FCC CFR47 PART 15 SUBPART C

Bluetooth

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS b/g/n and NFC

MODEL NUMBER : SM-J320ZN, SM-J320N0

FCC ID: A3LSMJ320ZN

REPORT NUMBER: 16K23140-E3V1

ISSUE DATE: APR 06, 2016

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by
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ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	04/06/16	Initial issue	SungGil Park

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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 and NFC
MODEL NUMBER:	SM-J320ZN, SM-J320N0
SERIAL NUMBER:	R38H308DJWH (RADIATED); 5503ec94 (CONDUCTED)
DATE TESTED:	MAR 22, 2016 - APR 01, 2016

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

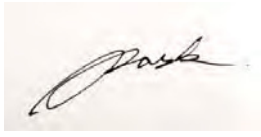
UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into 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:

CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

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

SM-J320ZN and SM-J320N0 are same hardware and only difference is existence of non-USA LTE band. SM-J320ZN supports LTE band 28/40. SM-J320N0 did not support LTE band 28/40. SM-J320ZN was used for the 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	9.52	8.96
		Peak	9.69	9.31
	Enhanced Pi/4-DPSK	Average	7.29	5.35
		Peak	9.72	9.36
	Enhanced 8PSK	Average	7.31	5.38
		Peak	10.22	10.51

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

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of -5.37 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U83HWE	DW2H226DS/A-E	N/A
Data Cable	SAMSUNG	ECB-DU68WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

I/O CABLES

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

TEST SETUP

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

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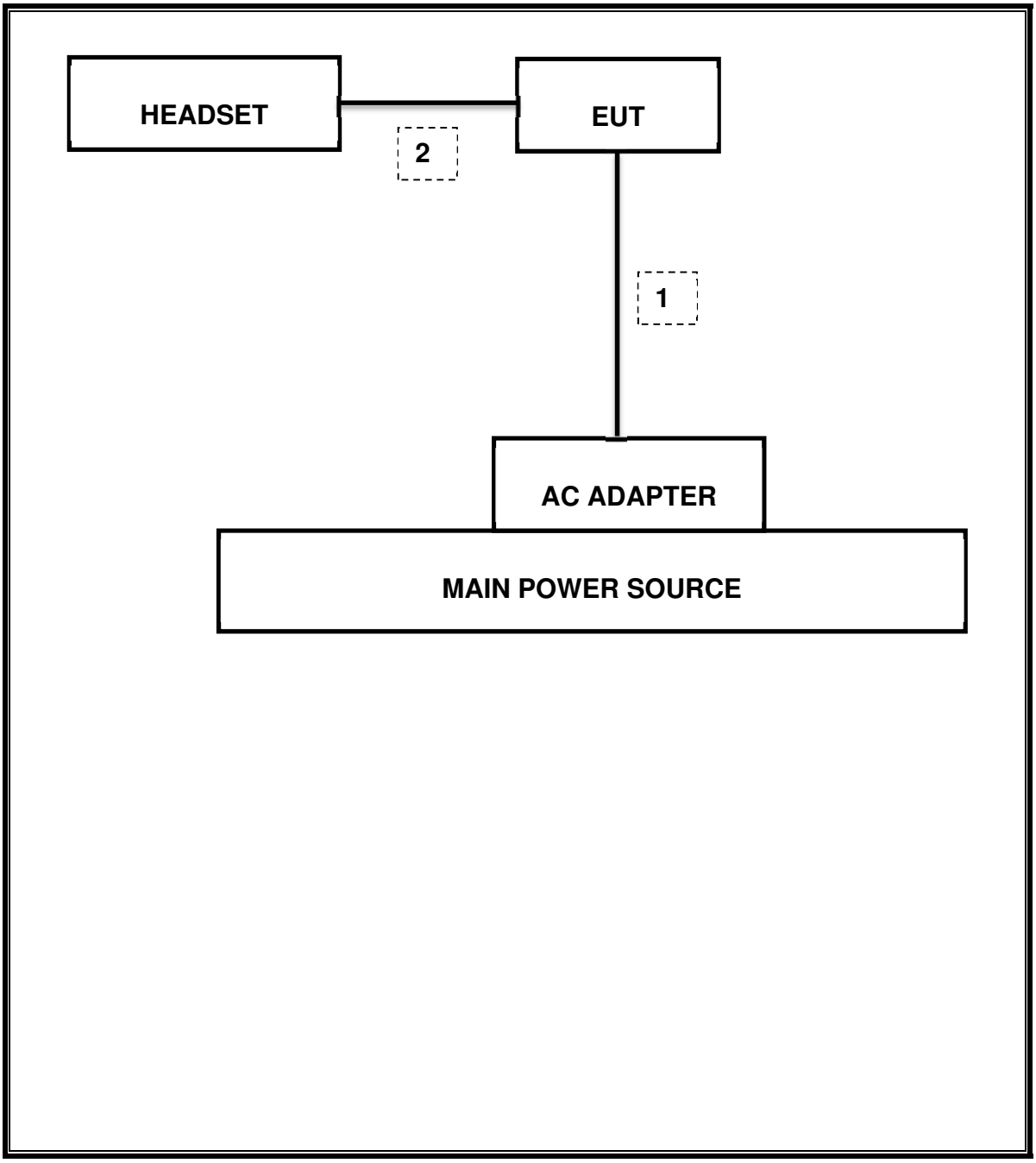
SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-16
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	09-23-16
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-24-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-16
Average Power Sensor	R&S	NRZ-Z91	102681	08-18-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	016	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	015	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16
Combiner	WEINSCHEL	1575	2153	08-20-16

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass	1.164 MHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-44.634 dBm
15.247 (b)(1)	TX conducted output power	<21dBm		Pass	10.217dBm (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	0.346 sec
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	42.71 dBuV (Qp)
15.205, 15.209	Radiated Spurious Emission	< 74dBuV/m	Radiated	Pass	51.38 dBuV/m

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8. ANTENNA PORT TEST RESULTS

8.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

8.1.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	0.943	0.898
Mid	2441	0.994	0.899
High	2480	1.007	0.903
Worst		1.007	0.903

8.1.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.241	1.130
Mid	2441	1.293	1.164
High	2480	1.291	1.162
Worst		1.293	1.164

8.1.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.268	1.134
Mid	2441	1.265	1.131
High	2480	1.266	1.131
Worst		1.268	1.134

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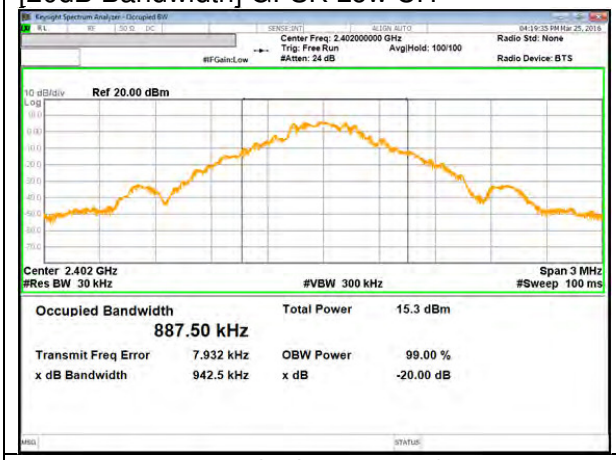
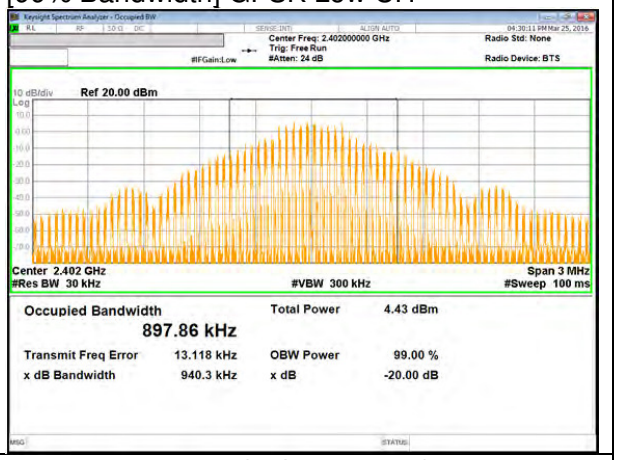
8.1.4. 20 dB AND 99% BANDWIDTH PLOTS

GFSK BANDWIDTH

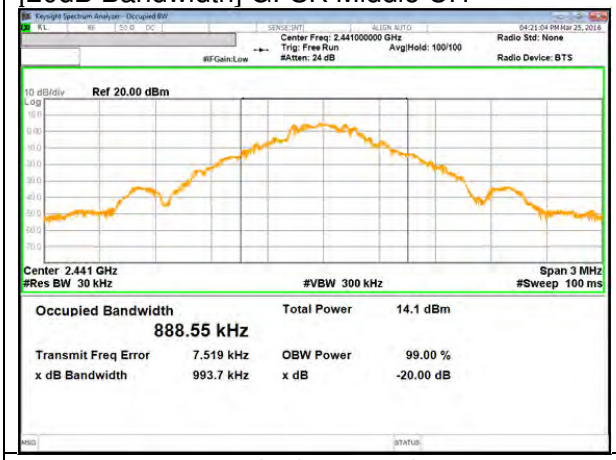
[20dB Bandwidth] GFSK Low CH



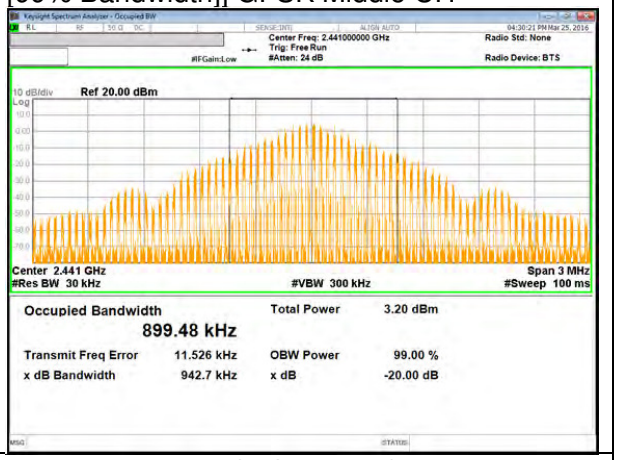
[99% Bandwidth] GFSK Low CH



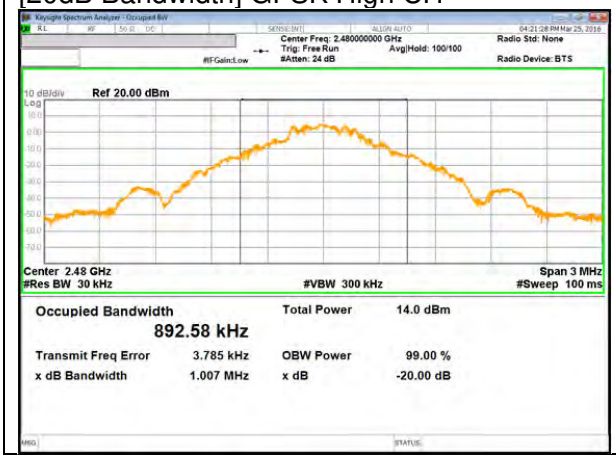
[20dB Bandwidth] GFSK Middle CH



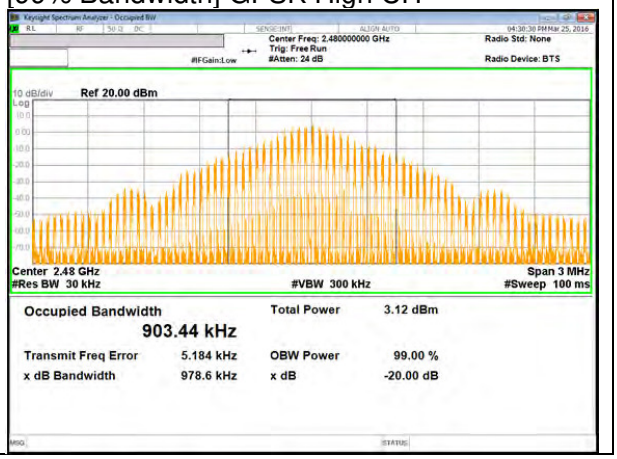
[99% Bandwidth]] GFSK Middle CH



[20dB Bandwidth] GFSK High CH



[99% Bandwidth] GFSK High CH

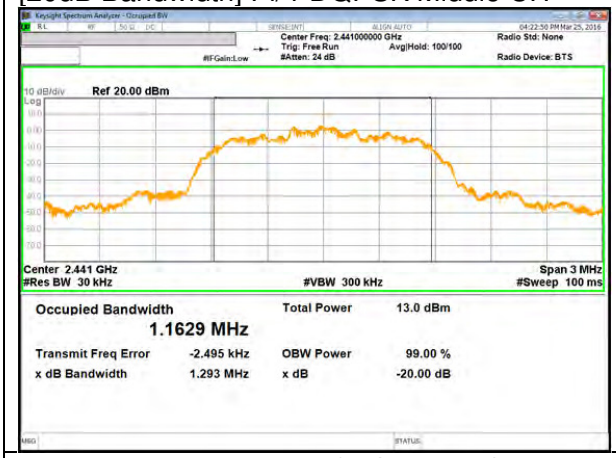


Pi/4-DQPSK BANDWIDTH

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

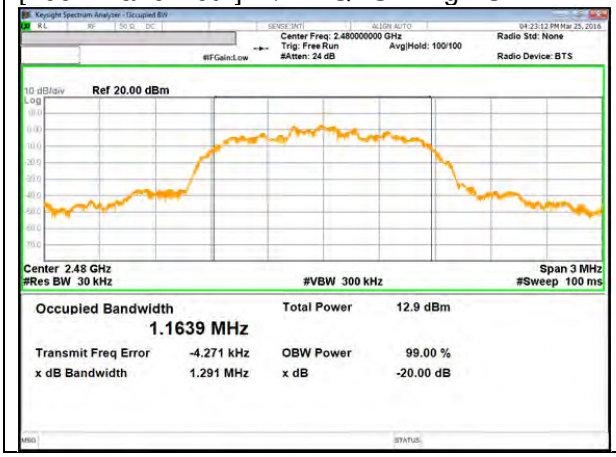
[99% Bandwidth] Pi/4-DQPSK Low CH

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

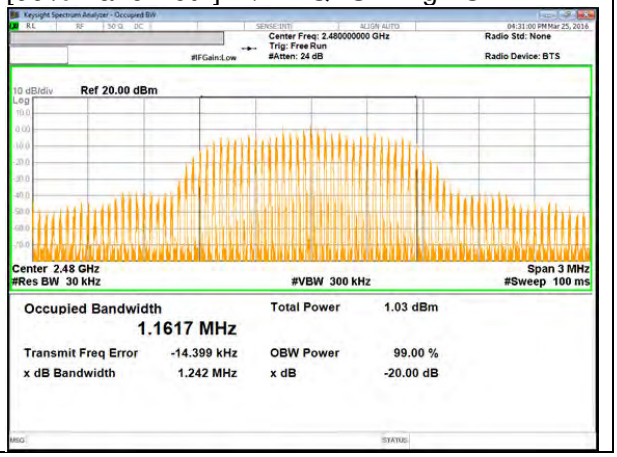


[99% Bandwidth]] Pi/4-DQPSK Middle CH

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

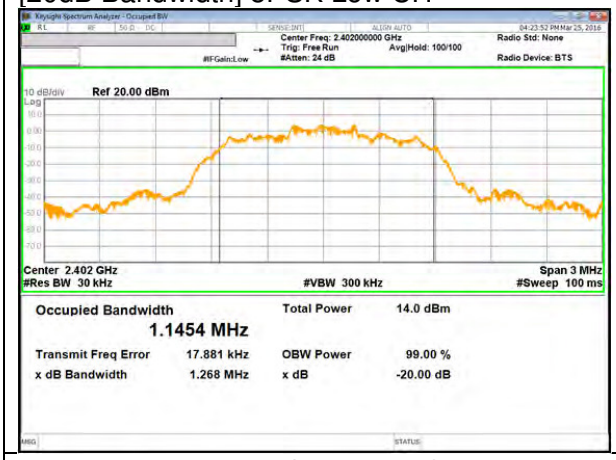


[99% Bandwidth] Pi/4-DQPSK High CH

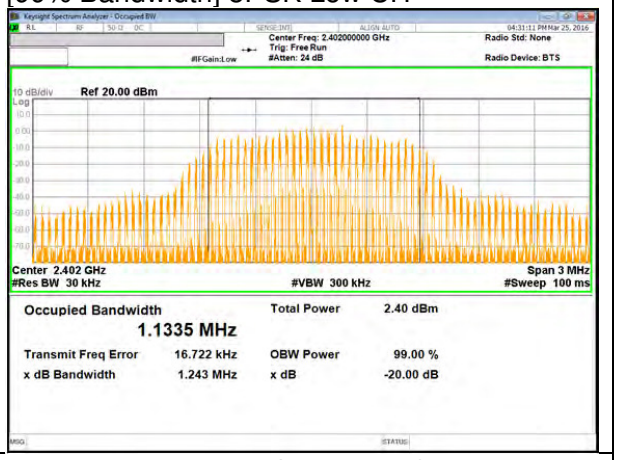


8PSK BANDWIDTH

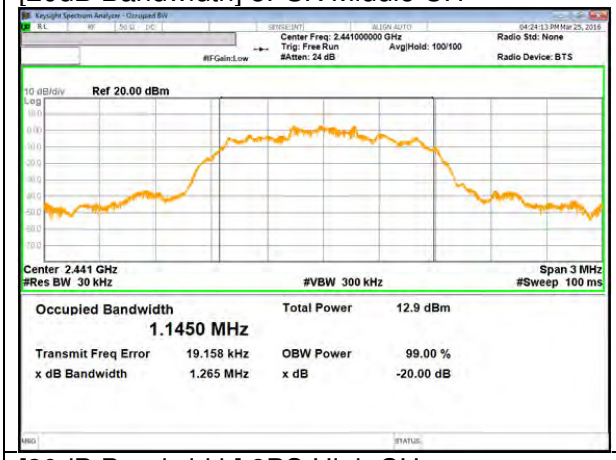
[20dB Bandwidth] 8PSK Low CH



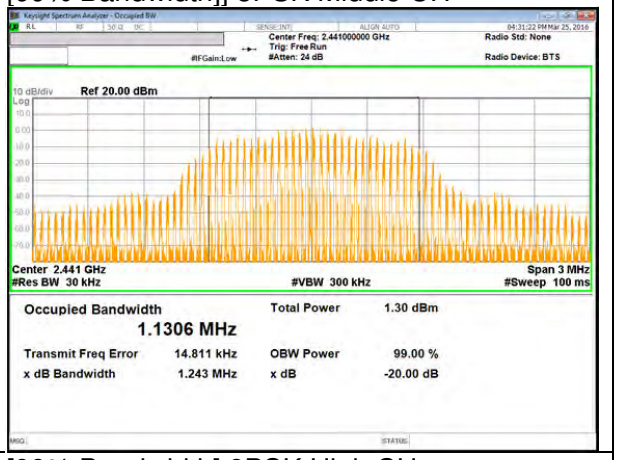
[99% Bandwidth] 8PSK Low CH



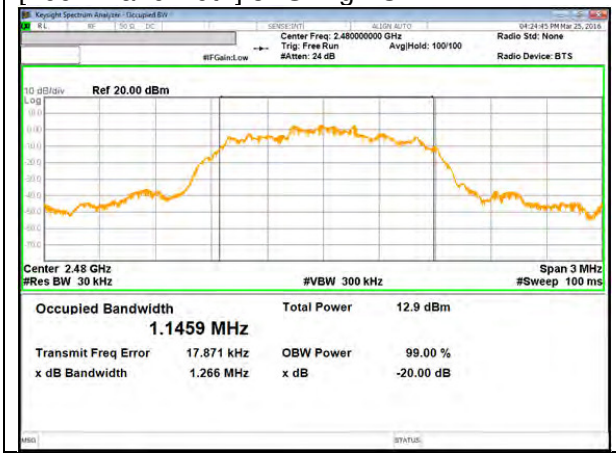
[20dB Bandwidth] 8PSK Middle CH



[99% Bandwidth]] 8PSK Middle CH



[20dB Bandwidth] 8PS High CH



[99% Bandwidth] 8PSK High CH

8.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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

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8.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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

TEST PROCEDURE

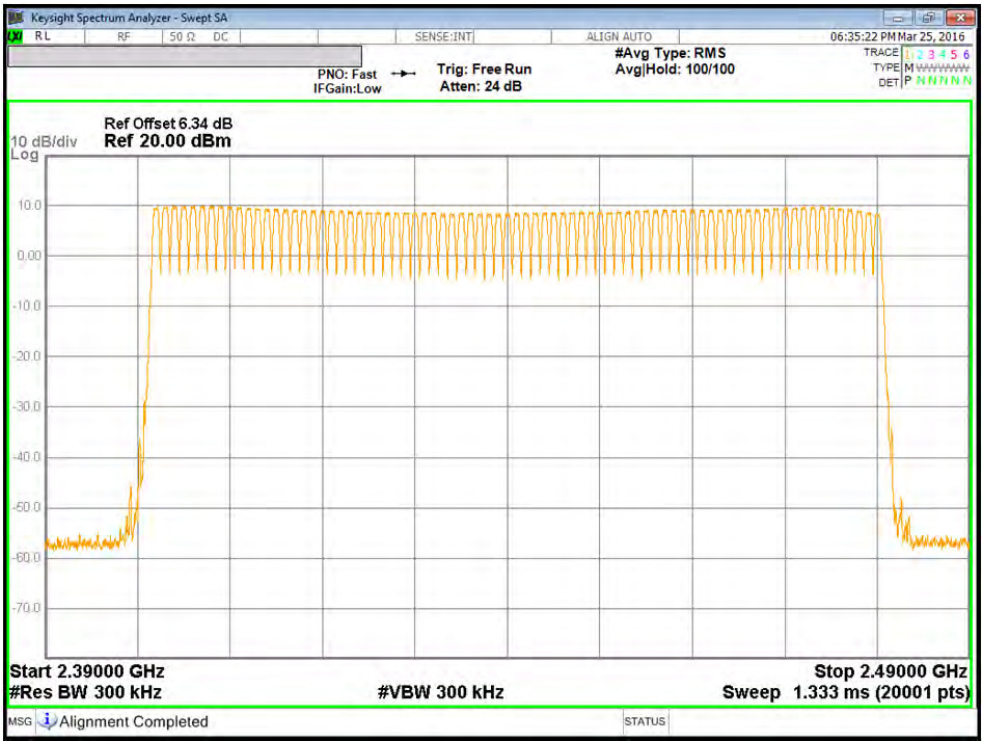
DA 00-705: The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

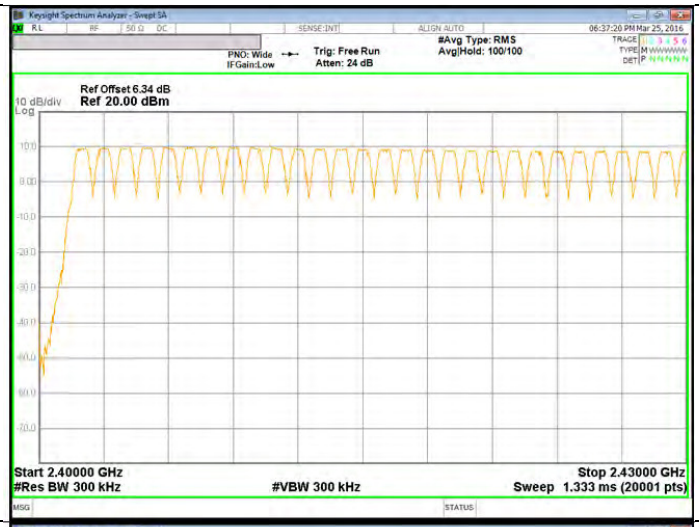
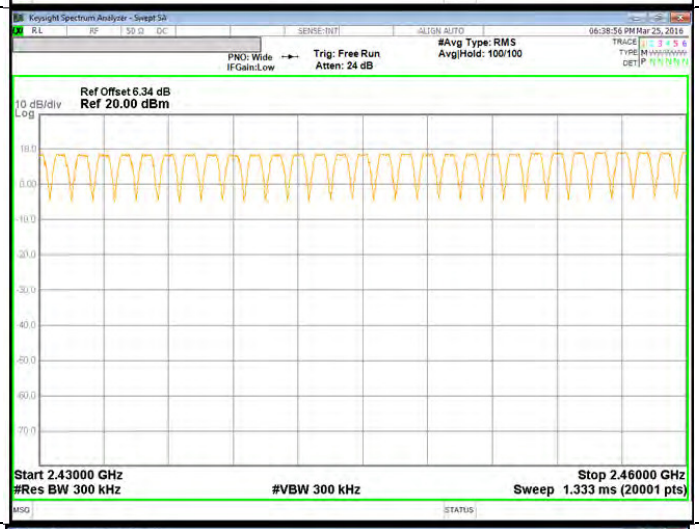
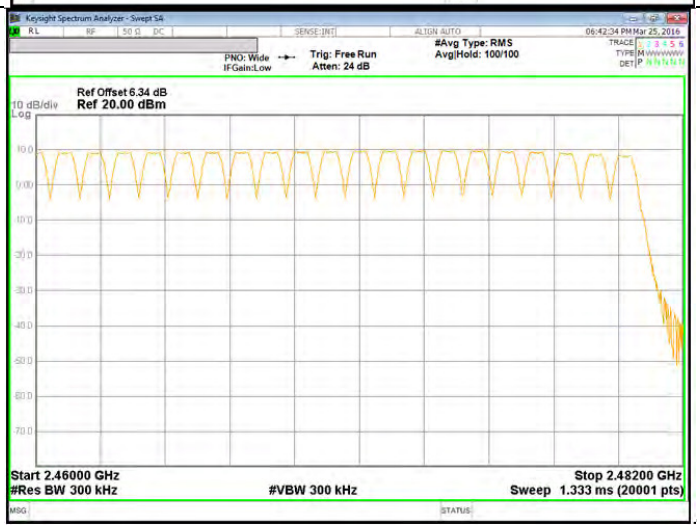
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS PLOTS

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



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

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8.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

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

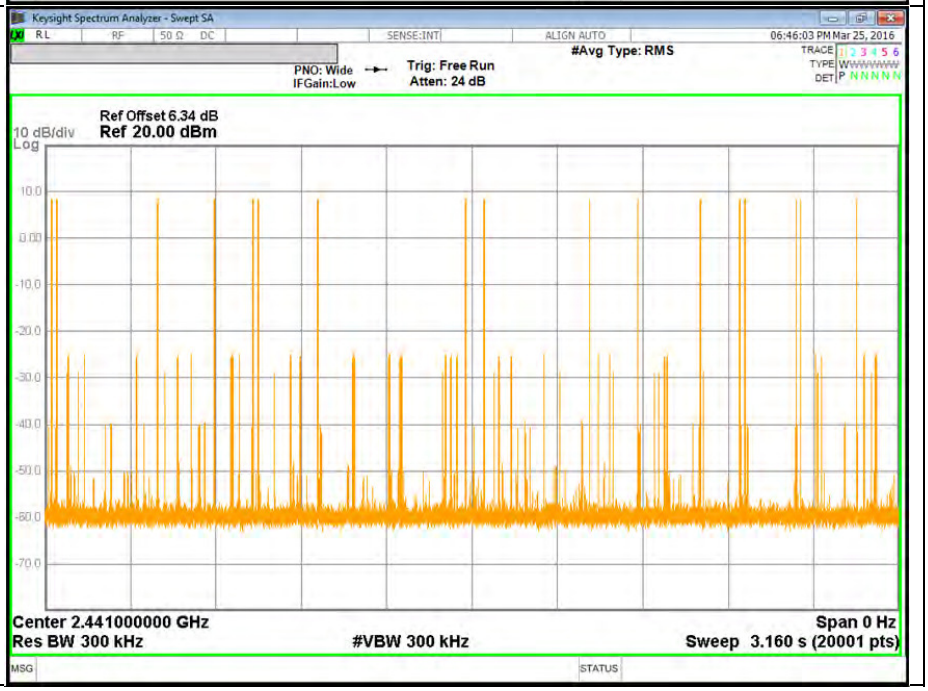
RESULTS

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	0.121344	0.4	-0.2787
DH3	1.635	17	0.277950	0.4	-0.1221
DH5	2.883	12	0.345960	0.4	-0.0540
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	0.030336	0.4	-0.36966
DH3	1.635	4.25	0.069488	0.4	-0.33051
DH5	2.883	3	0.086490	0.4	-0.31351

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	

8.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

8.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	9.691	21	-11.309
Middle	2441	8.496	21	-12.504
High	2480	8.481	21	-12.519
Worst		9.691	21	-11.309

8.5.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

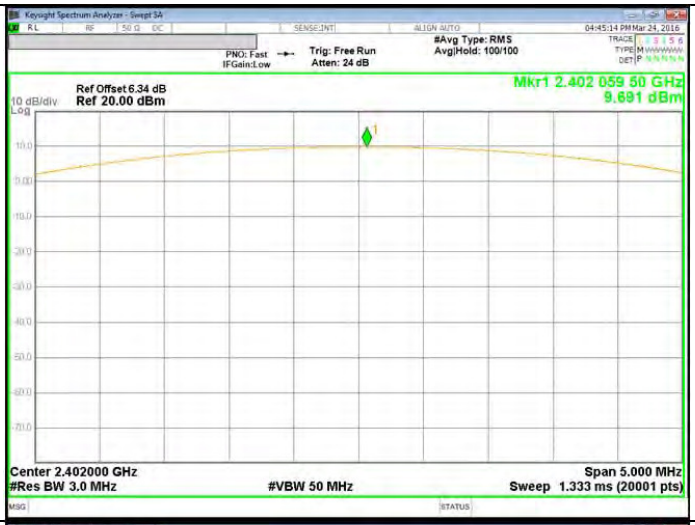
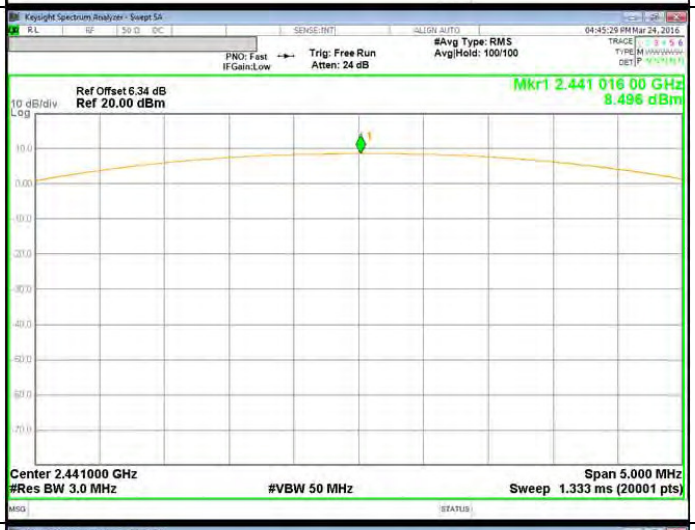
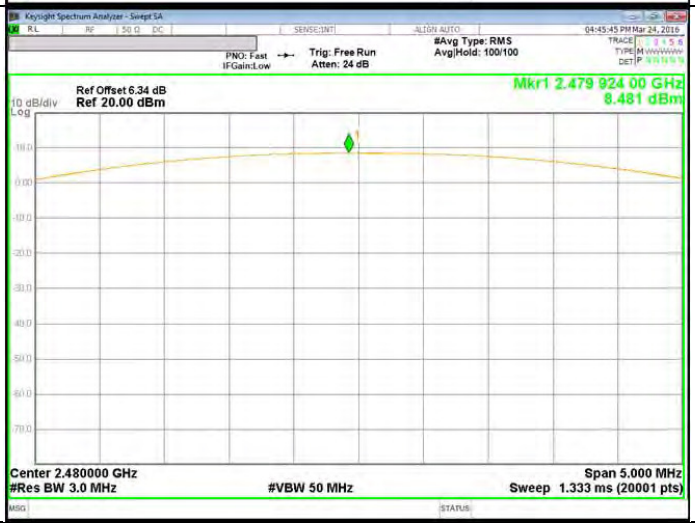
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	9.715	21	-11.285
Middle	2441	8.514	21	-12.486
High	2480	8.513	21	-12.487
Worst		9.715	21	-11.285

8.5.3. ENHANCED DATA RATE 8PSK MODULATION

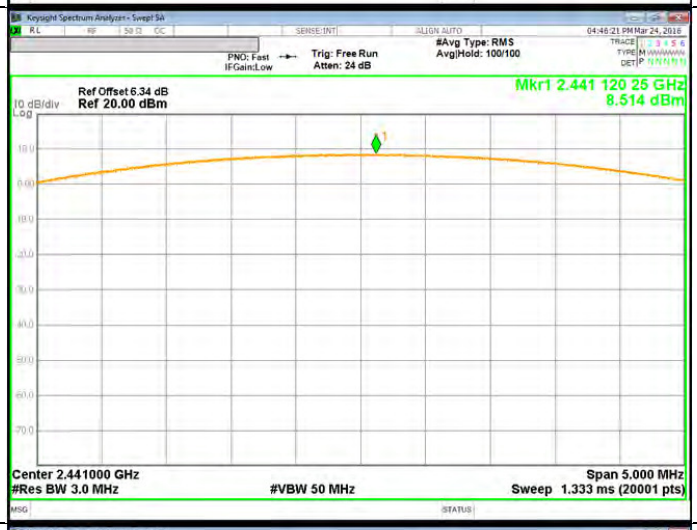
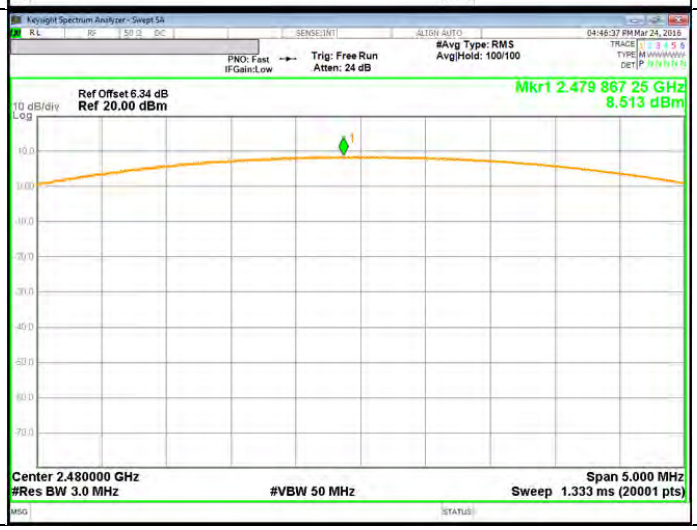
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	10.217	21	-10.783
Middle	2441	9.007	21	-11.993
High	2480	8.993	21	-12.007
Worst		10.217	21	-10.783

8.5.4. OUTPUT POWER PLOTS

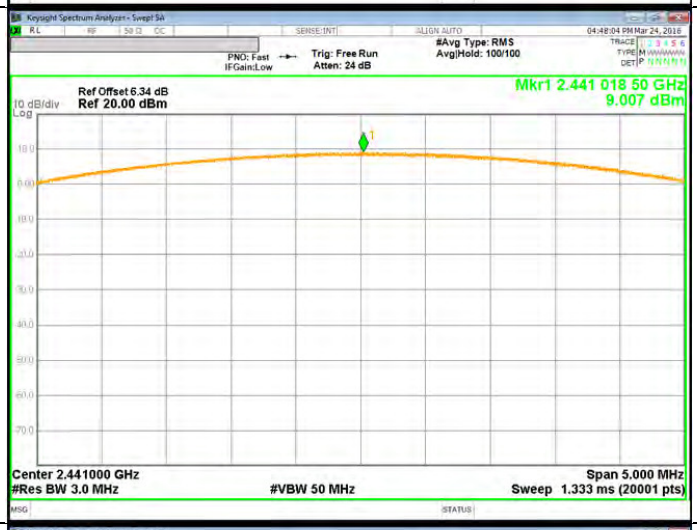
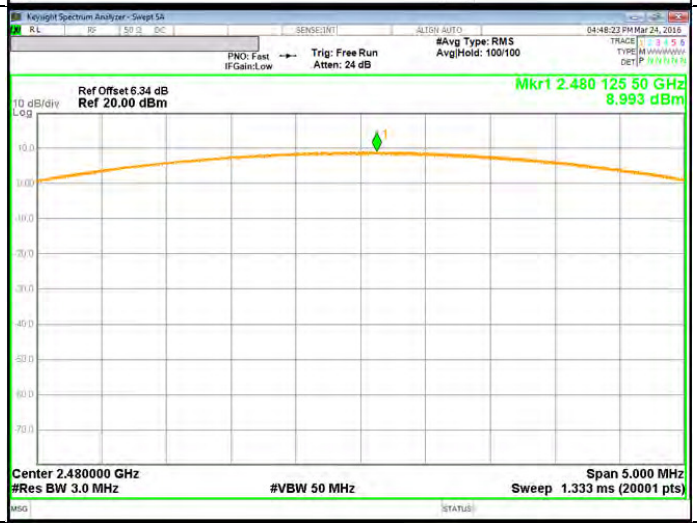
GFSK OUTPUT POWER

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			

8.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

The cable assembly insertion loss of 10.1 dB (including 10 dB pad and 0.1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

8.6.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	9.523	8.96
Middle	2441	8.328	6.80
High	2480	8.311	6.78

8.6.2. DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	7.286	5.35
Middle	2441	6.096	4.07
High	2480	6.065	4.04

8.6.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	7.307	5.38
Middle	2441	6.109	4.08
High	2480	6.084	4.06

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8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

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

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

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

RESULTS

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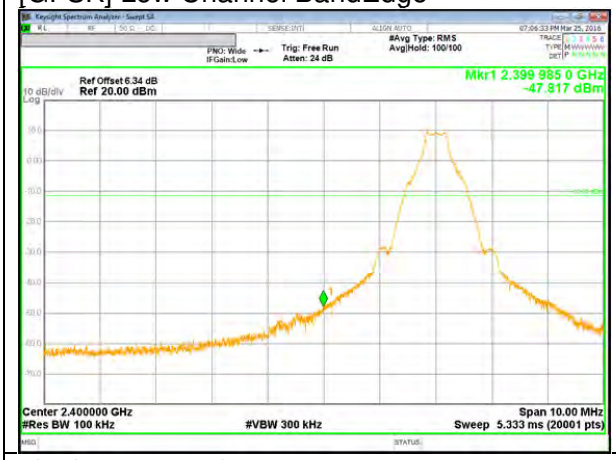
8.7.1. BASIC DATA RATE GFSK MODULATION

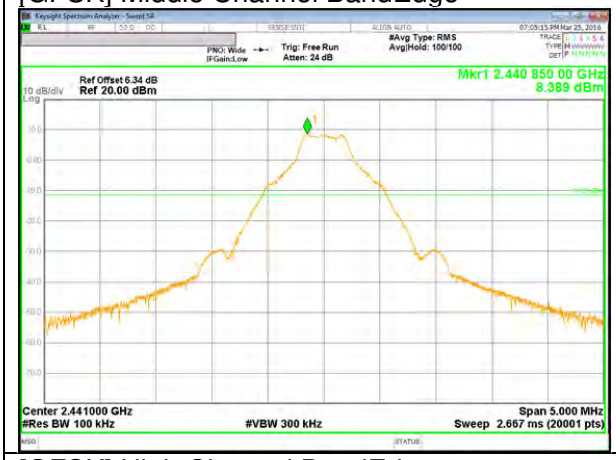
GFSK Mode

[GFSK] Low Channel BandEdge



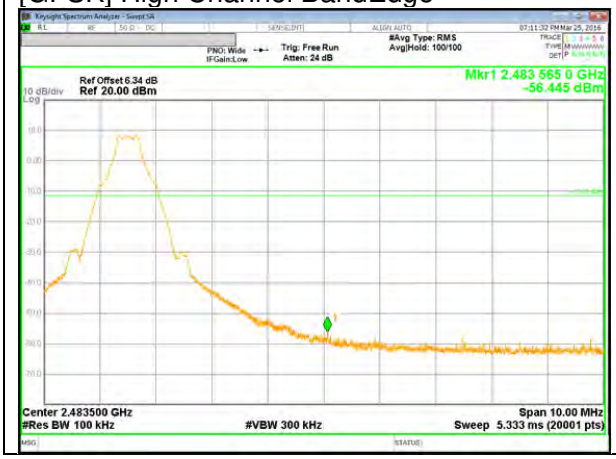
[GFSK] Low Channel Spurious

[GFSK] Middle Channel BandEdge



[GFSK] Middle Channel Spurious

[GFSK] High Channel BandEdge



[GFSK] High Channel Spurious

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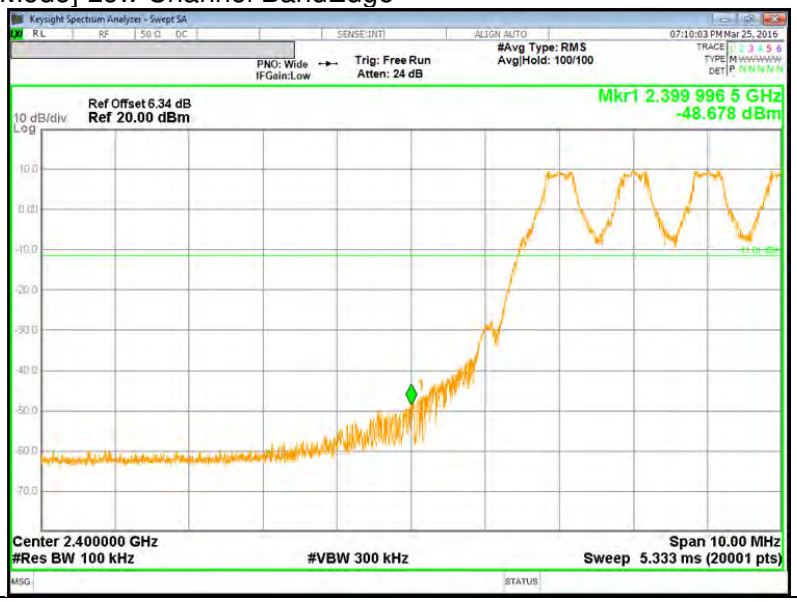
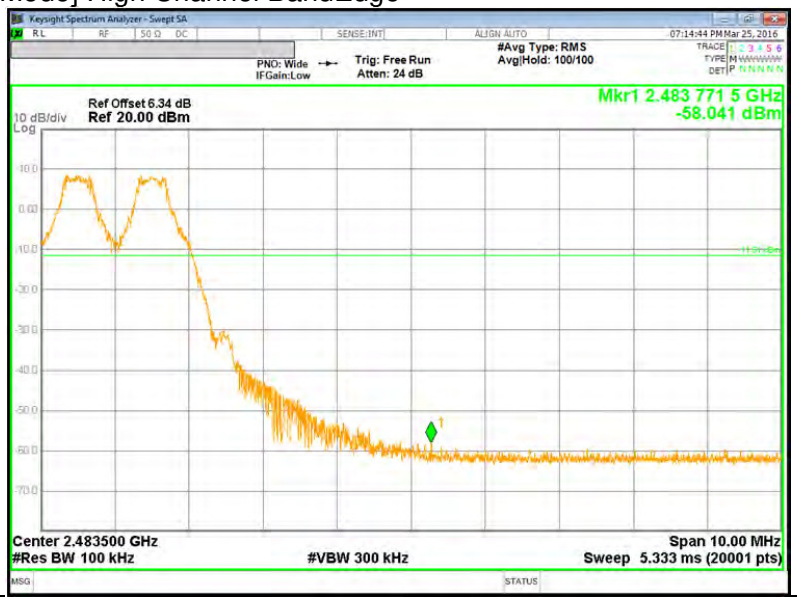
BandEdge Emission at GFSK Hopping Mode

[GFSK Hopping Mode] Low Channel BandEdge



[GFSK Hopping Mode] High Channel BandEdge



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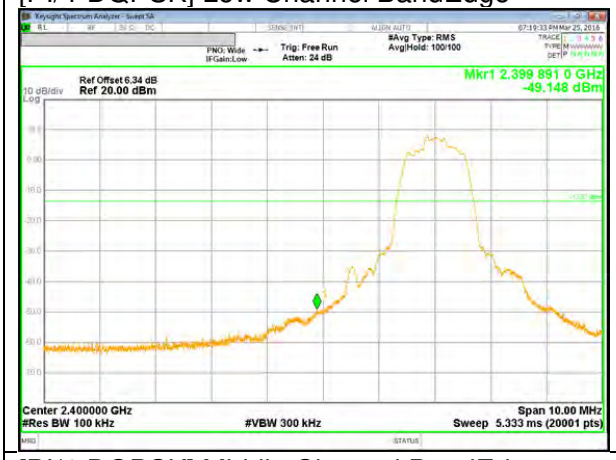
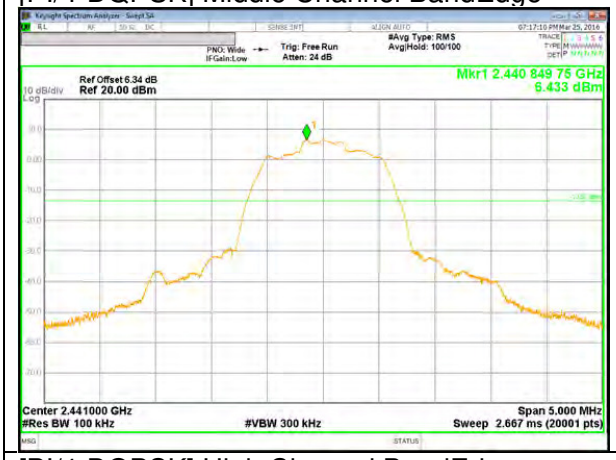
PI/4-DQPSK Mode

[PI/4-DQPSK] Low Channel BandEdge



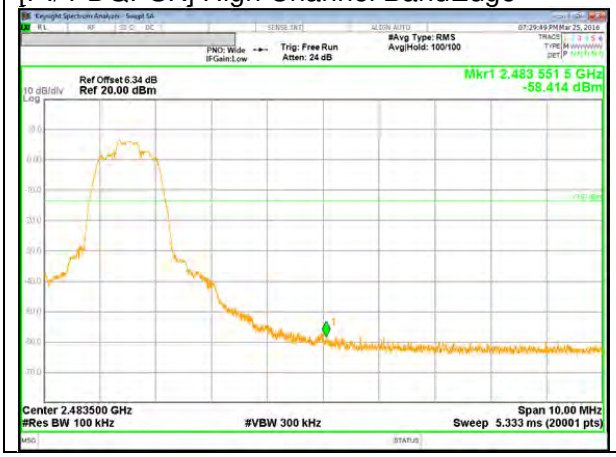
[PI/4-DQPSK] Low Channel Spurious

[PI/4-DQPSK] Middle Channel BandEdge

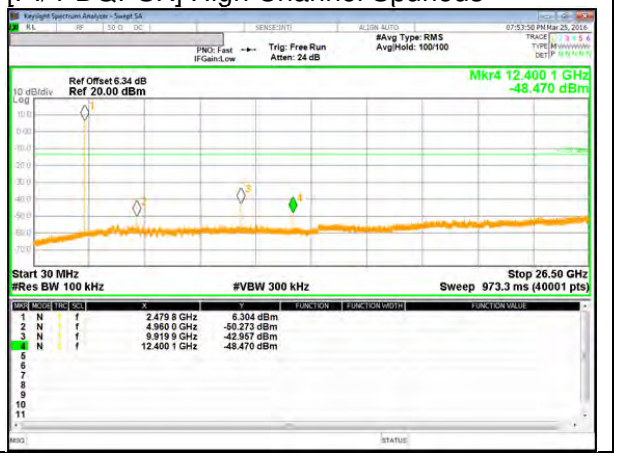


[PI/4-DQPSK] Middle Channel Spurious

[PI/4-DQPSK] High Channel BandEdge

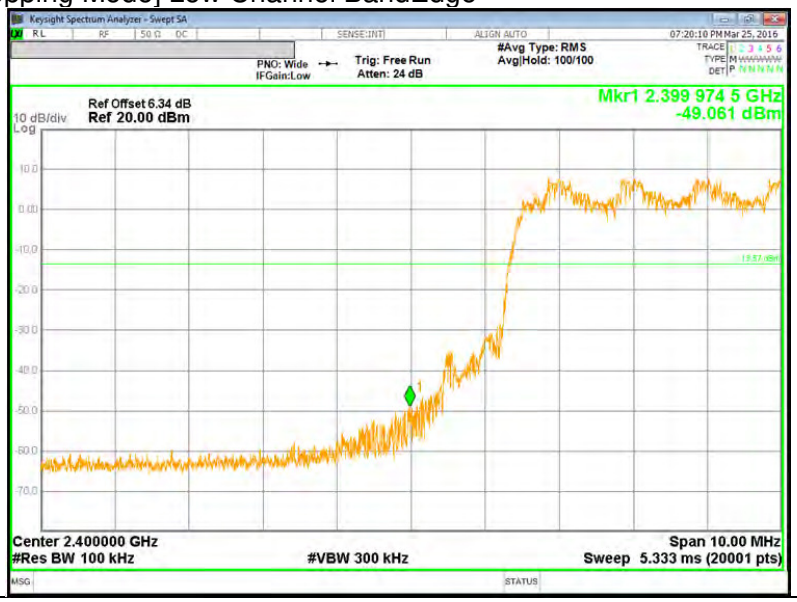


[PI/4-DQPSK] High Channel Spurious

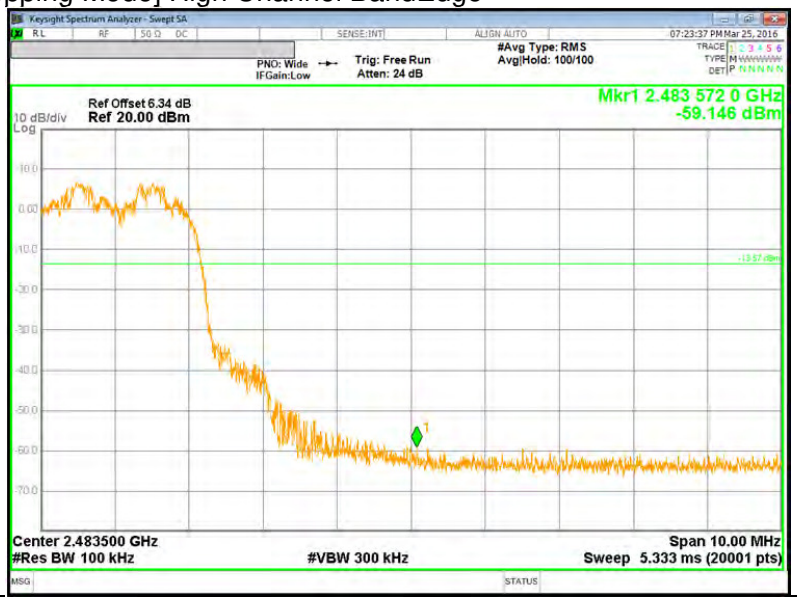


BandEdge Emission at PI/4-DQPSK Hopping Mode

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



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



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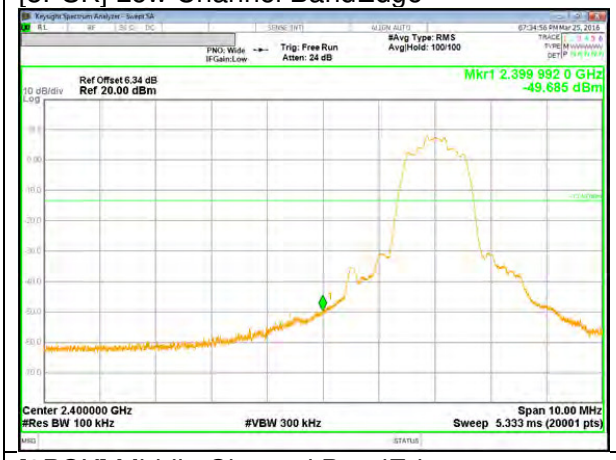
8PSK Mode

[8PSK] Low Channel BandEdge

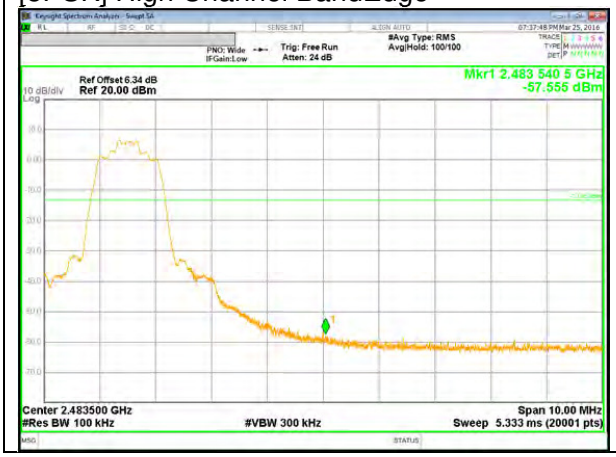


[8PSK] Low Channel Spurious

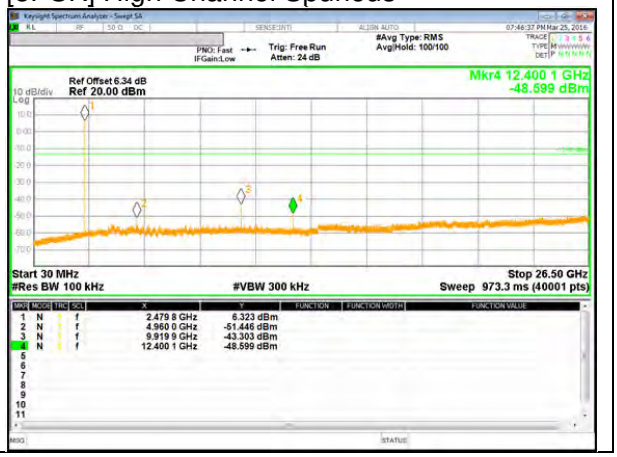
[8PSK] Middle Channel BandEdge

[8PSK] Middle Channel Spurious

[8PSK] High Channel BandEdge



[8PSK] High Channel Spurious



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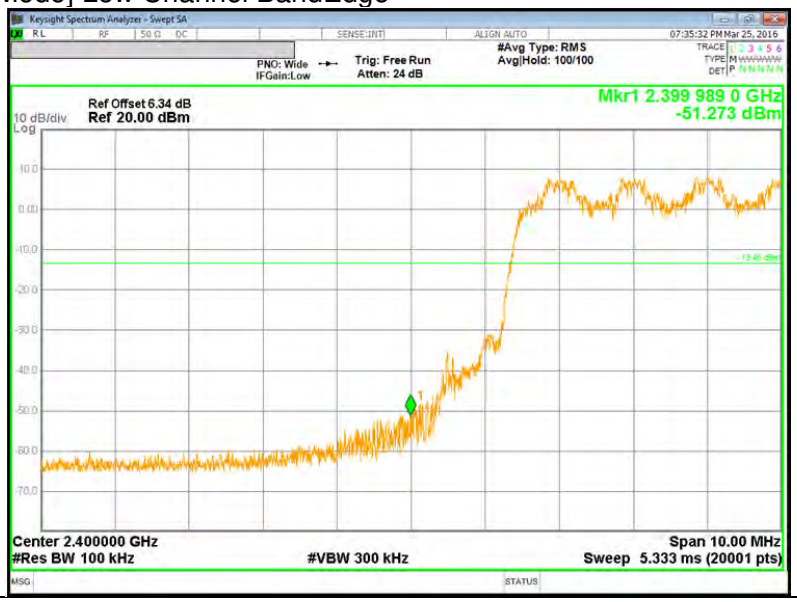
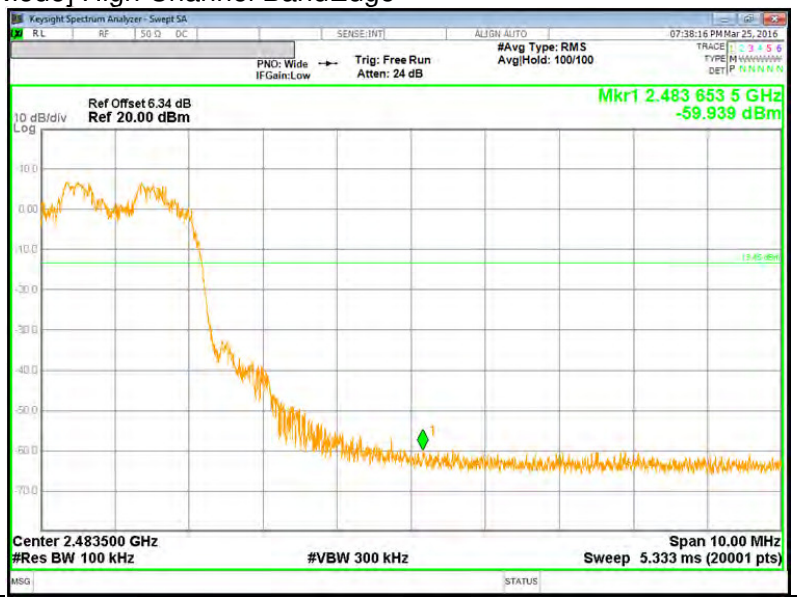
BandEdge Emission at 8PSK Hopping Mode

[8PSK Hopping Mode] Low Channel BandEdge



[8PSK Hopping Mode] High Channel BandEdge



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9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. 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 band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 1/T (on time) for average measurement.

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

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

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

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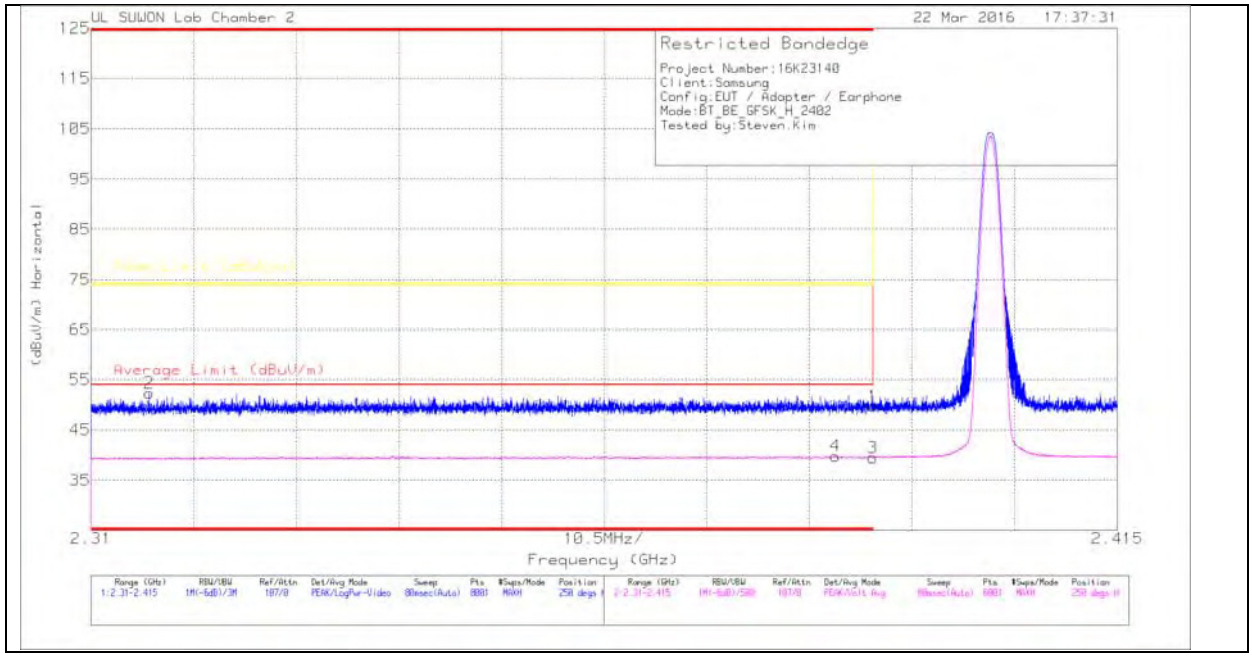
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

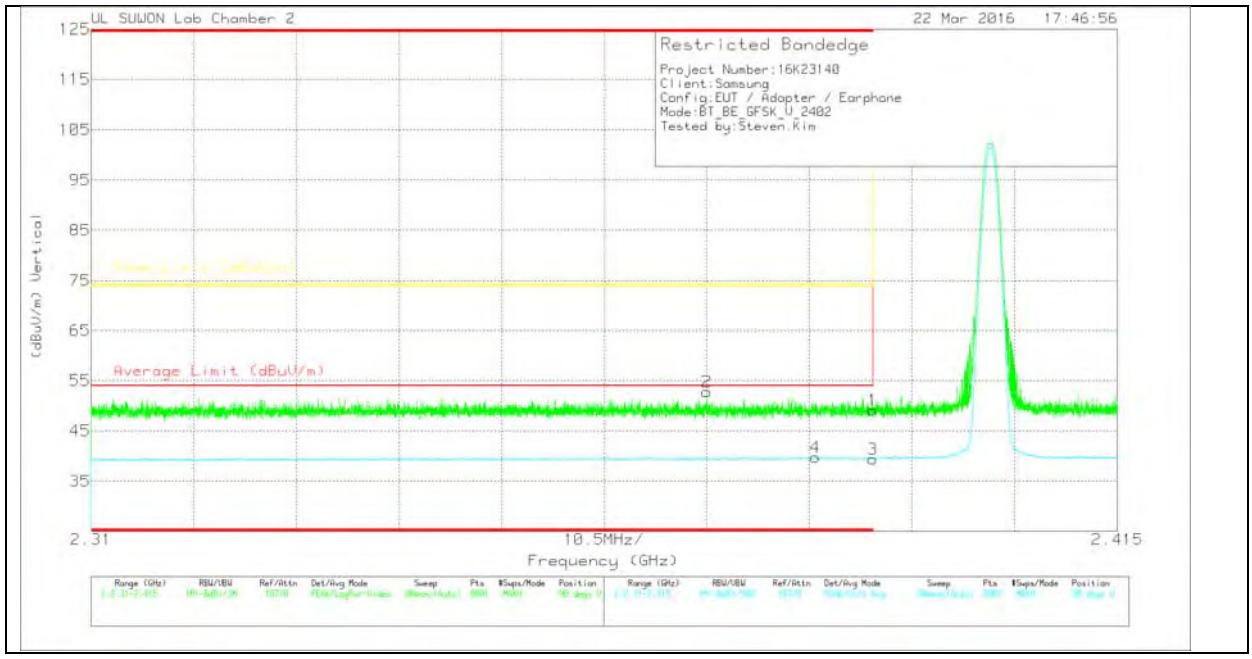
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.56	Pk	31.7	-19.5	49.76	-	-	74	-24.24	250	298	H
2	* 2.316	40.44	Pk	31.6	-19.7	52.34	-	-	74	-21.66	250	298	H
3	* 2.39	27.29	V1TV	31.7	-19.5	39.49	54	-14.51	-	-	250	298	H
4	* 2.386	27.63	V1TV	31.7	-19.5	39.83	54	-14.17	-	-	250	298	H

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

Pk - Peak detector

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_2_10dB	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	36.92	Pk	31.7	-19.5	49.12	-	-	74	-24.88	90	372	V
2	* 2.373	40.68	Pk	31.7	-19.6	52.78	-	-	74	-21.22	90	372	V
3	* 2.39	27.2	V1TV	31.7	-19.5	39.4	54	-14.6	-	-	90	372	V
4	* 2.384	27.57	V1TV	31.7	-19.5	39.77	54	-14.23	-	-	90	372	V

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

Pk - Peak detector

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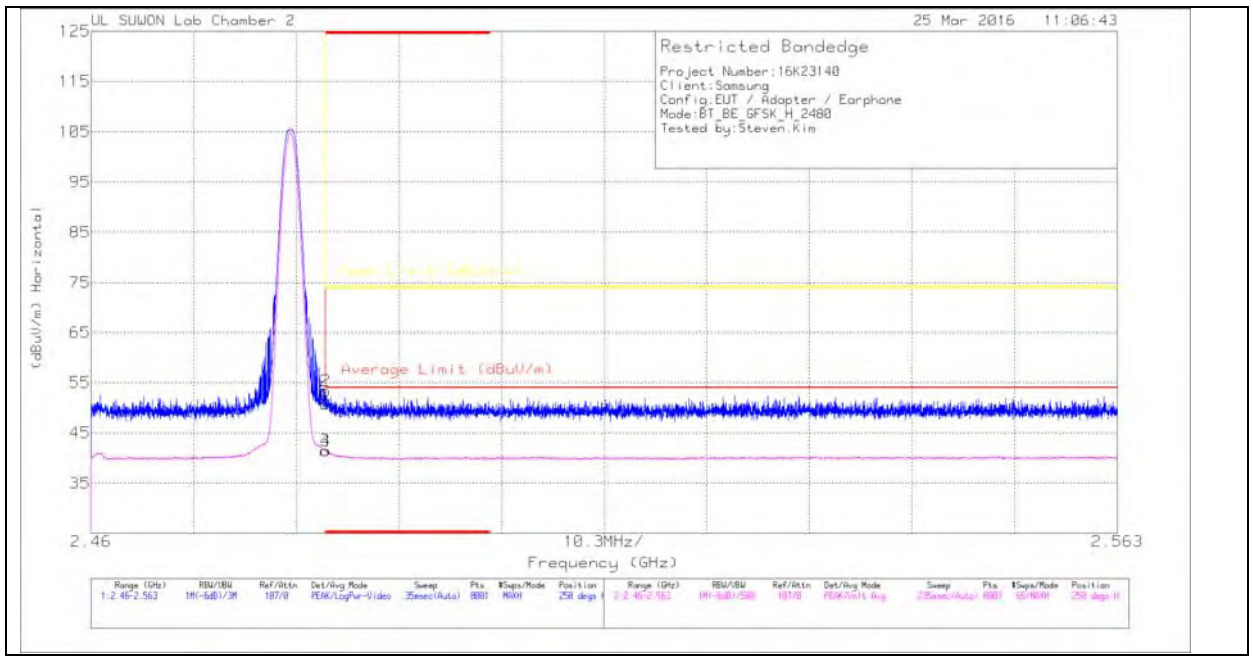
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

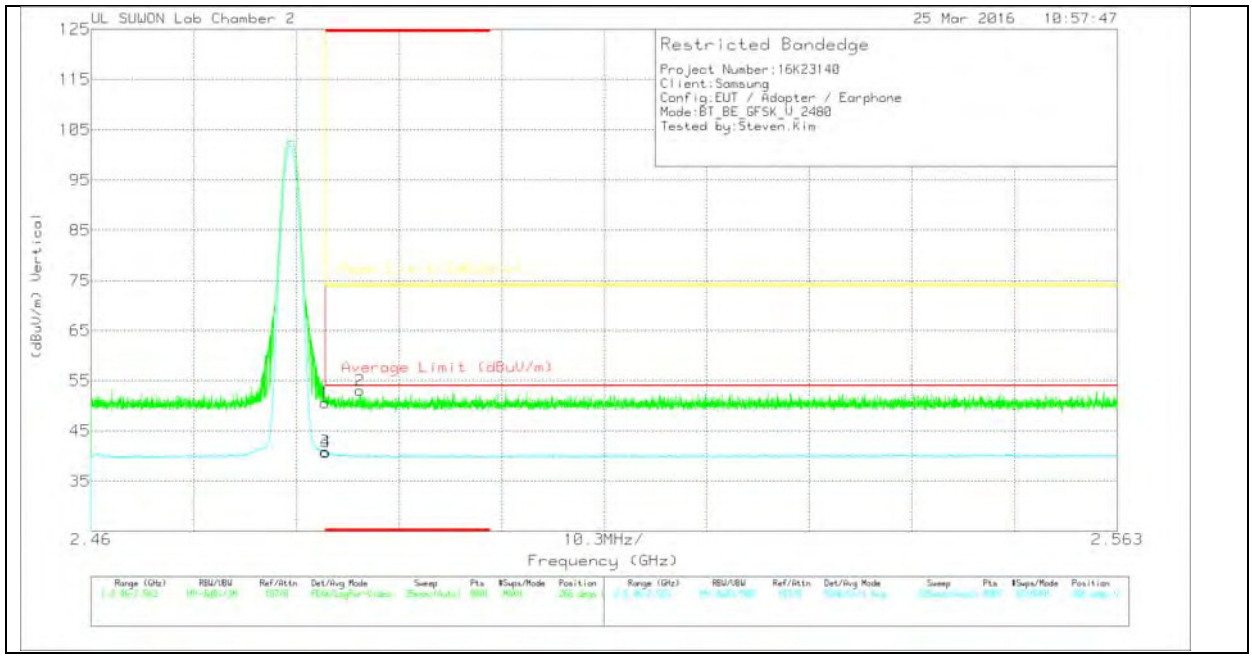
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.3	Pk	31.8	-19.4	50.7	-	-	74	-23.3	250	101	H
2	* 2.484	40.96	Pk	31.8	-19.4	53.36	-	-	74	-20.64	250	101	H
3	* 2.484	29.1	V1TV	31.8	-19.4	41.5	54	-12.5	-	-	250	101	H
4	* 2.484	29.06	V1TV	31.8	-19.4	41.46	54	-12.54	-	-	250	101	H

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

Pk - Peak detector

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.22	Pk	31.8	-19.4	50.62	-	-	74	-23.38	266	347	V
2	* 2.487	40.62	Pk	31.8	-19.4	53.02	-	-	74	-20.98	266	347	V
3	* 2.484	28.52	V1TV	31.8	-19.4	40.92	54	-13.08	-	-	266	347	V
4	* 2.484	28.39	V1TV	31.8	-19.4	40.79	54	-13.21	-	-	266	347	V

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

Pk - Peak detector

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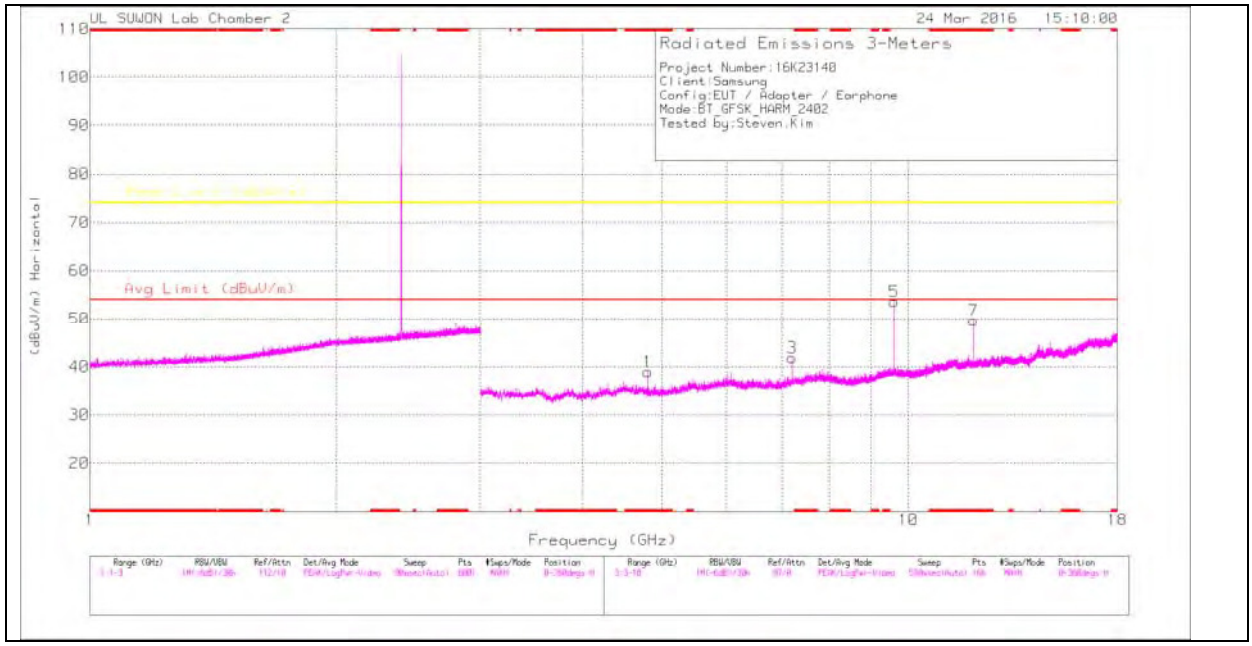
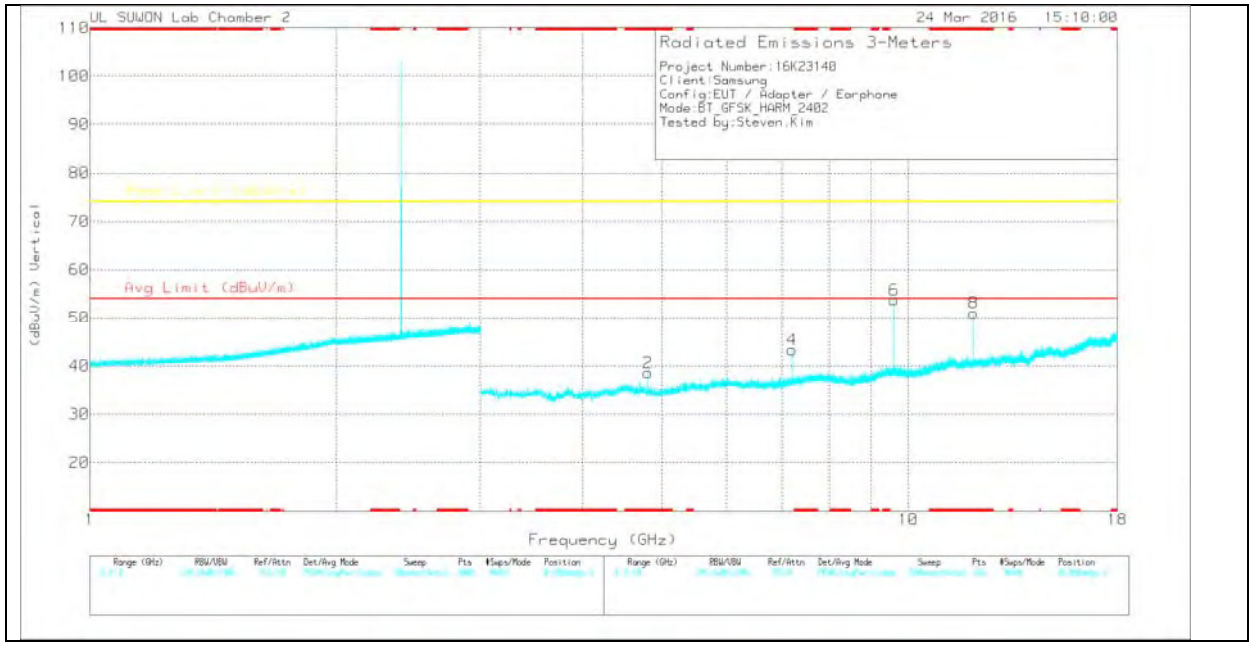
HARMONICS AND SPURIOUS EMISSIONS

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	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	30.4	PK	33.9	-25.3	39	-	-	74	-35	0-360	100	H
3	7.205	29.04	PK	35.8	-22.9	41.94	-	-	74	-32.06	0-360	100	H
5	9.608	35.85	PK	36.9	-19.1	53.65	-	-	74	-20.35	0-360	100	H
7	* 12.01	28.53	PK	38.7	-17.5	49.73	-	-	74	-24.27	0-360	200	H
2	* 4.804	29.99	PK	33.9	-25.3	38.59	-	-	74	-35.41	0-360	100	V
4	7.205	30.44	PK	35.8	-22.9	43.34	-	-	74	-30.66	0-360	200	V
6	9.608	35.95	PK	36.9	-19.1	53.75	-	-	74	-20.25	0-360	200	V
8	* 12.011	29.85	PK	38.7	-17.5	51.05	-	-	74	-22.95	0-360	200	V

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

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	39.28	PK2	33.9	-25.3	47.88	-	-	74	-26.12	183	103	H
* 4.804	29.13	VA1T	33.9	-25.3	37.73	54	-16.27	-	-	183	103	H
7.206	37.53	PK2	35.8	-22.9	50.43	-	-	74	-23.57	194	389	H
9.608	40.96	PK2	36.9	-19.1	58.76	-	-	74	-15.24	16	100	H
* 12.01	35.62	PK2	38.7	-17.5	56.82	-	-	74	-17.18	12	385	H
* 12.01	29.28	VA1T	38.7	-17.5	50.48	54	-3.52	-	-	12	385	H
* 4.804	39.11	PK2	33.9	-25.3	47.71	-	-	74	-26.29	21	143	V
* 4.804	28.44	VA1T	33.9	-25.3	37.04	54	-16.96	-	-	21	143	V
7.206	39.88	PK2	35.8	-22.9	52.78	-	-	74	-21.22	11	263	V
9.608	40.62	PK2	36.9	-19.1	58.42	-	-	74	-15.58	213	222	V
* 12.01	35.69	PK2	38.7	-17.5	56.89	-	-	74	-17.11	219	181	V
* 12.01	30.18	VA1T	38.7	-17.5	51.38	54	-2.62	-	-	219	181	V

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

PK2 - KDB558074 Method: Maximum Peak

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

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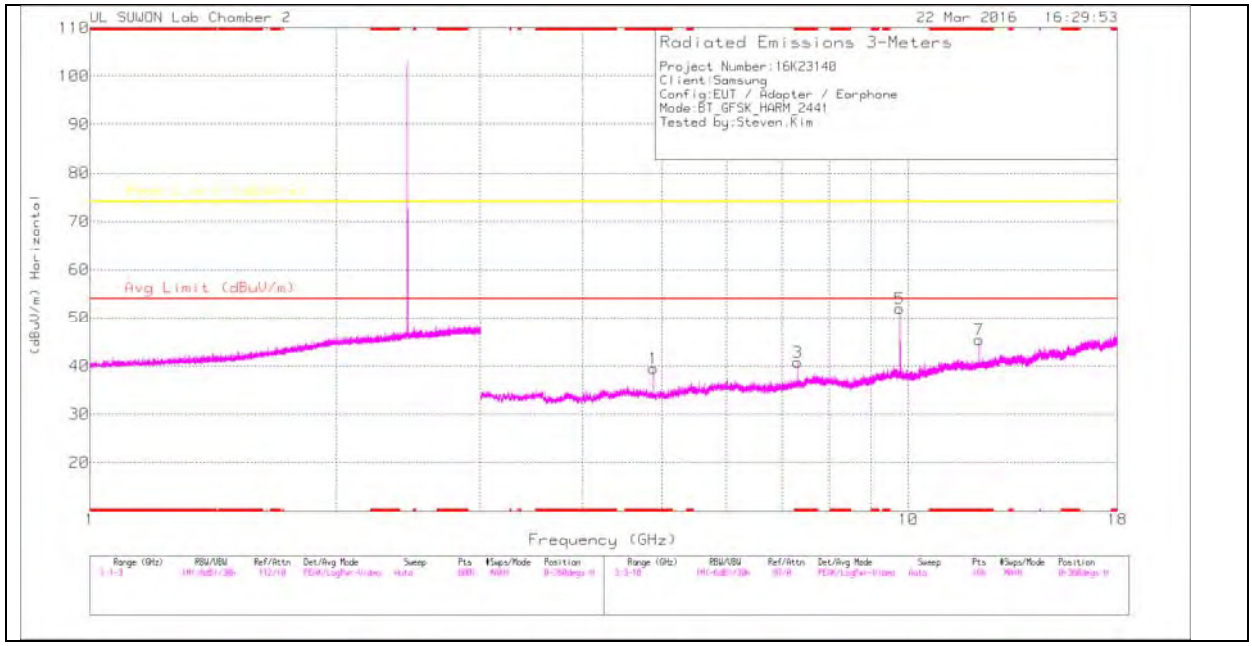
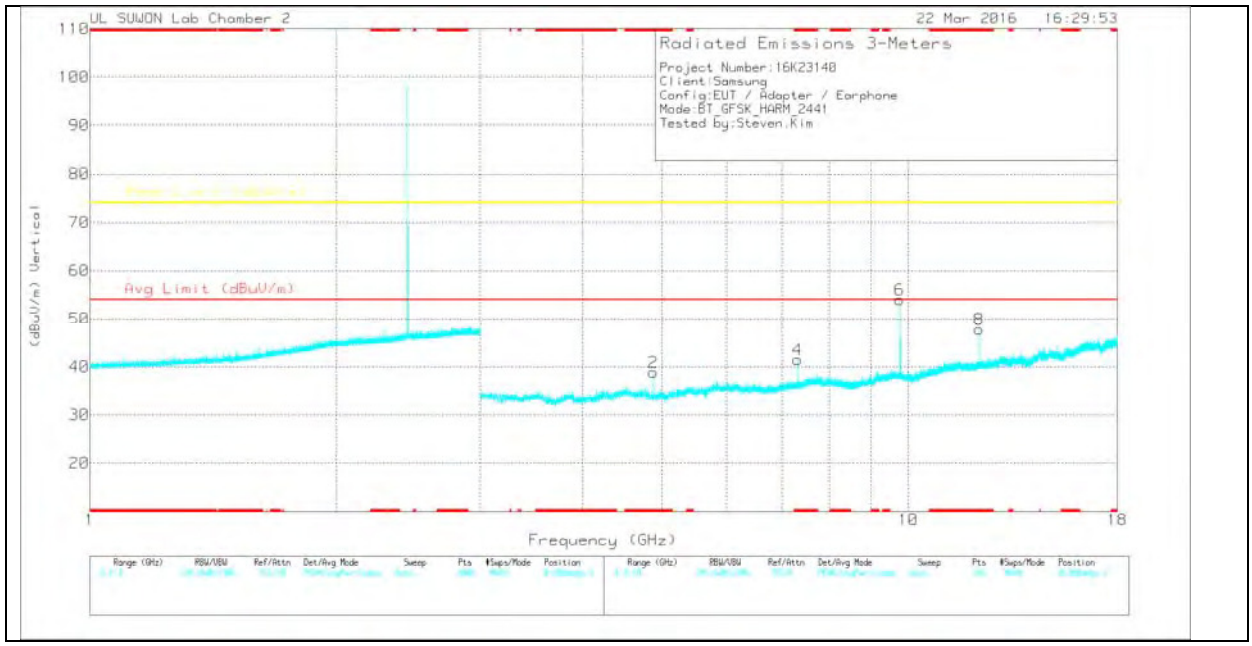
MID CHANNEL HORIZONTAL



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.

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	30.83	PK	33.9	-25.2	39.53	-	-	74	-34.47	0-360	100	H
3	* 7.323	27.3	PK	35.9	-22.5	40.7	-	-	74	-33.3	0-360	100	H
5	9.764	34.33	PK	37	-19.3	52.03	-	-	74	-21.97	0-360	200	H
7	* 12.205	23.84	PK	38.8	-17.2	45.44	-	-	74	-28.56	0-360	200	H
2	* 4.881	30.1	PK	33.9	-25.2	38.8	-	-	74	-35.2	0-360	100	V
4	* 7.323	28.05	PK	35.9	-22.5	41.45	-	-	74	-32.55	0-360	200	V
6	9.765	36.36	PK	37	-19.3	54.06	-	-	74	-19.94	0-360	200	V
8	* 12.205	26.23	PK	38.8	-17.2	47.83	-	-	74	-26.17	0-360	200	V

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

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.882	39.76	PK2	33.9	-25.2	48.46	-	-	74	-25.54	183	111	H
* 4.882	31.2	VA1T	33.9	-25.2	39.9	54	-14.1	-	-	183	111	H
* 7.323	30.84	PK2	35.9	-22.5	44.24	-	-	74	-29.76	189	107	H
* 7.323	24.74	VA1T	35.9	-22.5	38.14	54	-15.86	-	-	189	107	H
9.764	38.07	PK2	37	-19.3	55.77	-	-	74	-18.23	11	104	H
* 12.205	32.73	PK2	38.8	-17.2	54.33	-	-	74	-19.67	13	338	H
* 12.205	24.86	VA1T	38.8	-17.2	46.46	54	-7.54	-	-	13	338	H
* 4.882	39.54	PK2	33.9	-25.2	48.24	-	-	74	-25.76	23	326	V
* 4.882	30.55	VA1T	33.9	-25.2	39.25	54	-14.75	-	-	23	326	V
* 7.323	37.12	PK2	35.9	-22.5	50.52	-	-	74	-23.48	21	279	V
* 7.323	26.21	VA1T	35.9	-22.5	39.61	54	-14.39	-	-	21	279	V
9.764	39.7	PK2	37	-19.3	57.4	-	-	74	-16.6	249	184	V
* 12.205	33.44	PK2	38.8	-17.2	55.04	-	-	74	-18.96	221	188	V
* 12.205	26.42	VA1T	38.8	-17.2	48.02	54	-5.98	-	-	221	188	V

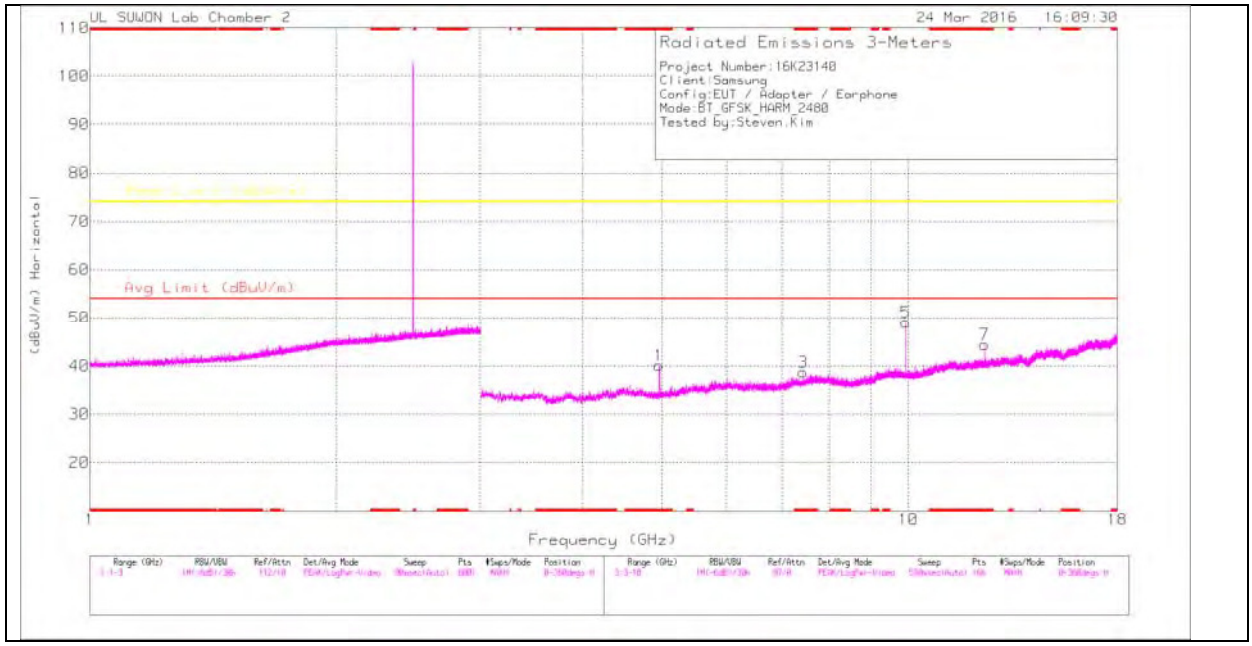
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

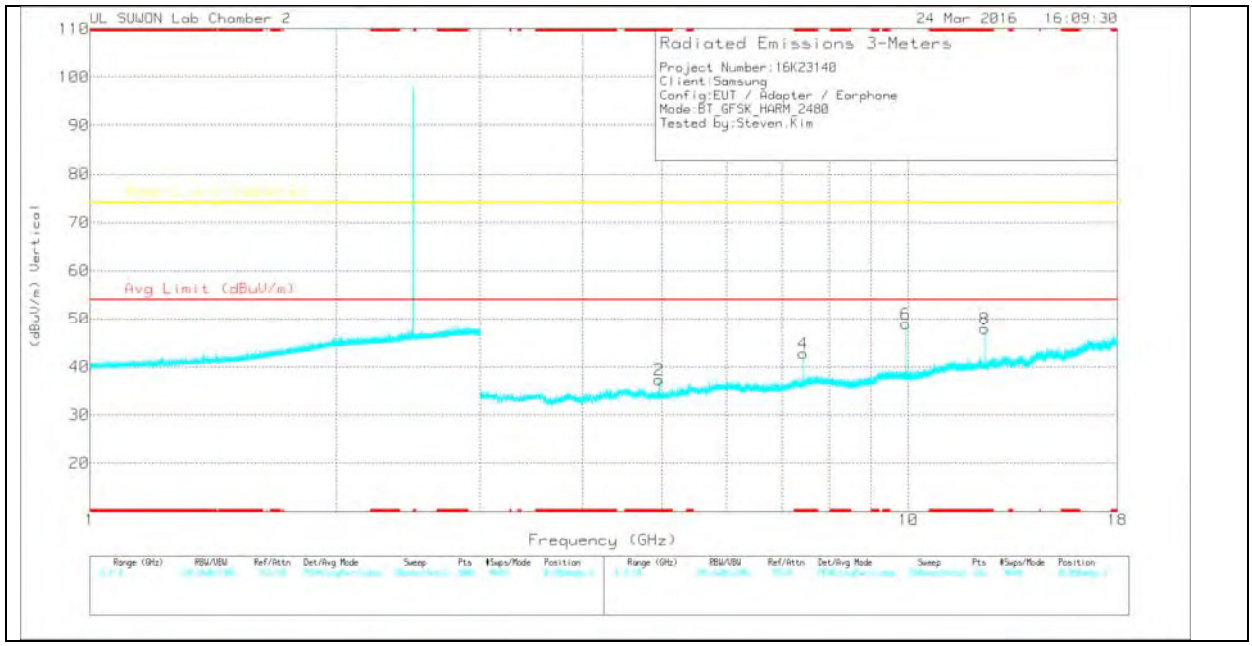
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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

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	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.959	31.18	PK	33.9	-25	40.08	-	-	74	-33.92	0-360	100	H
3	* 7.44	24.83	PK	36	-22.1	38.73	-	-	74	-35.27	0-360	200	H
5	9.92	31.04	PK	37.1	-19	49.14	-	-	74	-24.86	0-360	200	H
7	* 12.4	22.97	PK	38.8	-17.3	44.47	-	-	74	-29.53	0-360	200	H
2	* 4.959	28.38	PK	33.9	-25	37.28	-	-	74	-36.72	0-360	100	V
4	* 7.44	28.9	PK	36	-22.1	42.8	-	-	74	-31.2	0-360	200	V
6	9.92	30.83	PK	37.1	-19	48.93	-	-	74	-25.07	0-360	200	V
8	* 12.4	26.5	PK	38.8	-17.3	48	-	-	74	-26	0-360	200	V

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

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96	38.16	PK2	33.9	-25	47.06	-	-	74	-26.94	182	225	H
* 4.96	28.36	VA1T	33.9	-25	37.26	54	-16.74	-	-	182	225	H
* 7.44	36.47	PK2	36	-22.1	50.37	-	-	74	-23.63	187	101	H
* 7.44	23.84	VA1T	36	-22.1	37.74	54	-16.26	-	-	187	101	H
9.92	38.09	PK2	37.1	-19	56.19	-	-	74	-17.81	345	334	H
* 12.4	32.44	PK2	38.8	-17.3	53.94	-	-	74	-20.06	13	267	H
* 12.4	23.06	VA1T	38.8	-17.3	44.56	54	-9.44	-	-	13	267	H
* 7.44	28.07	PK2	36	-22.1	41.97	-	-	74	-32.03	7	328	V
* 7.44	25.68	VA1T	36	-22.1	39.58	54	-14.42	-	-	7	328	V
9.92	34.66	PK2	37.1	-19	52.76	-	-	74	-21.24	247	145	V
* 12.401	26.56	PK2	38.8	-17.3	48.06	-	-	74	-25.94	25	178	V
* 12.4	20.45	VA1T	38.8	-17.3	41.95	54	-12.05	-	-	25	178	V

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

PK2 - KDB558074 Method: Maximum Peak

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

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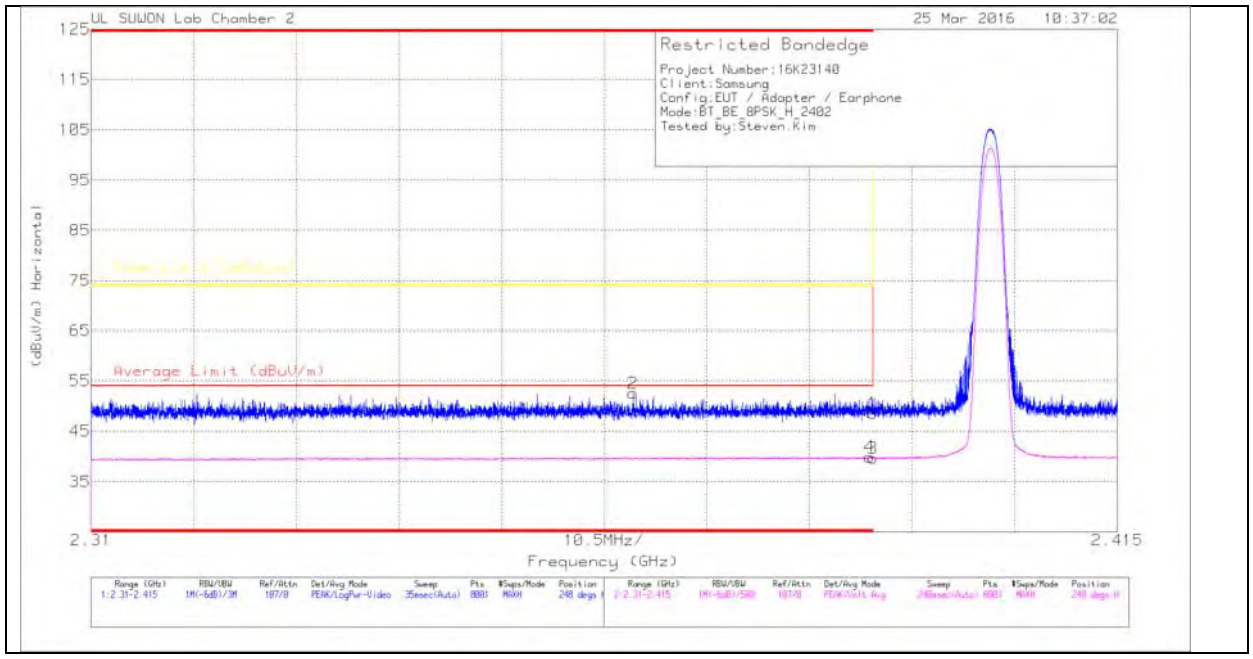
9.2.2. ENHANCED DATA RATE 8PSK MODULATION RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

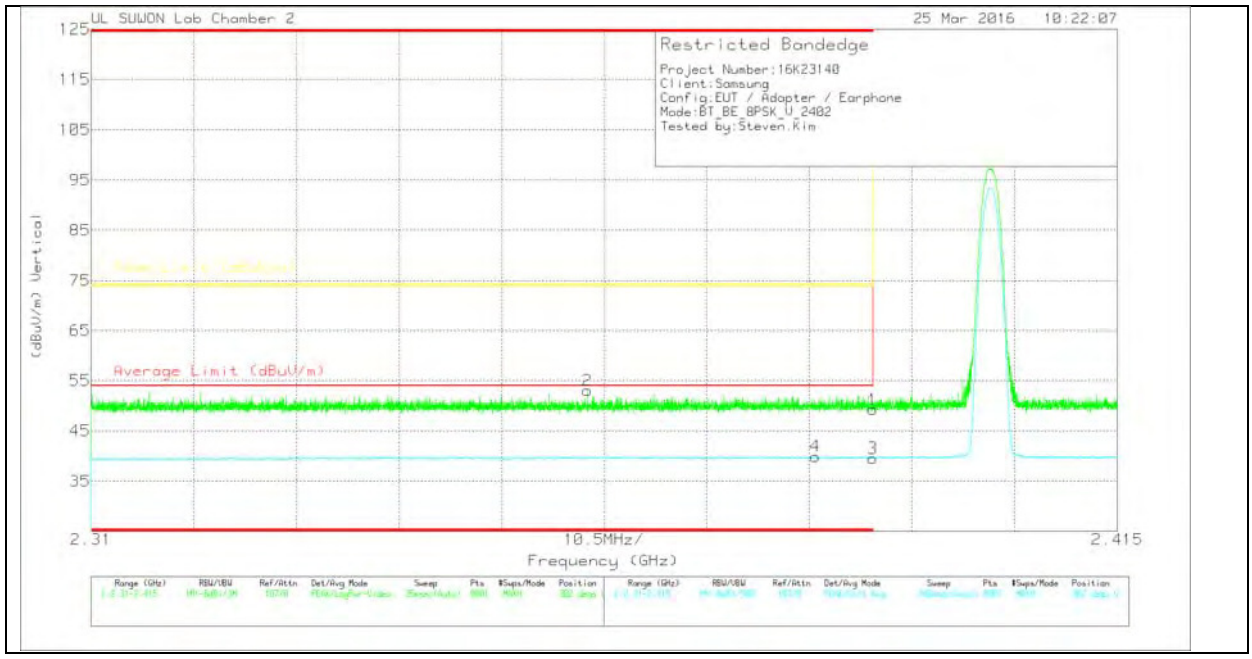
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8724)_150 619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	36.42	Pk	31.7	-19.5	48.62	-	-	74	-25.38	248	157	H
2	* 2.365	40.43	Pk	31.7	-19.6	52.53	-	-	74	-21.47	248	157	H
3	* 2.39	27.49	V1TV	31.7	-19.5	39.69	54	-14.31	-	-	248	157	H
4	* 2.39	27.72	V1TV	31.7	-19.5	39.92	54	-14.08	-	-	248	157	H

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

Pk - Peak detector

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

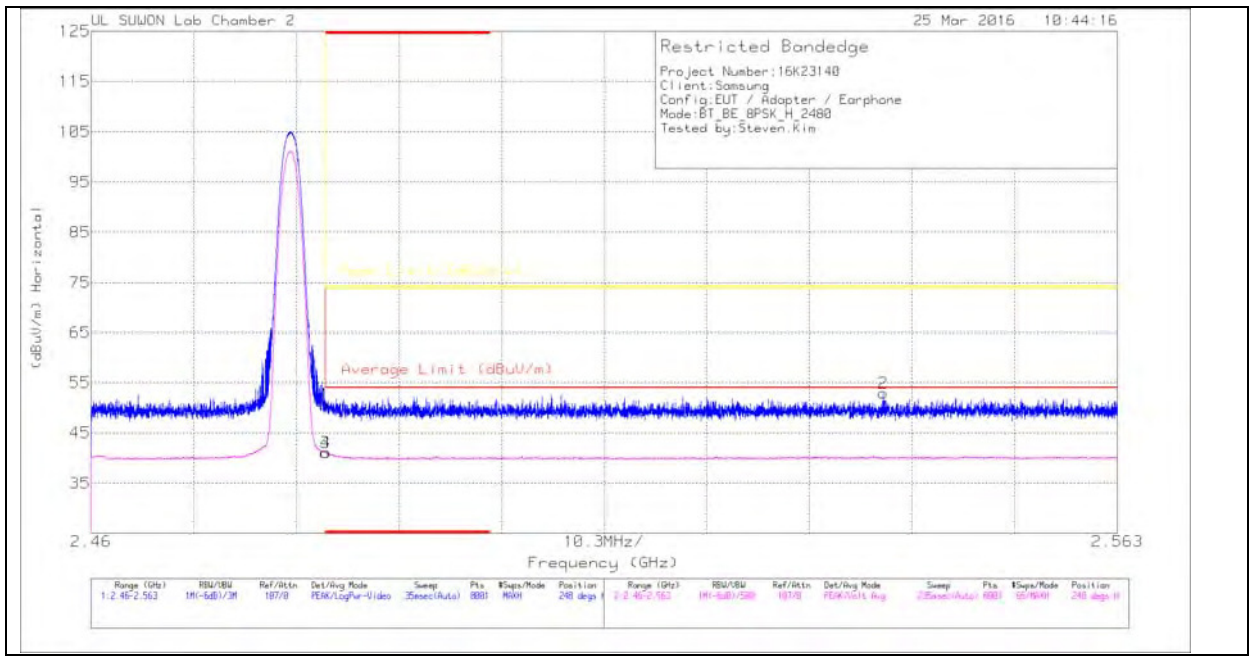
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.07	Pk	31.7	-19.5	49.27	-	-	74	-24.73	302	294	V
2	* 2.361	40.95	Pk	31.7	-19.6	53.05	-	-	74	-20.95	302	294	V
3	* 2.39	27.35	V1TV	31.7	-19.5	39.55	54	-14.45	-	-	302	294	V
4	* 2.384	27.75	V1TV	31.7	-19.5	39.95	54	-14.05	-	-	302	294	V

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

Pk - Peak detector

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

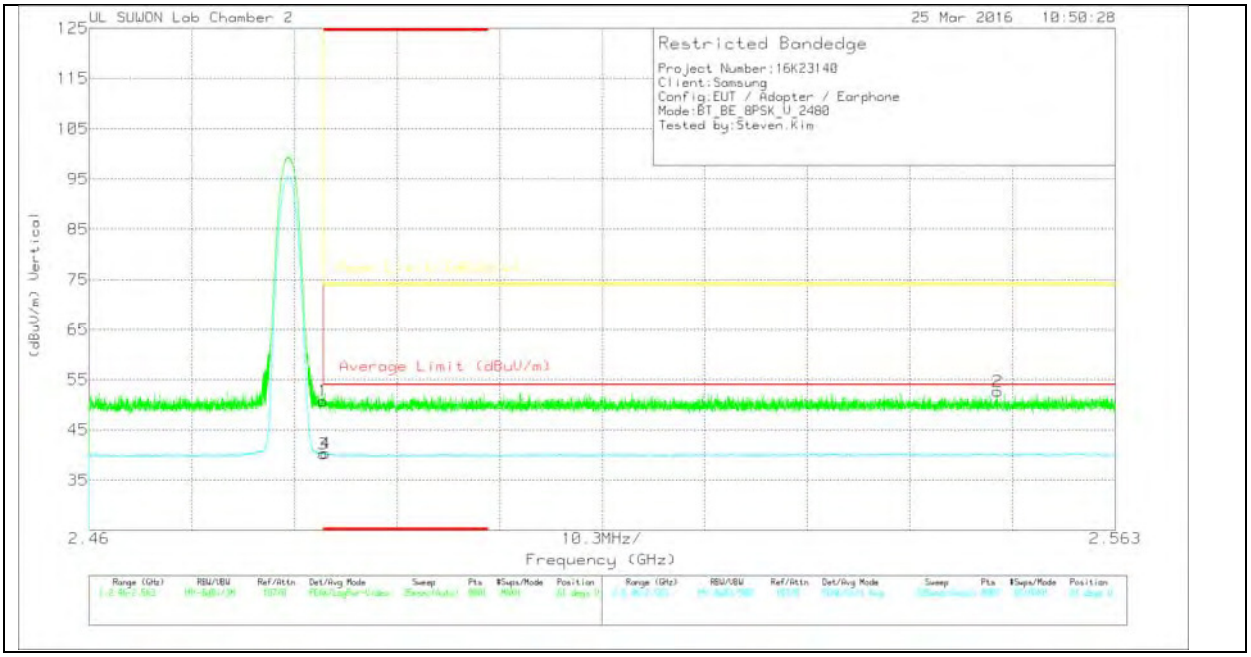
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724) _150619	Path_2_1 0dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.36	Pk	31.8	-19.4	50.76	-	-	74	-23.24	248	104	H
2	2.54	40.3	Pk	31.9	-19.3	52.9	-	-	74	-21.1	248	104	H
3	* 2.484	28.69	V1TV	31.8	-19.4	41.09	54	-12.91	-	-	248	104	H
4	* 2.484	28.72	V1TV	31.8	-19.4	41.12	54	-12.88	-	-	248	104	H

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

Pk - Peak detector

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

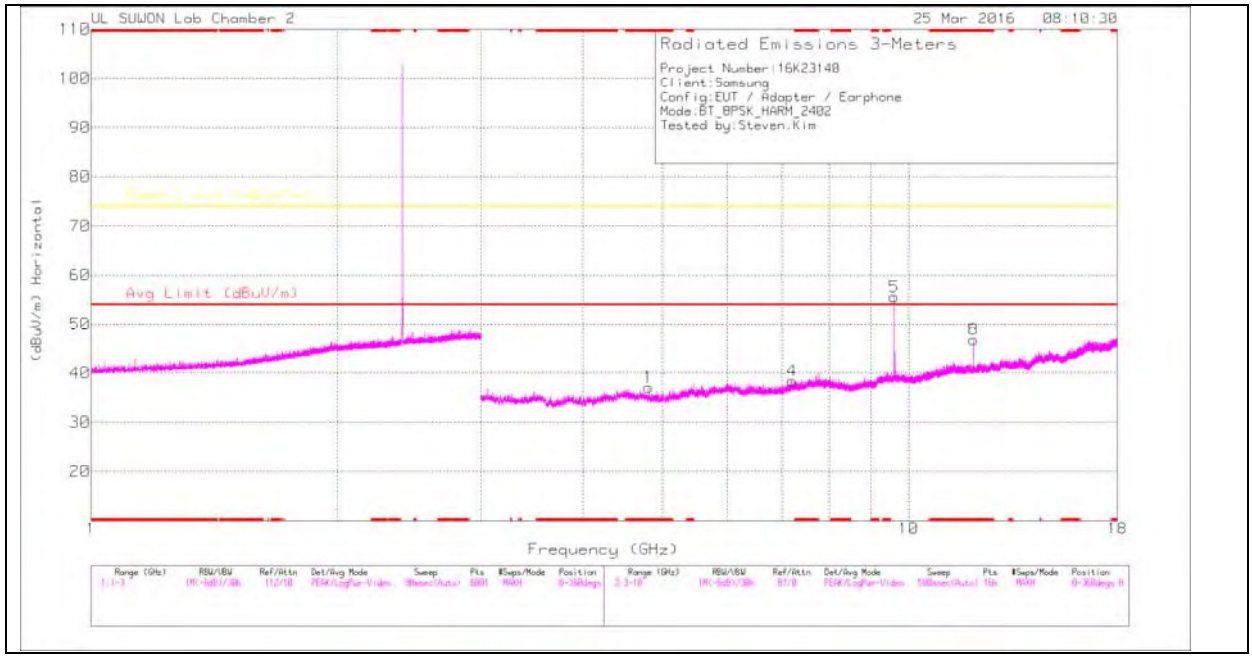
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_2_10dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.37	Pk	31.8	-19.4	50.77	-	-	74	-23.23	61	349	V
2	2.551	40.06	Pk	31.9	-19.3	52.66	-	-	74	-21.34	61	349	V
3	* 2.484	27.87	V1TV	31.8	-19.4	40.27	54	-13.73	-	-	61	349	V
4	* 2.484	27.99	V1TV	31.8	-19.4	40.39	54	-13.61	-	-	61	349	V

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

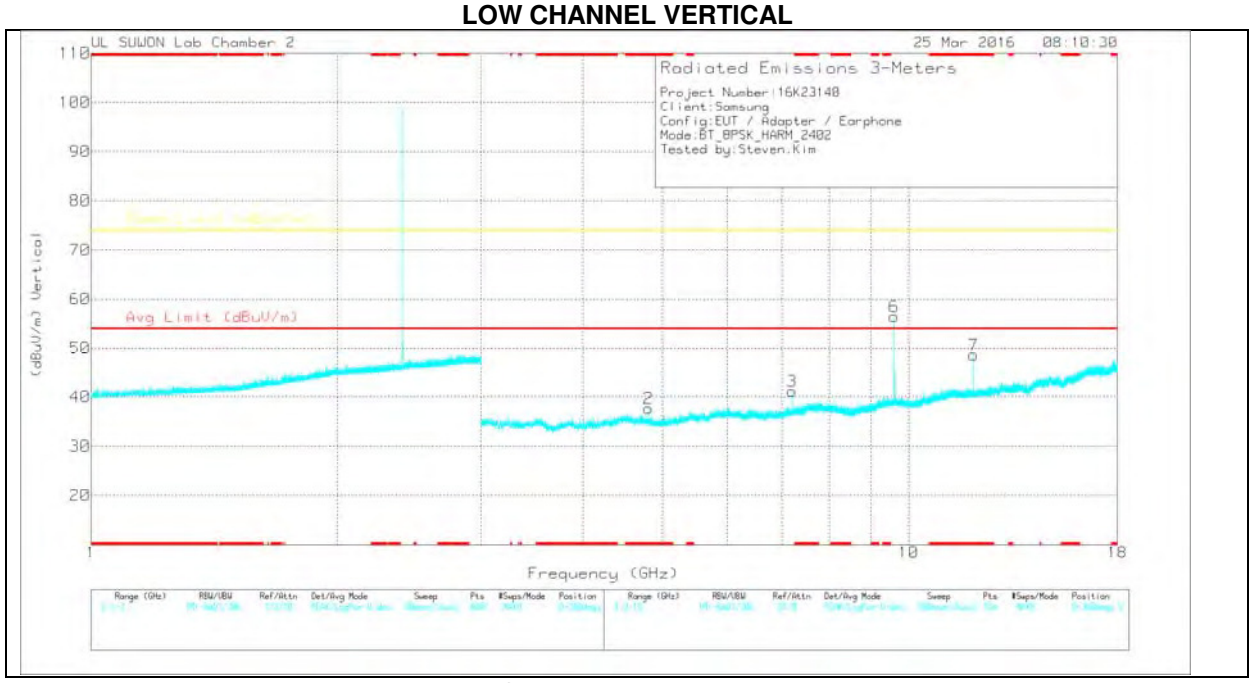
Pk - Peak detector

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	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	28.51	Pk	33.9	-25.3	37.11	-	-	74	-36.89	0-360	200	H
4	7.205	25.5	Pk	35.8	-22.9	38.4	-	-	74	-35.6	0-360	100	H
5	9.608	37.79	Pk	36.9	-19.1	55.59	-	-	74	-18.41	0-360	200	H
8	* 12.01	25.62	Pk	38.7	-17.5	46.82	-	-	74	-27.18	0-360	200	H
2	* 4.804	29.06	Pk	33.9	-25.3	37.66	-	-	74	-36.34	0-360	100	V
3	7.205	28.25	Pk	35.8	-22.9	41.15	-	-	74	-32.85	0-360	200	V
6	9.608	38.64	Pk	36.9	-19.1	56.44	-	-	74	-17.56	0-360	200	V
7	* 12.011	27.39	Pk	38.7	-17.5	48.59	-	-	74	-25.41	0-360	200	V

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

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
9.608	40.83	PK2	36.9	-19.1	58.63	-	-	74	-15.37	15	100	H
9.608	40.44	PK2	36.9	-19.1	58.24	-	-	74	-15.76	252	230	V
* 12.01	35.63	PK2	38.7	-17.5	56.83	-	-	74	-17.17	223	175	V
* 12.01	27.03	VA1T	38.7	-17.5	48.23	54	-5.77	-	-	223	175	V
* 12.01	29.78	PK2	38.7	-17.5	50.98	-	-	74	-23.02	15	290	H
* 12.01	25.58	VA1T	38.7	-17.5	46.78	54	-7.22	-	-	15	290	H
7.206	39.65	PK2	35.8	-22.9	52.55	-	-	74	-21.45	359	324	V

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

PK2 - KDB558074 Method: Maximum Peak

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

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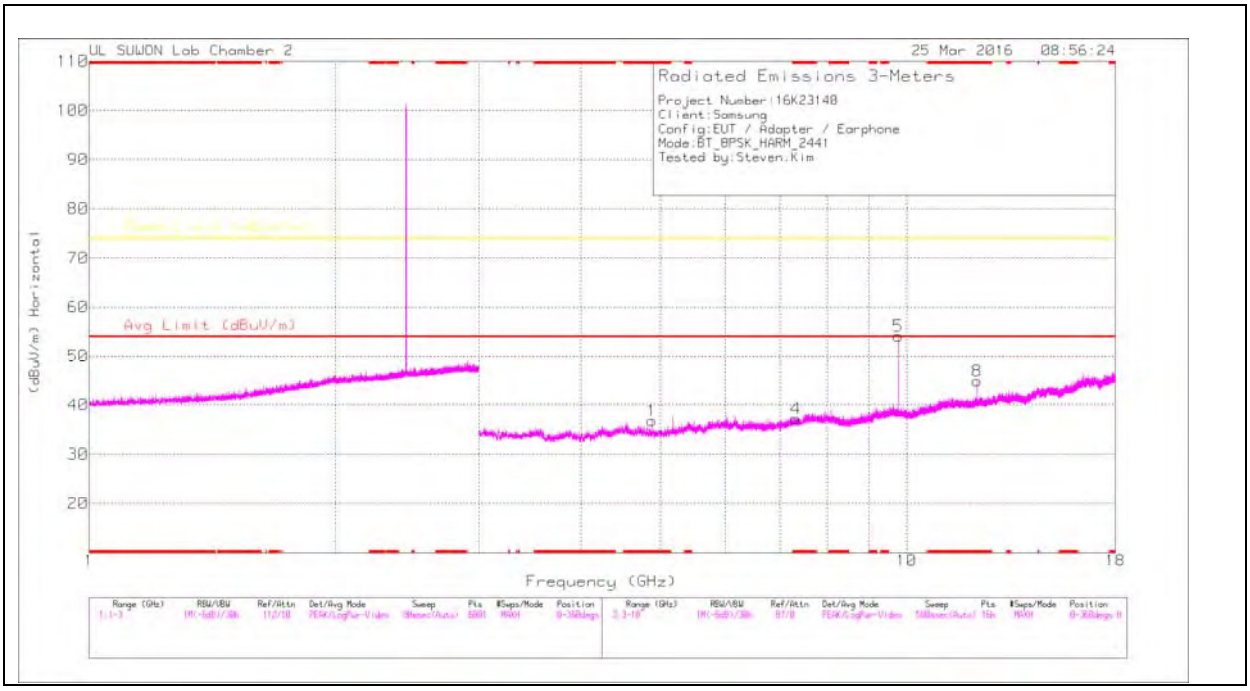
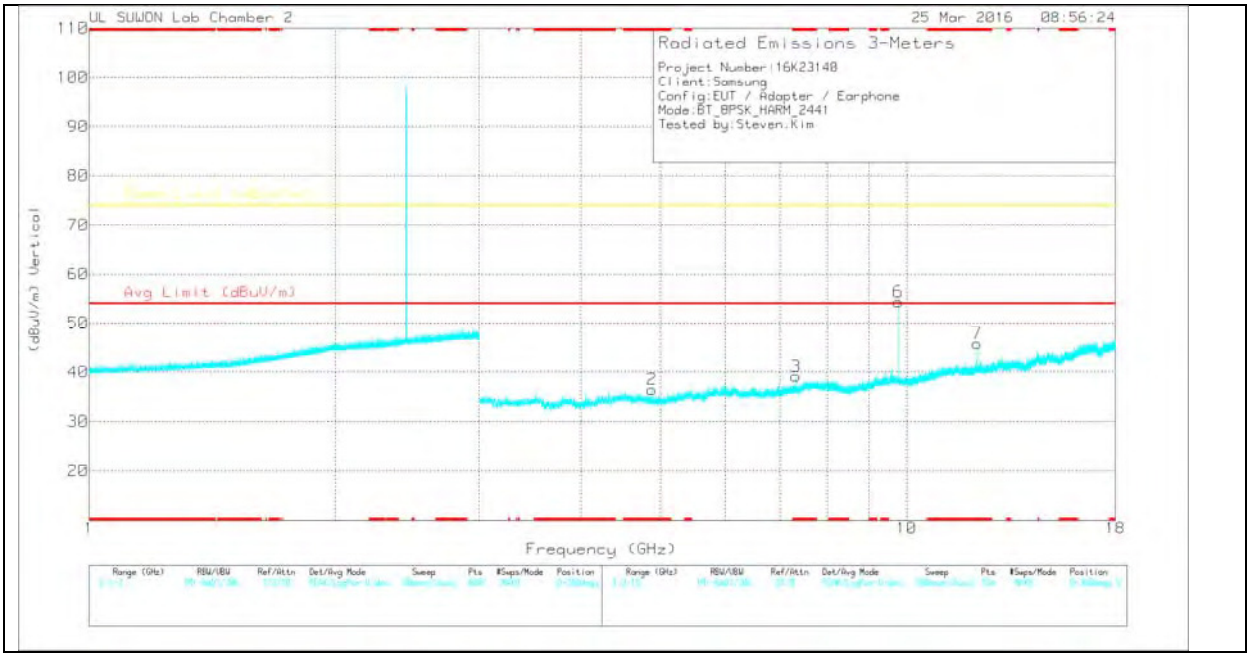
MID CHANNEL HORIZONTAL



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.

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	28.12	Pk	33.9	-25.2	36.82	-	-	74	-37.18	0-360	100	H
4	* 7.323	23.8	Pk	35.9	-22.5	37.2	-	-	74	-36.8	0-360	100	H
5	9.764	36.42	Pk	37	-19.3	54.12	-	-	74	-19.88	0-360	200	H
8	* 12.205	23.27	Pk	38.8	-17.2	44.87	-	-	74	-29.13	0-360	200	H
2	* 4.881	27.8	Pk	33.9	-25.2	36.5	-	-	74	-37.5	0-360	200	V
3	* 7.323	25.75	Pk	35.9	-22.5	39.15	-	-	74	-34.85	0-360	100	V
6	9.764	36.7	Pk	37	-19.3	54.4	-	-	74	-19.6	0-360	200	V
7	* 12.205	24.21	Pk	38.8	-17.2	45.81	-	-	74	-28.19	0-360	200	V

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

PK – Peak detector

Radiated Emissions

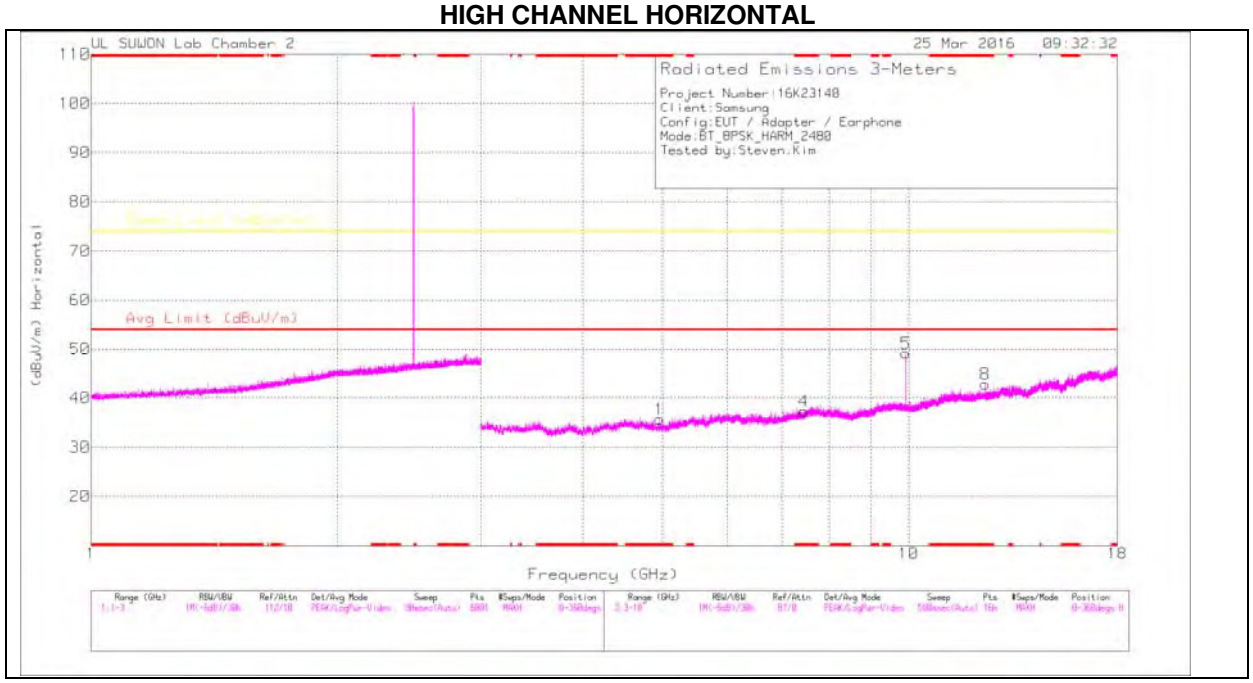
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
9.764	38.85	PK2	37	-19.3	56.55	-	-	74	-17.45	13	308	H
9.764	25.17	PK2	37	-19.3	42.87	-	-	74	-31.13	217	219	V
* 12.205	32.93	PK2	38.8	-17.2	54.53	-	-	74	-19.47	221	145	V
* 12.205	22.91	VA1T	38.8	-17.2	44.51	54	-9.49	-	-	221	145	V
* 12.205	32.96	PK2	38.8	-17.2	54.56	-	-	74	-19.44	20	321	H
* 12.205	23.13	VA1T	38.8	-17.2	44.73	54	-9.27	-	-	20	321	H

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

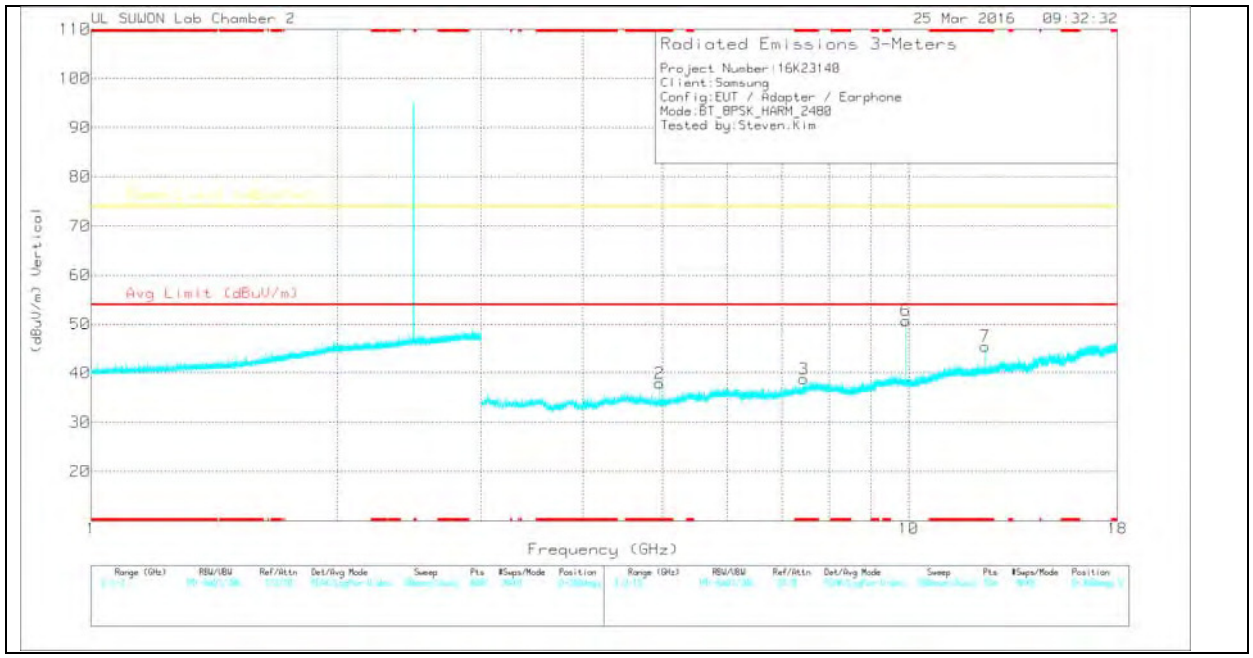
PK2 - KDB558074 Method: Maximum Peak

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)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.959	26.8	PK	33.9	-25	35.7	-	-	74	-38.3	0-360	200	H
4	* 7.44	23.39	PK	36	-22.1	37.29	-	-	74	-36.71	0-360	200	H
5	9.92	31.06	PK	37.1	-19	49.16	-	-	74	-24.84	0-360	200	H
8	* 12.401	21.31	PK	38.8	-17.3	42.81	-	-	74	-31.19	0-360	200	H
2	* 4.959	29.04	PK	33.9	-25	37.94	-	-	74	-36.06	0-360	100	V
3	* 7.44	24.87	PK	36	-22.1	38.77	-	-	74	-35.23	0-360	200	V
6	9.92	32.7	PK	37.1	-19	50.8	-	-	74	-23.2	0-360	200	V
7	* 12.401	23.93	PK	38.8	-17.3	45.43	-	-	74	-28.57	0-360	200	V

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

PK – Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(00168724)_150619	Path_3	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
9.92	34.92	PK2	37.1	-19	53.02	-	-	74	-20.98	259	256	V
9.92	36.55	PK2	37.1	-19	54.65	-	-	74	-19.35	355	268	H
* 12.4	31.09	PK2	38.8	-17.3	52.59	-	-	74	-21.41	32	343	H
* 12.4	20.12	VA1T	38.8	-17.3	41.62	54	-12.38	-	-	32	343	H
* 12.4	31.2	PK2	38.8	-17.3	52.7	-	-	74	-21.3	234	176	V
* 12.4	19.46	VA1T	38.8	-17.3	40.96	54	-13.04	-	-	234	176	V
* 4.96	37.92	PK2	33.9	-25	46.82	-	-	74	-27.18	36	391	V
* 4.96	25.64	VA1T	33.9	-25	34.54	54	-19.46	-	-	36	391	V

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

PK2 - KDB558074 Method: Maximum Peak

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

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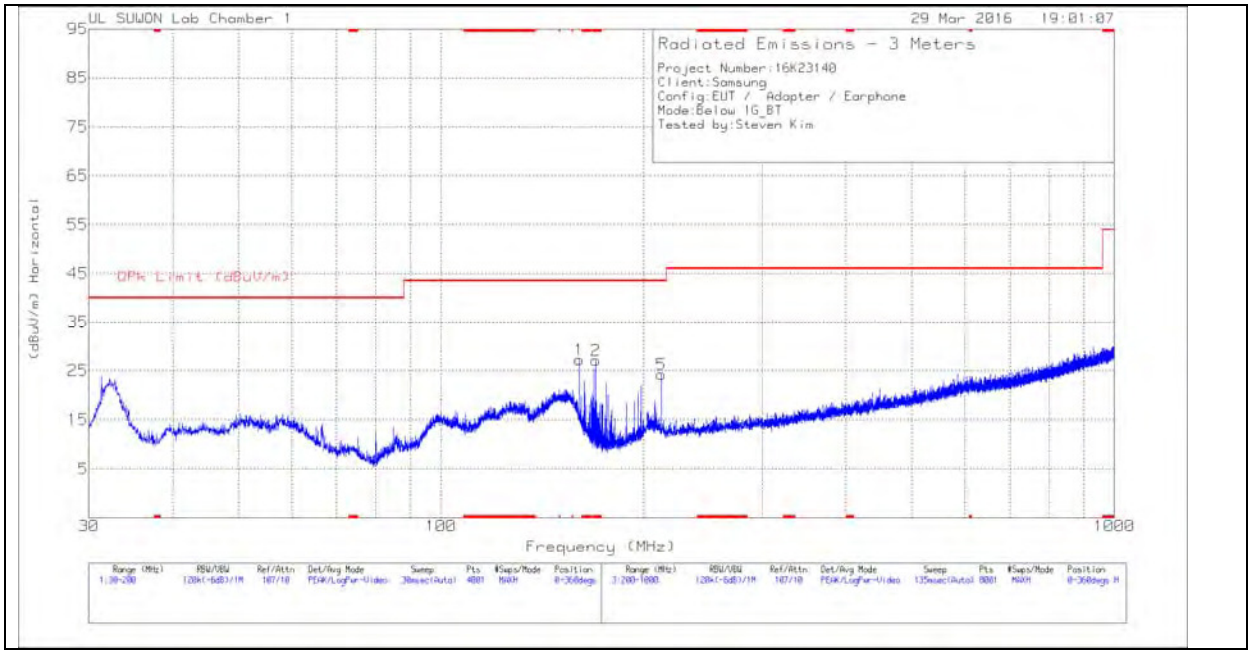
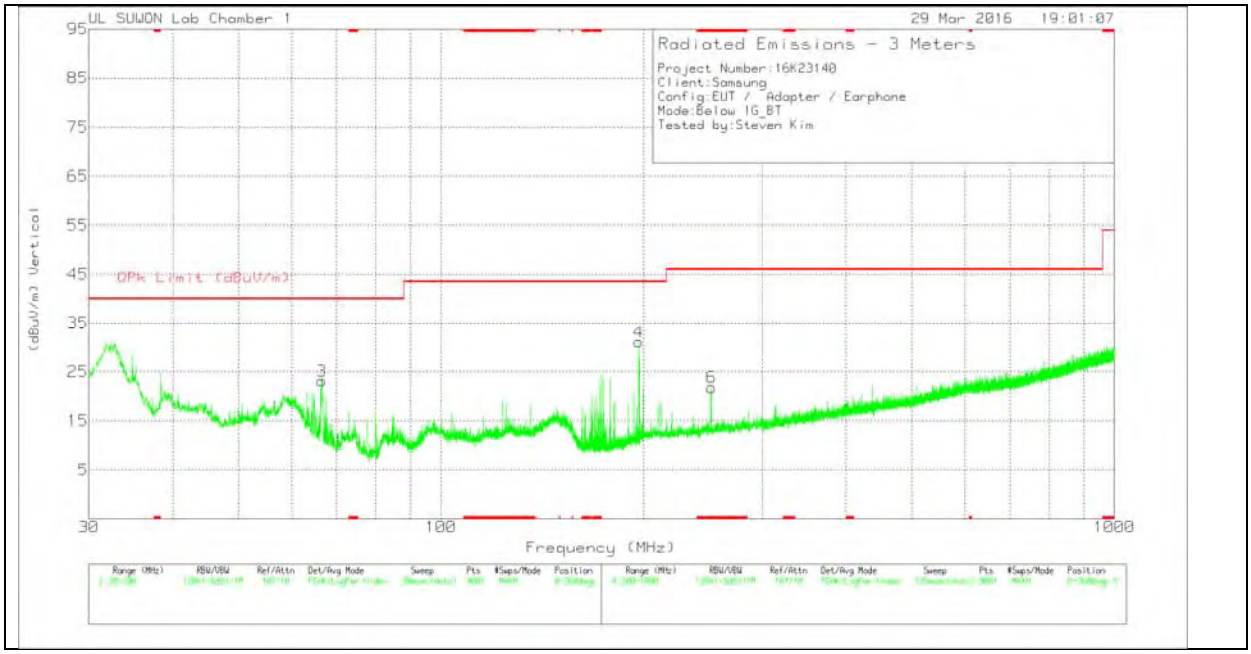
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	Bi-Log	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	160.6025	47.33	Pk	8.5	-28.6	27.23	43.52	-16.29	0-360	100	H
2	* 169.74	46.64	Pk	8.9	-28.4	27.14	43.52	-16.38	0-360	200	H
3	66.5075	42.21	Pk	10.7	-29.8	23.11	40	-16.89	0-360	100	V
4	196.5575	48.28	Pk	11	-28.2	31.08	43.52	-12.44	0-360	100	V
5	212.5	40.61	Pk	11.6	-28	24.21	43.52	-19.31	0-360	200	H
6	* 252	37.32	Pk	12.4	-27.9	21.82	46.02	-24.2	0-360	100	V

Pk - Peak detector

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10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

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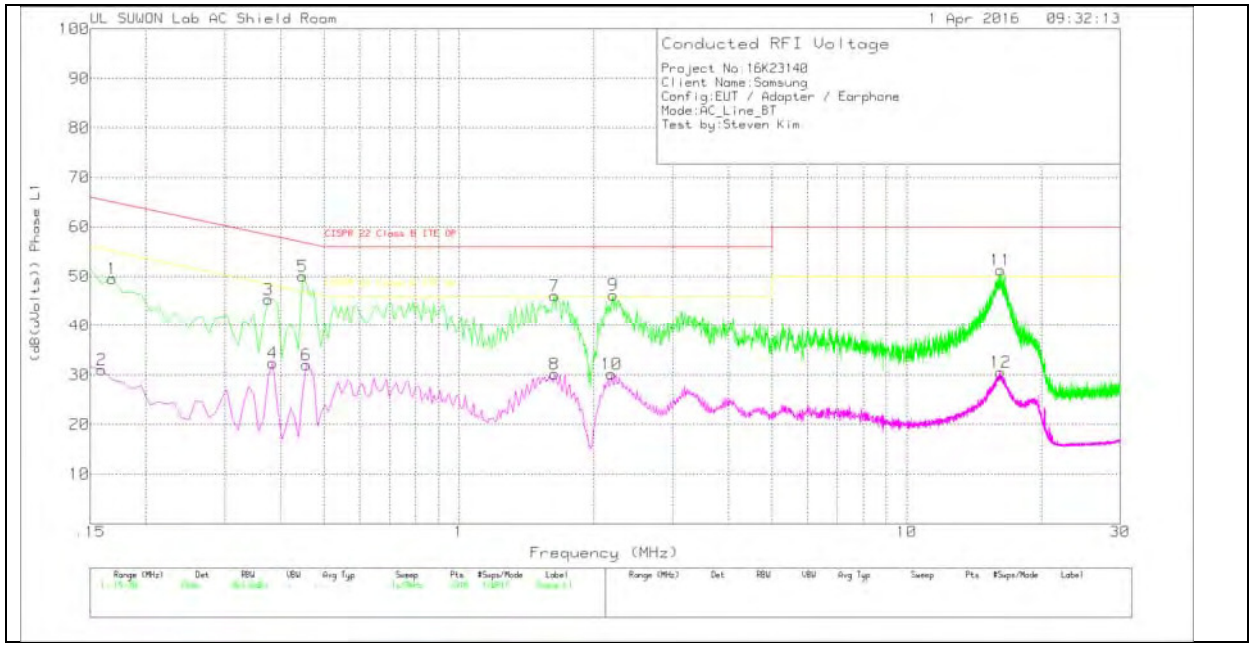
6 WORST EMISSIONS

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	.168	39.32	Pk	10.2	0	49.52	65.06	-15.54	-	-
2	.159	21	Av	10	0	31	-	-	55.52	-24.52
3	.375	35.3	Pk	10.1	0	45.4	58.39	-12.99	-	-
4	.384	22.29	Av	10.1	0	32.39	-	-	48.19	-15.8
5	.447	39.91	Pk	10.1	0	50.01	56.93	-6.92	-	-
6	.456	21.81	Av	10.2	0	32.01	-	-	46.77	-14.76
7	1.635	36.17	Pk	9.8	.1	46.07	56	-9.93	-	-
8	1.635	20.25	Av	9.8	.1	30.15	-	-	46	-15.85
9	2.211	36.39	Pk	9.8	.1	46.29	56	-9.71	-	-
10	2.193	20.21	Av	9.8	.1	30.11	-	-	46	-15.89
11	16.233	40.93	Pk	10.2	.2	51.33	60	-8.67	-	-
12	16.233	20.12	Av	10.2	.2	30.52	-	-	50	-19.48

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)
.1698	24.05	Qp	10.2	0	34.25	64.97	-30.72	-	-
.3795	31.26	Qp	10.1	0	41.36	58.29	-16.93	-	-
.4425	32.61	Qp	10.1	0	42.71	57.01	-14.3	-	-
1.6314	27.11	Qp	9.8	.1	37.01	56	-18.99	-	-
2.2101	28.1	Qp	9.8	.1	38	56	-18	-	-
16.2294	32.88	Qp	10.2	.2	43.28	60	-16.72	-	-

Qp – Quasi-Peak detector

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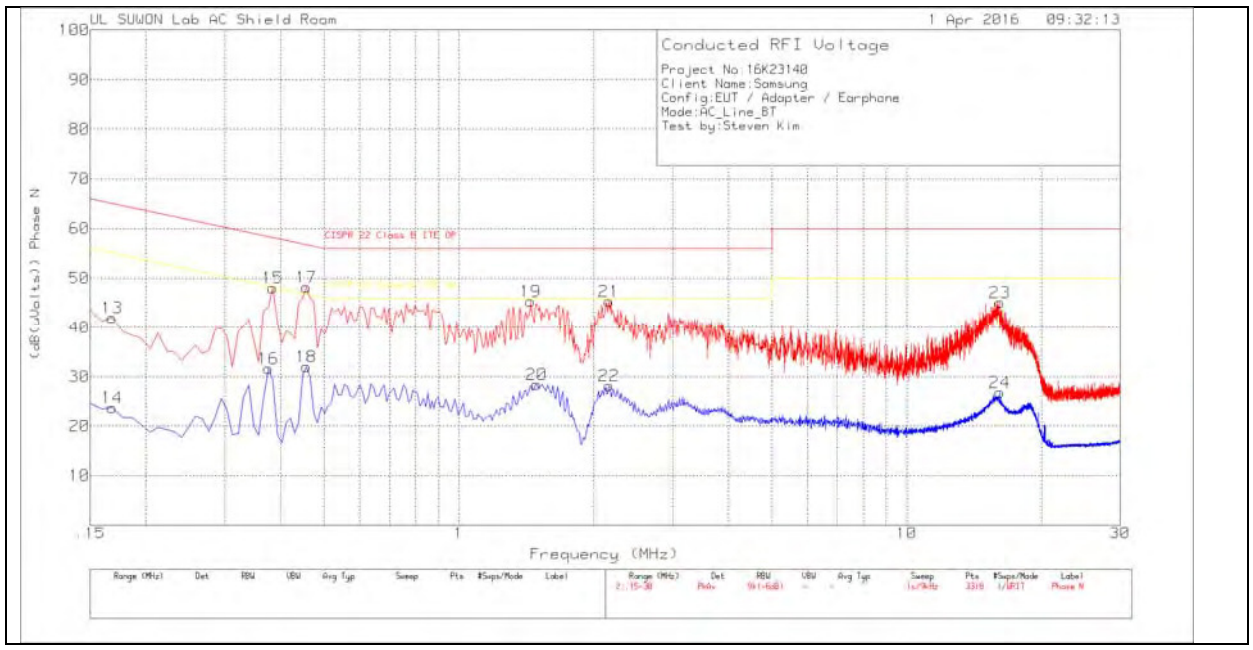
LINE 2 PLOT



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	.168	31.83	Pk	10.2	0	42.03	65.06	-23.03	-	-
14	.168	13.51	Av	10.2	0	23.71	-	-	55.06	-31.35
15	.384	38	Pk	10.1	0	48.1	58.19	-10.09	-	-
16	.375	21.56	Av	10.1	0	31.66	-	-	48.39	-16.73
17	.456	38.08	Pk	10.1	0	48.18	56.77	-8.59	-	-
18	.456	21.86	Av	10.1	0	31.96	-	-	46.77	-14.81
19	1.446	35.43	Pk	9.8	.1	45.33	56	-10.67	-	-
20	1.491	18.51	Av	9.8	.1	28.41	-	-	46	-17.59
21	2.166	35.44	Pk	9.8	.1	45.34	56	-10.66	-	-
22	2.166	18.26	Av	9.8	.1	28.16	-	-	46	-17.84
23	16.17	34.55	Pk	10.4	.2	45.15	60	-14.85	-	-
24	16.17	16.22	Av	10.4	.2	26.82	-	-	50	-23.18

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)
.1689	25.62	Qp	10.2	0	35.82	65.01	-29.19	-	-
.3822	31.48	Qp	10.1	0	41.58	58.23	-16.65	-	-
.4551	31.84	Qp	10.1	0	41.94	56.78	-14.84	-	-
1.4424	28.3	Qp	9.8	.1	38.2	56	-17.8	-	-
2.1615	27.64	Qp	9.8	.1	37.54	56	-18.46	-	-
16.1673	26.19	Qp	10.4	.2	36.79	60	-23.21	-	-

Qp – Quasi-Peak detector

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