



**FCC CFR47 PART 15 SUBPART C**

**CERTIFICATION TEST REPORT**

**FOR**

**GSM/WCDMA/LTE Tablet + Bluetooth/BLE and DTS/UNII a/b/g/n/ac and ANT+**

**MODEL NUMBER : SM-T815**

**FCC ID: A3LSMT815**

**REPORT NUMBER: 15K20540-E3**

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Tablet+Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+  
**MODEL NUMBER:** SM-T815  
**SERIAL NUMBER:** R32G300M6CW (RADIATED); R32G300N6DL (CONDUCTED)  
**DATE TESTED:** APRIL 06 - MAY 04, 2015

| APPLICABLE STANDARDS     |              |
|--------------------------|--------------|
| STANDARD                 | TEST RESULTS |
| CFR 47 Part 15 Subpart C | Pass         |

UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Korea, Ltd. By:

Tested By:



Ji Ho Choi  
Suwon Lab Manager  
UL Korea, Ltd.

CY Choi  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

| 218 Maeyeong-ro                     |           |
|-------------------------------------|-----------|
| <input checked="" type="checkbox"/> | Chamber 1 |
| <input type="checkbox"/>            | Chamber 2 |

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

## 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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 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 | 2.32 dB     |
| Radiated Disturbance, Below 1GHz      | 4.14 dB     |
| Radiated Disturbance, Above 1 GHz     | 5.97 dB     |

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Tablet + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+. This test report addresses the DSS (BT) operational mode.

### 5.2. MAXIMUM OUTPUT POWER

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

| Frequency Range<br>[MHz] | Mode               | Output Power<br>[dBm] | Output Power<br>[mW] |
|--------------------------|--------------------|-----------------------|----------------------|
| 2402 - 2480              | Basic GFSK         | 9.92                  | 9.82                 |
| 2402 - 2480              | Enhanced Pi/4-DPSK | 5.82                  | 3.82                 |
| 2402 - 2480              | Enhanced 8PSK      | 5.74                  | 3.75                 |

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & Pi/4-DPSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 8.6.

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -0.34 dBi.

### 5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |              |               |        |
|------------------------|--------------|--------------|---------------|--------|
| Description            | Manufacturer | Model        | Serial Number | FCC ID |
| Charger                | SAMSUNG      | EP-TA12EWE   | N/A           | N/A    |
| Data Cable             | SAMSUNG      | ECB-DG925UWE | N/A           | N/A    |
| Earphone               | SAMSUNG      | GH59-11129H  | N/A           | N/A    |

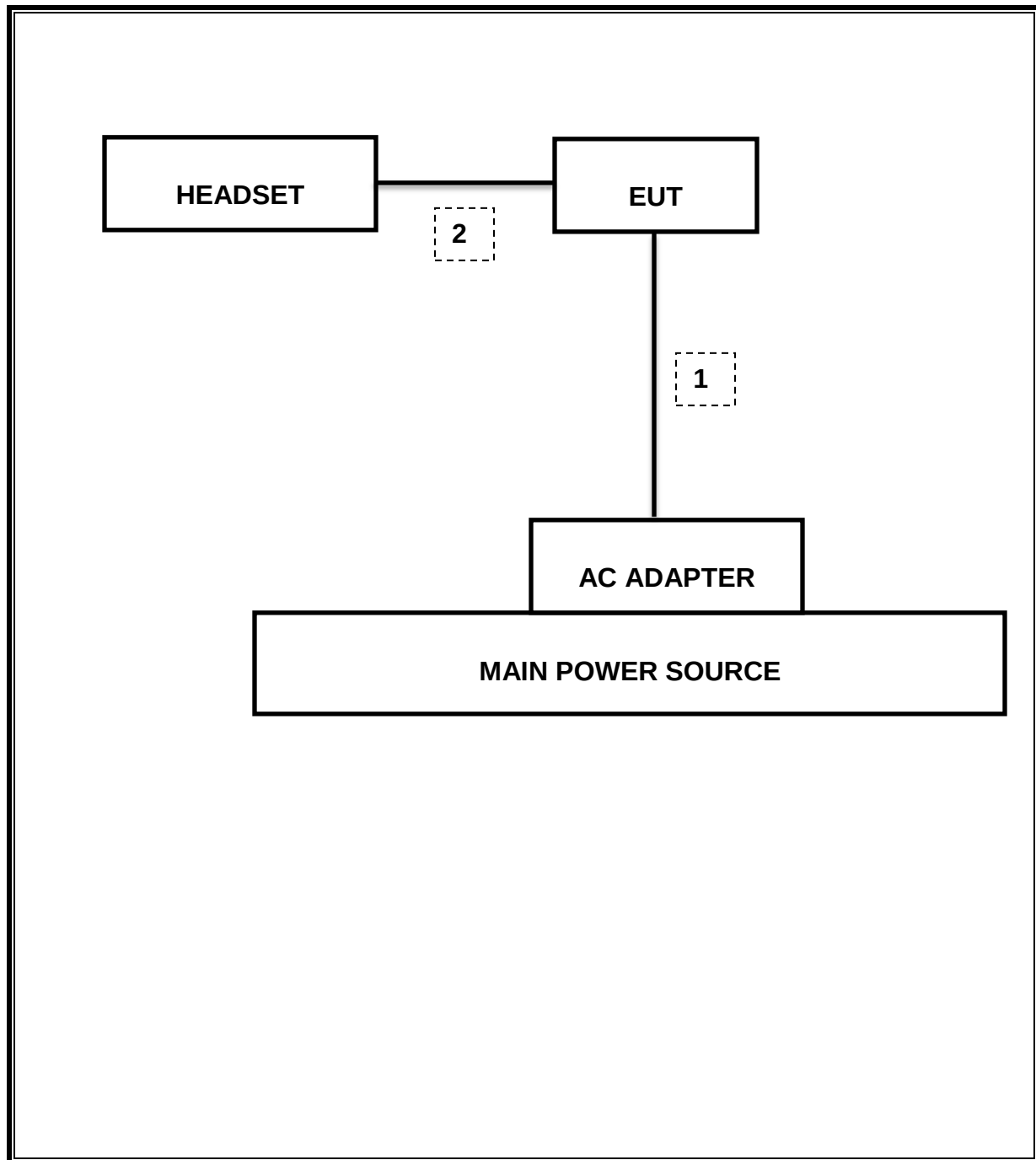
### I/O CABLES

| I/O Cable List |          |                      |                |            |                  |         |
|----------------|----------|----------------------|----------------|------------|------------------|---------|
| Cable No       | Port     | # of identical ports | Connector Type | Cable Type | Cable Length (m) | Remarks |
| 1              | DC Power | 1                    | Mini-USB       | Shielded   | 0.8m             | N/A     |
| 2              | Audio    | 1                    | Mini-Jack      | Unshielded | 1.0m             | N/A     |

### TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.  
EUT was set in the Hidden menu mode to enable BT communications.

**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

| Test Equipment List        |               |                        |             |          |
|----------------------------|---------------|------------------------|-------------|----------|
| Description                | Manufacturer  | Model                  | S/N         | Cal Due  |
| Antenna, Bilog, 30MHz-1GHz | SCHWARZBECK   | VULB9163               | 950         | 11-17-15 |
| Antenna, Horn, 18 GHz      | ETS           | 3115                   | 00167211    | 09-20-15 |
| Antenna, Horn, 40 GHz      | ETS           | 3116C                  | 00166255    | 09-23-15 |
| Antenna, Horn, 40 GHz      | ETS           | 3116C-PA               | 00168841    | 09-29-15 |
| Preamplifier, 1000 MHz     | Sonoma        | 310N                   | 341282      | 11-17-15 |
| Preamplifier, 18 GHz       | Miteq         | AFS42-00101800-25-S-42 | 1876511     | 11-18-15 |
| Spectrum Analyzer, 44 GHz  | Agilent / HP  | N9030A                 | MY54170614  | 09-23-15 |
| Bluetooth Tester           | TESCOM        | TC-3000C               | 3000C000546 | 11-17-15 |
| Average Power Sensor       | R&S           | NRZ-Z91                | 102681      | 11-17-15 |
| Average Power Sensor       | Agilent / HP  | U2000                  | MY54270007  | 09-23-15 |
| EMI Test Receive, 40 GHz   | R&S           | ESU40                  | 100439      | 11-17-15 |
| EMI Test Receive, 3 GHz    | R&S           | ESR3                   | 101832      | 11-17-15 |
| Attenuator / Switch driver | HP            | 11713A                 | 3748A04272  | N/A      |
| Low Pass Filter 3GHz       | Micro-Tronics | LPS17541               | 009         | 11-17-15 |
| High Pass Filter 5GHz      | Micro-Tronics | HPS17542               | 009         | 11-17-15 |
| High Pass Filter 6GHz      | Micro-Tronics | HPM17543               | 010         | 11-17-15 |
| LISN                       | R&S           | ENV-216                | 101836      | 04-09-16 |
| LISN                       | R&S           | ENV-216                | 101837      | 04-09-16 |

## 7. SUMMARY TABLE

| FCC Part Section   | Test Description                        | Test Limit                            | Test Condition       | Test Result | Worst Case        |
|--------------------|-----------------------------------------|---------------------------------------|----------------------|-------------|-------------------|
| 2.1049             | Occupied Band width (99%)               | N/A                                   | Conducted            | Pass        | 1.199 MHz         |
| 2.1051, 15.247 (d) | Band Edge / Conducted Spurious Emission | -20dBc                                |                      | Pass        | -38.940 dBm       |
| 15.247 (b)(1)      | TX conducted output power               | <21dBm                                |                      | Pass        | 9.92 dBm (AV)     |
| 15.247 (a)(1)      | Hopping frequency separation            | > 25KHz                               |                      | Pass        | 1 MHz             |
| 15.247 (a)(1)(iii) | Number of Hopping channels              | More than 15 non-overlapping channels |                      | Pass        | 79                |
| 15.247 (a)(1)(iii) | Avg Time of Occupancy                   | < 0.4sec                              |                      | Pass        | 0.317 sec         |
| 15.207 (a)         | AC Power Line conducted emissions       | Section 10                            | Power Line conducted | Pass        | 56.68 dBuV (QP)   |
| 15.205, 15.209     | Radiated Spurious Emission              | < 54dBuV/m                            | Radiated             | Pass        | 34.62 dBuV/m (AV) |

## 8. ANTENNA PORT TEST RESULTS

### 8.1. 20 dB AND 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

DA 00-705: 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.

#### RESULTS

##### 8.1.1. BASIC DATA RATE GFSK MODULATION

| Channel | Frequency<br>[MHz] | 20 dB Bandwidth<br>[MHz] | 99% Bandwidth<br>[MHz] |
|---------|--------------------|--------------------------|------------------------|
| Low     | 2402               | 0.925                    | 0.899                  |
| Mid     | 2440               | 0.936                    | 0.900                  |
| High    | 2480               | 0.932                    | 0.900                  |
| Worst   |                    | 0.936                    | 0.900                  |

##### 8.1.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION

| Channel | Frequency<br>[MHz] | 20 dB Bandwidth<br>[MHz] | 99% Bandwidth<br>[MHz] |
|---------|--------------------|--------------------------|------------------------|
| Low     | 2402               | 1.194                    | 1.166                  |
| Mid     | 2440               | 1.195                    | 1.199                  |
| High    | 2480               | 1.195                    | 1.199                  |
| Worst   |                    | 1.195                    | 1.199                  |

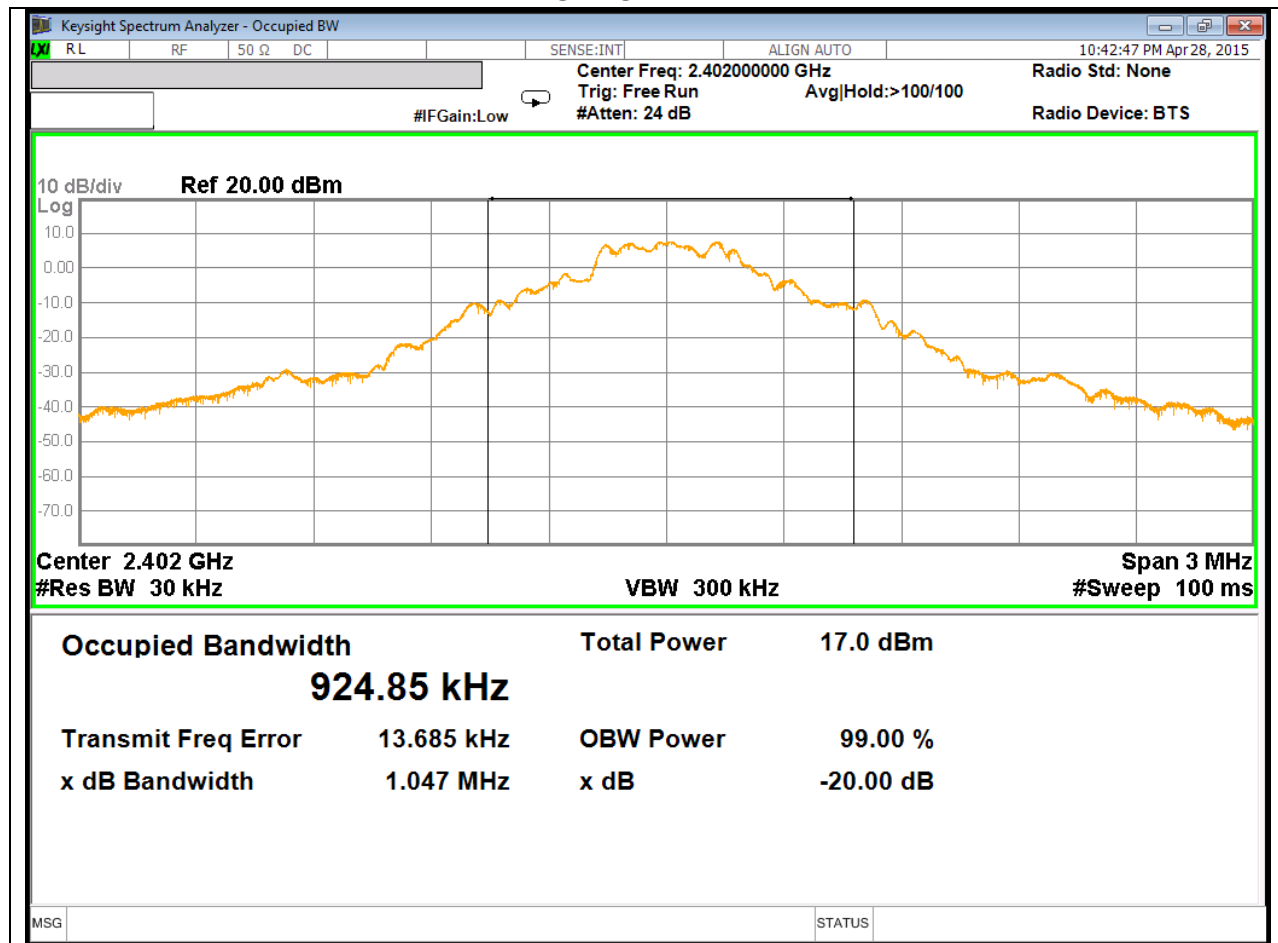
##### 8.1.3. ENHANCED DATA RATE 8PSK MODULATION

| Channel | Frequency<br>[MHz] | 20 dB Bandwidth<br>[MHz] | 99% Bandwidth<br>[MHz] |
|---------|--------------------|--------------------------|------------------------|
| Low     | 2402               | 1.177                    | 1.195                  |
| Mid     | 2440               | 1.177                    | 1.196                  |
| High    | 2480               | 1.177                    | 1.195                  |
| Worst   |                    | 1.177                    | 1.196                  |

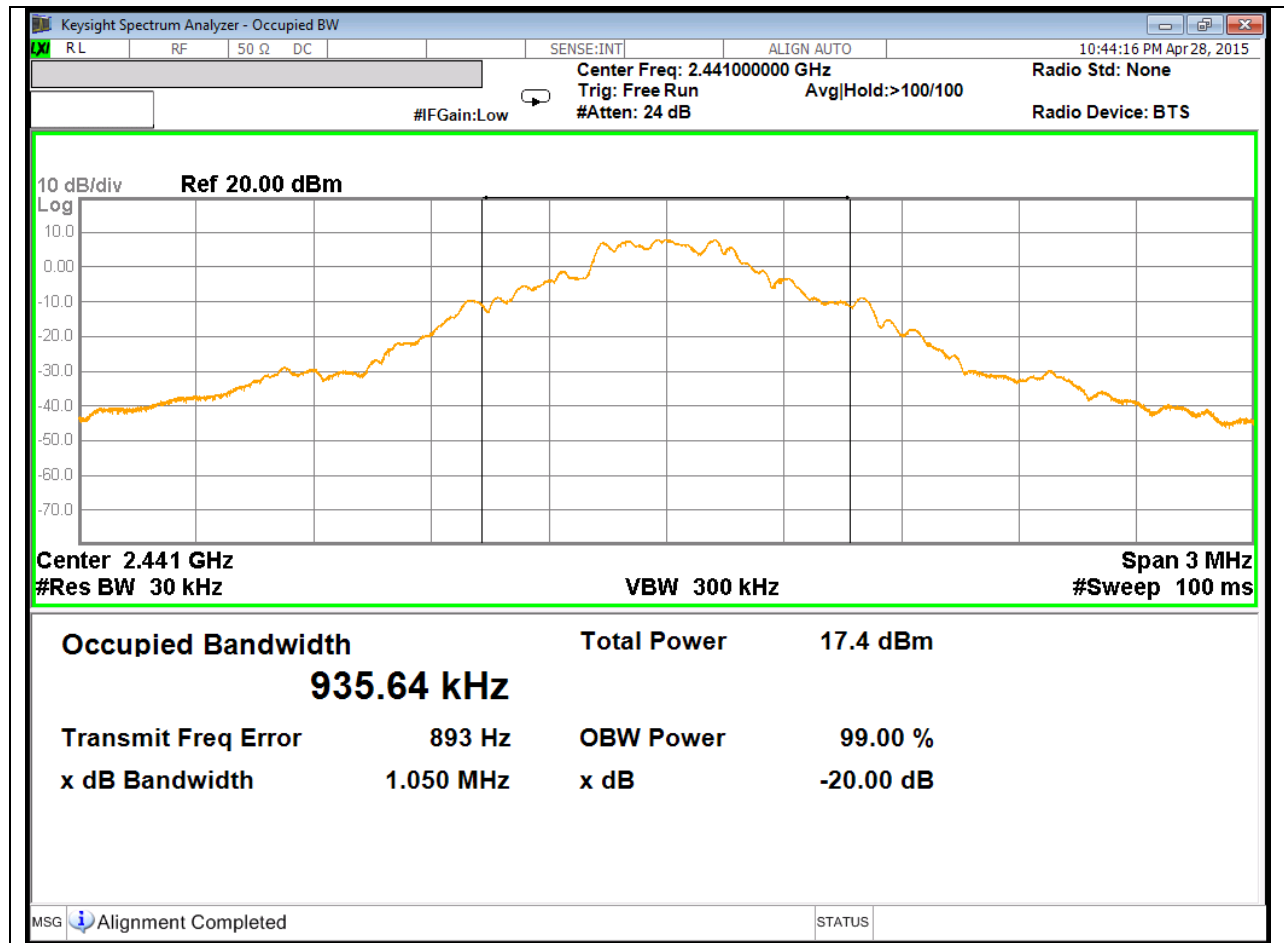
## 8.1.4. 20 dB AND 99% BANDWIDTH PLOTS

### GFSK 20 dB BANDWIDTH

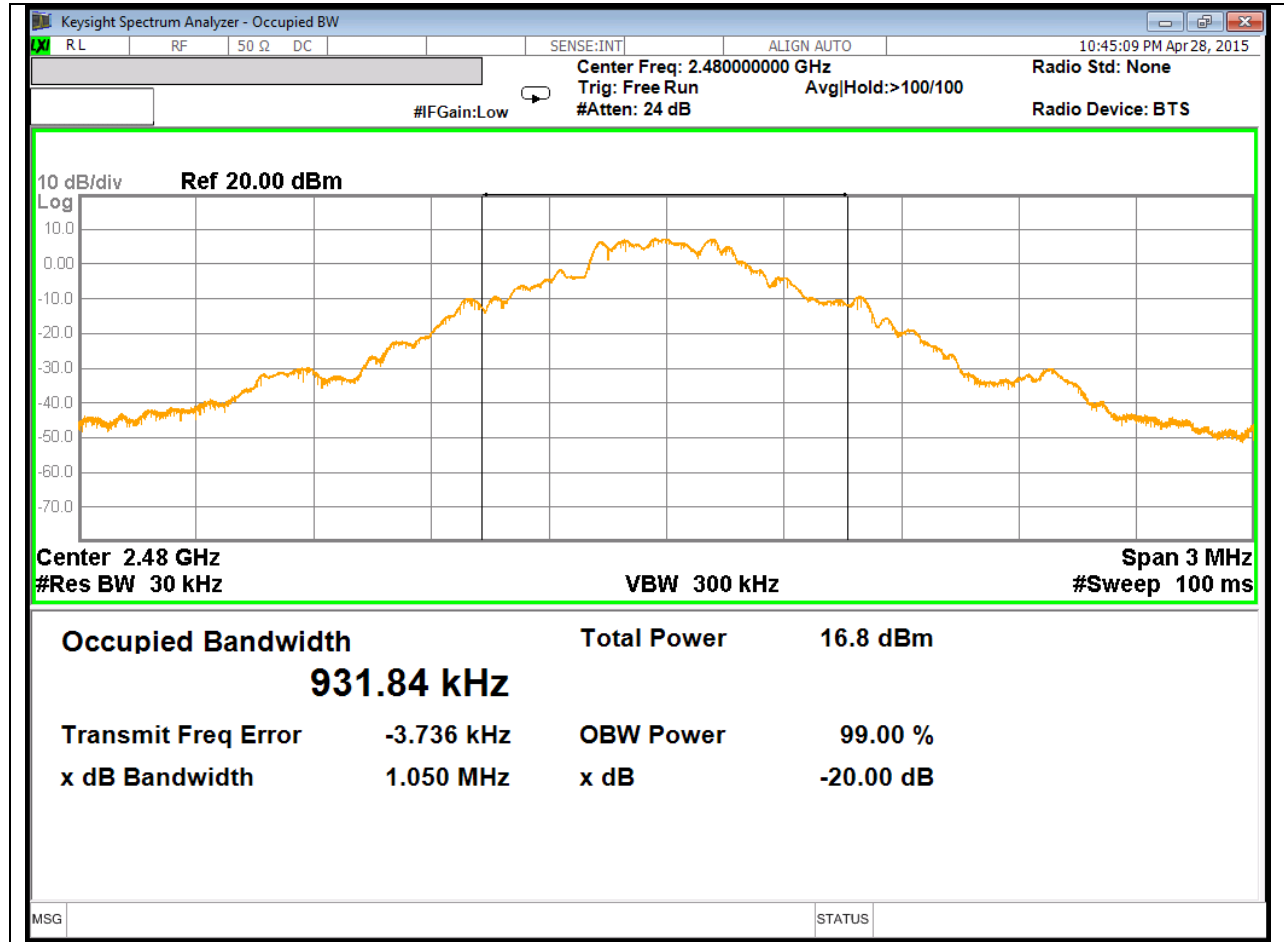
#### LOW CHANNEL



### MID CHANNEL

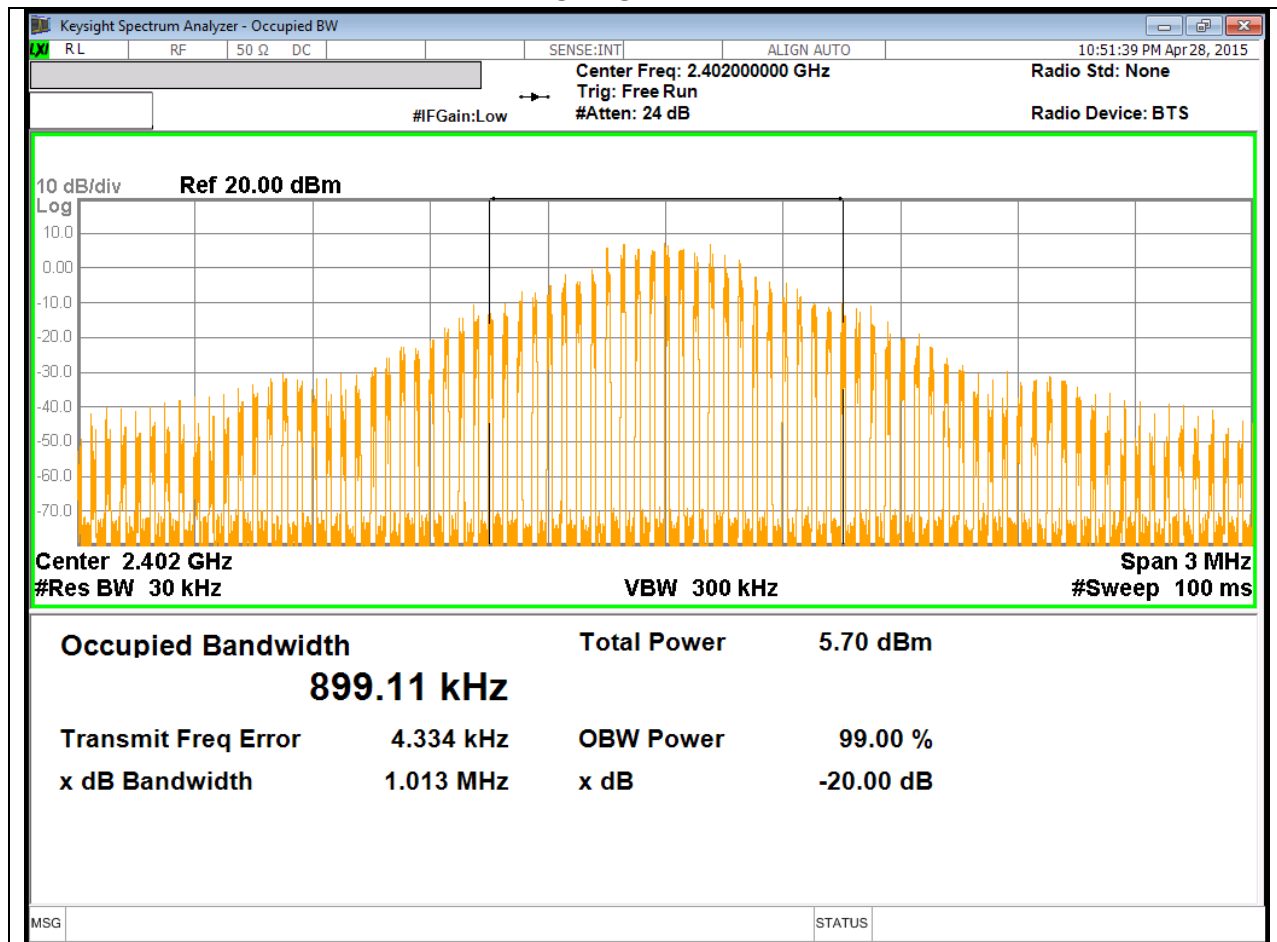


## HIGH CHANNEL

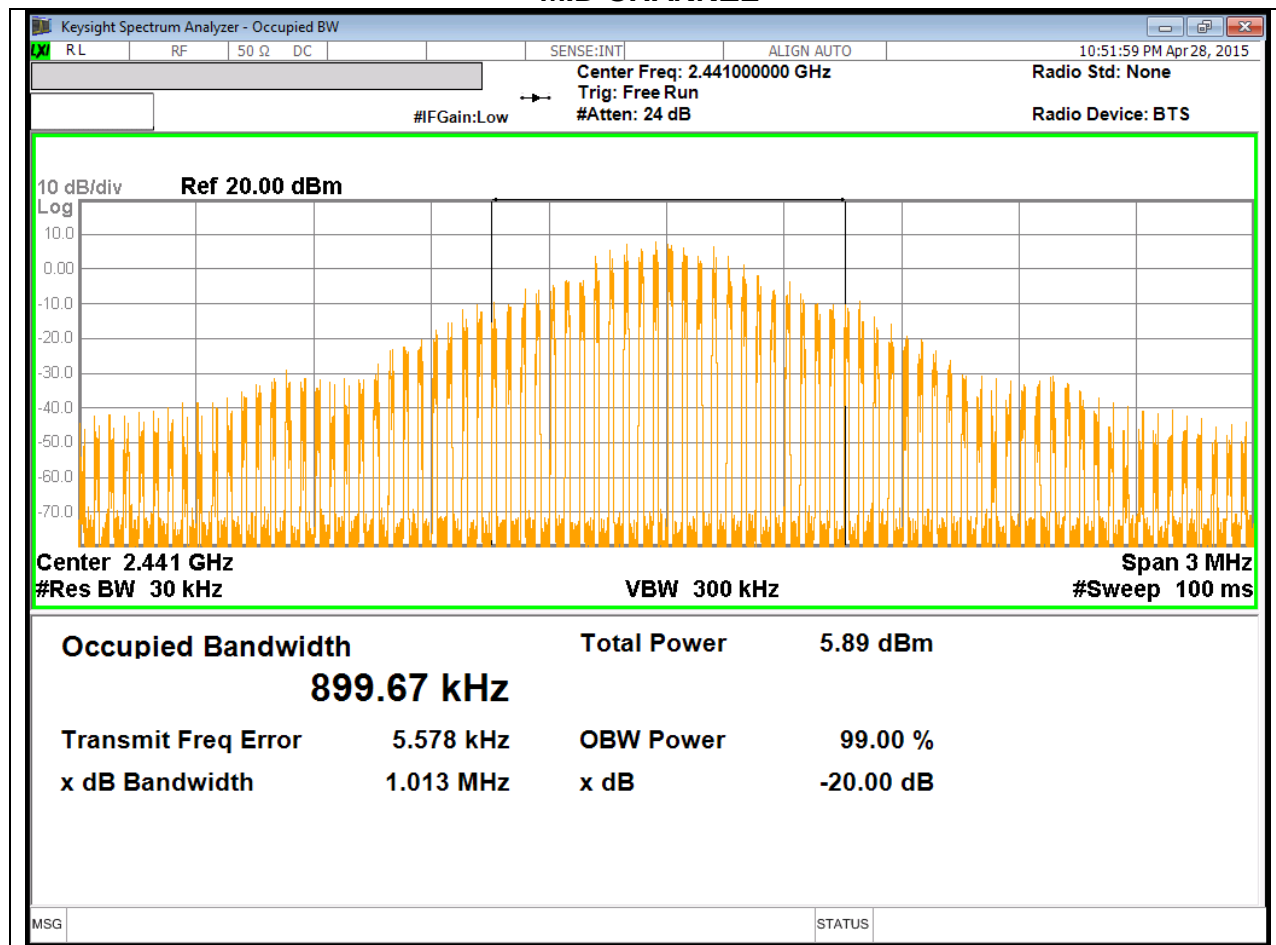


**GFSK 99% BANDWIDTH**

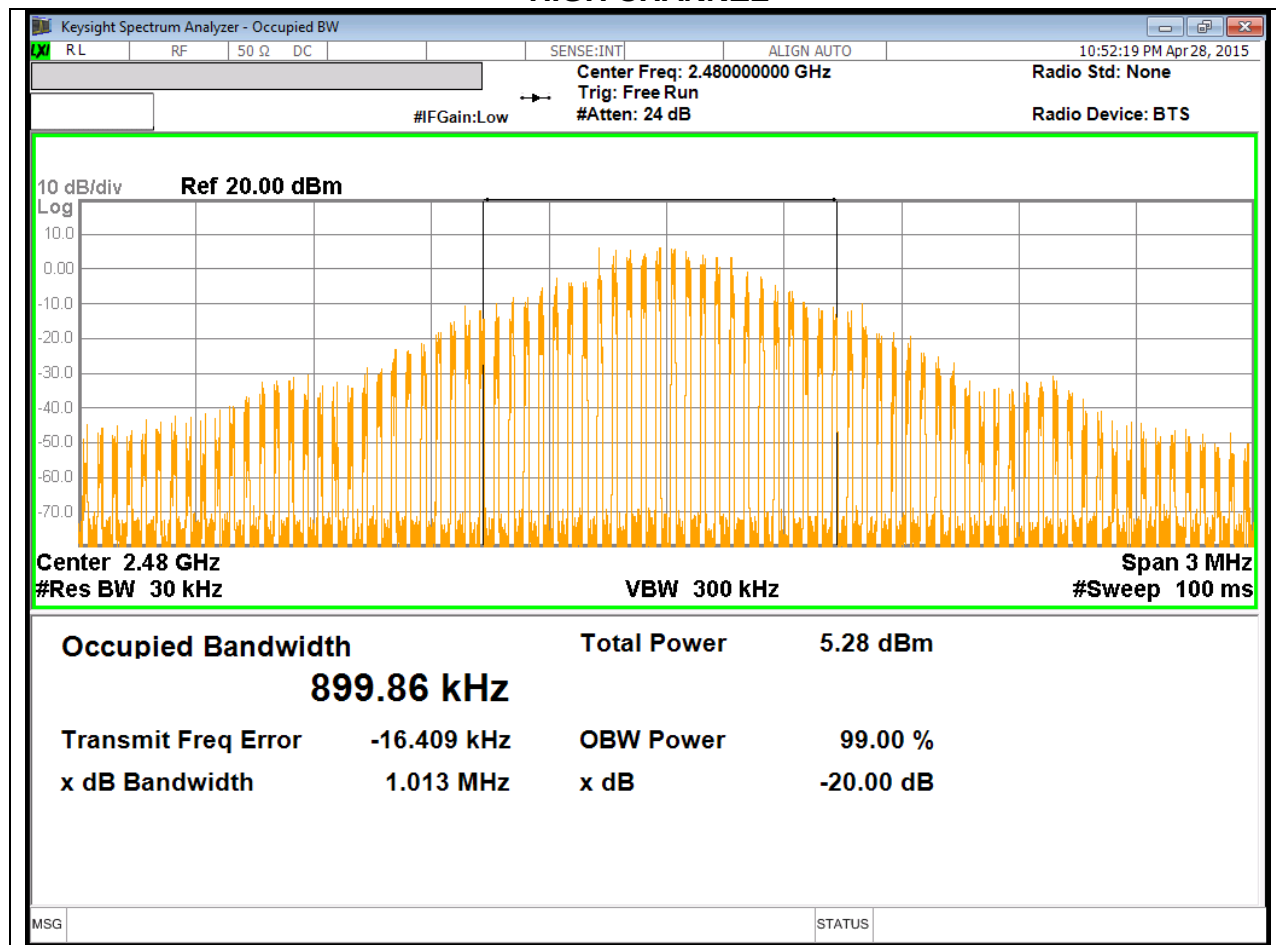
**LOW CHANNEL**



### MID CHANNEL

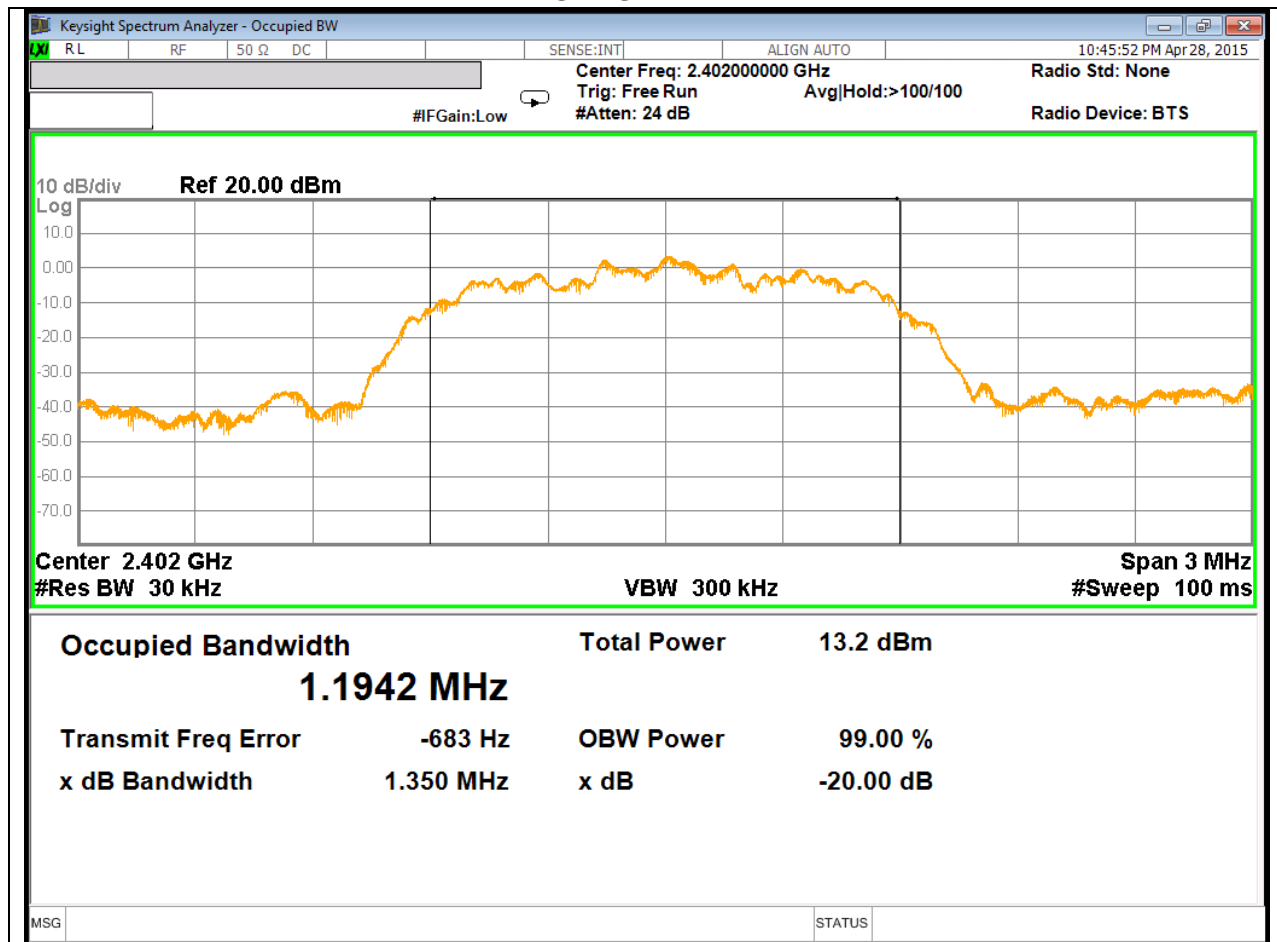


## HIGH CHANNEL

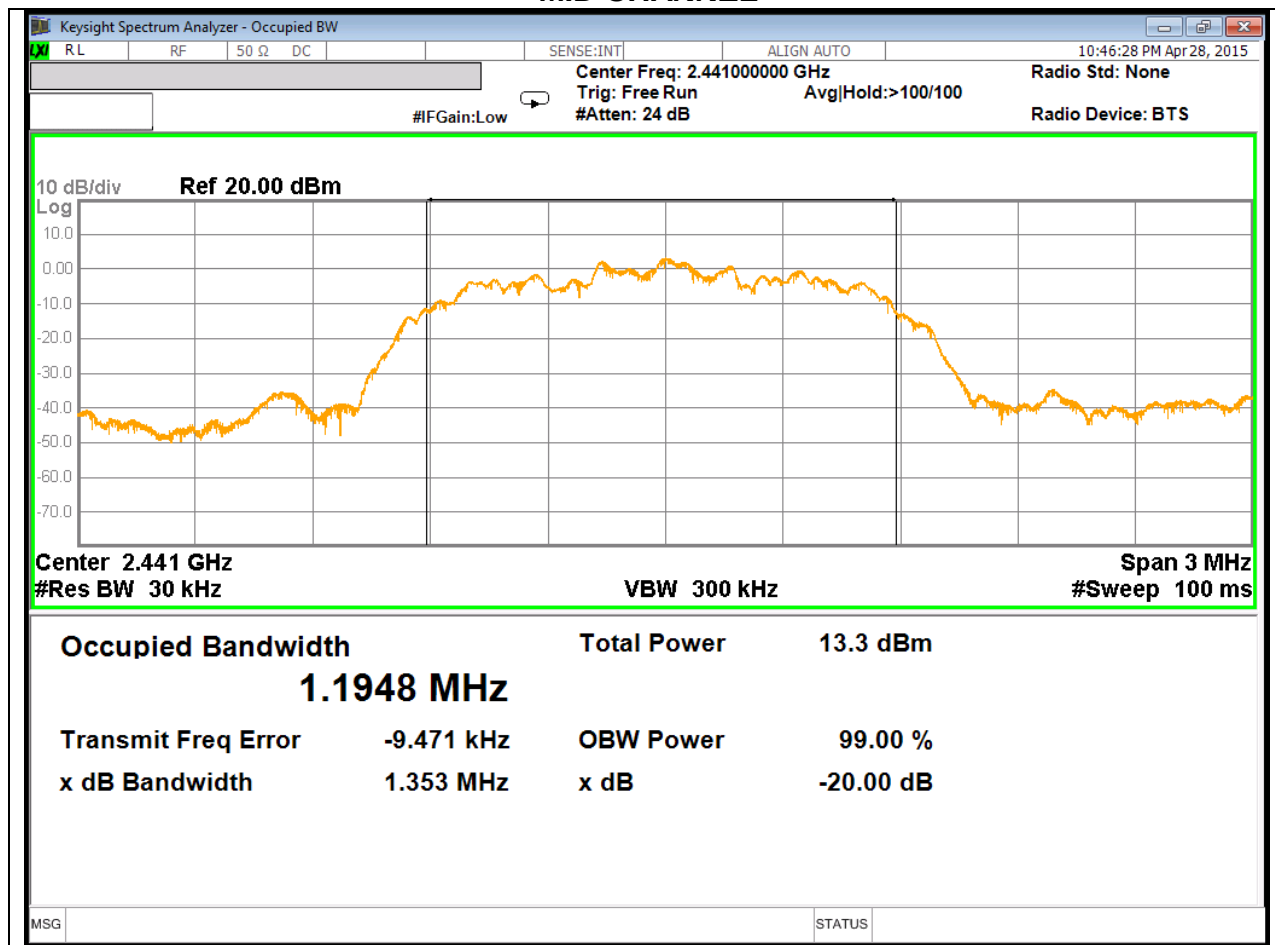


**Pi/4-DQPSK 20 dB BANDWIDTH**

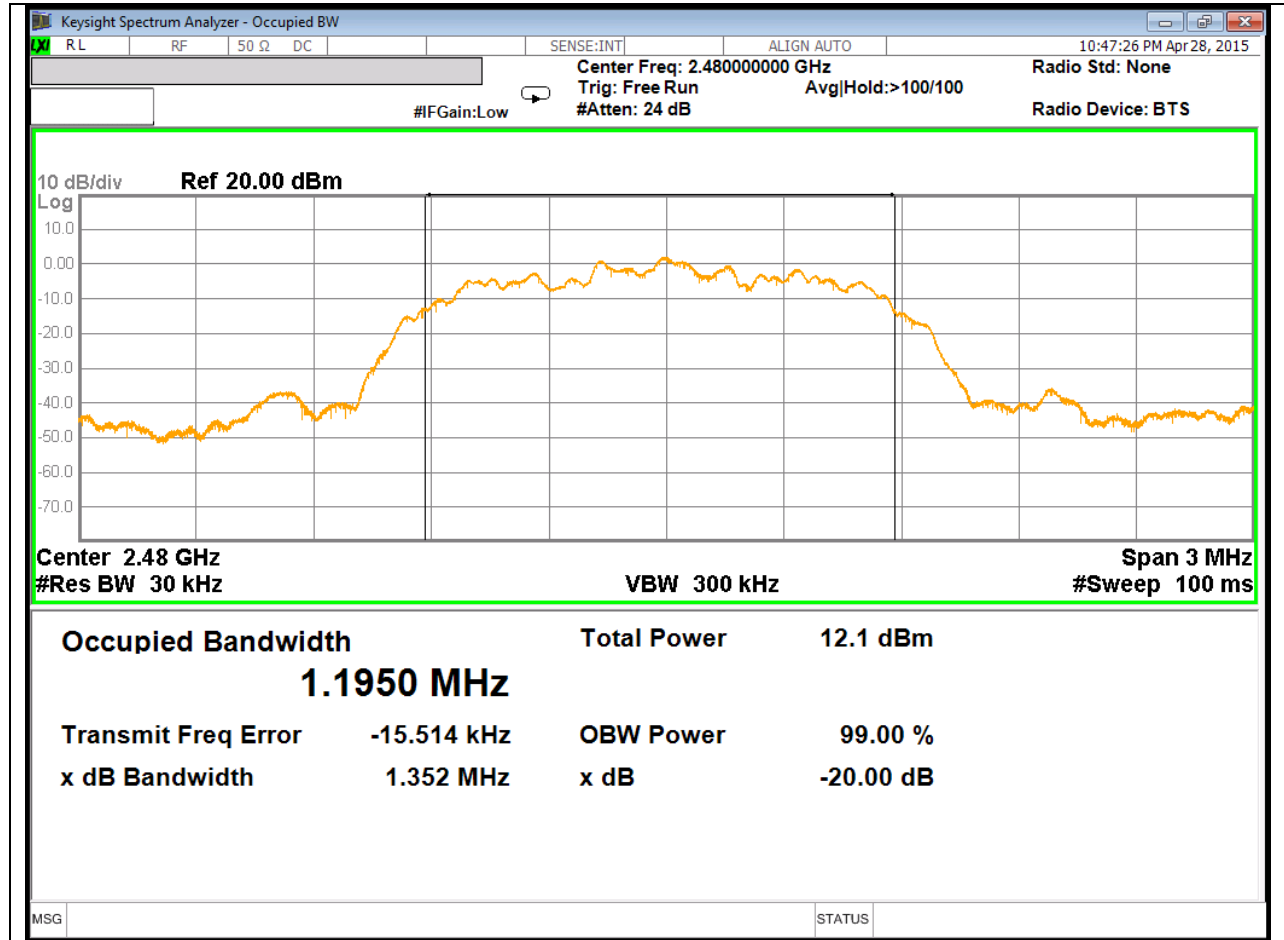
**LOW CHANNEL**



### MID CHANNEL

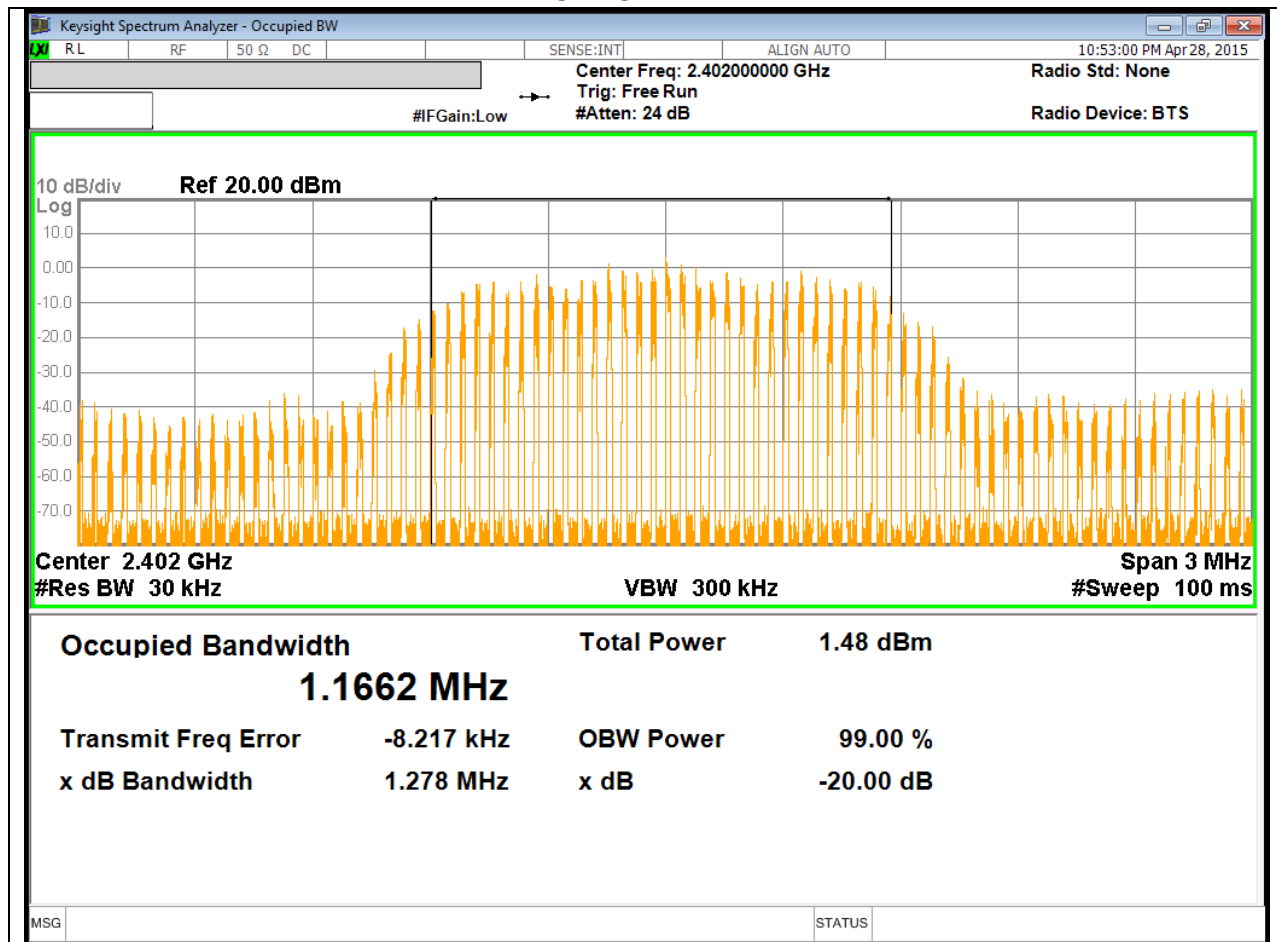


## HIGH CHANNEL

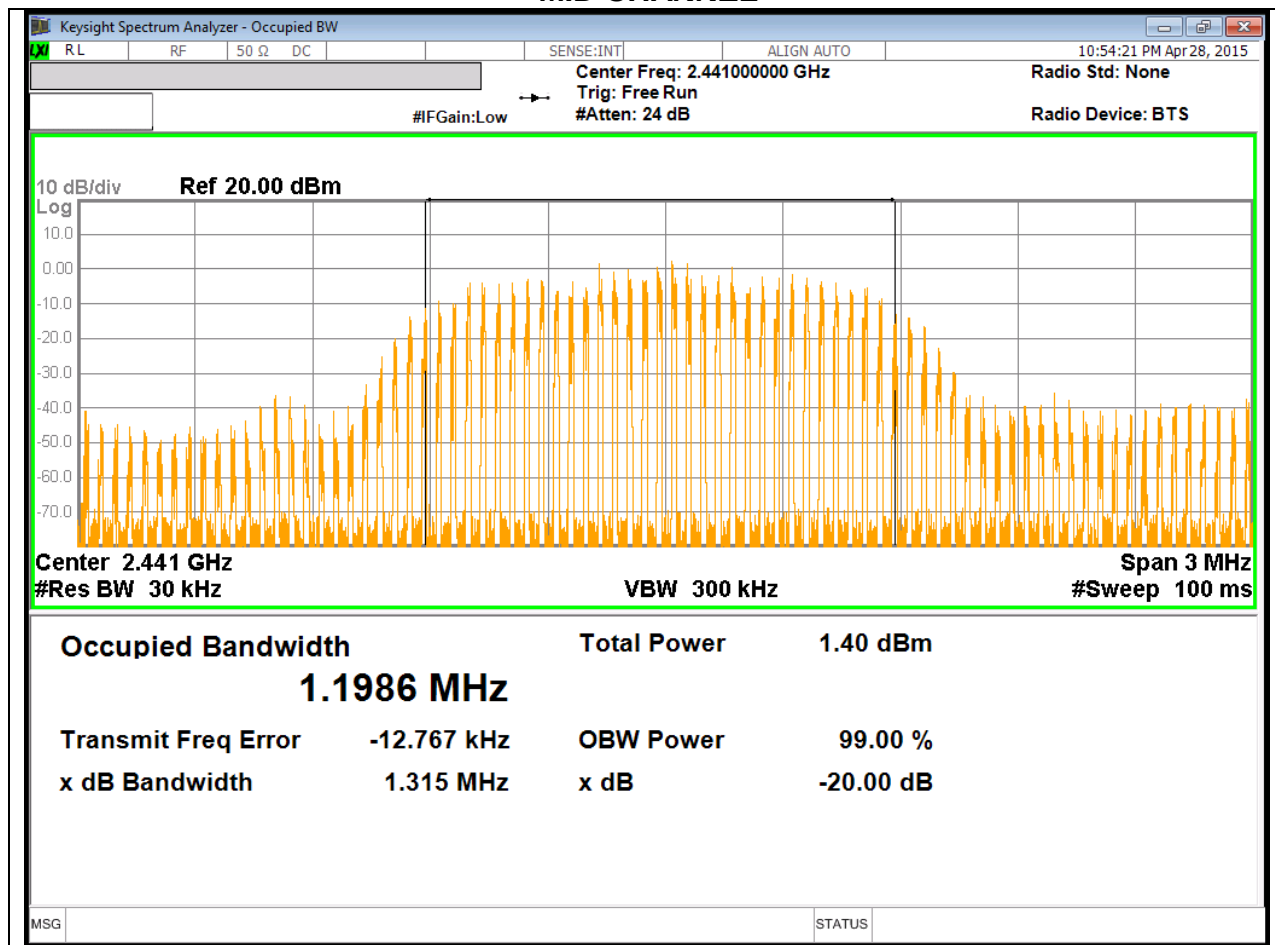


**Pi/4-DQPSK 99% BANDWIDTH**

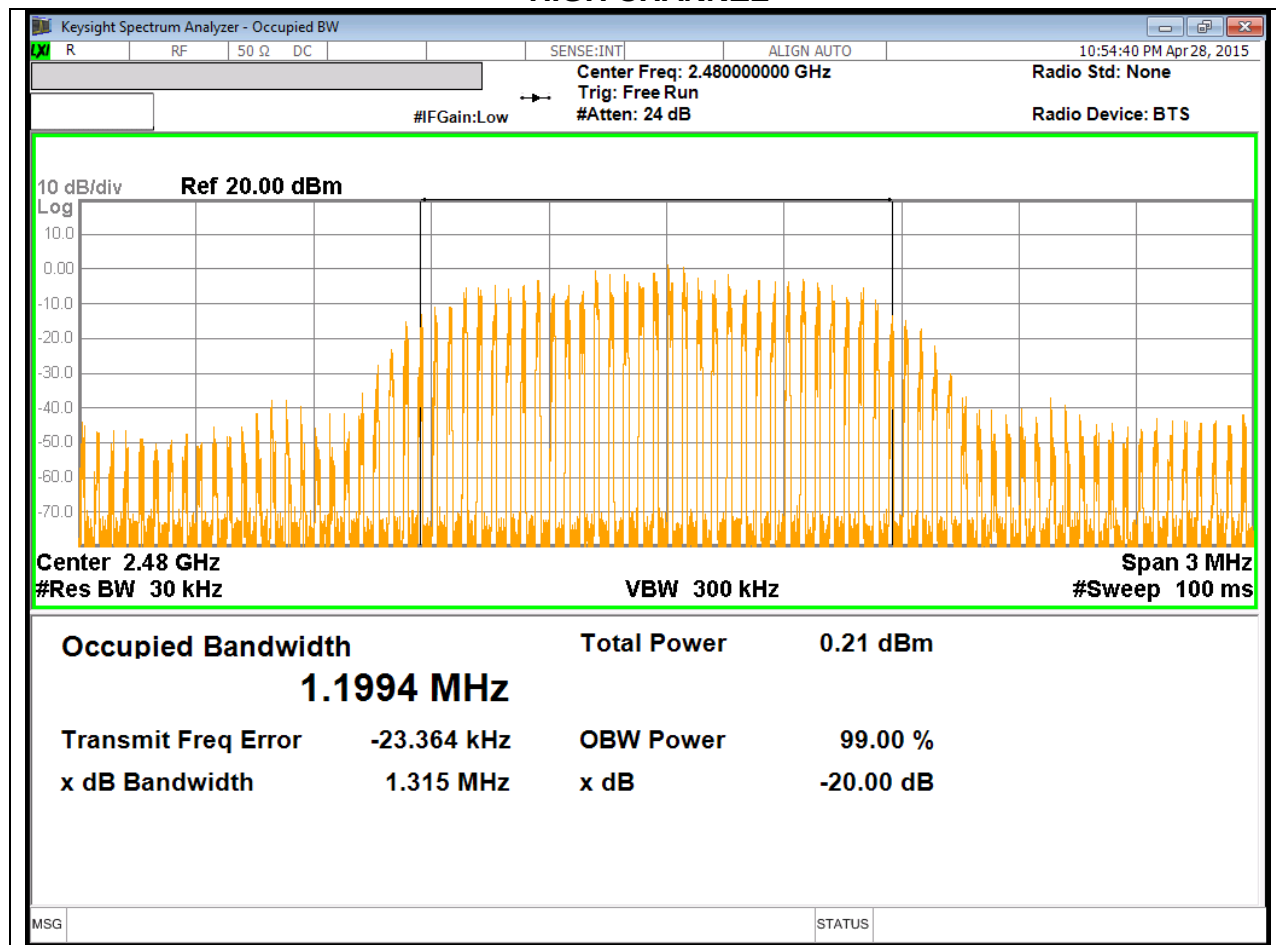
**LOW CHANNEL**



### MID CHANNEL

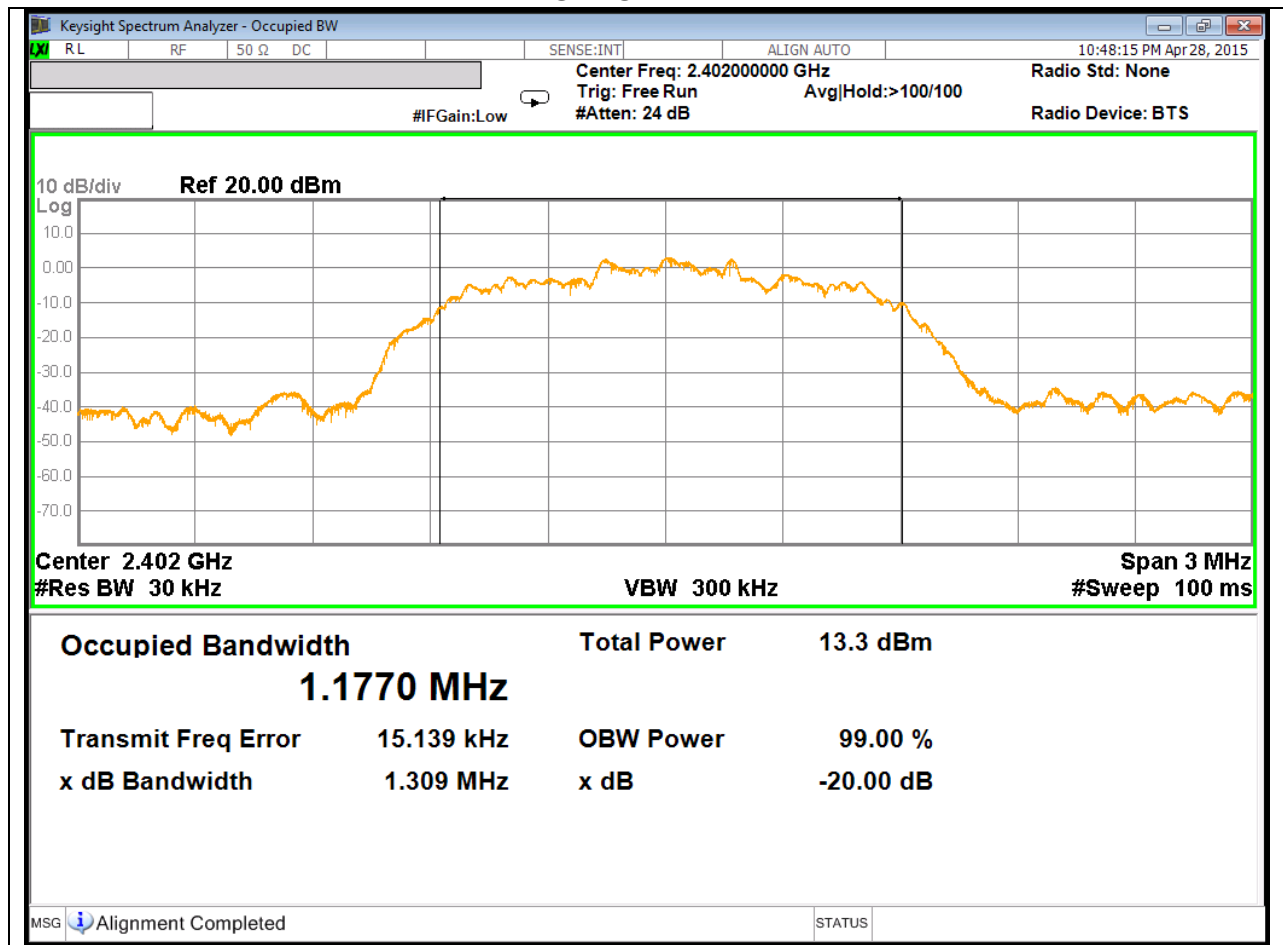


## HIGH CHANNEL

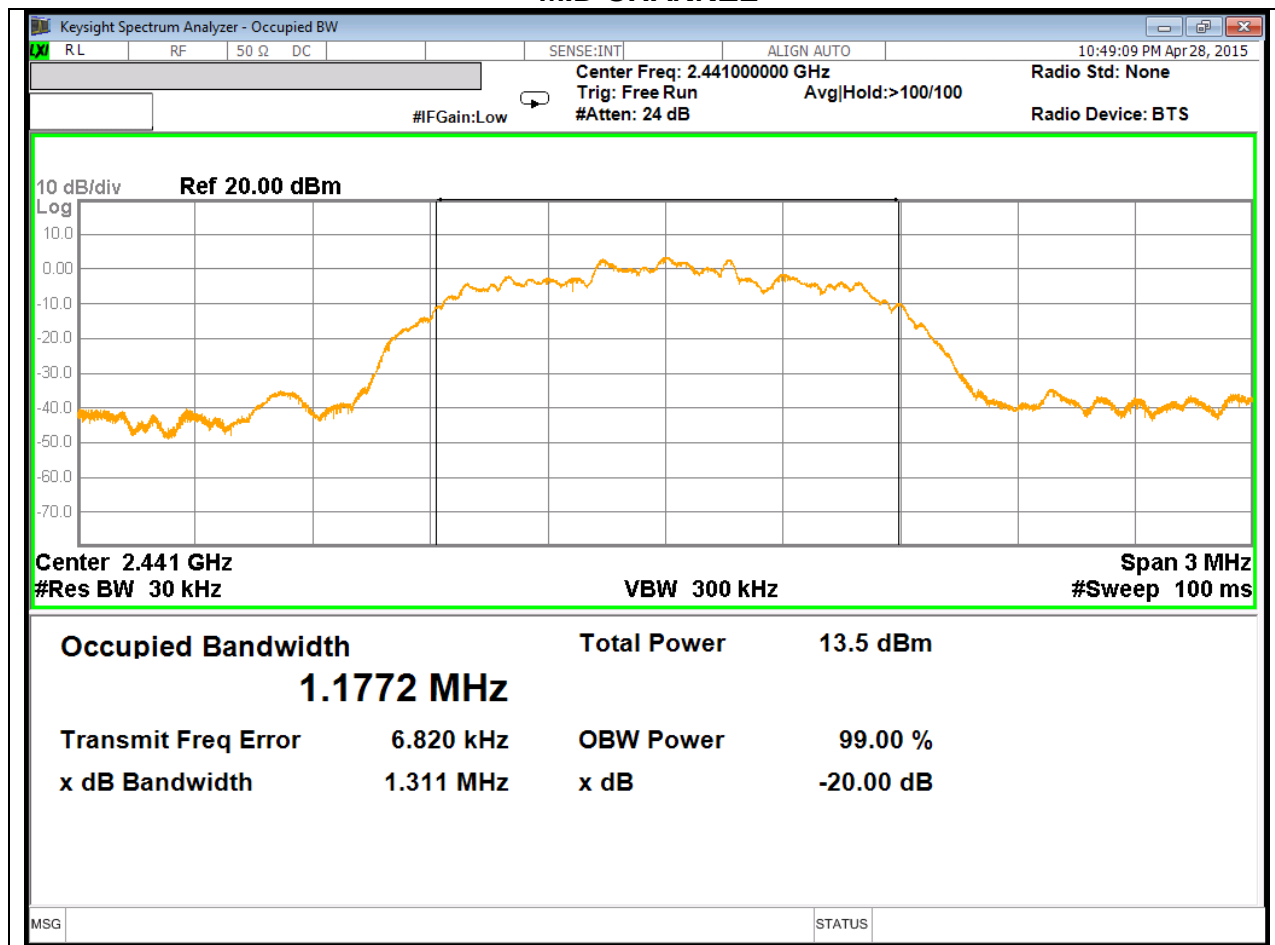


**8PSK 20 dB BANDWIDTH**

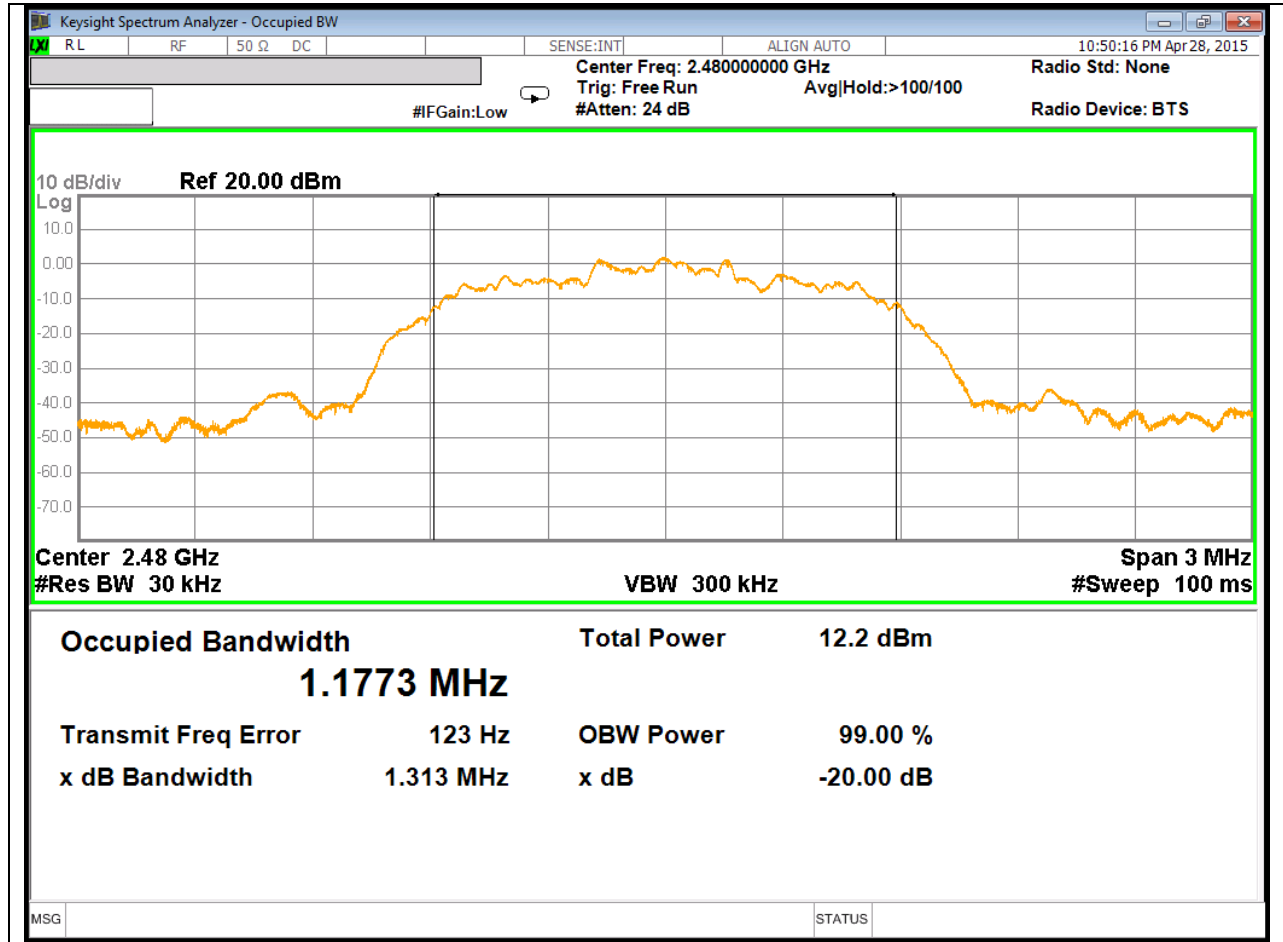
**LOW CHANNEL**



### MID CHANNEL

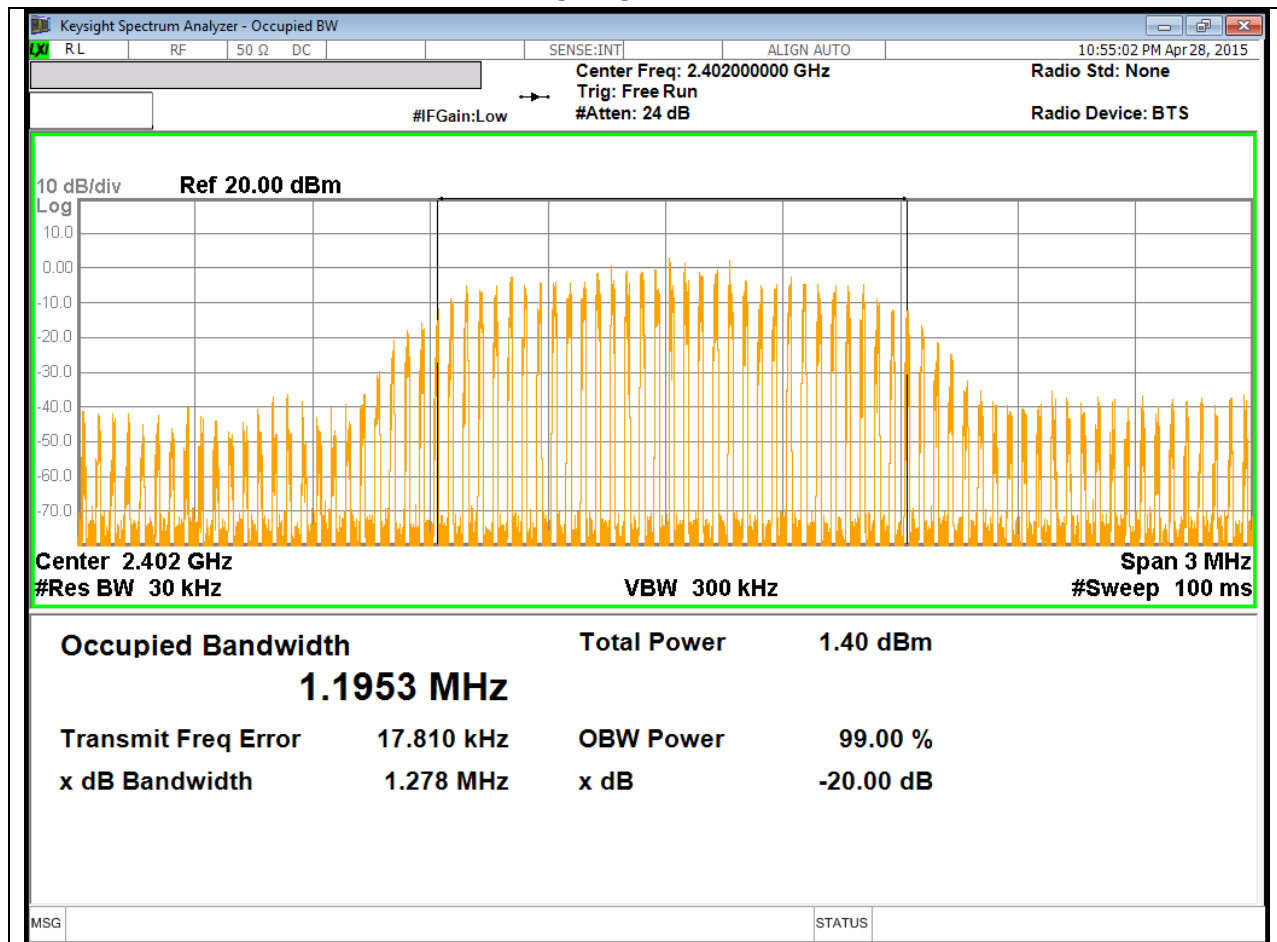


# HIGH CHANNEL

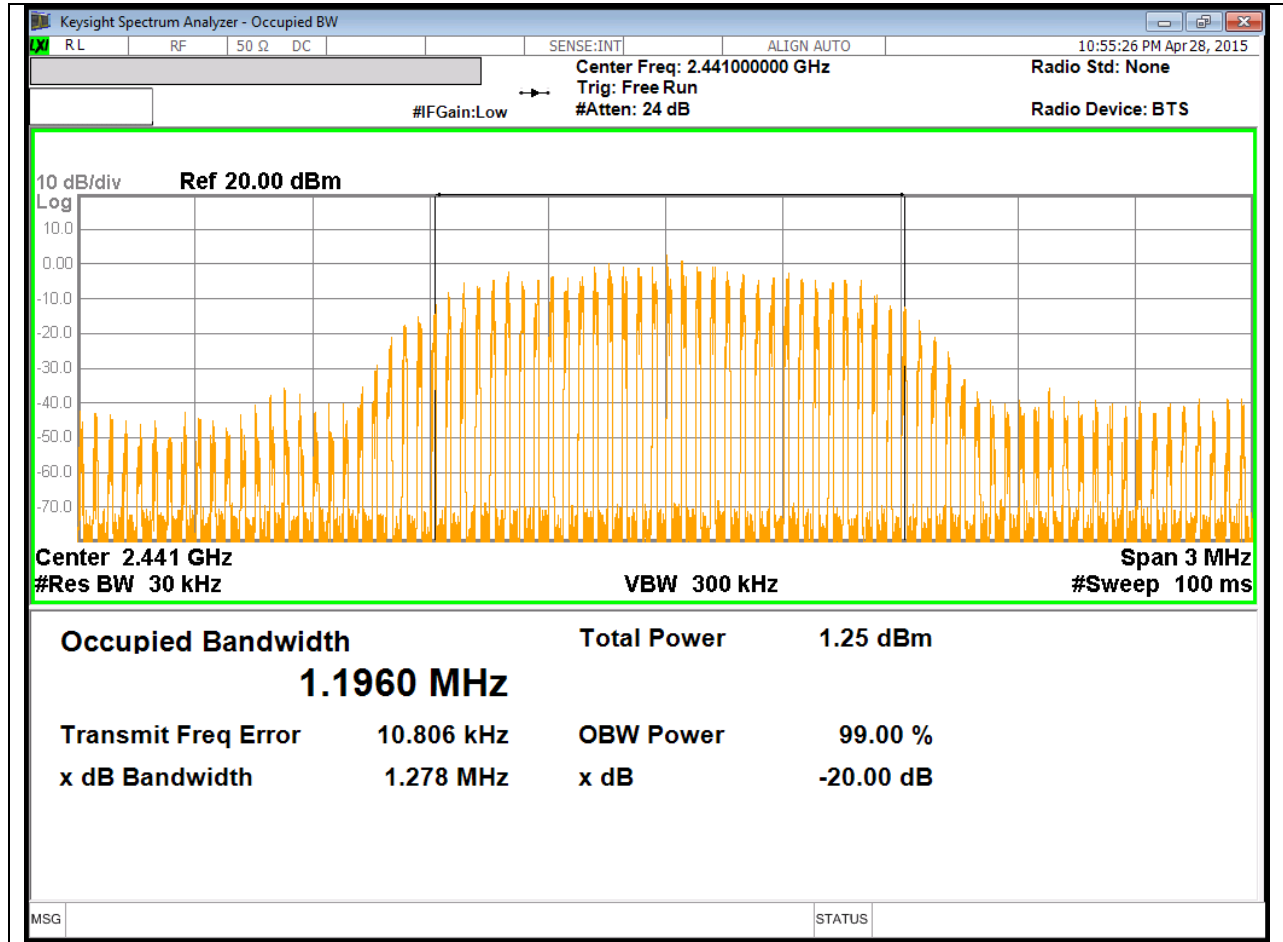


**8PSK 99% BANDWIDTH**

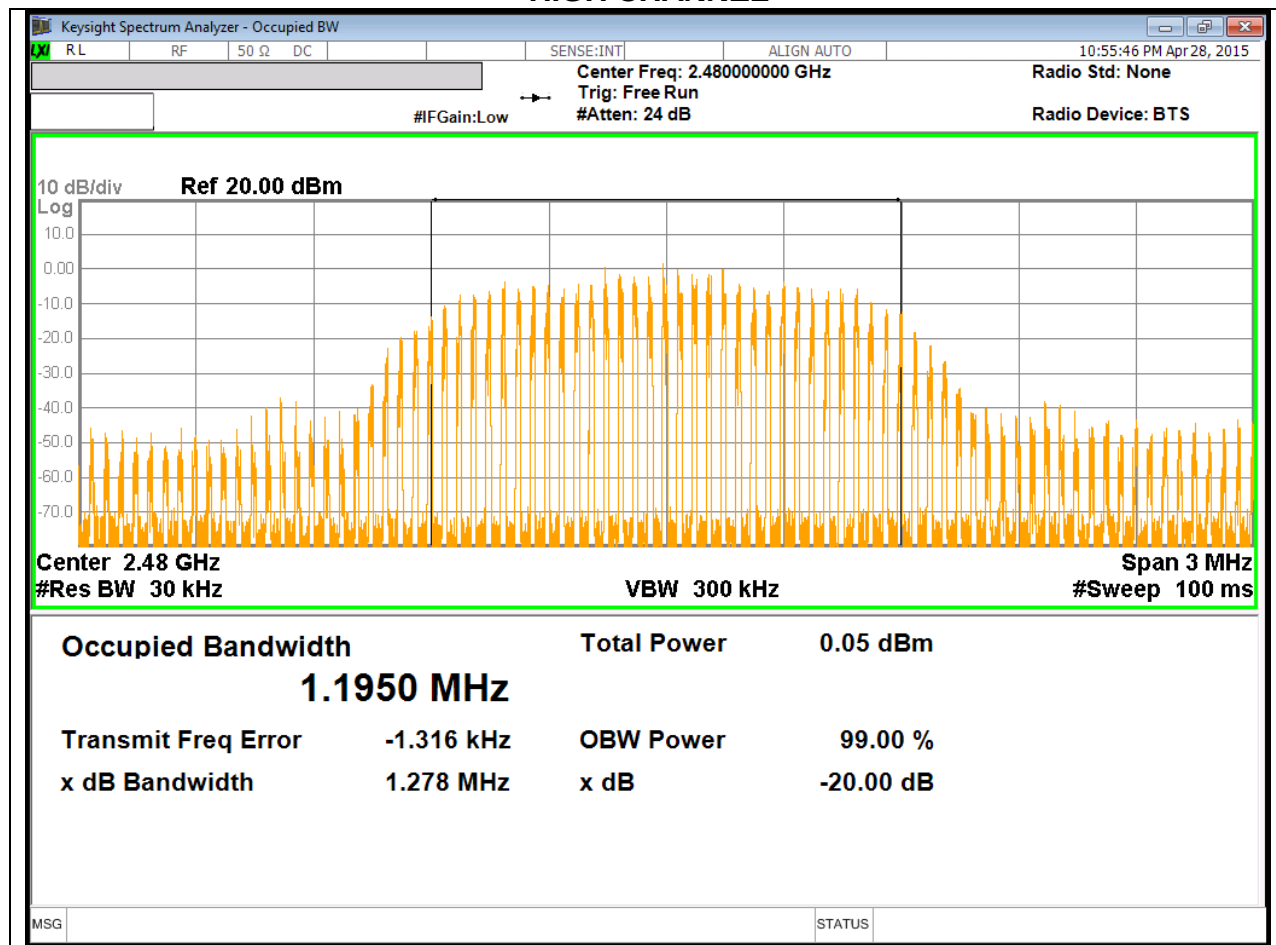
**LOW CHANNEL**



### MID CHANNEL



## HIGH CHANNEL



## **8.2. HOPPING FREQUENCY SEPARATION**

### **LIMIT**

FCC §15.247 (a) (1)

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

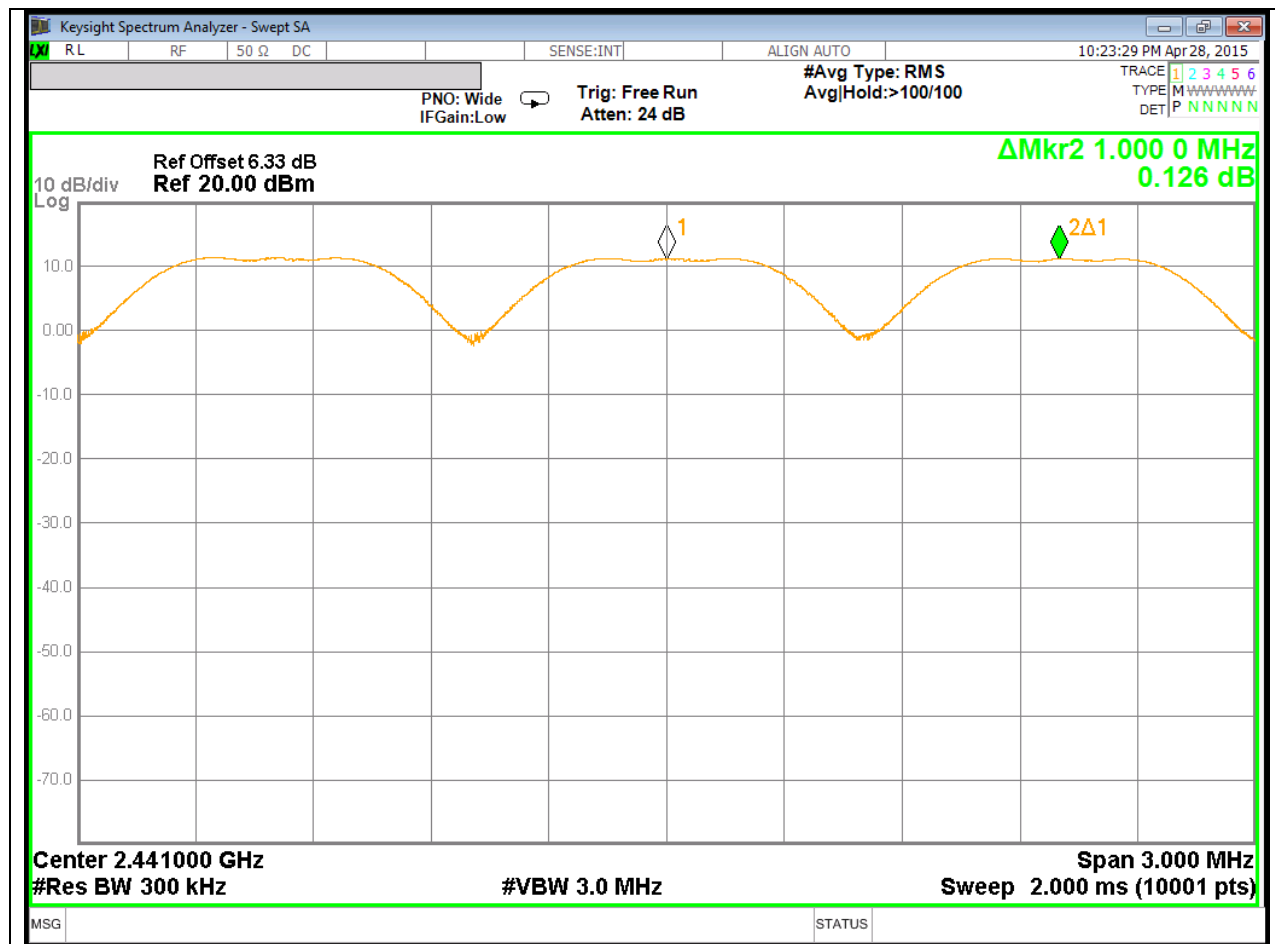
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

### **TEST PROCEDURE**

DA 00-705: 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 PLOT



### **8.3. NUMBER OF HOPPING CHANNELS**

#### **LIMIT**

FCC §15.247 (a) (1) (iii)

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

#### **TEST PROCEDURE**

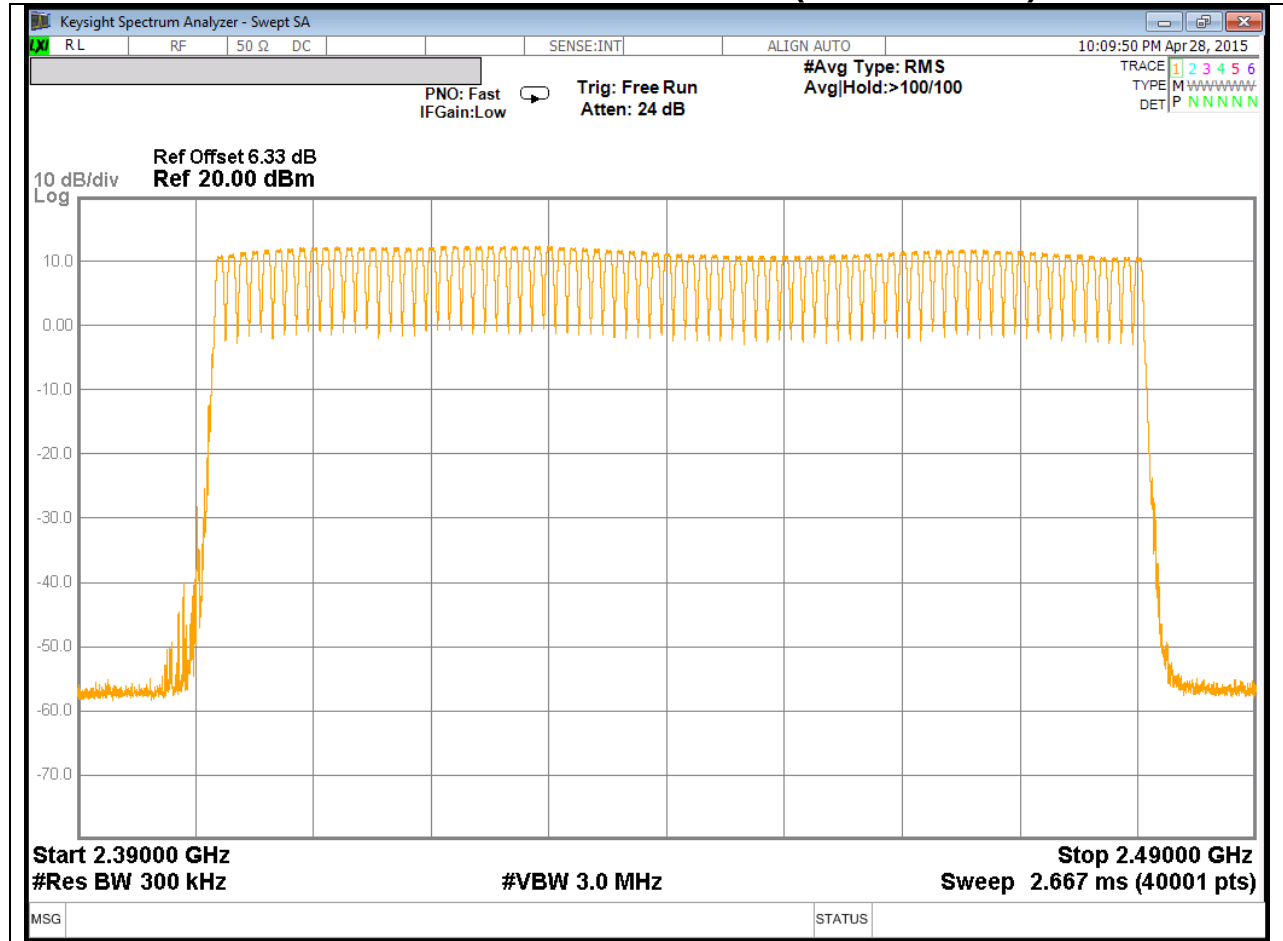
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

#### **RESULTS**

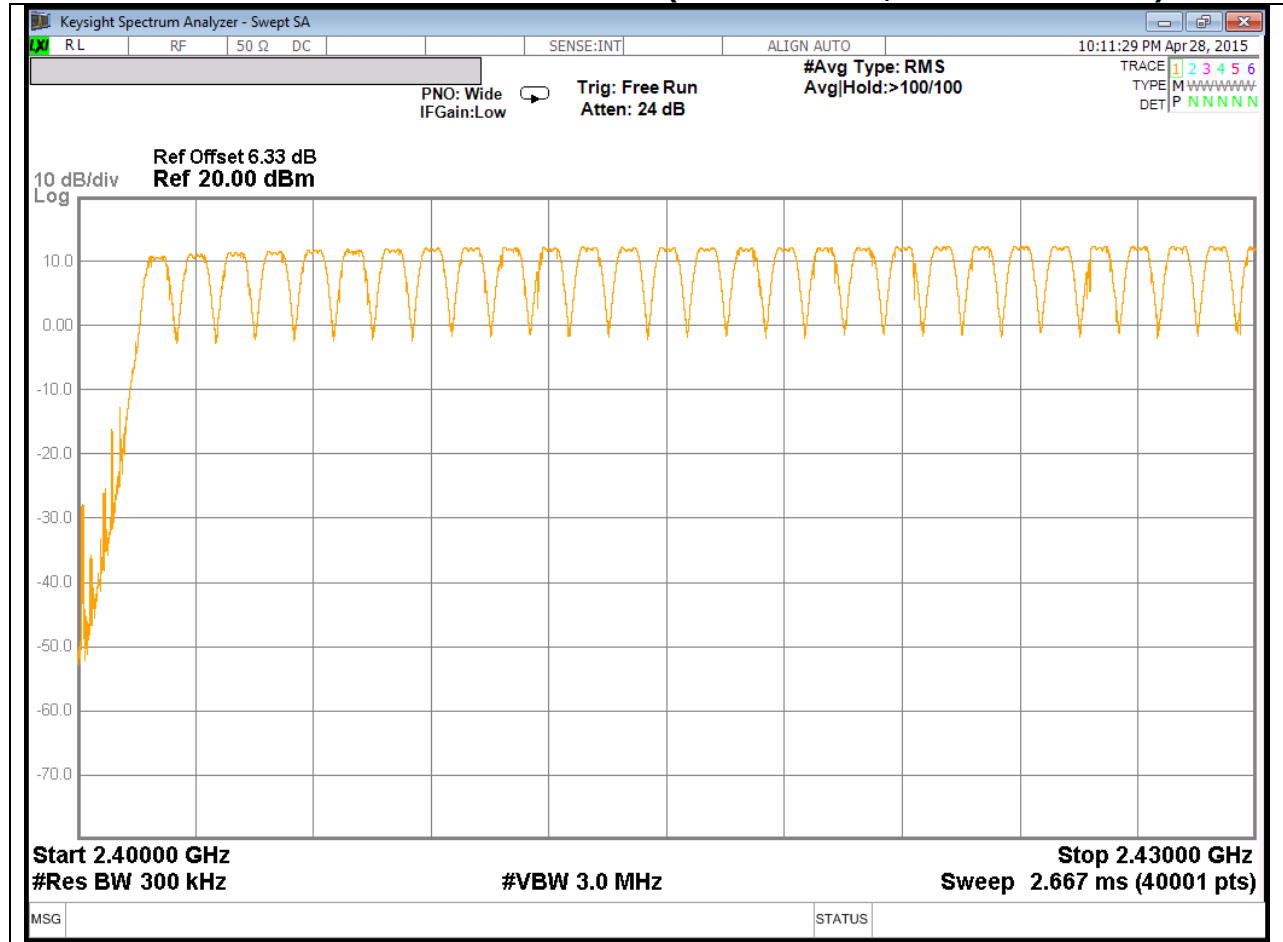
Normal Mode: 79 Channels observed.

**NUMBER OF HOPPING CHANNELS PLOTS**

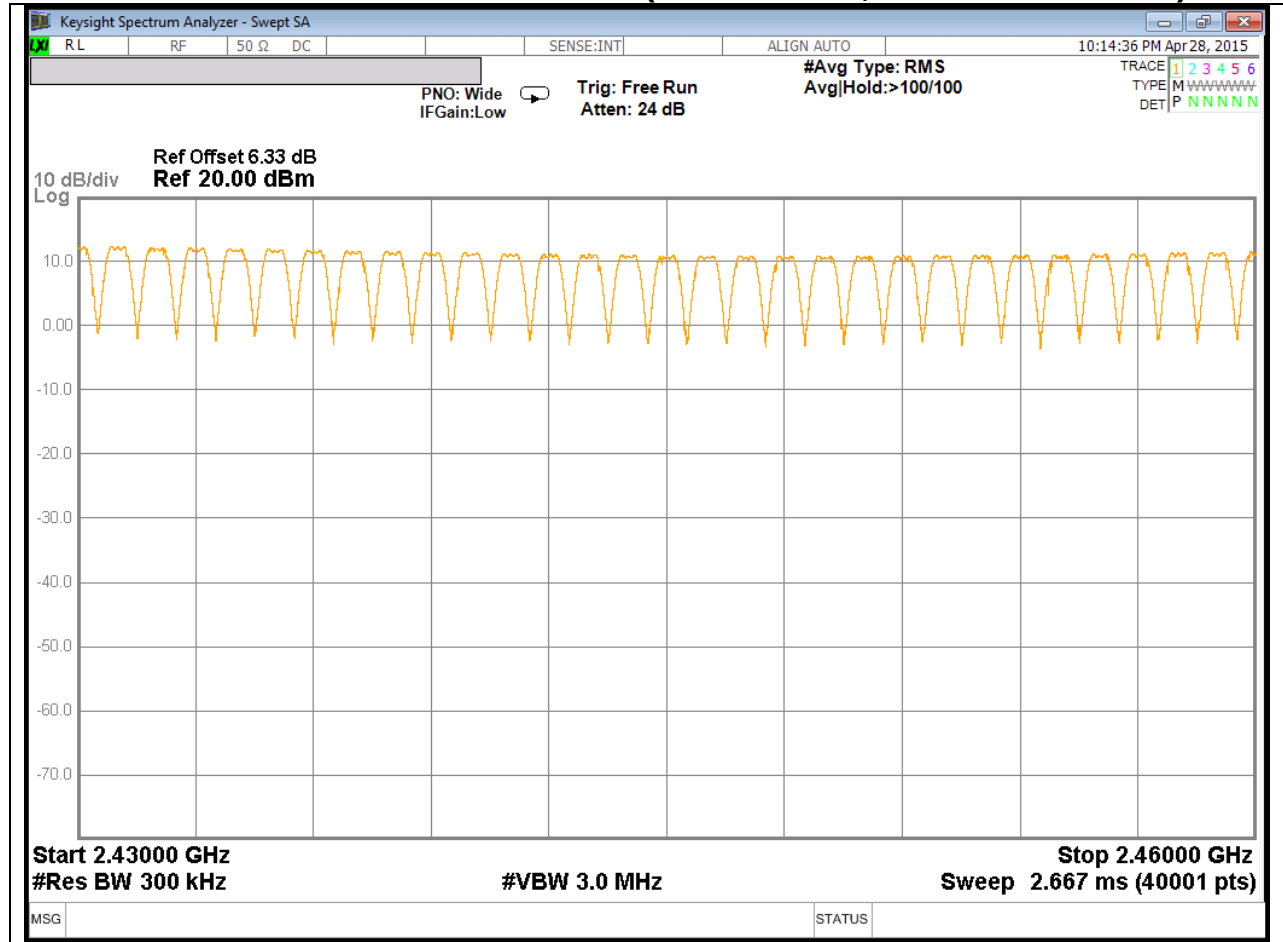
**NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)**



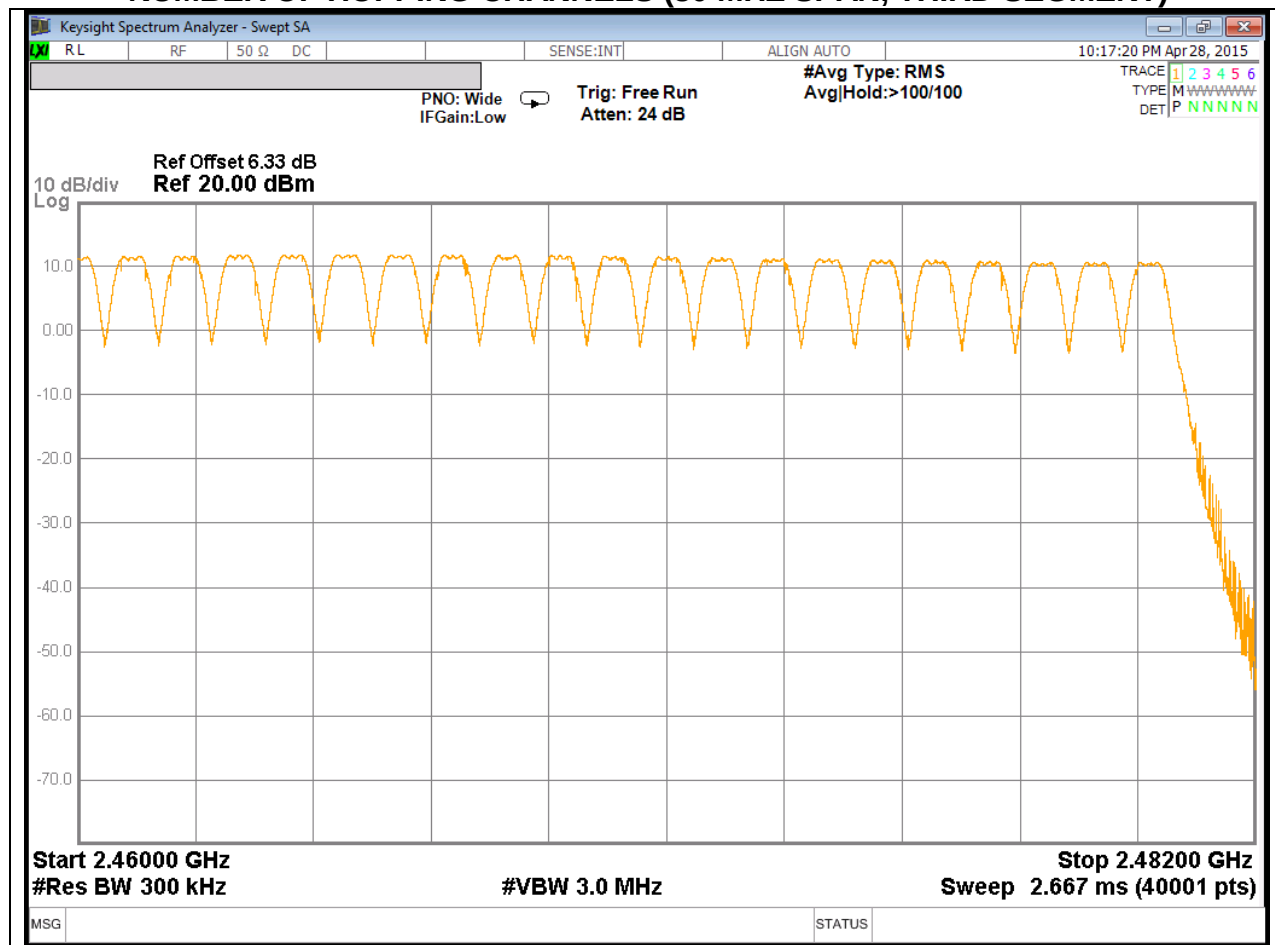
### NUMBER OF HOPPING CHANNELS (30 MHz SPAN, FIRST SEGMENT)



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



### NUMBER OF HOPPING CHANNELS (30 MHz SPAN, THIRD SEGMENT)



## 8.4. AVERAGE TIME OF OCCUPANCY

### LIMIT

FCC §15.247 (a) (1) (iii)

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.

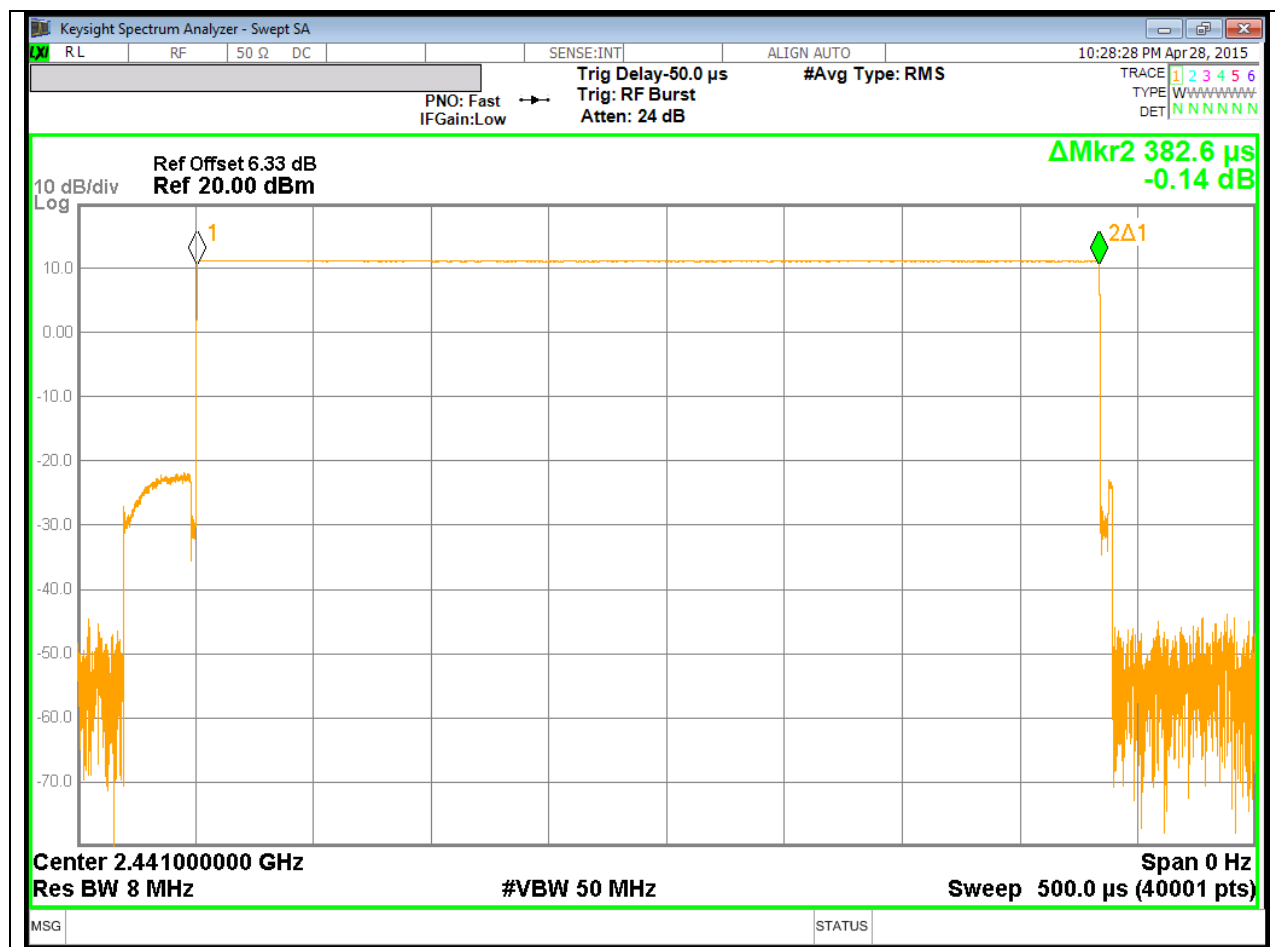
The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to  $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$ .

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels \* 0.4 seconds) is equal to  $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{pulse width}$ .

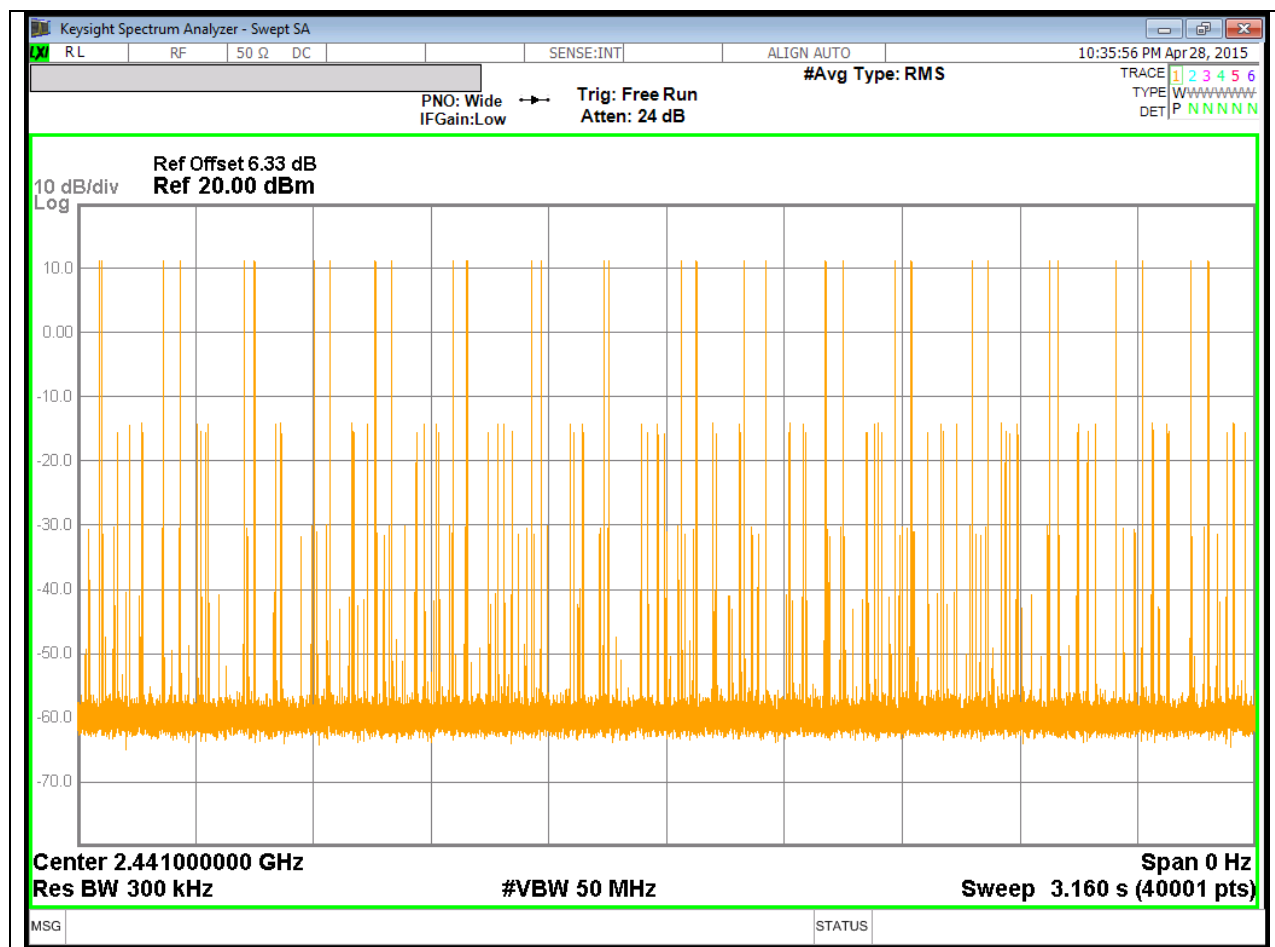
### RESULTS

| DH Packet   | Pulse Width [msec] | Number of Pulses in 3.16 seconds | Average Time of Occupancy [sec] | Limit [sec] | Margin [sec] |
|-------------|--------------------|----------------------------------|---------------------------------|-------------|--------------|
| GFSK Normal |                    |                                  |                                 |             |              |
| DH1         | 0.383              | 32                               | 0.122432                        | 0.4         | -0.2776      |
| DH3         | 1.639              | 17                               | 0.27863                         | 0.4         | -0.1214      |
| DH5         | 2.886              | 11                               | 0.31746                         | 0.4         | -0.0825      |
|             |                    |                                  |                                 |             |              |
| DH Packet   | Pulse Width [msec] | Number of Pulses in 0.8 seconds  | Average Time of Occupancy [sec] | Limit [sec] | Margin [sec] |
| GFSK AFH    |                    |                                  |                                 |             |              |
| DH1         | 0.383              | 8                                | 0.030608                        | 0.4         | -0.3694      |
| DH3         | 1.639              | 4.25                             | 0.0696575                       | 0.4         | -0.3303      |
| DH5         | 2.886              | 2.75                             | 0.079365                        | 0.4         | -0.3206      |

### PULSE WIDTH - DH1



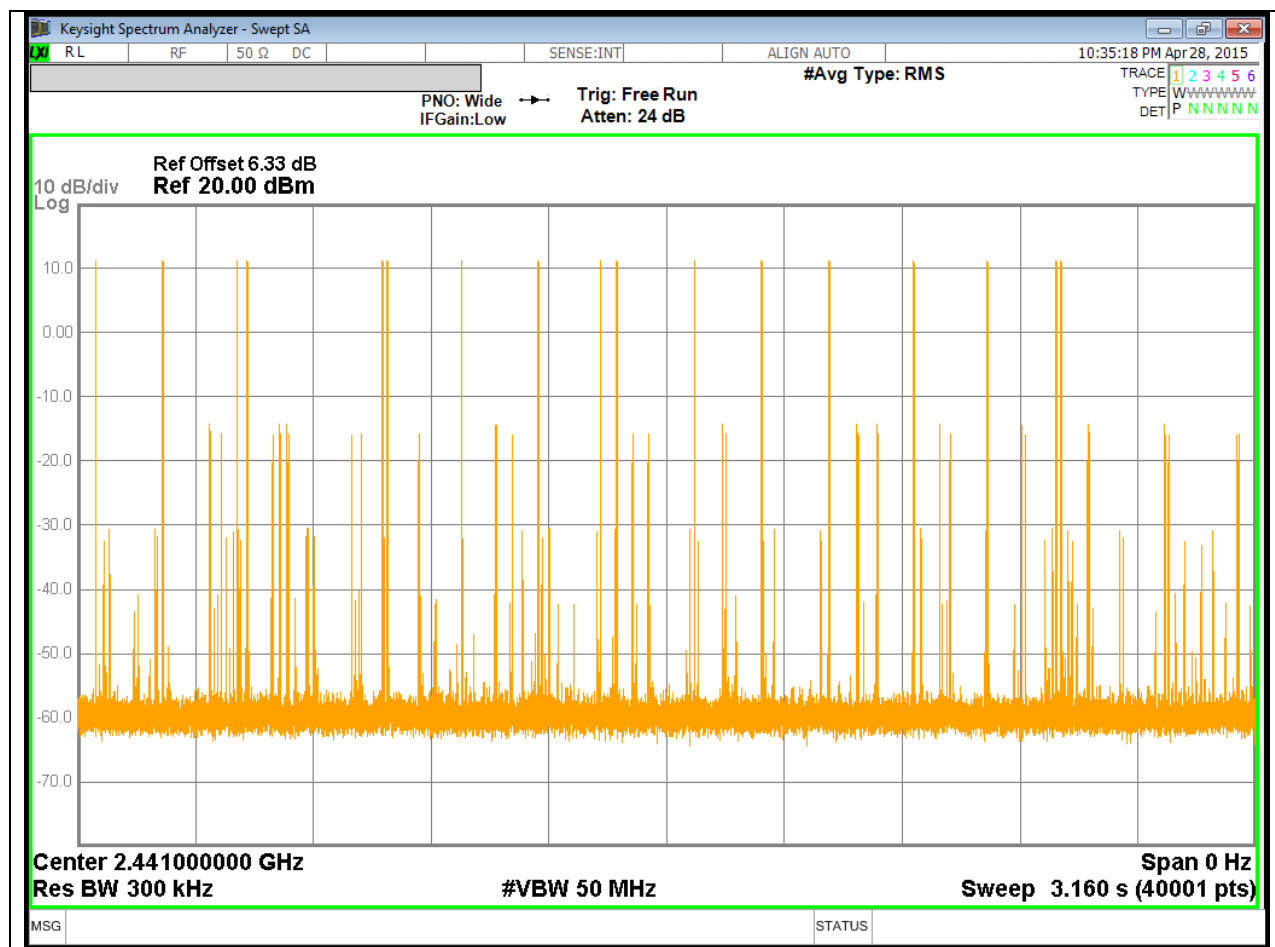
## NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH1



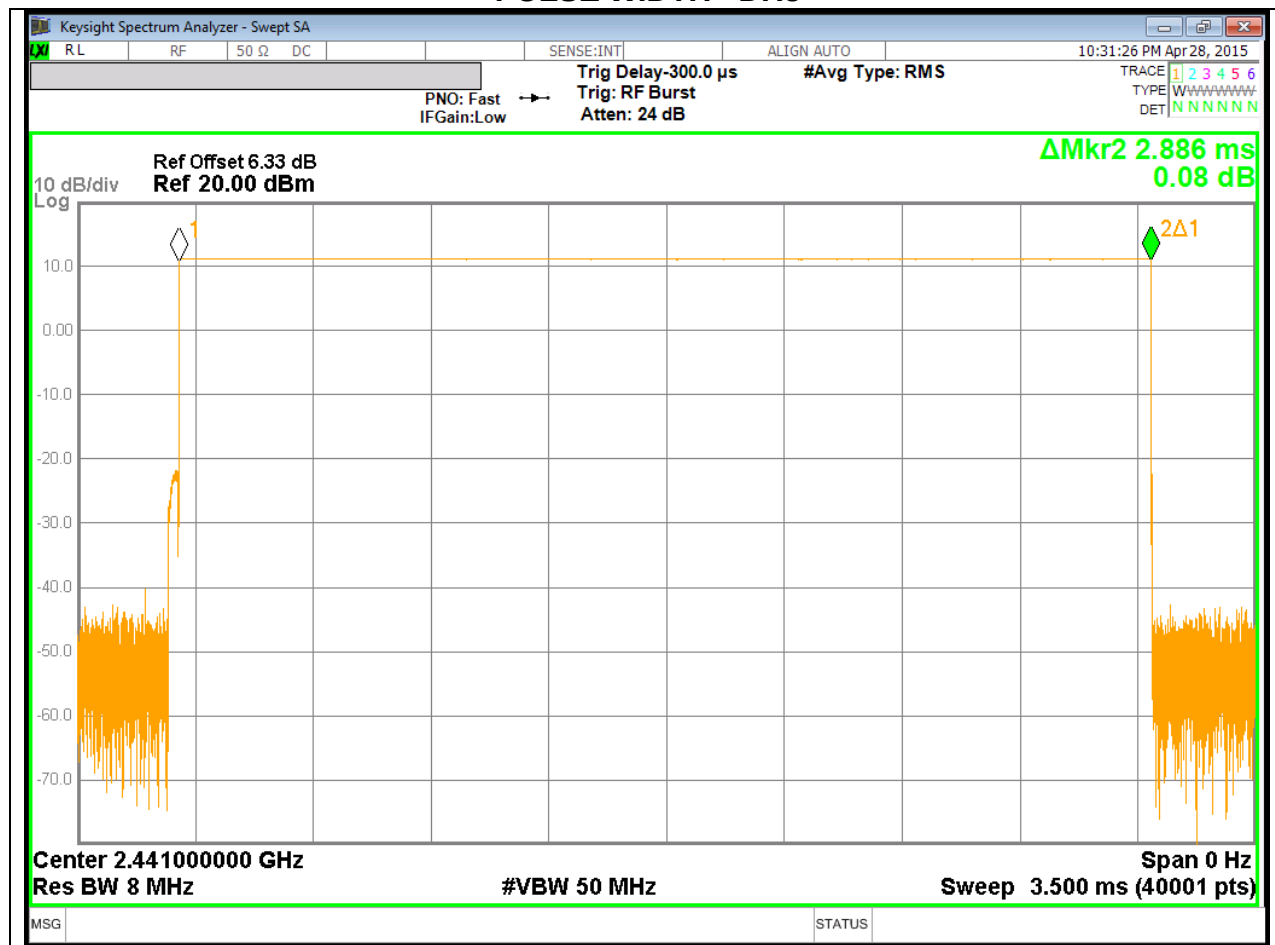
### PULSE WIDTH - DH3



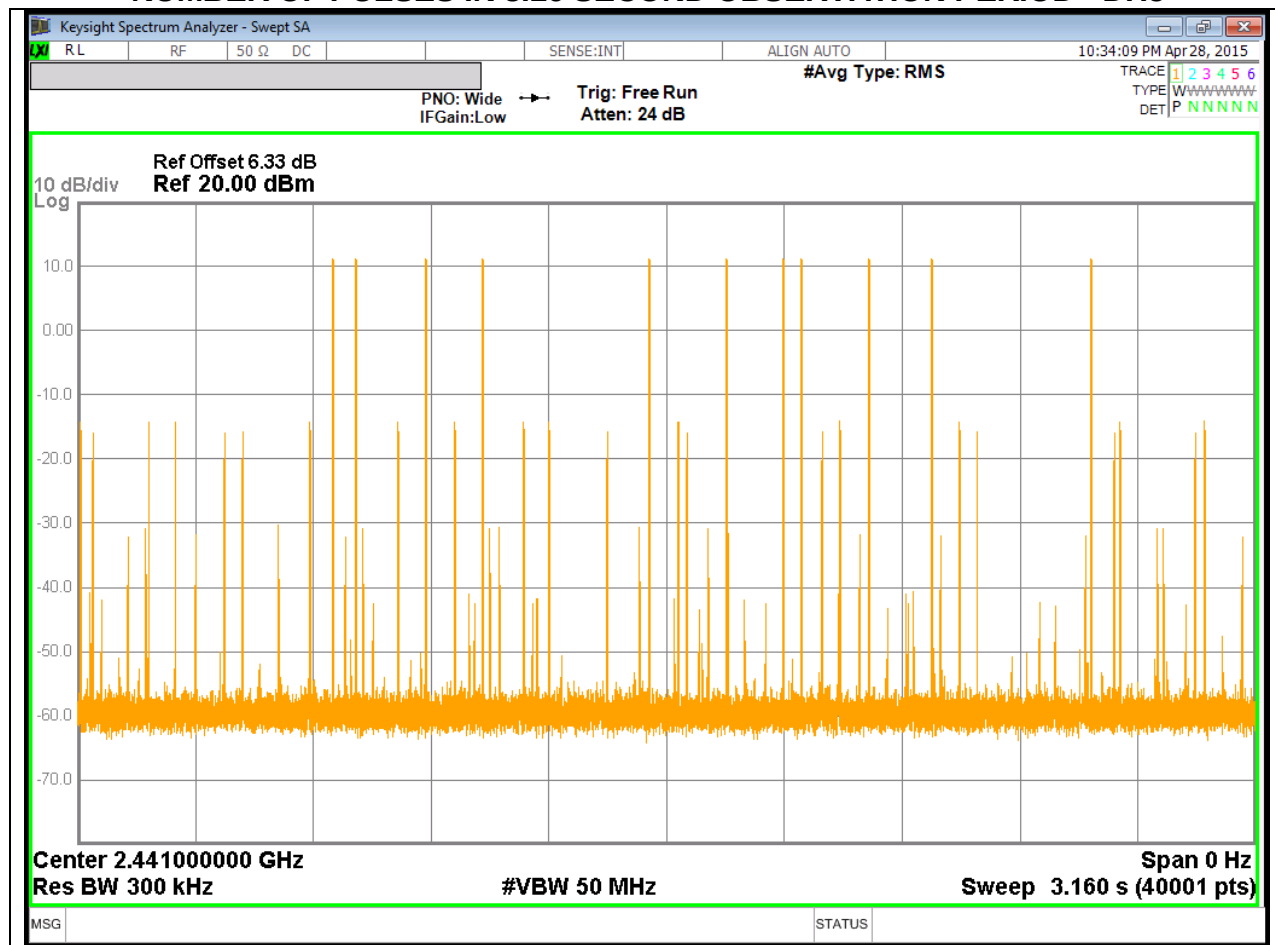
### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH3



### PULSE WIDTH - DH5



### NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD - DH5



## 8.5. OUTPUT POWER

### LIMIT

§15.247 (b) (1)

The maximum antenna gain is less than 6 dBi, therefore the limit is 21 dBm.

### TEST PROCEDURE

DA 00-705: 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

#### 8.5.1. BASIC DATA RATE GFSK MODULATION

| Channel | Frequency [MHz] | Output Power [dBm] | Limit [dBm] | Margin [dB] |
|---------|-----------------|--------------------|-------------|-------------|
| Low     | 2402            | 9.193              | 21          | -11.807     |
| Middle  | 2441            | 10.038             | 21          | -10.962     |
| High    | 2480            | 9.301              | 21          | -11.699     |
| Worst   |                 | 10.038             |             | -10.962     |

#### 8.5.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

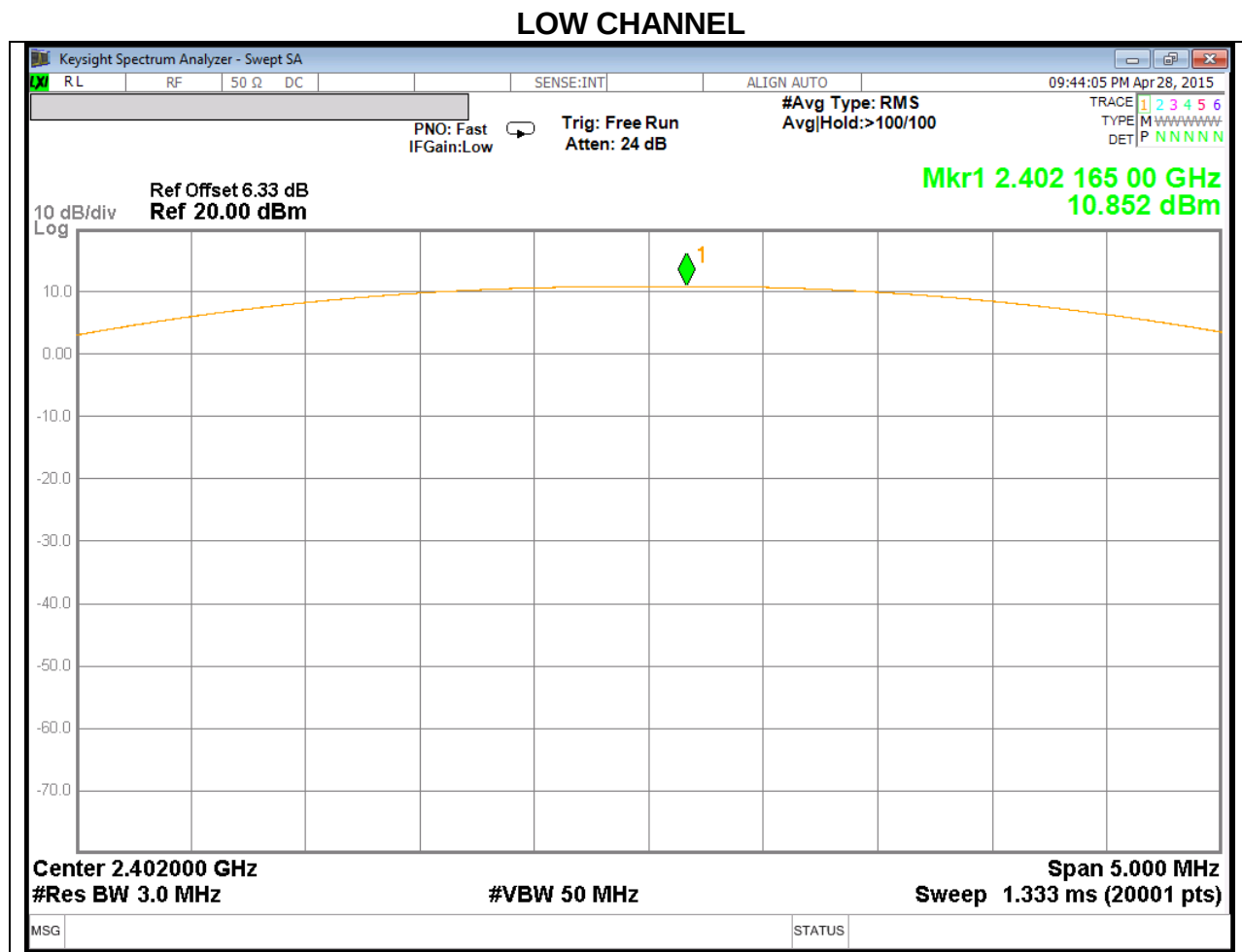
| Channel | Frequency [MHz] | Output Power [dBm] | Limit [dBm] | Margin [dB] |
|---------|-----------------|--------------------|-------------|-------------|
| Low     | 2402            | 7.630              | 21          | -13.370     |
| Middle  | 2441            | 8.198              | 21          | -12.802     |
| High    | 2480            | 7.160              | 21          | -13.840     |
| Worst   |                 | 8.198              |             | -12.802     |

#### 8.5.3. ENHANCED DATA RATE 8PSK MODULATION

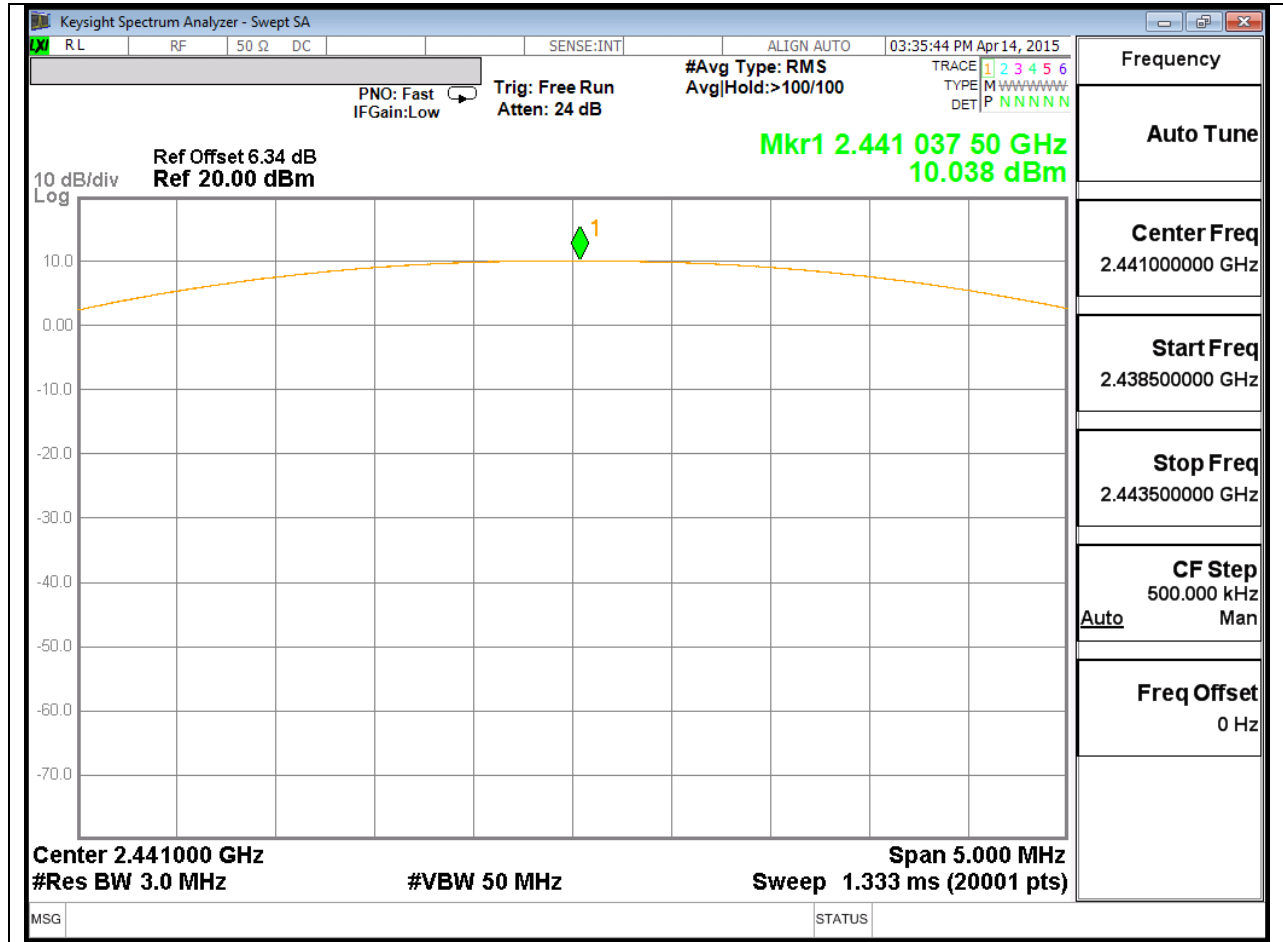
| Channel | Frequency [MHz] | Output Power [dBm] | Limit [dBm] | Margin [dB] |
|---------|-----------------|--------------------|-------------|-------------|
| Low     | 2402            | 7.650              | 21          | -13.350     |
| Middle  | 2441            | 8.175              | 21          | -12.825     |
| High    | 2480            | 7.145              | 21          | -13.855     |
| Worst   |                 | 8.175              |             | -12.825     |

## 8.5.4. OUTPUT POWER PLOTS

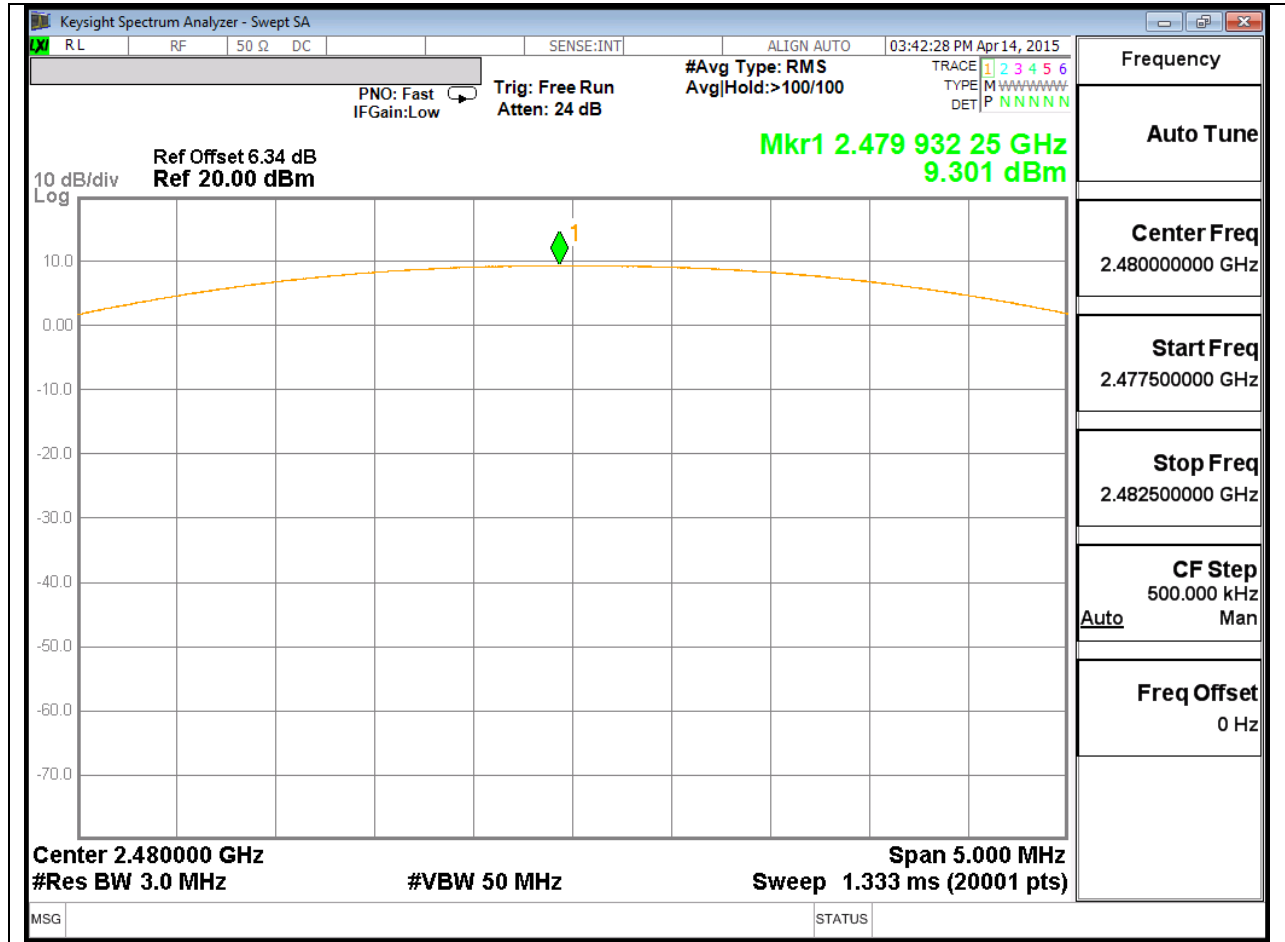
### GFSK OUTPUT POWER



# MID CHANNEL

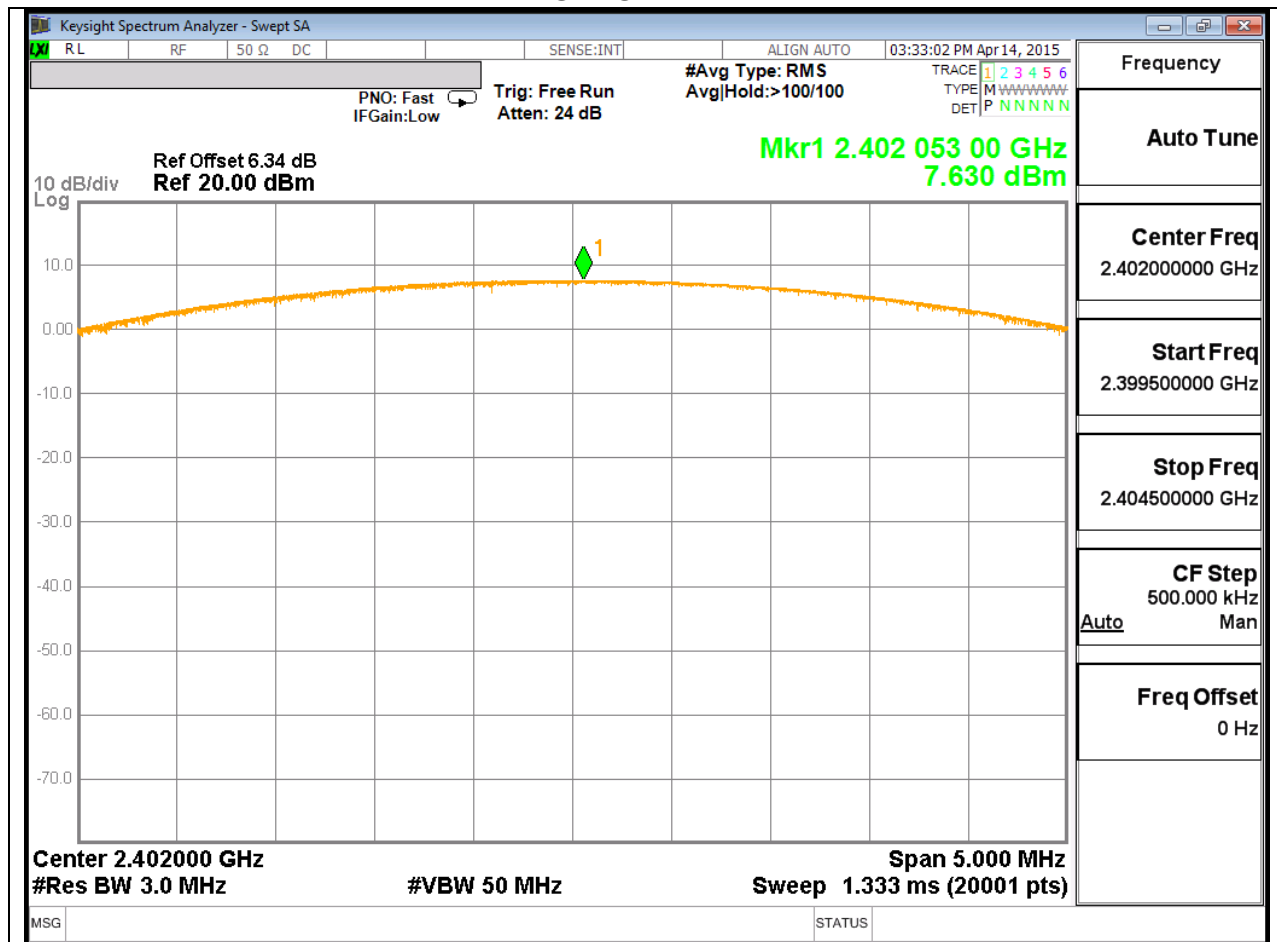


# HIGH CHANNEL

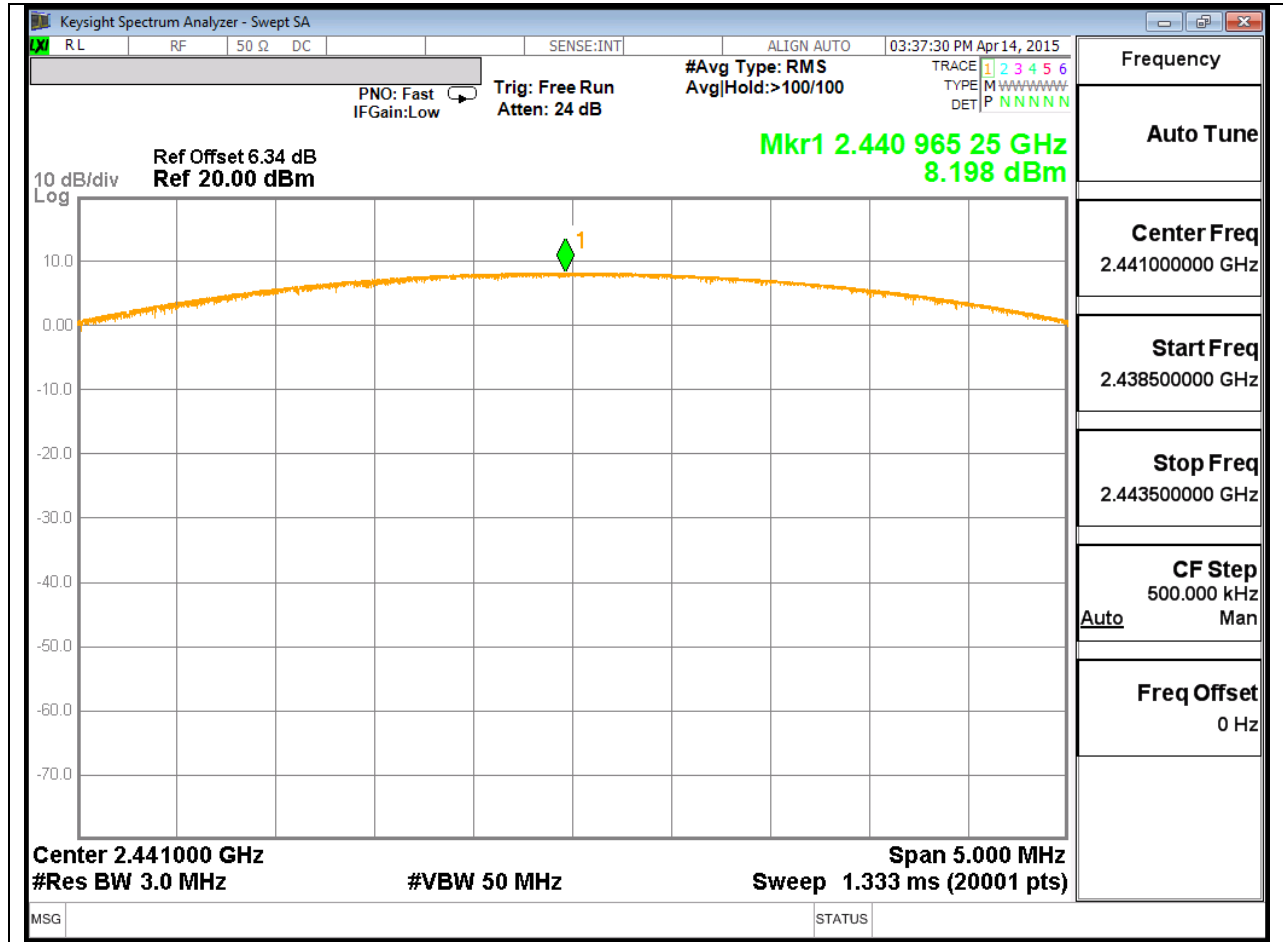


**Pi/4-DPSK OUTPUT POWER**

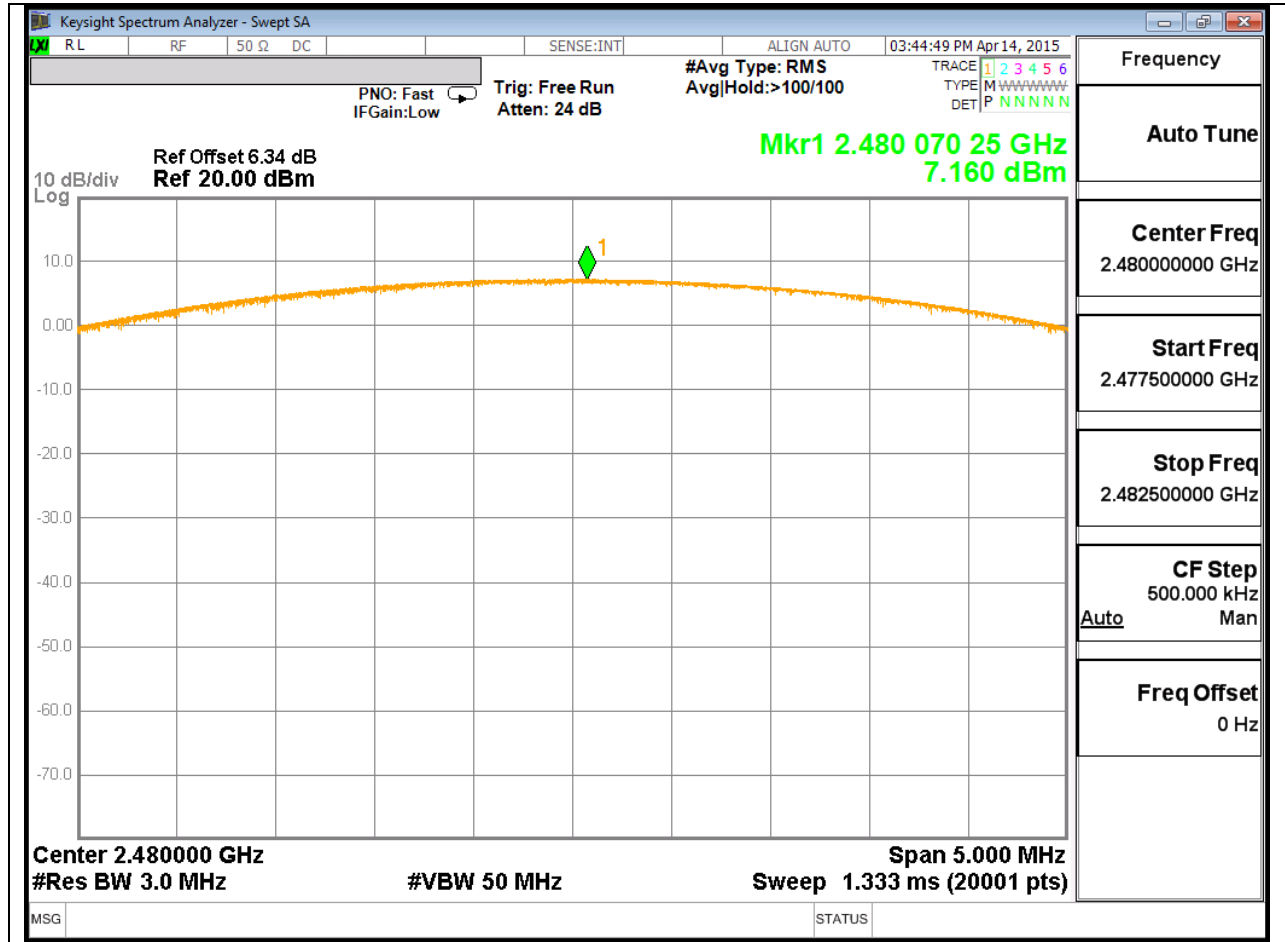
**LOW CHANNEL**



# MID CHANNEL

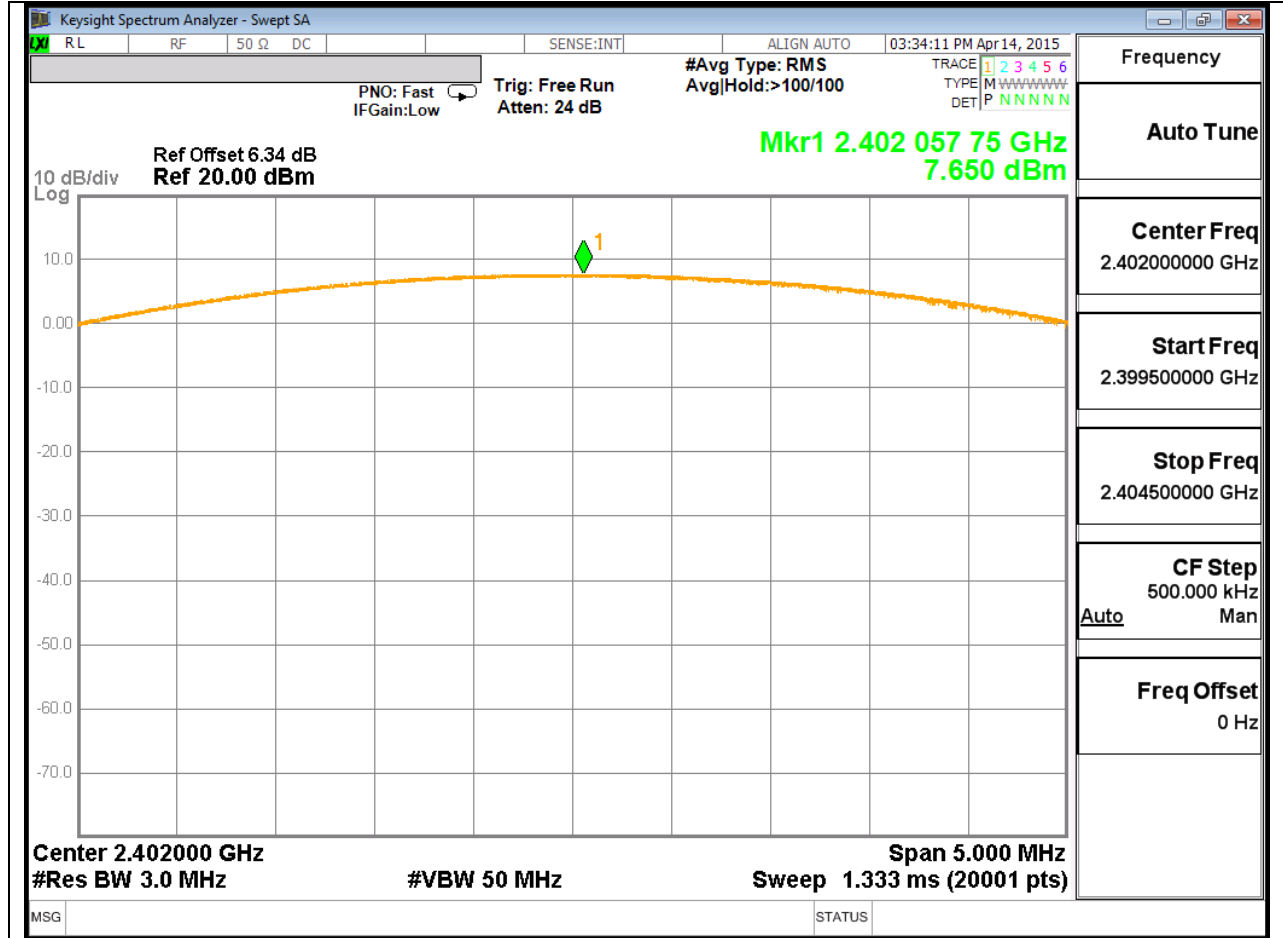


# HIGH CHANNEL

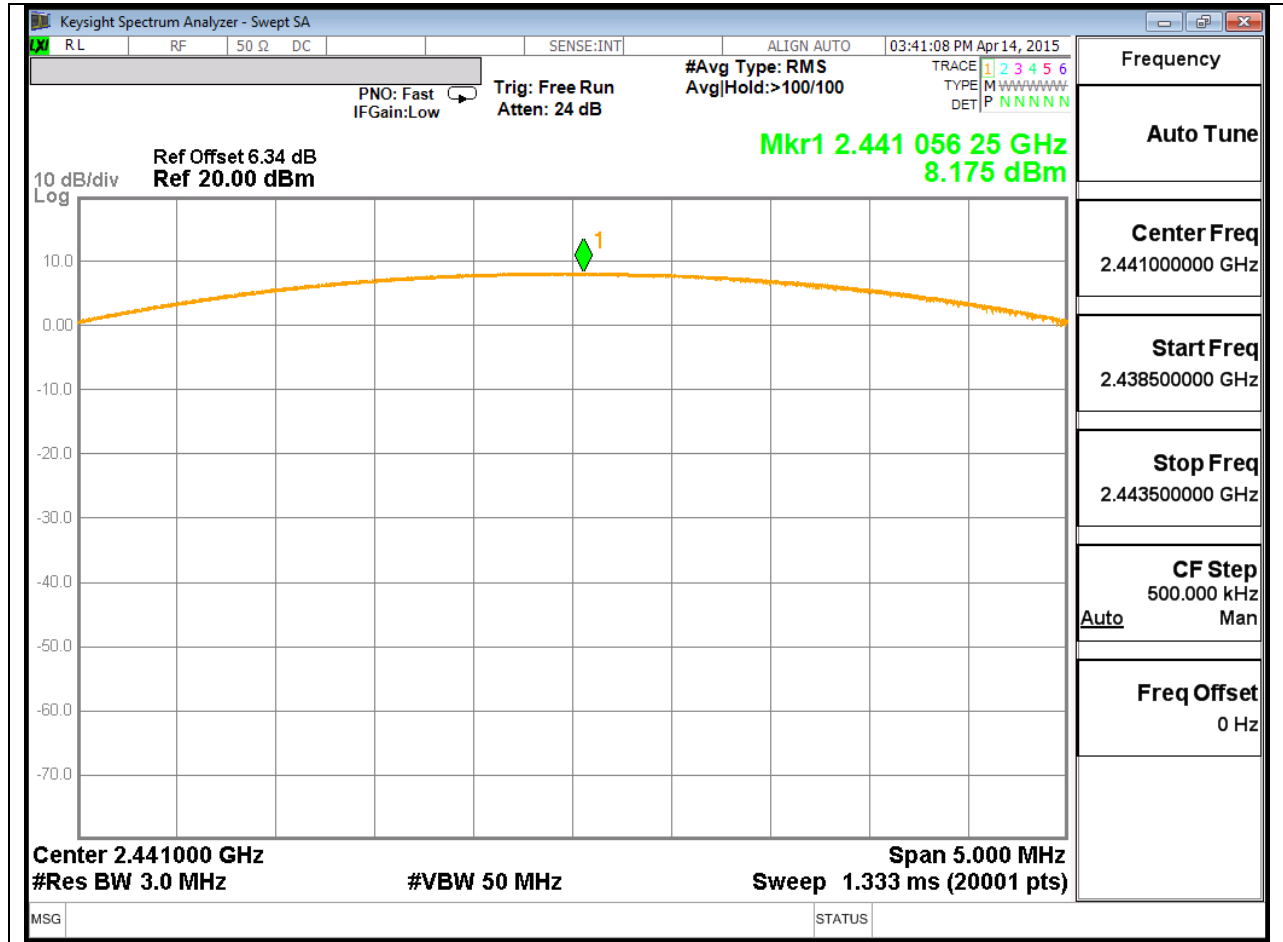


## 8PSK OUTPUT POWER

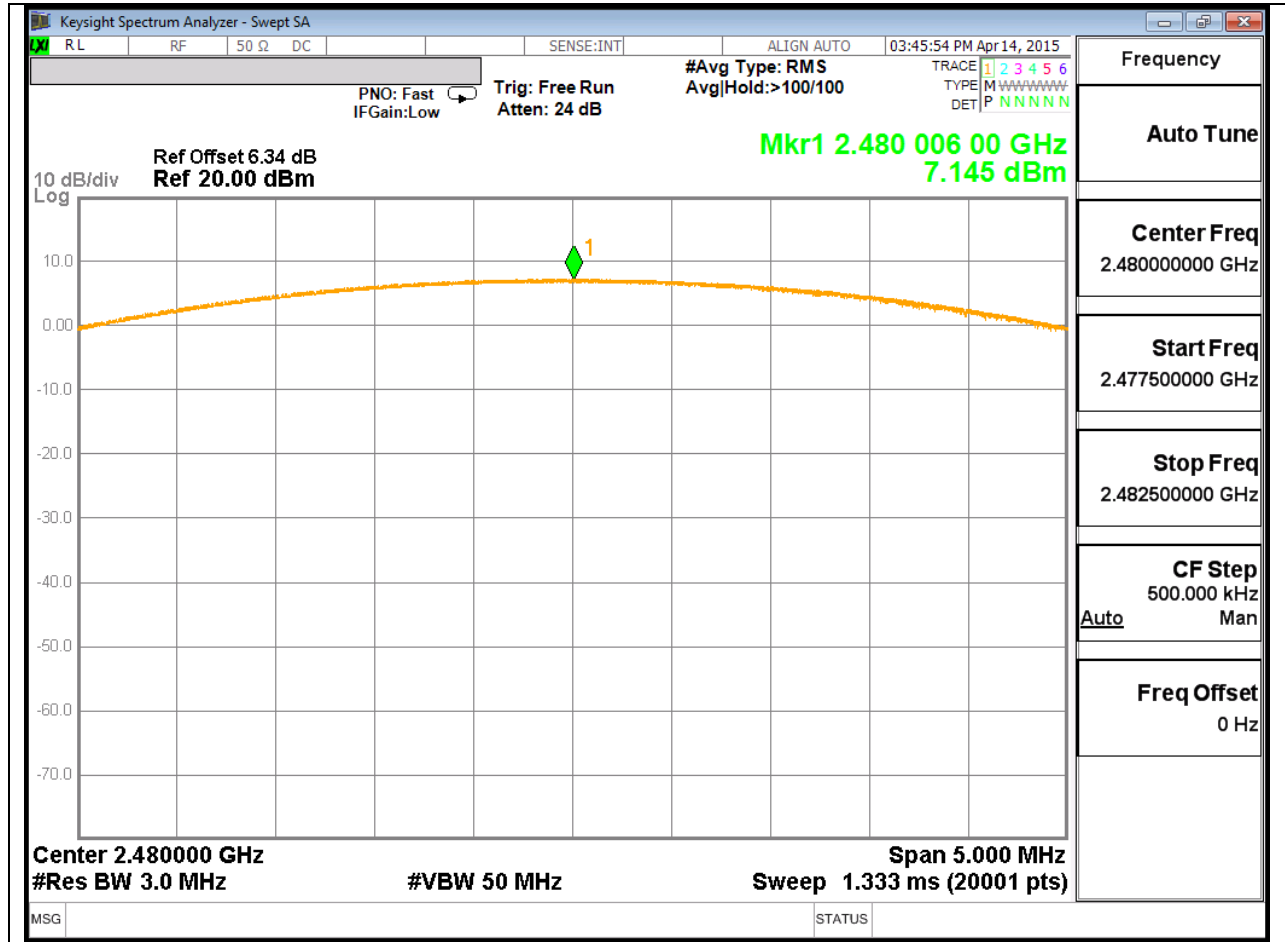
### LOW CHANNEL



# MID CHANNEL



# HIGH CHANNEL



## 8.6. AVERAGE POWER

### LIMIT

None; for reporting purposes only.

### TEST PROCEDURE

DA 00-705: The transmitter output is connected to a power meter.

### RESULTS

The cable assembly insertion loss of 10.7 dB (including 10 dB pad and 0.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

#### 8.6.1. BASIC DATA RATE GFSK MODULATION

| Channel | Frequency [MHz] | AV power [dBm] | AV power [mW] |
|---------|-----------------|----------------|---------------|
| Low     | 2402            | 9.09           | 8.12          |
| Middle  | 2441            | 9.92           | 9.82          |
| High    | 2480            | 9.03           | 8.00          |

#### 8.6.2. DATA RATE PI/4-DQPSK MODULATION

| Channel | Frequency [MHz] | AV power [dBm] | AV power [mW] |
|---------|-----------------|----------------|---------------|
| Low     | 2402            | 5.44           | 3.50          |
| Middle  | 2441            | 5.82           | 3.82          |
| High    | 2480            | 4.61           | 2.89          |

#### 8.6.3. ENHANCED DATA RATE 8PSK MODULATION

| Channel | Frequency [MHz] | AV power [dBm] | AV power [mW] |
|---------|-----------------|----------------|---------------|
| Low     | 2402            | 5.18           | 3.29          |
| Middle  | 2441            | 5.74           | 3.75          |
| High    | 2480            | 4.56           | 2.86          |

## **8.7. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

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.

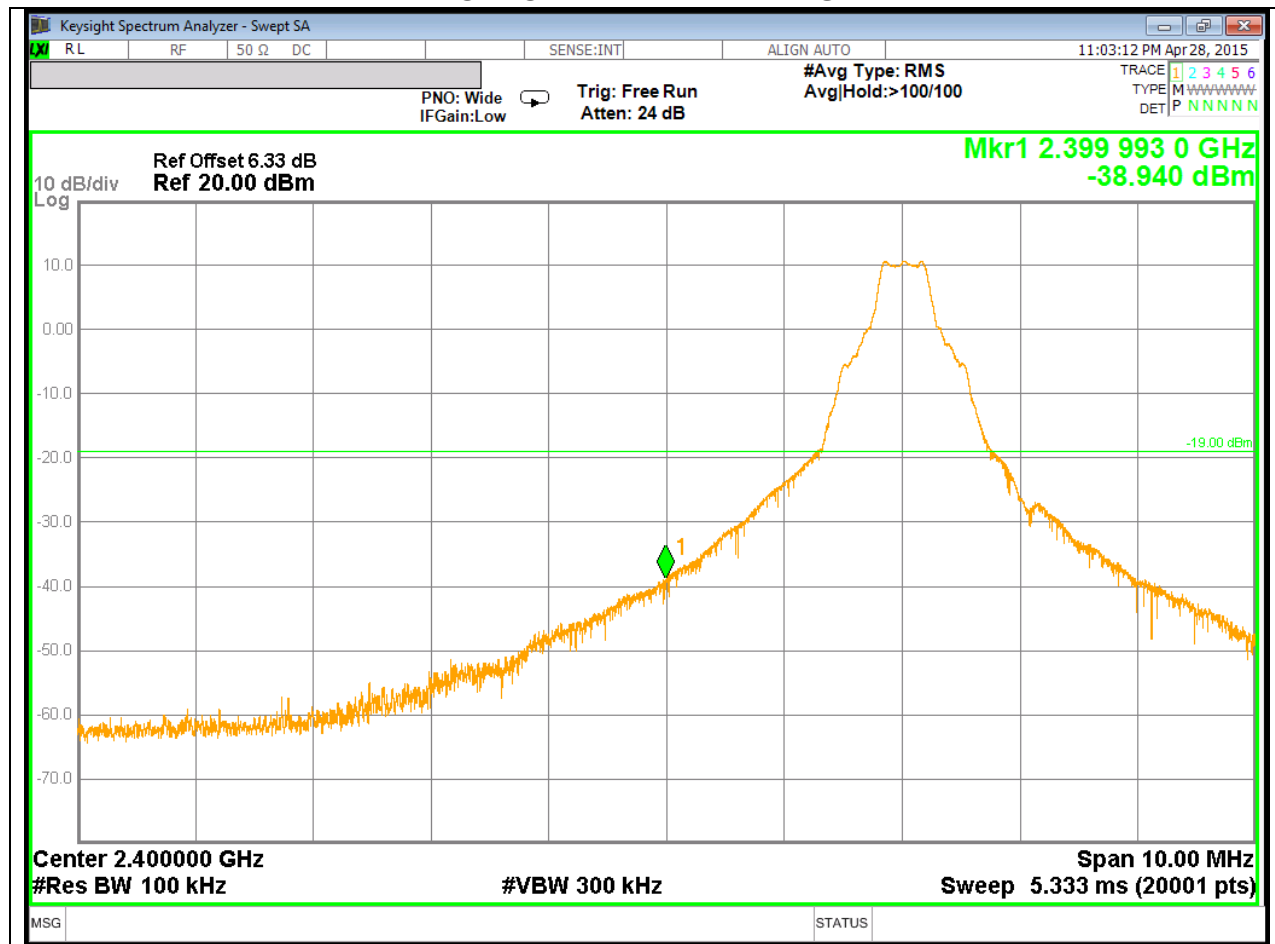
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

### **RESULTS**

## 8.7.1. BASIC DATA RATE GFSK MODULATION

### SPURIOUS EMISSIONS, LOW CHANNEL

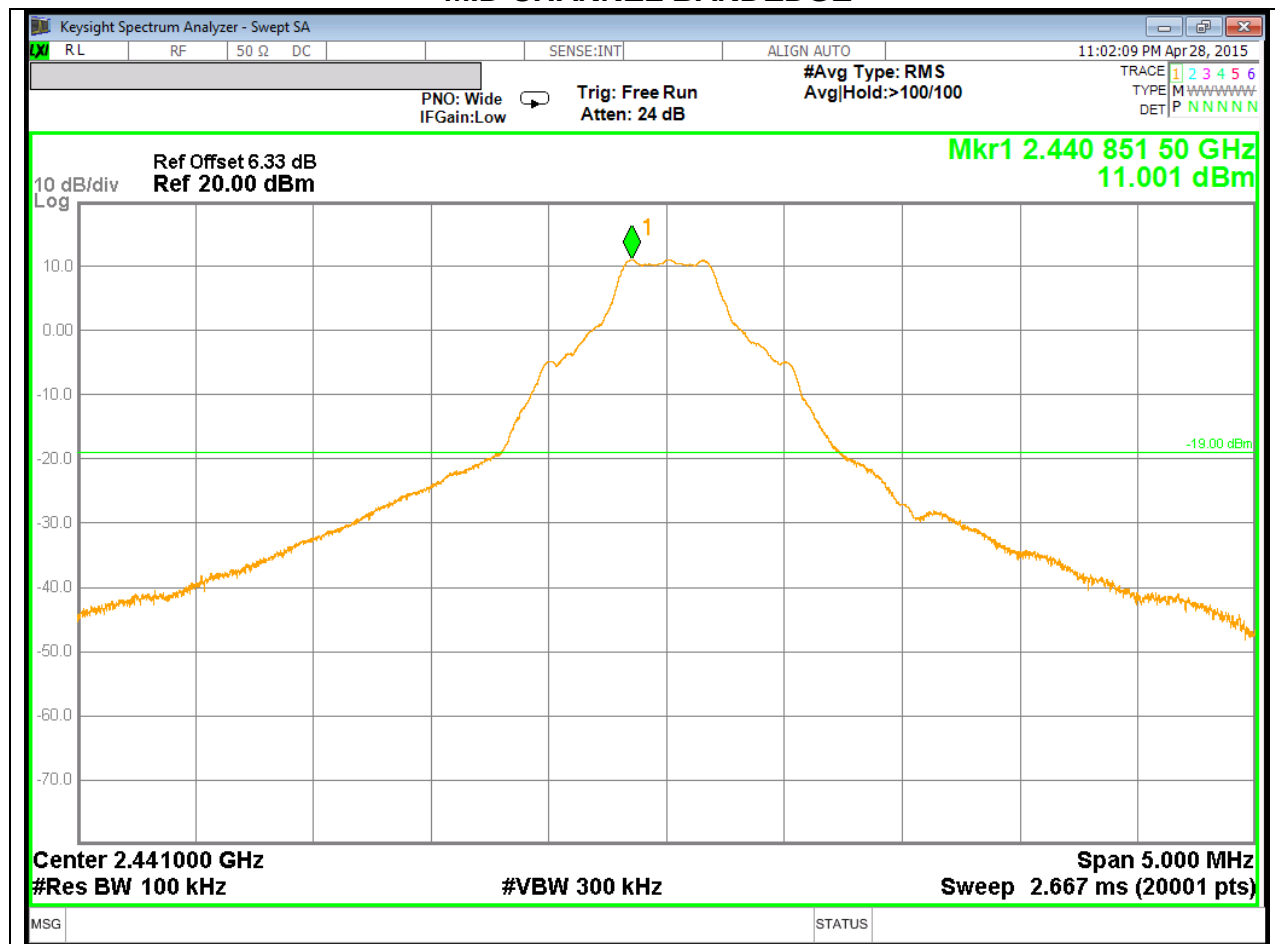
#### LOW CHANNEL BANDEDGE

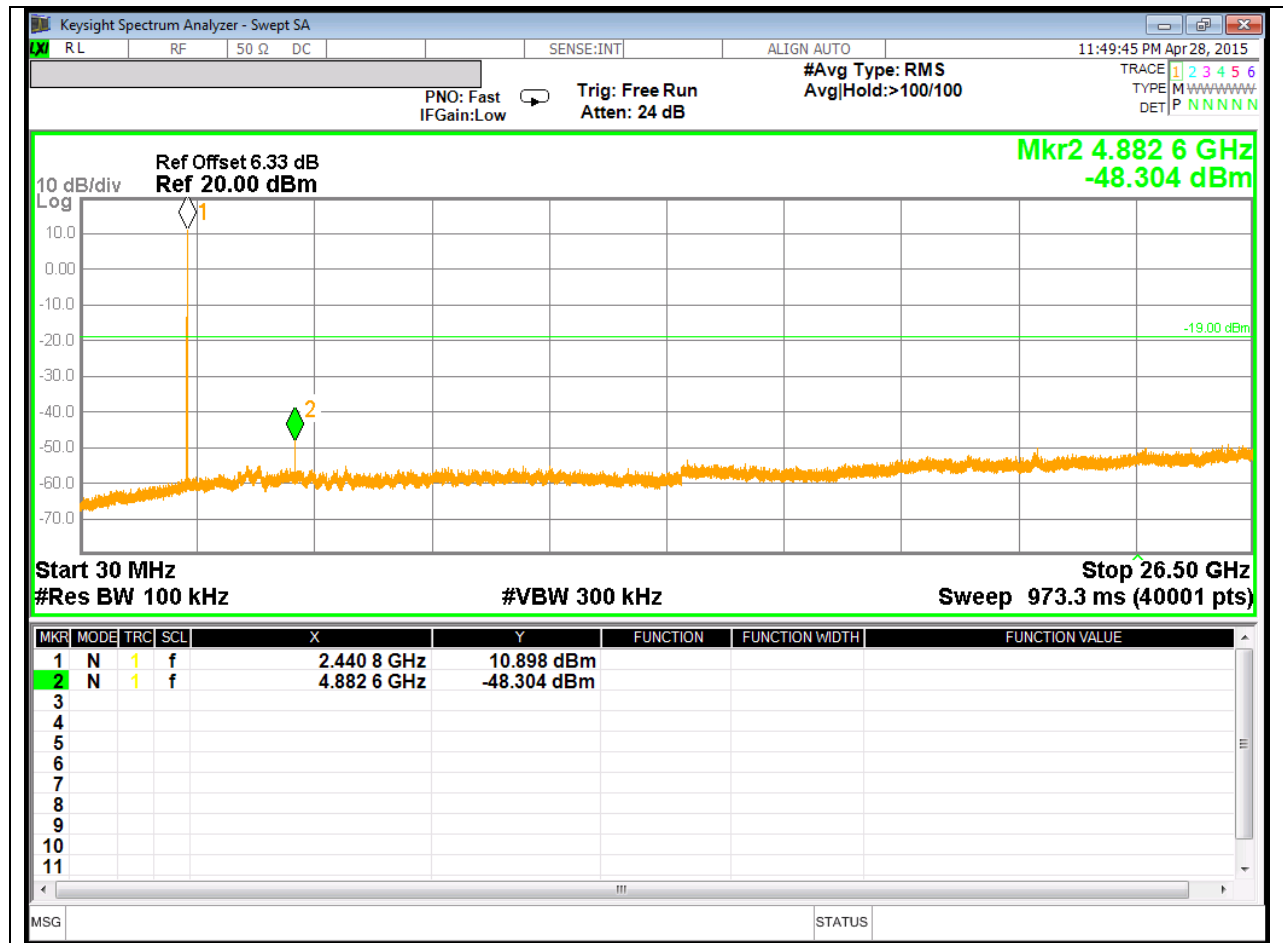




**SPURIOUS EMISSIONS, MID CHANNEL**

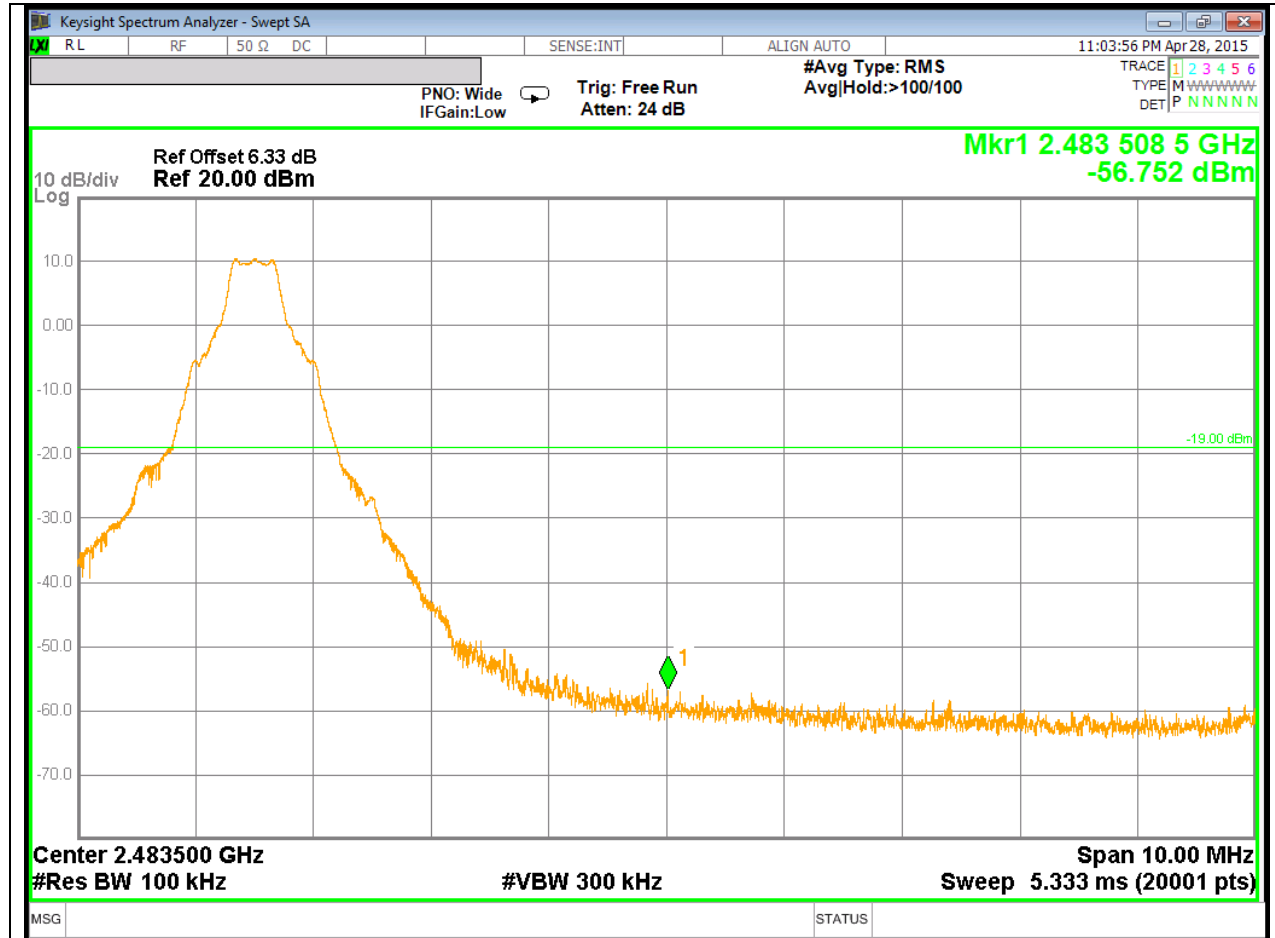
**MID CHANNEL BANDEDGE**

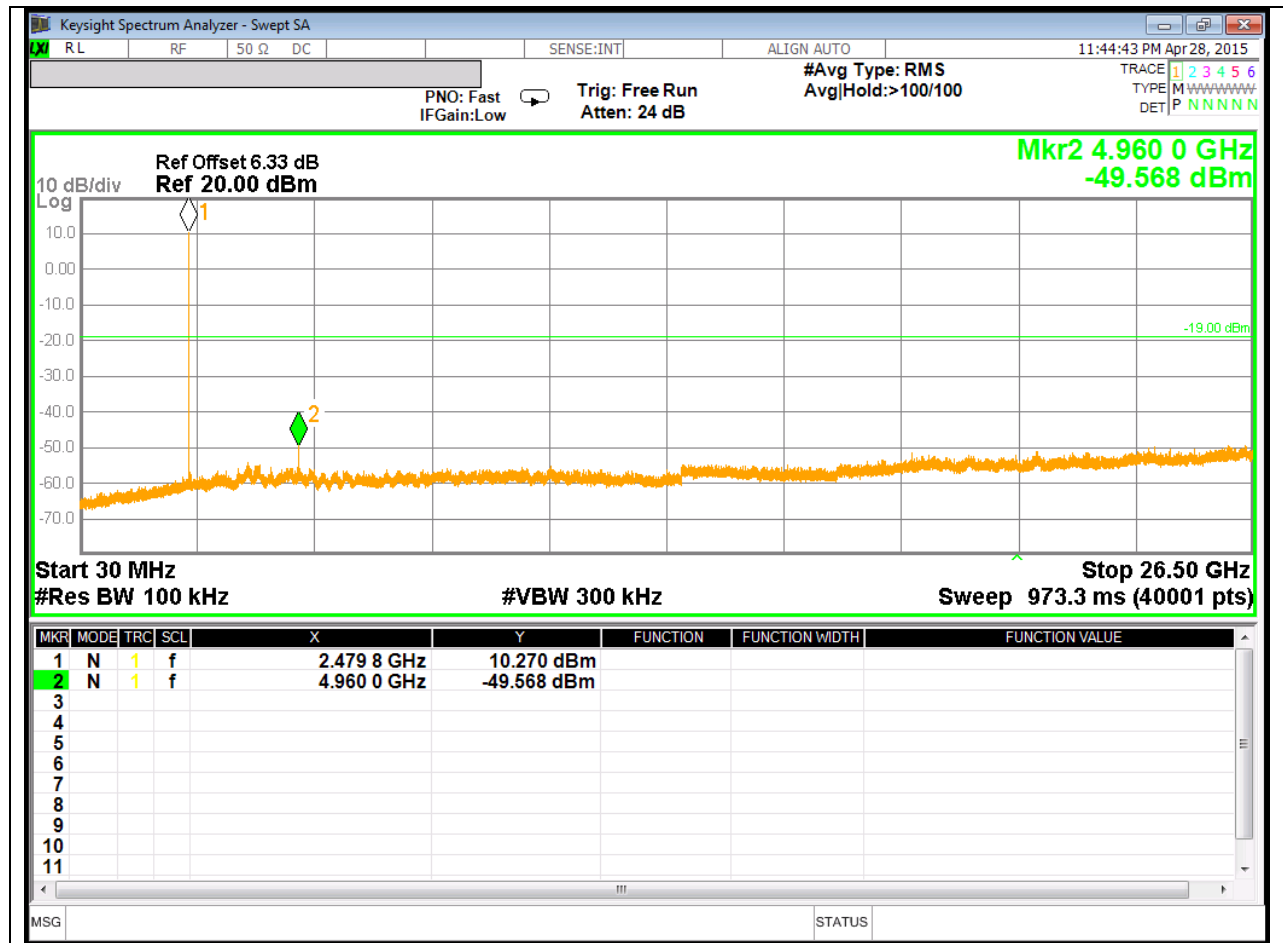




**SPURIOUS EMISSIONS, HIGH CHANNEL**

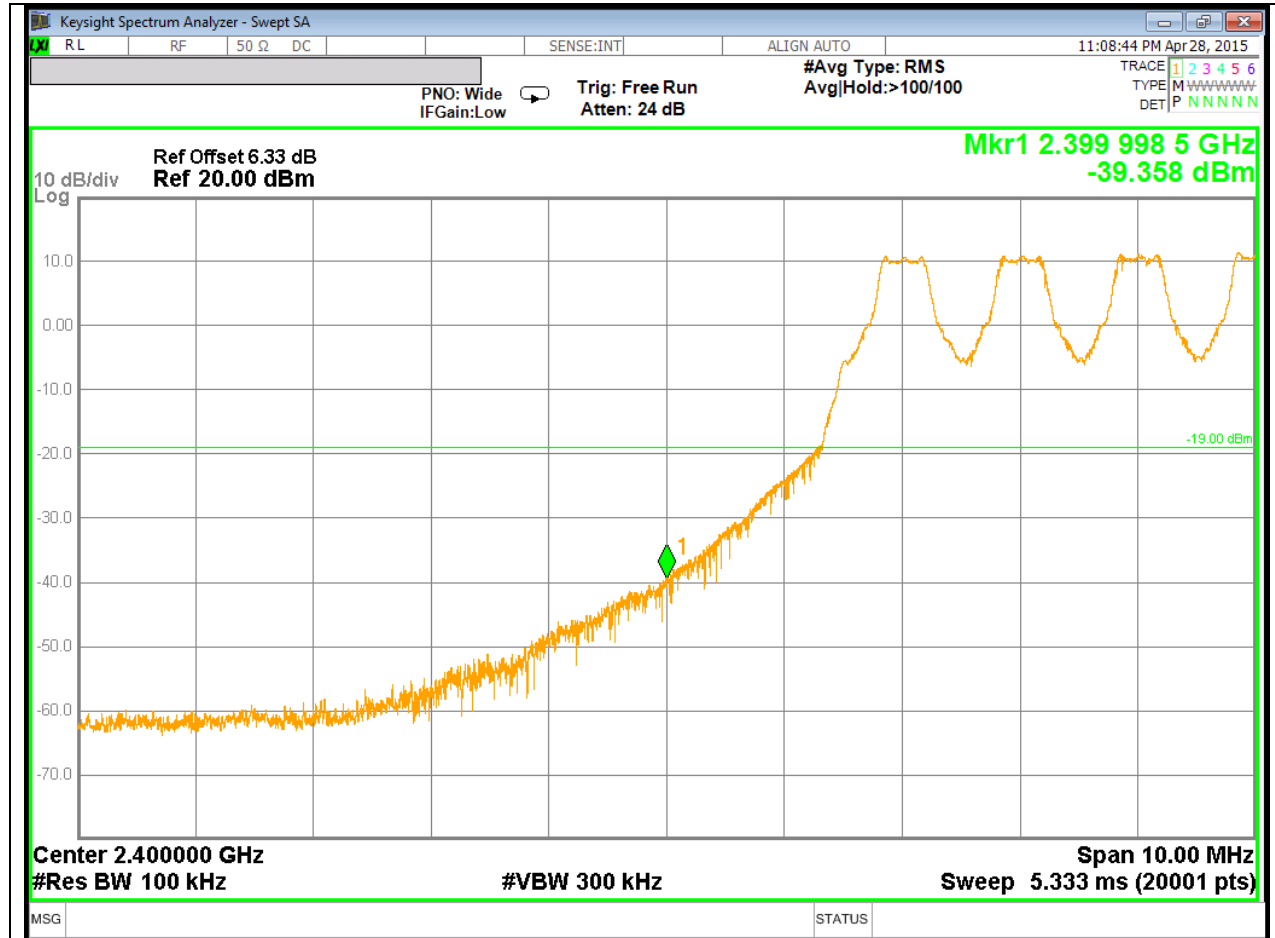
**HIGH CHANNEL BANDEDGE**



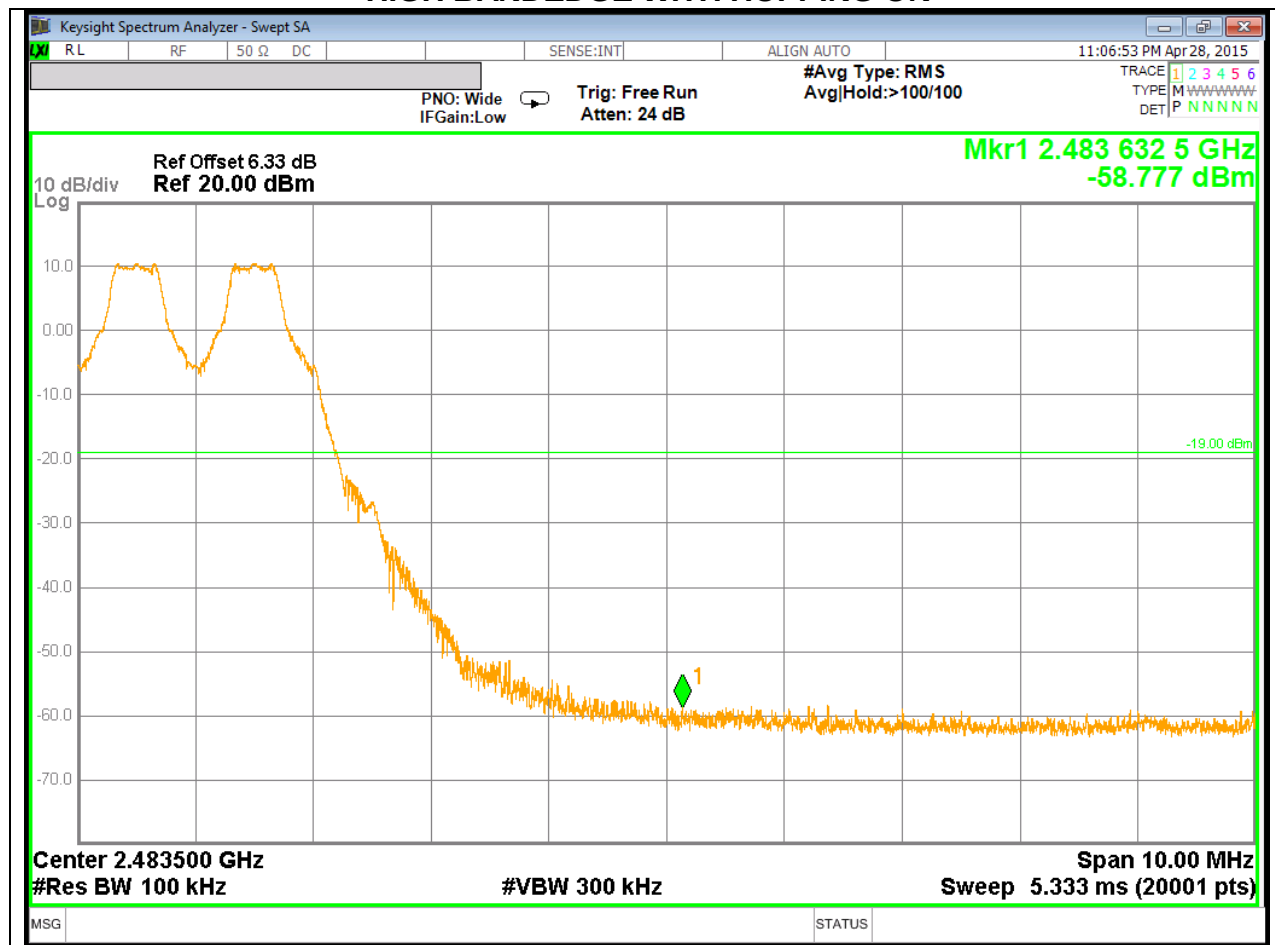


**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**

**LOW BANDEDGE WITH HOPPING ON**



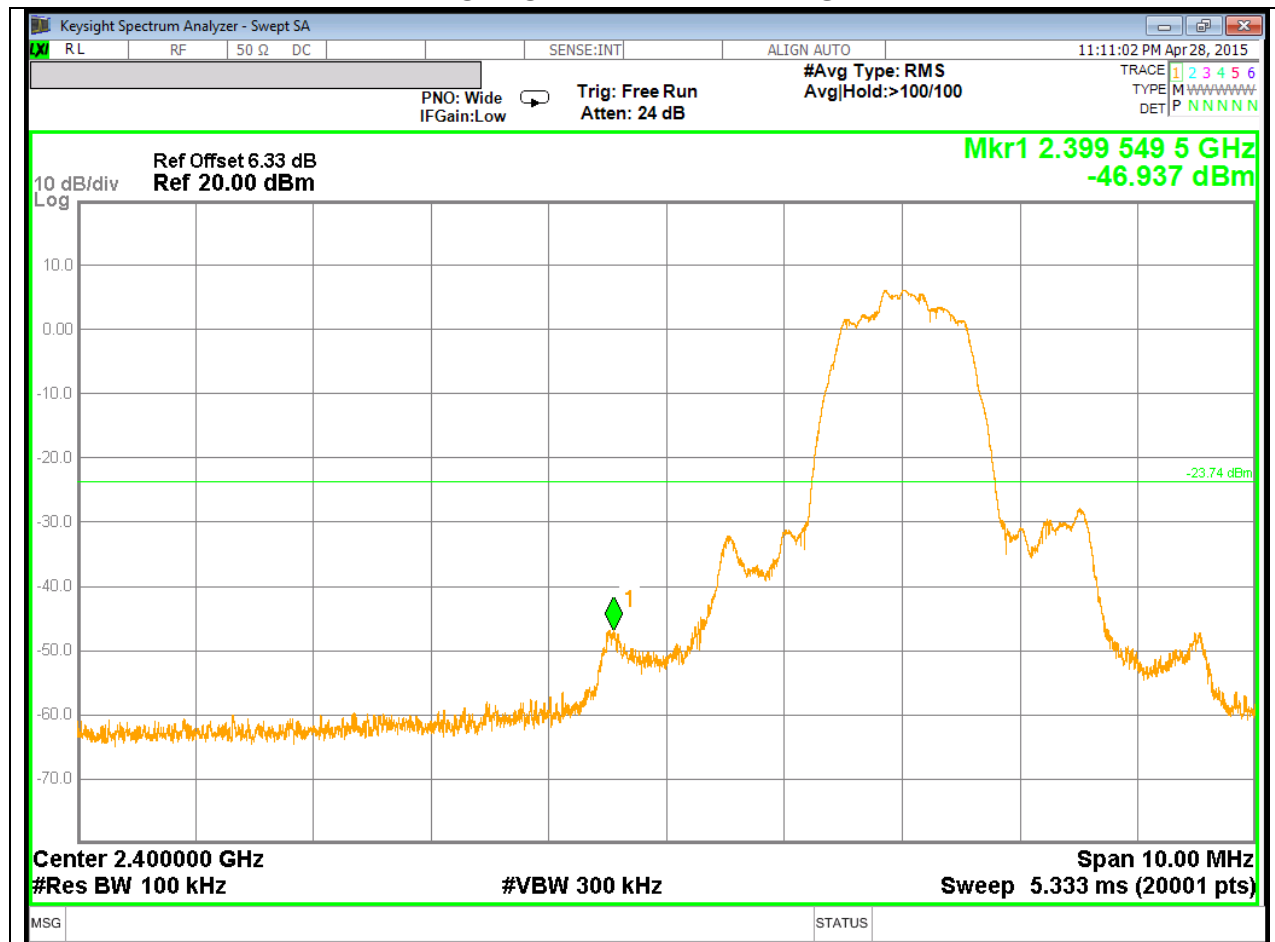
## HIGH BANDEGE WITH HOPPING ON

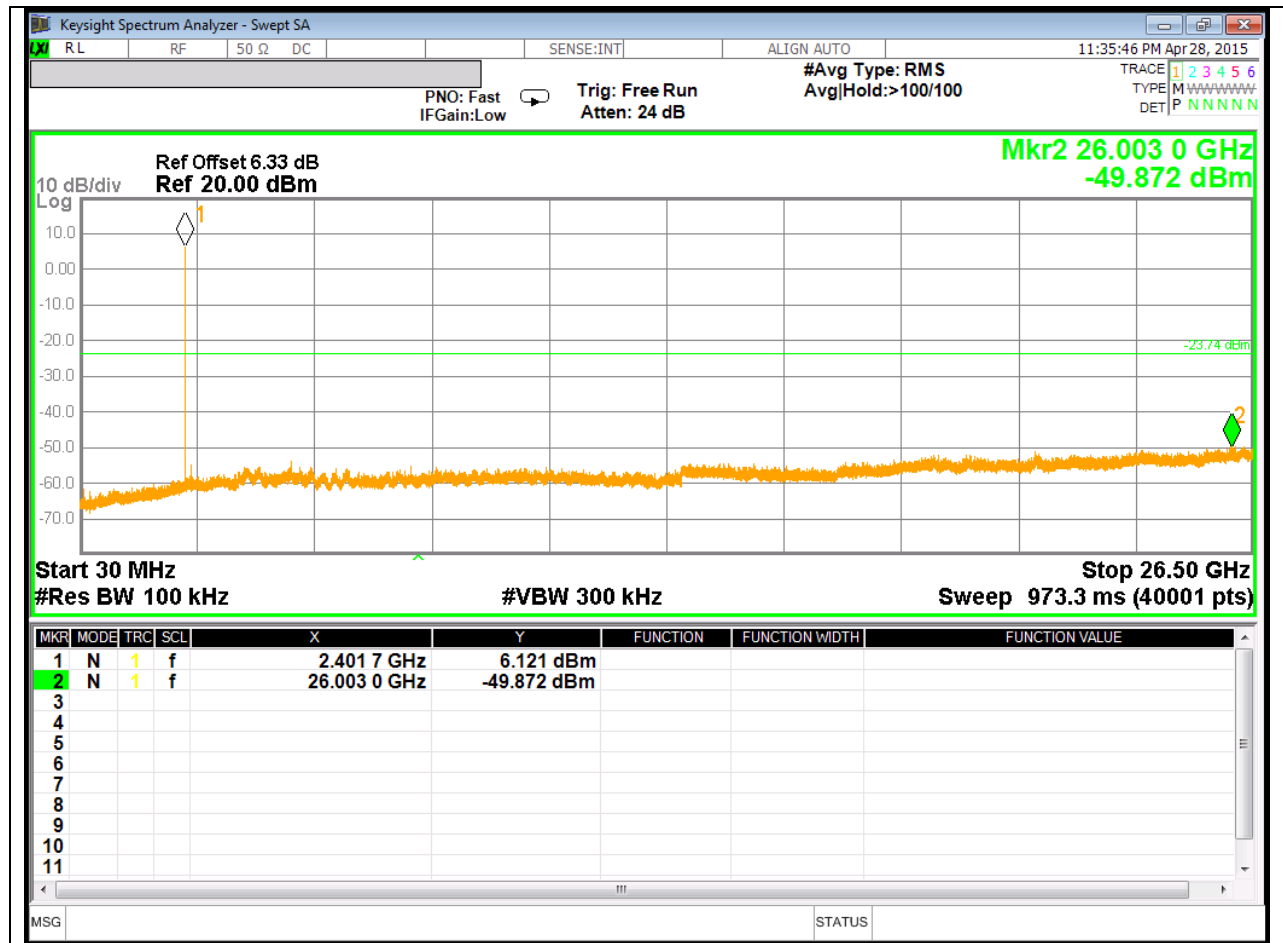


## 8.7.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

### SPURIOUS EMISSIONS, LOW CHANNEL

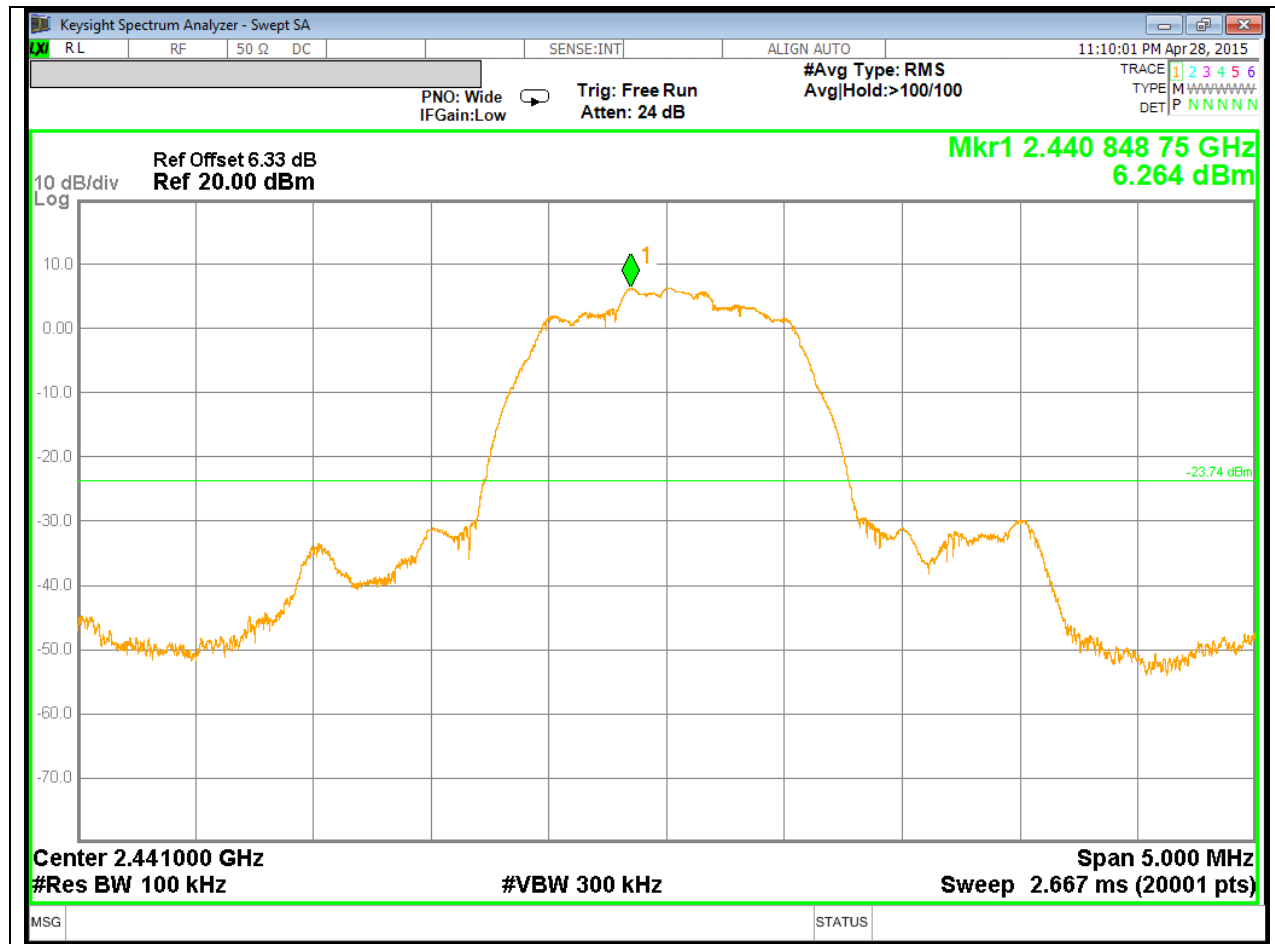
#### LOW CHANNEL BANDEDGE

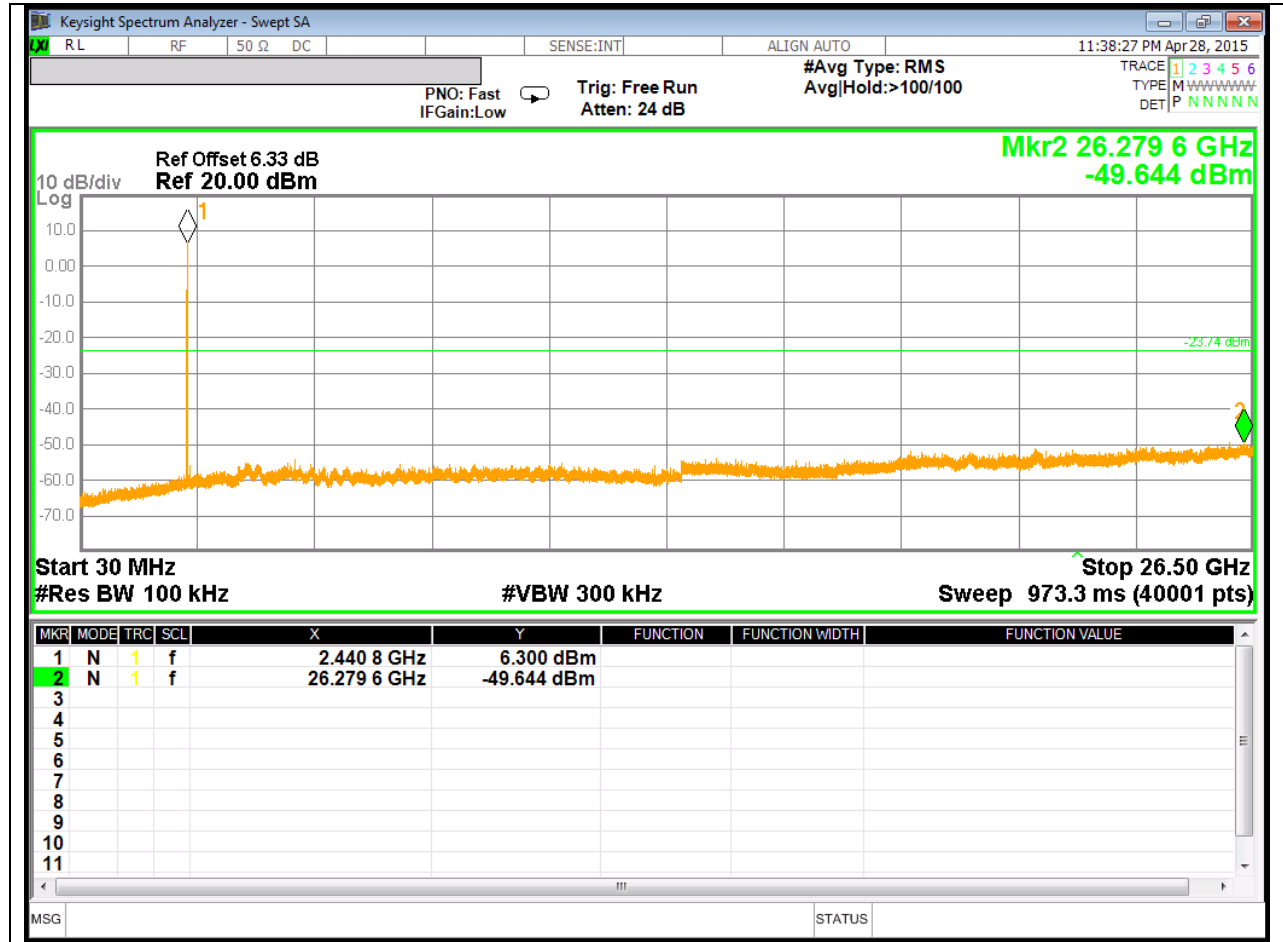




**SPURIOUS EMISSIONS, MID CHANNEL**

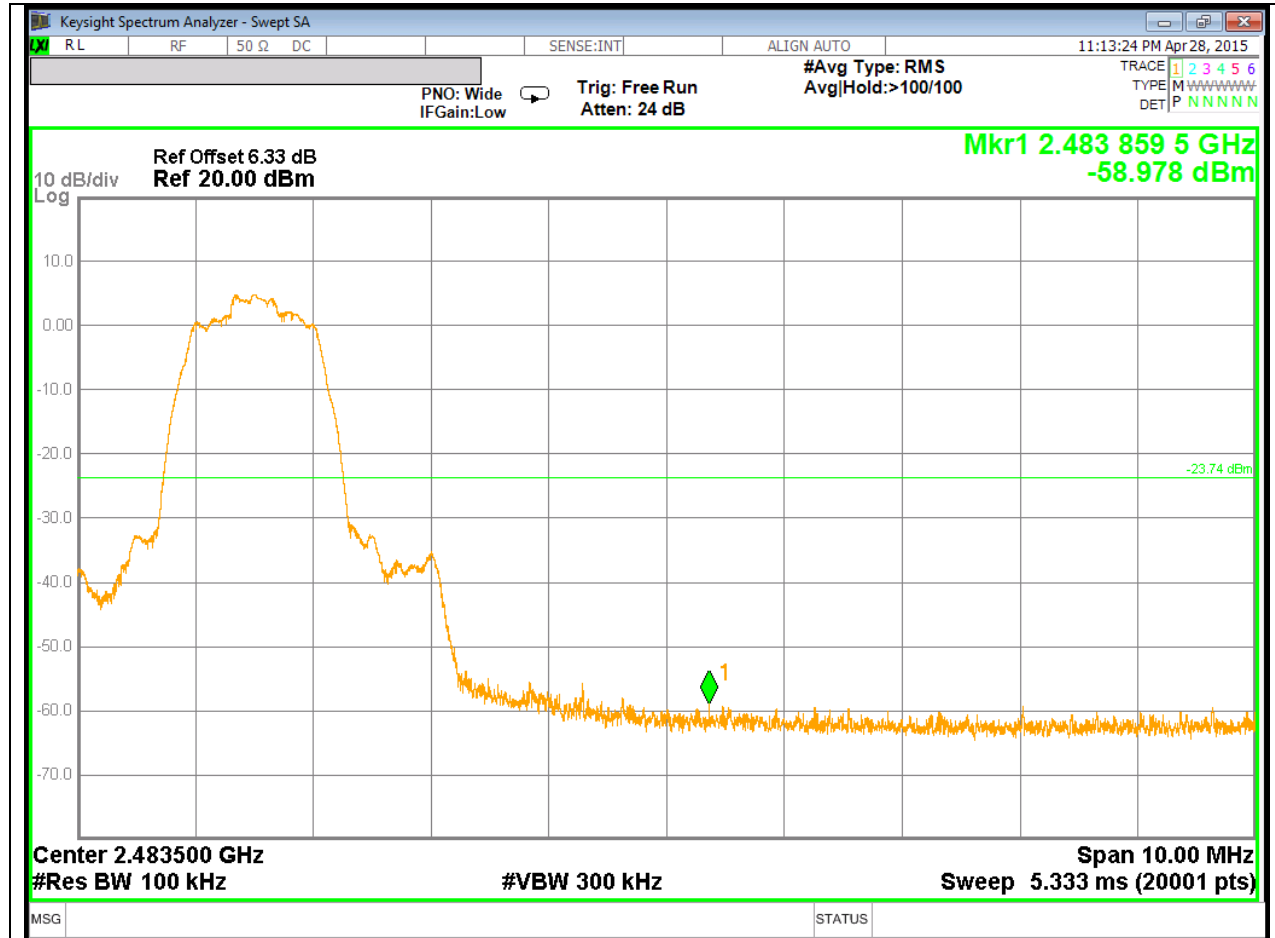
**MID CHANNEL BANDEDGE**





**SPURIOUS EMISSIONS, HIGH CHANNEL**

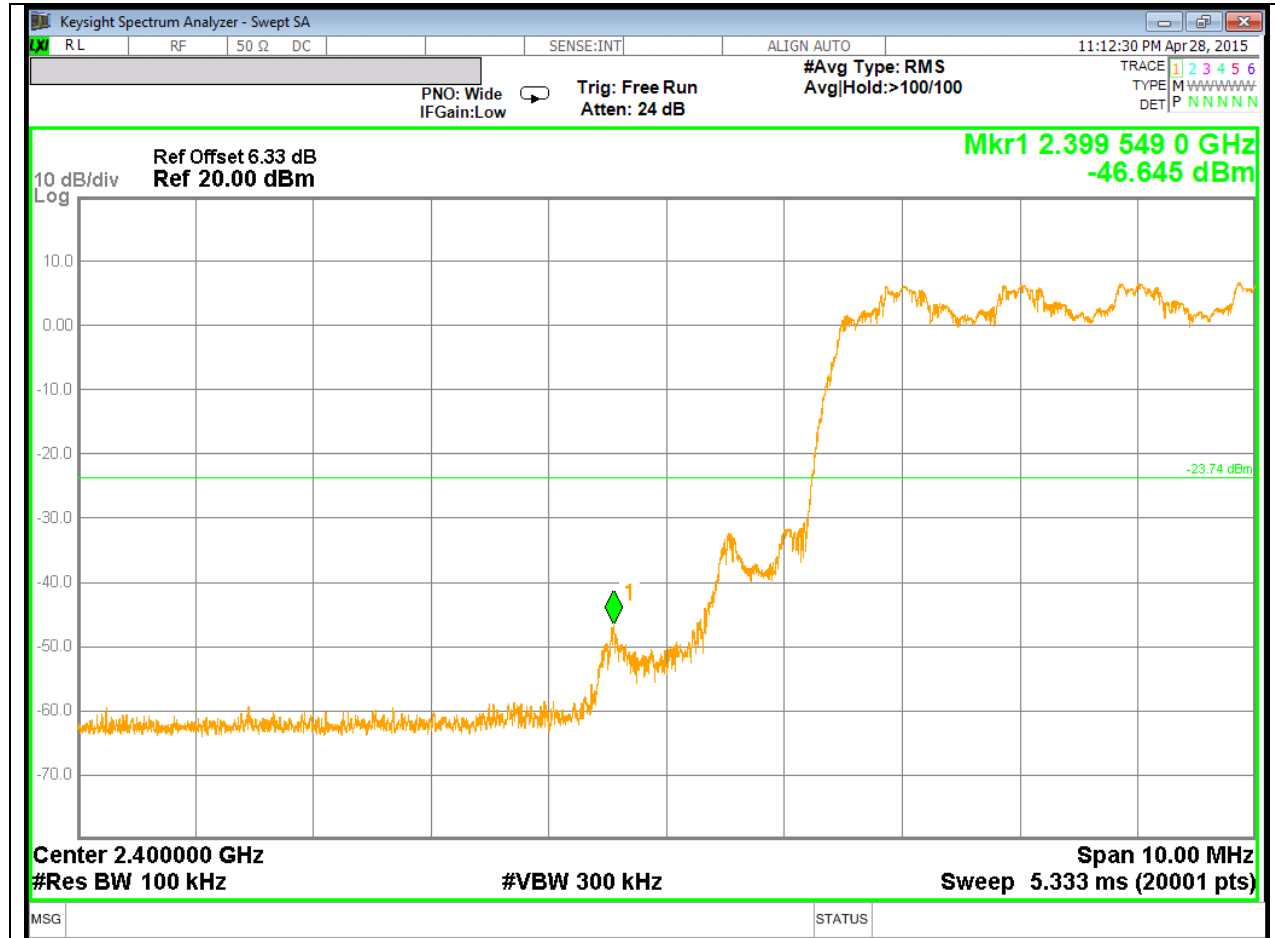
**HIGH CHANNEL BANDEDGE**



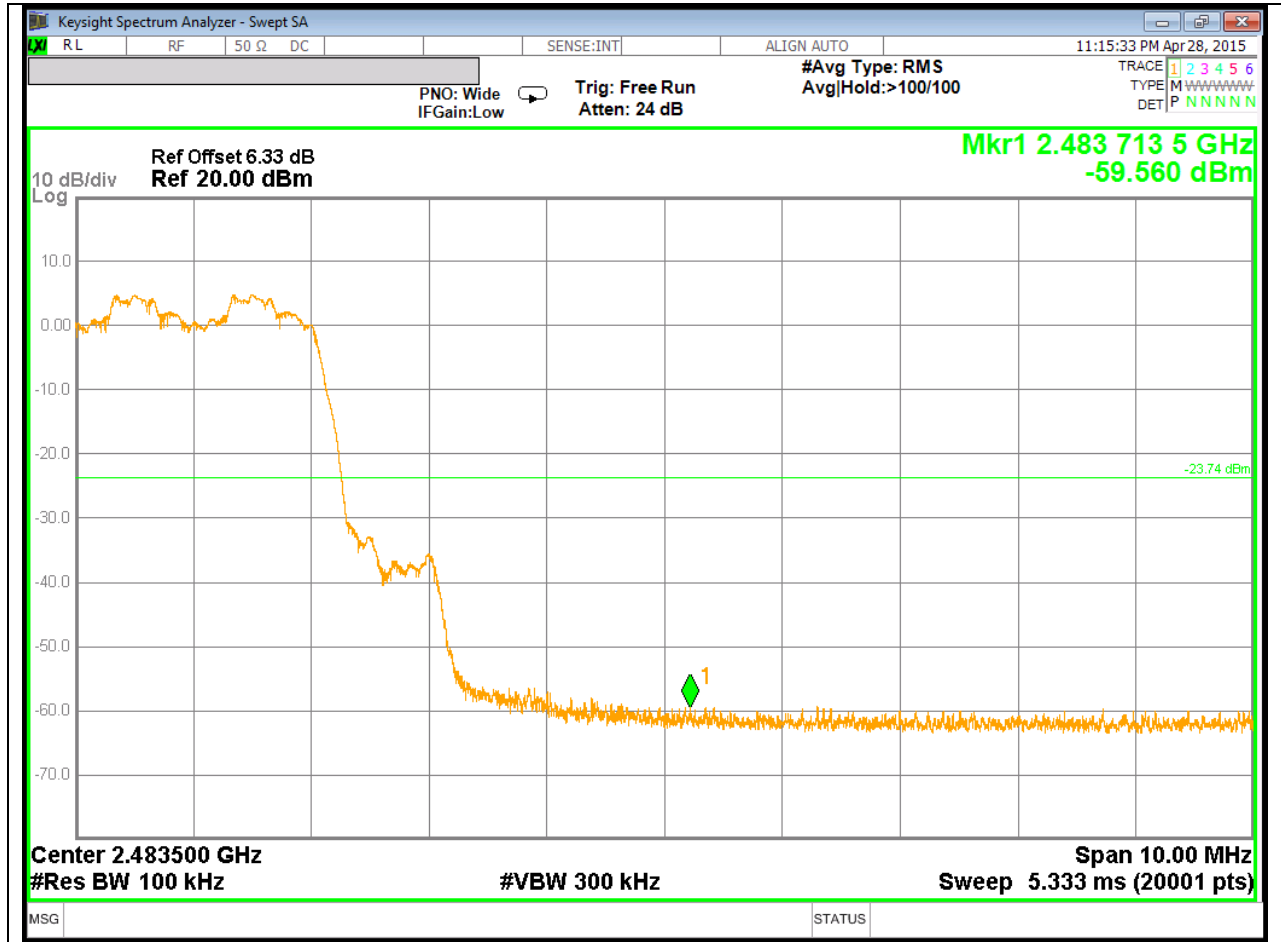


**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**

**LOW BANDEDGE WITH HOPPING ON**



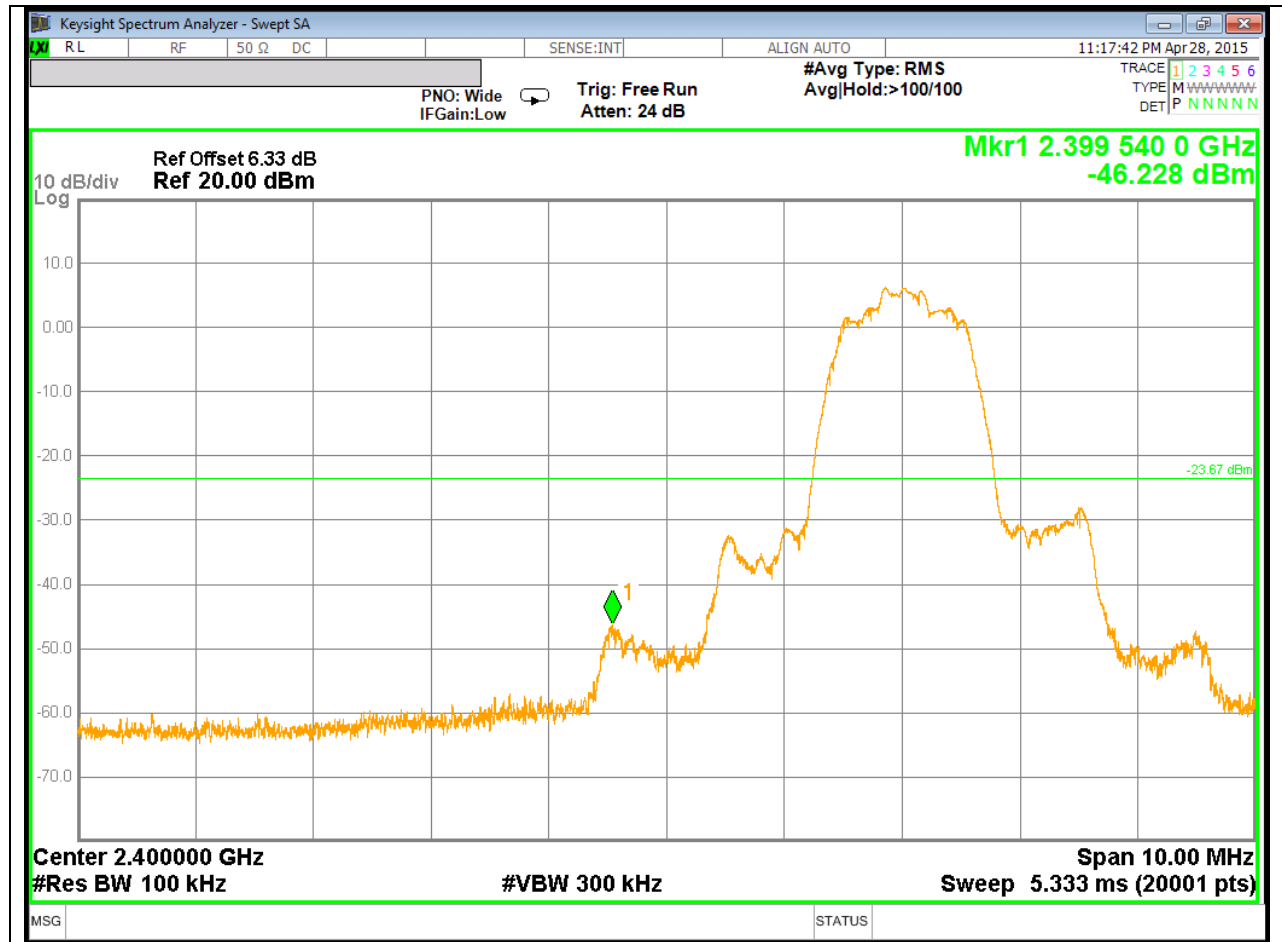
## HIGH BANDEDGE WITH HOPPING ON

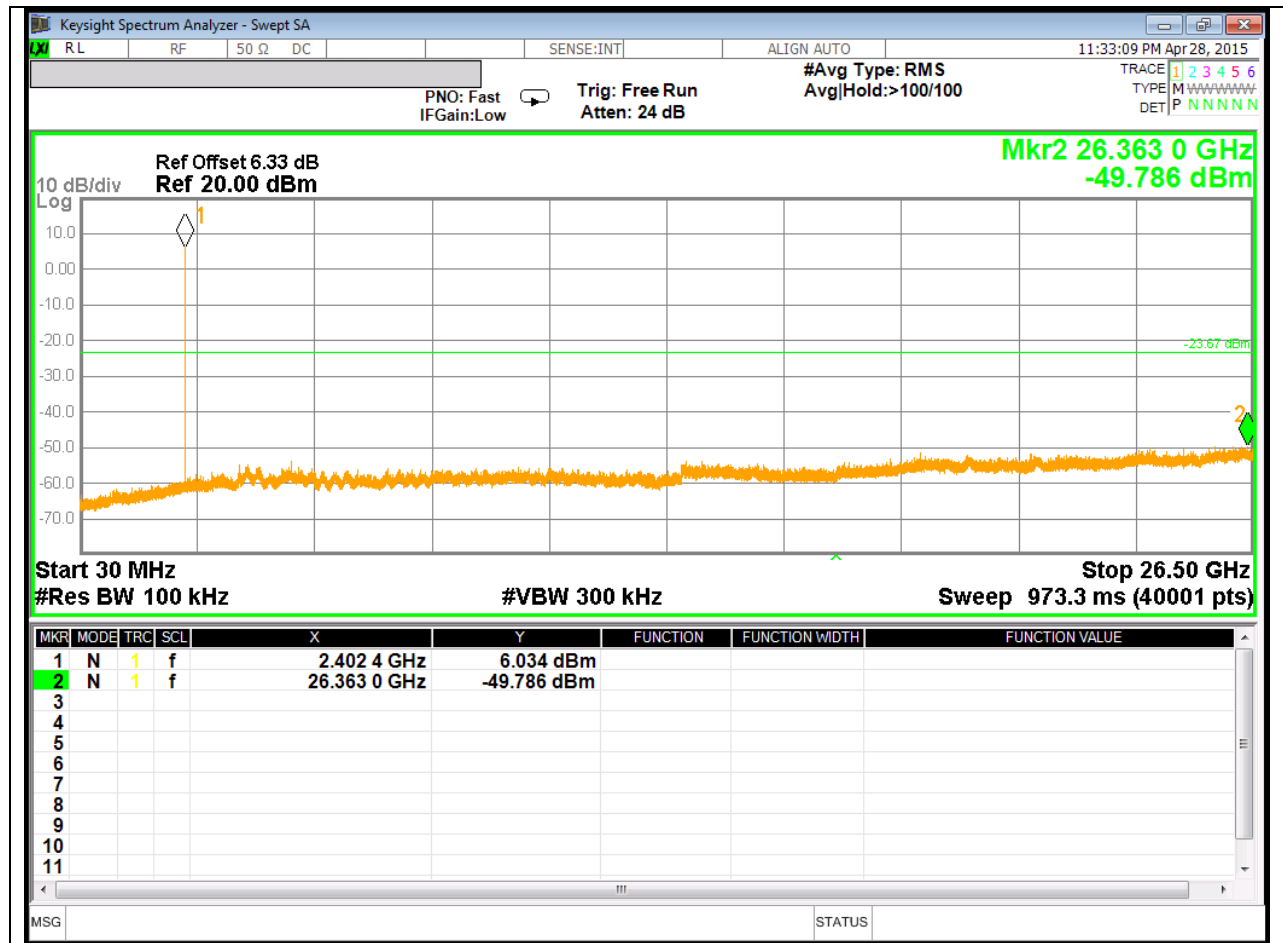


### 8.7.3. ENHANCED DATA RATE 8DPSK MODULATION

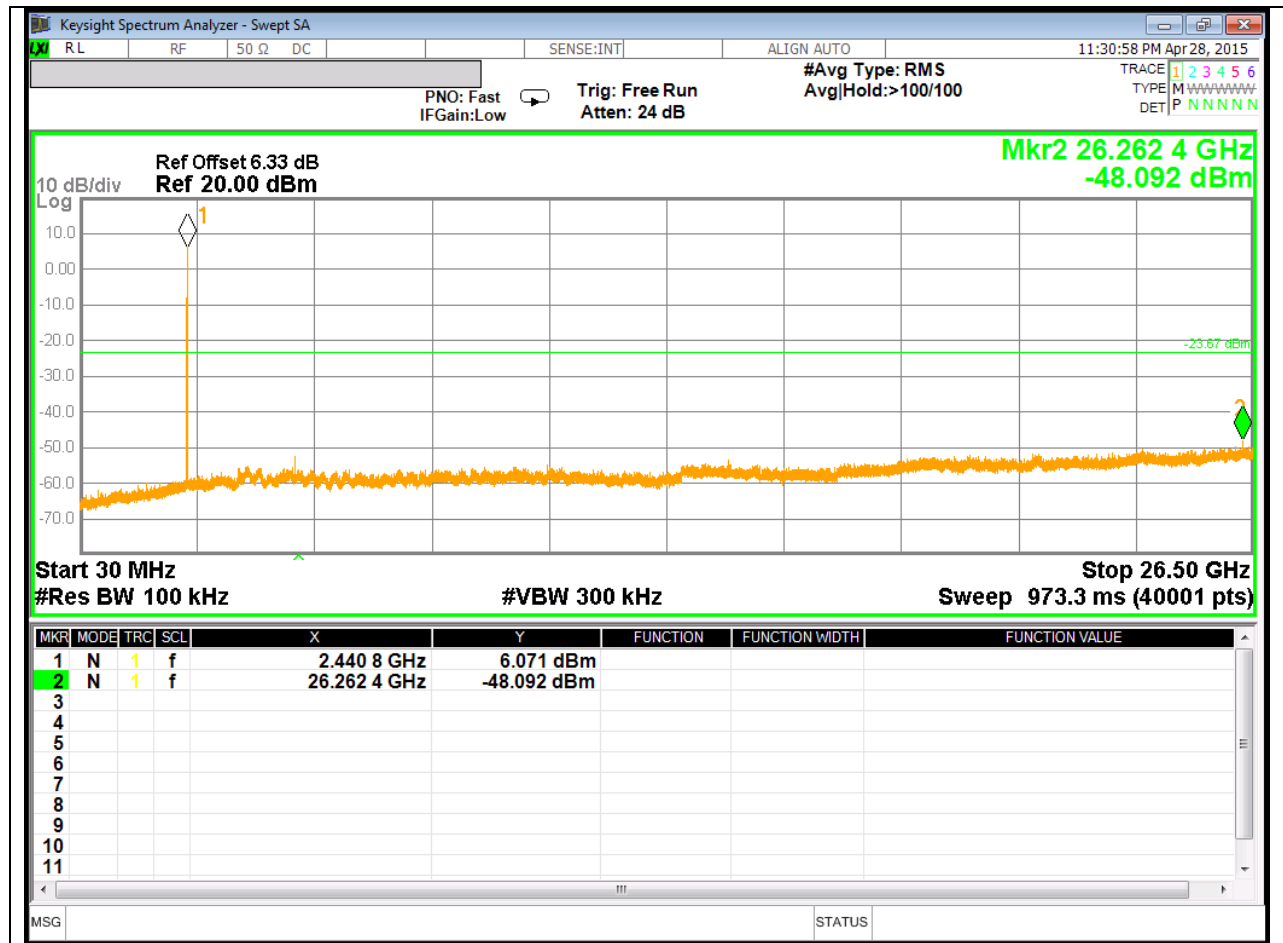
#### SPURIOUS EMISSIONS, LOW CHANNEL

#### LOW CHANNEL BANDEDGE



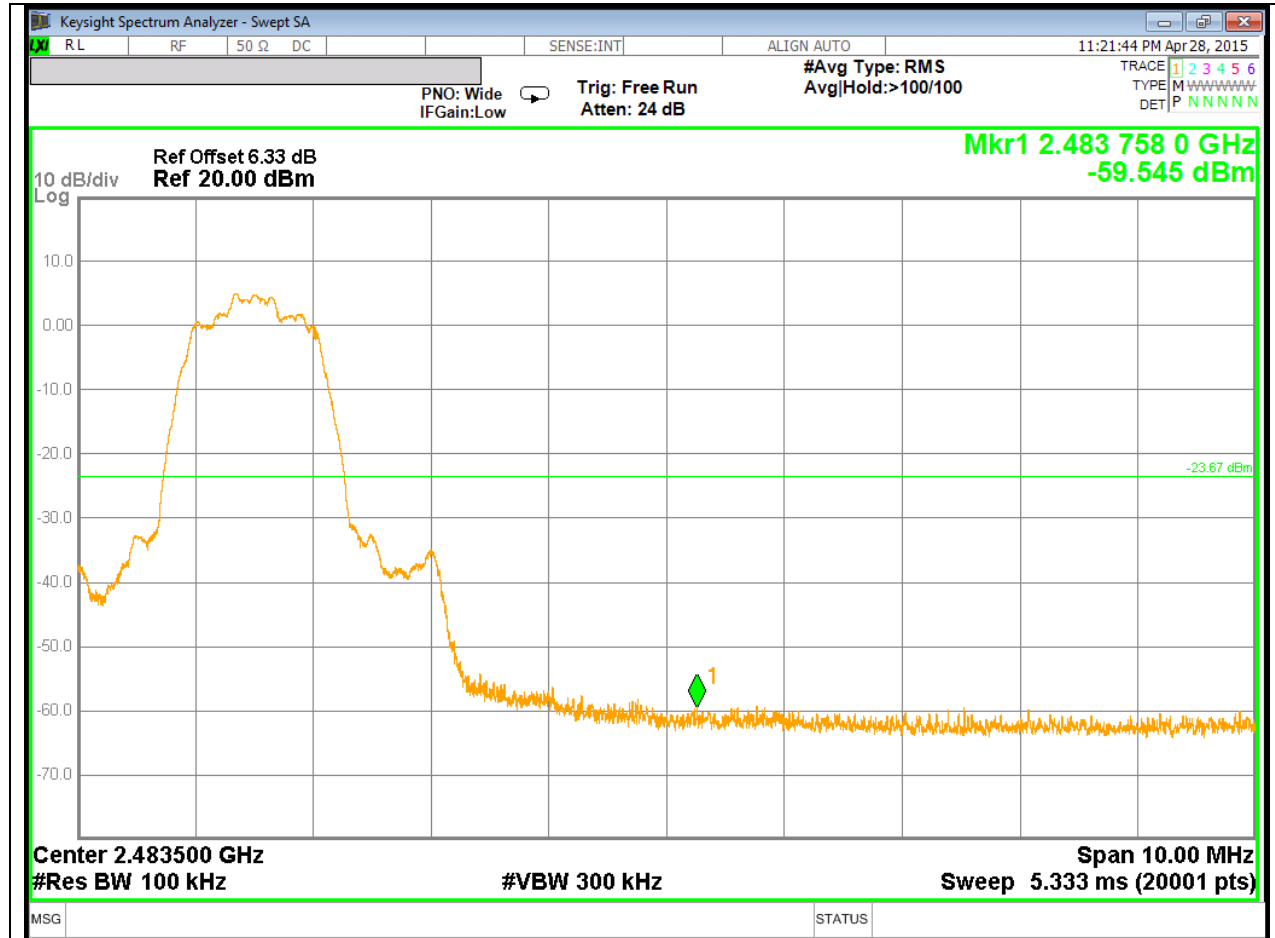


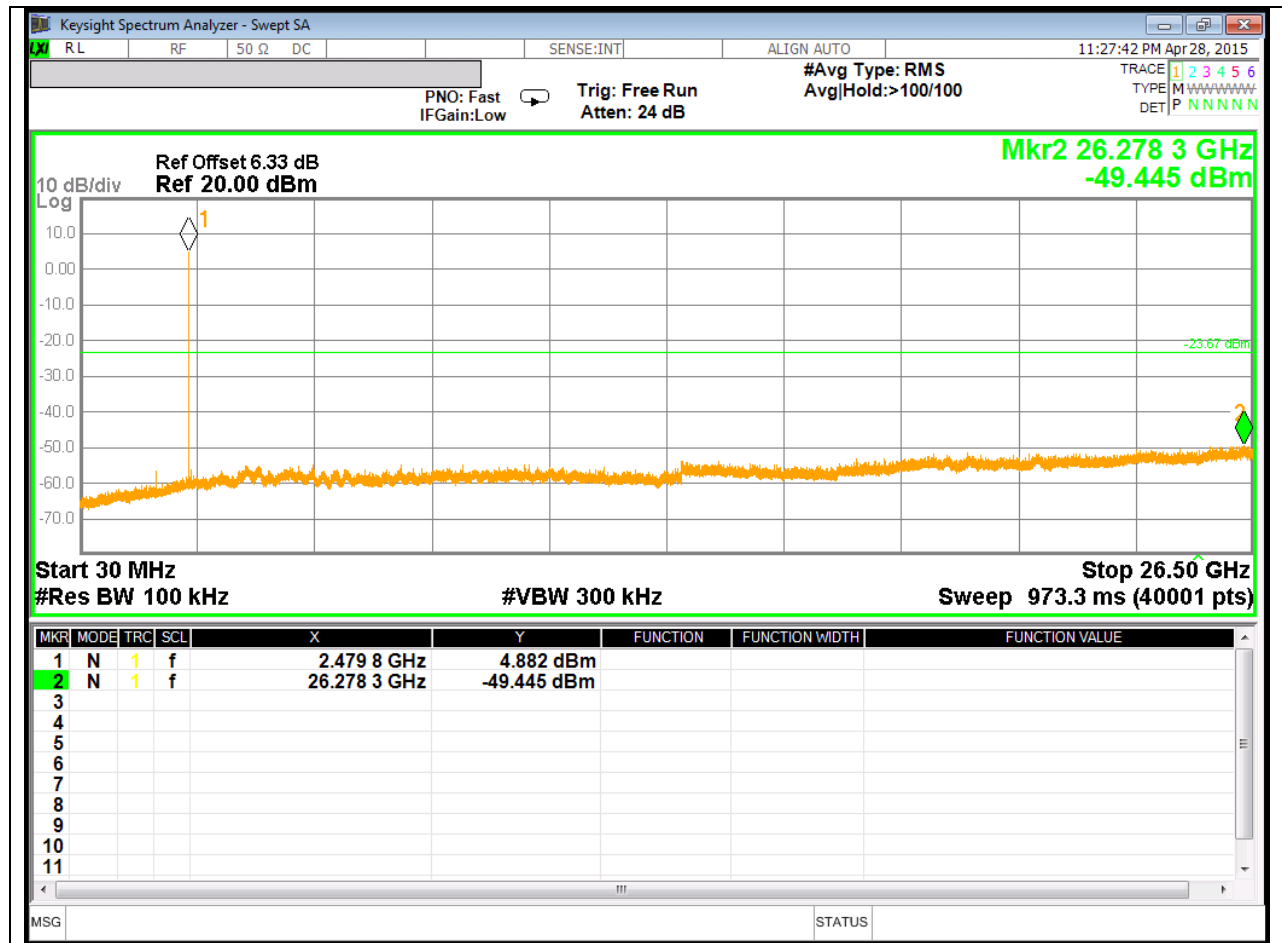




**SPURIOUS EMISSIONS, HIGH CHANNEL**

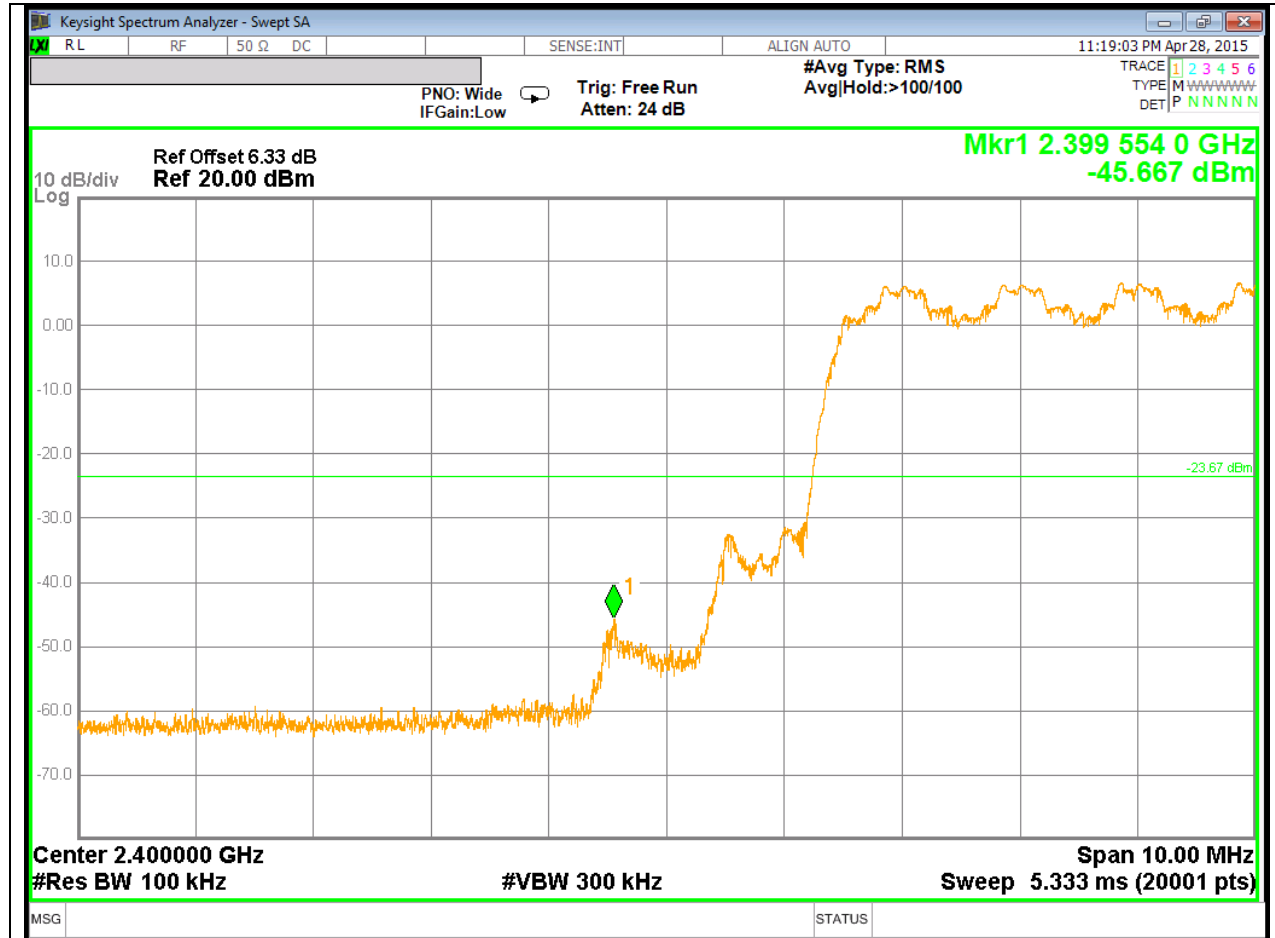
**HIGH CHANNEL BANDEDGE**



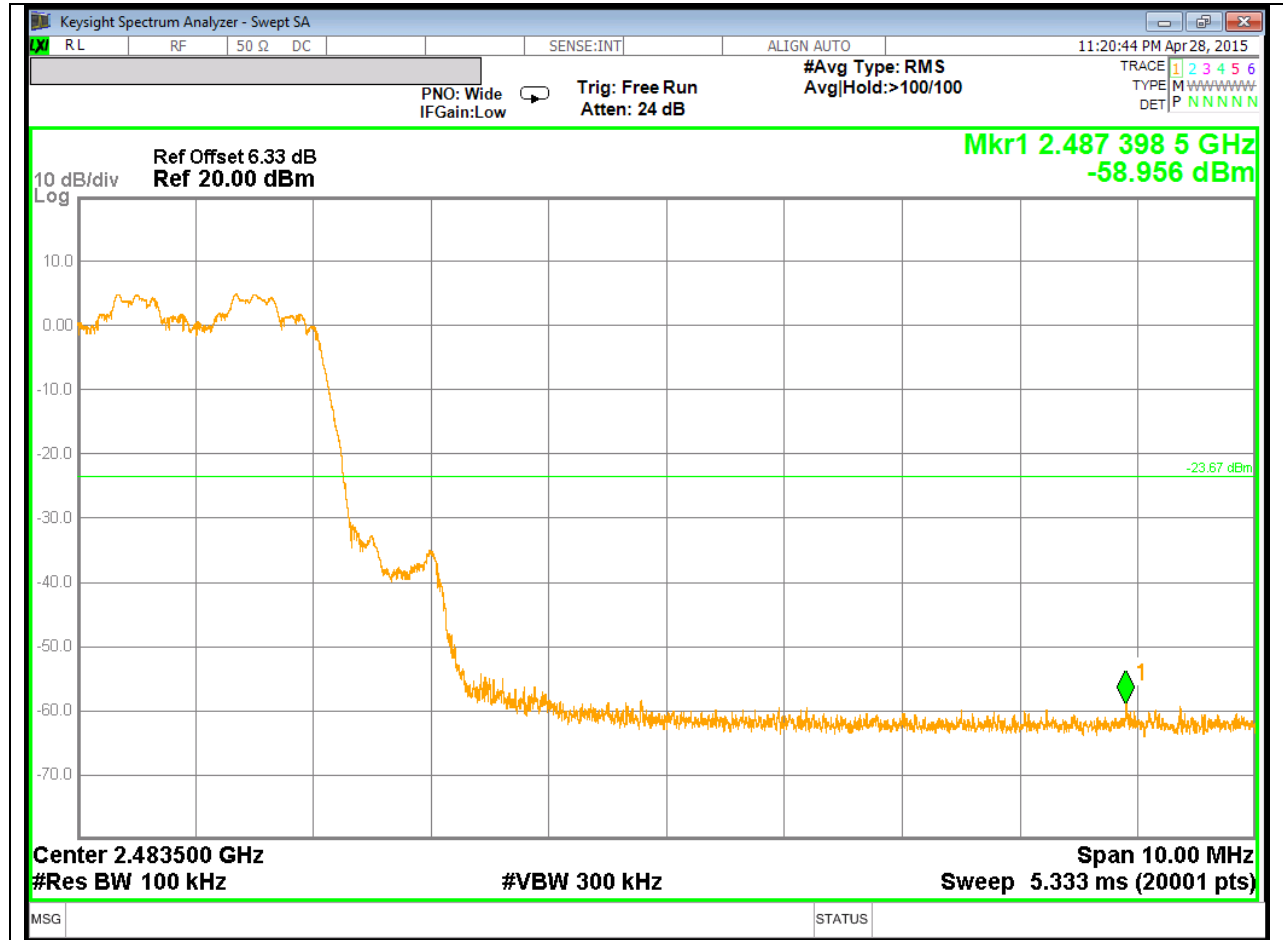


**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**

**LOW BANDEDGE WITH HOPPING ON**



## HIGH BANDEDGE WITH HOPPING ON



## 9. RADIATED TEST RESULTS

### 9.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

| 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 band edge 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 1/T (on time) for average measurement.

$$GFSK = 1/T = 1 / 0.0029S = 350Hz.$$

The spectrum from 1GHzHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

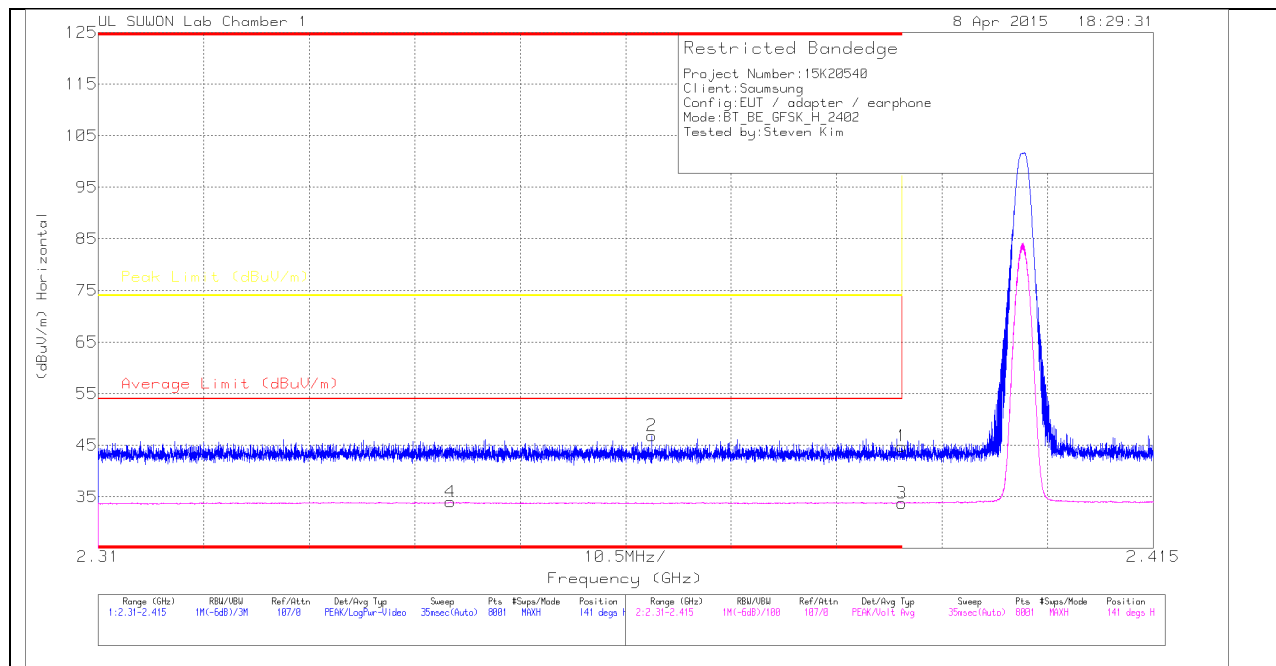
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

## 9.2. TRANSMITTER ABOVE 1 GHz

### 9.2.1. BASIC DATA RATE GFSK MODULATION

#### RESTRICTED BANDEDGE (LOW CHANNEL)

##### HORIZONTAL PEAK AND AVERAGE PLOT



##### HORIZONTAL DATA

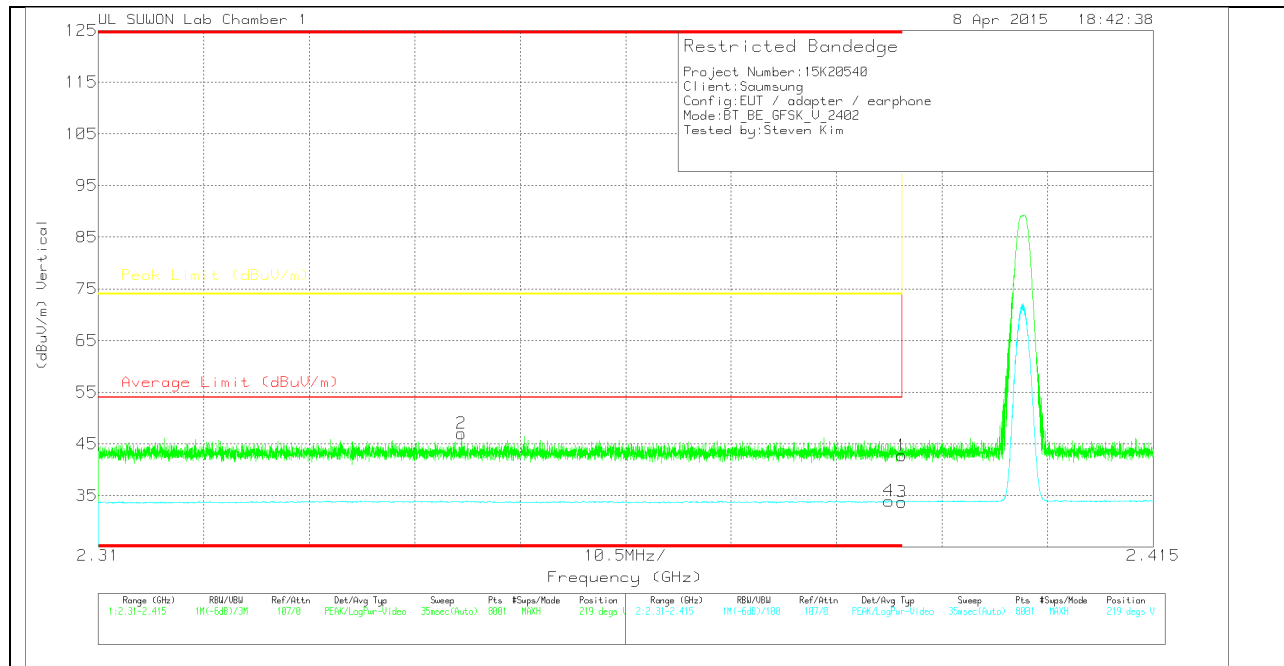
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.39          | 39.72                | Pk   | 27.9         | -22.8        | 44.82                      | -                      | -           | 74                  | -29.18         | 141            | 143         | H        |
| 2      | * 2.365         | 41.86                | Pk   | 27.8         | -22.8        | 46.86                      | -                      | -           | 74                  | -27.14         | 141            | 143         | H        |
| 3      | * 2.39          | 28.67                | VB1T | 27.9         | -22.8        | 33.77                      | 54                     | -20.23      | -                   | -              | 141            | 143         | H        |
| 4      | * 2.345         | 29.12                | VB1T | 27.8         | -22.9        | 34.02                      | 54                     | -19.98      | -                   | -              | 141            | 143         | H        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## VERTICAL PEAK AND AVERAGE PLOT



## VERTICAL DATA

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.39          | 37.68                | Pk   | 27.9         | -22.8        | 42.78                      | -                      | -           | 74                  | -31.22         | 219            | 173         | V        |
| 2      | * 2.346         | 42.12                | Pk   | 27.8         | -22.9        | 47.02                      | -                      | -           | 74                  | -26.98         | 219            | 173         | V        |
| 3      | * 2.39          | 28.67                | VB1T | 27.9         | -22.8        | 33.77                      | 54                     | -20.23      | -                   | -              | 219            | 173         | V        |
| 4      | * 2.389         | 28.87                | VB1T | 27.9         | -22.8        | 33.97                      | 54                     | -20.03      | -                   | -              | 219            | 173         | V        |

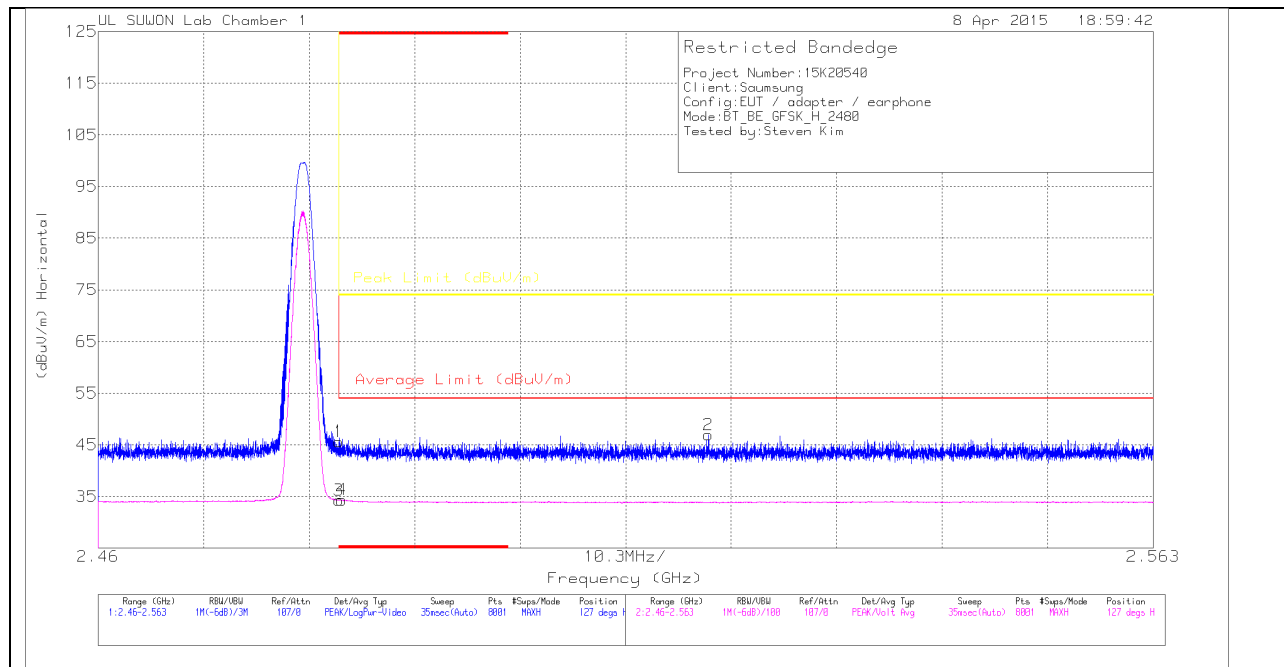
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## AUTHORIZED BANDEDGE (HIGH CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT



### HORIZONTAL DATA

#### Trace Markers

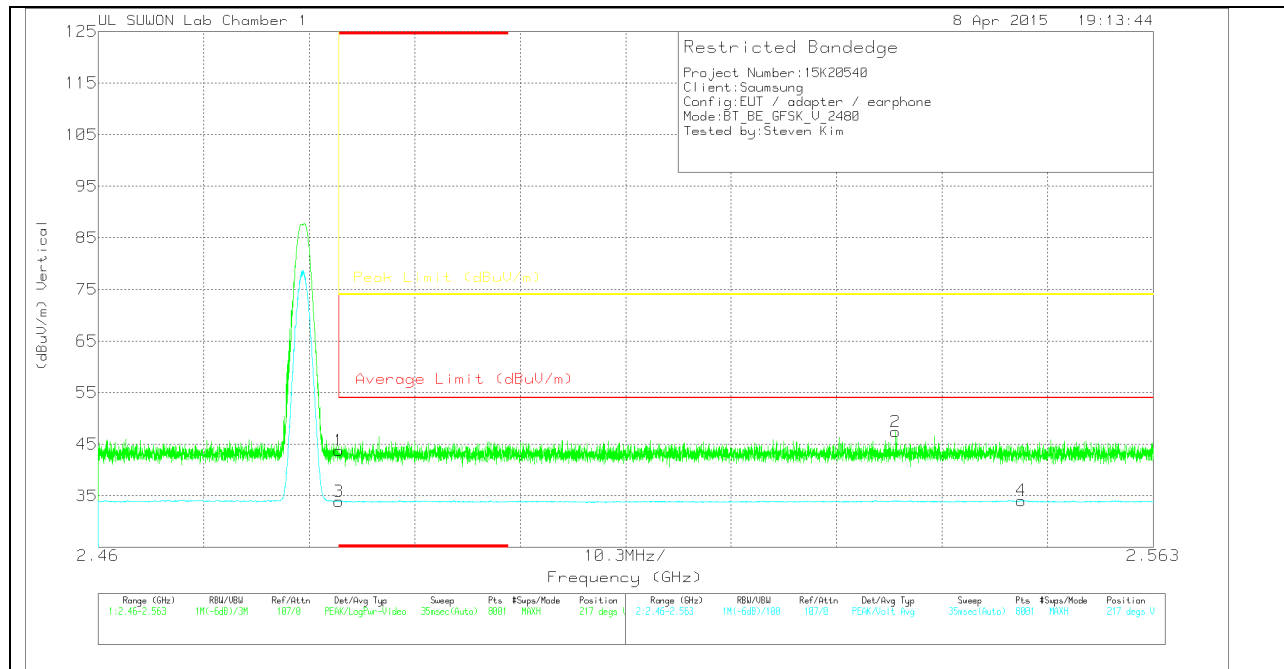
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.484         | 40.33                | Pk   | 27.9         | -22.6        | 45.63                      | -                      | -           | 74                  | -28.37         | 127            | 175         | H        |
| 2      | 2.52            | 41.66                | Pk   | 27.9         | -22.6        | 46.96                      | -                      | -           | 74                  | -27.04         | 127            | 175         | H        |
| 3      | * 2.484         | 28.98                | VB1T | 27.9         | -22.6        | 34.28                      | 54                     | -19.72      | -                   | -              | 127            | 175         | H        |
| 4      | * 2.484         | 29.07                | VB1T | 27.9         | -22.6        | 34.37                      | 54                     | -19.63      | -                   | -              | 127            | 175         | H        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## VERTICAL PEAK AND AVERAGE PLOT



## VERTICAL DATA

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.484         | 38.48                | Pk   | 27.9         | -22.6        | 43.78                      | -                      | -           | 74                  | -30.22         | 217            | 162         | V        |
| 2      | 2.538           | 42.14                | Pk   | 27.9         | -22.6        | 47.44                      | -                      | -           | 74                  | -26.56         | 217            | 162         | V        |
| 3      | * 2.484         | 28.64                | VB1T | 27.9         | -22.6        | 33.94                      | 54                     | -20.06      | -                   | -              | 217            | 162         | V        |
| 4      | 2.55            | 28.78                | VB1T | 27.9         | -22.6        | 34.08                      | 54                     | -19.92      | -                   | -              | 217            | 162         | V        |

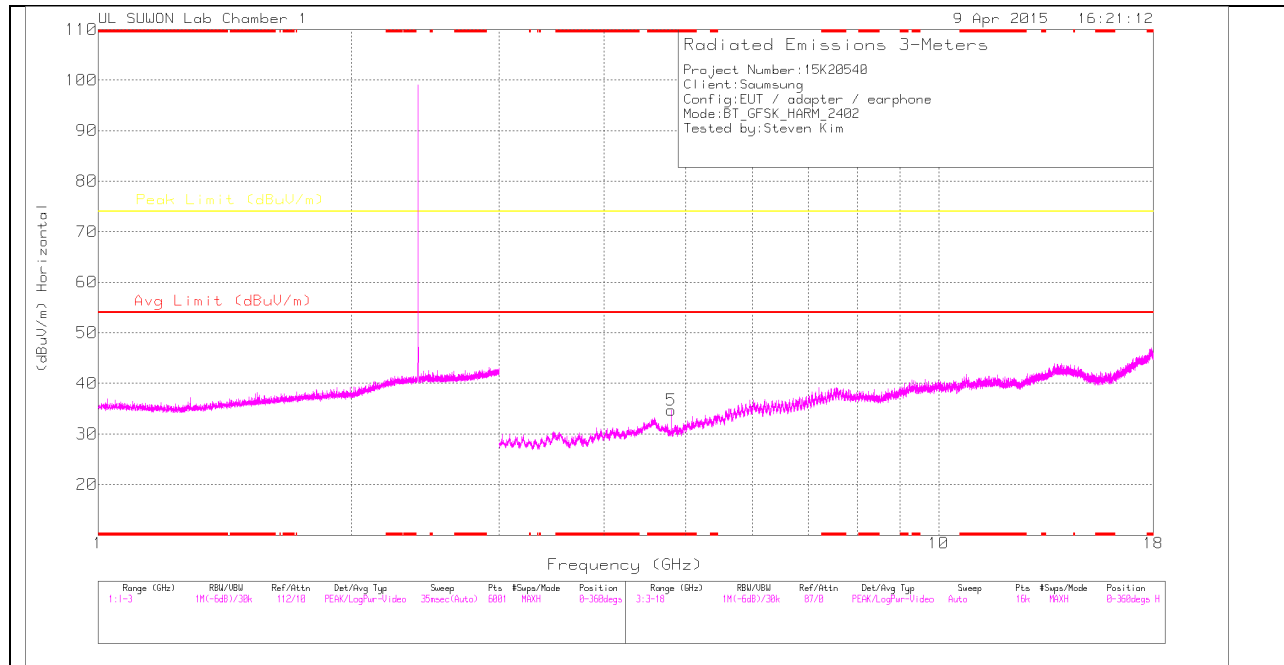
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

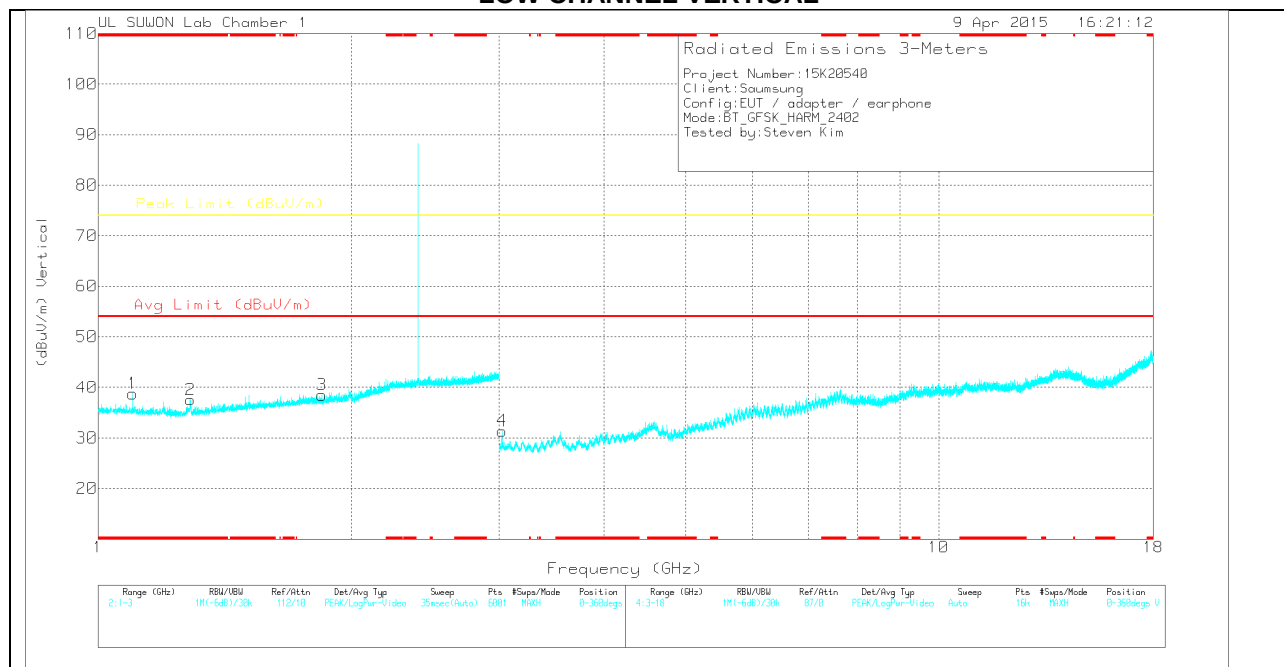
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL HORIZONTAL



### LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## LOW CHANNEL DATA

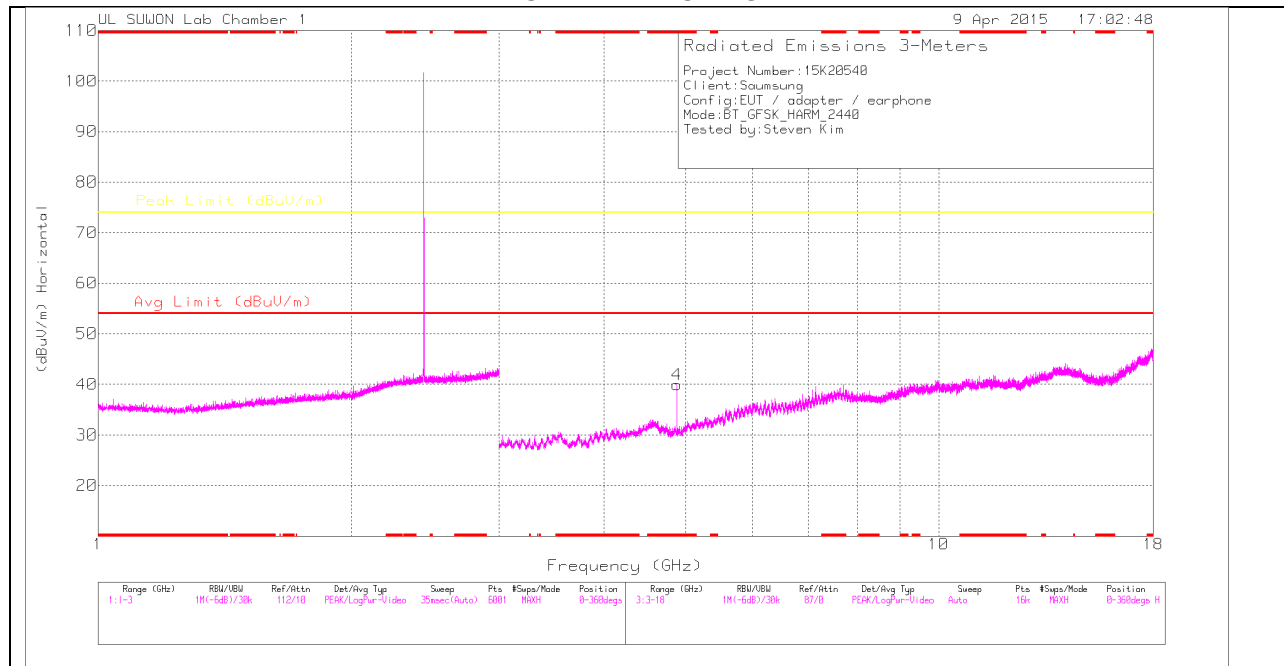
### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| 1      | * 1.1           | 39.56                | PK  | 24.3         | -25.1        | 38.76                      | -                  | -           | 74                  | -35.24      | 0-360          | 200         | V        |
| 2      | * 1.289         | 38.45                | PK  | 23.8         | -24.7        | 37.55                      | -                  | -           | 74                  | -36.45      | 0-360          | 100         | V        |
| 3      | 1.846           | 36.8                 | PK  | 25.3         | -23.6        | 38.5                       | -                  | -           | -                   | -           | 0-360          | 200         | V        |
| 5      | * 4.804         | 32.56                | PK  | 31.9         | -29.8        | 34.66                      | -                  | -           | 74                  | -39.34      | 0-360          | 100         | H        |
| 4      | 3.023           | 33.68                | PK  | 28.8         | -31.1        | 31.38                      | -                  | -           | -                   | -           | 0-360          | 200         | V        |

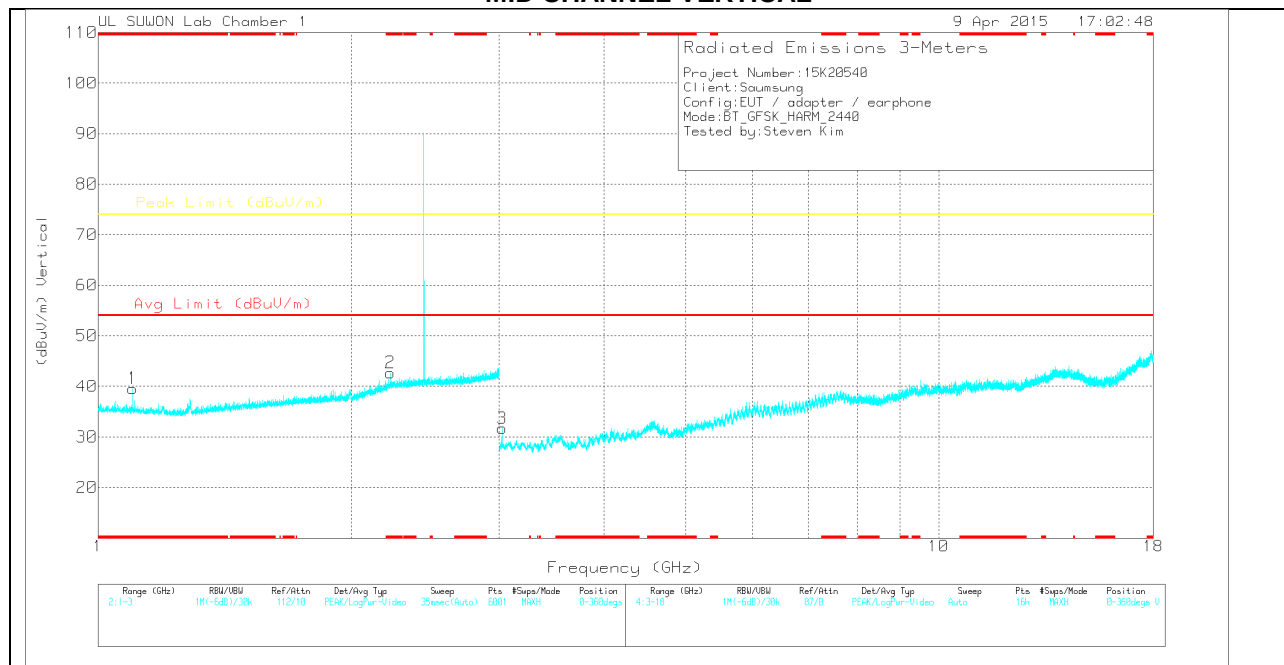
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

### MID CHANNEL HORIZONTAL



### MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## MID CHANNEL DATA

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| 1      | * 1.1           | 40.38                | PK  | 24.3         | -25.1        | 39.58                      | -                  | -           | 74                  | -34.42      | 0-360          | 200         | V        |
| 2      | * 2.228         | 38.11                | PK  | 27.6         | -23          | 42.71                      | -                  | -           | 74                  | -31.29      | 0-360          | 200         | V        |
| 4      | * 4.88          | 37.03                | PK  | 32           | -29.1        | 39.93                      | -                  | -           | 74                  | -34.07      | 0-360          | 100         | H        |
| 3      | 3.023           | 34.02                | PK  | 28.8         | -31.1        | 31.72                      | -                  | -           | -                   | -           | 0-360          | 200         | V        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

### Radiated Emissions

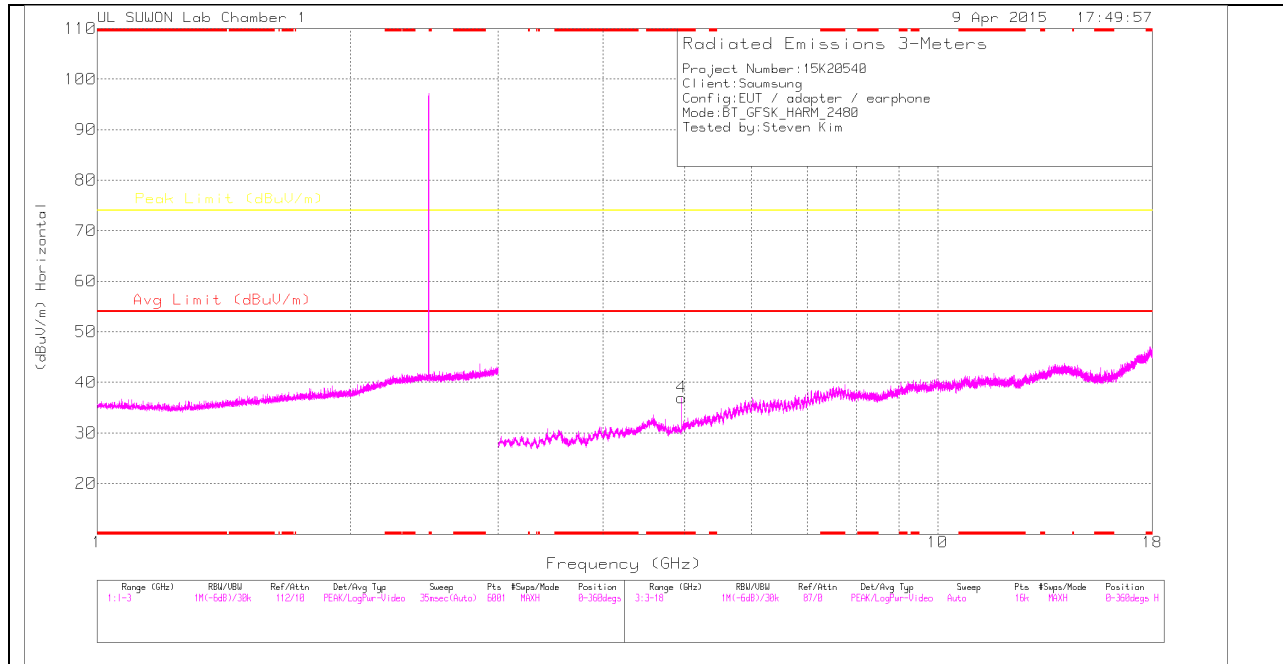
| Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_3_3G HP | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|------|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.88          | 42.9                 | PK3  | 32           | -29.1        | 45.8                       | -                  | -           | 74                  | -28.2       | 120            | 100         | H        |
| * 4.88          | 29.38                | VB1T | 32           | -29.1        | 32.28                      | 54                 | -21.72      | -                   | -           | 120            | 100         | H        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

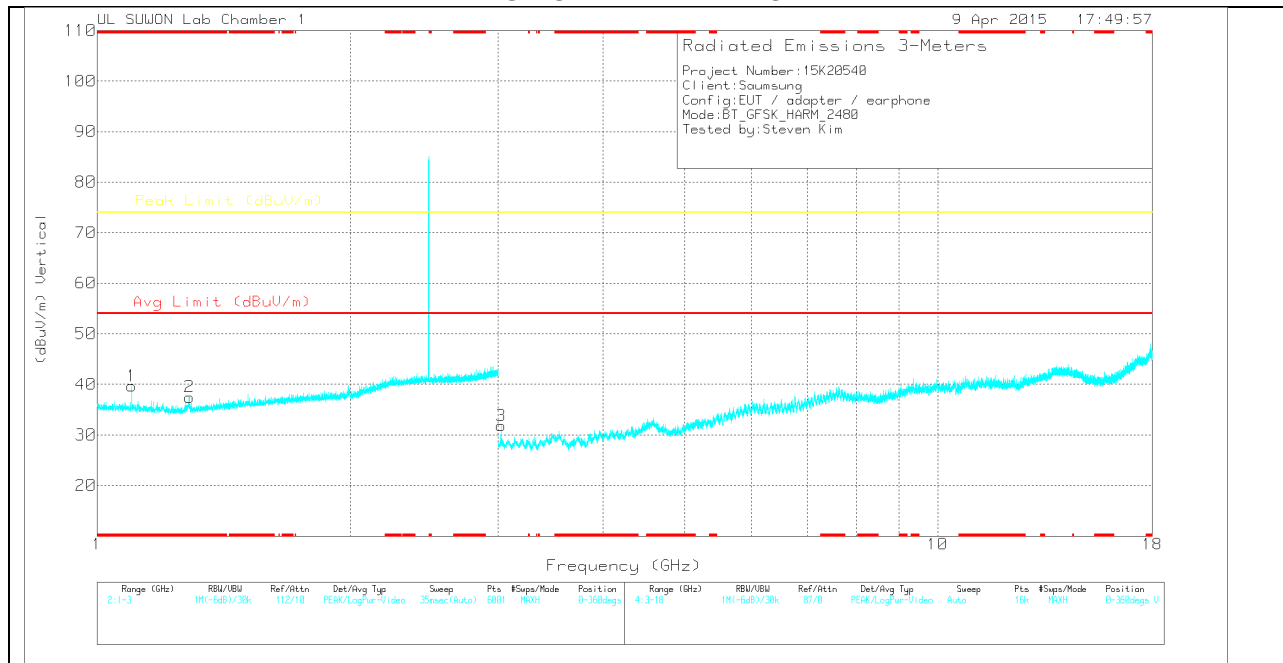
PK3 - FHSS Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

### HIGH CHANNEL HORIZONTAL



### HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## HIGH CHANNEL DATA

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| 1      | * 1.1           | 40.48                | PK  | 24.3         | -25.1        | 39.68                      | -                  | -           | 74                  | -34.32      | 0-360          | 200         | V        |
| 2      | * 1.288         | 38.39                | PK  | 23.8         | -24.7        | 37.49                      | -                  | -           | 74                  | -36.51      | 0-360          | 100         | V        |
| 4      | * 4.96          | 33.79                | PK  | 32.1         | -28.9        | 36.99                      | -                  | -           | 74                  | -37.01      | 0-360          | 100         | H        |
| 3      | 3.023           | 34.1                 | PK  | 28.8         | -31.1        | 31.8                       | -                  | -           | -                   | -           | 0-360          | 200         | V        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

### Radiated Emissions

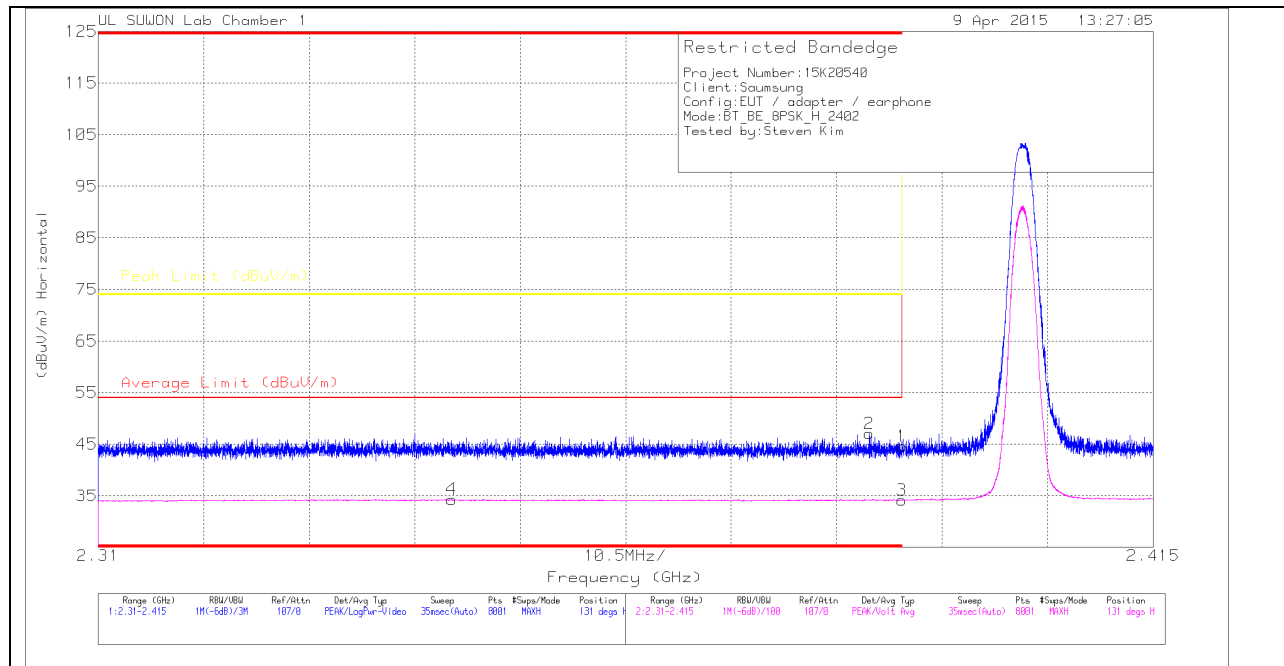
| Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_3_3G HP | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|-----------------|----------------------|------|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| * 4.88          | 42.9                 | PK3  | 32           | -29.1        | 45.8                       | -                  | -           | 74                  | -28.2       | 120            | 100         | H        |
| * 4.88          | 29.38                | VB1T | 32           | -29.1        | 32.28                      | 54                 | -21.72      | -                   | -           | 120            | 100         | H        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK3 - FHSS Method: Maximum Peak

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## 9.2.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION RESTRICTED BANDEDGE (LOW CHANNEL)



### HORIZONTAL DATA

#### Trace Markers

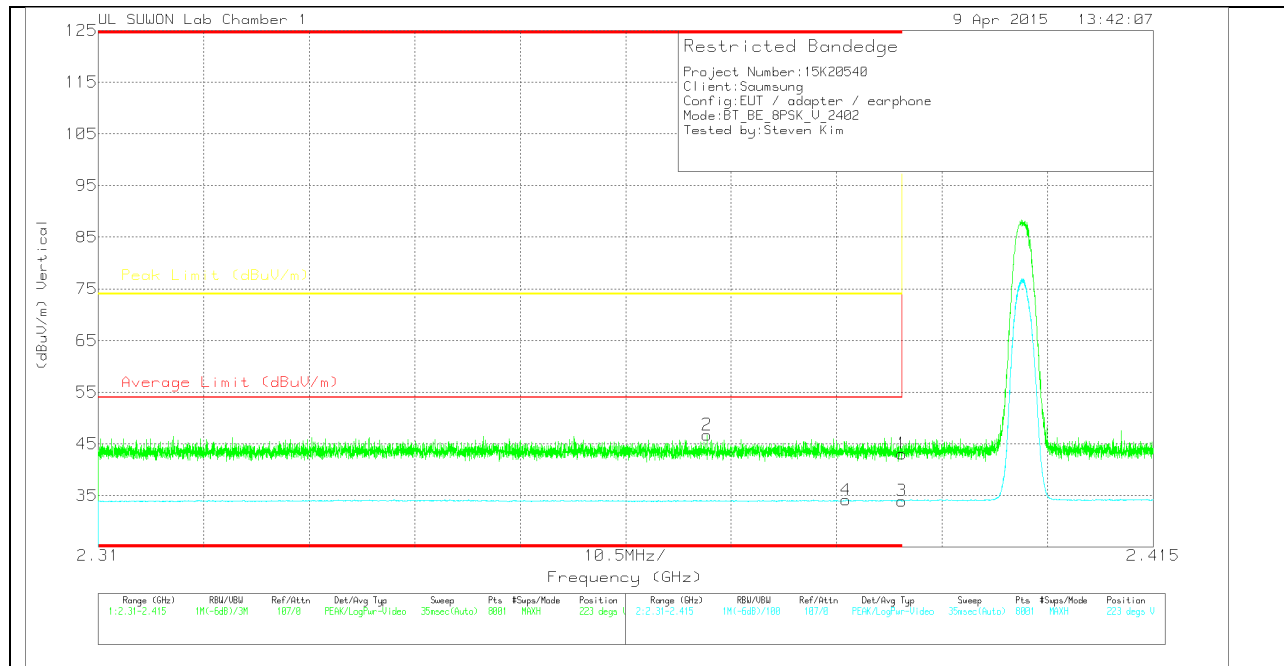
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.39          | 39.53                | Pk   | 27.9         | -22.8        | 44.63                      | -                      | -           | 74                  | -29.37         | 131            | 151         | H        |
| 2      | * 2.387         | 41.97                | Pk   | 27.9         | -22.8        | 47.07                      | -                      | -           | 74                  | -26.93         | 131            | 151         | H        |
| 3      | * 2.39          | 29.07                | VB1T | 27.9         | -22.8        | 34.17                      | 54                     | -19.83      | -                   | -              | 131            | 151         | H        |
| 4      | * 2.345         | 29.43                | VB1T | 27.8         | -22.9        | 34.33                      | 54                     | -19.67      | -                   | -              | 131            | 151         | H        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## VERTICAL PEAK AND AVERAGE PLOT



## VERTICAL DATA

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.39          | 38.02                | Pk   | 27.9         | -22.8        | 43.12                      | -                      | -           | 74                  | -30.88         | 223            | 131         | V        |
| 2      | * 2.371         | 41.74                | Pk   | 27.8         | -22.8        | 46.74                      | -                      | -           | 74                  | -27.26         | 223            | 131         | V        |
| 3      | * 2.39          | 28.89                | VB1T | 27.9         | -22.8        | 33.99                      | 54                     | -20.01      | -                   | -              | 223            | 131         | V        |
| 4      | * 2.384         | 29.07                | VB1T | 27.9         | -22.8        | 34.17                      | 54                     | -19.83      | -                   | -              | 223            | 131         | V        |

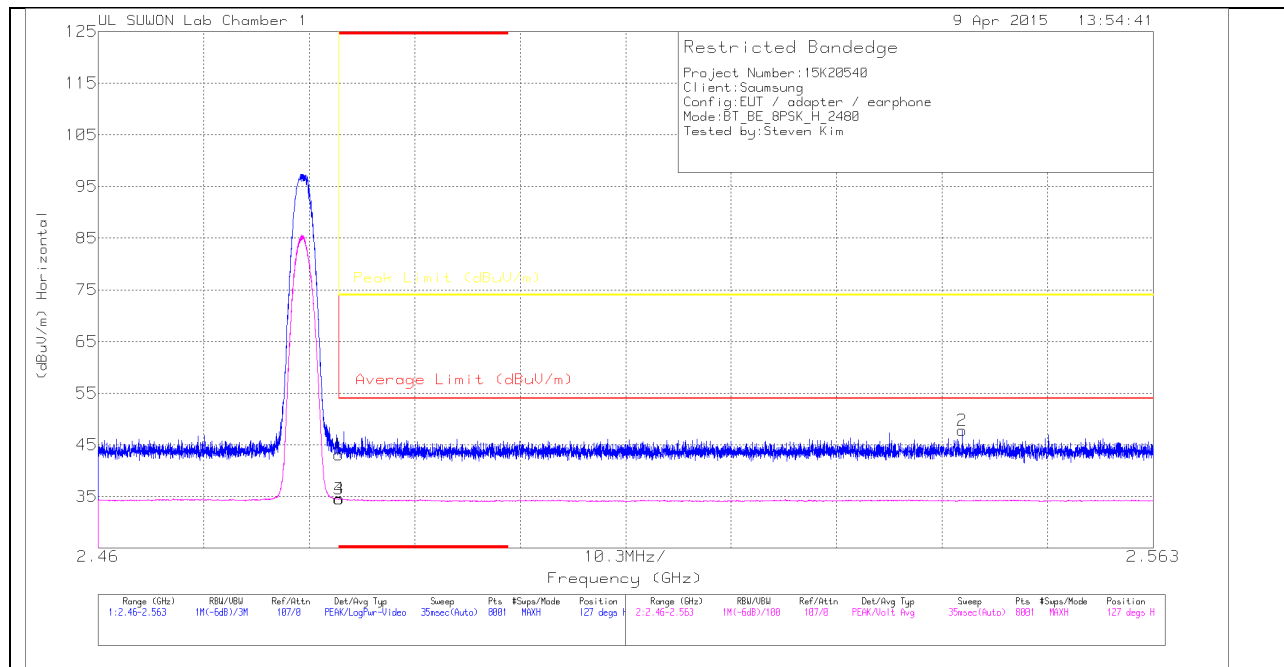
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## AUTHORIZED BANDEDGE (HIGH CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT



### HORIZONTAL DATA

#### Trace Markers

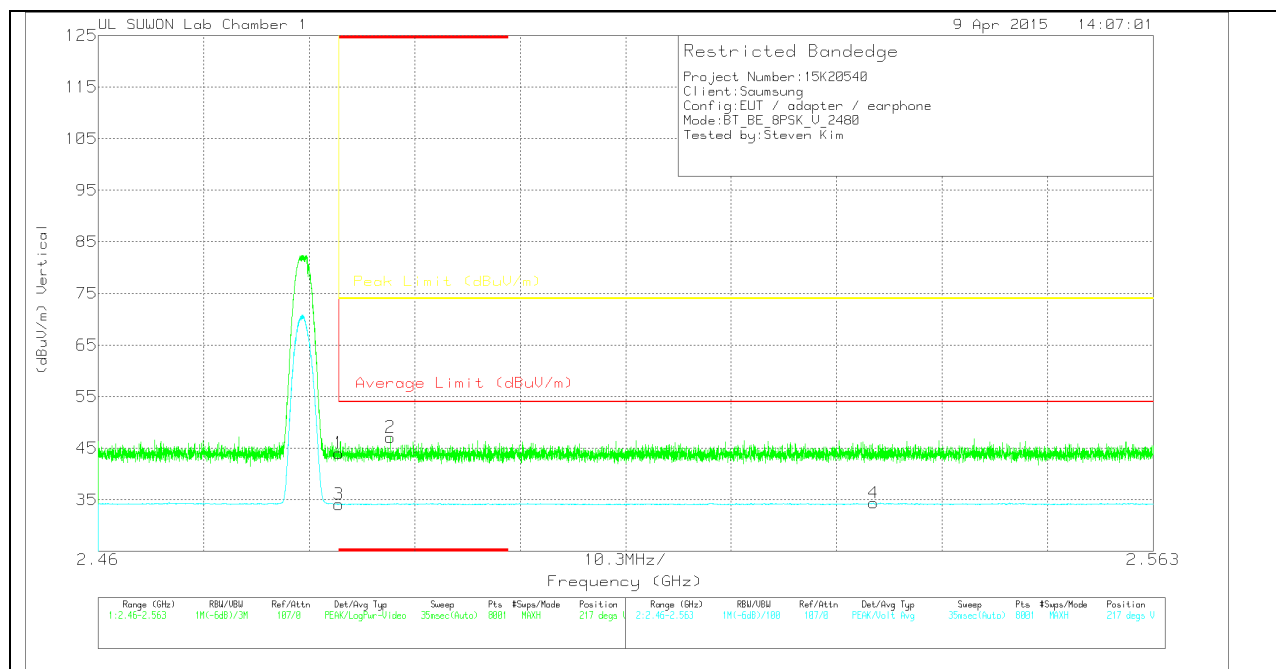
| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.484         | 37.84                | Pk   | 27.9         | -22.6        | 43.14                      | -                      | -           | 74                  | -30.86         | 127            | 174         | H        |
| 2      | 2.544           | 42.49                | Pk   | 27.9         | -22.6        | 47.79                      | -                      | -           | 74                  | -26.21         | 127            | 174         | H        |
| 3      | * 2.484         | 29.23                | VB1T | 27.9         | -22.6        | 34.53                      | 54                     | -19.47      | -                   | -              | 127            | 174         | H        |
| 4      | * 2.484         | 29.32                | VB1T | 27.9         | -22.6        | 34.62                      | 54                     | -19.38      | -                   | -              | 127            | 174         | H        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

### VERTICAL PEAK AND AVERAGE PLOT



### VERTICAL DATA

#### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det  | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Average Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|------|--------------|--------------|----------------------------|------------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 1      | * 2.484         | 38.78                | Pk   | 27.9         | -22.6        | 44.08                      | -                      | -           | 74                  | -29.92         | 217            | 137         | V        |
| 2      | * 2.484         | 41.81                | Pk   | 27.9         | -22.6        | 47.11                      | -                      | -           | 74                  | -26.89         | 217            | 137         | V        |
| 3      | * 2.484         | 28.83                | VB1T | 27.9         | -22.6        | 34.13                      | 54                     | -19.87      | -                   | -              | 217            | 137         | V        |
| 4      | 2.536           | 29.09                | VB1T | 27.9         | -22.6        | 34.39                      | 54                     | -19.61      | -                   | -              | 217            | 137         | V        |

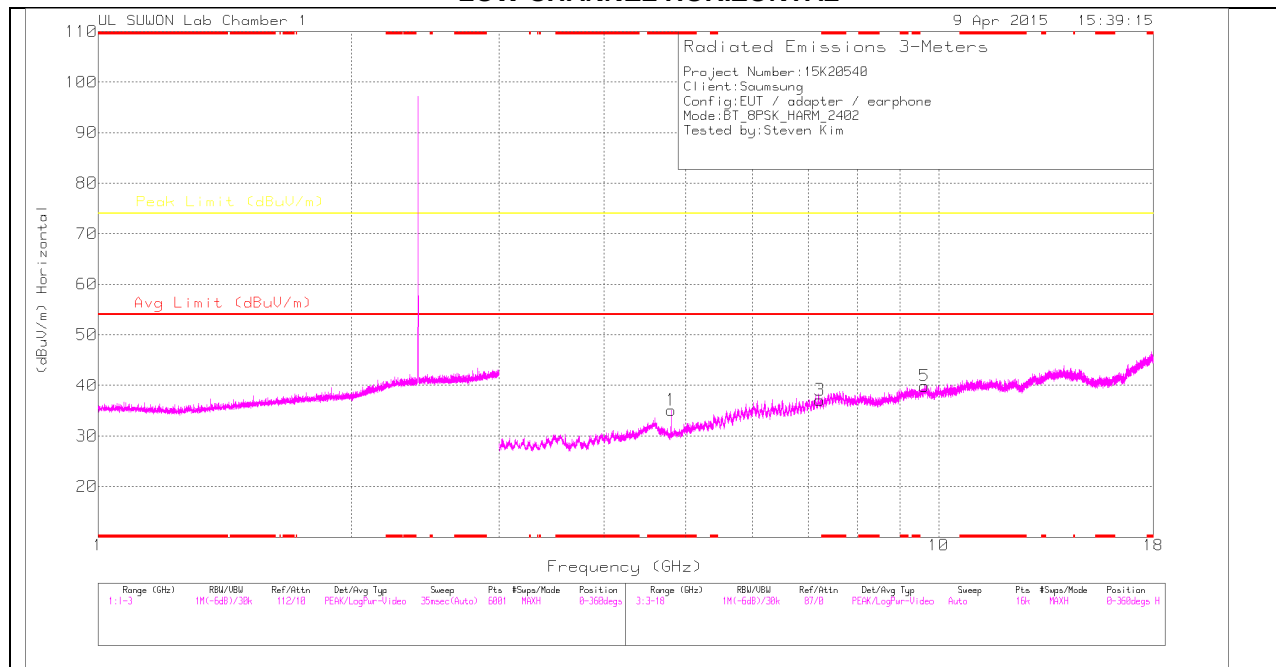
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

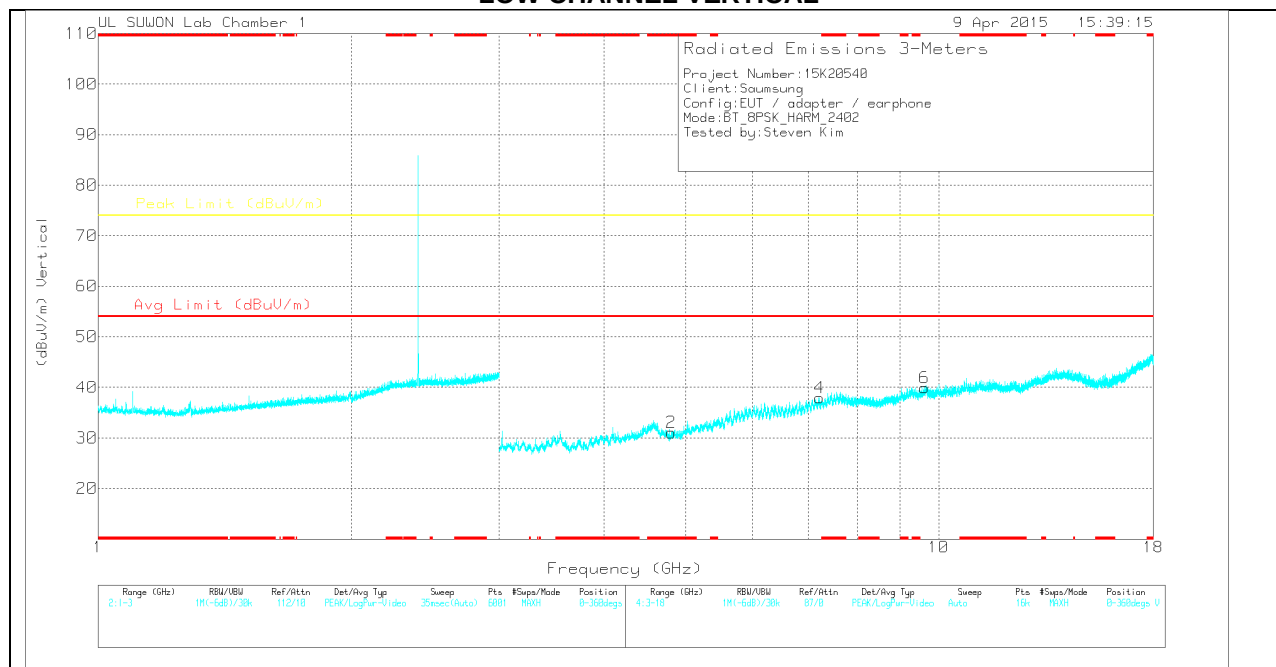
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL HORIZONTAL



### LOW CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## LOW CHANNEL DATA

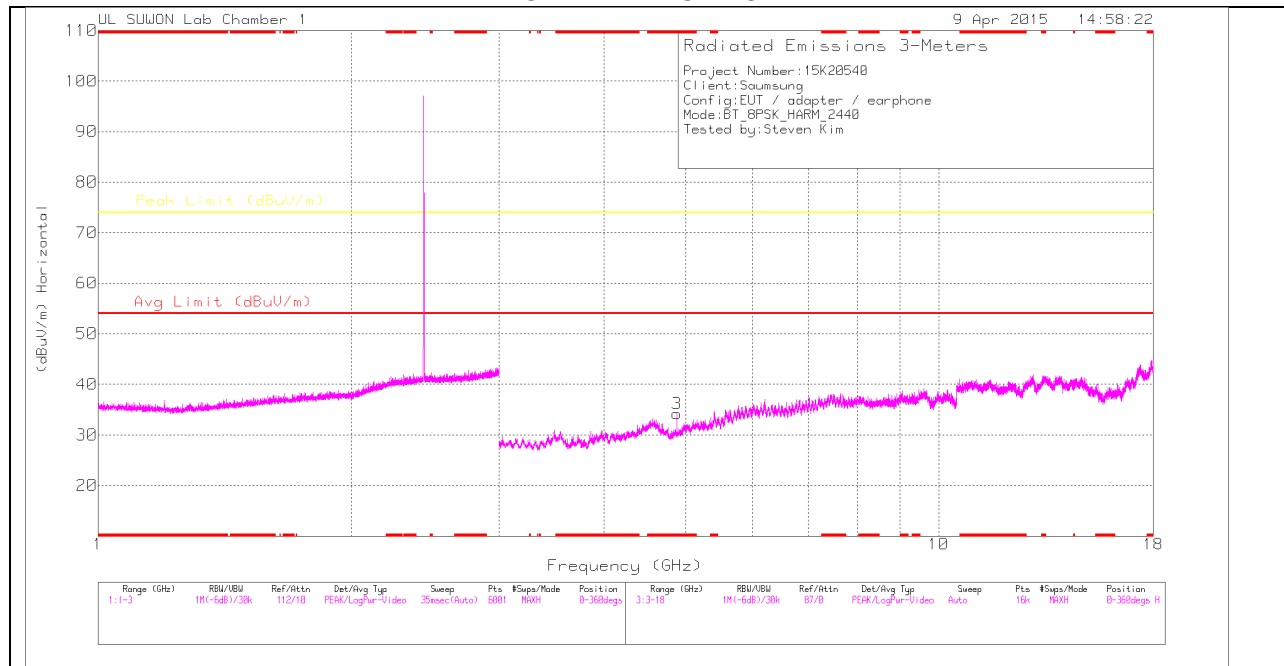
### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3115D Factor | Path_3_3G HP | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| 1      | * 4.804         | 32.99                | PK  | 31.9         | -29.8        | 35.09                      | -                  | -           | 74                  | -38.91      | 0-360          | 100         | H        |
| 3      | 7.221           | 25.58                | PK  | 37           | -25.5        | 37.08                      | -                  | -           | -                   | -           | 0-360          | 200         | H        |
| 5      | 9.614           | 23.18                | PK  | 37.7         | -21          | 39.88                      | -                  | -           | -                   | -           | 0-360          | 200         | H        |
| 2      | * 4.804         | 28.95                | PK  | 31.9         | -29.8        | 31.05                      | -                  | -           | 74                  | -42.95      | 0-360          | 100         | V        |
| 4      | 7.219           | 26.41                | PK  | 37           | -25.5        | 37.91                      | -                  | -           | -                   | -           | 0-360          | 100         | V        |
| 6      | 9.615           | 23.21                | PK  | 37.7         | -21          | 39.91                      | -                  | -           | -                   | -           | 0-360          | 200         | V        |

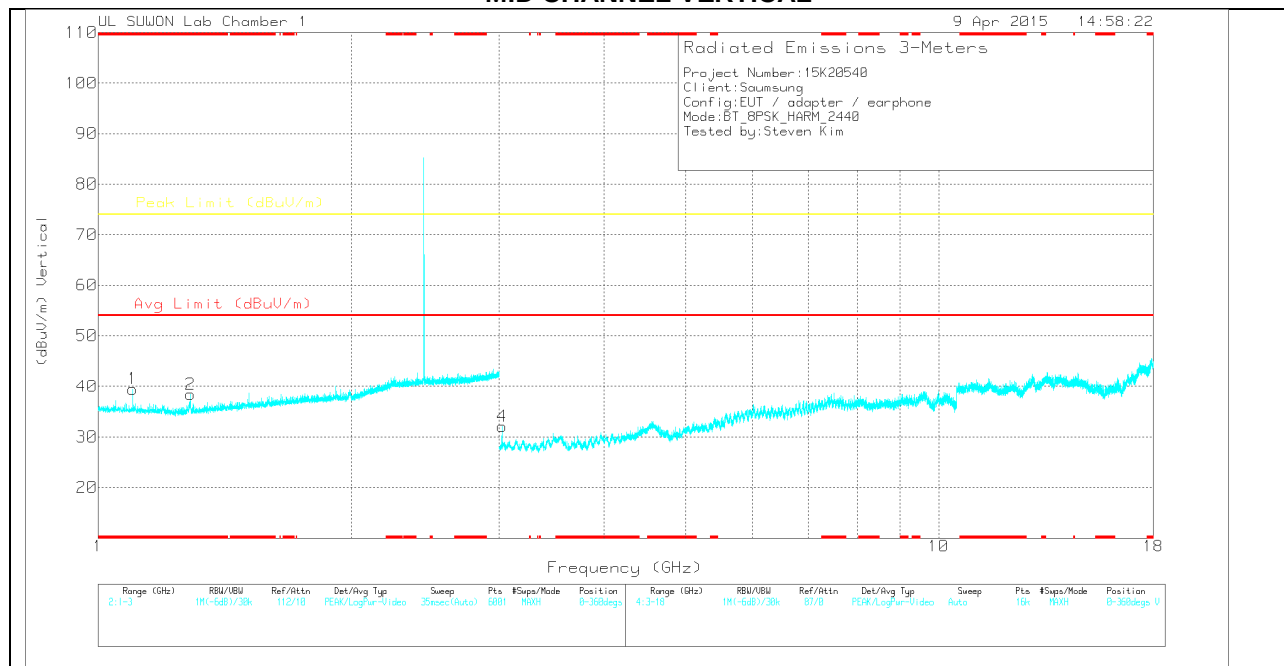
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

### MID CHANNEL HORIZONTAL



### MID CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## MID CHANNEL DATA

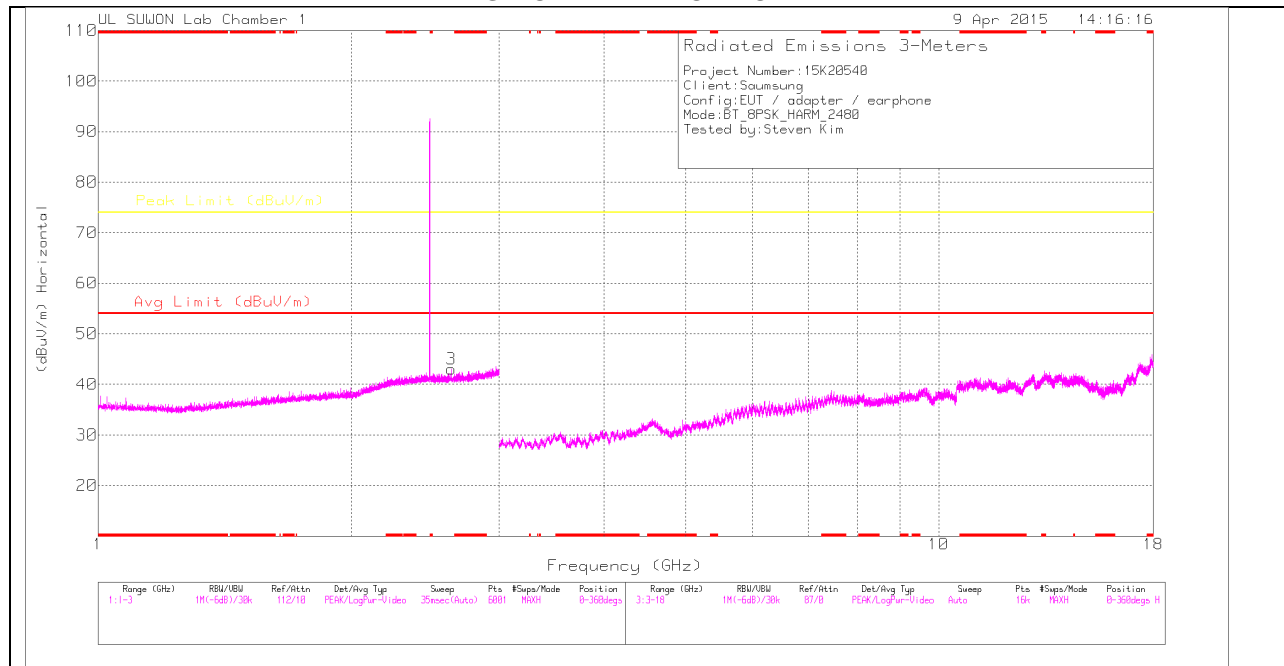
### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| 1      | * 1.1           | 40.29                | PK  | 24.3         | -25.1        | 39.49                      | -                  | -           | 74                  | -34.51      | 0-360          | 200         | V        |
| 2      | * 1.288         | 39.34                | PK  | 23.8         | -24.7        | 38.44                      | -                  | -           | 74                  | -35.56      | 0-360          | 100         | V        |
| 3      | * 4.88          | 31.29                | PK  | 32           | -29.1        | 34.19                      | -                  | -           | 74                  | -39.81      | 0-360          | 100         | H        |
| 4      | 3.023           | 34.37                | PK  | 28.8         | -31.1        | 32.07                      | -                  | -           | -                   | -           | 0-360          | 200         | V        |

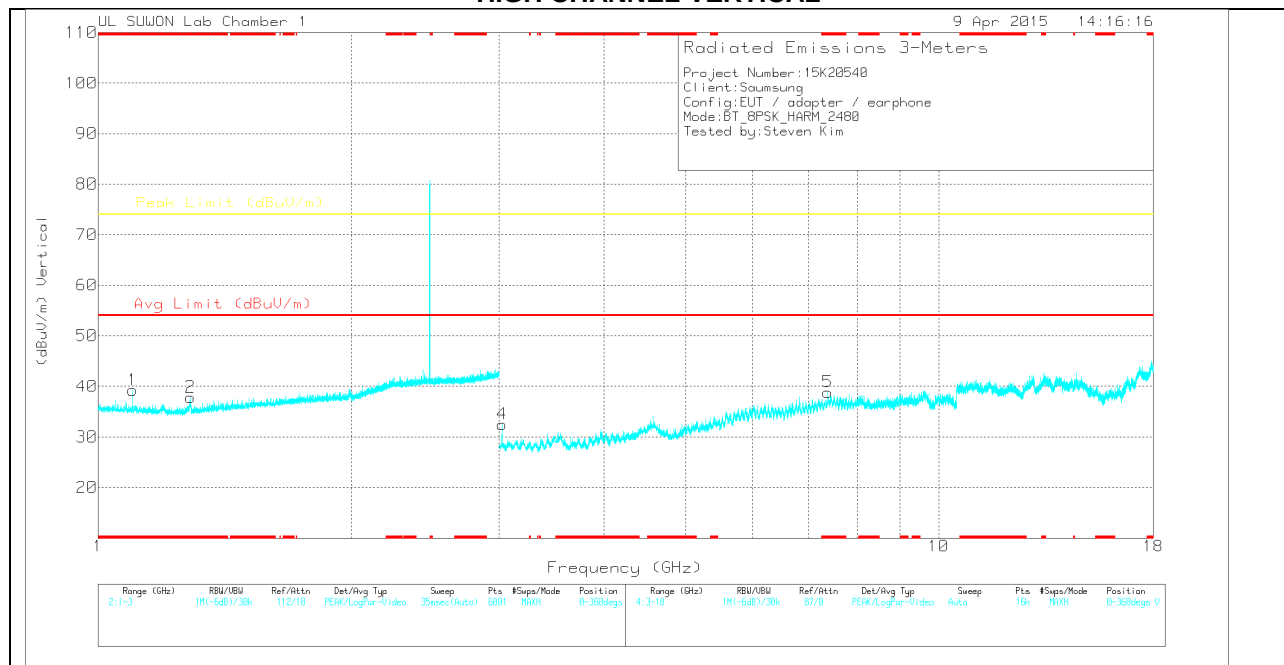
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

### HIGH CHANNEL HORIZONTAL



### HIGH CHANNEL VERTICAL



Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

## HIGH CHANNEL DATA

### Trace Markers

| Marker | Frequency (GHz) | Meter Reading (dBuV) | Det | 3115D Factor | Path_2_10 dB | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------------|----------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|----------|
| 3      | 2.631           | 37.53                | PK  | 27.9         | -22.4        | 43.03                      | -                  | -           | -                   | -           | 0-360          | 200         | H        |
| 1      | * 1.1           | 40.06                | PK  | 24.3         | -25.1        | 39.26                      | -                  | -           | 74                  | -34.74      | 0-360          | 100         | V        |
| 2      | * 1.289         | 38.75                | PK  | 23.8         | -24.7        | 37.85                      | -                  | -           | 74                  | -36.15      | 0-360          | 100         | V        |
| 4      | 3.023           | 34.82                | PK  | 28.8         | -31.1        | 32.52                      | -                  | -           | -                   | -           | 0-360          | 200         | V        |
| 5      | * 7.383         | 26.76                | PK  | 37.2         | -25.1        | 38.86                      | -                  | -           | 74                  | -35.14      | 0-360          | 100         | V        |

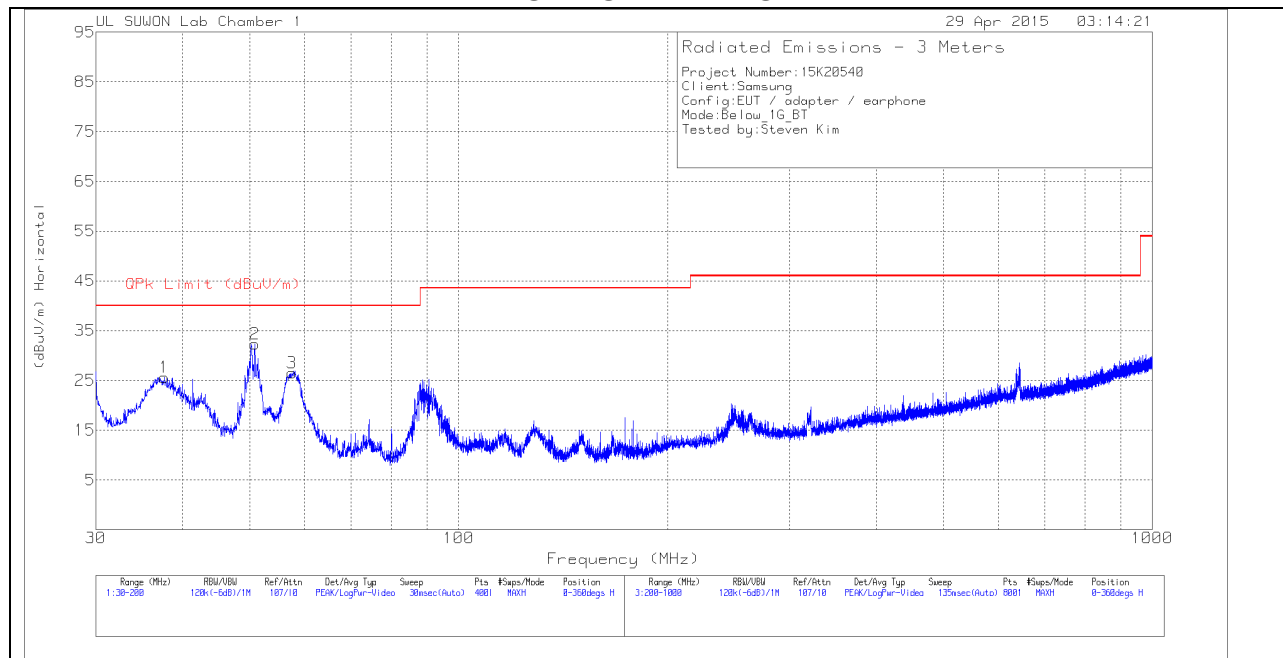
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

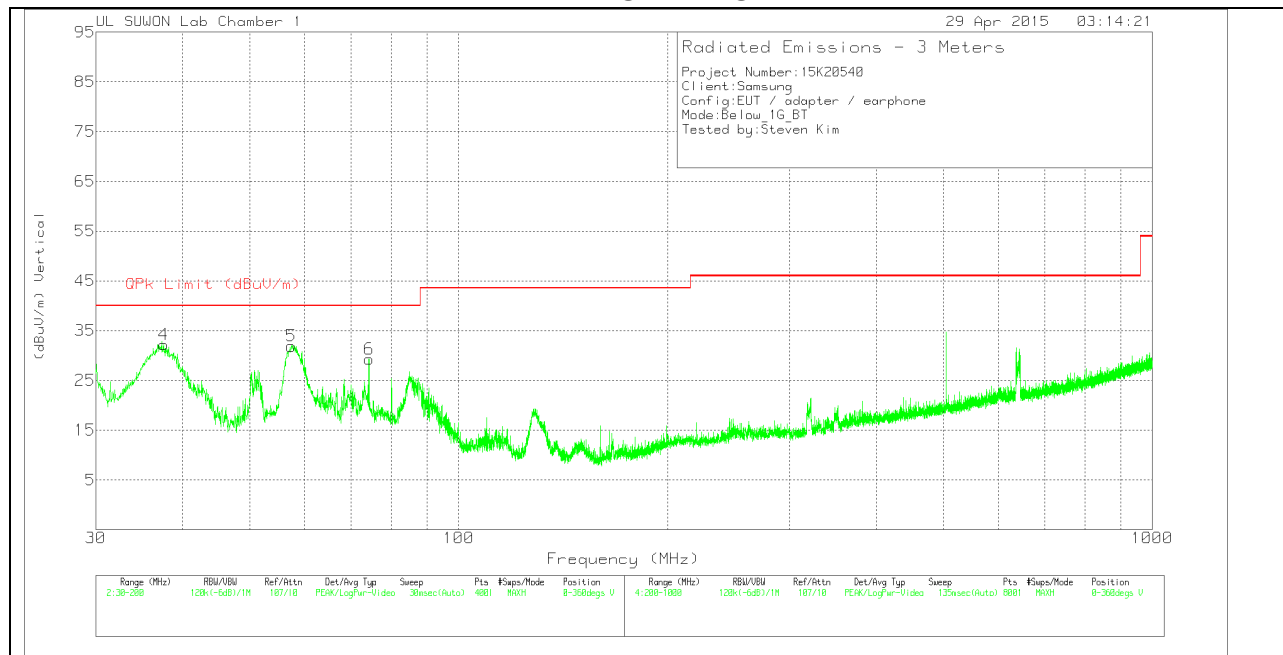
### 9.3. WORST-CASE BELOW 1 GHz

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

##### HORIZONTAL PLOT



##### VERTICAL PLOT



## BELOW 1 GHz TABLE

### Trace Markers

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | VULB9163-750 | Bi-Log | Corrected Reading (dBuV/m) | QPk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|--------------|--------|----------------------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 37.65           | 44.51                | Pk  | 11.5         | -30.4  | 25.61                      | 40                 | -14.39      | 0-360          | 300         | H        |
| 2      | 50.825          | 48.65                | Pk  | 13.8         | -30.1  | 32.35                      | 40                 | -7.65       | 0-360          | 400         | H        |
| 3      | 57.455          | 43.54                | Pk  | 13           | -30    | 26.54                      | 40                 | -13.46      | 0-360          | 400         | H        |
| 4      | 37.565          | 51.09                | Pk  | 11.5         | -30.4  | 32.19                      | 40                 | -7.81       | 0-360          | 100         | V        |
| 5      | 57.37           | 48.88                | Pk  | 13           | -30    | 31.88                      | 40                 | -8.12       | 0-360          | 100         | V        |
| 6      | 74.2425         | 50.53                | Pk  | 8.5          | -29.7  | 29.33                      | 40                 | -10.67      | 0-360          | 200         | V        |

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

| 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.

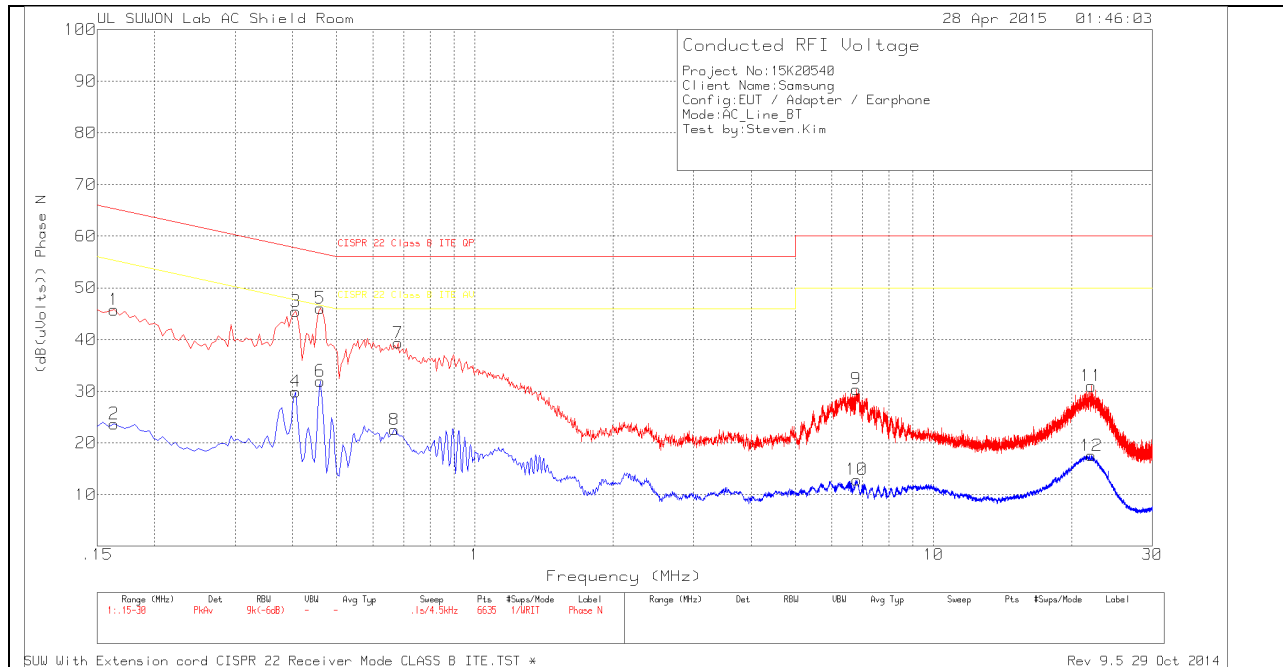
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

### RESULTS

## 6 WORST EMISSIONS

### LINE 1 PLOT



### LINE 1 RESULTS

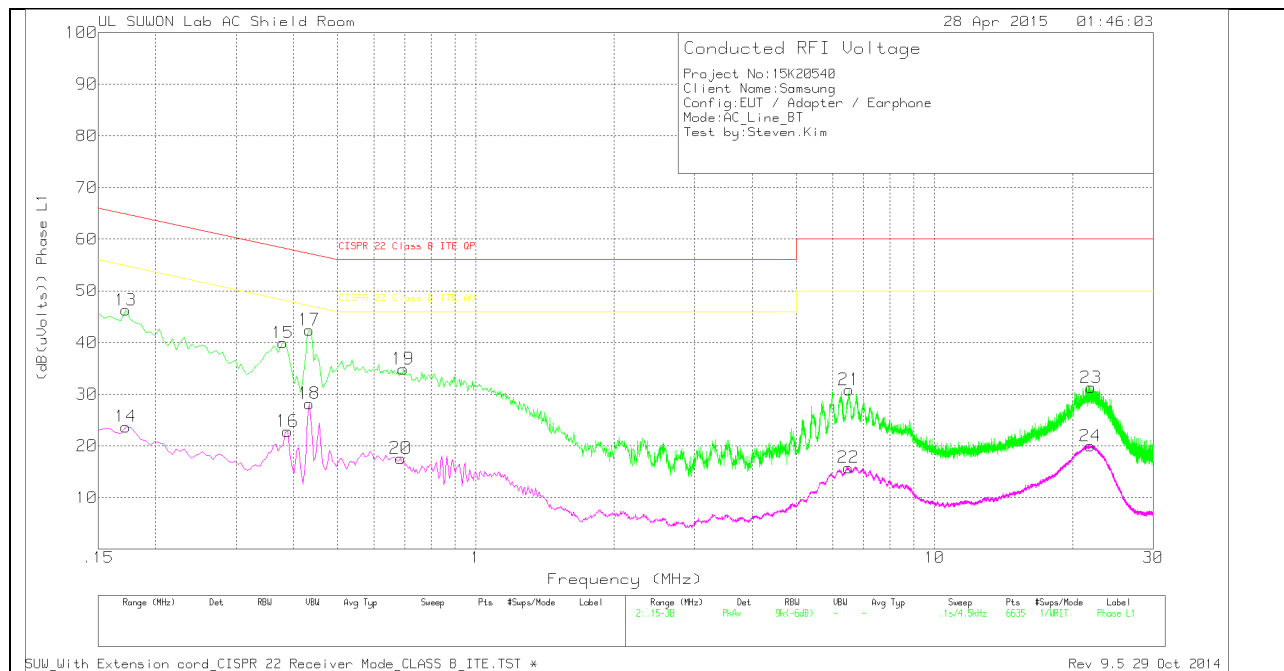
#### Phase N .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN HPF ON and Extension cord | CE Shield Room | Corrected Reading (dBuV) | CISPR 22 Class B ITE QP | Margin (dB) | CISPR 22 Class B ITE AV | Margin (dB) |
|--------|-----------------|----------------------|-----|--------------------------------|----------------|--------------------------|-------------------------|-------------|-------------------------|-------------|
| 1      | .1635           | 35.66                | Pk  | 10.1                           | 0              | 45.76                    | 65.28                   | -19.52      | -                       | -           |
| 2      | .1635           | 13.58                | Av  | 10.1                           | 0              | 23.68                    | -                       | -           | 55.28                   | -31.6       |
| 3      | .4065           | 35.37                | Pk  | 10.1                           | 0              | 45.47                    | 57.72                   | -12.25      | -                       | -           |
| 4      | .4065           | 19.82                | Av  | 10.1                           | 0              | 29.92                    | -                       | -           | 47.72                   | -17.8       |
| 5      | .4605           | 35.97                | Pk  | 10.1                           | 0              | 46.07                    | 56.68                   | -10.61      | -                       | -           |
| 6      | .4605           | 21.86                | Av  | 10.1                           | 0              | 31.96                    | -                       | -           | 46.68                   | -14.72      |
| 7      | .681            | 29.33                | Pk  | 10                             | 0              | 39.33                    | 56                      | -16.67      | -                       | -           |
| 8      | .6675           | 12.53                | Av  | 10                             | 0              | 22.53                    | -                       | -           | 46                      | -23.47      |
| 9      | 6.7875          | 20.41                | Pk  | 9.9                            | .1             | 30.41                    | 60                      | -29.59      | -                       | -           |
| 10     | 6.801           | 2.88                 | Av  | 9.9                            | .1             | 12.88                    | -                       | -           | 50                      | -37.12      |
| 11     | 22.101          | 20.14                | Pk  | 10.7                           | .2             | 31.04                    | 60                      | -28.96      | -                       | -           |
| 12     | 22.11           | 6.66                 | Av  | 10.7                           | .2             | 17.56                    | -                       | -           | 50                      | -32.44      |

Pk - Peak detector

Av - Average detection

## LINE 2 PLOT



## LINE 2 RESULTS

### Phase L1 .15 - 30MHz

| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | 101837_w ith extension cord_L1 | CE Shield Room | Corrected Reading (dBuV) | CISPR 22 Class B ITE QP | Margin (dB) | CISPR 22 Class B ITE AV | Margin (dB) |
|--------|-----------------|----------------------|-----|--------------------------------|----------------|--------------------------|-------------------------|-------------|-------------------------|-------------|
| 13     | .1725           | 35.98                | Pk  | 10.3                           | 0              | 46.28                    | 64.84                   | -18.56      | -                       | -           |
| 14     | .1725           | 13.41                | Av  | 10.3                           | 0              | 23.71                    | -                       | -           | 54.84                   | -31.13      |
| 15     | .3795           | 29.86                | Pk  | 10.1                           | 0              | 39.96                    | 58.29                   | -18.33      | -                       | -           |
| 16     | .3885           | 12.73                | Av  | 10.1                           | 0              | 22.83                    | -                       | -           | 48.1                    | -25.27      |
| 17     | .4335           | 32.33                | Pk  | 10.1                           | 0              | 42.43                    | 57.19                   | -14.76      | -                       | -           |
| 18     | .4335           | 18.11                | Av  | 10.1                           | 0              | 28.21                    | -                       | -           | 47.19                   | -18.98      |
| 19     | .6945           | 24.79                | Pk  | 10.1                           | 0              | 34.89                    | 56                      | -21.11      | -                       | -           |
| 20     | .6855           | 7.5                  | Av  | 10.1                           | 0              | 17.6                     | -                       | -           | 46                      | -28.4       |
| 21     | 6.5175          | 20.98                | Pk  | 9.8                            | .1             | 30.88                    | 60                      | -29.12      | -                       | -           |
| 22     | 6.495           | 5.91                 | Av  | 9.8                            | .1             | 15.81                    | -                       | -           | 50                      | -34.19      |
| 23     | 21.9435         | 20.71                | Pk  | 10.4                           | .2             | 31.31                    | 60                      | -28.69      | -                       | -           |
| 24     | 21.8895         | 9.41                 | Av  | 10.4                           | .2             | 20.01                    | -                       | -           | 50                      | -29.99      |

Pk - Peak detector

Av - Average detection