



**FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 2**

Bluetooth

CERTIFICATION TEST REPORT

FOR

BT/BLE and DTS b/g/n Wrist device

MODEL NUMBER : SM-R365

FCC ID: A3LSMR365

IC ID: 649E-SMR365

REPORT NUMBER: 4787892810-E3V1

ISSUE DATE: JUN 15, 2017

Prepared for

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

Prepared by

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



Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/15/17	Initial issue	Junwhan Lee

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION	6
4.2. SAMPLE CALCULATION	6
4.3. MEASUREMENT UNCERTAINTY.....	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. WORST-CASE CONFIGURATION AND MODE	8
5.5. DESCRIPTION OF TEST SETUP.....	9
6. TEST AND MEASUREMENT EQUIPMENT	11
7. REFERENCE MEASUREMENT RESULTS.....	12
7.1. 20 dB AND 99% BANDWIDTH	12
7.1.1. BASIC DATA RATE GFSK MODULATION	12
7.1.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION.....	12
7.1.3. ENHANCED DATA RATE 8PSK MODULATION	12
7.1.4. 20 dB AND 99% BANDWIDTH PLOTS.....	13
8. SUMMARY TABLE	16
9. ANTENNA PORT TEST RESULTS.....	17
9.1. HOPPING FREQUENCY SEPARATION	17
9.2. NUMBER OF HOPPING CHANNELS.....	18
9.3. AVERAGE TIME OF OCCUPANCY.....	20
9.4. OUTPUT POWER.....	24
9.4.1. BASIC DATA RATE GFSK MODULATION	24
9.4.2. ENHANCED DATA RATE PI/4-DPSK MODULATION	24
9.4.3. ENHANCED DATA RATE 8PSK MODULATION	24
9.4.4. OUTPUT POWER PLOTS.....	25
9.5. AVERAGE POWER	28
9.5.1. BASIC DATA RATE GFSK MODULATION	28
9.5.2. DATA RATE PI/4-DQPSK MODULATION	28
9.5.3. ENHANCED DATA RATE 8PSK MODULATION	28

9.6.	CONDUCTED SPURIOUS EMISSIONS.....	29
9.6.1.	BASIC DATA RATE GFSK MODULATION	30
10.	RADIATED TEST RESULTS	42
10.1.	LIMITS AND PROCEDURE.....	42
10.2.	TRANSMITTER ABOVE 1 GHz.....	44
10.2.1.	BASIC DATA RATE GFSK MODULATION	44
10.2.2.	ENHANCED DATA RATE 8PSK MODULATION.....	54
10.3.	WORST-CASE BELOW 1 GHz	64
11.	AC POWER LINE CONDUCTED EMISSIONS	66
12.	SETUP PHOTOS	71

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: BT/BLE and DTS b/g/n Wrist device

MODEL NUMBER: SM-R365

SERIAL NUMBER: R3AJ600185X, R3AJ600183R (RADIATED);
R3AJ600182J, R3AJ600186P (CONDUCTED)

DATE TESTED: MAR 14, 2017 - JUN 08, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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

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

Approved & Released For
UL Korea, Ltd. By:

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

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

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. FCC DA 00-705 Filling and measurement guidelines for FHSS systems
4. ANSI C63.10-2013.
5. IC RSS-GEN Issue 4
6. IC RSS-247 Issue 2

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:

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

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 BT/BLE and DTS b/g/n Wrist device.
This test report addresses the DSS (BT) operational mode.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	Basic GFSK	Average	8.737	7.477
		Peak	9.835	9.627
	Enhanced Pi/4-DPSK	Average	4.524	2.834
		Peak	7.072	5.096
	Enhanced 8PSK	Average	4.551	2.852
		Peak	7.619	5.780

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -7.33 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

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

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 9.5.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Adapter	SAMSUNG	ETA0U60JBE	RT2H608ES/7- E	N/A
Wireless Charger	SAMSUNG	EP-YB360	R37J4VA8PC2RT3	N/A

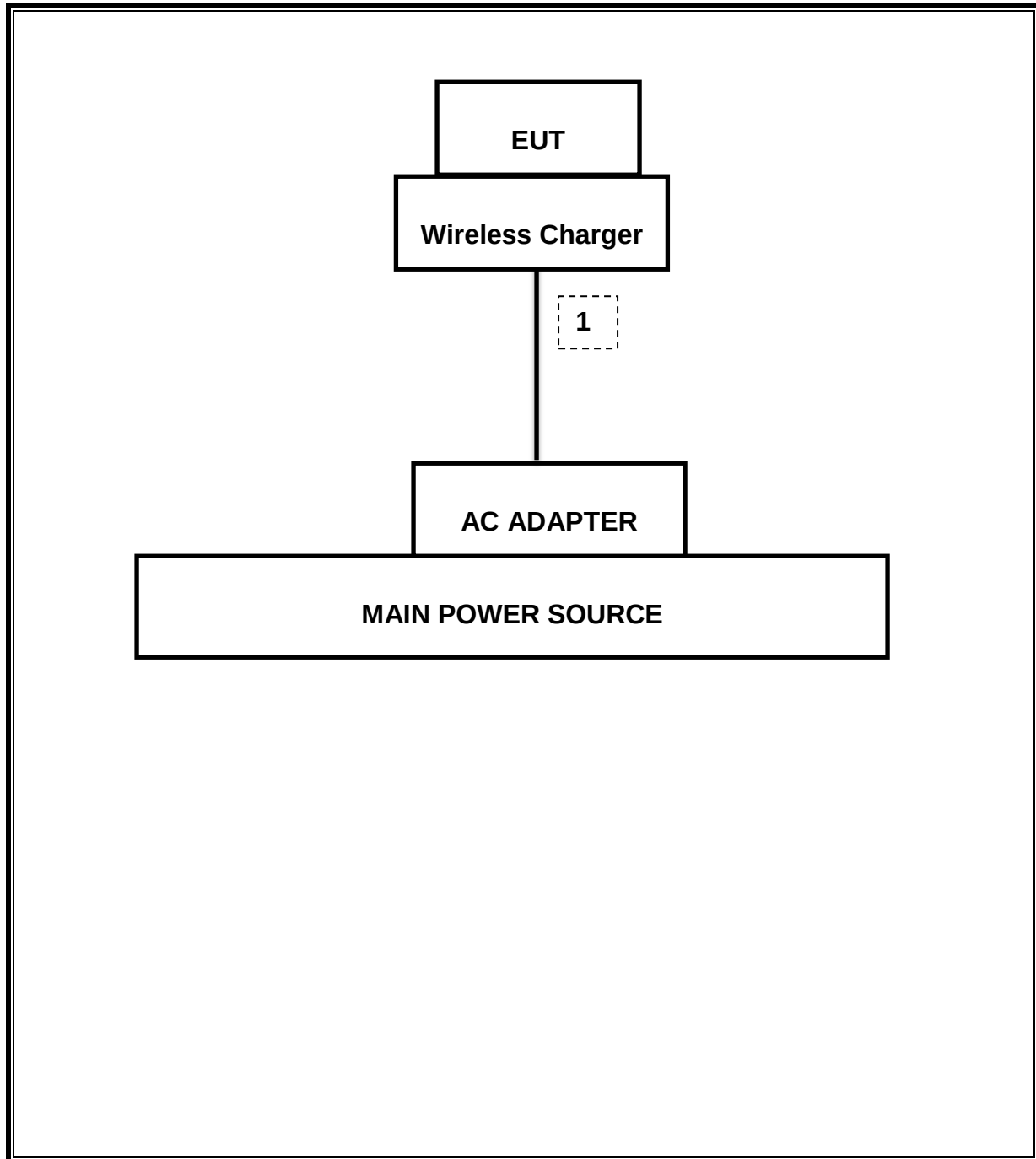
I/O CABLES

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

TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.
Test software 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	750	10-14-18
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
				04-14-19
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
				05-31-19
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
				05-31-19
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	03-09-18
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-17-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-16-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-17-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-16-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-17-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-16-17
LISN	R&S	ENV-216	101837	08-16-17
Attenuator	PASTERNAK	PE7087-10	A009	08-16-17
Combiner	WEINSCHEL	1575	2154	08-16-17
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. REFERENCE MEASUREMENT RESULTS

7.1. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

7.1.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [KHz]
Low	2402	1.051	895.920
Mid	2441	1.051	896.620
High	2480	1.055	896.770
Worst		1.055	896.770

7.1.2. ENHANCED DATA RATE $\pi/4$ -DQPSK MODULATION

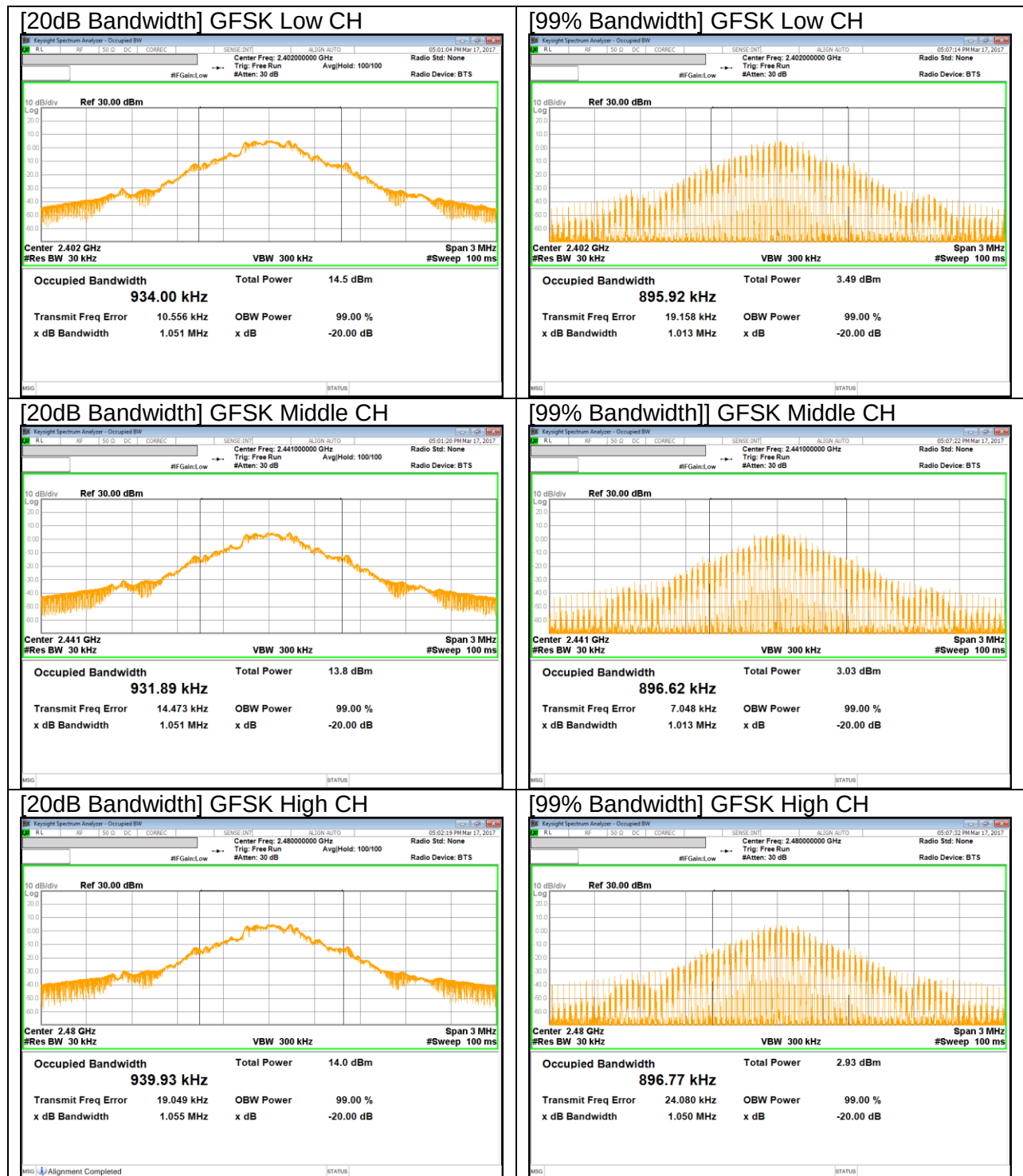
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.285	1.164
Mid	2441	1.348	1.166
High	2480	1.348	1.165
Worst		1.348	1.166

7.1.3. ENHANCED DATA RATE 8PSK MODULATION

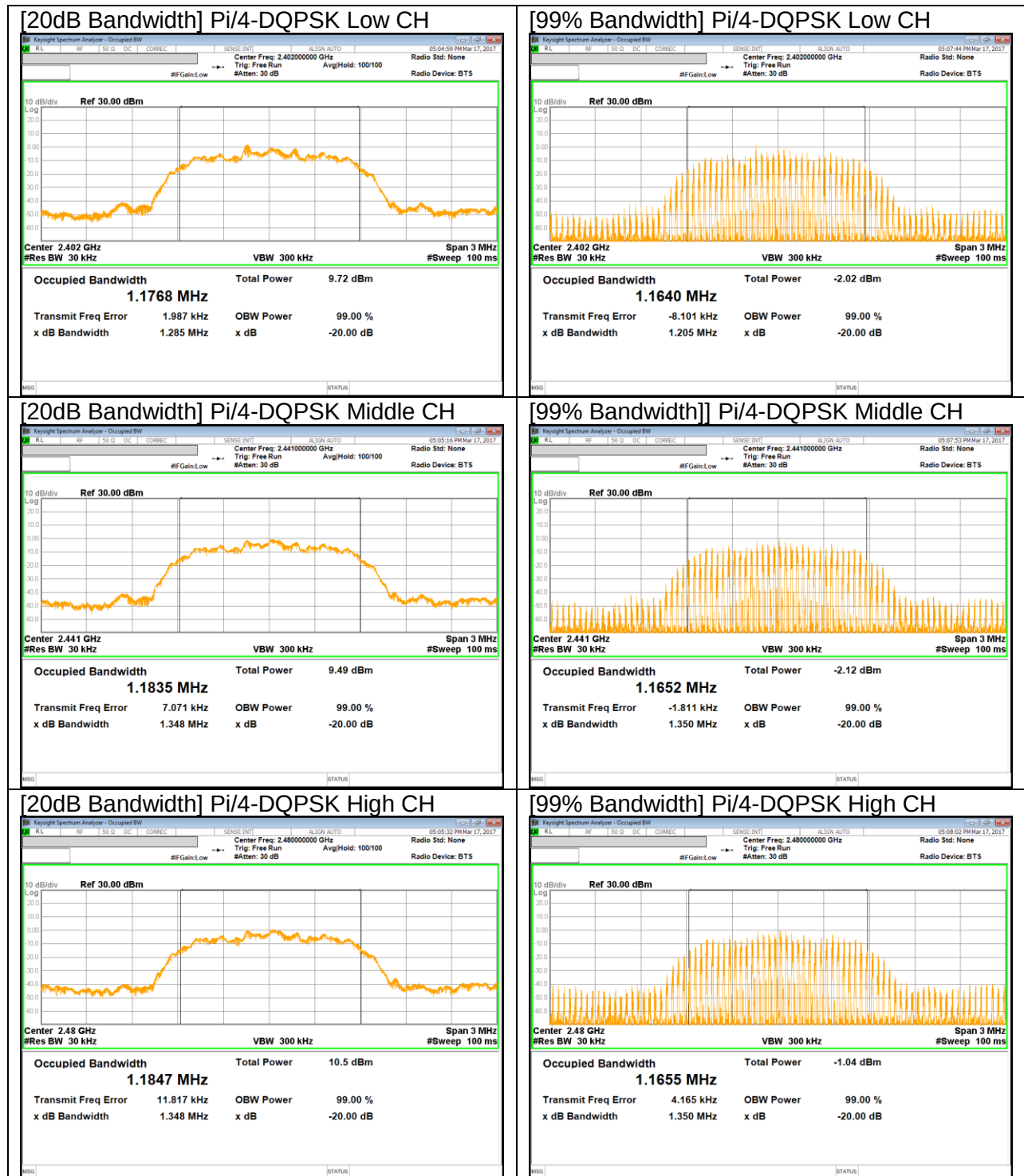
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.313	1.165
Mid	2441	1.309	1.194
High	2480	1.312	1.164
Worst		1.313	1.194

7.1.4. 20 dB AND 99% BANDWIDTH PLOTS

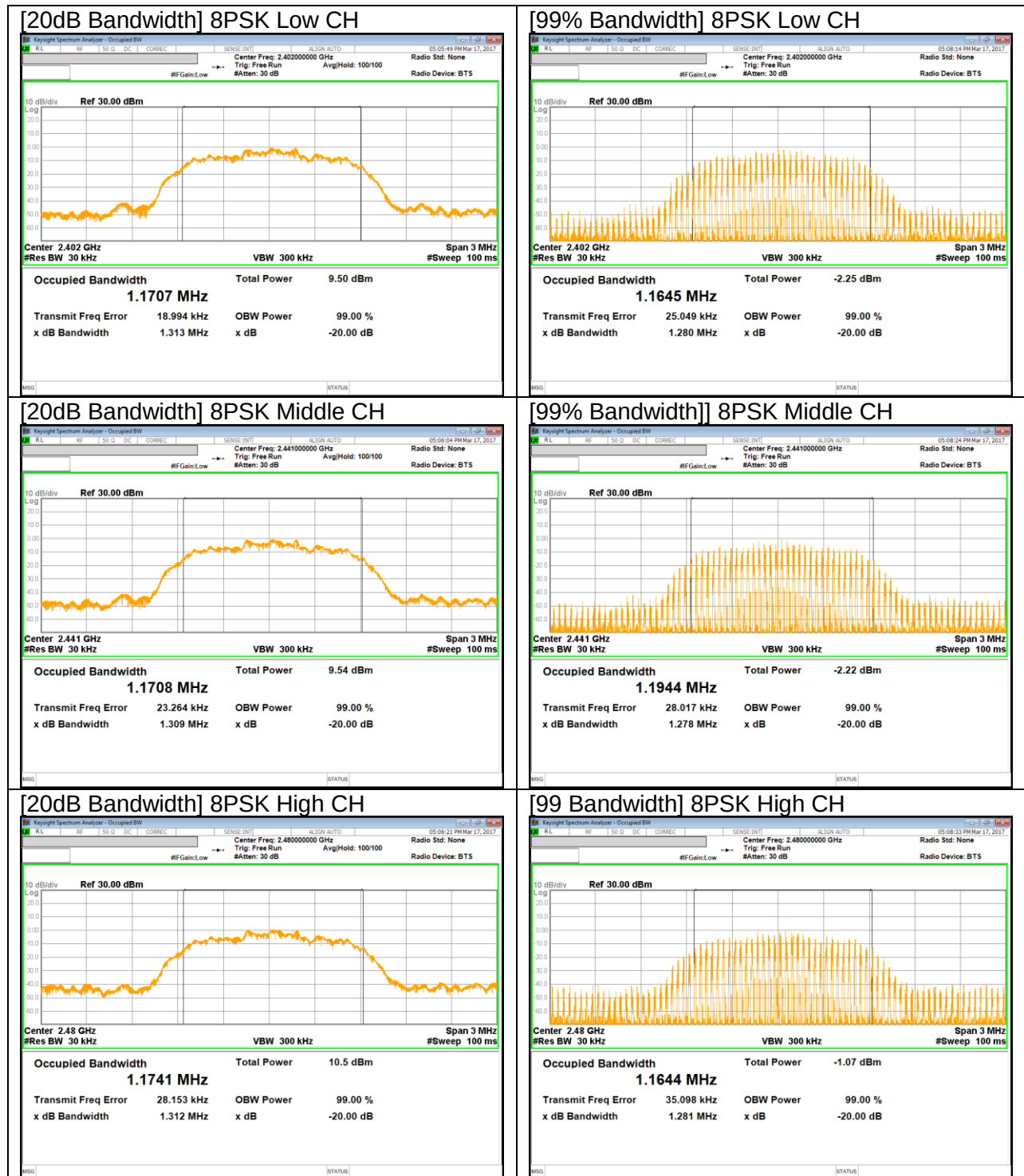
GFSK BANDWIDTH



Pi/4-DQPSK BANDWIDTH



8PSK BANDWIDTH



8. SUMMARY TABLE

FCC Part Section	IC Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
2.1051, 15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	-39.475 dBm
15.247 (b)(1)	RSS-247 5.1(b)	TX conducted output power	<21dBm		Pass	9.835 dBm (Peak)
15.247 (a)(1)	RSS-247 5.1(b)	Hopping frequency separation	> 25KHz		Pass	1 MHz
15.247 (a)(1)(iii)	RSS-247 5.1(d)	Number of Hopping channels	More than 15 non-overlapping channels		Pass	79
15.247 (a)(1)(iii)	RSS-247 5.1(d)	Avg Time of Occupancy	< 0.4sec		Pass	0.37518 sec
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass	36.58 dBuV (Qp)
15.205, 15.209	RSS-GEN Clause 7 & 8.9	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	53.62 dBuV/m (AV)

9. ANTENNA PORT TEST RESULTS

9.1. HOPPING FREQUENCY SEPARATION

LIMIT

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

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.

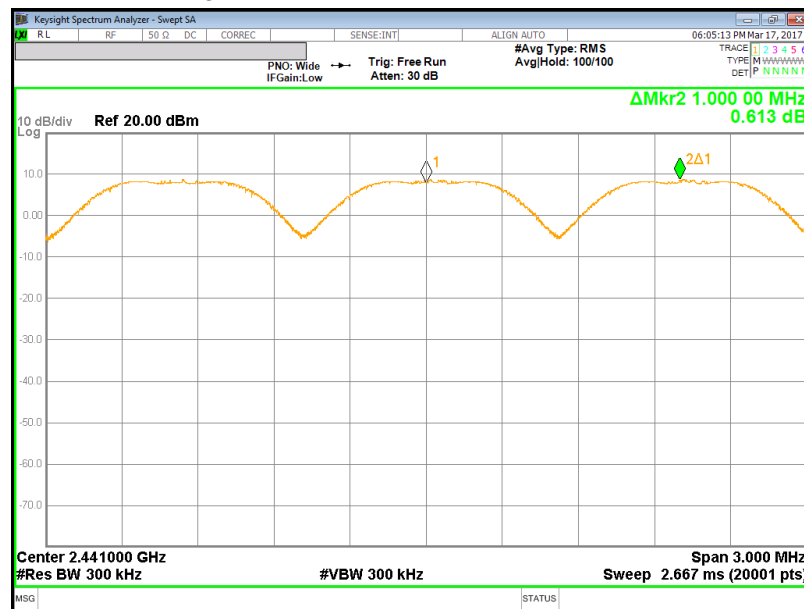
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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



9.2. NUMBER OF HOPPING CHANNELS

LIMIT

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

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.

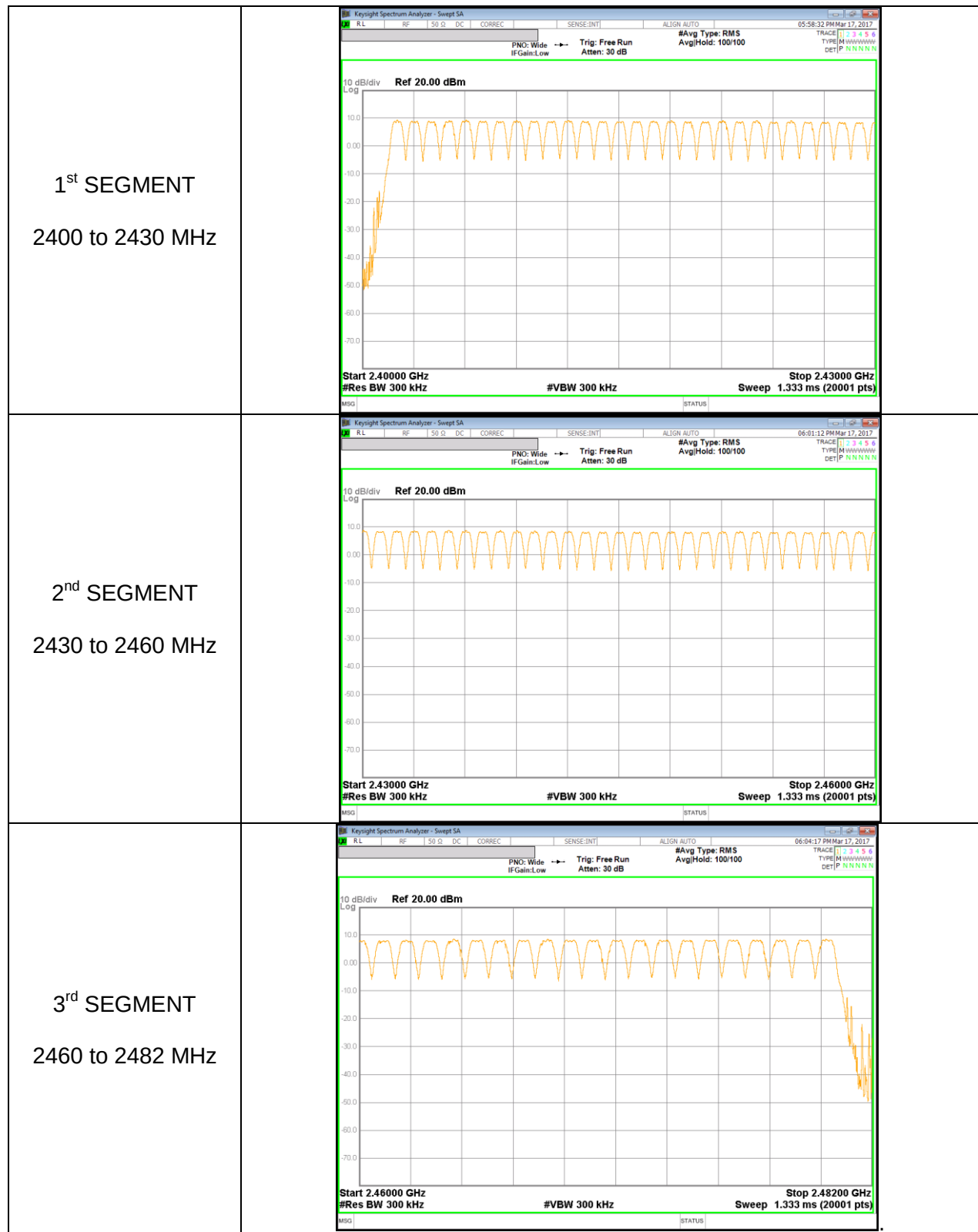
RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS PLOTS



NUMBER OF HOPPING CHANNELS (100 MHz SPAN)



9.3. AVERAGE TIME OF OCCUPANCY

LIMIT

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

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.

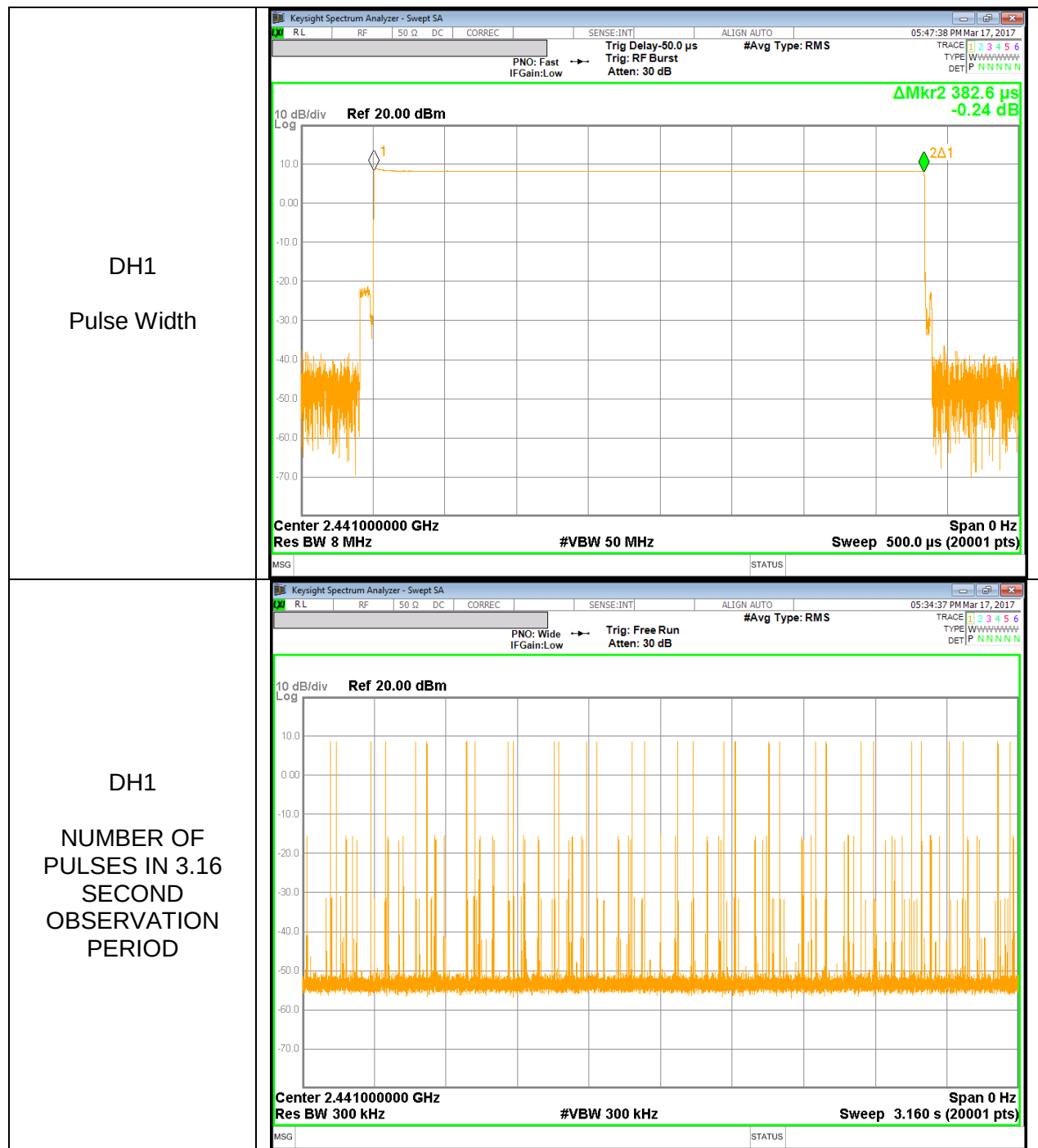
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

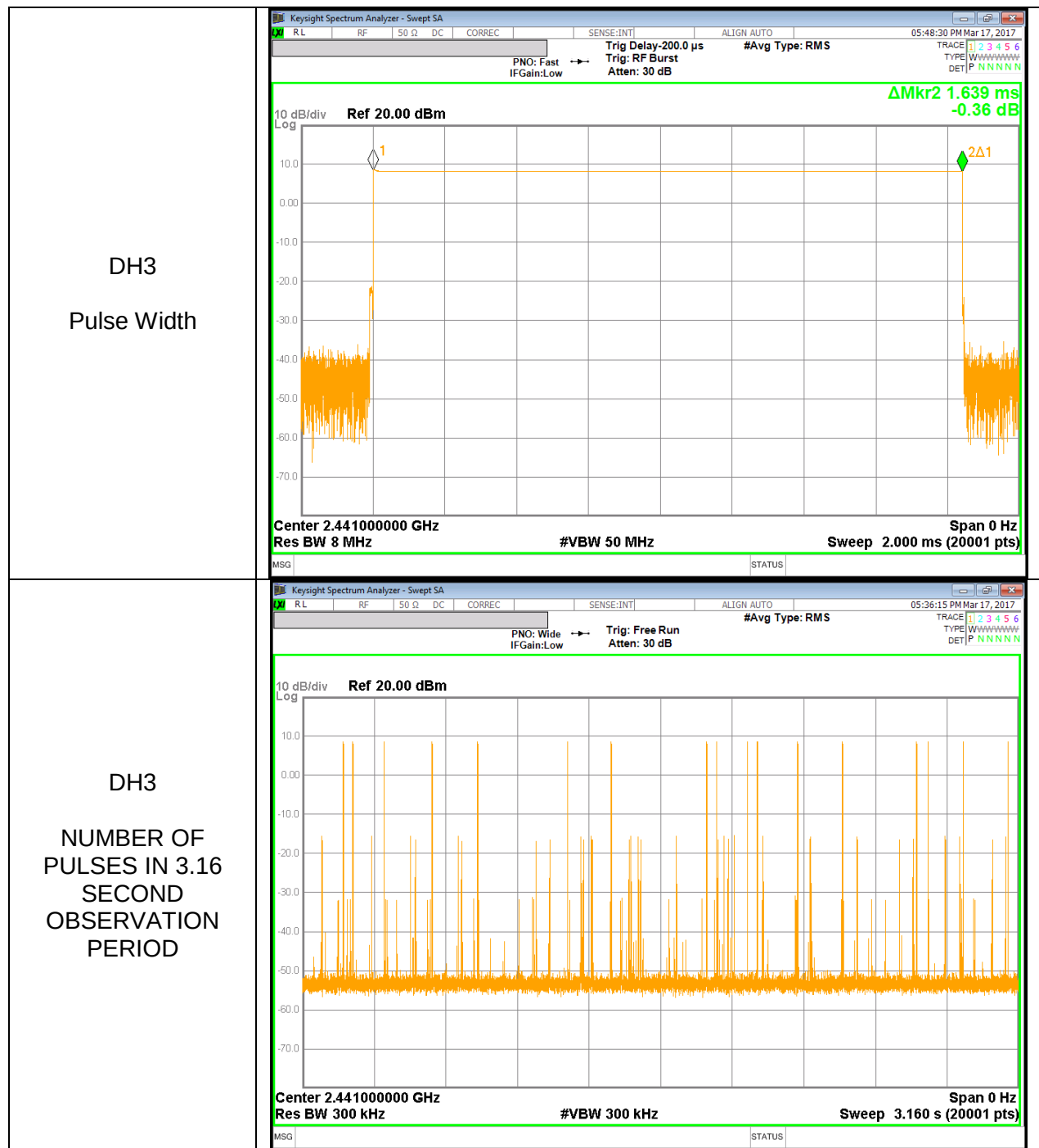
RESULTS

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	1.639	17	0.278630	0.4	-0.1214
DH5	2.886	13	0.375180	0.4	-0.0248
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	-0.36939
DH3	1.639	4.25	0.069658	0.4	-0.33034
DH5	2.886	3.25	0.093795	0.4	-0.30621

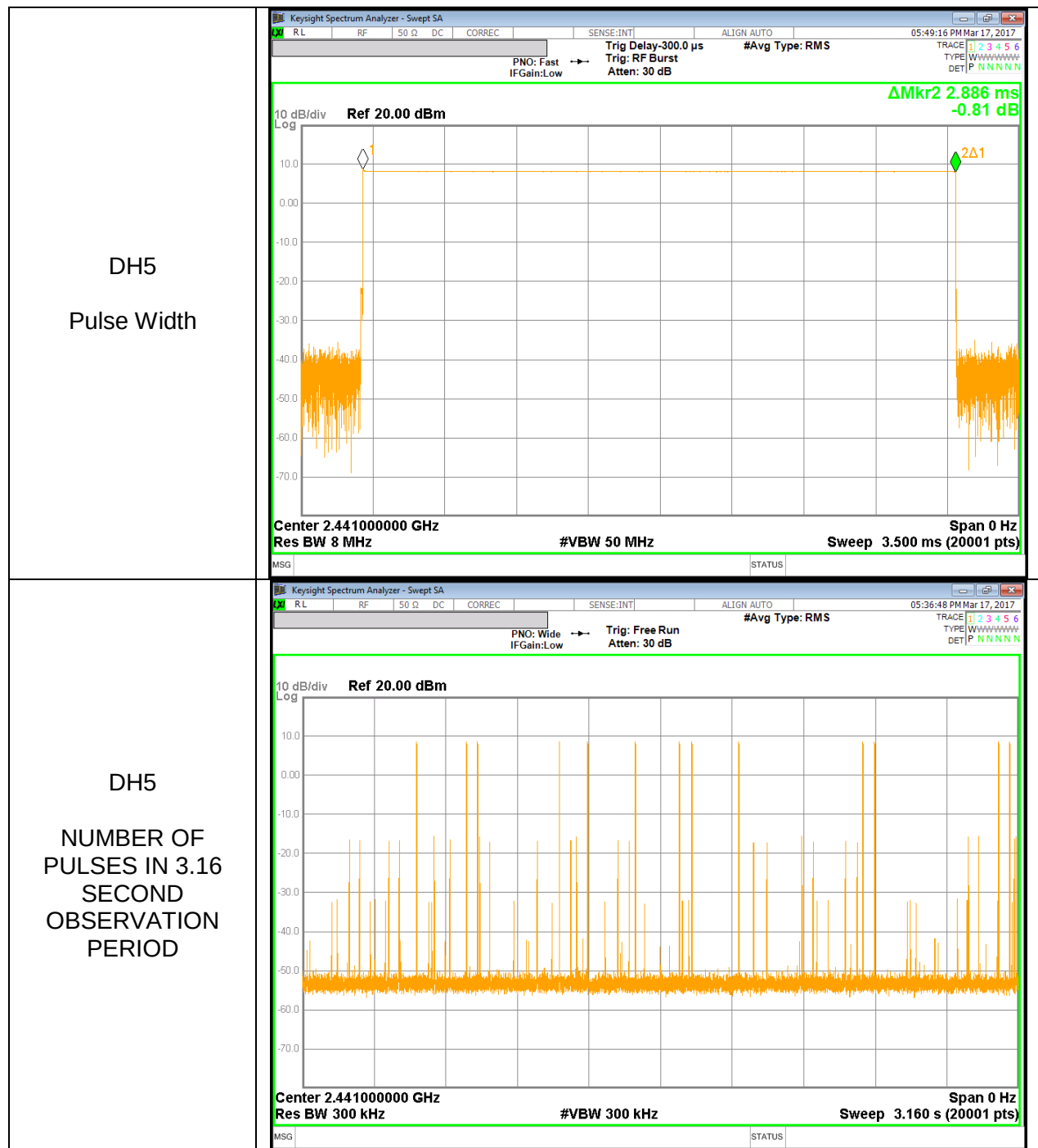
DH1



DH3



DH5



9.4. OUTPUT POWER

LIMIT

§15.247 (b) (1)
IC RSS-247 §5.1 (b)

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

TEST PROCEDURE

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

RESULTS

9.4.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	9.770	21	-11.23
Middle	2441	9.305	21	-11.695
High	2480	9.835	21	-11.165
Worst		9.835	21	-11.165

9.4.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

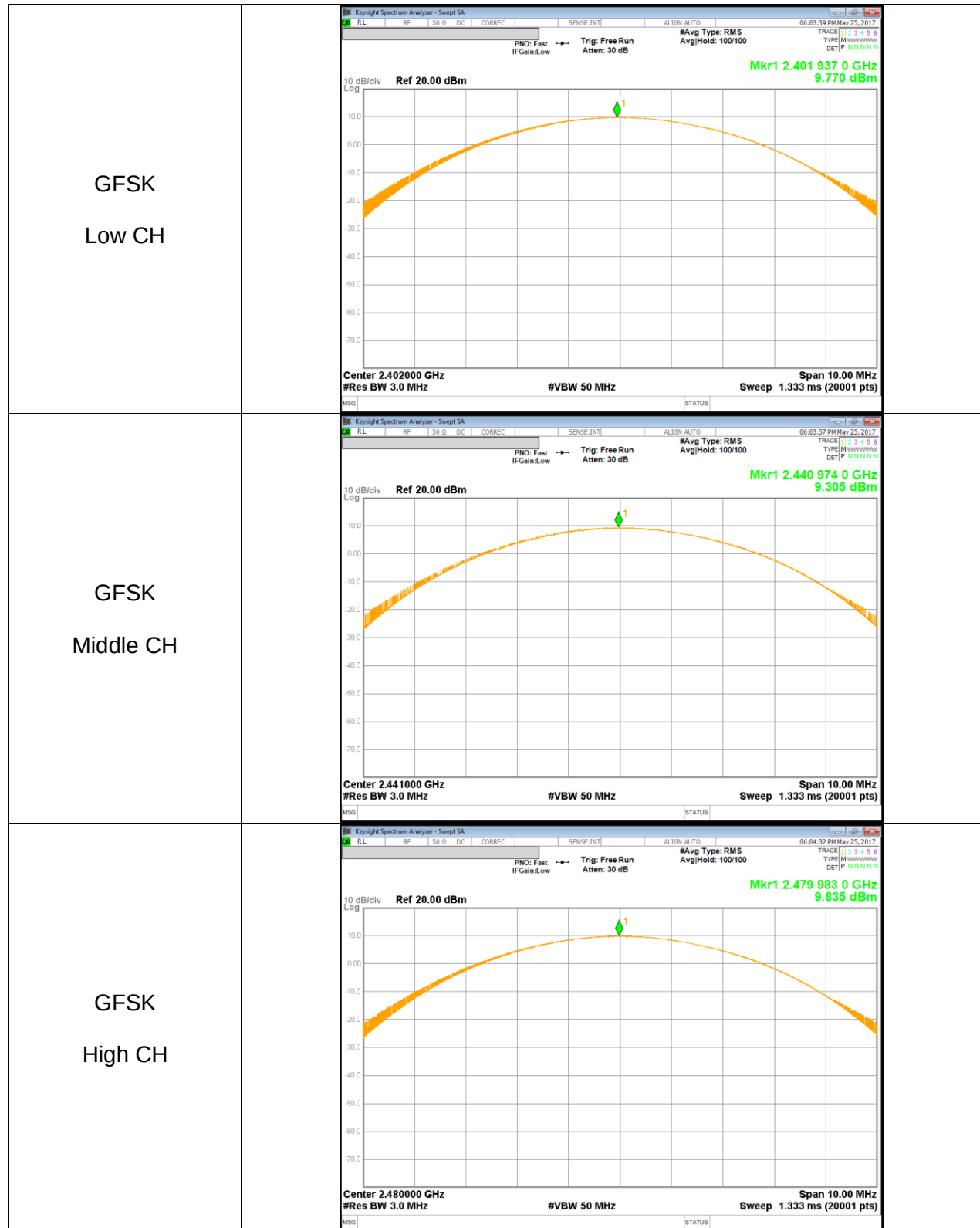
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	6.907	21	-14.093
Middle	2441	6.550	21	-14.450
High	2480	7.072	21	-13.928
Worst		7.072	21	-13.928

9.4.3. ENHANCED DATA RATE 8PSK MODULATION

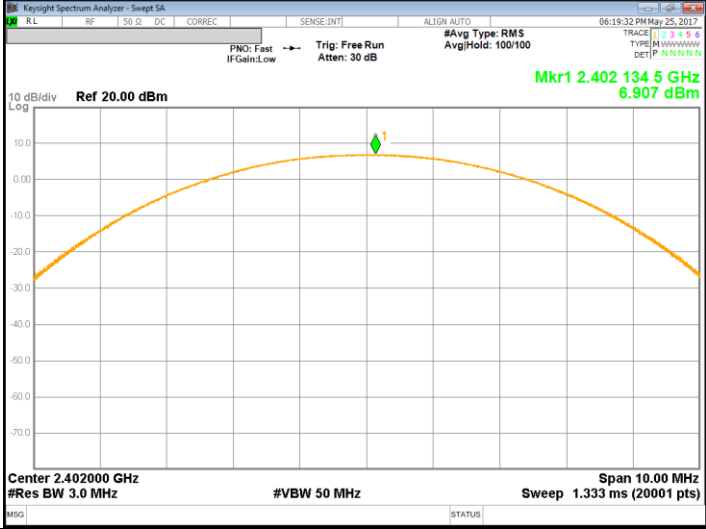
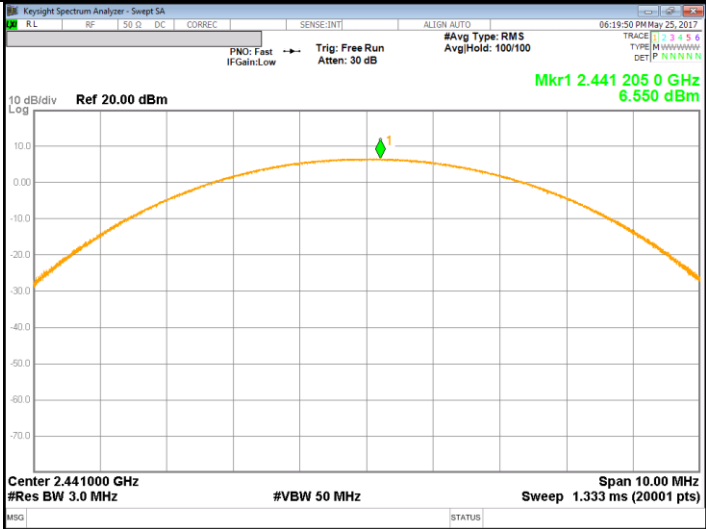
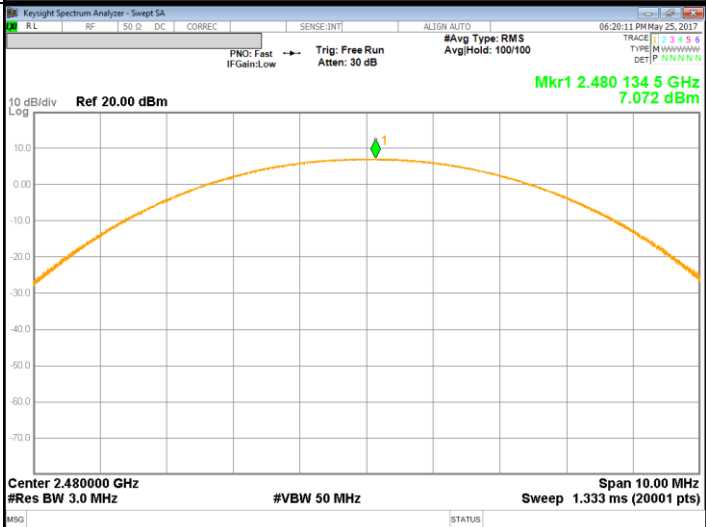
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	7.457	21	-13.543
Middle	2441	7.118	21	-13.882
High	2480	7.619	21	-13.381
Worst		7.619	21	-13.381

9.4.4. OUTPUT POWER PLOTS

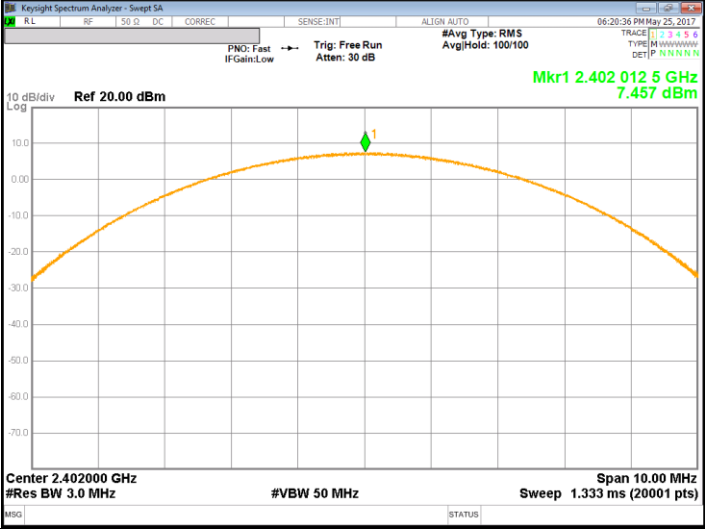
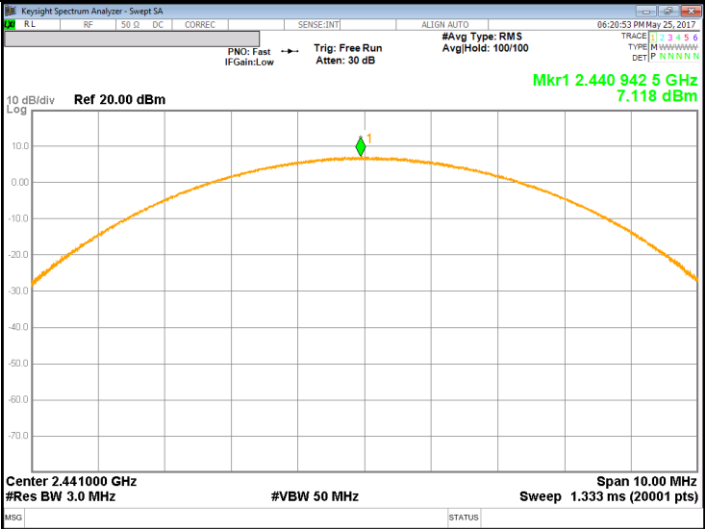
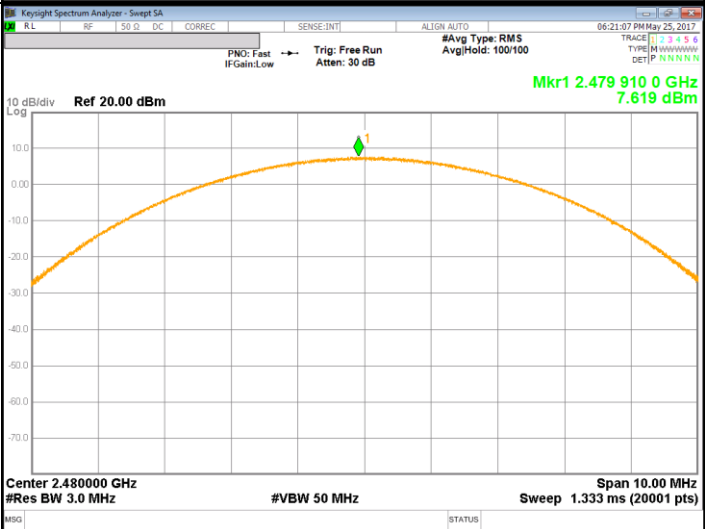
GFSK OUTPUT POWER



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	 KeySight Spectrum Analyzer - Swept SA RL RF 50 Ω DC CORREC SENSE:INT ALIGN AUTO 06:20:34 PM May 25, 2017 PNO: Fast IF Gain: Low Trig: Free Run Atten: 30 dB #Avg Type: RMS AvgHold: 100/100 10 dB/div Log Ref 20.00 dBm Mkr1 2.402 012 5 GHz 7.457 dBm Center 2.402000 GHz #Res BW 3.0 MHz #VBW 50 MHz Span 10.00 MHz Sweep 1.333 ms (20001 pts) MSG STATUS
8PSK Middle CH	 KeySight Spectrum Analyzer - Swept SA RL RF 50 Ω DC CORREC SENSE:INT ALIGN AUTO 06:20:53 PM May 25, 2017 PNO: Fast IF Gain: Low Trig: Free Run Atten: 30 dB #Avg Type: RMS AvgHold: 100/100 10 dB/div Log Ref 20.00 dBm Mkr1 2.440 942 5 GHz 7.118 dBm Center 2.441000 GHz #Res BW 3.0 MHz #VBW 50 MHz Span 10.00 MHz Sweep 1.333 ms (20001 pts) MSG STATUS
8PSK High CH	 KeySight Spectrum Analyzer - Swept SA RL RF 50 Ω DC CORREC SENSE:INT ALIGN AUTO 06:21:07 PM May 25, 2017 PNO: Fast IF Gain: Low Trig: Free Run Atten: 30 dB #Avg Type: RMS AvgHold: 100/100 10 dB/div Log Ref 20.00 dBm Mkr1 2.479 910 0 GHz 7.619 dBm Center 2.480000 GHz #Res BW 3.0 MHz #VBW 50 MHz Span 10.00 MHz Sweep 1.333 ms (20001 pts) MSG STATUS

9.5. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

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

9.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	8.737	7.48
Middle	2441	8.236	6.66
High	2480	8.675	7.37

9.5.2. DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	4.251	2.66
Middle	2441	4.006	2.52
High	2480	4.524	2.83

9.5.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	4.297	2.69
Middle	2441	4.028	2.53
High	2480	4.551	2.85

9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)
IC RSS-247 §5.5

Limit = -20 dBc

TEST PROCEDURE

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

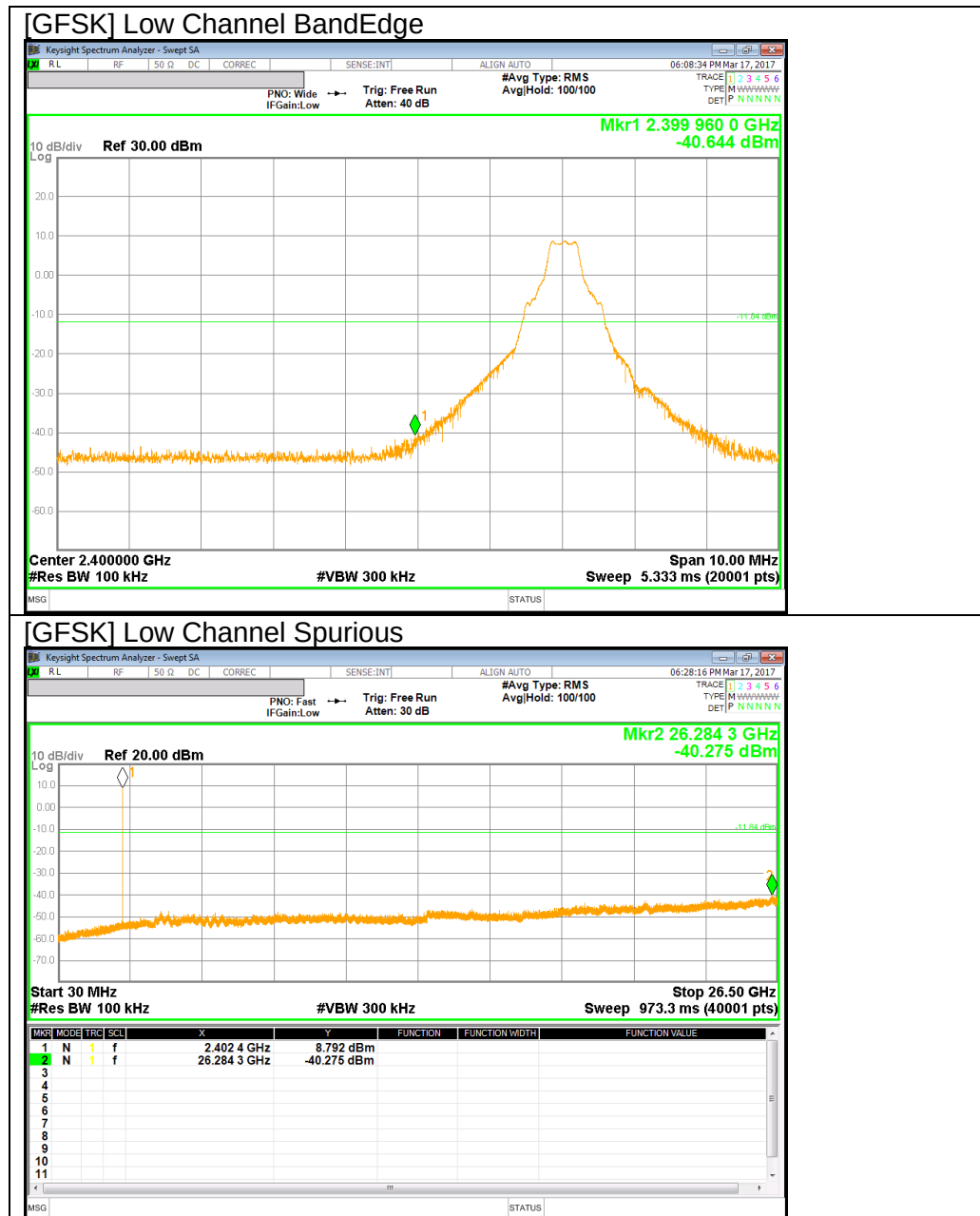
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

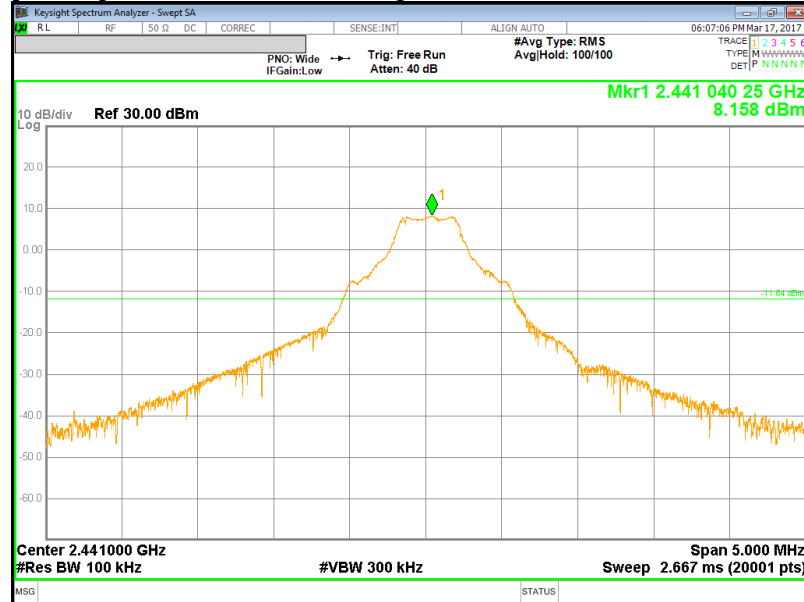
RESULTS

9.6.1. BASIC DATA RATE GFSK MODULATION

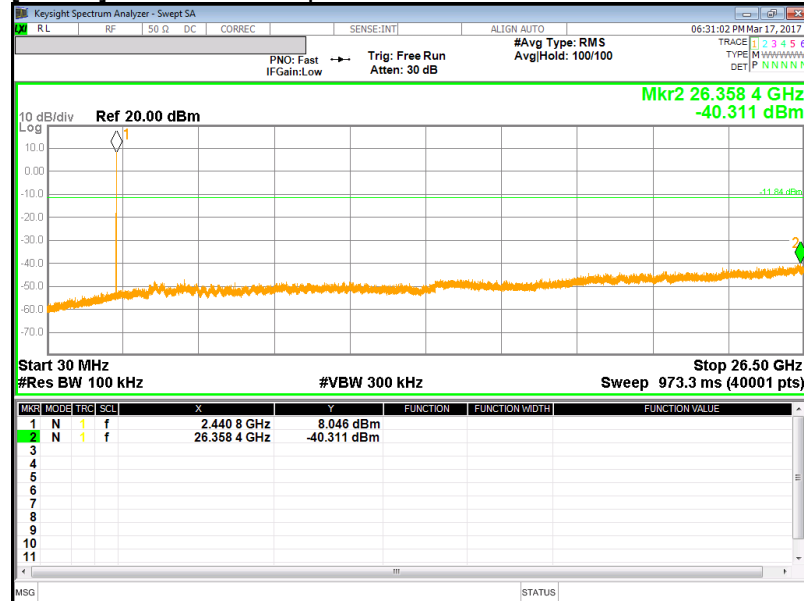
GFSK Mode



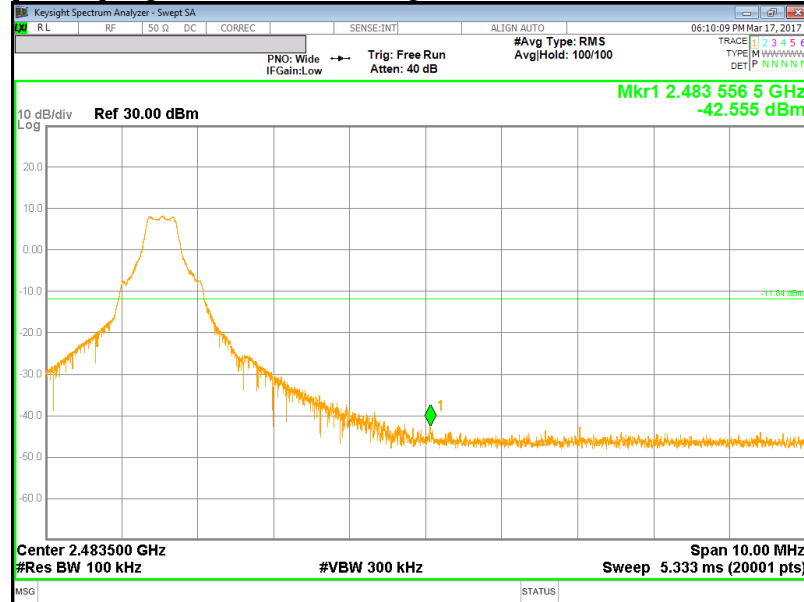
[GFSK] Mid Channel BandEdge



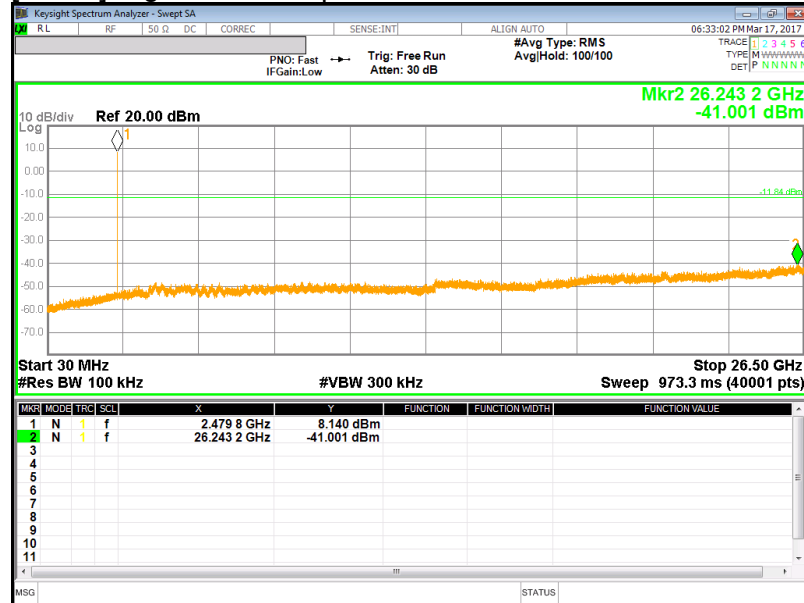
[GFSK] Mid Channel Spurious



[GFSK] High Channel BandEdge

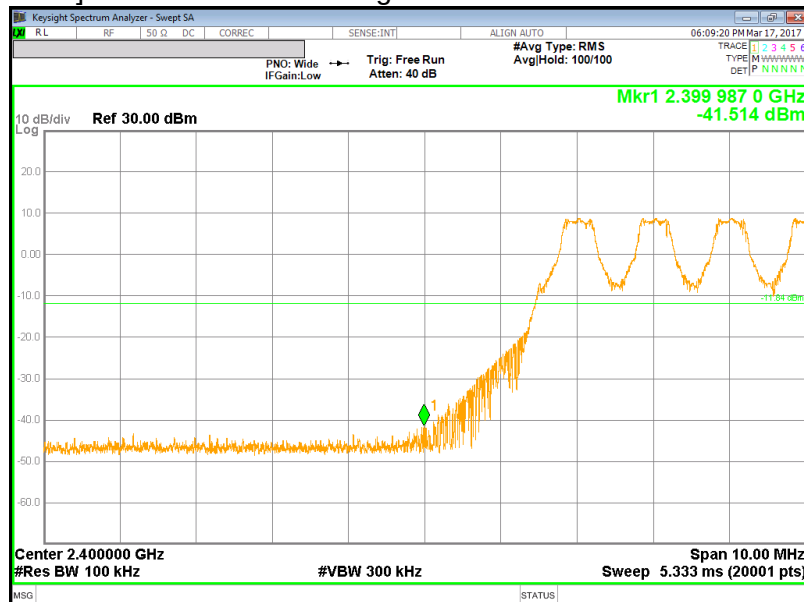


[GFSK] High Channel Spurious

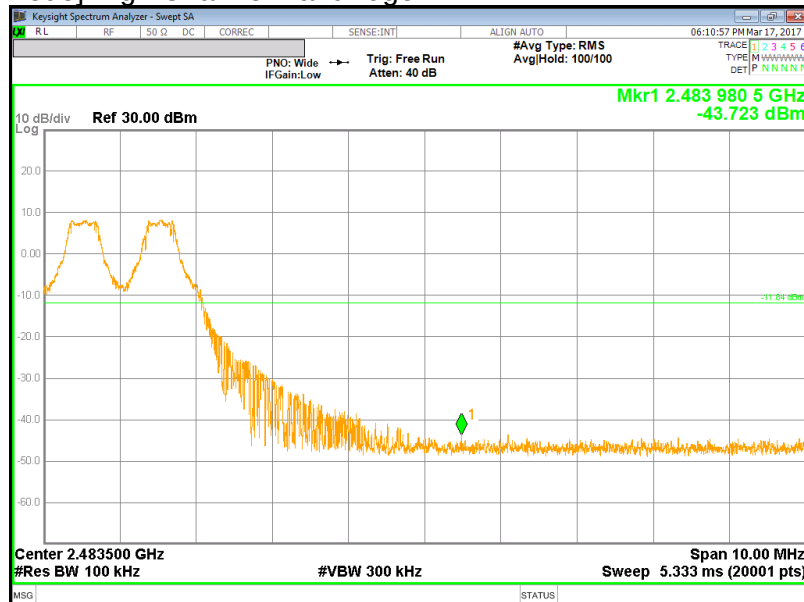


BandEdge Emission at GFSK Hopping Mode

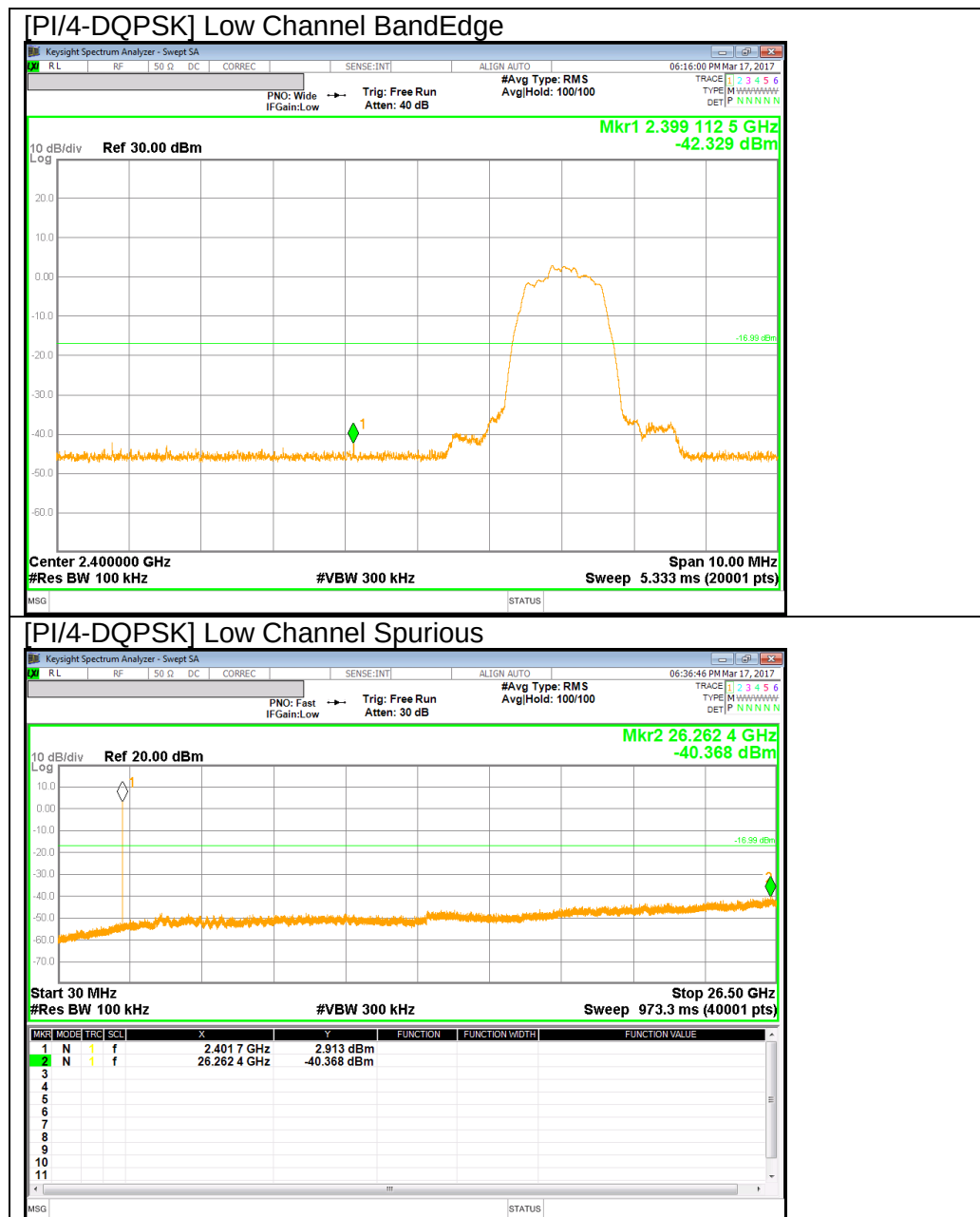
[GFSK Hopping Mode] Low Channel BandEdge



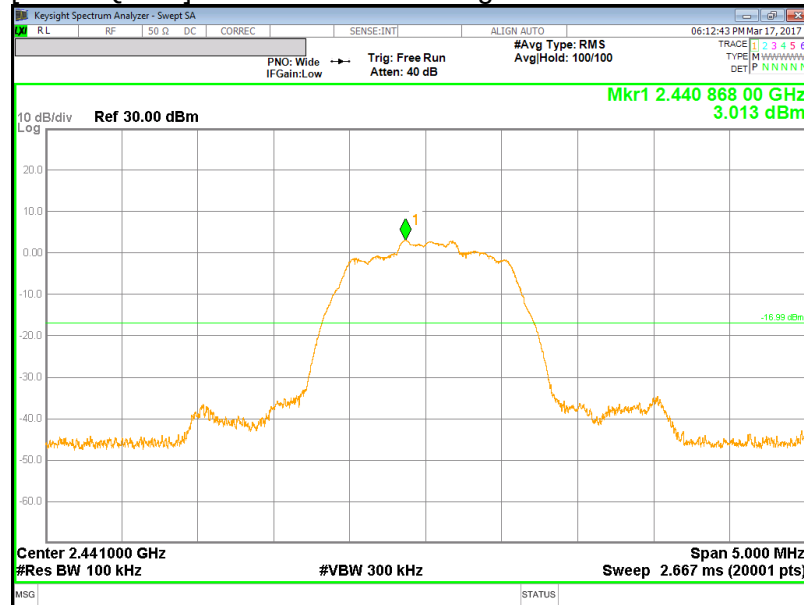
[GFSK Hopping Mode] High Channel BandEdge



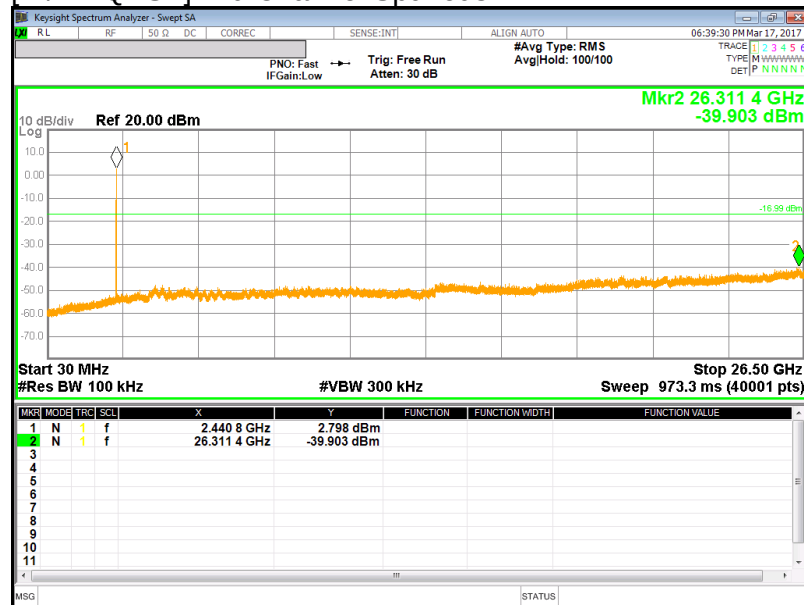
PI/4-DQPSK Mode



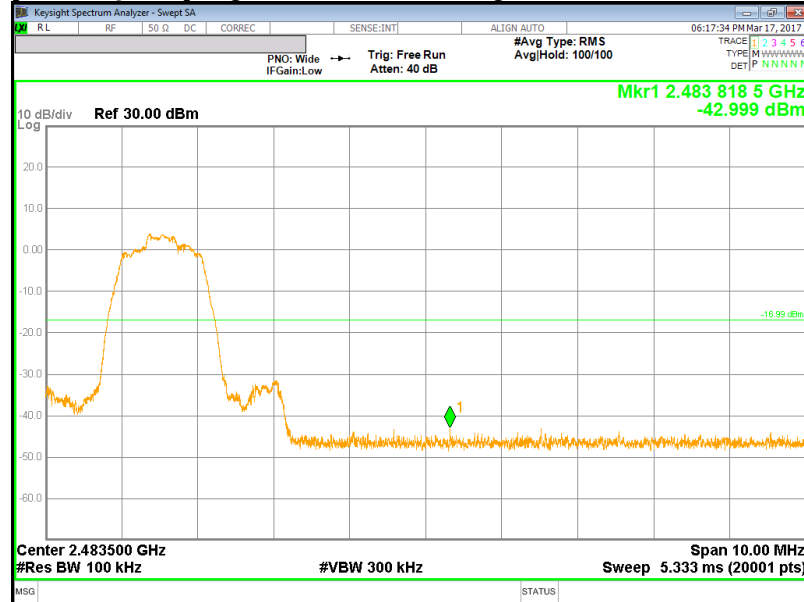
[PI/4-DQPSK] Mid Channel BandEdge



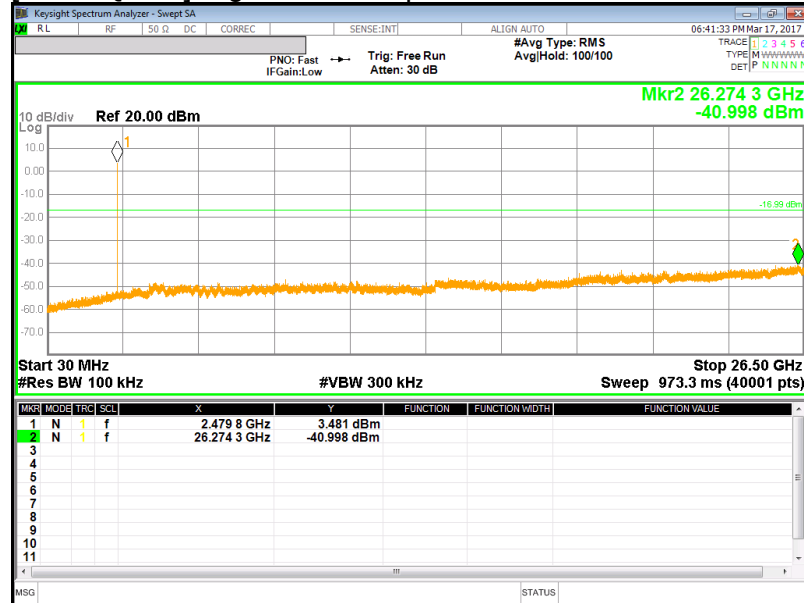
[PI/4-DQPSK] Mid Channel Spurious



[PI/4-DQPSK] High Channel BandEdge

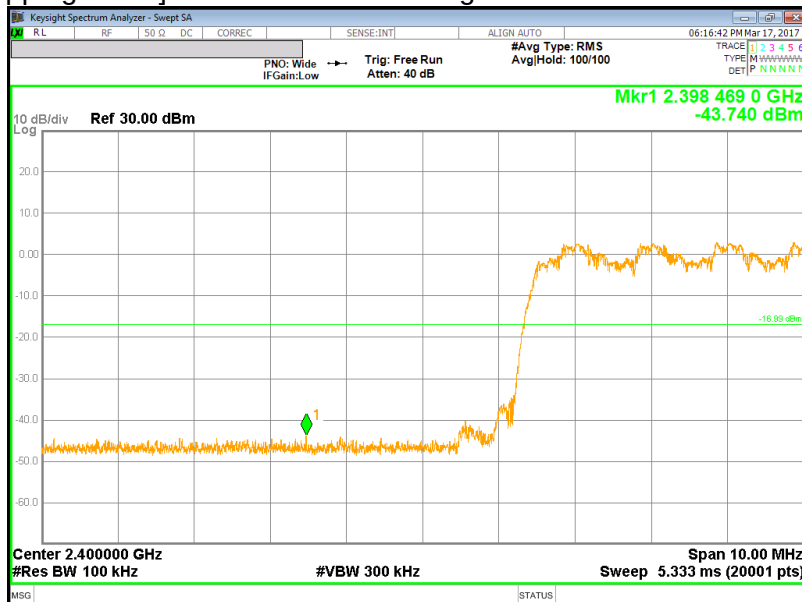


[PI/4-DQPSK] High Channel Spurious

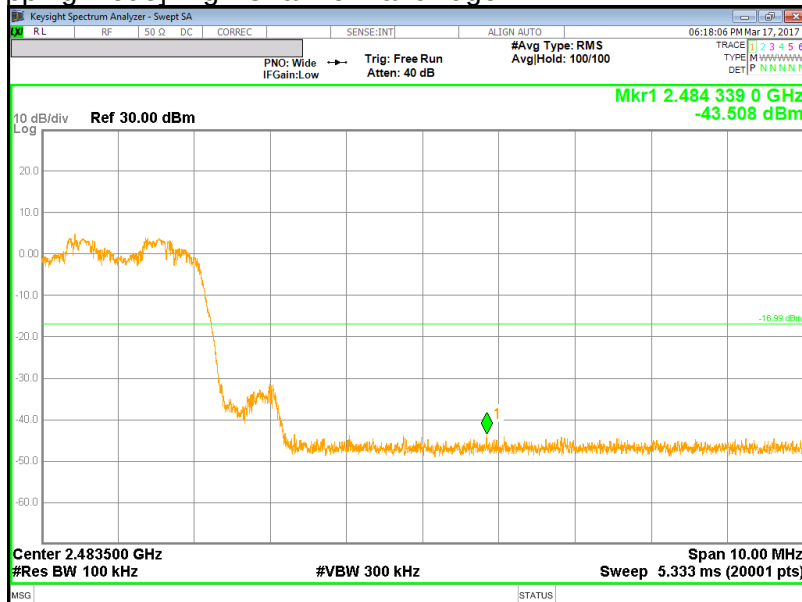


BandEdge Emission at PI/4-DQPSK Hopping Mode

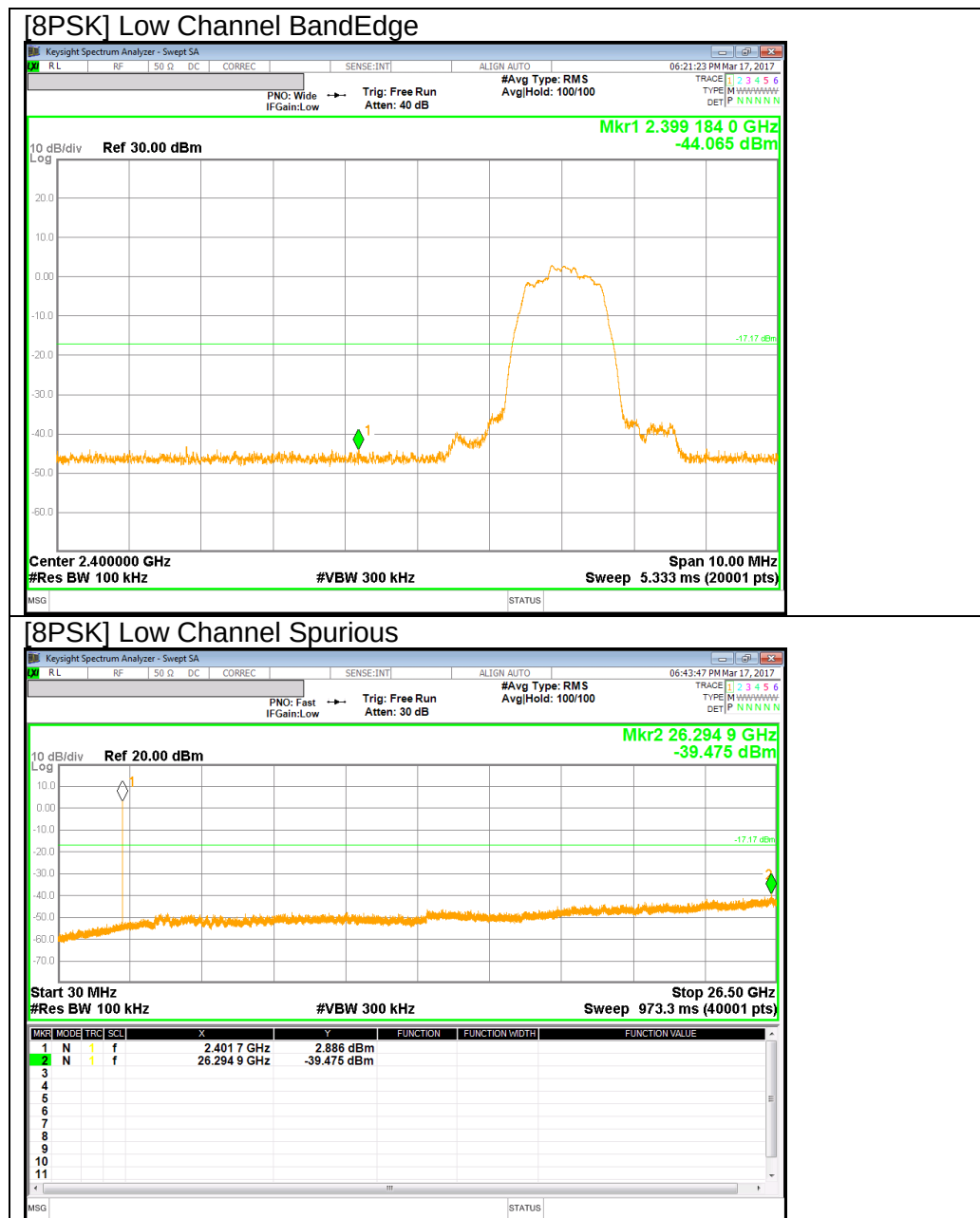
[PI/4-DQPSK Hopping Mode] Low Channel BandEdge



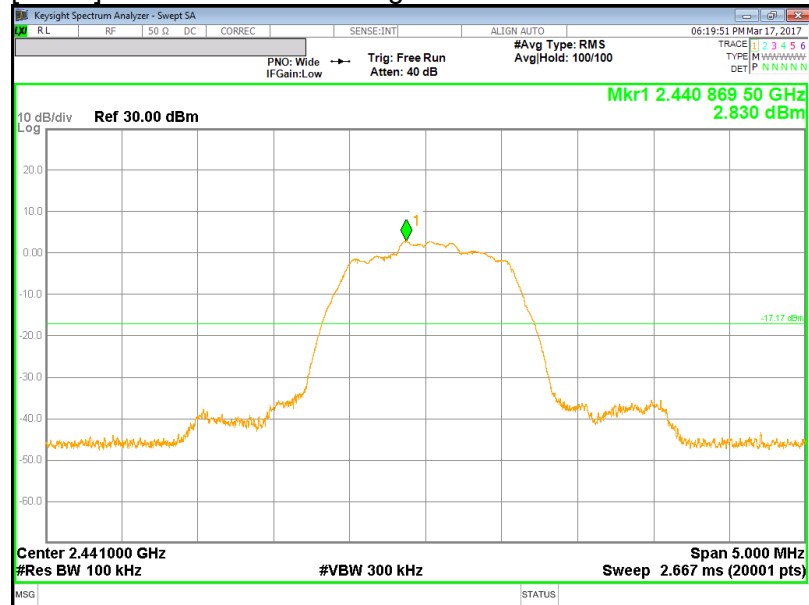
[PI/4-DQPSK Hopping Mode] High Channel BandEdge



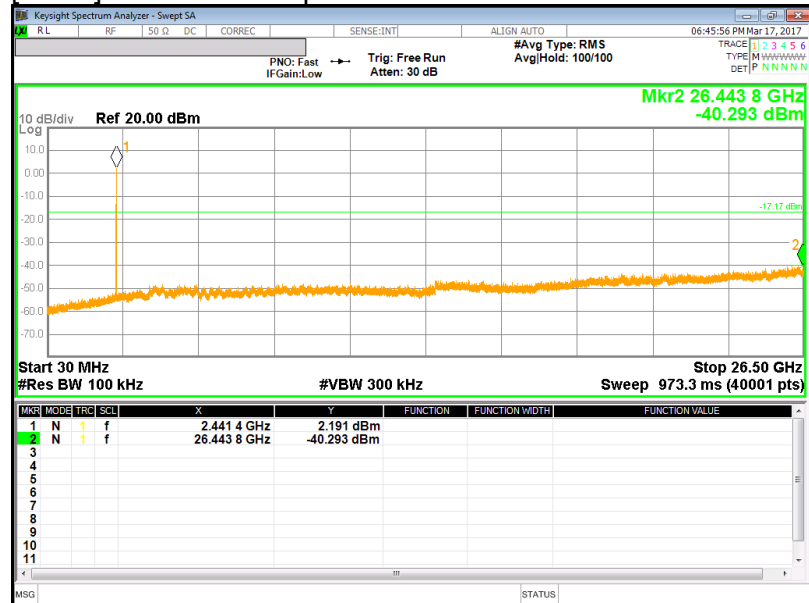
8PSK Mode



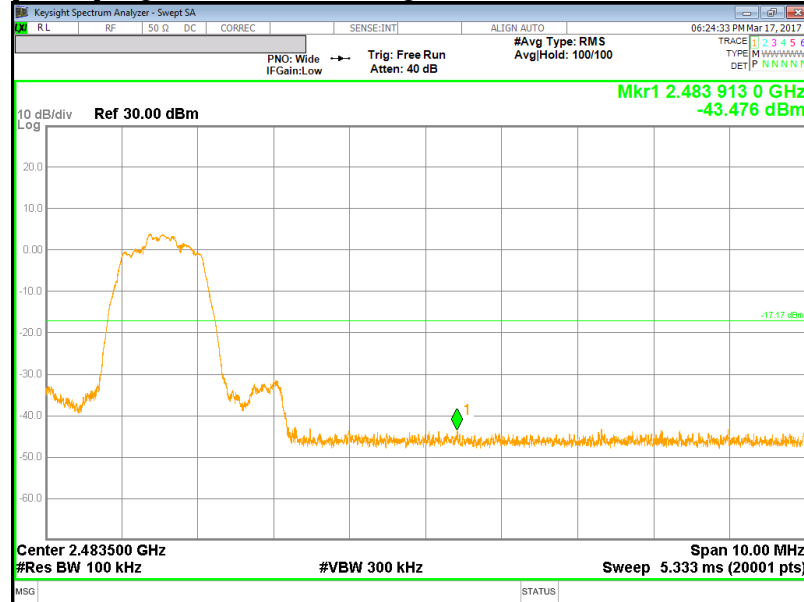
[8PSK] Mid Channel BandEdge



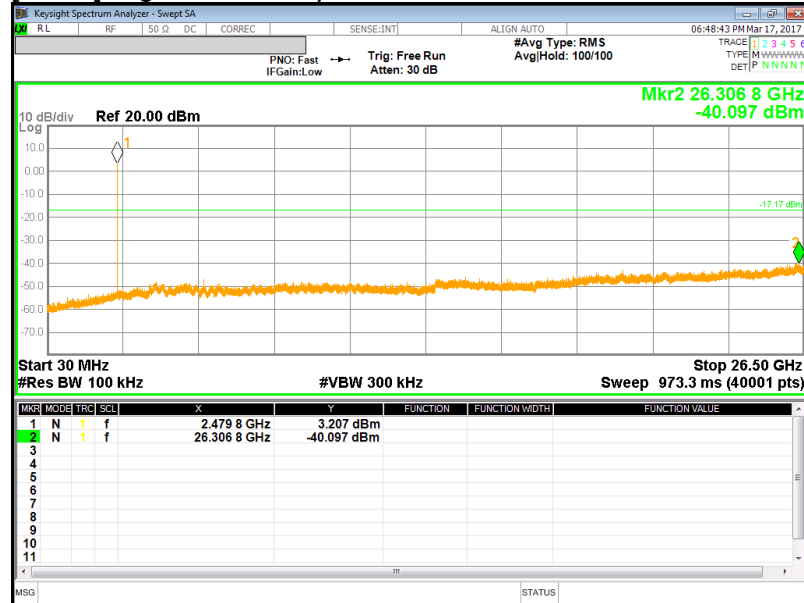
[8PSK] Mid Channel Spurious



[8PSK] High Channel BandEdge



[8PSK] High Channel Spurious



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-GEN Clause 8.9 (Transmitter)

IC RSS-GEN Clause 7 (Receiver)

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

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements.(Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.)

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

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

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

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

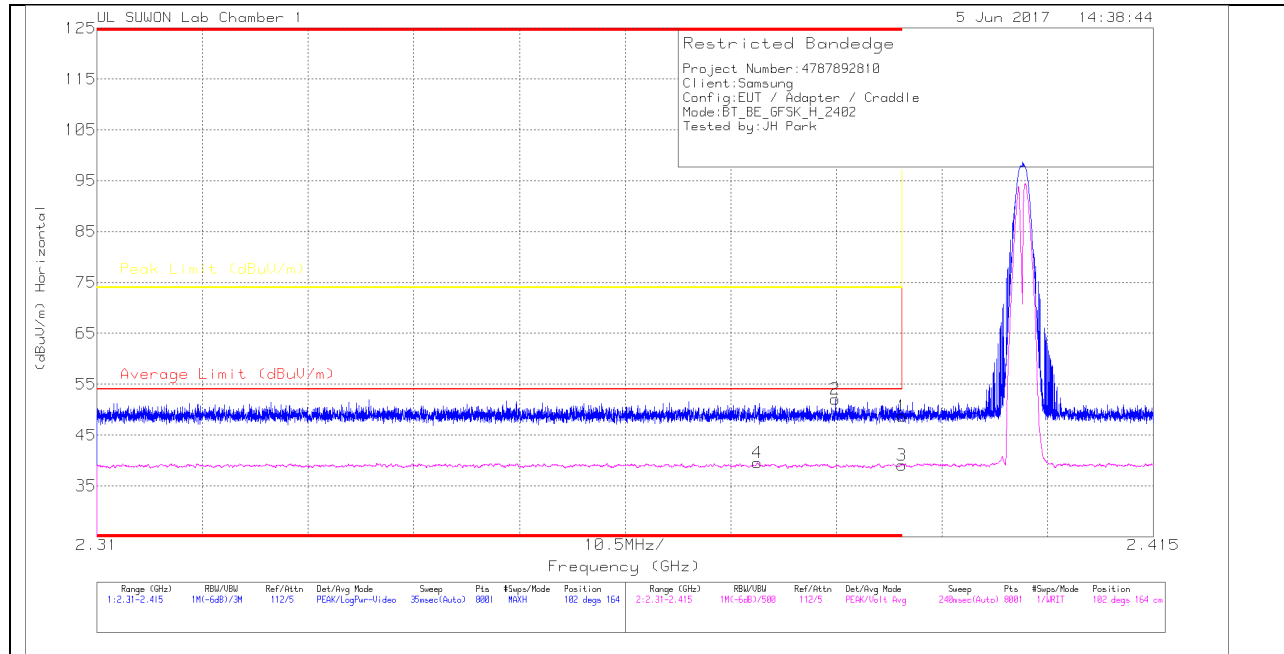
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

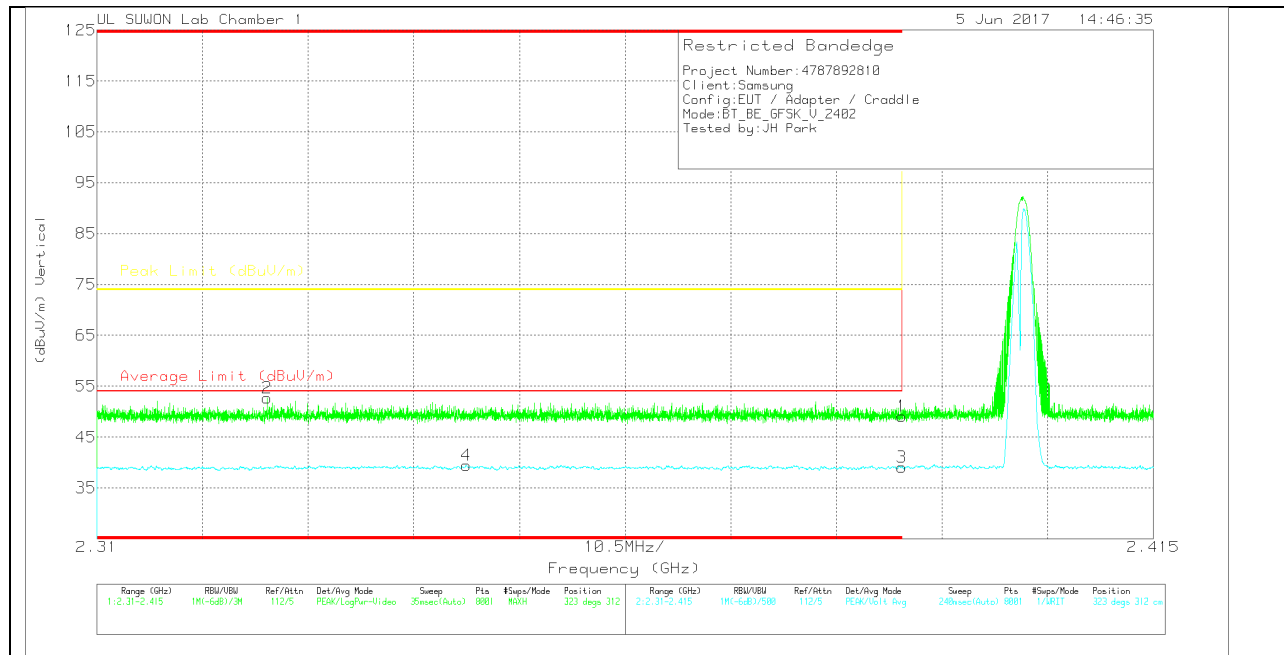
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.67	Pk	31.8	-28.7	48.77	-	-	74	-25.23	102	164	H
2	* 2.383	49.08	Pk	31.8	-28.8	52.08	-	-	74	-21.92	102	164	H
3	* 2.39	35.95	VA1T	31.8	-28.7	39.05	54	-14.95	-	-	102	164	H
4	* 2.376	36.43	VA1T	31.8	-28.7	39.53	54	-14.47	-	-	102	164	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	46.02	Pk	31.8	-28.7	49.12	-	-	74	-24.88	323	312	V
2	* 2.327	49.73	Pk	31.7	-28.8	52.63	-	-	74	-21.37	323	312	V
3	* 2.39	35.95	VA1T	31.8	-28.7	39.05	54	-14.95	-	-	323	312	V
4	* 2.347	36.58	VA1T	31.7	-28.8	39.48	54	-14.52	-	-	323	312	V

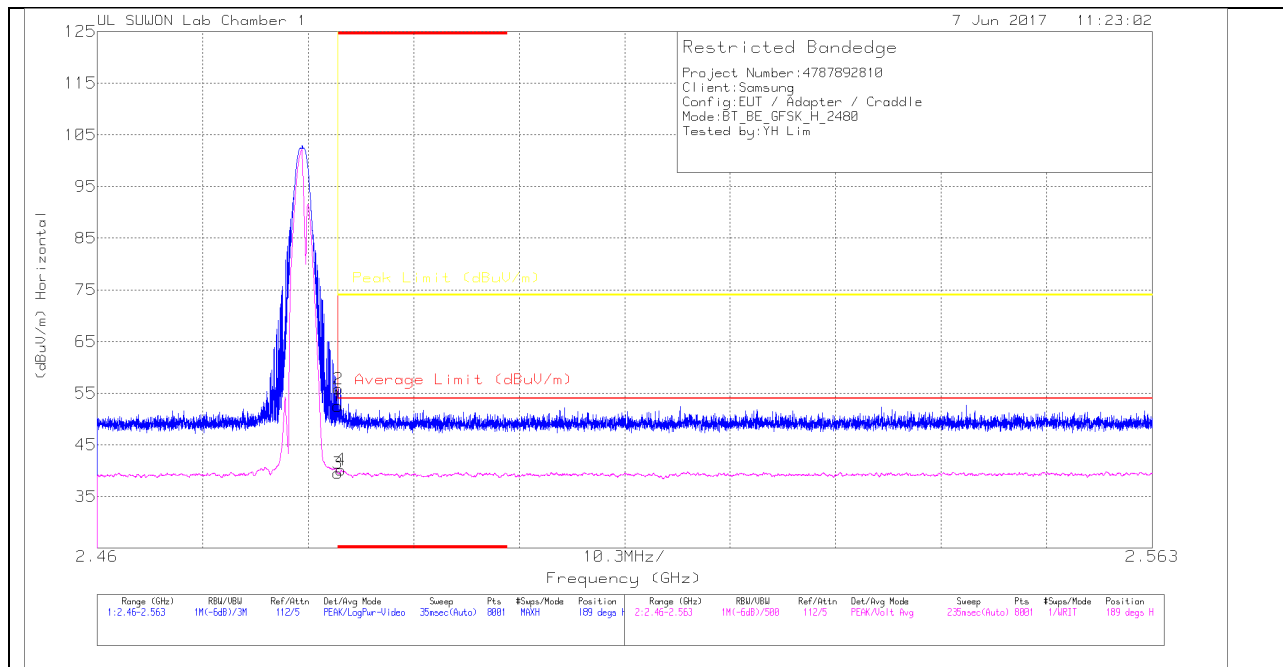
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

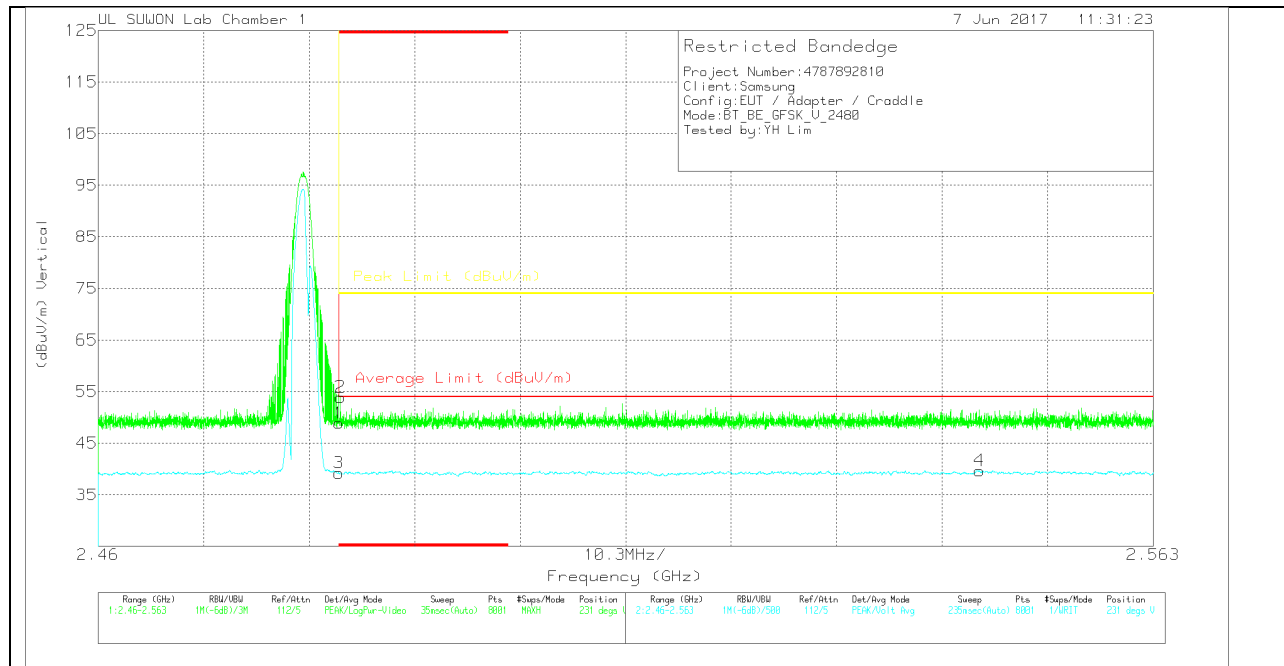
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.2	Pk	32	-28.7	52.5	-	-	74	-21.5	189	188	H
2	* 2.484	52.55	Pk	32	-28.7	55.85	-	-	74	-18.15	189	188	H
3	* 2.484	36.23	VA1T	32	-28.7	39.53	54	-14.47	-	-	189	188	H
4	* 2.484	36.86	VA1T	32	-28.7	40.16	54	-13.84	-	-	189	188	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.61	Pk	32	-28.7	48.91	-	-	74	-25.09	231	145	V
2	* 2.484	50.62	Pk	32	-28.7	53.92	-	-	74	-20.08	231	145	V
3	* 2.484	35.94	VA1T	32	-28.7	39.24	54	-14.76	-	-	231	145	V
4	2.546	36.29	VA1T	32	-28.6	39.69	54	-14.31	-	-	231	145	V

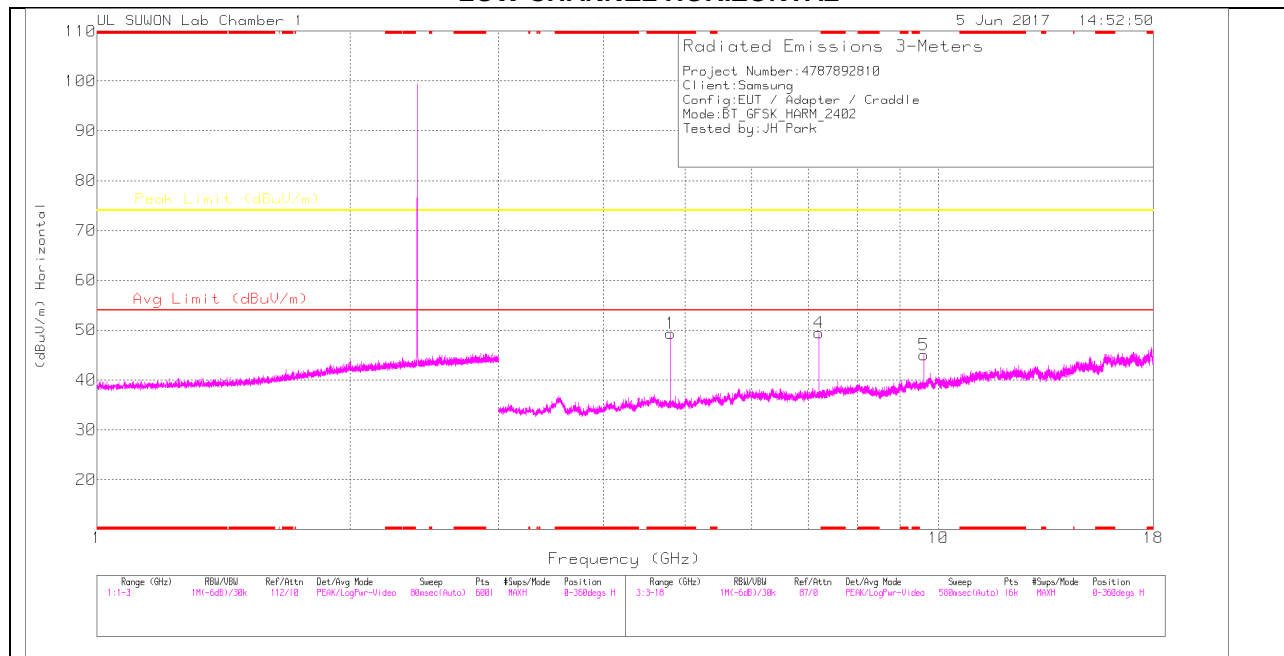
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

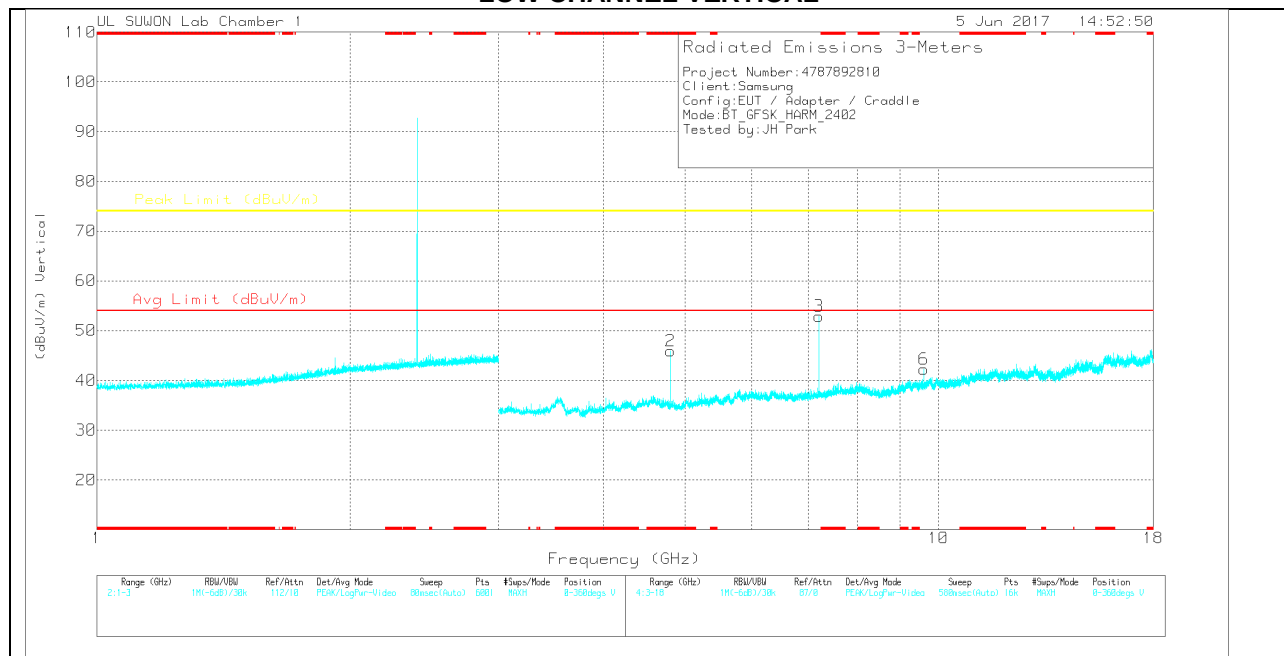
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	49.32	PK	34	-34	49.32	-	-	74	-24.68	0-360	150	H
4	7.205	44.85	PK	35.7	-31.1	49.45	-	-	74	-24.55	0-360	250	H
5	9.607	36.14	PK	37	-28.1	45.04	-	-	74	-28.96	0-360	250	H
2	* 4.804	45.89	PK	34	-34	45.89	-	-	74	-28.11	0-360	250	V
3	7.206	48.34	PK	35.7	-31.1	52.94	-	-	74	-21.06	0-360	250	V
6	9.609	33.51	PK	37	-28.2	42.31	-	-	74	-31.69	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

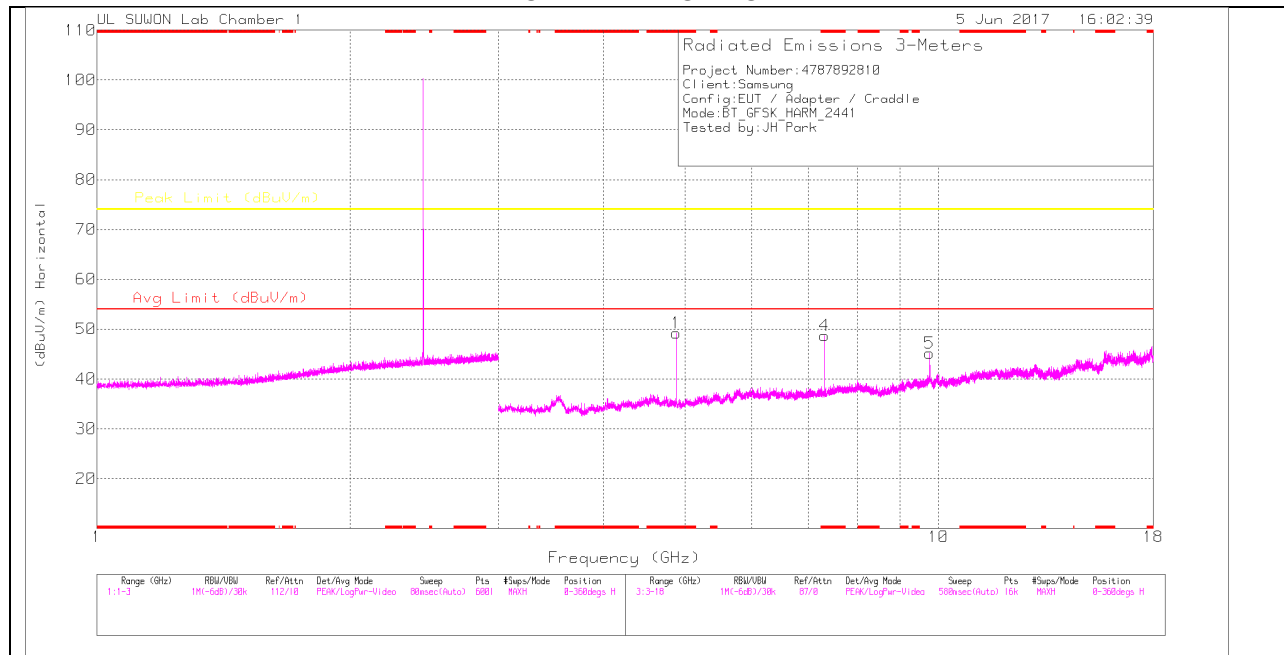
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	53.07	PK2	34	-34	53.07	-	-	74	-20.93	86	331	H
* 4.804	50.25	VA1T	34	-34	50.25	54	-3.75	-	-	86	331	H
7.206	49.87	PK2	35.7	-31.1	54.47	-	-	74	-19.53	184	102	V
7.206	50.52	PK2	35.7	-31.1	55.12	-	-	74	-18.88	77	274	H
9.608	44.49	PK2	37	-28.2	53.29	-	-	74	-20.71	111	124	H
9.608	43.65	PK2	37	-28.2	52.45	-	-	74	-21.55	344	105	V
* 4.804	53.64	PK2	34	-34	53.64	-	-	74	-20.36	194	393	V
* 4.804	48.88	VA1T	34	-34	48.88	54	-5.12	-	-	194	393	V

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

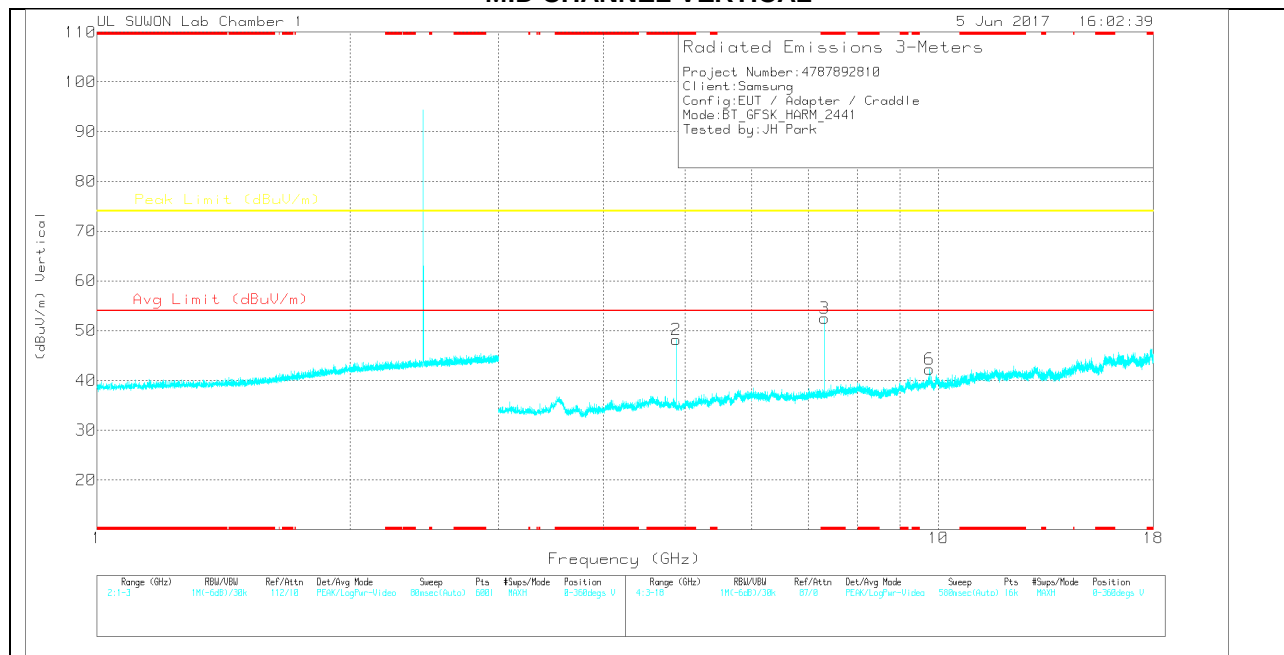
PK2 - KDB558074 Method: Maximum Peak

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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	49.47	PK	34	-34.2	49.27	-	-	74	-24.73	0-360	250	H
4	* 7.323	43.76	PK	35.8	-30.9	48.66	-	-	74	-25.34	0-360	250	H
5	9.765	35.34	PK	37.2	-27.4	45.14	-	-	74	-28.86	0-360	150	H
2	* 4.882	48.33	PK	34	-34.1	48.23	-	-	74	-25.77	0-360	250	V
3	* 7.323	47.56	PK	35.8	-30.9	52.46	-	-	74	-21.54	0-360	250	V
6	9.765	32.46	PK	37.2	-27.4	42.26	-	-	74	-31.74	0-360	150	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.882	54.9	PK2	34	-34.2	54.7	-	-	74	-19.3	89	246	H
* 4.882	50.83	VA1T	34	-34.2	50.63	54	-3.37	-	-	89	246	H
* 4.882	53.9	PK2	34	-34.2	53.7	-	-	74	-20.3	189	400	V
* 4.882	49.26	VA1T	34	-34.2	49.06	54	-4.94	-	-	189	400	V
* 7.322	53.52	PK2	35.8	-30.9	58.42	-	-	74	-15.58	116	241	V
* 7.323	50.06	PK2	35.8	-30.9	54.96	-	-	74	-19.04	59	139	H
* 7.323	44.25	VA1T	35.8	-30.9	49.15	54	-4.85	-	-	59	139	H
9.764	43.69	PK2	37.2	-27.5	53.39	-	-	74	-20.61	103	233	H
9.764	42.45	PK2	37.2	-27.5	52.15	-	-	74	-21.85	336	213	V

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

PK2 - KDB558074 Method: Maximum Peak

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

* For marker 3, 7.323 GHz(Vertical), used the following method to do averaging:

$DCCF = 20 \times \log(Ton/100ms)$

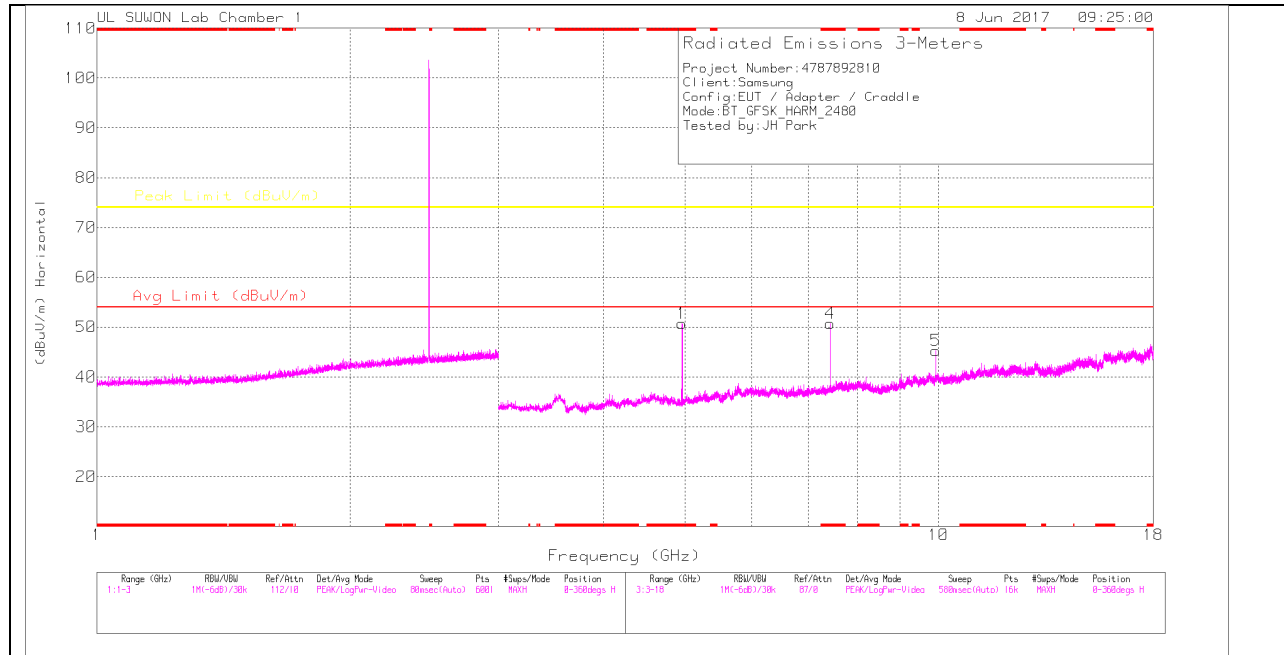
$Ton = 2.886ms$

$DCCF = 30.8$

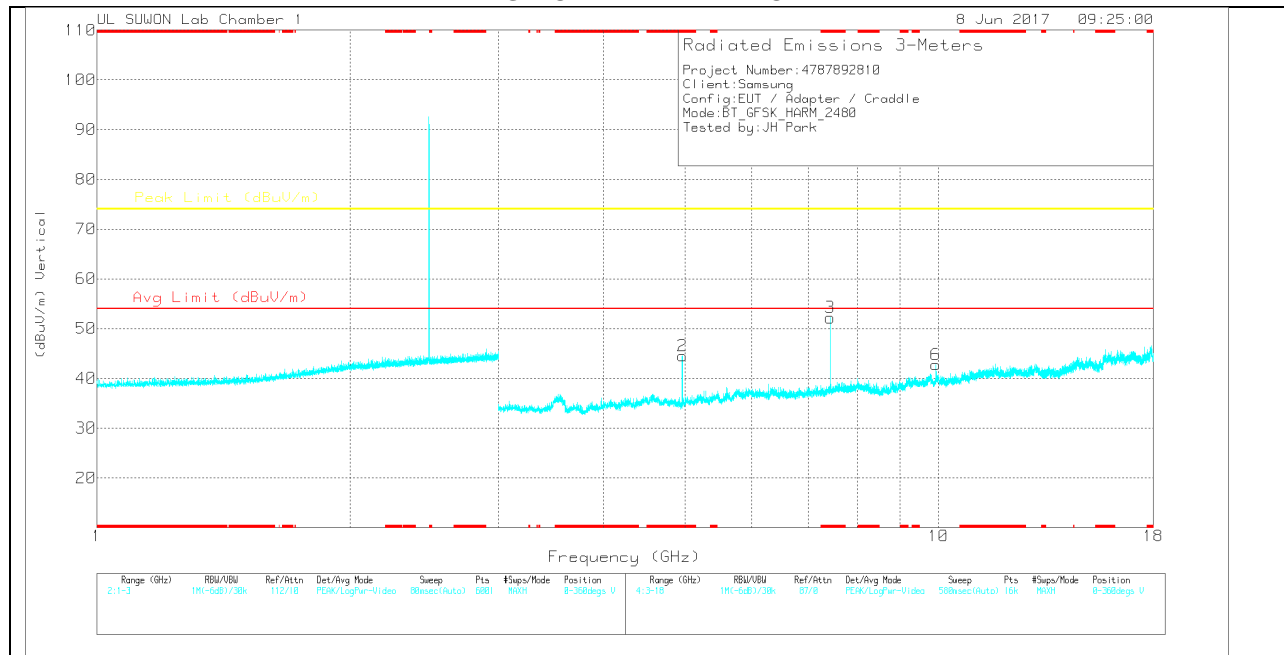
Corrected AV reading = Peak Reading – DCCF

= 60.04 – 30.79 = 27.63 dBuV/m

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.959	50.78	PK	34	-34.1	50.68	-	-	74	-23.32	0-360	250	H
4	* 7.44	46.07	PK	35.8	-31.1	50.77	-	-	74	-23.23	0-360	150	H
5	9.92	35.84	PK	37.4	-28	45.24	-	-	74	-28.76	0-360	150	H
2	* 4.96	44.69	PK	34	-34.1	44.59	-	-	74	-29.41	0-360	250	V
3	* 7.44	47.49	PK	35.8	-31.1	52.19	-	-	74	-21.81	0-360	150	V
6	9.919	33.28	PK	37.4	-27.9	42.78	-	-	74	-31.22	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96	56.49	PK2	34	-34.1	56.39	-	-	74	-17.61	258	348	H
* 4.96	52.64	VA1T	34	-34.1	52.54	54	-1.46	-	-	258	348	H
* 4.96	52.31	PK2	34	-34.1	52.21	-	-	74	-21.79	321	311	V
* 4.96	46.96	VA1T	34	-34.1	46.86	54	-7.14	-	-	321	311	V
* 7.44	53.44	PK2	35.8	-31.1	58.14	-	-	74	-15.86	186	105	V
* 7.44	48.92	VA1T	35.8	-31.1	53.62	54	-.38	-	-	186	105	V
* 7.44	51.58	PK2	35.8	-31.1	56.28	-	-	74	-17.72	262	100	H
* 7.44	46.34	VA1T	35.8	-31.1	51.04	54	-2.96	-	-	262	100	H
9.921	45.36	PK2	37.4	-28	54.76	-	-	74	-19.24	263	100	H
9.92	42.48	PK2	37.4	-28	51.88	-	-	74	-22.12	5	282	V

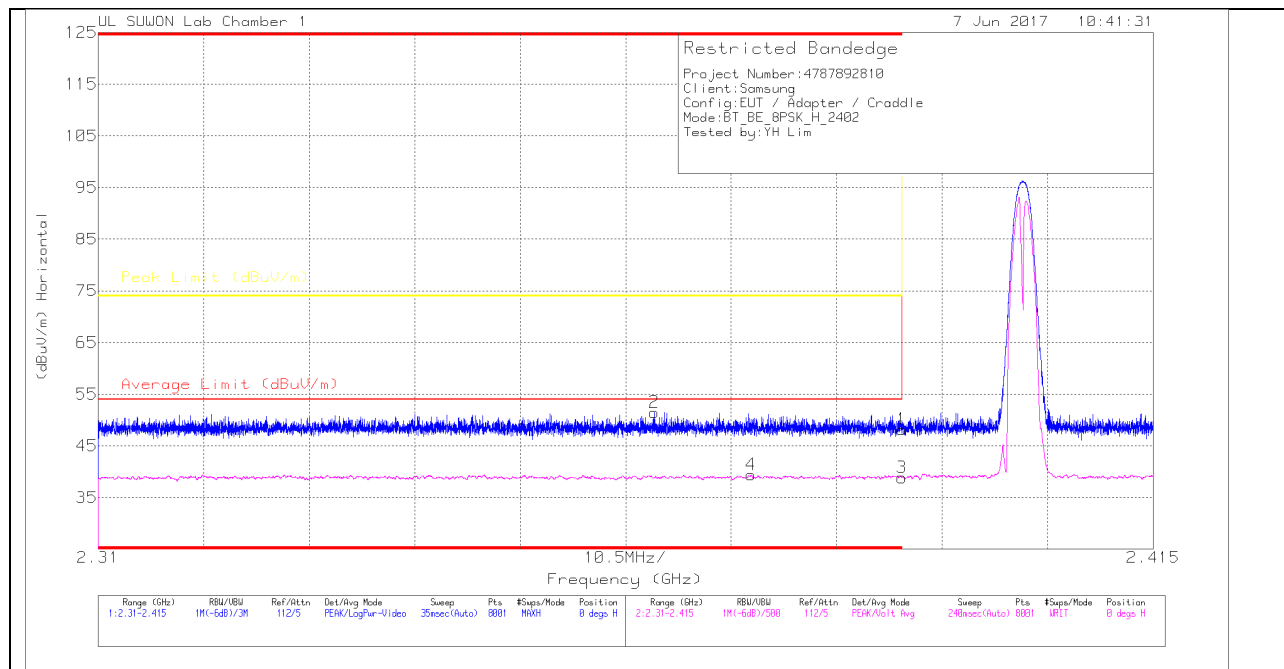
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

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

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

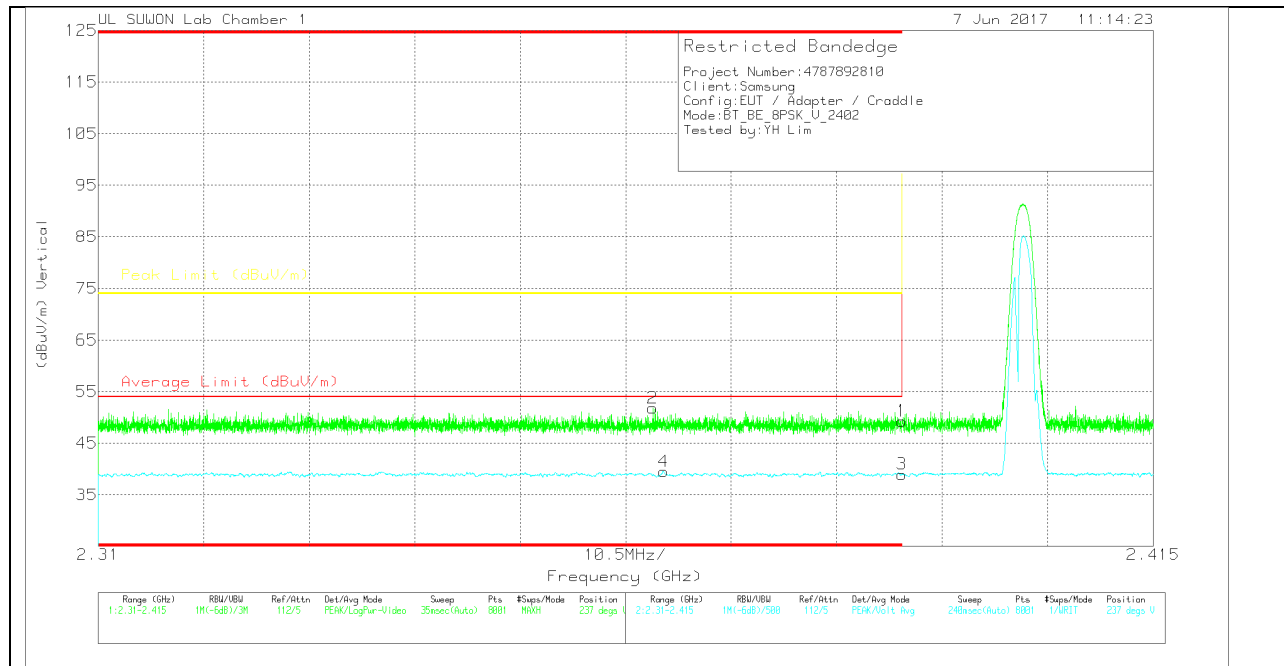
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	45.13	Pk	31.8	-28.7	48.23	-	-	74	-25.77	0	326	H
2	* 2.365	48.4	Pk	31.8	-28.7	51.5	-	-	74	-22.5	0	326	H
3	* 2.39	35.78	VA1T	31.8	-28.7	38.88	54	-15.12	-	-	0	326	H
4	* 2.375	36.34	VA1T	31.8	-28.7	39.44	54	-14.56	-	-	0	326	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	46.19	Pk		-28.7	49.29	-	-	74	-24.71	237	131	V
2	* 2.365	48.72	Pk		-28.7	51.82	-	-	74	-22.18	237	131	V
3	* 2.39	35.88	VA1T		-28.7	38.98	54	-15.02	-	-	237	131	V
4	* 2.366	36.42	VA1T		-28.7	39.52	54	-14.48	-	-	237	131	V

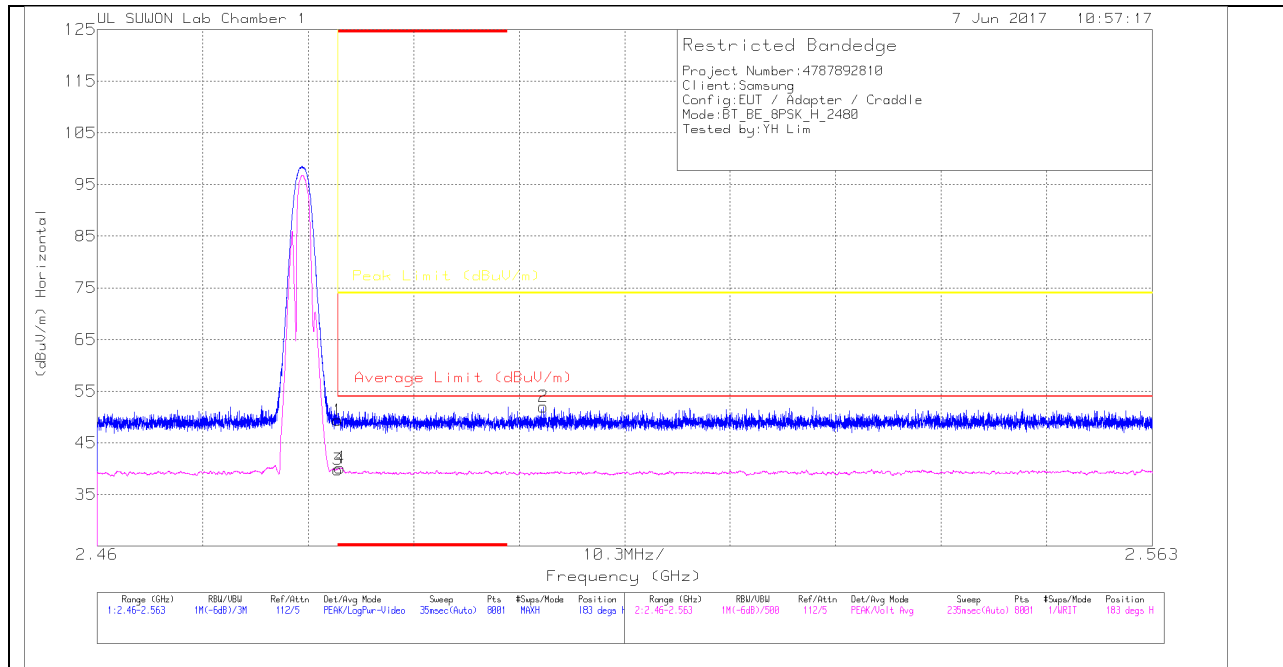
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

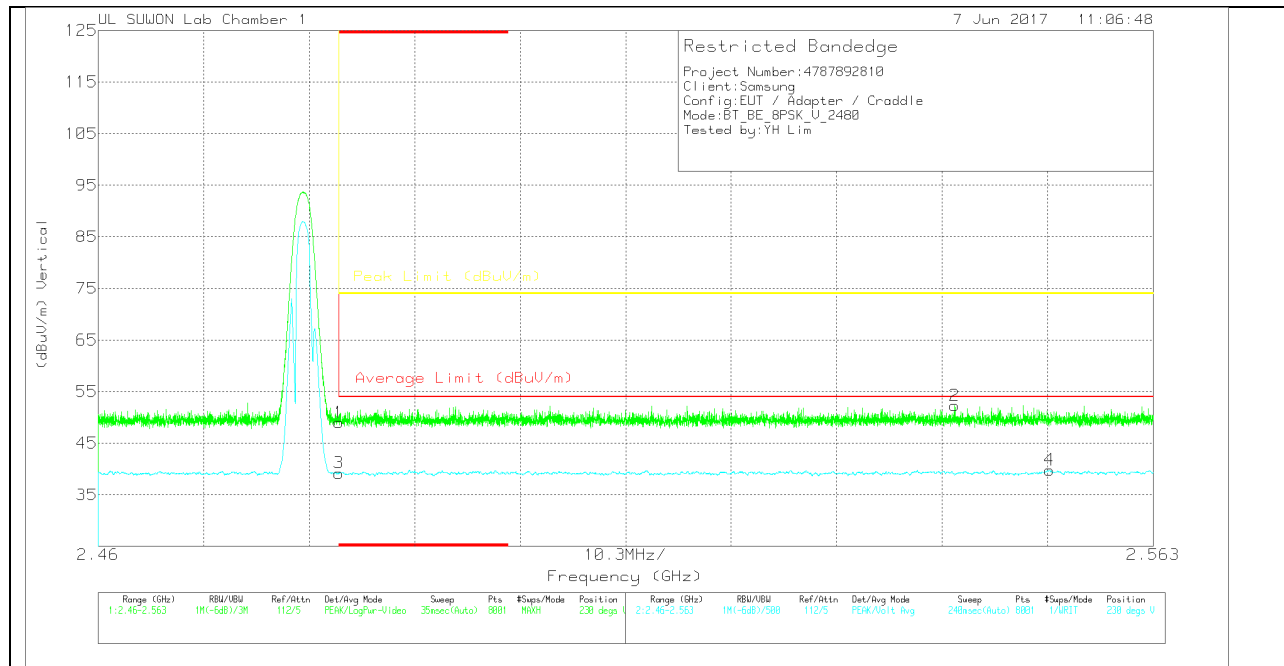
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.08	Pk	32	-28.7	49.38	-	-	74	-24.62	183	100	H
2	2.504	48.61	Pk	32	-28.6	52.01	-	-	74	-21.99	183	100	H
3	* 2.484	36.54	VA1T	32	-28.7	39.84	54	-14.16	-	-	183	100	H
4	* 2.484	36.87	VA1T	32	-28.7	40.17	54	-13.83	-	-	183	100	H

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

Pk - Peak detector

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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	10dB_Att(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.73	Pk	32	-28.7	49.03	-	-	74	-24.97	230	140	V
2	2.544	48.9	Pk	32	-28.6	52.3	-	-	74	-21.7	230	140	V
3	* 2.484	35.92	VA1T	32	-28.7	39.22	54	-14.78	-	-	230	140	V
4	2.553	36.32	VA1T	32	-28.5	39.82	54	-14.18	-	-	230	140	V

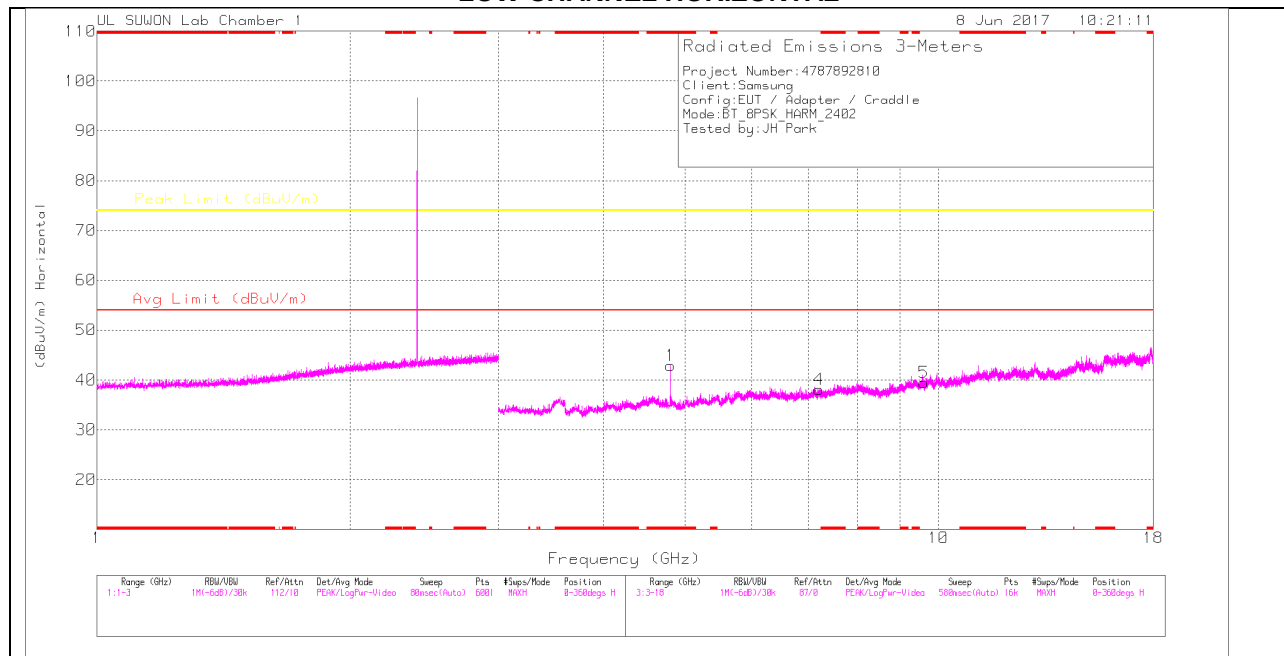
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

Pk - Peak detector

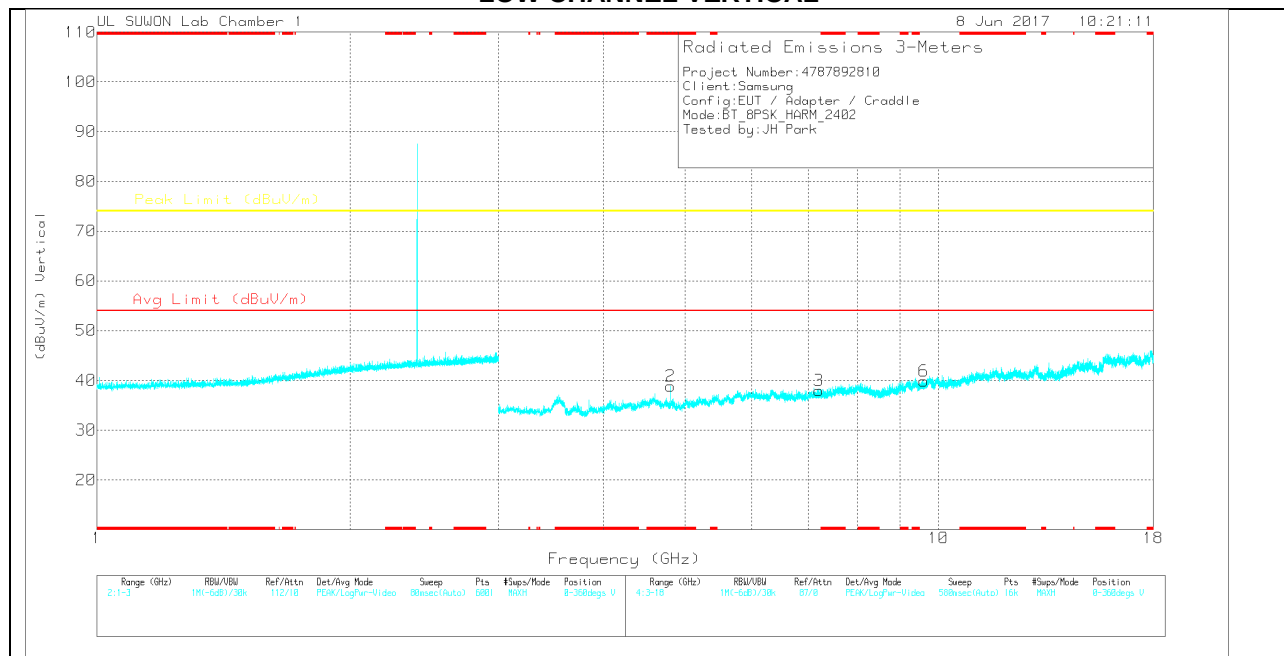
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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

LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804	42.9	PK	34	-34	42.9	-	-	74	-31.1	0-360	150	H
4	7.206	33.52	PK	35.7	-31.1	38.12	-	-	74	-35.88	0-360	250	H
5	9.61	30.69	PK	37	-28.2	39.49	-	-	74	-34.51	0-360	150	H
2	* 4.804	38.9	PK	34	-34	38.9	-	-	74	-35.1	0-360	250	V
3	7.208	33.41	PK	35.7	-31.2	37.91	-	-	74	-36.09	0-360	150	V
6	9.611	31.07	PK	37	-28.2	39.87	-	-	74	-34.13	0-360	150	V

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

PK – Peak Detector

Radiated Emissions

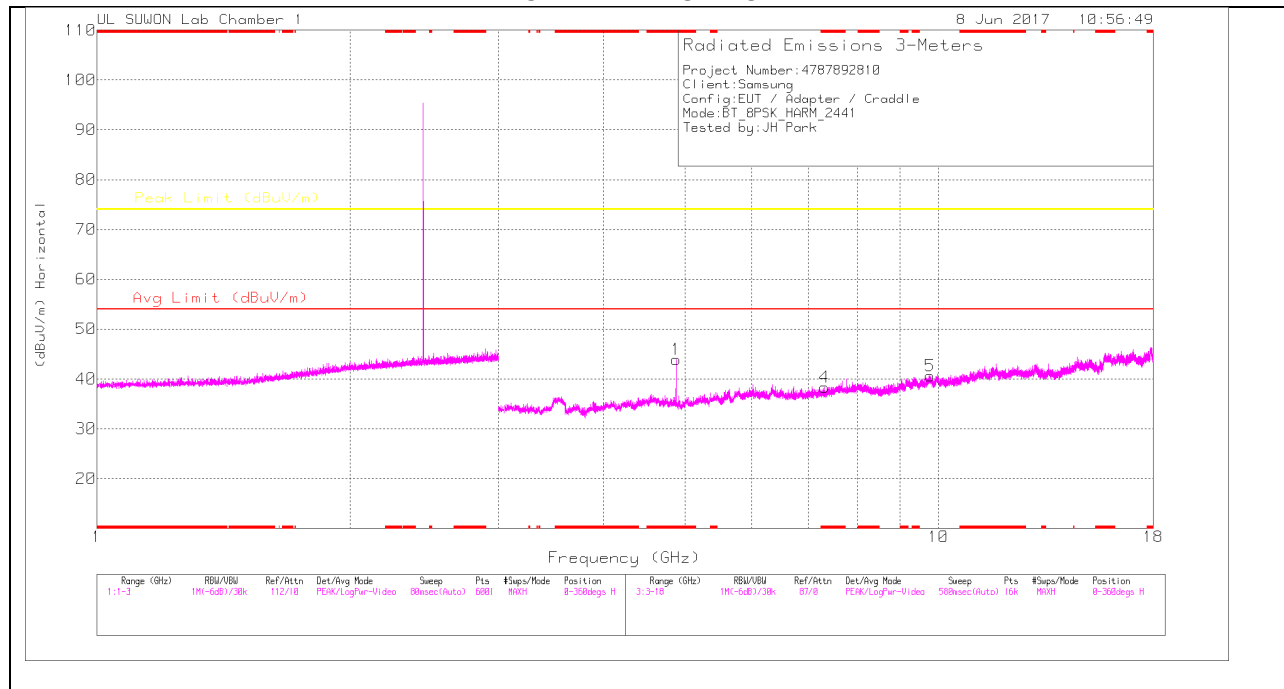
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.804	51.84	PK2	34	-34	51.84	-	-	74	-22.16	258	219	H
* 4.804	42.38	VA1T	34	-34	42.38	54	-11.62	-	-	258	219	H
* 4.804	49.36	PK2	34	-34	49.36	-	-	74	-24.64	287	312	V
* 4.804	38.02	VA1T	34	-34	38.02	54	-15.98	-	-	287	312	V

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

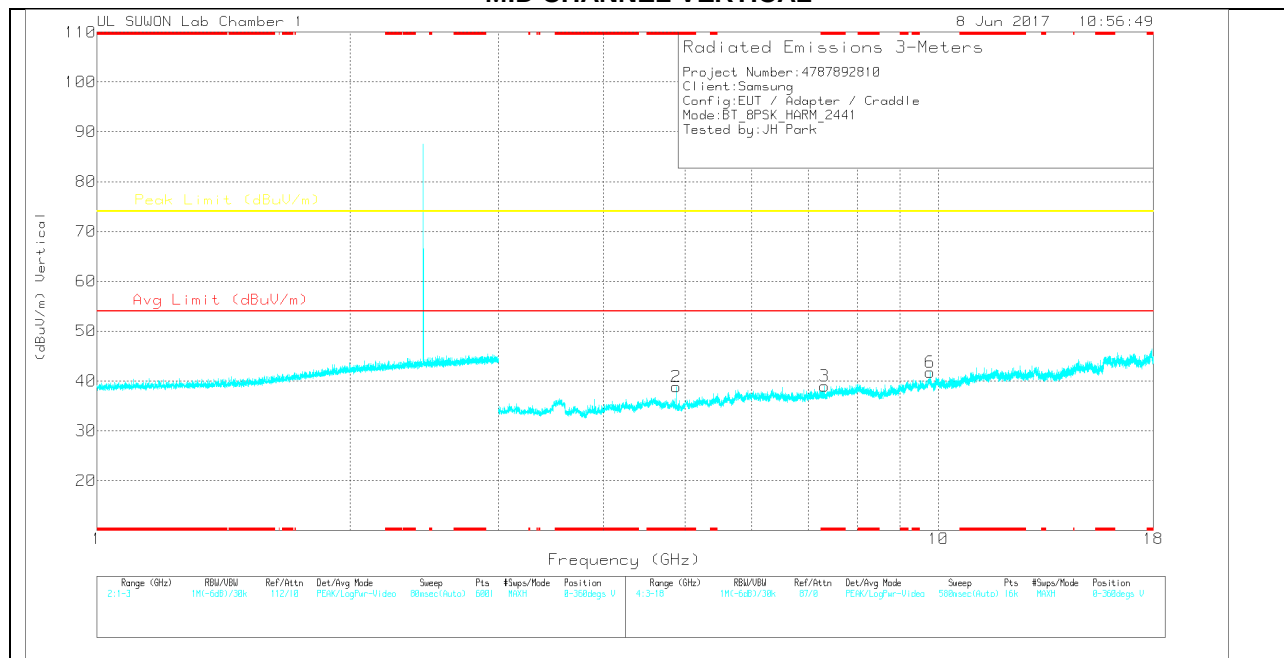
PK2 - KDB558074 Method: Maximum Peak

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

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.881	44.1	PK	34	-34.2	43.9	-	-	74	-30.1	0-360	250	H
4	* 7.323	33.4	PK	35.8	-30.9	38.3	-	-	74	-35.7	0-360	250	H
5	9.769	30.75	PK	37.2	-27.3	40.65	-	-	74	-33.35	0-360	150	H
2	* 4.881	39.04	PK	34	-34.2	38.84	-	-	74	-35.16	0-360	250	V
3	* 7.323	34.03	PK	35.8	-30.9	38.93	-	-	74	-35.07	0-360	250	V
6	9.766	31.92	PK	37.2	-27.4	41.72	-	-	74	-32.28	0-360	250	V

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

PK – Peak Detector

Radiated Emissions

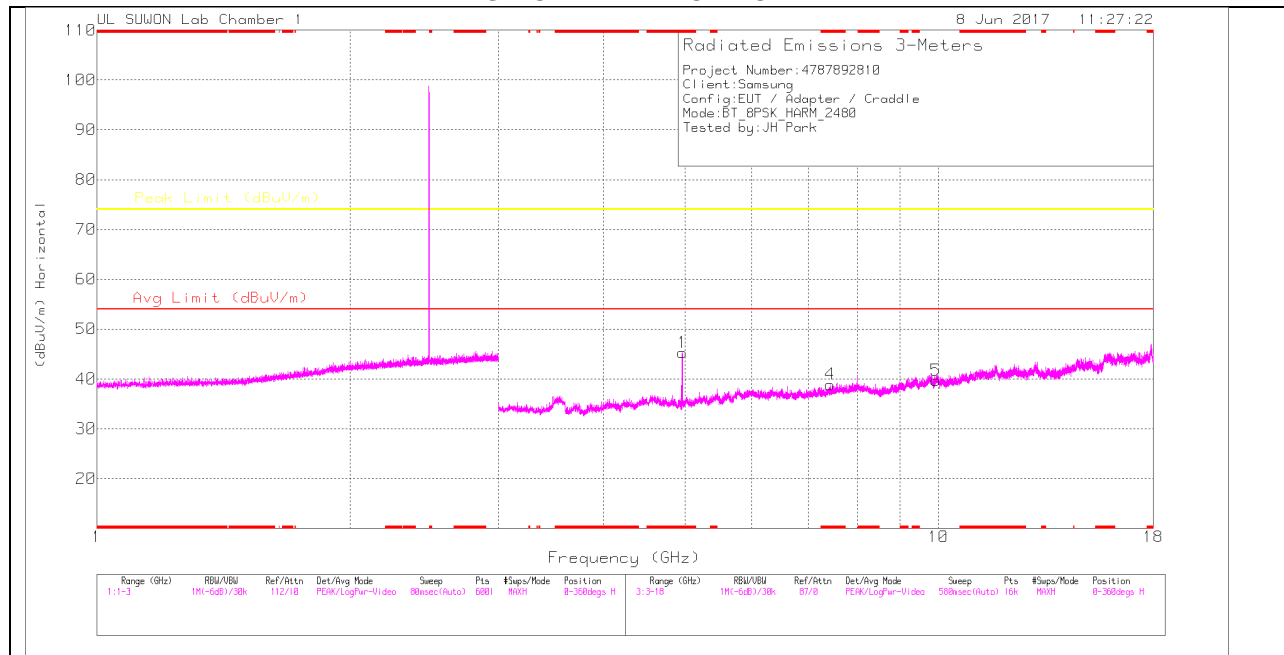
Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.882	54.1	PK2	34	-34.2	53.9	-	-	74	-20.1	262	265	H
* 4.882	44.39	VA1T	34	-34.2	44.19	54	-9.81	-	-	262	265	H
* 4.882	50.08	PK2	34	-34.1	49.98	-	-	74	-24.02	308	316	V
* 4.882	38.53	VA1T	34	-34.2	38.33	54	-15.67	-	-	308	316	V

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

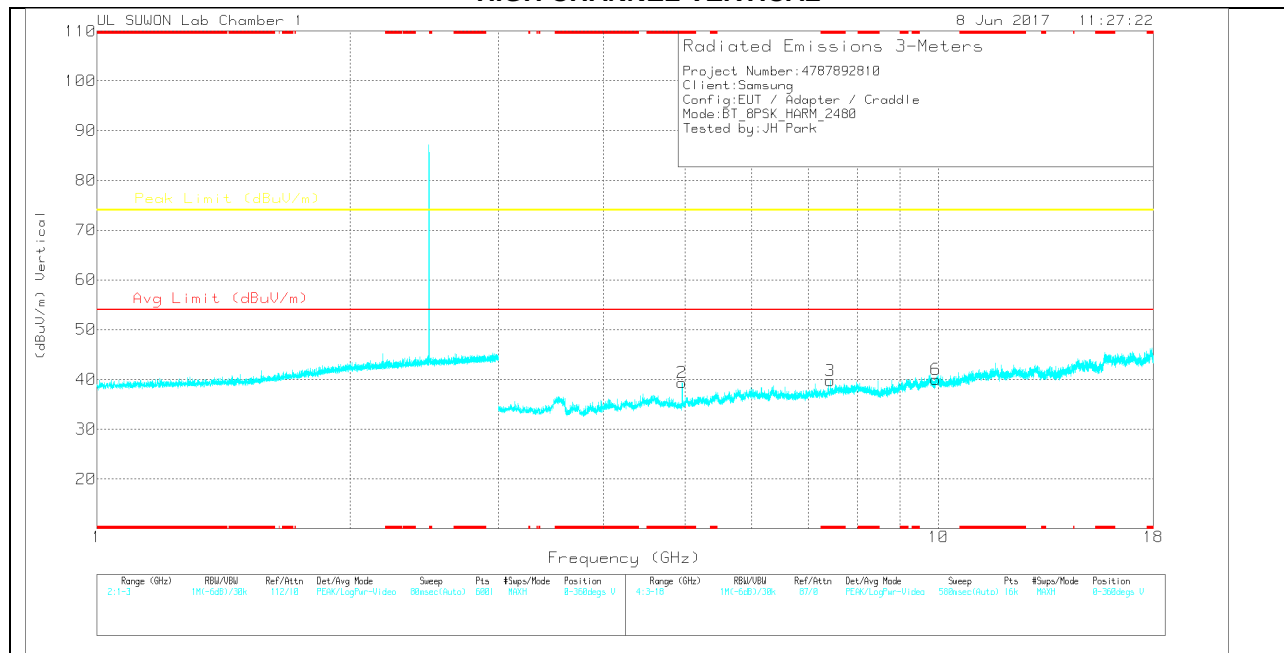
PK2 - KDB558074 Method: Maximum Peak

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

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



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

HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.96	45.41	PK	34	-34.1	45.31	-	-	74	-28.69	0-360	250	H
4	* 7.441	34.11	PK	35.8	-31	38.91	-	-	74	-35.09	0-360	250	H
5	9.919	30.19	PK	37.4	-27.9	39.69	-	-	74	-34.31	0-360	250	H
2	* 4.959	39.47	PK	34	-34.1	39.37	-	-	74	-34.63	0-360	250	V
3	* 7.44	35	PK	35.8	-31.1	39.7	-	-	74	-34.3	0-360	250	V
6	9.923	30.42	PK	37.4	-27.8	40.02	-	-	74	-33.98	0-360	150	V

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

PK – Peak Detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117(0016 8717)_150 619	3Ghz_HP(d B)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.96	54.25	PK2	34	-34.1	54.15	-	-	74	-19.85	256	258	H
* 4.96	45.53	VA1T	34	-34.1	45.43	54	-8.57	-	-	256	258	H
* 4.96	49.36	PK2	34	-34.1	49.26	-	-	74	-24.74	341	373	V
* 4.96	38.4	VA1T	34	-34.1	38.3	54	-15.7	-	-	341	373	V

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

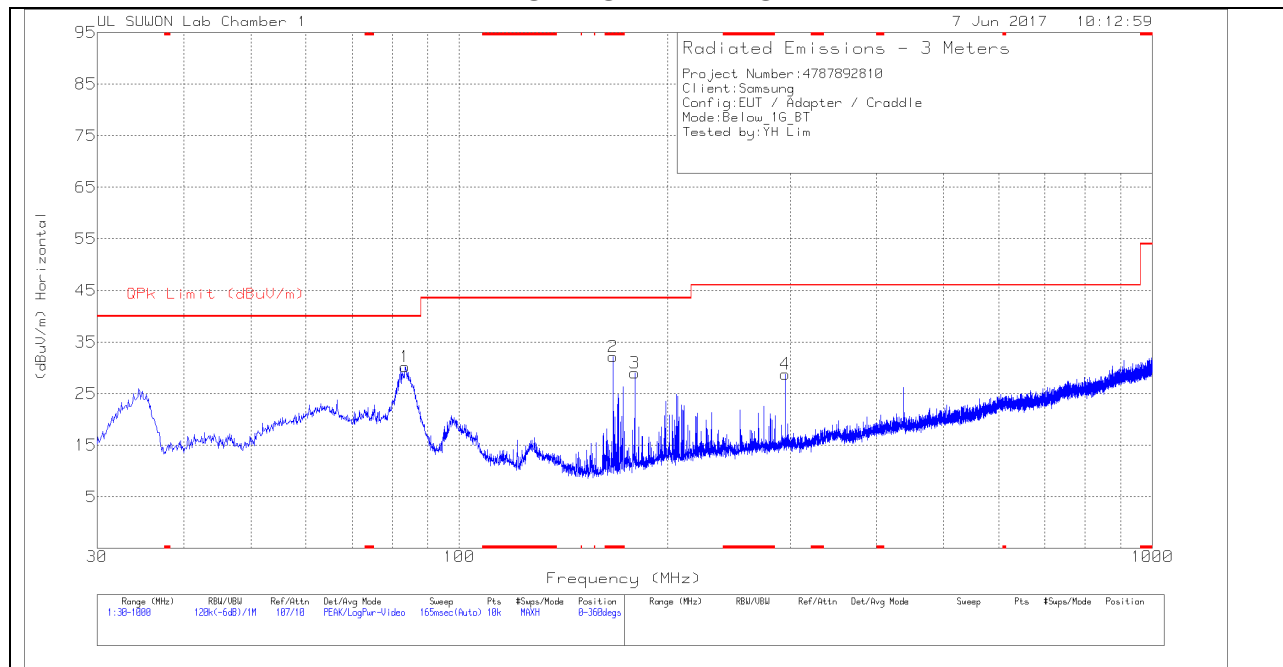
PK2 - KDB558074 Method: Maximum Peak

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

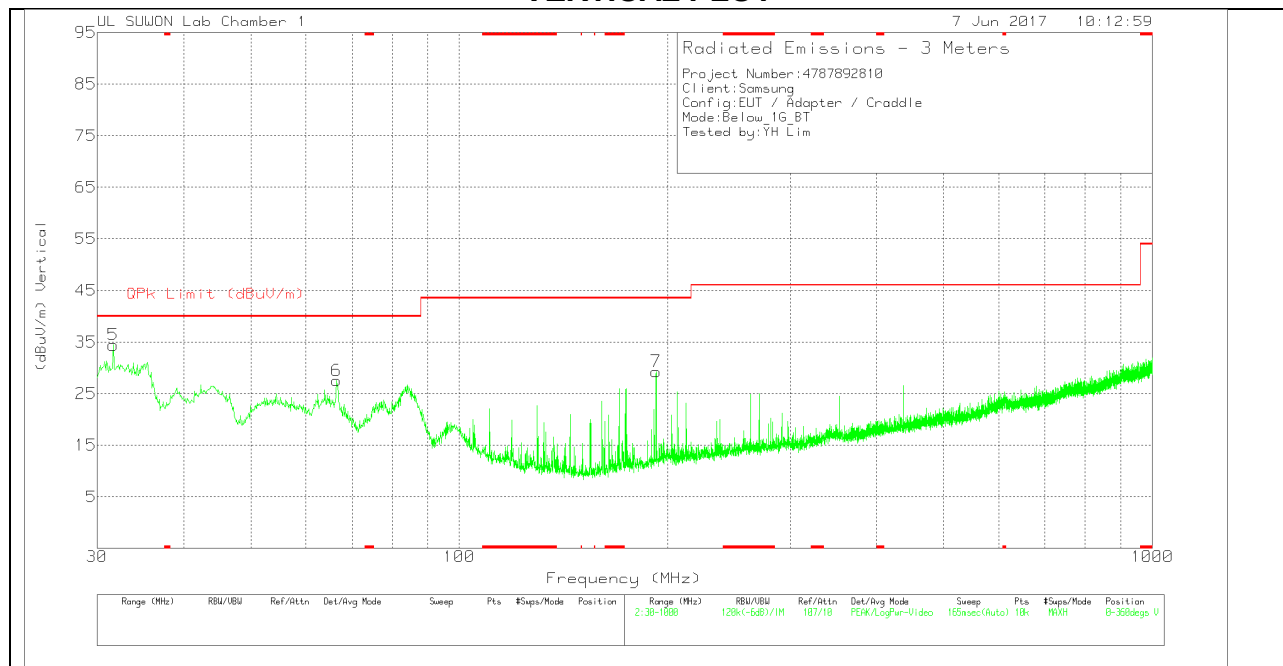
10.3. WORST-CASE BELOW 1 GHz

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

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_7 50(dB)	30-1000MHz(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	83.447	49.92	Pk	7.8	-27.5	30.22	40	-9.78	0-360	200	H
2	* 166.77	50.26	Pk	8.7	-26.8	32.16	43.52	-11.36	0-360	200	H
3	179.089	46.3	Pk	9.3	-26.6	29	43.52	-14.52	0-360	200	H
4	295.392	41.58	Pk	13.2	-26	28.78	46.02	-17.24	0-360	100	H
5	31.649	52.23	Pk	10.4	-28.2	34.43	40	-5.57	0-360	200	V
6	66.472	44.43	Pk	10.7	-27.6	27.53	40	-12.47	0-360	100	V
7	192.281	45.39	Pk	10.6	-26.7	29.29	43.52	-14.23	0-360	100	V

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

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)
IC RSS-GEN Clause 8.8

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

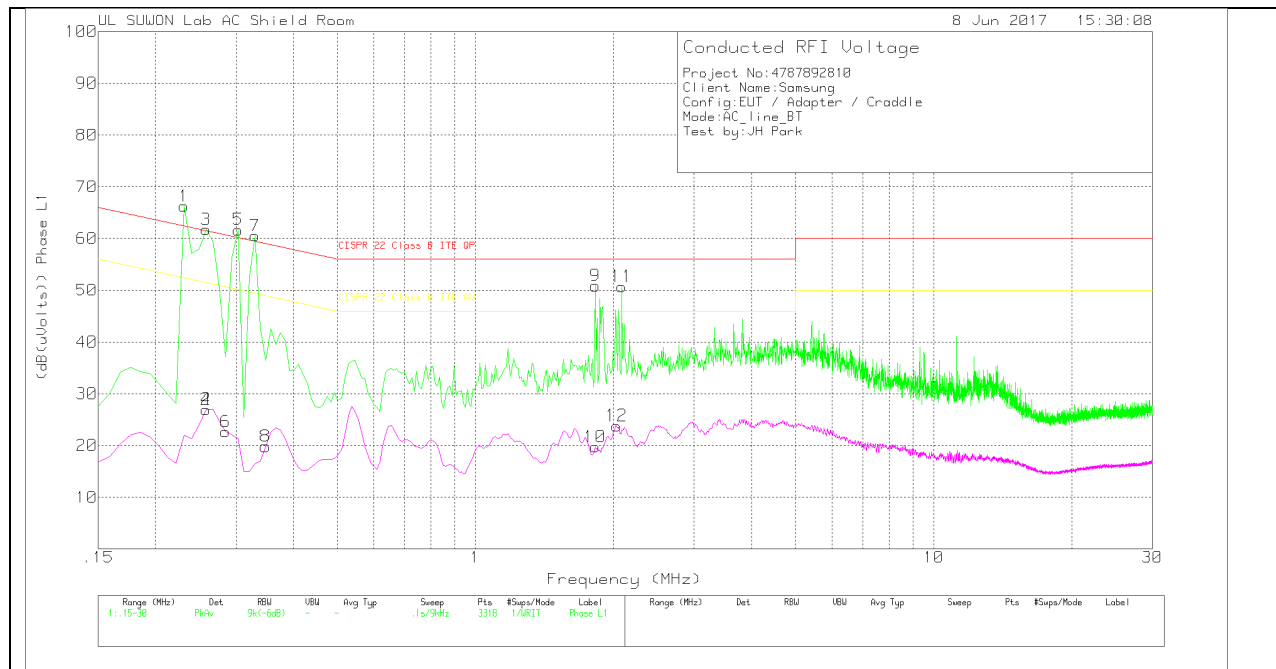
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

6 WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex- cord_L1	CABLELOS S(dB)	Corrected Reading (dB(uVolts)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
1	.231	56.37	Pk	9.7	.2	66.27	62.41	3.86	-	-
2	.258	17.07	Av	9.7	.2	26.97	-	-	51.5	-24.53
3	.258	51.84	Pk	9.7	.2	61.74	61.5	.24	-	-
4	.258	17.07	Av	9.7	.2	26.97	-	-	51.5	-24.53
5	.303	51.79	Pk	9.7	.2	61.69	60.16	1.53	-	-
6	.285	12.76	Av	9.7	.2	22.66	-	-	50.67	-28.01
7	.33	50.52	Pk	9.8	.2	60.52	59.45	1.07	-	-
8	.348	9.83	Av	9.8	.2	19.83	-	-	49.01	-29.18
9	1.824	40.87	Pk	9.7	.3	50.87	56	-5.13	-	-
10	1.824	9.73	Av	9.7	.3	19.73	-	-	46	-26.27
11	2.085	40.72	Pk	9.7	.3	50.72	56	-5.28	-	-
12	2.031	13.81	Av	9.7	.3	23.81	-	-	46	-22.19

Pk - Peak detector

Av - Average detection

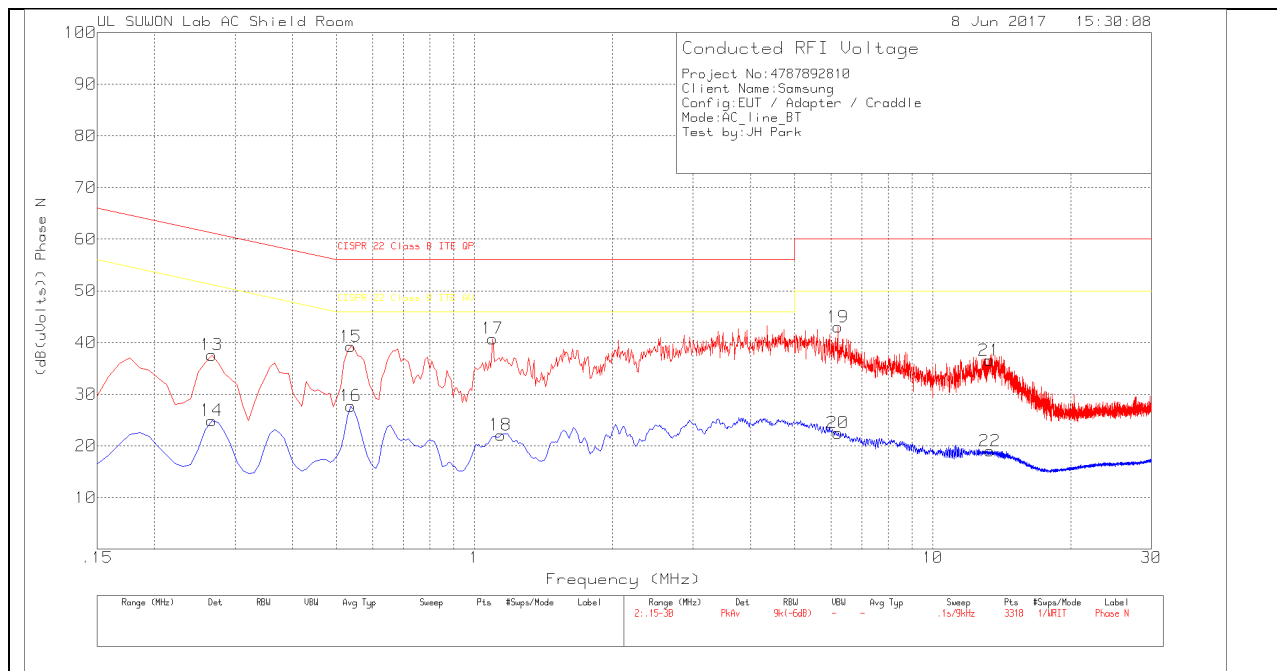
Quasi-Peak Emissions

Phase L1 .15 - 30MHz

Frequency (MHz)	Meter Reading (dBuV)	Det	101837_wit h ex-cord_L1	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
.2301	18.37	Qp	9.7	.2	28.27	62.45	-34.18	-	-
.2571	26.68	Qp	9.7	.2	36.58	61.52	-24.94	-	-
.2994	16.86	Qp	9.7	.2	26.76	60.26	-33.5	-	-
.2805	20.92	Qp	9.7	.2	30.82	60.8	-29.98	-	-
.3255	6.67	Qp	9.8	.2	16.67	59.57	-42.9	-	-
.3471	16.07	Qp	9.8	.2	26.07	59.03	-32.96	-	-
1.8249	14.39	Qp	9.7	.3	24.39	56	-31.61	-	-
2.0823	18.81	Qp	9.7	.3	28.81	56	-27.19	-	-
2.0328	20.39	Qp	9.7	.3	30.39	56	-25.61	-	-

Qp - Quasi-Peak detector

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101837_w ith ex- cord_N	CABLELOS S(dB)	Corrected Reading (dB(uVolts)	CISPR 22 Class B ITE QP	Margin (dB)	CISPR 22 Class B ITE AV	Margin (dB)
13	.267	27.7	Pk	9.7	.2	37.6	61.21	-23.61	-	-
14	.267	15.01	Av	9.7	.2	24.91	-	-	51.21	-26.3
15	.537	29.12	Pk	9.9	.2	39.22	56	-16.78	-	-
16	.537	17.64	Av	9.9	.2	27.74	-	-	46	-18.26
17	1.095	30.66	Pk	9.8	.3	40.76	56	-15.24	-	-
18	1.14	12	Av	9.8	.3	22.1	-	-	46	-23.9
19	6.207	32.82	Pk	9.9	.3	43.02	60	-16.98	-	-
20	6.207	12.32	Av	9.9	.3	22.52	-	-	50	-27.48
21	13.281	25.87	Pk	10.3	.4	36.57	60	-23.43	-	-
22	13.335	8.32	Av	10.3	.4	19.02	-	-	50	-30.98

Pk - Peak detector

Av - Average detection