FCC CFR47 PART 15 SUBPART C

Bluetooth

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-W728, SM-W728N0, SM-W727, SM-W727N0

FCC ID: A3LSMW728

REPORT NUMBER: 4787827147-E3V1

ISSUE DATE: FEB 17, 2017

Prepared for
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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	02/17/17	Initial issue	Junwhan Lee

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	WCDMA/LTE Tablet + Bluetooth/BLE and DTS/UNII a/b/g/n/ac
MODEL NUMBER:	SM-W728, SM-W728N0, SM-W727, SM-W727N0
SERIAL NUMBER:	R9KCR32HC000QD, 9RKCR32HC000QF (RADIATED); 9RKCR32HC000RZ (CONDUCTED)
DATE TESTED:	JAN 20, 2017 - FEB 16, 2017

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

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

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

Approved & Released For
UL Korea, Ltd. By:

SungGil Park
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 following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. FCC DA 00-705 Filling and measurement guidelines for FHSS systems
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
☐ Chamber 1
☒ 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:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	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 WCDMA/LTE Tablet + Bluetooth/BLE and DTS/UNII a/b/g/n/ac.
This test report addresses the DSS (BT) operational mode.

SM-W728 and multi-models(SM-W727, SM-W727N0, SM-W728N0) are same hardware, but difference is Windows version and HSDPA categories. PED document described detail of difference. All compliance tests were performed using SM-W728 and HSDPA conducted power checks for multi-models were performed.

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	9.957	9.901
		Peak	10.075	10.174
	Enhanced Pi/4-DPSK	Average	6.727	4.707
		Peak	8.917	7.793
	Enhanced 8PSK	Average	6.767	4.750
		Peak	9.287	8.486

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -0.54 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 9.5.

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Adapter	SAMSUNG	EP-TA300	R37HCSB00A3SE3	N/A
Data Cable	SAMSUNG	EP-DW720CWE	N/A	N/A
Earphone	SAMSUNG	EO-EG920BW	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type USB	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.1m	N/A

ADDITIONAL EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Keyboard	SAMSUNG	EJ-CW720	N/A	N/A
S-pen	SAMSUNG	EJ-PT820	N/A	N/A

Additional radiated spurious emission measurements were performed on worst case condition(Max conducted power) equipped with keyboard. Test data shown on section 10 and setup photo shown on section 12. Also radiated spurious emission below 1GHz and AC line conducted test were performed both condition(Stand-alone and equipped with keyboard).

TEST SETUP

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

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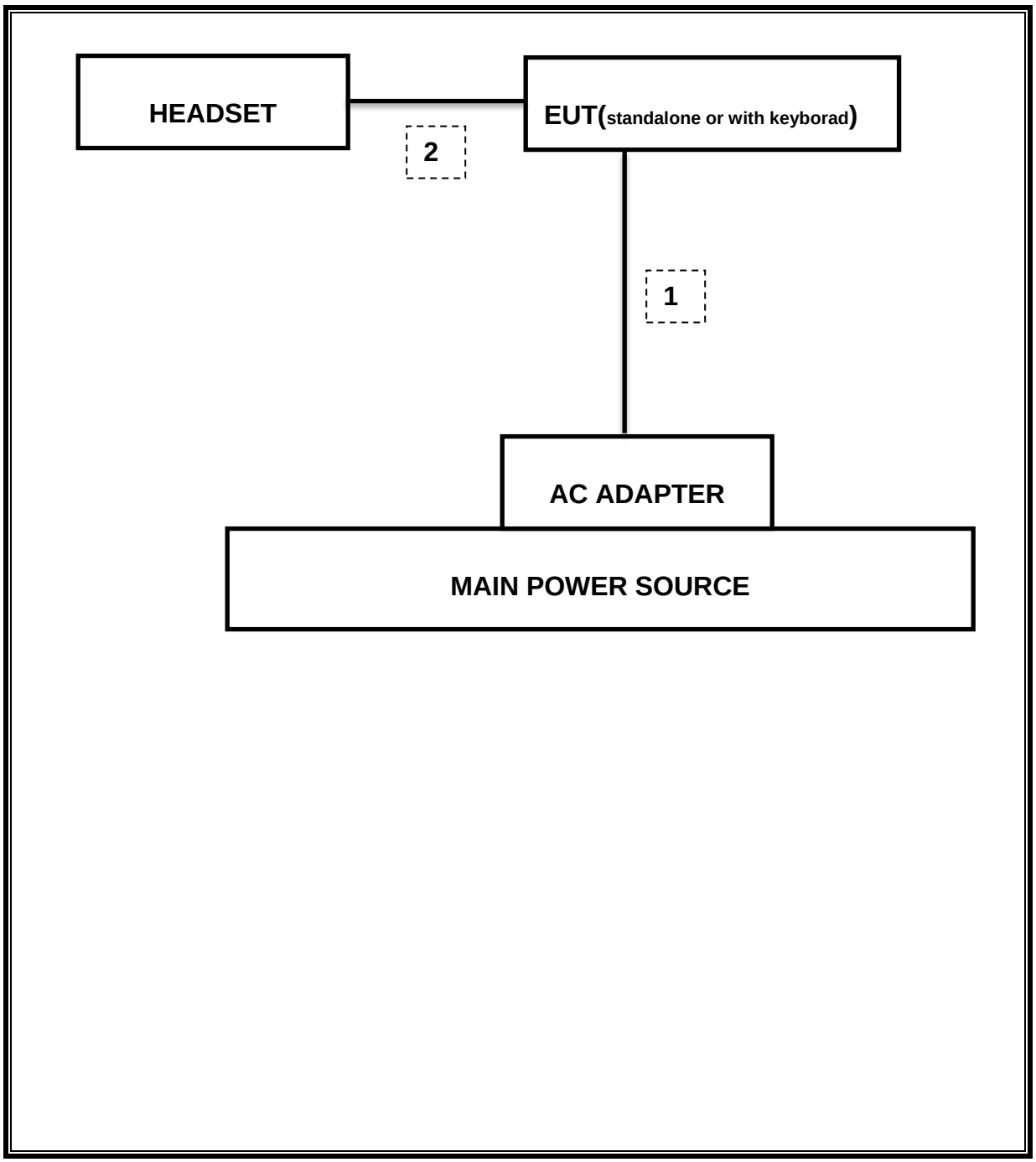
SETUP DIAGRAM FOR TESTS



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	10-14-18
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
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
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
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	NRP-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	PASTERNACK	PE7087-10	A009	08-16-17
Combiner	WEINSCHEL	1575	2151	08-17-17
UL Software				
Description	**Manufacturer**	**Model**	**Version**	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. REFERENCE MEASUREMENT RESULTS

7.1. 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 ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

7.1.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [KHz]	99% Bandwidth [KHz]
Low	2402	970.700	900.230
Mid	2441	965.900	896.630
High	2480	974.500	905.900
Worst		974.500	905.900

7.1.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.242	1.279
Mid	2441	1.305	1.274
High	2480	1.238	1.237
Worst		1.305	1.279

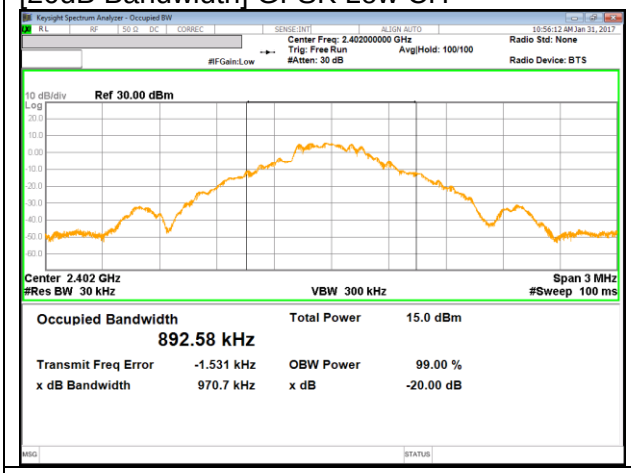
7.1.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.263	1.162
Mid	2441	1.268	1.162
High	2480	1.264	1.162
Worst		1.268	1.162

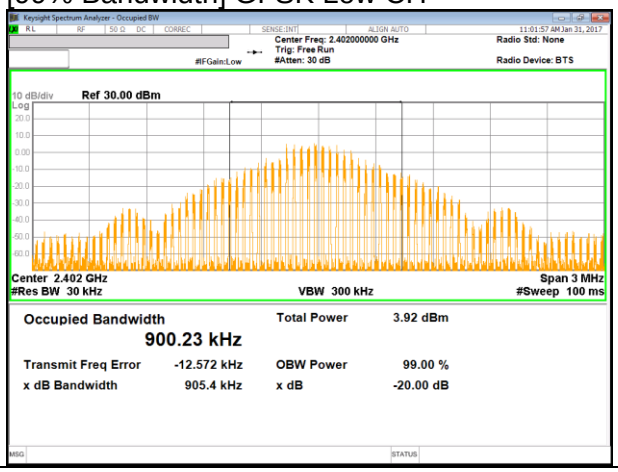
7.1.4. 20 dB AND 99% BANDWIDTH PLOTS

GFSK BANDWIDTH

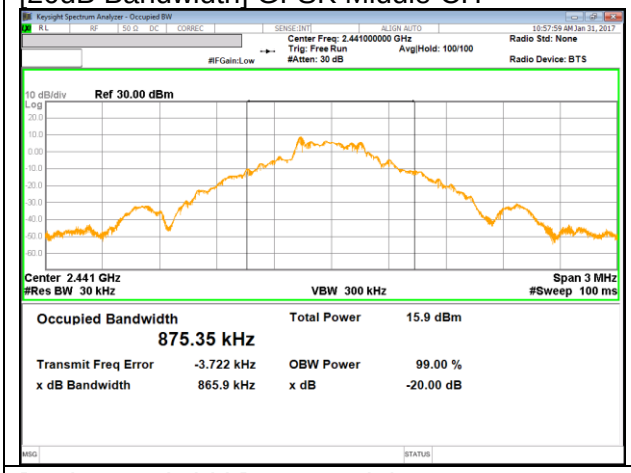
[20dB Bandwidth] GFSK Low CH



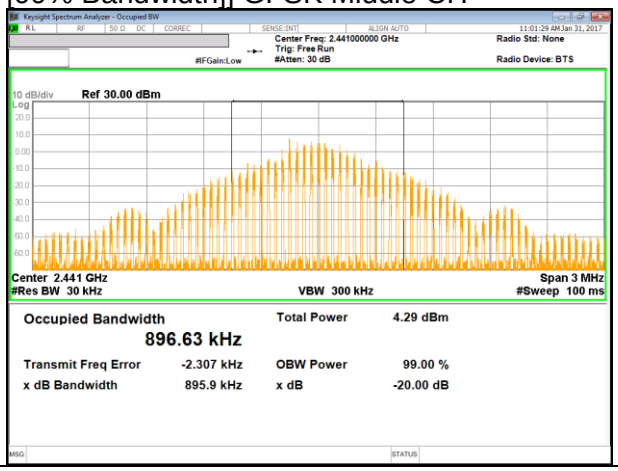
[99% Bandwidth] GFSK Low CH



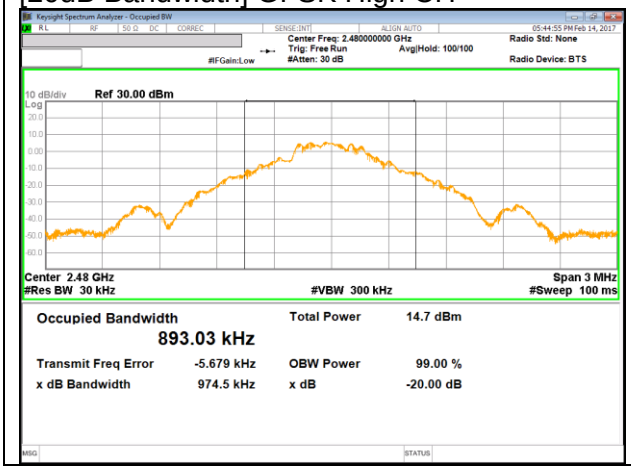
[20dB Bandwidth] GFSK Middle CH



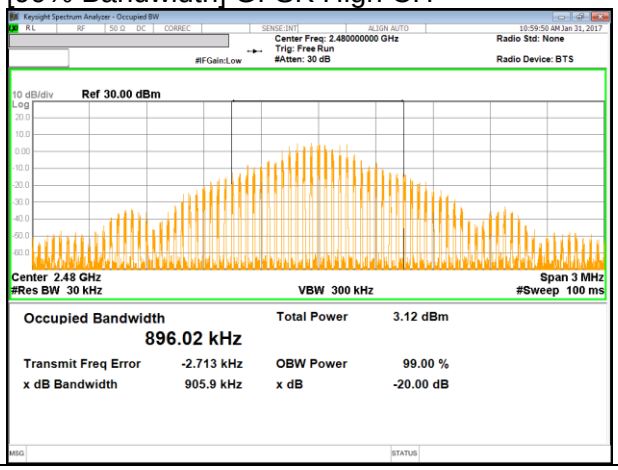
[99% Bandwidth]] GFSK Middle CH



[20dB Bandwidth] GFSK High CH

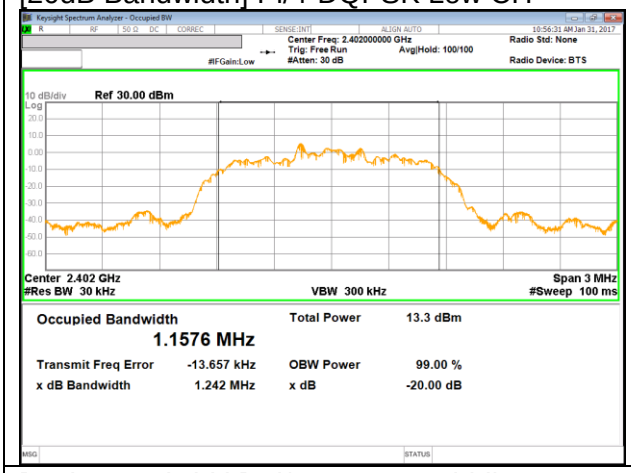


[99% Bandwidth] GFSK High CH

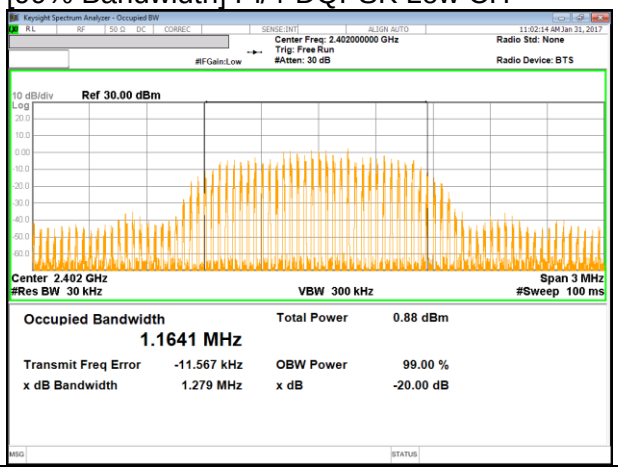


Pi/4-DQPSK BANDWIDTH

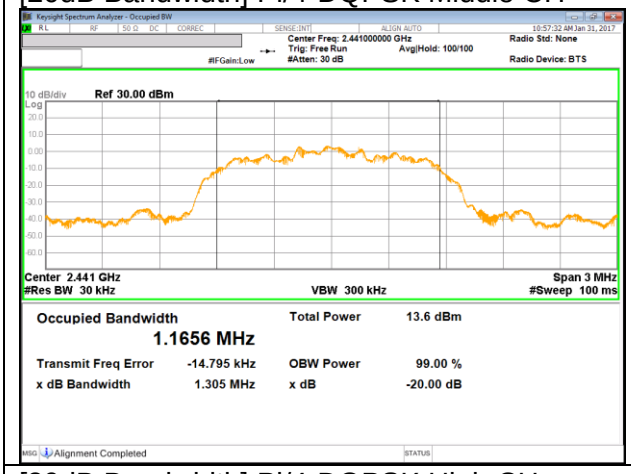
[20dB Bandwidth] Pi/4-DQPSK Low CH



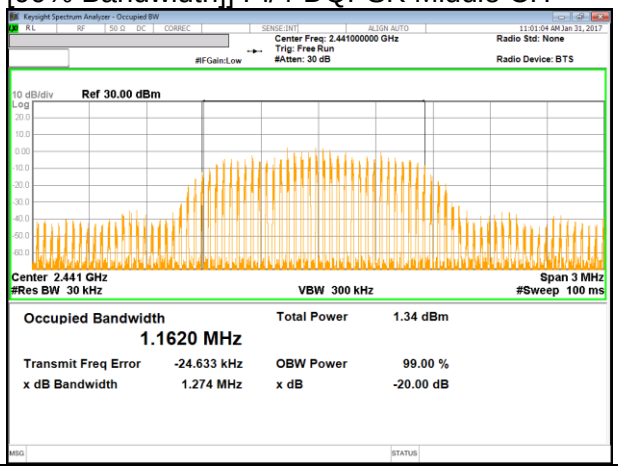
[99% Bandwidth] Pi/4-DQPSK Low CH



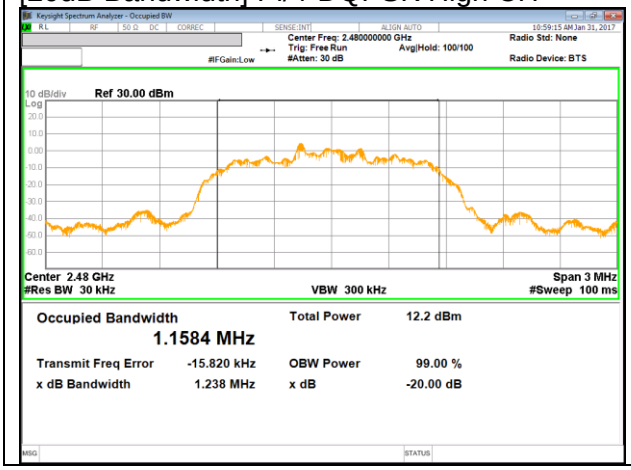
[20dB Bandwidth] Pi/4-DQPSK Middle CH



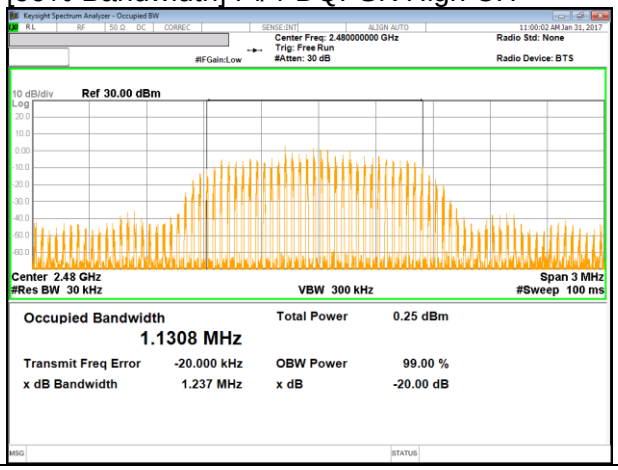
[99% Bandwidth]] Pi/4-DQPSK Middle CH



[20dB Bandwidth] Pi/4-DQPSK High CH

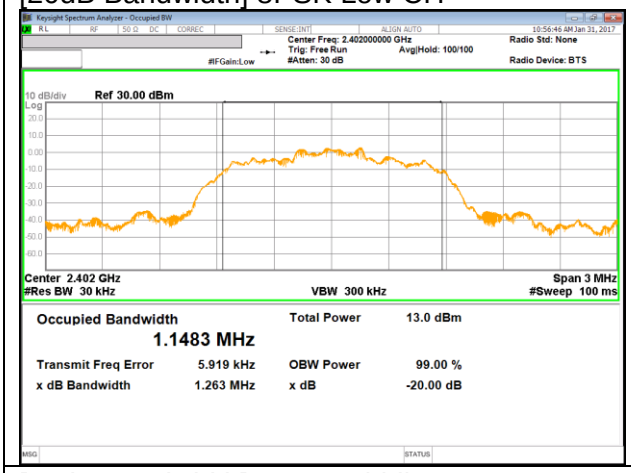


[99% Bandwidth] Pi/4-DQPSK High CH

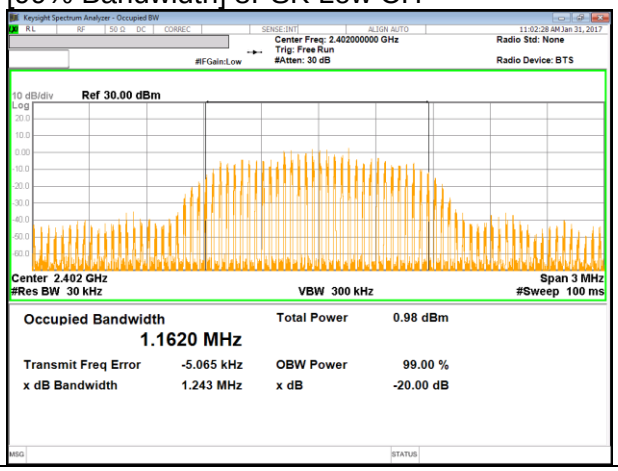


8PSK BANDWIDTH

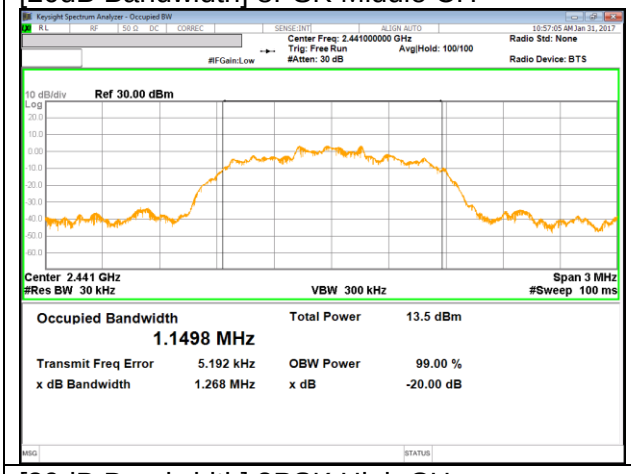
[20dB Bandwidth] 8PSK Low CH



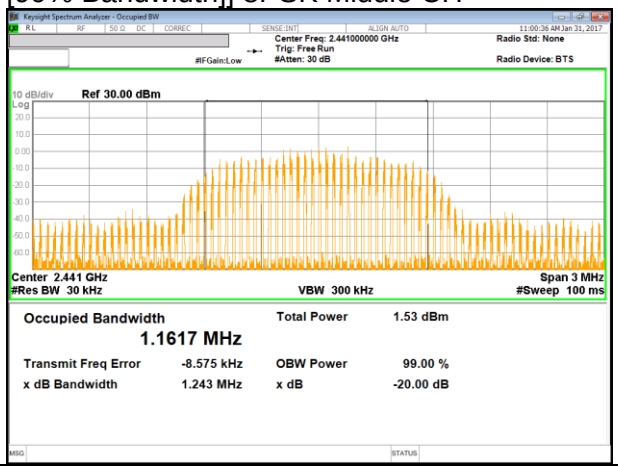
[99% Bandwidth] 8PSK Low CH



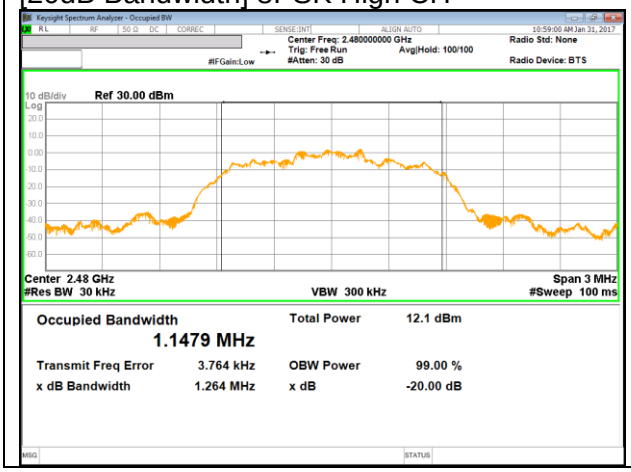
[20dB Bandwidth] 8PSK Middle CH



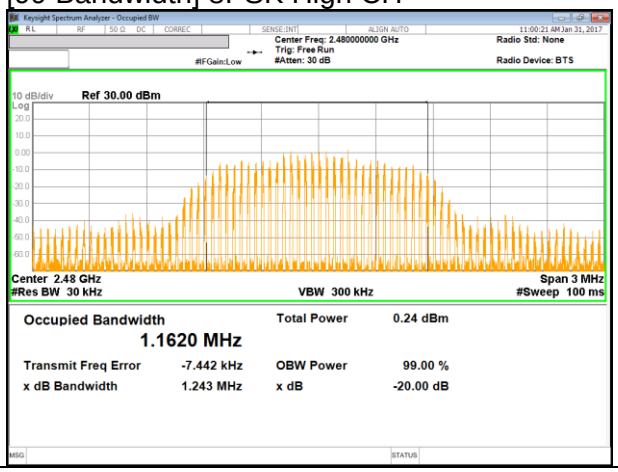
[99% Bandwidth]] 8PSK Middle CH



[20dB Bandwidth] 8PSK High CH



[99 Bandwidth] 8PSK High CH



8. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-39.309 dBm
15.247 (b)(1)	TX conducted output power	<21dBm		Pass	10.075 dBm (Peak)
15.247 (a)(1)	Hopping frequency separation	> 25KHz		Pass	1 MHz
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	79
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 0.4sec		Pass	0.37414 sec
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	48.31 dBuV (Qp)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	45.35 dBuV/m (Av)

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9. ANTENNA PORT TEST RESULTS

9.1. 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 hoping channel, whichever is greater.

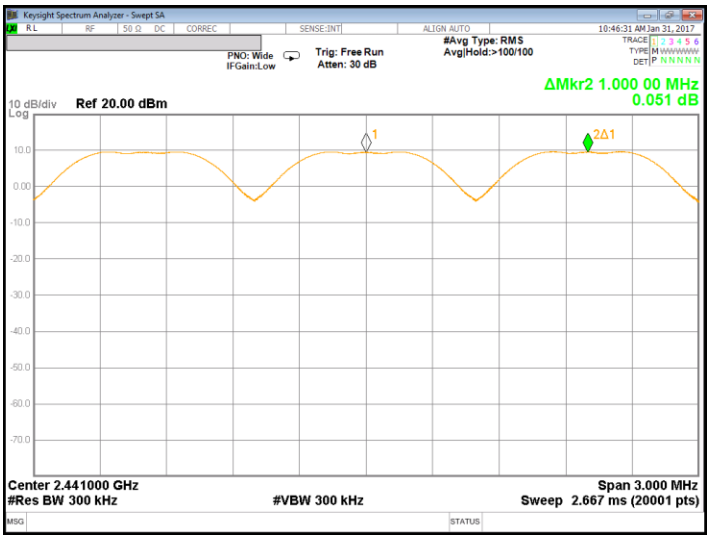
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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



9.2. 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

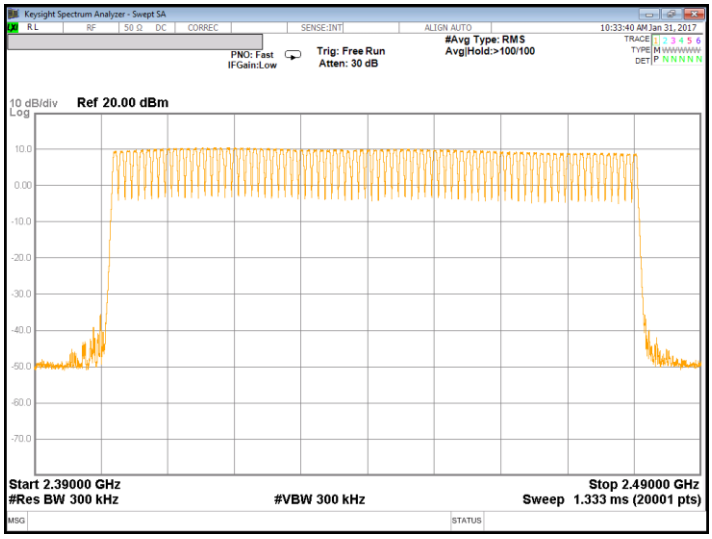
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

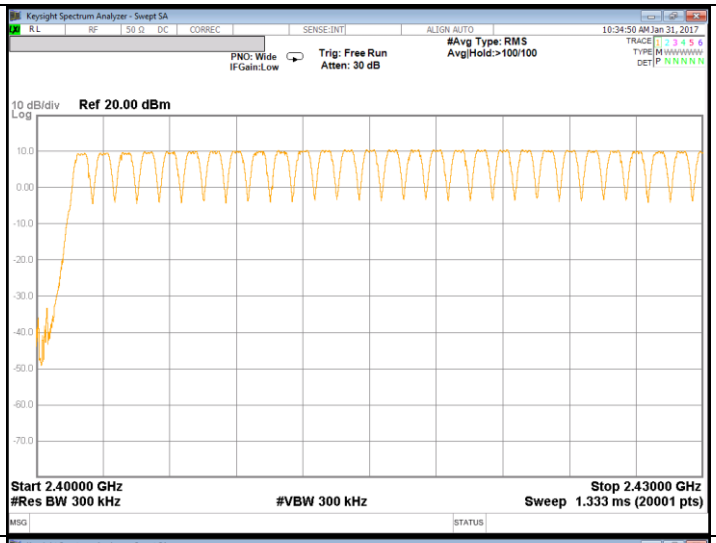
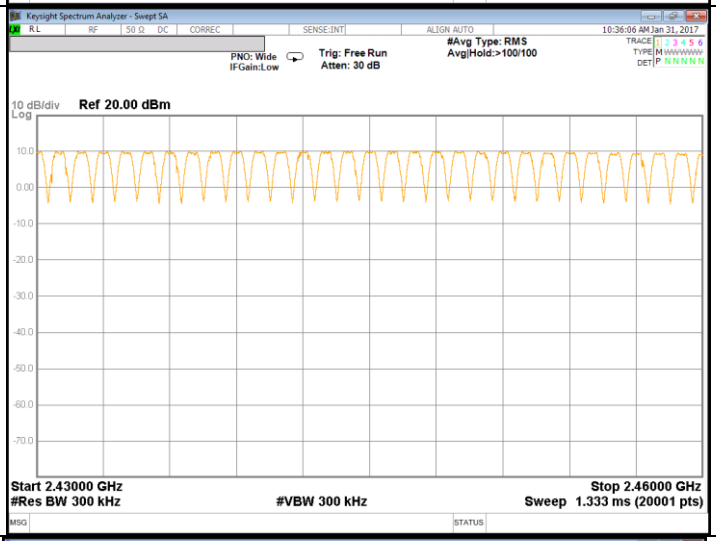
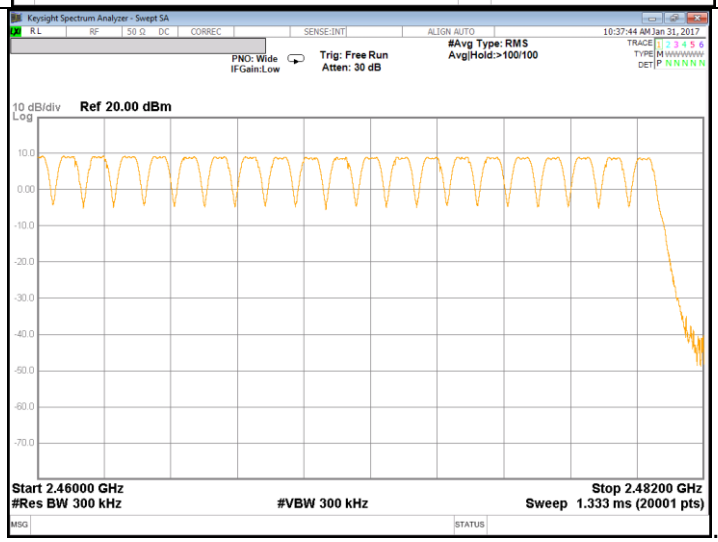
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS PLOTS

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



1st SEGMENT 2400 to 2430 MHz		
2nd SEGMENT 2430 to 2460 MHz		
3rd SEGMENT 2460 to 2482 MHz		

9.3. 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.

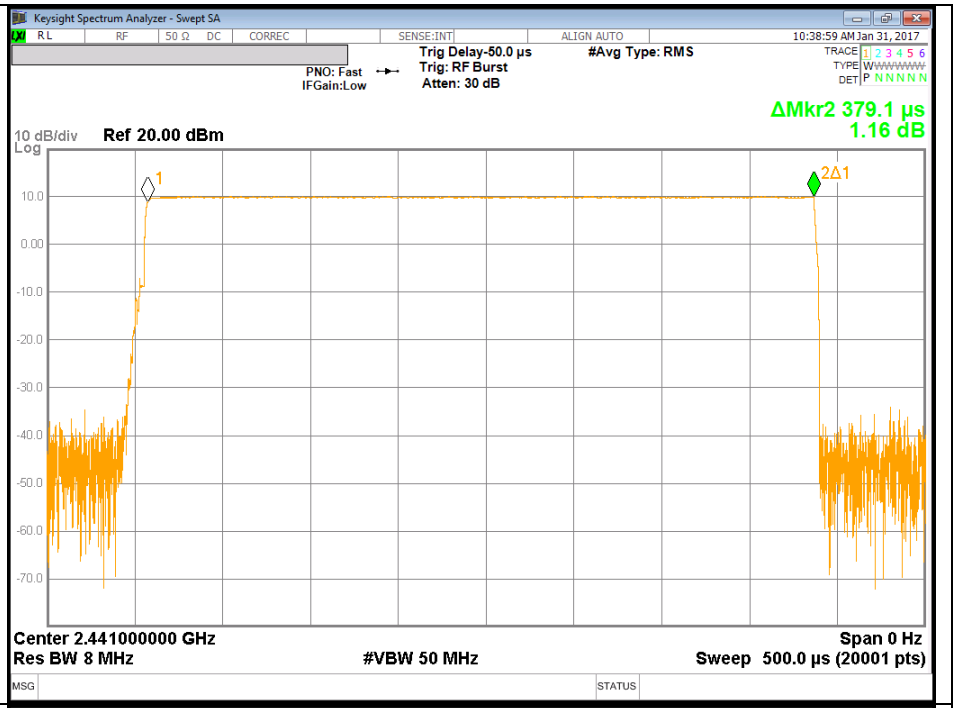
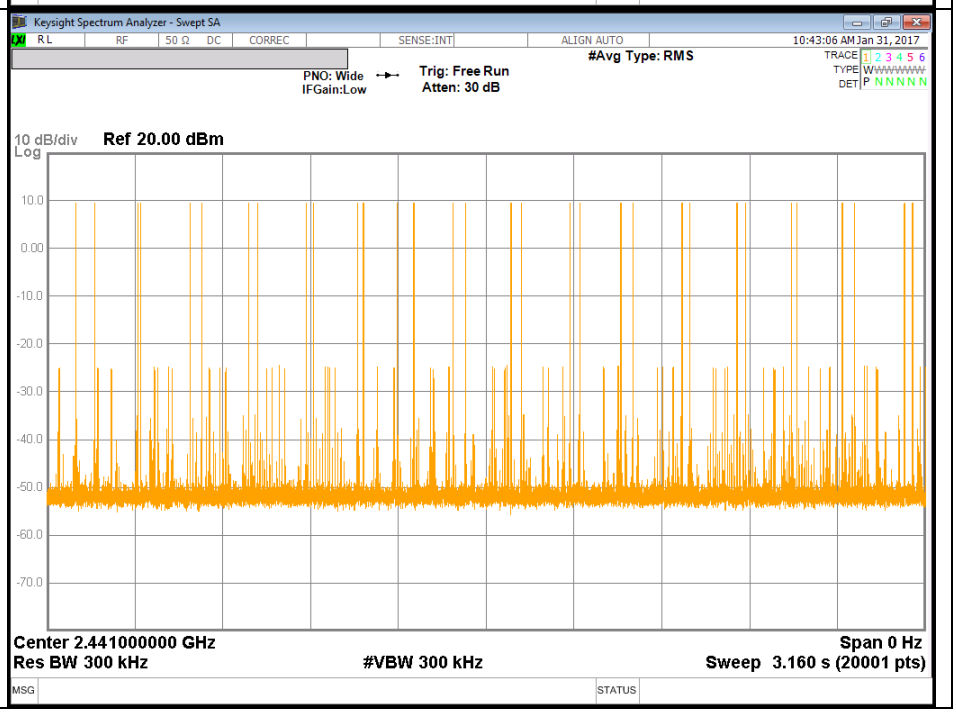
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

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.

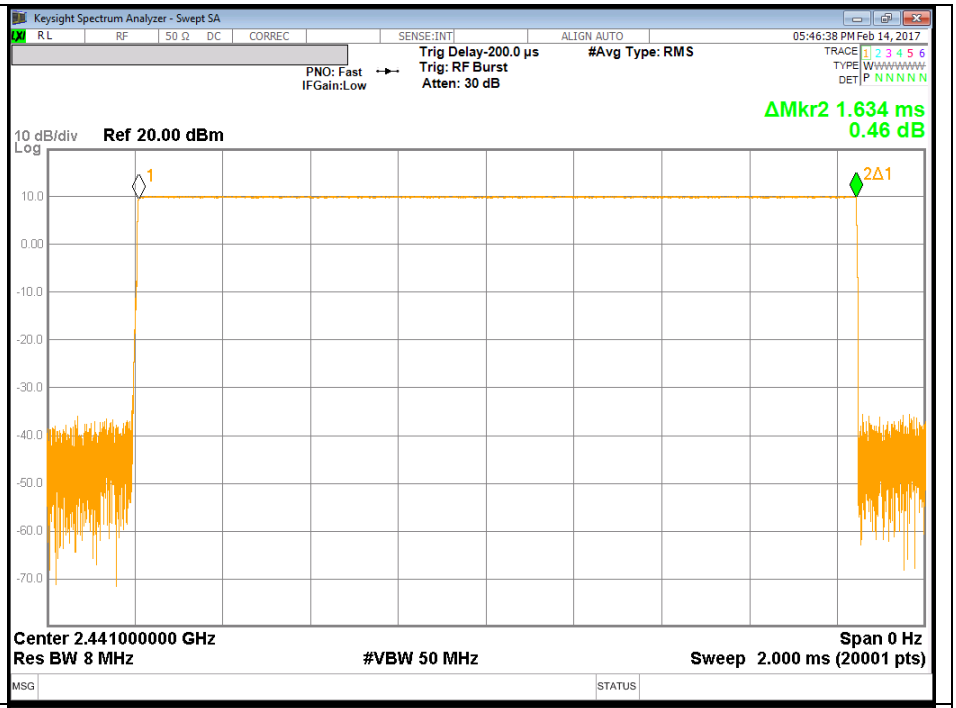
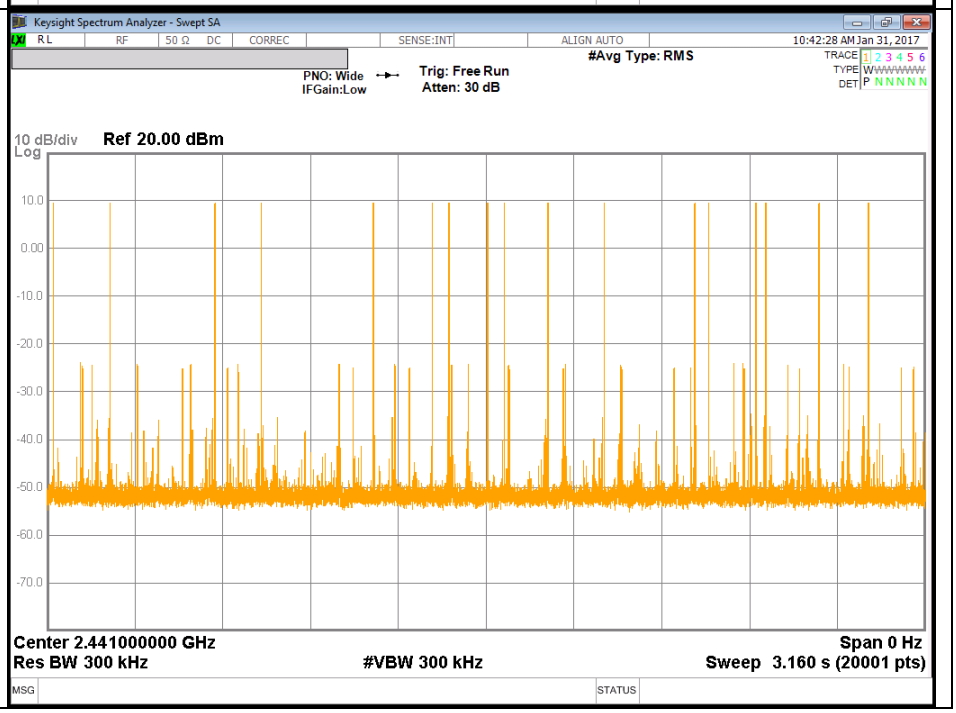
RESULTS

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.379	32	0.121312	0.4	-0.2787
DH3	1.634	17	0.277780	0.4	-0.1222
DH5	2.878	13	0.374140	0.4	-0.0259
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK AFH					
DH1	0.379	8	0.030328	0.4	-0.36967
DH3	1.634	4.25	0.069445	0.4	-0.33056
DH5	2.878	3.25	0.093535	0.4	-0.30647

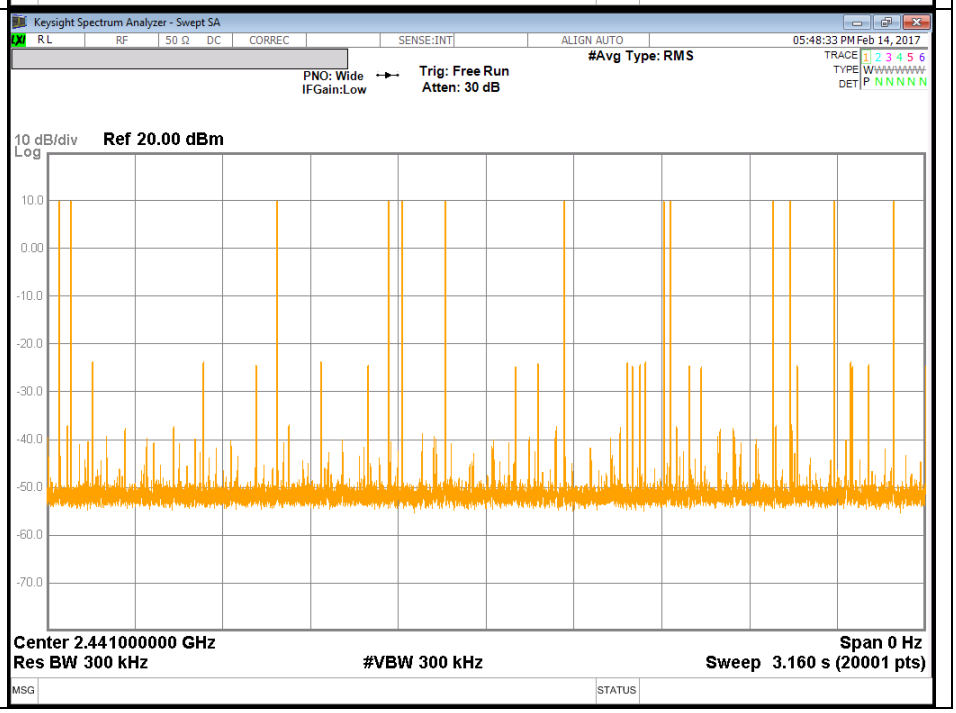
DH1

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	

9.4. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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

TEST PROCEDURE

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

9.4.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	9.479	21	-11.521
Middle	2441	10.075	21	-10.925
High	2480	9.008	21	-11.992
Worst		10.075	21	-10.925

9.4.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

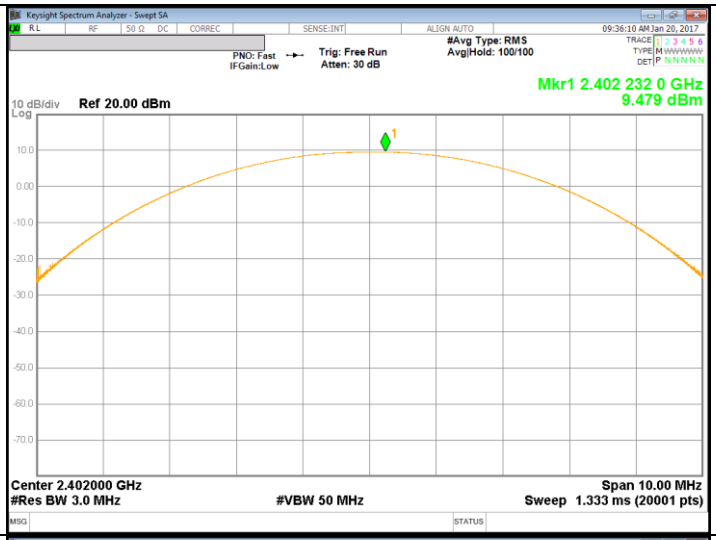
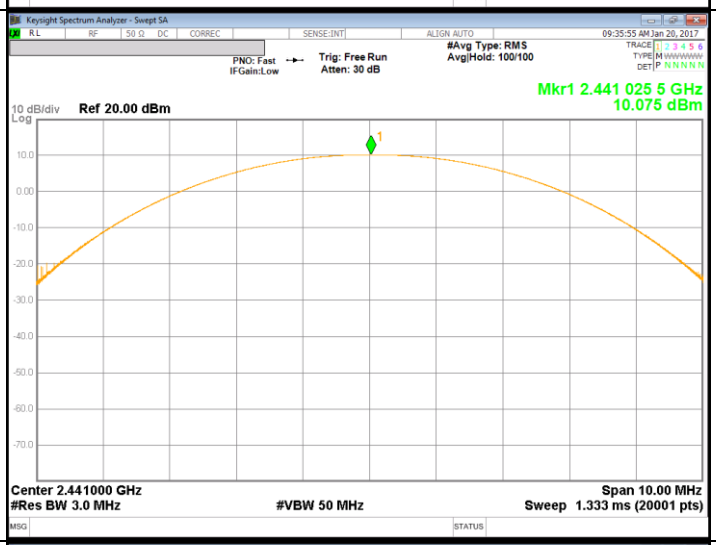
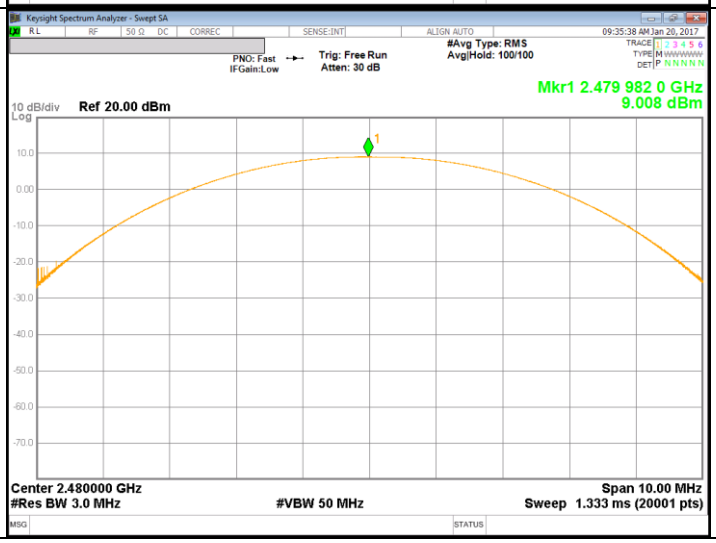
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	8.350	21	-12.650
Middle	2441	8.917	21	-12.083
High	2480	7.681	21	-13.319
Worst		8.917	21	-12.083

9.4.3. ENHANCED DATA RATE 8PSK MODULATION

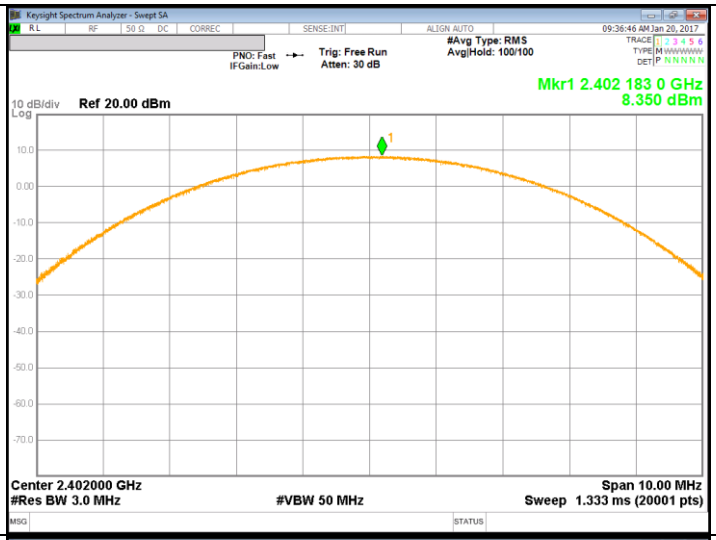
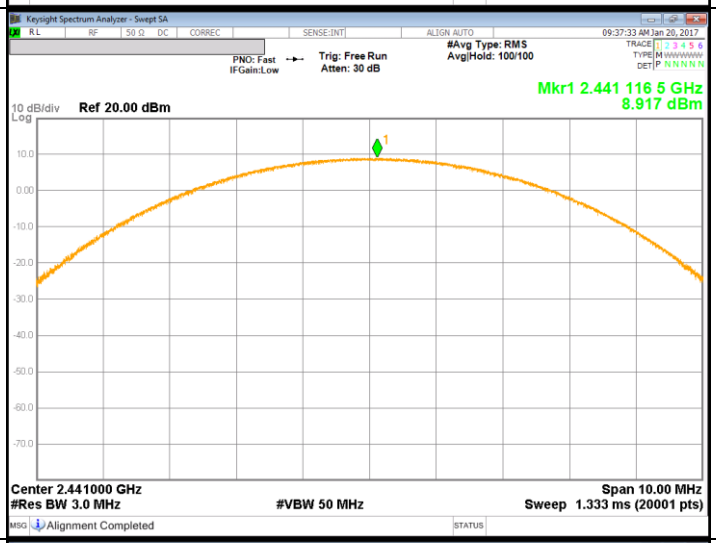
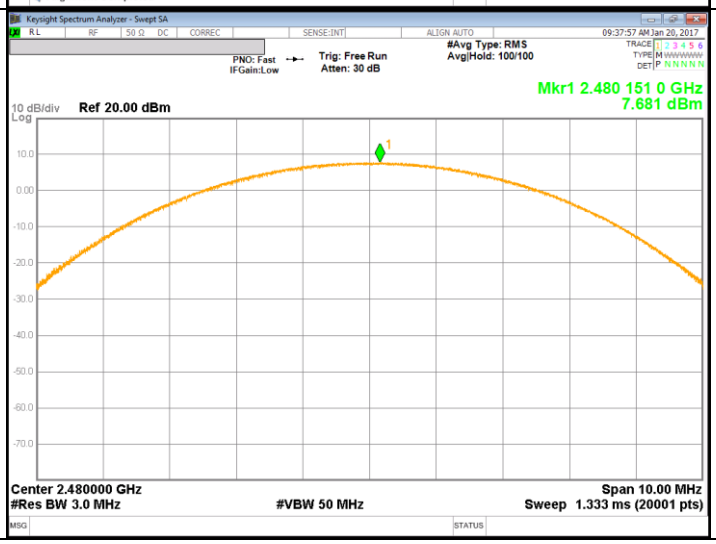
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	8.706	21	-12.294
Middle	2441	9.287	21	-11.713
High	2480	8.031	21	-12.969
Worst		9.287	21	-11.713

9.4.4. OUTPUT POWER PLOTS

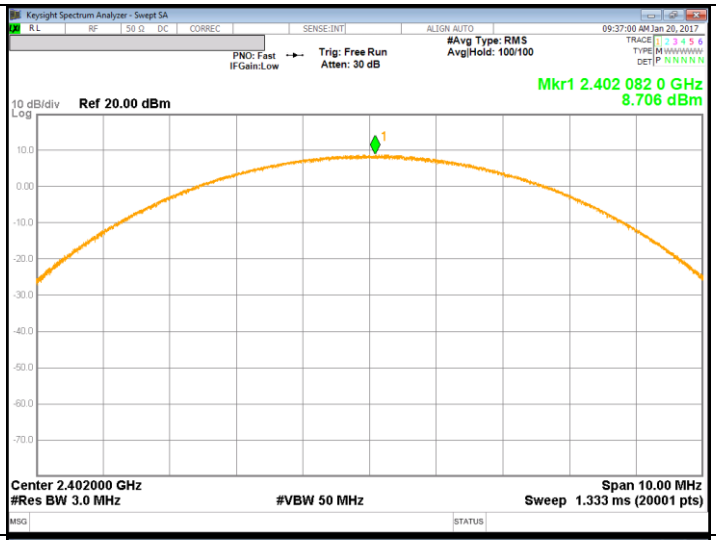
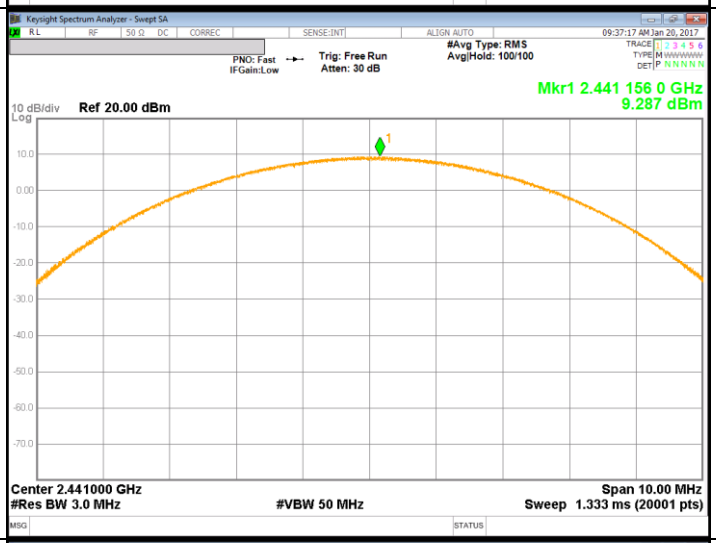
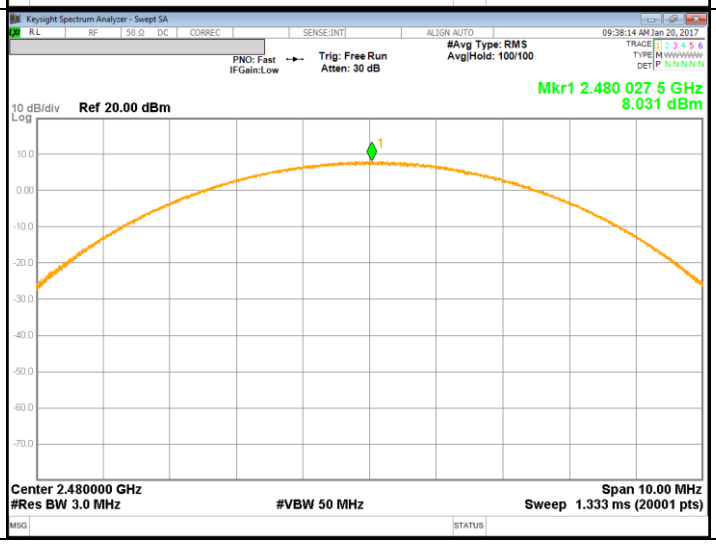
GFSK OUTPUT POWER

GFSK Low CH		
GFSK Middle CH		
GFSK High CH		

Pi/4-DPSK OUTPUT POWER

Pi/4-DPSK Low CH			
Pi/4-DPSK Middle CH			
Pi/4-DPSK High CH			

8PSK OUTPUT POWER

8PSK Low CH		
8PSK Middle CH		
8PSK High CH		

9.5. 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 was entered as an offset in the power meter to allow for direct reading of power.

9.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	9.405	8.72
Middle	2441	9.957	9.90
High	2480	8.763	7.52

9.5.2. DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	6.098	4.07
Middle	2441	6.727	4.71
High	2480	5.127	3.26

9.5.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	6.124	4.10
Middle	2441	6.767	4.75
High	2480	5.160	3.28

9.6. 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.

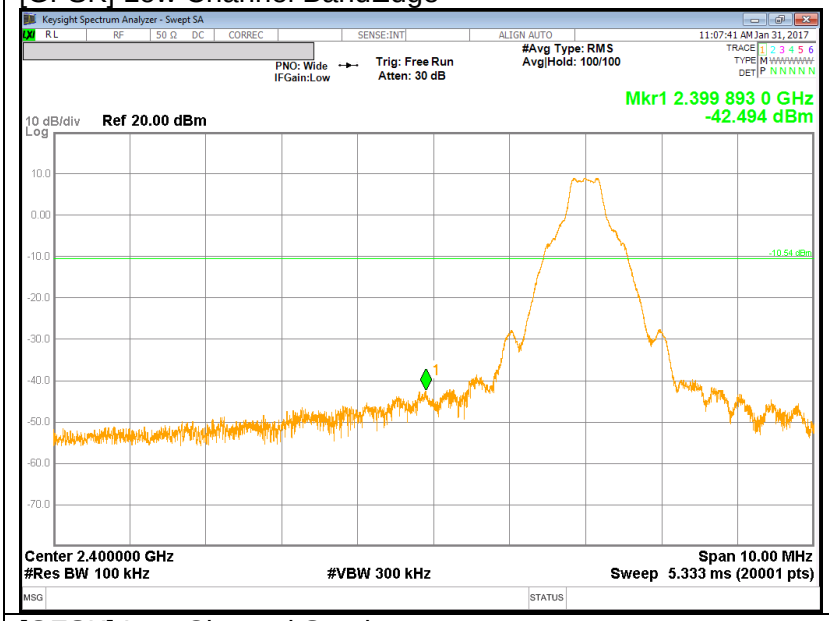
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

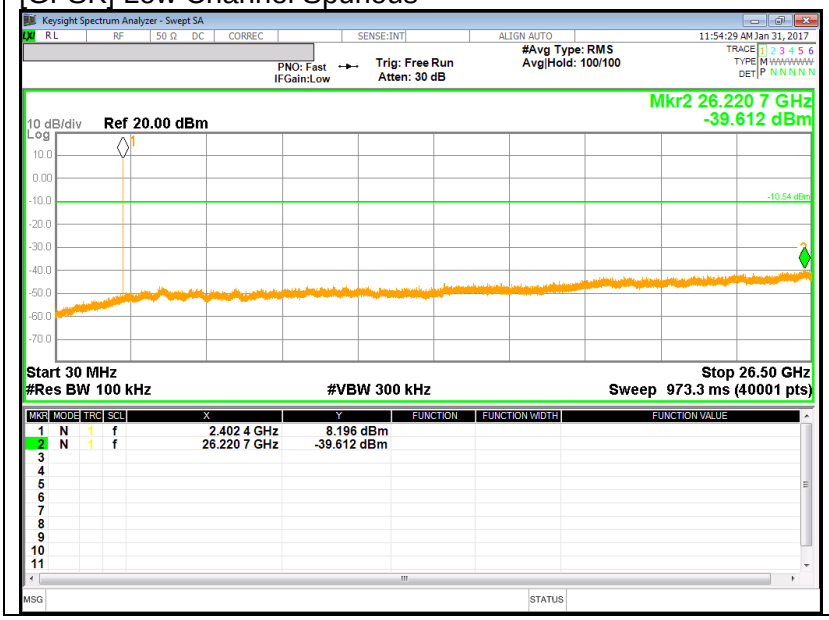
9.6.1. BASIC DATA RATE GFSK MODULATION

GFSK Mode

[GFSK] Low Channel BandEdge

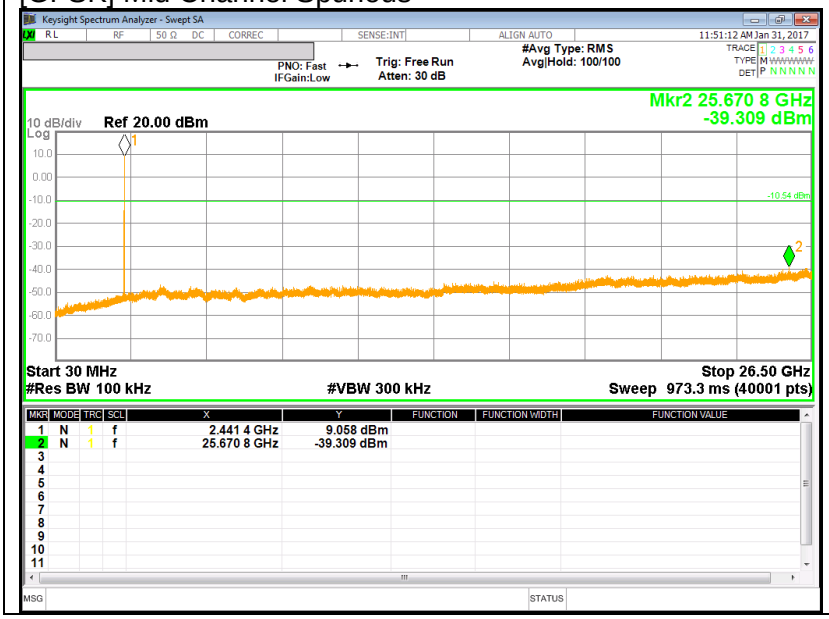


[GFSK] Low Channel Spurious

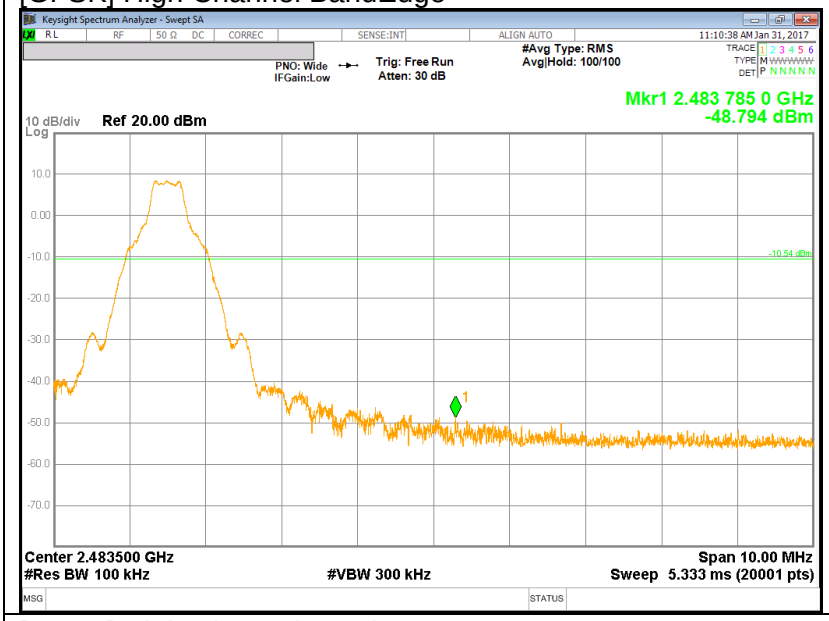


[GFSK] Mid Channel BandEdge

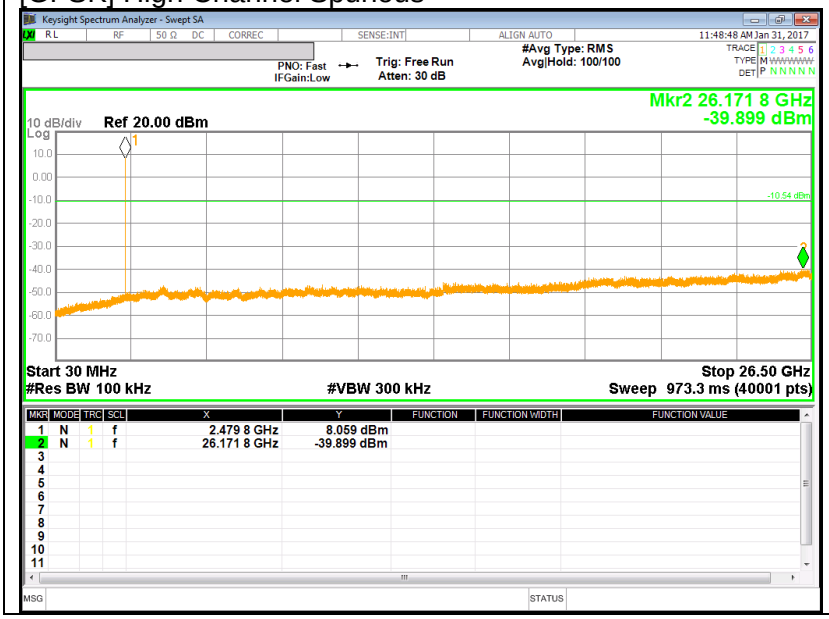
[GFSK] Mid Channel Spurious



[GFSK] High Channel BandEdge

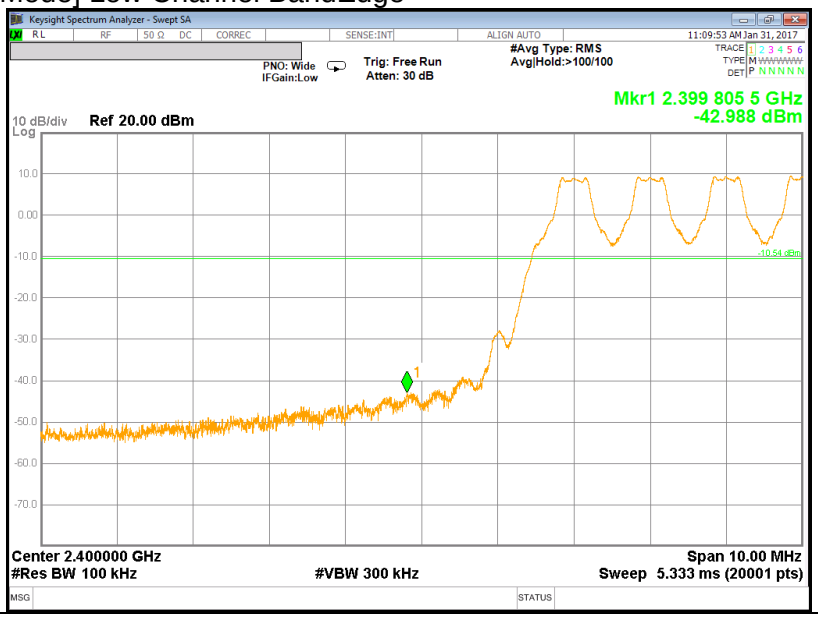


[GFSK] High Channel Spurious



BandEdge Emission at GFSK Hopping Mode

[GFSK Hopping Mode] Low Channel BandEdge

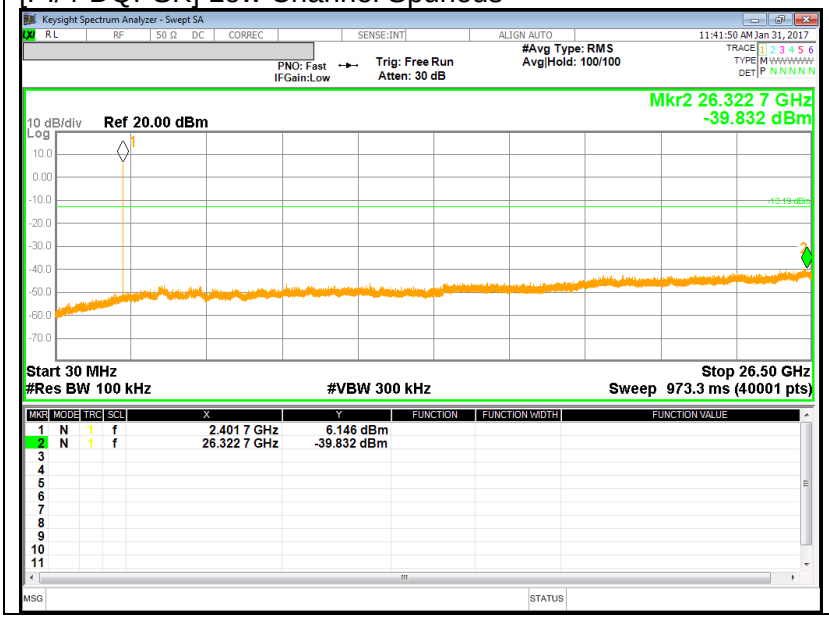


[GFSK Hopping Mode] High Channel BandEdge

PI/4-DQPSK Mode

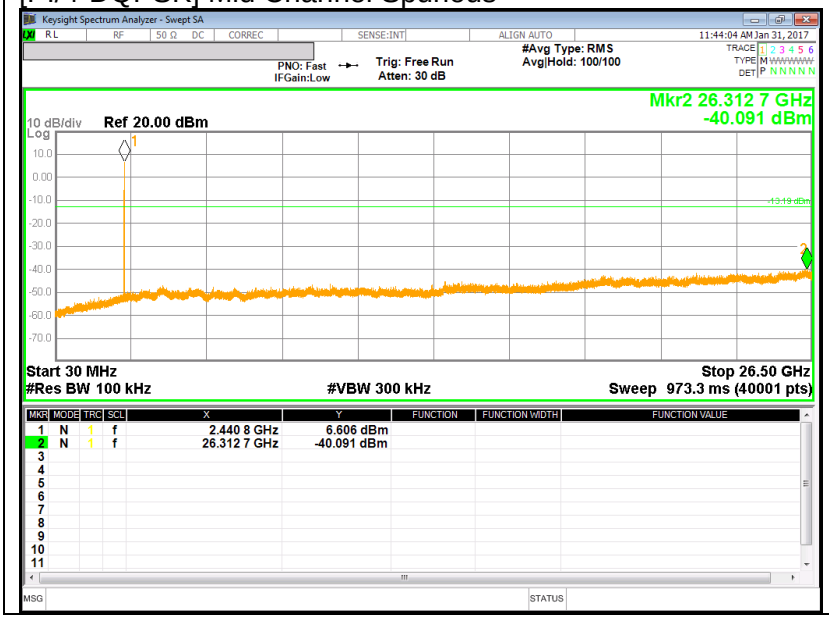
[PI/4-DQPSK] Low Channel BandEdge

[PI/4-DQPSK] Low Channel Spurious



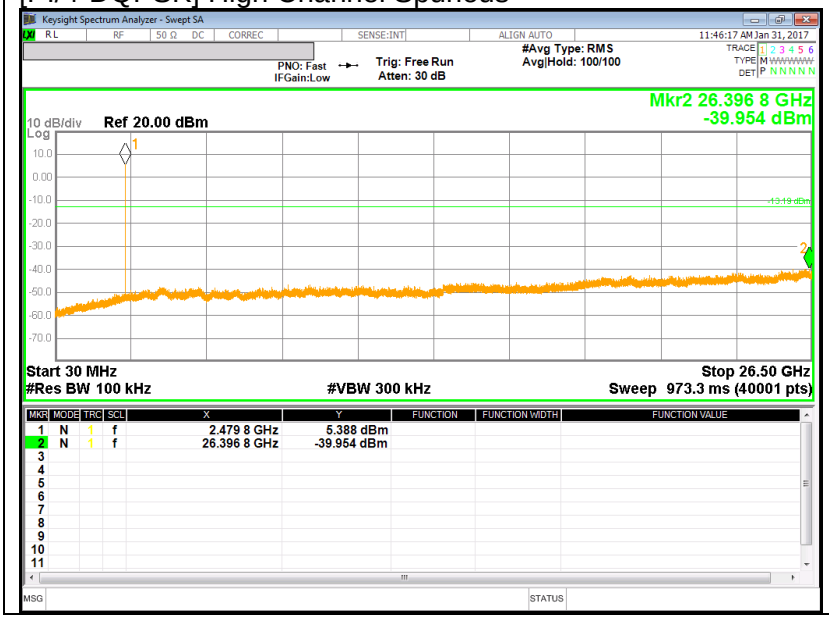
[PI/4-DQPSK] Mid Channel BandEdge

[PI/4-DQPSK] Mid Channel Spurious



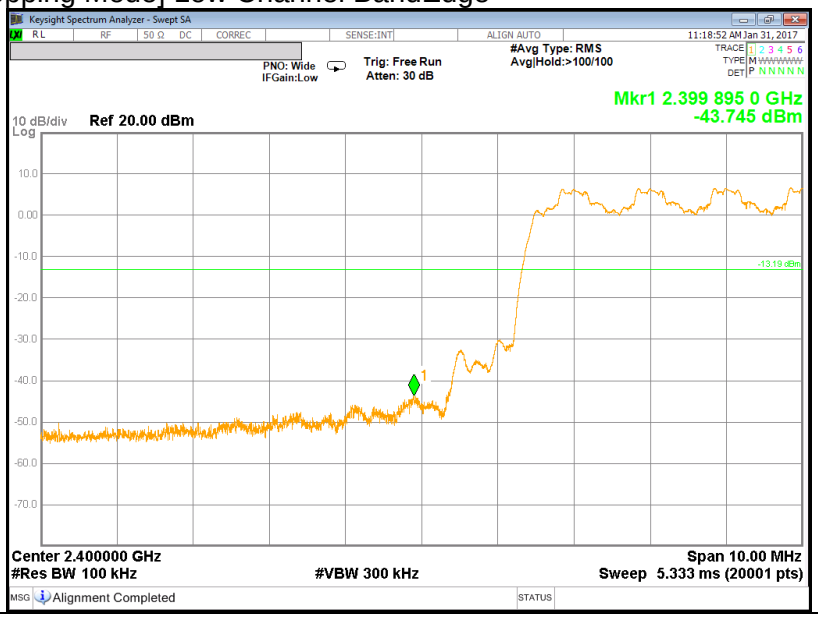
[PI/4-DQPSK] High Channel BandEdge

[PI/4-DQPSK] High Channel Spurious



BandEdge Emission at PI/4-DQPSK Hopping Mode

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



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

UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
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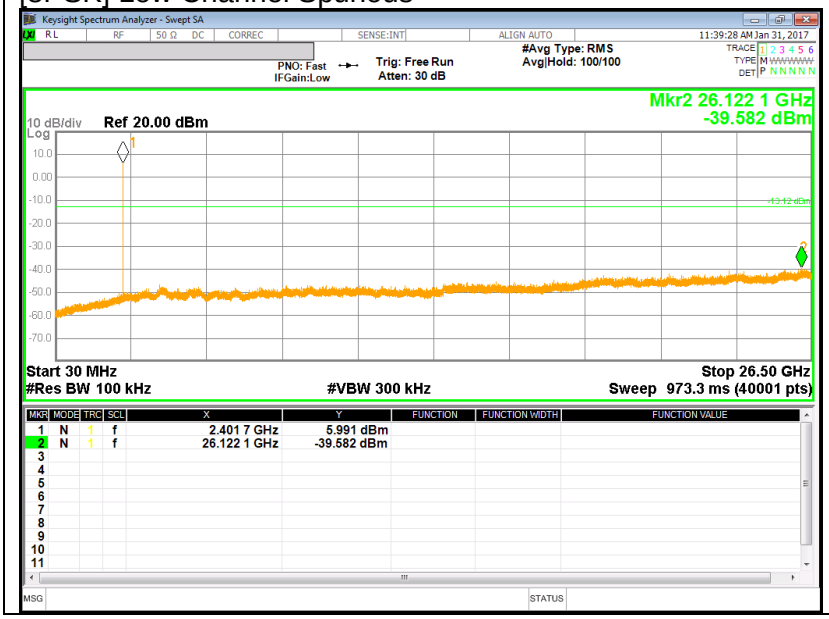
8PSK Mode

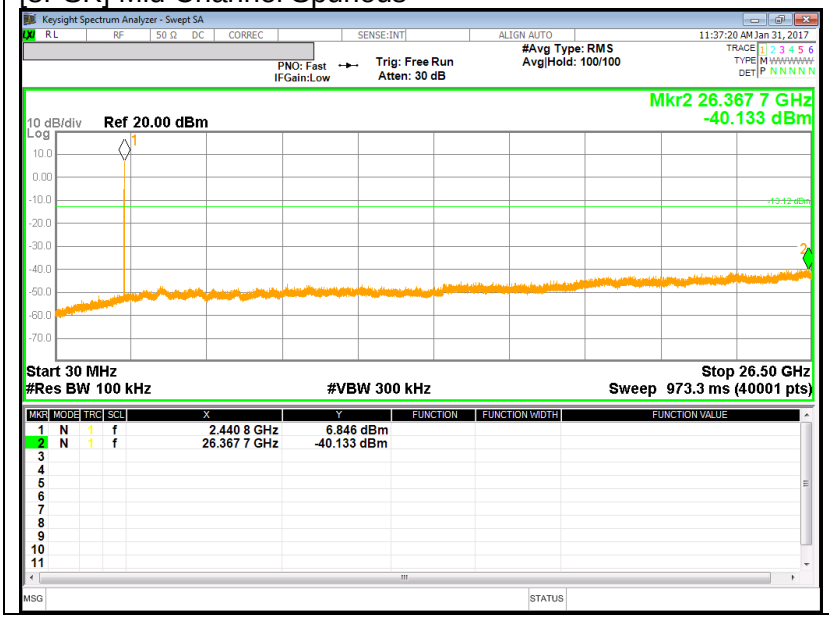
[8PSK] Low Channel BandEdge

[8PSK] Low Channel Spurious



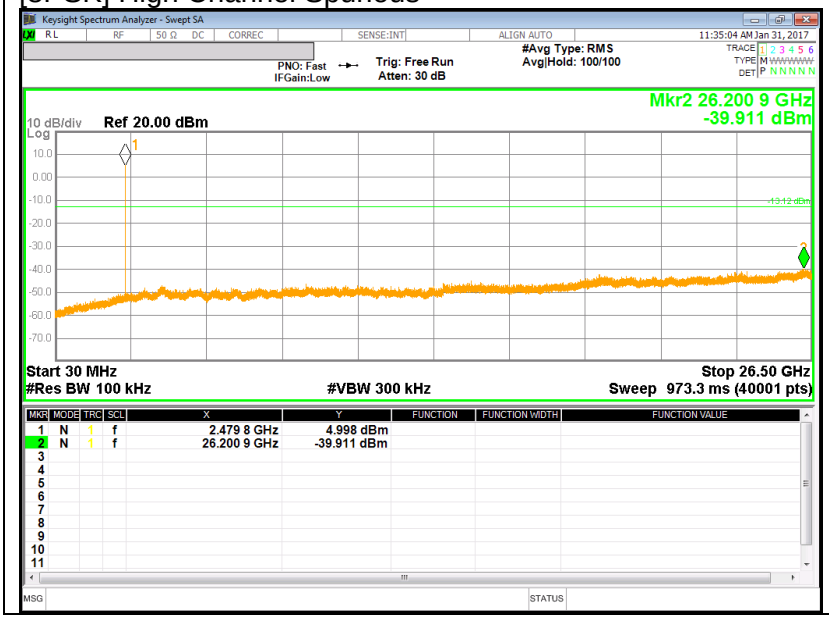
[8PSK] Mid Channel BandEdge

[8PSK] Mid Channel Spurious



[8PSK] High Channel BandEdge

[8PSK] High Channel Spurious



BandEdge Emission at 8PSK Hopping Mode

[8PSK Hopping Mode] Low Channel BandEdge

[8PSK Hopping Mode] High Channel BandEdge

10. RADIATED TEST RESULTS

10.1. 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.

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 1 MHz for peak measurements and 1/T (on time) for average measurement.

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

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)

Although these tests were performed other than open area 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 937606.

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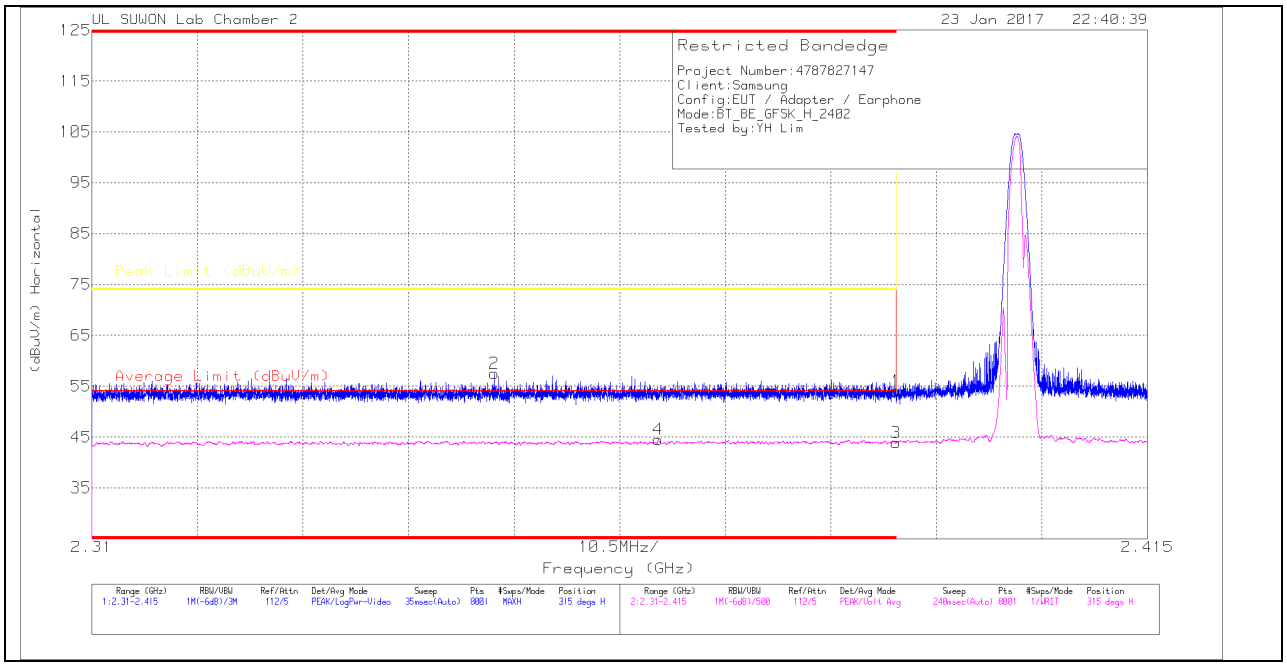
10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

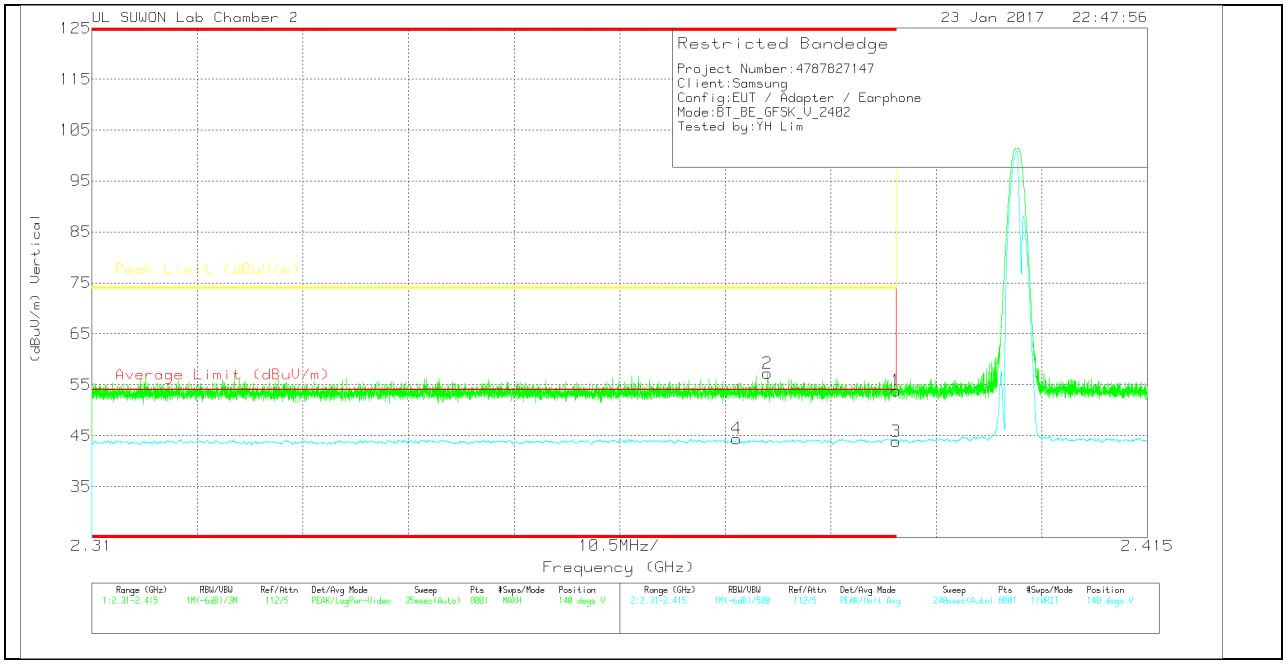
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.51	Pk	31.7	-18.2	54.01	-	-	74	-19.99	315	151	H
2	* 2.35	44.15	Pk	31.6	-18.3	57.45	-	-	74	-16.55	315	151	H
3	* 2.39	30.39	VA1T	31.7	-18.2	43.89	54	-10.11	-	-	315	151	H
4	* 2.366	31.11	VA1T	31.7	-18.3	44.51	54	-9.49	-	-	315	151	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(00168724)_150619	10dB[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	40.35	Pk	31.7	-18.2	53.85	-	-	74	-20.15	140	378	V
2	* 2.377	43.81	Pk	31.7	-18.3	57.21	-	-	74	-16.79	140	378	V
3	* 2.39	30.4	VA1T	31.7	-18.2	43.9	54	-10.1	-	-	140	378	V
4	* 2.374	31.05	VA1T	31.7	-18.3	44.45	54	-9.55	-	-	140	378	V

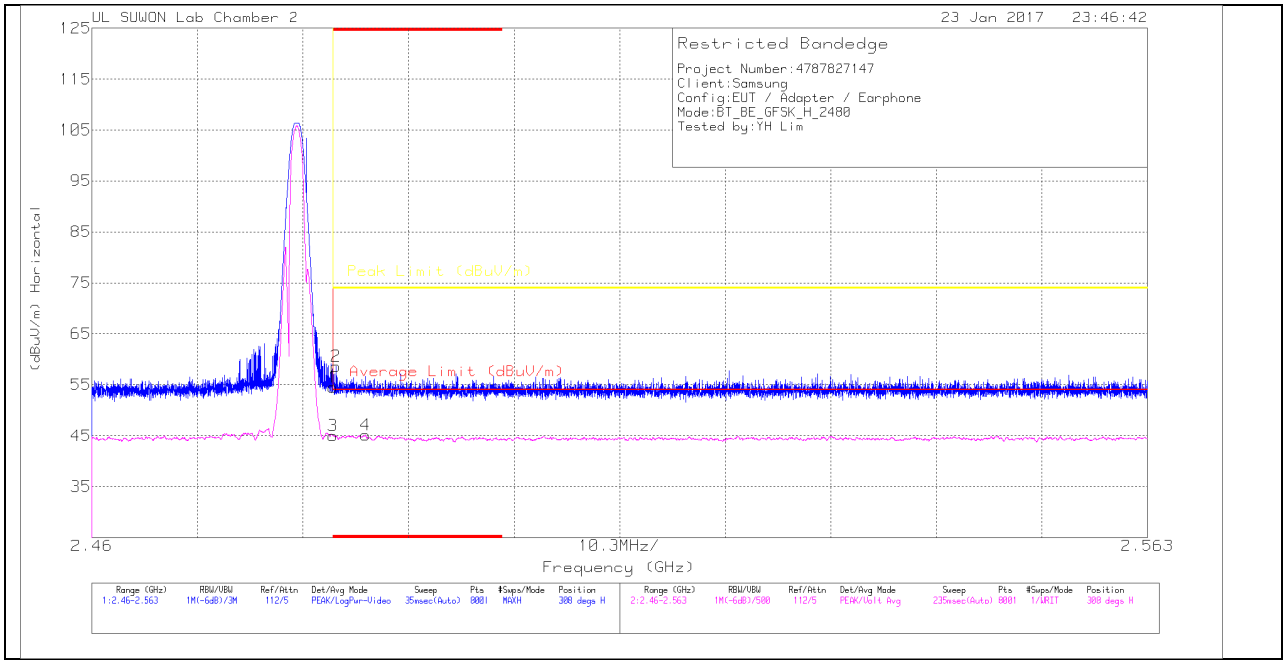
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

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

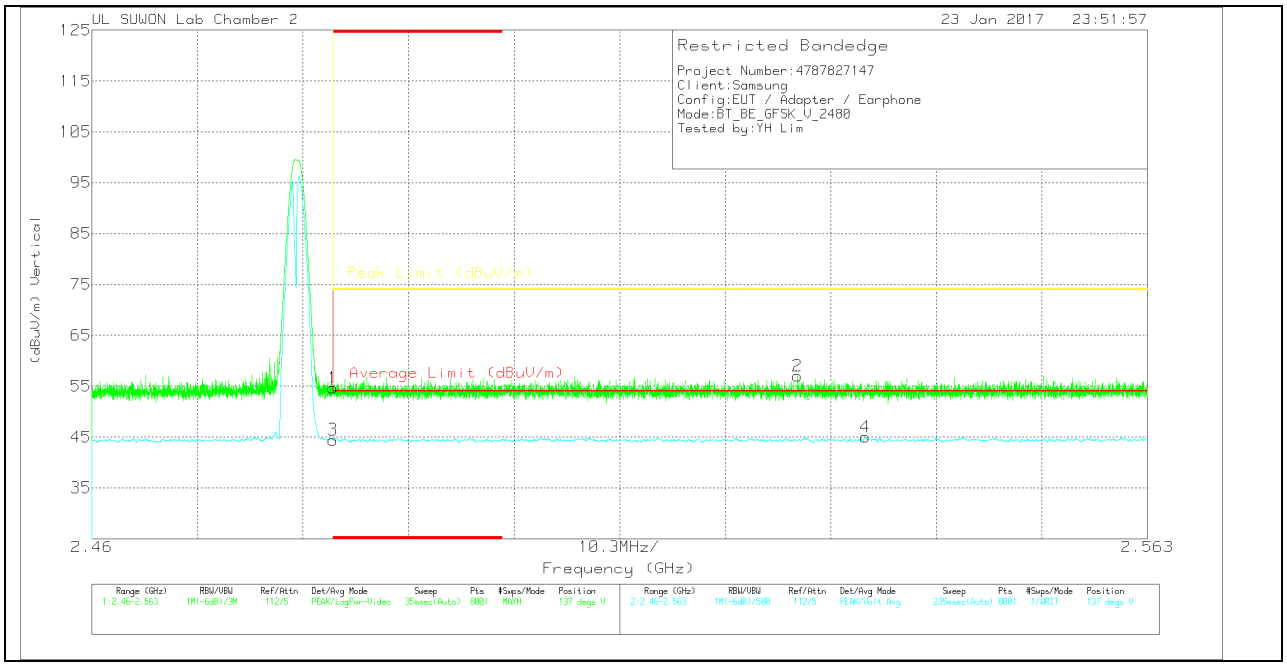
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.71	Pk	31.8	-18	54.51	-	-	74	-19.49	308	224	H
2	* 2.484	44.77	Pk	31.8	-18	58.57	-	-	74	-15.43	308	224	H
3	* 2.484	31.19	VA1T	31.8	-18	44.99	54	-9.01	-	-	308	224	H
4	* 2.487	31.28	VA1T	31.8	-18	45.08	54	-8.92	-	-	308	224	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(00168724)_150619	10dB[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	40.87	Pk	31.8	-18	54.67	-	-	74	-19.33	137	368	V
2	2.529	43.11	Pk	31.9	-18	57.01	-	-	74	-16.99	137	368	V
3	* 2.484	30.65	VA1T	31.8	-18	44.45	54	-9.55	-	-	137	368	V
4	2.535	31.06	VA1T	31.9	-18	44.96	54	-9.04	-	-	137	368	V

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

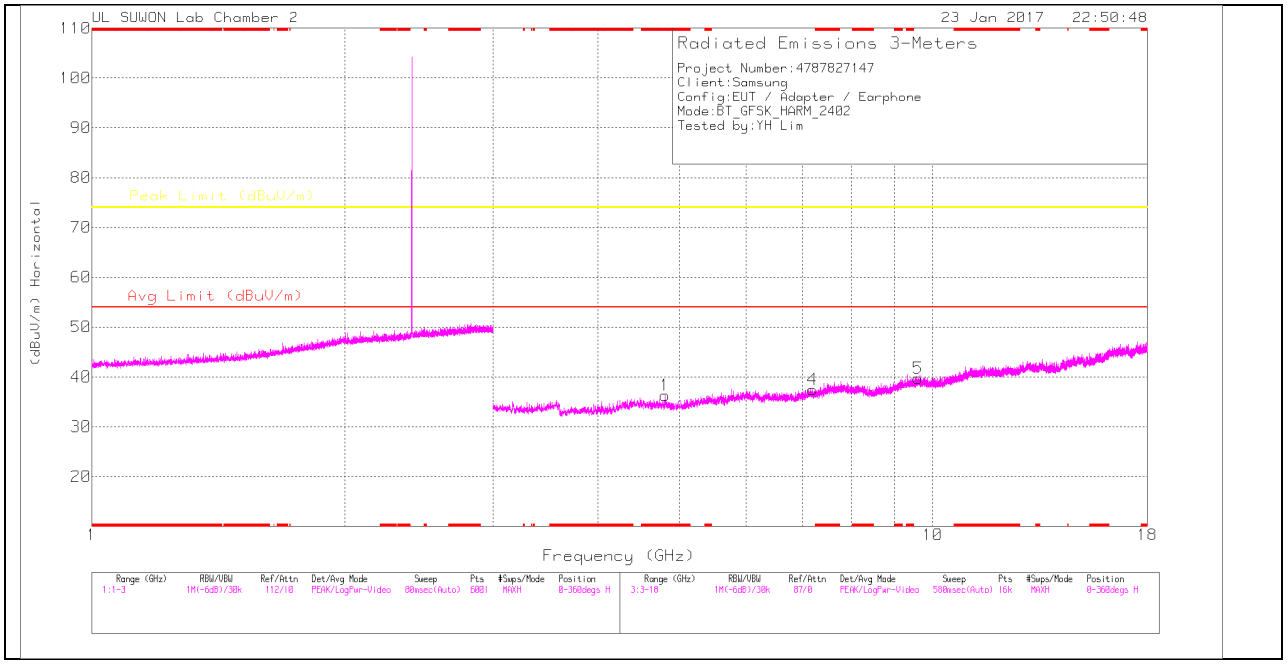
Pk - Peak detector

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

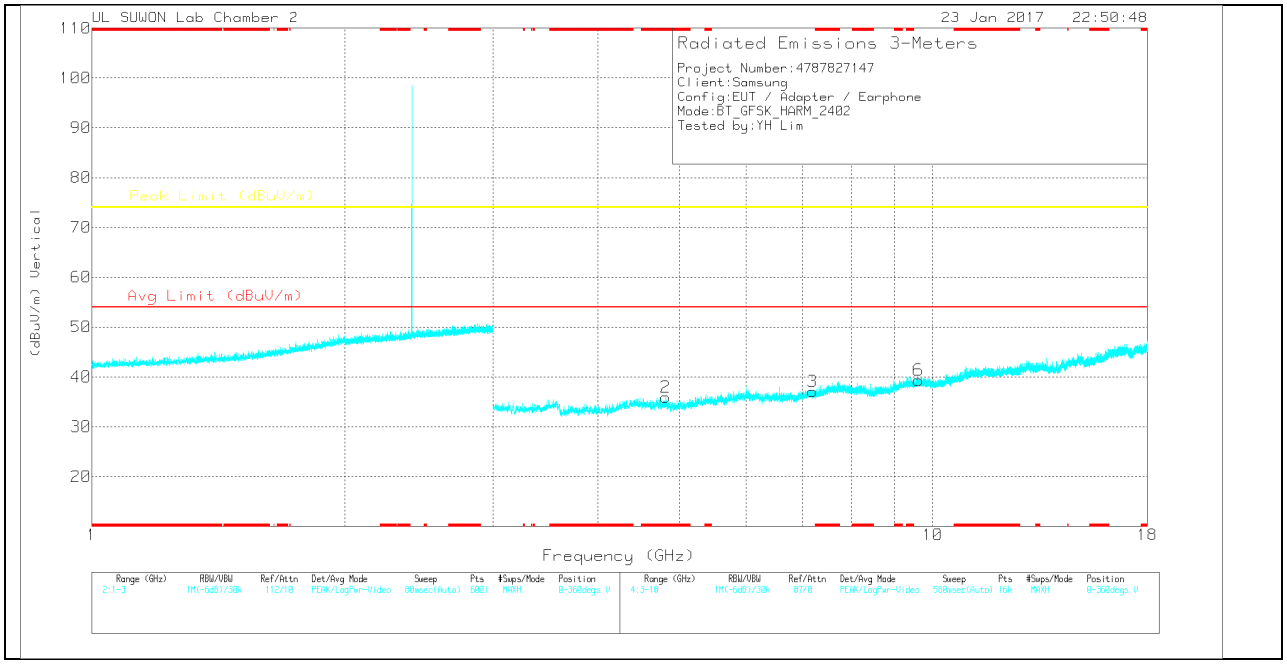
UL Korea, Ltd. Suwon Laboratory FORM ID: FCC_15C
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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

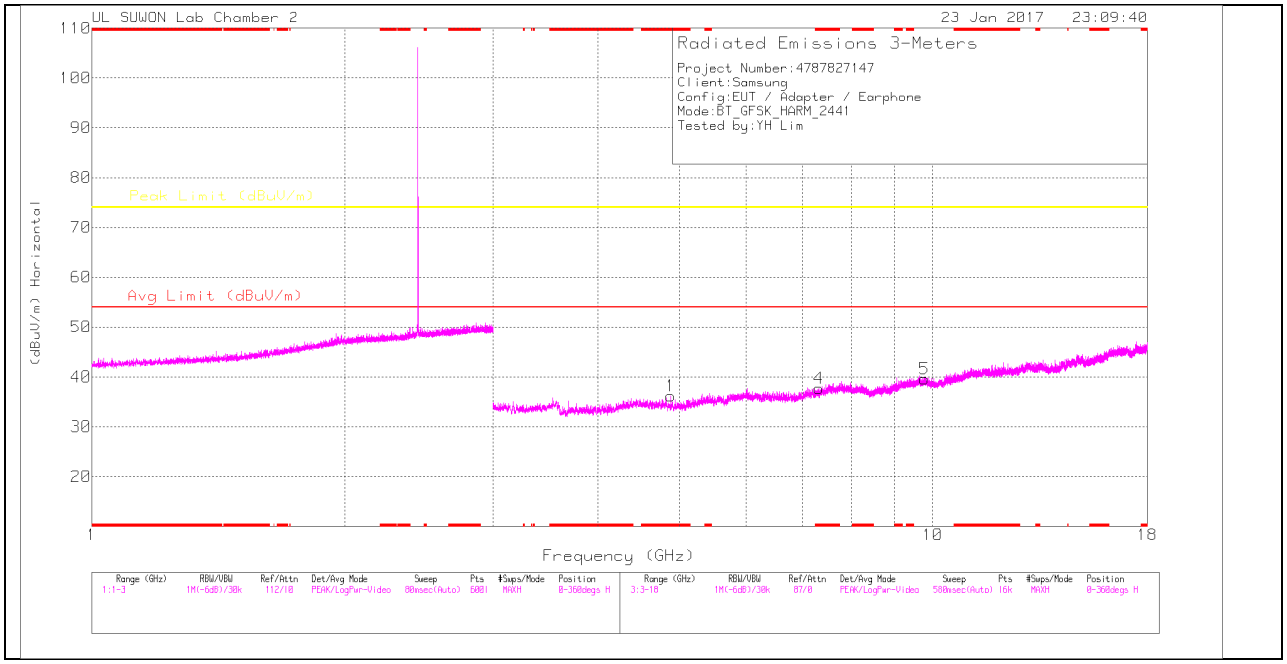
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	26.73	Pk	33.9	-24.3	36.33	-	-	74	-37.67	0-360	250	H
4	7.199	23.38	Pk	35.7	-21.6	37.48	-	-	74	-36.52	0-360	150	H
5	9.61	21.22	Pk	36.9	-18.4	39.72	-	-	74	-34.28	0-360	250	H
2	* 4.809	26.39	Pk	33.9	-24.3	35.99	-	-	74	-38.01	0-360	250	V
3	7.201	23	Pk	35.7	-21.6	37.1	-	-	74	-36.9	0-360	250	V
6	9.616	20.82	Pk	36.9	-18.4	39.32	-	-	74	-34.68	0-360	150	V

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

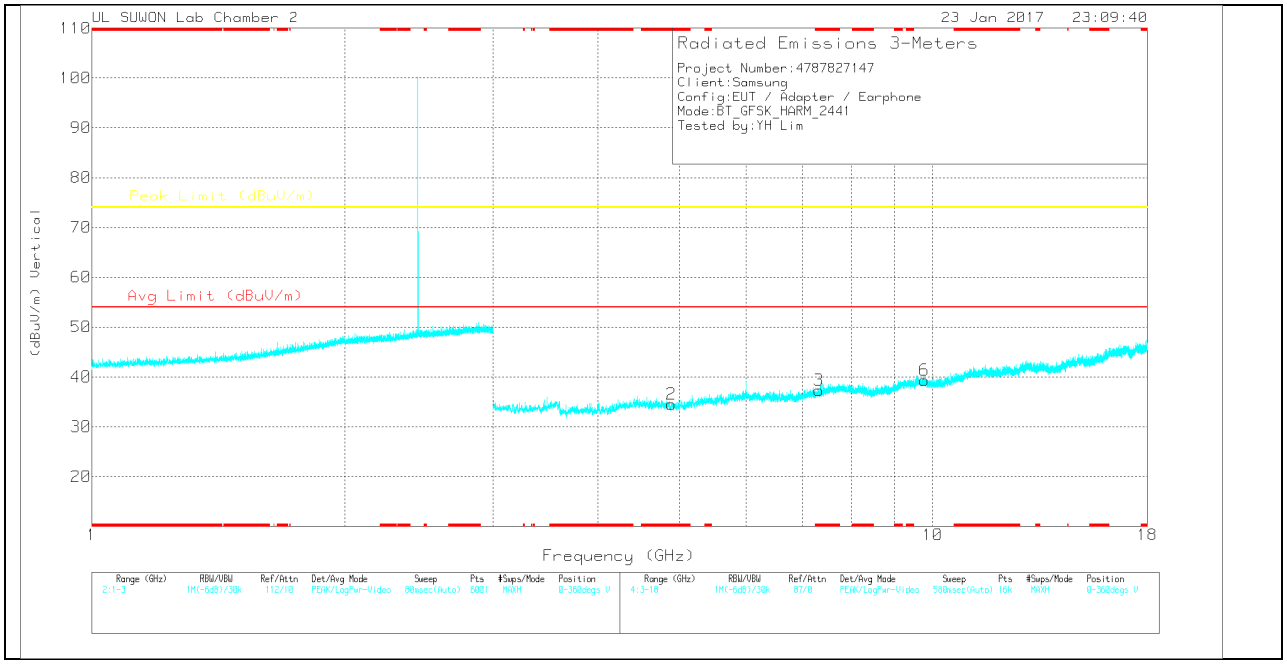
Pk – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limt (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

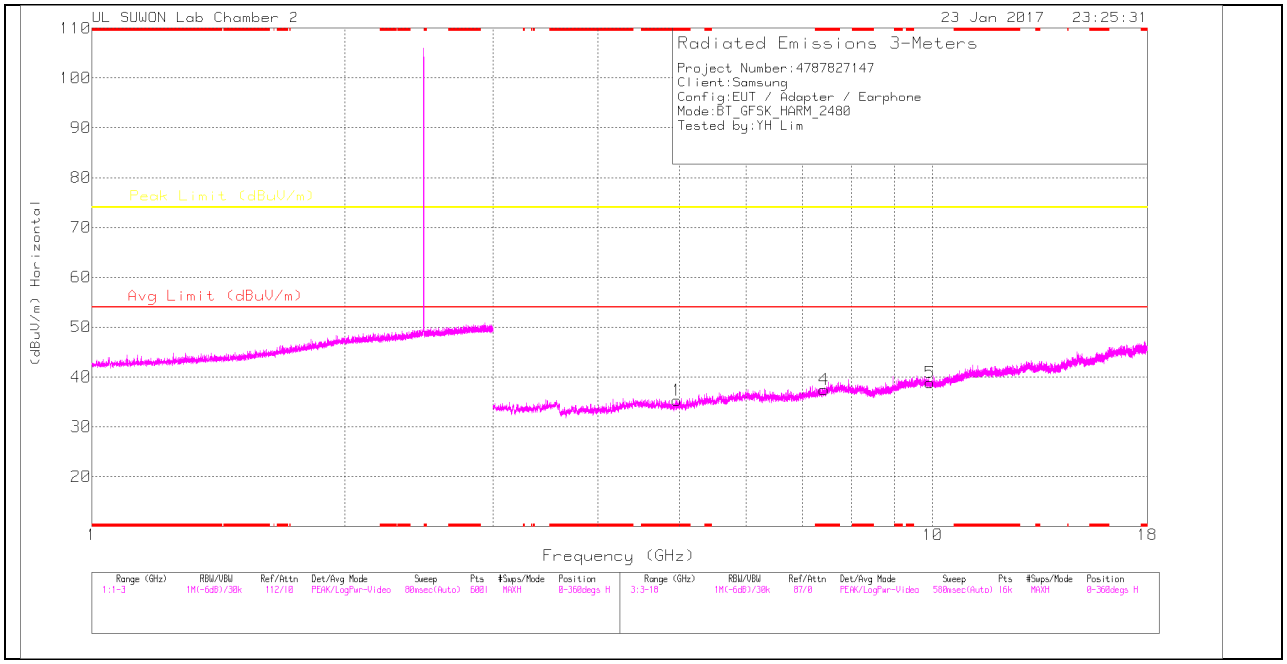
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	26.9	Pk	33.9	-24.6	36.2	-	-	74	-37.8	0-360	150	H
4	* 7.323	23.66	Pk	35.9	-21.9	37.66	-	-	74	-36.34	0-360	150	H
5	9.766	20.66	Pk	37	-18	39.66	-	-	74	-34.34	0-360	250	H
2	* 4.886	25.22	Pk	33.9	-24.6	34.52	-	-	74	-39.48	0-360	250	V
3	* 7.327	23.3	Pk	35.9	-21.9	37.3	-	-	74	-36.7	0-360	250	V
6	9.766	20.32	Pk	37	-18	39.32	-	-	74	-34.68	0-360	150	V

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

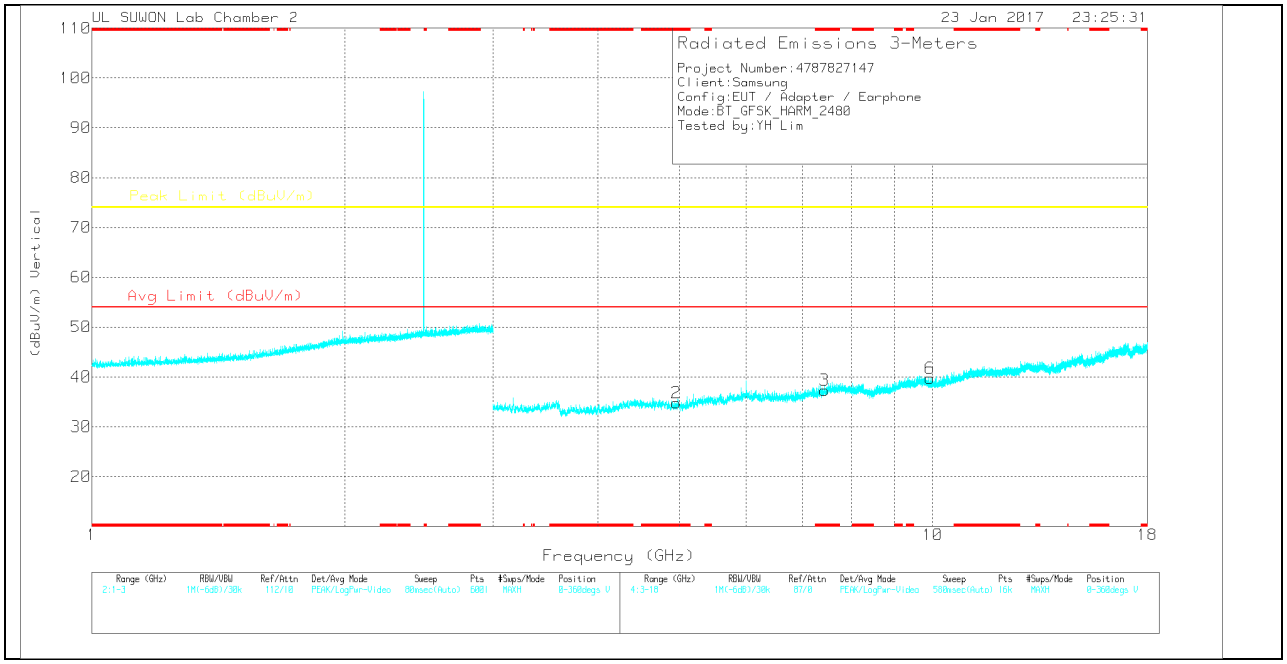
Pk – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limt (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(00168724)_150619	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	* 4.96	26.16	Pk	33.9	-24.7	35.36	-	-	74	-38.64	0-360	150	H
4	* 7.429	22.57	Pk	36	-21.1	37.47	-	-	74	-36.53	0-360	150	H
5	9.925	19.67	Pk	37.2	-18	38.87	-	-	74	-35.13	0-360	150	H
2	* 4.956	25.56	Pk	33.9	-24.7	34.76	-	-	74	-39.24	0-360	150	V
3	* 7.438	22.33	Pk	36	-21	37.33	-	-	74	-36.67	0-360	250	V
6	9.919	20.67	Pk	37.1	-18	39.77	-	-	74	-34.23	0-360	150	V

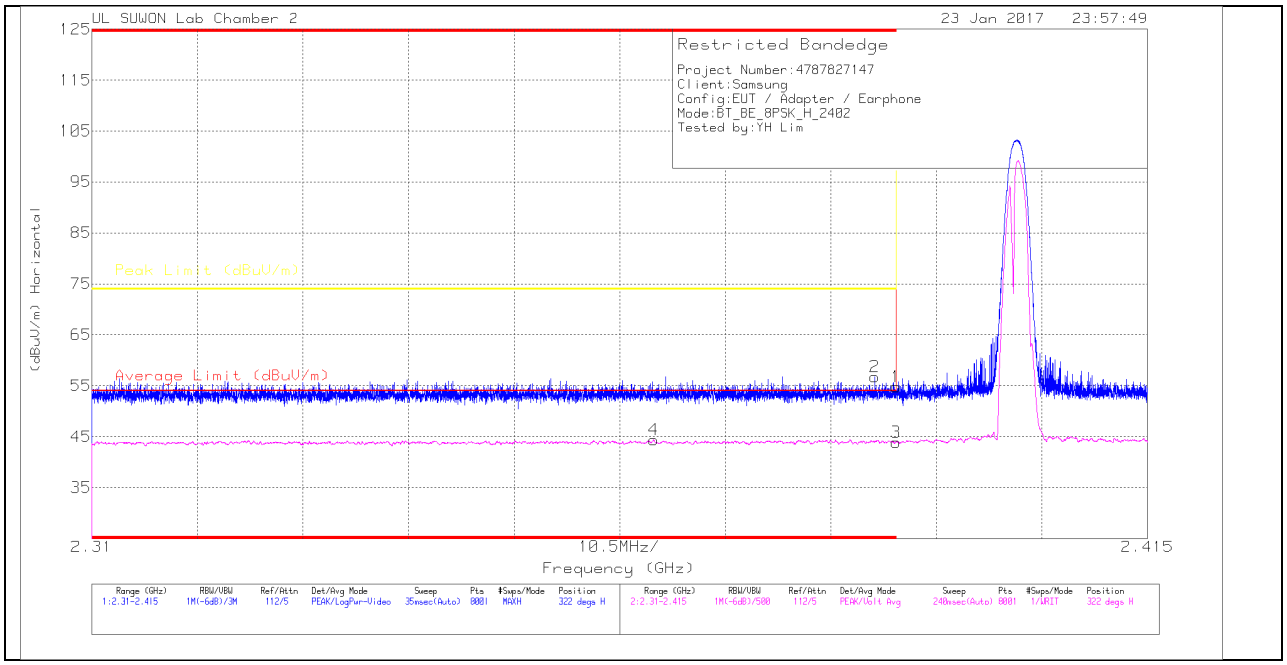
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk – Peak detector

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

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

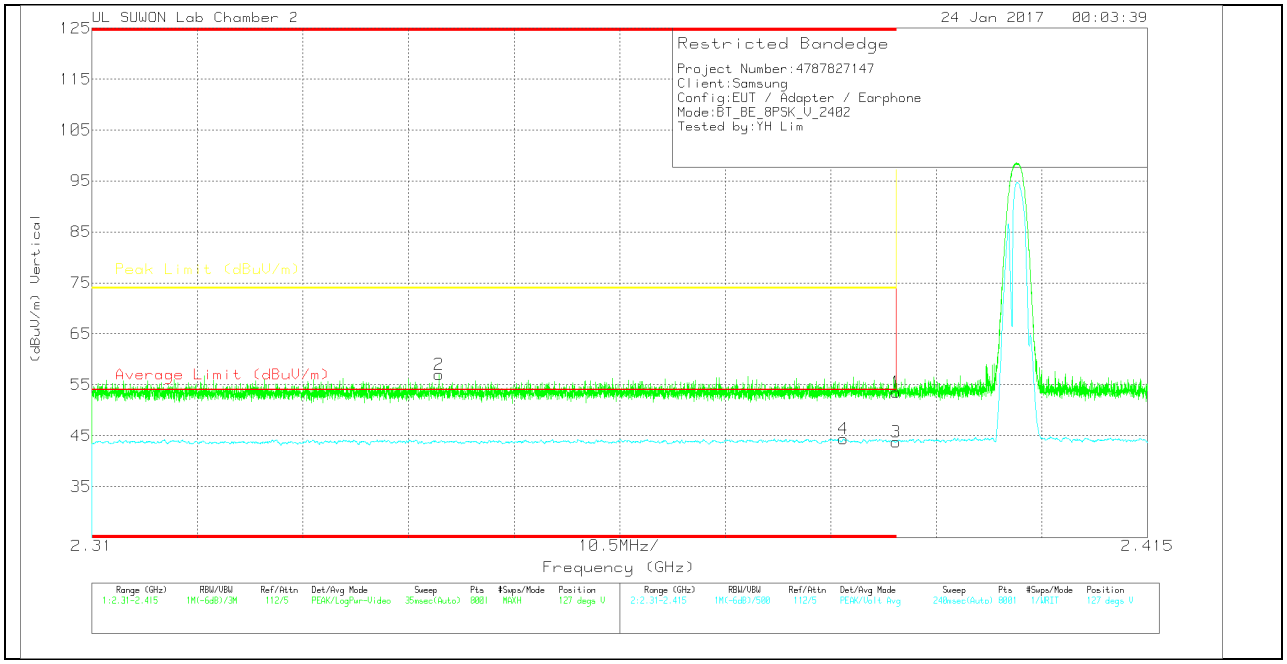
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.32	Pk	31.7	-18.2	54.82	-	-	74	-19.18	322	216	H
2	* 2.388	43.3	Pk	31.7	-18.2	56.8	-	-	74	-17.2	322	216	H
3	* 2.39	30.39	VA1T	31.7	-18.2	43.89	54	-10.11	-	-	322	216	H
4	* 2.366	31.02	VA1T	31.7	-18.3	44.42	54	-9.58	-	-	322	216	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(00168724)_150619	10dB[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	39.99	Pk	31.7	-18.2	53.49	-	-	74	-20.51	127	400	V
2	* 2.345	43.74	Pk	31.6	-18.3	57.04	-	-	74	-16.96	127	400	V
3	* 2.39	30.26	VA1T	31.7	-18.2	43.76	54	-10.24	-	-	127	400	V
4	* 2.385	30.85	VA1T	31.7	-18.2	44.35	54	-9.65	-	-	127	400	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

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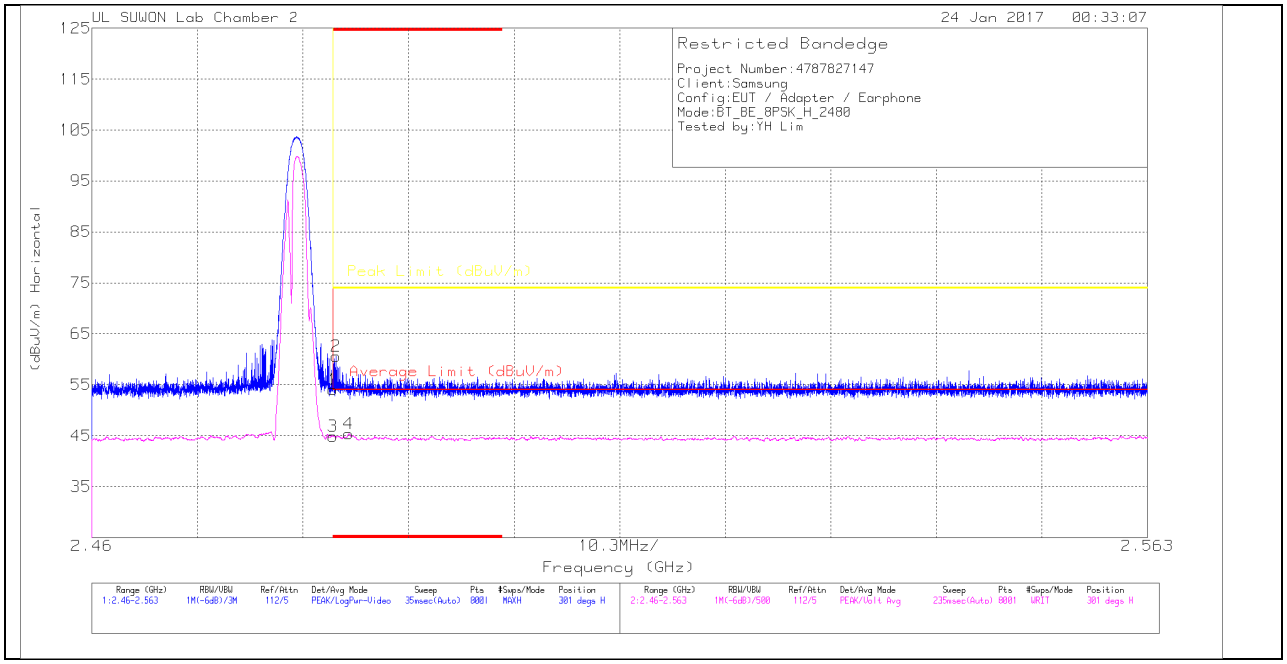
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[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	40.24	Pk	31.8	-18	54.04	-	-	74	-19.96	301	111	H
2	* 2.484	46.84	Pk	31.8	-18	60.64	-	-	74	-13.36	301	111	H
3	* 2.484	31.12	VA1T	31.8	-18	44.92	54	-9.08	-	-	301	111	H
4	* 2.485	31.55	VA1T	31.8	-18	45.35	54	-8.65	-	-	301	111	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

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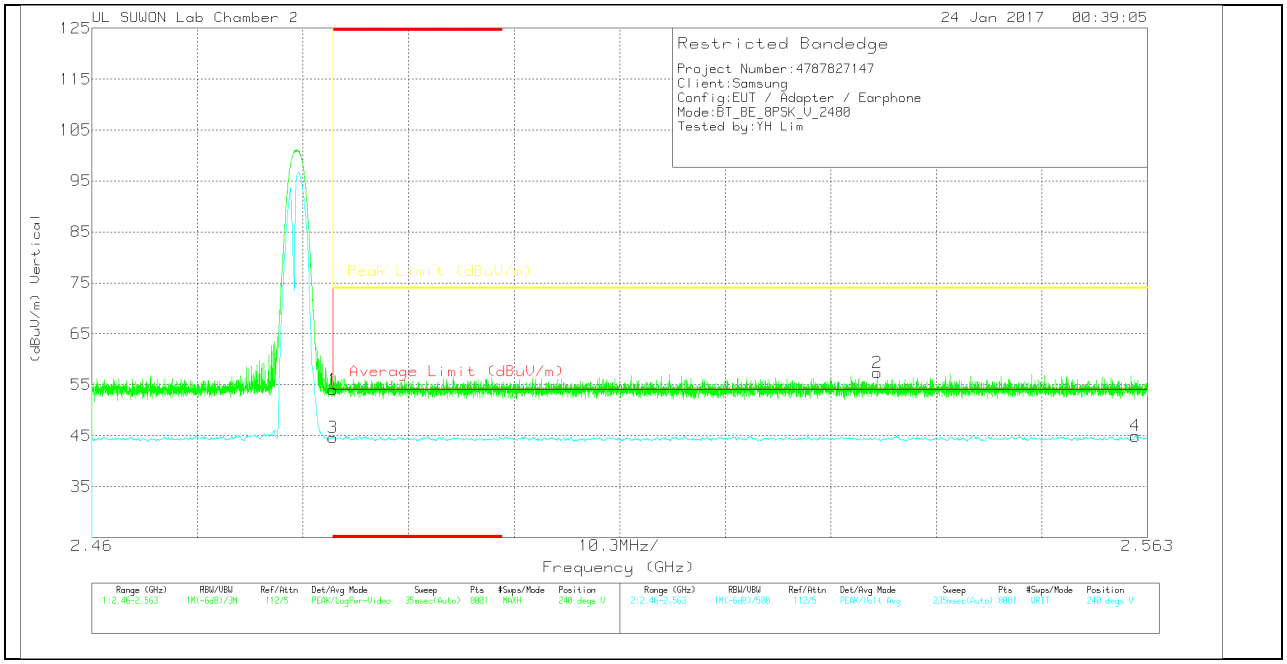
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[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	40.25	Pk	31.8	-18	54.05	-	-	74	-19.95	240	378	V
2	2.537	43.45	Pk	31.9	-18	57.35	-	-	74	-16.65	240	378	V
3	* 2.484	30.82	VA1T	31.8	-18	44.62	54	-9.38	-	-	240	378	V
4	2.562	31.05	VA1T	31.9	-18	44.95	54	-9.05	-	-	240	378	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

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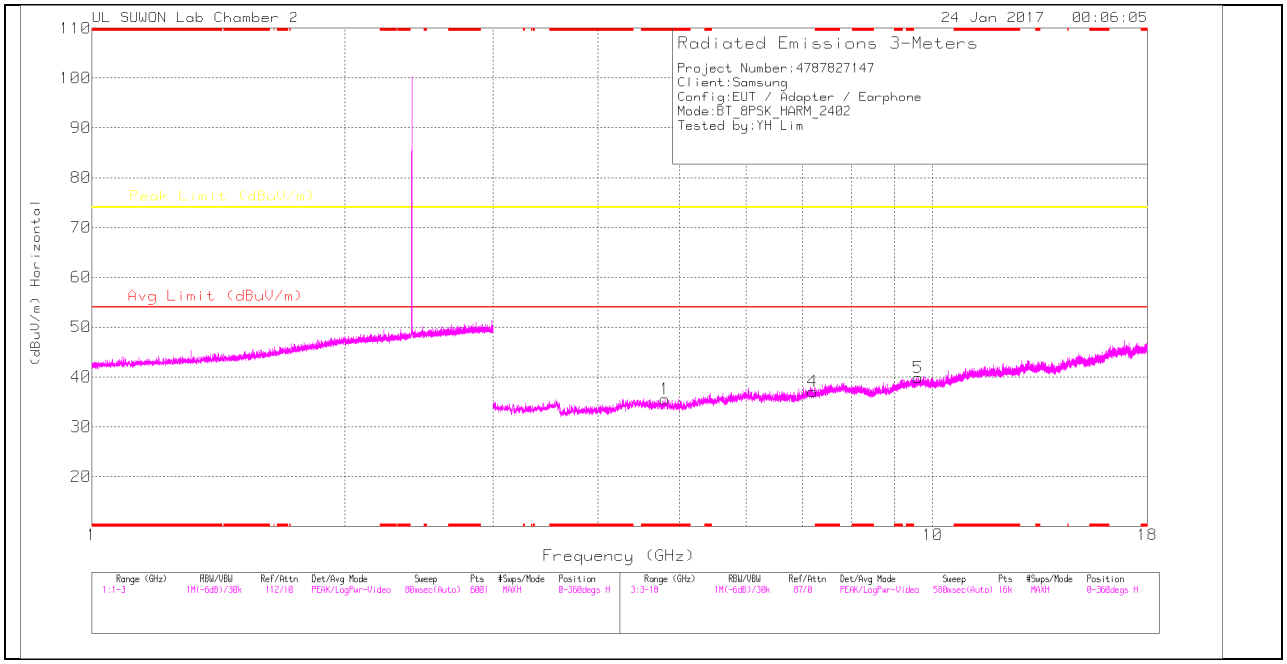
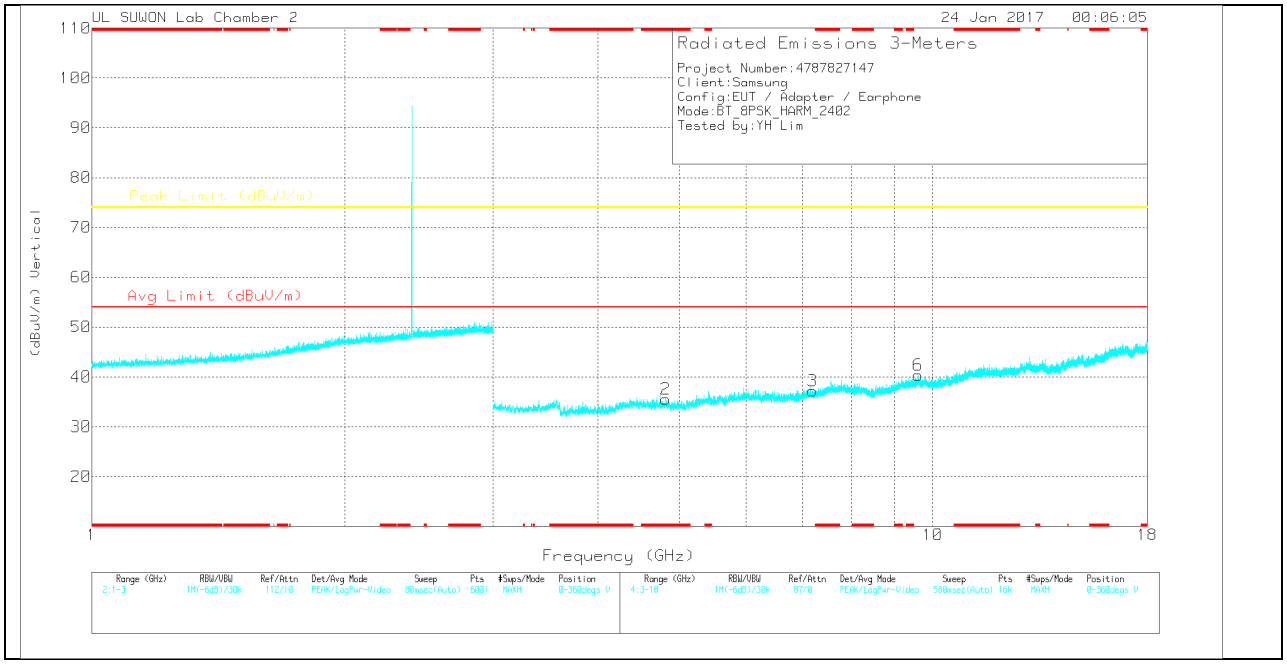
HARMONICS AND SPURIOUS EMISSIONS

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)_150619	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	* 4.807	25.97	Pk	33.9	-24.3	35.57	-	-	74	-38.43	0-360	250	H
4	7.198	22.99	Pk	35.7	-21.6	37.09	-	-	74	-36.91	0-360	150	H
5	9.608	21.35	Pk	36.9	-18.4	39.85	-	-	74	-34.15	0-360	150	H
2	* 4.812	25.98	Pk	33.9	-24.3	35.58	-	-	74	-38.42	0-360	250	V
3	7.2	23.13	Pk	35.7	-21.6	37.23	-	-	74	-36.77	0-360	250	V
6	9.601	21.83	Pk	36.9	-18.4	40.33	-	-	74	-33.67	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 limt (54dBuV/m).

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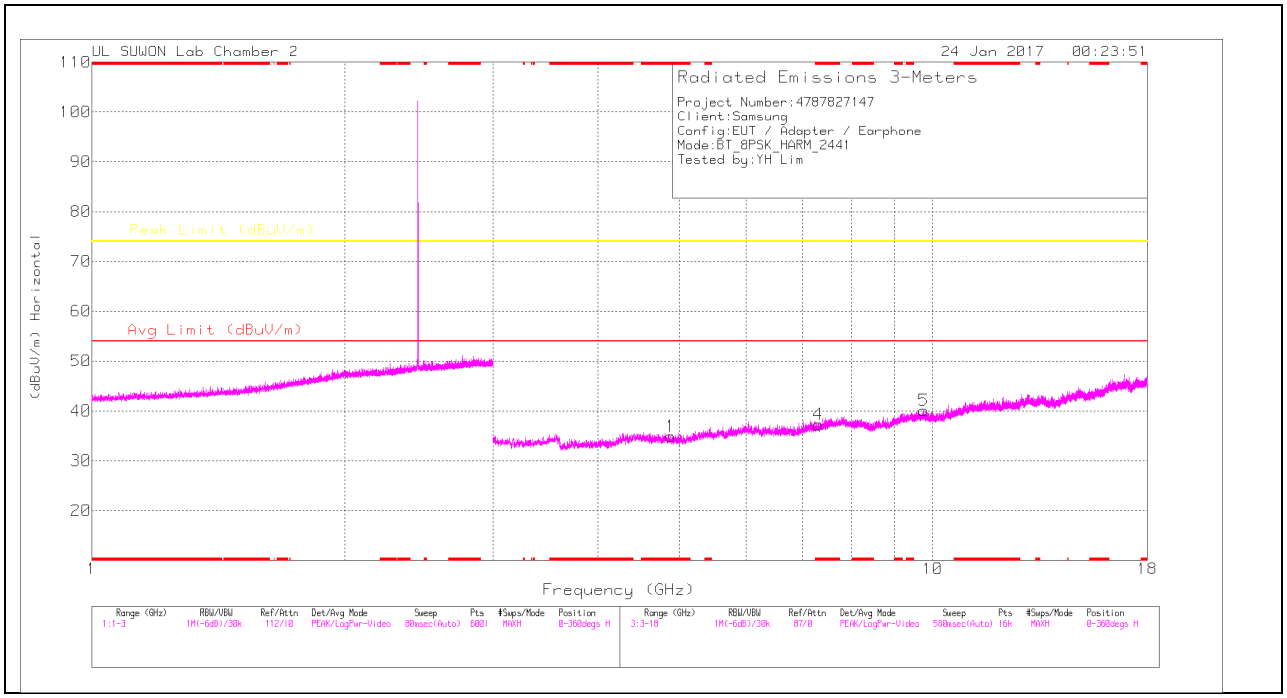
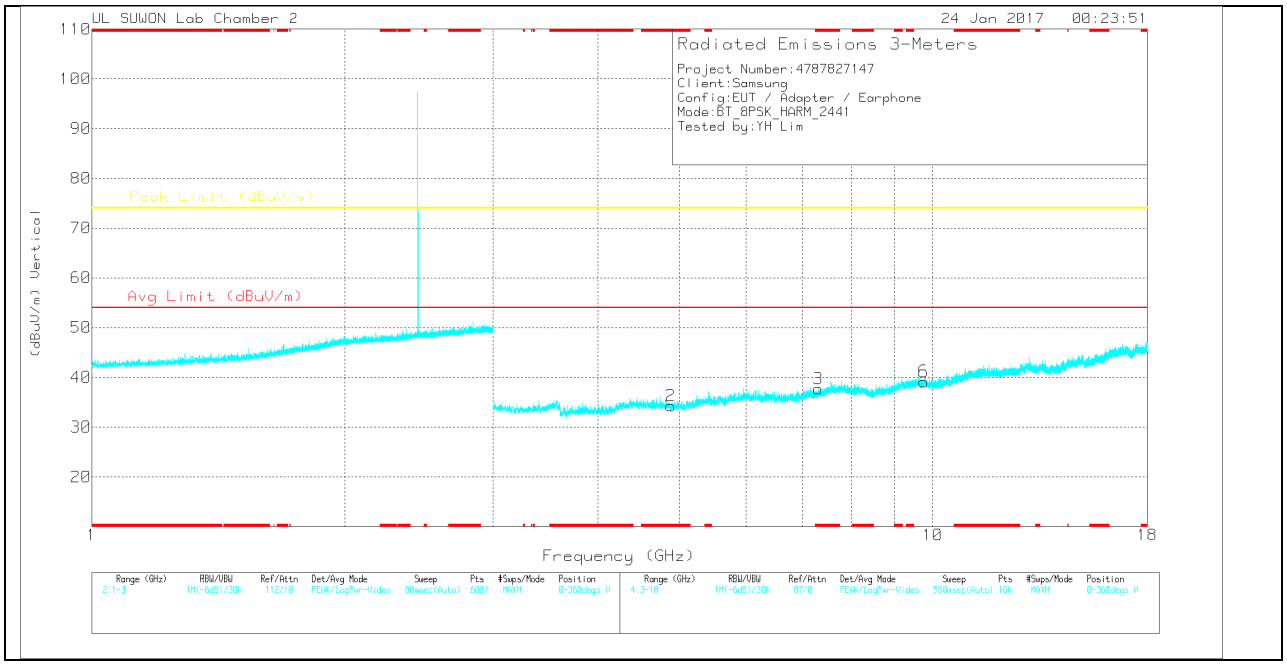
218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea TEL: (031) 337-9902 FAX: (031) 213-5433

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

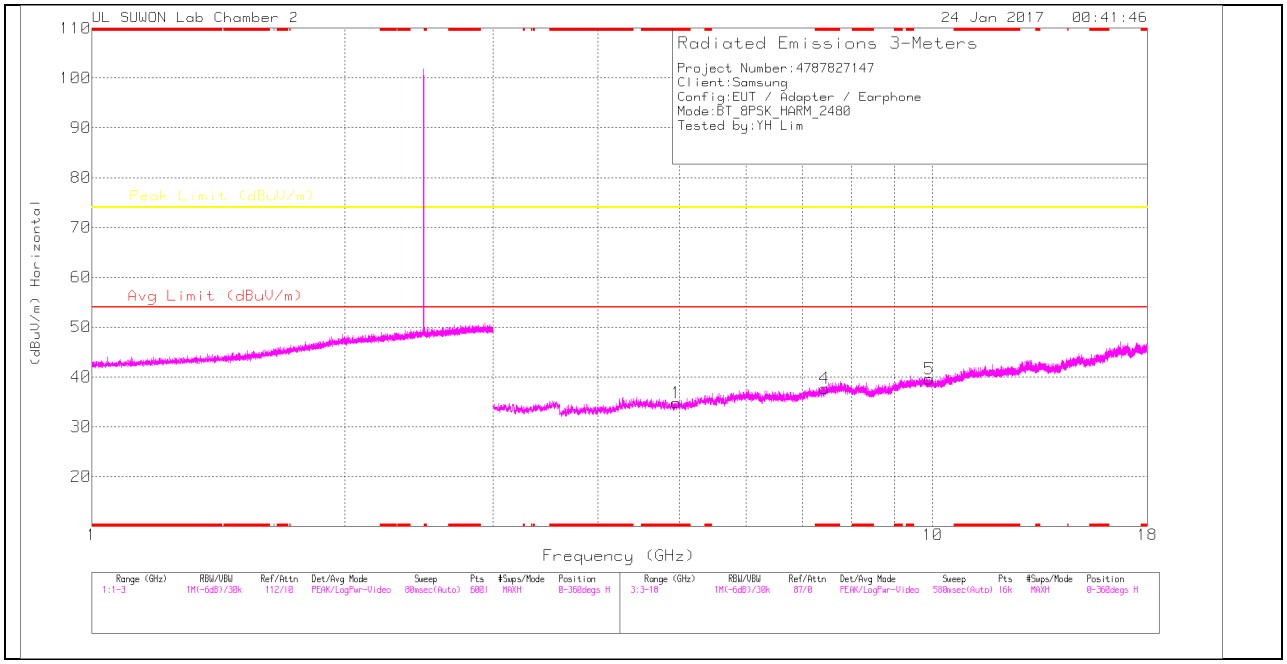
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.882	25.64	Pk	33.9	-24.6	34.94	-	-	74	-39.06	0-360	150	H
4	* 7.304	23.37	Pk	35.9	-22	37.27	-	-	74	-36.73	0-360	150	H
5	9.762	21.11	Pk	37	-18	40.11	-	-	74	-33.89	0-360	150	H
2	* 4.882	25	Pk	33.9	-24.6	34.3	-	-	74	-39.7	0-360	150	V
3	* 7.307	23.83	Pk	35.9	-22	37.73	-	-	74	-36.27	0-360	150	V
6	9.761	20.16	Pk	37	-18	39.16	-	-	74	-34.84	0-360	250	V

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

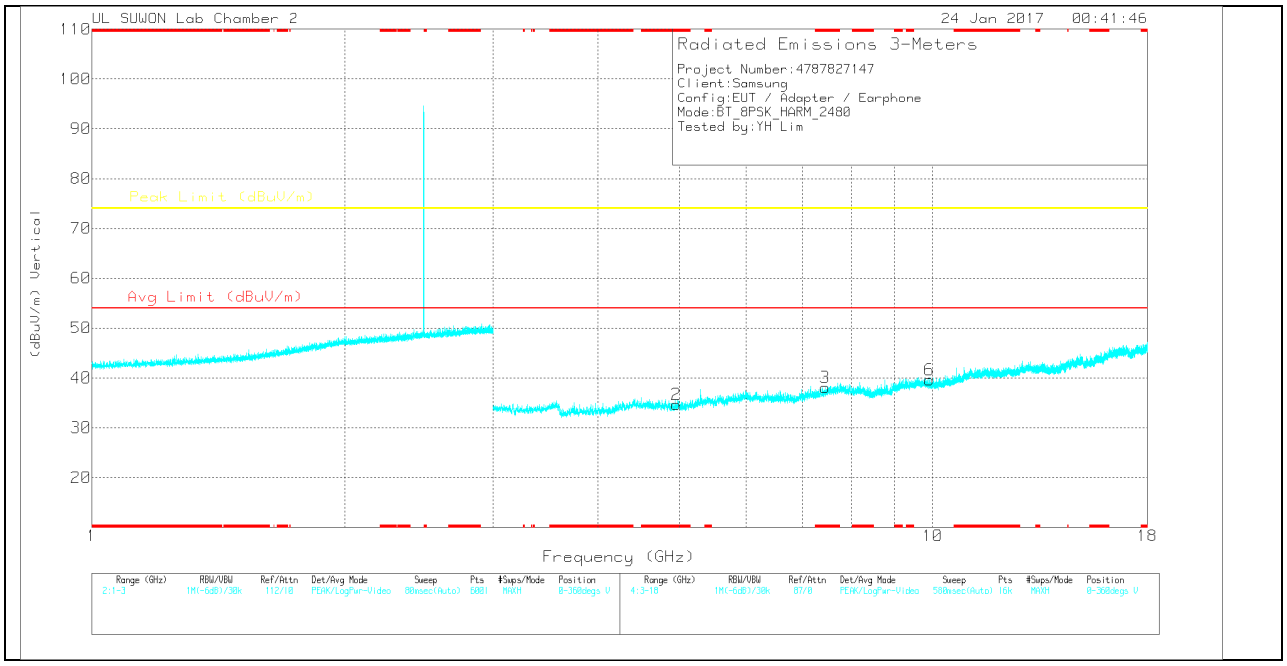
Pk – Peak detector

Note: Only peak measurement was performed. Because peak measurement result of unwanted emission is less than average limt (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(00168724)_150619	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	* 4.959	25.55	Pk	33.9	-24.7	34.75	-	-	74	-39.25	0-360	150	H
4	* 7.436	22.76	Pk	36	-21	37.76	-	-	74	-36.24	0-360	150	H
5	9.91	20.45	Pk	37.1	-18	39.55	-	-	74	-34.45	0-360	150	H
2	* 4.959	25.47	Pk	33.9	-24.7	34.67	-	-	74	-39.33	0-360	250	V
3	* 7.445	23.1	Pk	36	-21	38.1	-	-	74	-35.9	0-360	150	V
6	9.908	20.53	Pk	37.1	-18	39.63	-	-	74	-34.37	0-360	150	V

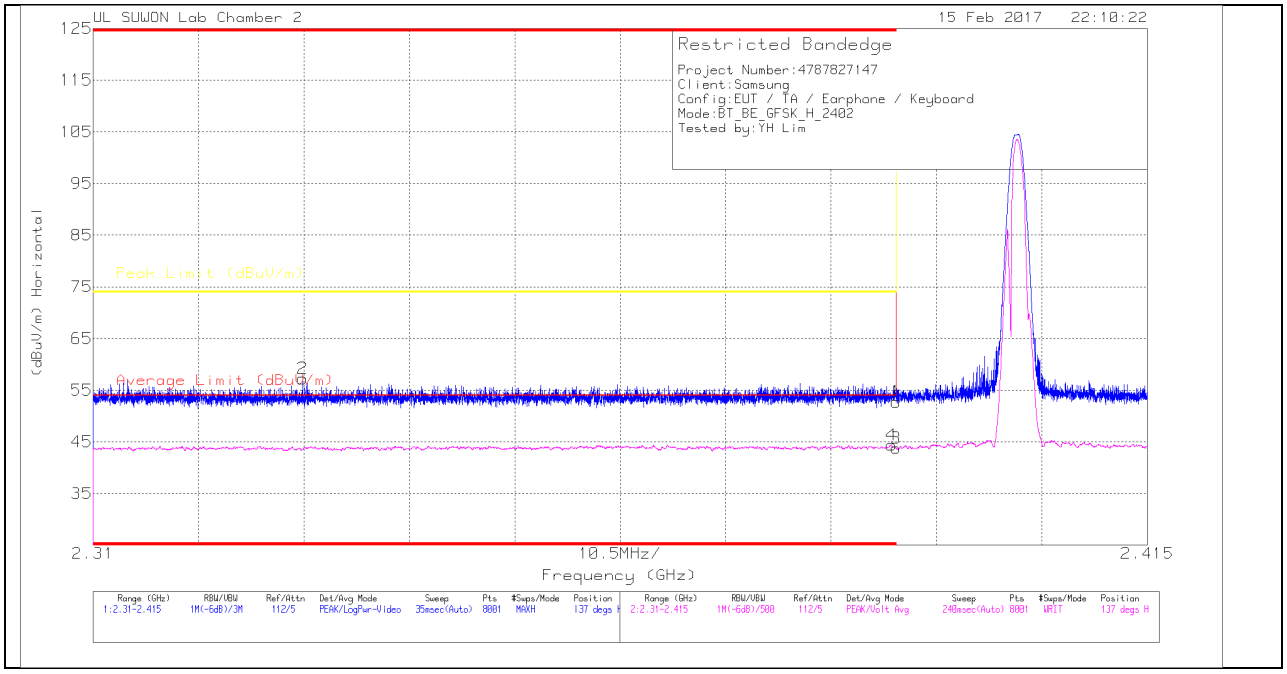
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk – Peak detector

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

AUTHORIZED BANDEDGE (GFSK LOW CHANNEL) equipped with keyboard

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

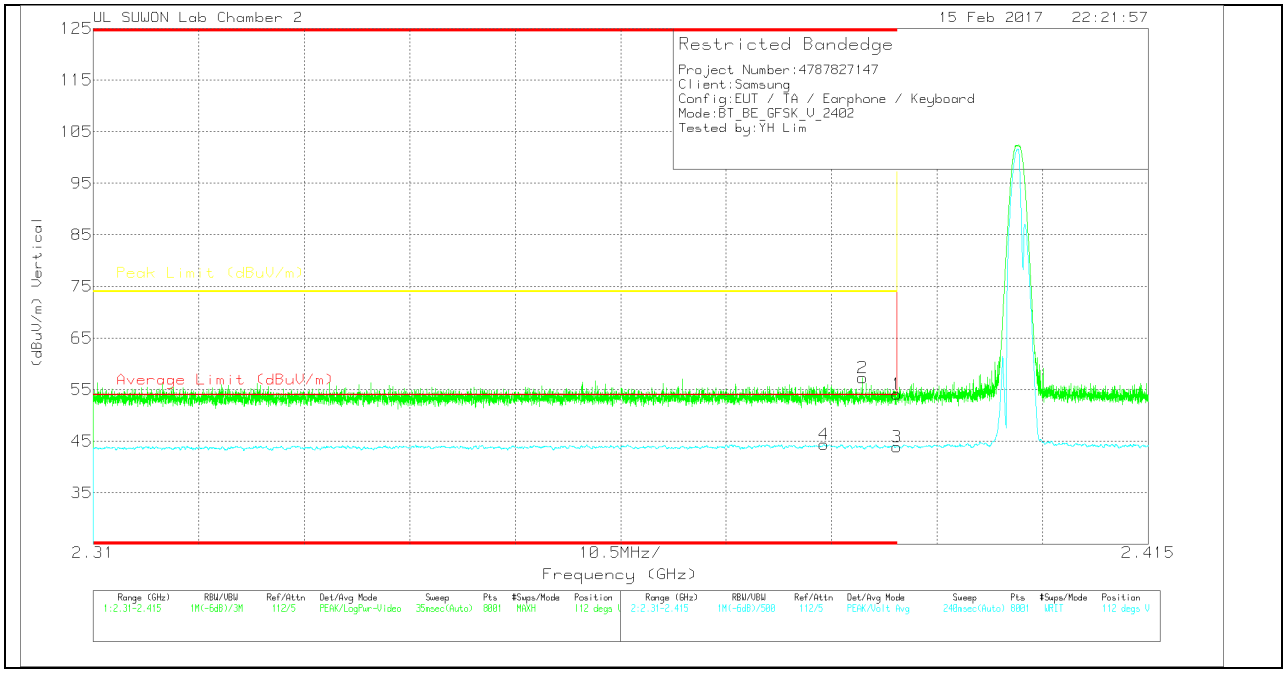
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.25	Pk	31.7	-18.2	52.75	-	-	74	-21.25	137	140	H
2	* 2.331	44.05	Pk	31.6	-18.4	57.25	-	-	74	-16.75	137	140	H
3	* 2.39	30.28	VA1T	31.7	-18.2	43.78	54	-10.22	-	-	137	140	H
4	* 2.39	30.89	VA1T	31.7	-18.2	44.39	54	-9.61	-	-	137	140	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(00168724)_150619	10dB[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	40.64	Pk	31.7	-18.2	54.14	-	-	74	-19.86	112	298	V
2	* 2.387	43.79	Pk	31.7	-18.2	57.29	-	-	74	-16.71	112	298	V
3	* 2.39	30.41	VA1T	31.7	-18.2	43.91	54	-10.09	-	-	112	298	V
4	* 2.383	30.9	VA1T	31.7	-18.2	44.4	54	-9.6	-	-	112	298	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

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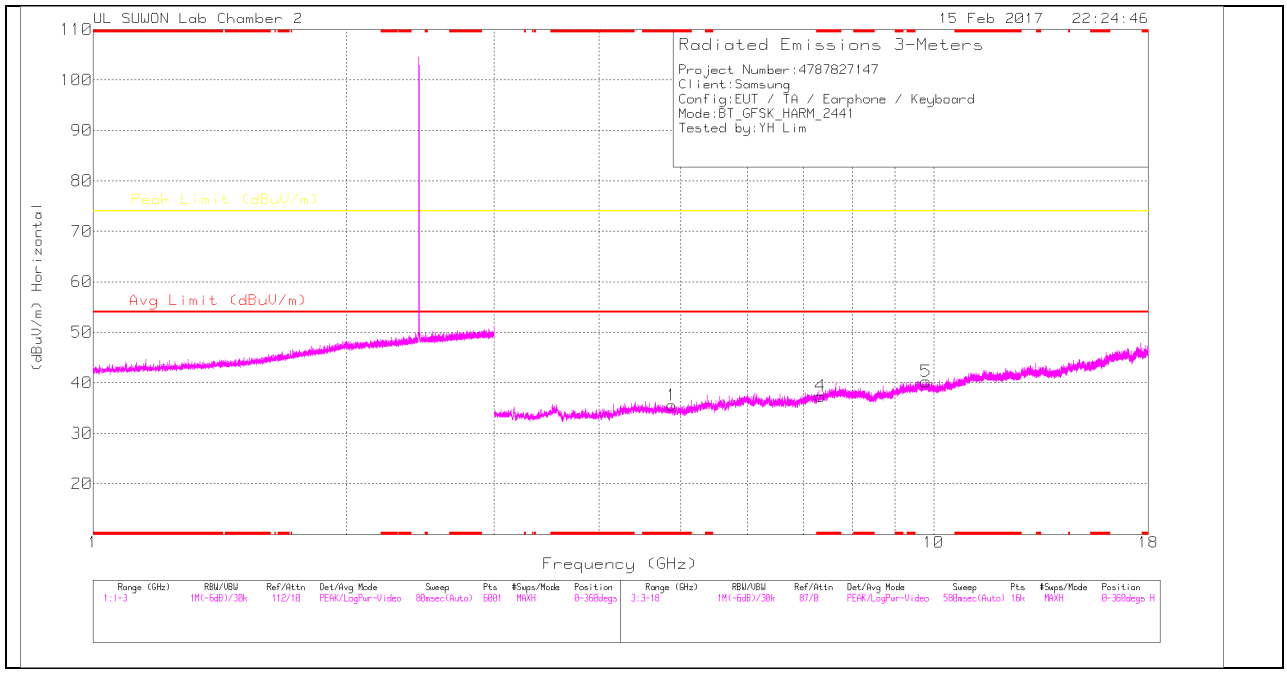
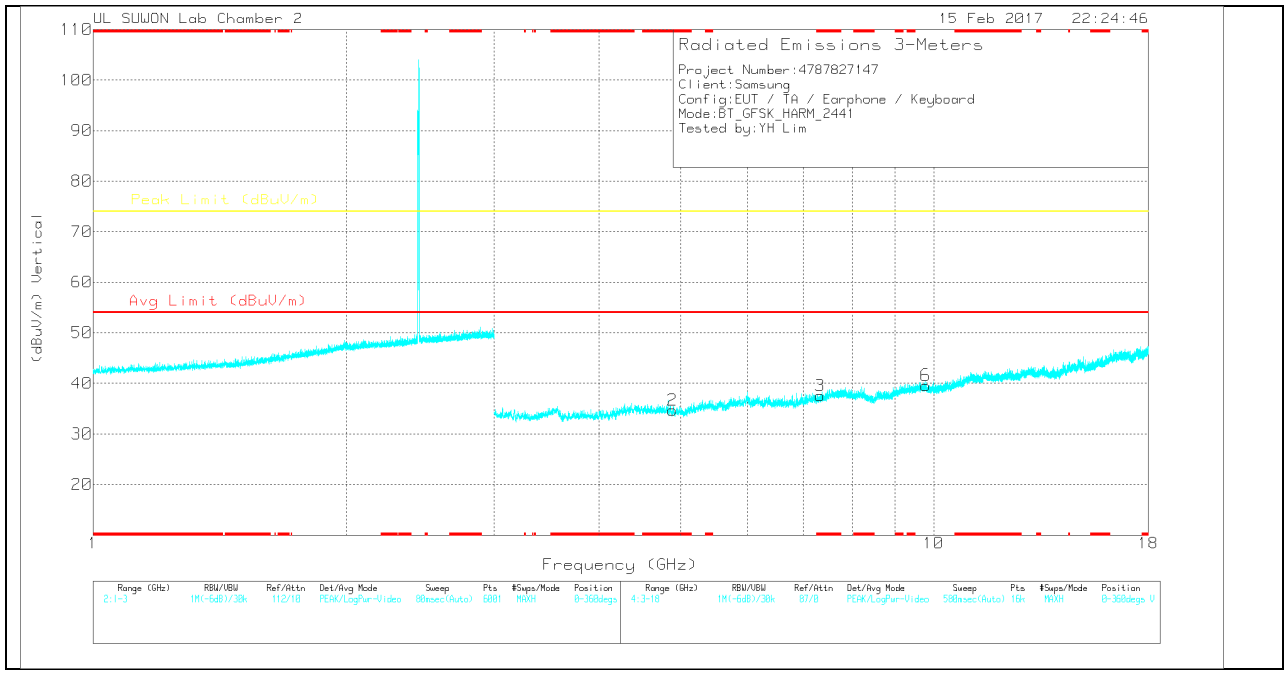
GFSK HARMONICS AND SPURIOUS EMISSIONS equipped with keyboard

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)_150619	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	* 4.881	26.23	Pk	33.9	-24.6	35.53	-	-	74	-38.47	0-360	250	H
4	* 7.336	23.36	Pk	35.9	-21.9	37.36	-	-	74	-36.64	0-360	150	H
5	9.793	21.15	Pk	37	-17.9	40.25	-	-	74	-33.75	0-360	250	H
2	* 4.89	25.38	Pk	33.9	-24.6	34.68	-	-	74	-39.32	0-360	150	V
3	* 7.33	23.56	Pk	35.9	-21.9	37.56	-	-	74	-36.44	0-360	250	V
6	9.791	20.47	Pk	37	-17.9	39.57	-	-	74	-34.43	0-360	250	V

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

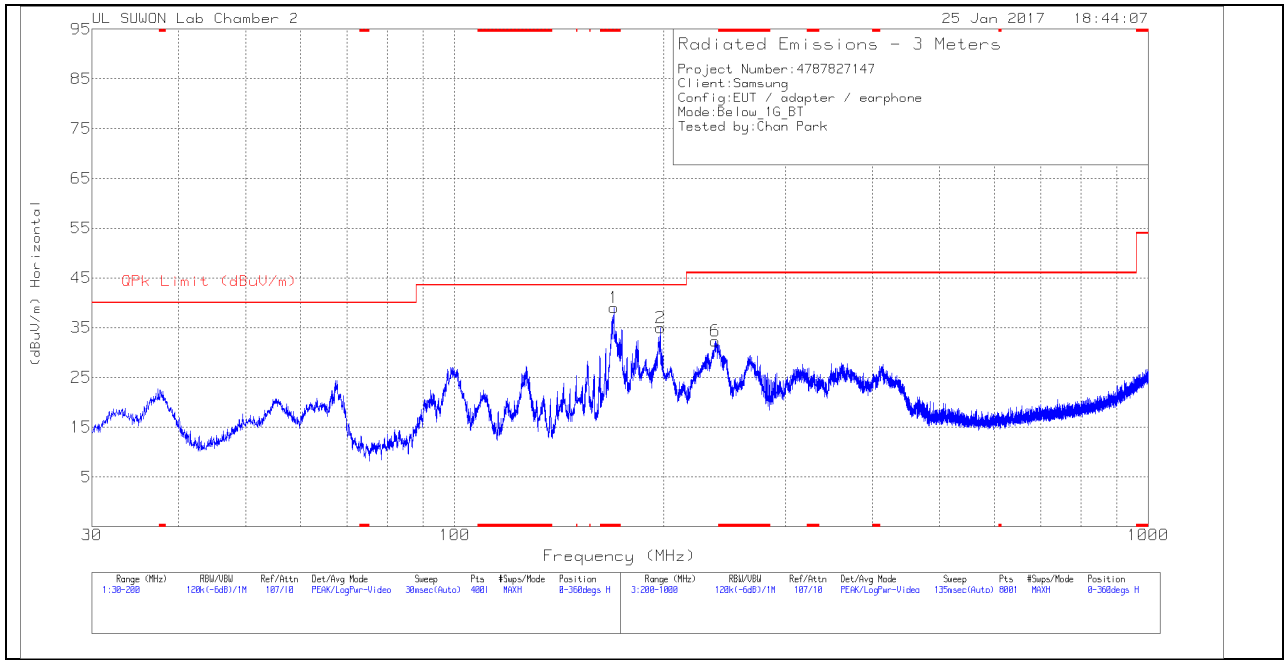
Pk – Peak detector

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

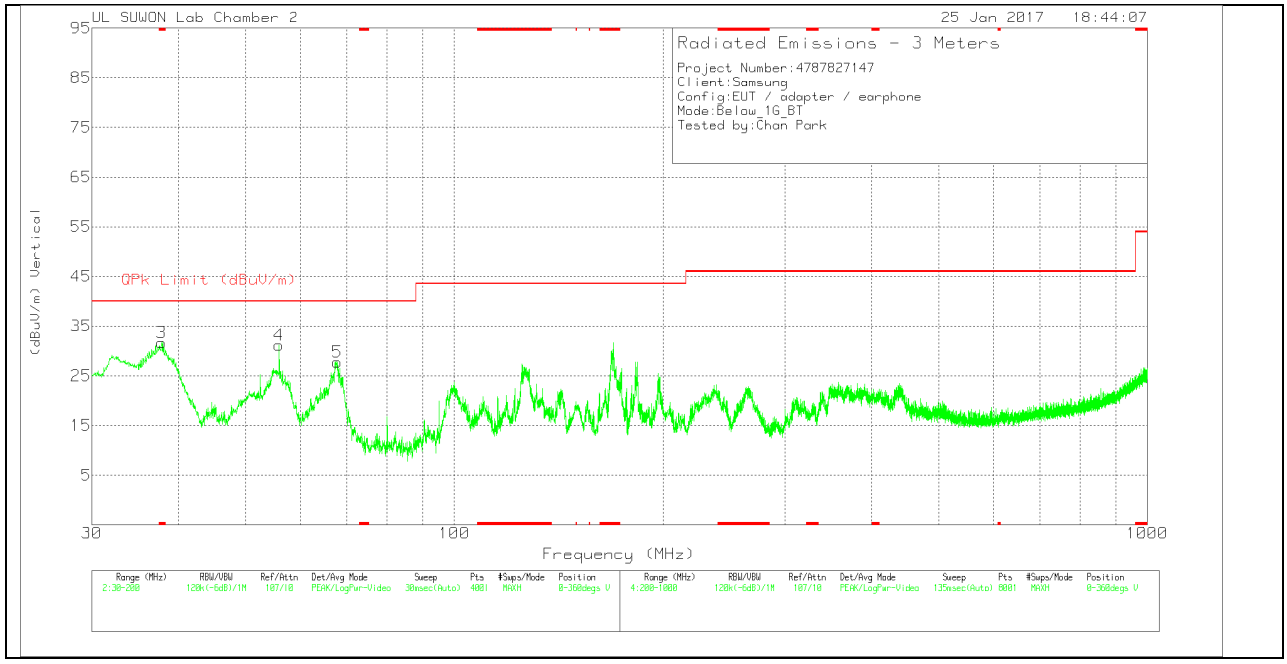
10.3. WORST-CASE BELOW 1 GHz

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	VULB9163-749	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 169.6975	60.59	Pk	9	-30.6	38.99	43.52	-4.53	0-360	200	H
2	198.0025	54.39	Pk	11.2	-30.6	34.99	43.52	-8.53	0-360	100	H
3	* 37.7775	51.38	Pk	11.9	-31.6	31.68	40	-8.32	0-360	100	V
4	55.8825	49.25	Pk	13.3	-31.4	31.15	40	-8.85	0-360	100	V
5	67.8675	48.71	Pk	10.3	-31.3	27.71	40	-12.29	0-360	100	V
6	237.5	50.47	Pk	12.2	-30.4	32.27	46.02	-13.75	0-360	100	H

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

Pk - Peak detector

Radiated Emissions

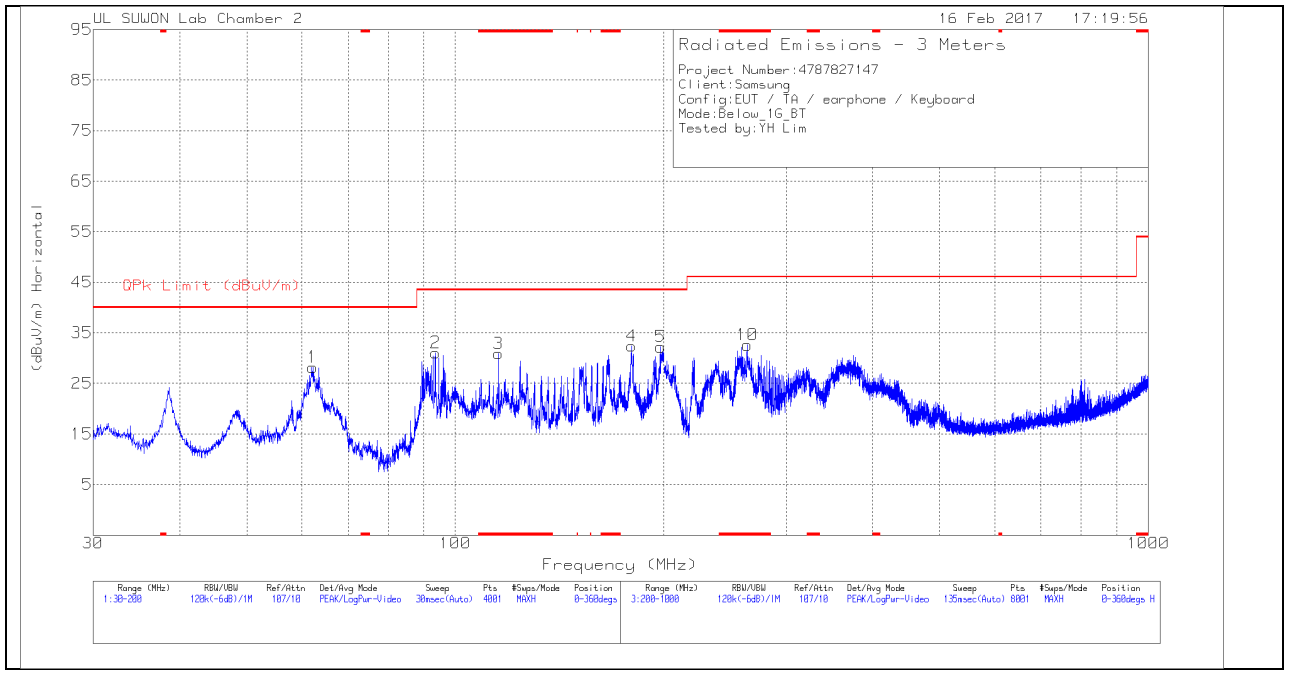
Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 169.612	60.91	Qp	9	-30.6	39.31	43.52	-4.21	313	198	H
197.8094	53.54	Qp	11.2	-30.6	34.14	43.52	-9.38	344	165	H
* 37.8368	47.91	Qp	11.9	-31.6	28.21	40	-11.79	249	102	V

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

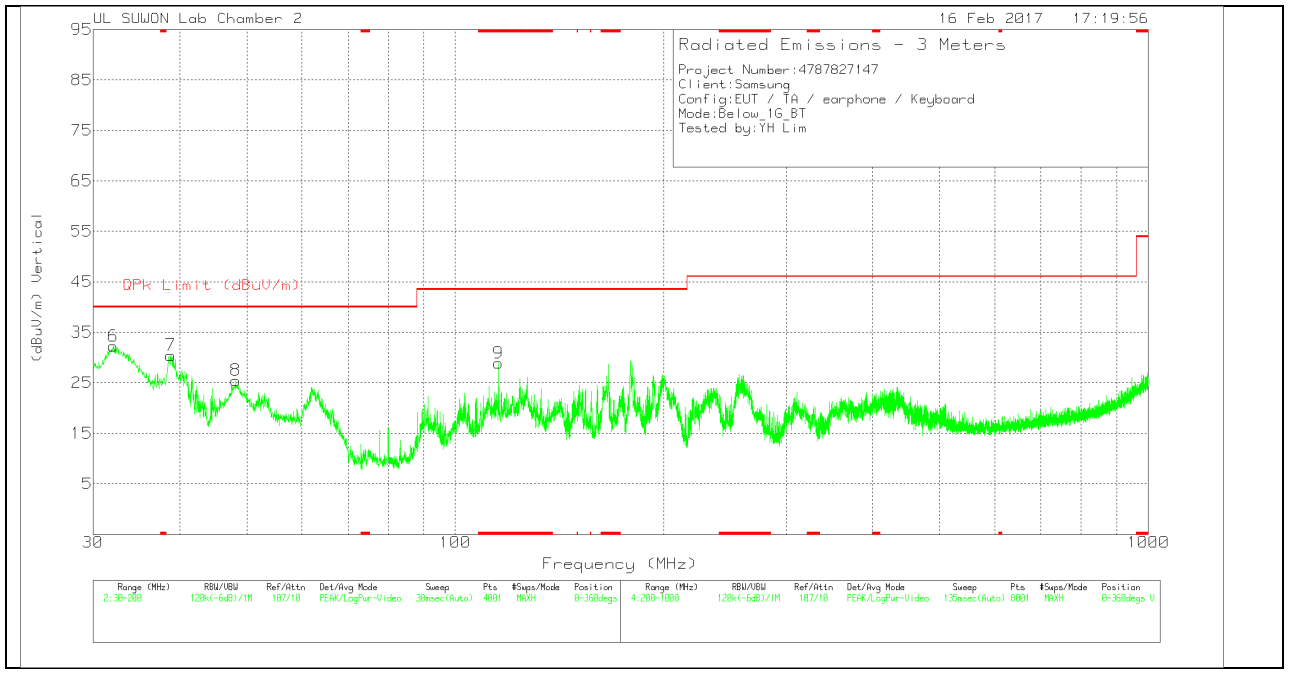
Qp - Quasi-Peak detector

GFSK SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL) equipped with keyboard

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-749	30-1000MHz[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	62.2575	47.37	Pk	12.1	-31.3	28.17	40	-11.83	0-360	400	H
2	93.58	51.84	Pk	10.3	-31.1	31.04	43.52	-12.48	0-360	200	H
3	* 115.3825	51.49	Pk	10.3	-30.9	30.89	43.52	-12.63	0-360	300	H
4	179.6425	53.46	Pk	9.5	-30.6	32.36	43.52	-11.16	0-360	200	H
5	197.8325	51.61	Pk	11.2	-30.6	32.21	43.52	-11.31	0-360	100	H
6	32.0825	53.33	Pk	10.5	-31.6	32.23	40	-7.77	0-360	100	V
7	38.84	49.64	Pk	12.3	-31.5	30.44	40	-9.56	0-360	100	V
8	48.19	42.97	Pk	14	-31.5	25.47	40	-14.53	0-360	100	V
9	* 115.425	49.47	Pk	10.3	-30.9	28.87	43.52	-14.65	0-360	100	V
10	* 263.7	50.09	Pk	12.7	-30.2	32.59	46.02	-13.43	0-360	100	H

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

Pk - Peak detector

11. 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.

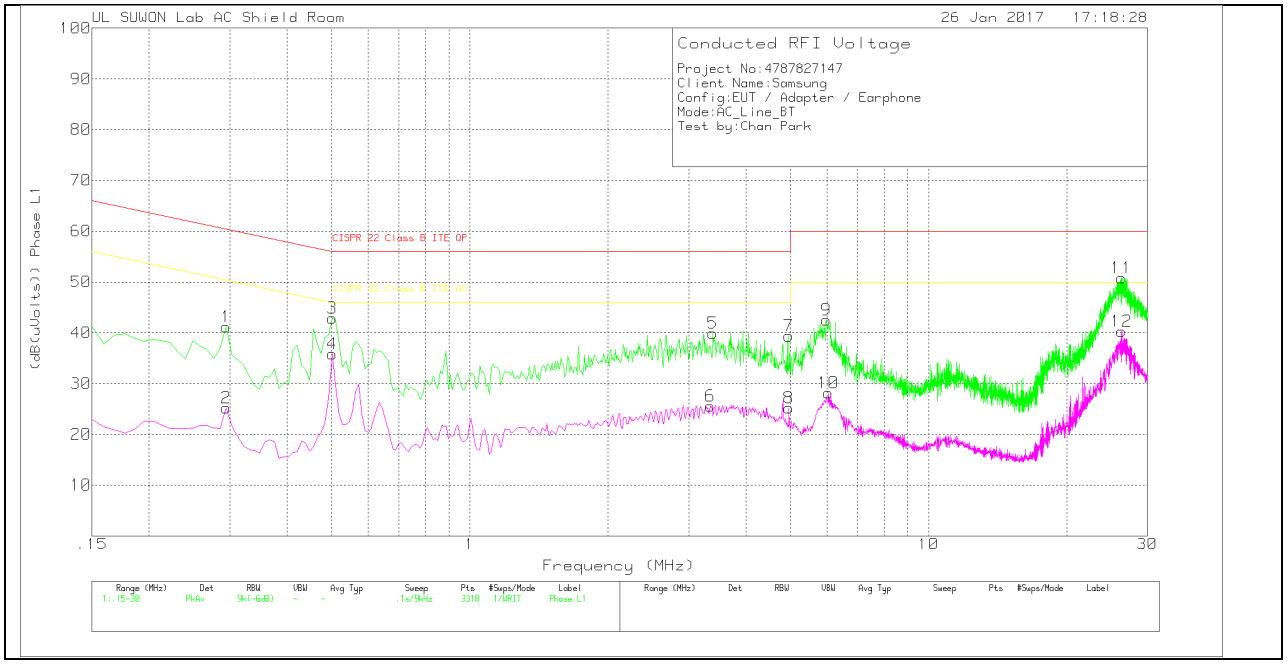
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with 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	.294	31.49	Pk	9.7	0	41.19	60.41	-19.22	-	-
2	.294	15.55	Av	9.7	0	25.25	-	-	50.41	-25.16
3	.501	33.01	Pk	9.9	0	42.91	56	-13.09	-	-
4	.501	25.93	Av	9.9	0	35.83	-	-	46	-10.17
5	3.381	30	Pk	9.8	.1	39.9	56	-16.1	-	-
6	3.345	15.68	Av	9.8	.1	25.58	-	-	46	-20.42
7	4.965	29.47	Pk	9.8	.1	39.37	56	-16.63	-	-
8	4.965	15.33	Av	9.8	.1	25.23	-	-	46	-20.77
9	5.991	32.59	Pk	9.8	.1	42.49	60	-17.51	-	-
10	6.054	18.26	Av	9.8	.1	28.16	-	-	50	-21.84
11	26.385	39.95	Pk	10.6	.3	50.85	60	-9.15	-	-
12	26.385	29.37	Av	10.6	.3	40.27	-	-	50	-9.73

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with 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)
.2949	27.46	Qp	9.7	0	37.16	60.39	-23.23	-	-
.5055	30.63	Qp	9.9	0	40.53	56	-15.47	-	-
3.3846	21.7	Qp	9.8	.1	31.6	56	-24.4	-	-
4.9632	17.85	Qp	9.8	.1	27.75	56	-28.25	-	-
5.9937	27.42	Qp	9.8	.1	37.32	60	-22.68	-	-
26.3895	37.27	Qp	10.6	.3	48.17	60	-11.83	-	-

Qp – Quasi-Peak detector

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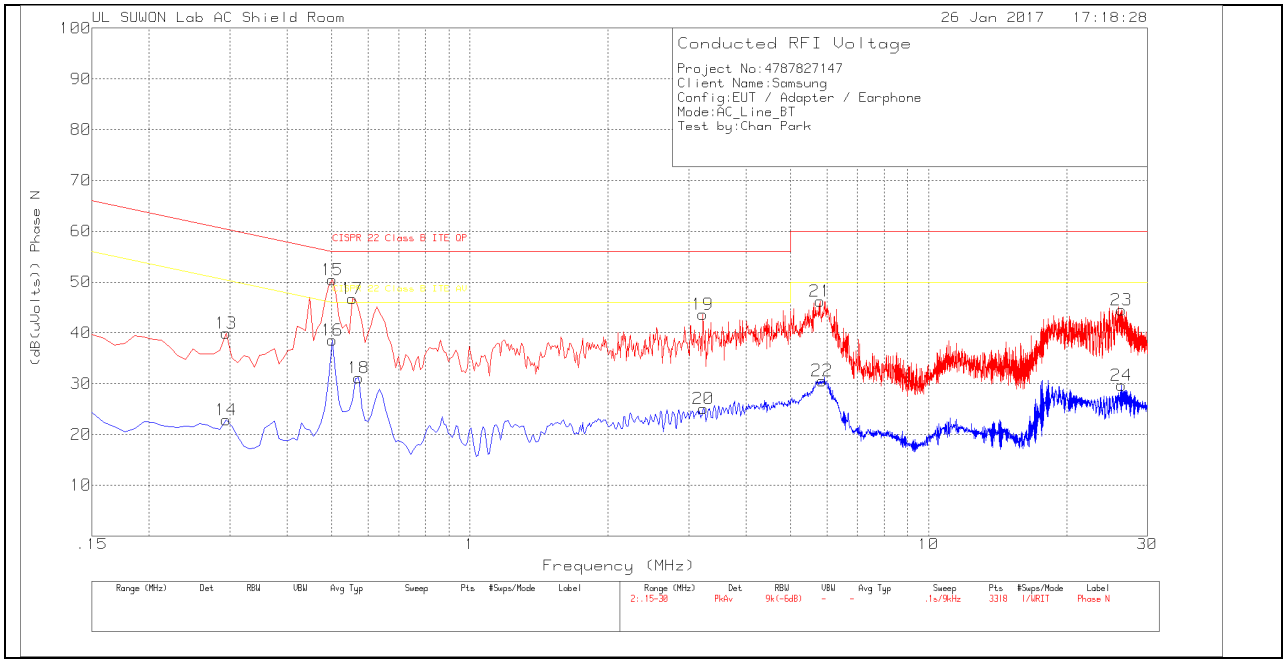
LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with 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	.294	30.22	Pk	9.7	0	39.92	60.41	-20.49	-	-
14	.294	13.13	Av	9.7	0	22.83	-	-	50.41	-27.58
15	.501	40.49	Pk	9.9	0	50.39	56	-5.61	-	-
16	.501	28.62	Av	9.9	0	38.52	-	-	46	-7.48
17	.555	36.84	Pk	9.9	0	46.74	56	-9.26	-	-
18	.573	21.25	Av	9.9	0	31.15	-	-	46	-14.85
19	3.219	33.76	Pk	9.8	.1	43.66	56	-12.34	-	-
20	3.228	15.2	Av	9.8	.1	25.1	-	-	46	-20.9
21	5.802	36.23	Pk	9.9	.1	46.23	60	-13.77	-	-
22	5.856	20.58	Av	9.9	.1	30.58	-	-	50	-19.42
23	26.349	33.34	Pk	10.9	.3	44.54	60	-15.46	-	-
24	26.385	18.43	Av	10.9	.3	29.63	-	-	50	-20.37

Pk - Peak detector

Av - Average detection

Quasi-Peak Emissions

Phase N .15 - 30MHz

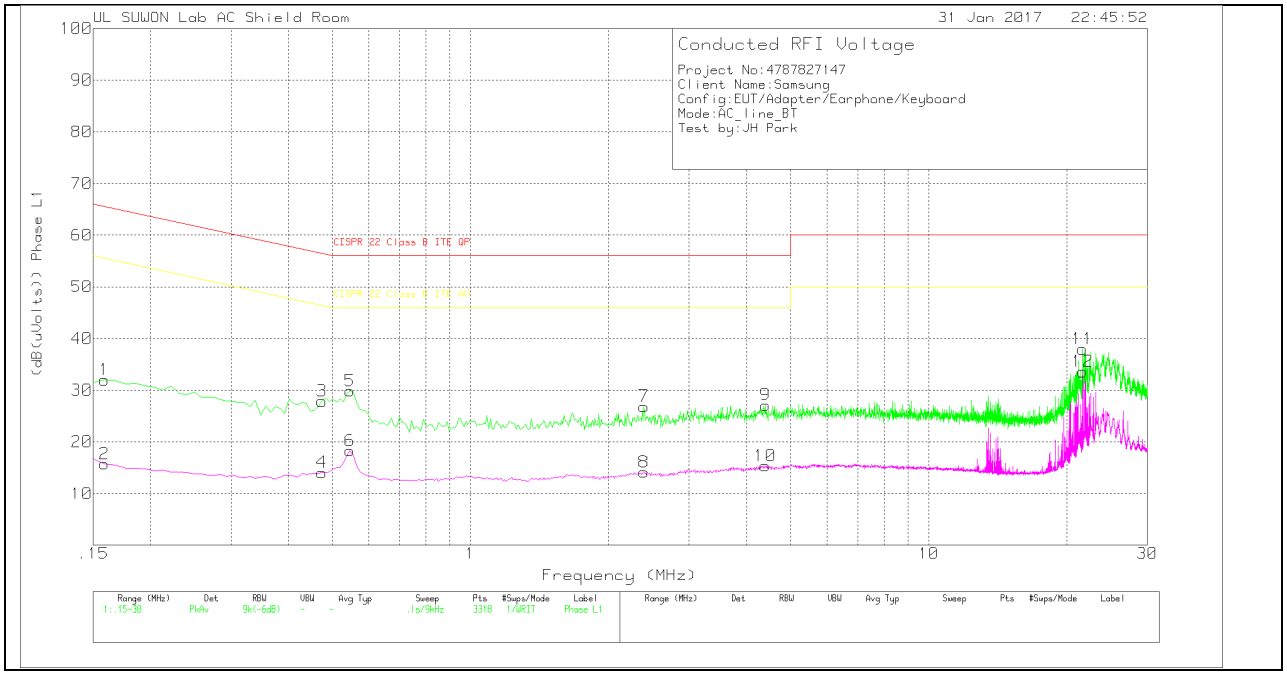
Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with ex-cord_N	CE Shield Room	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.2949	25.09	Qp	9.7	0	34.79	60.39	-25.6	-	-
.4983	38.41	Qp	9.9	0	48.31	56.03	-7.72	-	-
.5595	31.75	Qp	9.9	0	41.65	56	-14.35	-	-
3.2235	24.13	Qp	9.8	.1	34.03	56	-21.97	-	-
5.8065	28.38	Qp	9.9	.1	38.38	60	-21.62	-	-
26.3445	26.42	Qp	10.9	.3	37.62	60	-22.38	-	-

Qp – Quasi-Peak detector

RESULTS equipped with keyboard

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with 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	.159	22.11	Pk	9.9	0	32.01	65.52	-33.51	-	-
2	.159	5.85	Av	9.9	0	15.75	-	-	55.52	-39.77
3	.474	17.98	Pk	9.9	0	27.88	56.44	-28.56	-	-
4	.474	4.19	Av	9.9	0	14.09	-	-	46.44	-32.35
5	.546	19.94	Pk	9.9	0	29.84	56	-26.16	-	-
6	.546	8.37	Av	9.9	0	18.27	-	-	46	-27.73
7	2.391	17.06	Pk	9.7	.1	26.86	56	-29.14	-	-
8	2.391	4.33	Av	9.7	.1	14.13	-	-	46	-31.87
9	4.407	17.23	Pk	9.8	.1	27.13	56	-28.87	-	-
10	4.398	5.46	Av	9.8	.1	15.36	-	-	46	-30.64
11	21.66	27.37	Pk	10.4	.2	37.97	60	-22.03	-	-
12	21.66	23	Av	10.4	.2	33.6	-	-	50	-16.4

Pk - Peak detector

Av - Average detection

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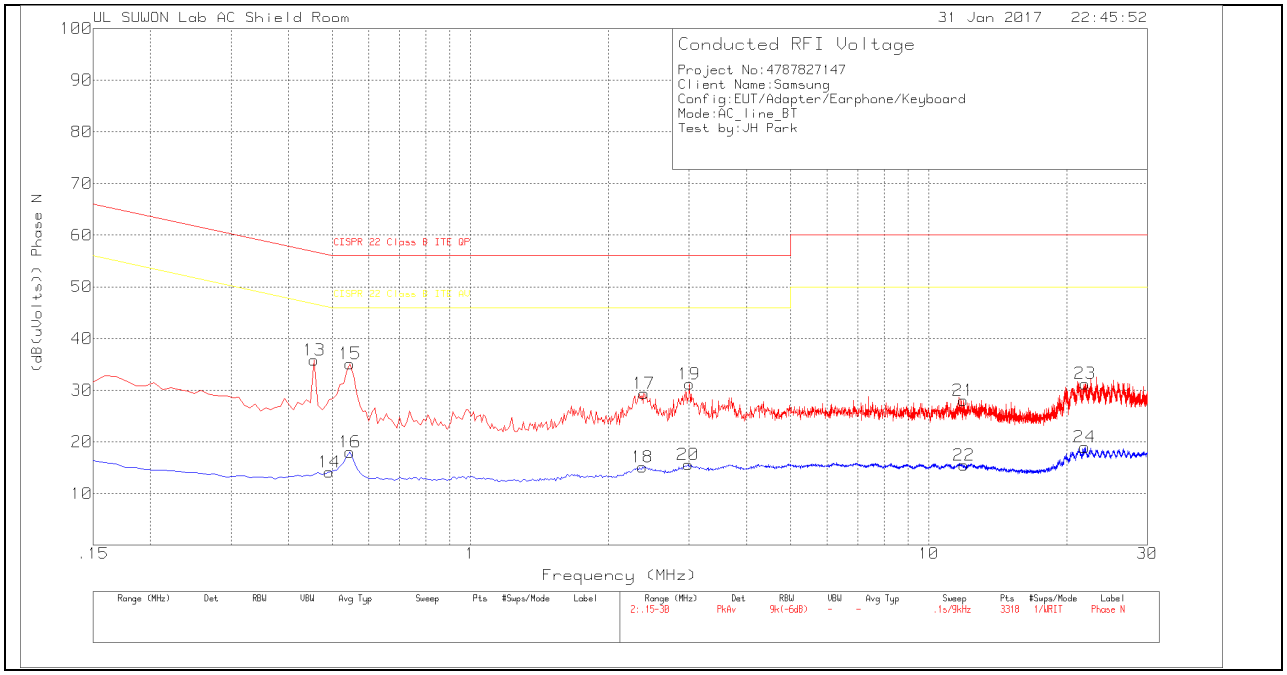
LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_with 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	.456	25.93	Pk	9.9	0	35.83	56.77	-20.94	-	-
14	.492	4.24	Av	9.9	0	14.14	-	-	46.13	-31.99
15	.546	25.22	Pk	9.9	0	35.12	56	-20.88	-	-
16	.546	8.11	Av	9.9	0	18.01	-	-	46	-27.99
17	2.391	19.56	Pk	9.7	.1	29.36	56	-26.64	-	-
18	2.373	5.32	Av	9.7	.1	15.12	-	-	46	-30.88
19	3.003	21.28	Pk	9.8	.1	31.18	56	-24.82	-	-
20	2.985	5.83	Av	9.7	.1	15.63	-	-	46	-30.37
21	11.895	17.65	Pk	10.2	.2	28.05	60	-31.95	-	-
22	11.931	5.08	Av	10.2	.2	15.48	-	-	50	-34.52
23	21.939	20.36	Pk	10.7	.2	31.26	60	-28.74	-	-
24	21.912	8.09	Av	10.7	.2	18.99	-	-	50	-31.01

Pk - Peak detector

Av - Average detection