CERTIFICATION TEST REPORT

Report Number. : 4789219881-E6V3

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-G986B/DS, SM-G986B
FCC ID	:	A3LSMG986B
EUT Description	:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
December 16, 2019

Prepared by:
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IAS ACCREDITED
Testing Laboratory
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	12/09/19	Initial issue	Hyunsik Yun
V2	12/12/19	Updated to address TCB's question	Hyunsik Yun
V3	12/16/19	Updated to address TCB's question	Hyunsik Yun

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT
MODEL NUMBER:	SM-G986B/DS, SM-G986B
SERIAL NUMBER:	R3CM9030DBT, R3CM90FS9RV (CONDUCTED) R3CM9033F1L, R3CM90FSA4H (RADIATED);
DATE TESTED:	OCT 22, 2019 – DEC 16, 2019;

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:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Hyunsik Yun
Suwon Lab Engineer
UL Korea, Ltd.

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2. TEST METHODOLOGY

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

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

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1
☒ Chamber 2
☐ Chamber 3

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.35 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

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

4.4. DECISION RULE

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

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

This report covers the Samsung models SM-G986B/DS and SM-G986B.
These models are identical in hardware except SM-G986B has single SIM tray.
With some pre-scan, model SM-G986B/DS was set for final test.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	Basic GFSK	Average	17.459	55.71
		Peak	17.751	59.58
	Enhanced Pi/4-DPSK	Average	11.266	13.38
		Peak	14.001	25.12
	Enhanced 8PSK	Average	11.345	13.63
		Peak	14.297	26.90

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -6.46 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

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

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

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

Note: GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance. For average power data please refer to section 9.5. All radiated and power line conducted tests were performed attached with travel adapter for the worst case condition mode.

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5.5.DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Charger	SAMSUNG	EP-TA800	R37M5DX86X1SE3	N/A
Data Cable	SAMSUNG	EP-DG977	N/A	N/A

I/O CABLE

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

TEST SETUP

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

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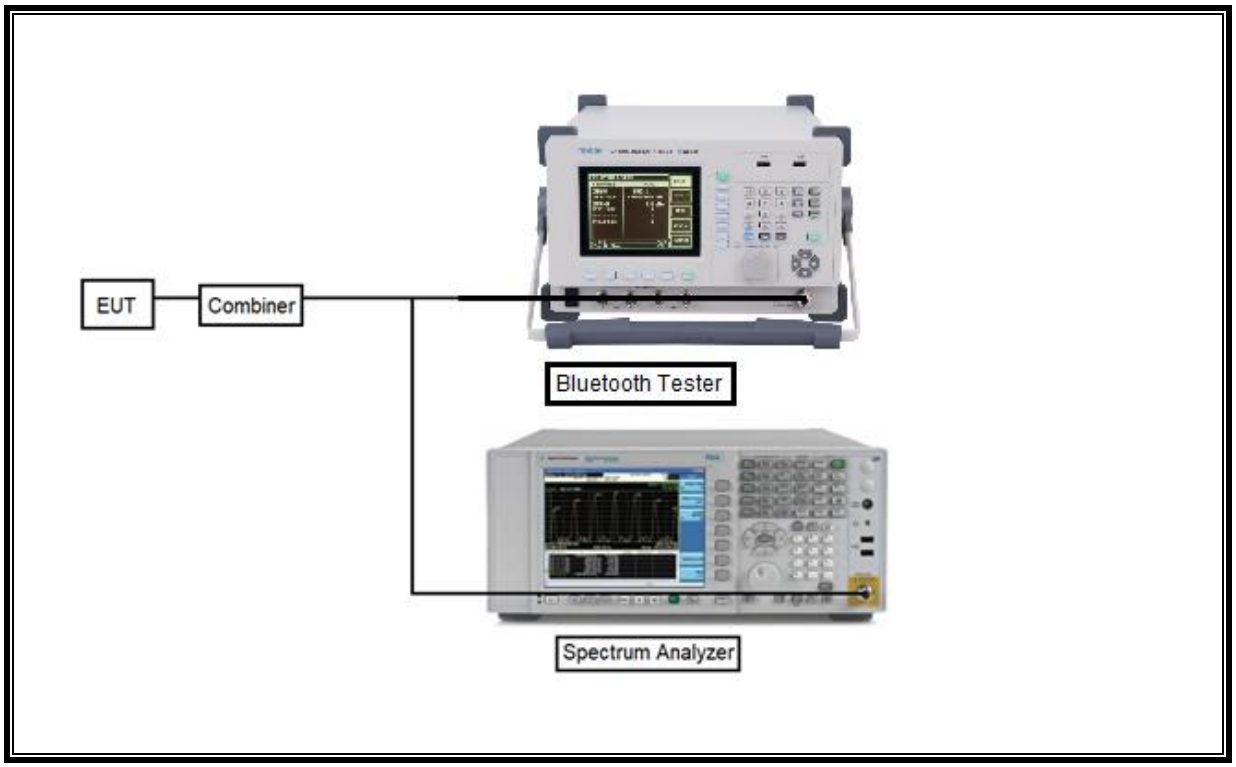
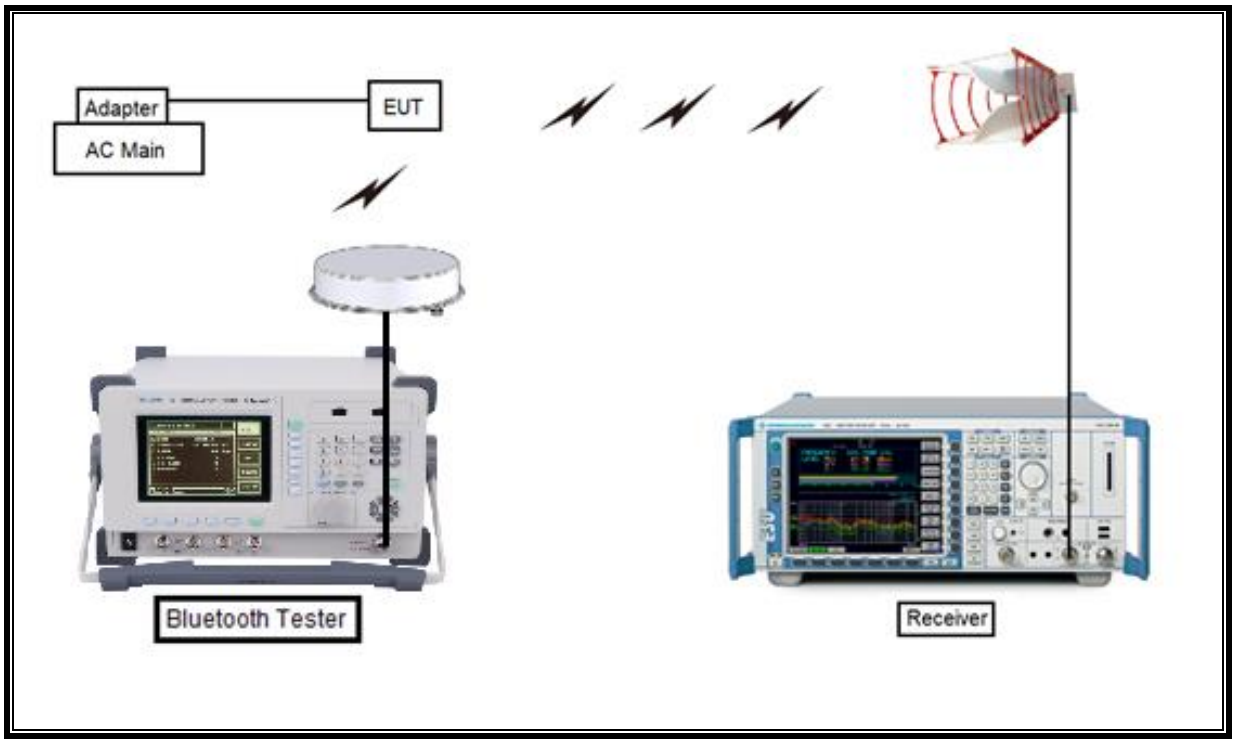
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. MEASUREMENT METHODS

20dB BW : ANSI C63.10, Section 6.9.2

99% BW : ANSI C63.10, Section 6.9.3

HOPPING FREQUENCY SEPARATION : ANSI C63.10, Section 7.8.2

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

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

OUTPUT POWER : ANSI C63.10, Section 7.8.5.

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

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

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

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

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7. TEST AND MEASUREMENT EQUIPMENT

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

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

UL Software			
Description	**Manufacturer**	**Model**	**Version**
Radiated software	UL	UL EMC	Ver 9.5
AC Line Conducted software	UL	UL EMC	Ver 9.5

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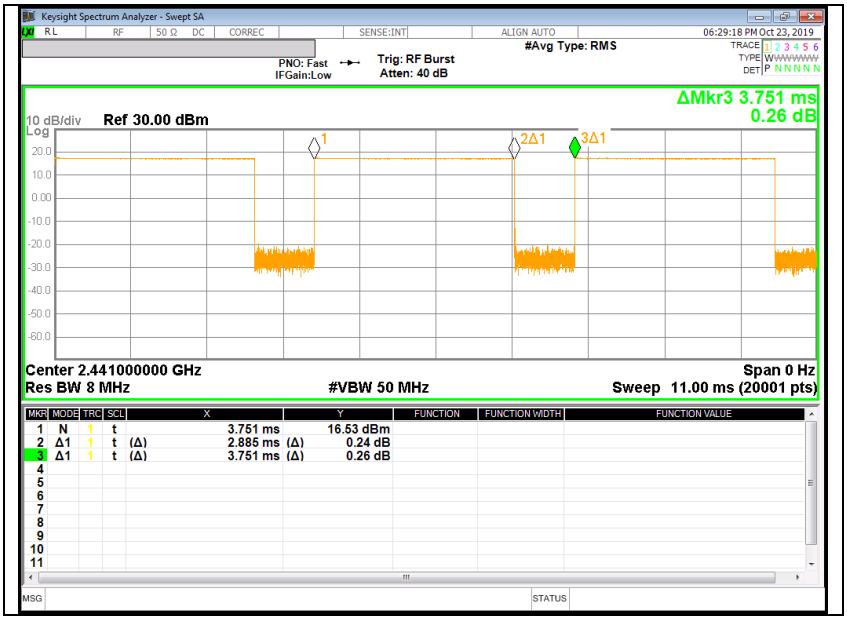
8. REFERENCE MEASUREMENT RESULTS

8.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

None: for reporting purposes only.

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
2400MHz Bands						
BT	2.885	3.751	0.769	76.9%	1.14	0.347



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8.2.20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

8.2.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [kHz]
Low	2 402	1.028	894.120
Mid	2 440	1.034	866.130
High	2 480	1.043	867.970
Worst		1.043	894.120

8.2.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [kHz]
Low	2 402	1.336	1167.100
Mid	2 440	1.326	1193.800
High	2 480	1.335	1164.300
Worst		1.336	1193.800

8.2.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [kHz]
Low	2 402	1.296	1164.300
Mid	2 440	1.280	1164.700
High	2 480	1.323	1194.100
Worst		1.323	1194.100

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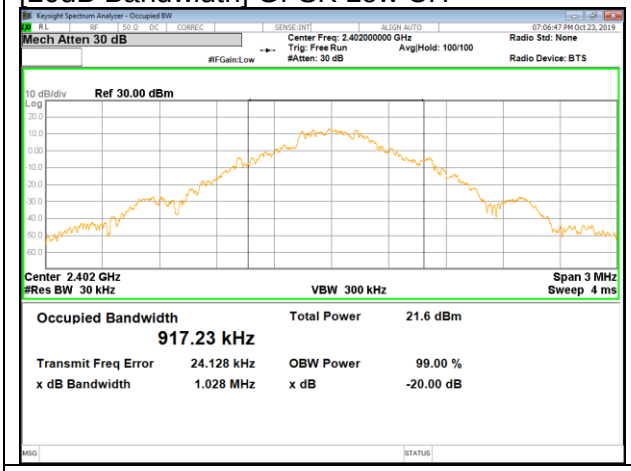
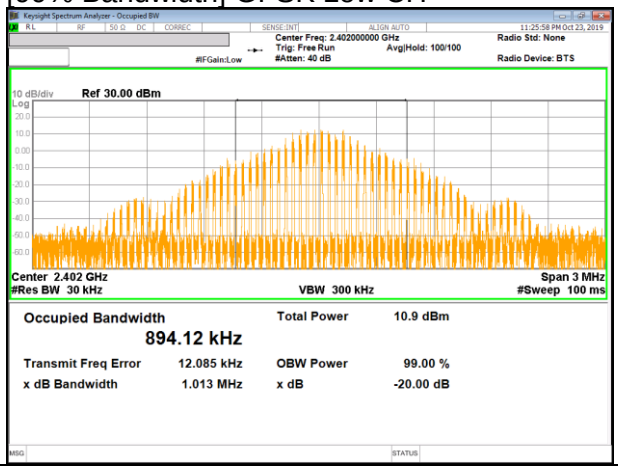
8.2.4. 20 dB AND 99% BANDWIDTH PLOTS

GFSK BANDWIDTH

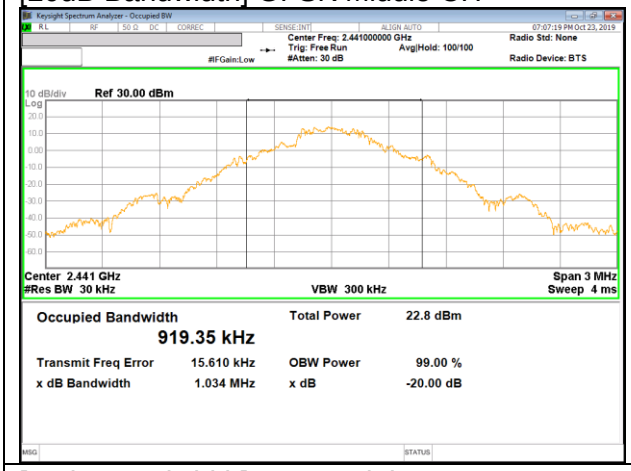
[20dB Bandwidth] GFSK Low CH



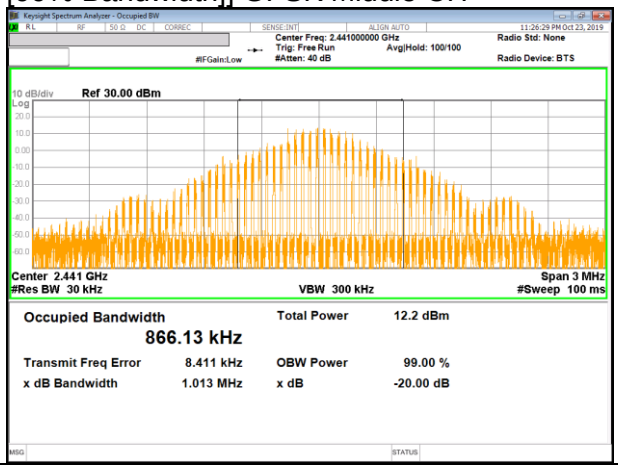
[99% Bandwidth] GFSK Low CH



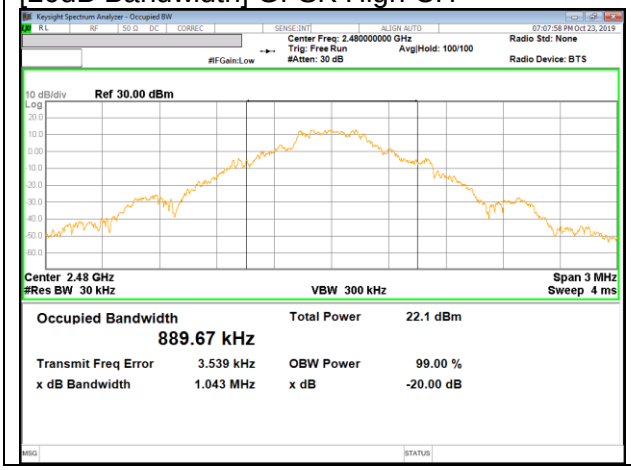
[20dB Bandwidth] GFSK Middle CH



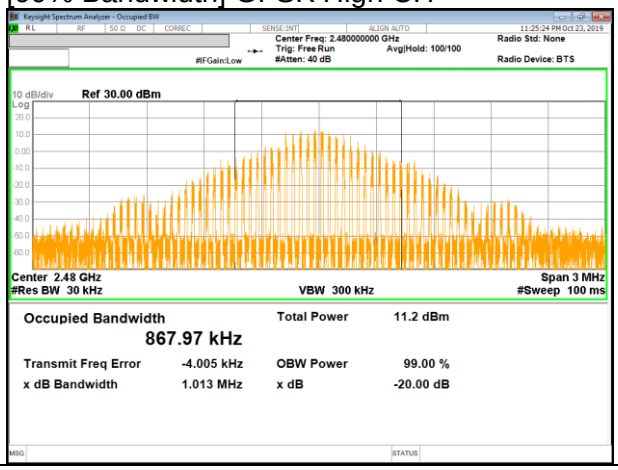
[99% Bandwidth]] GFSK Middle CH



[20dB Bandwidth] GFSK High CH



[99% Bandwidth] GFSK High CH



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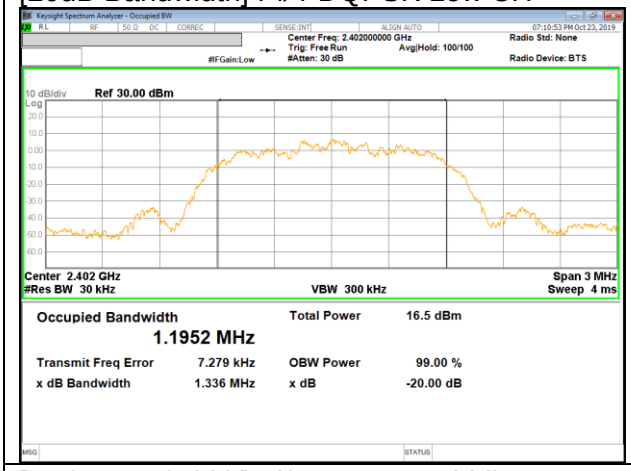
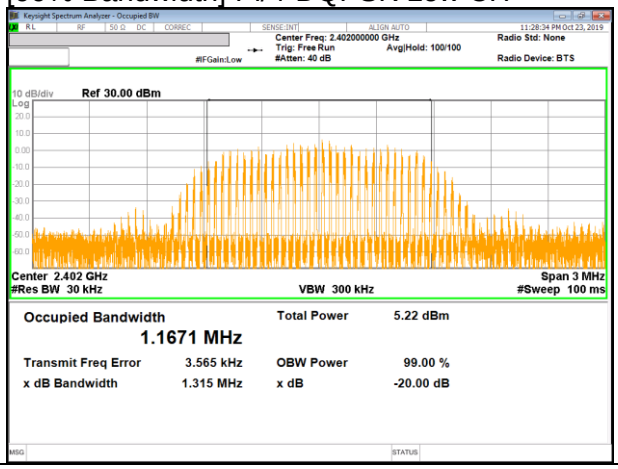
Pi/4-DQPSK BANDWIDTH

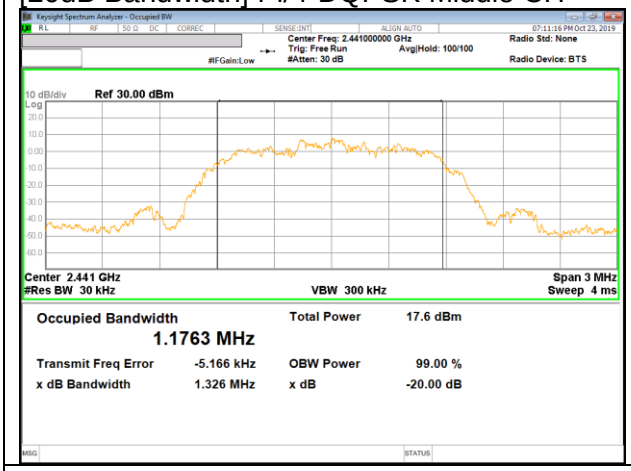
[20dB Bandwidth] Pi/4-DQPSK Low CH



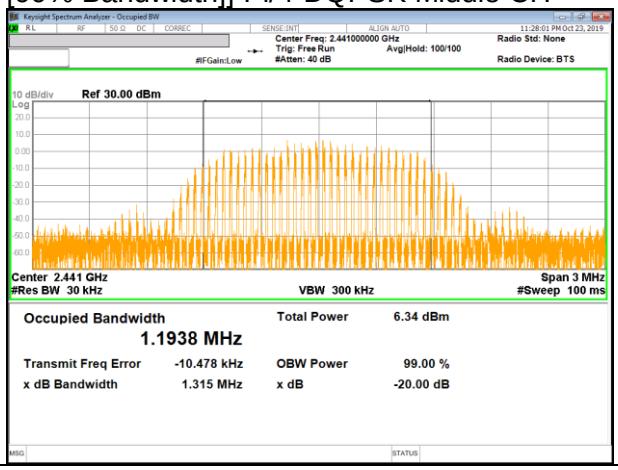
[99% Bandwidth] Pi/4-DQPSK Low CH



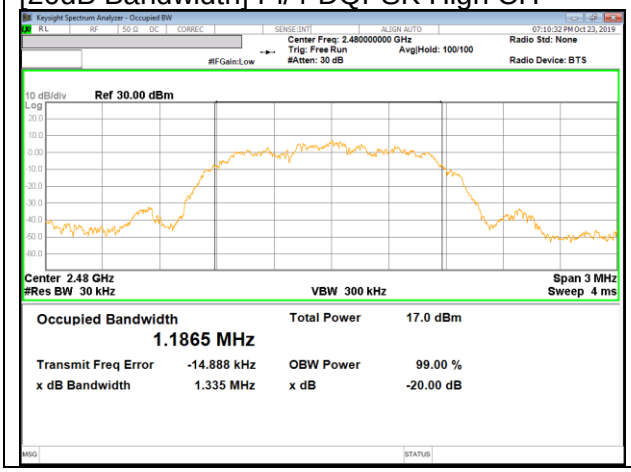
[20dB Bandwidth] Pi/4-DQPSK Middle CH



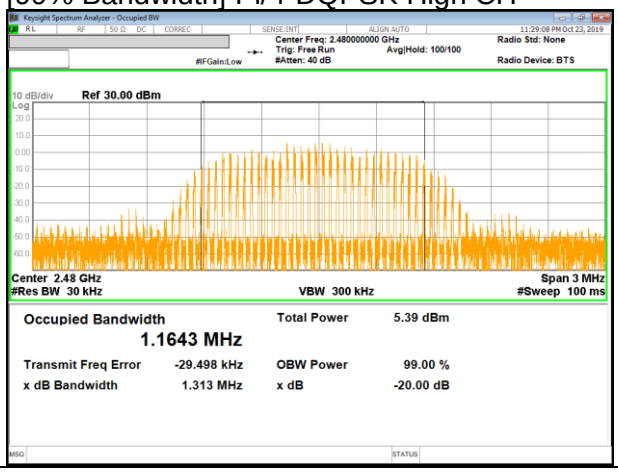
[99% Bandwidth]] Pi/4-DQPSK Middle CH



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



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



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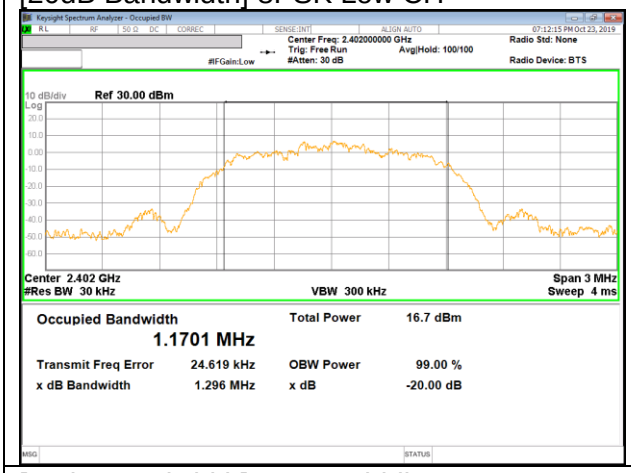
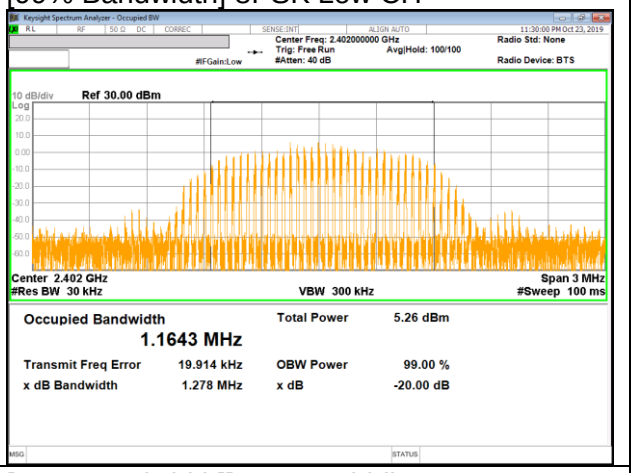
8PSK BANDWIDTH

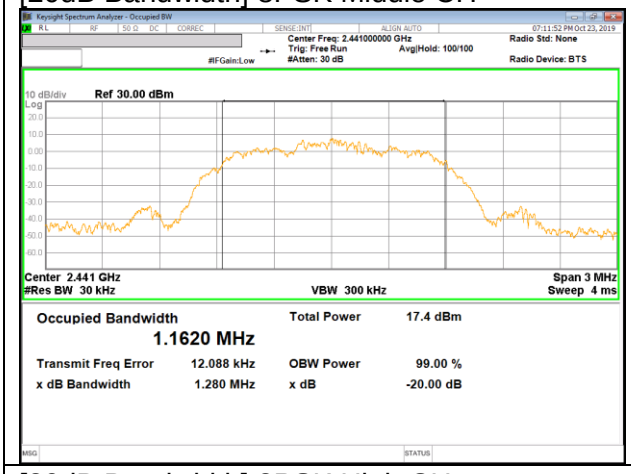
[20dB Bandwidth] 8PSK Low CH



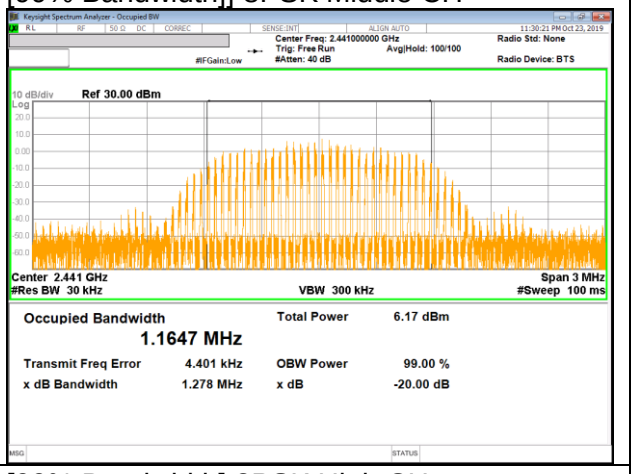
[99% Bandwidth] 8PSK Low CH



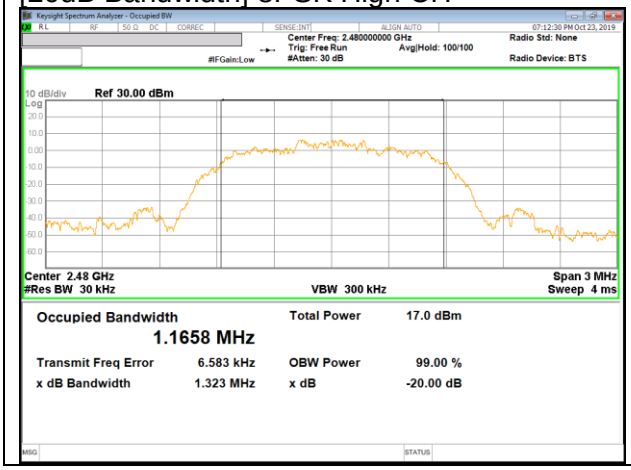
[20dB Bandwidth] 8PSK Middle CH



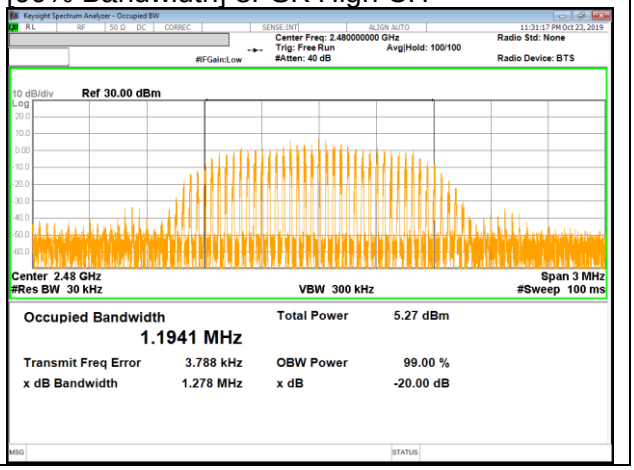
[99% Bandwidth]] 8PSK Middle CH



[20dB Bandwidth] 8PSK High CH



[99% Bandwidth] 8PSK High CH



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9. SUMMARY TABLE

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

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10. ANTENNA PORT TEST RESULTS

10.1. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

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

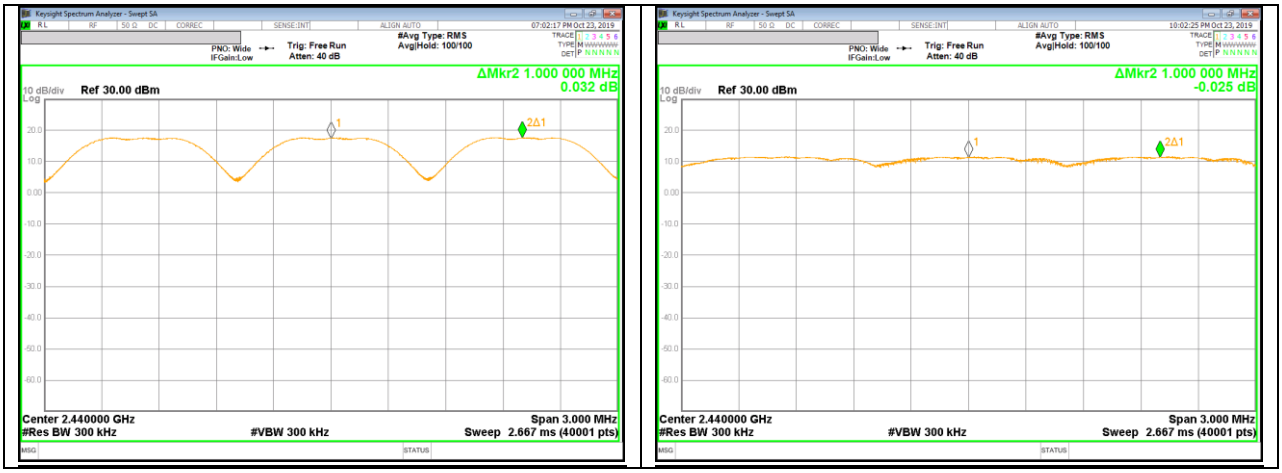
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION PLOT



[GFSK] **[8PSK]**

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10.2. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

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

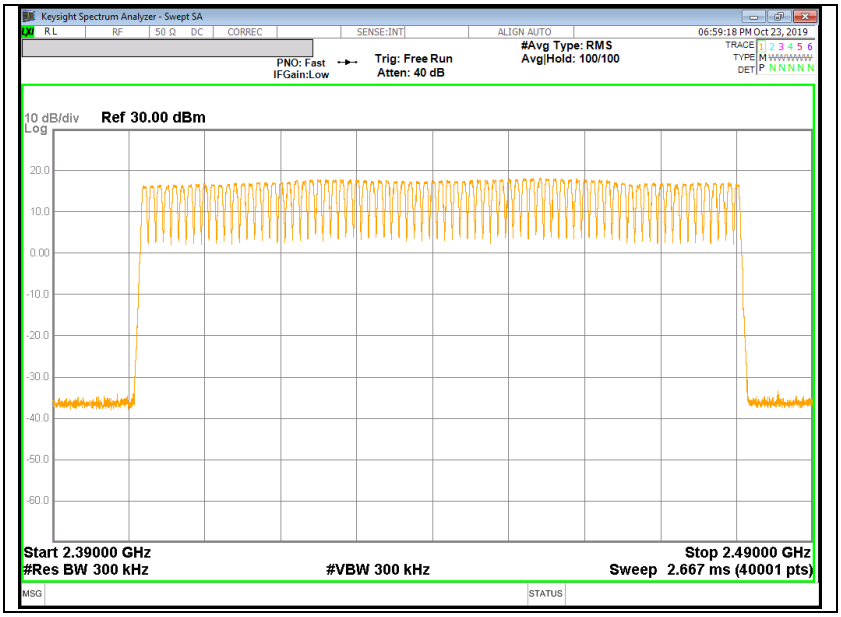
TEST PROCEDURE

RBW = To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
VBW ≥ RBW
Sweep = Auto
Detector function = Peak
Trace = Max hold

RESULTS

Normal Mode: 79 Channels observed.

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



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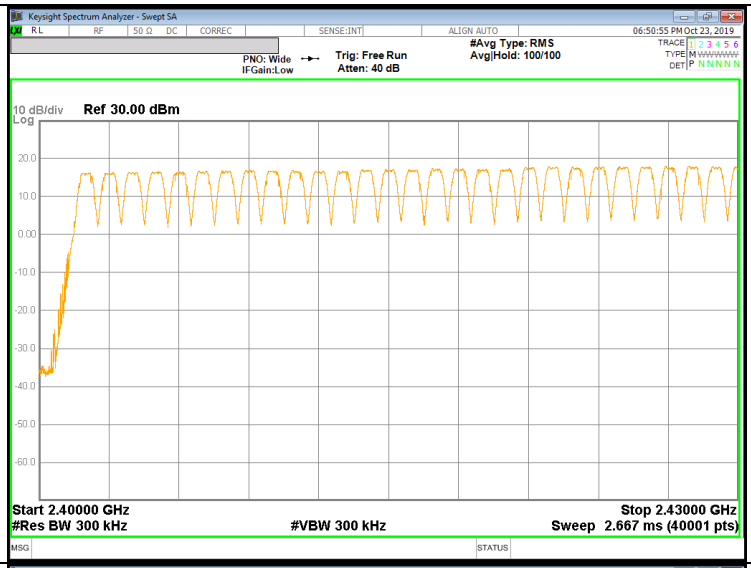
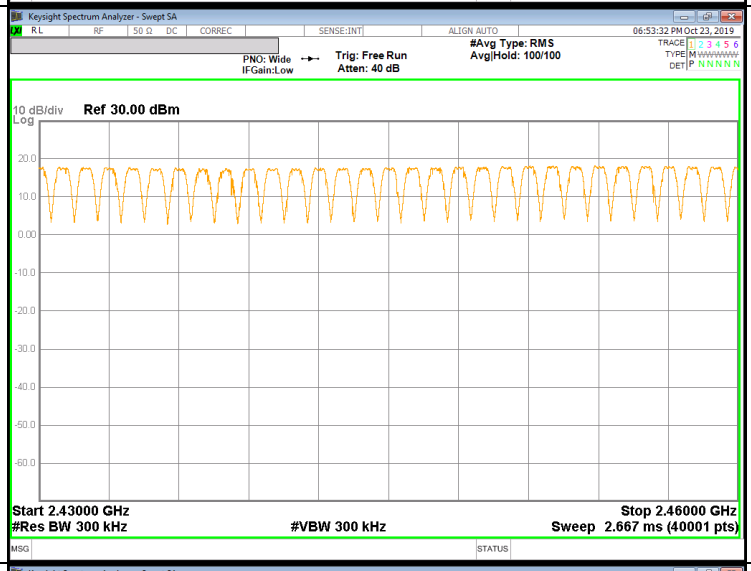
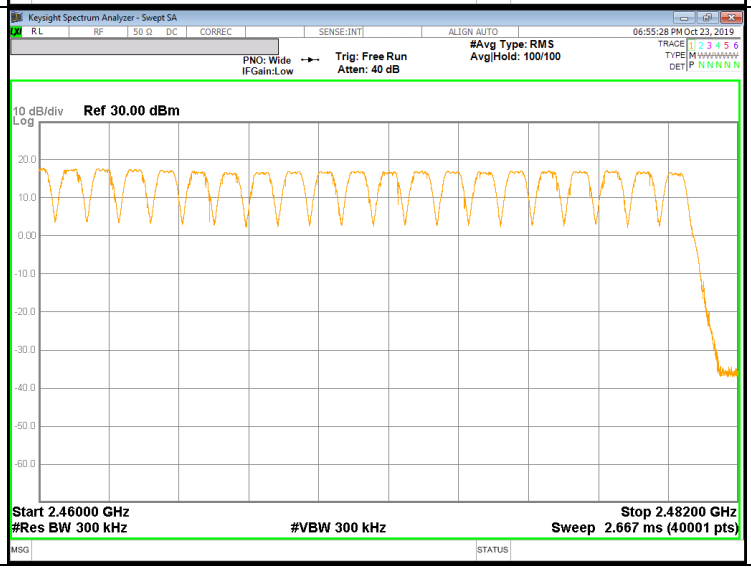
1st SEGMENT 2400 to 2430 MHz	
2nd SEGMENT 2430 to 2460 MHz	
3rd SEGMENT 2460 to 2482 MHz	

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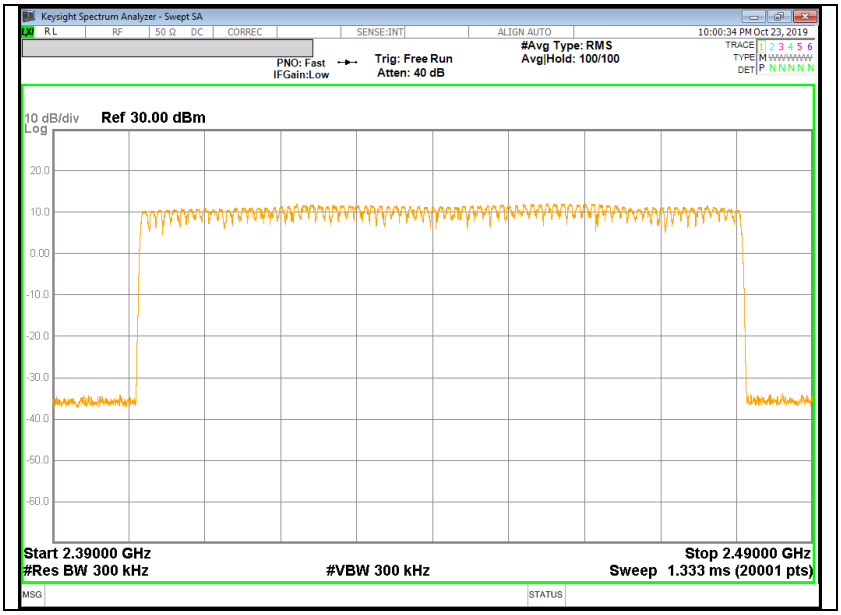
NUMBER OF HOPPING CHANNELS PLOTS[8PSK]

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



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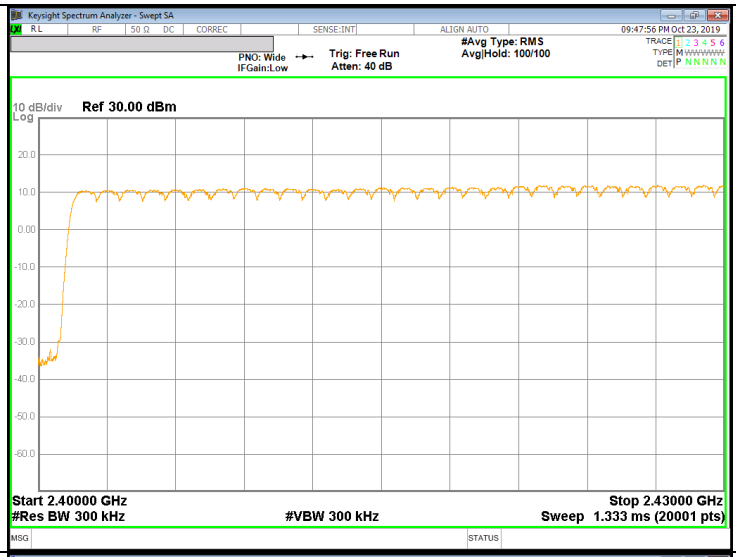
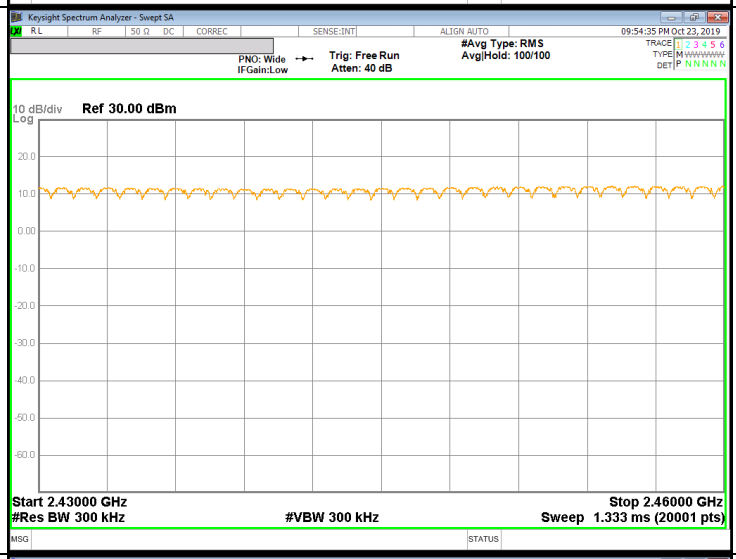
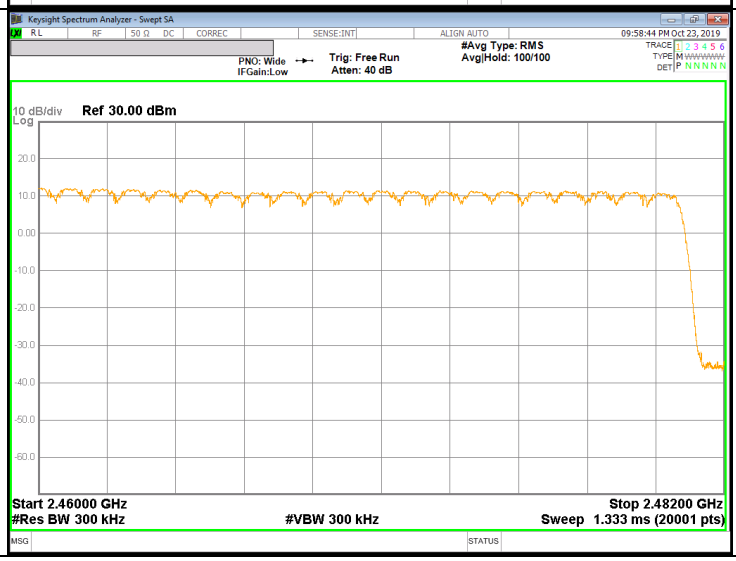
1st SEGMENT 2400 to 2430 MHz	
2nd SEGMENT 2430 to 2460 MHz	
3rd SEGMENT 2460 to 2482 MHz	

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10.3. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

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

TEST PROCEDURE

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

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

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

RESULTS[GFSK]

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.380	32	0.121600	0.4	-0.2784
DH3	1.635	16	0.261600	0.4	-0.1384
DH5	2.884	12	0.346080	0.4	-0.0539
DH Packet	**Pulse Width [msec]**	**Number of Pulses in 0.8 seconds**	**Average Time of Occupancy [sec]**	**Limit [sec]**	**Margin [sec]**
GFSK AFH					
DH1	0.380	8	0.030400	0.4	-0.3696
DH3	1.635	4	0.065400	0.4	-0.3346
DH5	2.884	3	0.086520	0.4	-0.3135

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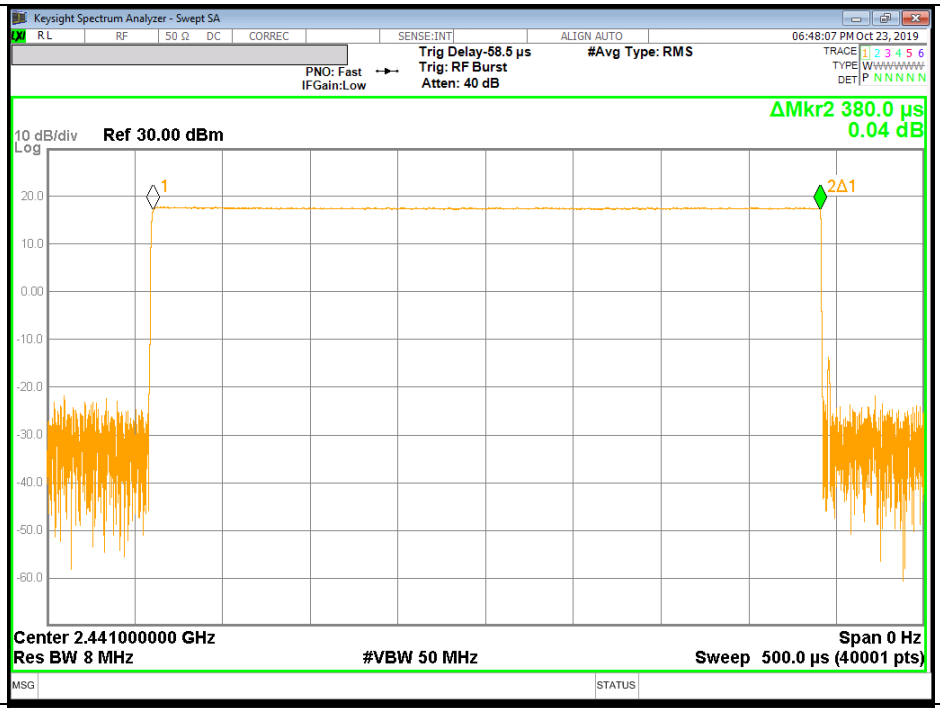
DH1

DH1 Pulse Width	
DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD	

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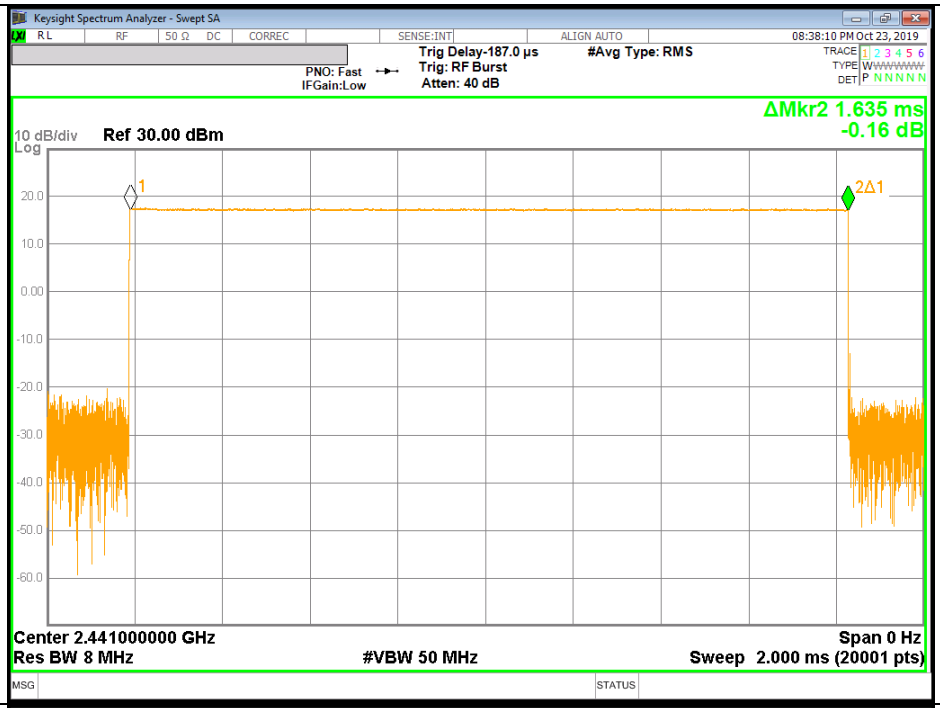
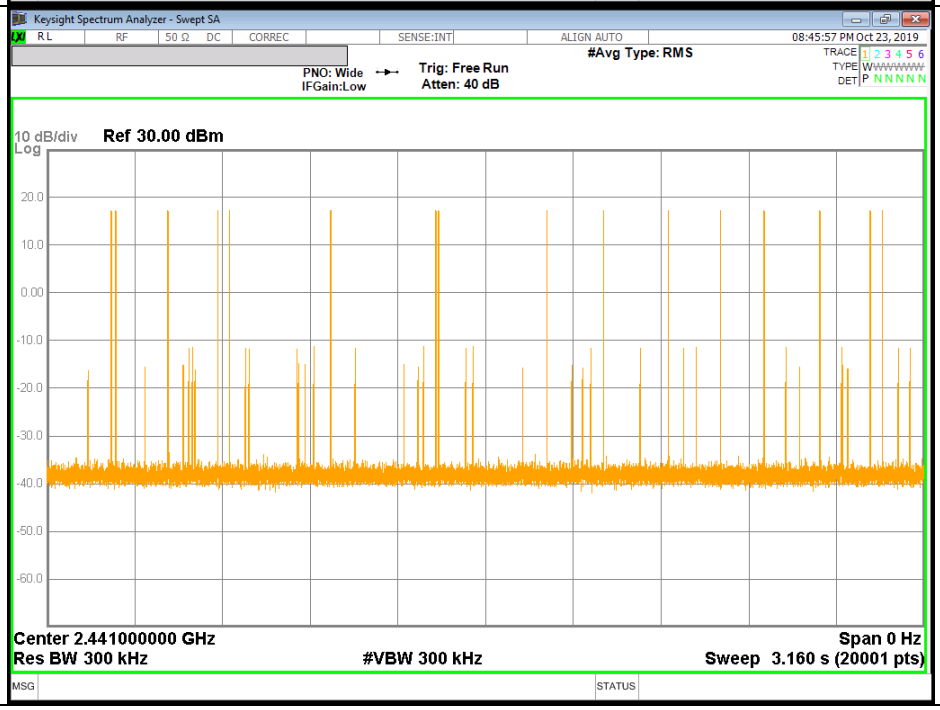
DH3

DH3 Pulse Width	
DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD	

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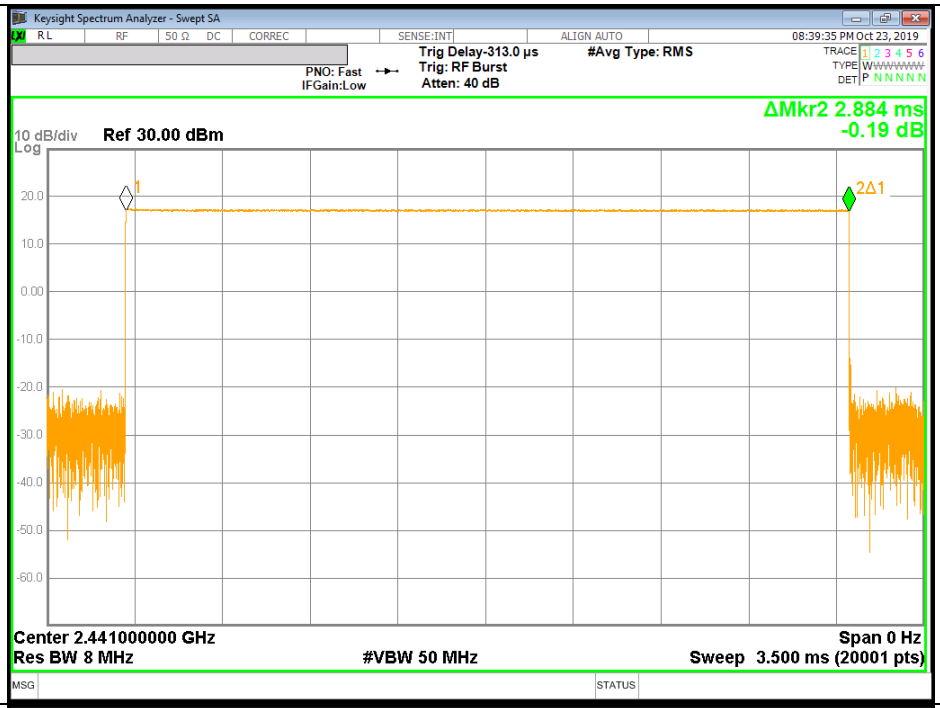
DH5

DH5 Pulse Width	
DH5 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD	

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RESULTS[8PSK]

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.386	32	0.123488	0.4	-0.2765
DH3	1.637	16	0.261920	0.4	-0.1381
DH5	2.886	12	0.346320	0.4	-0.0537
DH Packet	**Pulse Width [msec]**	**Number of Pulses in 0.8 seconds**	**Average Time of Occupancy [sec]**	**Limit [sec]**	**Margin [sec]**
GFSK AFH					
DH1	0.386	8	0.030872	0.4	-0.369128
DH3	1.637	4	0.065480	0.4	-0.33452
DH5	2.886	3	0.086580	0.4	-0.31342

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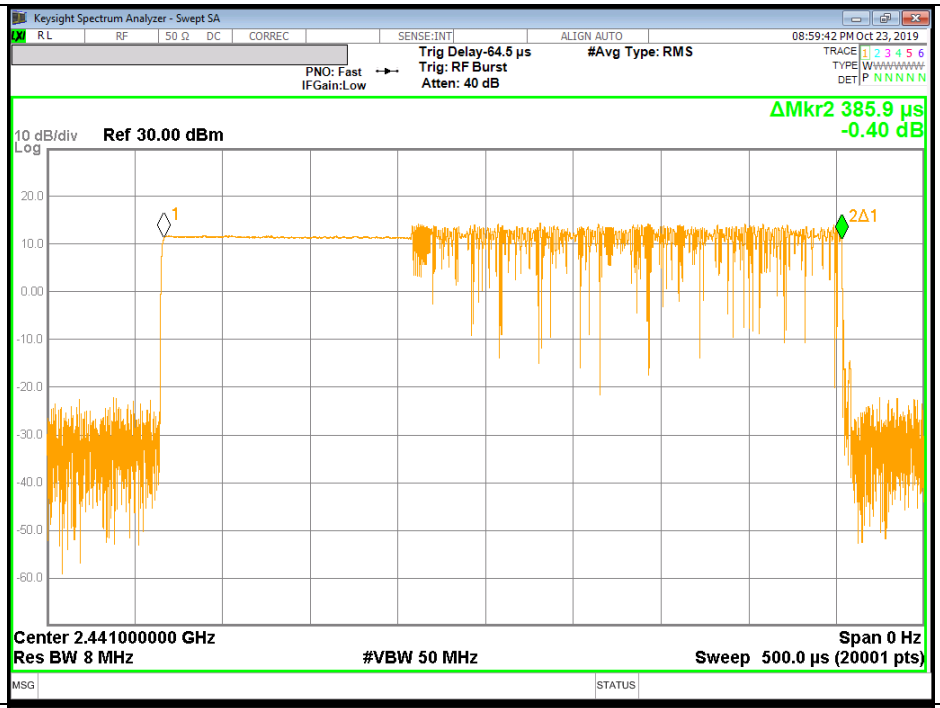
DH1

DH1 Pulse Width	
DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD	

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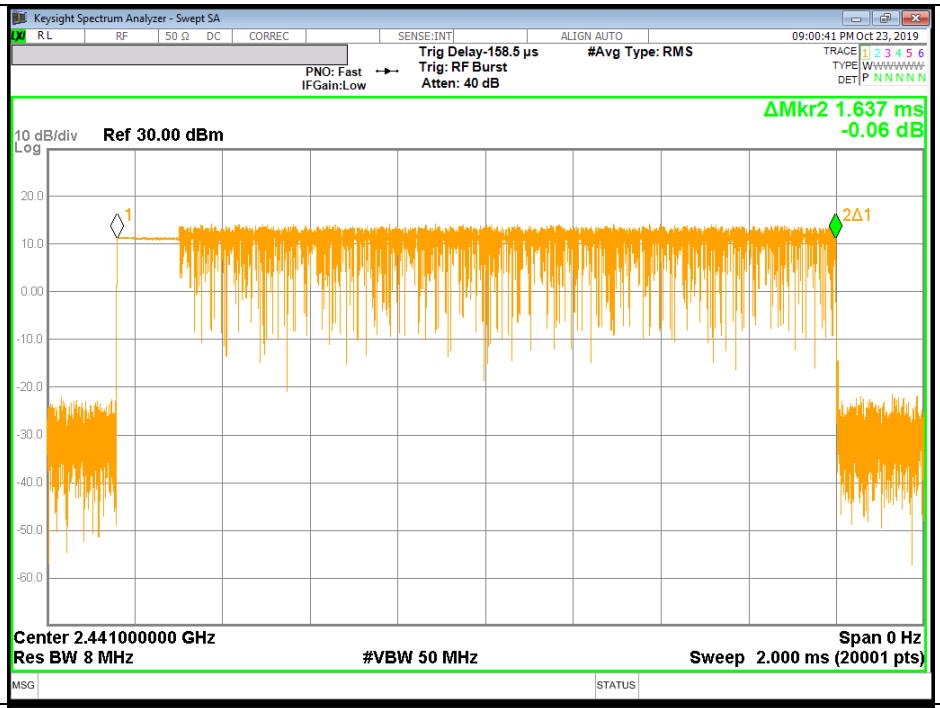
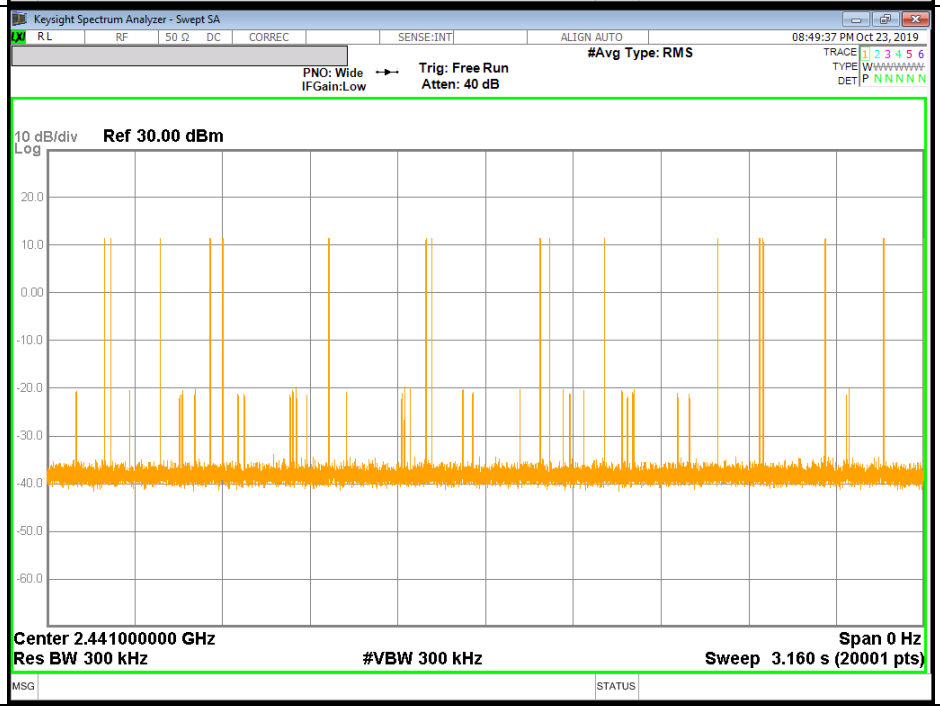
DH3

DH3 Pulse Width	
DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD	

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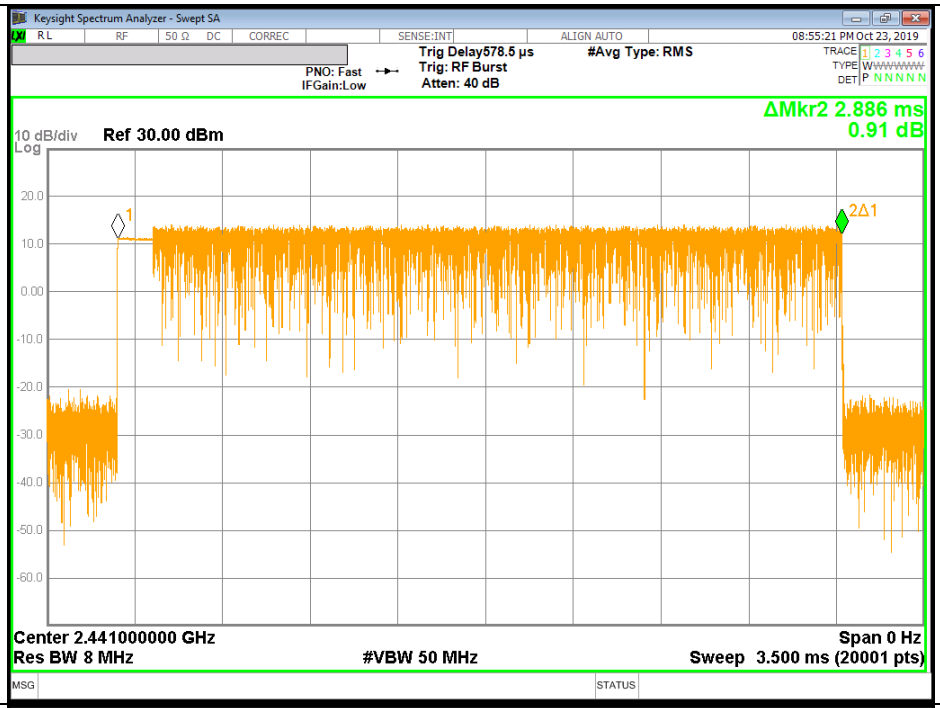
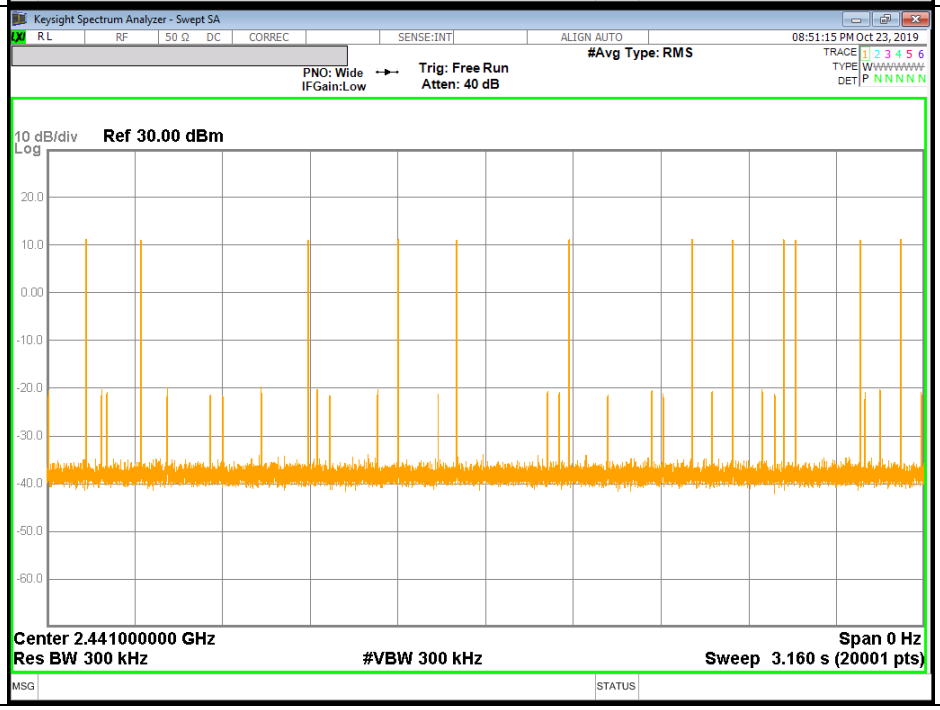
DH5

DH5 Pulse Width	
DH5 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD	

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10.4. OUTPUT POWER

LIMIT

§15.247 (b) (1)

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

TEST PROCEDURE

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

RESULTS

10.4.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	17.196	21.000	-3.804
Mid	2 441	**17.751**	**21.000**	**-3.249**
High	2 480	16.587	21.000	-4.413
Worst		17.751	21.000	-3.249

10.4.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	13.728	21.000	-7.272
Mid	2 441	**14.001**	**21.000**	**-6.999**
High	2 480	13.292	21.000	-7.708
Worst		14.001	21.000	-6.999

10.4.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	14.189	21.000	-6.811
Mid	2 441	**14.297**	**21.000**	**-6.703**
High	2 480	13.777	21.000	-7.223
Worst		14.297	21.000	-6.703

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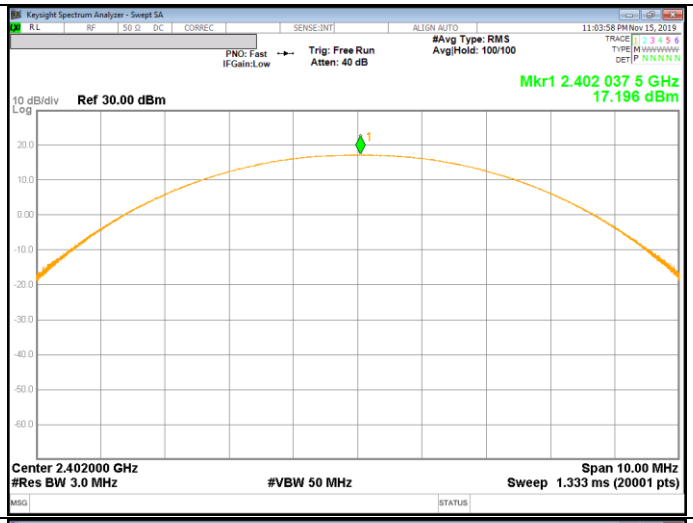
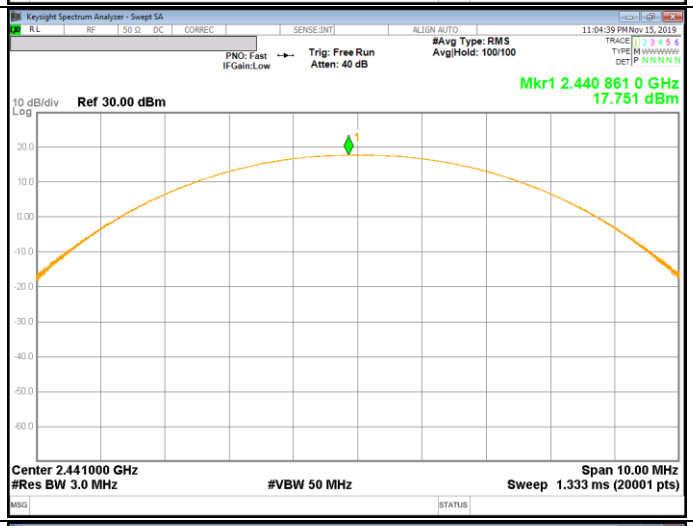
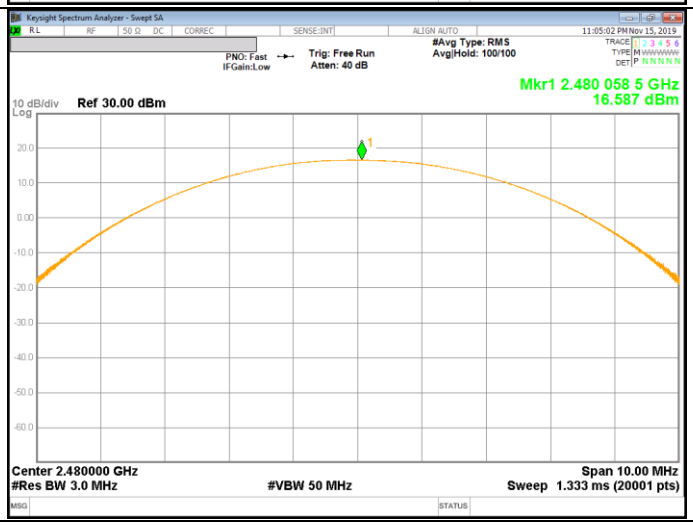
10.4.4. OUTPUT POWER PLOTS

GFSK OUTPUT POWER

GFSK Low CH	
GFSK Middle CH	
GFSK High CH	

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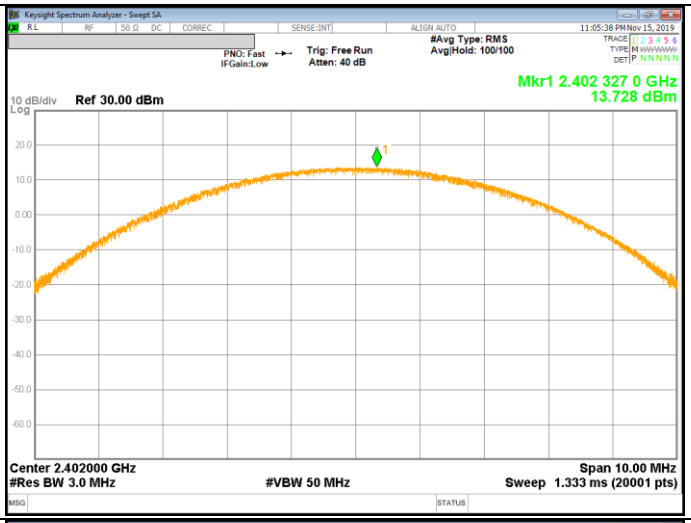
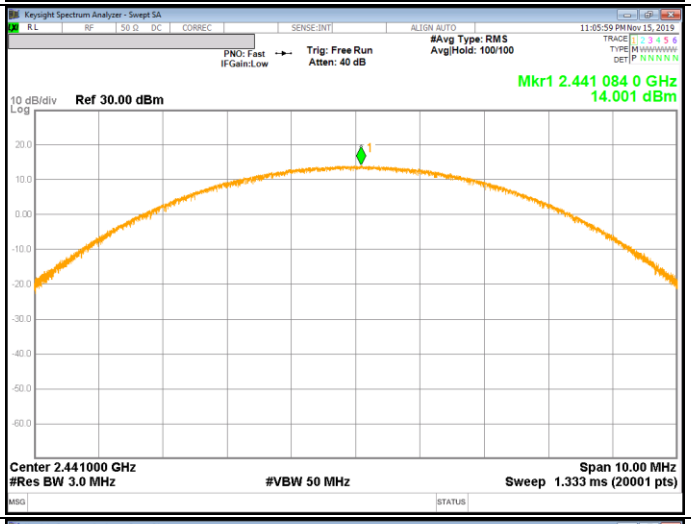
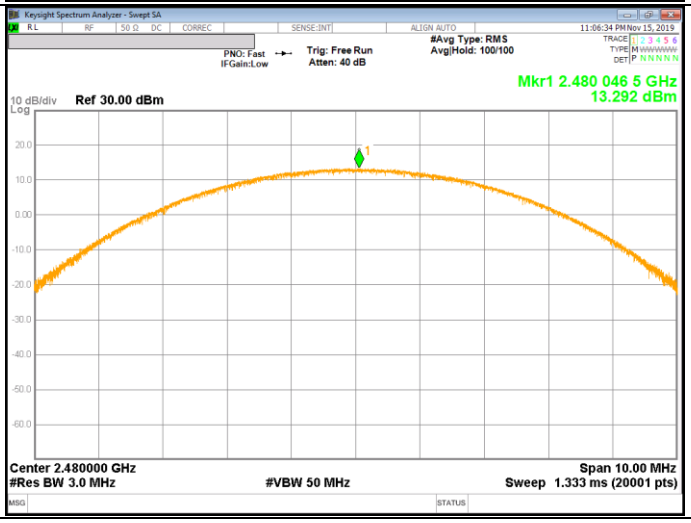
Pi/4-DPSK OUTPUT POWER

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

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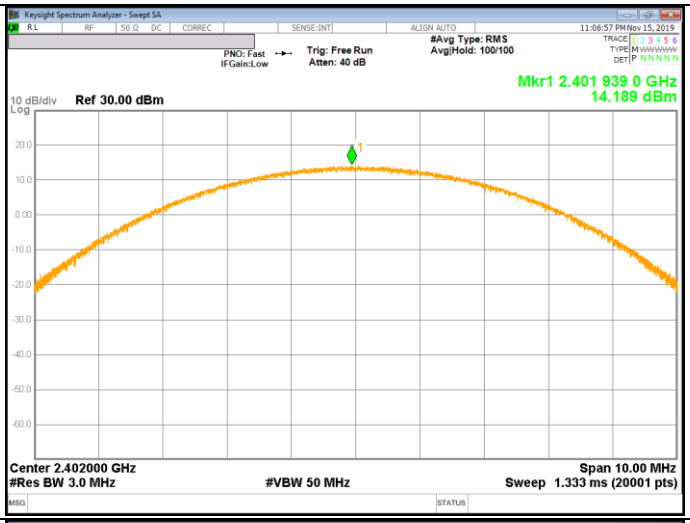
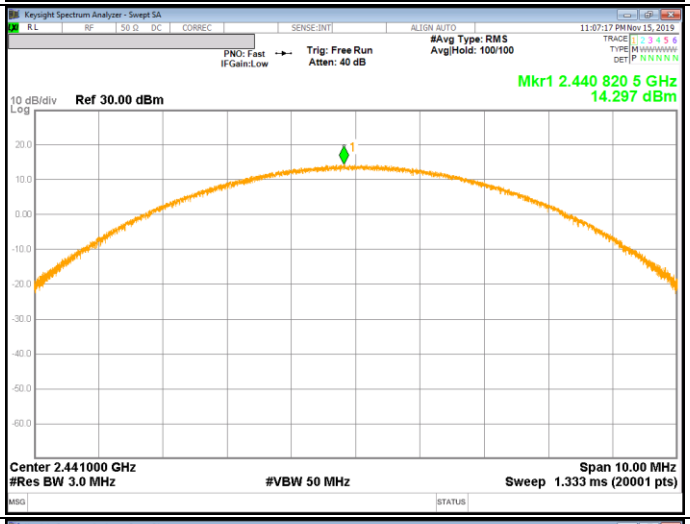
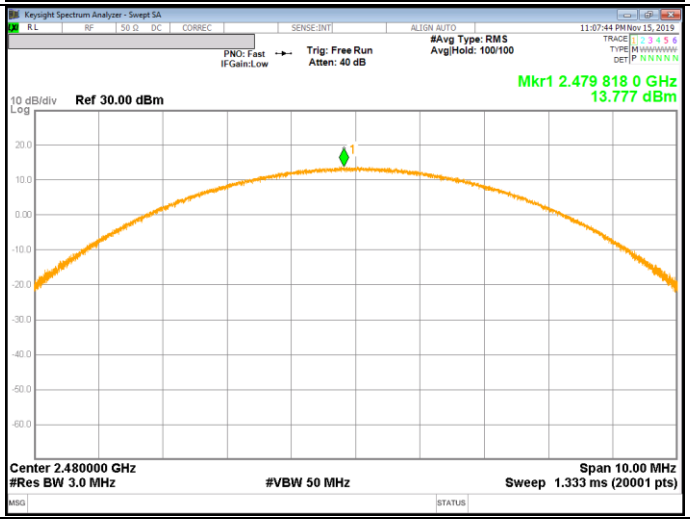
8PSK OUTPUT POWER

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

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10.5. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

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

10.5.1. BASIC DATA RATE GFSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	16.887	48.831
Middle	2 441	**17.459**	**55.706**
High	2 480	16.292	42.579

10.5.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	11.025	12.662
Middle	2 441	**11.266**	**13.384**
High	2 480	10.793	12.003

10.5.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2 402	11.042	12.712
Middle	2 441	**11.345**	**13.630**
High	2 480	10.799	12.020

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10.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

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

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

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

RESULTS

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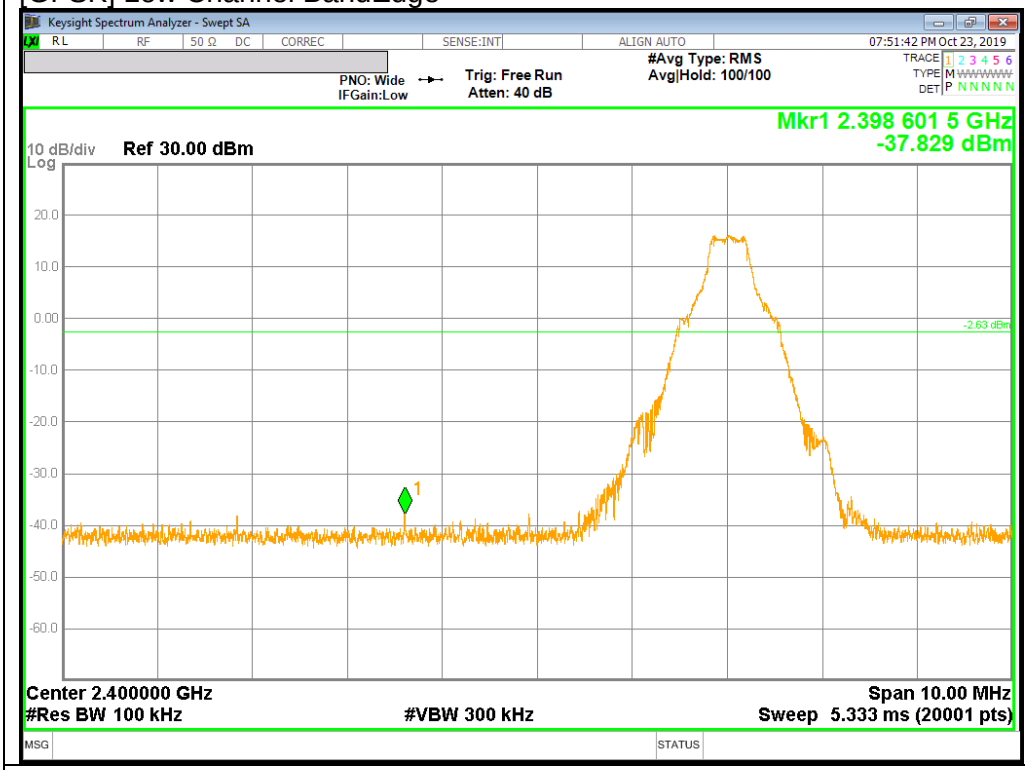
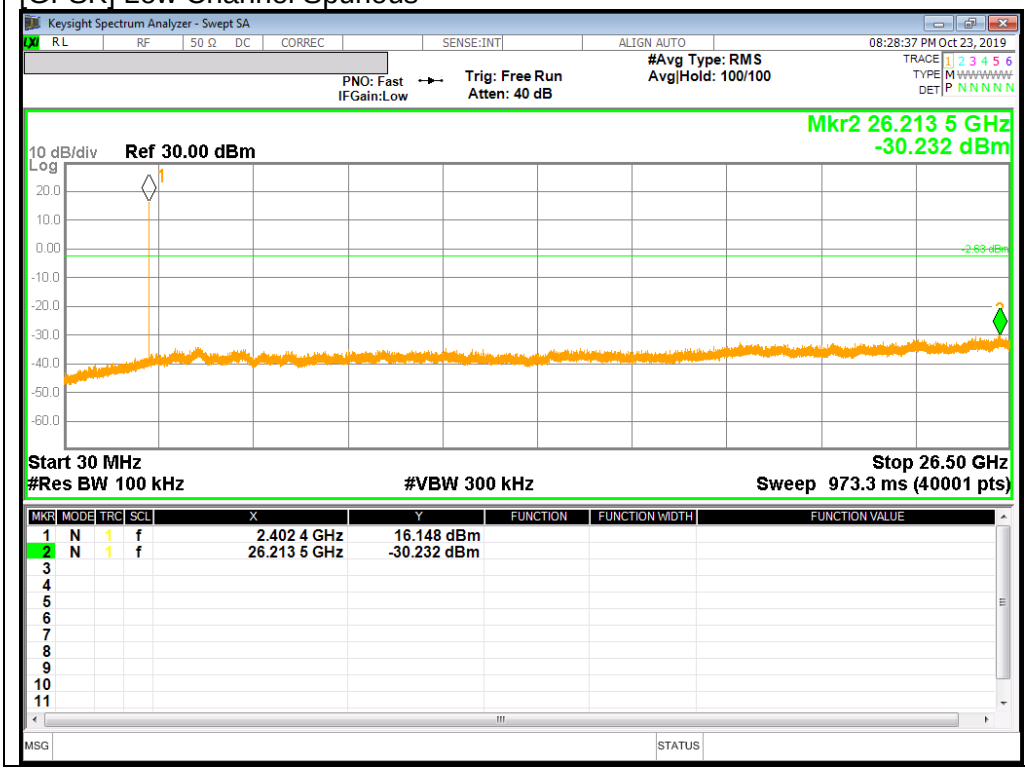
10.6.1. BASIC DATA RATE GFSK MODULATION

GFSK Mode

[GFSK] Low Channel BandEdge



[GFSK] Low Channel Spurious



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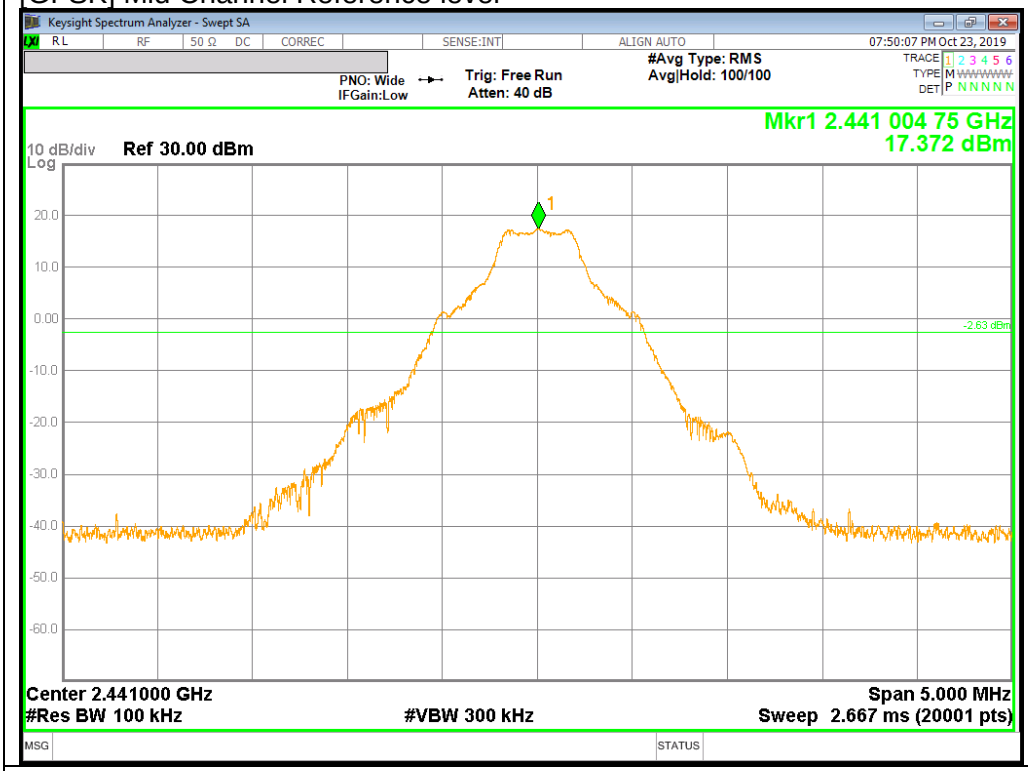
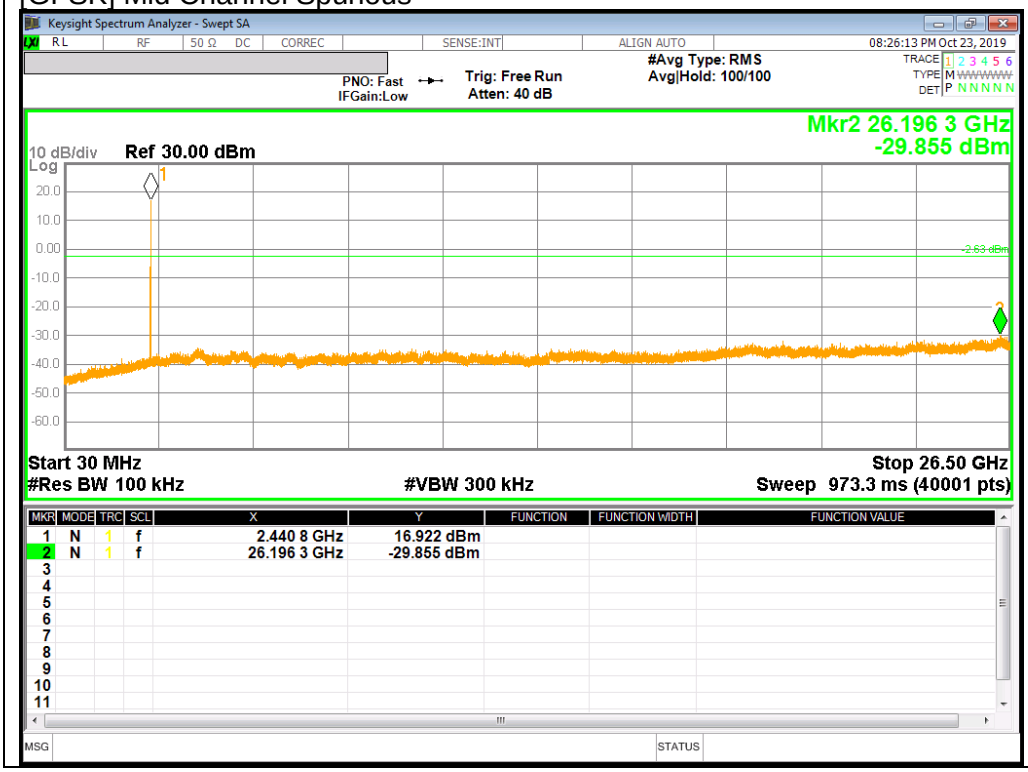
[GFSK] Mid Channel Reference level



[GFSK] Mid Channel Spurious



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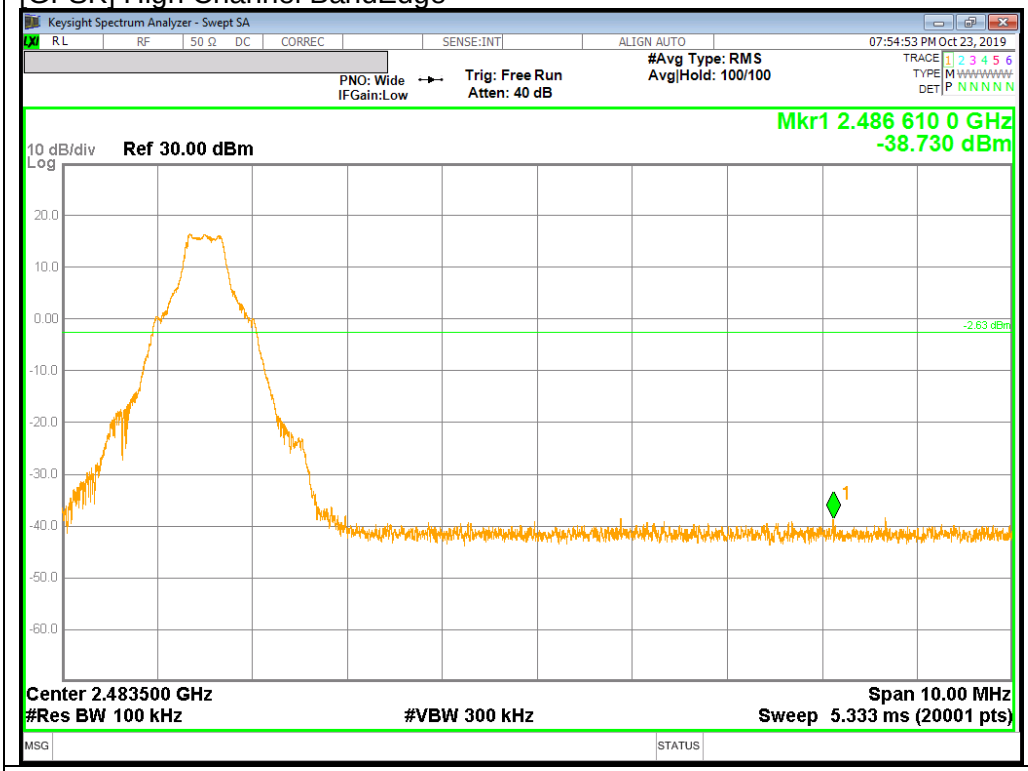
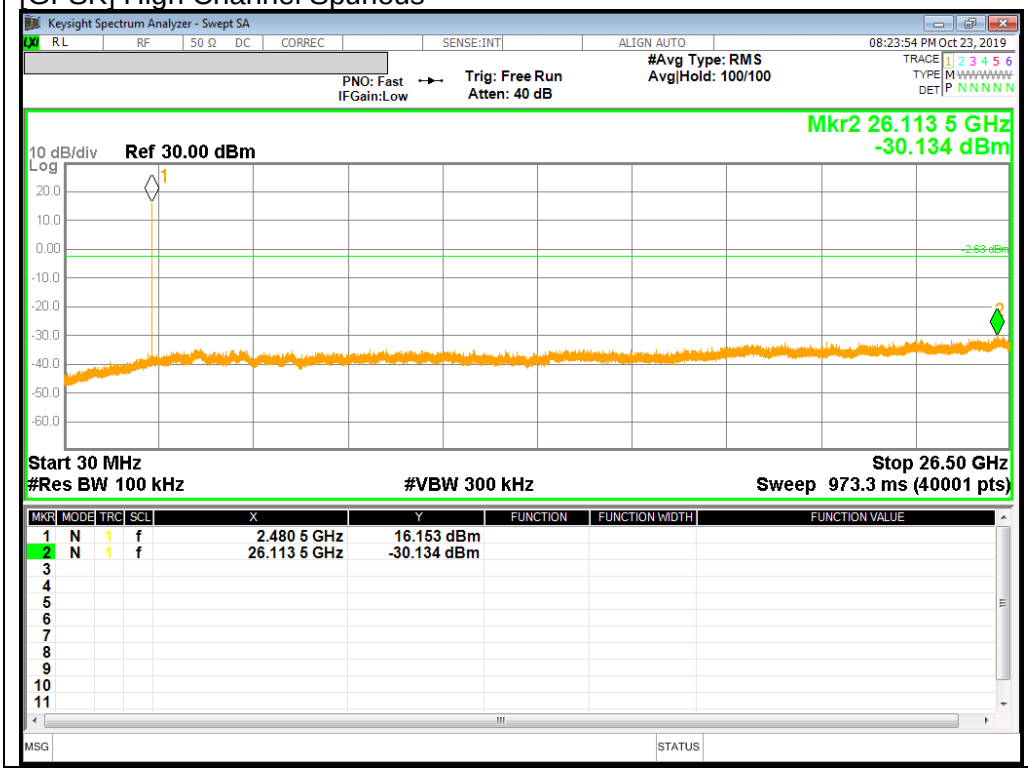
[GFSK] High Channel BandEdge



[GFSK] High Channel Spurious



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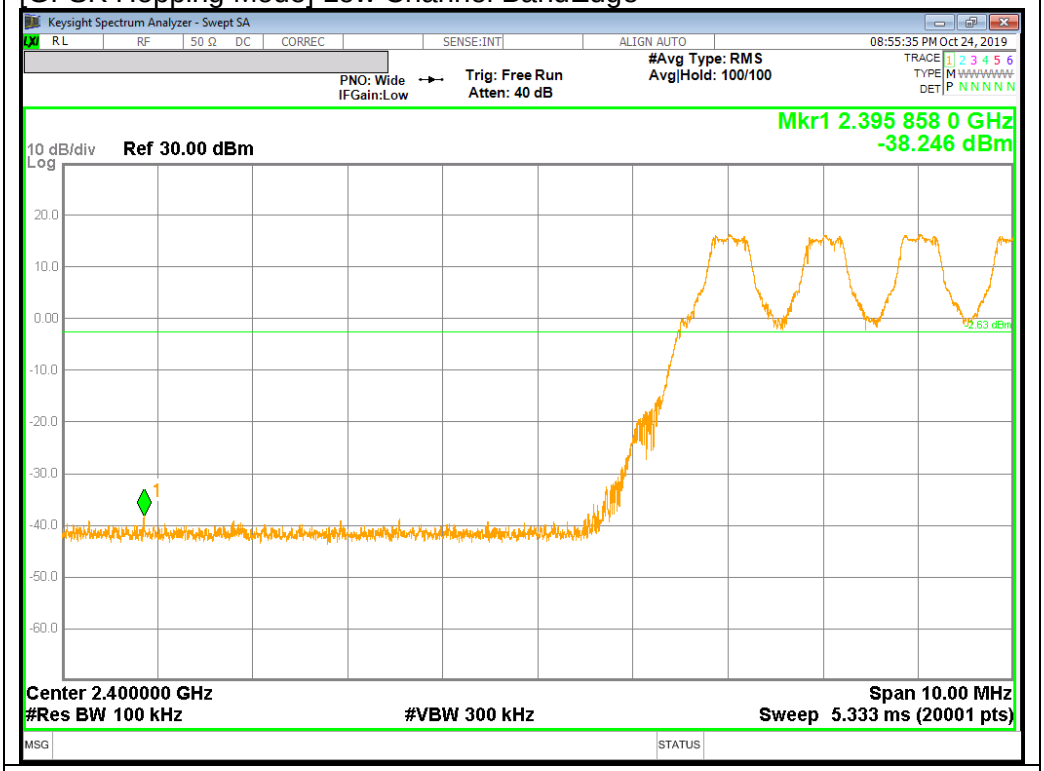
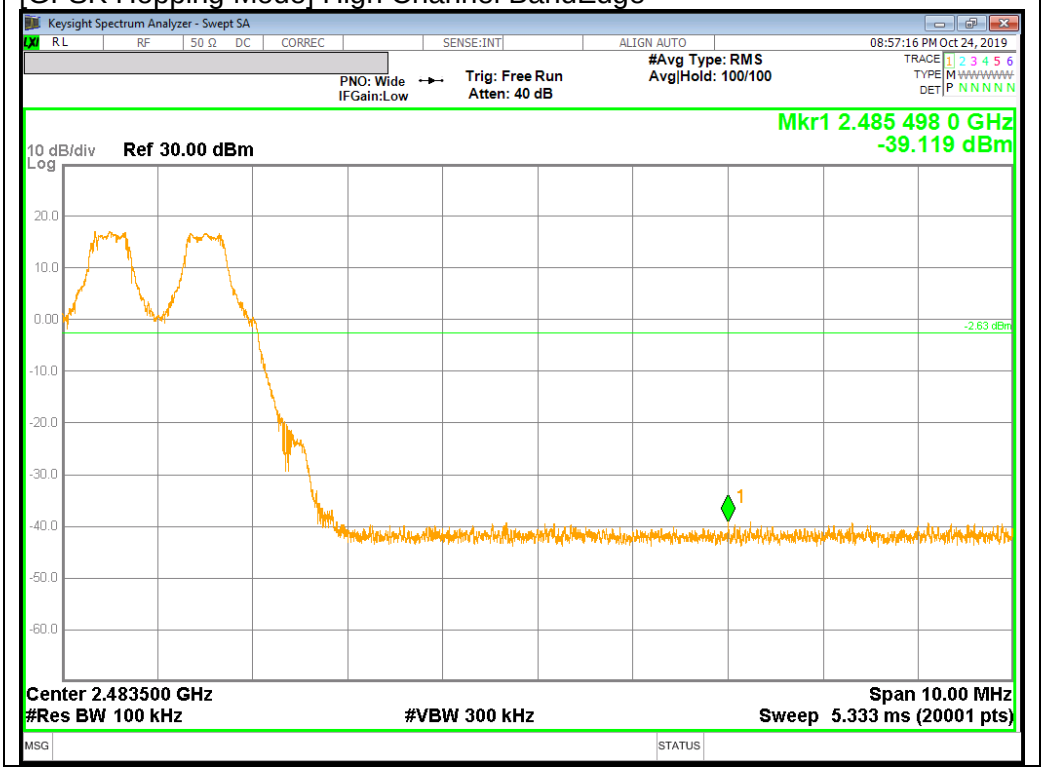
BandEdge Emission at GFSK Hopping Mode

[GFSK Hopping Mode] Low Channel BandEdge



[GFSK Hopping Mode] High Channel BandEdge



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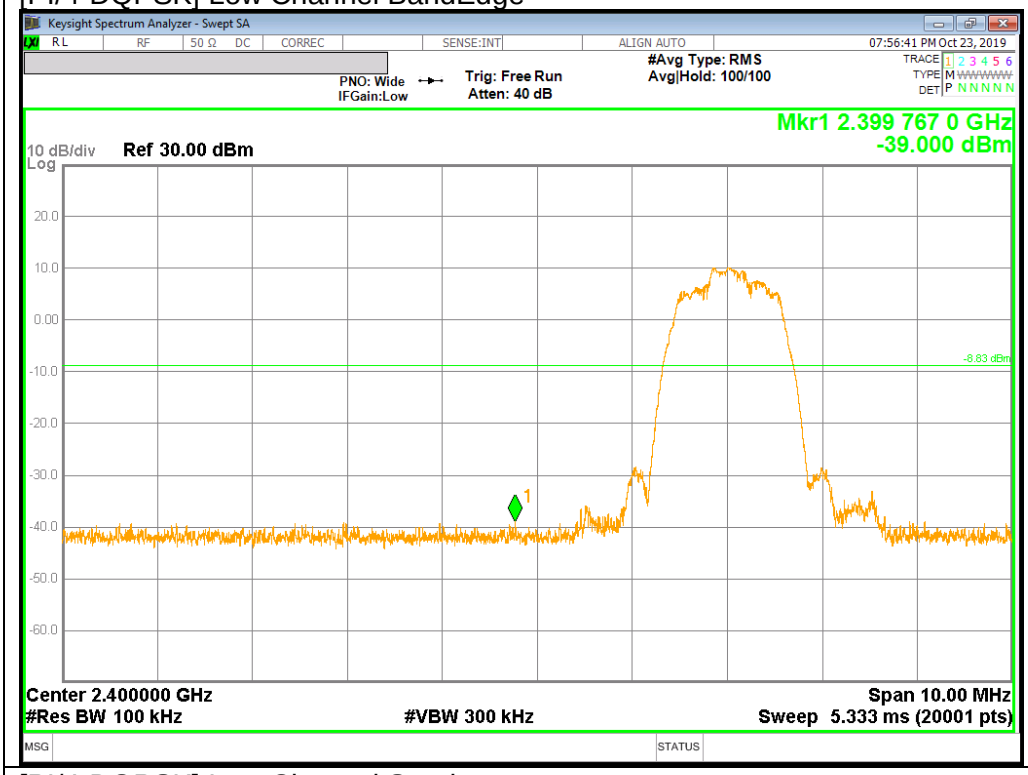
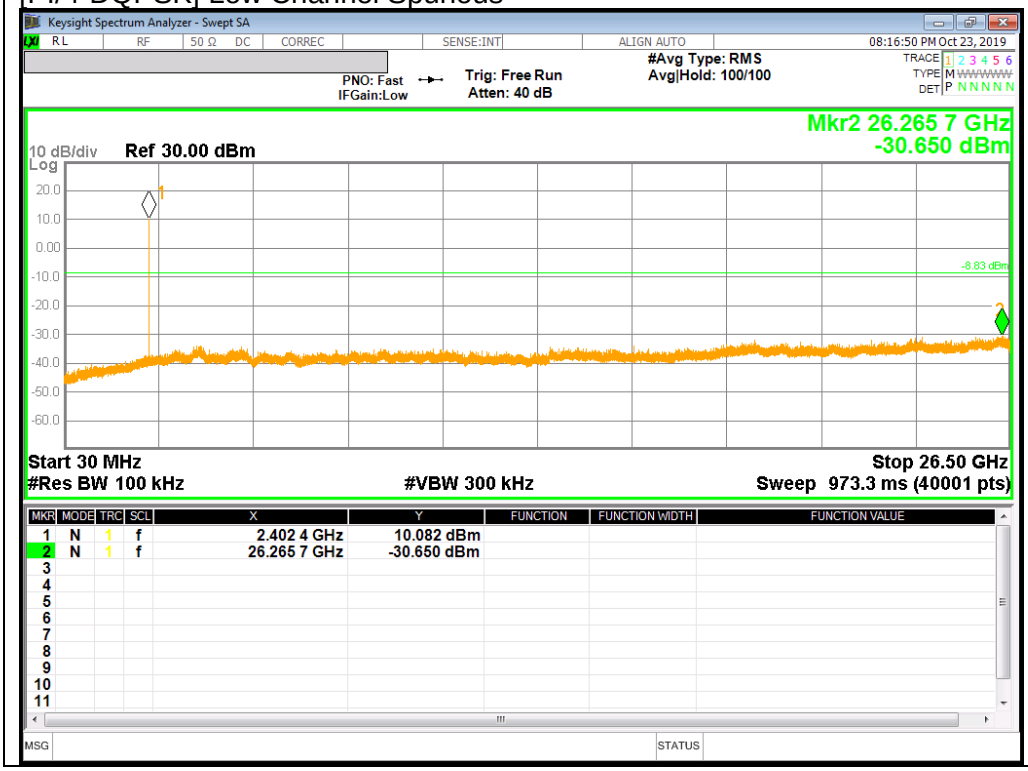
10.6.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

PI/4-DQPSK Mode

[PI/4-DQPSK] Low Channel BandEdge



[PI/4-DQPSK] Low Channel Spurious



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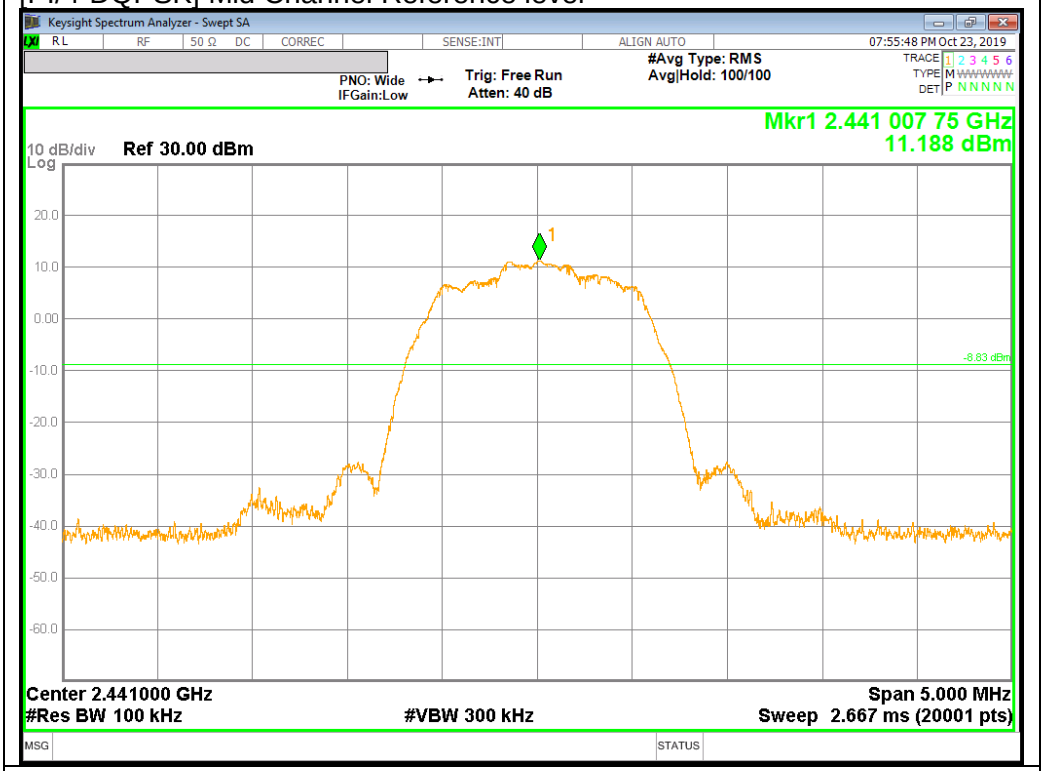
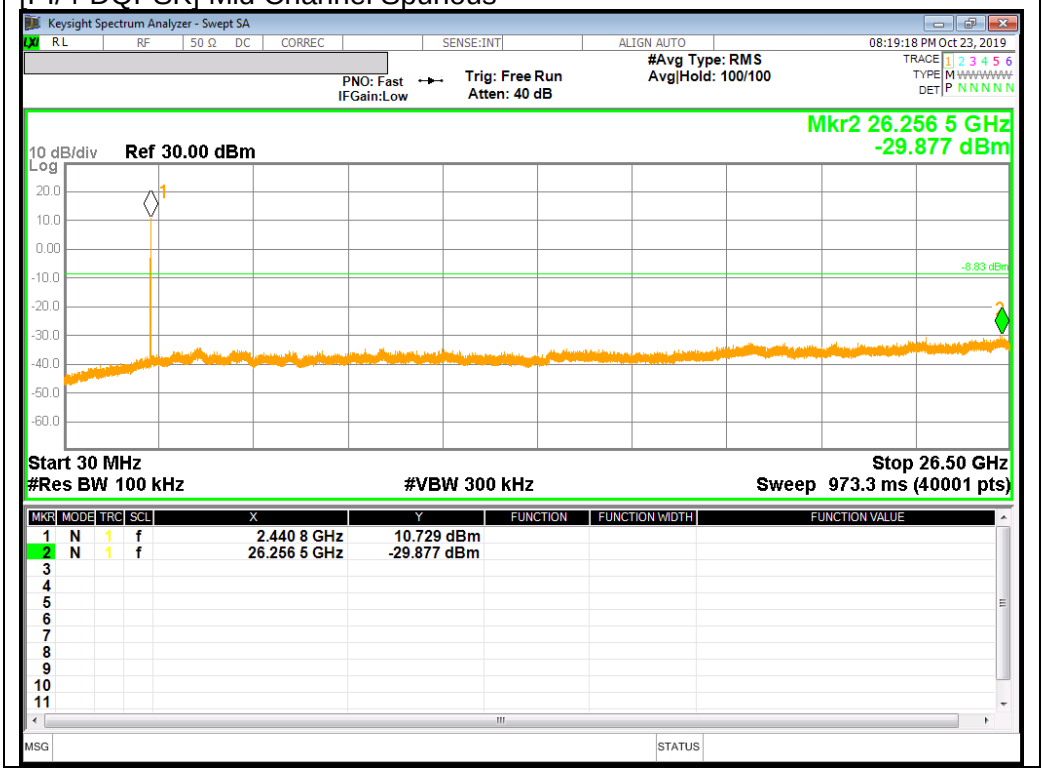
[PI/4-DQPSK] Mid Channel Reference level



[PI/4-DQPSK] Mid Channel Spurious



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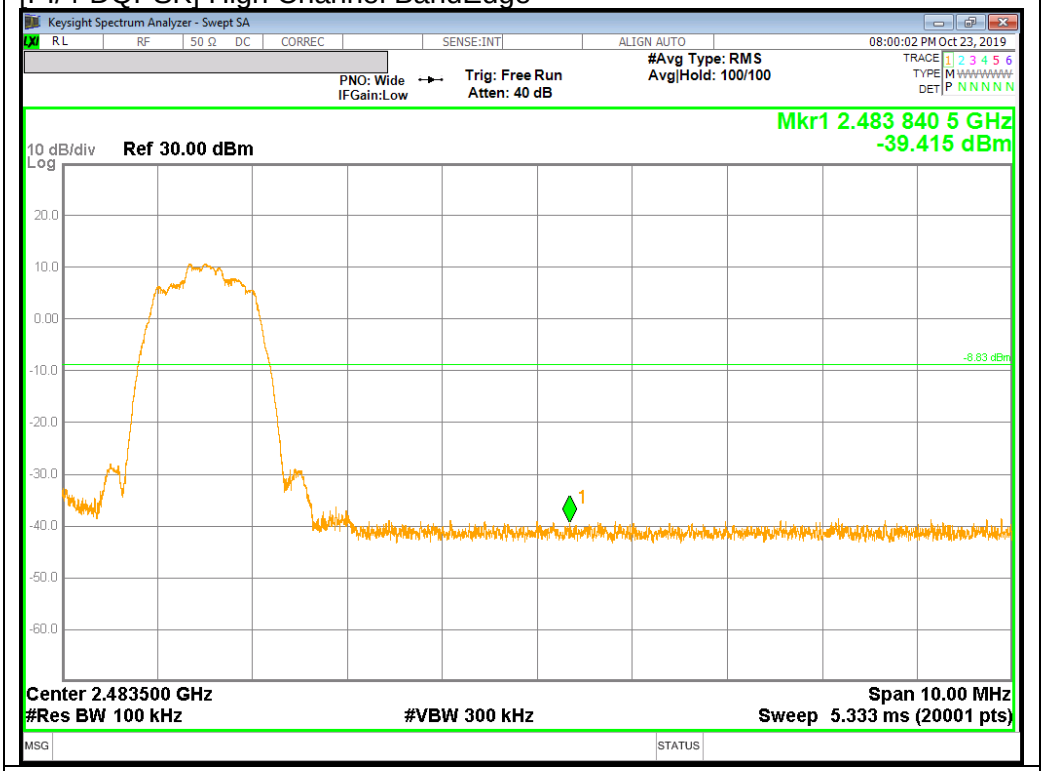
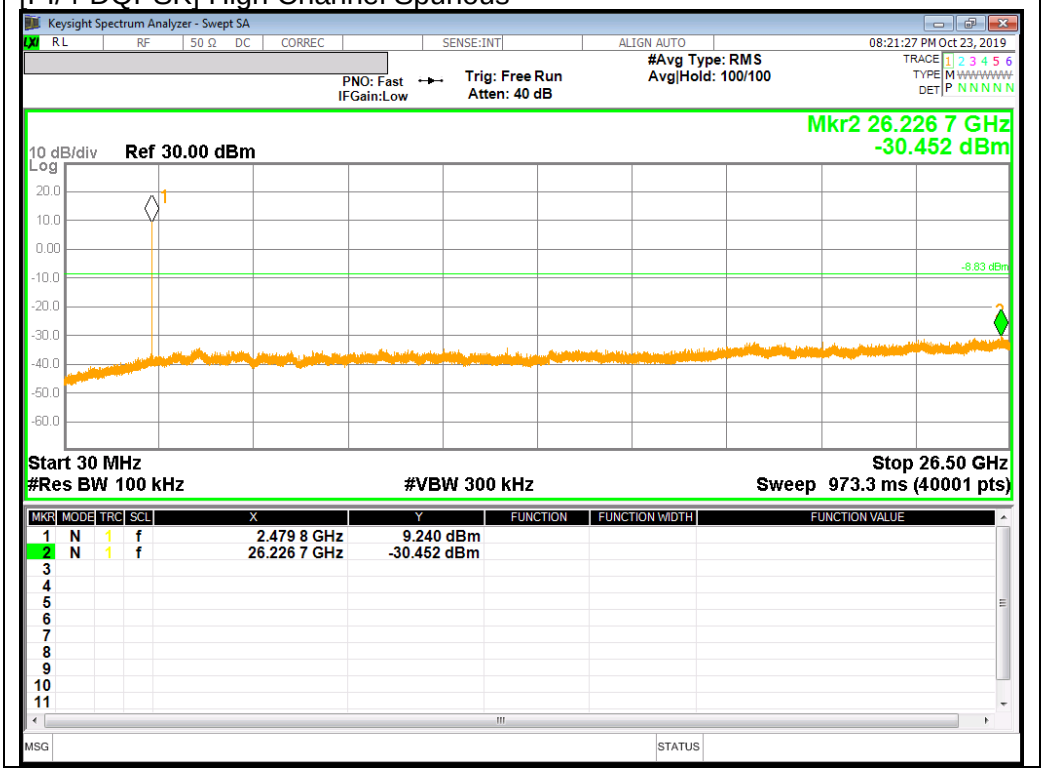
[PI/4-DQPSK] High Channel BandEdge



[PI/4-DQPSK] High Channel Spurious



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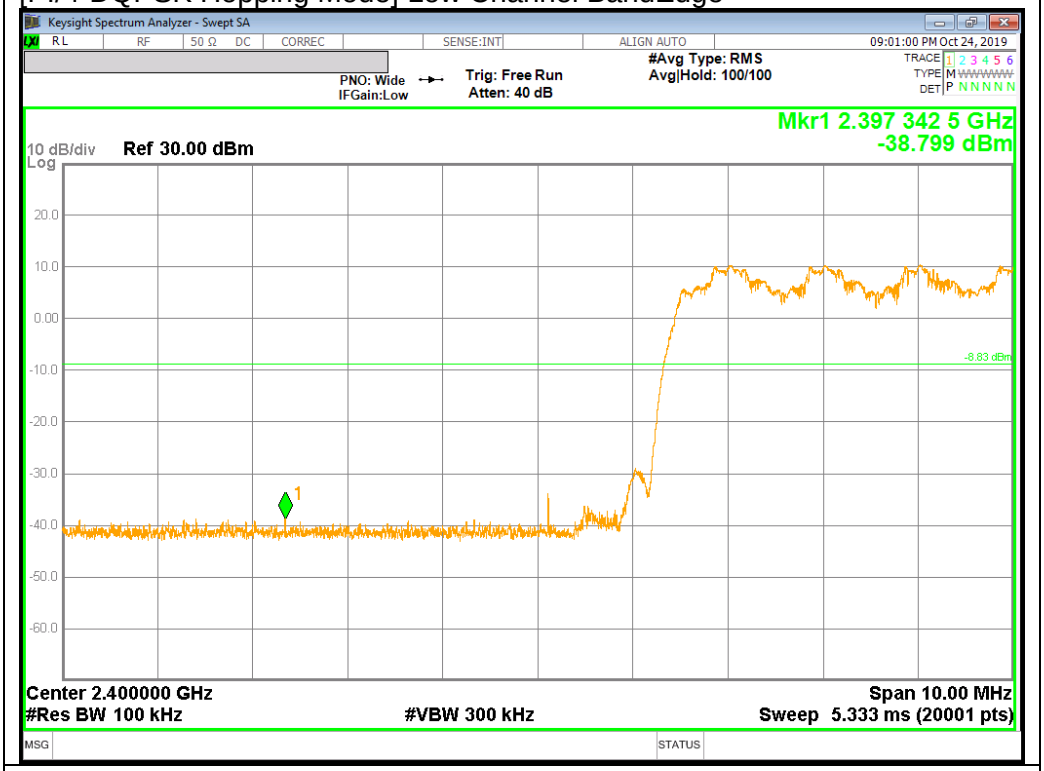
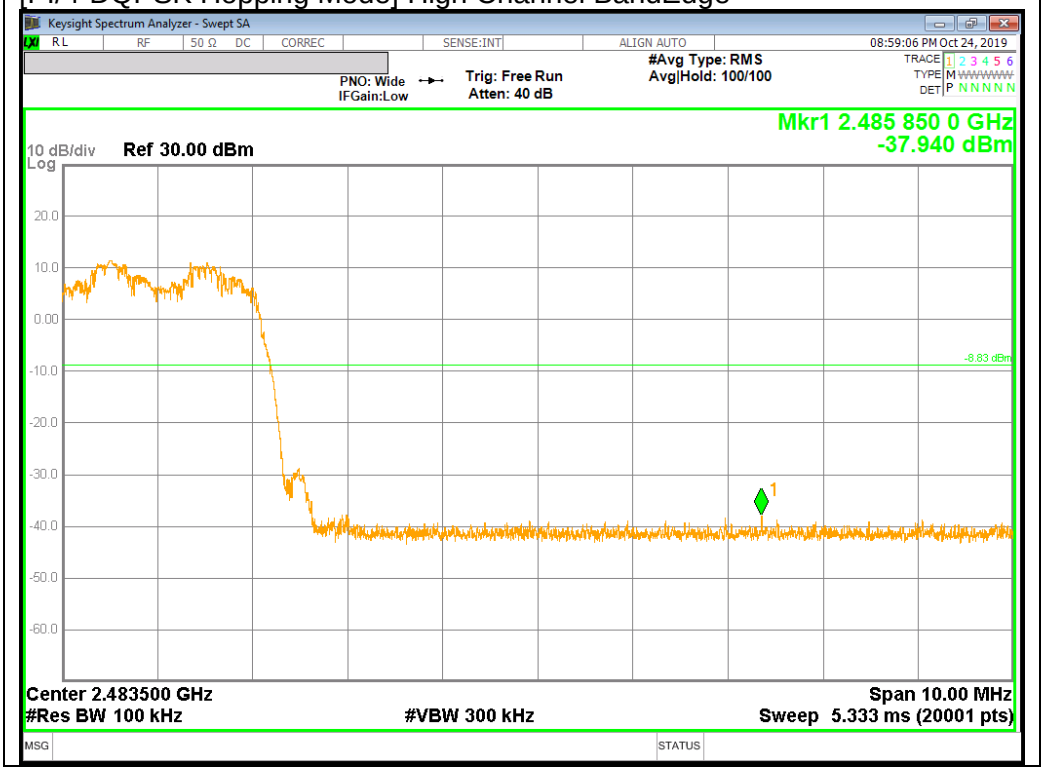
BandEdge Emission at PI/4-DQPSK Hopping Mode

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



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



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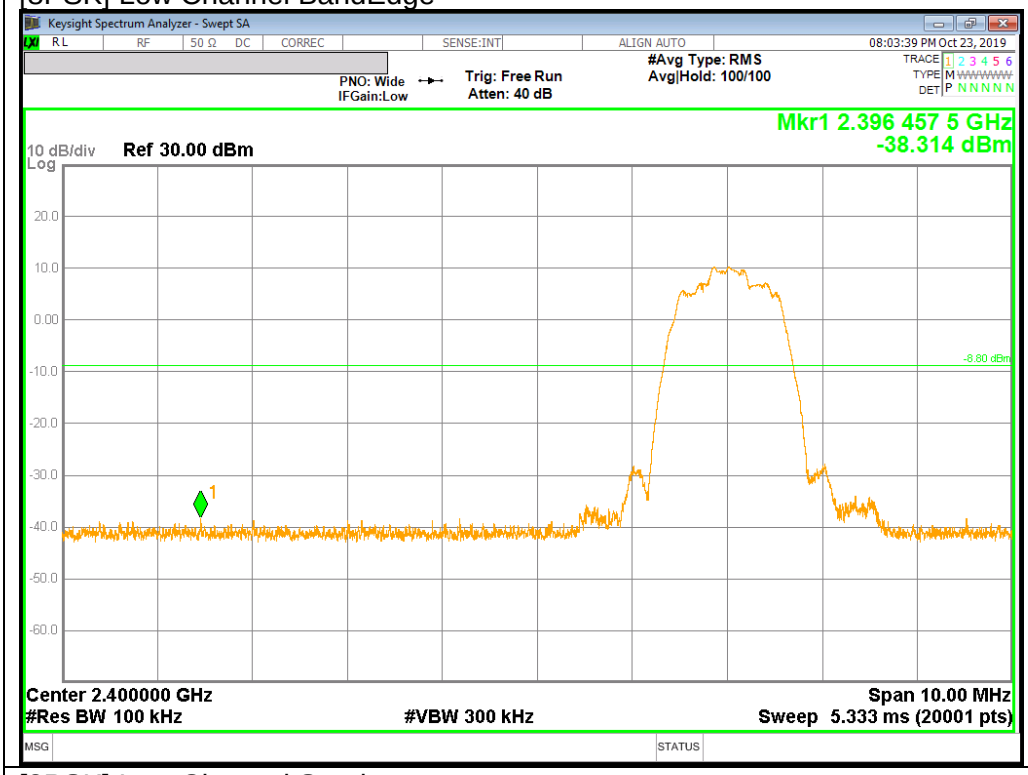
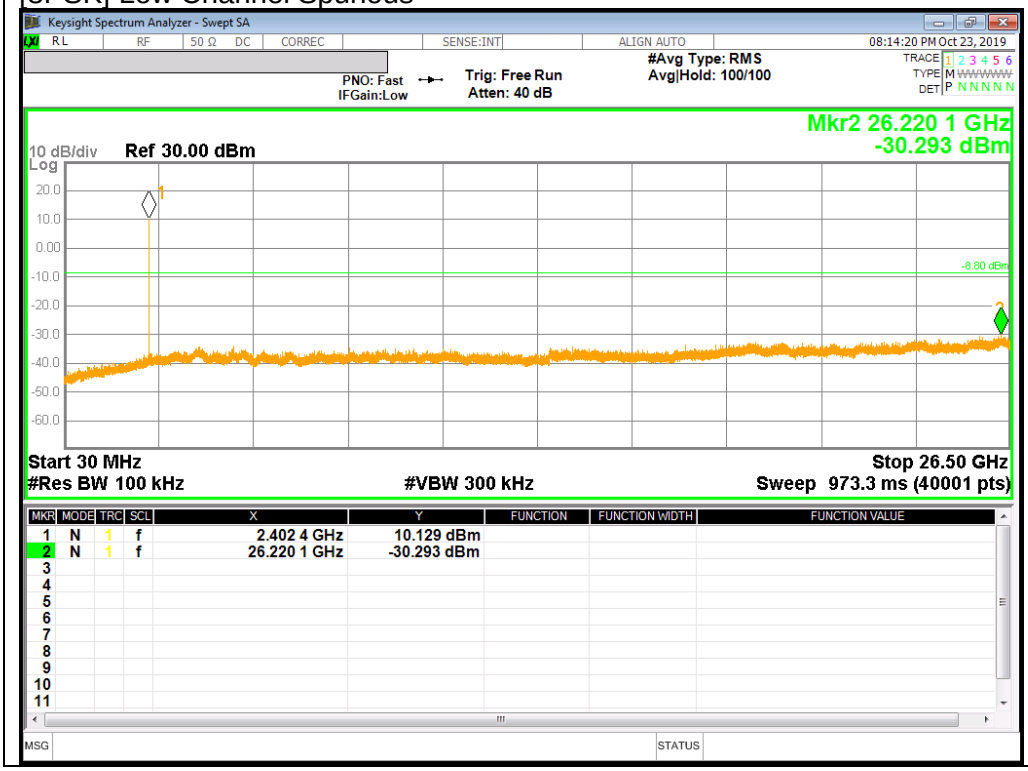
10.6.3. ENHANCED DATA RATE 8PSK MODULATION

8PSK Mode

[8PSK] Low Channel BandEdge



[8PSK] Low Channel Spurious



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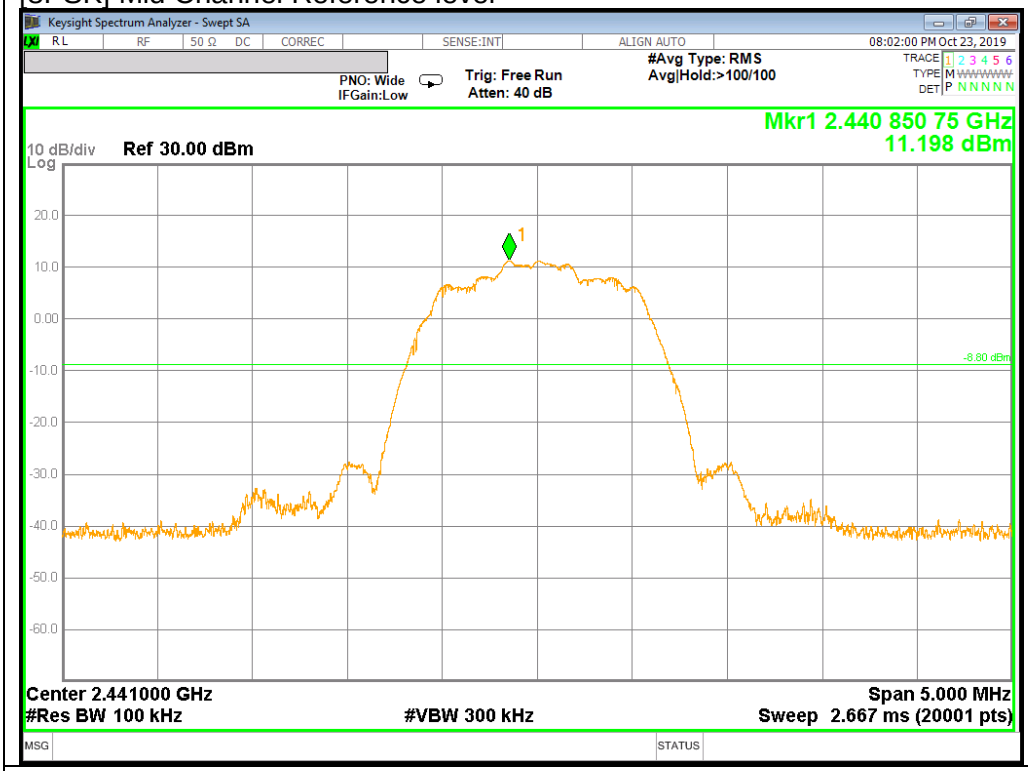
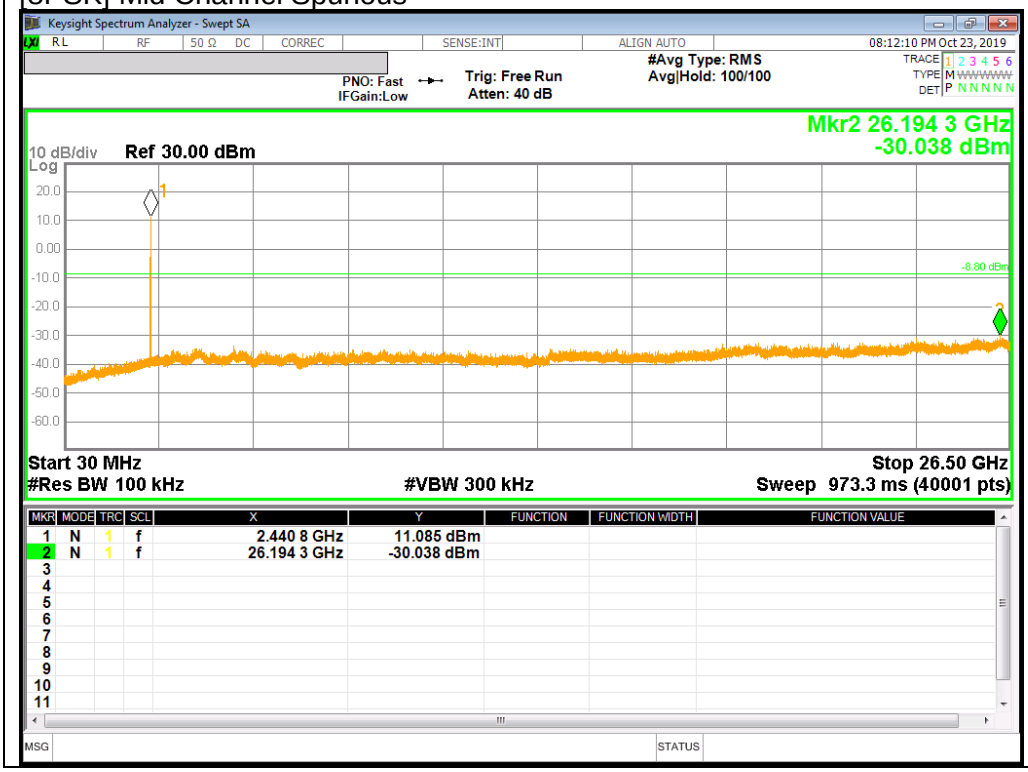
[8PSK] Mid Channel Reference level



[8PSK] Mid Channel Spurious



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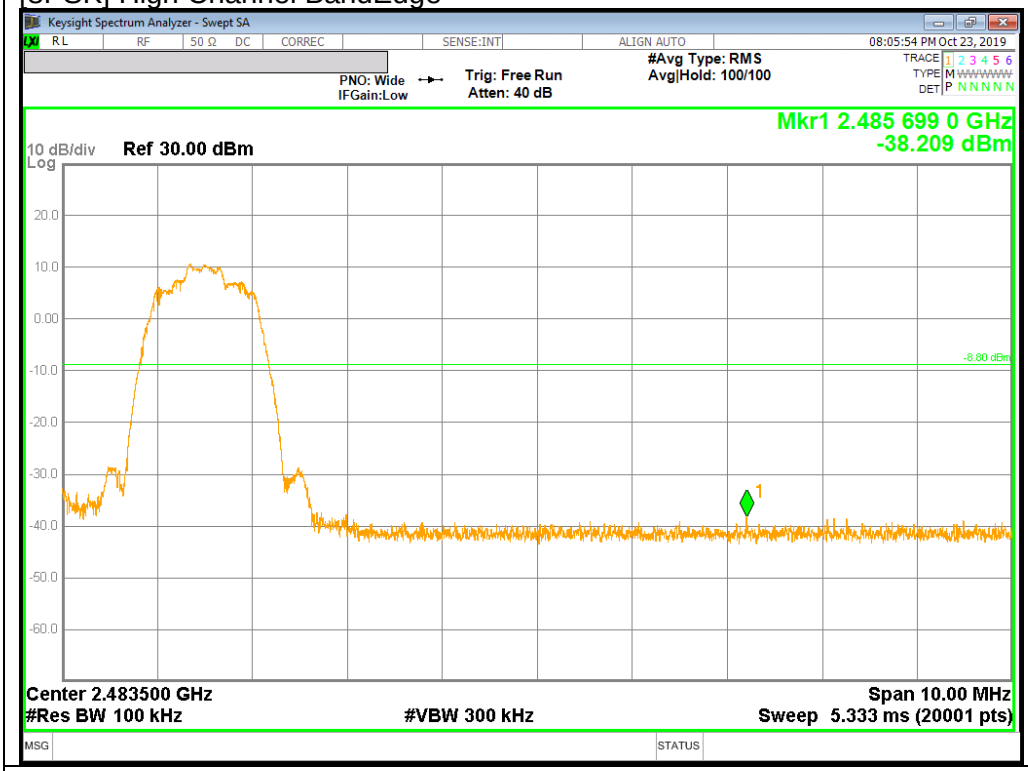
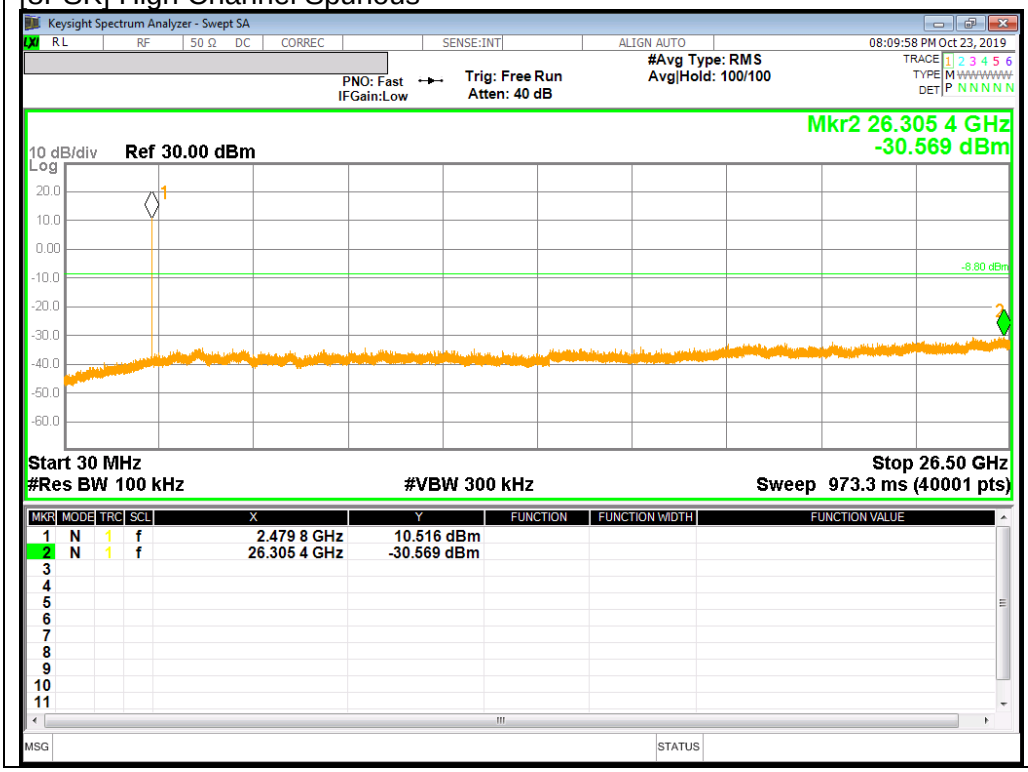
[8PSK] High Channel BandEdge



[8PSK] High Channel Spurious



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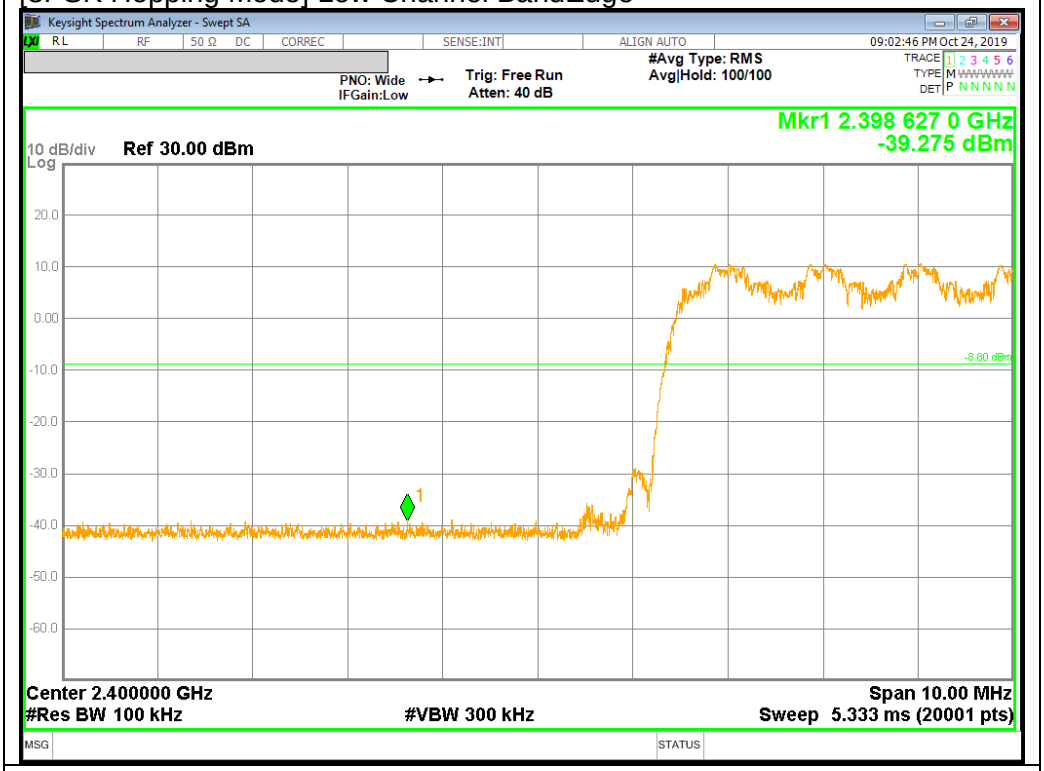
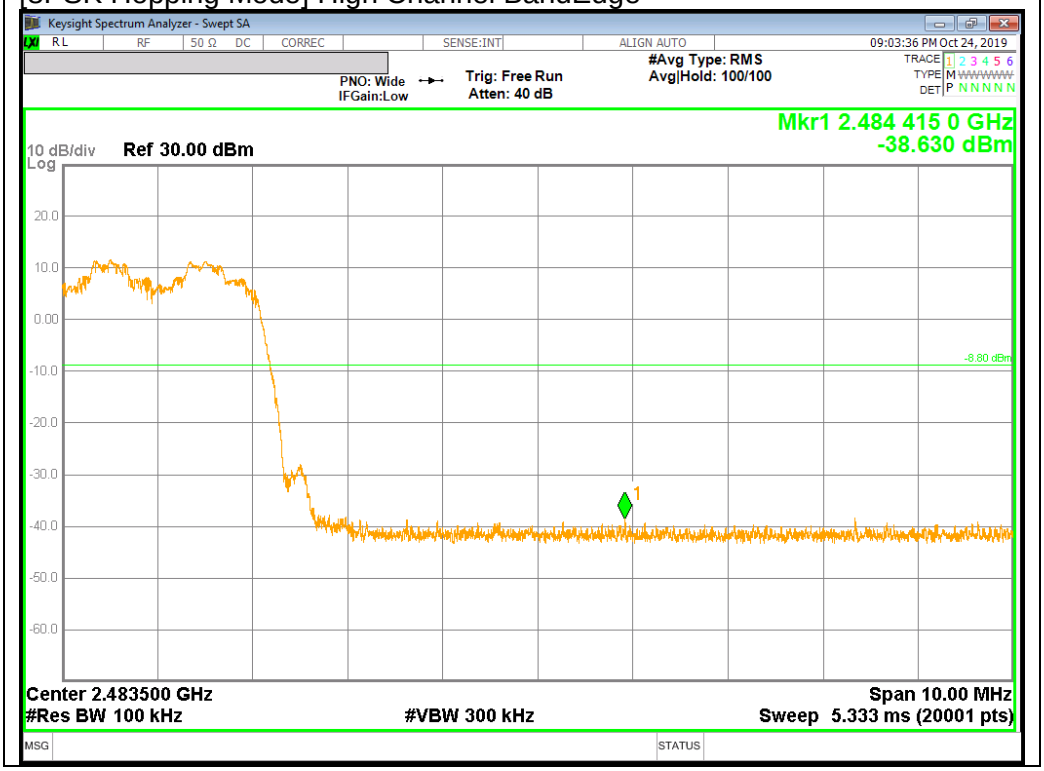
BandEdge Emission at 8PSK Hopping Mode

[8PSK Hopping Mode] Low Channel BandEdge



[8PSK Hopping Mode] High Channel BandEdge



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11. RADIATED TEST RESULTS

11.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

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

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

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TEST PROCEDURE

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

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

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

For band edge measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1/T (on time) for average measurement.

GFSK = 1/T = 1 / 0.002885S = 347Hz.

The minimum VBW was 347Hz, but test receiver(ESU40) couldn't set value 347Hz. Due to this reason, testing VBW was set to 500Hz(Worst cases).

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

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

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

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

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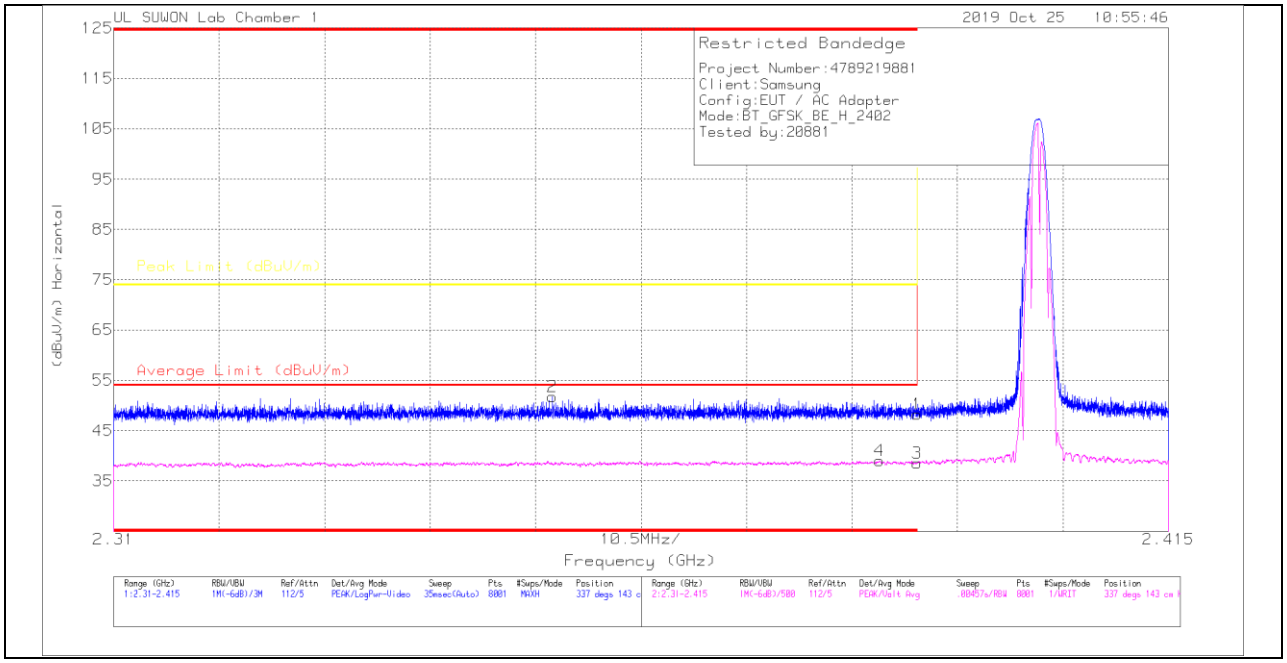
11.2. TRANSMITTER ABOVE 1 GHz

11.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	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	42.1	Pk	31.7	-25.5	48.3	-	-	74	-25.7	337	143	H
2	* 2.35365	45.63	Pk	31.6	-25.5	51.73	-	-	74	-22.27	337	143	H
3	* 2.39	32.36	VA1T	31.7	-25.5	38.56	54	-15.44	-	-	337	143	H
4	* 2.38624	32.82	VA1T	31.7	-25.5	39.02	54	-14.98	-	-	337	143	H

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

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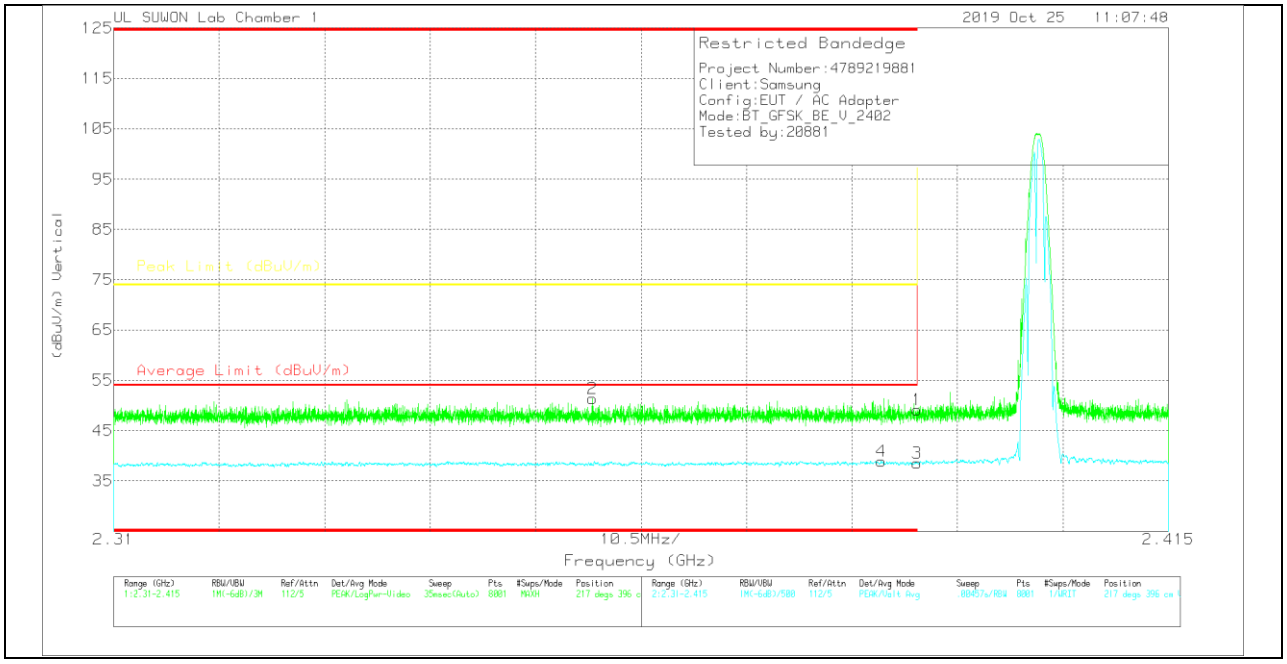
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	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	42.89	Pk	31.7	-25.5	49.09	-	-	74	-24.91	217	396	V
2	* 2.35763	45.45	Pk	31.6	-25.7	51.35	-	-	74	-22.65	217	396	V
3	* 2.39	32.29	VA1T	31.7	-25.5	38.49	54	-15.51	-	-	217	396	V
4	* 2.3864	32.73	VA1T	31.7	-25.5	38.93	54	-15.07	-	-	217	396	V

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

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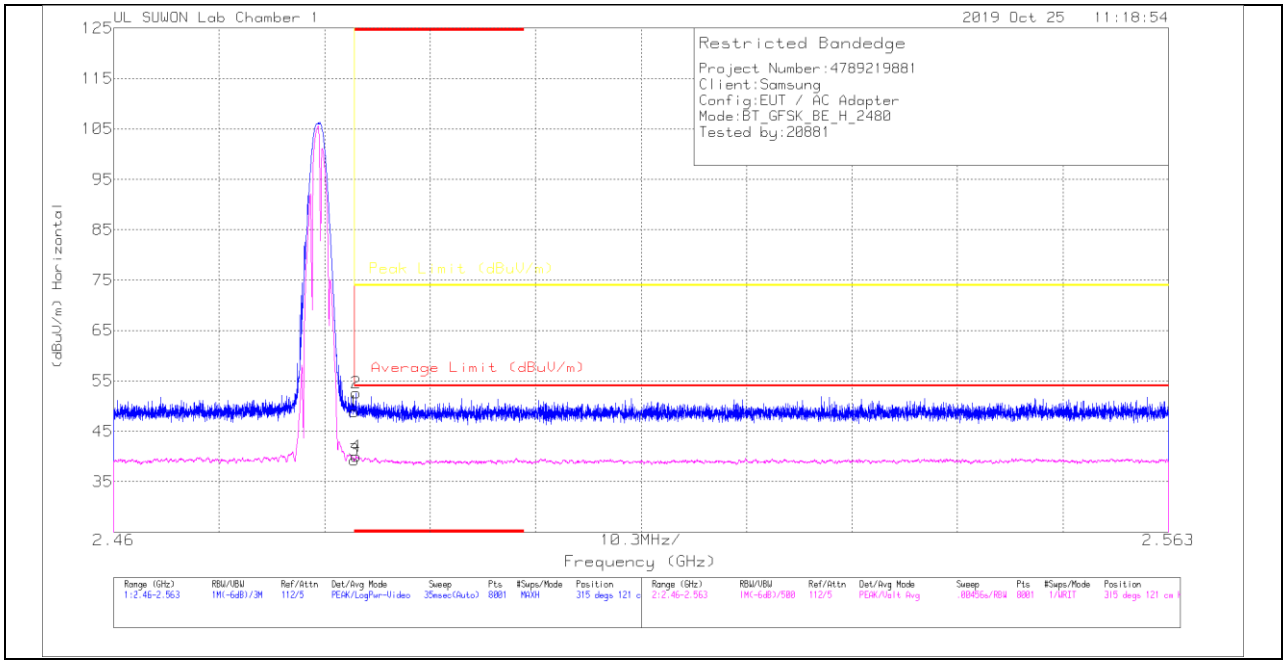
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	42.22	Pk	31.9	-25.2	48.92	-	-	74	-25.08	315	121	H
2	* 2.48369	45.88	Pk	31.9	-25.2	52.58	-	-	74	-21.42	315	121	H
3	* 2.48351	32.57	VA1T	31.9	-25.2	39.27	54	-14.73	-	-	315	121	H
4	* 2.48365	33.39	VA1T	31.9	-25.2	40.09	54	-13.91	-	-	315	121	H

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

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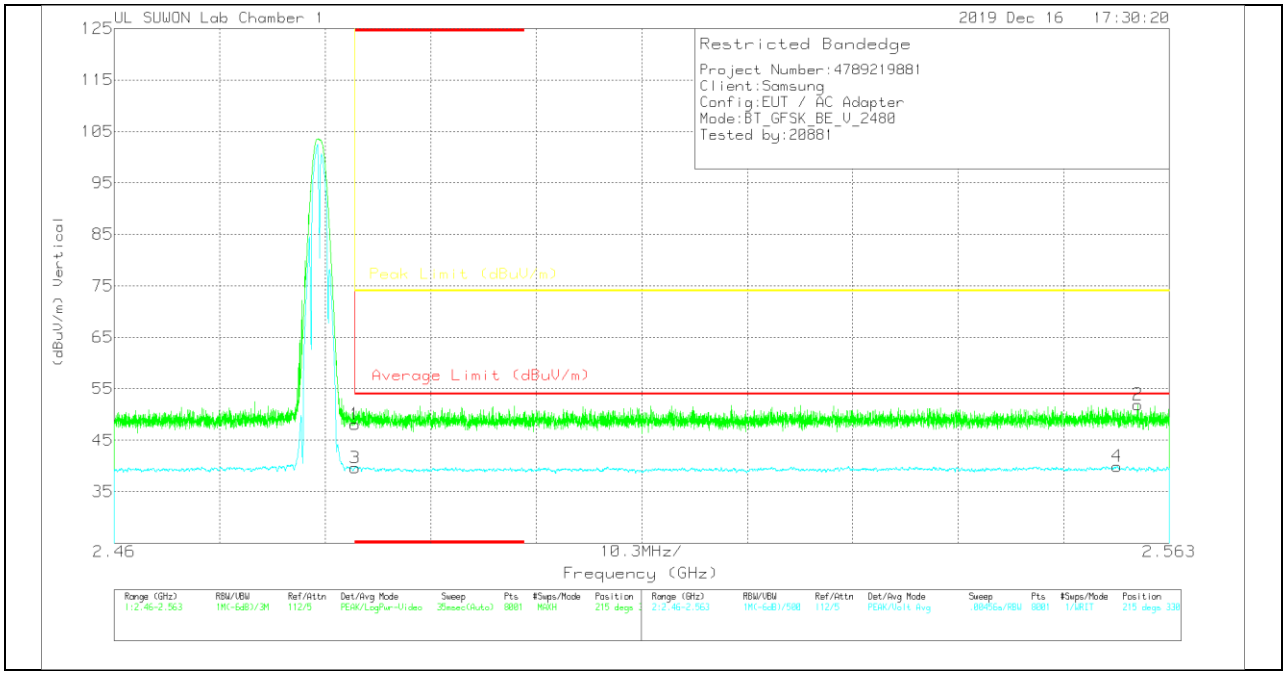
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency(GHz)	MeterReading(dBuV)	Det	3117_00168717	10dB_ATT[dB]	CorrectedReading(dBuV/m)	Average Limit (dBuV/m)	Margin(dB)	Peak Limit (dBuV/m)	PK Margin(dB)	Azimuth(Degs)	Height(cm)	Polarity
1	* 2.48351	41.39	Pk	31.9	-25.2	48.09	-	-	74	-25.91	215	330	V
2	2.55991	45.02	Pk	32	-25.1	51.92	-	-	74	-22.08	215	330	V
3	* 2.48351	32.95	VA1T	31.9	-25.2	39.65	54	-14.35	-	-	215	330	V
4	2.55791	32.93	VA1T	32	-25	39.93	54	-14.07	-	-	215	330	V

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

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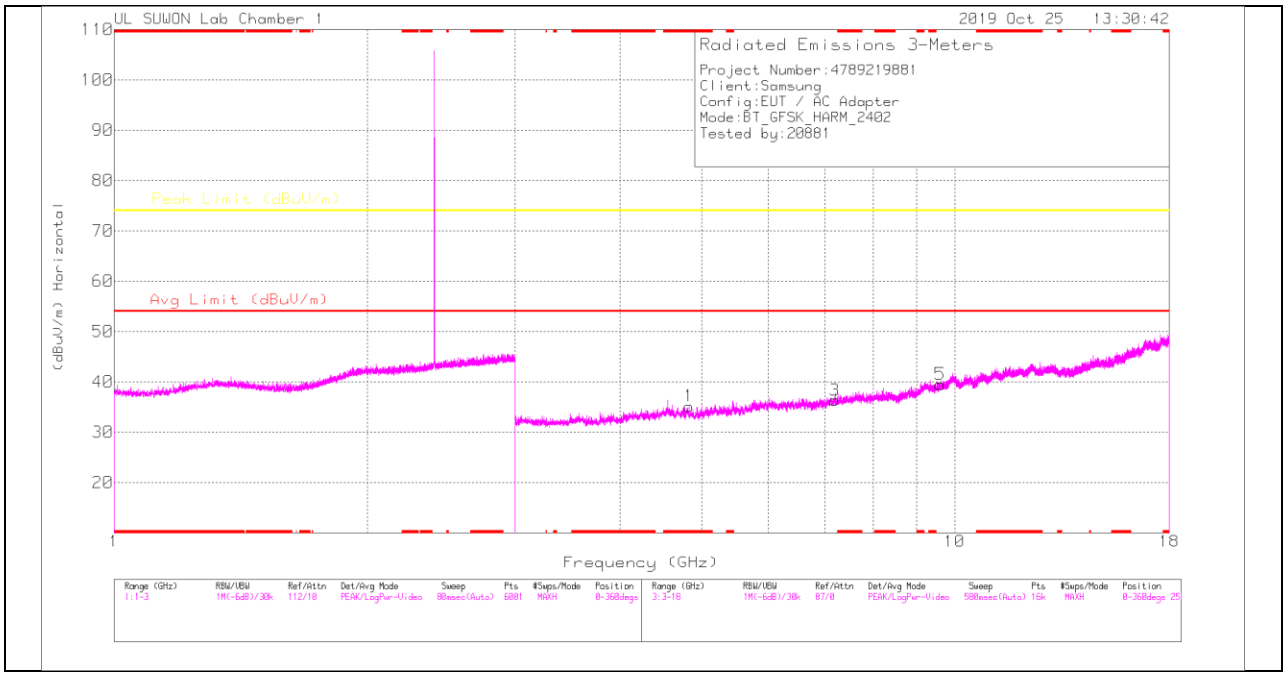
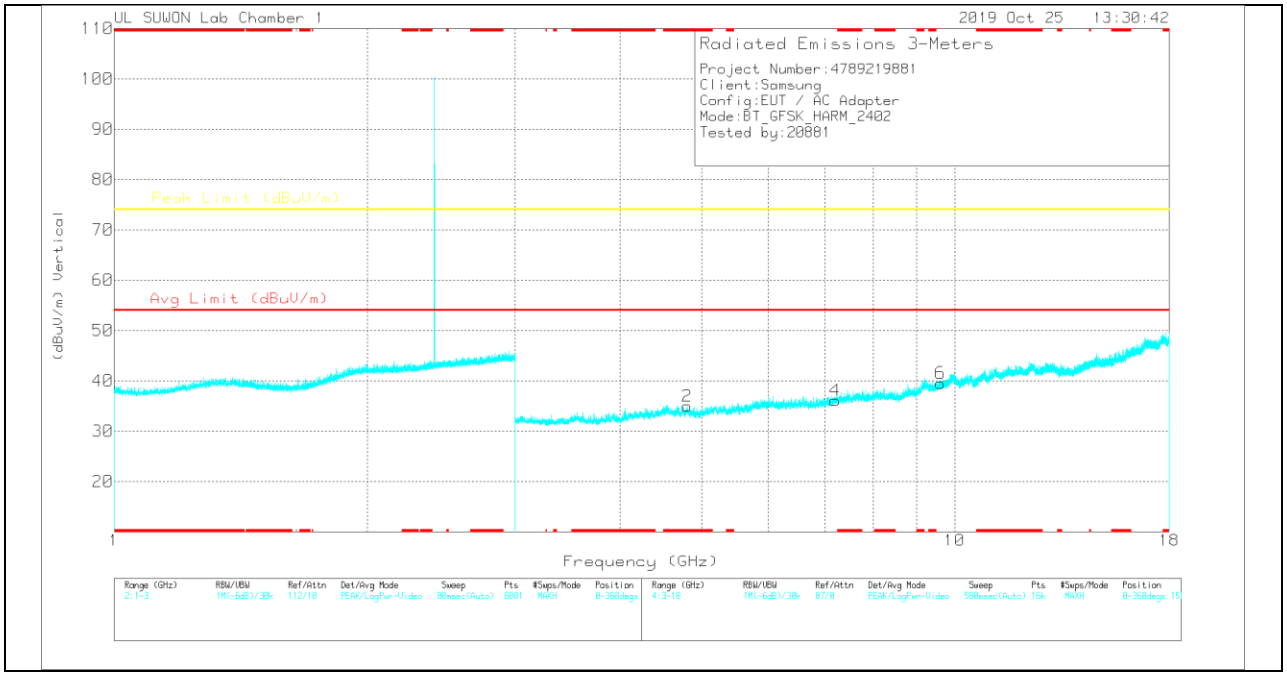
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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

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LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.82801	32.57	PK	34.2	-31.6	35.17	-	-	74	-38.83	0-360	250	H
3	7.20536	28.33	PK	35.8	-27.8	36.33	-	-	74	-37.67	0-360	150	H
5	9.6099	25.71	PK	37	-23.2	39.51	-	-	74	-34.49	0-360	250	H
2	* 4.80832	32.36	PK	34.2	-31.6	34.96	-	-	74	-39.04	0-360	150	V
4	7.20817	28.19	PK	35.8	-27.9	36.09	-	-	74	-37.91	0-360	250	V
6	9.61458	25.62	PK	37	-23.1	39.52	-	-	74	-34.48	0-360	250	V

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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.82673	38.75	PKFH	34.2	-31.5	41.45	-	-	74	-32.55	360	100	H
* 4.82889	38.66	PKFH	34.2	-31.6	41.26	-	-	74	-32.74	360	100	V
7.20459	35.33	PKFH	35.8	-27.8	43.33	-	-	74	-30.67	360	100	H
7.20516	35.85	PKFH	35.8	-27.8	43.85	-	-	74	-30.15	360	100	V
9.60851	32.74	PKFH	37	-23.2	46.54	-	-	74	-27.46	360	100	H
9.61123	32.86	PKFH	37	-23.2	46.66	-	-	74	-27.34	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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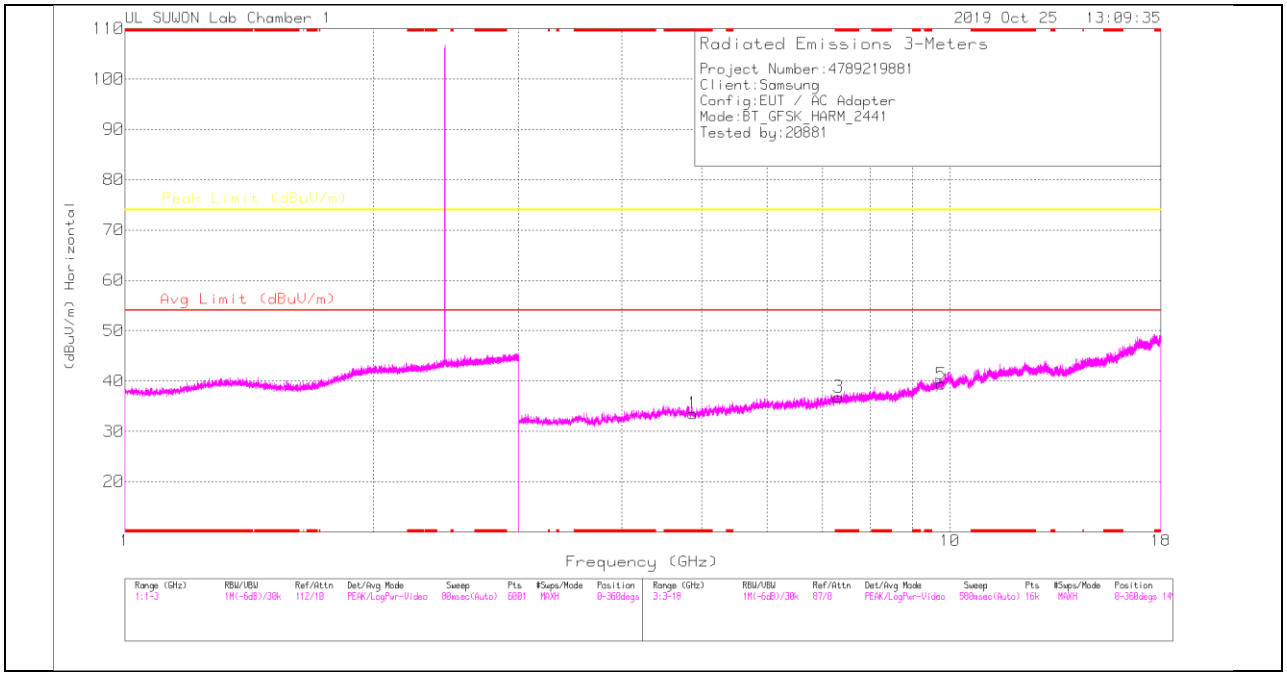
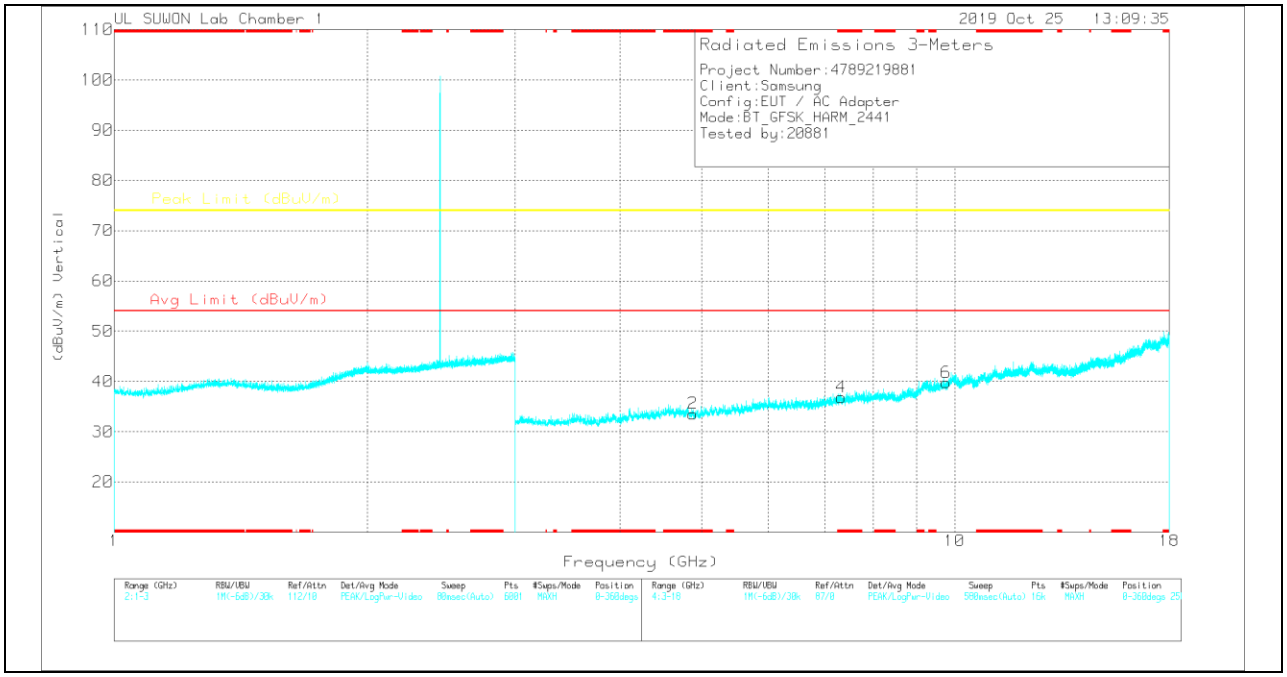
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88144	30.96	PK	34.2	-31.6	33.56	-	-	74	-40.44	0-360	149	H
3	* 7.32254	28.23	PK	35.8	-27.2	36.83	-	-	74	-37.17	0-360	149	H
5	9.76364	26.2	PK	37.2	-24	39.4	-	-	74	-34.6	0-360	250	H
2	* 4.88238	30.98	PK	34.2	-31.6	33.58	-	-	74	-40.42	0-360	250	V
4	* 7.32254	28.26	PK	35.8	-27.2	36.86	-	-	74	-37.14	0-360	150	V
6	9.76457	26.48	PK	37.2	-23.9	39.78	-	-	74	-34.22	0-360	150	V

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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.8816	38.75	PKFH	34.2	-31.6	41.35	-	-	74	-32.65	360	100	H
* 4.88089	39.34	PKFH	34.2	-31.6	41.94	-	-	74	-32.06	360	100	V
* 7.32246	36.74	PKFH	35.8	-27.2	45.34	-	-	74	-28.66	360	100	H
* 7.3225	36.41	PKFH	35.8	-27.2	45.01	-	-	74	-28.99	360	100	V
9.76344	33.13	PKFH	37.2	-23.9	46.43	-	-	74	-27.57	360	100	H
9.76312	33.46	PKFH	37.2	-23.9	46.76	-	-	74	-27.24	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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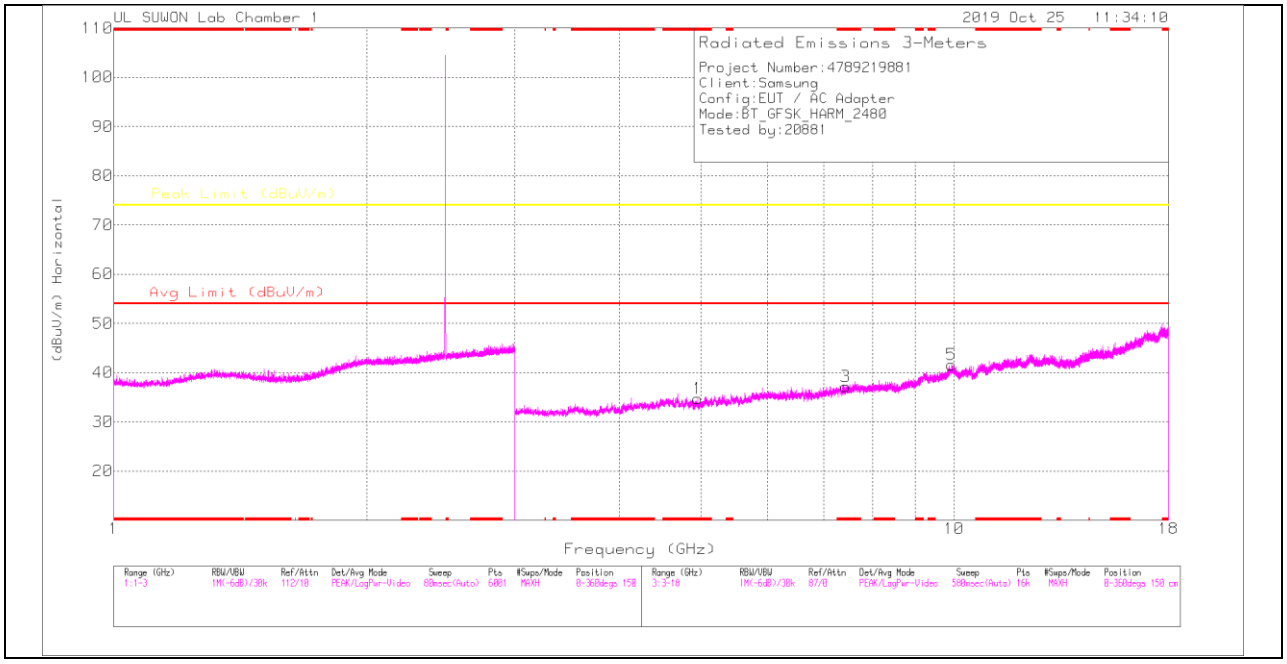
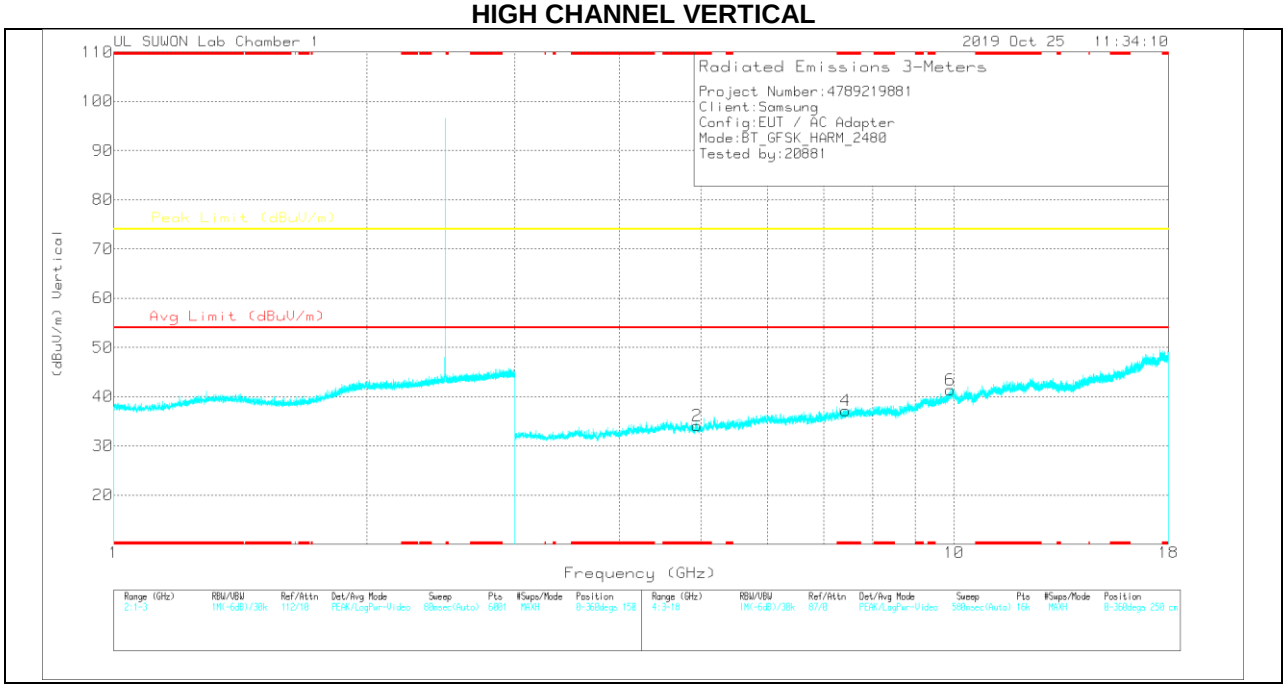
HIGH CHANNEL HORIZONTAL



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.

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HIGH CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.95456	32.08	PK	34.2	-31.6	34.68	-	-	74	-39.32	0-360	250	H
3	* 7.4341	28.52	PK	35.8	-27.2	37.12	-	-	74	-36.88	0-360	150	H
5	9.9305	25.67	PK	37.5	-21.6	41.57	-	-	74	-32.43	0-360	250	H
2	* 4.94894	31.49	PK	34.2	-31.6	34.09	-	-	74	-39.91	0-360	250	V
4	* 7.4341	28.54	PK	35.8	-27.2	37.14	-	-	74	-36.86	0-360	250	V
6	9.90894	25.94	PK	37.4	-22	41.34	-	-	74	-32.66	0-360	150	V

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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95596	38.39	PKFH	34.2	-31.6	40.99	-	-	74	-33.01	360	100	H
* 4.95634	38.28	PKFH	34.2	-31.6	40.88	-	-	74	-33.12	360	100	V
* 7.43308	36.33	PKFH	35.8	-27.2	44.93	-	-	74	-29.07	360	100	H
* 7.43491	35.84	PKFH	35.8	-27.1	44.54	-	-	74	-29.46	360	100	V
9.93217	31.69	PKFH	37.5	-21.5	47.69	-	-	74	-26.31	360	100	H
9.92859	31.81	PKFH	37.5	-21.7	47.61	-	-	74	-26.39	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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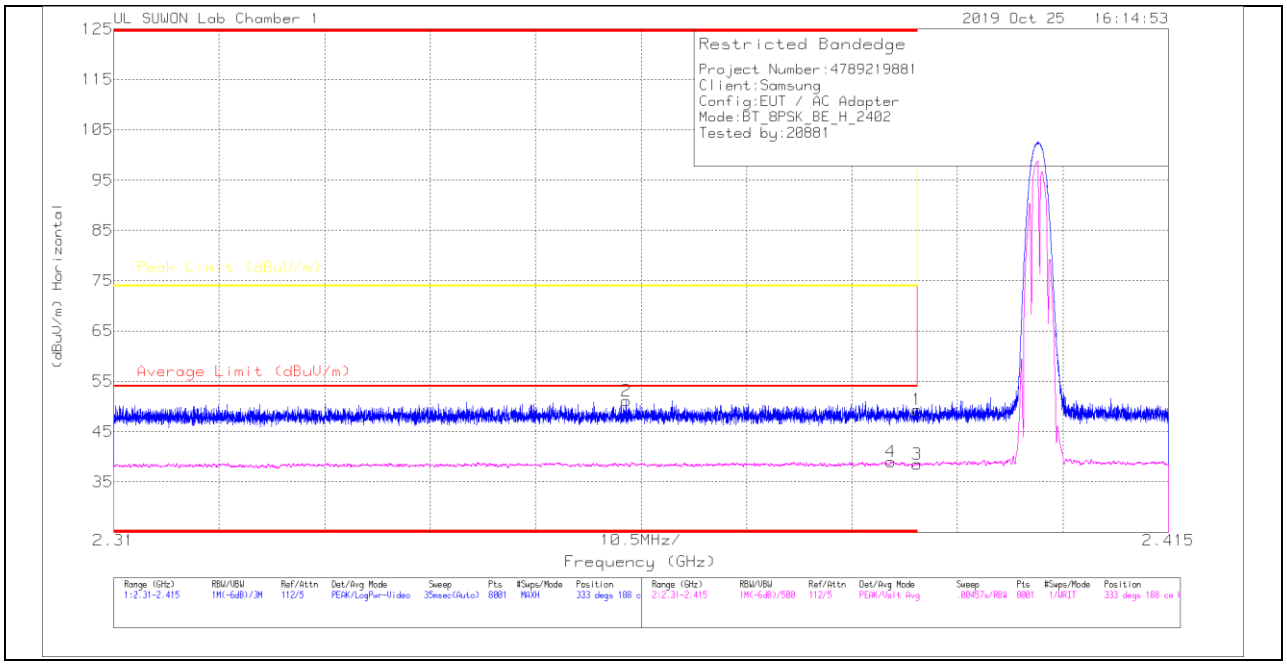
11.2.2. ENHANCED DATA RATE 8PSK MODULATION RESTRICTED BANDEDGE (LOW CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	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	43.22	Pk	31.7	-25.5	49.42	-	-	74	-24.58	333	188	H
2	* 2.361	45.18	Pk	31.6	-25.6	51.18	-	-	74	-22.82	333	188	H
3	* 2.39	32.31	VA1T	31.7	-25.5	38.51	54	-15.49	-	-	333	188	H
4	* 2.38733	32.82	VA1T	31.7	-25.5	39.02	54	-14.98	-	-	333	188	H

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

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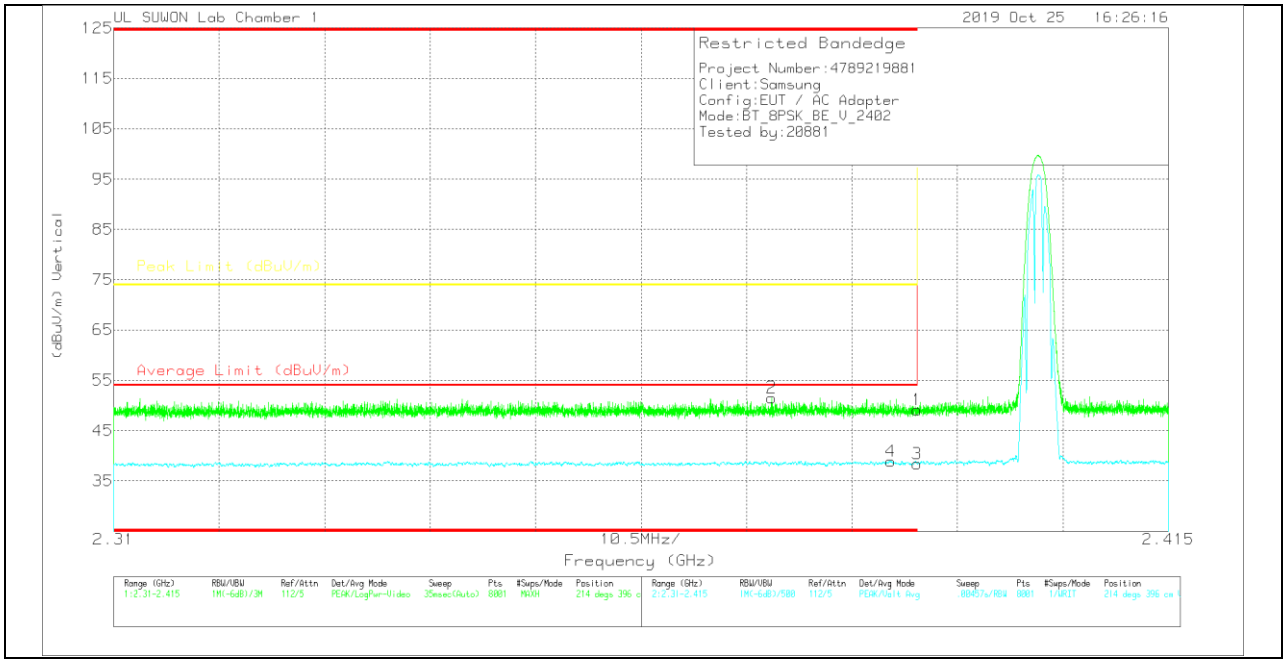
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	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	42.88	Pk	31.7	-25.5	49.08	-	-	74	-24.92	214	396	V
2	* 2.37553	45.56	Pk	31.6	-25.6	51.56	-	-	74	-22.44	214	396	V
3	* 2.39	32.27	VA1T	31.7	-25.5	38.47	54	-15.53	-	-	214	396	V
4	* 2.38735	32.77	VA1T	31.7	-25.5	38.97	54	-15.03	-	-	214	396	V

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

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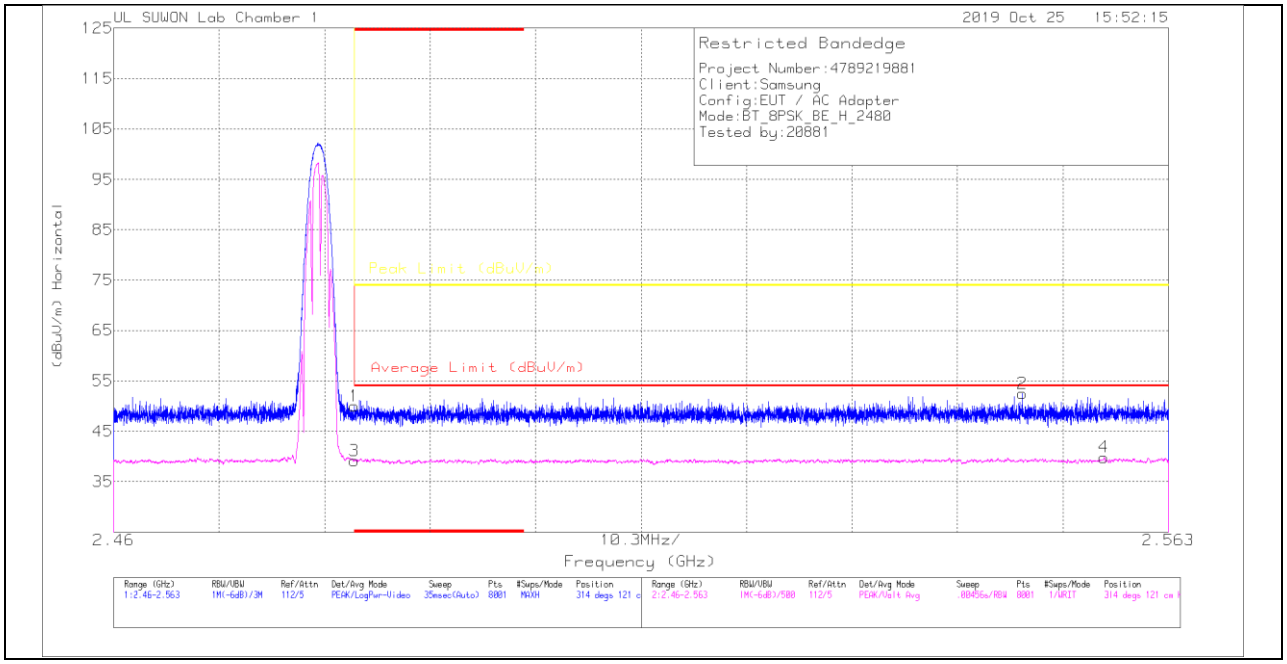
AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.33	Pk	31.9	-25.2	50.03	-	-	74	-23.97	314	121	H
2	2.54871	45.56	Pk	32	-25.1	52.46	-	-	74	-21.54	314	121	H
3	* 2.48351	32.46	VA1T	31.9	-25.2	39.16	54	-14.84	-	-	314	121	H
4	2.5567	32.85	VA1T	32	-25	39.85	54	-14.15	-	-	314	121	H

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

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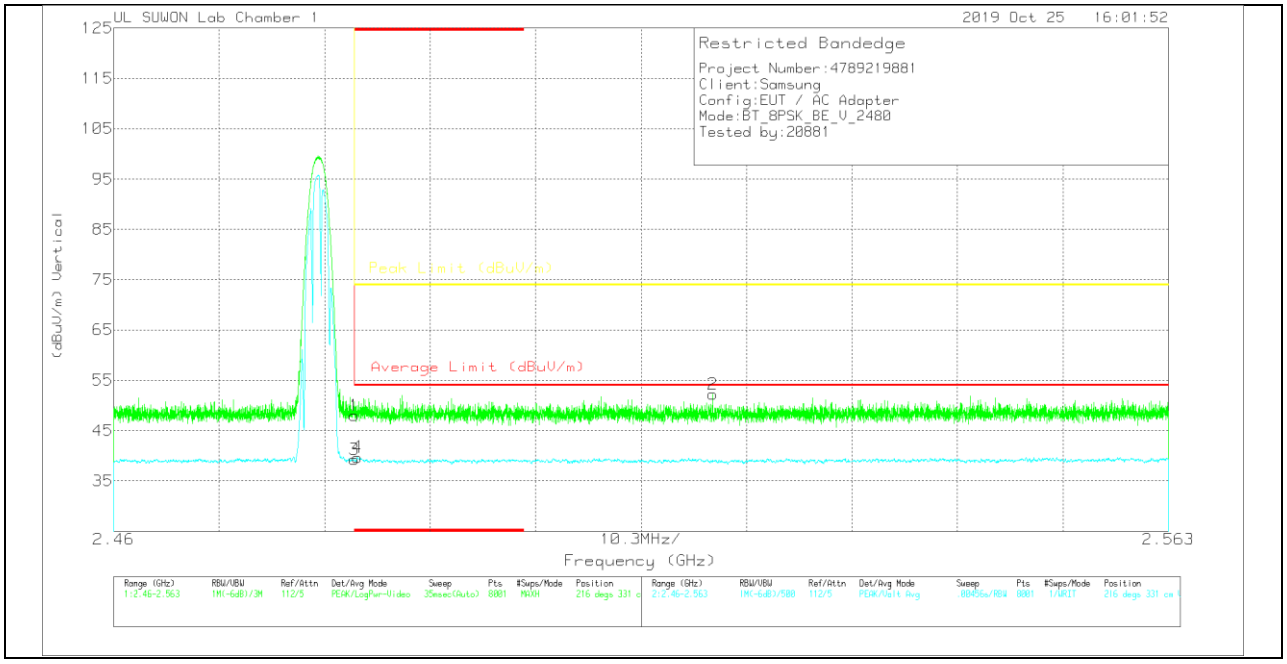
VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.31	Pk	31.9	-25.2	48.01	-	-	74	-25.99	216	331	V
2	2.51849	45.5	Pk	32	-25.2	52.3	-	-	74	-21.7	216	331	V
3	* 2.48351	32.58	VA1T	31.9	-25.2	39.28	54	-14.72	-	-	216	331	V
4	* 2.48378	33.02	VA1T	31.9	-25.2	39.72	54	-14.28	-	-	216	331	V

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

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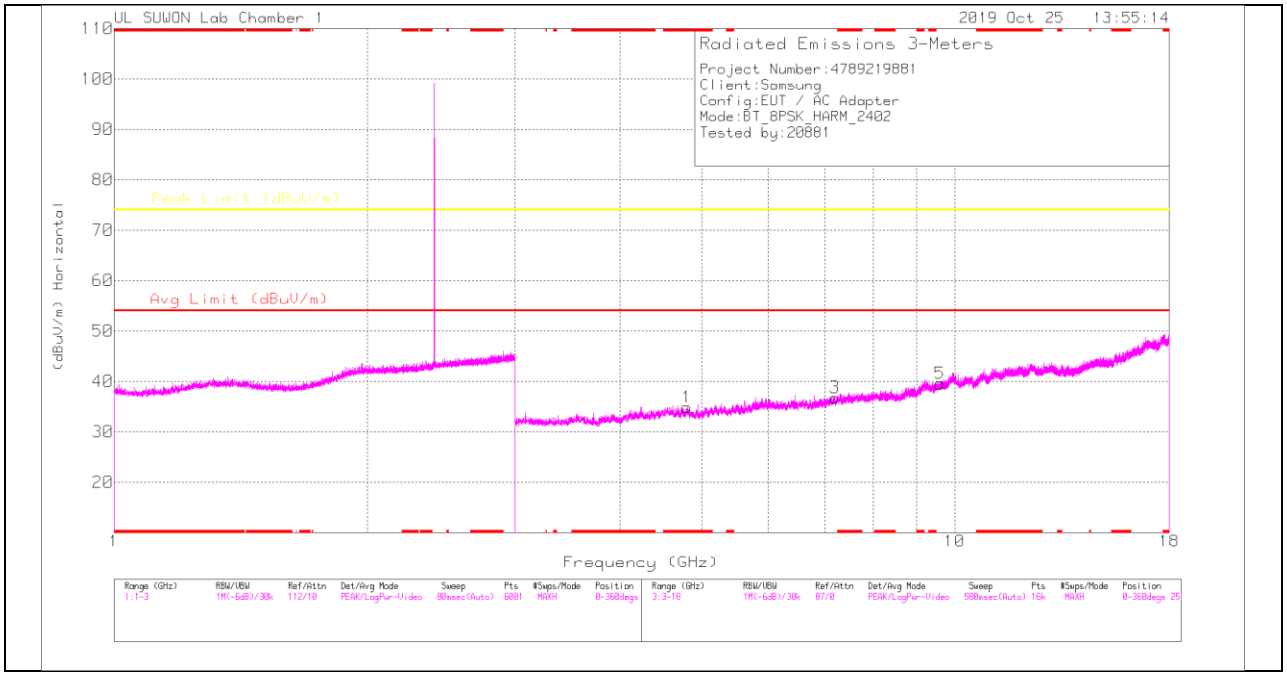
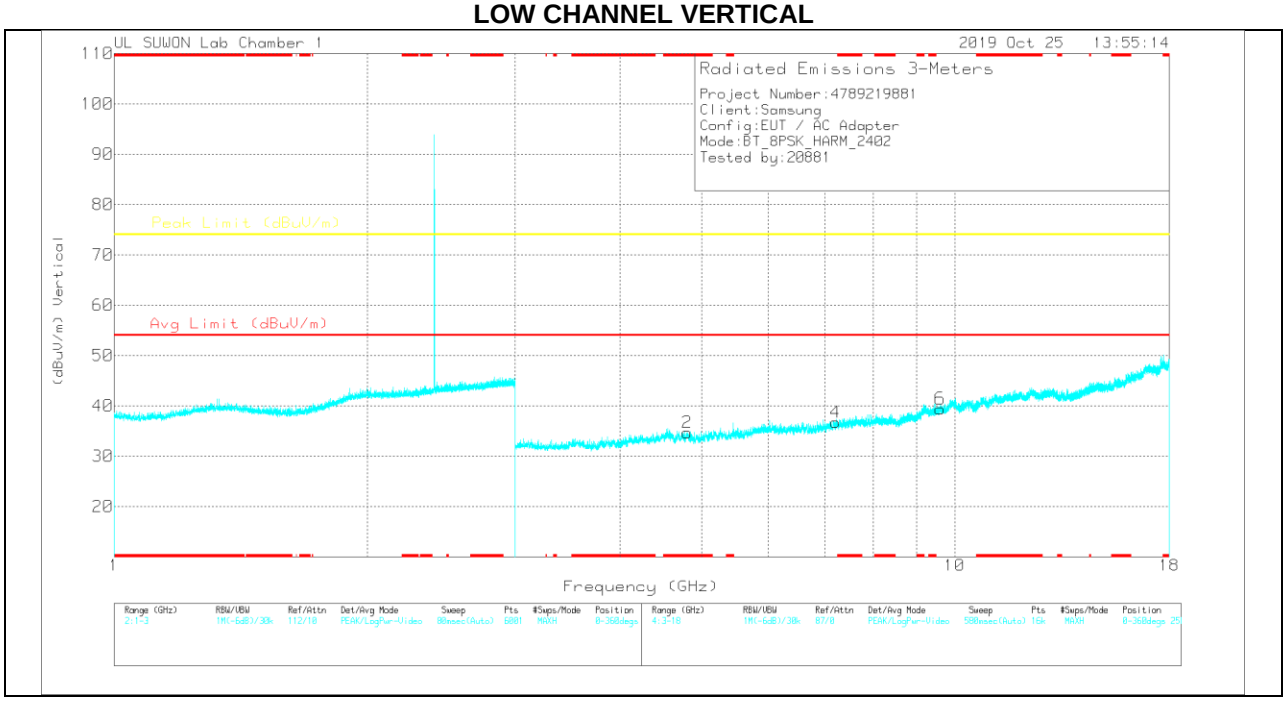
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



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

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LOW CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.80176	32.24	PK	34.2	-31.6	34.84	-	-	74	-39.16	0-360	250	H
3	7.1988	28.68	PK	35.8	-27.7	36.78	-	-	74	-37.22	0-360	150	H
5	9.6024	25.75	PK	37	-23.2	39.55	-	-	74	-34.45	0-360	150	H
2	* 4.80457	31.98	PK	34.2	-31.5	34.68	-	-	74	-39.32	0-360	149	V
4	7.21099	28.83	PK	35.8	-27.9	36.73	-	-	74	-37.27	0-360	149	V
6	9.60896	25.6	PK	37	-23.2	39.4	-	-	74	-34.6	0-360	149	V

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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80117	38.98	PKFH	34.2	-31.6	41.58	-	-	74	-32.42	360	100	H
* 4.80161	39.35	PKFH	34.2	-31.6	41.95	-	-	74	-32.05	360	100	V
7.19859	35.49	PKFH	35.8	-27.7	43.59	-	-	74	-30.41	360	100	H
7.19878	35.76	PKFH	35.8	-27.7	43.86	-	-	74	-30.14	360	100	V
9.60378	32.61	PKFH	37	-23.2	46.41	-	-	74	-27.59	360	100	H
9.60123	32.5	PKFH	37	-23.2	46.3	-	-	74	-27.7	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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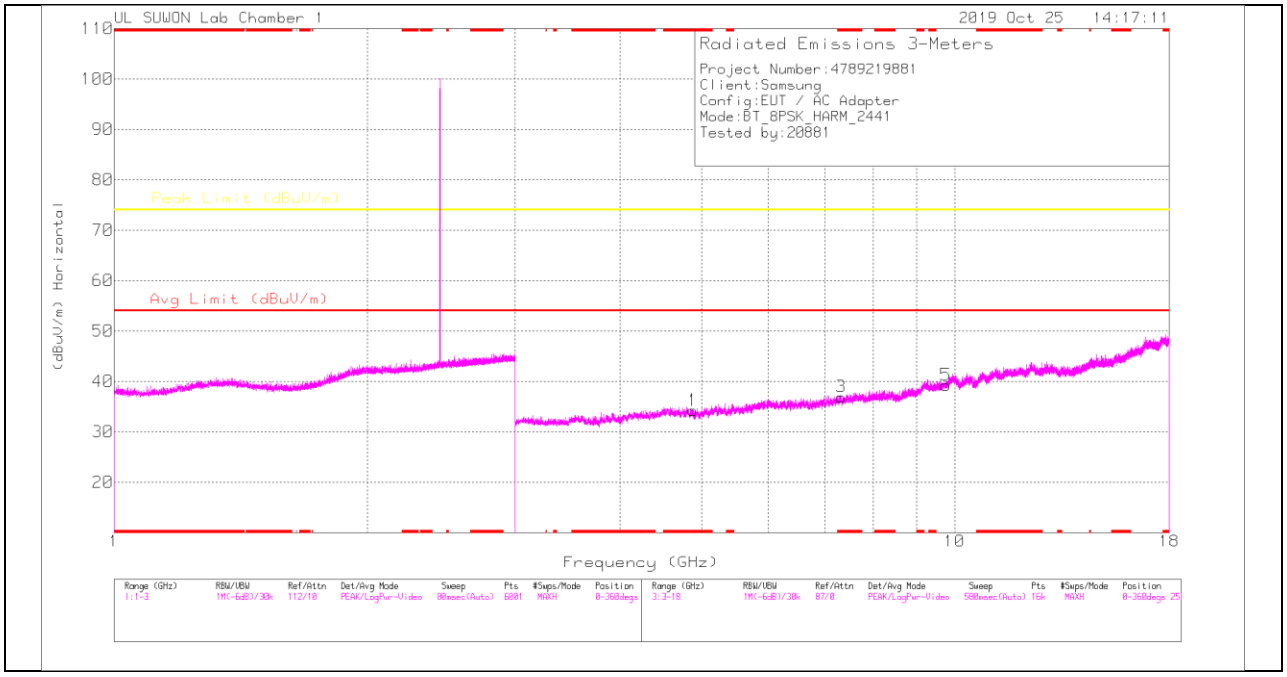
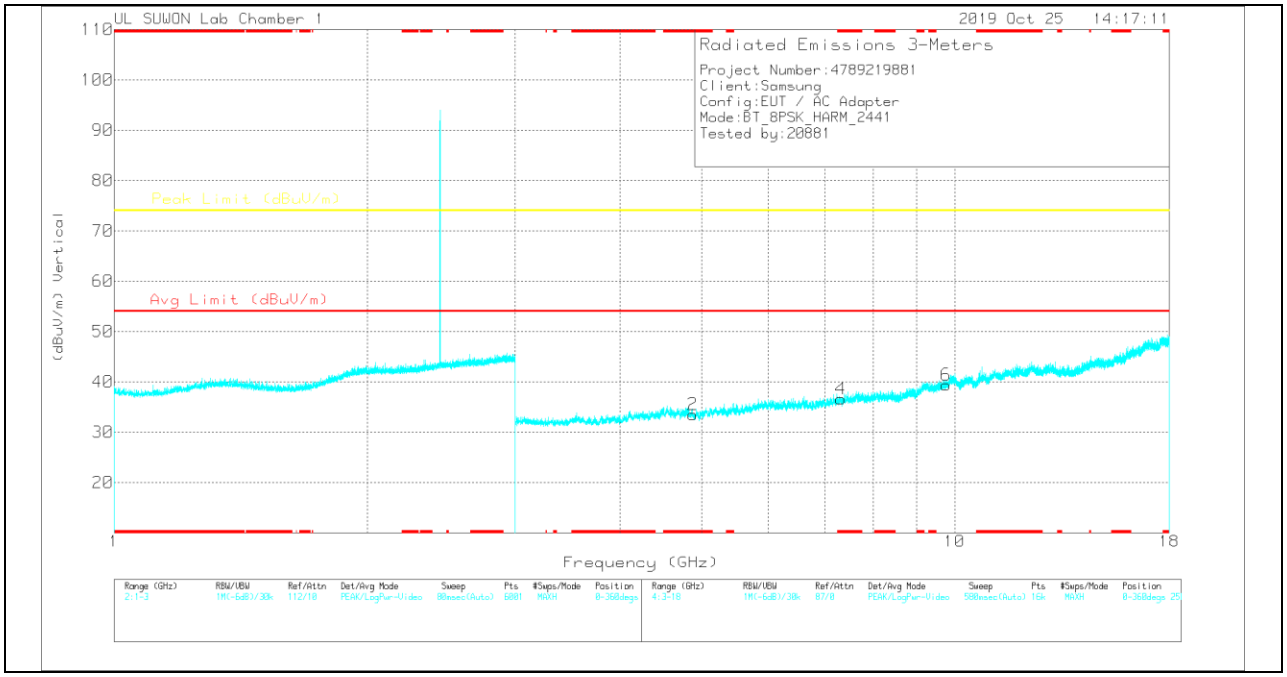
MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



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

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MID CHANNEL DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88238	31.64	PK	34.2	-31.6	34.24	-	-	74	-39.76	0-360	250	H
3	* 7.32254	28.31	PK	35.8	-27.2	36.91	-	-	74	-37.09	0-360	250	H
5	9.76082	25.97	PK	37.2	-23.9	39.27	-	-	74	-34.73	0-360	150	H
2	* 4.88144	30.92	PK	34.2	-31.6	33.52	-	-	74	-40.48	0-360	150	V
4	* 7.3216	27.98	PK	35.8	-27.2	36.58	-	-	74	-37.42	0-360	150	V
6	9.76176	26.08	PK	37.2	-23.9	39.38	-	-	74	-34.62	0-360	250	V

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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88253	38.86	PKFH	34.2	-31.6	41.46	-	-	74	-32.54	360	100	H
* 4.88337	39.05	PKFH	34.2	-31.6	41.65	-	-	74	-32.35	360	100	V
* 7.32388	35.78	PKFH	35.8	-27.2	44.38	-	-	74	-29.62	360	100	H
* 7.32095	36.17	PKFH	35.8	-27.2	44.77	-	-	74	-29.23	360	100	V
9.76227	34.31	PKFH	37.2	-23.9	47.61	-	-	74	-26.39	360	100	H
9.75959	32.67	PKFH	37.2	-23.9	45.97	-	-	74	-28.03	360	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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