



CERTIFICATION TEST REPORT

Report Number. : 12371351-E2V2

Applicant : SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA
SHINAGAWA-KU, TOKYO, 140-0002, JAPAN

FCC ID : PY7-26828G

EUT Description : GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

July 26, 2018

Prepared by:

UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888



NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	7/6/2018	Initial Issue	
V2	7/26/2018	Updated Section 8.4 & 8.5.2	Kiya Kedida

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS.....	5
2. TEST METHODOLOGY	6
3. FACILITIES AND ACCREDITATION.....	6
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION	7
4.2. SAMPLE CALCULATION.....	7
4.3. MEASUREMENT UNCERTAINTY	7
5. EQUIPMENT UNDER TEST	8
5.1. EUT DESCRIPTION.....	8
5.2. MAXIMUM OUTPUT POWER.....	8
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	8
5.4. SOFTWARE AND FIRMWARE	8
5.5. WORST-CASE CONFIGURATION AND MODE.....	9
5.6. DESCRIPTION OF TEST SETUP.....	10
6. TEST AND MEASUREMENT EQUIPMENT	13
7. MEASUREMENT METHODS.....	15
8. ANTENNA PORT TEST RESULTS	16
8.1. ON TIME AND DUTY CYCLE	16
8.2. 20 dB AND 99% BANDWIDTH.....	18
8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	19
8.2.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	20
8.3. HOPPING FREQUENCY SEPARATION	21
8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	22
8.3.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	23
8.4. NUMBER OF HOPPING CHANNELS.....	24
8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	25
8.4.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	27
8.5. AVERAGE TIME OF OCCUPANCY.....	29
8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	30
8.5.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	32
8.6. OUTPUT POWER	34
8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	35
8.6.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	36

8.7.	AVERAGE POWER.....	37
8.7.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	38
8.7.2.	BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	39
8.8.	CONDUCTED SPURIOUS EMISSIONS.....	40
8.8.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	41
8.8.2.	BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	43
9.	RADIATED TEST RESULTS	45
9.1.	TRANSMITTER ABOVE 1 GHz	46
9.1.1.	BLUETOOTH BASIC DATA RATE GFSK MODULATION.....	46
9.1.2.	BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION	56
9.2.	Worst Case Below 30 MHz.....	66
9.3.	Worst Case Below 1 GHz.....	67
9.4.	Worst Case 18-26 GHz	69
10.	AC POWER LINE CONDUCTED EMISSIONS	71
10.1.1.	AC Power Line Norm	72
11.	SETUP PHOTOS	74

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA,
SHINAGAWA-KU, TOKYO, 140-0002, JAPAN

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

SERIAL NUMBER: BH93004ED4, BH93008XD4 (Conducted),
BH93008MD4, BH93008QD4 (Radiated)

DATE TESTED: June 21 – July 26, 2018

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

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Reviewed By:



Dan Corona
CONSUMER TECHNOLOGY DIVISION
Operations Leader
UL Verification Services Inc.



Kiya Kedida
CONSUMER TECHNOLOGY DIVISION
Project Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, and ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and at 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
☐ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☒ Chamber K (ISED: 2324A-1)
☒ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☒ Chamber L (ISED: 2324A-3)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	
	☐ Chamber G (ISED:22541-4)	
	☐ Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

ISED company address codes for chambers K through L are in process, and have yet to be determined.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	11.47	14.03
2402 - 2480	Enhanced 8PSK	9.04	8.02

Note: GFSK, DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to showing compliance.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a loop antenna for chain 0 with maximum gain of -1.5dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was s_atp_0_00436_A_12_16
The test utility software used during testing was Tera Term Ver 4.79

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

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

Worst-case data rates as provided by the client were:

GFSK mode: DH5

8PSK mode: 3-DH5

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	20B7S0A200	PC015REW	N/A
Desktop	Lenovo	ThinkCentre	MJ00QA59	N/A
AC Adapter	SONY	UCH20	3416W45305784	N/A
DC Power Supply	Ametek	XT 15-4	T463	N/A

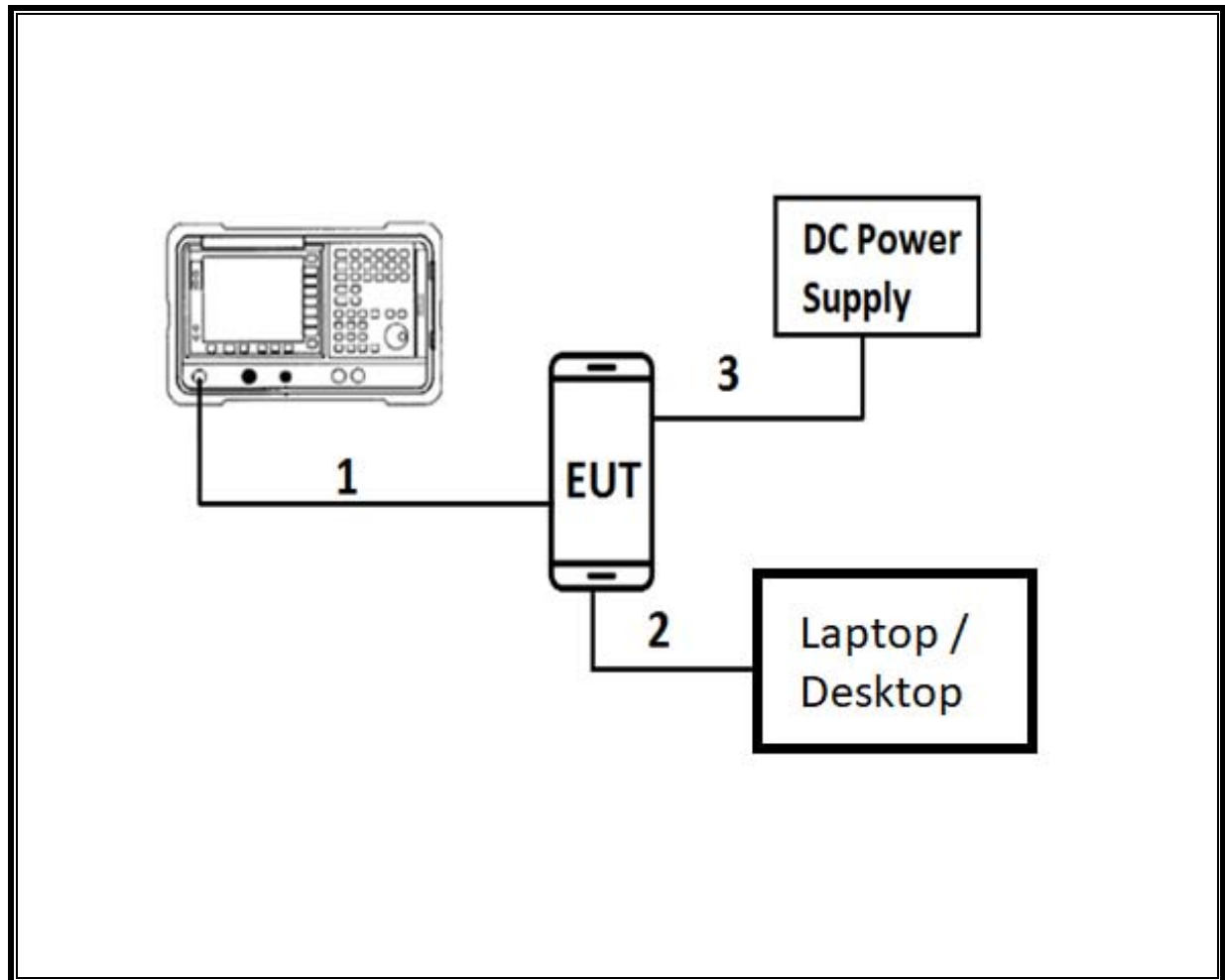
I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	RF	Shielded	0.2	To spectrum Analyzer
2	USB	1	USB Type C	Shielded	1	N/A
3	DC	1	DC	Shielded	0.3	N/A

I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB Type C	Shielded	3	N/A

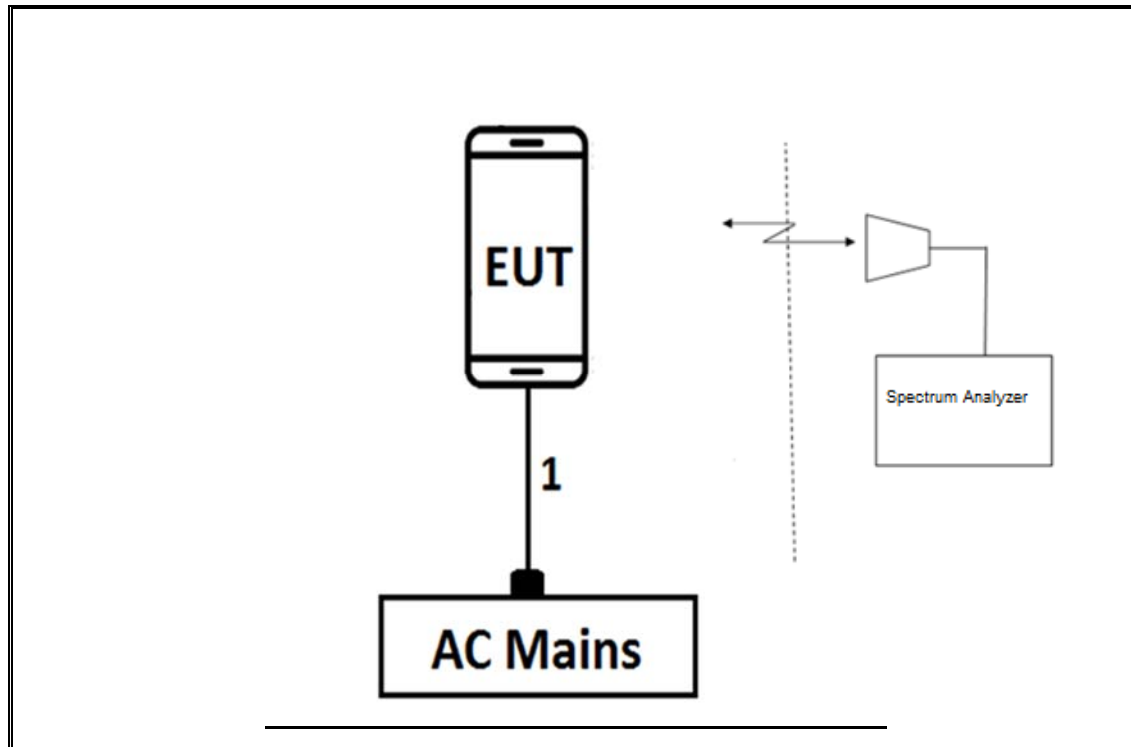
CONDCUTED TEST SETUP DIAGRAM



TEST SETUP

For conducted tests: the EUT was connected to a host laptop via an USB cable for parameter setting purpose such as channel, output power...etc. The test software exercises the radio.

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



TEST SETUP

For radiated tests: All support equipment were removed after the EUT programmed. The test software exercises the radio.

6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	ID Num	Cal Due
Amplifier	Hewlett Packard	8447D	T64	06/25/2019
Amplifier, 9KHz to 1GHz, 32dB	Sonoma Instrument	310	PRE0180089	06/21/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/10/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad	Sunol Sciences Corp.	JB3	T477	07/07/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	04/30/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T4294	04/30/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	05/24/2019
Amplifier, 1 to 18GHz, 35dB	AMPLICAL	AMP1G18-35	T1569	06/03/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T1568	06/21/2019
Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	T493	04/03/2019
Amplifier, 1 to 7.0GHz, 20.0dB Gain minimum, 6dB NF	AMPLICAL	AMP1G7-20-27	T1563	06/03/2019
Amplifier 1-8GHz 30dB gain	L3 Narda	AMF-4D-01000800-30-29P	167495	06/22/2019
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179522	05/11/2019
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	04/25/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T146	07/18/2018
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1271	07/17/2018
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1225	04/10/2019
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T1013	06/21/2019
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T894	06/03/2019
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/10/2018
18 - 26.5 GHz Horn Antenna	Seavey Division	MWH-1826/B	T89	01/18/2019
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	03/09/2019
EMI Reciever	Rohde & Schwarz	ESR	T1436	02/21/2019
L.I.S.N.	FCC INC.	FCC LISN 50/250	T1310	06/15/2019
L.I.S.N.	FCC INC.	FCC LISN 50/250	T24	03/06/2019
Thermometer - Digital	Control Company	14-650-118	PRE0177862	02/22/2019

UL AUTOMATION SOFTWARE			
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018
Antenna Port Software	UL	UL EMC	Ver 8.4, June 12, 2018

7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

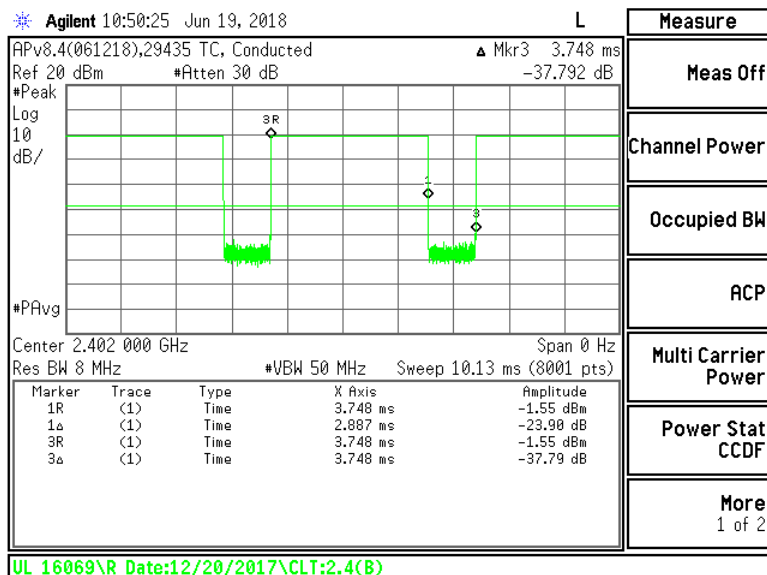
PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

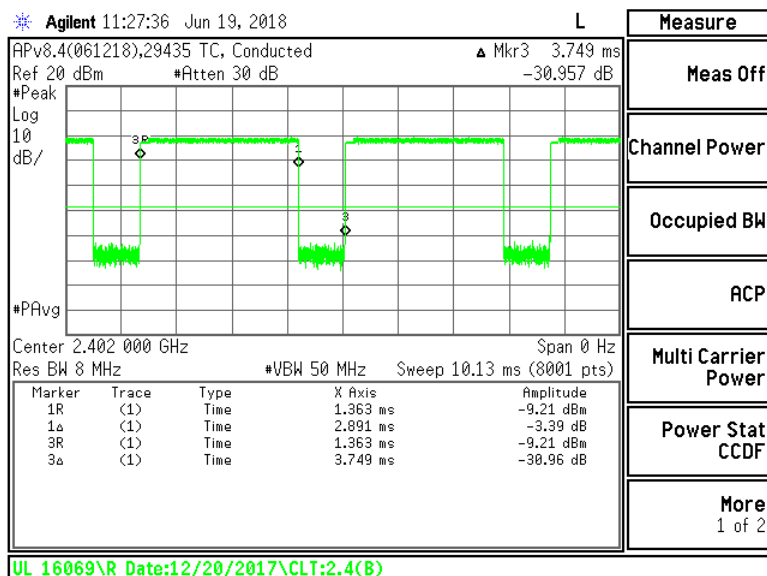
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
Bluetooth GFSK	2.887	3.748	0.770	77.0%	1.13	0.346
Bluetooth 8PSK	2.891	3.749	0.771	77.1%	1.13	0.346

DUTY CYCLE PLOTS



GFSK



8PSK

8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

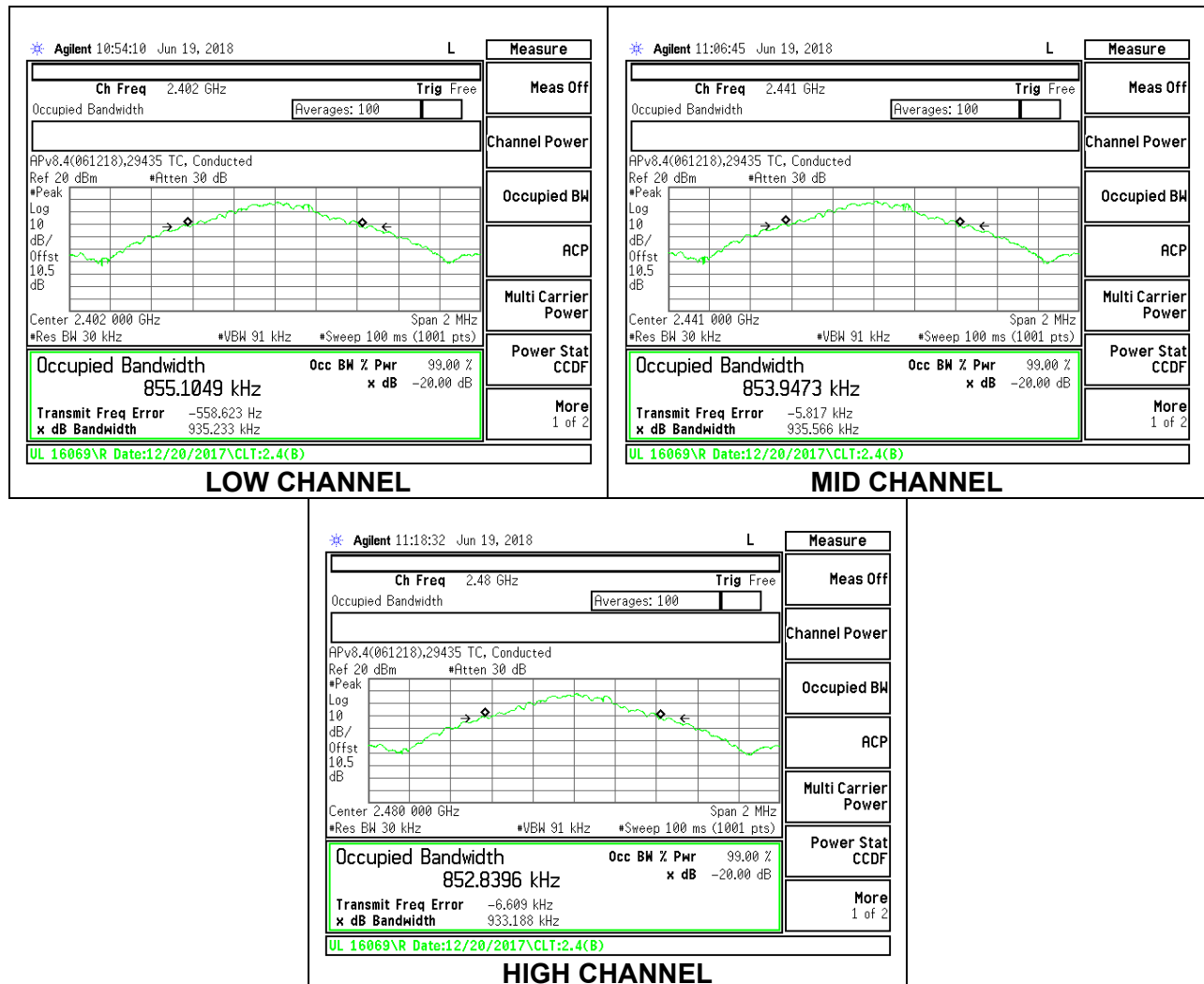
TEST PROCEDURE

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

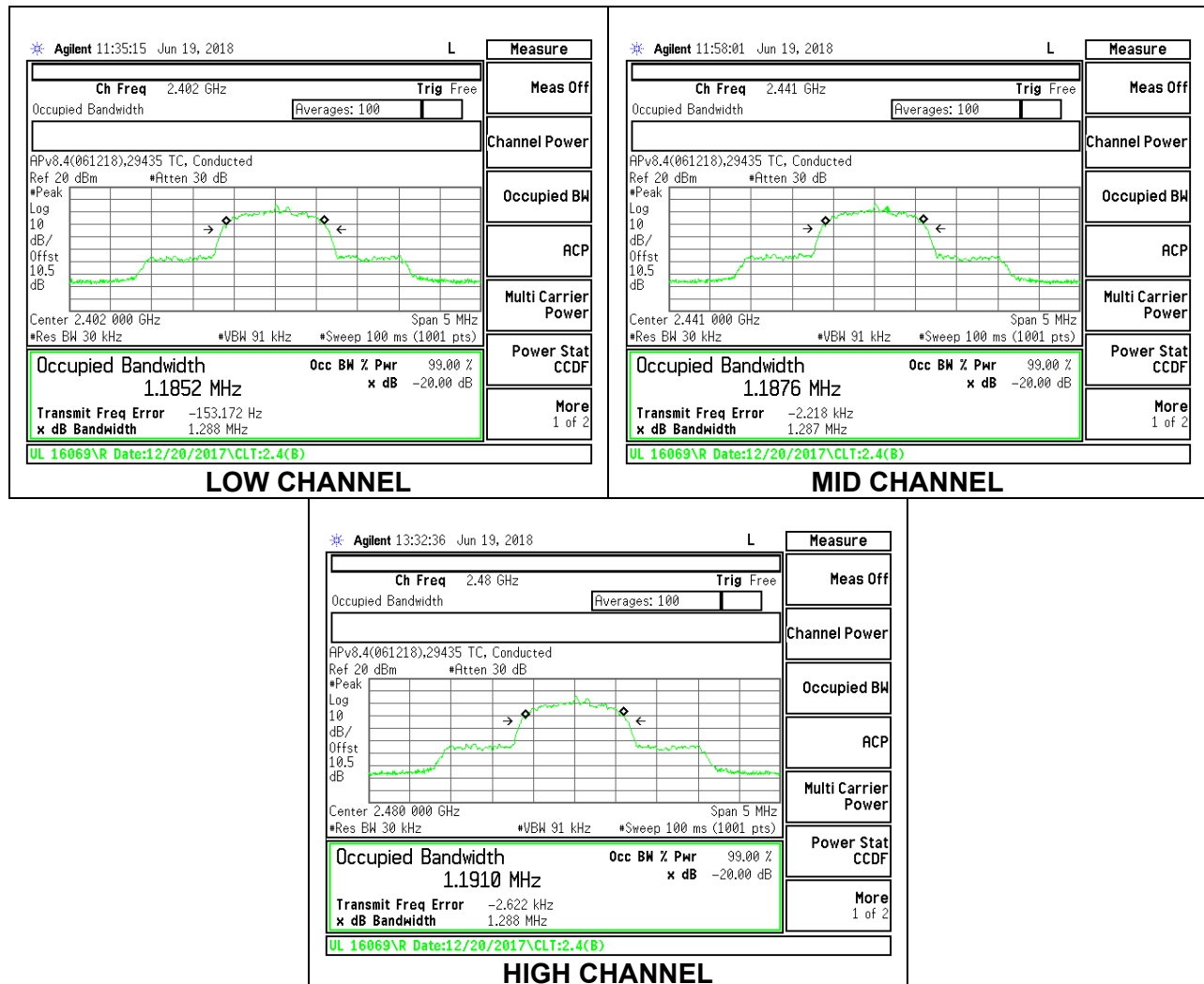
8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.935	0.855
Mid	2441	0.936	0.854
High	2480	0.933	0.853



8.2.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.288	1.185
Mid	2441	1.287	1.188
High	2480	1.288	1.191



8.3. HOPPING FREQUENCY SEPARATION

LIMITS

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.

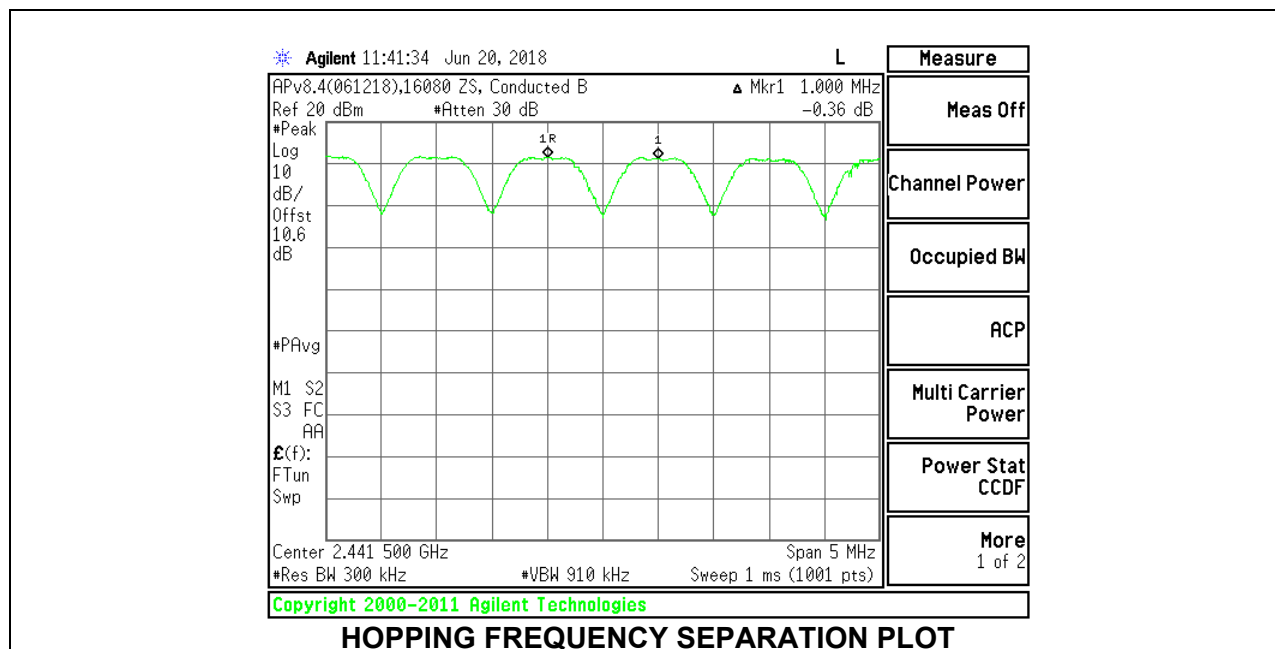
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

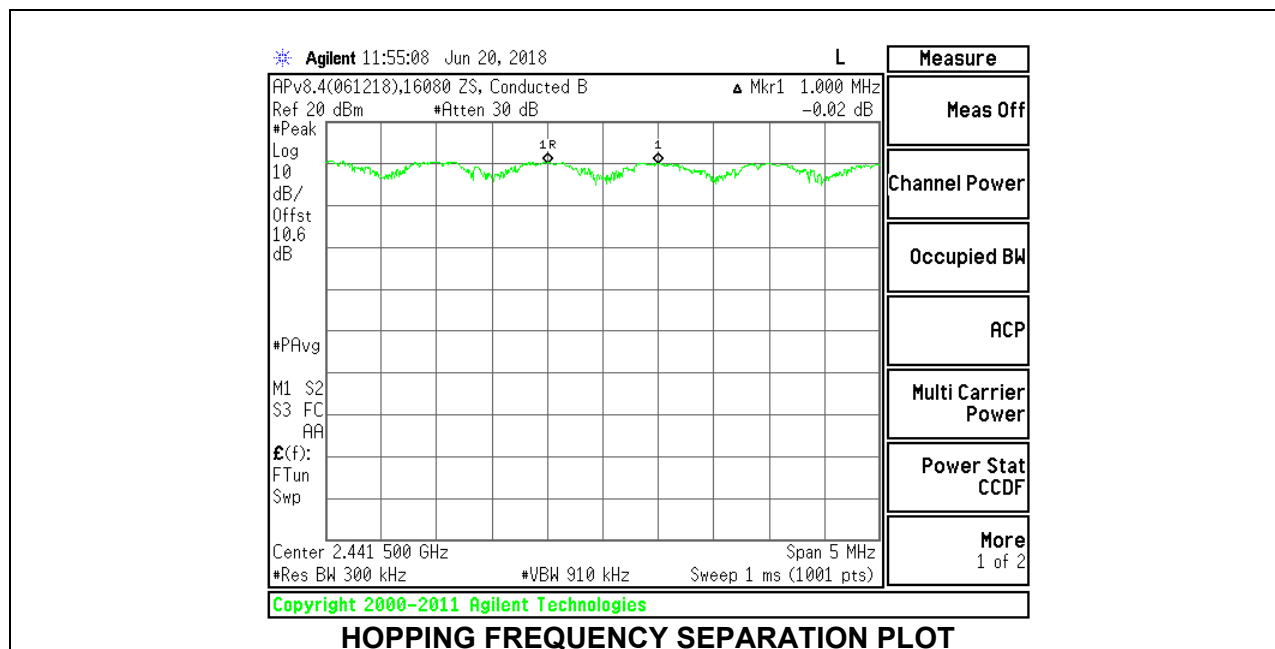
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS

8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



8.3.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION



8.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

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

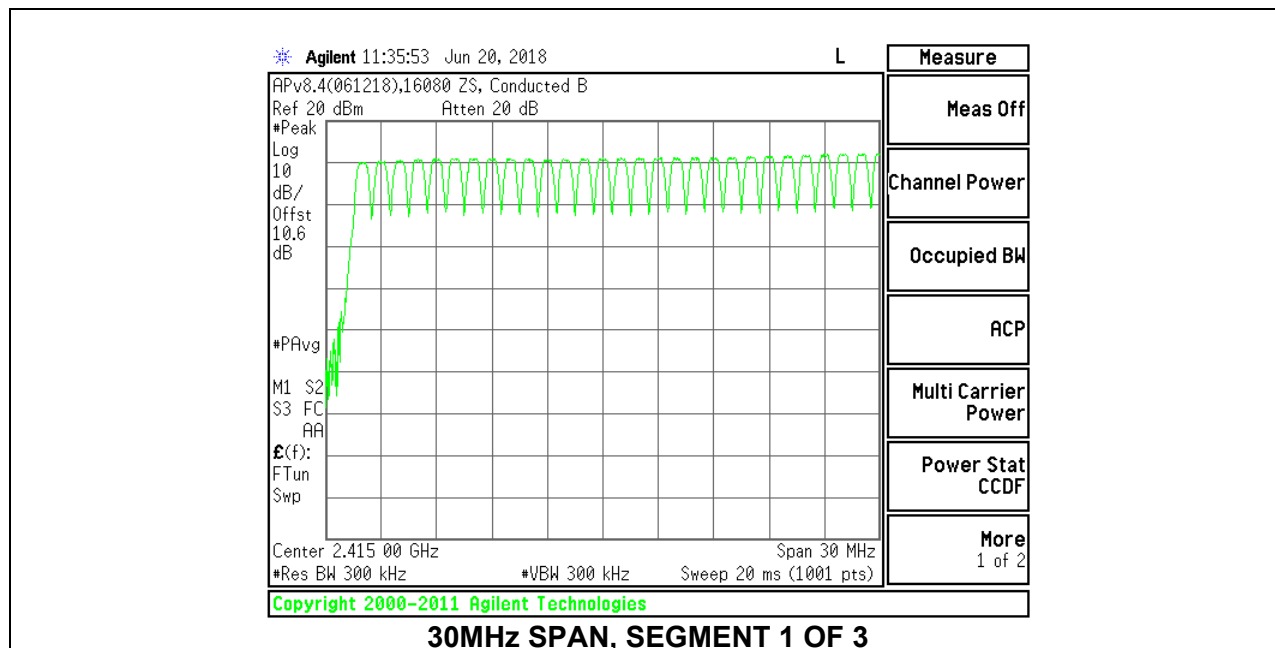
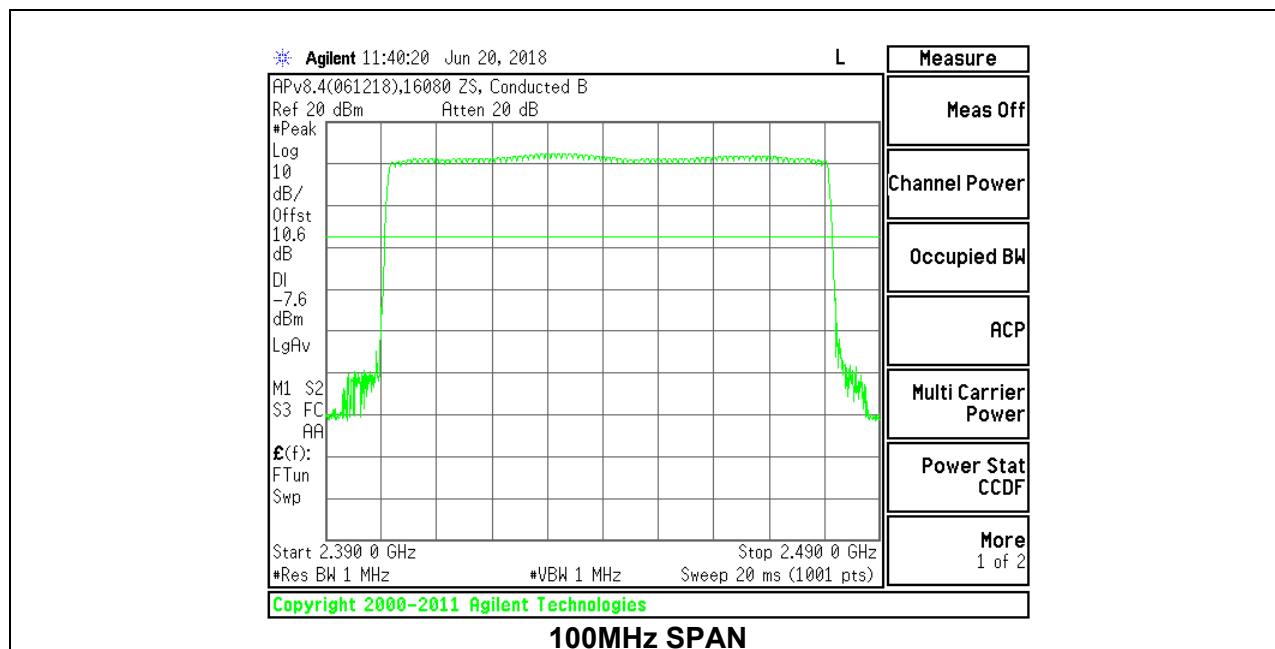
TEST PROCEDURE

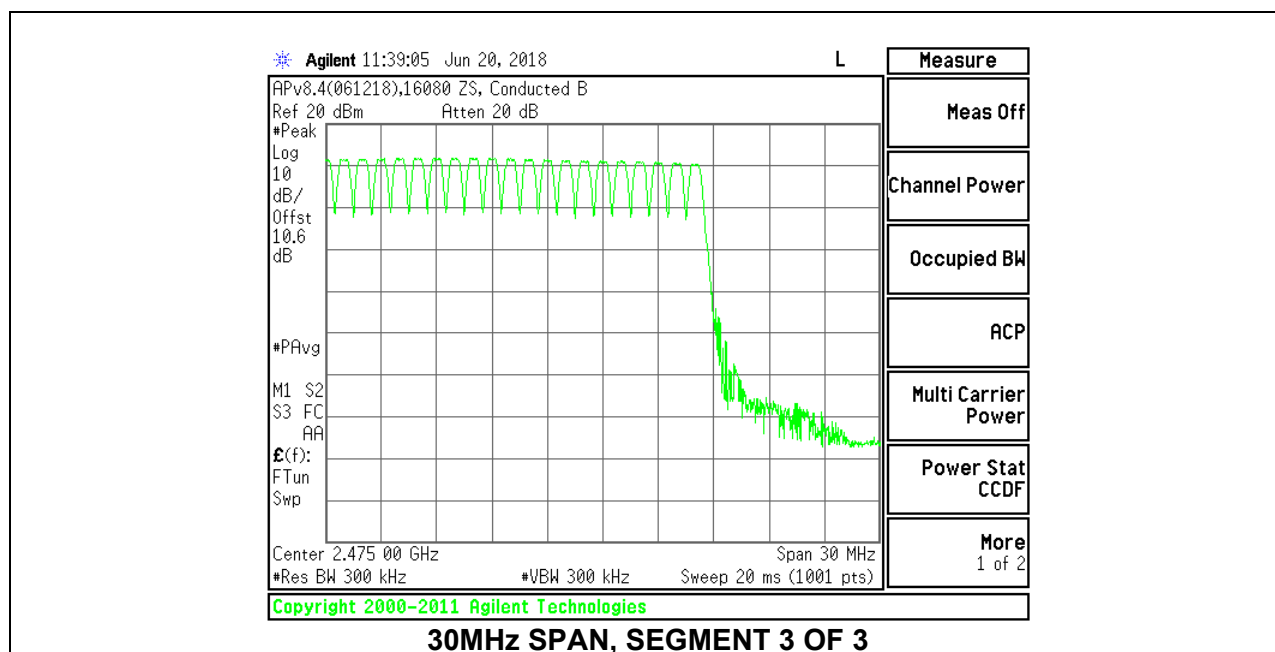
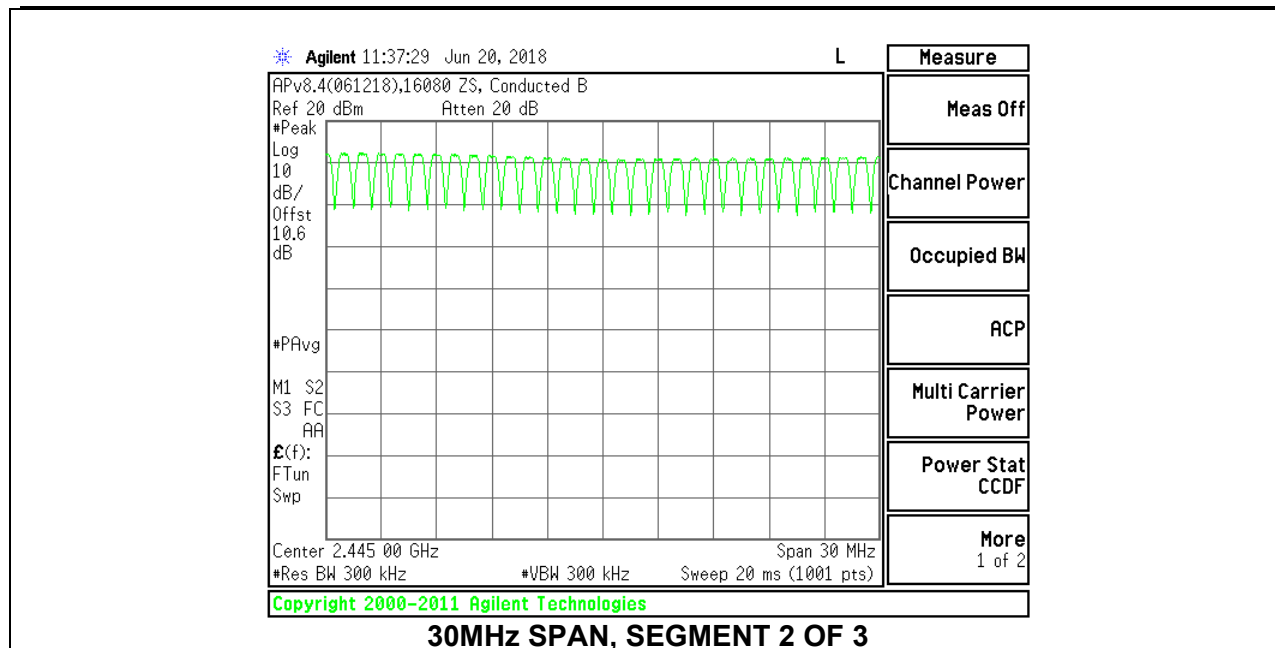
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

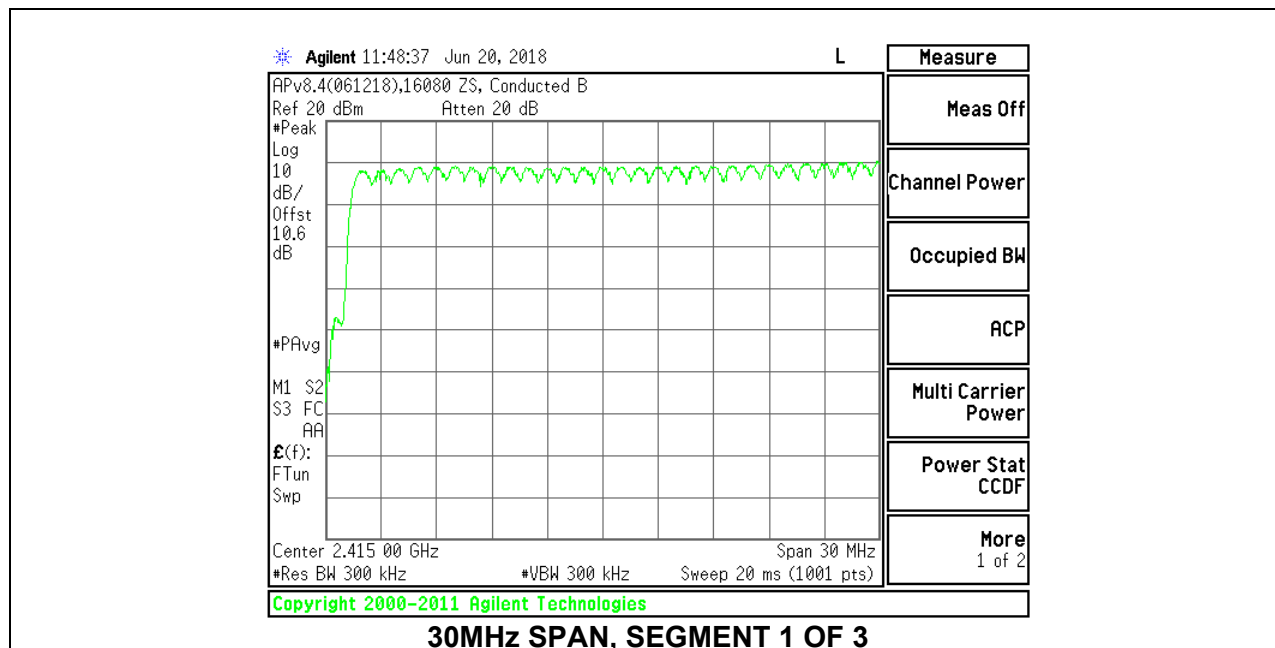
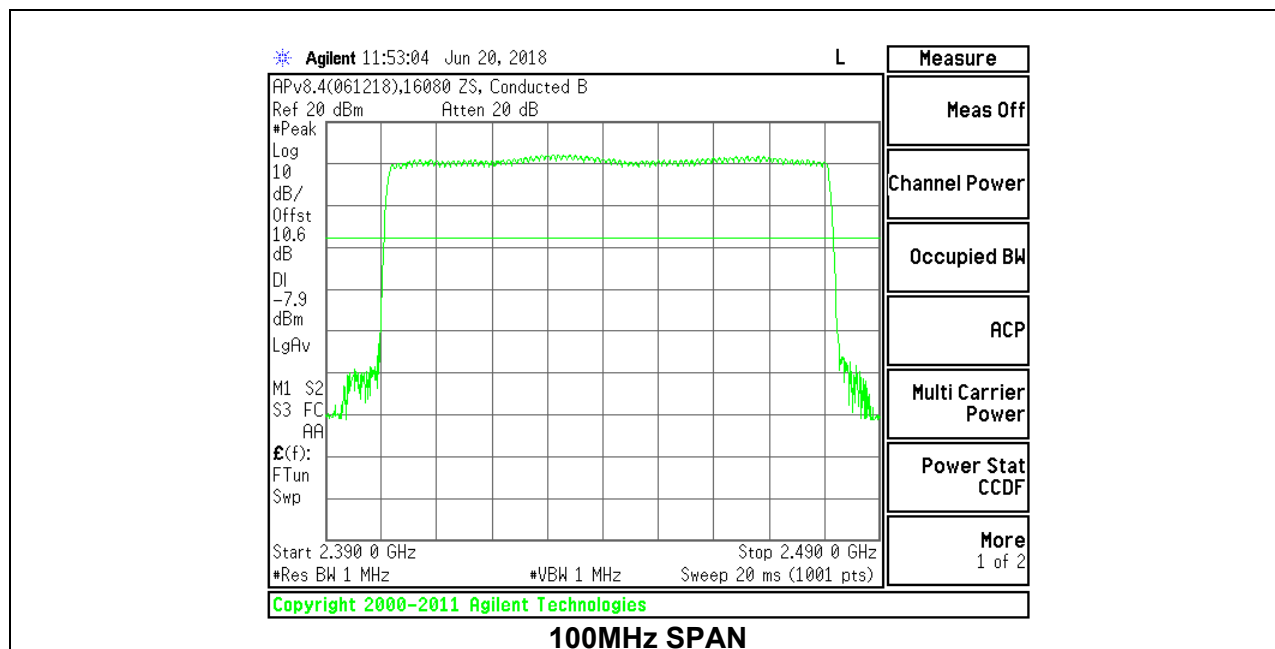
Normal Mode: 79 Channels Observed

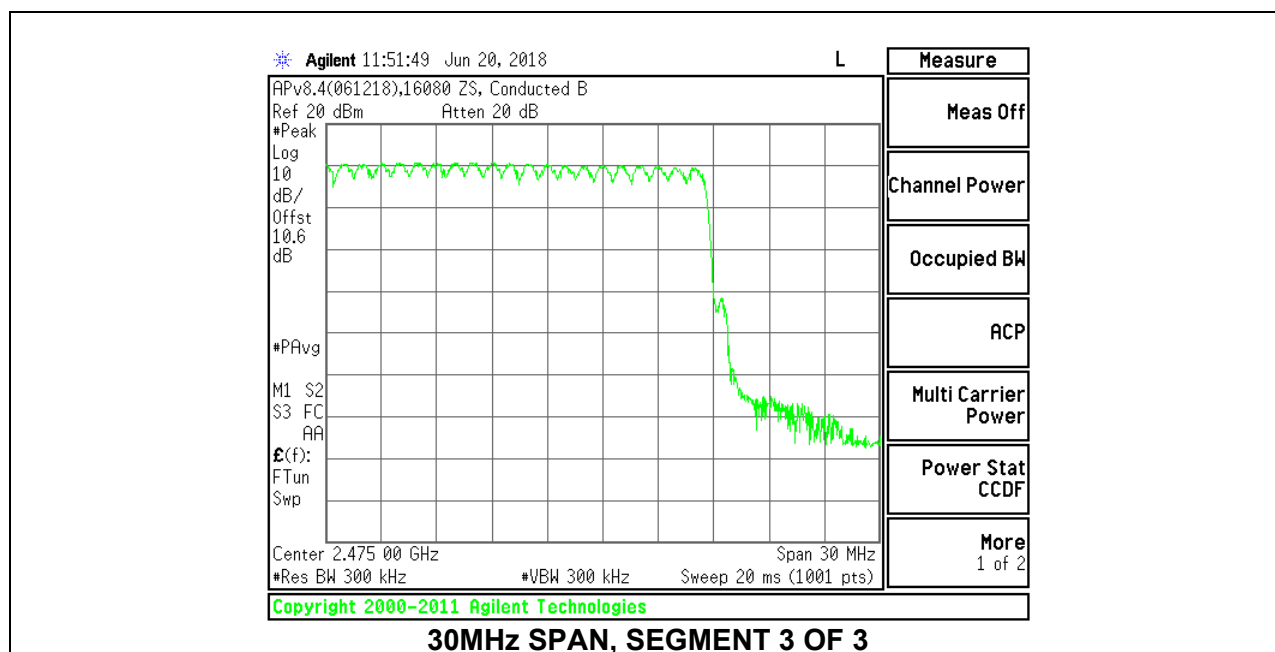
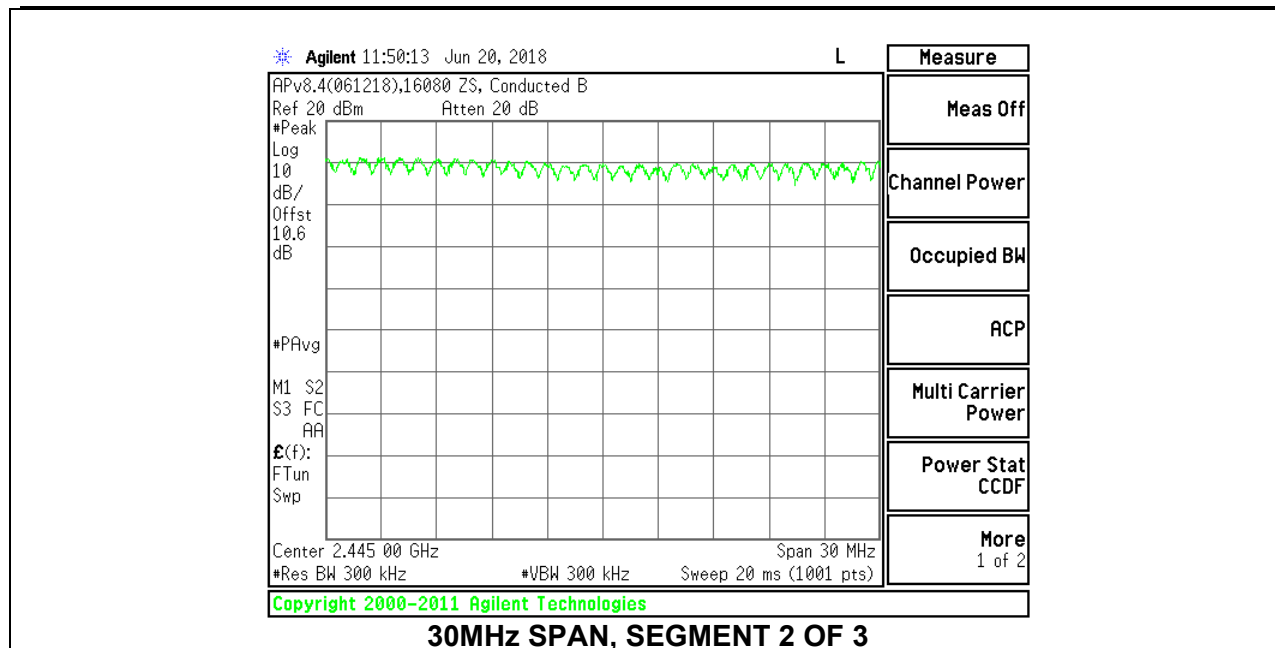
8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION





8.4.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION





8.5. AVERAGE TIME OF OCCUPANCY

LIMITS

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.

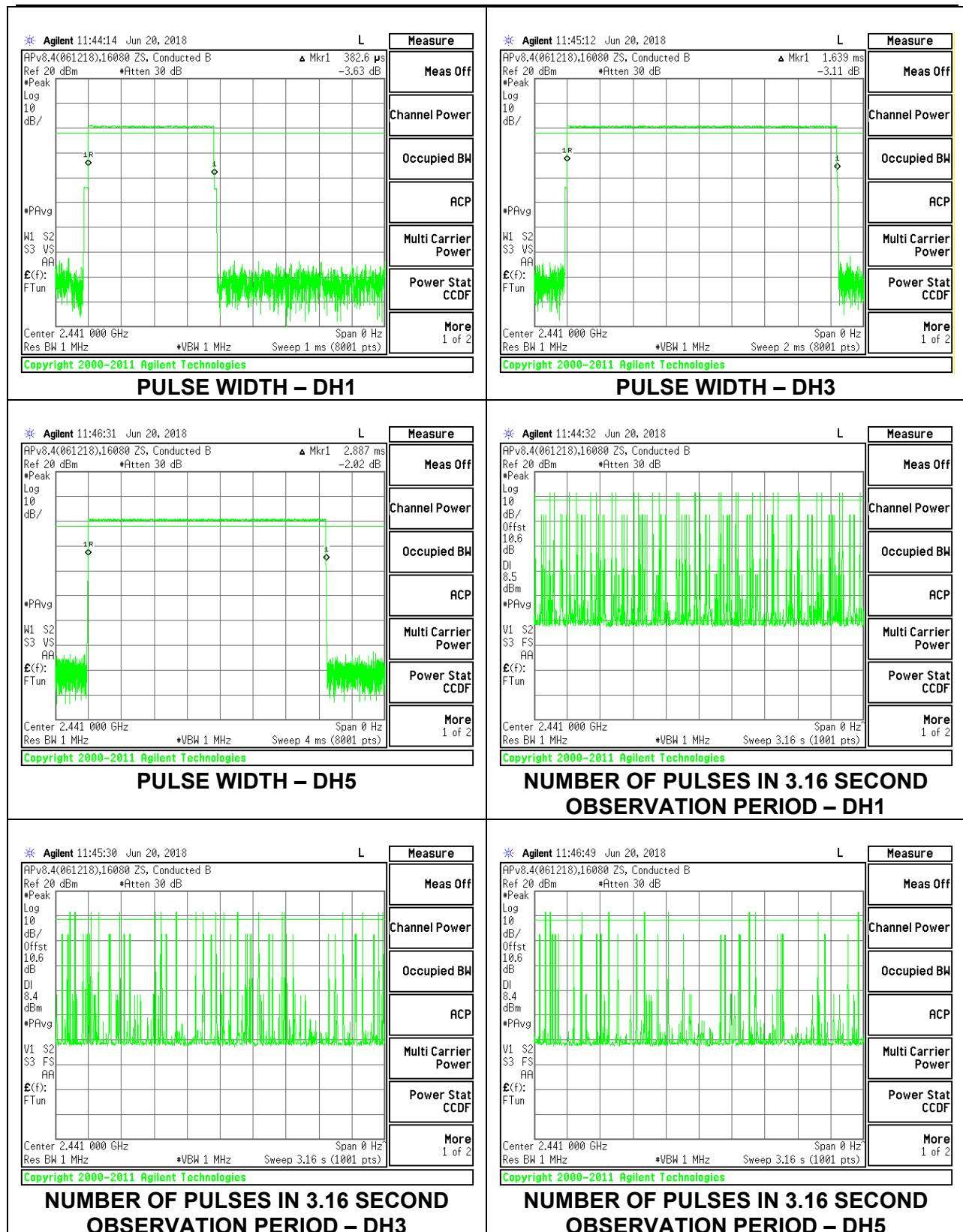
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

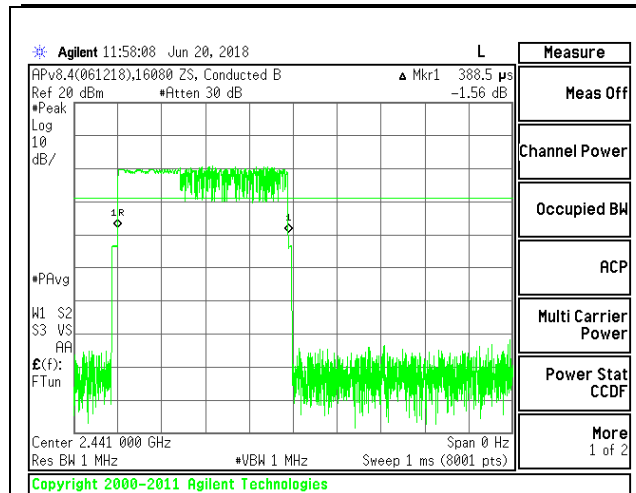
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.383	31	0.1186	0.4	-0.2814
DH3	1.639	19	0.3114	0.4	-0.0886
DH5	2.887	10	0.2887	0.4	-0.1113
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.383	7.75	0.0297	0.4	-0.3703
DH3	1.639	4.75	0.0779	0.4	-0.3221
DH5	2.887	2.5	0.0722	0.4	-0.3278



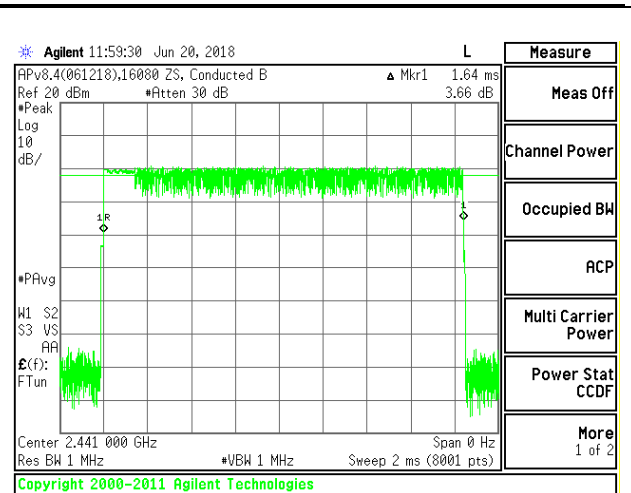
8.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
DH1	0.389	31	0.1204	0.4	-0.2796
DH3	1.640	20	0.3280	0.4	-0.0720
DH5	2.890	11	0.3179	0.4	-0.0821

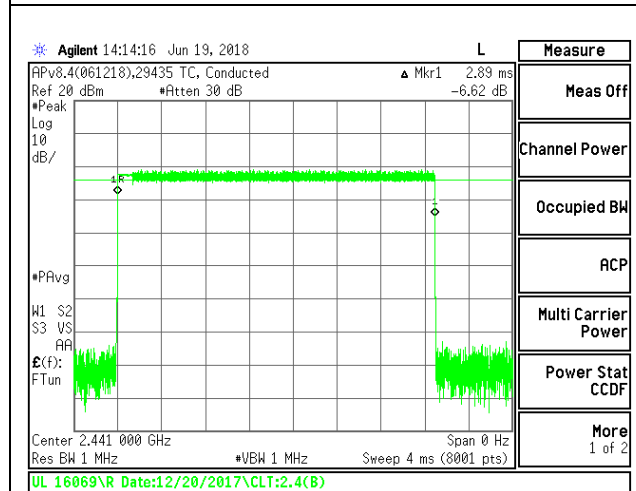
Note: for AFH (8PSK) mode, please refer to the results of AFH (GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate in section 4.5.1 demonstrates compliance with channel occupancy when AFH is employed.



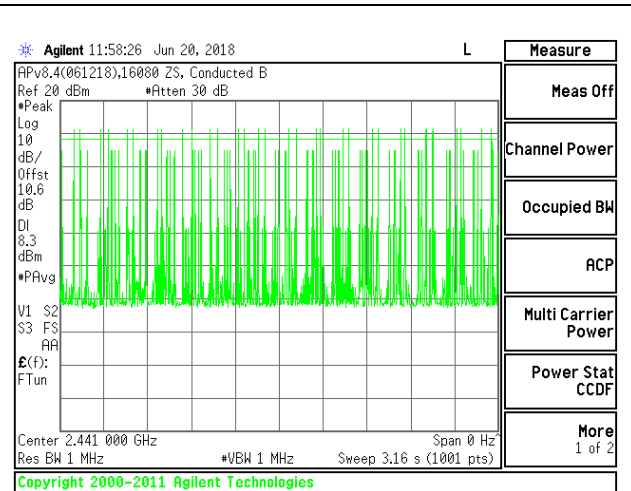
PULSE WIDTH – DH1



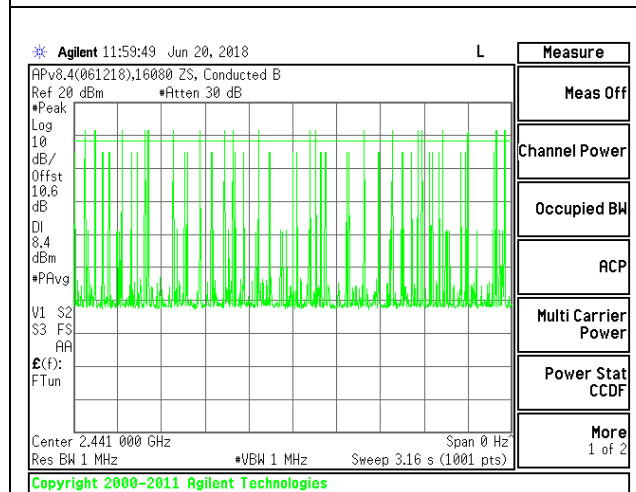
PULSE WIDTH – DH3



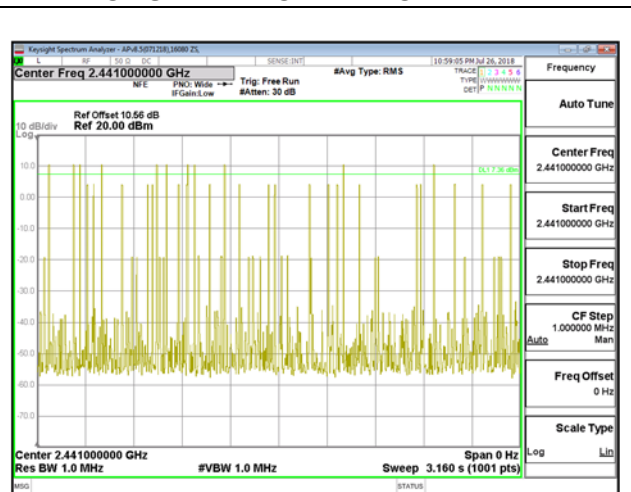
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

8.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter. The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	39005 RA
Date:	6/18/2018

Channel	Frequency (MHz)	Output Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.01	30	-19.99
Middle	2441	11.47	30	-18.53
High	2480	10.38	30	-19.62

8.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	39005 RA
Date:	6/18/2018

Channel	Frequency (MHz)	Output Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.49	21	-13.51
Middle	2441	9.04	21	-11.96
High	2480	8.01	21	-12.99

8.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

The transmitter output is connected to a power meter. The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated Average reading of power.

RESULTS

8.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	39005 RA
Date	6/18/2018

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.86
Middle	2441	11.31
High	2480	10.2

8.7.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

Tested By:	39005 RA
Date	6/18/2018

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	7.33
Middle	2441	8.88
High	2480	7.85

8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

Limit = -20 dBc

TEST PROCEDURE

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

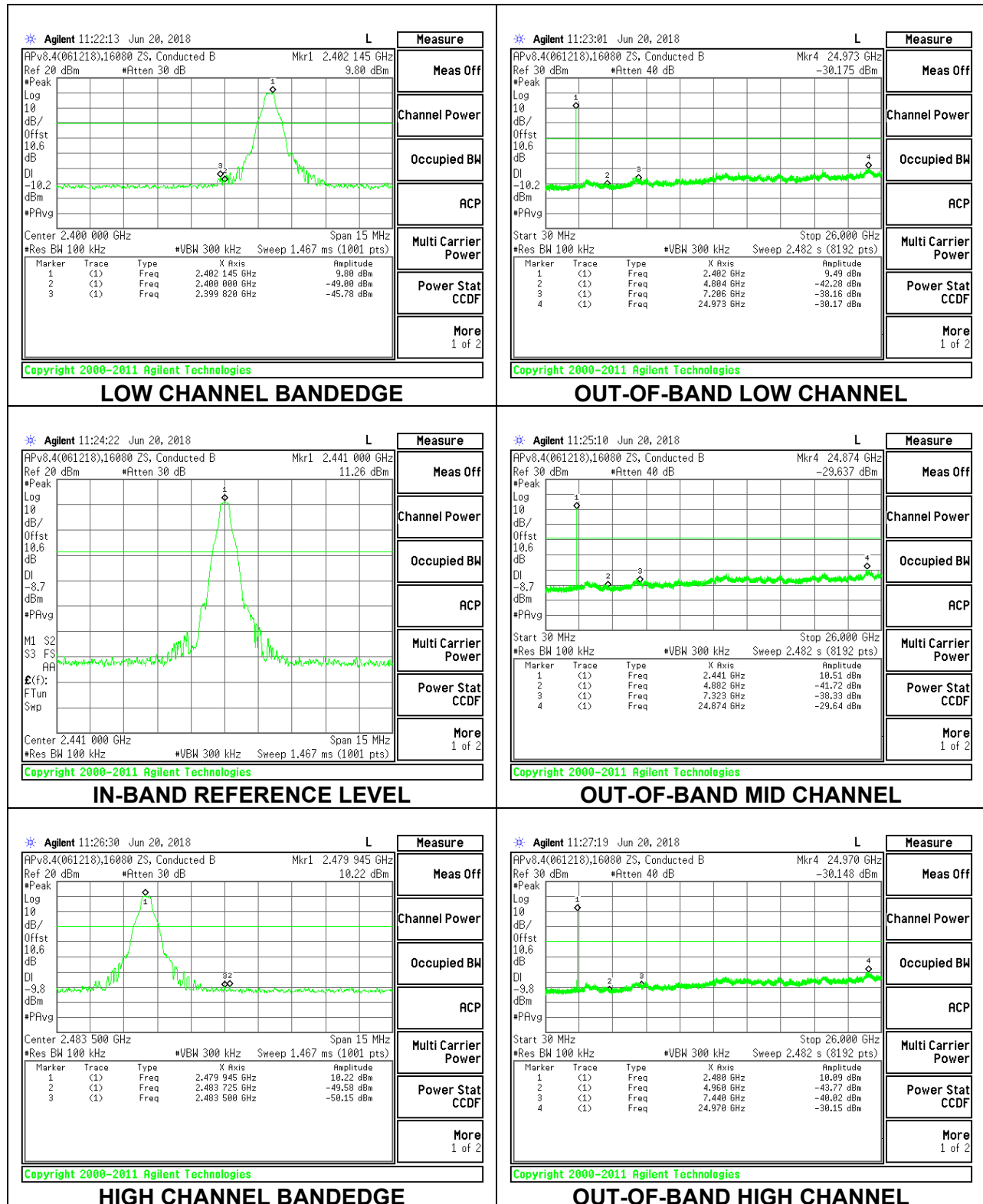
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

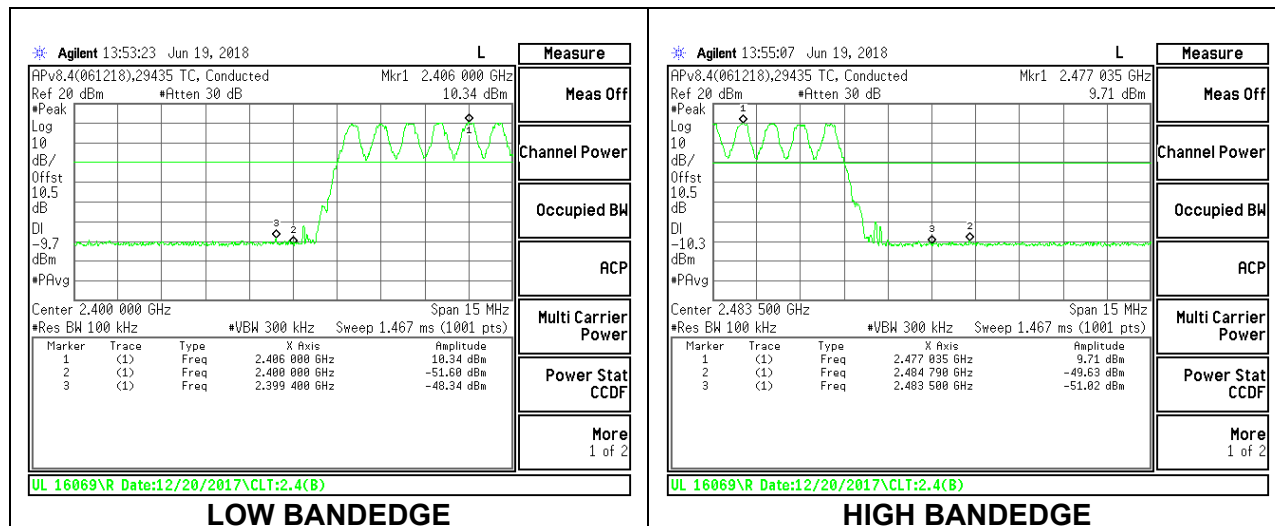
RESULTS

8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

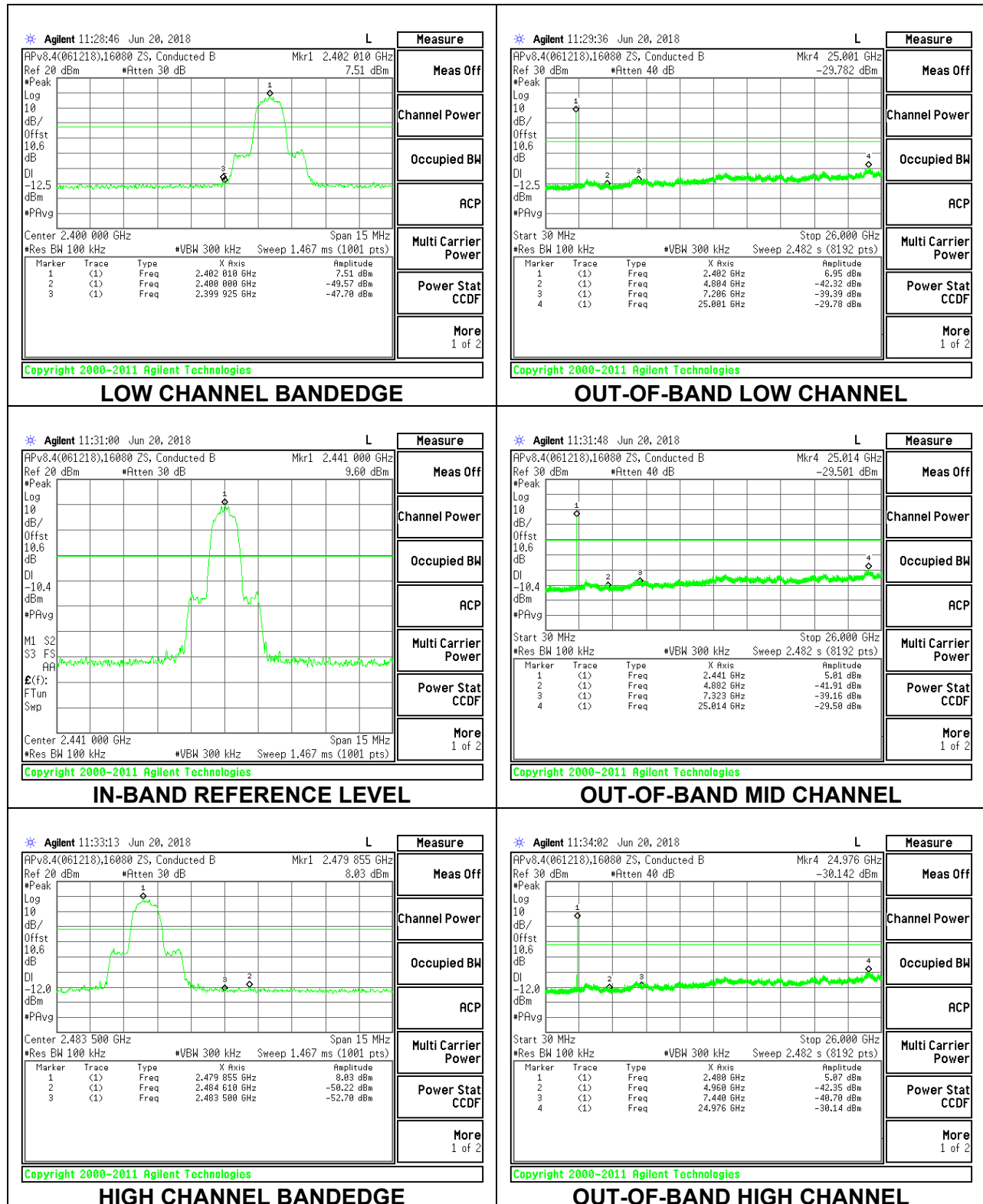


Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

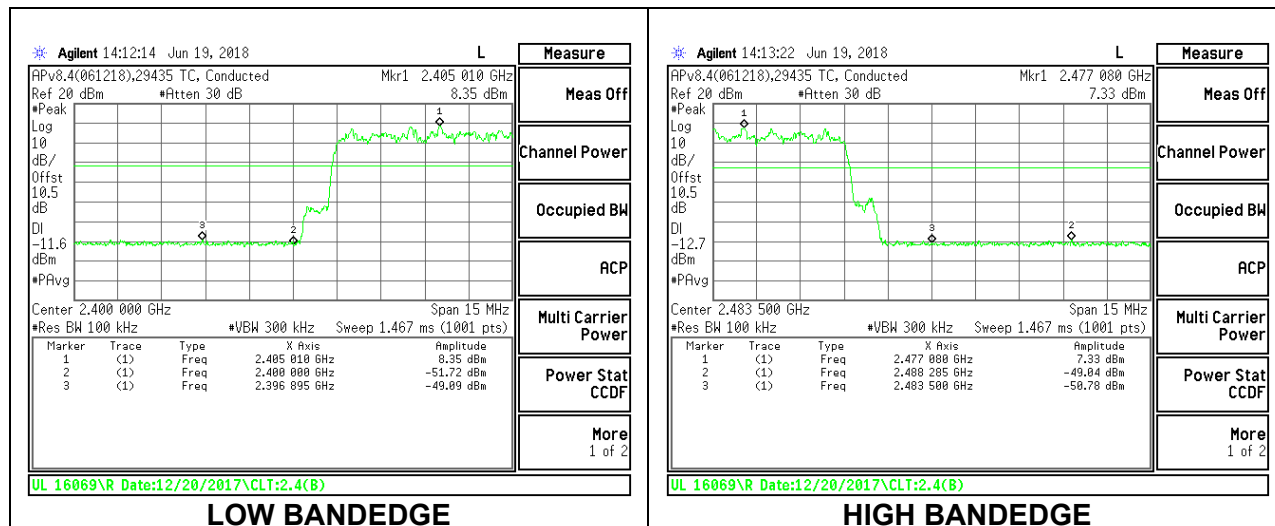


8.8.2. BLUETOOTH ENCHANCED DATA RATE 8PSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



9. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. 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 pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For 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 MHz resolution bandwidth with 1/T (360 Hz) video bandwidth with peak detector for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

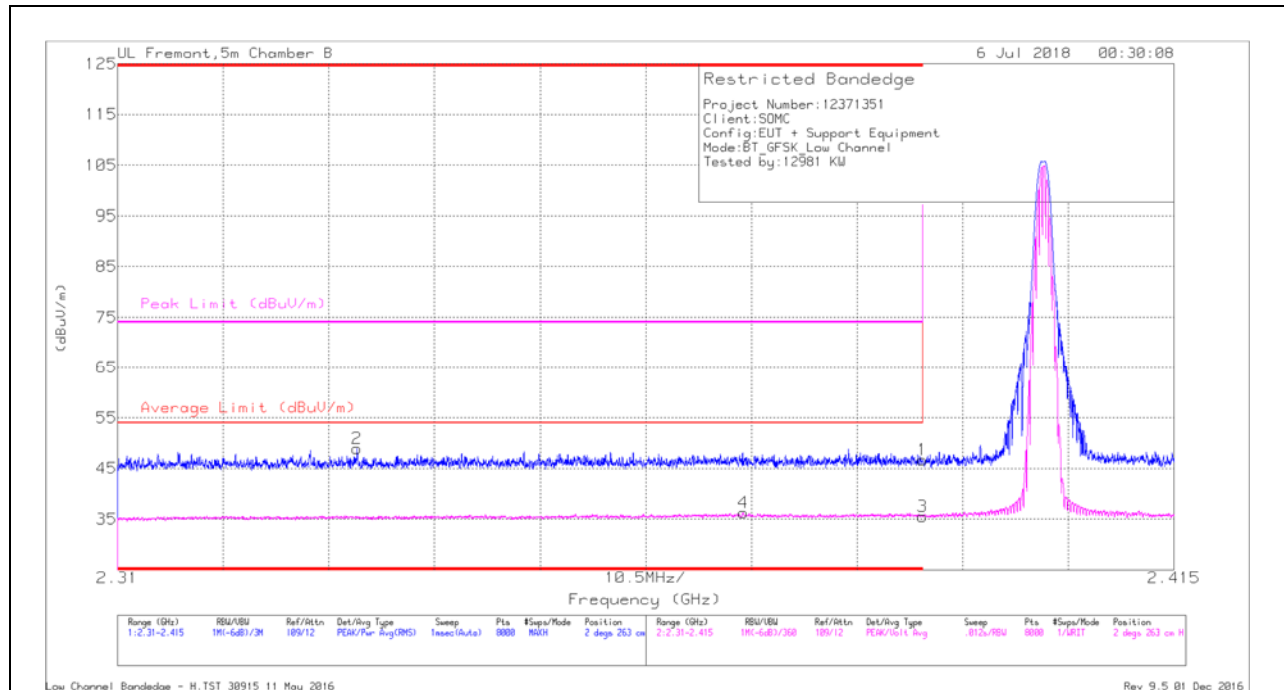
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (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	35.91	Pk	32.3	-21.5	46.71	-	-	74	-27.29	2	263	H
2	* 2.334	38.43	Pk	32.1	-21.6	48.93	-	-	74	-25.07	2	263	H
3	* 2.39	24.76	VA1T	32.3	-21.5	35.56	54	-18.44	-	-	2	263	H
4	* 2.372	25.34	VA1T	32.3	-21.4	36.24	54	-17.76	-	-	2	263	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.363	38.47	Pk	32.2	-21.5	49.17	-	-	74	-24.83	27	387	V
4	* 2.385	25.14	VA1T	32.3	-21.4	36.04	54	-17.96	-	-	27	387	V
1	* 2.39	35.69	Pk	32.3	-21.5	46.49	-	-	74	-27.51	27	387	V
3	* 2.39	24.65	VA1T	32.3	-21.5	35.45	54	-18.55	-	-	27	387	V

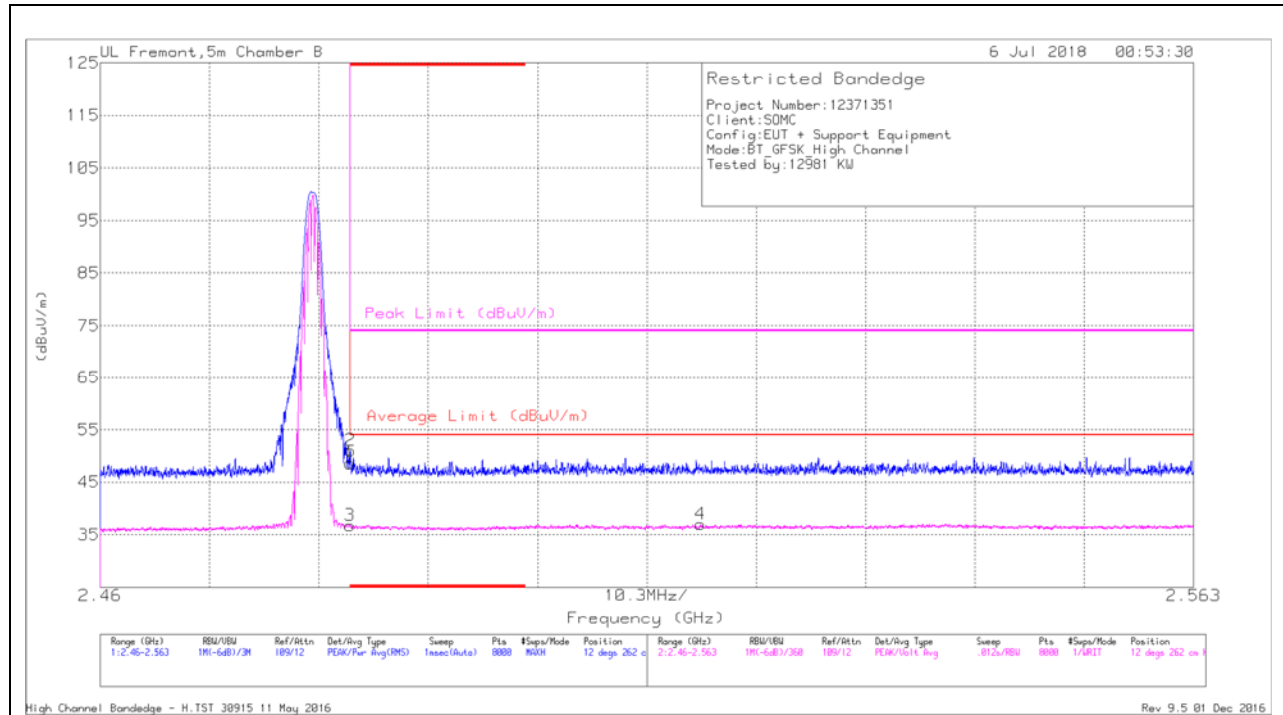
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

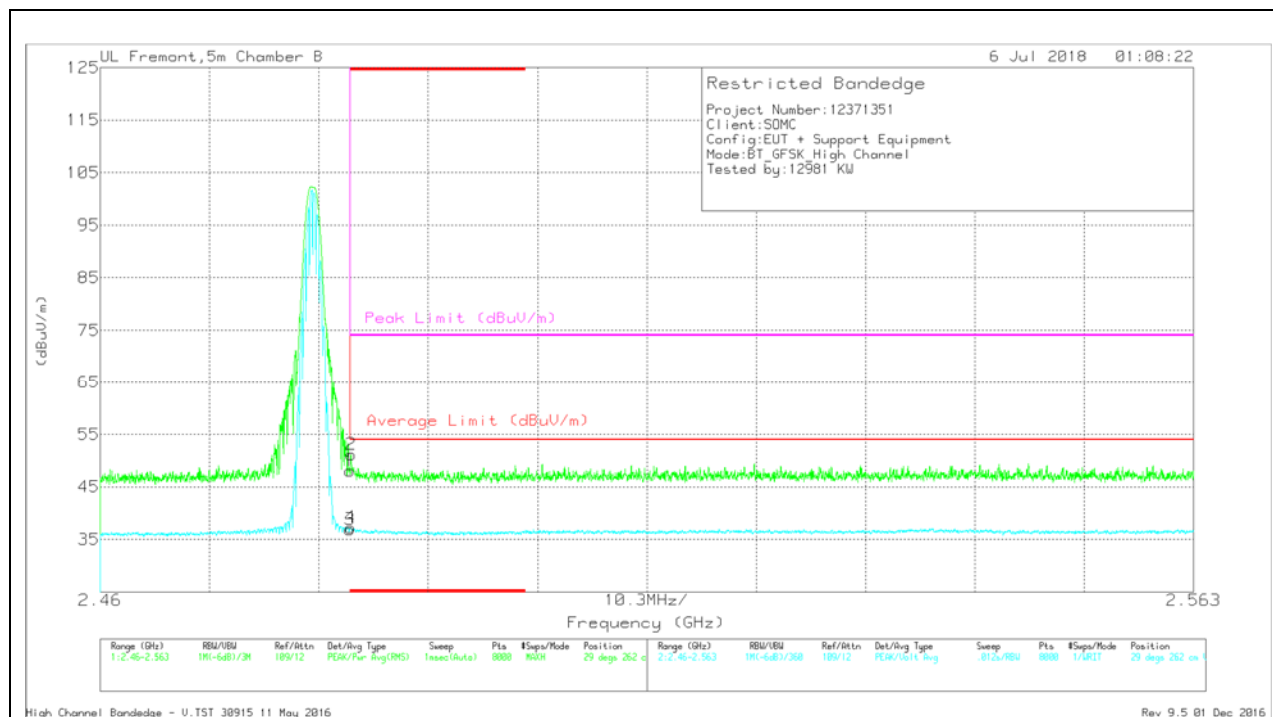
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.52	Pk	32.6	-21.5	48.62	-	-	74	-25.38	12	262	H
2	* 2.484	39.99	Pk	32.6	-21.5	51.09	-	-	74	-22.91	12	262	H
3	* 2.484	25.67	VA1T	32.6	-21.5	36.77	54	-17.23	-	-	12	262	H
4	2.517	25.66	VA1T	32.7	-21.3	37.06	54	-16.94	-	-	12	262	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	36.99	Pk	32.6	-21.5	48.09	-	-	74	-25.91	29	262	V
2	* 2.484	40.1	Pk	32.6	-21.5	51.2	-	-	74	-22.8	29	262	V
3	* 2.484	25.76	VA1T	32.6	-21.5	36.86	54	-17.14	-	-	29	262	V
4	* 2.484	26.17	VA1T	32.6	-21.5	37.27	54	-16.73	-	-	29	262	V

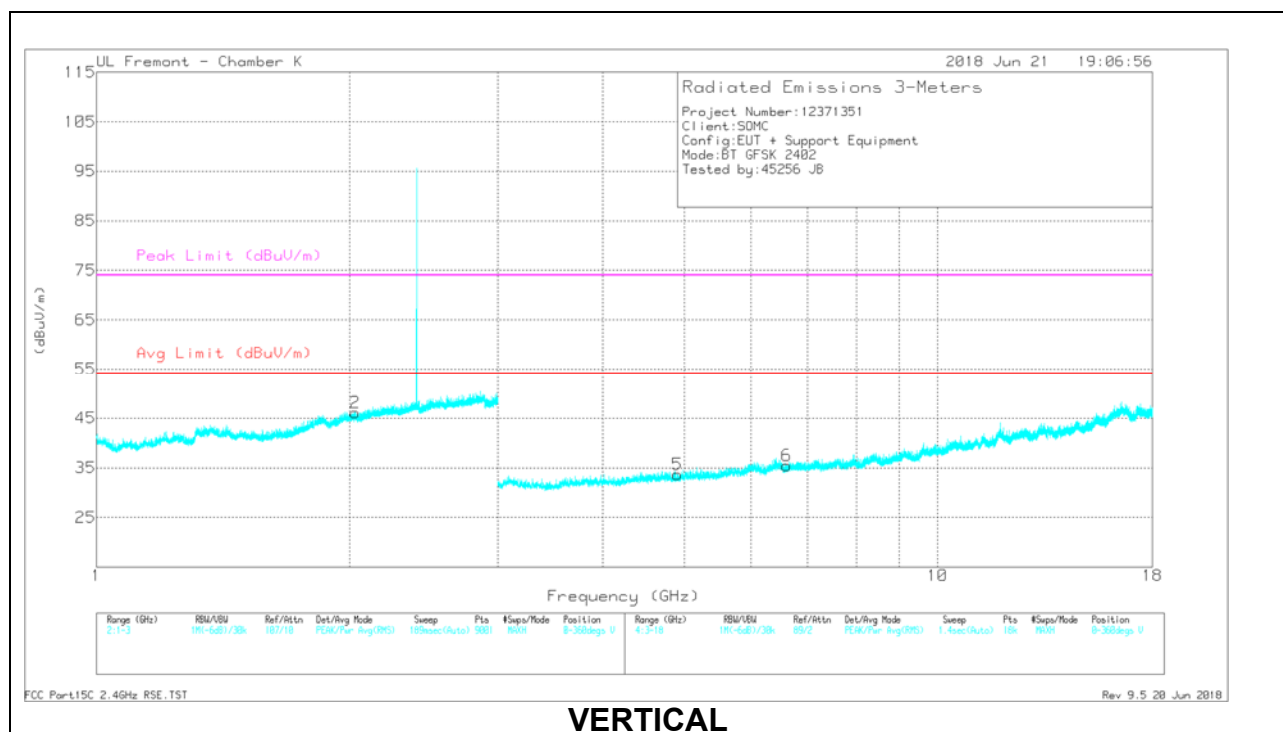
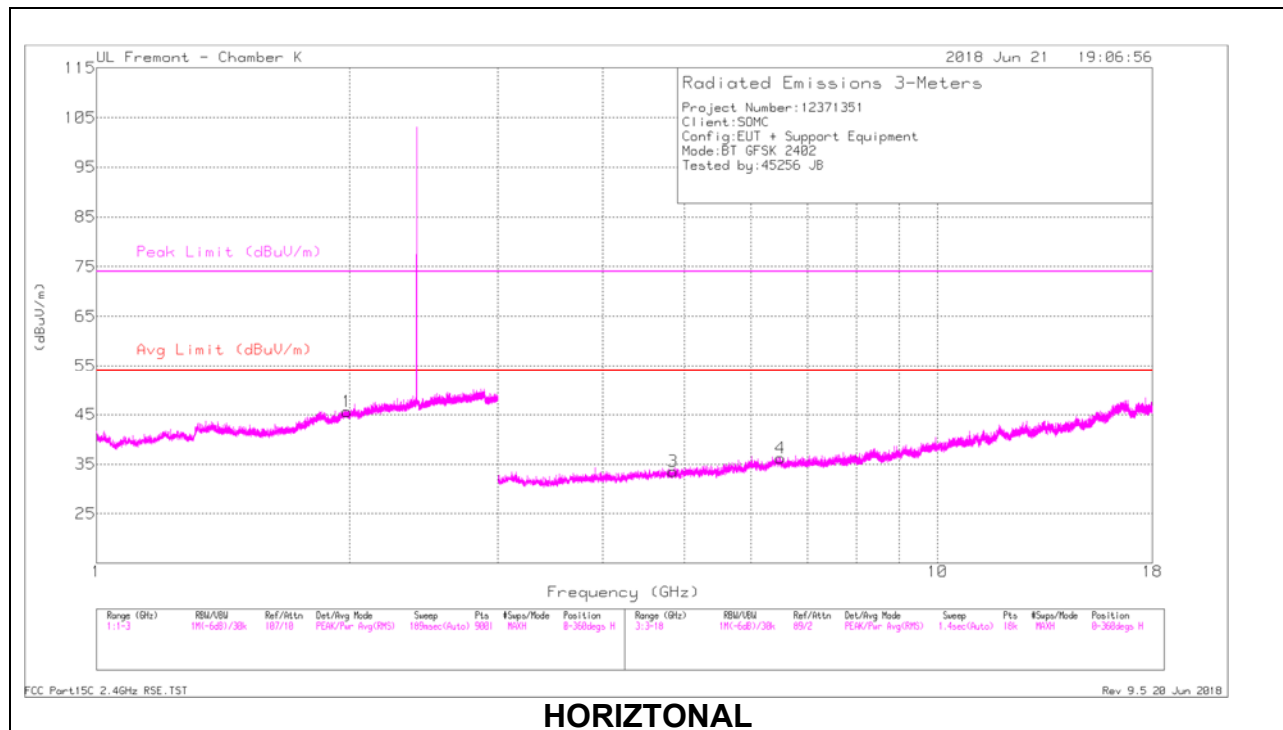
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

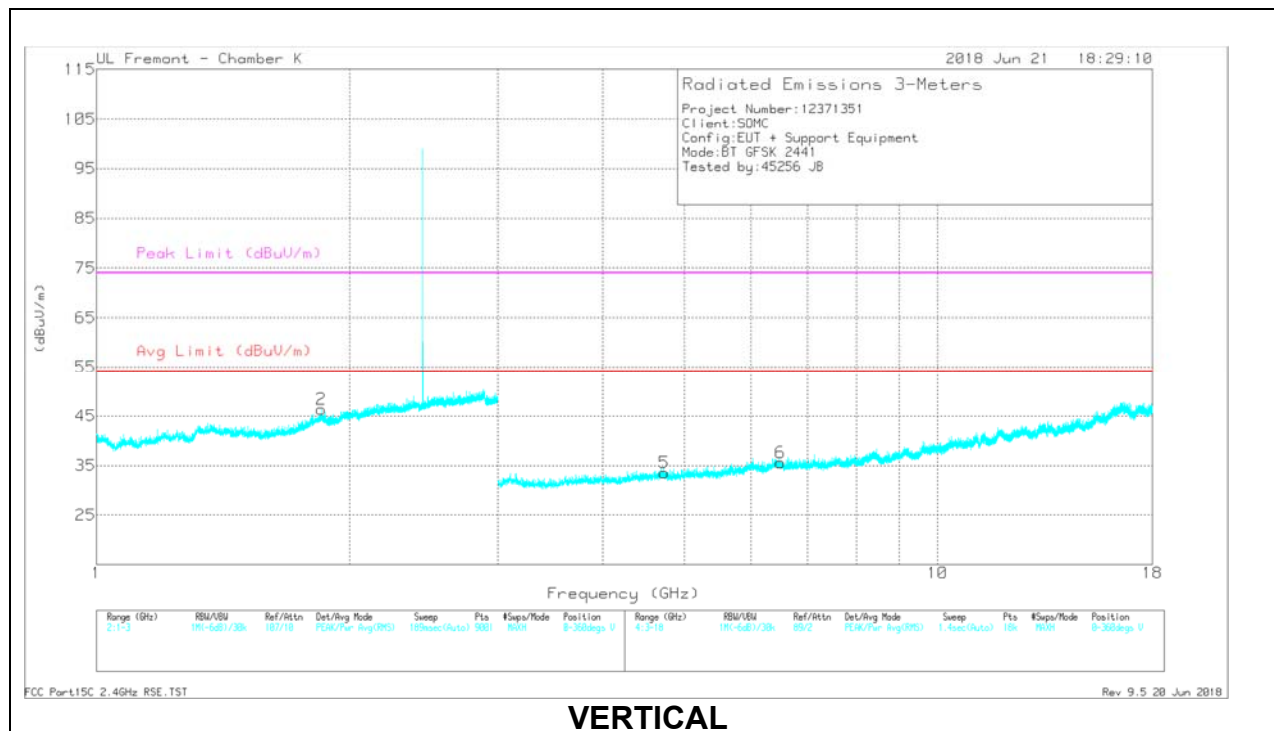
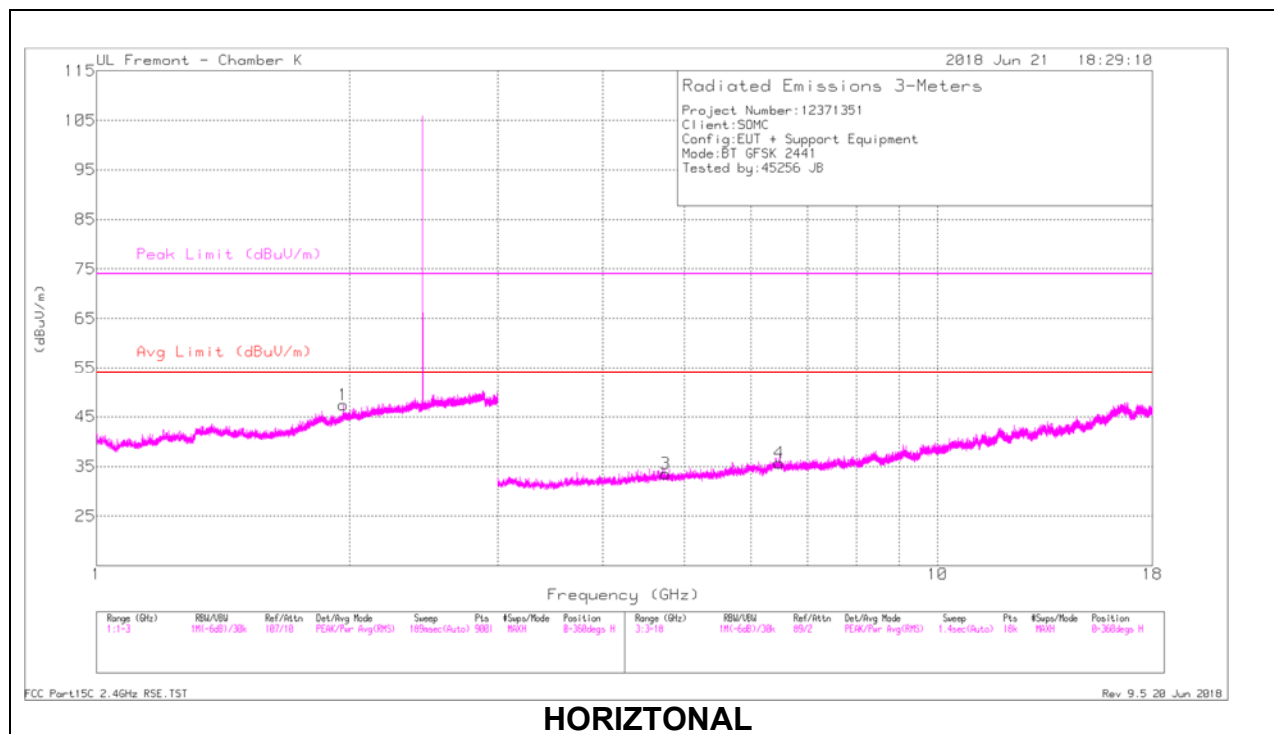
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.984	30.94	PKFH	30.9	-8.7	53.14	-	-	-	-	134	311	H
	1.986	18.4	VA1T	31	-8.7	40.7	-	-	-	-	134	311	H
2	2.031	30.56	PKFH	31.2	-8.6	53.16	-	-	-	-	277	332	H
	2.03	18.28	VA1T	31.1	-8.6	40.78	-	-	-	-	277	332	H
3	* 4.843	37.72	PKFH	34.1	-30.9	40.92	-	-	74	-33.08	20	282	H
	* 4.844	25.48	VA1T	34.1	-30.9	28.68	54	-25.32	-	-	20	282	H
4	6.501	35.29	PKFH	35.4	-27.1	43.59	-	-	-	-	120	130	H
	6.502	22.85	VA1T	35.4	-27.1	31.15	-	-	-	-	120	130	H
5	* 4.908	39.53	PKFH	34.1	-31.2	42.43	-	-	74	-31.57	214	366	H
	* 4.909	26.15	VA1T	34.1	-31.2	29.05	54	-24.95	-	-	214	366	H
6	6.611	35.24	PKFH	35.5	-27.9	42.84	-	-	-	-	85	357	H
	6.613	23.21	VA1T	35.5	-27.9	30.81	-	-	-	-	85	357	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

MID CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

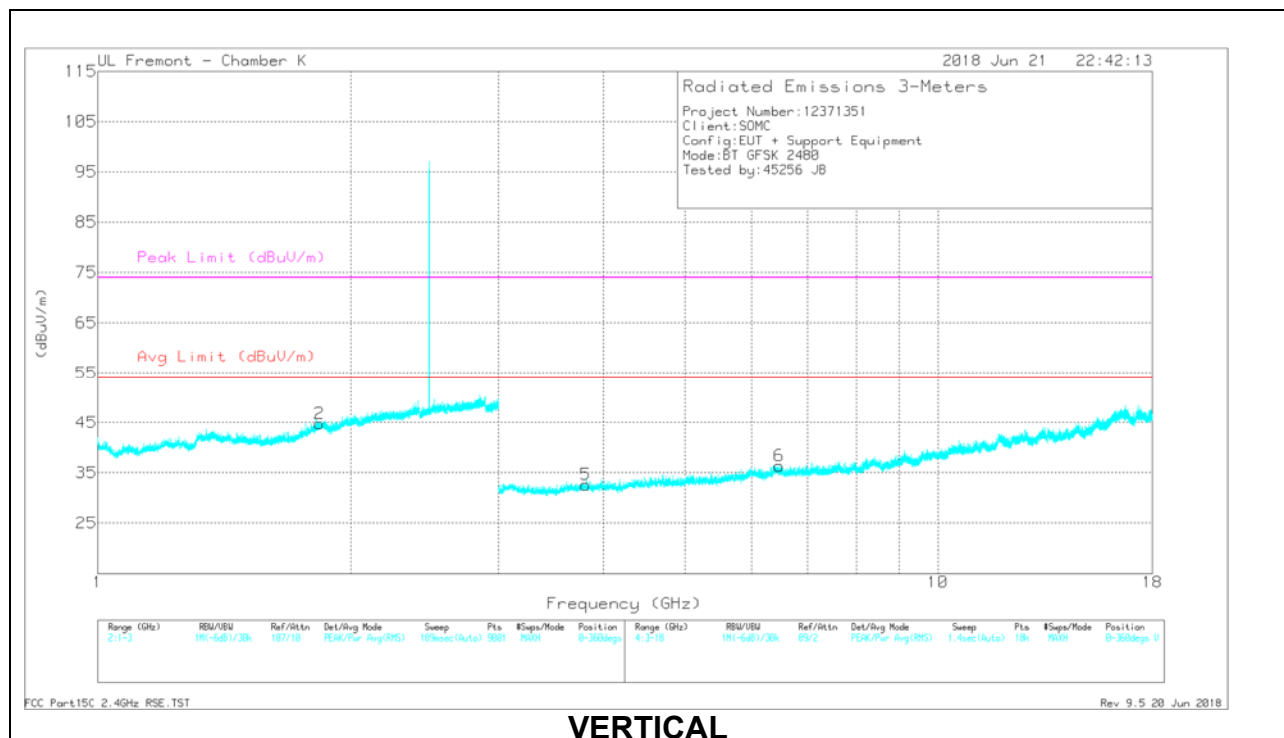
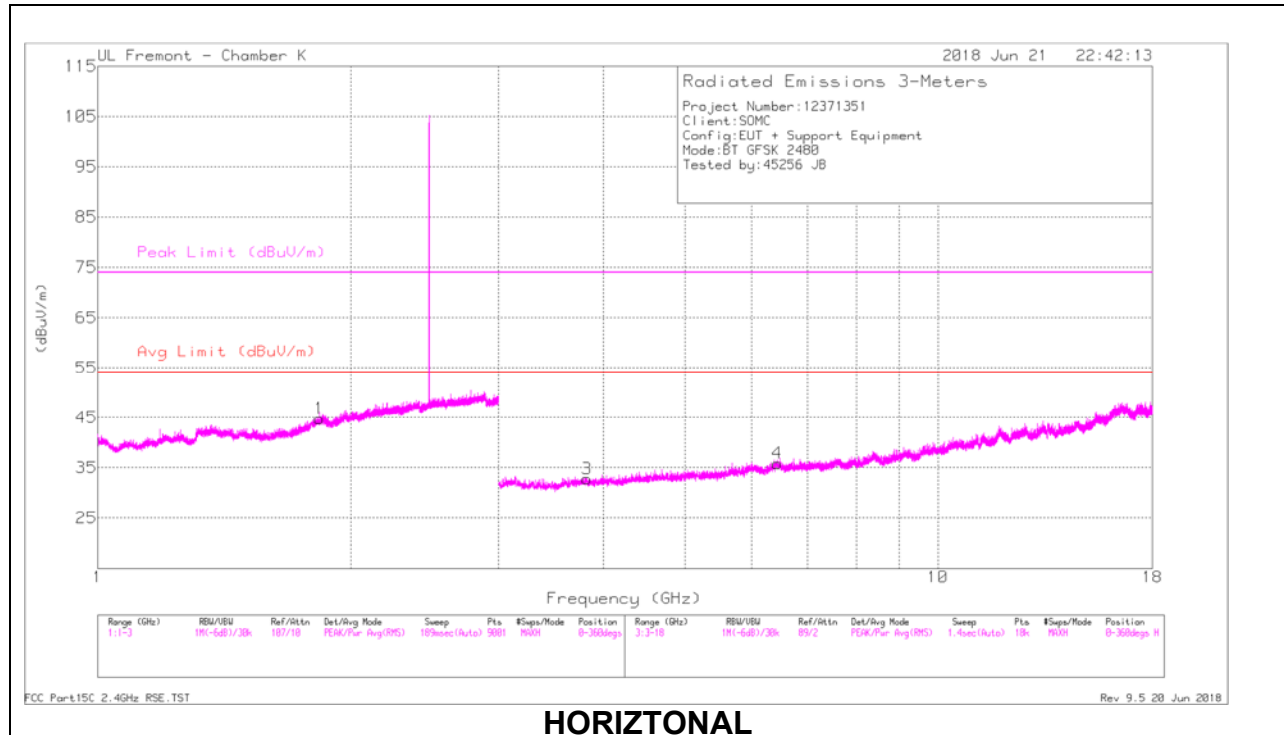
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.967	31.62	PKFH	30.9	-8.6	53.92	-	-	-	-	311	286	H
	1.966	18.32	VA1T	30.9	-8.6	40.62	-	-	-	-	311	286	H
2	1.85	30.85	PKFH	30.4	-9	52.25	-	-	-	-	0	254	H
	1.852	18.79	VA1T	30.4	-9	40.19	-	-	-	-	0	254	H
3	* 4.751	37.8	PKFH	34.1	-30.9	41	-	-	74	-33	318	106	H
	* 4.751	25.59	VA1T	34.1	-30.9	28.79	54	-25.21	-	-	318	106	H
4	6.483	35.13	PKFH	35.4	-27	43.53	-	-	-	-	54	164	H
	6.482	22.83	VA1T	35.4	-27	31.23	-	-	-	-	54	164	H
5	* 4.728	38.22	PKFH	34.1	-30.7	41.62	-	-	74	-32.38	84	339	H
	* 4.729	25.53	VA1T	34.1	-30.7	28.93	54	-25.07	-	-	84	339	H
6	6.499	35.16	PKFH	35.4	-27	43.56	-	-	-	-	251	123	H
	6.501	22.72	VA1T	35.4	-27.1	31.02	-	-	-	-	251	123	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.837	31.01	PKFH	30.4	-8.9	52.51	-	-	-	-	45	216	H
	1.836	18.49	VA1T	30.3	-8.8	39.99	-	-	-	-	45	216	H
2	1.839	30.89	PKFH	30.4	-8.9	52.39	-	-	-	-	114	386	V
	1.838	18.53	VA1T	30.4	-8.9	40.03	-	-	-	-	114	386	V
3	* 3.822	39.32	PKFH	33.4	-31.9	40.82	-	-	74	-33.18	282	260	H
	* 3.822	26.72	VA1T	33.4	-31.9	28.22	54	-25.78	-	-	282	260	H
4	6.442	35.95	PKFH	35.4	-26.9	44.45	-	-	-	-	343	362	H
	6.442	22.78	VA1T	35.4	-26.9	31.28	-	-	-	-	343	362	H
5	* 3.81	39.59	PKFH	33.4	-32	40.99	-	-	74	-33.01	107	263	V
	* 3.813	26.71	VA1T	33.4	-32	28.11	54	-25.89	-	-	107	263	V
6	6.478	37.02	PKFH	35.4	-27	45.42	-	-	-	-	242	385	V
	6.476	22.77	VA1T	35.4	-26.9	31.27	-	-	-	-	242	385	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

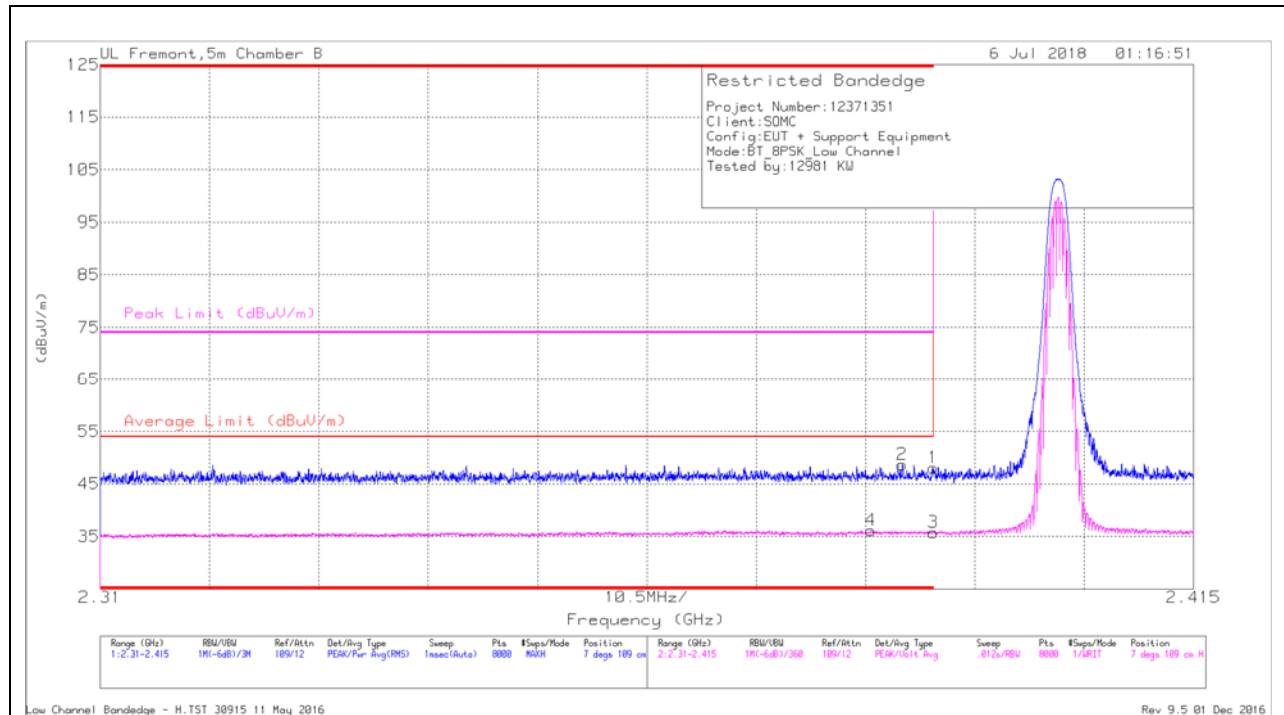
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.384	25.19	VA1T	32.3	-21.4	36.09	54	-17.91	-	-	7	109	H
2	* 2.387	37.93	Pk	32.3	-21.5	48.73	-	-	74	-25.27	7	109	H
1	* 2.39	37.31	Pk	32.3	-21.5	48.11	-	-	74	-25.89	7	109	H
3	* 2.39	24.95	VA1T	32.3	-21.5	35.75	54	-18.25	-	-	7	109	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.371	37.96	Pk	32.3	-21.3	48.96	-	-	74	-25.04	9	269	V
4	* 2.386	25.29	VA1T	32.3	-21.4	36.19	54	-17.81	-	-	9	269	V
1	* 2.39	35.82	Pk	32.3	-21.5	46.62	-	-	74	-27.38	9	269	V
3	* 2.39	24.94	VA1T	32.3	-21.5	35.74	54	-18.26	-	-	9	269	V

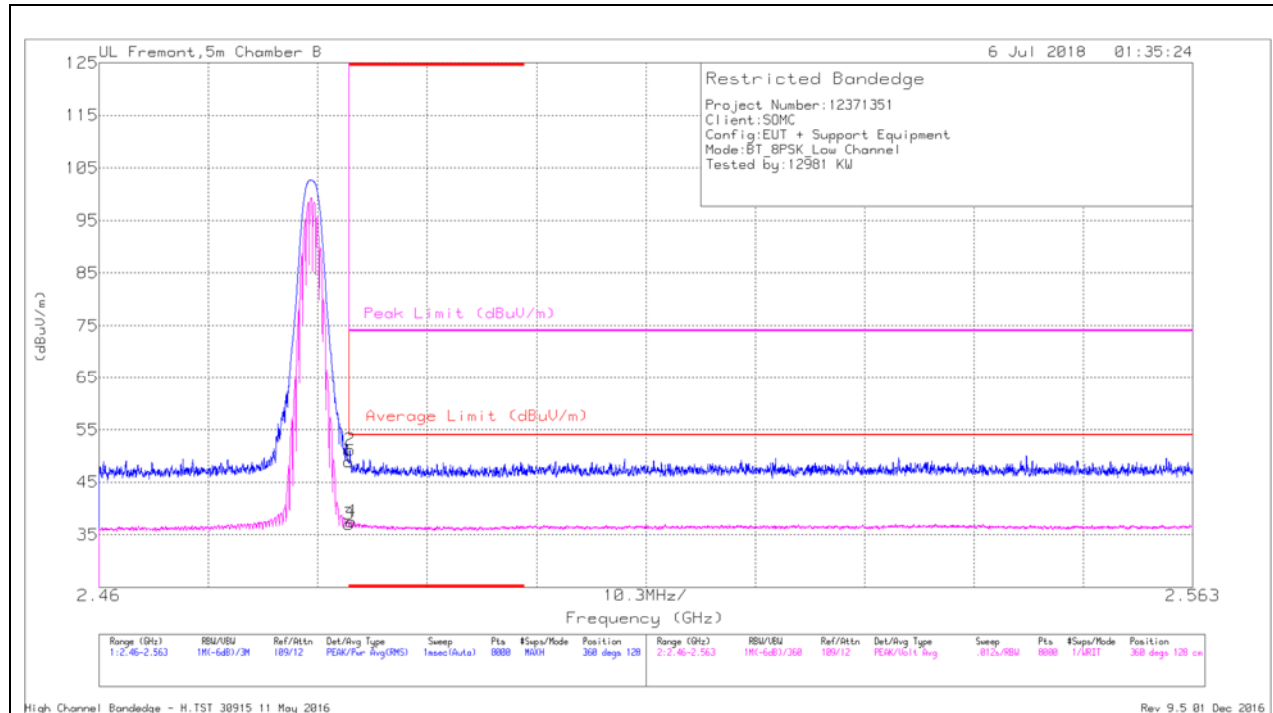
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

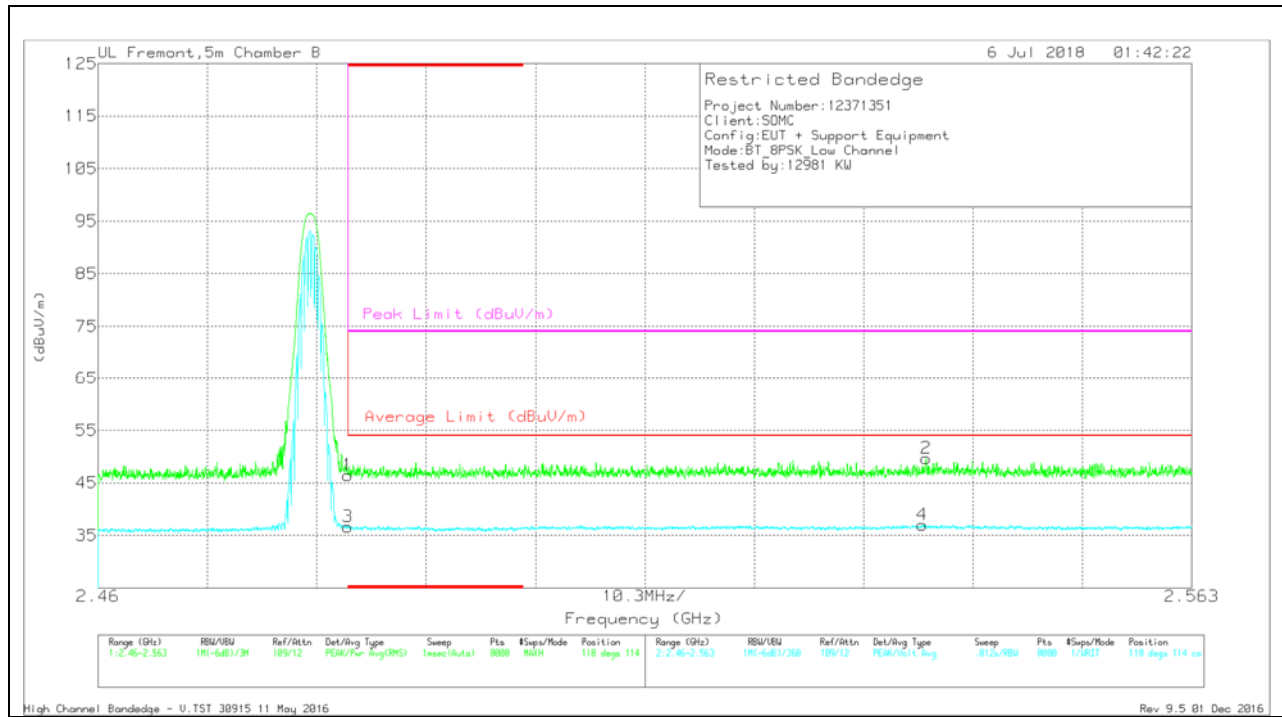
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.85	Pk	32.6	-21.5	48.95	-	-	74	-25.05	360	128	H
2	* 2.484	40.11	Pk	32.6	-21.5	51.21	-	-	74	-22.79	360	128	H
3	* 2.484	25.93	VA1T	32.6	-21.5	37.03	54	-16.97	-	-	360	128	H
4	* 2.484	26.46	VA1T	32.6	-21.5	37.56	54	-16.44	-	-	360	128	H

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AFT863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	35.3	Pk	32.6	-21.5	46.4	-	-	74	-27.6	118	114	V
3	* 2.484	25.54	VA1T	32.6	-21.5	36.64	54	-17.36	-	-	118	114	V
2	2.538	38.12	Pk	32.7	-21.2	49.62	-	-	74	-24.38	118	114	V
4	2.538	25.52	VA1T	32.7	-21.2	37.02	54	-16.98	-	-	118	114	V

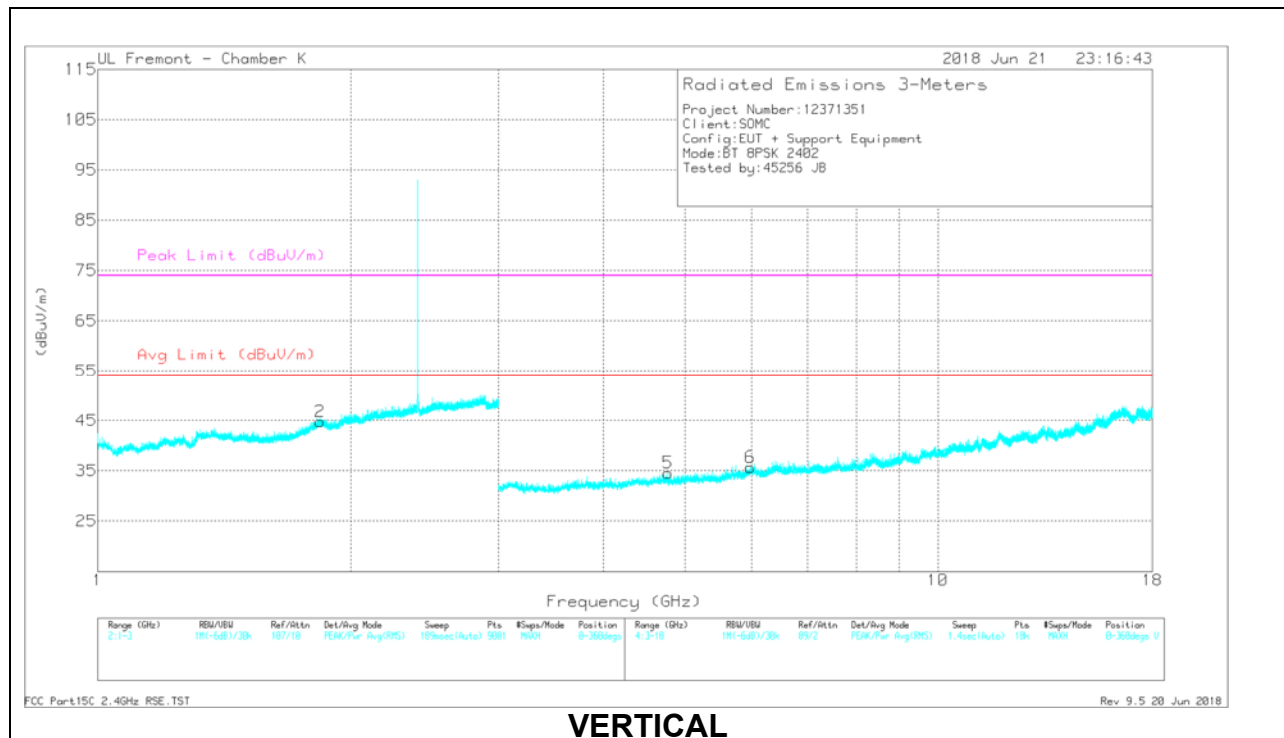
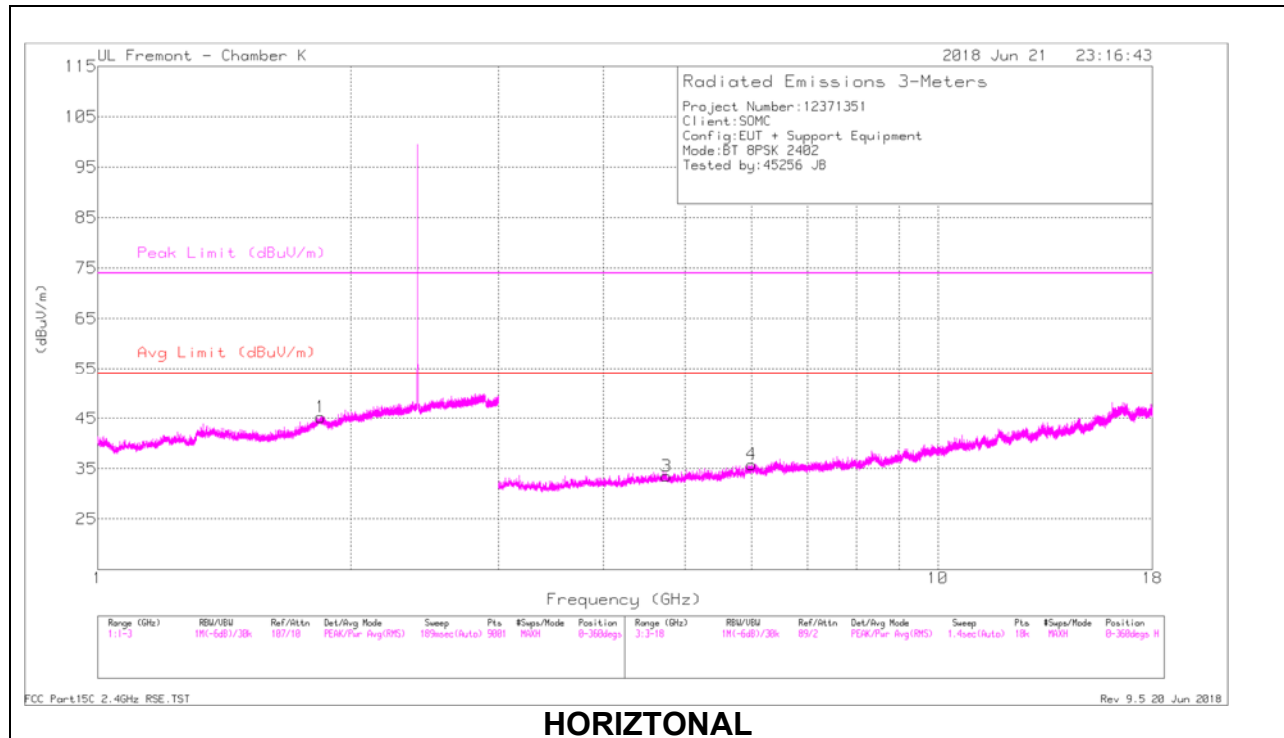
* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

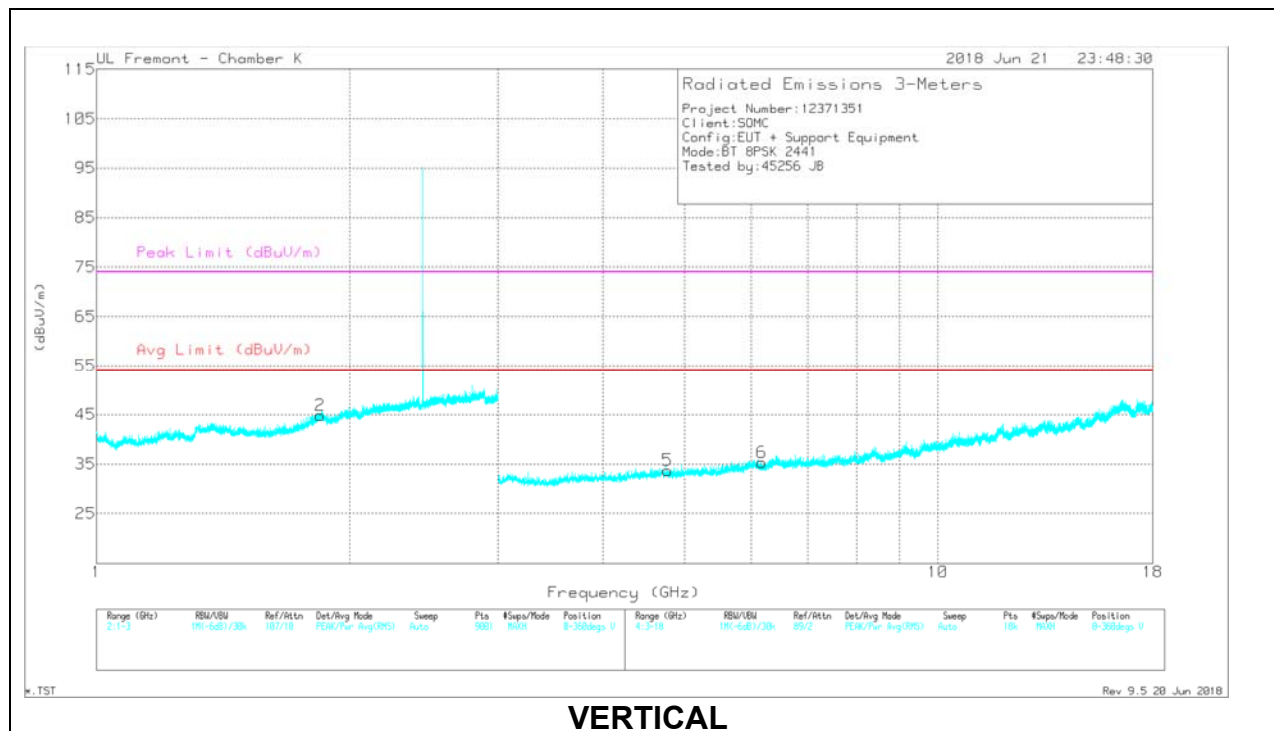
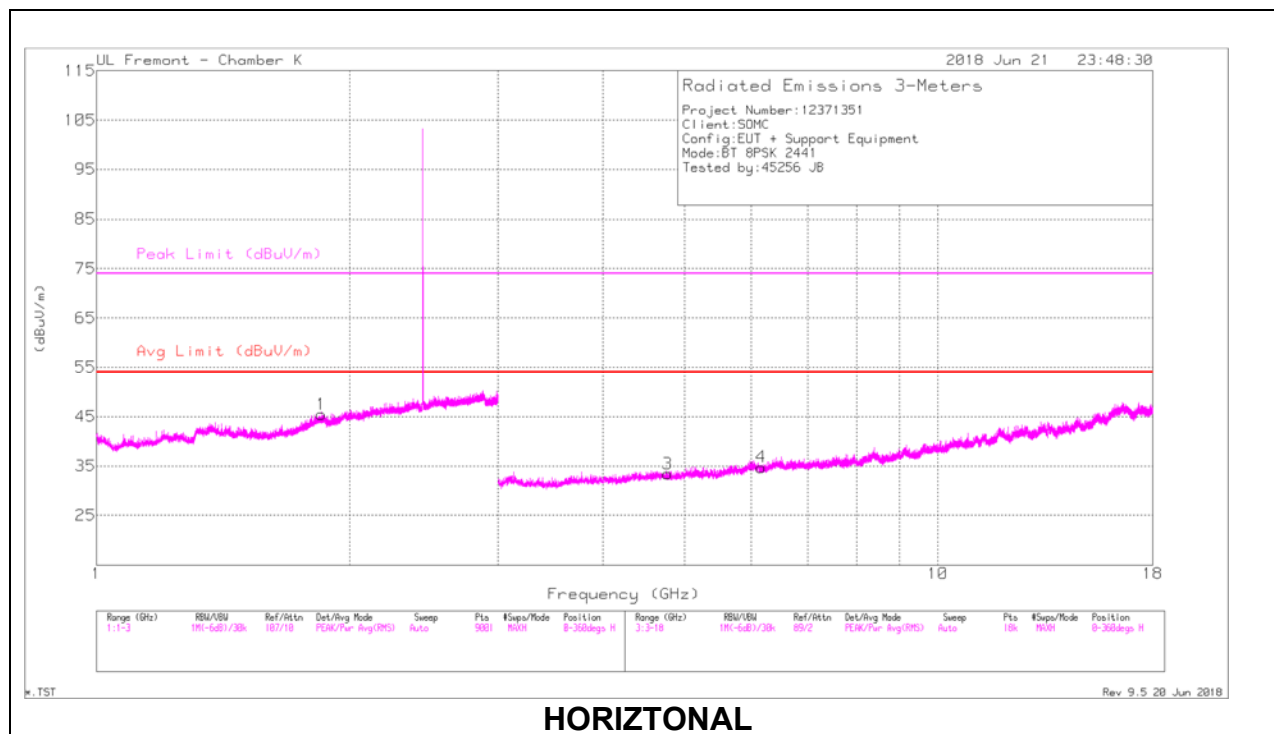
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.844	30.29	PKFH	30.4	-9	51.69	-	-	-	-	63	391	H
	1.845	18.7	VA1T	30.4	-9	40.1	-	-	-	-	63	391	H
2	1.84	31.05	PKFH	30.4	-8.9	52.55	-	-	-	-	239	306	V
	1.842	18.64	VA1T	30.4	-8.9	40.14	-	-	-	-	239	306	V
3	* 4.753	38.09	PKFH	34.1	-30.9	41.29	-	-	74	-32.71	103	392	H
	* 4.754	25.83	VA1T	34.1	-30.8	29.13	54	-24.87	-	-	103	392	H
4	6.001	35.96	PKFH	35.2	-28.1	43.06	-	-	-	-	15	164	H
	6	23.74	VA1T	35.2	-28.1	30.84	-	-	-	-	15	164	H
5	* 4.777	38.19	PKFH	34.1	-30.7	41.59	-	-	74	-32.41	74	236	V
	* 4.776	25.29	VA1T	34.1	-30.7	28.69	54	-25.31	-	-	74	236	V
6	5.981	36.06	PKFH	35.1	-28.4	42.76	-	-	-	-	5	117	V
	5.982	23.96	VA1T	35.1	-28.4	30.66	-	-	-	-	5	117	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

MID CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

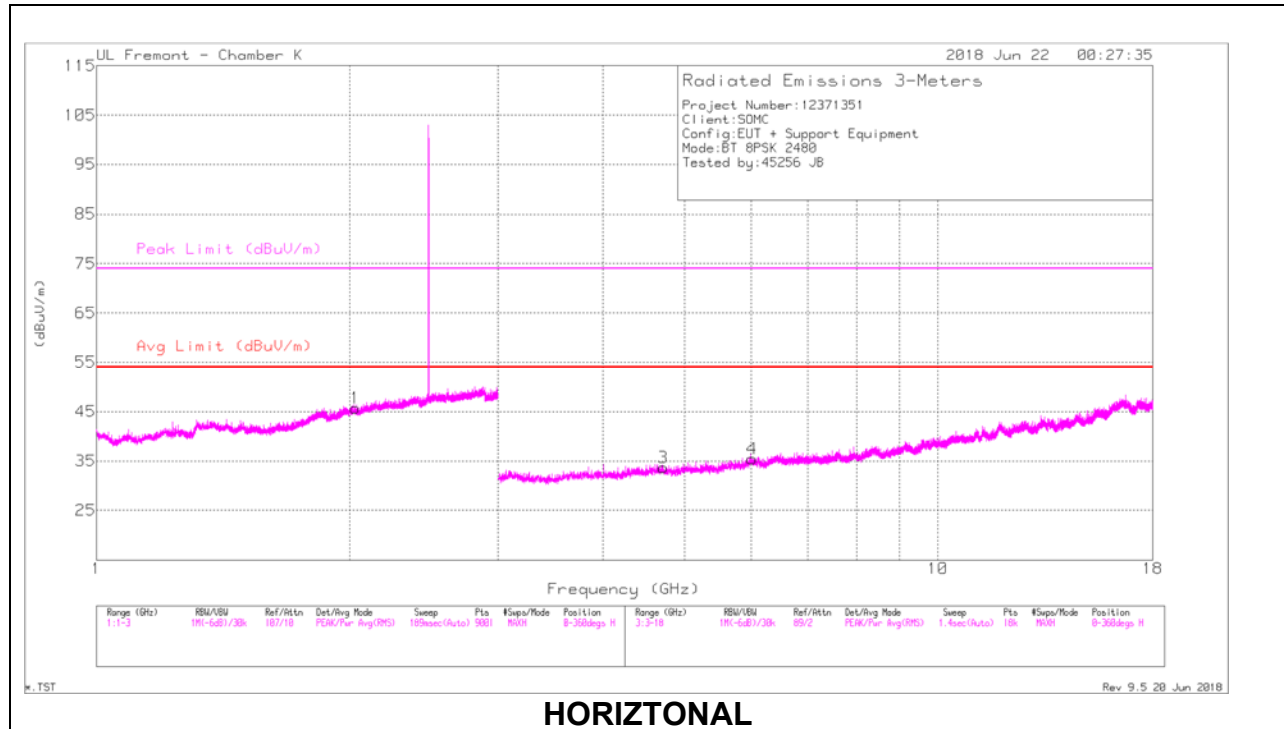
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.853	30.9	PKFH	30.4	-9	52.3	-	-	-	-	228	329	H
	1.852	18.86	VA1T	30.4	-9	40.26	-	-	-	-	228	329	H
2	1.845	30.69	PKFH	30.4	-9	52.09	-	-	-	-	109	314	V
	1.845	18.67	VA1T	30.4	-9	40.07	-	-	-	-	109	314	V
3	* 4.776	37.9	PKFH	34.1	-30.7	41.3	-	-	74	-32.7	274	148	H
	* 4.773	25.25	VA1T	34.1	-30.7	28.65	54	-25.35	-	-	274	148	H
4	6.161	35.61	PKFH	35.3	-28.3	42.61	-	-	-	-	190	354	H
	6.162	23.35	VA1T	35.3	-28.3	30.35	-	-	-	-	190	354	H
5	* 4.769	37.62	PKFH	34.1	-30.8	40.92	-	-	74	-33.08	171	321	V
	* 4.769	25.52	VA1T	34.1	-30.8	28.82	54	-25.18	-	-	171	321	V
6	6.171	36.47	PKFH	35.3	-28.3	43.47	-	-	-	-	81	275	V
	6.171	23.53	VA1T	35.3	-28.3	30.53	-	-	-	-	81	275	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

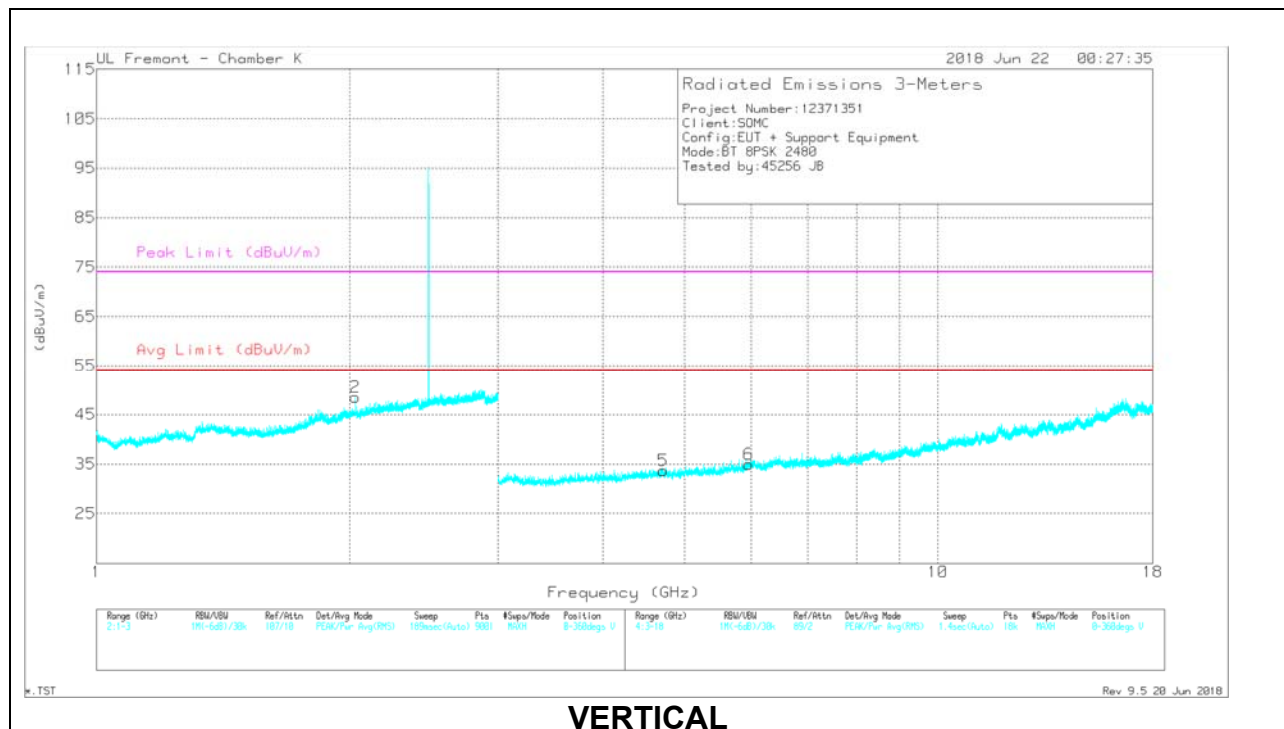
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

HIGH CHANNEL RESULTS



HORIZTONTAL



VERTICAL

RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T407 (dB)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.031	30.74	PKFH	31.2	-8.6	53.34	-	-	-	-	30	273	H
	2.034	18.29	VA1T	31.2	-8.6	40.89	-	-	-	-	30	273	H
2	2.032	30.49	PKFH	31.2	-8.6	53.09	-	-	-	-	212	179	V
	2.032	18.27	VA1T	31.2	-8.6	40.87	-	-	-	-	212	179	V
3	* 4.714	37.85	PKFH	34.1	-31	40.95	-	-	74	-33.05	300	174	H
	* 4.718	25.71	VA1T	34.1	-30.9	28.91	54	-25.09	-	-	300	174	H
4	6.014	36.12	PKFH	35.2	-28.1	43.22	-	-	-	-	126	398	H
	6.014	23.6	VA1T	35.2	-28.1	30.7	-	-	-	-	126	398	H
5	* 4.719	37.63	PKFH	34.1	-30.9	40.83	-	-	74	-33.17	345	223	V
	* 4.719	25.75	VA1T	34.1	-30.9	28.95	54	-25.05	-	-	345	223	V
6	5.959	36.52	PKFH	35.1	-28.7	42.92	-	-	-	-	82	365	V
	5.959	24.1	VA1T	35.1	-28.7	30.5	-	-	-	-	82	365	V

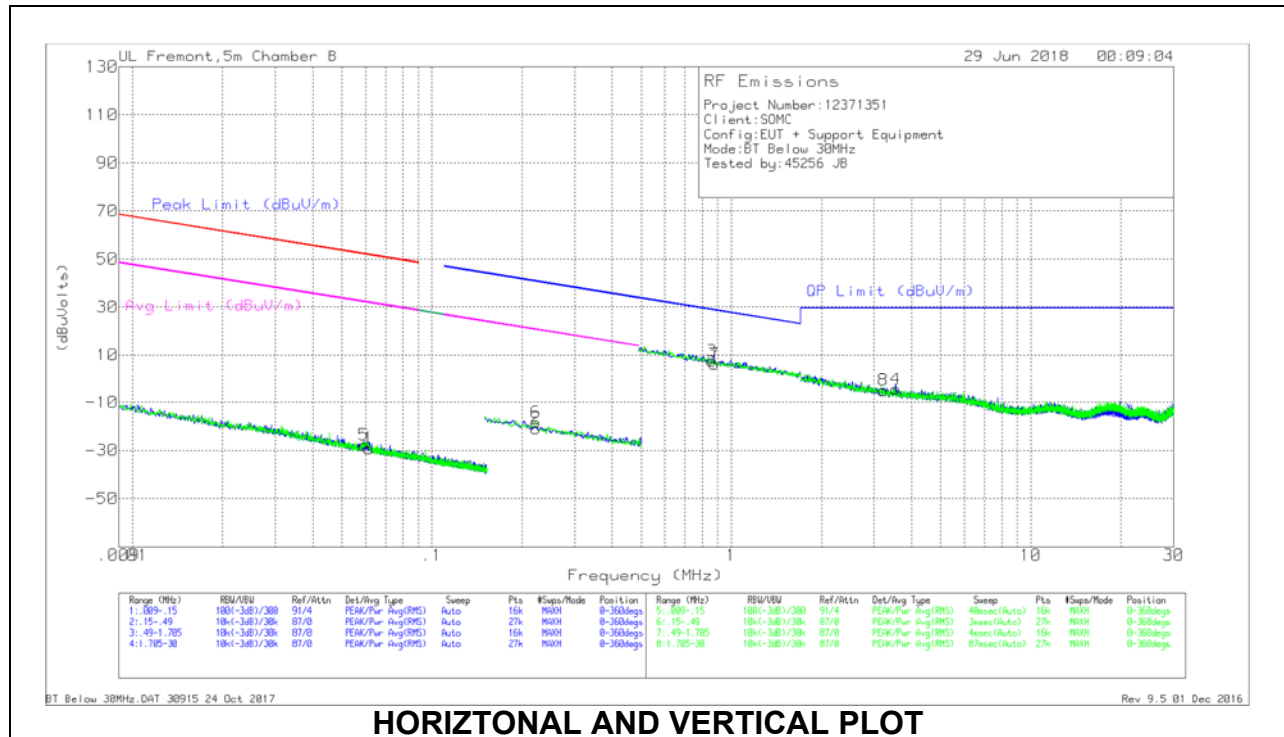
* - indicates frequency in CFR47 Pt 15 Restricted Band

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

9.2. Worst Case Below 30 MHz

SPURIOUS EMISSIONS 9 kHz TO 30 MHz (WORST-CASE CONFIGURATION)



HORIZONTAL AND VERTICAL PLOT

Below 30 MHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.05925	36.26	Pk	14.5	1.4	-80	-27.84	52.13	-79.97	32.13	-59.97	-	-	-	-	0-360
1	.06157	34.96	Pk	14.5	1.4	-80	-29.14	51.8	-80.94	31.8	-60.94	-	-	-	-	0-360
6	.22223	46.28	Pk	13.9	1.5	-80	-18.32	-	-	-	-	40.68	-59	20.68	-39	0-360
2	.22254	43.65	Pk	13.9	1.5	-80	-20.95	-	-	-	-	40.67	-61.62	20.67	-41.62	0-360

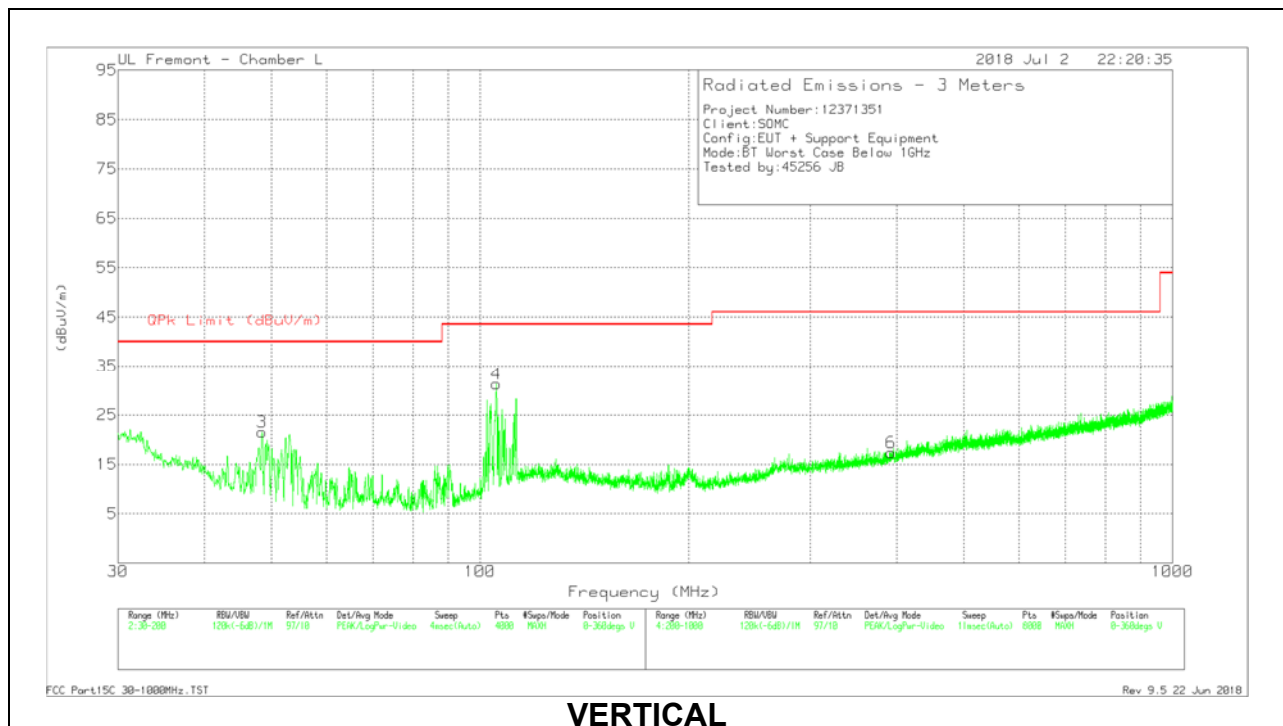
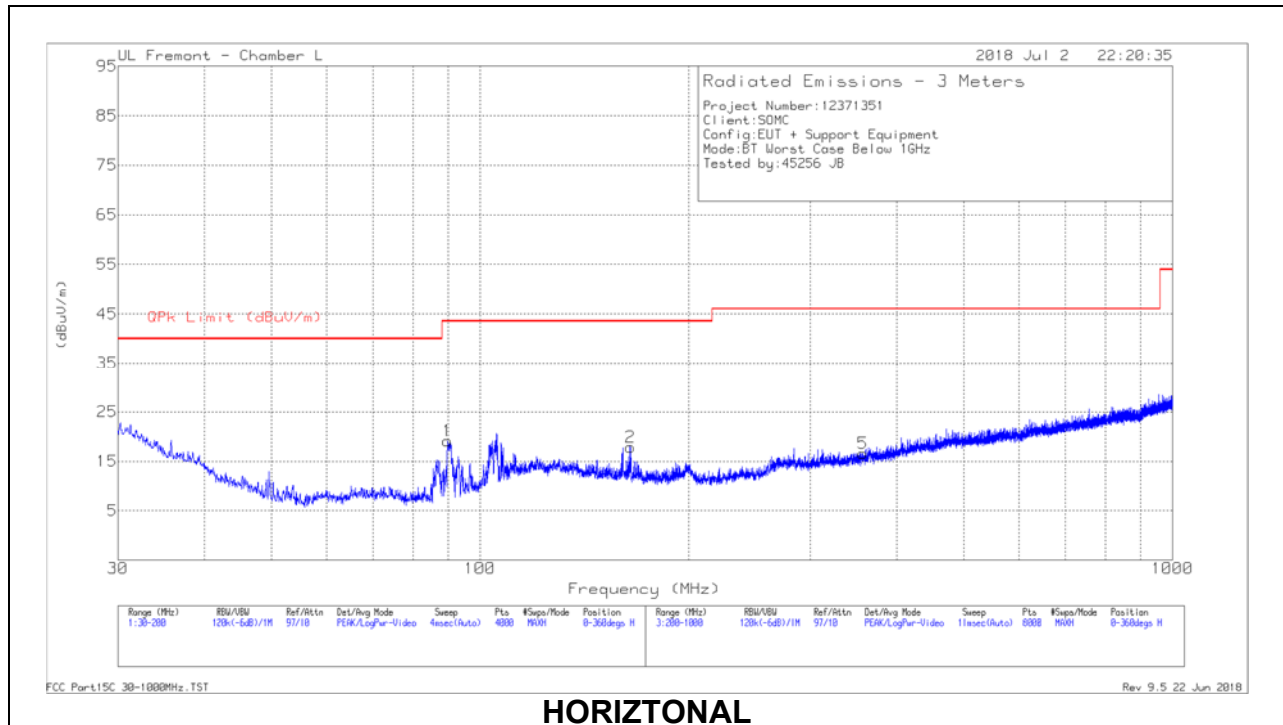
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.86126	31.93	Pk	14.1	1.5	-40	7.53	28.92	-21.39	-	-	-	-	0-360
7	.87912	30.68	Pk	14.1	1.5	-40	6.28	28.74	-22.46	-	-	-	-	0-360
8	3.22198	19	Pk	14.4	1.5	-40	-5.1	29.5	-34.6	-	-	-	-	0-360
4	3.54634	19.46	Pk	14.5	1.5	-40	-4.54	29.5	-34.04	-	-	-	-	0-360

Pk - Peak detector

9.3. Worst Case Below 1 GHz

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



Below 1GHz Data

Trace Markers

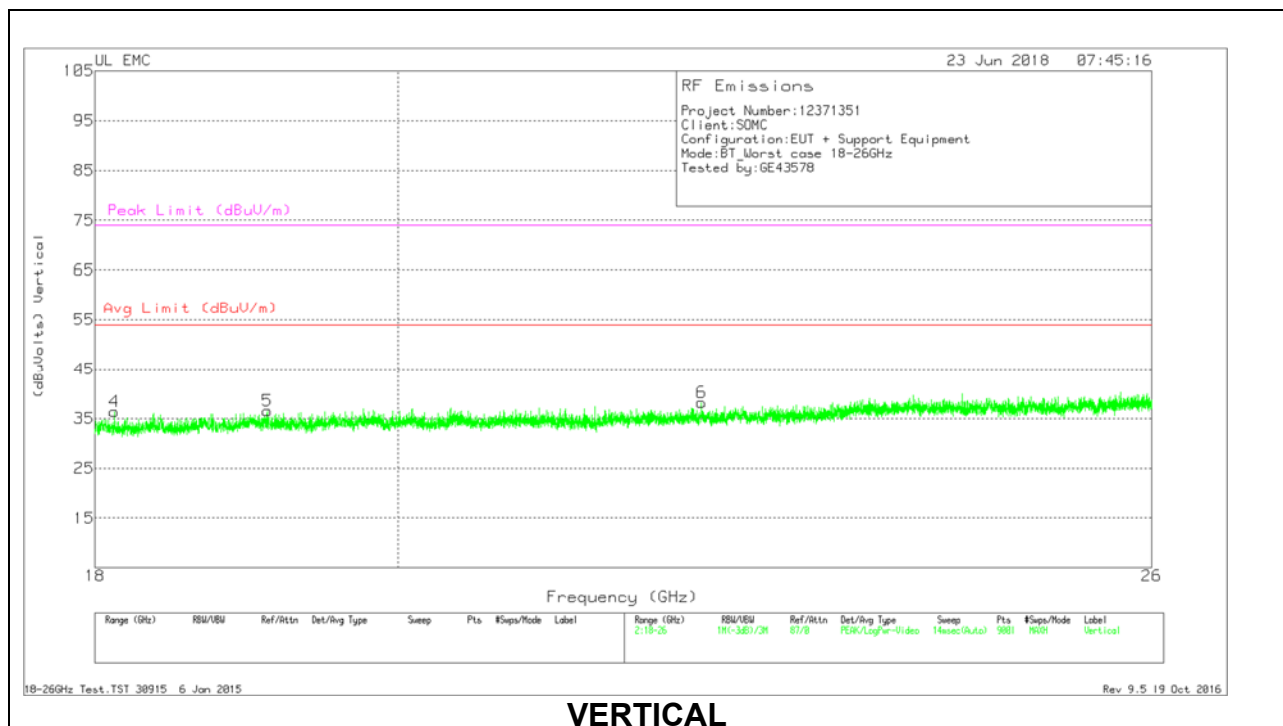
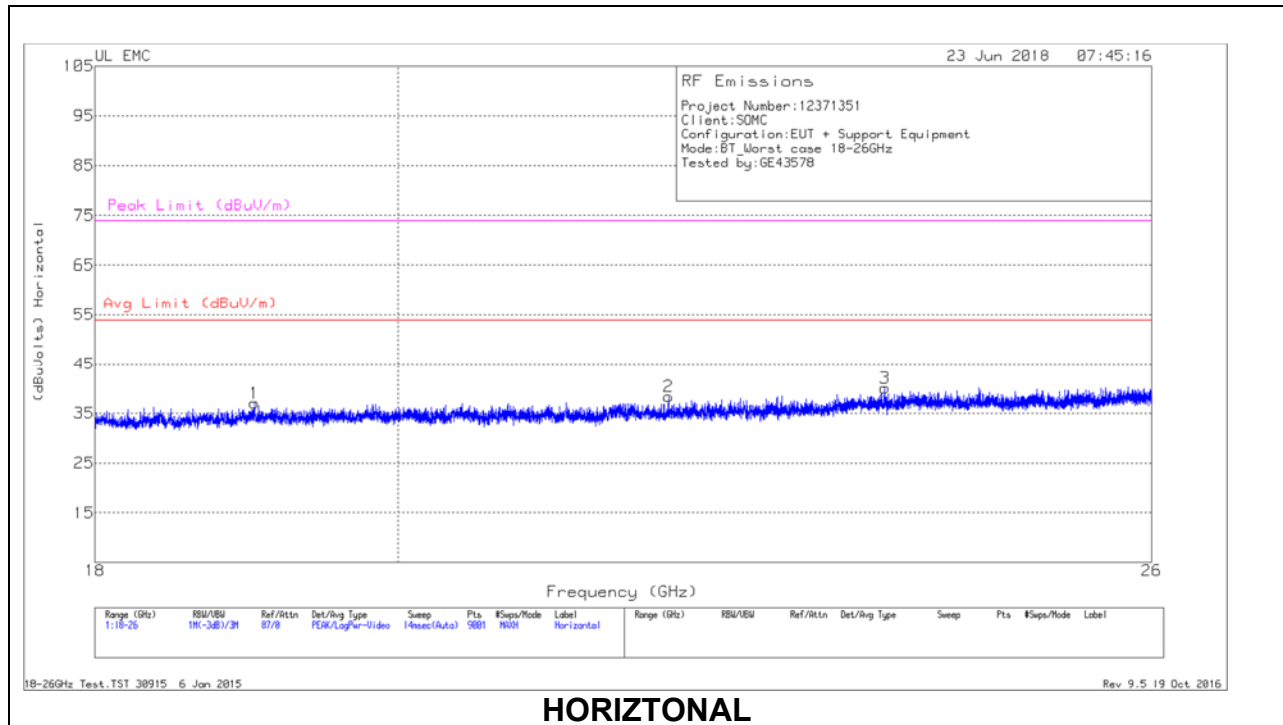
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	89.7705	37.98	Pk	12.1	-31	19.08	43.52	-24.44	0-360	399	H
2	* 164.9299	31.96	Pk	16.4	-30.5	17.86	43.52	-25.66	0-360	199	H
3	48.4498	39.73	Pk	13.2	-31.4	21.53	40	-18.47	0-360	100	V
4	105.5846	46.15	Pk	16.1	-30.9	31.35	43.52	-12.17	0-360	100	V
5	356.9204	27.44	Pk	19	-29.8	16.64	46.02	-29.38	0-360	199	H
6	392.625	27.33	Pk	19.7	-29.7	17.33	46.02	-28.69	0-360	299	V

* - indicates frequency in CFR47 Pt 15 Restricted Band

Pk - Peak detector

9.4. Worst Case 18-26 GHz

SPURIOUS EMISSIONS 18-26 GHz (WORST-CASE CONFIGURATION)



18 – 26GHz DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.027	38.83	Pk	32.5	-24.8	-9.5	37.03	54	-16.97	74	-36.97
2	21.976	39.56	Pk	33.4	-25.1	-9.5	38.36	54	-15.64	74	-35.64
3	23.692	40.09	Pk	33.8	-24.3	-9.5	40.09	54	-13.91	74	-33.91
4	18.122	39.16	Pk	32.3	-25.6	-9.5	36.36	54	-17.64	74	-37.64
5	19.114	38.25	Pk	32.5	-24.7	-9.5	36.55	54	-17.45	74	-37.45
6	22.229	38.8	Pk	33.5	-24.6	-9.5	38.2	54	-15.8	74	-35.8

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

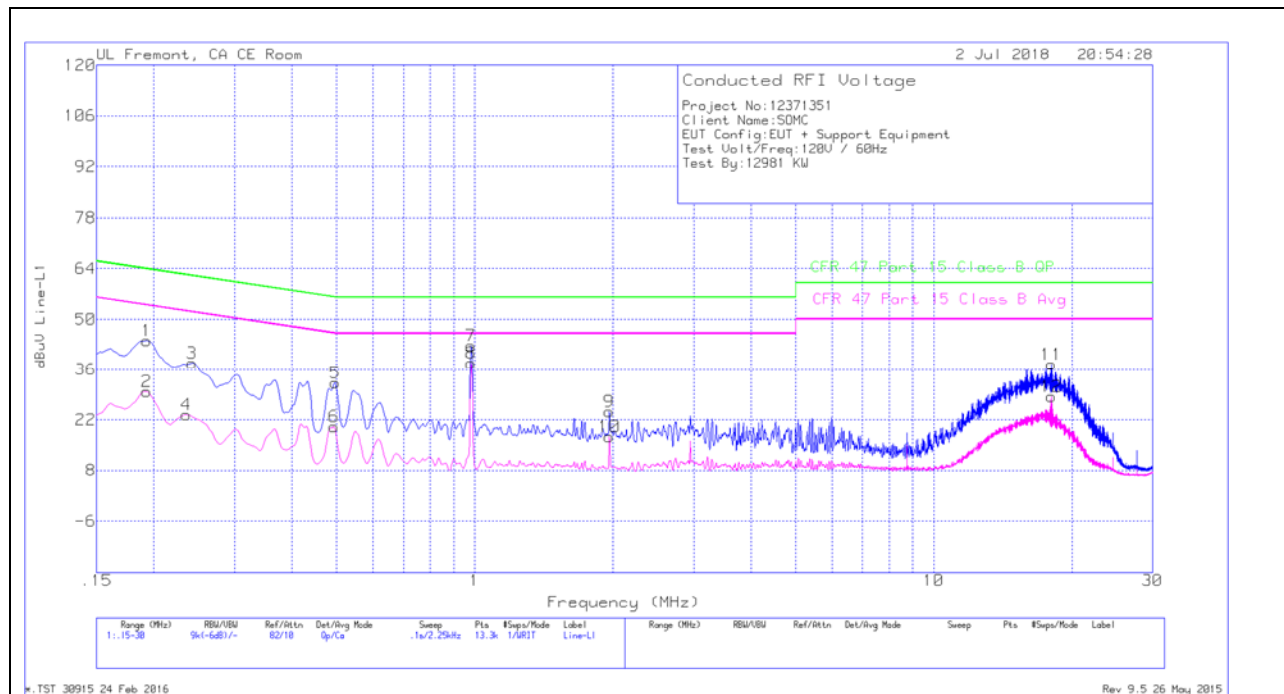
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS



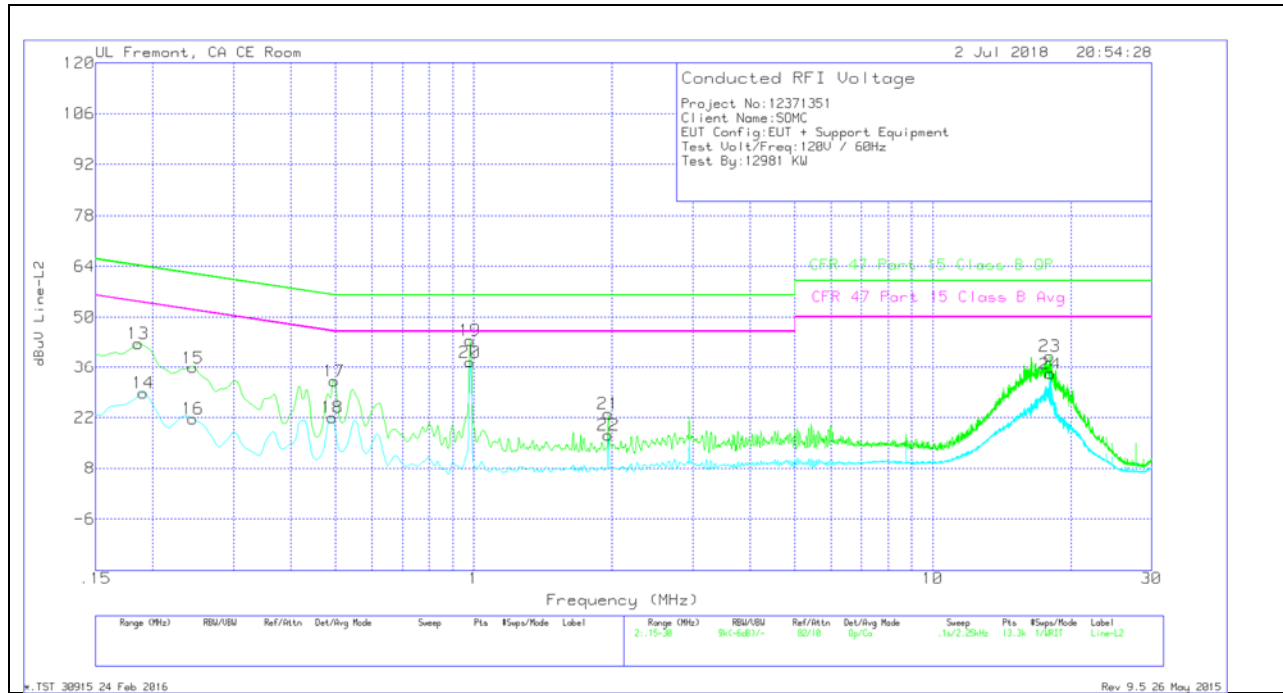
Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.19275	33.96	Qp	0	0	10.1	44.06	63.92	-19.86	-	-
2	.19275	19.76	Ca	0	0	10.1	29.86	-	-	53.92	-24.06
3	.24225	27.81	Qp	0	0	10.1	37.91	62.02	-24.11	-	-
4	.2355	13.23	Ca	0	0	10.1	23.33	-	-	52.25	-28.92
5	.4965	22.12	Qp	0	0	10.1	32.22	56.06	-23.84	-	-
6	.49425	10.01	Ca	0	0	10.1	20.11	-	-	46.1	-25.99
7	.9825	32.42	Qp	0	.1	10.1	42.62	56	-13.38	-	-
8	.9825	27.65	Ca	0	.1	10.1	37.85	-	-	46	-8.15
9	1.96575	14.09	Qp	0	.1	10.1	24.29	56	-31.71	-	-
10	1.96575	7.19	Ca	0	.1	10.1	17.39	-	-	46	-28.61
11	18.042	26.77	Qp	.1	.3	10.3	37.47	60	-22.53	-	-
12	18.042	17.7	Ca	.1	.3	10.3	28.4	-	-	50	-21.6

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Trace Markers

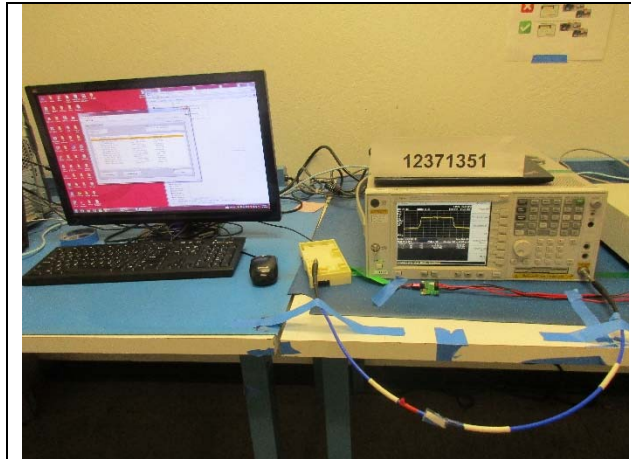
Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.186	32.54	Qp	0	0	10.1	42.64	64.21	-21.57	-	-
14	.1905	18.77	Ca	0	0	10.1	28.87	-	-	54.01	-25.14
15	.2445	25.83	Qp	0	0	10.1	35.93	61.94	-26.01	-	-
16	.2445	11.55	Ca	0	0	10.1	21.65	-	-	51.94	-30.29
17	.4965	22.08	Qp	0	0	10.1	32.18	56.06	-23.88	-	-
18	.492	11.86	Ca	0	0	10.1	21.96	-	-	46.13	-24.17
19	.9825	33.33	Qp	0	.1	10.1	43.53	56	-12.47	-	-
20	.9825	27.21	Ca	0	.1	10.1	37.41	-	-	46	-8.59
21	1.9635	12.91	Qp	0	.1	10.1	23.11	56	-32.89	-	-
22	1.96575	6.89	Ca	0	.1	10.1	17.09	-	-	46	-28.91
23	17.979	28.45	Qp	.1	.3	10.3	39.15	60	-20.85	-	-
24	18.04425	23.44	Ca	.1	.3	10.3	34.14	-	-	50	-15.86

Qp - Quasi-Peak detector

Ca - CISPR average detection

11. SETUP PHOTOS

ANTENNA PORT AND AC LINE CONDUCTED SETUP



RF ANTENNA PORT CONDUCTED



AC LINE CONDUCTED (FRONT)

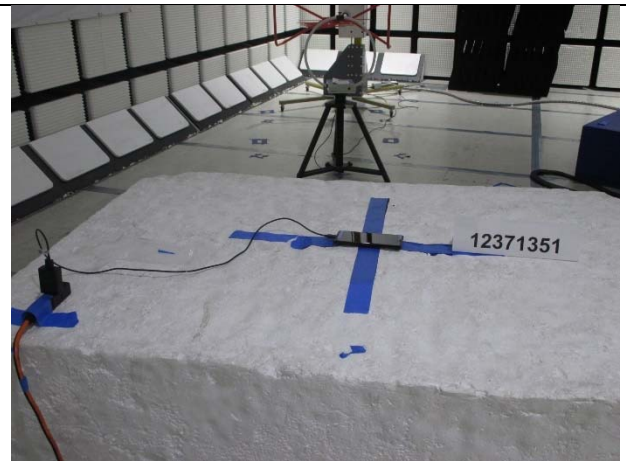


AC LINE CONDUCTED (BACK)

RADIATED RF MEASUREMENT SETUP



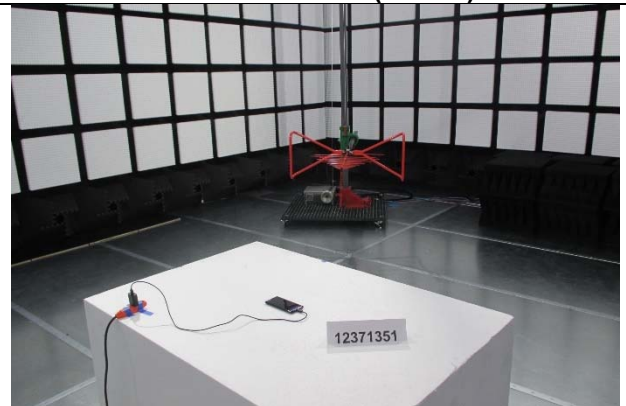
BELOW 30MHz (FRONT)



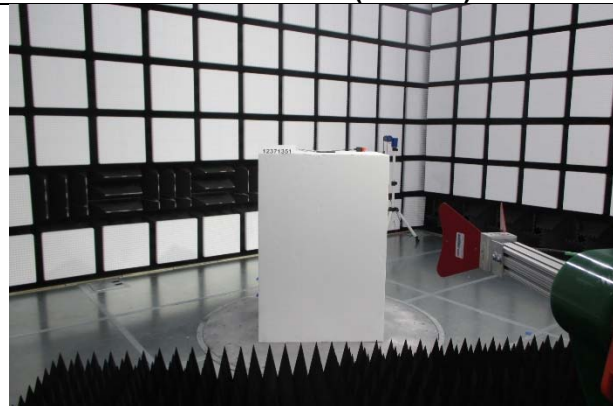
BELOW 30MHz (BACK)



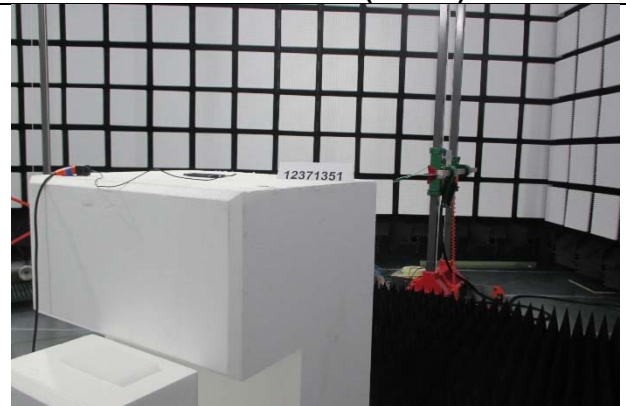
BELOW 1GHz (FRONT)



BELOW 1GHz (BACK)

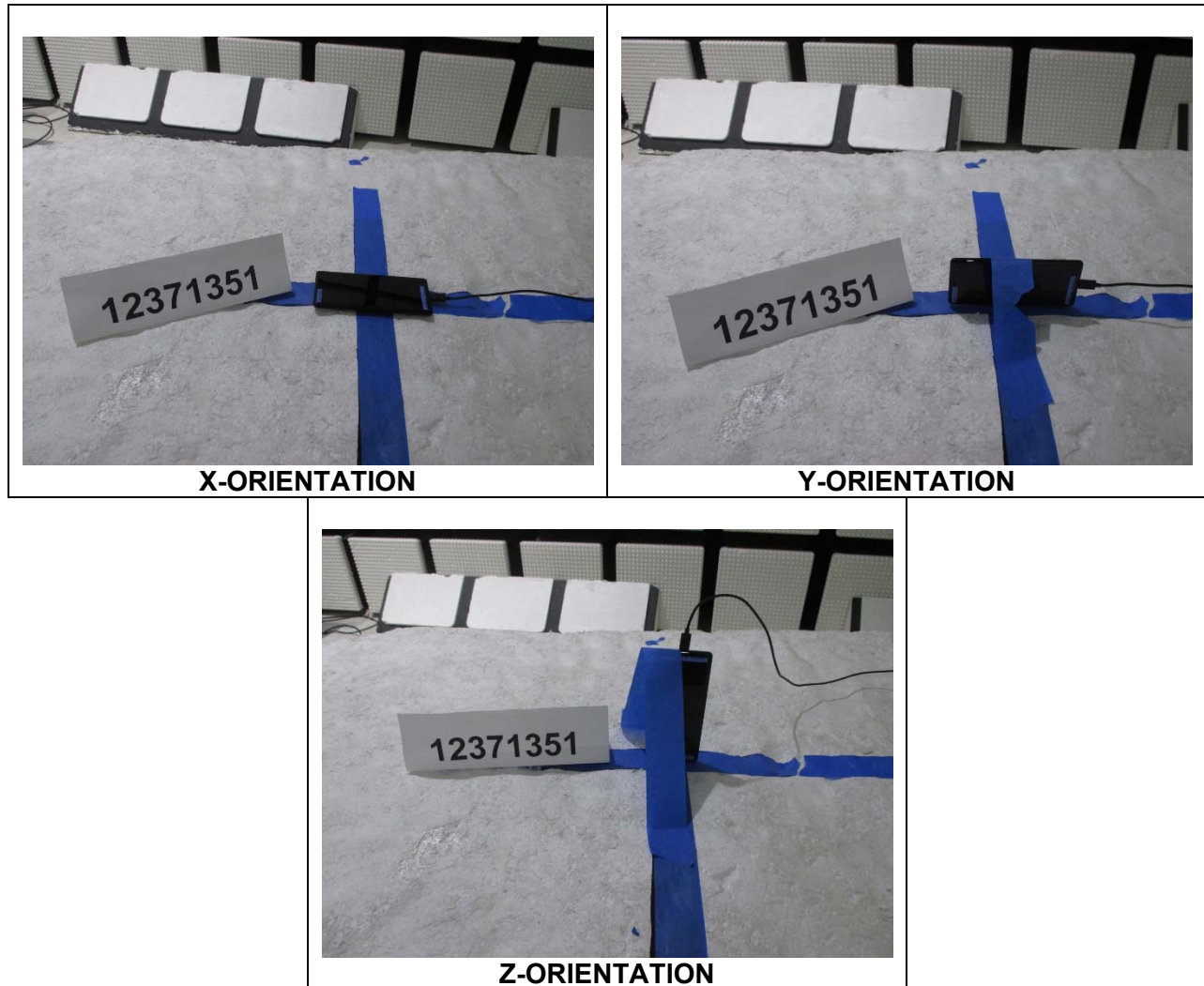


ABOVE 1GHz (FRONT)



ABOVE 1GHz (BACK)

ORIENTATIONS



END OF REPORT