



**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-247 ISSUE 1**

**Bluetooth**

**CERTIFICATION TEST REPORT**

**FOR**

**ARTIK-0530**

**MODEL NUMBER : SIP005AFS30**

**FCC ID: A3LSIP005AFS30**

**IC ID : 649E-SIP005AFS30**

**REPORT NUMBER: 16K23791-E3V3**

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*Prepared for*

**SAMSUNG ELECTRONICS CO., LTD.  
1, SAMSUNG-RO, GIHEUNG-GU, YONGIN-SI,  
GYEONGGI-DO, 17113, KOREA**

*Prepared by*

**UL Korea, Ltd. Suwon Laboratory  
218 Maeyeong-ro, Yeongtong-gu,  
Suwon-si, Gyeonggi-do, 16675, Korea  
TEL: (031) 337-9902  
FAX: (031) 213-5433**



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<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	09/29/16	Initial issue	Junwhan Lee
V2	10/06/16	Revised section 9.1	Junwhan Lee
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## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST METHODOLOGY .....</b>	<b>6</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>6</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	6
4.2. SAMPLE CALCULATION .....	6
4.3. MEASUREMENT UNCERTAINTY.....	6
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>7</b>
5.1. DESCRIPTION OF EUT .....	7
5.2. MAXIMUM OUTPUT POWER.....	7
5.3. DESCRIPTION OF AVAILABLE ANTENNAS .....	7
5.4. WORST-CASE CONFIGURATION AND MODE.....	7
5.5. DESCRIPTION OF TEST SETUP.....	8
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>10</b>
<b>7. SUMMARY TABLE .....</b>	<b>11</b>
<b>8. ANTENNA PORT TEST RESULTS .....</b>	<b>12</b>
8.1. 20 dB AND 99% BANDWIDTH .....	12
8.1.1. BASIC DATA RATE GFSK MODULATION .....	12
8.1.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION.....	12
8.1.3. ENHANCED DATA RATE 8PSK MODULATION .....	12
8.1.4. 20 dB AND 99% BANDWIDTH PLOTS.....	13
8.2. HOPPING FREQUENCY SEPARATION .....	16
8.3. NUMBER OF HOPPING CHANNELS.....	17
8.4. AVERAGE TIME OF OCCUPANCY.....	19
8.5. OUTPUT POWER.....	23
8.5.1. BASIC DATA RATE GFSK MODULATION .....	23
8.5.2. ENHANCED DATA RATE PI/4-DPSK MODULATION .....	23
8.5.3. ENHANCED DATA RATE 8PSK MODULATION .....	23
8.5.4. OUTPUT POWER PLOTS.....	24
8.6. AVERAGE POWER.....	27
8.6.1. BASIC DATA RATE GFSK MODULATION .....	27
8.6.2. DATA RATE PI/4-DQPSK MODULATION .....	27
8.6.3. ENHANCED DATA RATE 8PSK MODULATION .....	27
8.7. CONDUCTED SPURIOUS EMISSIONS.....	28
8.7.1. BASIC DATA RATE GFSK MODULATION .....	29

**9. RADIATED TEST RESULTS.....41**  
    9.1. *LIMITS AND PROCEDURE* .....41  
    9.2. *TRANSMITTER ABOVE 1 GHz* .....43  
        9.2.1. BASIC DATA RATE GFSK MODULATION .....43  
        9.2.2. ENHANCED DATA RATE 8PSK MODULATION .....53  
    9.3. *WORST-CASE BELOW 1 GHz*.....63  
**10. AC POWER LINE CONDUCTED EMISSIONS .....65**  
**11. SETUP PHOTOS .....68**

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** ARTIK-0530  
**MODEL NUMBER:** SIP005AFS30  
**SERIAL NUMBER:** 530MWB8R00300018 (RADIATED, CONDUCTED)  
**DATE TESTED:** SEP 06, 2016 - OCT 12, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	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:



CY Choi  
Suwon Lab Engineer  
UL Korea, Ltd.

Tested By:



Junwhan Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013 for FCC and ANSI C63.10-2013, RSS-GEN Issue 4, RSS-247 Issue 1 for IC.

## 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, 16675, 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 checked="" 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 ARTIK-0530.  
 This test report addresses the DSS (BT) operational mode.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	Basic GFSK	Average	6.717	4.696
		Peak	6.911	4.910
	Enhanced Pi/4-DPSK	Average	3.784	2.390
		Peak	6.502	4.469
	Enhanced 8PSK	Average	3.809	2.404
		Peak	6.820	4.808

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an dipole antenna, with a maximum gain of 1.43 dBi.

### 5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

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

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

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

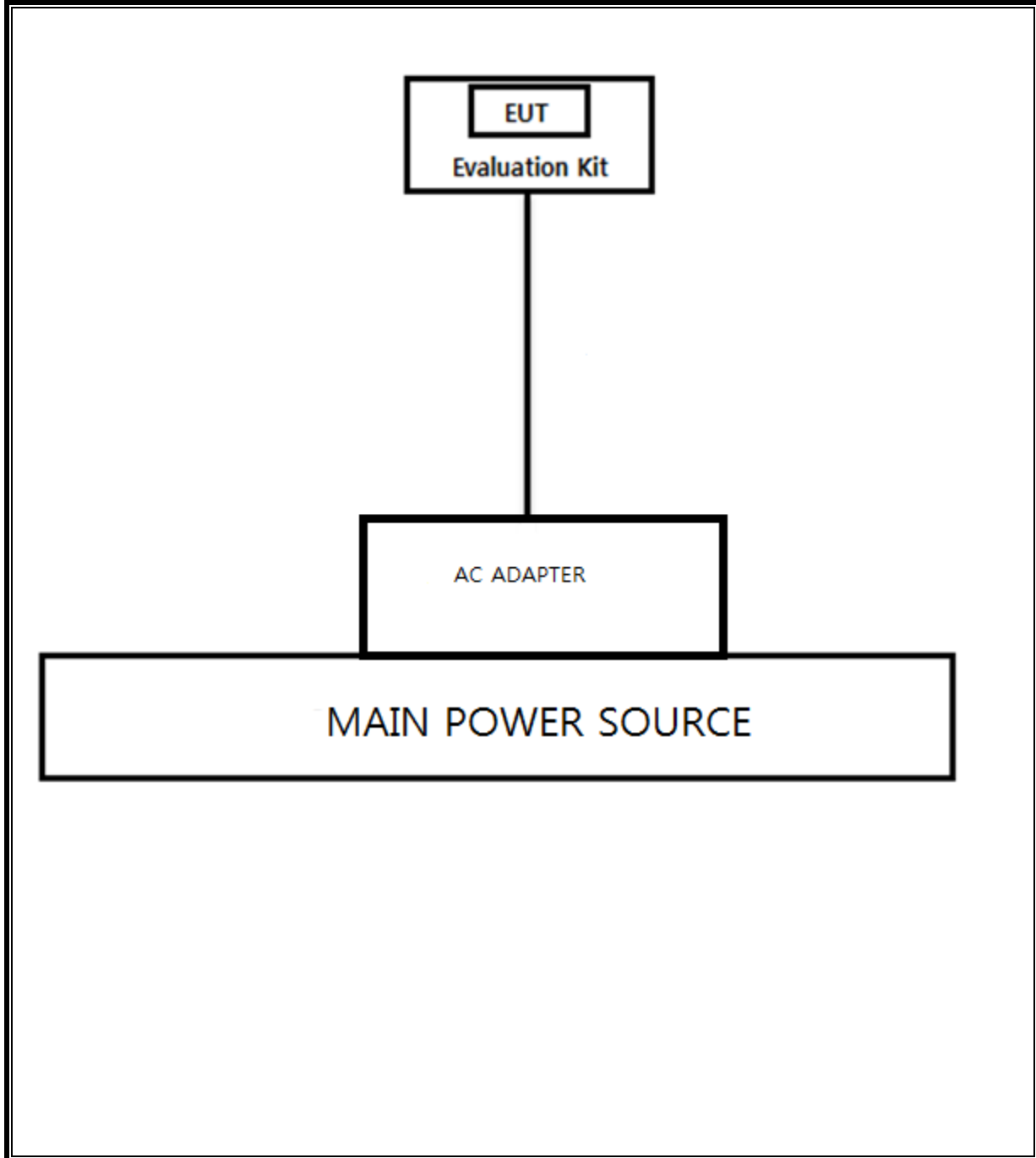
Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Evaluation Kit	SAMSUNG	SIPKITNXD00	N/A	N/A
ADAPTER	Shenzhen Fujia Appliance CO,. LTD	FJ-SW0505000T	N/A	N/A

### TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.  
Test software 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	750	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-16-17
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-17
Average Power Sensor	R&S	NRZ-Z91	102681	08-16-17
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-17-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-16-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-17-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-16-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-17-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-16-17
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17
Attenuator	PASTERNAK	PE7087-10	A009	08-16-17
DC Power Supply	Agilent / HP	E3640A	MY54226395	08-16-17

## 7. SUMMARY TABLE

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	RSS-GEN 4.6	Occupied Band width (99%)	N/A	Conducted	Pass	1.164 MHz
2.1051, 15.247 (d)	RSS-247 5.1(2)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-36.932 dBm
15.247 (b)(1)	RSS-247 5.1(2)	TX conducted output power	<21dBm		Pass	6.911 dBm (Peak)
15.247 (a)(1)	RSS-247 5.1(2)	Hopping frequency separation	> 25KHz		Pass	1 MHz
15.247 (a)(1)(iii)	RSS-247 5.1(4)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	79
15.247 (a)(1)(iii)	RSS-247 5.1(4)	Avg Time of Occupancy	< 0.4sec		Pass	0.37518 sec
15.205, 15.209	RSS-GEN Clause 7 & 8.9	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	43.68 dBuV/m (Pk)

## 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 [MHz]	20 dB Bandwidth [KHz]	99% Bandwidth [KHz]
Low	2402	941.400	831.460
Mid	2441	939.700	853.650
High	2480	941.000	859.720
Worst		941.400	859.720

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

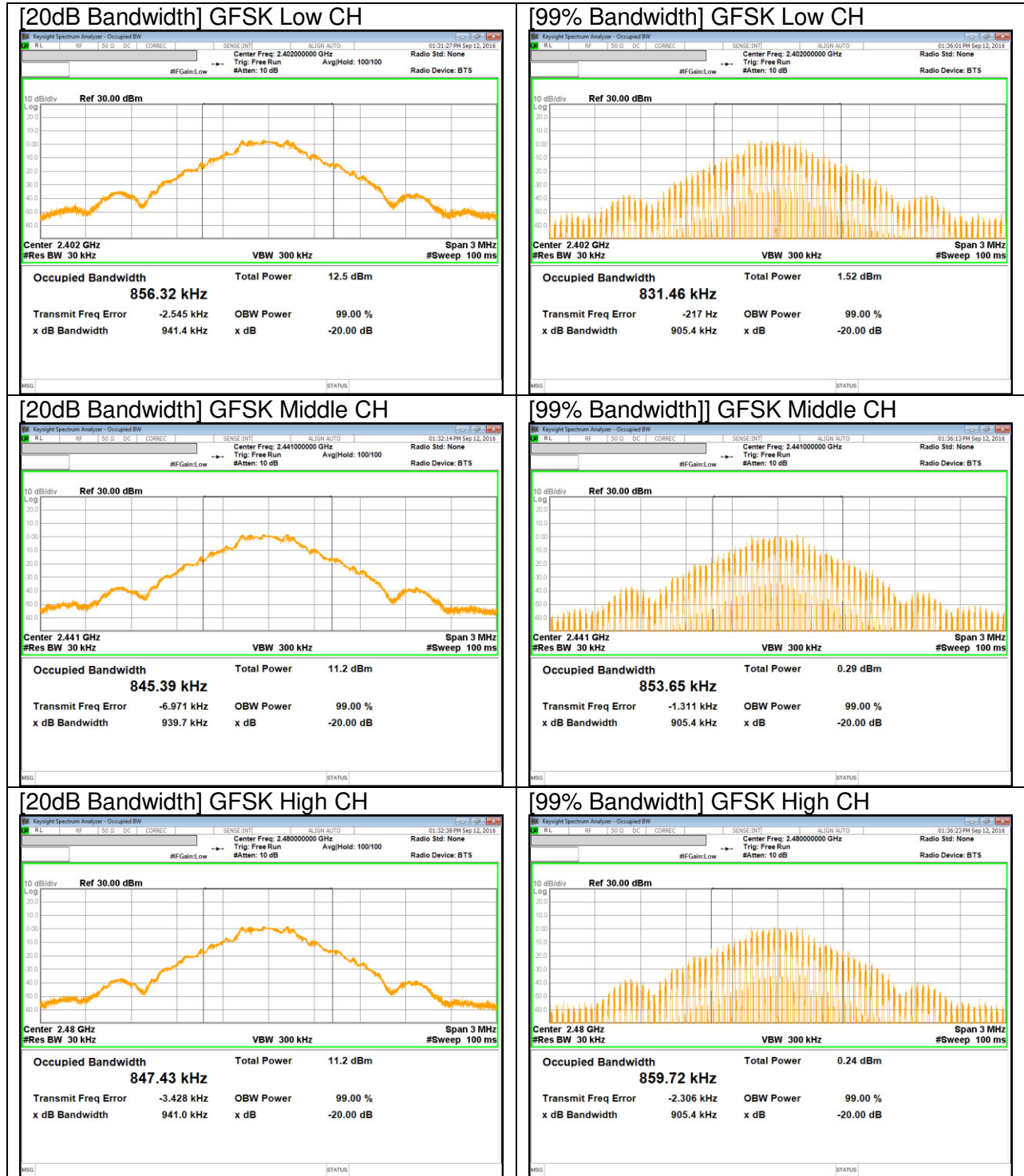
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.312	1.164
Mid	2441	1.312	1.163
High	2480	1.309	1.161
Worst		1.312	1.164

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

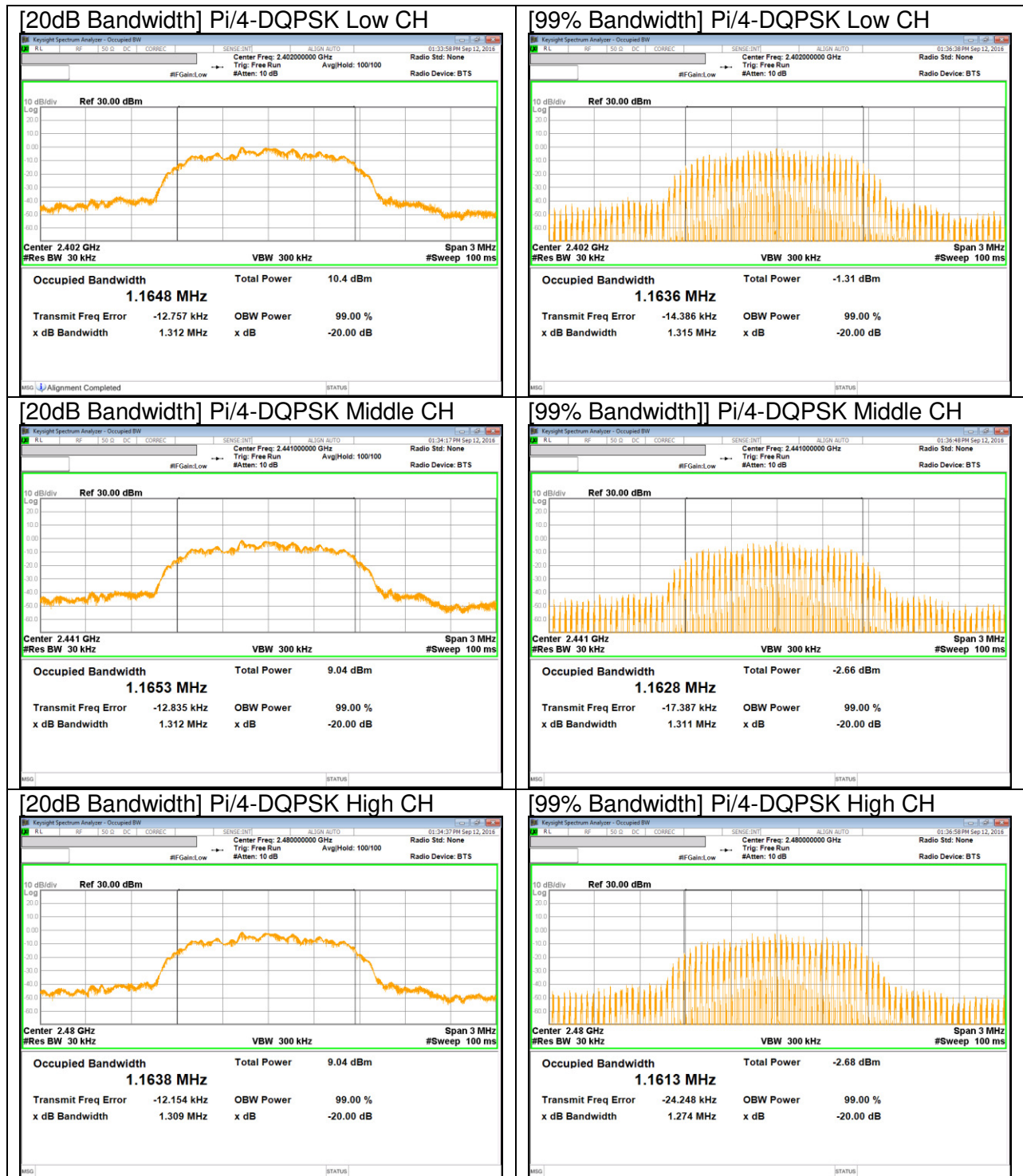
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.270	1.163
Mid	2441	1.269	1.163
High	2480	1.268	1.161
Worst		1.270	1.163

### 8.1.4. 20 dB AND 99% BANDWIDTH PLOTS

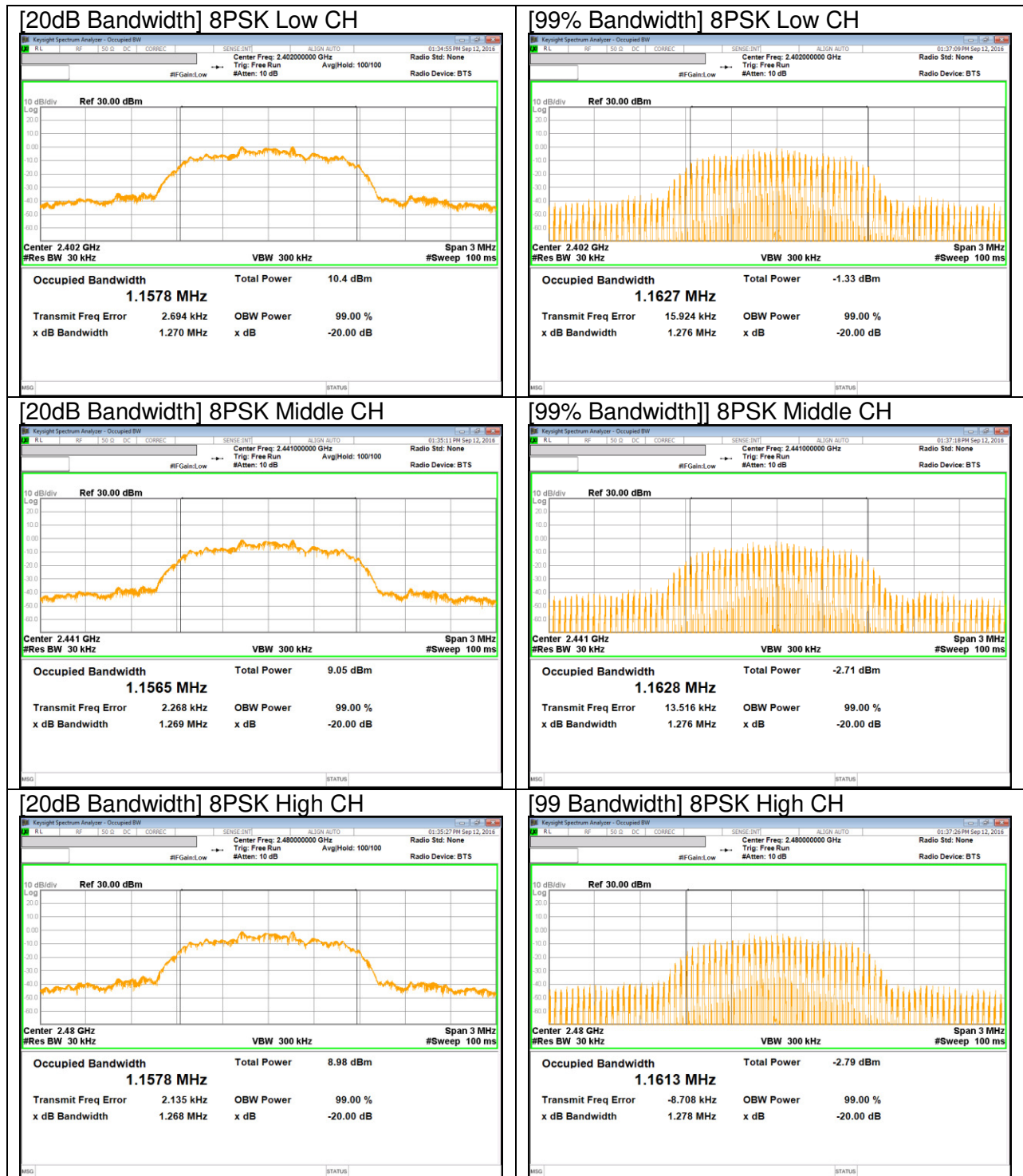
#### GFSK BANDWIDTH



**Pi/4-DQPSK BANDWIDTH**



**8PSK BANDWIDTH**



## 8.2. HOPPING FREQUENCY SEPARATION

### LIMIT

FCC §15.247 (a) (1)  
 IC RSS-247 §5.1 (2)

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.

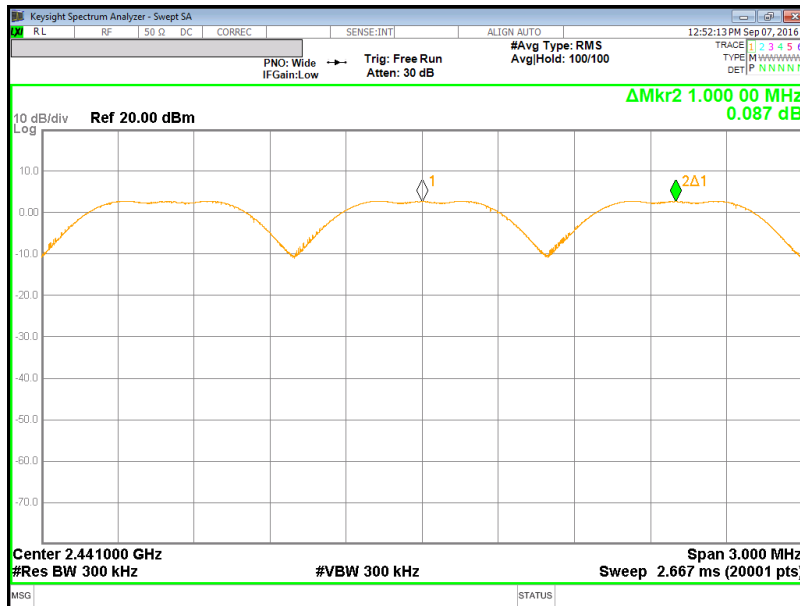
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

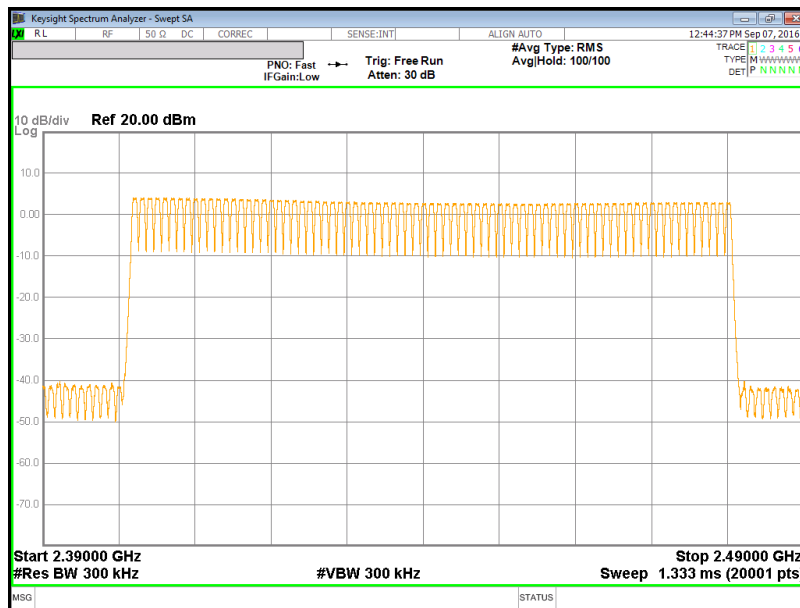
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

#### RESULTS

Normal Mode: 79 Channels observed.

#### NUMBER OF HOPPING CHANNELS PLOTS

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





## 8.4. AVERAGE TIME OF OCCUPANCY

### LIMIT

FCC §15.247 (a) (1) (iii)  
 IC RSS-247 §5.1 (4)

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.

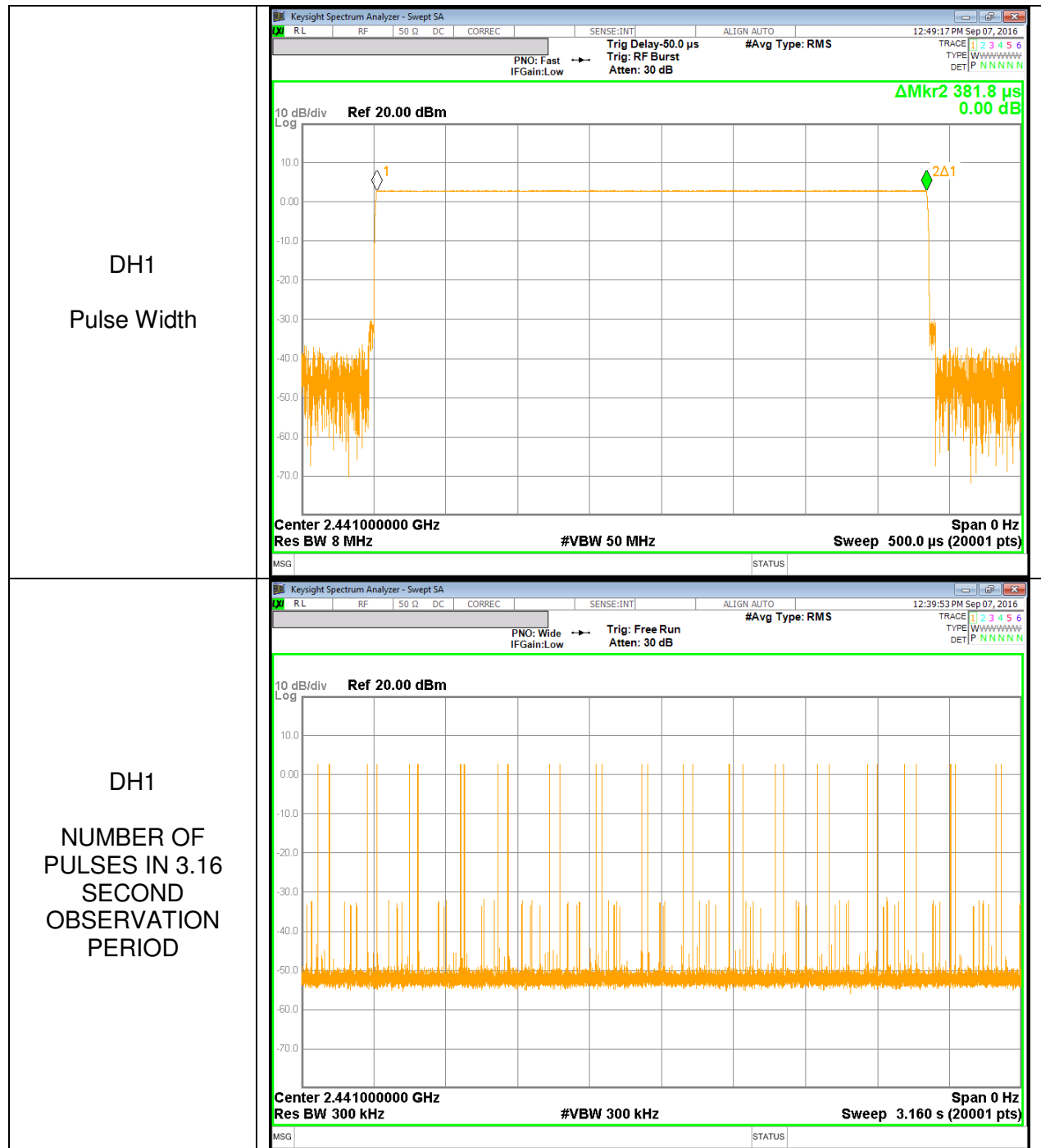
The average time of occupancy in the specified 31.6 second period (79 channels \* 0.4 s) is equal to 10 \* (# of pulses in 3.16 s) \* pulse width.

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

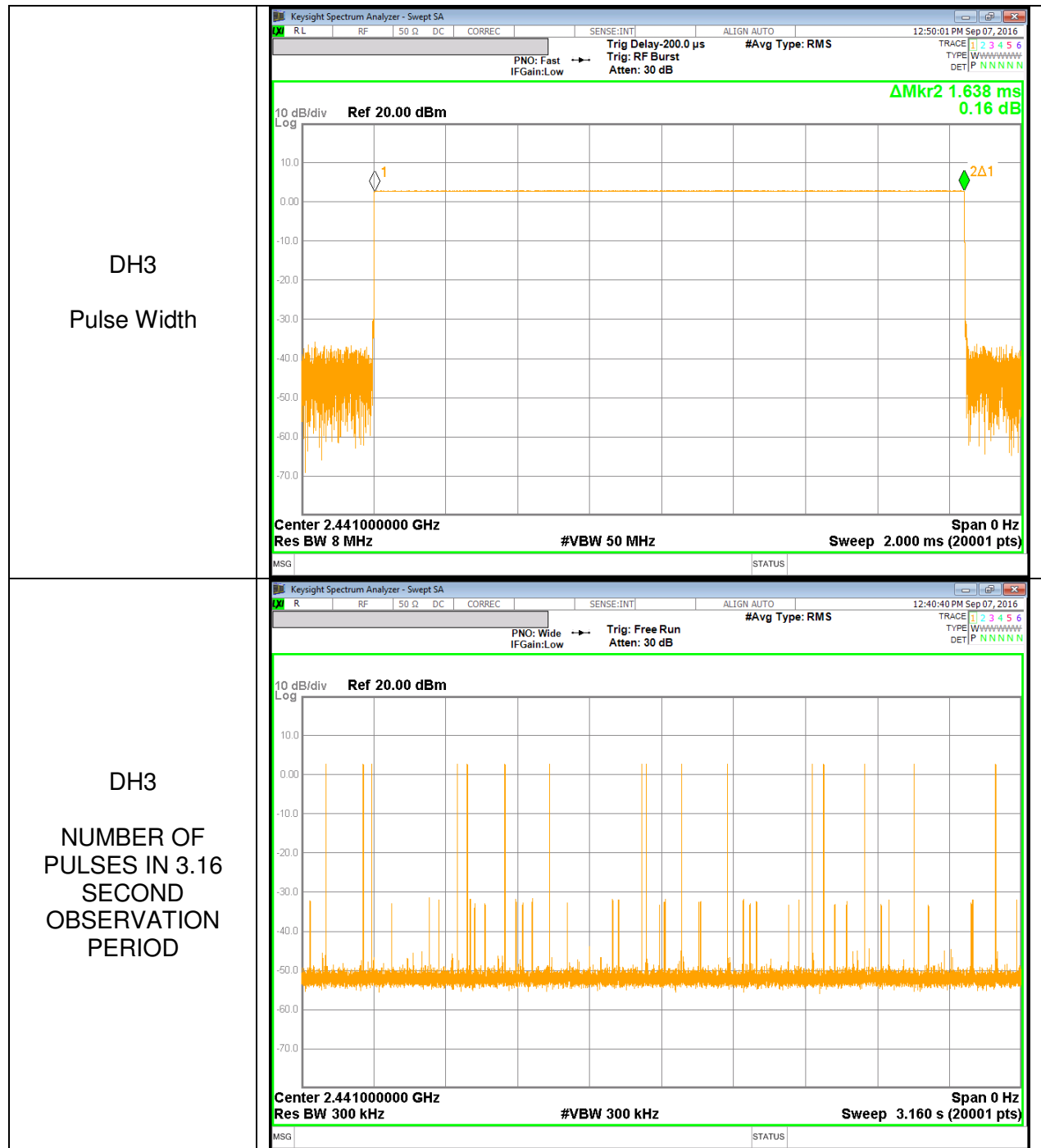
### RESULTS

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.382	32	0.122176	0.4	-0.2778
DH3	1.638	16	0.262080	0.4	-0.1379
DH5	2.886	13	0.375180	0.4	-0.0248
GFSK AFH					
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK AFH					
DH1	0.382	8	0.030544	0.4	-0.36946
DH3	1.638	4	0.065520	0.4	-0.33448
DH5	2.886	3.25	0.093795	0.4	-0.30621

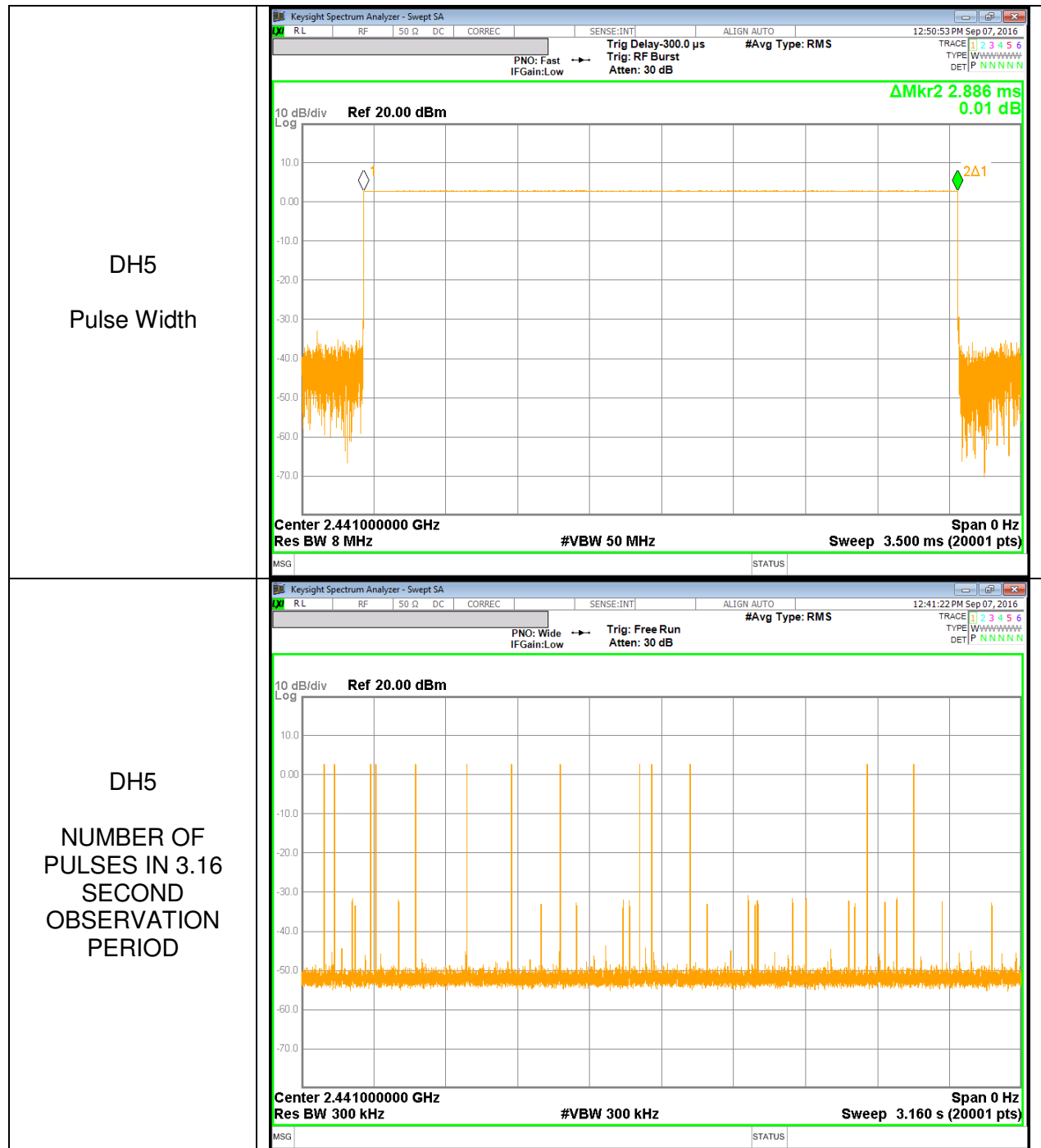
**DH1**



**DH3**



**DH5**



## 8.5. OUTPUT POWER

### LIMIT

§15.247 (b) (1)  
 IC RSS-247 §5.1 (2)

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	6.911	21	-14.089
Middle	2441	5.602	21	-15.398
High	2480	5.578	21	-15.422
Worst		6.911	21	-14.089

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

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	6.502	21	-14.498
Middle	2441	5.202	21	-15.798
High	2480	5.084	21	-15.916
Worst		6.502	21	-14.498

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

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	6.820	21	-14.180
Middle	2441	5.487	21	-15.513
High	2480	5.446	21	-15.554
Worst		6.820	21	-14.180

### 8.5.4. OUTPUT POWER PLOTS

#### GFSK OUTPUT POWER

<p>GFSK Low CH</p>	
<p>GFSK Middle CH</p>	
<p>GFSK High CH</p>	



**Pi/4-DPSK OUTPUT POWER**

<p>Pi/4-DPSK Low CH</p>	<p>KeySight Spectrum Analyzer - Swept SA          Ref 30.00 dBm          Mkr1 2.4018215 GHz          6.502 dBm          Center 2.402000 GHz          #Res BW 3.0 MHz #VBW 50 MHz          Span 10.00 MHz          Sweep 1.333 ms (20001 pts)</p>
<p>Pi/4-DPSK Middle CH</p>	<p>KeySight Spectrum Analyzer - Swept SA          Ref 30.00 dBm          Mkr1 2.4410870 GHz          5.202 dBm          Center 2.441000 GHz          #Res BW 3.0 MHz #VBW 50 MHz          Span 10.00 MHz          Sweep 1.333 ms (20001 pts)</p>
<p>Pi/4-DPSK High CH</p>	<p>KeySight Spectrum Analyzer - Swept SA          Ref 30.00 dBm          Mkr1 2.4797995 GHz          5.084 dBm          Center 2.480000 GHz          #Res BW 3.0 MHz #VBW 50 MHz          Span 10.00 MHz          Sweep 1.333 ms (20001 pts)</p>

**8PSK OUTPUT POWER**

<p>8PSK Low CH</p>	<p>KeySight Spectrum Analyzer - Swept SA              Ref 30.00 dBm              Mkr1 2.402 090 5 GHz              6.820 dBm              Center 2.402000 GHz              #Res BW 3.0 MHz              #VBW 50 MHz              Span 10.00 MHz              Sweep 1.333 ms (20001 pts)</p>
<p>8PSK Middle CH</p>	<p>KeySight Spectrum Analyzer - Swept SA              Ref 30.00 dBm              Mkr1 2.441 109 0 GHz              5.487 dBm              Center 2.441000 GHz              #Res BW 3.0 MHz              #VBW 50 MHz              Span 10.00 MHz              Sweep 1.333 ms (20001 pts)</p>
<p>8PSK High CH</p>	<p>KeySight Spectrum Analyzer - Swept SA              Ref 30.00 dBm              Mkr1 2.480 085 5 GHz              5.446 dBm              Center 2.480000 GHz              #Res BW 3.0 MHz              #VBW 50 MHz              Span 10.00 MHz              Sweep 1.333 ms (20001 pts)</p>

## 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 10.1 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	6.717	4.70
Middle	2441	5.334	3.41
High	2480	5.332	3.41

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

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	3.784	2.39
Middle	2441	2.415	1.74
High	2480	2.373	1.73

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

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	3.809	2.40
Middle	2441	2.440	1.75
High	2480	2.400	1.74

## **8.7. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)  
IC RSS-247 §5.1 (2)

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.

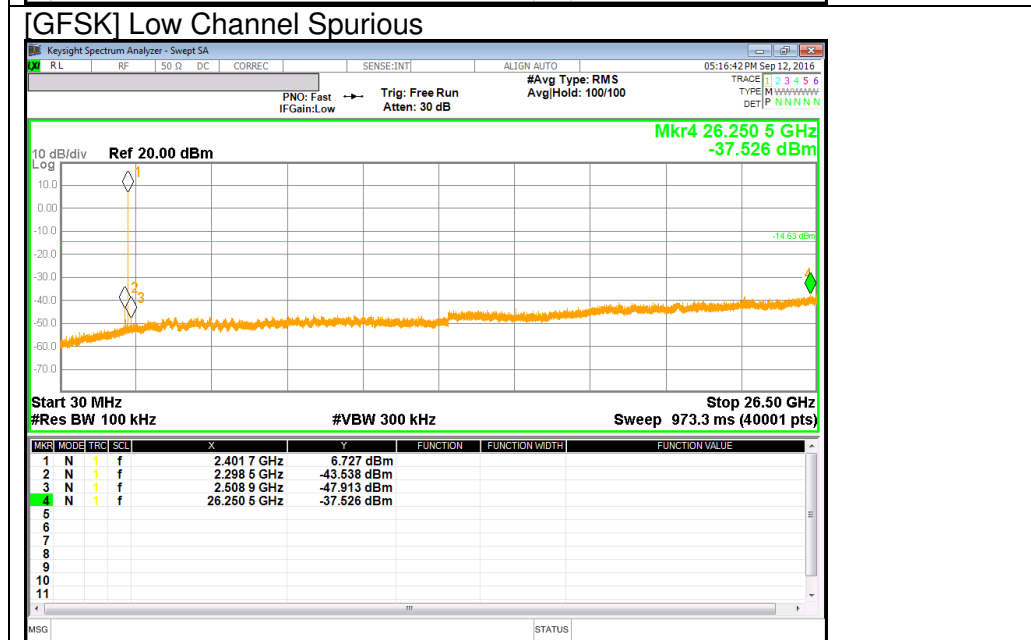
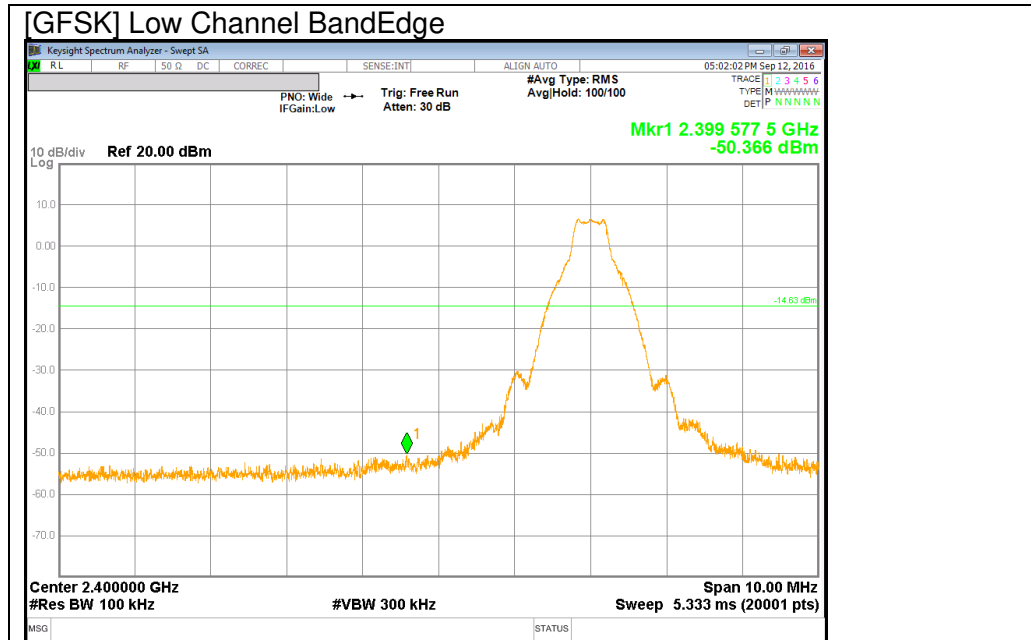
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

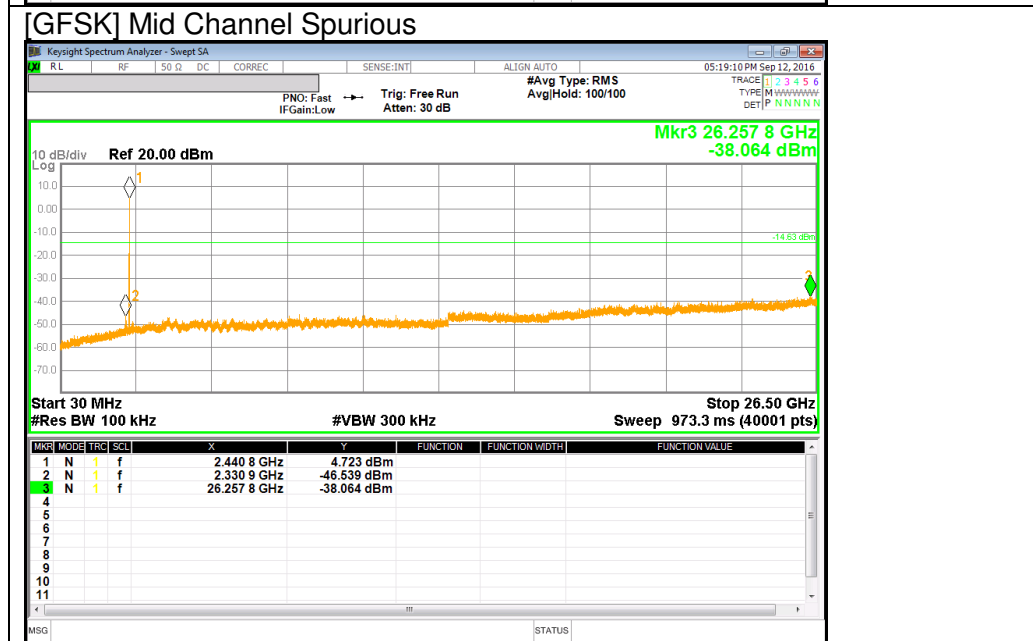
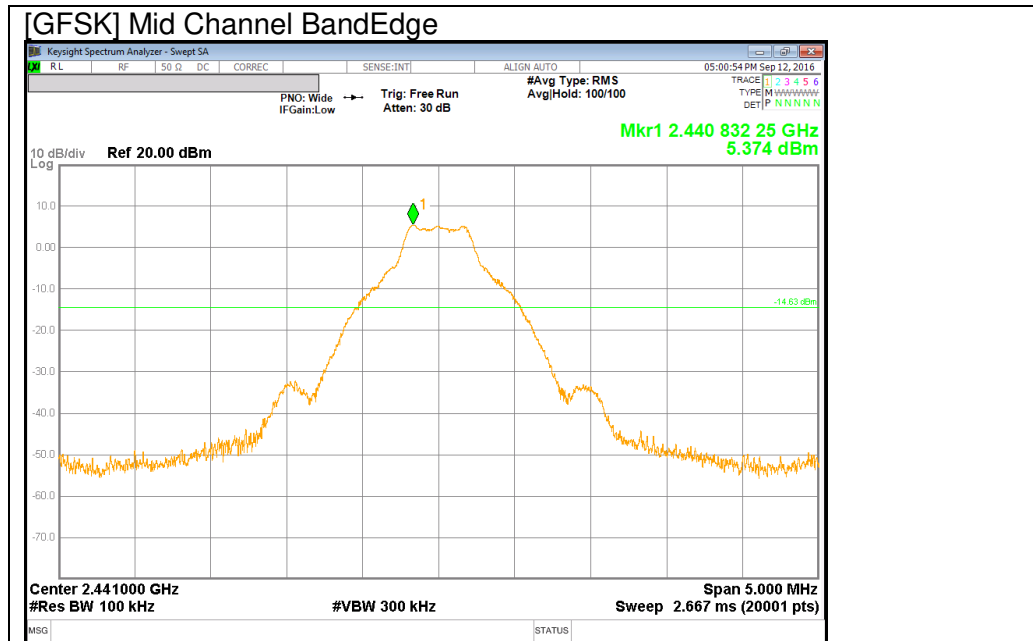
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

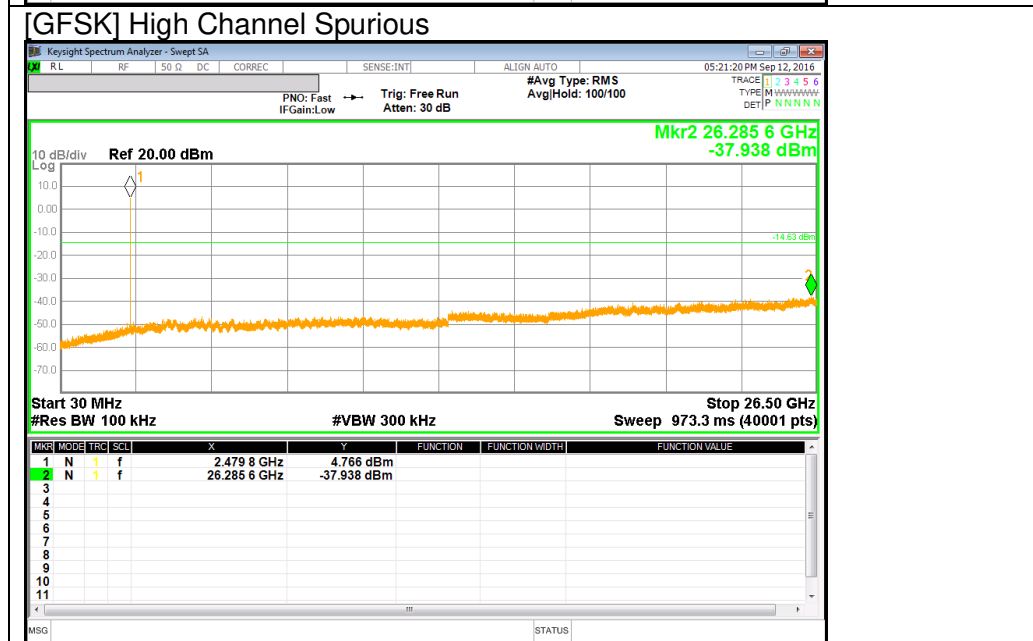
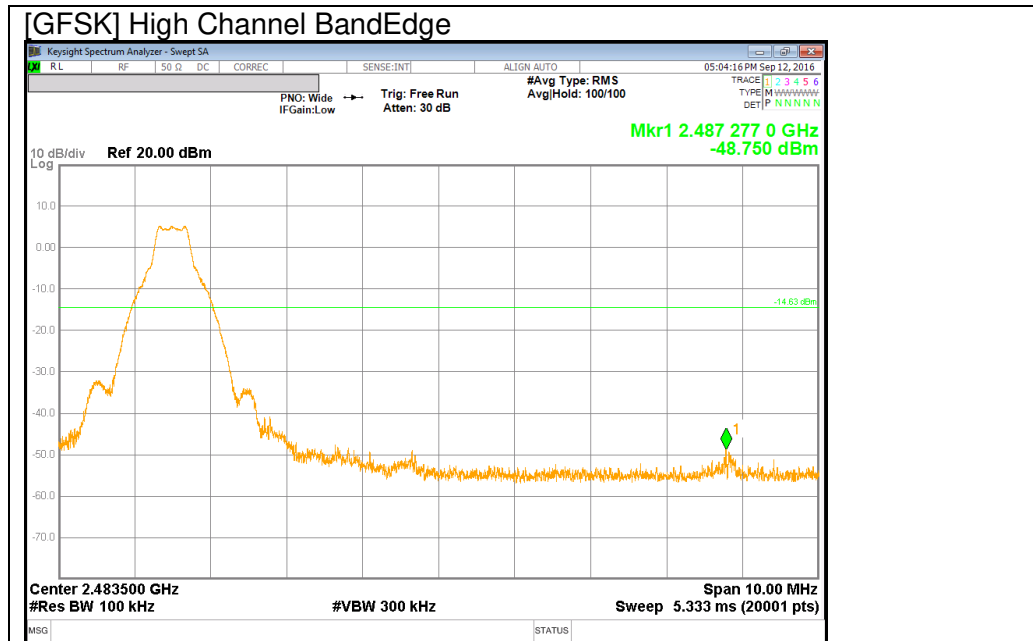
### **RESULTS**

### 8.7.1. BASIC DATA RATE GFSK MODULATION

#### GFSK Mode

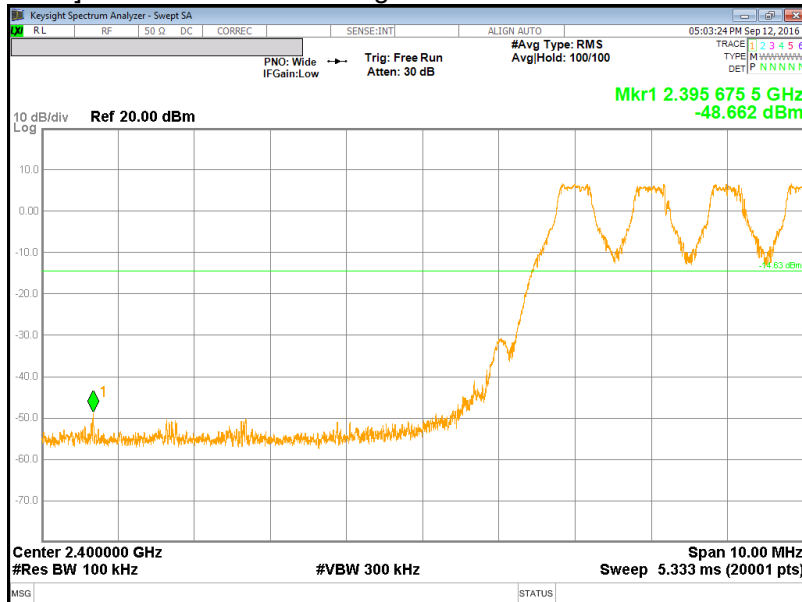




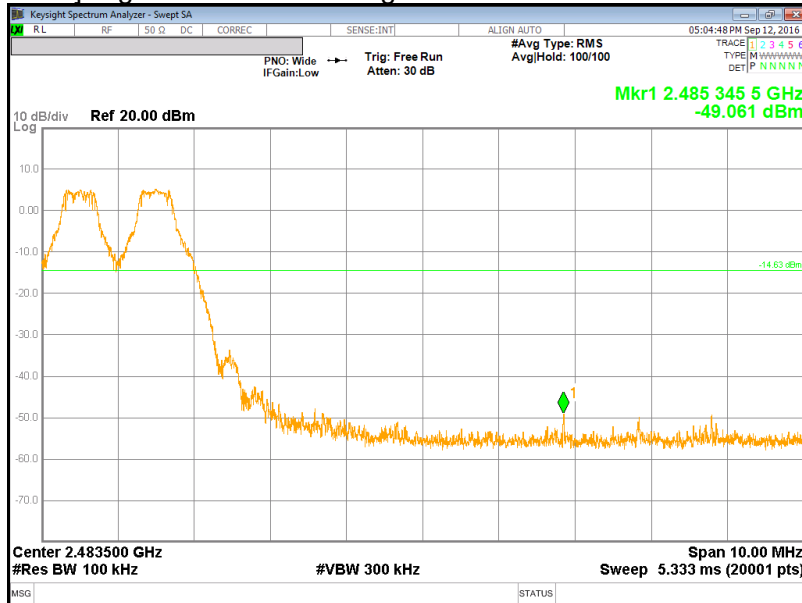


**BandEdge Emission at GFSK Hopping Mode**

[GFSK Hopping Mode] Low Channel BandEdge

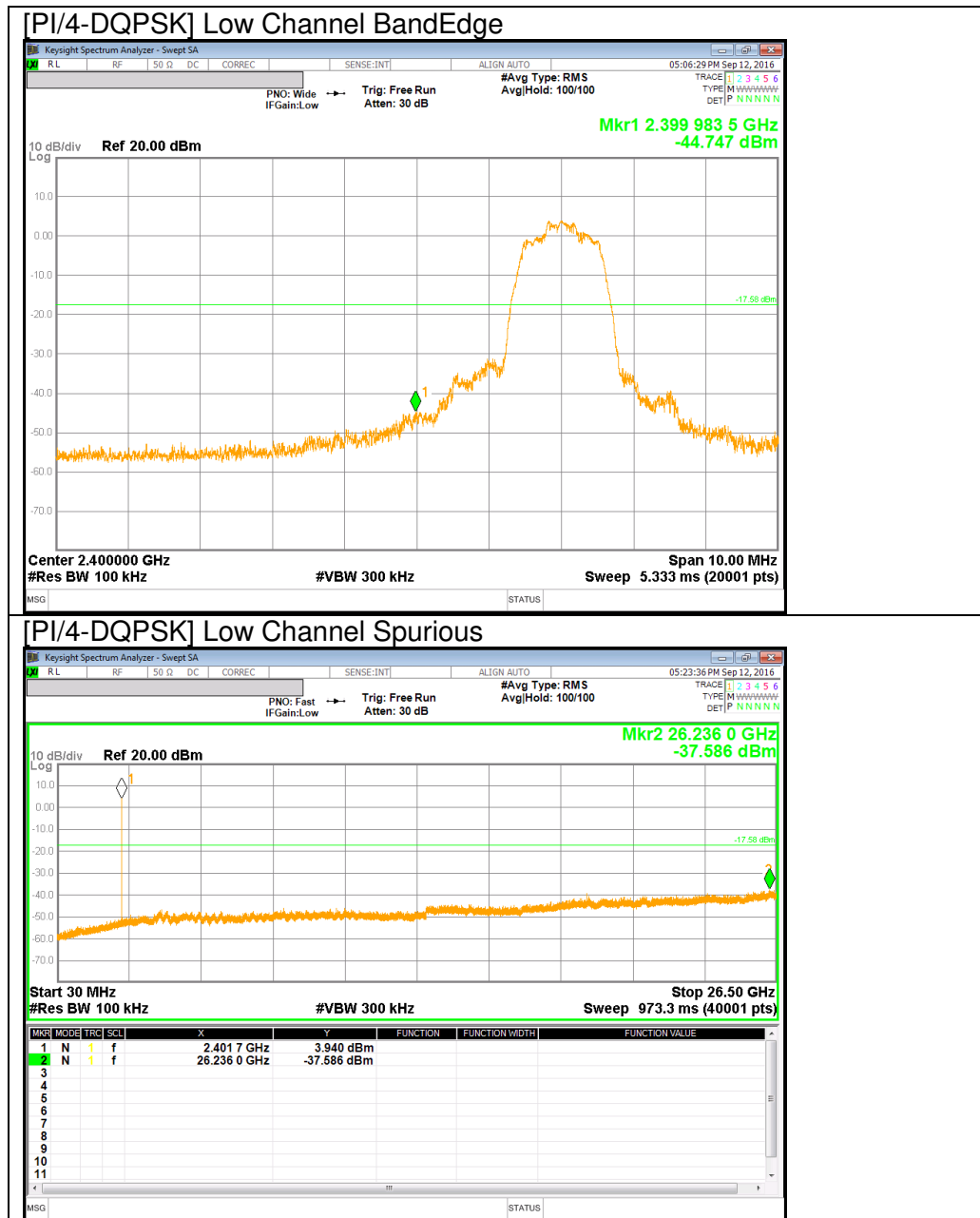


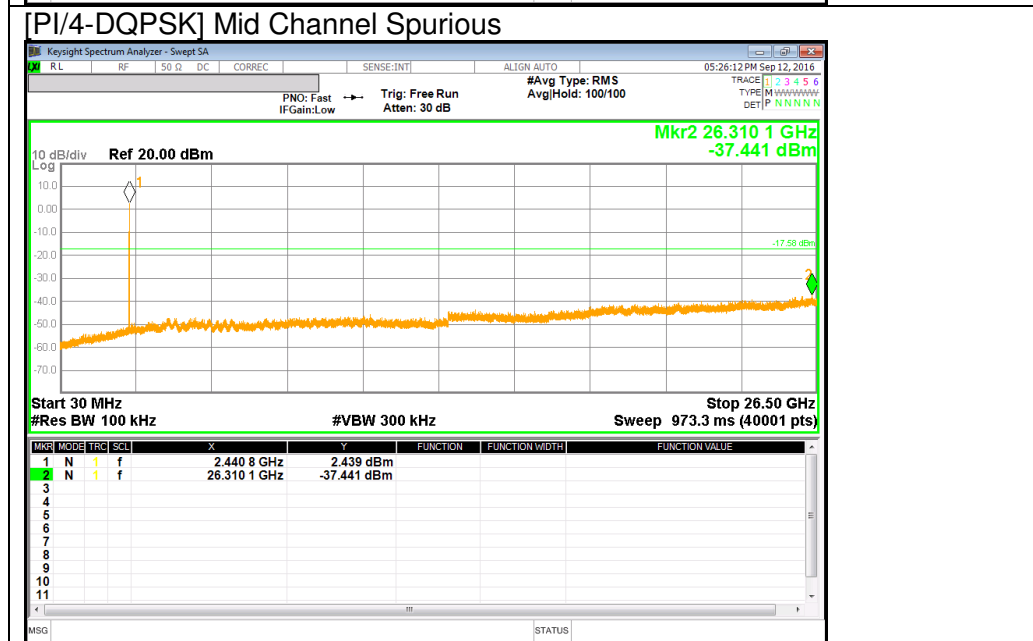
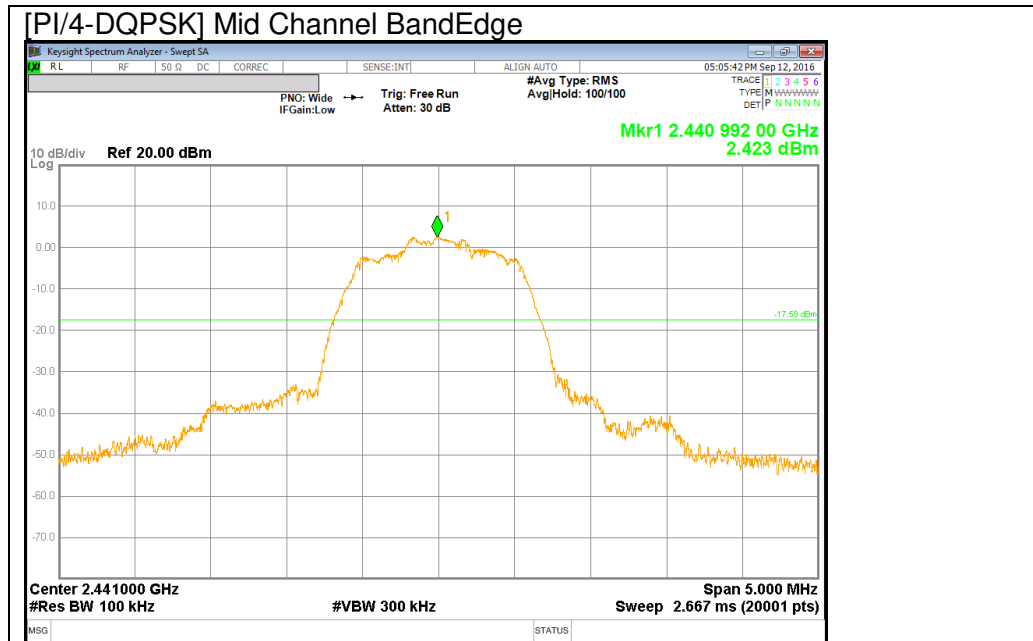
[GFSK Hopping Mode] High Channel BandEdge

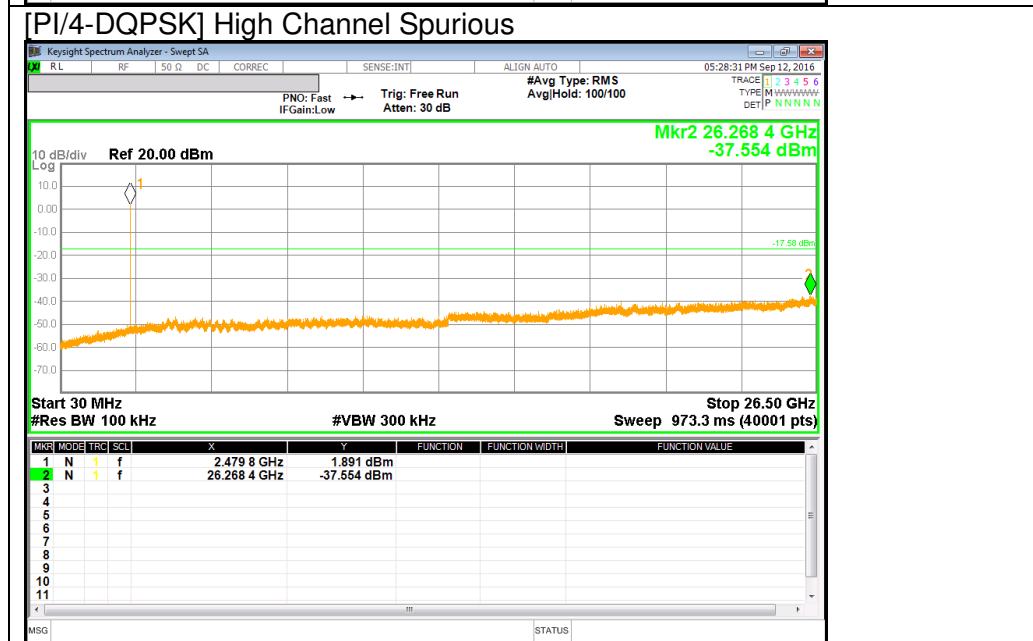
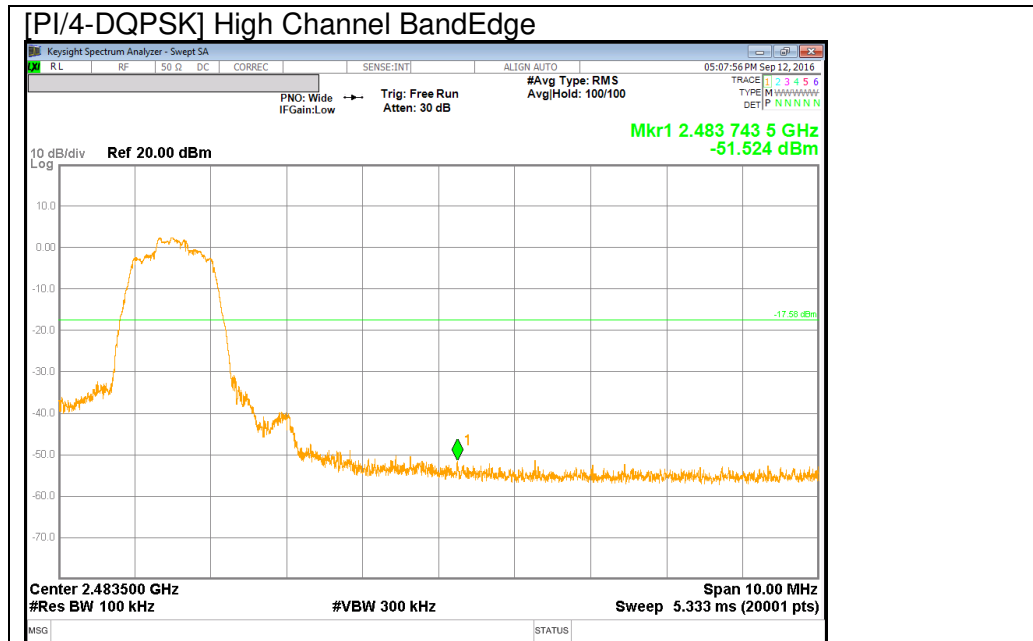




**PI/4-DQPSK Mode**

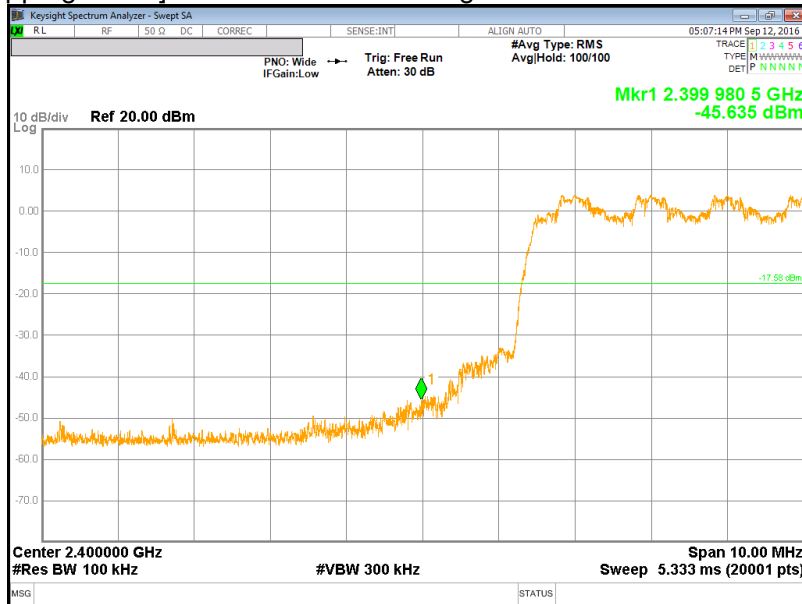






**BandEdge Emission at PI/4-DQPSK Hopping Mode**

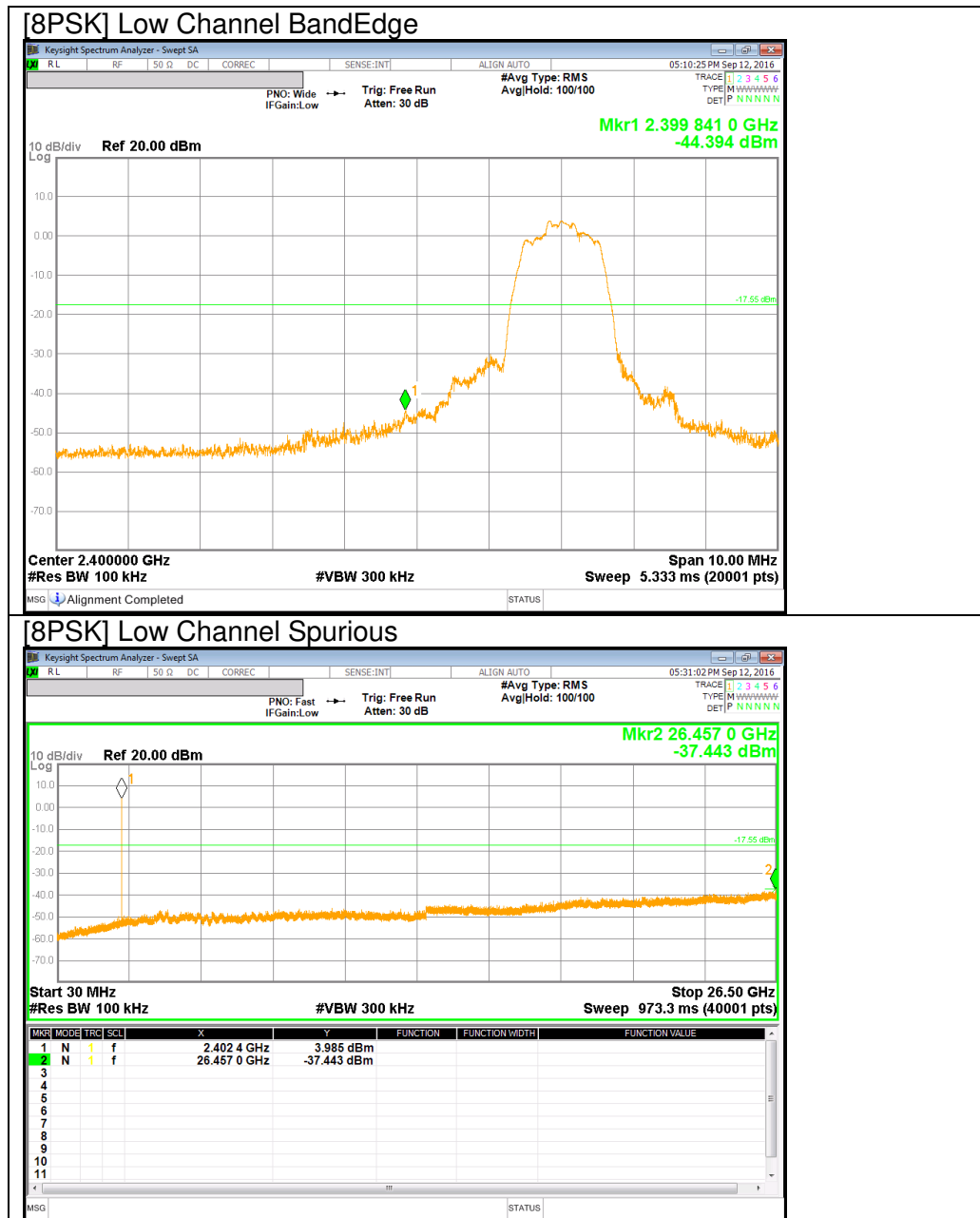
[PI/4-DQPSK Hopping Mode] Low Channel BandEdge

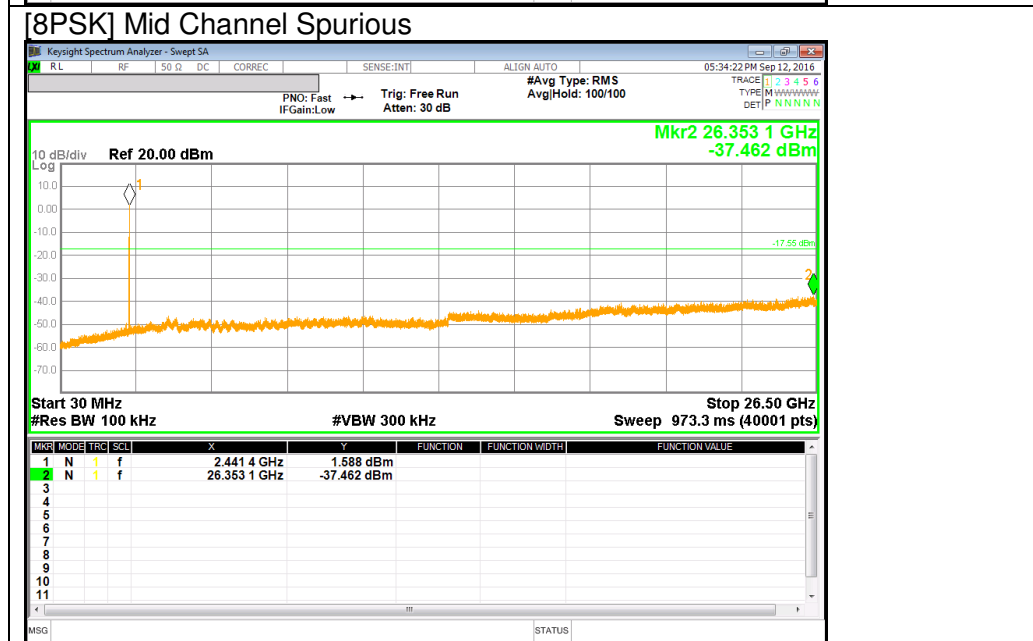
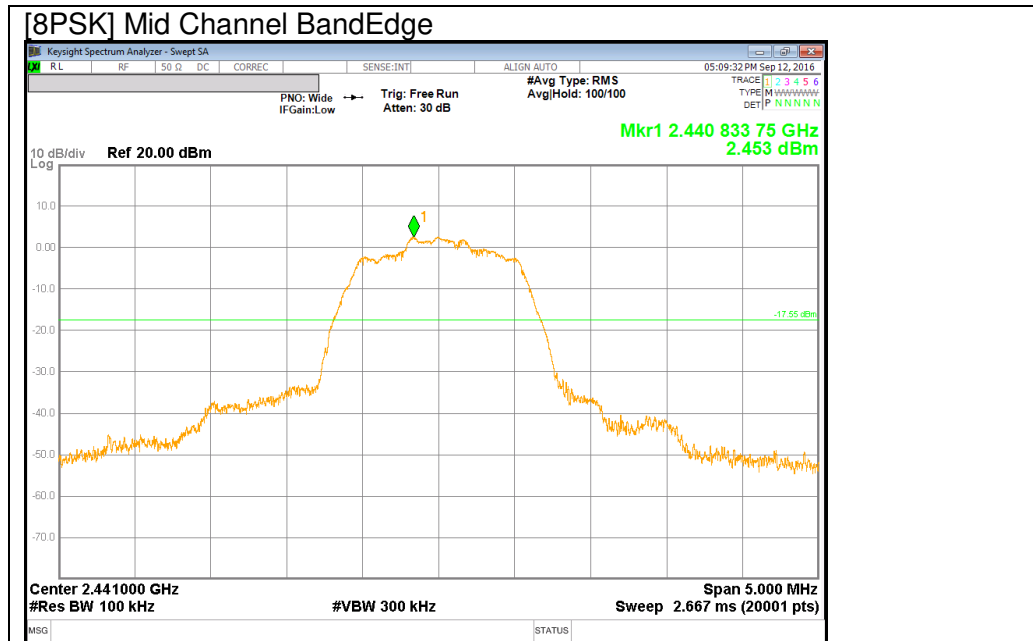


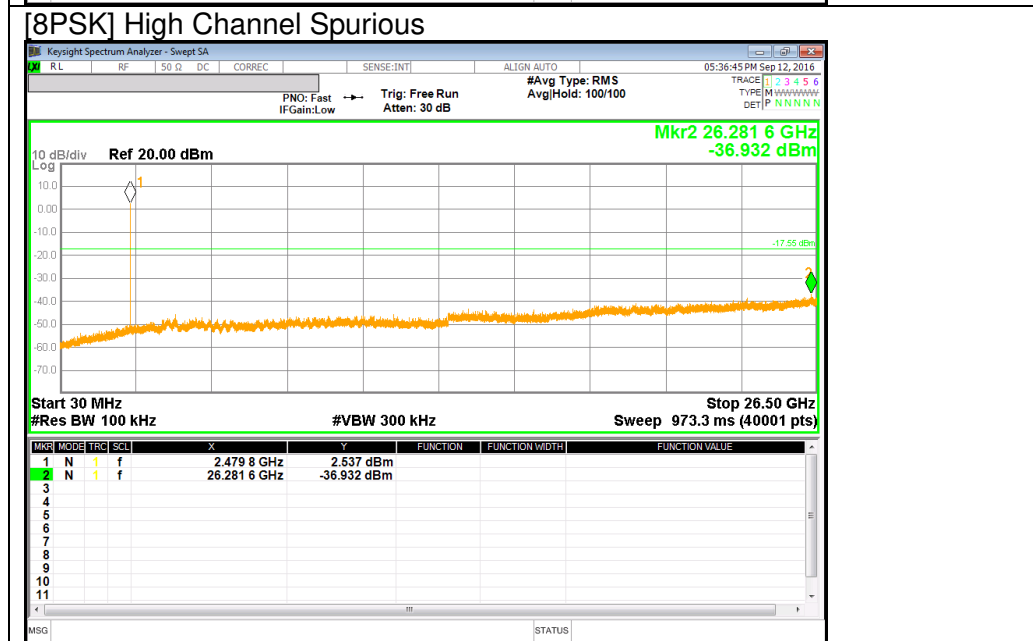
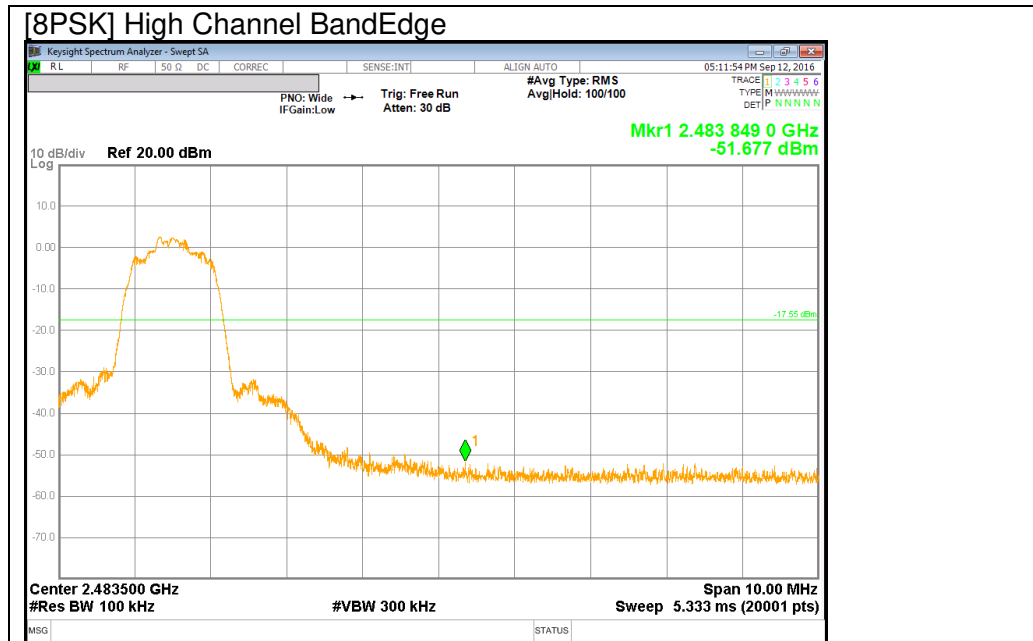
[PI/4-DQPSK Hopping Mode] High Channel BandEdge



**8PSK Mode**





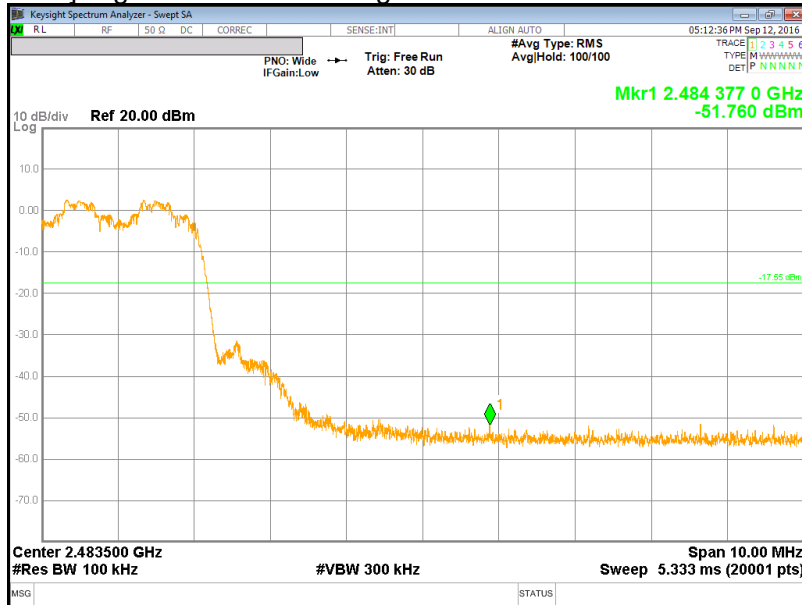


**BandEdge Emission at 8PSK Hopping Mode**

[8PSK Hopping Mode] Low Channel BandEdge



[8PSK Hopping Mode] High Channel BandEdge





## 9. RADIATED TEST RESULTS

### 9.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209  
 IC RSS-GEN Clause 8.9 (Transmitter)  
 IC RSS-GEN Clause 7 (Receiver)

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The EUT is configured in accordance with ANSI C63.10. 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; the video bandwidth is set to 3 MHz for peak measurements.(Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.)

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1/T (on time) for average measurement.

$$\text{GFSK} = 1/T = 1 / 0.0029\text{S} = 350\text{Hz}.$$

The minimum VBW was 350Hz, but test receiver(ESU40) couldn't set value 350Hz. Due to this reason, testing VBW was set to 500Hz(Worst cases).

The spectrum from 1GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.  
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

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.

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).  
Per FCC part 15.31(o), test results were not reported.

Formula for converting the filed strength from uV/m to dBuV/m is:  
Limit (dBuV/m) = 20 log limit (uV/m)

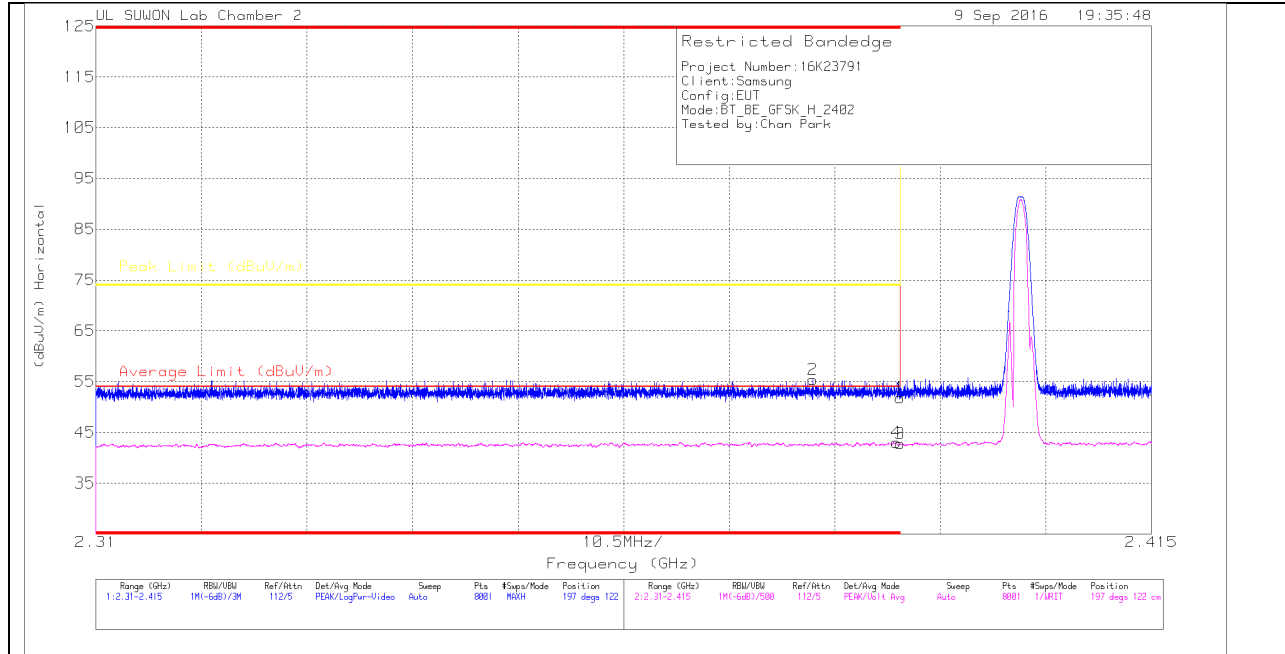
Radiated test of below 30MHz was performed inside anechoic chamber.  
For check the correlation with open air site, comparison test was conducted between chamber and open site. The test results indicated that there is a close correlation.

## 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

##### Trace Markers

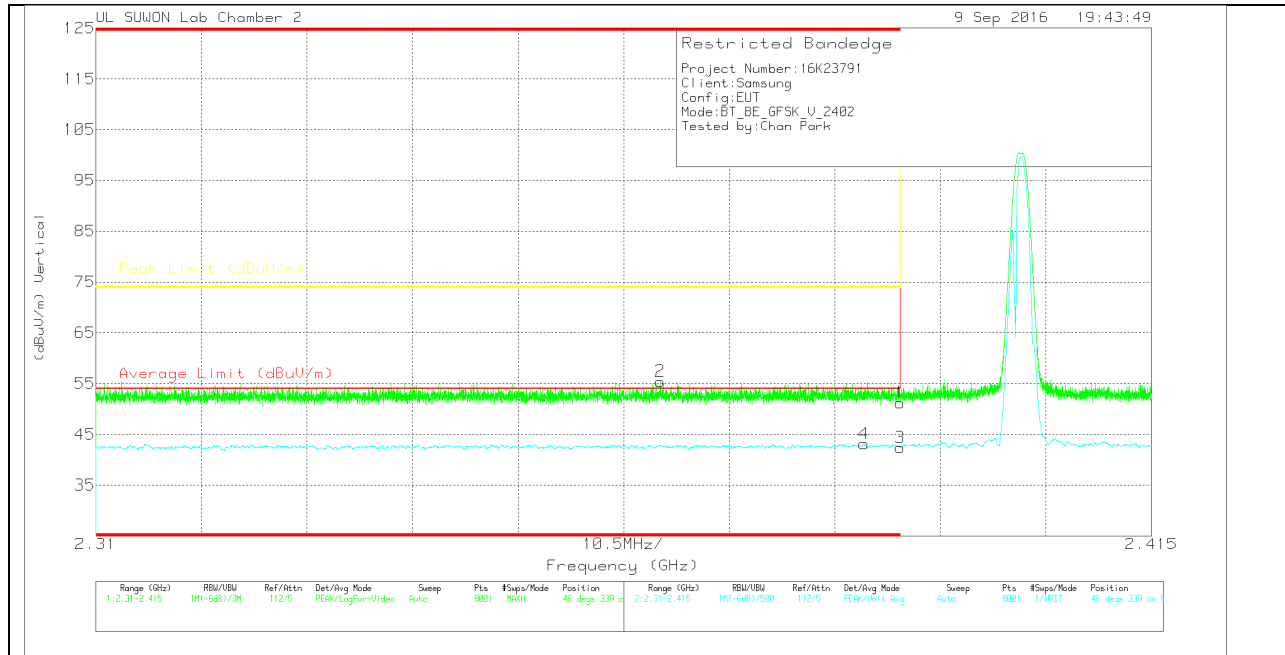
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.62	Pk	31.7	-19.5	51.82	-	-	74	-22.18	197	122	H
2	* 2.381	43.19	Pk	31.7	-19.5	55.39	-	-	74	-18.61	197	122	H
3	* 2.39	30.62	VA1T	31.7	-19.5	42.82	54	-11.18	-	-	197	122	H
4	* 2.39	30.86	VA1T	31.7	-19.5	43.06	54	-10.94	-	-	197	122	H

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $VB=1/Ton$  where: Ton is transmit duration

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	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	38.98	Pk	31.7	-19.5	51.18	-	-	74	-22.82	46	339	V
2	* 2.366	43.36	Pk	31.7	-19.6	55.46	-	-	74	-18.54	46	339	V
3	* 2.39	30.24	VA1T	31.7	-19.5	42.44	54	-11.56	-	-	46	339	V
4	* 2.386	30.98	VA1T	31.7	-19.5	43.18	54	-10.82	-	-	46	339	V

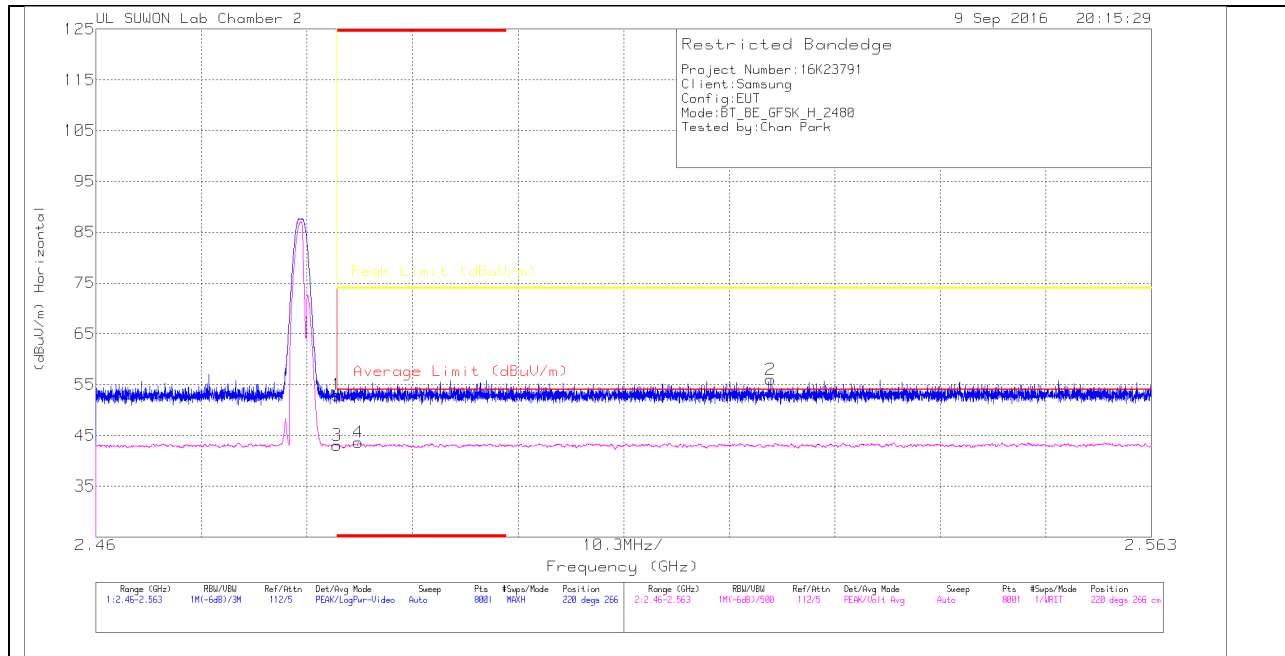
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $VB=1/Ton$  where: Ton is transmit duration

### AUTHORIZED BANDEDGE (HIGH CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

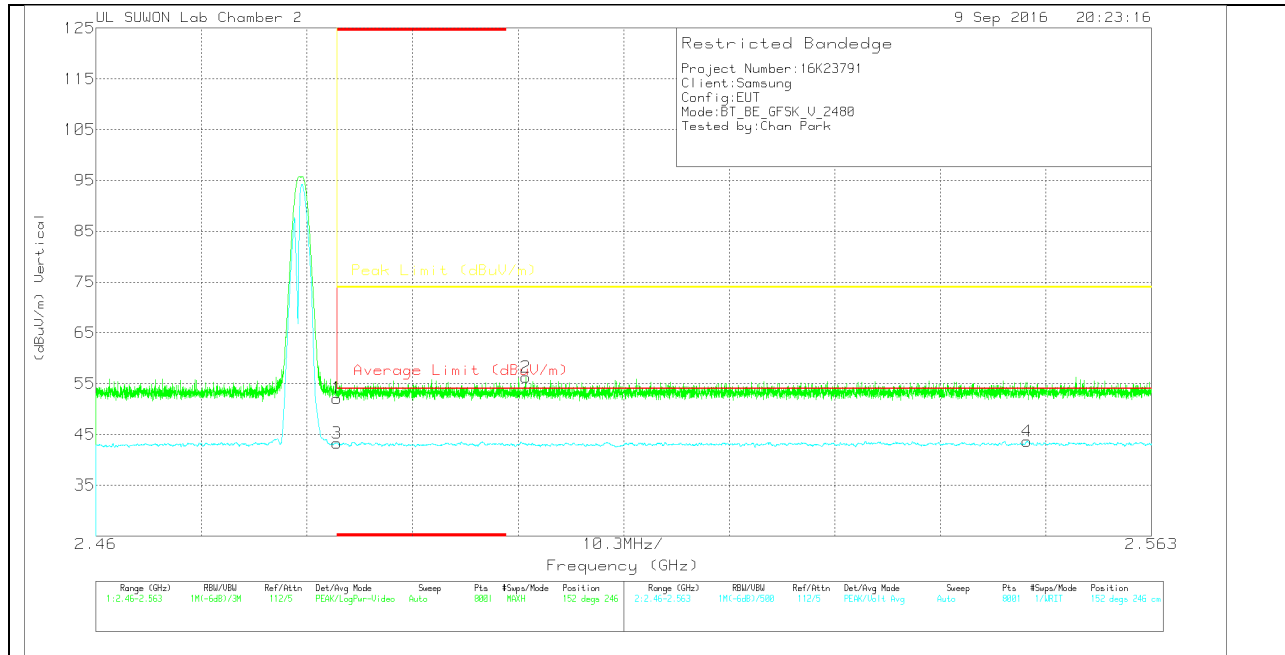
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.59	Pk	31.8	-19.4	52.99	-	-	74	-21.01	220	266	H
2	2.526	43.4	Pk	31.9	-19.3	56	-	-	74	-18	220	266	H
3	* 2.484	30.69	VA1T	31.8	-19.4	43.09	54	-10.91	-	-	220	266	H
4	* 2.486	31.28	VA1T	31.8	-19.4	43.68	54	-10.32	-	-	220	266	H

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	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	39.72	Pk			52.12	-	-	74	-21.88	152	246	V
2	2.502	43.71	Pk			56.31	-	-	74	-17.69	152	246	V
3	* 2.484	30.88	VA1T			43.28	54	-10.72	-	-	152	246	V
4	2.551	31.04	VA1T			43.64	54	-10.36	-	-	152	246	V

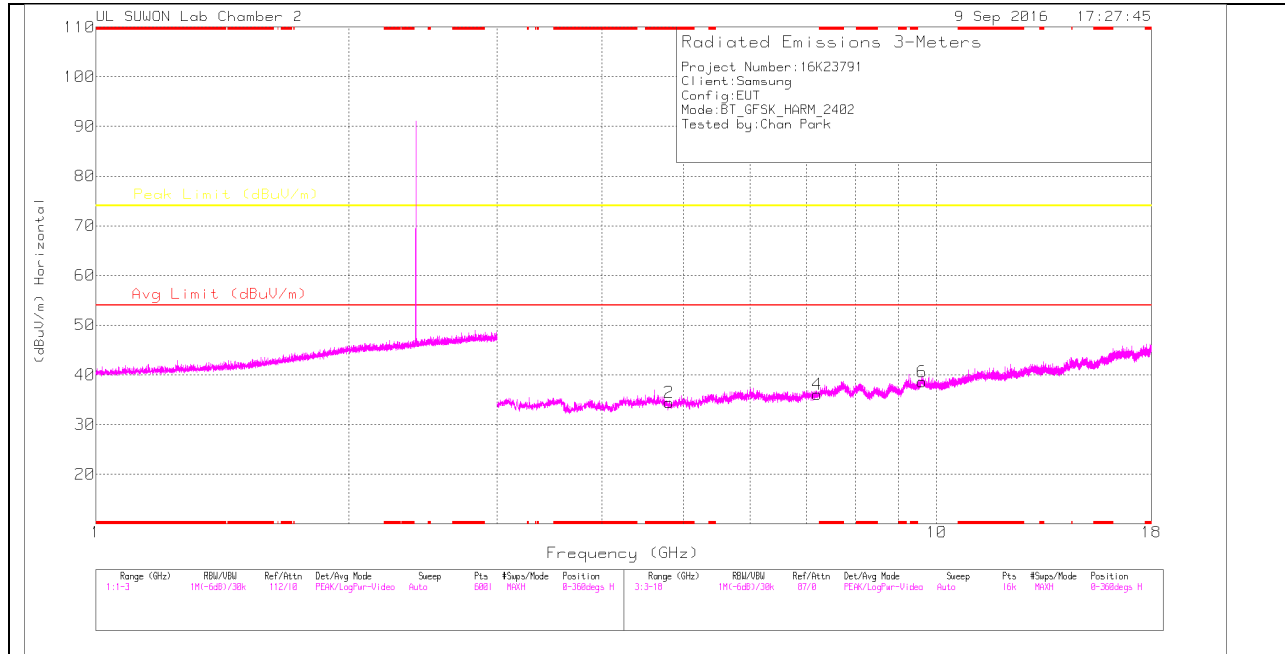
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

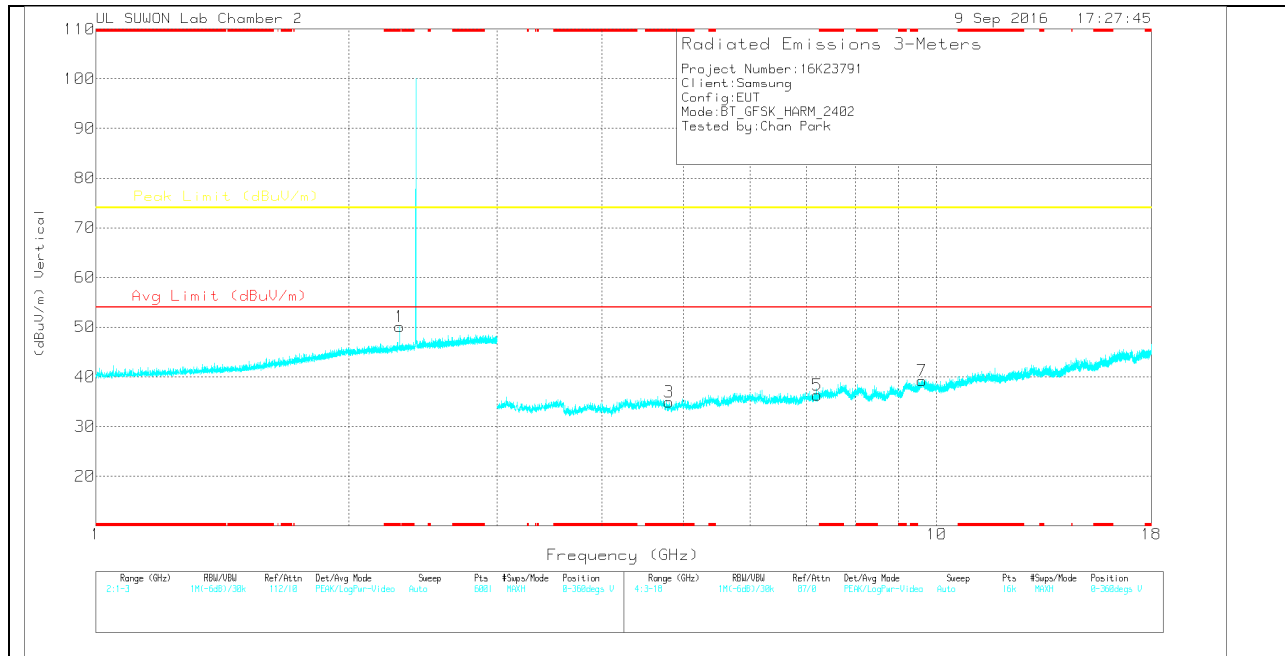
VA1T - FHSS: Linear Voltage Average  $VB=1/Ton$  where: Ton is transmit duration

### 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	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	37.04	PK	34	-33.8	37.24	-	-	74	-36.76	0-360	150	H
3	7.21	32.47	PK	35.7	-30.8	37.37	-	-	74	-36.63	0-360	250	H
5	9.609	30.95	PK	37	-27.3	40.65	-	-	74	-33.35	0-360	150	H
2	* 4.804	35.93	PK	34	-33.8	36.13	-	-	74	-37.87	0-360	150	V
4	7.199	33.03	PK	35.7	-30.7	38.03	-	-	74	-35.97	0-360	150	V
6	9.6	30.46	PK	37	-27.3	40.16	-	-	74	-33.84	0-360	150	V

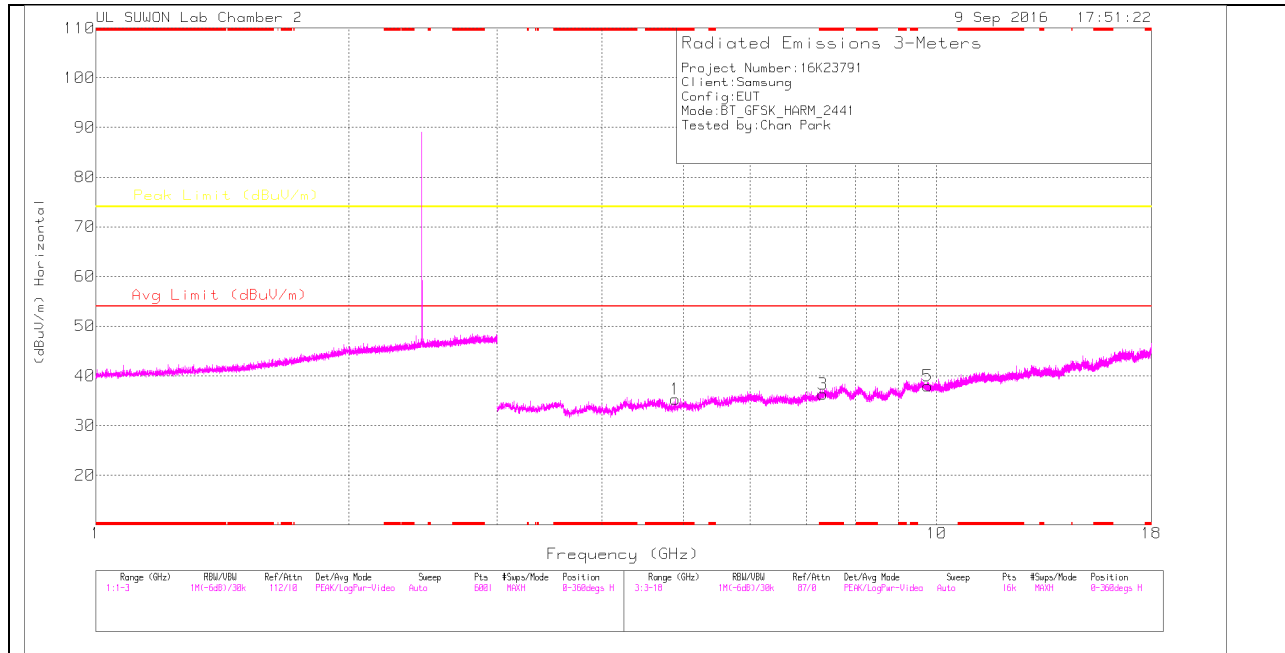
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

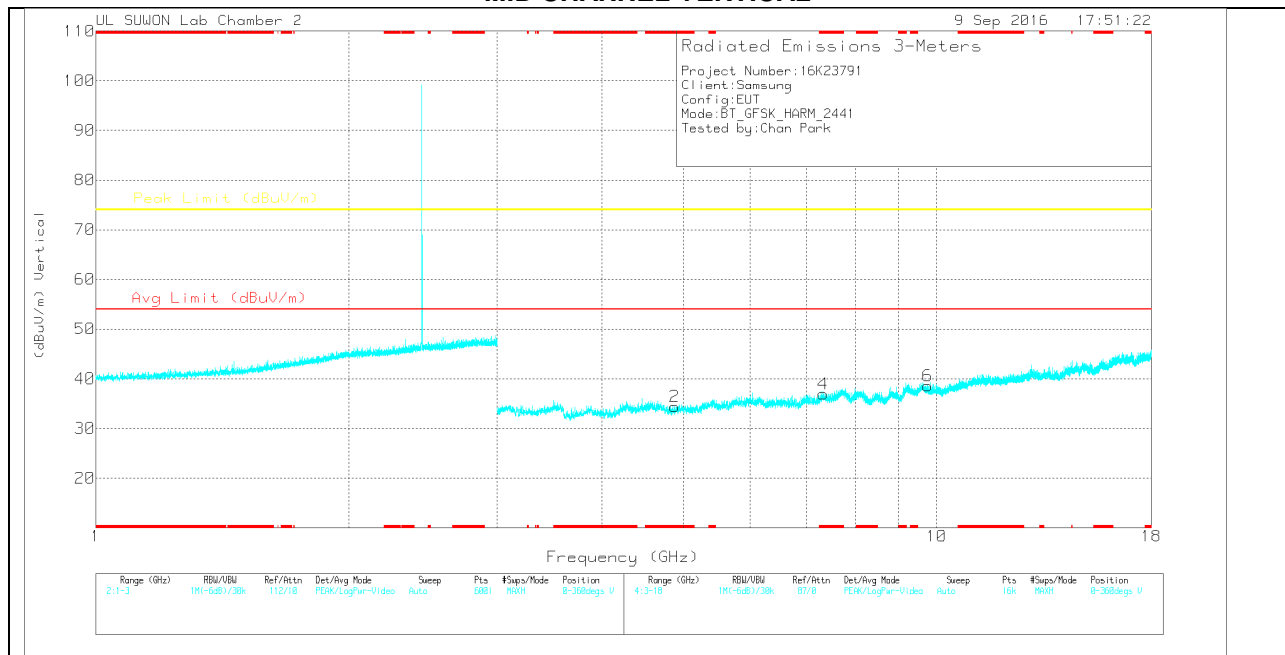
Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).



### 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

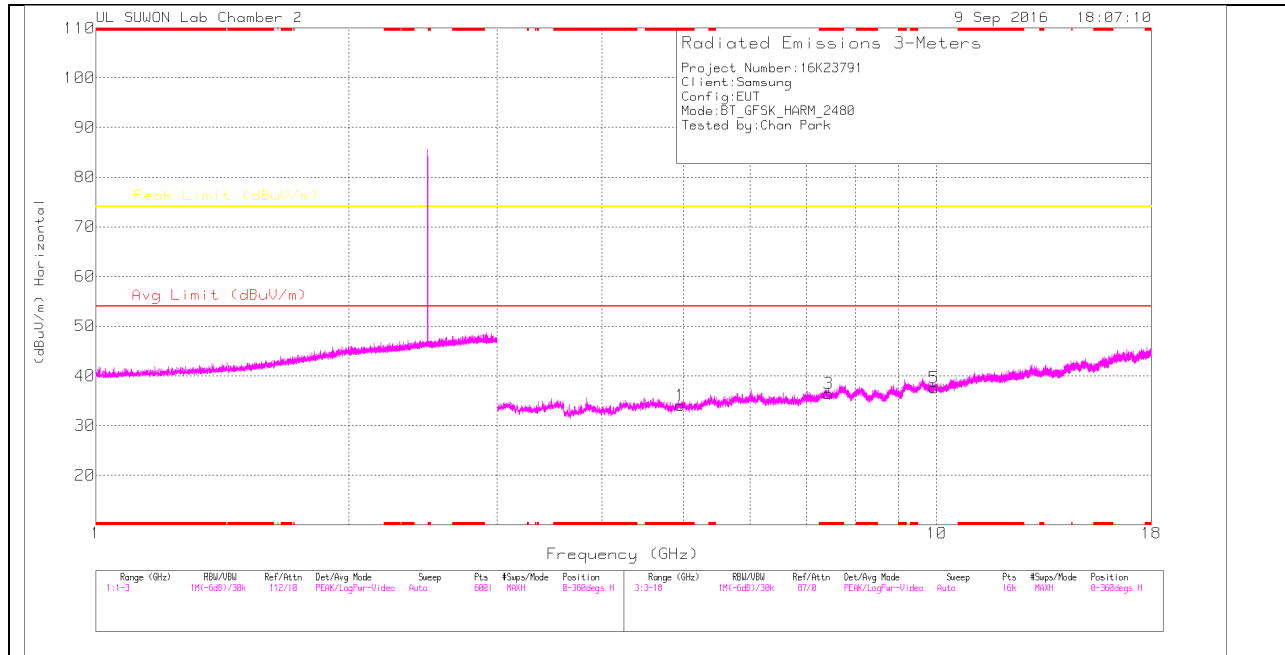
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.874	35.6	PK	34	-34	35.6	-	-	74	-38.4	0-360	150	H
3	* 7.324	32.3	PK	35.8	-30.9	37.2	-	-	74	-36.8	0-360	150	H
5	9.763	30.14	PK	37.2	-26.6	40.74	-	-	74	-33.26	0-360	150	H
2	* 4.878	35.09	PK	34	-34	35.09	-	-	74	-38.91	0-360	250	V
4	* 7.322	32.47	PK	35.8	-30.9	37.37	-	-	74	-36.63	0-360	250	V
6	9.763	30.48	PK	37.2	-26.6	41.08	-	-	74	-32.92	0-360	250	V

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

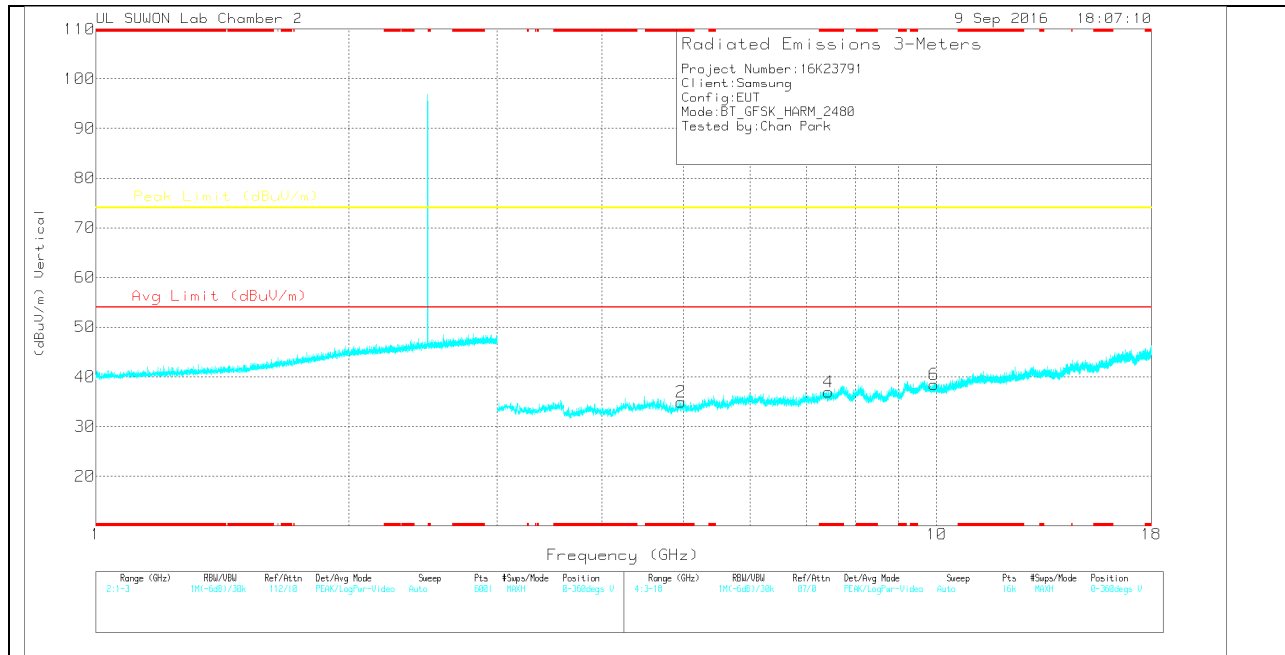
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

### 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	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.964	35.11	PK	34	-34	35.11	-	-	74	-38.89	0-360	150	H
3	* 7.435	32.96	PK	35.8	-30.7	38.06	-	-	74	-35.94	0-360	150	H
5	9.918	29.64	PK	37.4	-27.3	39.74	-	-	74	-34.26	0-360	250	H
2	* 4.962	35.3	PK	34	-34	35.3	-	-	74	-38.7	0-360	250	V
4	* 7.438	33.63	PK	35.8	-30.7	38.73	-	-	74	-35.27	0-360	250	V
6	9.925	30.57	PK	37.4	-27.1	40.87	-	-	74	-33.13	0-360	250	V

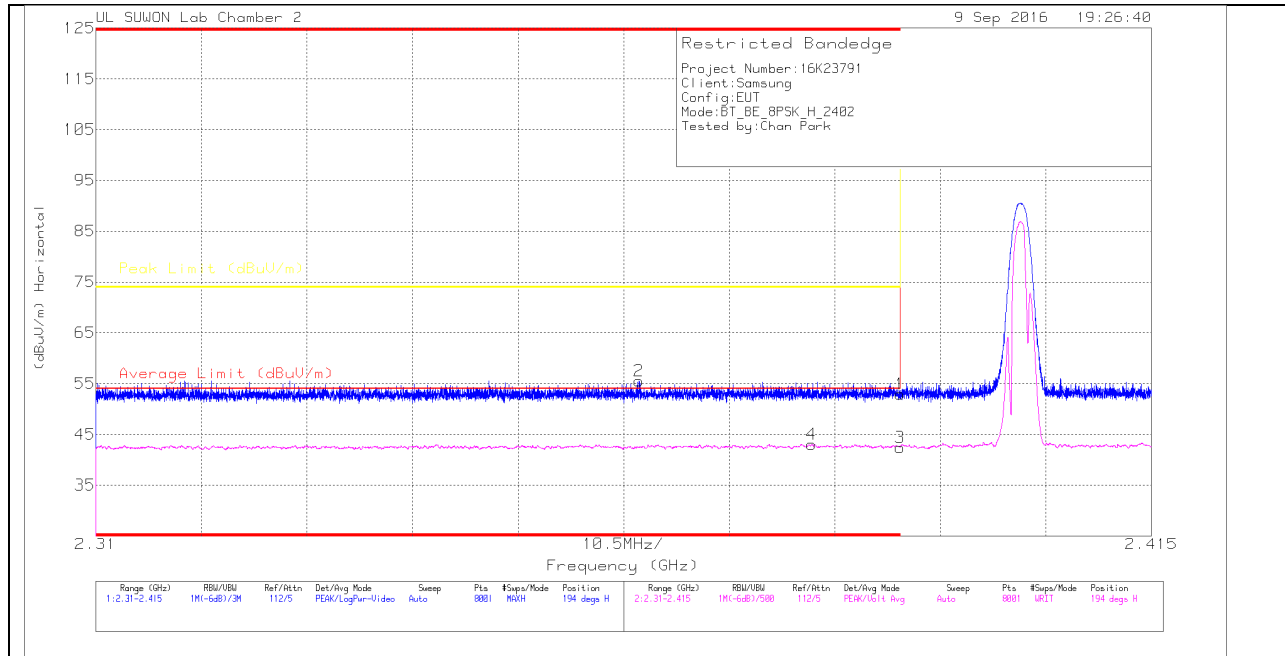
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

## 9.2.2. ENHANCED DATA RATE 8PSK MODULATION RESTRICTED BANDEDGE (LOW CHANNEL)

### HORIZONTAL PEAK AND AVERAGE PLOT



### HORIZONTAL DATA

#### Trace Markers

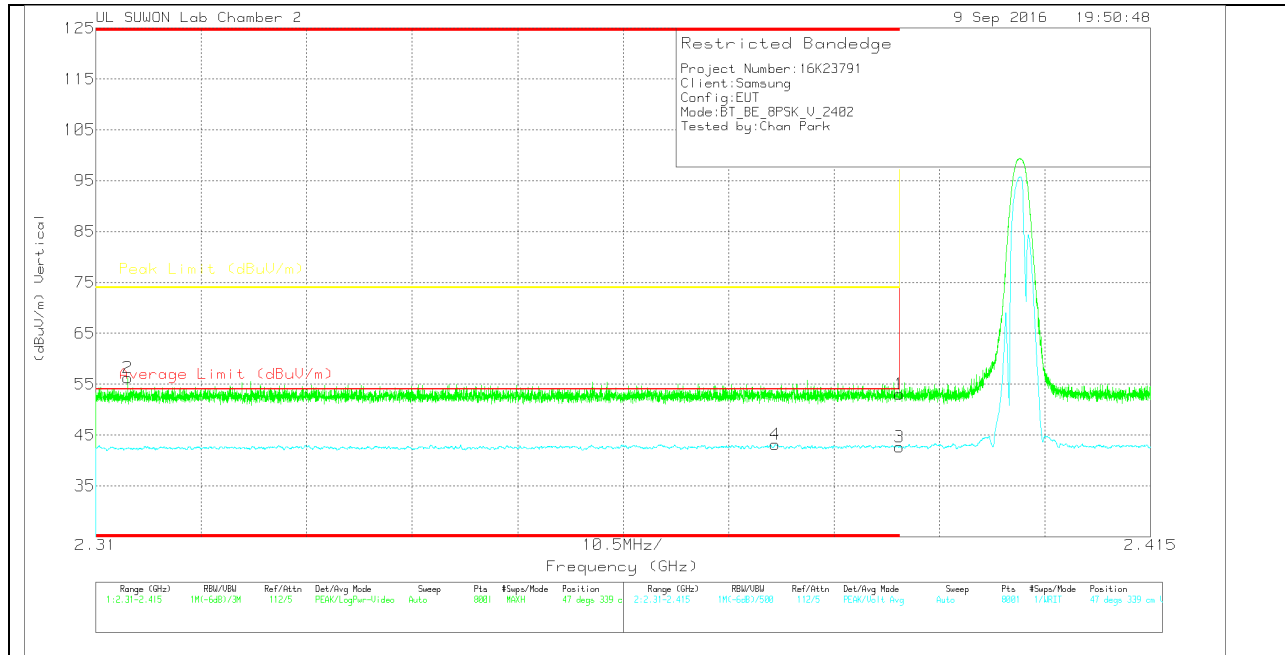
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.07	Pk	31.8	-29	47.87	-	-	74	-26.13	41	150	H
2	* 2.345	49.74	Pk	31.7	-29	52.44	-	-	74	-21.56	41	150	H
3	* 2.39	35.68	VA1T	31.8	-29	38.48	54	-15.52	-	-	41	150	H
4	* 2.37	36.37	VA1T	31.8	-29	39.17	54	-14.83	-	-	41	150	H

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2	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	44.76	Pk	31.8	-29	47.56	-	-	74	-26.44	200	200	V
2	* 2.372	48.56	Pk	31.8	-29	51.36	-	-	74	-22.64	200	200	V
3	* 2.39	35.06	VA1T	31.8	-29	37.86	54	-16.14	-	-	200	200	V
4	* 2.356	35.9	VA1T	31.7	-29	38.6	54	-15.4	-	-	200	200	V

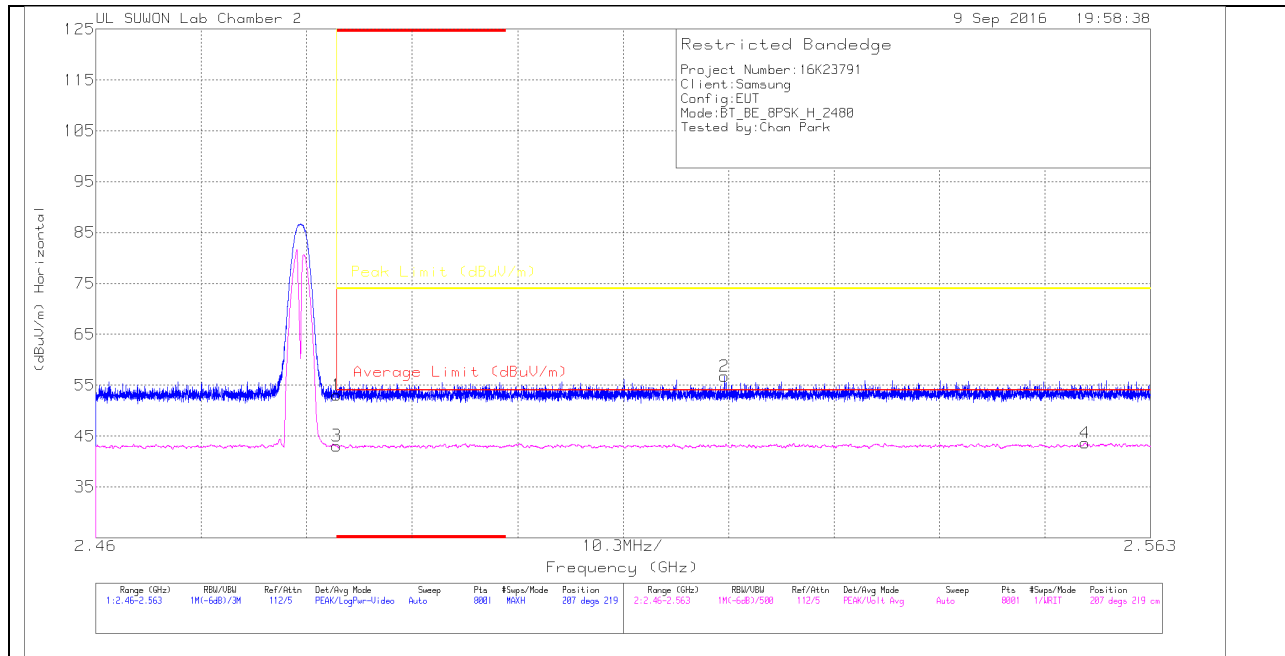
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $VB=1/Ton$  where: Ton is transmit duration

### AUTHORIZED BANDEDGE (HIGH CHANNEL)

#### HORIZONTAL PEAK AND AVERAGE PLOT



#### HORIZONTAL DATA

##### Trace Markers

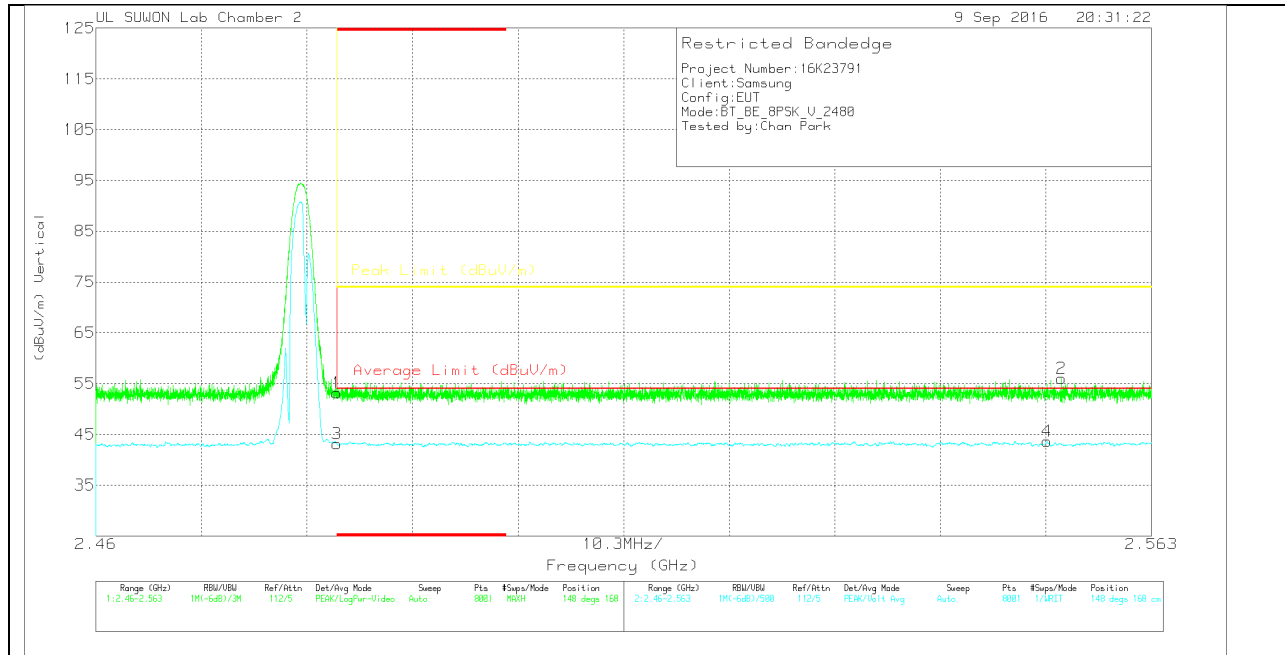
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.01	Pk	32	-28.9	48.11	-	-	74	-25.89	354	154	H
2	2.562	48.55	Pk	32	-28.8	51.75	-	-	74	-22.25	354	154	H
3	* 2.484	35.75	VA1T	32	-28.9	38.85	54	-15.15	-	-	354	154	H
4	2.554	36.25	VA1T	32	-28.8	39.45	54	-14.55	-	-	354	154	H

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

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**VERTICAL PEAK AND AVERAGE PLOT**



**VERTICAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_2	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	44.72	Pk	32	-28.9	47.82	-	-	74	-26.18	184	198	V
2	2.507	48.6	Pk	32	-28.9	51.7	-	-	74	-22.3	184	198	V
3	* 2.484	35.66	VA1T	32	-28.9	38.76	54	-15.24	-	-	184	198	V
4	2.546	36.08	VA1T	32	-28.8	39.28	54	-14.72	-	-	184	198	V

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

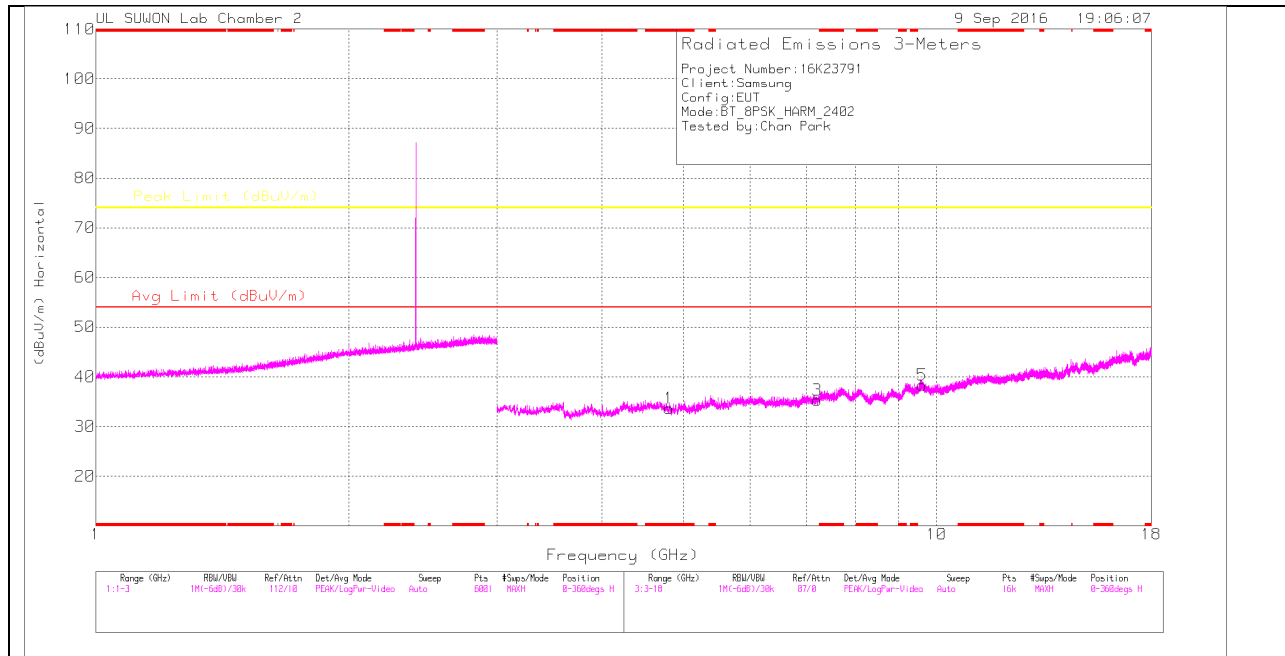
Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

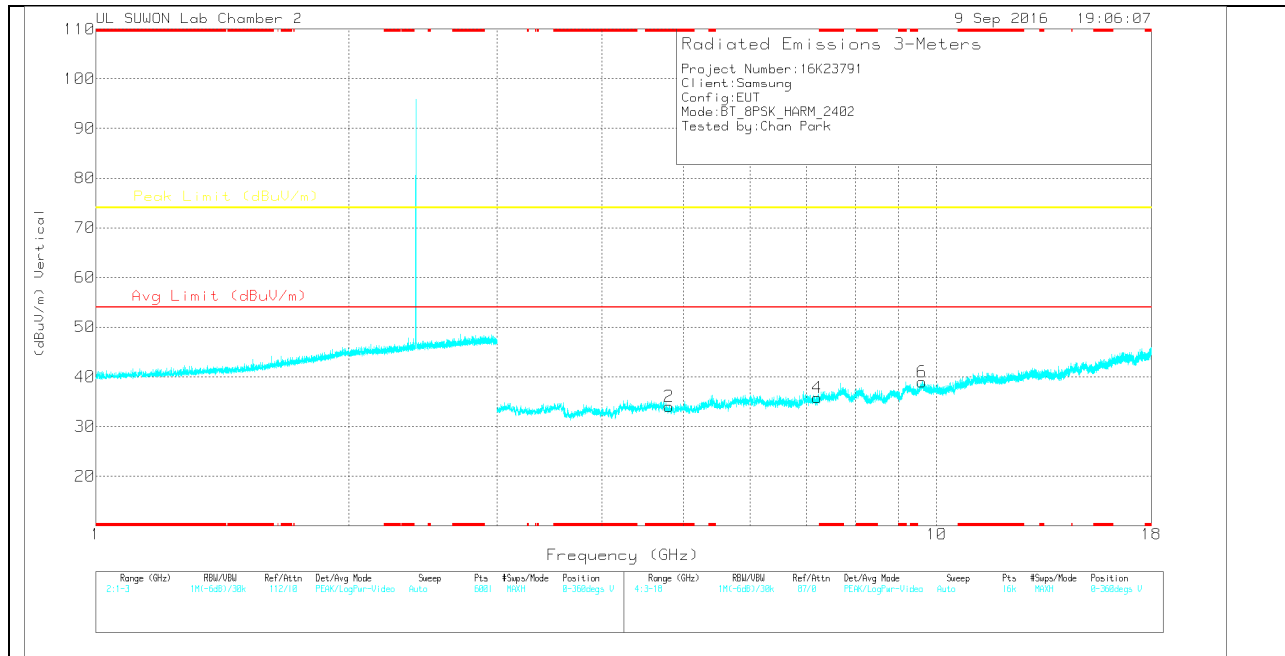


### HARMONICS AND SPURIOUS EMISSIONS

#### 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

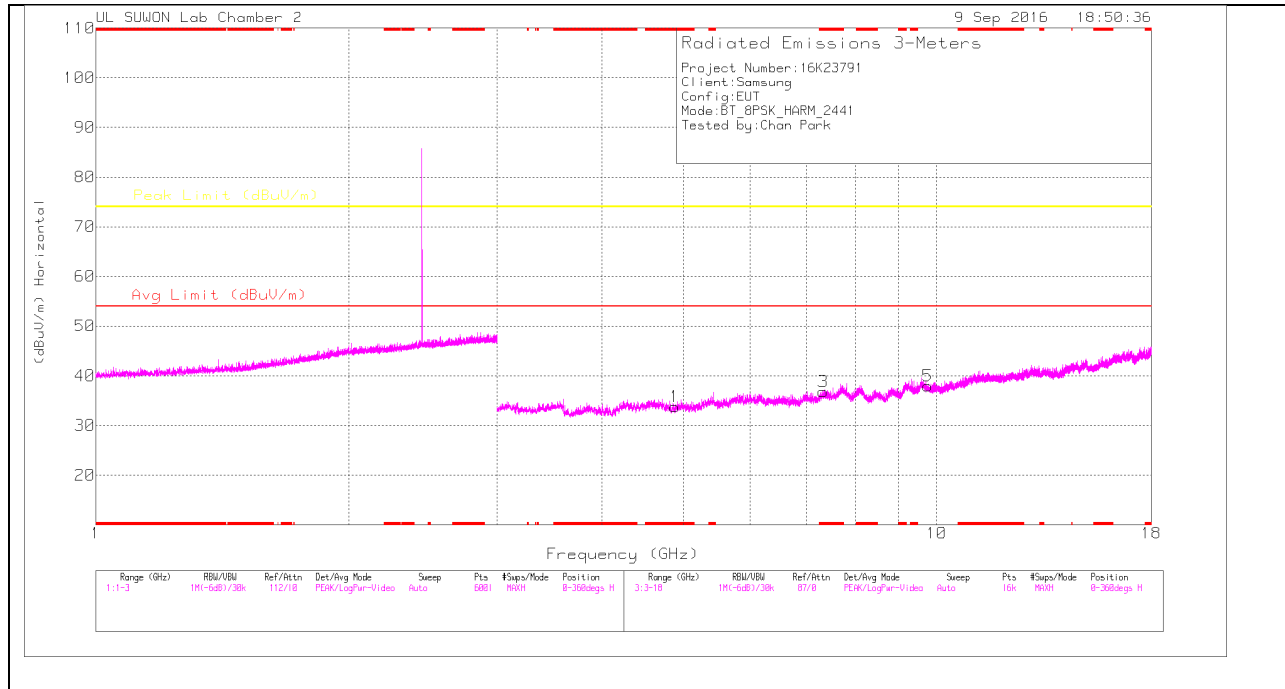
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.806	35.37	PK	34	-33.8	35.57	-	-	74	-38.43	0-360	150	H
3	7.209	32.19	PK	35.7	-30.8	37.09	-	-	74	-36.91	0-360	250	H
5	9.613	30.27	PK	37	-27.2	40.07	-	-	74	-33.93	0-360	250	H
2	* 4.81	35.42	PK	34	-33.8	35.62	-	-	74	-38.38	0-360	150	V
4	7.208	33.02	PK	35.7	-30.8	37.92	-	-	74	-36.08	0-360	250	V
6	9.606	30.62	PK	37	-27.3	40.32	-	-	74	-33.68	0-360	150	V

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

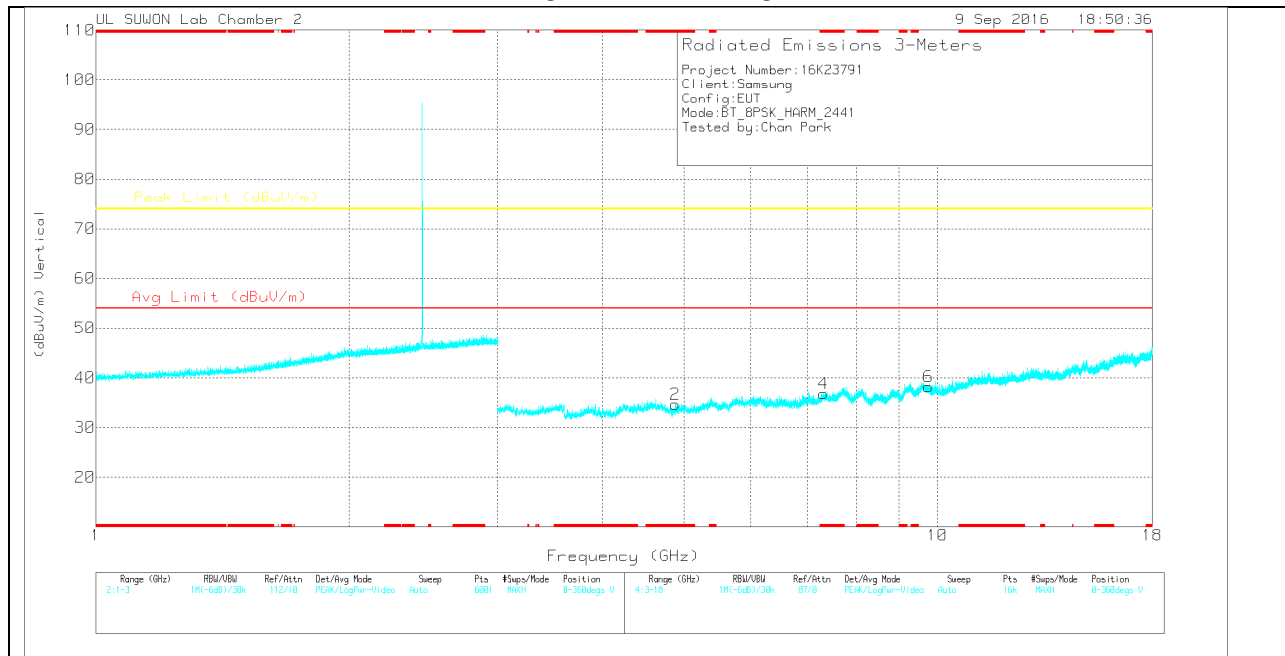
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

**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

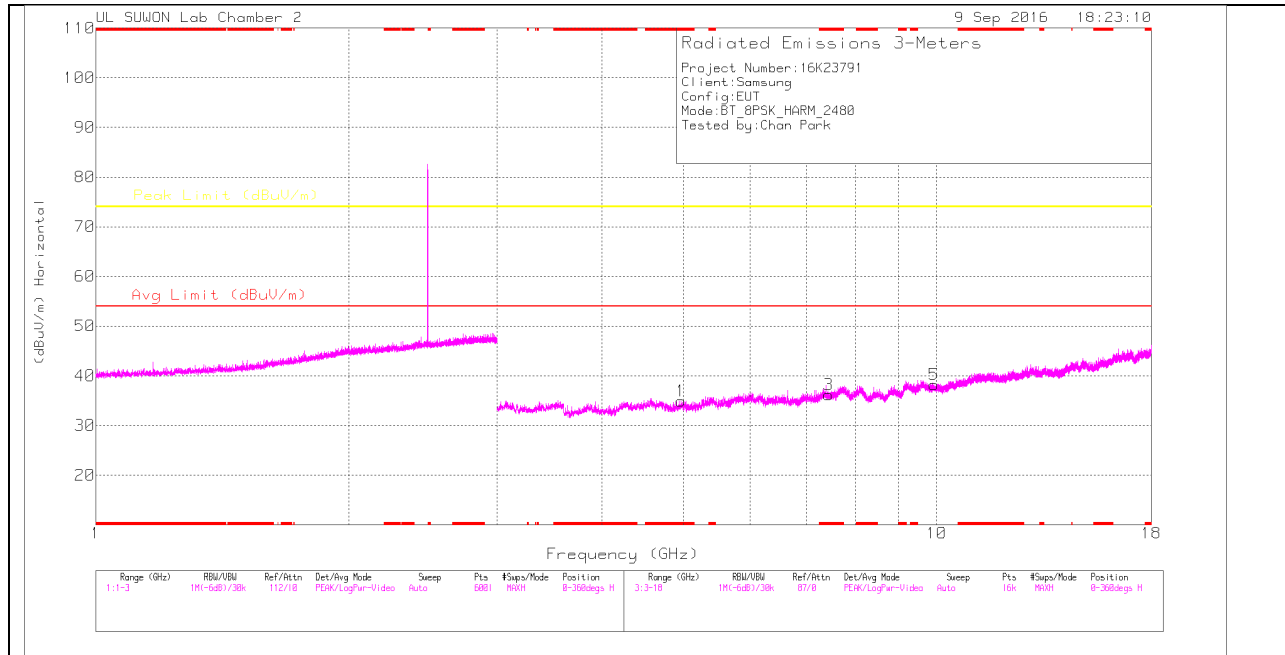
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.882	34.92	PK	34	-34	34.92	-	-	74	-39.08	0-360	250	H
3	* 7.328	32.23	PK	35.8	-30.8	37.23	-	-	74	-36.77	0-360	150	H
5	9.767	30.18	PK	37.2	-26.5	40.88	-	-	74	-33.12	0-360	250	H
2	* 4.884	35.17	PK	34	-34	35.17	-	-	74	-38.83	0-360	150	V
4	* 7.326	33.13	PK	35.8	-30.8	38.13	-	-	74	-35.87	0-360	250	V
6	9.765	30.53	PK	37.2	-26.6	41.13	-	-	74	-32.87	0-360	250	V

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

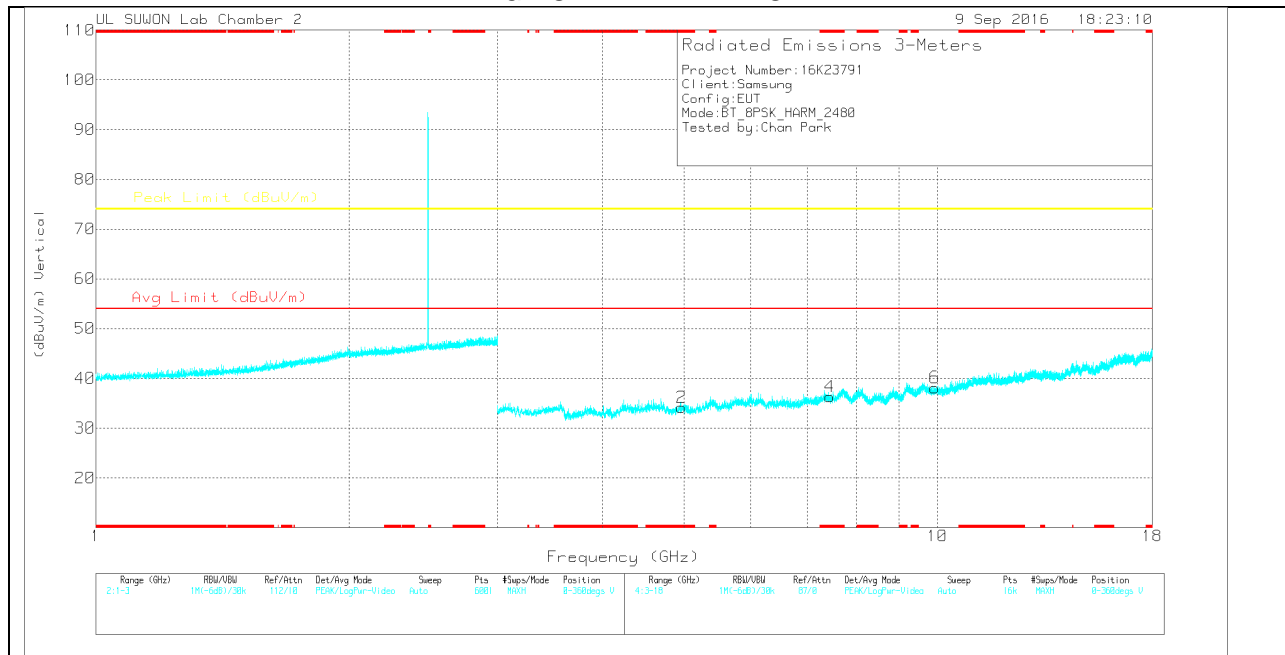
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

### 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	3117(0016 8717)_150 619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96	35.04	PK	34	-34	35.04	-	-	74	-38.96	0-360	150	H
3	* 7.438	32.85	PK	35.8	-30.7	37.95	-	-	74	-36.05	0-360	250	H
5	9.919	29.76	PK	37.4	-27.2	39.96	-	-	74	-34.04	0-360	150	H
2	* 4.964	35.66	PK	34	-34	35.66	-	-	74	-38.34	0-360	250	V
4	* 7.44	33.09	PK	35.8	-30.7	38.19	-	-	74	-35.81	0-360	150	V
6	9.925	29.22	PK	37.4	-27.1	39.52	-	-	74	-34.48	0-360	250	V

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

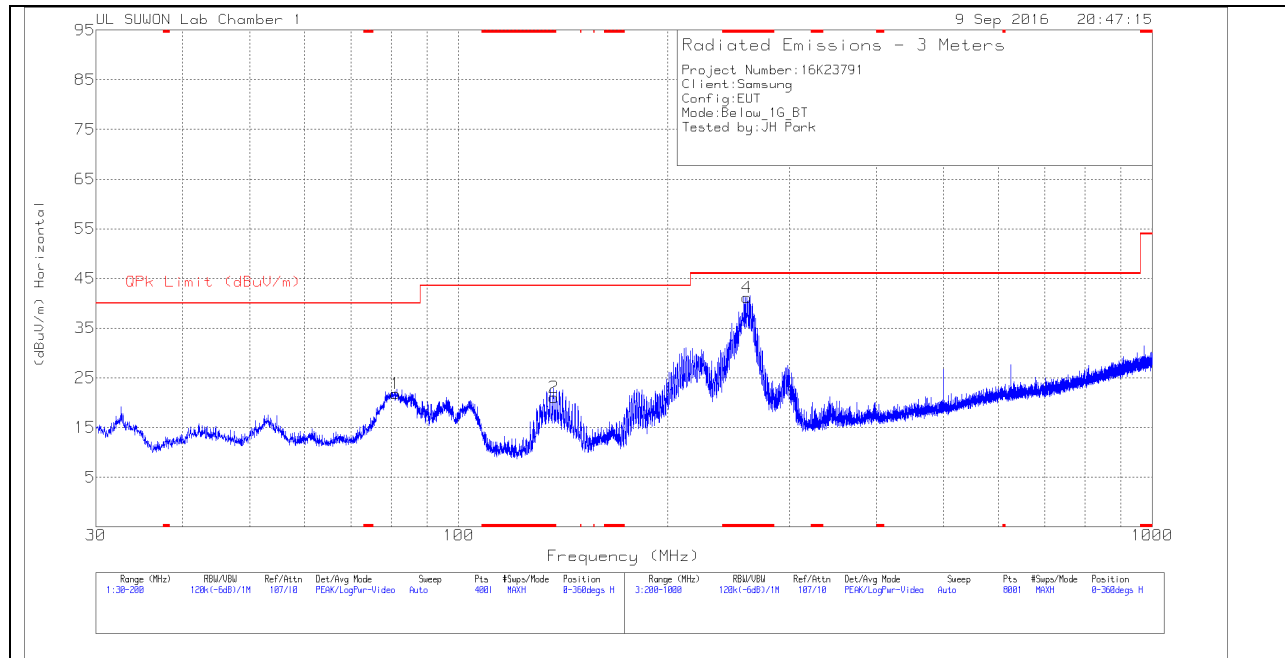
PK – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limit (54dBuV/m).

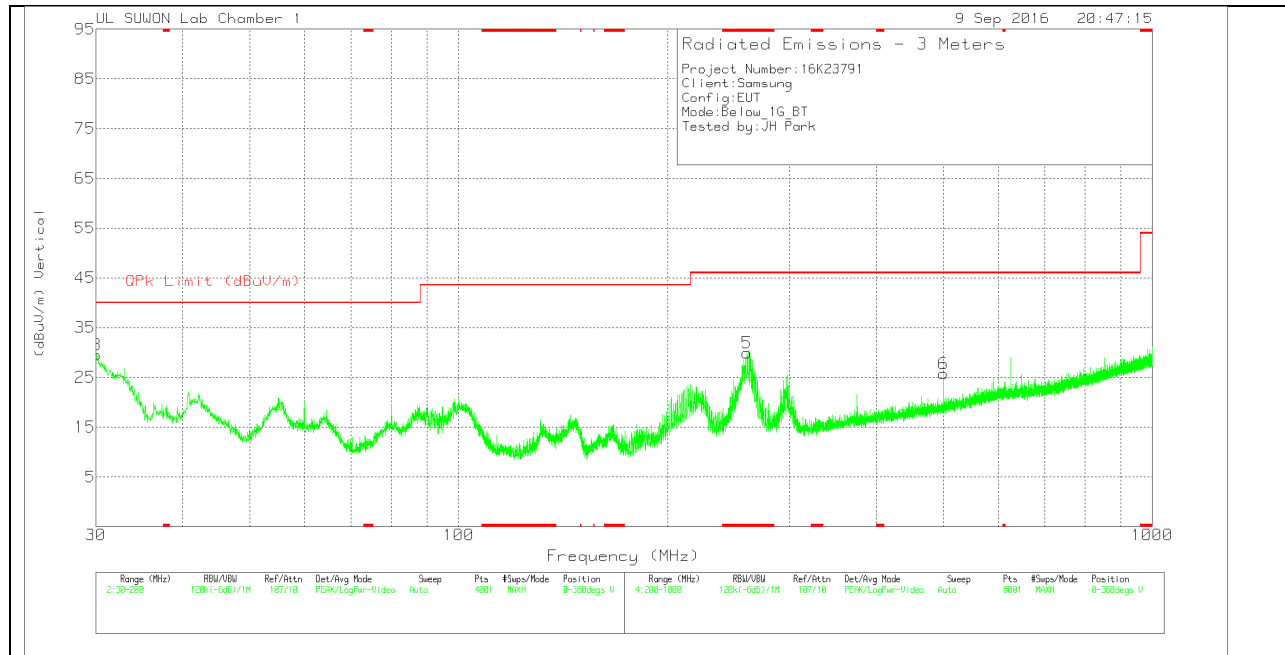
### 9.3. WORST-CASE BELOW 1 GHz

#### 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	69.695	44.72	Pk	9.7	-29.8	24.62	40	-15.38	0-360	300	H
2	144.75	43.3	Pk	8	-28.7	22.6	43.52	-20.92	0-360	200	H
3	30.085	56.06	Pk	10.3	-30.5	35.86	40	-4.14	0-360	100	V
4	64.255	48.42	Pk	11.4	-29.9	29.92	40	-10.08	0-360	100	V
5	71.1825	48.25	Pk	9.3	-29.7	27.85	40	-12.15	0-360	100	V
6	234.8	42.33	Pk	12	-27.9	26.43	46.02	-19.59	0-360	100	H

Pk - Peak detector

Radiated Emissions

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
30.01958	52.67	Qp	10.3	-30.5	32.47	40	-7.53	209	100	V

Qp - Quasi-Peak detector



## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)  
IC RSS-GEN Clause 8.8

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 C63.10.

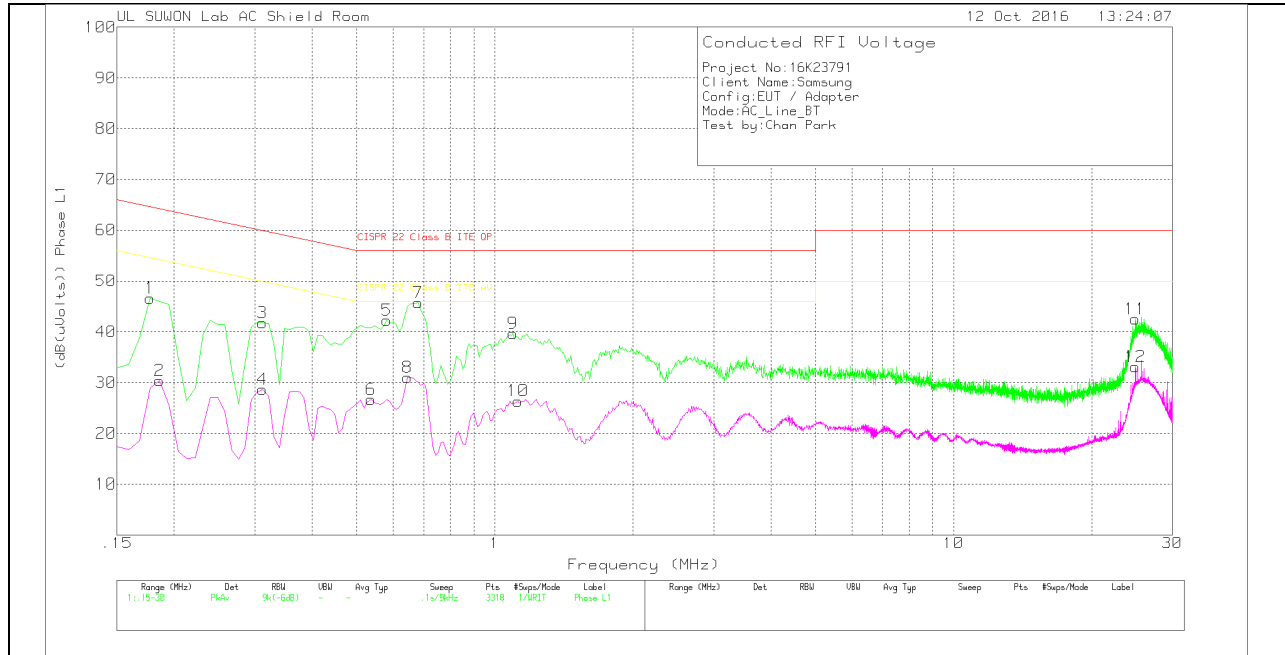
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

**RESULTS**

**6 WORST EMISSIONS**

**LINE 1 PLOT**



**LINE 1 RESULTS**

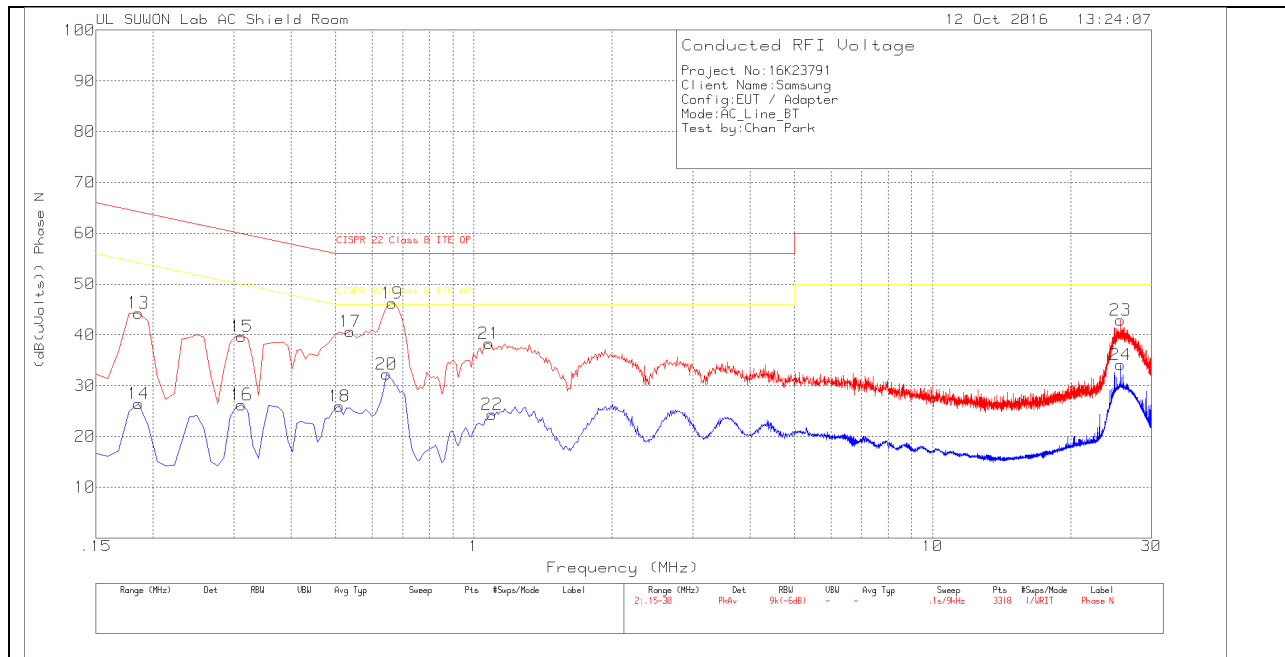
Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex-cord_L1	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.177	36.46	Pk	10.2	0	46.66	64.63	-17.97	-	-
2	.186	20.28	Av	10.1	0	30.38	-	-	54.21	-23.83
3	.312	31.92	Pk	9.9	0	41.82	59.92	-18.1	-	-
4	.312	18.75	Av	9.9	0	28.65	-	-	49.92	-21.27
5	.582	32.12	Pk	10.1	0	42.22	56	-13.78	-	-
6	.537	16.58	Av	10.1	0	26.68	-	-	46	-19.32
7	.681	35.61	Pk	10.1	0	45.71	56	-10.29	-	-
8	.645	20.97	Av	10.1	0	31.07	-	-	46	-14.93
9	1.095	29.74	Pk	9.9	0	39.64	56	-16.36	-	-
10	1.122	16.48	Av	9.9	0	26.38	-	-	46	-19.62
11	24.9	31.63	Pk	10.6	.3	42.53	60	-17.47	-	-
12	24.9	22.27	Av	10.6	.3	33.17	-	-	50	-16.83

Pk - Peak detector

Av - Average detection

### LINE 2 PLOT



### LINE 2 RESULTS

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.186	34.31	Pk	10	0	44.31	64.21	-19.9	-	-
14	.186	16.47	Av	10	0	26.47	-	-	54.21	-27.74
15	.312	29.81	Pk	9.9	0	39.71	59.92	-20.21	-	-
16	.312	16.35	Av	9.9	0	26.25	-	-	49.92	-23.67
17	.537	30.54	Pk	10.1	0	40.64	56	-15.36	-	-
18	.51	15.8	Av	10.1	0	25.9	-	-	46	-20.1
19	.663	36.22	Pk	10	0	46.22	56	-9.78	-	-
20	.645	22.22	Av	10	0	32.22	-	-	46	-13.78
21	1.077	28.47	Pk	9.9	0	38.37	56	-17.63	-	-
22	1.095	14.44	Av	9.9	0	24.34	-	-	46	-21.66
23	25.692	31.78	Pk	10.8	.3	42.88	60	-17.12	-	-
24	25.692	23.03	Av	10.8	.3	34.13	-	-	50	-15.87

Pk - Peak detector

Av - Average detection