



CERTIFICATION TEST REPORT

Report Number. : 12781776-E1V4

Applicant : Microsoft Corp.
One Microsoft Way
Redmond, WA 98052

Model : 1797

FCC ID : C3K1797

IC : 3048A-1797

EUT Description : Wireless Input Device

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

Date Of Issue:
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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	5/6/2019	Initial Issue	---
V2	5/23/2019	Section 5.5 Headset & Charger as worst case statement added	Henry Lau
V3	5/28/2019	Section 6 – Pre-Amp description fix Section 9 – Below 30MHz added to statement	Jose Martinez Henry Lau
V4	5/31/2019	Section 8.6 – “Gated” is removed	Henry Lau

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Microsoft Corp.
One Microsoft Way
Redmond, WA 98052

EUT DESCRIPTION: Wireless Input Device

MODEL: 1797

SERIAL NUMBER: 02630001482912 (Conducted)
02630001242912 (Radiated)

DATE TESTED: April 17, 2019 – May 02, 2019

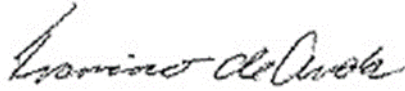
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

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.

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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, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5, 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
<input type="checkbox"/> Chamber A	<input type="checkbox"/> Chamber D	<input checked="" type="checkbox"/> Chamber I
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E	<input type="checkbox"/> Chamber J
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F	<input checked="" type="checkbox"/> Chamber K
	<input type="checkbox"/> Chamber G	<input type="checkbox"/> Chamber L
	<input type="checkbox"/> Chamber H	<input type="checkbox"/> Chamber M

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: 2324A.

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)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

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.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

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 a Wireless Input Device

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	5.25	3.35
2402 - 2480	Enhanced DQPSK	8.50	7.08
2402 - 2480	Enhanced 8PSK	9.38	8.67

Note: GFSK, DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to show compliance. For average power data please refer to section 8.7.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a monopole antenna, with a maximum gain of 1.79 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was FW: 4.7.1774.0

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 Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

The EUT was tested with headset and charger as worst case configuration.

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
AC Adapter to EUT	SONY	N/A	N/A	N/A
Laptop	Lenovo	X1 Carbon	4973401	PD97265NGU
AC Adapter to Laptop	Lenovo	ADLX45NLC2A	45N0474	N/A
Earphone	SONY	N/A	N/A	N/A
Debug Board*	Microsoft	N/A	X930837-002	N/A

* Note: Debug board only used for programming EUT. Not used during tests.

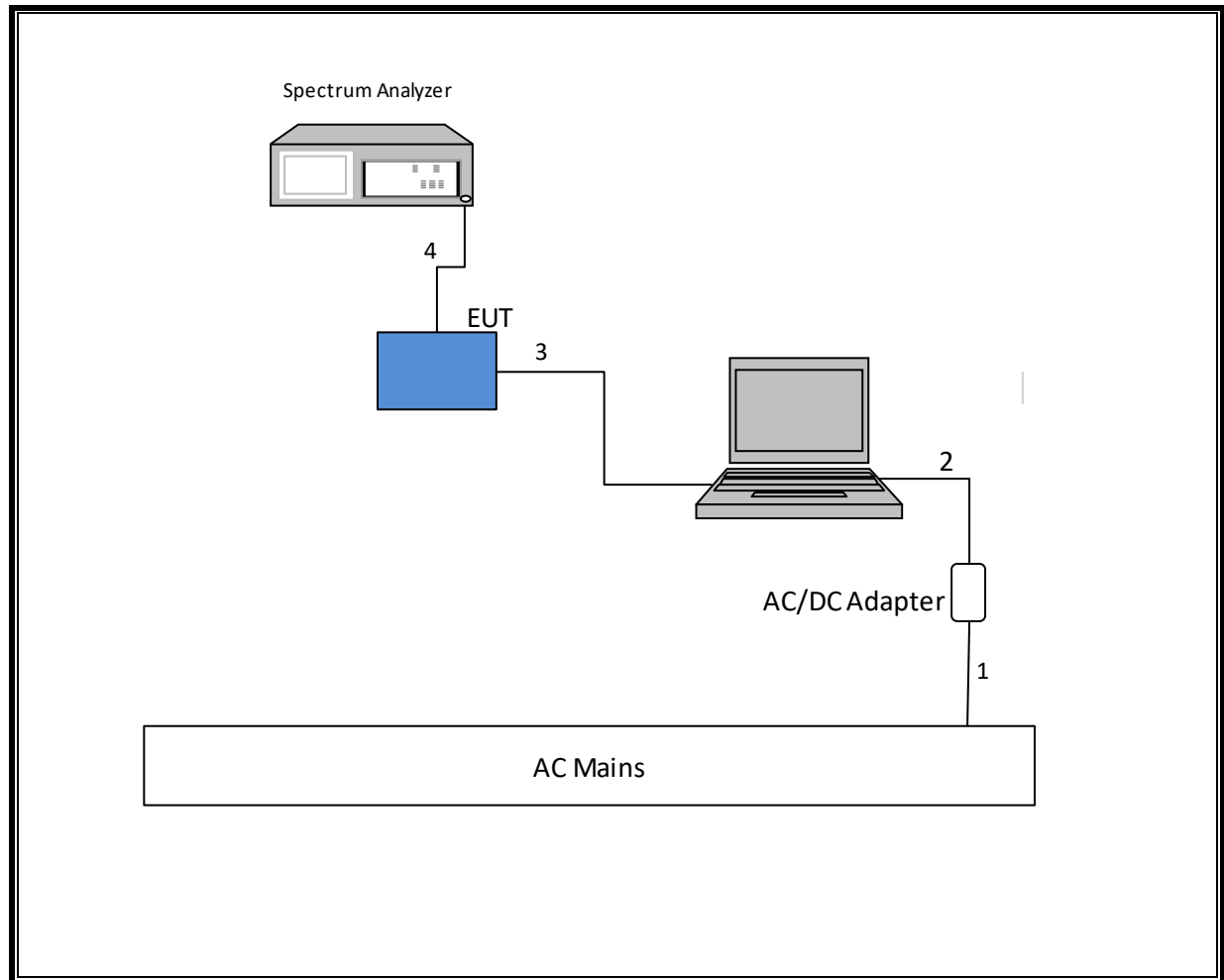
I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-Shielded	0.2	to AC/DC Adaptor
2	DC	1	DC	Shielded	1	to Laptop
3	USB	1	Type C	Un-shielded	2	Laptop to EUT
4	Antenna	1	SMA	Un-Shielded	0.2	to Analyzer

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
3	USB	1	Type C	Un-shielded	2	Laptop to EUT
2	earphone	1	3.5mm	Un-shielded	1	to EUT

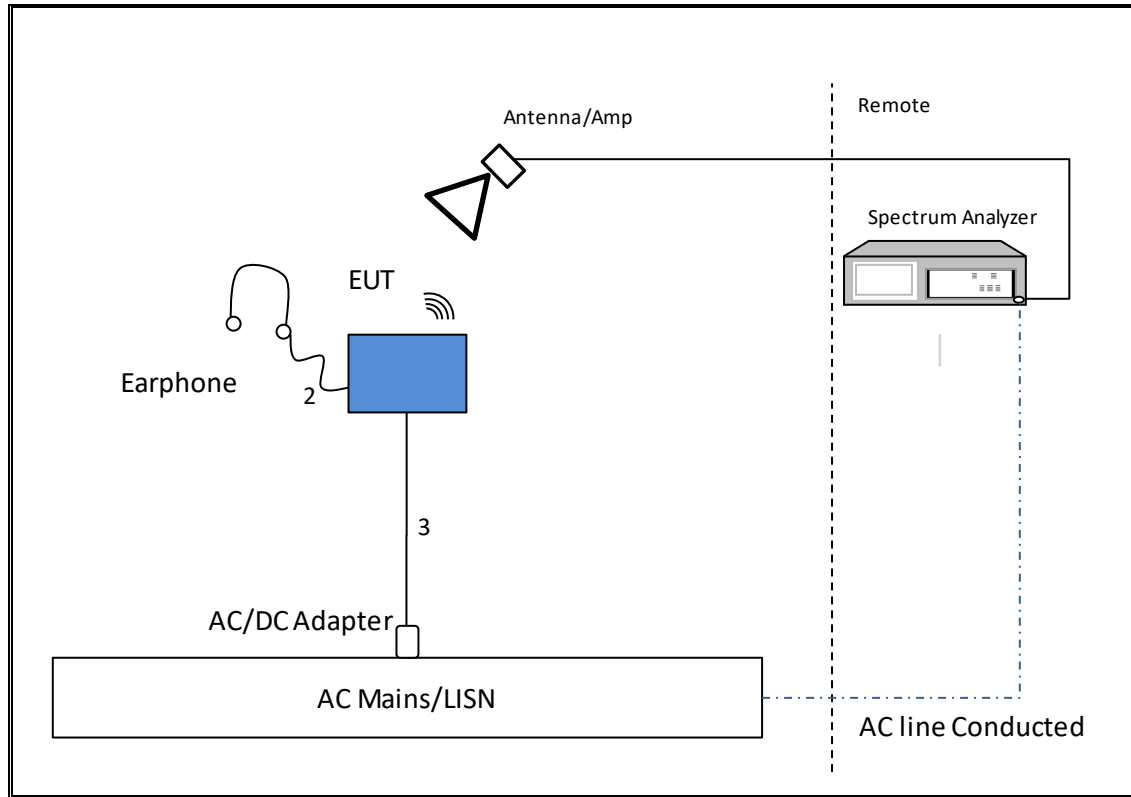
CONDCUTED TEST SETUP DIAGRAM



TEST SETUP

For conducted tests, the EUT was connected to a laptop. The test software exercises the radio.

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



TEST SETUP

For radiated tests: EUT is connected to a charger. 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	Last Cal
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1265	01/29/2020	01/29/2019
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1227	02/05/2020	02/05/2019
Antenna, Passive Loop 30Hz to 1MHz	ELETRO METRICS	EM-6871	PRE0179465	05/22/2019	05/22/2018
Antenna, Passive Loop 100kHz to 30MHz	ELETRO METRICS	EM-6872	PRE0179467	05/22/2019	05/22/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/25/2019	05/25/2018
Amplifier, 1 to 18GHz	MITEQ	AFS42-00101800-25-S-42	PRE018078	08/01/2019	08/01/2018
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184052	10/24/2019	10/24/2018
Amplifier, 100kHz to 1GHz, 32 dB	Agilent (Keysight) Technologies	8447D	PRE0186650	12/13/2019	12/13/2018
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	PRE0182188	08/29/2019	08/29/2018
Pre-Amp, 18-26.5GHz	Amplical	AMP18G26.5-60	PRE0181238	05/01/2020	05/01/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179367	02/14/2020	02/14/2019
EMI Test Receiver	Rohde&Schwarz	ESW44	PRE0179372	02/16/2020	02/16/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T908	01/23/2020	01/23/2019
AC Line Conducted					
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/14/2020	02/14/2019
LISN for Conducted Emissions CISPR-16	FCC INC.	FCC LISN 50/250	T1310	01/24/2020	01/24/2019
Test Software List					
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018		
Antenna Port Software	UL	UL RF	Ver 9.6, April 18, 2019		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the 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.

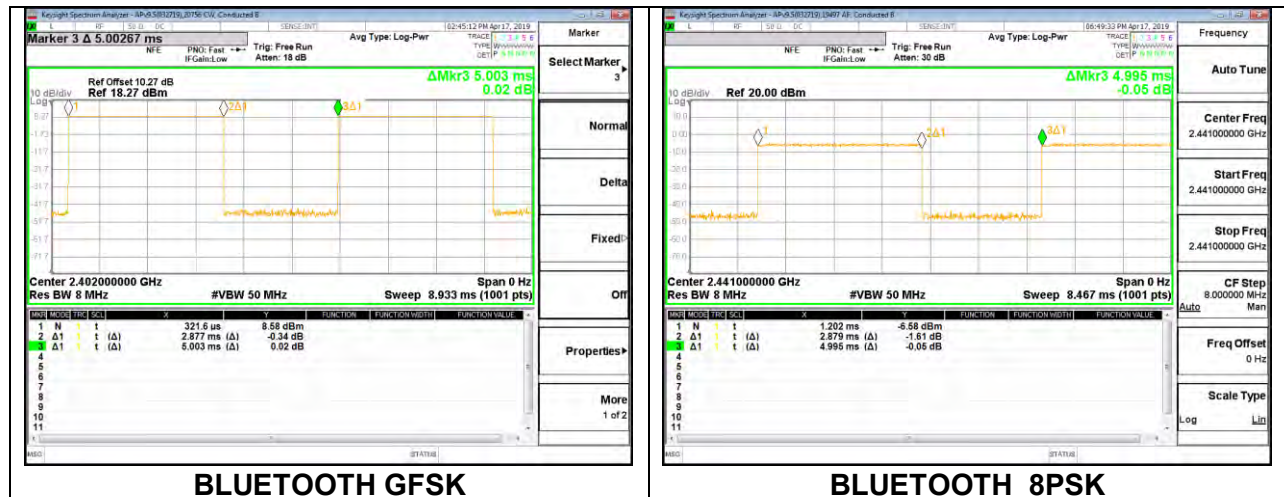
PROCEDURE

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	2.88	5.03	0.572	57.2%	2.43	0.348
Bluetooth 8PSK	2.88	5.00	0.576	57.6%	2.39	0.347

DUTY CYCLE PLOTS



8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

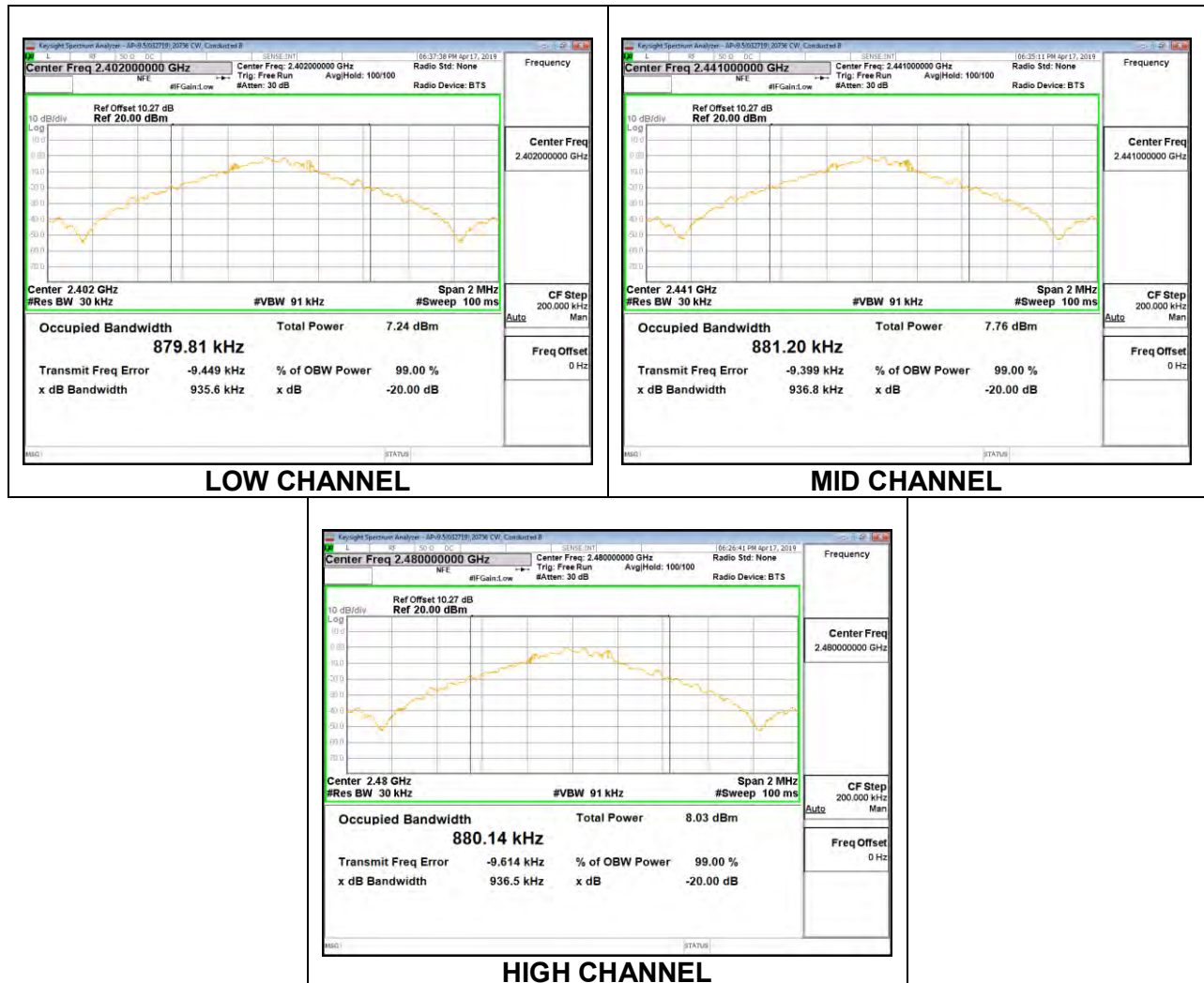
TEST PROCEDURE

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 \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	0.936	0.880
Mid	2441	0.937	0.881
High	2480	0.936	0.880



8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.279	1.177
Mid	2441	1.277	1.177
High	2480	1.279	1.177



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.

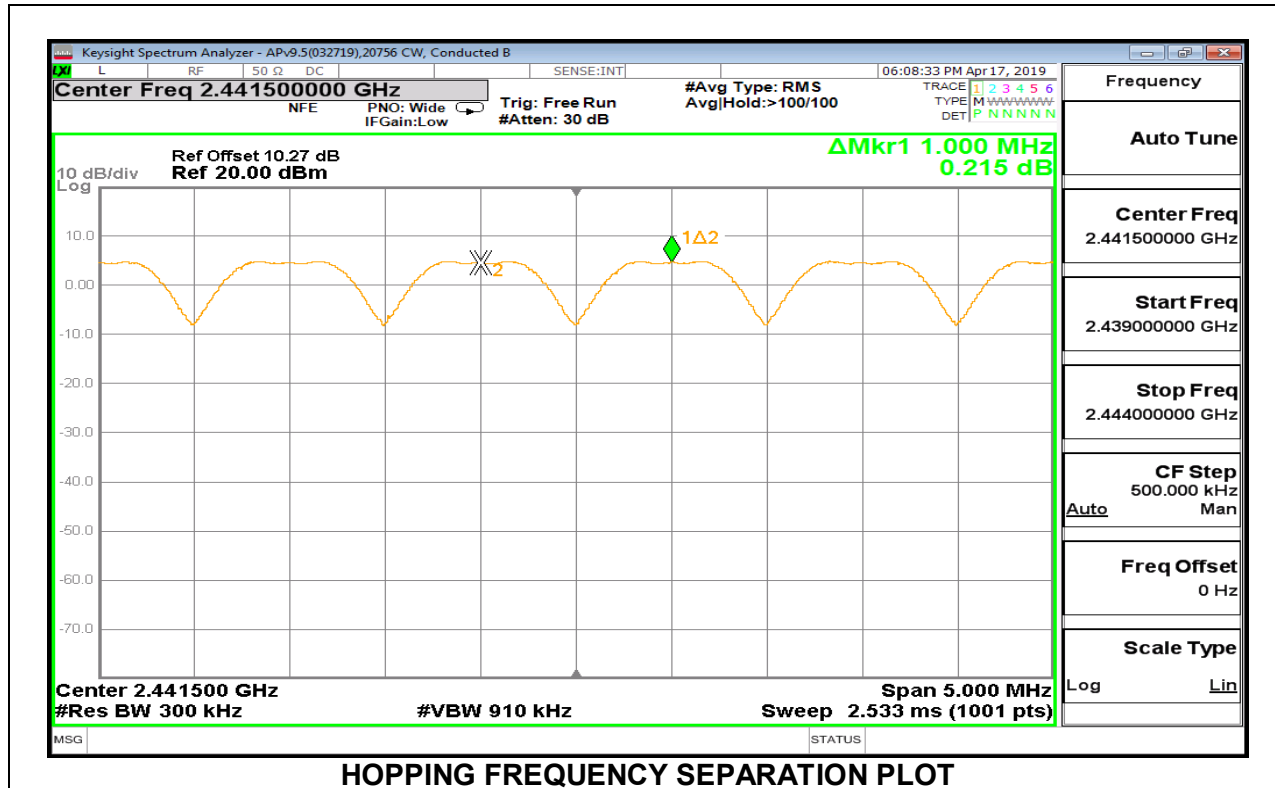
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

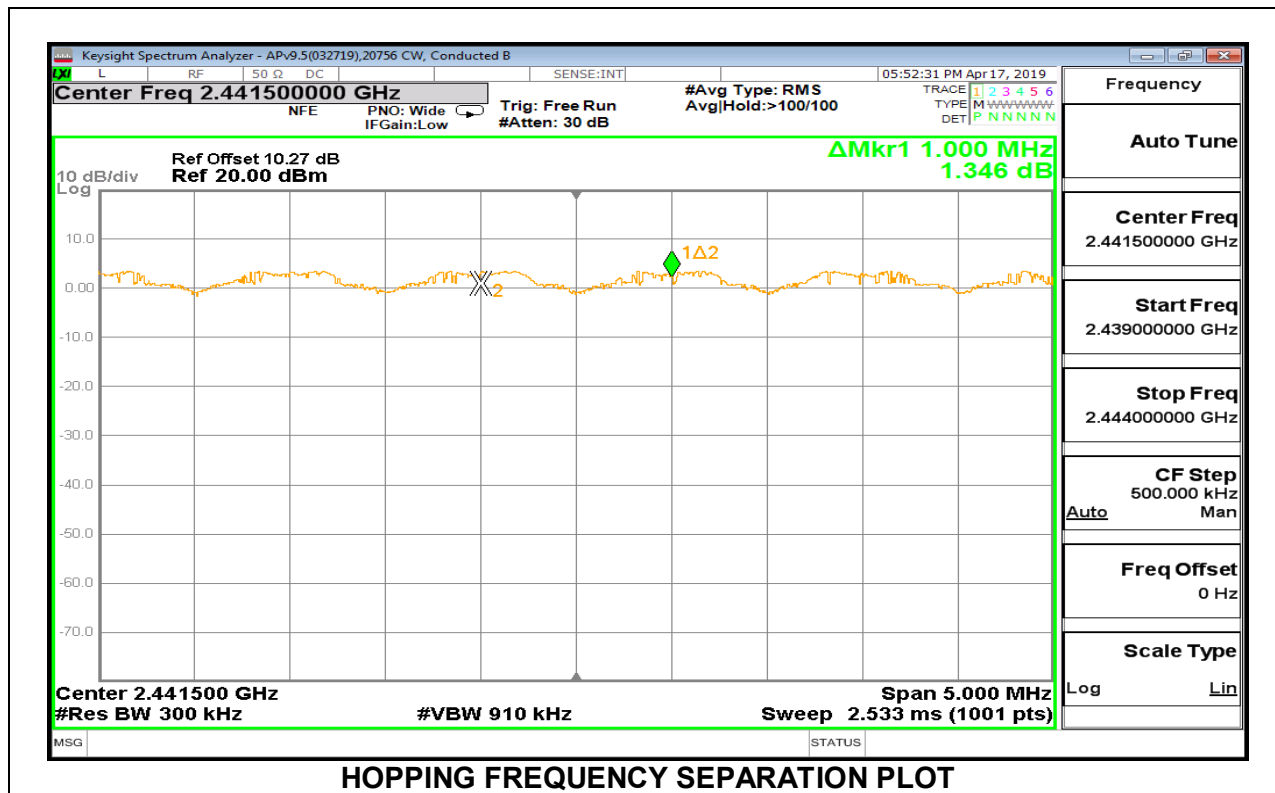
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to $VBW \geq RBW$. The sweep time is coupled.

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.

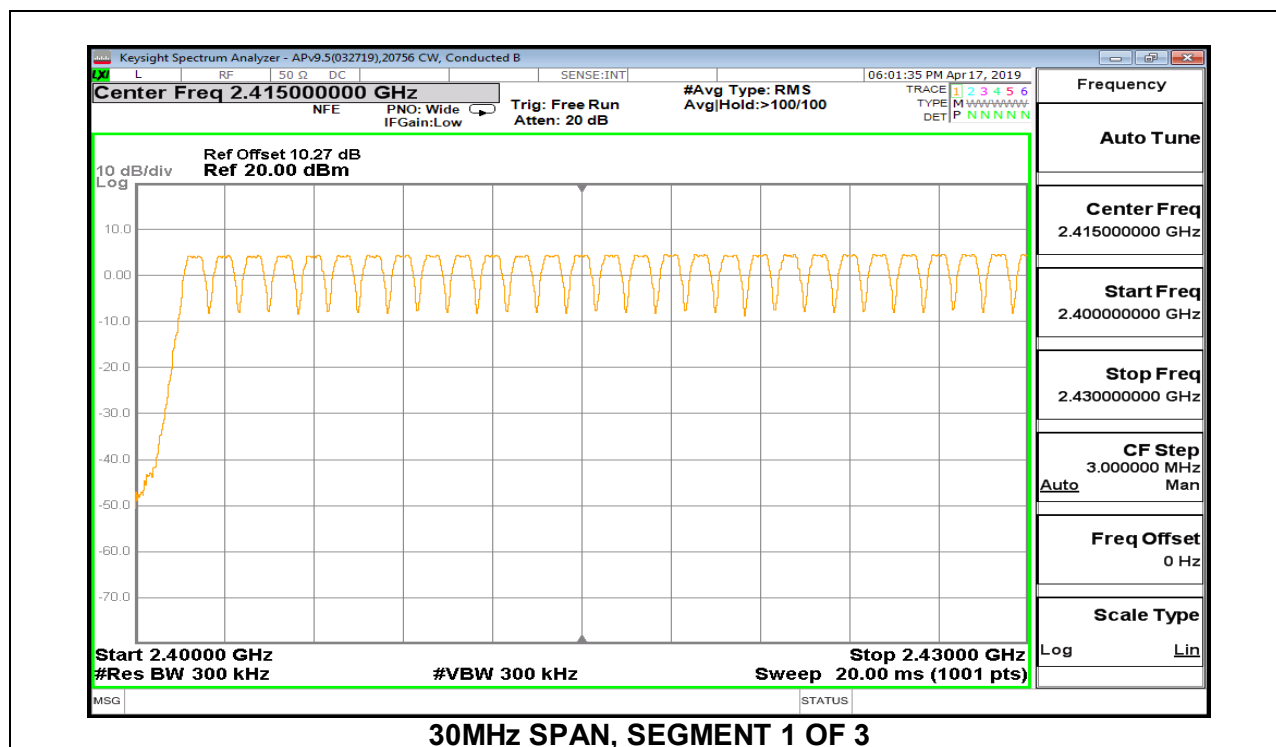
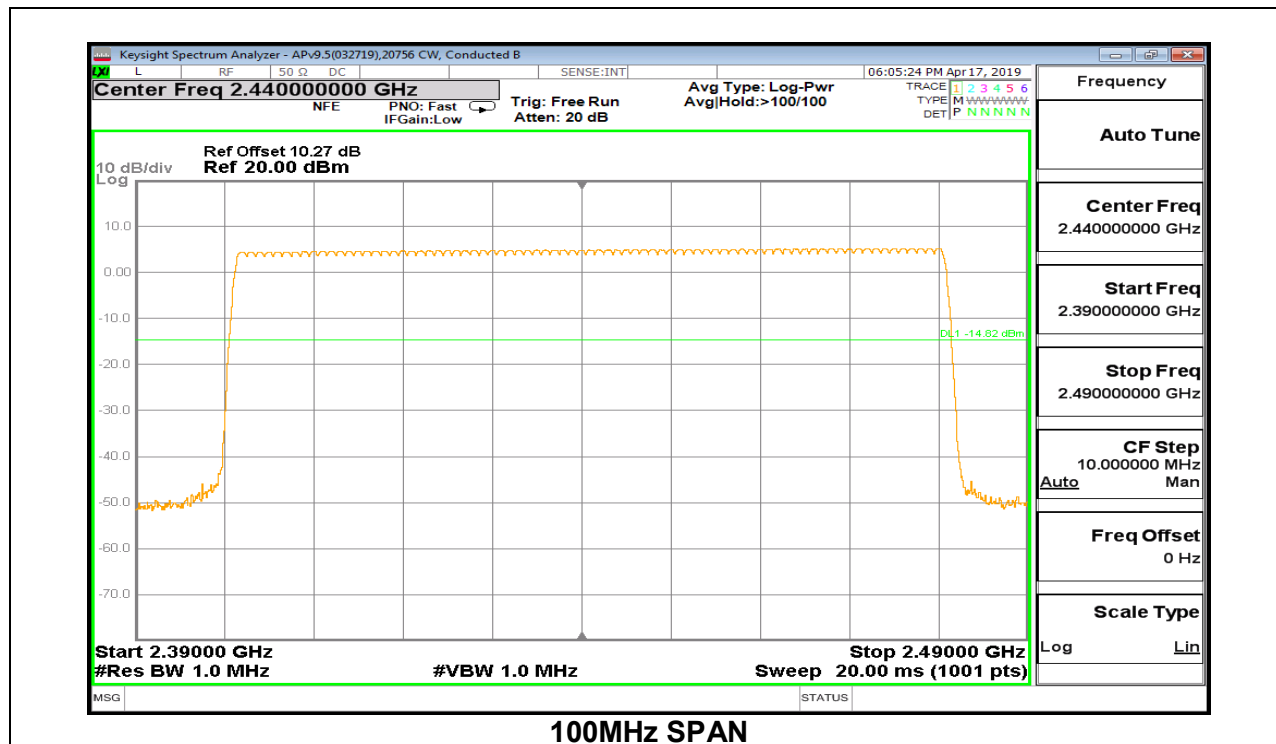
TEST PROCEDURE

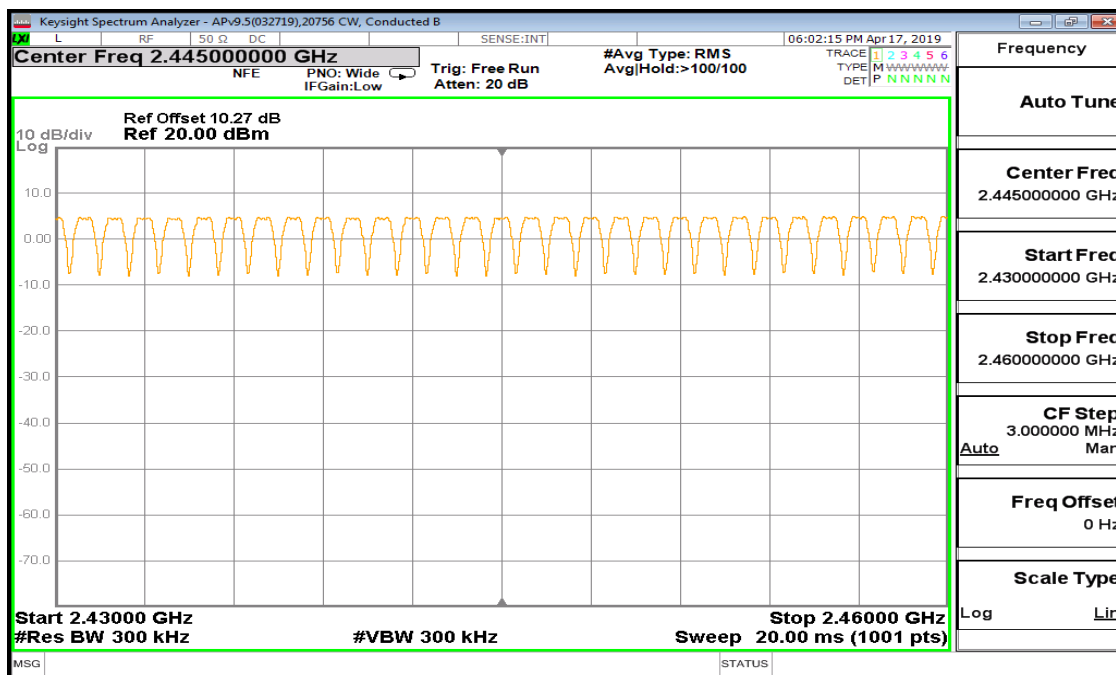
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

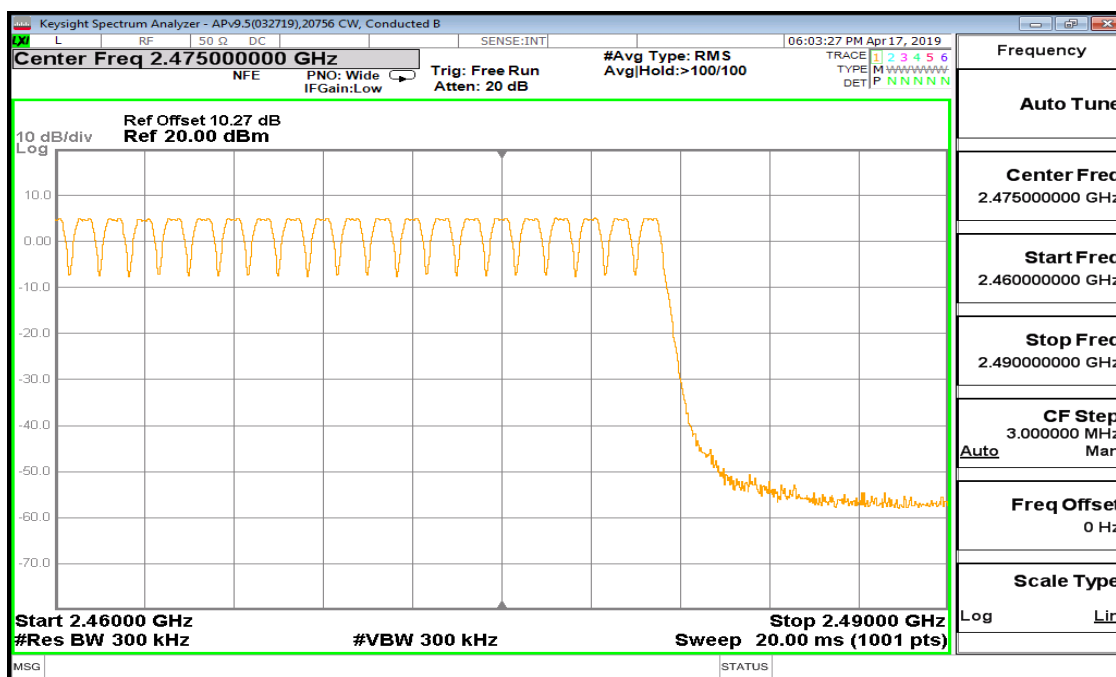
Normal Mode: 79 Channels Observed

8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



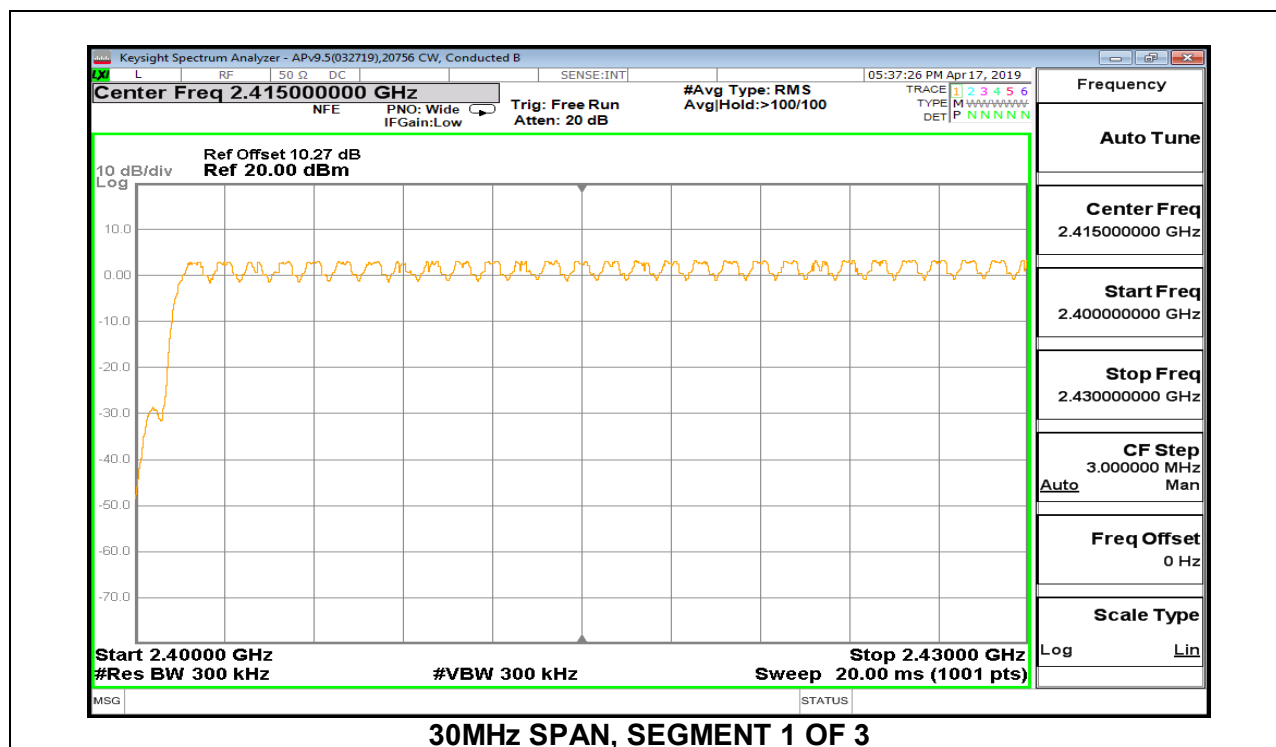
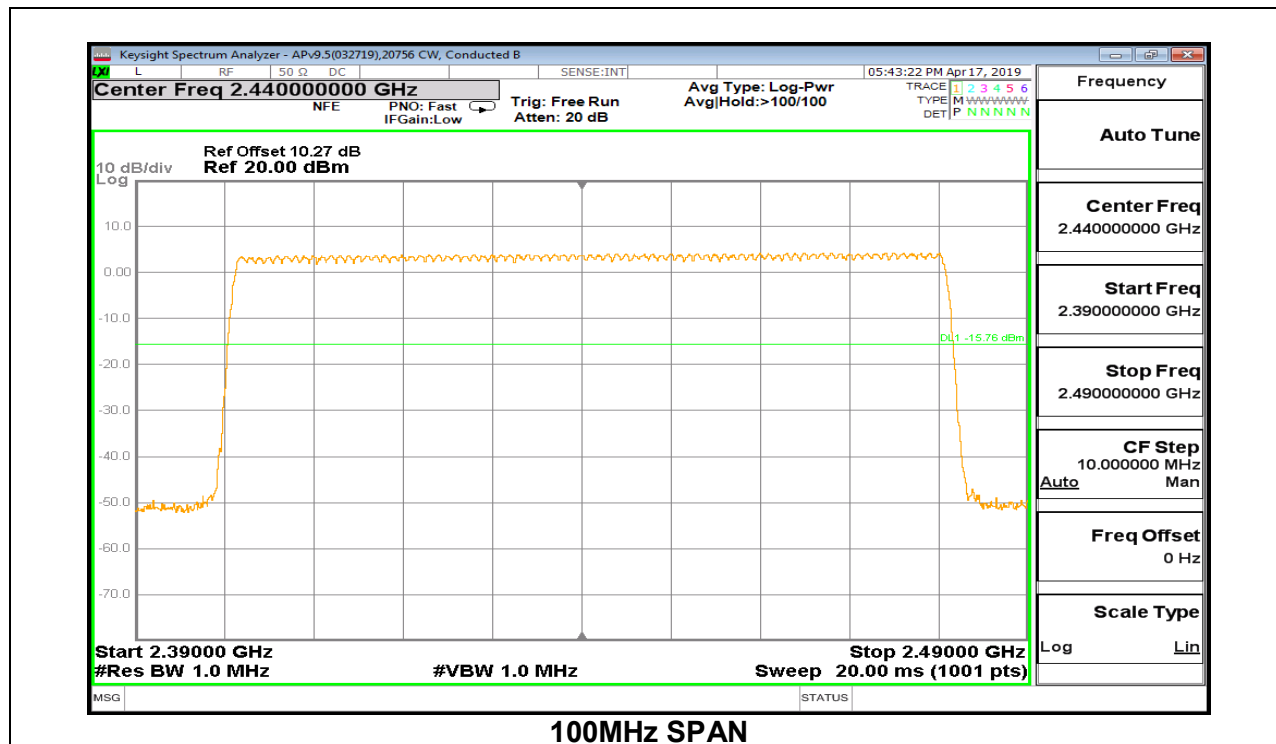


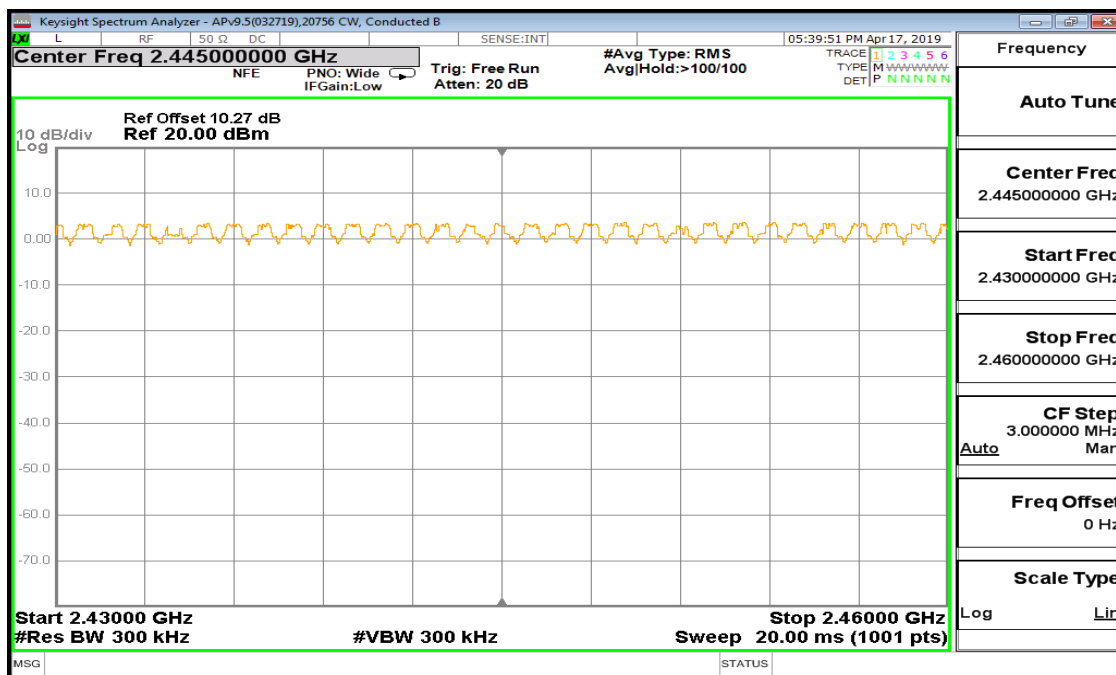
30MHz SPAN, SEGMENT 2 OF 3



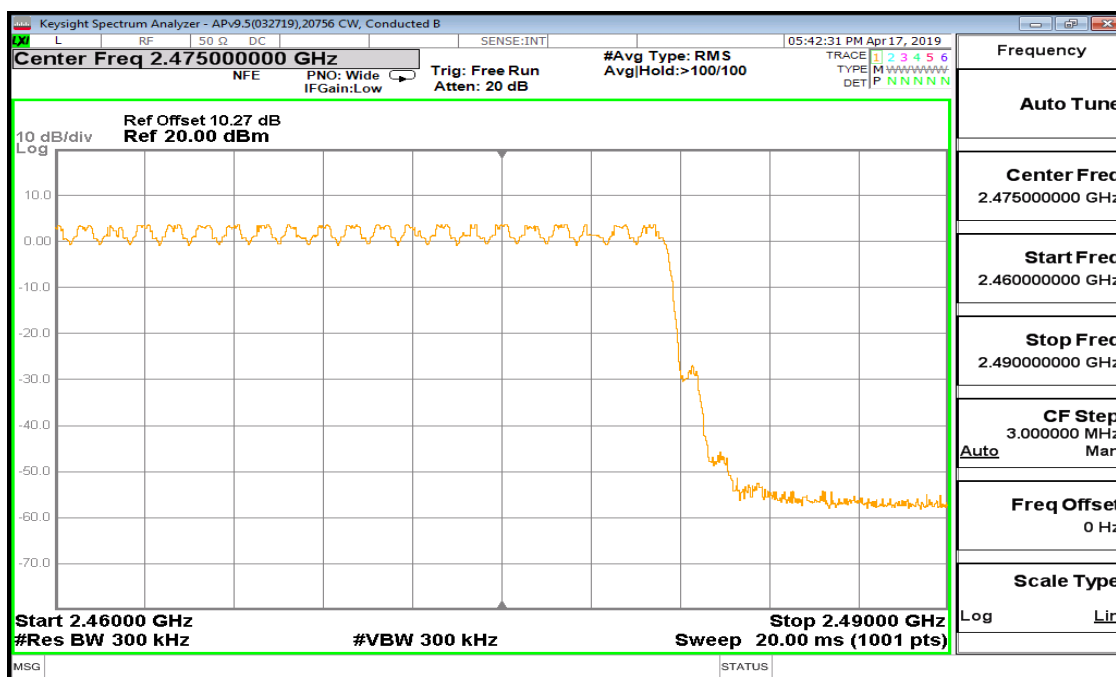
30MHz SPAN, SEGMENT 3 OF 3

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.

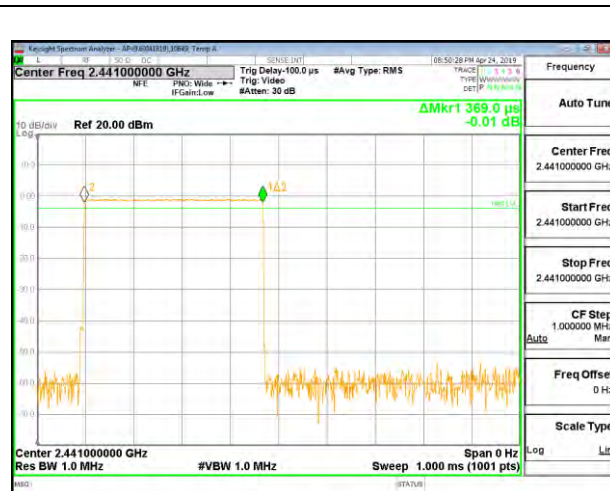
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

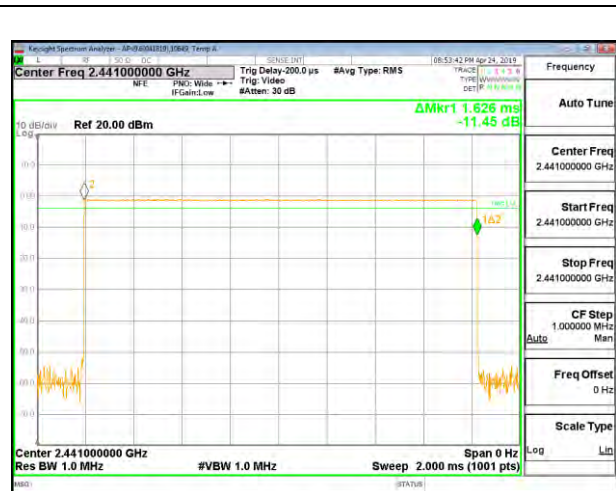
RESULTS

8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

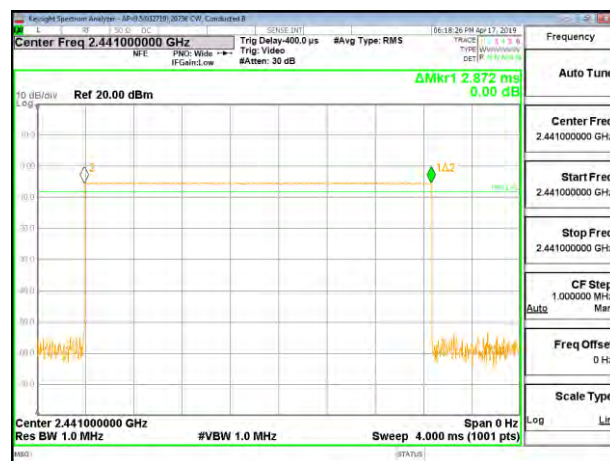
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.369	18	0.0664	0.4	-0.3336
DH3	1.626	13	0.2114	0.4	-0.1886
DH5	2.872	6	0.1723	0.4	-0.2277
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.369	4.5	0.01661	0.4	-0.3834
DH3	1.626	3.25	0.05285	0.4	-0.3472
DH5	2.872	1.5	0.04308	0.4	-0.3569



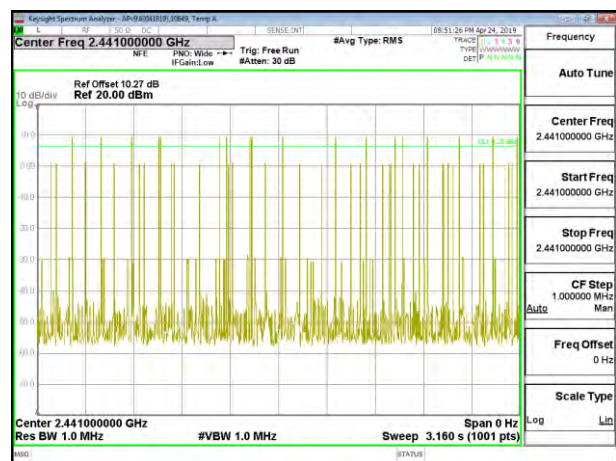
PULSE WIDTH – DH1



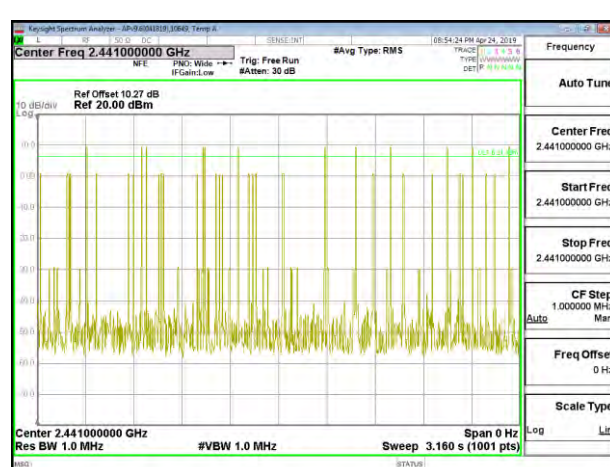
PULSE WIDTH – DH3



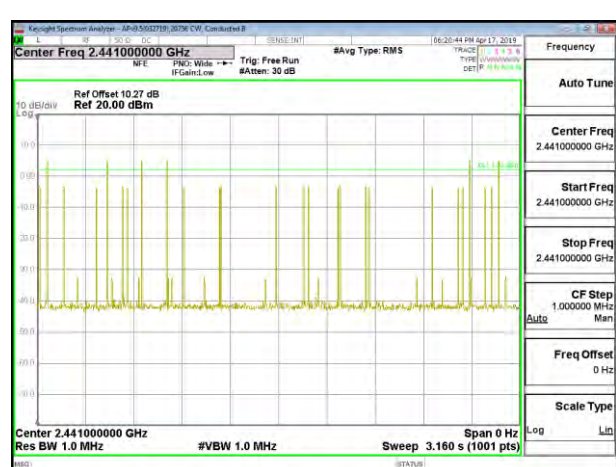
PULSE WIDTH – DH5



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



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

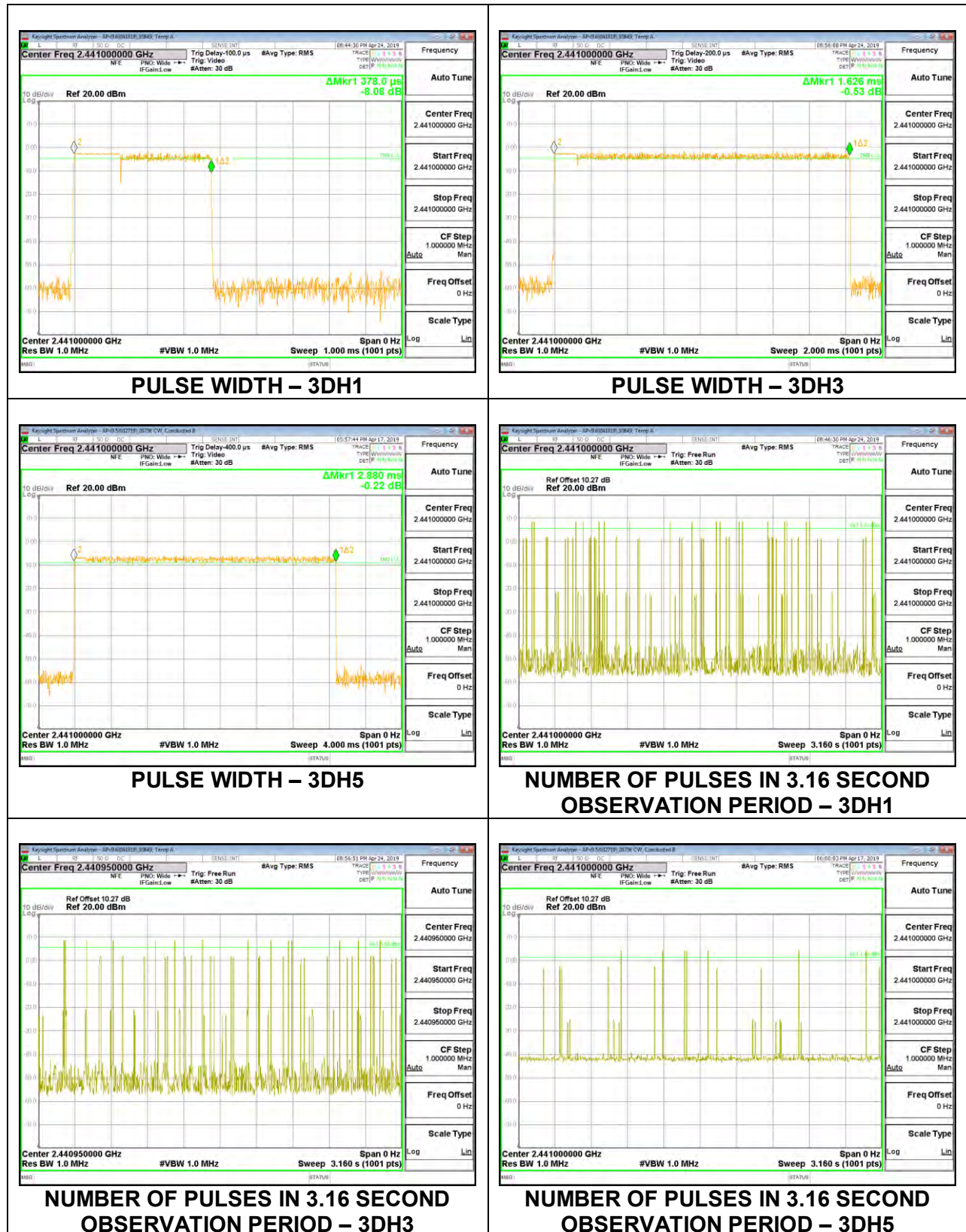


**NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – DH5**

8.5.2. 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					
3DH1	0.378	19	0.07182	0.4	-0.32818
3DH3	1.626	14	0.22764	0.4	-0.17236
3DH5	2.88	7	0.2016	0.4	-0.1984

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.



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.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.27 dB (including 10 dB pad and 0.27 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	10649 JR
Date:	4/19/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.43	30	-25.57
Middle	2441	4.93	30	-25.07
High	2480	5.25	30	-24.75

8.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	10649 JR
Date:	4/19/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	8.27	21	-12.73
Middle	2441	8.74	21	-12.26
High	2480	9.38	21	-11.62

8.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	10649 JR
Date:	4/19/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.90	21	-13.1
Middle	2441	8.38	21	-12.62
High	2480	8.50	21	-12.5

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 10.27 dB (including 10 dB pad and 0.27 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:	10649 JR
Date	4/19/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	4.18
Middle	2441	4.65
High	2480	4.99

8.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	10649 JR
Date	4/19/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	6.24
Middle	2441	6.30
High	2480	6.42

8.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	10649 JR
Date	4/19/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	5.80
Middle	2441	6.12
High	2480	6.30

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 300 kHz.

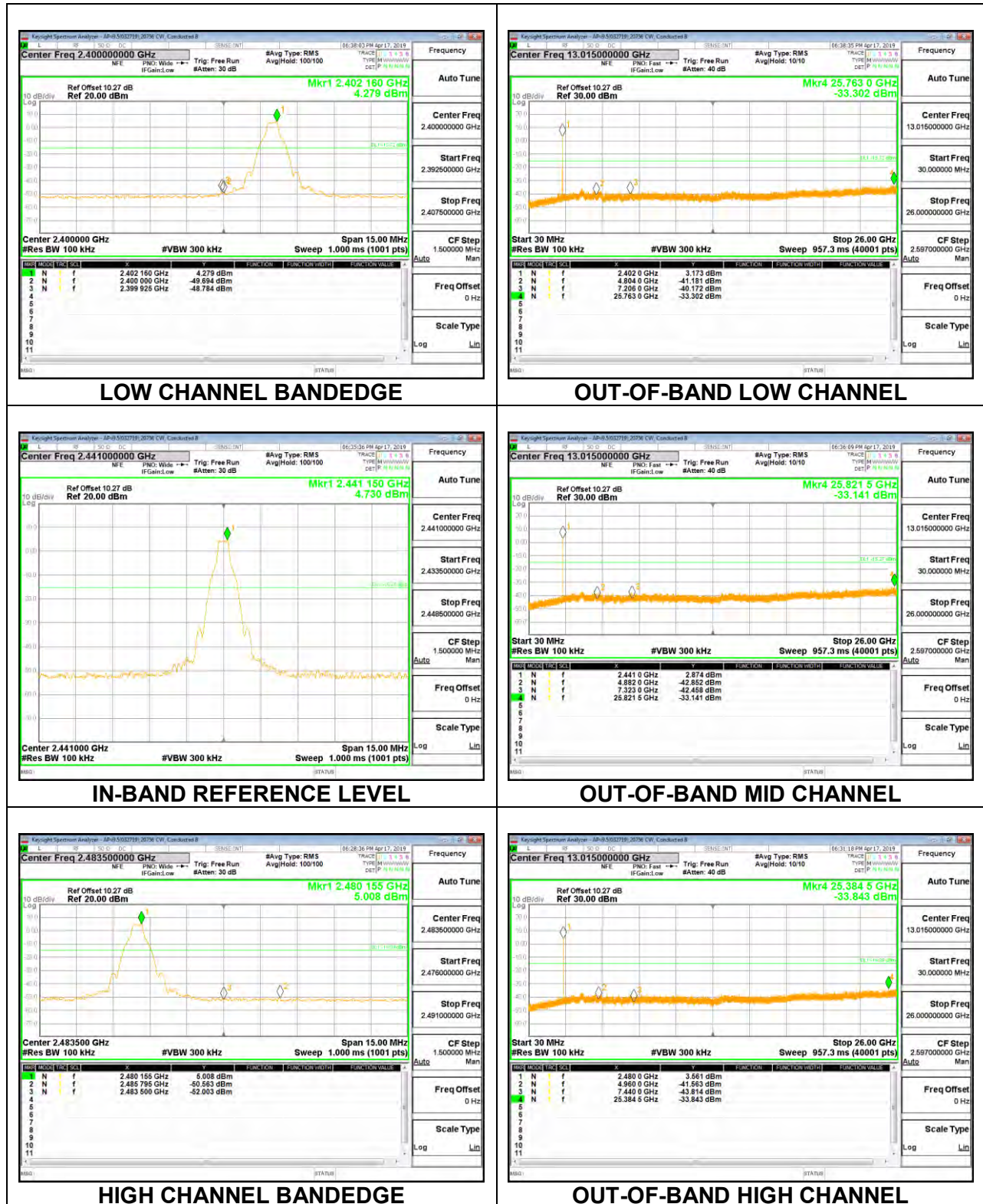
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

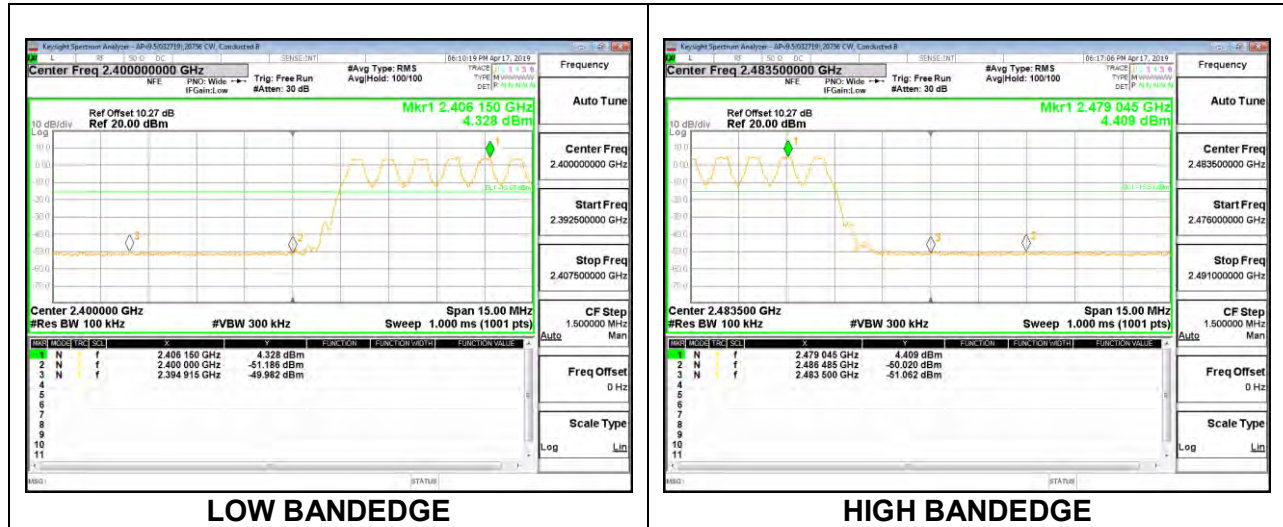
RESULTS

8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

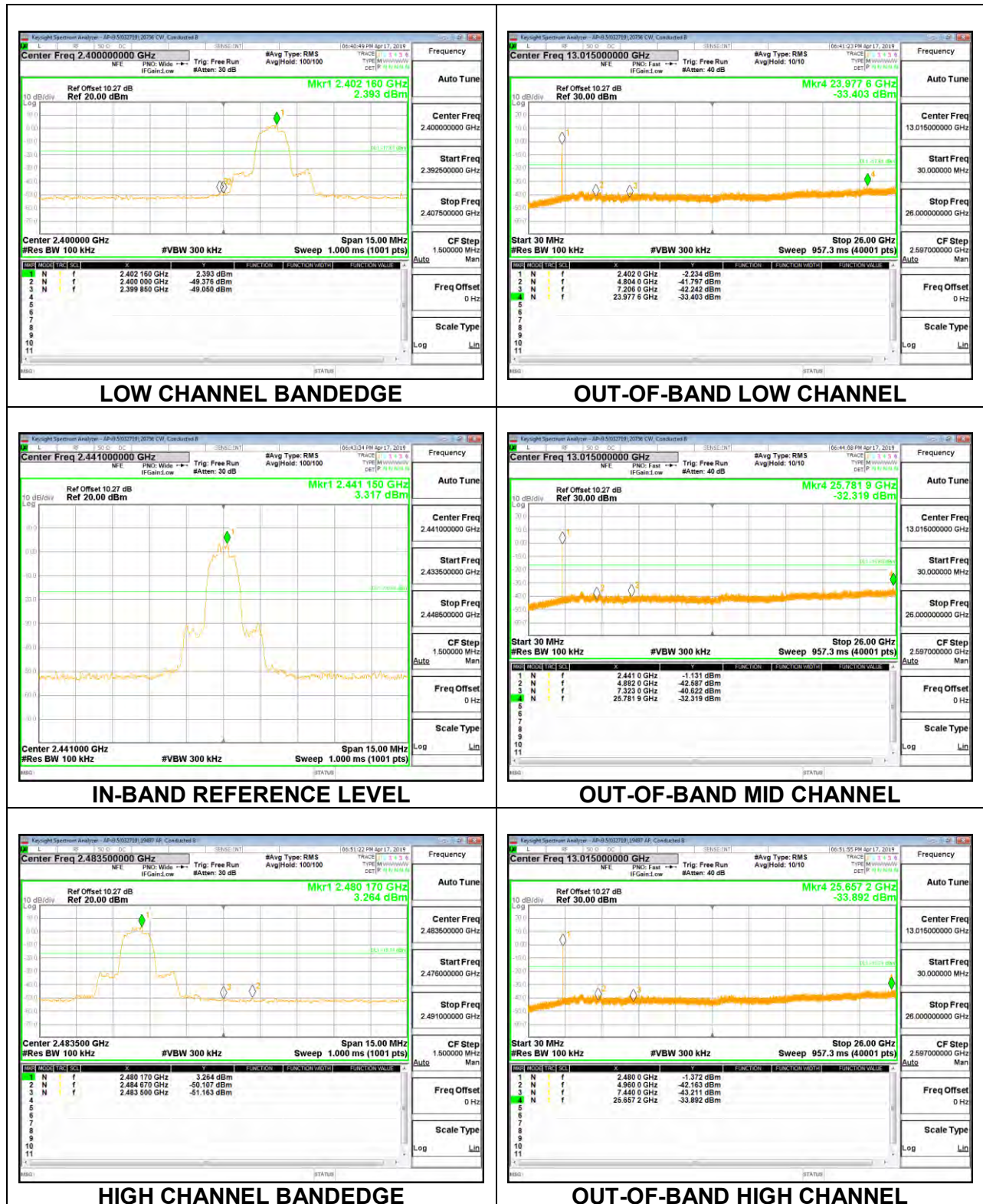


Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

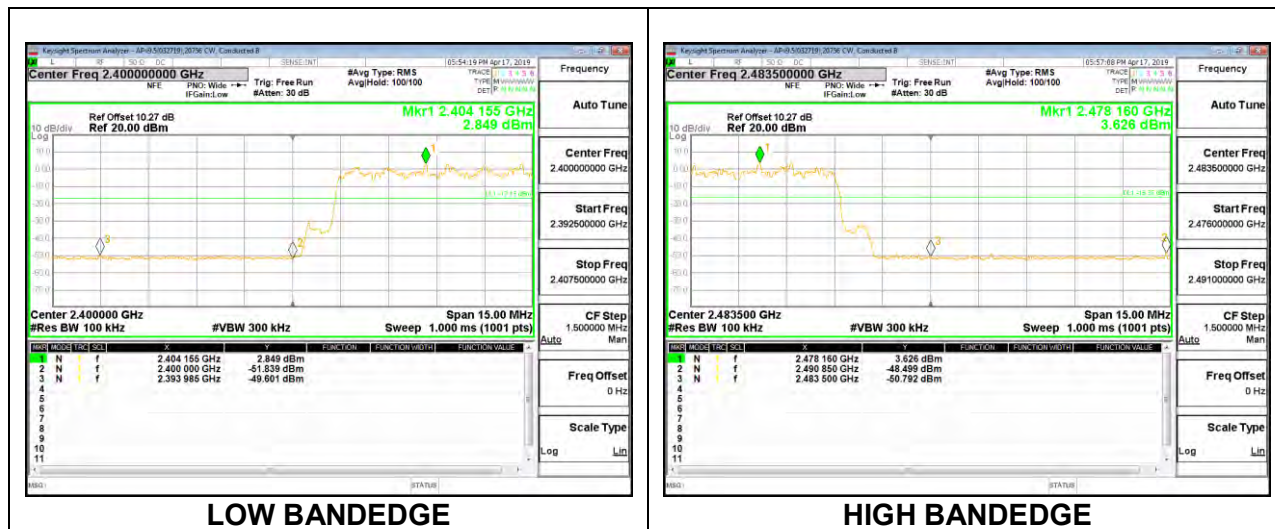


8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

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

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 measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T 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 30MHz, 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.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

KDB 558074 D01 15.247 Meas Guidance v05r01

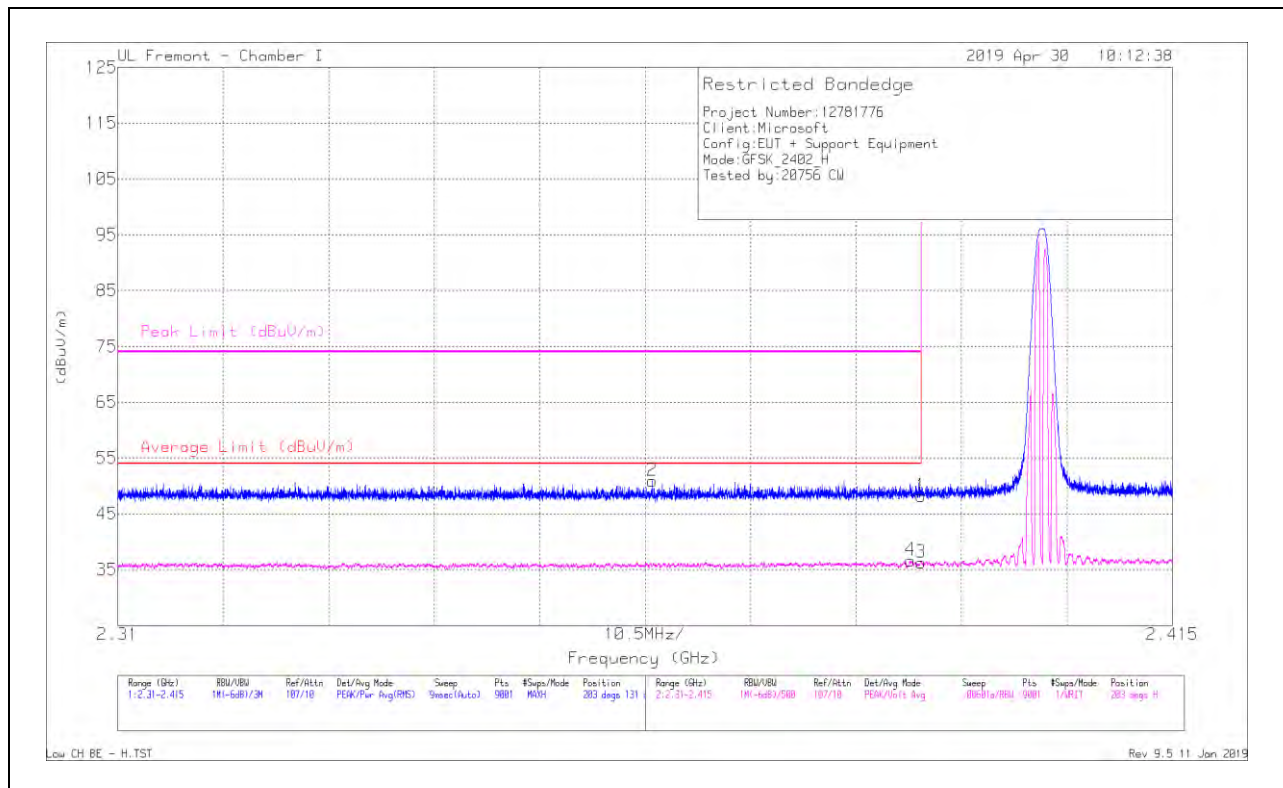
Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement. The maximum radiated field strength level represents the worst-case (maximum amplitude) RMS measurement of the emission(s) during continuous transmission (i.e., not including any time intervals during which the transmitter is off or is transmitting at a reduced power level). It is also acceptable to apply the DCCF to a measurement performed with a peak detector instead of the specified RMS power averaging detector. Note that Section 15.35(c) specifies that the DCCF shall represent the worst-case (greatest duty cycle) over any 100 msec transmission period.

9.1. TRANSMITTER ABOVE 1 GHz

9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



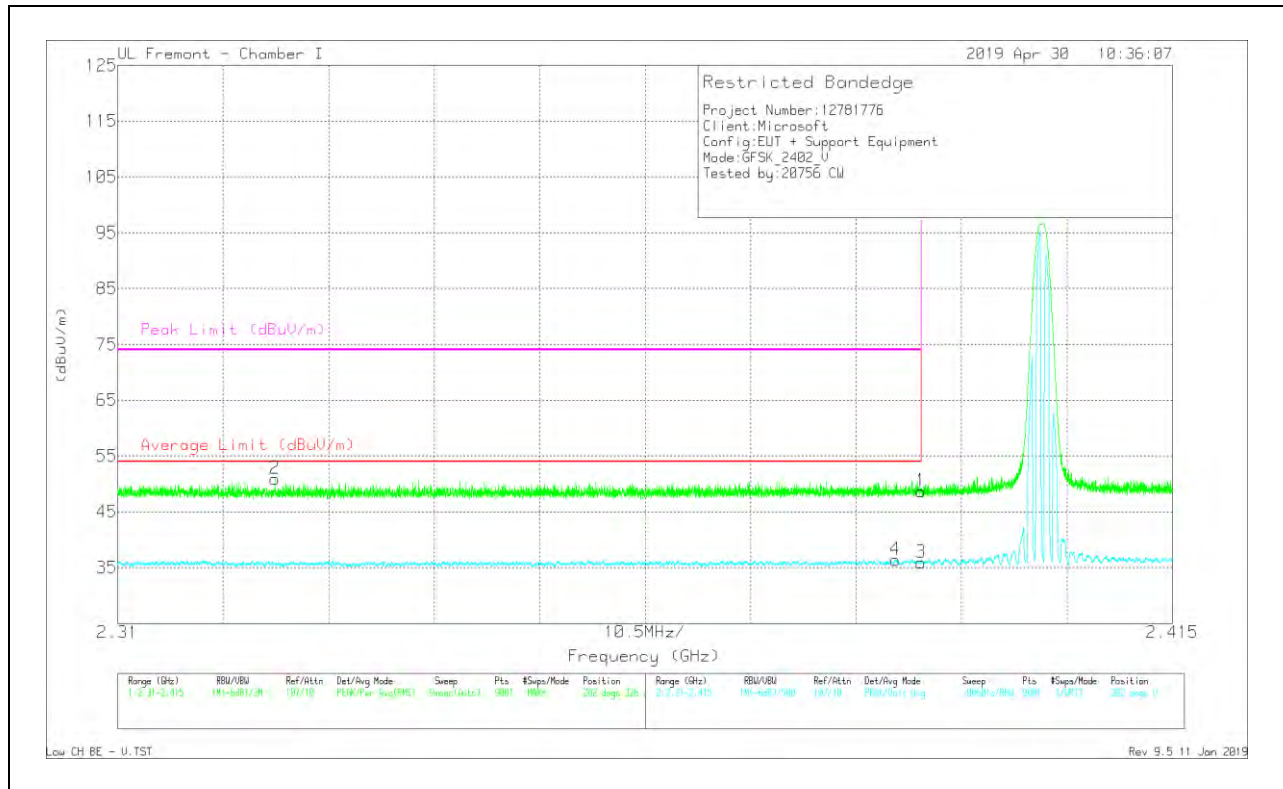
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.93	Pk	31.8	-21.6	48.13	-	-	74	-25.87	203	131	H
2	* 2.363	40.82	Pk	31.6	-21.5	50.92	-	-	74	-23.08	203	131	H
3	* 2.39	26.09	VA1T	31.8	-21.6	36.29	54	-17.71	-	-	203	131	H
4	* 2.389	26.38	VA1T	31.8	-21.6	36.58	54	-17.42	-	-	203	131	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 T862 (dB/m)	Amp/Cbl/Fit r/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	38.45	Pk	31.8	-21.6	48.65	-	-	74	-25.35	202	326	V
2	* 2.326	40.93	Pk	31.5	-21.5	50.93	-	-	74	-23.07	202	326	V
3	* 2.39	25.64	VA1T	31.8	-21.6	35.84	54	-18.16	-	-	202	326	V
4	* 2.387	26.24	VA1T	31.8	-21.6	36.44	54	-17.56	-	-	202	326	V

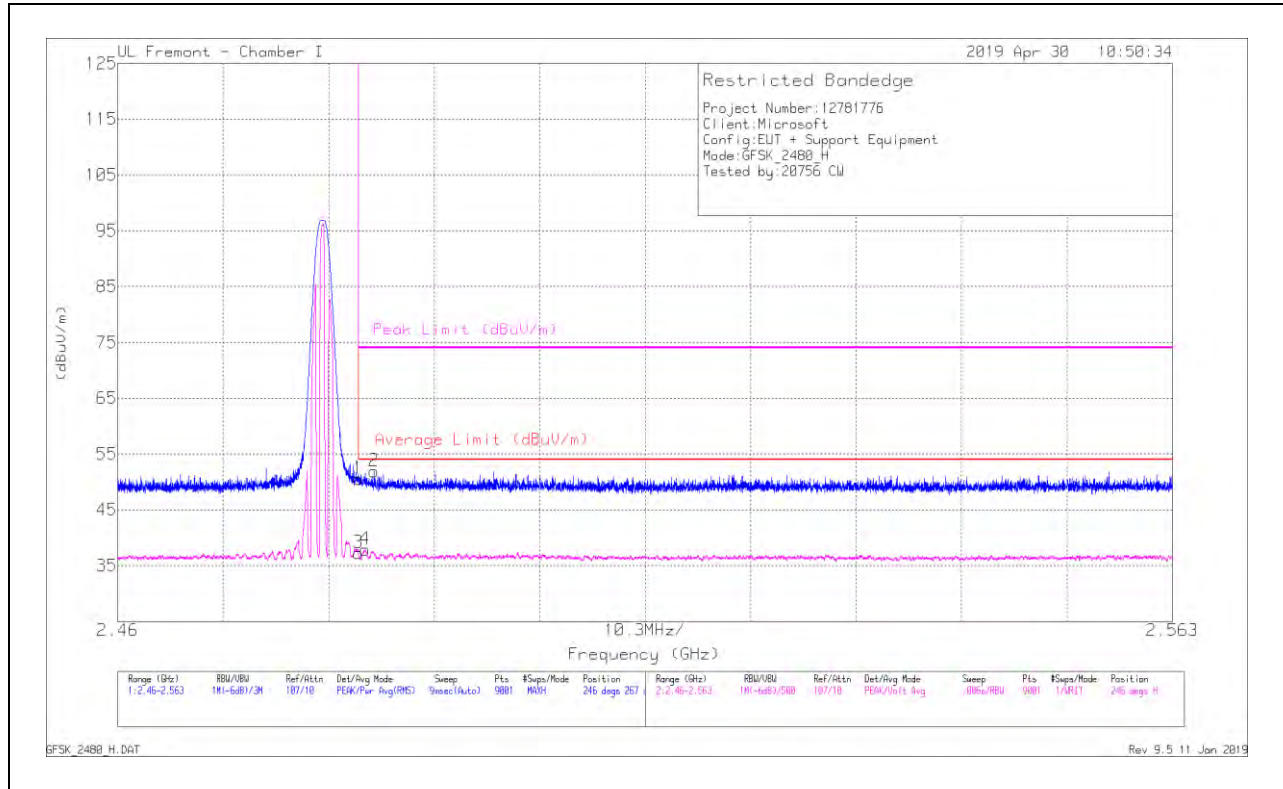
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



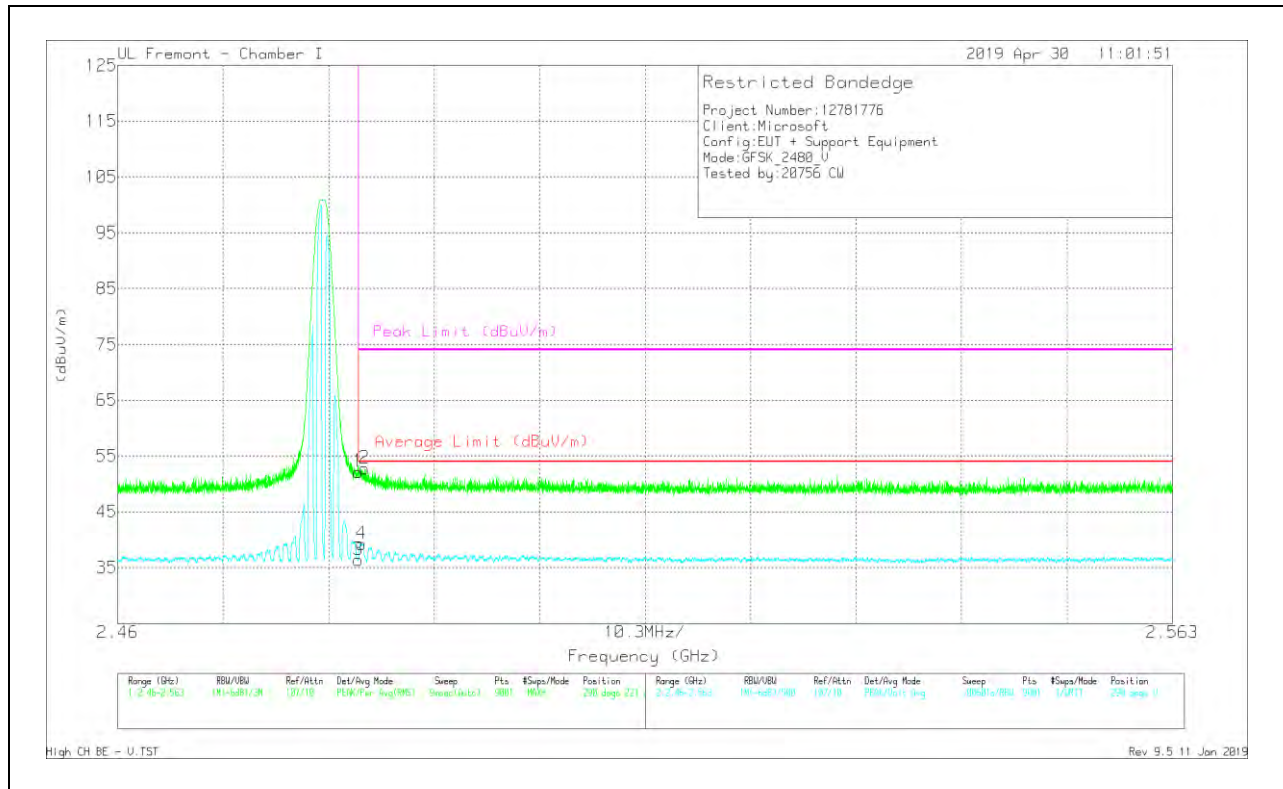
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.84	Pk	32.4	-21.7	50.54	-	-	74	-23.46	246	267	H
2	* 2.485	41.27	Pk	32.4	-21.8	51.87	-	-	74	-22.13	246	267	H
3	* 2.484	26.6	VA1T	32.4	-21.7	37.3	54	-16.7	-	-	246	267	H
4	* 2.484	27.2	VA1T	32.4	-21.7	37.9	54	-16.1	-	-	246	267	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 T862 (dB/m)	Amp/Cbl/Fit r/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	41.44	Pk	32.4	-21.7	52.14	-	-	74	-21.86	290	221	V
2	* 2.484	42.11	Pk	32.4	-21.7	52.81	-	-	74	-21.19	290	221	V
3	* 2.484	25.65	VA1T	32.4	-21.7	36.35	54	-17.65	-	-	290	220	V
4	* 2.484	28.54	VA1T	32.4	-21.7	39.24	54	-14.76	-	-	290	220	V

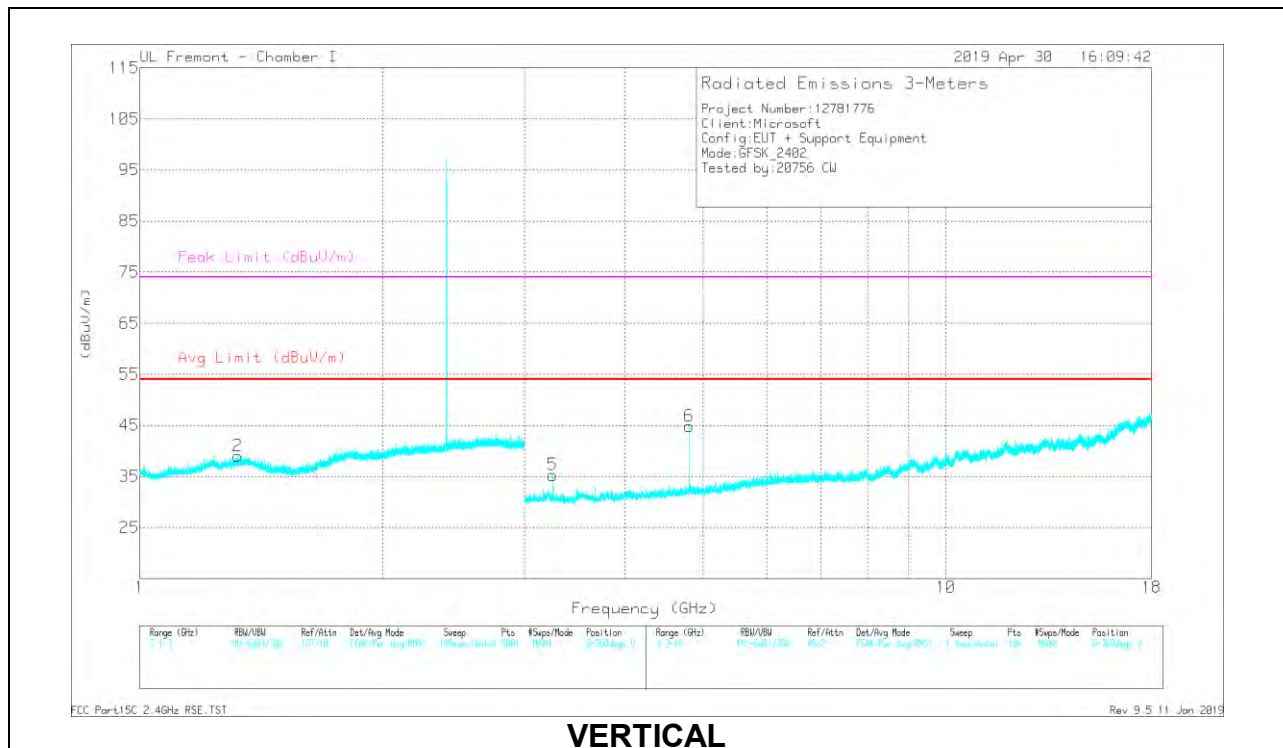
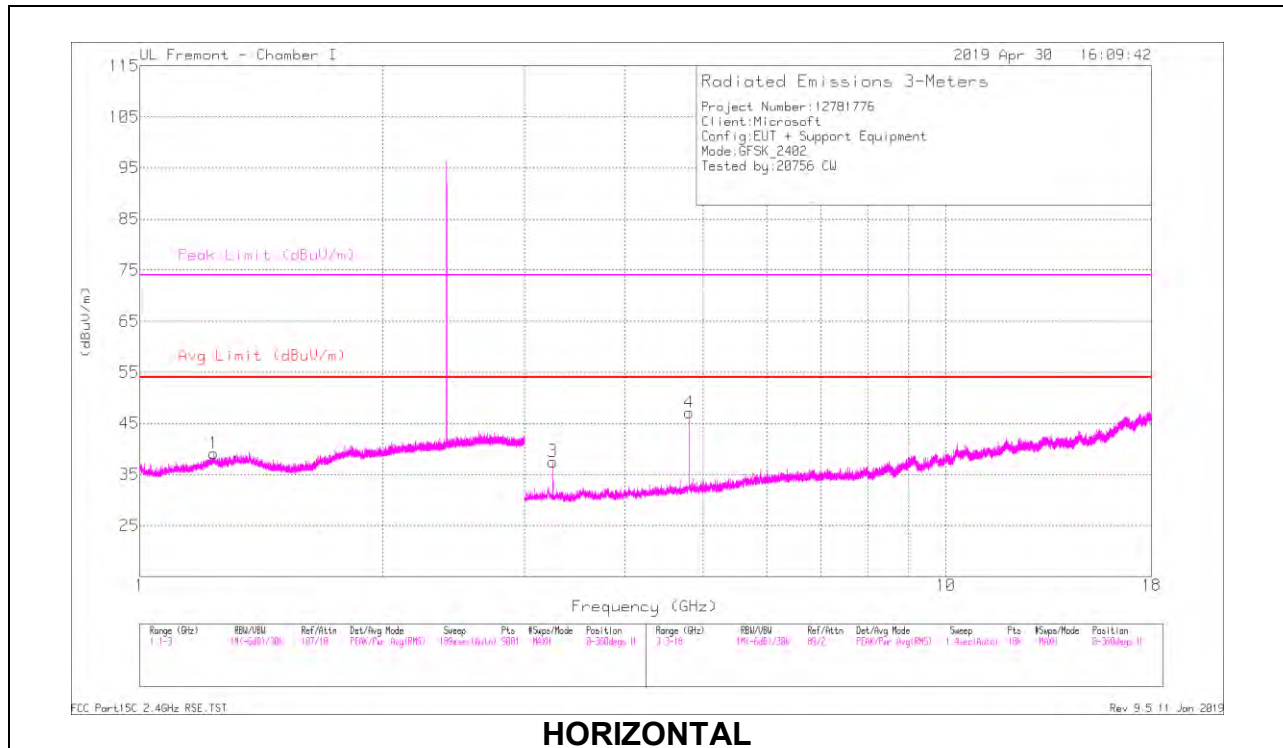
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



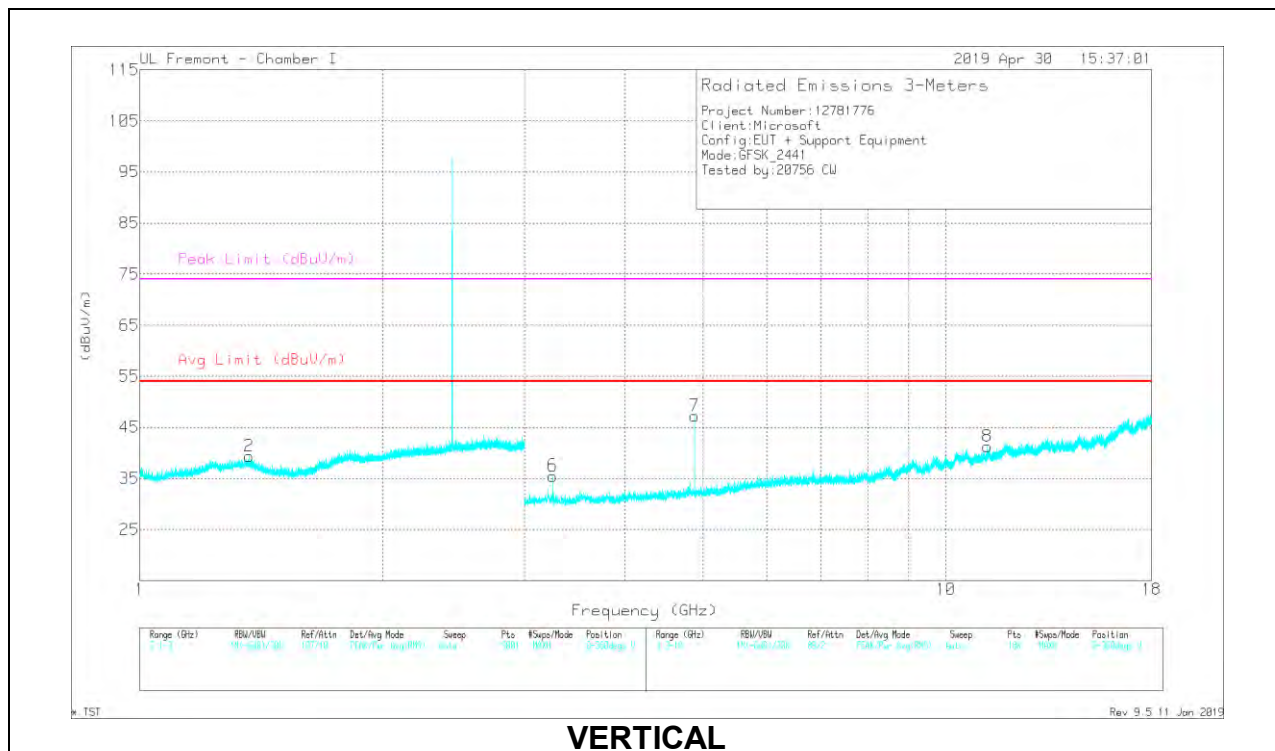
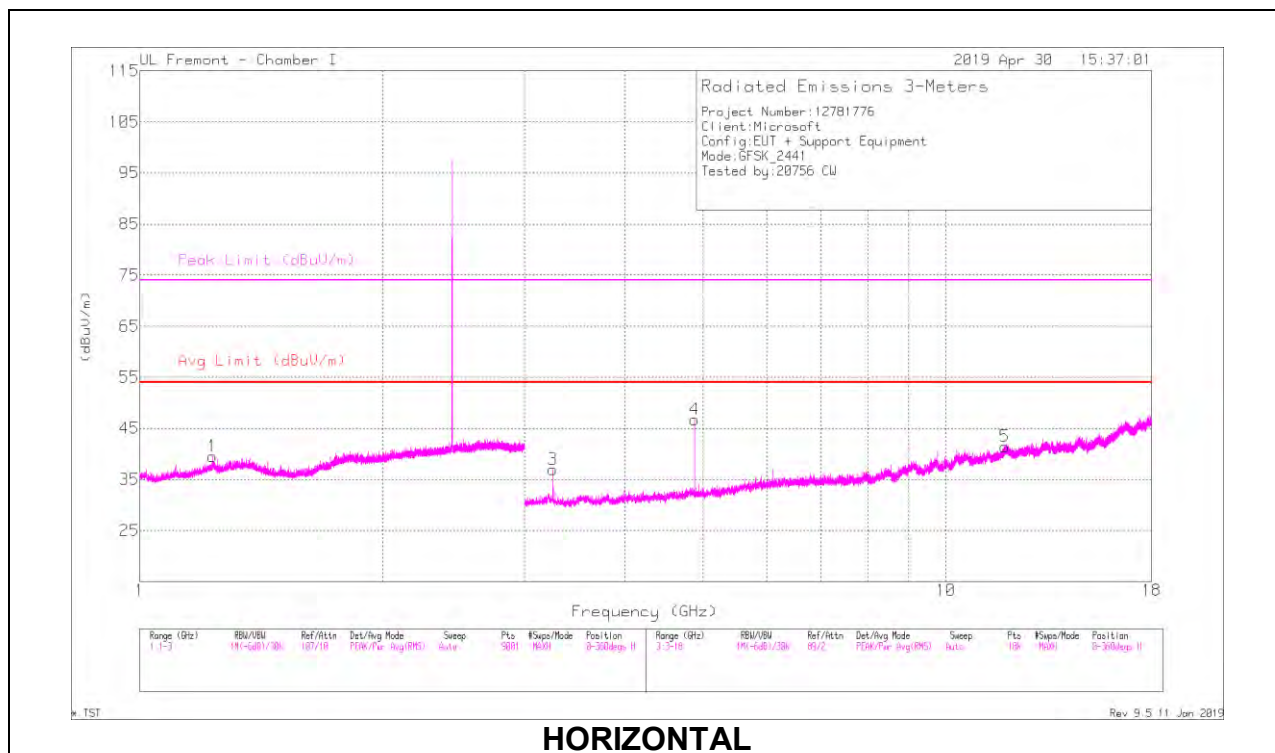
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/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	* 1.233	39.41	PKFH	29	-22.9	45.51	-	-	74	-28.49	80	134	H
	* 1.233	27.38	VA1T	29	-22.9	33.48	54	-20.52	-	-	80	134	H
2	* 1.322	39.96	PKFH	29.4	-23	46.36	-	-	74	-27.64	148	110	V
	* 1.324	27.22	VA1T	29.4	-23	33.62	54	-20.38	-	-	148	110	V
3	3.256	40.77	PKFH	32.8	-30.1	43.47	-	-	-	-	161	215	H
	3.256	35.31	VA1T	32.8	-30.1	38.01	-	-	-	-	161	215	H
4	* 4.804	44.42	PKFH	34.2	-28	50.62	-	-	74	-23.38	272	100	H
	* 4.804	40.5	VA1T	34.3	-28	46.8	54	-7.2	-	-	272	100	H
5	3.256	38.42	PKFH	32.8	-30.1	41.12	-	-	-	-	259	128	V
	3.256	30.27	VA1T	32.8	-30.1	32.97	-	-	-	-	259	128	V
6	* 4.804	43.05	PKFH	34.3	-28	49.35	-	-	74	-24.65	110	283	V
	* 4.804	36.45	VA1T	34.3	-28	42.75	54	-11.25	-	-	110	283	V

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

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

MID CHANNEL RESULTS



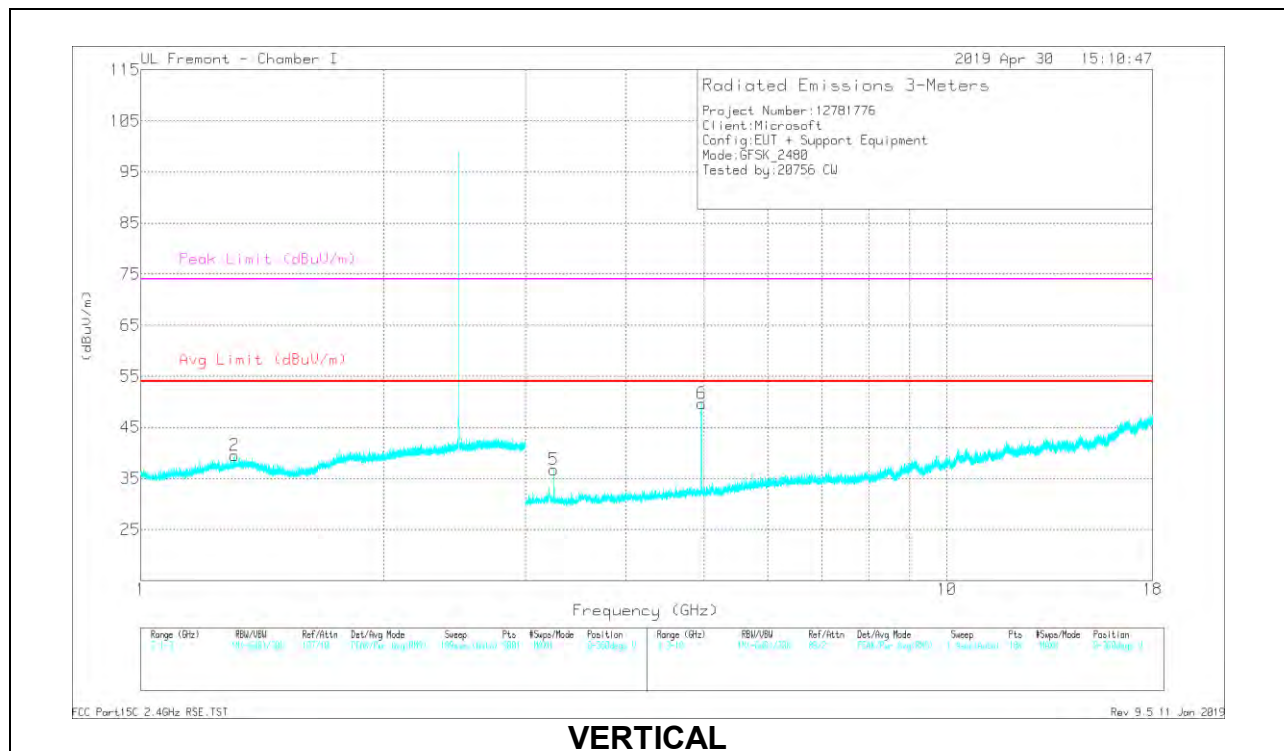
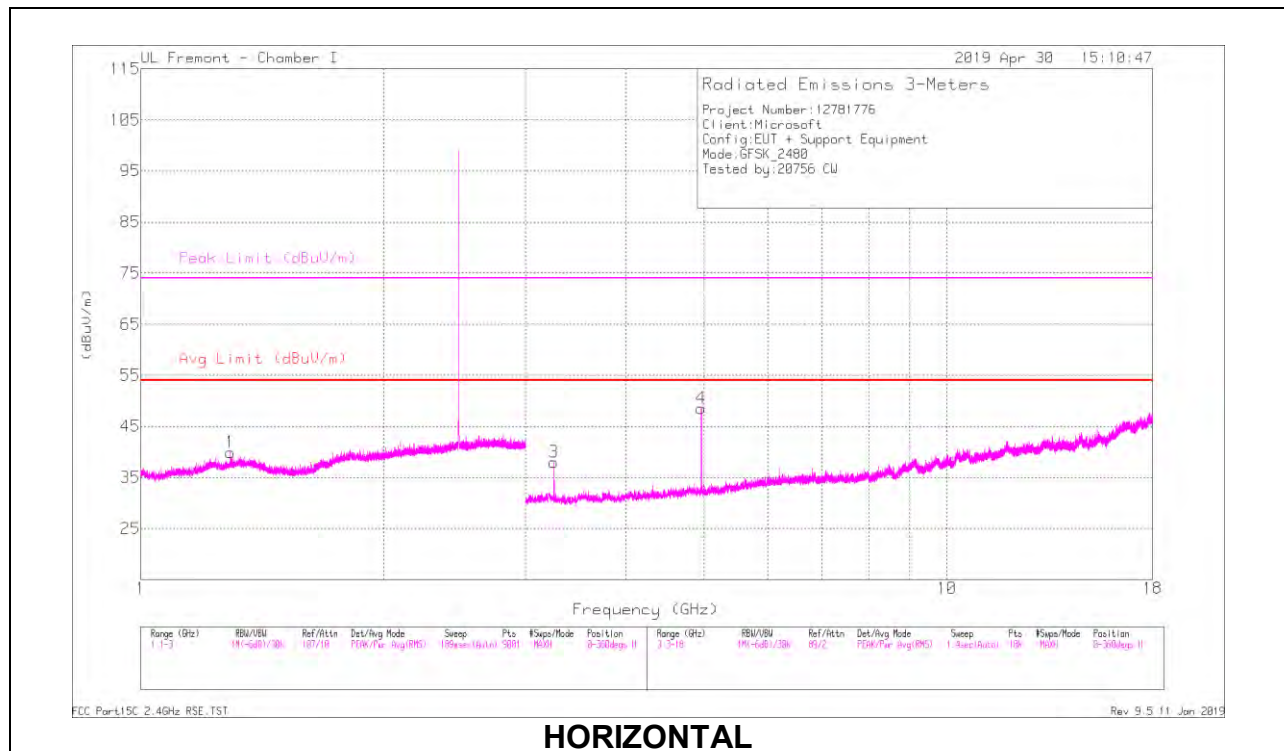
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/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	* 1.23	40.38	PKFH	29	-22.9	46.48	-	-	74	-27.52	36	120	H
	* 1.229	27.3	VA1T	28.9	-22.9	33.3	54	-20.7	-	-	36	120	H
2	* 1.367	39.58	PKFH	29.6	-23.2	45.98	-	-	74	-28.02	137	143	V
	* 1.366	27.29	VA1T	29.6	-23.2	33.69	54	-20.31	-	-	137	143	V
3	3.256	39.63	PKFH	32.8	-30.1	42.33	-	-	-	-	0	119	H
	3.256	33.36	VA1T	32.8	-30.1	36.06	-	-	-	-	0	119	H
4	* 4.882	45.74	PKFH	34.1	-28.8	51.04	-	-	74	-22.96	236	189	H
	* 4.882	42.15	VA1T	34.1	-28.8	47.45	54	-6.55	-	-	236	189	H
5	* 11.833	29.79	PKFH	38.7	-20.7	47.79	-	-	74	-26.21	335	220	H
	* 11.833	18.38	VA1T	38.7	-20.7	36.38	54	-17.62	-	-	335	220	H
6	3.256	39.07	PKFH	32.8	-30.1	41.77	-	-	-	-	205	116	V
	3.256	29.8	VA1T	32.8	-30.1	32.5	-	-	-	-	205	116	V
7	* 4.882	45.04	PKFH	34.1	-28.8	50.34	-	-	74	-23.66	105	193	V
	* 4.882	42	VA1T	34.1	-28.8	47.3	54	-6.7	-	-	105	193	V
8	* 11.27	31.04	PKFH	37.9	-20.4	48.54	-	-	74	-25.46	29	155	V
	* 11.27	17.73	VA1T	37.9	-20.4	35.23	54	-18.77	-	-	29	155	V

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

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 T862 (dB/m)	Amp/Cbl/FI tr/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	* 1.294	40.05	PKFH	29.3	-23	46.35	-	-	74	-27.65	94	156	H
	* 1.294	27.06	VA1T	29.3	-23	33.36	54	-20.64	-	-	94	156	H
2	* 1.306	39.92	PKFH	29.4	-23	46.32	-	-	74	-27.68	188	108	V
	* 1.31	27.48	VA1T	29.4	-23	33.88	54	-20.12	-	-	188	108	V
3	3.256	39.54	PKFH	32.8	-30.1	42.24	-	-	-	-	156	201	H
	3.256	32.71	VA1T	32.8	-30.1	35.41	-	-	-	-	156	201	H
4	* 4.959	41.62	PKFH	34.2	-29	46.82	-	-	74	-27.18	236	158	H
	* 4.959	36.73	VA1T	34.2	-29	41.93	54	-12.07	-	-	236	158	H
5	3.256	38.73	PKFH	32.8	-30.1	41.43	-	-	-	-	88	100	V
	3.256	32.17	VA1T	32.8	-30.1	34.87	-	-	-	-	88	100	V
6	* 4.96	46.23	PKFH	34.2	-29	51.43	-	-	74	-22.57	94	198	V
	* 4.96	43.15	VA1T	34.2	-29	48.35	54	-5.65	-	-	94	198	V

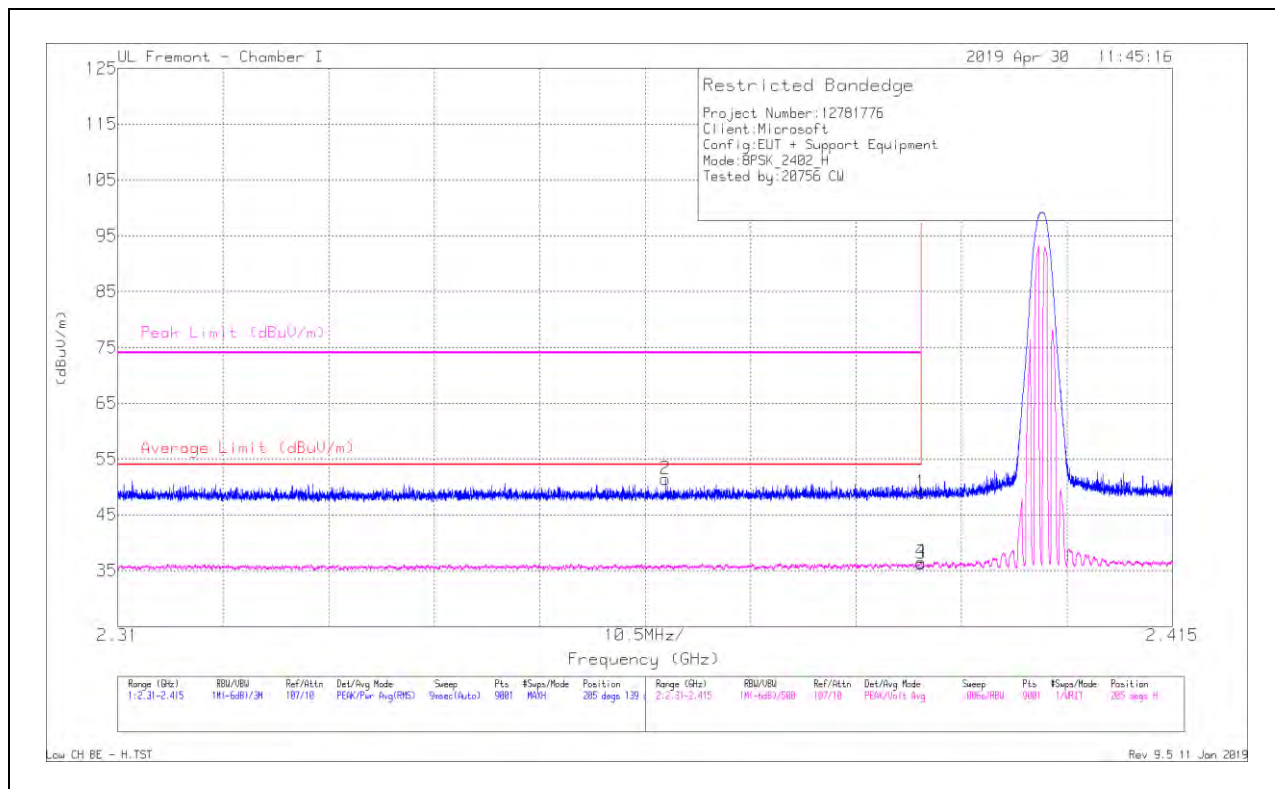
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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



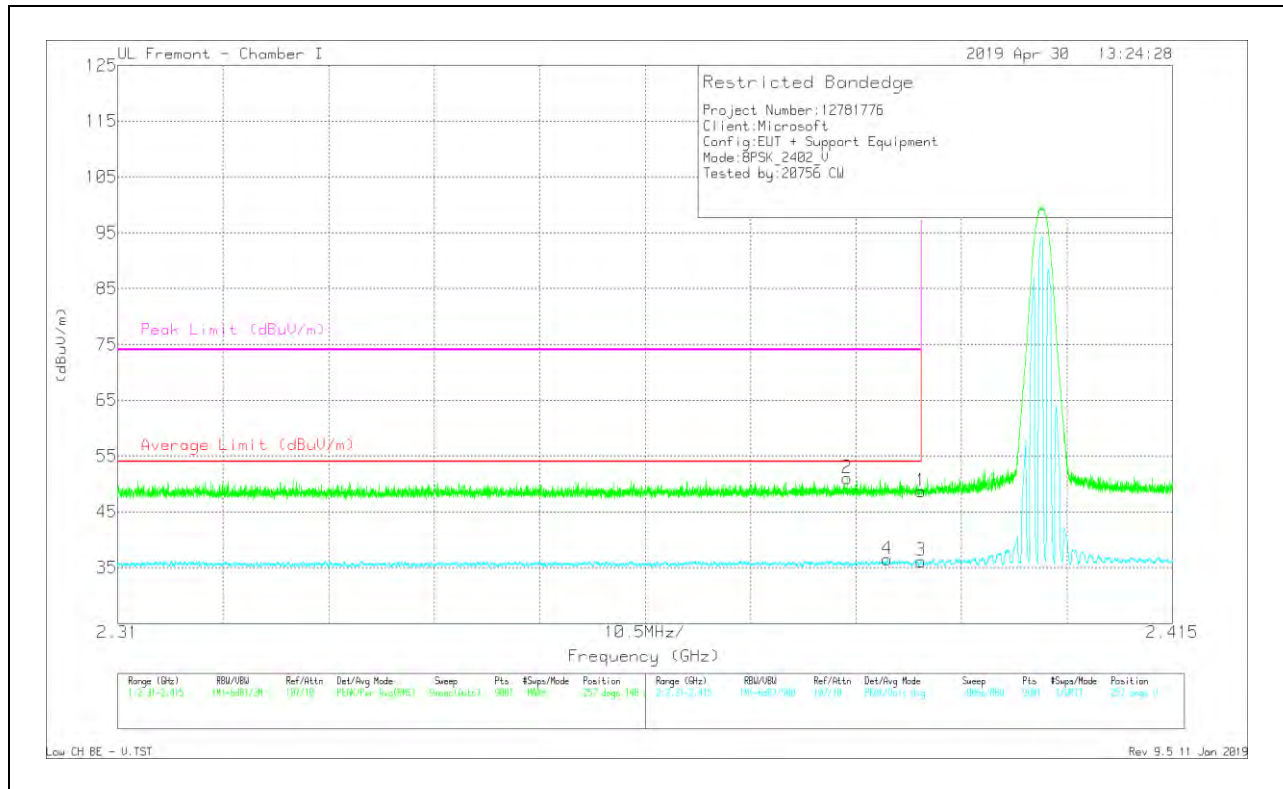
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dBm)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	38.76	Pk	31.8	-21.6	48.96	-	-	74	-25.04	205	139	H
2	* 2.365	41.34	Pk	31.6	-21.5	51.44	-	-	74	-22.56	205	139	H
3	* 2.39	26.12	VA1T	31.8	-21.6	36.32	54	-17.68	-	-	205	139	H
4	* 2.39	26.35	VA1T	31.8	-21.6	36.55	54	-17.45	-	-	205	139	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 T862 (dBm)	Amp/Cbl/Fit r/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	38.46	Pk	31.8	-21.6	48.66	-	-	74	-25.34	257	148	V
2	* 2.383	40.95	Pk	31.7	-21.6	51.05	-	-	74	-22.95	257	148	V
3	* 2.39	26	VA1T	31.8	-21.6	36.2	54	-17.8	-	-	257	148	V
4	* 2.387	26.27	VA1T	31.8	-21.6	36.47	54	-17.53	-	-	257	148	V

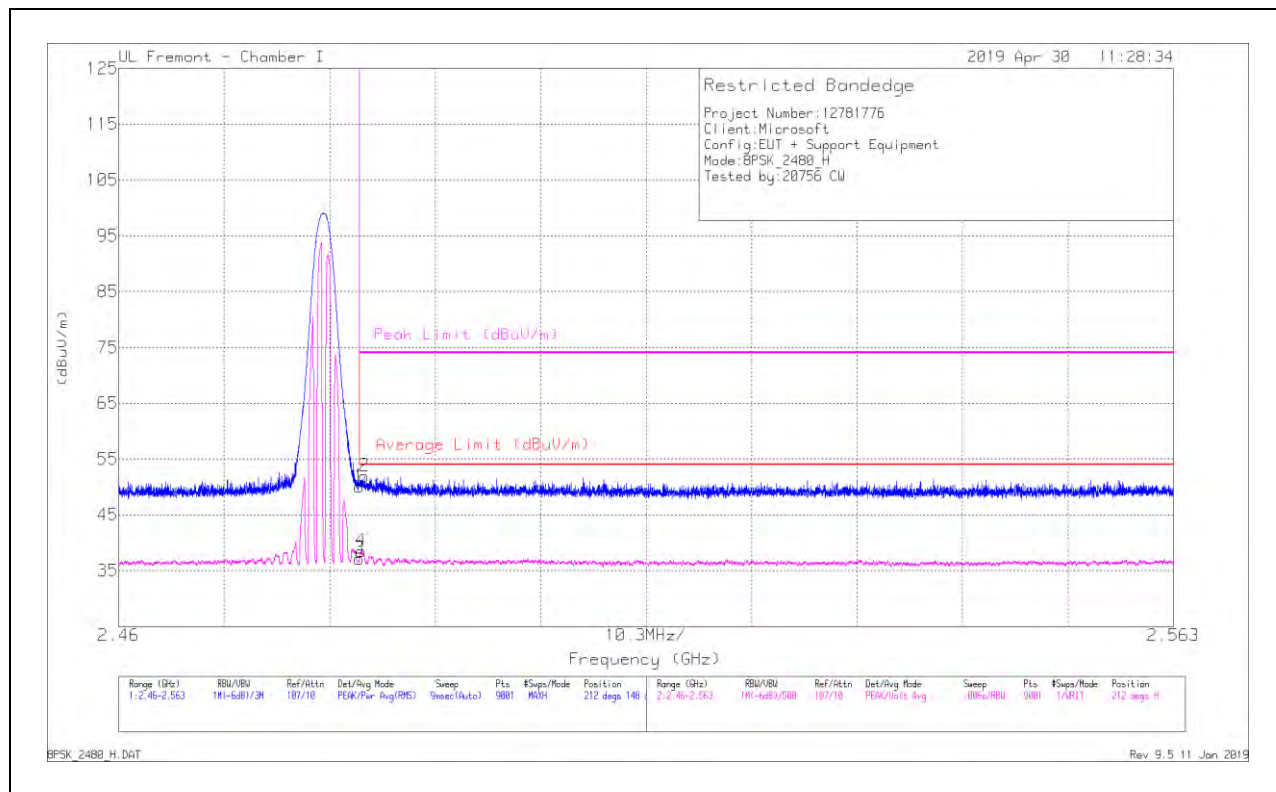
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



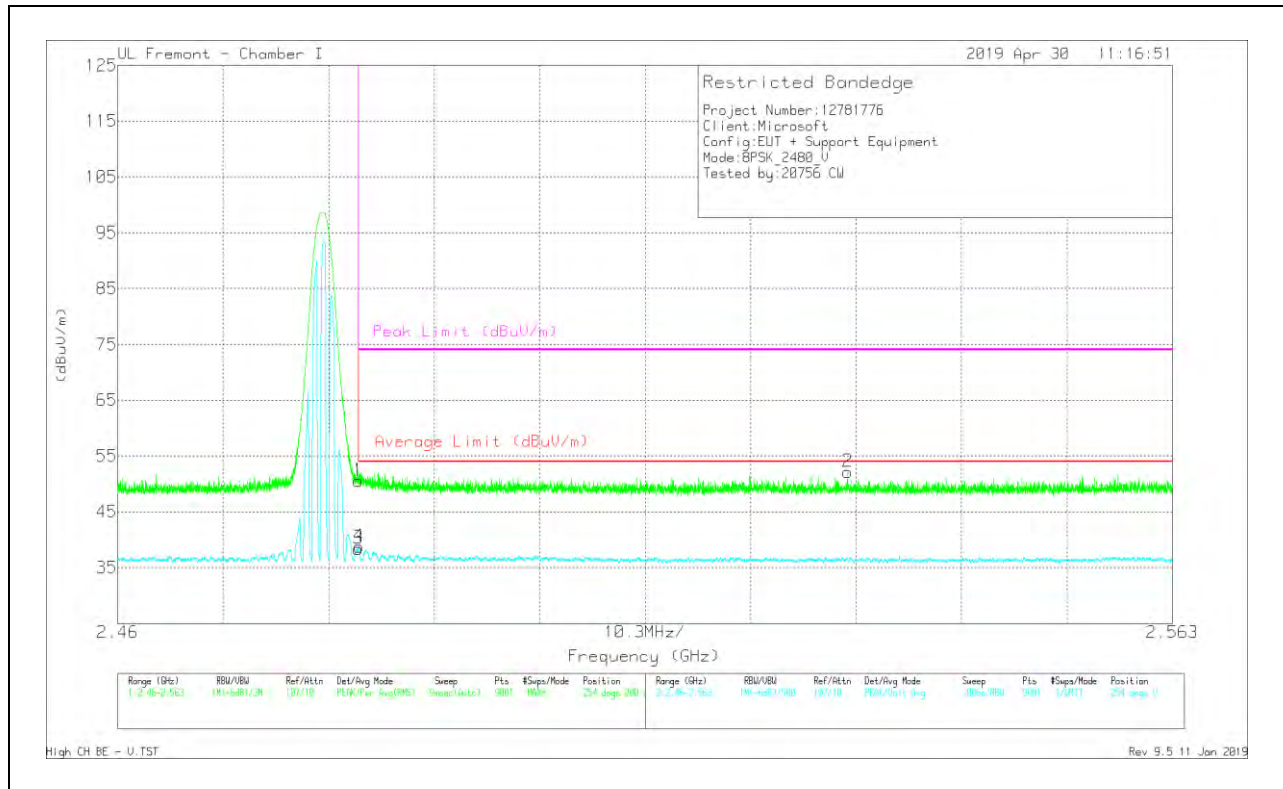
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	39.4	Pk	32.4	-21.7	50.1	-	-	74	-23.9	212	148	H
2	* 2.484	41.26	Pk	32.4	-21.7	51.96	-	-	74	-22.04	212	148	H
3	* 2.484	26.42	VA1T	32.4	-21.7	37.12	54	-16.88	-	-	212	148	H
4	* 2.484	27.75	VA1T	32.4	-21.7	38.45	54	-15.55	-	-	212	148	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 T862 (dBm)	Amp/Cbl/Fit r/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	39.79	Pk	32.4	-21.7	50.49	-	-	74	-23.51	254	200	V
2	2.531	41.46	Pk	32.4	-21.7	52.16	-	-	74	-21.84	254	200	V
3	* 2.484	27.73	VA1T	32.4	-21.7	38.43	54	-15.57	-	-	254	199	V
4	* 2.484	28.06	VA1T	32.4	-21.7	38.76	54	-15.24	-	-	254	199	V

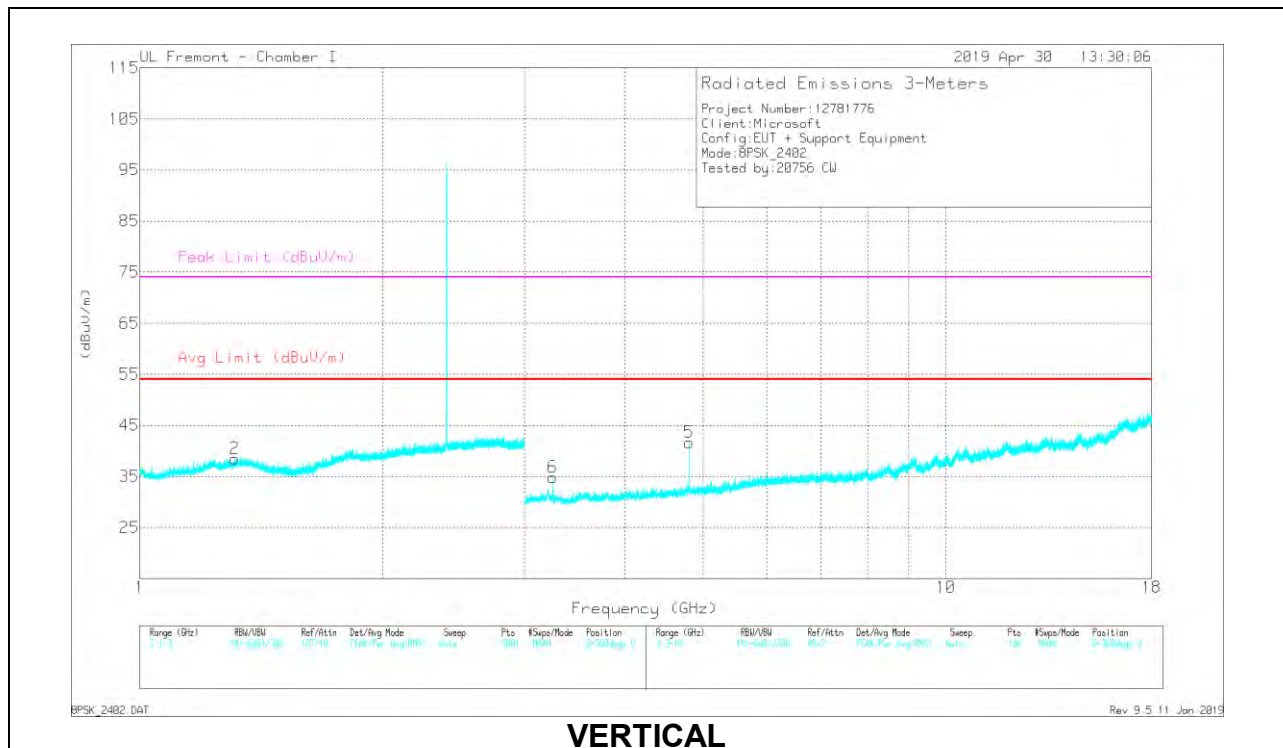
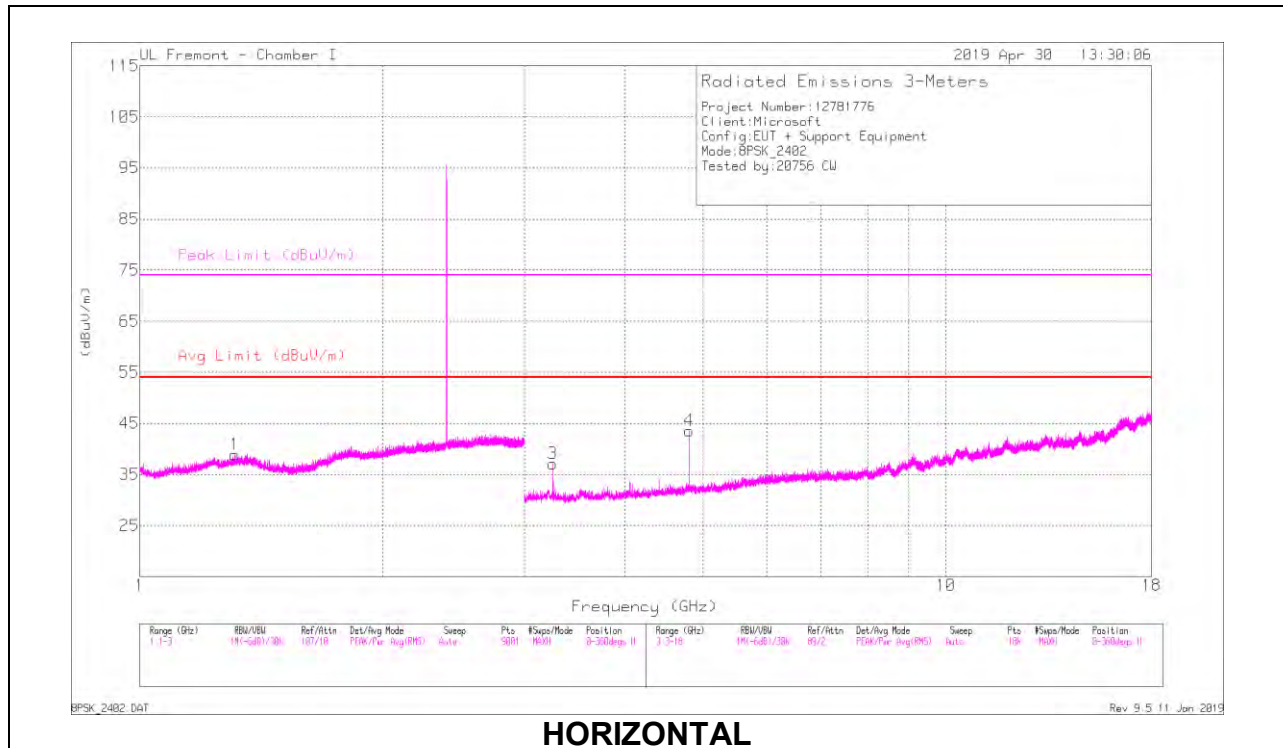
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



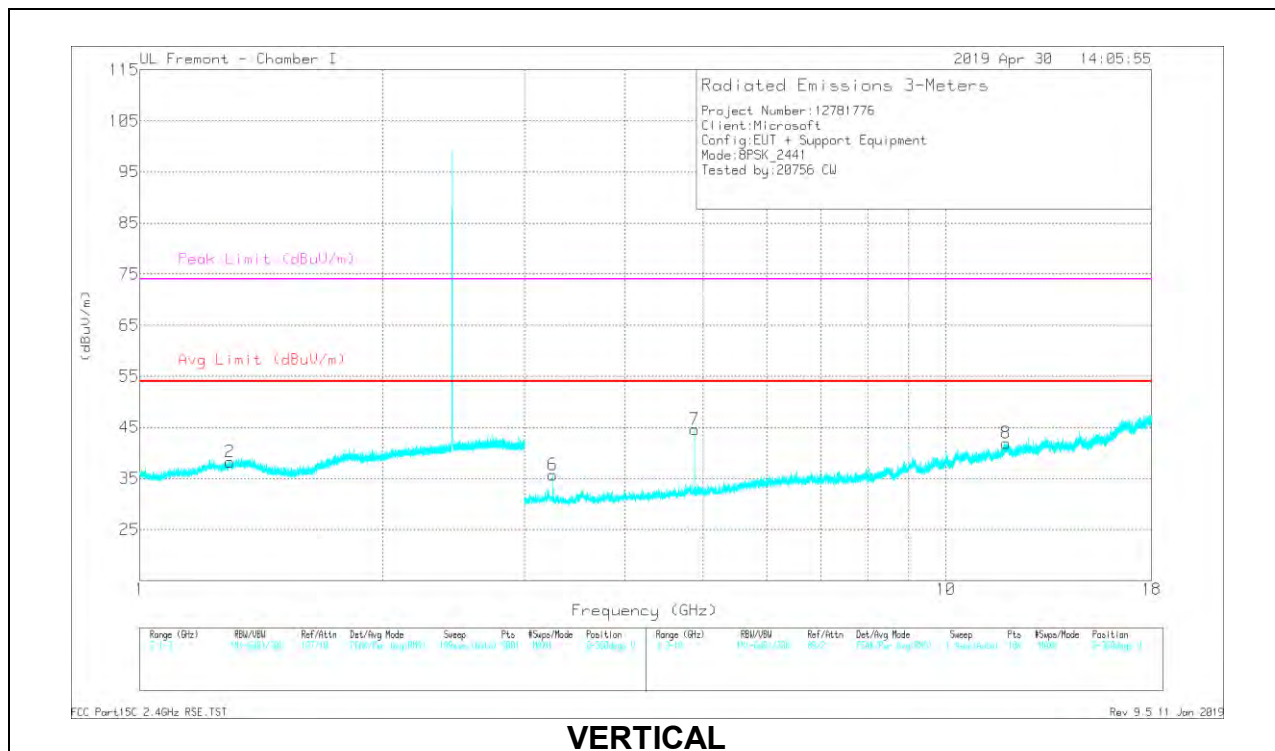
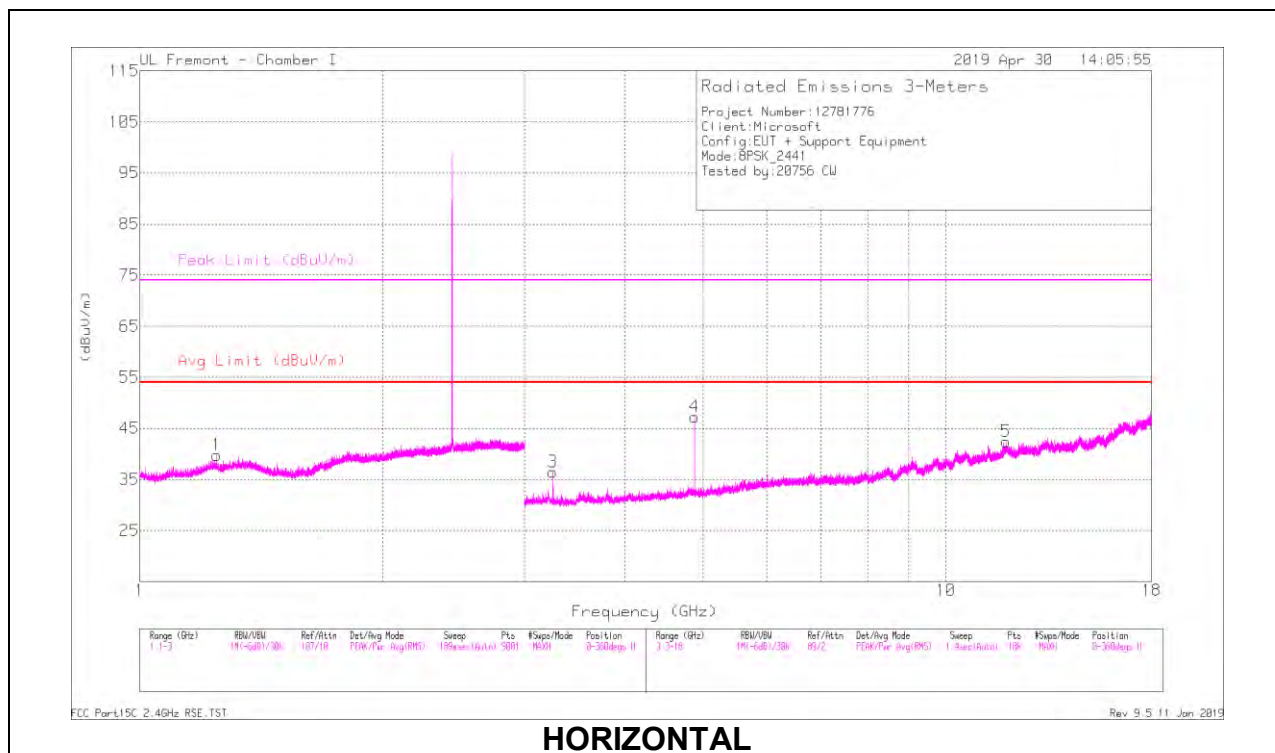
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/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	* 1.312	39.48	PKFH	29.4	-23	45.88	-	-	74	-28.12	218	134	H
	* 1.311	27.2	VA1T	29.4	-23	33.6	54	-20.4	-	-	218	134	H
2	* 1.312	39.89	PKFH	29.4	-23	46.29	-	-	74	-27.71	101	178	V
	* 1.313	27.12	VA1T	29.3	-23	33.42	54	-20.58	-	-	101	178	V
3	3.256	40.58	PKFH	32.8	-30.1	43.28	-	-	-	-	159	200	H
	3.256	35.16	VA1T	32.8	-30.1	37.86	-	-	-	-	159	200	H
4	* 4.804	43.65	PKFH	34.3	-28	49.95	-	-	74	-24.05	120	294	H
	* 4.804	35.79	VA1T	34.3	-28	42.09	54	-11.91	-	-	120	294	H
5	* 4.804	42.98	PKFH	34.3	-28	49.28	-	-	74	-24.72	129	246	V
	* 4.804	33.8	VA1T	34.3	-28	40.1	54	-13.9	-	-	129	246	V
6	3.256	39.73	PKFH	32.8	-30.1	42.43	-	-	-	-	205	100	V
	3.256	32.92	VA1T	32.8	-30.1	35.62	-	-	-	-	205	100	V

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

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

MID CHANNEL RESULTS



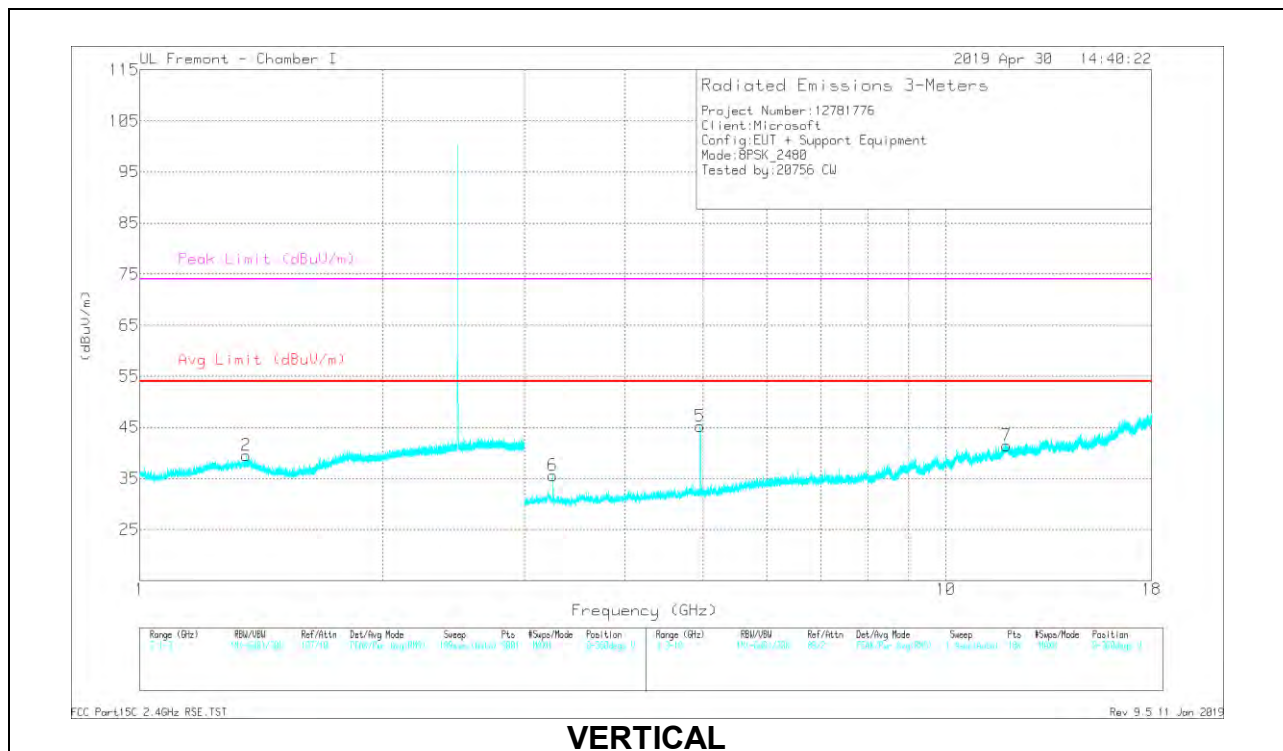
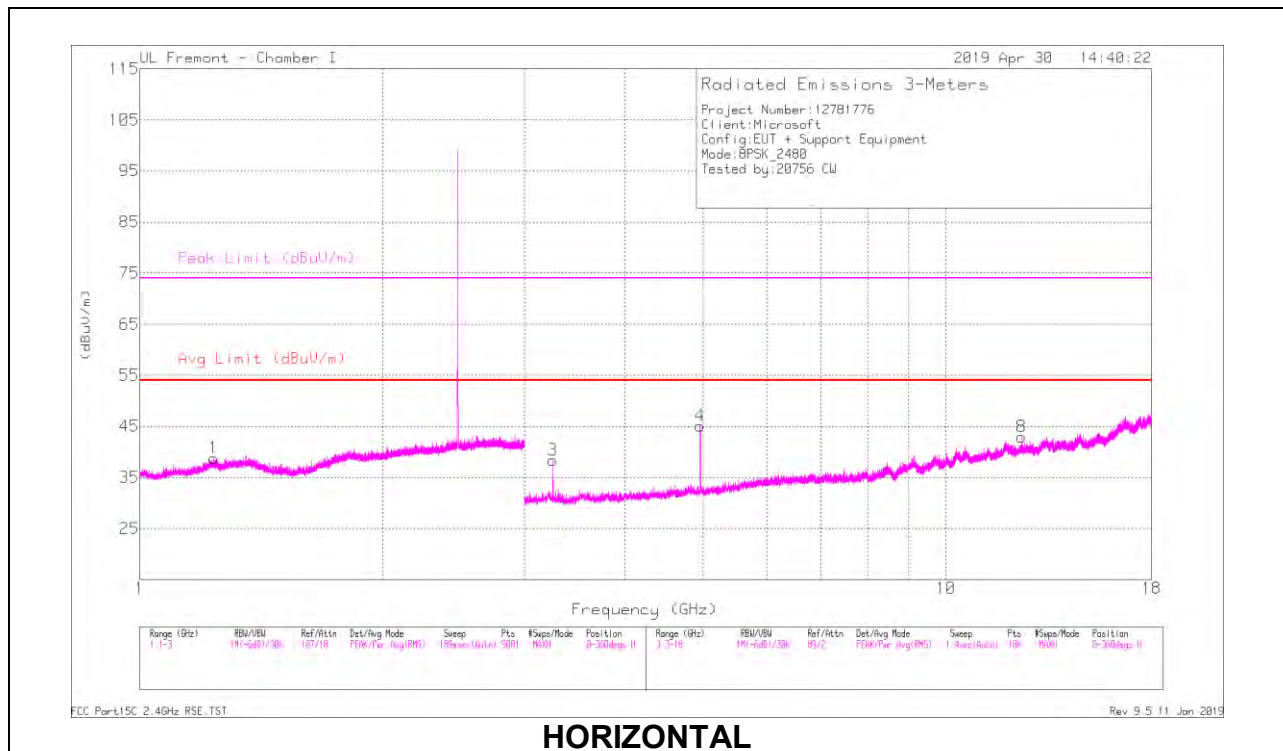
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/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	* 1.247	39.93	PKFH	28.9	-22.9	45.93	-	-	74	-28.07	204	124	H
	* 1.245	27.52	VA1T	28.9	-22.9	33.52	54	-20.48	-	-	204	124	H
2	* 1.293	39.36	PKFH	29.3	-23	45.66	-	-	74	-28.34	300	194	V
	* 1.292	27.08	VA1T	29.3	-23	33.38	54	-20.62	-	-	300	194	V
3	3.256	40.62	PKFH	32.8	-30.1	43.32	-	-	-	-	156	203	H
	3.256	33.08	VA1T	32.8	-30.1	35.78	-	-	-	-	156	203	H
4	* 4.882	45.51	PKFH	34.1	-28.8	50.81	-	-	74	-23.19	237	167	H
	* 4.882	38.34	VA1T	34.1	-28.8	43.64	54	-10.36	-	-	237	167	H
5	* 11.875	30.64	PKFH	38.7	-20.8	48.54	-	-	74	-25.46	81	136	H
	* 11.875	18.67	VA1T	38.7	-20.8	36.57	54	-17.43	-	-	81	136	H
6	3.256	38.52	PKFH	32.8	-30.1	41.22	-	-	-	-	90	102	V
	3.256	31.41	VA1T	32.8	-30.1	34.11	-	-	-	-	90	102	V
7	* 4.882	45.59	PKFH	34.1	-28.8	50.89	-	-	74	-23.11	109	325	V
	* 4.882	38.67	VA1T	34.1	-28.8	43.97	54	-10.03	-	-	109	325	V
8	* 11.879	30.21	PKFH	38.7	-20.8	48.11	-	-	74	-25.89	57	286	V
	* 11.879	18.77	VA1T	38.7	-20.8	36.67	54	-17.33	-	-	57	286	V

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

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

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

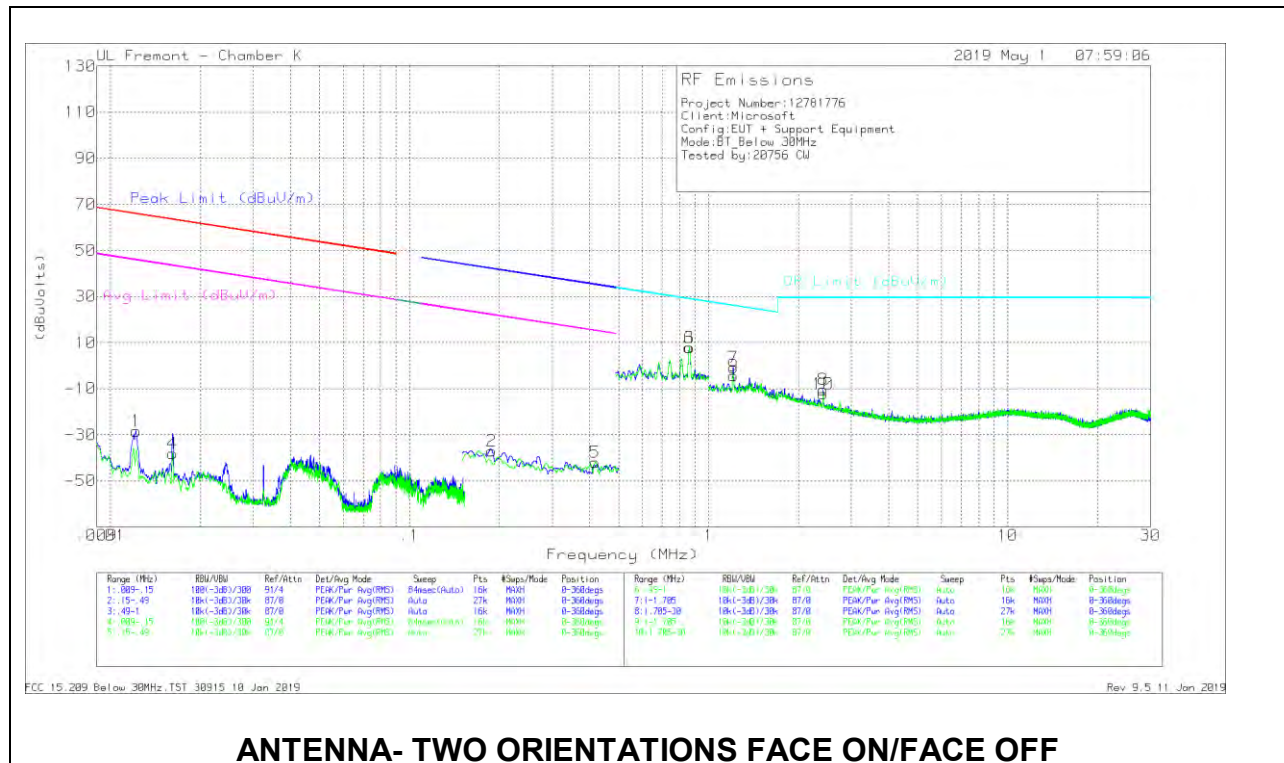
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.233	39.99	PKFH	29	-22.9	46.09	-	-	74	-27.91	113	163	H
	* 1.236	27.41	VA1T	29	-23	33.41	54	-20.59	-	-	113	163	H
2	* 1.355	39.32	PKFH	29.5	-23.1	45.72	-	-	74	-28.28	227	229	V
	* 1.354	27.29	VA1T	29.5	-23.1	33.69	54	-20.31	-	-	227	229	V
3	3.256	40.46	PKFH	32.8	-30.1	43.16	-	-	-	-	158	206	H
	3.256	35.43	VA1T	32.8	-30.1	38.13	-	-	-	-	158	206	H
4	* 4.959	45.38	PKFH	34.2	-29	50.58	-	-	74	-23.42	233	136	H
	* 4.959	37.04	VA1T	34.2	-29	42.24	54	-11.76	-	-	233	136	H
8	* 12.422	29.78	PKFH	39	-21.4	47.38	-	-	74	-26.62	315	305	H
	* 12.422	18.55	VA1T	39	-21.4	36.15	54	-17.85	-	-	315	305	H
5	* 4.96	46.94	PKFH	34.2	-29	52.14	-	-	74	-21.86	102	197	V
	* 4.96	39.52	VA1T	34.2	-29	44.72	54	-9.28	-	-	102	197	V
6	3.256	38.57	PKFH	32.8	-30.1	41.27	-	-	-	-	202	116	V
	3.256	32.34	VA1T	32.8	-30.1	35.04	-	-	-	-	202	116	V
7	* 11.892	30.84	PKFH	38.7	-20.9	48.64	-	-	74	-25.36	82	163	V
	* 11.892	18.81	VA1T	38.7	-20.9	36.61	54	-17.39	-	-	82	163	V

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

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

9.2. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186 650	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)
1	.0122	23.36	Pk	60	-31.8	-80	-28.44	65.86	-94.3	45.86	-74.3	-	-	-	-	0-360
2	.18858	16.97	Pk	56.2	-32.1	-80	-36.93	-	-	-	-	42.11	-79.04	22.11	-59.04	0-360
4	.01616	14.28	Pk	59.5	-31.9	-80	-38.12	63.42	-101.54	43.42	-81.54	-	-	-	-	0-360
5	.418	14.04	Pk	56.2	-32.1	-80	-41.86	-	-	-	-	35.18	-77.04	15.18	-57.04	0-360

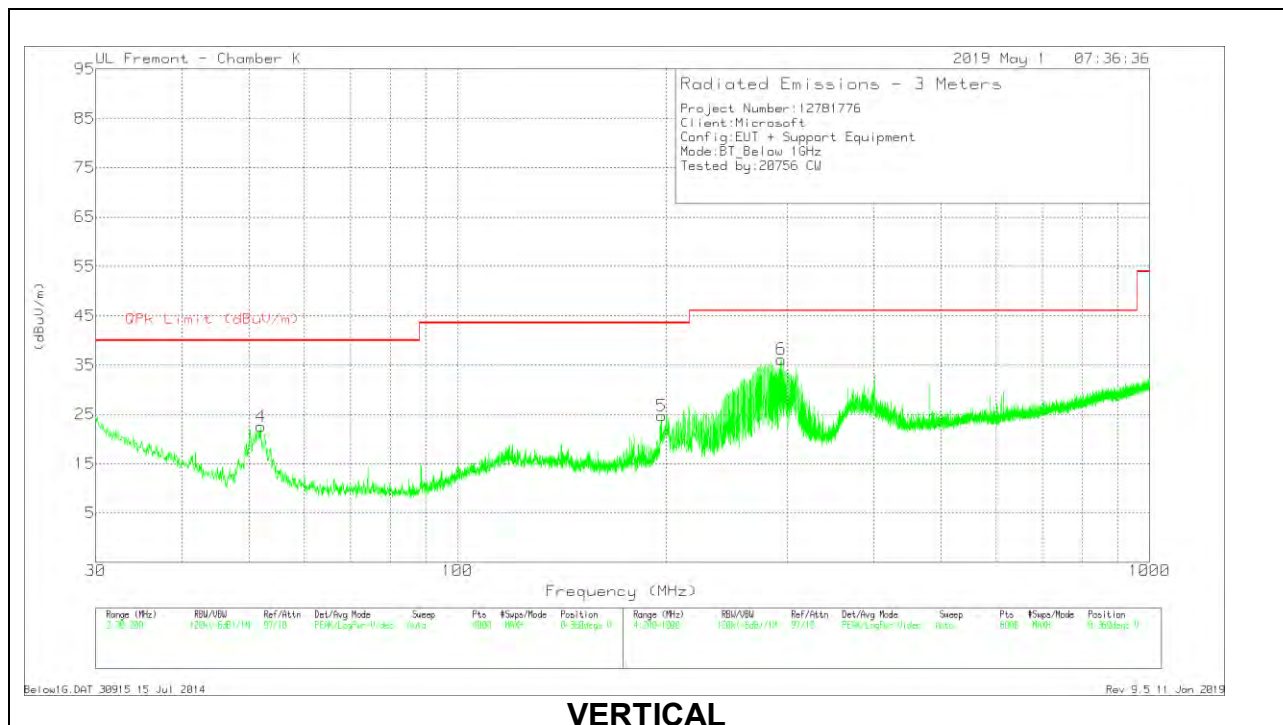
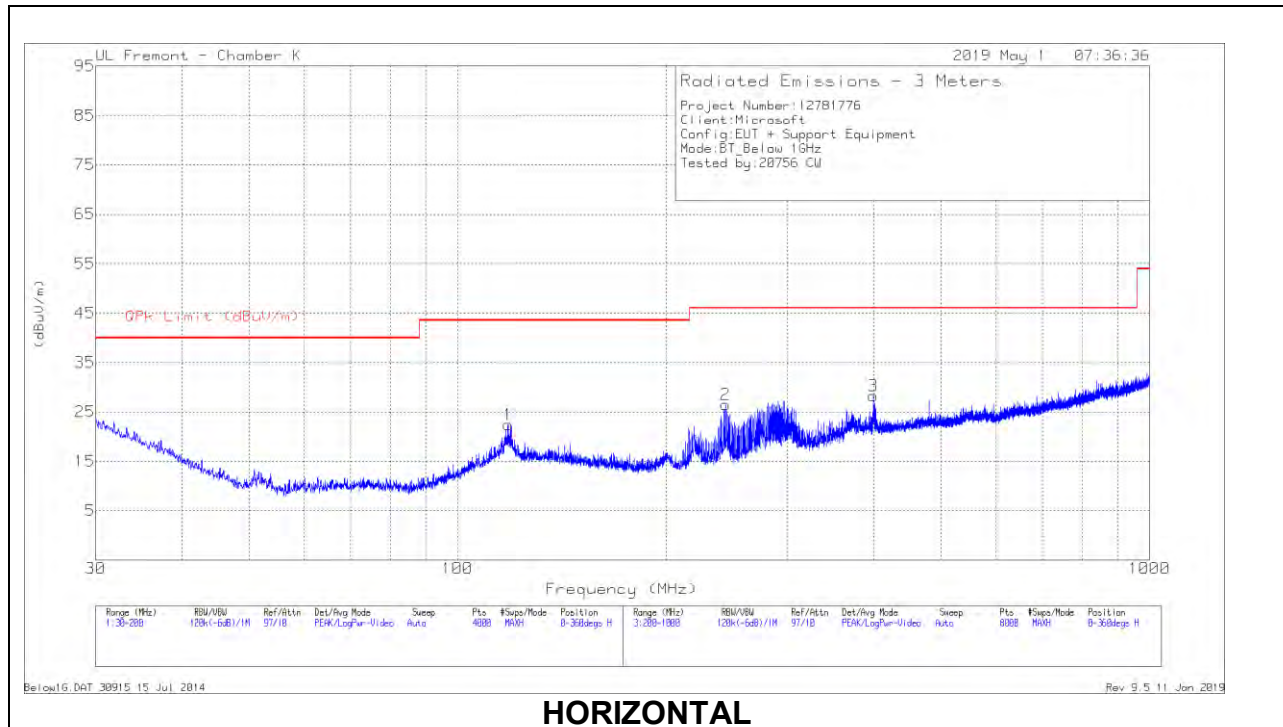
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186 650	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.86082	23.79	Pk	56.3	-32.1	-40	7.99	28.92	-20.93	0-360
6	.86285	23.56	Pk	56.3	-32.1	-40	7.76	28.9	-21.14	0-360
7	1.20766	26.06	Pk	45.3	-32.1	-40	-7.74	25.99	-26.73	0-360
8	2.4145	21.52	Pk	40	-32	-40	-10.48	29.5	-39.98	0-360
9	1.20997	22.32	Pk	45.3	-32.1	-40	-4.48	25.97	-30.45	0-360
10	2.4145	19.86	Pk	40	-32	-40	-12.14	29.5	-41.64	0-360

Pk - Peak detector

9.3. 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 PRE0184052 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 118.2953	33.67	Pk	19.5	-30.8	22.37	43.52	-21.15	0-360	199	H
4	51.9782	40.69	Pk	13.2	-31.3	22.59	40	-17.41	0-360	100	V
5	197.1107	36.9	Pk	18	-30.2	24.7	43.52	-18.82	0-360	100	V
2	* 243.8057	39.11	Pk	17.5	-30.1	26.51	46.02	-19.51	0-360	100	H
3	398.9259	36.02	Pk	21.6	-29.4	28.22	46.02	-17.8	0-360	100	H
6	293.4121	46.8	Pk	19.2	-29.8	36.2	46.02	-9.82	0-360	99	V

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

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184052 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
293.6154	39.02	Qp	19.2	-29.8	28.42	46.02	-17.6	313	111	V

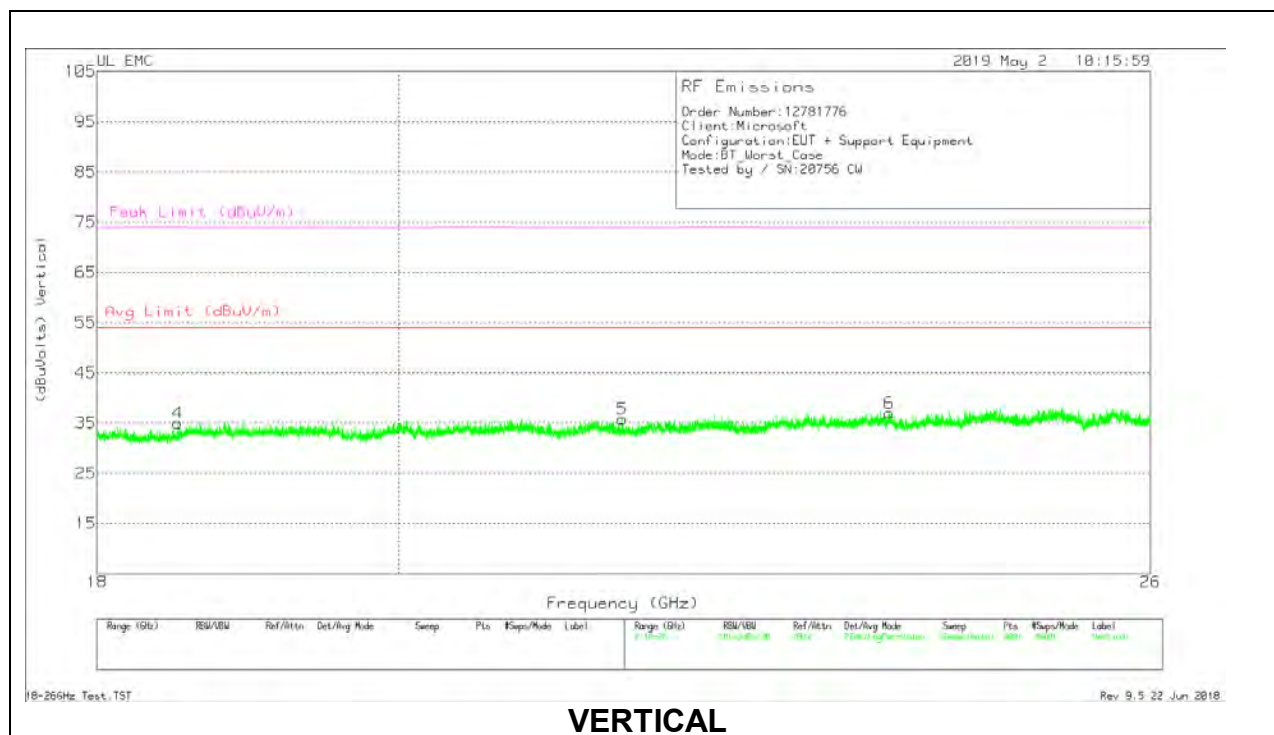
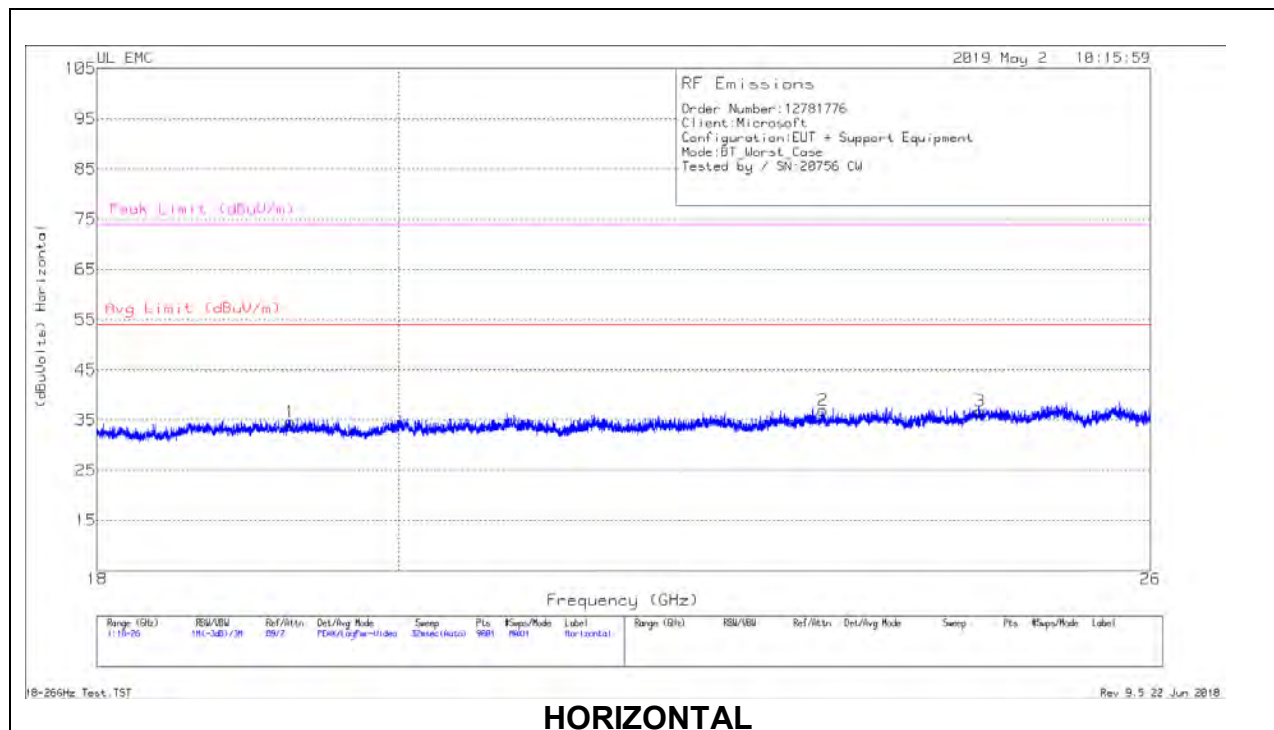
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

9.4. WORST CASE 18-26 GHZ

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE018218 8 (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	19.257	68.18	Pk	33.3	-57.3	-9.5	34.68	54	-19.32	74	-39.32
2	23.192	69.11	Pk	34.4	-57.1	-9.5	36.91	54	-17.09	74	-37.09
3	24.497	67.93	Pk	34.7	-56.3	-9.5	36.83	54	-17.17	74	-37.17
4	18.515	70.76	Pk	33	-59.3	-9.5	34.96	54	-19.04	74	-39.04
5	21.622	68.81	Pk	33.8	-57.3	-9.5	35.81	54	-18.19	74	-38.19
6	23.734	68.66	Pk	34.6	-56.8	-9.5	36.96	54	-17.04	74	-37.04

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

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.

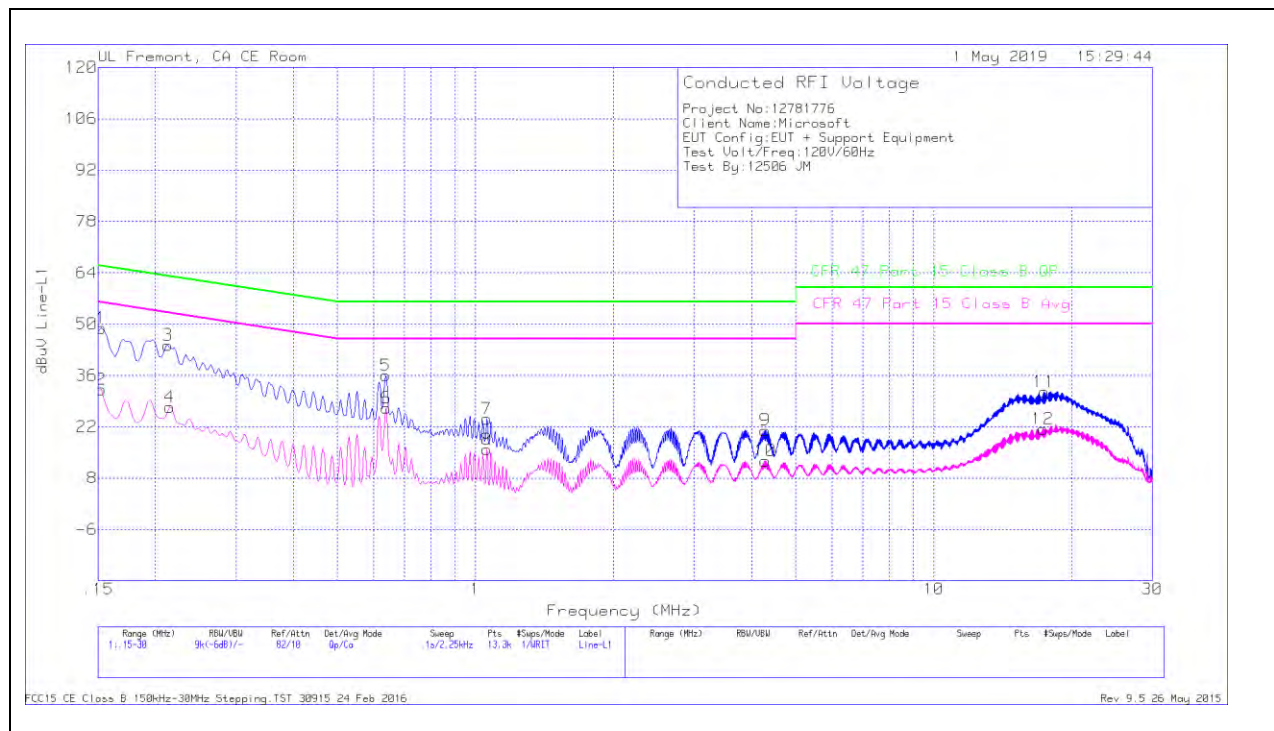
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS

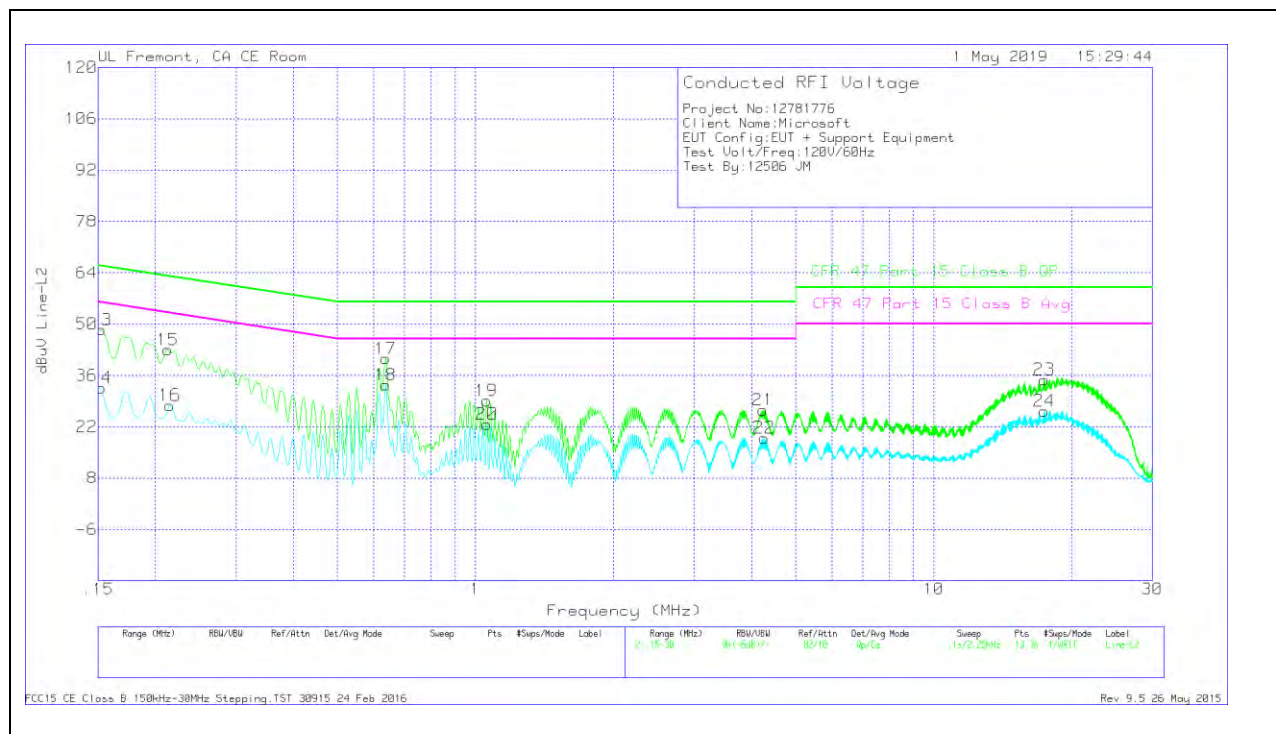


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15225	38.73	Qp	.1	0	10.1	48.93	65.88	-16.95	-	-
2	.15225	21.96	Ca	.1	0	10.1	32.16	-	-	55.88	-23.72
3	.213	34.15	Qp	0	0	10.1	44.25	63.09	-18.84	-	-
4	.21525	17.26	Ca	0	0	10.1	27.36	-	-	53	-25.64
5	.636	25.85	Qp	0	0	10.1	35.95	56	-20.05	-	-
6	.63825	17.01	Ca	0	0	10.1	27.11	-	-	46	-18.89
7	1.059	13.91	Qp	0	.1	10.1	24.11	56	-31.89	-	-
8	1.059	5.61	Ca	0	.1	10.1	15.81	-	-	46	-30.19
9	4.28775	10.82	Qp	0	.1	10.1	21.02	56	-34.98	-	-
10	4.28775	2.45	Ca	0	.1	10.1	12.65	-	-	46	-33.35
11	17.40975	20.78	Qp	.1	.3	10.3	31.48	60	-28.52	-	-
12	17.30175	10.68	Ca	.1	.3	10.3	21.38	-	-	50	-28.62

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	.15225	38.28	Qp	.1	0	10.1	48.48	65.88	-17.4	-	-
14	.15225	22.41	Ca	.1	0	10.1	32.61	-	-	55.88	-23.27
15	.213	32.89	Qp	0	0	10.1	42.99	63.09	-20.1	-	-
16	.21525	17.73	Ca	0	0	10.1	27.83	-	-	53	-25.17
17	.636	30.48	Qp	0	0	10.1	40.58	56	-15.42	-	-
18	.636	23.3	Ca	0	0	10.1	33.4	-	-	46	-12.6
19	1.05675	18.89	Qp	0	.1	10.1	29.09	56	-26.91	-	-
20	1.059	12.5	Ca	0	.1	10.1	22.7	-	-	46	-23.3
21	4.24275	16.32	Qp	0	.1	10.1	26.52	56	-29.48	-	-
22	4.263	8.73	Ca	0	.1	10.1	18.93	-	-	46	-27.07
23	17.4345	24.14	Qp	.1	.3	10.3	34.84	60	-25.16	-	-
24	17.4345	15.58	Ca	.1	.3	10.3	26.28	-	-	50	-23.72

Qp - Quasi-Peak detector

Ca - CISPR average detection