



CERTIFICATION TEST REPORT

Report Number. : 4789247757-E6V2

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

Model : SM-G985F/DS, SM-G985F

FCC ID : A3LSMG985F

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 17, 2019

Prepared by:

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory

218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea

TEL: (031) 337-9902

FAX: (031) 213-5433



ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	12/12/19	Initial issue	Hyunsik Yun
V2	12/17/19	Updated to address TCB's question	Hyunsik Yun

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
1.1. INTRODUCTION OF TEST DATA REUSE	6
1.2. DIFFERENCE	6
1.3. SPOT CHECK VERIFICATION DATA.....	6
1.4. REFERENCE DETAIL.....	7
2. TEST METHODOLOGY	8
3. FACILITIES AND ACCREDITATION	8
4. CALIBRATION AND UNCERTAINTY	8
4.1. MEASURING INSTRUMENT CALIBRATION.....	8
4.2. SAMPLE CALCULATION.....	8
4.3. MEASUREMENT UNCERTAINTY	9
4.4. DECISION RULE	9
5. EQUIPMENT UNDER TEST	10
5.1. DESCRIPTION OF EUT.....	10
5.2. MAXIMUM OUTPUT POWER.....	10
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	10
5.4. WORST-CASE CONFIGURATION AND MODE	10
5.5. DESCRIPTION OF TEST SETUP.....	11
6. MEASUREMENT METHODS	13
7. TEST AND MEASUREMENT EQUIPMENT	14
8. REFERENCE MEASUREMENT RESULTS.....	15
8.1. ON TIME AND DUTY CYCLE RESULTS	15
8.2. 20 dB AND 99% BANDWIDTH.....	16
8.2.1. BASIC DATA RATE GFSK MODULATION.....	16
8.2.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION.....	16
8.2.3. ENHANCED DATA RATE 8PSK MODULATION	16
8.2.4. 20 dB AND 99% BANDWIDTH PLOTS.....	17
9. SUMMARY TABLE	20
10. ANTENNA PORT TEST RESULTS	21
10.1. HOPPING FREQUENCY SEPARATION	21
10.2. NUMBER OF HOPPING CHANNELS.....	22
10.3. AVERAGE TIME OF OCCUPANCY.....	26

10.4.	OUTPUT POWER.....	34
10.4.1.	BASIC DATA RATE GFSK MODULATION.....	34
10.4.2.	ENHANCED DATA RATE $\pi/4$ -DPSK MODULATION	34
10.4.3.	ENHANCED DATA RATE 8PSK MODULATION	34
10.4.4.	OUTPUT POWER PLOTS.....	35
10.5.	AVERAGE POWER.....	38
10.5.1.	BASIC DATA RATE GFSK MODULATION.....	38
10.5.2.	ENHANCED DATA RATE $\pi/4$ -DQPSK MODULATION	38
10.5.3.	ENHANCED DATA RATE 8PSK MODULATION	38
10.6.	CONDUCTED SPURIOUS EMISSIONS.....	39
10.6.1.	BASIC DATA RATE GFSK MODULATION.....	40
10.6.2.	ENHANCED DATA RATE $\pi/4$ -DQPSK MODULATION	44
10.6.3.	ENHANCED DATA RATE 8PSK MODULATION	48
11.	RADIATED TEST RESULTS	52
11.1.	LIMITS AND PROCEDURE	52
11.2.	TRANSMITTER ABOVE 1 GHz	54
11.2.1.	BASIC DATA RATE GFSK MODULATION.....	54
11.2.2.	ENHANCED DATA RATE 8PSK MODULATION	64
11.3.	WORST-CASE BELOW 1 GHz.....	74
12.	AC POWER LINE CONDUCTED EMISSIONS	76

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-G985F/DS, SM-G985F

SERIAL NUMBER: R3CM9030DBT, R3CM90FS9RV (CONDUCTED, Original);
R3CM9033F1L, R3CM90FSA4H (RADIATED, Original);
R38MA0KHL5Y (RADIATED, Spot check)

DATE TESTED: OCT 22, 2019 – DEC 16, 2019 (Original);
NOV 22, 2019 – NOV 29, 2019 (Spot check)

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.

1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMG986B DSS BT(FCC CFR 47 Part 15C). And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMG985F shares the same enclosure and circuit board as FCC ID: A3LSMG986B. The BT antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMG986B remains representative of FCC ID: A3LSMG985F. The test data of FCC ID: A3LSMG986B being submitted for this application to cover BT features.

1.3. SPOT CHECK VERIFICATION DATA

(Worst case of the radiated spurious and band edge emissions)

Band	Test Item	Mode	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-G986B/DS	SM-G985F/DS		
					FCC ID : A3LSMG986B	FCC ID : A3LSMG985F		
DSS BT	Band Edge	GFSK_2480	2480 MHz	54 dBuV/m	40.09 dBuV/m	40.62 dBuV/m	0.53 dB	-
	RSE	GFSK_2480	2480 MHz	74 dBuV/m	47.69 dBuV/m	48.35 dBuV/m	0.66 dB	4th Harmonic Noise floor

Comparison of two models, upper deviation is within 3 dB range and all test results are under FCC Technical Limits.

1.4. REFERENCE DETAIL

Reference application that contains the reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Variant Test Report Number	Data Re-used
PCE	A3LSMG986B	Original Grant	4789219881-E2	Test Report	4789247757-E2	All
DTS	A3LSMG986B	Original Grant	4789219881-E3 (802.11b/g/n)	Test Report	4789247757-E3 (802.11b/g/n)	All
			4789219881-E4 (802.11ax)	Test Report	4789247757-E4 (802.11ax)	All
			4789219881-E5 Bluetooth LE	Test Report	4789247757-E5 Bluetooth LE	All
DSS	A3LSMG986B	Original Grant	4789219881-E6 (Bluetooth)	Test Report	4789247757-E6 (Bluetooth)	All
NII	A3LSMG986B	Original Grant	4789219881-E7 (802.11a/n/ac)	Test Report	4789247757-E7 (802.11a/n/ac)	All
			4789219881-E8 (802.11ax)	Test Report	4789247757-E8 (802.11ax)	All
DXX	A3LSMG986B	Original Grant	4789219881-E9 (ANT+)	Test Report	4789247757-E9 (ANT+)	All
			4789219881-E10 (NFC)	Test Report	4789247757-E10 (NFC)	All
DCD	A3LSMG986B	Original Grant	4789219881-E11 (WPT)	Test Report	4789247757-E11 (WPT)	All

For this application the data reuse is summarized below for each equipment class:

Equipment Class	Reference FCC ID (Parent)	Application Type	Test Item	Data Re-used
PCE	A3LSMG986B	Original Grant	WWAN	All except SAR (full test), HAC (full test)
DTS	A3LSMG986B	Original Grant	BLE	All
			WLAN	All except SAR (full test), HAC (full test)
			WLAN 802.11ax	All except HAC (full test)
DSS	A3LSMG986B	Original Grant	BT	All except SAR (full test)
NII	A3LSMG986B	Original Grant	WLAN	All except SAR (full test), HAC (full test)
			WLAN 802.11ax	All except HAC (full test)
DXX	A3LSMG986B	Original Grant	ANT+	All
			NFC	All
DCD	A3LSMG986B	Original Grant	WPT	All except RF exposure

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

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/wp-content/uploads/2017/05/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:

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

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	2.35 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.

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-G985F/DS and SM-G985F. These models are identical in hardware except SM-G985F has single SIM tray. With some pre-scan, model SM-G985F/DS was set for spot check 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.

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

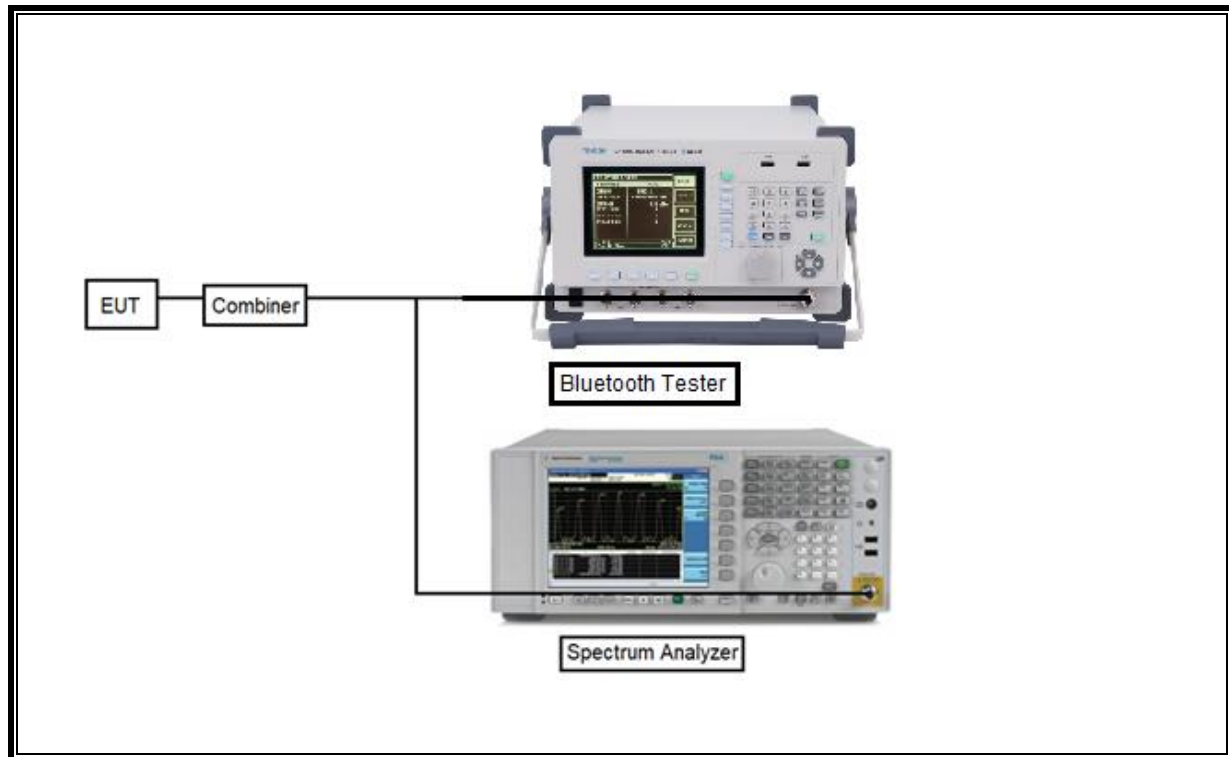
I/O CABLE

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

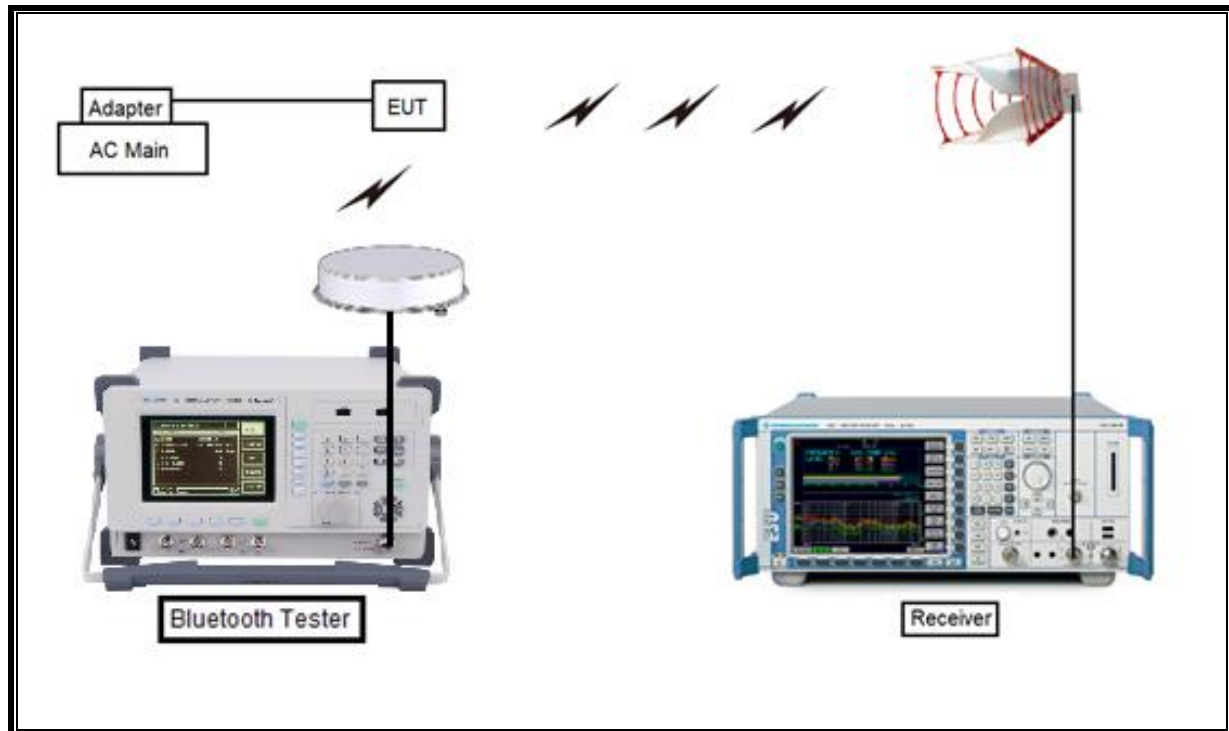
TEST SETUP

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

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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.

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	PASTERNAK	PE7087-10	A001	08-08-20
Attenuator	PASTERNAK	PE7087-10	A008	08-08-20
Attenuator	PASTERNAK	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	WEINCHEL	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	

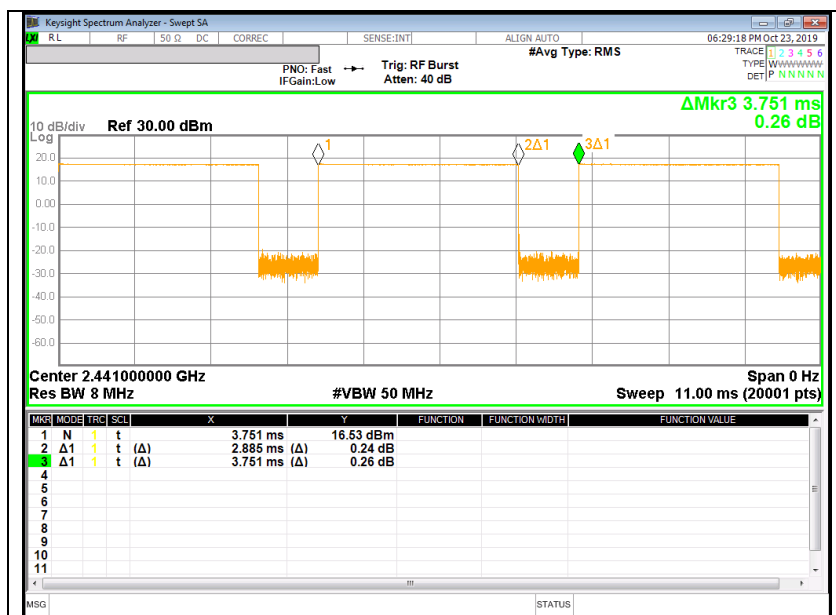
8. REFERENCE MEASUREMENT RESULTS

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



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 $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ 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

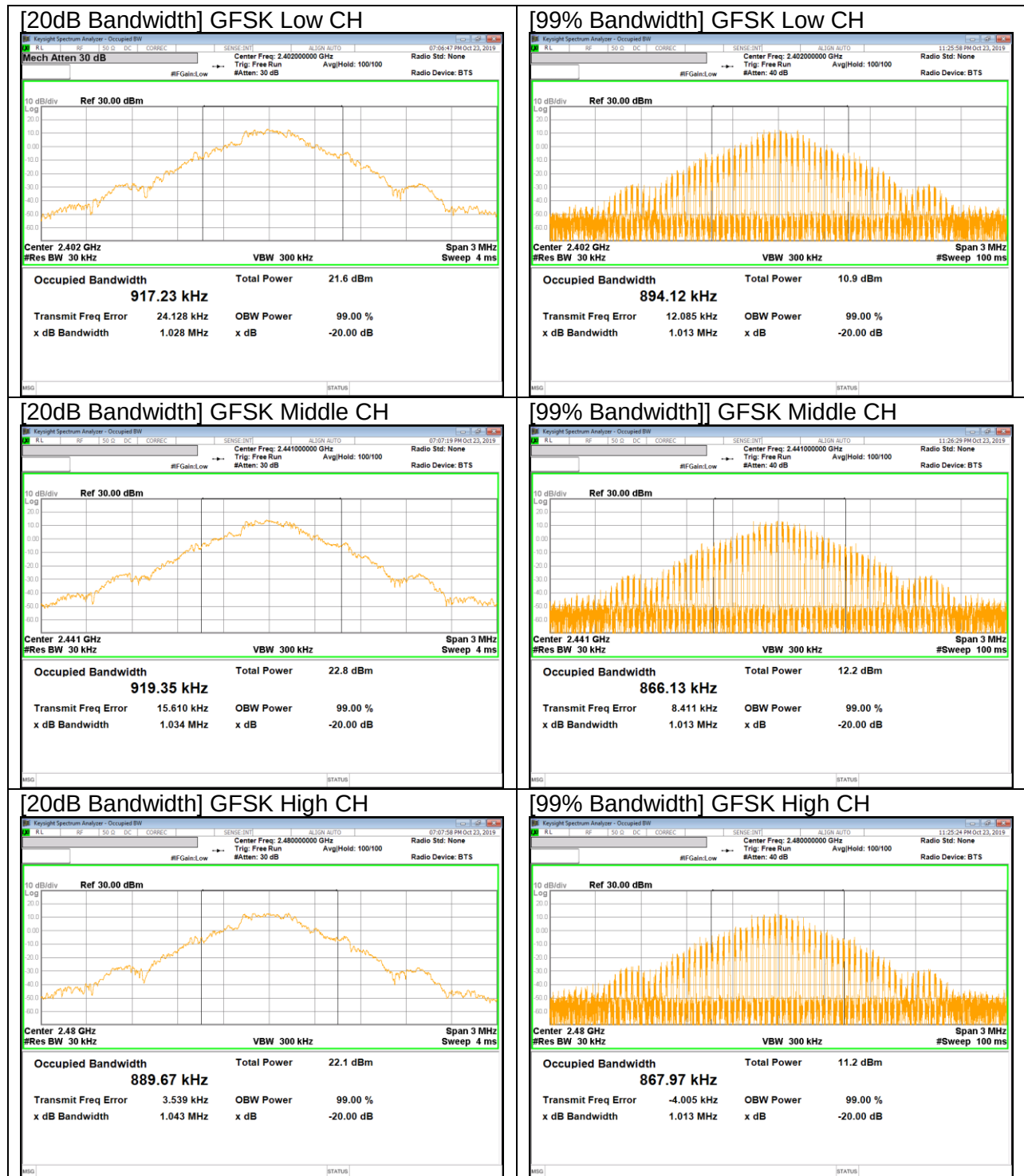
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [kHz]
Low	2 402	1.336	1167.100
Mid	2 440	1.326	1193.800
High	2 480	1.335	1164.300
Worst		1.336	1193.800

8.2.3. ENHANCED DATA RATE 8PSK MODULATION

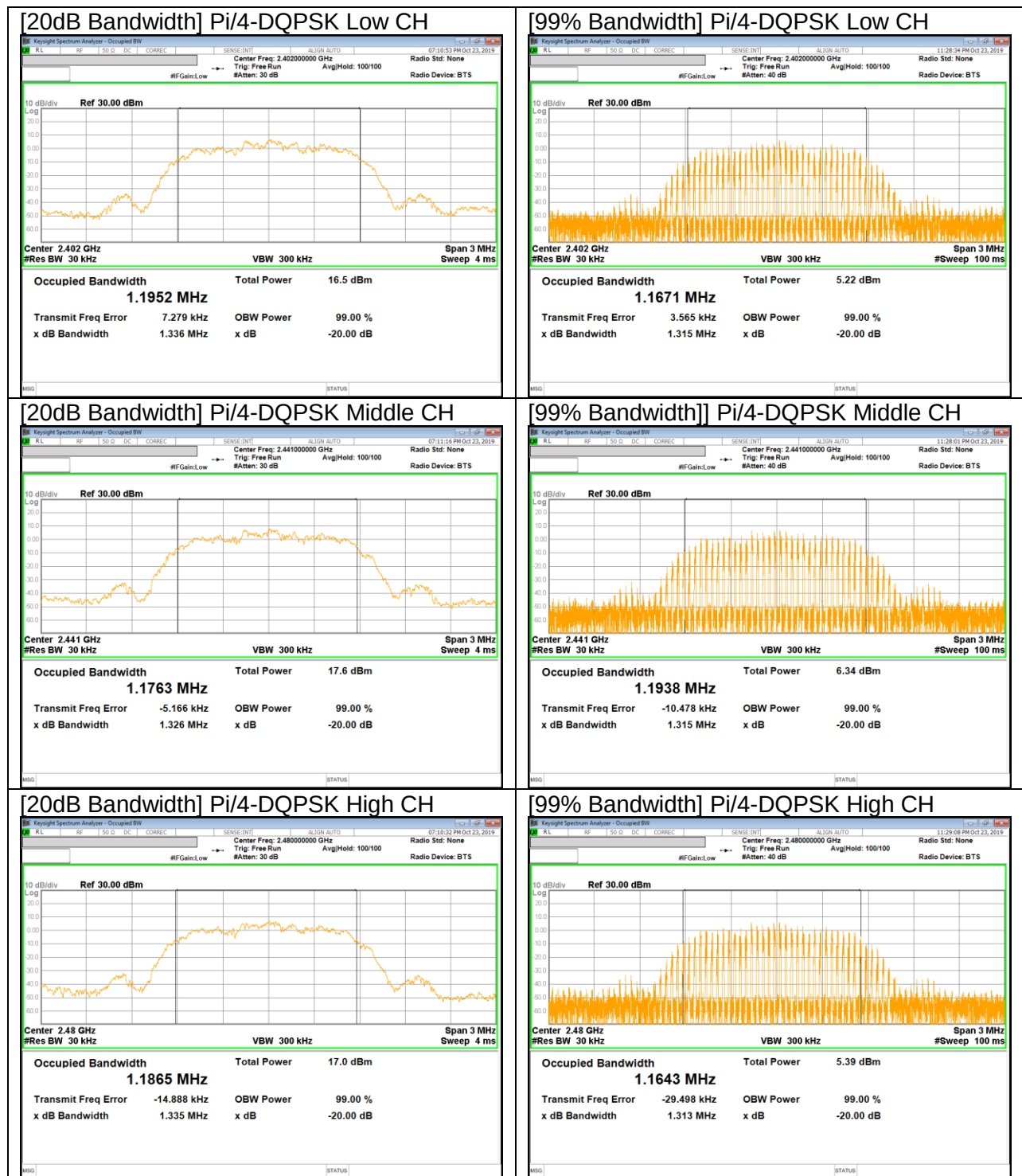
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [kHz]
Low	2 402	1.296	1164.300
Mid	2 440	1.280	1164.700
High	2 480	1.323	1194.100
Worst		1.323	1194.100

8.2.4. 20 dB AND 99% BANDWIDTH PLOTS

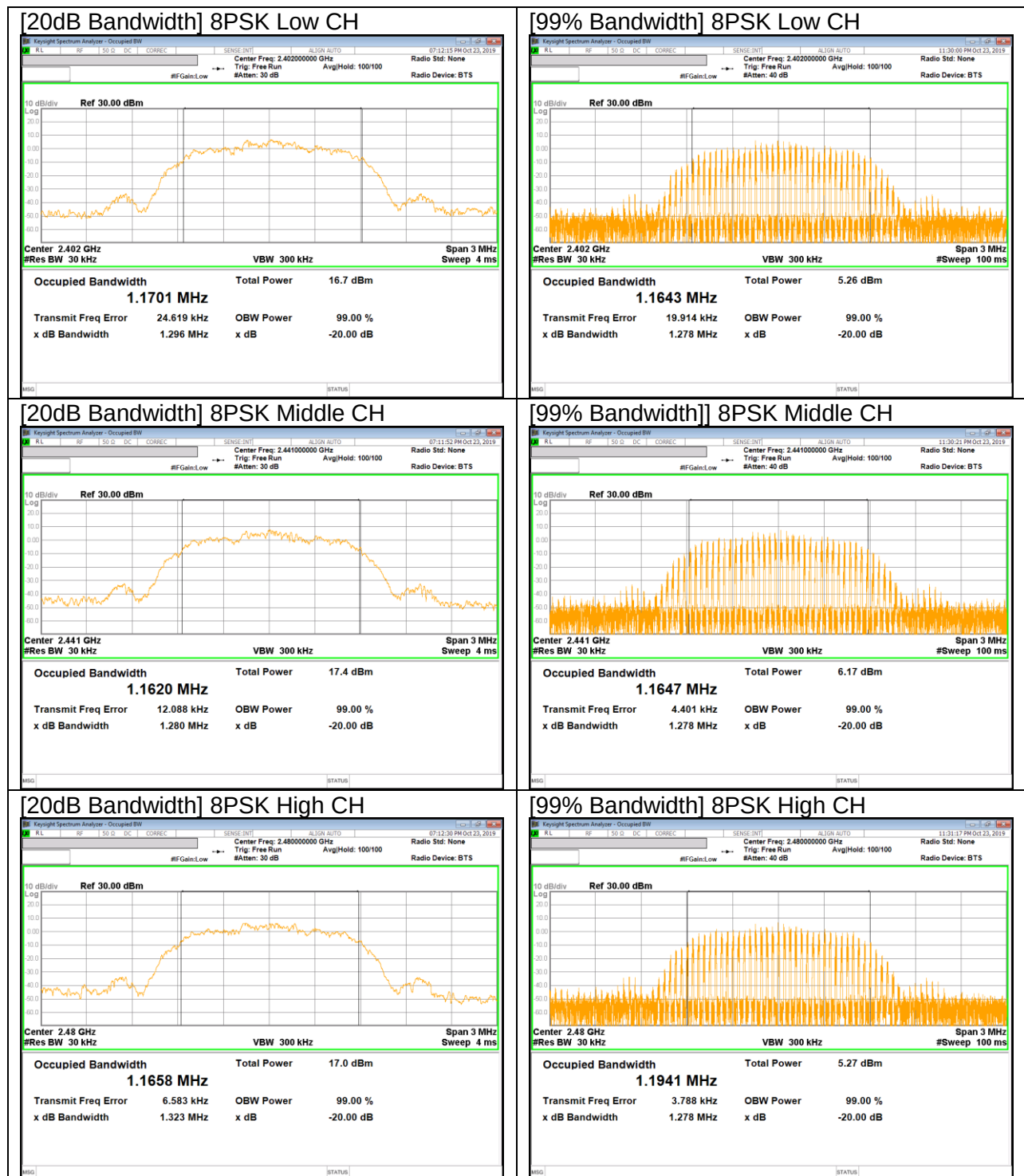
GFSK BANDWIDTH



Pi/4-DQPSK BANDWIDTH



8PSK BANDWIDTH



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

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 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

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 $\geq$ RBW

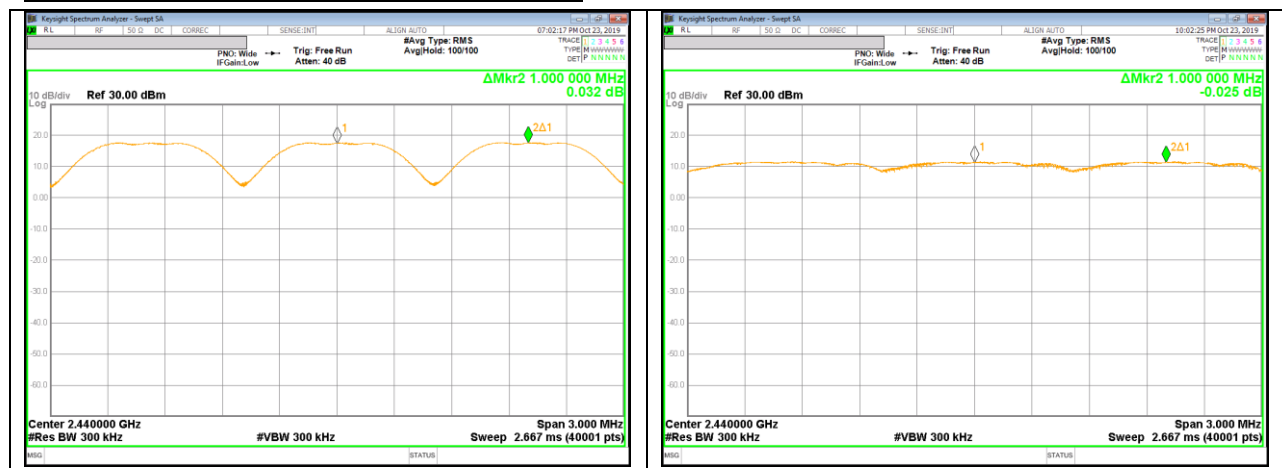
Sweep = Auto

Detector function = Peak

Trace = Max hold

RESULTS

HOPPING FREQUENCY SEPARATION PLOT



[GFSK]

[8PSK]

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 $\geq$ RBW

Sweep = Auto

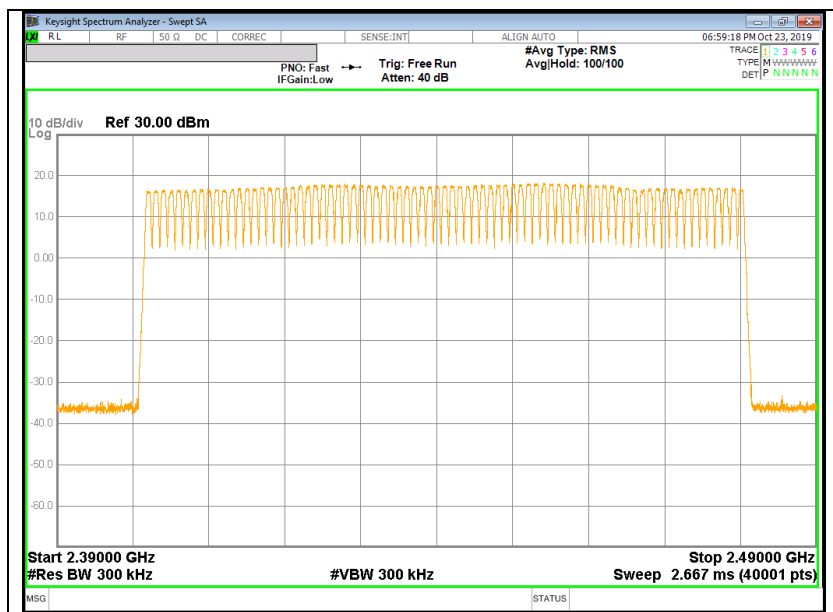
Detector function = Peak

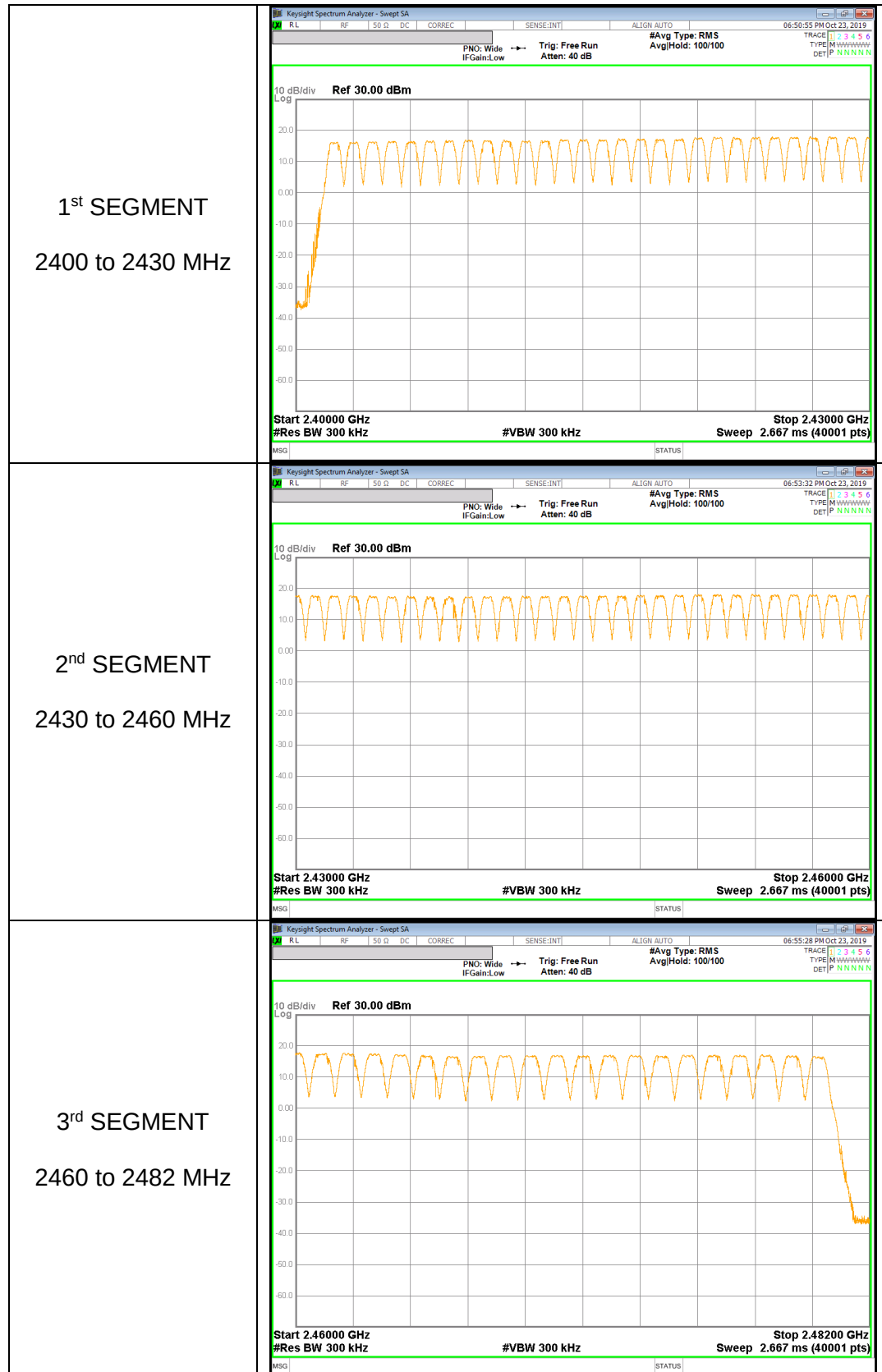
Trace = Max hold

RESULTS

Normal Mode: 79 Channels observed.

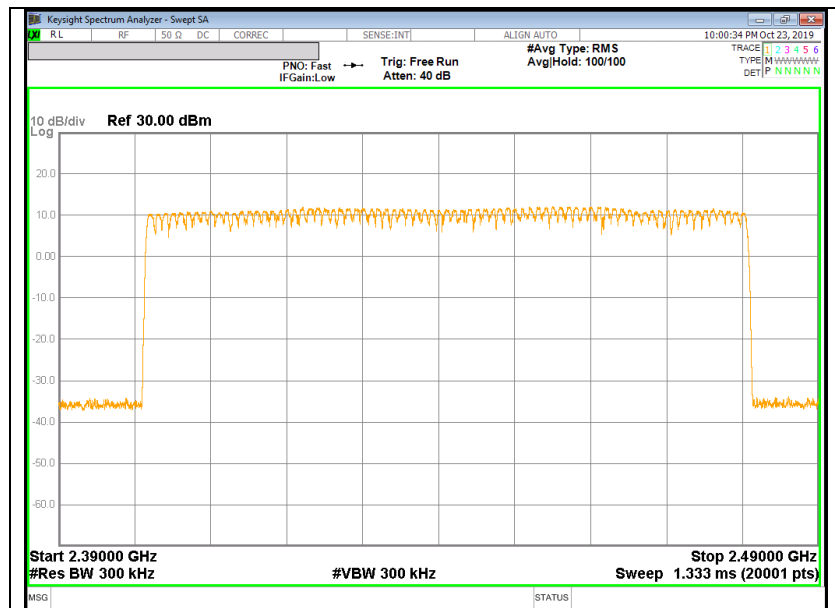
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)





NUMBER OF HOPPING CHANNELS PLOTS[8PSK]

NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)





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.

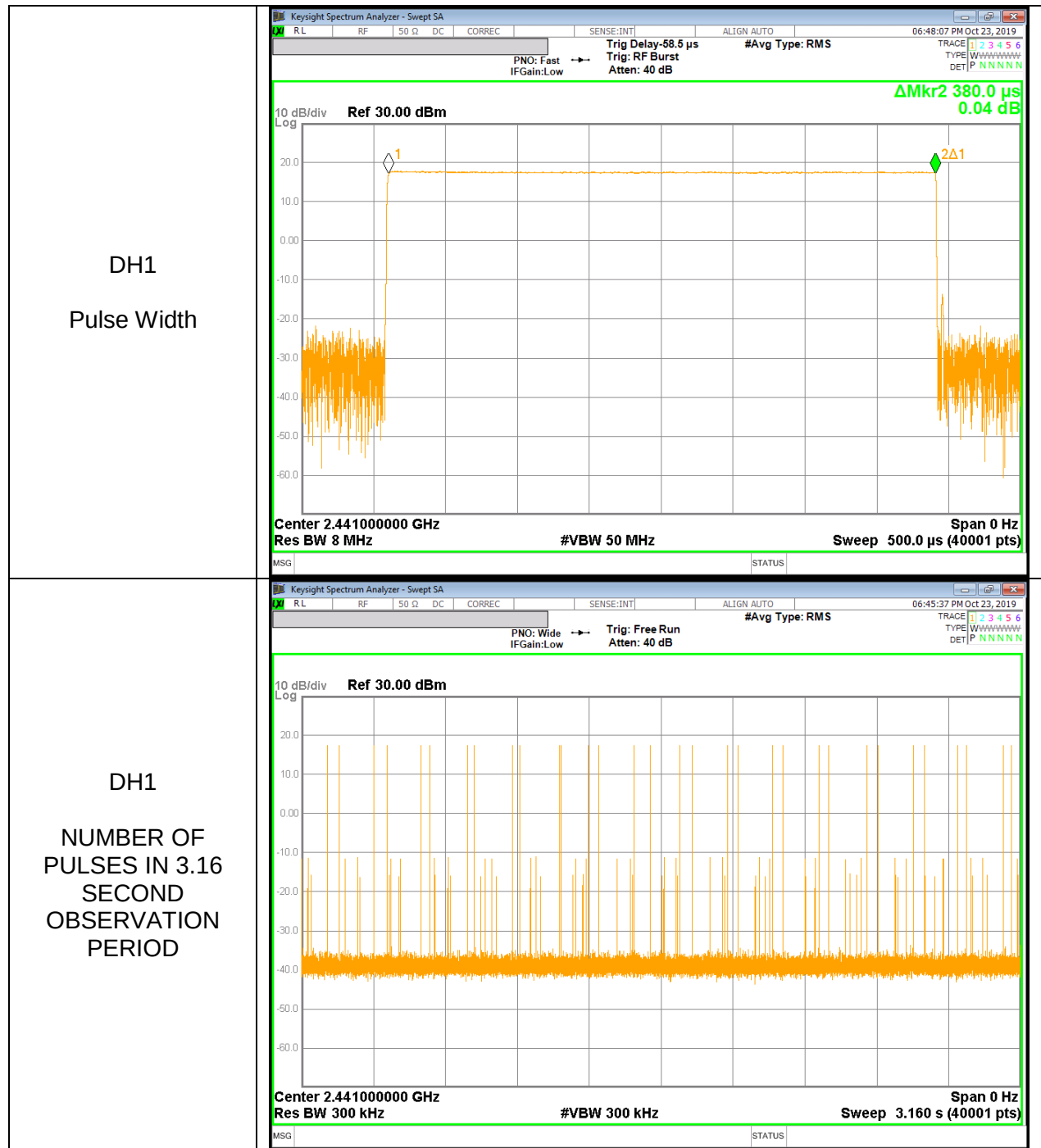
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

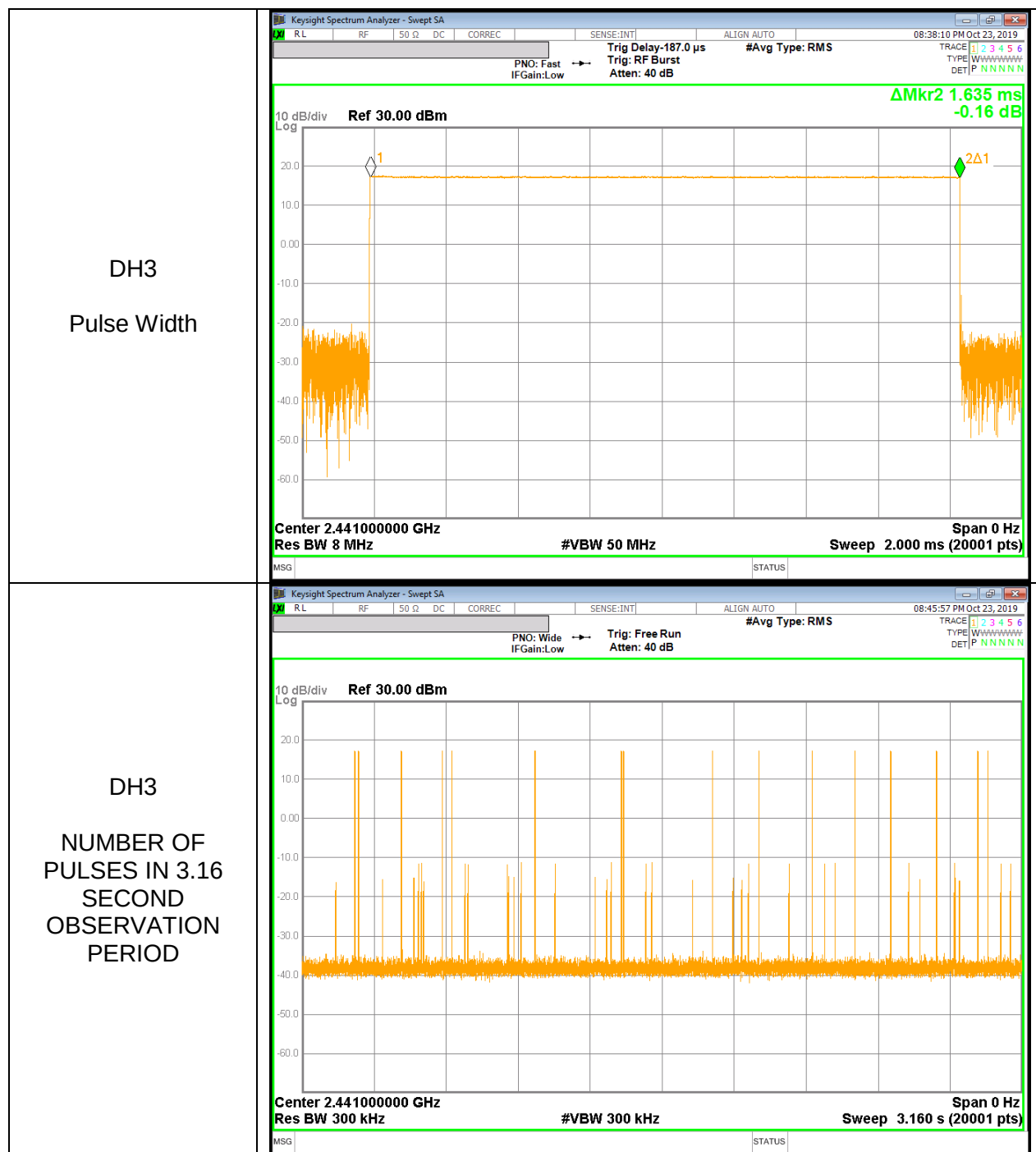
RESULTS[GFSK]

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

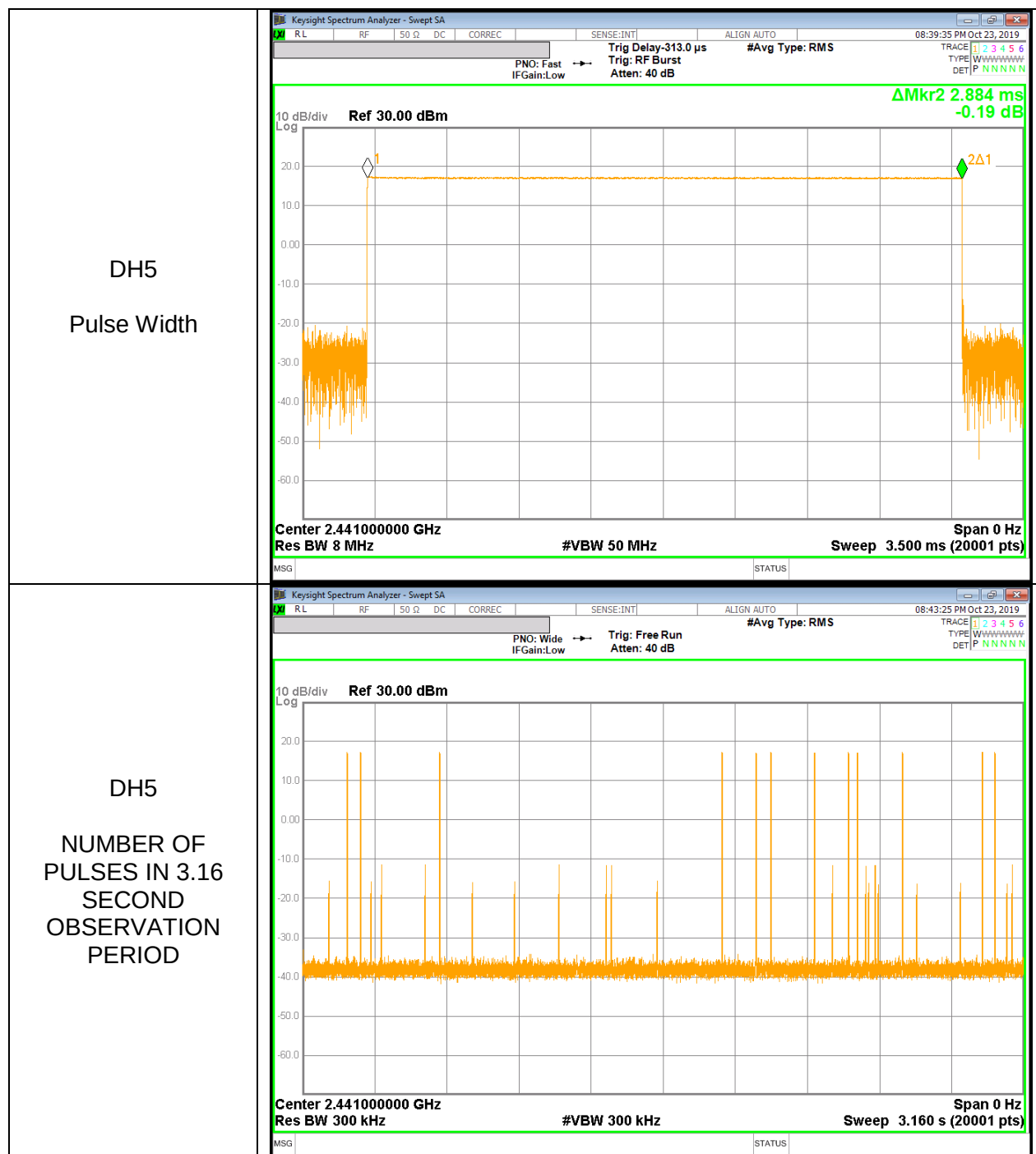
DH1



DH3



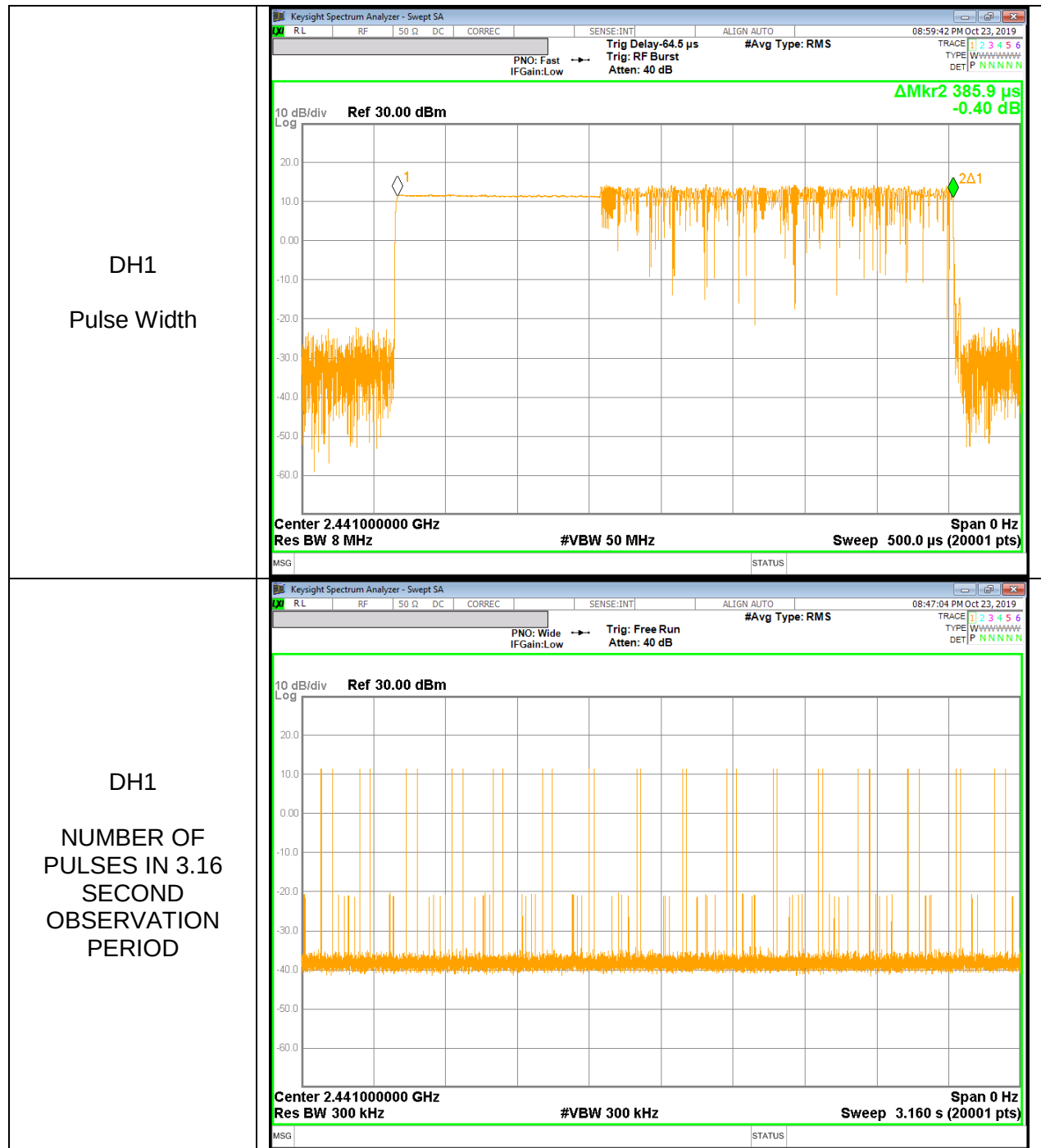
DH5



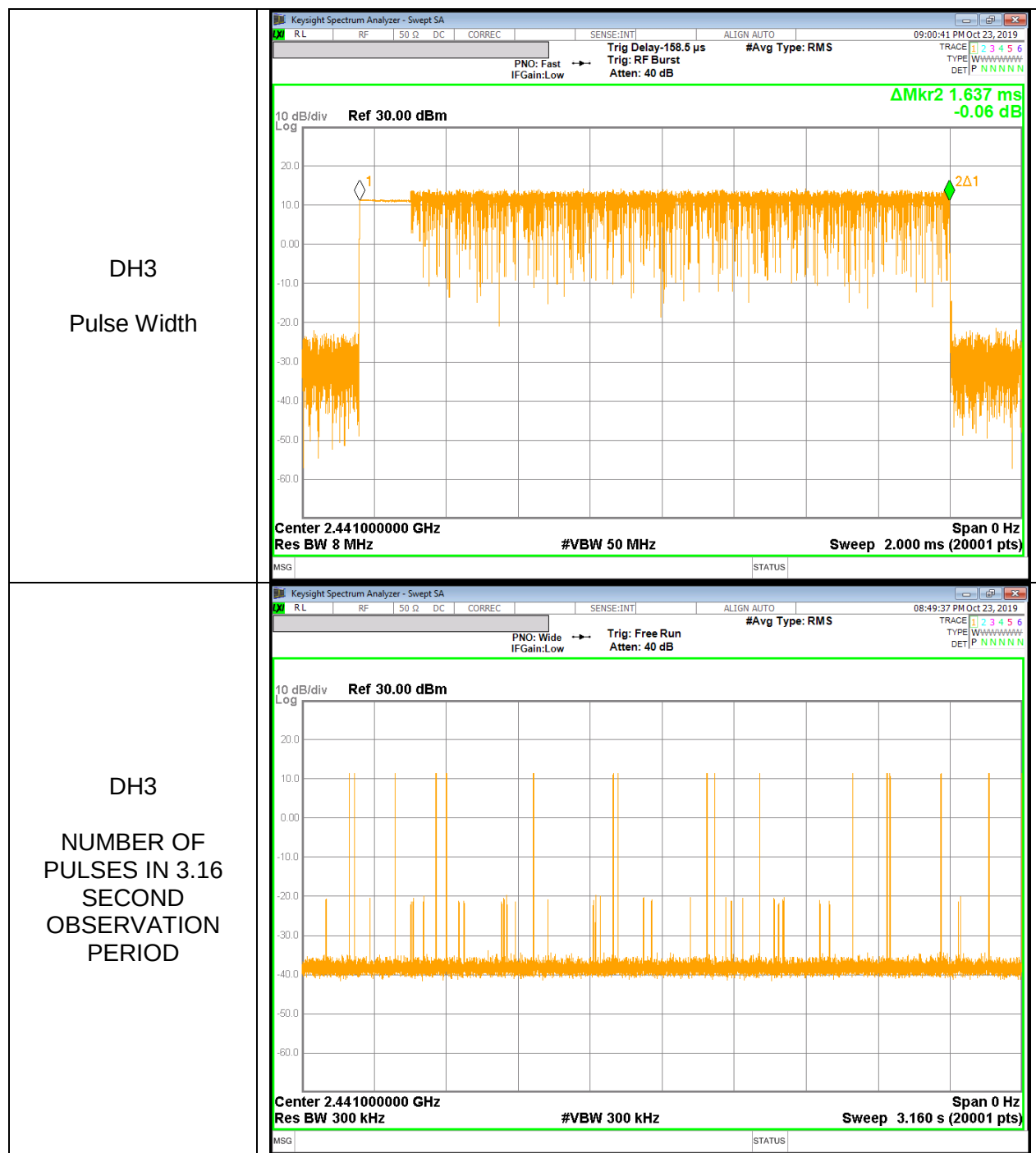
RESULTS[8PSK]

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

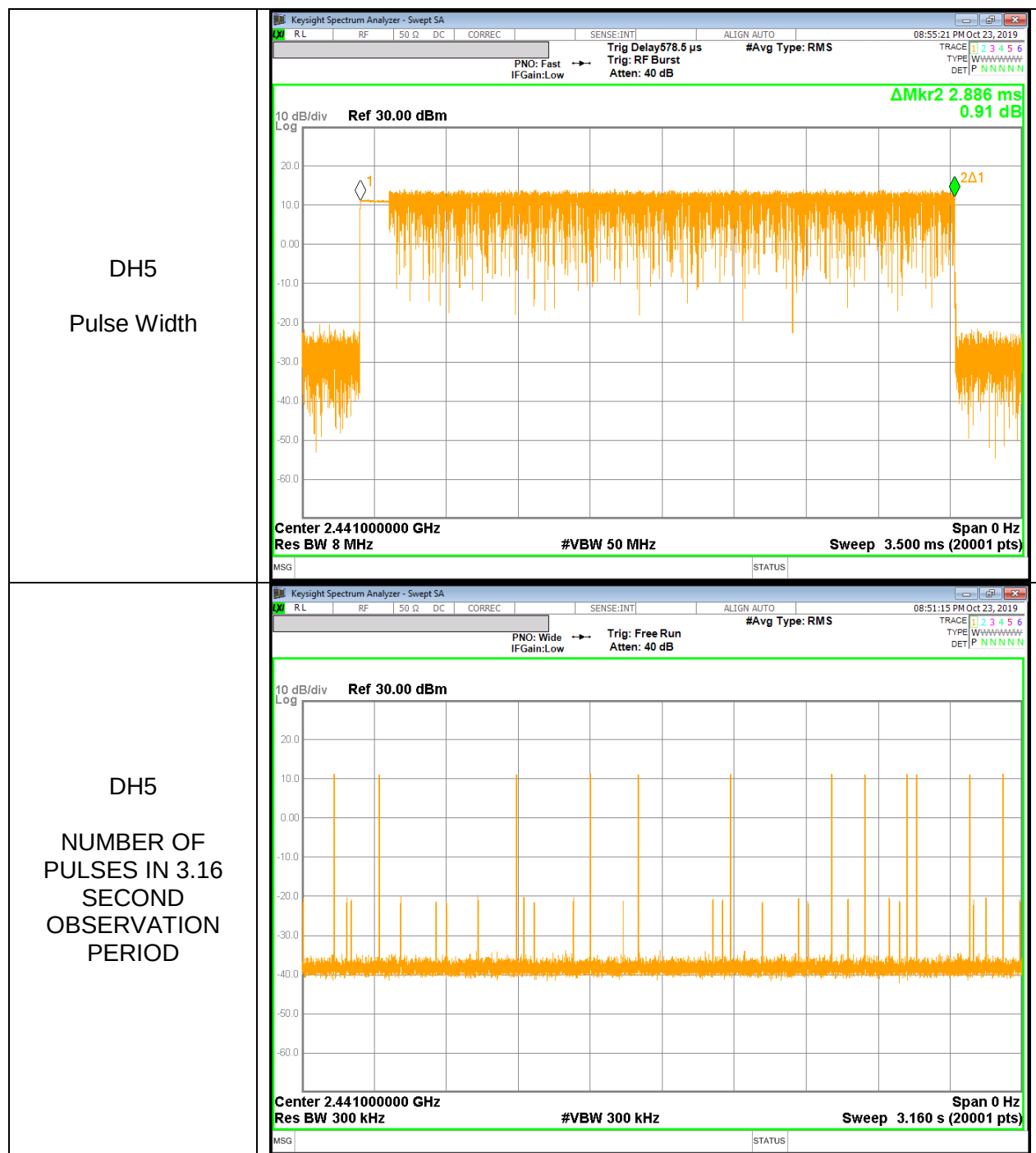
DH1



DH3



DH5



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

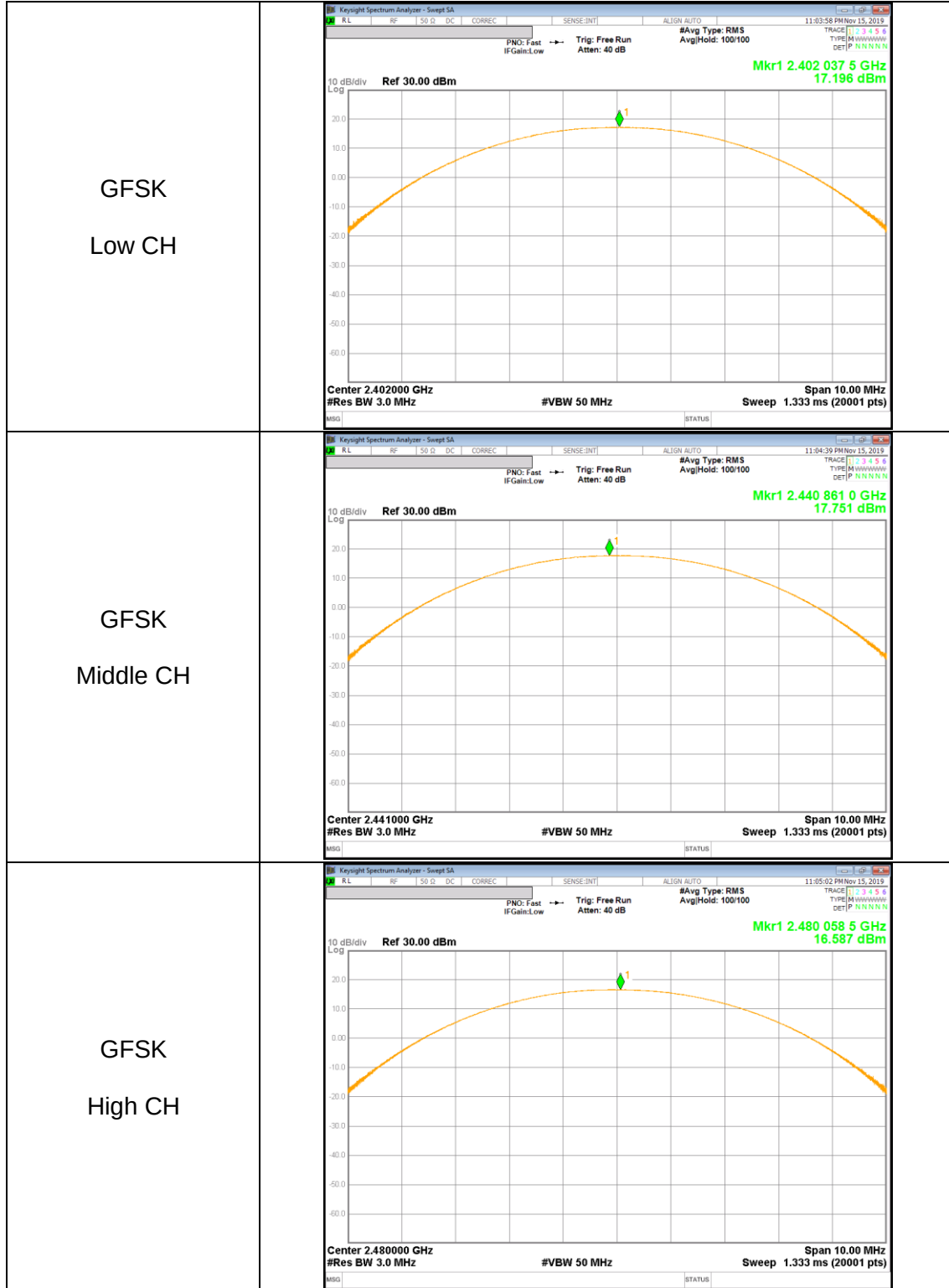
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	13.728	21.000	-7.272
Mid	2 441	14.001	21.000	-6.999
High	2 480	13.292	21.000	-7.708
Worst		14.001	21.000	-6.999

10.4.3.ENHANCED DATA RATE 8PSK MODULATION

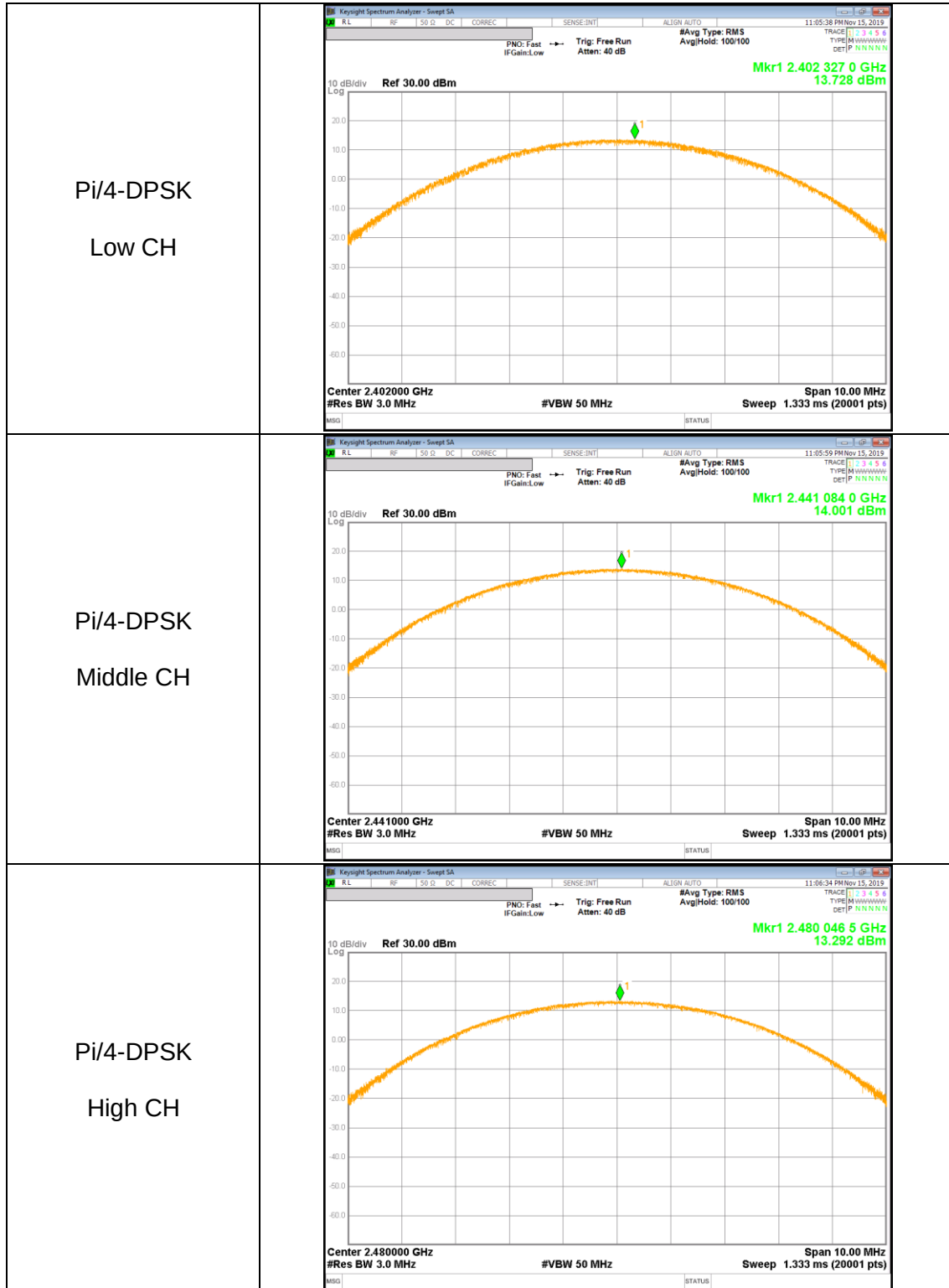
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2 402	14.189	21.000	-6.811
Mid	2 441	14.297	21.000	-6.703
High	2 480	13.777	21.000	-7.223
Worst		14.297	21.000	-6.703

10.4.4.OUTPUT POWER PLOTS

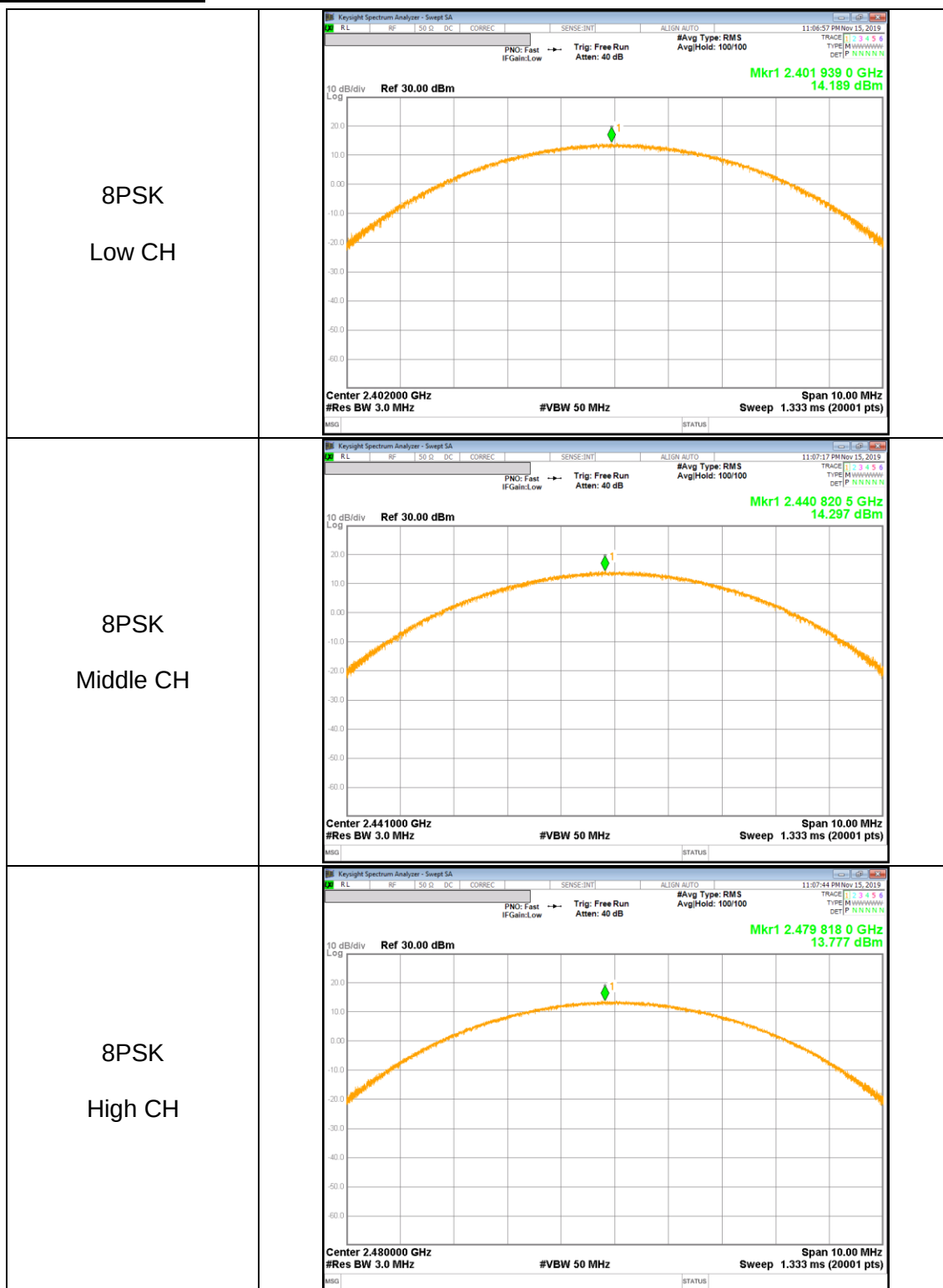
GFSK OUTPUT POWER



Pi/4-DPSK OUTPUT POWER



8PSK OUTPUT POWER



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

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.

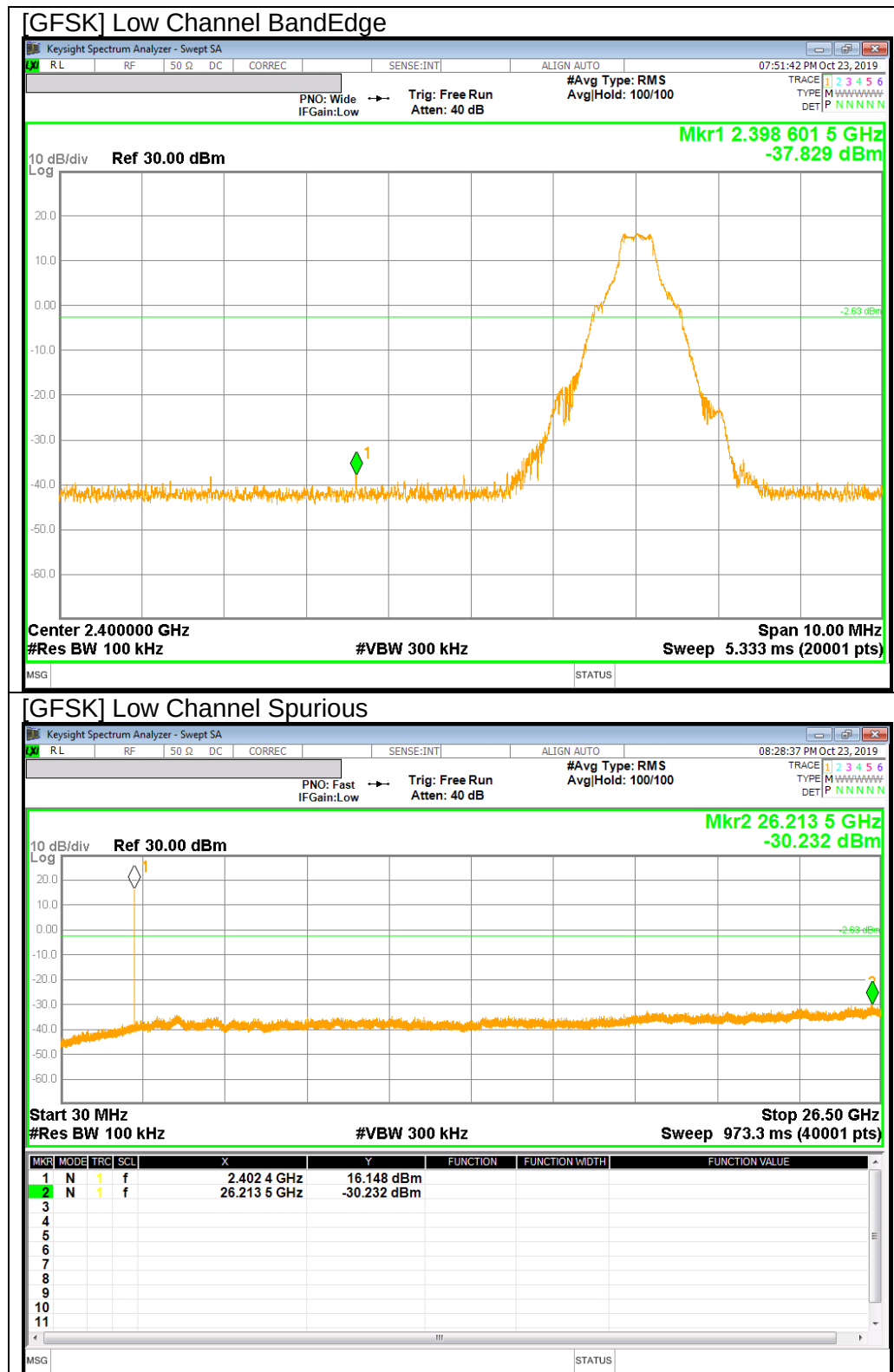
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

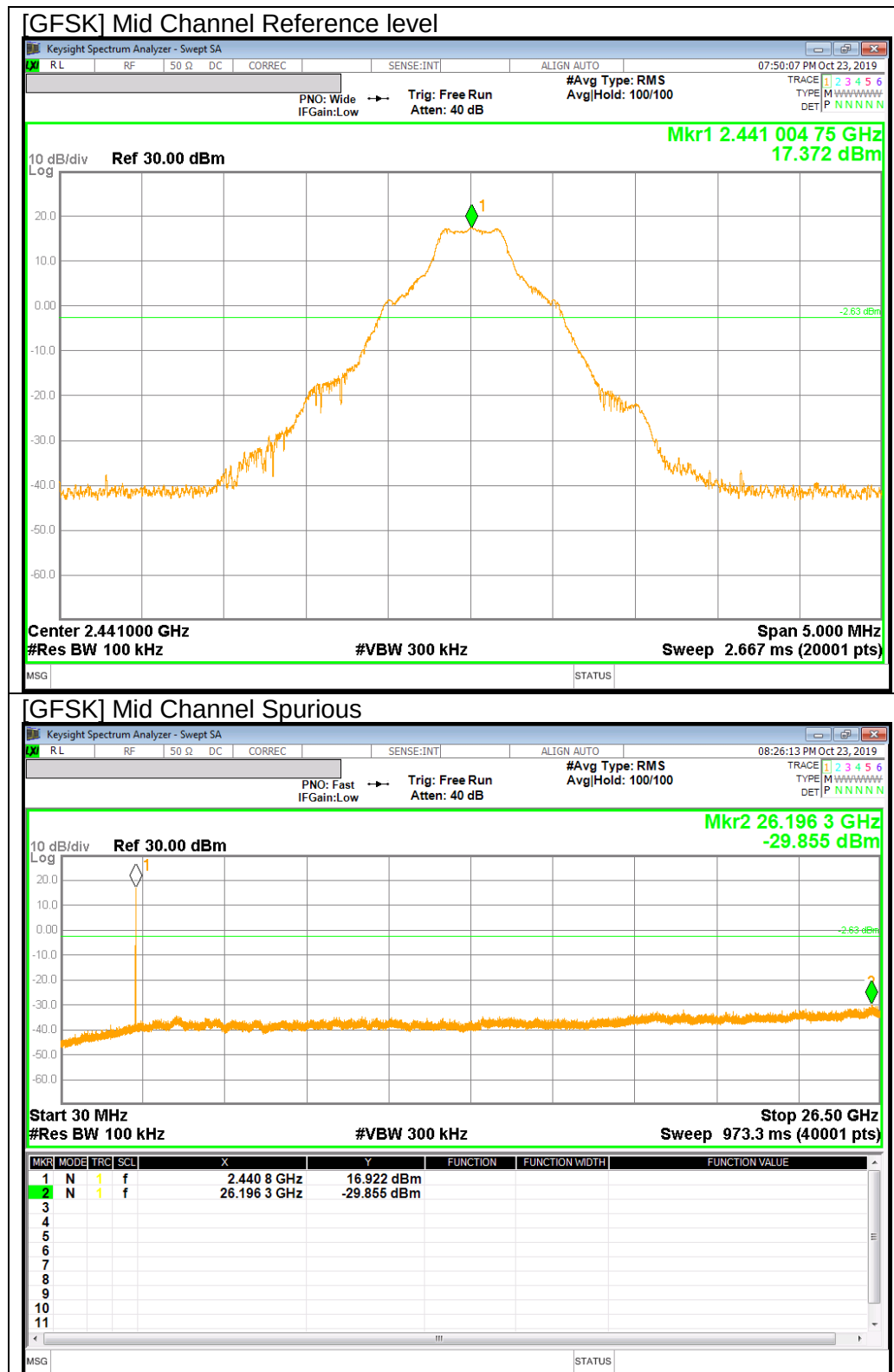
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

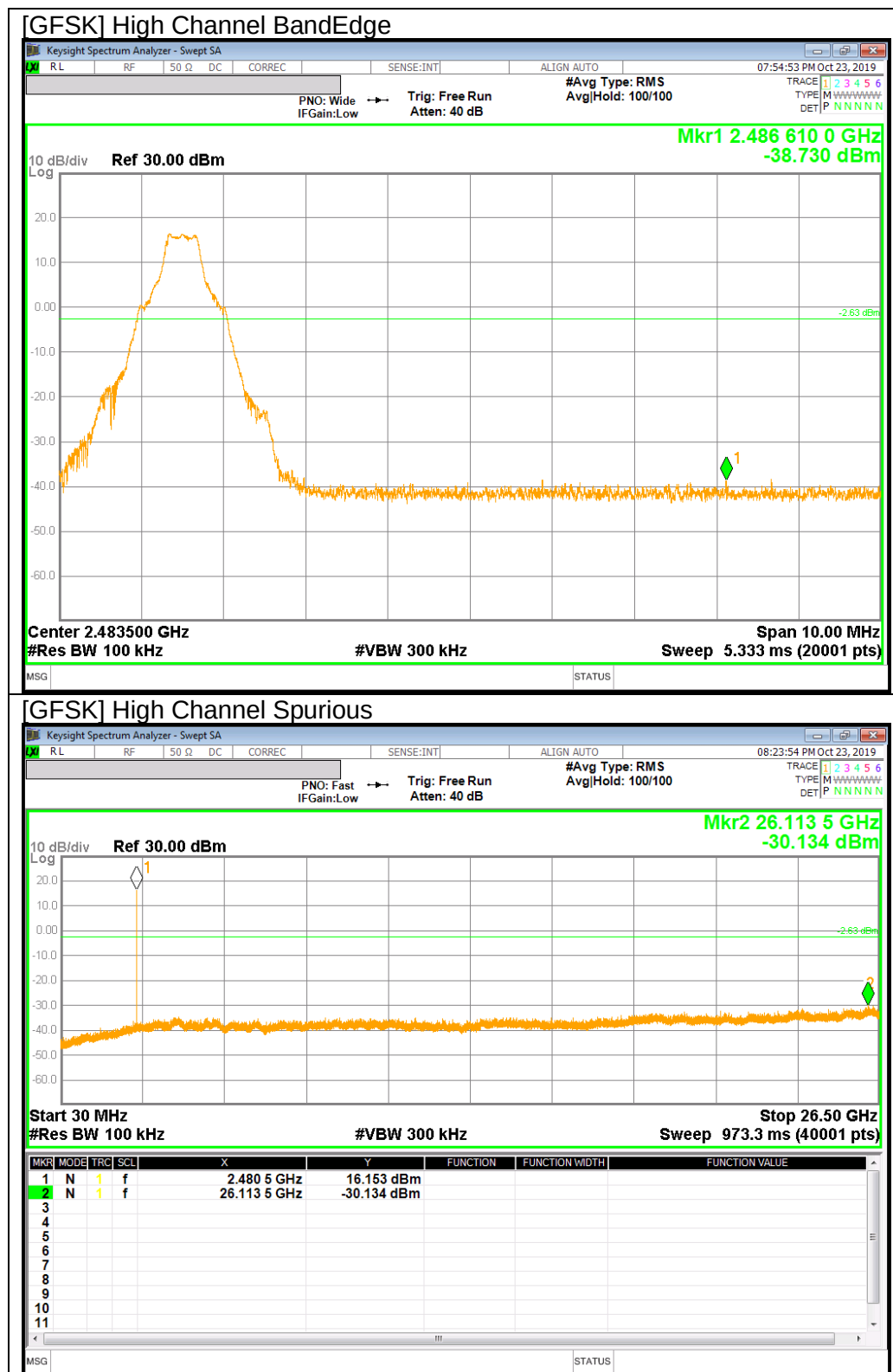
RESULTS

10.6.1.BASIC DATA RATE GFSK MODULATION

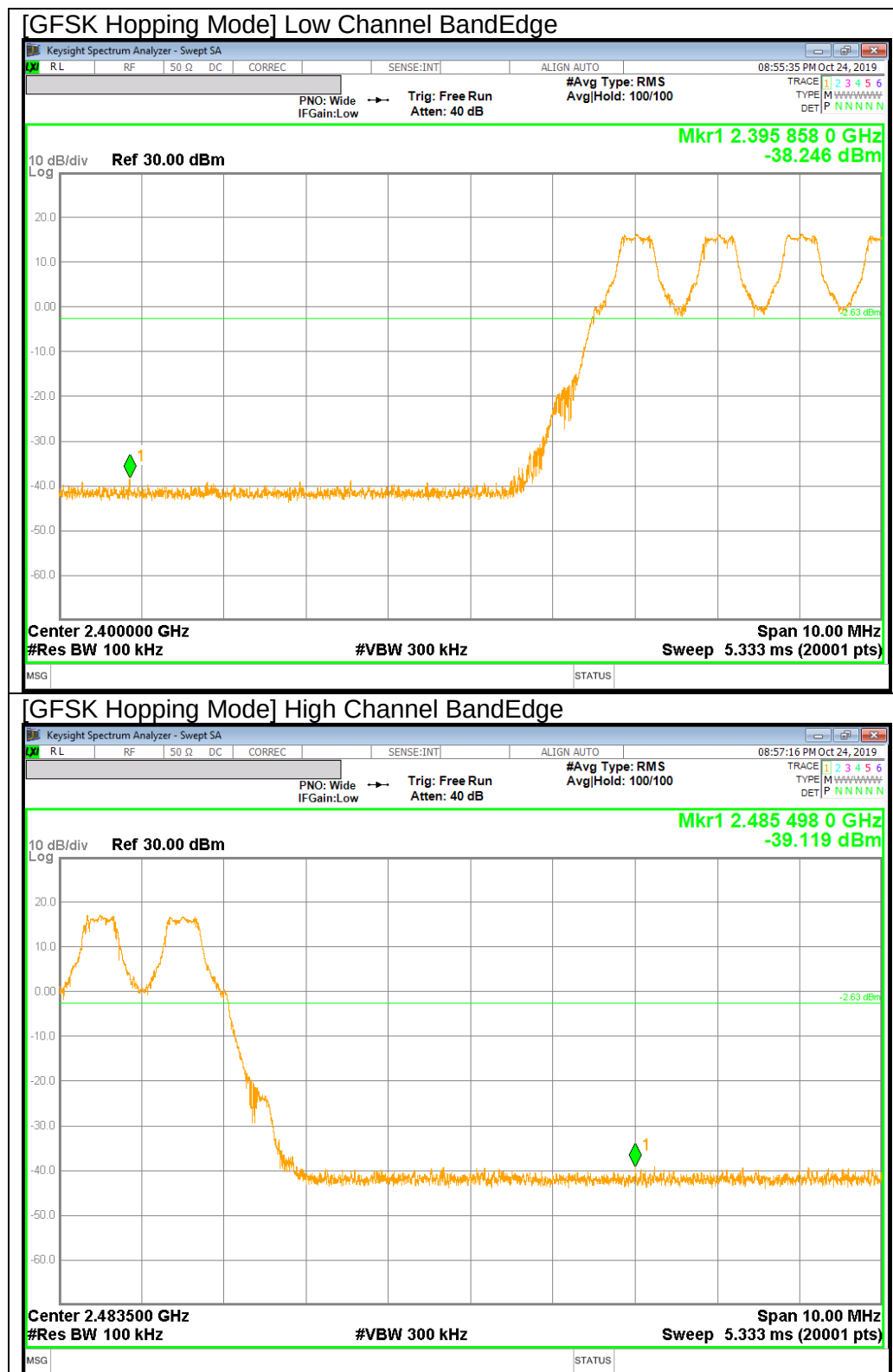
GFSK Mode





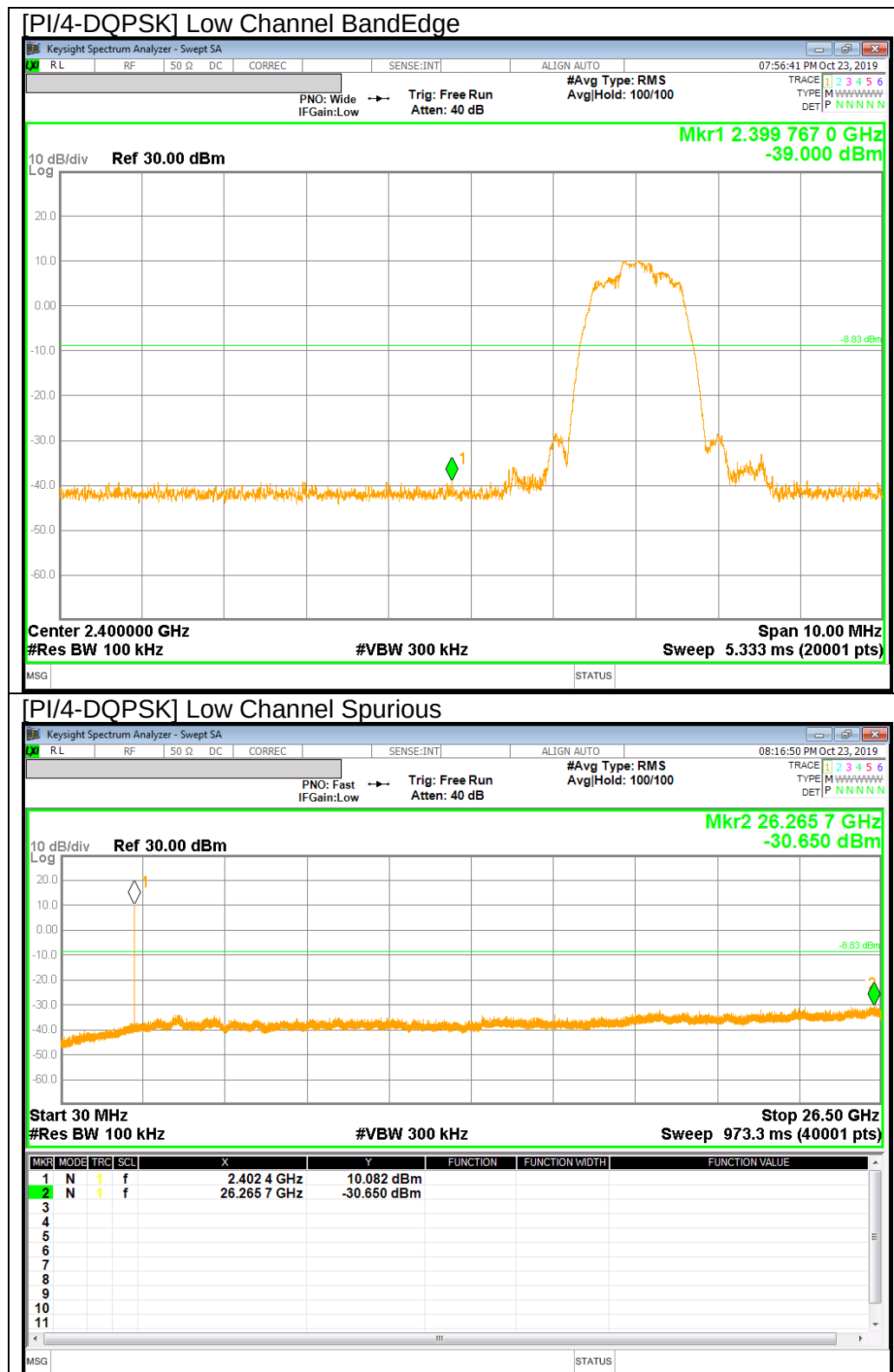


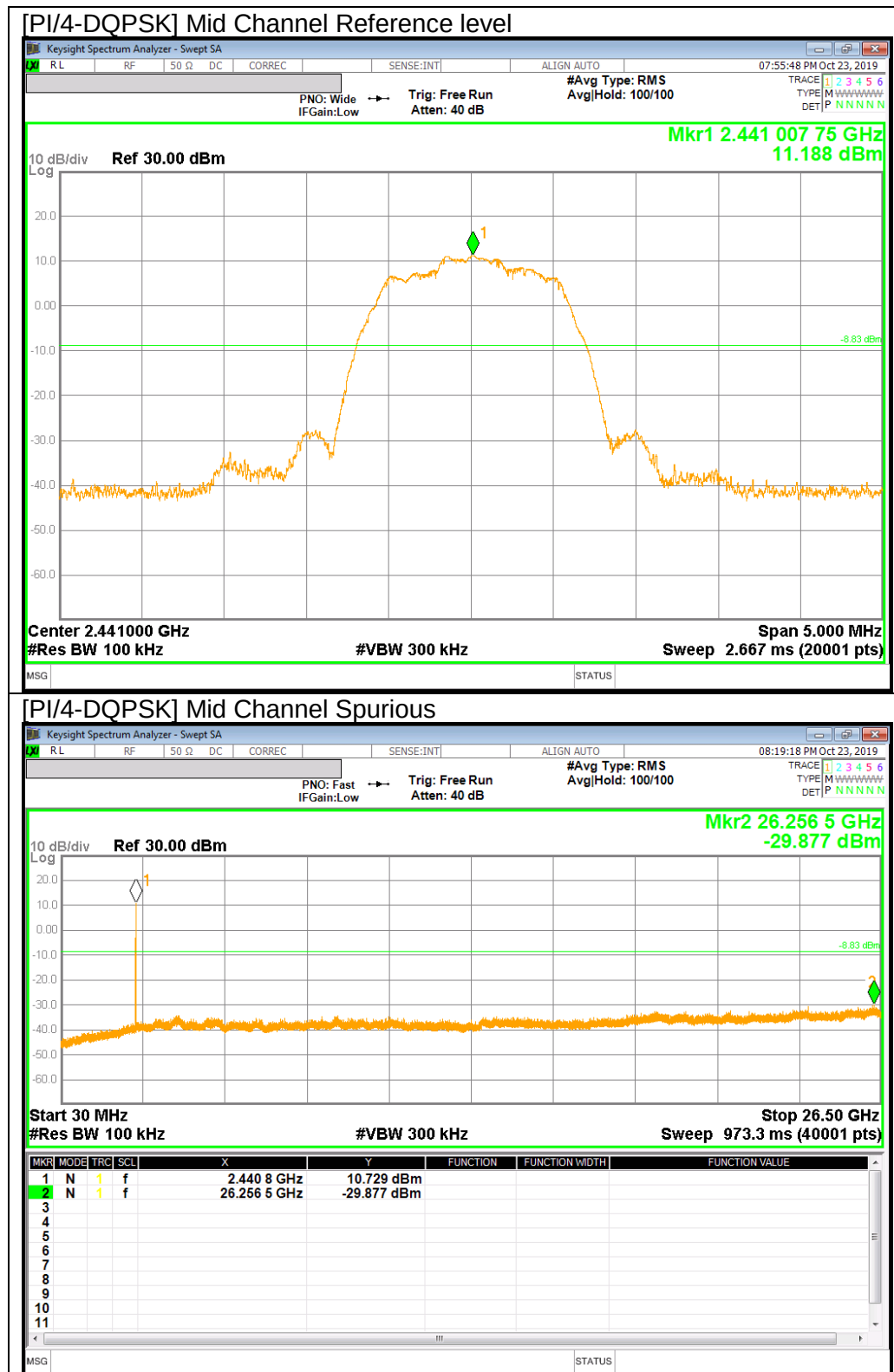
BandEdge Emission at GFSK Hopping Mode

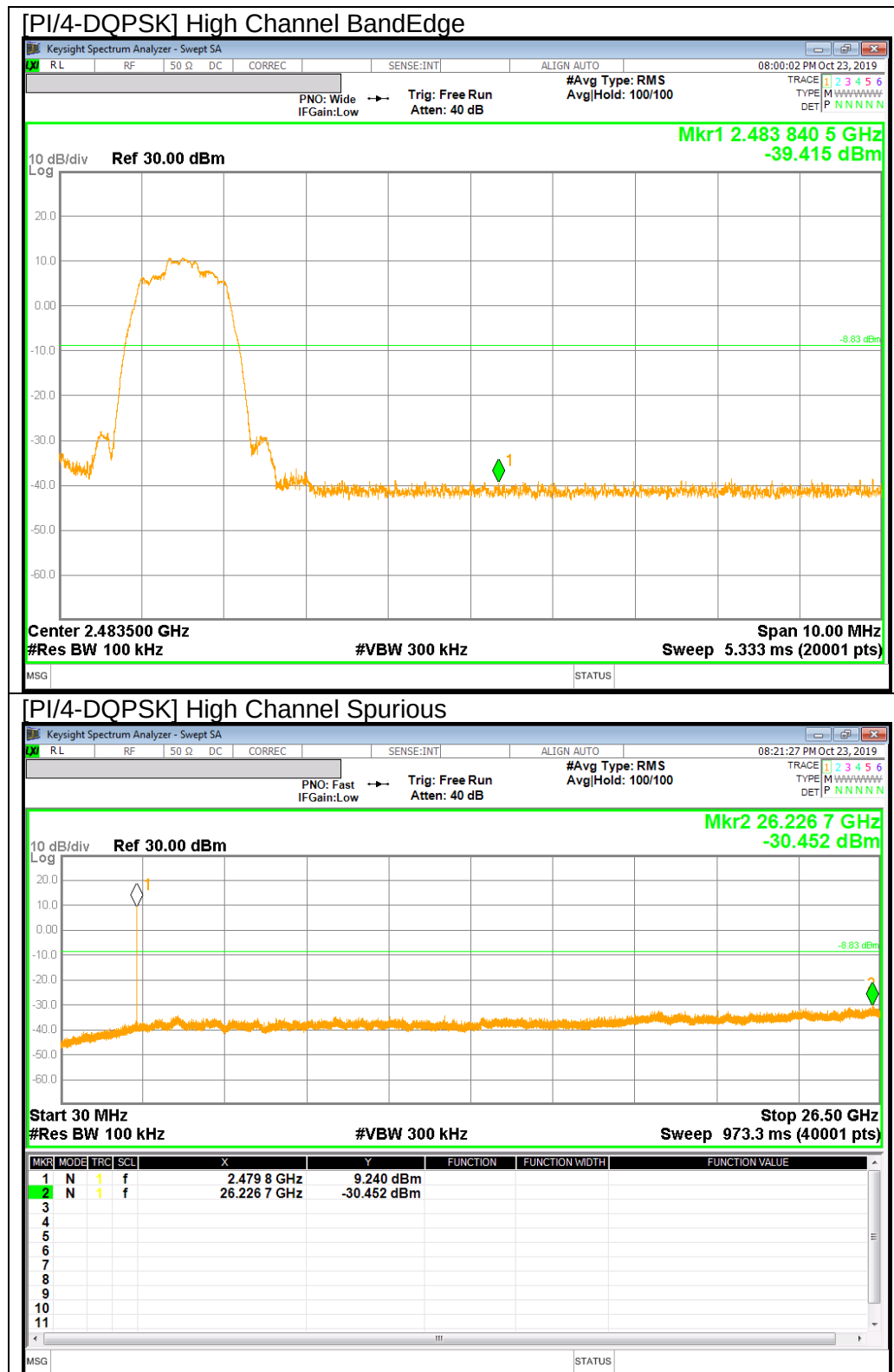


10.6.2.ENHANCED DATA RATE PI/4-DQPSK MODULATION

PI/4-DQPSK Mode







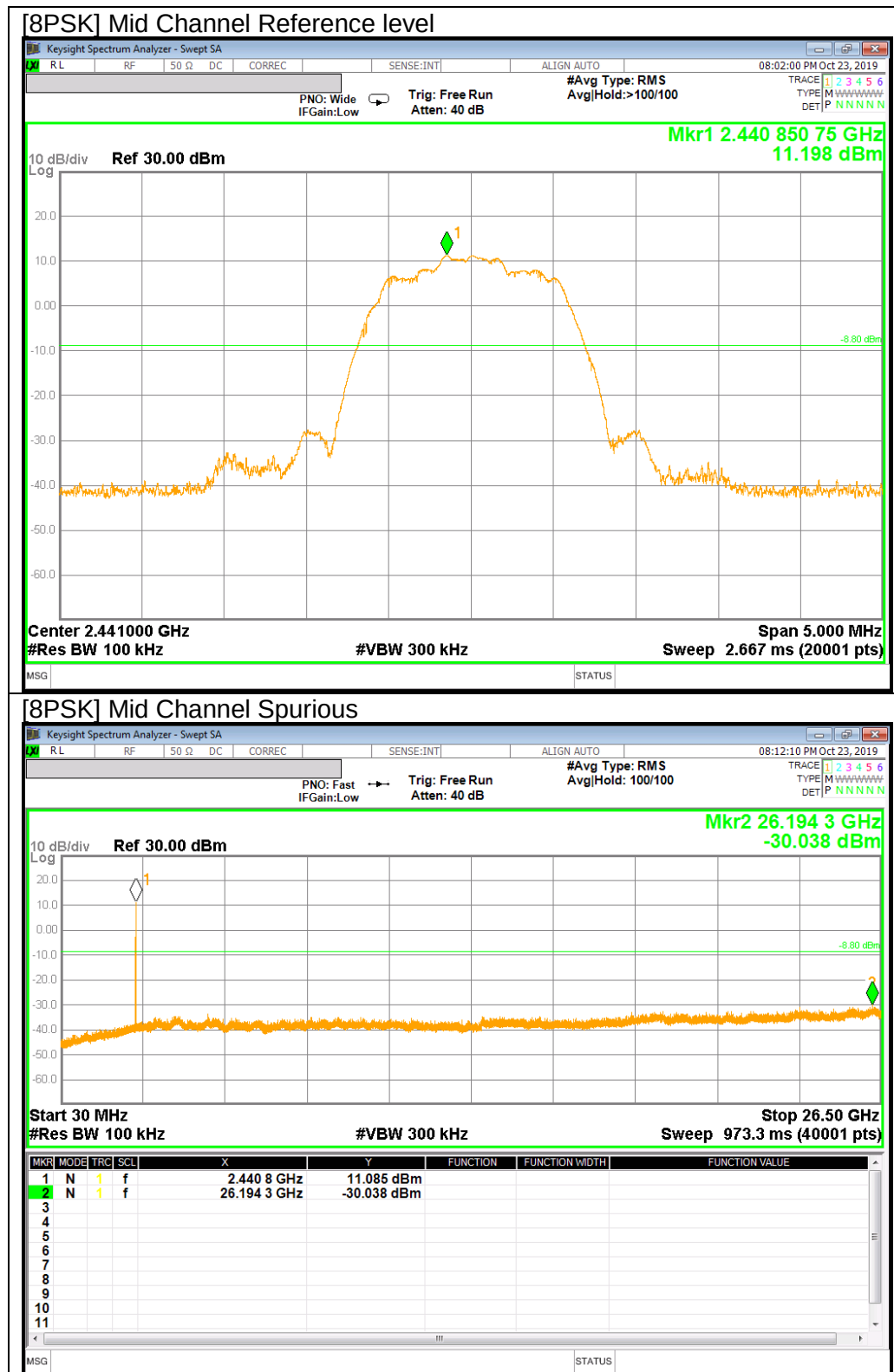
BandEdge Emission at PI/4-DQPSK Hopping Mode

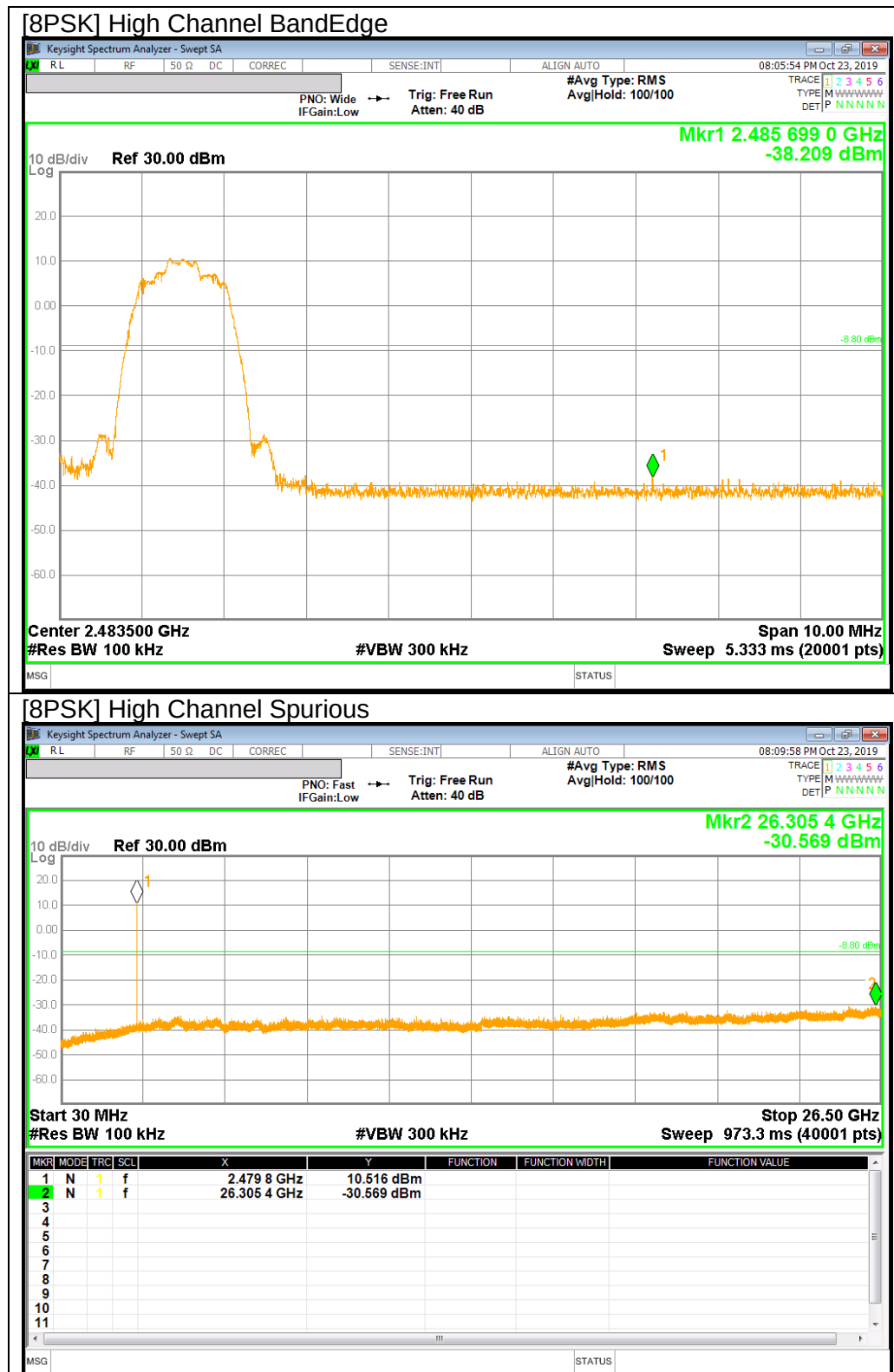


10.6.3.ENHANCED DATA RATE 8PSK MODULATION

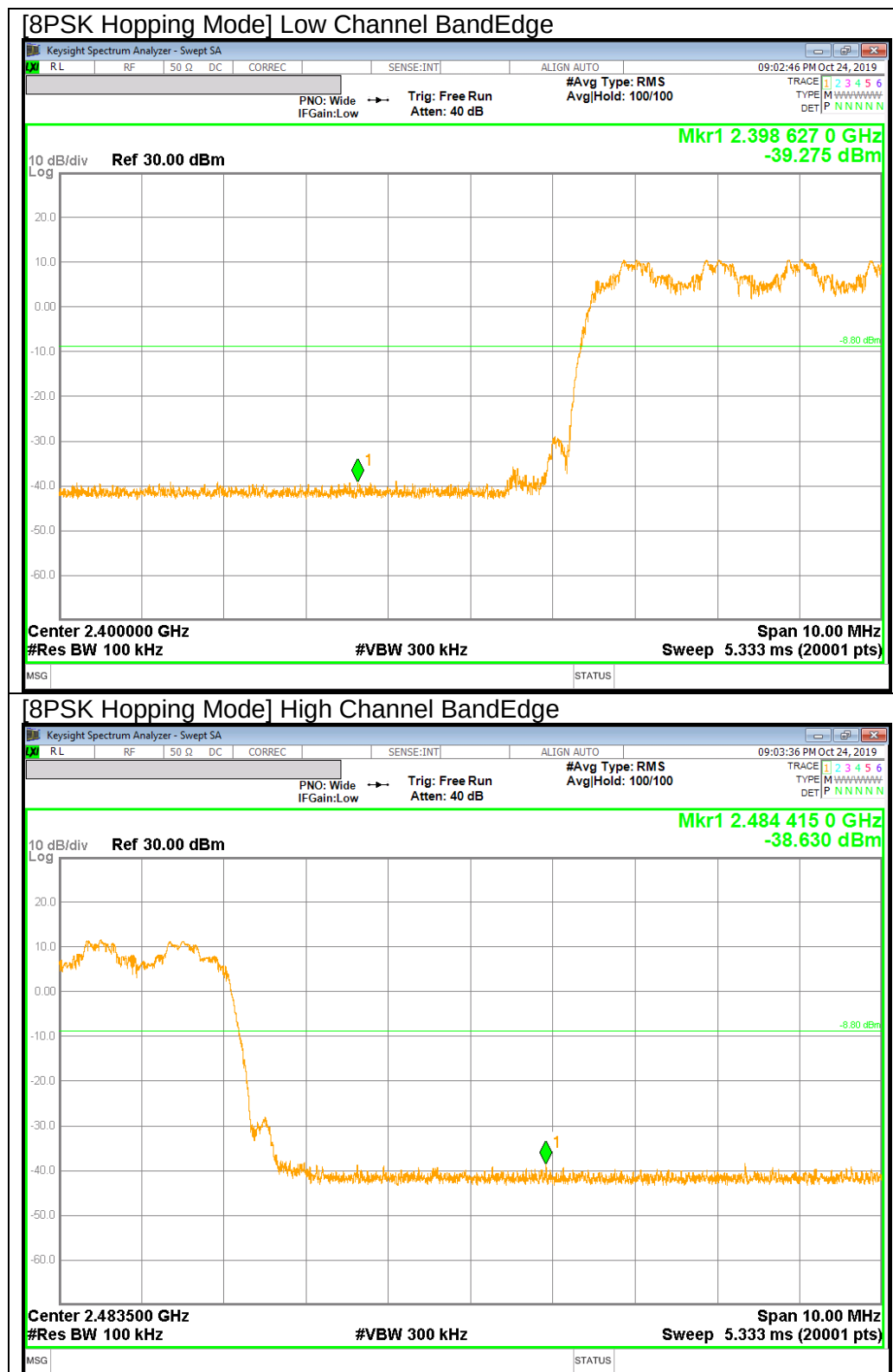
8PSK Mode







BandEdge Emission at 8PSK Hopping Mode



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.

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.

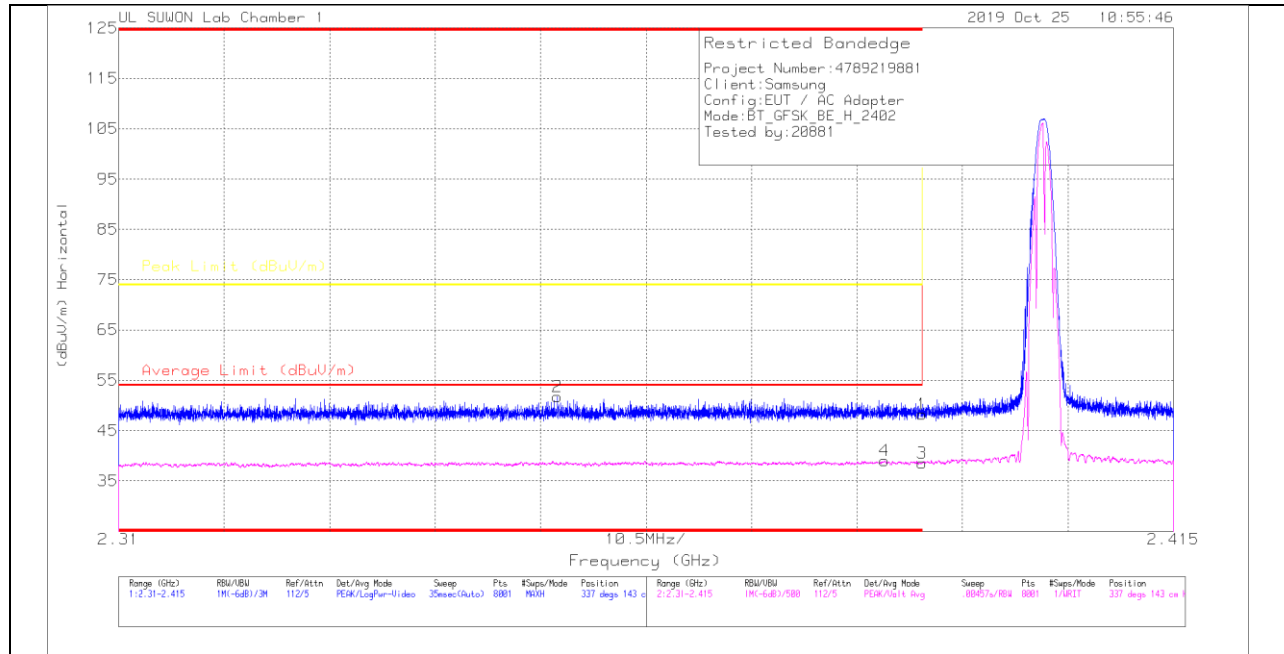
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

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

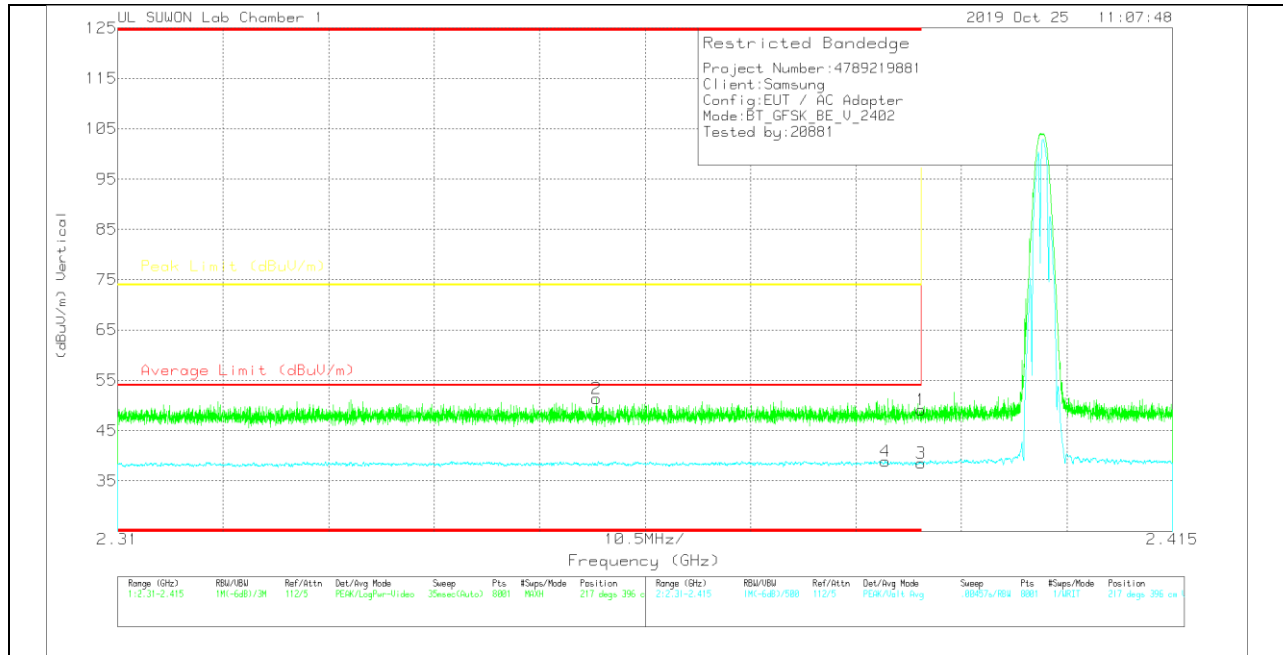
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.1	Pk	31.7	-25.5	48.3	-	-	74	-25.7	337	143	H
2	* 2.35365	45.63	Pk	31.6	-25.5	51.73	-	-	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

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

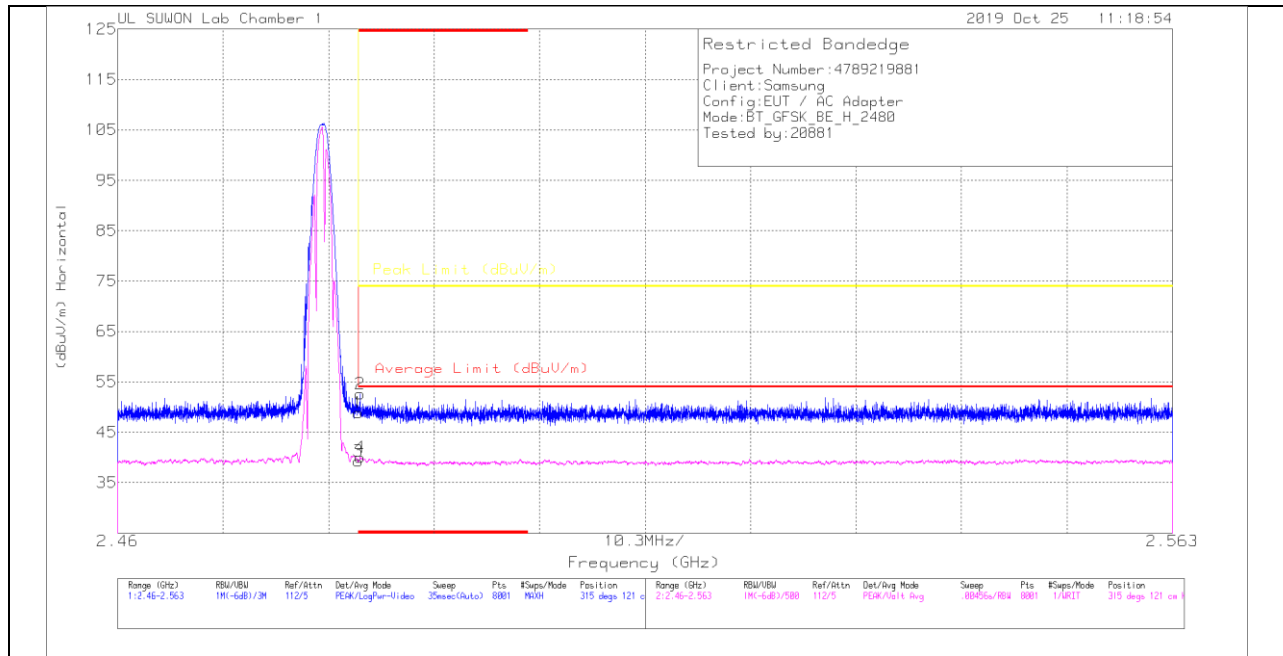
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

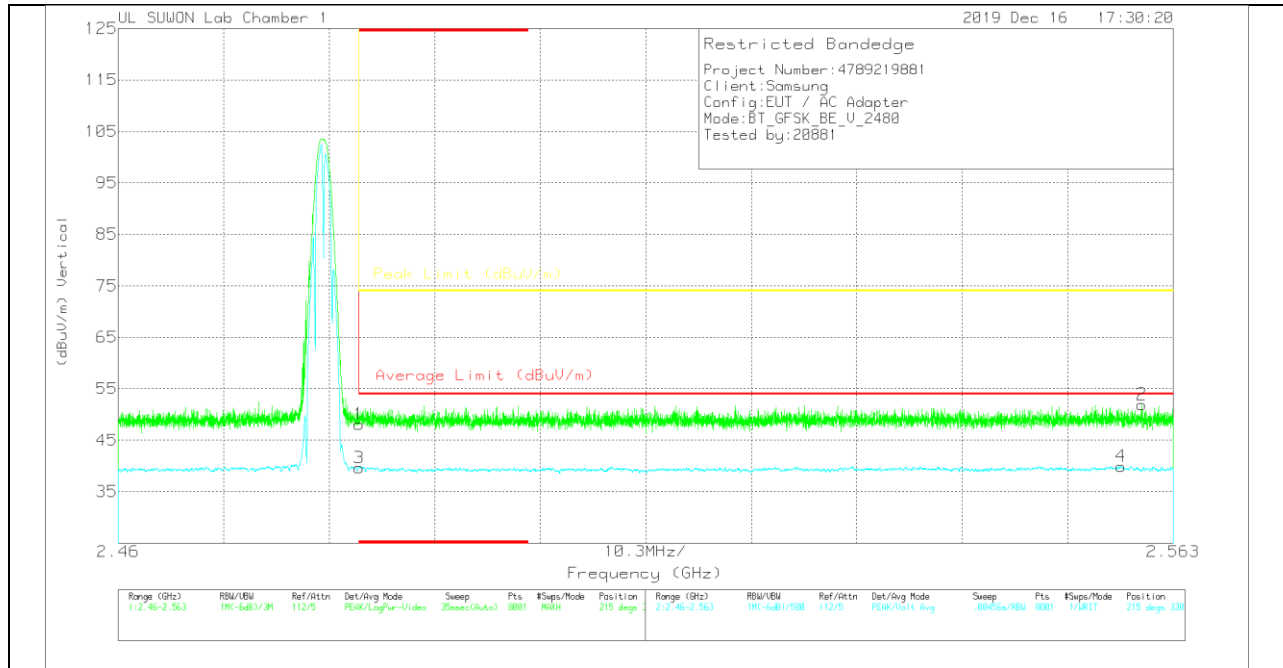
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	42.22	Pk	31.9	-25.2	48.92	-	-	74	-25.08	315	121	H
2	* 2.48369	45.88	Pk	31.9	-25.2	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

VERTICAL PEAK AND AVERAGE PLOT



VERTICAL DATA

Trace Markers

Marker	Frequency(G Hz)	MeterReadin g(dBuV)	Det	3117_001687 17	10dB_ATT[d B]	CorrectedRe ading(dBuV/ m)	Average Limit (dBuV/m)	Margin(dB)	Peak Limit (dBuV/m)	PK Margin(dB)	Azimuth(Deg s)	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

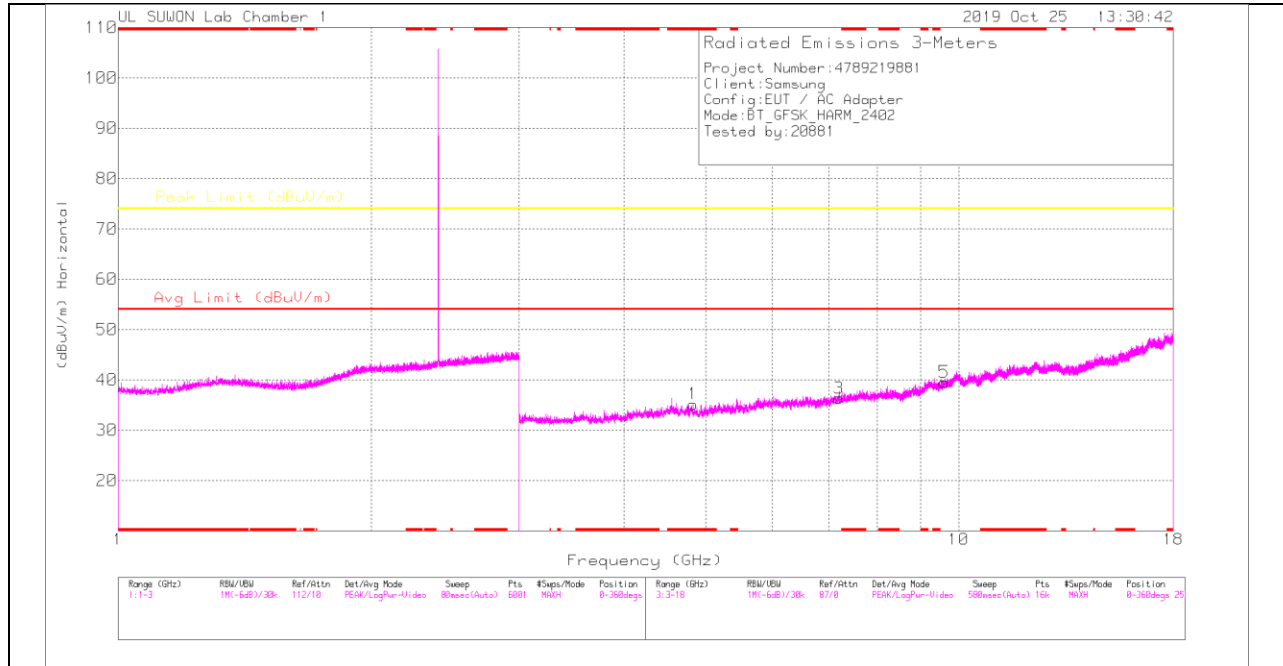
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

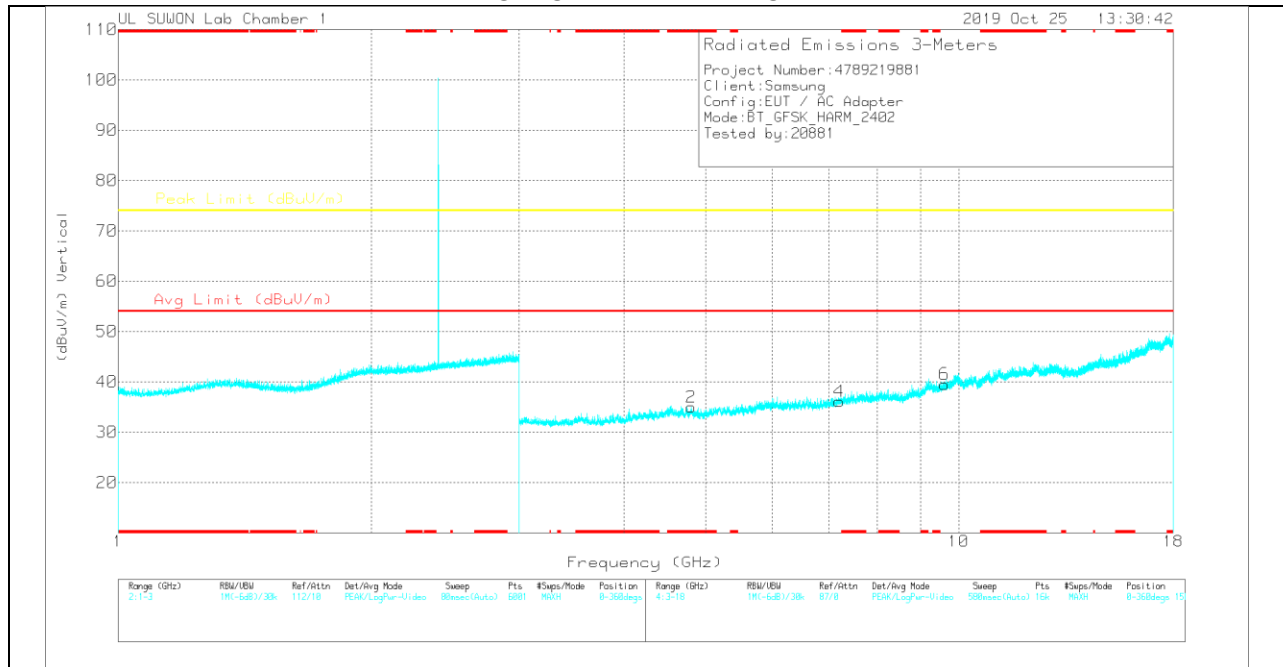
VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

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_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

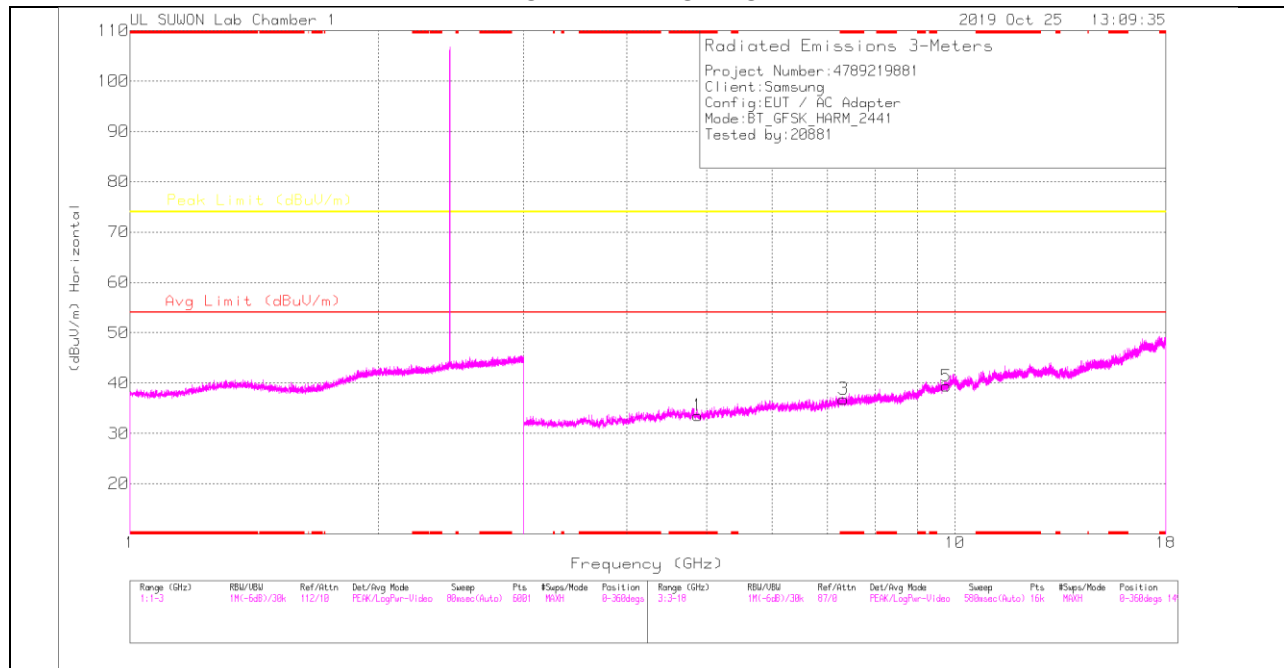
Radiated Emissions

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

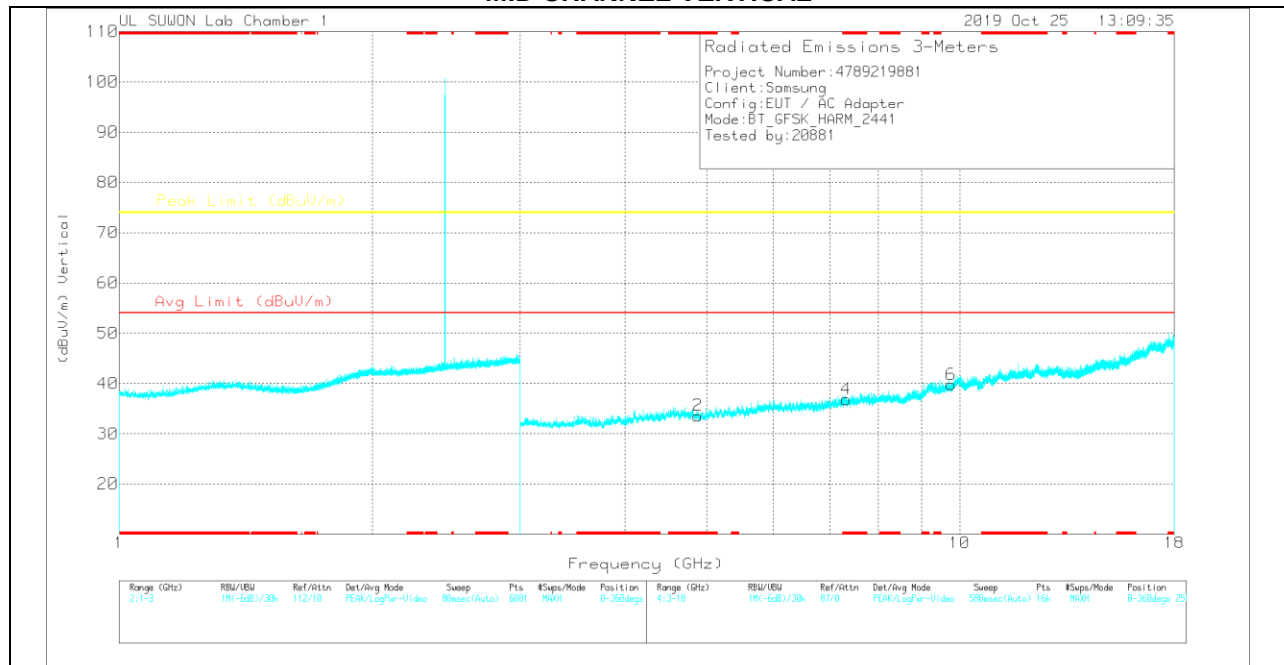
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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_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

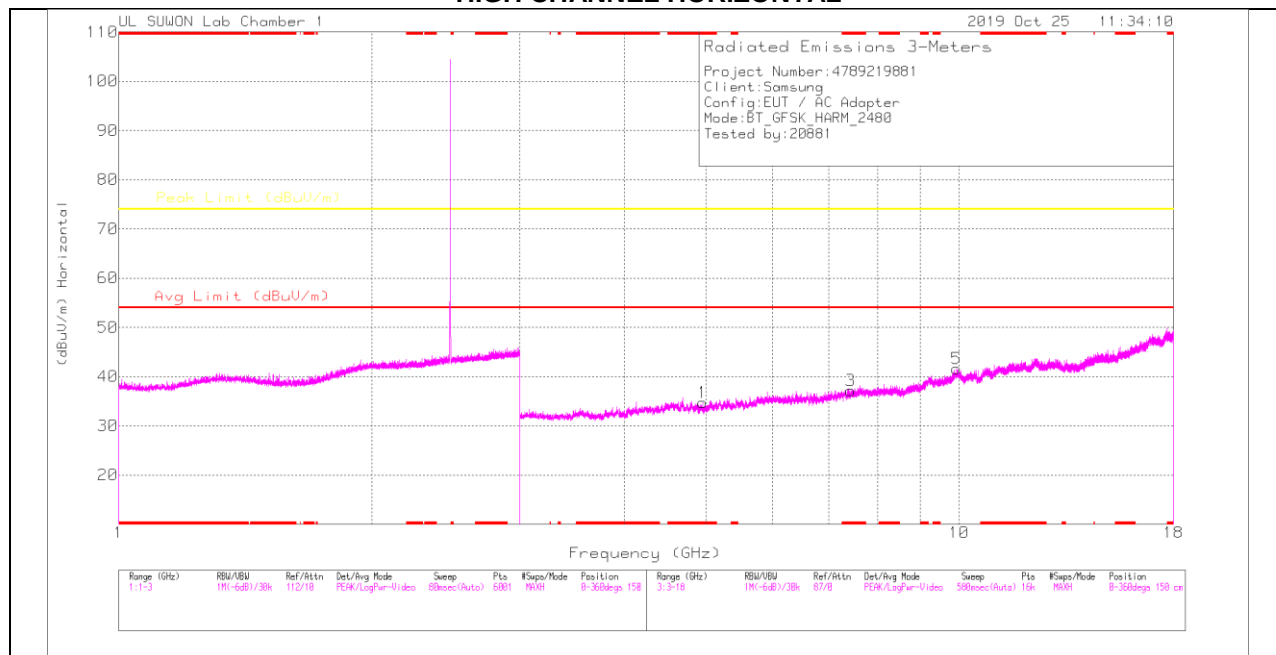
Radiated Emissions

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

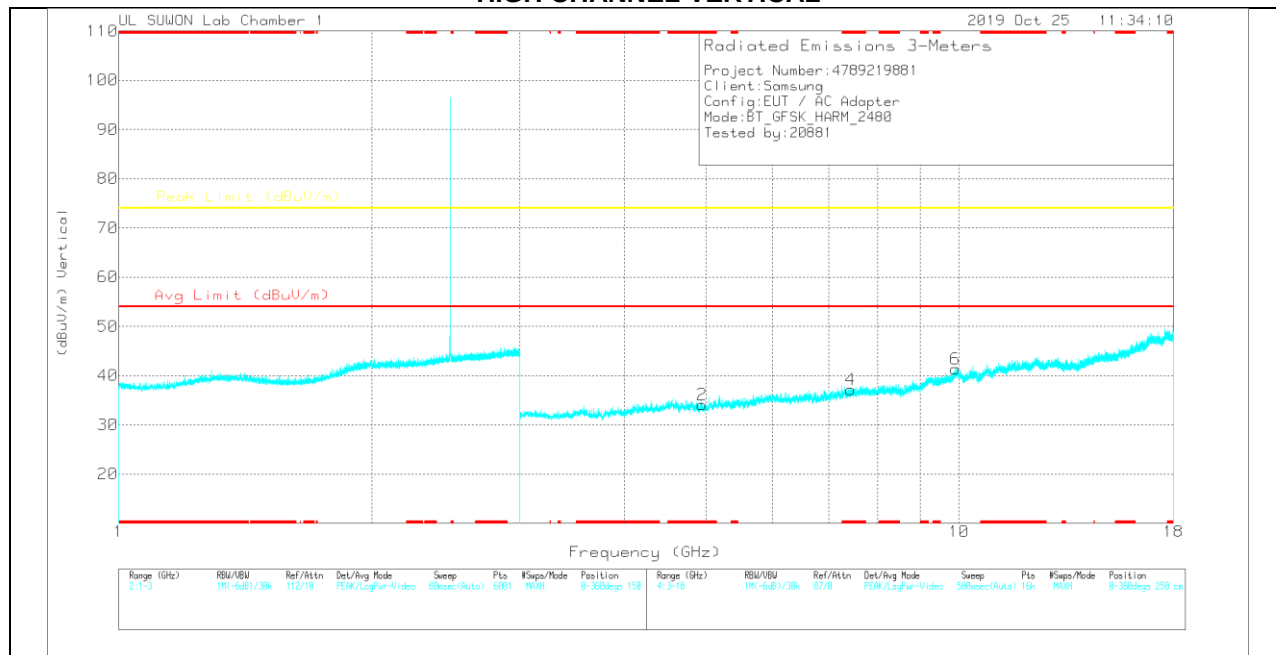
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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_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	41.67	-	-	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

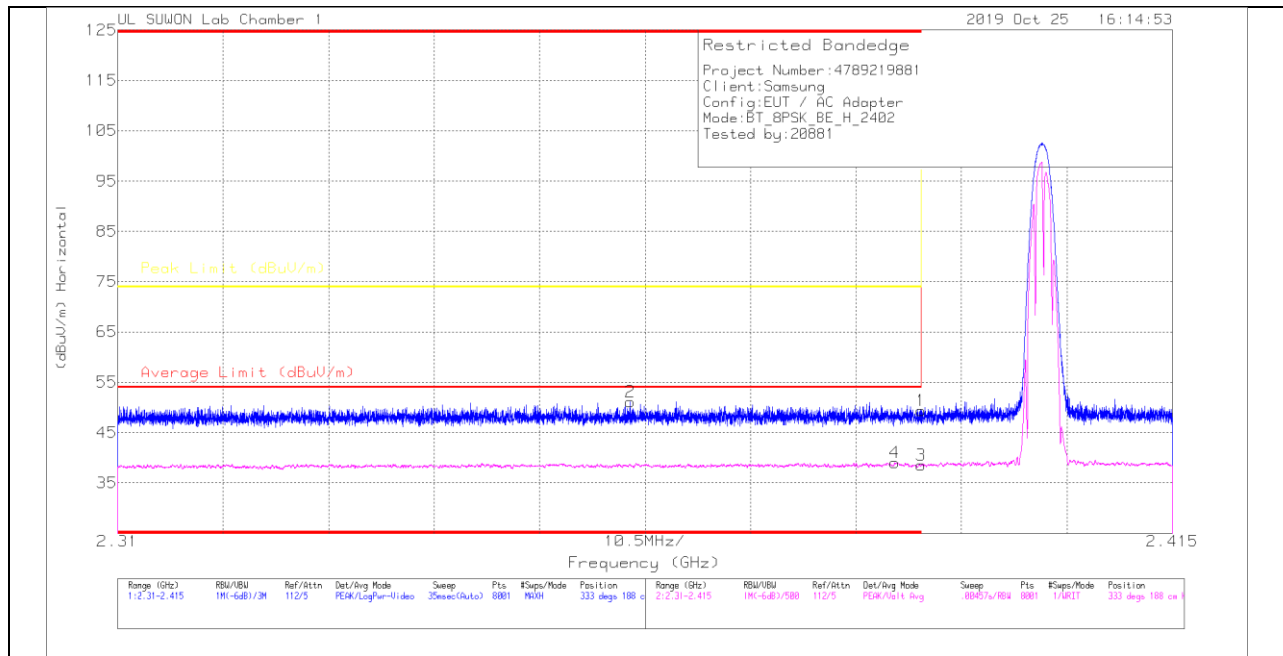
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.95596	38.39	PKFH	34.2	-31.6	40.99	-	-	74	-33.01	360	100	H
* 4.95634	38.28	PKFH	34.2	-31.6	40.88	-	-	74	-33.12	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).

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

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

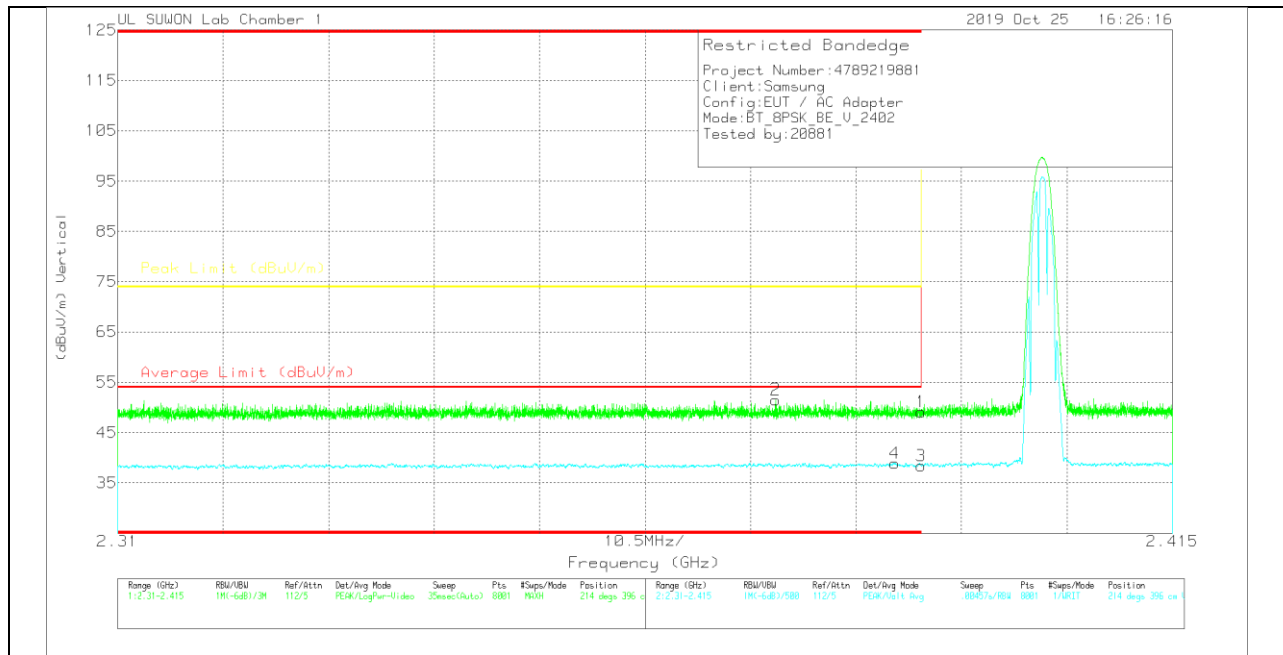
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	43.22	Pk	31.7	-25.5	49.42	-	-	74	-24.58	333	188	H
2	* 2.361	45.18	Pk	31.6	-25.6	51.18	-	-	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

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

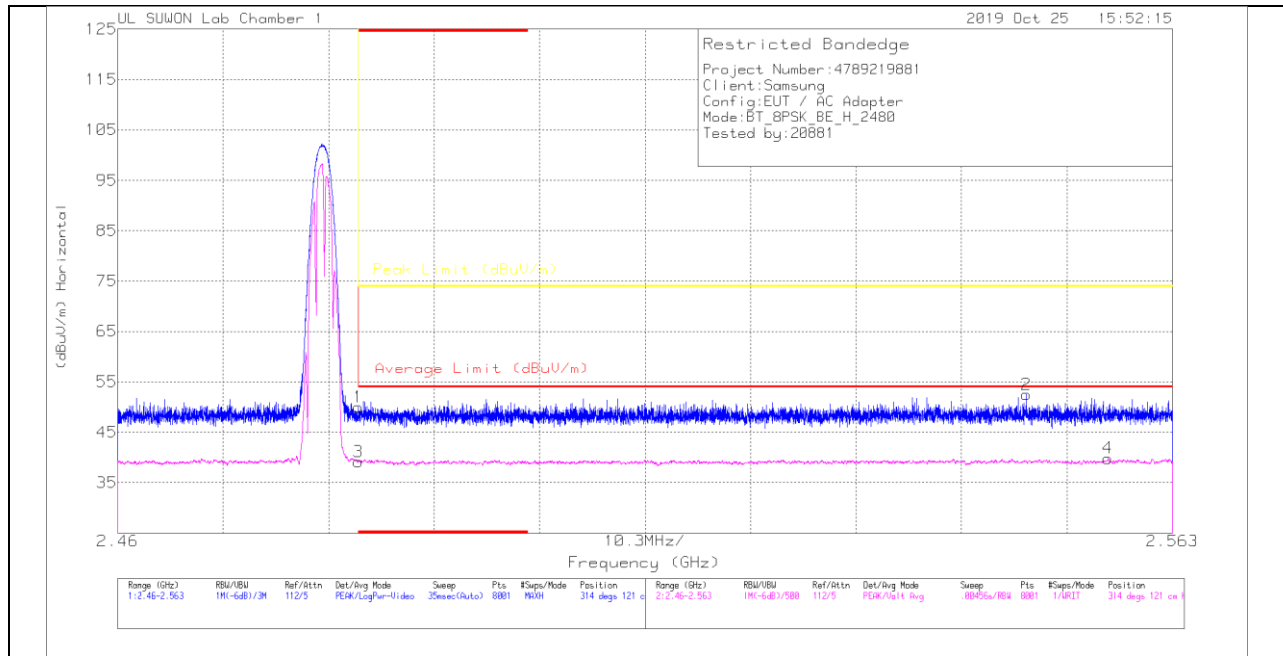
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

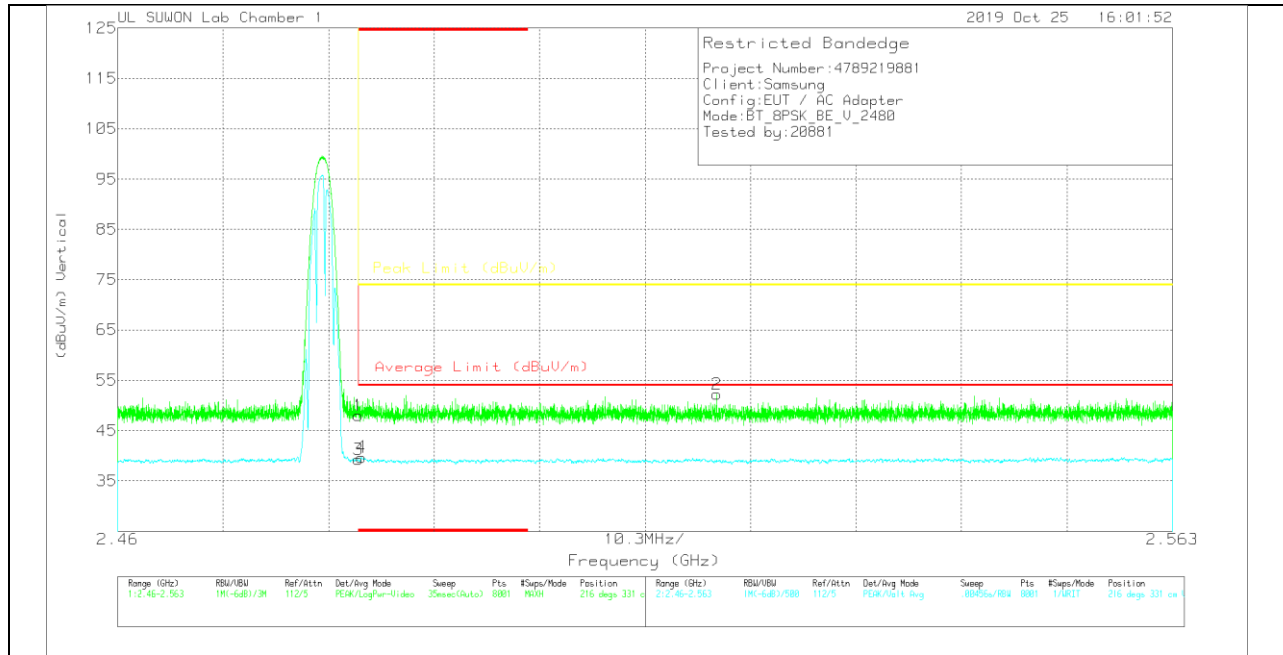
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.33	Pk	31.9	-25.2	50.03	-	-	74	-23.97	314	121	H
2	2.54871	45.56	Pk	32	-25.1	52.46	-	-	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

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

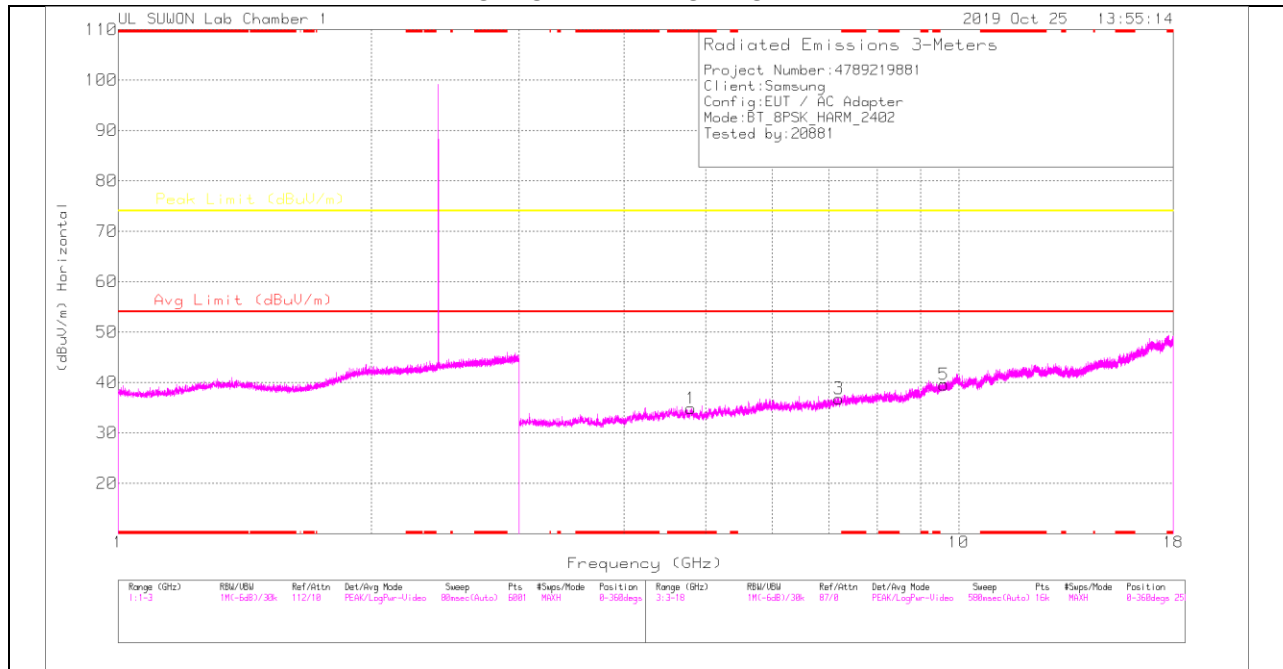
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK - Peak detector

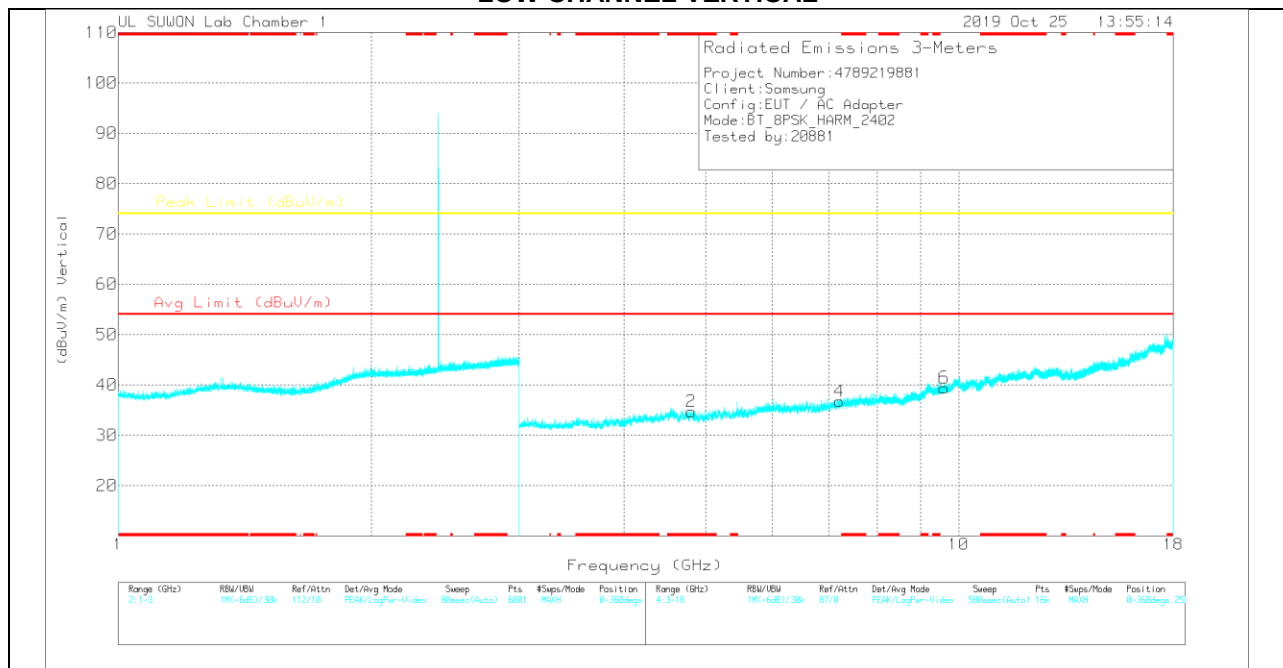
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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_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

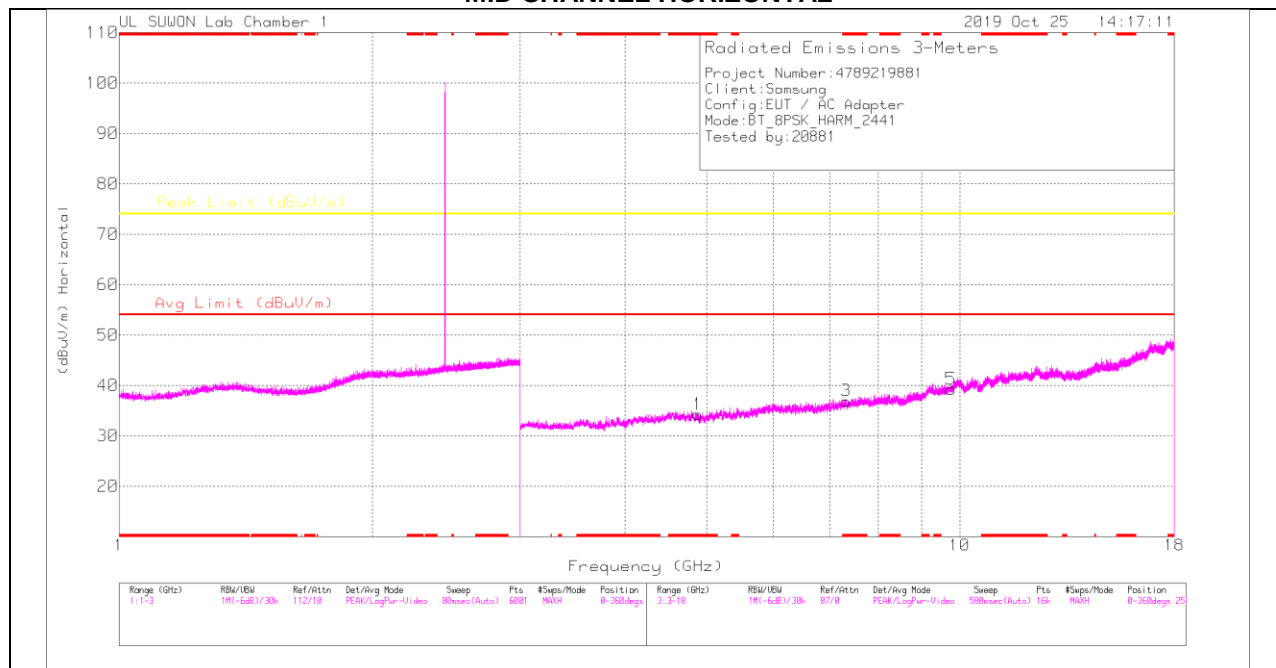
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80117	38.98	PKFH	34.2	-31.6	41.58	-	-	74	-32.42	360	100	H
* 4.80161	39.35	PKFH	34.2	-31.6	41.95	-	-	74	-32.05	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

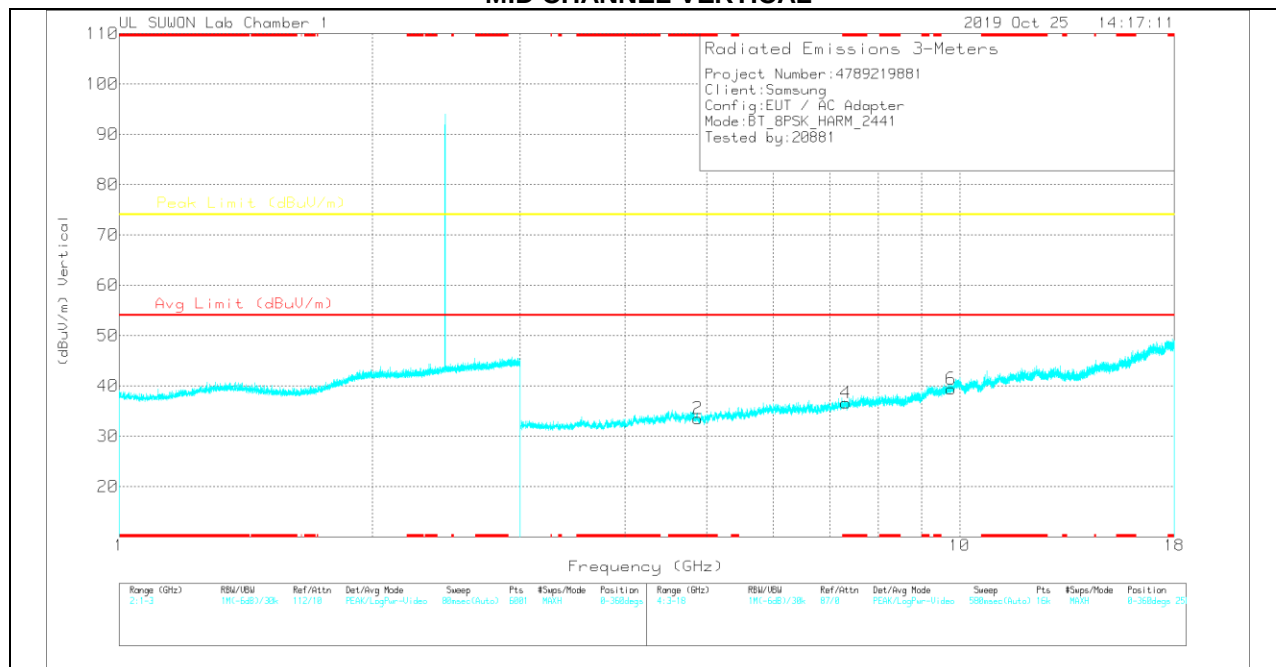
PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

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

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_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).