



CERTIFICATION TEST REPORT

Report Number. : 12646381-E1V2

Applicant : APPLE, INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A2178

FCC ID : BCG-A2178

IC : 579C-A2178

EUT Description : iPod touch

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5

Date Of Issue:

April 29, 2019

Prepared by:

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	4/15/2019	Initial Issue	Chin Pang
V2	4/29/2019	Address TCB's Questions on page 33	Chin Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: IPOD TOUCH

MODEL: A2178

SERIAL NUMBER: CCQXW00TLQJ9 (Conducted); CCQXW00LLQJ1 (Radiated)

DATE TESTED: FEBRUARY 07 – APRIL 5, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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:



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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 5, KDB 558074 D01v05r02 and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 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 I (ISED:2324A-5)
☐ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☐ Chamber J (ISED:2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☐ Chamber K (ISED:2324A-1)
	☒ Chamber G (ISED:22541-4)	☐ Chamber L (ISED:2324A-3)
	☐ Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

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

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

36.5 dBuV + 0 dB + 10.1 dB + 0 dB = 46.6 dBuV

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	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is an iPod touch with IEEE 802.11a/b/g/n/ac and Bluetooth Radio.

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	12.28	16.90
2402 - 2480	Enhanced DQPSK	11.63	14.55
2402 - 2480	Enhanced 8PSK	12.13	16.33

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. For average power data please refer to section 8.7.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	0.20

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 17.1.124

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y and Z and it was determined that X (Flatbed) orientation was the worst-case orientation.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT was set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario. There were no emissions found below 30MHz within 20dB of the limit

For below 1GHz tests EUT was connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

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	Apple	Macbook Pro	C02P41RZG086	FCC DoC
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	NA
EUT AC Adapter	Apple	A1385	D292365CDYADHLH	NA

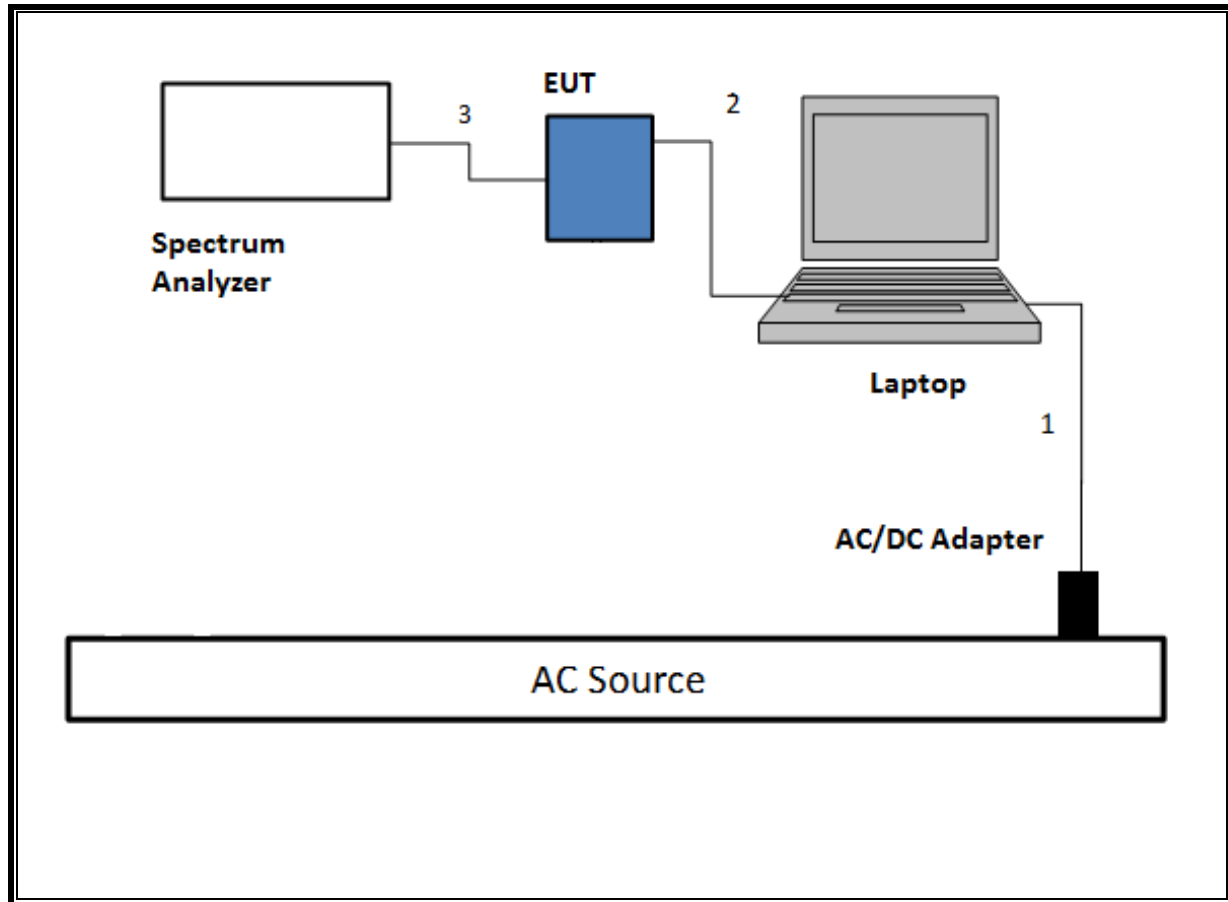
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC/DC	Un-shielded	2	N/A
2	USB	1	USB	Shielded	1	N/A
3	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer

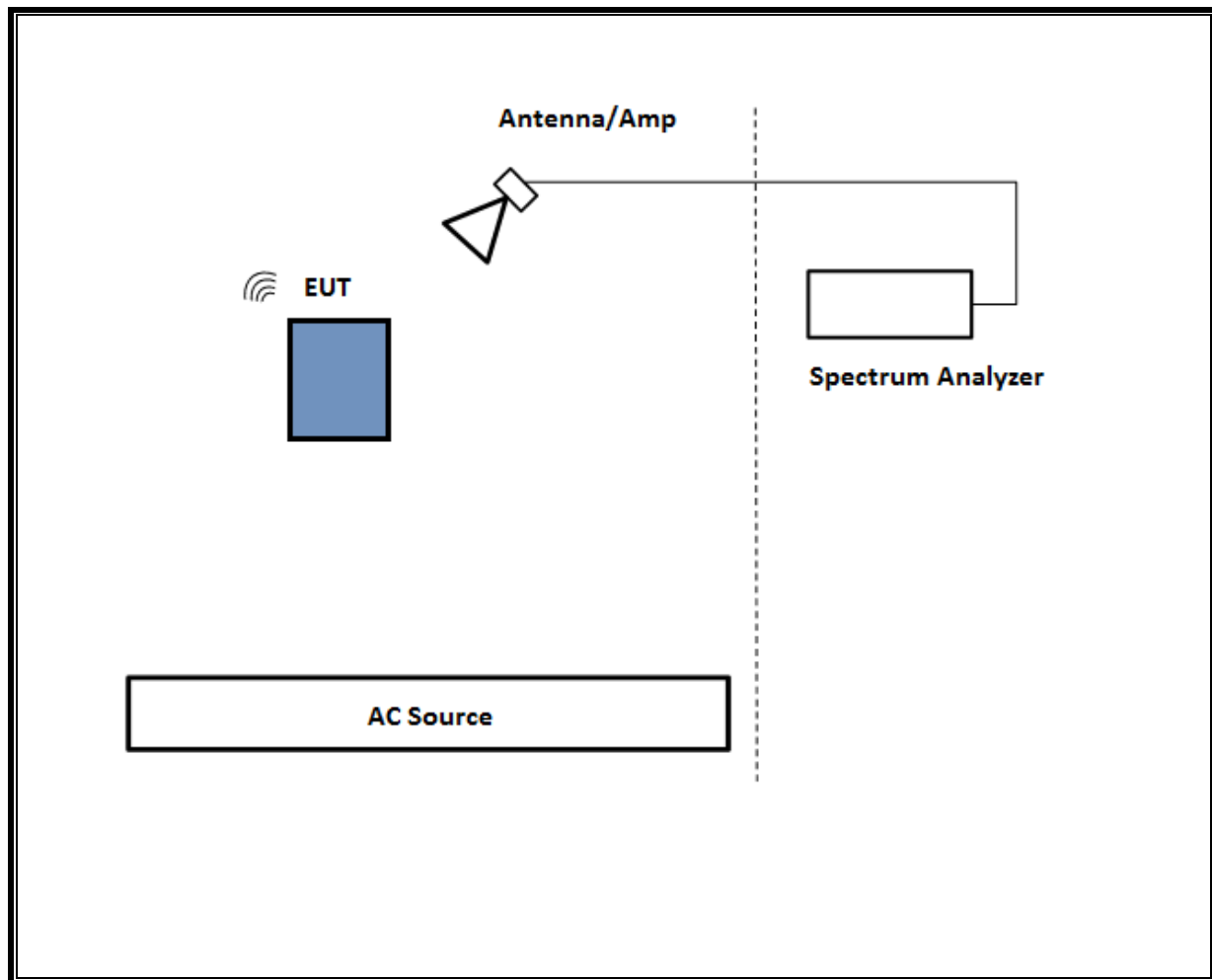
TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

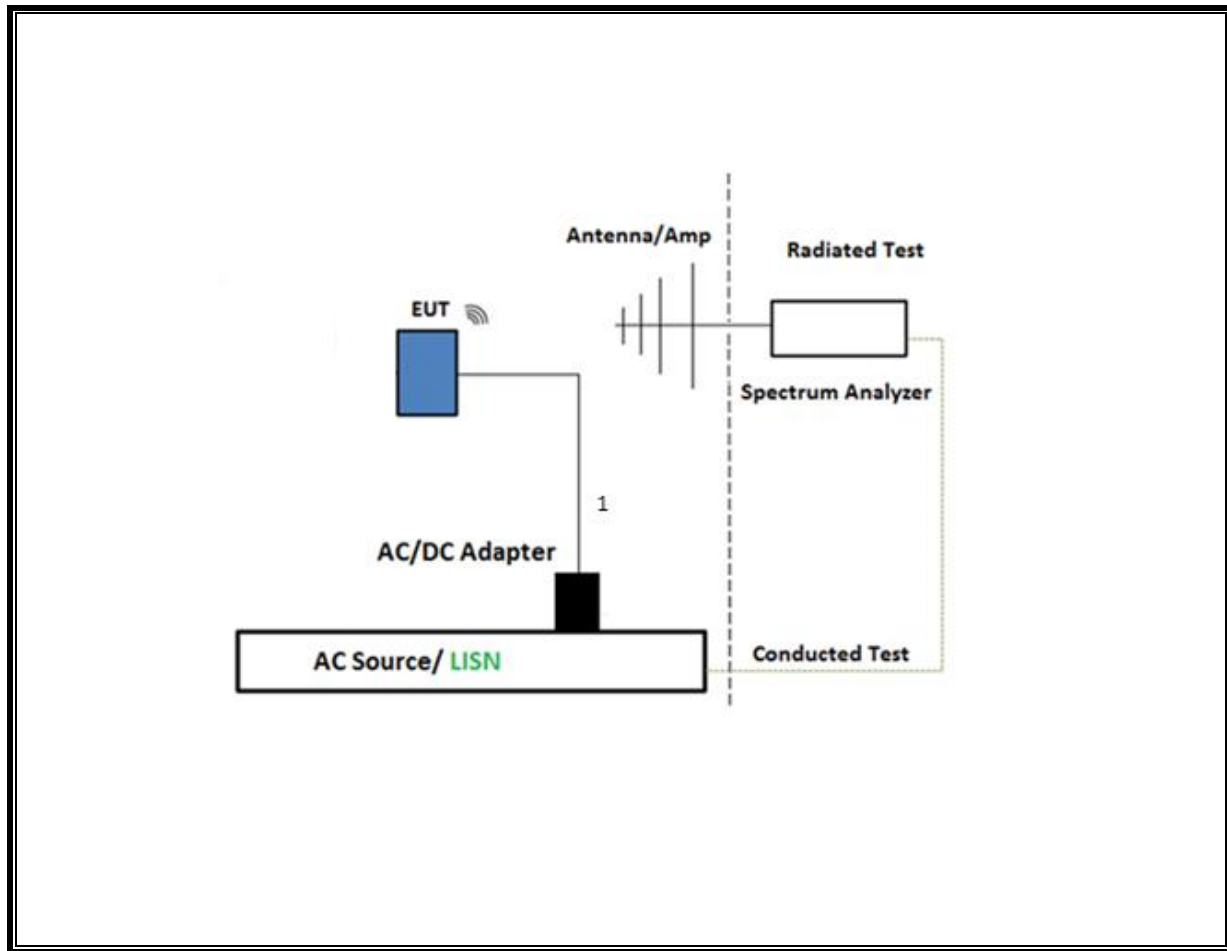
SETUP DIAGRAM FOR CONDUCTED TESTS



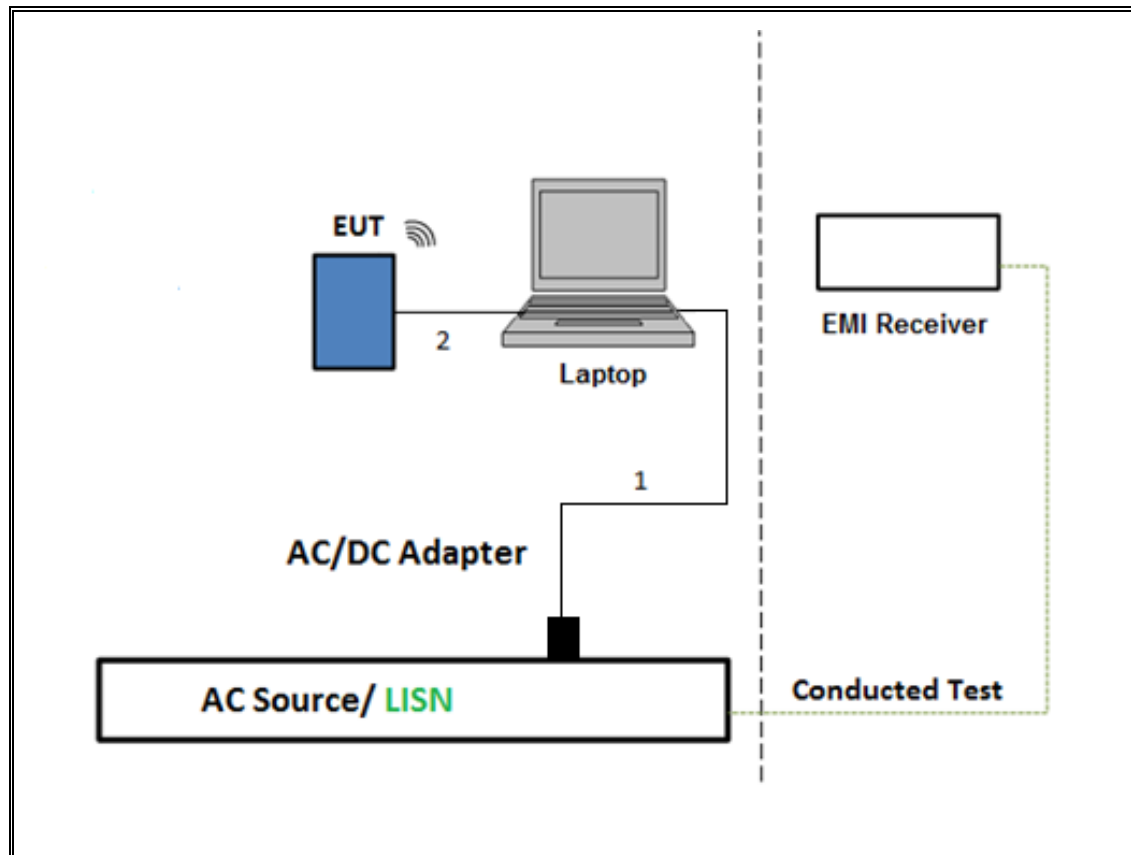
SETUP DIAGRAM FOR RADIATED TESTS Above 1GHz



SETUP DIAGRAM FOR BELOW 1GHz and AC LINE CONDUCTED TEST



TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



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	Last Cal
*Spectrum Analyzer, PXA, 3Hz to 50GHz w/Ext. Mixer	Agilent (Keysight) Technologies	N9030A	T342	02/22/2019	02/22/2018
Thermometer	Control Company	14-650-118, 15557603	T1817	05/01/2019	05/01/2018
Horn Antenna 1-18GHz	ETS-Lindgren	3117	T345	04/25/2019	04/25/2018
Horn Antenna 1-18GHz	ETS-Lindgren	3117	T120	07/02/2019	07/02/2018
Amplifier, 10KHz to 1GHz, 32dB	Sonoma Instrument Co.	310N	T286	06/04/2019	06/04/2018
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T1616	10/18/2019	10/18/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	T185	04/19/2019	04/19/2018
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	06/16/2019	06/16/2018
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25	T491	05/19/2019	05/19/2018
*Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	03/09/2019	03/09/2018
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T227	10/29/2019	10/29/2018
Power Sensor	Power Sensor	Keysight	T1226	02/06/2020	02/06/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T340	01/22/2020	01/22/2019
AC Line Conducted					
*EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESC17	T1436	02/23/2019	
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2019	
**LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/19/2019	
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016		
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

*Testing is completed before equipment expiration date.

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 Below 30MHz: ANSI C63.10-2013 Section 6.4

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.

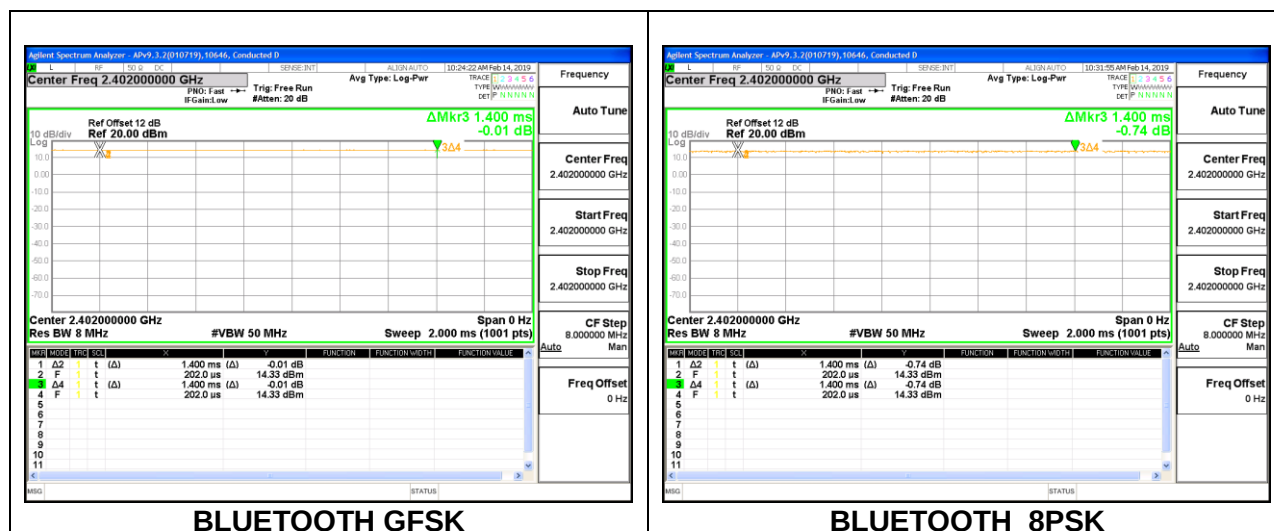
PROCEDURE

ANSI C63.10, Section 11.6 : 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	1.40	1.40	1.000	100.0%	0.00	0.010
Bluetooth 8PSK	1.40	1.40	1.000	100.0%	0.00	0.010

DUTY CYCLE PLOTS



8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

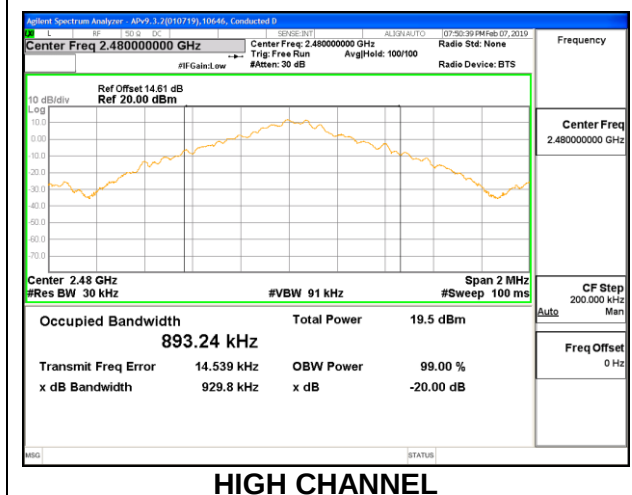
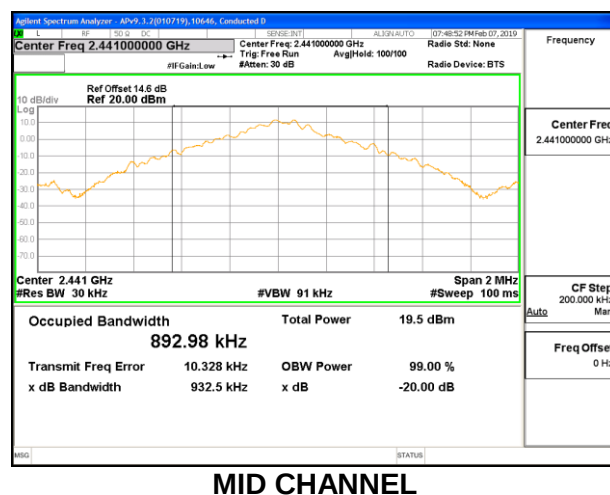
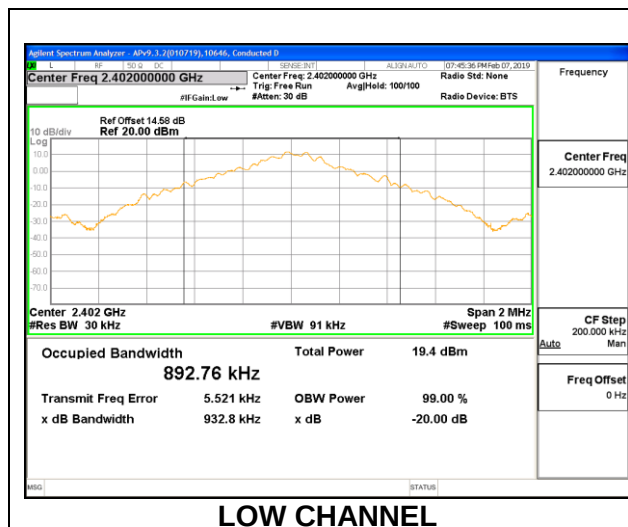
TEST PROCEDURE

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 3x RBW. The sweep time is coupled.

RESULTS

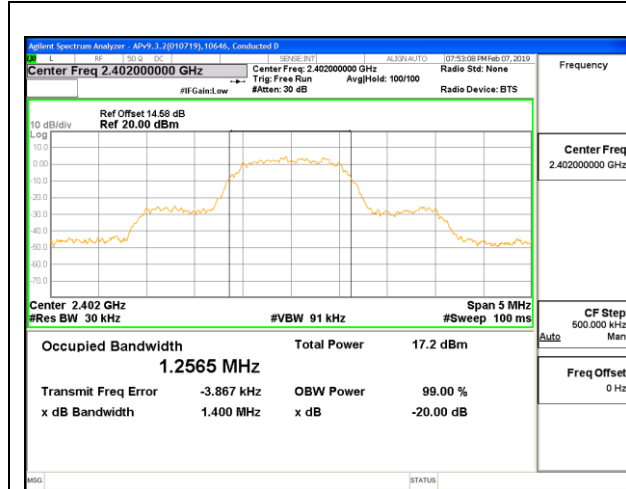
8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.9328	0.89276
Mid	2441	0.9325	0.89298
High	2480	0.9298	0.89324

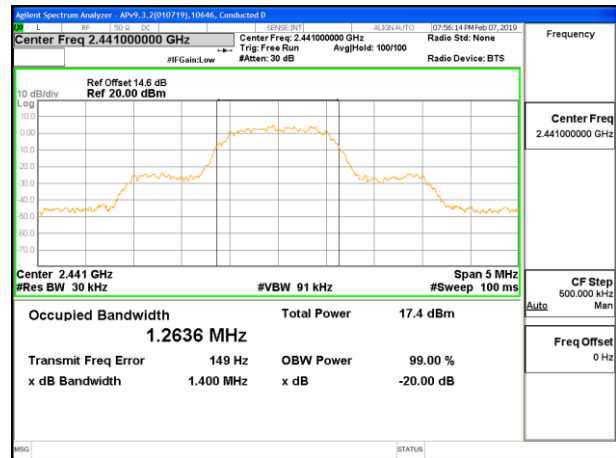


8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

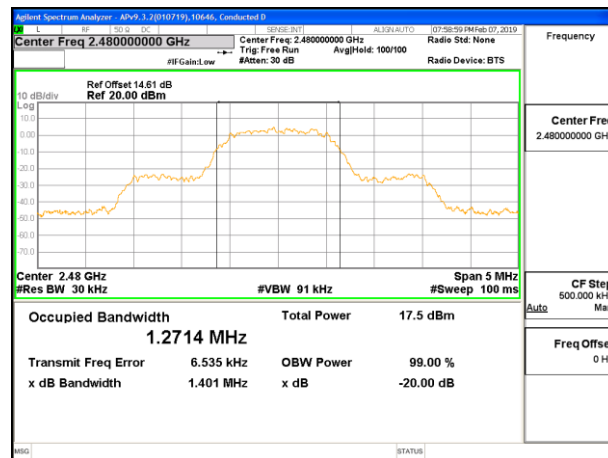
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.400	1.2565
Mid	2441	1.400	1.2636
High	2480	1.401	1.2714



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

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

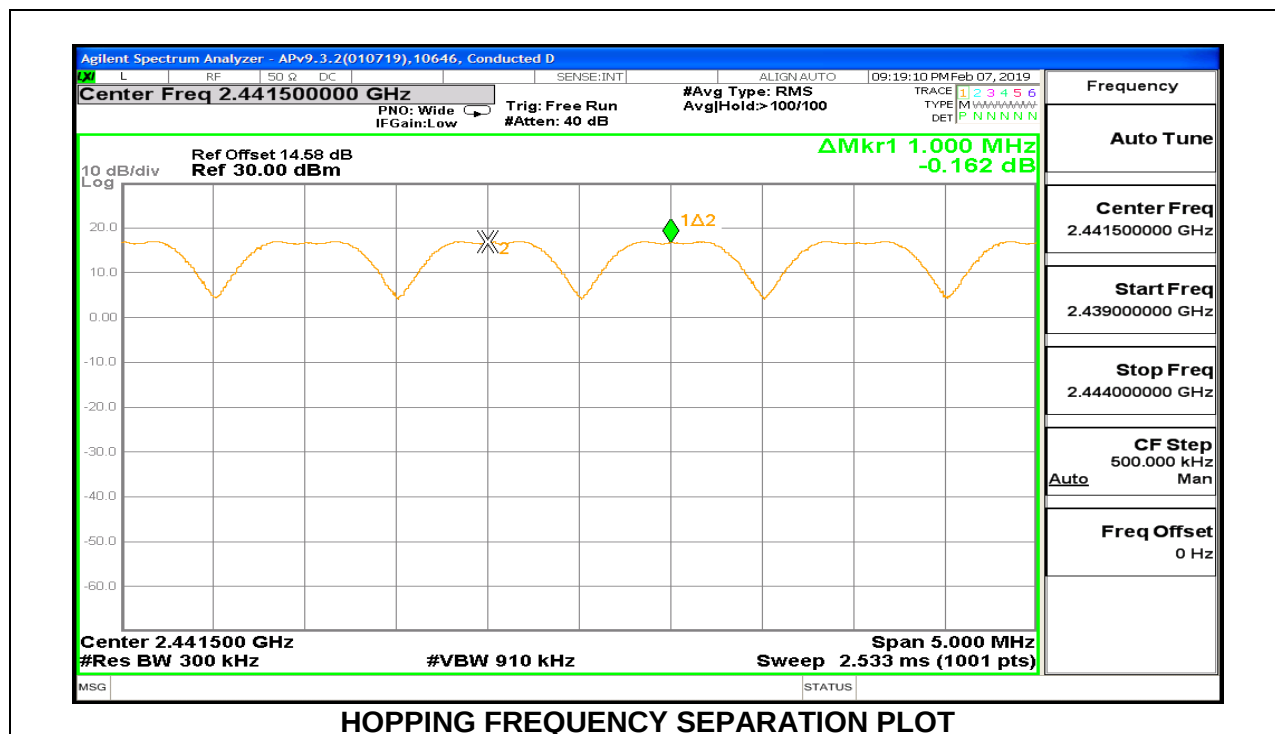
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

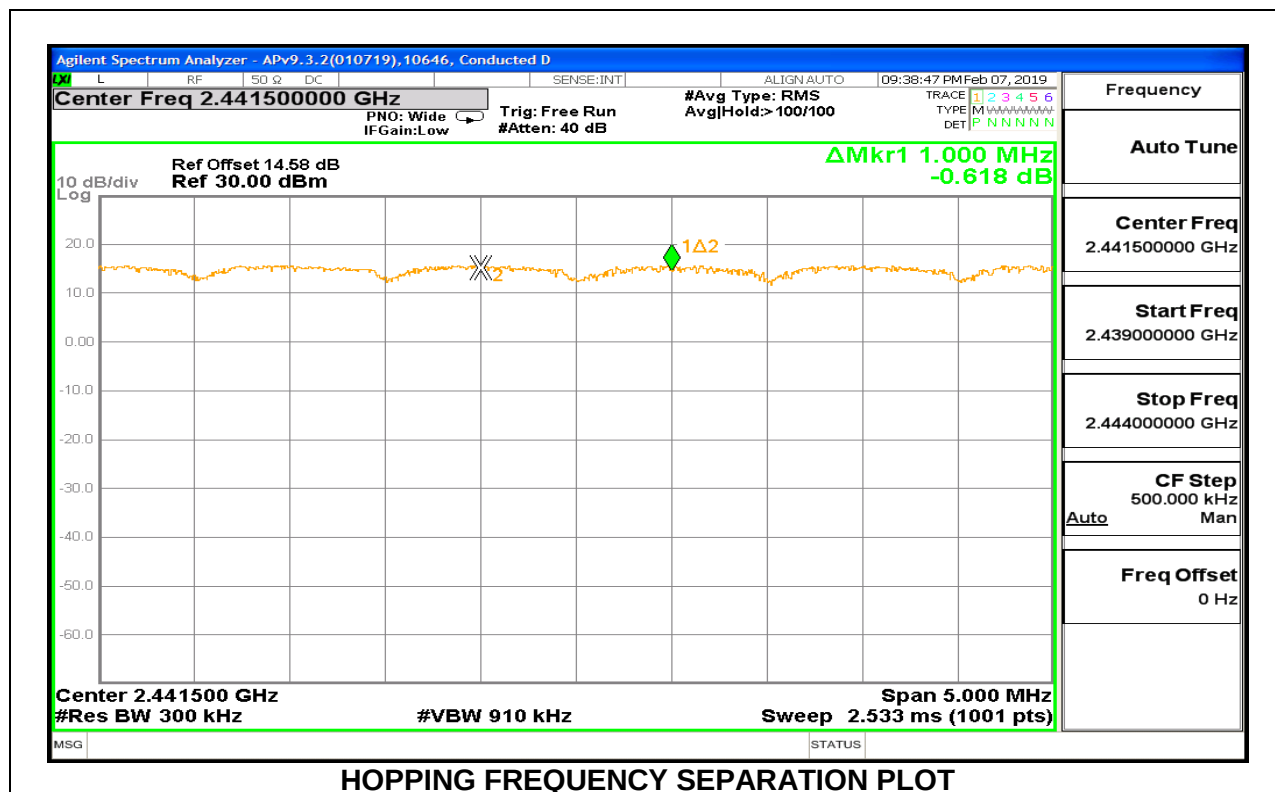
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 3x RBW. The sweep time is coupled.

RESULTS

8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



8.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



8.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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

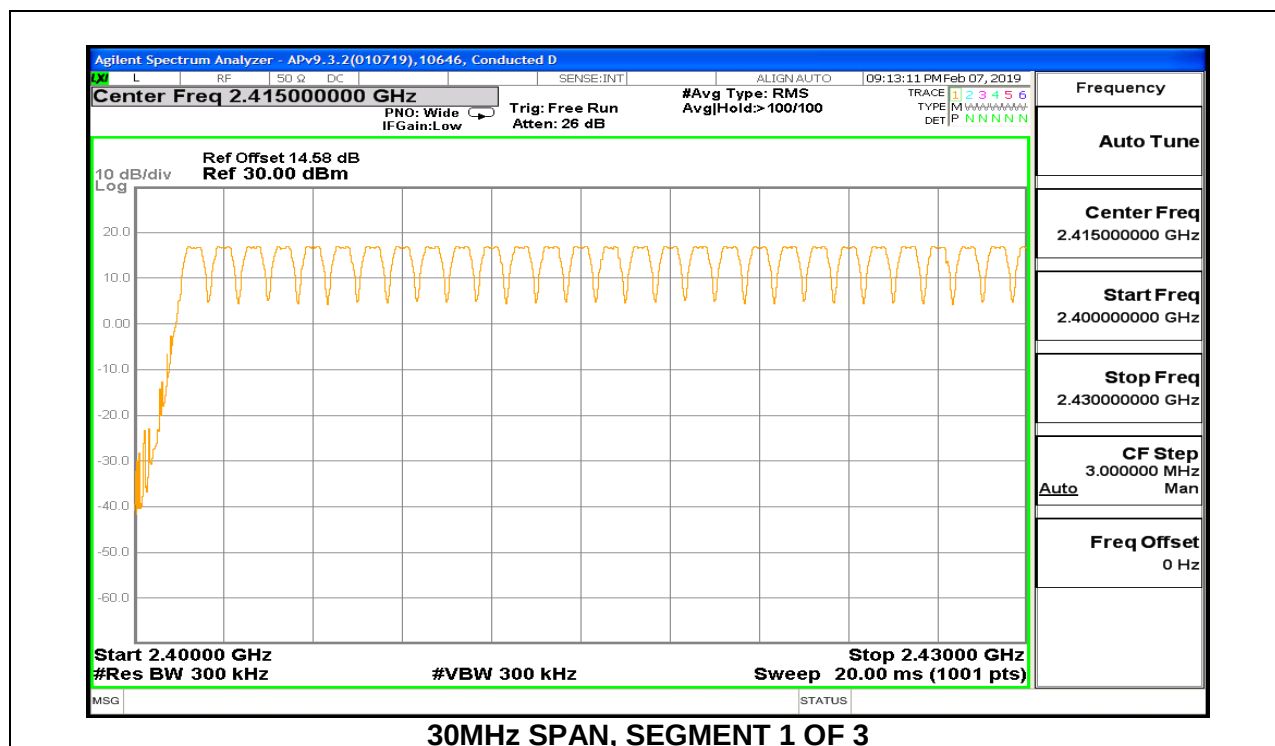
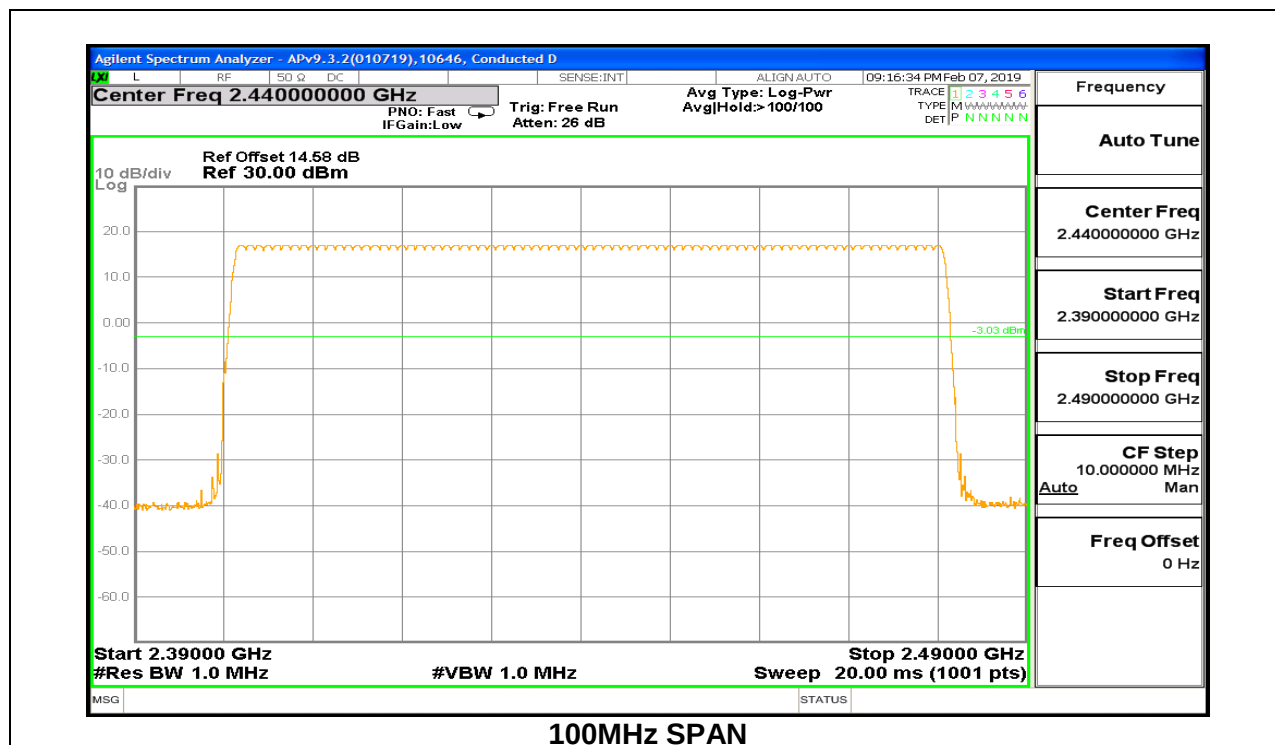
TEST PROCEDURE

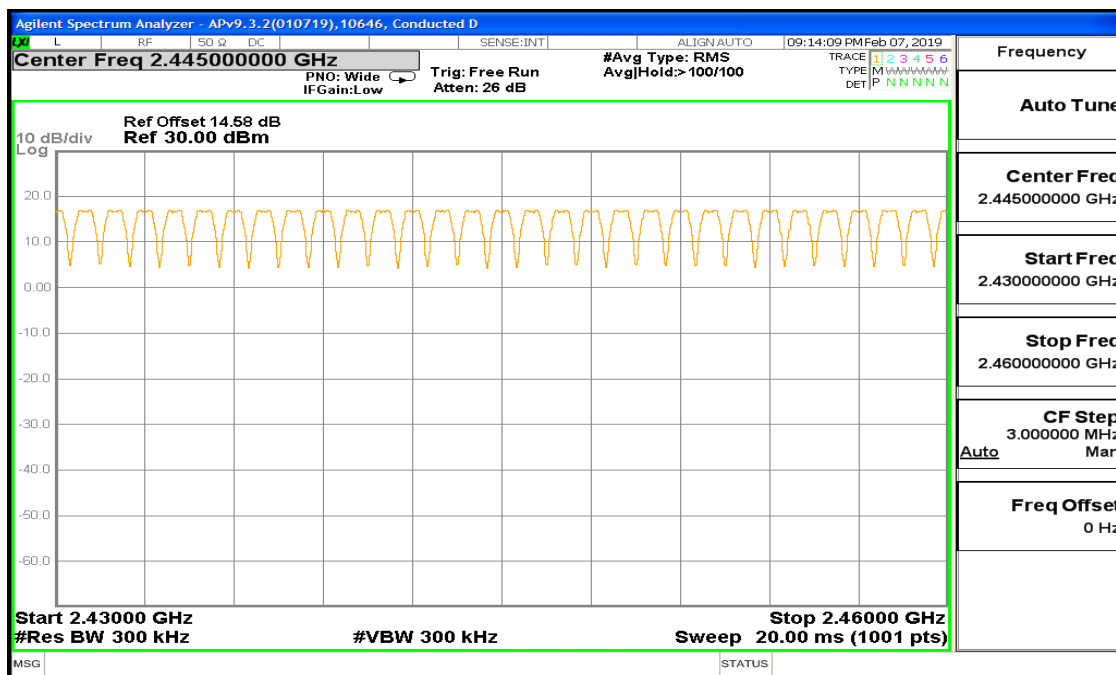
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

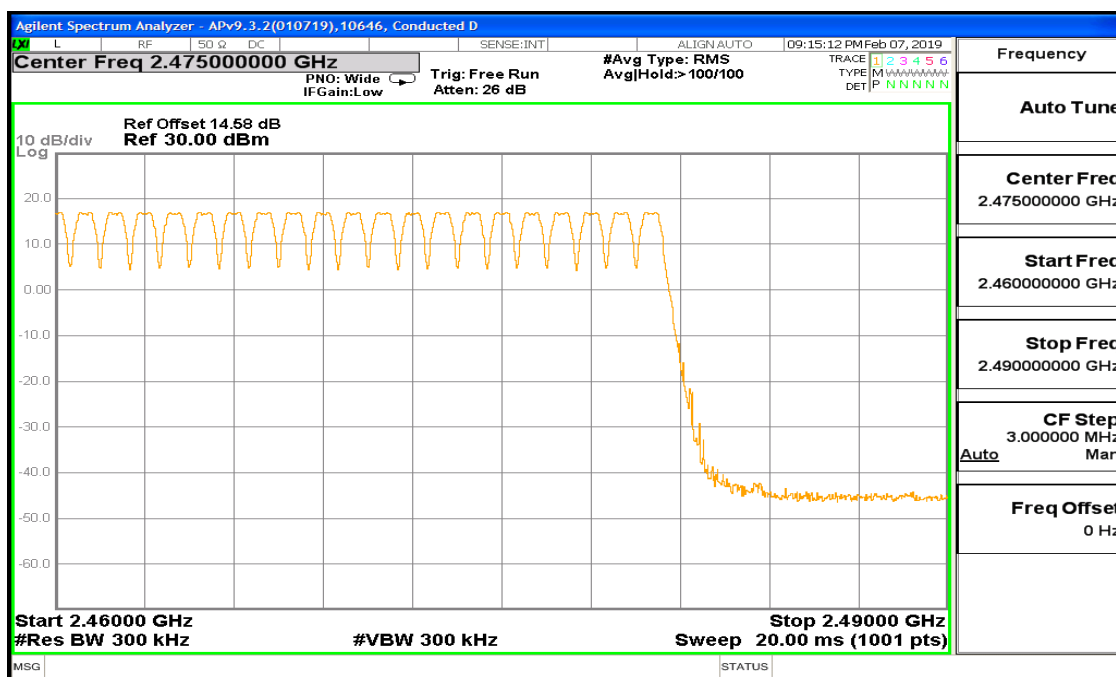
Normal Mode: 79 Channels Observed

8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



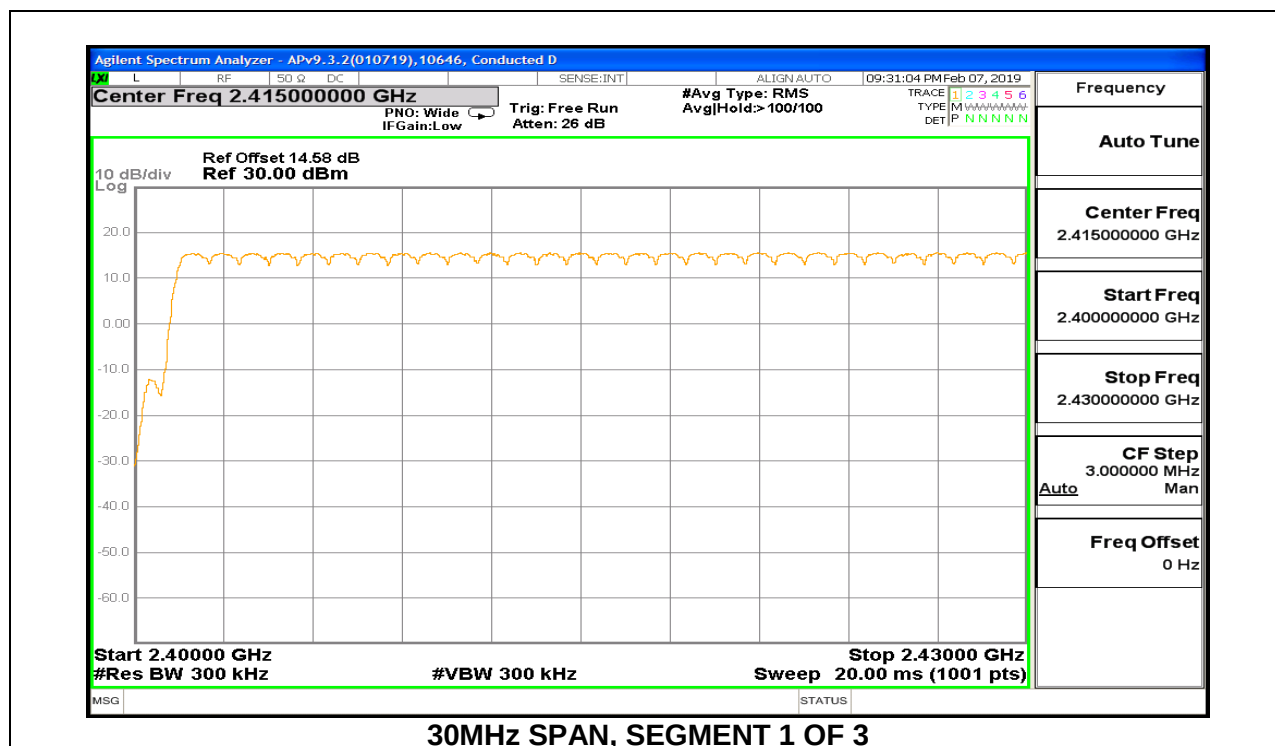
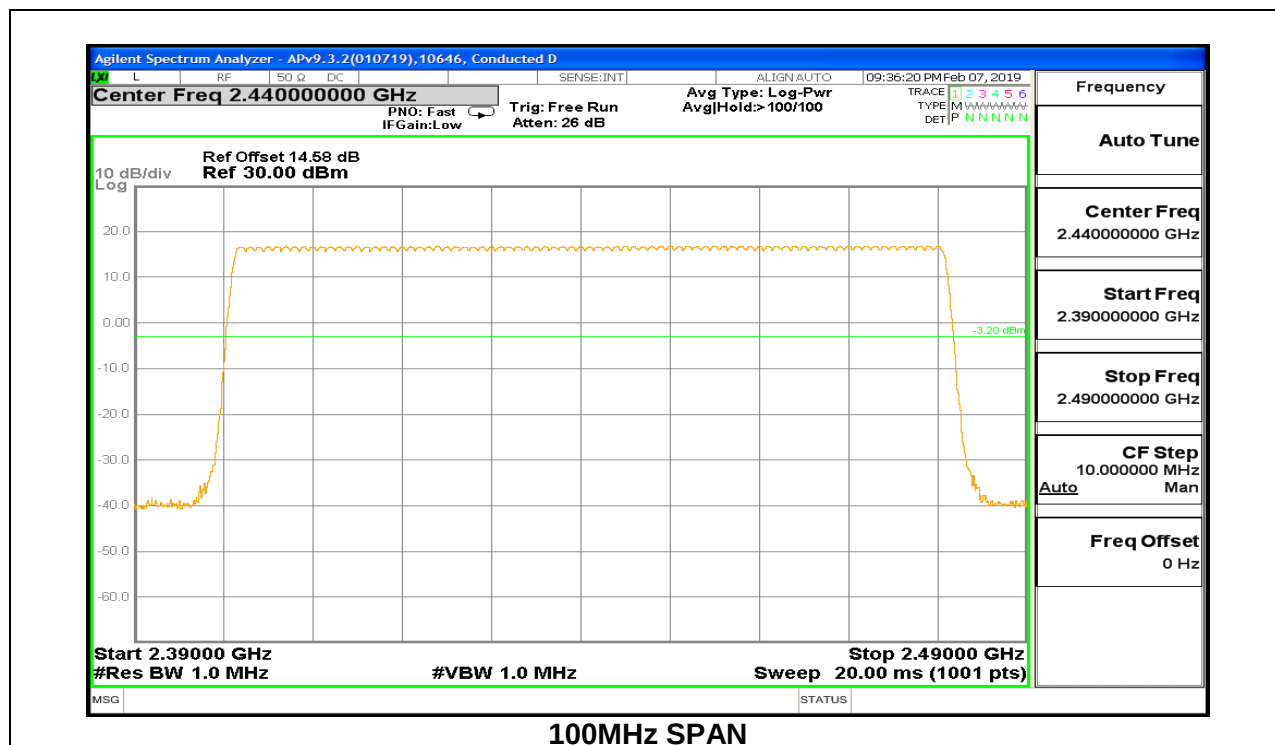


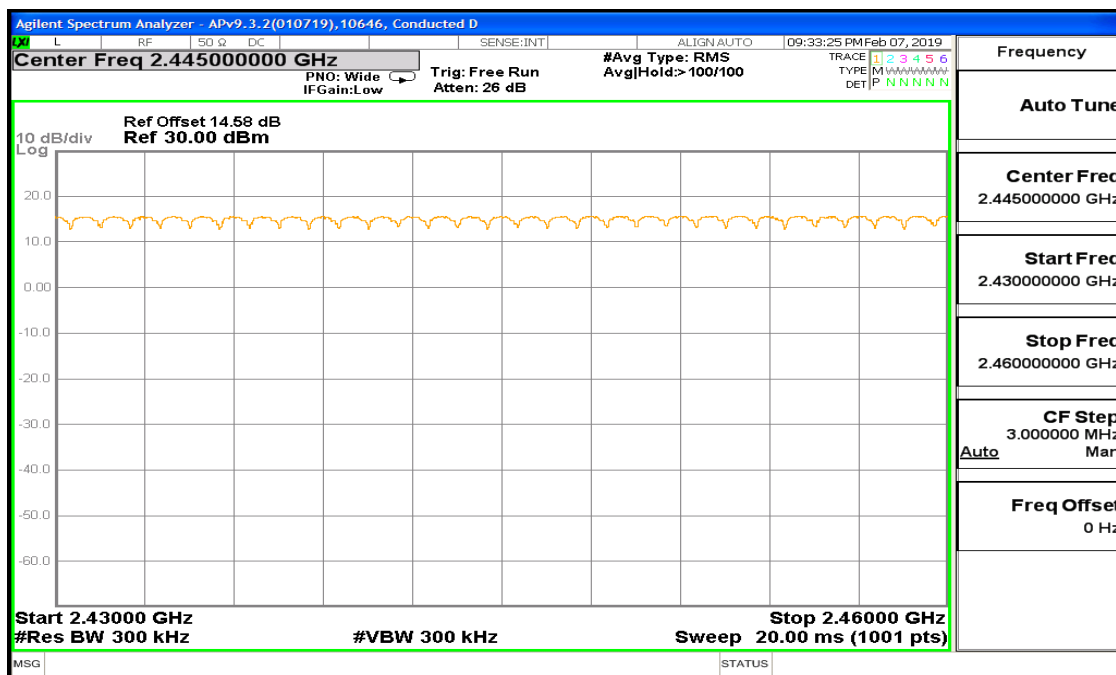
30MHz SPAN, SEGMENT 2 OF 3



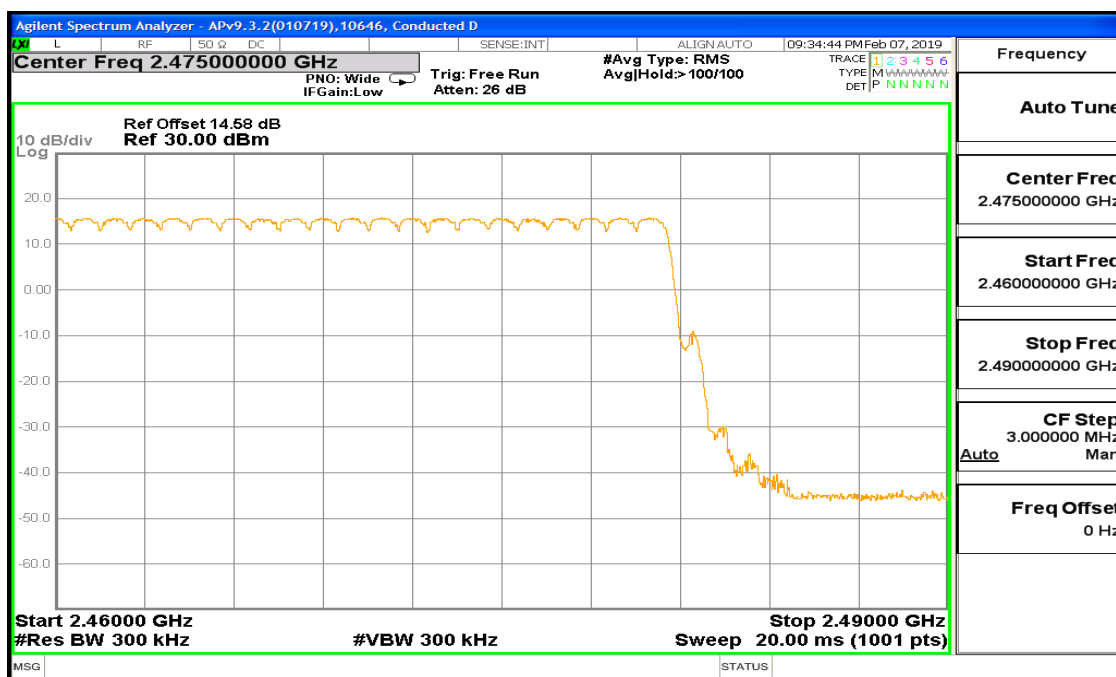
30MHz SPAN, SEGMENT 3 OF 3

8.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

8.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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

TEST PROCEDURE

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

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

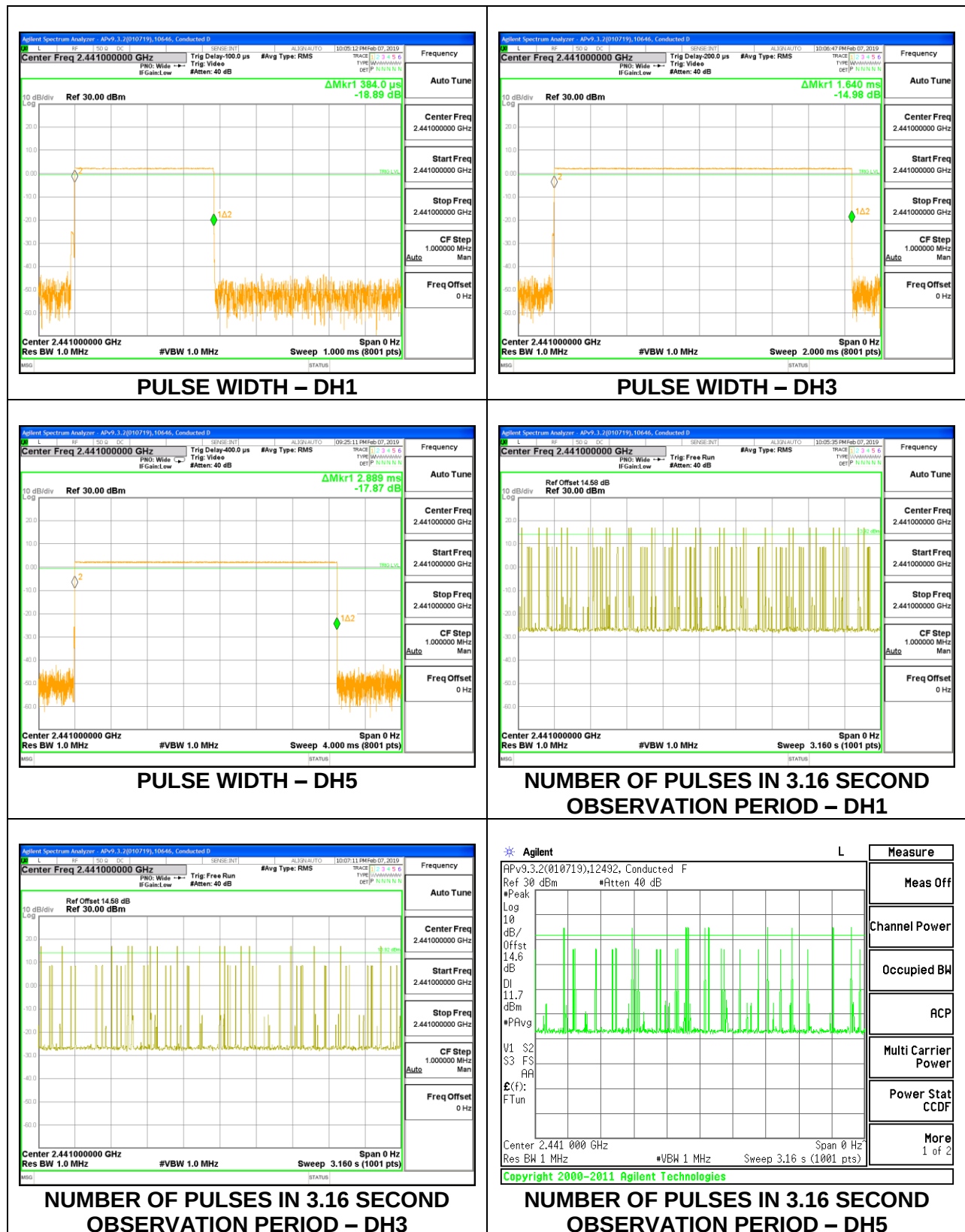
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{pulse width}$.

RESULTS

8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

ID:	12492	Date:	02/08/2019
------------	-------	--------------	------------

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	0.384	30	0.1152	0.4	-0.2848
DH3	1.640	17	0.2788	0.4	-0.1212
DH5	2.889	10	0.2889	0.4	-0.1111
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	0.384	7.5	0.02880	0.4	-0.3712
DH3	1.640	4.25	0.06970	0.4	-0.3303
DH5	2.889	2.5	0.07223	0.4	-0.3278

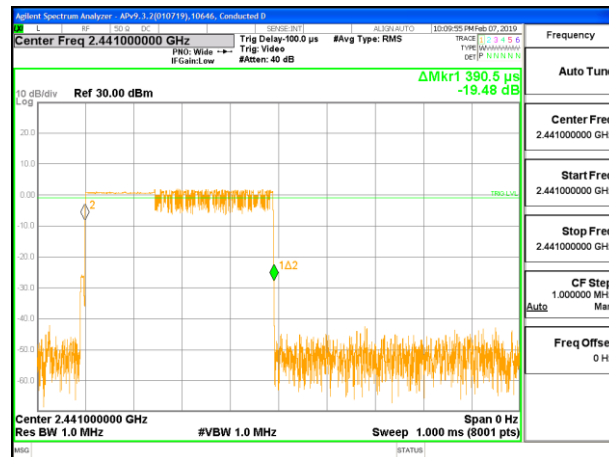


8.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

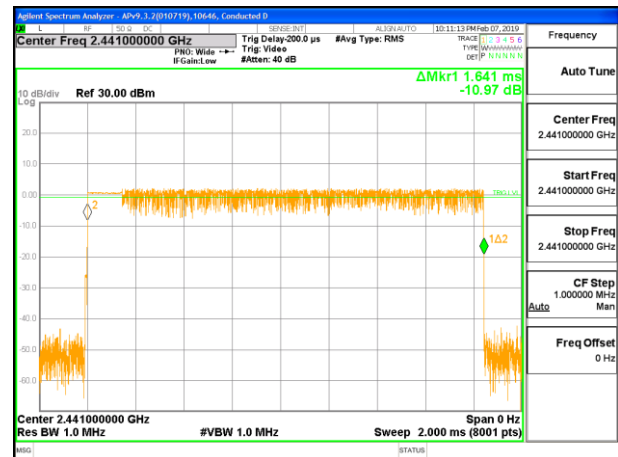
ID:	12492	Date:	02/08/2019
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DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.3905	30	0.11715	0.4	-0.28285
3DH3	1.641	16	0.26256	0.4	-0.13744
3DH5	2.893	12	0.34716	0.4	-0.05284

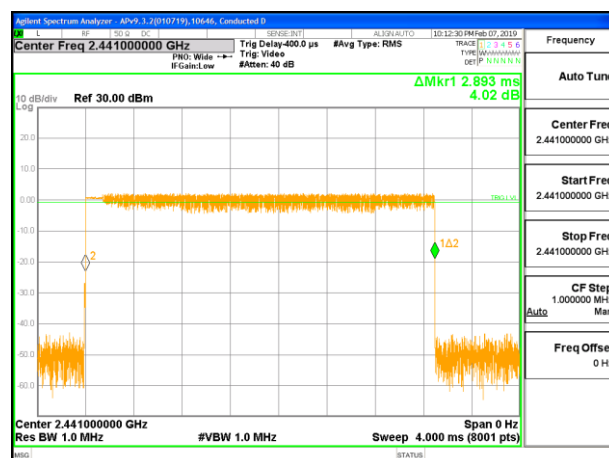
Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.



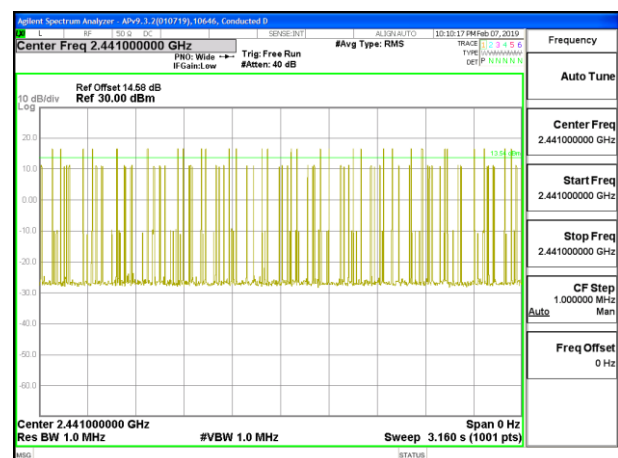
PULSE WIDTH – 3DH1



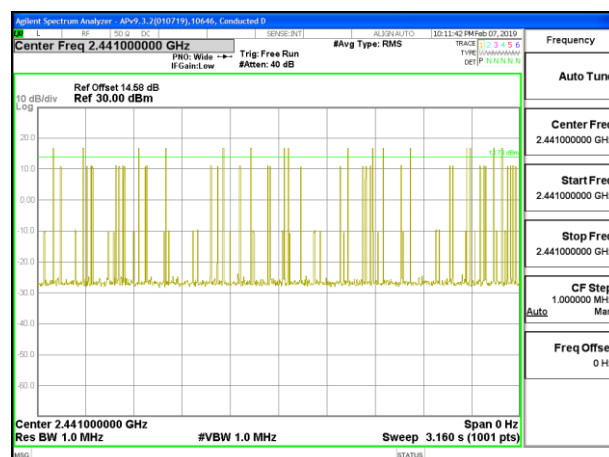
PULSE WIDTH – 3DH3



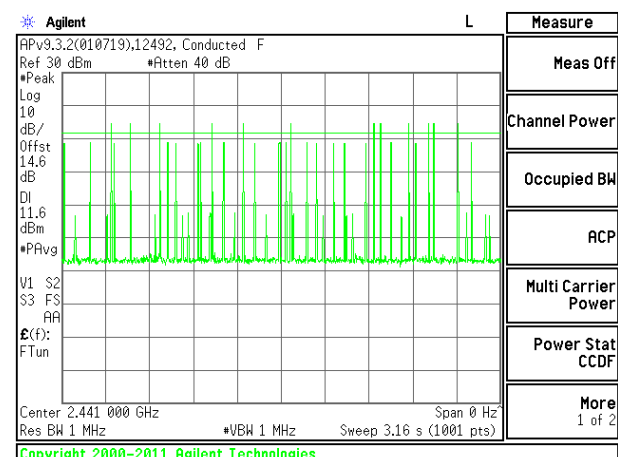
PULSE WIDTH – 3DH5



**NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – 3DH1**



**NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – 3DH3**



**NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – 3DH5**

8.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (b)

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

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.65 dB (including 10 dB pad and 0.65 dB cable) 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:	44366
Date:	4/5/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.28	21	-8.72
Middle	2441	12.26	21	-8.74
High	2480	12.25	21	-8.75

8.6.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	19419
Date:	2/19/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.56	21	-9.44
Middle	2441	11.63	21	-9.37
High	2480	11.62	21	-9.38

8.6.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	19419
Date:	2/19/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.13	21	-8.87
Middle	2441	11.65	21	-9.35
High	2480	11.67	21	-9.33

8.7. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.65 dB (including 10 dB pad and 0.65 dB cable) 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:	44366
Date	4/5/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	11.95
Middle	2441	11.98
High	2480	11.96

8.7.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	19419
Date	2/18/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.67
Middle	2441	9.85
High	2480	9.92

8.7.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	19419
Date	2/18/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.75
Middle	2441	9.87
High	2480	9.96

8.8. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 3x RBW.

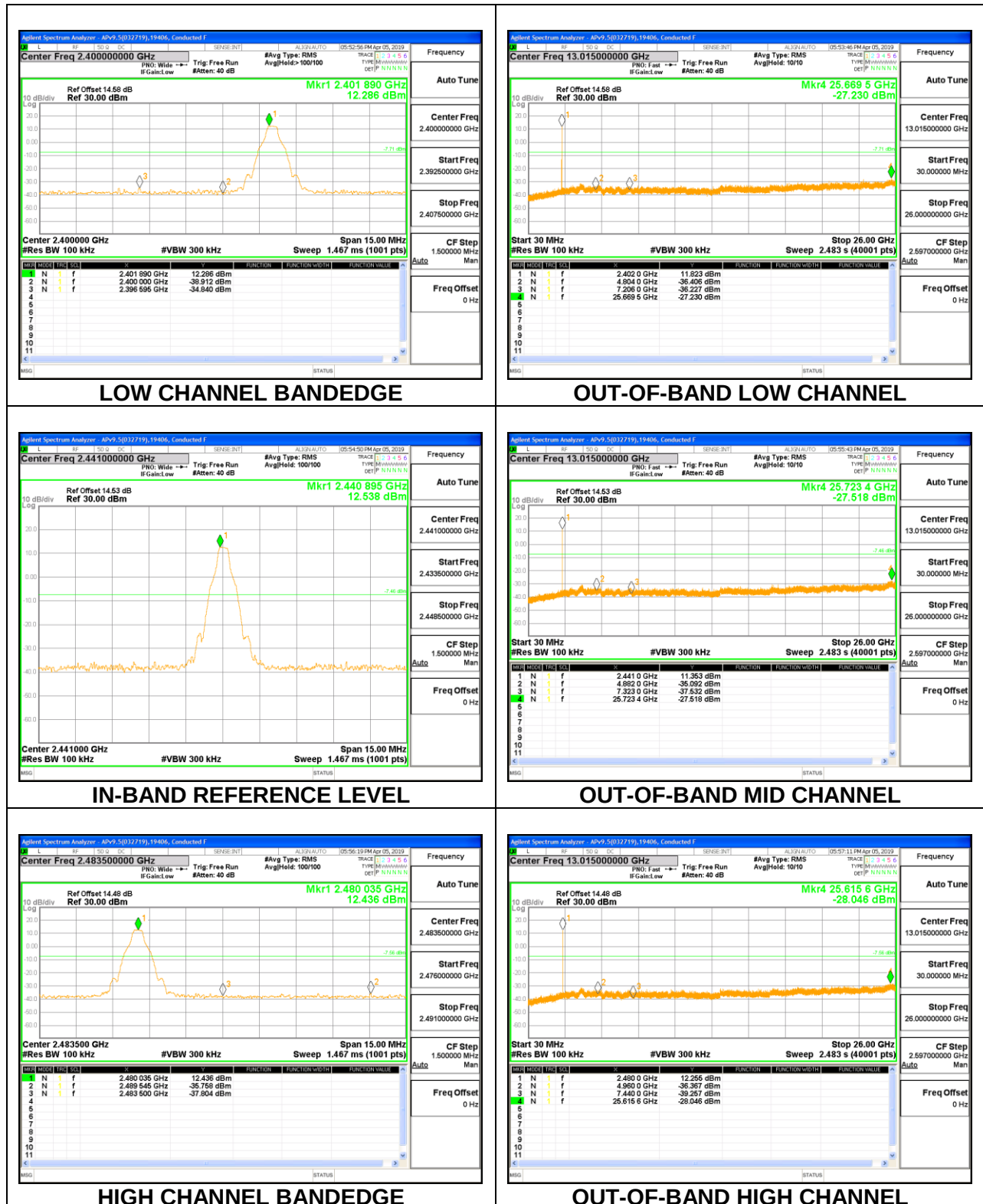
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

RESULTS

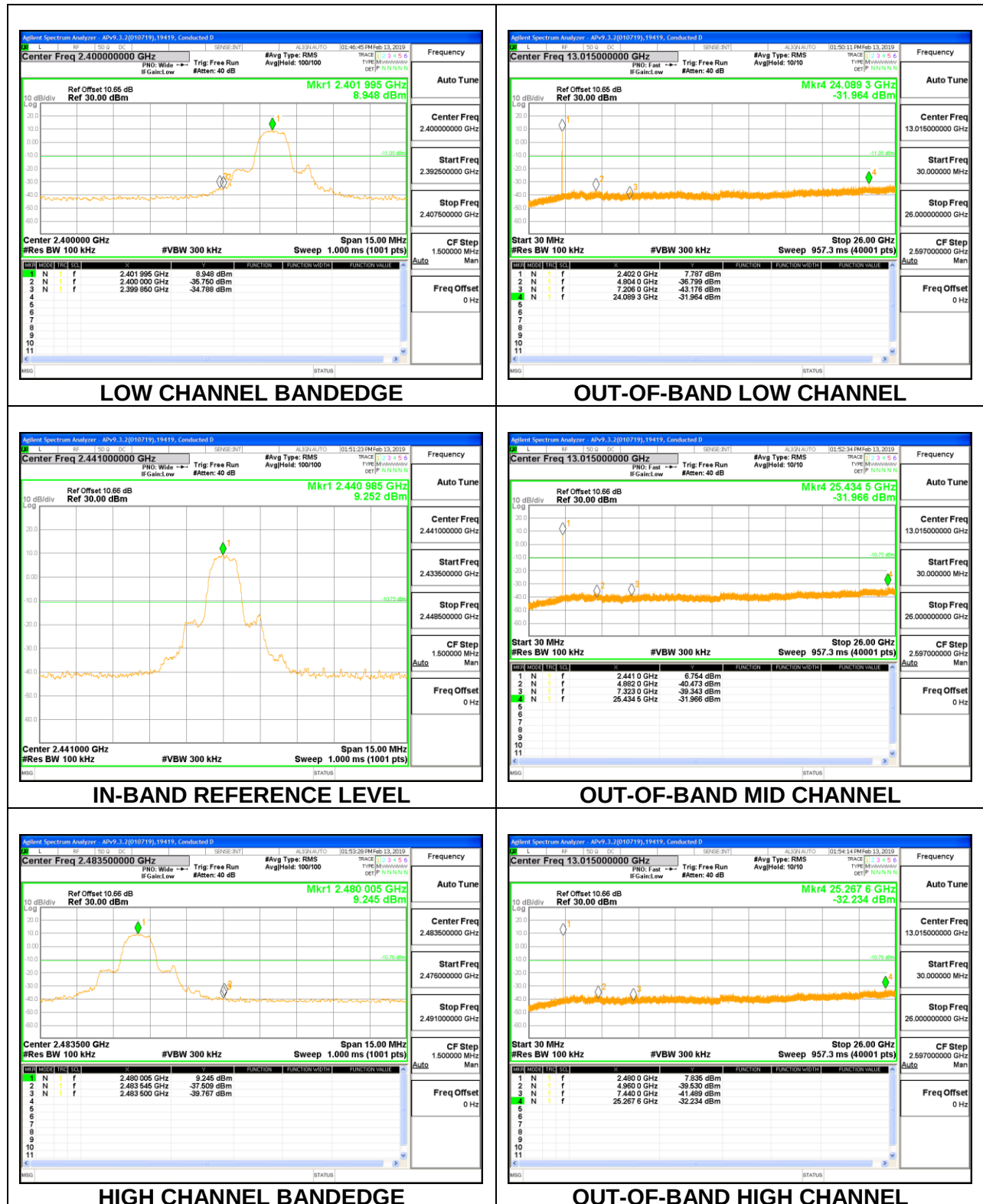
8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



9. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

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 final scans 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 (10 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.

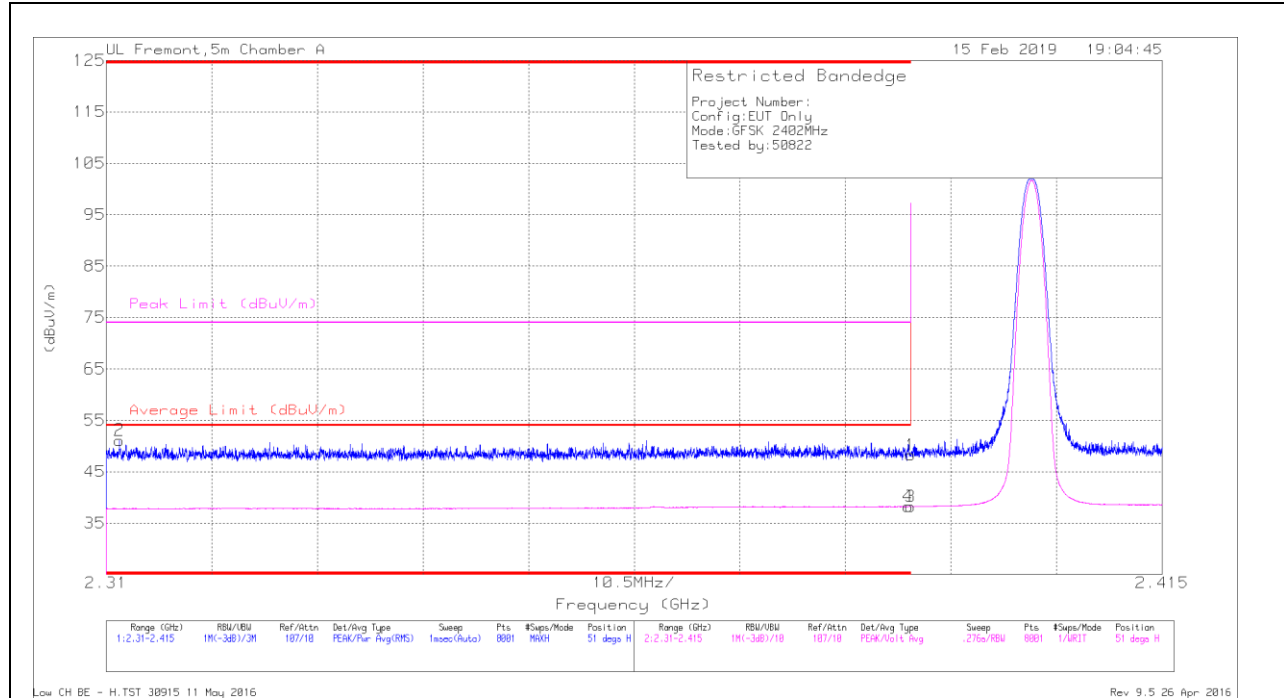
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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



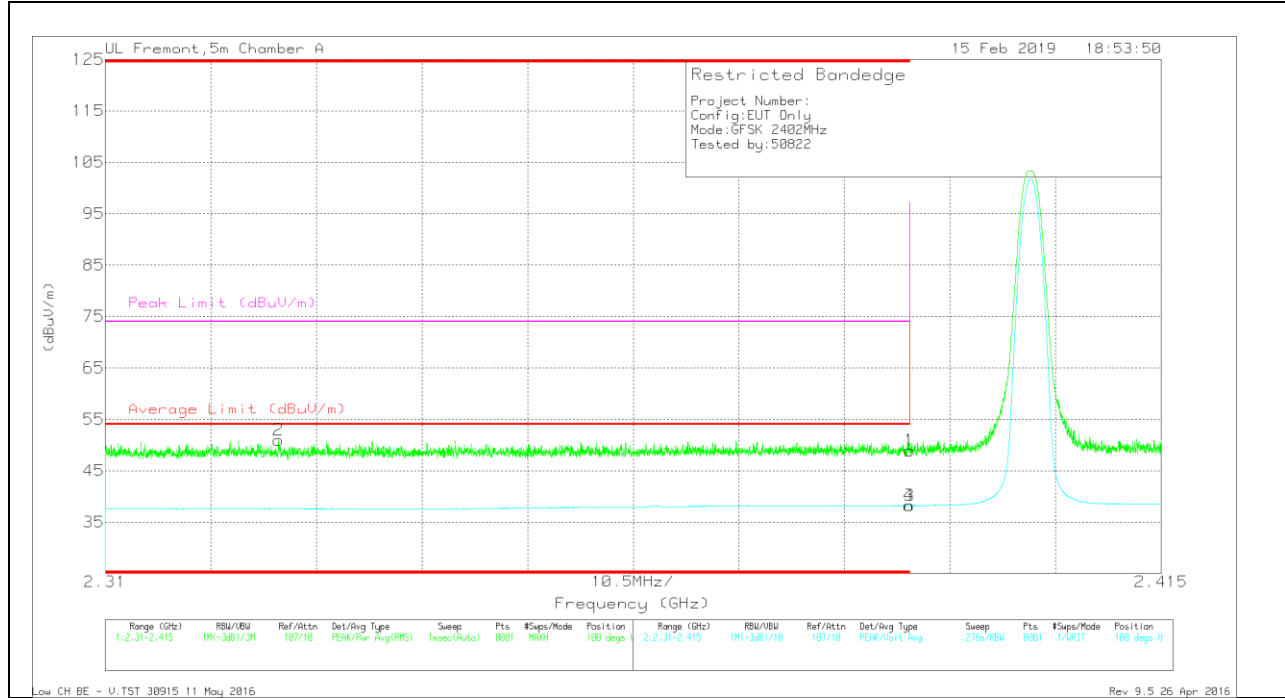
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cb/Filt/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.23	Pk	32	-23	48.23	-	-	74	-25.77	51	351	H
2	* 2.311	42.41	Pk	31.7	-23	51.11	-	-	74	-22.89	51	351	H
3	* 2.39	29.21	VA1T	32	-23	38.21	54	-15.79	-	-	51	351	H
4	* 2.39	29.24	VA1T	32	-23	38.24	54	-15.76	-	-	51	351	H

* - 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

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/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	39.94	Pk	32	-23	48.94	-	-	74	-25.06	100	349	V
2	* 2.327	42.17	Pk	31.8	-23	50.97	-	-	74	-23.03	100	349	V
3	* 2.39	29.21	VA1T	32	-23	38.21	54	-15.79	-	-	100	349	V
4	* 2.39	29.23	VA1T	32	-23	38.23	54	-15.77	-	-	100	349	V

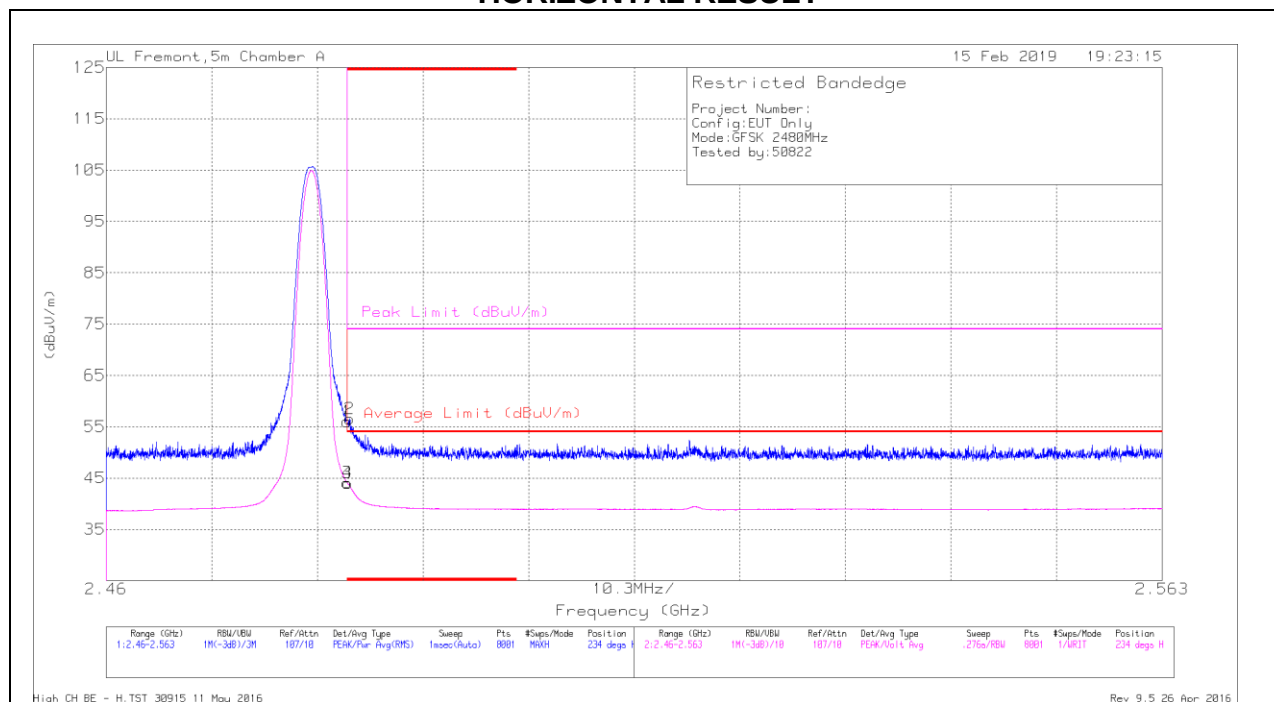
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



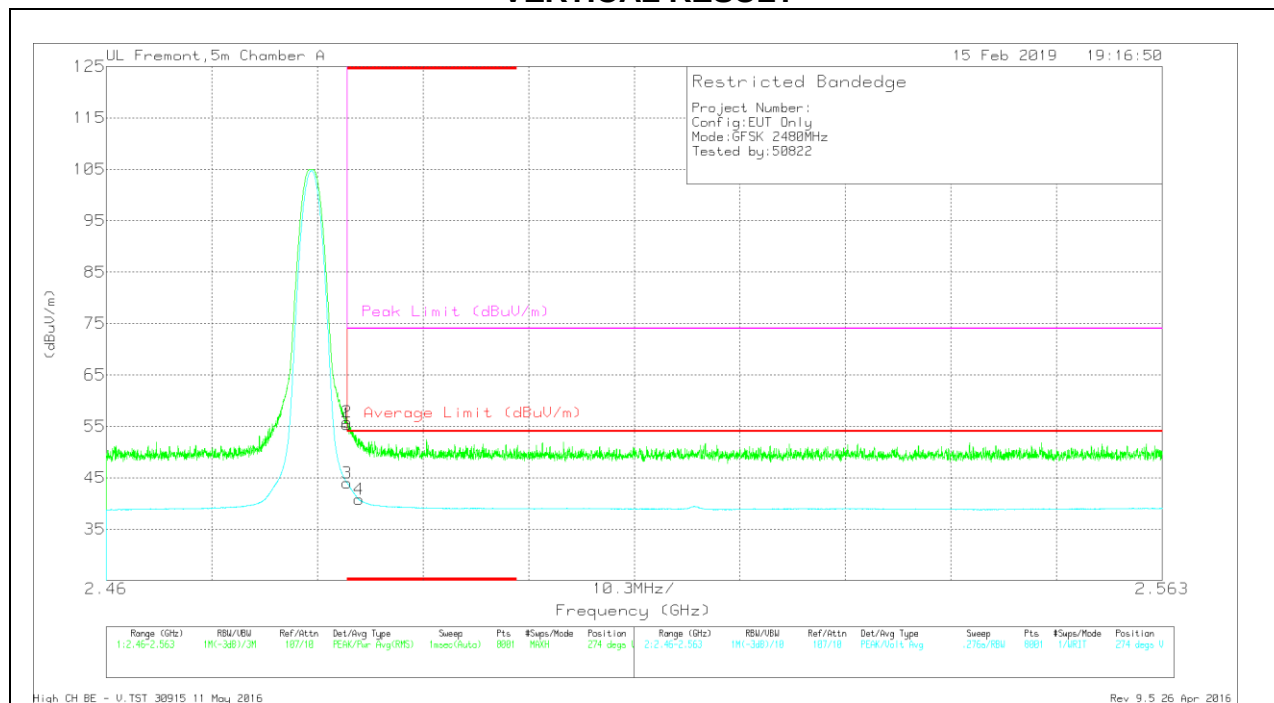
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	46.32	Pk	32.4	-22.7	56.02	-	-	74	-17.98	234	114	H
2	* 2.484	46.85	Pk	32.4	-22.7	56.55	-	-	74	-17.45	234	114	H
3	* 2.484	34.39	VA1T	32.4	-22.7	44.09	54	-9.91	-	-	234	114	H
4	* 2.484	34.33	VA1T	32.4	-22.7	44.03	54	-9.97	-	-	234	114	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 RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.66	Pk	32.4	-22.7	55.36	-	-	74	-18.64	274	314	V
2	* 2.484	46.1	Pk	32.4	-22.7	55.8	-	-	74	-18.2	274	314	V
3	* 2.484	34.26	VA1T	32.4	-22.7	43.96	54	-10.04	-	-	274	314	V
4	* 2.485	31.1	VA1T	32.4	-22.7	40.8	54	-13.2	-	-	274	314	V

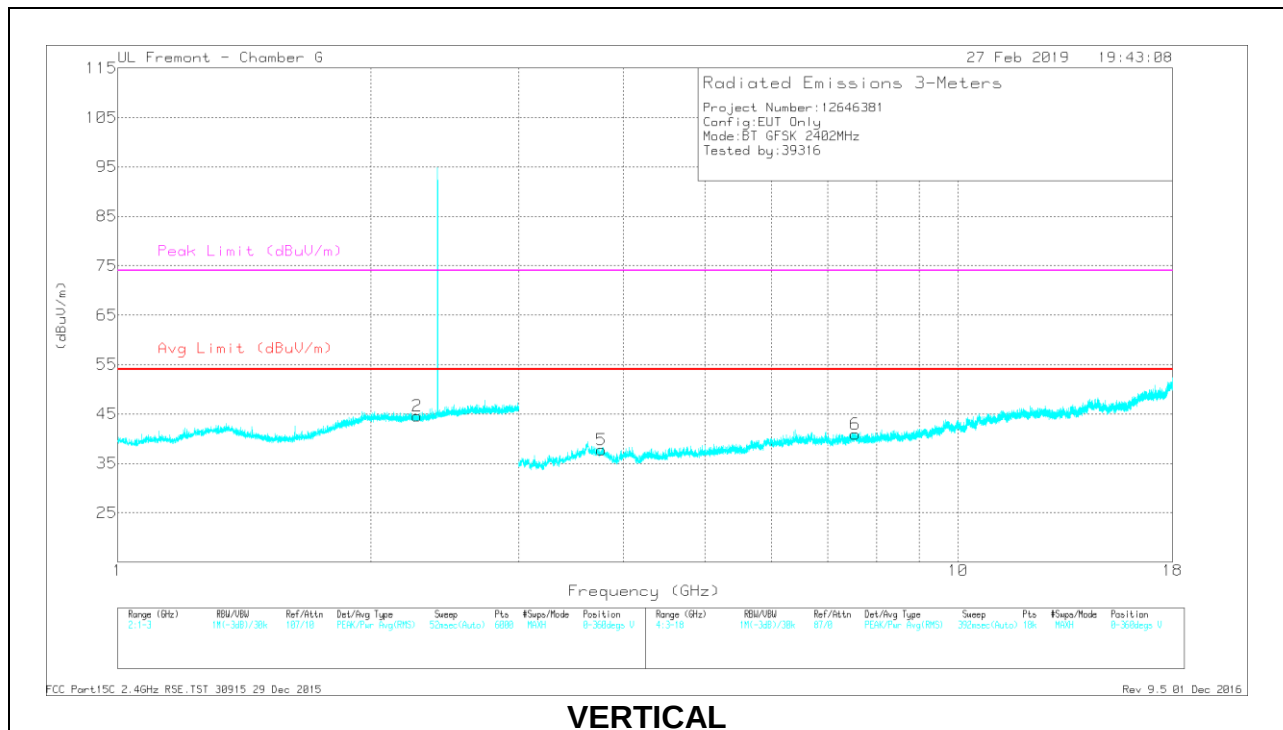
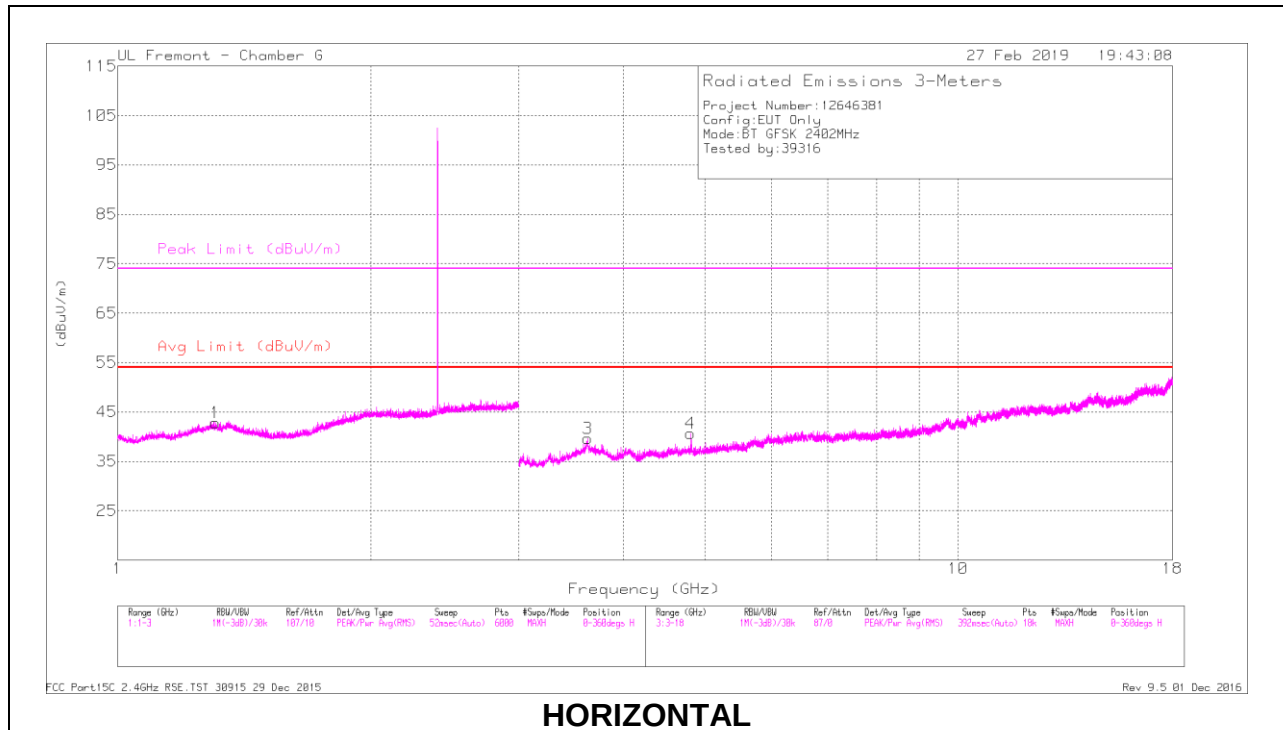
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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 RESULTS



RADIATED EMISSIONS

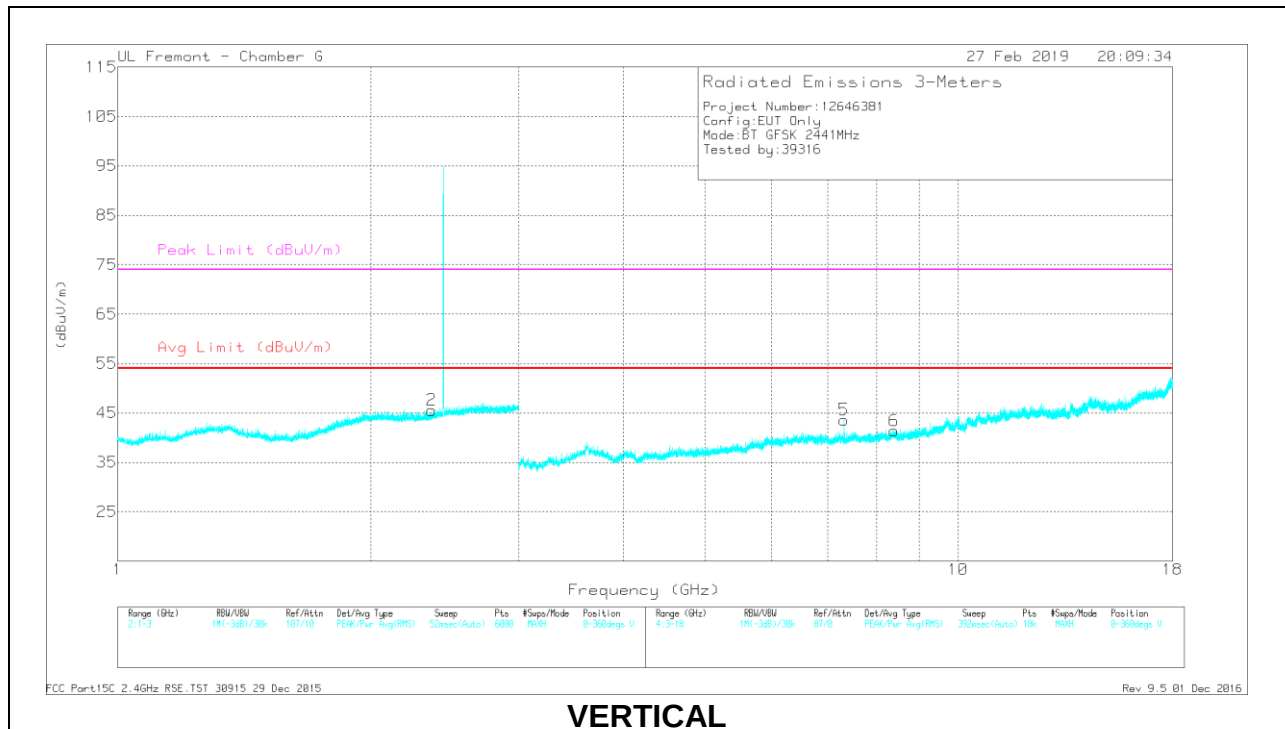
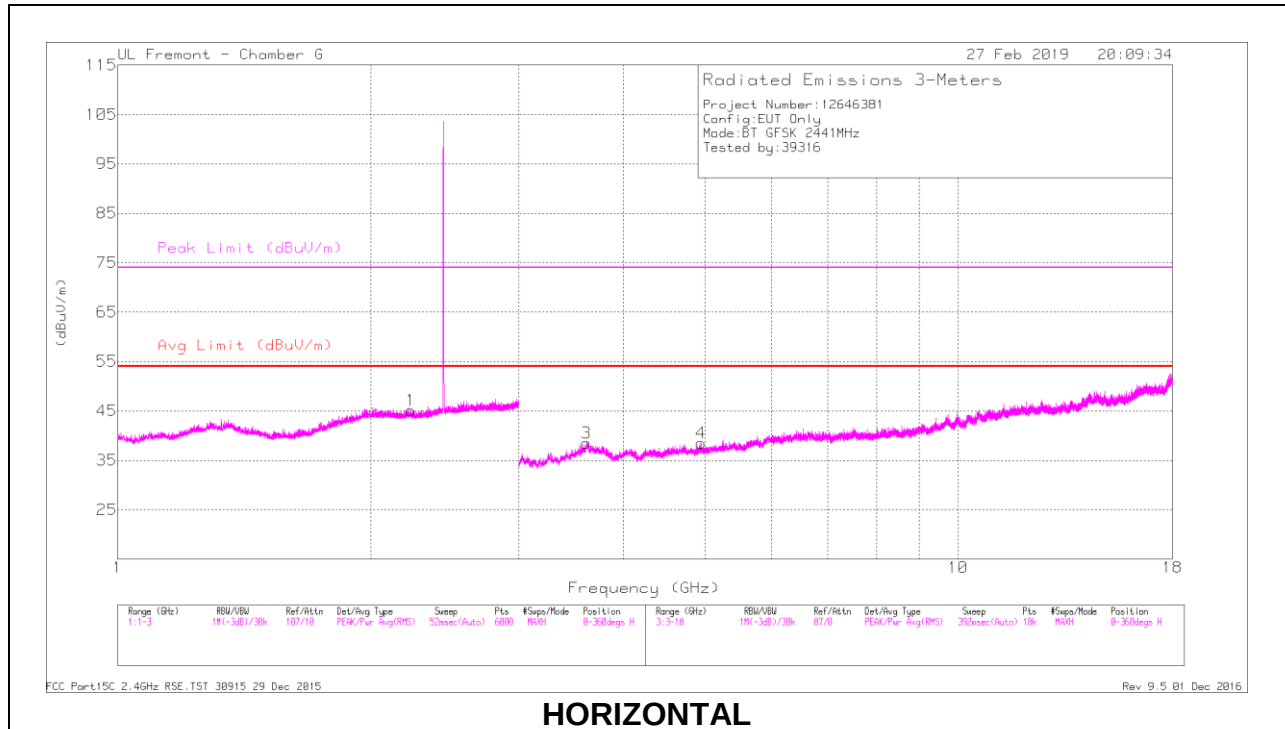
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.309	41.56	PKFH	29.8	-23.8	47.56	-	-	74	-26.44	246	164	H
	* 1.306	29.62	VA1T	29.8	-23.8	35.62	54	-18.38	-	-	246	164	H
2	* 2.27	42.27	PKFH	31.7	-22.5	51.47	-	-	74	-22.53	313	193	V
	* 2.273	30.11	VA1T	31.7	-22.5	39.31	54	-14.69	-	-	313	193	V
3	* 3.624	39.58	PKFH	35.5	-30.1	44.98	-	-	74	-29.02	257	212	H
	* 3.625	27.51	VA1T	35.4	-30	32.91	54	-21.09	-	-	257	212	H
4	* 4.803	40.35	PKFH	34.3	-29.8	44.85	-	-	74	-29.15	110	168	H
	* 4.804	30.43	VA1T	34.3	-29.8	34.93	54	-19.07	-	-	110	168	H
5	* 3.768	40	PKFH	33.8	-29.5	44.3	-	-	74	-29.7	322	183	V
	* 3.768	27.8	VA1T	33.8	-29.5	32.1	54	-21.9	-	-	322	183	V
6	* 7.552	38.56	PKFH	36	-26.7	47.86	-	-	74	-26.14	204	269	V
	* 7.552	25.82	VA1T	36	-26.7	35.12	54	-18.88	-	-	204	269	V

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

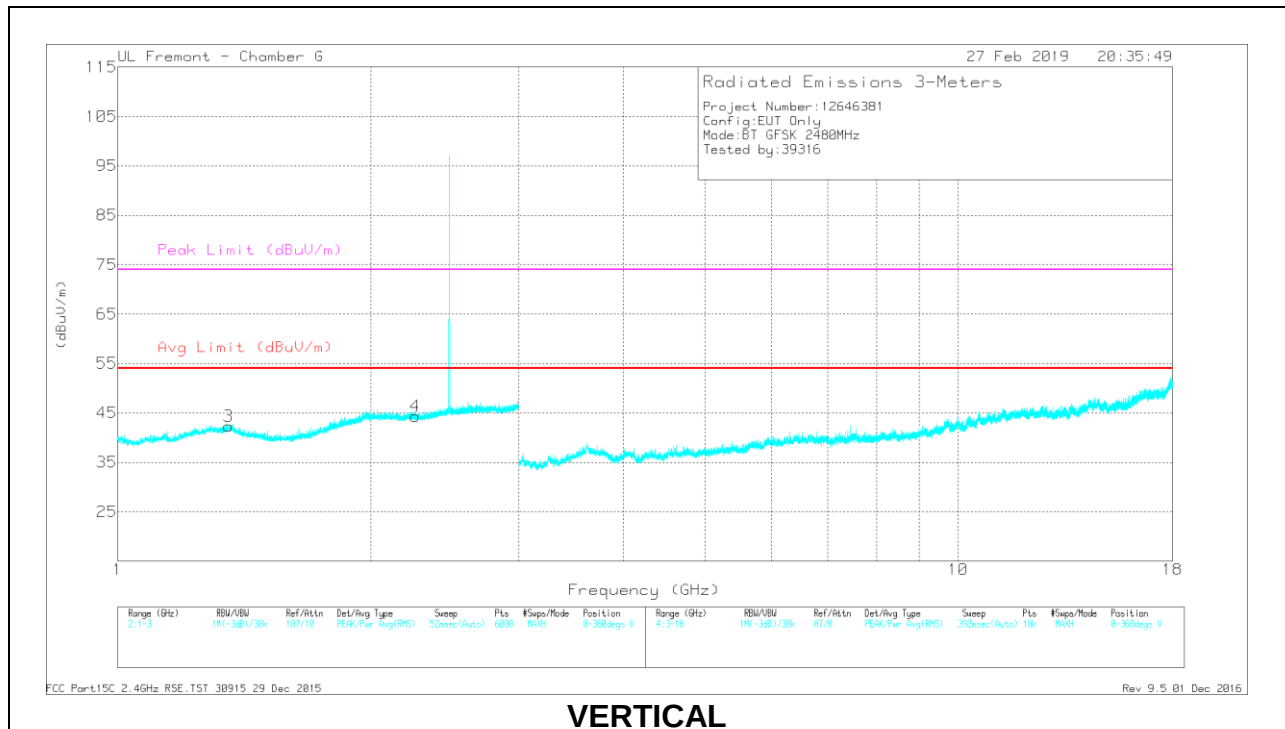
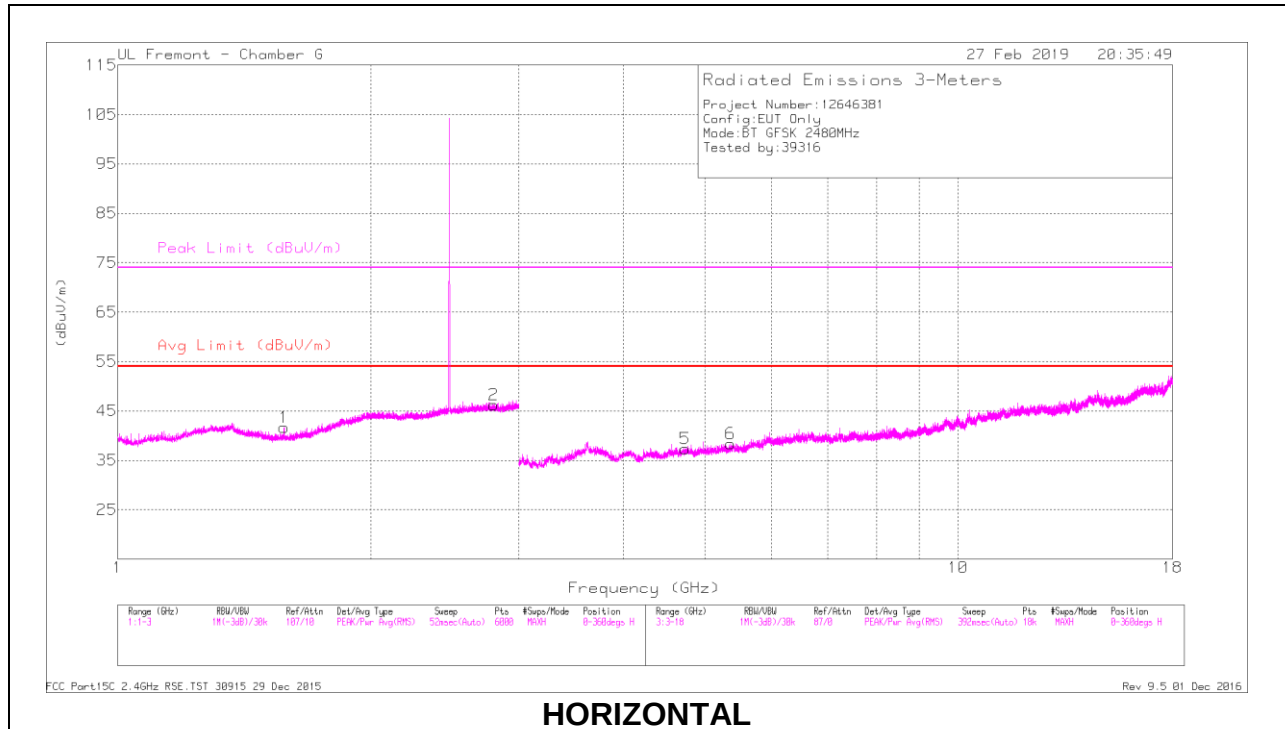
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.234	41.15	PKFH	31.9	-22.5	50.55	-	-	74	-23.45	180	143	H
	* 2.232	28.9	VA1T	31.8	-22.5	38.2	54	-15.8	-	-	180	143	H
2	* 2.364	41.48	PKFH	31.7	-22.3	50.88	-	-	74	-23.12	213	191	V
	* 2.365	29.54	VA1T	31.7	-22.3	38.94	54	-15.06	-	-	213	191	V
3	* 3.615	39.87	PKFH	35.5	-30.4	44.97	-	-	74	-29.03	352	278	H
	* 3.617	28.26	VA1T	35.6	-30.3	33.56	54	-20.44	-	-	352	278	H
4	* 4.944	39.54	PKFH	34.1	-29.7	43.94	-	-	74	-30.06	300	201	H
	* 4.944	27.53	VA1T	34.1	-29.7	31.93	54	-22.07	-	-	300	201	H
5	* 7.323	40.98	PKFH	35.9	-27.6	49.28	-	-	74	-24.72	291	238	V
	* 7.323	33.22	VA1T	35.9	-27.6	41.52	54	-12.48	-	-	291	238	V
6	* 8.402	36.95	PKFH	36.1	-26.1	46.95	-	-	74	-27.05	238	175	V
	* 8.4	25.52	VA1T	36.1	-26.1	35.52	54	-18.48	-	-	238	175	V

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

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	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	* 1.575	42.3	PKFH	27.9	-23.2	47	-	-	74	-27	294	170	H
	* 1.579	29.81	VA1T	27.9	-23.2	34.51	54	-19.49	-	-	294	170	H
2	* 2.802	42.05	PKFH	32.8	-22.1	52.75	-	-	74	-21.25	167	245	H
	* 2.799	29.67	VA1T	32.8	-22.1	40.37	54	-13.63	-	-	167	245	H
3	* 1.353	41.85	PKFH	30	-23.7	48.15	-	-	74	-25.85	233	282	V
	* 1.352	30.62	VA1T	30	-23.7	36.92	54	-17.08	-	-	233	282	V
4	* 2.259	41.86	PKFH	31.7	-22.6	50.96	-	-	74	-23.04	143	221	V
	* 2.261	29.82	VA1T	31.7	-22.5	39.02	54	-14.98	-	-	143	221	V
5	* 4.736	39.79	PKFH	34.2	-29.8	44.19	-	-	74	-29.81	78	167	H
	* 4.737	28.21	VA1T	34.2	-29.8	32.61	54	-21.39	-	-	78	167	H
6	* 5.367	39.04	PKFH	34.7	-28.7	45.04	-	-	74	-28.96	106	191	H
	* 5.369	27.11	VA1T	34.7	-28.8	33.01	54	-20.99	-	-	106	191	H

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

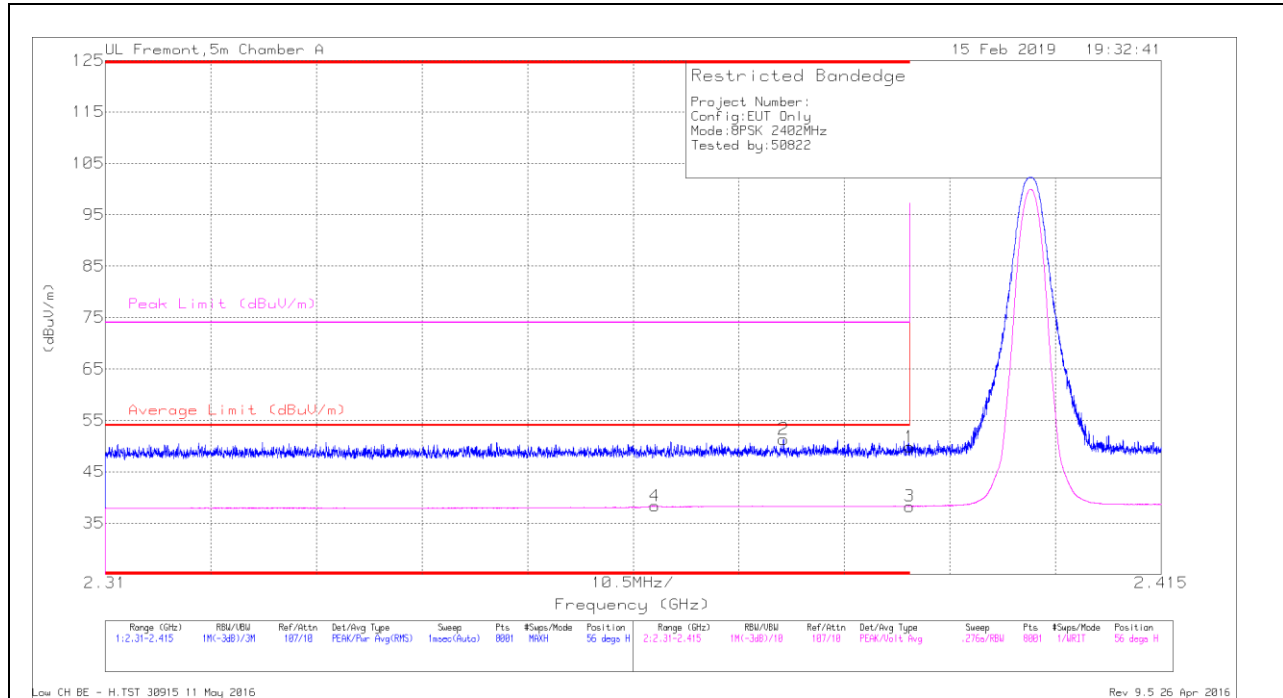
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

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

9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

BANDEGE (LOW CHANNEL)

HORIZONTAL RESULT



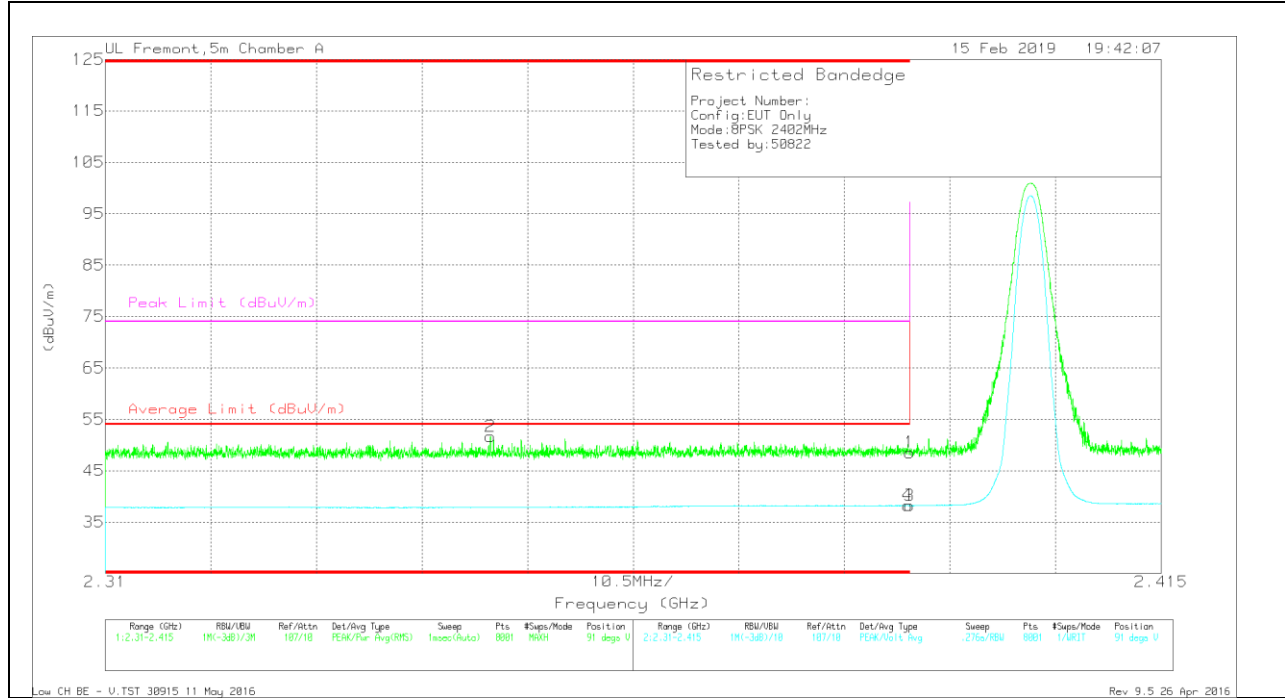
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.84	Pk	32	-23	49.84	-	-	74	-24.16	56	249	H
2	* 2.377	42.22	Pk	32	-22.9	51.32	-	-	74	-22.68	56	249	H
3	* 2.39	29.29	VA1T	32	-23	38.29	54	-15.71	-	-	56	249	H
4	* 2.365	29.44	VA1T	31.8	-22.9	38.34	54	-15.66	-	-	56	249	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 RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pa d (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	39.55	Pk	32	-23	48.55	-	-	74	-25.45	91	341	V
2	* 2.348	42.94	Pk	31.7	-23	51.64	-	-	74	-22.36	91	341	V
3	* 2.39	29.2	VA1T	32	-23	38.2	54	-15.8	-	-	91	341	V
4	* 2.39	29.27	VA1T	32	-23	38.27	54	-15.73	-	-	91	341	V

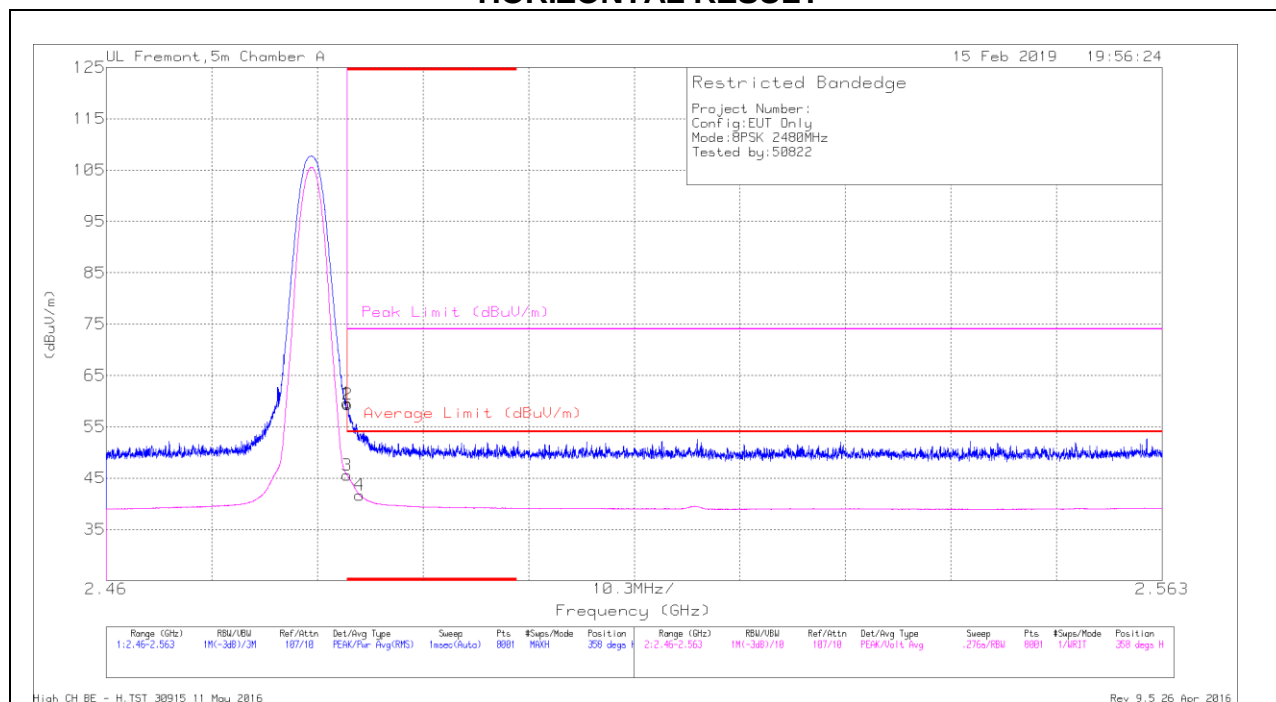
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



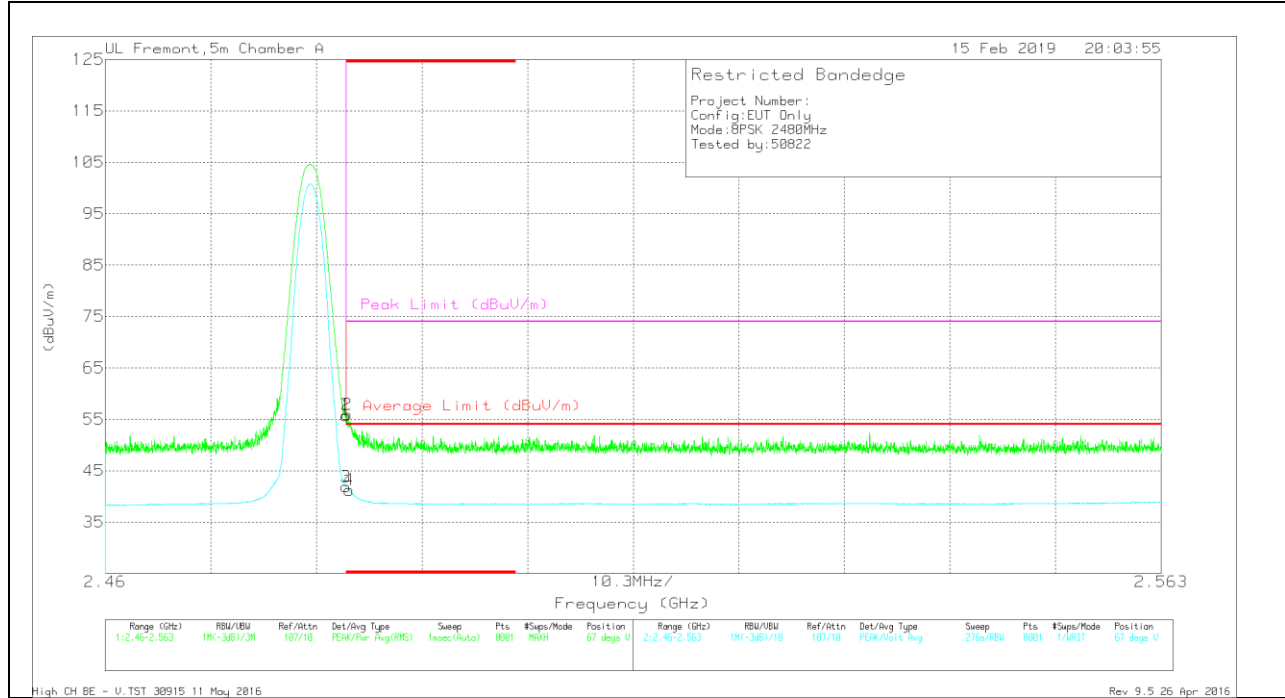
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Filtr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	49.89	Pk	32.4	-22.7	59.59	-	-	74	-14.41	358	269	H
2	* 2.484	49.68	Pk	32.4	-22.7	59.38	-	-	74	-14.62	358	269	H
3	* 2.484	35.87	VA1T	32.4	-22.7	45.57	54	-8.43	-	-	358	269	H
4	* 2.485	32	VA1T	32.4	-22.7	41.7	54	-12.3	-	-	358	269	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 RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T345 (dB/m)	Amp/Cbl/Fitr/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	46.04	Pk	32.4	-22.7	55.74	-	-	74	-18.26	67	374	V
2	* 2.484	46.22	Pk	32.4	-22.7	55.92	-	-	74	-18.08	67	374	V
3	* 2.484	32.18	VA1T	32.4	-22.7	41.88	54	-12.12	-	-	67	374	V
4	* 2.484	31.54	VA1T	32.4	-22.7	41.24	54	-12.76	-	-	67	374	V

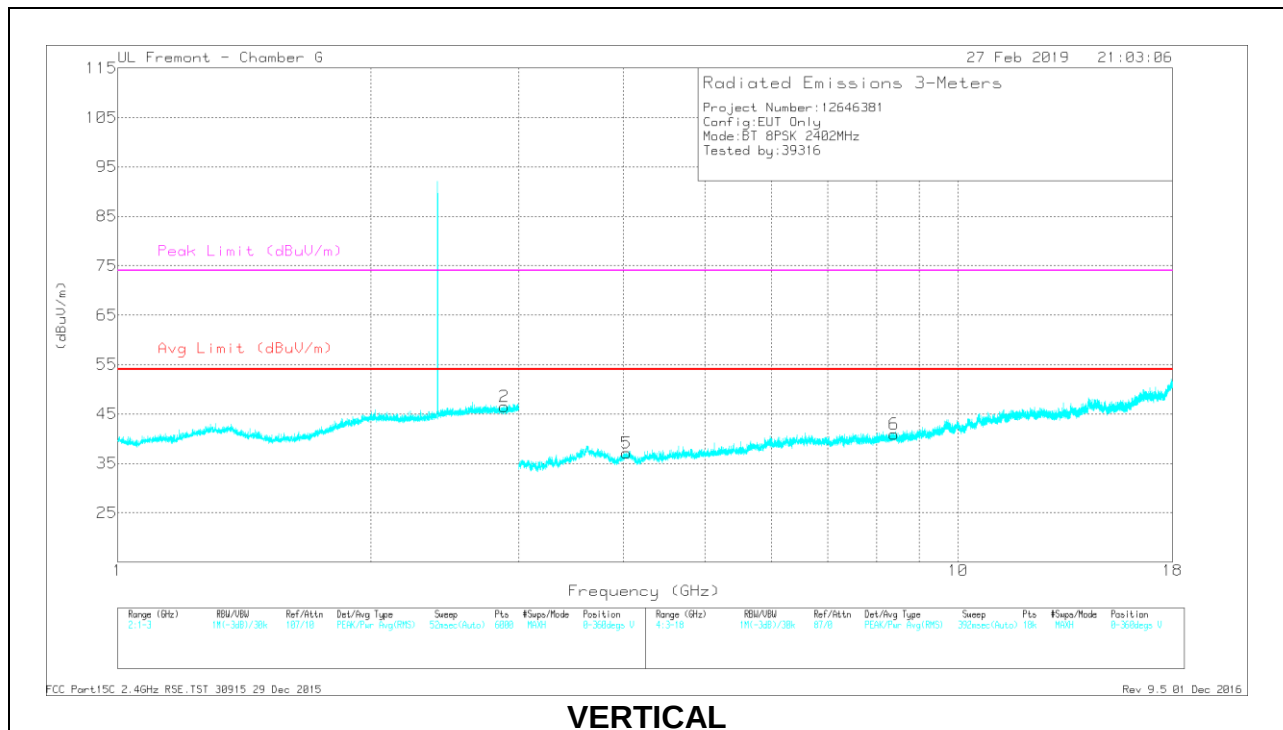
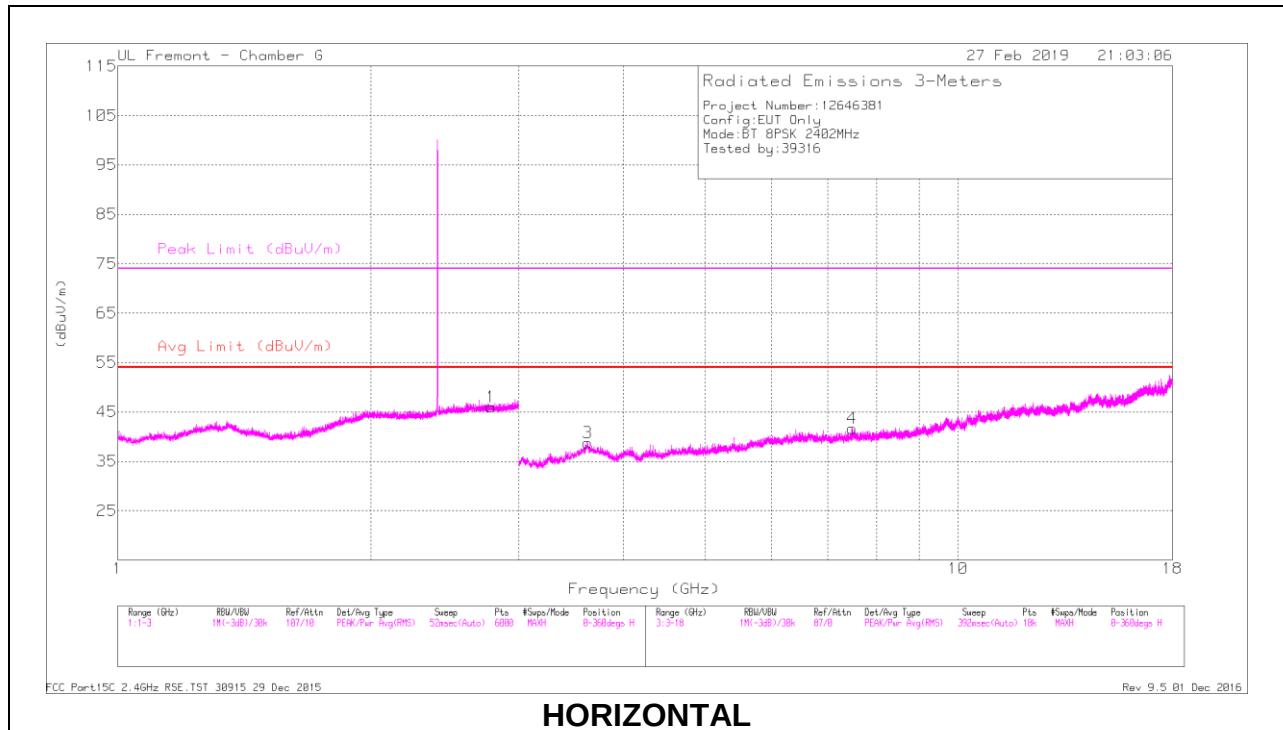
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

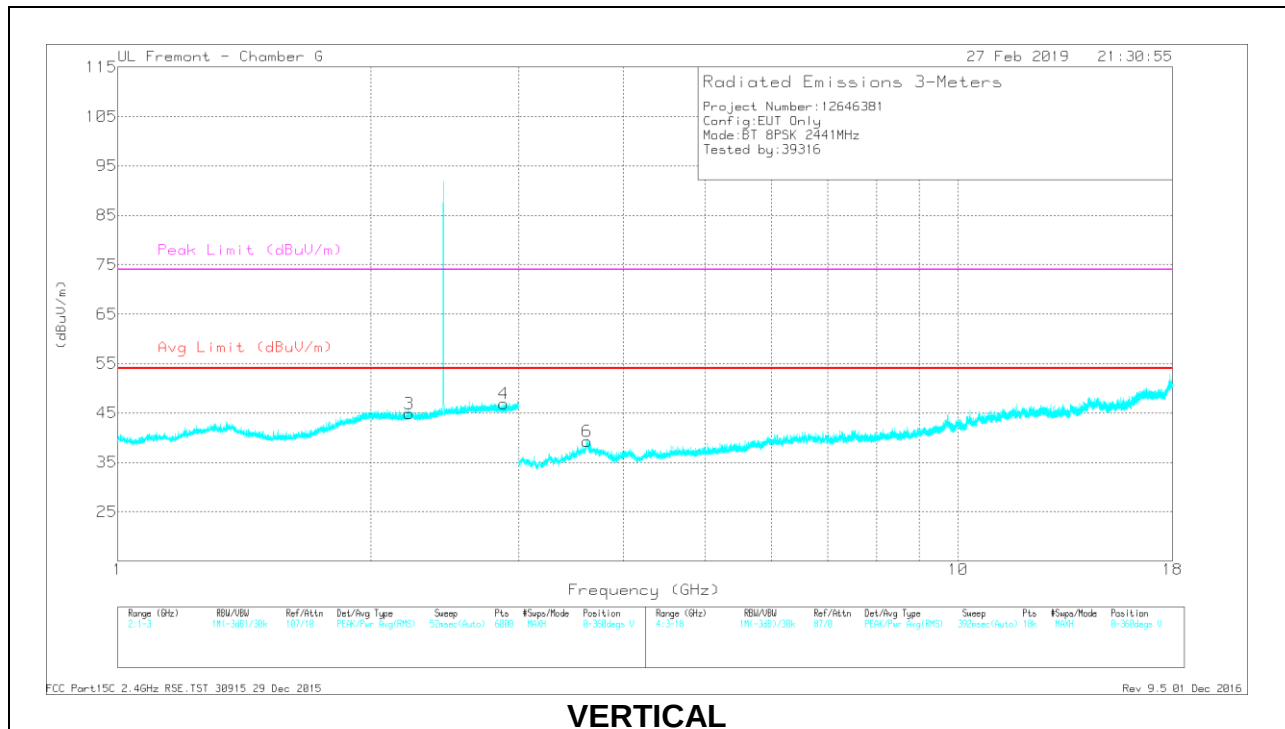
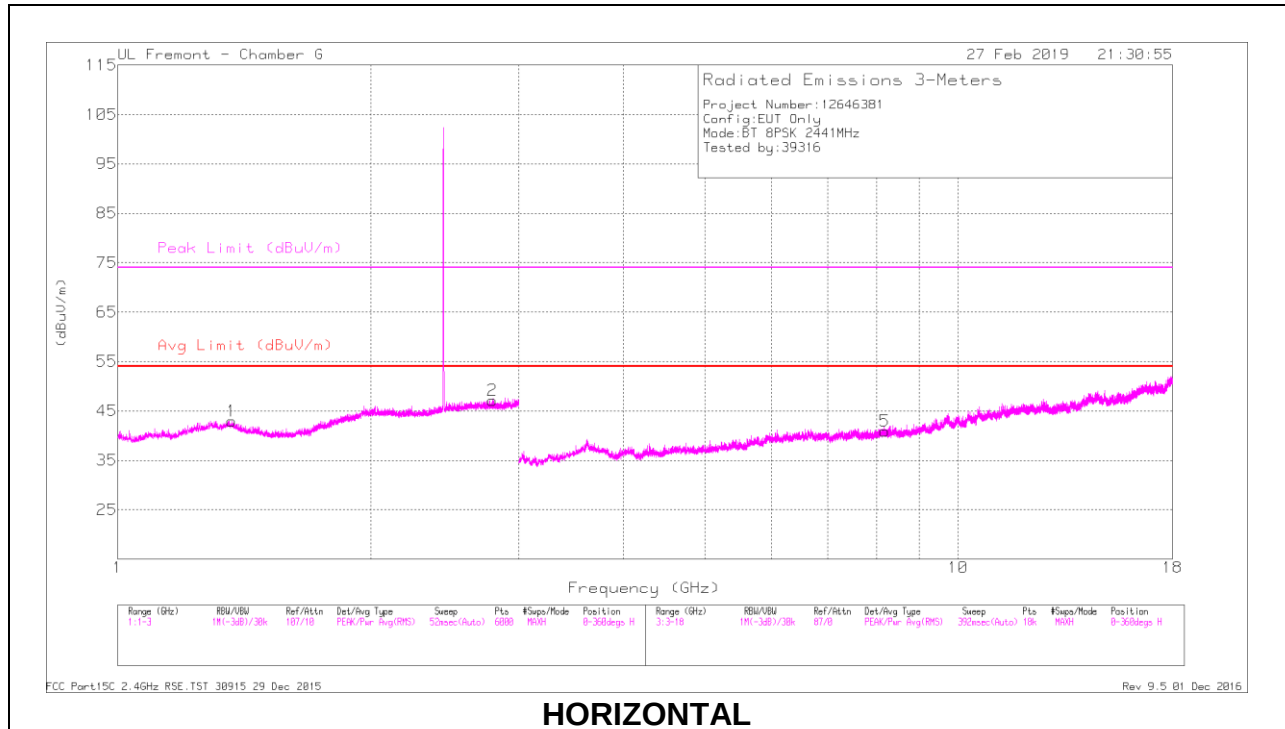
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.781	40.97	PKFH	32.8	-22.1	51.67	-	-	74	-22.33	114	158	H
	* 2.784	29.45	VA1T	32.8	-22.1	40.15	54	-13.85	-	-	114	158	H
2	* 2.888	41.56	PKFH	32.7	-21.9	52.36	-	-	74	-21.64	147	234	V
	* 2.885	29.48	VA1T	32.7	-21.9	40.28	54	-13.72	-	-	147	234	V
3	* 3.624	40.71	PKFH	35.5	-30.1	46.11	-	-	74	-27.89	301	185	H
	* 3.621	28.2	VA1T	35.7	-30.2	33.7	54	-20.3	-	-	301	185	H
4	* 7.486	38.25	PKFH	35.9	-27.3	46.85	-	-	74	-27.15	244	272	H
	* 7.485	26.29	VA1T	35.9	-27.3	34.89	54	-19.11	-	-	244	272	H
5	* 4.032	39.26	PKFH	33.7	-29.6	43.36	-	-	74	-30.64	305	312	V
	* 4.036	27.91	VA1T	33.7	-29.6	32.01	54	-21.99	-	-	305	312	V
6	* 8.395	37.93	PKFH	36.1	-26.2	47.83	-	-	74	-26.17	264	132	V
	* 8.396	25.36	VA1T	36.1	-26.2	35.26	54	-18.74	-	-	264	132	V

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

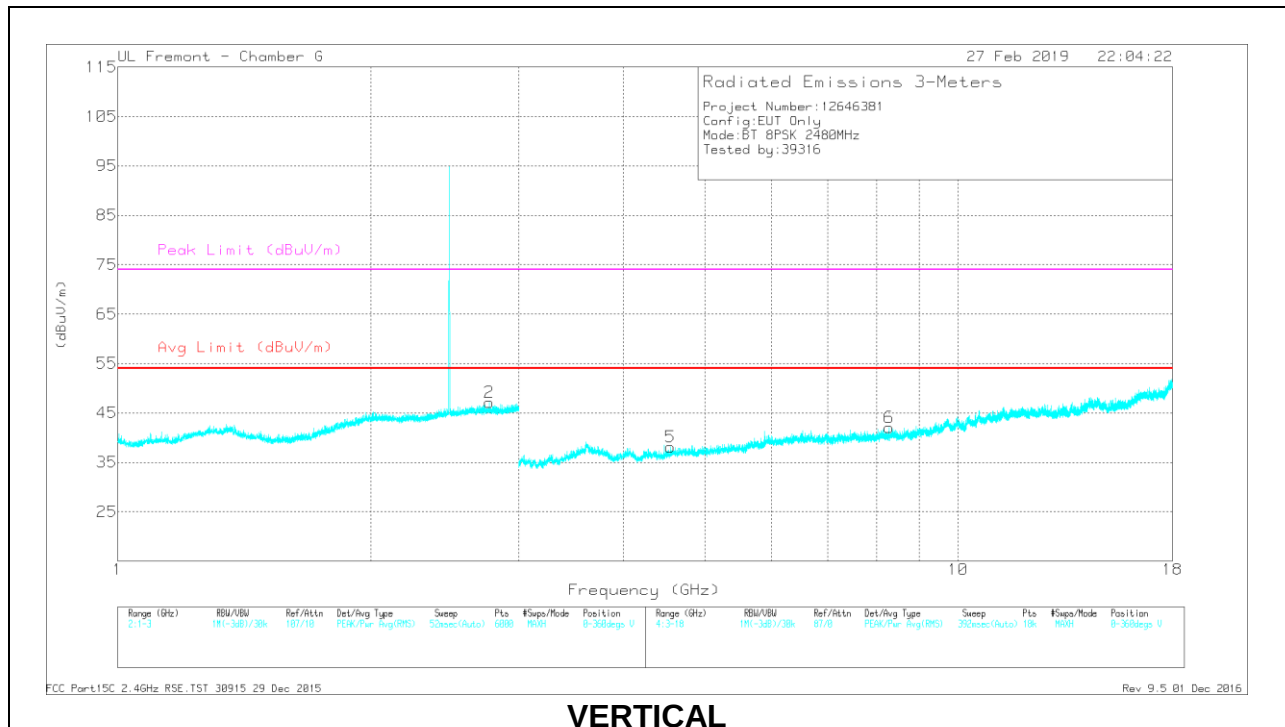
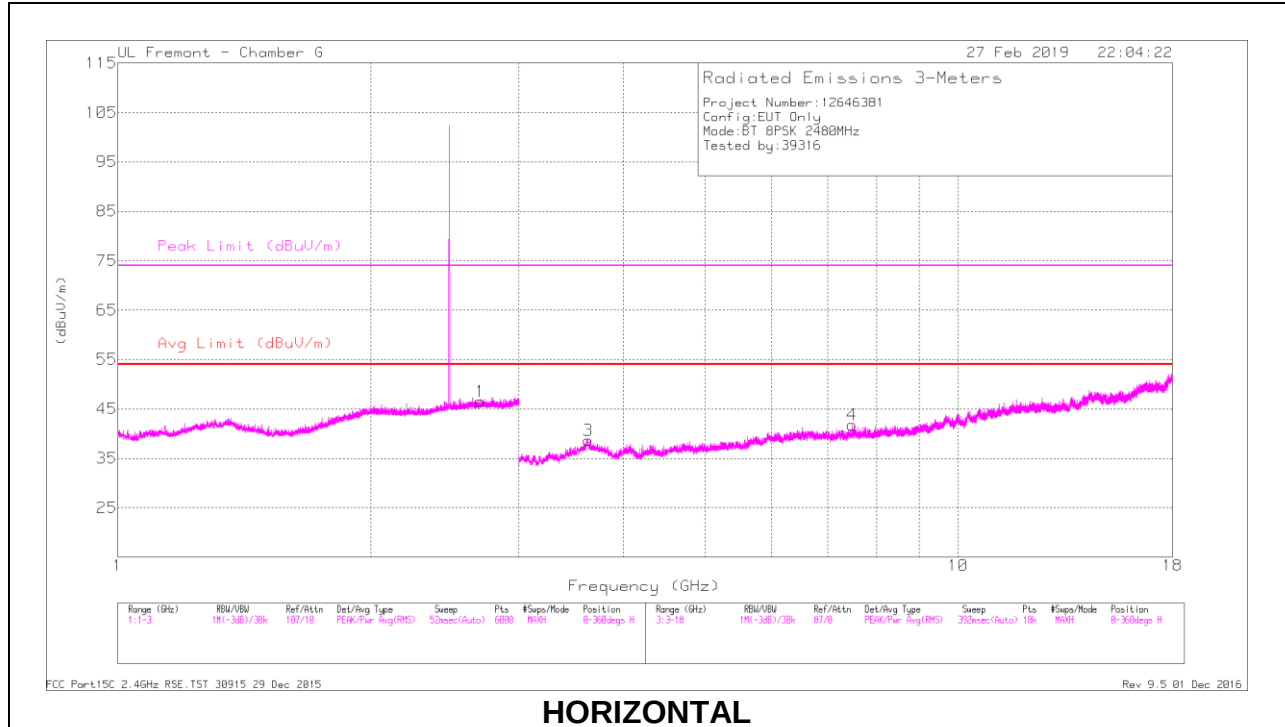
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.368	41.97	PKFH	30	-23.7	48.27	-	-	74	-25.73	0	142	H
	* 1.365	30.42	VA1T	30	-23.7	36.72	54	-17.28	-	-	0	142	H
2	* 2.792	41.87	PKFH	32.8	-22.1	52.57	-	-	74	-21.43	36	175	H
	* 2.793	29.91	VA1T	32.8	-22.1	40.61	54	-13.39	-	-	36	175	H
3	* 2.223	41.86	PKFH	31.9	-22.6	51.16	-	-	74	-22.84	61	234	V
	* 2.223	29.87	VA1T	31.9	-22.6	39.17	54	-14.83	-	-	61	234	V
4	* 2.879	41.42	PKFH	32.7	-21.9	52.22	-	-	74	-21.78	166	296	V
	* 2.88	29.77	VA1T	32.7	-21.9	40.57	54	-13.43	-	-	166	296	V
5	* 8.18	36.78	PKFH	36.1	-26.5	46.38	-	-	74	-27.62	212	232	H
	* 8.177	25.51	VA1T	36.1	-26.5	35.11	54	-18.89	-	-	212	232	H
6	* 3.618	39.32	PKFH	35.7	-30.3	44.72	-	-	74	-29.28	95	135	V
	* 3.616	27.25	VA1T	35.6	-30.3	32.55	54	-21.45	-	-	95	135	V

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

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	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	* 2.7	41.92	PKFH	32.6	-22.1	52.42	-	-	74	-21.58	202	230	H
	* 2.702	29.8	VA1T	32.6	-22.1	40.3	54	-13.7	-	-	202	230	H
2	* 2.77	43.14	PKFH	32.7	-22.1	53.74	-	-	74	-20.26	352	237	V
	* 2.769	29.83	VA1T	32.7	-22.1	40.43	54	-13.57	-	-	352	237	V
3	* 3.631	38.29	PKFH	35	-29.9	43.39	-	-	74	-30.61	104	156	H
	* 3.629	26.77	VA1T	35.2	-29.9	32.07	54	-21.93	-	-	104	156	H
4	* 7.484	37.71	PKFH	35.9	-27.3	46.31	-	-	74	-27.69	360	234	H
	* 7.483	26.15	VA1T	35.9	-27.3	34.75	54	-19.25	-	-	360	234	H
5	* 4.545	39.65	PKFH	34.2	-30	43.85	-	-	74	-30.15	293	178	V
	* 4.545	28.06	VA1T	34.2	-30	32.26	54	-21.74	-	-	293	178	V
6	* 8.283	38.08	PKFH	36.1	-27.1	47.08	-	-	74	-26.92	333	224	V
	* 8.283	26.15	VA1T	36.1	-27.1	35.15	54	-18.85	-	-	333	224	V

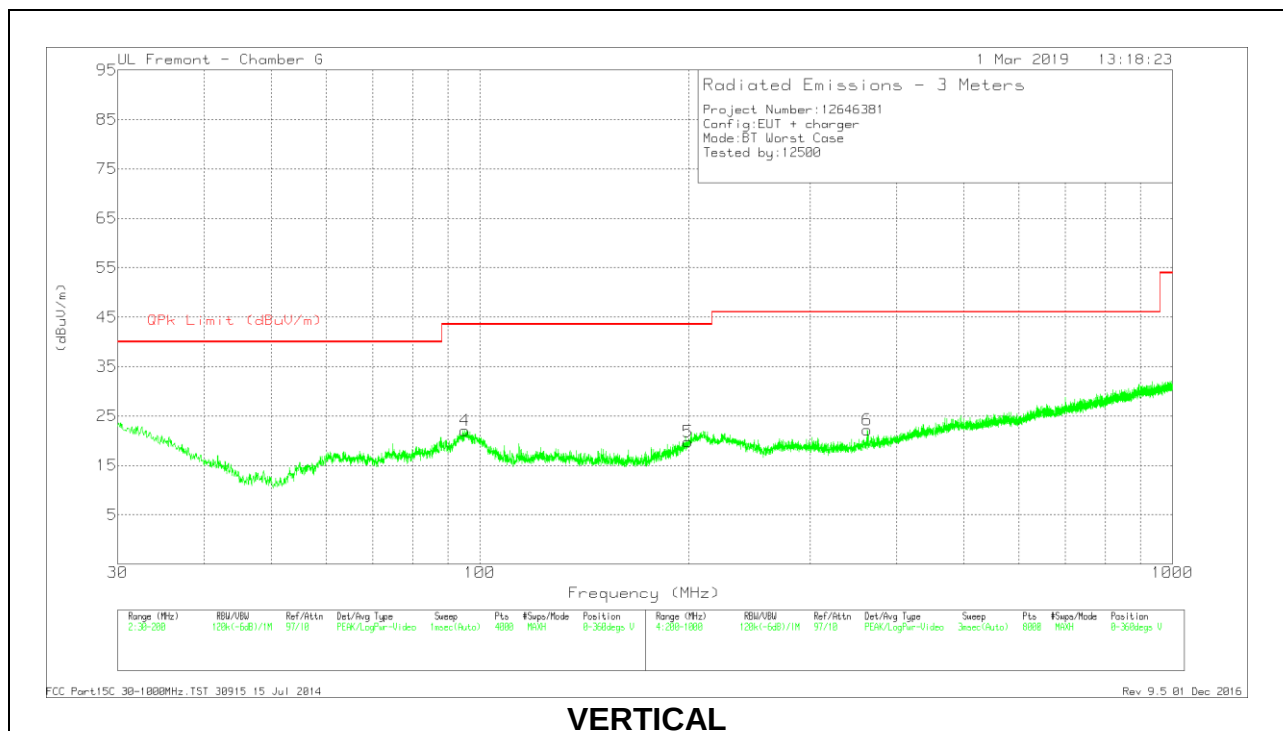
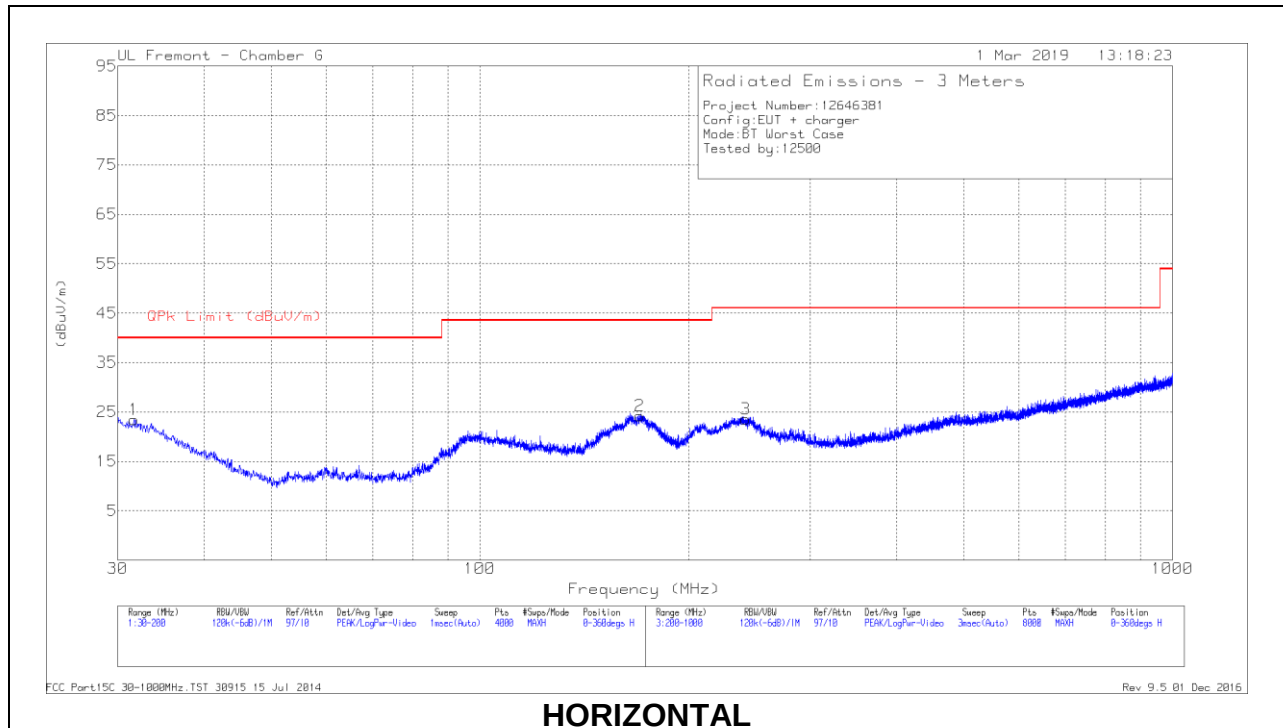
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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 1 GHz

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



Below 1GHz Data

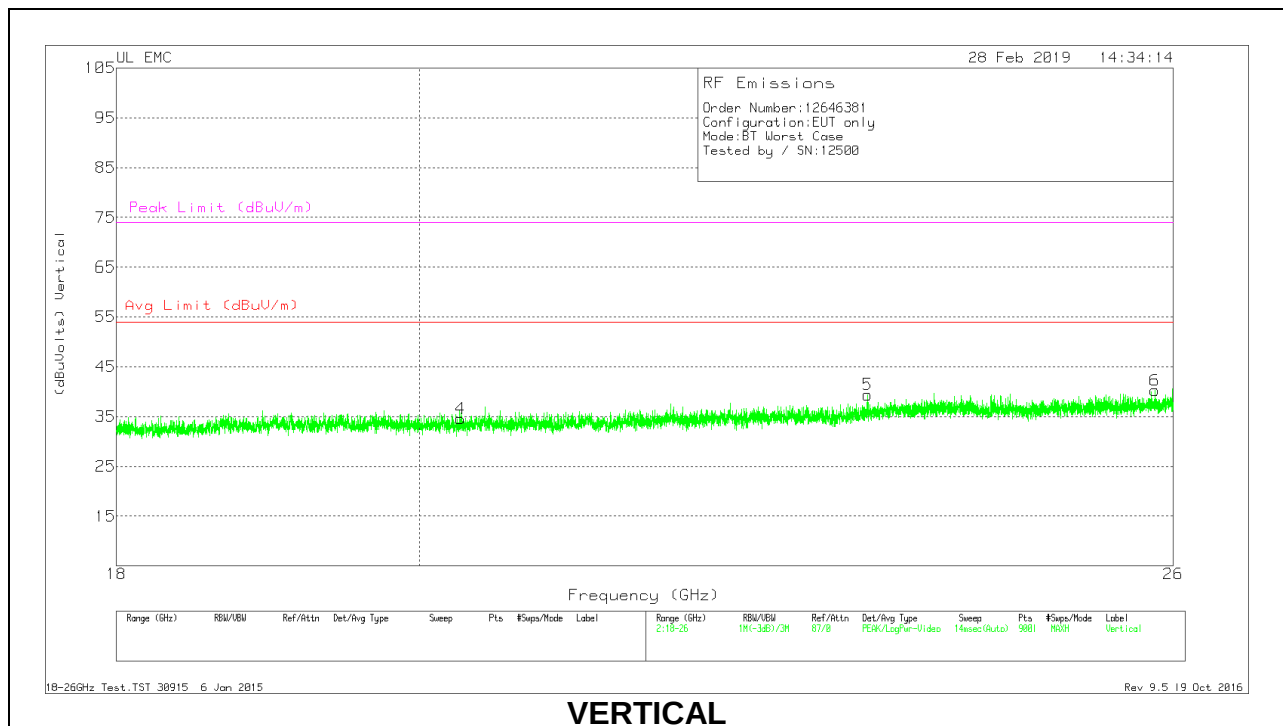
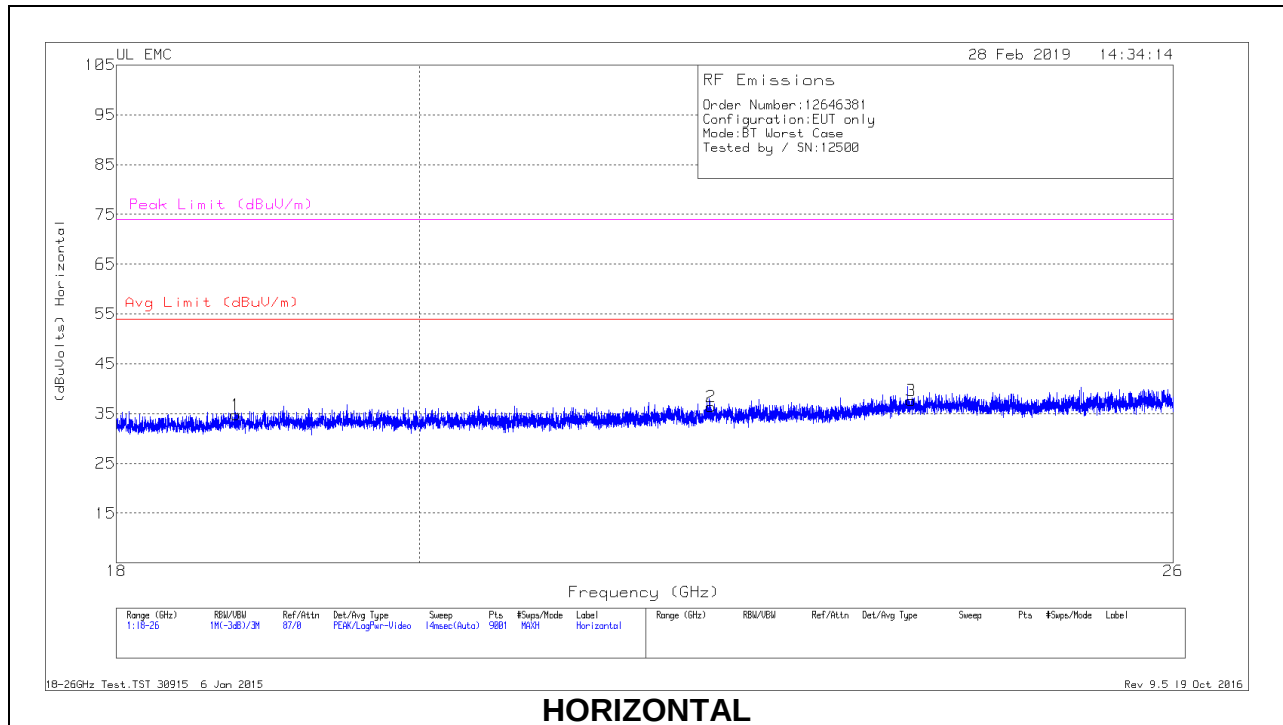
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 170.1337	35.42	Qp	17.5	-29.8	23.12	43.52	-20.4	352	144	H
3	* 241.756	33.15	Qp	17.6	-29.3	21.45	46.02	-24.57	36	104	H
1	31.7683	22.87	Qp	25.8	-31.2	17.47	40	-22.53	349	225	H
4	95.253	36.52	Qp	14.7	-30.5	20.72	43.52	-22.8	81	105	V
5	199.5824	27.85	Qp	18.4	-29.6	16.65	43.52	-26.87	264	106	V
6	362.7482	22.14	Qp	20.8	-28.4	14.54	46.02	-31.48	241	111	V

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

Qp - Quasi-Peak detector

9.3. Worst Case 18-26 GHz

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T447 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	18.764	36.67	Pk	32.4	-24.8	-9.5	34.77	54	-19.23	74	-39.23
2	22.136	37.37	Pk	33.4	-24.9	-9.5	36.37	54	-17.63	74	-37.63
3	23.734	37.27	Pk	34.1	-24.3	-9.5	37.57	54	-16.43	74	-36.43
4	20.289	36.46	Pk	32.8	-25.2	-9.5	34.56	54	-19.44	74	-39.44
5	23.377	39.48	Pk	33.9	-24.5	-9.5	39.38	54	-14.62	74	-34.62
6	25.835	39.96	Pk	34.5	-24.7	-9.5	40.26	54	-13.74	74	-33.74

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of emission (MHz)	Conducted limit (dBμV)	
	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

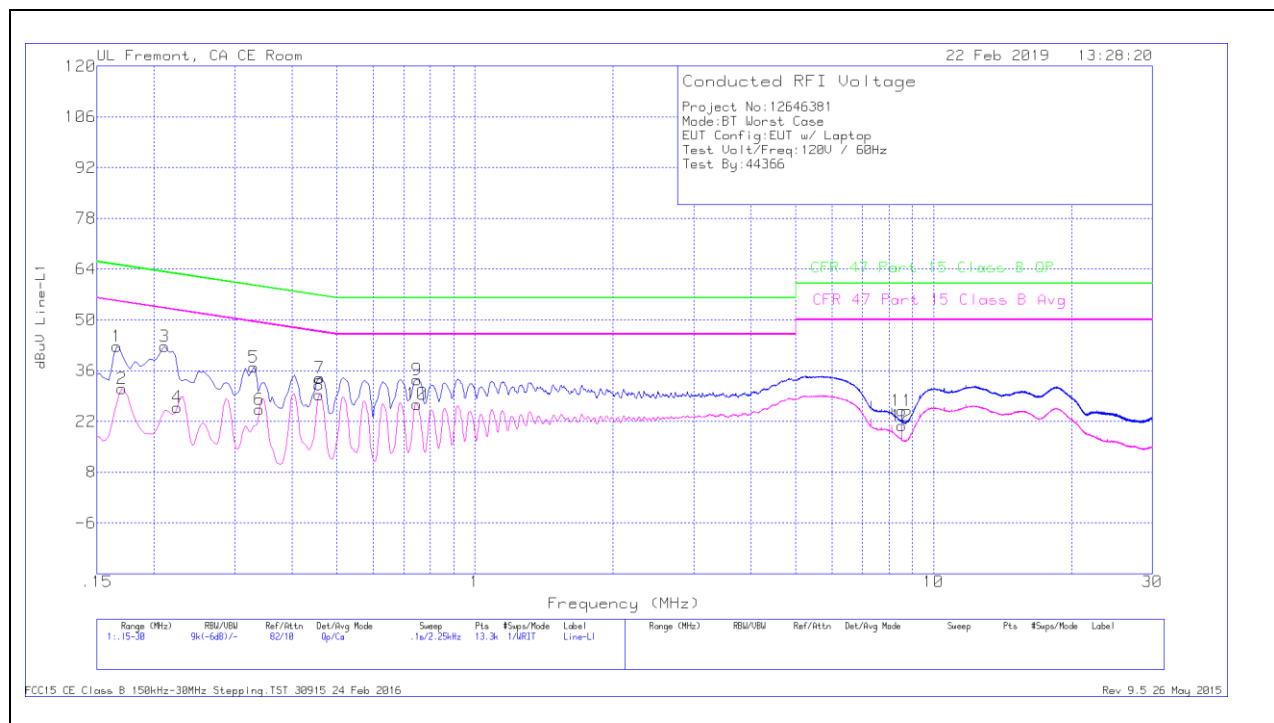
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

10.1.1. AC Power Line Host

LINE 1 RESULTS



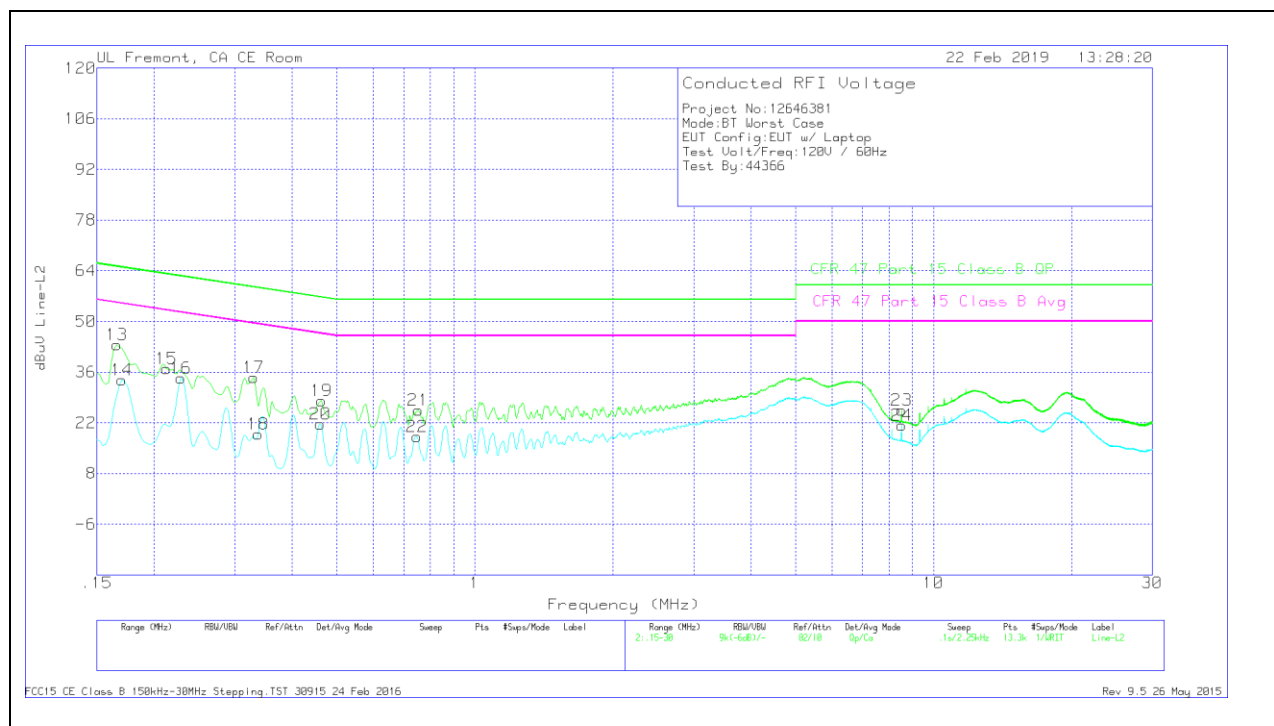
Range 1: Line-L1 .15 - 30MHz

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	.16575	32.42	Qp	.1	0	10.1	42.62	65.17	-22.55	-	-
2	.17025	20.88	Ca	0	0	10.1	30.98	-	-	54.95	-23.97
3	.21075	32.67	Qp	0	0	10.1	42.77	63.18	-20.41	-	-
4	.22425	15.82	Ca	0	0	10.1	25.92	-	-	52.66	-26.74
5	.33	26.81	Qp	0	0	10.1	36.91	59.45	-22.54	-	-
6	.339	15.14	Ca	0	0	10.1	25.24	-	-	49.23	-23.99
7	.45937	23.95	Qp	0	0	10.1	34.05	56.7	-22.65	-	-
8	.45825	19.21	Ca	0	0	10.1	29.31	-	-	46.72	-17.41
9	.7485	23.43	Qp	0	0	10.1	33.53	56	-22.47	-	-
10	.7485	16.69	Ca	0	0	10.1	26.79	-	-	46	-19.21
11	8.51775	14.53	Qp	0	.2	10.2	24.93	60	-35.07	-	-
12	8.51775	10.34	Ca	0	.2	10.2	20.74	-	-	50	-29.26

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

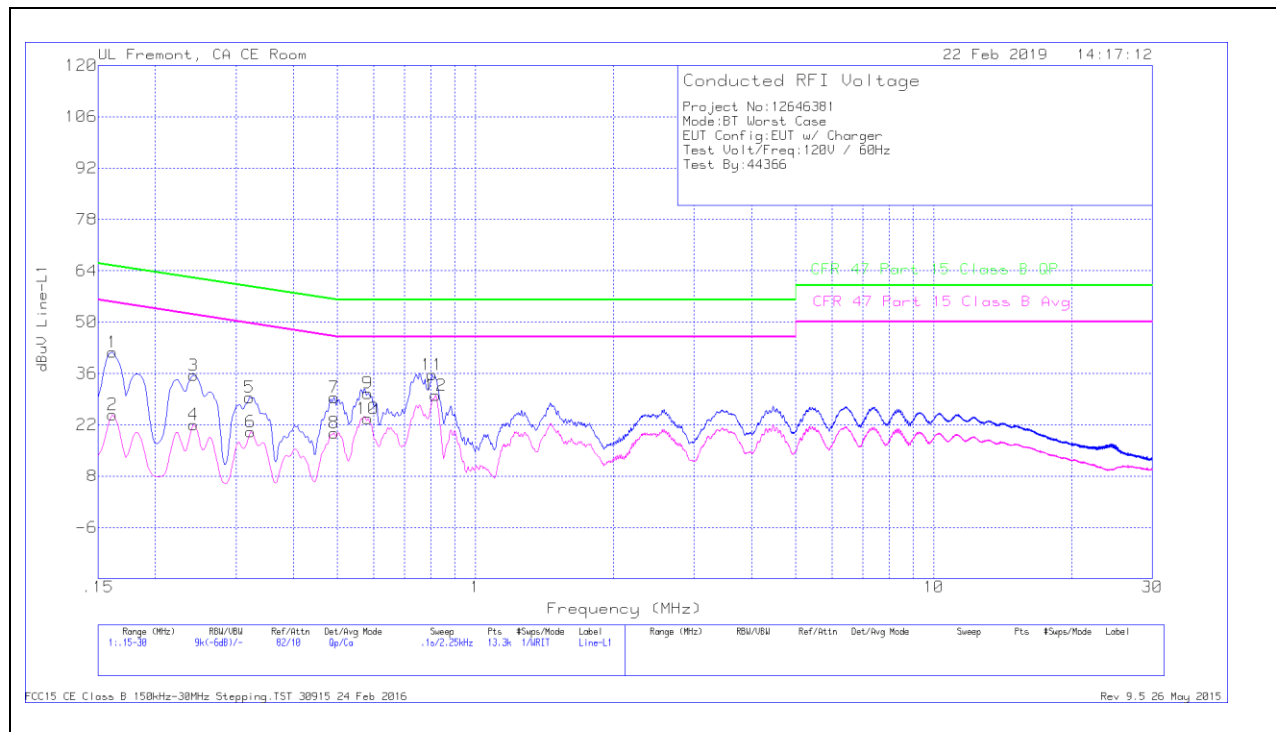
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.16575	33.39	Qp	.1	0	10.1	43.59	65.17	-21.58	-	-
14	.17025	23.68	Ca	0	0	10.1	33.78	-	-	54.95	-21.17
15	.213	26.86	Qp	0	0	10.1	36.96	63.09	-26.13	-	-
16	.22875	24.21	Ca	0	0	10.1	34.31	-	-	52.49	-18.18
17	.33	24.35	Qp	0	0	10.1	34.45	59.45	-25	-	-
18	.33675	8.75	Ca	0	0	10.1	18.85	-	-	49.28	-30.43
19	.46275	17.95	Qp	0	0	10.1	28.05	56.64	-28.59	-	-
20	.4605	11.59	Ca	0	0	10.1	21.69	-	-	46.68	-24.99
21	.753	15.43	Qp	0	0	10.1	25.53	56	-30.47	-	-
22	.7485	8.01	Ca	0	0	10.1	18.11	-	-	46	-27.89
23	8.5155	15.07	Qp	0	.2	10.2	25.47	60	-34.53	-	-
24	8.5155	10.96	Ca	0	.2	10.2	21.36	-	-	50	-28.64

Qp - Quasi-Peak detector

Ca - CISPR average detection

10.1.2. AC Power Line Norm

LINE 1 RESULTS



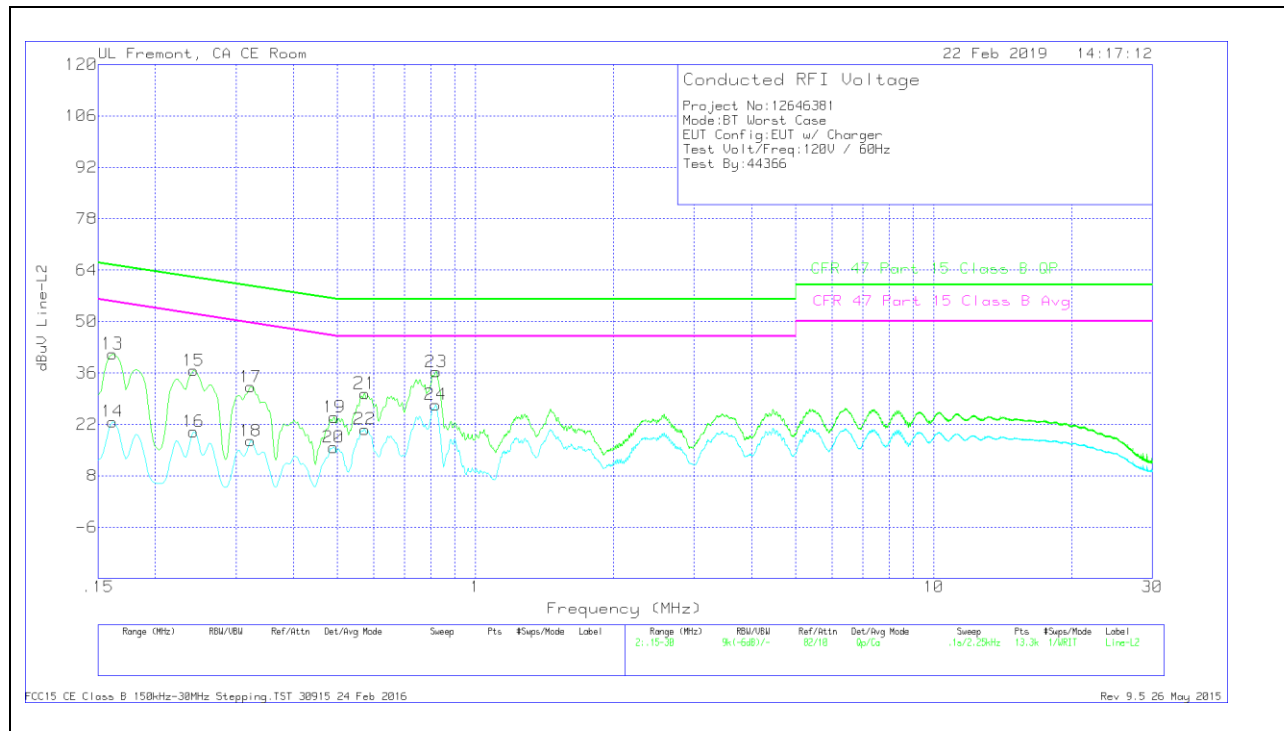
Range 1: Line-L1 .15 - 30MHz

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	.16125	31.57	Qp	.1	0	10.1	41.77	65.4	-23.63	-	-
2	.16125	14.52	Ca	.1	0	10.1	24.72	-	-	55.4	-30.68
3	.24225	25.34	Qp	0	0	10.1	35.44	62.02	-26.58	-	-
4	.24225	11.91	Ca	0	0	10.1	22.01	-	-	52.02	-30.01
5	.321	19.32	Qp	0	0	10.1	29.42	59.68	-30.26	-	-
6	.32325	9.94	Ca	0	0	10.1	20.04	-	-	49.62	-29.58
7	.492	19.31	Qp	0	0	10.1	29.41	56.13	-26.72	-	-
8	.492	9.68	Ca	0	0	10.1	19.78	-	-	46.13	-26.35
9	.582	20.49	Qp	0	0	10.1	30.59	56	-25.41	-	-
10	.582	13.58	Ca	0	0	10.1	23.68	-	-	46	-22.32
11	.80475	25.51	Qp	0	0	10.1	35.61	56	-20.39	-	-
12	.81825	19.9	Ca	0	0	10.1	30	-	-	46	-16

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



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	.16125	30.97	Qp	.1	0	10.1	41.17	65.4	-24.23	-	-
14	.16125	12.53	Ca	.1	0	10.1	22.73	-	-	55.4	-32.67
15	.24225	26.54	Qp	0	0	10.1	36.64	62.02	-25.38	-	-
16	.24225	9.9	Ca	0	0	10.1	20	-	-	52.02	-32.02
17	.32325	22.09	Qp	0	0	10.1	32.19	59.62	-27.43	-	-
18	.32325	7.39	Ca	0	0	10.1	17.49	-	-	49.62	-32.13
19	.492	13.85	Qp	0	0	10.1	23.95	56.13	-32.18	-	-
20	.48975	5.64	Ca	0	0	10.1	15.74	-	-	46.17	-30.43
21	.573	20.28	Qp	0	0	10.1	30.38	56	-25.62	-	-
22	.573	10.58	Ca	0	0	10.1	20.68	-	-	46	-25.32
23	.8205	26.21	Qp	0	0	10.1	36.31	56	-19.69	-	-
24	.81825	17.24	Ca	0	0	10.1	27.34	-	-	46	-18.66

Qp - Quasi-Peak detector

Ca - CISPR average detection

11. SETUP PHOTOS

Please refer to 12646381-EP1V1 for setup photos

END OF TEST REPORT