



# CERTIFICATION TEST REPORT

**Report Number.** : 4789294522-E5V2

**Applicant** : SAMSUNG ELECTRONICS CO., LTD.  
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,  
GYEONGGI-DO, 16677, KOREA

**Model** : SM-J260MU/DS, SM-J260MU

**FCC ID** : A3LSMJ260MU

**EUT Description** : GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n

**Test Standard(s)** : FCC 47 CFR PART 15 SUBPART C

**Date Of Issue:**

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ACCREDITED

**Testing Laboratory**

**TL-637**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	01/20/20	Initial issue	Sungeun Lee
V2	01/28/20	Updated to address TCB's question	Sungeun Lee

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n  
**MODEL NUMBER:** SM-J260MU/DS, SM-J260MU  
**SERIAL NUMBER:** R3MC02TBTW (CONDUCTED)  
R38MC08F0PL (RADIATED);  
**DATE TESTED:** JAN 06, 2020 – JAN 17, 2020;

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  
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Tested By:



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Suwon Lab Engineer  
UL Korea, Ltd.

Sungeun Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02
4. ANSI C63.10-2013.

## 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
<input type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/wp-content/uploads/2017/05/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:

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

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### 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	2.35 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

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

### 4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

## 5. EQUIPMENT UNDER TEST

### 5.1.DESCRPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n.  
 This test report addresses the DSS (BT) operational mode.

This report covers the Samsung models SM-J260MU/DS and SM-J260MU.  
 All components are same except for SIM Slot.  
 With some pre-scan, model SM-J260MU/DS was set for final test.

### 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	9.953	9.89
		Peak	10.455	11.10
	Enhanced Pi/4-DPSK	Average	8.693	7.40
		Peak	11.290	13.46
	Enhanced 8PSK	Average	8.704	7.42
		Peak	11.775	15.05

### 5.3.DESCRPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.  
 Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes an internal antennas, with a maximum gain of 0.6 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.

## 5.5.DESCRPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U83EWE	R37MC4KKQG2HM3	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
EAR PHONE	SAMSUNG	EHS61ASFWE	N/A	N/A

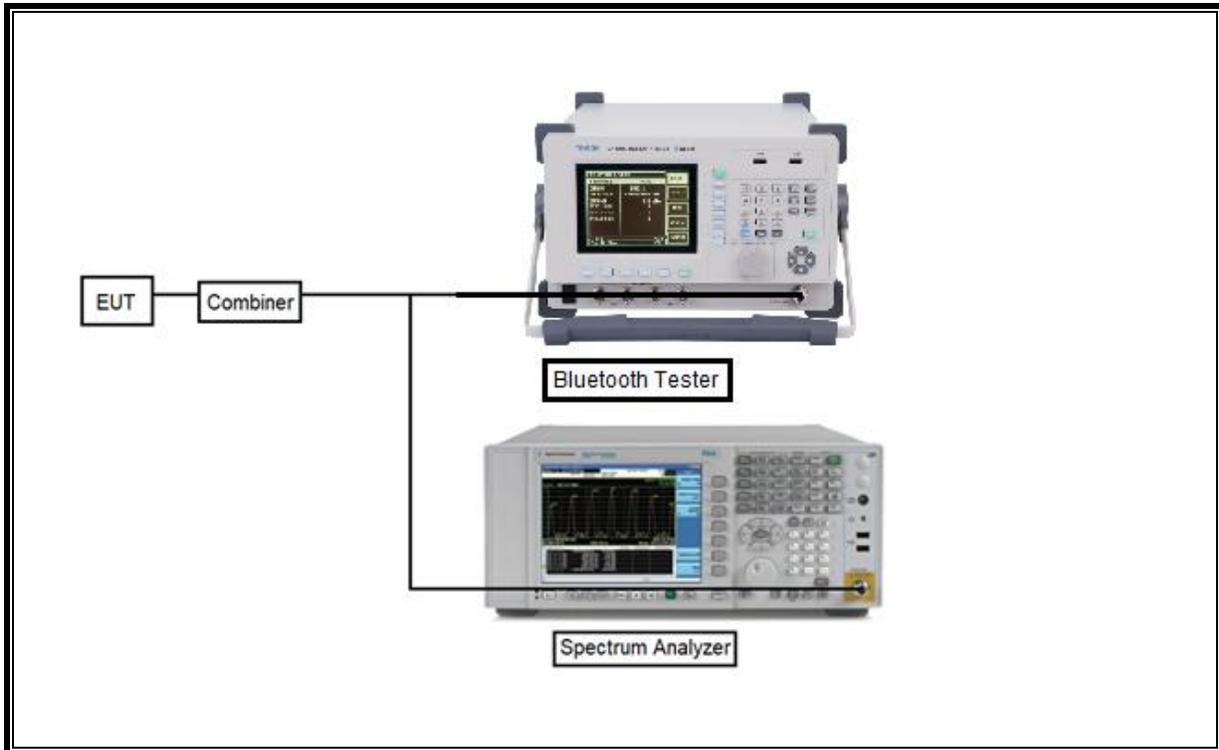
### I/O CABLE

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0m	N/A

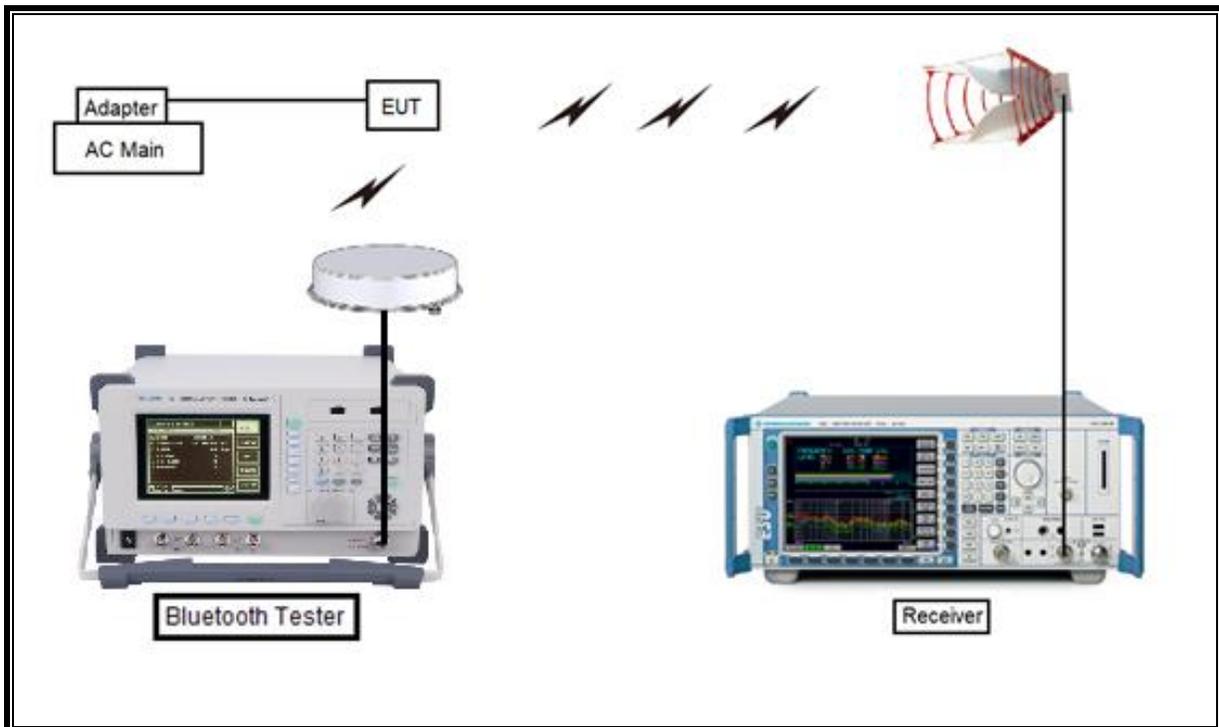
### TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.  
 Test software enable BT communications.

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



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## 6. MEASUREMENT METHODS

20dB BW : ANSI C63.10, Section 6.9.2

99% BW : ANSI C63.10, Section 6.9.3

HOPPING FREQUENCY SEPARATION : ANSI C63.10, Section 7.8.2

NUMBER OF HOPPING CHANNELS : ANSI C63.10, Section 7.8.3

AVERAGE TIME OF OCCUPANCY : ANSI C63.10, Section 7.8.4

OUTPUT POWER : ANSI C63.10, Section 7.8.5.

Out-of-band EMISSIONS (Conducted) : ANSI C63.10, Section 7.8.6, 7.8.8

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: ANSI C63.10, Section 6.

Out-of-band EMISSIONS IN RESTRICTED BANDS : ANSI C63.10, Section 6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

## 7. 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	Next Cal. Date
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Preamplifier	ETS	3116C-PA	00168841	08-08-20
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-05-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-20
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-09-20
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-07-20
Combiner	WEINCHEL	1575	2150	08-08-20
Attenuator	PASTERNAK	PE7087-10	A001	08-08-20
Attenuator	PASTERNAK	PE7087-10	A008	08-08-20
Attenuator	PASTERNAK	PE7087-10	2	08-06-20
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-20
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-20
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-05-20
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-05-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-06-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-06-20
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-06-20
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-06-20
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-20
LISN	R&S	ENV-216	101837	08-09-20
Termination	WEINSCHL	M1406A	T01	08-08-20
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

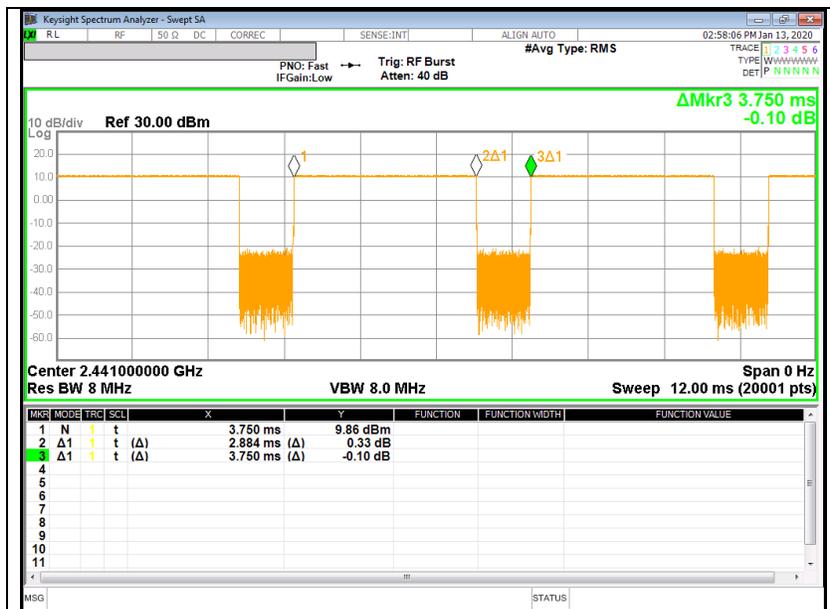
## 8. REFERENCE MEASUREMENT RESULTS

### 8.1.ON TIME AND DUTY CYCLE RESULTS

#### LIMITS

None: for reporting purposes only.

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
<b>2400MHz Bands</b>						
BT	2.884	3.750	0.769	76.9%	1.14	0.347



## 8.2.20 dB BANDWIDTH

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

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

### RESULTS

#### 8.2.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]
Low	2 402	0.947
Mid	2 440	0.947
High	2 480	0.947
Worst		0.947

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

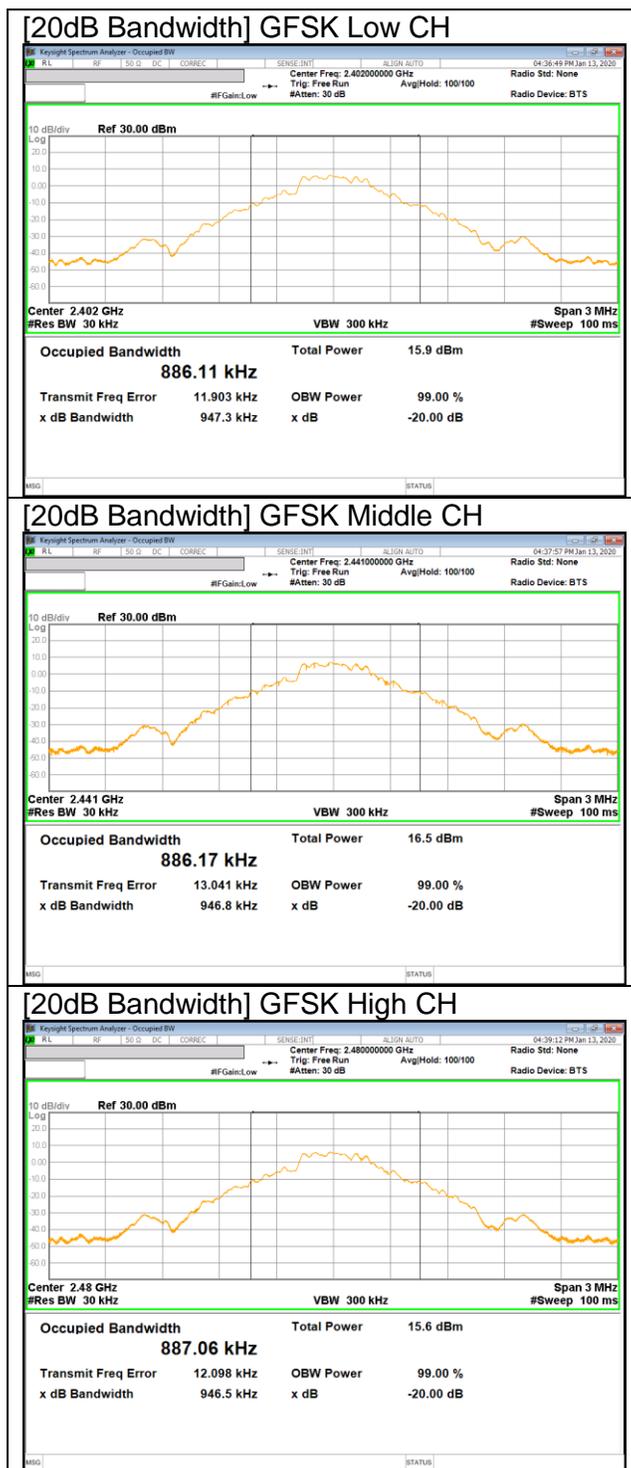
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]
Low	2 402	1.232
Mid	2 440	1.300
High	2 480	1.300
Worst		1.300

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

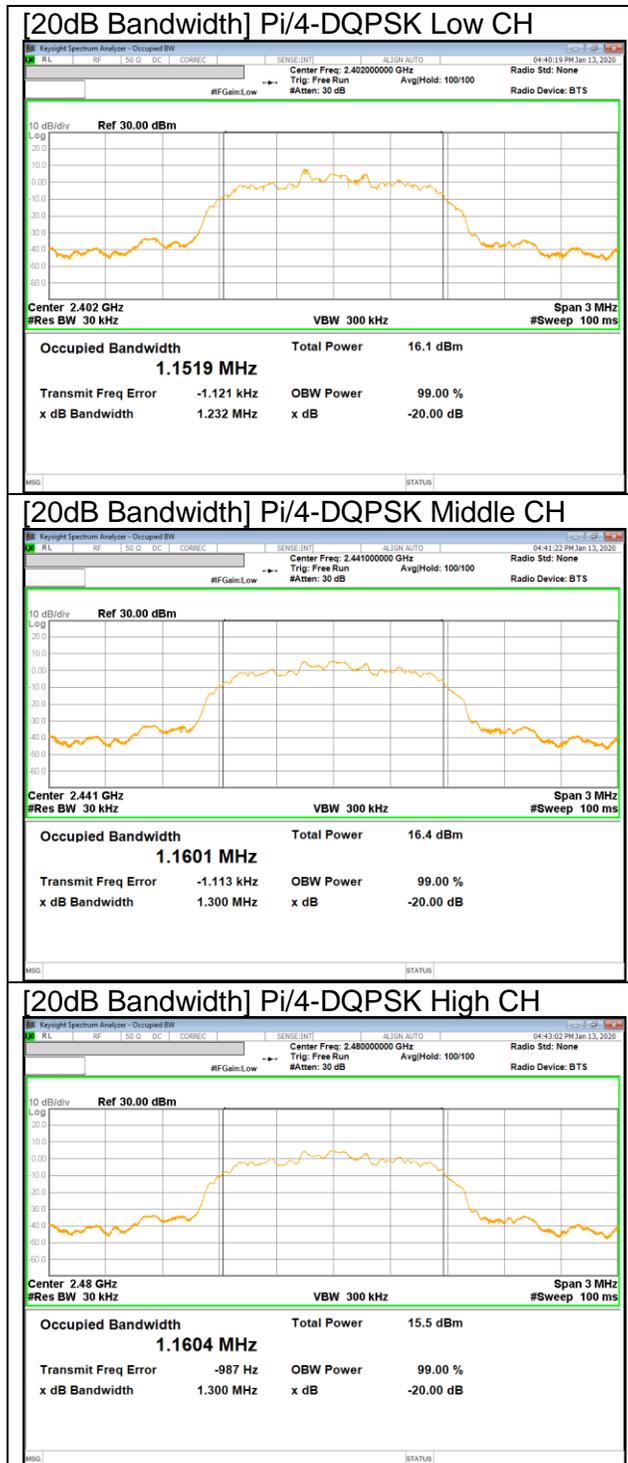
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]
Low	2 402	1.267
Mid	2 440	1.267
High	2 480	1.264
Worst		1.267

### 8.2.4. 20 dB BANDWIDTH PLOTS

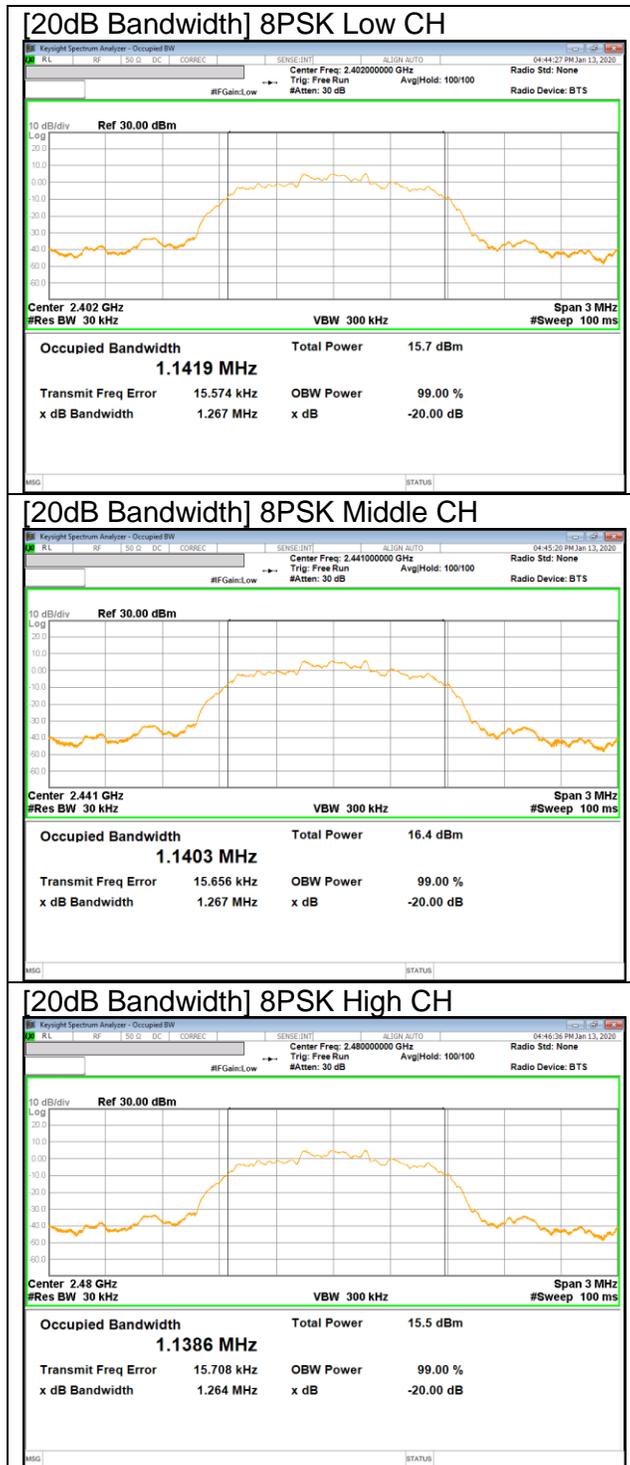
#### GFSK BANDWIDTH



**20 dB BANDWIDTH**



**8PSK BANDWIDTH**



## 9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc	Conducted	Pass
15.247 (b)(1)	TX conducted output power	<21dBm		Pass
15.247 (a)(1)	Hopping frequency separation	> two-thirds of the 20 dB bandwidth		Pass
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		Pass
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 0.4sec		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

## 10. ANTENNA PORT TEST RESULTS

### 10.1. 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

- Span = wide enough to capture the peaks of two adjacent channels
- RBW = Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- VBW ≥ RBW
- Sweep = Auto
- Detector function = Peak
- Trace = Max hold

#### RESULTS

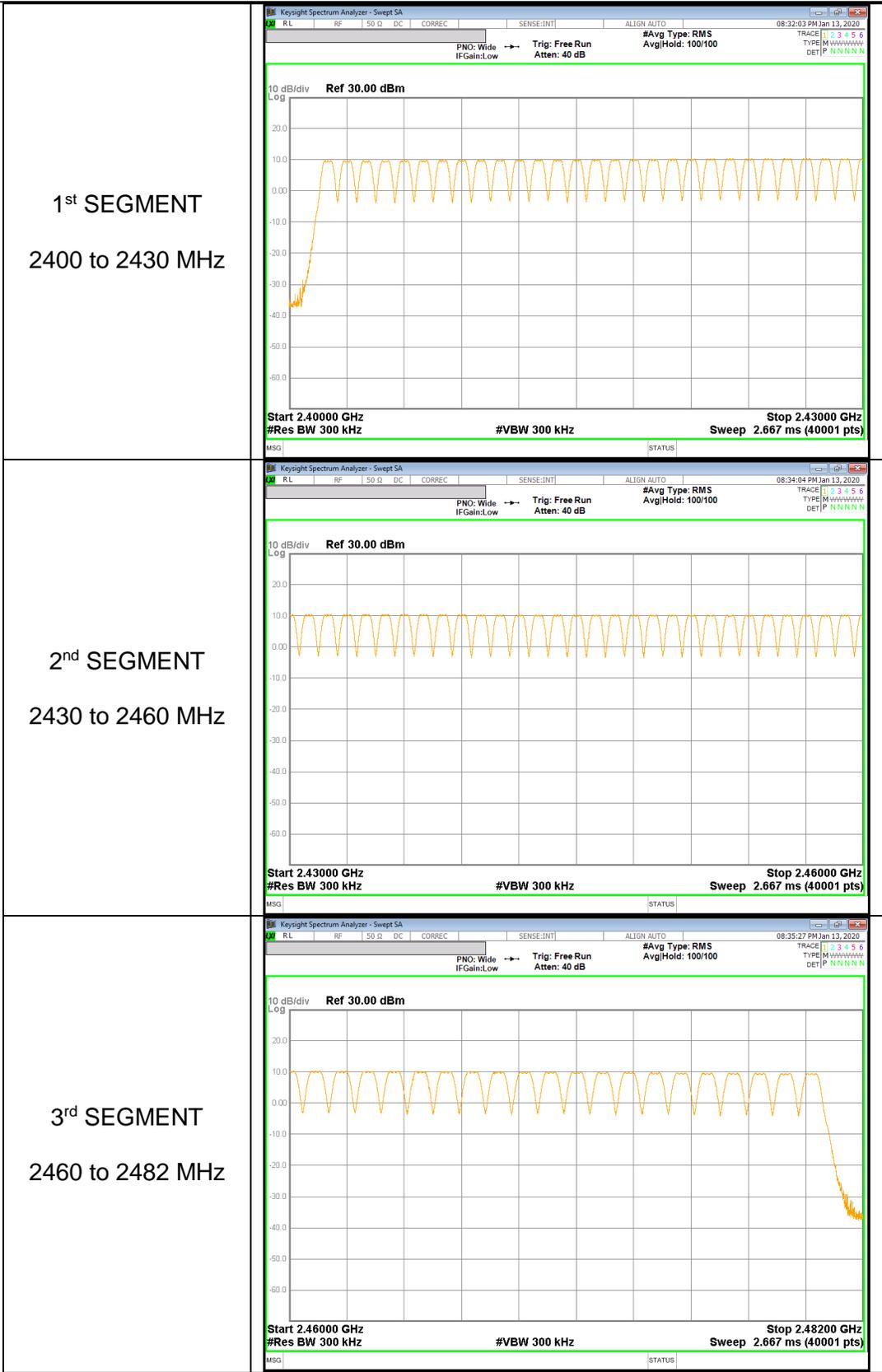
##### HOPPING FREQUENCY SEPARATION PLOT



[GFSK]

[8PSK]

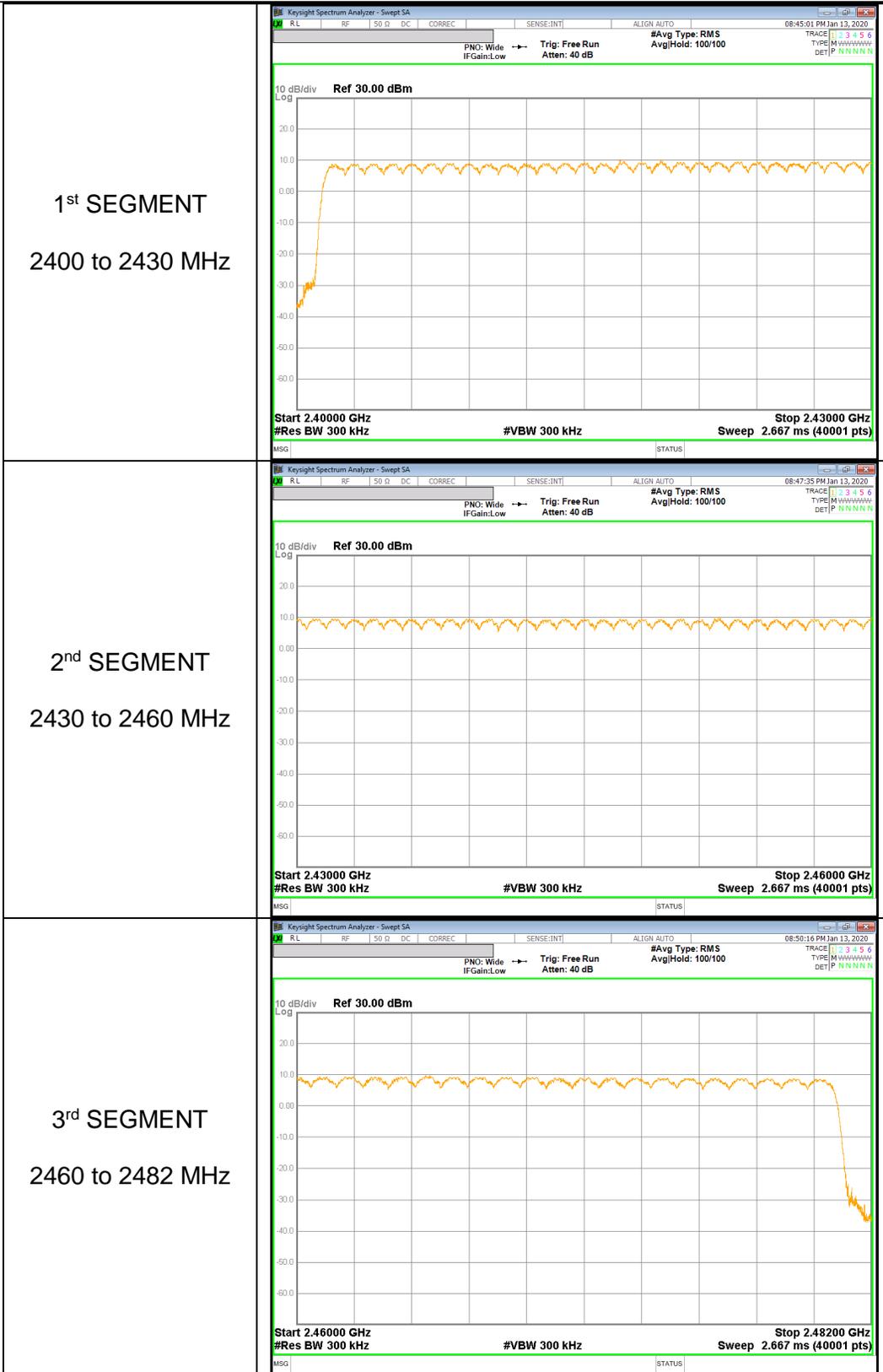




**NUMBER OF HOPPING CHANNELS PLOTS[8PSK]**

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





**10.3. 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 \* (# 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[GFSK]**

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.380	32	0.122	0.4	-0.278
DH3	1.636	16	0.262	0.4	-0.138
DH5	2.884	12	0.346	0.4	-0.054

DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK AFH					
DH1	0.380	8	0.030	0.4	-0.370
DH3	1.636	4	0.065	0.4	-0.335
DH5	2.884	3	0.087	0.4	-0.313

**DH1**

DH1  
 Pulse Width

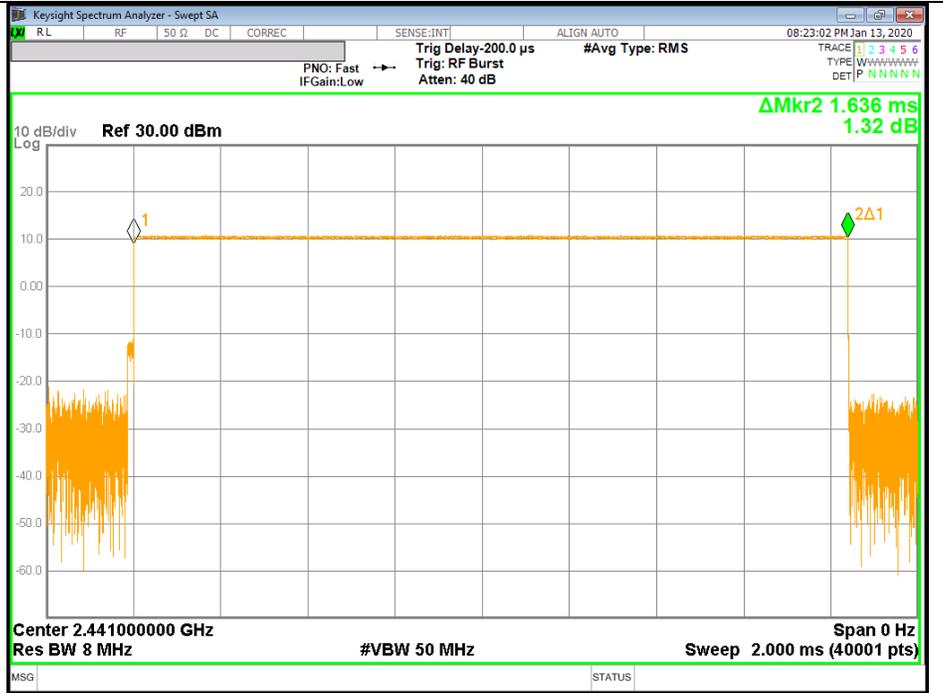


DH1  
 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

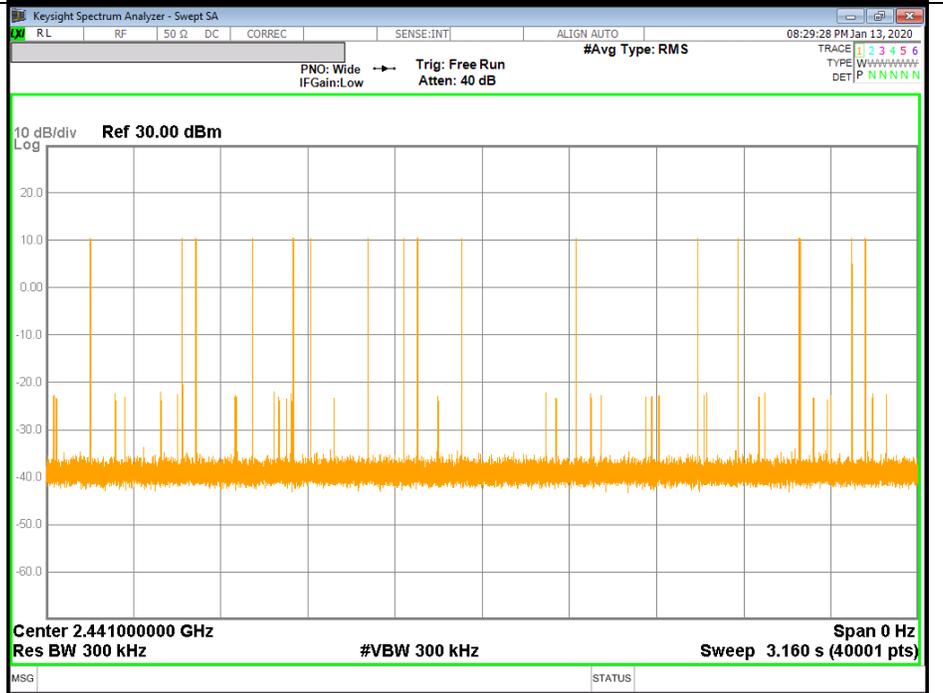


**DH3**

DH3  
Pulse Width

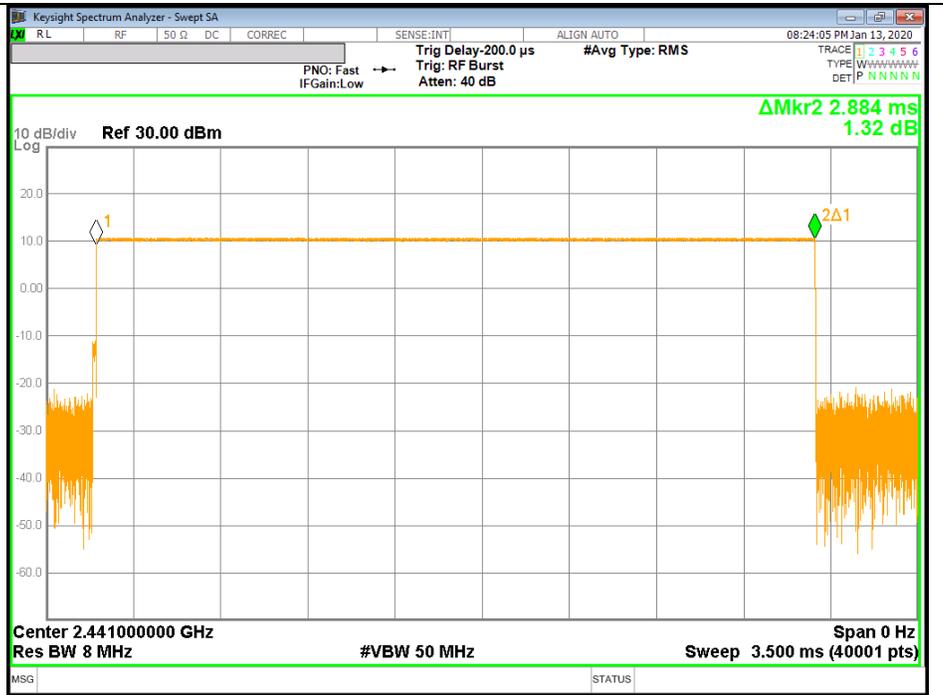


DH3  
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

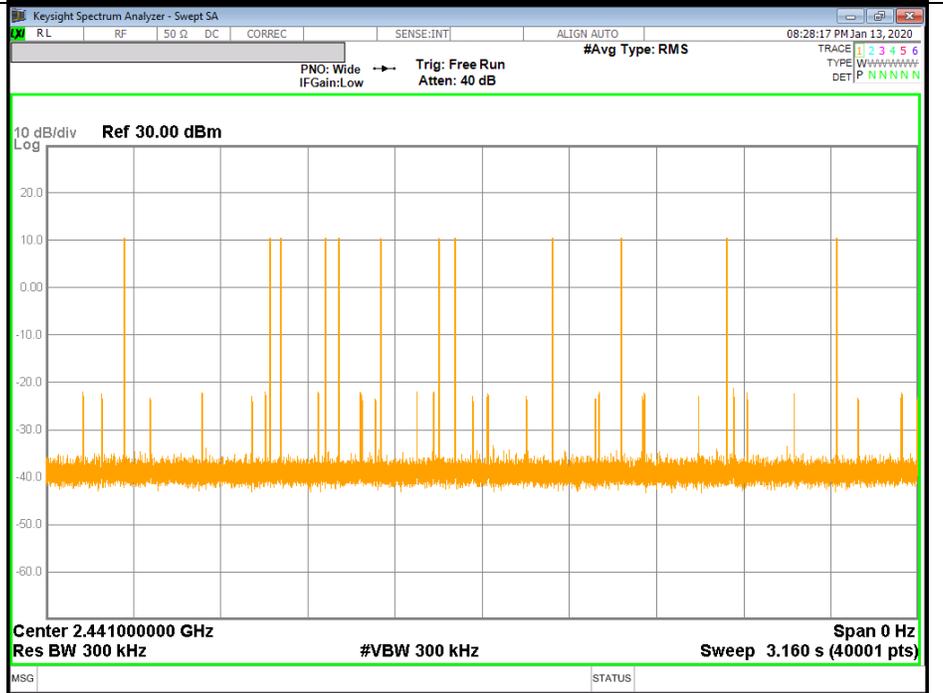


**DH5**

DH5  
Pulse Width



DH5  
NUMBER OF  
PULSES IN 3.16  
SECOND  
OBSERVATION  
PERIOD

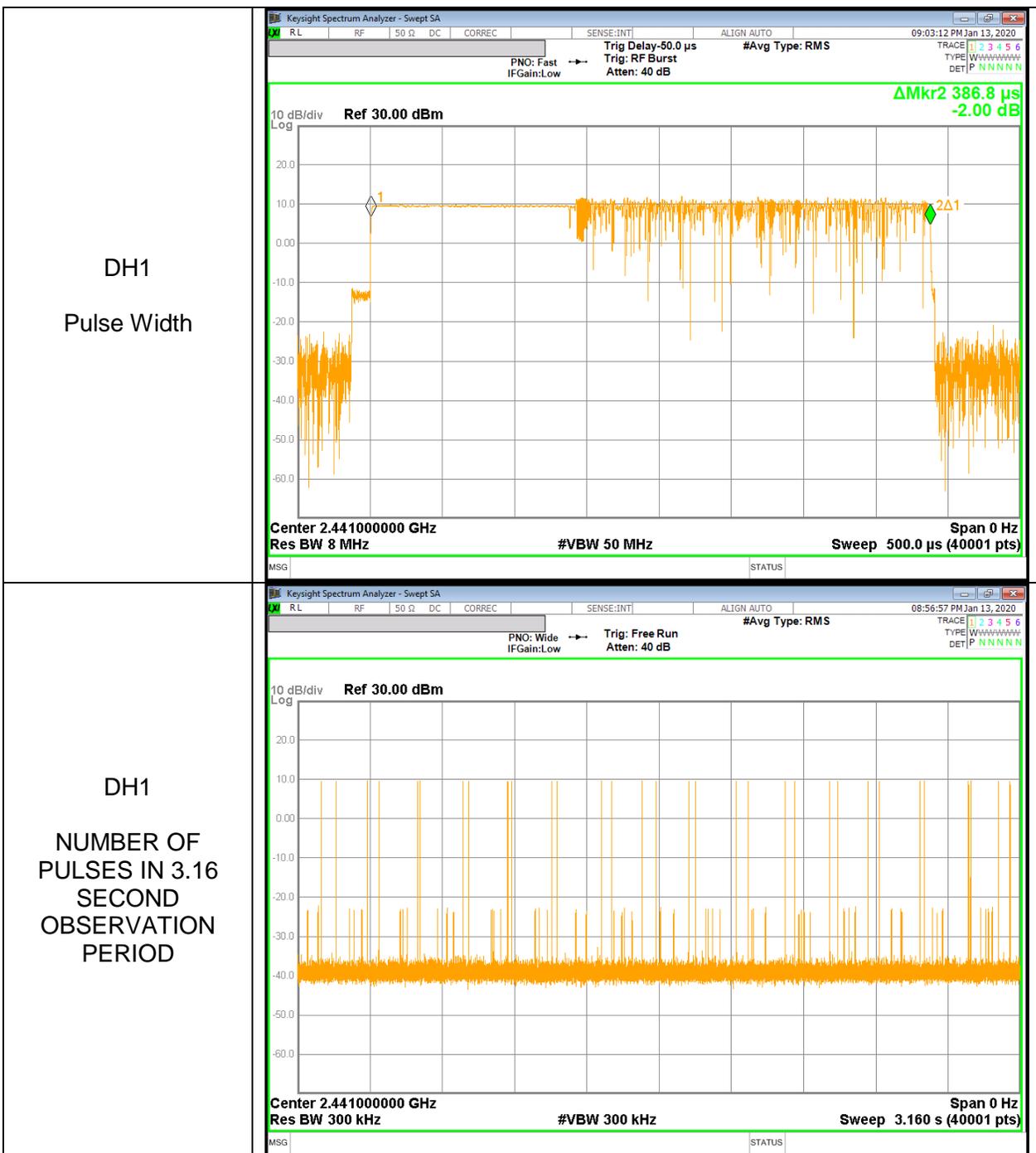


**RESULTS[8PSK]**

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.387	32	0.124	0.4	-0.276
DH3	1.638	16	0.262	0.4	-0.138
DH5	2.888	12	0.347	0.4	-0.053

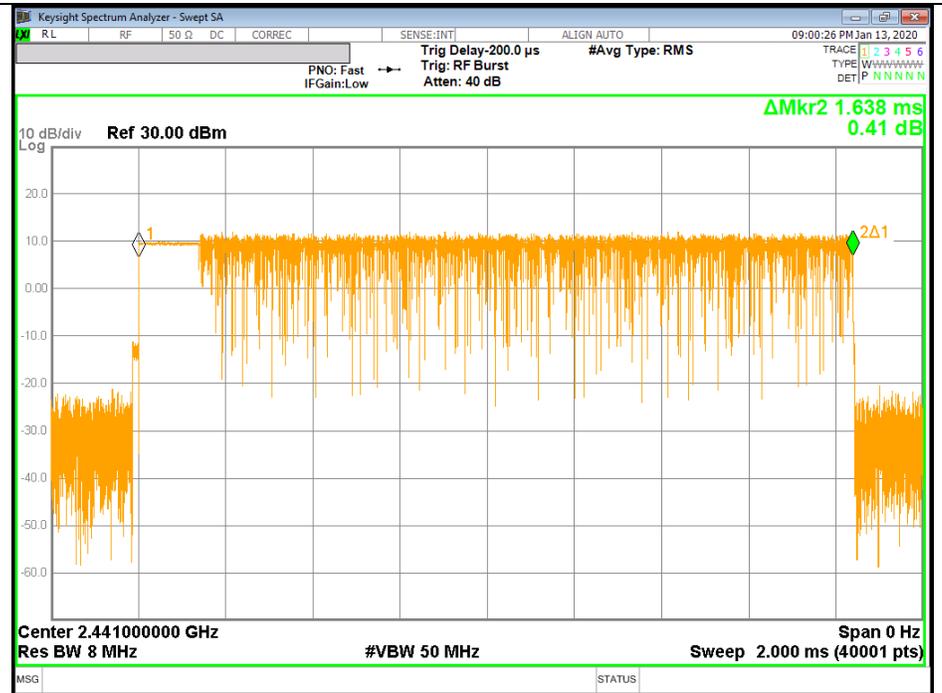
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK AFH					
DH1	0.387	8	0.031	0.4	-0.369
DH3	1.638	4	0.066	0.4	-0.334
DH5	2.888	3	0.087	0.4	-0.313

**DH1**

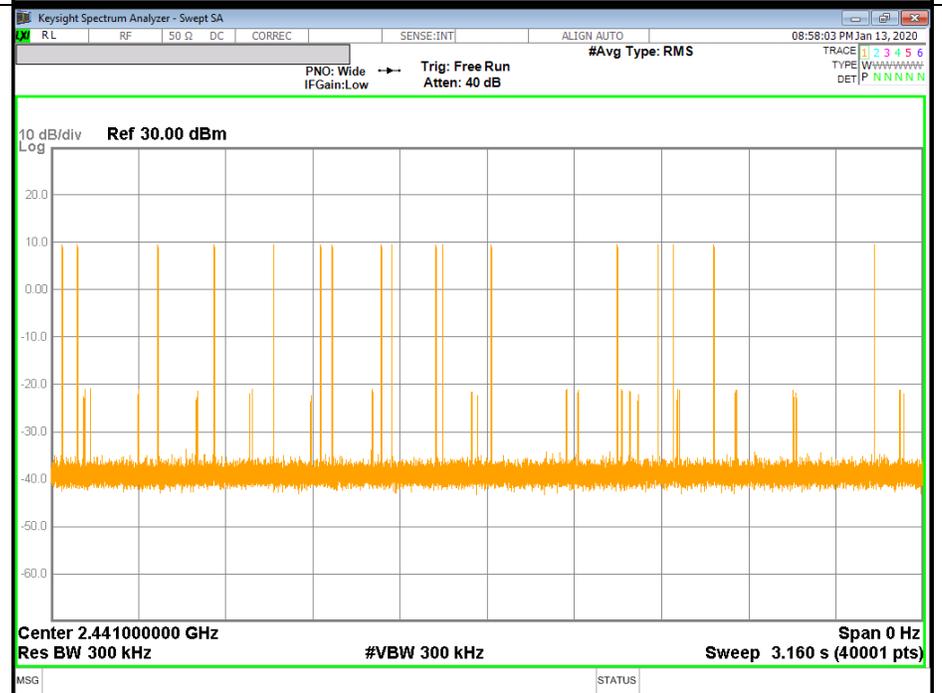


**DH3**

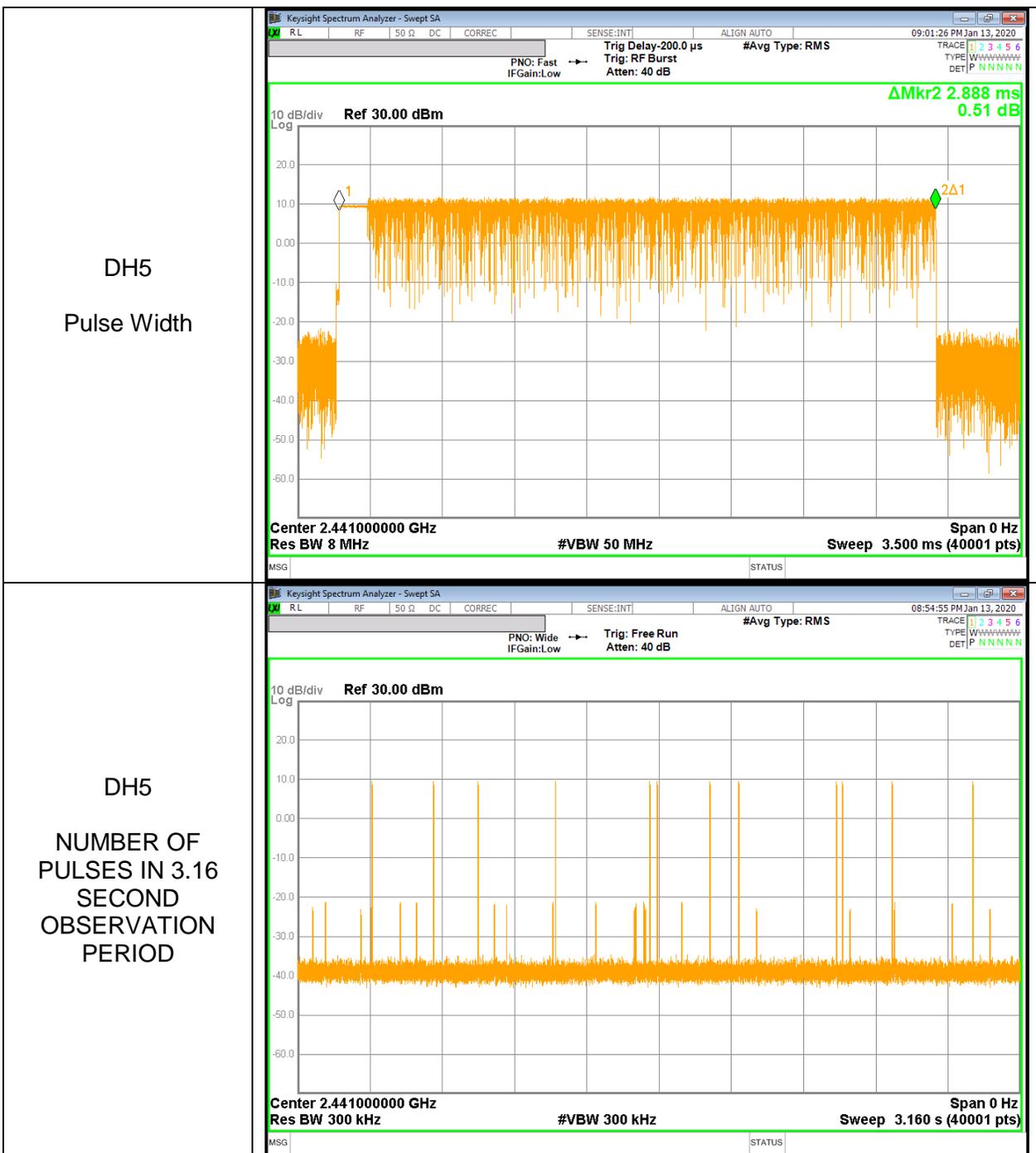
DH3  
Pulse Width



DH3  
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



**DH5**



## 10.4. OUTPUT POWER

### LIMIT

§15.247 (b) (1)

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

### TEST PROCEDURE

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

### RESULTS

#### 10.4.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	9.801	21.000	-11.199
Mid	2 441	<b>10.455</b>	<b>21.000</b>	<b>-10.545</b>
High	2 480	9.494	21.000	-11.506
Worst		10.455	21.000	-10.545

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

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	10.604	21.000	-10.396
Mid	2 441	<b>11.290</b>	<b>21.000</b>	<b>-9.710</b>
High	2 480	10.347	21.000	-10.653
Worst		11.290	21.000	-9.710

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

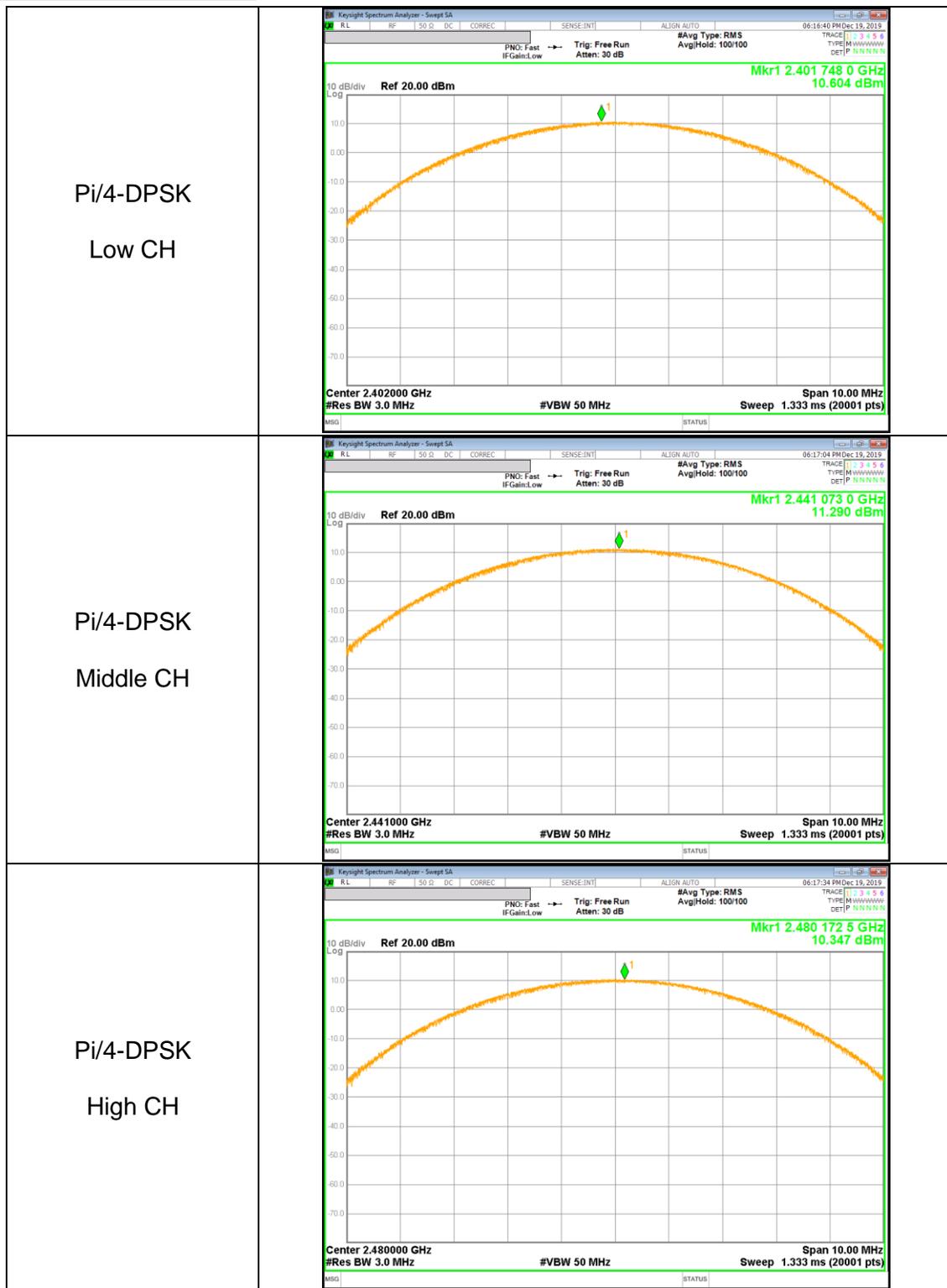
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	11.152	21.000	-9.848
Mid	2 441	<b>11.775</b>	<b>21.000</b>	<b>-9.225</b>
High	2 480	10.864	21.000	-10.136
Worst		11.775	21.000	-9.225

**10.4.4. OUTPUT POWER PLOTS**

**GFSK OUTPUT POWER**

<p>GFSK Low CH</p>	<p>KeySight Spectrum Analyzer - Swept SA          Ref 20.00 dBm          Mkr1 2.401 991 5 GHz          9.801 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>GFSK Middle CH</p>	<p>KeySight Spectrum Analyzer - Swept SA          Ref 20.00 dBm          Mkr1 2.441 061 5 GHz          10.455 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>GFSK High CH</p>	<p>KeySight Spectrum Analyzer - Swept SA          Ref 20.00 dBm          Mkr1 2.480 040 0 GHz          9.494 dBm          Center 2.480000 GHz          #Res BW 3.0 MHz          #VBW 50 MHz          Span 10.00 MHz          Sweep 1.333 ms (20001 pts)</p>

**Pi/4-DPSK OUTPUT POWER**



**8PSK OUTPUT POWER**

<p>8PSK Low CH</p>	 <p>Key parameters from screenshot:                  Center: 2.402000 GHz                  Res BW: 3.0 MHz                  VBW: 50 MHz                  Span: 10.00 MHz                  Sweep: 1.333 ms (20001 pts)                  Mkr1: 2.402 000 5 GHz, 11.152 dBm</p>
<p>8PSK Middle CH</p>	 <p>Key parameters from screenshot:                  Center: 2.441000 GHz                  Res BW: 3.0 MHz                  VBW: 50 MHz                  Span: 10.00 MHz                  Sweep: 1.333 ms (20001 pts)                  Mkr1: 2.441 192 5 GHz, 11.775 dBm</p>
<p>8PSK High CH</p>	 <p>Key parameters from screenshot:                  Center: 2.480000 GHz                  Res BW: 3.0 MHz                  VBW: 50 MHz                  Span: 10.00 MHz                  Sweep: 1.333 ms (20001 pts)                  Mkr1: 2.480 027 0 GHz, 10.864 dBm</p>

## 10.5. AVERAGE POWER

### LIMIT

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

### RESULTS

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

#### 10.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	9.245	8.404
Middle	2 441	<b>9.953</b>	<b>9.892</b>
High	2 480	9.014	7.969

#### 10.5.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	8.045	6.375
Middle	2 441	<b>8.693</b>	<b>7.401</b>
High	2 480	7.759	5.969

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

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	8.061	6.399
Middle	2 441	<b>8.704</b>	<b>7.420</b>
High	2 480	7.771	5.985

---

## **10.6. 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.

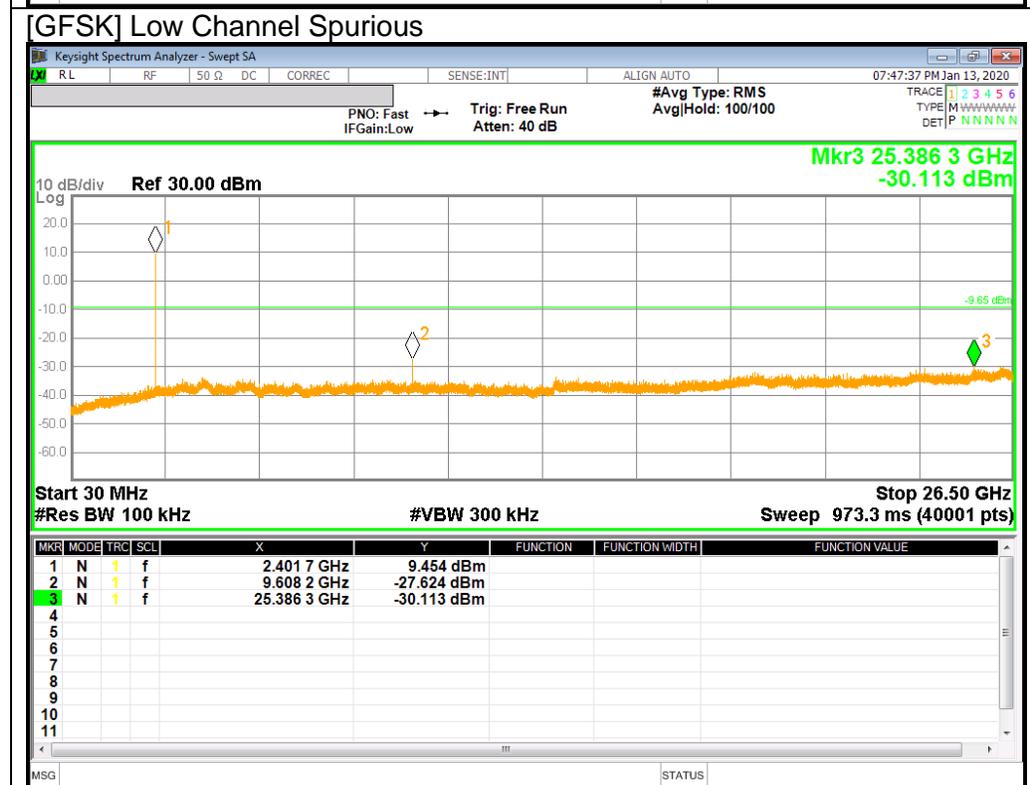
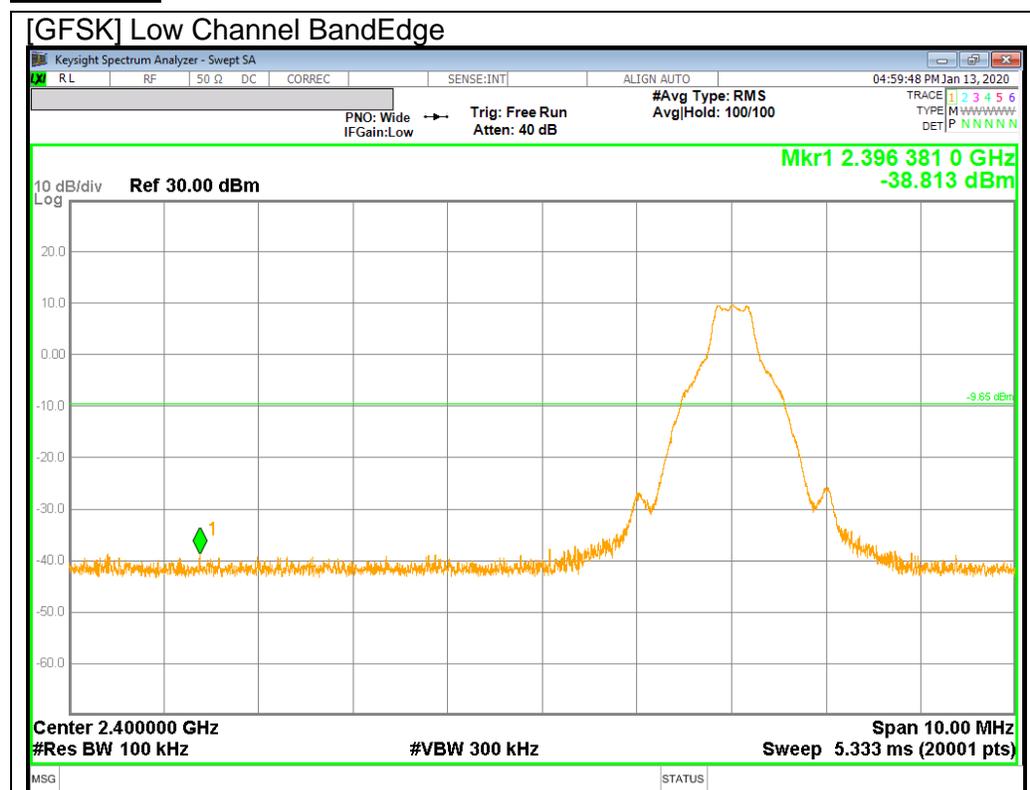
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

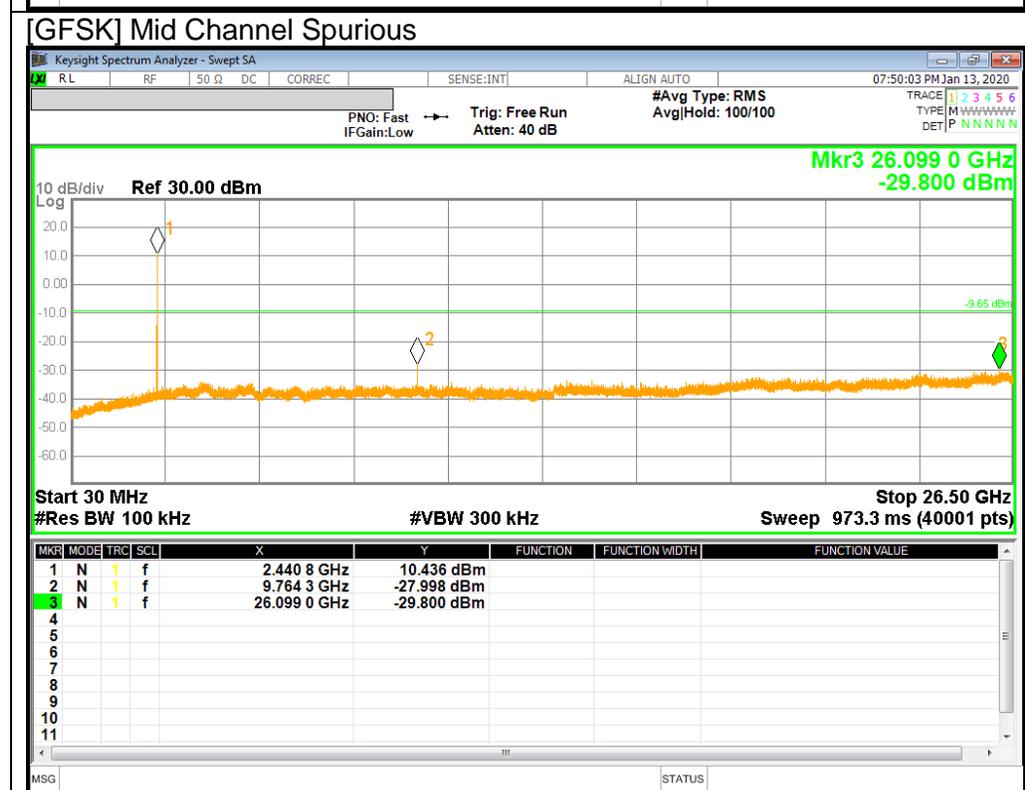
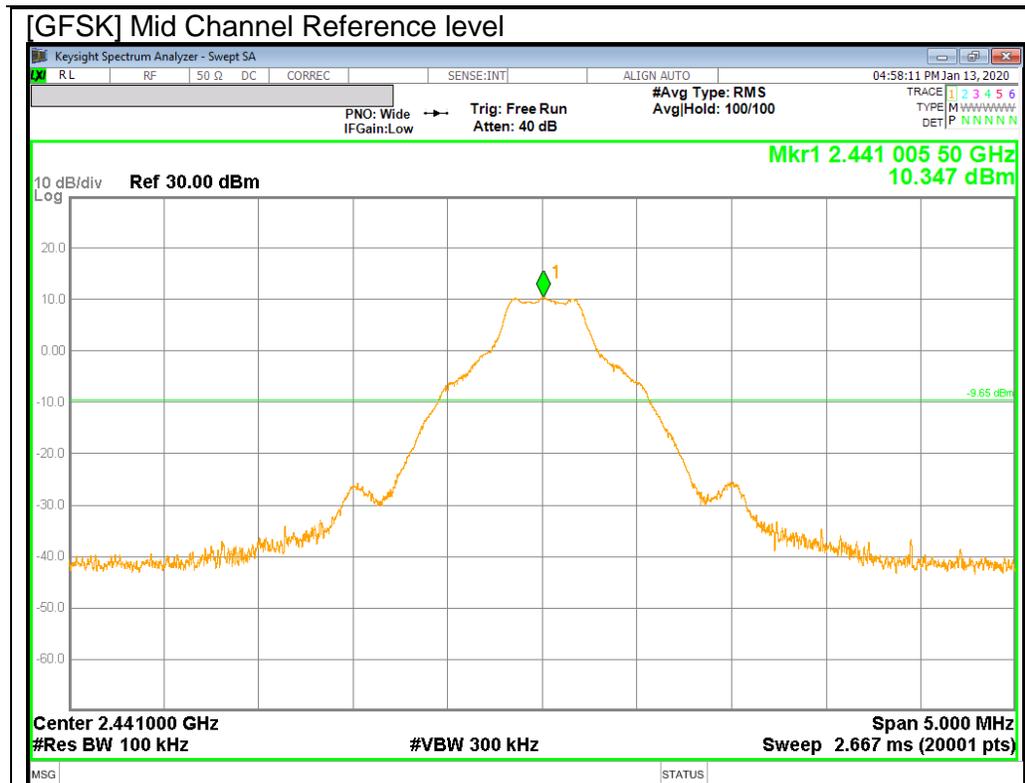
### **RESULTS**

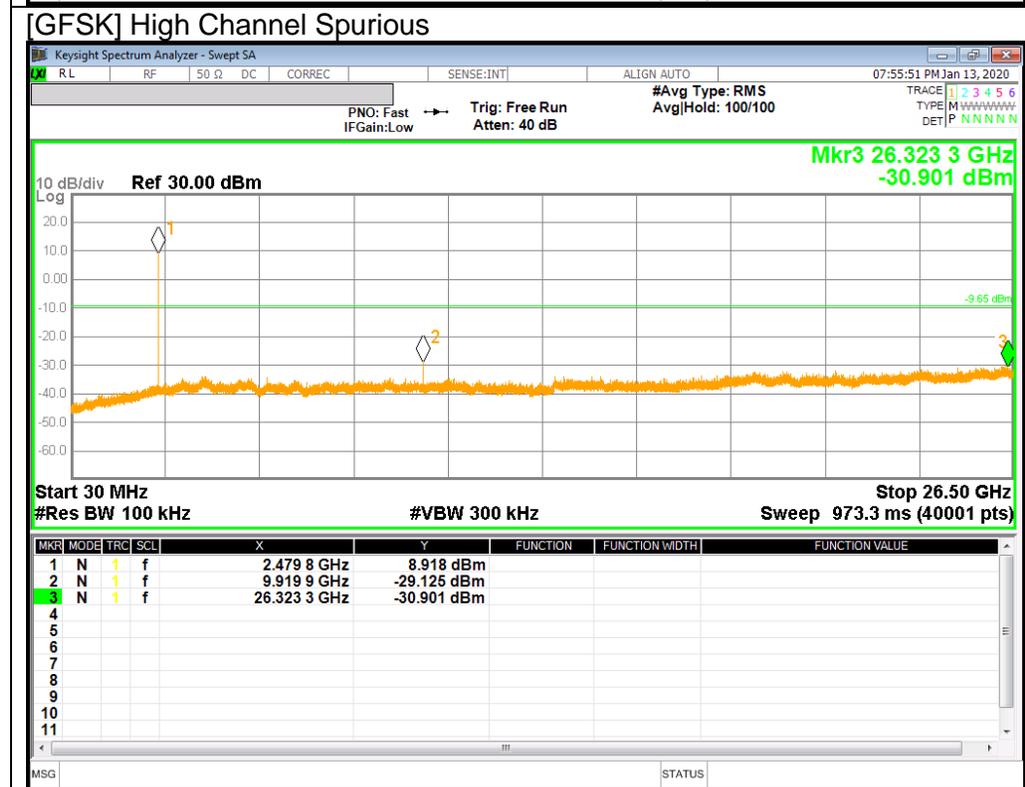
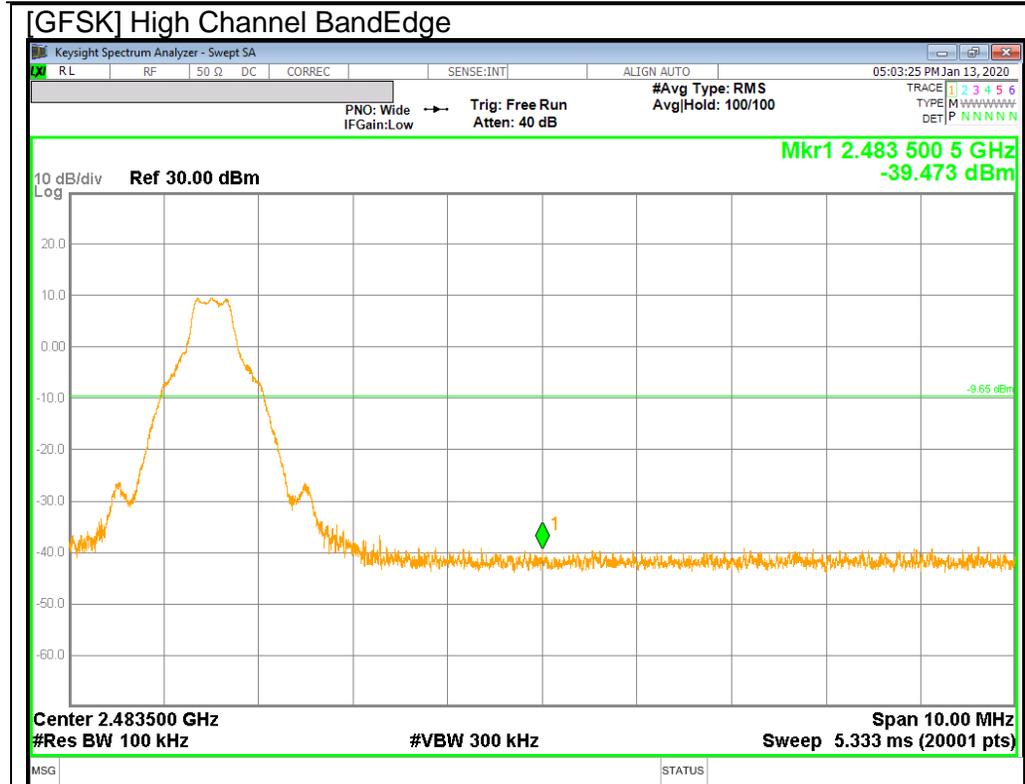
See next page.

### 10.6.1. BASIC DATA RATE GFSK MODULATION

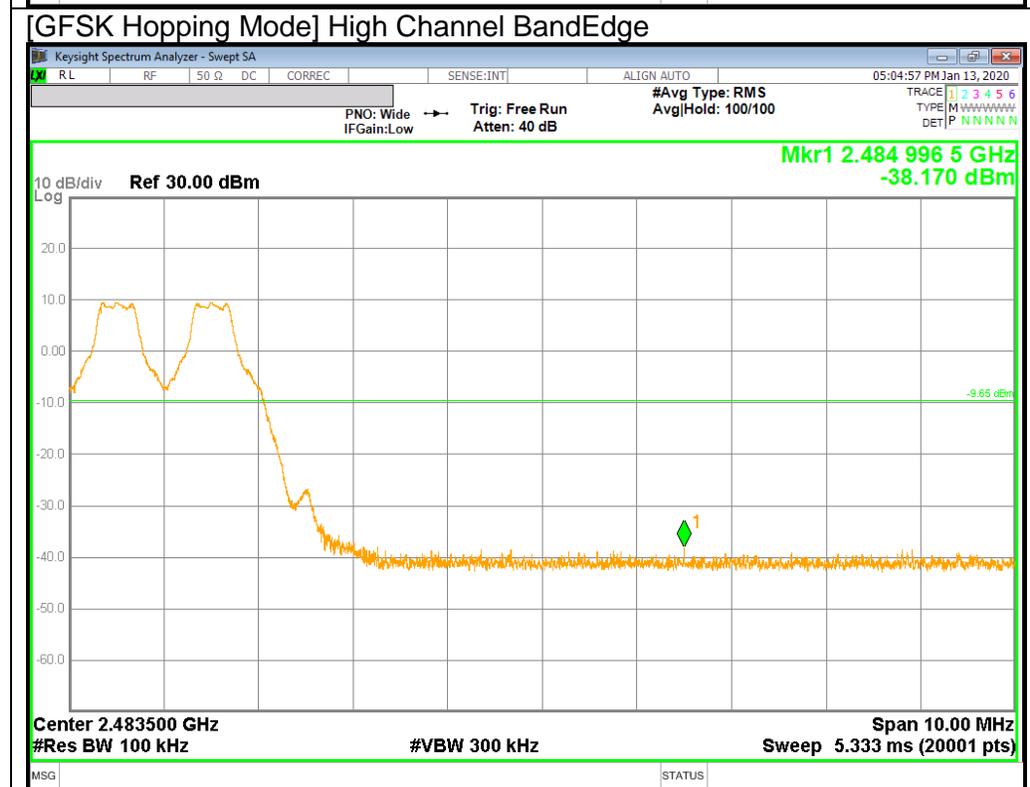
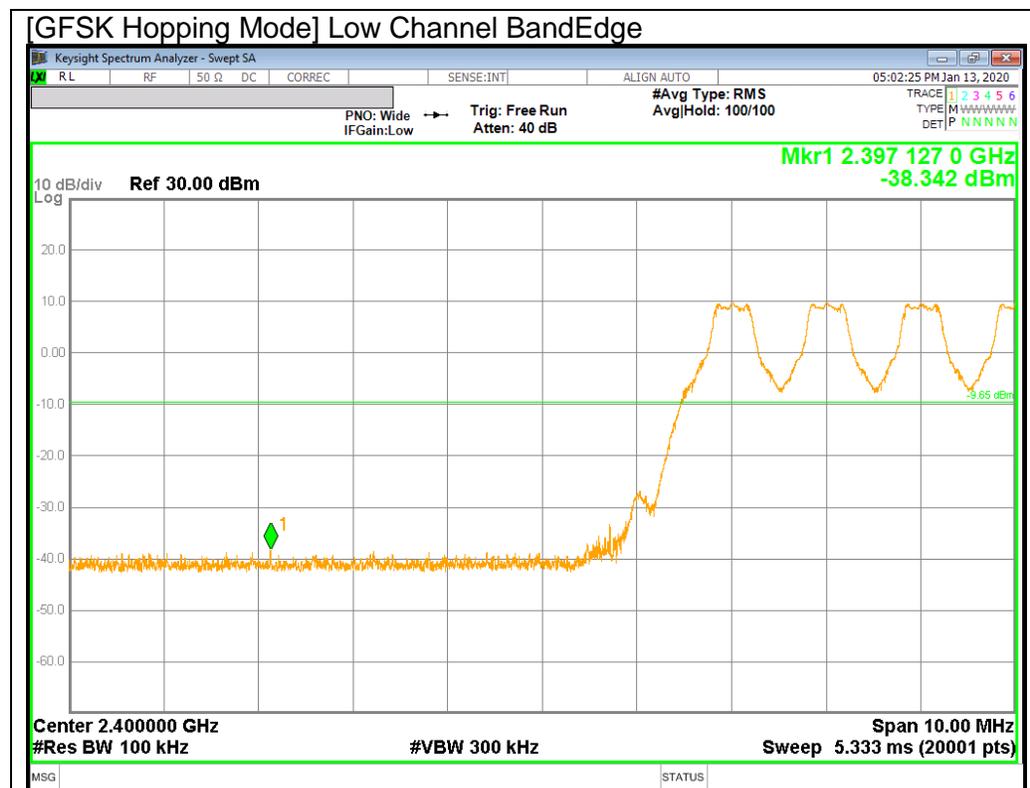
#### GFSK Mode





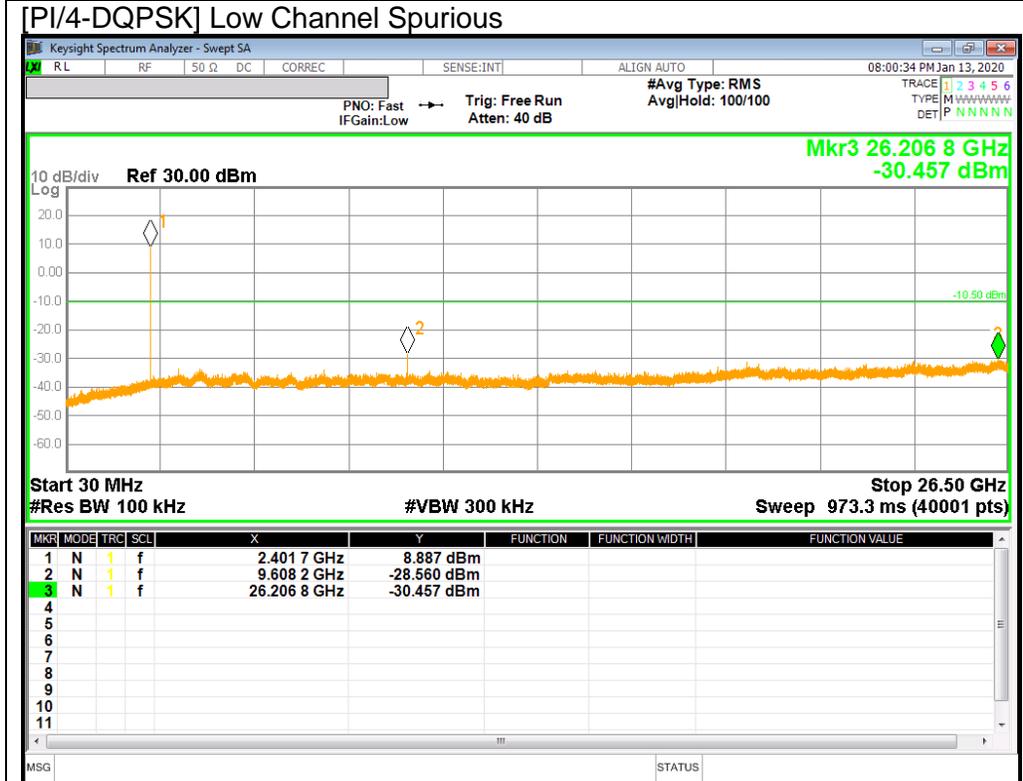
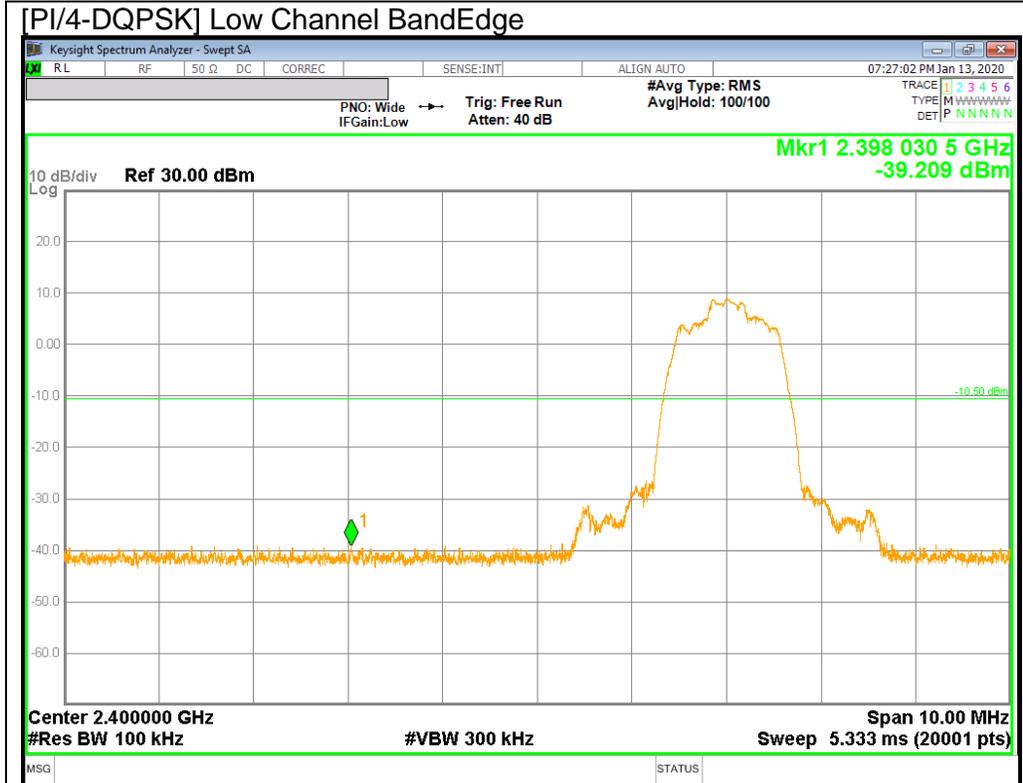


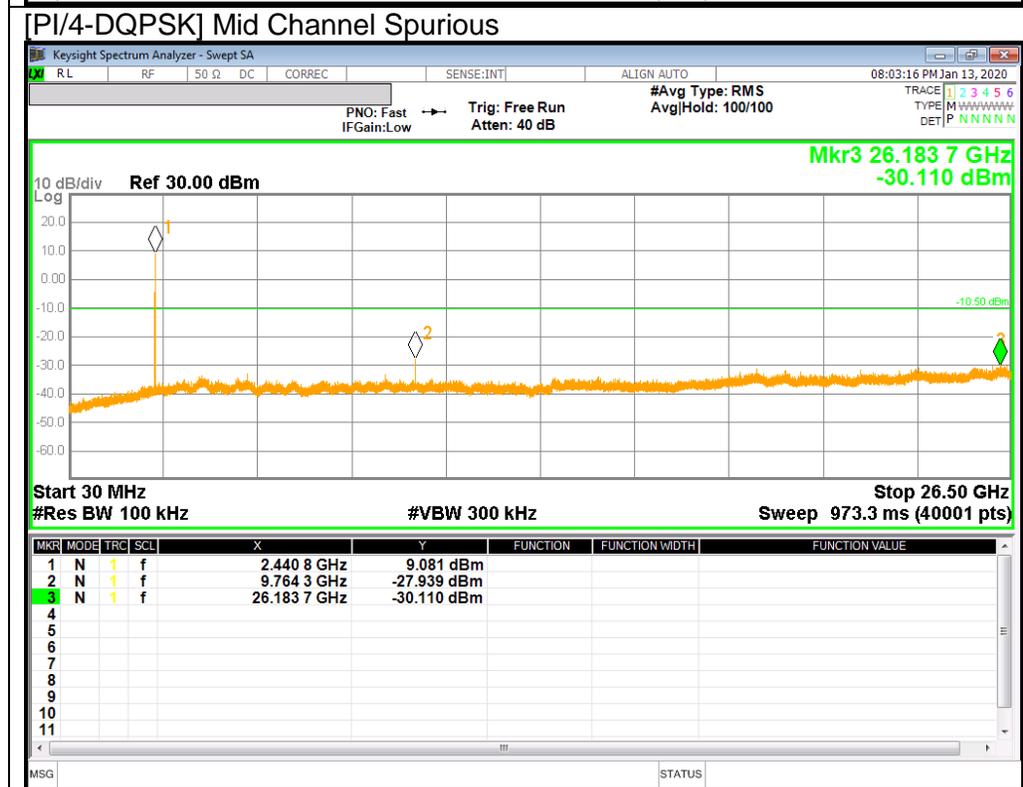
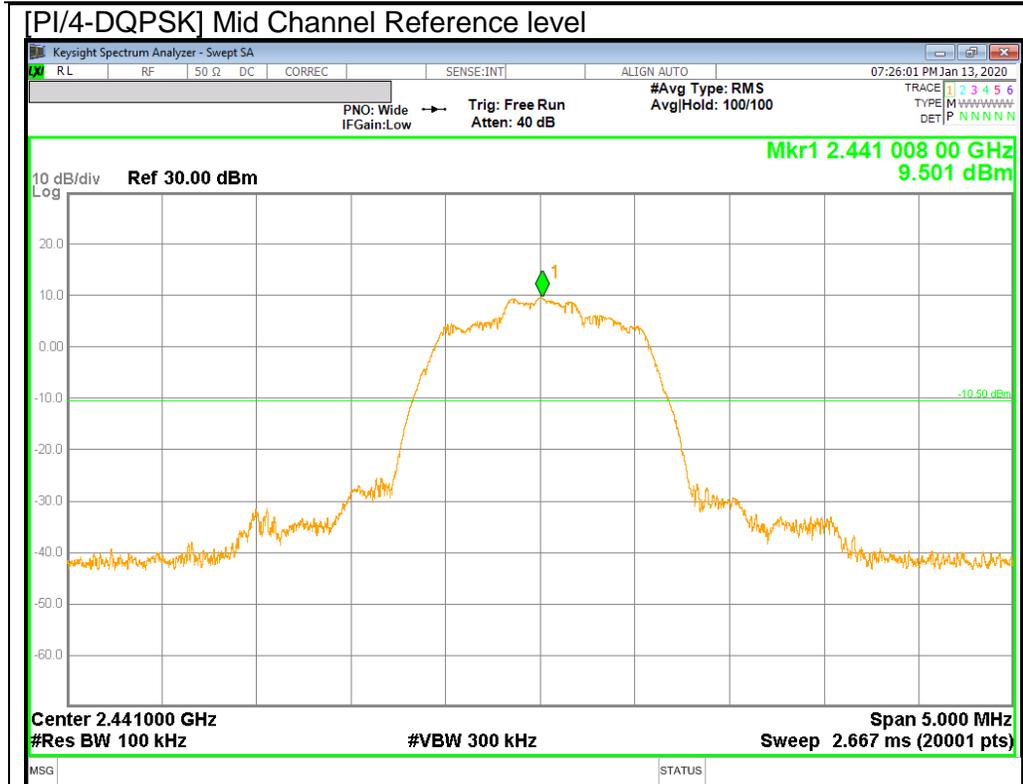
**BandEdge Emission at GFSK Hopping Mode**

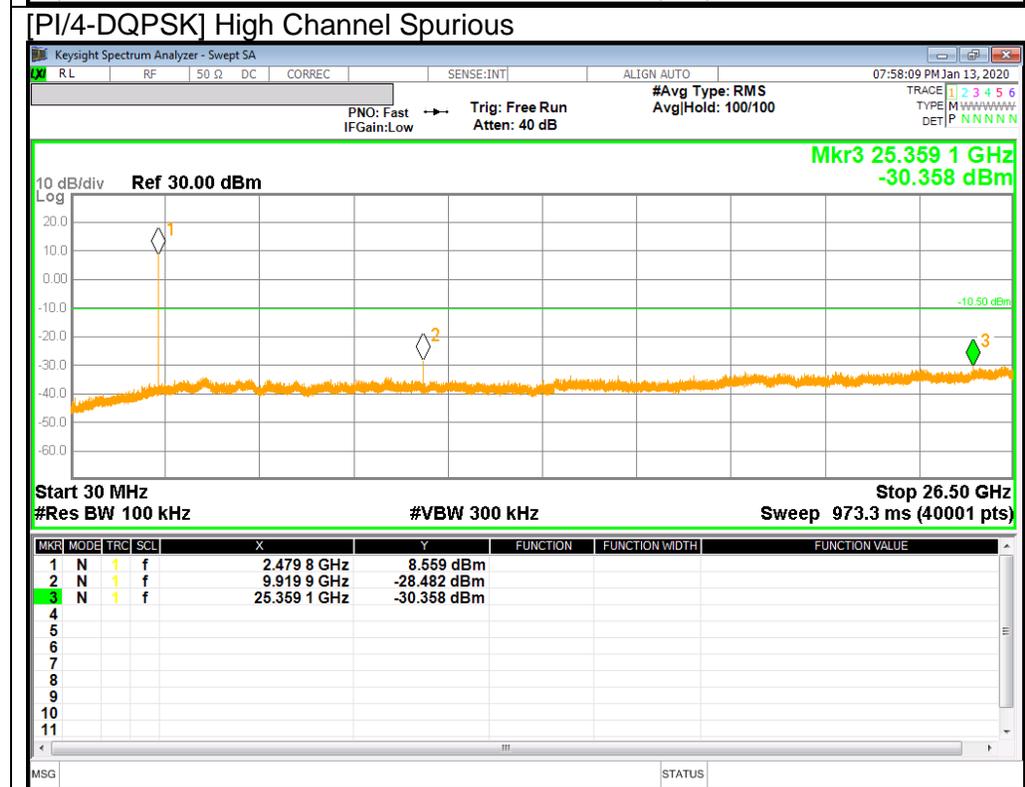
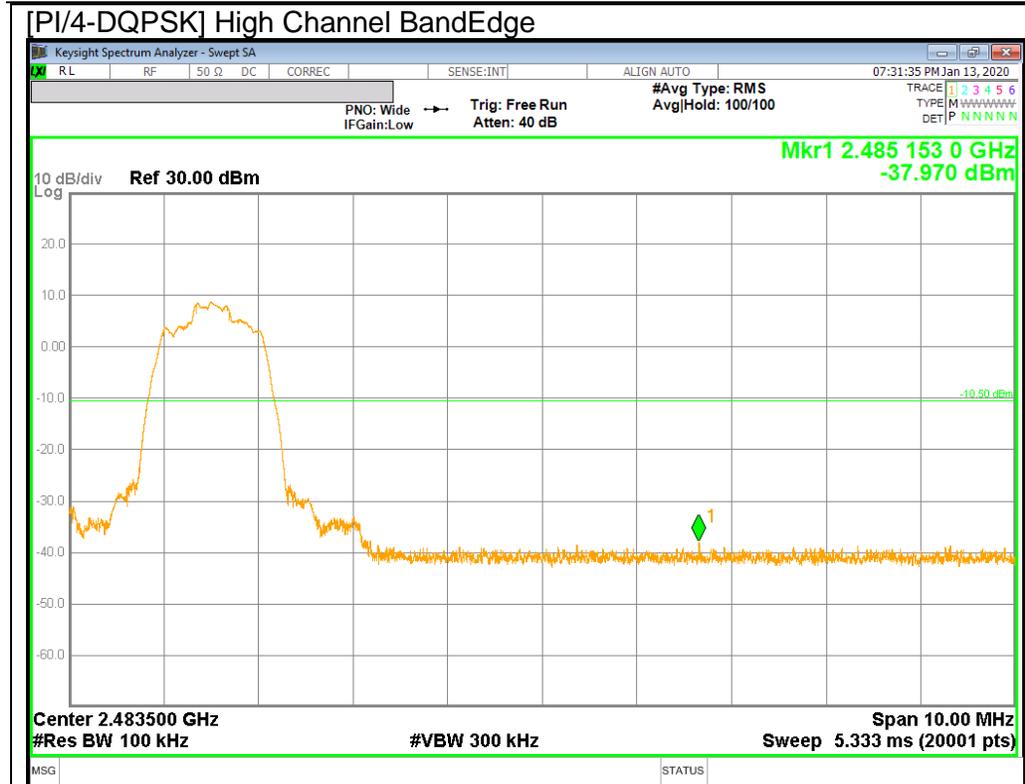


**10.6.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION**

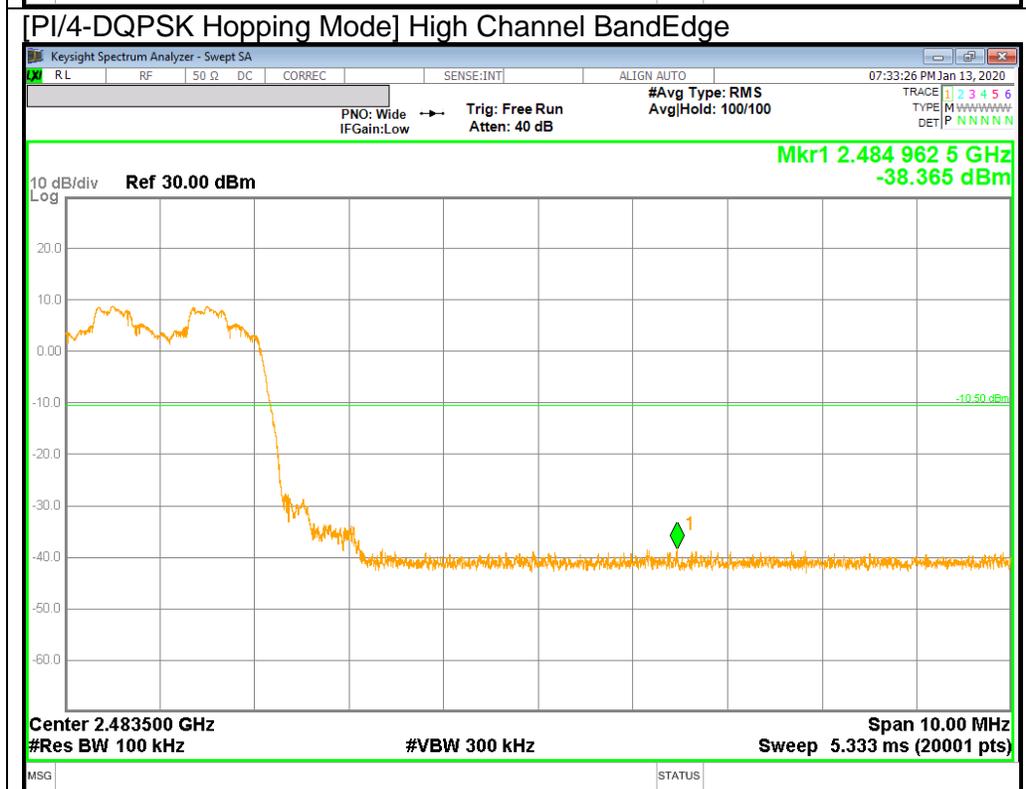
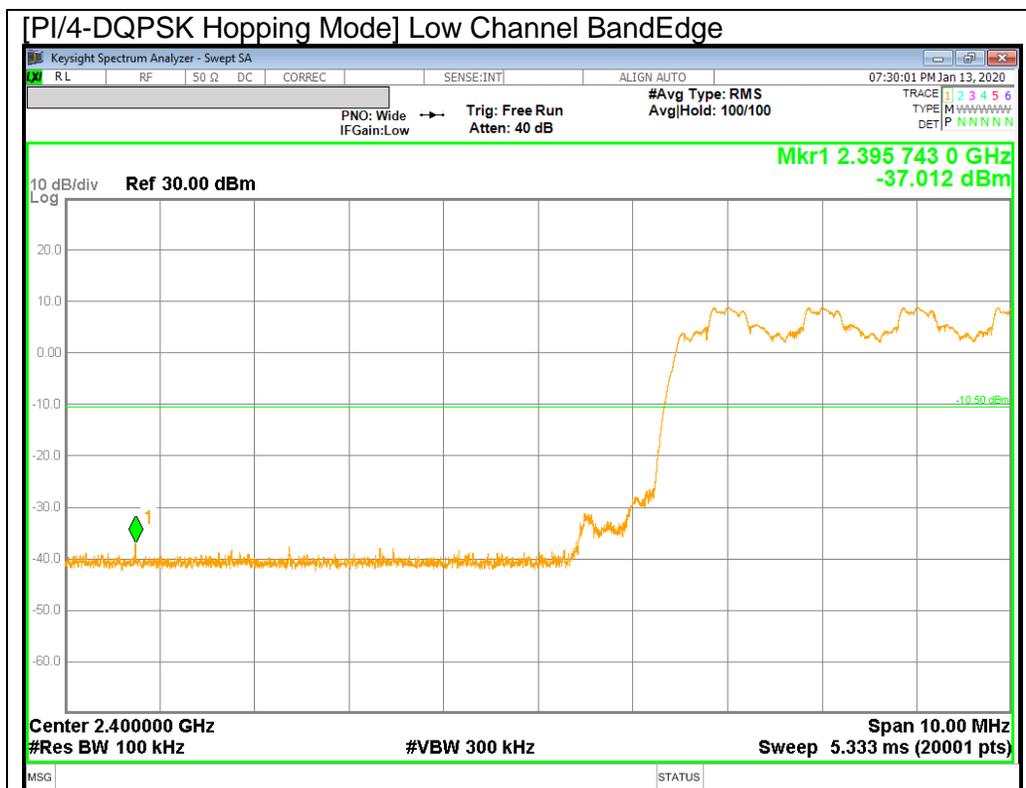
**PI/4-DQPSK Mode**





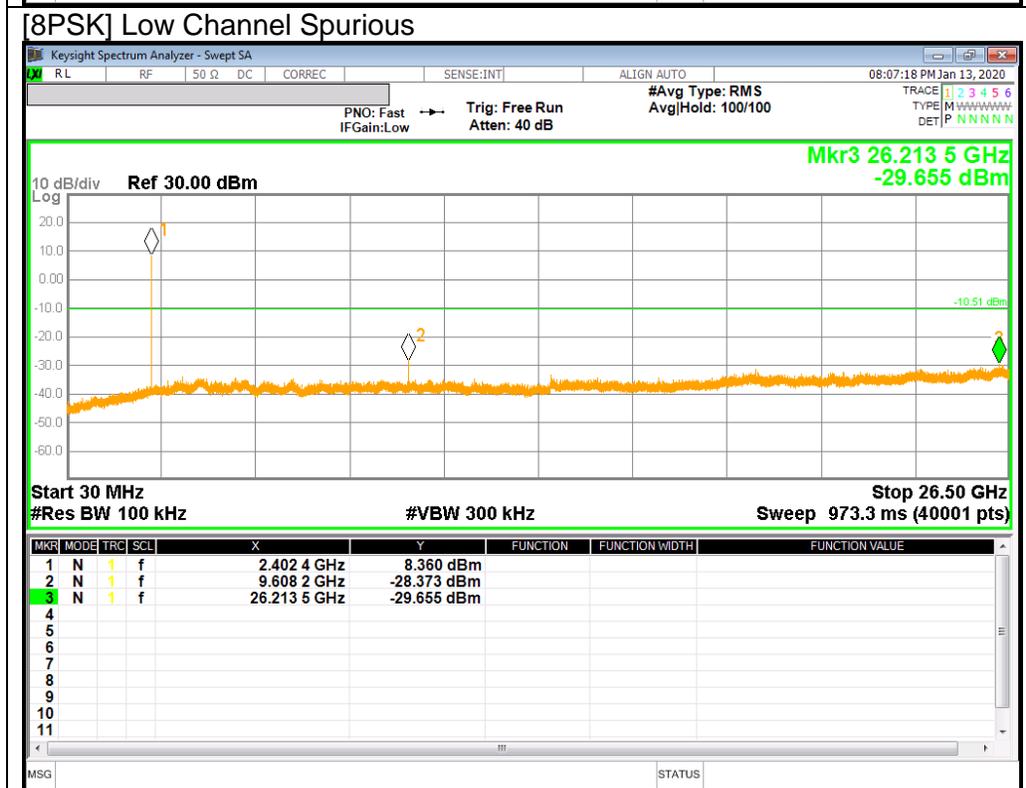
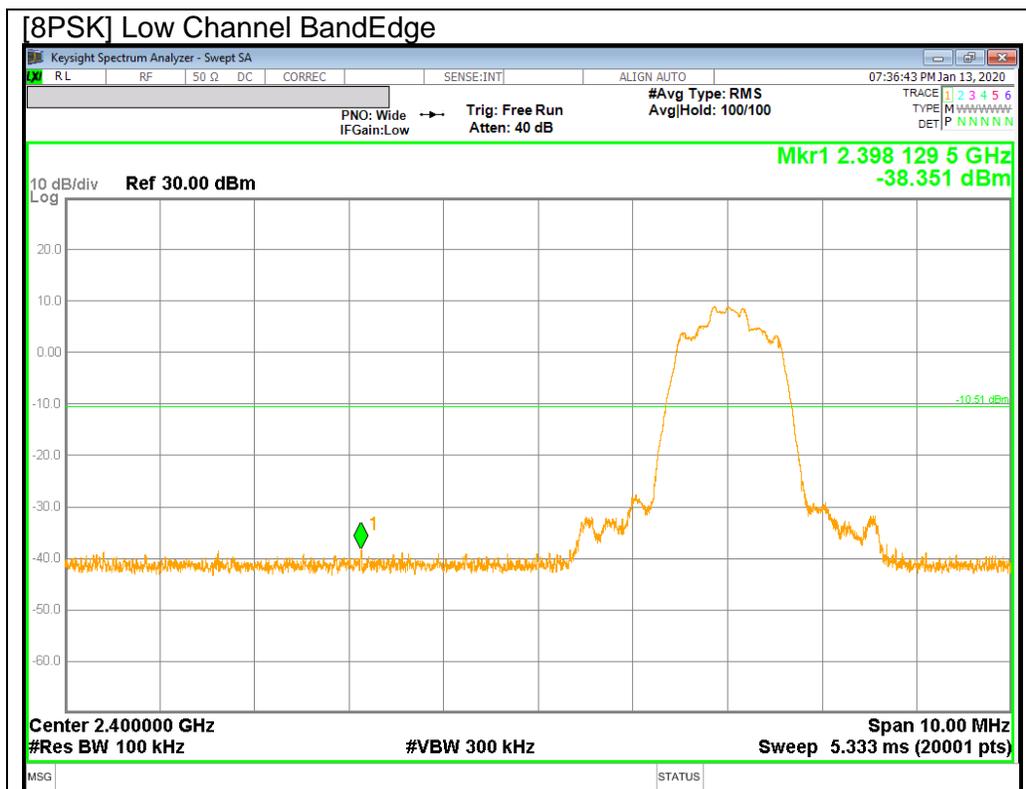


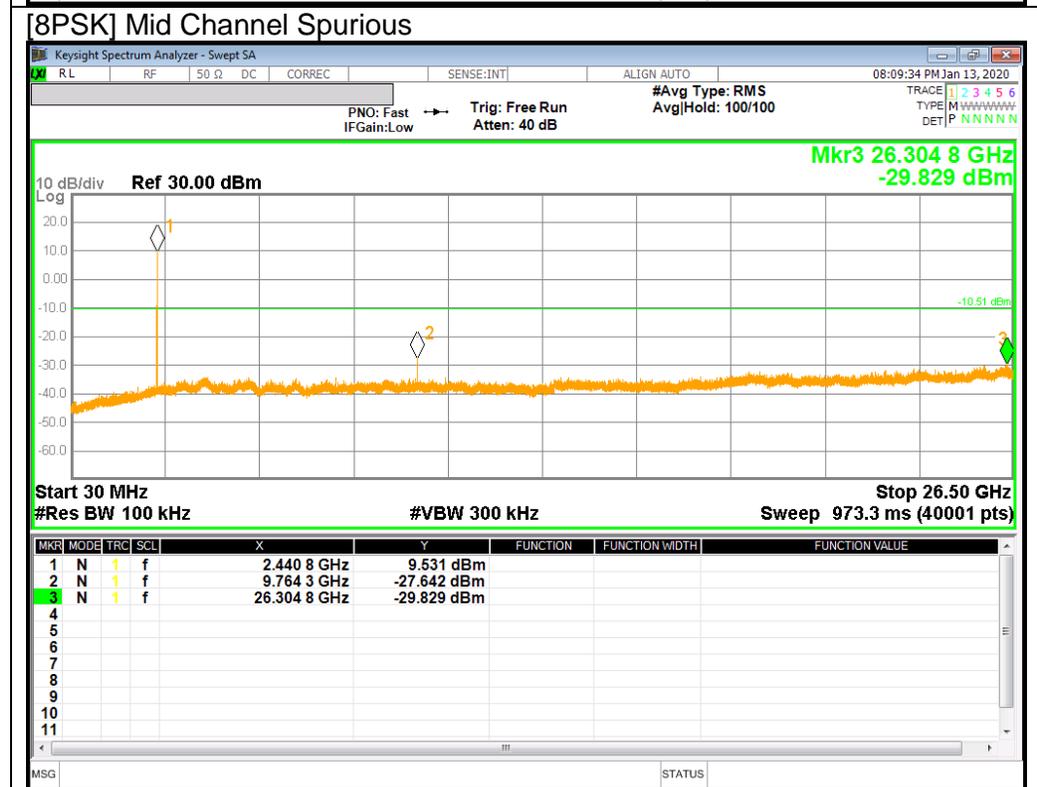
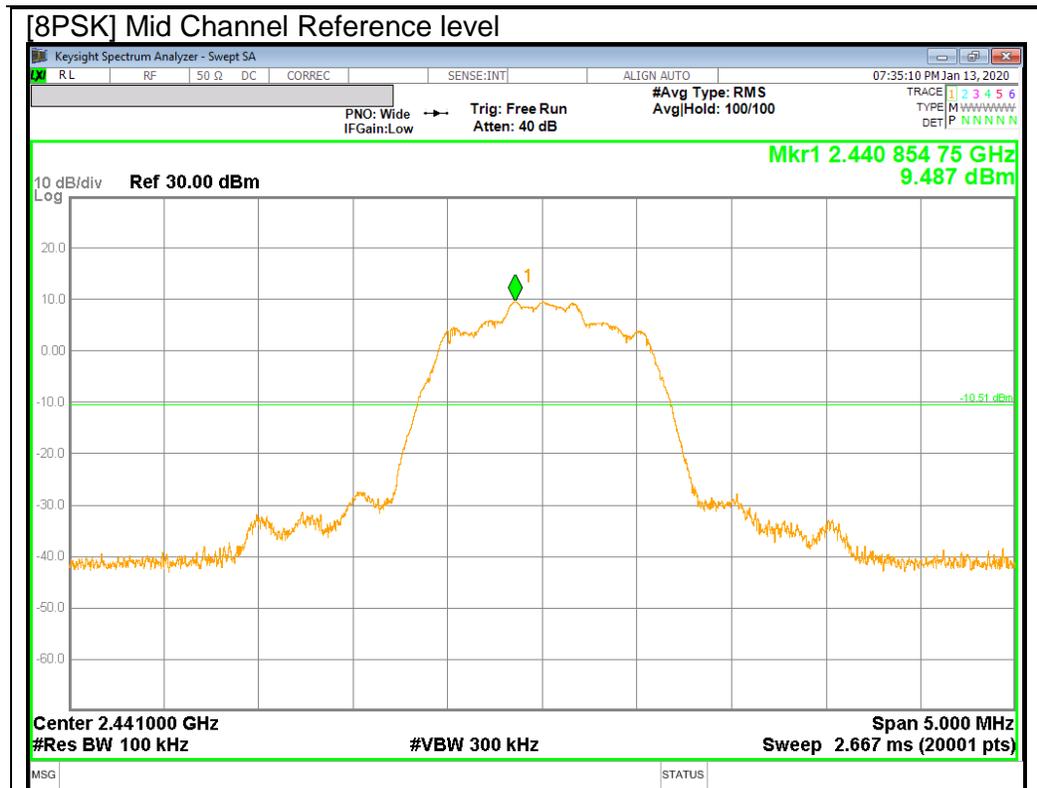
**BandEdge Emission at PI/4-DQPSK Hopping Mode**

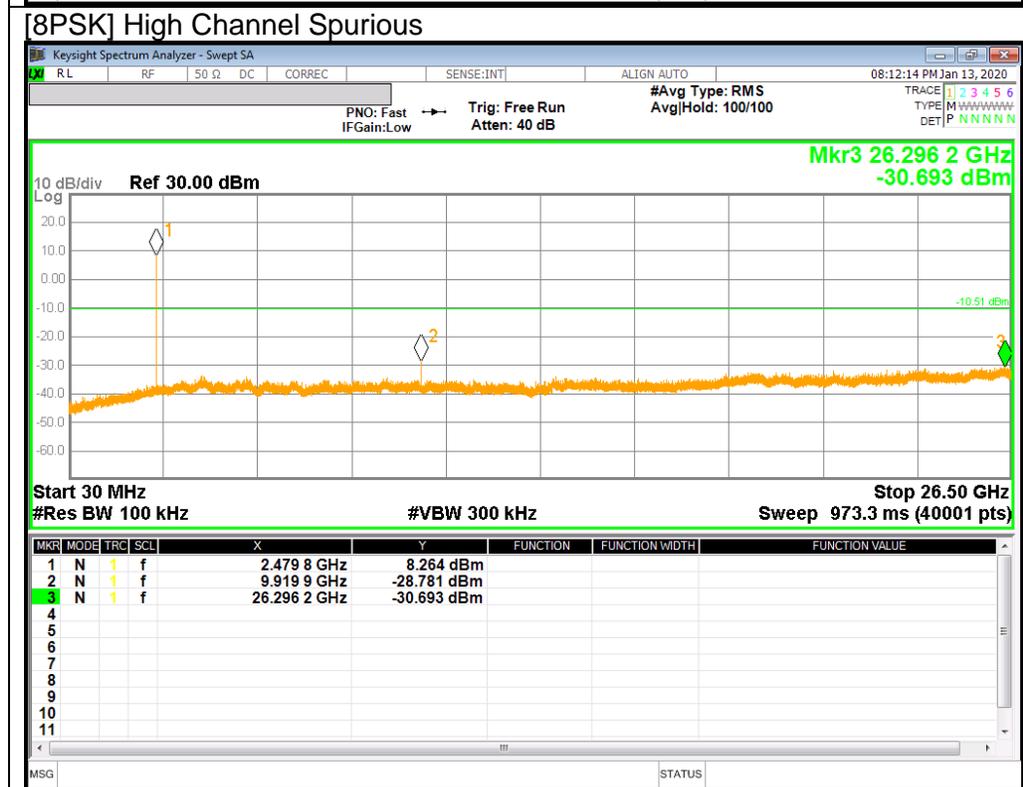
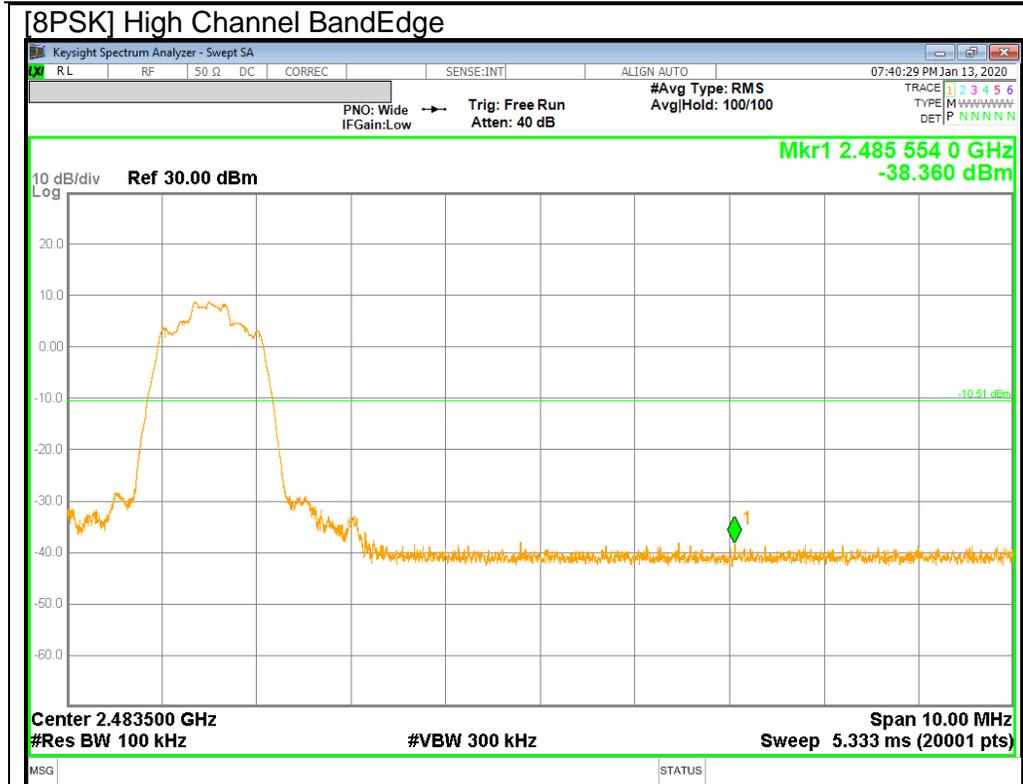


### 10.6.3. ENHANCED DATA RATE 8PSK MODULATION

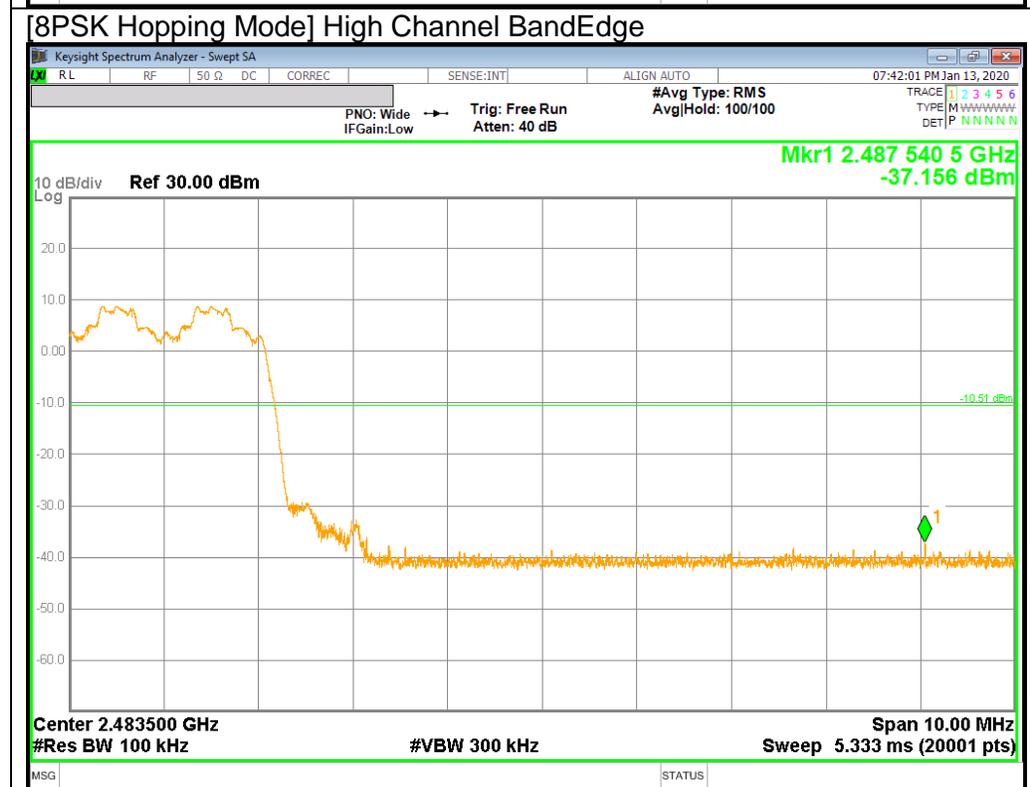
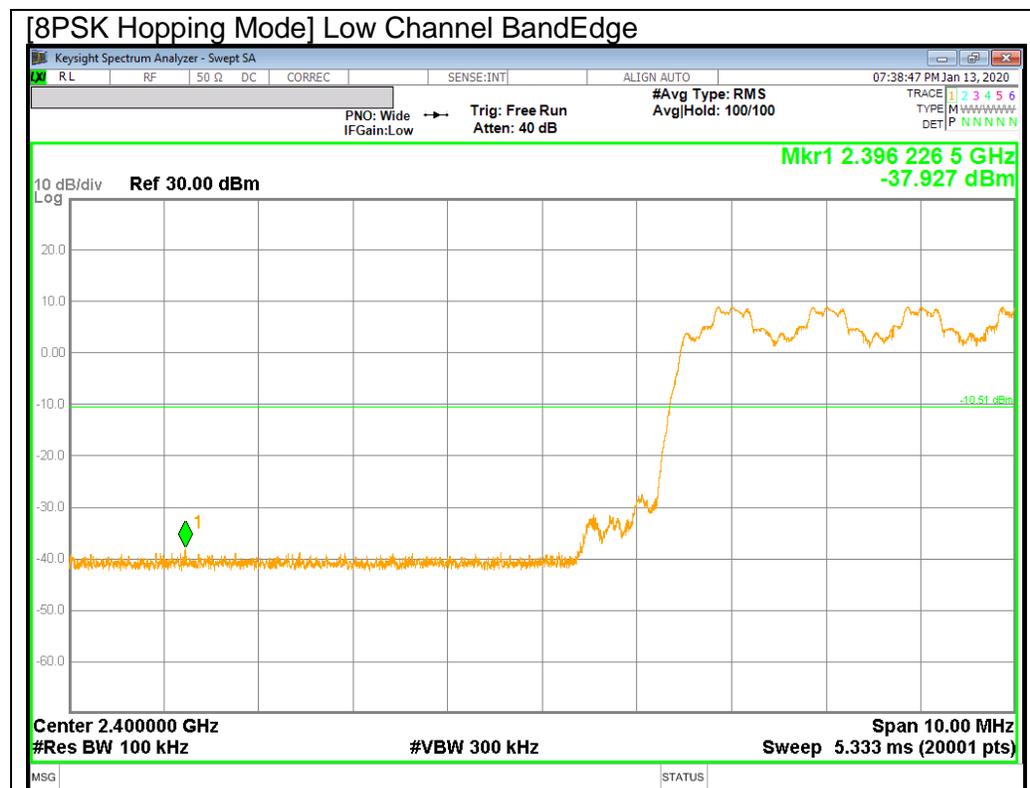
#### 8PSK Mode







**BandEdge Emission at 8PSK Hopping Mode**



# 11. RADIATED TEST RESULTS

## 11.1. LIMITS AND PROCEDURE

### LIMITS

FCC §15.205 and §15.209

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.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

---

## **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.

$$\text{GFSK} = 1/T = 1 / 0.002884\text{S} = 347\text{Hz}.$$

The minimum VBW was 347Hz, but test receiver(ESU40) couldn't set value 347Hz. 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.

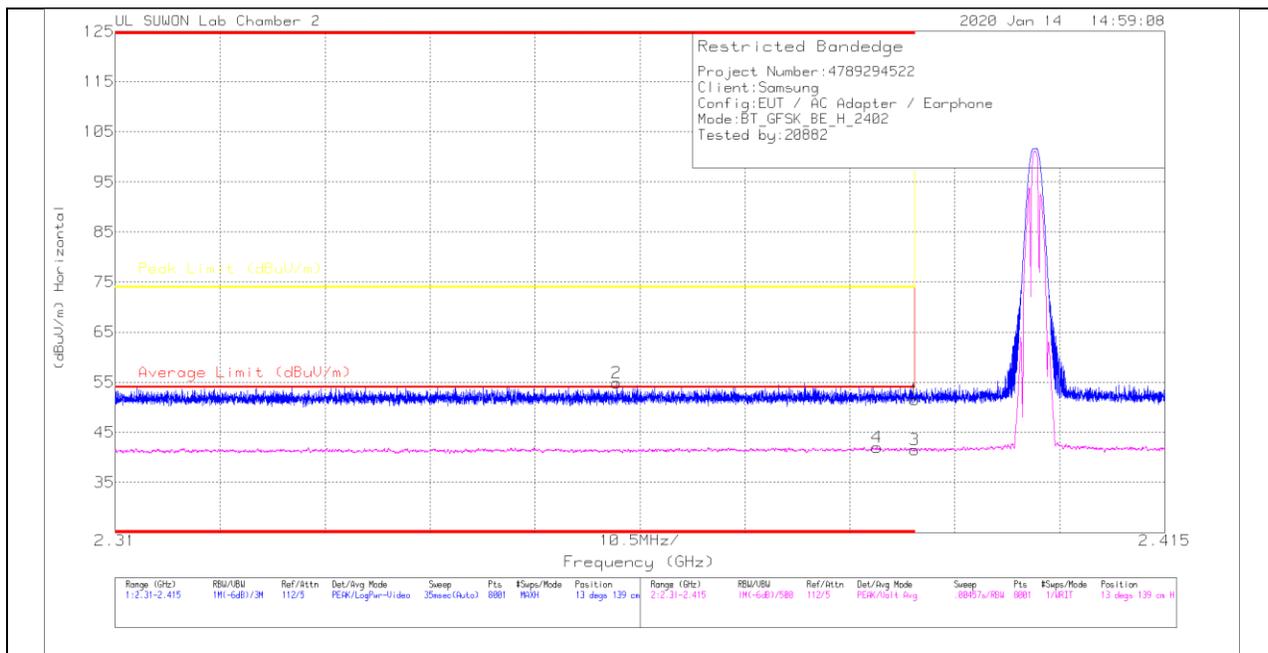
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.  
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

## 11.2. TRANSMITTER ABOVE 1 GHz

### 11.2.1. BASIC DATA RATE GFSK MODULATION

#### RESTRICTED BANDEDGE (LOW CHANNEL)

##### HORIZONTAL PEAK AND AVERAGE PLOT



##### HORIZONTAL DATA

##### Trace Markers

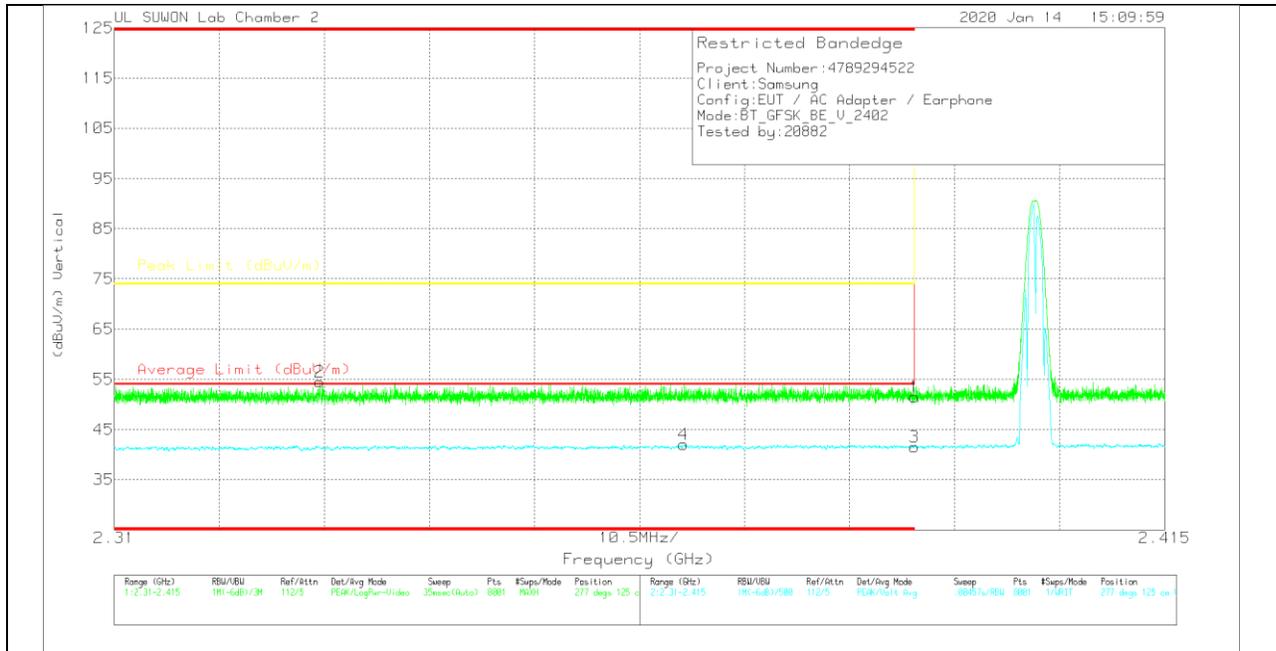
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.53	Pk	31.6	-20.6	51.53	-	-	74	-22.47	13	139	H
2	* 2.36015	43.91	Pk	31.6	-20.7	54.81	-	-	74	-19.19	13	139	H
3	* 2.39	30.53	VA1T	31.6	-20.6	41.53	54	-12.47	-	-	13	139	H
4	* 2.3862	31.01	VA1T	31.6	-20.6	42.01	54	-11.99	-	-	13	139	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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**

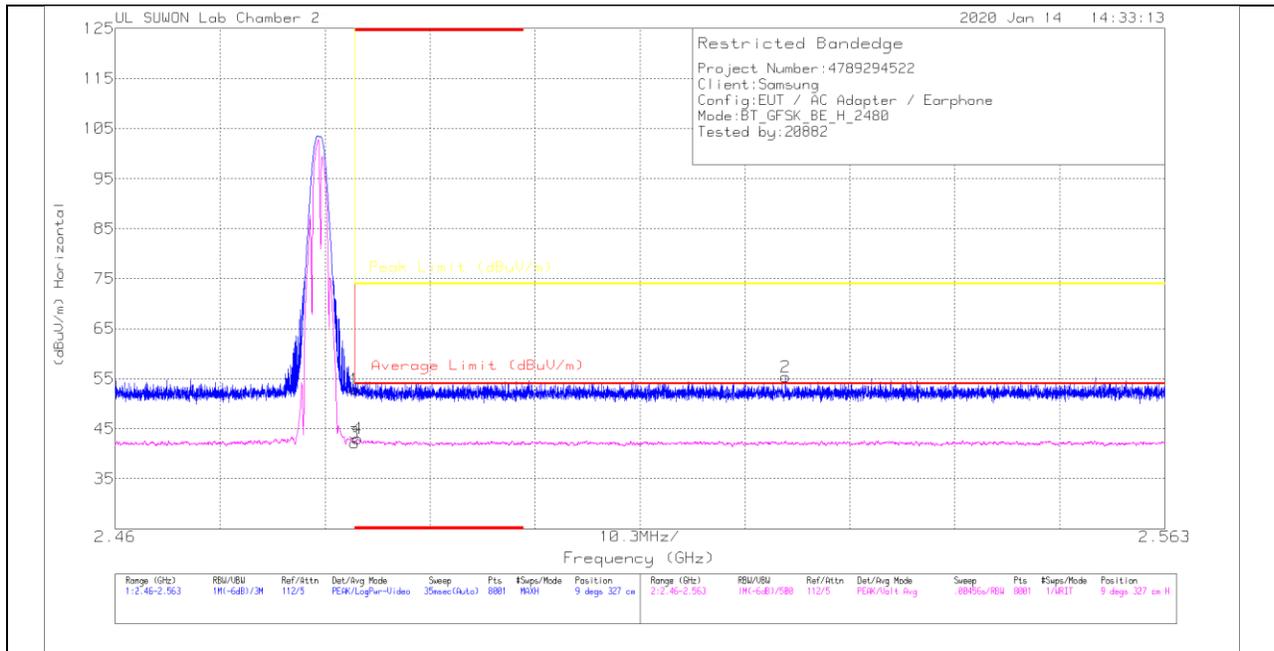
**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[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	40.53	Pk	31.6	-20.6	51.53	-	-	74	-22.47	277	125	V
2	* 2.33054	43.69	Pk	31.5	-20.7	54.49	-	-	74	-19.51	277	125	V
3	* 2.39	30.56	VA1T	31.6	-20.6	41.56	54	-12.44	-	-	277	125	V
4	* 2.3669	30.99	VA1T	31.6	-20.6	41.99	54	-12.01	-	-	277	125	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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**

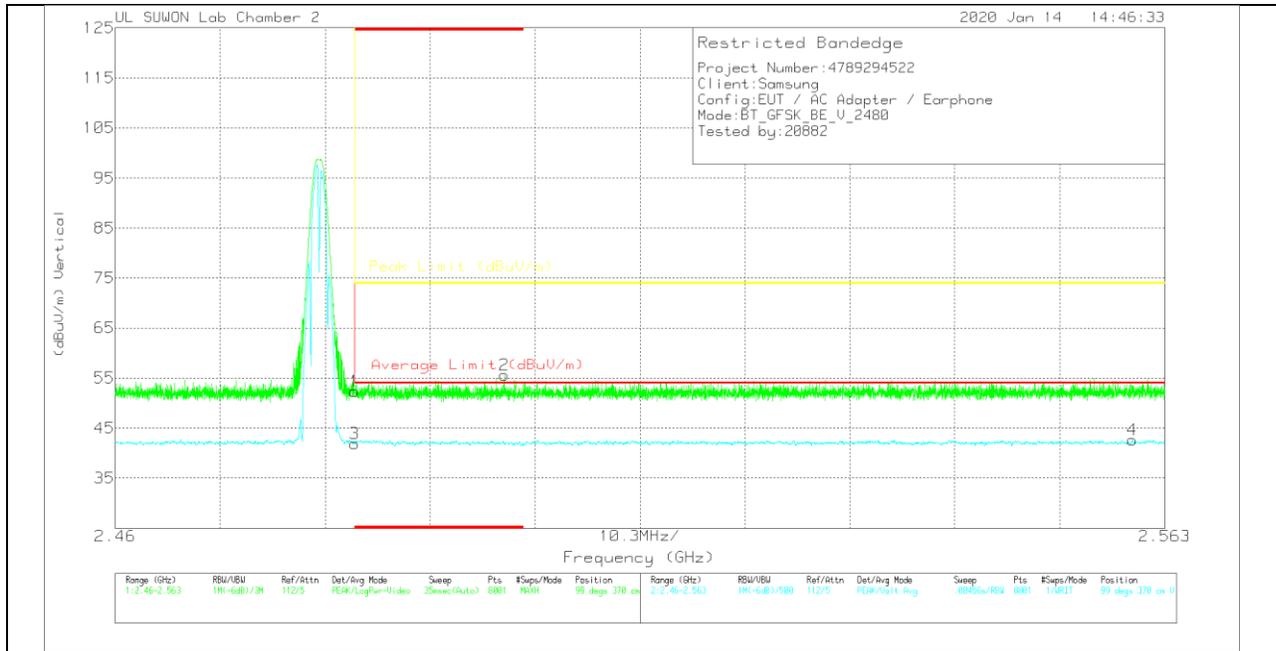
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.42	Pk		-20.4	52.92	-	-	74	-21.08	9	327	H
2	2.52577	43.97	PK		-20.5	55.37	-	-	74	-18.63	9	327	H
3	* 2.48351	30.64	VA1T		-20.4	42.14	54	-11.86	-	-	9	327	H
4	* 2.48378	31.51	VA1T		-20.4	43.01	54	-10.99	-	-	9	327	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.86	Pk		-20.4	52.36	-	-	74	-21.64	99	370	V
2	* 2.49816	44.22	Pk		-20.5	55.62	-	-	74	-18.38	99	370	V
3	* 2.48351	30.42	VA1T		-20.4	41.92	54	-12.08	-	-	99	370	V
4	2.55982	31.04	VA1T		-20.4	42.64	54	-11.36	-	-	99	370	V

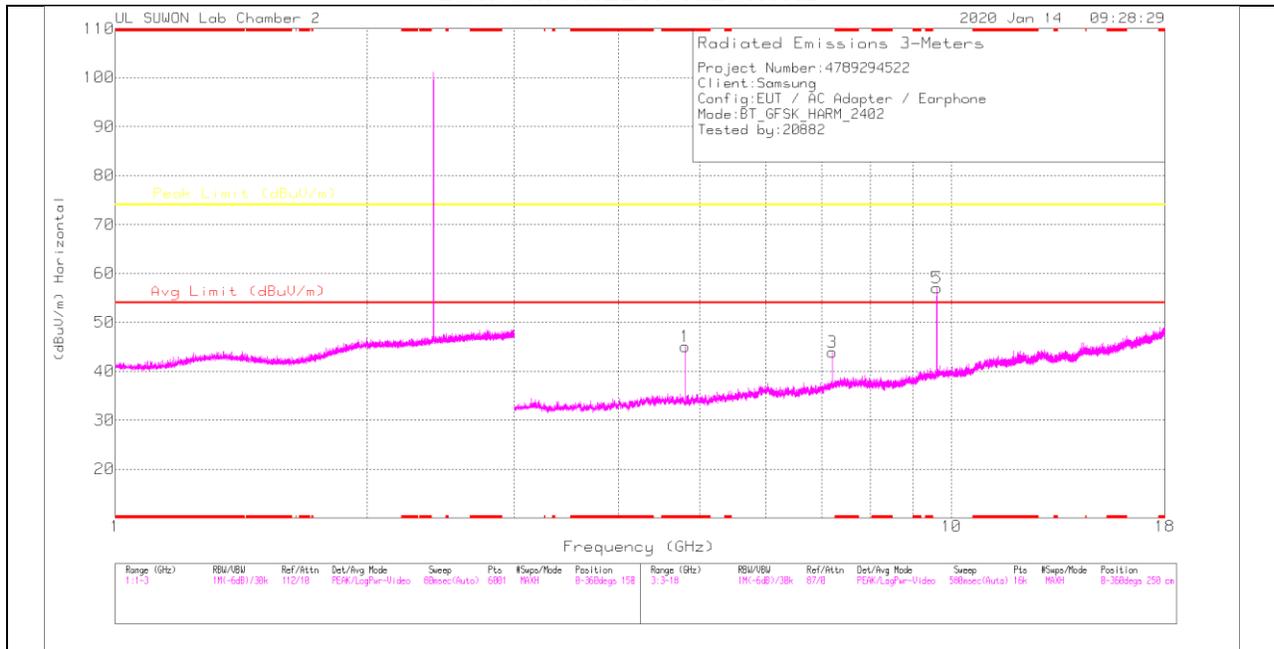
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

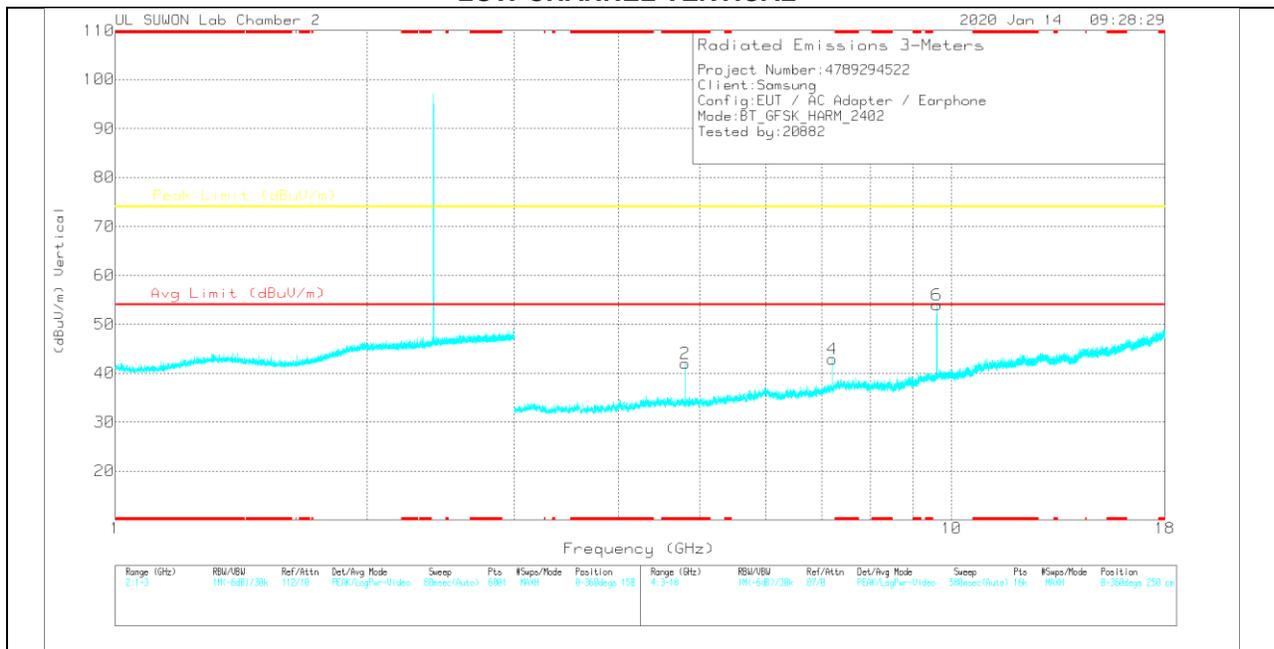
VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

### 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_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.80364	39.07	PK	34	-28	45.07	-	-	74	-28.93	0-360	150	H
3	7.2063	32.97	PK	36.1	-25.2	43.87	-	-	74	-30.13	0-360	250	H
5	9.60802	41.77	PK	37	-21.7	57.07	-	-	74	-16.93	0-360	250	H
2	* 4.80364	36.03	PK	34	-28	42.03	-	-	74	-31.97	0-360	250	V
4	7.20536	32.06	PK	36.1	-25.3	42.86	-	-	74	-31.14	0-360	250	V
6	9.60802	38.61	PK	37	-21.7	53.91	-	-	74	-20.09	0-360	150	V

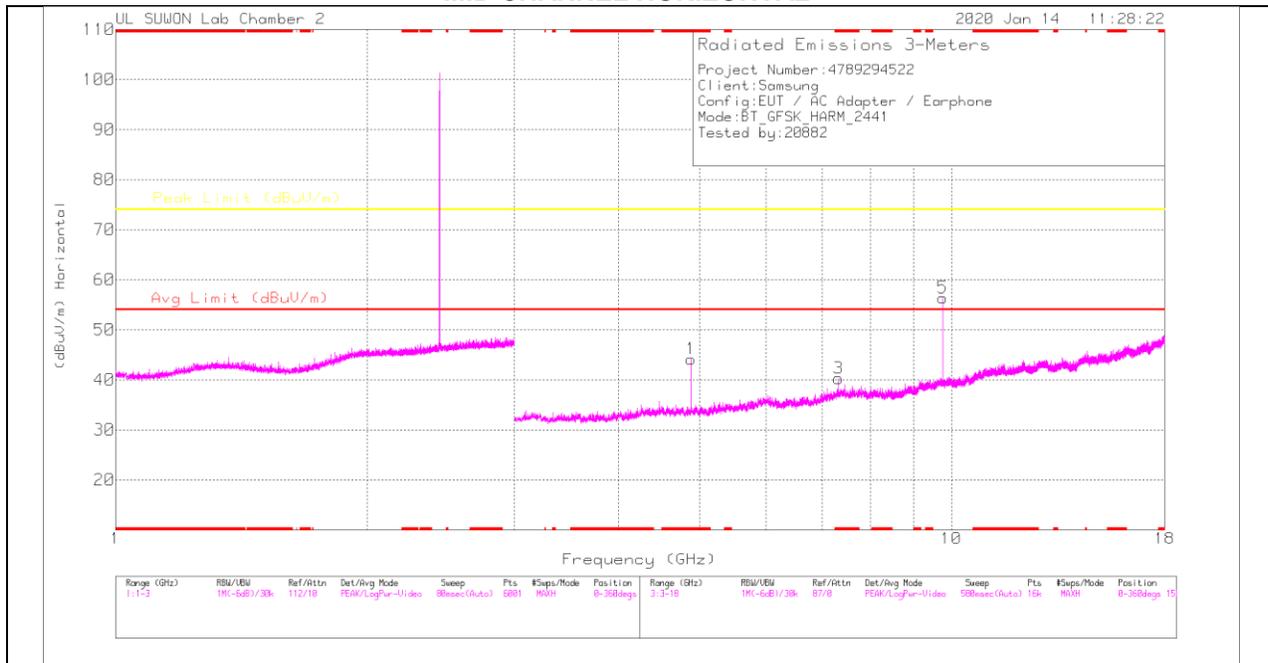
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

Radiated Emissions

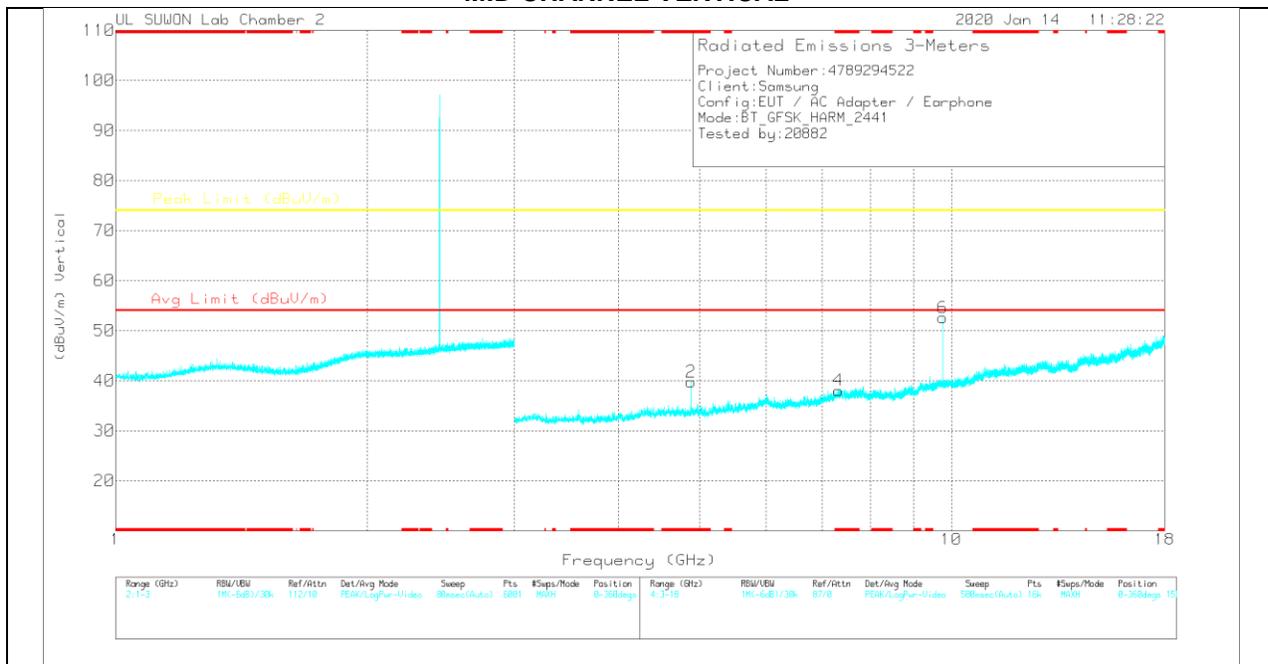
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80433	43.16	PKFH	34	-27.9	49.26	-	-	74	-24.74	61	101	H
* 4.80403	39.32	VA1T	34	-28	45.32	54	-8.68	-	-	61	101	H
* 4.80433	41.79	PKFH	34	-27.9	47.89	-	-	74	-26.11	86	390	V
* 4.80387	35.5	VA1T	34	-28	41.5	54	-12.5	-	-	86	390	V
7.20586	38.65	PKFH	36.1	-25.3	49.45	-	-	74	-24.55	299	100	H
7.20554	38.62	PKFH	36.1	-25.3	49.42	-	-	74	-24.58	106	375	V
9.6082	44.65	PKFH	37	-21.7	59.95	-	-	74	-14.05	288	100	H
9.60802	42.07	PKFH	37	-21.7	57.37	-	-	74	-16.63	100	113	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**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_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88144	37.96	PK	34	-27.8	44.16	-	-	74	-29.84	0-360	150	H
3	* 7.32254	28.9	PK	36.2	-24.8	40.3	-	-	74	-33.7	0-360	250	H
5	9.76364	40.4	PK	37.2	-21.2	56.4	-	-	74	-17.6	0-360	250	H
2	* 4.88144	33.54	PK	34	-27.8	39.74	-	-	74	-34.26	0-360	250	V
4	* 7.32254	26.64	PK	36.2	-24.8	38.04	-	-	74	-35.96	0-360	250	V
6	9.76364	36.6	PK	37.2	-21.2	52.6	-	-	74	-21.4	0-360	150	V

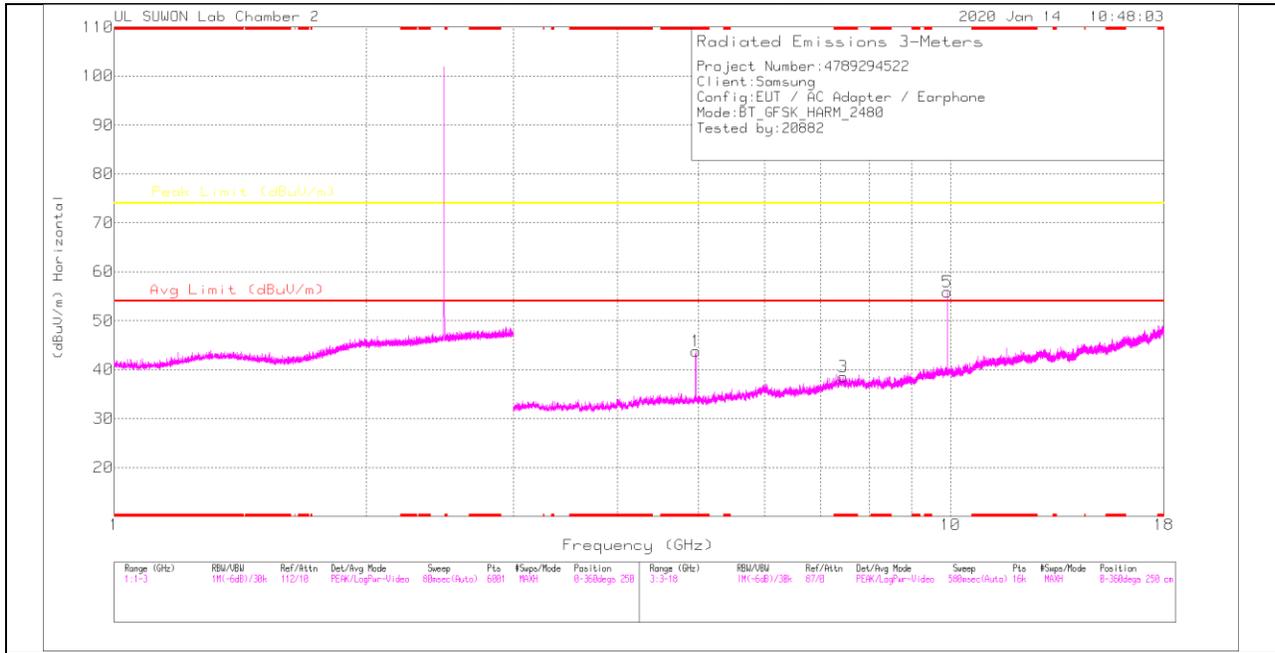
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

**Radiated Emissions**

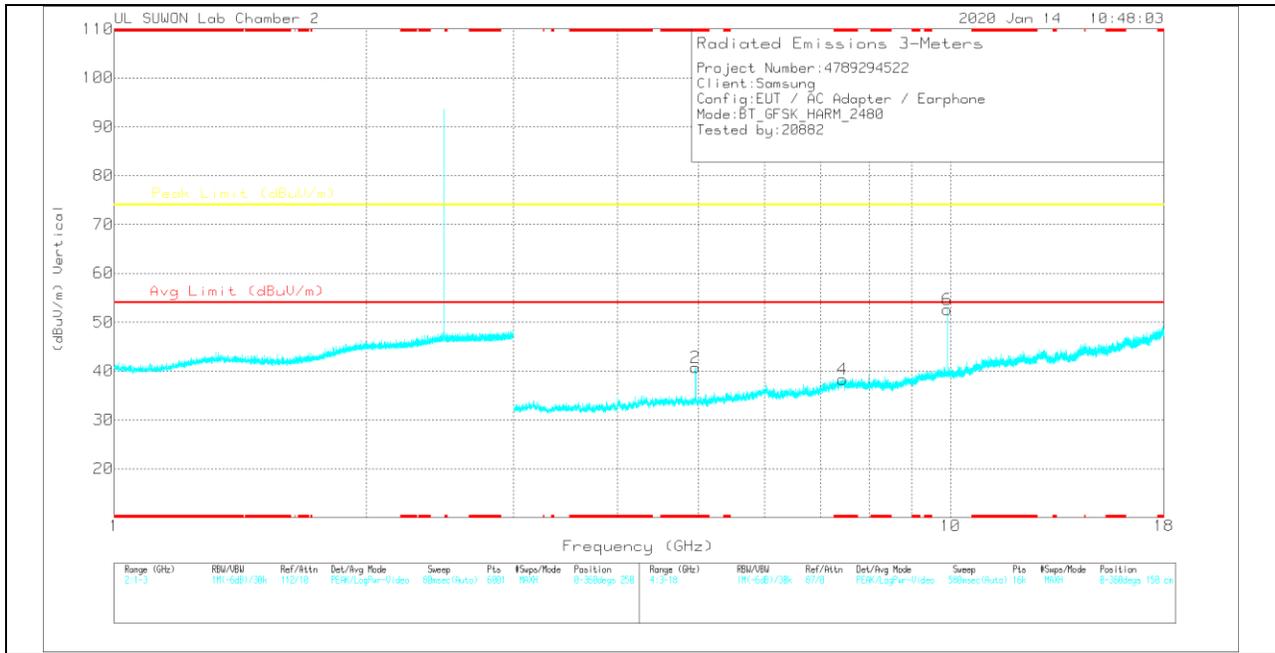
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88182	41.52	PKFH	34	-27.8	47.72	-	-	74	-26.28	46	109	H
* 4.88204	37.02	VA1T	34	-27.8	43.22	54	-10.78	-	-	46	109	H
* 4.88218	39.99	PKFH	34	-27.8	46.19	-	-	74	-27.81	86	400	V
* 4.88214	33.37	VA1T	34	-27.8	39.57	54	-14.43	-	-	86	400	V
* 7.32304	34.82	PKFH	36.2	-24.8	46.22	-	-	74	-27.78	314	101	H
* 7.3228	25.57	VA1T	36.2	-24.8	36.97	54	-17.03	-	-	314	101	H
* 7.32348	33.84	PKFH	36.2	-24.8	45.24	-	-	74	-28.76	186	104	V
* 7.32292	22.95	VA1T	36.2	-24.8	34.35	54	-19.65	-	-	186	104	V
9.764	43.03	PKFH	37.2	-21.3	58.93	-	-	74	-15.07	285	103	H
9.76398	39.3	PKFH	37.2	-21.3	55.2	-	-	74	-18.8	189	104	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**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_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96019	36.62	PK	34.1	-27	43.72	-	-	74	-30.28	0-360	150	H
3	* 7.43972	26.3	PK	36.2	-23.9	38.6	-	-	74	-35.4	0-360	150	H
5	9.92019	39.46	PK	37.4	-21	55.86	-	-	74	-18.14	0-360	250	H
2	* 4.95925	33.63	PK	34.1	-27	40.73	-	-	74	-33.27	0-360	250	V
4	* 7.43316	25.94	PK	36.2	-23.9	38.24	-	-	74	-35.76	0-360	150	V
6	9.92019	36.22	PK	37.4	-21	52.62	-	-	74	-21.38	0-360	150	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

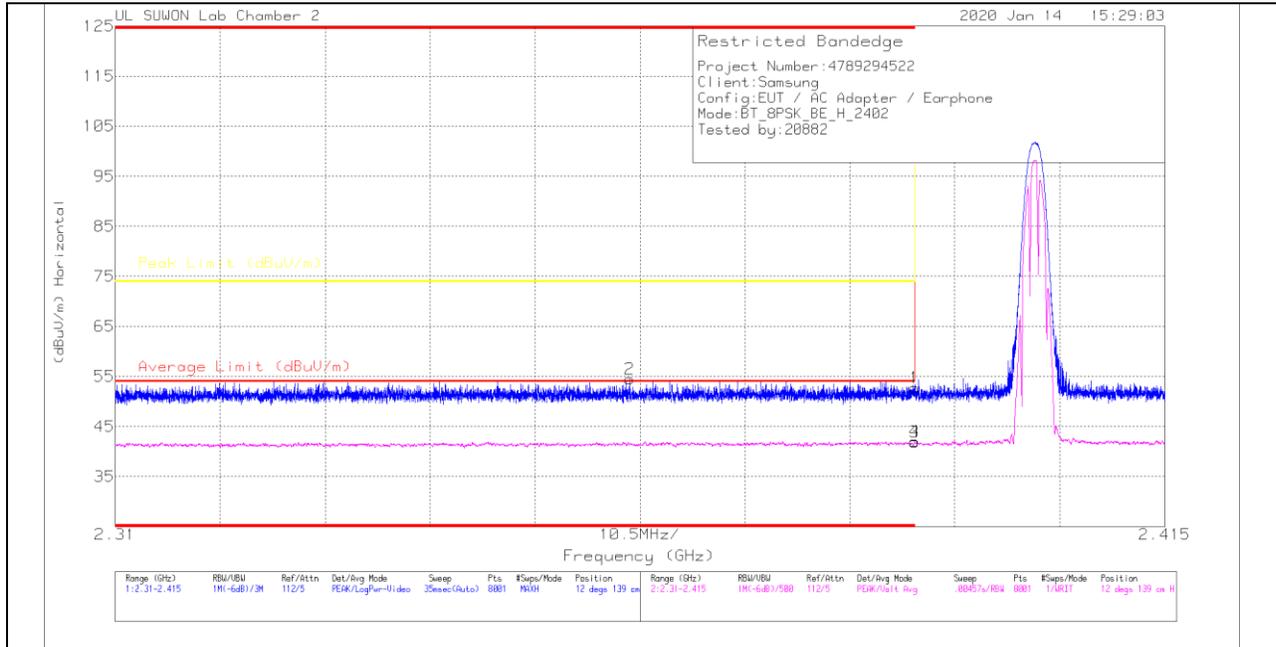
**Radiated Emissions**

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96035	40.88	PKFH	34.1	-27	47.98	-	-	74	-26.02	64	106	H
* 4.96001	35.68	VA1T	34.1	-27	42.78	54	-11.22	-	-	64	106	H
* 4.96021	38.65	PKFH	34.1	-27	45.75	-	-	74	-28.25	87	383	V
* 4.96003	31.99	VA1T	34.1	-27	39.09	54	-14.91	-	-	87	383	V
* 7.44017	33.23	PKFH	36.2	-23.9	45.53	-	-	74	-28.47	0	100	H
* 7.44123	33.06	PKFH	36.2	-23.9	45.36	-	-	74	-28.64	0	100	V
9.92003	41.3	PKFH	37.4	-20.9	57.8	-	-	74	-16.2	282	100	H
9.91991	39.16	PKFH	37.4	-20.9	55.66	-	-	74	-18.34	239	102	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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

### HORIZONTAL PEAK AND AVERAGE PLOT



### HORIZONTAL DATA

#### Trace Markers

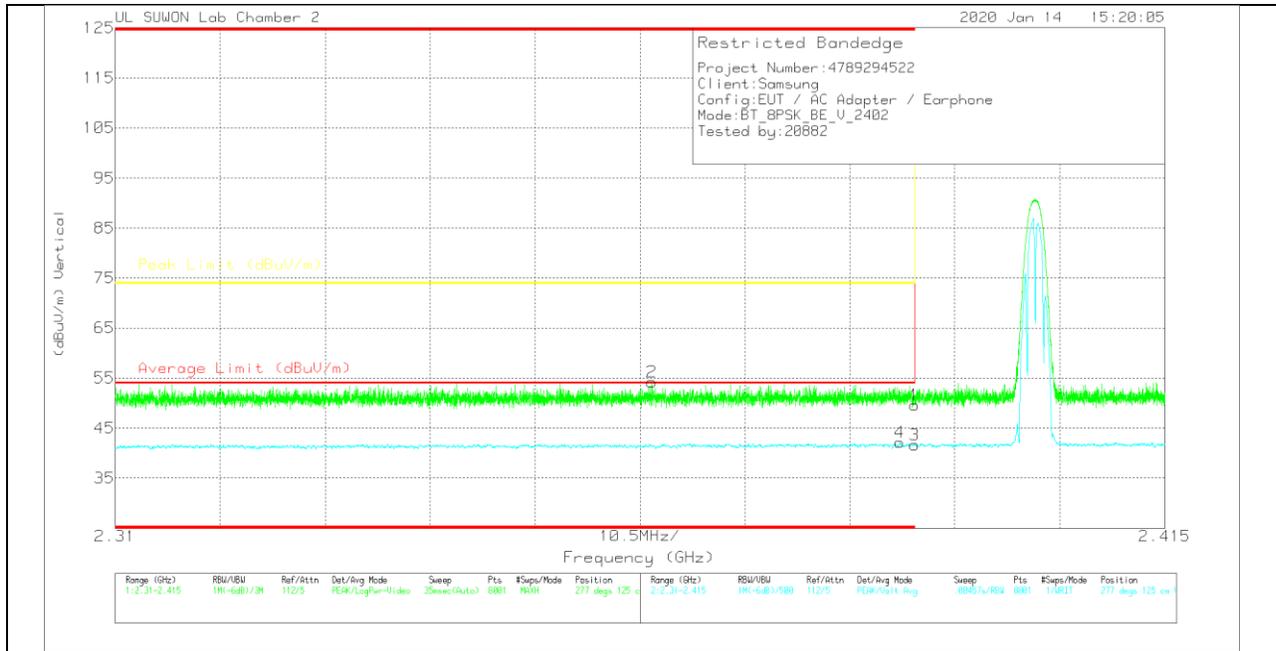
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.8	Pk	31.6	-20.6	52.8	-	-	74	-21.2	12	139	H
2	* 2.36144	43.63	Pk	31.6	-20.7	54.53	-	-	74	-19.47	12	139	H
3	* 2.39	30.95	VA1T	31.6	-20.6	41.95	54	-12.05	-	-	12	139	H
4	* 2.38998	31.04	VA1T	31.6	-20.6	42.04	54	-11.96	-	-	12	139	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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**

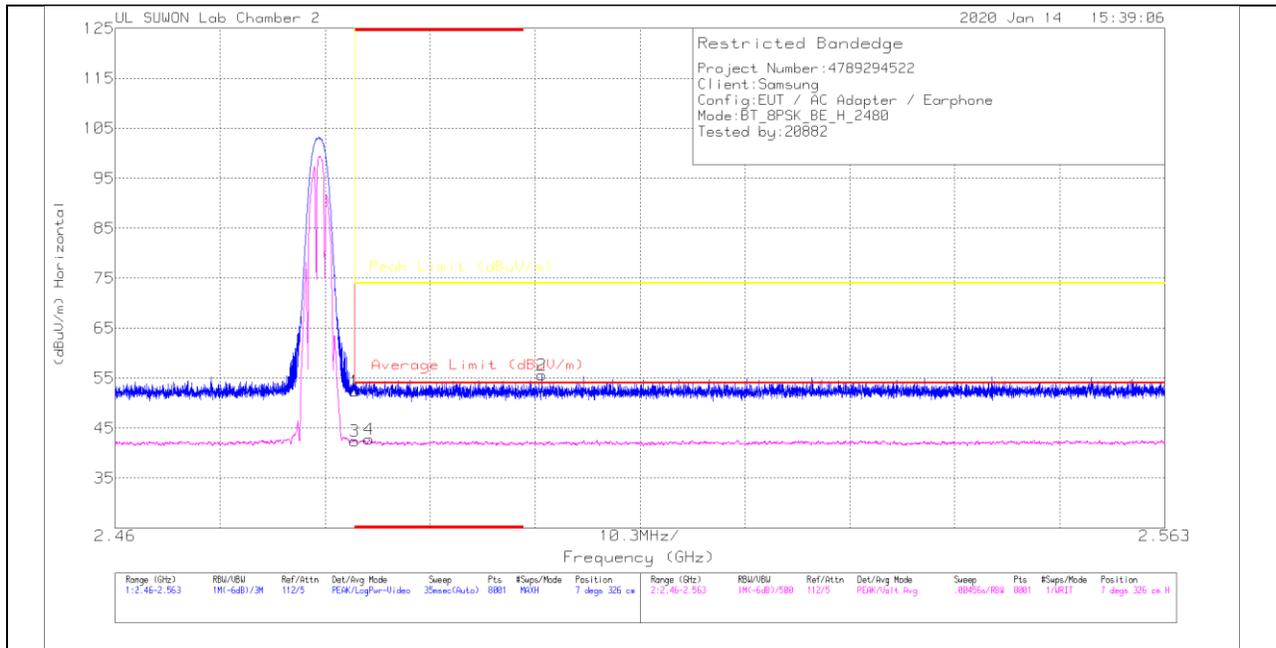
**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[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	38.66	Pk	31.6	-20.6	49.66	-	-	74	-24.34	277	125	V
2	* 2.36368	43.28	Pk	31.6	-20.6	54.28	-	-	74	-19.72	277	125	V
3	* 2.39	30.68	VA1T	31.6	-20.6	41.68	54	-12.32	-	-	277	125	V
4	* 2.3885	31.13	VA1T	31.6	-20.6	42.13	54	-11.87	-	-	277	125	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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**



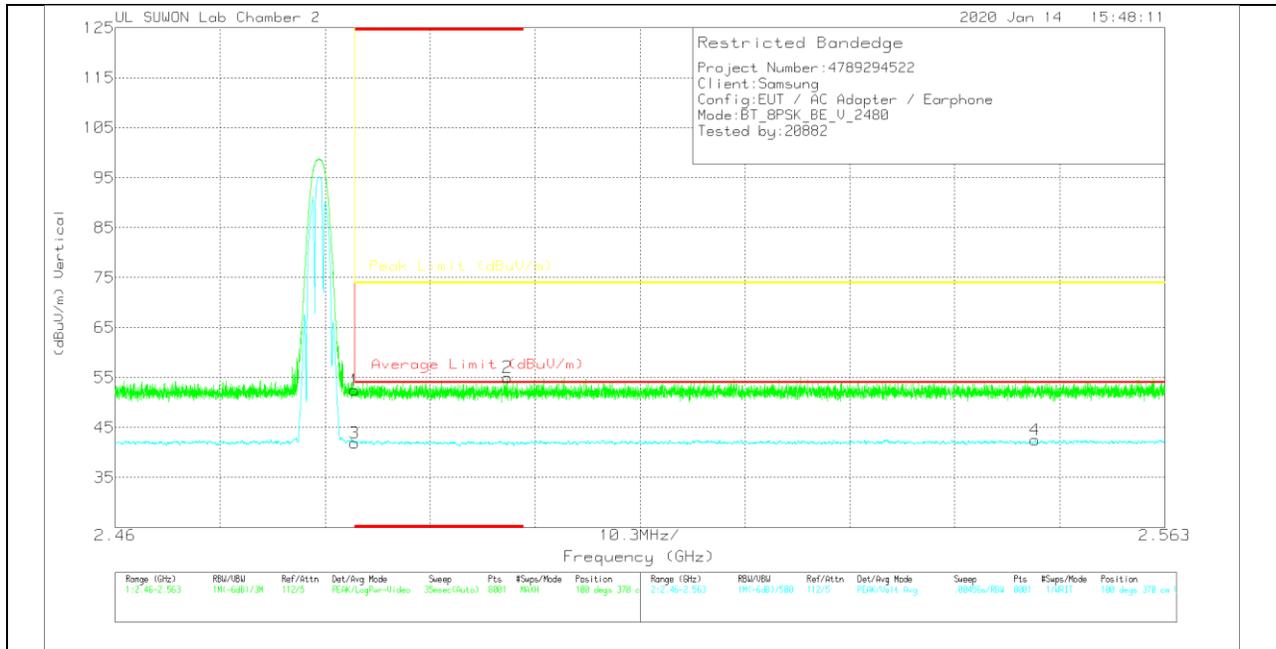
**HORIZONTAL DATA**

**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.82	Pk	31.9	-20.4	52.32	-	-	74	-21.68	7	326	H
2	2.50187	44.12	Pk	31.9	-20.4	55.62	-	-	74	-18.38	7	326	H
3	* 2.48351	30.96	VA1T	31.9	-20.4	42.46	54	-11.54	-	-	7	326	H
4	* 2.48493	31.28	VA1T	31.9	-20.4	42.78	54	-11.22	-	-	7	326	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-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**

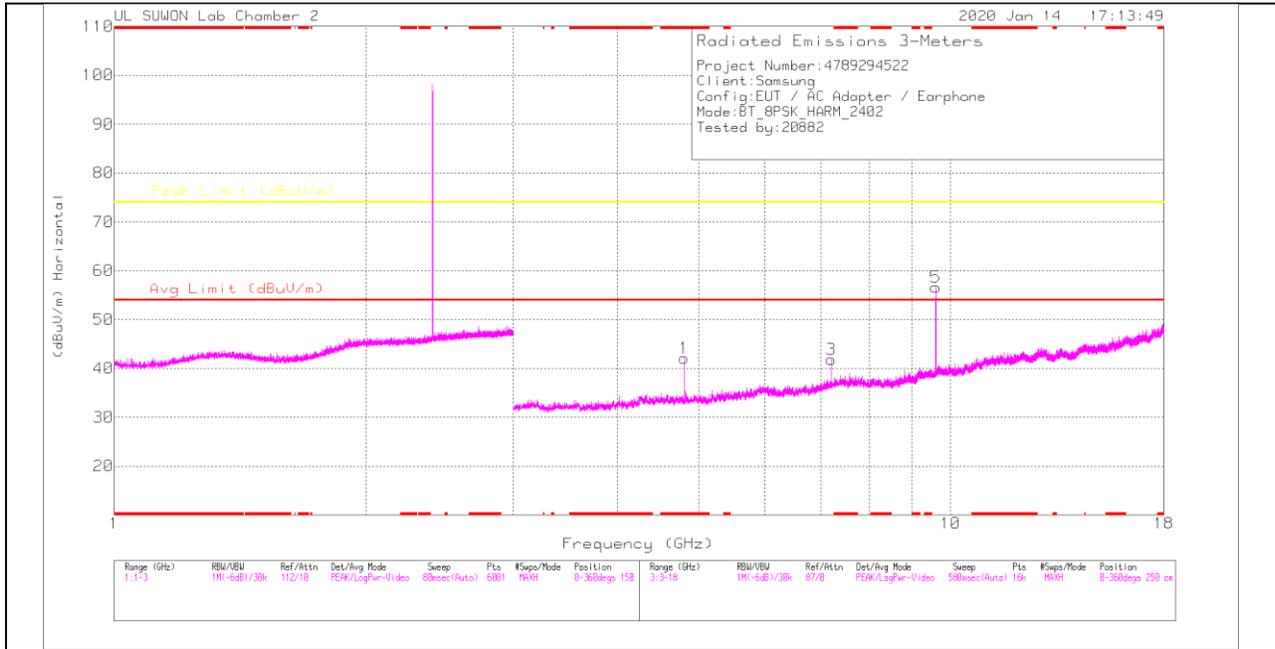
**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.96	Pk	31.9	-20.4	52.46	-	-	74	-21.54	100	370	V
2	* 2.49847	43.65	Pk	31.9	-20.5	55.05	-	-	74	-18.95	100	370	V
3	* 2.48351	30.4	VA1T	31.9	-20.4	41.9	54	-12.1	-	-	100	370	V
4	2.55024	30.98	VA1T	32	-20.4	42.58	54	-11.42	-	-	100	370	V

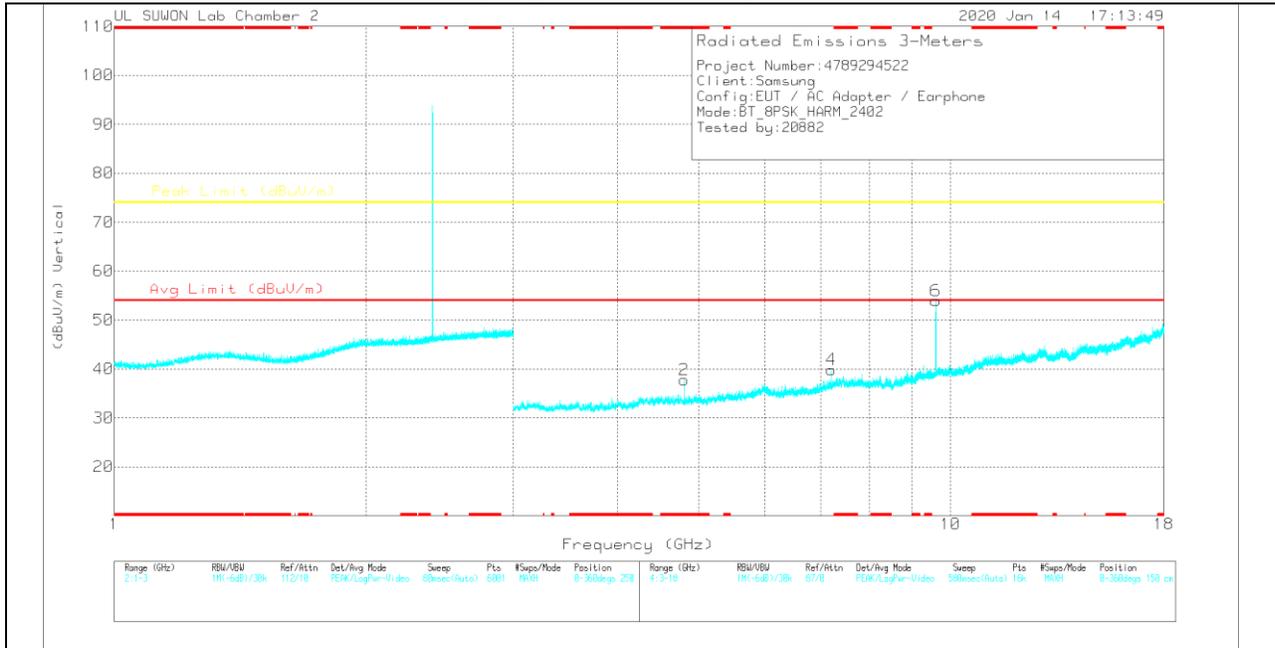
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

### 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_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.80364	36.09	PK	34	-28	42.09	-	-	74	-31.91	0-360	150	H
3	7.2063	30.94	PK	36.1	-25.2	41.84	-	-	74	-32.16	0-360	250	H
5	9.60802	41.32	PK	37	-21.7	56.62	-	-	74	-17.38	0-360	250	H
2	* 4.80364	31.77	PK	34	-28	37.77	-	-	74	-36.23	0-360	250	V
4	7.2063	28.98	PK	36.1	-25.2	39.88	-	-	74	-34.12	0-360	250	V
6	9.60802	38.68	PK	37	-21.7	53.98	-	-	74	-20.02	0-360	150	V

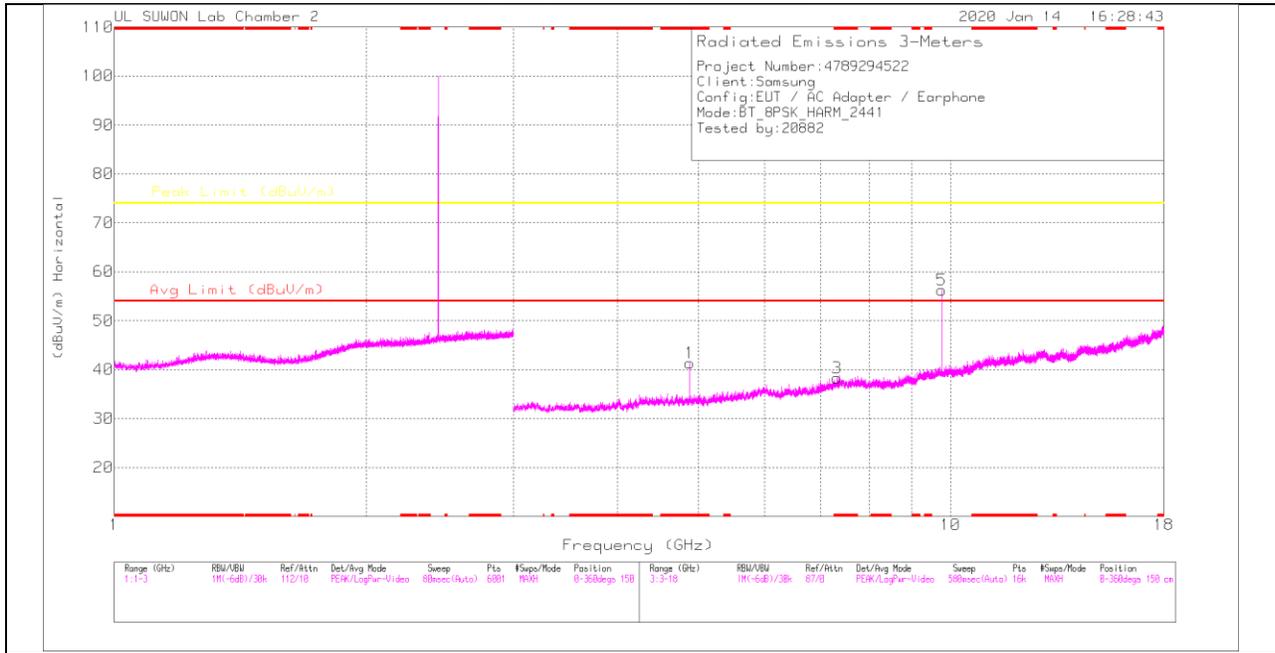
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

**Radiated Emissions**

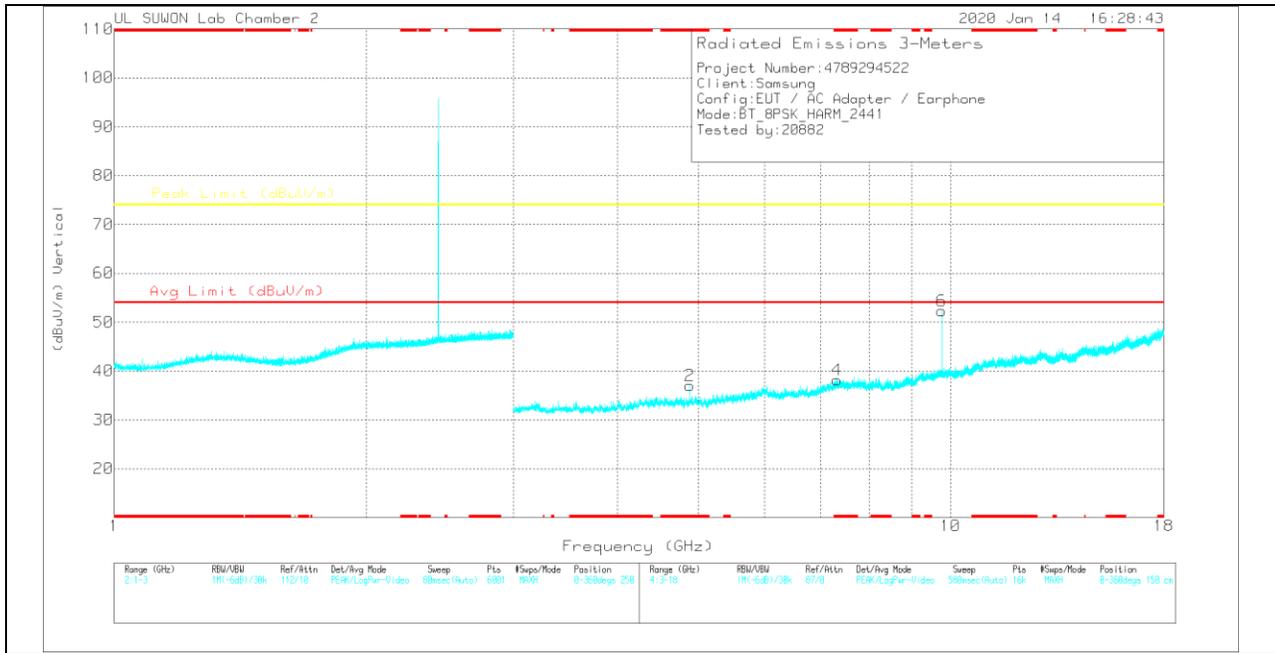
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80404	41.87	PKFH	34	-28	47.87	-	-	74	-26.13	60	128	H
* 4.8039	34.78	VA1T	34	-28	40.78	54	-13.22	-	-	60	128	H
* 4.8039	39.57	PKFH	34	-28	45.57	-	-	74	-28.43	85	388	V
* 4.80396	31.55	VA1T	34	-28	37.55	54	-16.45	-	-	85	388	V
7.20606	38.03	PKFH	36.1	-25.2	48.93	-	-	74	-25.07	299	100	H
7.20578	37.76	PKFH	36.1	-25.3	48.56	-	-	74	-25.44	116	344	V
9.60802	45.1	PKFH	37	-21.7	60.4	-	-	74	-13.6	287	100	H
9.608	42.32	PKFH	37	-21.6	57.72	-	-	74	-16.28	104	144	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**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_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88144	35.1	PK	34	-27.8	41.3	-	-	74	-32.7	0-360	150	H
3	* 7.32254	26.91	PK	36.2	-24.8	38.31	-	-	74	-35.69	0-360	250	H
5	9.76364	40.31	PK	37.2	-21.2	56.31	-	-	74	-17.69	0-360	250	H
2	* 4.88144	30.8	PK	34	-27.8	37	-	-	74	-37	0-360	250	V
4	* 7.32067	26.8	PK	36.2	-24.8	38.2	-	-	74	-35.8	0-360	150	V
6	9.76364	36.32	PK	37.2	-21.2	52.32	-	-	74	-21.68	0-360	150	V

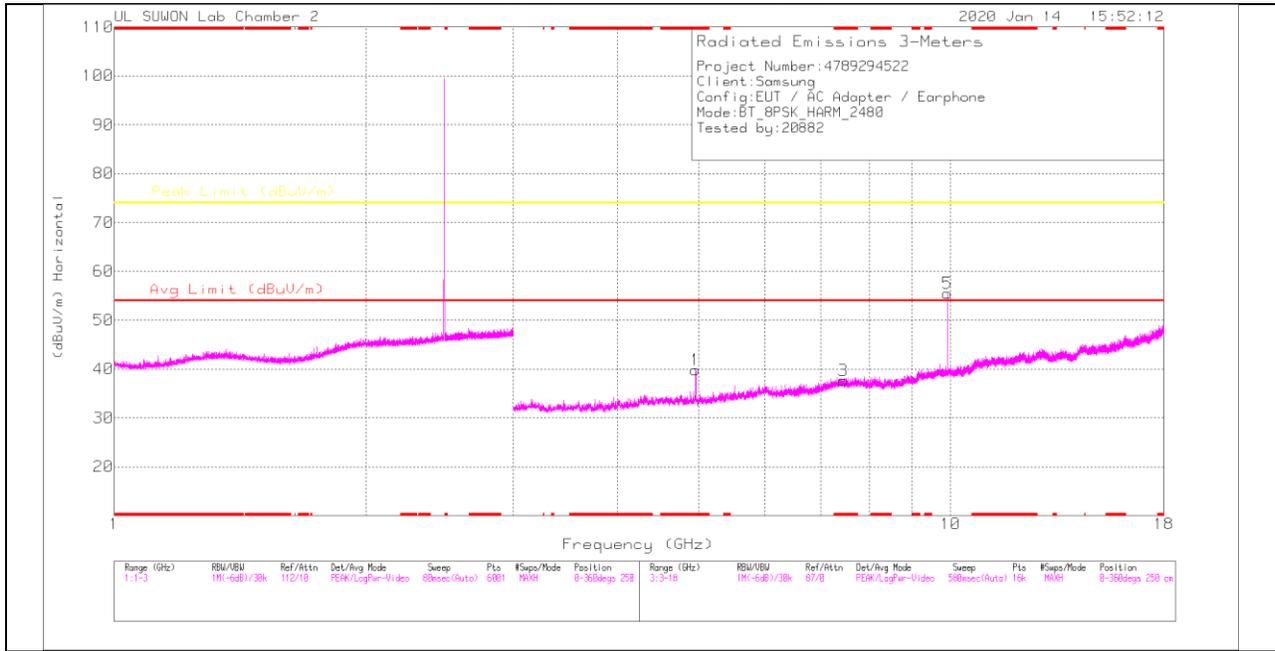
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

**Radiated Emissions**

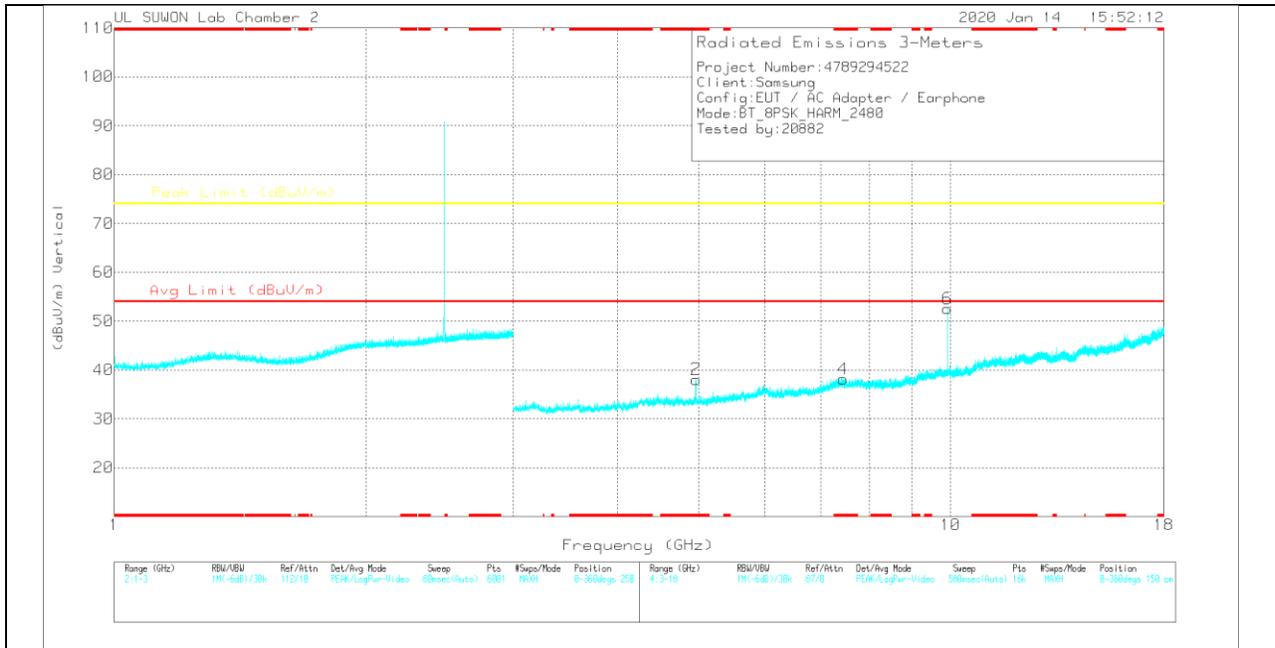
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88204	41.24	PKFH	34	-27.8	47.44	-	-	74	-26.56	46	132	H
* 4.88206	33.64	VA1T	34	-27.8	39.84	54	-14.16	-	-	46	132	H
* 4.88236	39.19	PKFH	34	-27.8	45.39	-	-	74	-28.61	85	398	V
* 4.88206	30.41	VA1T	34	-27.8	36.61	54	-17.39	-	-	85	398	V
* 7.323	34.15	PKFH	36.2	-24.8	45.55	-	-	74	-28.45	0	100	H
* 7.32309	32.96	PKFH	36.2	-24.8	44.36	-	-	74	-29.64	0	100	V
9.76406	42.71	PKFH	37.2	-21.3	58.61	-	-	74	-15.39	283	251	H
9.7639	40.2	PKFH	37.2	-21.3	56.1	-	-	74	-17.9	189	100	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**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_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.95925	32.76	PK	34.1	-27	39.86	-	-	74	-34.14	0-360	250	H
3	* 7.43878	25.35	PK	36.2	-23.9	37.65	-	-	74	-36.35	0-360	250	H
5	9.92019	39.08	PK	37.4	-21	55.48	-	-	74	-18.52	0-360	250	H
2	* 4.96019	31	PK	34.1	-27	38.1	-	-	74	-35.9	0-360	250	V
4	* 7.44535	25.93	PK	36.2	-24	38.13	-	-	74	-35.87	0-360	250	V
6	9.92019	36.18	PK	37.4	-21	52.58	-	-	74	-21.42	0-360	150	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK – Peak Detector

**Radiated Emissions**

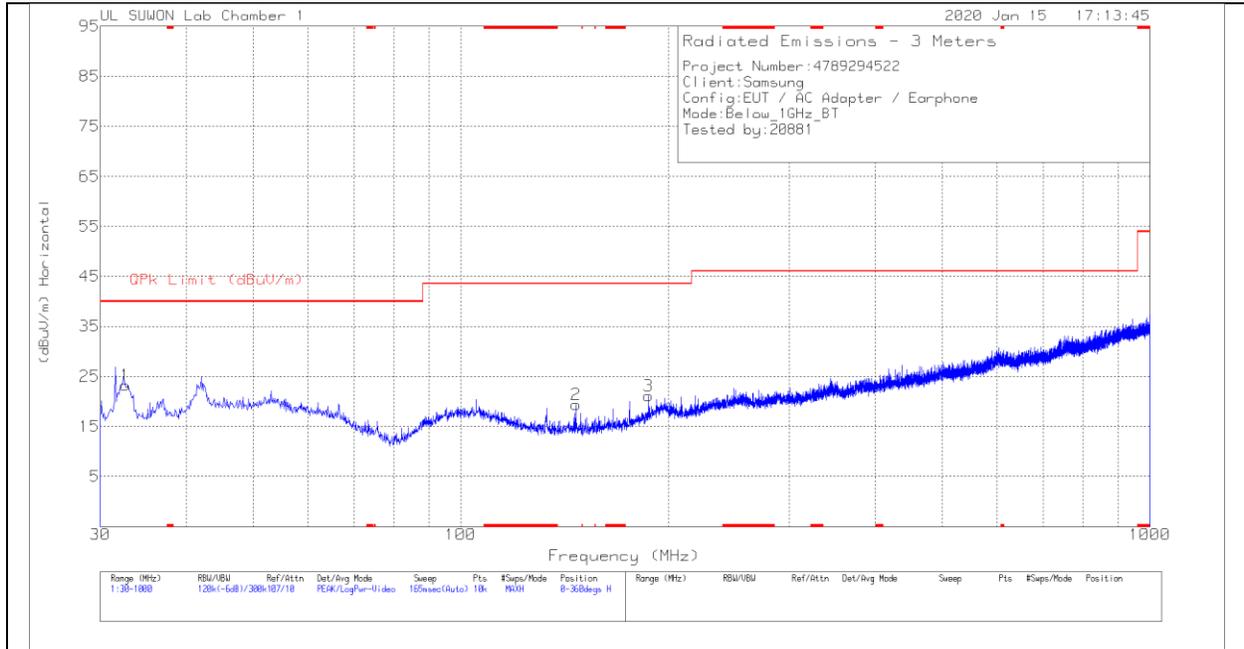
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95985	39.94	PKFH	34.1	-27	47.04	-	-	74	-26.96	52	117	H
* 4.95989	31.41	VA1T	34.1	-27	38.51	54	-15.49	-	-	52	117	H
* 4.96009	37.61	PKFH	34.1	-27	44.71	-	-	74	-29.29	88	383	V
* 4.95989	28.61	VA1T	34.1	-27	35.71	54	-18.29	-	-	88	383	V
* 7.43698	32.18	PKFH	36.2	-23.9	44.48	-	-	74	-29.52	0	100	H
* 7.4387	32.46	PKFH	36.2	-23.9	44.76	-	-	74	-29.24	0	100	V
9.92013	41.13	PKFH	37.4	-20.9	57.63	-	-	74	-16.37	282	100	H
9.92001	39.61	PKFH	37.4	-20.9	56.11	-	-	74	-17.89	237	103	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

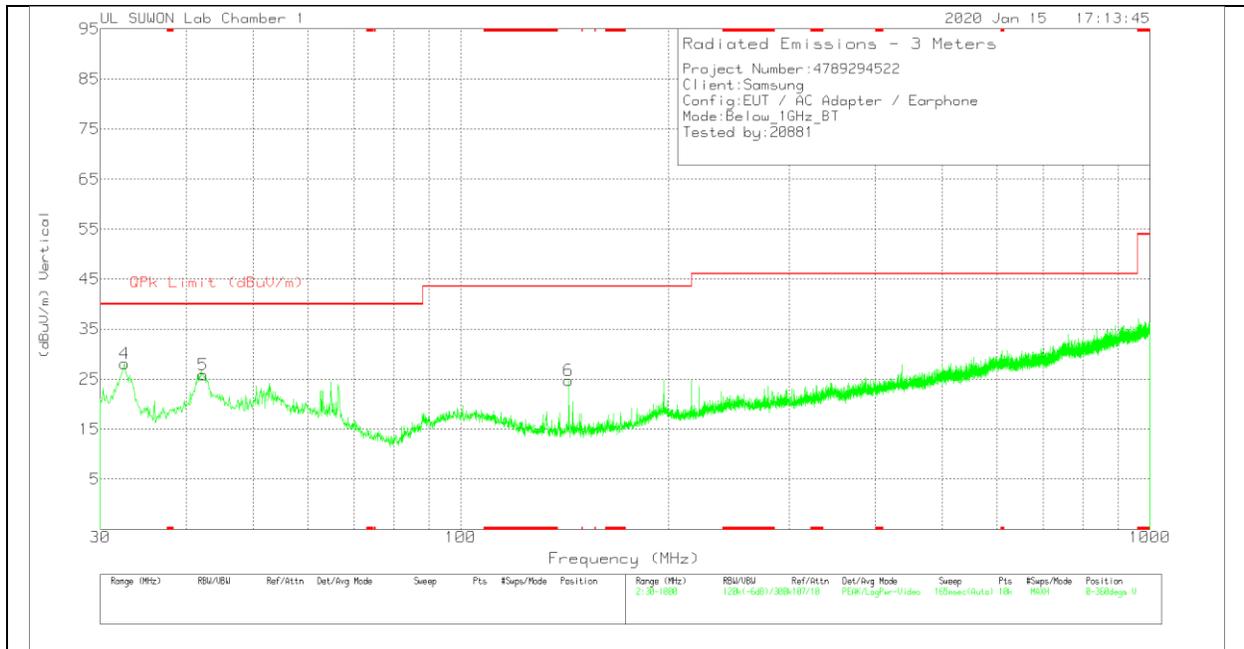
### 11.3. WORST-CASE BELOW 1 GHz

#### GFSK SPURIOUS EMISSIONS 30 TO 1000 MHz

#### HORIZONTAL PLOT



#### VERTICAL PLOT



**BELOW 1 GHz TABLE**

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.619	37.61	Pk	15.7	-30.1	23.21	40	-16.79	0-360	400	H
2	146.982	33.35	Pk	14.1	-28.1	19.35	43.52	-24.17	0-360	200	H
3	187.237	32.25	Pk	16.6	-27.7	21.15	43.52	-22.37	0-360	200	H
4	32.522	42.38	Pk	15.7	-30	28.08	40	-11.92	0-360	100	V
5	42.319	36.37	Pk	19.2	-29.7	25.87	40	-14.13	0-360	100	V
6	143.49	38.71	Pk	14.1	-28.1	24.71	43.52	-18.81	0-360	100	V

Pk - Peak detector

## 12. 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 C63.10.

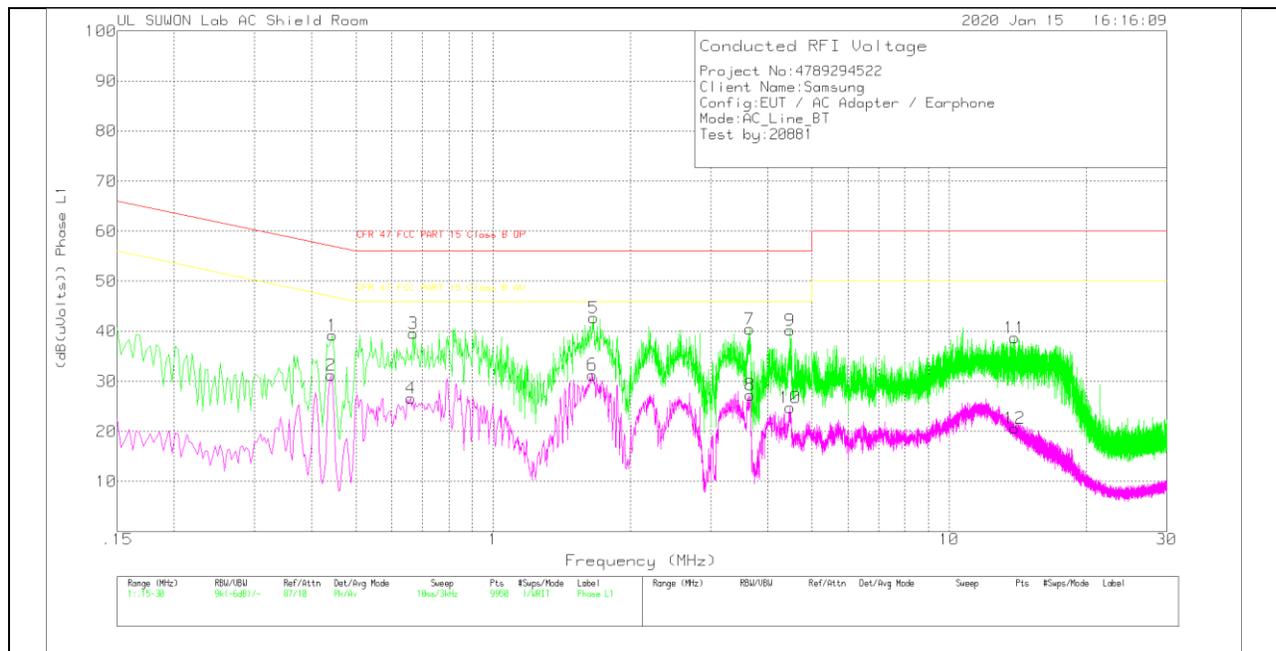
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

**RESULTS**

**WORST EMISSIONS**

**LINE 1 PLOT**



**LINE 1 RESULTS**

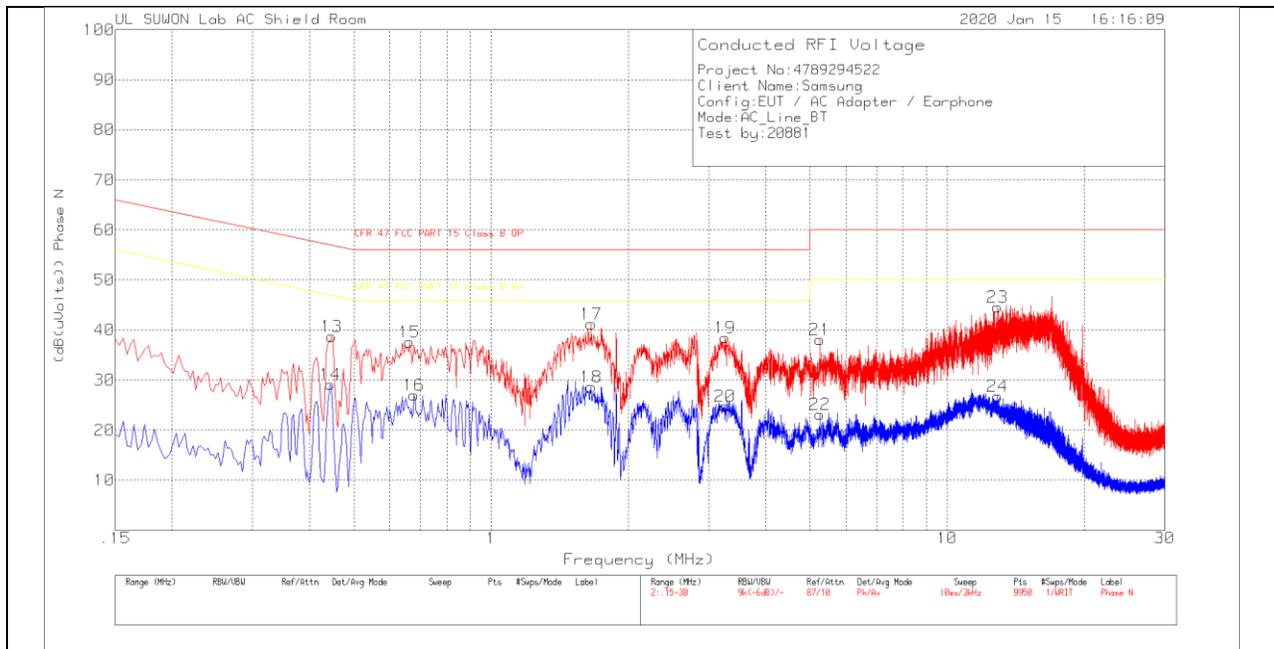
**Trace Markers**

Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h Ex_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.444	29.09	Pk	9.9	.2	39.19	56.99	-17.8	-	-
2	.441	21.19	Av	9.9	.2	31.29	-	-	47.04	-15.75
3	.669	29.54	Pk	9.9	.2	39.64	56	-16.36	-	-
4	.66	16.51	Av	9.9	.2	26.61	-	-	46	-19.39
5	1.662	32.66	Pk	9.8	.3	42.76	56	-13.24	-	-
6	1.653	21.2	Av	9.8	.3	31.3	-	-	46	-14.7
7	3.648	30.37	Pk	9.8	.3	40.47	56	-15.53	-	-
8	3.657	17.21	Av	9.8	.3	27.31	-	-	46	-18.69
9	4.485	30.12	Pk	9.8	.3	40.22	56	-15.78	-	-
10	4.485	14.61	Av	9.8	.3	24.71	-	-	46	-21.29
11	13.911	28.16	Pk	10.1	.4	38.66	60	-21.34	-	-
12	13.923	10.18	Av	10.1	.4	20.68	-	-	50	-29.32

Pk - Peak detector  
 Av - Average detection

**LINE 2 PLOT**



**LINE 2 RESULTS**

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_With EX_N[dB]	CABLELOSS (dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.447	28.61	Pk	9.9	.2	38.71	56.93	-18.22	-	-
14	.444	19.02	Av	9.9	.2	29.12	-	-	46.99	-17.87
15	.663	27.46	Pk	9.9	.2	37.56	56	-18.44	-	-
16	.678	16.94	Av	9.9	.2	27.04	-	-	46	-18.96
17	1.659	31.08	Pk	9.8	.3	41.18	56	-14.82	-	-
18	1.659	18.52	Av	9.8	.3	28.62	-	-	46	-17.38
19	3.261	28.42	Pk	9.8	.3	38.52	56	-17.48	-	-
20	3.261	14.71	Av	9.8	.3	24.81	-	-	46	-21.19
21	5.262	27.99	Pk	9.8	.3	38.09	60	-21.91	-	-
22	5.262	13.02	Av	9.8	.3	23.12	-	-	50	-26.88
23	12.909	34.13	Pk	10.1	.4	44.63	60	-15.37	-	-
24	12.915	16.28	Av	10.1	.4	26.78	-	-	50	-23.22

Pk - Peak detector  
 Av - Average detection

**END OF REPORT**