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

# CERTIFICATION TEST REPORT

**FOR**

**BT 2.1 + EDR HEADSET WITH VIDEO CAMERA**

**MODEL NUMBER: LX1**

**FCC ID: YJ8-LX1**
**IC: 9087A-LX1**

**REPORT NUMBER: 10U13339-1, Revision A**

**ISSUE DATE: AUGUST 25, 2010**

*Prepared for*
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NVLAP LAB CODE 200065-0

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| -- | 08/12/10 | Initial Issue | F. Ibrahim |
| A | 08/25/10 | Revised FCC ID per clients request | A. Zaffar |

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Looxcie, Inc.
1196 Borregas Ave, suite 200
Sunnyvale, CA 94089, U.S.A.

**EUT DESCRIPTION:** BT 2.1 + EDR Headset with video camera

**MODEL:** LX1

**SERIAL NUMBER:** Radiated EUT: 02124, Conducted EUT: 02127

**DATE TESTED:** August 4-6, 2010

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| CFR 47 Part 15 Subpart C | Pass |
| INDUSTRY CANADA RSS-210 Issue 7 Annex 8 | Pass |
| INDUSTRY CANADA RSS-GEN Issue 2 | Pass |

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

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

Approved & Released For CCS By:

FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

TOM CHEN
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

# 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 2, and RSS-210 Issue 7.

# 3. FACILITIES AND ACCREDITATION

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

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

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

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

## 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

## 4.3. MEASUREMENT UNCERTAINTY

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

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

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

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth v2.1 + EDR headset with a video camera.

## 5.2. MAXIMUM OUTPUT POWER

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

| Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|---|---|---|---|
| 2402 - 2480 | Basic GFSK | 5.59 | 3.62 |
| 2402 - 2480 | Enhanced QPSK | 4.53 | 2.84 |
| 2402 - 2480 | Enhanced 8PSK | 4.52 | 2.83 |

## 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Multi-chip antenna, with a maximum gain of 1.5 dBi.

## 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was rev.E V2.

The test utility software used during testing was CSR Bleu Test3.exe.

## 5.5. WORST-CASE CONFIGURATION AND MODE

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

Radiated Emissions 30-1000 MHz was performed with the EUT set to the channel with the highest output power.

The EUT is a portable device that has three orientations; therefore X, Y and Z orientations have been investigated. The worst case was found to be Z orientation.

All testing was performed for both basic GFSK and 8PSK modulations as they cover the highest output power with lowest data rate for GFSK, and lowest output power with highest data rate for 8PSK.

## 5.6. DESCRIPTION OF TEST SETUP

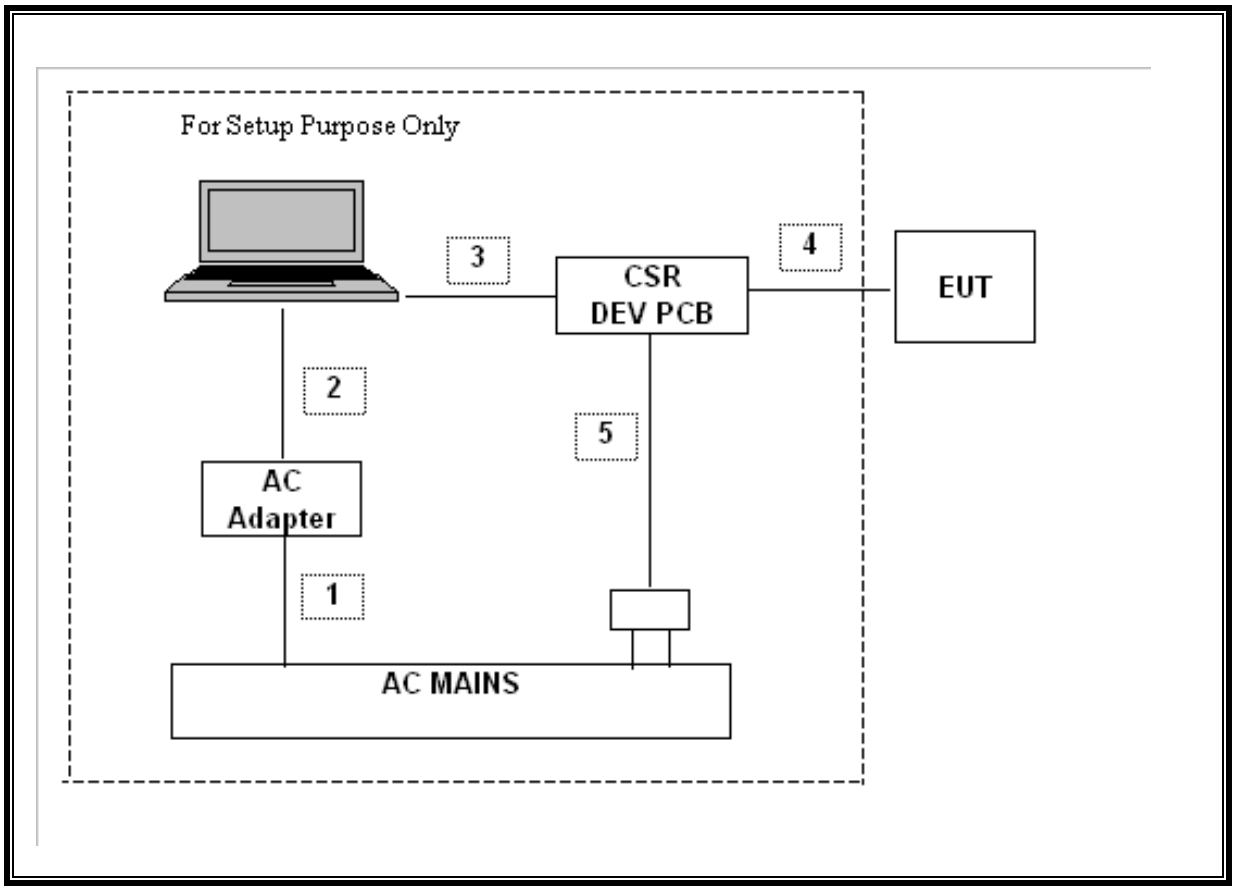
**SUPPORT EQUIPMENT**

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **Serial Number** |
| Laptop | Dell | PP01X | CN07J187-12961-24J |
| AC Adapter | Dell | ADP-90FB | TH06G356-17971-32K-29CZ |
| AC Adapter | ECOPAC | 3A-181WP09 | NA |
| DEV PCB | CSR | EXPB8870 | NA |

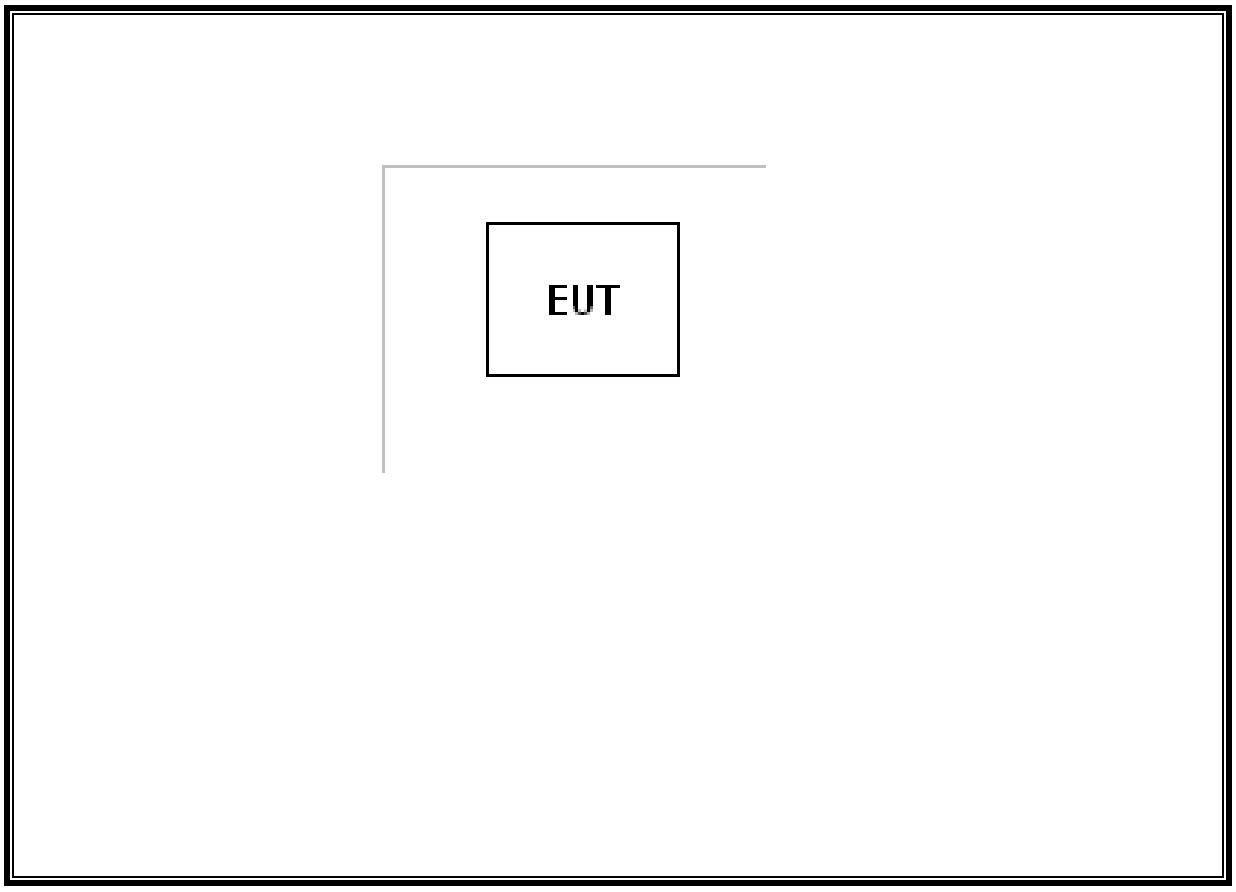
**I/O CABLES**

| I/O CABLE LIST | | | | | | |
|---|---|---|---|---|---|---|
| **Cable No.** | **Port** | **# of Identical Ports** | **Connector Type** | **Cable Type** | **Cable Length** | **Remarks** |
| 1 | AC | 2 | US115V | Unshielded | 1.8m | |
| 2 | DC | 1 | DC | Unshielded | 1m | A ferrite at laptop end |
| 3 | USB | 1 | USB | shielded | 1.5m | |
| 4 | IO | 5 | IO | Wire | 0.15m | |
| 5 | DC | 1 | DC | Unshielded | 1.2m | A ferrite at Adapter end |
| 6 | USB | 1 | mini USB | Unshielded | 0.25m | |

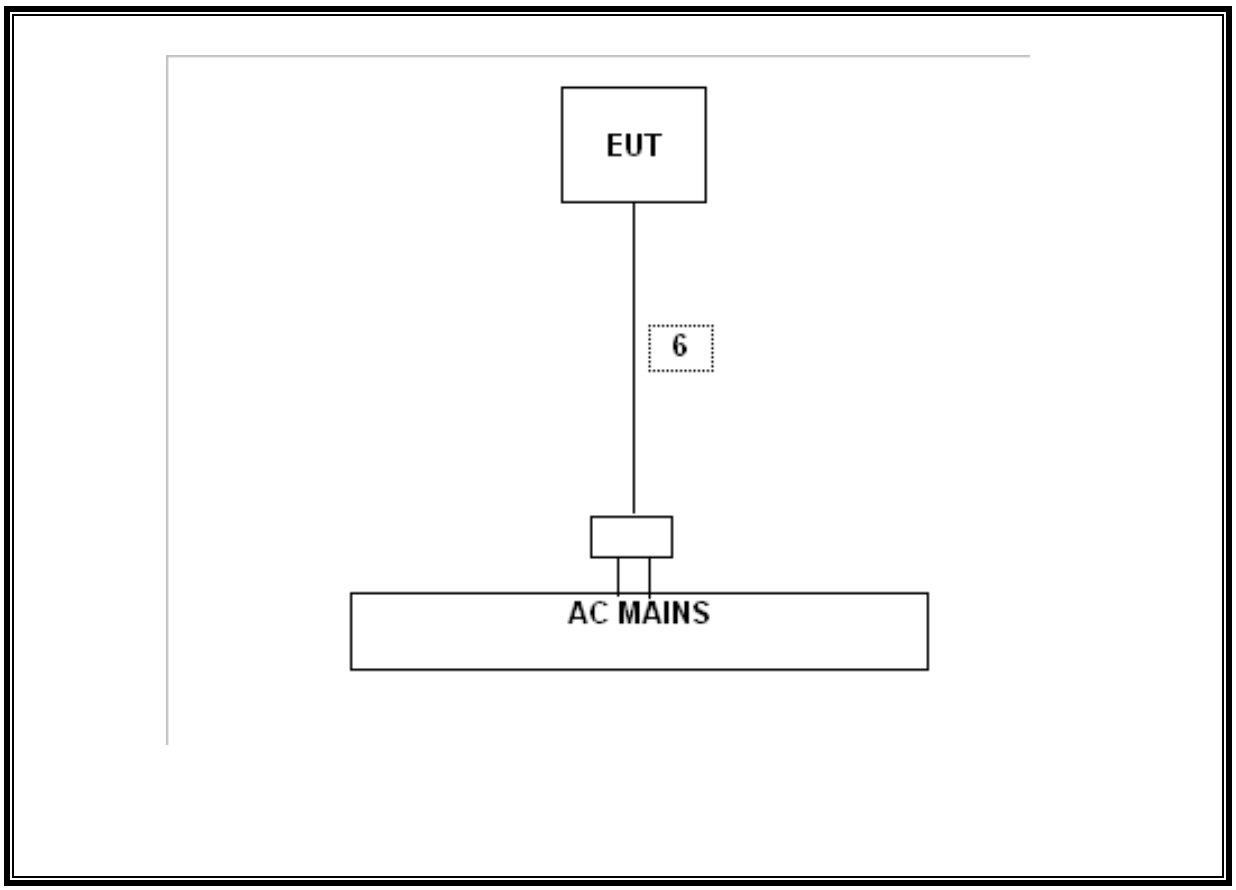
**SETUP DIAGRAM FOR CONDUCTED TEST**



**SETUP DIAGRAM FOR RADIATED TEST**



**SETUP DIAGRAM FOR AC LINE CONDUCTION TEST**



# 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 | C01159 | 05/08/11 |
| Spectrum Analyzer, 26.5 GHz | Agilent / HP | E4440A | C01178 | 08/31/10 |
| Antenna, Horn, 18 GHz | EMCO | 3115 | C00783 | 07/29/11 |
| Preamplifier, 26.5 GHz | Agilent / HP | 8449B | C01063 | 08/04/11 |
| Antenna, Bilog, 2 GHz | Sunol Sciences | JB1 | C01016 | 07/14/11 |
| Preamplifier, 1300 MHz | Agilent / HP | 8447D | C00580 | 07/06/11 |
| Peak Power Meter | Agilent / HP | E4416A | C00963 | 12/04/11 |
| Peak / Average Power Sensor | Agilent / HP | E9327A | C00964 | 12/04/11 |
| LISN, 30 MHz | FCC | LISN-50/250-25-2 | N02625 | 11/06/10 |

# 7. ANTENNA PORT TEST RESULTS

## 7.1. AVERAGE TIME OF OCCUPANCY

**LIMIT**

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**

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

GFSK Mode

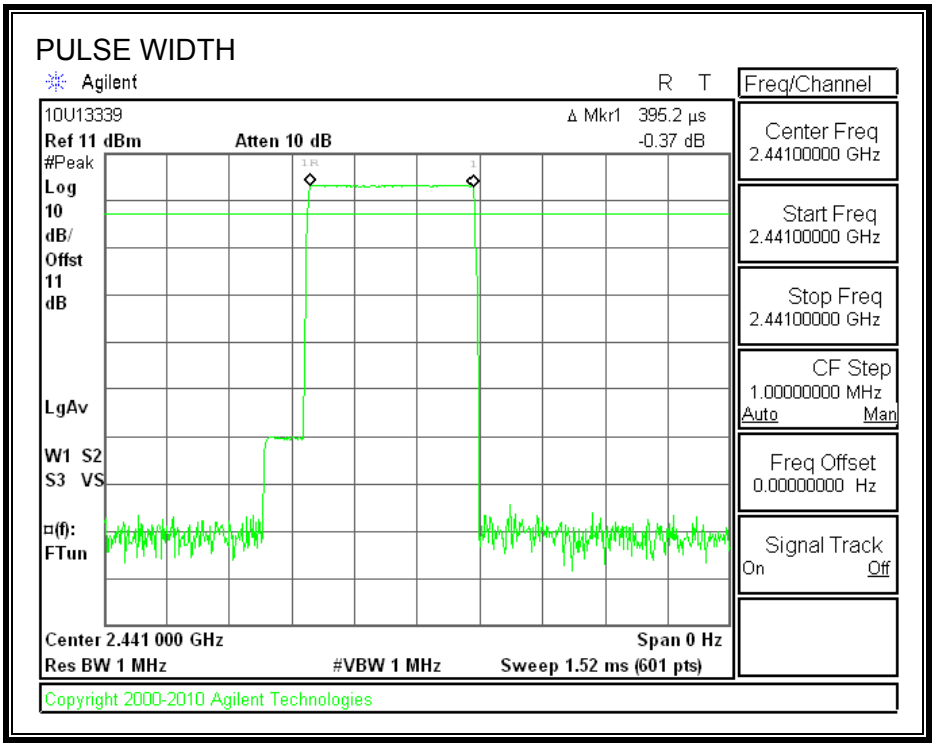
| DH Packet | Pulse Width (msec) | Number of Pulses in 3.16 seconds | Average Time of (sec) | Limit (sec) | Margin (sec) |
|---|---|---|---|---|---|
| DH1 | 0.3952 | 32 | 0.126 | 0.4 | 0.274 |
| DH3 | 1.65 | 16 | 0.264 | 0.4 | 0.136 |
| DH5 | 2.9 | 11 | 0.319 | 0.4 | 0.081 |

8PSK Mode

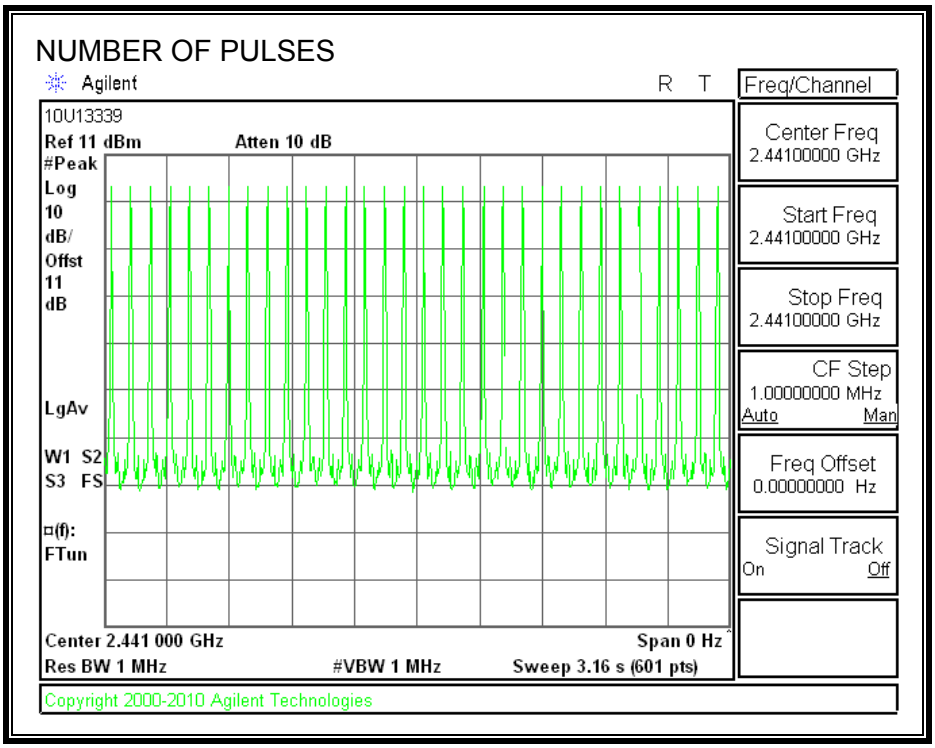
| DH Packet | Pulse Width (msec) | Number of Pulses in 3.16 seconds | Average Time of Occupancy (sec) | Limit (sec) | Margin (sec) |
|---|---|---|---|---|---|
| DH1 | 0.4003 | 32 | 0.128 | 0.4 | 0.272 |
| DH3 | 1.654 | 16 | 0.265 | 0.4 | 0.135 |
| DH5 | 2.9 | 11 | 0.319 | 0.4 | 0.081 |

**GFSK**

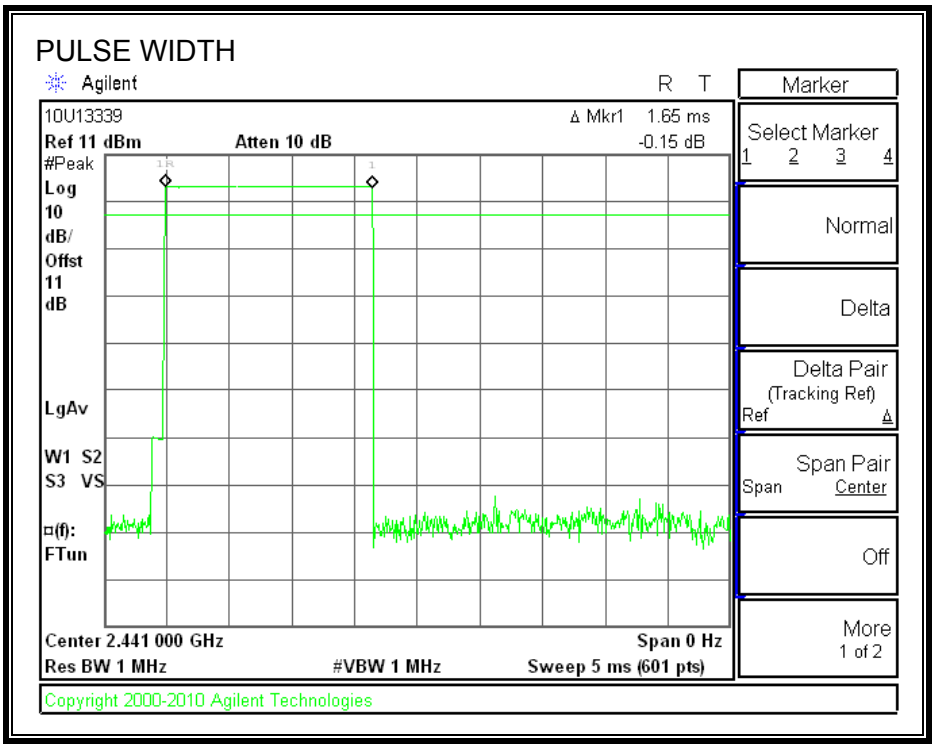
**DH1 PULSE WIDTH**



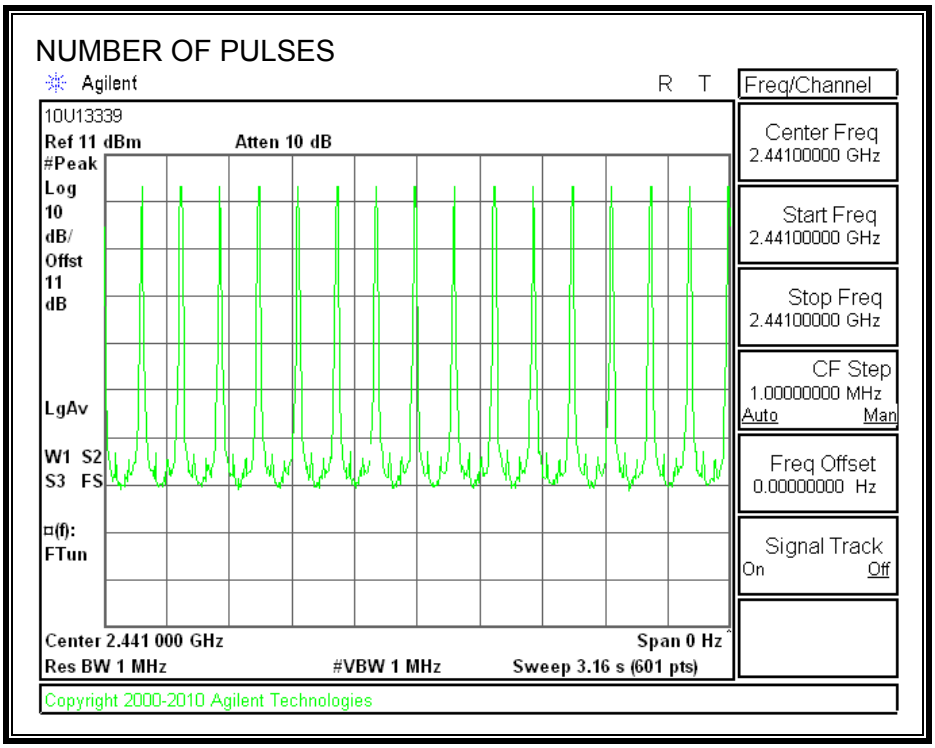
**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**



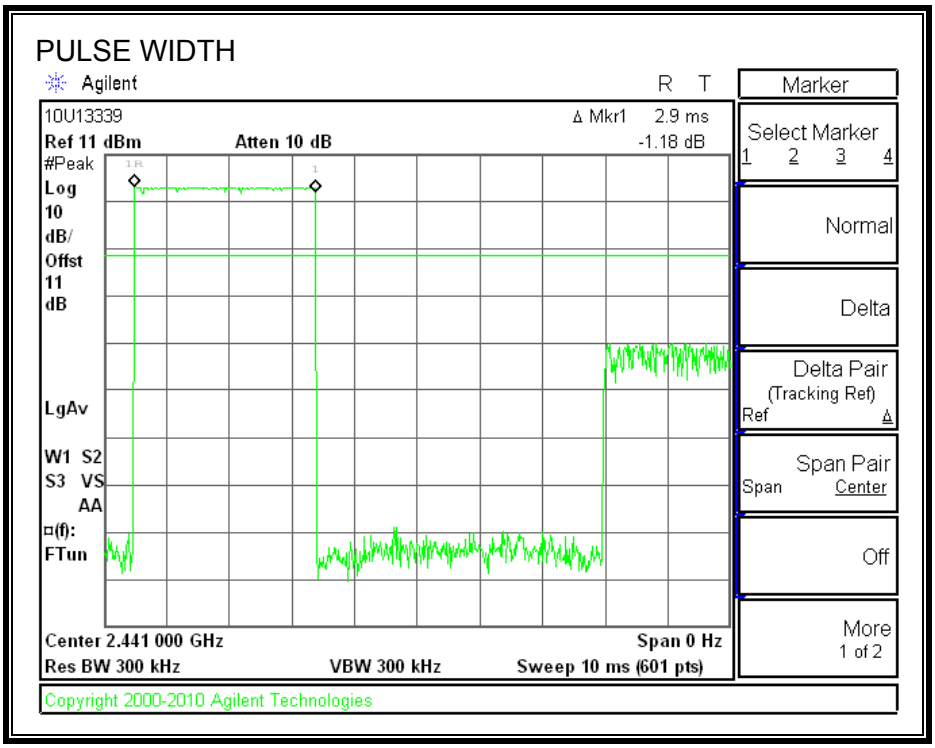
**DH3 PULSE WIDTH**



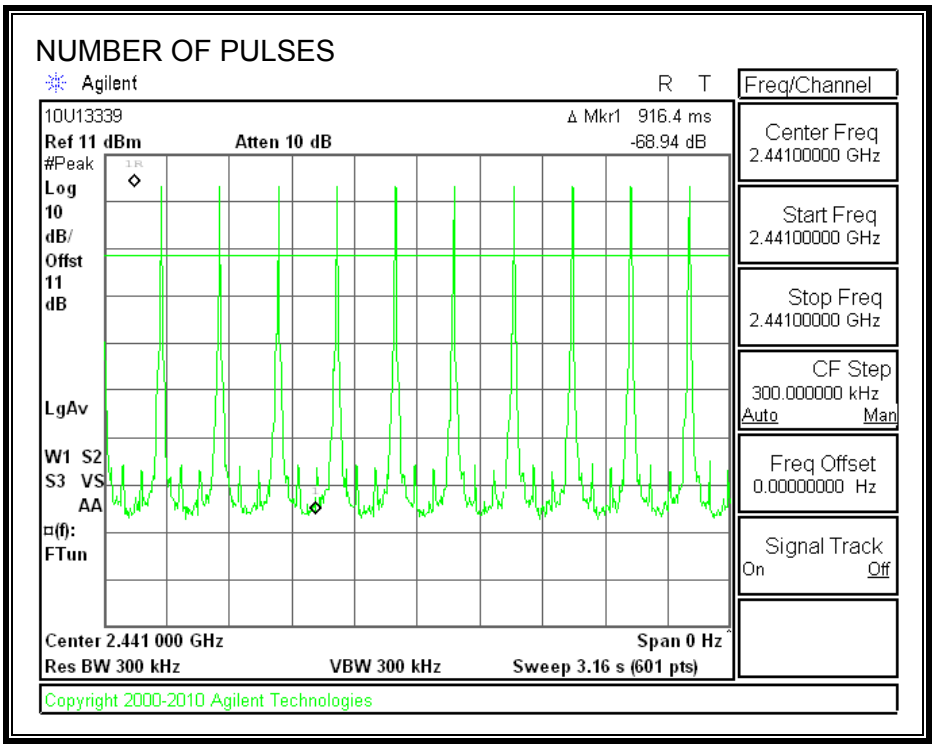
**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**



**DH5 PULSE WIDTH**

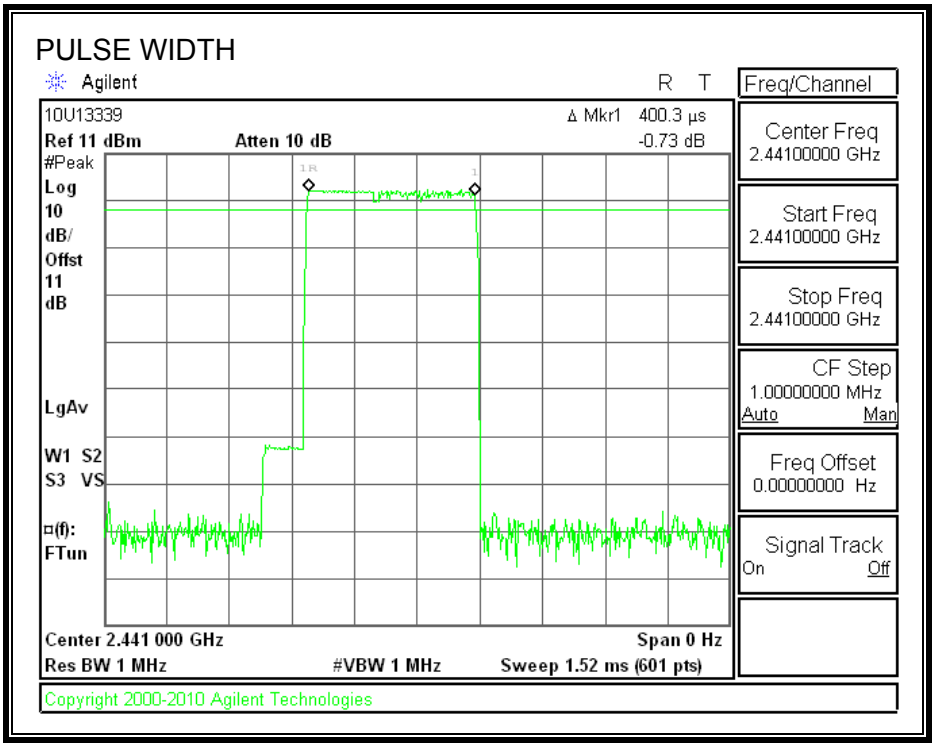


**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**

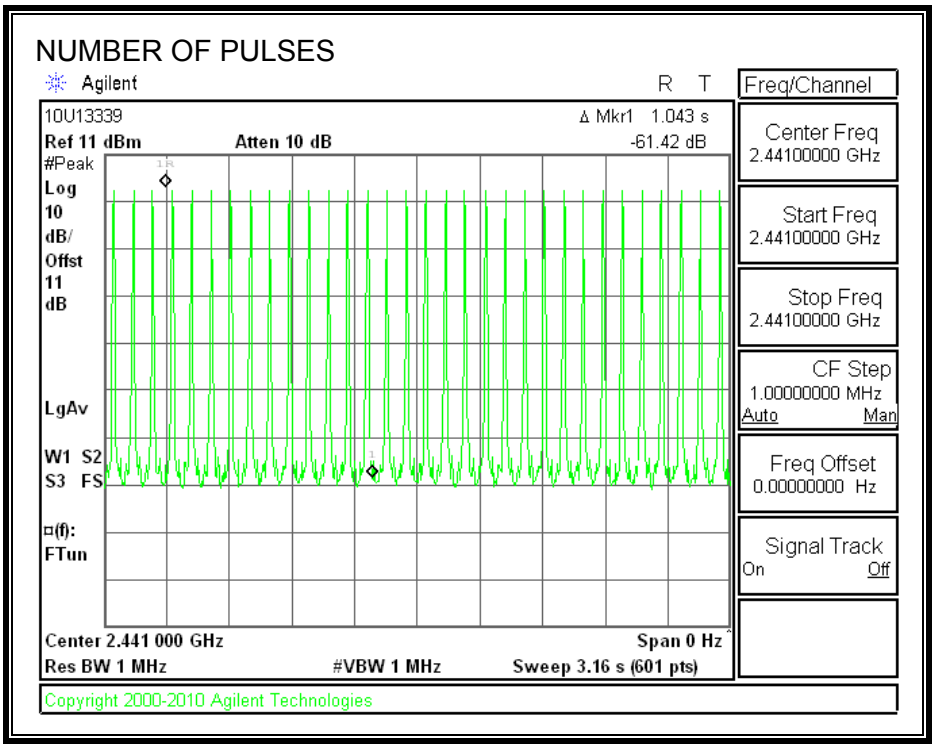


**8PSK**

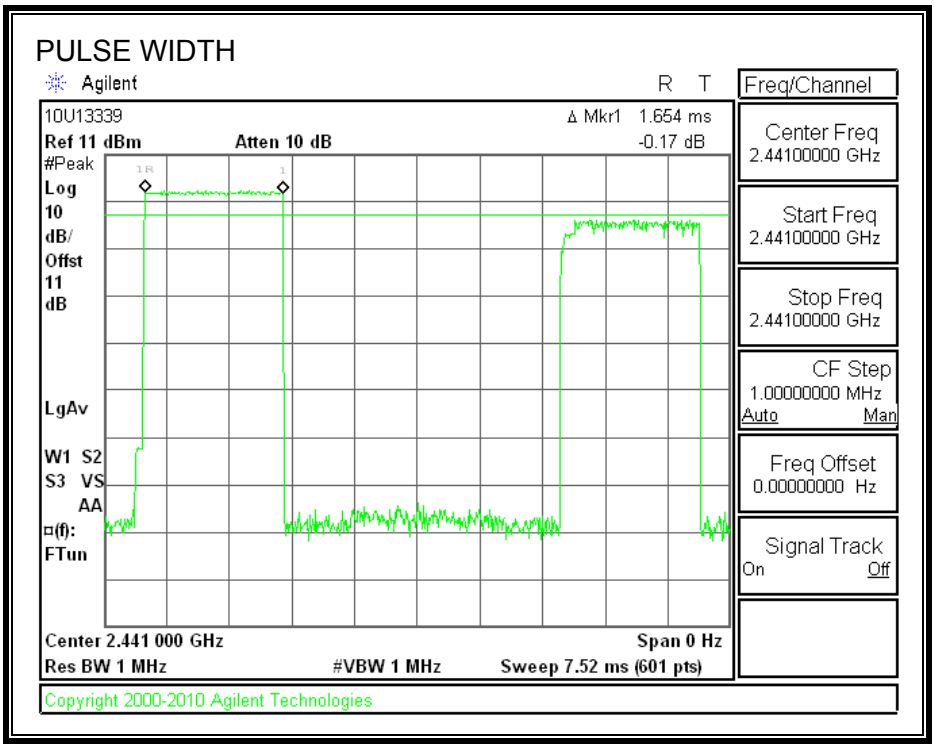
**DH1 PULSE WIDTH**



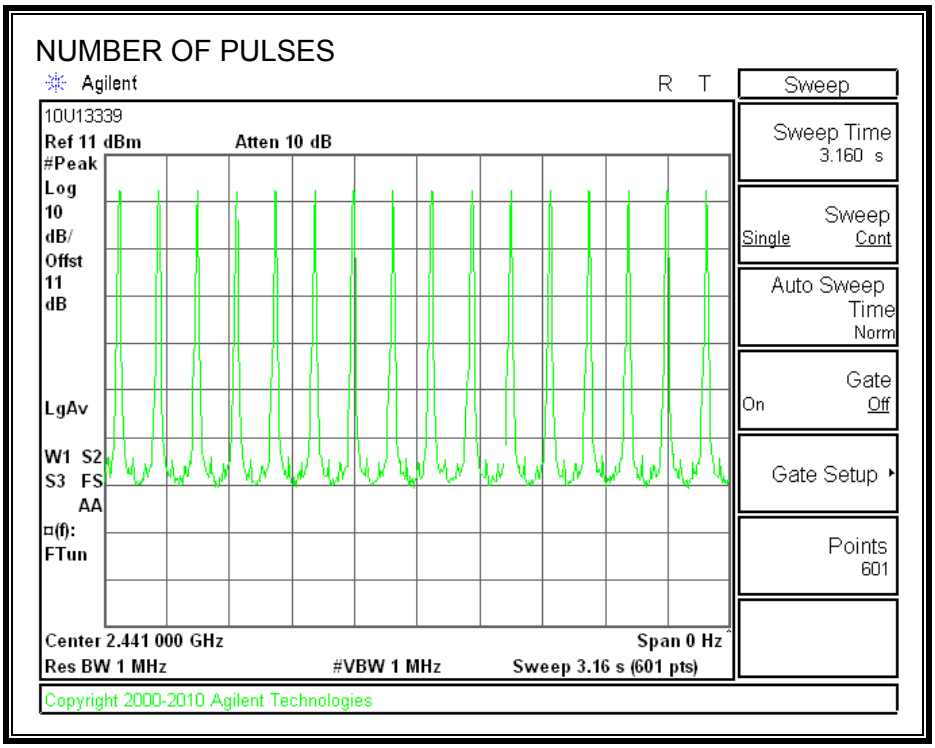
**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**



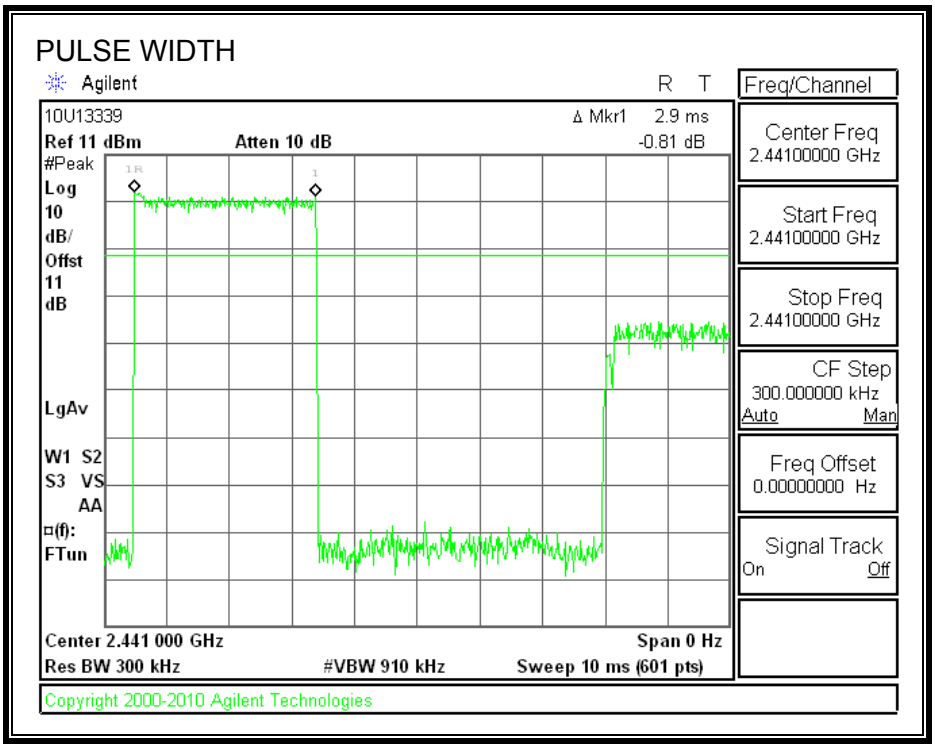
**DH3 PULSE WIDTH**



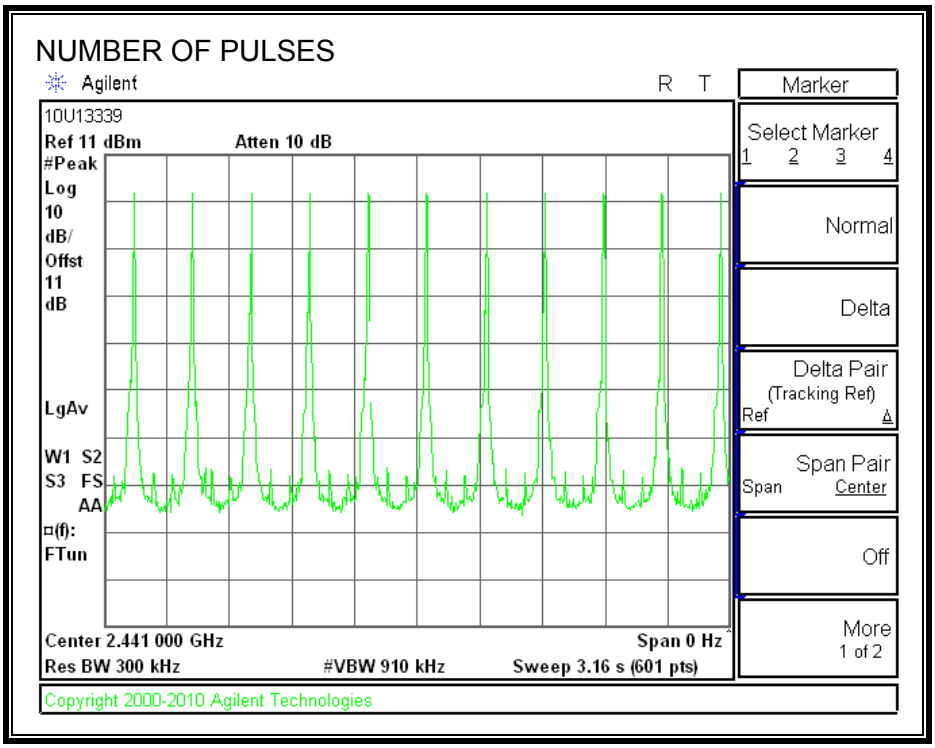
**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD**



**DH5 PULSE WIDTH**



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



# 7.2. BASIC DATA RATE GFSK MODULATION

## 7.2.1. 20 dB AND 99% BANDWIDTH

**LIMIT**

None; for reporting purposes only.

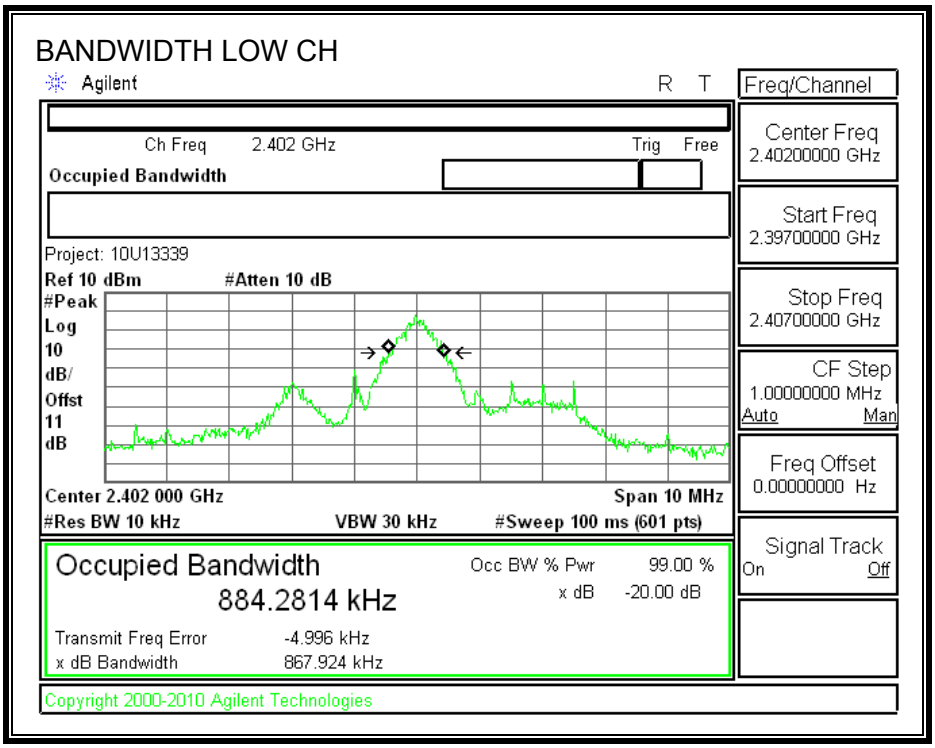
**TEST PROCEDURE**

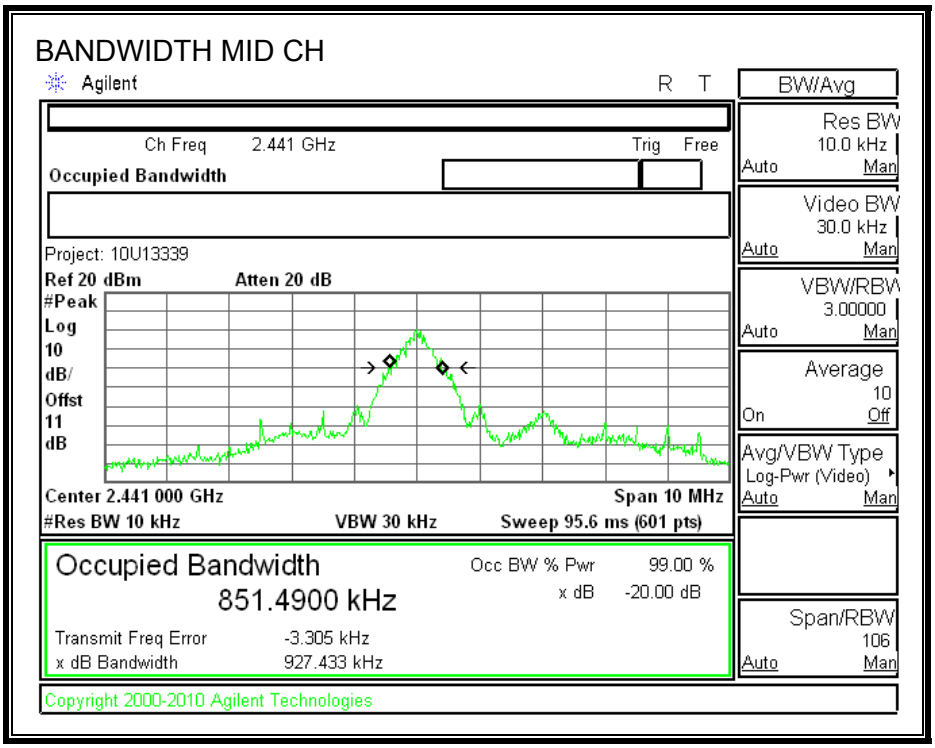
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

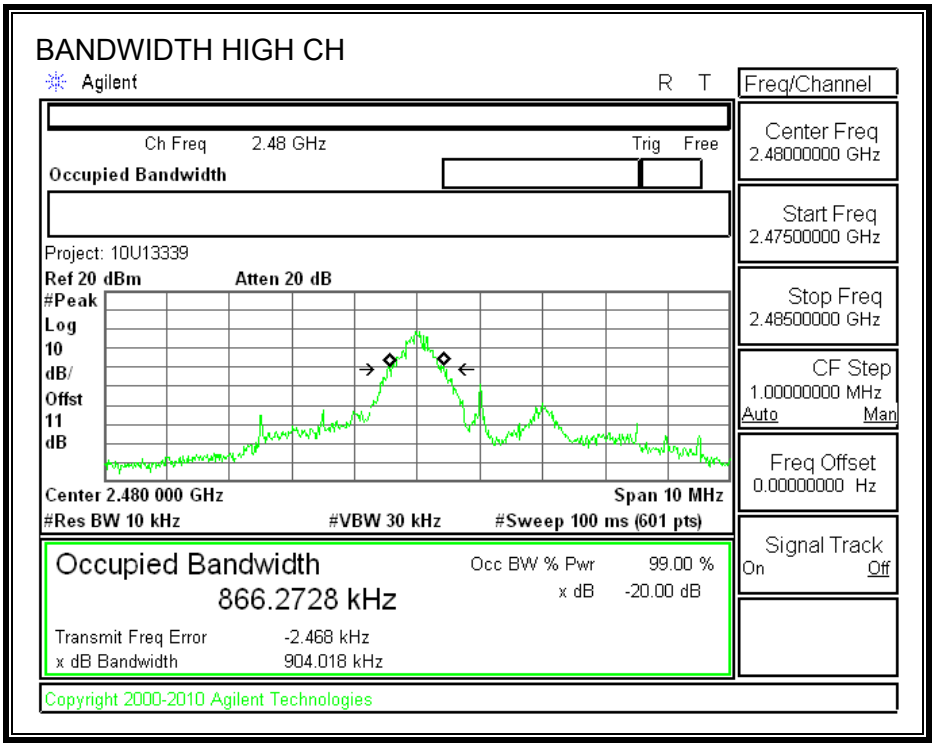
**RESULTS**

| Channel | Frequency (MHz) | 20 dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|---|
| Low | 2402 | 867.924 | 852.2999 |
| Middle | 2441 | 927.433 | 833.8830 |
| High | 2480 | 904.018 | 829.6742 |

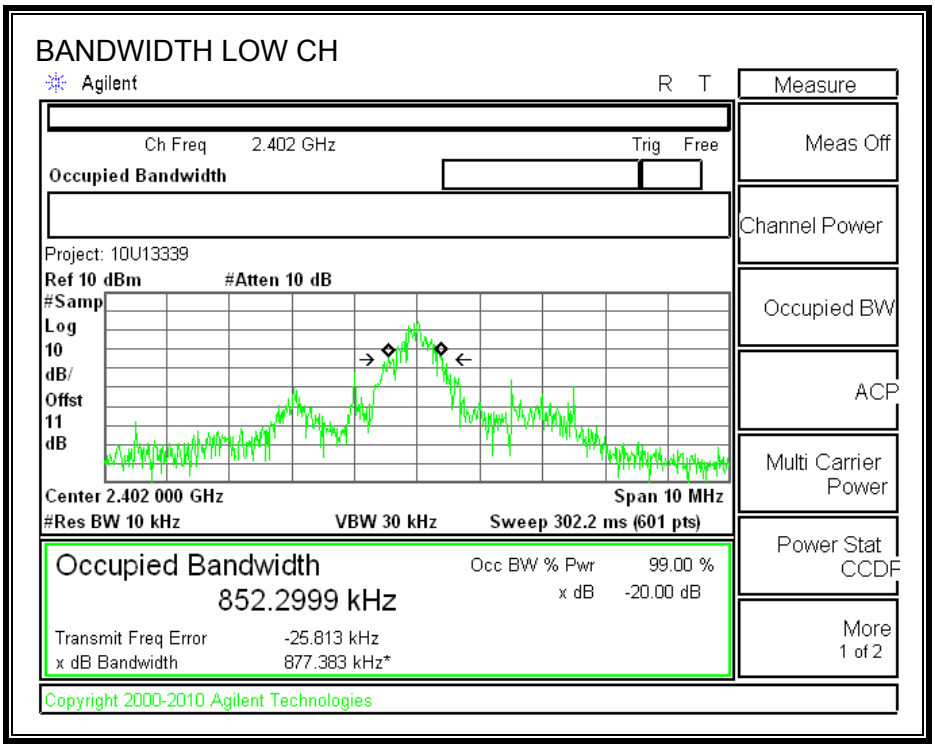
**20 dB BANDWIDTH**

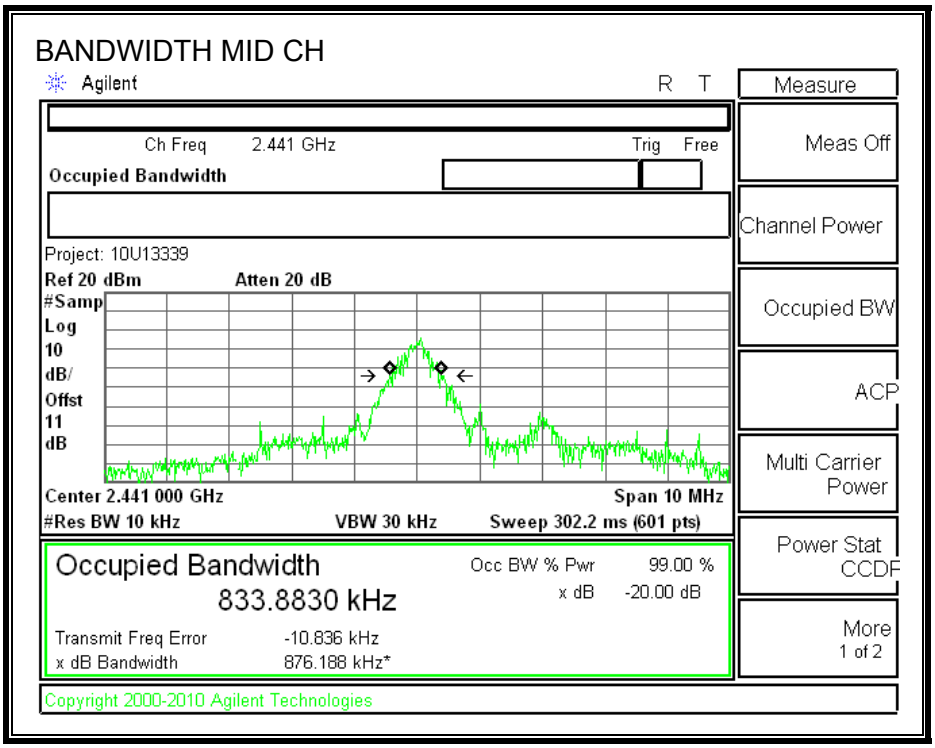


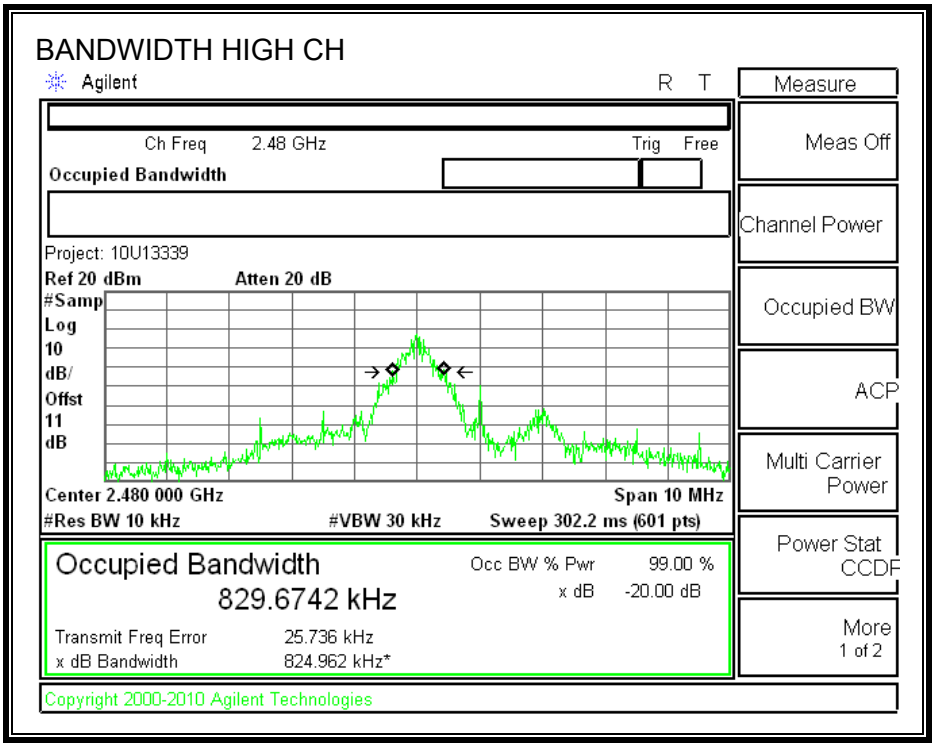





**99% BANDWIDTH**





## 7.2.2. 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.

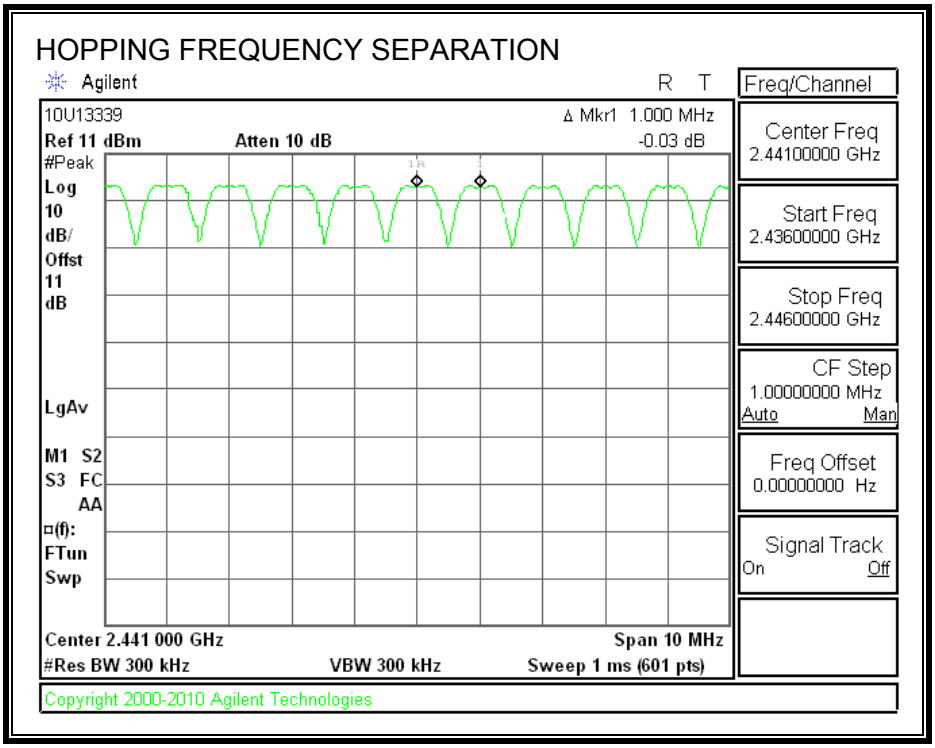
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

**TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

## RESULTS

## HOPPING FREQUENCY SEPARATION



## 7.2.3. 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 non-overlapping channels.

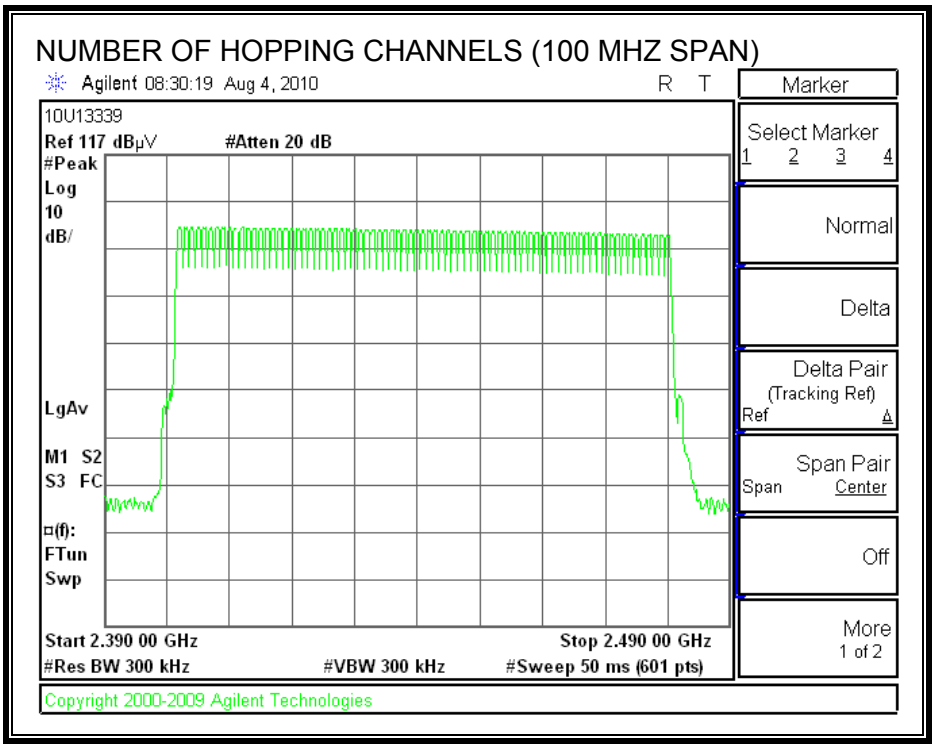
**TEST PROCEDURE**

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.

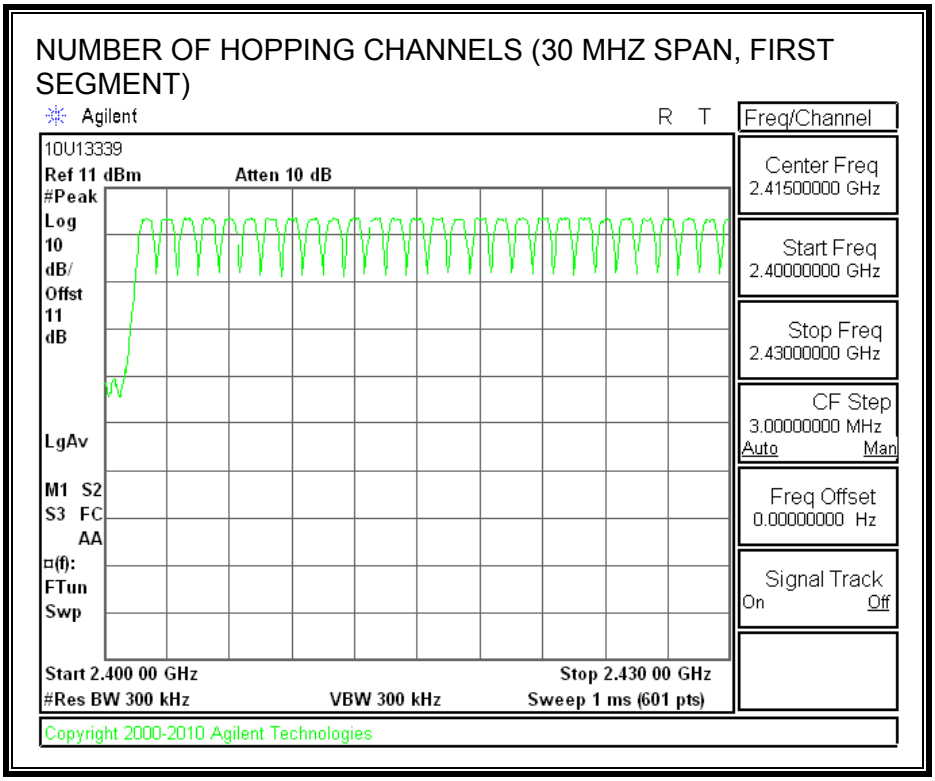
**RESULTS**

79 Channels observed.

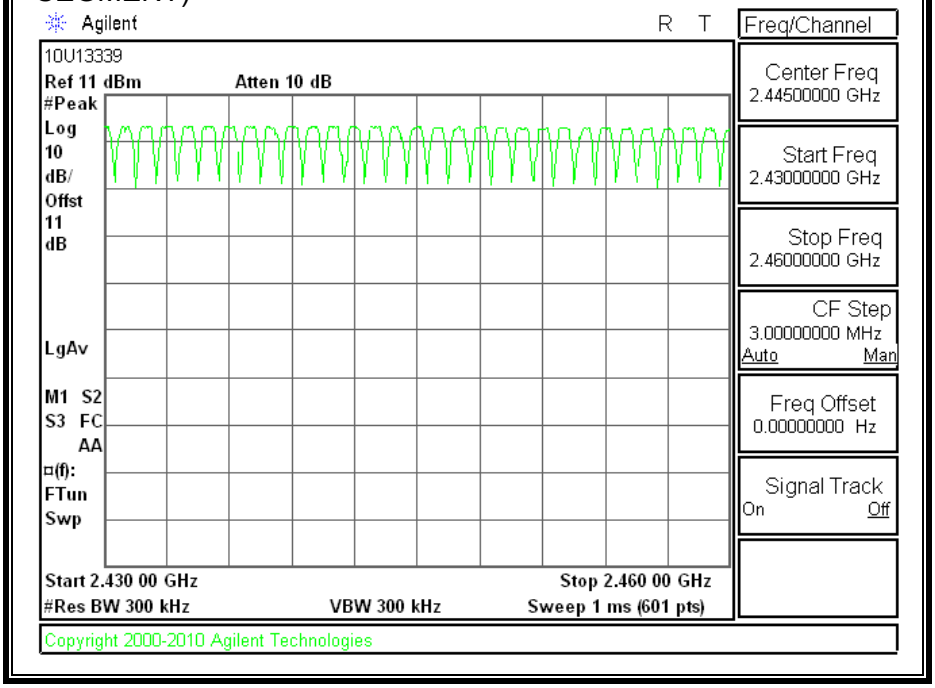
**NUMBER OF HOPPING CHANNELS**



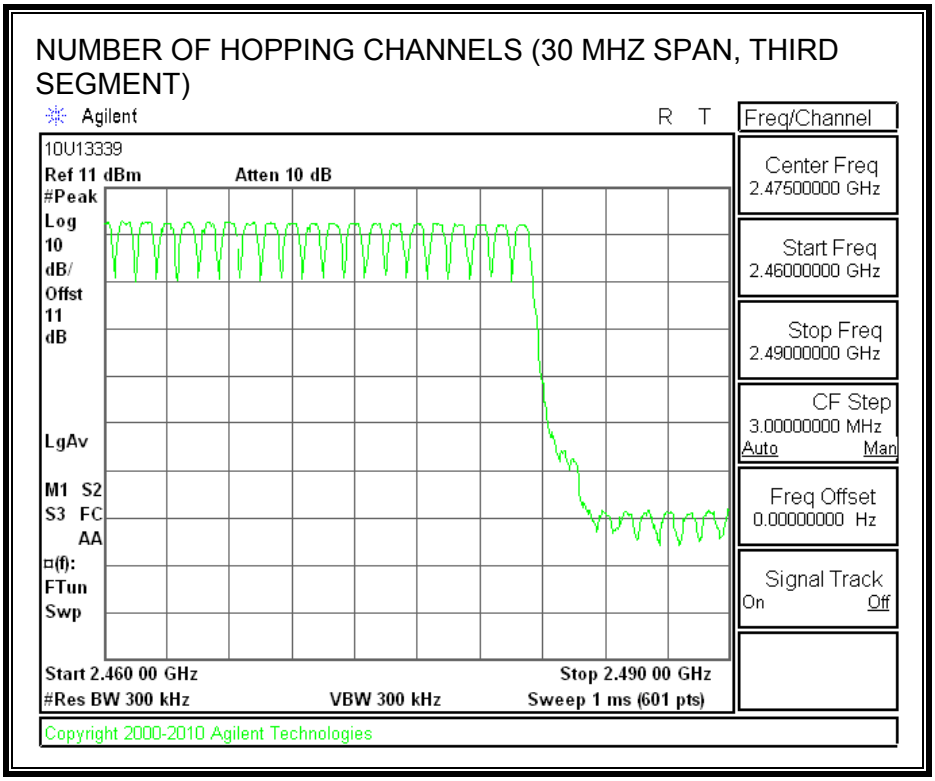
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



## 7.2.4. OUTPUT POWER

**LIMIT**

§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.

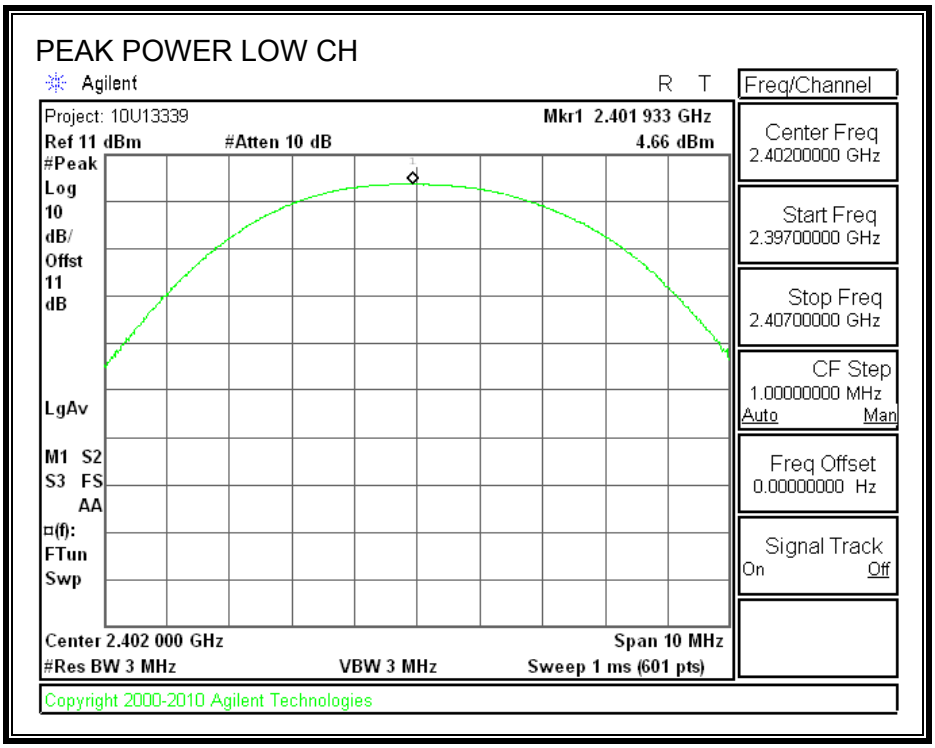
**TEST PROCEDURE**

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.

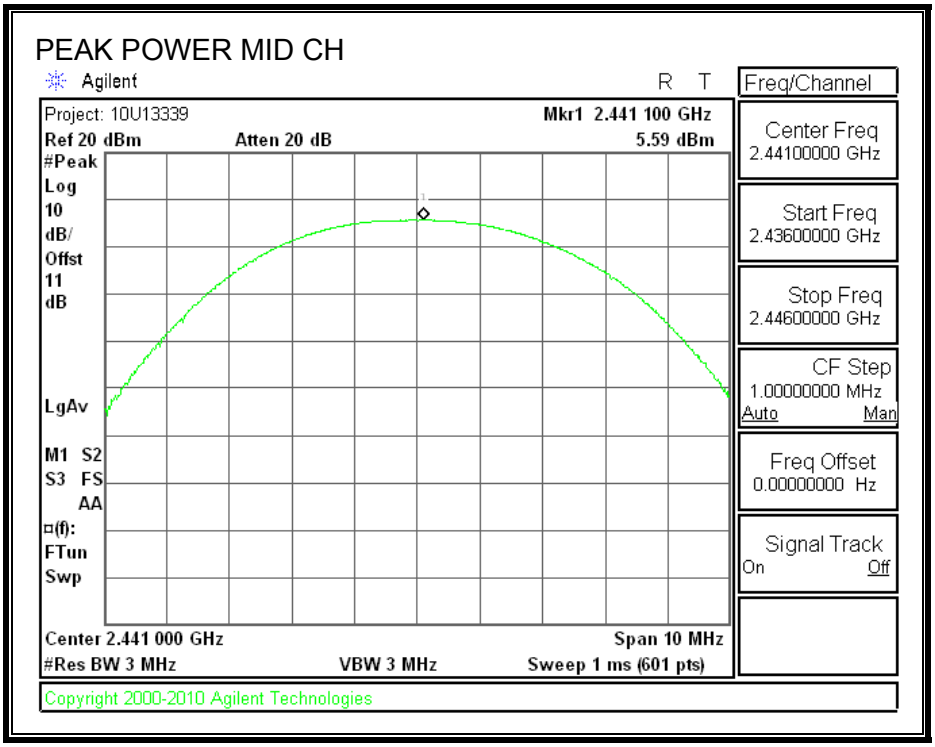
**RESULTS**

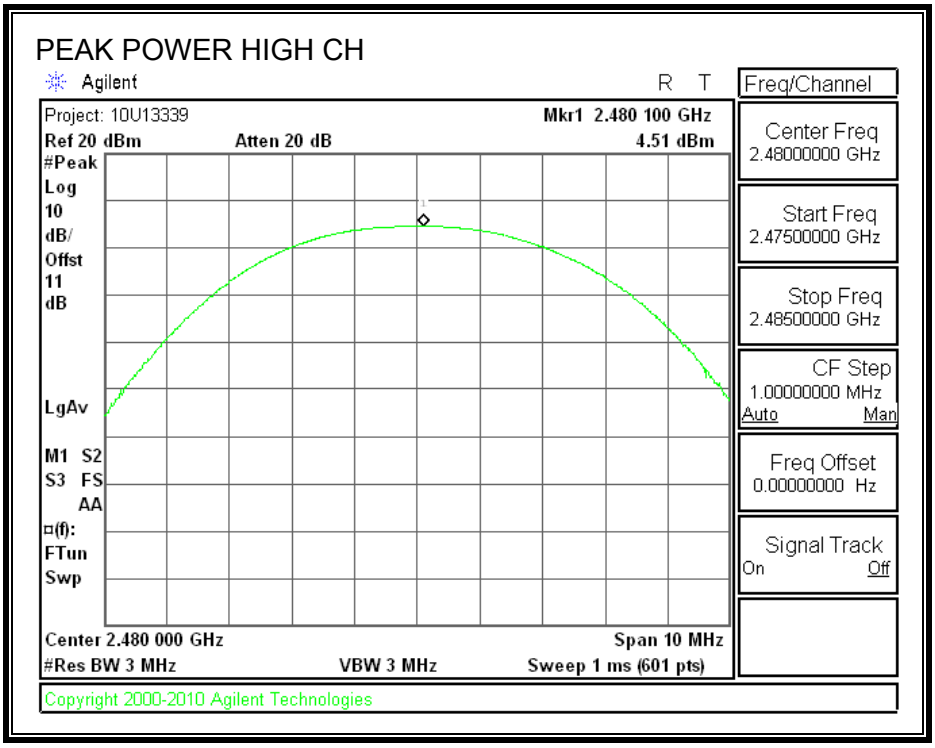
| Channel | Frequency (MHz) | Output Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 4.66 | 30 | -25.34 |
| Middle | 2441 | 5.59 | 30 | -24.41 |
| High | 2480 | 4.51 | 30 | -25.49 |

**OUTPUT POWER**



PEAK POWER MID CH





## 7.2.5. AVERAGE POWER

**LIMIT**

None; for reporting purposes only.

**TEST PROCEDURE**

The transmitter output is connected to a power meter.

**RESULTS**

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2402 | 4.20 |
| Middle | 2441 | 5.48 |
| High | 2480 | 4.50 |

## 7.2.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

**TEST PROCEDURE**

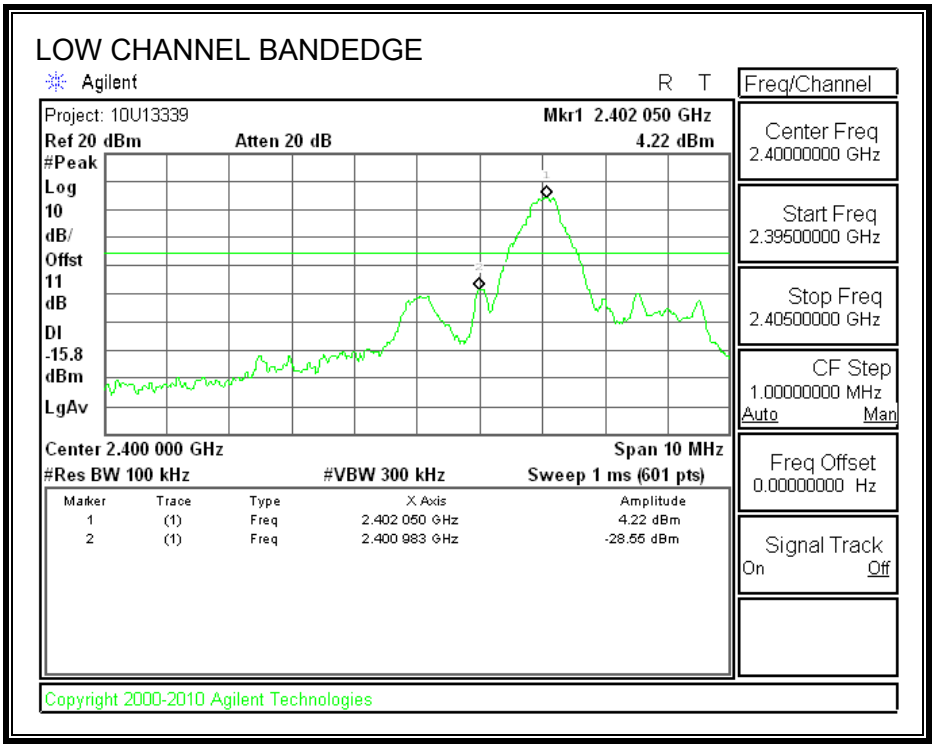
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

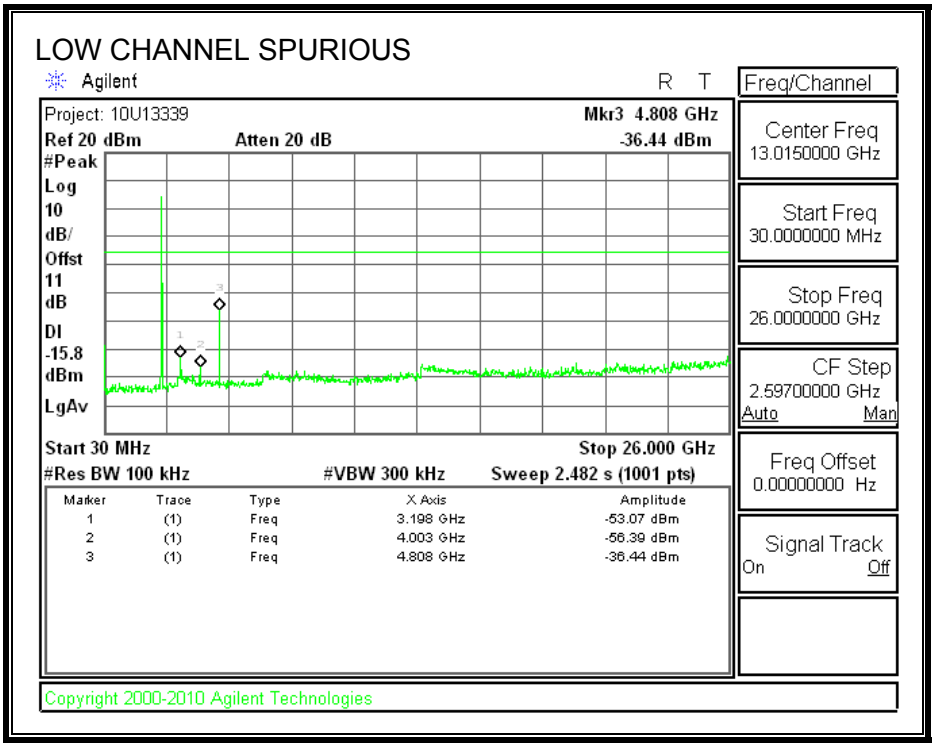
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

## RESULTS

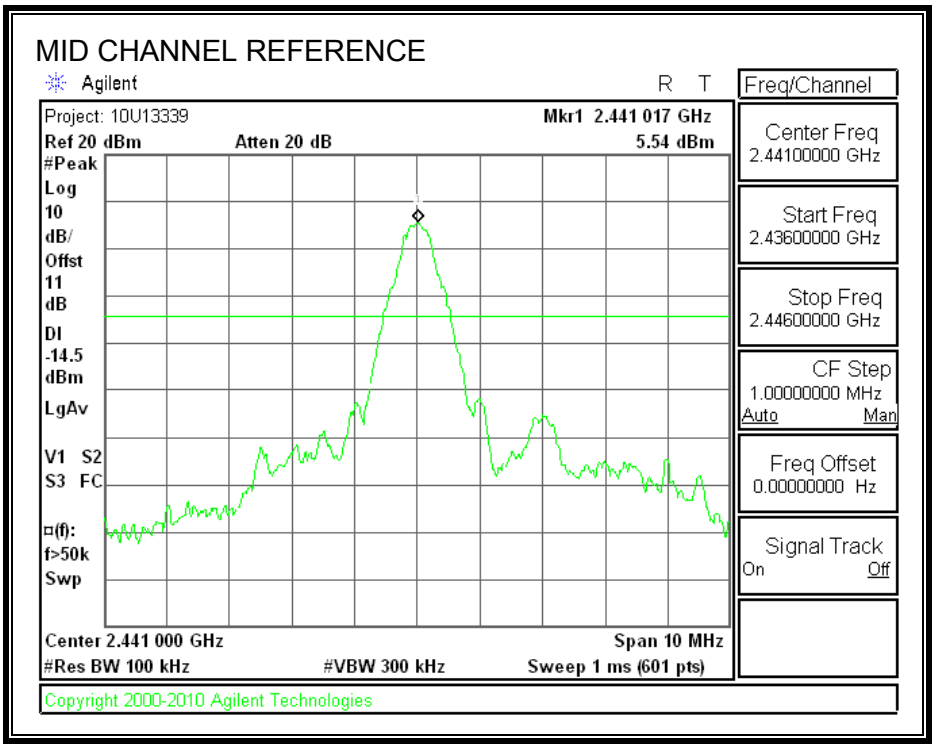
## SPURIOUS EMISSIONS, LOW CHANNEL

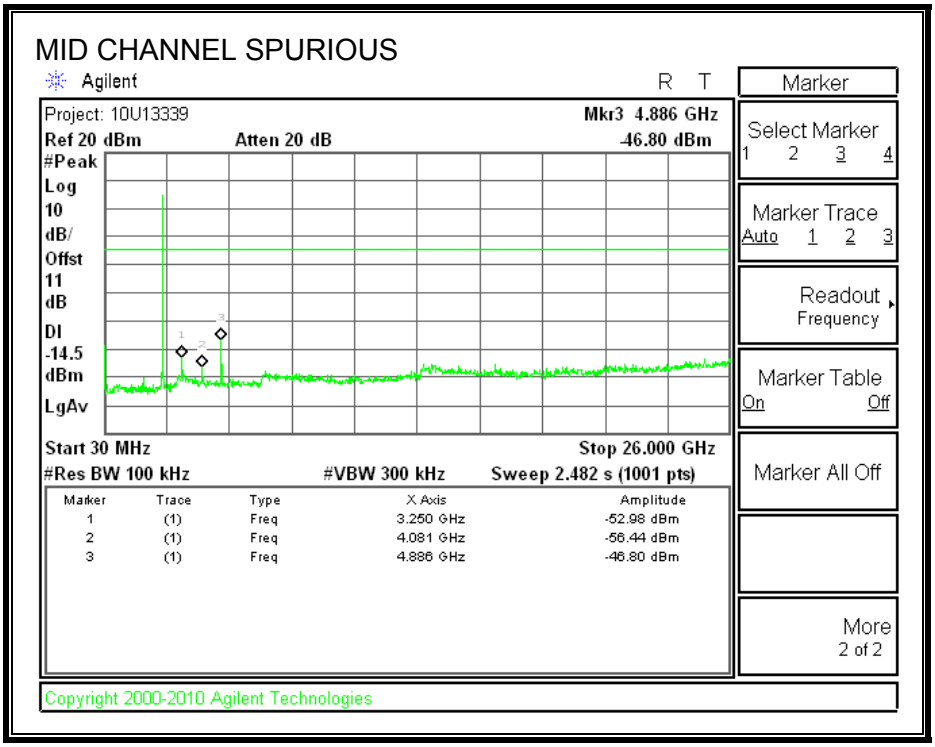


LOW CHANNEL SPURIOUS

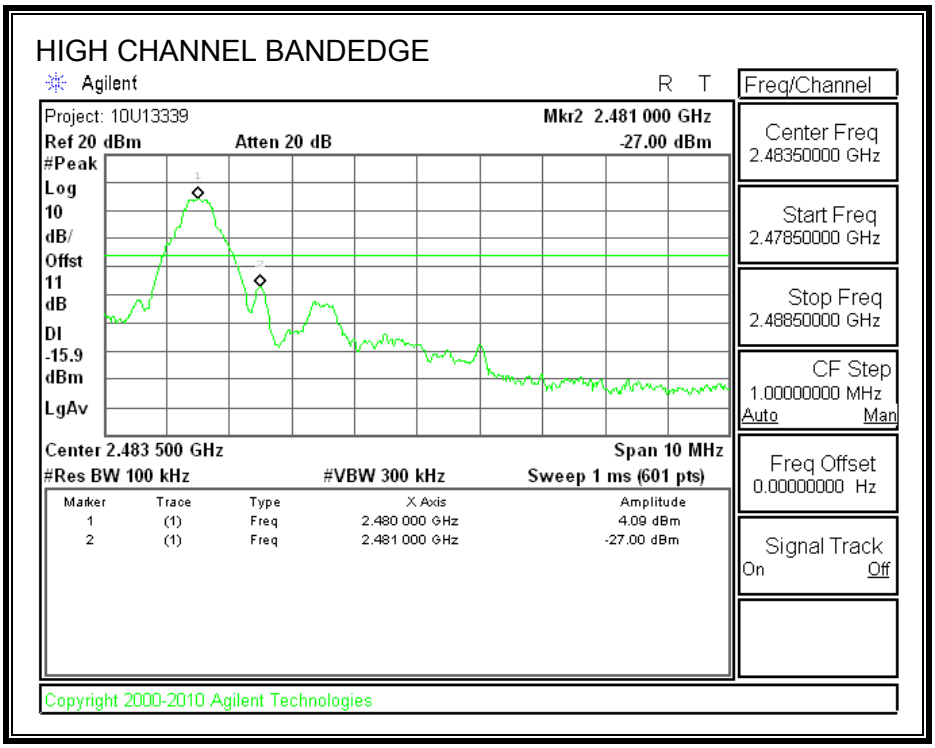


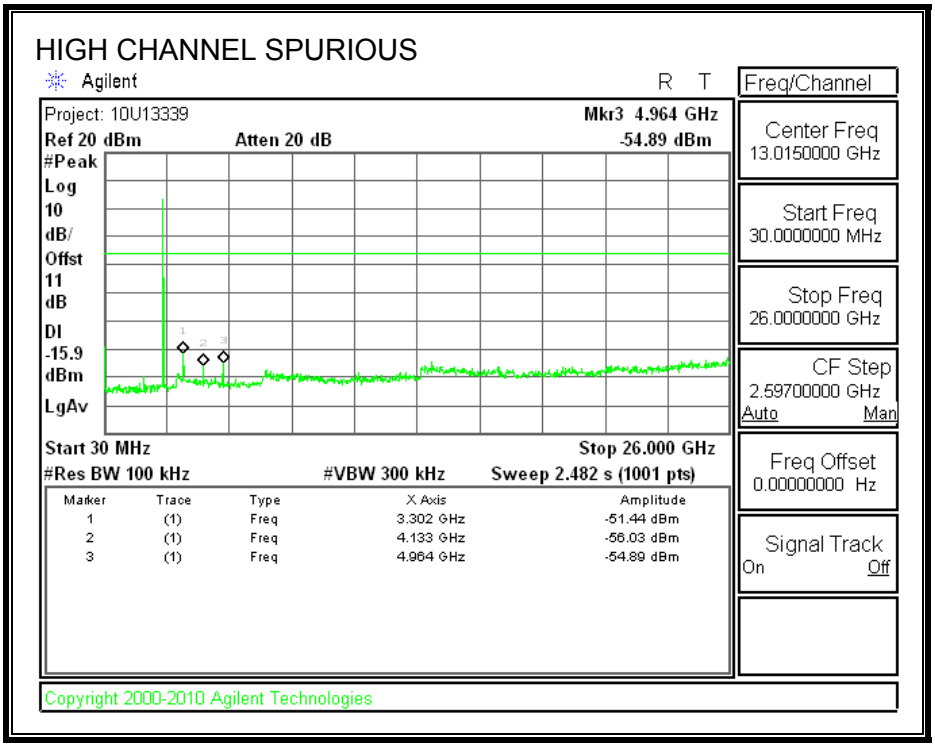
**SPURIOUS EMISSIONS, MID CHANNEL**



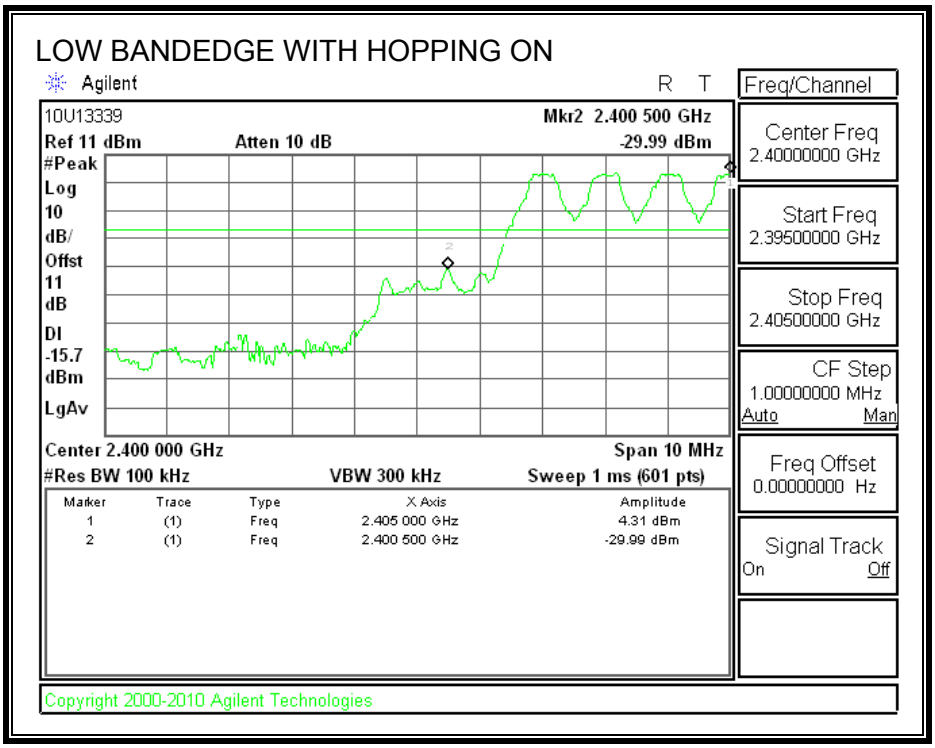


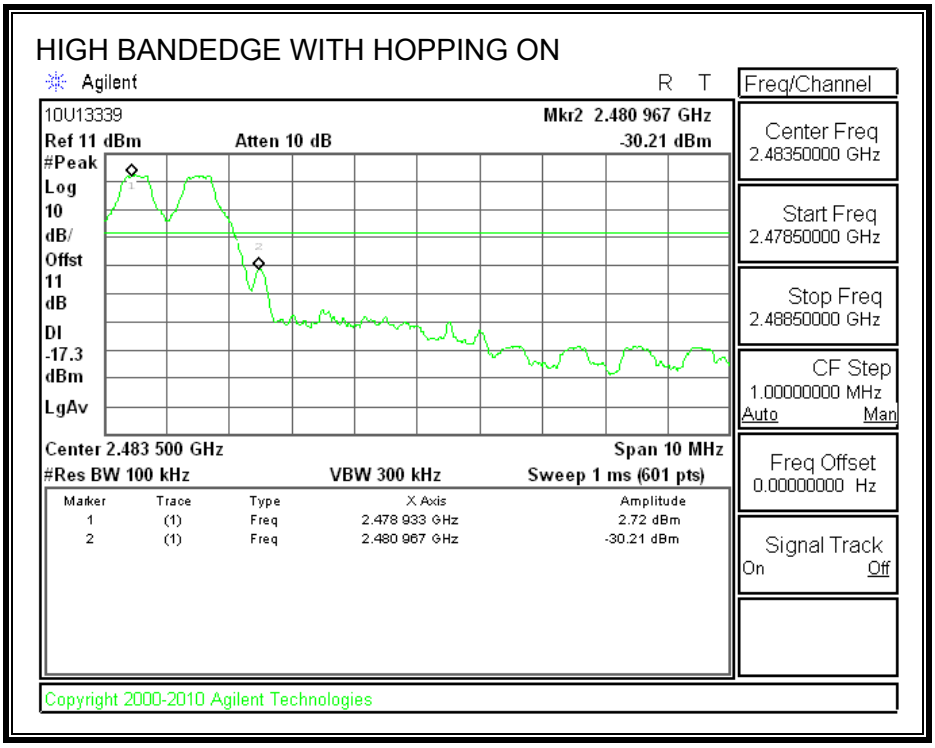
**SPURIOUS EMISSIONS, HIGH CHANNEL**





**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**





# 7.3. ENHANCED DATA RATE 8PSK MODULATION

## 7.3.1. 20 dB AND 99% BANDWIDTH

**LIMIT**

None; for reporting purposes only.

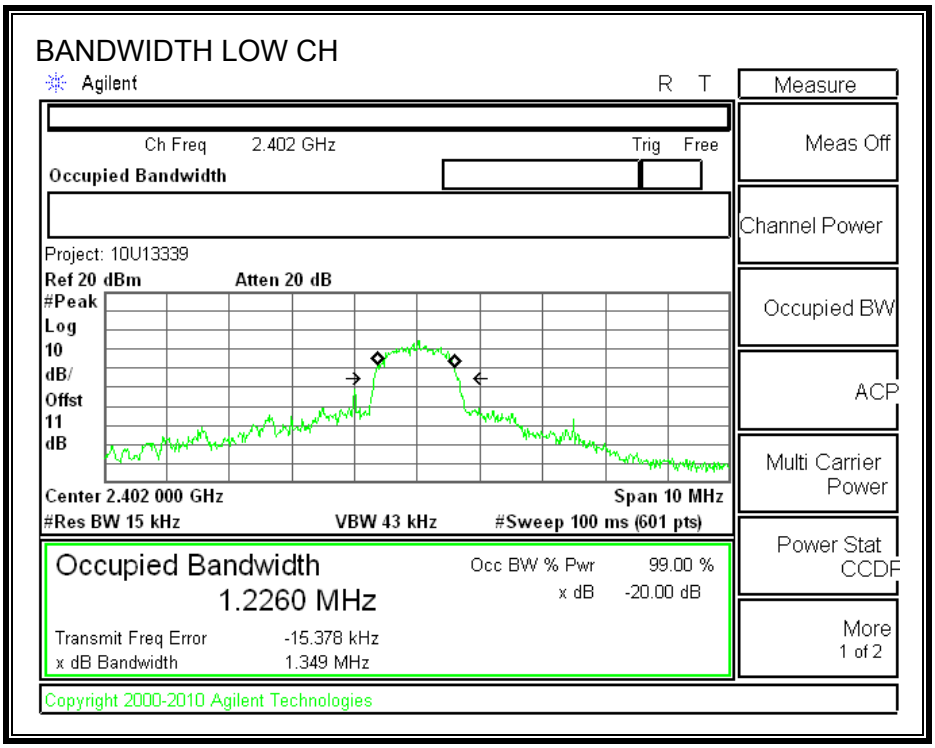
**TEST PROCEDURE**

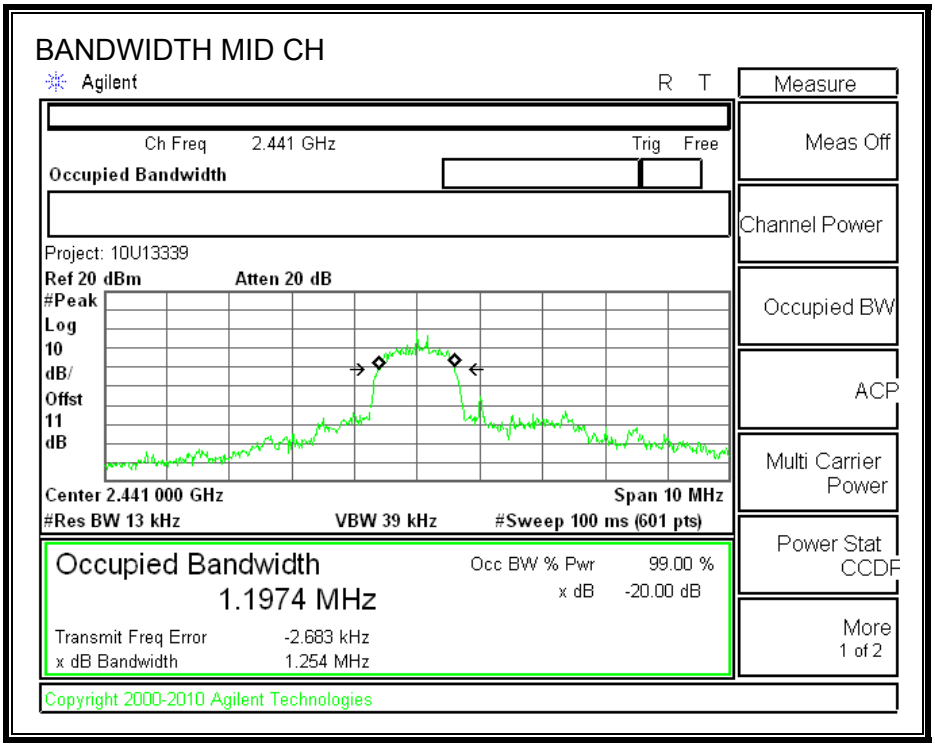
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

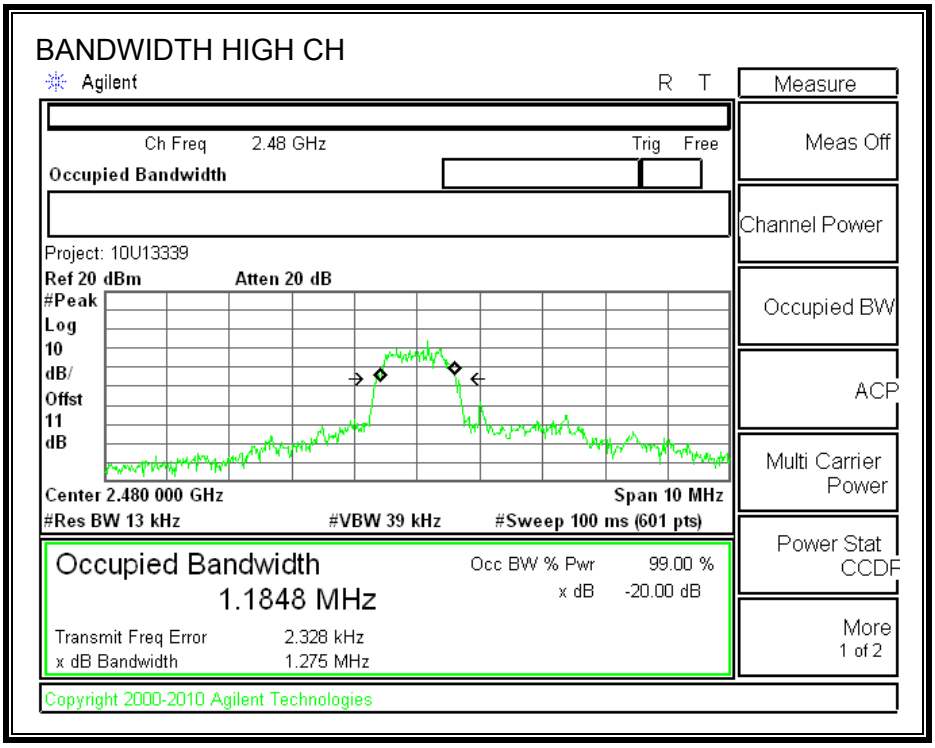
**RESULTS**

| Channel | Frequency (MHz) | 20 dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|---|
| Low | 2402 | 1349 | 1204.9 |
| Middle | 2441 | 1254 | 1216.7 |
| High | 2480 | 1275 | 1197.1 |

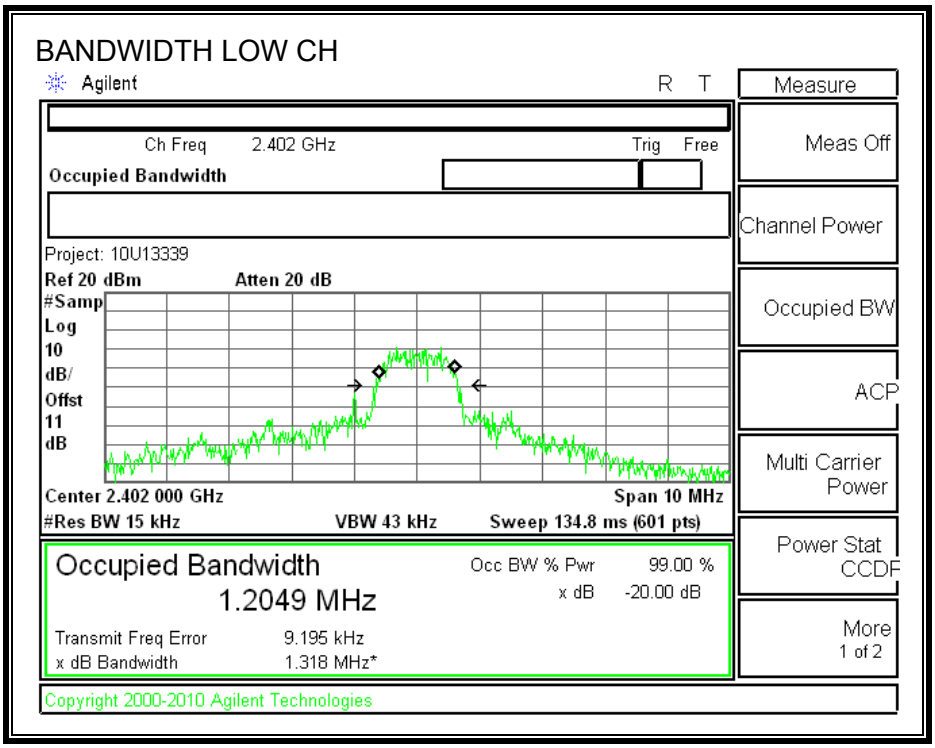
**20 dB BANDWIDTH**

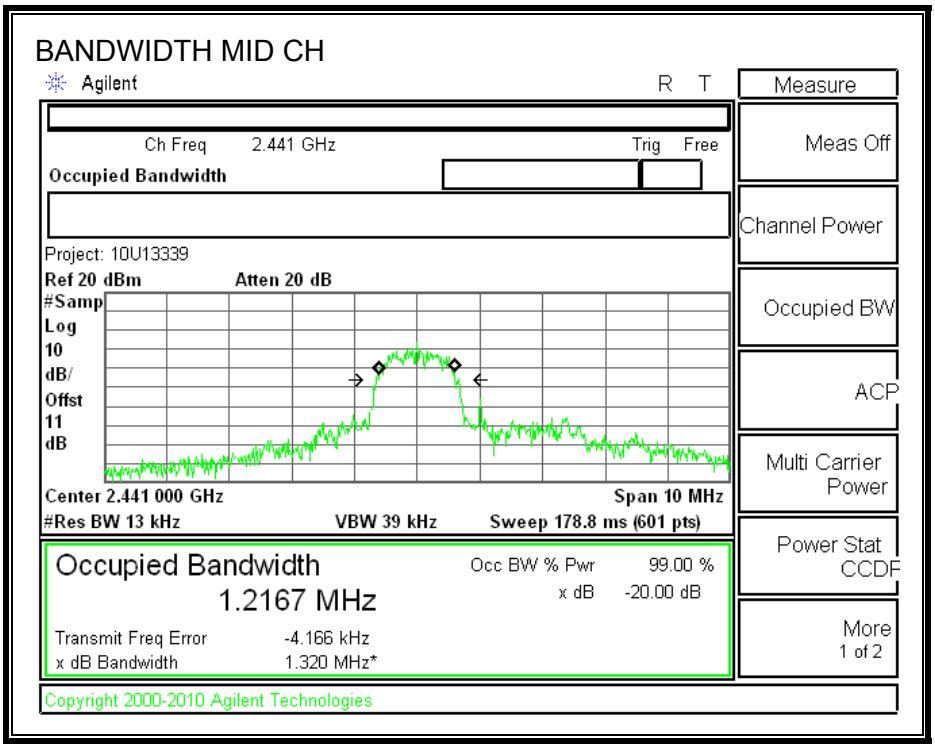


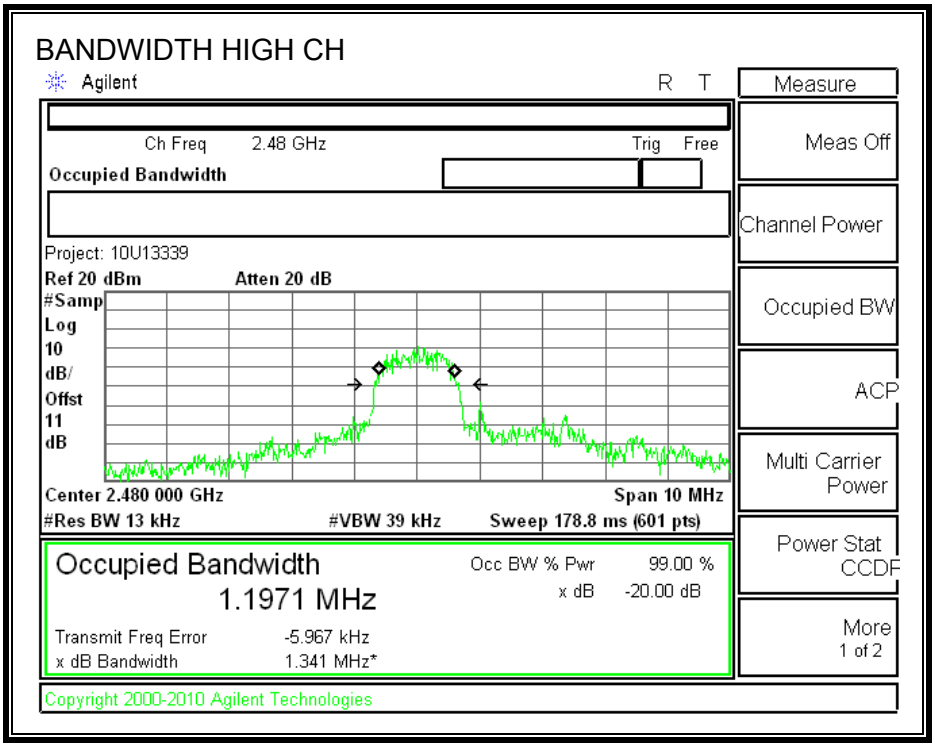





**99% BANDWIDTH**





## 7.3.2. 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.

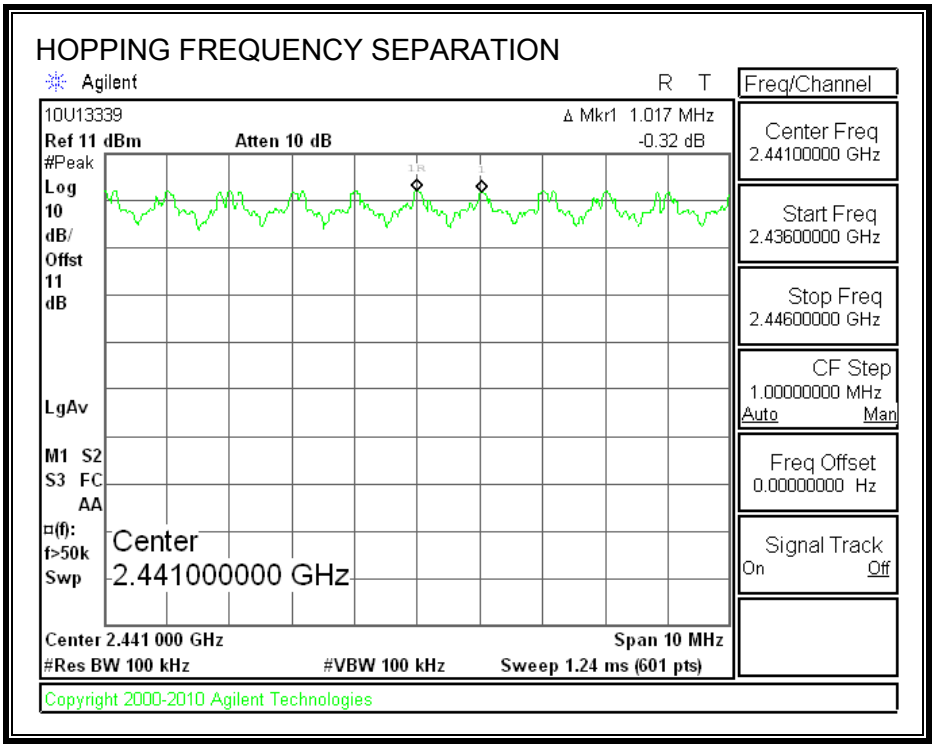
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



## 7.3.3. 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 non-overlapping channels.

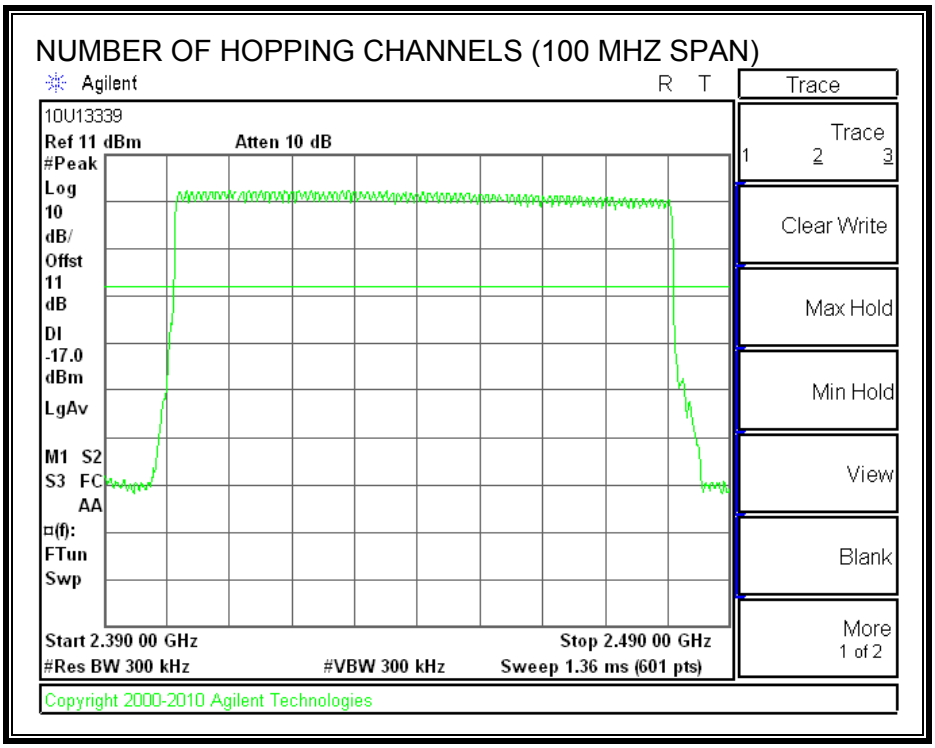
**TEST PROCEDURE**

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.

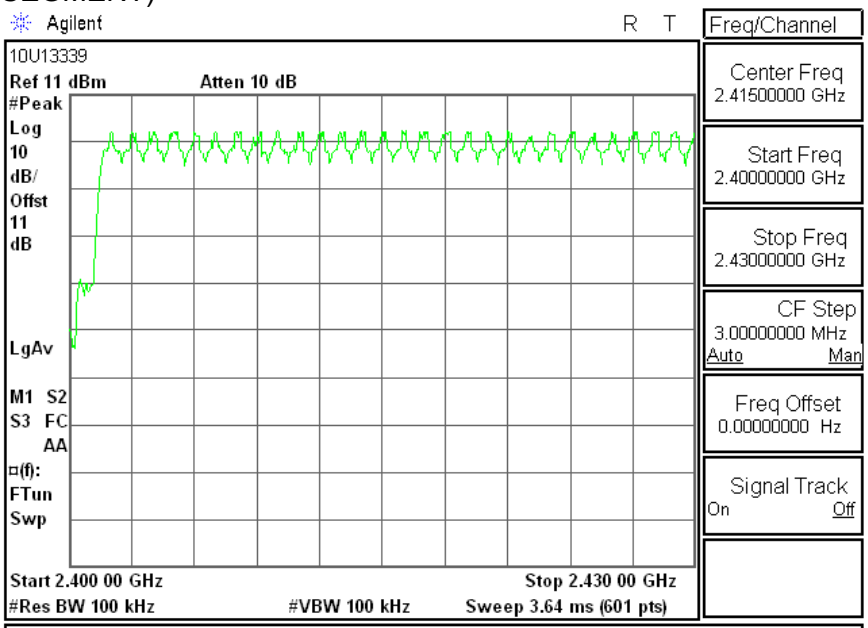
**RESULTS**

79 Channels observed.

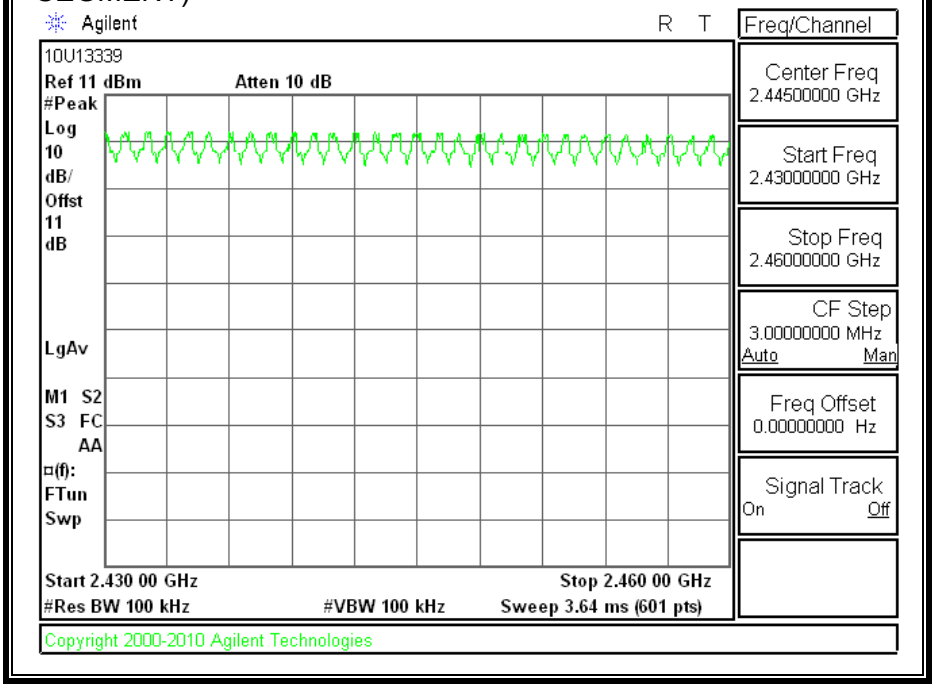
**NUMBER OF HOPPING CHANNELS**



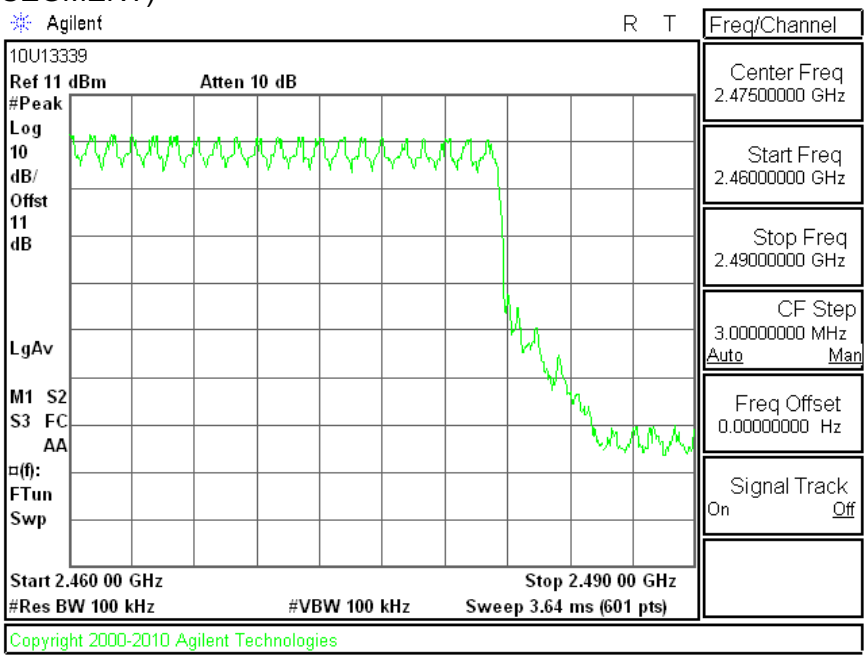
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



## 7.3.4. OUTPUT POWER

**LIMIT**

§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.

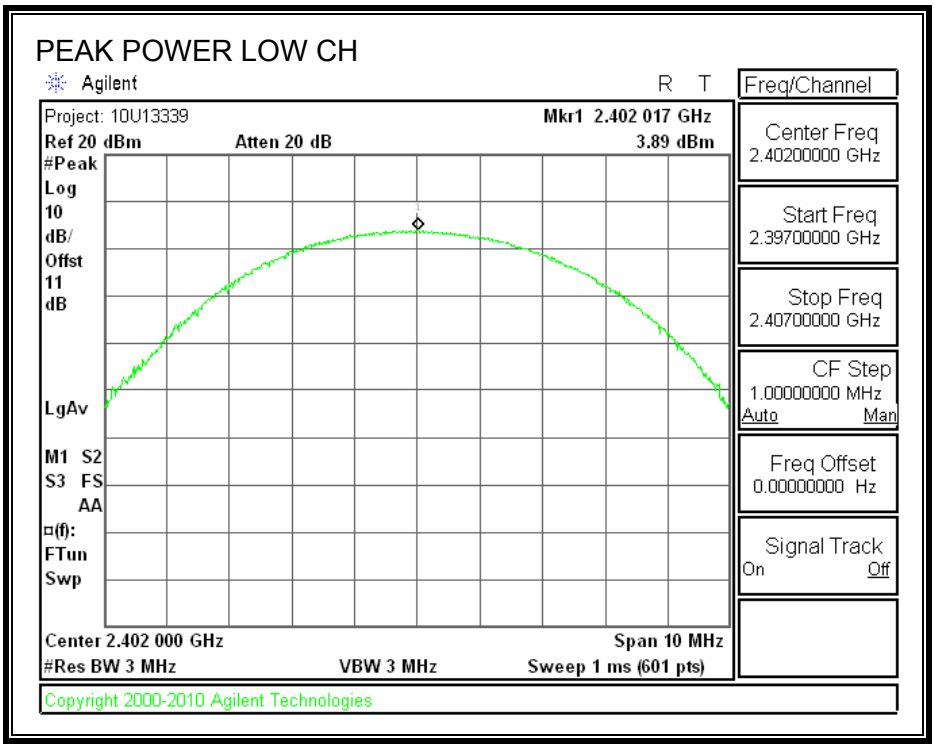
**TEST PROCEDURE**

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.

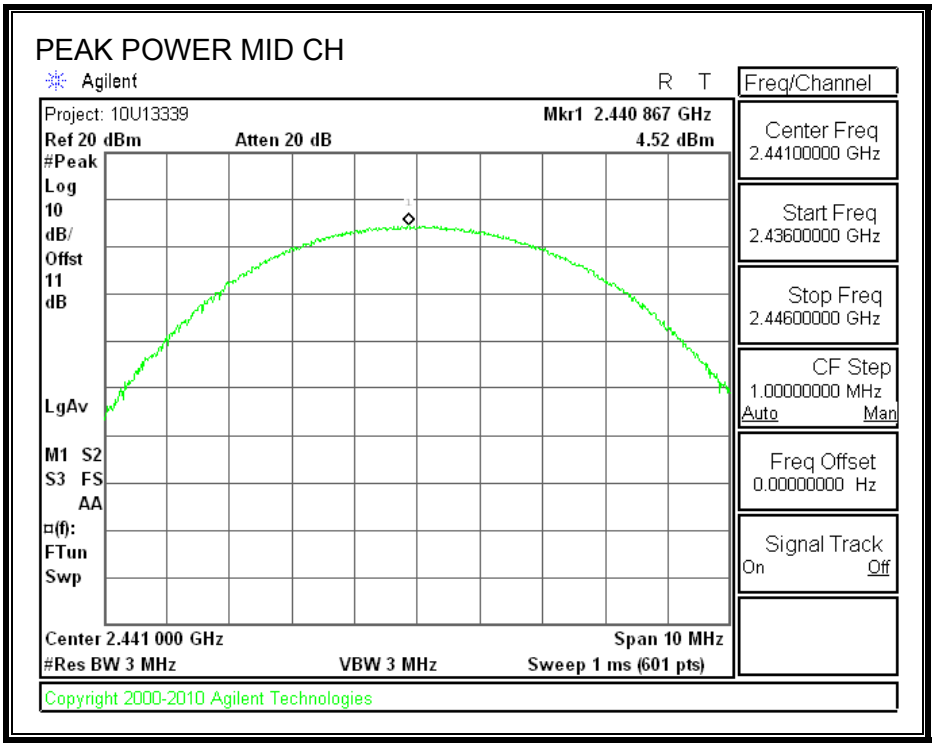
**RESULTS**

| Channel | Frequency (MHz) | Output Power (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|
| Low | 2402 | 3.89 | 30 | -26.11 |
| Middle | 2441 | 4.52 | 30 | -25.48 |
| High | 2480 | 2.97 | 30 | -27.03 |

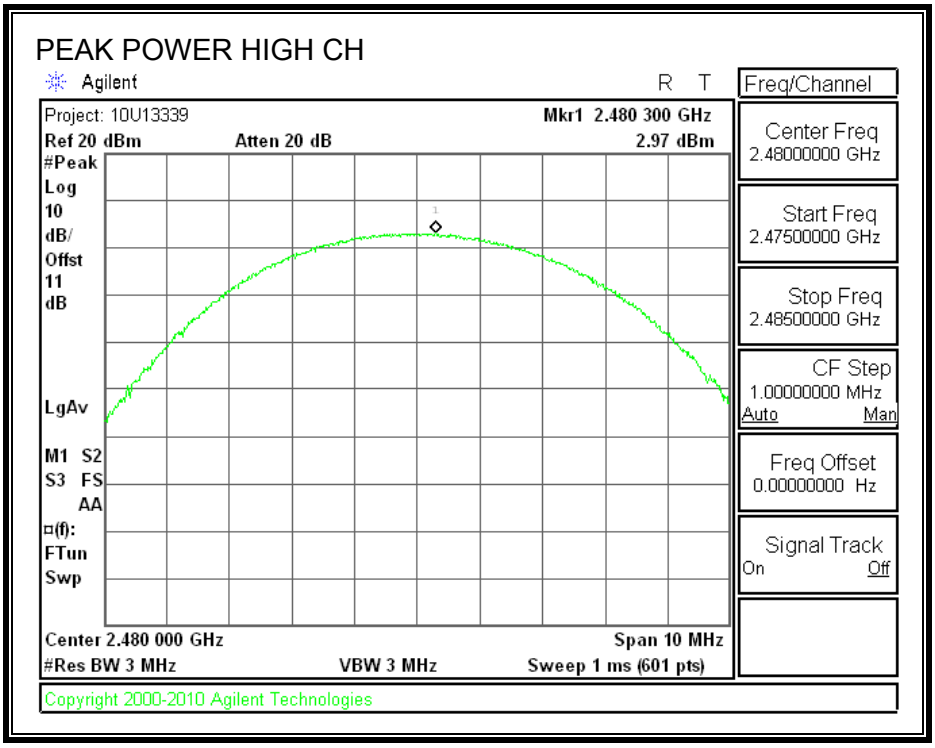
**OUTPUT POWER**



PEAK POWER MID CH



PEAK POWER HIGH CH



## 7.3.5. AVERAGE POWER

**LIMIT**

None; for reporting purposes only.

**TEST PROCEDURE**

The transmitter output is connected to a power meter.

**RESULTS**

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

| Channel | Frequency (MHz) | Average Power (dBm) |
|---|---|---|
| Low | 2402 | 2.90 |
| Middle | 2441 | 3.24 |
| High | 2480 | 1.65 |

## 7.3.6. CONDUCTED SPURIOUS EMISSIONS

**LIMITS**

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

**TEST PROCEDURE**

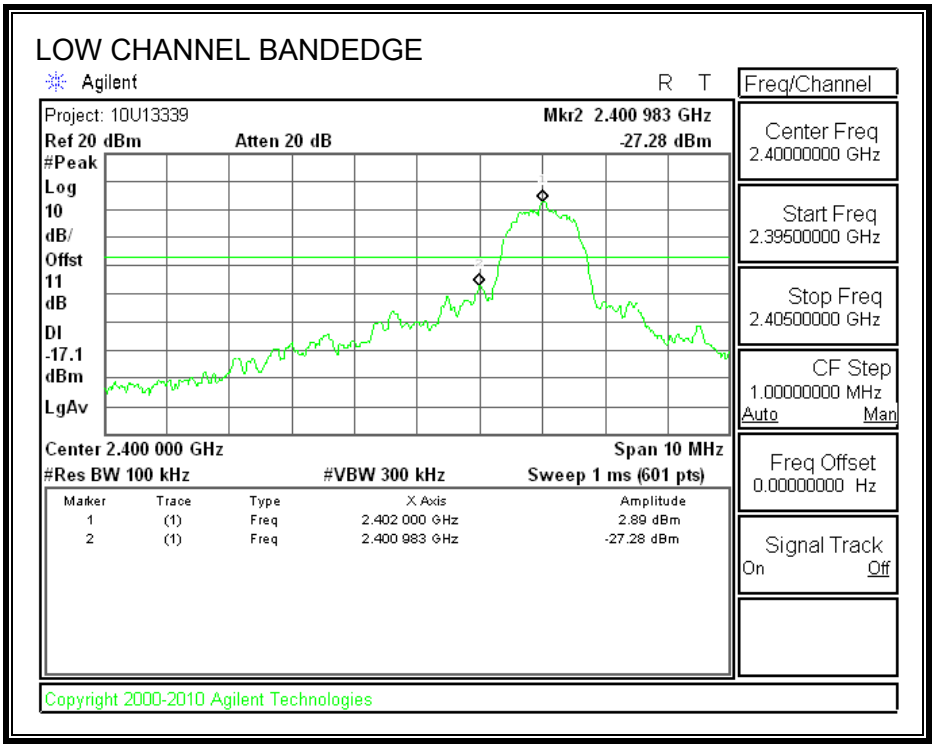
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

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

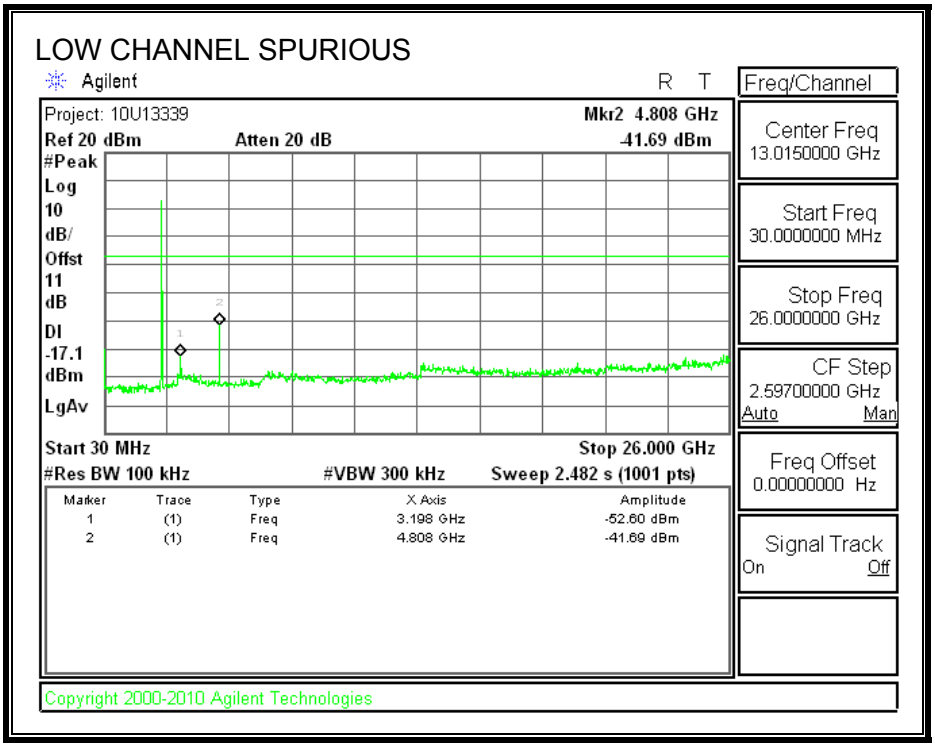
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

## RESULTS

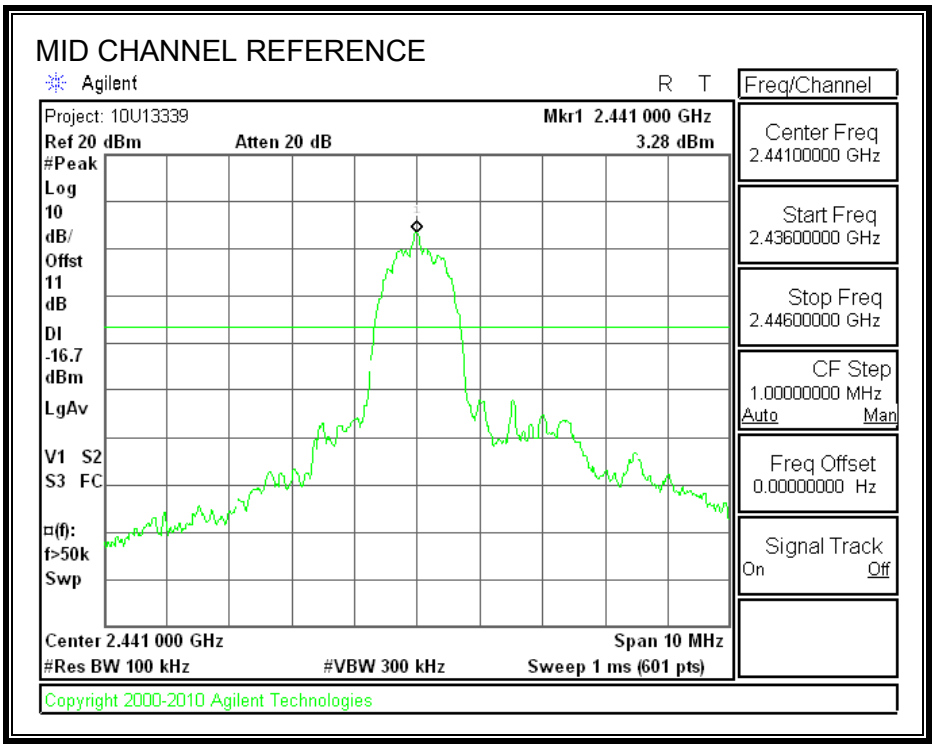
## SPURIOUS EMISSIONS, LOW CHANNEL

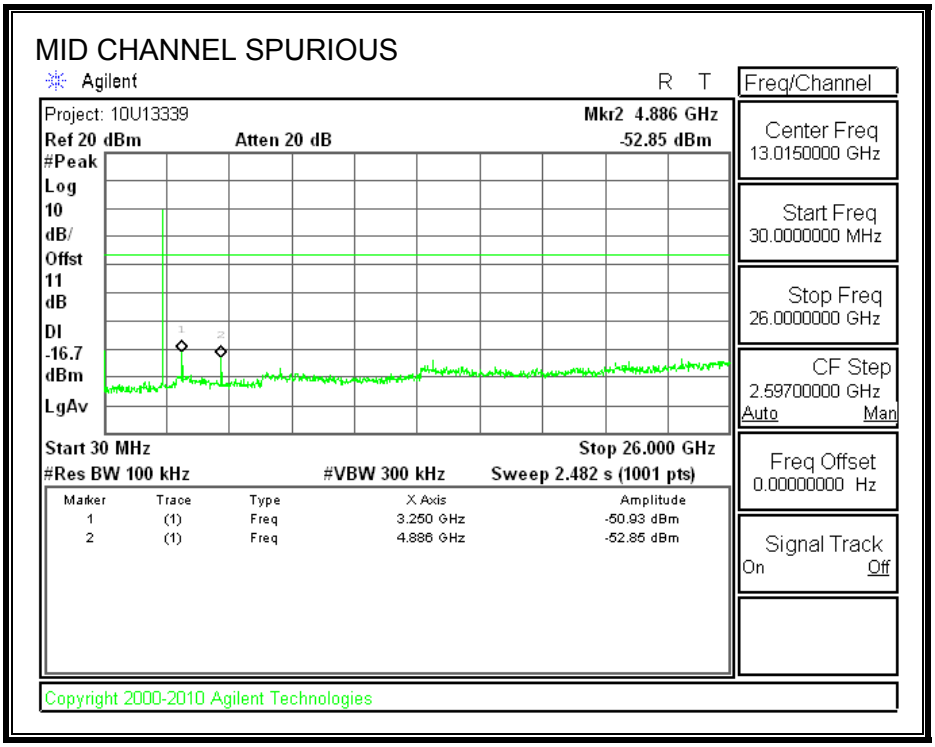


LOW CHANNEL SPURIOUS

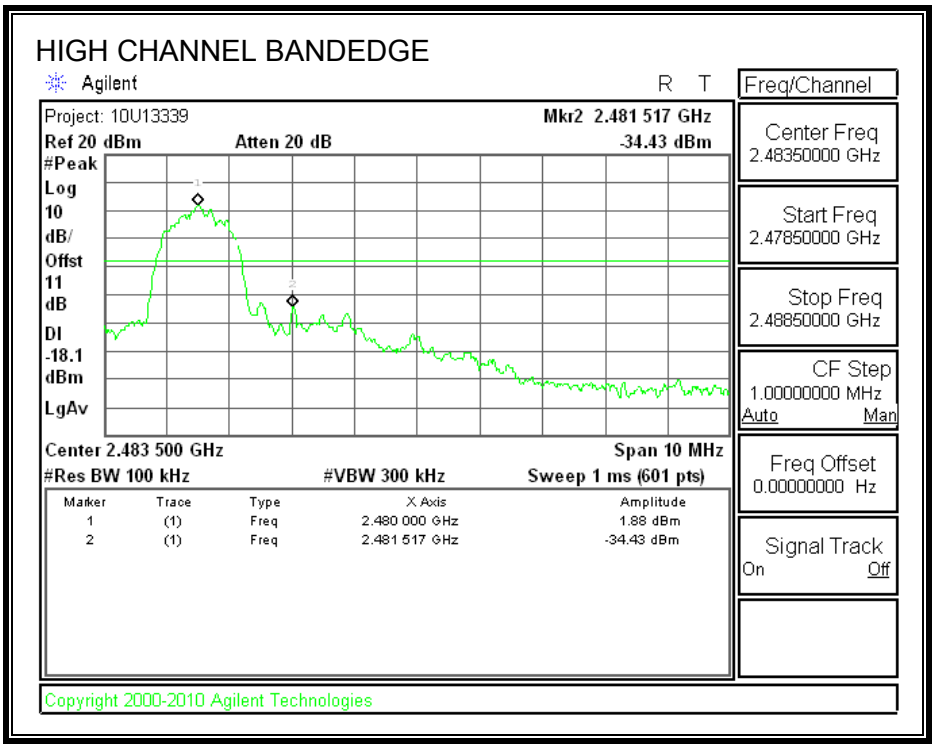


**SPURIOUS EMISSIONS, MID CHANNEL**

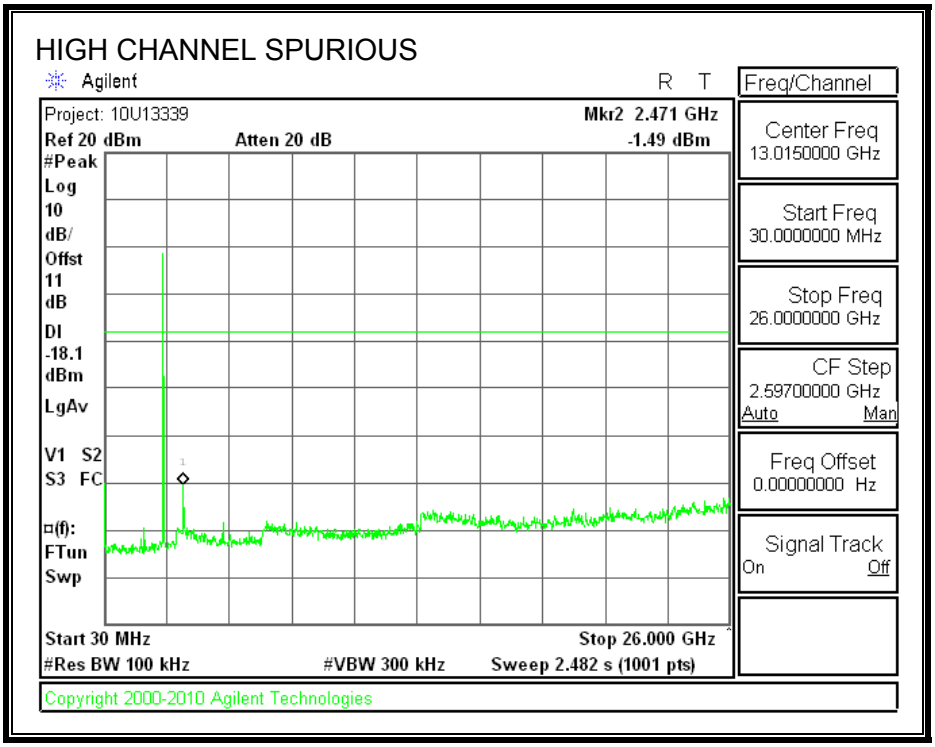




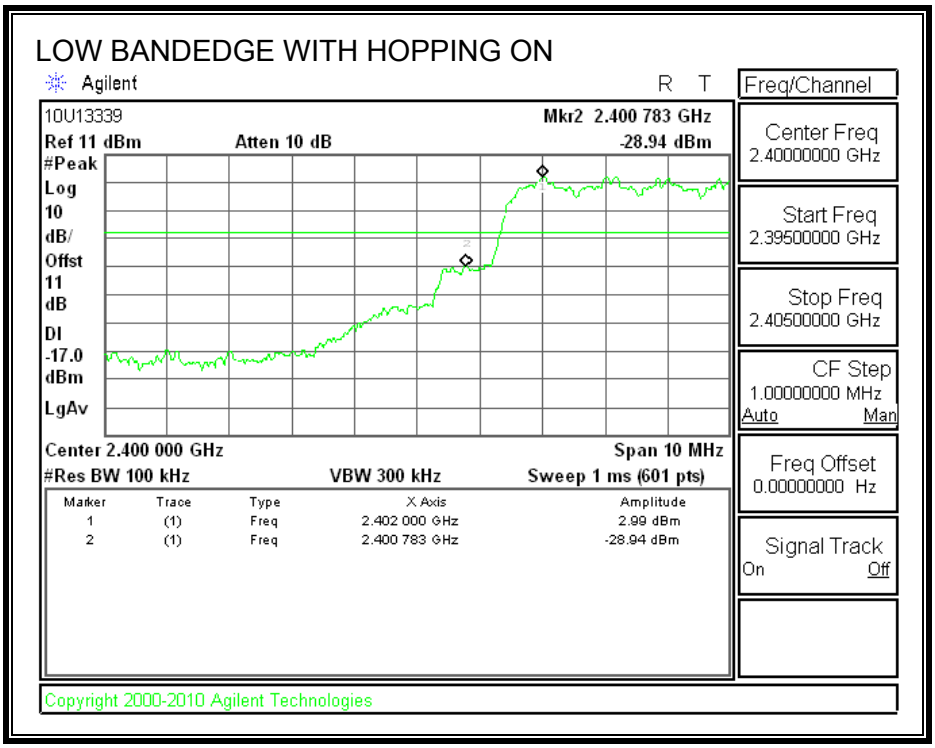
**SPURIOUS EMISSIONS, HIGH CHANNEL**

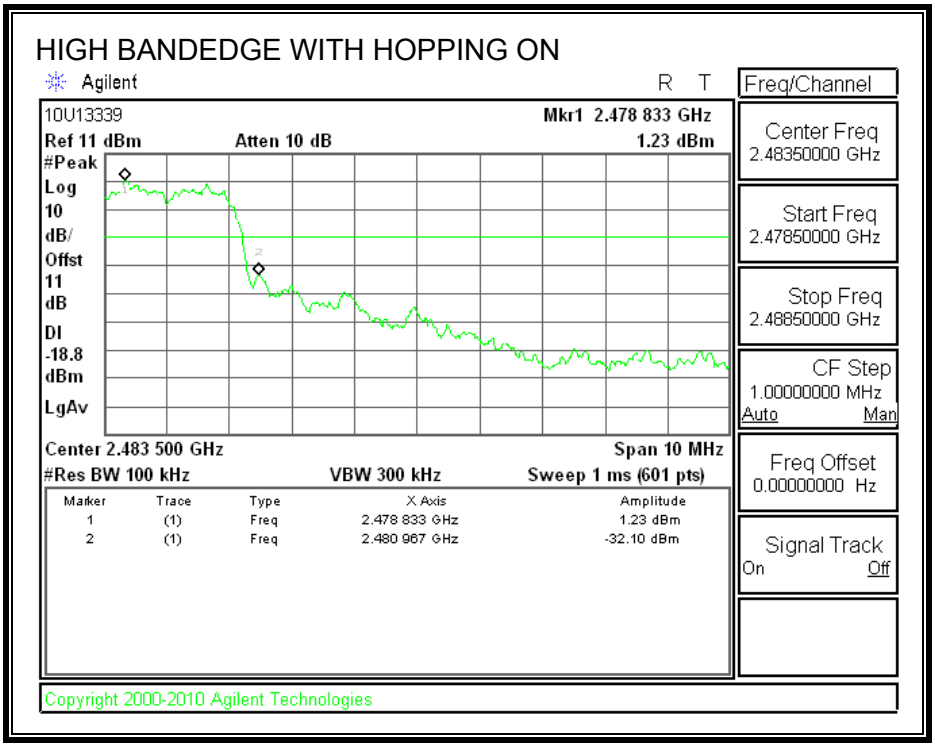


HIGH CHANNEL SPURIOUS



**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**





# 8. RADIATED TEST RESULTS

## 8.1. LIMITS AND PROCEDURE

**LIMITS**

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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

**TEST PROCEDURE**

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

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

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

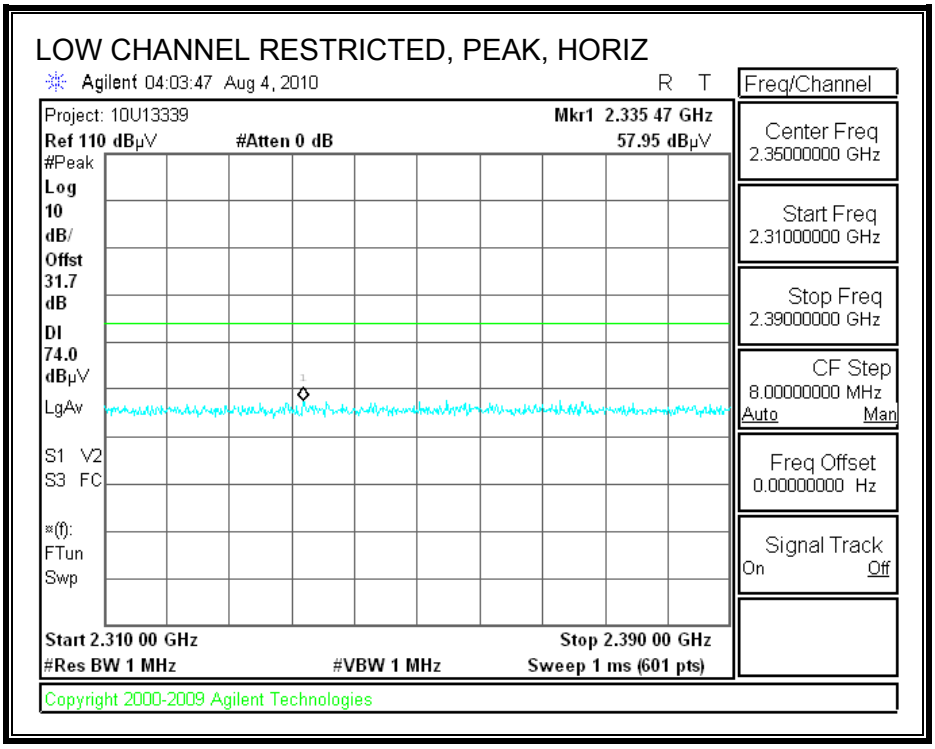
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

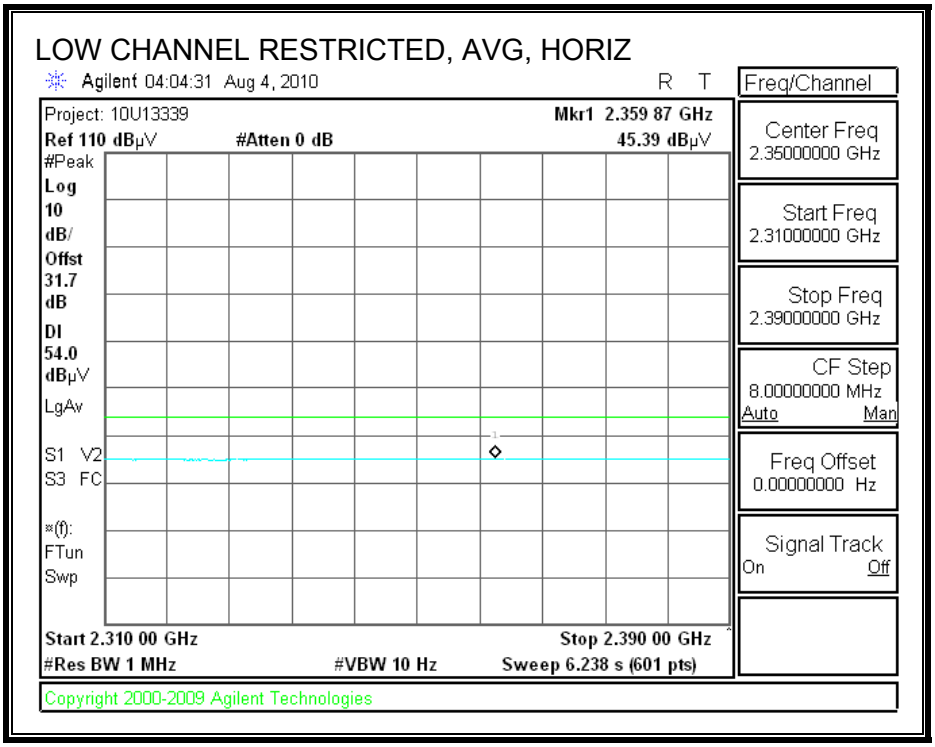
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

# 8.2. TRANSMITTER ABOVE 1 GHz

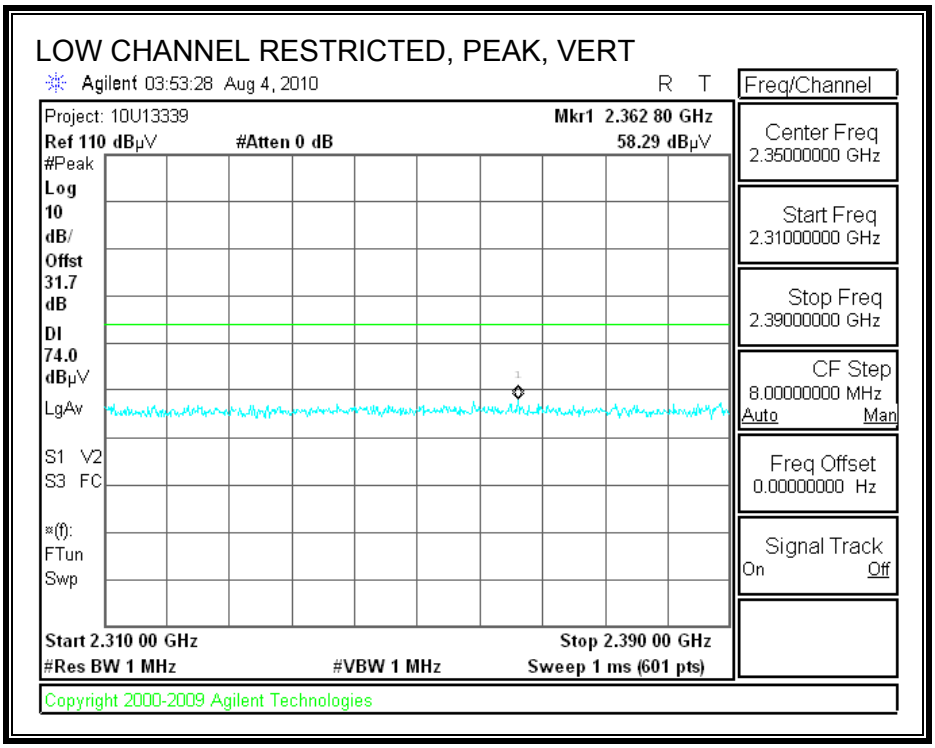
## 8.2.1. BASIC DATA RATE GFSK MODULATION

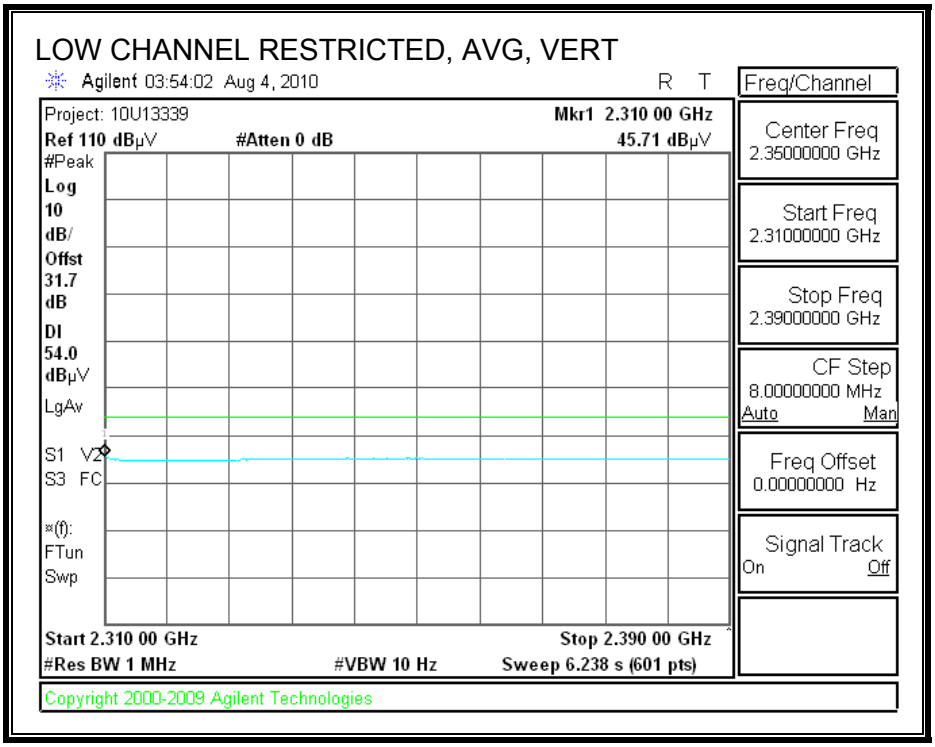
**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



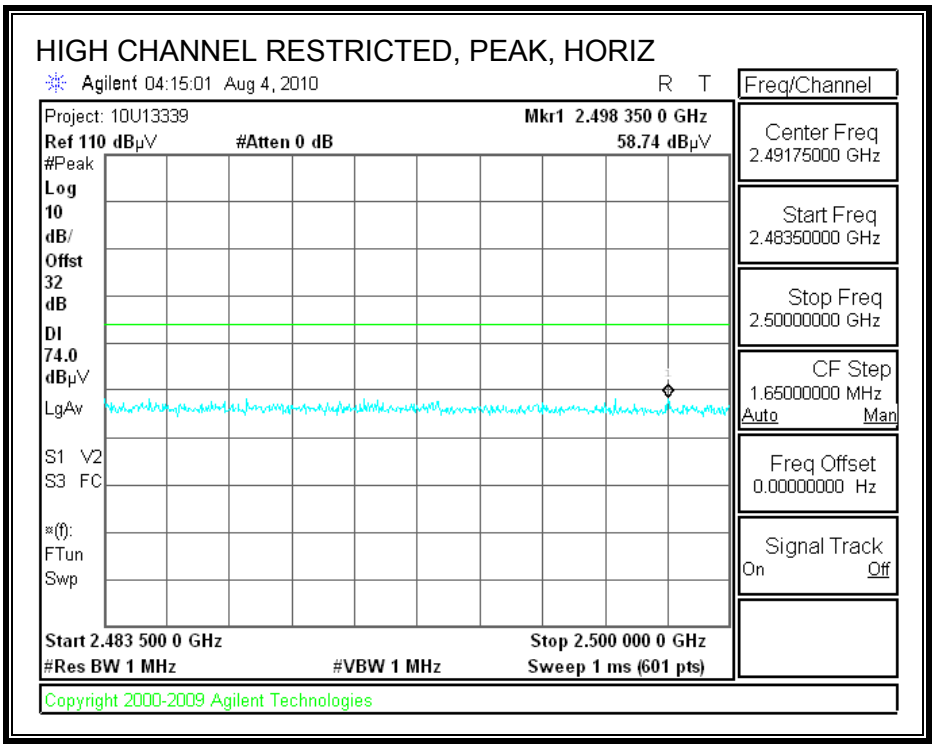


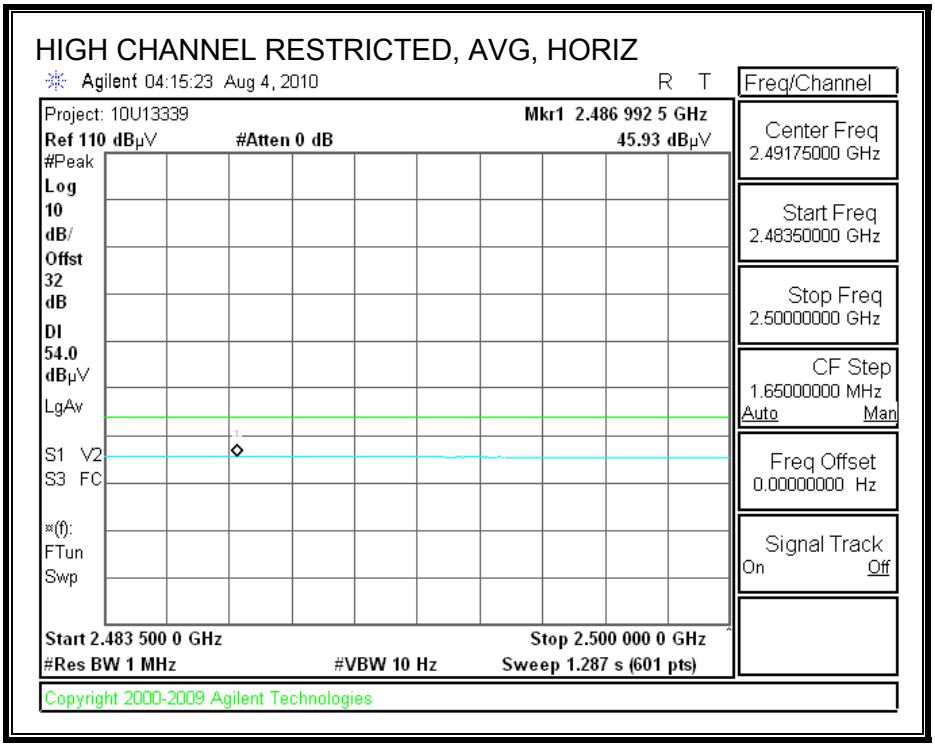
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



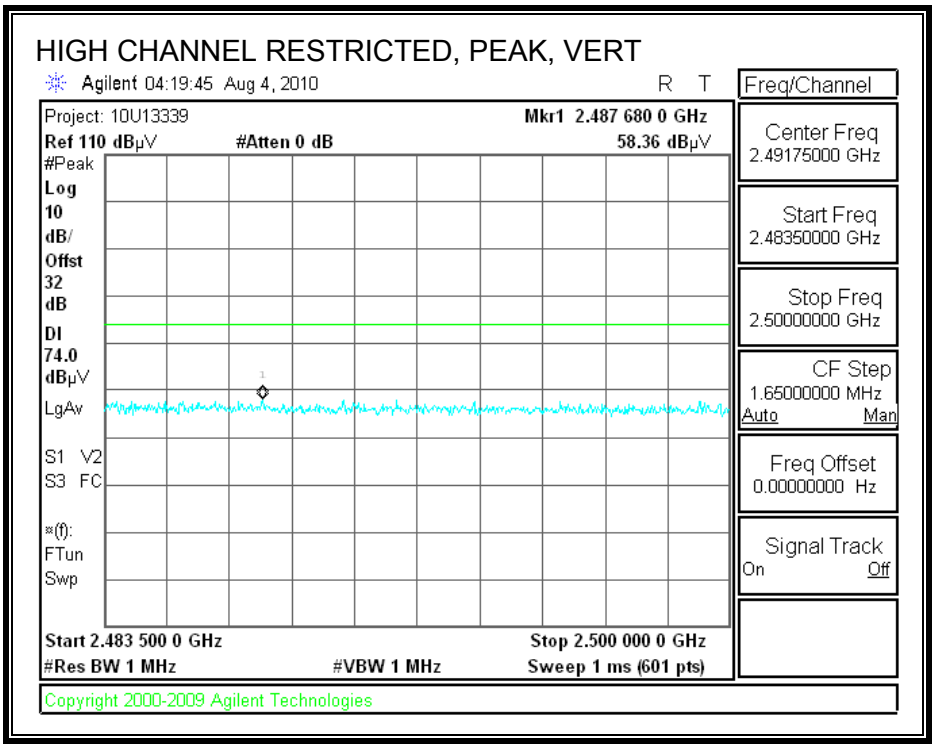


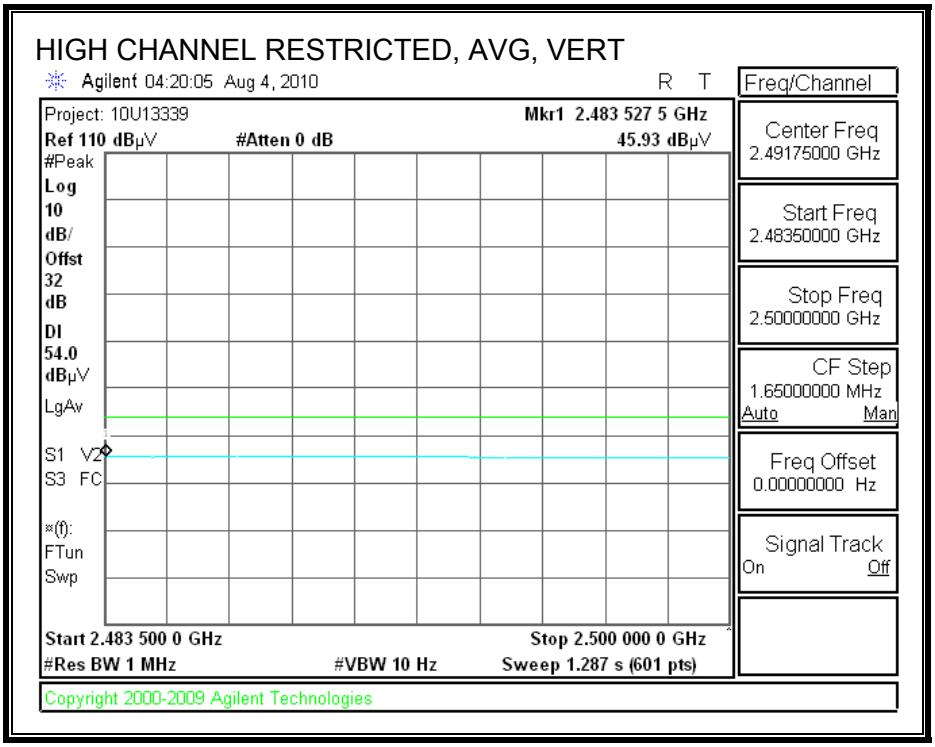
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





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





## HARMONICS AND SPURIOUS EMISSIONS

**High Frequency Measurement**
**Compliance Certification Services, Fremont 5m Chamber**

**Test Engr:** Tom Chen
**Date:** 08/04/10
**Project #:** 10U13339
**Company:** Looxcie
**EUT Description:** BT 2.1 + EDR Headset with video camera
**EUT M/N:** EUT only
**Test Target:** FCC Class B
**Mode Oper:** TX mode

Duty Cycle Correction Factor = 20log (100/(0.98 / 100)) = -20.1dB (Max = 20dB allowable)

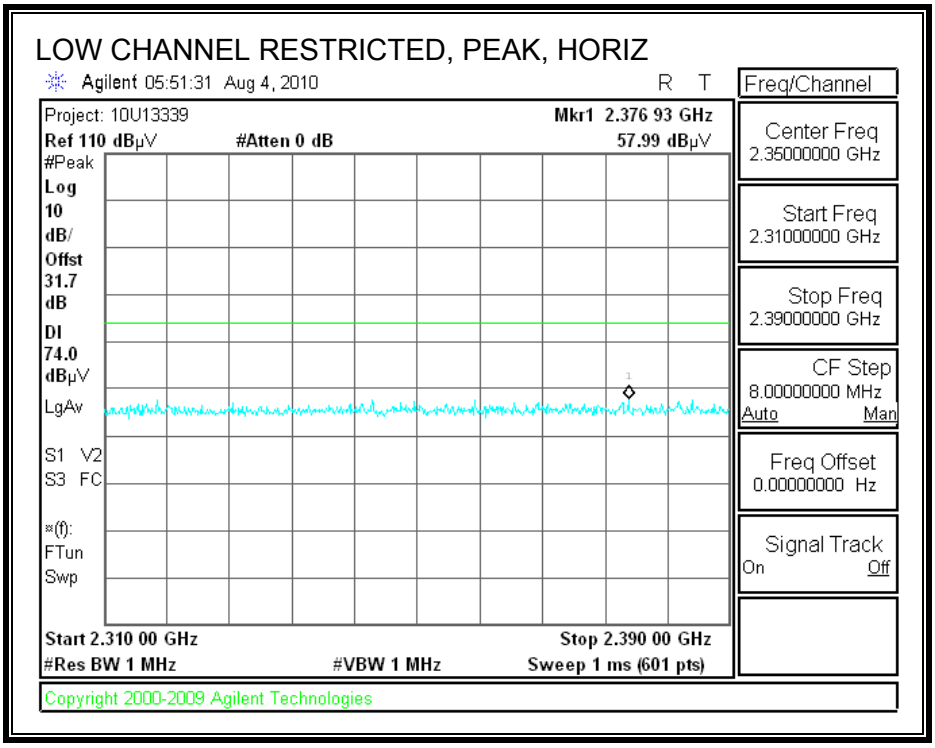
| | | | | | |
|---|---|---|---|---|---|
| f | Measurement Frequency | Amp | Preamp Gain | | Average Field Strength Limit |
| Dist | Distance to Antenna | D Corr | Distance Correct to 3 meters | | Peak Field Strength Limit |
| Read | Analyzer Reading | Avg | Average Field Strength @ 3 m | | Margin vs.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

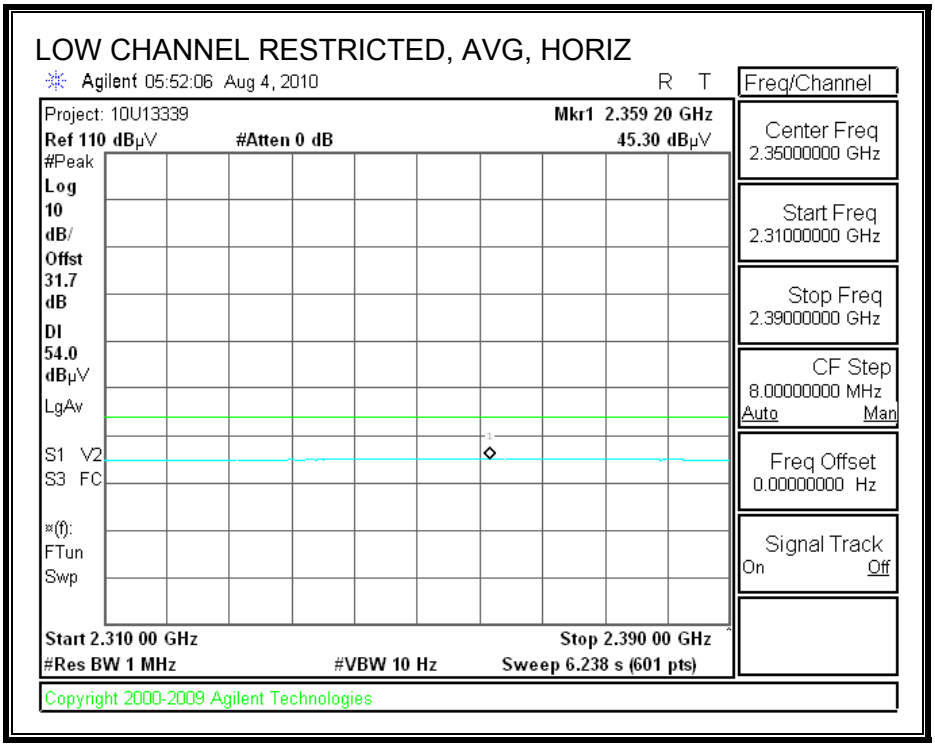
| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2402MHz | | | | | | | | | | | | | |
| 4.804 | 3.0 | 69.3 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 71.6 | 74.0 | -2.4 | H | P | |
| 4.804 | 3.0 | 49.2 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 51.5 | 54.0 | -2.5 | H | A | |
| 7.206 | 3.0 | 37.4 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 43.5 | 74.0 | -30.5 | H | P | |
| 7.206 | 3.0 | 25.1 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 31.2 | 54.0 | -22.8 | H | A | |
| 2402MHz | | | | | | | | | | | | | |
| 4.804 | 3.0 | 69.2 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 71.6 | 74.0 | -2.4 | V | P | |
| 4.804 | 3.0 | 49.1 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 51.4 | 54.0 | -2.6 | V | A | |
| 7.206 | 3.0 | 37.0 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 43.1 | 74.0 | -30.9 | V | P | |
| 7.206 | 3.0 | 25.1 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 31.2 | 54.0 | -22.8 | V | A | |
| 2441MHz | | | | | | | | | | | | | |
| 4.882 | 3.0 | 68.7 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 71.2 | 74.0 | -2.8 | H | P | |
| 4.882 | 3.0 | 39.2 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 41.6 | 54.0 | -12.4 | H | A | |
| 7.323 | 3.0 | 37.7 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 44.0 | 74.0 | -30.0 | H | P | |
| 7.323 | 3.0 | 26.4 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 32.7 | 54.0 | -21.3 | H | A | |
| 2441MHz | | | | | | | | | | | | | |
| 4.882 | 3.0 | 66.1 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 68.5 | 74.0 | -5.5 | V | P | |
| 4.882 | 3.0 | 37.0 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 39.5 | 54.0 | -14.5 | V | A | |
| 7.323 | 3.0 | 36.8 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 43.2 | 74.0 | -30.8 | V | P | |
| 7.323 | 3.0 | 24.8 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 31.2 | 54.0 | -22.8 | V | A | |
| 2480 MHz | | | | | | | | | | | | | |
| 4.960 | 3.0 | 64.5 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 67.2 | 74.0 | -6.8 | V | P | |
| 4.960 | 3.0 | 44.3 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 46.9 | 54.0 | -7.1 | V | A | |
| 7.440 | 3.0 | 39.2 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 45.8 | 74.0 | -28.2 | V | P | |
| 7.440 | 3.0 | 26.5 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 33.1 | 54.0 | -20.9 | V | A | |
| 4.960 | 3.0 | 65.3 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 67.9 | 74.0 | -7.7 | H | P | |
| 4.960 | 3.0 | 45.0 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 47.6 | 54.0 | -6.4 | H | A | |
| 7.440 | 3.0 | 39.0 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 45.6 | 74.0 | -28.4 | H | P | |
| 7.440 | 3.0 | 26.8 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 33.4 | 54.0 | -20.6 | H | A | |

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

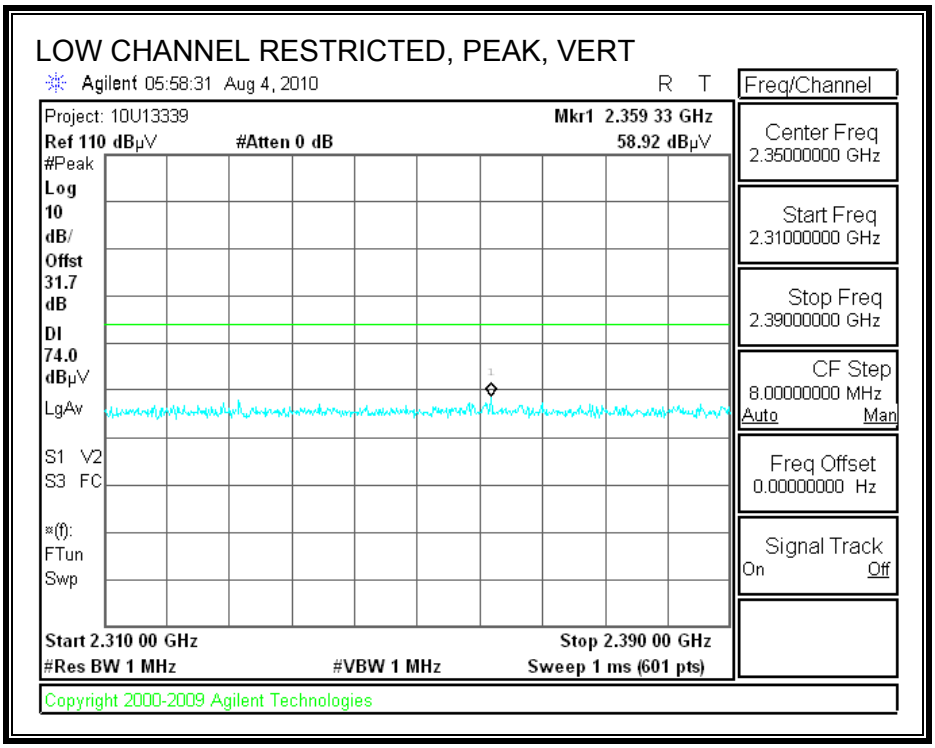
## 8.2.2. ENHANCED DATA RATE 8PSK MODULATION

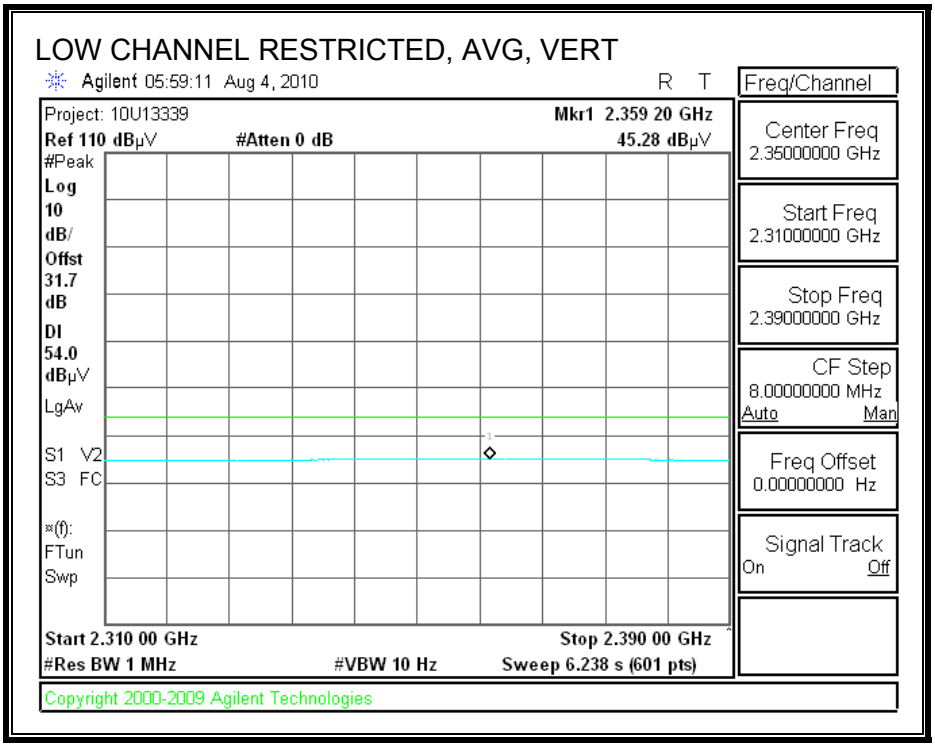
**RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)**



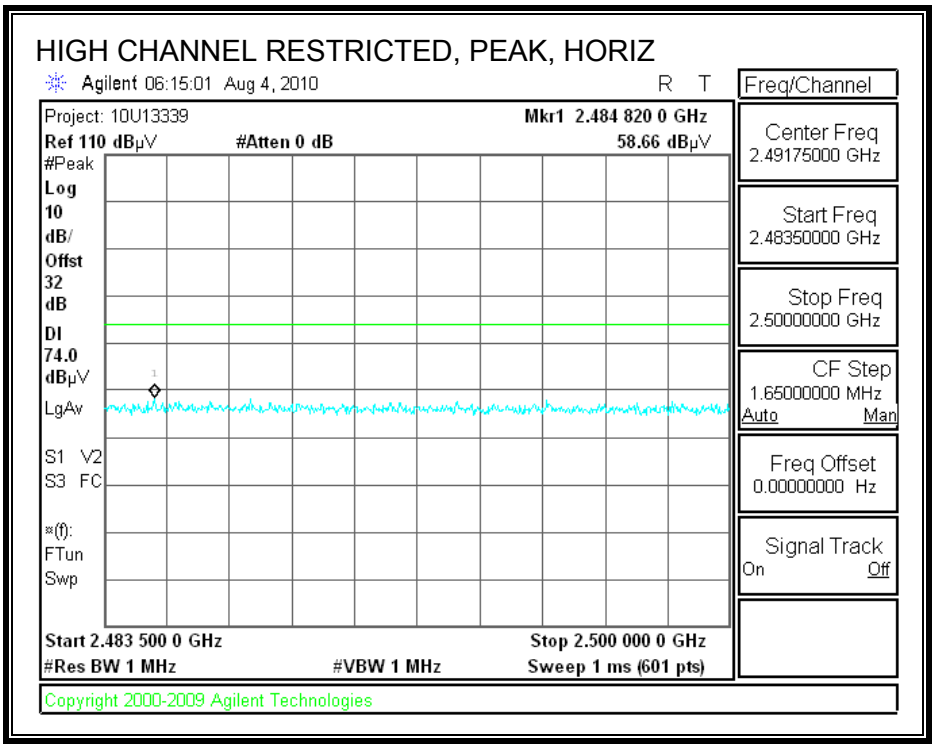


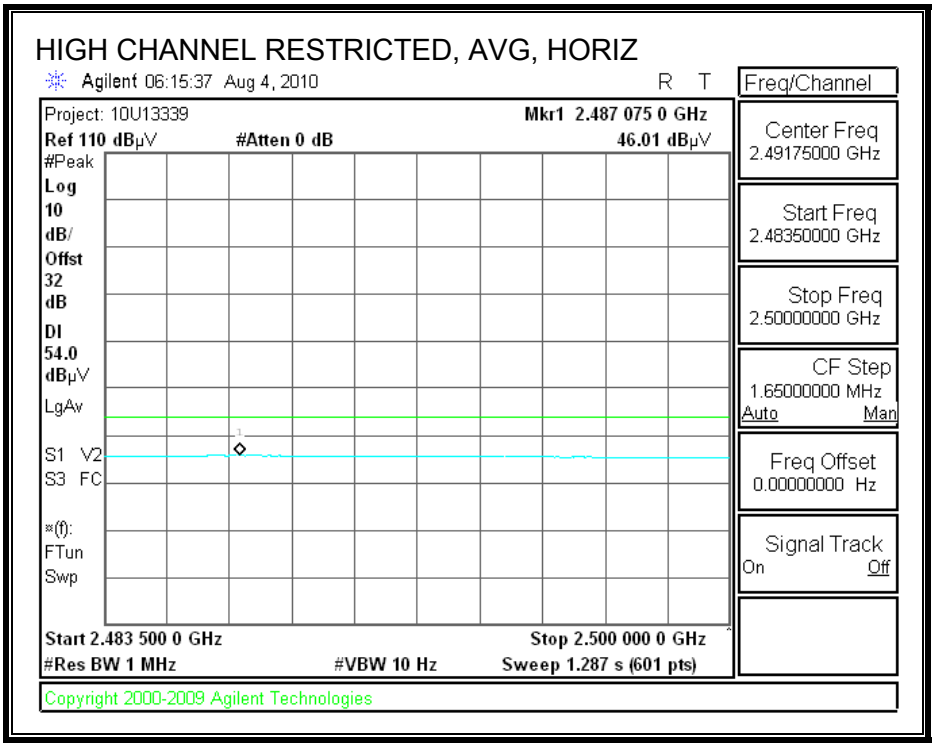
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**



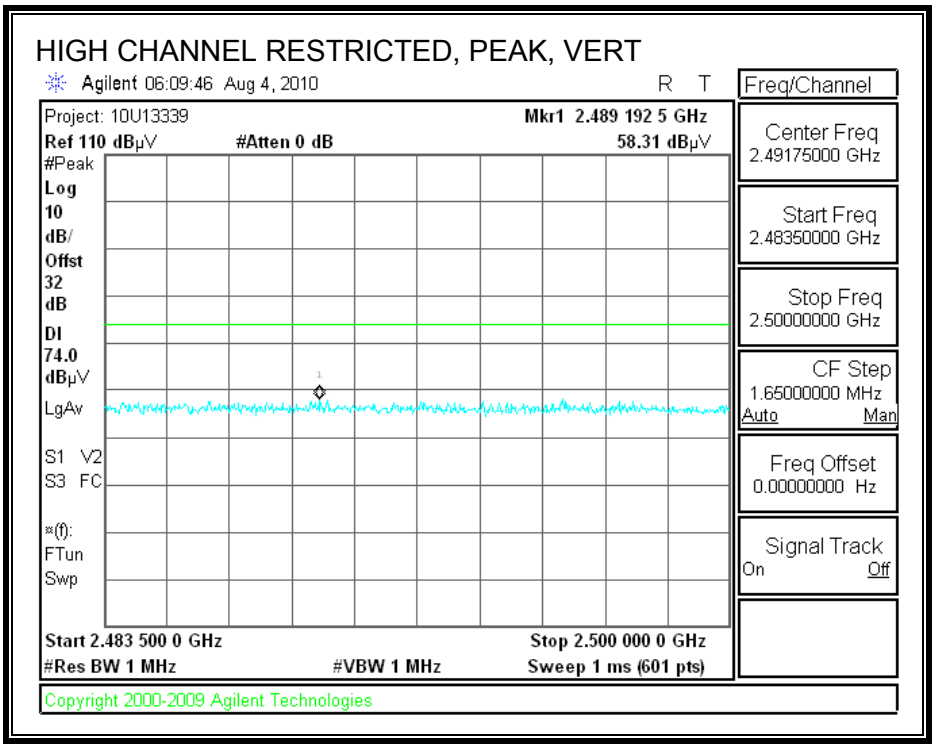


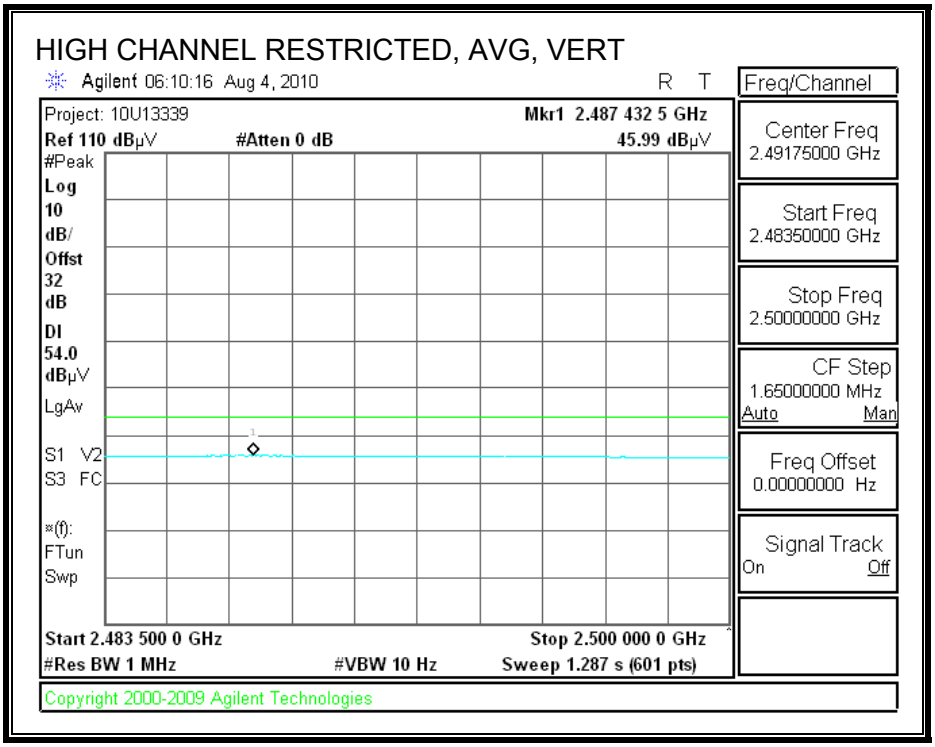
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





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





## HARMONICS AND SPURIOUS EMISSIONS

**High Frequency Measurement**
**Compliance Certification Services, Fremont 5m Chamber**

**Test Engr:** Tom Chen
**Date:** 08/04/10
**Project #:** 10U13339
**Company:** Looxcie
**EUT Description:** BT 2.1 + EDR Headset with video camera
**EUT M/N:** EUT only
**Test Target:** FCC Class B
**Mode Oper:** TX mode

Duty Cycle Correction Factor = 20log (100/(0.98 / 100)) = -20.1dB (Max = 20dB allowable)

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

| f GHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2402 MHz 8PSK | | | | | | | | | | | | | |
| 4.804 | 3.0 | 69.7 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 72.0 | 74.0 | -2.0 | V | P | |
| 4.804 | 3.0 | 49.5 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 51.8 | 54.0 | -2.2 | V | A | |
| 7.206 | 3.0 | 37.3 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 43.4 | 74.0 | -30.6 | V | P | |
| 7.206 | 3.0 | 25.8 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 31.9 | 54.0 | -22.1 | V | A | |
| 4.804 | 3.0 | 69.3 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 71.7 | 74.0 | -2.3 | H | P | |
| 4.804 | 3.0 | 49.2 | 33.0 | 5.8 | -36.5 | 0.0 | 0.0 | 51.5 | 54.0 | -2.5 | H | A | |
| 7.206 | 3.0 | 37.7 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 43.8 | 74.0 | -30.2 | H | P | |
| 7.206 | 3.0 | 27.5 | 35.1 | 7.2 | -36.2 | 0.0 | 0.0 | 33.6 | 54.0 | -20.4 | H | A | |
| 2441 MHz 8PSK | | | | | | | | | | | | | |
| 4.882 | 3.0 | 67.8 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 70.3 | 74.0 | -3.7 | H | P | |
| 4.882 | 3.0 | 47.6 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 50.1 | 54.0 | -3.9 | H | A | |
| 7.323 | 3.0 | 38.0 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 44.3 | 74.0 | -29.7 | H | P | |
| 7.323 | 3.0 | 27.9 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 34.3 | 54.0 | -19.7 | H | A | |
| 4.882 | 3.0 | 67.2 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 69.7 | 74.0 | -4.3 | V | P | |
| 4.882 | 3.0 | 47.0 | 33.1 | 5.8 | -36.5 | 0.0 | 0.0 | 49.5 | 54.0 | -4.5 | V | A | |
| 7.323 | 3.0 | 37.7 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 44.1 | 74.0 | -29.9 | V | P | |
| 7.323 | 3.0 | 26.0 | 35.3 | 7.3 | -36.2 | 0.0 | 0.0 | 32.4 | 54.0 | -21.6 | V | A | |
| 2480 MHz 8PSK | | | | | | | | | | | | | |
| 4.960 | 3.0 | 63.0 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 65.6 | 74.0 | -8.4 | V | P | |
| 4.960 | 3.0 | 42.7 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 45.3 | 54.0 | -8.7 | V | A | |
| 7.440 | 3.0 | 37.6 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 44.2 | 74.0 | -29.8 | V | P | |
| 7.440 | 3.0 | 24.9 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 31.5 | 54.0 | -22.5 | V | A | |
| 4.960 | 3.0 | 63.7 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 66.3 | 74.0 | -7.7 | H | P | |
| 4.960 | 3.0 | 43.4 | 33.2 | 5.9 | -36.5 | 0.0 | 0.0 | 46.1 | 54.0 | -7.9 | H | A | |
| 7.440 | 3.0 | 37.4 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 44.0 | 74.0 | -30.0 | H | P | |
| 7.440 | 3.0 | 25.2 | 35.5 | 7.3 | -36.2 | 0.0 | 0.0 | 31.8 | 54.0 | -22.2 | H | A | |

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

## 8.3. RECEIVER ABOVE 1 GHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: Looxcie
Project #: 10U13339
Date: 8/5/2010
Test Engineer: Tom Chen
Configuration: EUT only
Mode: RX mode

Test Equipment:

| Horn 1-18GHz | Pre-amplifer 1-26GHz | Pre-amplifer 26-40GHz | Horn > 18GHz | Limit |
|---|---|---|---|---|
| T73; S/N: 6717 @3m | T144 Miteq 3008A00931 | | | RX RSS 210 |

Hi Frequency Cables

| 3' cable 22807700 | 12' cable 22807600 | 20' cable 22807500 | HPF | Reject Filter |
|---|---|---|---|---|
| 3' cable 22807700 | 12' cable 22807600 | 20' cable 22807500 | | |

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

| f GHz | Dist (m) | Read Pk dBuV | Read Avg. dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Fltr dB | Peak dBuV/m | Avg dBuV/m | Pk Lim dBuV/m | Avg Lim dBuV/m | Pk Mar dB | Avg Mar dB | Notes (V/H) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.147 | 3.0 | 49.6 | 42.8 | 24.3 | 2.5 | -39.3 | 0.0 | 0.0 | 37.2 | 30.4 | 74 | 54 | -36.8 | -23.6 | V |
| 1.627 | 3.0 | 59.1 | 57.1 | 26.0 | 3.1 | -38.6 | 0.0 | 0.0 | 49.6 | 47.5 | 74 | 54 | -24.4 | -6.5 | V |
| 2.440 | 3.0 | 48.6 | 41.4 | 28.3 | 3.9 | -37.5 | 0.0 | 0.0 | 43.3 | 36.1 | 74 | 54 | -30.7 | -17.9 | V |
| 1.627 | 3.0 | 61.9 | 61.2 | 26.0 | 3.1 | -38.6 | 0.0 | 0.0 | 52.3 | 51.6 | 74 | 54 | -21.7 | -2.4 | H |
| 2.443 | 3.0 | 46.3 | 40.4 | 28.3 | 3.9 | -37.5 | 0.0 | 0.0 | 41.0 | 35.1 | 74 | 54 | -33.0 | -18.9 | H |
| 4.133 | 3.0 | 43.4 | 39.6 | 32.4 | 5.3 | -36.6 | 0.0 | 0.0 | 44.4 | 40.6 | 74 | 54 | -29.6 | -13.4 | H |

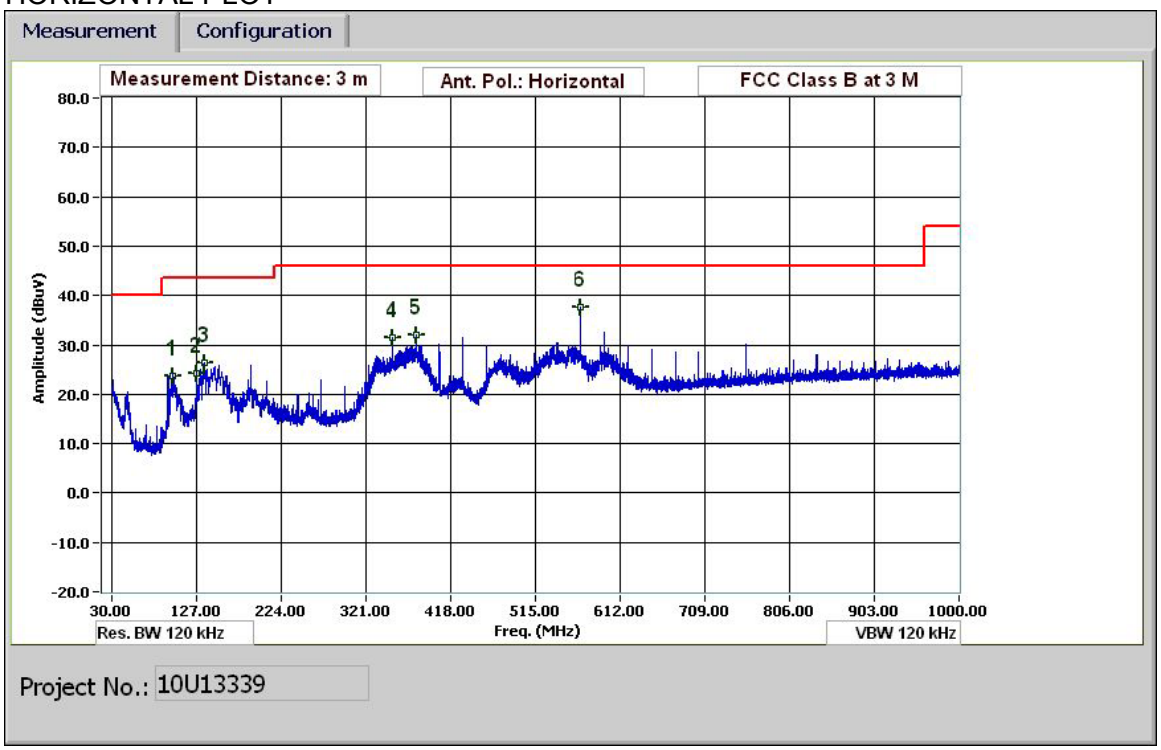
**Note: No other emissions were detected above the system noise floor.**
Rev. 07.22.09

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

## 8.4. WORST-CASE BELOW 1 GHz

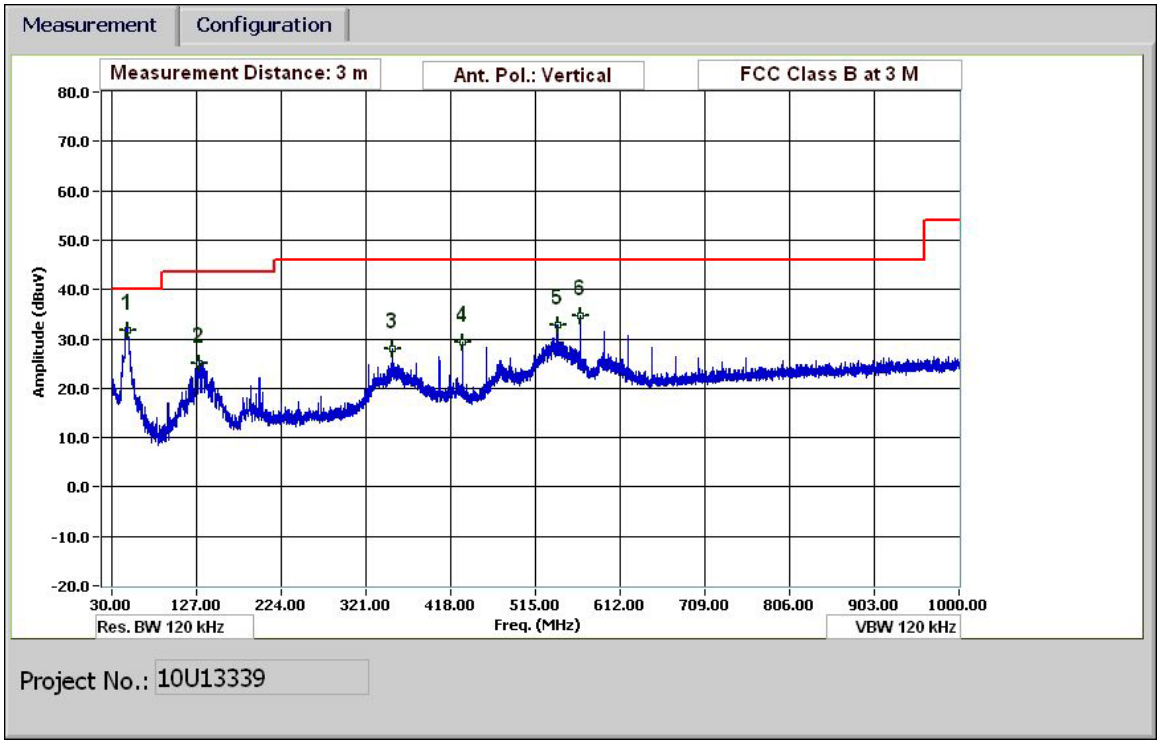
**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)**

HORIZONTAL PLOT



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

VERTICAL PLOT



## HORIZONTAL AND VERTICAL DATA

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

**Test Engr:** Tom Chen
**Date:** 08/04/10
**Project #:** 10U13339
**Company:** Looxcie
**EUT Description:** BT 2.1 + EDR Headset with video camera
**EUT M/N:** EUT only
**Test Target:** FCC Class B
**Mode Oper:** TX mode, Worst Case

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

| f MHz | Dist (m) | Read dBuV | AF dB/m | CL dB | Amp dB | D Corr dB | Filter dB | Corr. dBuV/m | Limit dBuV/m | Margin dB | Ant. Pol. V/H | Det. P/A/QP | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Horizontal** | | | | | | | | | | | | | |
| 99.363 | 3.0 | 41.3 | 9.8 | 0.9 | 28.3 | 0.0 | 0.0 | 23.7 | 43.5 | -19.8 | H | P | |
| 127.444 | 3.0 | 38.0 | 13.6 | 1.1 | 28.3 | 0.0 | 0.0 | 24.3 | 43.5 | -19.2 | H | P | |
| 135.844 | 3.0 | 40.1 | 13.4 | 1.1 | 28.3 | 0.0 | 0.0 | 26.3 | 43.5 | -17.2 | H | P | |
| 351.013 | 3.0 | 43.8 | 14.2 | 1.7 | 28.1 | 0.0 | 0.0 | 31.6 | 46.0 | -14.4 | H | P | |
| 378.014 | 3.0 | 43.7 | 14.6 | 1.7 | 28.1 | 0.0 | 0.0 | 31.9 | 46.0 | -14.1 | H | P | |
| 567.022 | 3.0 | 45.2 | 17.9 | 2.2 | 27.6 | 0.0 | 0.0 | 37.6 | 46.0 | -8.4 | H | P | |
| **Vertical** | | | | | | | | | | | | | |
| 48.241 | 3.0 | 50.2 | 9.2 | 0.6 | 28.4 | 0.0 | 0.0 | 31.7 | 40.0 | -8.3 | V | P | |
| 130.684 | 3.0 | 38.8 | 13.5 | 1.1 | 28.3 | 0.0 | 0.0 | 25.1 | 43.5 | -18.4 | V | P | |
| 351.013 | 3.0 | 40.2 | 14.2 | 1.7 | 28.1 | 0.0 | 0.0 | 28.0 | 46.0 | -18.0 | V | P | |
| 432.017 | 3.0 | 39.9 | 15.5 | 1.9 | 28.0 | 0.0 | 0.0 | 29.2 | 46.0 | -16.8 | V | P | |
| 540.021 | 3.0 | 41.0 | 17.4 | 2.1 | 27.7 | 0.0 | 0.0 | 32.8 | 46.0 | -13.2 | V | P | |
| 567.022 | 3.0 | 42.3 | 17.9 | 2.2 | 27.6 | 0.0 | 0.0 | 34.7 | 46.0 | -11.3 | V | P | |

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

# 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**

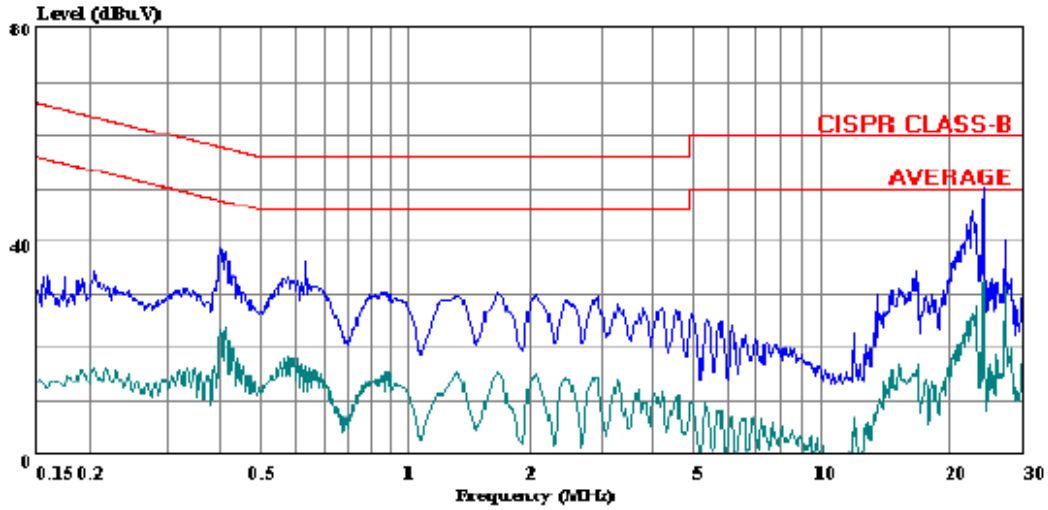
## 6 WORST EMISSIONS

| CONDUCTED EMISSIONS DATA (115VAC 60Hz) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq. | Reading | | | Closs | Limit | EN_B | Margin | | Remark |
| (MHz) | PK (dBuV) | QP (dBuV) | AV (dBuV) | (dB) | QP | AV | QP (dB) | AV (dB) | L1 / L2 |
| 0.40 | 38.71 | -- | 23.51 | 0.00 | 57.81 | 47.81 | -19.10 | -24.30 | L1 |
| 0.64 | 36.49 | -- | 15.24 | 0.00 | 56.00 | 46.00 | -19.51 | -30.76 | L1 |
| 24.01 | 50.15 | -- | 36.08 | 0.00 | 60.00 | 50.00 | -9.85 | -13.92 | L1 |
| 0.40 | 36.57 | -- | 25.46 | 0.00 | 57.81 | 47.81 | -21.24 | -22.35 | L2 |
| 0.57 | 30.97 | -- | 15.73 | 0.00 | 56.00 | 46.00 | -25.03 | -30.27 | L2 |
| 24.01 | 46.01 | -- | 32.44 | 0.00 | 60.00 | 50.00 | -13.99 | -17.56 | L2 |
| 6 Worst Data | | | | | | | | | |

**LINE 1 RESULTS**

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

Data#: 7 File#: 10U13339-LC.EMI Date: 08-06-2010 Time: 09:08:02



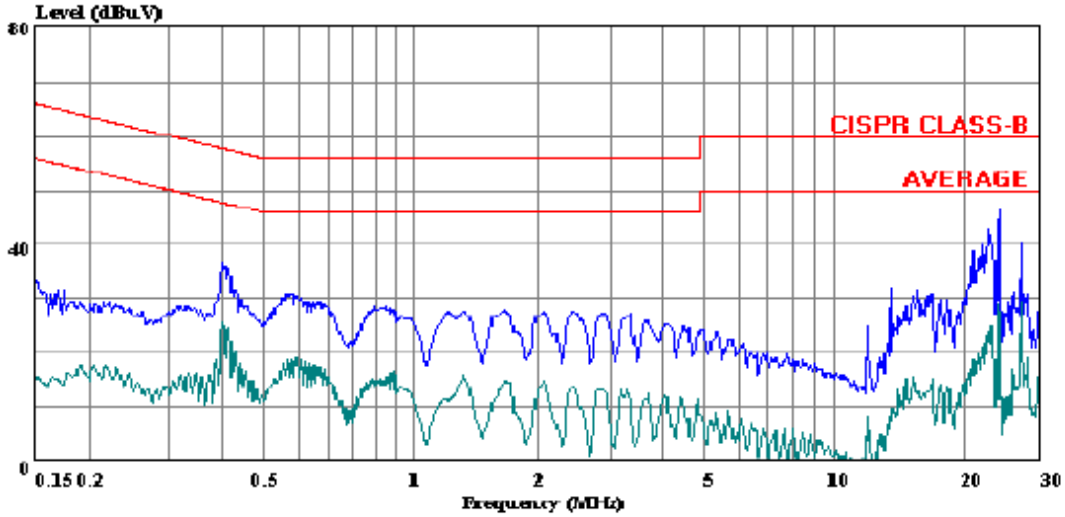

Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Tom Chen
Project #: : 10U13339
Company: : Looxcie
Configuration:: EUT with AC Charger
Mode : : BT v2.1+EDR Headset with a video camera
Target: : CISPR Class B
Voltage: : 115V / 60Hz
: L1: Peak ( Blue ), Average ( Green )

**LINE 2 RESULTS**

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

Data#: 14 File#: 10U13339-LC.EMI Date: 08-06-2010 Time: 09:19:34




Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Tom Chen
Project #: : 10U13339
Company: : Looxcie
Configuration:: EUT with AC Charger
Mode : : BT v2.1+EDR Headset with a video camera
Target: : CISPR Class B
Voltage: : 115V / 60Hz
: L2: Peak ( Blue ), Average ( Green )

# 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.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density ($mW/cm^2$) | Averaging time (minutes) |
|---|---|---|---|---|
| (A) Limits for Occupational/Controlled Exposures | | | | |
| 0.3–3.0 | 614 | 1.63 | *(100) | 6 |
| 3.0–30 | 1842/f | 4.89/f | *($900/f^2$) | 6 |
| 30–300 | 61.4 | 0.163 | 1.0 | 6 |
| 300–1500 | ..... | ..... | f/300 | 6 |
| 1500–100,000 | ..... | ..... | 5 | 6 |
| (B) Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3–1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34–30 | 824/f | 2.19/f | *($180/f^2$) | 30 |

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

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density ($mW/cm^2$) | Averaging time (minutes) |
|---|---|---|---|---|
| 30–300 | 27.5 | 0.073 | 0.2 | 30 |
| 300–1500 | ..... | ..... | f/1500 | 30 |
| 1500–100,000 | ..... | ..... | 1.0 | 30 |

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

**IC RULES**

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

**Table 5**
**Exposure Limits for Persons Not Classed As RF and Microwave Exposed Workers (Including the General Public)**

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

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

**Notes:** 1. Frequency, $f$, is in MHz.
2. A power density of 10 $W/m^2$ is equivalent to 1 $mW/cm^2$.
3. A magnetic field strength of 1 A/m corresponds to 1.257 microtesla (μT) or 12.57 milligauss (mG).

**EQUATIONS**

Power density is given by:

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

where

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

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

Distance is given by:

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

where

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

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 x
Gx = 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 mW/cm^2

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 10 W/m^2

**RESULTS**

(MPE distance equals 20 cm)

| Band | Mode | Separation Distance (m) | Output Power (dBm) | Antenna Gain (dBi) | IC Power Density (W/m^2) | FCC Power Density (mW/cm^2) |
|---|---|---|---|---|---|---|
| 2.4 GHz | Bluetooth | 0.20 | 5.59 | 1.50 | 0.01 | 0.001 |