

## FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

**CERTIFICATION TEST REPORT** 

FOR

802.11b/g/n WLAN + Bluetooth Module Combo Card

MODEL NUMBER: BCM94319SDB

FCC ID: QDS-BRCM1056 IC: 4324A- BRCM1056

REPORT NUMBER: 11U13681-4

**ISSUE DATE: FEBRUARY 28, 2011** 

Prepared for BROADCOM CORPORATION 190 MATHILDA PLACE SUNNYVALE, CA 94086, U.S.A.

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NVLAP LAB CODE 200065-0

### Revision History

| Rev. | Issue<br>Date | Revisions     | Revised By |
|------|---------------|---------------|------------|
|      | 02/28/11      | Initial Issue | T. Chan    |

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# **1. ATTESTATION OF TEST RESULTS**

|                  | STANDARD  |                 |  |  |  |
|------------------|---|-----------------|--|--|--|
|                  | APPLICABLE STANDARDS  |                 |  |  |  |
| DATE TESTED:     | FEBRUARY 23 to 28, 2011   |                 |  |  |  |
| SERIAL NUMBER:   | 336   |                 |  |  |  |
| MODEL:           | BCM94319SDB   |                 |  |  |  |
| EUT DESCRIPTION: | 802.11b/g/n WLAN + Bluetooth Mod  | dule Combo Card |  |  |  |
| COMPANY NAME:    | BROADCOM CORPORATION<br>190 MATHILDA PLACE<br>SUNNYVALE, CA 94086, U.S.A. |                 |  |  |  |

| STANDARD                                | TEST RESULTS |
|---|--------------|
| CFR 47 Part 15 Subpart C                | Pass         |
| INDUSTRY CANADA RSS-210 Issue 8 Annex 8 | Pass         |
| INDUSTRY CANADA RSS-GEN Issue 3         | Pass         |

Compliance Certification Services (UL 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 UL 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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 UL CCS By:

Tested By:

THU CHAN ENGINEERING MANAGER UL CCS Queryunder

VIEN TRAN EMC ENGINEER UL CCS

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

# 3. FACILITIES AND ACCREDITATION

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

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

# 4. CALIBRATION AND UNCERTAINTY

# 4.1. MEASURING INSTRUMENT CALIBRATION

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

# 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

# 4.3. MEASUREMENT UNCERTAINTY

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

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

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

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# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

802.11b/g/n WLAN + Bluetooth Module Combo Card.

The radio module is manufactured by Broadcom.

# 5.2. MAXIMUM OUTPUT POWER

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

| Frequency Range | Mode           | Output Power | Output Power |
|-----------------|----------------|--------------|--------------|
| (MHz)           |                | (dBm)        | (mW)         |
| 2402 - 2480     | Basic GFSK     | -1.29        | 0.74         |
| 2402 - 2480     | Enhanced 8PSK  | 1.75         | 1.50         |
| 2402 - 2480     | Low Energy BLE | -0.98        | 0.80         |

# 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an 802.11bgn WLAN and Bluetooth antenna with a maximum gain of 3.9 dBi.

# 5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom Bluetooth 4.0 + HS USB, rev. 5.6.0.3200.

The test utility software used during testing was Bluetool, ver. 1.4.3.0 and BCM\_BTDL, ver 1.8.17.

# 5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

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# 5.6. DESCRIPTION OF TEST SETUP

### FOR GFSK, 8PSK MODES; Hopping ON & OFF and LE MODE; Hopping OFF

#### SUPPORT EQUIPMENT

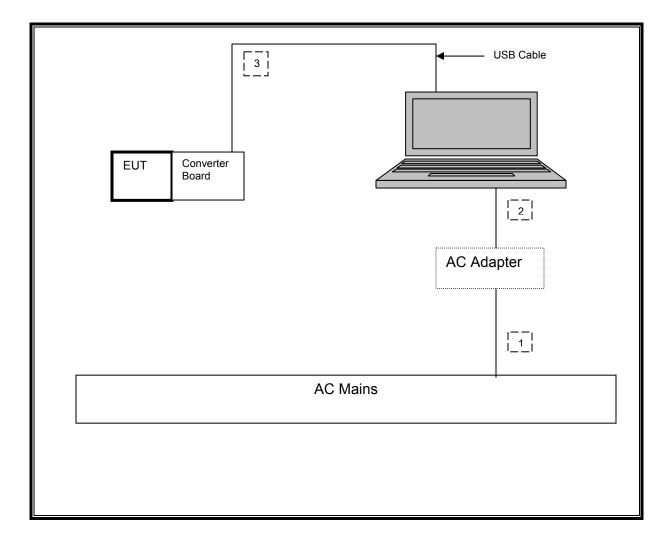
| PERIPHERAL SUPPORT EQUIPMENT LIST |   |             |                          |     |  |  |  |  |
|-----------------------------------|---|-------------|--------------------------|-----|--|--|--|--|
| Description                       | Description Manufacturer Model Serial Number FCC ID |             |                          |     |  |  |  |  |
| Laptop                            | Dell  | PP09S       | N/A                      | DoC |  |  |  |  |
| AC Adapter                        | Dell  | PA-1650-05D | CN-05U092-71615-49Q-18B8 | DoC |  |  |  |  |
| Converter Board                   | Broadcom  | BCM94319SDB | 1396825                  | N/A |  |  |  |  |
| USB Cable                         | N/A   | N/A         | N/A                      | N/A |  |  |  |  |

#### I/O CABLES

|              | I/O CABLE LIST |                            |                   |               |                 |                         |  |  |  |
|--------------|----------------|----------------------------|-------------------|---------------|-----------------|-------------------------|--|--|--|
| Cable<br>No. | Port           | # of<br>Identical<br>Ports | Connector<br>Type | Cable<br>Type | Cable<br>Length | Remarks                 |  |  |  |
| 1            | AC             | 1                          | US 115V           | Shielded      | 1.5m            | NA                      |  |  |  |
| 2            | DC             | 1                          | DC                | Un-shielded   | 1.5m            | Ferrite at laptop's end |  |  |  |
| 4            | USB            | 1                          | USB               | Un-shielded   | 1.0m            | NA                      |  |  |  |

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### SETUP DIAGRAM



## TEST SETUP

The EUT was tested as an external module that installed on a converter board connected to a host Laptop PC USB cable.

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## FOR LE MODE; Hopping ON

### SUPPORT EQUIPMENT

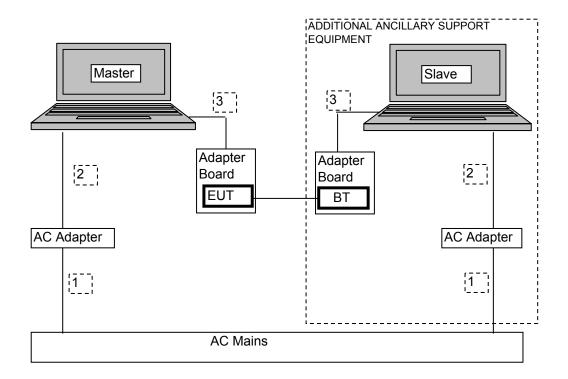
| PERIPHERAL SUPPORT EQUIPMENT LIST |              |               |                          |        |  |
|-----------------------------------|--------------|---------------|--------------------------|--------|--|
| Description                       | Manufacturer | Model         | Serial Number            | FCC ID |  |
| Laptop                            | Dell         | PP09S         | N/A                      | DoC    |  |
| AC Adapter                        | Dell         | PA-1650-05D   | CN-05U092-71615-49Q-18B8 | DoC    |  |
| Converter Board                   | Broadcom     | BCM94319SDB   | 1396825                  | N/A    |  |
| USB Cable                         | N/A          | N/A           | N/A                      | N/A    |  |
| Laptop                            | Dell         | Inspiron 0000 | N/A                      | N/A    |  |
| AC Adapter                        | Dell         | PA-1600-06D1  | CN-0F9710-71616-56H-510D | N/A    |  |
| Converter Board                   | Broadcom     | BCM94319SDB   | 1408781                  | N/A    |  |
| USB Cable                         | N/A          | N/A           | N/A                      | N/A    |  |

### I/O CABLES

|              | I/O CABLE LIST |                            |                   |               |                 |                         |  |  |
|--------------|----------------|----------------------------|-------------------|---------------|-----------------|-------------------------|--|--|
| Cable<br>No. |                | # of<br>Identical<br>Ports | Connector<br>Type | Cable<br>Type | Cable<br>Length | Remarks                 |  |  |
| 1            | AC             | 2                          | AC                | Unshielded    | 1.8m            | N/A                     |  |  |
| 2            | DC             | 2                          | DC                | Unshielded    | 1.8m            | Ferrite at laptop's end |  |  |
| 3            | USB            | 2                          | USB               | Unshielded    | 1.0m            | N/A                     |  |  |

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### SETUP DIAGRAM FOR HOPPING TEST



## TEST SETUP

The EUT and the ancillary support equipment are configured to create an operating communications link. Traffic is sent forward across this link, acknowledgements are sent back, and the performance of the link is monitored.

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# 6. TEST AND MEASUREMENT EQUIPMENT

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

| TEST EQUIPMENT LIST                          |                |                  |        |          |  |  |  |  |  |
|--|----------------|------------------|--------|----------|--|--|--|--|--|
| Description Manufacturer Model Asset Cal Due |                |                  |        |          |  |  |  |  |  |
| Spectrum Analyzer, 44 GHz                    | Agilent / HP   | E4446A           | C00996 | 10/29/11 |  |  |  |  |  |
| Antenna, Bilog, 2 GHz                        | Sunol Sciences | JB1              | C01171 | 07/14/11 |  |  |  |  |  |
| Antenna, Horn, 18 GHz                        | EMCO           | 3115             | C00872 | 07/29/11 |  |  |  |  |  |
| Antenna, Horn, 26.5 GHz                      | ARA            | MWH-1826/B       | C00980 | 07/29/11 |  |  |  |  |  |
| Preamplifier, 1300 MHz                       | Agilent / HP   | 8447D            | C00778 | 01/26/12 |  |  |  |  |  |
| Preamplifier, 26.5 GHz                       | Agilent / HP   | 8449B            | C00749 | 08/04/11 |  |  |  |  |  |
| Peak Power Meter                             | Agilent / HP   | E9327A           | C00964 | 12/04/11 |  |  |  |  |  |
| Peak Power Sensor                            | Agilent / HP   | E4416A           | C00963 | 12/04/11 |  |  |  |  |  |
| Reject Filter, 2.4-2.5 GHz                   | Micro-Tronics  | BRM50702         | N02685 | CNR      |  |  |  |  |  |
| LISN, 30 MHz                                 | FCC            | LISN-50/250-25-2 | N02625 | 11/06/10 |  |  |  |  |  |
| EMI Test Receiver, 30 MHz                    | R&S            | ESHS 20          | N02396 | 05/06/11 |  |  |  |  |  |

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# 7. ANTENNA PORT TEST RESULTS

# 7.1. BASIC DATA RATE GFSK MODULATION

## 7.1.1.99% BANDWIDTH

## <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

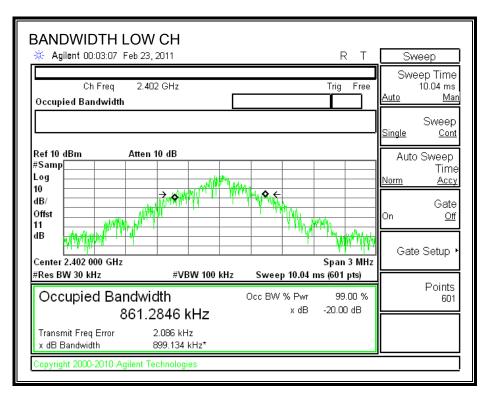
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 99% bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

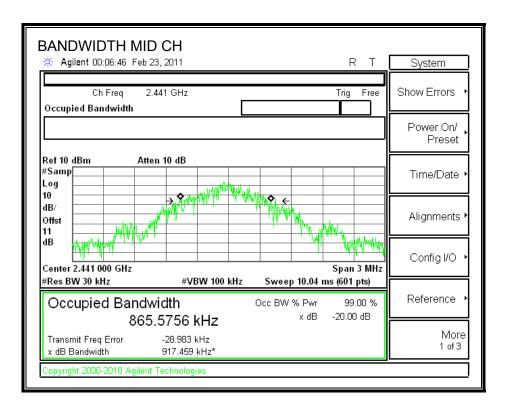
### <u>RESULTS</u>

| Channel | Frequency | 99% Bandwidth |
|---------|-----------|---------------|
|         | (MHz)     | (kHz)         |
| Low     | 2402      | 861.2846      |
| Middle  | 2441      | 865.5756      |
| High    | 2480      | 863.5888      |

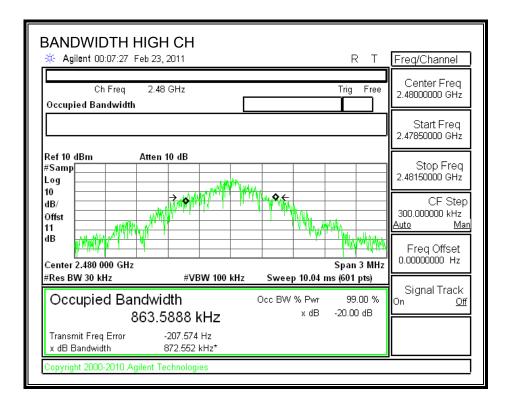
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### 99% BANDWIDTH





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## 7.1.2. 20 dB BANDWIDTH

### <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

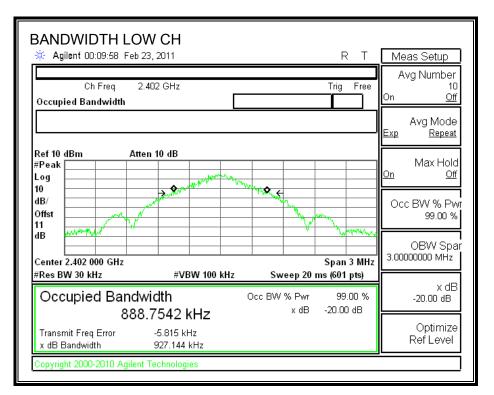
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

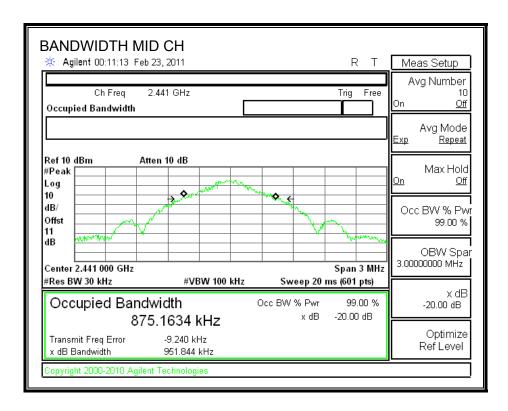
#### <u>RESULTS</u>

| Channel | Frequency | 20 dB Bandwidth |
|---------|-----------|-----------------|
|         | (MHz)     | (kHz)           |
| Low     | 2402      | 927.144         |
| Middle  | 2441      | 951.844         |
| High    | 2480      | 933.321         |

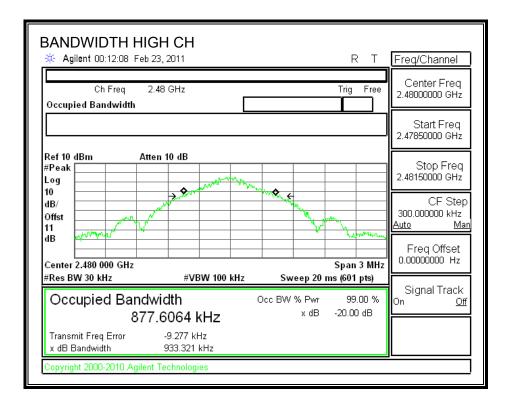
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#### 20 dB BANDWIDTH





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## 7.1.3. HOPPING FREQUENCY SEPARATION

### LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

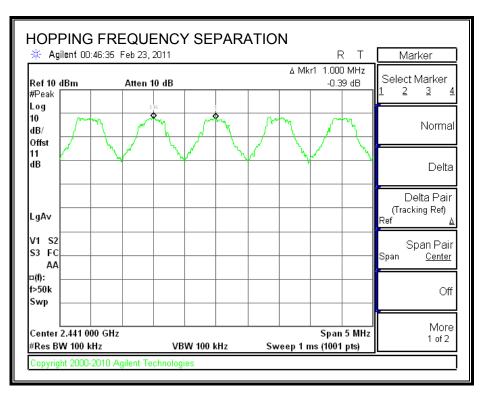
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

### RESULTS

### HOPPING FREQUENCY SEPARATION



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## 7.1.4. NUMBER OF HOPPING CHANNELS

### <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

### TEST PROCEDURE

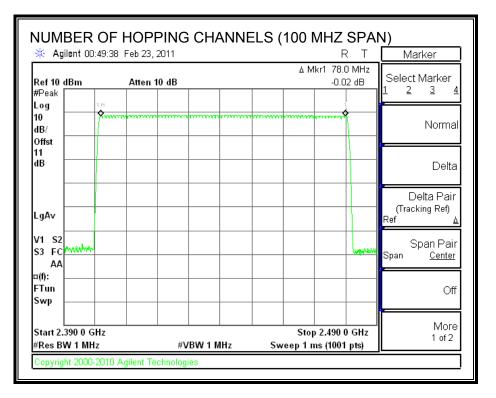
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

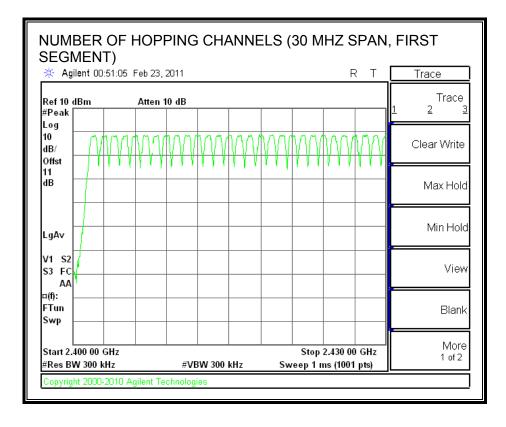
#### **RESULTS**

79 Channels observed.

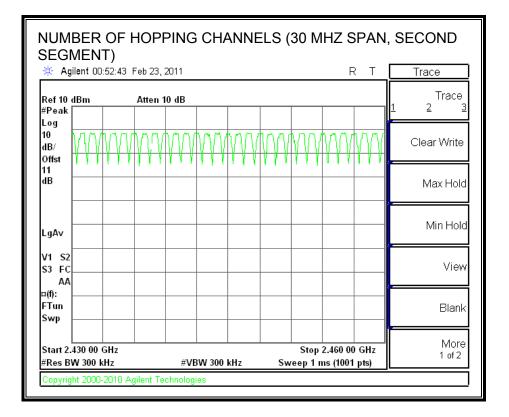
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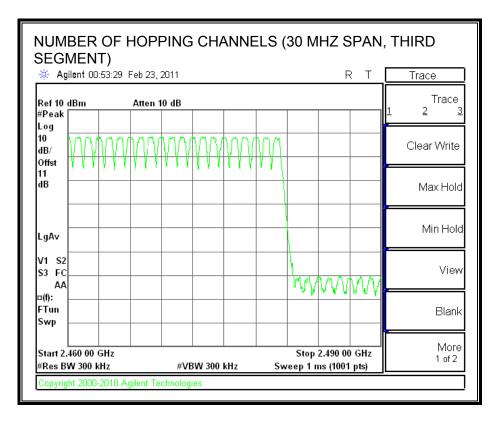
### NUMBER OF HOPPING CHANNELS





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## 7.1.5. AVERAGE TIME OF OCCUPANCY

### <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to 10 \* (# of pulses in 3.16 s) \* pulse width.

#### **RESULTS**

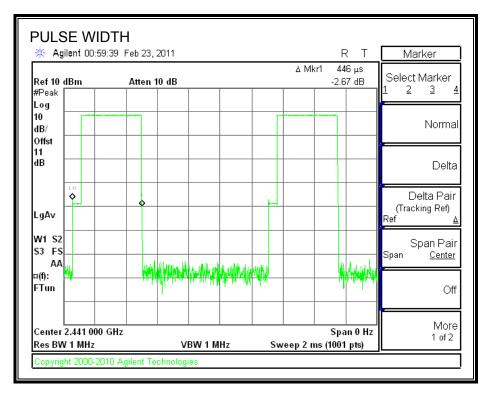
| DH Packet | Pulse<br>Width<br>(msec) | Number of<br>Pulses in 3.16<br>seconds | Average<br>Time of<br>(sec) | Limit<br>(sec) | Margin<br>(sec) |
|-----------|--------------------------|--|-----------------------------|----------------|-----------------|
| DH1       | 0.446                    | 32                                     | 0.143                       | 0.4            | -0.257          |
| DH3       | 1.705                    | 18                                     | 0.307                       | 0.4            | -0.093          |
| DH5       | 2.949                    | 13                                     | 0.383                       | 0.4            | -0.017          |

GFSK Mode

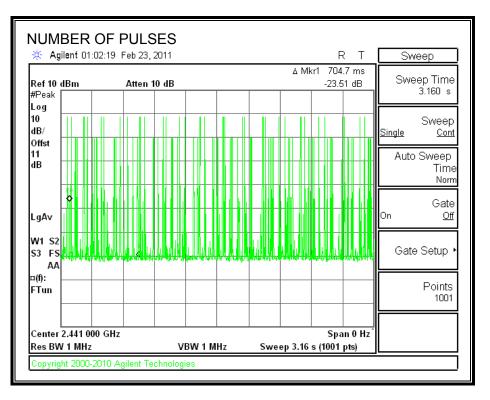
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### <u>DH1</u>

### PULSE WIDTH



## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

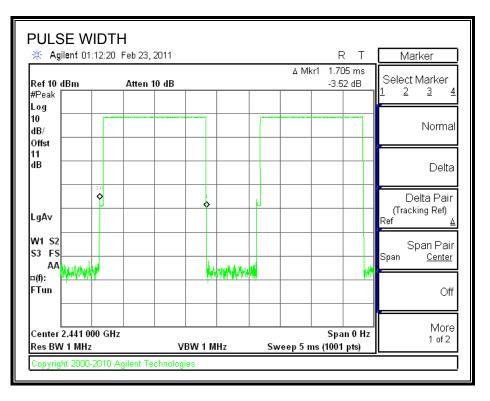


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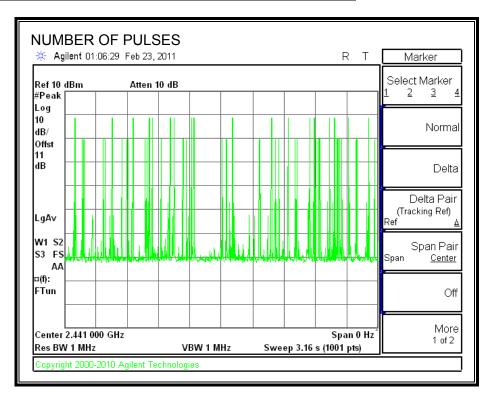
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701D47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.

### <u>DH3</u>

### **PULSE WIDTH**



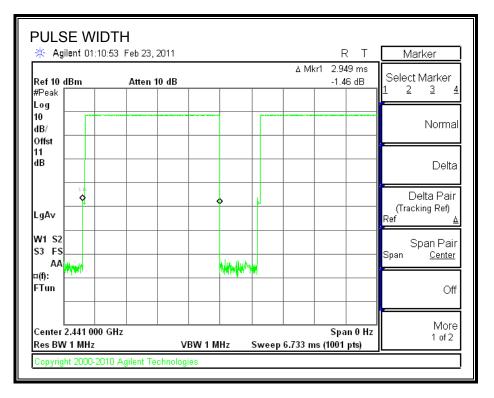
#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



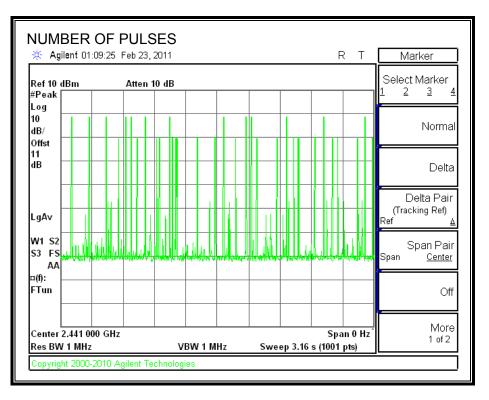
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### <u>DH5</u>

### **PULSE WIDTH**



## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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## 7.1.6. OUTPUT POWER

<u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

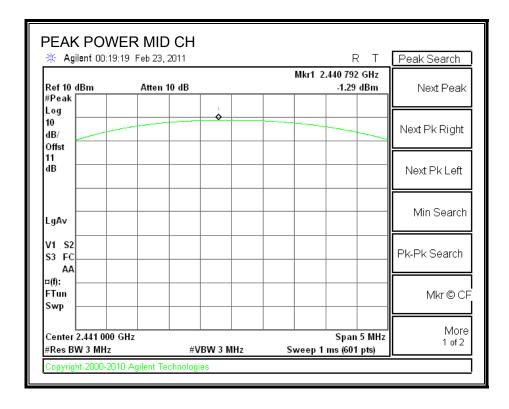
#### **RESULTS**

| Channel | Frequency | Output Power | Limit | Margin |
|---------|-----------|--------------|-------|--------|
|         | (MHz)     | (dBm)        | (dBm) | (dB)   |
| Low     | 2402      | -1.43        | 30    | -31.43 |
| Middle  | 2441      | -1.29        | 30    | -31.29 |
| High    | 2480      | -1.54        | 30    | -31.54 |

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### **OUTPUT POWER**

| PEAK POWE                            |                      |         | RT                                 | Peak Search    |
|--------------------------------------|----------------------|---------|------------------------------------|----------------|
| Ref 10 dBm<br>#Peak                  | Atten 10 dB          |         | Mkr1 2.402 008 GHz<br>-1.43 dBm    | Next Peak      |
| Log<br>10<br>dB/<br>Offst            |                      | *<br>*  |                                    | Next Pk Right  |
| dB                                   |                      |         |                                    | Next Pk Left   |
| LgAv                                 |                      |         |                                    | Min Search     |
| V1 S2<br>S3 FC<br>AA                 |                      |         |                                    | Pk-Pk Search   |
| ¤(f):<br>FTun<br>Swp                 |                      |         |                                    | Mkr © CF       |
| Center 2.402 000 GI<br>#Res BW 3 MHz |                      | W 3 MHz | Span 5 MHz<br>Sweep 1 ms (601 pts) | More<br>1 of 2 |
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| 🔆 Agilent 00:20                   | :07 Feb 23, 2011 | R                                   | T Peak Search |
|-----------------------------------|------------------|-------------------------------------|---------------|
| Ref 10 dBm<br>#Peak               | Atten 10 dB      | Mkr1 2.479 992 GH<br>-1.54 dBn      |               |
| Log<br>10<br>dB/                  |                  |                                     | Next Pk Right |
| Offst<br>11<br>dB                 |                  |                                     | Next Pk Left  |
| LgAv                              |                  |                                     | Min Search    |
| V1 S2<br>S3 FC                    |                  |                                     | Pk-Pk Search  |
| ¤(f):<br>FTun<br>Swp              |                  |                                     | Mkr © Cl      |
| Center 2.480 000<br>#Res BW 3 MHz | GHz<br>#VBW 3 MH | Span 5 M<br>Iz Sweep 1 ms (601 pts) |               |

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## 7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

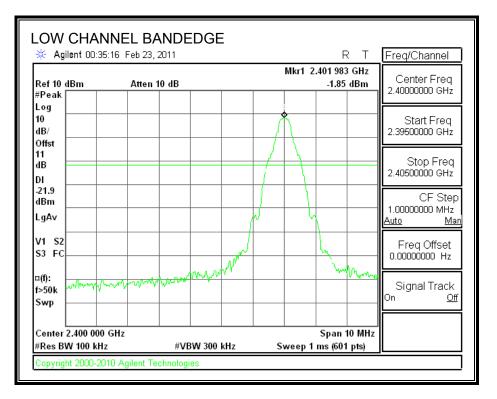
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

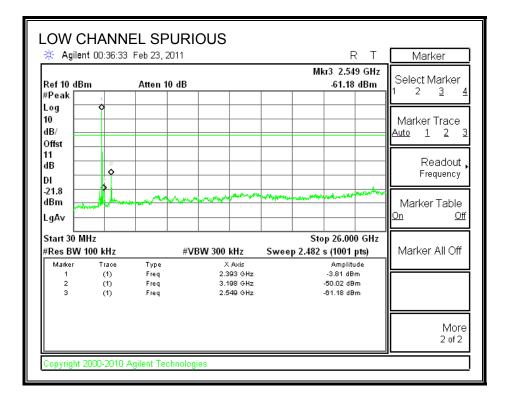
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

### **RESULTS**

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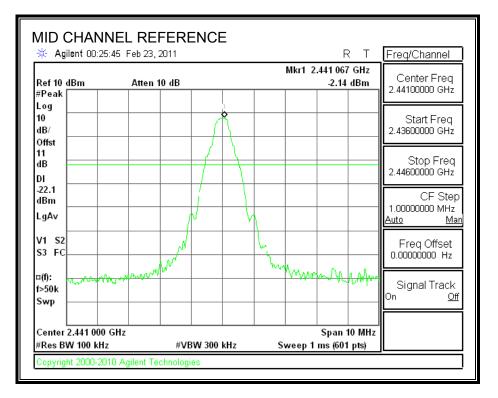
#### SPURIOUS EMISSIONS, LOW CHANNEL

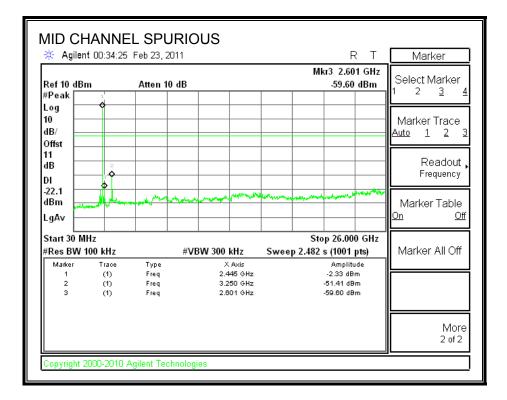




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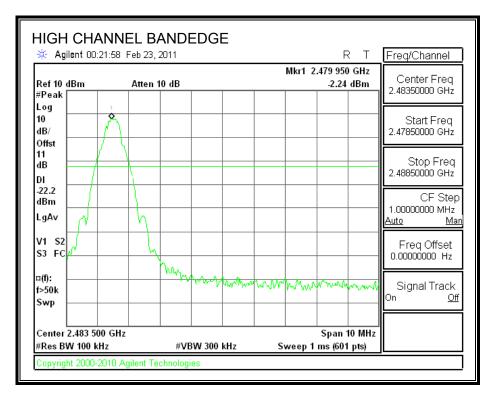
#### SPURIOUS EMISSIONS, MID CHANNEL

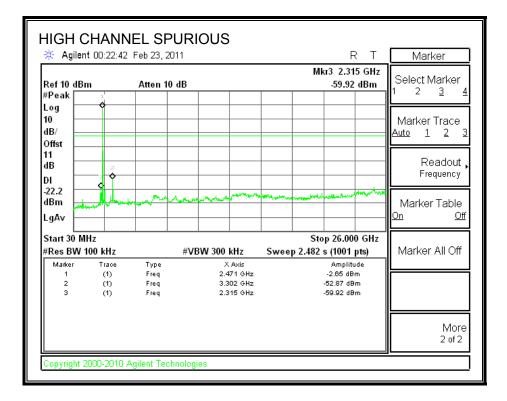




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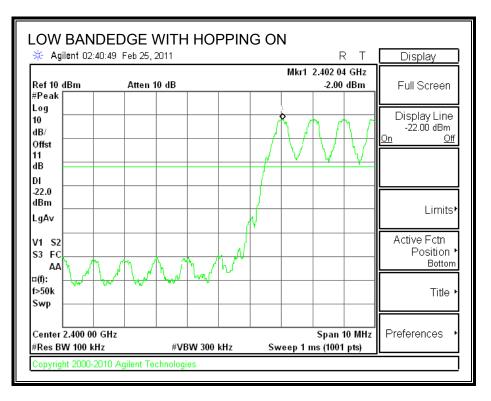
#### SPURIOUS EMISSIONS, HIGH CHANNEL

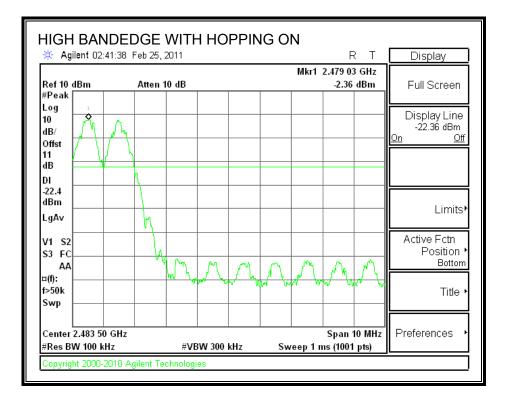




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#### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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# 7.2. ENHANCED DATA RATE 8PSK MODULATION

## 7.2.1. 99% BANDWIDTH

### <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

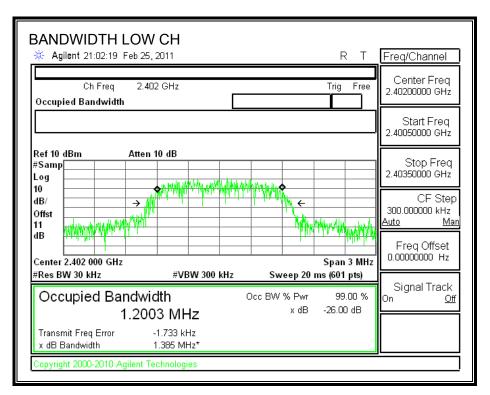
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 99% bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

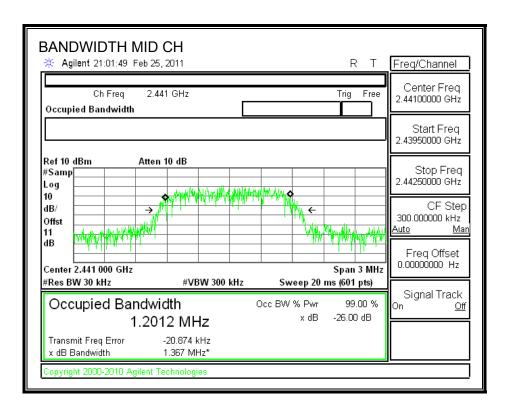
### **RESULTS**

| Channel | Frequency | 99% Bandwidth |
|---------|-----------|---------------|
|         | (MHz)     | (MHz)         |
| Low     | 2402      | 1.2003        |
| Middle  | 2441      | 1.2012        |
| High    | 2480      | 1.2043        |

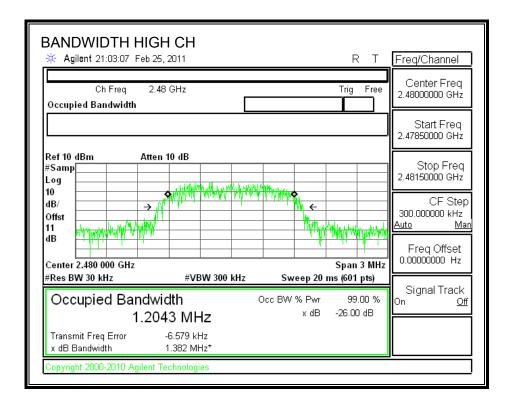
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### 99% BANDWIDTH





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## 7.2.2. 20dB BANDWIDTH

#### <u>LIMIT</u>

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

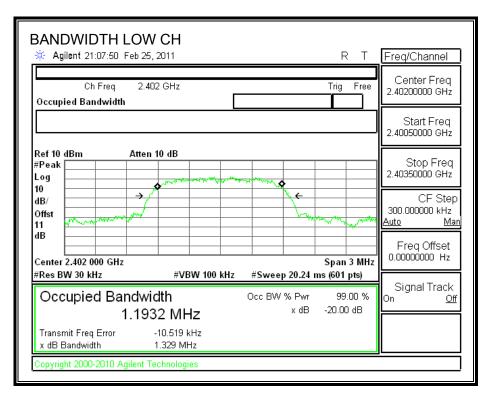
#### <u>RESULTS</u>

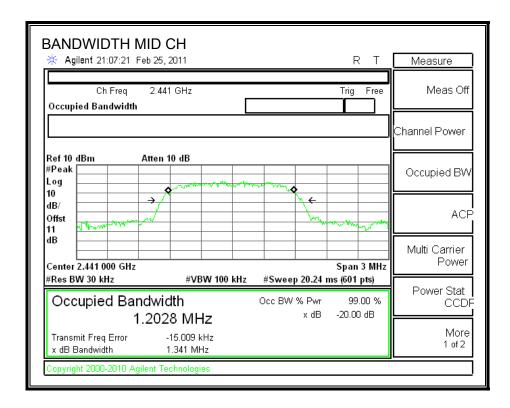
| Channel | Frequency | 20 dB Bandwidth |
|---------|-----------|-----------------|
|         | (MHz)     | (MHz)           |
| Low     | 2402      | 1.329           |
| Middle  | 2441      | 1.341           |
| High    | 2480      | 1.342           |

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#### 20 dB BANDWIDTH





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| BANDWIDTH HIGH CH  | RT                                     | Measure                |
|--|--|------------------------|
| Ch Freq 2.48 GHz<br>Occupied Bandwidth   | Trig Free                              | Meas Off               |
|  |  | Channel Power          |
| Ref 10 dBm Atten 10 dB<br>#Peak<br>Log<br>10   |  | Occupied BW            |
| dB/<br>Offst<br>11 M <sup>-</sup> m |  | ACP                    |
| dB Center 2.480 000 GHz  | Span 3 MHz                             | Multi Carrier<br>Power |
| #Res BW 30 kHz #VBW 100 kHz  | #Sweep 20.24 ms (601 pts)              | Power Stat             |
| Occupied Bandwidth<br>1.1956 MHz   | Occ BW % Pwr 99.00 %<br>x dB -20.00 dB |                        |
| Transmit Freq Error -9.398 kHz<br>x dB Bandwidth 1.342 MHz   |  | More<br>1 of 2         |
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## 7.2.3. HOPPING FREQUENCY SEPARATION

## LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

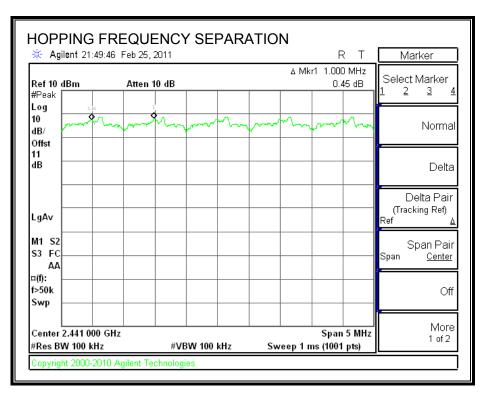
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

### RESULTS

### HOPPING FREQUENCY SEPARATION



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## 7.2.4. NUMBER OF HOPPING CHANNELS

## LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

### TEST PROCEDURE

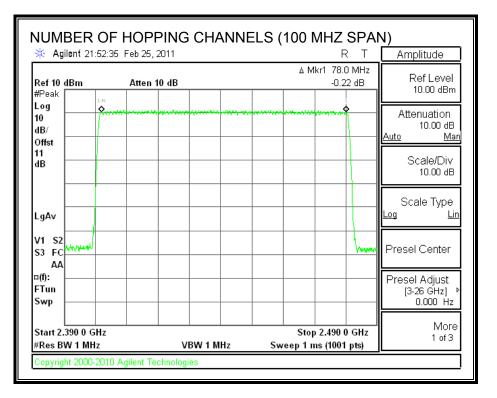
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

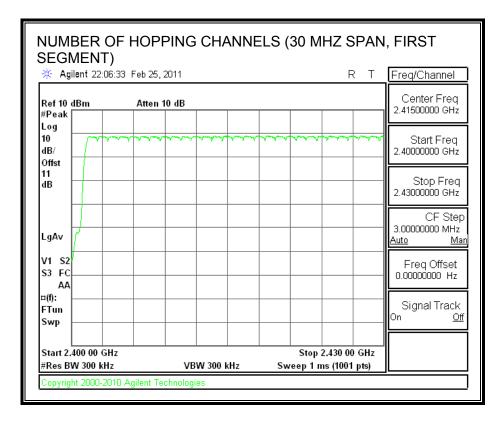
#### **RESULTS**

79 Channels observed.

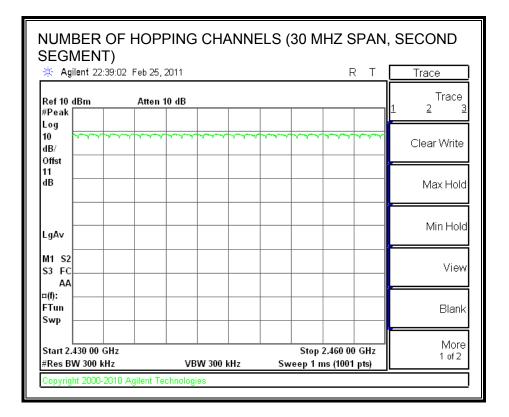
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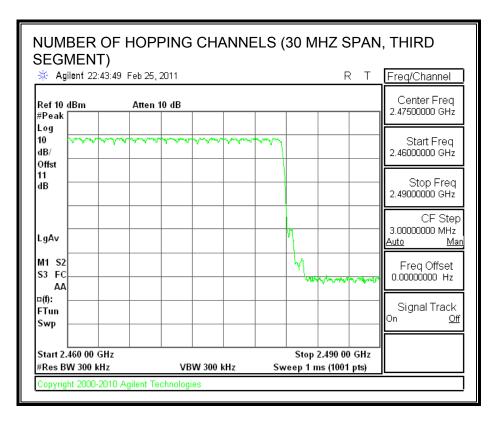
#### NUMBER OF HOPPING CHANNELS





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## 7.2.5. AVERAGE TIME OF OCCUPANCY

## <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to 10 \* (# of pulses in 3.16 s) \* pulse width.

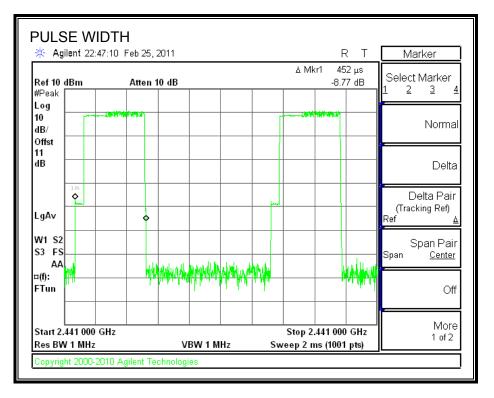
#### **RESULTS**

| DH Packet | Pulse<br>Width | Number of<br>Pulses in 3.16<br>seconds | Average<br>Time of<br>Occupancy | Limit | Margin |
|-----------|----------------|--|---------------------------------|-------|--------|
|           | (msec)         |  | (sec)                           | (sec) | (sec)  |
| DH1       | 0.452          | 32                                     | 0.145                           | 0.4   | -0.255 |
| DH3       | 1.700          | 17                                     | 0.289                           | 0.4   | -0.111 |
| DH5       | 2.950          | 13                                     | 0.384                           | 0.4   | -0.017 |

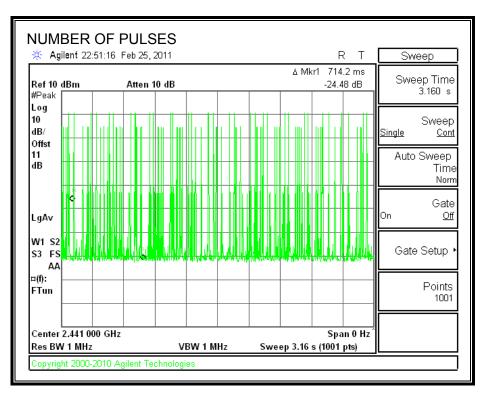
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### <u>DH1</u>

## **PULSE WIDTH**



## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

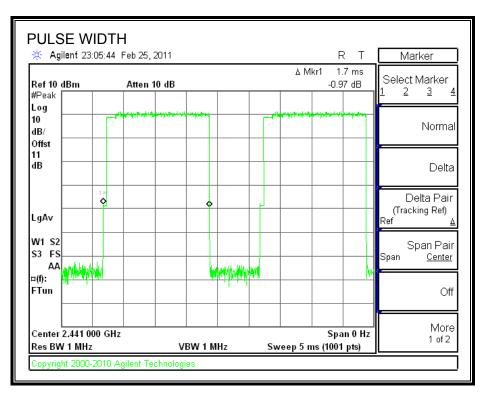


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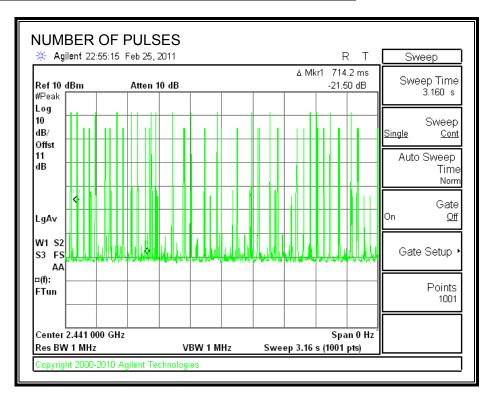
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#### <u>DH3</u>

### PULSE WIDTH



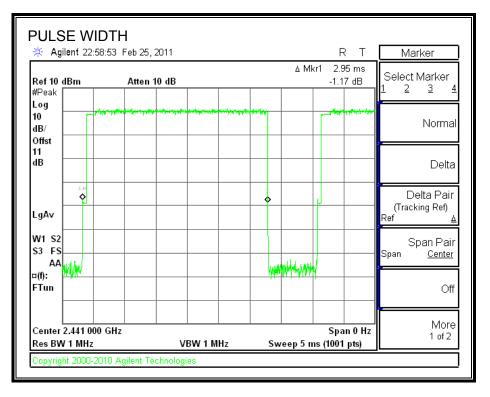
#### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



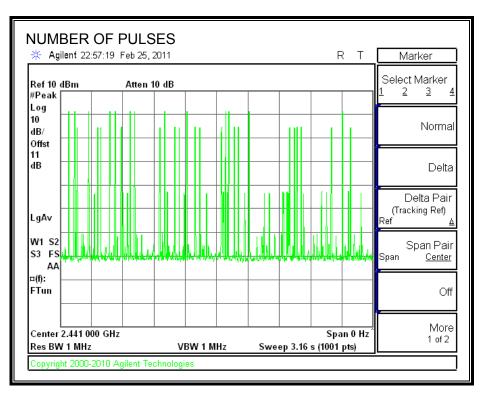
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#### <u>DH5</u>

## PULSE WIDTH



## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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## 7.2.6. OUTPUT POWER

## <u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

## TEST PROCEDURE

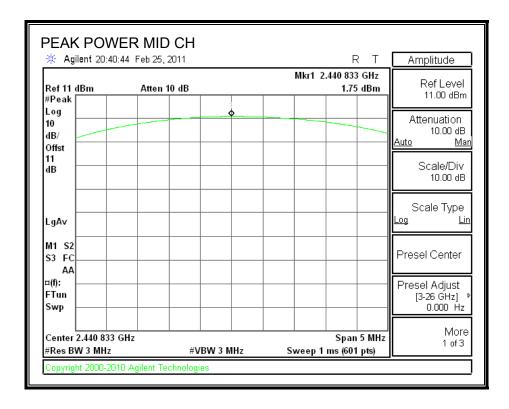
The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

### **RESULTS**

| Channel | Frequency | Output Power | Limit | Margin |
|---------|-----------|--------------|-------|--------|
|         | (MHz)     | (dBm)        | (dBm) | (dB)   |
| Low     | 2402      | 1.66         | 20.97 | -19.31 |
| Middle  | 2441      | 1.75         | 20.97 | -19.22 |
| High    | 2480      | 1.40         | 20.97 | -19.57 |

### **OUTPUT POWER**

| PEAK POWE                           |                     | 4         | R T                                | Peak Search    |
|-------------------------------------|---------------------|-----------|------------------------------------|----------------|
| Ref 11 dBm<br>#Peak                 | Atten 10 dB         |           | Mkr1 2.401 842 GHz<br>1.66 dBm     | Next Peak      |
| Log<br>10<br>dB/<br>Offst           |                     |           |                                    | Next Pk Right  |
| dB                                  |                     |           |                                    | Next Pk Left   |
| LgAv                                |                     |           |                                    | Min Search     |
| V1 S2<br>S3 FC<br>AA                |                     |           |                                    | Pk-Pk Search   |
| ¤(f):<br>FTun<br>Swp                |                     |           |                                    | Mkr © CF       |
| Center 2.402 000 G<br>#Res BW 3 MHz |                     | VBW 3 MHz | Span 5 MHz<br>Sweep 1 ms (601 pts) | More<br>1 of 2 |
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| 🔆 Agilent 20:43                   | 2:35   Feb 25, | 2011       | RT                                 | Peak Search    |
|-----------------------------------|----------------|------------|------------------------------------|----------------|
| Ref 11 dBm                        | Atten          | 10 dB      | Mkr1 2.479 842 GHz<br>1.40 dBm     | Next Peak      |
| #Peak<br>Log                      |                | 1          |                                    |                |
| 10<br>dB/<br>Offst                |                |            |                                    | Next Pk Right  |
| dB                                |                |            |                                    | Next Pk Left   |
| LgAv                              |                |            |                                    | Min Search     |
| V1 S2<br>S3 FC                    |                |            |                                    | Pk-Pk Search   |
| ¤(f):<br>FTun<br>Swp              |                |            |                                    | - Mkr © Cl     |
| Center 2.479 933<br>#Res BW 3 MHz | GHz            | #VBW 3 MHz | Span 5 MHz<br>Sweep 1 ms (601 pts) | More<br>1 of 2 |

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## 7.2.7. CONDUCTED SPURIOUS EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

## TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

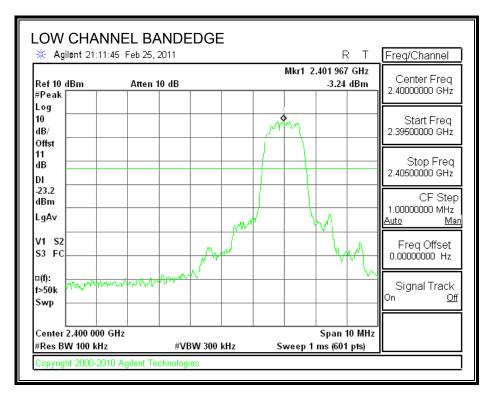
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

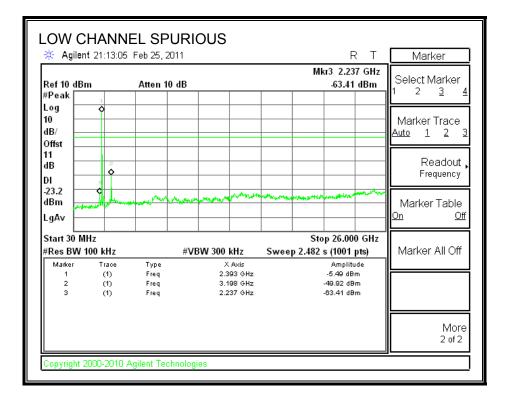
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

**RESULTS** 

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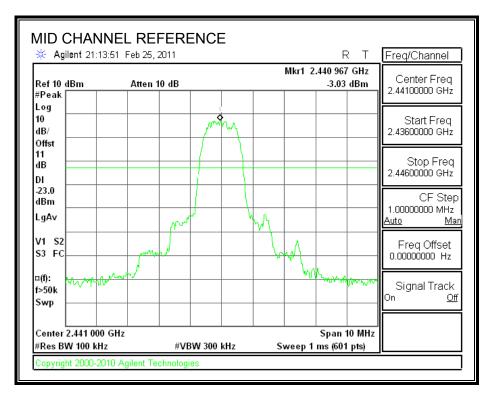
#### SPURIOUS EMISSIONS, LOW CHANNEL

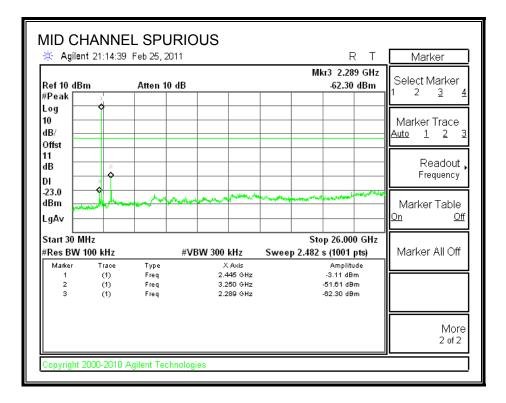




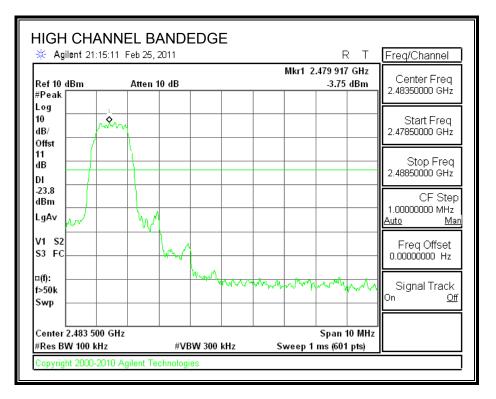
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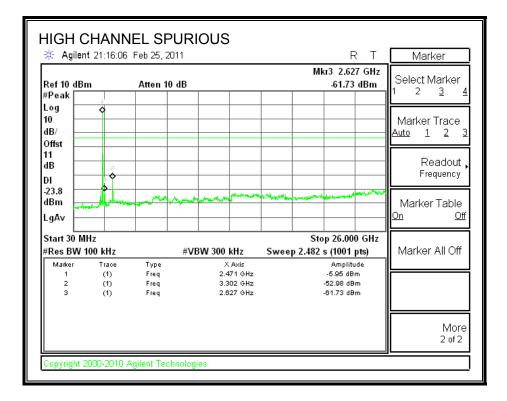
#### SPURIOUS EMISSIONS, MID CHANNEL



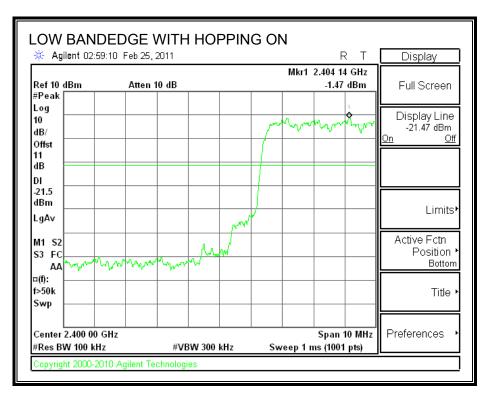


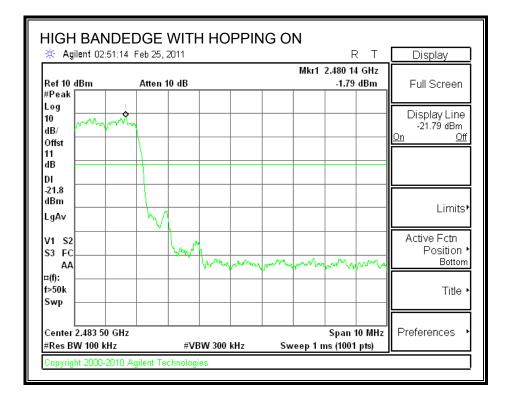
#### SPURIOUS EMISSIONS, HIGH CHANNEL





#### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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# 7.3. LE (LOW ENERGY) MODULATION

## 7.3.1.99% BANDWIDTH

## <u>LIMIT</u>

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 99% bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

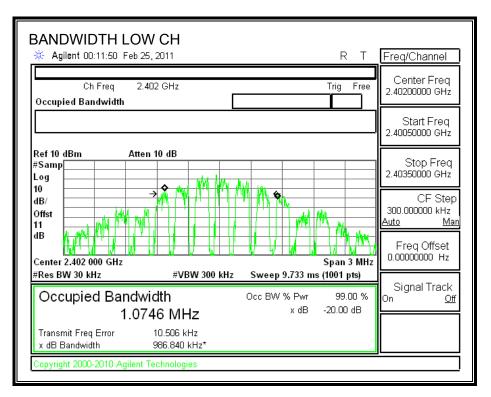
#### RESULTS

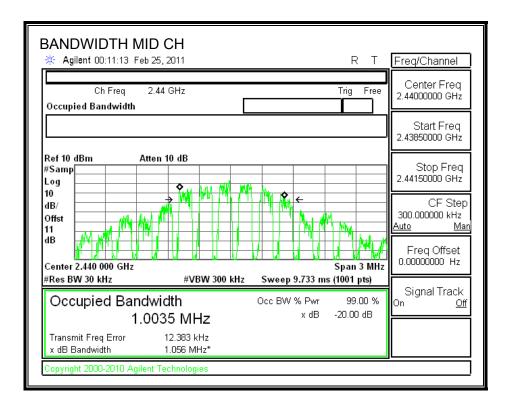
| Channel | Frequency | 99% Bandwidth |
|---------|-----------|---------------|
|         | (MHz)     | (MHz)         |
| Low     | 2402      | 1.0746        |
| Middle  | 2440      | 1.0035        |
| High    | 2480      | 1.1056        |

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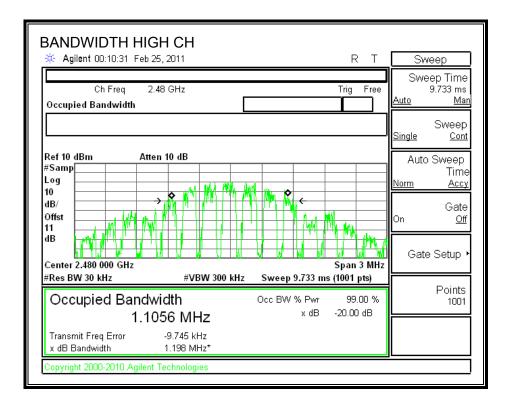
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#### 99% BANDWIDTH





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## 7.3.2. 20dB BANDWIDTH

#### <u>LIMIT</u>

None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1% of the 20dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

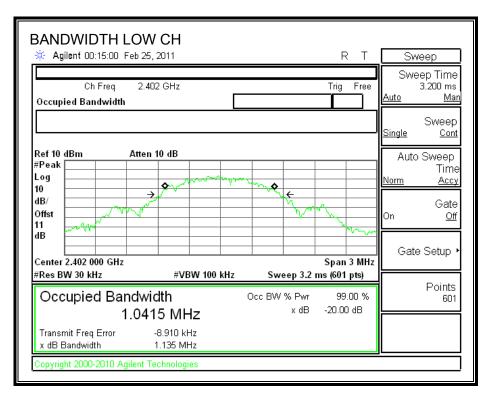
#### <u>RESULTS</u>

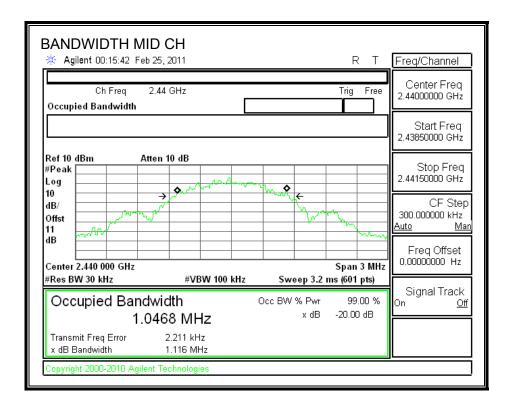
| Channel | Frequency | 20 dB Bandwidth |
|---------|-----------|-----------------|
|         | (MHz)     | (MHz)           |
| Low     | 2402      | 1.135           |
| Middle  | 2440      | 1.116           |
| High    | 2480      | 1.110           |

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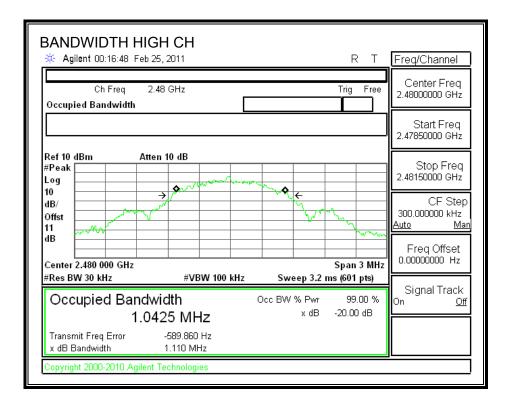
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#### 20 dB BANDWIDTH





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## 7.3.3. HOPPING FREQUENCY SEPARATION

## LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

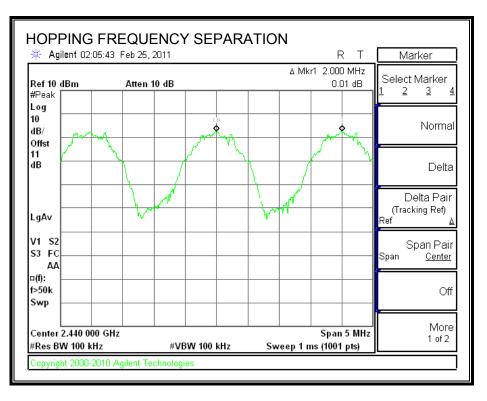
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

### RESULTS

### HOPPING FREQUENCY SEPARATION



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## 7.3.4. NUMBER OF HOPPING CHANNELS

## <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

### TEST PROCEDURE

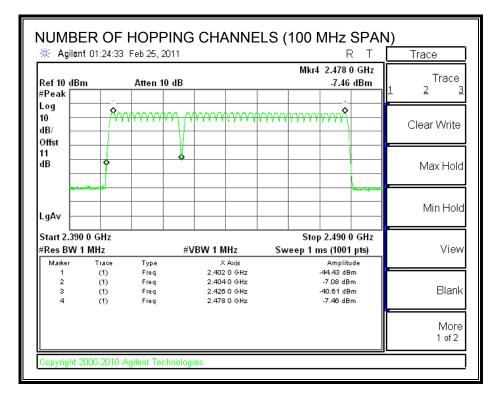
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

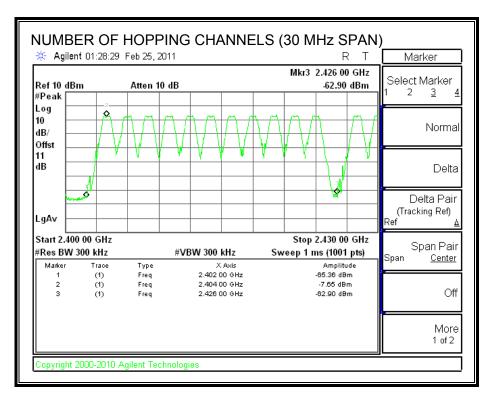
#### **RESULTS**

Please see advertising channels for 2402, 2426, and 2480MHz explanation in separated document.

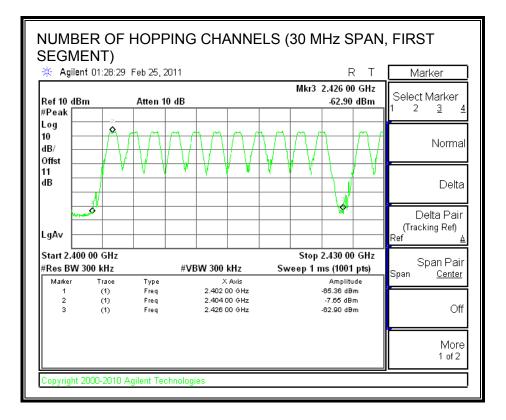
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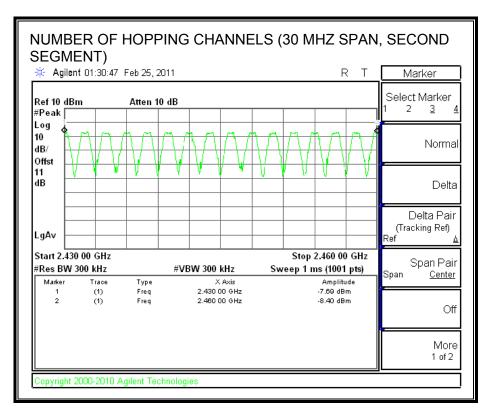
#### NUMBER OF HOPPING CHANNELS



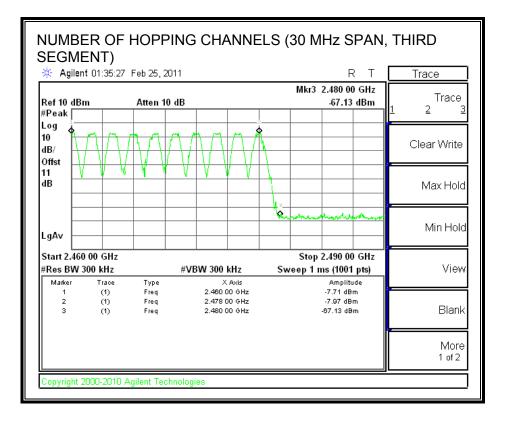


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## 7.3.5. AVERAGE TIME OF OCCUPANCY

## <u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 1.60 second scan, to enable resolution of each occurrence.

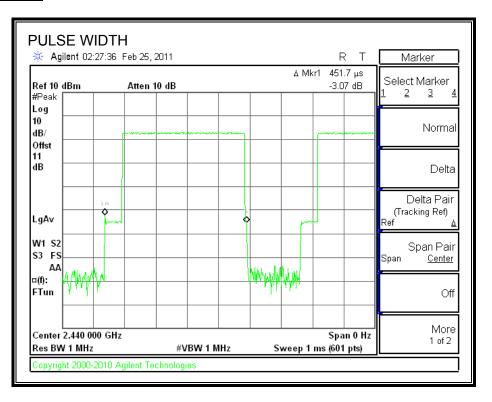
The average time of occupancy in the specified 1.60 second period (40 channels \* 0.4 s) is equal to 10 \* (# of pulses in 1.60 s) \* pulse width.

### **RESULTS**

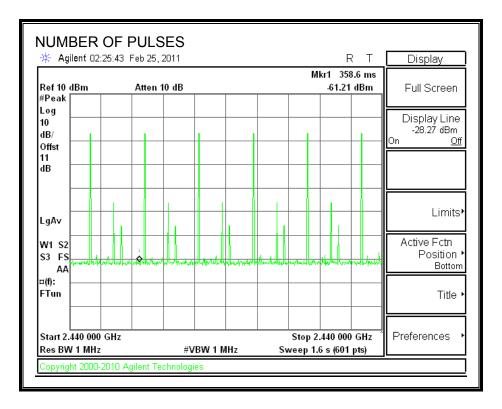
| Pulse<br>Width<br>(msec) | Number of<br>Pulses in 1.6<br>seconds | Average<br>Time of<br>(sec) | Limit<br>(sec) | Margin<br>(sec) |
|--------------------------|---------------------------------------|-----------------------------|----------------|-----------------|
| 0.452                    | 6                                     | 0.027                       | 0.4            | -0.373          |

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#### PULSE WIDTH



#### NUMBER OF PULSES IN 1.60 SECOND OBSERVATION PERIOD



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## 7.3.6. OUTPUT POWER

## <u>LIMIT</u>

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

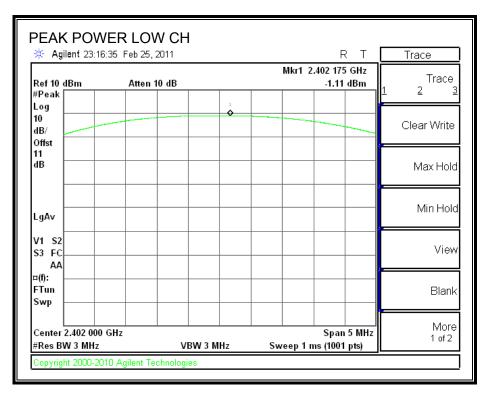
## **RESULTS**

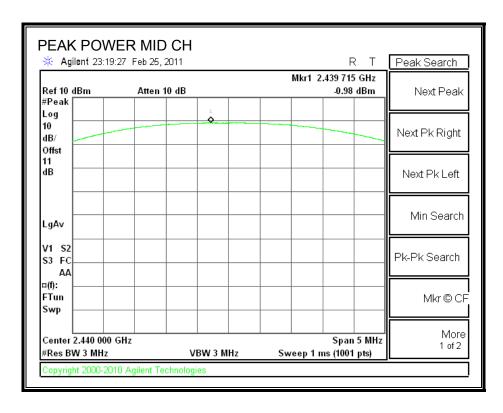
LE MODE

| Channel | Frequency | Output Power | Limit | Margin |
|---------|-----------|--------------|-------|--------|
|         | (MHz)     | (dBm)        | (dBm) | (dB)   |
| Low     | 2402      | -1.11        | 30    | -31.11 |
| Middle  | 2440      | -0.98        | 30    | -30.98 |
| High    | 2480      | -1.31        | 30    | -31.31 |

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## LE MODE





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| 🔆 Agilent 23:20                   | :27 Feb 25, 2011 |           | R 1                               | Peak Search   |
|-----------------------------------|------------------|-----------|-----------------------------------|---------------|
| Ref 10 dBm<br>#Peak               | Atten 10 dB      |           | Mkr1 2.479 670 GH<br>-1.31 dBn    | - 11          |
| Log<br>10<br>dB/                  |                  |           |                                   | Next Pk Right |
| dB                                |                  |           |                                   | Next Pk Left  |
| LgAv                              |                  |           |                                   | - Min Search  |
| V1 S2<br>S3 FC<br>AA              |                  |           |                                   | Pk-Pk Search  |
| ⊐(f):<br>FTun<br>Swp              |                  |           |                                   | Mkr©CF        |
| Center 2.480 000<br>#Res BW 3 MHz |                  | /BW 3 MHz | Span 5 M<br>Sweep 1 ms (1001 pts) |               |

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# 7.3.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

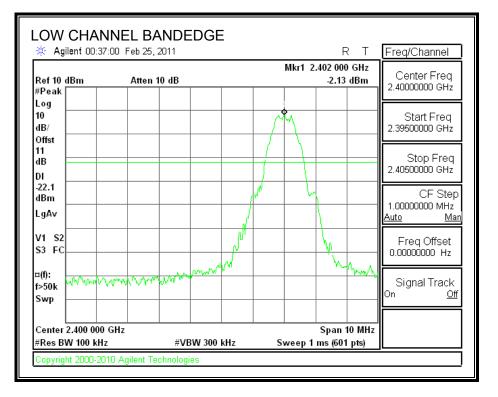
The band edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

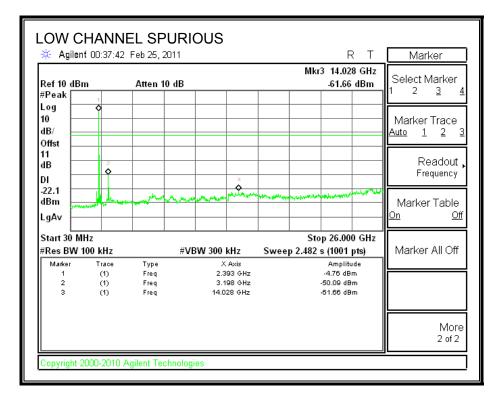
#### <u>RESULTS</u>

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# LE MODE

#### SPURIOUS EMISSIONS, LOW CHANNEL

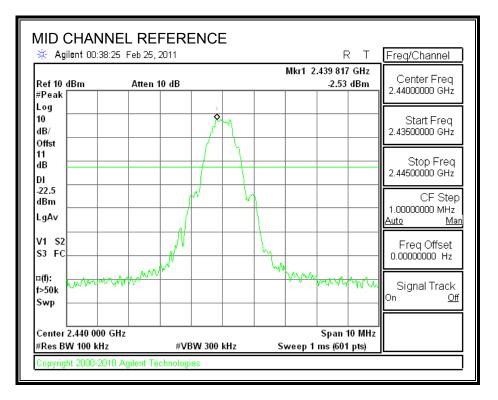


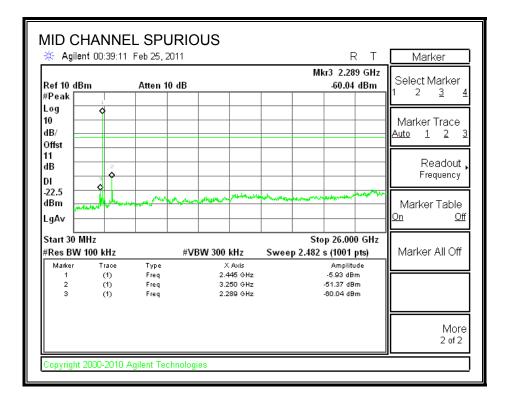


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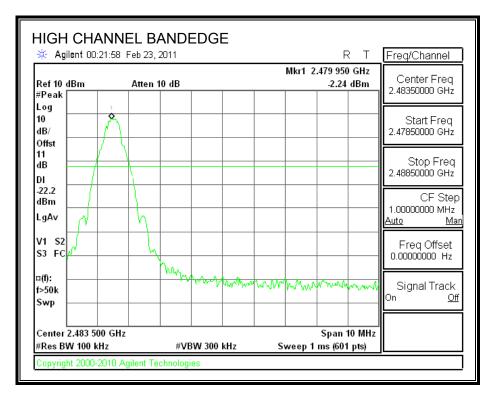
COMPLIANCE CERTIFICATION SERVICES (UL CCS)FORM NO: CCSUP4701D47173 BENICIA STREET, FREMONT, CA 94538, USATEL: (510) 771-1000FAX: (510) 661-0888This report shall not be reproduced except in full, without the written approval of UL CCS.CCS.

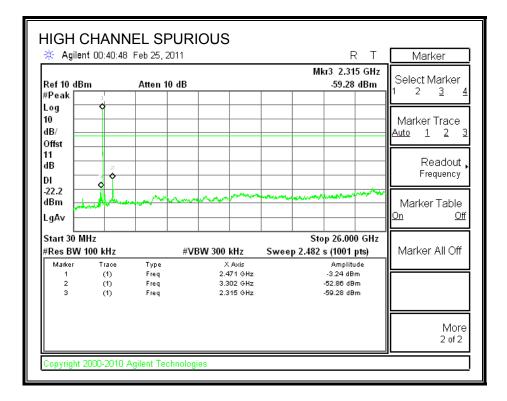
#### SPURIOUS EMISSIONS, MID CHANNEL





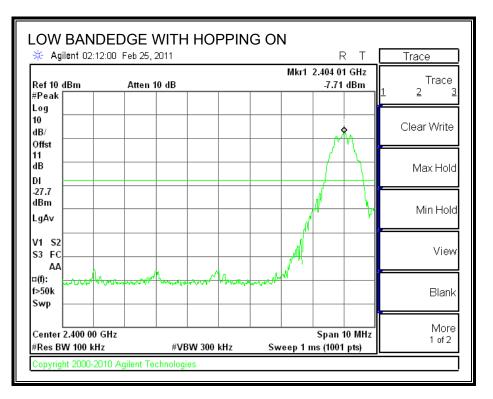
#### SPURIOUS EMISSIONS, HIGH CHANNEL

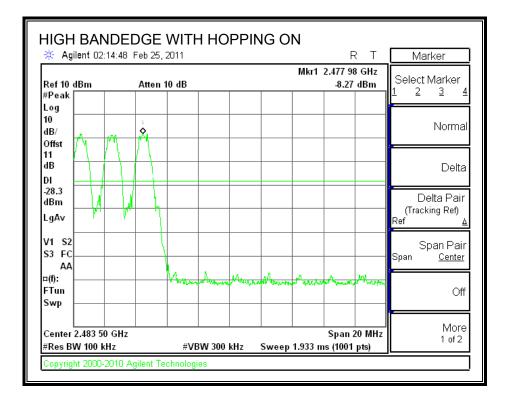




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#### SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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# 8. RADIATED TEST RESULTS

# 8.1. LIMITS AND PROCEDURE

## <u>LIMITS</u>

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

#### TEST PROCEDURE

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

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

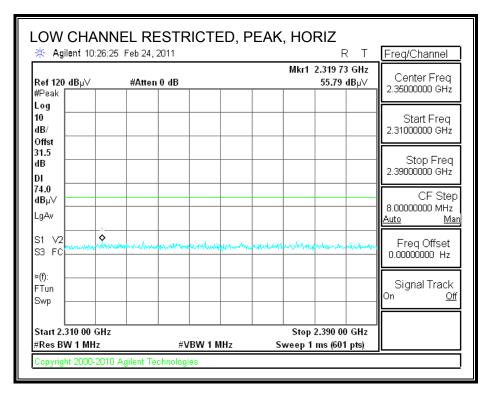
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

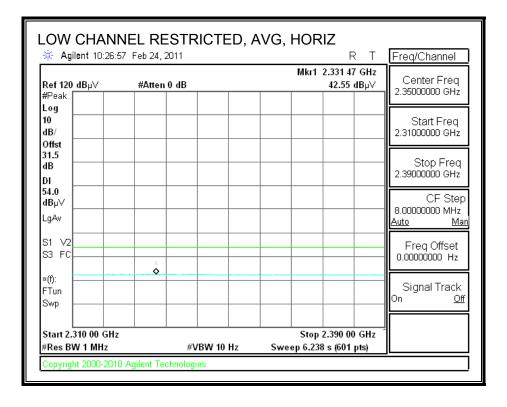
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

# 8.1.1. BASIC DATA RATE GFSK MODULATION

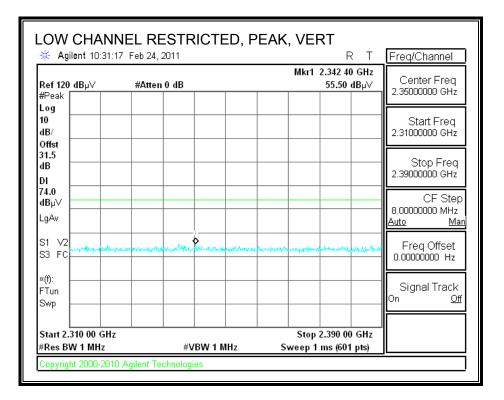
#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

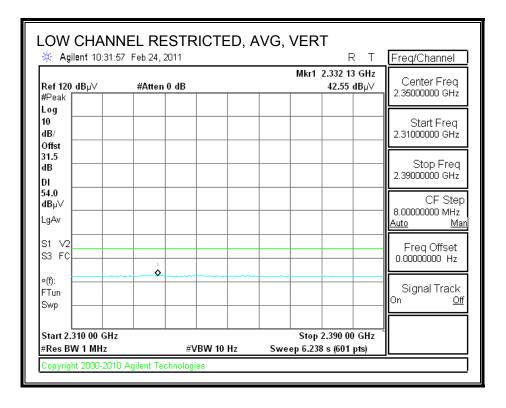




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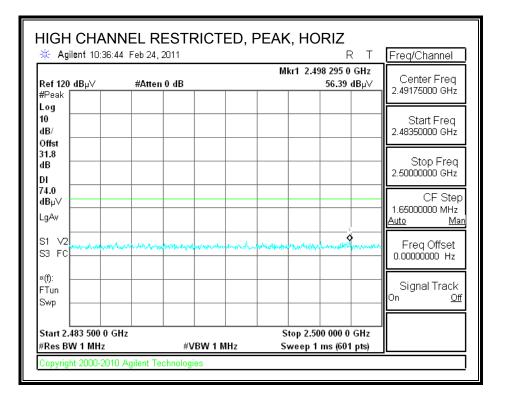
#### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

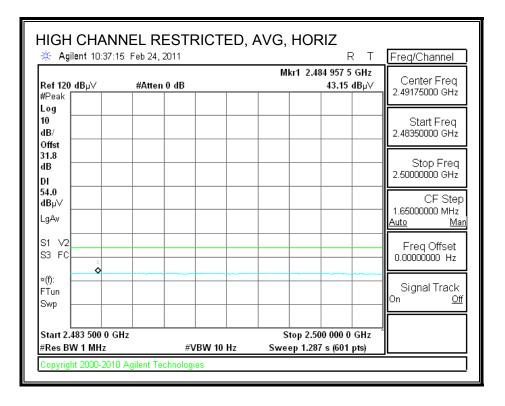




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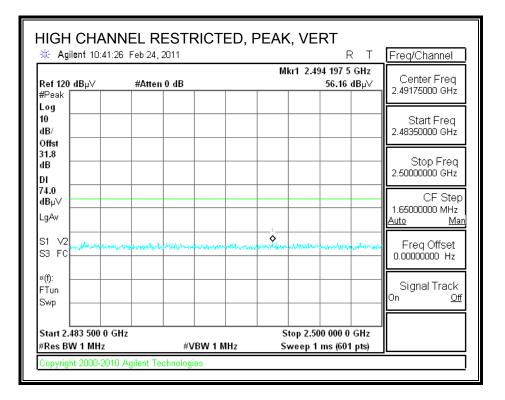
#### **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

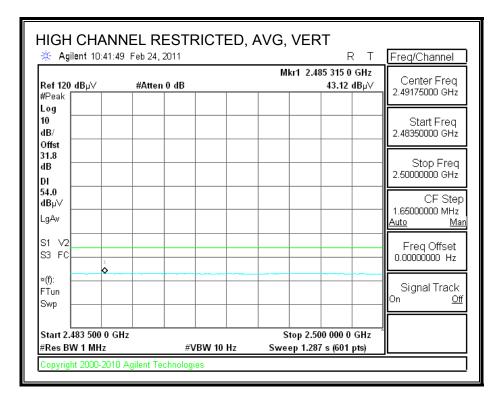




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#### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





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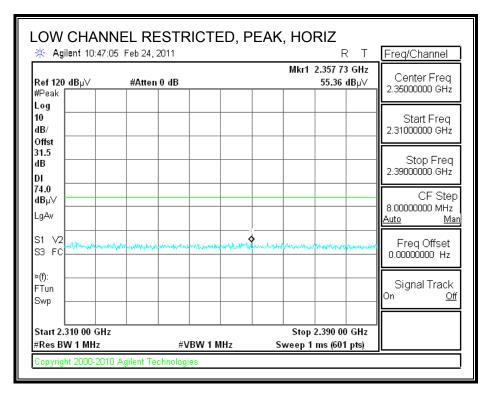
#### HARMONICS AND SPURIOUS EMISSIONS

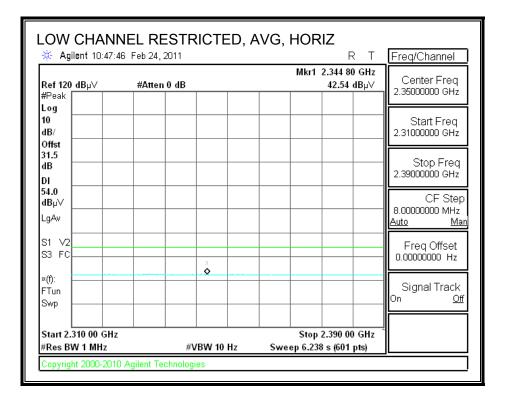
|   |   | Measuren<br>tification  |  | s, Fre   | mont 51   | n Chamb  | er   |  |  |  |  |   |       |
|---|---|---|--|--|---|--|--|--|--|--|--|---|-------|
| Test Engr   |   | David Ga  | arcia  |  |   |  |  |  |  |  |  |   |       |
| Date:   |   | 02/24/11  |  |  |   |  |  |  |  |  |  |   |       |
| Project #   |   | 11U1368   | 1  |  |   |  |  |  |  |  |  |   |       |
| Company   |   | Broadco   | m  |  |   |  |  |  |  |  |  |   |       |
| Test Targ   | et:   | FCC 15.3  | 205  |  |   |  |  |  |  |  |  |   |       |
| Mode Op   | er:   | Tx GFSK   | c  |  |   |  |  |  |  |  |  |   |       |
|   |   |   |  |  |   |  |  |  |  |  |  |   |       |
|   | f   | Measuren  |  | • •  | -   | Preamp (   |  |  |  | -  | Field Stren                                    | -   |       |
|   | Dist  | Distance  |  | ma   |   | Distance   |  |  |  |  | ld Strength                                    |   |       |
|   | Read  | Analyzer  | -  |  | Avg   | -  |  | trength @  | ·  | -  | rs. Average                                    |   |       |
|   | AF  | Antenna   |  |  | Peak  |  |  | Field Str  | ength  | Margin v   | rs. Peak Lii                                   | nit   |       |
|   | CL  | Cable Los   | 55   |  | HPF   | High Pas   | s Filter   | ,  |  |  |  |   |       |
| f   | Dist  | Read  | AF   | CL   | Атр   | D Corr   |  | Corr.  |  |  | Ant. Pol.                                      |   | Notes |
| GHz   | (m)   | dBuV  | dB/m   | dB   | dB  | dB   | dB   | dBuV/m   | dBuV/m   | dB   | V/H  | P/A/QP  |       |
|   |   | ; 2402 MF   |  |  |   |  |  |  |  |  |  |   |       |
| 4.804   | 3.0   | 36.7  | 32.7   | 5.8  | -34.8   | 0.0  | 0.0  | 40.3   | 74.0   | -33.7  | V  | P   |       |
| 4.804   | 3.0   | 23.7  | 32.7   | 5.8  | -34.8   | 0.0  | 0.0  | 27.3   | 54.0   | -26.7  | <u>v</u>                                       | A   |       |
| 4.804<br>4.804  | 3.0<br>3.0  | 35.9<br>23.7  | 32.7<br>32.7   | 5.8<br>5.8   | -34.8<br>-34.8  | 0.0<br>0.0   | 0.0<br>0.0   | 39.5<br>27.4   | 74.0<br>54.0   | -34.5<br>-26.6   | H<br>H   | P   |       |
|   |   | A   |  | 7.0  | -340  | 0.0  | 0.0  | £1.4   | 24U  | -20.0  |  | A   |       |
|   | INNEL -   | 244 I M H 2   |  |  |   |  | å  |  |  |  |  |   |       |
| MID CHA   | NNEL:   | 2441 MHa<br>36.2  |  | 5.8  | -34.8   | 0.0  | 0.0  | 39.9   | 74.0   | -34.1  | v  | Р   |       |
|   |   | ·····   | 32.7<br>32.7   | 5.8<br>5.8   | -34.8<br>-34.8  | 0.0<br>0.0   | 0.0<br>0.0   | 39.9<br>27.1   | 74.0<br>54.0   | -34.1<br>-26.9   | v<br>v   | P<br>A  |       |
| MID CHA<br>4.882  | 3.0   | 36.2  | 32.7   | \$   |   |  | å  |  |  | \$   |  | P<br>A<br>P   |       |
| MID CH/<br>4.882<br>4.882   | 3.0<br>3.0  | 36.2<br>23.3  | 32.7<br>32.7   | 5.8  | -34.8   | 0.0  | 0.0  | 27.1   | 54.0   | - <b>26.9</b>  | V  | A<br>P<br>A   |       |
| MID CH/<br>4.882<br>4.882<br>7.323<br>7.323<br>4.882  | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0  | 36.2<br>23.3<br>34.9<br>23.0<br>36.0  | 32.7<br>32.7<br>35.5<br>35.5<br>32.7   | 5.8<br>7.3<br>7.3<br>5.8   | -34.8<br>-34.1<br>-34.1<br>-34.8  | 0.0<br>0.0<br>0.0<br>0.0   | 0.0<br>0.0<br>0.0<br>0.0   | 27.1<br>43.5<br>31.7<br>39.7   | 54.0<br>74.0<br>54.0<br>74.0   | -26.9<br>-30.5<br>-22.3<br>-34.3   | V<br>V<br>V<br>H                               | A<br>P<br>A<br>P  |       |
| MID CH/<br>4.882<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>4.882  | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0   | 36.2<br>23.3<br>34.9<br>23.0<br>36.0<br>23.3  | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7   | 5.8<br>7.3<br>7.3<br>5.8<br>5.8  | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8   | 0.0<br>0.0<br>0.0<br>0.0<br>0.0                                    | 0.0<br>0.0<br>0.0<br>0.0<br>0.0                                    | 27.1<br>43.5<br>31.7<br>39.7<br>27.0   | 54.0<br>74.0<br>54.0<br>74.0<br>54.0   | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0  | V<br>V<br>V<br>H<br>H                          | A<br>P<br>A<br>P<br>A   |       |
| MID CH/<br>4.882<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>4.882<br>7.323   | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0  | 36.2<br>23.3<br>34.9<br>23.0<br>36.0<br>23.3<br>36.3  | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>32.7<br>35.5   | 5.8<br>7.3<br>7.3<br>5.8<br>5.8<br>7.3   | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.1  | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0                             | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0                             | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9   | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>54.0<br>74.0   | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1   | V<br>V<br>V<br>H<br>H<br>H                     | A<br>P<br>A<br>P<br>A<br>P  |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>4.882<br>7.323<br>7.323<br>7.323  | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                                | 36.2<br>23.3<br>34.9<br>23.0<br>36.0<br>23.3<br>36.3<br>23.0  | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5   | 5.8<br>7.3<br>7.3<br>5.8<br>5.8  | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8   | 0.0<br>0.0<br>0.0<br>0.0<br>0.0                                    | 0.0<br>0.0<br>0.0<br>0.0<br>0.0                                    | 27.1<br>43.5<br>31.7<br>39.7<br>27.0   | 54.0<br>74.0<br>54.0<br>74.0<br>54.0   | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0  | V<br>V<br>V<br>H<br>H                          | A<br>P<br>A<br>P<br>A   |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>4.882<br>7.323<br>7.323<br>7.323<br>HIGH CH                                     | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>4ANNEL                                    | 36.2<br>23.3<br>34.9<br>23.0<br>23.3<br>36.0<br>23.3<br>36.3<br>23.0<br>: 2480 MI                                 | 32.7<br>35.5<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5<br>Hz   | 5.8<br>7.3<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3                                    | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.1<br>-34.1   | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0                      | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0                      | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9<br>31.7   | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>54.0   | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3  | V<br>V<br>H<br>H<br>H<br>H                     | A<br>P<br>A<br>P<br>A<br>P<br>A   |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>7.323<br>7.323<br>7.323<br>HIGH CH<br>4.960                                     | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>4ANNEL<br>3.0                             | 36.2<br>23.3<br>34.9<br>23.0<br>36.0<br>23.3<br>36.3<br>23.0<br>: 2480 MI<br>36.6                                 | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>Hz<br>32.8   | 5.8<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3<br>7.3<br>5.9                             | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.1  | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0                      | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0               | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9<br>31.7<br>40.5                                 | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0   | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3<br>-33.5                                     | V<br>V<br>H<br>H<br>H<br>Y                     | A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>P                                    |       |
| MID CH/<br>4.882<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>4.882<br>7.323<br>7.323<br>7.323<br>HICH CH<br>4.960<br>4.960          | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>4ANNEL<br>3.0<br>3.0                      | 36.2<br>23.3<br>34.9<br>23.0<br>23.3<br>36.3<br>23.0<br>: 2480 MI<br>36.6<br>23.6                                 | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5<br>35.5<br>Hz<br>32.8<br>32.8<br>32.8                 | 5.8<br>7.3<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3<br>7.3<br>5.9<br>5.9               | -34.8<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.1<br>-34.8<br>-34.8  | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0        | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0               | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9<br>31.7<br>40.5<br>27.5                         | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0                                 | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3<br>-33.5<br>-26.5                            | V<br>V<br>H<br>H<br>H<br>V<br>V                | A<br>P<br>A<br>A<br>P<br>A<br>A<br>P<br>A<br>A<br>P<br>A                          |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>7.323<br>7.323<br>7.323<br>HIGH CH<br>4.960<br>4.960<br>7.440                   | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>4ANNEL<br>3.0<br>3.0<br>3.0<br>3.0 | 36.2<br>23.3<br>34.9<br>23.0<br>23.3<br>36.3<br>23.0<br>: 2480 MI<br>36.6<br>23.6<br>35.1                         | 32.7<br>35.5<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5<br>Hz<br>32.8<br>32.8<br>32.8<br>32.8<br>35.6         | 5.8<br>7.3<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3<br>7.3<br>5.9<br>5.9<br>5.9<br>7.3 | -34.8<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.1                            | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9<br>31.7<br>40.5<br>27.5<br>44.0                 | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>74.0                 | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3<br>-33.5<br>-26.5<br>-30.0                   | V<br>V<br>H<br>H<br>H<br>V<br>V<br>V<br>V      | A<br>P<br>A<br>P<br>A<br>A<br>P<br>A<br>A<br>P<br>A<br>P<br>A<br>P<br>P           |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>7.323<br>7.323<br>7.323<br>7.323<br>HIGH CH<br>4.960<br>4.960<br>7.440<br>7.440          | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>4ANNEL<br>3.0<br>3.0                      | 36.2<br>23.3<br>34.9<br>23.0<br>23.3<br>36.3<br>23.0<br>: 2480 MI<br>36.6<br>23.6                                 | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5<br>35.5<br>Hz<br>32.8<br>32.8<br>32.8                 | 5.8<br>7.3<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3<br>7.3<br>5.9<br>5.9               | -34.8<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.1<br>-34.8<br>-34.8  | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0        | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0               | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9<br>31.7<br>40.5<br>27.5                         | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0 | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3<br>-33.5<br>-26.5<br>-30.0<br>-22.2          | V<br>V<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V | A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>A                          |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>4.882<br>7.323<br>7.323<br>7.323<br>HIGH CH                                     | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>4ANNEL<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0 | 36.2<br>23.3<br>34.9<br>23.0<br>36.0<br>23.3<br>36.3<br>23.0<br>23.0<br>2480 MI<br>36.6<br>23.6<br>35.1<br>22.9   | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5<br>Hz<br>32.8<br>32.8<br>32.8<br>32.8<br>35.6<br>35.6 | 5.8<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3<br>7.3<br>5.9<br>5.9<br>7.3<br>7.3        | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.8<br>-34.1<br>-34.1          | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 27.1<br>43.5<br>31.7<br>27.0<br>44.9<br>31.7<br>40.5<br>27.5<br>44.0<br>31.8                 | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>74.0                 | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3<br>-33.5<br>-26.5<br>-30.0<br>-22.2<br>-33.7 | V<br>V<br>H<br>H<br>H<br>V<br>V<br>V<br>V      | A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>P<br>A<br>P |       |
| MID CH/<br>4.882<br>7.323<br>7.323<br>4.882<br>4.882<br>7.323<br>4.882<br>7.323<br>HICH CH<br>4.960<br>7.440<br>7.440<br>7.440<br>4.960 | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                                | 36.2<br>23.3<br>34.9<br>23.0<br>36.0<br>23.3<br>36.3<br>23.0<br>: 2480 MI<br>36.6<br>23.6<br>35.1<br>22.9<br>36.4 | 32.7<br>32.7<br>35.5<br>35.5<br>32.7<br>32.7<br>35.5<br>35.5<br>35.5<br>Hz<br>32.8<br>32.8<br>32.8<br>35.6<br>35.6<br>32.8 | 5.8<br>7.3<br>5.8<br>5.8<br>7.3<br>7.3<br>5.9<br>5.9<br>7.3<br>7.3<br>7.3<br>5.9 | -34.8<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.1<br>-34.8<br>-34.8<br>-34.8<br>-34.1<br>-34.1<br>-34.1<br>-34.8 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 27.1<br>43.5<br>31.7<br>39.7<br>27.0<br>44.9<br>31.7<br>40.5<br>27.5<br>44.0<br>31.8<br>40.3 | 54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0<br>54.0<br>74.0         | -26.9<br>-30.5<br>-22.3<br>-34.3<br>-27.0<br>-29.1<br>-22.3<br>-33.5<br>-26.5<br>-30.0<br>-22.2          | V<br>V<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V | A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>P<br>A<br>A                          |       |

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# 8.1.2. ENHANCED DATA RATE 8PSK MODULATION

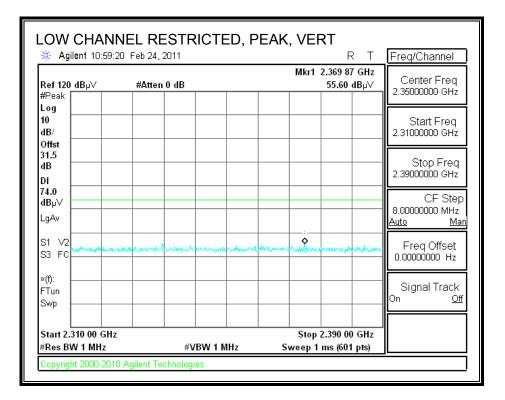
#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

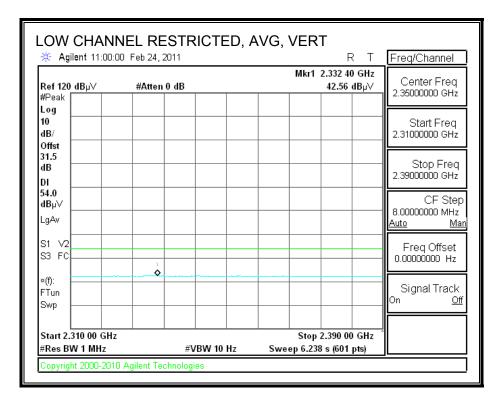




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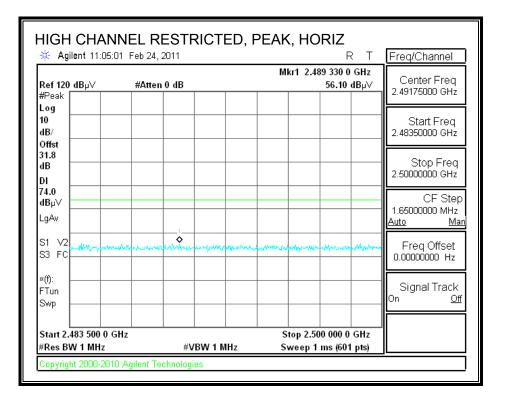
#### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

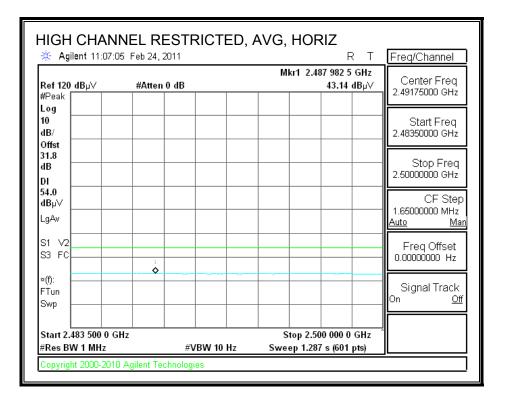




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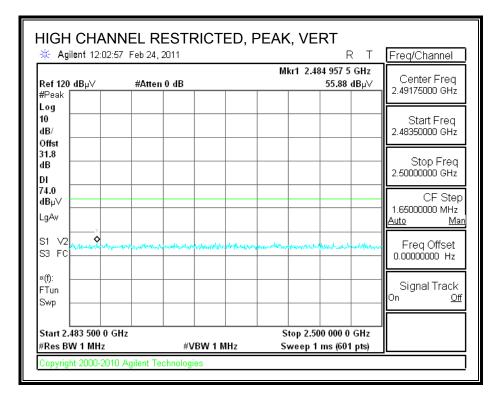
#### **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

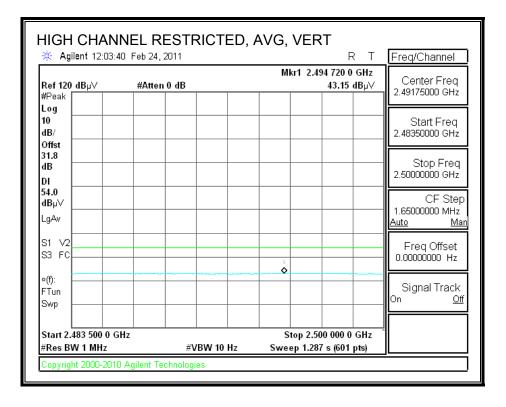




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#### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





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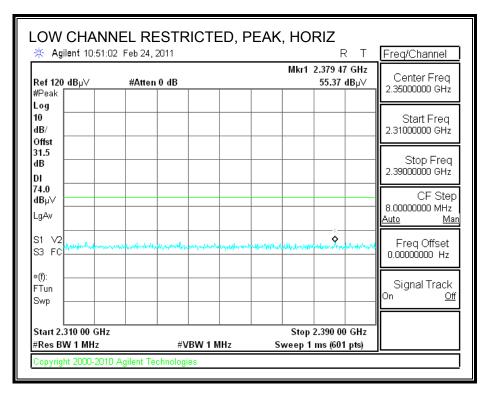
#### HARMONICS AND SPURIOUS EMISSIONS

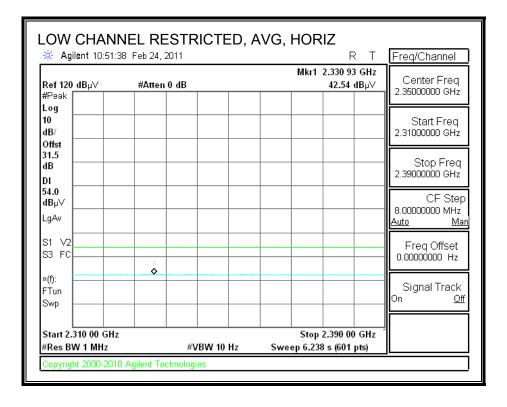
| -                       |                   | Measuren<br>tification |              | s, Fre     | mont 5n        | n Chamb    | er         |              |              |                |              |  |       |
|-------------------------|-------------------|------------------------|--------------|------------|----------------|------------|------------|--------------|--------------|----------------|--------------|--|-------|
| Test Engi               |                   | David Ga               | arcia        |            |                |            |            |              |              |                |              |  |       |
| Date:                   |                   | 02/24/11               |              |            |                |            |            |              |              |                |              |  |       |
| Project #               | :                 | 11U1368                | 1            |            |                |            |            |              |              |                |              |  |       |
| Company                 | <b>/:</b>         | Broadco                | m            |            |                |            |            |              |              |                |              |  |       |
| Test Targ               | et:               | FCC 15.3               | 205          |            |                |            |            |              |              |                |              |  |       |
| Mode Op                 | er:               | Tx 8PSK                |              |            |                |            |            |              |              |                |              |  |       |
|                         |                   |                        |              |            |                |            |            |              |              |                |              |  |       |
|                         | f                 | Measuren               |              | • •        | -              | Preamp (   |            |              |              | -              | Field Stren  | -                                      |       |
|                         | Dist              | Distance               |              |            |                | Distance   |            |              |              |                | ld Strength  |  |       |
|                         | Read              | Analyzer               | ~            |            | Avg            | -          |            | trength @    | r            | -              | s. Average   |  |       |
|                         | AF                | Antenna                |              |            | Peak           |            |            | Field Stre   | ength        | Margin v       | rs. Peak Lii | mut                                    |       |
|                         | CL                | Cable Los              | 55           |            | HPF            | High Pas   | s Filter   |              |              |                |              |  |       |
| f                       | Dist              | Read                   | AF           | CL         | Amp            | D Corr     |            | Corr.        | :            |                | Ant. Pol.    |  | Notes |
| GHz                     | (m)               | dBuV                   | dB/m         | dB         | dB             | dB         | dB         | dBuV/m       | dBuV/m       | dB             | V/H          | P/A/QP                                 |       |
|                         |                   | : 2402 MH              | ·····        |            |                |            |            |              |              |                |              |  |       |
| 4.804                   | 3.0               | 36.1                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 39.7         | 74.0         | -34.3          | V            | Р                                      |       |
| 4.804                   | 3.0               | 23.8                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 27.4         | 54.0         | -26.6          | <u>v</u>     | A                                      |       |
| 4.804                   | 3.0               | 35.9                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 39.5         | 74.0         | -34.5          | H            | P                                      |       |
| 4.804<br>MID CH         | 3.0               | 23.8<br>2441 MHz       | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 27.4         | 54.0         | -26.6          | H            | A                                      |       |
| 4.882                   | 3.0               | 35.8                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 39.5         | 74.0         | -34.5          | v            | Р                                      |       |
| 4.882                   | 3.0               | 23.3                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 27.0         | 54.0         | -27.0          | v            | Å                                      |       |
| 7.323                   | 3.0               | 34.9                   | 35.5         | 7.3        | -34.1          | 0.0        | 0.0        | 43.6         | 74.0         | -30.4          | v            | P                                      |       |
| 7.323                   | 3.0               | 23.0                   | 35.5         | 7.3        | -34.1          | 0.0        | 0.0        | 31.7         | 54.0         | -22.3          | V            | A                                      |       |
| 4.882                   | 3.0               | 36.0                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 39.8         | 74.0         | -34.2          | H            | Р                                      |       |
| 4.882                   | 3.0               | 23.4                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 27.1         | 54.0         | - <b>26.9</b>  | H            | A                                      |       |
| 7.323                   | 3.0               | 35.6                   | 35.5         | 7.3        | -34.1          | 0.0        | 0.0        | 44.2         | 74.0         | -29.8          | H            | Р                                      |       |
| 7.323                   | 3.0               | 23.1                   | 35.5         | 7.3        | -34.1          | 0.0        | 0.0        | 31.7         | 54.0         | -22.3          | H            | A                                      |       |
|                         |                   | : 2480 MI              | ·····        |            |                |            |            | 46.5         |              |                | <b></b>      |  |       |
| 4.960                   | 3.0               | 36.9                   | 32.8         | 5.9        | -34.8          | 0.0        | 0.0        | 40.8         | 74.0         | -33.2          | V            | P                                      |       |
| 4.960<br>7.440          | 3.0<br>3.0        | 23.7<br>35.1           | 32.8<br>35.6 | 5.9<br>7.3 | -34.8<br>-34.1 | 0.0<br>0.0 | 0.0<br>0.0 | 27.6<br>44.0 | 54.0<br>74.0 | -26.4<br>-30.0 | v<br>v       | A<br>P                                 |       |
| ( <b>.440</b>           | 3.0               | 35.1<br>22.9           | 35.0<br>35.6 | 7.3        | -34.1          | 0.0        | 0.0        | 44.0<br>31.8 | 74.0<br>54.0 | -30.0          | v<br>V       | P<br>A                                 |       |
| T 440                   | 3.0               | 36.6                   | 32.8         | 7.3<br>5.9 | -34.1          | 0.0        | 0.0        | 40.4         | 54.0<br>74.0 | -33.6          | v<br>H       | P<br>P                                 |       |
|                         |                   | 23.7                   | 32.8         | 5.9        | -34.8          | 0.0        | 0.0        | 40.4<br>27.6 | 74.0<br>54.0 | -33.0          | H<br>H       | r<br>A                                 |       |
| 7.440<br>4.960<br>4.960 | 3.0               |                        | 35.6         | 7.3        | -34.1          | 0.0        | 0.0        | 44.6         | 74.0         | -29.4          | H            | P                                      |       |
| 4.960<br>4.960          | 3.0               | 35.7                   |              |            |                |            |            |              |              |                |              | •••••••••••••••••••••••••••••••••••••• |       |
| 4.960                   | 3.0<br>3.0<br>3.0 | 35.7<br>22.9           | 35.6         | 7.3        | -34.1          | 0.0        | 0.0        | 31.8         | 54.0         | -22.2          | н            | A                                      |       |

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# 8.1.3. LE (LOW ENERGY) MODULATION

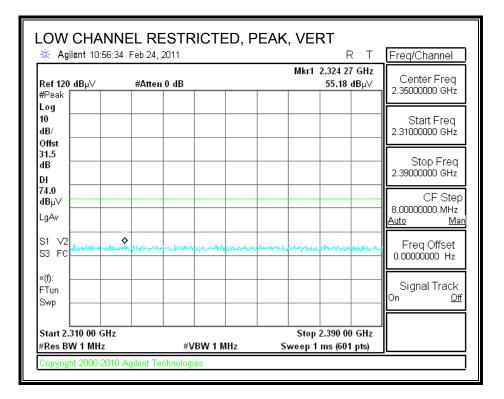
#### **RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**

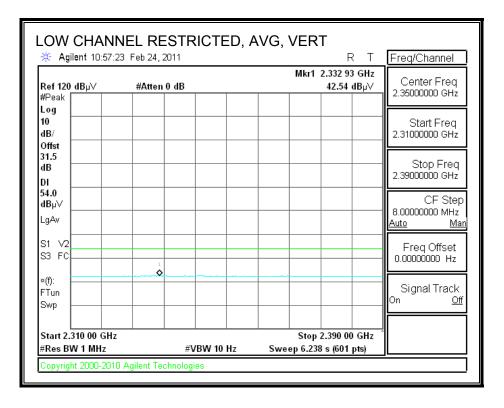




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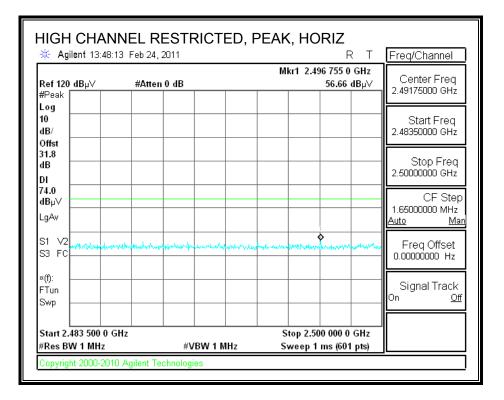
#### **RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

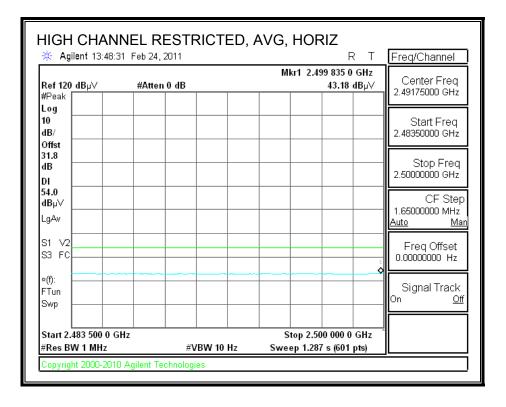




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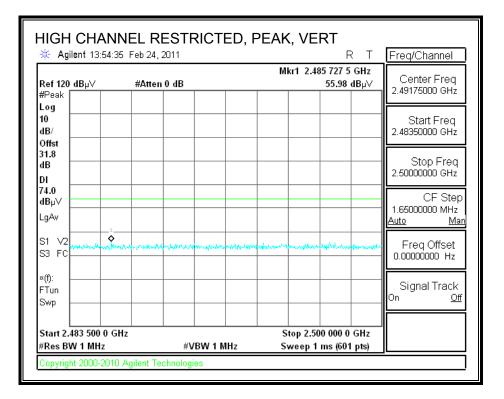
#### **RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**

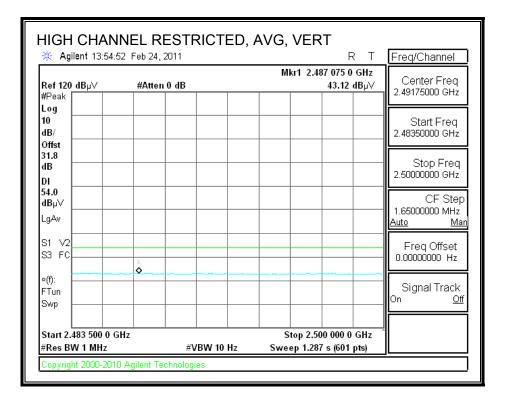




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#### **RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





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#### HARMONICS AND SPURIOUS EMISSIONS

| -                              |        | Measuren<br>tification |              | s, Fre     | mont 3n        | n Chamb    | er         |              |              |                |              |           |       |
|--------------------------------|--------|------------------------|--------------|------------|----------------|------------|------------|--------------|--------------|----------------|--------------|-----------|-------|
| Test Engr                      |        | David G                | arcia        |            |                |            |            |              |              |                |              |           |       |
| Date:                          | -      | 02/24/11               |              |            |                |            |            |              |              |                |              |           |       |
| Project #                      |        | 11U1368                |              |            |                |            |            |              |              |                |              |           |       |
| Company                        |        | Broadco                |              |            |                |            |            |              |              |                |              |           |       |
| Test Targ                      |        | FCC 15.                |              |            |                |            |            |              |              |                |              |           |       |
| Mode Op                        |        | Tx LE GI               | FSK          |            |                |            |            |              |              |                |              |           |       |
| •                              |        |                        |              |            |                |            |            |              |              |                |              |           |       |
|                                | f      | Measuren               | nent Freq    | piency     | Amp            | Preamp (   | Gain       |              |              | Average        | Field Stren  | gth Limit |       |
|                                | Dist   | Distance               | to Anter     | ma -       | D Corr         | Distance   | Correc     | ct to 3 me   | ters         | Peak Fie       | ld Strength  | Limit     |       |
|                                | Read   | Analyzer               | Reading      |            | Avg            | Average    | Field S    | trength @    | 3 m          | Margin v       | rs. Average  | Limit     |       |
|                                | AF     | Antenna                | Factor       |            | Peak           | Calculate  | d Peak     | r Field Stre | ength        | Margin v       | rs. Peak Lii | nit       |       |
|                                | CL     | Cable Los              | 55           |            | HPF            | High Pas   | s Filter   | r            |              |                |              |           |       |
| f                              | Dist   | Read                   | AF           | CL         | Атр            | D Corr     | Fltr       | Corr.        | Limit        | Margin         | Ant. Pol.    | Det.      | Notes |
| GHz                            | (m)    | dBuV                   | dB/m         | dB         | dB             | dB         | dB         | dBuV/m       | dBuV/m       | dB             | V/H          | P/A/QP    |       |
| LOW CE                         | IANNEL | : 2402 MF              | Ł            |            |                |            |            |              |              | 1              |              |           |       |
| 4.804                          | 3.0    | 38.0                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 41.6         | 74.0         | -32.4          | V            | P         |       |
| 4.804                          | 3.0    | 27.4                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 31.0         | 54.0         | - <b>23.0</b>  | V            | A         |       |
| 4.804                          | 3.0    | 41.1                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 44.8         | 74.0         | -29.3          | H            | P         |       |
| 4.804                          | 3.0    | 30.2                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 33.8         | 54.0         | -20.2          | H            | A         |       |
|                                |        | 2440 MHL               |              | ļ          | ļ              |            |            |              |              |                |              |           |       |
| 4.880                          | 3.0    | 35.6                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 39.3         | 74.0         | -34.7          | V            | P         |       |
| 4.880                          | 3.0    | 23.3                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 27.0         | 54.0         | -27.0          | V            | A         |       |
| 7.320                          | 3.0    | 35.8                   | 35.5         | 7.3        | -34.1          | 0.0        | 0.0        | 44.4         | 74.0         | -29.6          | V            | P         |       |
| 7.320                          | 3.0    | 23.0                   | 35.5         | 7.3        | -34.1          | 0.0        | 0.0        | 31.7         | 54.0         | -22.3          | V            | A         |       |
| 4.880                          | 3.0    | 42.5                   | 32.7         | 5.8        | -34.8          | 0.0        | 0.0        | 46.2         | 74.0         | -27.8          | H            | P         |       |
| 4.880<br>7.320                 | 3.0    | 32.2                   | 32.7<br>35.5 | 5.8        | -34.8<br>-34.1 | 0.0        | 0.0        | 35.9         | 54.0<br>74.0 | -18.1          | H            | A         |       |
| 7.320<br>7.320                 | 3.0    | 35.5<br>23.0           | 35.5         | 7.3<br>7.3 | -34.1          | 0.0<br>0.0 | 0.0<br>0.0 | 44.1         | 74.0<br>54.0 | -29.9<br>-22.3 | H<br>H       | P<br>A    |       |
|                                |        | : 23.0<br>4: 2480 MD   |              | · /.3      | -34.1          | 0.0        | 0.0        | 31.7         | 24.U         | -42.3          | n            | A         |       |
| <u>ніся сі</u><br>4.960        | 3.0    | 36.5                   | 32.8         | 5.9        | -34.8          | 0.0        | 0.0        | 40.4         | 74.0         | -33.6          | v            | Р         |       |
| 4.960                          | 3.0    | 24.9                   | 32.8         | 5.9        | -34.8          | 0.0        | 0.0        | 28.7         | 74.0<br>54.0 | -25.3          | v<br>V       | A         |       |
| 4.900<br>7.440                 | 3.0    | 35.3                   | 35.6         | 7.3        | -34.1          | 0.0        | 0.0        | 44.2         | 54.0<br>74.0 | -29.8          | v<br>V       | P         |       |
| 7.440                          | 3.0    | 22.8                   | 35.6         | 7.3        | -34.1          | 0.0        | 0.0        | 31.7         | 54.0         | -22.3          | v            | A         |       |
| 4.960                          | 3.0    | 40.7                   | 32.8         | 5.9        | -34.8          | 0.0        | 0.0        | 44.6         | 74.0         | -29.4          | ч<br>Н       | P         |       |
| 4.960                          | 3.0    | 30.0                   | 32.8         | 5.9        | -34.8          | 0.0        | 0.0        | 33.8         | 54.0         | -20.2          | H            | Â         |       |
|                                | 3.0    | 35.3                   | 35.6         | 7.3        | -34.1          | 0.0        | 0.0        | 44.2         | 74.0         | -29.8          | H            | P         |       |
| 7.440                          |        | 22.8                   | 35.6         | 7.3        | -34.1          | 0.0        | 0.0        | 31.7         | 54.0         | -22.3          | H            | Â         |       |
| 7 <b>.440</b><br>7 <b>.440</b> | 3.0    |                        |              |            |                |            |            |              |              |                |              |           |       |

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# 8.2. RECEIVER ABOVE 1 GHz

# 8.2.1. WORST-CASE MODE

|  | ~   |   | 7 Measurem  |  |   |   |  |   |  |  |  |   |  |   |   |
|--|---|---|---|--|---|---|--|---|--|--|--|---|--|---|---|
| Complia  | nce Ce  | rtification   | Services, Fr  | emont (  | 3m Ch   | amber   |  |   |  |  |  |   |  |   |   |
| Compan   | v:  |   | Broadcom  |  |   |   |  |   |  |  |  |   |  |   |   |
| Project  |   |   | 11U13681  |  |   |   |  |   |  |  |  |   |  |   |   |
| Date:  |   |   | 2/24/2011   |  |   |   |  |   |  |  |  |   |  |   |   |
| Fest En  | gineer:   |   | David Garcia  |  |   |   |  |   |  |  |  |   |  |   |   |
| Configu  | ation:  |   | EUT, Laptop H   | PC   |   |   |  |   |  |  |  |   |  |   |   |
| Mode:  |   |   | BT Rx   |  |   |   |  |   |  |  |  |   |  |   |   |
| fest Eq  | uipmen  | <u>t:</u>   |   |  |   |   |  |   |  |  |  |   |  |   |   |
| Н  | orn 1-  | 18GHz   | Pre-ar  | mplifer  | 1-260   | GHz   | Pre-am   | plifer  | 26-40GH  | z  | Ho   | orn > 180   | Hz   |   | Limit   |
| T60; S   | /N: 2238  | 3@3m  | T34 H/  | P 8449B  |   | -   |  |   |  | -  |  |   |  | -   | RX RSS 210 📮  |
|  |   |   |   |  |   |   | I  |   |  |  |  |   |  |   |   |
|  | uency Cat<br>able 2   | 2807700   | 12' c   | able 2   | 28076   | 500   | 20' ca   | ble 22  | 807500   |  | HPF  | Re  | eject Filte  |   | <u>Measurements</u>   |
| 21.00  | nble 228  | 07700   |   |  |   | _   | 20' cab  | 1. 2200   | 7500   |  |  |   |  |   | W=VBW=1MHz  |
| 3 6  | ible 228  | 0//00   | 12' ca  | able 228   | 07600   | -   | ZU Cab   | ie ZZOU   | <sup>77500</sup> -   |  |  | -   |  |   | ge <u>Measurements</u><br>1MHz; VBW=10Hz                                    |
| J  |   | _   |   |  |   |   | 1  |   |  | 1 ,  |  |   |  |   | 10112, VDW-10112  |
|  |   | D 1.D   |   |  |   |   |  |   |  |  |  |   |  |   |   |
| f  | Dist  | Read Pk   | Read Avg.   | AF   | CL  | Amp   | D Corr   | Fltr  | Peak   | Avg  | Pk Lim   | Avg Lim   | Pk Mar   | Avg Mar   | Notes   |
| f<br>GHz   | Dist<br>(m)   | Read Pk<br>dBuV   | Read Avg.<br>dBuV   | AF<br>dB/m   | CL<br>dB  | Amp<br>dB   | D Corr<br>dB   | Fltr<br>dB  |  | Avg<br>dBuV/m  | Pk Lim<br>dBuV/m   | Avg Lim<br>dBuV/m   | Pk Mar<br>dB   | Avg Mar<br>dB   | Notes<br>(V/H)  |
| GHz<br>.036  | (m)<br>3.0  | dBuV<br>48.5  | dBuV<br>35.2  | dB/m<br>24.6   | dB<br>2.4   | dB<br>-38.2   | dB<br>0.0  | dB<br>0.0   | dBuV/m<br>37.3   | dBuV/m<br>24.0   | dBuV/m<br>74   | dBuV/m<br>54  | dB<br>-36.7  | dB<br>-30.0   | (V/H)<br>H  |
| GHz<br>036<br>.141   | (m)<br>3.0<br>3.0   | dBuV<br>48.5<br>48.9  | dBuV<br>35.2<br>33.5  | dB/m<br>24.6<br>24.9   | dB<br>2.4<br>2.5  | dB<br>-38.2<br>-38.1  | dB<br>0.0<br>0.0   | dB<br>0.0<br>0.0  | dBuV/m<br>37.3<br>38.3   | dBuV/m<br>24.0<br>22.9   | dBuV/m<br>74<br>74   | dBuV/m<br>54<br>54  | dB<br>-36.7<br>-35.7   | dB<br>-30.0<br>-31.1  | (V/H)<br>H<br>H   |
| GHz<br>.036<br>.141<br>.230  | (m)<br>3.0<br>3.0<br>3.0  | dBuV<br>48.5<br>48.9<br>46.7  | dBuV<br>35.2<br>33.5<br>33.1  | dB/m<br>24.6<br>24.9<br>25.2   | dB<br>2.4<br>2.5<br>2.6   | dB<br>-38.2<br>-38.1<br>-37.9   | dB<br>0.0<br>0.0<br>0.0  | dB<br>0.0<br>0.0<br>0.0   | dBuV/m<br>37.3<br>38.3<br>36.6   | dBuV/m<br>24.0<br>22.9<br>23.0   | dBuV/m<br>74<br>74<br>74   | dBuV/m<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4  | dB<br>-30.0<br>-31.1<br>-31.0   | (V/H)<br>H<br>H<br>H  |
| GHz<br>1.036<br>1.141<br>1.230<br>1.295  | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0  | dBuV<br>48.5<br>48.9<br>46.7<br>48.3  | dBuV<br>35.2<br>33.5<br>33.1<br>35.3  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5   | dB<br>2.4<br>2.5<br>2.6<br>2.7  | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9  | dB<br>0.0<br>0.0<br>0.0<br>0.0   | dB<br>0.0<br>0.0<br>0.0<br>0.0  | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6   | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6   | dBuV/m<br>74<br>74<br>74<br>74<br>74   | dBuV/m<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4   | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4  | (V/H)<br>H<br>H<br>H<br>H   |
| GHz<br>1036<br>141<br>230<br>295<br>1.795  | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0  | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5  | dBuV<br>35.2<br>33.5<br>33.1<br>35.3<br>33.0  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1   | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2   | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2   | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | dBuV/m<br>37 3<br>38 3<br>36.6<br>38.6<br>43.7   | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2   | <u>dBuV/m</u><br>74<br>74<br>74<br>74<br>74<br>74                                    | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3  | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8   | (V/H)<br>H<br>H<br>H<br>H<br>H  |
| GHz<br>1.036<br>1.141<br>1.230<br>1.295<br>1.795<br>2.491  | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                              | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5<br>45.5  | dBuV<br>35.2<br>33.5<br>33.1<br>35.3<br>33.0<br>34.1  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3   | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9                                    | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0  | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6<br>43.7<br>41.5   | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74                               | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3<br>-32.5   | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-23.9  | (V/H)<br>H<br>H<br>H<br>H<br>H<br>H   |
| GHz<br>036<br>141<br>230<br>295<br>795<br>2491<br>036  | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0  | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5  | dBuV<br>35.2<br>33.5<br>33.1<br>35.3<br>33.0  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1   | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2   | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2   | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | dBuV/m<br>37 3<br>38 3<br>36.6<br>38.6<br>43.7   | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2   | <u>dBuV/m</u><br>74<br>74<br>74<br>74<br>74<br>74                                    | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3  | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8   | (V/H)<br>H<br>H<br>H<br>H<br>H  |
| GHz<br>1.036<br>1.141<br>1.230<br>1.295<br>1.795<br>2.491<br>1.036<br>1.141                                    | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                       | dBuV<br>485<br>489<br>46.7<br>483<br>505<br>455<br>50.6   | dBuV<br>352<br>33.5<br>33.1<br>35.3<br>33.0<br>34.1<br>38.5   | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.6                                 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4                             | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-38.2   | dB           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0 | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | dBuV/m<br>373<br>383<br>366<br>386<br>437<br>415<br>394  | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74                         | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3<br>-32.5<br>-34.6  | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-23.9<br>-26.7   | (V/H)<br>H<br>H<br>H<br>H<br>H<br>V   |
| GHz<br>036<br>141<br>230<br>295<br>795<br>2491<br>036<br>141<br>230  | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5<br>45.5<br>50.6<br>48.1  | dBuV<br>352<br>335<br>33.1<br>353<br>33.0<br>34.1<br>385<br>362   | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.6<br>24.9                         | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5                      | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-38.2<br>-38.1  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | 4B<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | dBuV/m<br>373<br>383<br>366<br>386<br>43.7<br>41.5<br>39.4<br>37.5   | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74                   | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5   | dB<br>-30.0<br>-31.1<br>-28.4<br>-27.8<br>-23.9<br>-26.7<br>-28.4   | (V/H)<br>H<br>H<br>H<br>H<br>V<br>V   |
| GHz<br>036<br>141<br>230<br>295<br>795<br>2491<br>036<br>141<br>230<br>295<br>795<br>795                       | (m)<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                       | dBuV           48.5           48.9           46.7           48.3           50.5           45.5           50.6           48.1           50.2           48.5           49.1 | dBuV<br>352<br>335<br>331<br>353<br>330<br>341<br>385<br>362<br>345<br>345<br>348<br>350  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2 | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.9<br>-37.2  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.   | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6<br>43.7<br>41.5<br>39.4<br>37.5<br>40.1<br>38.8<br>42.3                 | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6<br>24.4<br>25.1<br>28.2   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74 | dBuV/m           54 | dB<br>-36.7<br>-35.7<br>-35.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2<br>-31.7                       | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-23.9<br>-26.7<br>-28.4<br>-29.6<br>-28.9<br>-25.8   | (V/H)<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V           |
|  | (m)<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30                   | dBuV           48.5           48.9           46.7           48.3           50.5           45.5           50.6           48.1           50.2           48.5                | dBuV<br>35.2<br>33.5<br>33.1<br>35.3<br>33.0<br>34.1<br>38.5<br>36.2<br>34.5<br>34.8  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.6<br>24.9<br>25.2<br>25.5         | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7        | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.9   | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0   | dBuV/m<br>373<br>383<br>366<br>386<br>437<br>415<br>394<br>375<br>40.1<br>388                                  | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6<br>24.4<br>25.1   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74       | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2                       | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-23.9<br>-26.7<br>-28.4<br>-29.6<br>-28.9  | (V/H)<br>H<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V                     |
| GHz<br>1.036<br>1.141<br>1.230<br>1.295<br>1.795<br>2.491<br>1.036<br>1.141<br>1.230<br>1.295<br>1.795         | (m)<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30 | dBuV           48.5           48.9           46.7           48.3           50.5           45.5           50.6           48.1           50.2           48.5           49.1 | dBuV<br>352<br>335<br>331<br>353<br>330<br>341<br>385<br>362<br>345<br>345<br>348<br>350  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2 | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.9<br>-37.2  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.   | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6<br>43.7<br>41.5<br>39.4<br>37.5<br>40.1<br>38.8<br>42.3                 | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6<br>24.4<br>25.1<br>28.2   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74 | dBuV/m           54 | dB<br>-36.7<br>-35.7<br>-35.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2<br>-31.7                       | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-23.9<br>-26.7<br>-28.4<br>-29.6<br>-28.9<br>-25.8   | (V/H)<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V |
| GHz<br>1036<br>1.141<br>1.230<br>1.295<br>1.795<br>2.491<br>1.036<br>1.141<br>1.230<br>1.295<br>1.795<br>2.491 | (m)<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30                   | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5<br>50.6<br>50.6<br>48.1<br>50.6<br>48.1<br>48.5<br>48.1<br>48.1  | dBuV<br>352<br>335<br>331<br>353<br>330<br>341<br>385<br>362<br>345<br>345<br>348<br>350  | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2 | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.9<br>-37.2  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.   | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6<br>43.7<br>41.5<br>39.4<br>37.5<br>40.1<br>38.8<br>42.3                 | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6<br>24.4<br>25.1<br>28.2   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74 | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2<br>-31.7<br>-29.9              | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-23.9<br>-26.7<br>-28.4<br>-29.6<br>-28.9<br>-25.8   | (V/H)<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V<br>V |
| GHz<br>1036<br>141<br>230<br>295<br>2491<br>036<br>141<br>230<br>295<br>2491<br>230<br>295<br>2491<br>2491     | (m)<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30                   | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5<br>50.6<br>50.6<br>48.1<br>50.6<br>48.1<br>48.5<br>48.1<br>48.1  | dBuV<br>352<br>335<br>331<br>353<br>330<br>341<br>385<br>362<br>345<br>345<br>345<br>339<br>ent Frequency   | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2 | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-36.3<br>-38.2<br>-36.3   | dB<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00<br>00   | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.   | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6<br>43.7<br>41.5<br>39.4<br>37.5<br>40.1<br>38.8<br>42.3                 | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6<br>24.4<br>25.1<br>28.2<br>29.9   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74 | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2<br>-31.7<br>-29.9<br> | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-28.4<br>-29.6<br>-28.4<br>-29.9<br>-25.8<br>-24.1   | (V/H)<br>H<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V                     |
| GHz<br>036<br>141<br>230<br>295<br>491<br>036<br>141<br>230<br>295<br>795<br>2491<br>2491                      | (m)<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30                   | dBuV<br>48.5<br>48.9<br>46.3<br>48.3<br>50.5<br>50.6<br>48.1<br>50.6<br>48.1<br>50.2<br>48.5<br>49.1<br>48.1<br>48.1  | dBuV<br>35.2<br>33.5<br>33.1<br>35.3<br>33.0<br>34.1<br>38.5<br>36.2<br>34.5<br>34.5<br>35.0<br>33.9<br>ent Frequenc:                               | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2 | dB<br>-38.2<br>-38.1<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.9<br>-37.2<br>-36.3<br>-36.3<br>-38.2<br>-36.3   | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.  | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.   | dBuV/m<br>37.3<br>38.8<br>36.6<br>38.6<br>38.6<br>38.6<br>38.6<br>39.4<br>37.5<br>40.1<br>38.8<br>42.3<br>44.1 | dBuV/m<br>24.0<br>22.9<br>23.0<br>25.6<br>26.2<br>30.1<br>27.3<br>25.6<br>24.4<br>25.6<br>24.4<br>25.1<br>28.2<br>29.9   | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74 | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-36.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2<br>-31.7<br>-29.9<br>          | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-28.4<br>-29.6<br>-26.7<br>-28.4<br>-29.6<br>-28.9<br>-25.8<br>-24.1<br>-25.8<br>-24.1                       | (V/H)<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V<br>V                     |
| GHz<br>1036<br>141<br>230<br>295<br>2491<br>036<br>141<br>230<br>295<br>2491<br>230<br>295<br>2491<br>2491     | (m)<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30<br>30                   | dBuV<br>48.5<br>48.9<br>46.7<br>48.3<br>50.5<br>50.6<br>48.1<br>50.2<br>48.1<br>49.1<br>48.1<br>48.1<br>Measurem<br>Distance to   | dBuV<br>35.2<br>33.5<br>33.1<br>35.3<br>33.0<br>34.1<br>38.5<br>36.2<br>34.5<br>36.2<br>34.5<br>35.0<br>33.9<br>ent Frequency<br>Antenna<br>eeading | dB/m<br>24.6<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3<br>24.9<br>25.2<br>25.5<br>27.1<br>28.3 | dB<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2<br>3.9<br>2.4<br>2.5<br>2.6<br>2.7<br>3.2 | dB           -38.2           -38.1           -37.9           -37.2           -36.3           -38.1           -37.2           -36.3           -37.2           -36.3           -37.2           -36.3           -37.2           -36.3           D Corr | dB<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.  | dB           0.0      < | dBuV/m<br>37.3<br>38.3<br>36.6<br>38.6<br>43.7<br>41.5<br>39.4<br>37.5<br>40.1<br>38.8<br>42.3<br>44.1         | dBuV/m<br>24.0<br>22.9<br>23.9<br>25.6<br>26.2<br>26.2<br>27.3<br>25.6<br>24.4<br>25.1<br>28.2<br>29.9<br>29.9<br>29.9<br>29.9<br>20.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0<br>27.0 | dBuV/m<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74<br>74 | dBuV/m<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54<br>54  | dB<br>-36.7<br>-35.7<br>-37.4<br>-35.4<br>-30.3<br>-32.5<br>-34.6<br>-36.5<br>-33.9<br>-35.2<br>-31.7<br>-29.9<br> | dB<br>-30.0<br>-31.1<br>-31.0<br>-28.4<br>-27.8<br>-28.4<br>-26.7<br>-28.4<br>-26.7<br>-28.4<br>-26.7<br>-28.4<br>-26.9<br>-25.8<br>-24.1<br>-25.8<br>-24.1<br> | (V/H)<br>H<br>H<br>H<br>V<br>V<br>V<br>V<br>V<br>V                          |

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# 8.3. WORST-CASE BELOW 1 GHz

# 8.3.1. WORST-CASE MODE

# SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

|   | -  | ency Meas<br>ication Sei   |  |   | t 5m Cha   | amber  |  |  |  |   |   |   |       |
|---|--|--|--|---|--|--|--|--|--|---|---|---|-------|
| Test Engr<br>Date:<br>Project #:<br>Company<br>Test Targ<br>Mode Ope  | :<br>2t:   | David Gaz<br>02/24/11<br>11U13681<br>Broadcon<br>FCC Clas<br>Tx Worst                        | 1<br>15 B  |   |  |  |  |  |  |   |   |   |       |
|   | f<br>Dist<br>Baad  | Measurema<br>Distance to   | o Antenn   |   | Amp<br>D Corr<br>Filter  | Preamp G<br>Distance (<br>Filter Inse                              | Correct  | to 3 meters  |  | Margin  | Margin vs.                                | Limit   |       |
|   | Read<br>AF   | Analyzer F<br>Antenna F  | ·····••  |   | Filter<br>Corr.  | Filter Inse<br>Calculated  |  |  |  |   |   |   |       |
|   | CL   | Cable Loss   |  |   | Limit  | Field Stre   |  |  |  |   |   |   |       |
| f   | Dist   | Read   | AF   | CL  | Amp  | D Corr   | Pad  | Согт.  | Limit  | Margin  | Ant. Pol.                                 | Det.  | Notes |
| MHz   | (m)  | dBuV   | dB/m   | dB  | dB   | dB   | dB   | dBuV/m   | dBuV/m   | dB  | V/H                                       | P/A/QP  |       |
| 117.484   | 3.0  | 53.7   | 13.0   | 0.9   | 28.1   | 0.0  | 0.0  | 39.5   | 43.5   | - <b>4.0</b>  | V   | Р   |       |
| 125.524   | 3.0  | 50.7   | 14.1   | 0.9   | 28.0   | 0.0  | 0.0  | 37.7   | 43.5   | - <b>5.8</b>  | V   | Р   |       |
|   | 3.0  | 50.8   | 13.9   | 0.9   | 28.0   | 0.0  | 0.0  | 37.7   | 43.5   | -5.8  | V   | P   |       |
|   |  | 52.7   | 12.9   | 1.0<br>1.1  | 27.9<br>27.4   | 0.0<br>0.0   | 0.0  | 38.7<br>38.2   | 43.5<br>43.5   | -4.8<br>-5.3  | V<br>V                                    | P<br>P  |       |
| 144.125   | 3.0  | 50.0   |  |   |  |  | 0.0  | 58.2   | 4.1.5  | -5.5  | . U .                                     | P :   |       |
| 144.125<br>194.647  | 3.0  | 52.9   | 11.6   |   |  |  |  | ¢  |  | ·   |   |   |       |
| 144.125<br>194.647<br>305.651   | 3.0<br>3.0   | 47.7   | 13.6   | 1.5   | 27.4   | 0.0  | 0.0  | 35.3   | 46.0   | - <b>10.7</b>   | v   | Р   |       |
| 144.125<br>194.647<br>305.651<br>312.012  | 3.0<br>3.0<br>3.0  | 47.7<br>46.5   | 13.6<br>13.7   | 1.5<br>1.5  | 27.4<br>27.5   | 0.0<br>0.0   | 0.0  | 35.3<br>34.2   | 46.0<br>46.0   | -10.7<br>-11.8  | V<br>V                                    | P<br>P  |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057   | 3.0<br>3.0   | 47.7<br>46.5<br>44.8   | 13.6<br>13.7<br>15.9   | 1.5<br>1.5<br>1.9   | 27.4<br>27.5<br>28.3   | 0.0<br>0.0<br>0.0  | 0.0<br>0.0   | 35.3<br>34.2<br>34.3   | 46.0<br>46.0<br>46.0   | -10.7<br>-11.8<br>-11.7   | v   | P<br>P<br>P   |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753  | 3.0<br>3.0<br>3.0<br>3.0   | 47.7<br>46.5   | 13.6<br>13.7   | 1.5<br>1.5  | 27.4<br>27.5   | 0.0<br>0.0   | 0.0  | 35.3<br>34.2   | 46.0<br>46.0   | -10.7<br>-11.8  | V<br>V<br>V                               | P<br>P  |       |
| 144,125<br>194,647<br>305,651<br>312,012<br>449,057<br>831,753<br>895,836   | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                             | 47.7<br>46.5<br>44.8<br>37.3   | 13.6<br>13.7<br>15.9<br>21.3   | 1.5<br>1.5<br>1.9<br>2.6  | 27.4<br>27.5<br>28.3<br>28.1   | 0.0<br>0.0<br>0.0<br>0.0   | 0.0<br>0.0<br>0.0  | 35.3<br>34.2<br>34.3<br>33.0   | 46.0<br>46.0<br>46.0<br>46.0   | -10.7<br>-11.8<br>-11.7<br>-13.0  | V<br>V<br>V<br>V                          | P<br>P<br>P<br>P  |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753<br>895.836<br>970.839  | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0                      | 47.7<br>46.5<br>44.8<br>37.3<br>36.3   | 13.6<br>13.7<br>15.9<br>21.3<br>22.0   | 1.5<br>1.5<br>1.9<br>2.6<br>2.7   | 27.4<br>27.5<br>28.3<br>28.1<br>27.9   | 0.0<br>0.0<br>0.0<br>0.0<br>0.0                                    | 0.0<br>0.0<br>0.0<br>0.0   | 35.3<br>34.2<br>34.3<br>33.0<br>33.2   | 46.0<br>46.0<br>46.0<br>46.0<br>46.0   | -10.7<br>-11.8<br>-11.7<br>-13.0<br>-12.8<br>-22.9<br>-8.8                                    | V<br>V<br>V<br>V<br>V                     | P<br>P<br>P<br>P<br>P   |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753<br>895.836<br>970.839<br>312.012<br>346.573  | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0 | 47.7<br>46.5<br>44.8<br>37.3<br>36.3<br>33.4<br>49.4<br>49.4                                 | 13.6<br>13.7<br>15.9<br>21.3<br>22.0<br>22.5<br>13.7<br>14.2                         | 1.5<br>1.5<br>1.9<br>2.6<br>2.7<br>2.9                                    | 27.4<br>27.5<br>28.3<br>28.1<br>27.9<br>27.7<br>27.5<br>27.7                         | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0        | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0                      | 35.3<br>34.2<br>34.3<br>33.0<br>33.2<br>31.1<br>37.2<br>37.5                         | 46.0<br>46.0<br>46.0<br>46.0<br>46.0<br>54.0   | -10.7<br>-11.8<br>-11.7<br>-13.0<br>-12.8<br>-22.9<br>-8.8<br>-8.5                            | V<br>V<br>V<br>V<br>V<br>H<br>H           | P   |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753<br>895.836<br>970.839<br>312.012<br>346.573<br>381.134   | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0 | 47.7<br>46.5<br>44.8<br>37.3<br>36.3<br>33.4<br>49.4<br>49.4<br>49.4<br>47.0                 | 13.6<br>13.7<br>15.9<br>21.3<br>22.0<br>22.5<br>13.7<br>14.2<br>14.7                 | 1.5<br>1.5<br>1.9<br>2.6<br>2.7<br>2.9<br>1.5<br>1.6<br>1.7               | 27.4<br>27.5<br>28.3<br>28.1<br>27.9<br>27.7<br>27.5<br>27.7<br>27.9                 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0               | 35.3<br>34.2<br>34.3<br>33.0<br>33.2<br>31.1<br>37.2<br>37.5<br>35.5                 | 46.0<br>46.0<br>46.0<br>46.0<br>54.0<br>54.0<br>46.0<br>46.0<br>46.0                 | -10.7<br>-11.8<br>-11.7<br>-13.0<br>-12.8<br>-22.9<br>-8.8<br>-8.5<br>-10.5                   | V<br>V<br>V<br>V<br>H<br>H<br>H           | P           P |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753<br>895.836<br>970.839<br>312.012<br>346.573<br>381.134<br>479.899                                  | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0 | 47.7<br>46.5<br>44.8<br>37.3<br>36.3<br>33.4<br>49.4<br>49.4<br>49.4<br>47.0<br>44.4         | 13.6<br>13.7<br>15.9<br>21.3<br>22.0<br>22.5<br>13.7<br>14.2<br>14.7<br>16.5         | 1.5<br>1.5<br>1.9<br>2.6<br>2.7<br>2.9<br>1.5<br>1.6<br>1.7<br>1.9        | 27.4<br>27.5<br>28.3<br>28.1<br>27.9<br>27.7<br>27.5<br>27.7<br>27.9<br>28.5         | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0        | 35.3<br>34.2<br>34.3<br>33.0<br>33.2<br>31.1<br>37.2<br>37.5<br>35.5<br>34.3         | 46.0<br>46.0<br>46.0<br>46.0<br>54.0<br>54.0<br>46.0<br>46.0<br>46.0<br>46.0         | -10.7<br>-11.8<br>-11.7<br>-13.0<br>-12.8<br>-22.9<br>-8.8<br>-8.5<br>-10.5<br>-11.7          | V<br>V<br>V<br>V<br>H<br>H<br>H<br>H      | P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P   |       |
| 144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753<br>895.836<br>970.839<br>312.012<br>346.573<br>381.134<br>479.899<br>543.861                       | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0 | 47.7<br>46.5<br>44.8<br>37.3<br>36.3<br>33.4<br>49.4<br>49.4<br>49.4<br>47.0<br>44.4<br>42.5 | 13.6<br>13.7<br>15.9<br>21.3<br>22.0<br>22.5<br>13.7<br>14.2<br>14.7<br>16.5<br>17.6 | 1.5<br>1.5<br>1.9<br>2.6<br>2.7<br>2.9<br>1.5<br>1.6<br>1.7<br>1.9<br>2.1 | 27.4<br>27.5<br>28.3<br>28.1<br>27.9<br>27.7<br>27.5<br>27.7<br>27.9<br>28.5<br>28.6 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 35.3<br>34.2<br>34.3<br>33.0<br>33.2<br>31.1<br>37.2<br>37.5<br>35.5<br>34.3<br>33.5 | 46.0<br>46.0<br>46.0<br>46.0<br>54.0<br>46.0<br>46.0<br>46.0<br>46.0<br>46.0<br>46.0 | -10.7<br>-11.8<br>-11.7<br>-13.0<br>-12.8<br>-22.9<br>-8.8<br>-8.5<br>-10.5<br>-11.7<br>-12.5 | V<br>V<br>V<br>V<br>H<br>H<br>H<br>H<br>H | P         P             |       |
| 128.524<br>144.125<br>194.647<br>305.651<br>312.012<br>449.057<br>831.753<br>895.836<br>970.839<br>312.012<br>346.573<br>381.134<br>479.899<br>543.861<br>554.782 | 3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0<br>3.0 | 47.7<br>46.5<br>44.8<br>37.3<br>36.3<br>33.4<br>49.4<br>49.4<br>49.4<br>47.0<br>44.4         | 13.6<br>13.7<br>15.9<br>21.3<br>22.0<br>22.5<br>13.7<br>14.2<br>14.7<br>16.5         | 1.5<br>1.5<br>1.9<br>2.6<br>2.7<br>2.9<br>1.5<br>1.6<br>1.7<br>1.9        | 27.4<br>27.5<br>28.3<br>28.1<br>27.9<br>27.7<br>27.5<br>27.7<br>27.9<br>28.5         | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0 | 0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0<br>0.0        | 35.3<br>34.2<br>34.3<br>33.0<br>33.2<br>31.1<br>37.2<br>37.5<br>35.5<br>34.3         | 46.0<br>46.0<br>46.0<br>46.0<br>54.0<br>54.0<br>46.0<br>46.0<br>46.0<br>46.0         | -10.7<br>-11.8<br>-11.7<br>-13.0<br>-12.8<br>-22.9<br>-8.8<br>-8.5<br>-10.5<br>-11.7          | V<br>V<br>V<br>V<br>H<br>H<br>H<br>H      | P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P           P         P   |       |

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# 9. AC POWER LINE CONDUCTED EMISSIONS

## LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

\* Decreases with the logarithm of the frequency.

#### TEST PROCEDURE

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

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

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

**RESULTS** 

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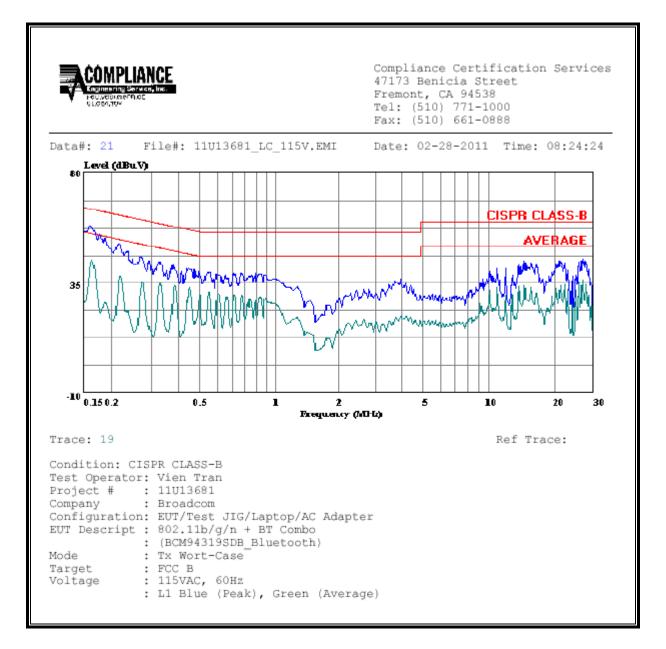
# 9.1. WORST-CASE MODE

#### **<u>6 WORST EMISSIONS</u>**

|           | CONDUCTED EMISSIONS DATA (115VAC 60Hz) |           |           |       |       |       |         |        |       |  |  |
|-----------|--|-----------|-----------|-------|-------|-------|---------|--------|-------|--|--|
| Freq.     |  |           | Closs     | Limit | FCC_B | Marg  | (in     | Remark |       |  |  |
| (MHz)     | PK (dBuV)                              | QP (dBuV) | AV (dBuV) | (dB)  | QP    | AV    | QP (dB) | AV(dB) | L1/L2 |  |  |
| 0.16      | 58.49                                  |           | 44.36     | 0.00  | 65.46 | 55.46 | -6.97   | -11.10 | L1    |  |  |
| 0.22      | 50.60                                  |           | 38.07     | 0.00  | 62.86 | 52.86 | -12.26  | -14.79 | L1    |  |  |
| 26.70     | 45.11                                  |           | 36.33     | 0.00  | 60.00 | 50.00 | -14.89  | -13.67 | L1    |  |  |
| 0.18      | 55.82                                  |           | 43.55     | 0.00  | 64.67 | 54.67 | -8.85   | -11.12 | L2    |  |  |
| 0.23      | 48.74                                  |           | 39.30     | 0.00  | 62.31 | 52.31 | -13.57  | -13.01 | L2    |  |  |
| 2.95      | 44.28                                  |           | 30.61     | 0.00  | 56.00 | 46.00 | -11.72  | -15.39 | L2    |  |  |
| 6 Worst I | <br>Data<br>                           |           |           |       |       |       |         |        |       |  |  |

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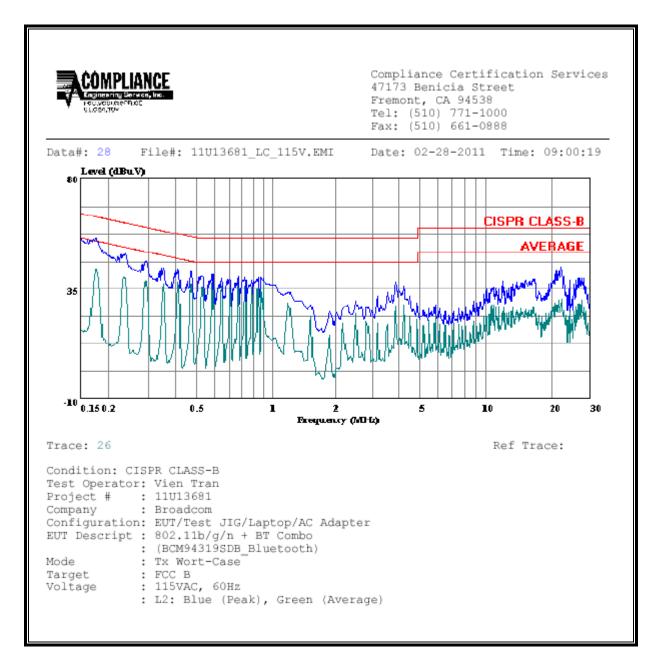
#### LINE 1 RESULTS



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#### LINE 2 RESULTS



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#### 10. MAXIMUM PERMISSIBLE EXPOSURE

#### **FCC RULES**

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

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

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

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

|                                    | (V/m) | (A/m) | (mW/cm <sup>2</sup> ) | (minutes)      |
|------------------------------------|-------|-------|-----------------------|----------------|
| 30–300<br>300–1500<br>1500–100.000 | 27.5  | 0.073 | 0.2<br>f/1500<br>1.0  | 30<br>30<br>30 |

f = frequency in MHz

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

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

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## IC RULES

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

# Table 5

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

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

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

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

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

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#### EQUATIONS

Power density is given by:

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

where

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

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

Distance is given by:

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

where

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

For multiple colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the Power \* Gain product (in linear units) of each transmitter.

Total EIRP = (P1 \* G1) + (P2 \* G2) + ... + (Pn \* Pn)

where

Px = Power of transmitter xGx = Numeric gain of antenna x

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 =  $1.0 \text{ mW/cm}^2$ From IC Safety Code 6, Section 2.2 Table 5 Column 4, S =  $10 \text{ W/m}^2$ 

#### **RESULTS**

| Band    | Mode      | Separation | Output | Antenna | IC Power | FCC Power |
|---------|-----------|------------|--------|---------|----------|-----------|
|         |           | Distance   | Power  | Gain    | Density  | Density   |
|         |           | (m)        | (dBm)  | (dBi)   | (W/m^2)  | (mW/cm^2) |
| 2.4 GHz | Bluetooth | 0.20       | 1.75   | 3.90    | 0.01     | 0.001     |

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