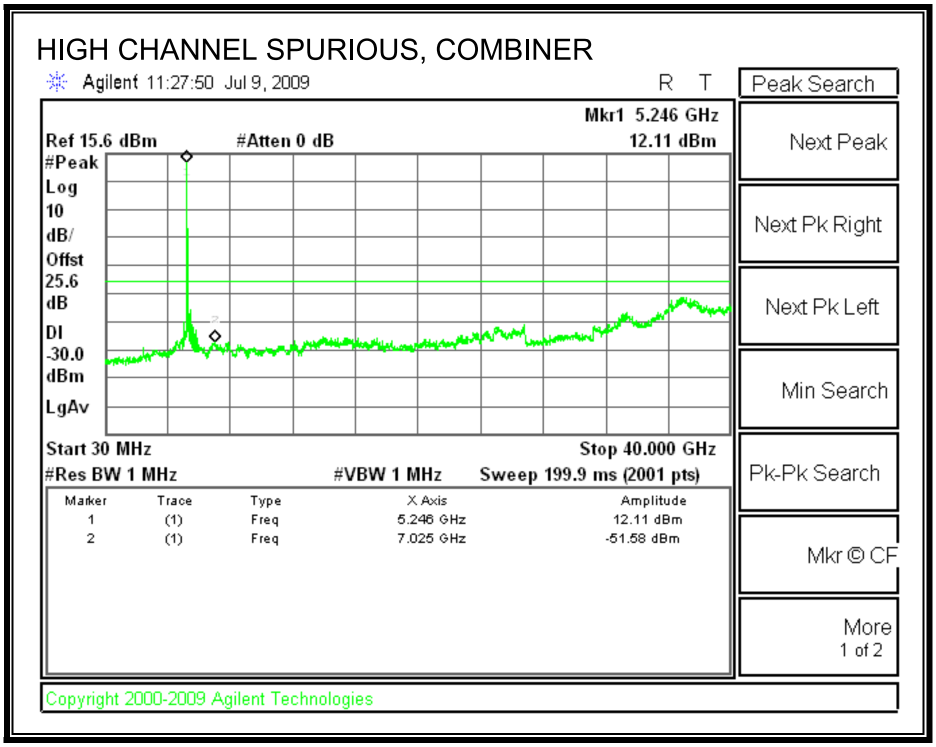
LOW CHANNEL SPURIOUS EMISSIONS



MID CHANNEL SPURIOUS EMISSIONS



HIGH CHANNEL SPURIOUS EMISSIONS



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.246 GHz	12.11 dBm
2	(1)	Freq	7.025 GHz	-51.58 dBm

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

7.3.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

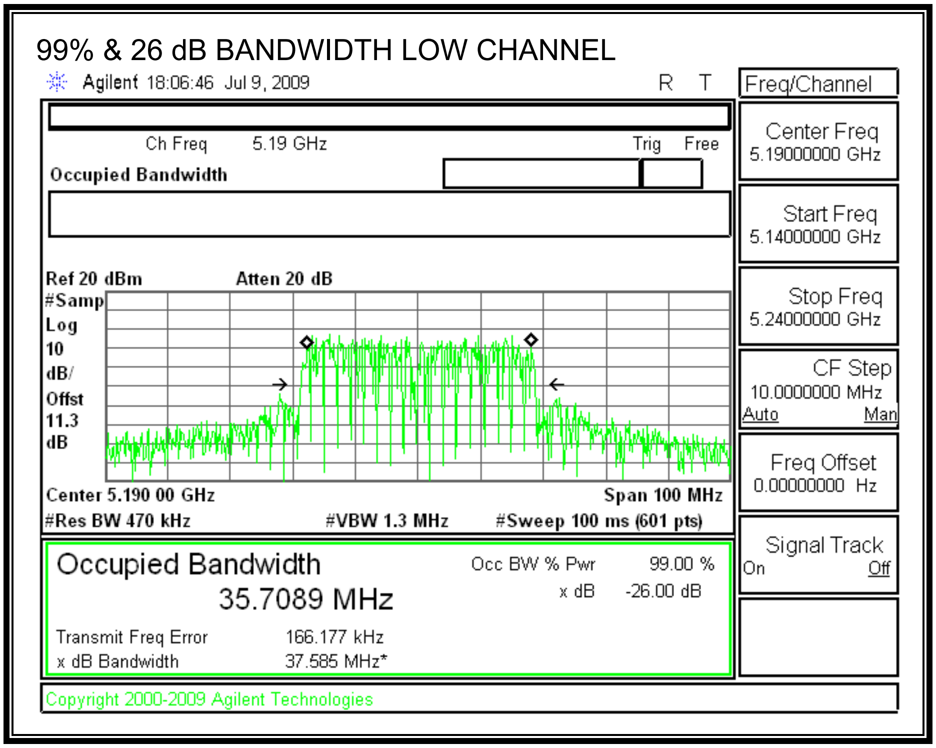
TEST PROCEDURE

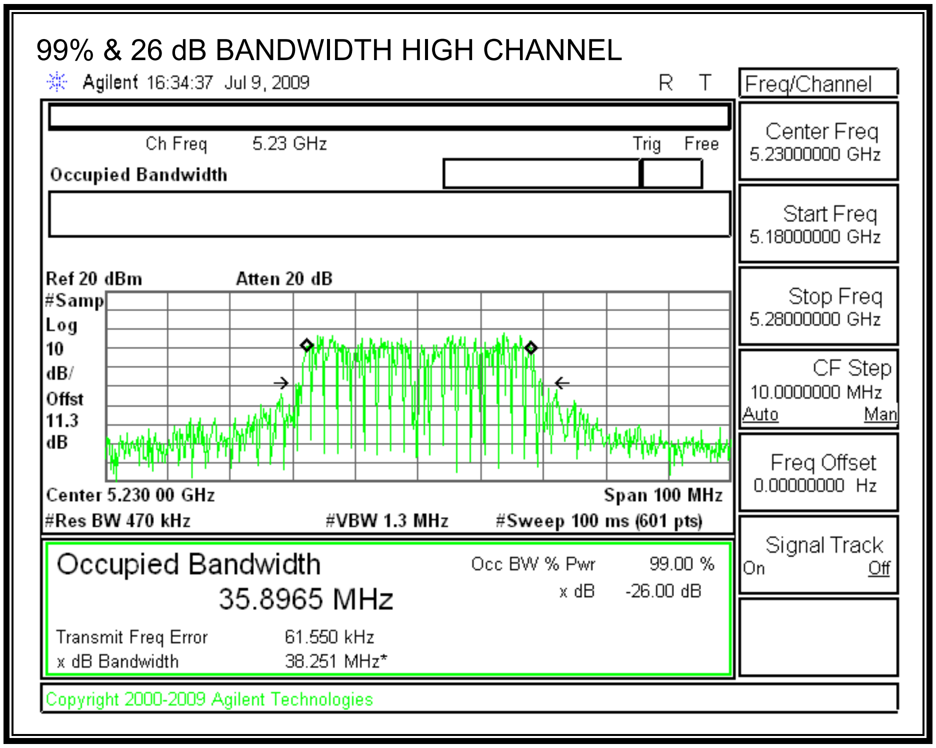
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

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

99% & 26 dB BANDWIDTH





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.

RESULTS

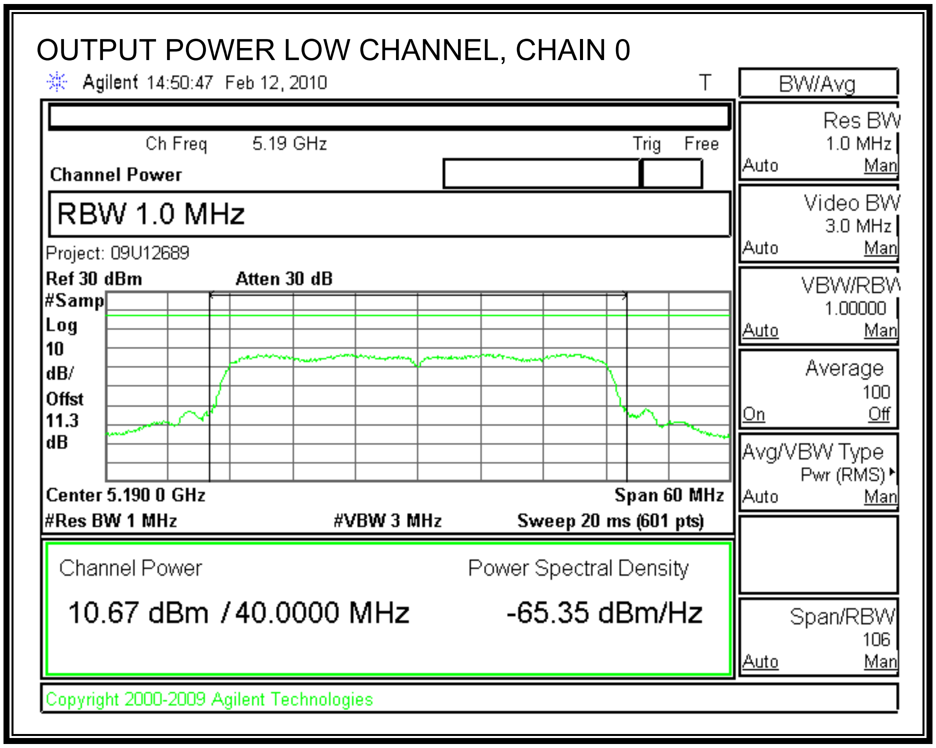
Limit

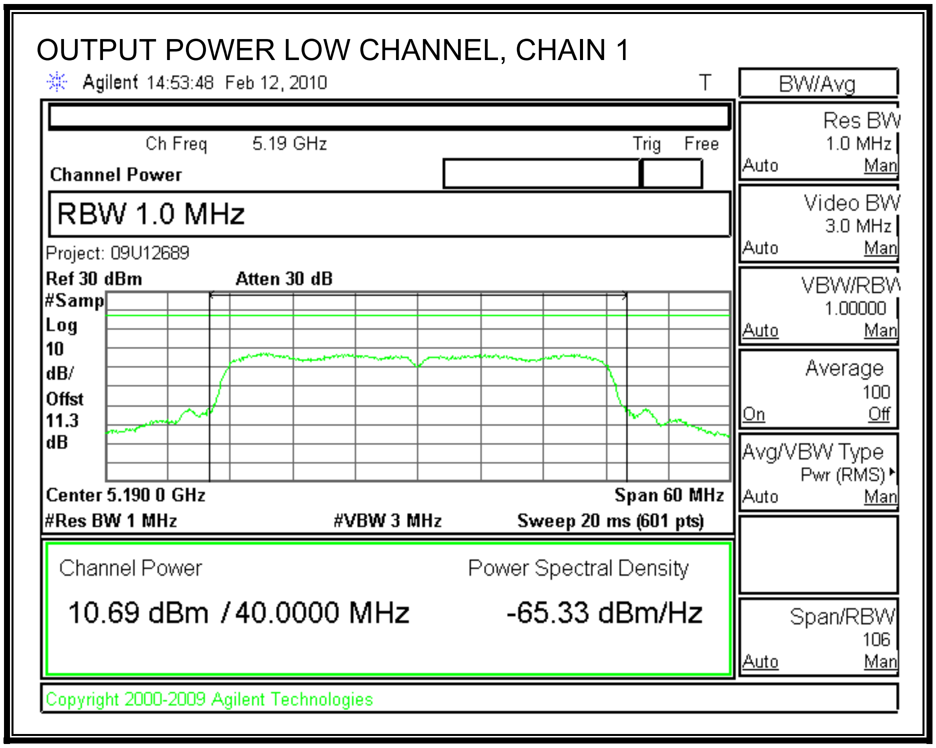
Channel	Freq (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5190	17	37.585	19.75	3	17.00
High	5230	17	38.251	19.83	3	17.00

Individual Chain Results

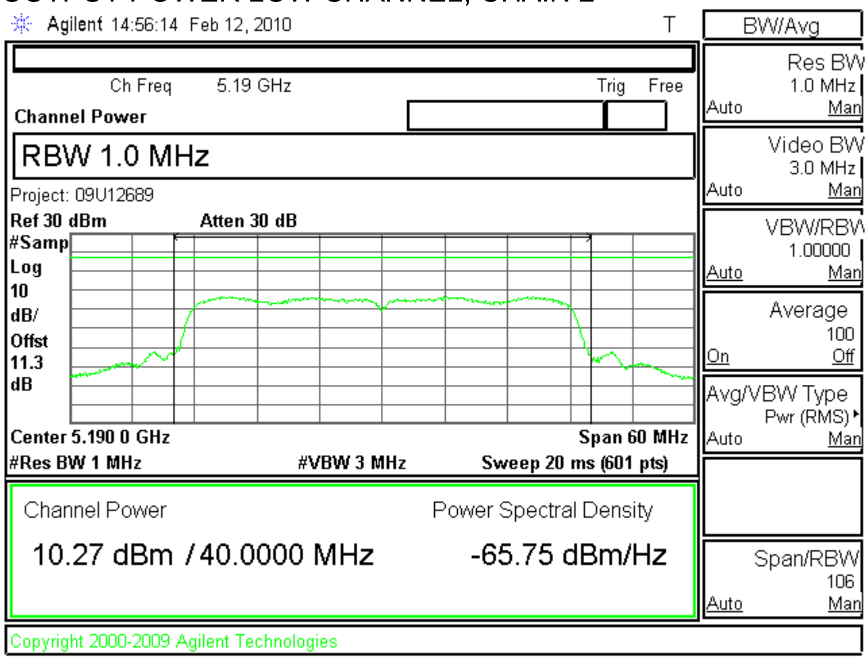
Channel	Freq (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5190	10.67	10.69	10.27	10.58	16.58	17.00	-0.42
High	5230	10.47	10.82	10.71	10.84	16.73	17.00	-0.27

OUTPUT POWER, LOW CHANNEL

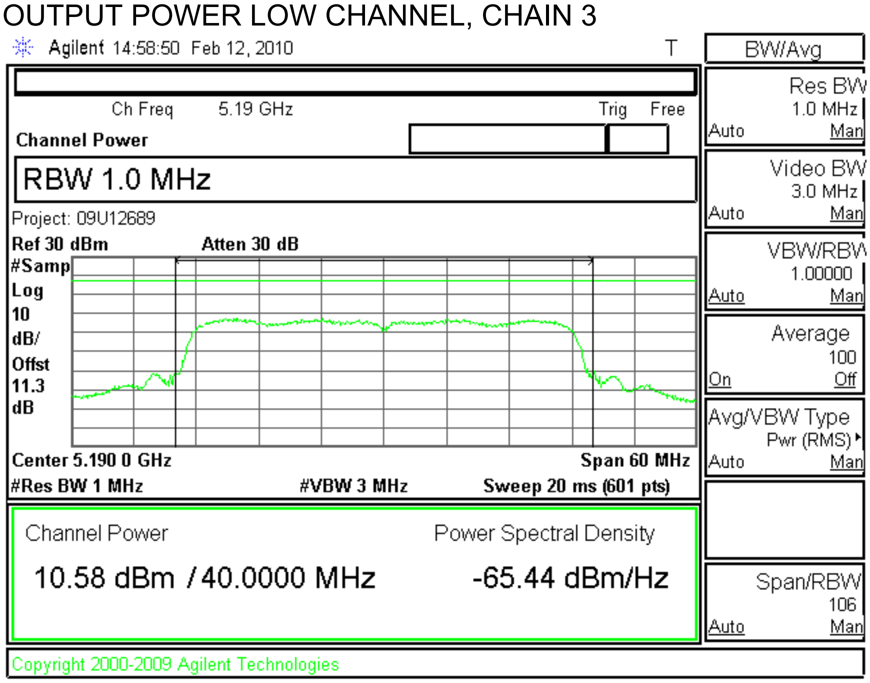




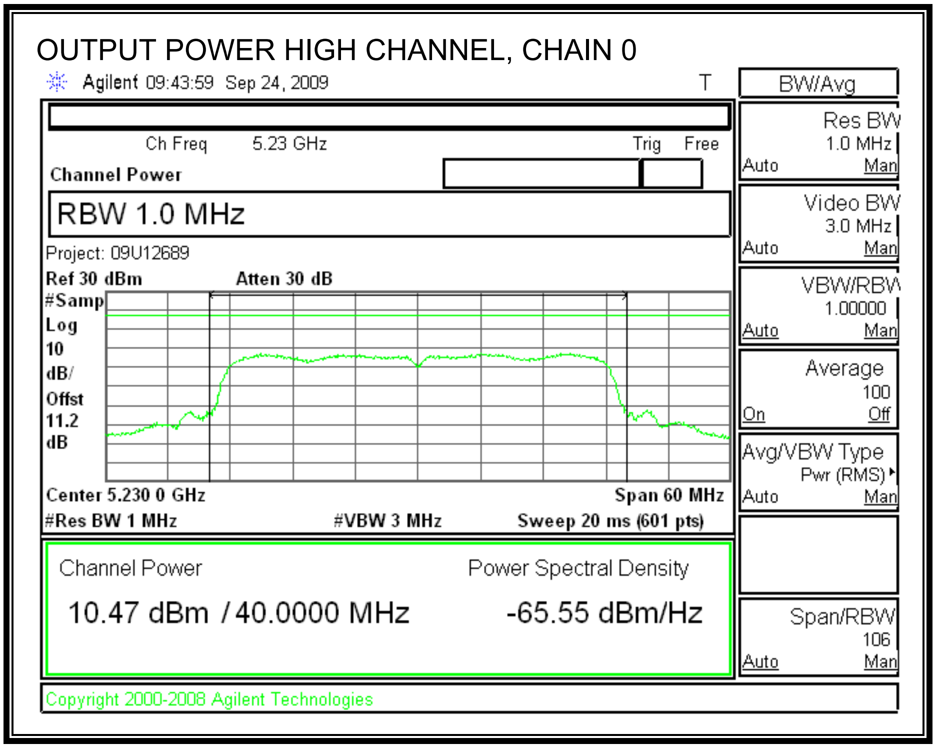
OUTPUT POWER LOW CHANNEL, CHAIN 2

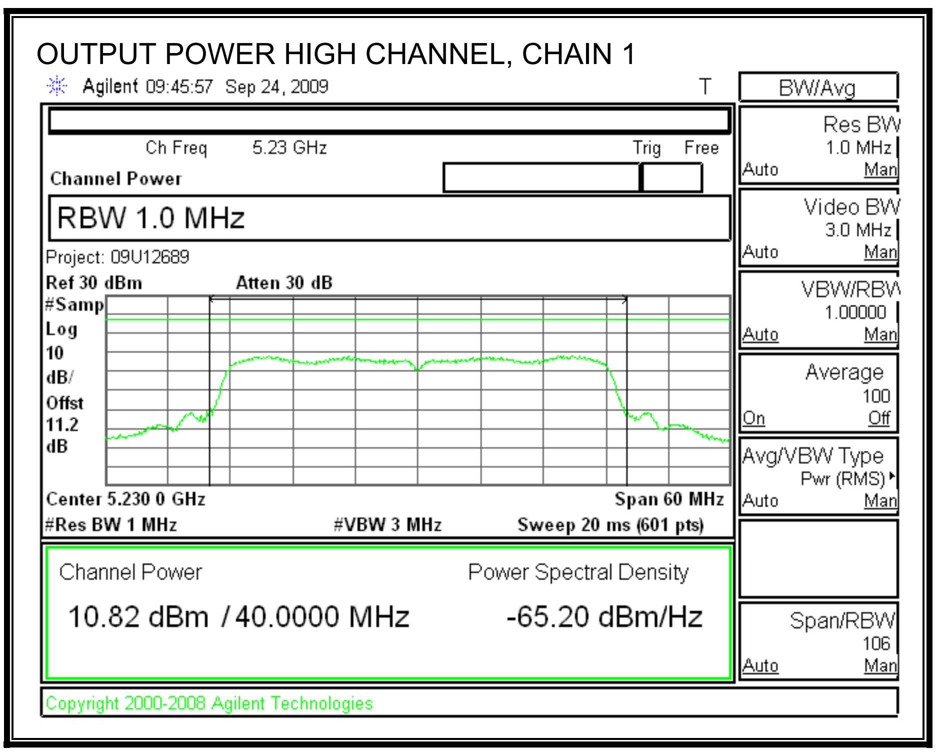


OUTPUT POWER LOW CHANNEL, CHAIN 3

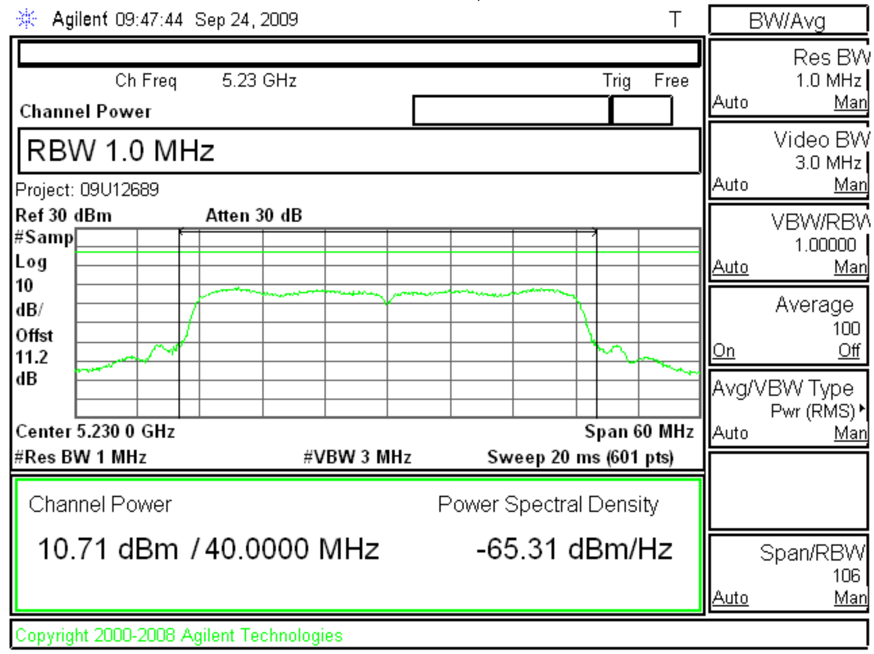


OUTPUT POWER, HIGH CHANNEL

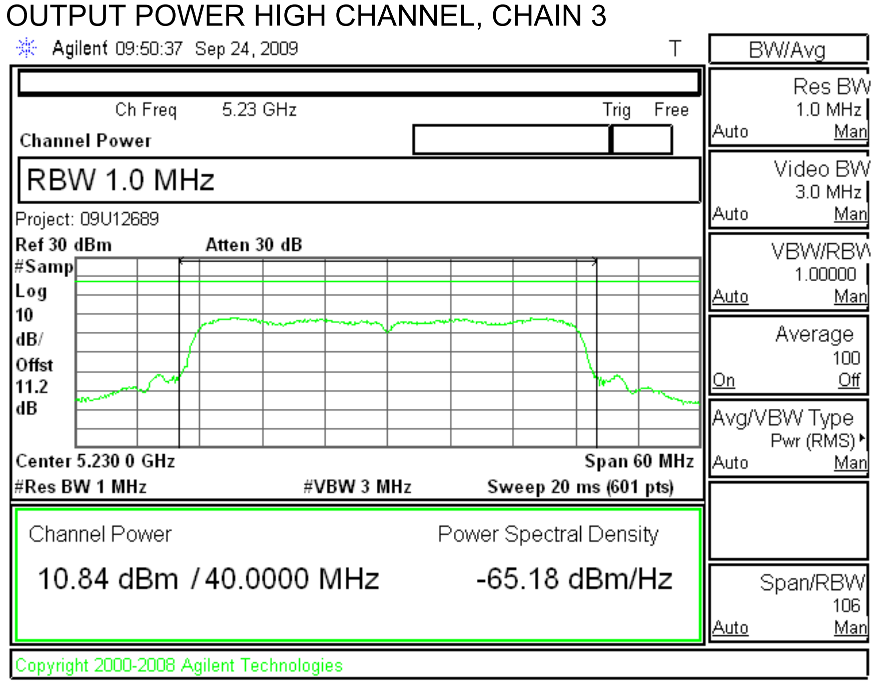




OUTPUT POWER HIGH CHANNEL, CHAIN 2



OUTPUT POWER HIGH CHANNEL, CHAIN 3



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

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.

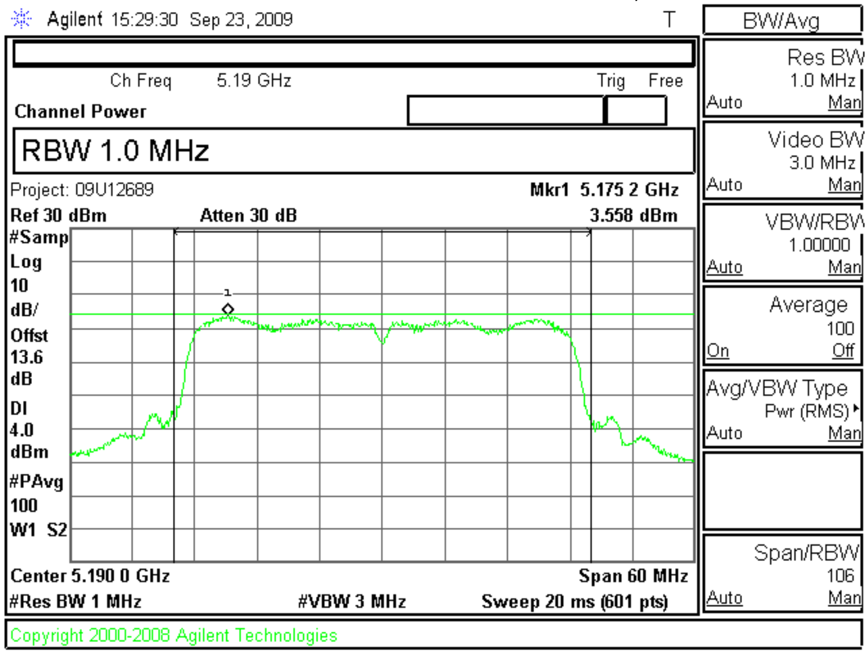
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

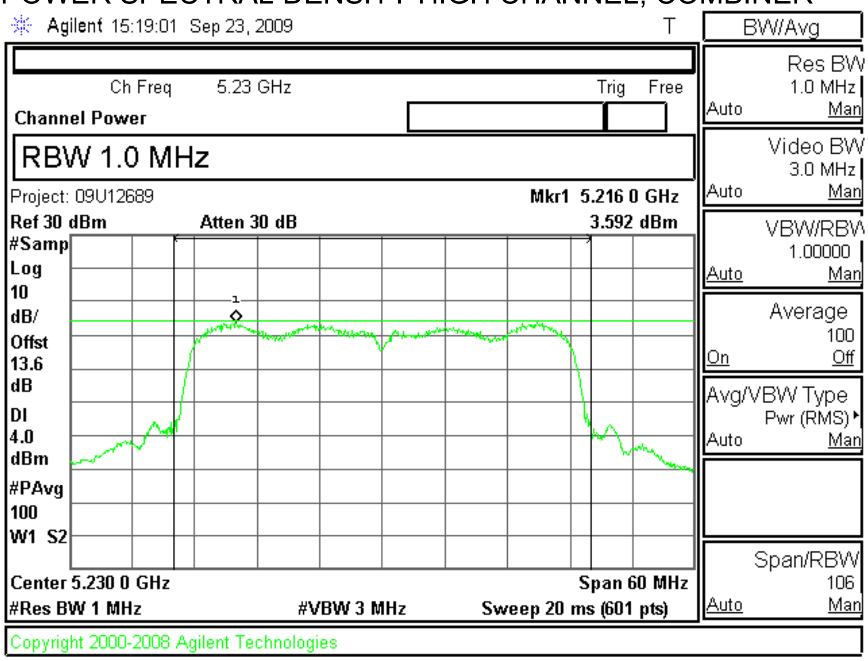
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5190	3.56	4	-0.44
High	5230	3.59	4	-0.41

POWER SPECTRAL DENSITY

POWER SPECTRAL DENSITY LOW CHANNEL, COMBINER



POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER



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.

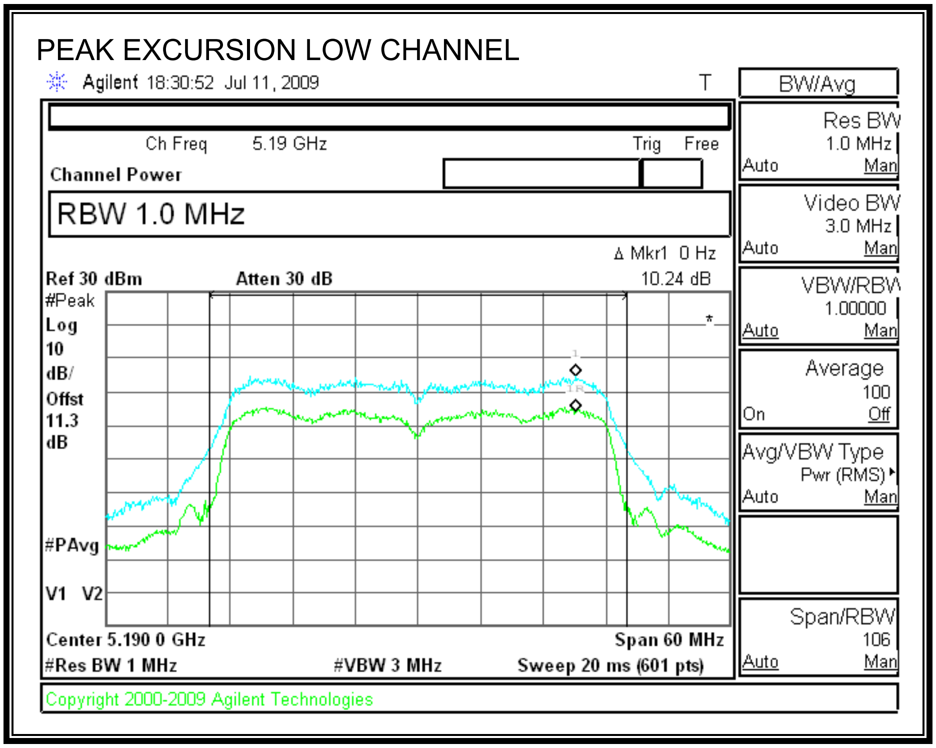
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

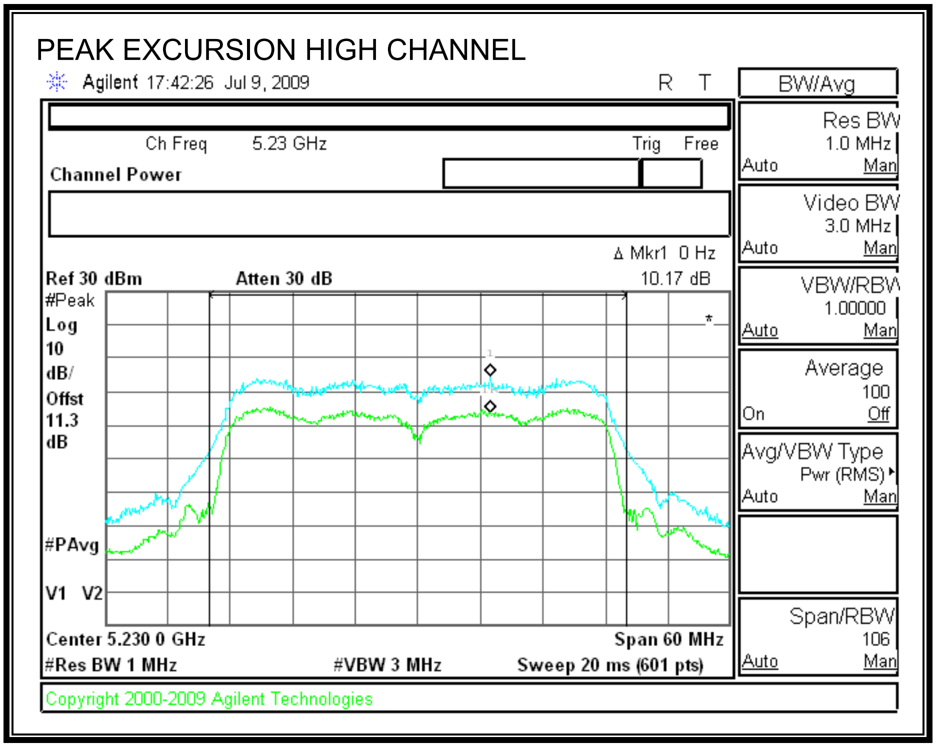
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

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

PEAK EXCURSION





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

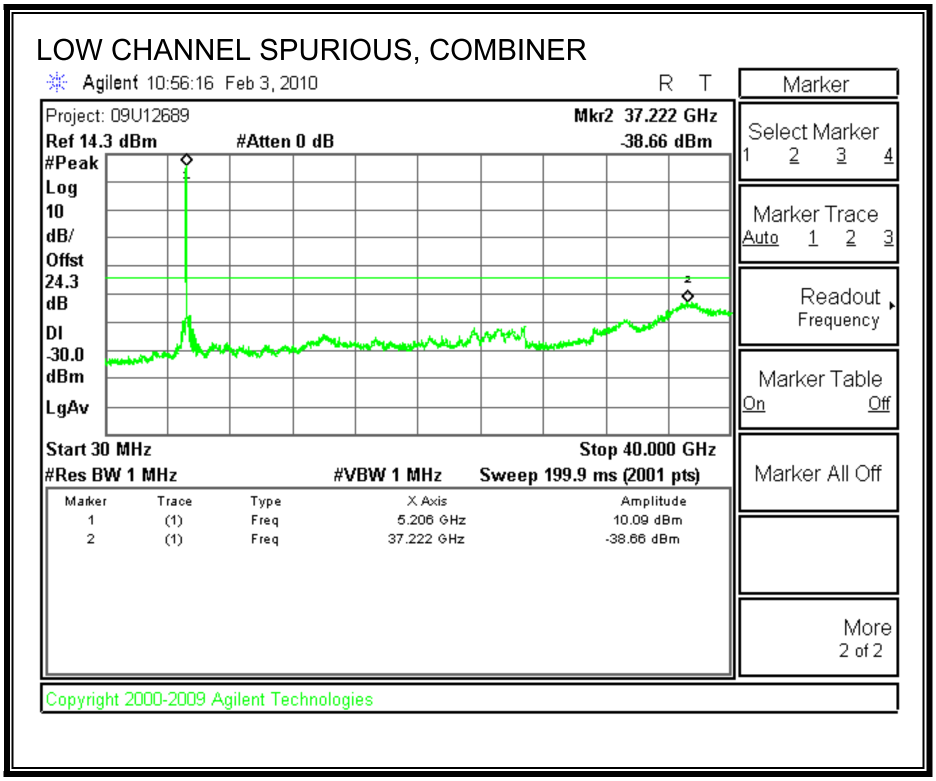
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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.

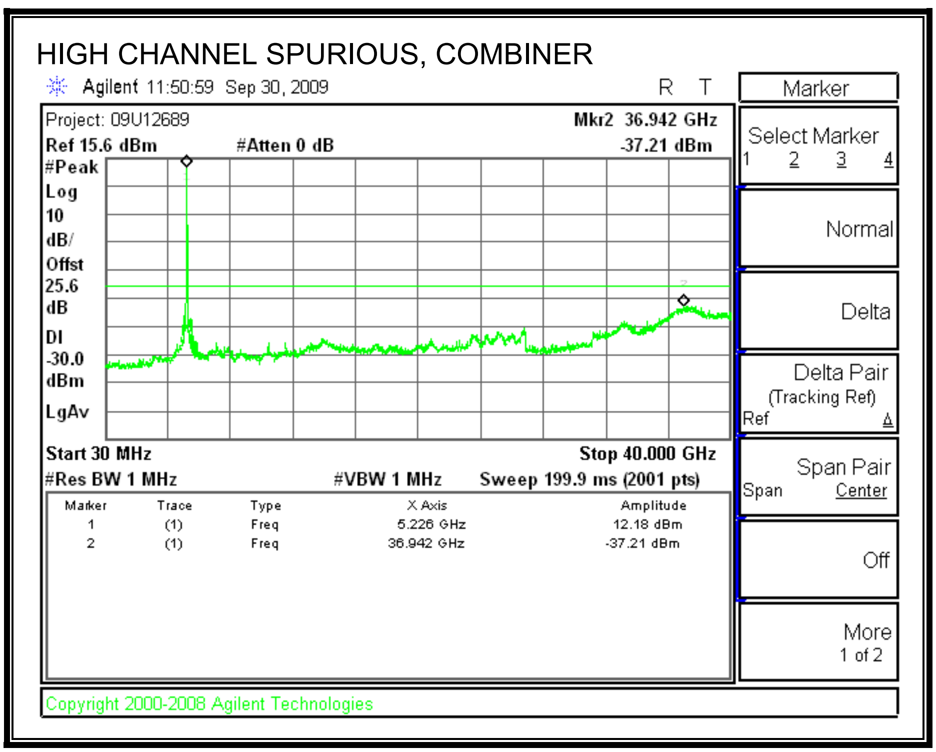
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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.

LOW CHANNEL SPURIOUS EMISSIONS



HIGH CHANNEL SPURIOUS EMISSIONS



7.4. 5.3 GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.4.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

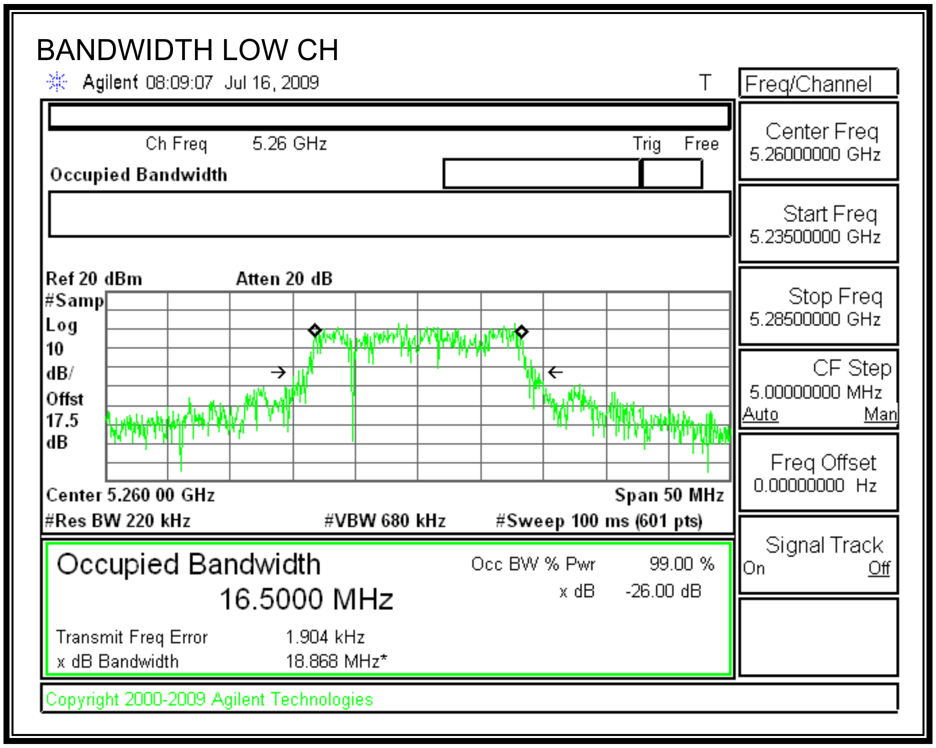
TEST PROCEDURE

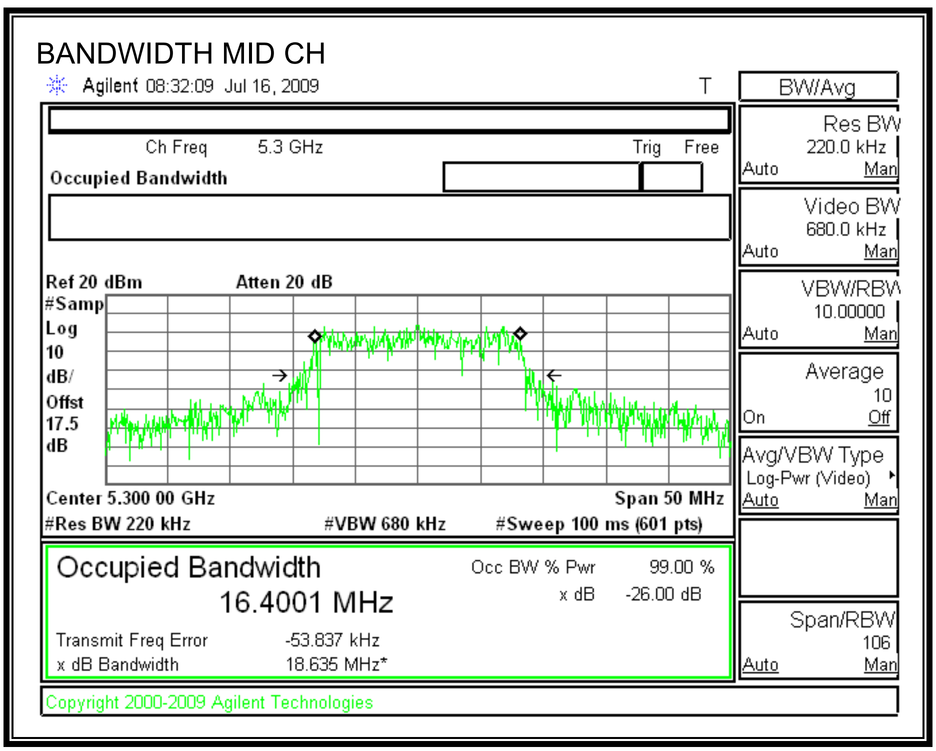
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

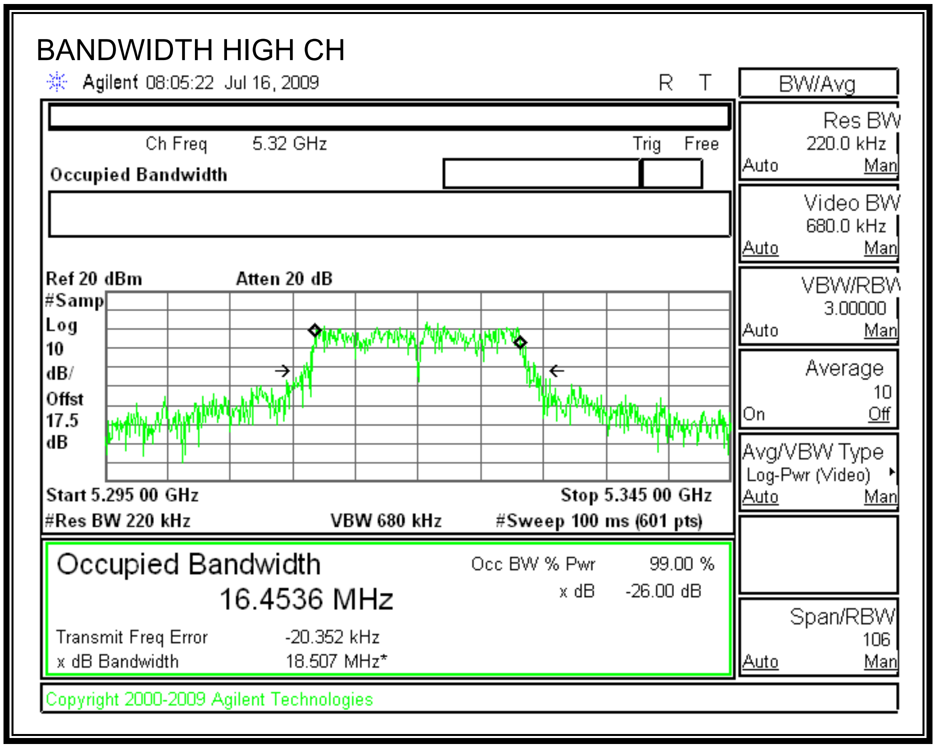
RESULTS

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

26 dB and 99% BANDWIDTH






BANDWIDTH HIGH CH
Agilent 08:05:22 Jul 16, 2009
R T
BW/Avg
Ch Freq 5.32 GHz
Trig Free
Occupied Bandwidth
Ref 20 dBm
Atten 20 dB
#Samp
Log
10
dB/
Offst
17.5
dB
Start 5.295 00 GHz
Stop 5.345 00 GHz
#Res BW 220 kHz
VBW 680 kHz
#Sweep 100 ms (601 pts)
Occupied Bandwidth
16.4536 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -20.352 kHz
x dB Bandwidth 18.507 MHz*
Res BW
220.0 kHz
Auto Man
Video BW
680.0 kHz
Auto Man
VBW/RBW
3.00000
Auto Man
Average
10
On Off
Avg/VBW Type
Log-Pwr (Video)
Auto Man
Span/RBW
106
Auto Man
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7.4.2. OUTPUT POWER

LIMITS

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

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

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (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

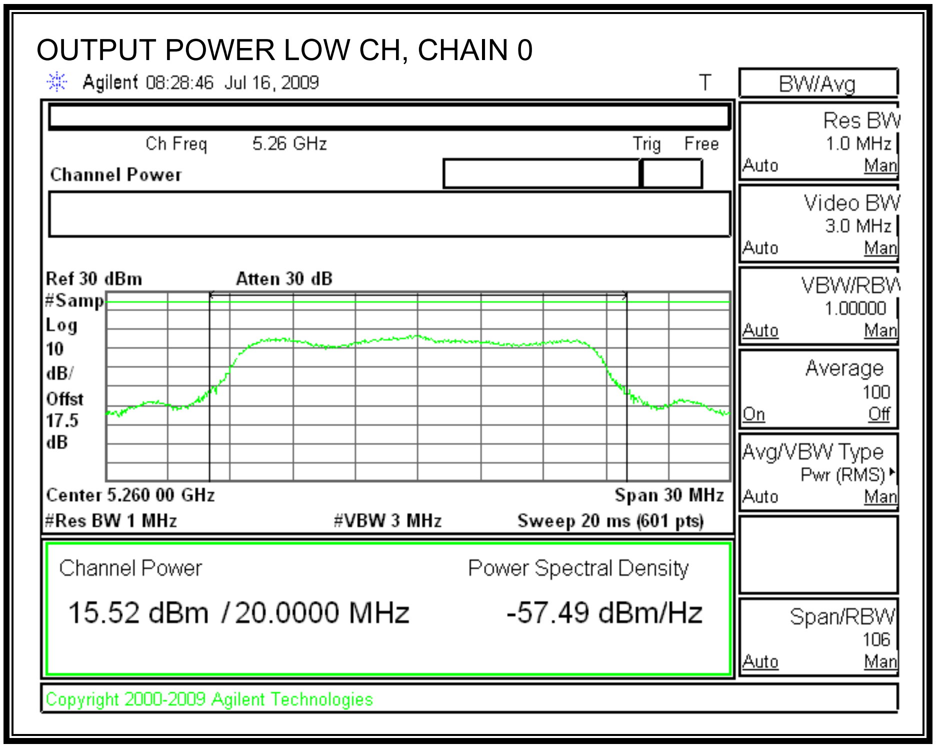
Limit

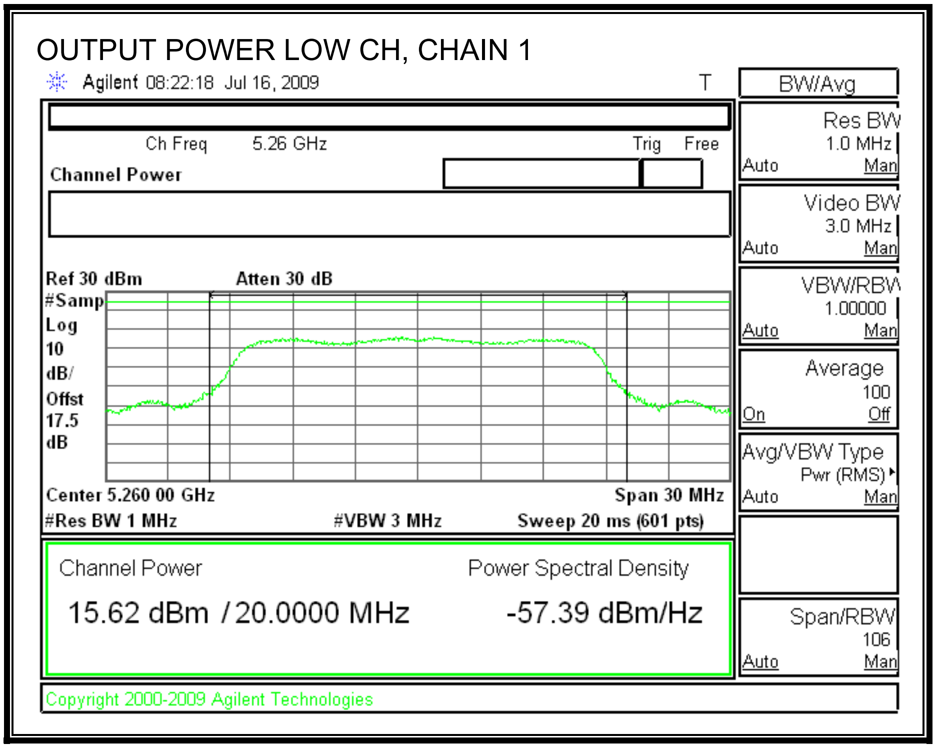
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Effective Ant Gain (dBi)	Limit (dBm)
Low	5260	24	18.8680	23.76	6.01	23.75
Mid	5300	24	18.6350	23.70	6.01	23.69
High	5320	24	18.5070	23.67	6.01	23.66

Individual Chain Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (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

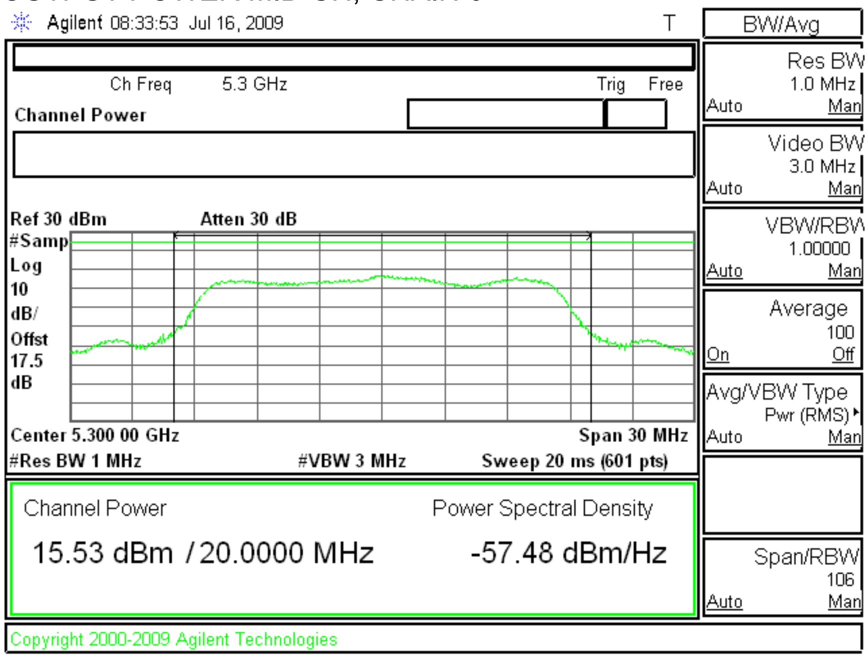
OUTPUT POWER, LOW CHANNEL



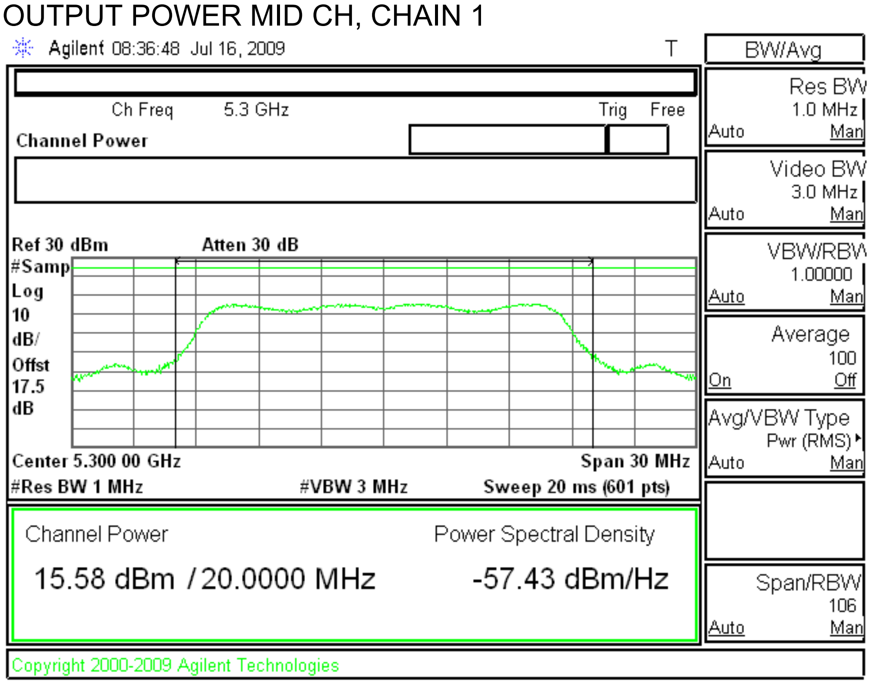


OUTPUT POWER, MID CHANNEL

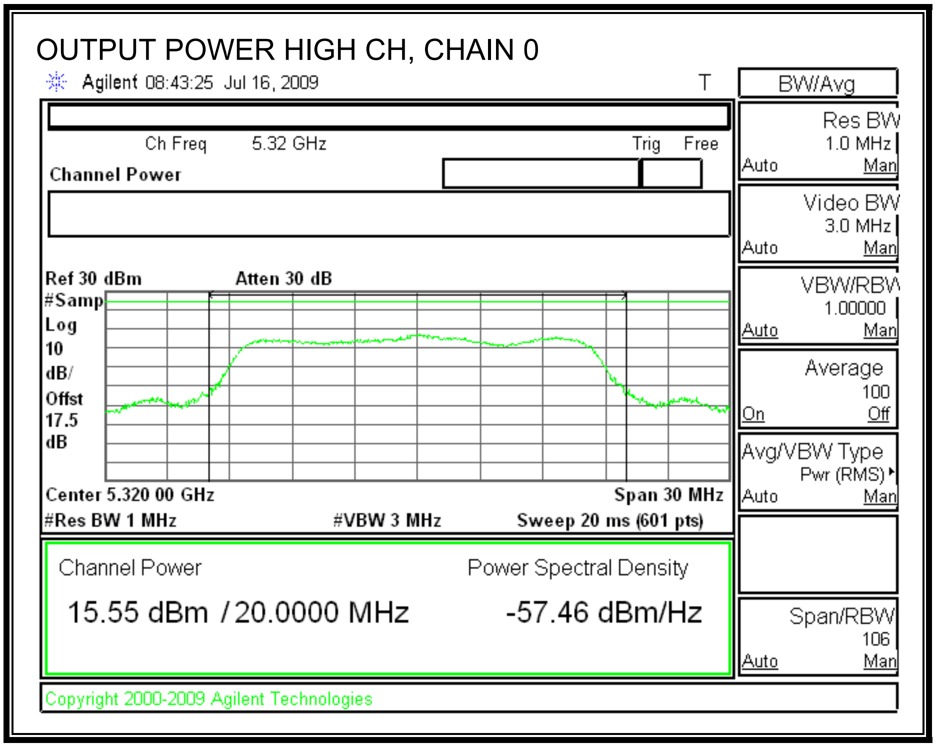
OUTPUT POWER MID CH, CHAIN 0

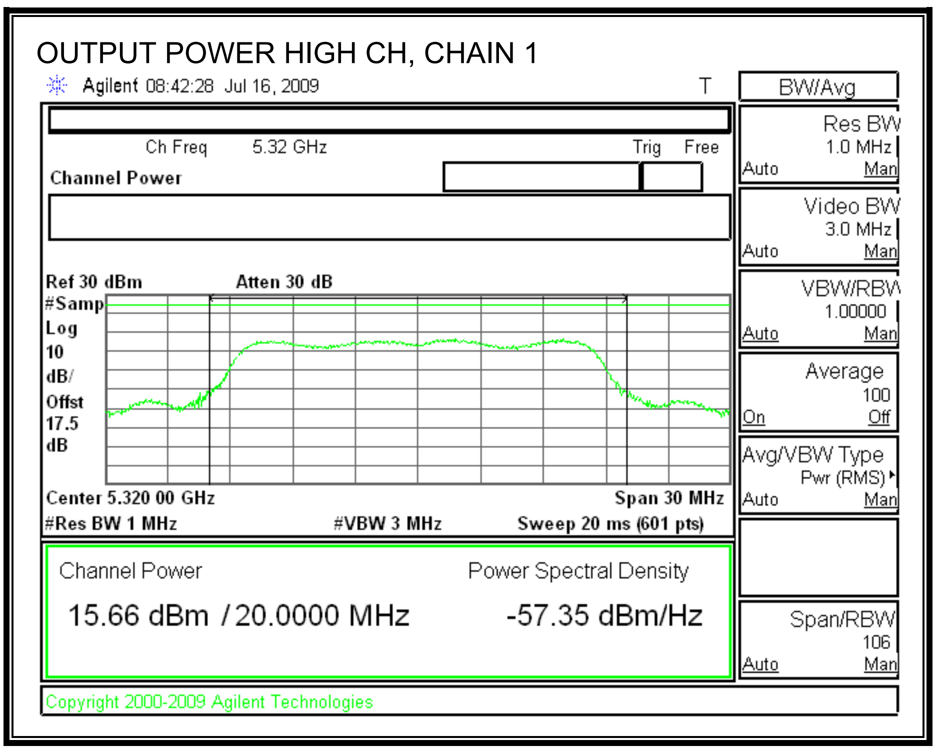


OUTPUT POWER MID CH, CHAIN 1



OUTPUT POWER, HIGH CHANNEL





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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (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

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

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (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.

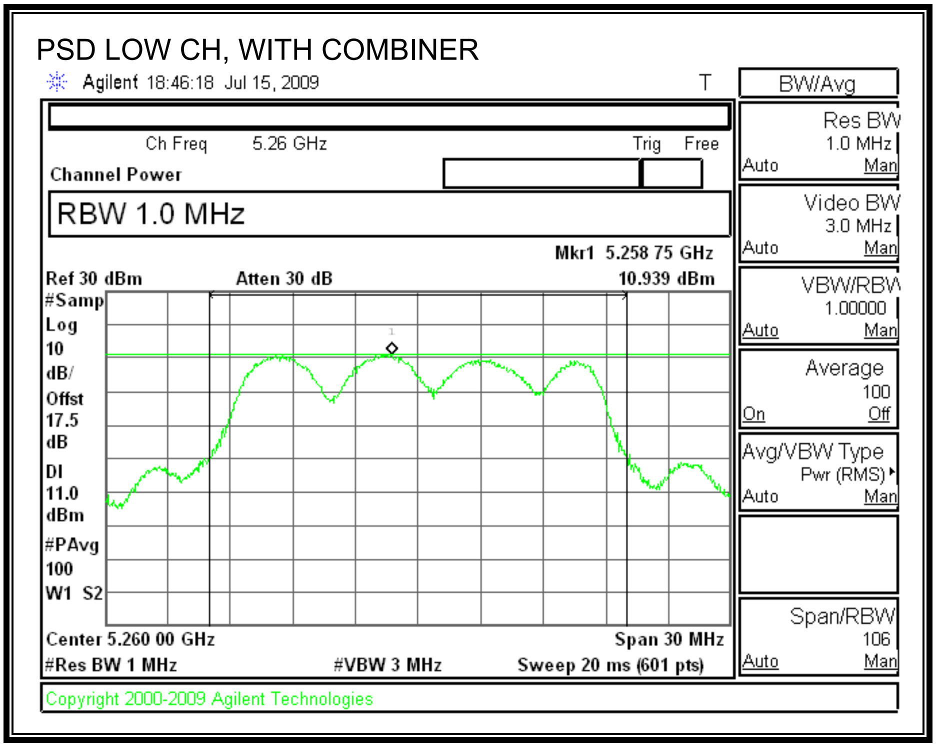
TEST PROCEDURE

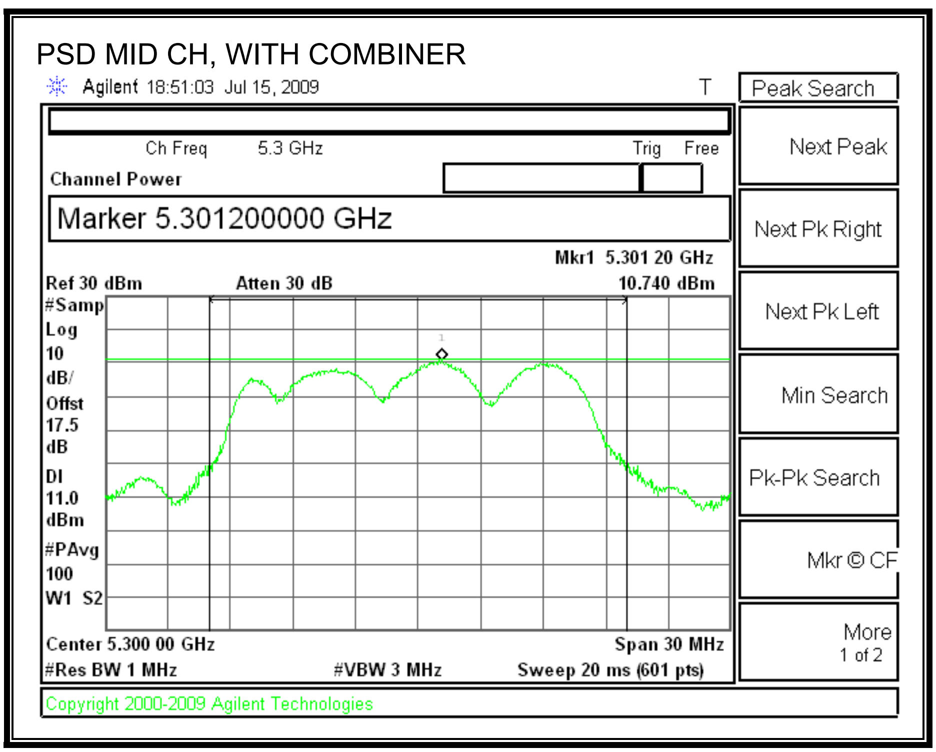
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

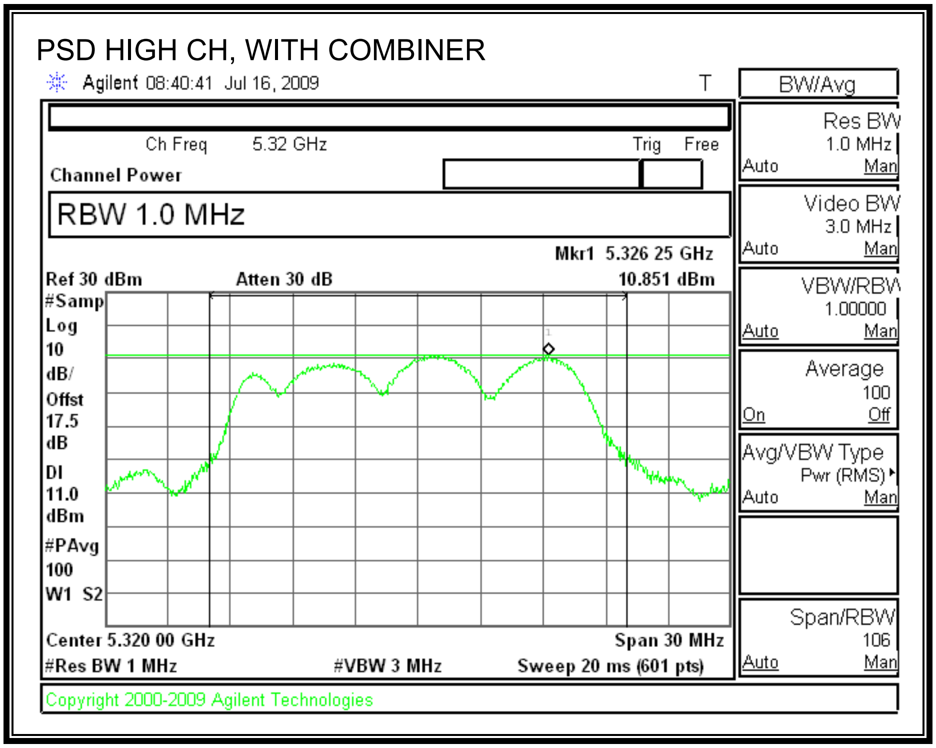
RESULTS

Channel	Frequency (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (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**

POWER SPECTRAL DENSITY WITH COMBINER






PSD HIGH CH, WITH COMBINER
Agilent 08:40:41 Jul 16, 2009
T
BW/Avg
Ch Freq 5.32 GHz
Trig Free
Channel Power
RBW 1.0 MHz
Mkr1 5.326 25 GHz
Ref 30 dBm
Atten 30 dB
10.851 dBm
#Samp
Log
10
dB/
Offst
17.5
dB
Dl
11.0
dBm
#PAvg
100
W1 S2
Center 5.320 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Res BW
1.0 MHz
Auto Man
Video BW
3.0 MHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Pwr (RMS)
Auto Man
Span/RBW
106
Auto Man
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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.

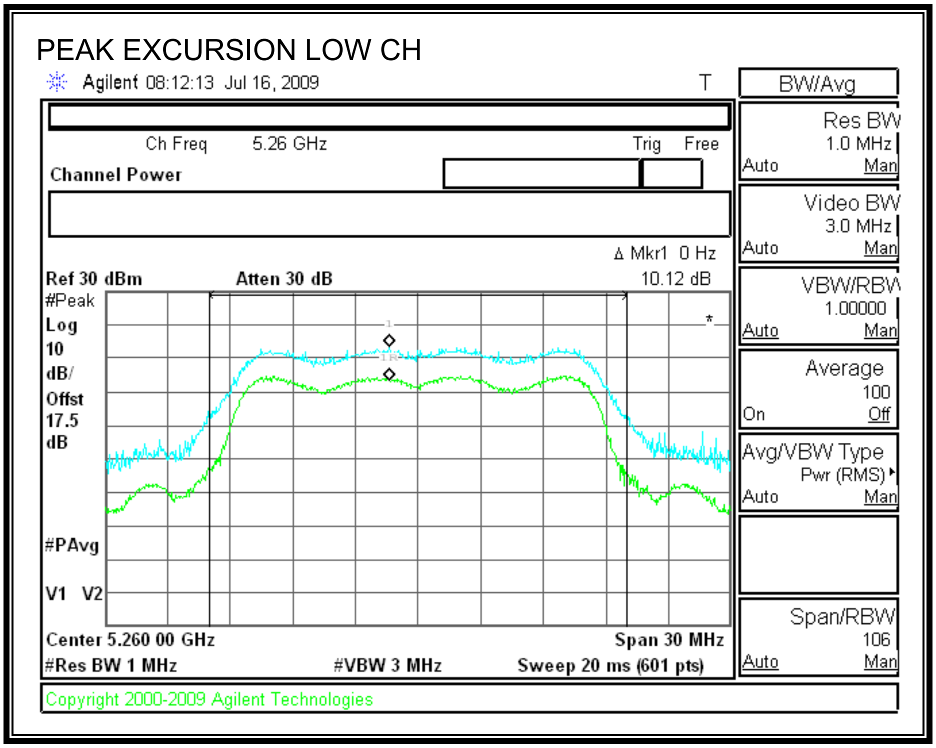
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

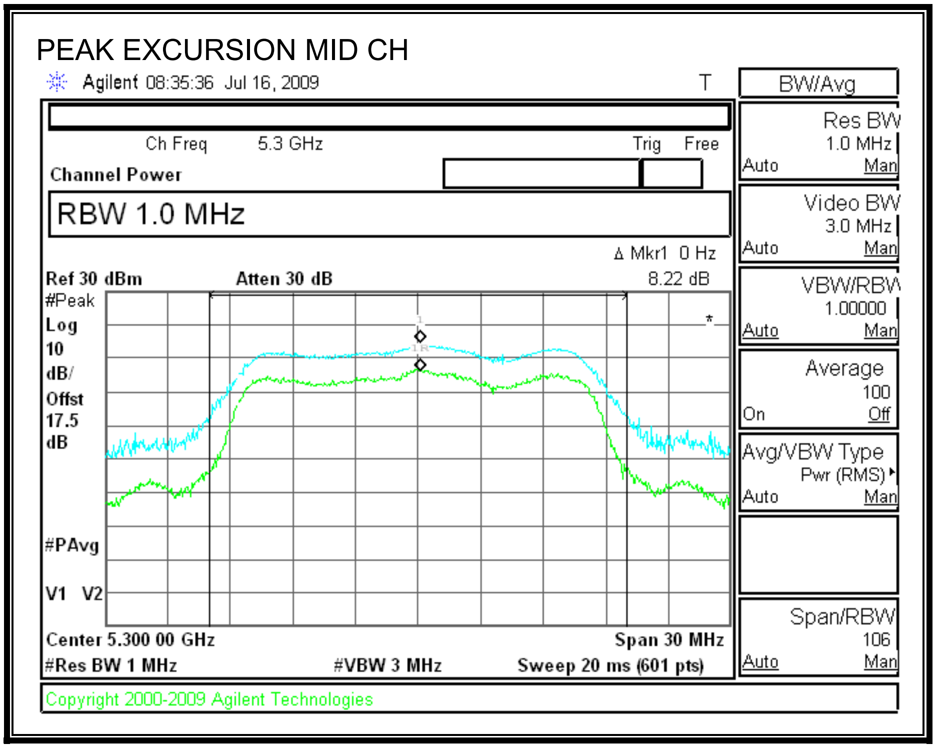
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

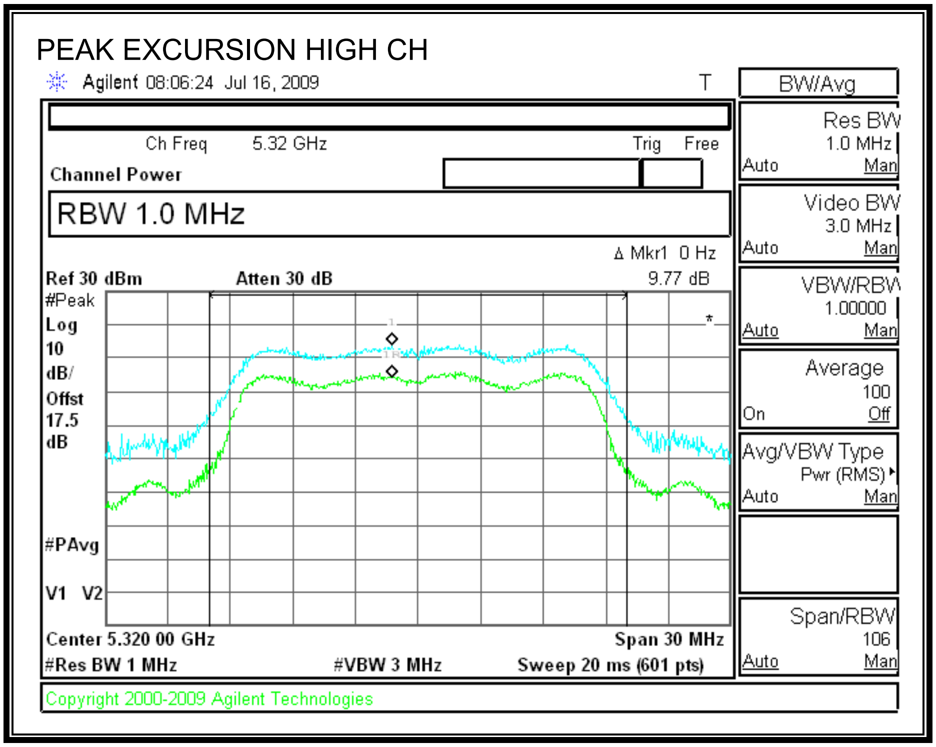
RESULTS

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

PEAK EXCURSION






PEAK EXCURSION HIGH CH
Agilent 08:06:24 Jul 16, 2009
T
BW/Avg
Ch Freq 5.32 GHz
Trig Free
Channel Power
RBW 1.0 MHz
Δ Mkr1 0 Hz
9.77 dB
Ref 30 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
17.5
dB
#PAvg
V1 V2
Center 5.320 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Res BW
1.0 MHz
Auto Man
Video BW
3.0 MHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Pwr (RMS)
Auto Man
Span/RBW
106
Auto Man
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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.

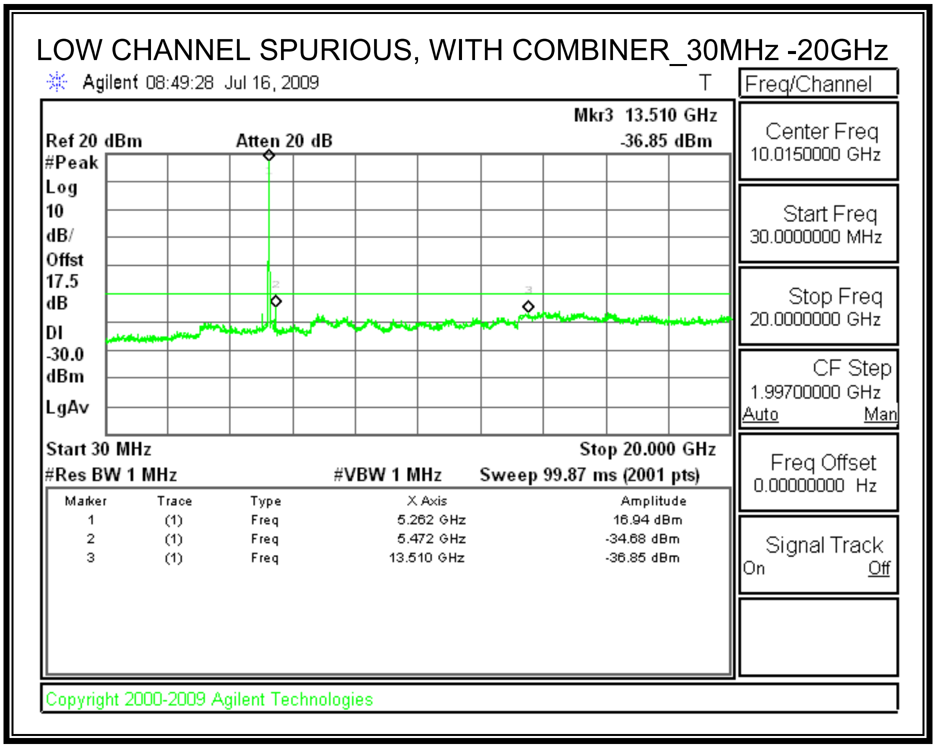
TEST PROCEDURE

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.

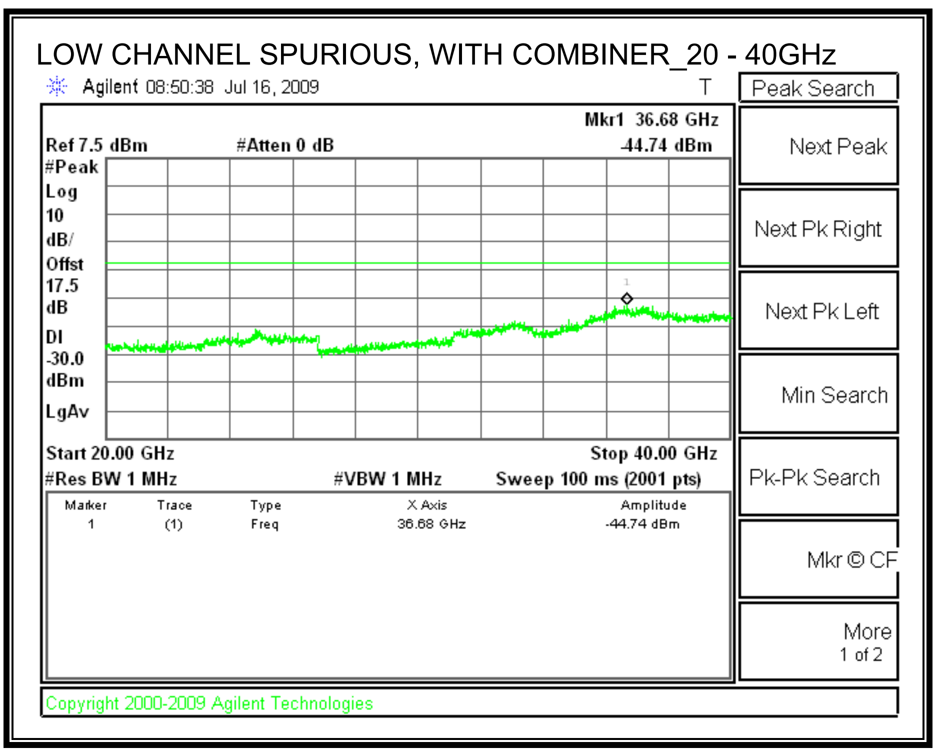
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

SPURIOUS EMISSIONS WITH COMBINER

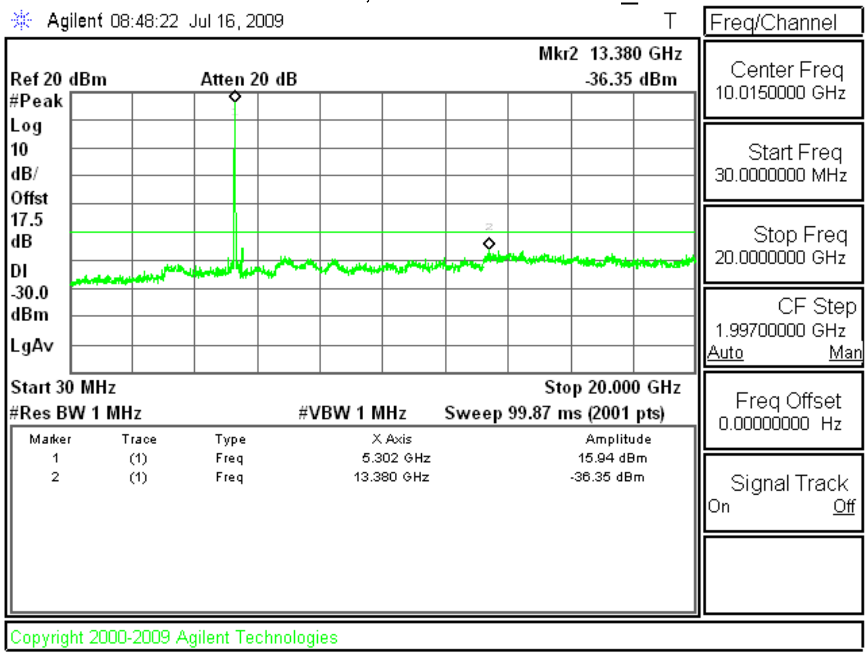


LOW CHANNEL SPURIOUS, WITH COMBINER_30MHz -20GHz

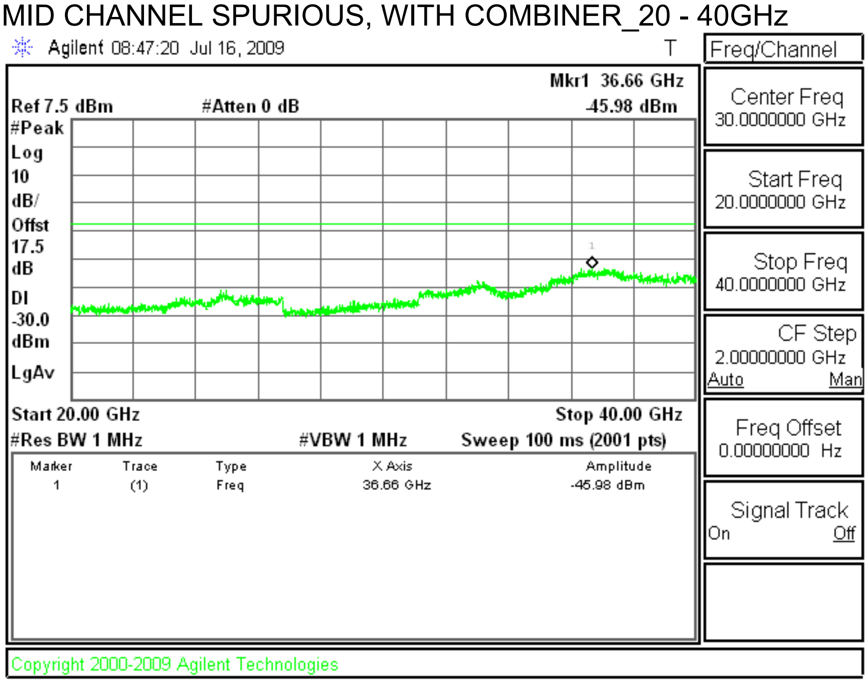


LOW CHANNEL SPURIOUS, WITH COMBINER_20 - 40GHz

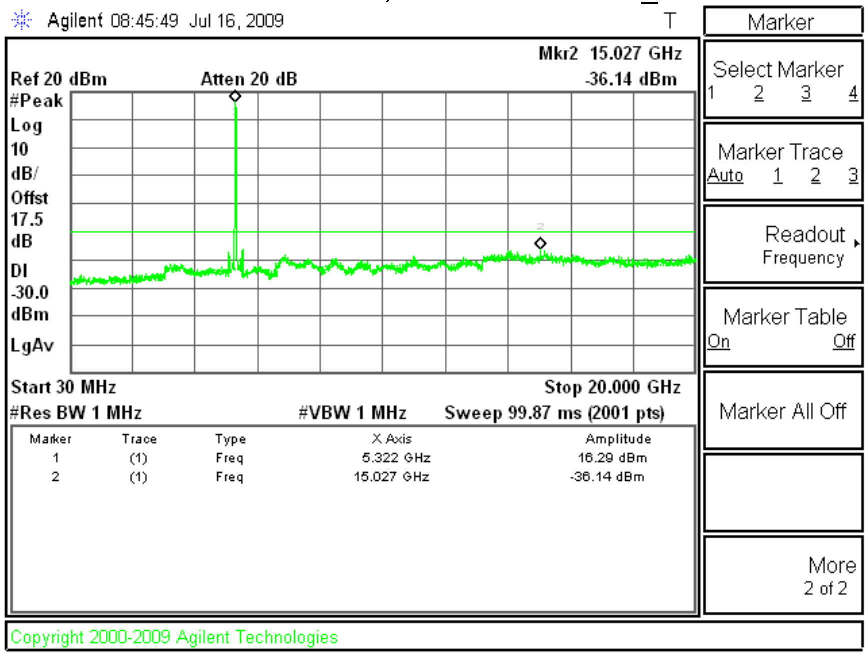
MID CHANNEL SPURIOUS, WITH COMBINER_30MHz -20GHz



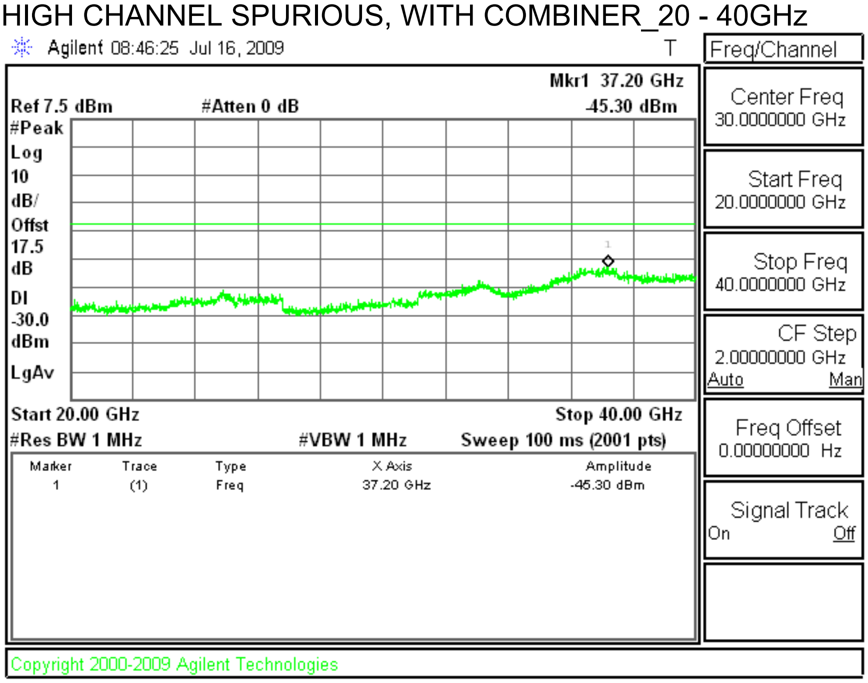
MID CHANNEL SPURIOUS, WITH COMBINER_20 - 40GHz



HIGH CHANNEL SPURIOUS, WITH COMBINER_30MHz -20GHz



HIGH CHANNEL SPURIOUS, WITH COMBINER_20 - 40GHz



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

7.5.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

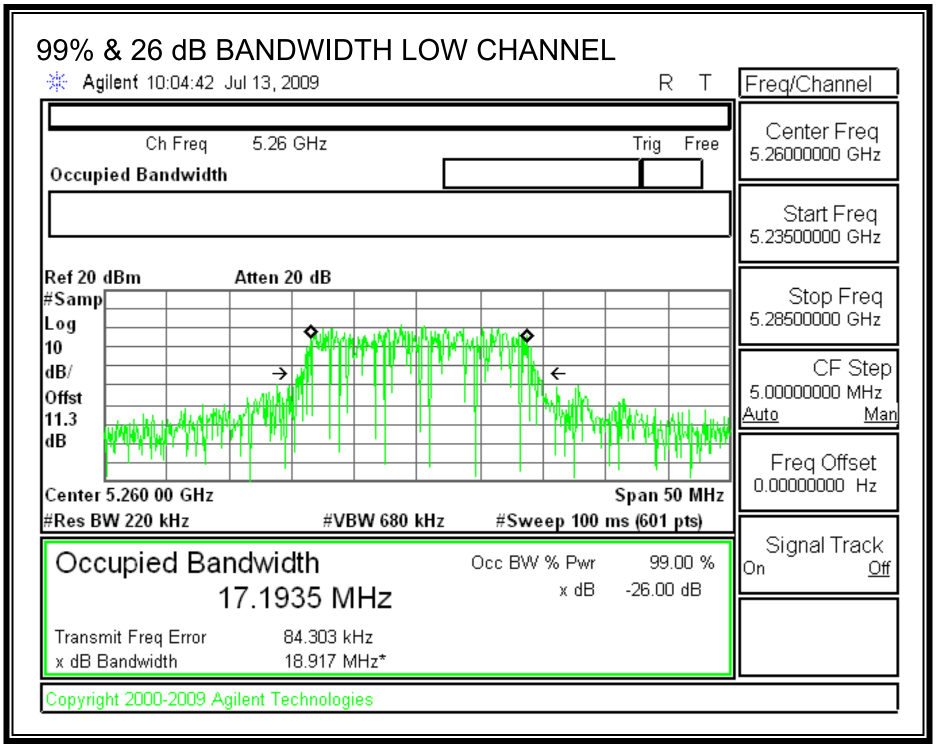
TEST PROCEDURE

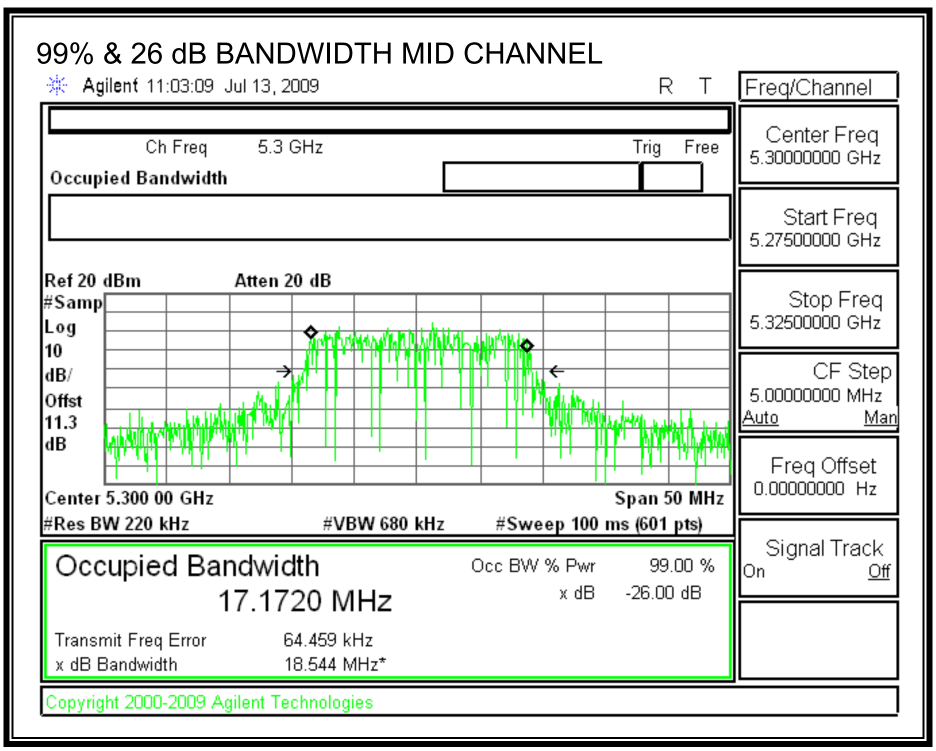
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

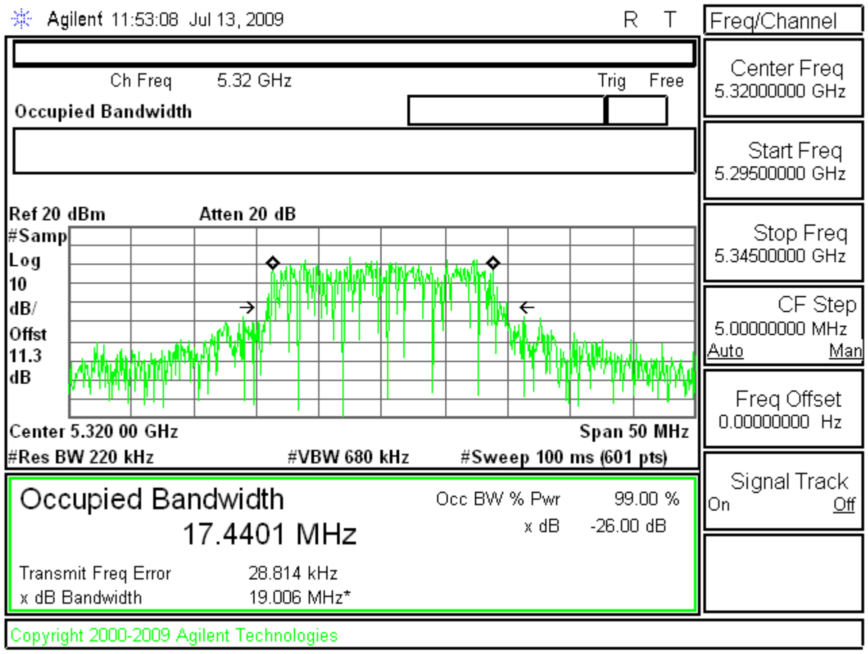
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	5260	17.1935	18.917
Middle	5300	17.172	18.544
High	5320	17.44	19.006

99% & 26 dB BANDWIDTH





99% & 26 dB BANDWIDTH HIGH CHANNEL



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

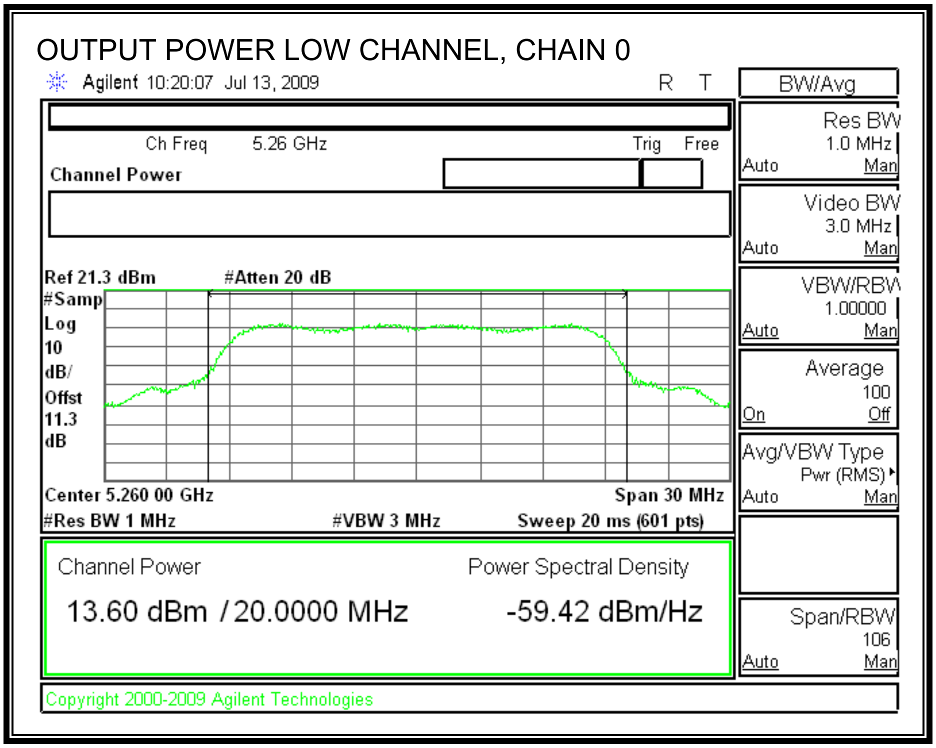
Channel	Freq (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5260	24	18.917	23.77	3	23.77
Mid	5300	24	18.544	23.68	3	23.68
High	5320	24	19.006	23.79	3	23.79

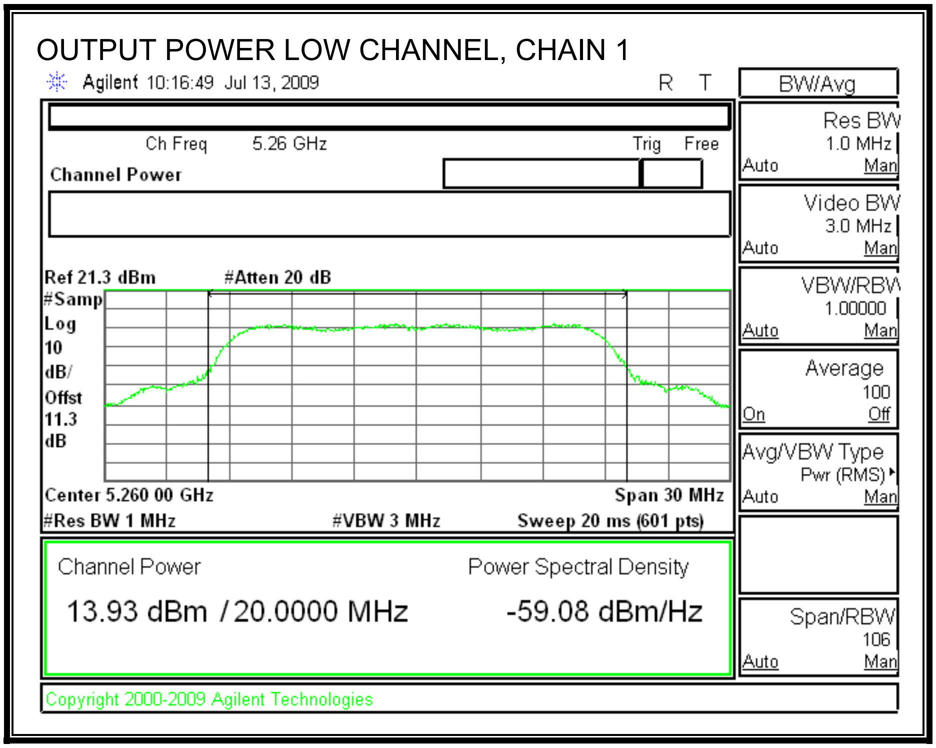
Individual Chain Results

Channel	Freq (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (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

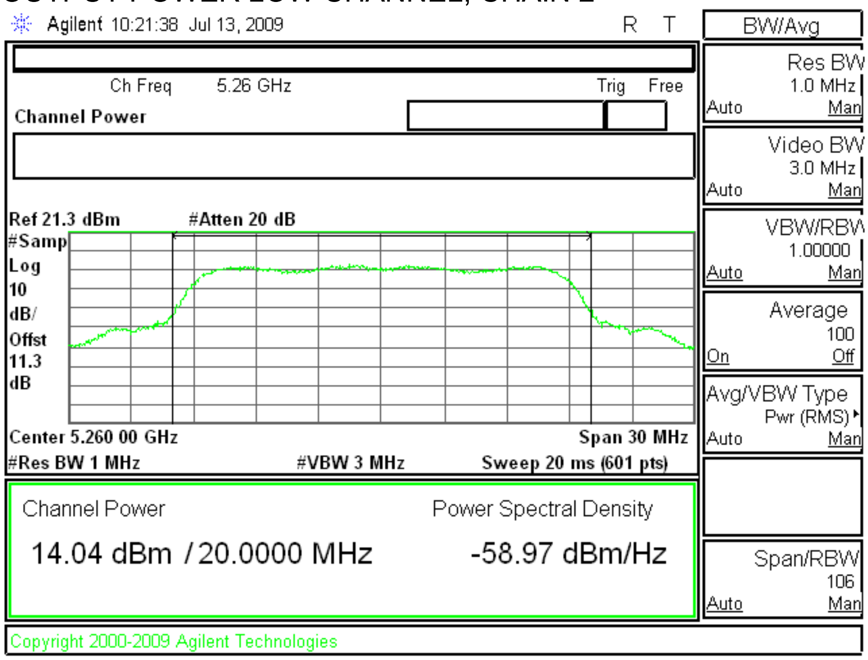
COMPLIANCE CERTIFICATION SERVICES FORM NO: CCSUP4701C
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

OUTPUT POWER, LOW CHANNEL

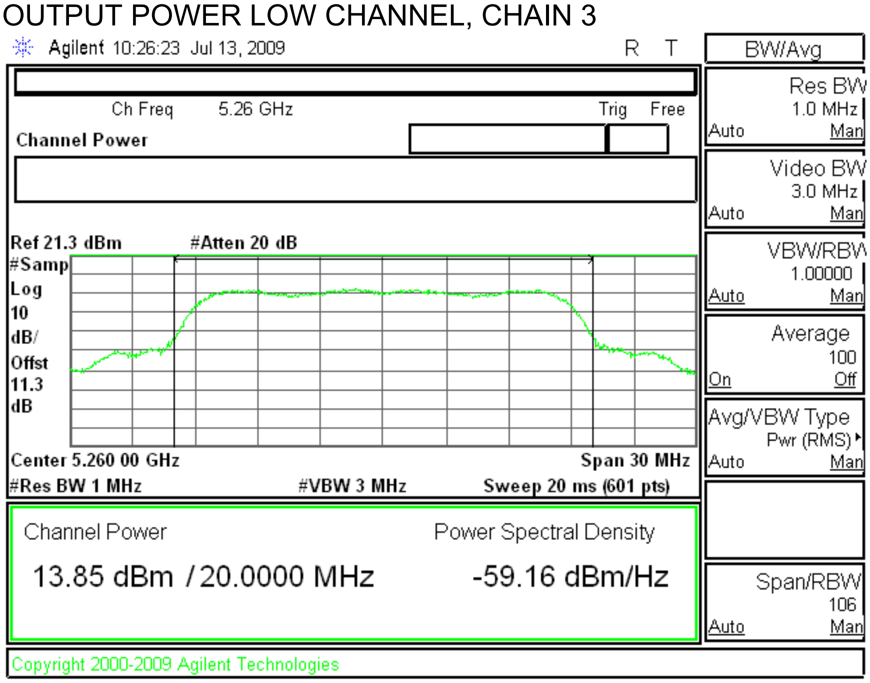




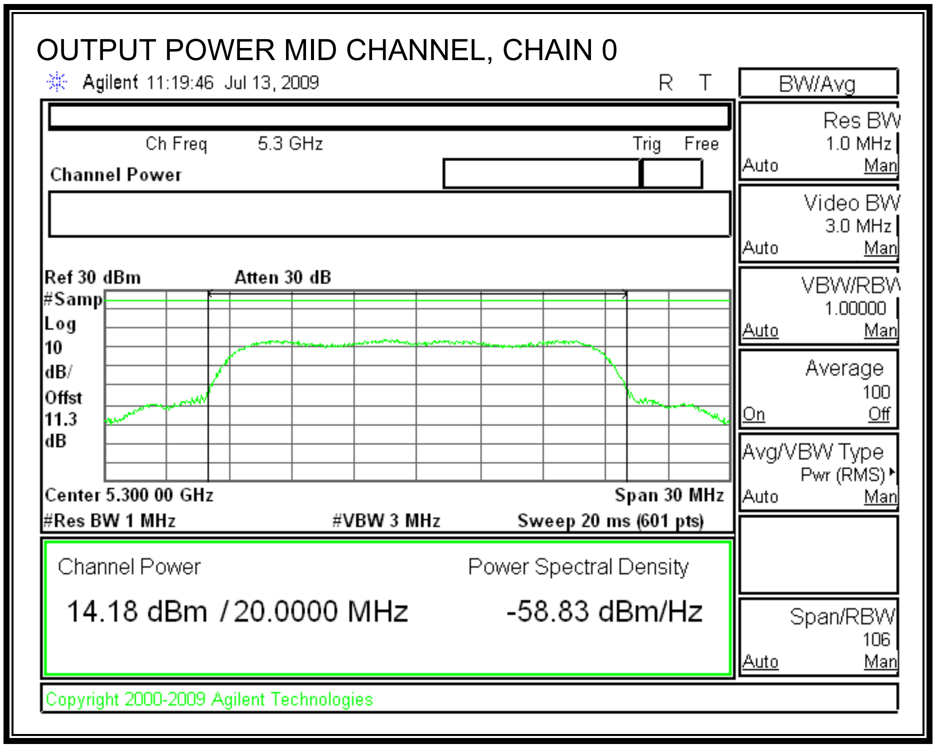
OUTPUT POWER LOW CHANNEL, CHAIN 2

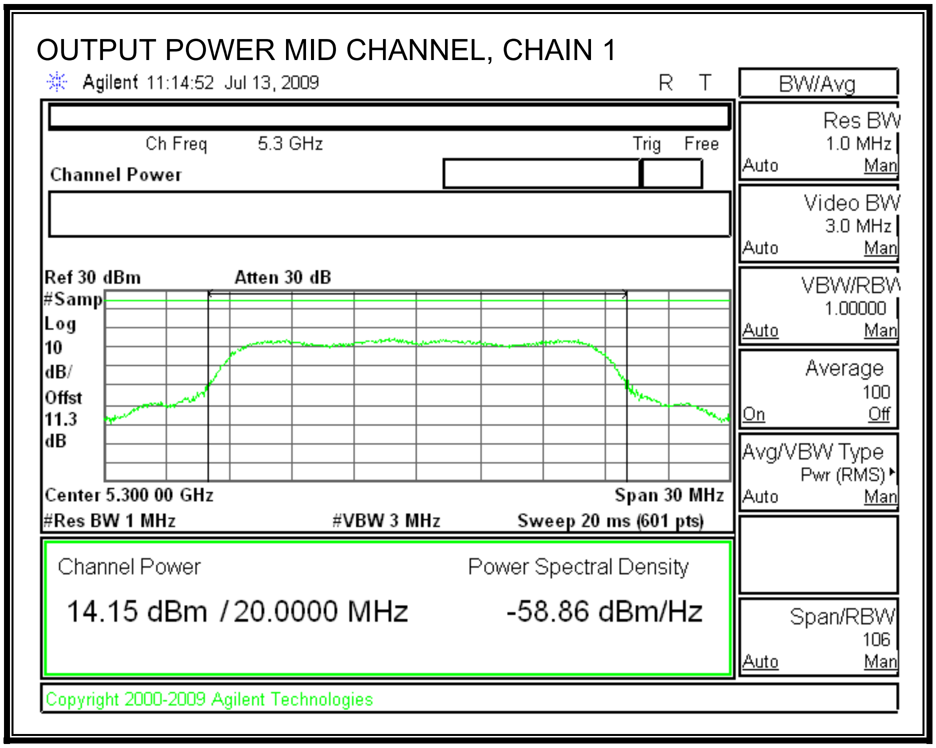


OUTPUT POWER LOW CHANNEL, CHAIN 3

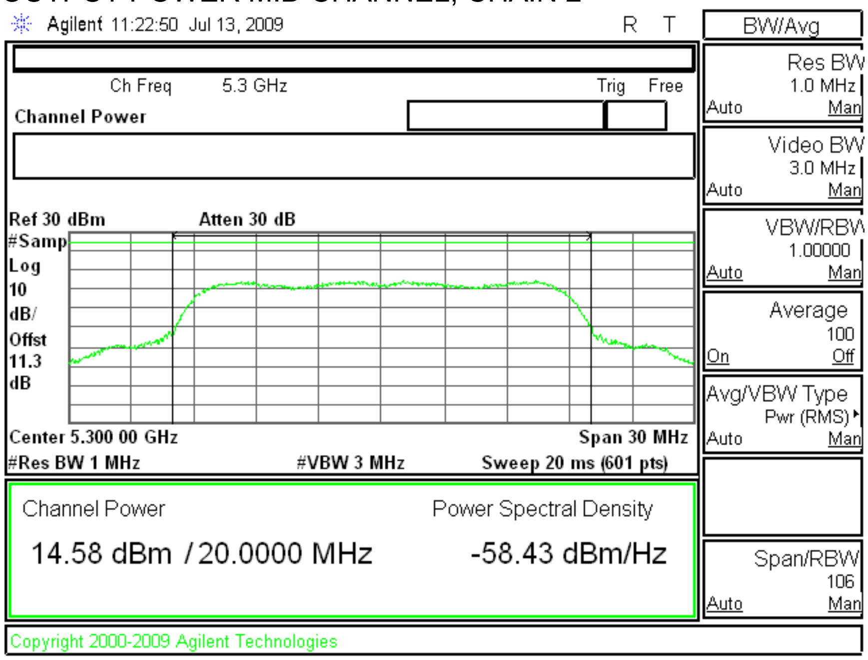


OUTPUT POWER, MID CHANNEL

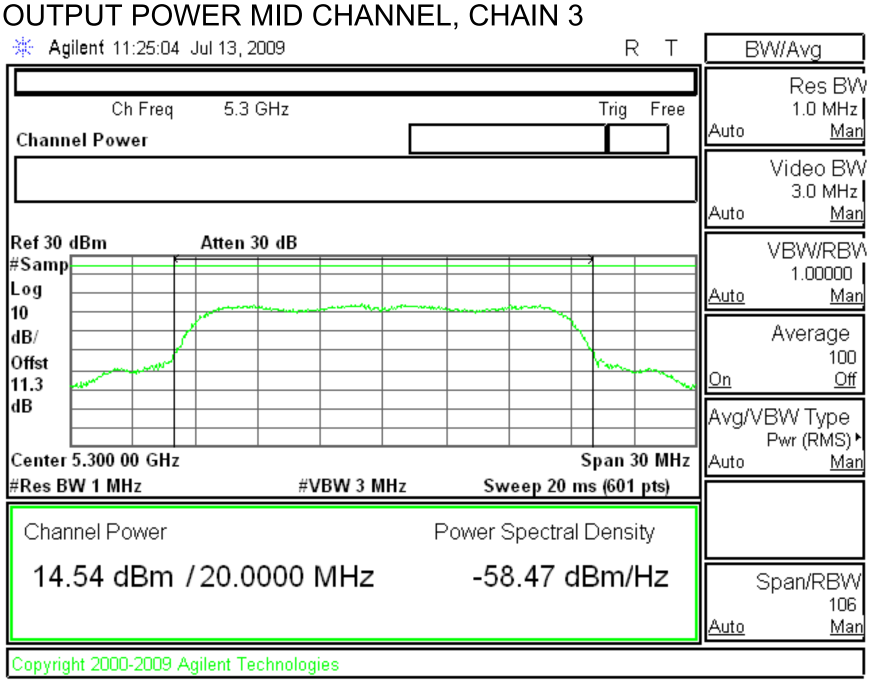




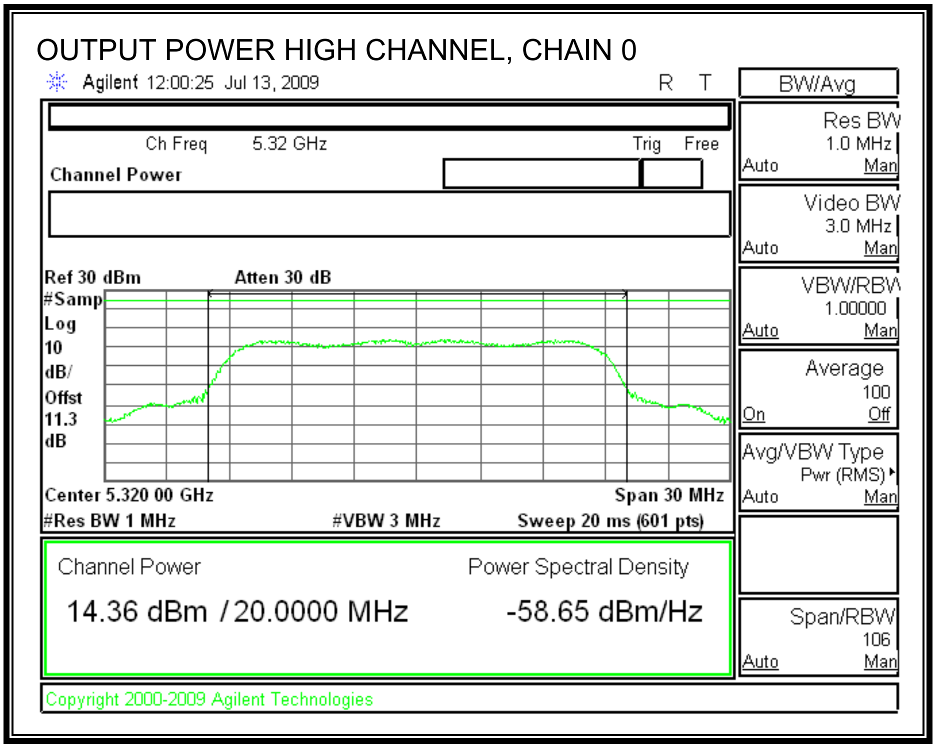
OUTPUT POWER MID CHANNEL, CHAIN 2

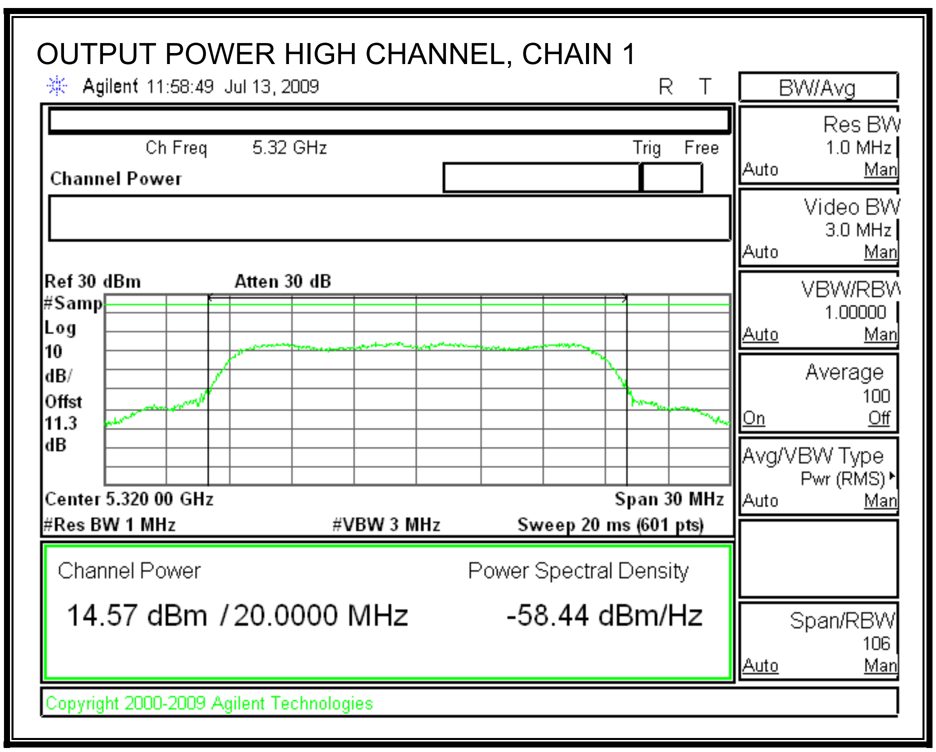


OUTPUT POWER MID CHANNEL, CHAIN 3

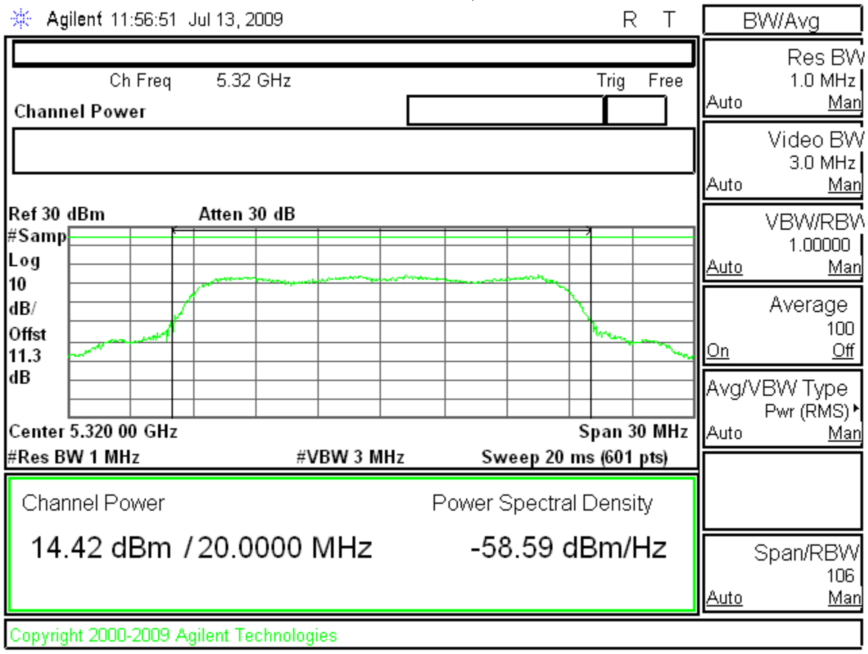


OUTPUT POWER, HIGH CHANNEL

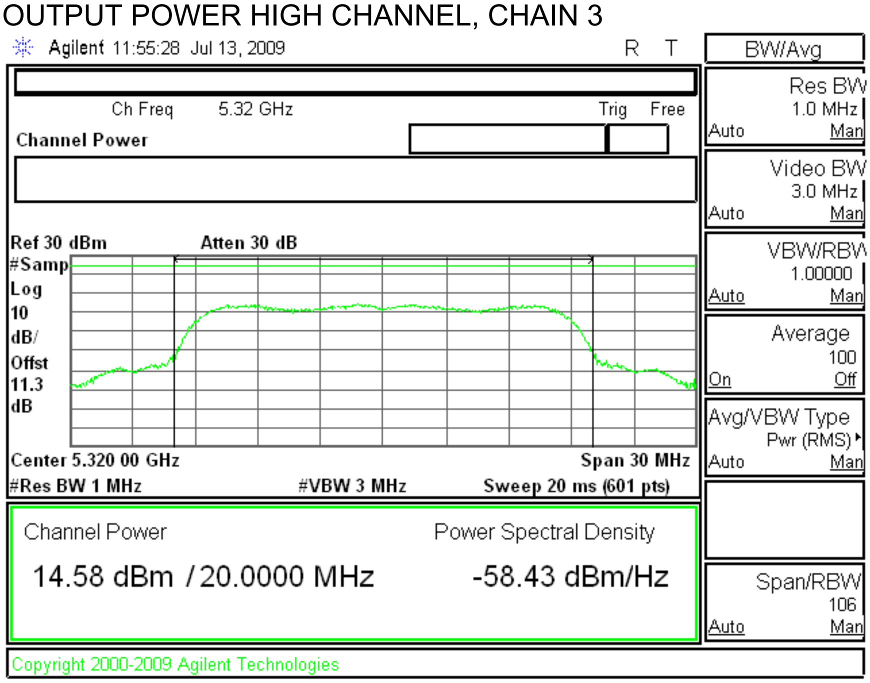




OUTPUT POWER HIGH CHANNEL, CHAIN 2



OUTPUT POWER HIGH CHANNEL, CHAIN 3



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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (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

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

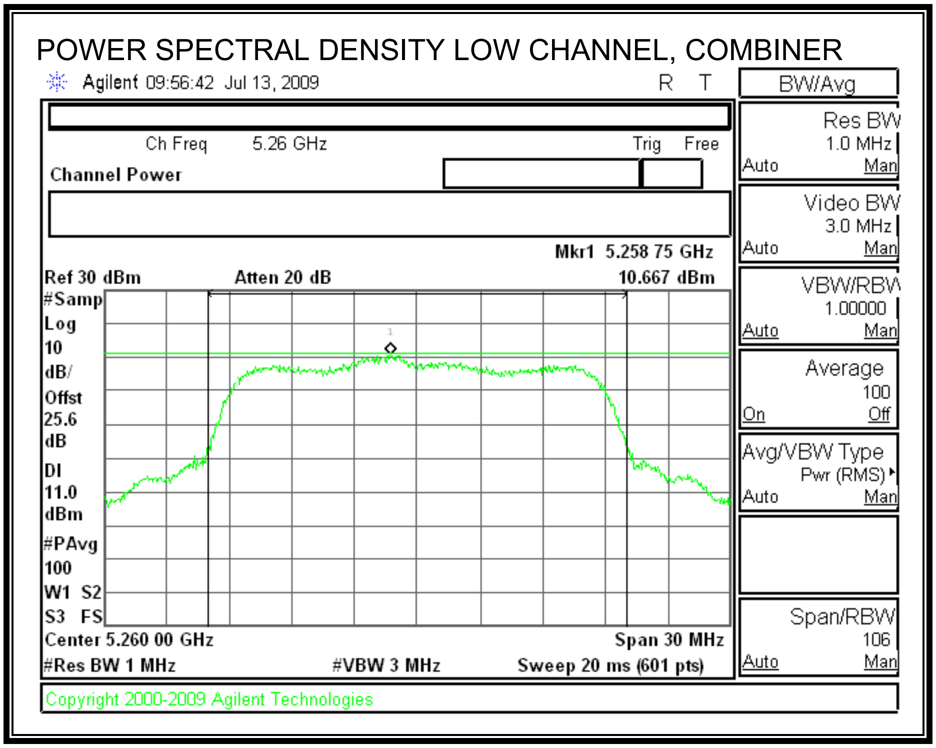
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

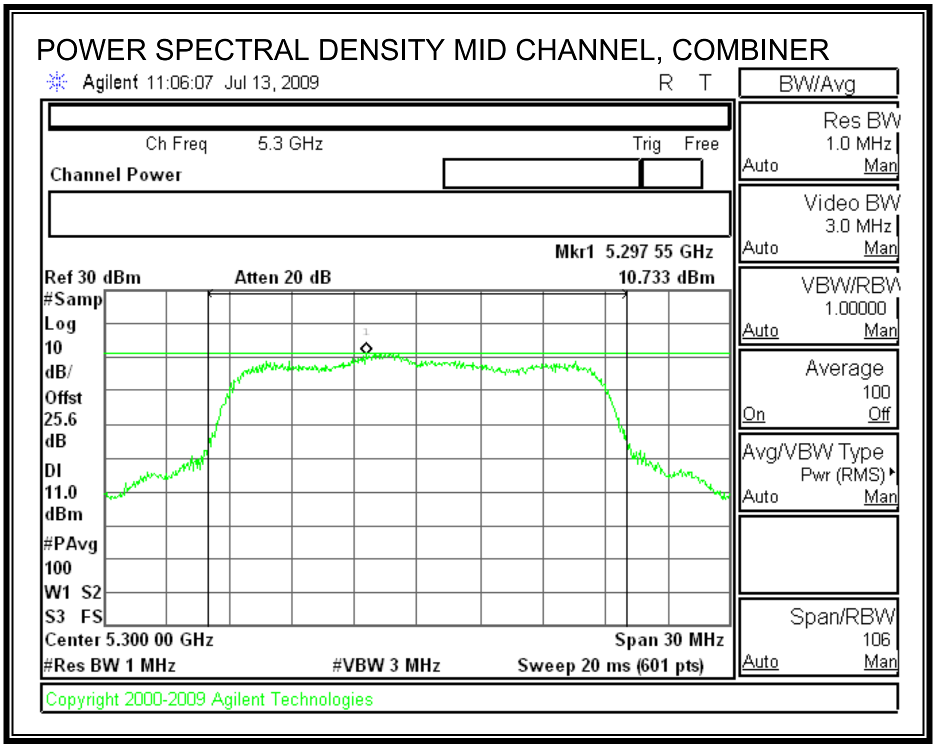
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

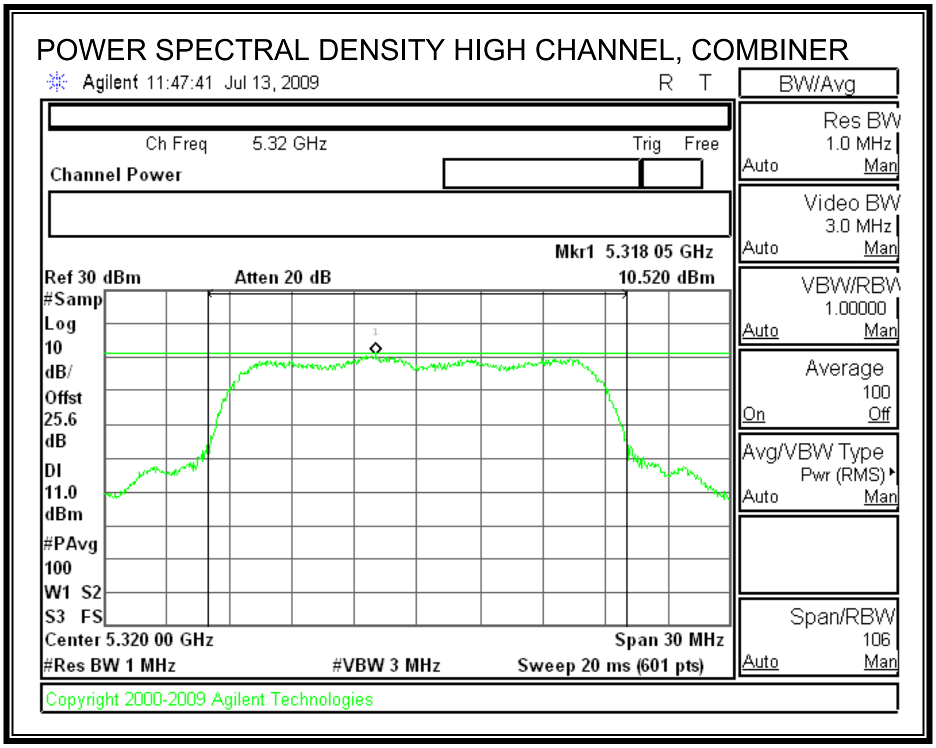
RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (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

POWER SPECTRAL DENSITY






POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER
Agilent 11:47:41 Jul 13, 2009
R T
BW/Avg
Ch Freq 5.32 GHz
Trig Free
Channel Power
Mkr1 5.318 05 GHz
Ref 30 dBm
Atten 20 dB
10.520 dBm
#Samp
Log
10
dB/
Offst
25.6
dB
Dl
11.0
dBm
#PAvg
100
W1 S2
S3 FS
Center 5.320 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
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Res BW
1.0 MHz
Auto Man
Video BW
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Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Pwr (RMS)
Auto Man
Span/RBW
106
Auto Man
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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.

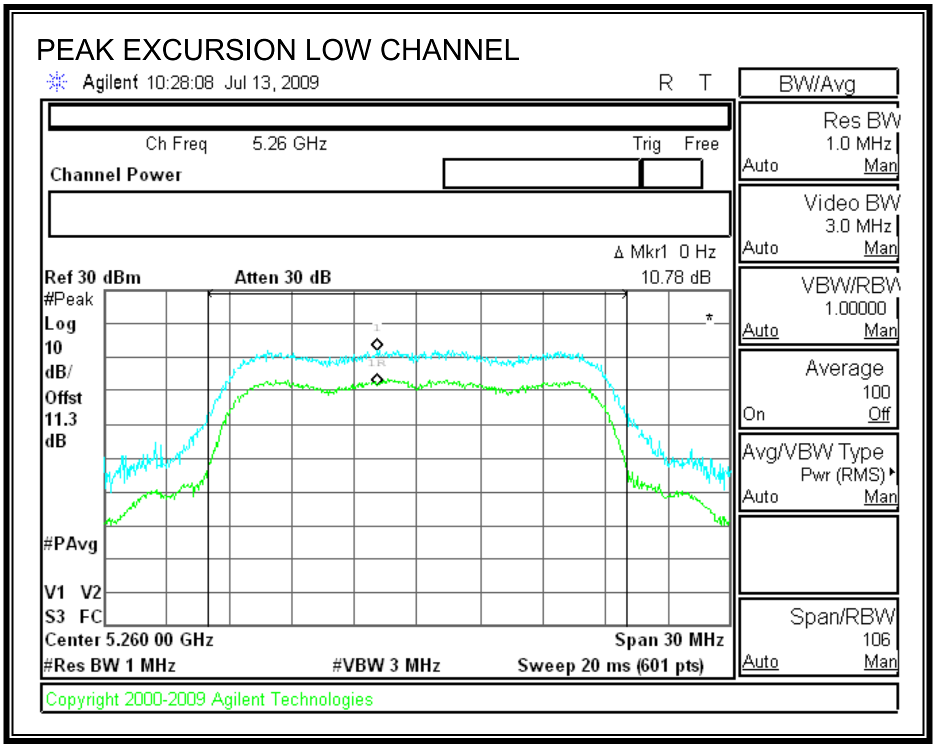
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

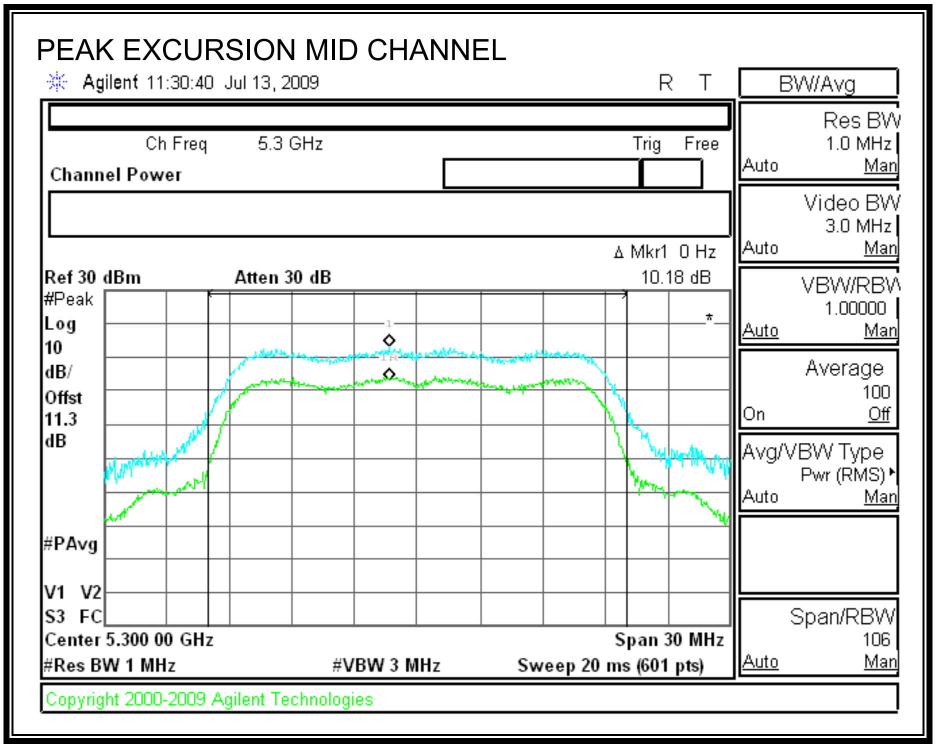
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

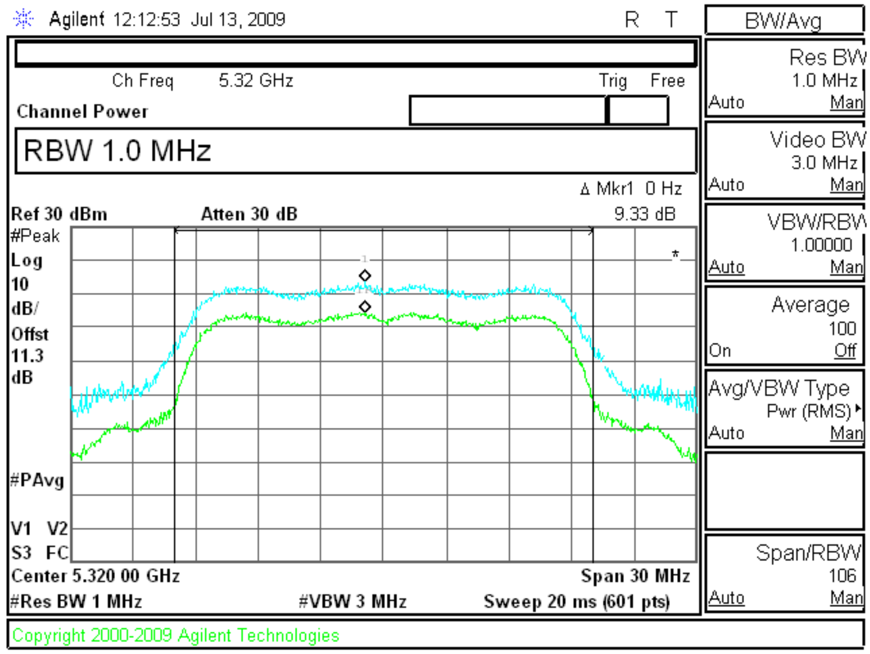
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5260	10.78	13	-2.22
Middle	5300	10.18	13	-2.82
High	5320	9.33	13	-3.67

PEAK EXCURSION





PEAK EXCURSION HIGH CHANNEL



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

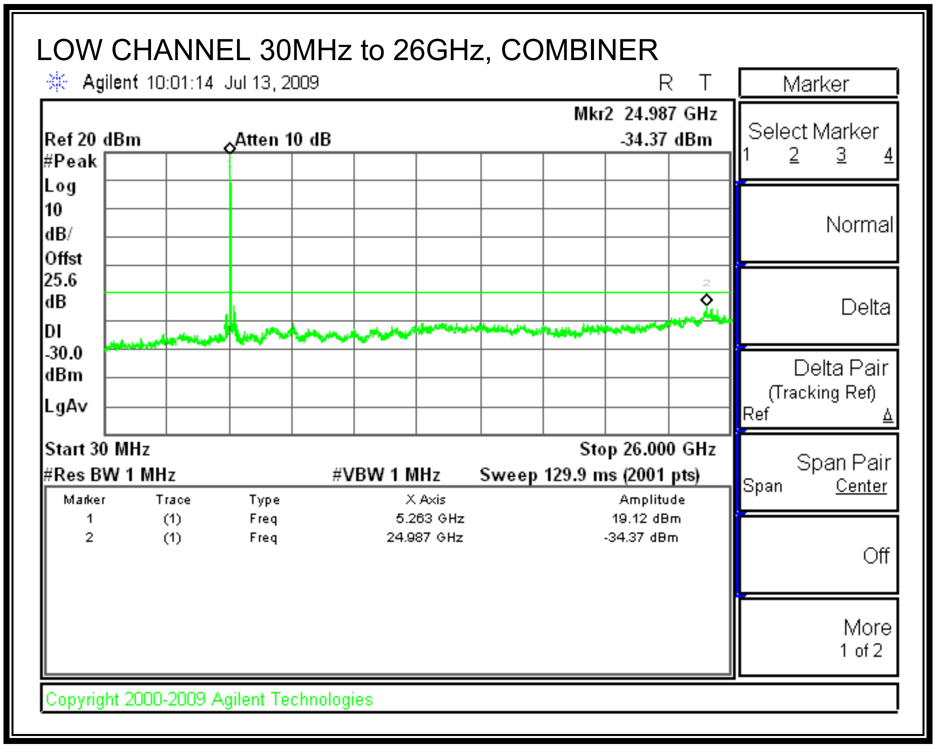
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

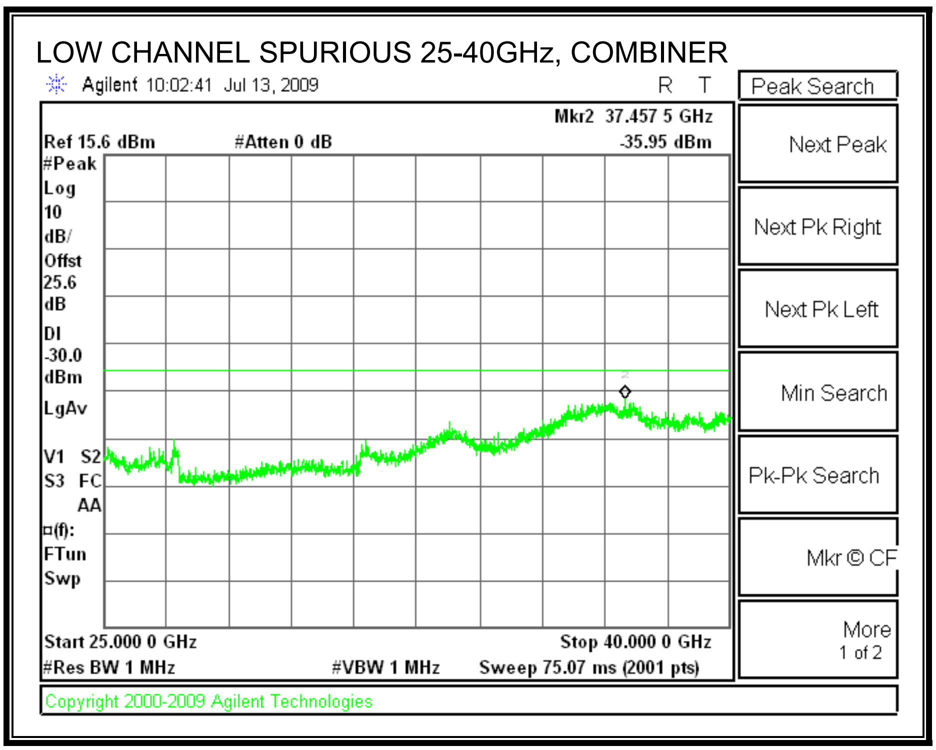
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

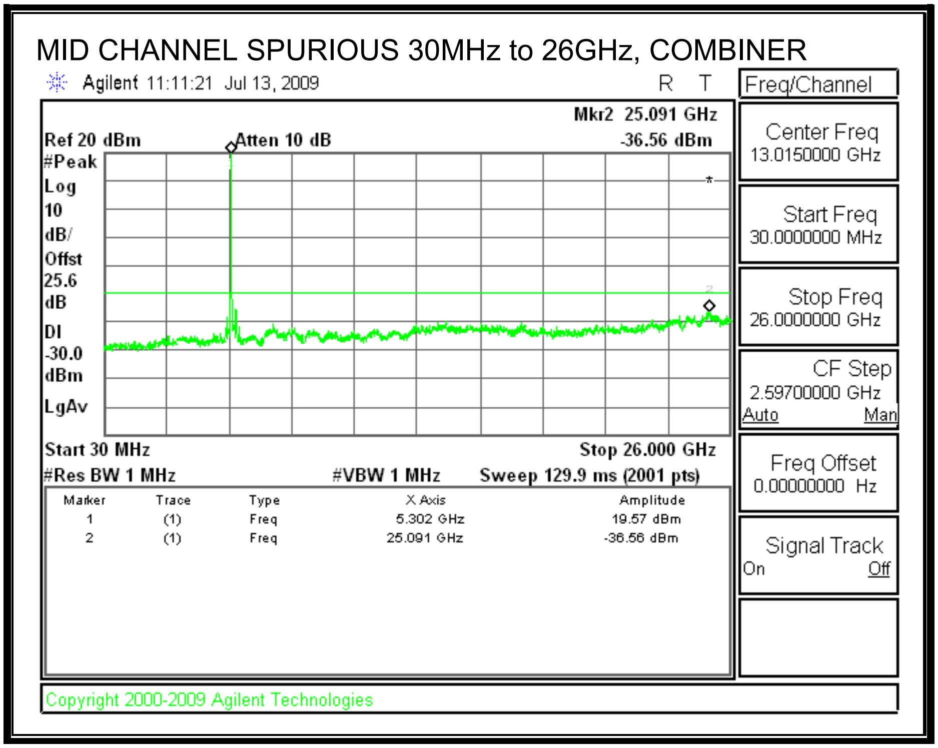
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

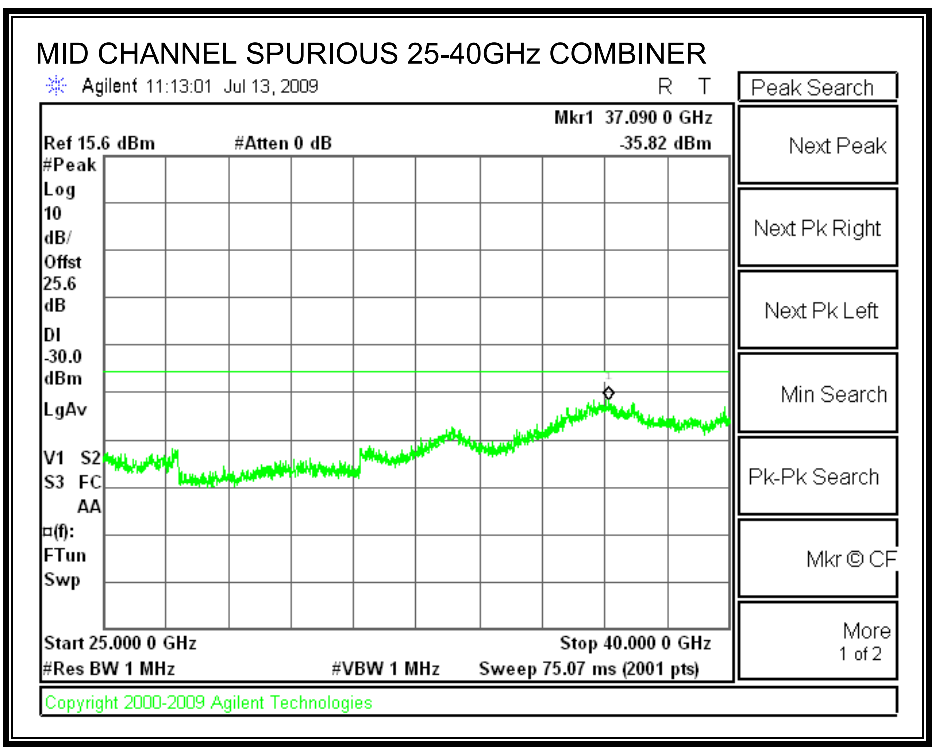
LOW CHANNEL SPURIOUS EMISSIONS



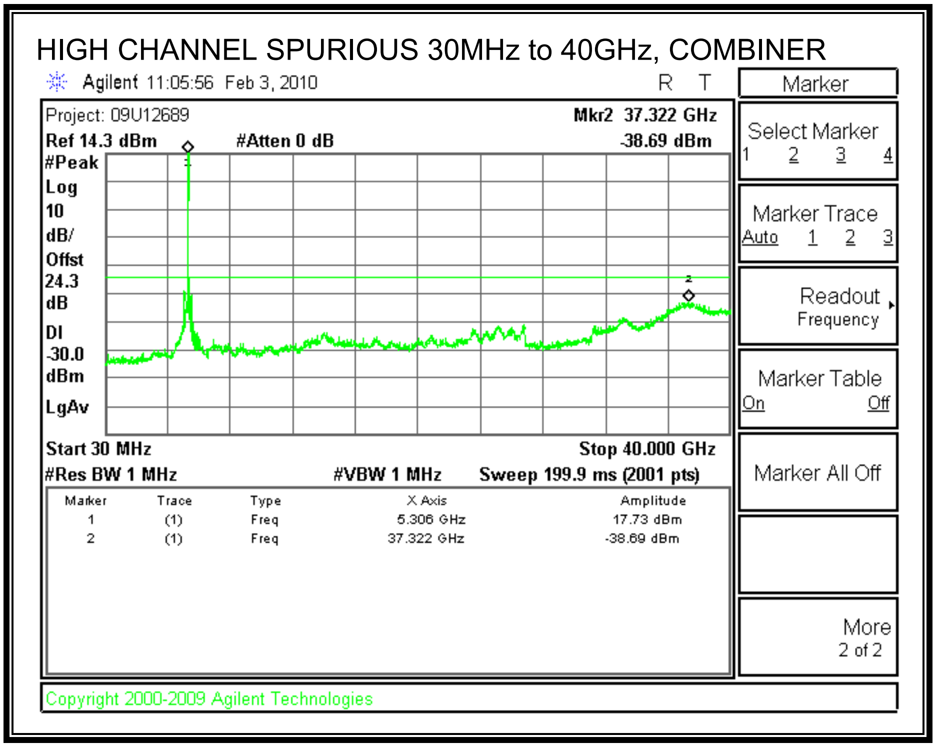


MID CHANNEL SPURIOUS EMISSIONS





HIGH CHANNEL SPURIOUS EMISSIONS



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

7.6.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

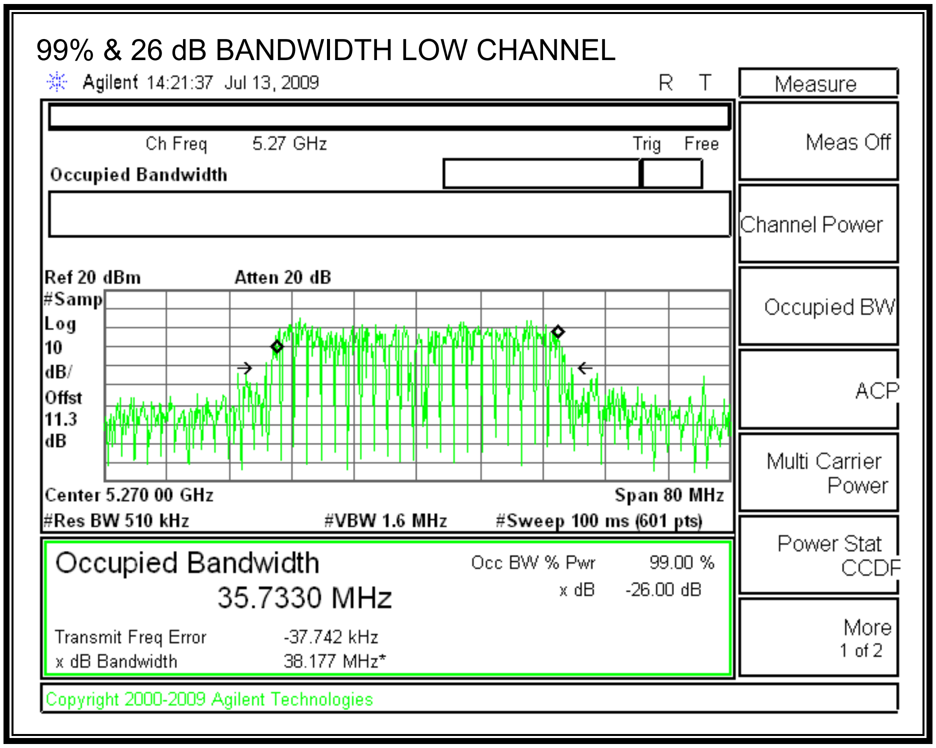
TEST PROCEDURE

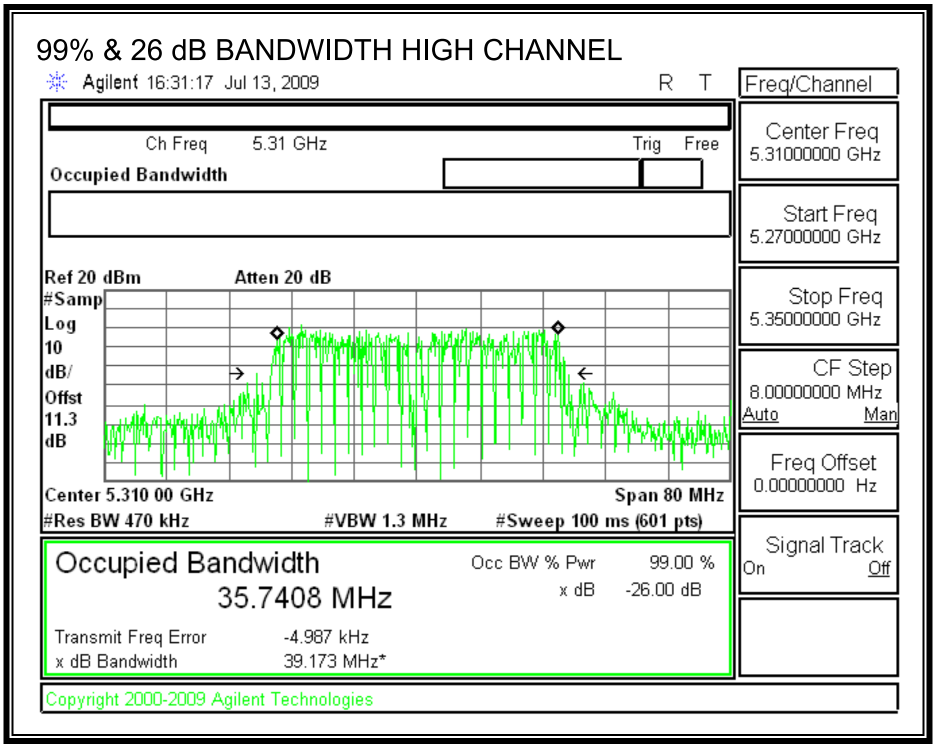
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

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

99% & 26 dB BANDWIDTH





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

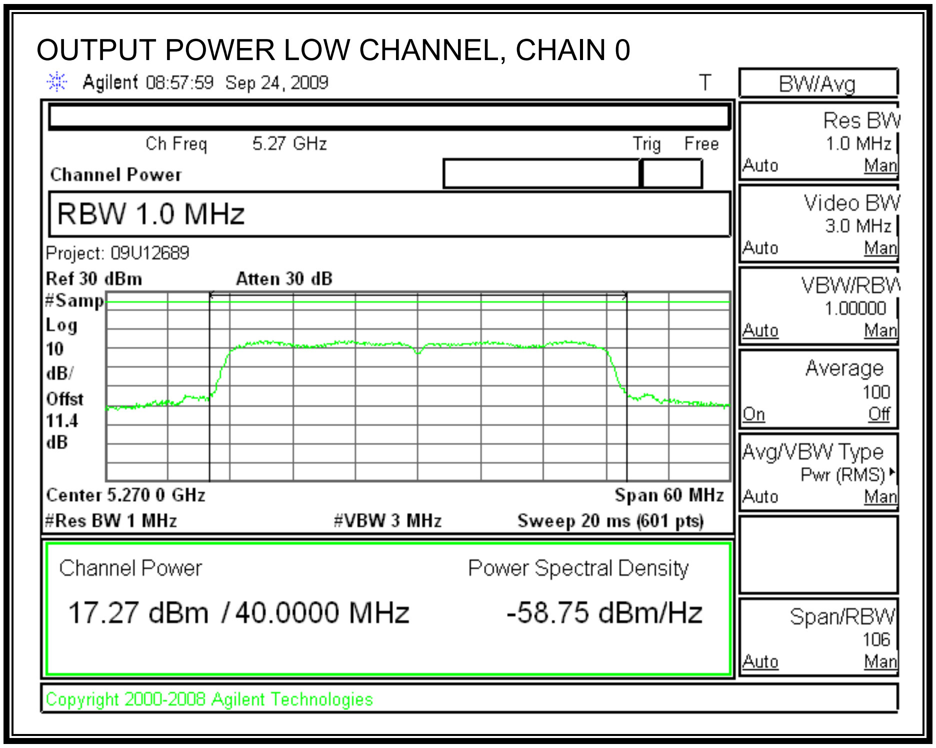
Limit

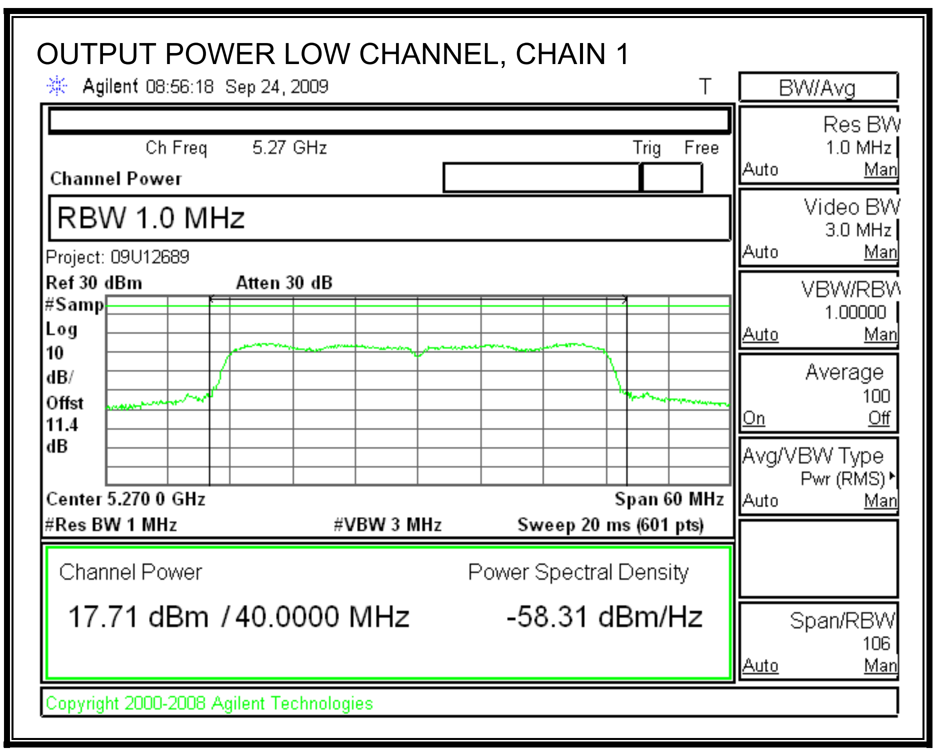
Channel	Freq (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5270	24	38.177	26.82	3	24.00
High	5310	24	39.174	26.93	3	24.00

Individual Chain Results

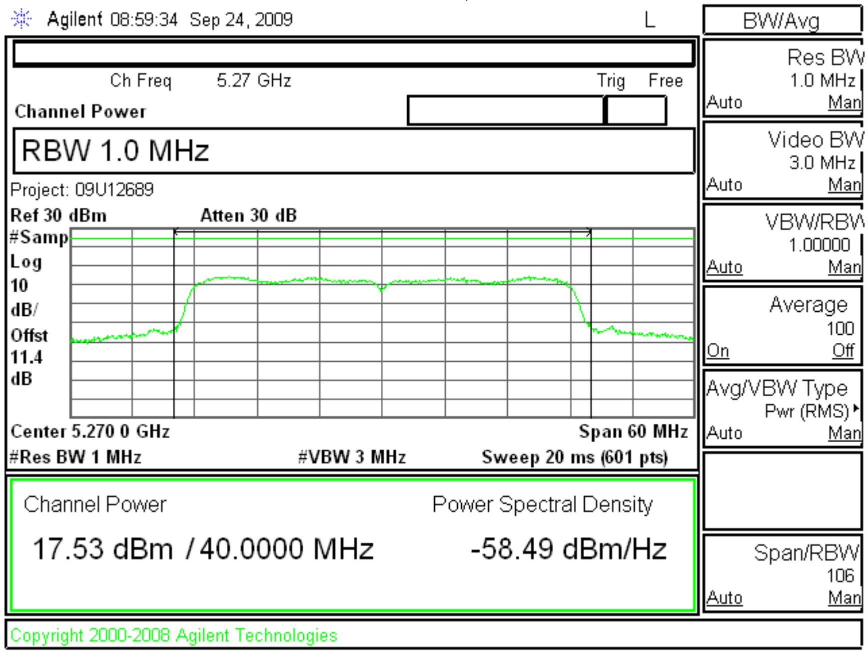
Channel	Freq (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5270	17.27	17.71	17.53	17.88	23.62	24.00	-0.38
High	5310	12.35	12.69	12.30	12.78	18.56	24.00	-5.44

OUTPUT POWER, LOW CHANNEL

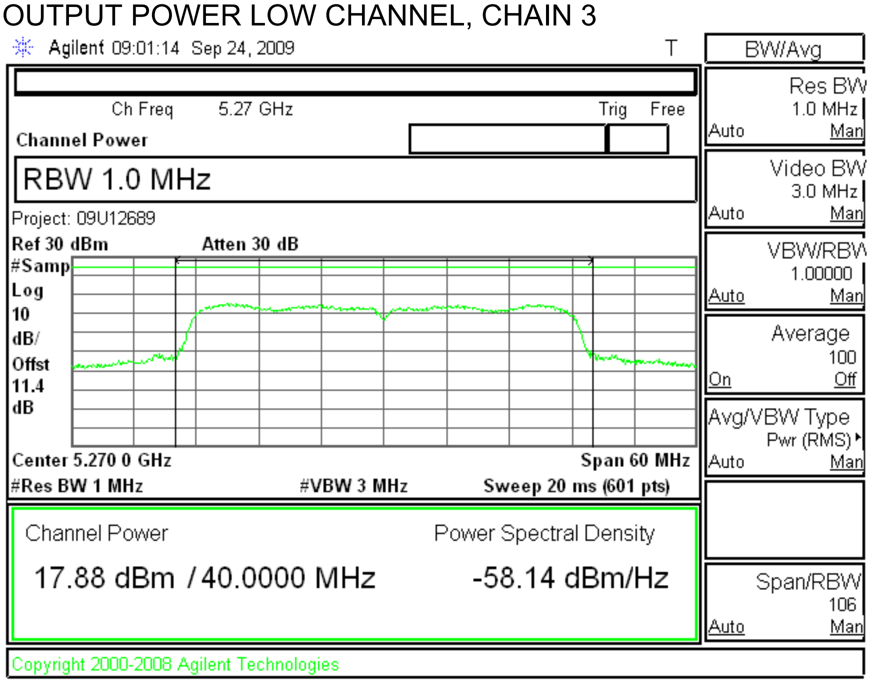




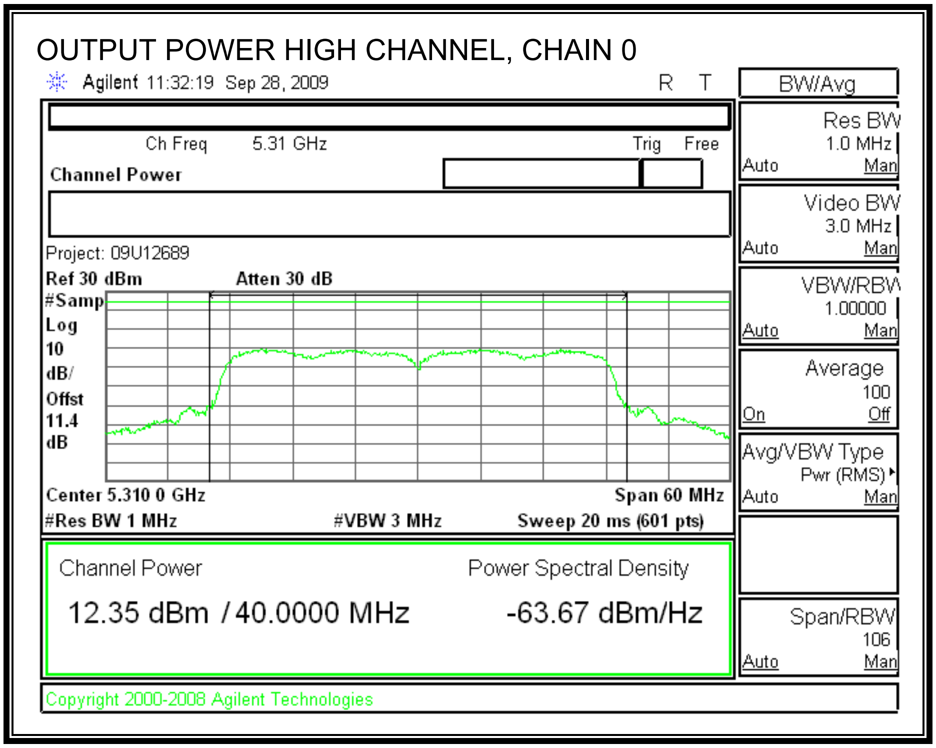
OUTPUT POWER LOW CHANNEL, CHAIN 2

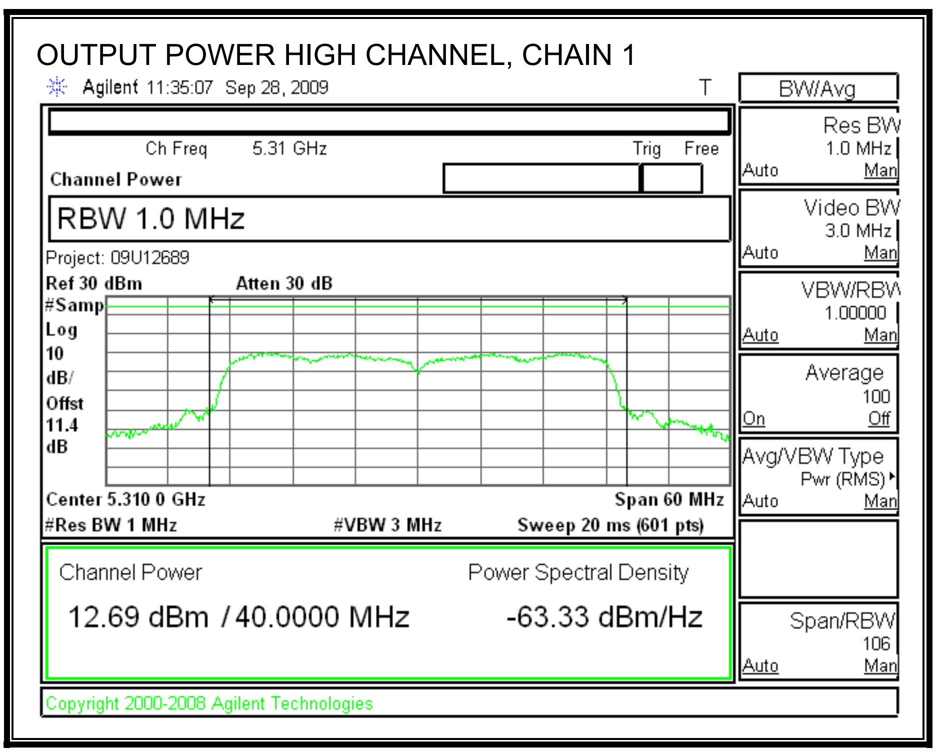


OUTPUT POWER LOW CHANNEL, CHAIN 3

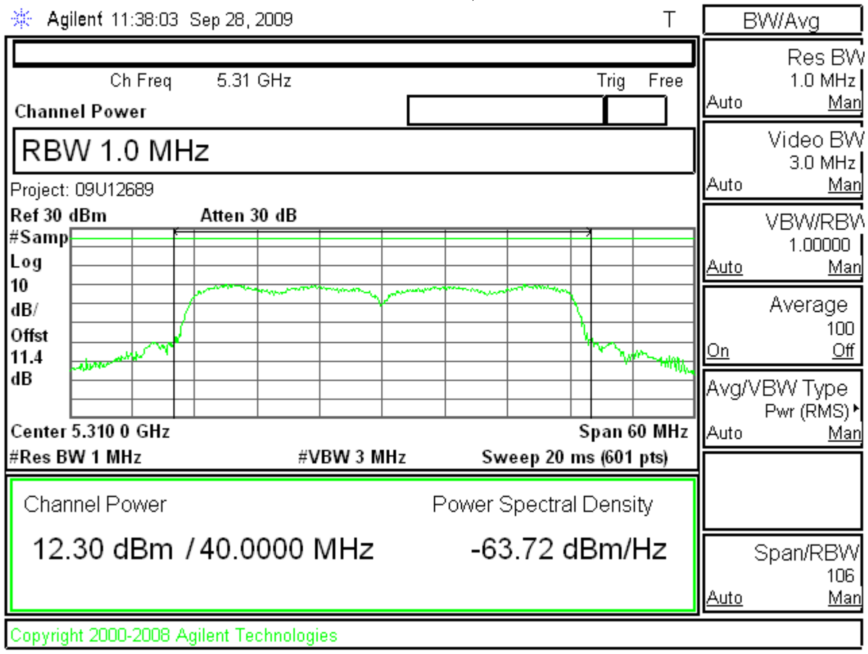


OUTPUT POWER, HIGH CHANNEL

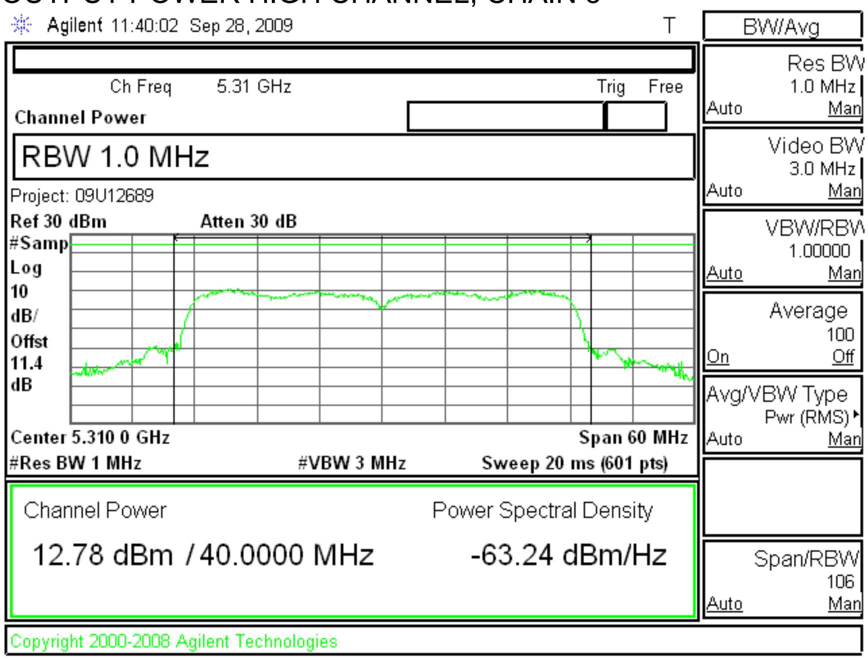




OUTPUT POWER HIGH CHANNEL, CHAIN 2



OUTPUT POWER HIGH CHANNEL, CHAIN 3



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

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.

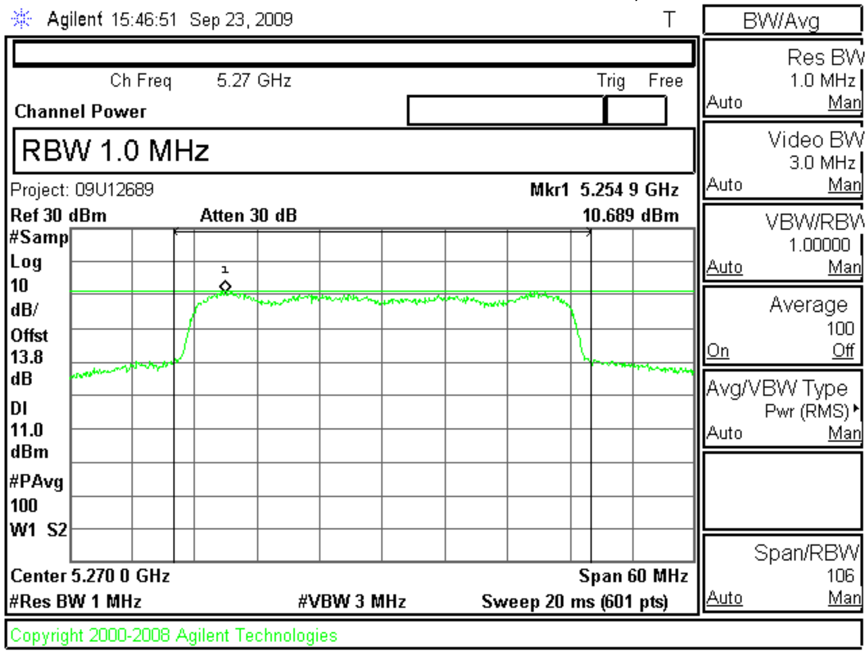
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

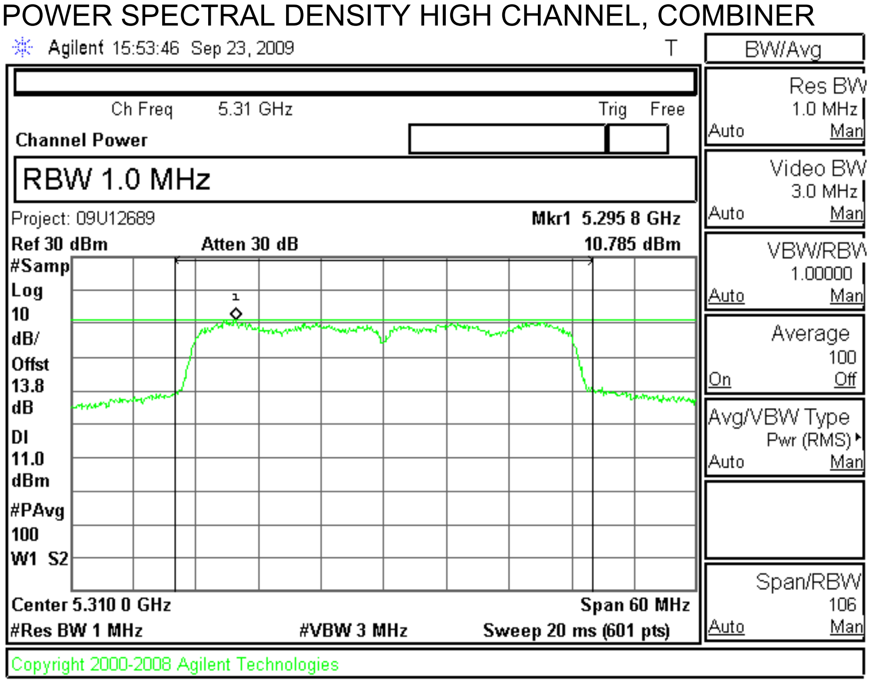
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5270	10.69	11.00	-0.31
High	5310	10.79	11.00	-0.21

POWER SPECTRAL DENSITY

POWER SPECTRAL DENSITY LOW CHANNEL, COMBINER



POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER



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.

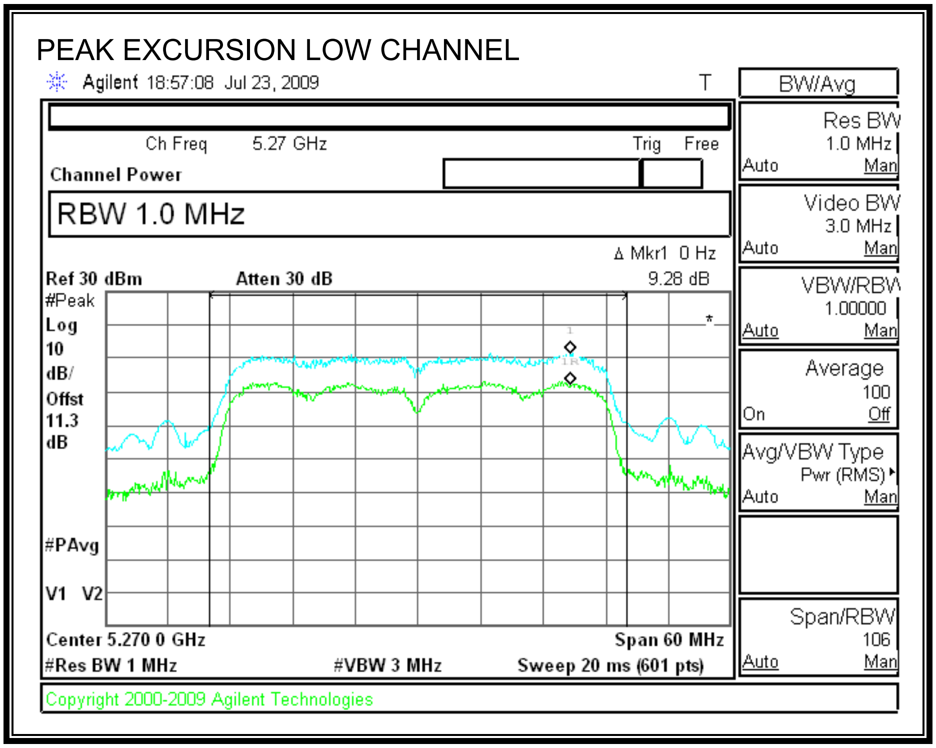
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

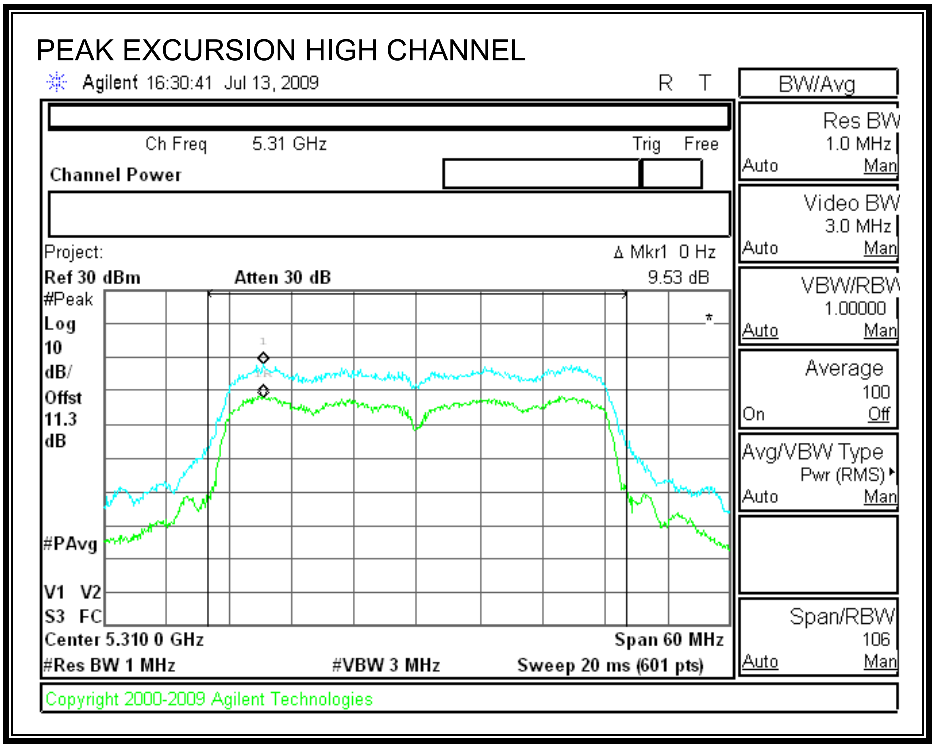
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

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

PEAK EXCURSION





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

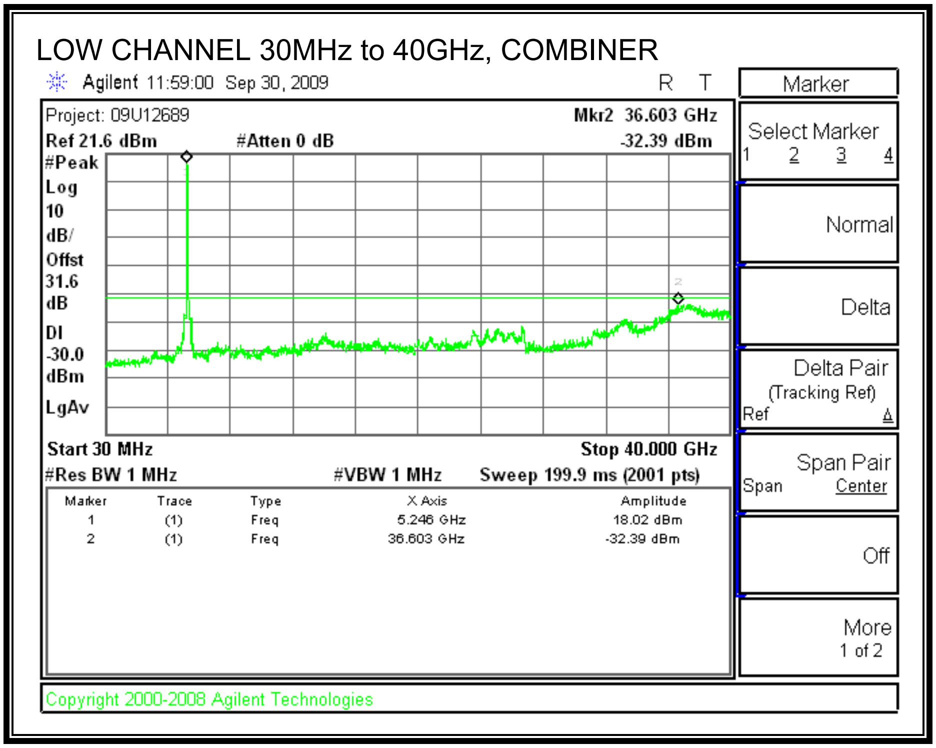
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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.

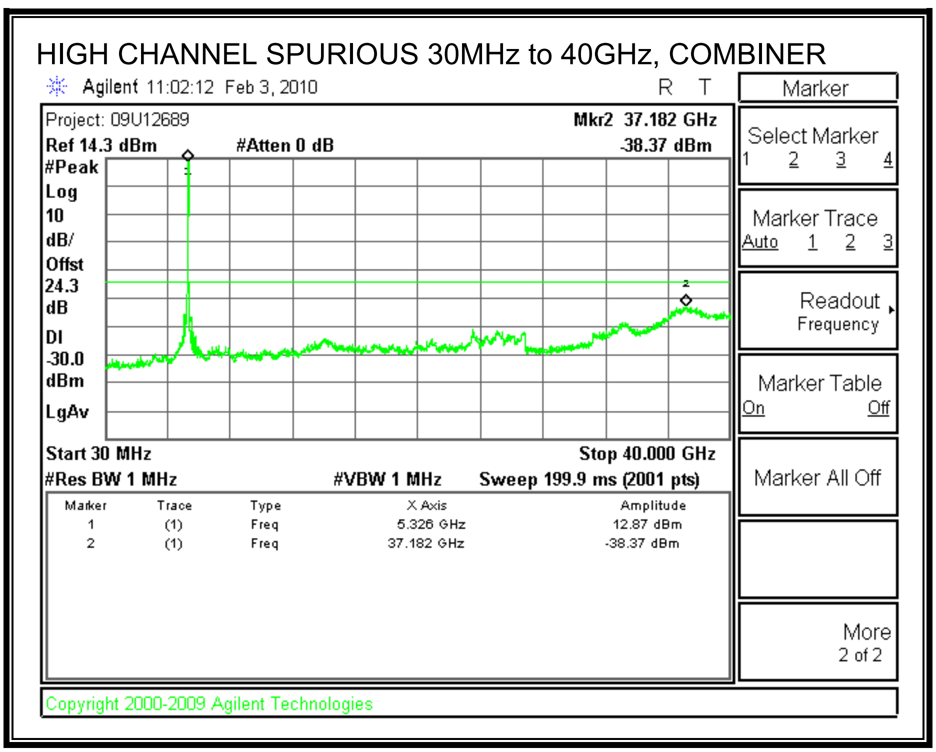
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

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.

LOW CHANNEL SPURIOUS EMISSIONS



HIGH CHANNEL SPURIOUS EMISSIONS



7.7. 5.6GHz BAND CHANNEL TESTS FOR 802.11a MODE

7.7.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

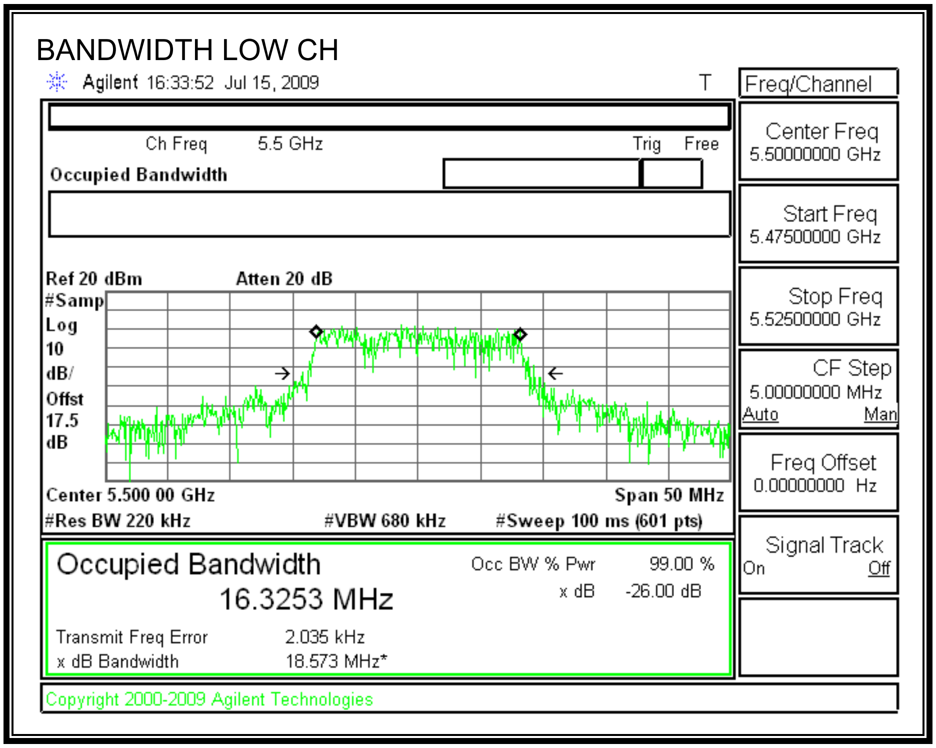
TEST PROCEDURE

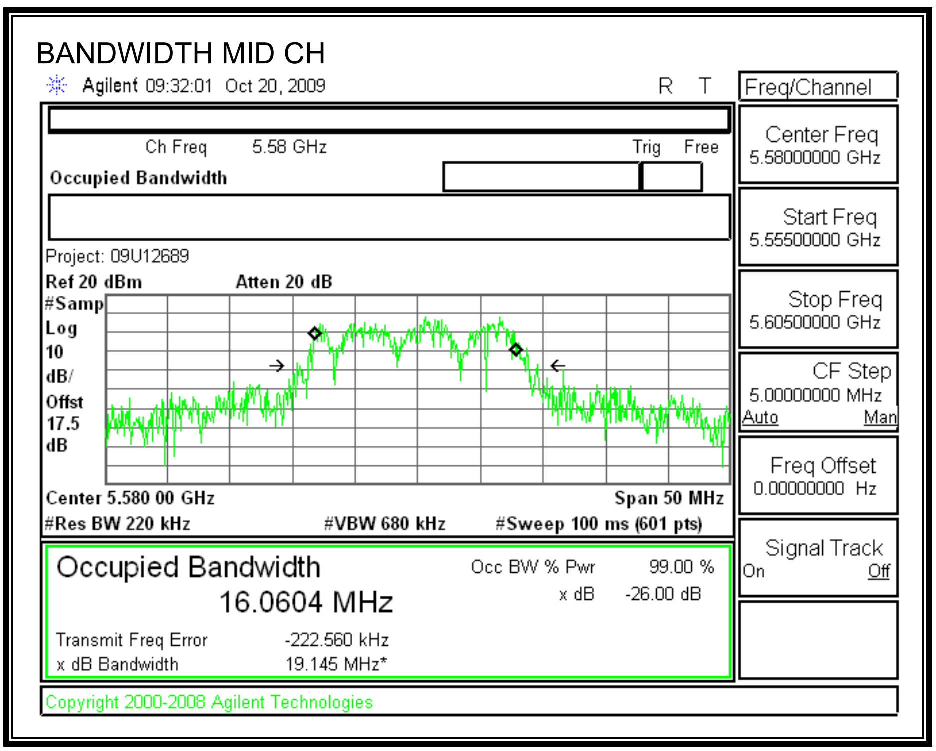
The transmitter outputs are connected to the spectrum analyzer via a combiner. The RBW is set to 1% to 3% of the measured bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

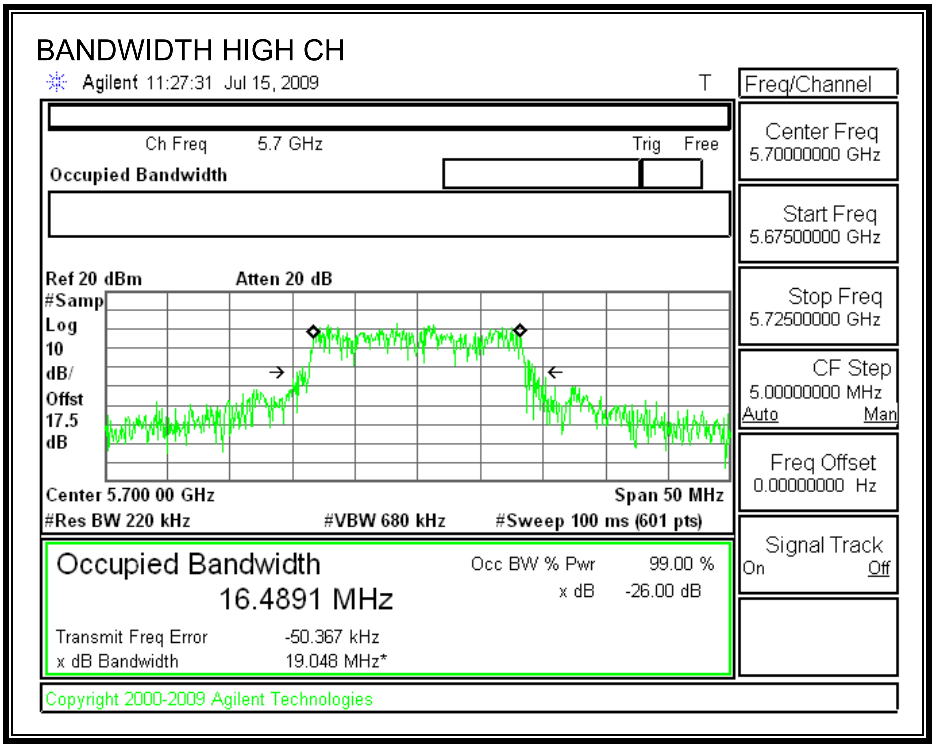
RESULTS

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

26 dB and 99% BANDWIDTH






BANDWIDTH HIGH CH
Agilent 11:27:31 Jul 15, 2009
T
Freq/Channel
Ch Freq 5.7 GHz
Trig Free
Occupied Bandwidth
Center Freq
5.70000000 GHz
Start Freq
5.67500000 GHz
Stop Freq
5.72500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Ref 20 dBm
Atten 20 dB
#Samp
Log
10
dB/
Offst
17.5
dB
Center 5.700 00 GHz
Span 50 MHz
#Res BW 220 kHz
#VBW 680 kHz
#Sweep 100 ms (601 pts)
Occupied Bandwidth
16.4891 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -50.367 kHz
x dB Bandwidth 19.048 MHz*
Copyright 2000-2009 Agilent Technologies

7.7.2. OUTPUT POWER

LIMITS

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

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

Antenna Gain (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (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

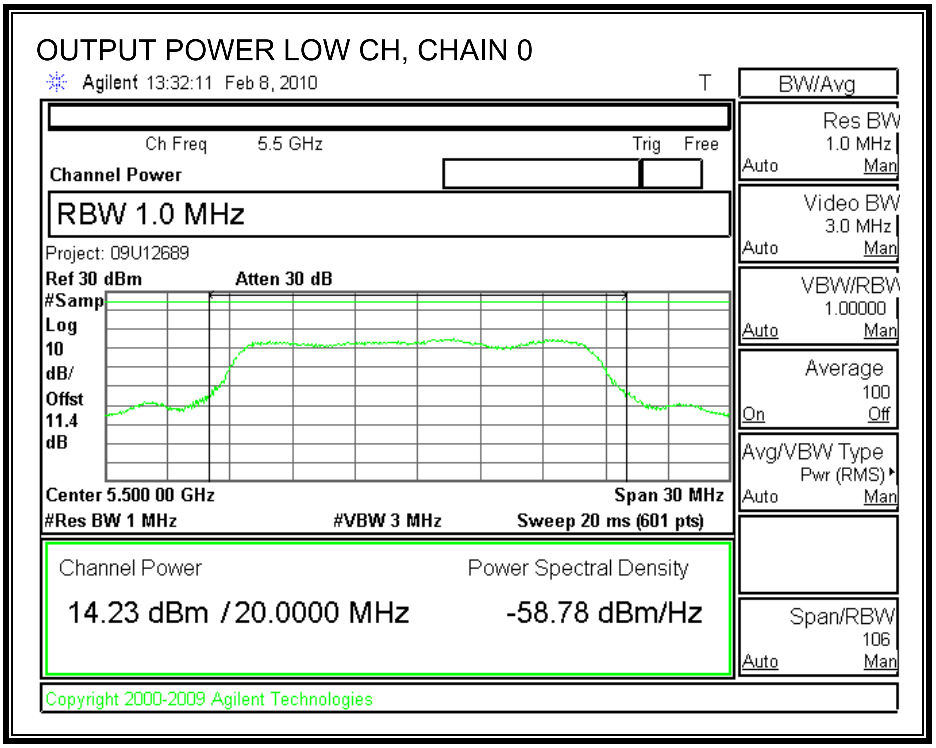
Limit

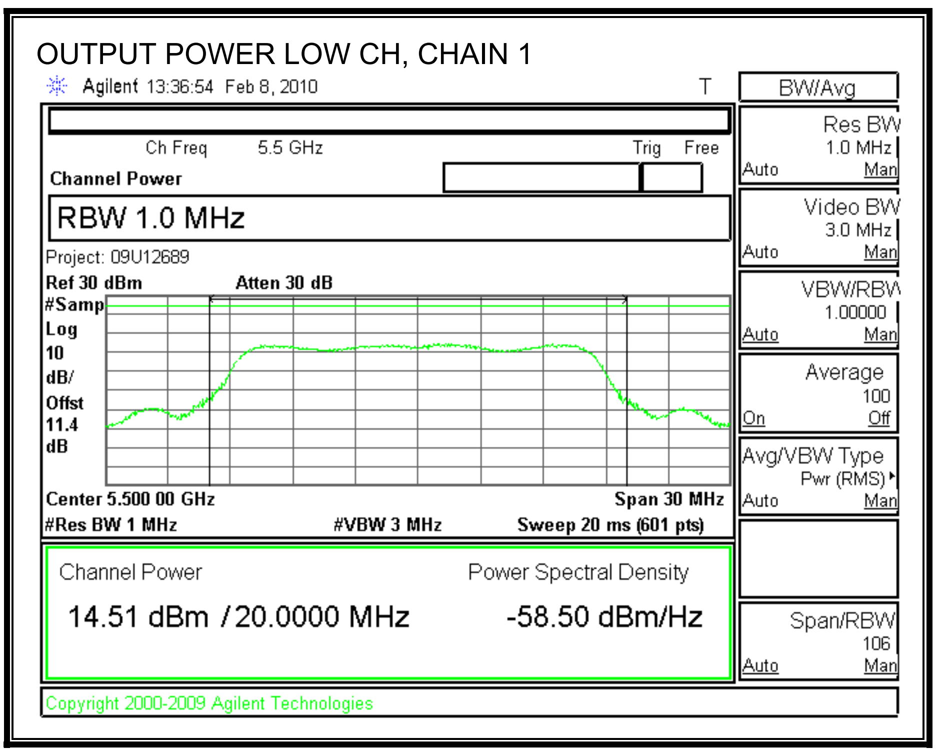
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Effective Ant Gain (dBi)	Limit (dBm)
Low	5500	24	18.573	23.69	6.01	23.68
Mid	5580	24	19.145	23.82	6.01	23.81
High	5700	24	19.048	23.80	6.01	23.79

Individual Chain Results

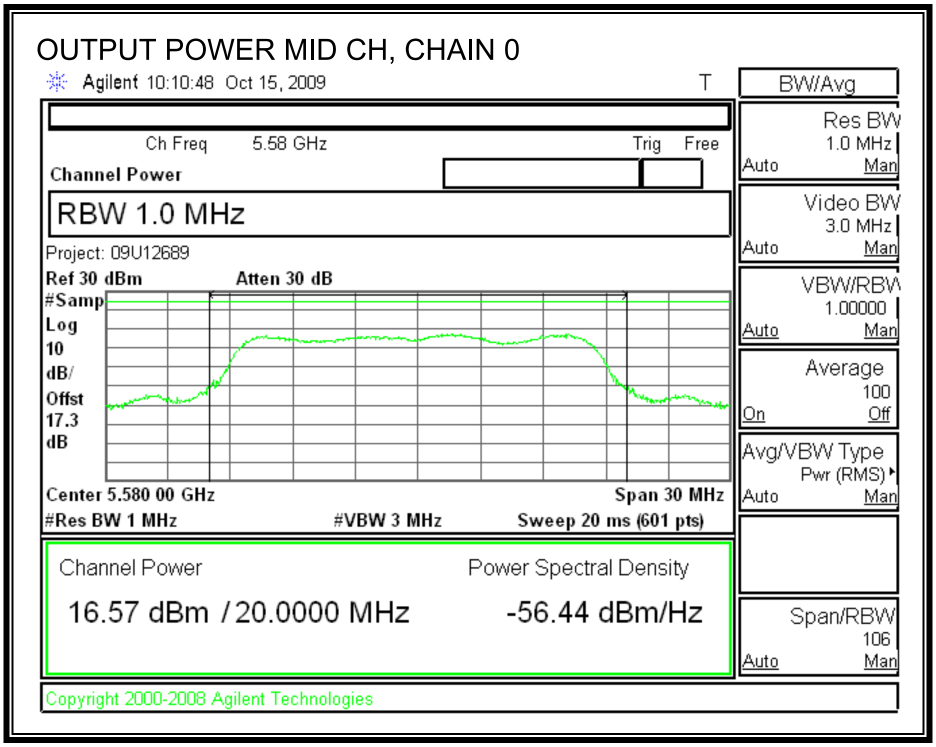
Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	14.23	14.51	17.38	23.68	-6.30
Mid	5580	16.57	16.92	19.76	23.81	-4.05
High	5700	13.13	13.23	16.19	23.79	-7.60

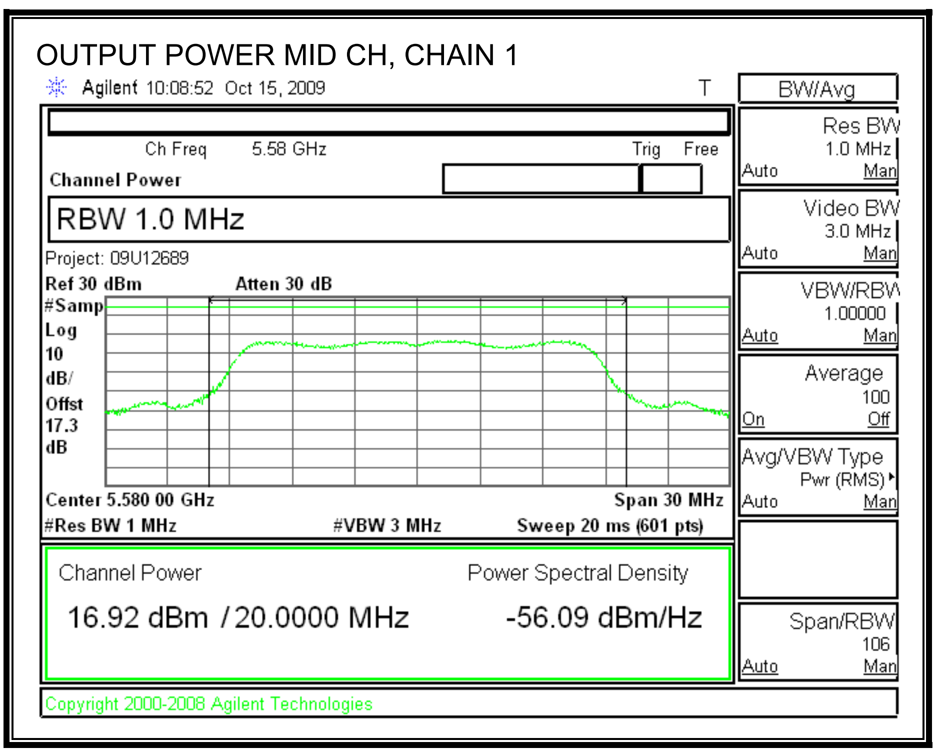
OUTPUT POWER, LOW CHANNEL



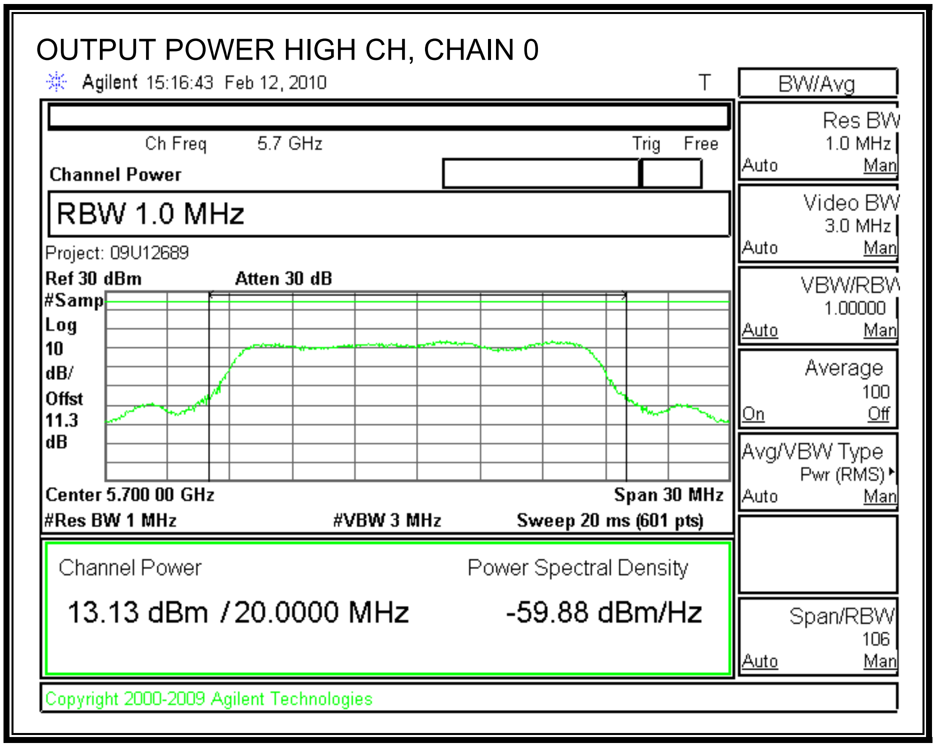


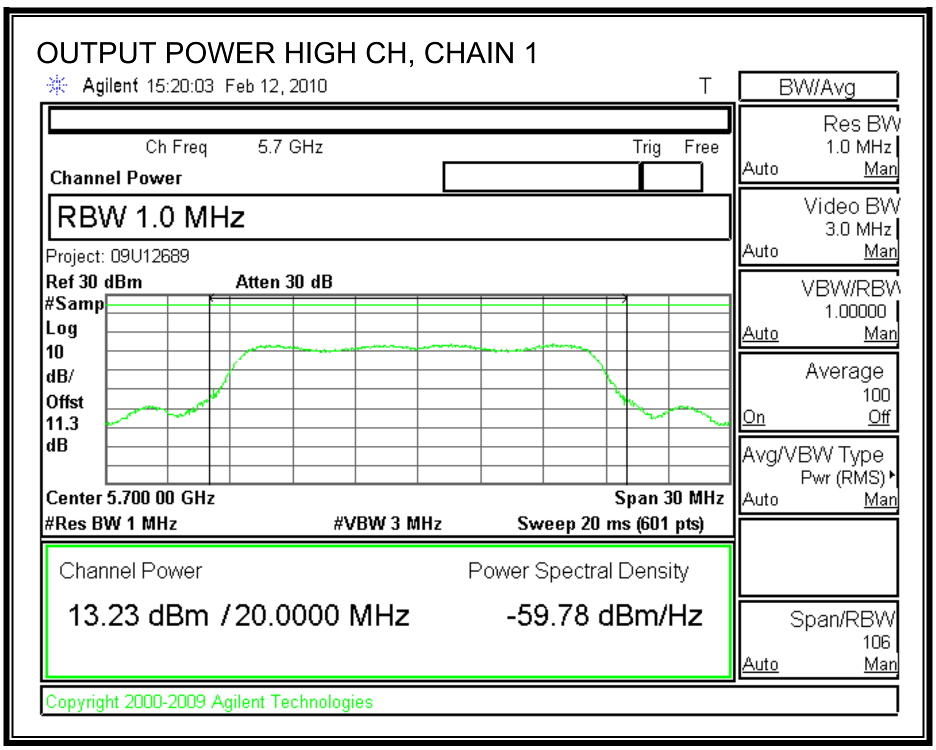
OUTPUT POWER, MID CHANNEL





OUTPUT POWER, HIGH CHANNEL





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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (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

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 (dBi)	10 Log (# Tx Chains) (dB)	Effective Legacy Gain (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 (MHz)	PPSD With Combiner (dBm)	Limit (dBm)	Margin (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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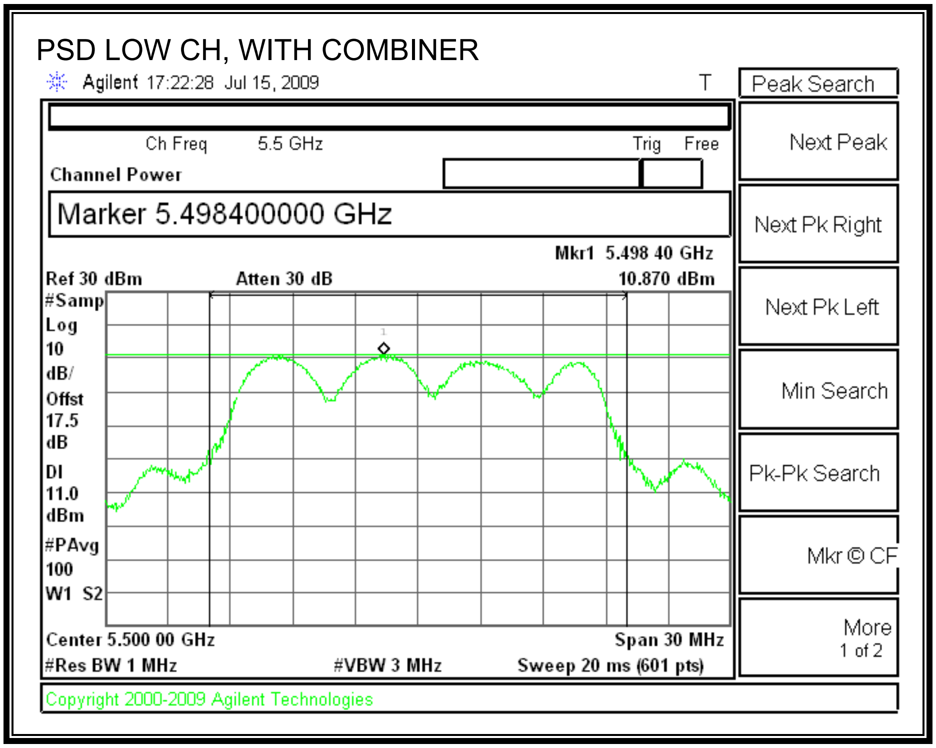
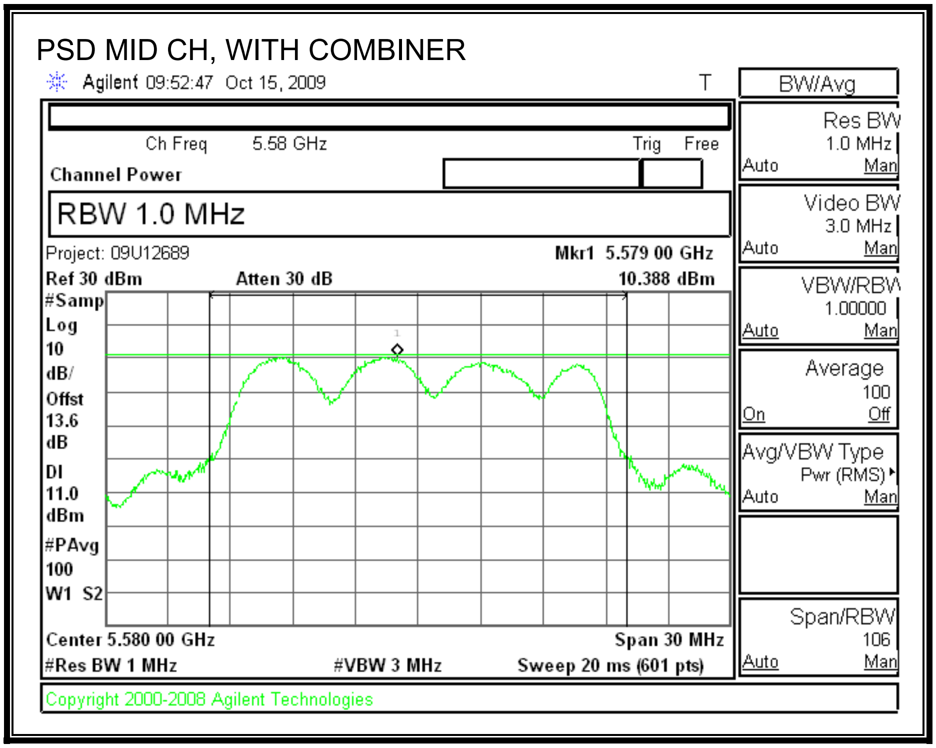
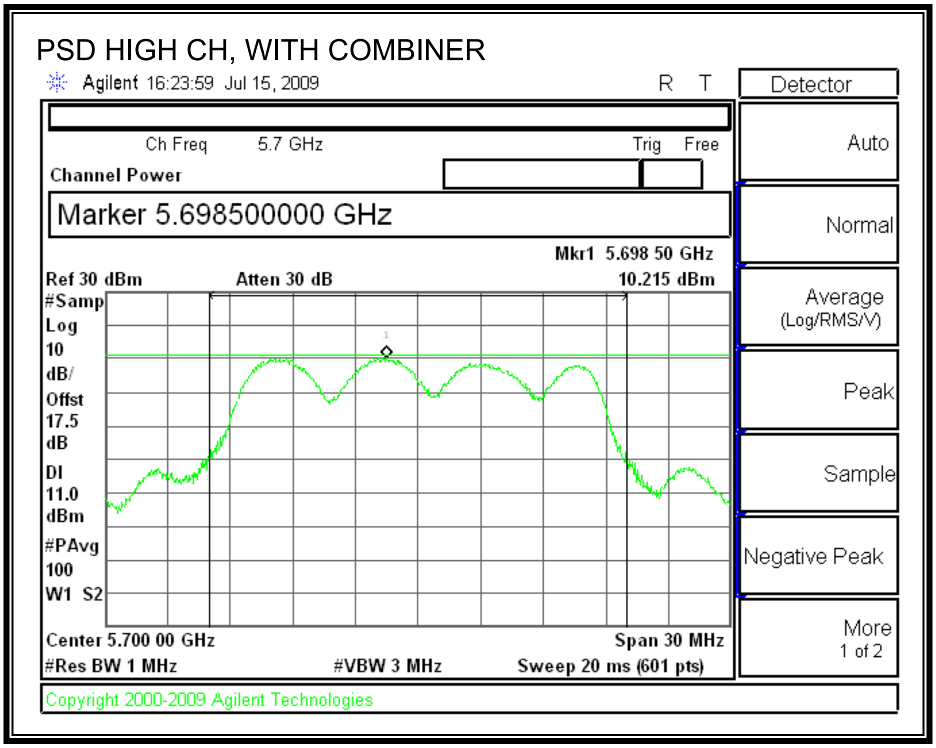
POWER SPECTRAL DENSITY WITH COMBINER






PSD HIGH CH, WITH COMBINER
Agilent 16:23:59 Jul 15, 2009
R T
Detector
Ch Freq 5.7 GHz
Trig Free
Channel Power
Marker 5.698500000 GHz
Mkr1 5.698 50 GHz
Ref 30 dBm
Atten 30 dB
10.215 dBm
#Samp
Log
10
dB/
Offst
17.5
dB
Dl
11.0
dBm
#PAvg
100
W1 S2
Center 5.700 00 GHz
Span 30 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
Auto
Normal
Average
(Log/RMS/V)
Peak
Sample
Negative Peak
More
1 of 2
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7.7.5. 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 (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (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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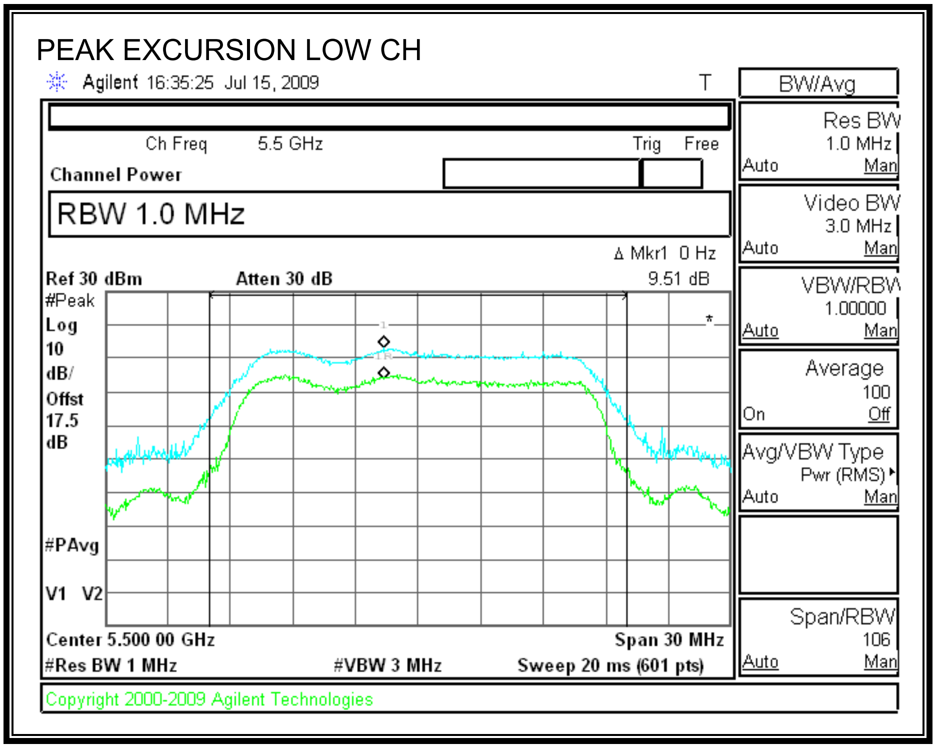
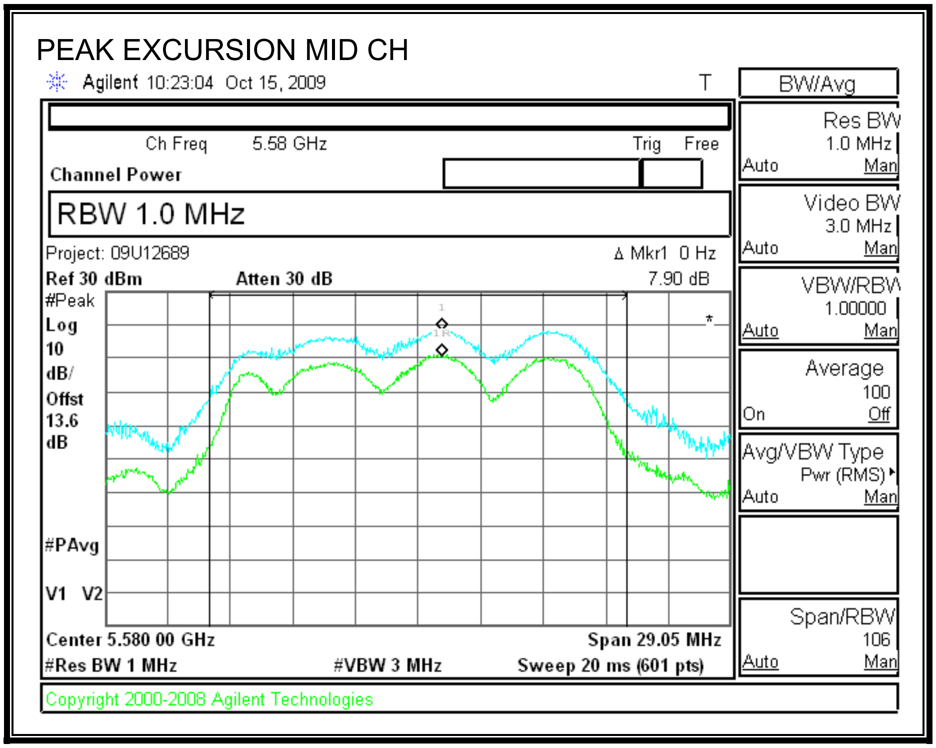
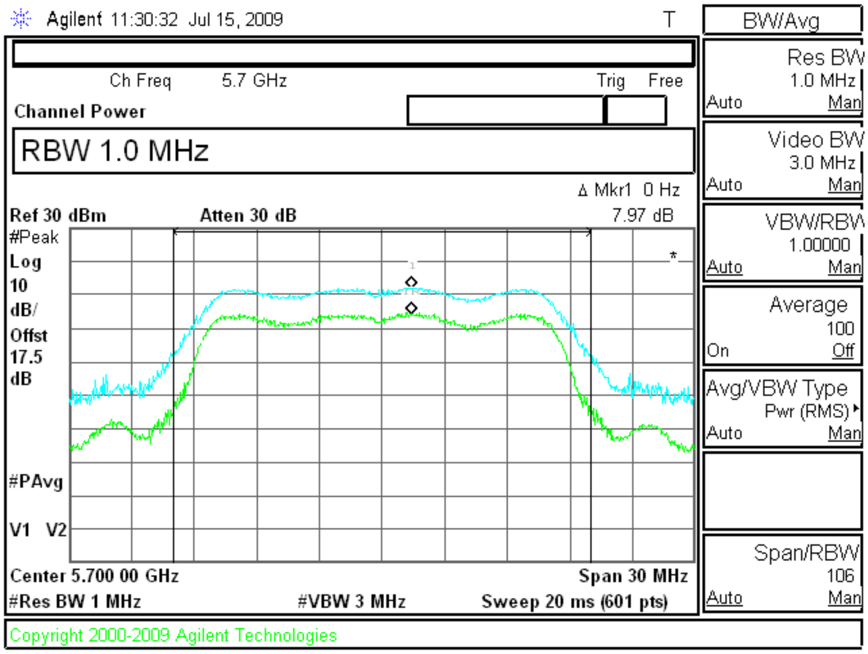
PEAK EXCURSION





PEAK EXCURSION HIGH CH



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

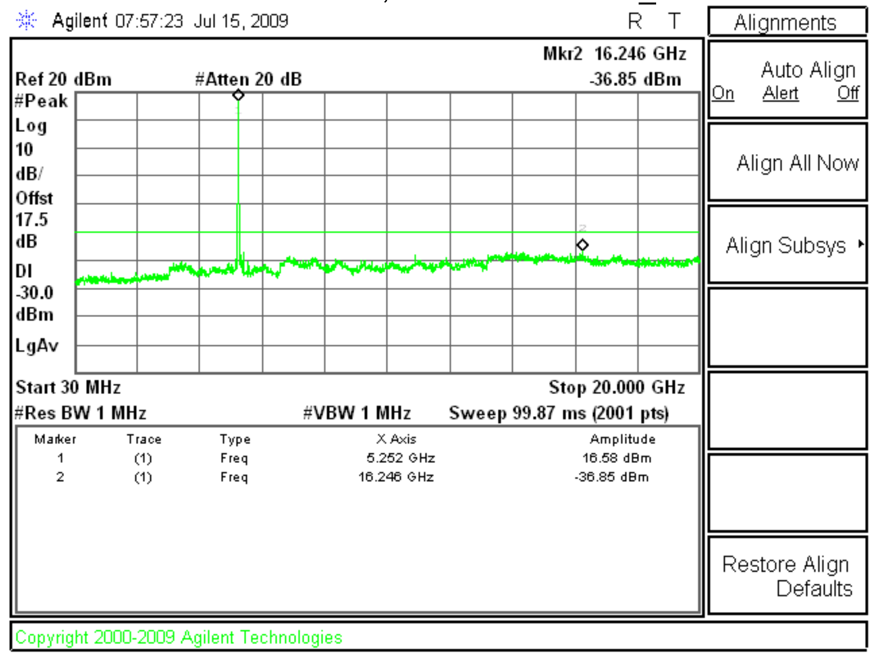
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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.

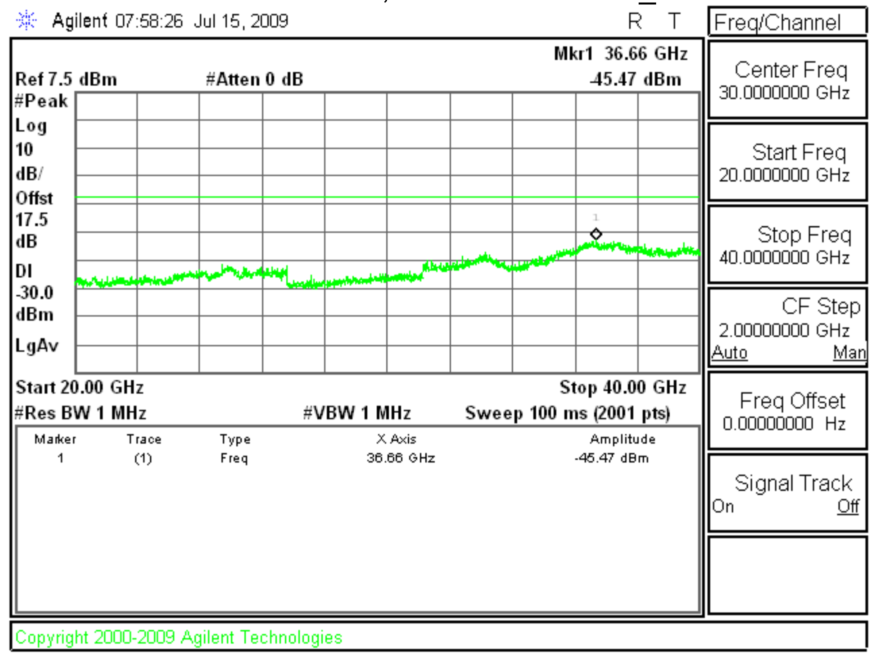
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

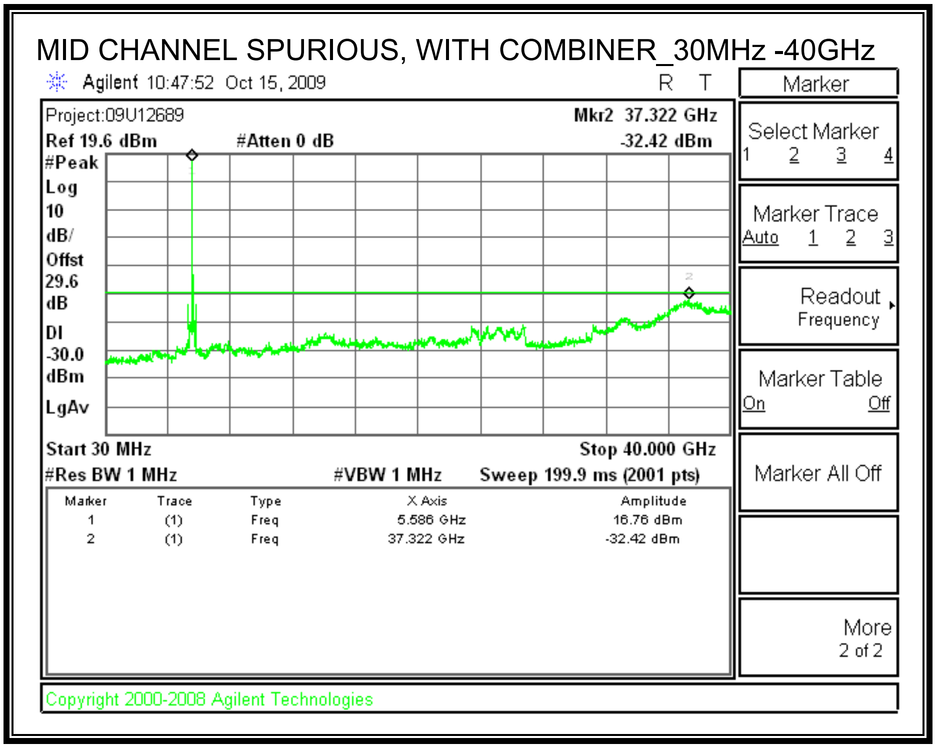
SPURIOUS EMISSIONS WITH COMBINER

LOW CHANNEL SPURIOUS, WITH COMBINER_30MHz -20GHz



LOW CHANNEL SPURIOUS, WITH COMBINER_20 - 40GHz




MID CHANNEL SPURIOUS, WITH COMBINER_30MHz -40GHz
Agilent 10:47:52 Oct 15, 2009
R T
Marker
Project:09U12689
Mkr2 37.322 GHz
Ref 19.6 dBm
#Atten 0 dB
-32.42 dBm
#Peak
Log
10
dB/
Offst
29.6
dB
Dl
-30.0
dBm
LgAv
Start 30 MHz
Stop 40.000 GHz
#Res BW 1 MHz
#VBW 1 MHz
Sweep 199.9 ms (2001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 5.586 GHz 16.76 dBm
2 (1) Freq 37.322 GHz -32.42 dBm
Select Marker
1 2 3 4
Marker Trace
Auto 1 2 3
Readout
Frequency
Marker Table
On Off
Marker All Off
More
2 of 2
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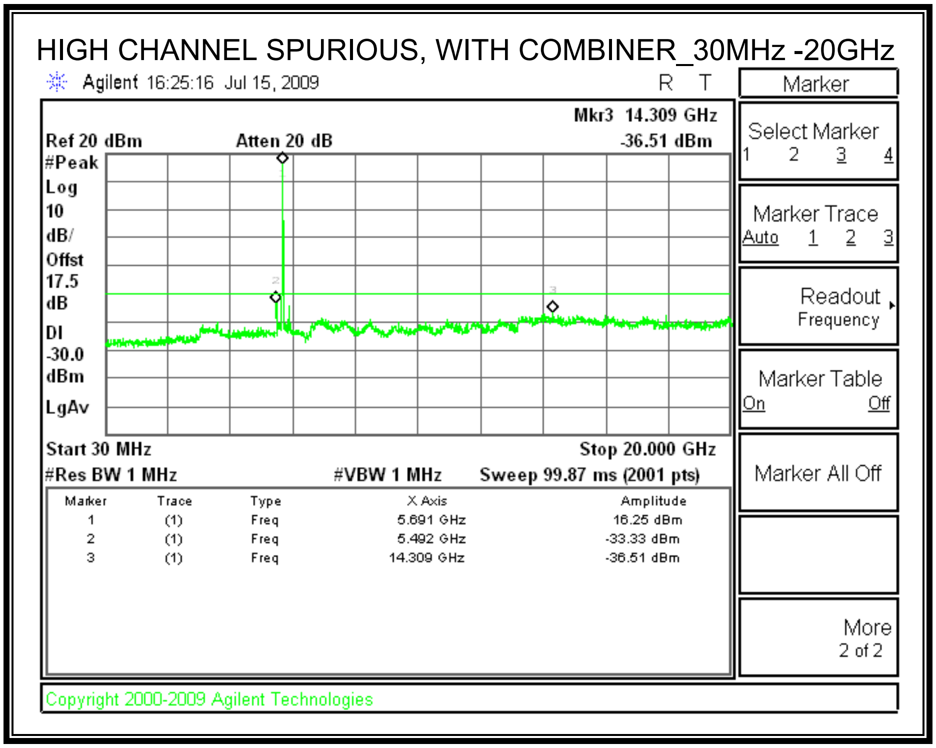
HIGH CHANNEL SPURIOUS, WITH COMBINER_30MHz -20GHz
Agilent 16:25:16 Jul 15, 2009
Mkr3 14.309 GHz
Ref 20 dBm Atten 20 dB -36.51 dBm
Start 30 MHz Stop 20.000 GHz
#Res BW 1 MHz #VBW 1 MHz Sweep 99.87 ms (2001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 5.691 GHz 16.25 dBm
2 (1) Freq 5.492 GHz -33.33 dBm
3 (1) Freq 14.309 GHz -36.51 dBm
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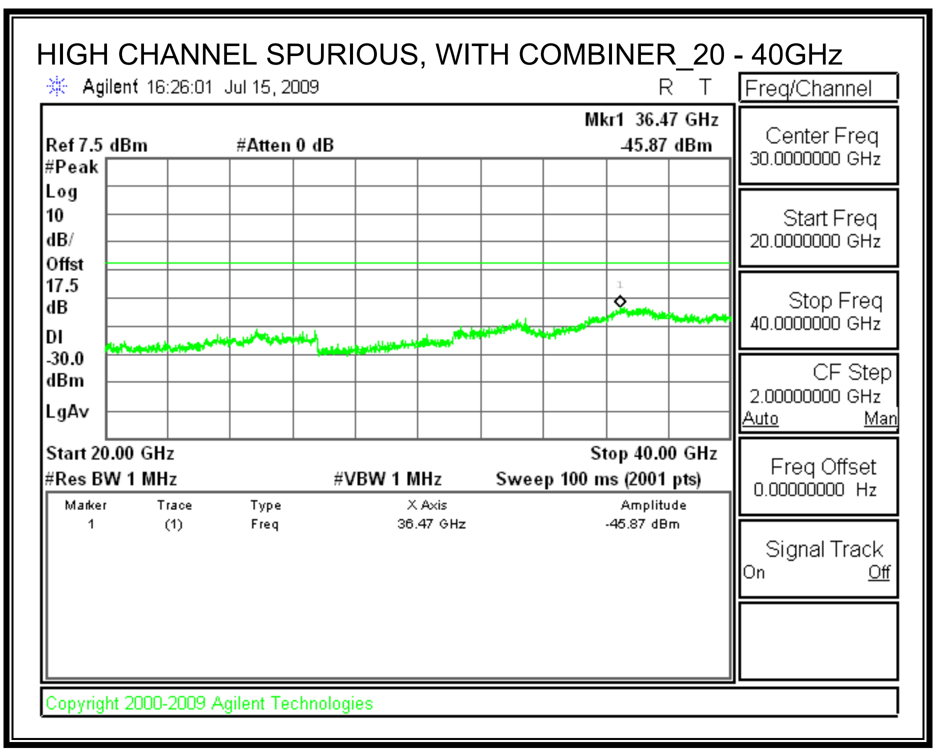
HIGH CHANNEL SPURIOUS, WITH COMBINER_20 - 40GHz
Agilent 16:26:01 Jul 15, 2009
Mkr1 36.47 GHz
Ref 7.5 dBm #Atten 0 dB -45.87 dBm
Start 20.00 GHz Stop 40.00 GHz
#Res BW 1 MHz #VBW 1 MHz Sweep 100 ms (2001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 36.47 GHz -45.87 dBm
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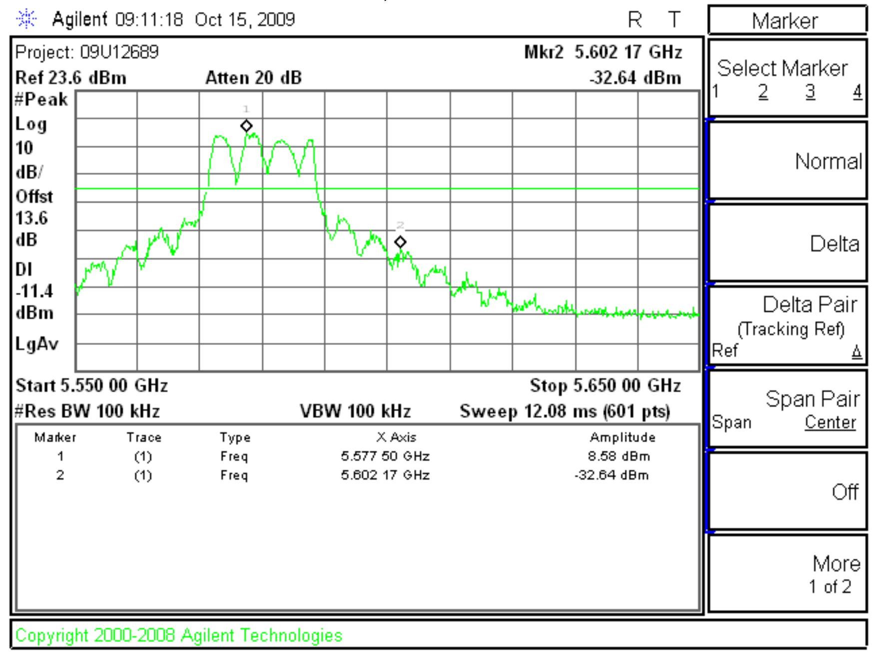
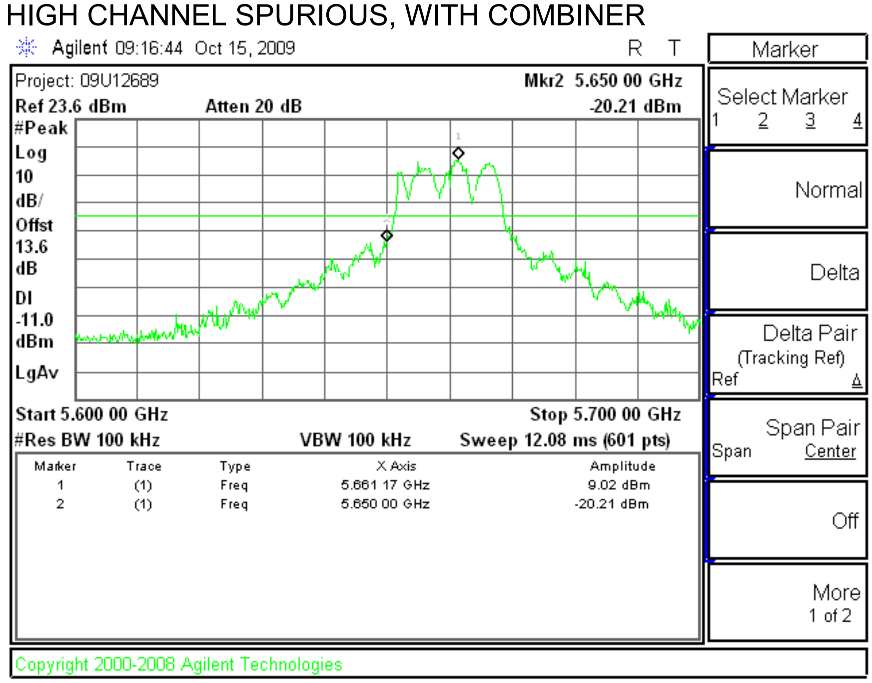
7.7.7. CONDUCTED SPURIOUS (-20 dBc)

LOW CHANNEL SPURIOUS, WITH COMBINER



HIGH CHANNEL SPURIOUS, WITH COMBINER



7.8. 5.6 GHz BAND CHANNEL TESTS FOR 802.11HT20 MODE

7.8.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

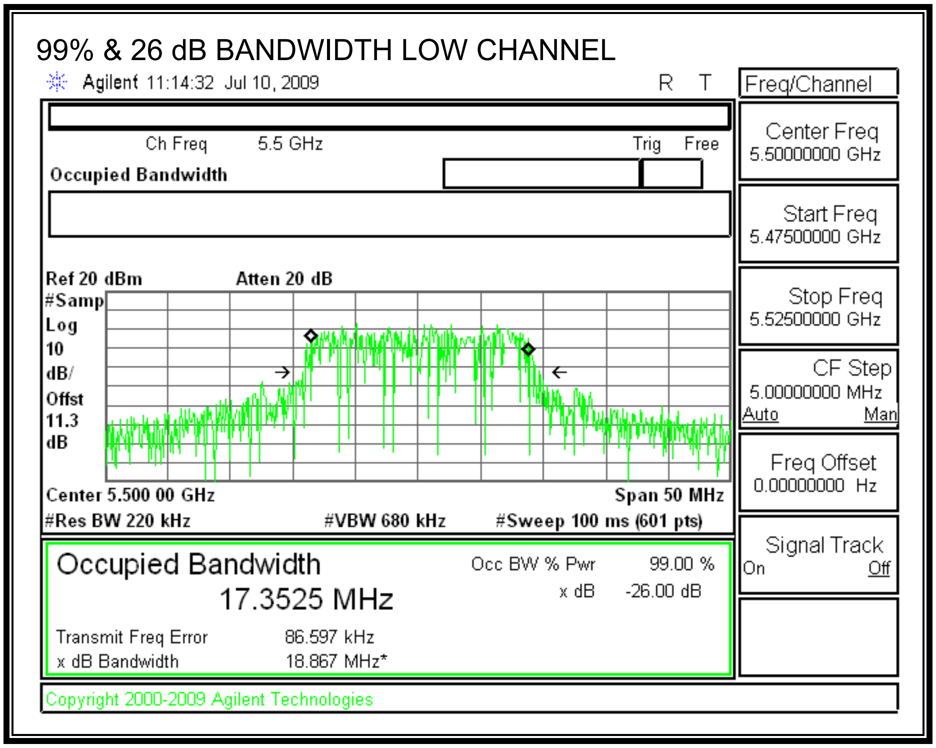
TEST PROCEDURE

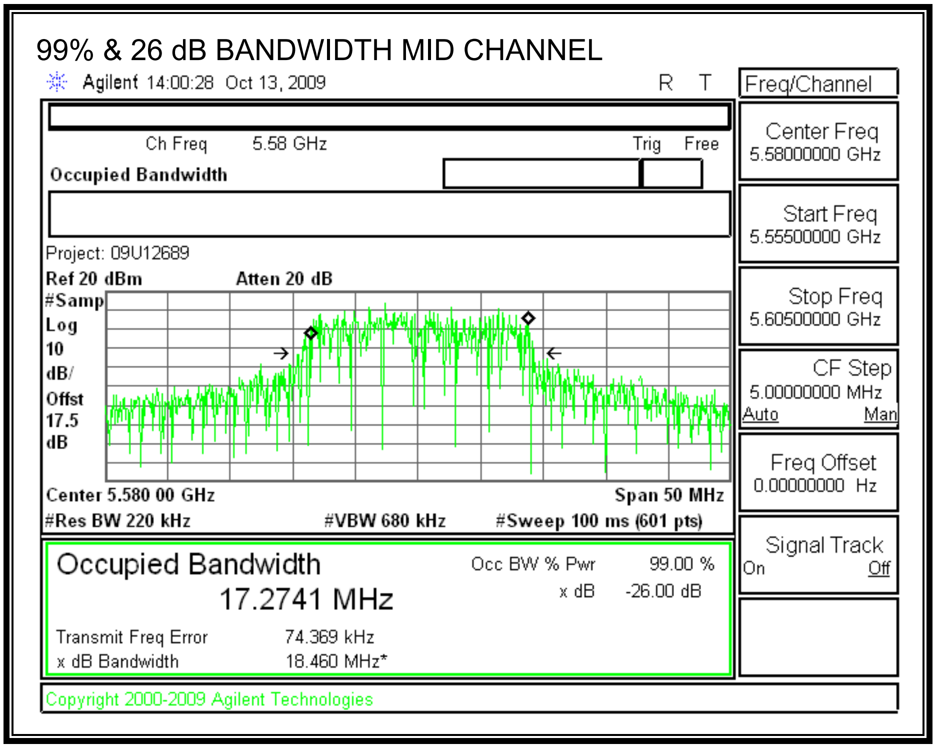
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

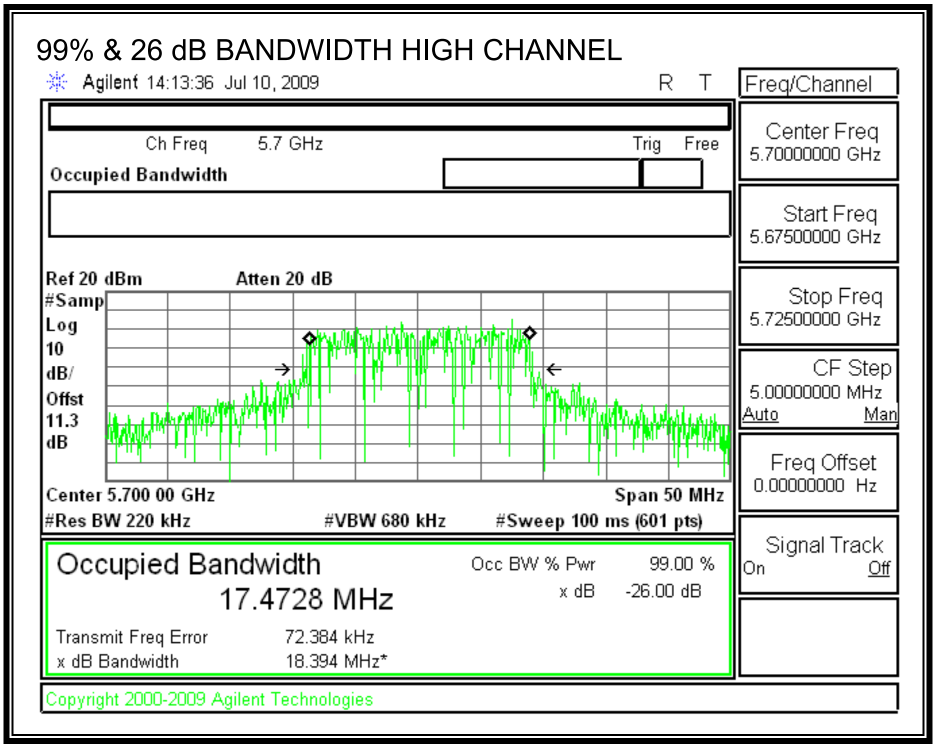
RESULTS

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

99% & 26 dB BANDWIDTH






99% & 26 dB BANDWIDTH HIGH CHANNEL
Agilent 14:13:36 Jul 10, 2009
R T
Freq/Channel
Ch Freq 5.7 GHz
Trig Free
Occupied Bandwidth
Center Freq
5.70000000 GHz
Start Freq
5.67500000 GHz
Ref 20 dBm
Atten 20 dB
#Samp
Log
10
dB/
Offst
11.3
dB
Stop Freq
5.72500000 GHz
CF Step
5.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Center 5.700 00 GHz
Span 50 MHz
#Res BW 220 kHz
#VBW 680 kHz
#Sweep 100 ms (601 pts)
Signal Track
On Off
Occupied Bandwidth
17.4728 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 72.384 kHz
x dB Bandwidth 18.394 MHz*
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7.8.2. OUTPUT POWER

LIMITS

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

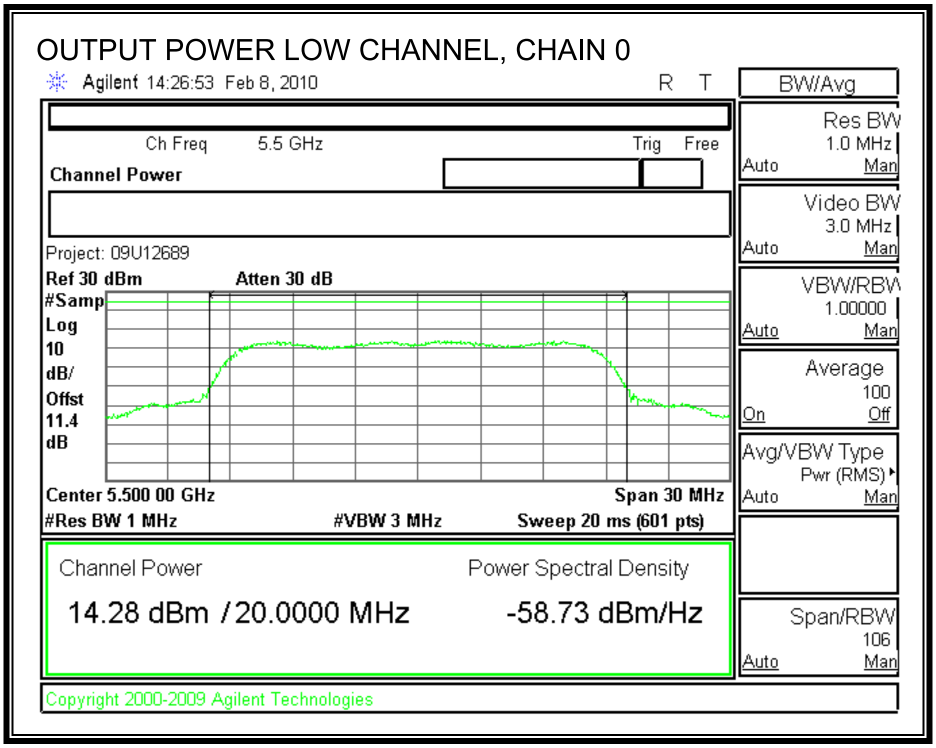
Limit

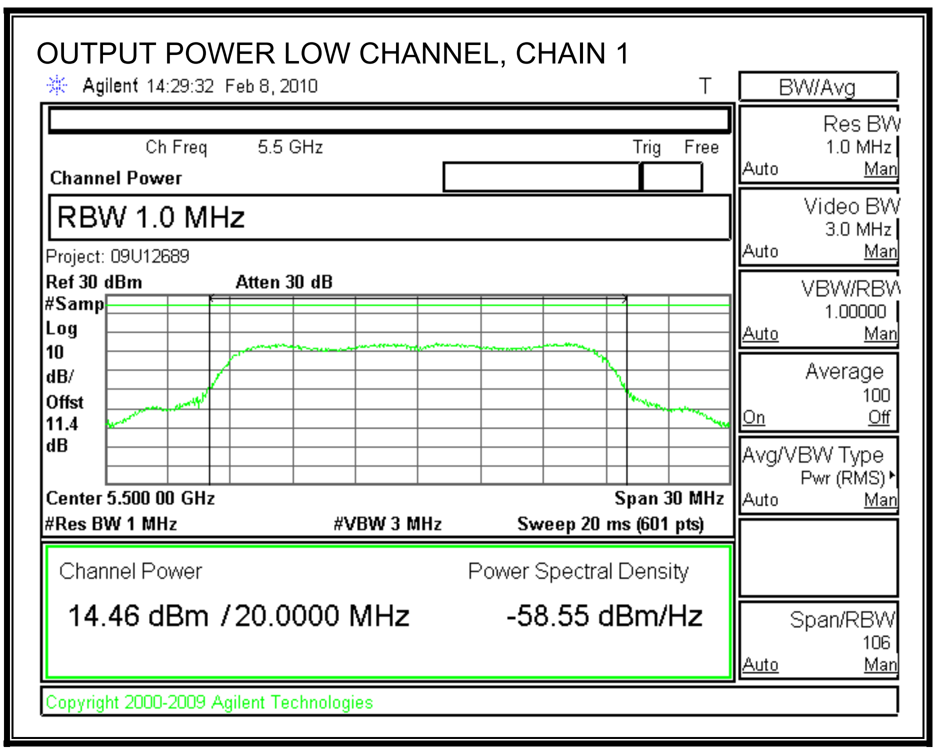
Channel	Freq (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Low	5500	24	18.867	23.76	3	23.76
Mid	5580	24	18.460	23.66	3	23.66
High	5700	24	18.394	23.65	3	23.65

Individual Chain Results

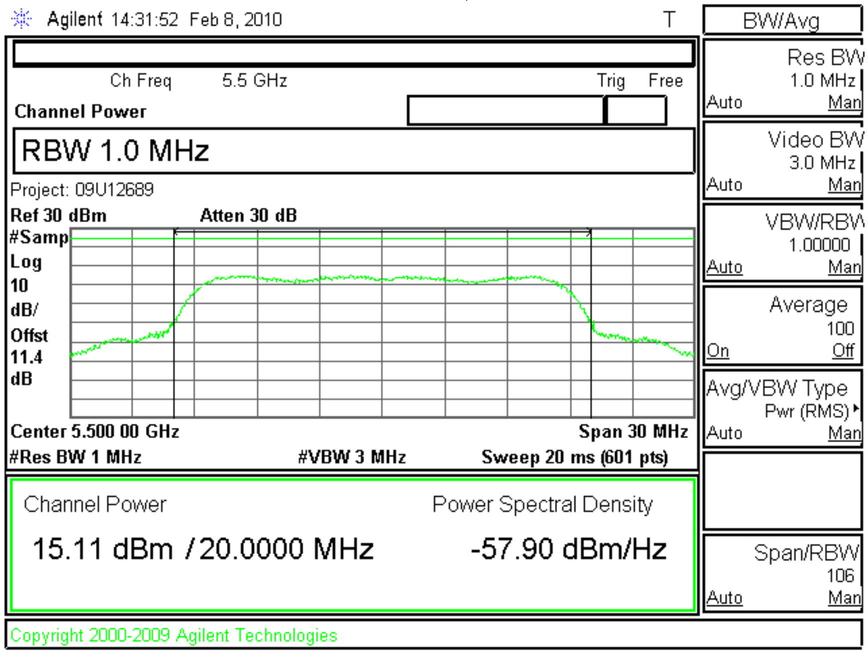
Channel	Freq (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (dB)
Low	5500	14.28	14.46	15.11	14.43	20.60	23.76	-3.15
Mid	5580	13.19	14.55	14.58	13.38	19.99	23.66	-3.67
High	5700	12.46	13.54	13.31	13.22	19.17	23.65	-4.48

OUTPUT POWER, LOW CHANNEL

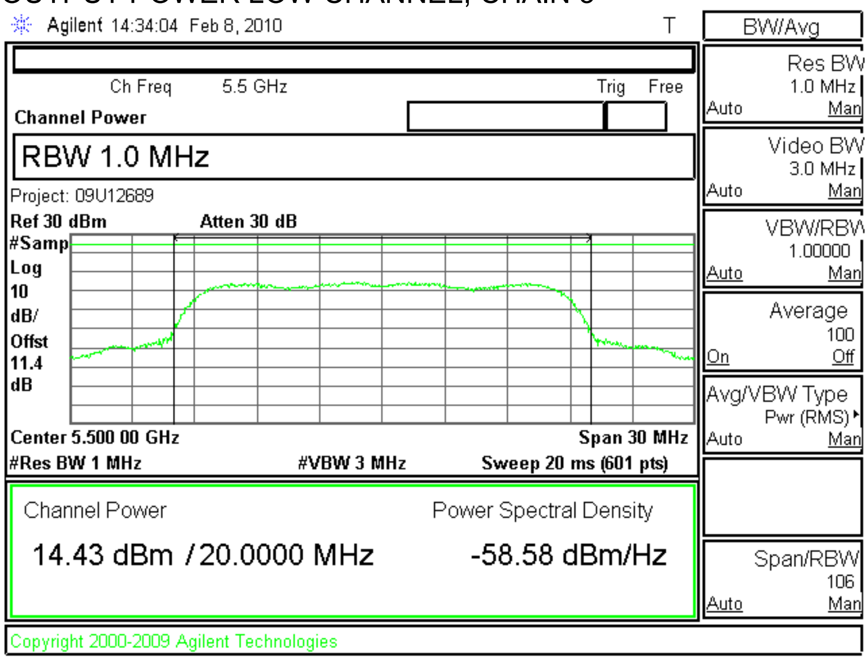




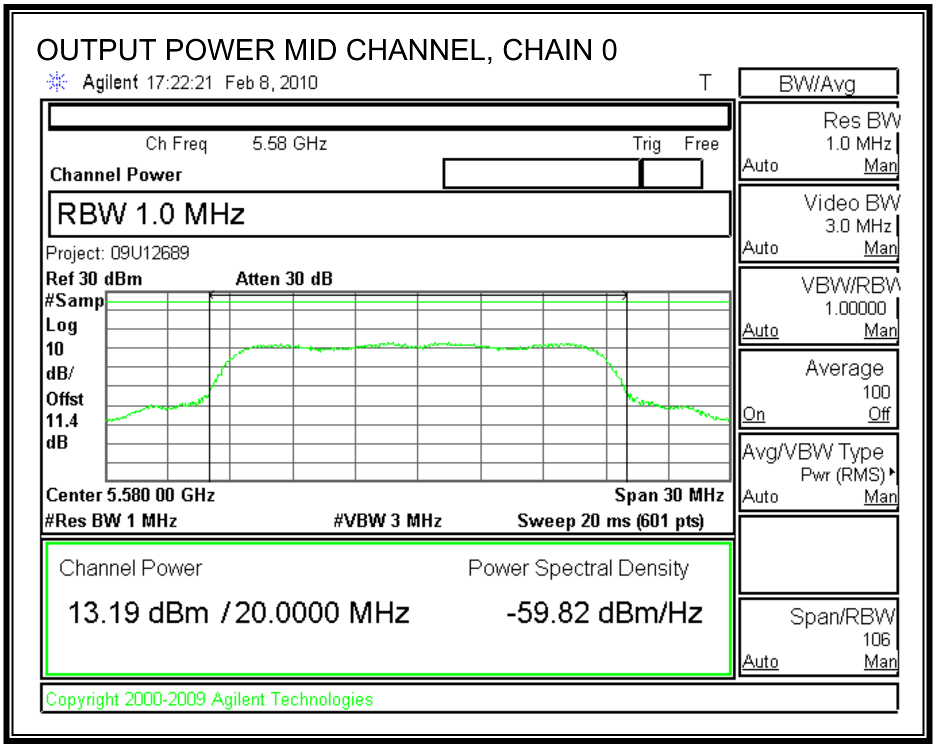
OUTPUT POWER LOW CHANNEL, CHAIN 2

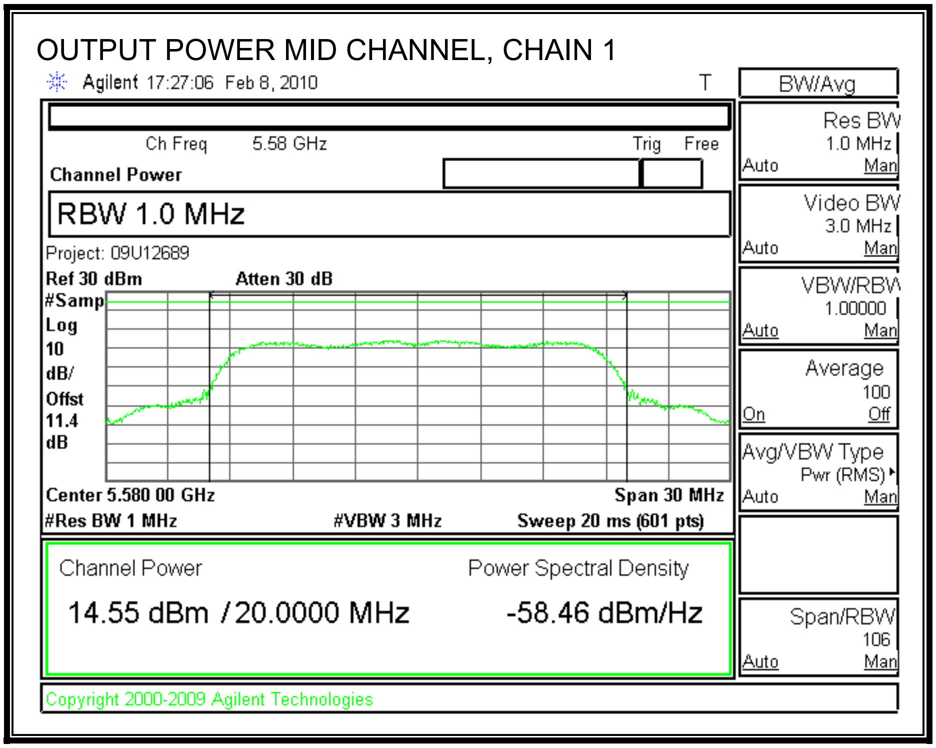


OUTPUT POWER LOW CHANNEL, CHAIN 3

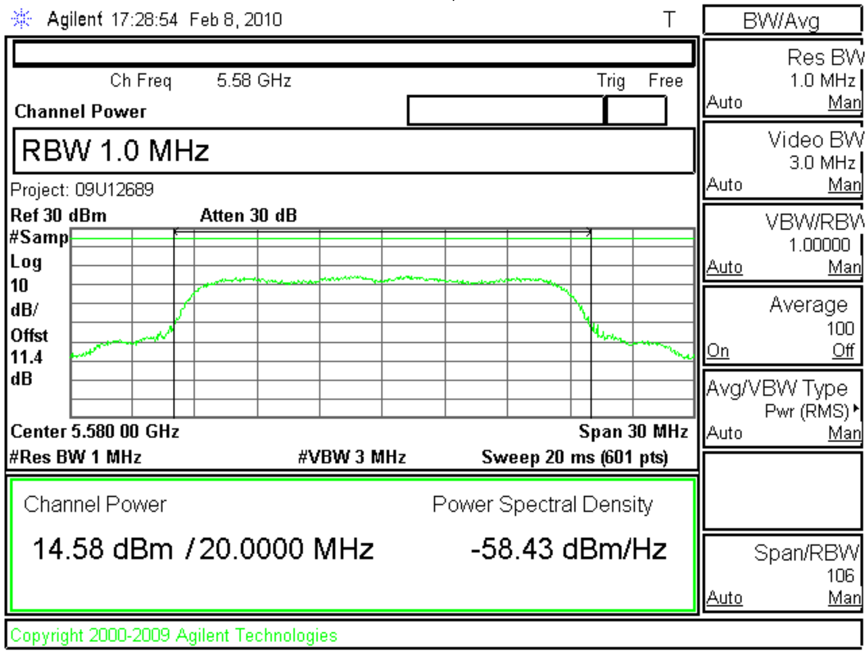


OUTPUT POWER, MID CHANNEL

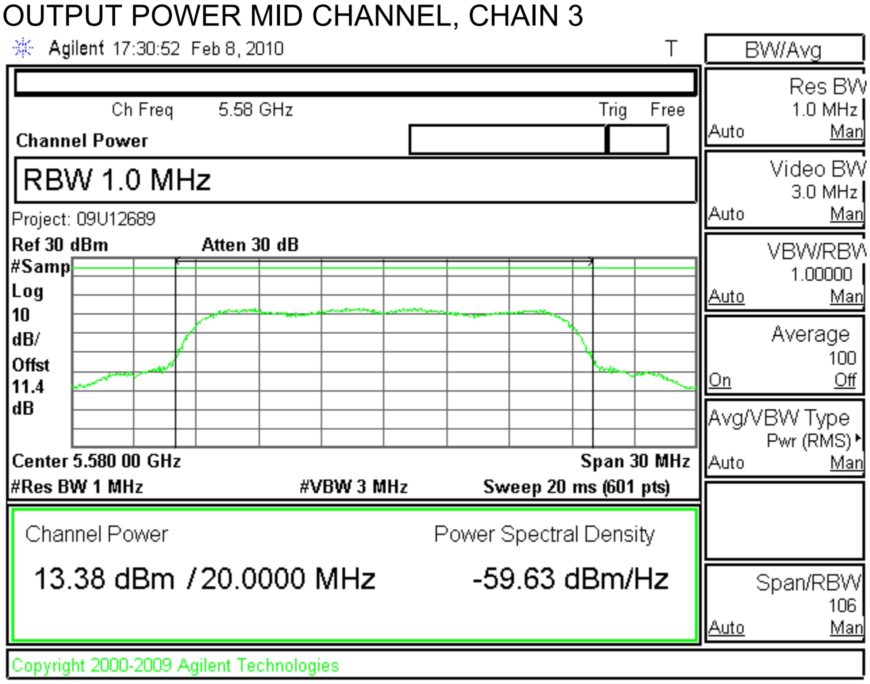




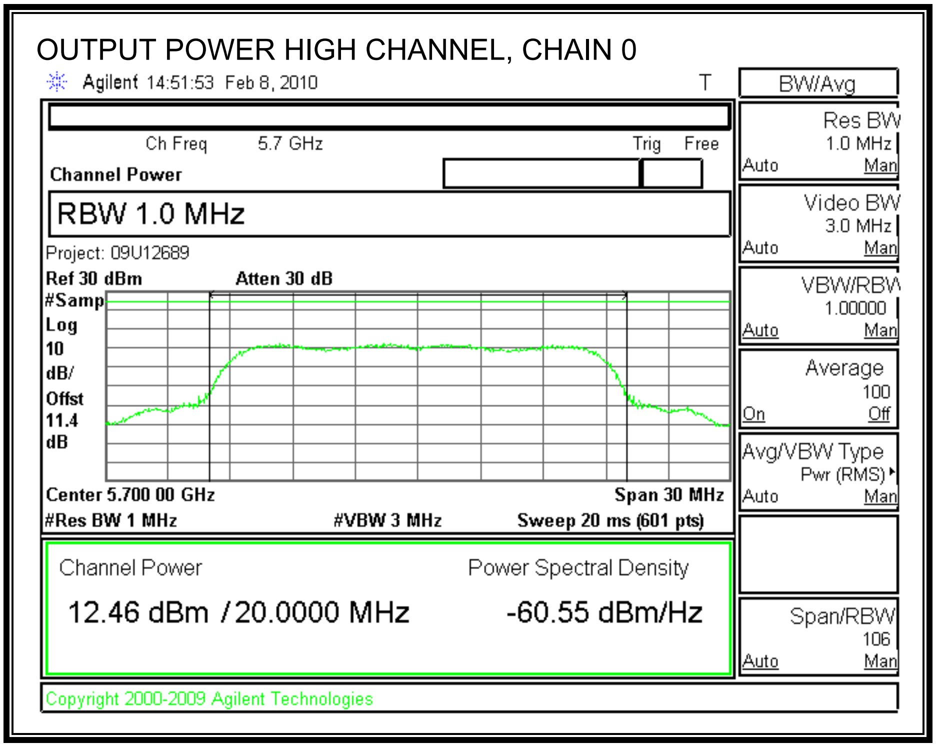
OUTPUT POWER MID CHANNEL, CHAIN 2

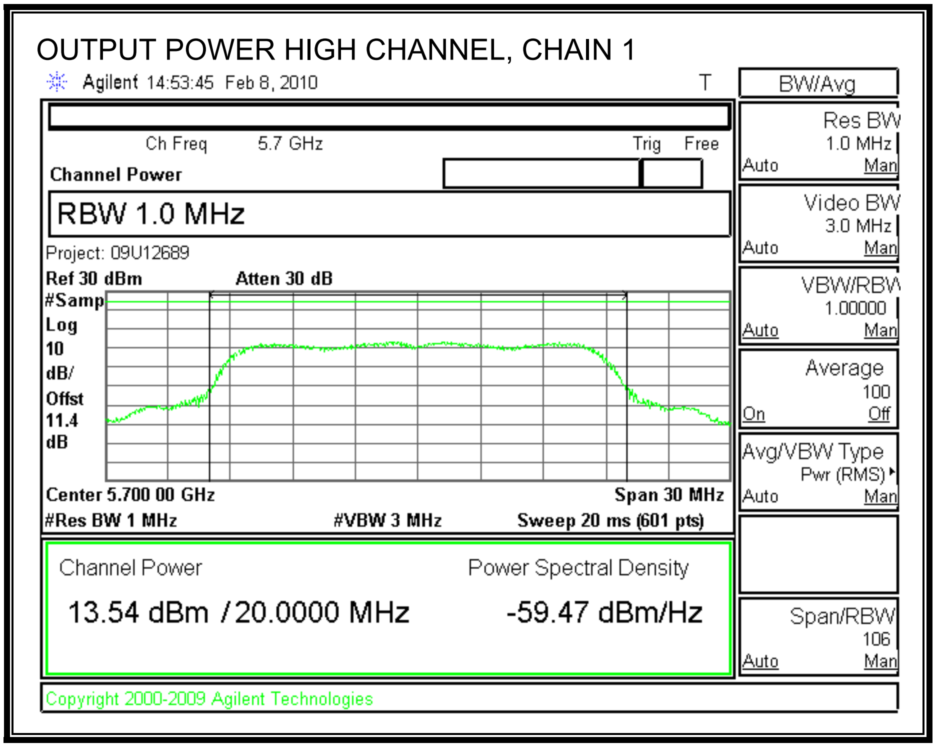


OUTPUT POWER MID CHANNEL, CHAIN 3

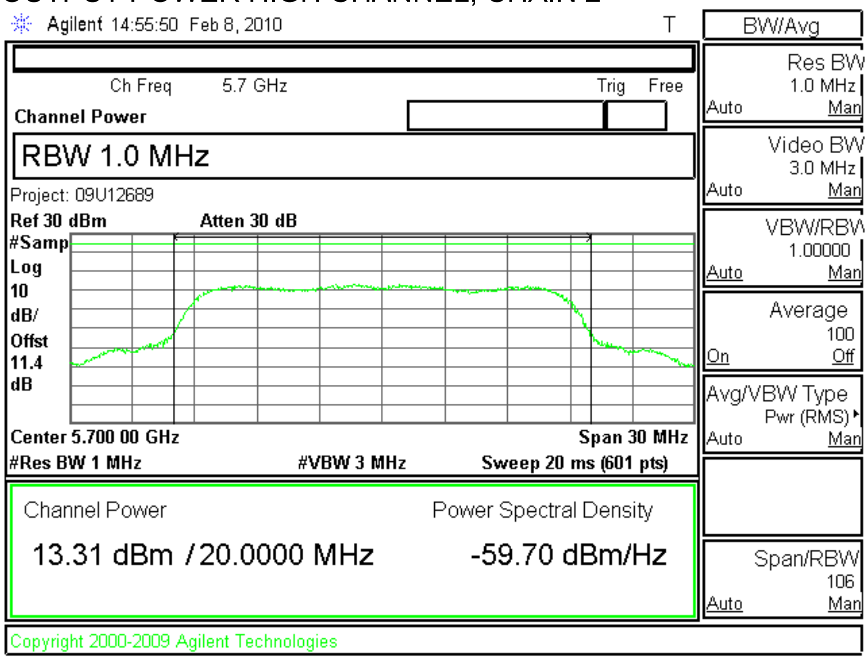


OUTPUT POWER, HIGH CHANNEL

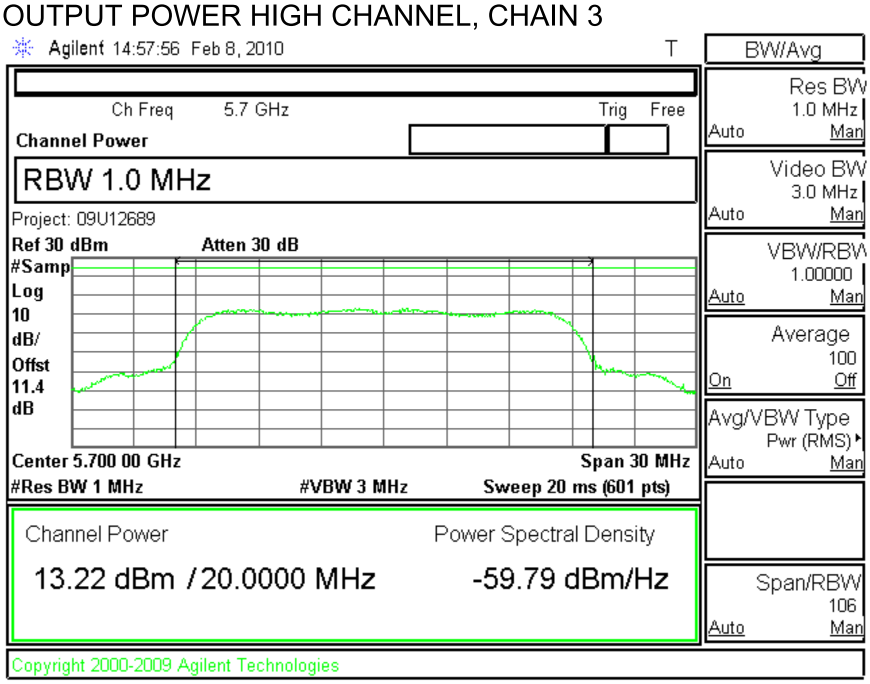




OUTPUT POWER HIGH CHANNEL, CHAIN 2



OUTPUT POWER HIGH CHANNEL, CHAIN 3



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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (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.

RESULTS

Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (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

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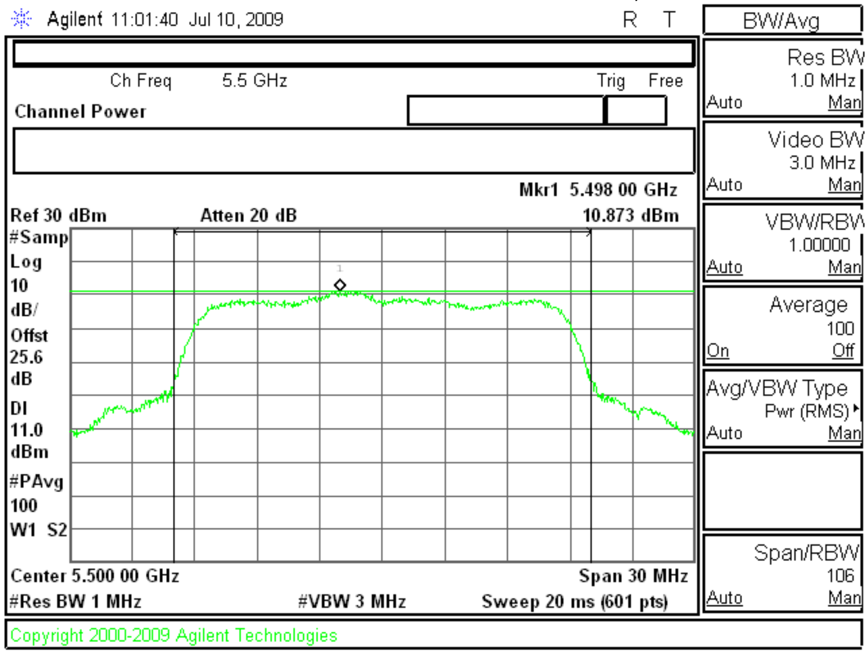
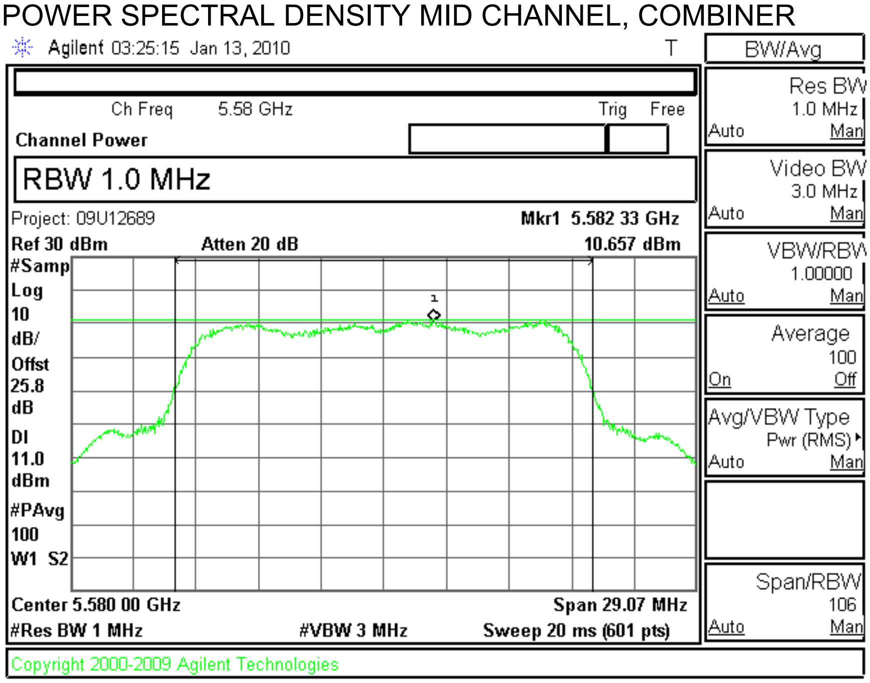
POWER SPECTRAL DENSITY

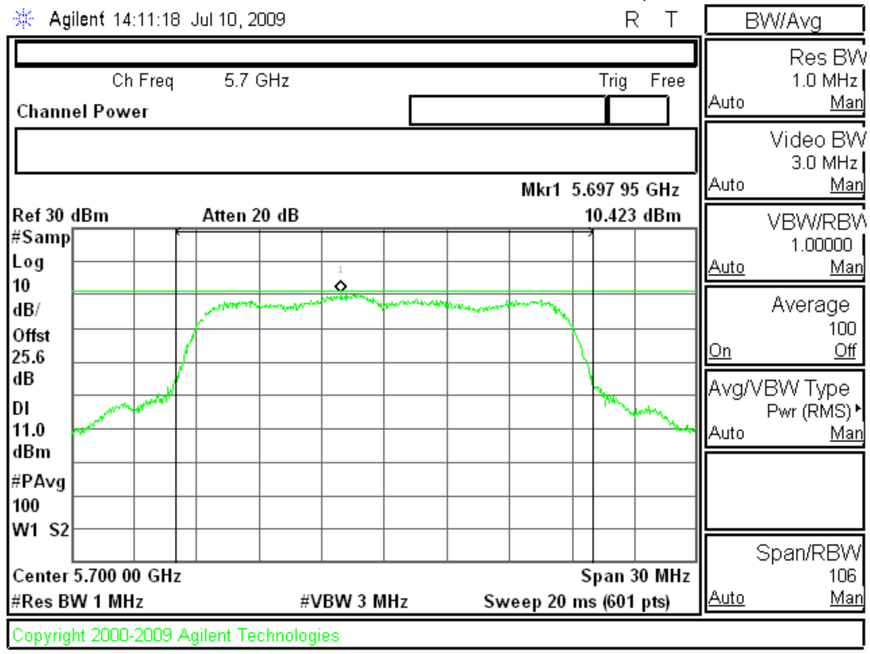
POWER SPECTRAL DENSITY LOW CHANNEL, COMBINER



POWER SPECTRAL DENSITY MID CHANNEL, COMBINER



POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER



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.

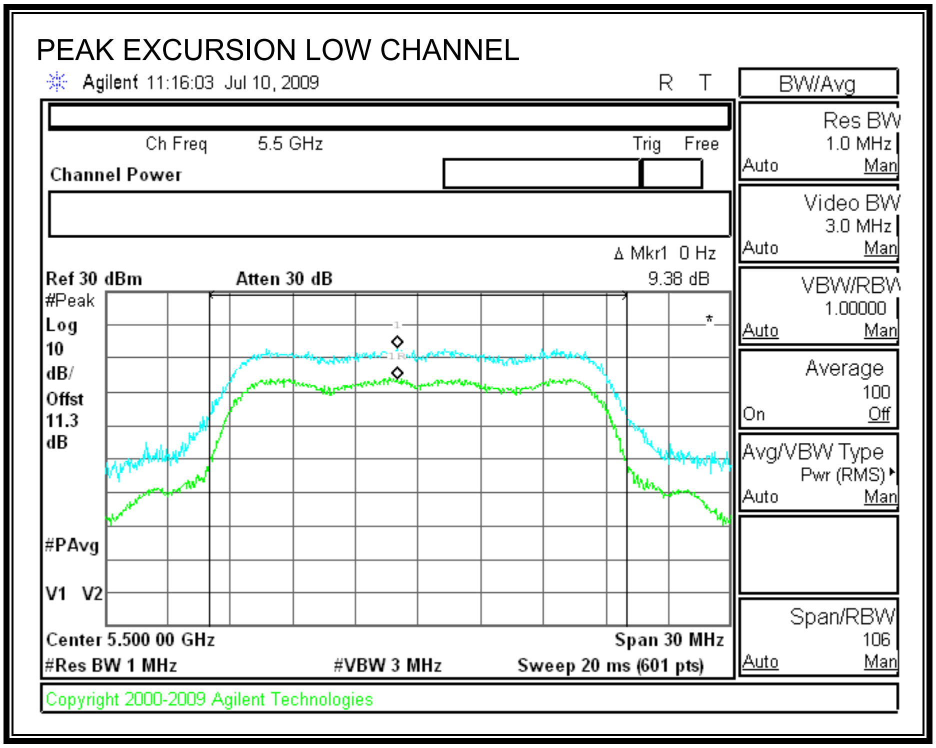
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

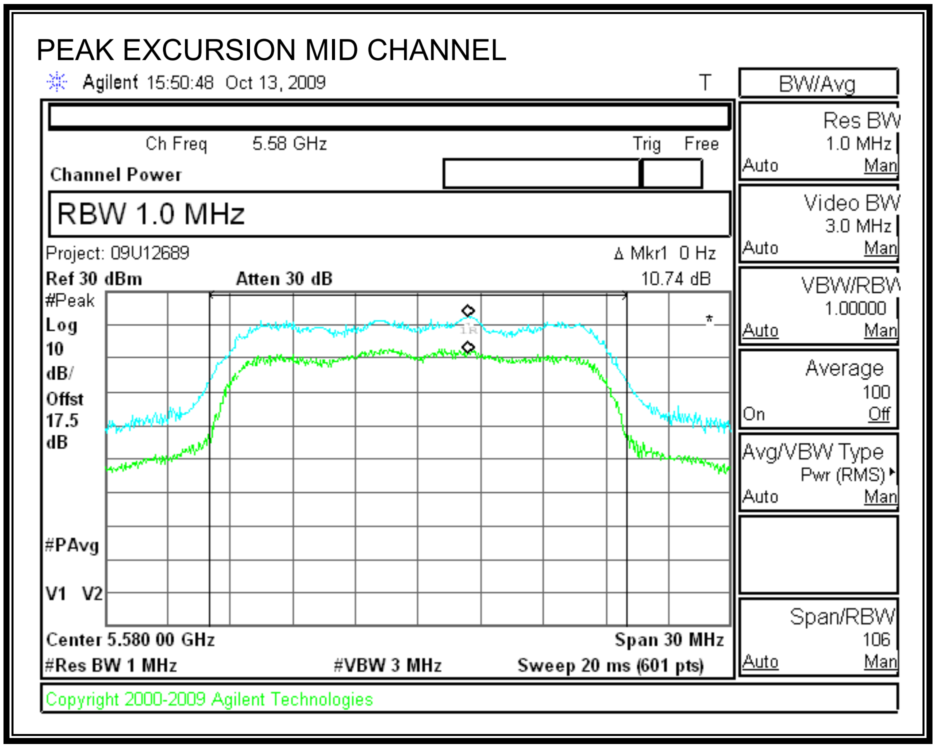
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

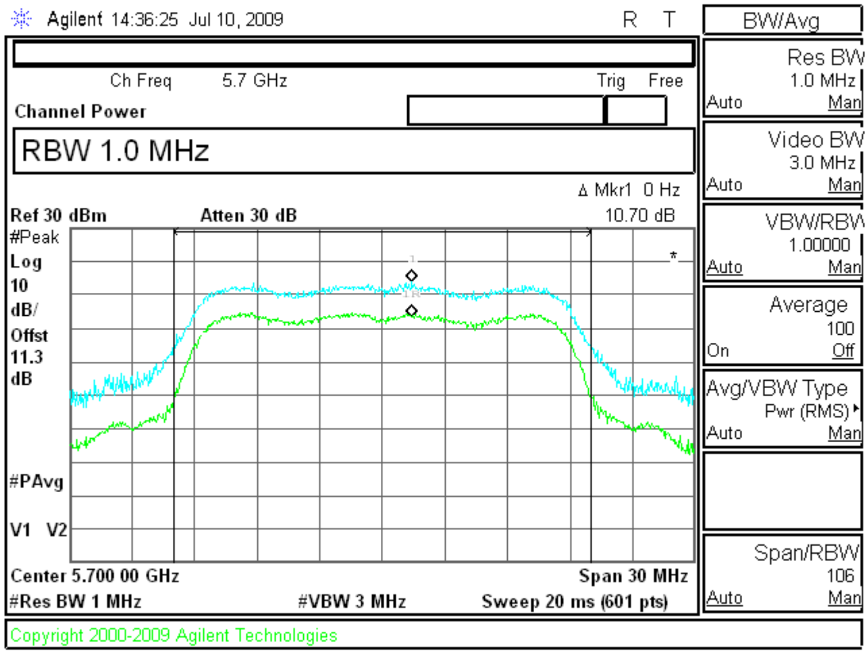
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5500	9.38	13	-3.62
Middle	5580	10.74	13	-2.26
High	5700	10.70	13	-2.30

PEAK EXCURSION





PEAK EXCURSION HIGH CHANNEL



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

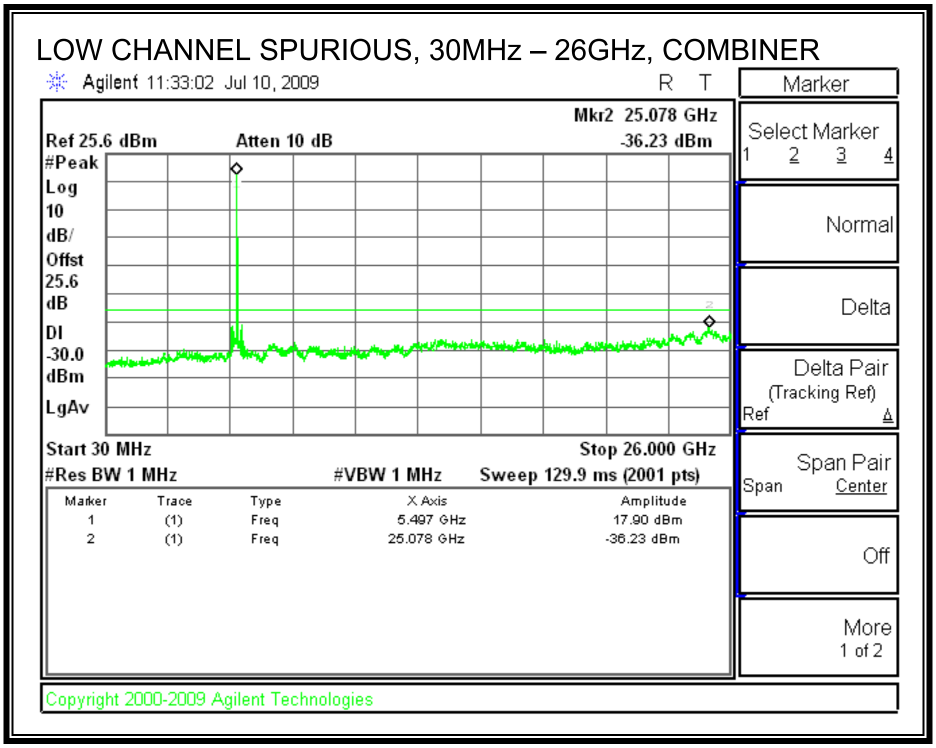
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

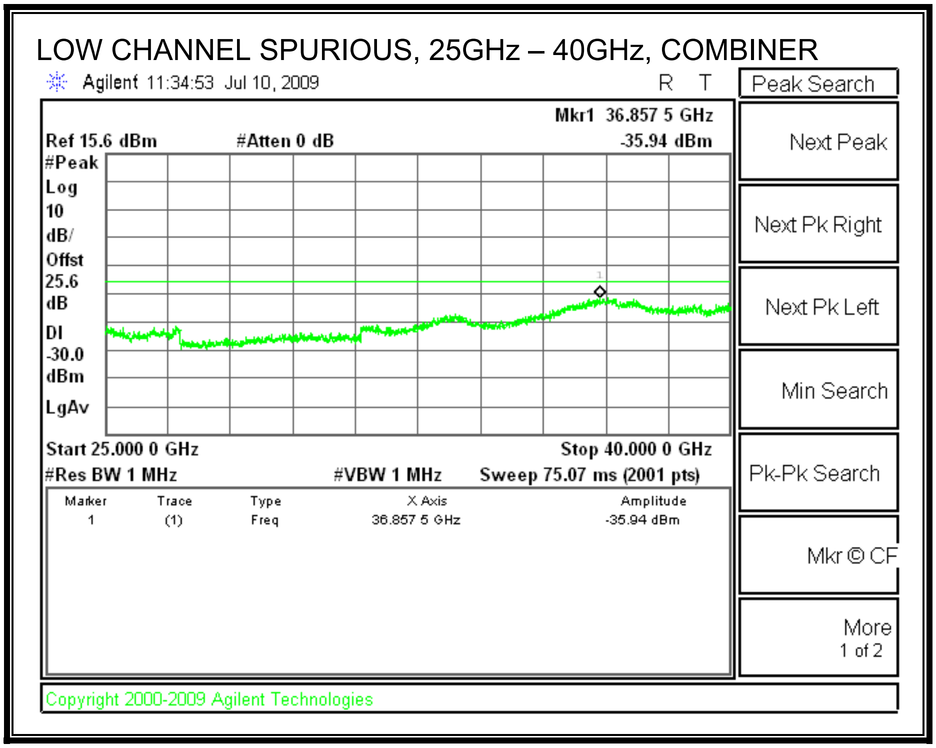
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

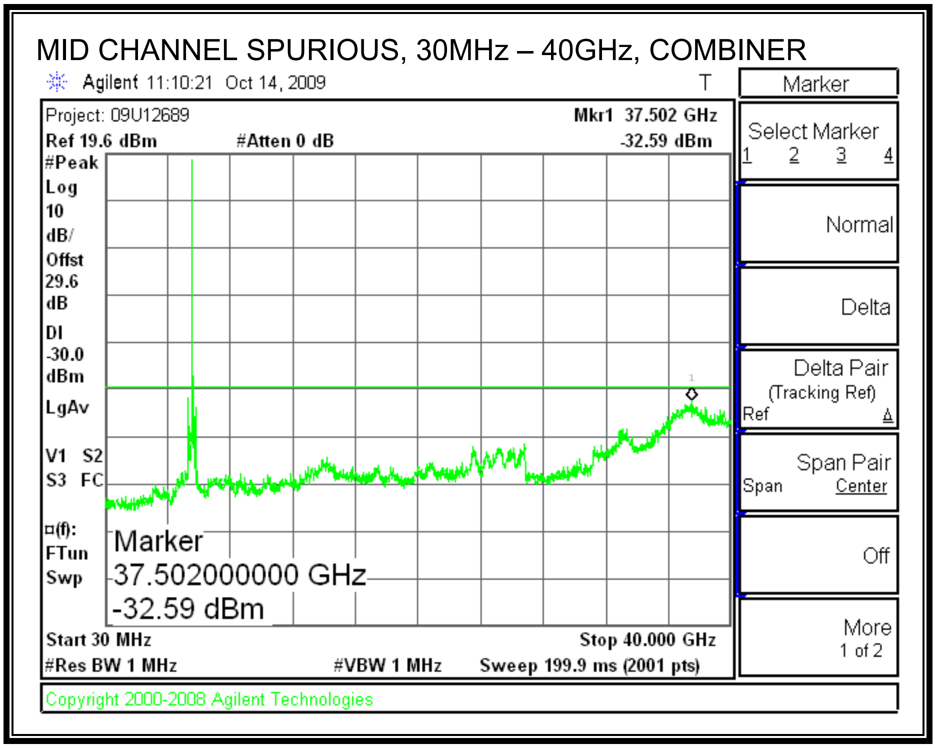
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

LOW CHANNEL SPURIOUS EMISSIONS

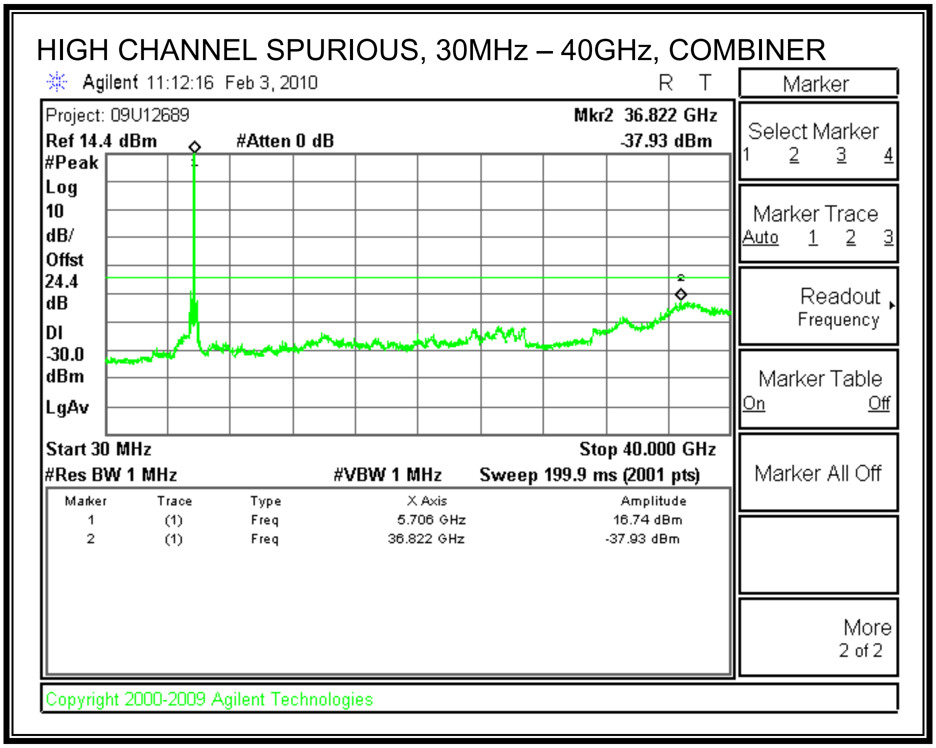




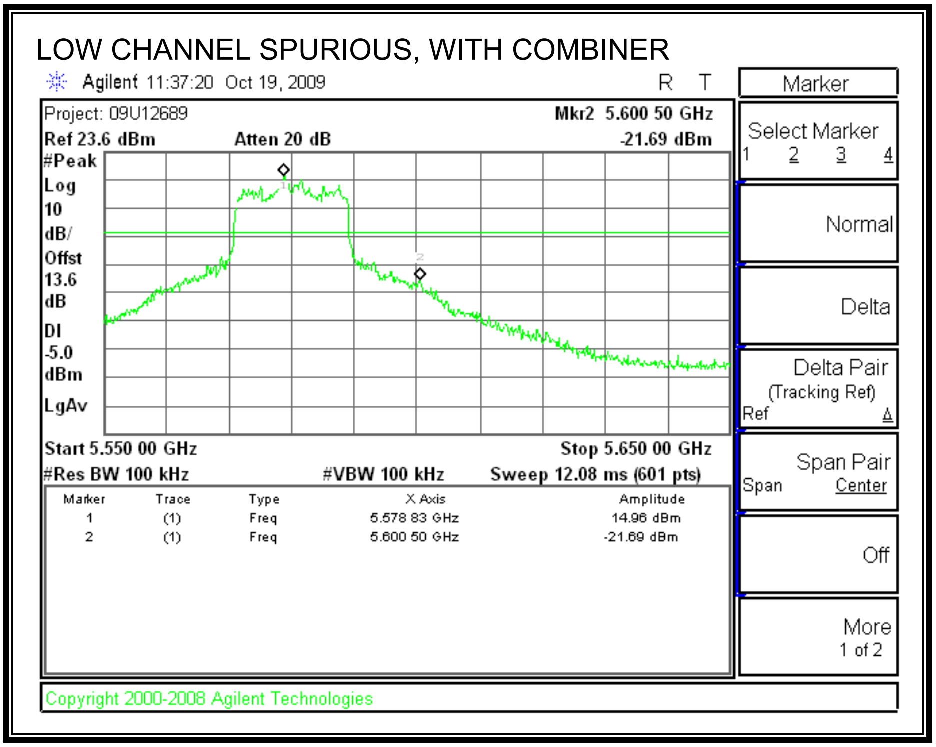
MID CHANNEL SPURIOUS EMISSIONS

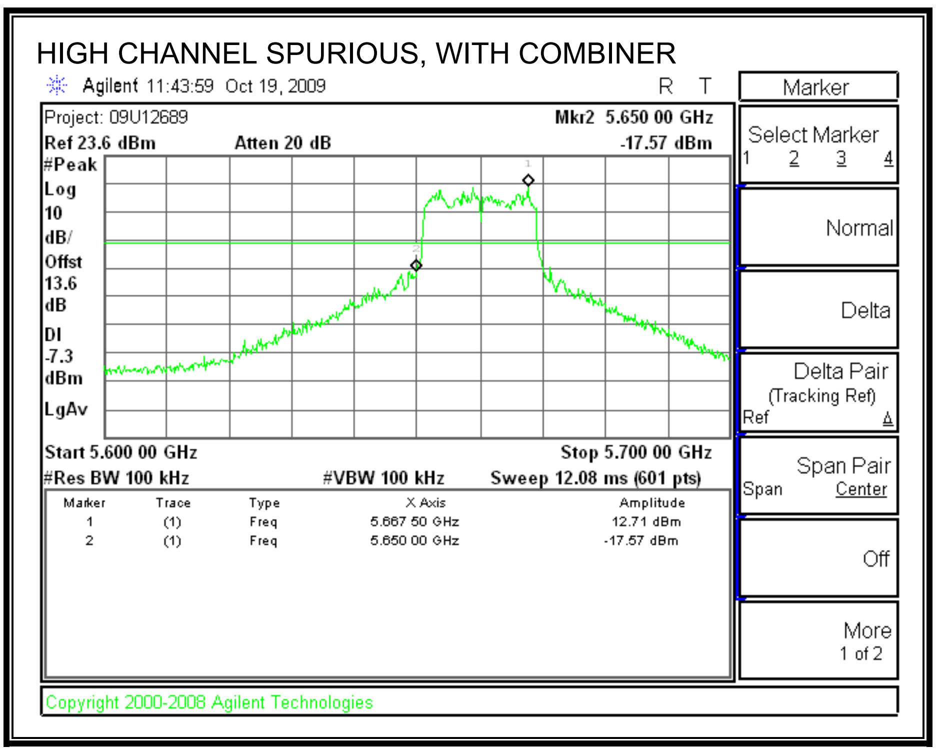


HIGH CHANNEL SPURIOUS EMISSIONS



7.8.7. CONDUCTED SPURIOUS (-20 dBc)





7.9. 5.6 Hz BAND CHANNEL TESTS FOR 802.11HT40 MODE

7.9.1. 99% & 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

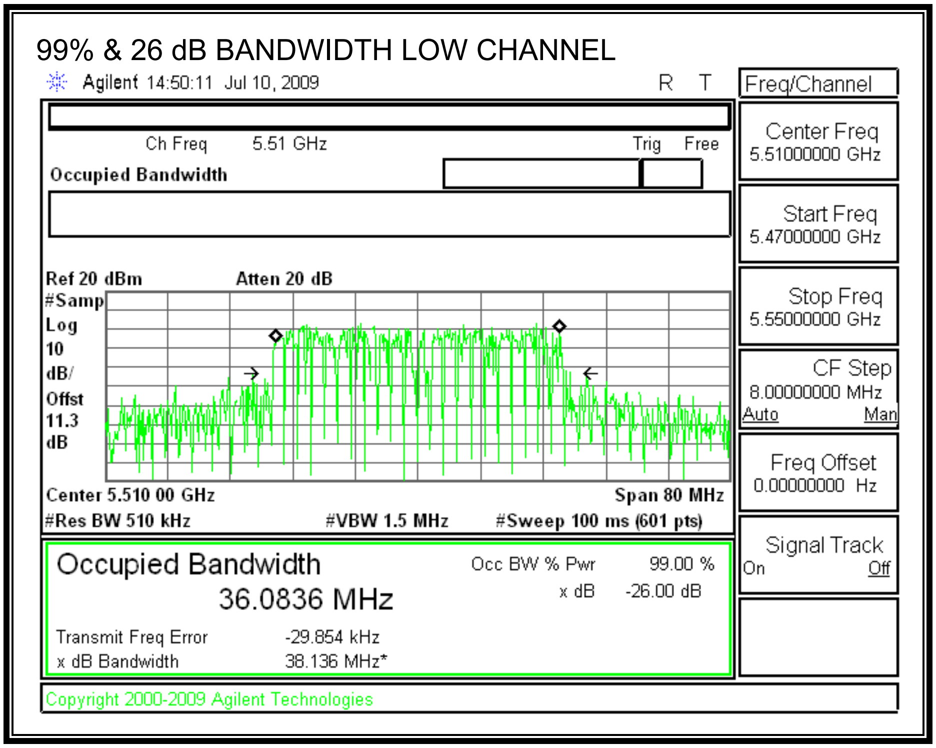
TEST PROCEDURE

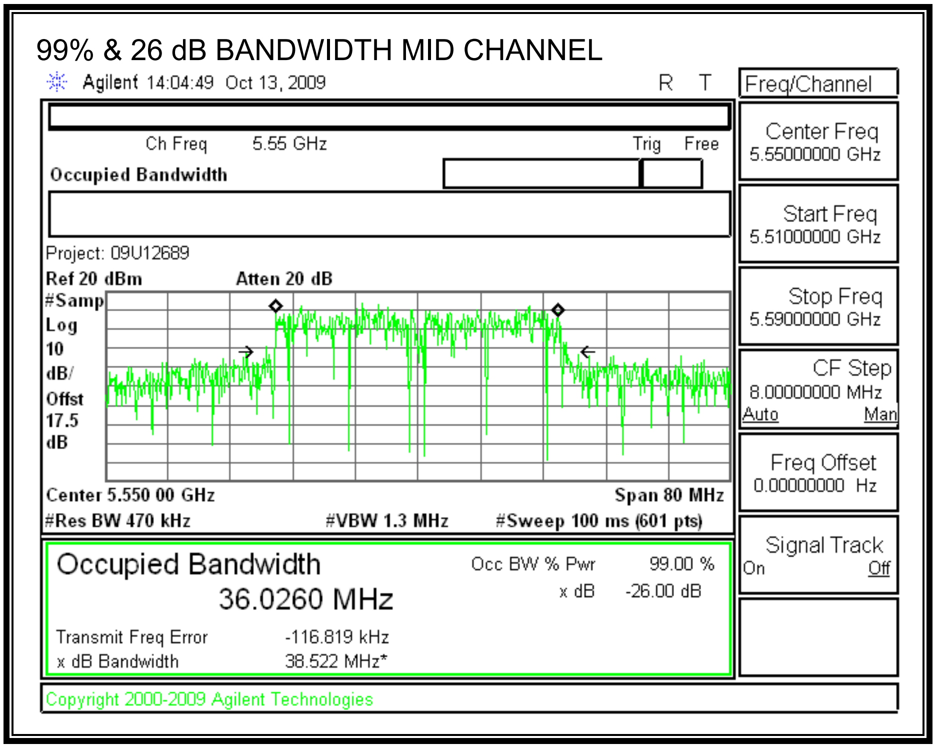
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth measurement function is utilized.

RESULTS

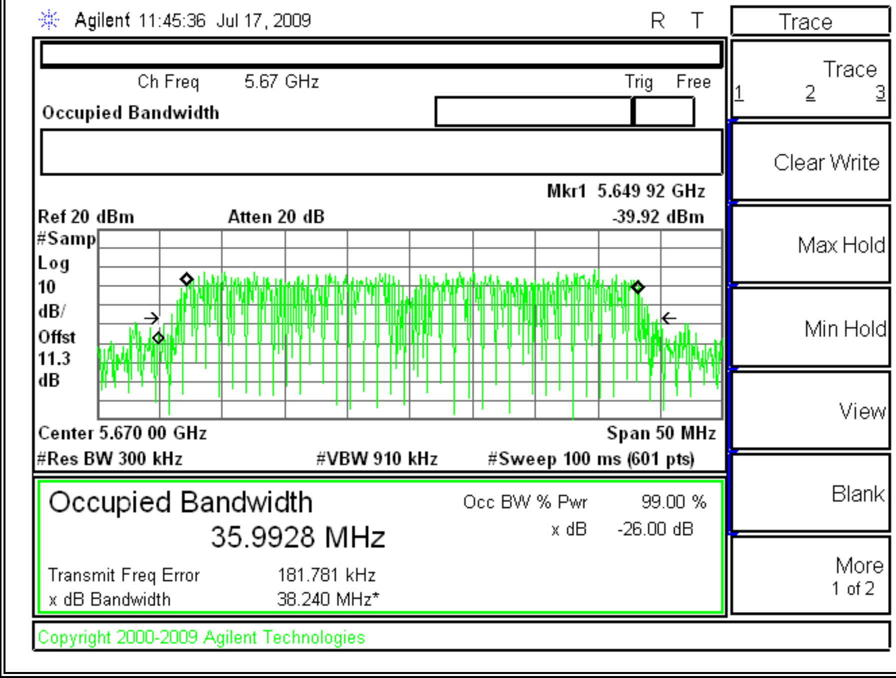
Channel	Frequency (MHz)	99% OBW (MHz)	26 dB BW (MHz)
Low	5510	36.0836	38.136
Middle	5550	36.0260	38.522
High	5670	35.9928	38.24

99% & 26 dB BANDWIDTH





99% & 26 dB BANDWIDTH HIGH CHANNEL



7.9.2. OUTPUT POWER

LIMITS

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 (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (dBm)	Total Power (dBm)	Limit (dBm)	Margin (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

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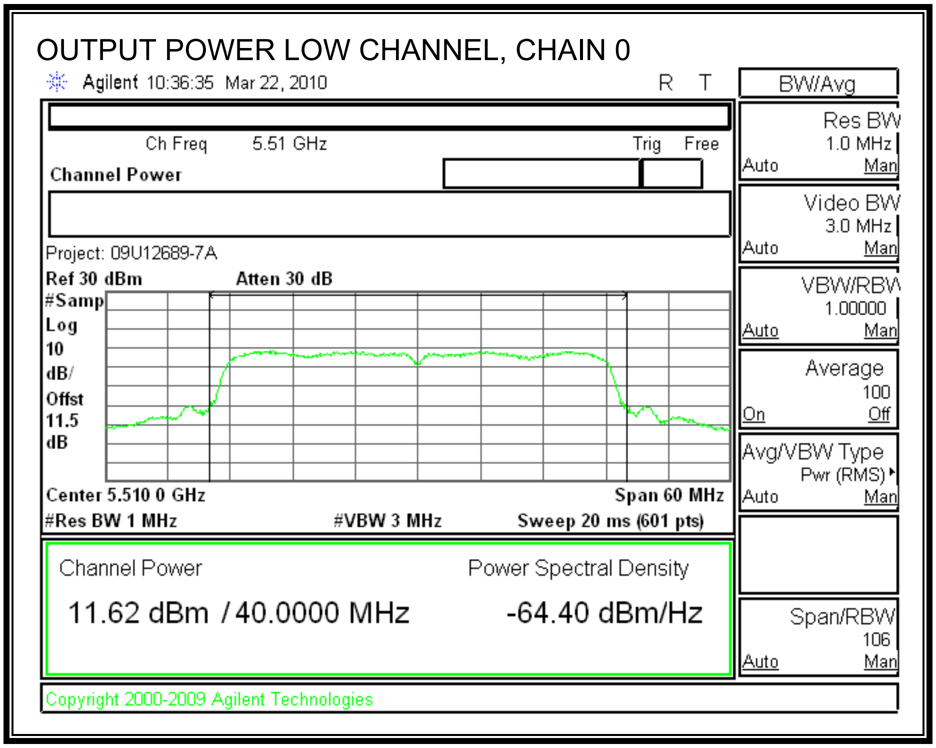
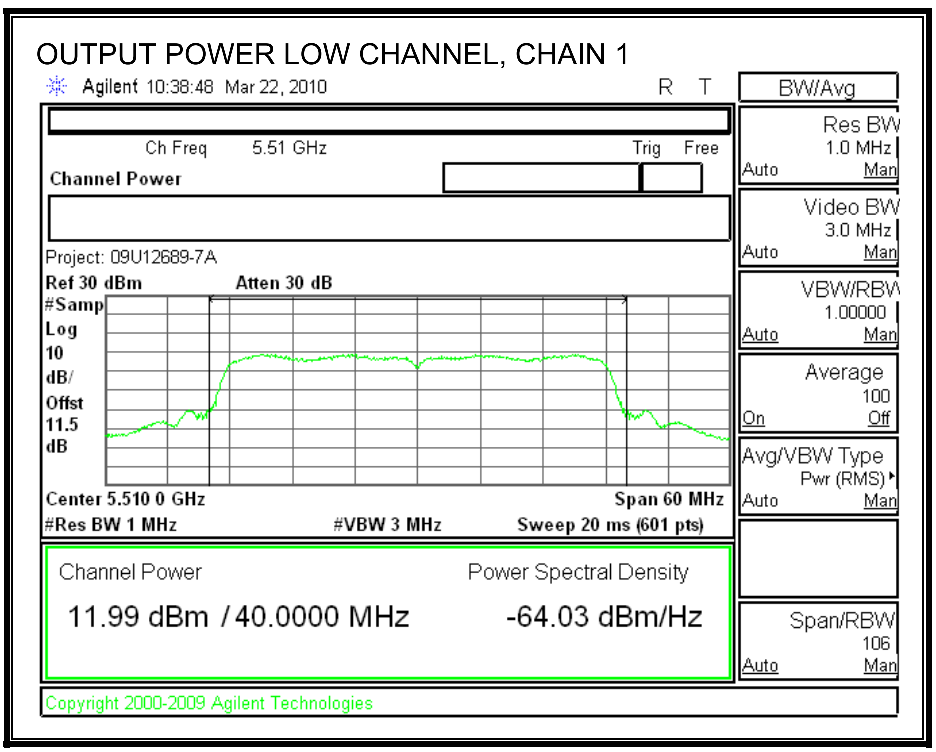
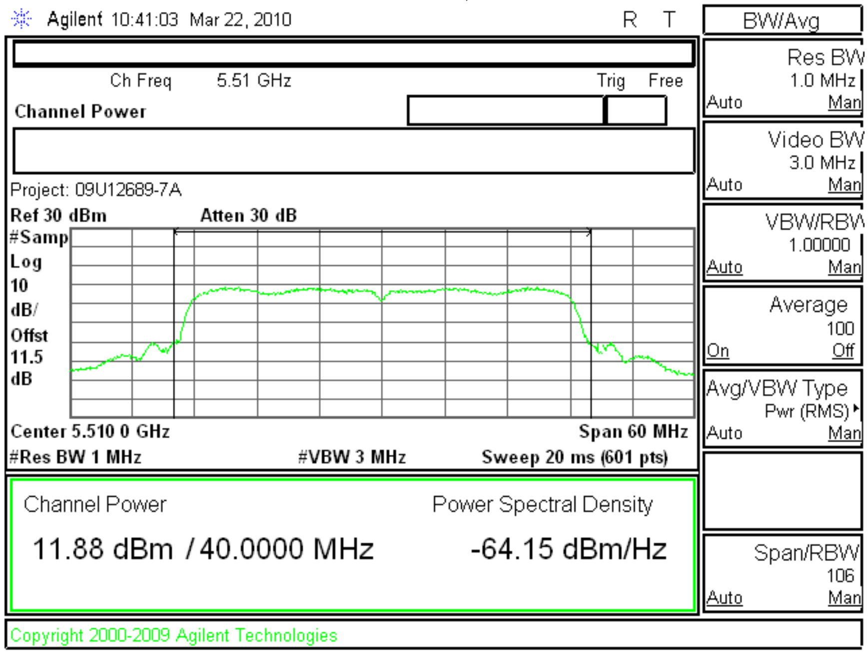
OUTPUT POWER, LOW CHANNEL

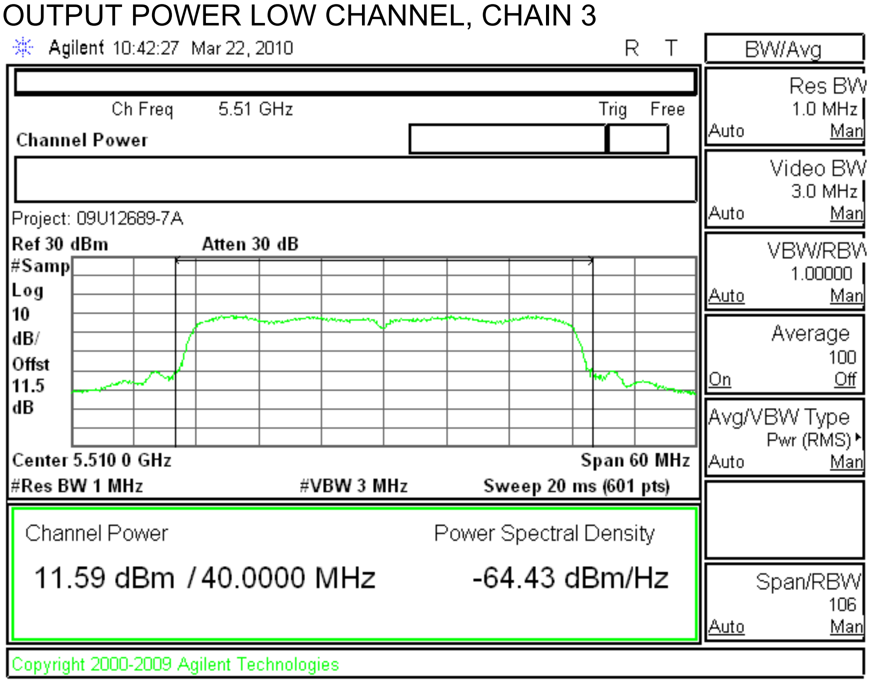




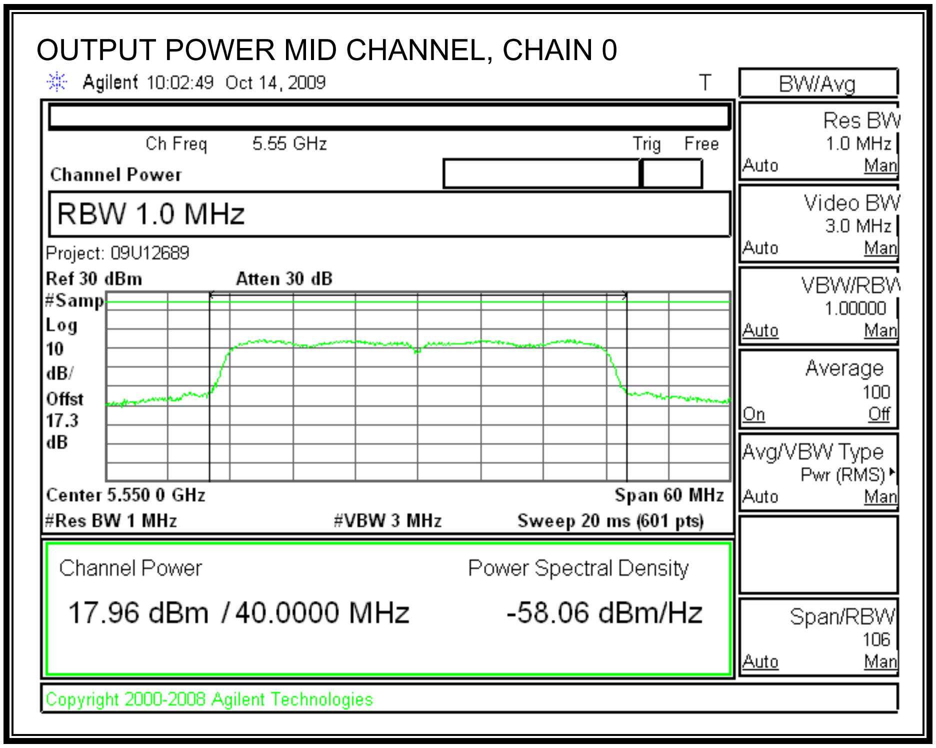
OUTPUT POWER LOW CHANNEL, CHAIN 2

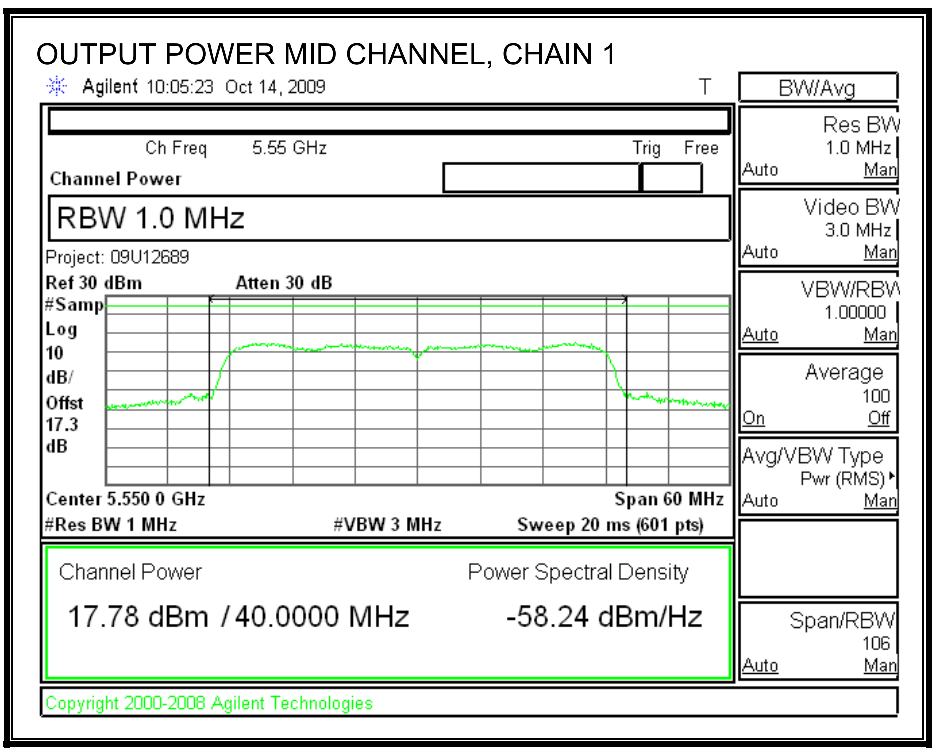


OUTPUT POWER LOW CHANNEL, CHAIN 3

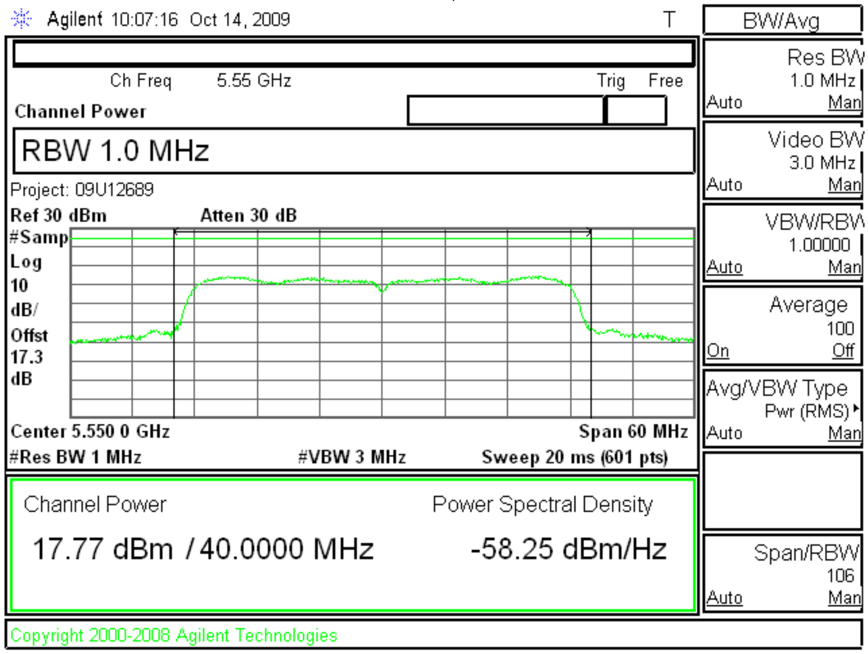


OUTPUT POWER, MID CHANNEL

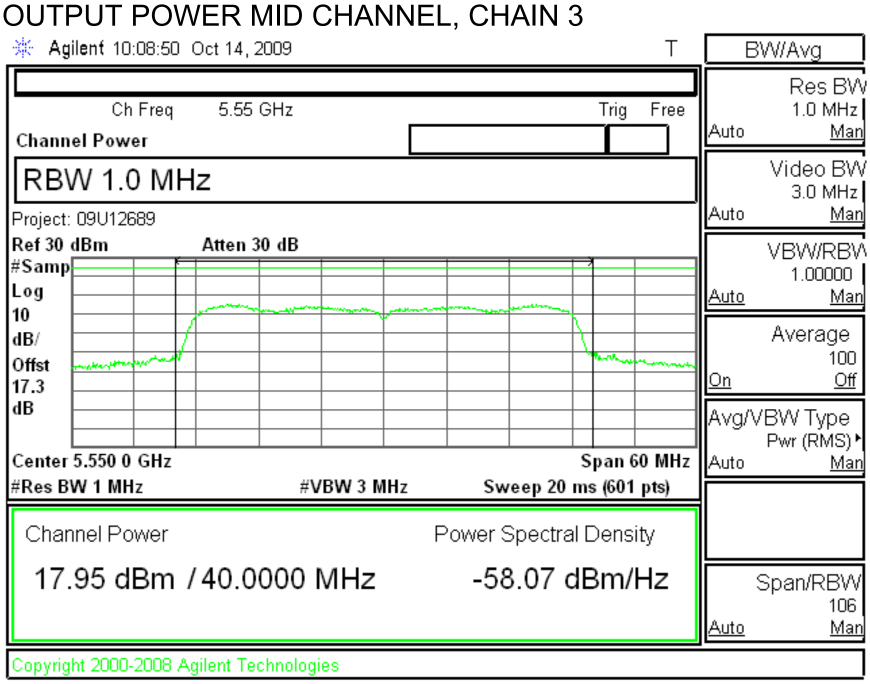




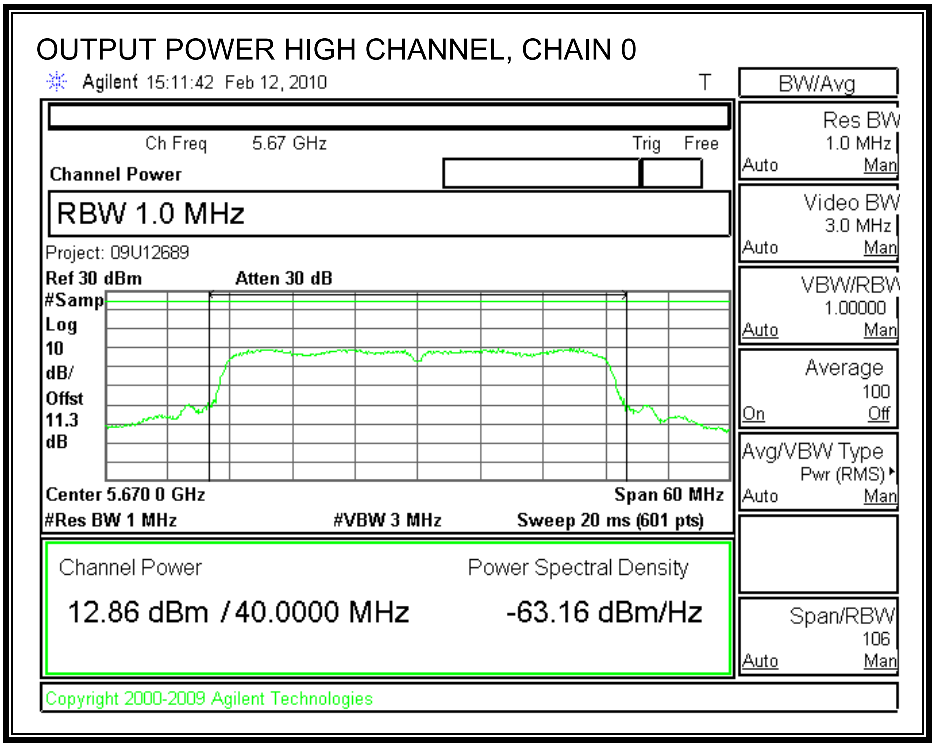
OUTPUT POWER MID CHANNEL, CHAIN 2

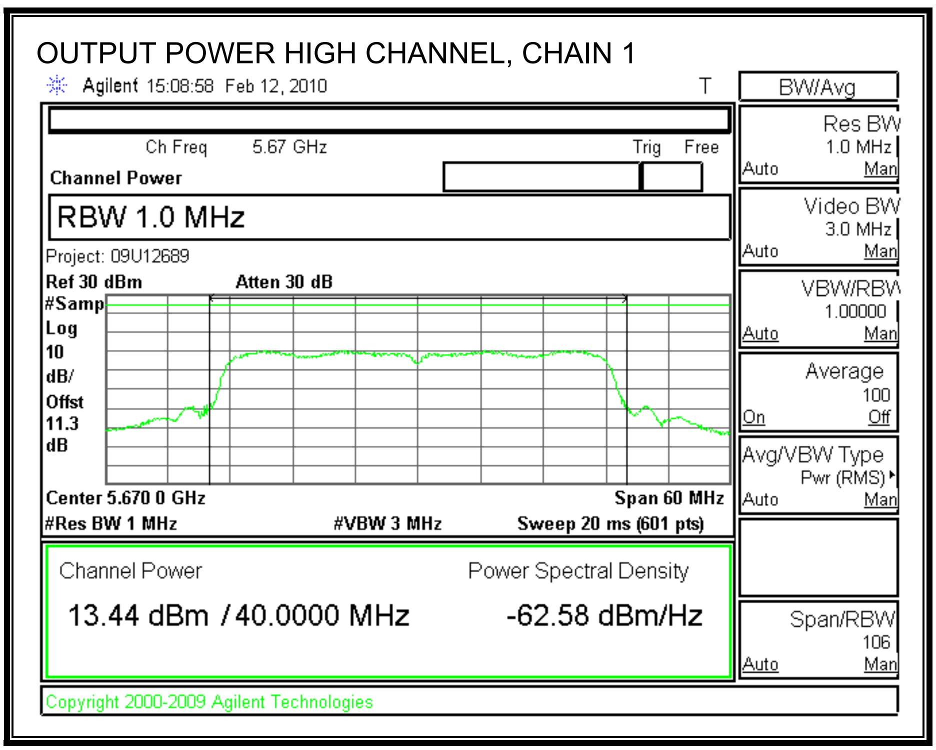


OUTPUT POWER MID CHANNEL, CHAIN 3

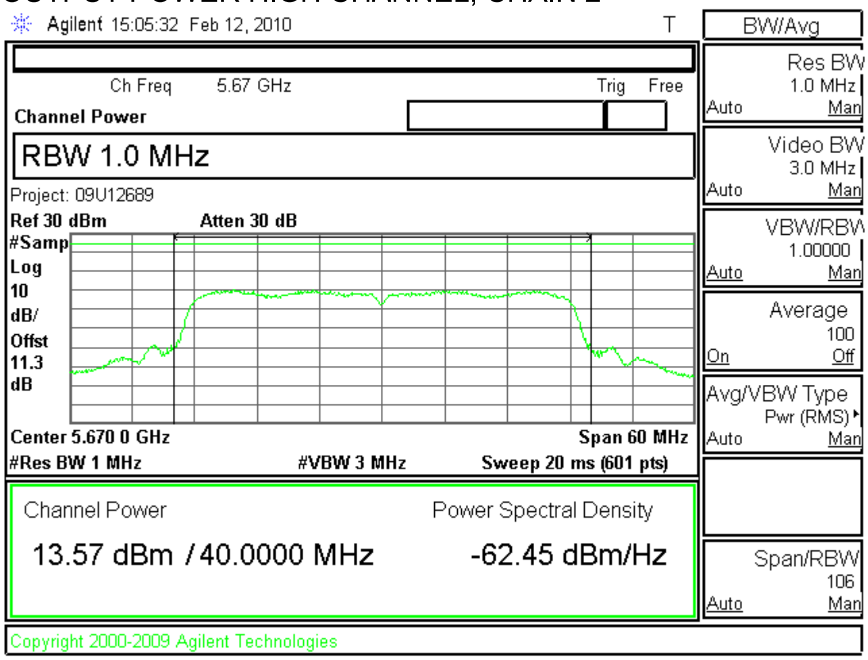


OUTPUT POWER, HIGH CHANNEL

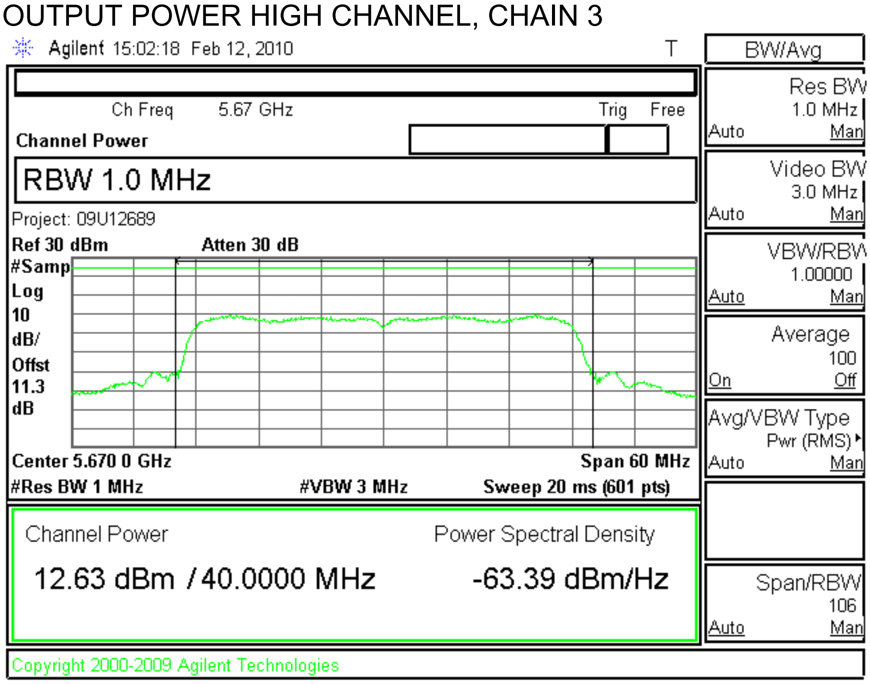




OUTPUT POWER HIGH CHANNEL, CHAIN 2



OUTPUT POWER HIGH CHANNEL, CHAIN 3



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 (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Chain 3 Power (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

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.

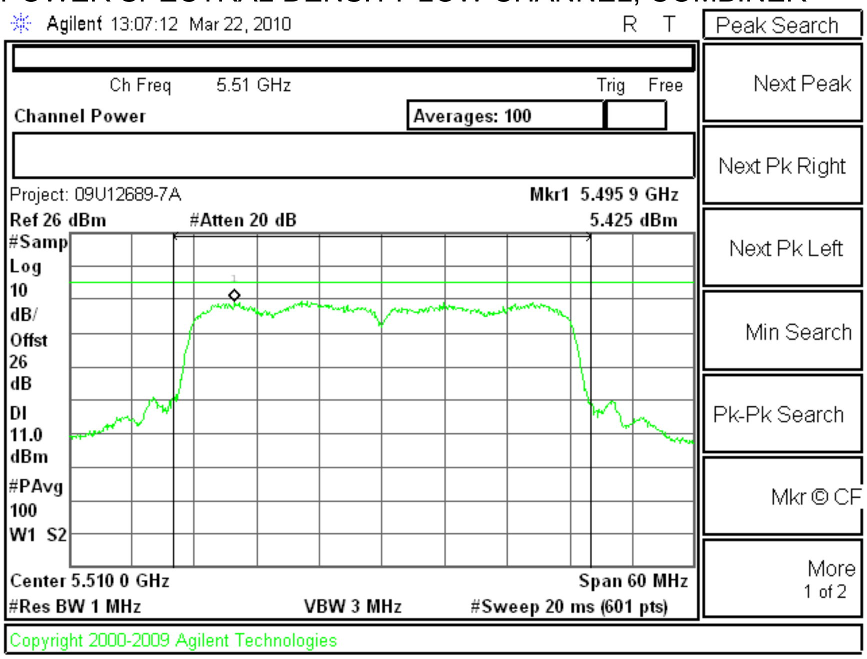
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

RESULTS

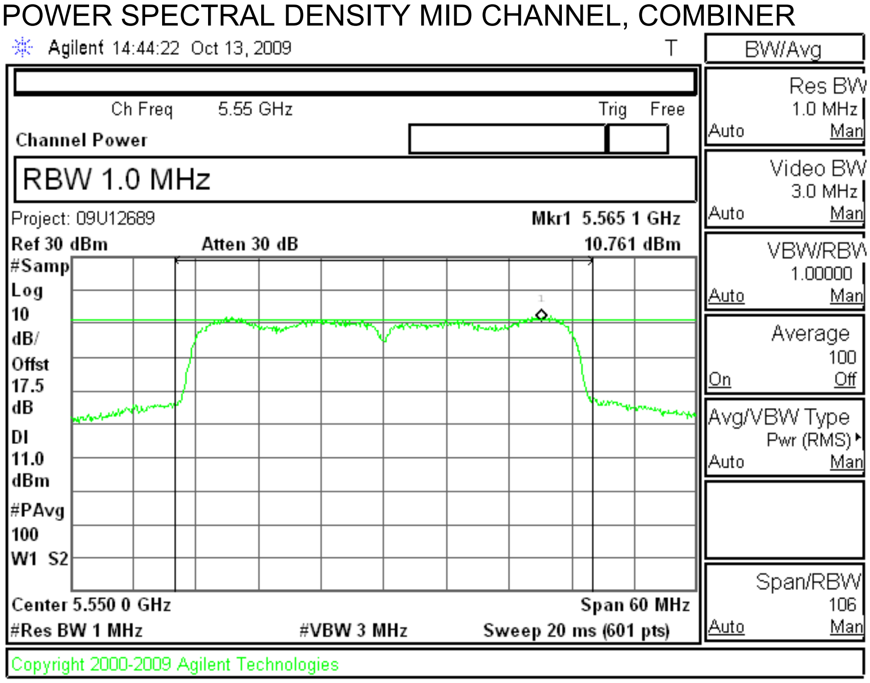
Channel	Frequency (MHz)	PSD with Combiner (dBm)	Limit (dBm)	Margin (dB)
Low	5510	5.425	11.00	-5.58
Middle	5550	10.761	11.00	-0.24
High	5670	9.038	11.00	-1.96

POWER SPECTRAL DENSITY

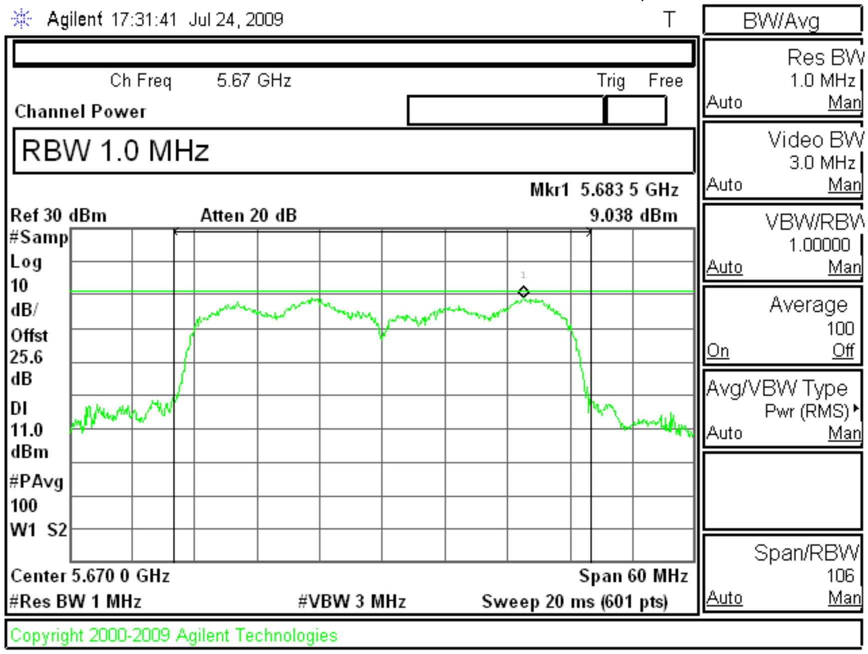
POWER SPECTRAL DENSITY LOW CHANNEL, COMBINER



POWER SPECTRAL DENSITY MID CHANNEL, COMBINER



POWER SPECTRAL DENSITY HIGH CHANNEL, COMBINER



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.

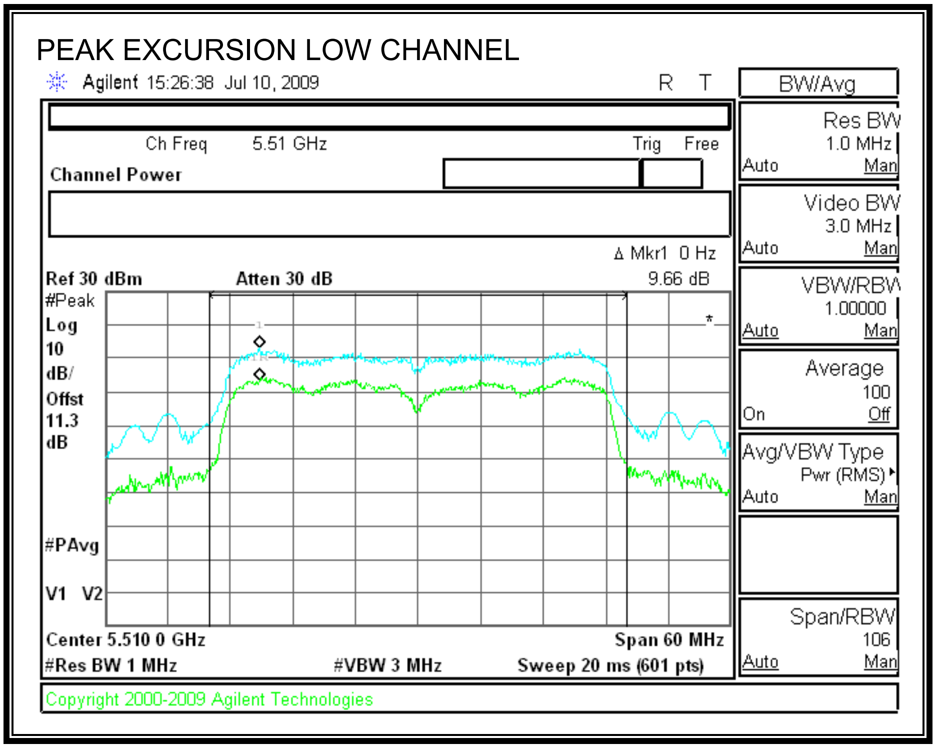
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

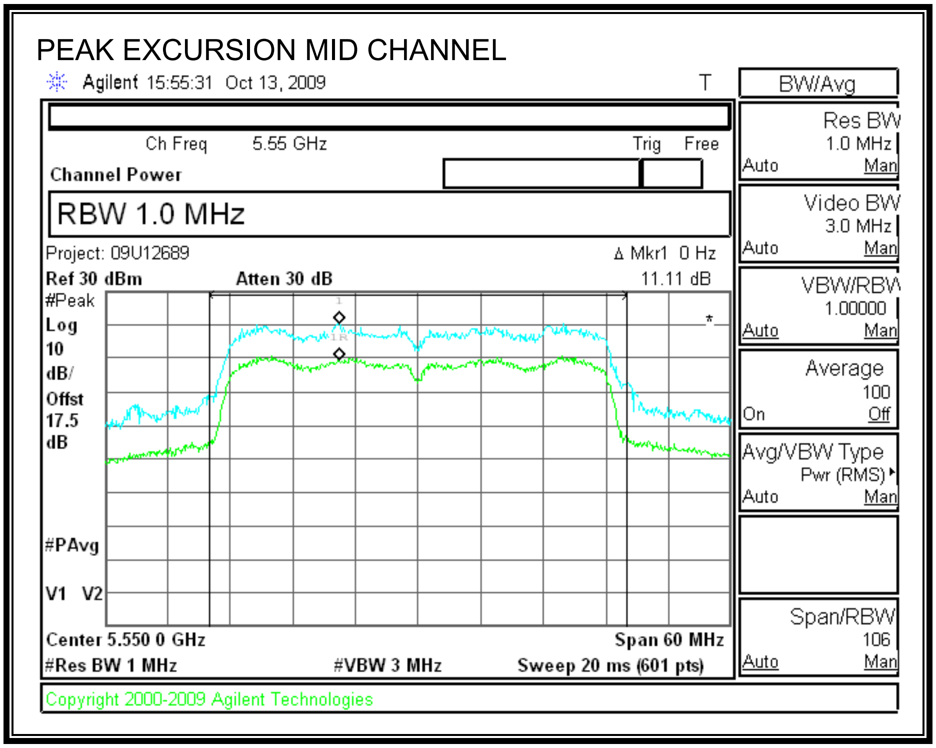
Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

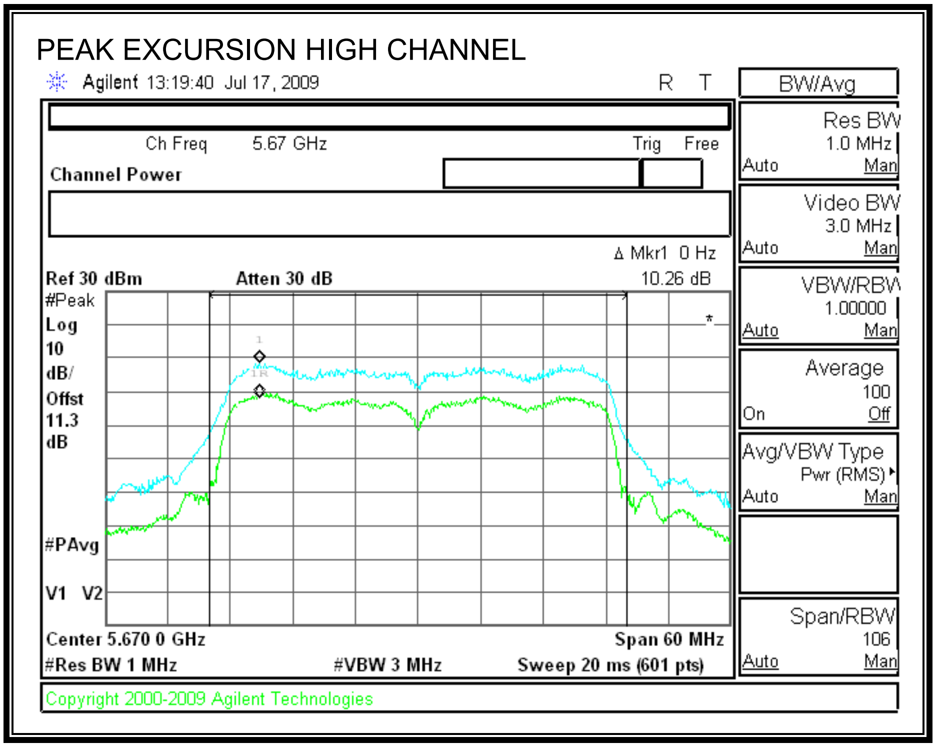
RESULTS

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

PEAK EXCURSION






PEAK EXCURSION HIGH CHANNEL
Agilent 13:19:40 Jul 17, 2009
R T
Ch Freq 5.67 GHz
Trig Free
Channel Power
Δ Mkr1 0 Hz
Ref 30 dBm
Atten 30 dB
10.26 dB
#Peak
Log
10
dB/
Offst
11.3
dB
#PAvg
V1 V2
Center 5.670 0 GHz
Span 60 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 20 ms (601 pts)
BW/Avg
Res BW
1.0 MHz
Auto Man
Video BW
3.0 MHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Pwr (RMS)
Auto Man
Span/RBW
106
Auto Man
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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

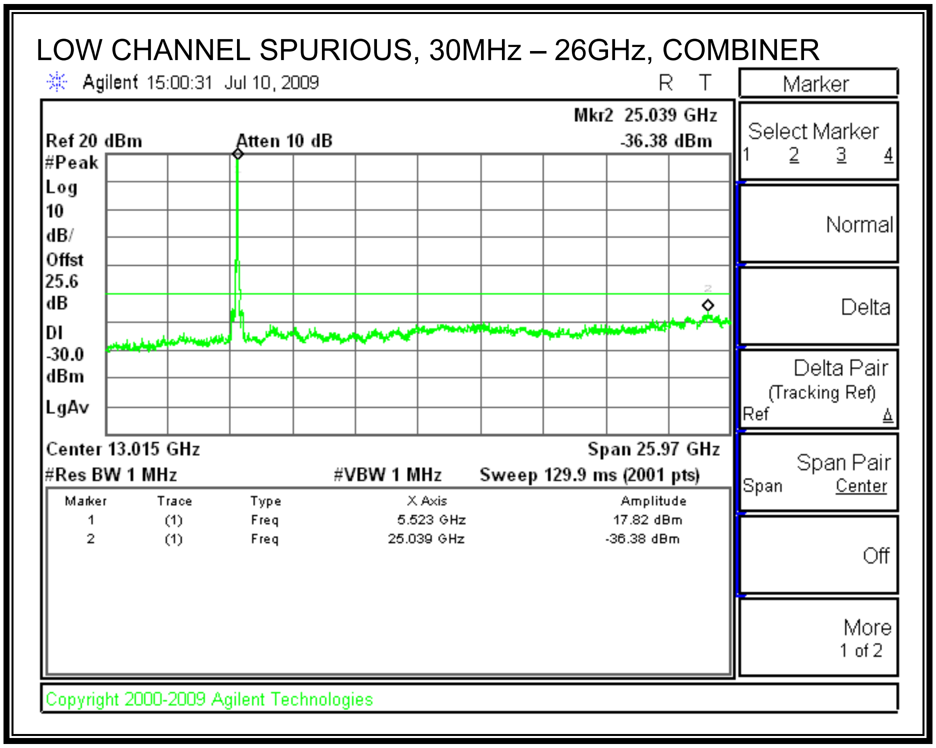
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

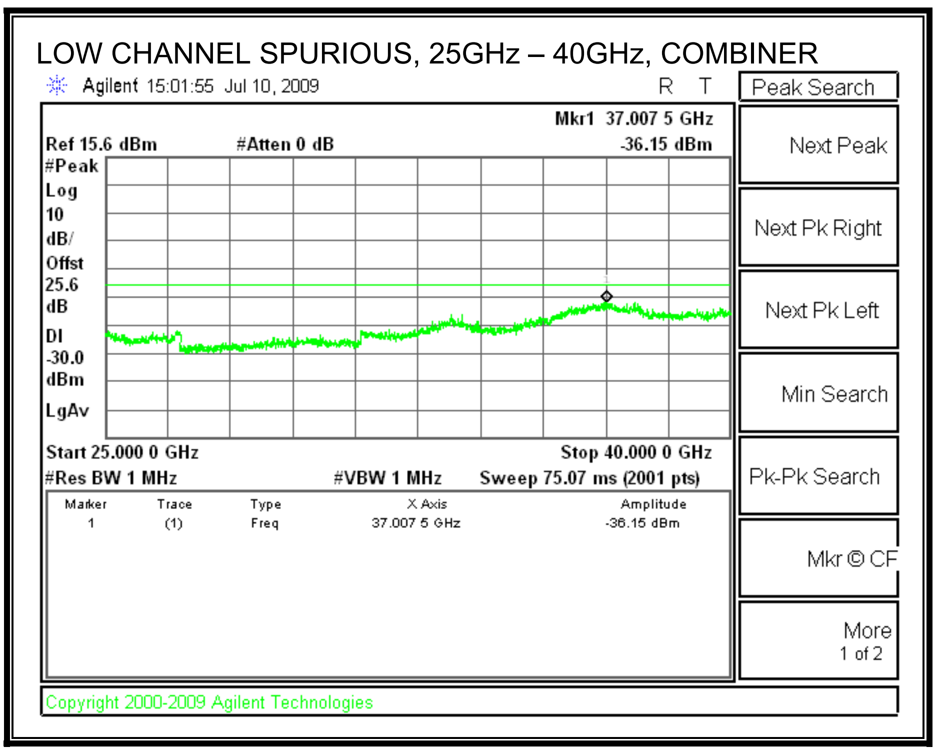
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to EIRP limit, adjusted for the maximum antenna gain.

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

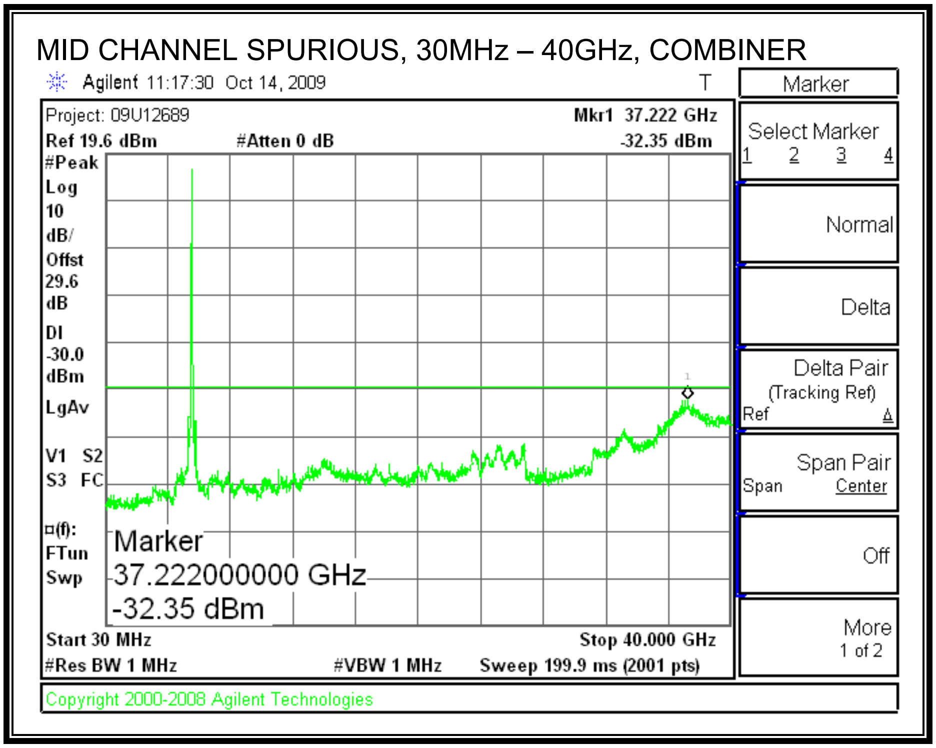
Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

LOW CHANNEL SPURIOUS EMISSIONS

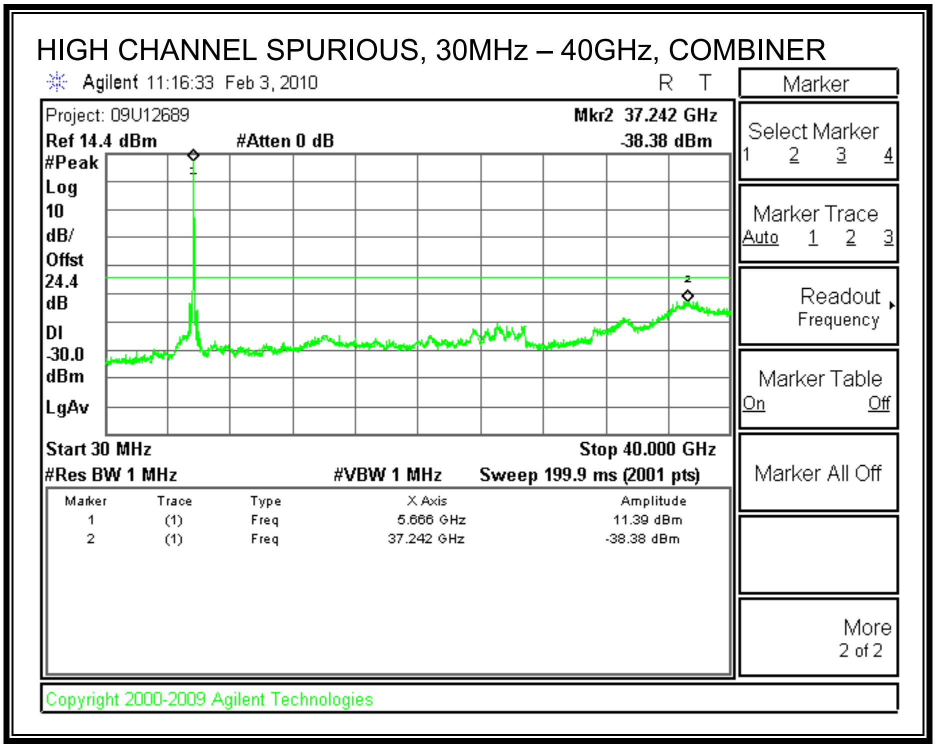




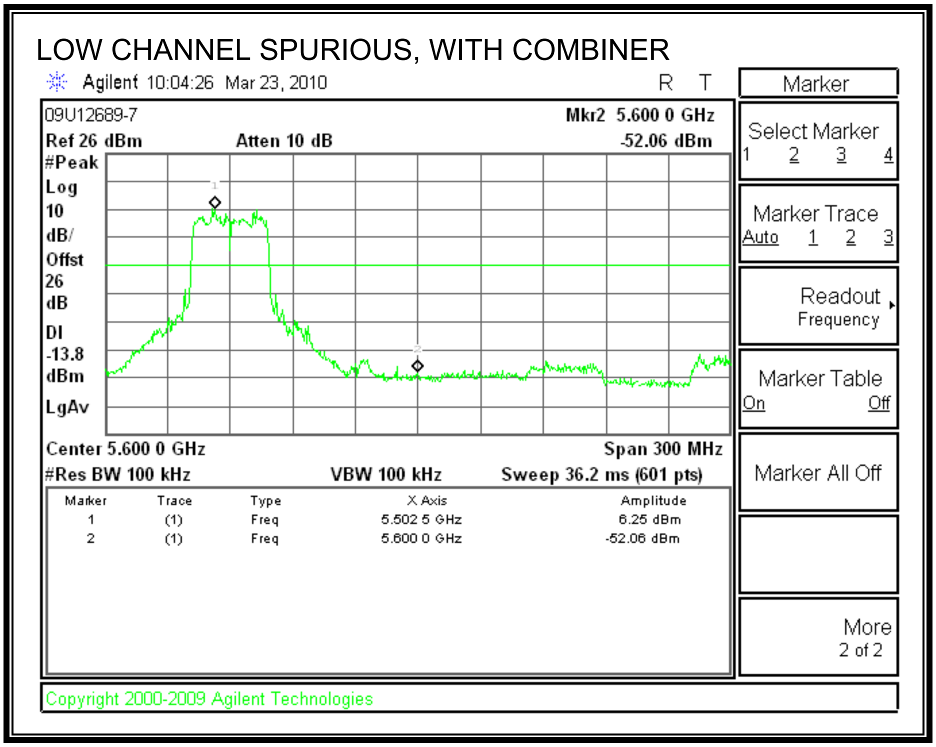
MID CHANNEL SPURIOUS EMISSIONS

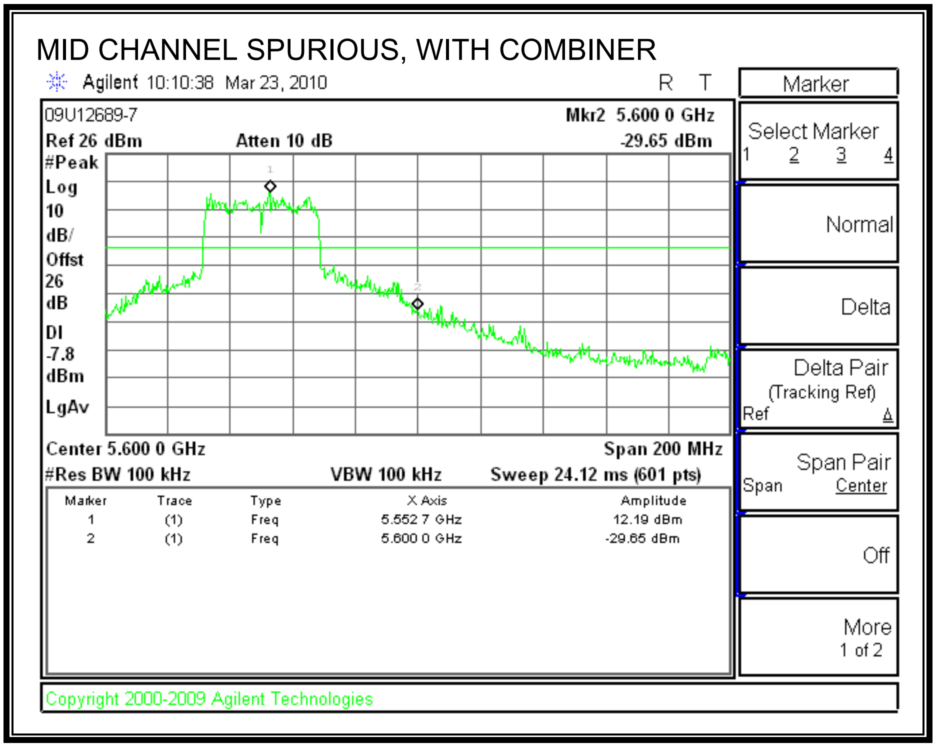


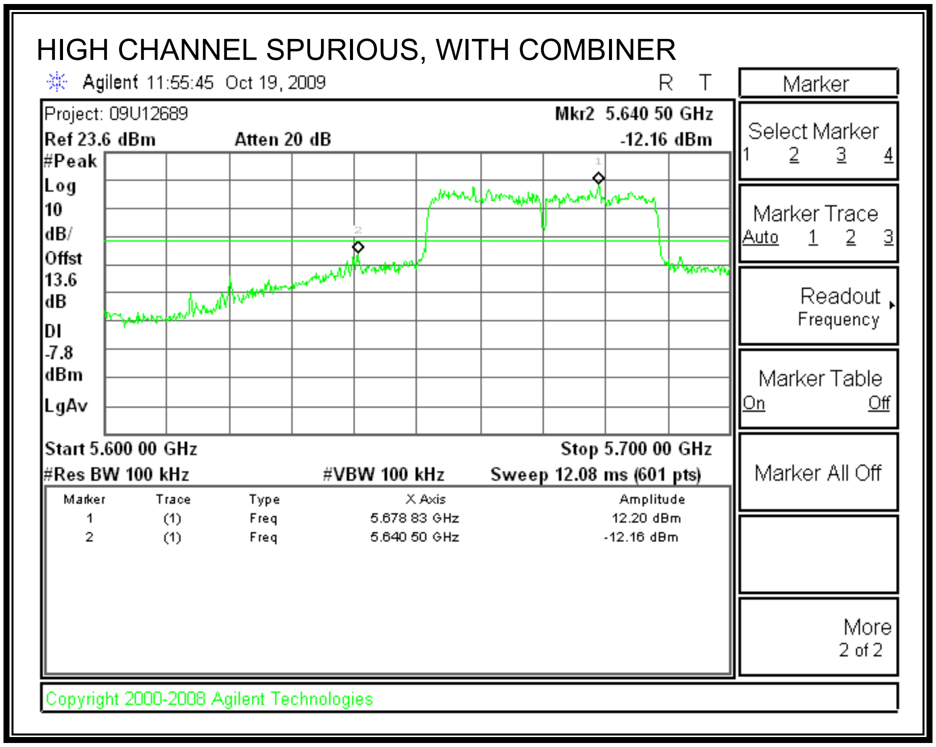
HIGH CHANNEL SPURIOUS EMISSIONS



7.9.7. CONDUCTED SPURIOUS (-20 dBc)




MID CHANNEL SPURIOUS, WITH COMBINER
Agilent 10:10:38 Mar 23, 2010
R T
Marker
09U12689-7
Mkr2 5.600 0 GHz
Ref 26 dBm
Atten 10 dB
-29.65 dBm
#Peak
Log
10
dB/
Offst
26
dB
DI
-7.8
dBm
LgAv
Center 5.600 0 GHz
Span 200 MHz
#Res BW 100 kHz
VBW 100 kHz
Sweep 24.12 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 5.552 7 GHz 12.19 dBm
2 (1) Freq 5.600 0 GHz -29.65 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2009 Agilent Technologies


HIGH CHANNEL SPURIOUS, WITH COMBINER
Agilent 11:55:45 Oct 19, 2009
R T
Marker
Project: 09U12689
Mkr2 5.640 50 GHz
Ref 23.6 dBm
Atten 20 dB
-12.16 dBm
#Peak
Log
10
dB/
Offst
13.6
dB
Dl
-7.8
dBm
LgAv
Start 5.600 00 GHz
Stop 5.700 00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 12.08 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 5.678 83 GHz 12.20 dBm
2 (1) Freq 5.640 50 GHz -12.16 dBm
Select Marker
1 2 3 4
Marker Trace
Auto 1 2 3
Readout
Frequency
Marker Table
On Off
Marker All Off
More
2 of 2
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8. RECEIVER CONDUCTED SPURIOUS EMISSIONS

LIMITS

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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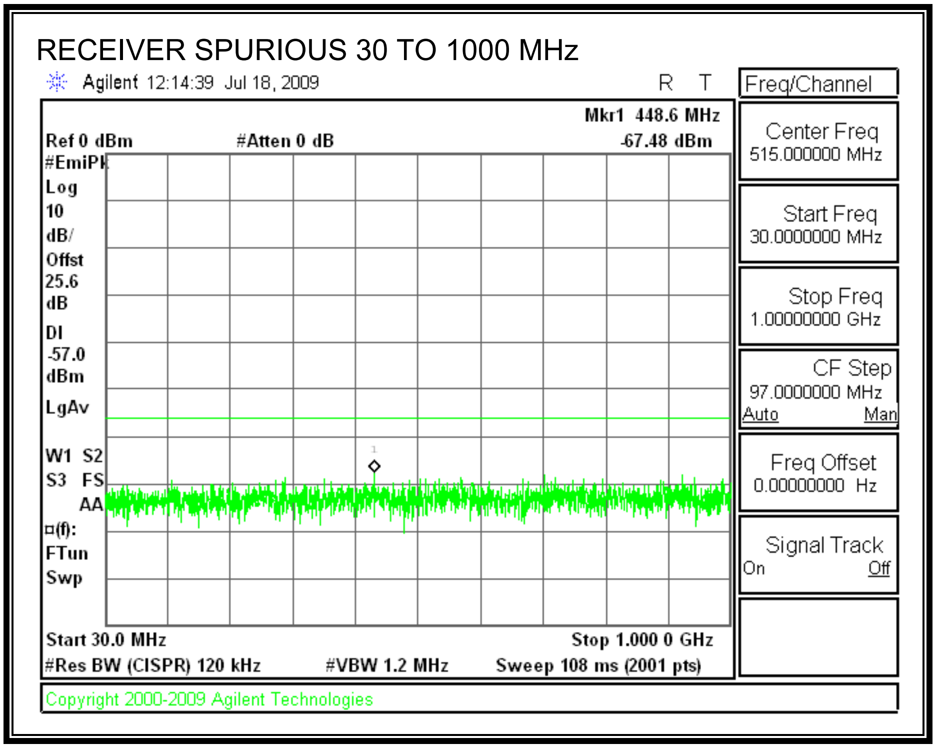
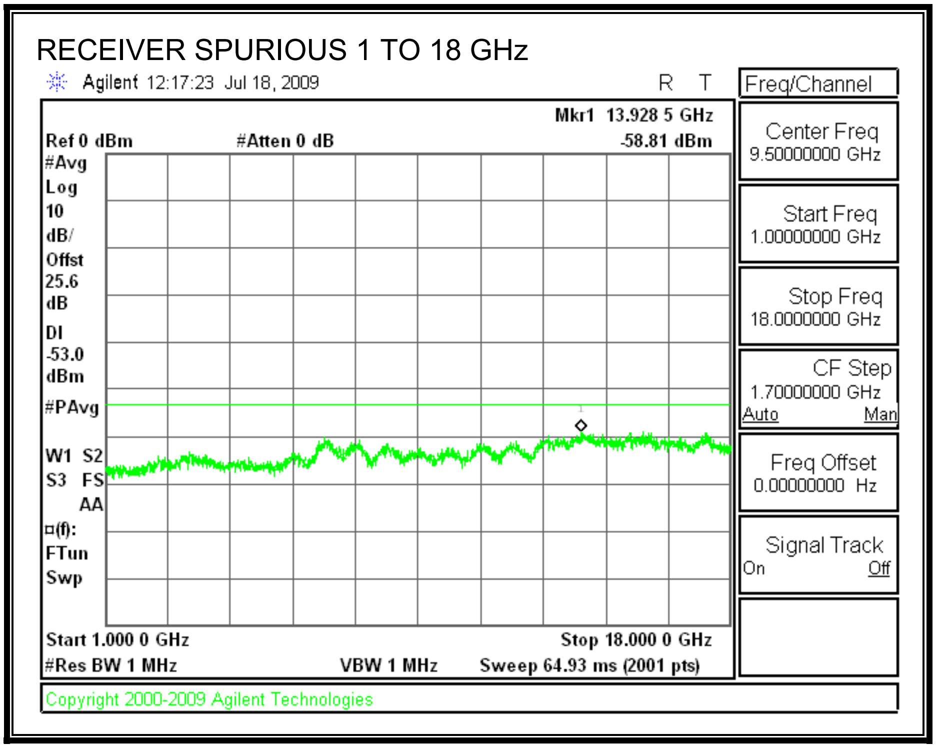
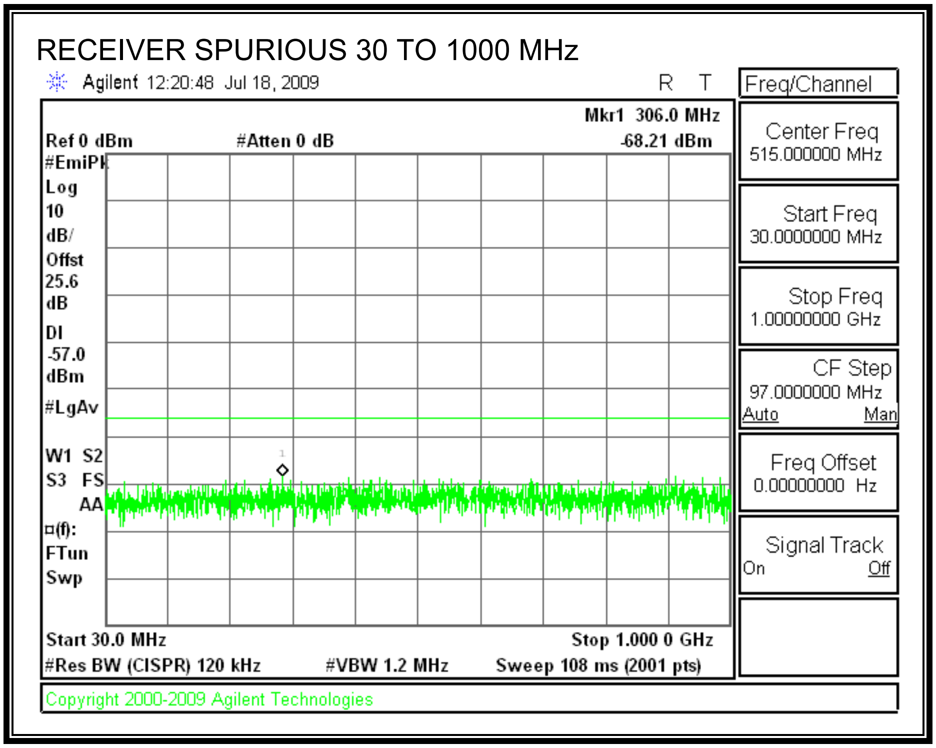
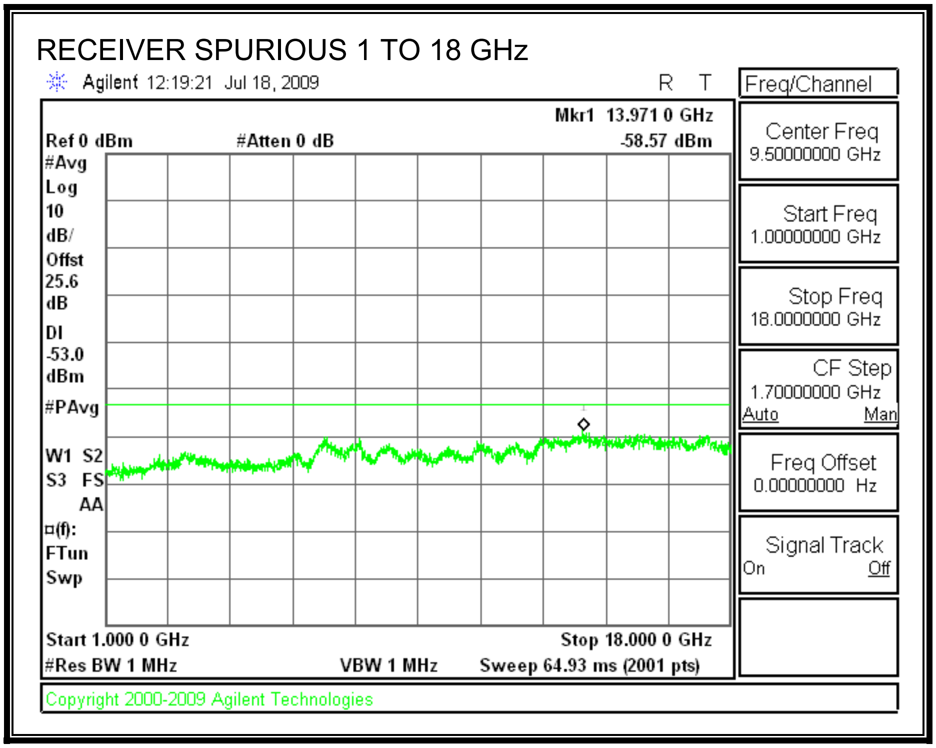
RECEIVER SPURIOUS EMISSIONS IN THE 5.2 GHz BAND



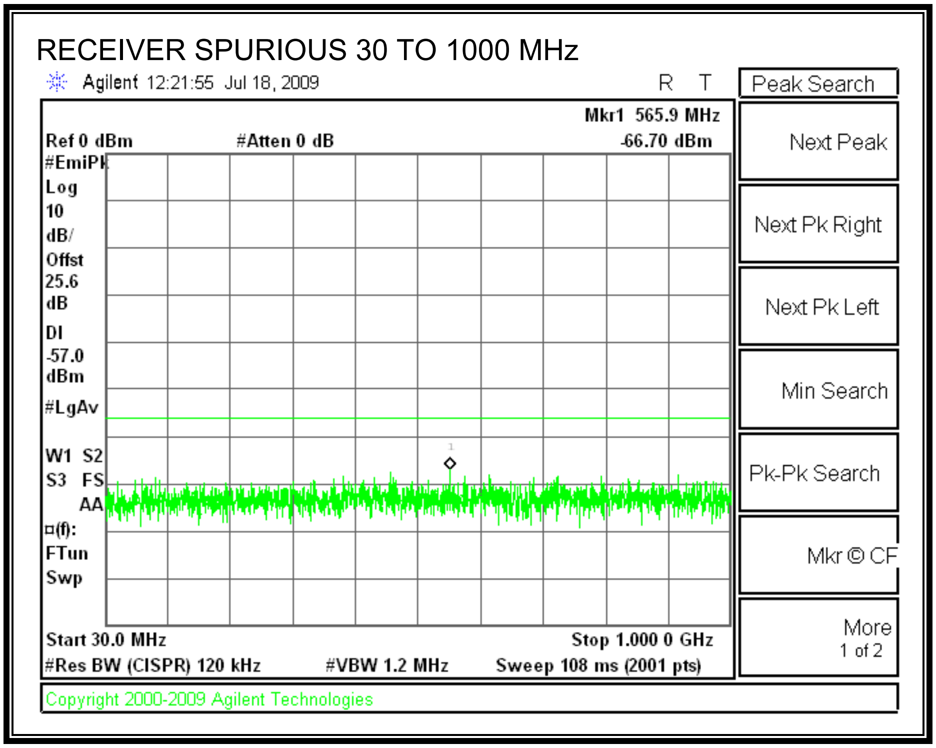


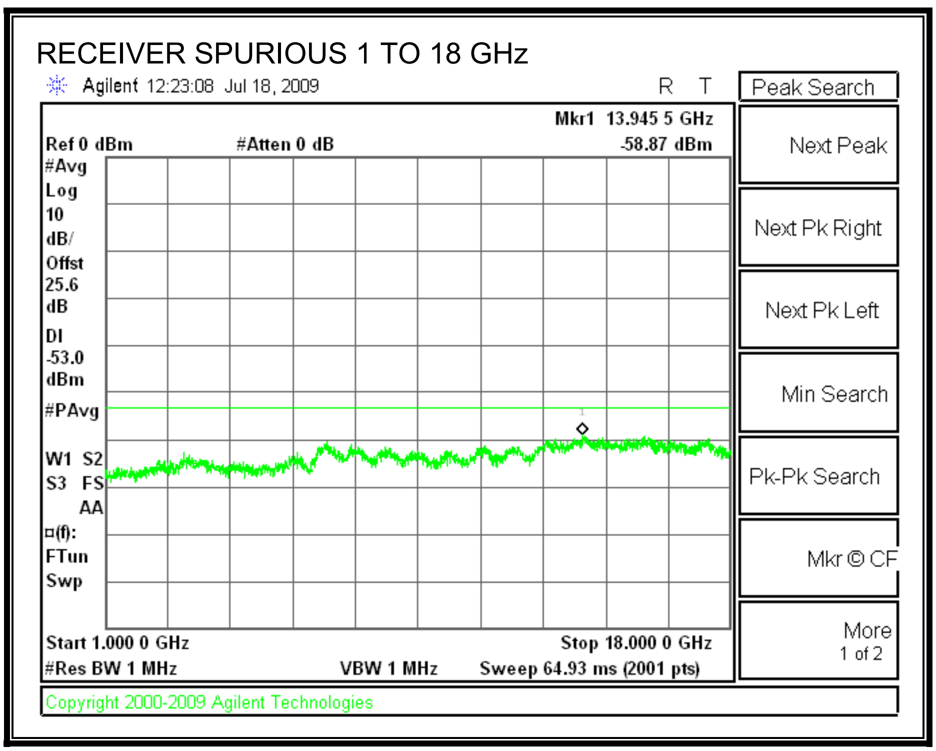
RECEIVER SPURIOUS EMISSIONS IN THE 5.3 GHz BAND





RECEIVER SPURIOUS EMISSIONS IN THE 5.5 GHz BAND





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 (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (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.

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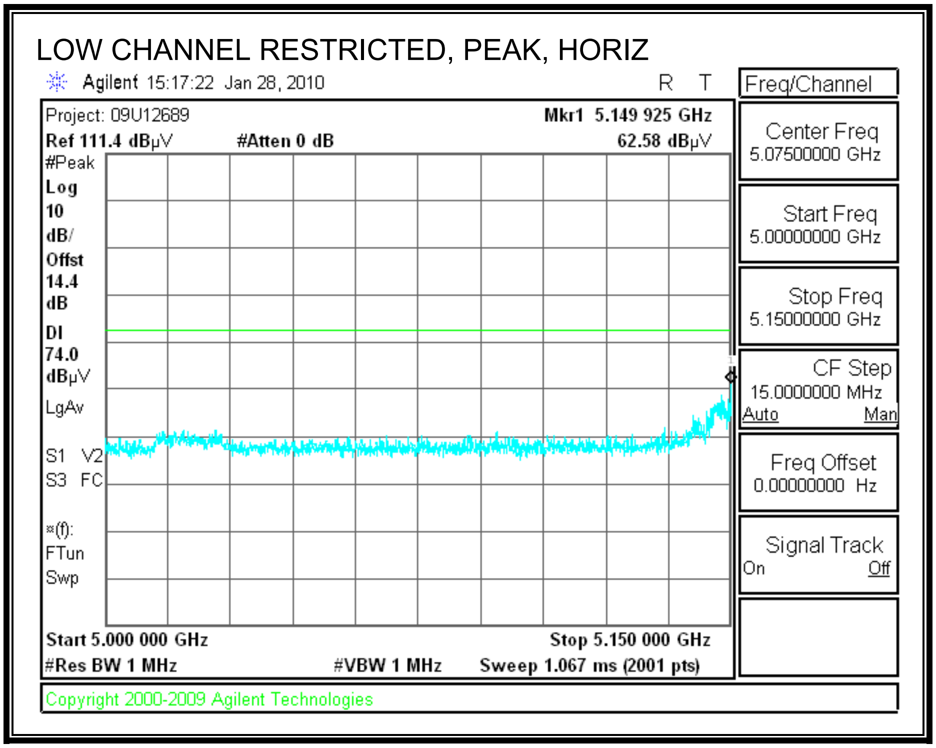
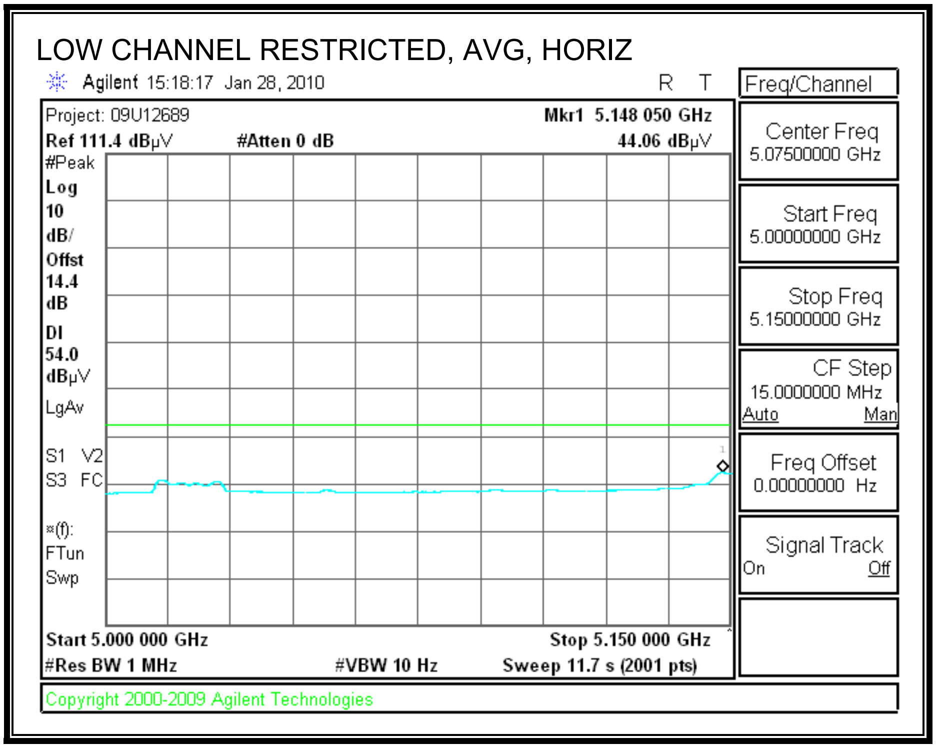
9.2. TRANSMITTER ABOVE 1 GHz

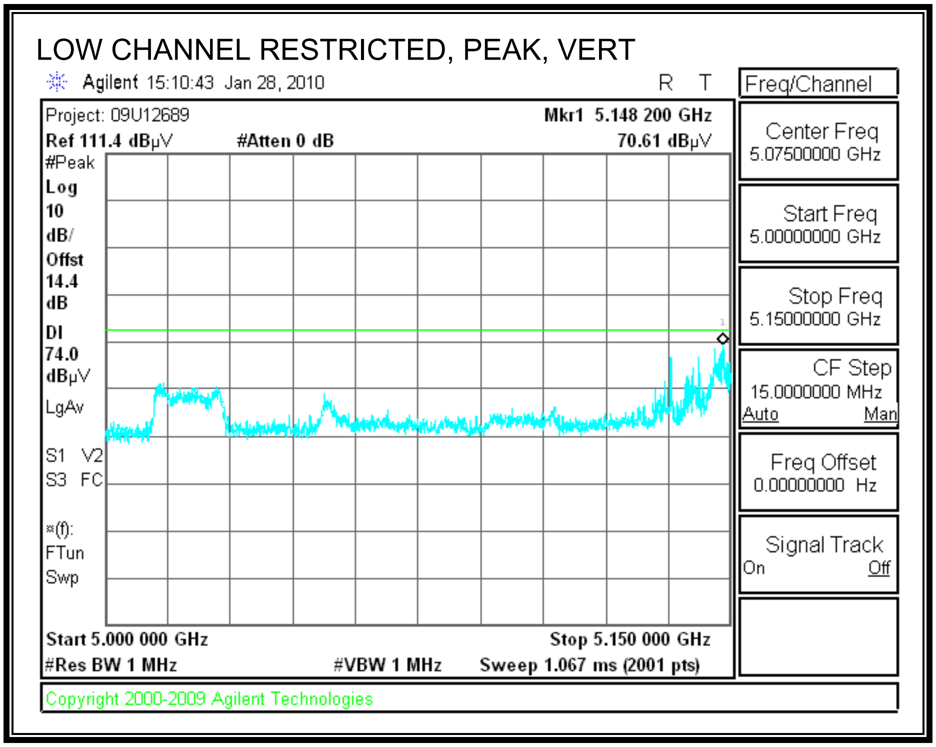
9.2.1. 802.11a MODE IN 5.2 GHz BAND

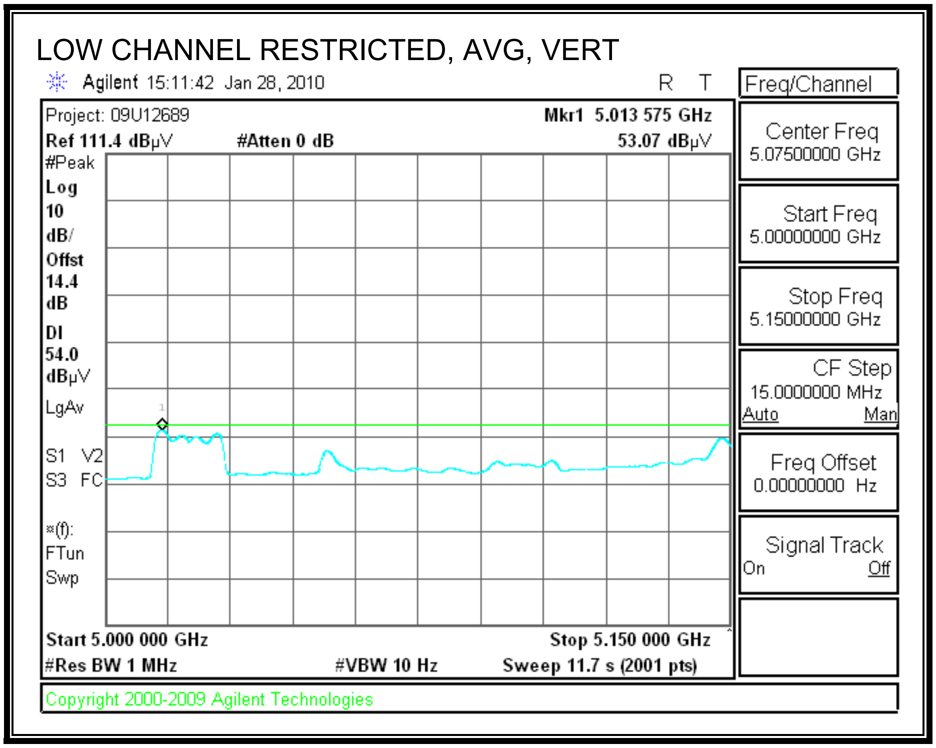
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)




LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 15:18:17 Jan 28, 2010
R T
Project: 09U12689
Mkr1 5.148 050 GHz
Ref 111.4 dBμV
#Atten 0 dB
44.06 dBμV
#Peak
Log
10
dB/
Offst
14.4
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Copyright 2000-2009 Agilent Technologies
Freq/Channel
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off

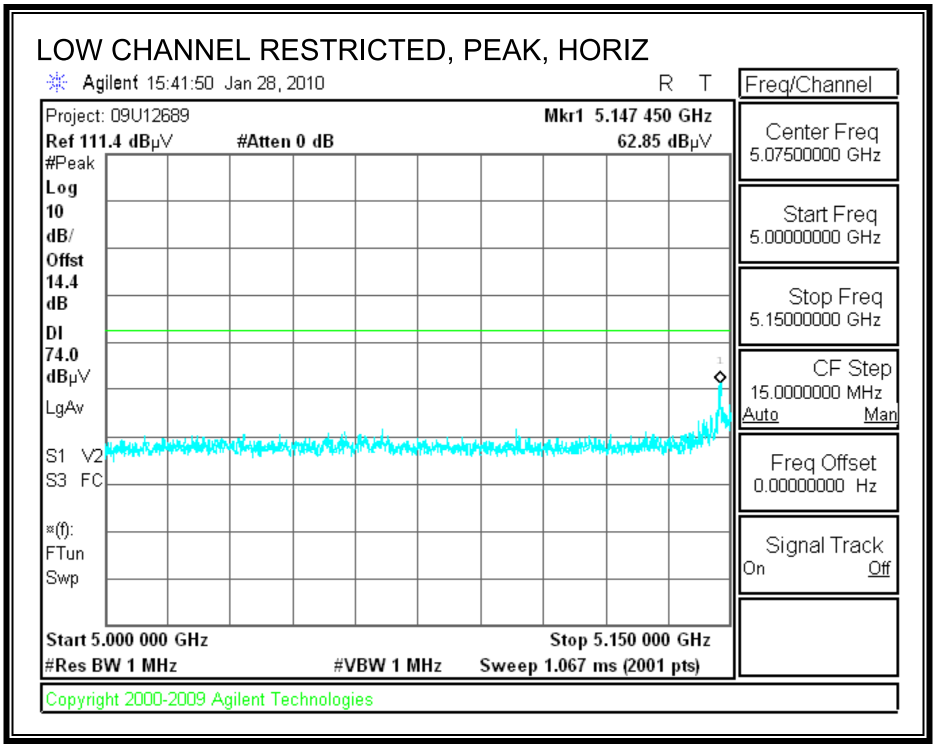
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

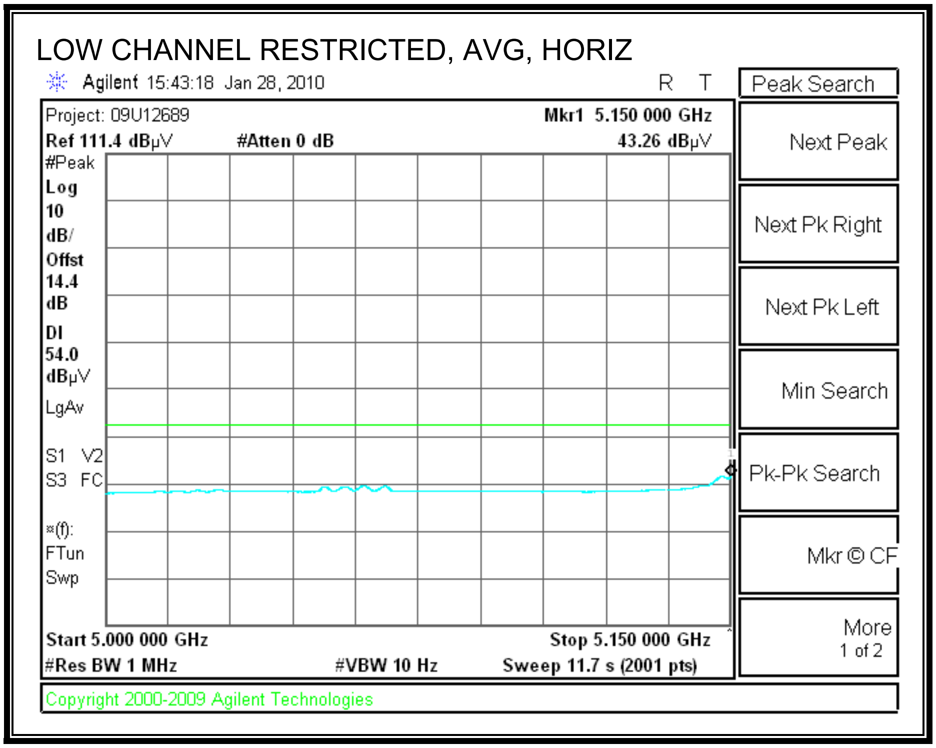



LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 15:11:42 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.013 575 GHz
Ref 111.4 dBμV
#Atten 0 dB
53.07 dBμV
#Peak
Log
10
dB/
Offst
14.4
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

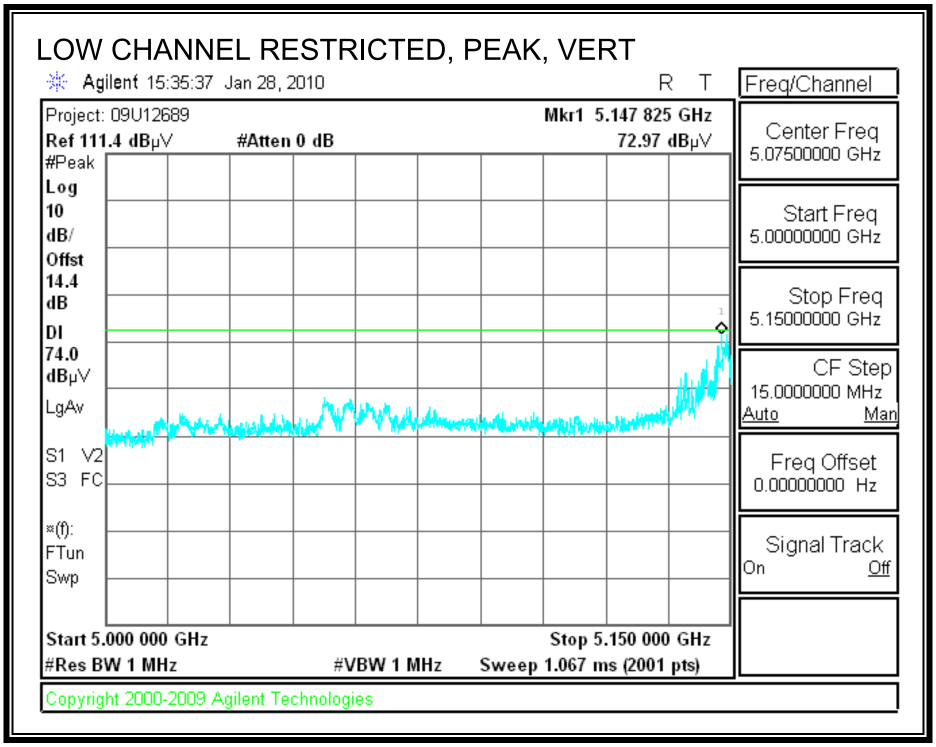
9.2.2. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.2 GHz BAND

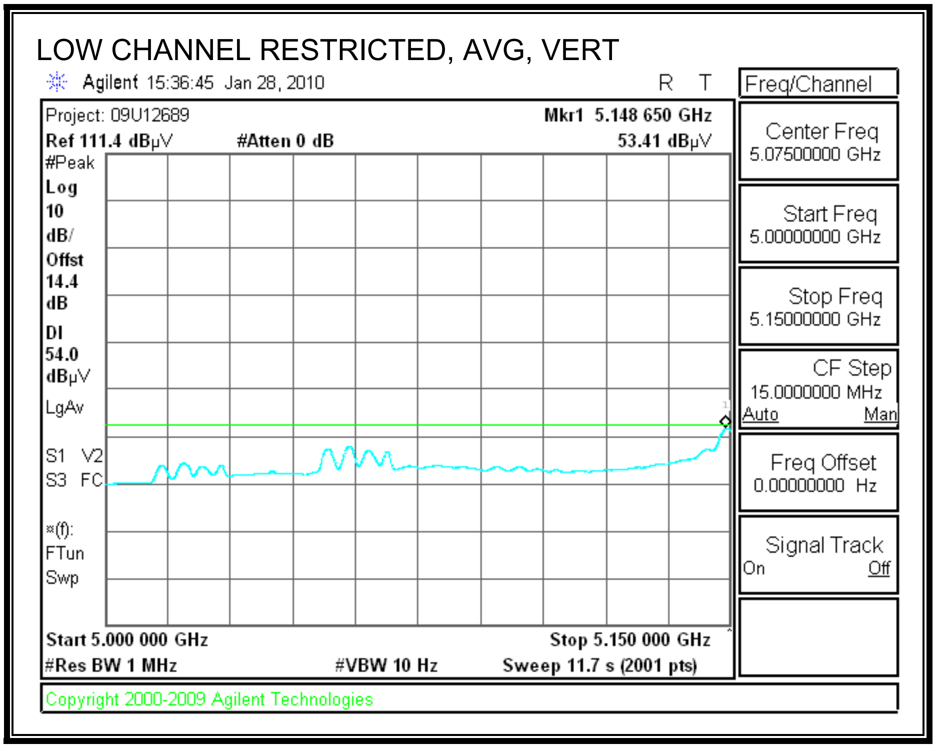
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)




LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 15:43:18 Jan 28, 2010
R T
Peak Search
Project: 09U12689
Mkr1 5.150 000 GHz
Ref 111.4 dBµV
#Atten 0 dB
43.26 dBµV
#Peak
Log
10
dB/
Offst
14.4
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr © CF
More
1 of 2
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)




LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 15:36:45 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.148 650 GHz
Ref 111.4 dBμV
#Atten 0 dB
53.41 dBμV
#Peak
Log
10
dB/
Offst
14.4
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Thanh Nguyen
Date: 07/15/09
Project #: 09U12652
Company: QualComm
EUT Description: Ethernet card
EUT M/N: 65-VN663-P2
Test Target: FCC 15.247/15.407
Mode Oper: Transmit

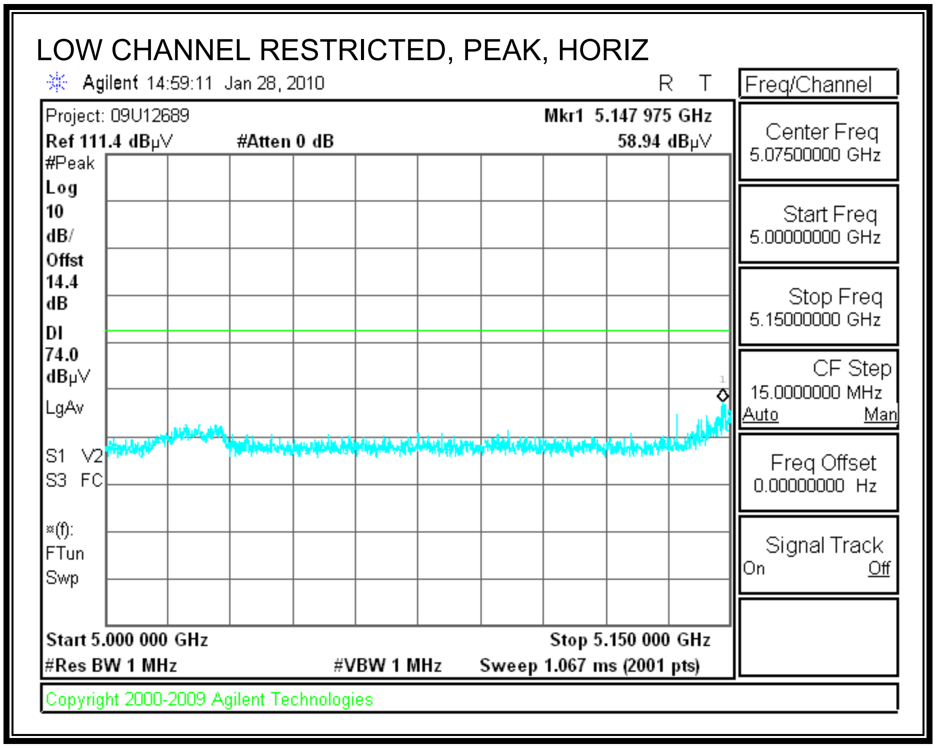
f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter	

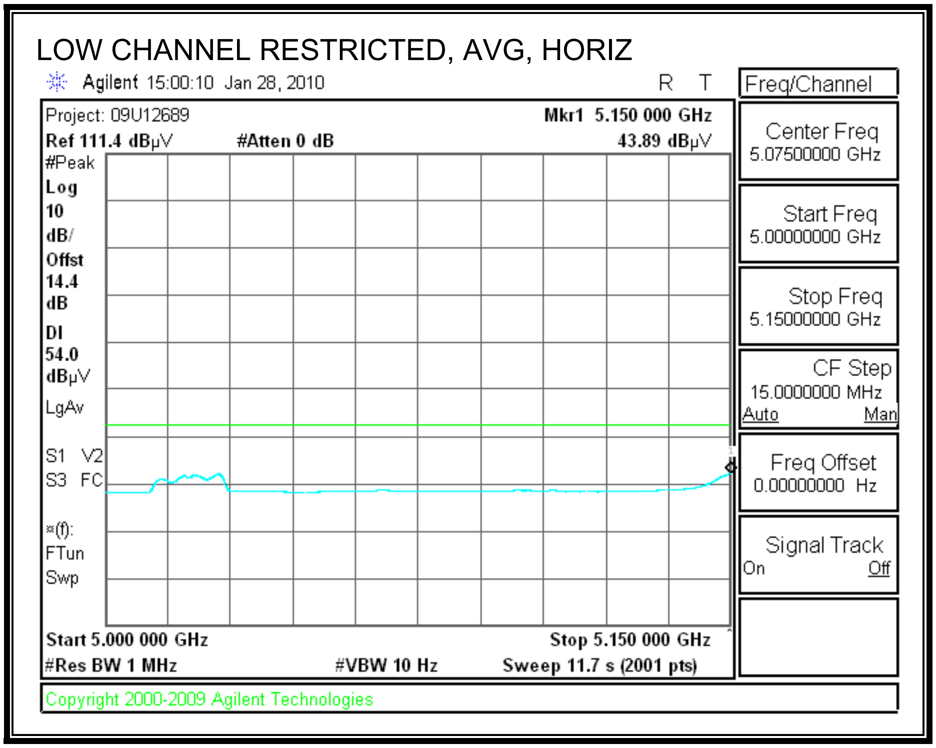
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low ch 5180															
15.540	3.0	35.8	38.7	11.3	-34.8	0.0	0.7	51.7	74.0	-22.3	V	P	147.8	304.8	
15.540	3.0	23.7	38.7	11.3	-34.8	0.0	0.7	39.6	54.0	-14.4	V	A	147.8	304.8	
15.540	3.0	34.6	38.7	11.3	-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	-16.3	H	A	156.5	346.0	
Mid ch 5200															
15.600	3.0	37.1	38.5	11.4	-34.8	0.0	0.7	52.9	74.0	-21.1	V	P	147.8	296.5	
15.600	3.0	24.4	38.5	11.4	-34.8	0.0	0.7	40.2	54.0	-13.8	V	A	147.8	296.5	
15.600	3.0	37.1	38.5	11.4	-34.8	0.0	0.7	52.9	74.0	-21.1	H	P	150.5	300.0	
15.600	3.0	23.4	38.5	11.4	-34.8	0.0	0.7	39.4	54.0	-14.6	H	A	150.5	300.0	
High ch 5240															
15.720	3.0	36.6	38.2	11.4	-34.7	0.0	0.7	52.2	74.0	-21.8	V	P	166.9	200.0	
15.720	3.0	25.5	38.2	11.4	-34.7	0.0	0.7	41.2	54.0	-12.8	V	A	166.9	200.0	
15.720	3.0	36.4	38.2	11.4	-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	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

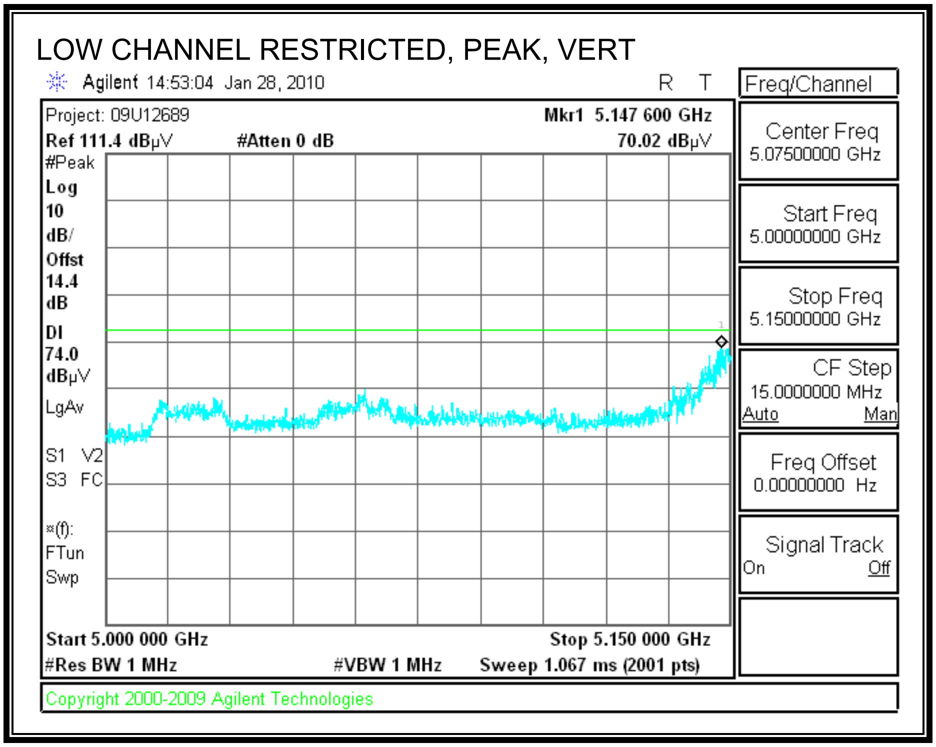
9.2.3. 802.11n HT20 MODE IN 5.2 GHz BAND

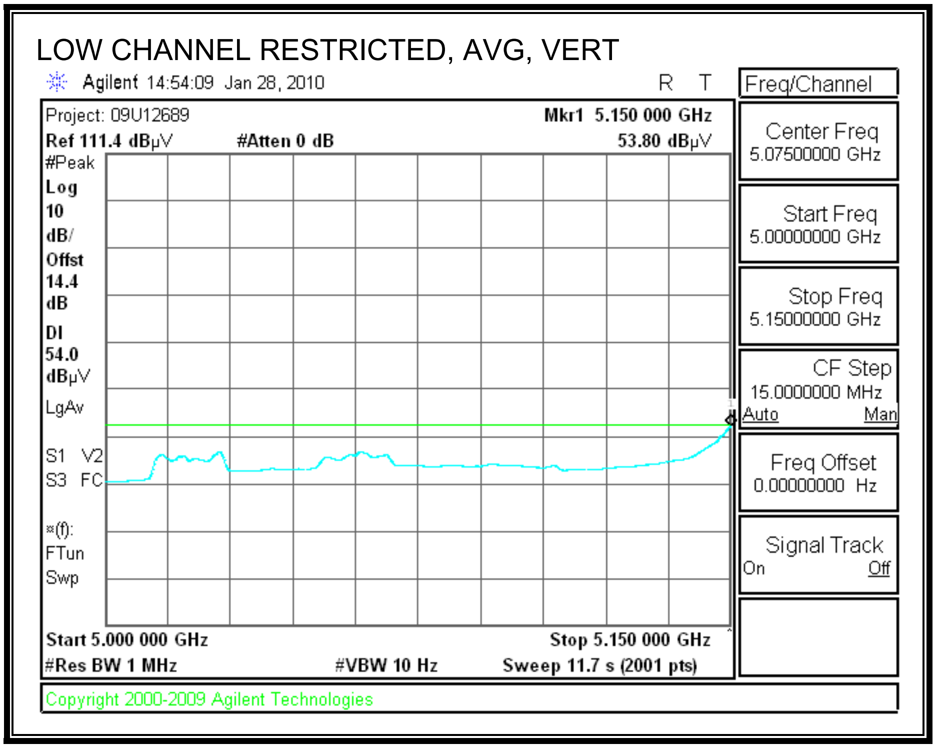
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



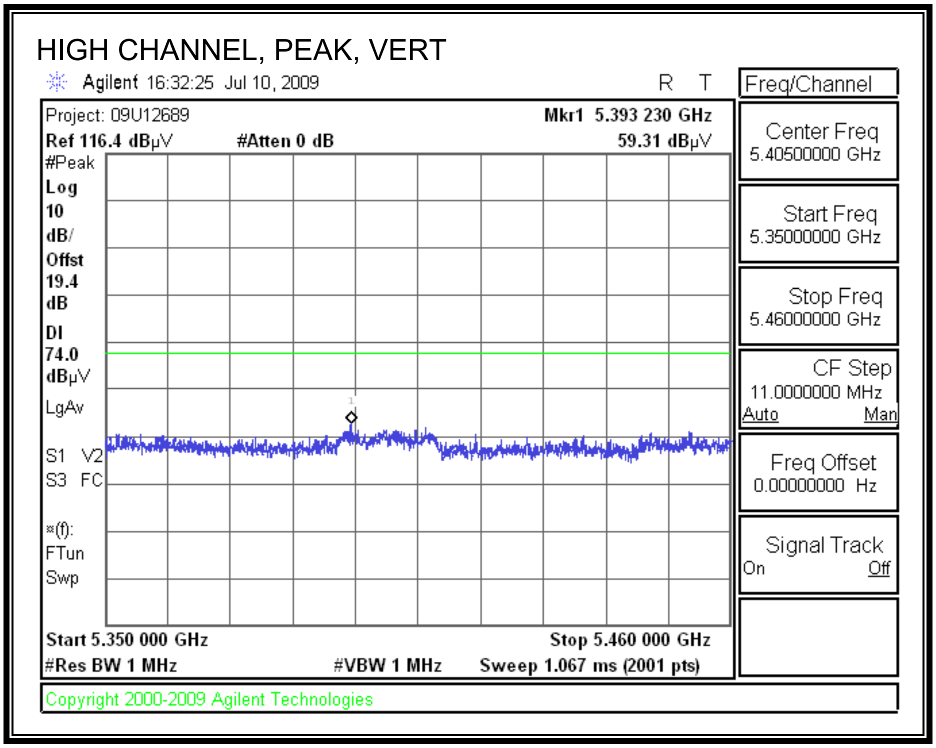

LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 15:00:10 Jan 28, 2010
R T
Project: 09U12689
Mkr1 5.150 000 GHz
Ref 111.4 dBµV
#Atten 0 dB
43.89 dBµV
#Peak
Log
10
dB/
Offst
14.4
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
FTun
Swp
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Freq/Channel
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2009 Agilent Technologies

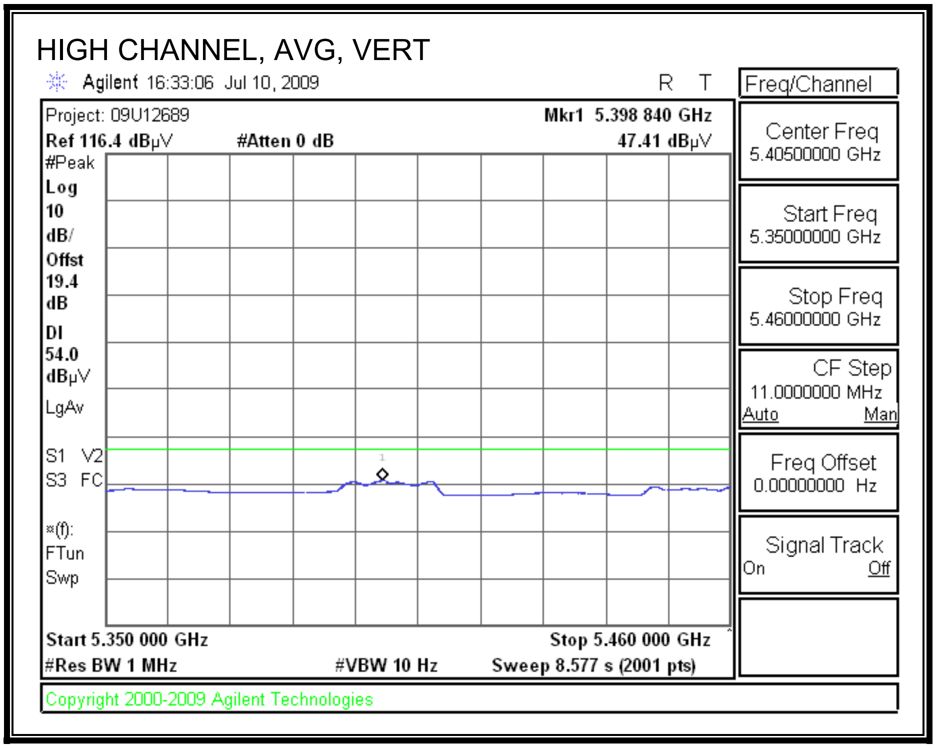
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)




LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 14:54:09 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.150 000 GHz
Ref 111.4 dBµV
#Atten 0 dB
53.80 dBµV
#Peak
Log
10
dB/
Offst
14.4
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2009 Agilent Technologies

AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Qualcomm
Project #: 09U12689
Date: 07/13/09
Test Engineer: Doug Anderson
Configuration: EUT w/Support Notebook
Mode: Tx / HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

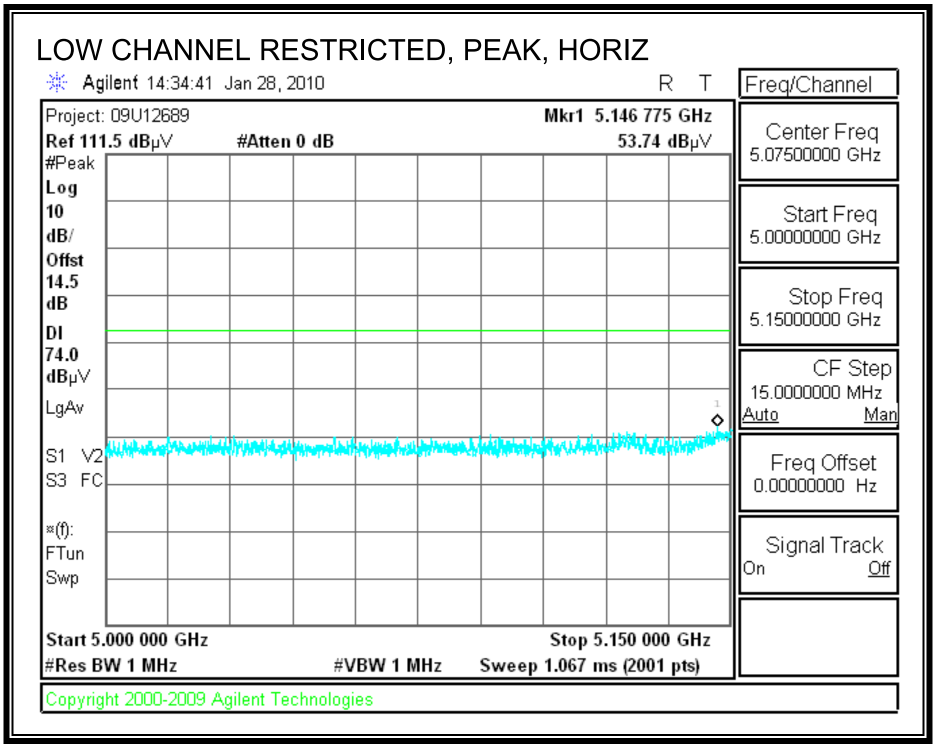
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch.: 5180 (Power = 14 dBm)															
15.540	3.0	43.5	29.7	38.7	11.3	-34.8	0.0	0.7	59.4	45.7	74	54	-14.6	-8.3	V (Noise Floor)
15.540	3.0	43.4	29.7	38.7	11.3	-34.8	0.0	0.7	59.3	45.6	74	54	-14.7	-8.4	H (Noise Floor)
Mid. Ch.: 5200 (Power = 14 dBm)															
15.600	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)
High Ch.: 5240 (Power = 14 dBm)															
15.720	3.0	42.3	31.4	38.2	11.4	-34.7	0.0	0.7	58.0	47.0	74	54	-16.0	-7.0	V (Noise Floor)
15.720	3.0	43.0	29.0	38.2	11.4	-34.7	0.0	0.7	58.6	44.6	74	54	-15.4	-9.4	H (Noise Floor)

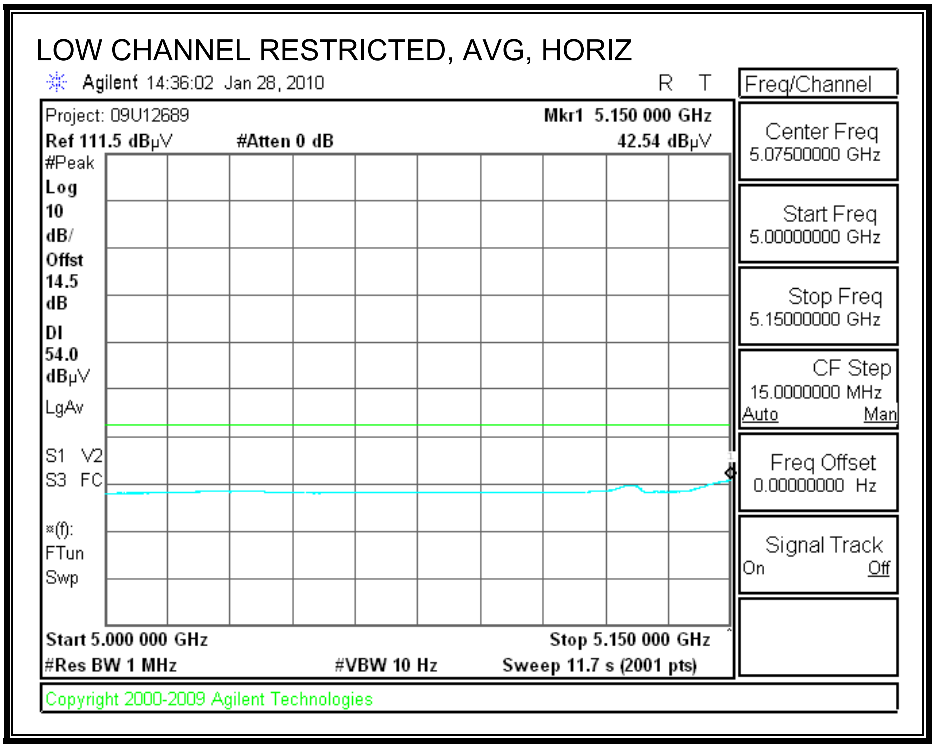
Rev. 11.10.08

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

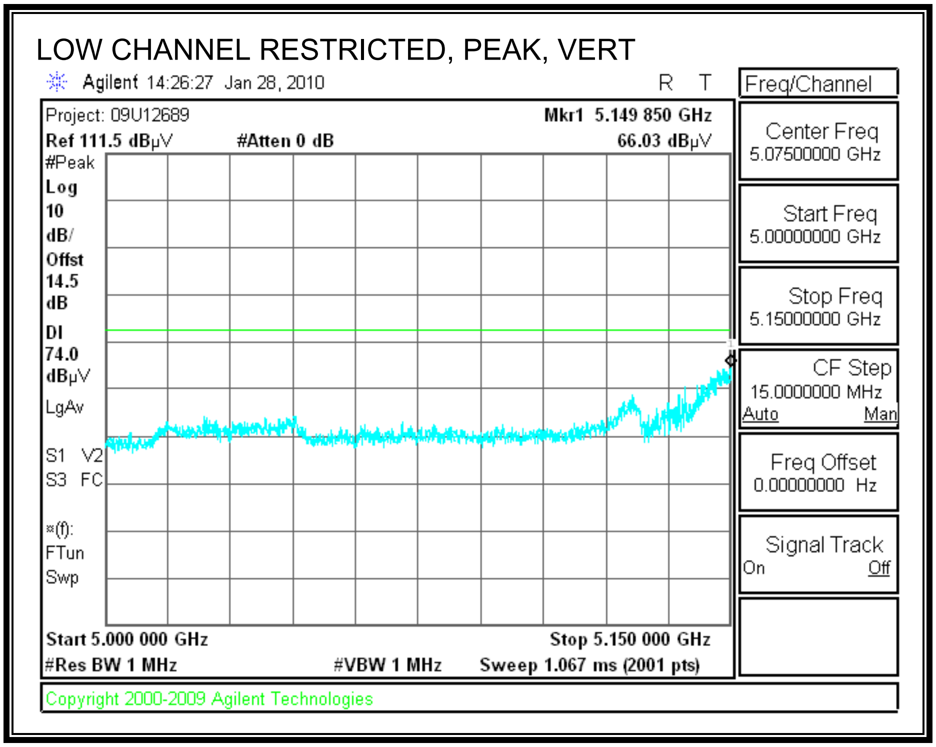
9.2.4. 802.11n HT40 MODE IN 5.2 GHz BAND

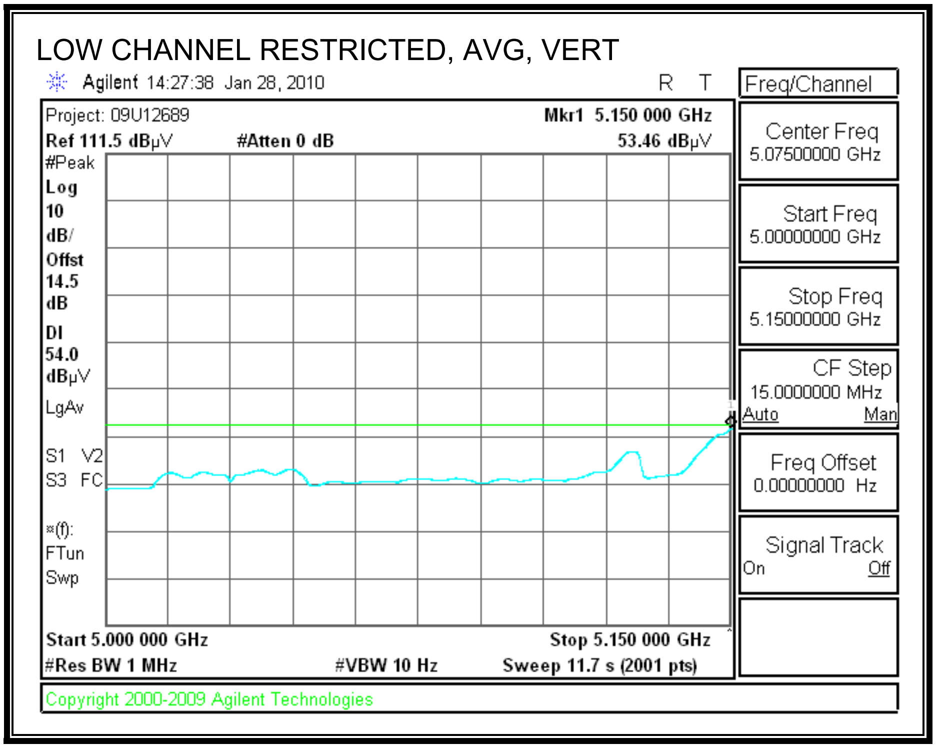
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)




LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 14:36:02 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.150 000 GHz
Ref 111.5 dBμV
#Atten 0 dB
42.54 dBμV
#Peak
Log
10
dB/
Offst
14.5
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)




LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 14:27:38 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.150 000 GHz
Ref 111.5 dBµV
#Atten 0 dB
53.46 dBµV
#Peak
Log
10
dB/
Offst
14.5
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
FTun
Swp
Start 5.000 000 GHz
Stop 5.150 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 11.7 s (2001 pts)
Center Freq
5.07500000 GHz
Start Freq
5.00000000 GHz
Stop Freq
5.15000000 GHz
CF Step
15.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
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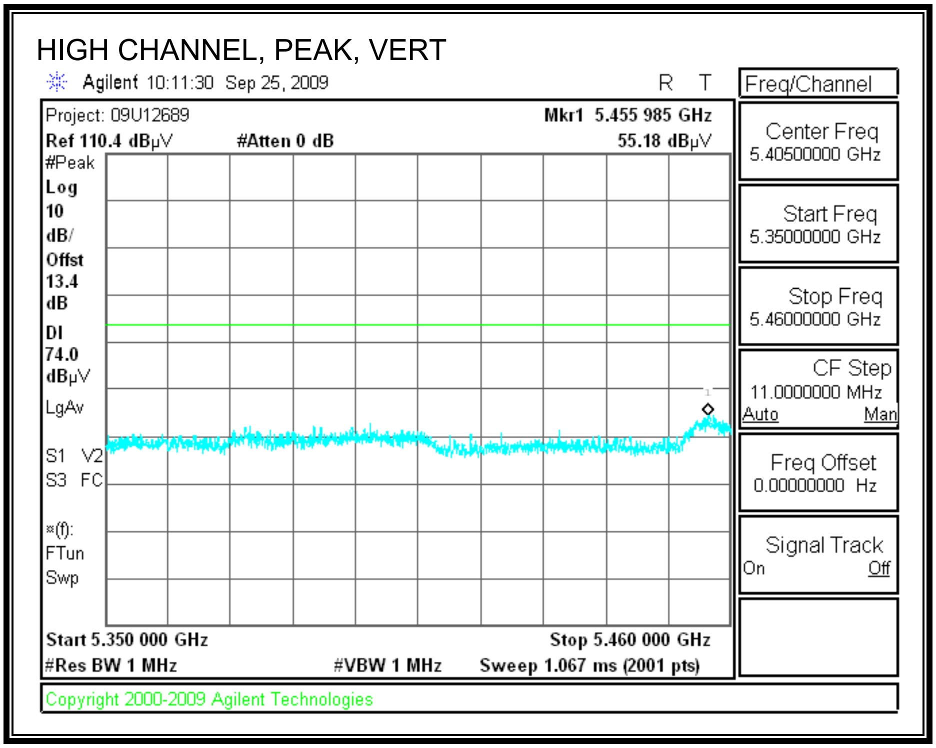
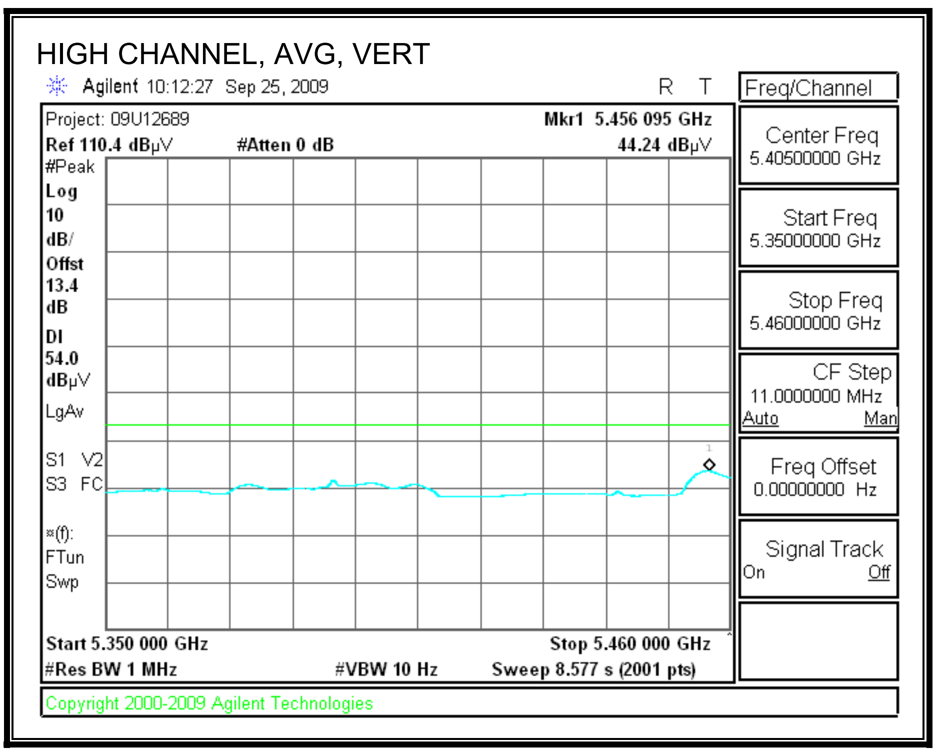
AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/25/09
Project #: 09U12689
Company: Qualcomm
Configuration: EUT w/Support Notebook
Mode Oper: Tx HT40

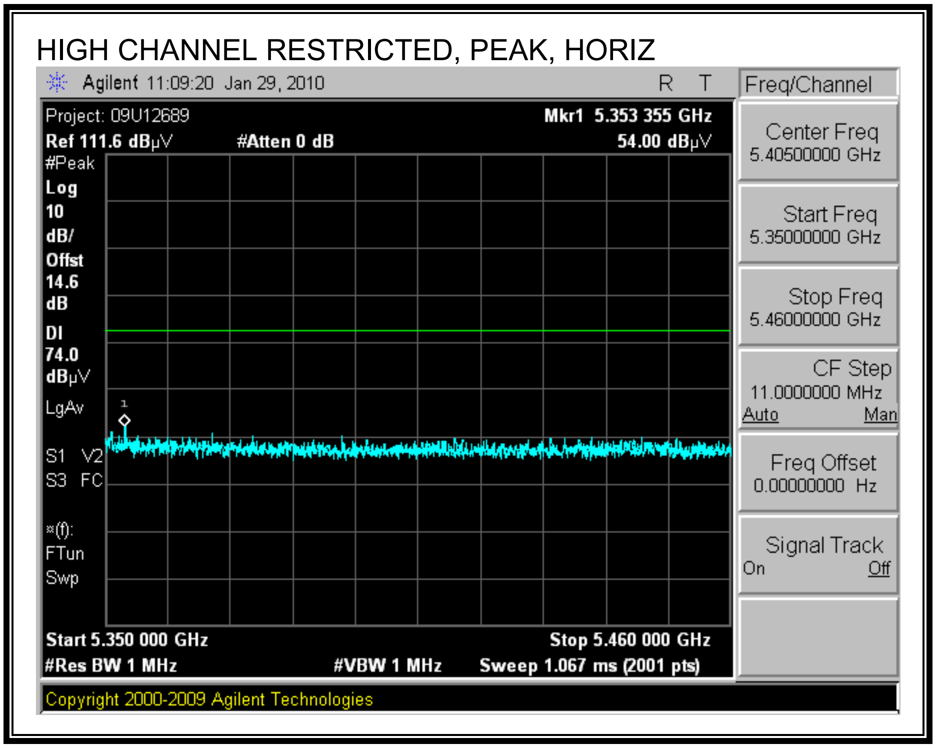
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
5190MHz, Power Setting=12 dBm															
15.570	3.0	35.5	38.6	11.4	-34.8	0.0	0.7	51.3	74.0	-22.7	V	P	170.4	360.0	
15.570	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	
15.570	3.0	35.0	38.6	11.4	-34.8	0.0	0.7	50.9	74.0	-23.1	H	P	122.4	156.9	
15.570	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	
5230MHz, Power Setting=12 dBm															
15.690	3.0	35.2	38.3	11.4	-34.7	0.0	0.7	50.9	74.0	-23.1	V	P	121.6	357.2	
15.690	3.0	22.8	38.3	11.4	-34.7	0.0	0.7	38.5	54.0	-15.5	V	A	121.6	357.2	
15.690	3.0	36.2	38.3	11.4	-34.7	0.0	0.7	51.9	74.0	-22.1	H	P	100.0	87.3	
15.690	3.0	22.8	38.3	11.4	-34.7	0.0	0.7	38.5	54.0	-15.5	H	A	100.0	87.3	

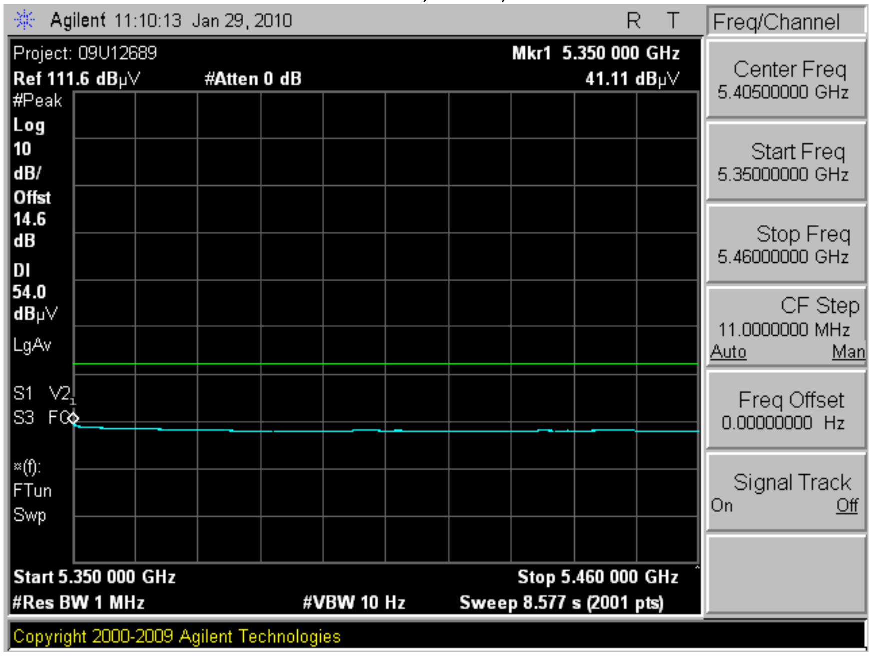
Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

9.2.5. 802.11a MODE IN 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

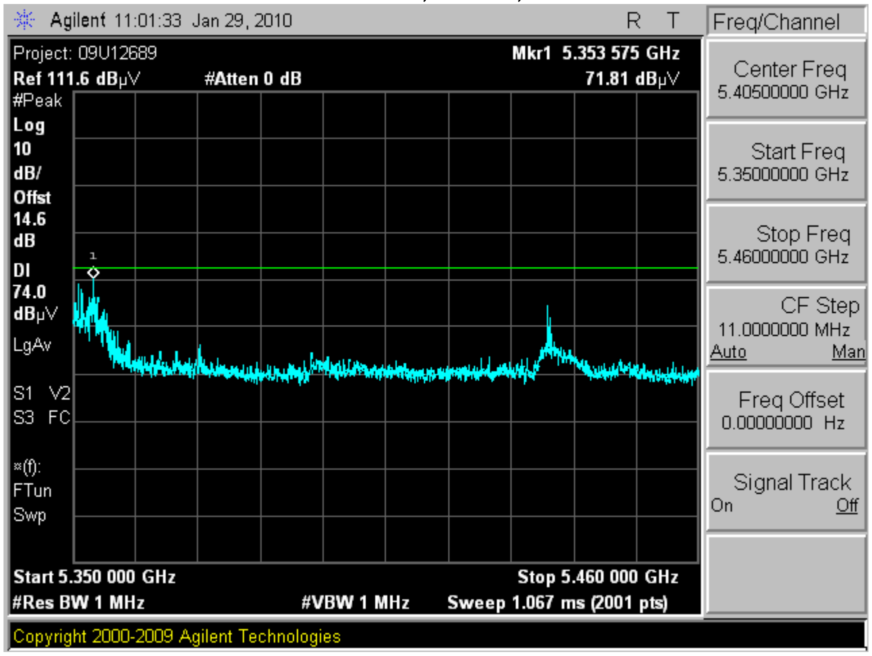


HIGH CHANNEL RESTRICTED, AVG, HORIZ

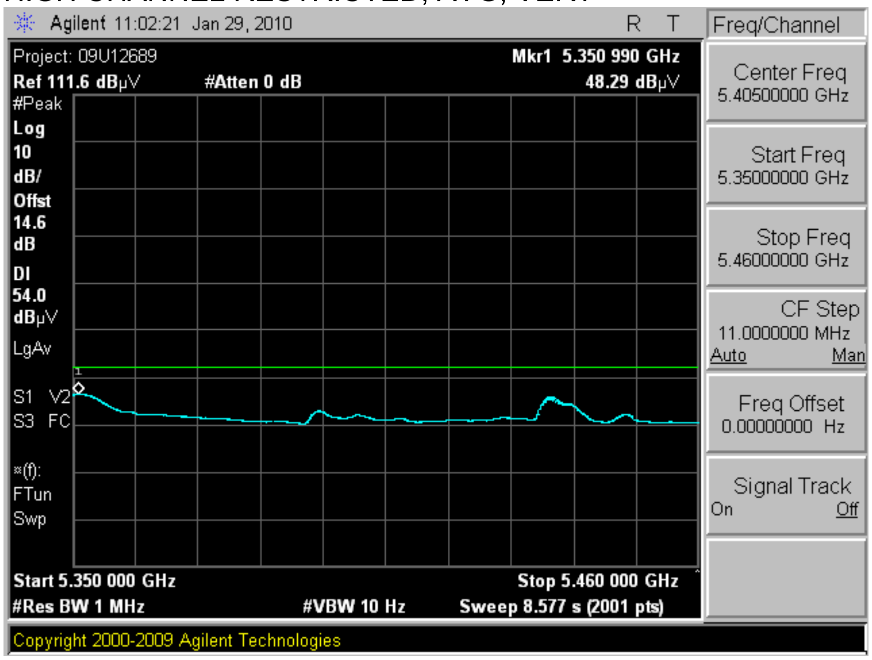


RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

HIGH CHANNEL RESTRICTED, PEAK, VERT

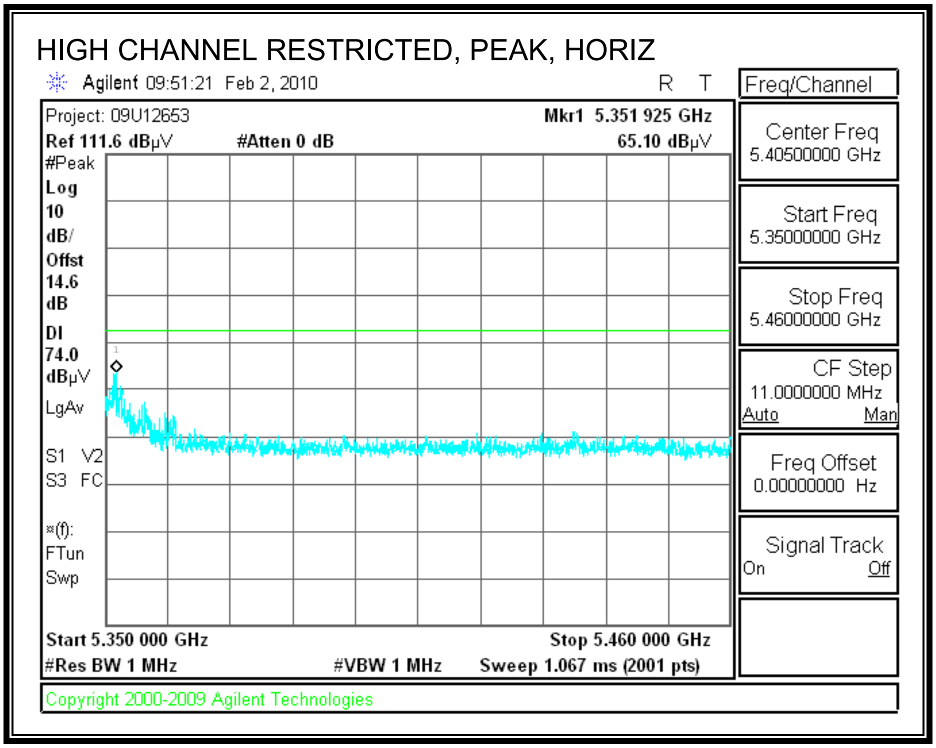


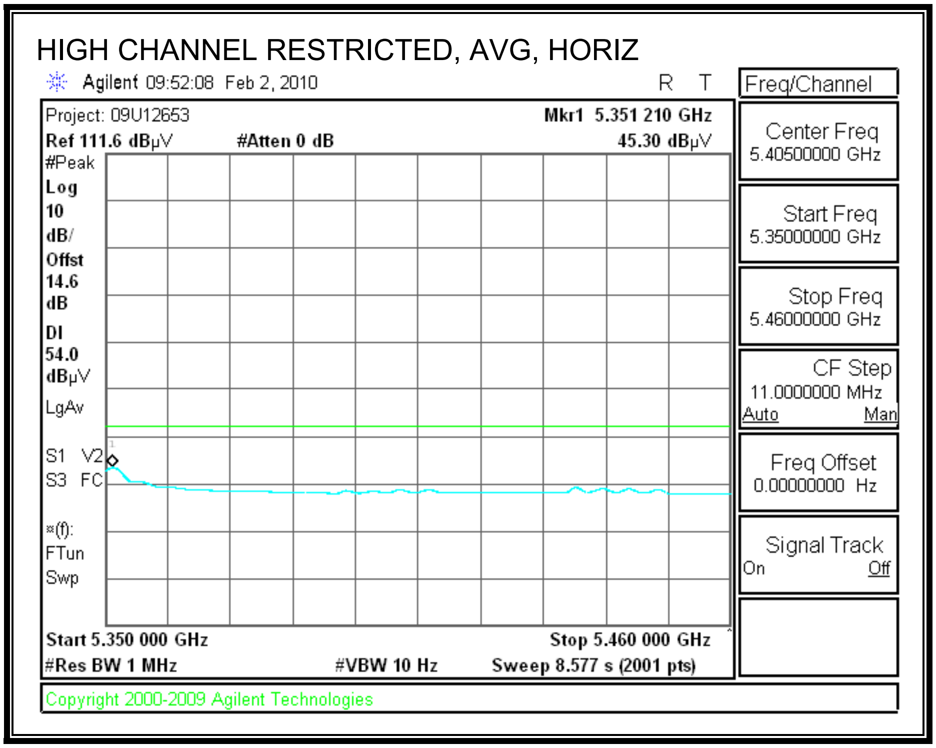
HIGH CHANNEL RESTRICTED, AVG, VERT



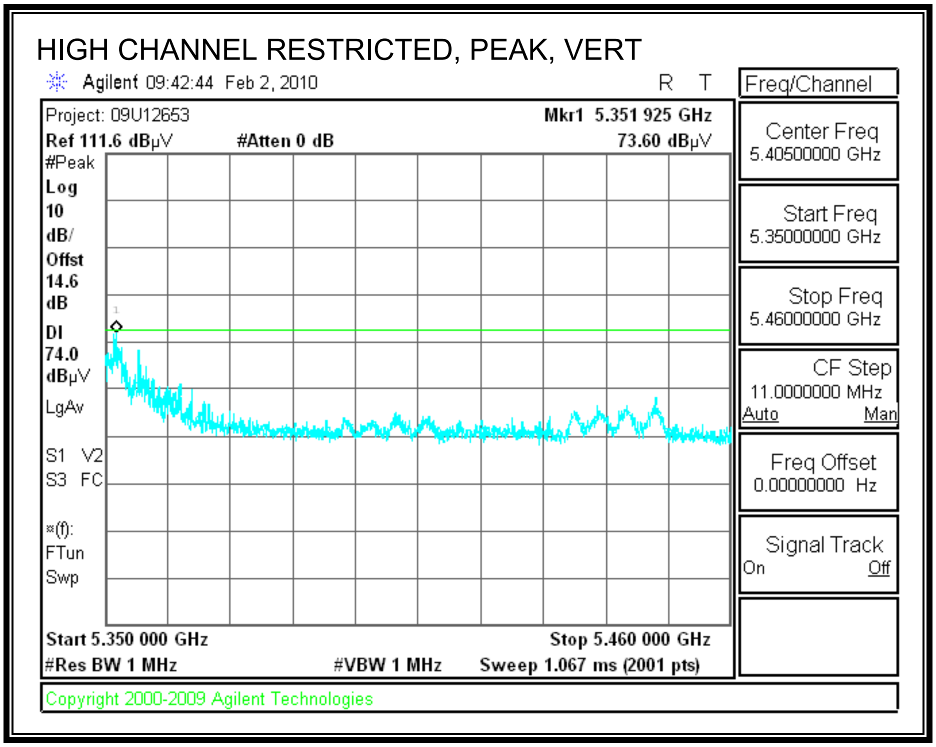
9.2.6. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.3 GHz BAND

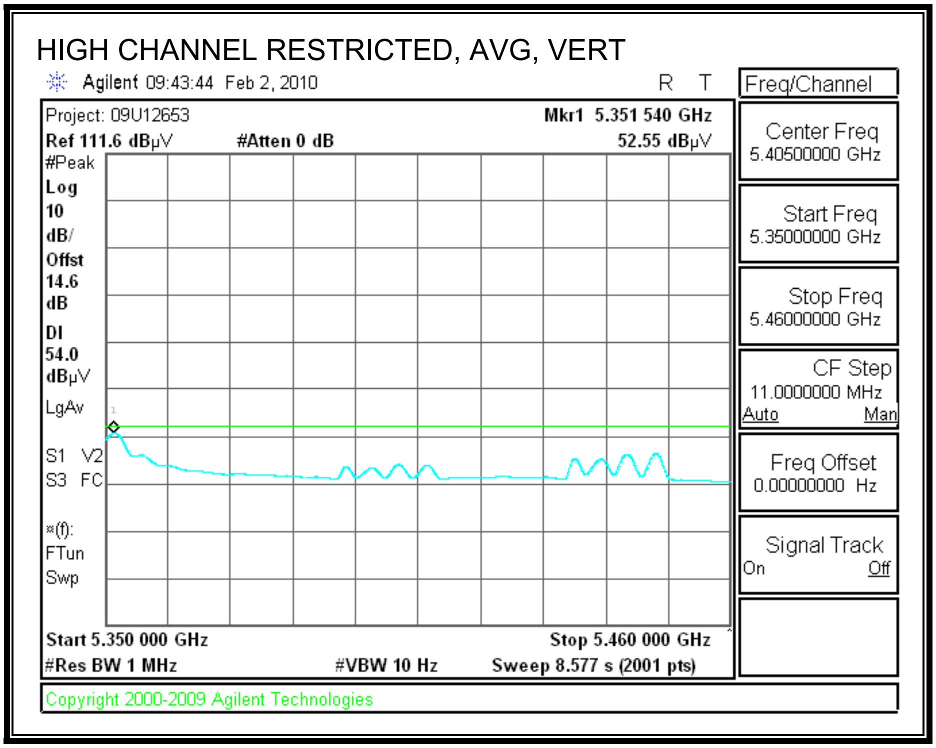
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)




HIGH CHANNEL RESTRICTED, AVG, HORIZ
Agilent 09:52:08 Feb 2, 2010
R T
Freq/Channel
Project: 09U12653
Mkr1 5.351 210 GHz
Ref 111.6 dBμV
#Atten 0 dB
45.30 dBμV
#Peak
Log
10
dB/
Offst
14.6
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)




HIGH CHANNEL RESTRICTED, AVG, VERT
Agilent 09:43:44 Feb 2, 2010
R T
Project: 09U12653
Mkr1 5.351 540 GHz
Ref 111.6 dBμV
#Atten 0 dB
52.55 dBμV
#Peak
Log
10
dB/
Offst
14.6
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Freq/Channel
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2009 Agilent Technologies

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Qualcomm
Project #: 09U12689
Date: 07/10/09
Test Engineer: Thanh Nguyen
Configuration: EUT with dongle , remote Notebook
Mode: Tx 2 chains, 11a

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

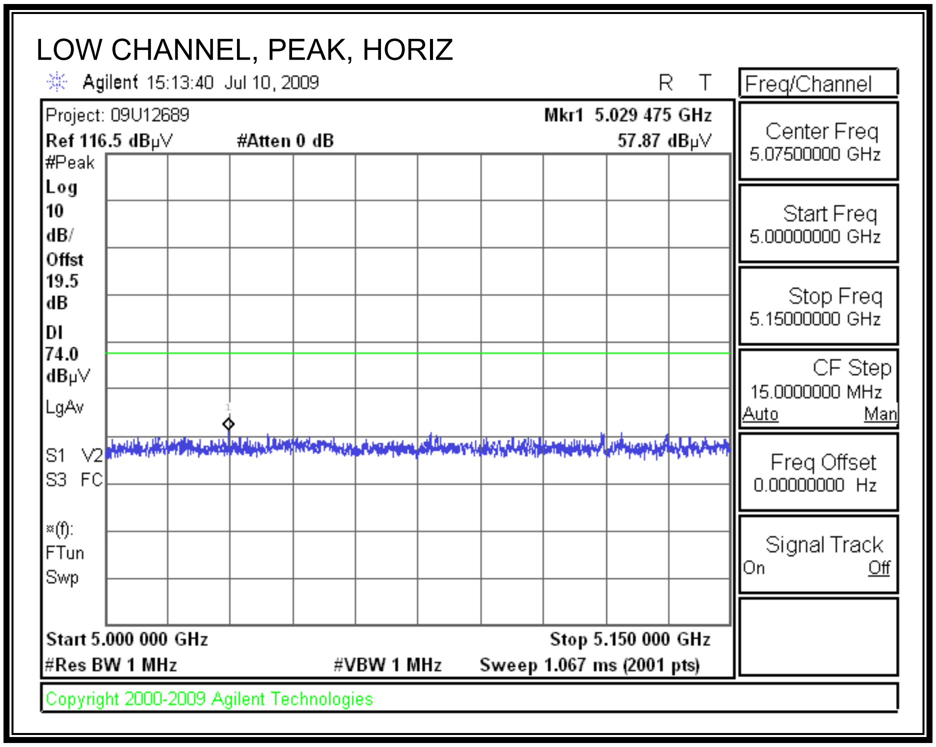
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch.: 5260Mhz															
15.780	3.0	41.4	28.4	38.0	11.5	-34.6	0.0	0.7	56.9	43.9	74	54	-17.1	-10.1	V
15.780	3.0	38.3	26.4	38.0	11.5	-34.6	0.0	0.7	53.8	41.9	74	54	-20.2	-12.1	H
Mid. Ch.: 5300															
10.600	3.0	38.2	28.4	37.7	9.0	-36.6	0.0	0.8	49.2	39.3	74	54	-24.8	-14.7	V
15.900	3.0	39.3	28.2	37.7	11.5	-34.6	0.0	0.7	54.7	43.6	74	54	-19.3	-10.4	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	-16.8	H
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)
High Ch.: 5320															
10.640	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	11.5	-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	-16.8	H
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)

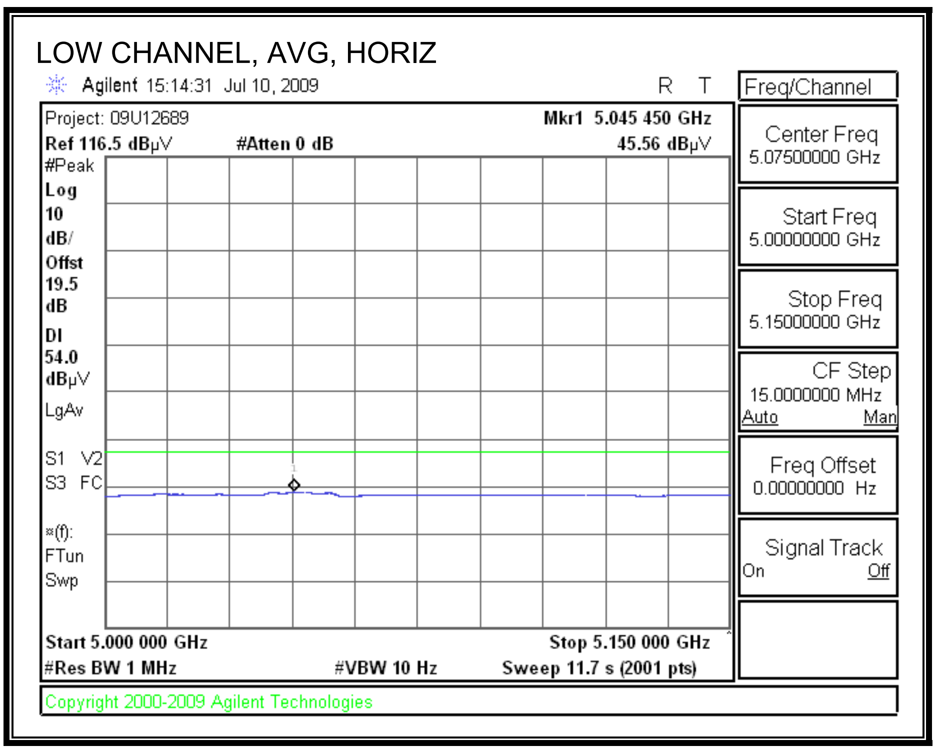
Rev. 11.10.08

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

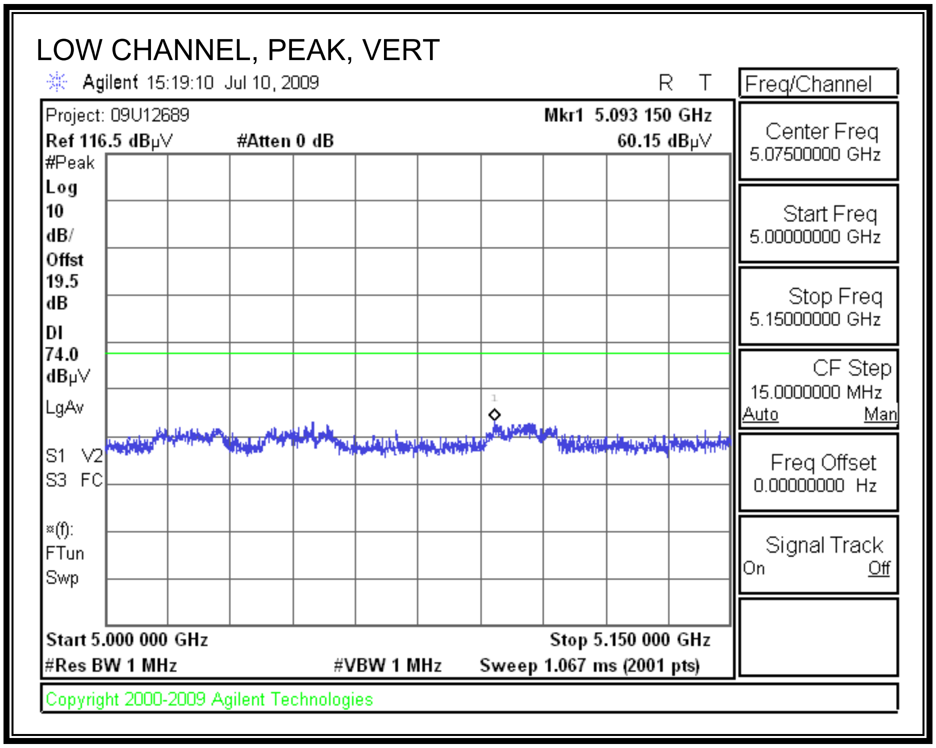
9.2.7. 802.11n HT20 MODE IN 5.3GHz BAND

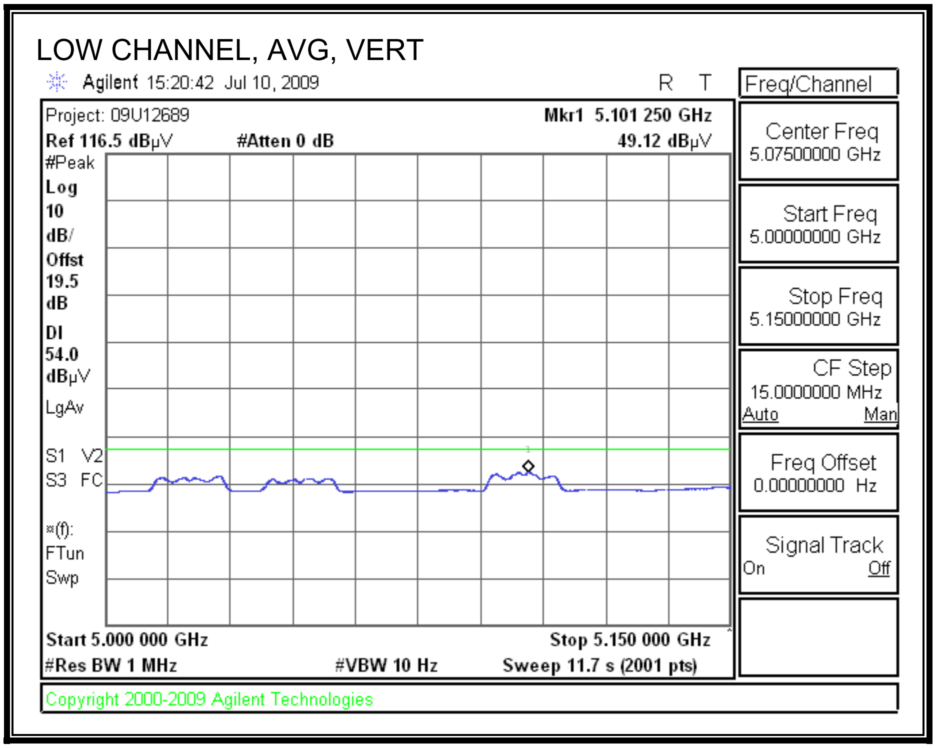
AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)



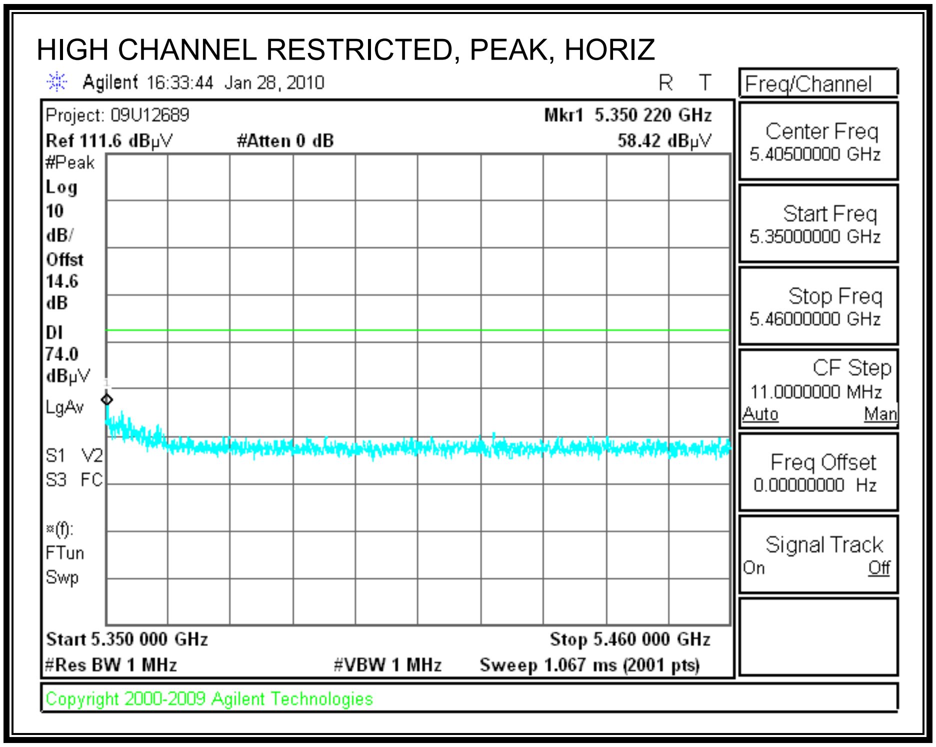


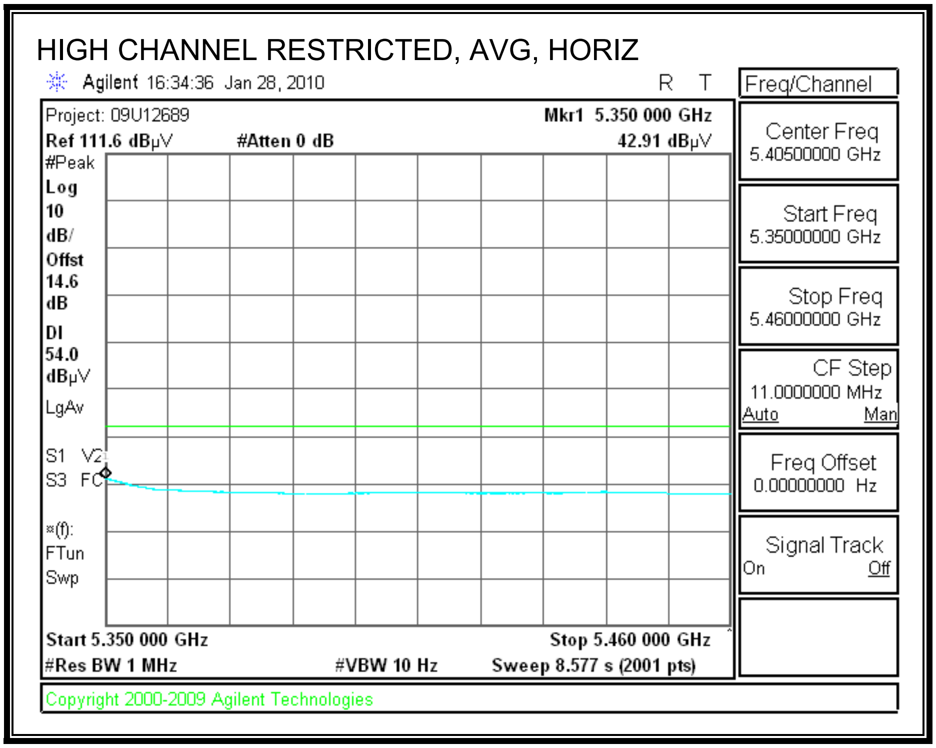
AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)



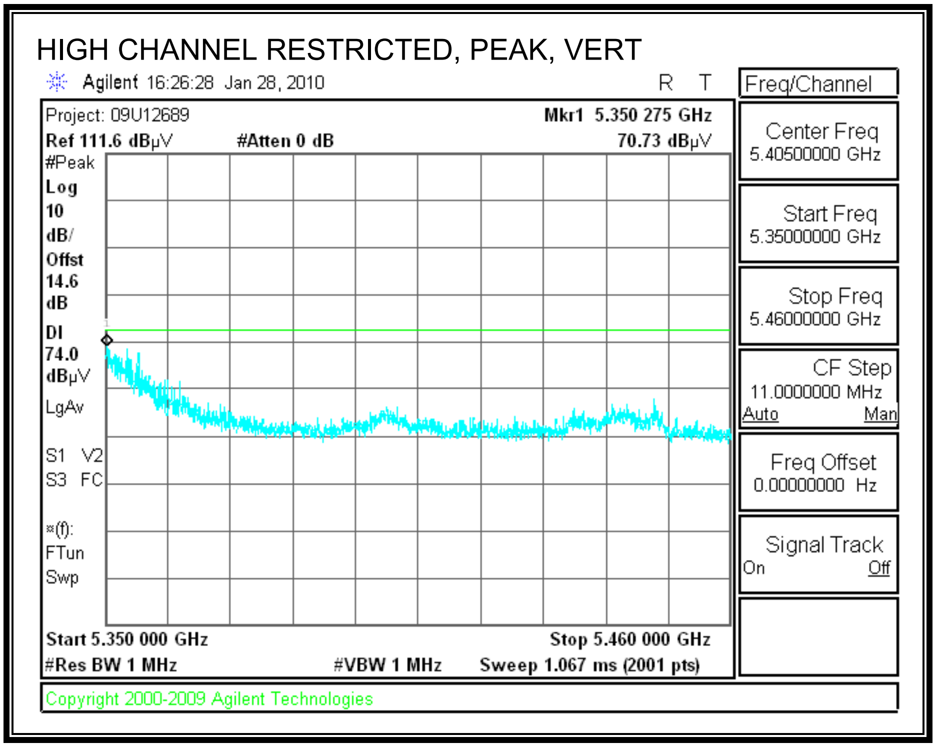


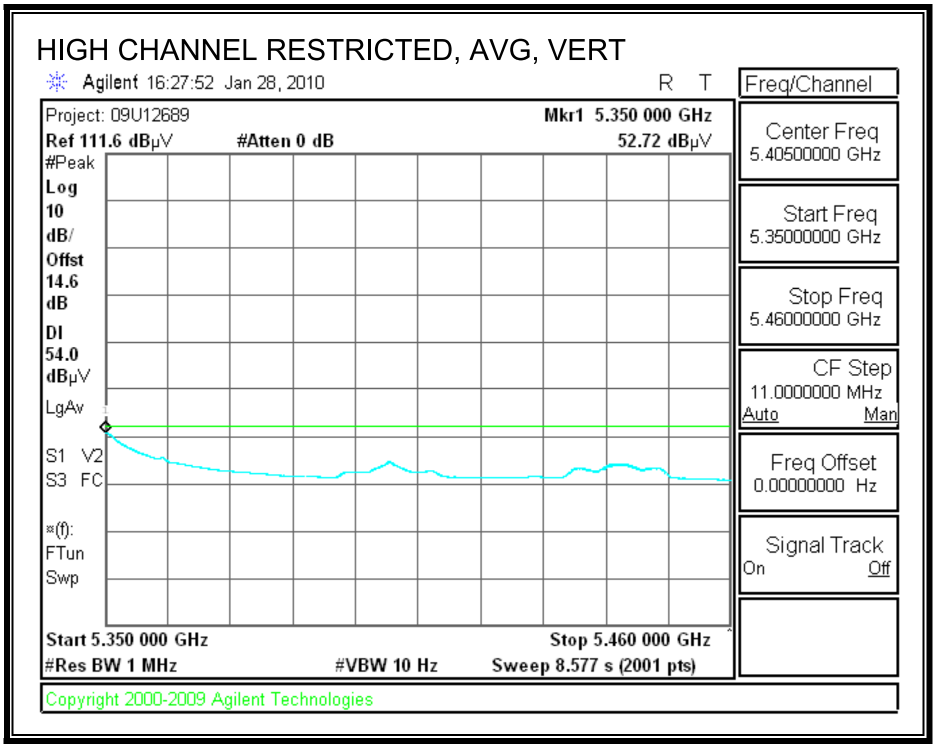
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)




HIGH CHANNEL RESTRICTED, AVG, HORIZ
Agilent 16:34:36 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.350 000 GHz
Ref 111.6 dBµV
#Atten 0 dB
42.91 dBµV
#Peak
Log
10
dB/
Offst
14.6
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
FTun
Swp
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)




HIGH CHANNEL RESTRICTED, AVG, VERT
Agilent 16:27:52 Jan 28, 2010
R T
Project: 09U12689
Mkr1 5.350 000 GHz
Ref 111.6 dBμV
#Atten 0 dB
52.72 dBμV
#Peak
Log
10
dB/
Offst
14.6
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Freq/Channel
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2009 Agilent Technologies

HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Qualcomm
Project #: 09U12689
Date: 07/10/09
Test Engineer: Doug Anderson
Configuration: EUT w/Support Notebook
Mode: Tx / HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

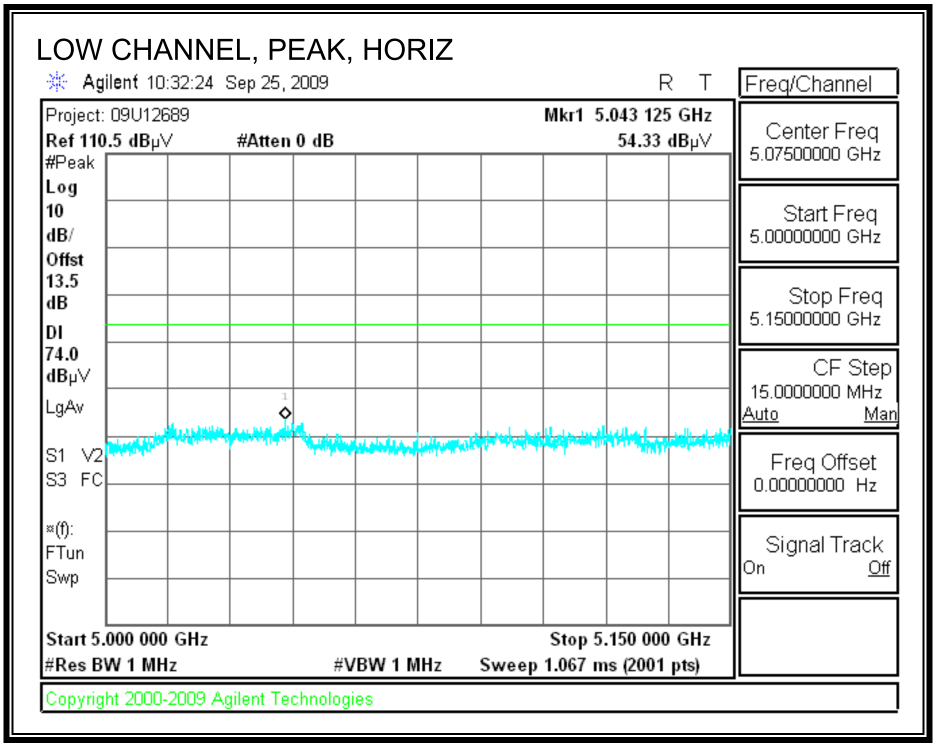
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch.: 5260															
15.780	3.0	35.2	24.5	38.0	11.5	-34.6	0.0	0.7	50.7	40.1	74	54	-23.3	-13.9	V (Noise Floor)
15.780	3.0	36.8	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)
Mid. Ch.: 5300															
10.600	3.0	46.4	39.3	37.7	9.0	-36.6	0.0	0.8	57.3	50.2	74	54	-16.7	-3.8	V
15.900	3.0	42.6	29.1	37.7	11.5	-34.6	0.0	0.7	57.9	44.5	74	54	-16.1	-9.5	V (Noise Floor)
10.600	3.0	42.2	29.0	37.7	9.0	-36.6	0.0	0.8	53.1	40.0	74	54	-20.9	-14.0	H
15.780	3.0	43.0	29.0	38.0	11.5	-34.6	0.0	0.7	58.5	44.6	74	54	-15.5	-9.4	H (Noise Floor)
High Ch.: 5320															
10.640	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
15.960	3.0	42.5	28.9	37.5	11.5	-34.5	0.0	0.7	57.7	44.2	74	54	-16.3	-9.8	V (Noise Floor)
10.640	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
15.960	3.0	42.1	29.3	37.5	11.5	-34.5	0.0	0.7	57.4	44.6	74	54	-16.6	-9.4	H (Noise Floor)

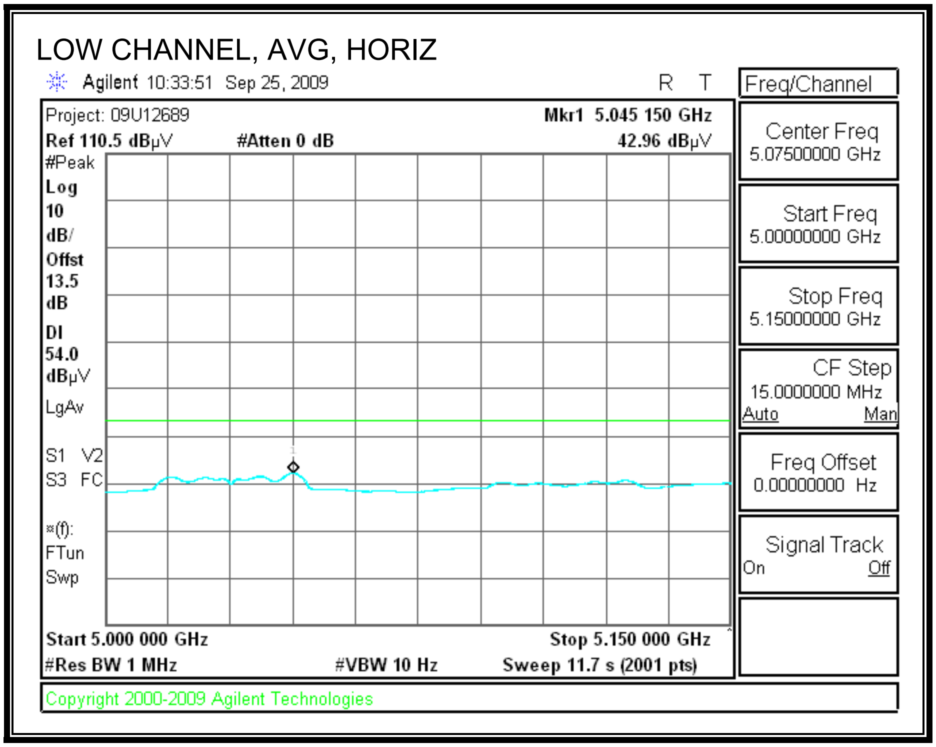
Rev. 11.10.08

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

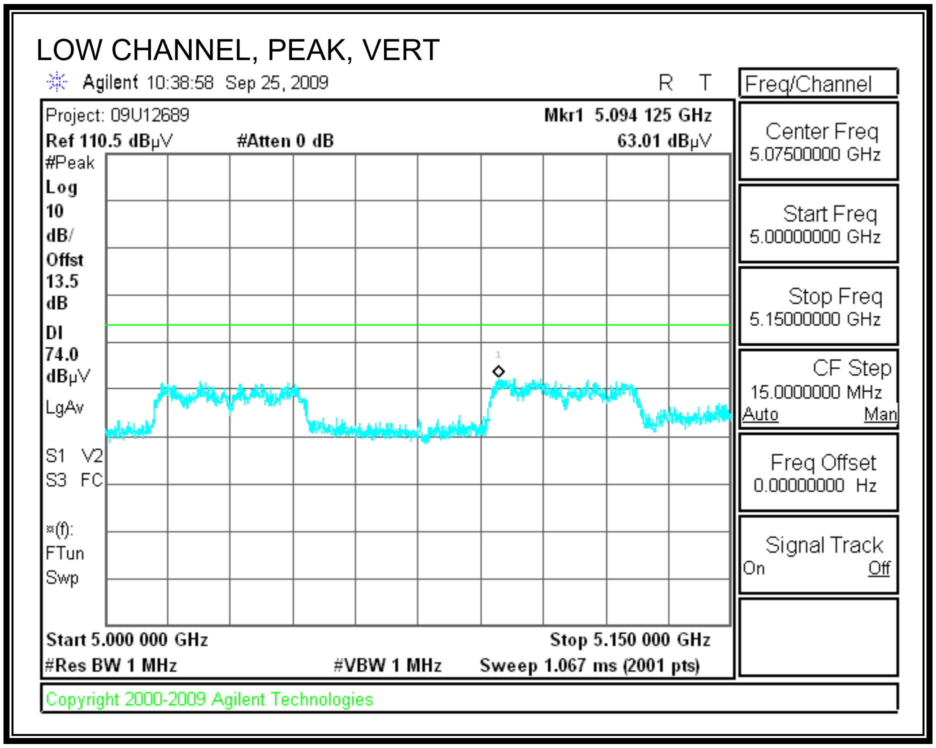
9.2.8. 802.11n HT40 MODE IN 5.3GHz BAND

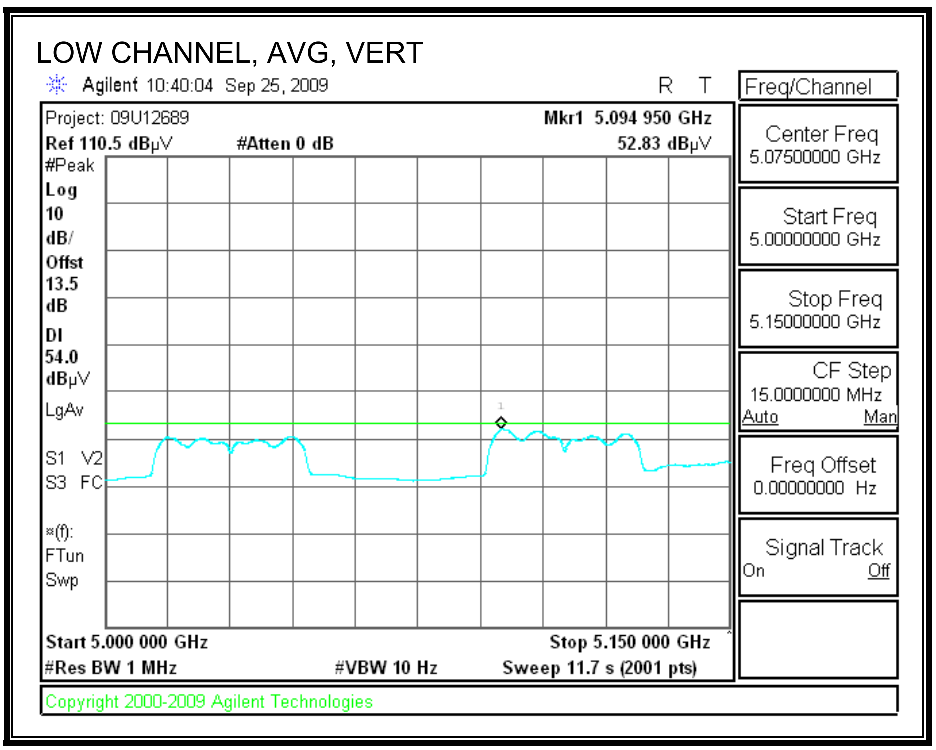
AUTHORIZED BANDEDGE (LOW CHANNEL, HORIZONTAL)



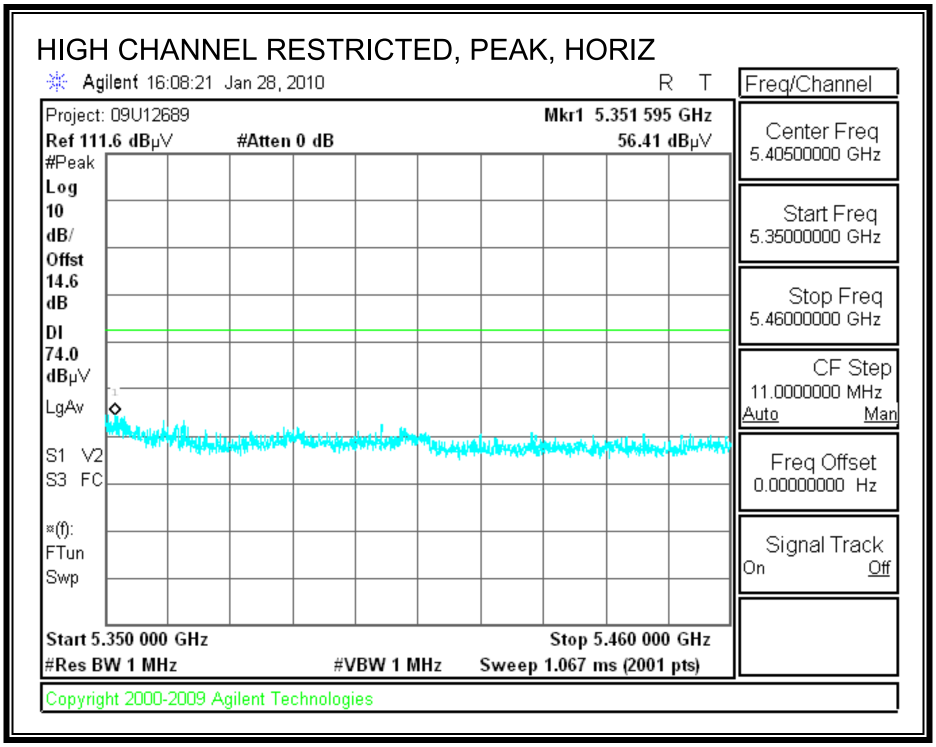


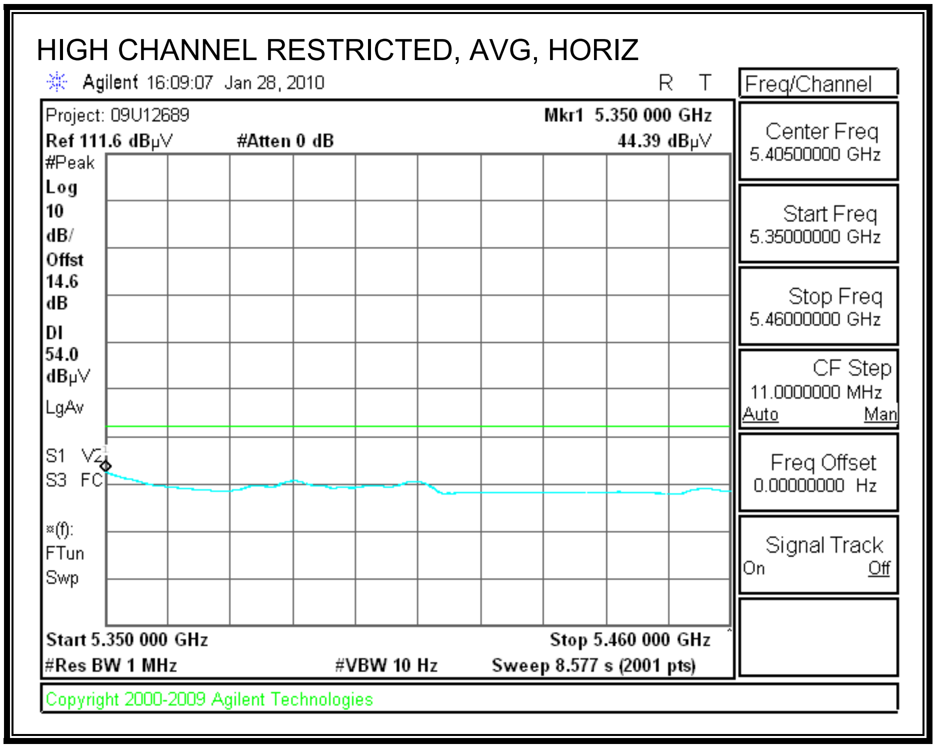
AUTHORIZED BANDEDGE (LOW CHANNEL, VERTICAL)



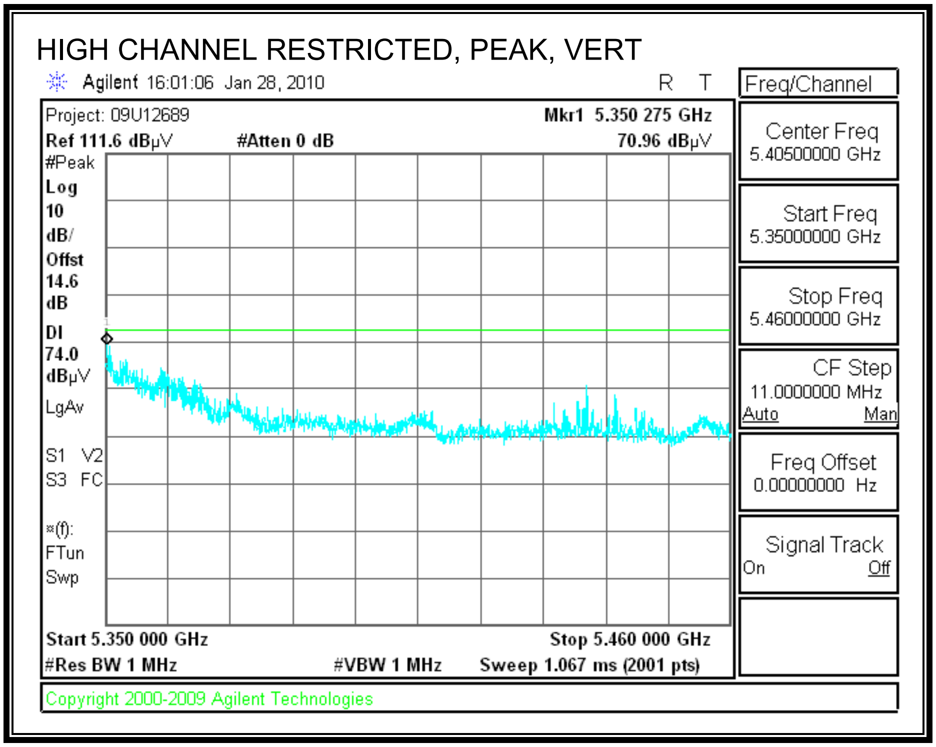


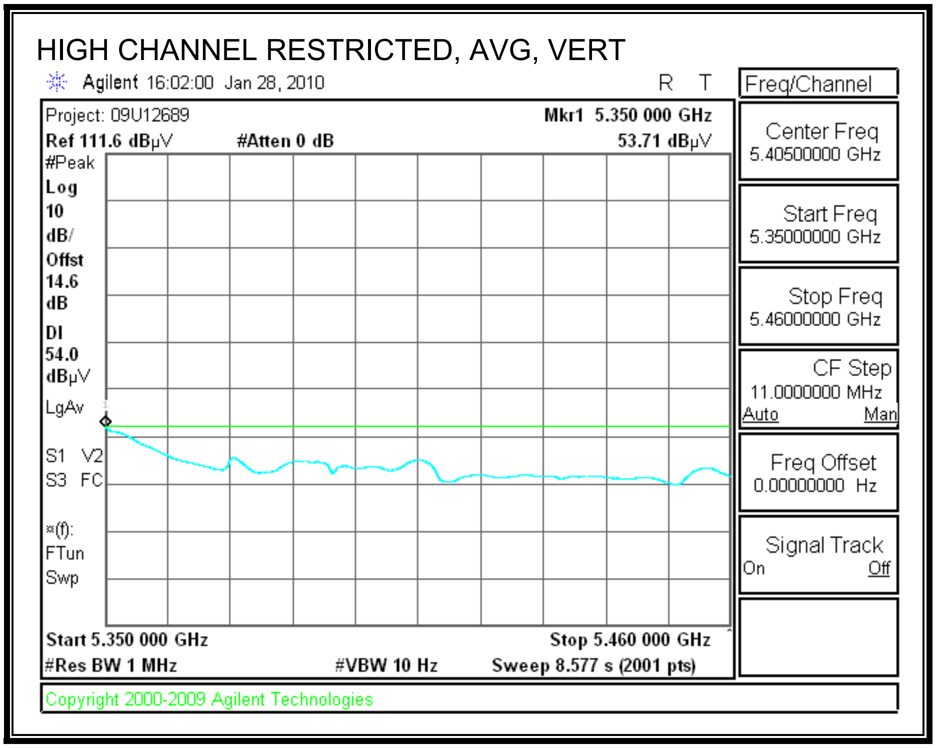
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)




HIGH CHANNEL RESTRICTED, AVG, HORIZ
Agilent 16:09:07 Jan 28, 2010
R T
Project: 09U12689
Mkr1 5.350 000 GHz
Ref 111.6 dBµV
#Atten 0 dB
44.39 dBµV
#Peak
Log
10
dB/
Offst
14.6
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Freq/Channel
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)




HIGH CHANNEL RESTRICTED, AVG, VERT
Agilent 16:02:00 Jan 28, 2010
R T
Project: 09U12689
Mkr1 5.350 000 GHz
Ref 111.6 dBμV
#Atten 0 dB
53.71 dBμV
#Peak
Log
10
dB/
Offst
14.6
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Freq/Channel
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2009 Agilent Technologies

HARMONICS AND SPURIOUS EMISSIONS

Low channel:

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr:	**William Zhuang**
Date:	**09/25/09**
Project #:	**09U12689**
Company:	**Qualcomm**
Configuration:	**EUT w/Support Notebook**
Mode Oper:	**Tx HT40**

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	HPF	High Pass Filter		

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
15.810	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	
15.810	3.0	24.4	37.9	11.5	-34.6	0.0	0.7	39.9	54.0	-14.1	V	A	106.8	63.8	
15.810	3.0	36.0	37.9	11.5	-34.6	0.0	0.7	51.6	74.0	-22.4	H	P	173.3	166.5	
15.810	3.0	23.2	37.9	11.5	-34.6	0.0	0.7	38.7	54.0	-15.3	H	A	173.3	166.5	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

High channel:

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: William Zhuang
Date: 09/25/09
Project #: 09U12689
Company: Qualcomm
Configuration: EUT w/Support Notebook
Mode Oper: Tx HT40

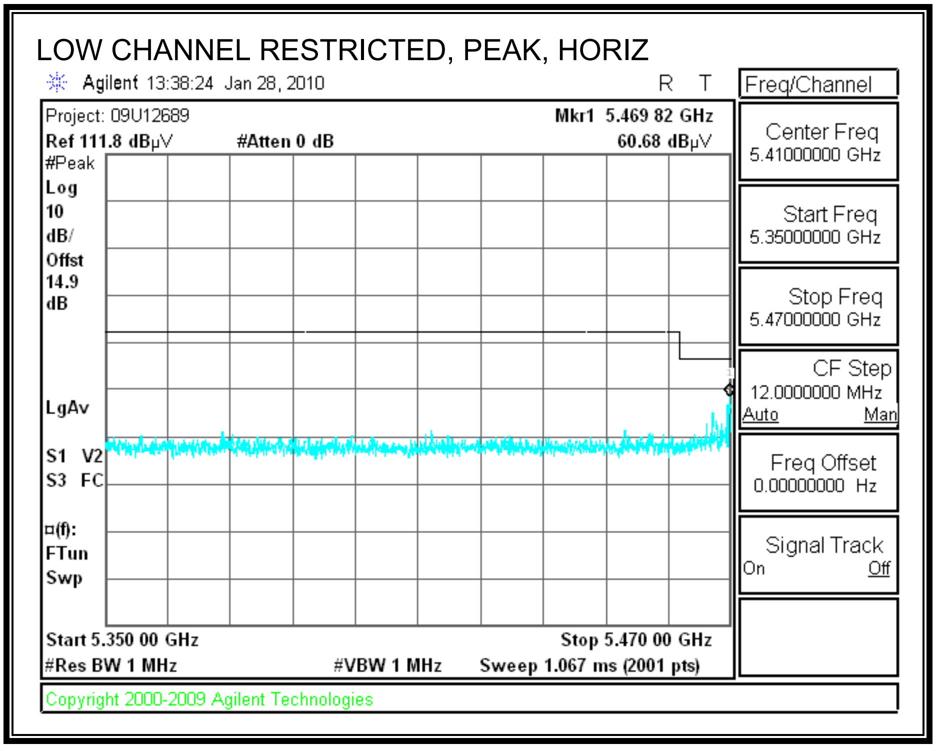
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

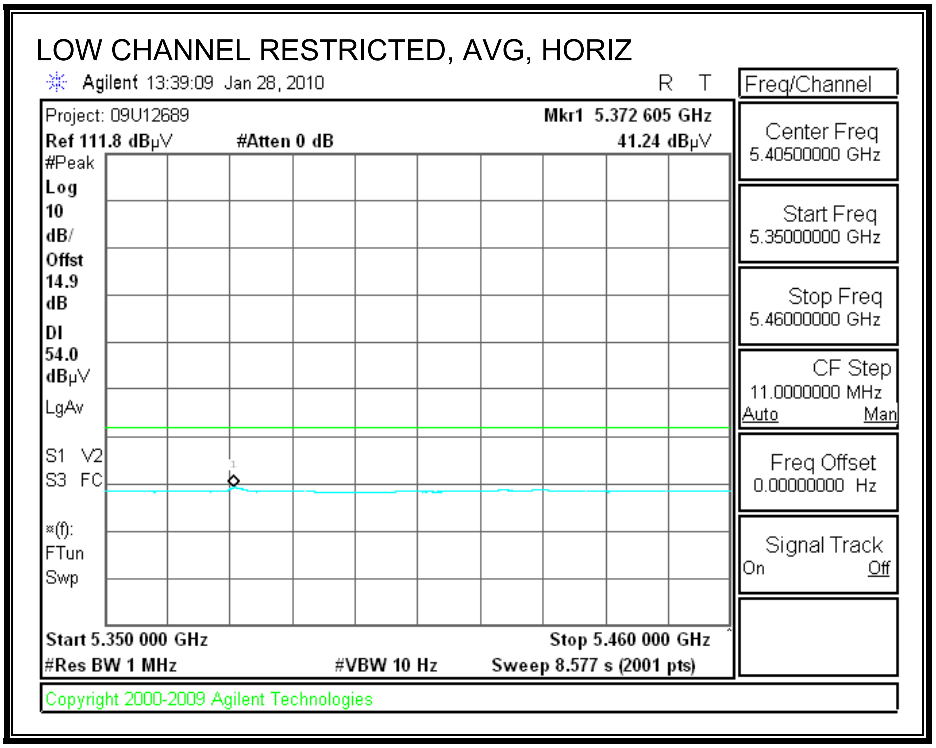
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
10.620	3.0	44.8	37.7	9.1	-36.6	0.0	0.8	55.8	74.0	-18.2	V	P	133.4	86.5	
10.620	3.0	40.6	37.7	9.1	-36.6	0.0	0.8	51.6	54.0	-2.4	V	A	133.4	86.5	
10.620	3.0	37.2	37.7	9.1	-36.6	0.0	0.8	48.2	74.0	-25.8	H	P	143.9	199.0	
10.620	3.0	29.2	37.7	9.1	-36.6	0.0	0.8	40.2	54.0	-13.8	H	A	143.9	199.0	
15.930	3.0	35.1	37.6	11.5	-34.5	0.0	0.7	50.4	74.0	-23.6	V	P	197.2	188.8	
15.930	3.0	23.8	37.6	11.5	-34.5	0.0	0.7	39.1	54.0	-14.9	V	A	197.2	188.8	
15.930	3.0	34.7	37.6	11.5	-34.5	0.0	0.7	50.0	74.0	-24.0	H	P	158.9	35.2	
15.930	3.0	22.6	37.6	11.5	-34.5	0.0	0.7	38.0	54.0	-16.0	H	A	158.9	35.2	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

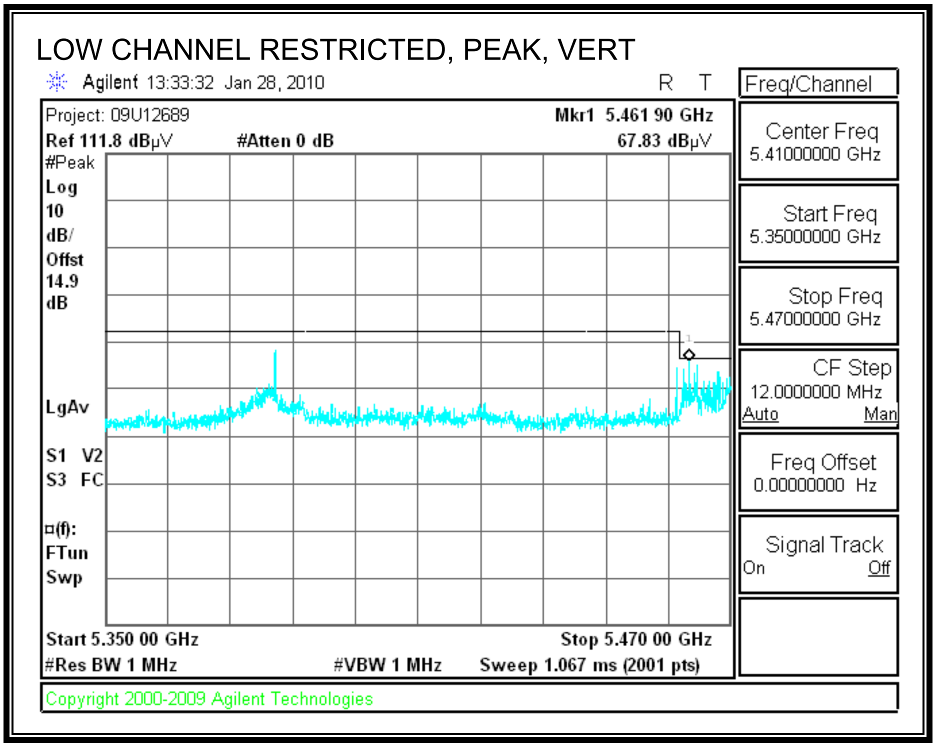
9.2.9. 802.11a MODE IN 5.6 GHz BAND

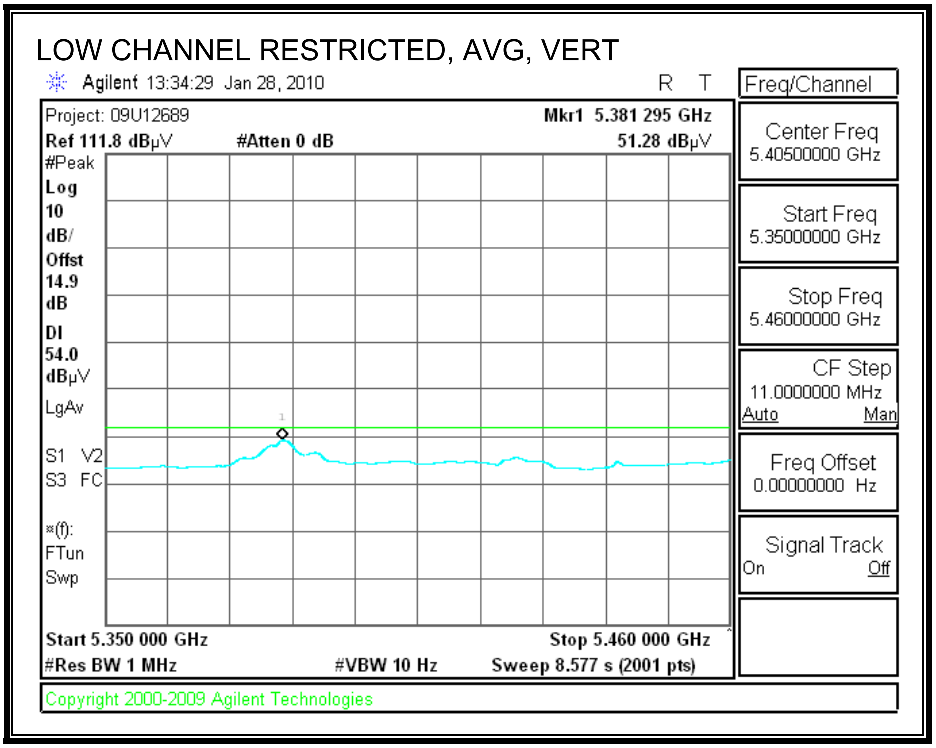
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



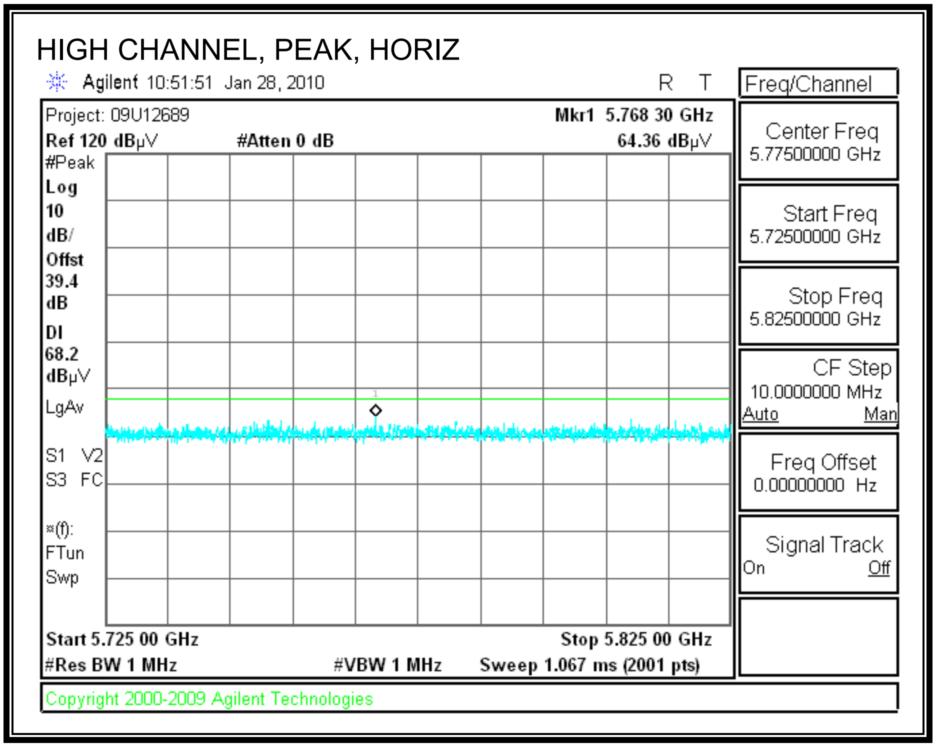

LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 13:39:09 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.372 605 GHz
Ref 111.8 dBμV
#Atten 0 dB
41.24 dBμV
#Peak
Log
10
dB/
Offst
14.9
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

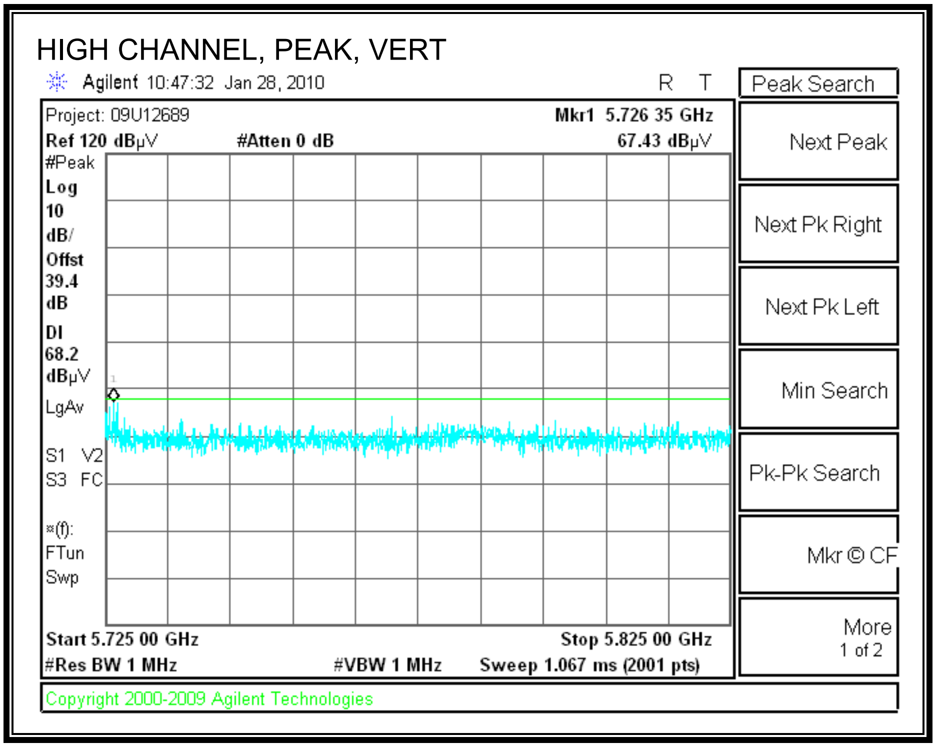



LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 13:34:29 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.381 295 GHz
Ref 111.8 dBμV
#Atten 0 dB
51.28 dBμV
#Peak
Log
10
dB/
Offst
14.9
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

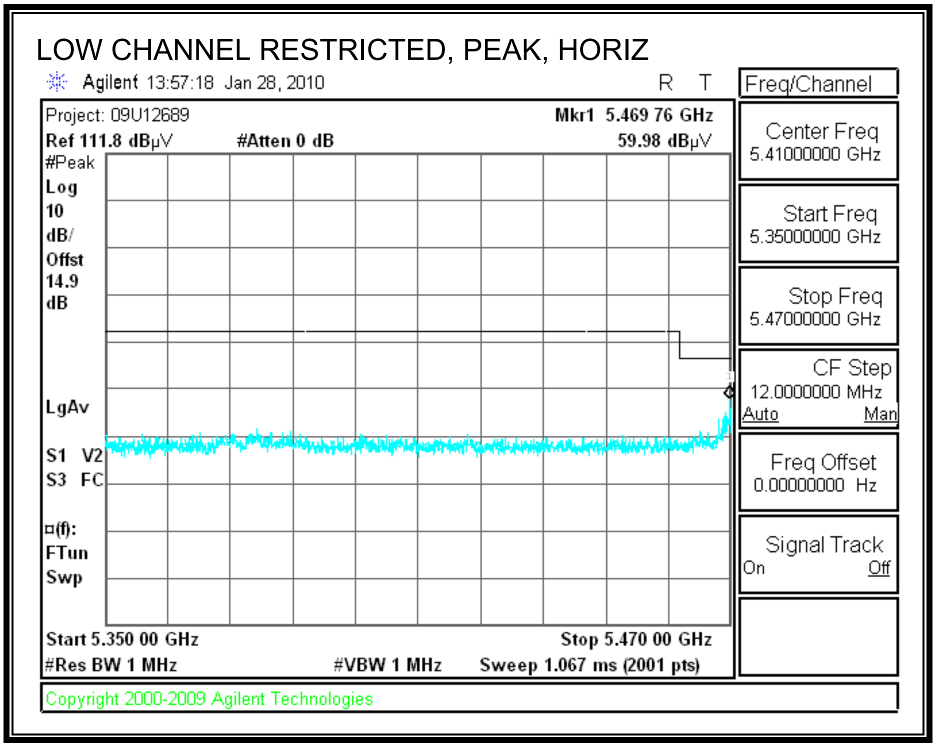


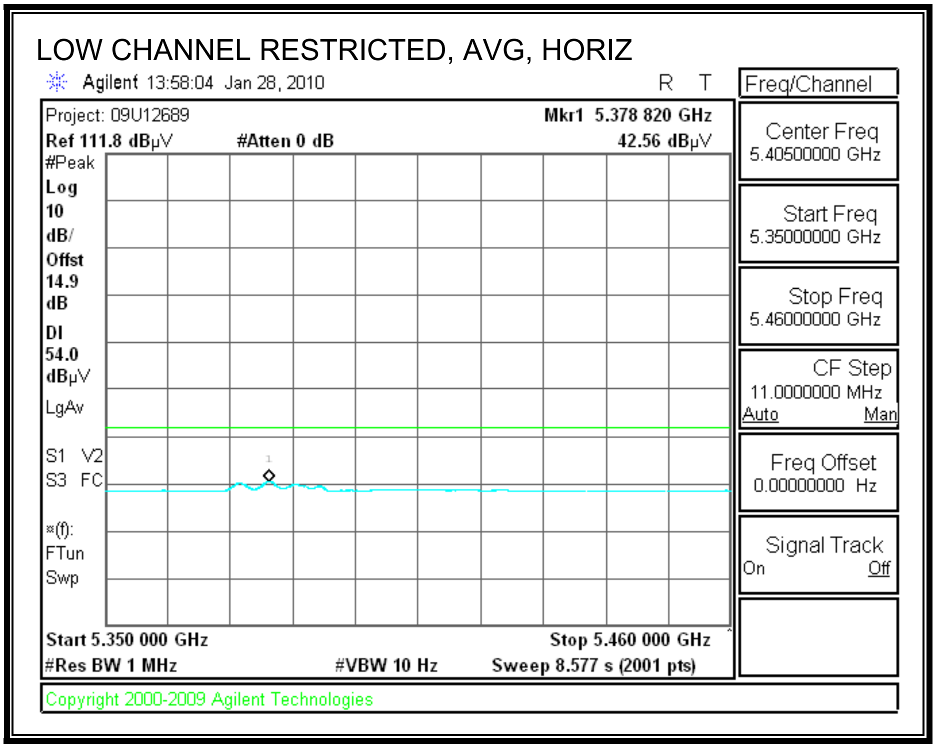
AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



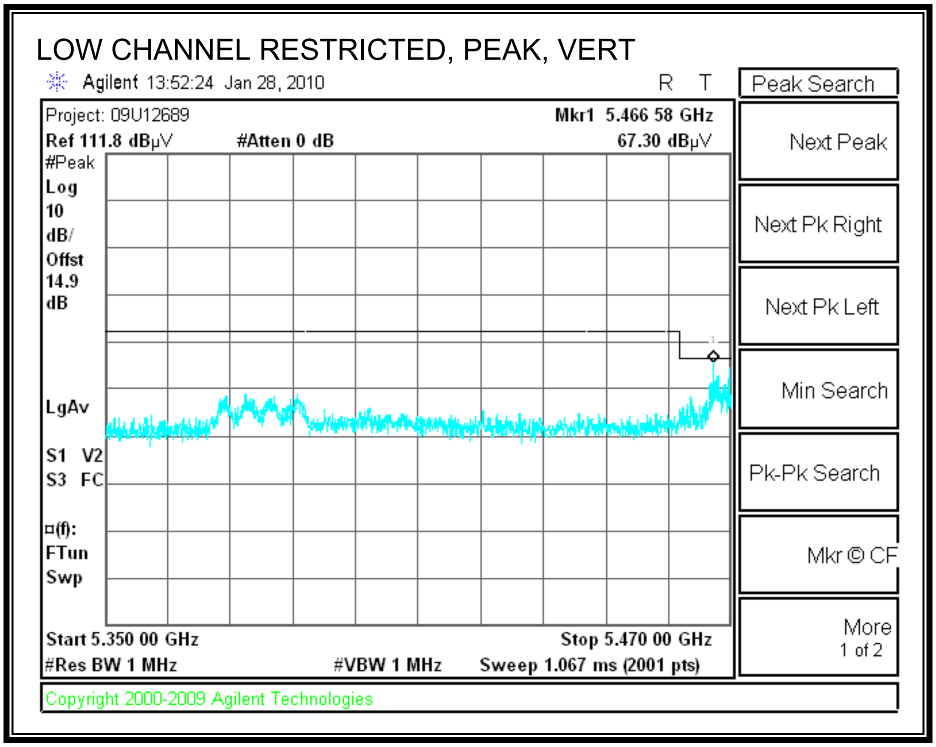
9.2.10. TX ABOVE 1 GHz FOR 802.11a DUAL CHAIN MODE IN 5.6 GHz BAND

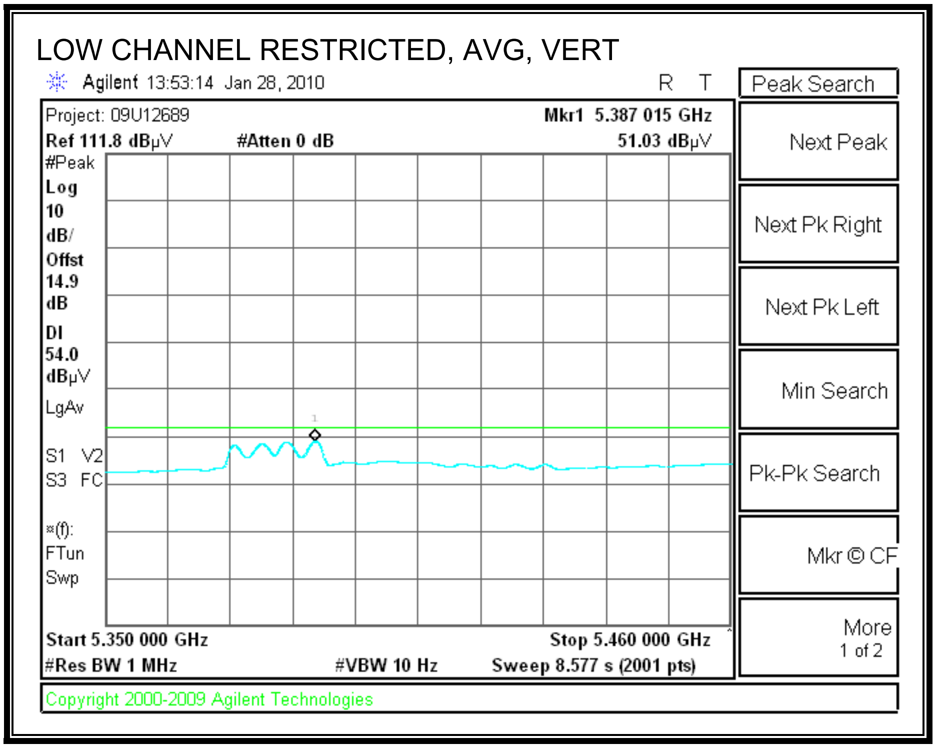
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



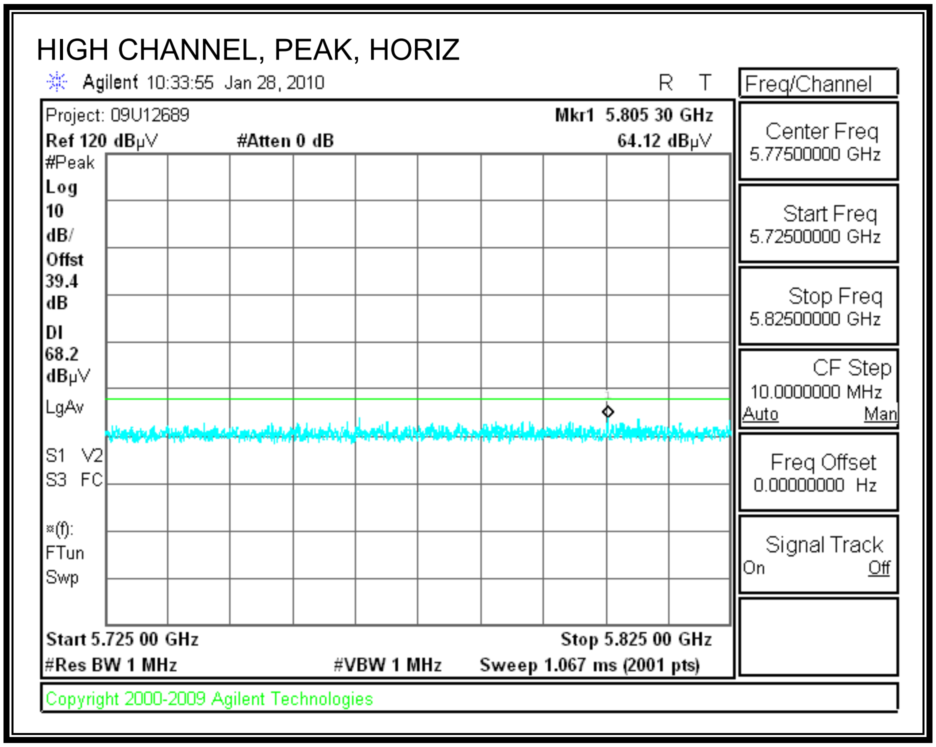

LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 13:58:04 Jan 28, 2010
R T
Freq/Channel
Project: 09U12689
Mkr1 5.378 820 GHz
Ref 111.8 dBμV
#Atten 0 dB
42.56 dBμV
#Peak
Log
10
dB/
Offst
14.9
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
×(f):
FTun
Swp
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

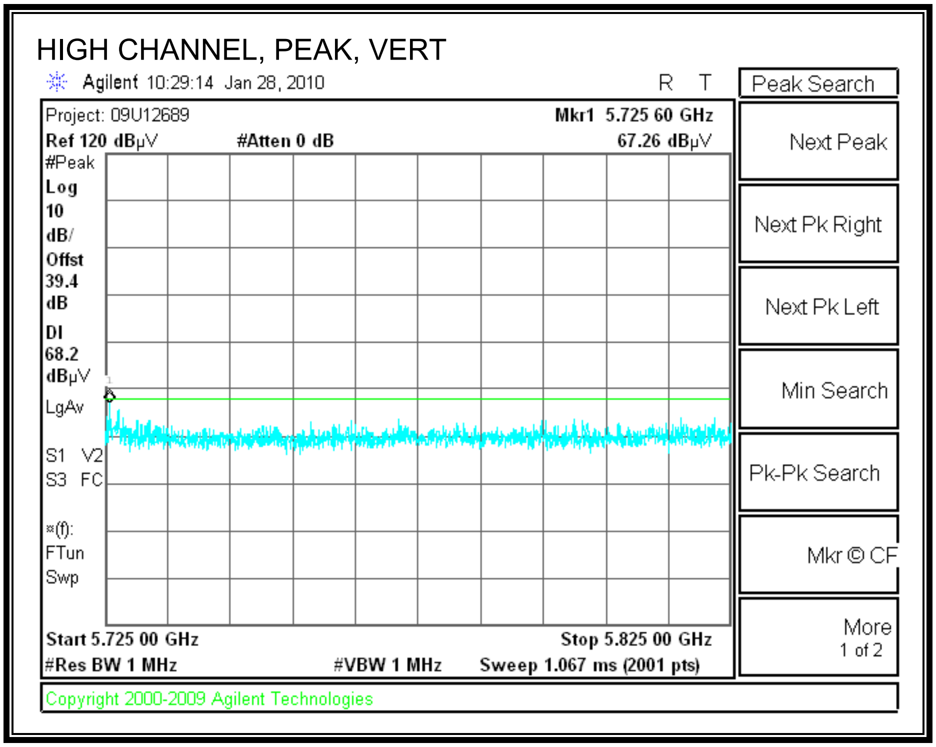



LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 13:53:14 Jan 28, 2010
R T
Peak Search
Project: 09U12689
Mkr1 5.387 015 GHz
Ref 111.8 dBµV
#Atten 0 dB
51.03 dBµV
#Peak
Log
10
dB/
Offst
14.9
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr © CF
More
1 of 2
Copyright 2000-2009 Agilent Technologies

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr:	Thanh Nguyen
Date:	07/15/09
Project #:	09U12687
Company:	QualComm
EUT Description:	Ethernet Card
EUT M/N:	65-VN663-P1
Test Target:	FCC15.247/15.407
Mode Oper:	Transmit 2x4

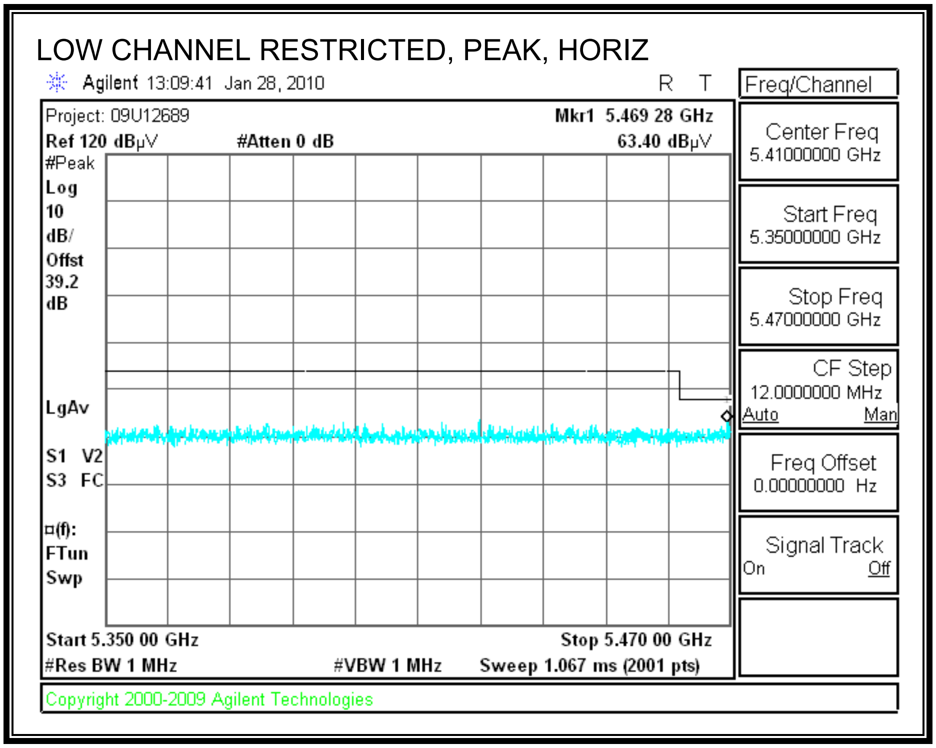
f	Measurement Frequency	Amp	Preamp Gain		Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m		Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength		Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

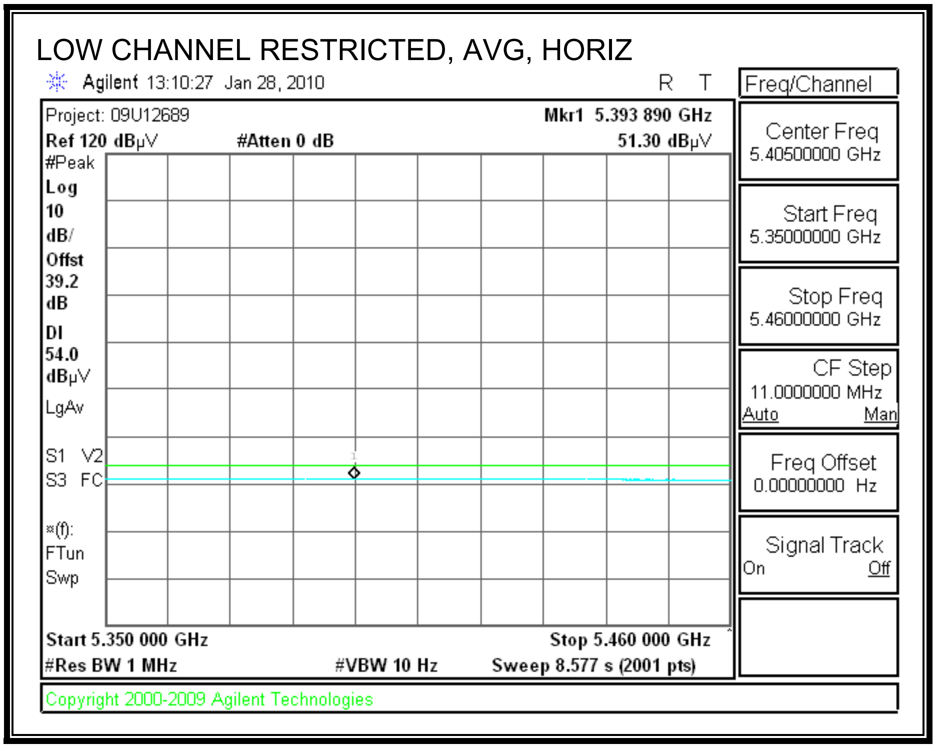
f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Ant.High cm	Table Angle Degree	Notes
Low ch 5500MHz															
11.000	3.0	39.6	37.9	9.2	-36.3	0.0	0.7	51.1	74.0	-22.9	V	P	172.9	139.5	
11.000	3.0	33.2	37.9	9.2	-36.3	0.0	0.7	44.8	54.0	-9.2	V	A	172.9	139.5	
11.000	3.0	37.7	37.9	9.2	-36.3	0.0	0.7	49.3	74.0	-24.7	H	P	139.5	199.3	
11.000	3.0	29.2	37.9	9.2	-36.3	0.0	0.7	40.8	54.0	-13.2	H	A	139.5	199.3	
Mid ch 5580															
11.160	3.0	38.8	38.1	9.3	-36.1	0.0	0.7	50.9	74.0	-23.1	V	P	181.5	207.7	
11.160	3.0	32.1	38.1	9.3	-36.1	0.0	0.7	44.1	54.0	-9.9	V	A	181.5	207.7	
11.160	3.0	37.9	38.1	9.3	-36.1	0.0	0.7	50.0	74.0	-24.0	H	P	162.7	204.2	
11.160	3.0	31.3	38.1	9.3	-36.1	0.0	0.7	43.3	54.0	-10.7	H	A	162.7	204.2	
High ch 5700															
11.400	3.0	40.5	38.3	9.4	-35.9	0.0	0.7	53.0	74.0	-21.0	V	P	129.5	252.8	
11.400	3.0	35.7	38.3	9.4	-35.9	0.0	0.7	48.3	54.0	-5.8	V	A	129.5	252.8	
11.400	3.0	36.0	38.3	9.4	-35.9	0.0	10.0	57.8	74.0	-16.2	H	P	142.1	230.6	
11.400	3.0	23.8	38.3	9.4	-35.9	0.0	10.0	45.6	54.0	-8.4	H	A	142.1	230.6	

Rev. 4.1.2.7
Note: No other emissions were detected above the system noise floor.

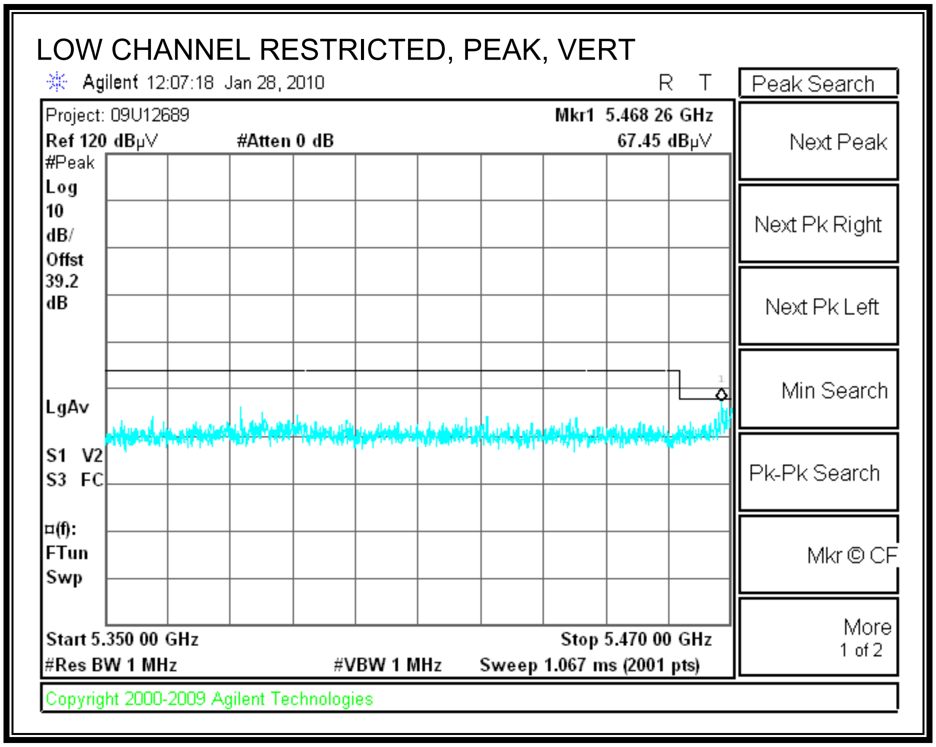
9.2.11. 802.11n HT20 MODE 5.6 GHz BAND

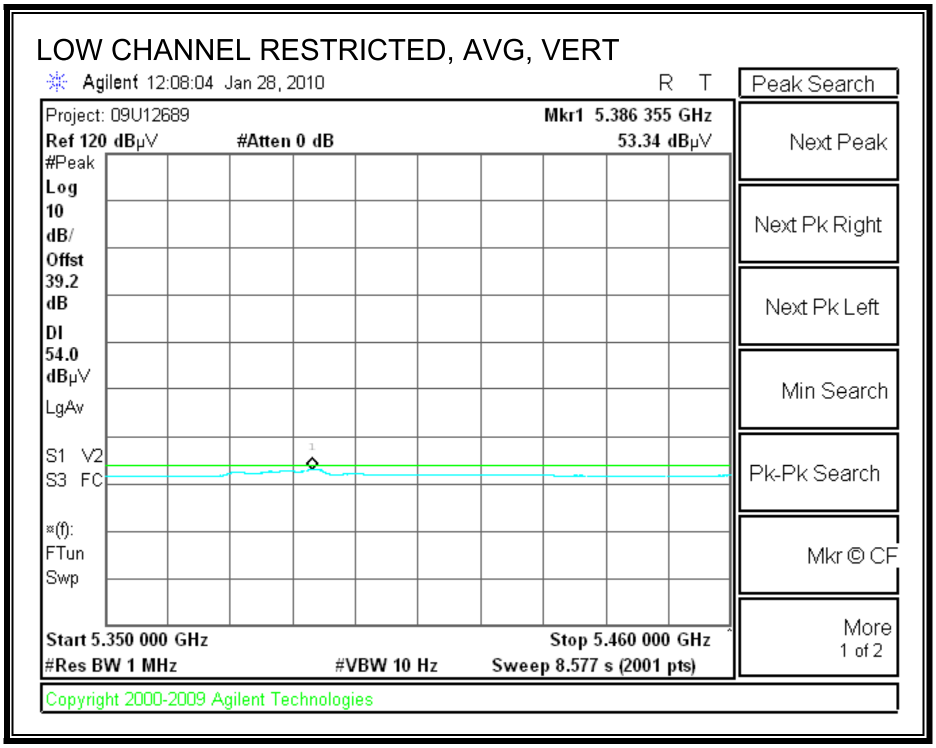
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



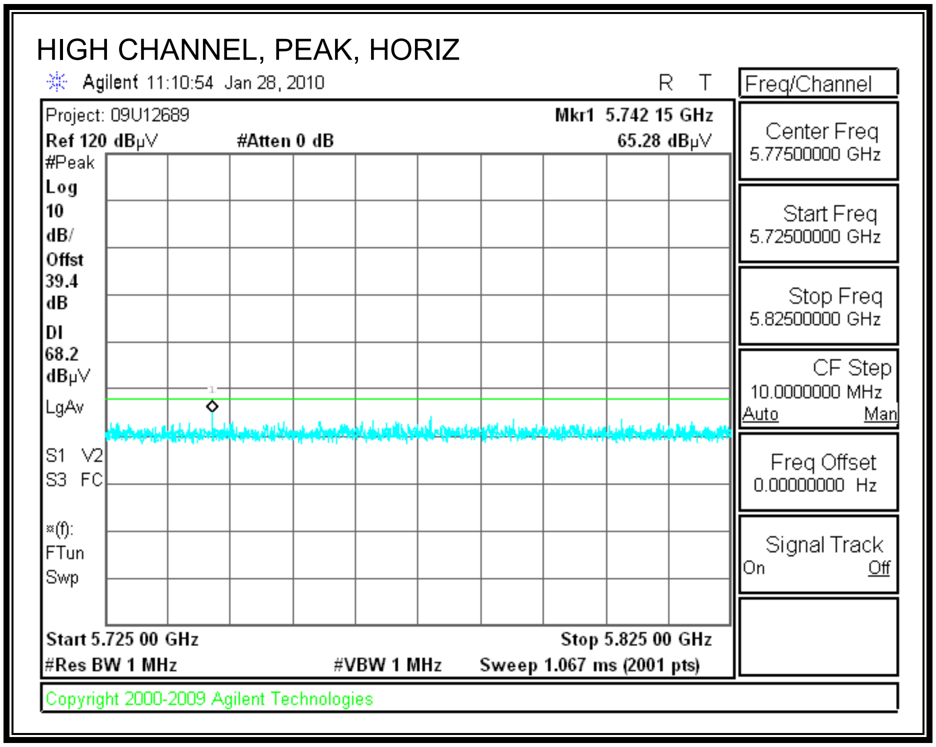

LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 13:10:27 Jan 28, 2010
R T
Project: 09U12689
Mkr1 5.393 890 GHz
Ref 120 dBµV
#Atten 0 dB
51.30 dBµV
#Peak
Log
10
dB/
Offst
39.2
dB
Dl
54.0
dBµV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Copyright 2000-2009 Agilent Technologies
Freq/Channel
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

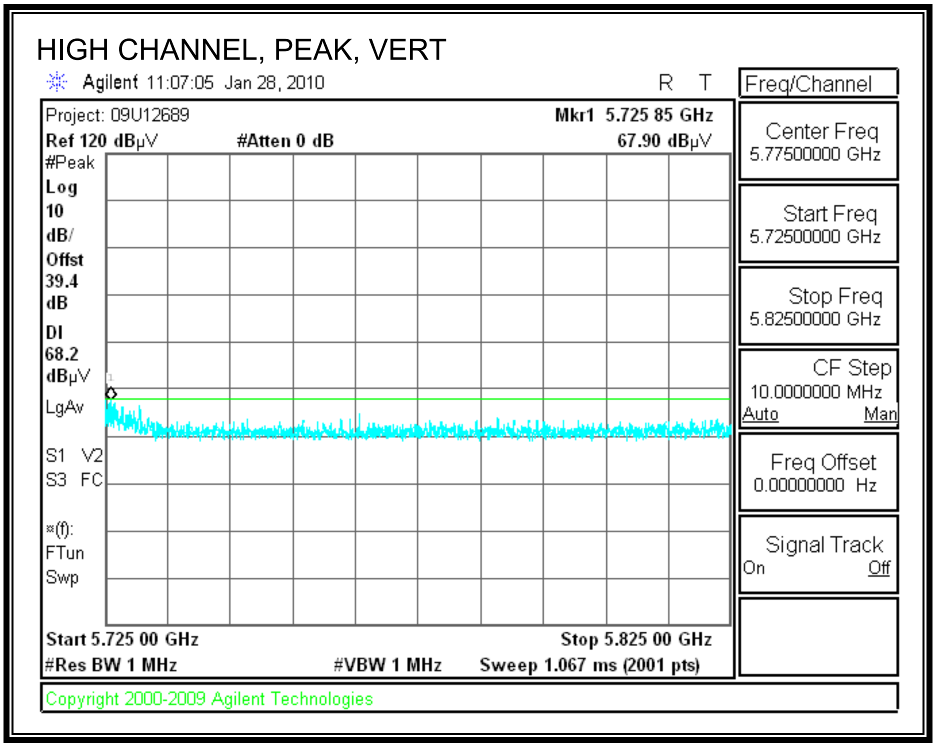



LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 12:08:04 Jan 28, 2010
R T
Peak Search
Project: 09U12689
Mkr1 5.386 355 GHz
Ref 120 dBμV
#Atten 0 dB
53.34 dBμV
#Peak
Log
10
dB/
Offst
39.2
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr © CF
More
1 of 2
Start 5.350 000 GHz
Stop 5.460 000 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (2001 pts)
Copyright 2000-2009 Agilent Technologies

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Qualcomm
Project #: 09U12689
Date: 07/06/09
Test Engineer: Doug Anderson
Configuration: EUT w/Support Notebook
Mode: Tx / HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

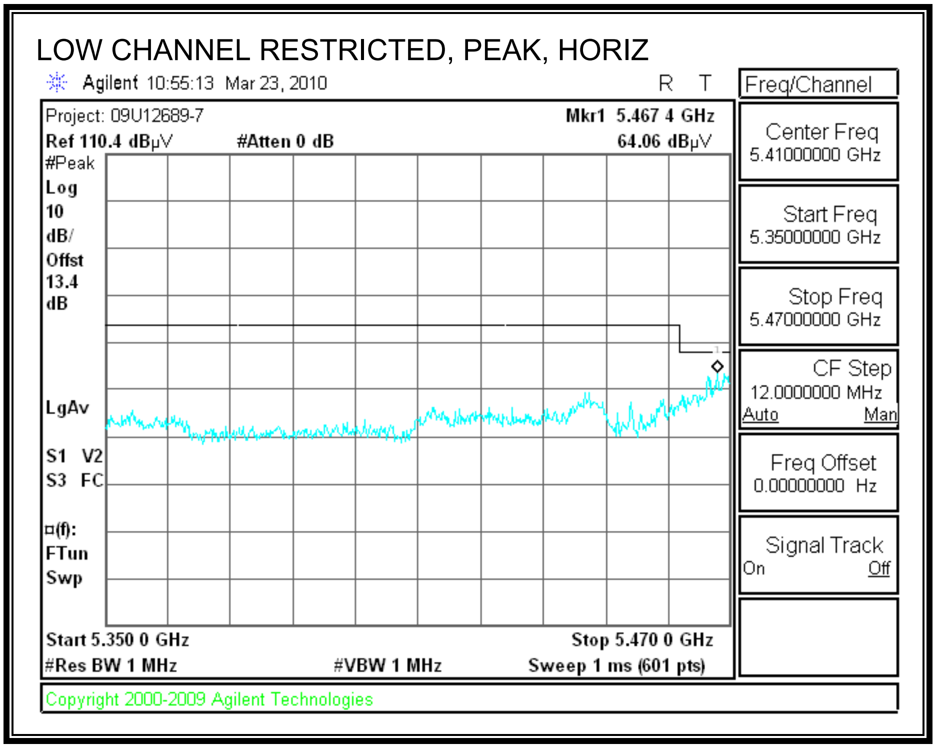
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch.: 5500															
11.000	3.0	47.0	40.8	37.9	9.2	-36.3	0.0	0.7	58.5	52.4	74	54	-15.5	-1.6	V
11.000	3.0	41.9	29.0	37.9	9.2	-36.3	0.0	0.7	53.5	40.6	74	54	-20.5	-13.4	H
Mid Ch.: 5580															
11.160	3.0	44.6	35.2	38.0	9.3	-36.1	0.0	0.7	56.5	47.1	74	54	-17.5	-6.9	V
11.160	3.0	44.3	34.4	38.0	9.3	-36.1	0.0	0.7	56.2	46.4	74	54	-17.8	-7.6	H
High Ch.: 5700															
11.400	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
11.400	3.0	43.9	28.0	38.3	9.4	-35.9	0.0	0.7	56.4	40.5	74	54	-17.6	-13.5	H

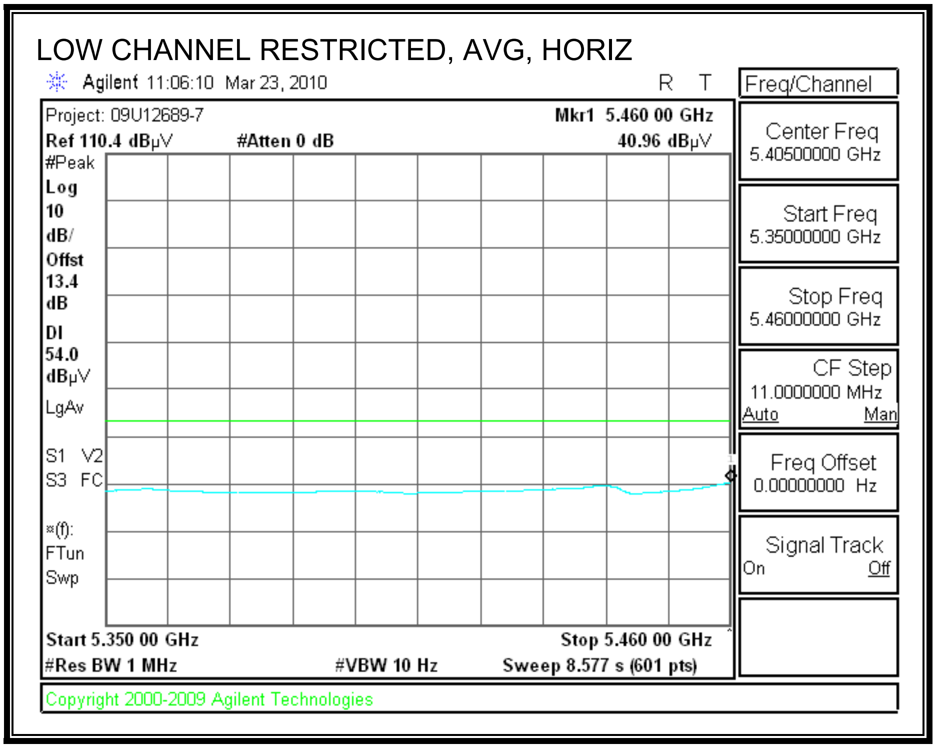
Rev. 11.10.08

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

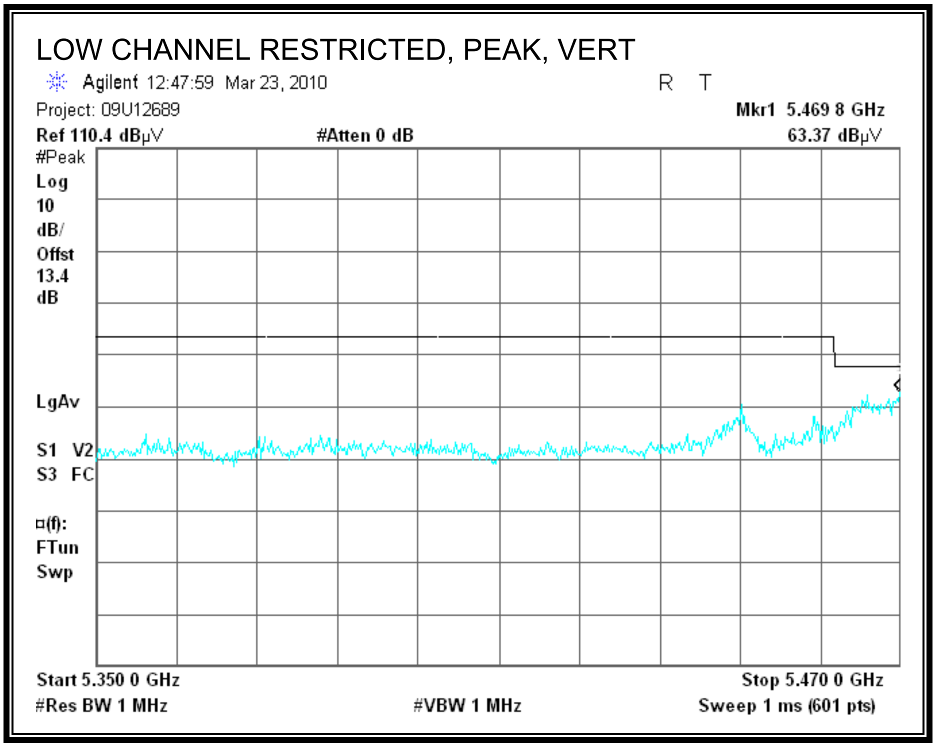
9.2.12. 802.11n HT40 MODE 5.6 GHz BAND

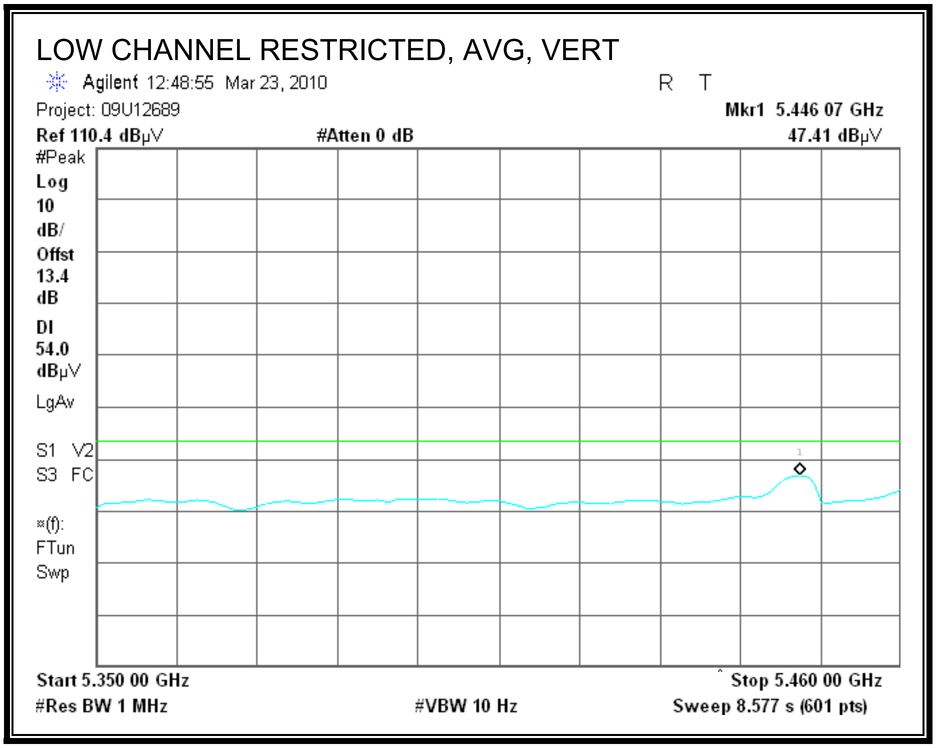
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



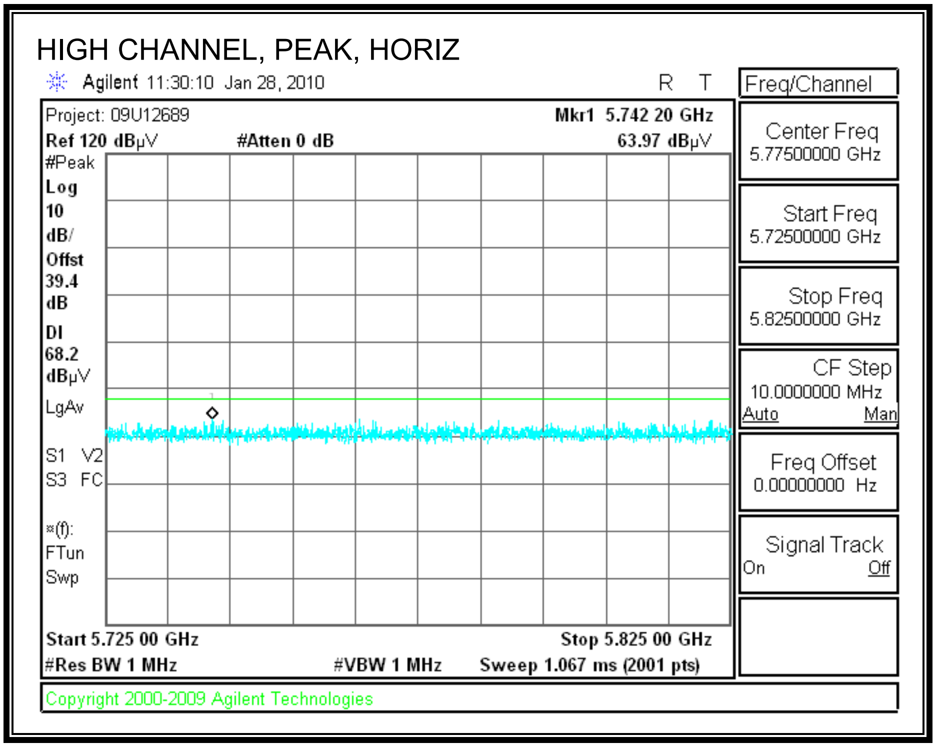

LOW CHANNEL RESTRICTED, AVG, HORIZ
Agilent 11:06:10 Mar 23, 2010
R T
Freq/Channel
Project: 09U12689-7
Mkr1 5.460 00 GHz
Ref 110.4 dBμV
#Atten 0 dB
40.96 dBμV
#Peak
Log
10
dB/
Offst
13.4
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
FTun
Swp
Start 5.350 00 GHz
Stop 5.460 00 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (601 pts)
Center Freq
5.40500000 GHz
Start Freq
5.35000000 GHz
Stop Freq
5.46000000 GHz
CF Step
11.0000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2009 Agilent Technologies

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

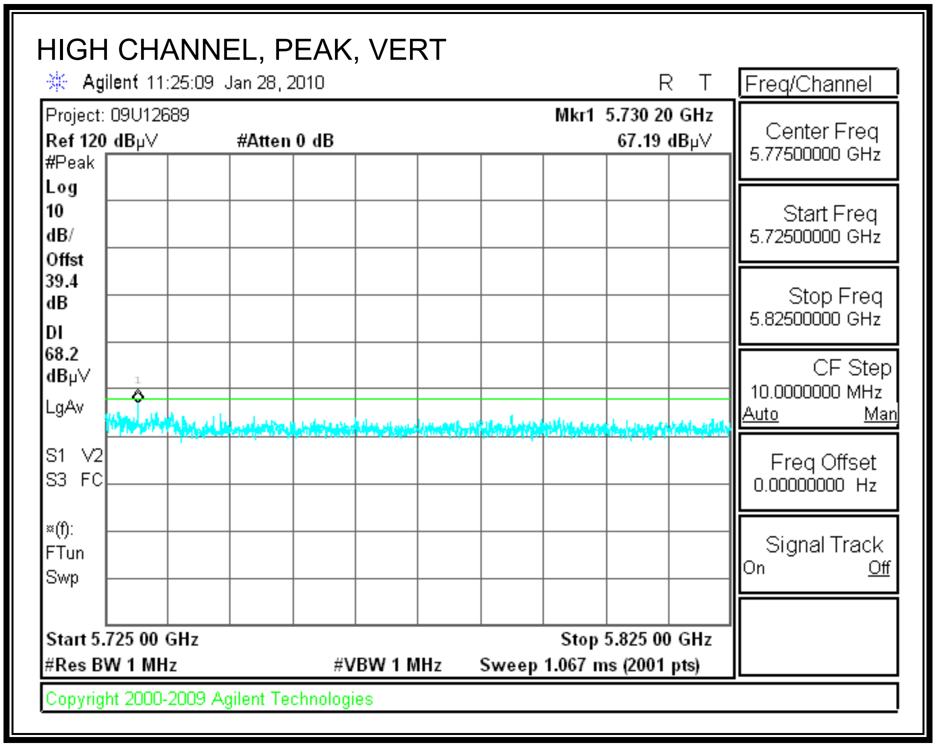



LOW CHANNEL RESTRICTED, AVG, VERT
Agilent 12:48:55 Mar 23, 2010
R T
Project: 09U12689
Mkr1 5.446 07 GHz
Ref 110.4 dBμV
#Atten 0 dB
47.41 dBμV
#Peak
Log
10
dB/
Offst
13.4
dB
Dl
54.0
dBμV
LgAv
S1 V2
S3 FC
¤(f):
FTun
Swp
Start 5.350 00 GHz
Stop 5.460 00 GHz
#Res BW 1 MHz
#VBW 10 Hz
Sweep 8.577 s (601 pts)

AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Qualcomm
Project #: 09U12689
Date: 07/06/09
Test Engineer: Doug Anderson
Configuration: EUT w/Support Notebook
Mode: Tx HT40_5.6GHz Band

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.205

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

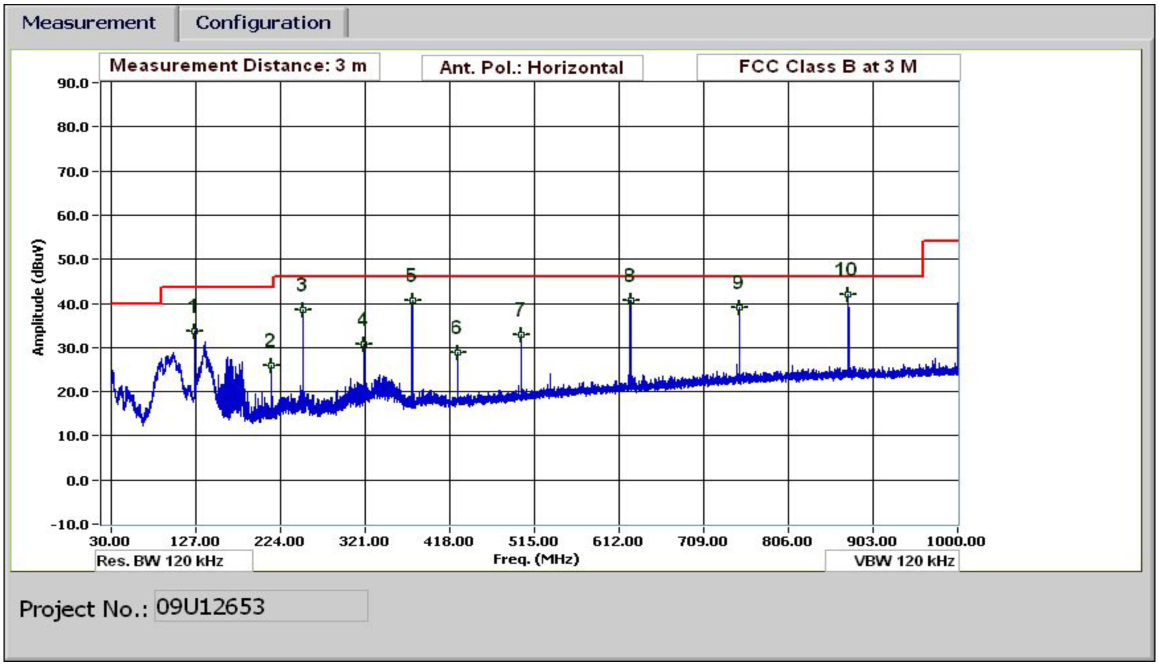
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Ch. 5510MHz															
11.020	3.0	45.4	36.7	37.9	9.2	-36.3	0.0	0.7	57.0	48.3	74	54	-17.0	-5.7	V
11.020	3.0	41.2	27.2	37.9	9.2	-36.3	0.0	0.7	52.8	38.8	74	54	-21.2	-15.2	H
Mid Ch. 5550MHz															
11.100	3.0	41.5	27.4	38.0	9.3	-36.2	0.0	0.7	53.3	39.2	74	54	-20.7	-14.8	V
11.100	3.0	41.1	29.8	38.0	9.3	-36.2	0.0	0.7	52.9	41.7	74	54	-21.1	-12.3	H
High Ch. 5670MHz															
11.340	3.0	45.5	35.5	38.2	9.4	-36.0	0.0	0.7	57.9	47.8	74	54	-16.1	-6.2	V
11.340	3.0	41.9	28.4	38.2	9.4	-36.0	0.0	0.7	54.3	40.8	74	54	-19.7	-13.2	H

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

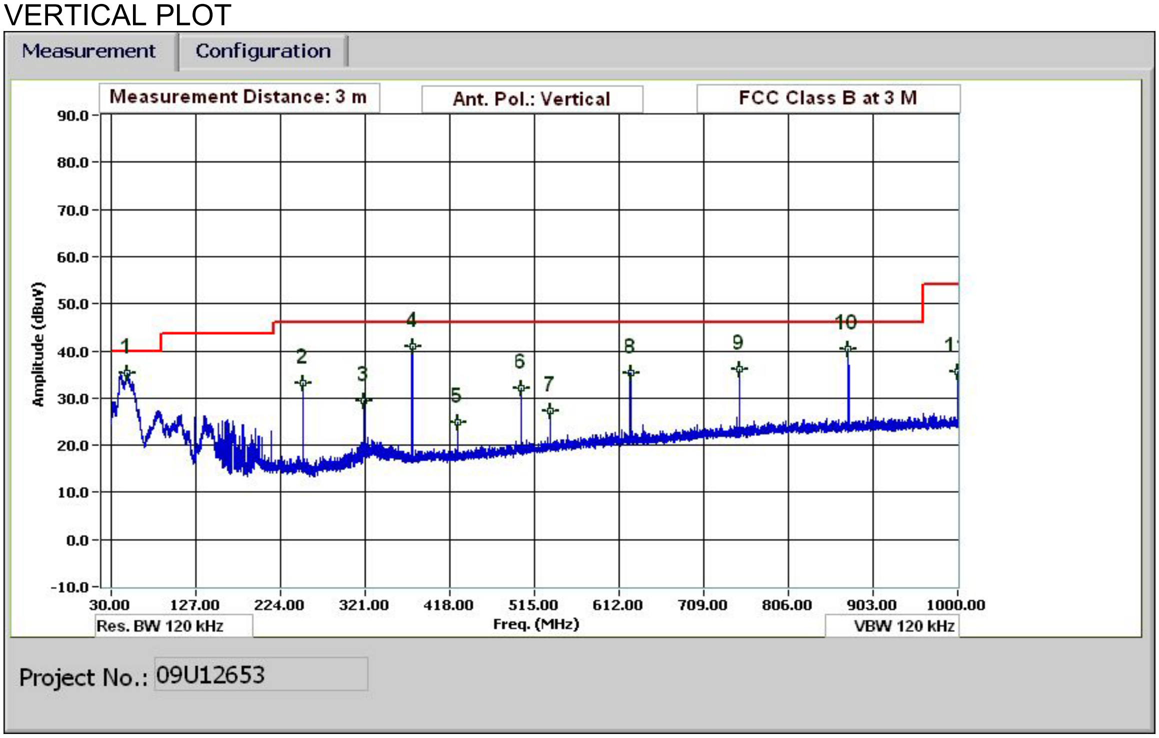
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



EMISSIONS DATA

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Test Engr: Vien Tran
Date: 06/26/09
Project #: 09U12653
Company: Qualcomm
EUT Description: 802.11n 4x4 WLAN Ethernet Adapter
EUT M/N: Non-DFS:65-VN663-P1
Test Target: FCC Class B
Mode Oper: Tx HT20 MCS31, 5805MHz

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filter dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
5805MHz_Horizontal													
125.044	3.0	47.3	13.7	1.1	28.3	0.0	0.0	33.7	43.5	-9.8	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	-3.9	H	EP	
5805MHz_Vertical													
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	
533.301	3.0	35.7	17.3	2.1	27.7	0.0	0.0	27.3	46.0	-18.7	V	EP	
624.985	3.0	41.8	18.7	2.3	27.4	0.0	0.0	35.4	46.0	-10.6	V	EP	
749.910	3.0	40.6	20.3	2.5	27.3	0.0	0.0	36.1	46.0	-9.9	V	EP	
874.955	3.0	43.7	21.6	2.8	27.7	0.0	0.0	40.4	46.0	-5.6	V	EP	
999.880	3.0	37.9	22.5	3.0	27.9	0.0	0.0	35.4	54.0	-18.6	V	EP	

Rev. 1.27.09
Note: No other emissions were detected above the system noise floor.

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

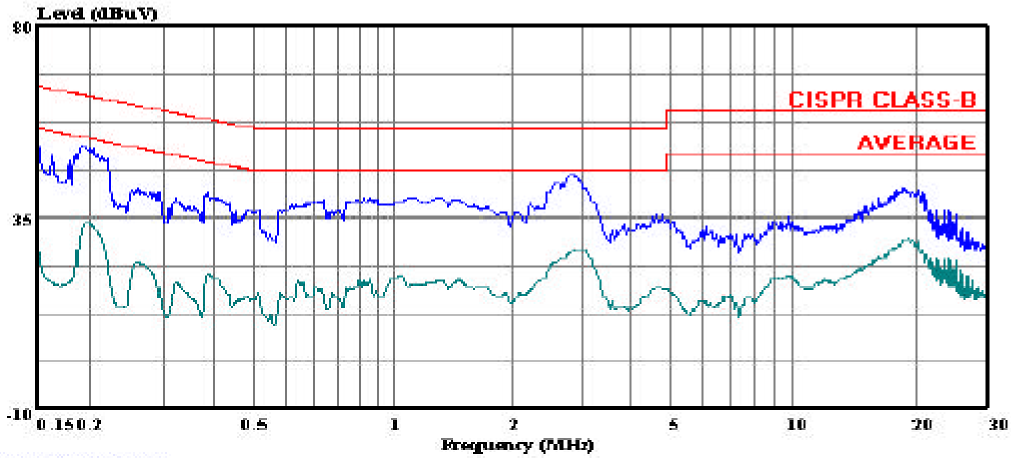
6 WORST EMISSIONS

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 Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: Qualcomm_09U12653_LC.EMI
Date: 06-26-2009 Time: 11:52:34



(Line Conduction)

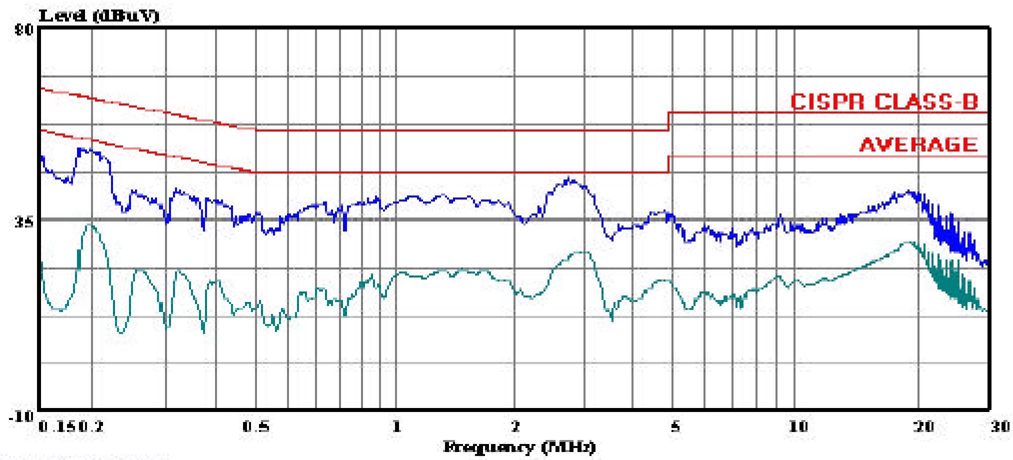
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Vien Tran
Project #: : 09U12653
Company: : Qualcomm
EUT Description: : 802.11n 4x4 WLAN Module
: Ethernet Adapter
Mode: : Tx worst case 5GHz Band
Target: : FCC Class B
Voltage: : 115VAC, 60Hz
: L1: Peak (Blue) , Average (Green)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: Qualcomm_09U12653_LC.EMI
Date: 06-26-2009 Time: 12:02:29



(Line Conduction)

Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Vien Tran
Project #: : 09U12653
Company: : Qualcomm
EUT Description:: 802.11n 4x4 WLAN Module
: Ethernet Adapter
Mode: : Tx worst case 5GHz Band
Target: : FCC Class B
Voltage: : 115VAC, 60Hz
: L2: Peak (Blue) , Average (Green)

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.

FCC

§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”.

COMPLIANCE CERTIFICATION SERVICES FORM NO: CCSUP4701C
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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 Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes

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 has 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 threshold level to trigger a DFS response.	

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
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.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
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 (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

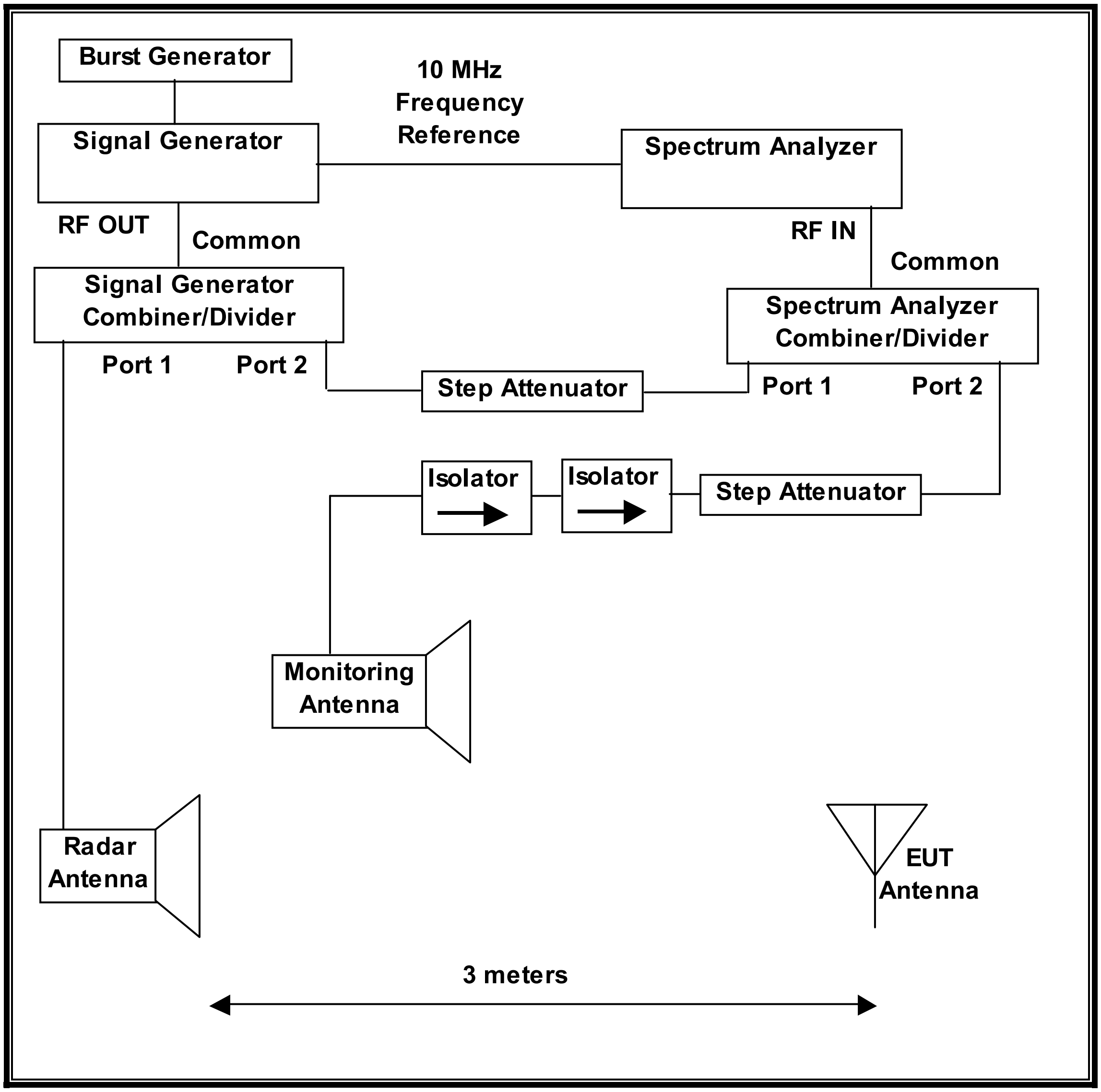
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (μsec)	PRI (μsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

11.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



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 run-time.

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 Freqeuncy 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.

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.

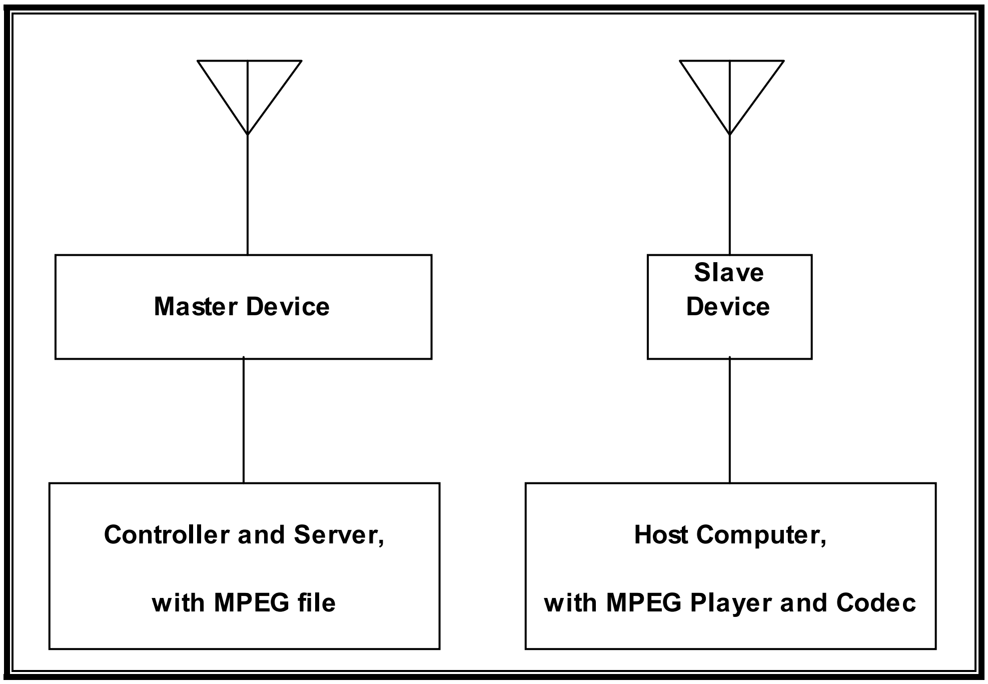
TEST AND MEASUREMENT EQUIPMENT

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

11.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

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

MASTER CONFIGURATION:

PERIPHERAL SUPPORT EQUIPMENT 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 N328Z9DE	DoC
Dual Band Wireless USB Network Adapter (Slave Device)	Linksys/Cisco	WUSB600N	001C10EB00CB	Q87-WUSB600N

SLAVE CONFIGURATION:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter (EUT)	Phihong	PSA15R-050P	P93824329A3	DoC
Wireless Access Point (Master Device)	Cisco	AIR-AP1252AG-A-K9	FTX120690N2	LDK102061
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH112490BD	DoC
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

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.

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.

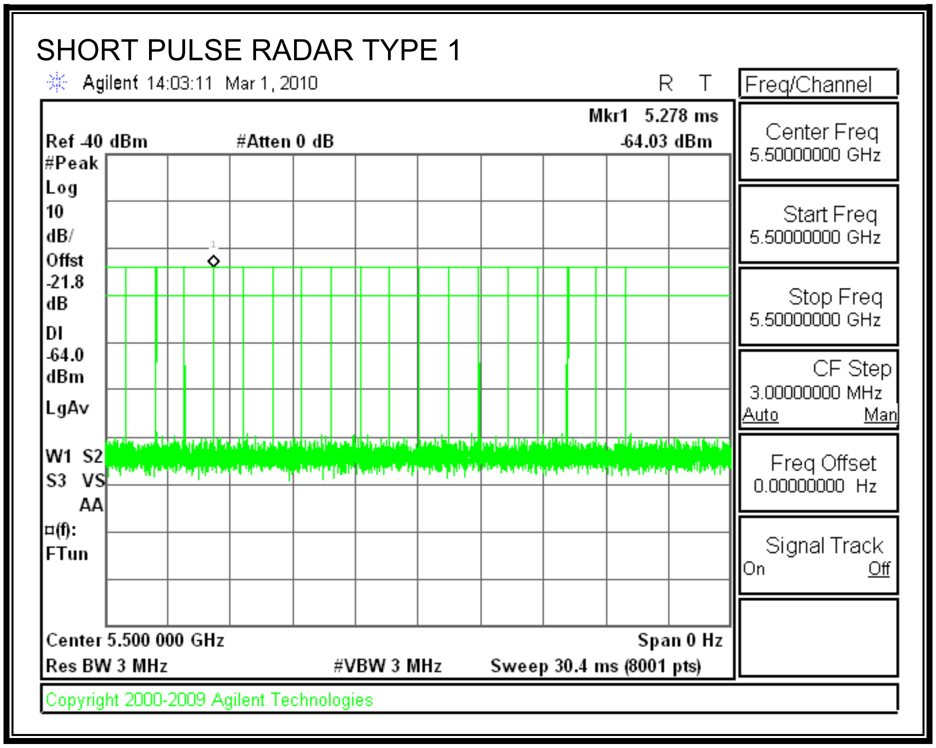
11.2. MASTER DEVICE CONFIGURATION IN 20 MHz BANDWIDTH

11.2.1. TEST CHANNEL

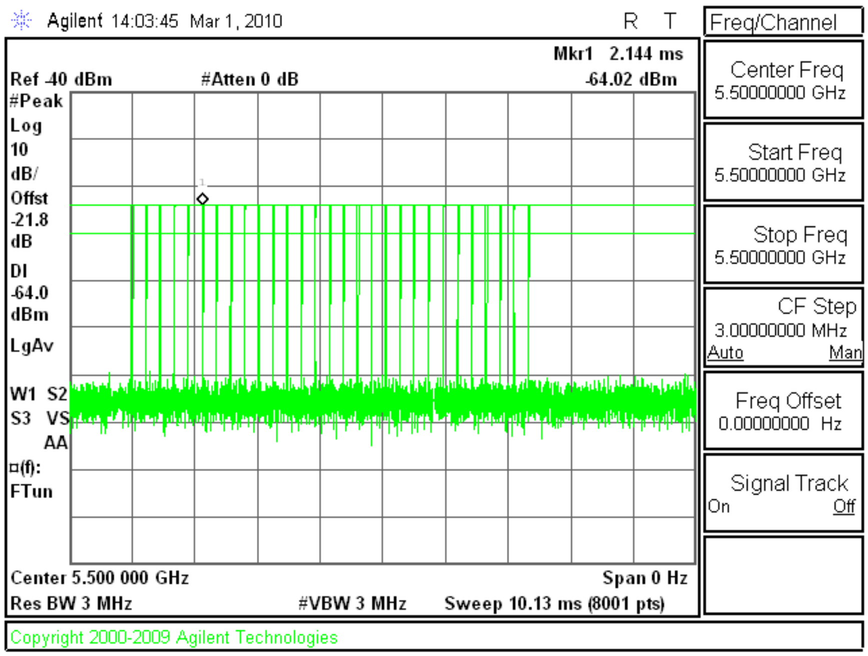
All tests were performed at a channel center frequency of 5500 MHz.

11.2.2. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

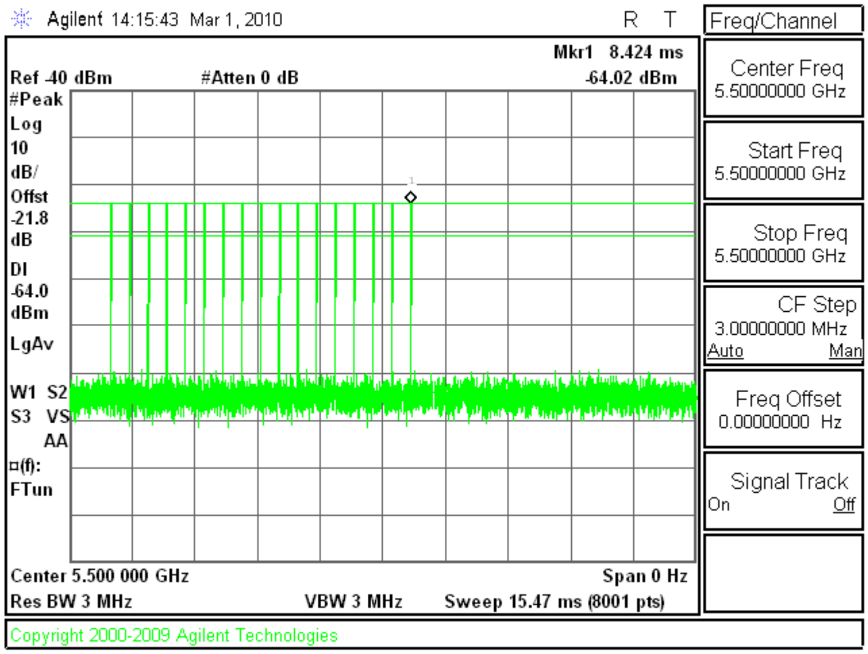
PLOTS OF RADAR WAVEFORMS

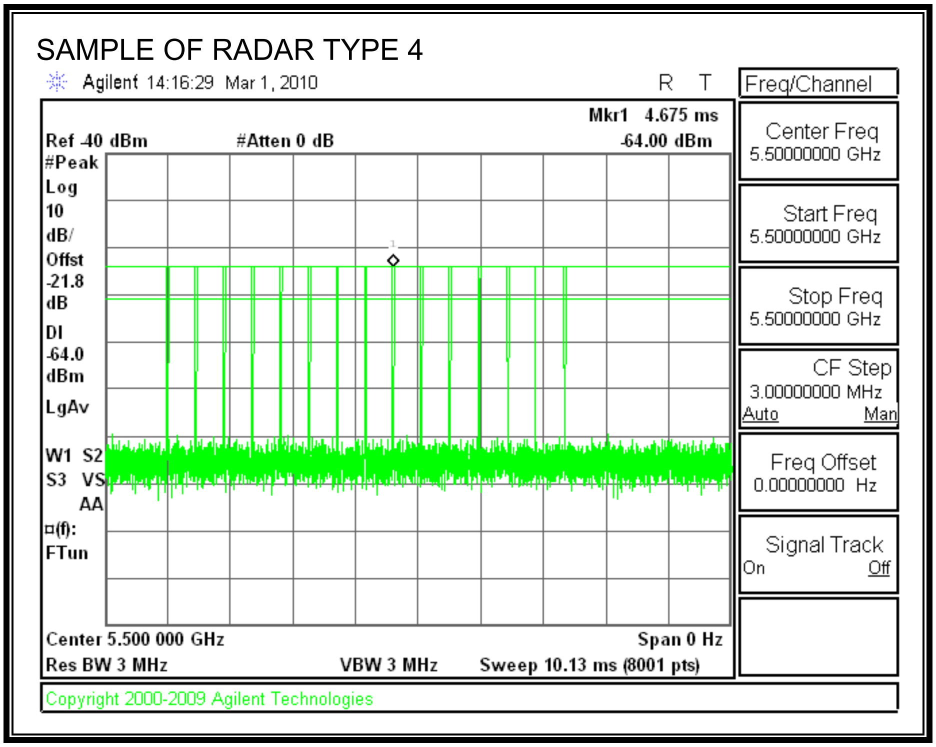


SAMPLE OF RADAR TYPE 2

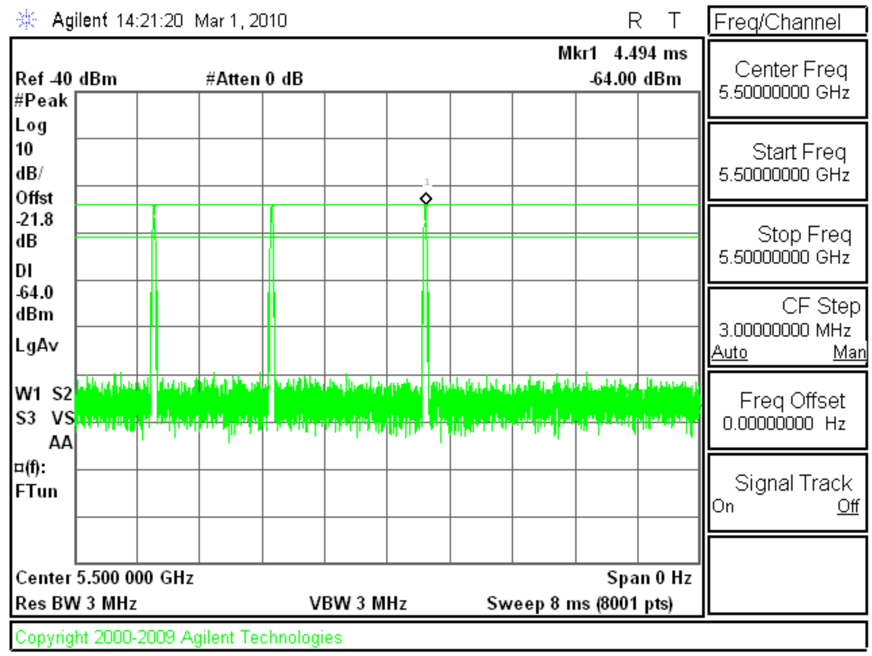


SAMPLE OF RADAR TYPE 3

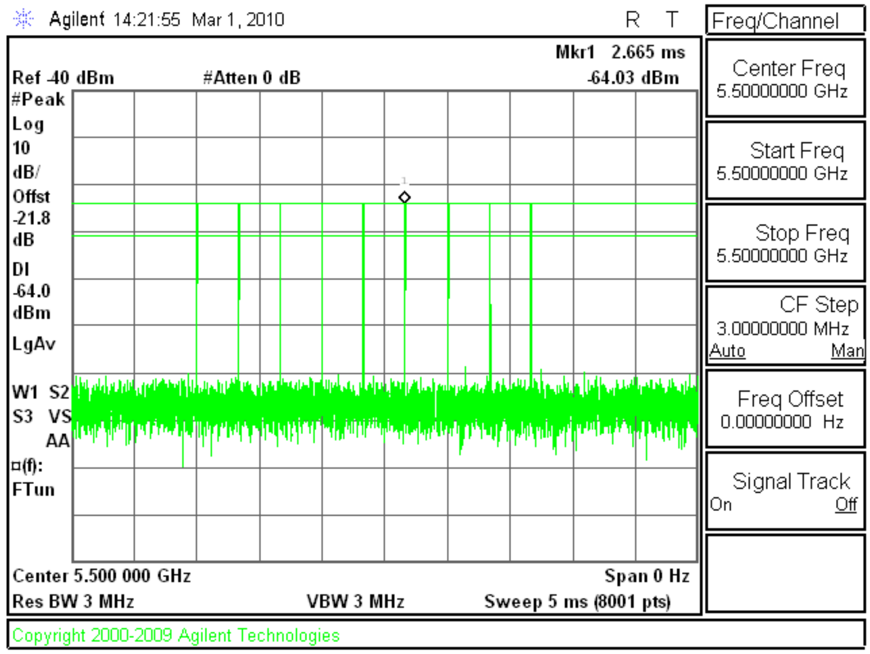



SAMPLE OF RADAR TYPE 4
Agilent 14:16:29 Mar 1, 2010
R T
Freq/Channel
Mkr1 4.675 ms
Ref -40 dBm
#Atten 0 dB
-64.00 dBm
#Peak
Log
10
dB/
Offst
-21.8
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 VS
AA
FTun
Center Freq
5.50000000 GHz
Start Freq
5.50000000 GHz
Stop Freq
5.50000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 5.500 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 10.13 ms (8001 pts)
Copyright 2000-2009 Agilent Technologies

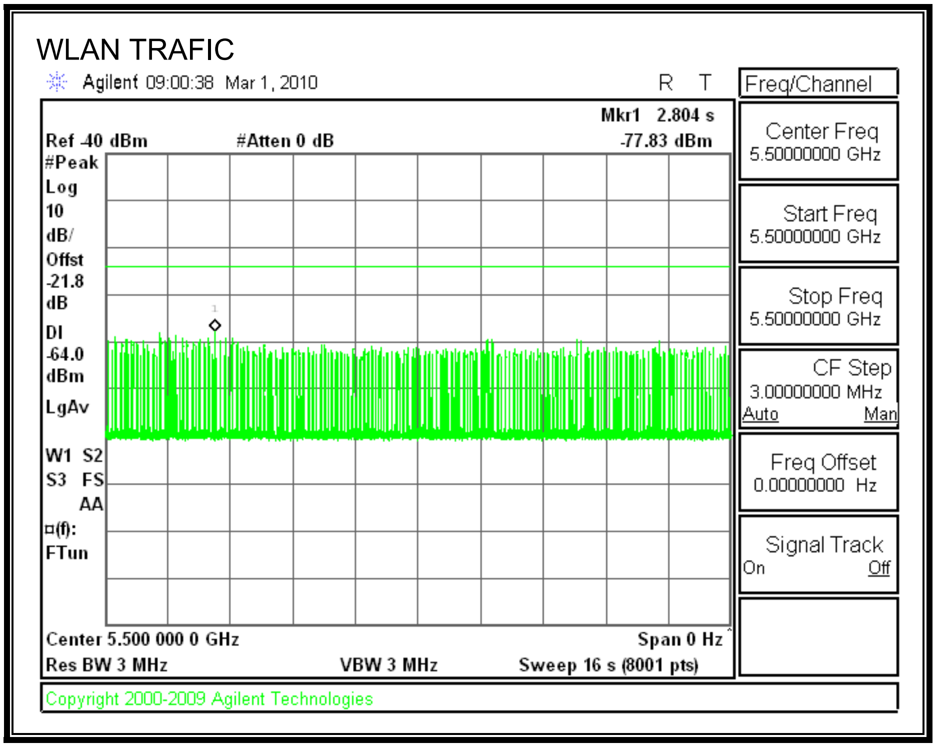
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



PLOT OF WLAN TRAFFIC FROM MASTER



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

Radar Near Beginning of CAC

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

Radar Near End of CAC

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

QUALITATIVE RESULTS

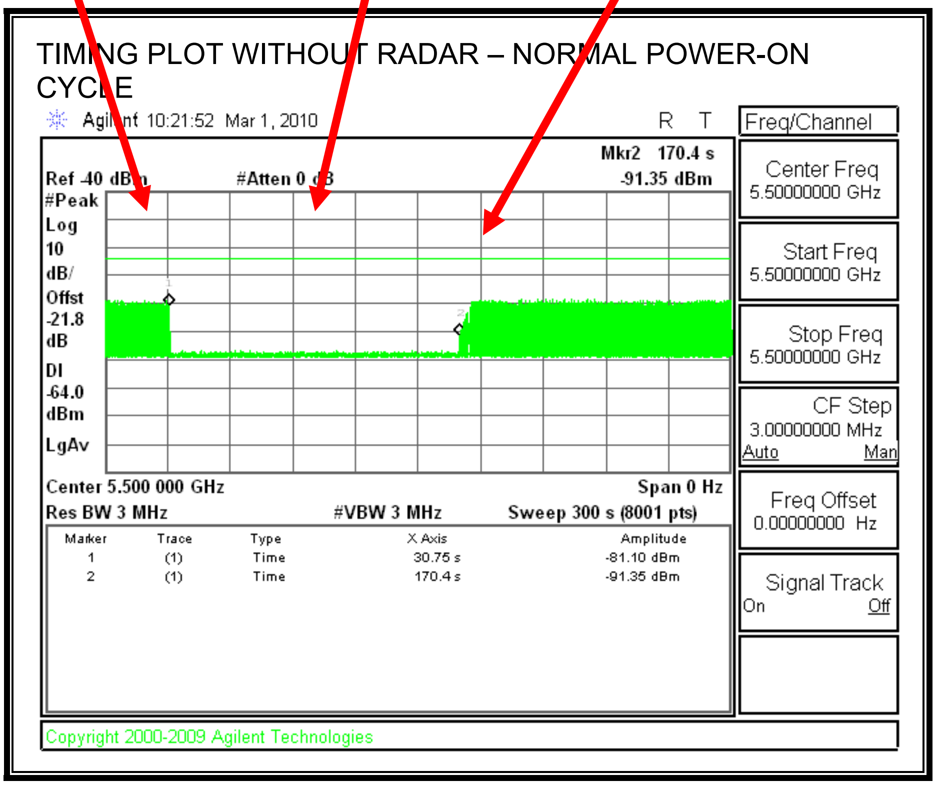
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within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

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



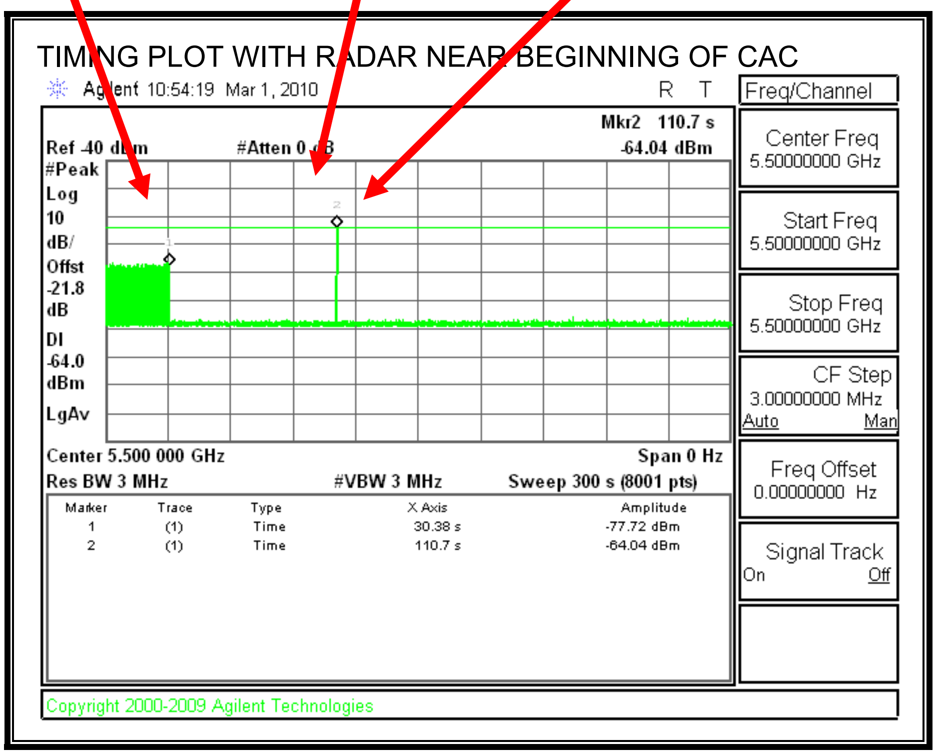
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



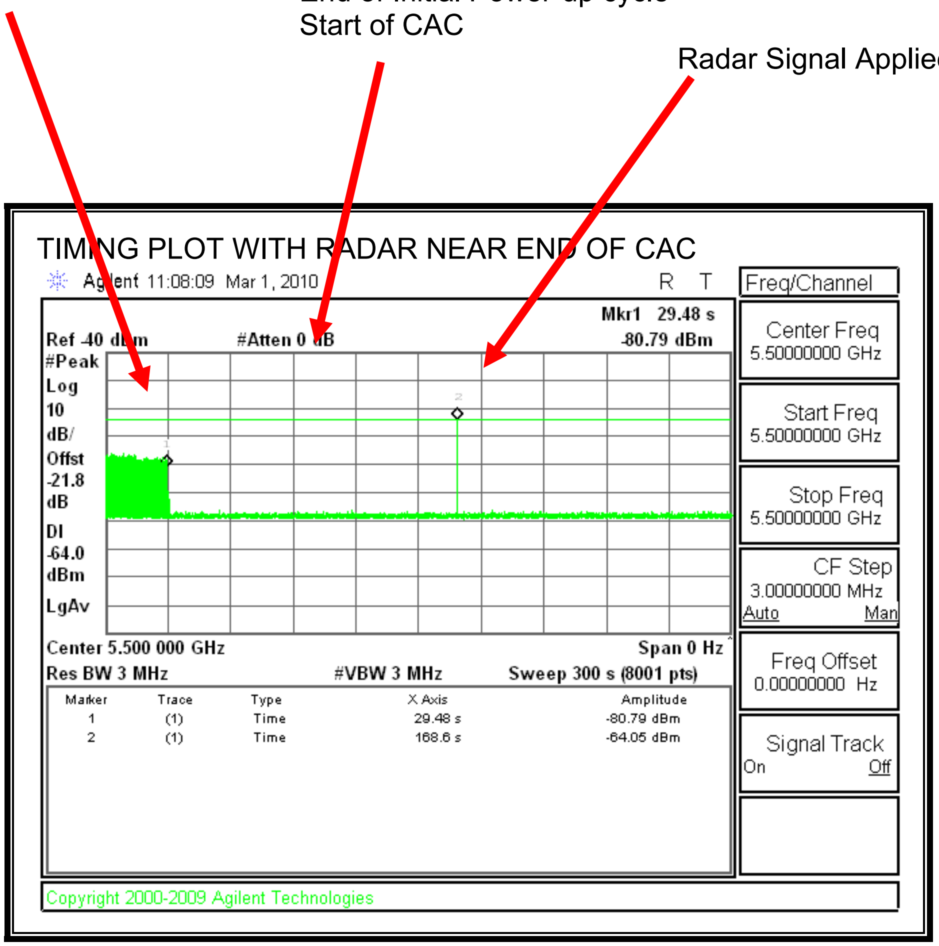
No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

11.2.4. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

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).

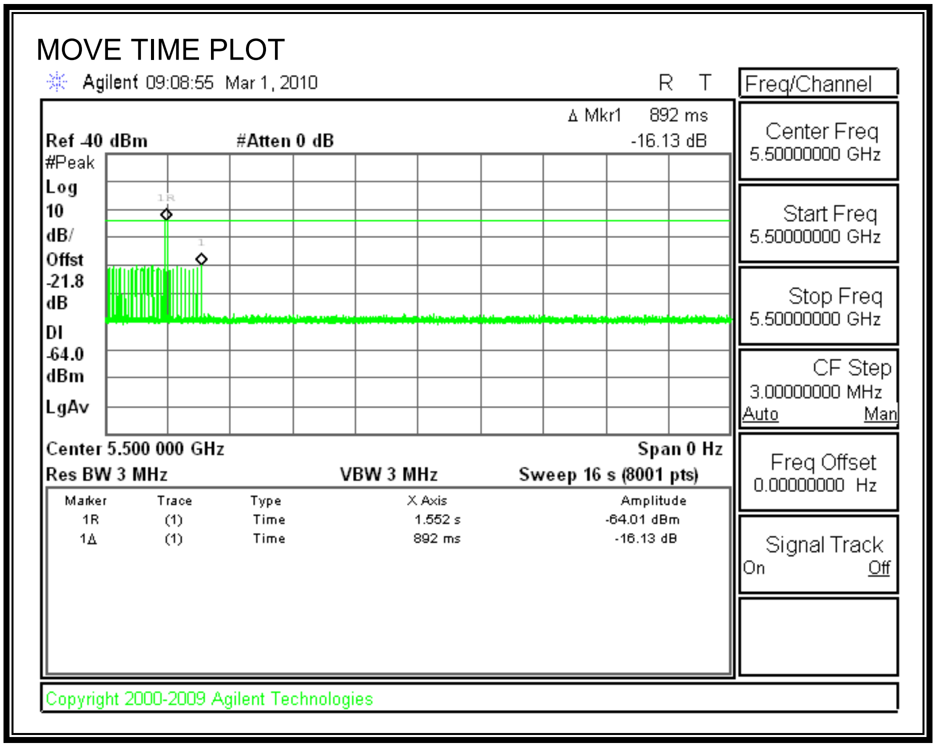
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

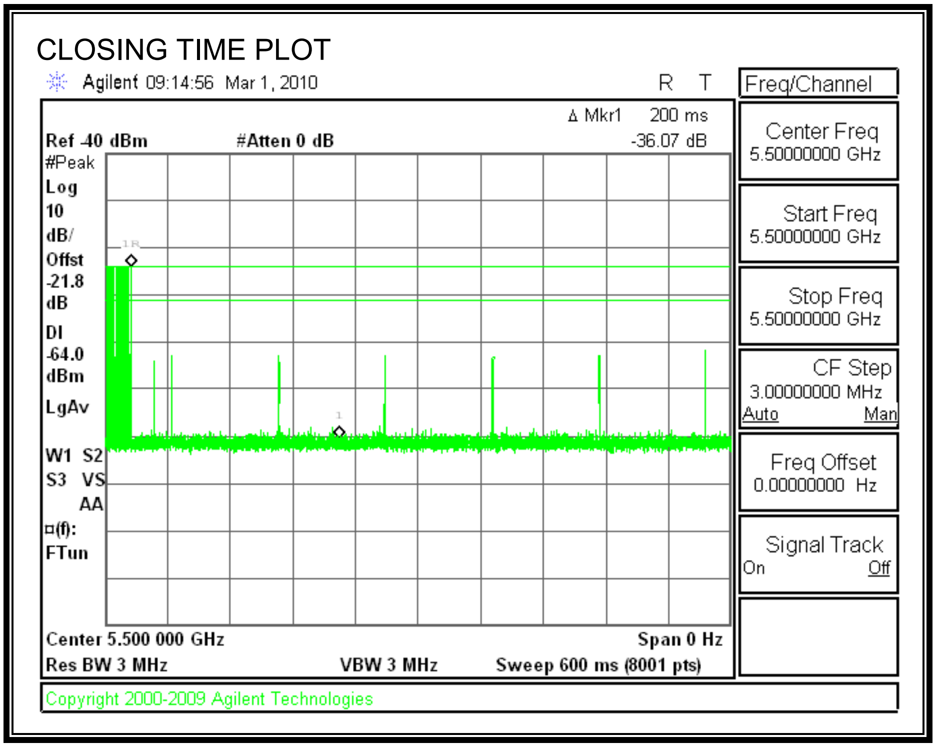
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.892	10

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

MOVE TIME

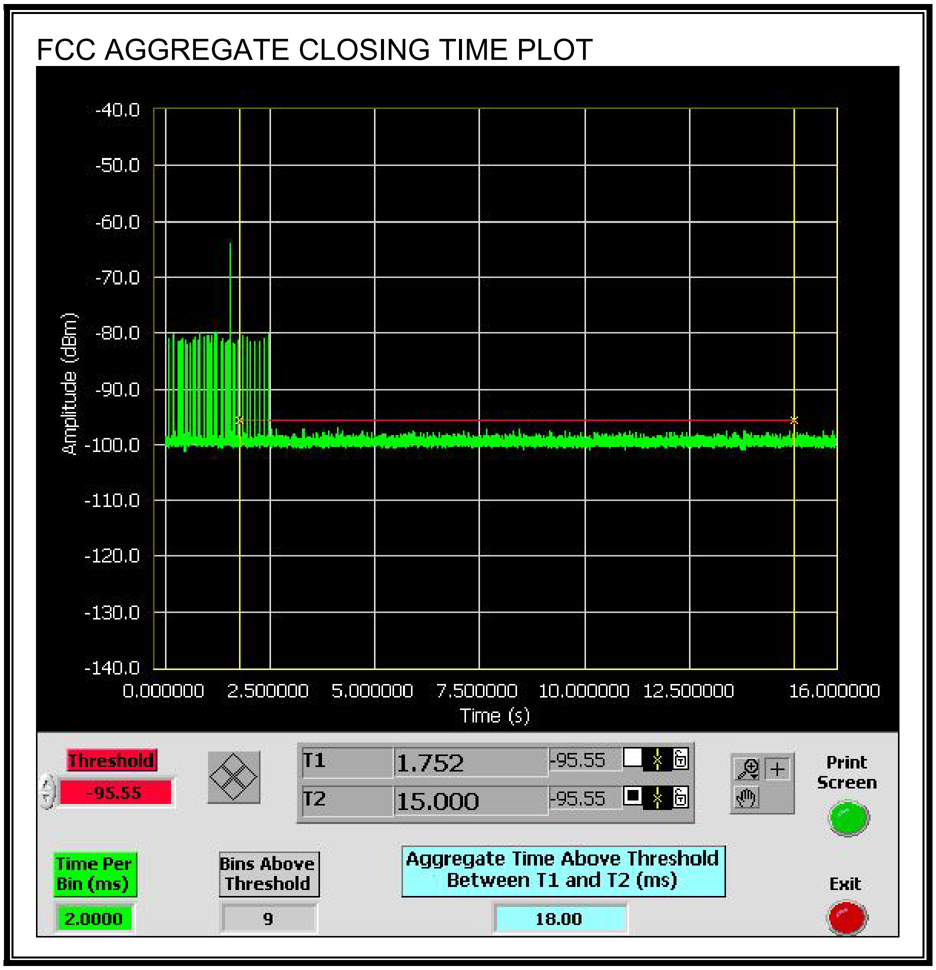

MOVE TIME PLOT
Agilent 09:08:55 Mar 1, 2010
R T
Freq/Channel
Δ Mkr1 892 ms
Ref -40 dBm
#Atten 0 dB
-16.13 dB
#Peak
Log
10
dB/
Offst
-21.8
dB
Dl
-64.0
dBm
LgAv
Center Freq
5.50000000 GHz
Start Freq
5.50000000 GHz
Stop Freq
5.50000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 5.500 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.552 s -64.01 dBm
1Δ (1) Time 892 ms -16.13 dB
Copyright 2000-2009 Agilent Technologies

CHANNEL CLOSING TIME

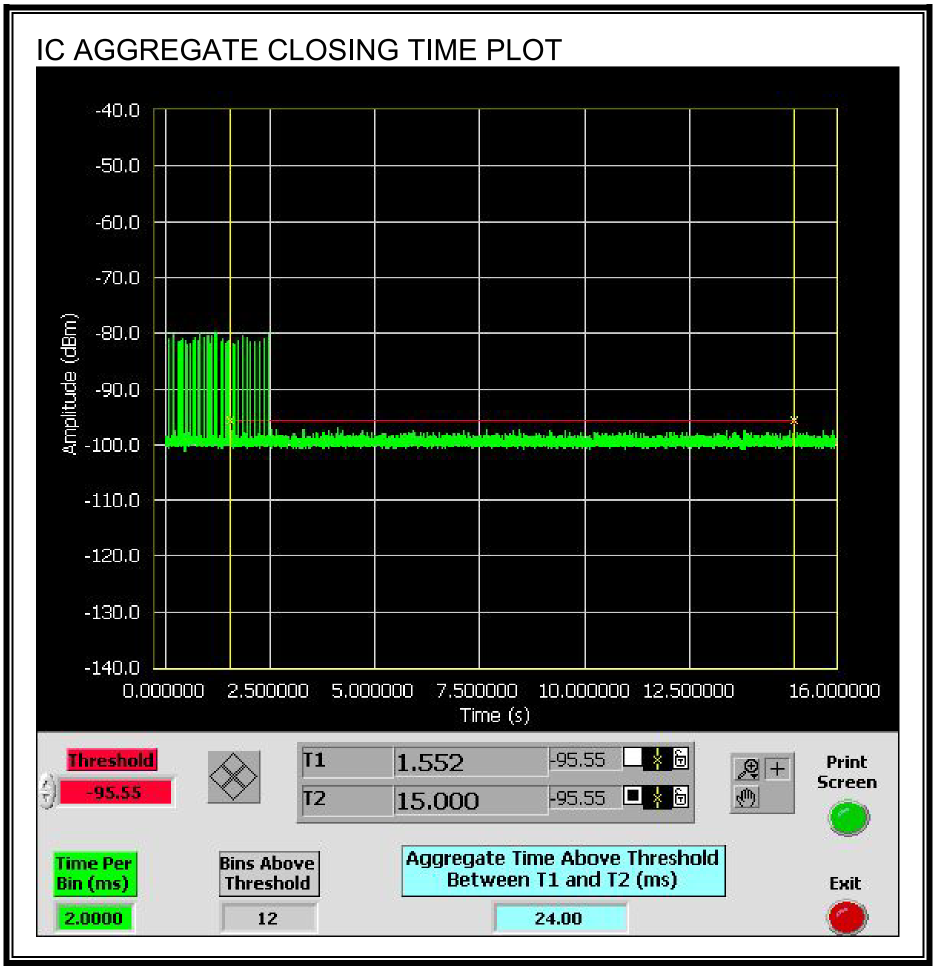


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

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



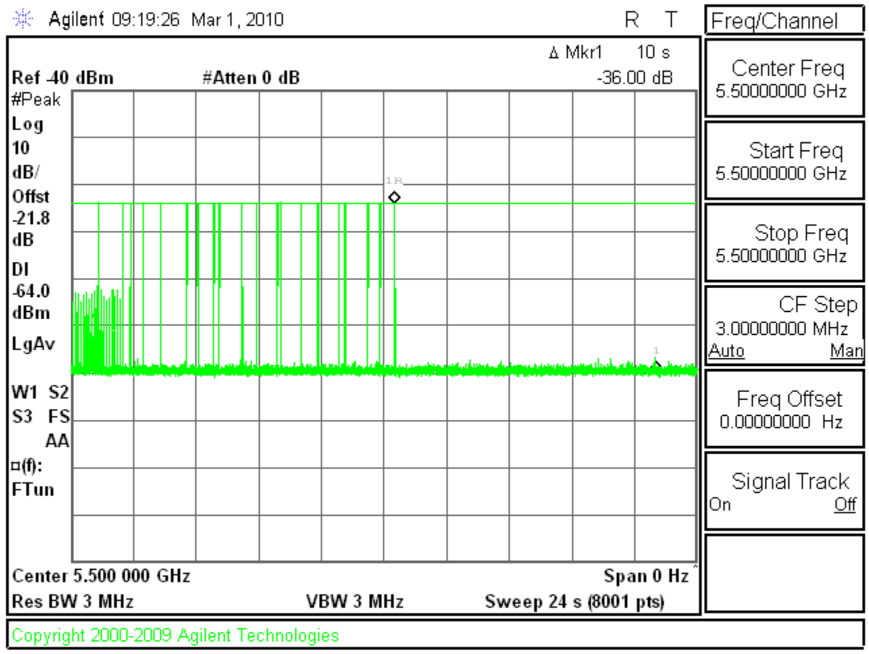
Only intermittent transmissions are observed during the IC aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

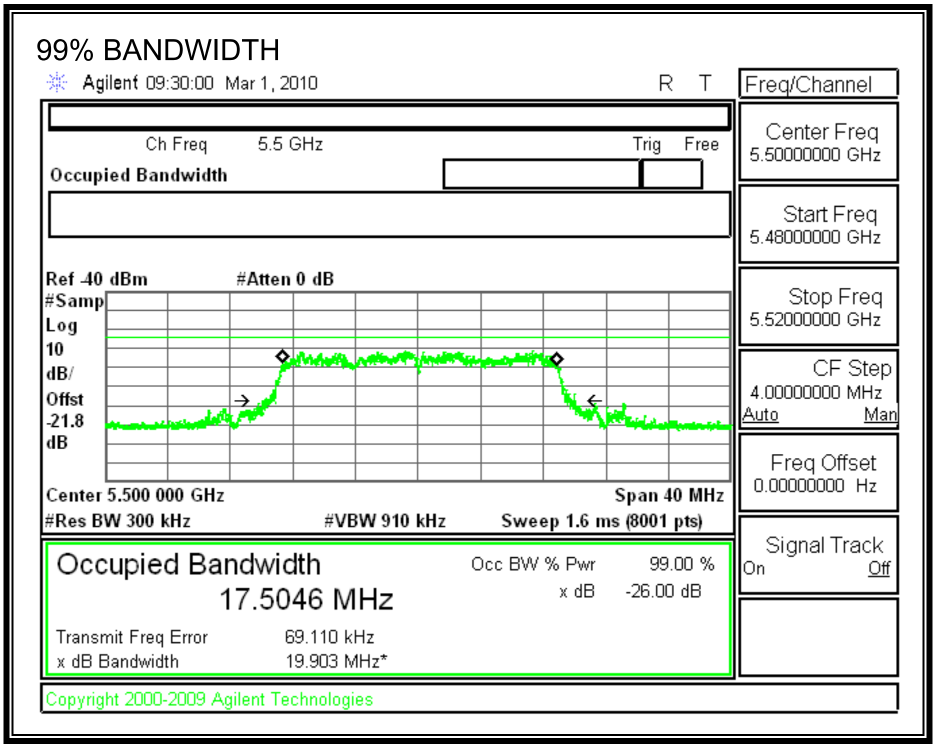
The traffic ceases prior to 10 seconds after the end of the radar waveform.

MOVE TIME PLOT FOR LONG PULSE RADAR



11.2.6. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

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

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	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

11.2.7. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary				
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

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	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

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (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
2030	1.1	194.00	23	Yes

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TYPE 3 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 3				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (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

TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (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
4030	10.9	305.00	14	Yes

TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5

Trial	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.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (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

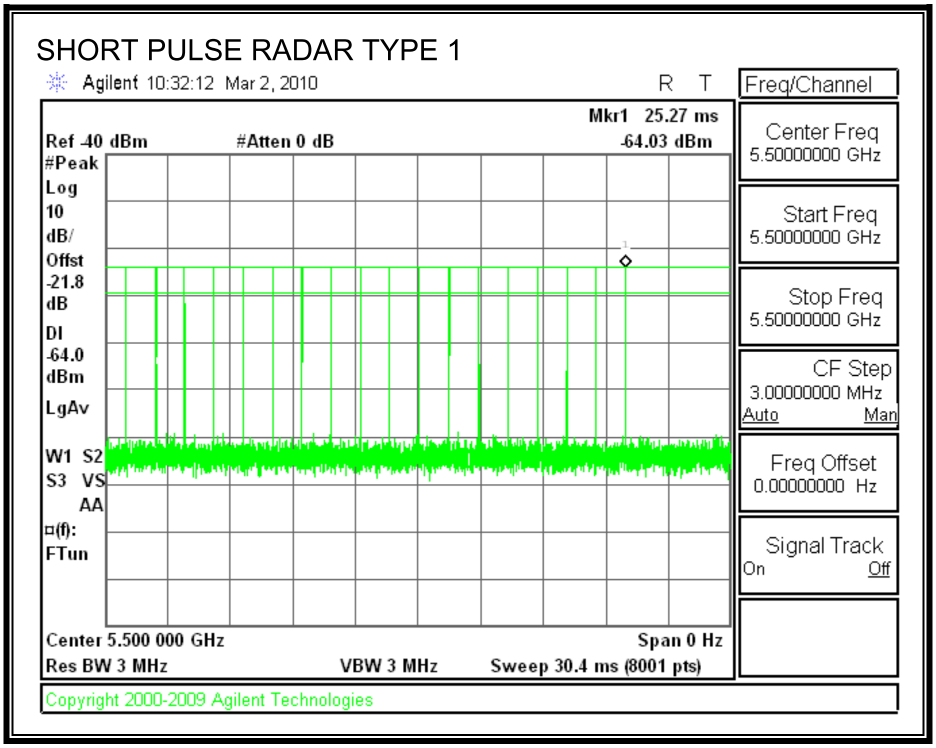
11.3. SLAVE DEVICE CONFIGURATION IN 20 MHz BANDWIDTH

11.3.1. TEST CHANNEL

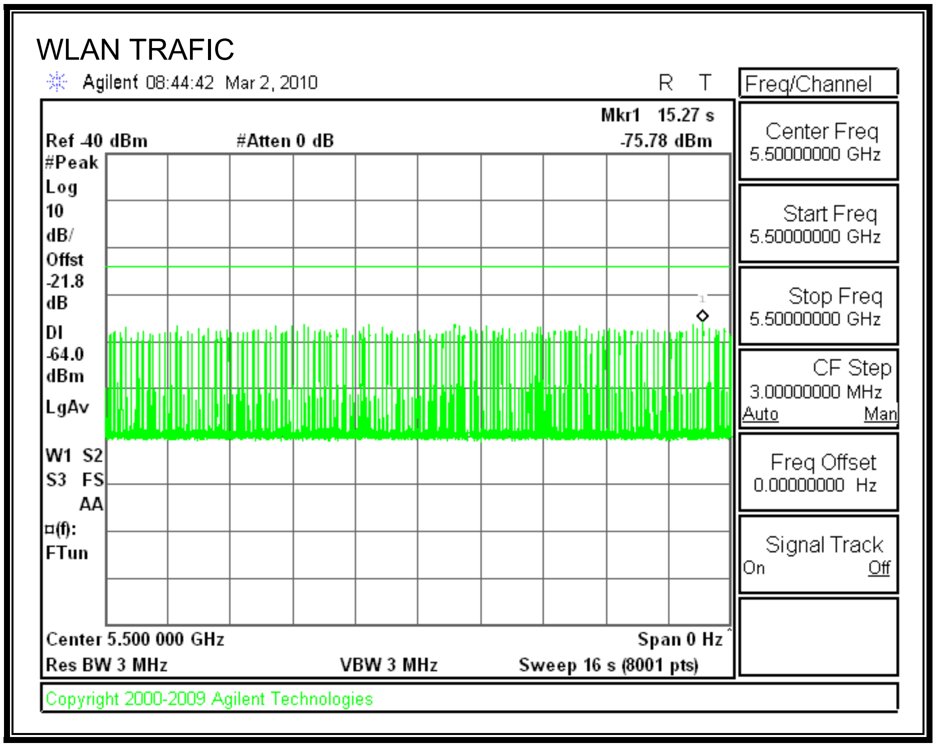
All tests were performed at a channel center frequency of 5500 MHz.

11.3.2. PLOTS OF RADAR WAVEFORM AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORM



PLOT OF WLAN TRAFFIC



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 (sec)	Limit (sec)
FCC / IC	0.544	10

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

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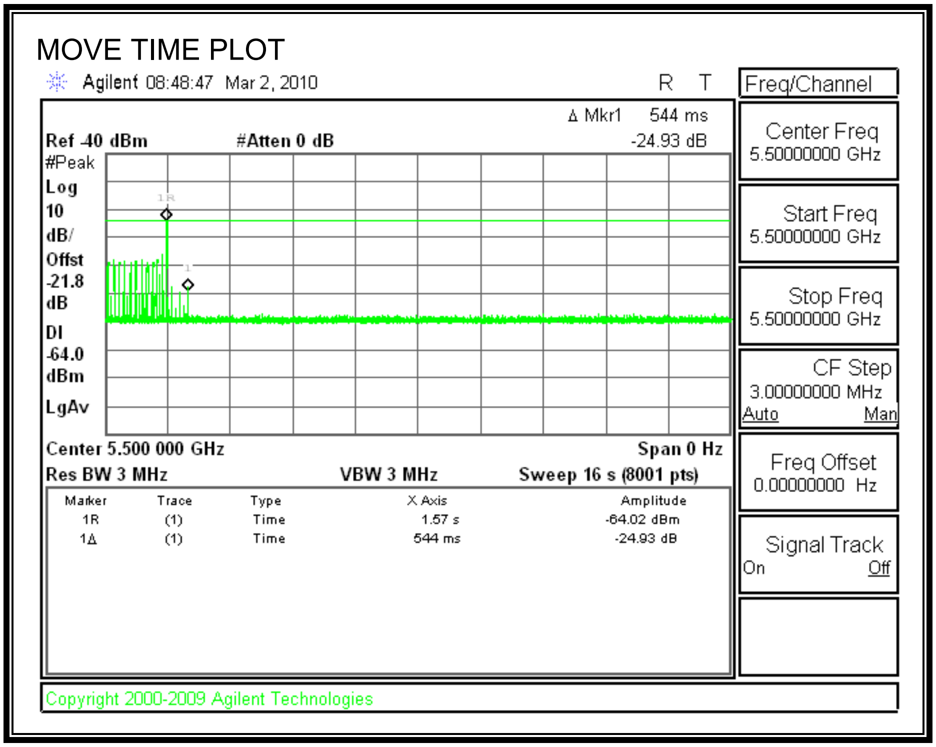
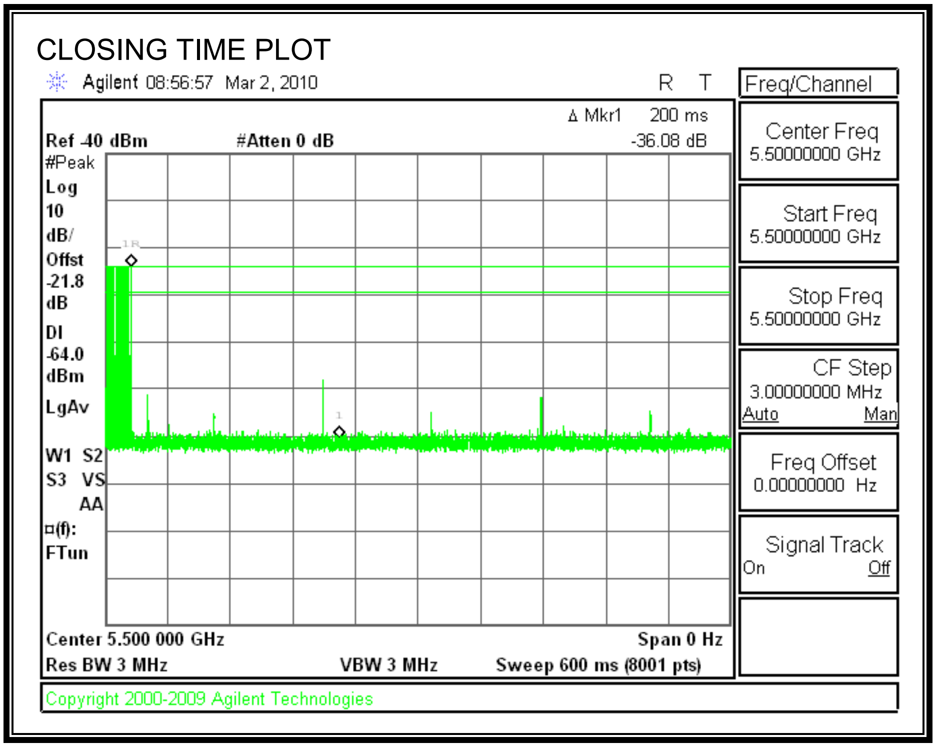
MOVE TIME

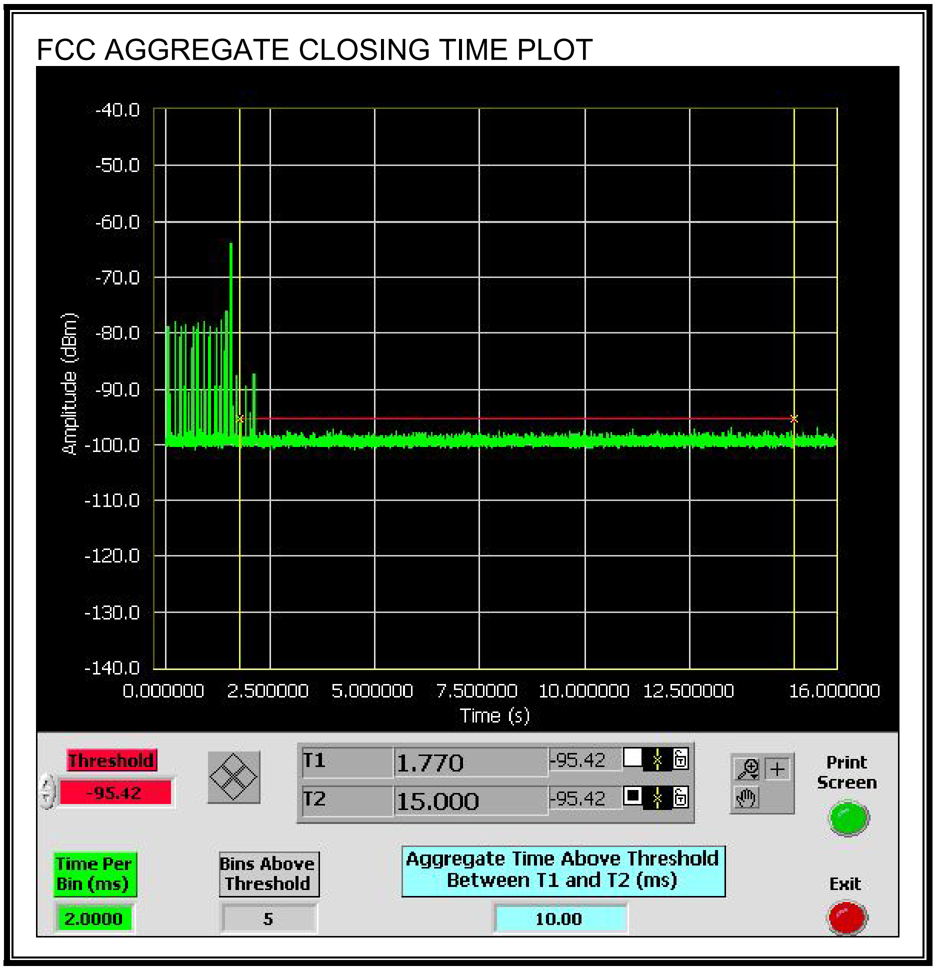

MOVE TIME PLOT
Agilent 08:48:47 Mar 2, 2010
R T
Freq/Channel
Δ Mkr1 544 ms
Ref -40 dBm #Atten 0 dB -24.93 dB
#Peak
Log
10
dB/
Offst
-21.8
dB
Dl
-64.0
dBm
LgAv
Center 5.500 000 GHz Span 0 Hz
Res BW 3 MHz VBW 3 MHz Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.57 s -64.02 dBm
1Δ (1) Time 544 ms -24.93 dB
Center Freq 5.50000000 GHz
Start Freq 5.50000000 GHz
Stop Freq 5.50000000 GHz
CF Step 3.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off
Copyright 2000-2009 Agilent Technologies

CHANNEL CLOSING TIME

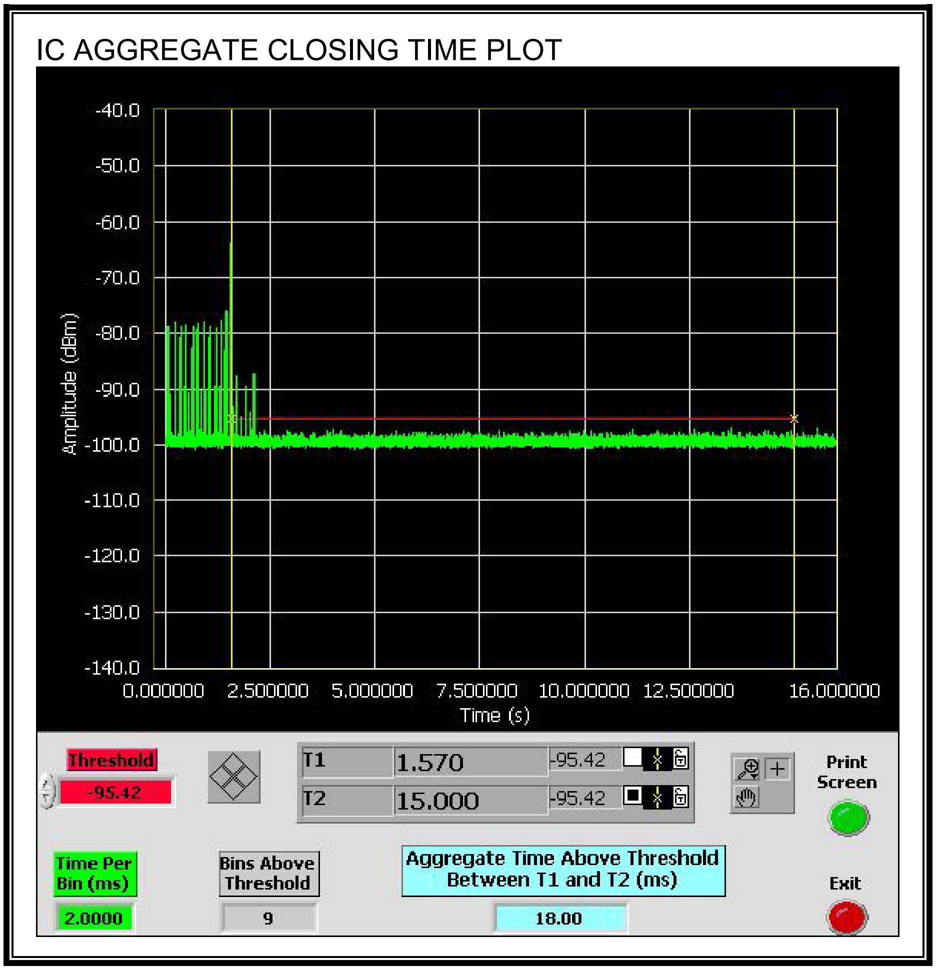


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

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



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



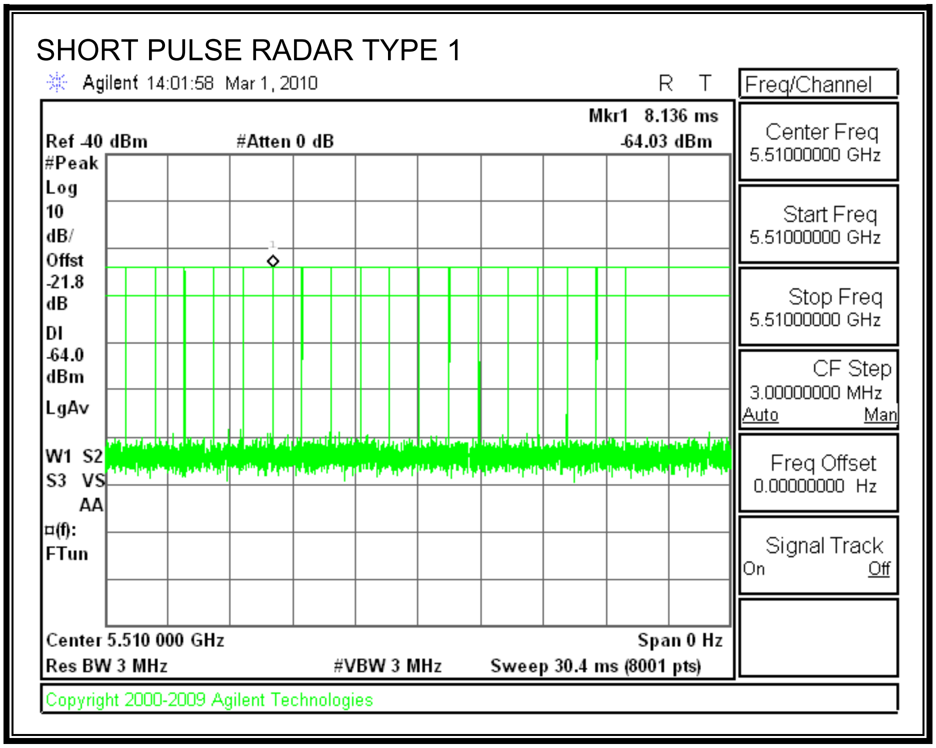
11.4. MASTER DEVICE CONFIGURATION IN 40 MHz BANDWIDTH

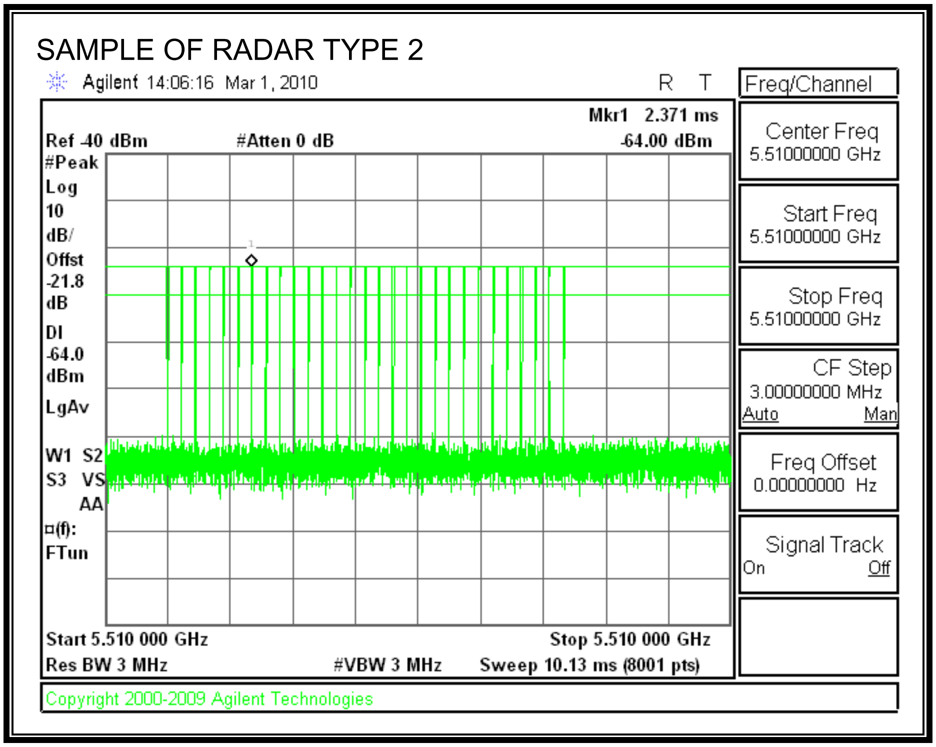
11.4.1. TEST CHANNEL

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

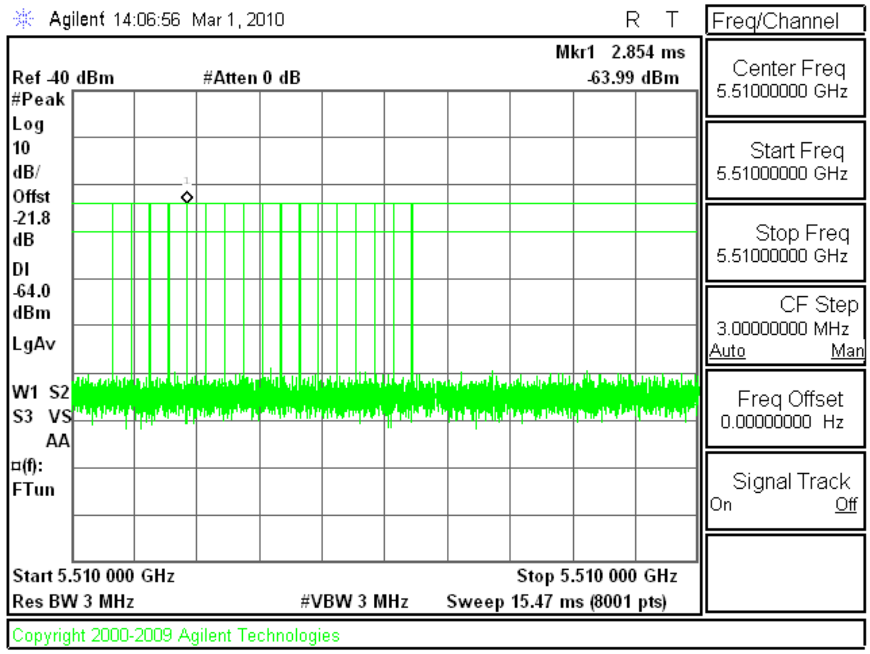
11.4.2. PLOTS OF RADAR WAVEFORMS AND WLAN TRAFFIC

PLOTS OF RADAR WAVEFORMS

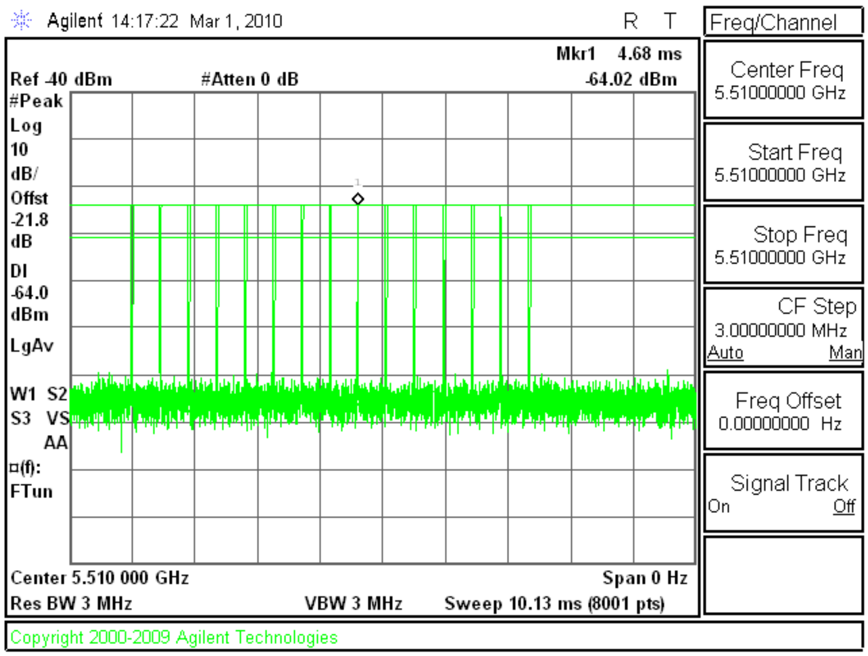



SAMPLE OF RADAR TYPE 2
Agilent 14:06:16 Mar 1, 2010
R T
Freq/Channel
Mkr1 2.371 ms
Ref -40 dBm #Atten 0 dB -64.00 dBm
#Peak
Log
10
dB/
Offst
-21.8
dB
Dl
-64.0
dBm
LgAv
W1 S2
S3 VS
AA
FTun
Center Freq 5.51000000 GHz
Start Freq 5.51000000 GHz
Stop Freq 5.51000000 GHz
CF Step 3.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off
Start 5.510 000 GHz Stop 5.510 000 GHz
Res BW 3 MHz #VBW 3 MHz Sweep 10.13 ms (8001 pts)
Copyright 2000-2009 Agilent Technologies

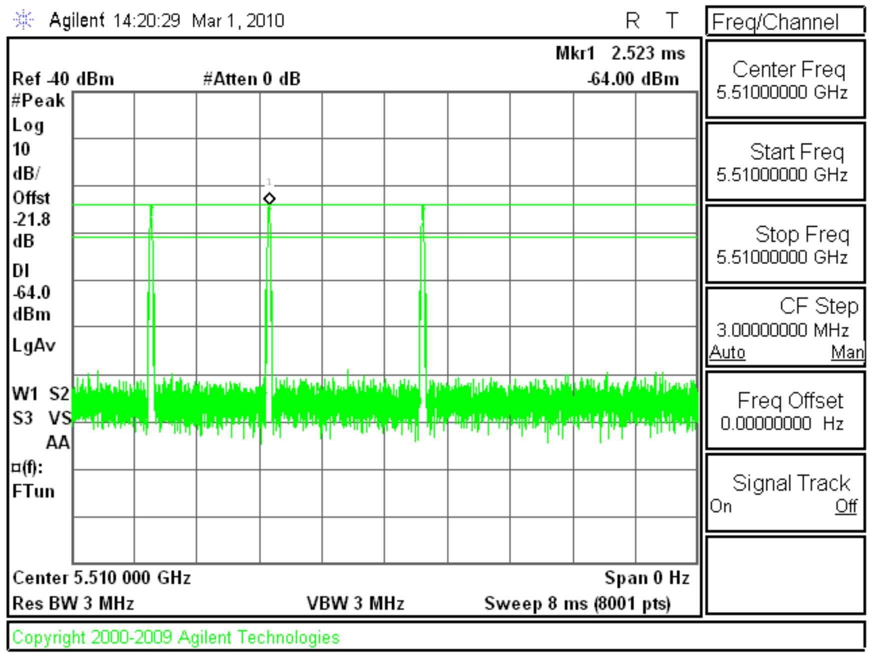
SAMPLE OF RADAR TYPE 3



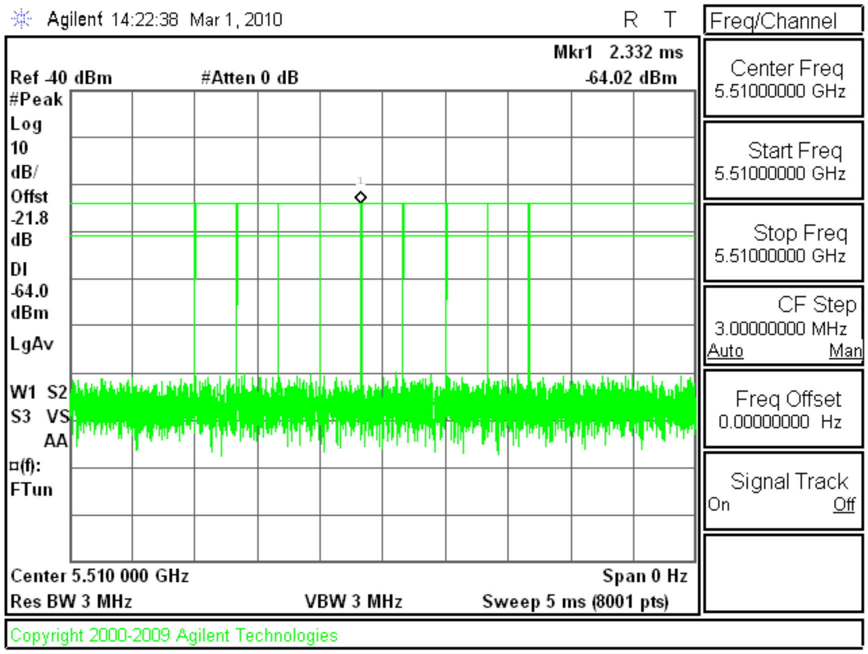
SAMPLE OF RADAR TYPE 4



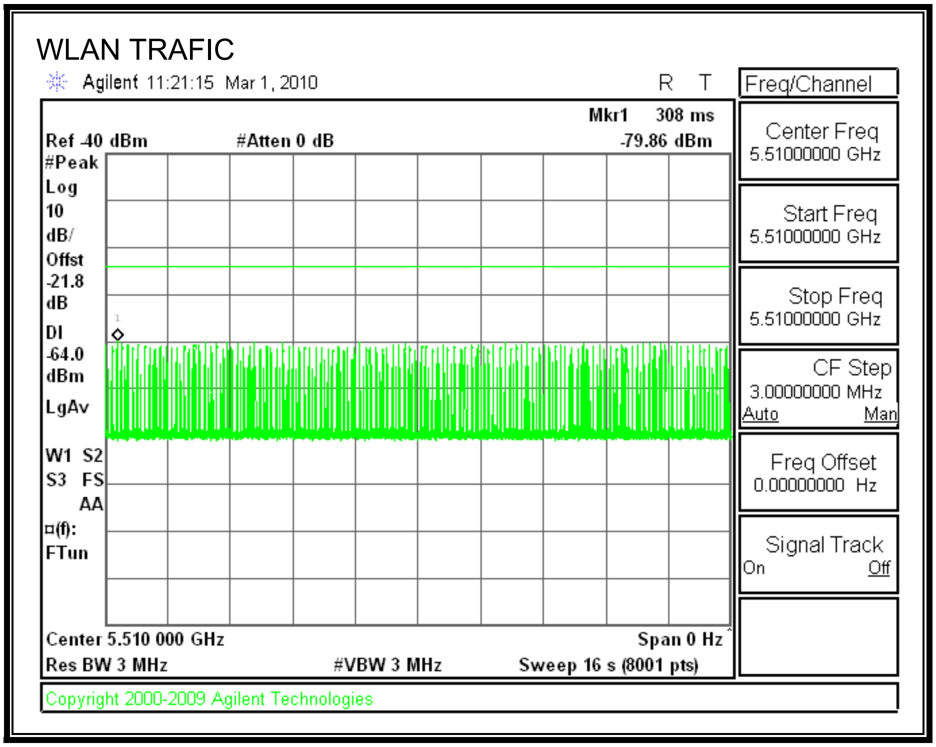
SAMPLE OF SINGLE BURST OF RADAR TYPE 5



SINGLE BURST OF RADAR TYPE 6



PLOT OF WLAN TRAFFIC FROM MASTER



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

Radar Near Beginning of CAC

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

Radar Near End of CAC

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

QUALITATIVE RESULTS

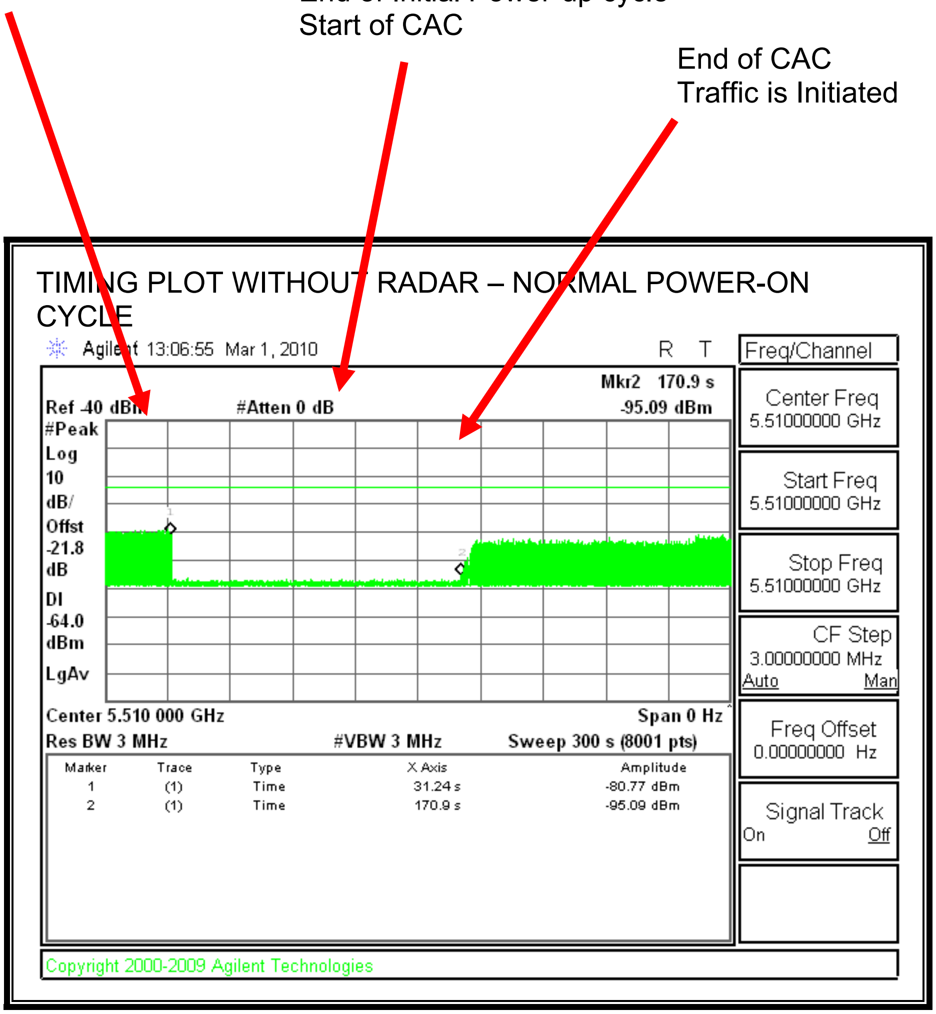
Timing of Radar Burst	Display on Control Computer	Spectrum Analyzer Display
No Radar Triggered	EUT marks Channel as active	Transmissions begin on channel after completion of the initial power-up cycle and the CAC
Within 0 to 6 second window	EUT indicates radar detected	No transmissions on channel
Within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

TIMING PLOT WITHOUT RADAR DURING CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

End of CAC
Traffic is Initiated



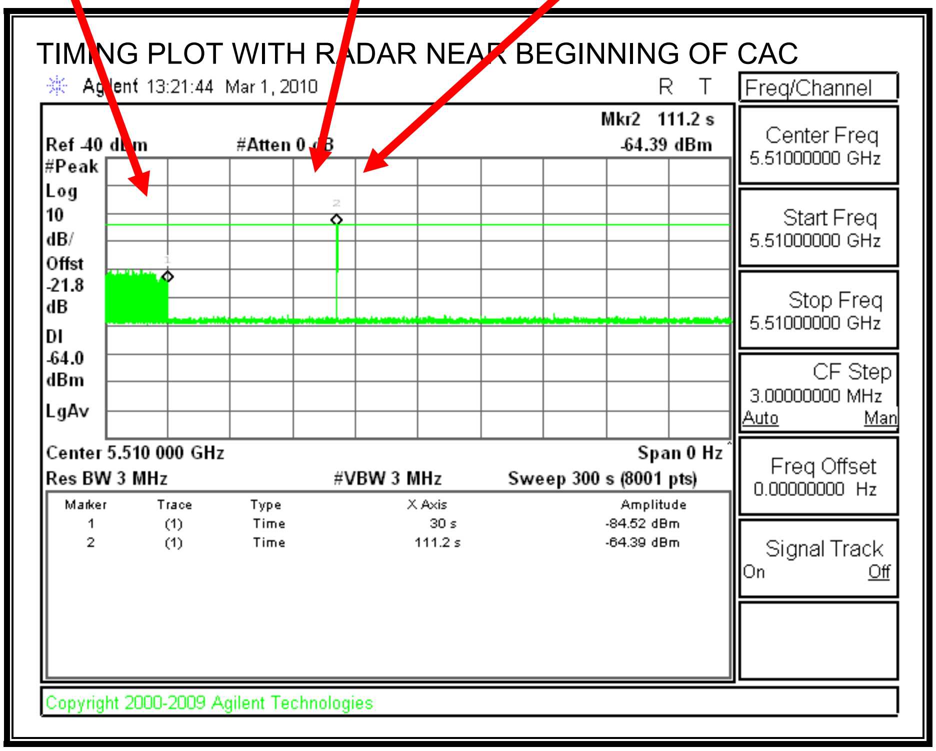
Transmissions begin on channel after completion of the initial power-up cycle and the CAC.

TIMING PLOT WITH RADAR NEAR BEGINNING OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



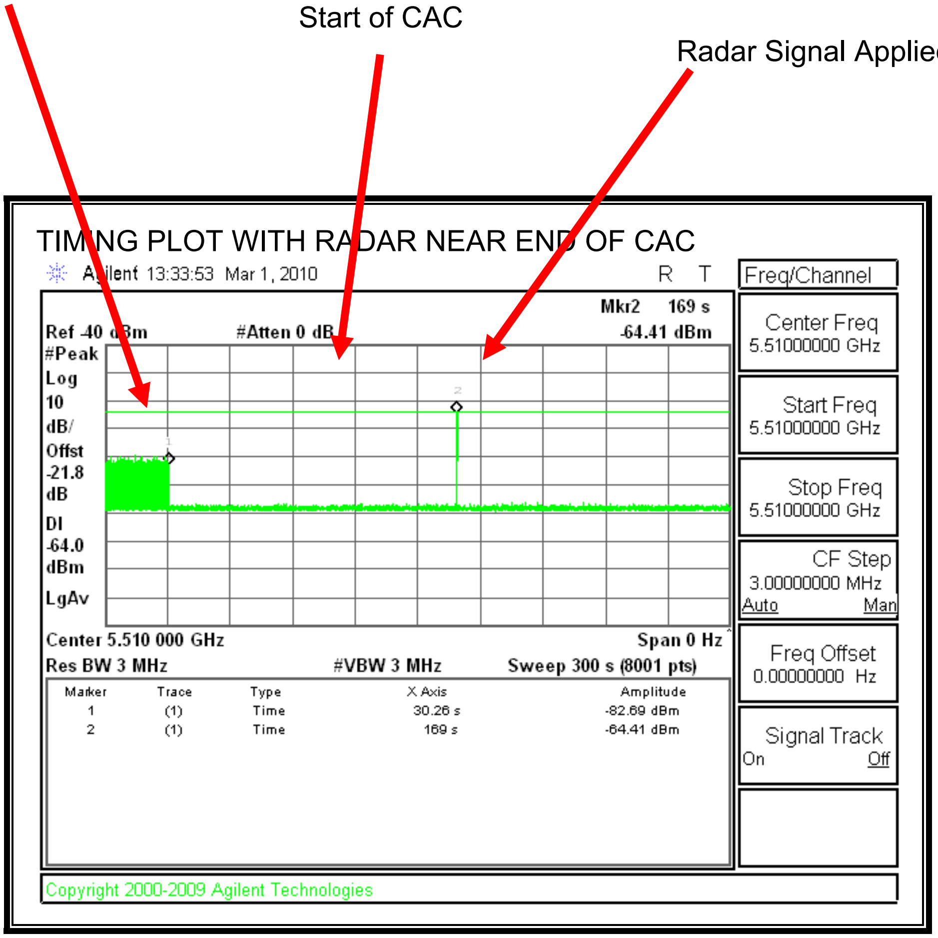
No EUT transmissions were observed after the radar signal.

TIMING PLOT WITH RADAR NEAR END OF CAC

AP is rebooted
Traffic ceases
Start of Initial Power-up cycle

End of Initial Power-up cycle
Start of CAC

Radar Signal Applied



No EUT transmissions were observed after the radar signal.

11.4.4. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

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 (sec)	Limit (sec)
FCC / IC	0.928	10

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

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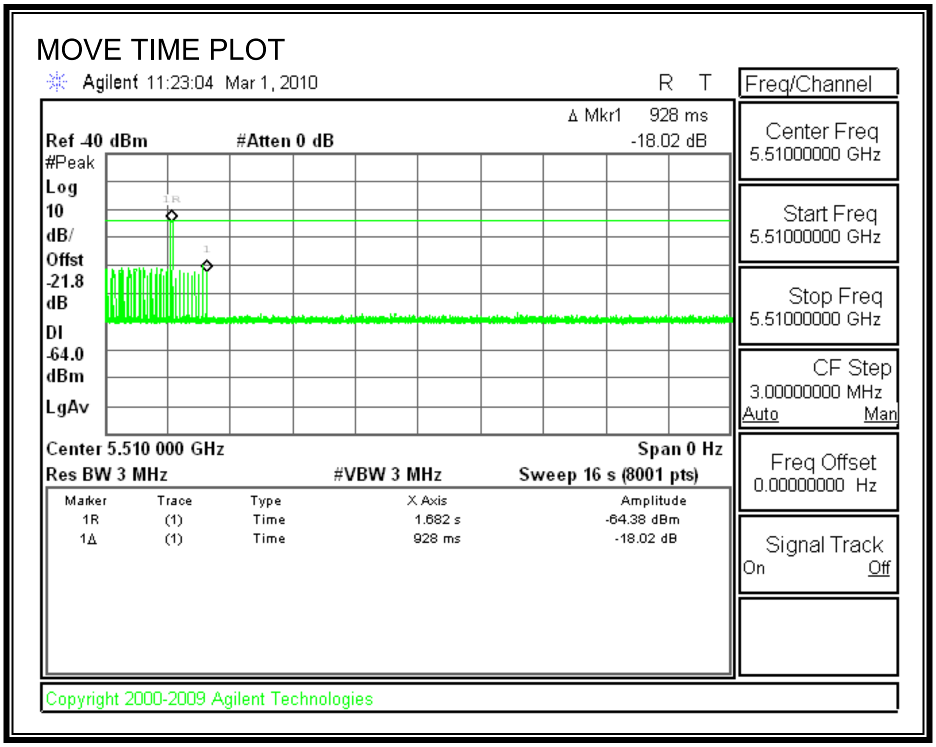
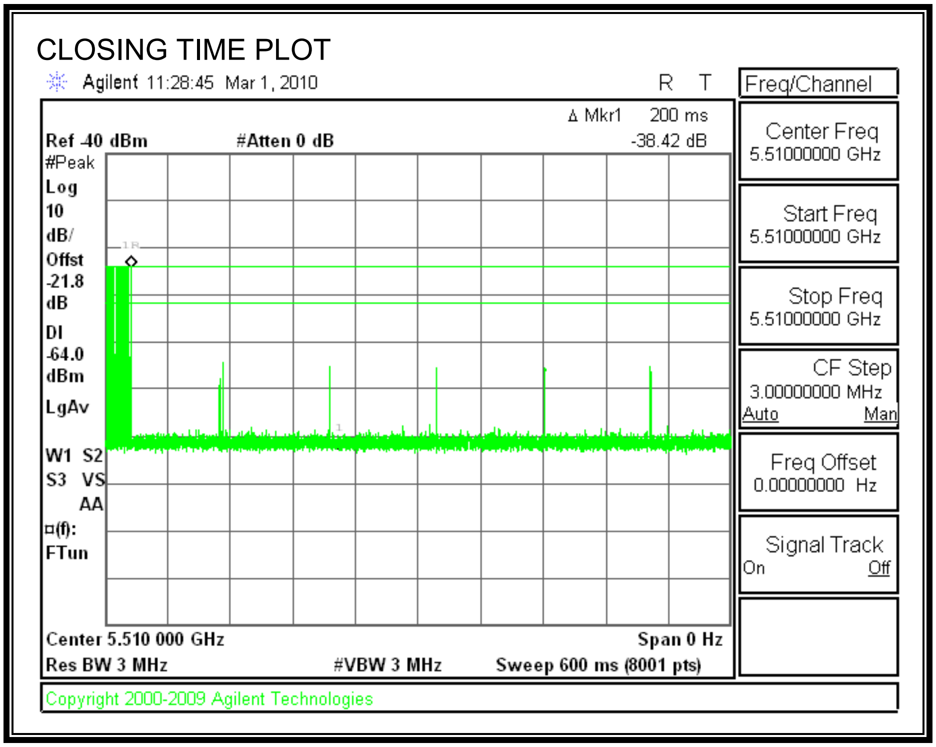
MOVE TIME

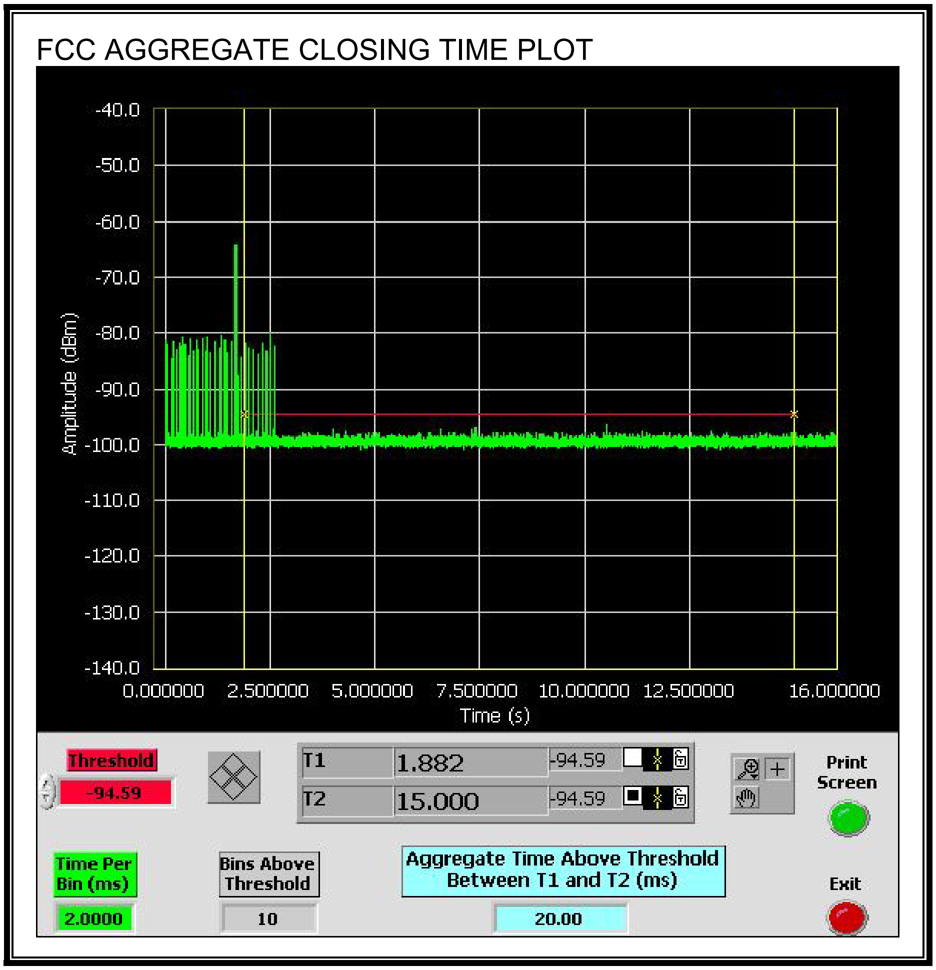

MOVE TIME PLOT
Agilent 11:23:04 Mar 1, 2010
R T
Δ Mkr1 928 ms
Ref -40 dBm #Atten 0 dB -18.02 dB
#Peak
Log
10
dB/
Offst
-21.8
dB
Dl
-64.0
dBm
LgAv
Center 5.510 000 GHz Span 0 Hz
Res BW 3 MHz #VBW 3 MHz Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.682 s -64.38 dBm
1Δ (1) Time 928 ms -18.02 dB
Freq/Channel
Center Freq 5.51000000 GHz
Start Freq 5.51000000 GHz
Stop Freq 5.51000000 GHz
CF Step 3.00000000 MHz Auto Man
Freq Offset 0.00000000 Hz
Signal Track On Off
Copyright 2000-2009 Agilent Technologies

CHANNEL CLOSING TIME

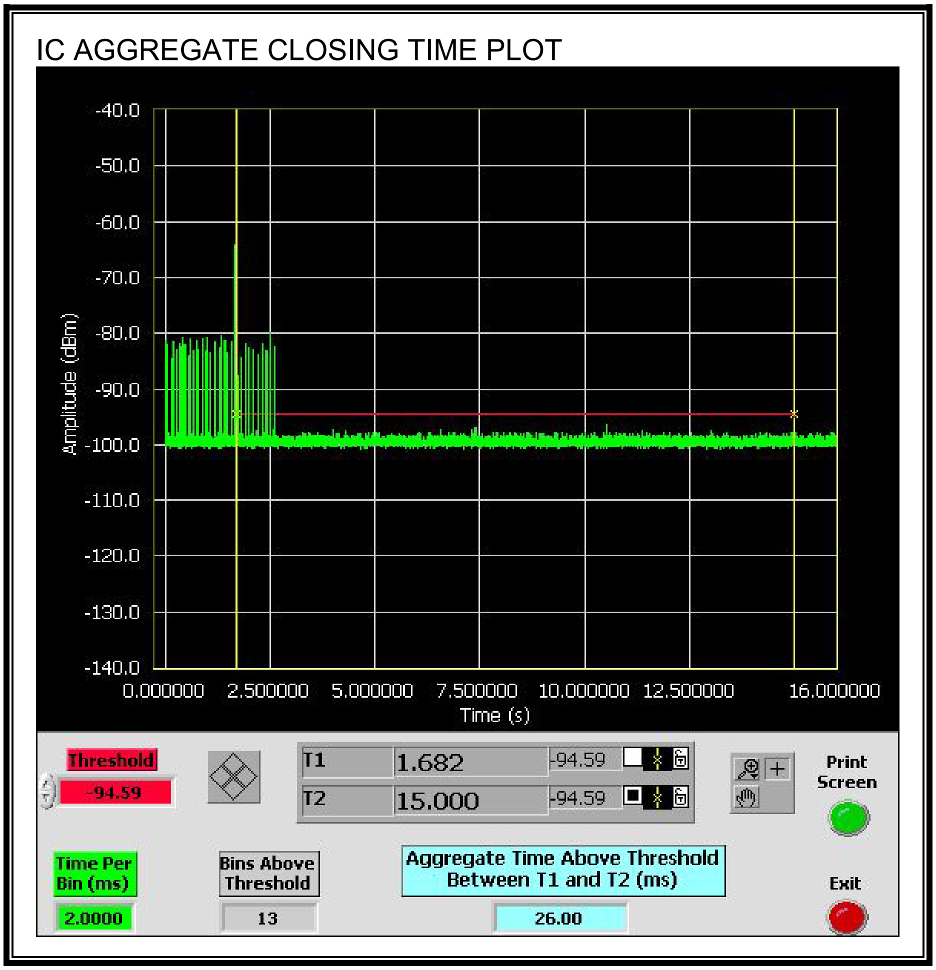


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

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

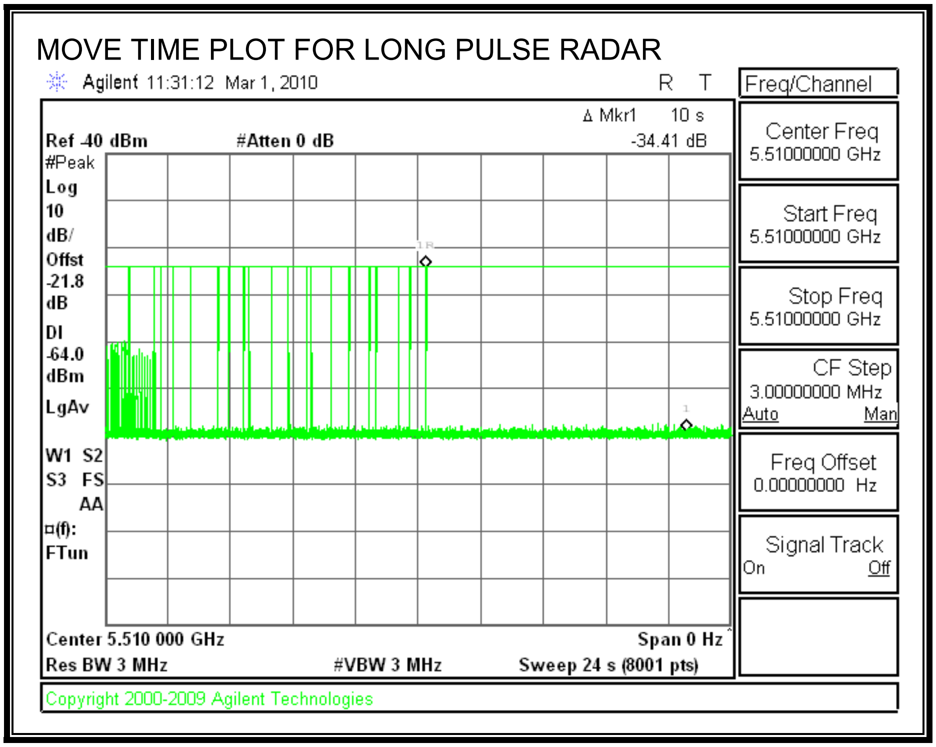


Only intermittent transmissions are observed during the IC aggregate monitoring period.



LONG PULSE CHANNEL MOVE TIME

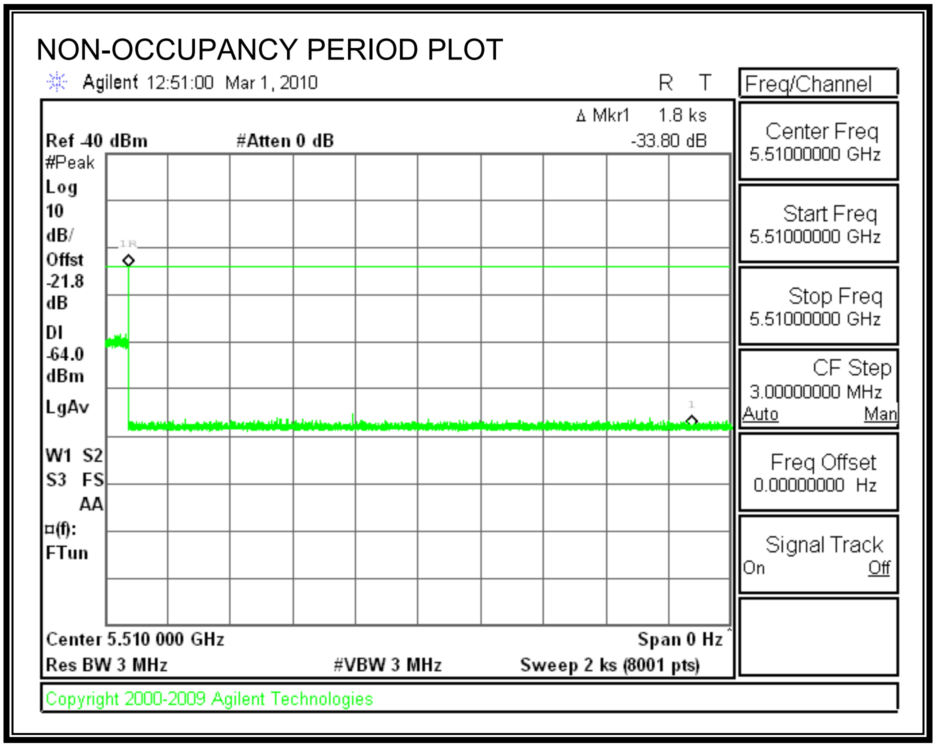
The traffic ceases prior to 10 seconds after the end of the radar waveform.



11.4.6. NON-OCCUPANCY PERIOD

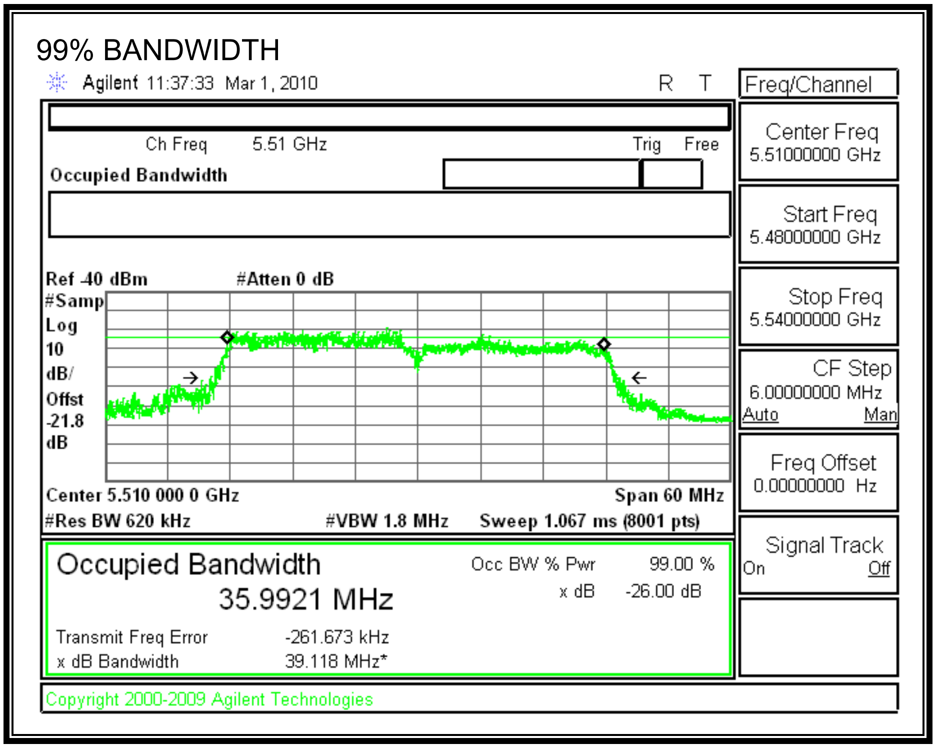
RESULTS

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



11.4.7. DETECTION BANDWIDTH

REFERENCE PLOT OF 99% POWER BANDWIDTH



RESULTS

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

DETECTION BANDWIDTH PROBABILITY

DETECTION BANDWIDTH PROBABILITY RESULTS

Detection Bandwidth Test Results				
FCC Type 1 Waveform: 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst				
Frequency (MHz)	Number of Trials	Number Detected	Detection (%)	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

11.4.8. IN-SERVICE MONITORING

RESULTS

FCC Radar Test Summary				
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	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

TYPE 1 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 1 1 us Pulse Width, 1428 us PRI, 18 Pulses per Burst	
Trial	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

TYPE 2 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 2				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (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

Data Sheet for FCC Short Pulse Radar Type 3				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (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
3030	8.7	311	17	Yes

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TYPE 4 DETECTION PROBABILITY

Data Sheet for FCC Short Pulse Radar Type 4				
Waveform	Pulse Width (us)	PRI (us)	Pulses Per Burst	Successful Detection (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
4030	10.9	305.00	14	Yes

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TYPE 5 DETECTION PROBABILITY

Data Sheet for FCC Long Pulse Radar Type 5

Trial	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.

TYPE 6 DETECTION PROBABILITY

Data Sheet for FCC Hopping Radar Type 6				
1 us Pulse Width, 333 us PRI, 9 Pulses per Burst, 1 Burst per Hop				
NTIA August 2005 Hopping Sequence				
Trial	Starting Index Within Sequence	Signal Generator Frequency (MHz)	Hops within Detection BW	Successful Detection (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
37	17249	5528	6	Yes

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).

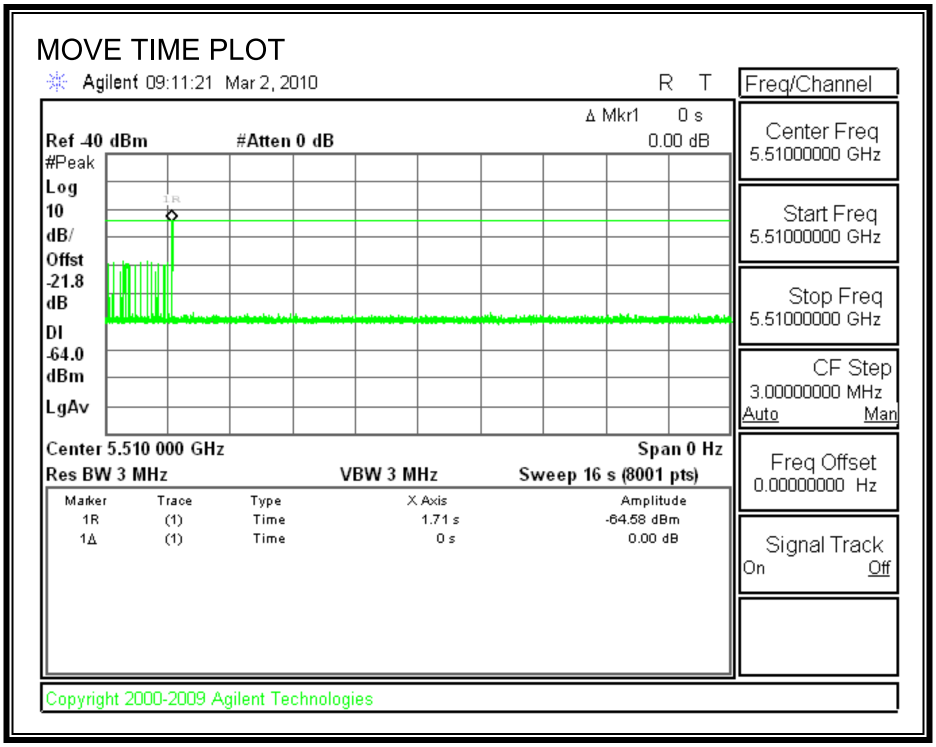
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

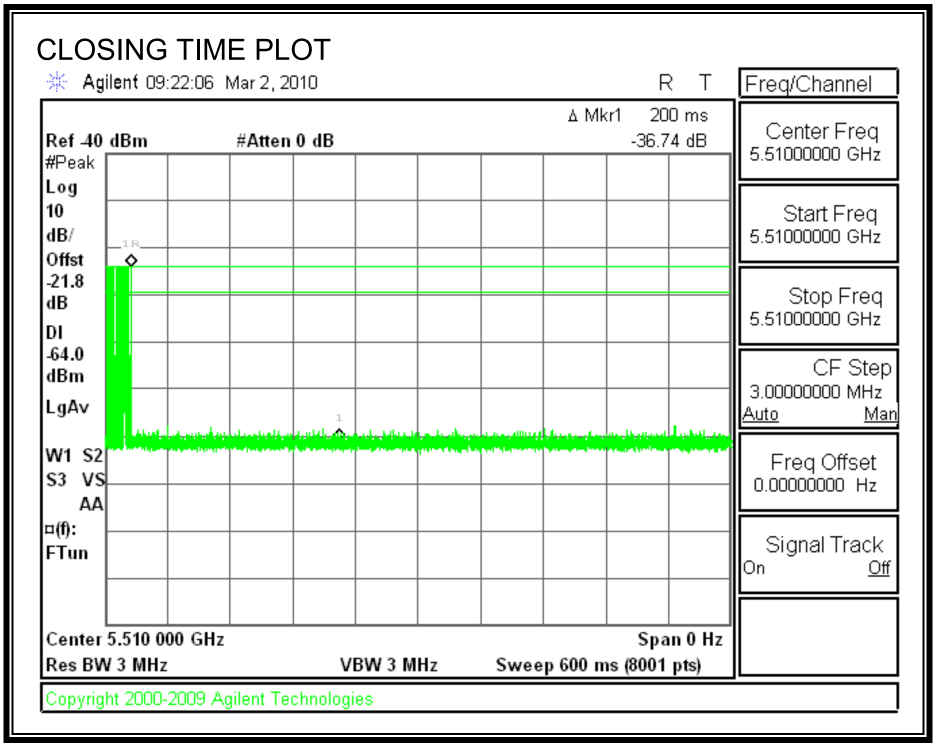
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.0	10

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

MOVE TIME

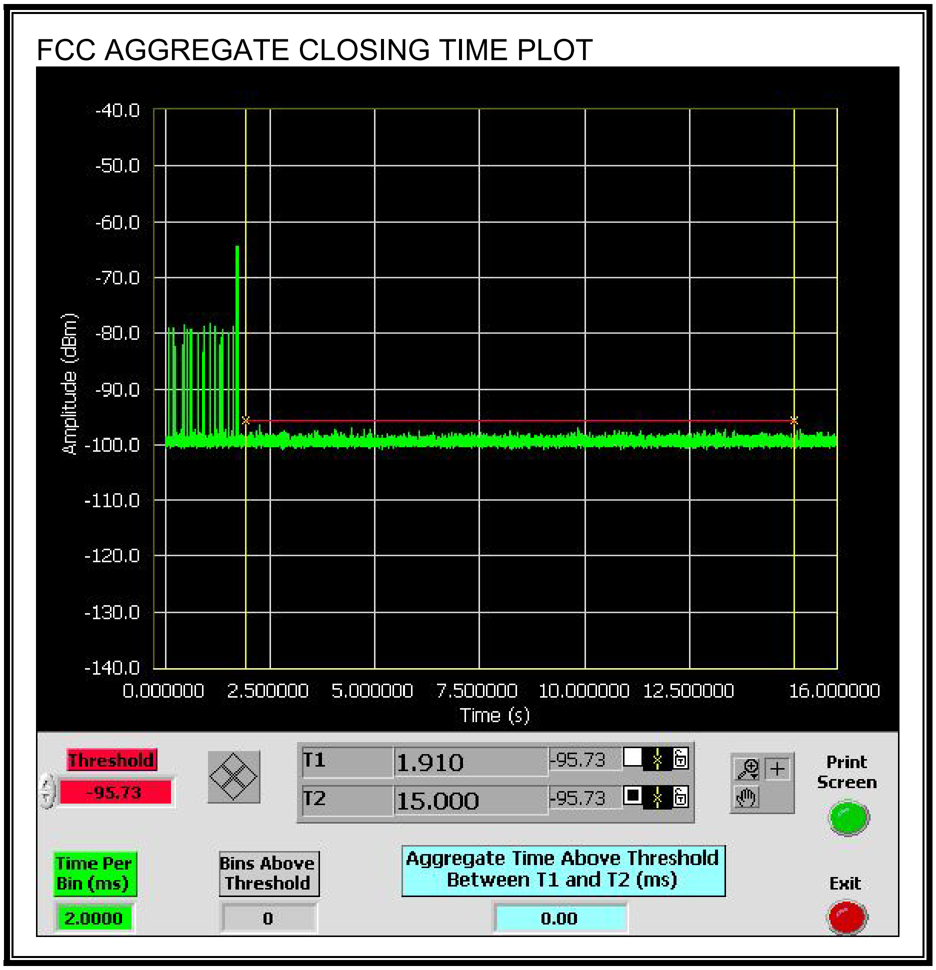

MOVE TIME PLOT
Agilent 09:11:21 Mar 2, 2010
R T
Freq/Channel
Δ Mkr1 0 s
Ref -40 dBm
#Atten 0 dB
0.00 dB
#Peak
Log
10
dB/
Offst
-21.8
dB
Dl
-64.0
dBm
LgAv
Center Freq
5.51000000 GHz
Start Freq
5.51000000 GHz
Stop Freq
5.51000000 GHz
CF Step
3.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 5.510 000 GHz
Span 0 Hz
Res BW 3 MHz
VBW 3 MHz
Sweep 16 s (8001 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 1.71 s -64.58 dBm
1Δ (1) Time 0 s 0.00 dB
Copyright 2000-2009 Agilent Technologies

CHANNEL CLOSING TIME

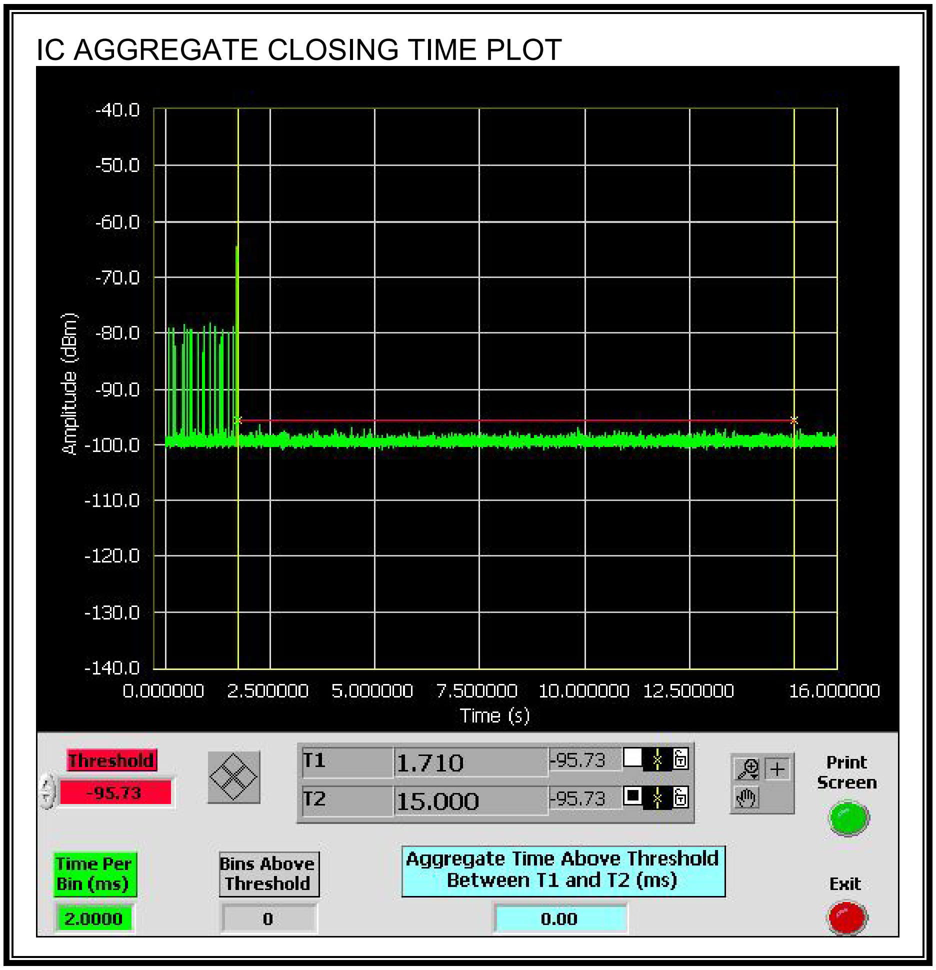


AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.



No transmissions are observed during the IC aggregate monitoring period.



11.6.1. SLAVE NON-OCCUPANCY

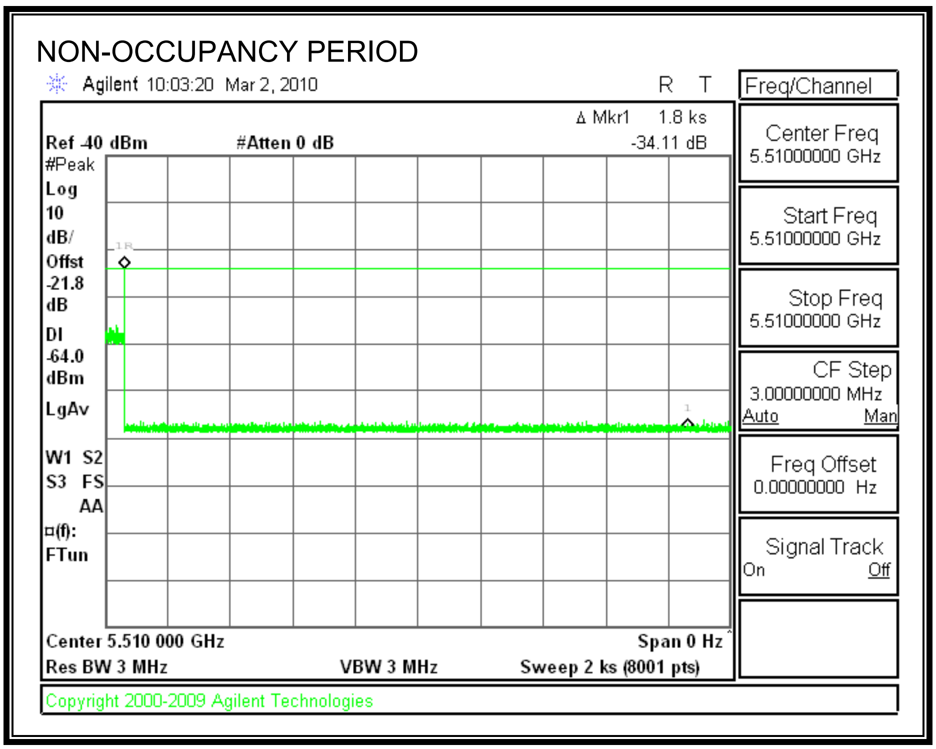
TEST PROCEDURE

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.



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.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	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 occupational/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 exposed, 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.

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 Exposed Workers (Including the General Public)

1 Frequency (MHz)	2 Electric Field Strength; rms (V/m)	3 Magnetic Field Strength; rms (A/m)	4 Power Density (W/m^2)	5 Averaging Time (min)
0.003–1	280	2.19		6
1–10	$280/f$	$2.19/f$		6
10–30	28	$2.19/f$		6
30–300	28	0.073	2*	6
300–1 500	$1.585f^{0.5}$	$0.0042f^{0.5}$	$f/150$	6
1 500–15 000	61.4	0.163	10	6
15 000–150 000	61.4	0.163	10	$616\,000/f^{1.2}$
150 000–300 000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616\,000/f^{1.2}$

* 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^2 is equivalent to 1 mW/cm^2.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (µT) or 12.57 milligauss (mG).

EQUATIONS

Power density is given by:

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

where

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

Power density in units of W/m^2 is converted to units of mWc/m^2 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^2

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.

LIMITS

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

RESULTS

(MPE distance equals 20 cm)

Band	Mode	Separation Distance (m)	Output Power (dBm)	Antenna Gain (dBi)	IC Power Density (W/m^2)	FCC Power Density (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