



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

GSM Phone + Bluetooth/BLE and DTS b/g/n

MODEL NUMBER : SM-G361H, SM-G361H/DS

FCC ID: A3LSMG361H

REPORT NUMBER: 15K20822-E3

ISSUE DATE: JUN 01, 2015

Prepared for

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ACCREDITED

TL-637

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	05/21/15	Initial issue	CY Choi
A	05/27/15	Update section 5.2	CY Choi
B	06/01/15	Update model name and description	CY Choi

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM Phone + Bluetooth/BLE and DTS b/g/n
MODEL NUMBER: SM-G361H, SM-G361H/DS
SERIAL NUMBER: R31G401L8VT (RADIATED); R31G401LD7E (CONDUCTED)
DATE TESTED: MAY 11 - MAY 27, 2015

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

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

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

Approved & Released For
UL Korea, Ltd. By:

Tested By:



Ji Ho Choi
Suwon Lab Manager
UL Korea, Ltd.

CY Choi
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM Phone + Bluetooth/BLE, DTS b/g/n.

SM-G361H and SM-G361H/DS are same hardware but for different number of SIM card slot. SM-G361H has one slot. SM-G361H/DS is dual SIM version.

This test report addresses the DSS (BT) operational mode.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	Basic GFSK	Average	10.80	12.01
		Peak	11.10	12.87
	Enhanced Pi/4-DPSK	Average	6.49	4.46
		Peak	8.78	7.55
	Enhanced 8PSK	Average	6.65	4.62
		Peak	8.85	7.67

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 -2.51 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.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	ETA0U10EWE	N/A	N/A
Data Cable	SAMSUNG	ECB-DU28WE	N/A	N/A
Earphone	SAMSUNG	EHS61ASFWE	N/A	N/A

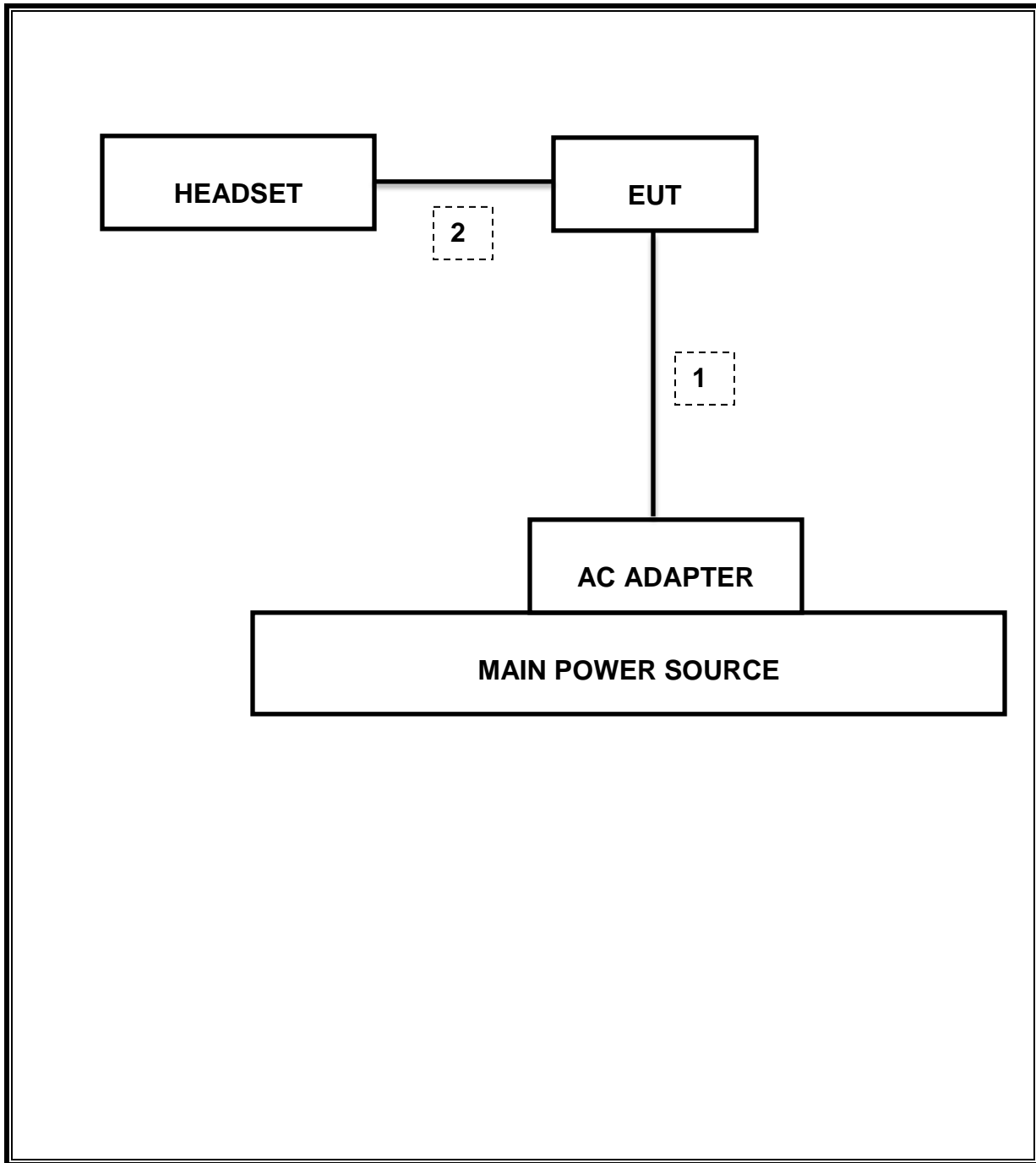
I/O CABLES

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
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

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

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1049	Occupied Band width (99%)	N/A	Conducted	Pass	1.200 MHz
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-46.090 dBm
15.247 (b)(1)	TX conducted output power	<21dBm		Pass	11.097 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	0.346 sec
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	45.50 dBuV (QP)
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	37.31 dBuV/m (AV)

8. ANTENNA PORT TEST RESULTS

8.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

8.1.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.006	0.928
Mid	2441	1.013	0.907
High	2480	1.031	0.929
Worst		1.031	0.929

8.1.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION

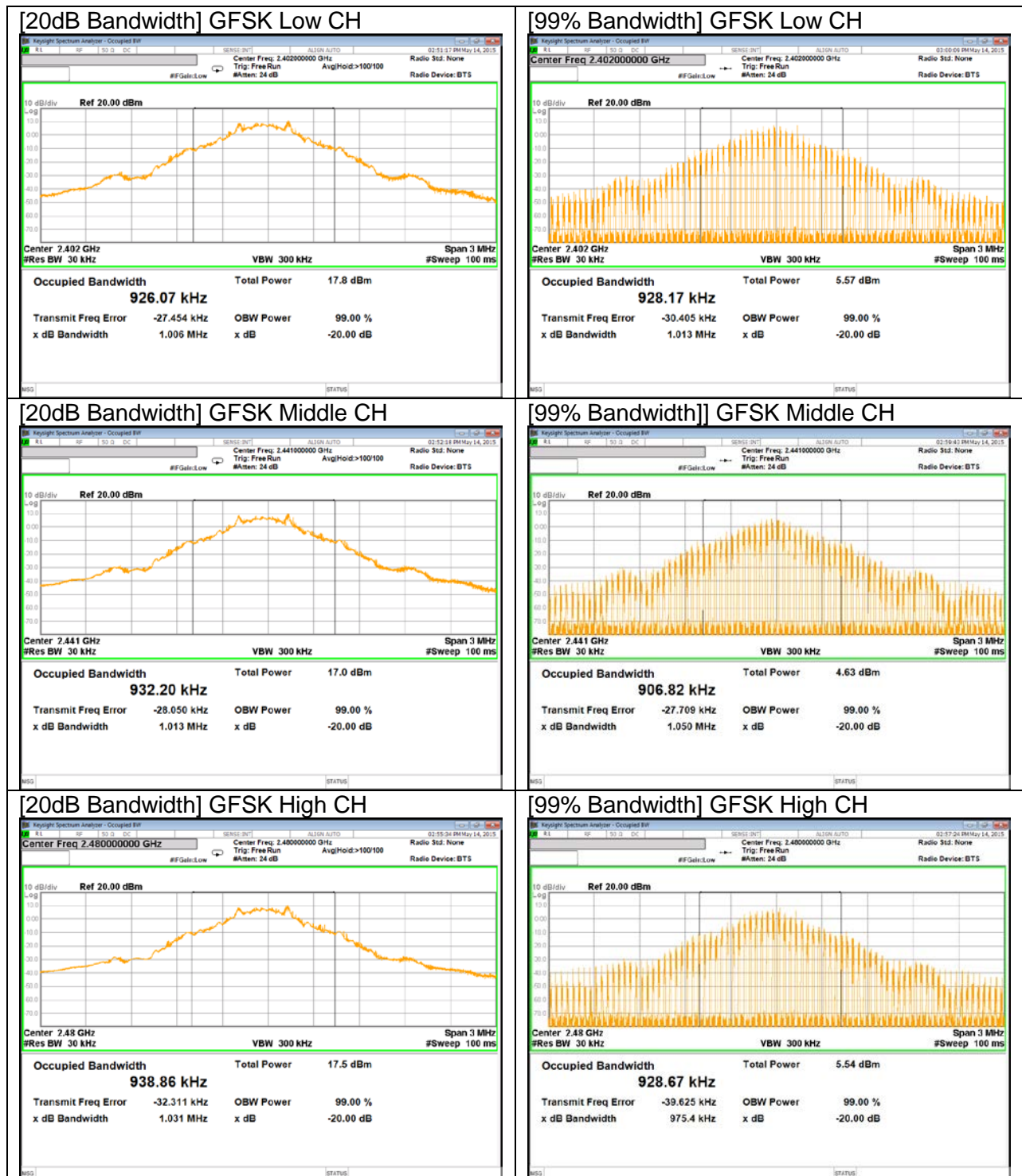
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.271	1.168
Mid	2441	1.277	1.196
High	2480	1.290	1.167
Worst		1.290	1.196

8.1.3. ENHANCED DATA RATE 8PSK MODULATION

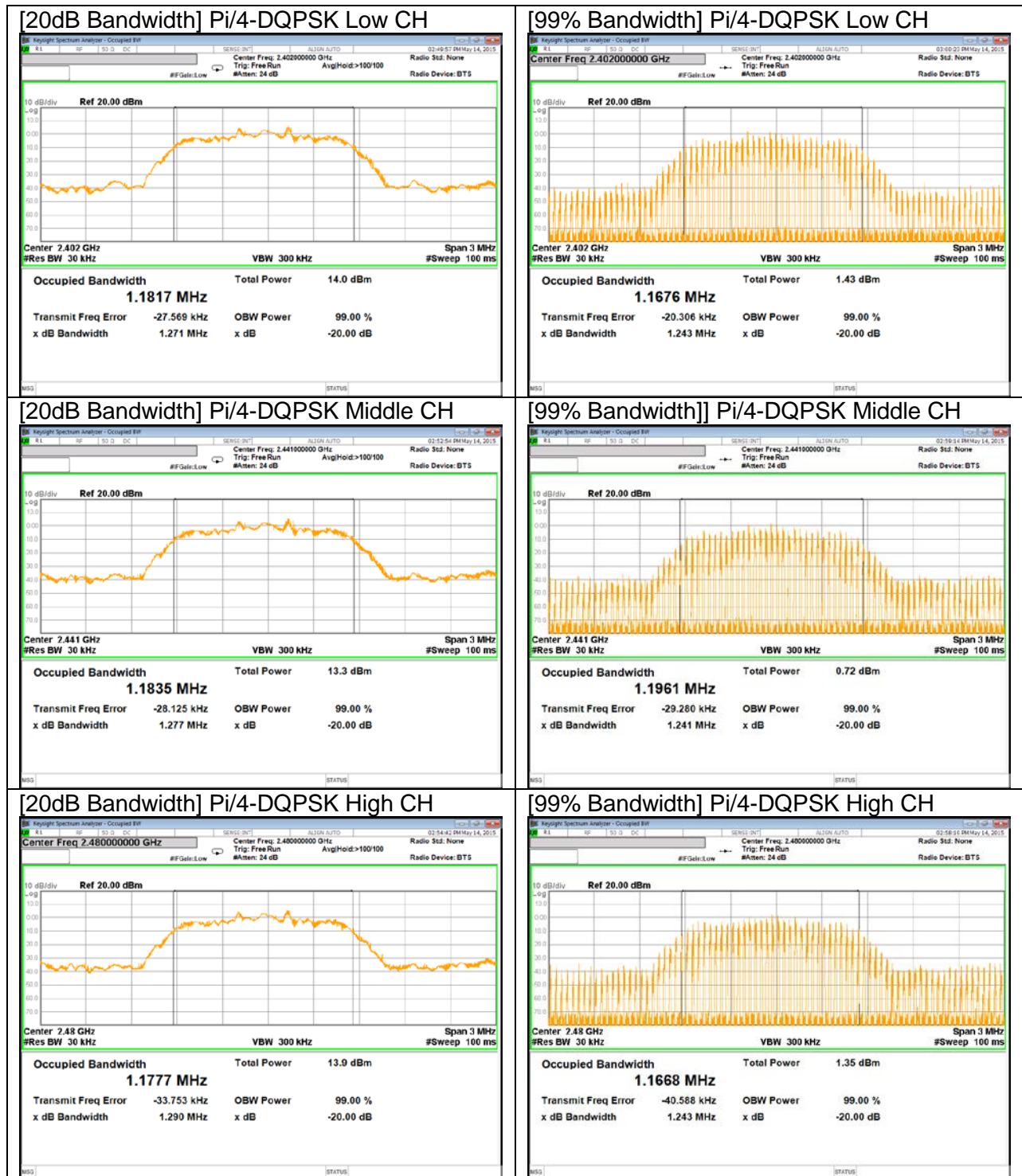
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.338	1.198
Mid	2441	1.331	1.200
High	2480	1.319	1.199
Worst		1.338	1.200

8.1.4. 20 dB AND 99% BANDWIDTH PLOTS

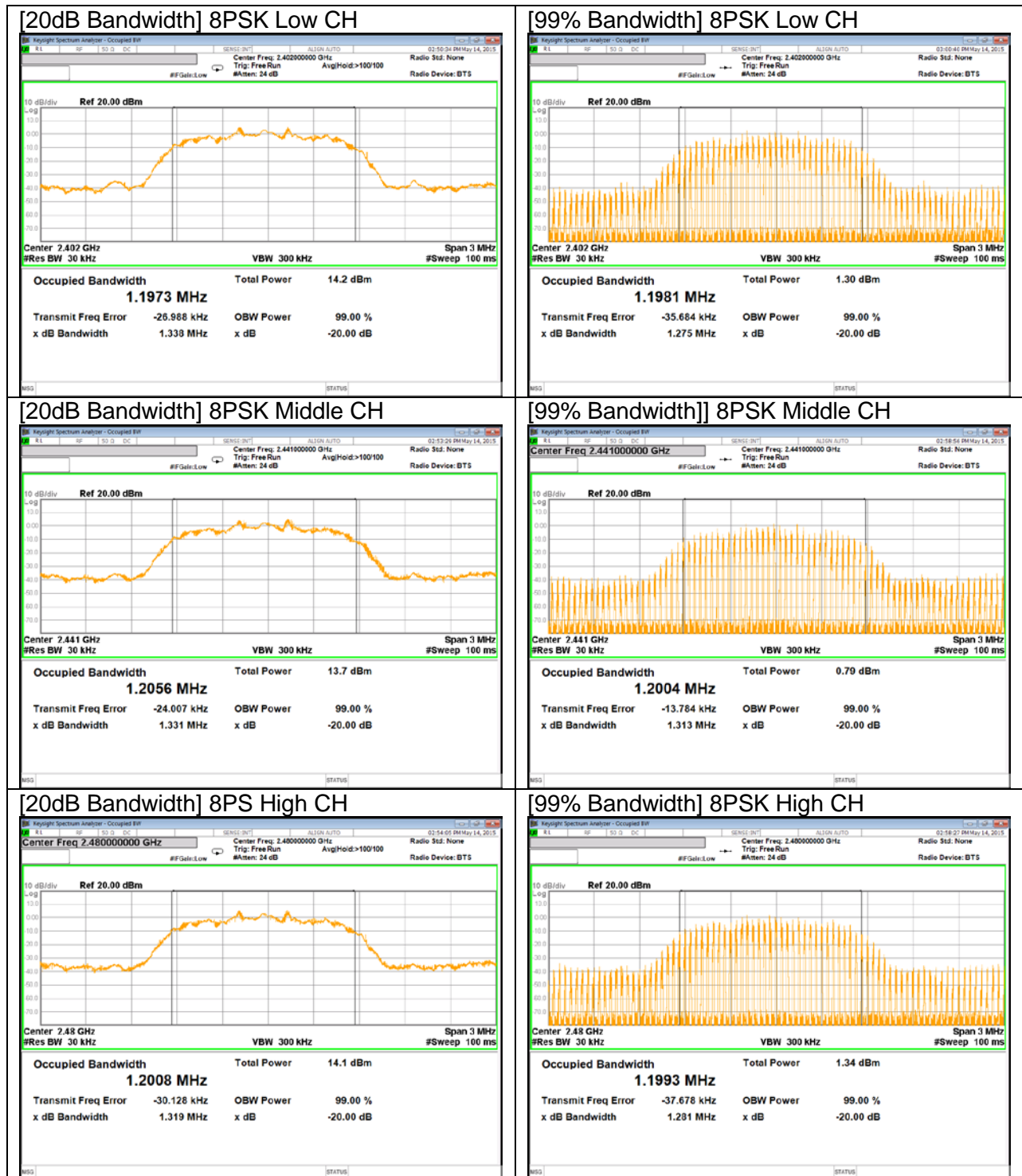
GFSK BANDWIDTH



Pi/4-DQPSK BANDWIDTH



8PSK BANDWIDTH



8.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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

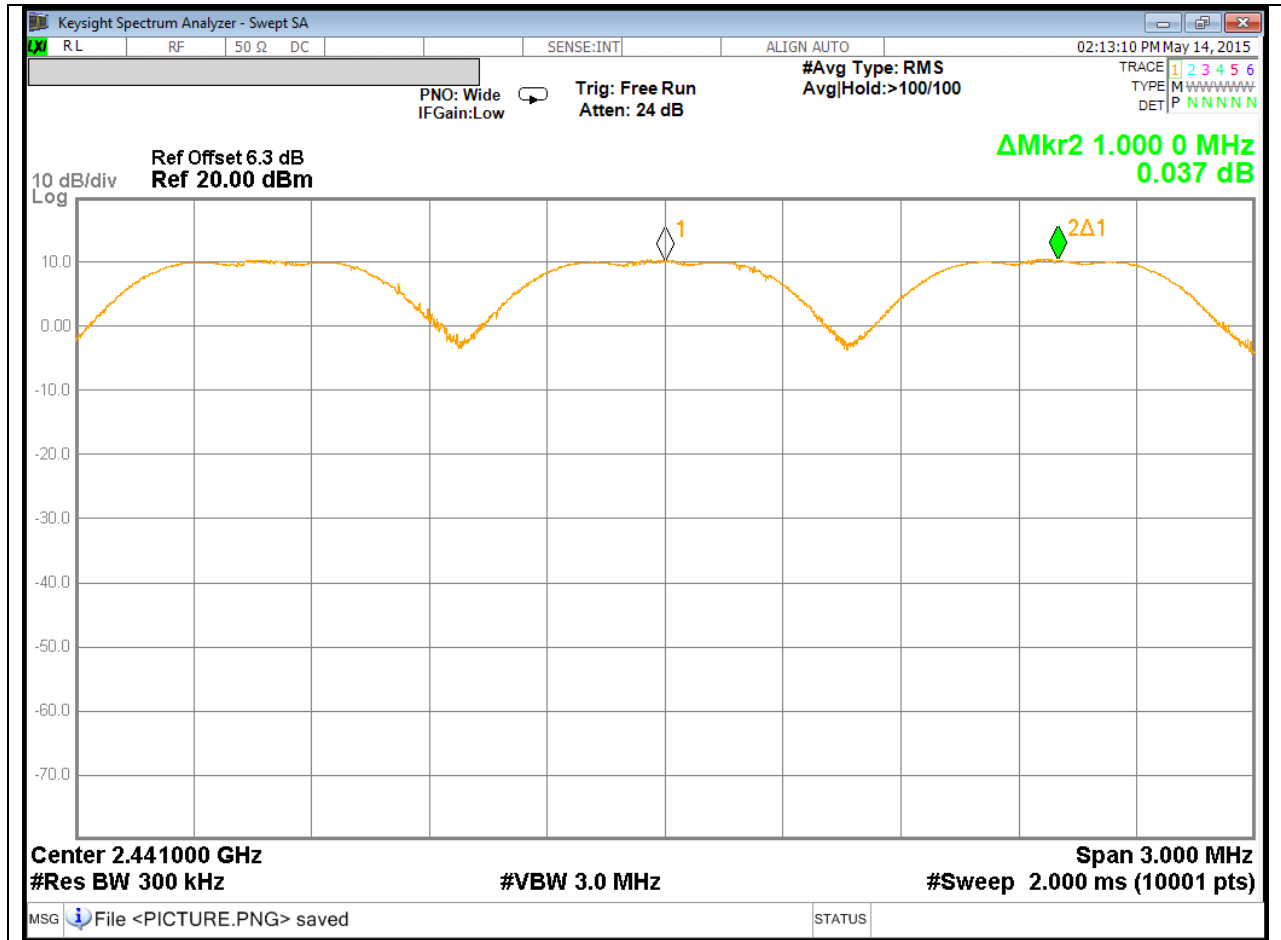
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

DA 00-705: The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

HOPPING FREQUENCY SEPARATION PLOT



8.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

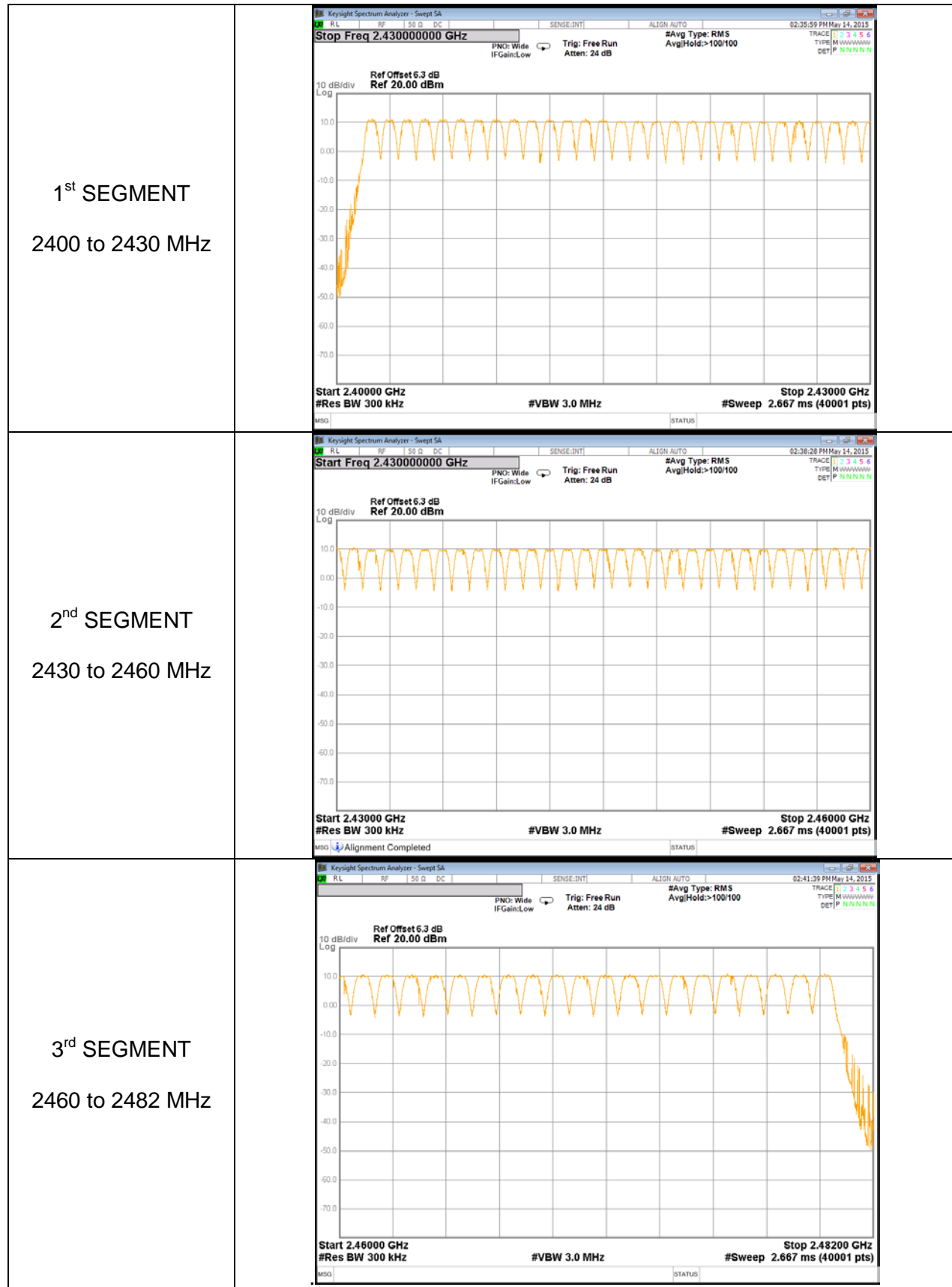
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

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

RESULTS

Normal Mode: 79 Channels observed.



8.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

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

TEST PROCEDURE

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

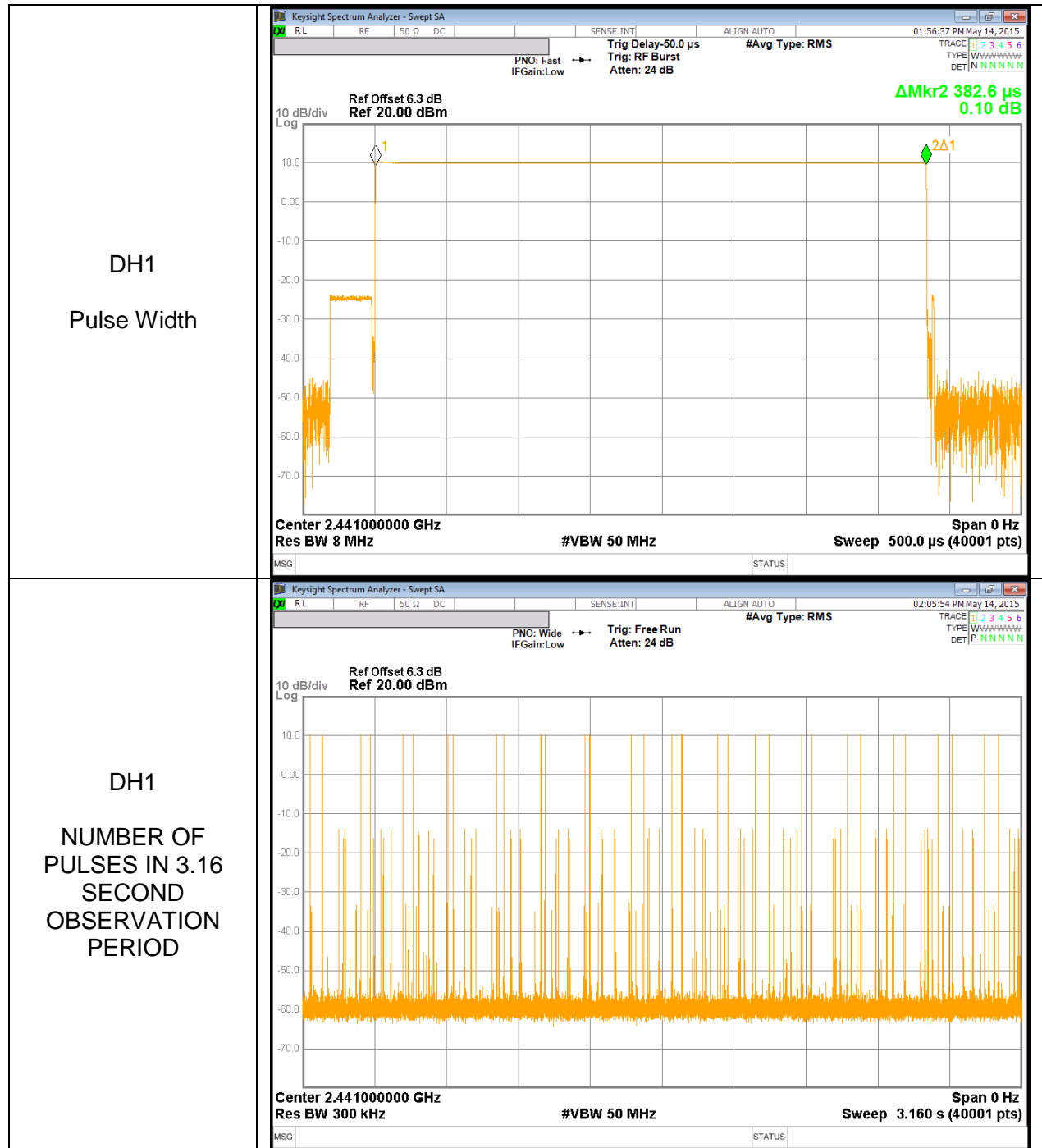
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

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

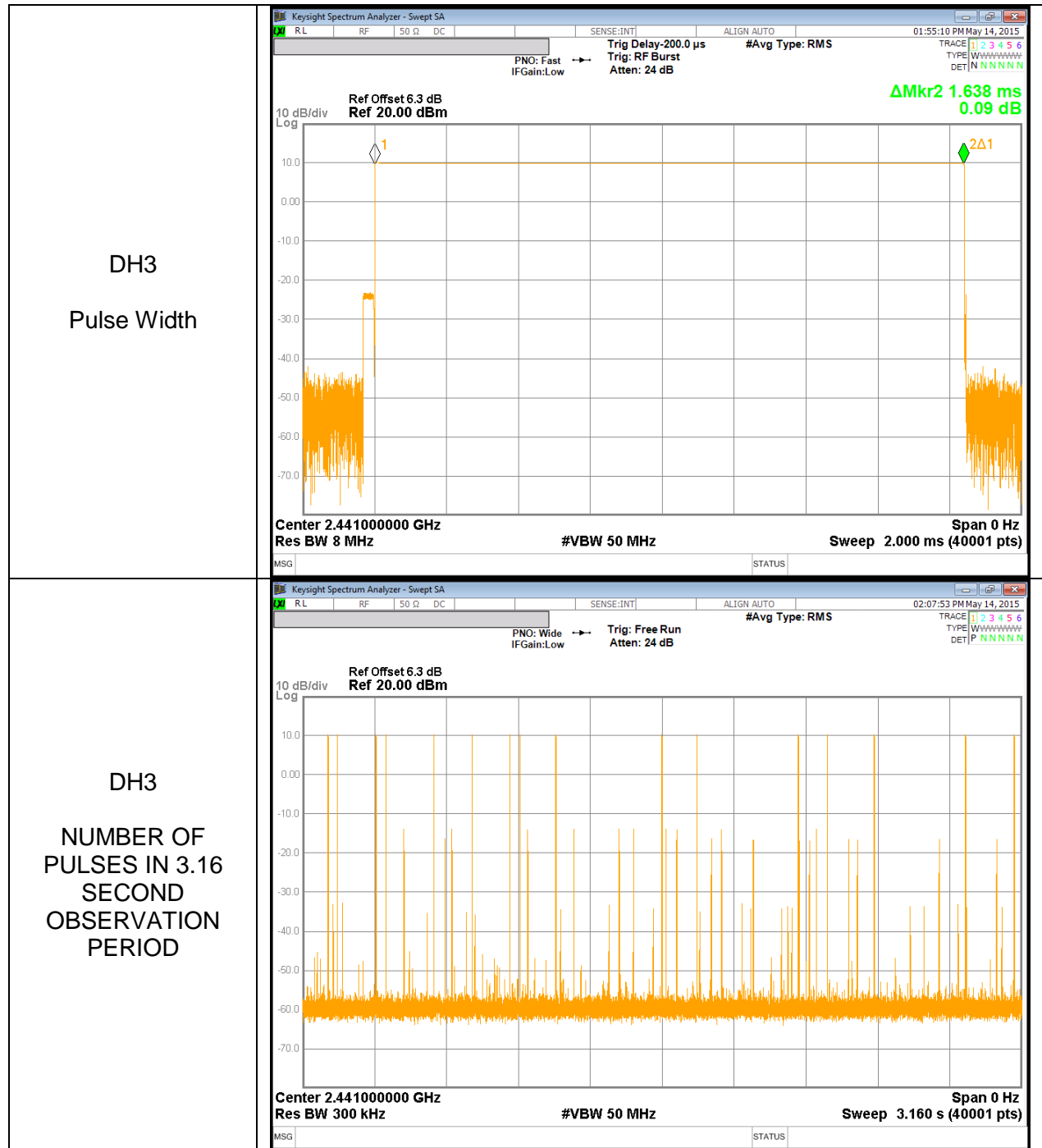
RESULTS

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.383	32	0.122432	0.4	-0.2776
DH3	1.638	16	0.262080	0.4	-0.1379
DH5	2.887	12	0.346440	0.4	-0.0536
GFSK AFH					
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK AFH					
DH1	0.383	8	0.030608	0.4	-0.3694
DH3	1.638	4	0.065520	0.4	-0.3345
DH5	2.887	3	0.086610	0.4	-0.3134

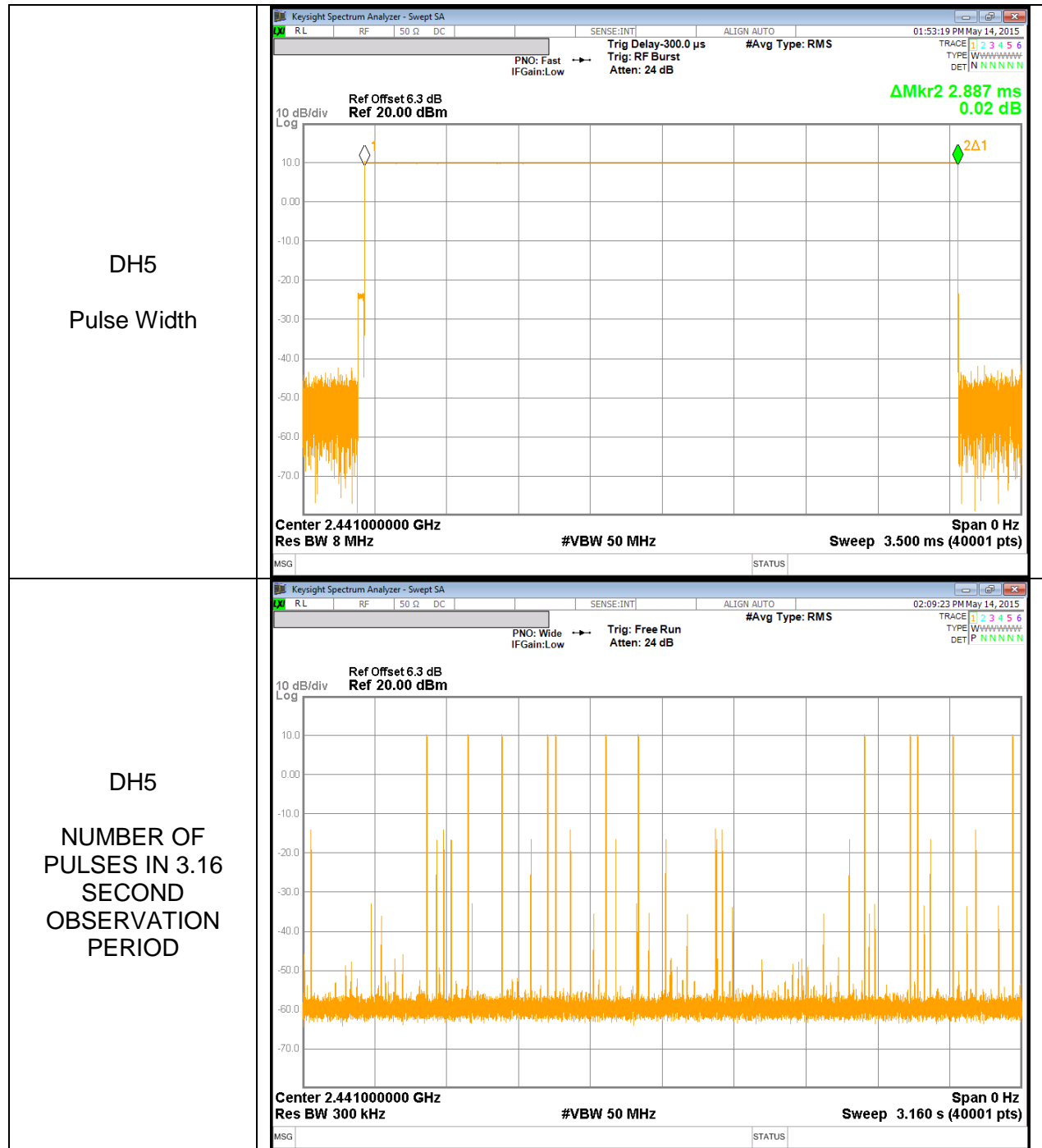
DH1



DH3



DH5



8.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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

TEST PROCEDURE

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

RESULTS

8.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	11.097	21	-9.903
Middle	2441	10.190	21	-10.81
High	2480	11.001	21	-9.999
Worst		11.097	21	-9.903

8.5.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

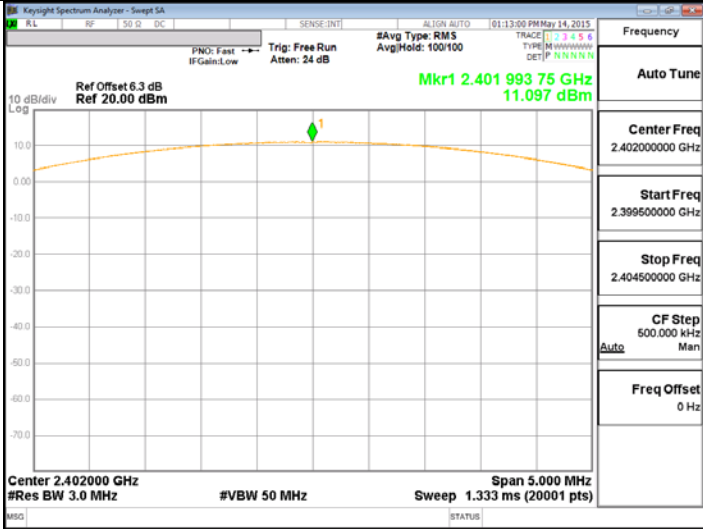
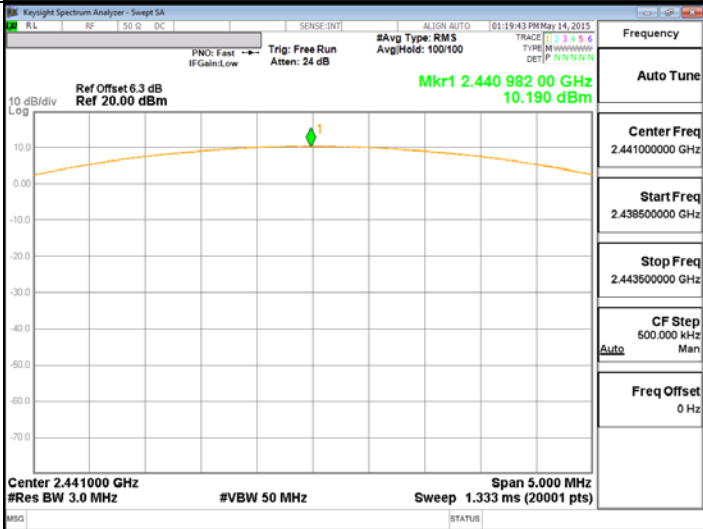
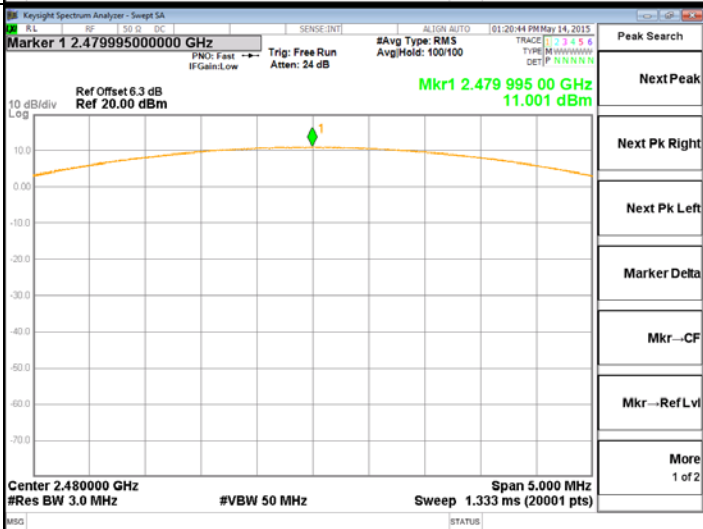
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	8.780	21	-12.220
Middle	2441	8.134	21	-12.866
High	2480	8.764	21	-12.236
Worst		8.780	21	-12.220

8.5.3. ENHANCED DATA RATE 8PSK MODULATION

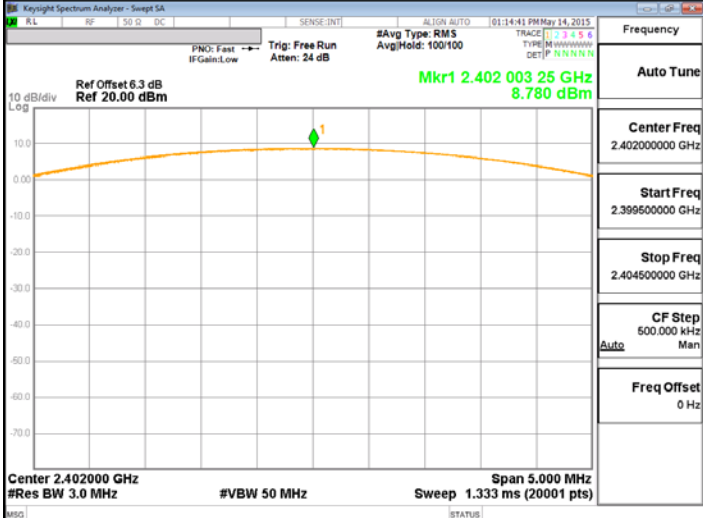
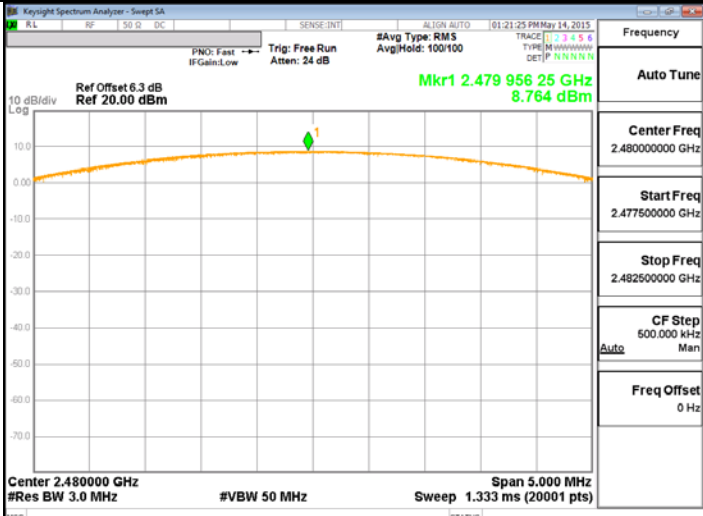
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	8.850	21	-12.150
Middle	2441	8.143	21	-12.857
High	2480	8.761	21	-12.239
Worst		8.850	21	-12.150

8.5.4. OUTPUT POWER PLOTS

GFSK OUTPUT POWER

<p>GFSK Low CH</p>	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.401 993 75 GHz 11.097 dBm</p> <p>Center 2.402000 GHz #Res BW 3.0 MHz #VBW 50 MHz Span 5.000 MHz Sweep 1.333 ms (20001 pts)</p>
<p>GFSK Middle CH</p>	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.440 982 00 GHz 10.190 dBm</p> <p>Center 2.441000 GHz #Res BW 3.0 MHz #VBW 50 MHz Span 5.000 MHz Sweep 1.333 ms (20001 pts)</p>
<p>GFSK High CH</p>	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.479 995 00 GHz 11.001 dBm</p> <p>Center 2.480000 GHz #Res BW 3.0 MHz #VBW 50 MHz Span 5.000 MHz Sweep 1.333 ms (20001 pts)</p>

Pi/4-DPSK OUTPUT POWER

<p>Pi/4-DPSK Low CH</p>	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.402 003 25 GHz 8.780 dBm</p> <p>Center 2.402000 GHz #Res BW 3.0 MHz #VBW 50 MHz Sweep 1.333 ms (20001 pts)</p>
<p>Pi/4-DPSK Middle CH</p>	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.440 982 00 GHz 8.134 dBm</p> <p>Center 2.441000 GHz #Res BW 3.0 MHz #VBW 50 MHz Sweep 1.333 ms (20001 pts)</p>
<p>Pi/4-DPSK High CH</p>	 <p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.479 956 25 GHz 8.764 dBm</p> <p>Center 2.480000 GHz #Res BW 3.0 MHz #VBW 50 MHz Sweep 1.333 ms (20001 pts)</p>

8PSK OUTPUT POWER

<p>8PSK Low CH</p>	<p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.401 965 25 GHz 8.850 dBm</p> <p>Center 2.402000 GHz #Res BW 3.0 MHz #VBW 50 MHz Sweep 1.333 ms (20001 pts)</p>
<p>8PSK Middle CH</p>	<p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.440 968 00 GHz 8.143 dBm</p> <p>Center 2.441000 GHz #Res BW 3.0 MHz #VBW 50 MHz Sweep 1.333 ms (20001 pts)</p>
<p>8PSK High CH</p>	<p>Keysight Spectrum Analyzer - Swept SA</p> <p>Ref Offset 6.3 dB Ref 20.00 dBm</p> <p>Mkr1 2.479 979 75 GHz 8.761 dBm</p> <p>Center 2.480000 GHz #Res BW 3.0 MHz #VBW 50 MHz Sweep 1.333 ms (20001 pts)</p>

8.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

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

8.6.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	10.80	12.01
Middle	2441	9.88	9.72
High	2480	10.39	10.93

8.6.2. DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	6.46	4.43
Middle	2441	5.79	3.79
High	2480	6.49	4.46

8.6.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	6.63	4.60
Middle	2441	5.95	3.94
High	2480	6.65	4.62

8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

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

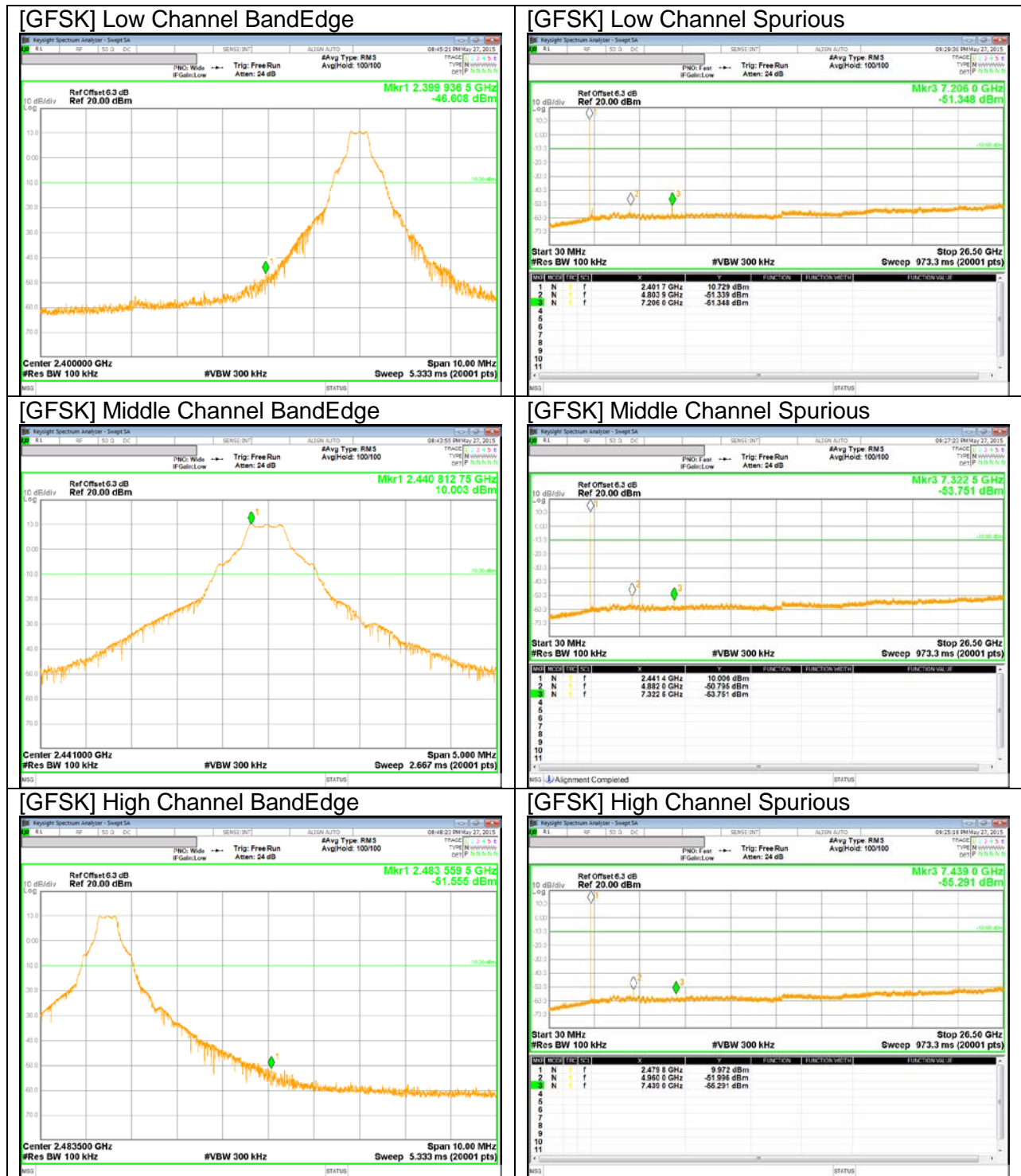
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

RESULTS

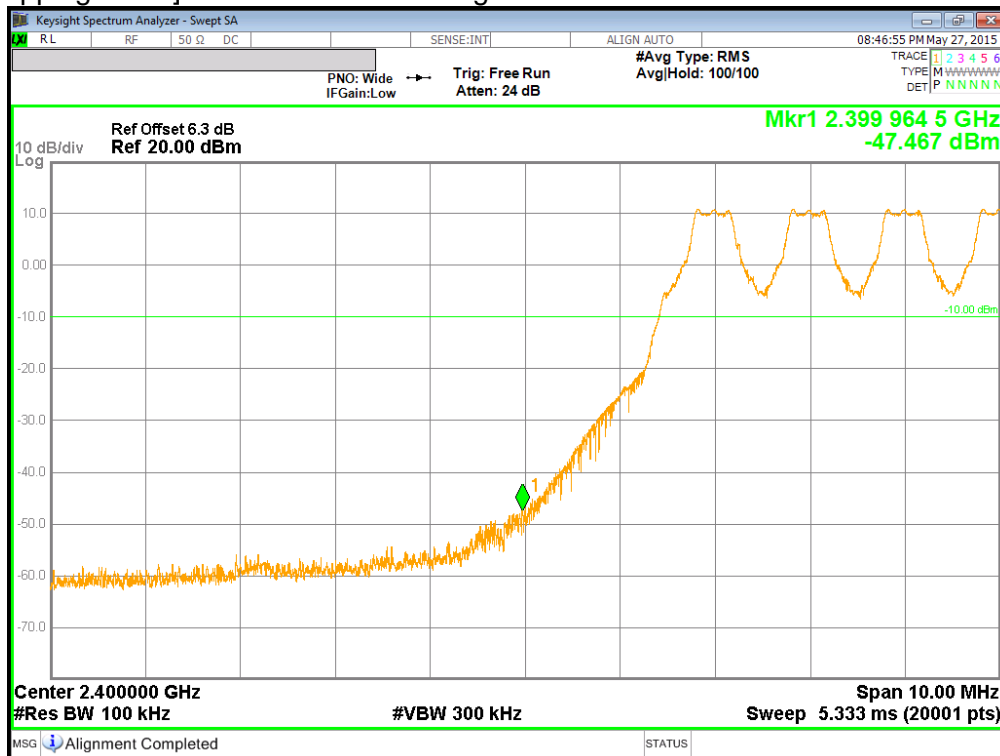
8.7.1. BASIC DATA RATE GFSK MODULATION

GFSK Mode



BandEdge Emission at GFSK Hopping Mode

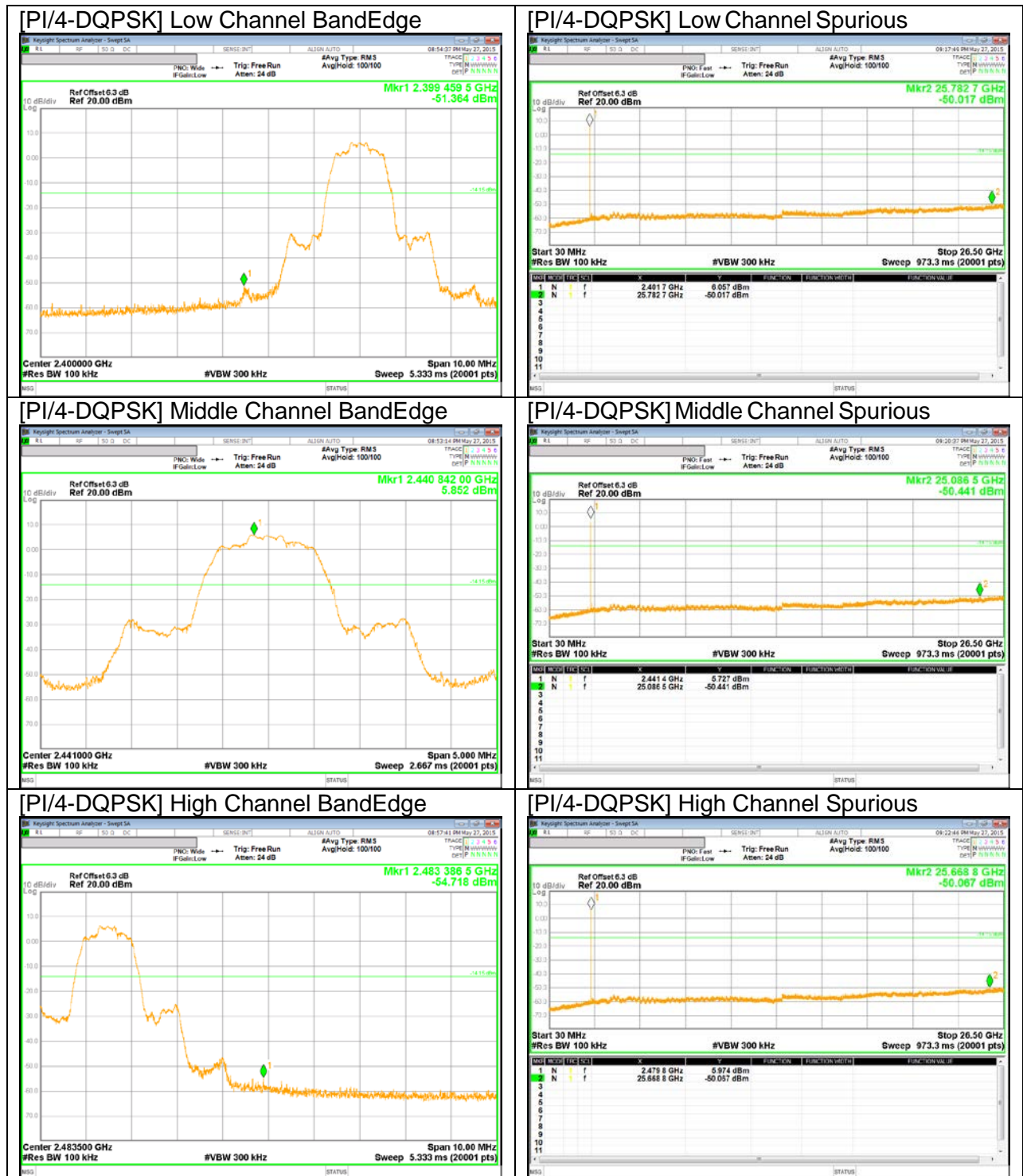
[GFSK Hopping Mode] Low Channel BandEdge



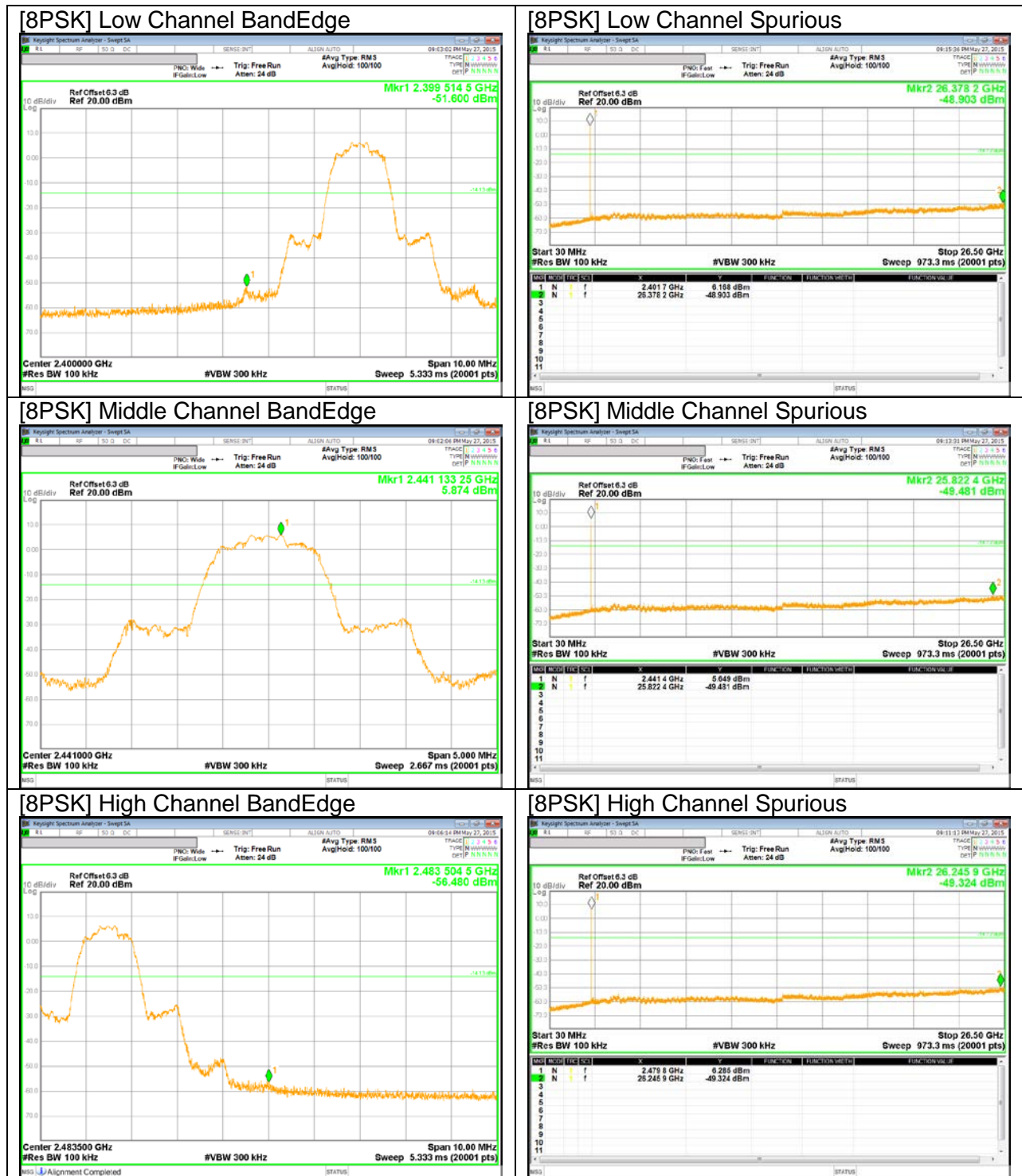
[GFSK Hopping Mode] High Channel BandEdge



PI/4-DQPSK Mode

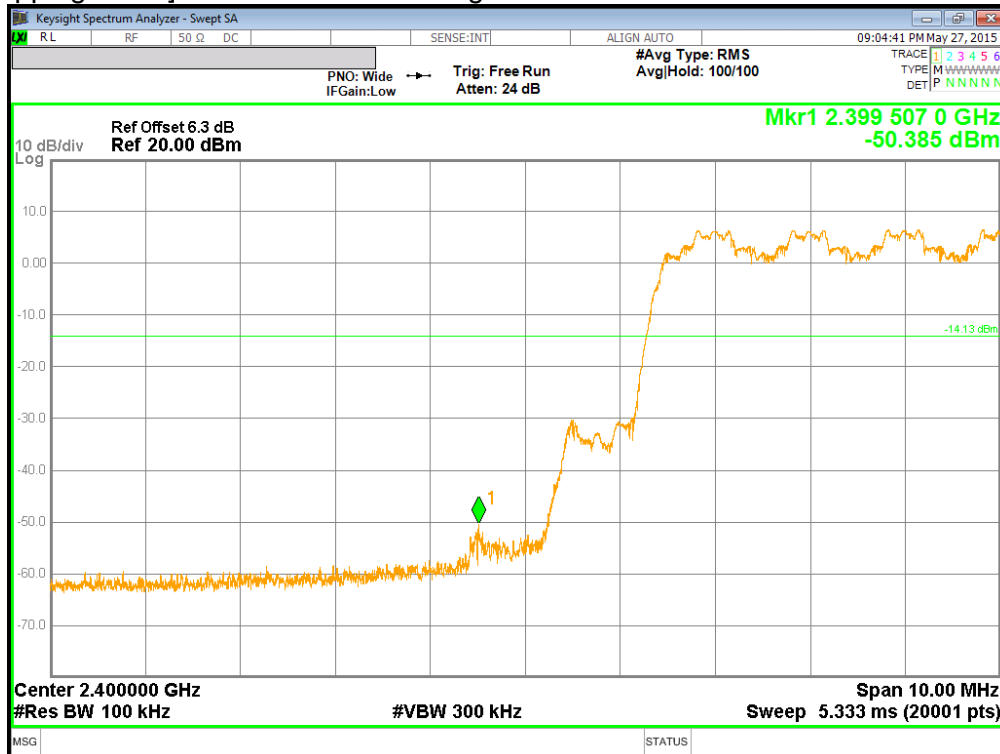


8PSK Mode

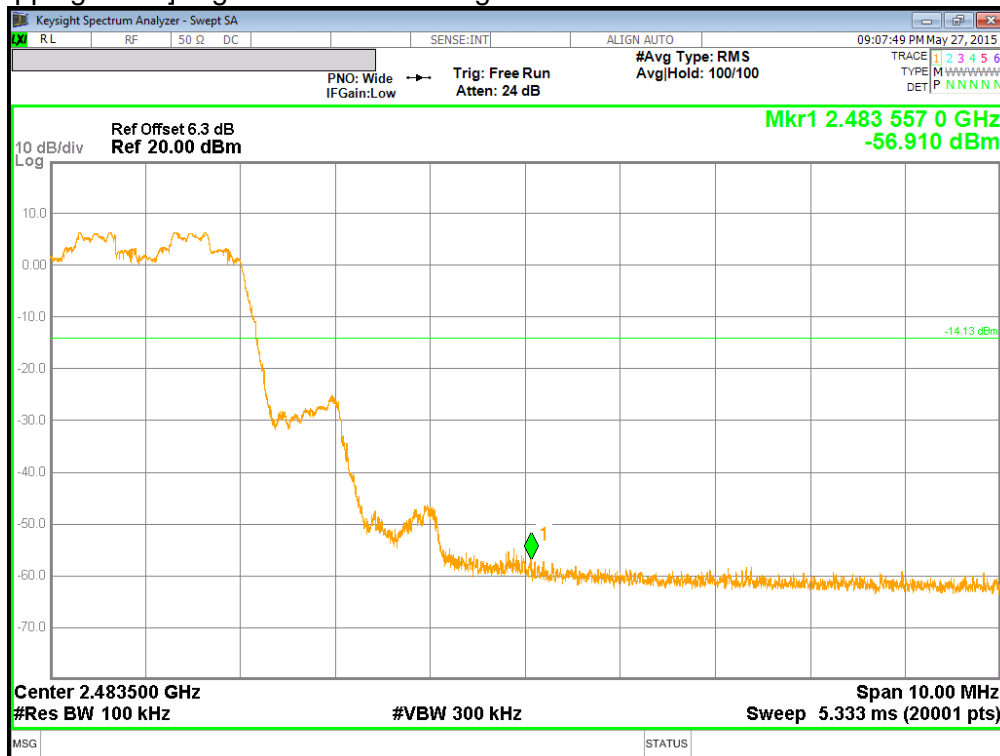


BandEdge Emission at 8PSK Hopping Mode

[8PSK Hopping Mode] Low Channel BandEdge



[8PSK Hopping Mode] High Channel BandEdge



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

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

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

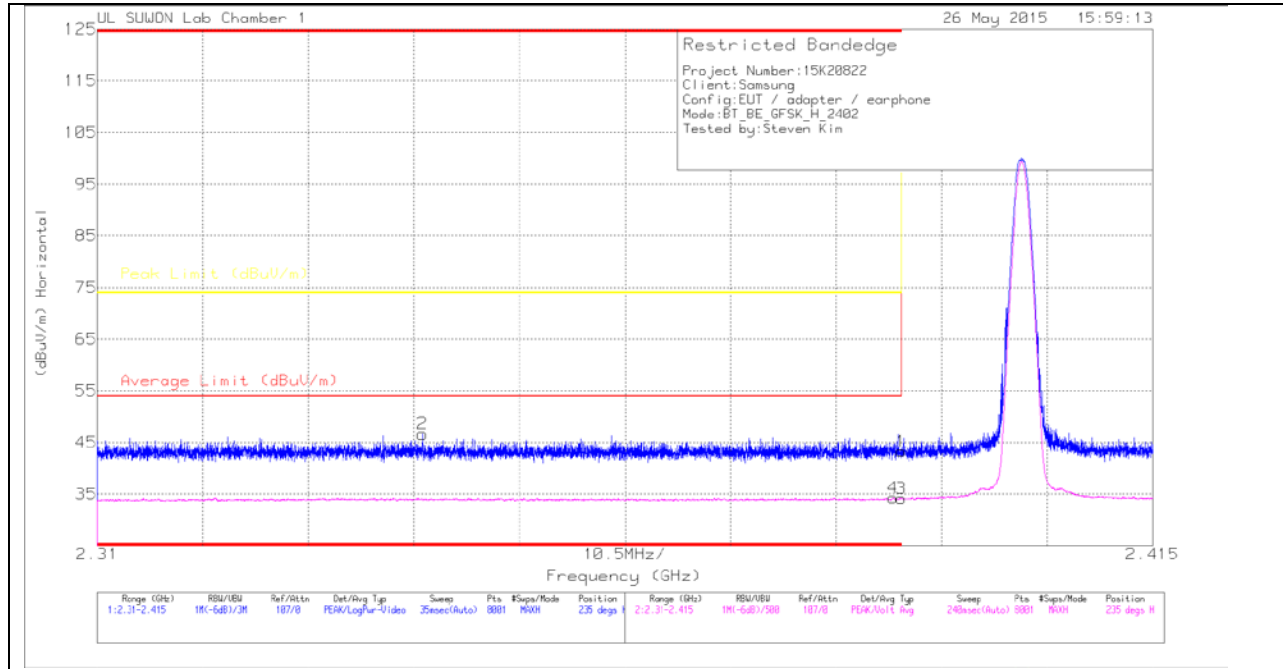
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

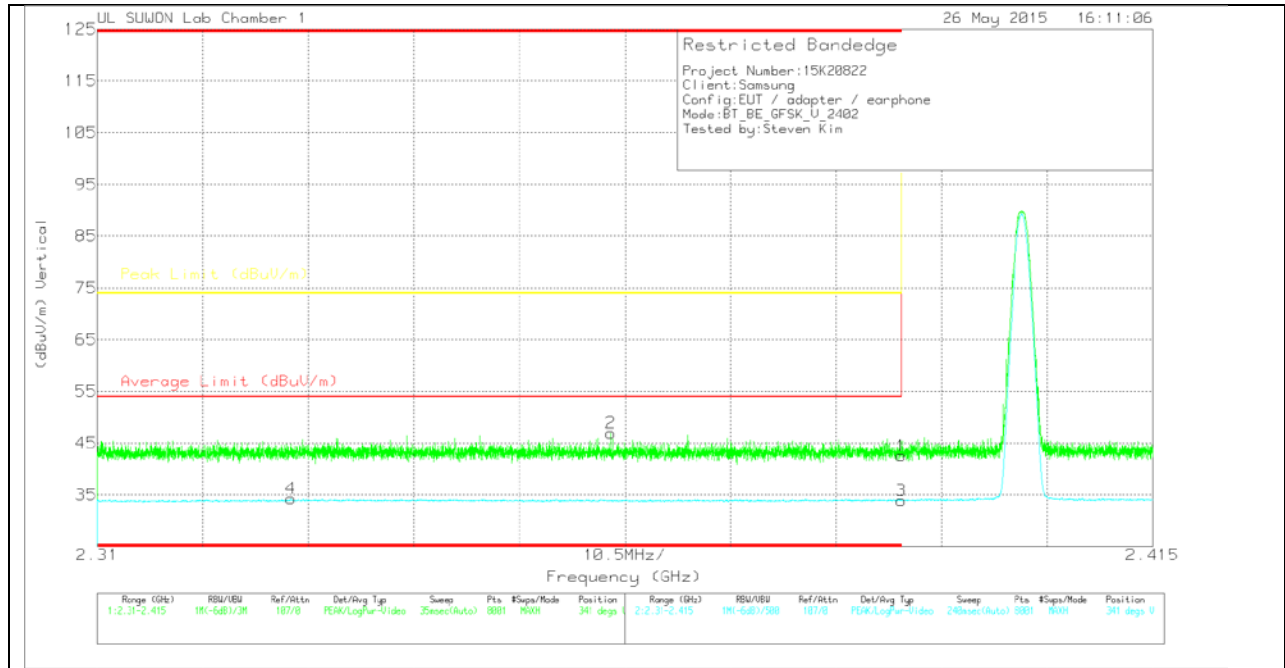
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.21	Pk	27.9	-22.8	43.31	-	-	74	-30.69	235	101	H
2	* 2.342	41.77	Pk	27.8	-22.9	46.67	-	-	74	-27.33	235	101	H
3	* 2.39	29.06	VB1T	27.9	-22.8	34.16	54	-19.84	-	-	235	101	H
4	* 2.389	29.18	VB1T	27.9	-22.8	34.28	54	-19.72	-	-	235	101	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.47	Pk	27.9	-22.8	42.57	-	-	74	-31.43	341	127	V
2	* 2.361	41.94	Pk	27.8	-22.8	46.94	-	-	74	-27.06	341	127	V
3	* 2.39	28.84	VB1T	27.9	-22.8	33.94	54	-20.06	-	-	341	127	V
4	* 2.329	29.38	VB1T	27.8	-22.9	34.28	54	-19.72	-	-	341	127	V

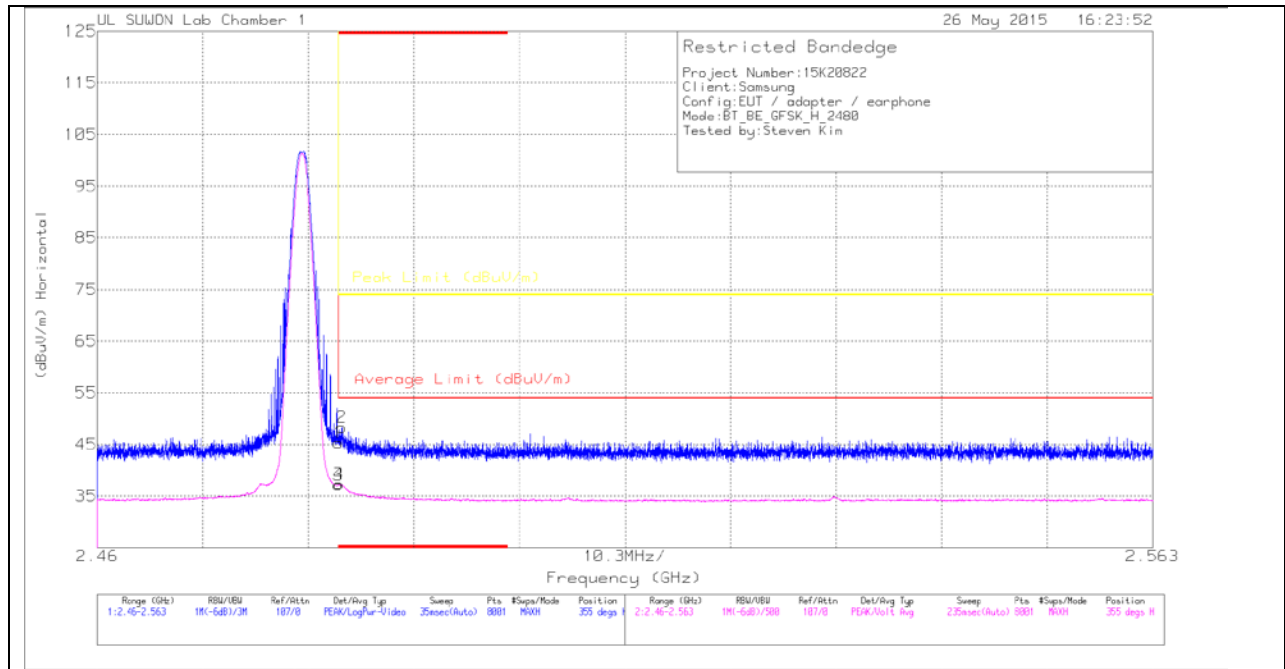
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

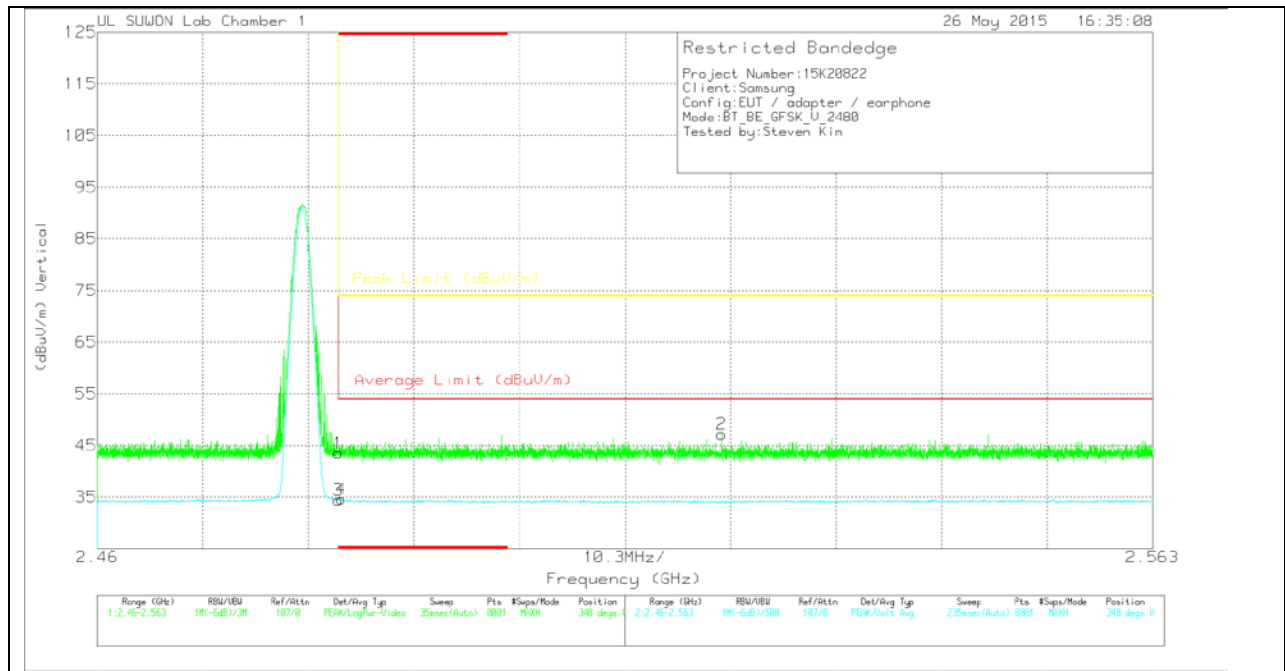
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.04	Pk	27.9	-22.6	45.34	-	-	74	-28.66	355	100	H
2	* 2.484	43.03	Pk	27.9	-22.6	48.33	-	-	74	-25.67	355	100	H
3	* 2.484	31.94	VB1T	27.9	-22.6	37.24	54	-16.76	-	-	355	100	H
4	* 2.484	32.01	VB1T	27.9	-22.6	37.31	54	-16.69	-	-	355	100	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	38.24	Pk	27.9	-22.6	43.54	-	-	74	-30.46	348	294	V
2	2.521	41.9	Pk	27.9	-22.6	47.2	-	-	74	-26.8	348	294	V
3	* 2.484	29.16	VB1T	27.9	-22.6	34.46	54	-19.54	-	-	348	294	V
4	* 2.484	29.37	VB1T	27.9	-22.6	34.67	54	-19.33	-	-	348	294	V

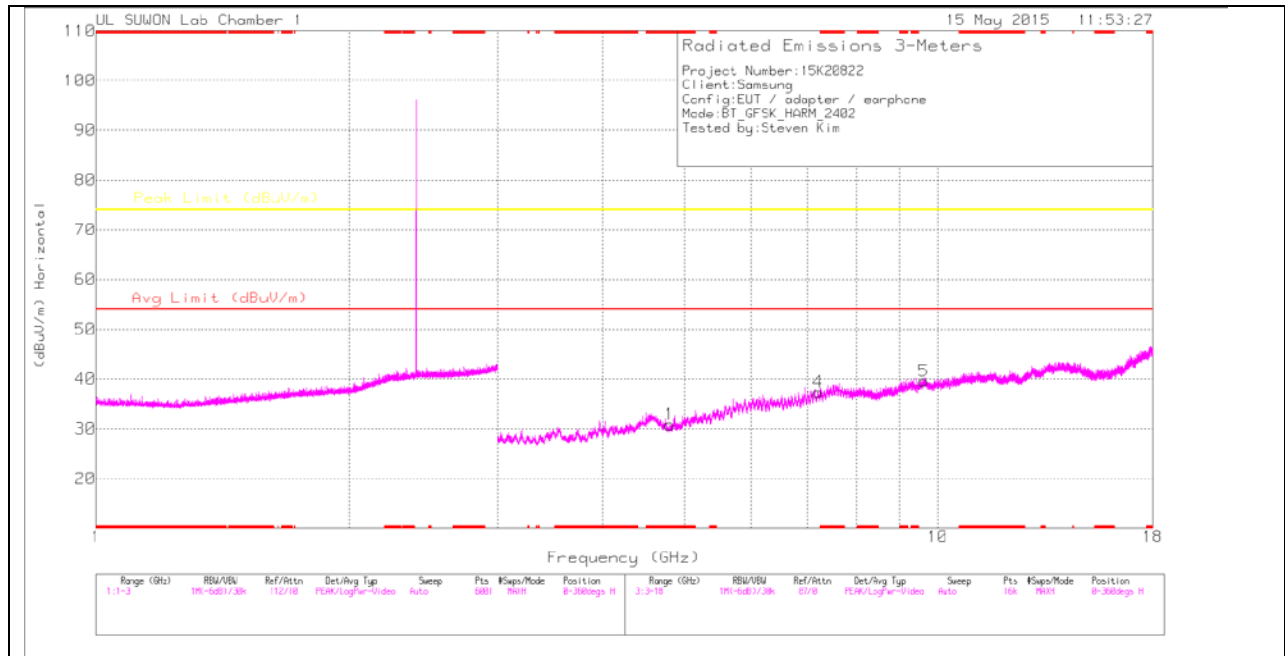
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

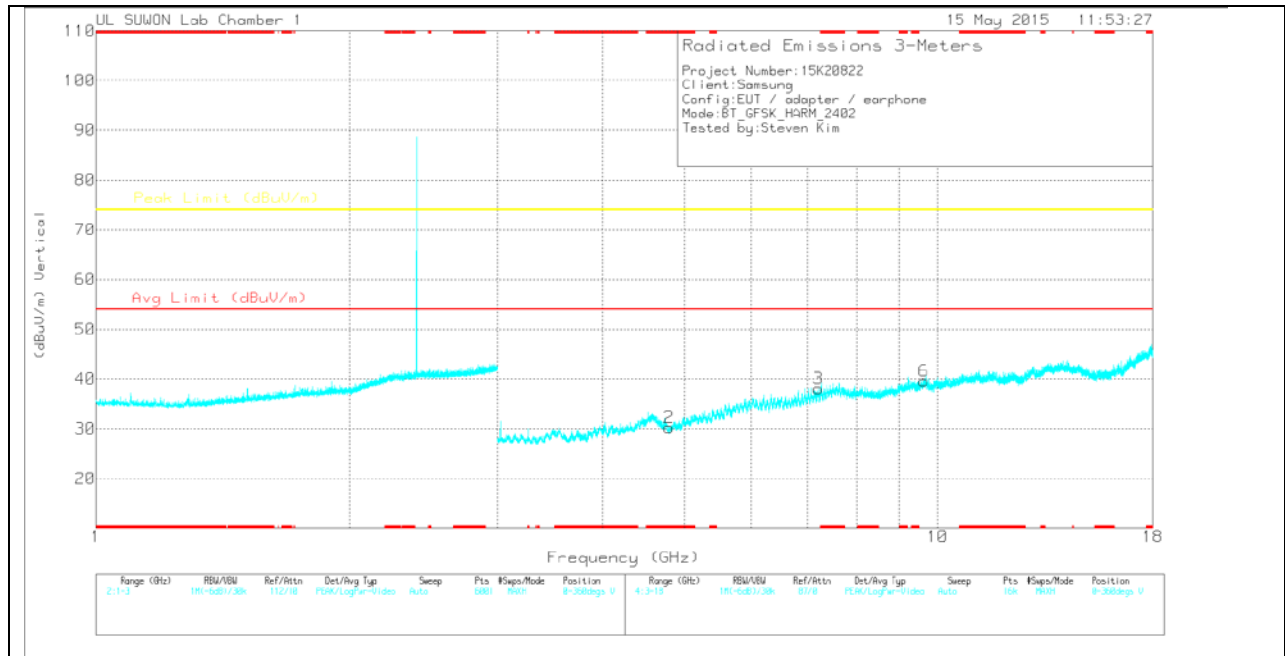
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

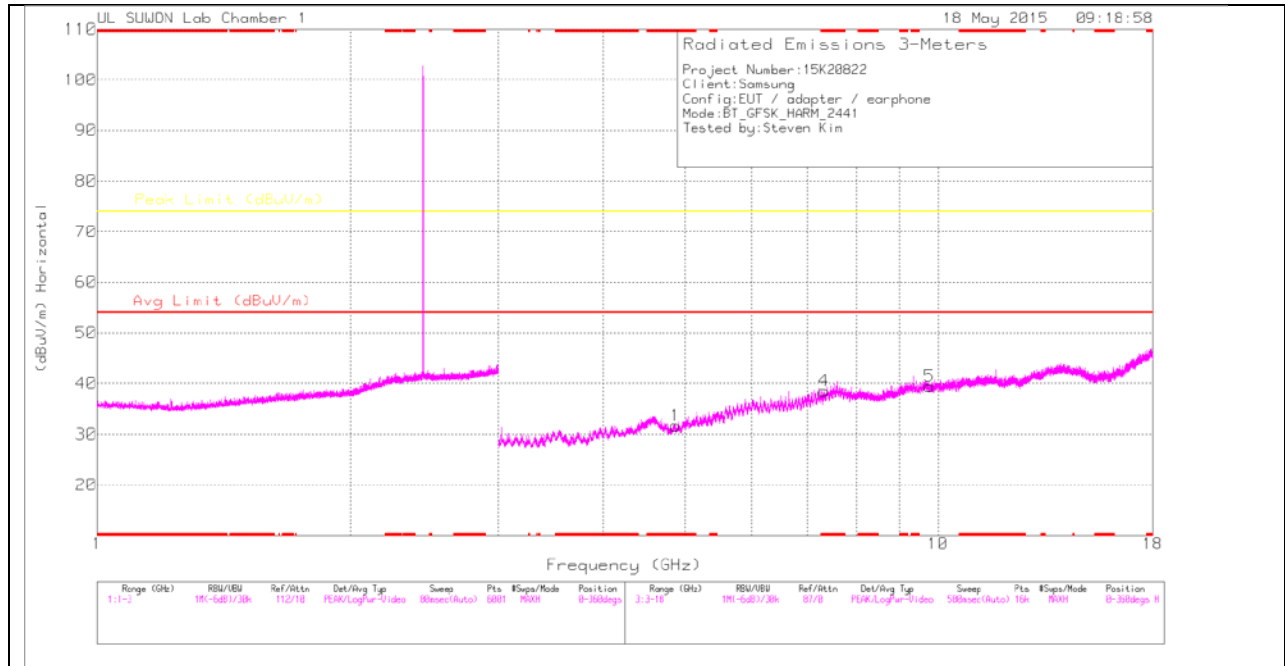
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.803	28.72	PK	31.9	-29.8	30.82	-	-	74	-43.18	0-360	200	H
4	7.207	25.79	PK	37	-25.4	37.39	-	-	-	-	0-360	100	H
5	9.62	22.86	PK	37.7	-20.9	39.66	-	-	-	-	0-360	100	H
2	* 4.798	28.24	PK	31.9	-29.9	30.24	-	-	74	-43.76	0-360	100	V
3	7.212	26.53	PK	37	-25.4	38.13	-	-	-	-	0-360	200	V
6	9.621	22.79	PK	37.7	-20.9	39.59	-	-	-	-	0-360	200	V

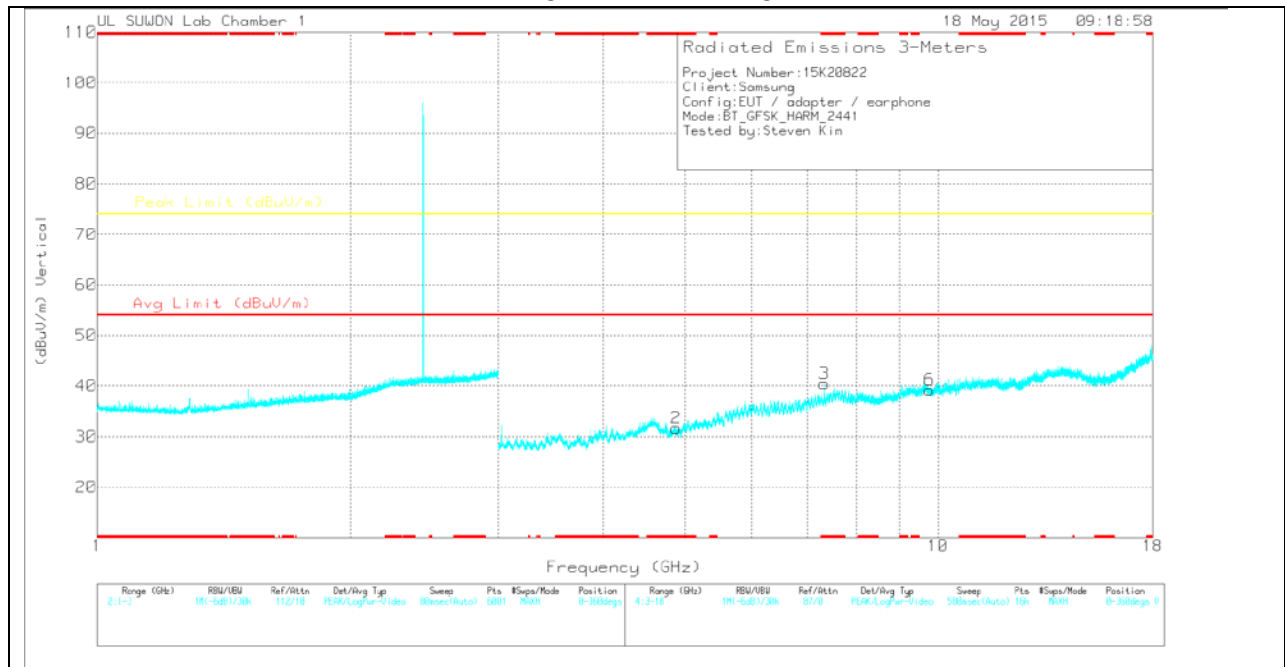
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

MID CHANNEL DATA

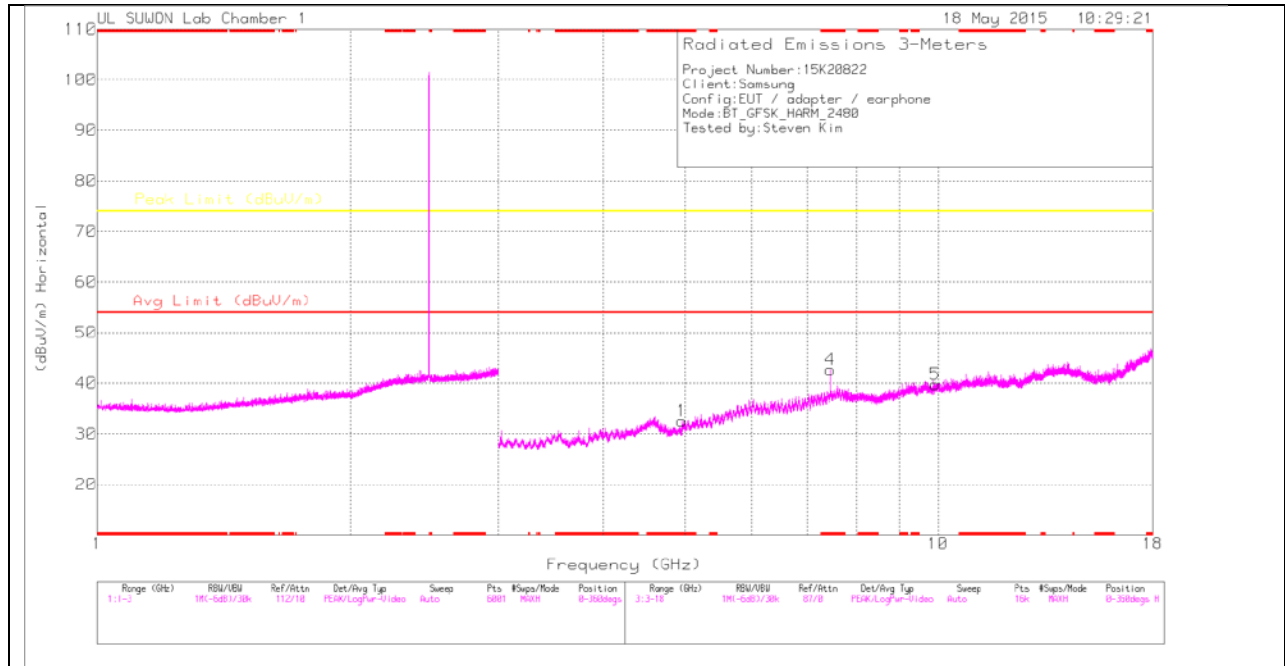
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.874	28.86	PK	32	-29.2	31.66	-	-	74	-42.34	0-360	200	H
4	* 7.321	27.03	PK	37.1	-25.6	38.53	-	-	74	-35.47	0-360	100	H
5	9.77	23.95	PK	37.6	-22.1	39.45	-	-	-	-	0-360	100	H
2	* 4.881	28.76	PK	32	-29.1	31.66	-	-	74	-42.34	0-360	200	V
3	* 7.323	28.85	PK	37.2	-25.6	40.45	-	-	74	-33.55	0-360	200	V
6	9.77	23.71	PK	37.6	-22.1	39.21	-	-	-	-	0-360	200	V

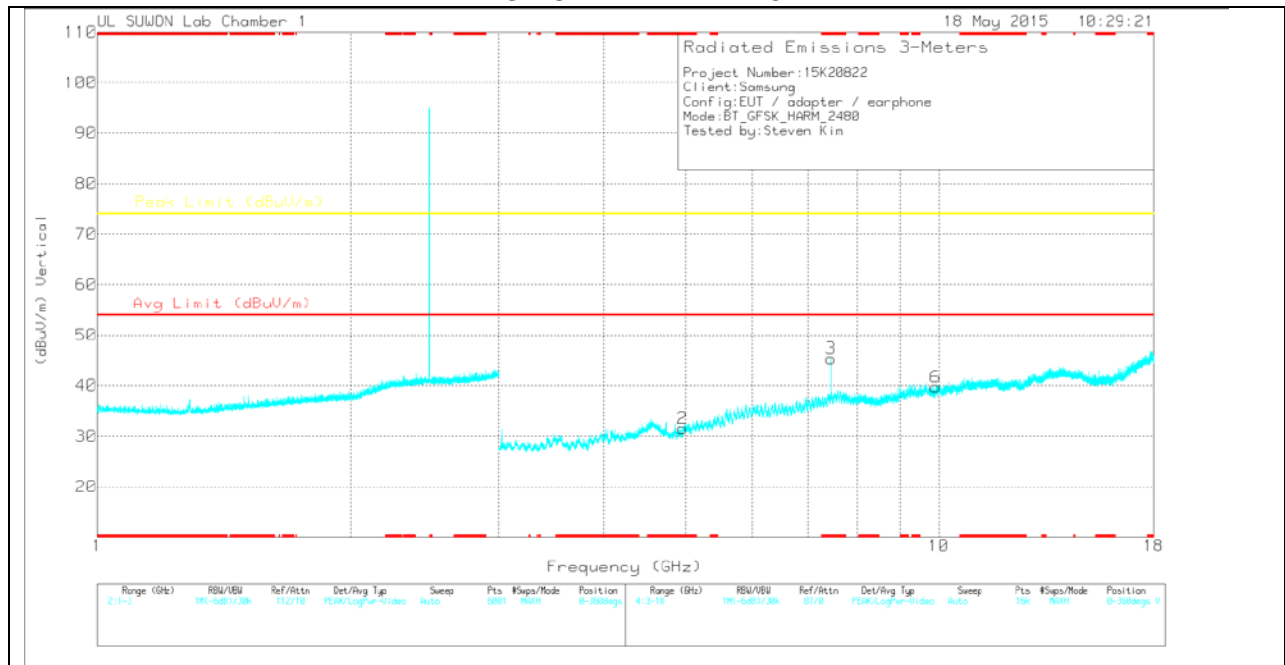
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96	29.37	PK	32.1	-28.9	32.57	-	-	74	-41.43	0-360	100	H
4	* 7.44	30.19	PK	37.3	-24.8	42.69	-	-	74	-31.31	0-360	200	H
5	9.918	22.29	PK	37.9	-20.4	39.79	-	-	-	-	0-360	100	H
2	* 4.959	28.34	PK	32.1	-28.9	31.54	-	-	74	-42.46	0-360	100	V
3	* 7.44	32.86	PK	37.3	-24.8	45.36	-	-	74	-28.64	0-360	100	V
6	9.914	22.35	PK	37.9	-20.5	39.75	-	-	-	-	0-360	200	V

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

PK – Peak detector

Radiated Emissions

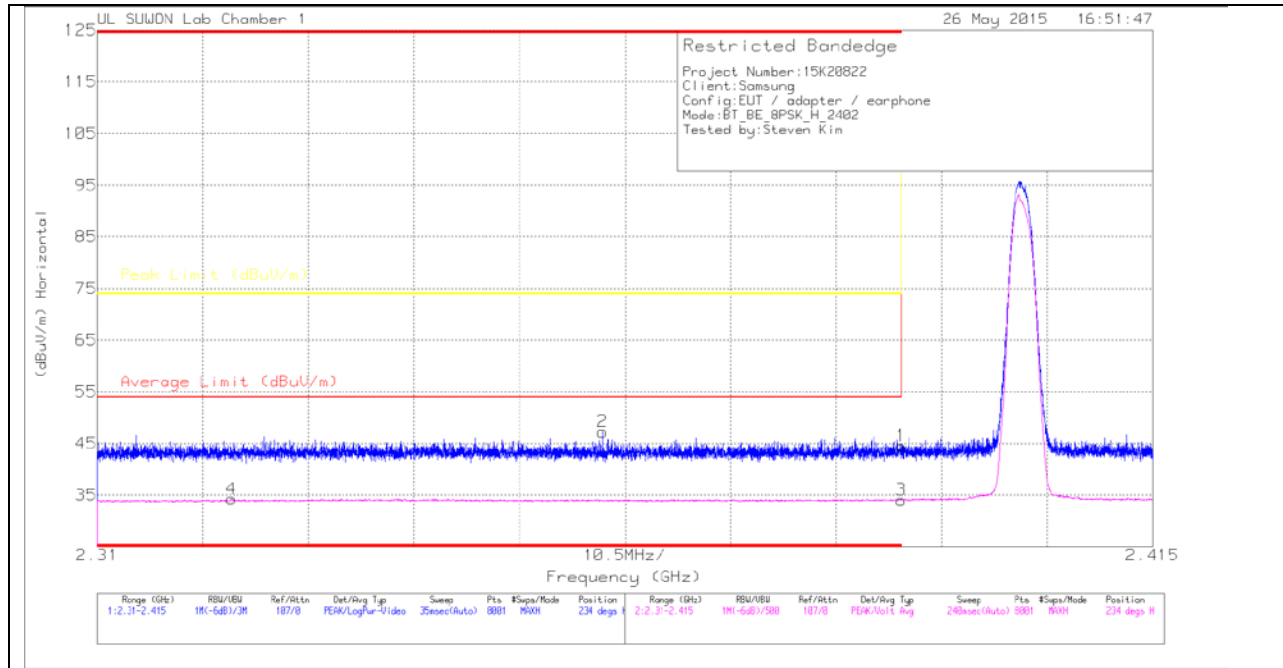
Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 7.44	39.24	PK3	37.3	-24.8	51.74	-	-	74	-22.26	260	371	V
* 7.44	24.81	VB1T	37.3	-24.8	37.31	54	-16.69	-	-	260	371	V

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

PK3 - FHSS Method: Maximum Peak

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

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



HORIZONTAL DATA

Trace Markers

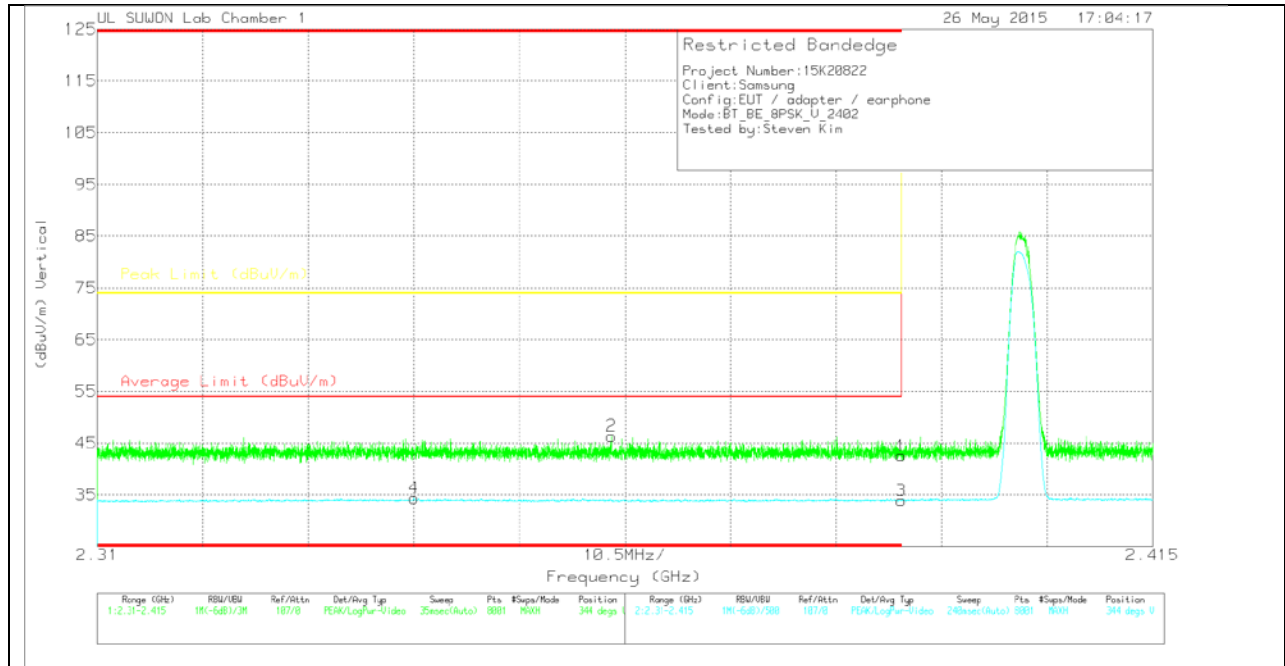
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.47	Pk	27.9	-22.8	44.57	-	-	74	-29.43	234	101	H
2	* 2.36	42.27	Pk	27.8	-22.8	47.27	-	-	74	-26.73	234	101	H
3	* 2.39	28.99	VB1T	27.9	-22.8	34.09	54	-19.91	-	-	234	101	H
4	* 2.323	29.38	VB1T	27.8	-22.9	34.28	54	-19.72	-	-	234	101	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.48	Pk	27.9	-22.8	42.58	-	-	74	-31.42	344	127	V
2	* 2.361	41.36	Pk	27.8	-22.8	46.36	-	-	74	-27.64	344	127	V
3	* 2.39	28.81	VB1T	27.9	-22.8	33.91	54	-20.09	-	-	344	127	V
4	* 2.342	29.48	VB1T	27.8	-22.9	34.38	54	-19.62	-	-	344	127	V

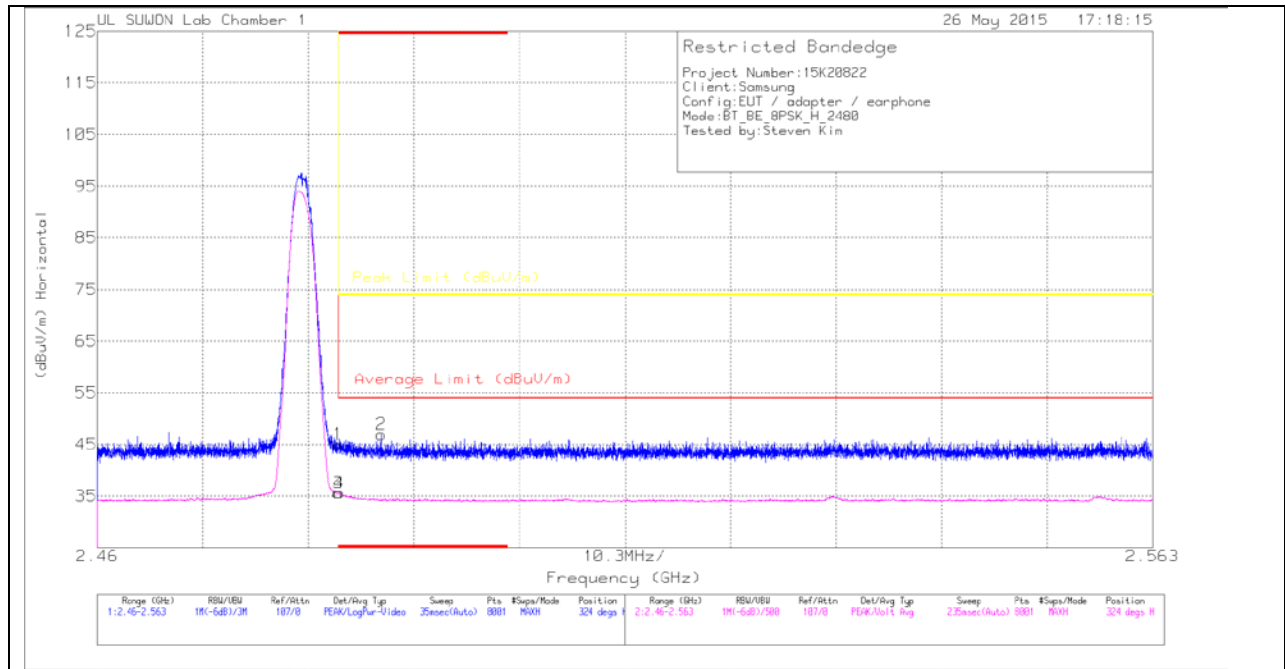
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

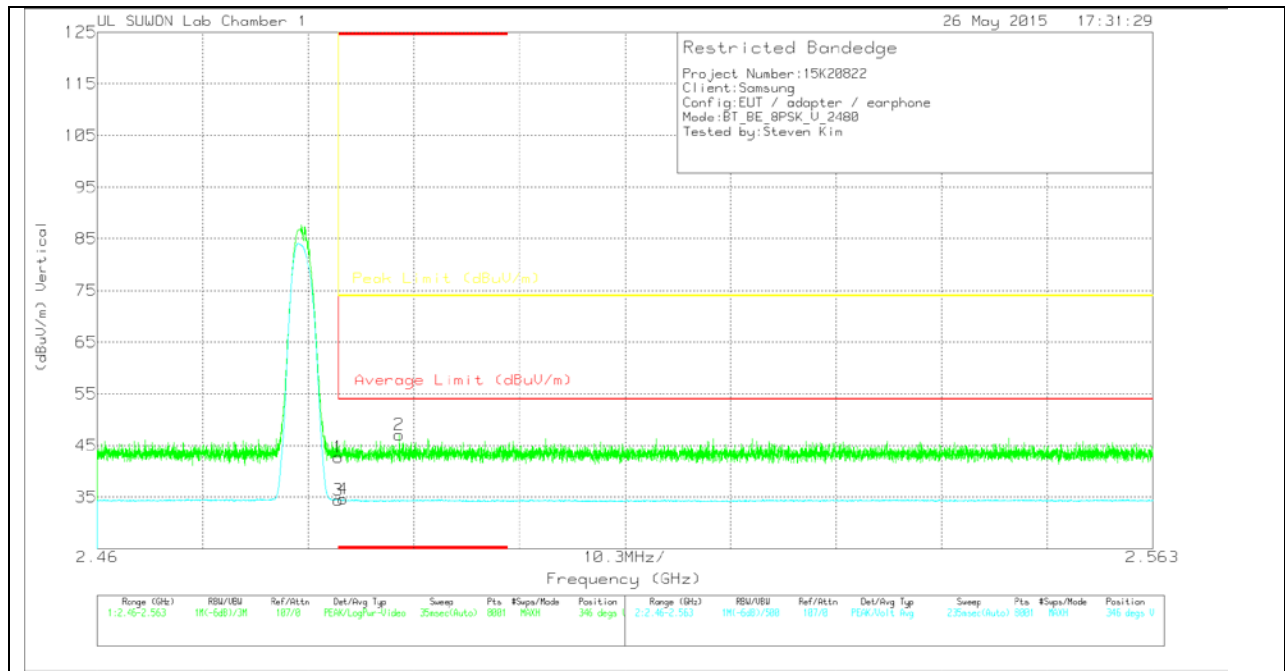
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.74	Pk	27.9	-22.6	45.04	-	-	74	-28.96	324	100	H
2	* 2.488	41.67	Pk	27.9	-22.6	46.97	-	-	74	-27.03	324	100	H
3	* 2.484	30.3	VB1T	27.9	-22.6	35.6	54	-18.4	-	-	324	100	H
4	* 2.484	30.3	VB1T	27.9	-22.6	35.6	54	-18.4	-	-	324	100	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_2_10 dB	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.44	Pk	27.9	-22.6	42.74	-	-	74	-31.26	346	293	V
2	* 2.489	41.78	Pk	27.9	-22.6	47.08	-	-	74	-26.92	346	293	V
3	* 2.484	29.13	VB1T	27.9	-22.6	34.43	54	-19.57	-	-	346	293	V
4	* 2.484	29.34	VB1T	27.9	-22.6	34.64	54	-19.36	-	-	346	293	V

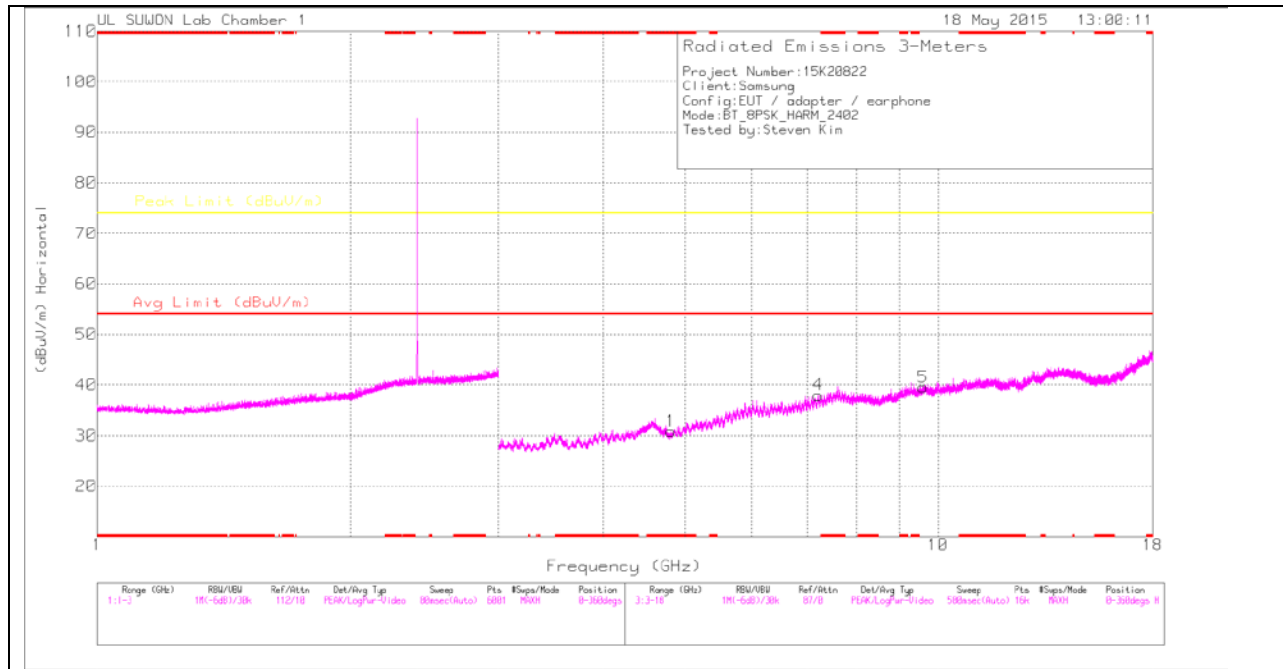
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

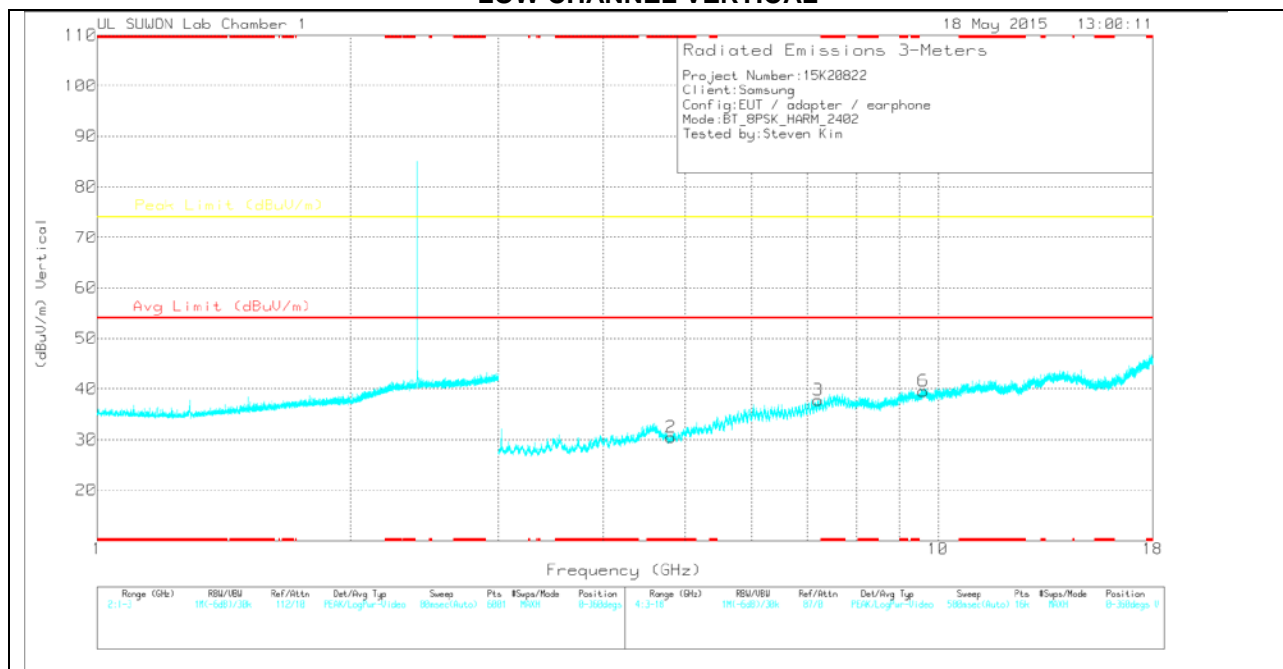
VB1T - FHSS Method: VB=1/Ton, Voltage Averaging Max Hold where: Ton is the duration of the packet

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

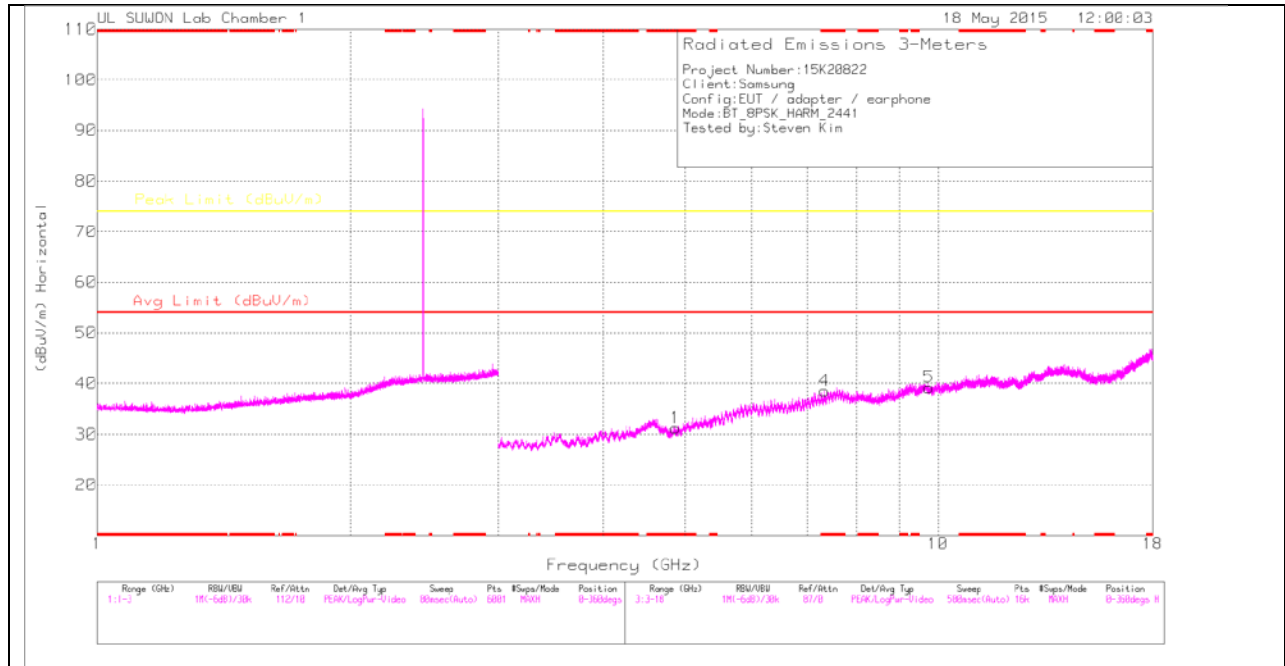
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.813	28.63	PK	31.9	-29.7	30.83	-	-	74	-43.17	0-360	200	H
4	7.203	26.49	PK	36.9	-25.4	37.99	-	-	-	-	0-360	200	H
5	9.606	22.85	PK	37.7	-21	39.55	-	-	-	-	0-360	100	H
2	* 4.817	28.27	PK	31.9	-29.7	30.47	-	-	74	-43.53	0-360	100	V
3	7.203	26.3	PK	36.9	-25.4	37.8	-	-	-	-	0-360	100	V
6	9.609	22.9	PK	37.7	-21	39.6	-	-	-	-	0-360	100	V

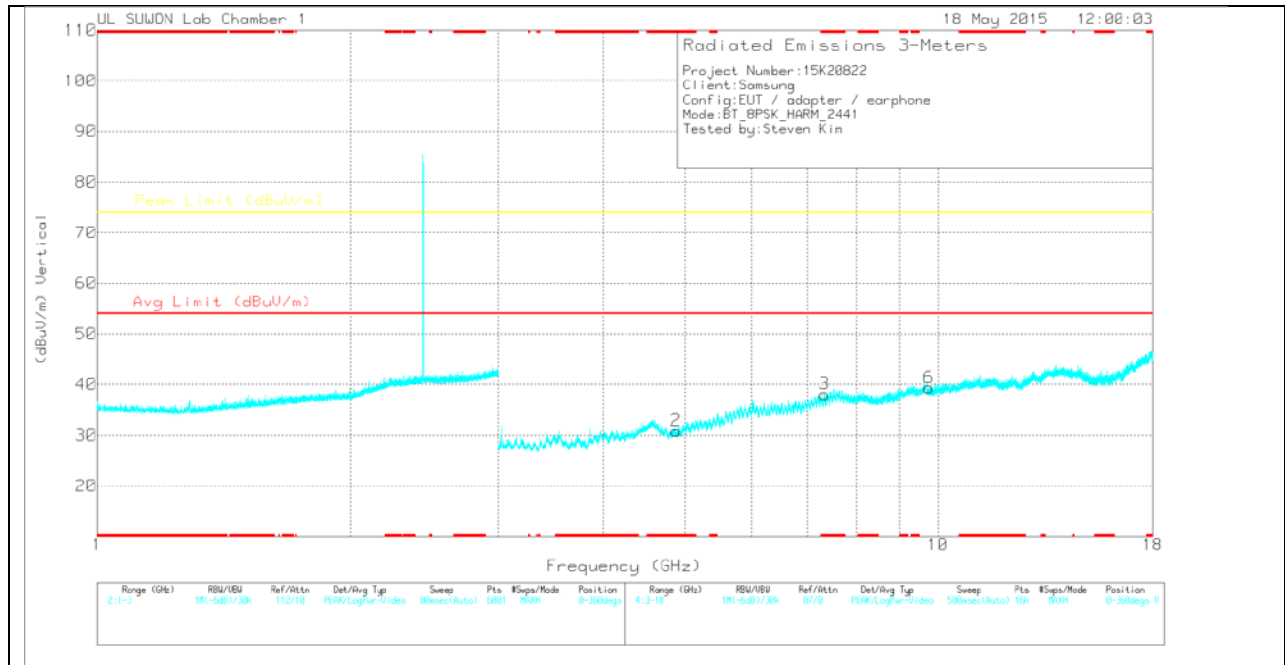
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

MID CHANNEL DATA

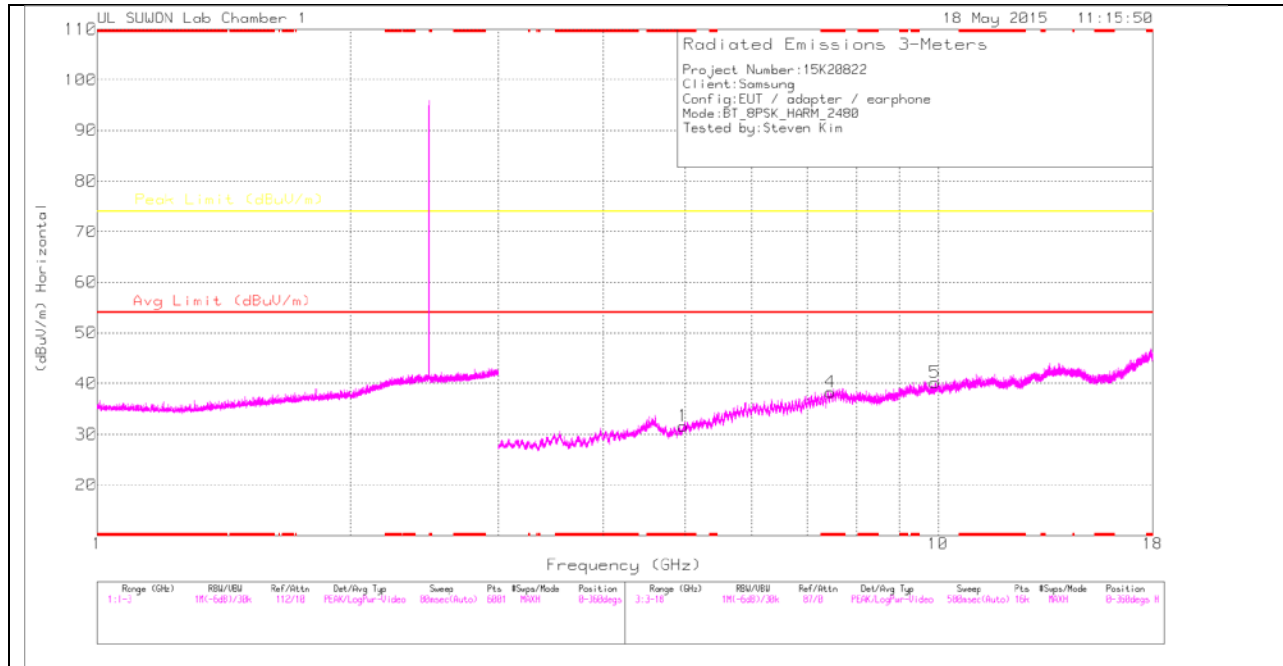
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.872	28.43	PK	32	-29.2	31.23	-	-	74	-42.77	0-360	200	H
4	* 7.329	26.93	PK	37.2	-25.6	38.53	-	-	74	-35.47	0-360	100	H
5	9.751	23.54	PK	37.6	-21.9	39.24	-	-	-	-	0-360	200	H
2	* 4.882	27.97	PK	32	-29.1	30.87	-	-	74	-43.13	0-360	100	V
3	* 7.323	26.52	PK	37.2	-25.6	38.12	-	-	74	-35.88	0-360	100	V
6	9.748	23.67	PK	37.6	-21.9	39.37	-	-	-	-	0-360	100	V

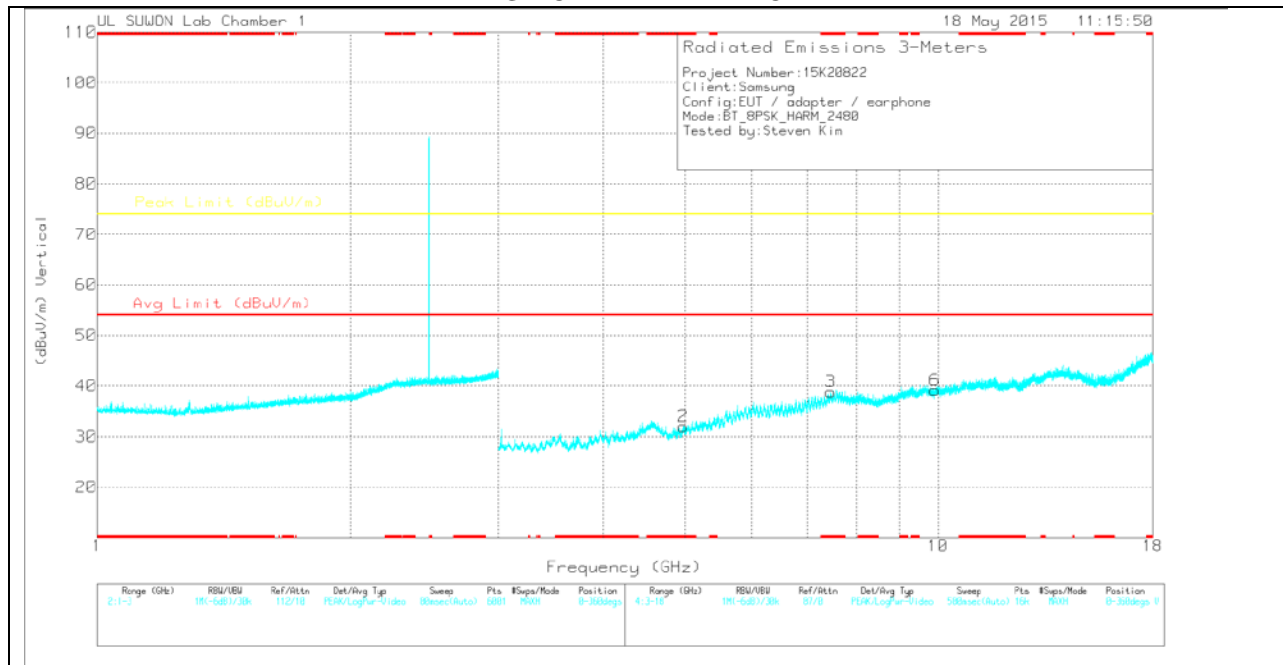
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak Detector

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3115D Factor	Path_3_3G HP	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.973	28.23	PK	32.2	-28.8	31.63	-	-	74	-42.37	0-360	200	H
4	* 7.443	25.8	PK	37.3	-24.8	38.3	-	-	74	-35.7	0-360	200	H
5	9.914	22.81	PK	37.9	-20.5	40.21	-	-	-	-	0-360	100	H
2	* 4.975	28.49	PK	32.2	-28.7	31.99	-	-	74	-42.01	0-360	100	V
3	* 7.448	26.36	PK	37.3	-24.8	38.86	-	-	74	-35.14	0-360	100	V
6	9.912	21.75	PK	37.9	-20.5	39.15	-	-	-	-	0-360	200	V

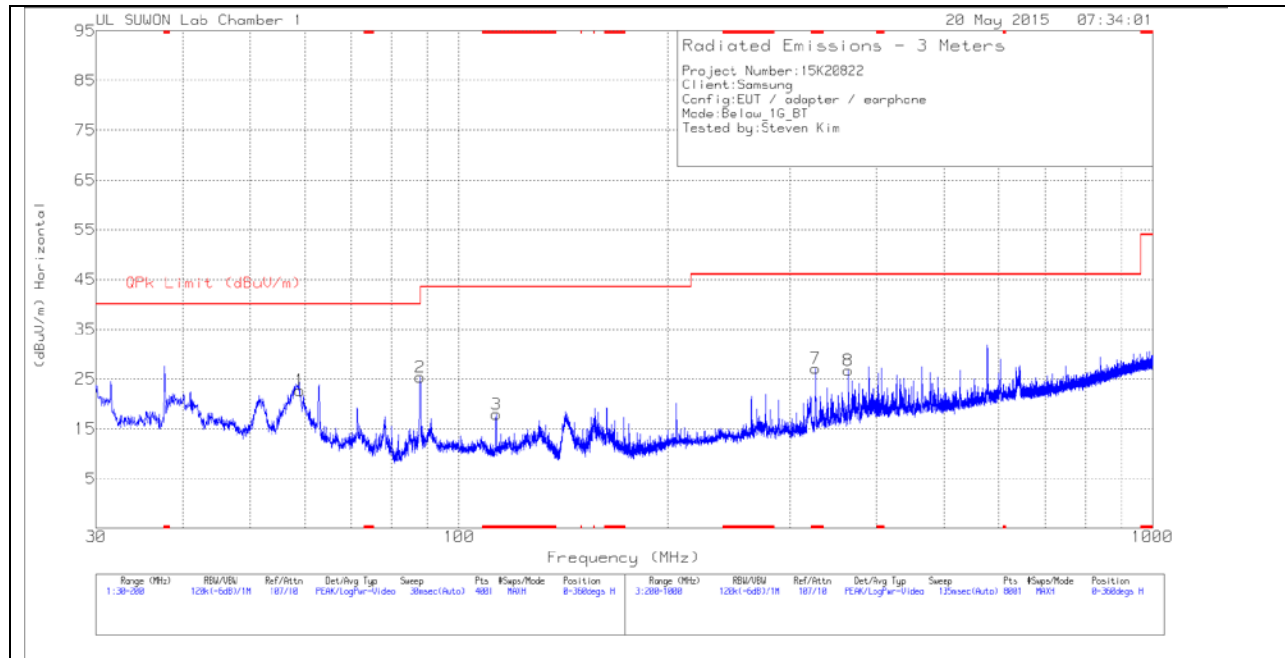
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK – Peak detector

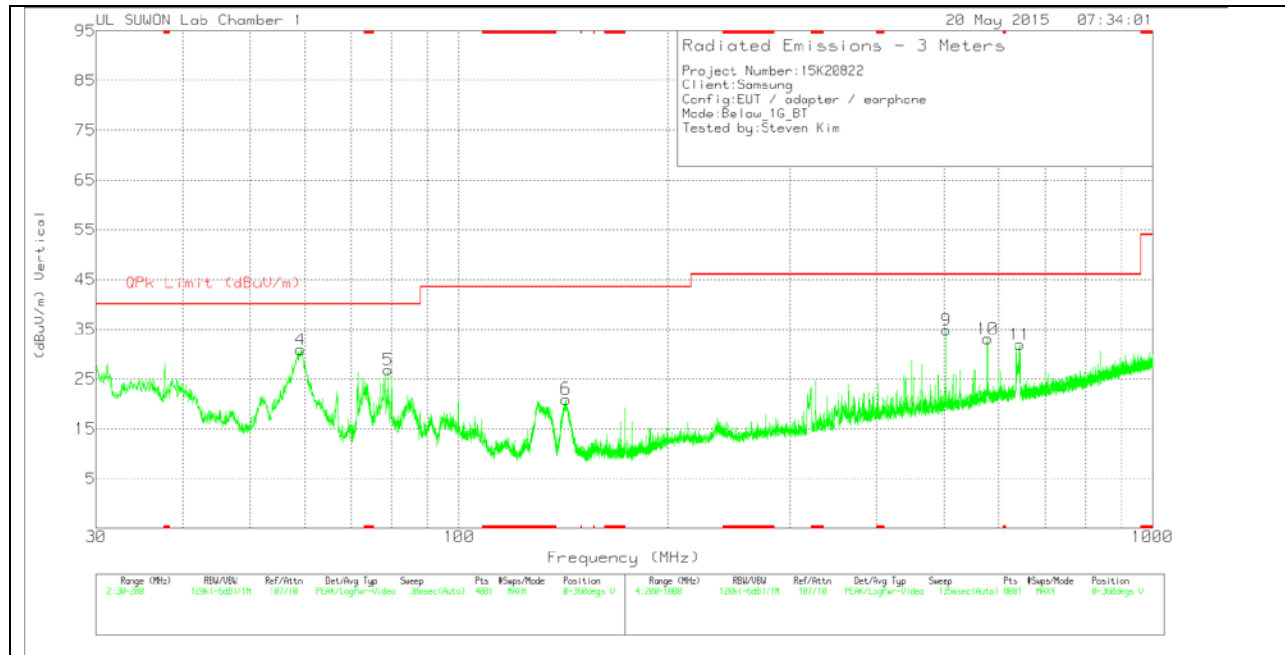
9.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163-750	Bi-Log	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	58.9	39.86	Pk	12.8	-29.9	22.76	40	-17.24	0-360	400	H
2	88.055	45.92	Pk	9	-29.5	25.42	43.52	-18.1	0-360	400	H
3	* 113.1725	36.48	Pk	10.5	-29.1	17.88	43.52	-25.64	0-360	200	H
4	59.07	48.04	Pk	12.8	-29.9	30.94	40	-9.06	0-360	100	V
5	79.045	49.43	Pk	7.1	-29.6	26.93	40	-13.07	0-360	200	V
6	142.71	41.8	Pk	7.9	-28.7	21	43.52	-22.52	0-360	100	V
7	* 326.8	40.41	Pk	13.9	-27.2	27.11	46.02	-18.91	0-360	300	H
8	364.5	38.93	Pk	14.8	-27	26.73	46.02	-19.29	0-360	100	H
9	504	43.89	Pk	17.1	-26.2	34.79	46.02	-11.23	0-360	100	V
10	578.5	40.27	Pk	18.7	-25.9	33.07	46.02	-12.95	0-360	100	V
11	644.2	38.11	Pk	19.3	-25.5	31.91	46.02	-14.11	0-360	100	V

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

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

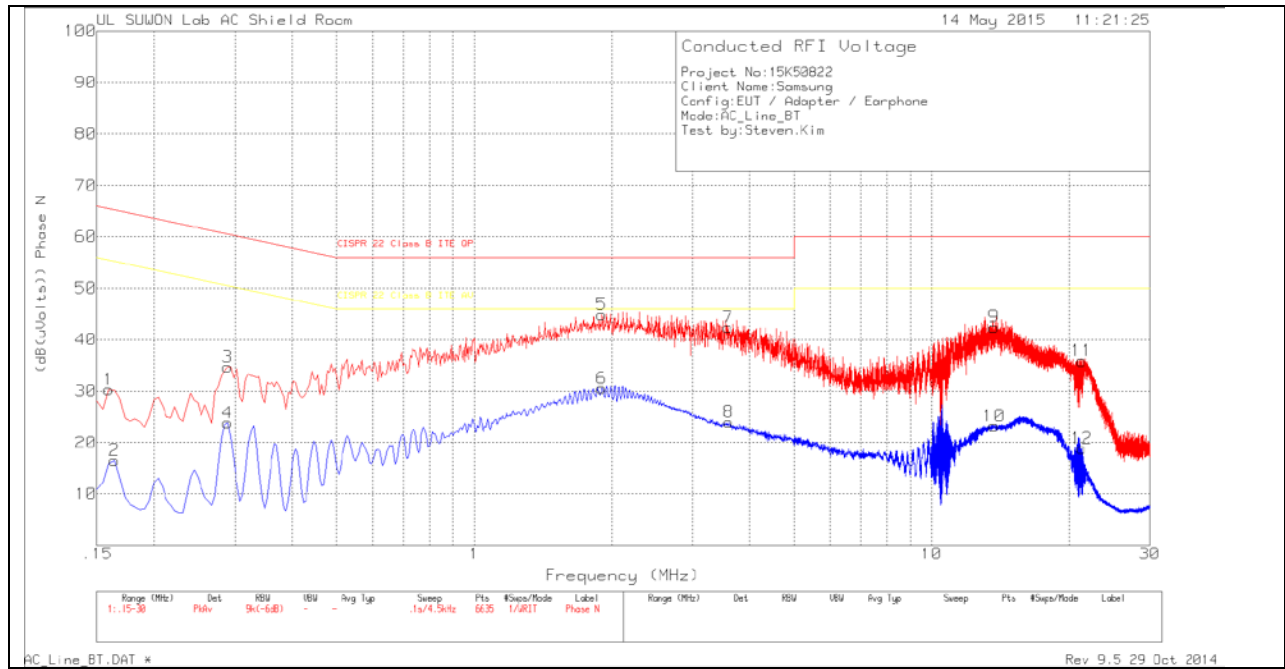
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

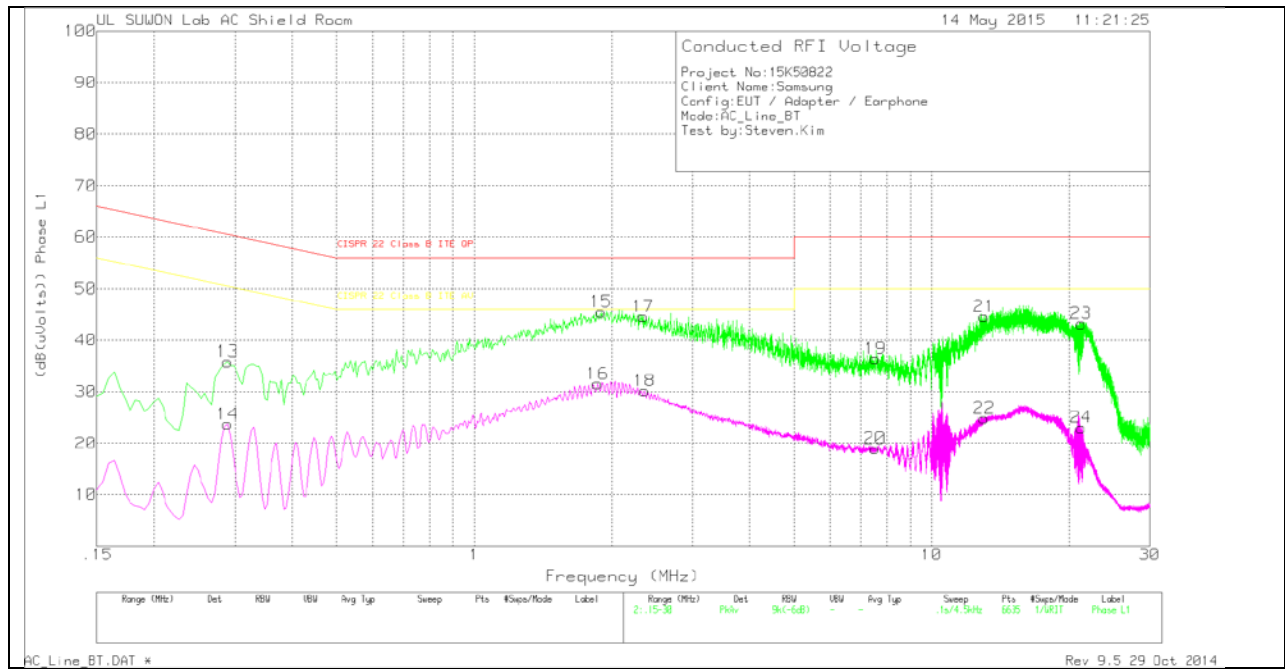
Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN HPF ON and Extension cord	CE Shield Room	Corrected Reading (dBuV)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.159	20.32	Pk	10	0	30.32	65.52	-35.2	-	-
2	.1635	6.43	Av	10.1	0	16.53	-	-	55.28	-38.75
3	.2895	24.87	Pk	9.8	0	34.67	60.54	-25.87	-	-
4	.2895	14.03	Av	9.8	0	23.83	-	-	50.54	-26.71
5	1.905	34.99	Pk	9.8	.1	44.89	56	-11.11	-	-
6	1.905	20.63	Av	9.8	.1	30.53	-	-	46	-15.47
7	3.5925	32.52	Pk	9.8	.1	42.42	56	-13.58	-	-
8	3.6015	14.08	Av	9.8	.1	23.98	-	-	46	-22.02
9	13.704	32.06	Pk	10.2	.2	42.46	60	-17.54	-	-
10	13.704	12.82	Av	10.2	.2	23.22	-	-	50	-26.78
11	21.282	25.08	Pk	10.6	.2	35.88	60	-24.12	-	-
12	21.2865	8.05	Av	10.6	.2	18.85	-	-	50	-31.15

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith extension cord_L1	CE Shield Room	Corrected Reading (dBuV)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.2895	26.03	Pk	9.8	0	35.83	60.54	-24.71	-	-
14	.2895	13.92	Av	9.8	0	23.72	-	-	50.54	-26.82
15	1.896	35.6	Pk	9.8	.1	45.5	56	-10.5	-	-
16	1.8645	21.62	Av	9.8	.1	31.52	-	-	46	-14.48
17	2.346	34.68	Pk	9.8	.1	44.58	56	-11.42	-	-
18	2.3595	20.24	Av	9.8	.1	30.14	-	-	46	-15.86
19	7.539	26.39	Pk	9.9	.1	36.39	60	-23.61	-	-
20	7.5345	8.98	Av	9.9	.1	18.98	-	-	50	-31.02
21	13.047	34.3	Pk	10.1	.2	44.6	60	-15.4	-	-
22	13.0425	14.53	Av	10.1	.2	24.83	-	-	50	-25.17
23	21.246	32.6	Pk	10.4	.2	43.2	60	-16.8	-	-
24	21.246	12.43	Av	10.4	.2	23.03	-	-	50	-26.97

Pk - Peak detector

Av - Average detection