



FCC CFR47 PART 15 SUBPART C

Bluetooth

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, ANT+, NFC and WPT

MODEL NUMBER : SM-N970F/DS, SM-N970F, SM-N970X

FCC ID: A3LSMN970F

REPORT NUMBER: 4789014604-E7V3

ISSUE DATE: JUL 01, 2019

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

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



TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/26/19	Initial issue	Junwhan Lee
V2	06/28/19	Updated to address TCB's question	Junwhan Lee
V3	07/01/19	Updated to address TCB's question	Junwhan Lee

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION	6
4. CALIBRATION AND UNCERTAINTY	6
4.1. MEASURING INSTRUMENT CALIBRATION.....	6
4.2. SAMPLE CALCULATION.....	6
4.3. MEASUREMENT UNCERTAINTY	7
5. EQUIPMENT UNDER TEST	8
5.1. DESCRIPTION OF EUT.....	8
5.1. MAXIMUM OUTPUT POWER.....	8
5.2. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.3. WORST-CASE CONFIGURATION AND MODE	8
5.4. DESCRIPTION OF TEST SETUP	9
6. MEASUREMENT METHODS	11
7. TEST AND MEASUREMENT EQUIPMENT	12
8. REFERENCE MEASUREMENT RESULTS.....	13
8.1. ON TIME AND DUTY CYCLE RESULTS.....	13
8.2. 20 dB AND 99% BANDWIDTH.....	14
8.2.1. BASIC DATA RATE GFSK MODULATION.....	14
8.2.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION.....	14
8.2.3. ENHANCED DATA RATE 8PSK MODULATION	14
8.2.4. 20 dB AND 99% BANDWIDTH PLOTS.....	15
9. SUMMARY TABLE	18
10. ANTENNA PORT TEST RESULTS	19
10.1. HOPPING FREQUENCY SEPARATION	19
10.2. NUMBER OF HOPPING CHANNELS.....	20
10.3. AVERAGE TIME OF OCCUPANCY.....	24
10.4. OUTPUT POWER.....	32
10.4.1. BASIC DATA RATE GFSK MODULATION.....	32
10.4.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION	32
10.4.3. ENHANCED DATA RATE 8PSK MODULATION	32
10.4.4. OUTPUT POWER PLOTS.....	33
10.5. AVERAGE POWER	36

10.5.1.	BASIC DATA RATE GFSK MODULATION.....	36
10.5.2.	ENHANCED DATA RATE PI/4-DQPSK MODULATION	36
10.5.3.	ENHANCED DATA RATE 8PSK MODULATION	36
10.6.	CONDUCTED SPURIOUS EMISSIONS.....	37
10.6.1.	BASIC DATA RATE GFSK MODULATION.....	38
10.6.2.	ENHANCED DATA RATE PI/4-DQPSK MODULATION	42
10.6.3.	ENHANCED DATA RATE 8PSK MODULATION	46
11.	RADIATED TEST RESULTS	50
11.1.	LIMITS AND PROCEDURE	50
11.2.	TRANSMITTER ABOVE 1 GHz	52
11.2.1.	BASIC DATA RATE GFSK MODULATION.....	52
11.2.2.	ENHANCED DATA RATE 8PSK MODULATION	62
11.3.	WORST-CASE BELOW 1 GHz.....	72
12.	AC POWER LINE CONDUCTED EMISSIONS	74
13.	SETUP PHOTOS	79

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-N970F/DS, SM-N970F, SM-N970X

SERIAL NUMBER: cea8944711197e34, R38M6037DNE (CONDUCTED)
R38M502Q83H, R38M6037F5L (RADIATED);

DATE TESTED: MAY 23, 2019 – JUN 25, 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:

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

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

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. 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/PDF/TL/TL-637.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.86 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.97 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.57 dB

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

5. EQUIPMENT UNDER TEST

5.1.DESCRPTION 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-N970F/DS, SM-N970F and SM-N970X. These models are identical in hardware except SM-N970F has single SIM tray and model SM-N970X has been disabled all cellular bands by software. With some pre-scan, model SM-N970F/DS was set for final test.

5.1.MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2402 - 2480	Basic GFSK	Average	15.248	33.481
		Peak	15.813	38.133
	Enhanced Pi/4-DPSK	Average	10.058	10.134
		Peak	12.529	17.902
	Enhanced 8PSK	Average	10.106	10.247
		Peak	13.345	21.602

5.2.DESCRPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of -5.2 dBi.

5.3.WORST-CASE CONFIGURATION AND MODE

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

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

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

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

5.4.DESCRPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37M5DL3FL1SE3	N/A
Data Cable	SAMSUNG	EP-DG977	N/A	N/A

I/O CABLE

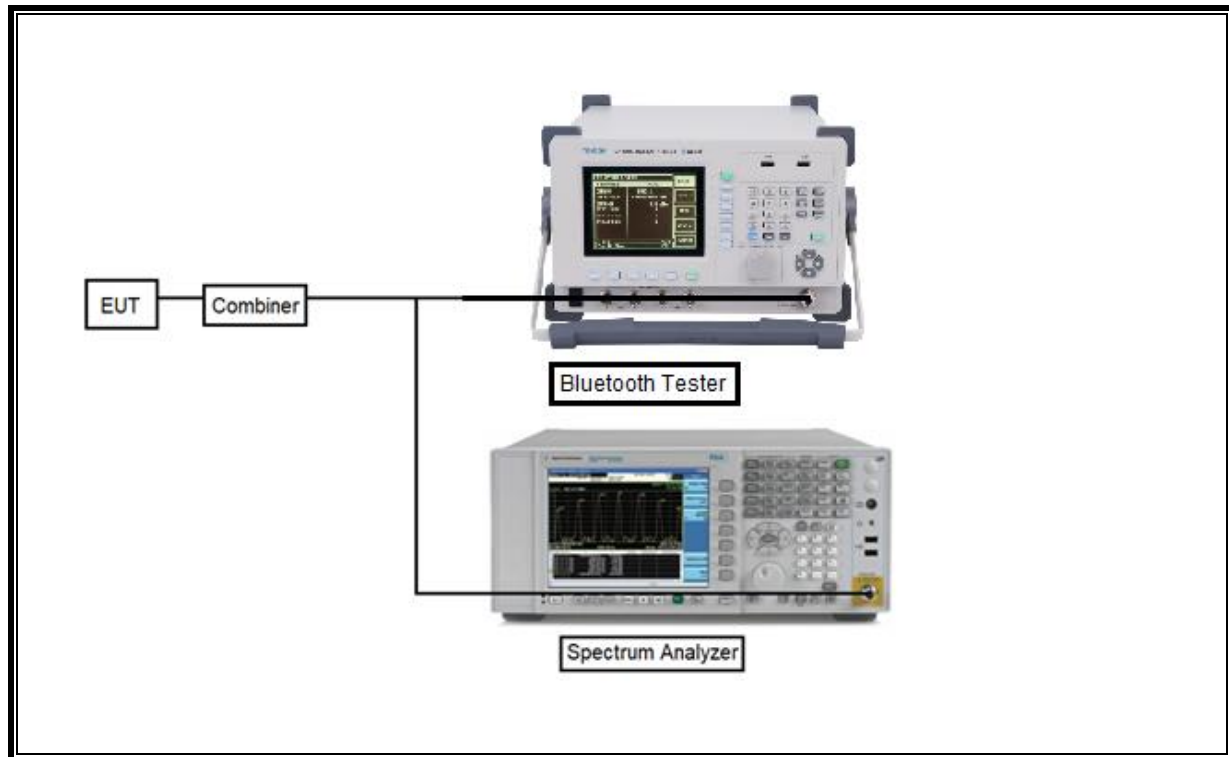
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0m	N/A

TEST SETUP

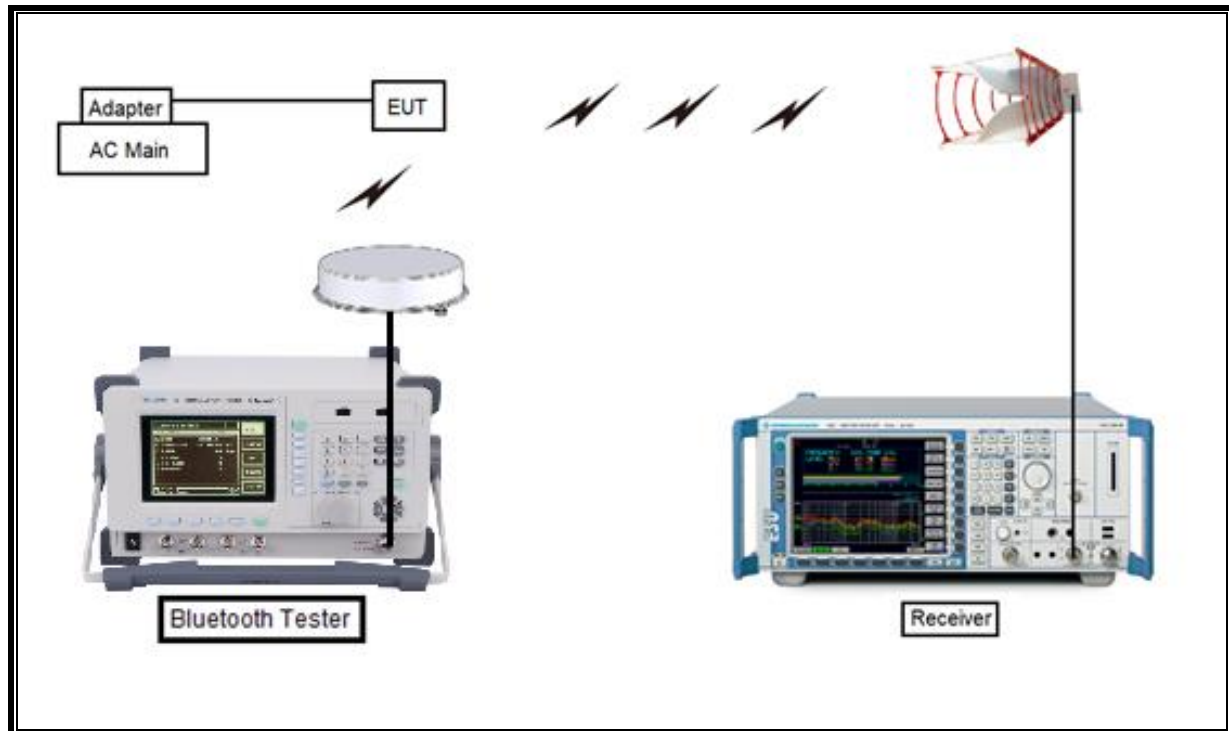
The EUT is continuously communicating to the Bluetooth tester during the tests.
Test software enable BT communications.

This EUT is able to equipped with S-pen on the inside. Spot check were performed both inserted and removed condition. Because there is no deviation between the two data, all tests were performed under equipped with the S-pen.

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	10-26-19
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	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-07-19
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-07-19
Combiner	WEINCHEL	1575	2150	08-08-19
Attenuator	PASTERNAK	PE7087-10	A001	08-08-19
Attenuator	PASTERNAK	PE7087-10	A008	08-08-19
Attenuator	PASTERNAK	PE7087-10	2	08-07-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-19
LISN	R&S	ENV-216	101837	08-09-19
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	

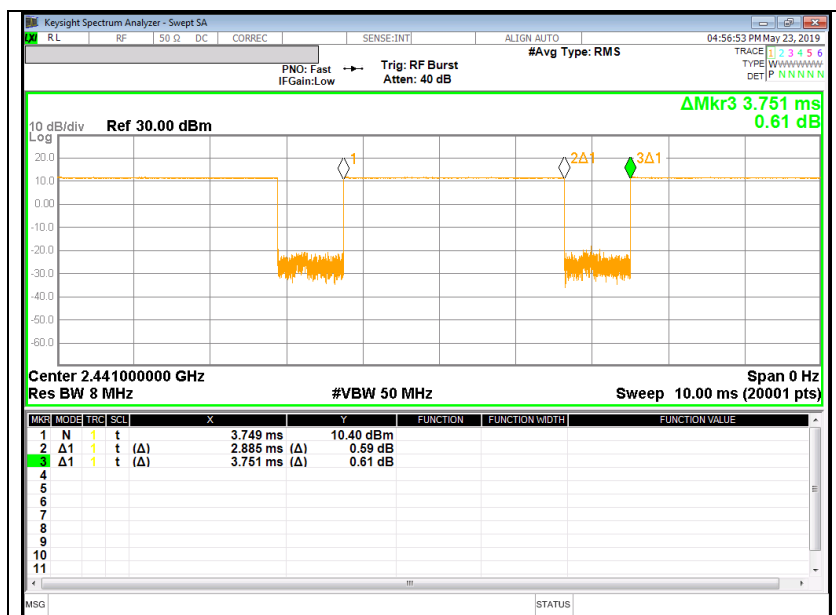
8. REFERENCE MEASUREMENT RESULTS

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	2402	1.046	867.98
Mid	2441	1.045	895.02
High	2480	1.046	867.28
Worst		1.046	895.02

8.2.2. ENHANCED DATA RATE Pi/4-DQPSK MODULATION

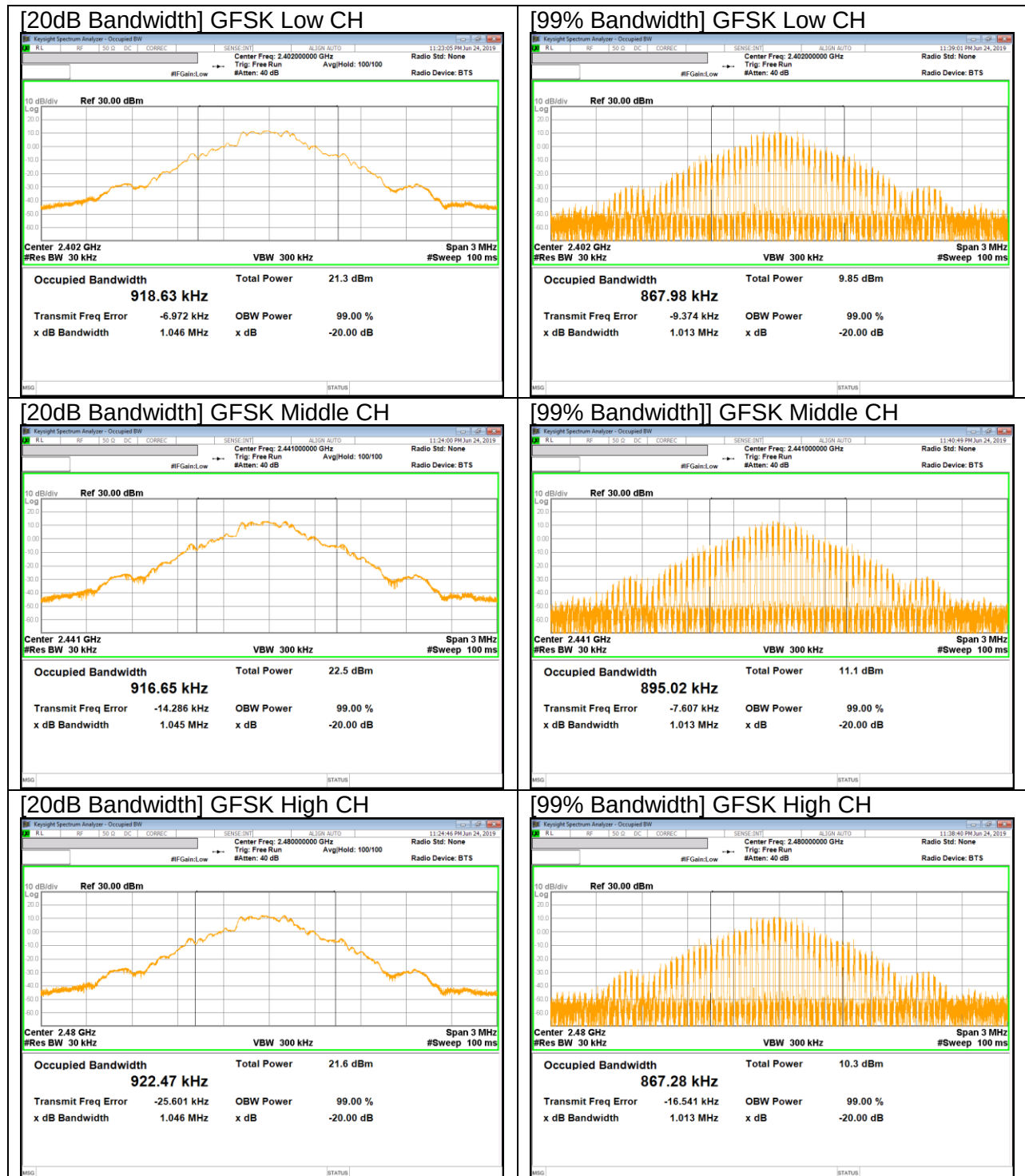
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.346	1.167
Mid	2441	1.346	1.165
High	2480	1.347	1.166
Worst		1.347	1.167

8.2.3. ENHANCED DATA RATE 8PSK MODULATION

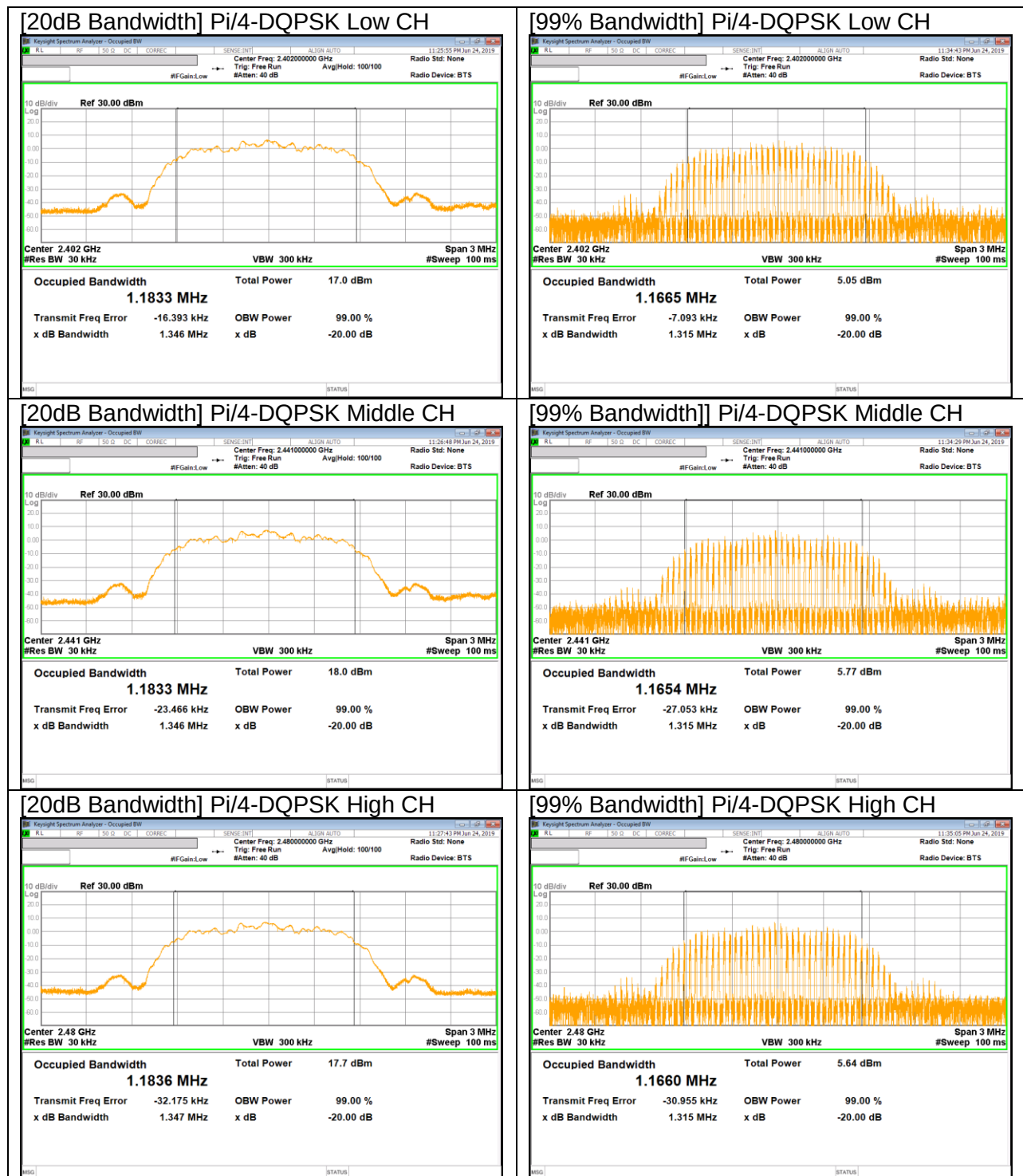
Channel	Frequency [MHz]	20 dB Bandwidth [MHz]	99% Bandwidth [MHz]
Low	2402	1.306	1.195
Mid	2441	1.308	1.165
High	2480	1.309	1.194
Worst		1.309	1.195

8.2.4. 20 dB AND 99% BANDWIDTH PLOTS

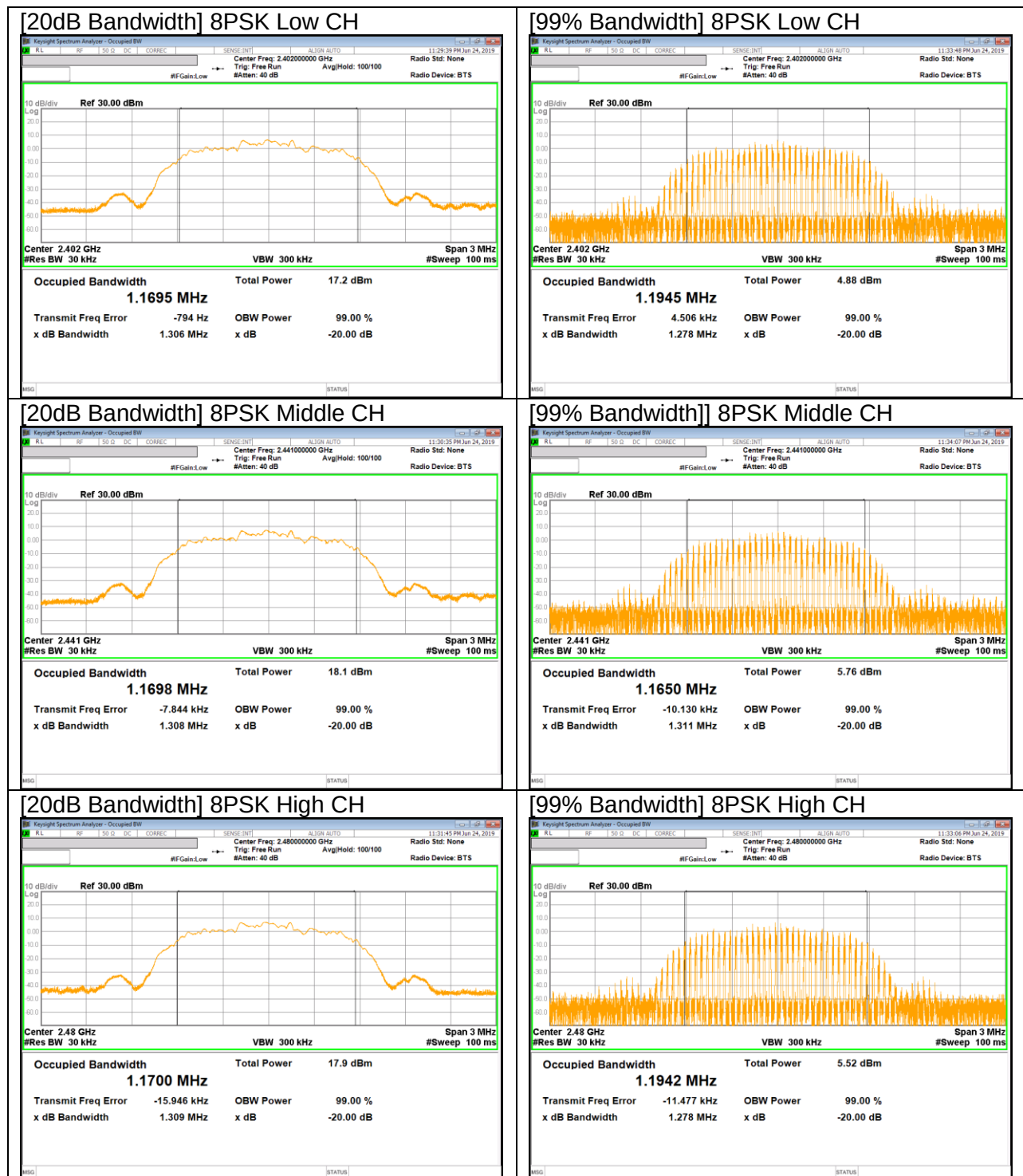
GFSK BANDWIDTH



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.

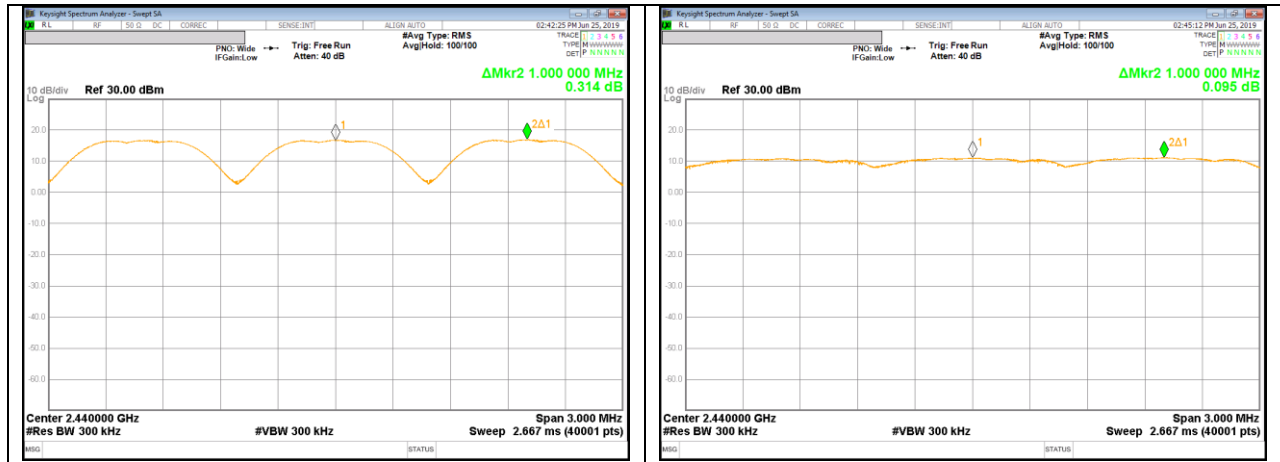
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

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

RESULTS

HOPPING FREQUENCY SEPARATION PLOT



[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.

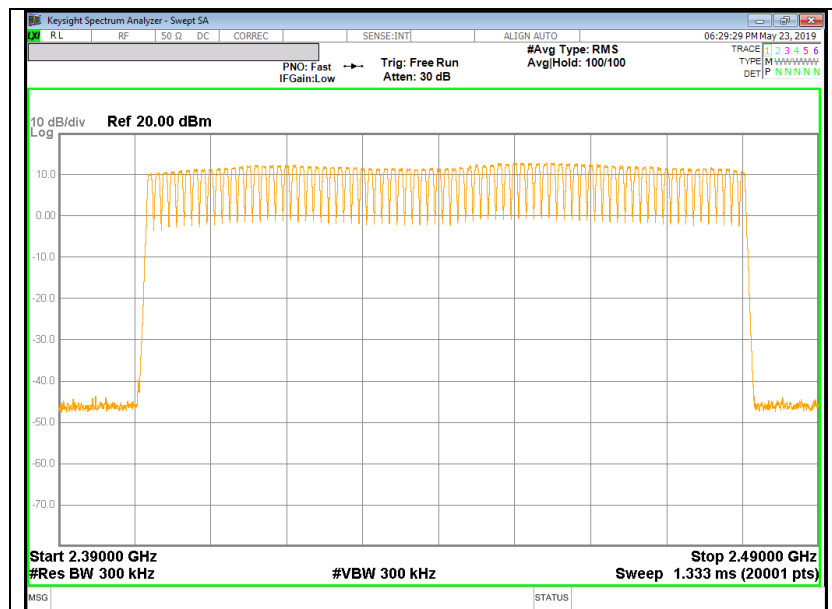
TEST PROCEDURE

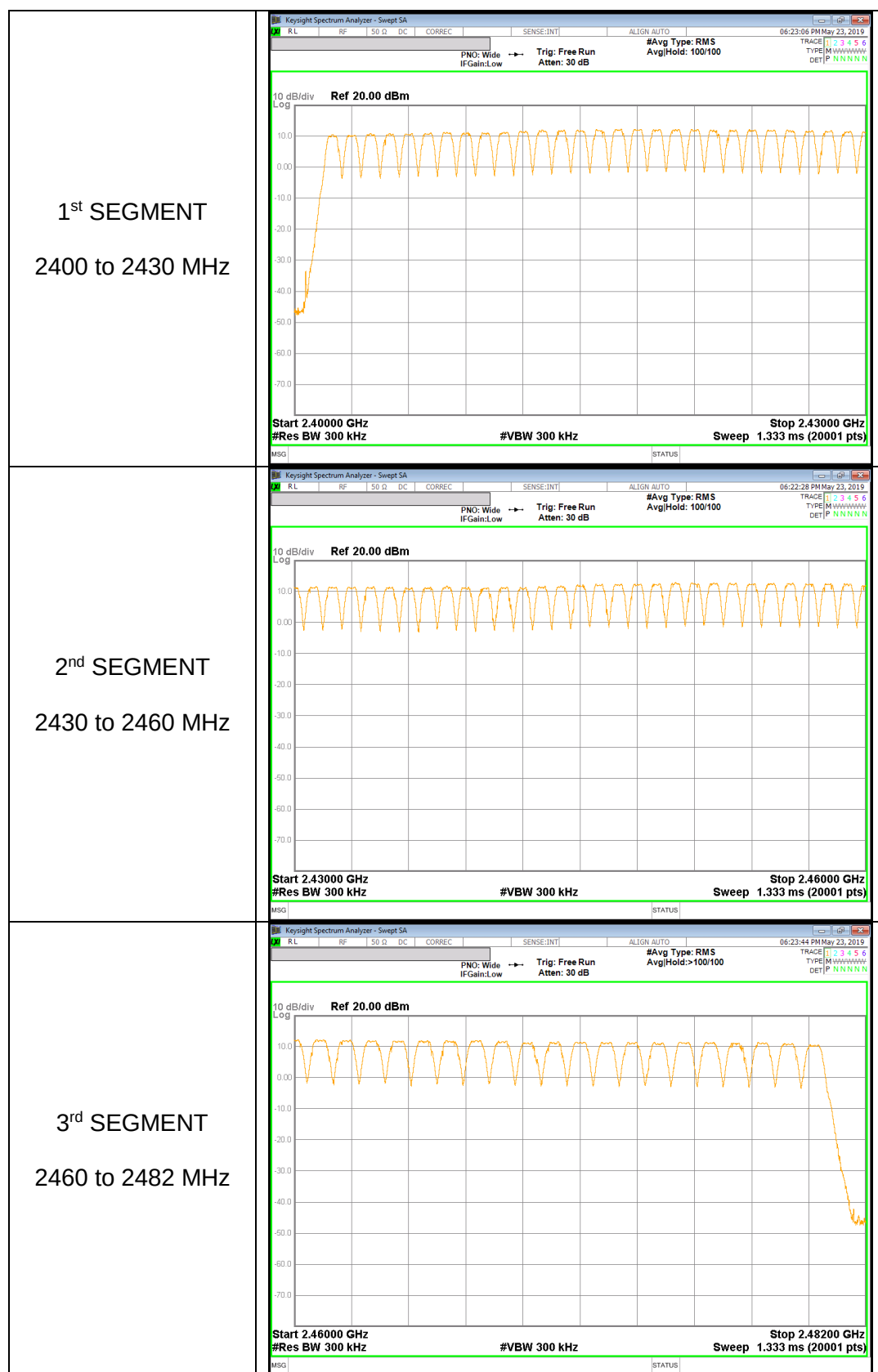
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

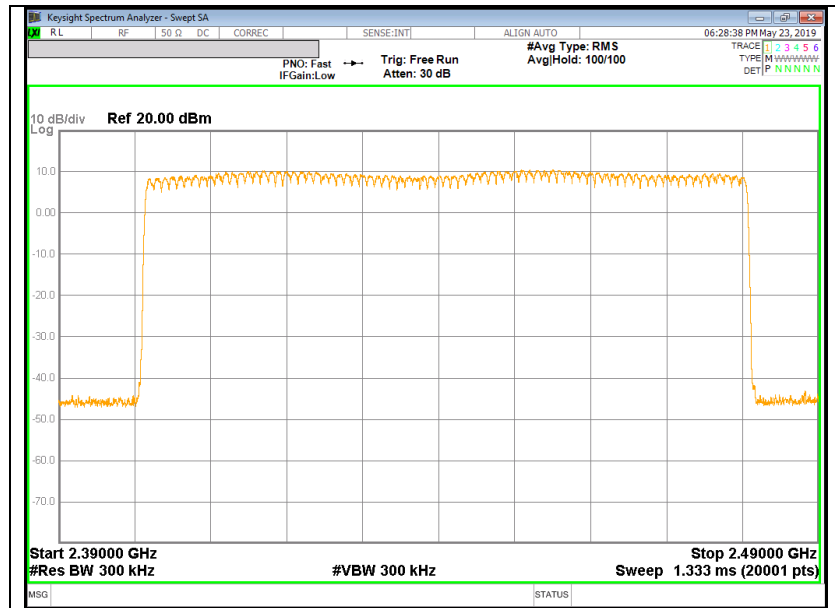
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)





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.

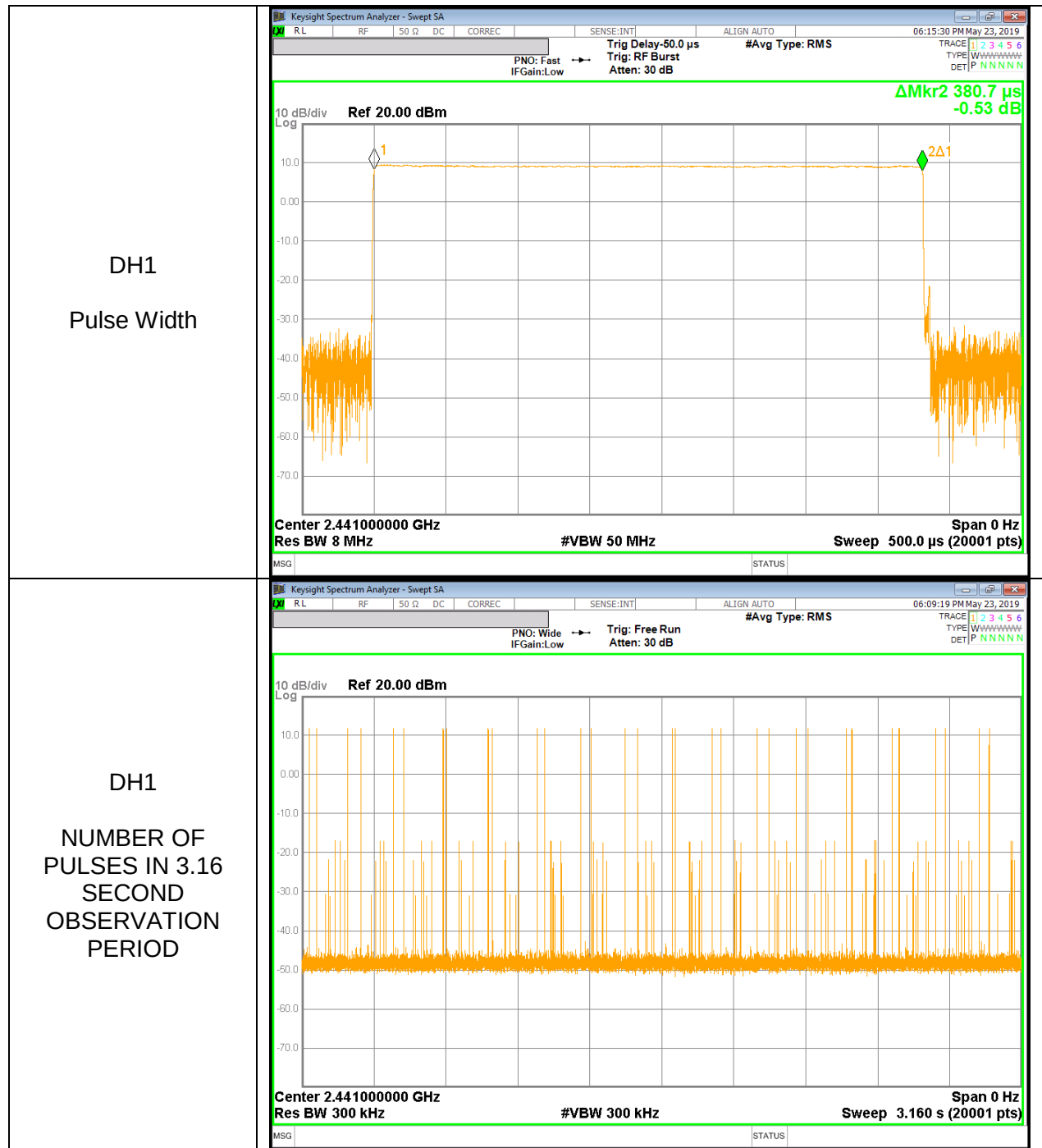
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

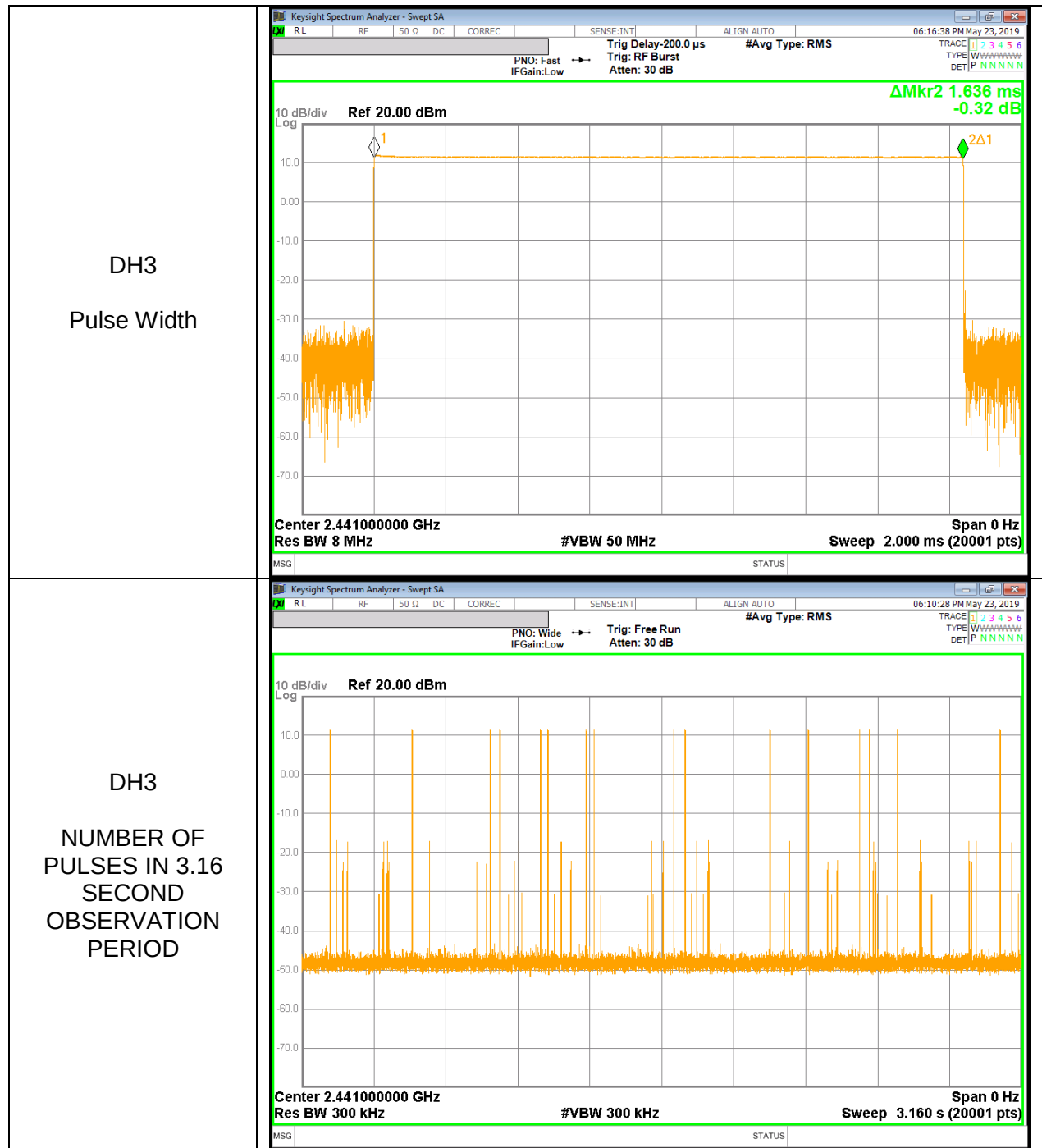
RESULTS[GFSK]

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal					
DH1	0.381	32	0.121824	0.4	-0.2782
DH3	1.636	16	0.261760	0.4	-0.1382
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	0.381	8	0.030456	0.4	-0.3695
DH3	1.636	4	0.065440	0.4	-0.3346
DH5	2.884	3	0.086520	0.4	-0.3135

DH1



DH3



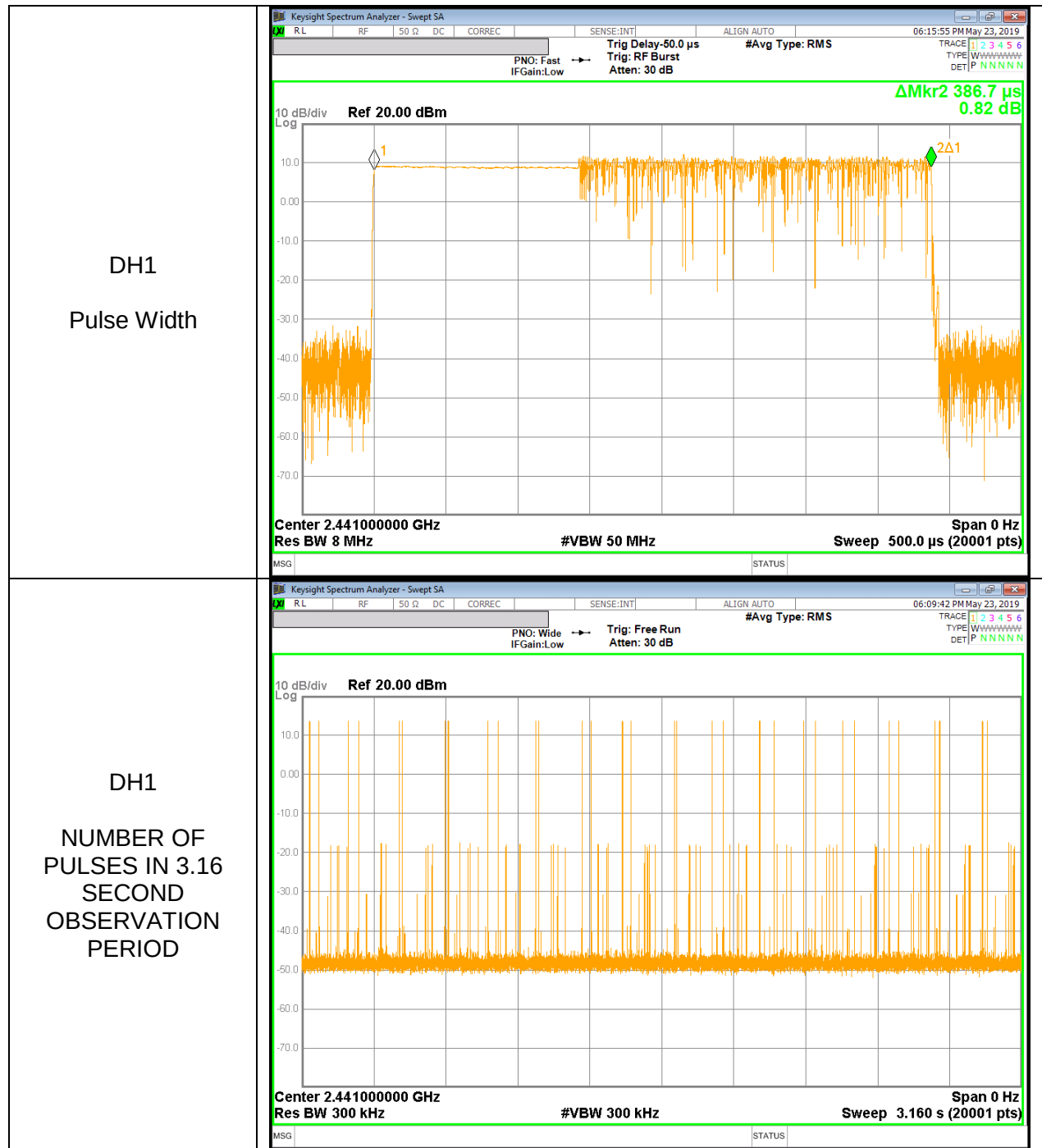
DH5



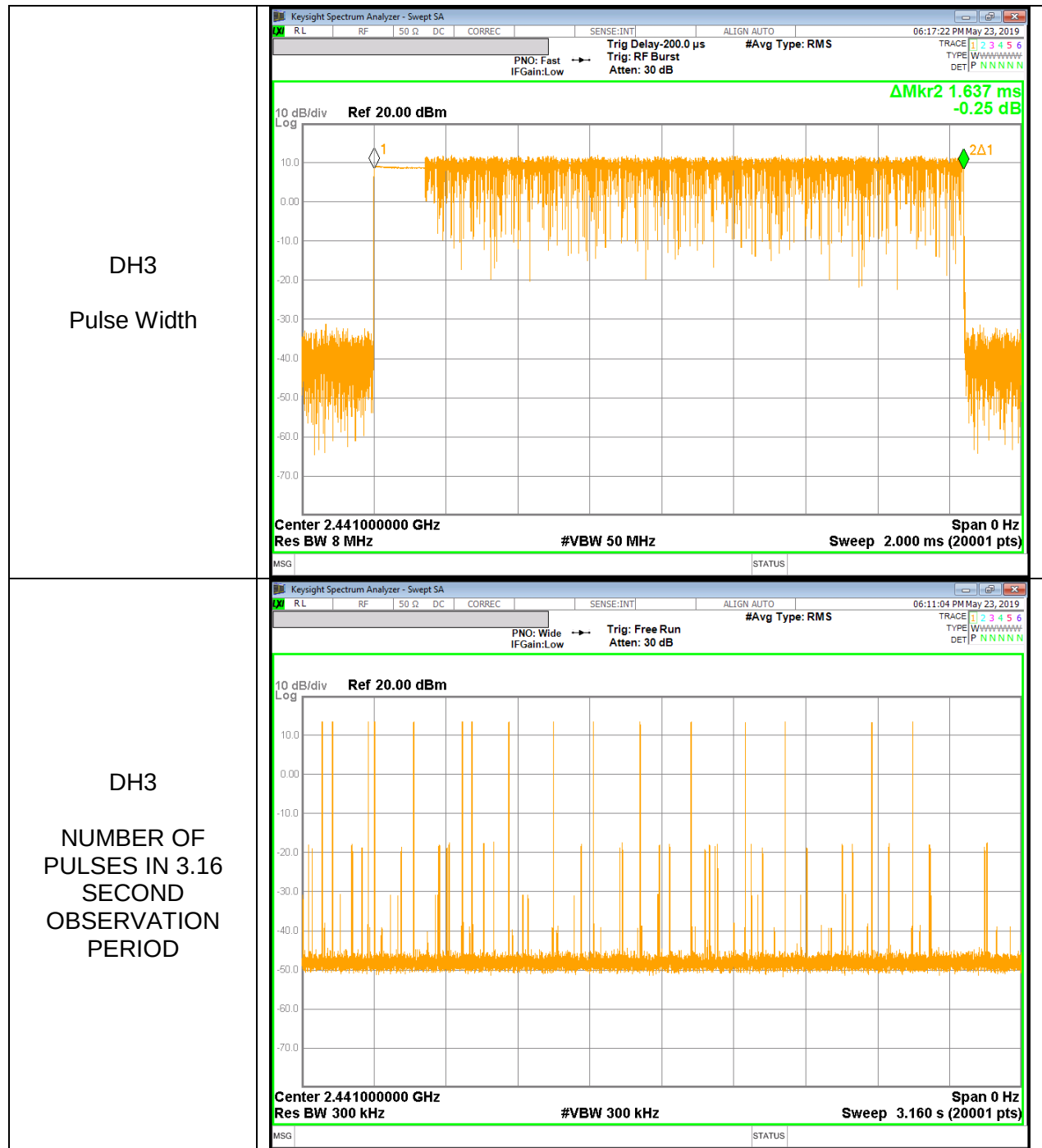
RESULTS[8PSK]

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK Normal					
DH1	0.387	32	0.123744	0.4	-0.2763
DH3	1.637	16	0.261920	0.4	-0.1381
DH5	2.888	12	0.346560	0.4	-0.0534
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK AFH					
DH1	0.387	8	0.030936	0.4	-0.3691
DH3	1.637	4	0.065480	0.4	-0.3345
DH5	2.888	3	0.086640	0.4	-0.3134

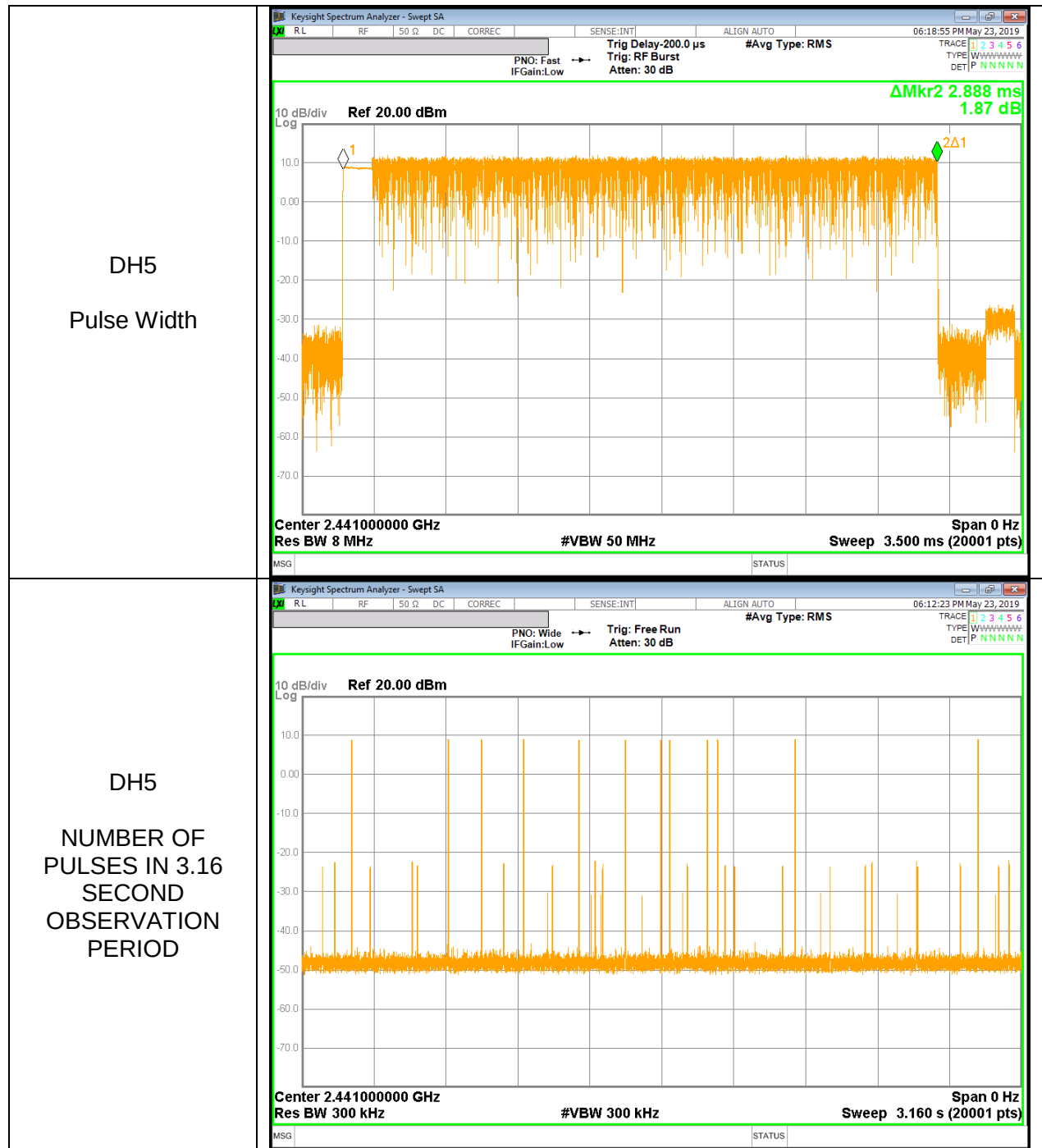
DH1



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	2402	15.223	21	-5.777
Middle	2441	15.813	21	-5.187
High	2480	15.525	21	-5.475
Worst		15.813	21	-5.187

10.4.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

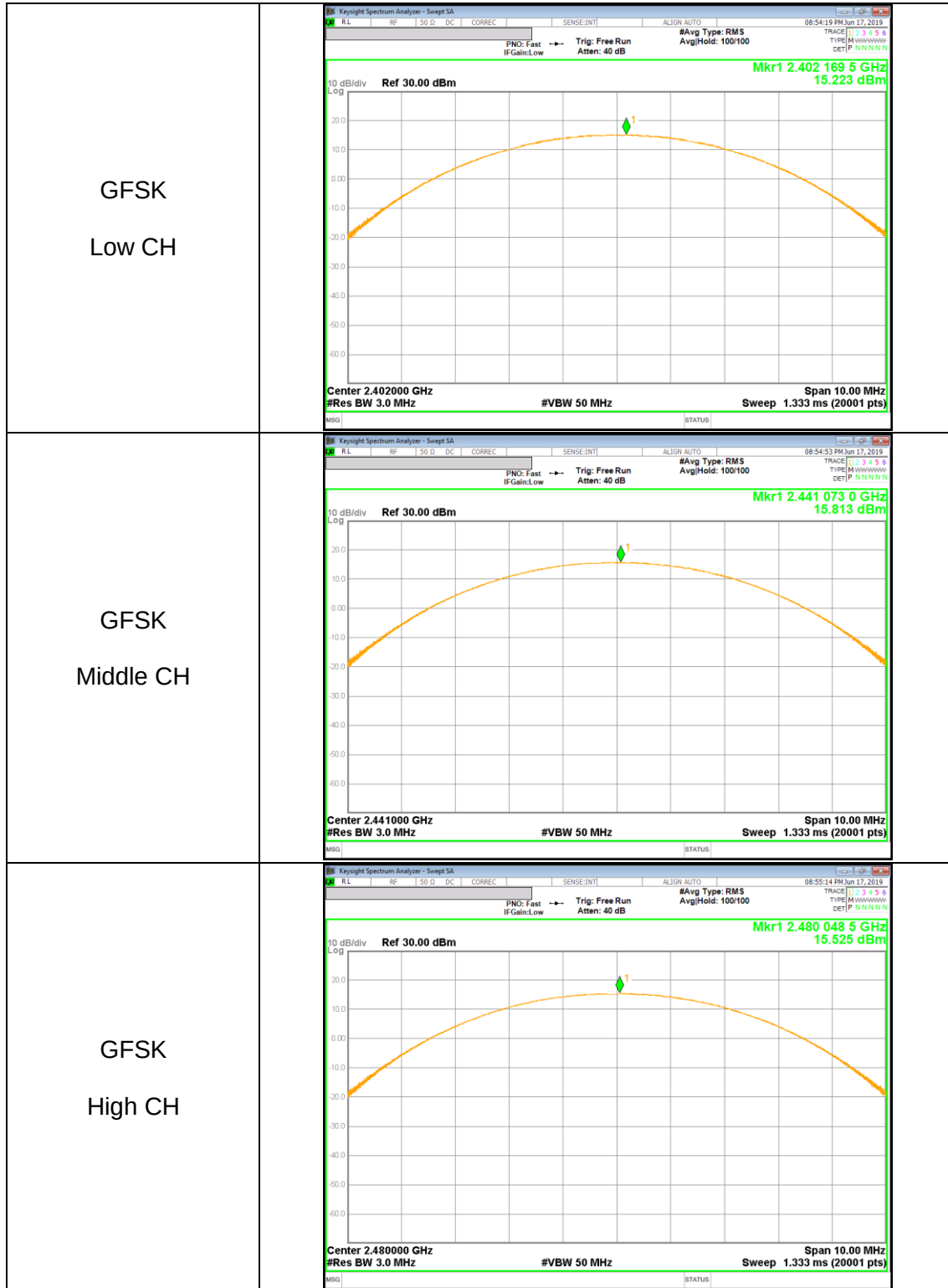
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	12.159	21	-8.841
Middle	2441	12.244	21	-8.756
High	2480	12.529	21	-8.471
Worst		12.529	21	-8.471

10.4.3. ENHANCED DATA RATE 8PSK MODULATION

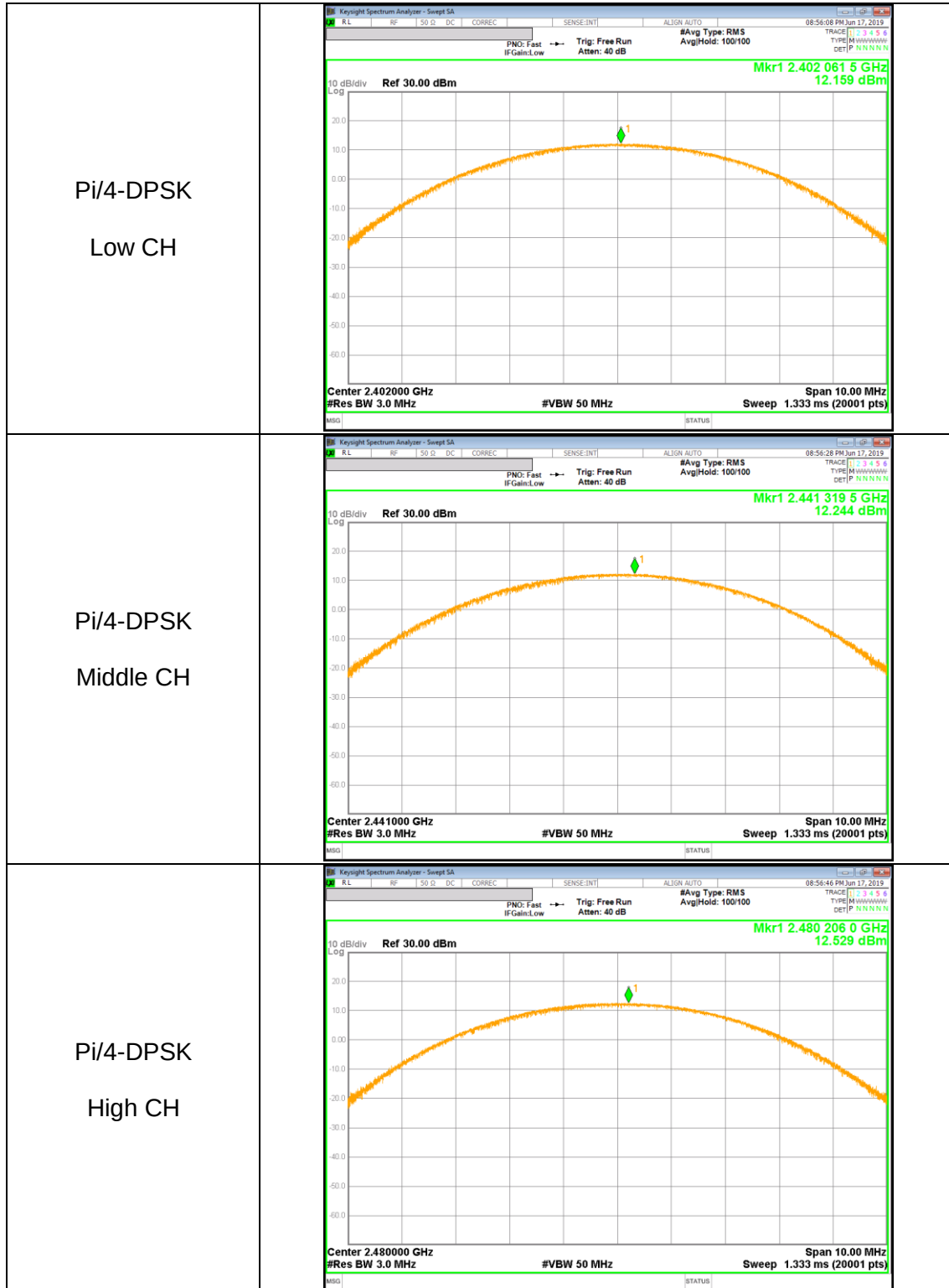
Channel	Frequency [MHz]	Output Power [dBm]	Limit [dBm]	Margin [dB]
Low	2402	12.873	21	-8.127
Middle	2441	12.925	21	-8.075
High	2480	13.345	21	-7.655
Worst		13.345	21	-7.655

10.4.4. OUTPUT POWER PLOTS

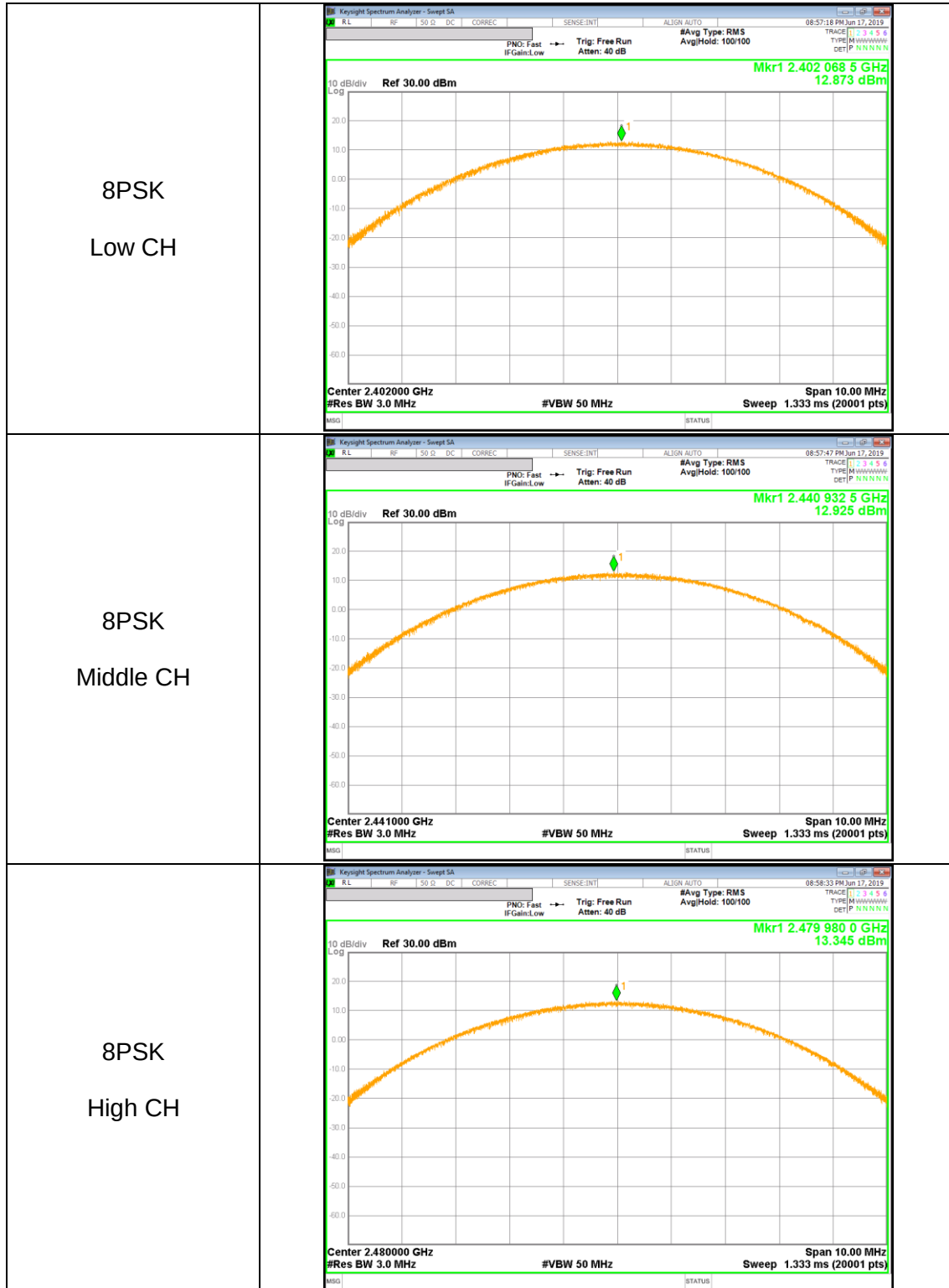
GFSK OUTPUT POWER



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	2402	14.604	28.87
Middle	2441	15.248	33.48
High	2480	14.971	31.41

10.5.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	9.566	9.05
Middle	2441	9.688	9.31
High	2480	10.058	10.13

10.5.3. ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency [MHz]	AV power [dBm]	AV power [mW]
Low	2402	9.596	9.11
Middle	2441	9.723	9.38
High	2480	10.106	10.25

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.

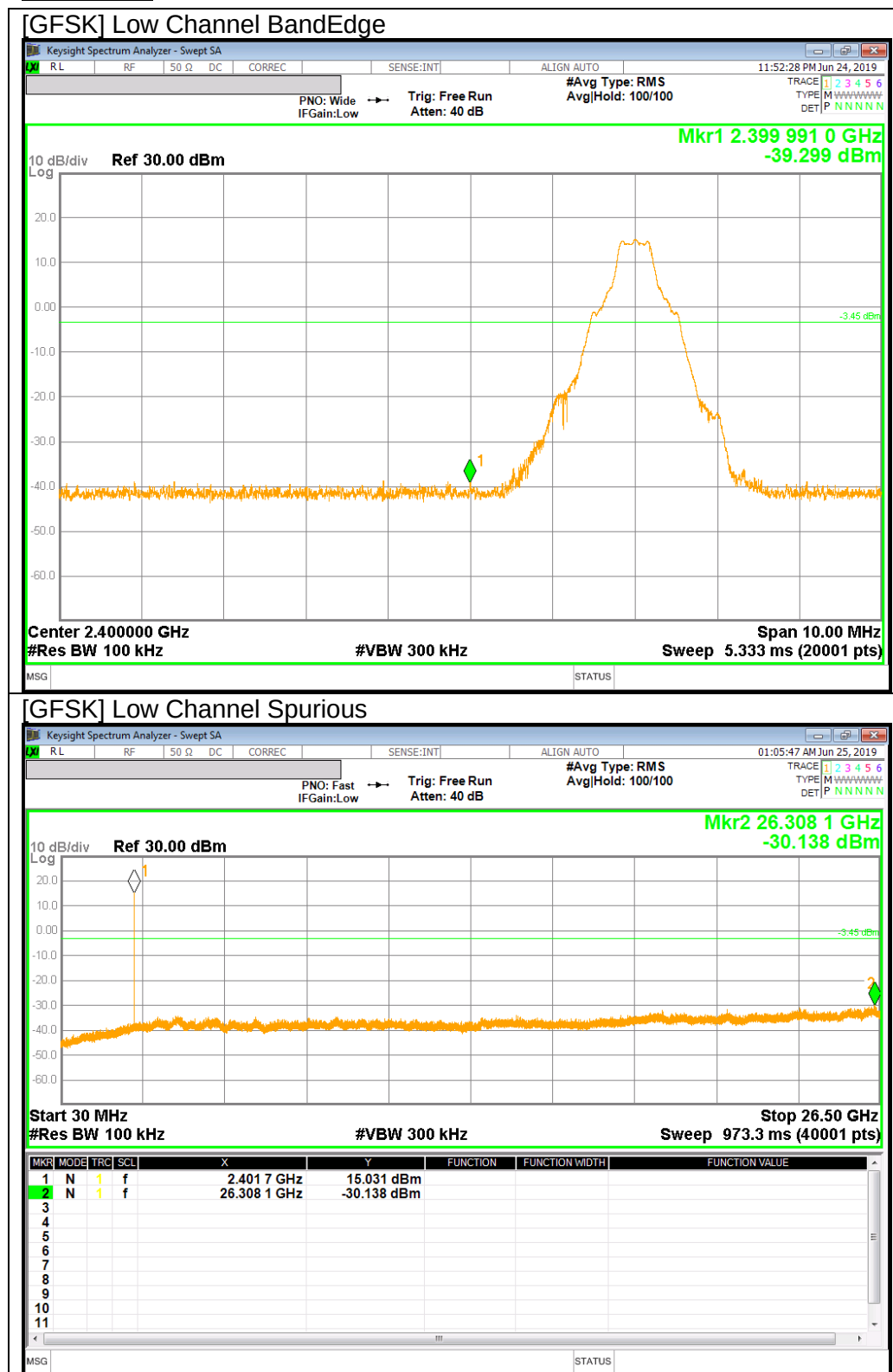
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

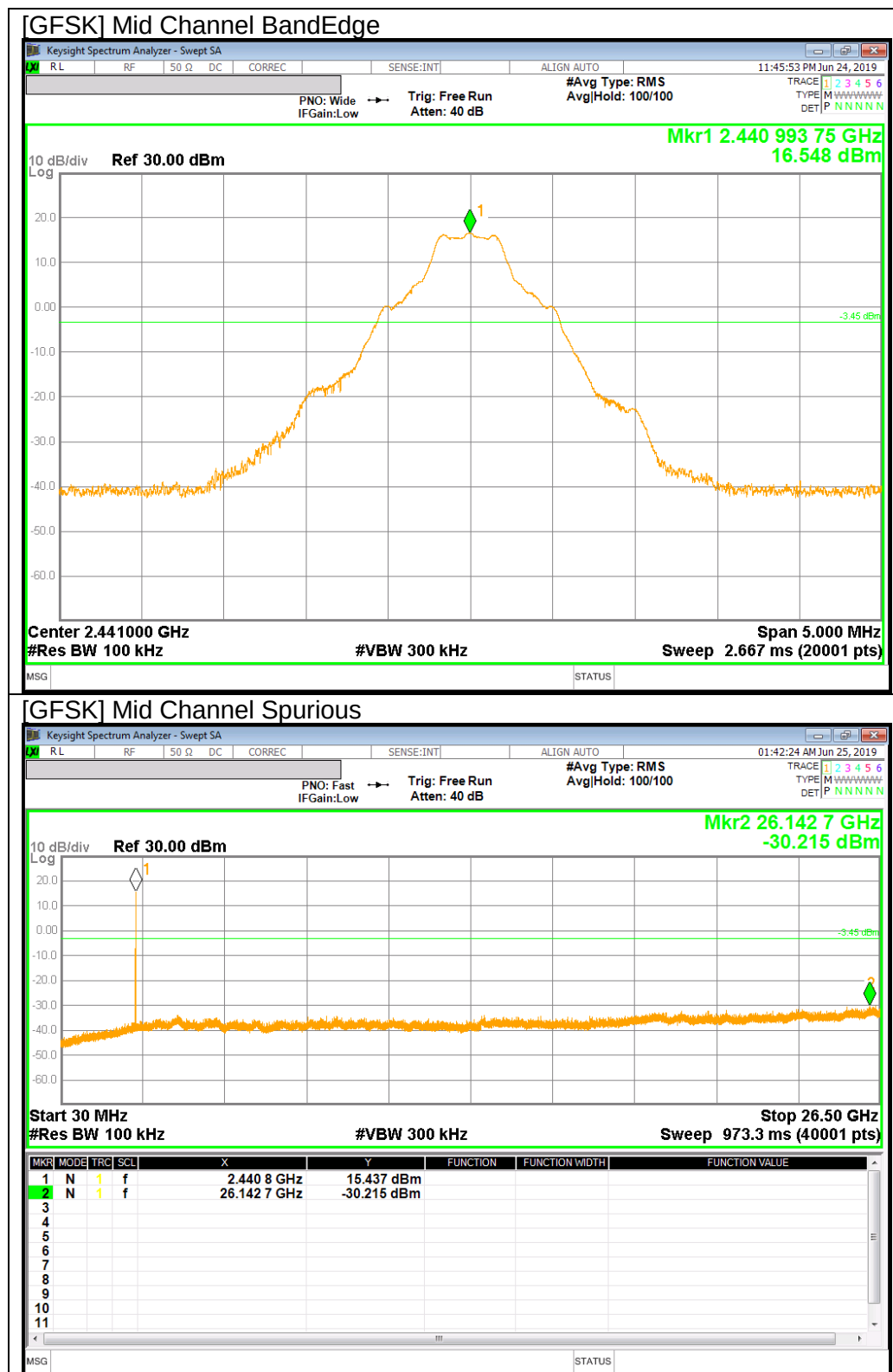
The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

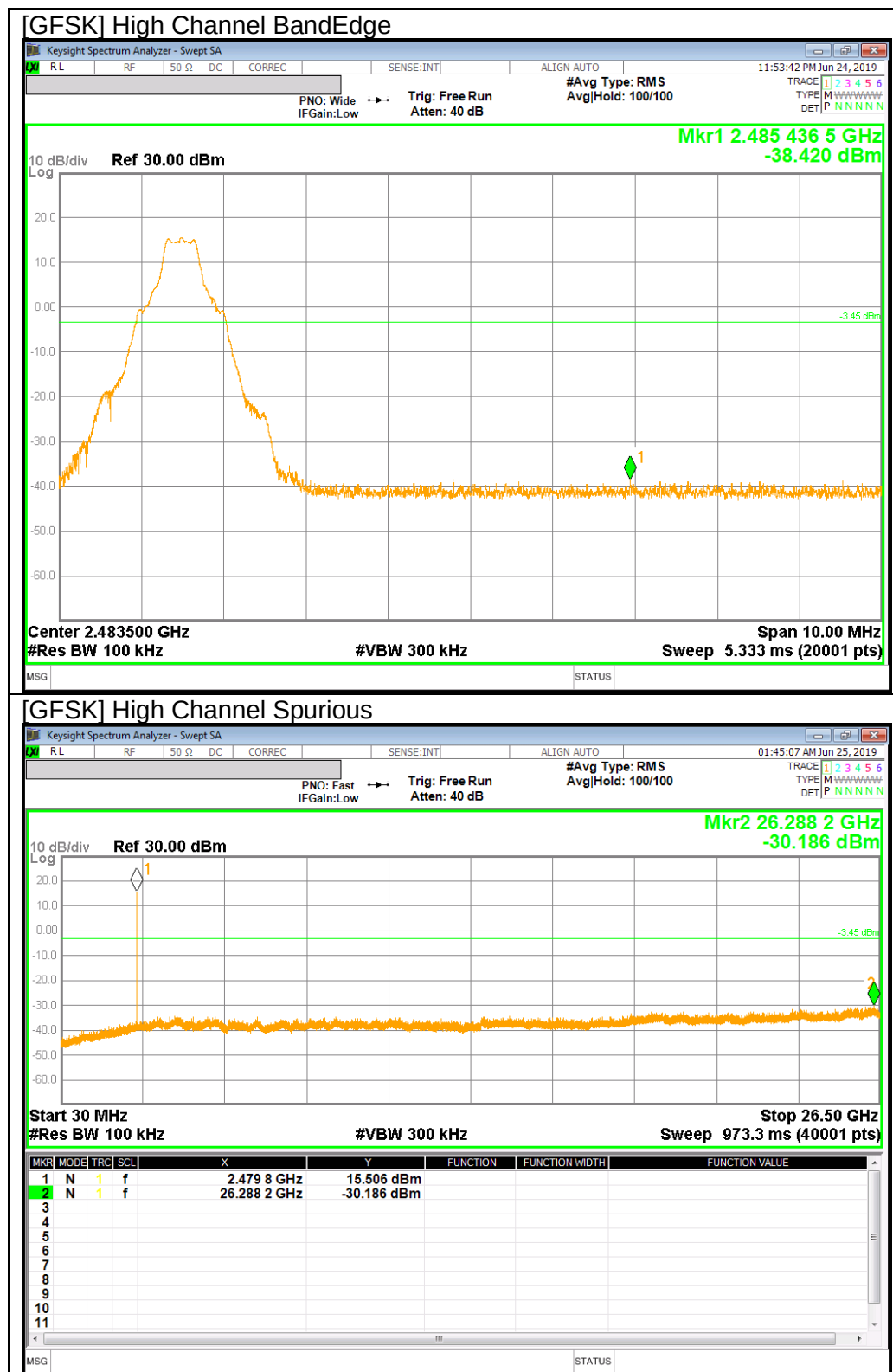
RESULTS

10.6.1. BASIC DATA RATE GFSK MODULATION

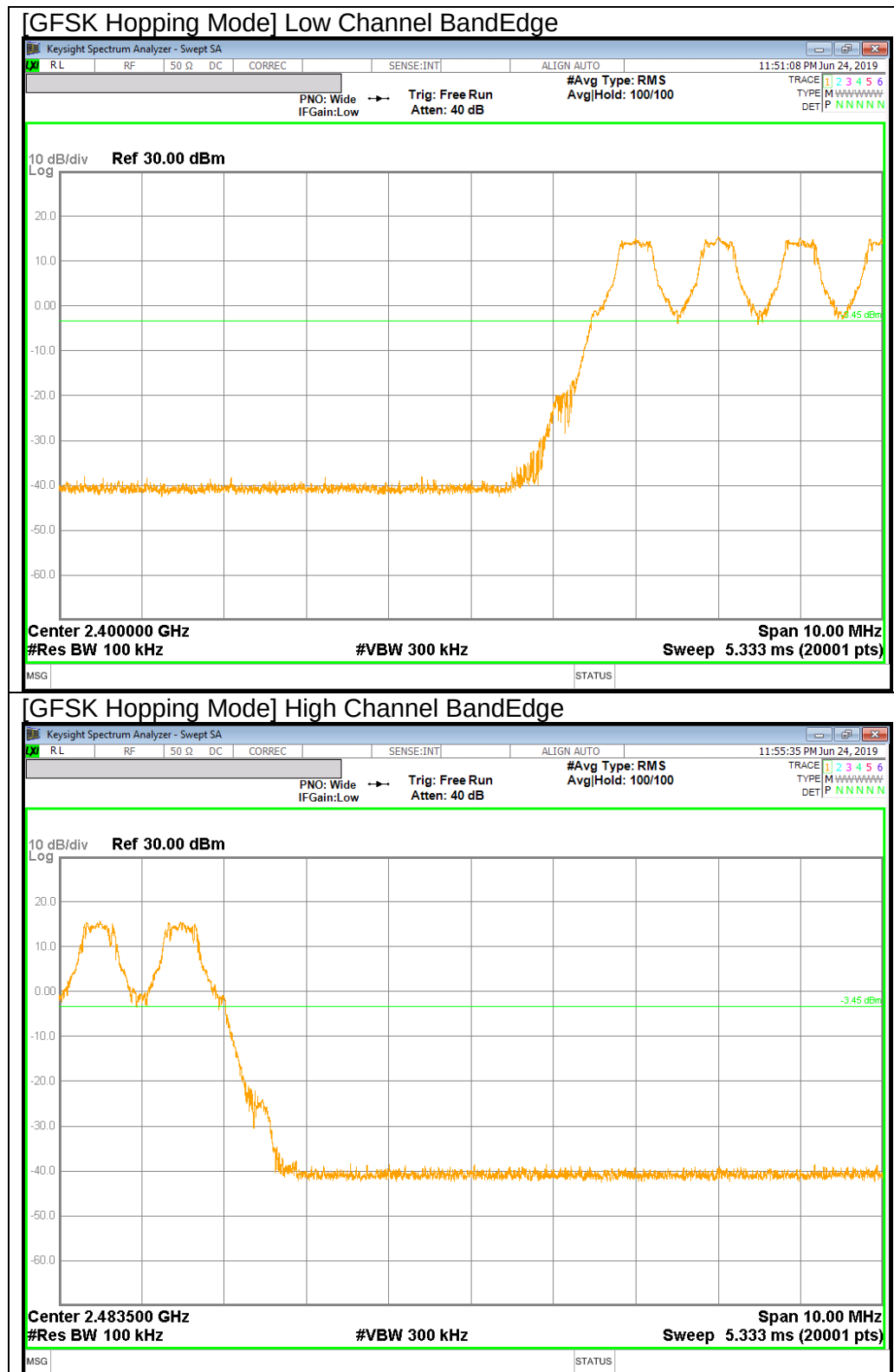
GFSK Mode





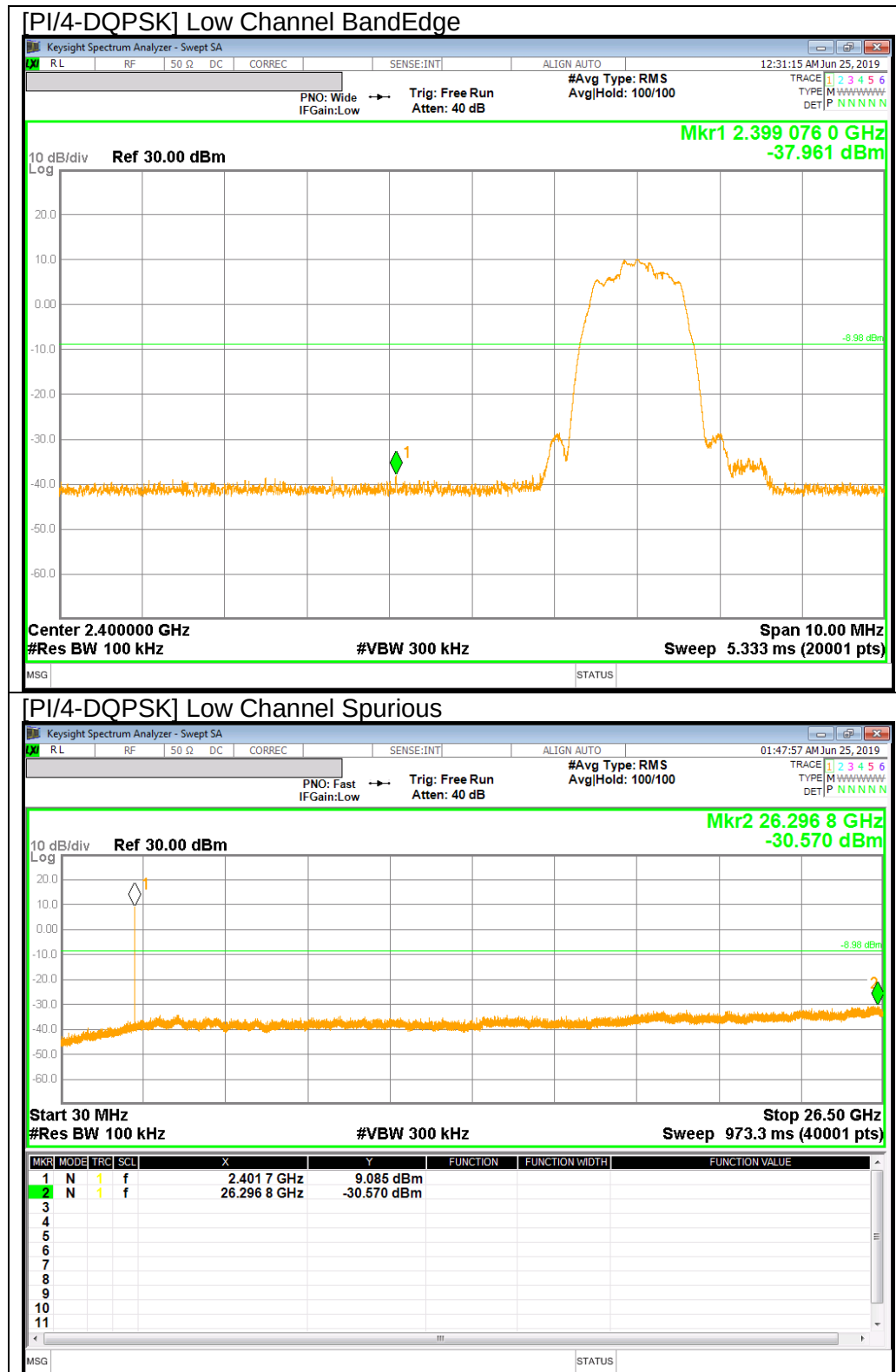


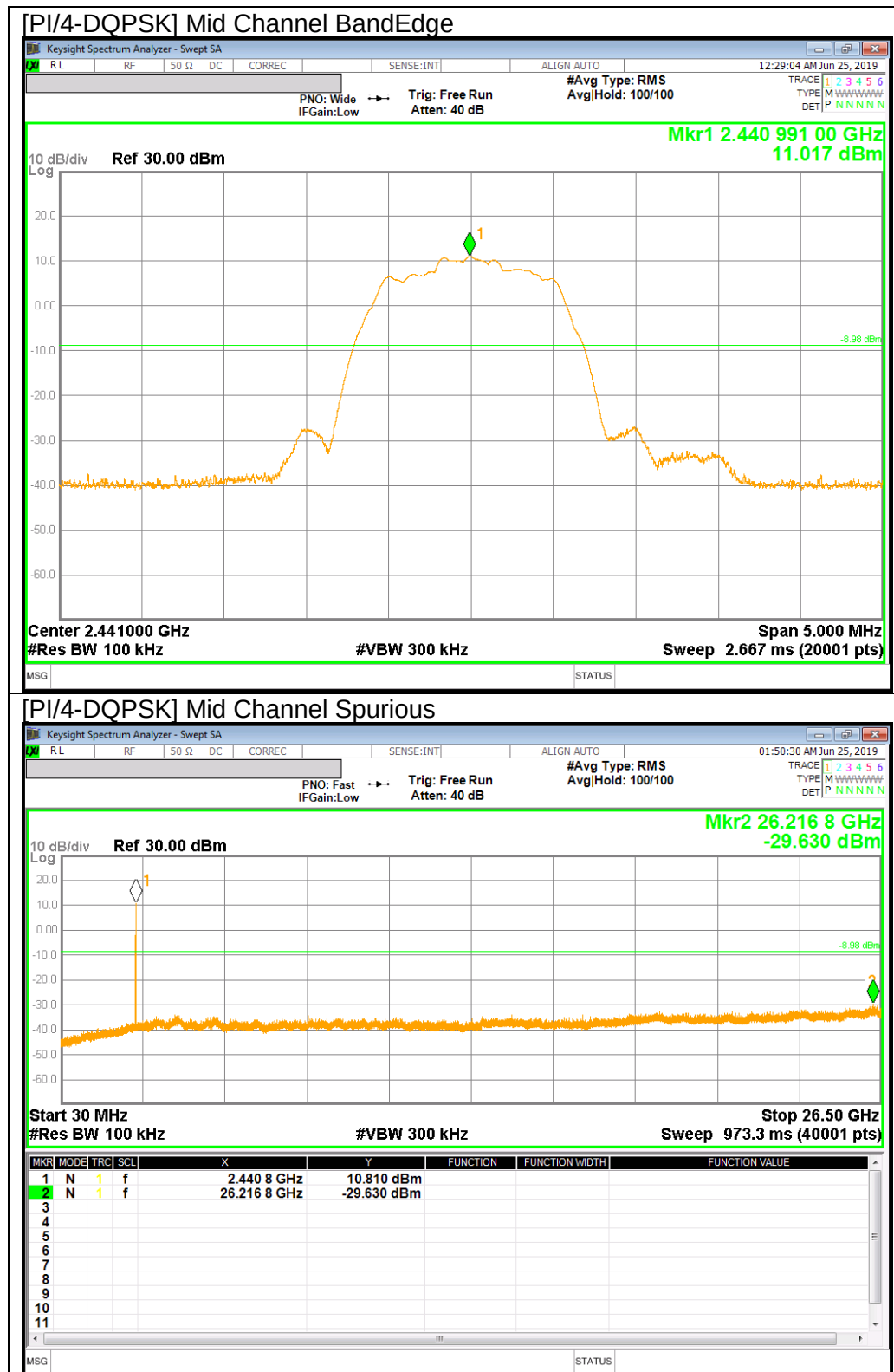
BandEdge Emission at GFSK Hopping Mode

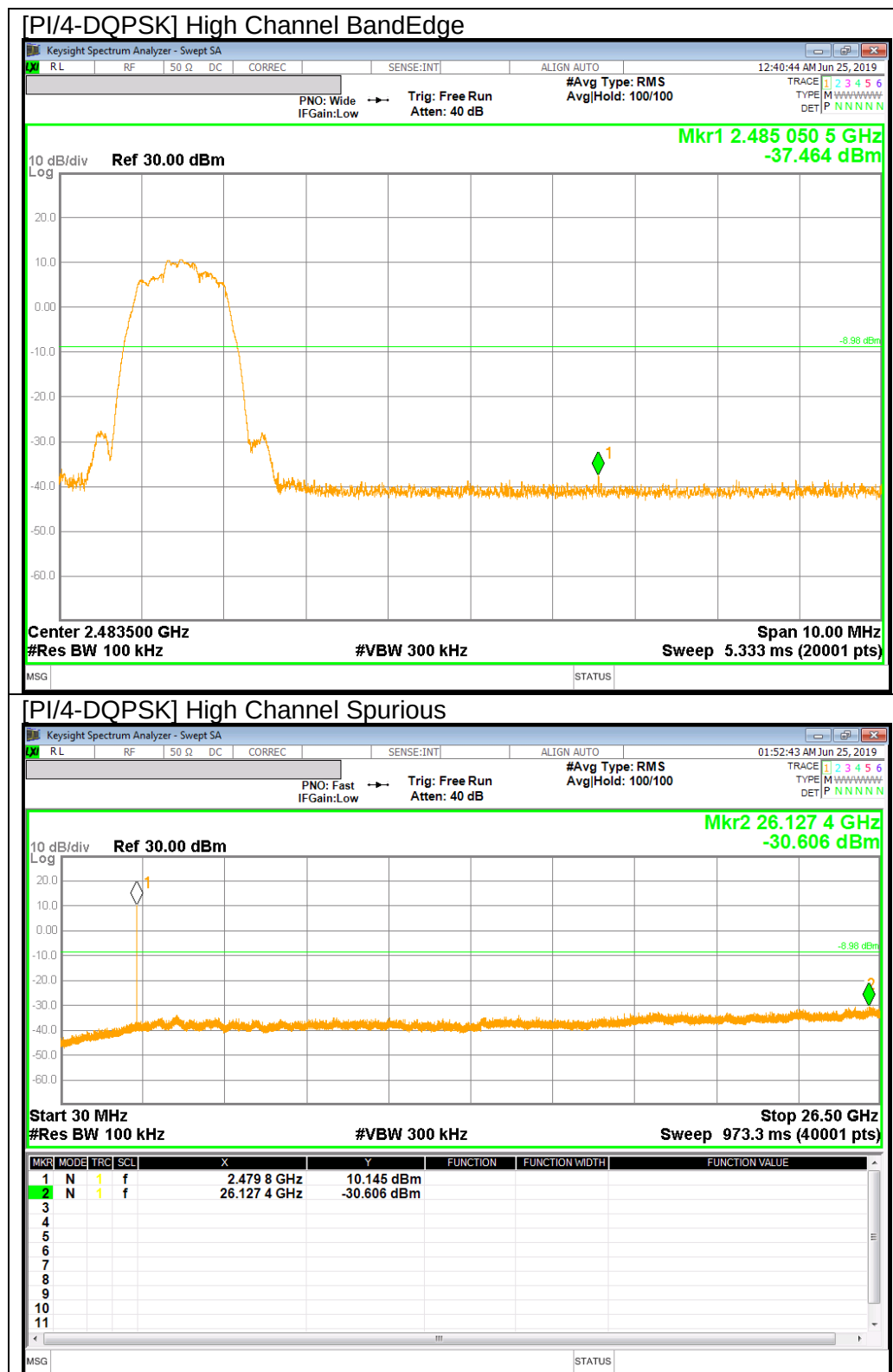


10.6.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

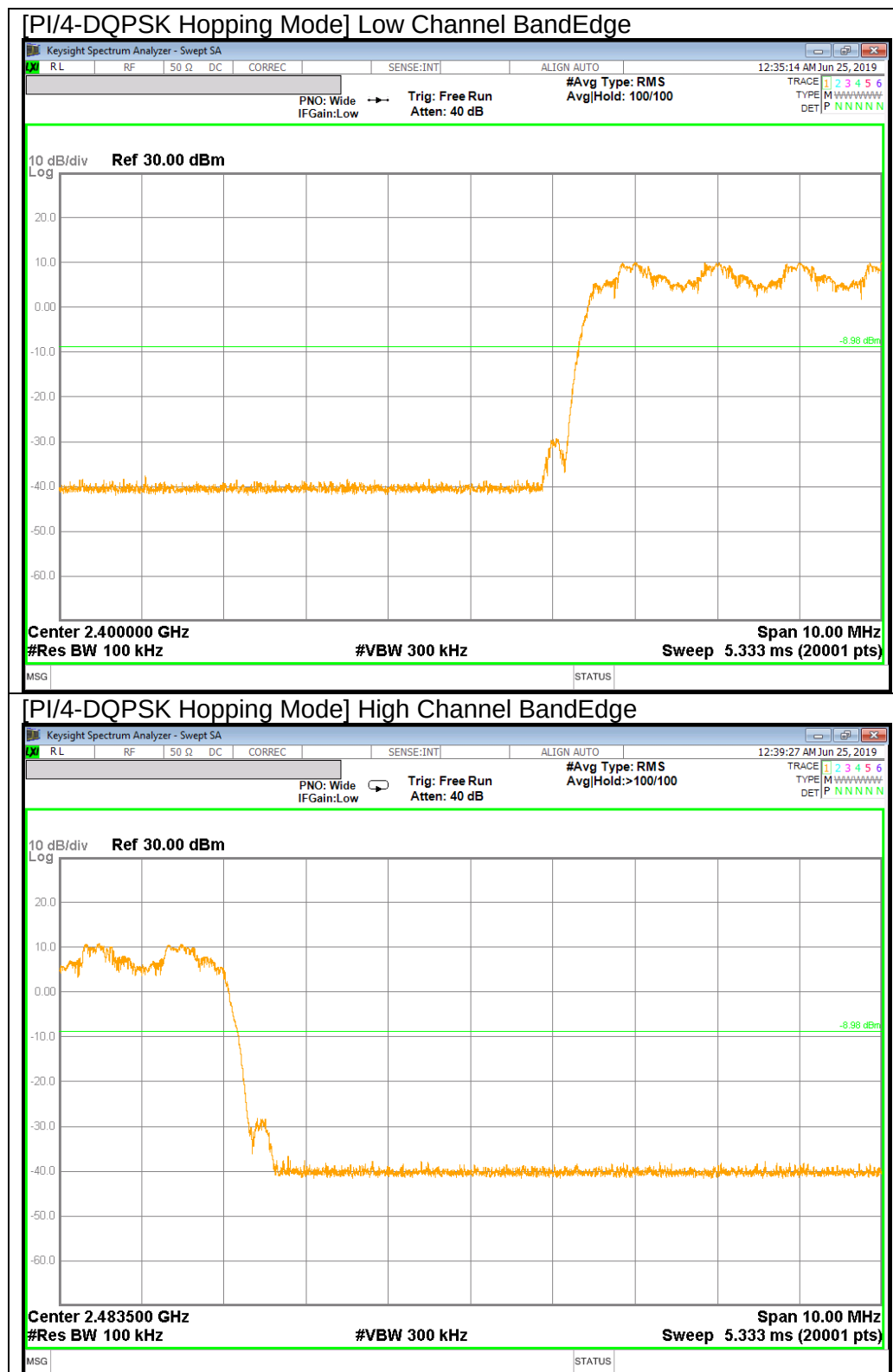
PI/4-DQPSK Mode





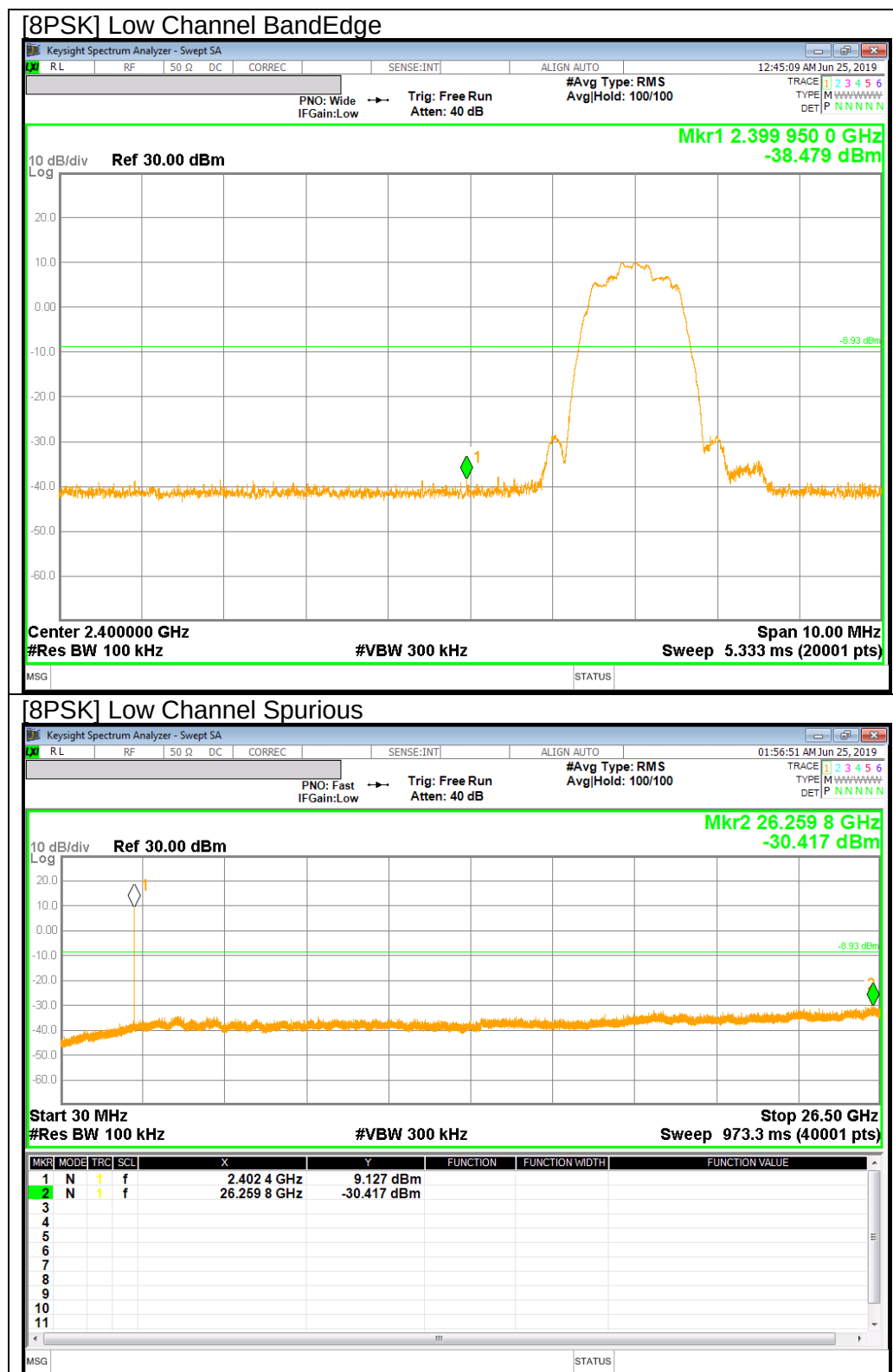


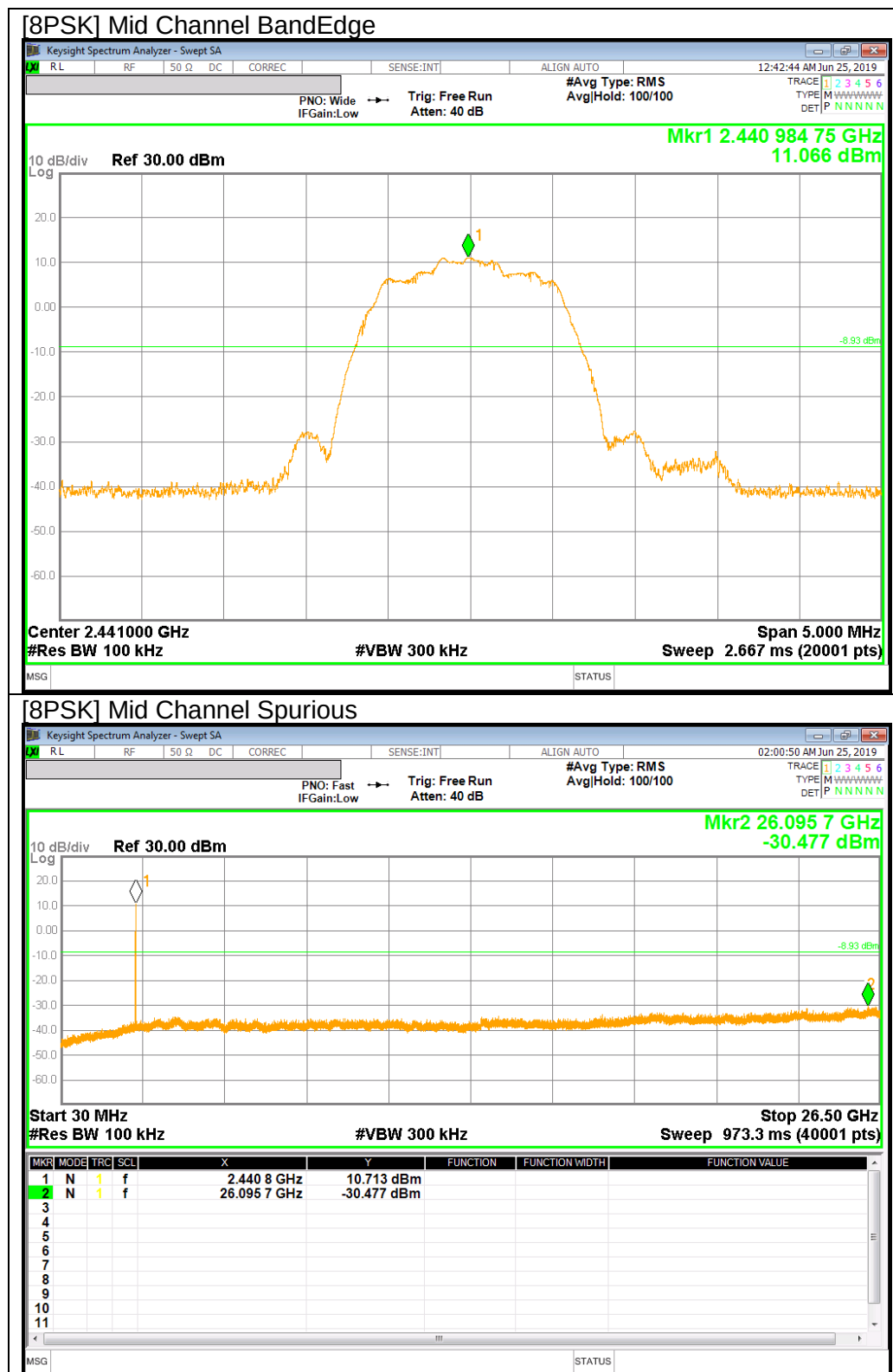
BandEdge Emission at PI/4-DQPSK Hopping Mode

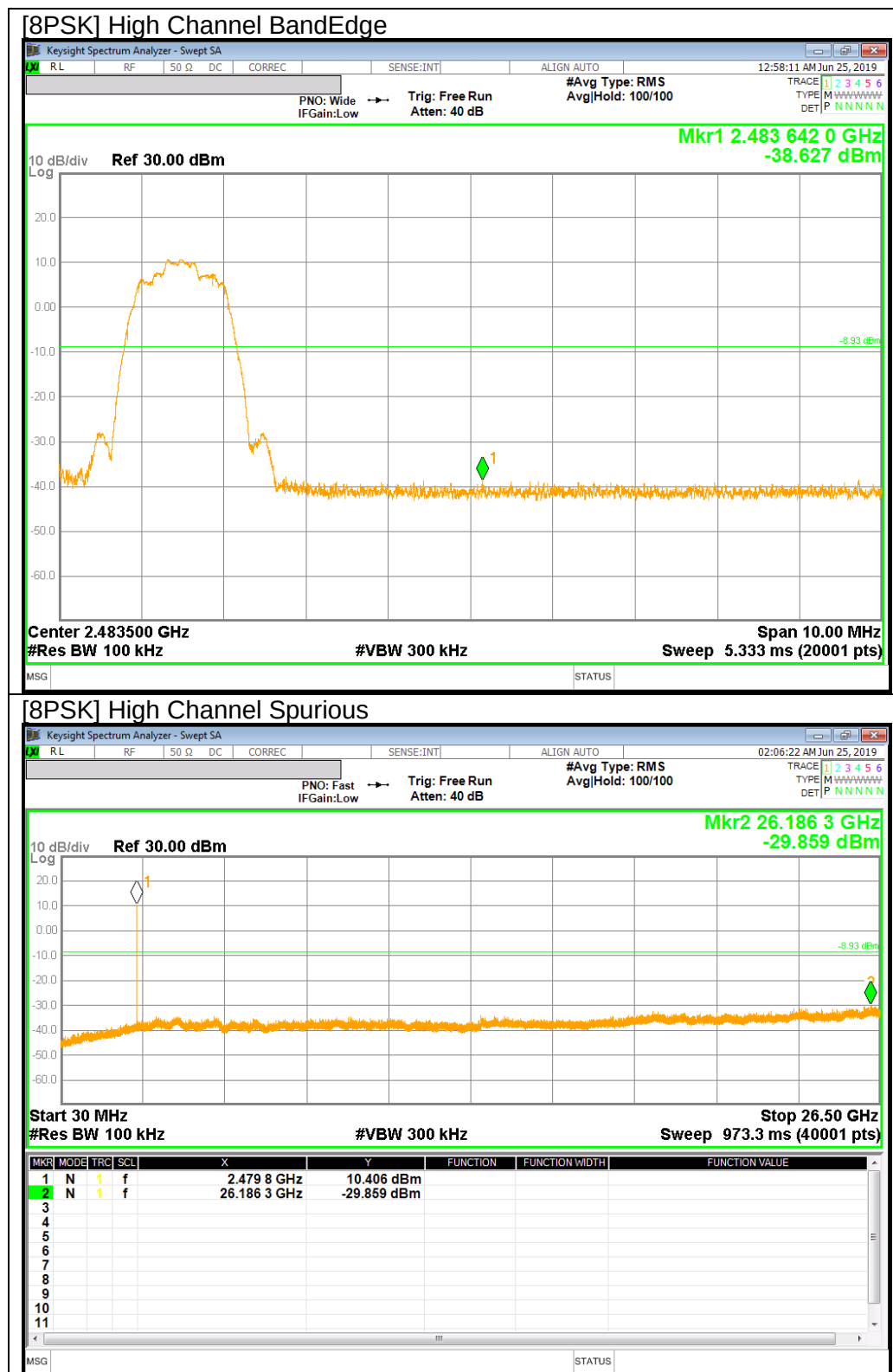


10.6.3. ENHANCED DATA RATE 8PSK MODULATION

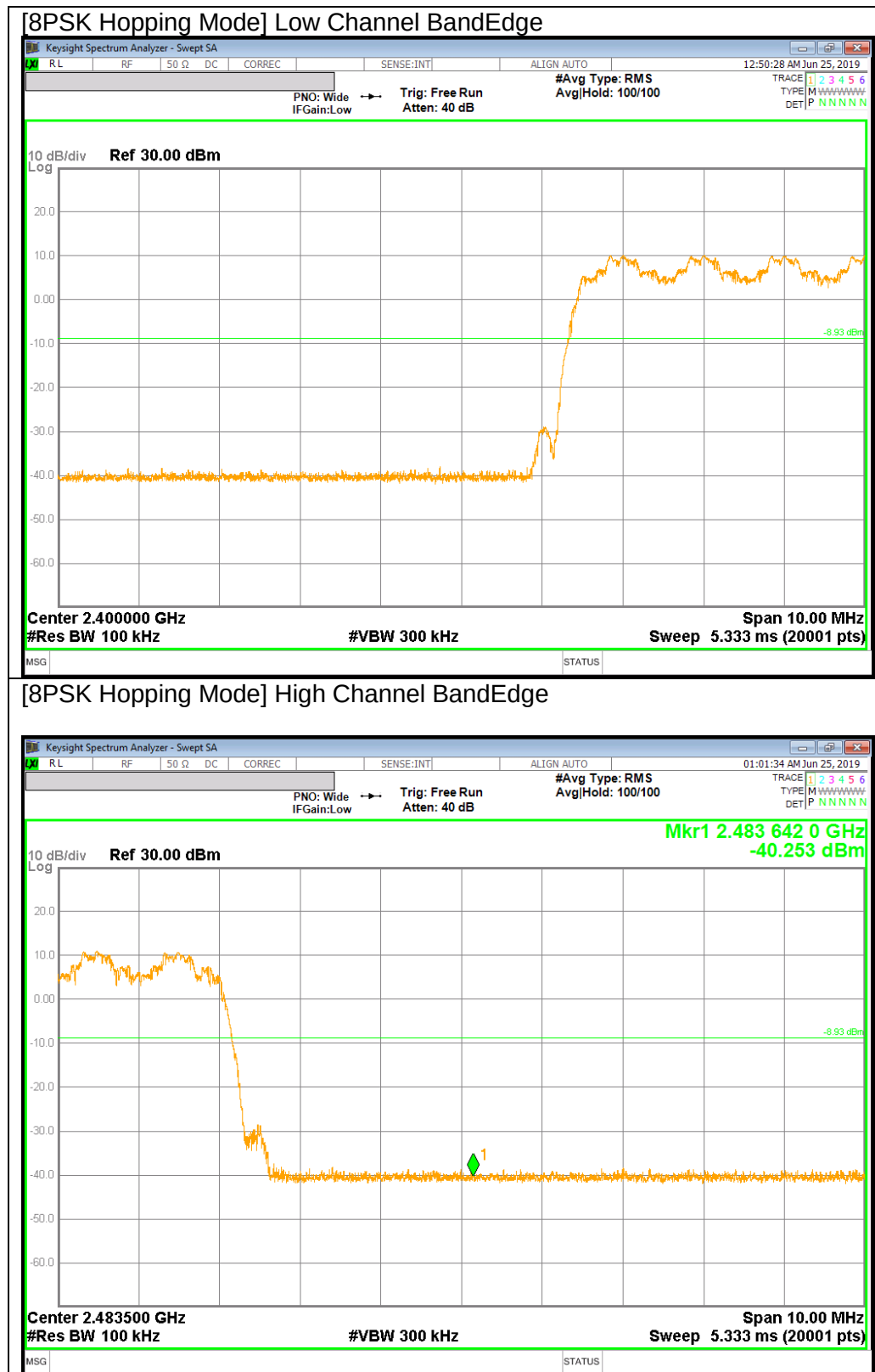
8PSK Mode







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.

$$\text{GFSK} = 1/T = 1 / 0.002885\text{S} = 347\text{Hz}.$$

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.

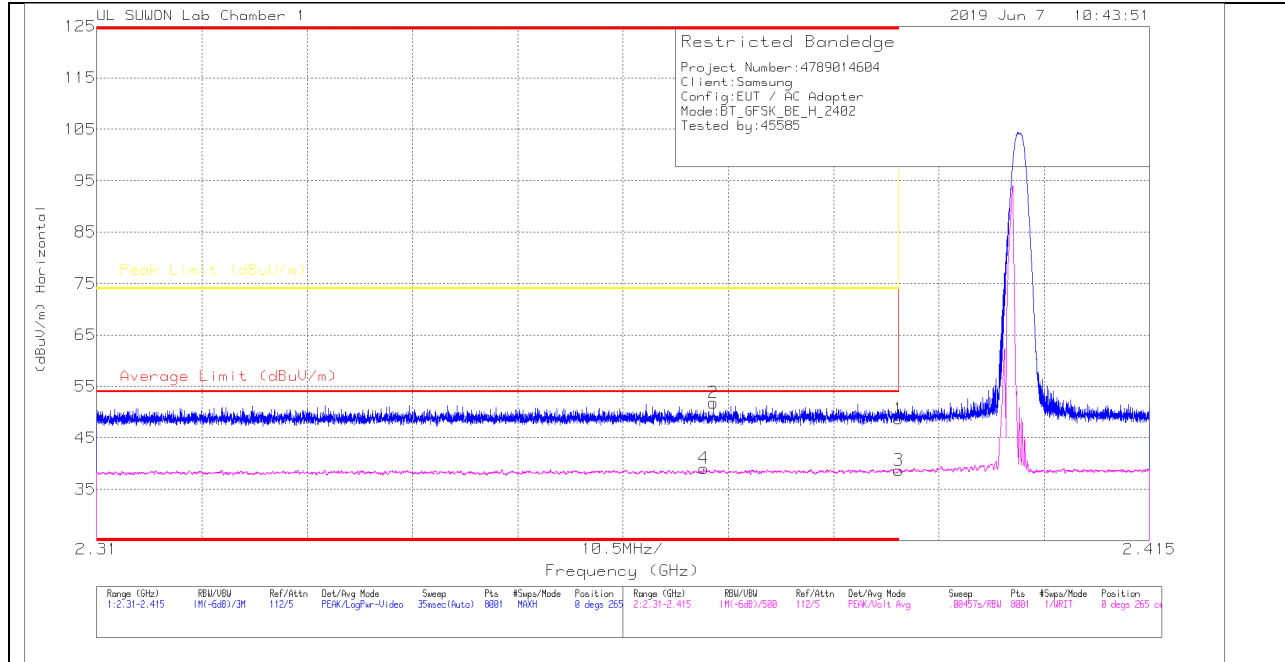
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

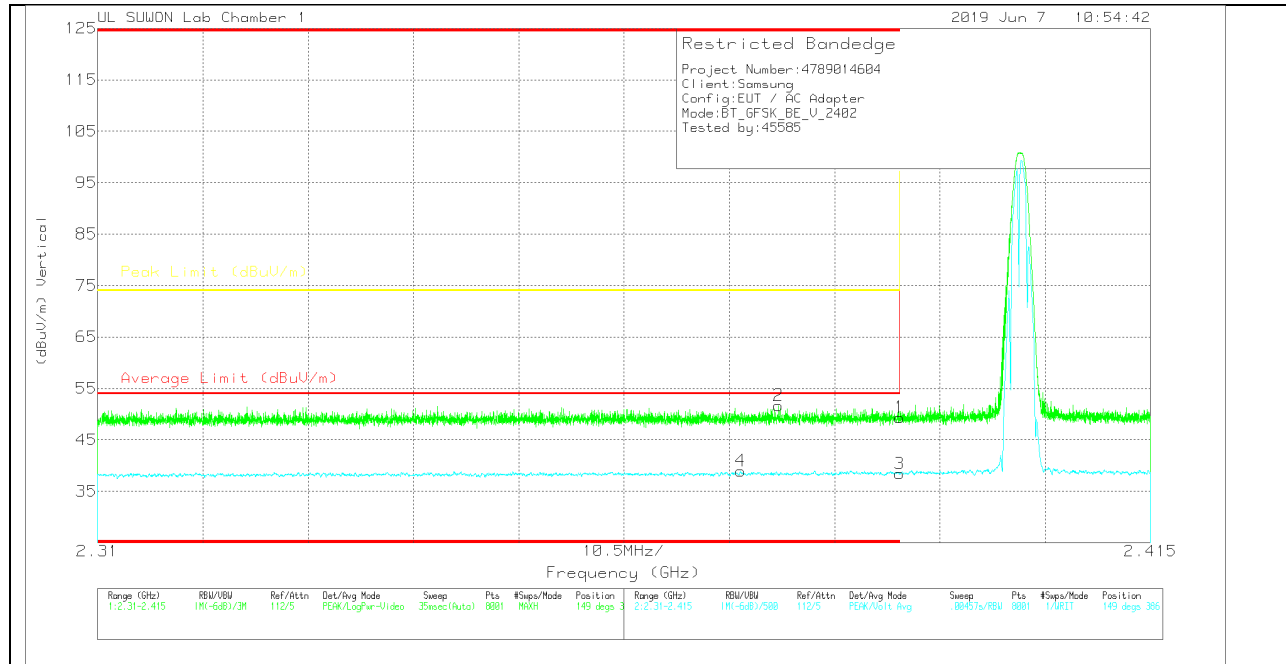
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_001687 17	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.52	Pk	31.7	-25.5	48.72	-	-	74	-25.28	0	265	H
2	* 2.37149	45.84	Pk	31.6	-25.6	51.84	-	-	74	-22.16	0	265	H
3	* 2.39	32.52	VA1T	31.7	-25.5	38.72	54	-15.28	-	-	0	265	H
4	* 2.37053	33.09	VA1T	31.6	-25.6	39.09	54	-14.91	-	-	0	265	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_001687 17	10dB[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	43.16	Pk	31.7	-25.5	49.36	-	-	74	-24.64	149	386	V
2	* 2.37788	45.57	Pk	31.6	-25.5	51.67	-	-	74	-22.33	149	386	V
3	* 2.39	32.25	VA1T	31.7	-25.5	38.45	54	-15.55	-	-	149	386	V
4	* 2.37414	32.98	VA1T	31.6	-25.6	38.98	54	-15.02	-	-	149	386	V

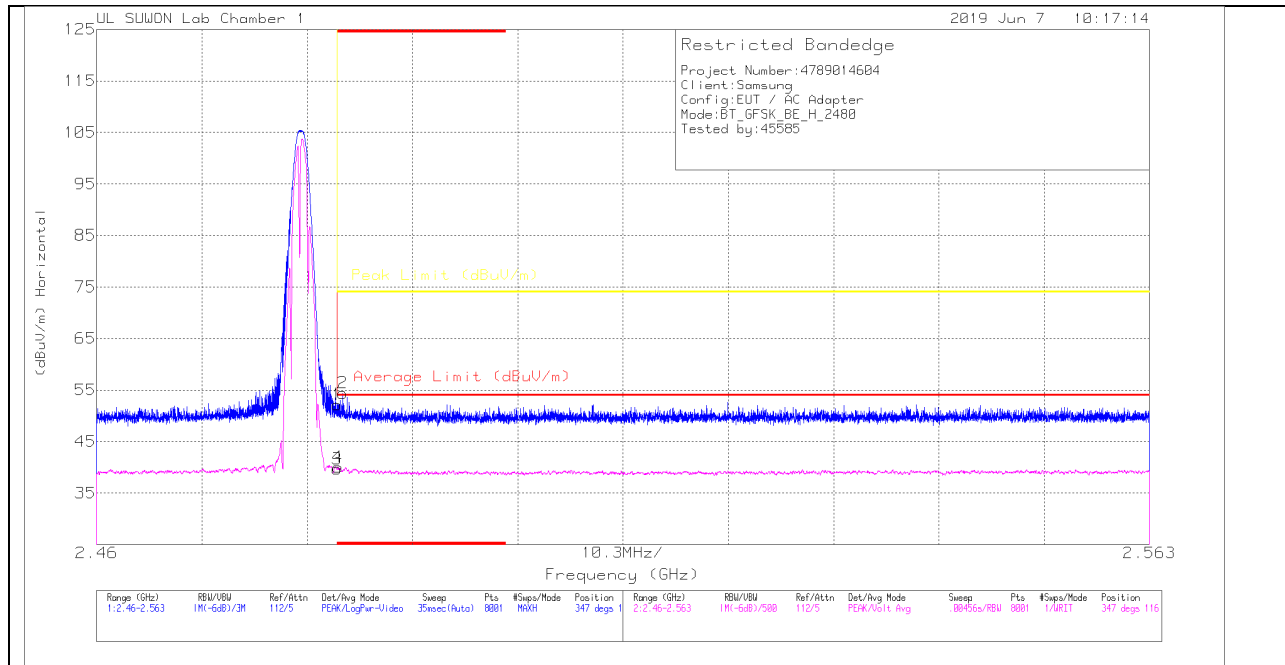
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

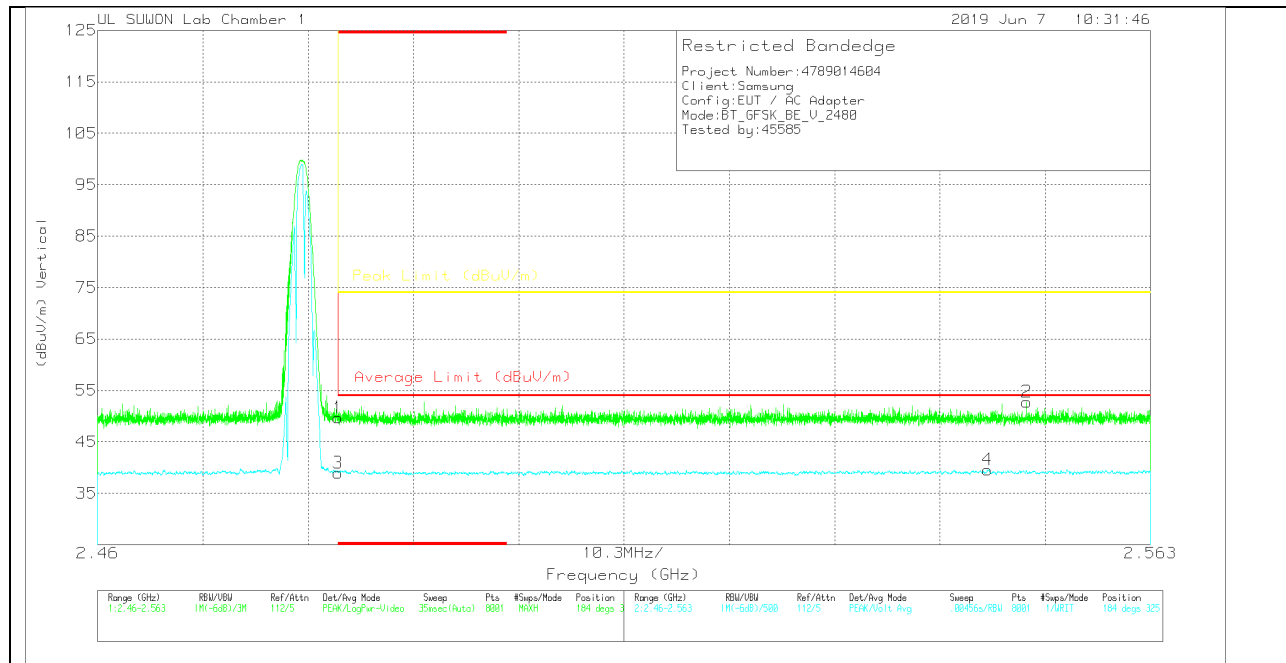
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_001687 17	10dB(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	45.55	Pk	31.9	-25.3	52.15	-	-	74	-21.85	347	116	H
2	* 2.48408	47.79	Pk	31.9	-25.3	54.39	-	-	74	-19.61	347	116	H
3	* 2.48351	33.02	VA1T	31.9	-25.3	39.62	54	-14.38	-	-	347	116	H
4	* 2.4836	33.42	VA1T	31.9	-25.3	40.02	54	-13.98	-	-	347	116	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_001687 17	10dB[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	43.11	Pk	31.9	-25.3	49.71	-	-	74	-24.29	184	325	V
2	2.5509	45.88	Pk	32	-25.1	52.78	-	-	74	-21.22	184	325	V
3	* 2.48351	32.36	VA1T	31.9	-25.3	38.96	54	-15.04	-	-	184	325	V
4	2.54705	32.69	VA1T	32	-25.1	39.59	54	-14.41	-	-	184	325	V

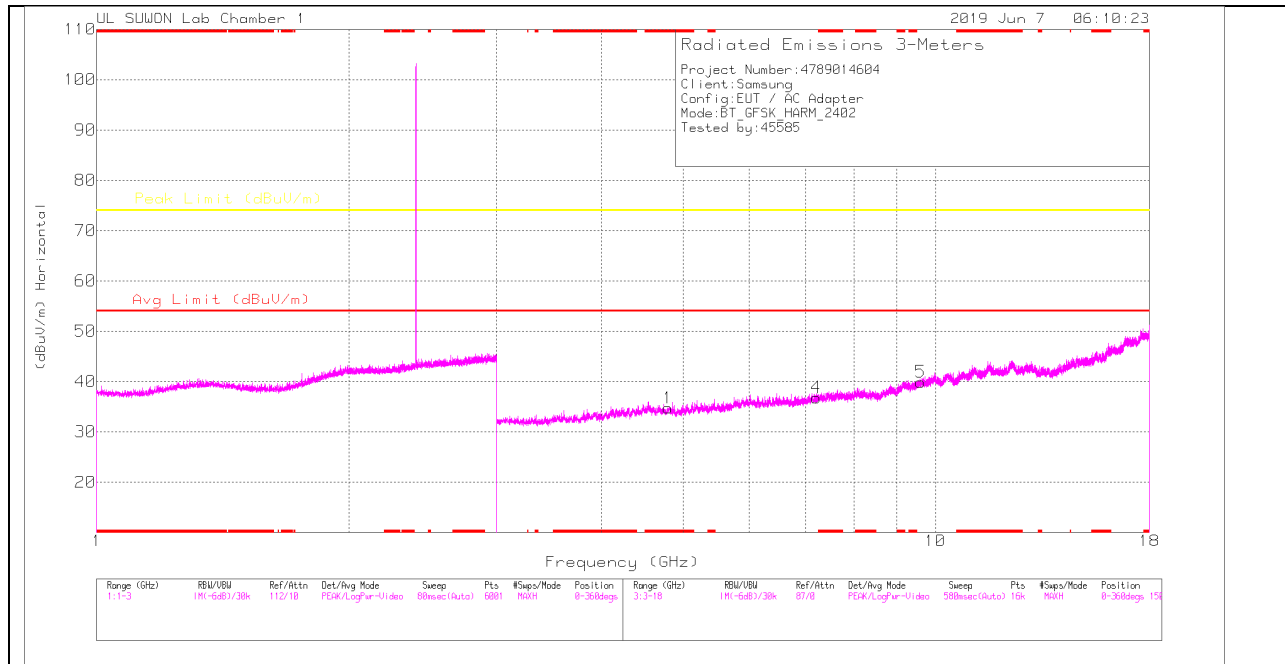
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

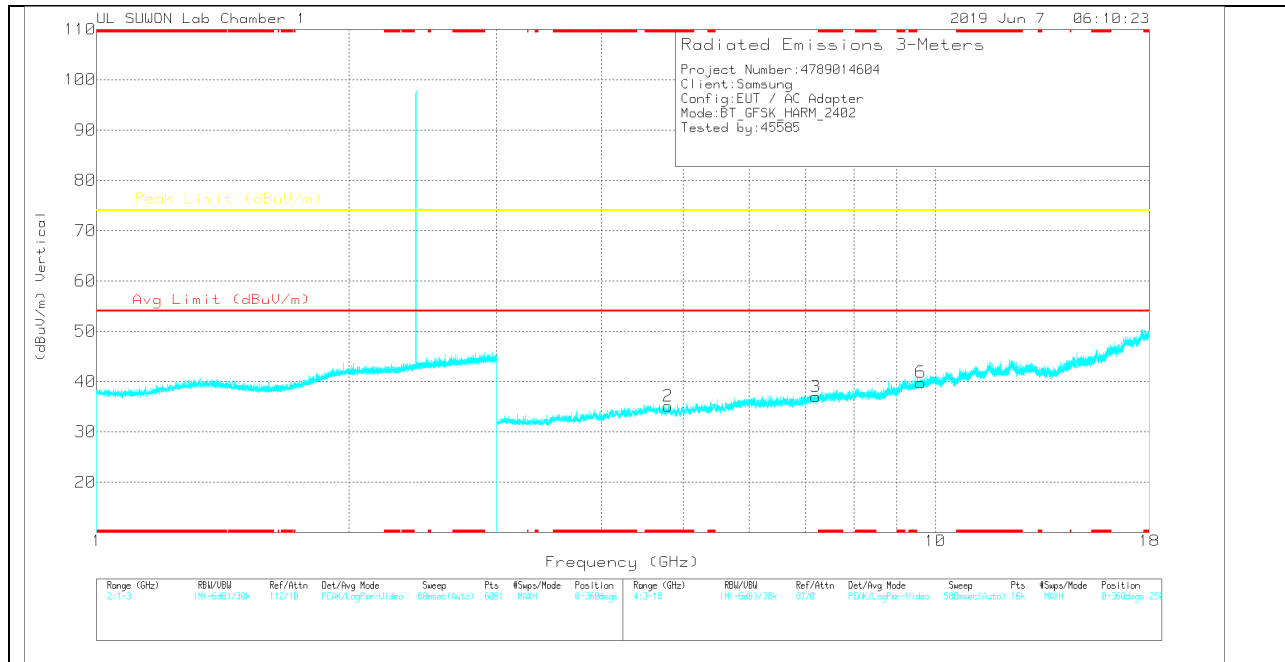
VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

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

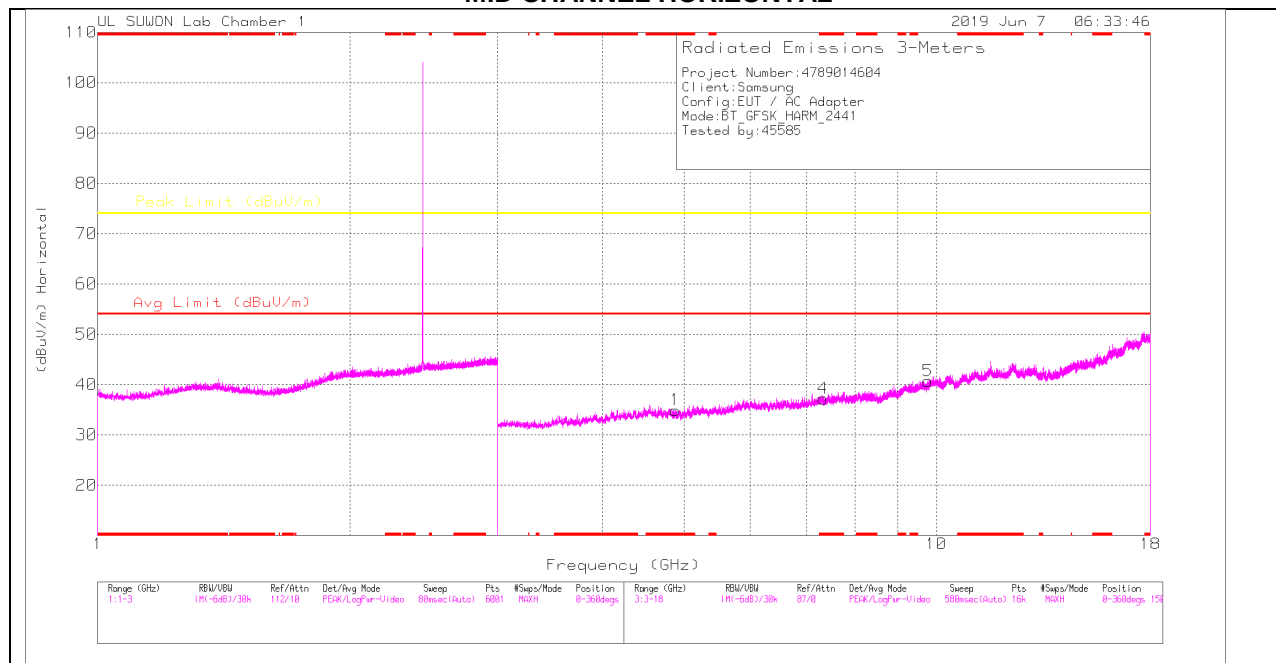
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016871 7	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.79801	31.94	PK	34.2	-31.4	34.74	-	-	74	-39.26	0-360	250	H
4	7.20724	28.9	PK	35.8	-27.9	36.8	-	-	74	-37.2	0-360	150	H
5	9.59959	25.92	PK	37	-23	39.92	-	-	74	-34.08	0-360	150	H
2	* 4.80082	32.34	PK	34.2	-31.4	35.14	-	-	74	-38.86	0-360	250	V
3	7.1988	29.08	PK	35.8	-27.9	36.98	-	-	74	-37.02	0-360	150	V
6	9.6099	25.91	PK	37	-23.1	39.81	-	-	74	-34.19	0-360	250	V

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

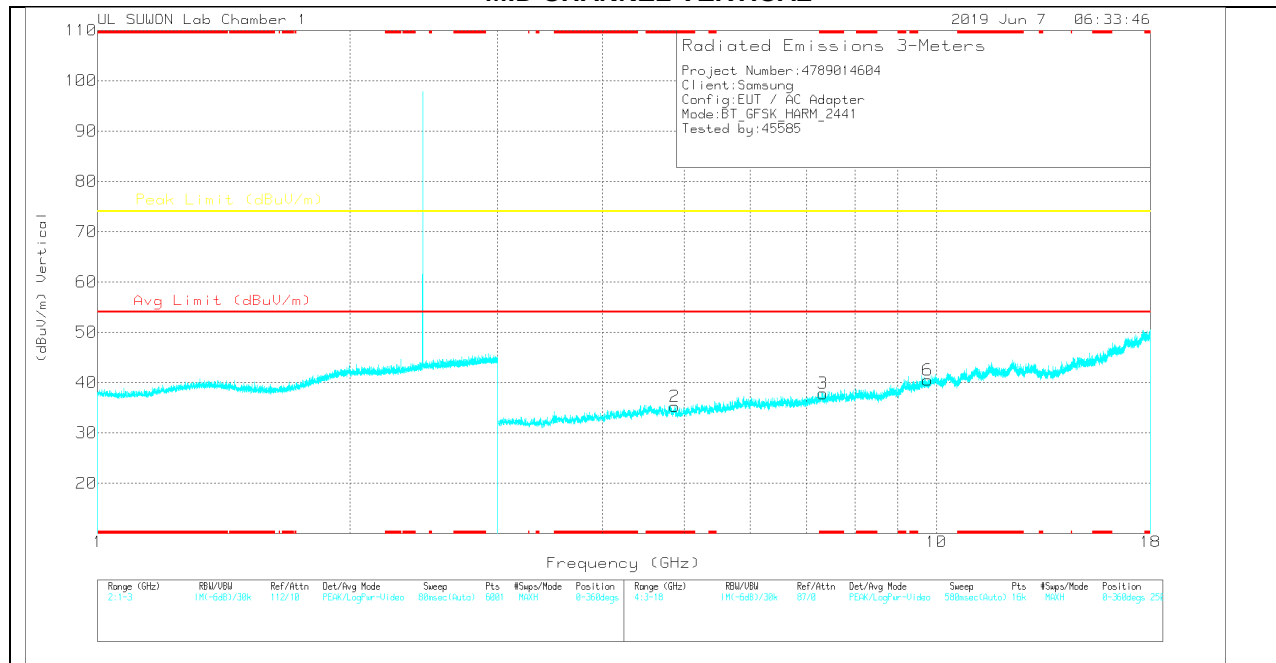
PK – Peak Detector

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

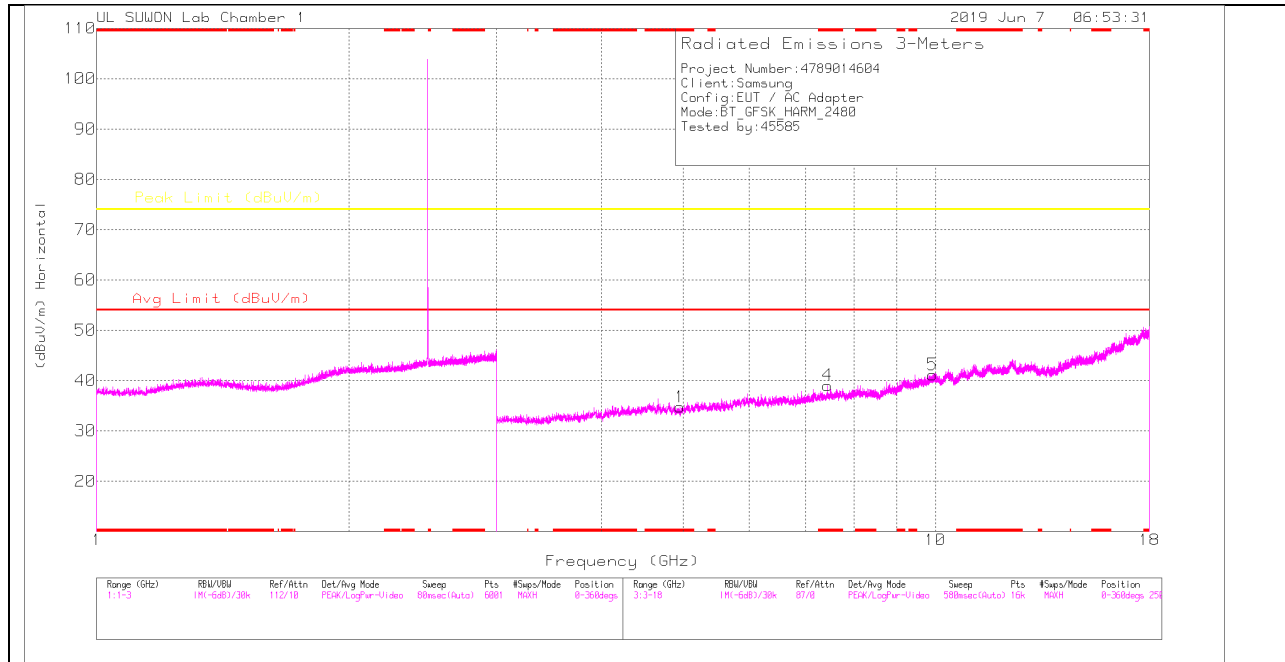
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016871 7	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.88426	32.24	PK	34.2	-31.5	34.94	-	-	74	-39.06	0-360	250	H
4	* 7.31973	28.7	PK	35.8	-27.3	37.2	-	-	74	-36.8	0-360	150	H
5	9.76457	27.4	PK	37.2	-23.9	40.7	-	-	74	-33.3	0-360	250	H
2	* 4.87863	32.54	PK	34.2	-31.5	35.24	-	-	74	-38.76	0-360	250	V
3	* 7.3291	29.22	PK	35.8	-27.2	37.82	-	-	74	-36.18	0-360	150	V
6	9.76176	27.21	PK	37.2	-23.9	40.51	-	-	74	-33.49	0-360	250	V

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

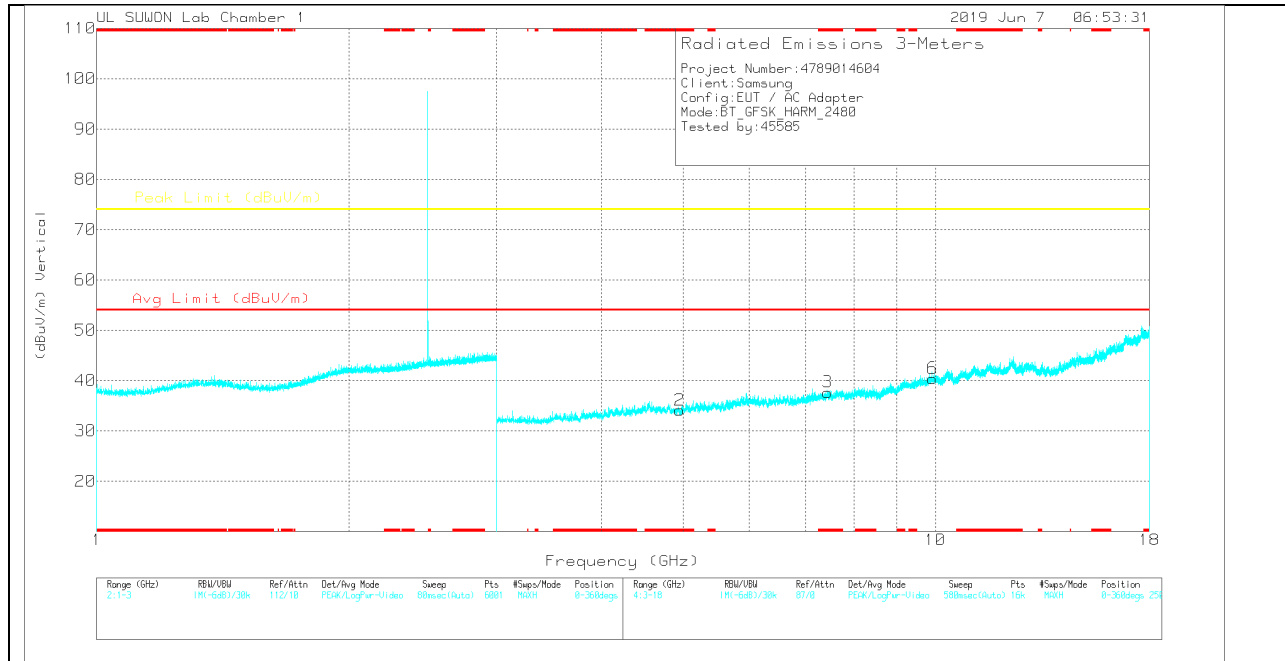
PK – Peak Detector

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_0016871 7	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	* 4.96019	31.93	PK	34.2	-31.4	34.73	-	-	74	-39.27	0-360	250	H
4	* 7.44066	30.26	PK	35.8	-27	39.06	-	-	74	-34.94	0-360	150	H
5	9.91644	25.97	PK	37.5	-22.3	41.17	-	-	74	-32.83	0-360	150	H
2	* 4.9555	31.4	PK	34.2	-31.5	34.1	-	-	74	-39.9	0-360	150	V
3	* 7.43972	28.89	PK	35.8	-27	37.69	-	-	74	-36.31	0-360	150	V
6	9.92019	25.22	PK	37.5	-22.3	40.42	-	-	74	-33.58	0-360	250	V

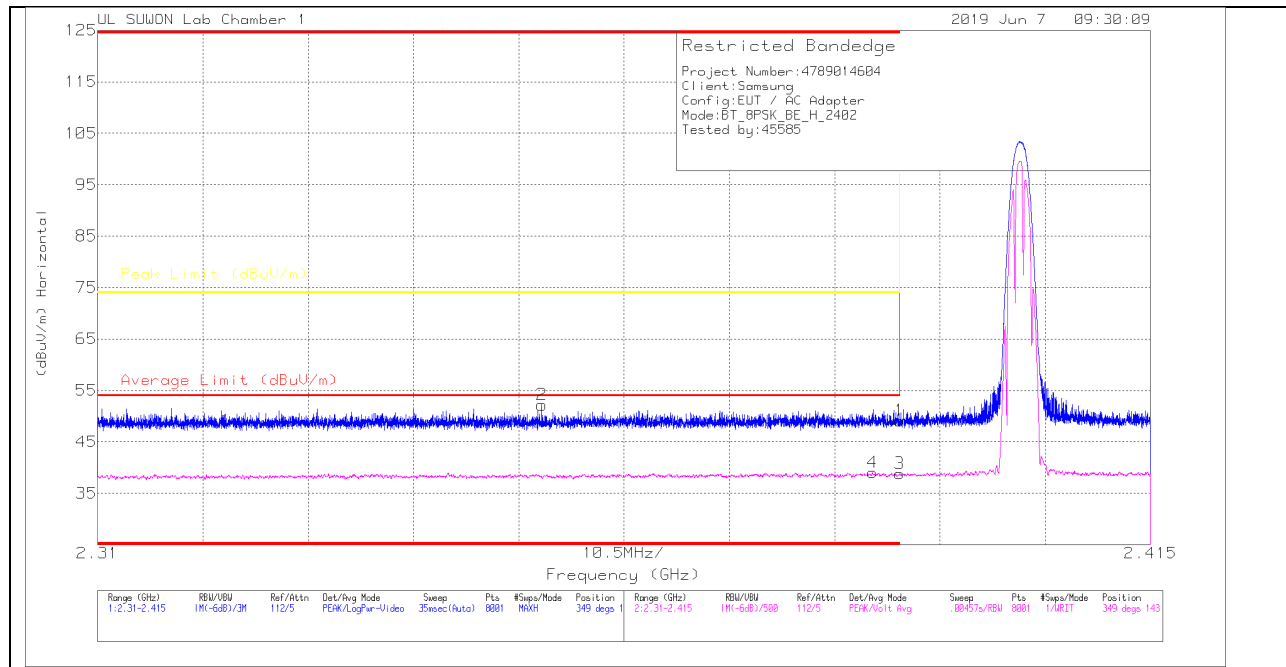
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK – Peak Detector

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

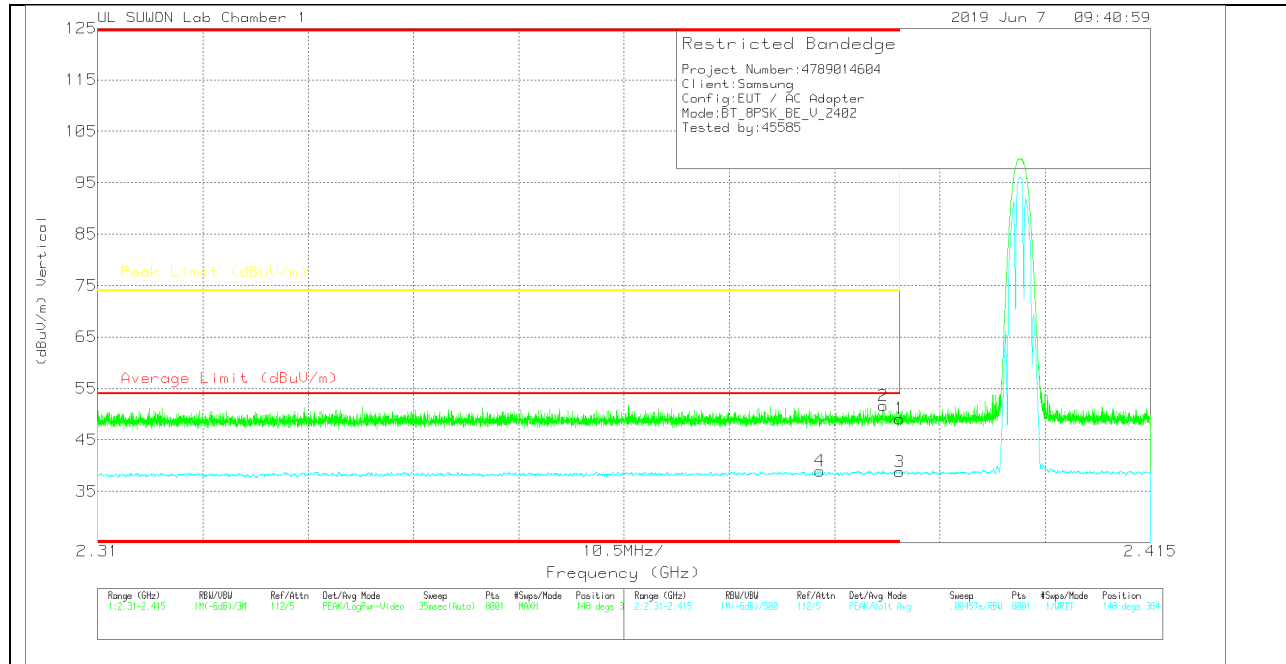
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_001687 17	10dB(dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	42.93	Pk	31.7	-25.5	49.13	-	-	74	-24.87	349	143	H
2	* 2.3543	46.3	Pk	31.6	-25.7	52.2	-	-	74	-21.8	349	143	H
3	* 2.39	32.63	VA1T	31.7	-25.5	38.83	54	-15.17	-	-	349	143	H
4	* 2.38727	32.83	VA1T	31.7	-25.5	39.03	54	-14.97	-	-	349	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_001687 17	10dB[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	42.92	Pk	31.7	-25.5	49.12	-	-	74	-24.88	148	384	V
2	* 2.38833	45.4	Pk	31.7	-25.5	51.6	-	-	74	-22.4	148	384	V
3	* 2.39	32.58	VA1T	31.7	-25.5	38.78	54	-15.22	-	-	148	384	V
4	* 2.38202	32.78	VA1T	31.7	-25.5	38.98	54	-15.02	-	-	148	384	V

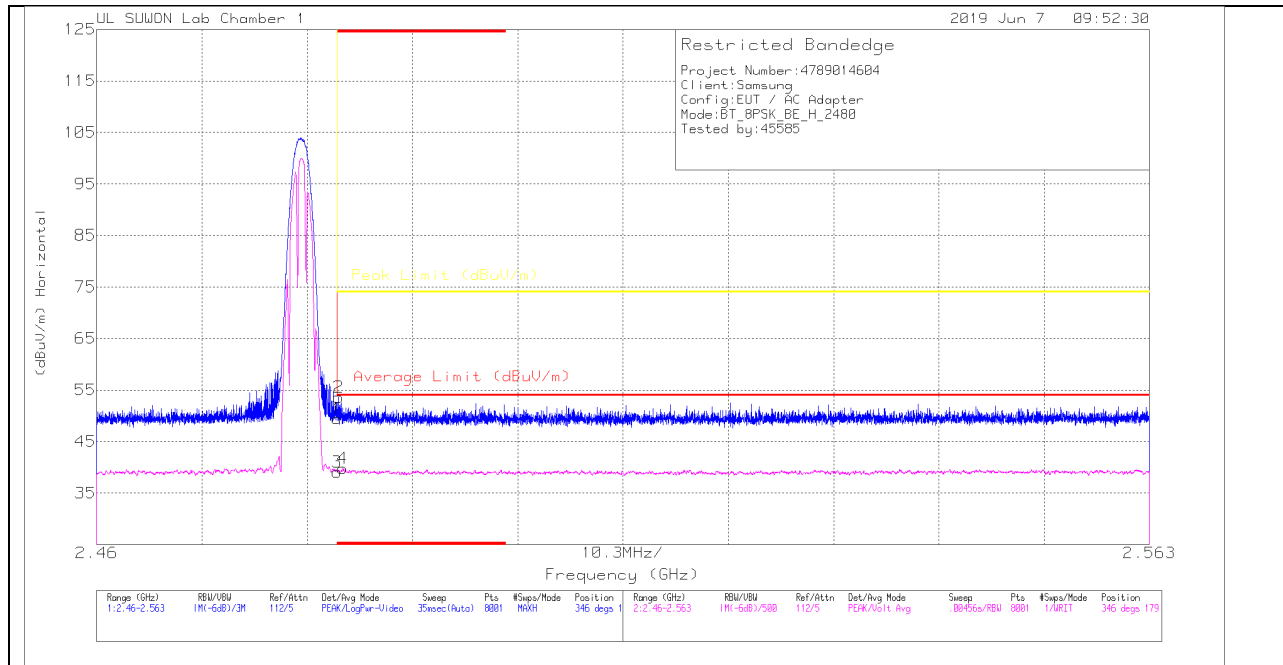
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

AUTHORIZED BANDEDGE (HIGH CHANNEL)

HORIZONTAL PEAK AND AVERAGE PLOT



HORIZONTAL DATA

Trace Markers

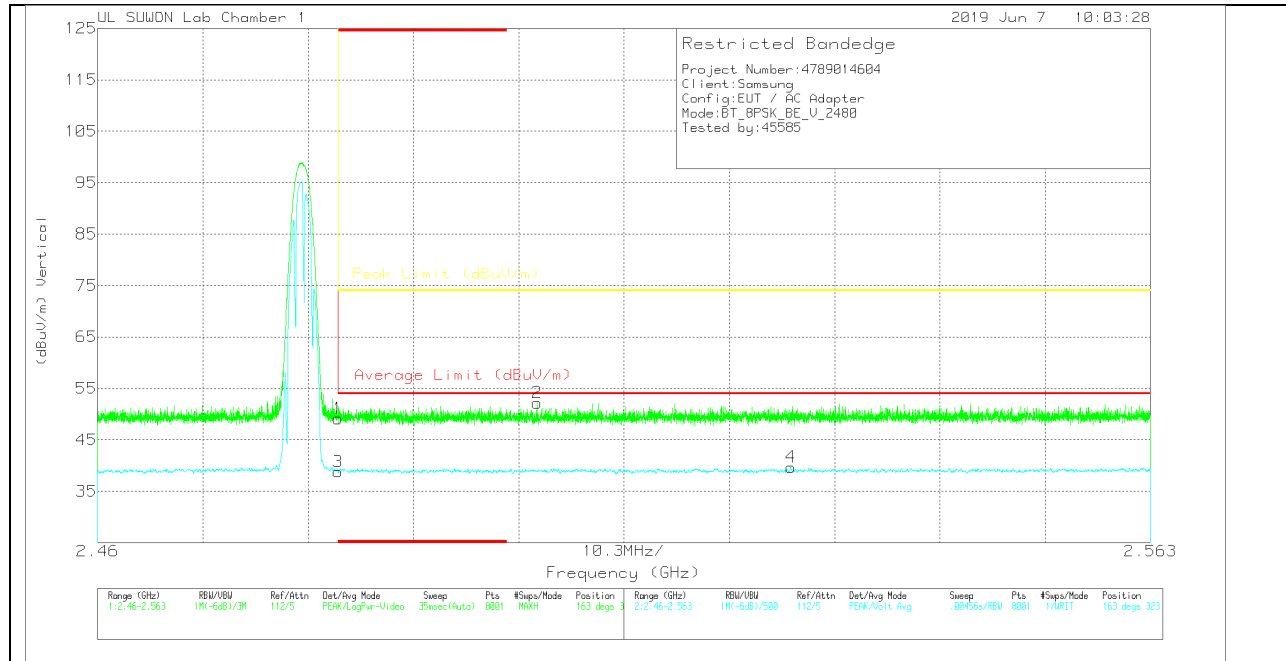
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_001687 17	10dB[dB]	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	42.8	Pk	31.9	-25.3	49.4	-	-	74	-24.6	346	179	H
2	* 2.48366	47.01	Pk	31.9	-25.3	53.61	-	-	74	-20.39	346	179	H
3	* 2.48351	32.47	VA1T	31.9	-25.3	39.07	54	-14.93	-	-	346	179	H
4	* 2.48409	33.17	VA1T	31.9	-25.3	39.77	54	-14.23	-	-	346	179	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_001687 17	10dB[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	42.55	Pk	31.9	-25.3	49.15	-	-	74	-24.85	163	323	V
2	2.503	45.4	Pk	32	-25.2	52.2	-	-	74	-21.8	163	323	V
3	* 2.48351	32.19	VA1T	31.9	-25.3	38.79	54	-15.21	-	-	163	323	V
4	2.5278	32.91	VA1T	32	-25.2	39.71	54	-14.29	-	-	163	323	V

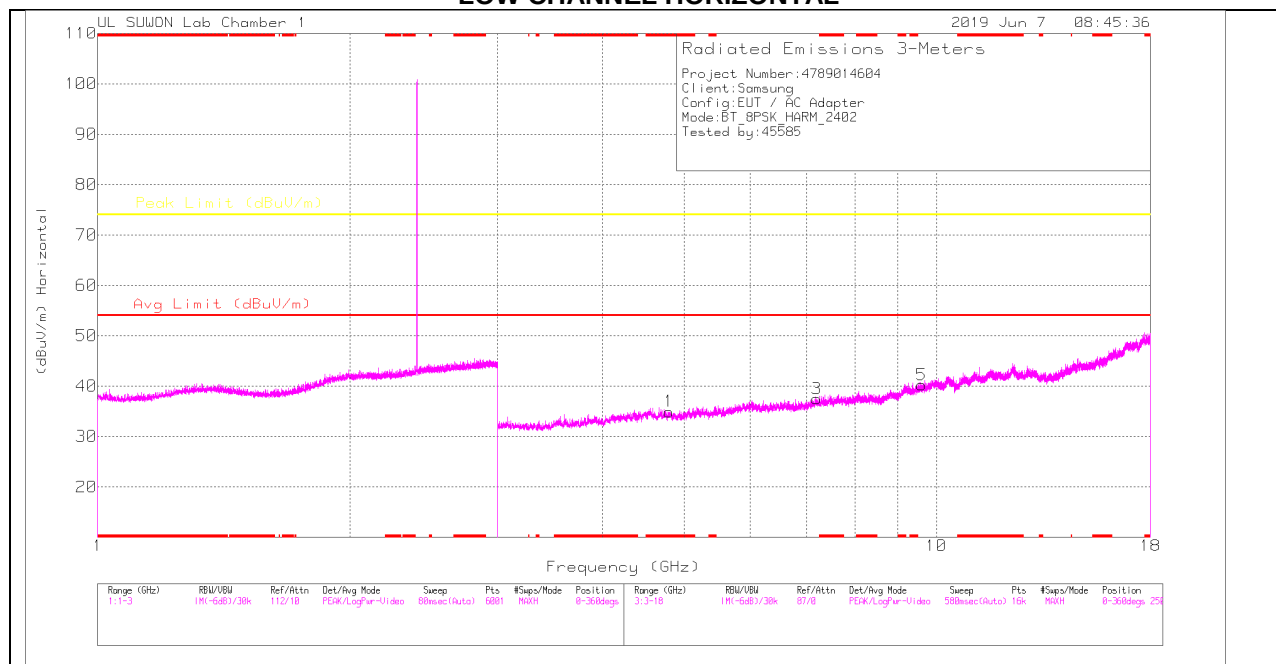
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

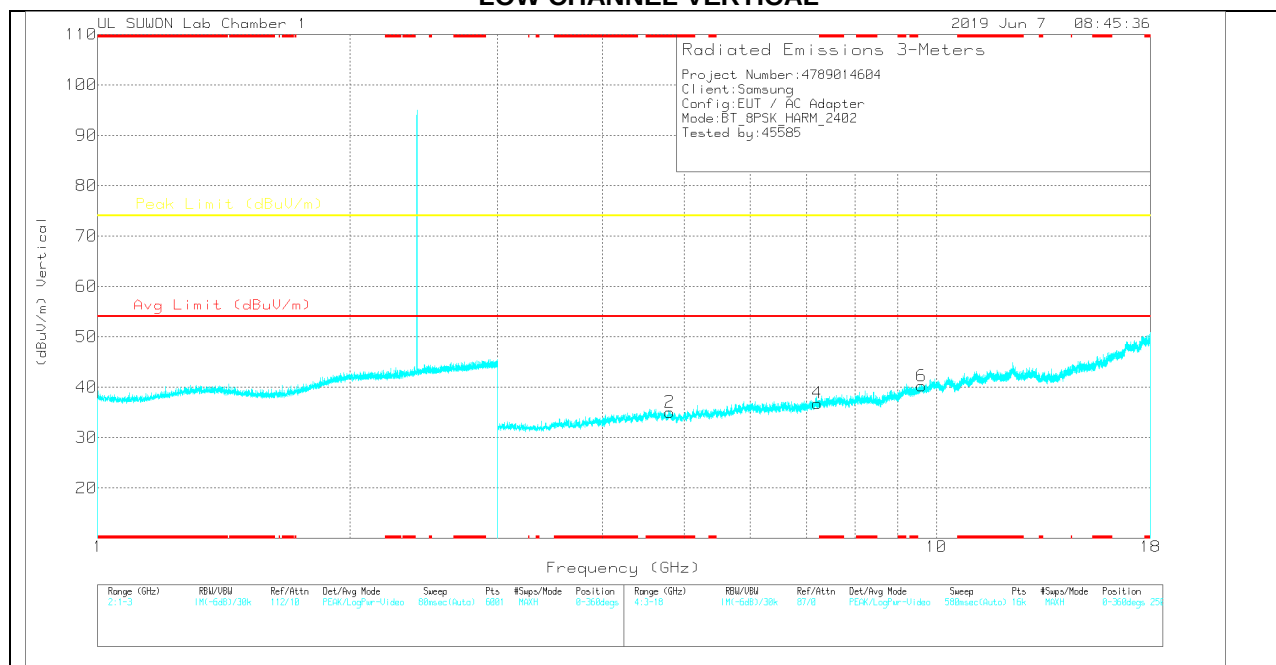
VA1T - FHSS: Linear Voltage Average $V_B = 1/T_{on}$ where: T_{on} is transmit duration

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

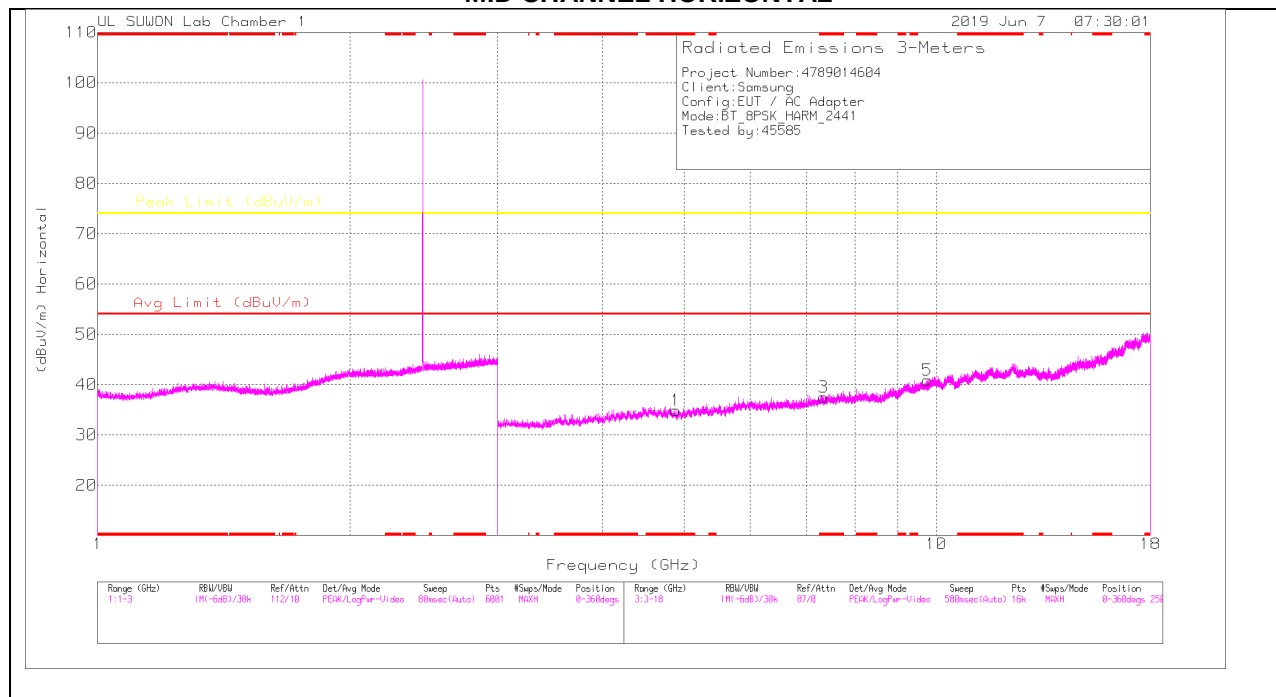
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016871 7	3GHz_HP[dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.80176	32.14	PK	34.2	-31.4	34.94	-	-	74	-39.06	0-360	150	H
3	7.19692	29.61	PK	35.8	-27.9	37.51	-	-	74	-36.49	0-360	250	H
5	9.60052	26.33	PK	37	-23.1	40.23	-	-	74	-33.77	0-360	250	H
2	* 4.80739	32.35	PK	34.2	-31.5	35.05	-	-	74	-38.95	0-360	150	V
4	7.20911	28.91	PK	35.8	-27.9	36.81	-	-	74	-37.19	0-360	150	V
6	9.60802	26.36	PK	37	-23.1	40.26	-	-	74	-33.74	0-360	150	V

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

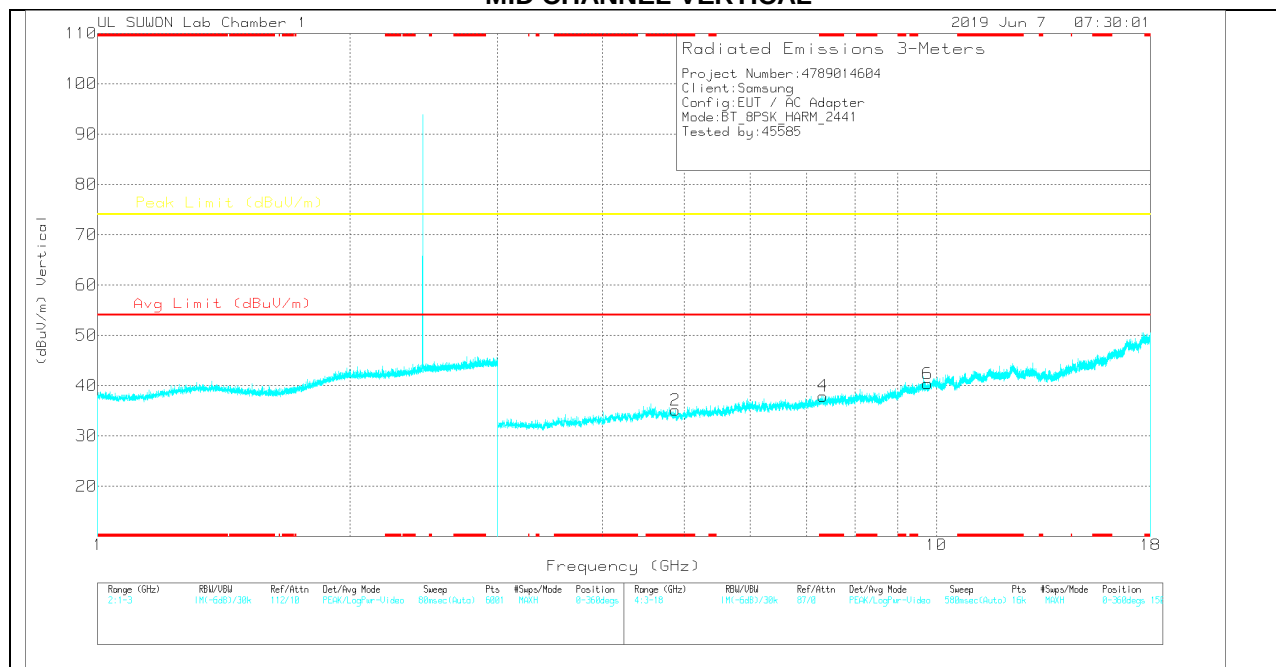
PK – Peak Detector

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

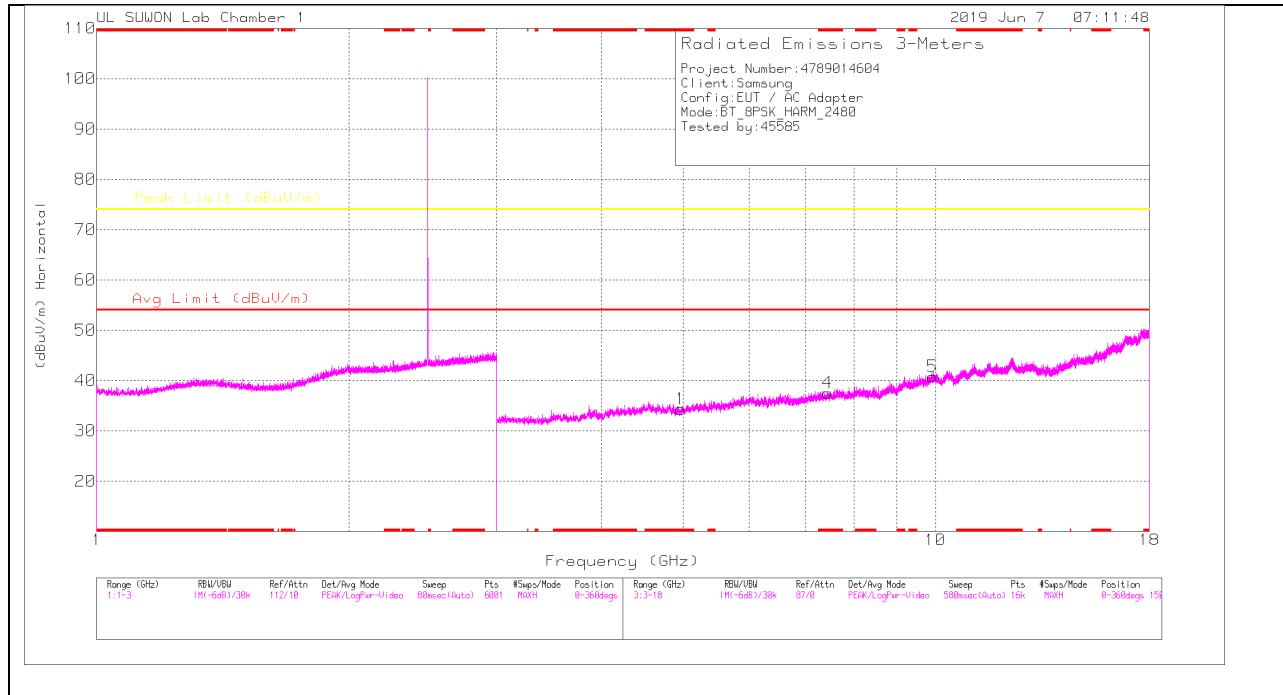
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016871_7	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	* 4.88894	32.2	PK	34.2	-31.5	34.9	-	-	74	-39.1	0-360	150	H
3	* 7.33192	28.9	PK	35.8	-27.2	37.5	-	-	74	-36.5	0-360	150	H
5	9.75708	27.58	PK	37.2	-23.9	40.88	-	-	74	-33.12	0-360	150	H
2	* 4.88144	32.45	PK	34.2	-31.5	35.15	-	-	74	-38.85	0-360	150	V
4	* 7.31973	29.43	PK	35.8	-27.3	37.93	-	-	74	-36.07	0-360	250	V
6	9.75989	27.07	PK	37.2	-23.9	40.37	-	-	74	-33.63	0-360	250	V

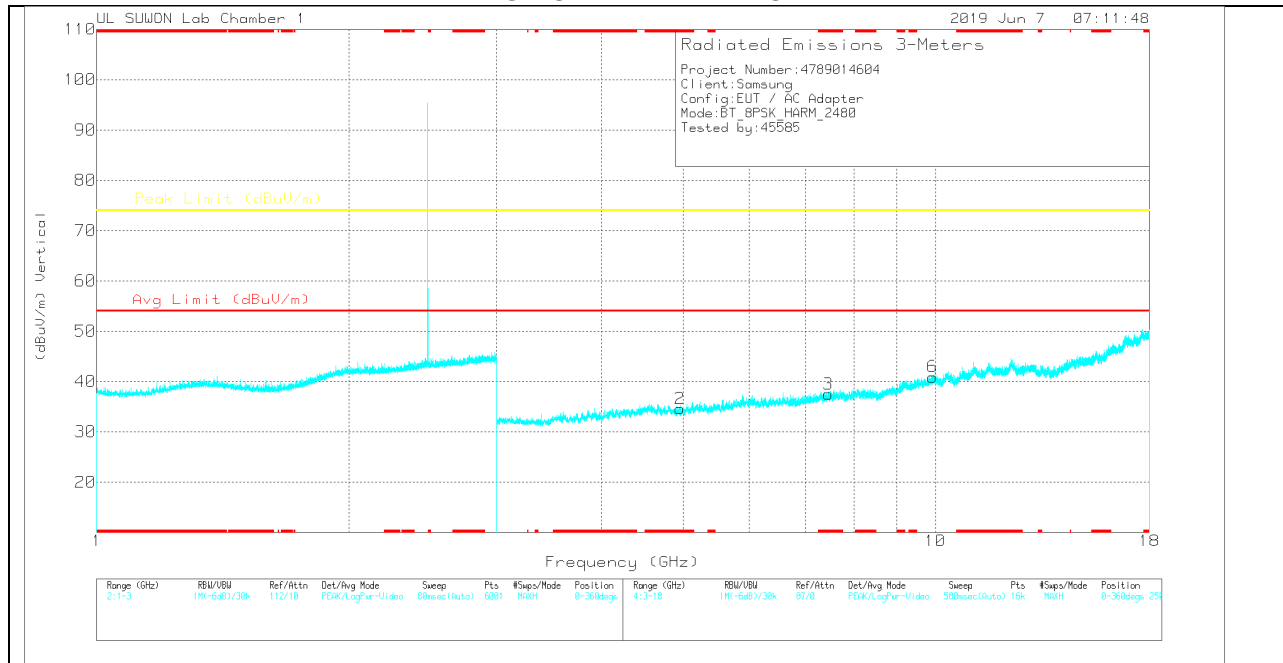
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK – Peak Detector

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_0016871 7	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	* 4.9705	31.52	PK	34.2	-31.4	34.32	-	-	74	-39.68	0-360	250	H
4	* 7.44253	28.75	PK	35.8	-27	37.55	-	-	74	-36.45	0-360	150	H
5	9.91644	25.58	PK	37.5	-22.3	40.78	-	-	74	-33.22	0-360	250	H
2	* 4.96113	31.8	PK	34.2	-31.4	34.6	-	-	74	-39.4	0-360	250	V
3	* 7.44722	28.76	PK	35.8	-27.1	37.46	-	-	74	-36.54	0-360	150	V
6	9.92206	25.73	PK	37.5	-22.3	40.93	-	-	74	-33.07	0-360	250	V

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

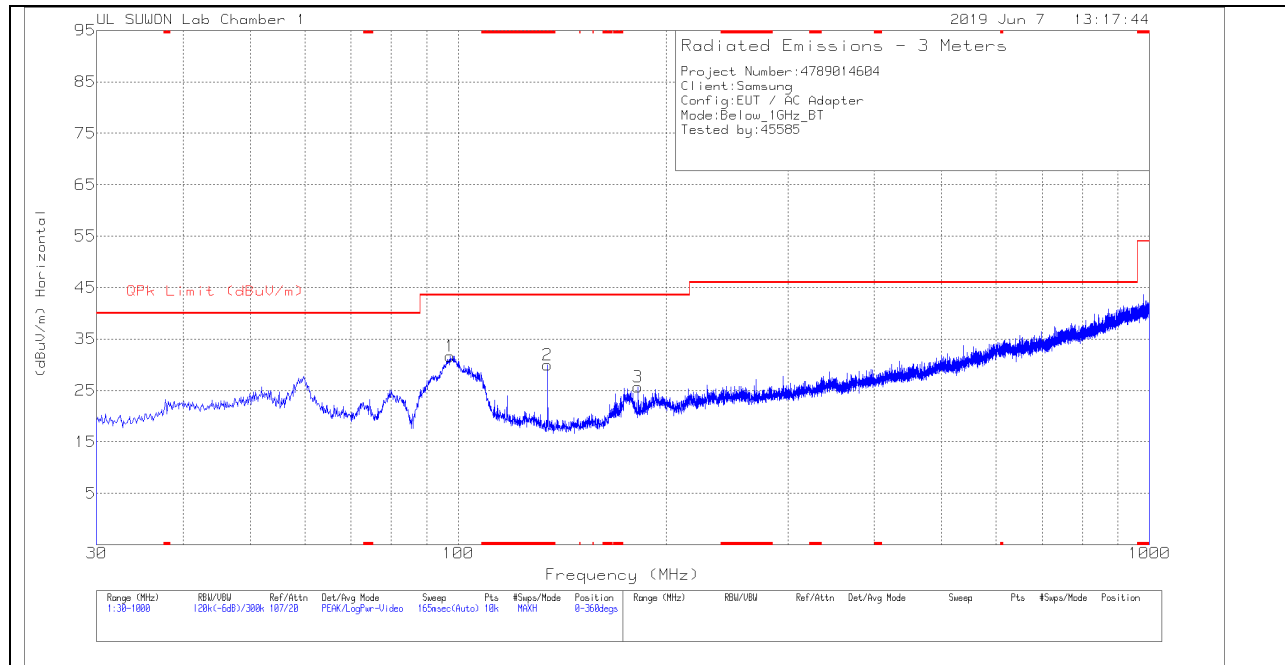
PK – Peak Detector

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

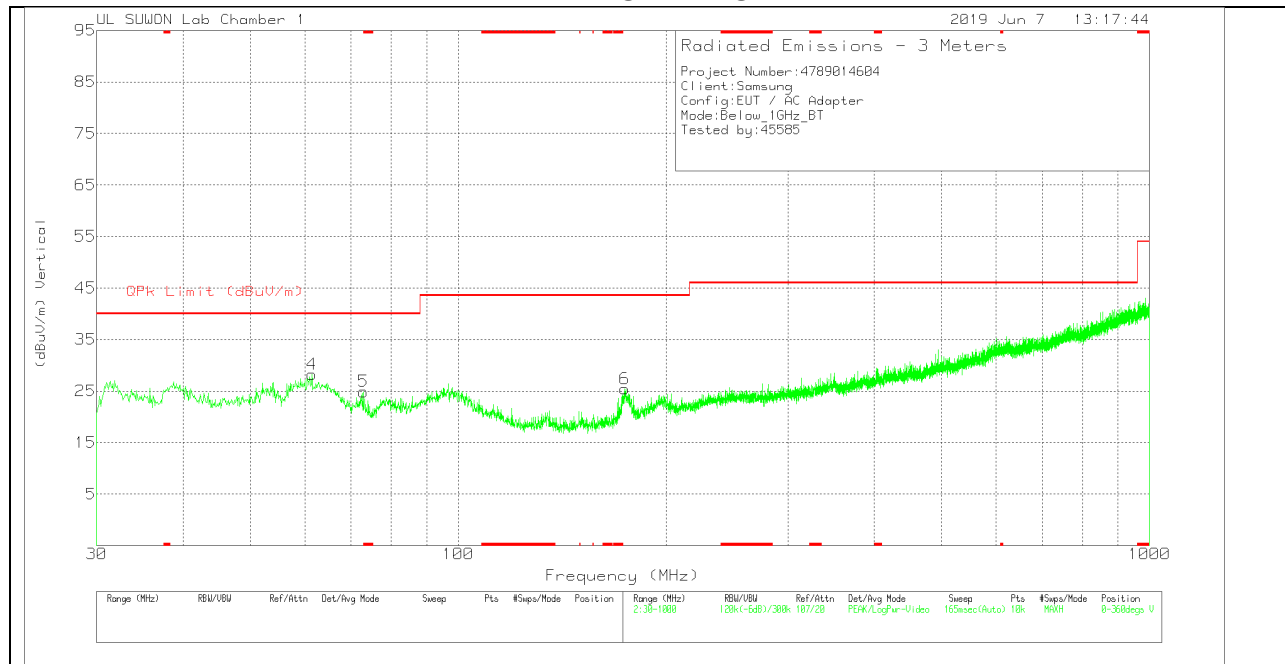
11.3. WORST-CASE BELOW 1 GHz

GFSK SPURIOUS EMISSIONS 30 TO 1000 MHz

HORIZONTAL PLOT



VERTICAL PLOT



BELOW 1 GHz TABLE

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	97.415	43.64	Pk	17.7	-29.7	31.64	43.52	-11.88	0-360	300	H
2	* 134.663	44.93	Pk	14.2	-29.2	29.93	43.52	-13.59	0-360	300	H
3	182.096	38.45	Pk	15.9	-28.7	25.65	43.52	-17.87	0-360	200	H
4	61.428	40.34	Pk	18.2	-30.3	28.24	40	-11.76	0-360	100	V
5	72.874	40.58	Pk	14.4	-30.1	24.88	40	-15.12	0-360	100	V
6	174.142	39.22	Pk	15	-28.8	25.42	43.52	-18.1	0-360	100	V

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

Pk - Peak detector

12. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

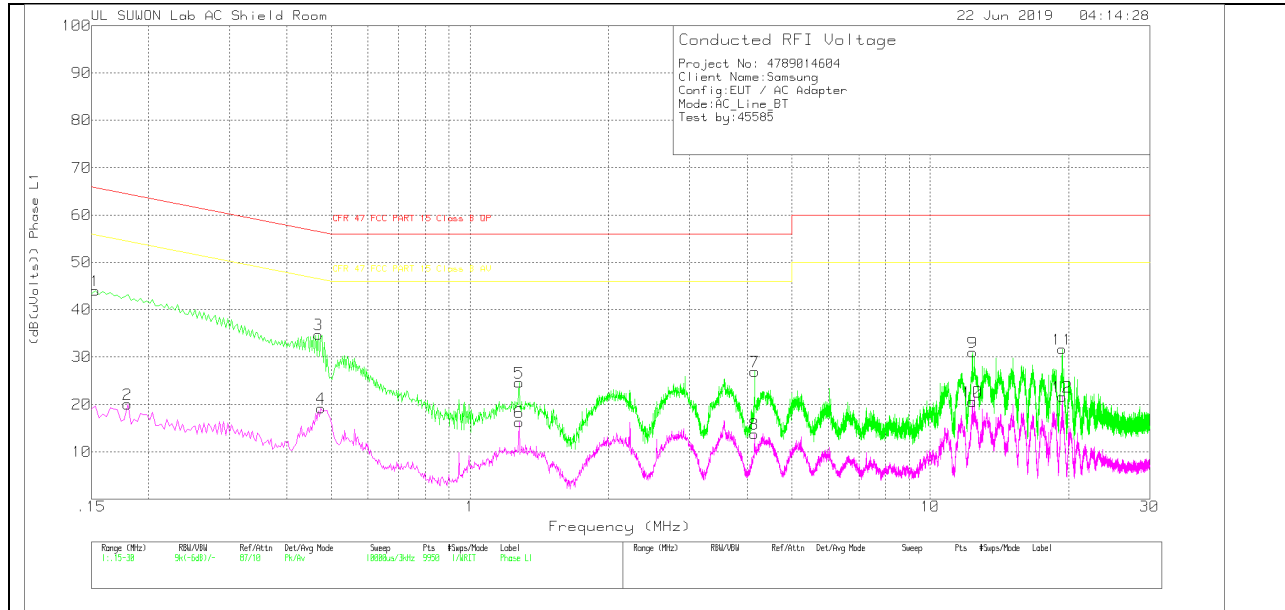
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

WORST EMISSIONS

LINE 1 PLOT



LINE 1 RESULTS

Trace Markers

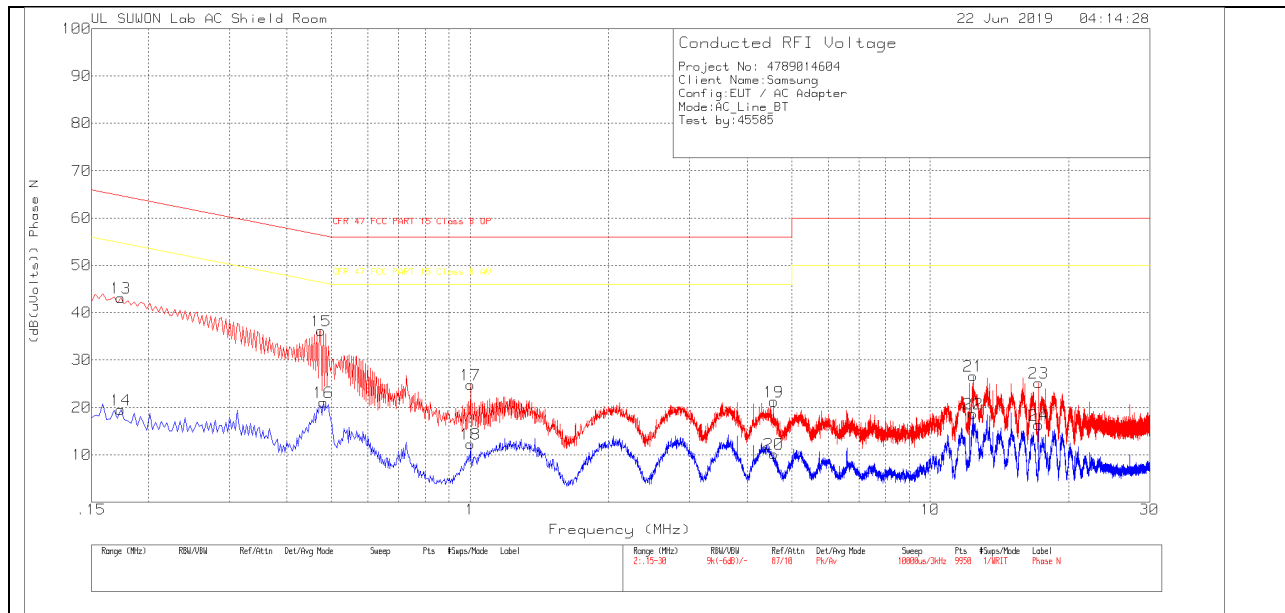
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex- cord_L1	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.153	34.11	Pk	9.8	.1	44.01	65.84	-21.83	-	-
2	.18	9.83	Av	10	.2	20.03	-	-	54.49	-34.46
3	.468	24.66	Pk	9.9	.2	34.76	56.55	-21.79	-	-
4	.474	9.09	Av	9.9	.2	19.19	-	-	46.44	-27.25
5	1.278	14.49	Pk	9.8	.3	24.59	56	-31.41	-	-
6	1.278	6.14	Av	9.8	.3	16.24	-	-	46	-29.76
7	4.155	16.82	Pk	9.8	.3	26.92	56	-29.08	-	-
8	4.152	3.61	Av	9.8	.3	13.71	-	-	46	-32.29
9	12.369	20.59	Pk	10.1	.3	30.99	60	-29.01	-	-
10	12.366	10.18	Av	10.1	.3	20.58	-	-	50	-29.42
11	19.377	20.86	Pk	10.4	.4	31.66	60	-28.34	-	-
12	19.377	10.8	Av	10.4	.4	21.6	-	-	50	-28.4

Pk - Peak detector

Av - Average detection

LINE 2 PLOT



LINE 2 RESULTS

Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ENV216_10183 6_With ex- cord_N	CABLELOSS(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.174	32.91	Pk	10	.2	43.11	64.77	-21.66	-	-
14	.174	9.32	Av	10	.2	19.52	-	-	54.77	-35.25
15	.474	26.28	Pk	9.7	.2	36.18	56.44	-20.26	-	-
16	.48	11.17	Av	9.7	.2	21.07	-	-	46.34	-25.27
17	1.002	14.67	Pk	9.8	.3	24.77	56	-31.23	-	-
18	1.002	2.18	Av	9.8	.3	12.28	-	-	46	-33.72
19	4.572	11.13	Pk	9.8	.3	21.23	56	-34.77	-	-
20	4.572	.04	Av	9.8	.3	10.14	-	-	46	-35.86
21	12.399	16.22	Pk	10.1	.3	26.62	60	-33.38	-	-
22	12.399	8.25	Av	10.1	.3	18.65	-	-	50	-31.35
23	17.214	14.35	Pk	10.4	.4	25.15	60	-34.85	-	-
24	17.214	5.5	Av	10.4	.4	16.3	-	-	50	-33.7

Pk - Peak detector

Av - Average detection