



CERTIFICATION TEST REPORT

Report Number. : 12935947-E2V2

Applicant : Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
USA

Model : 1872

FCC ID : C3K1872

IC : 3048A-1872

EUT Description : Portable Computing Device

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

Date Of Issue:
September 10, 2019

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	8/29/2019	Initial Issue	--
V2	9/10/2019	Section 11: Statement added, Setup photos Removed	Henry Lau

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
USA

EUT DESCRIPTION: Portable Computing Device

MODEL: 1872

SERIAL NUMBER: 006404792757(Conducted)
013880192757(Conducted)
013885392757(Radiated)
014813492757(Radiated)

DATE TESTED: July 17, 2019 –August 22, 2019

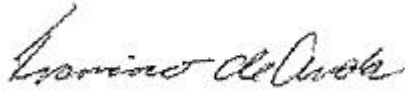
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

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 Road
☐ Chamber A	☐ Chamber D	☒ Chamber I
☐ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☒ Chamber K
	☐ Chamber G	☒ Chamber L
	☐ Chamber H	☐ 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 Portable Computing 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	2.26	1.68
2402 - 2480	Enhanced DQPSK	4.73	2.97
2402 - 2480	Enhanced 8PSK	4.86	3.06

Note: GFSK, DQPSK, 8PSK average Power are all investigated. See section 8.7

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of -2.2 dBi.

5.4. SOFTWARE AND FIRMWARE

The operating system installed on the EUT is MTEOS 1.652.0.

The Bluetooth Driver installed on the EUT is version 21.0.19157.20088.

The test utility software used during testing was version 11.1916.0-09531.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 30MHz, 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 EUT has one intended orientations, X; therefore, all final radiated testing was performed with the EUT in X orientation.

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

GFSK mode: DH5

8PSK mode: 3-DH5

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC DC Adapter	Microsoft	1706	0C130J02T8396	DoC
USB Mouse	Microsoft	1113	X821908-002	DoC
USB Type C to Audio Jack	SONY	A1-0231	N/A	DoC
Earphone	SONY	AG1100	N/A	DoC
Earphone	SONY	AG1100	N/A	DoC

I/O CABLES (CONDUCTED TEST)

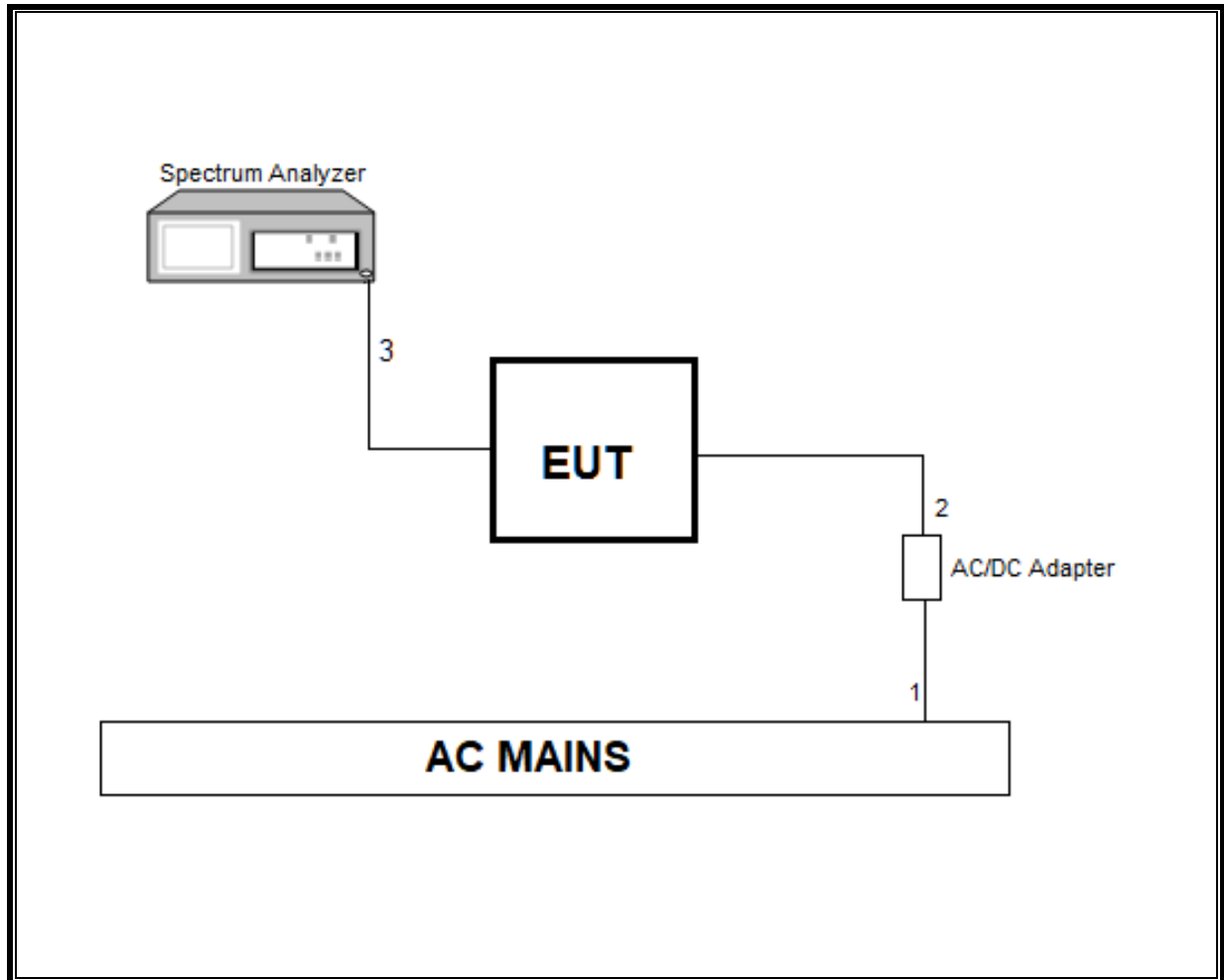
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-Shielded	0.2	to AC/DC Adaptor
2	DC	1	DC	Shielded	1	to Laptop, to EUT
3	Antenna	1	SMA	Un-Shielded	0.2	to Analyzer

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
1	AC	1	Type C	Un-shielded	0.2	to AC/DC Adapter
2	DC	1	DC	Shielded	1	to EUT
3	USB	1	Type A	Shielded	1.5	EUT TO Mouse
4	USB	1	Type C	Shielded	0.1	EUT to earphone AUX
5	earphone	1	3.5mm	Un-shielded	1	EUT to earphone

TEST SETUP

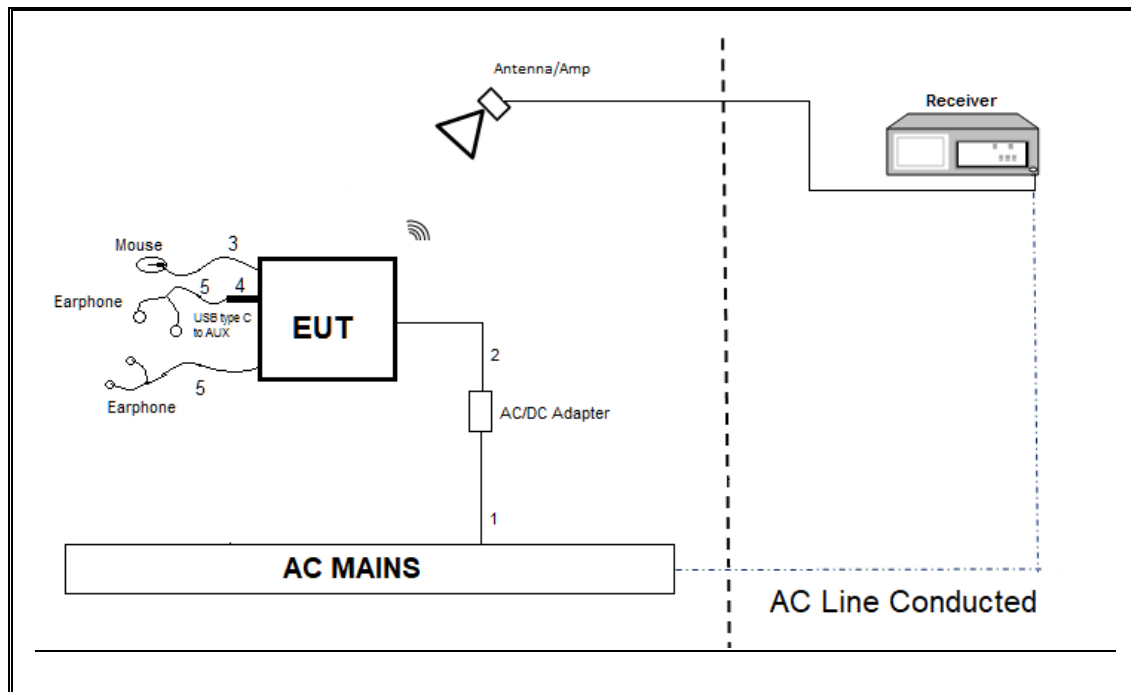
CONDUCTED TEST SETUP DIAGRAM



TEST SETUP

For conducted tests, the test software exercises the radio.

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



TEST SETUP

For radiated tests: EUT is connected to all support equipment. 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
Antenna, Passive Loop 30Hz to 1MHz	ELETRO METRICS	EM-6871	PRE0179465	05/31/2020	05/31/2019
Antenna, Passive Loop 100kHz to 30MHz	ELETRO METRICS	EM-6872	PRE0179467	05/31/2020	05/31/2019
Amplifier, 9kHz to 1GHz, 32dB	Sonoma Instrument	310	PRE0186650	12/13/2019	12/13/2018
Hybrid Antenna, 30MHz to 3GHz	Sunol Sciences Corp	JB3	PRE0184971	11/13/2019	11/13/2018
Amplifier, 9kHz to 1GHz, 32 dB	Sonoma Instrument	310	PRE0180175	06/29/2020	06/29/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T120	07/10/2020	07/10/2019
Amplifier, 1 to18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	06/18/2020	06/18/2019
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	PRE0182188	08/29/2019	08/29/2018
Rf Amplifier, 18-26.5GHz, 60dB gain	Ampical	AMP18G26.5-60	PRE0181238	05/01/2020	05/01/2019
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
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179367	05/16/2020	05/16/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179376	02/14/2020	05/14/2019
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 & Jan 11, 2019		
Antenna Port Software	UL	UL RF	Ver 9.7, May 7, 2019		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

NOTES:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- 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.

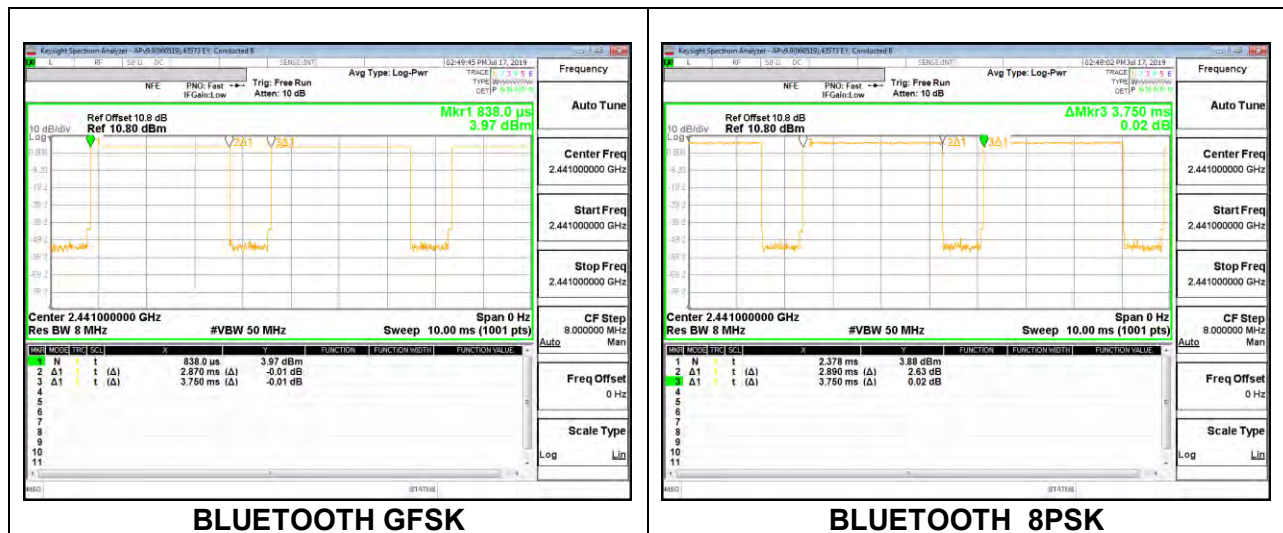
PROCEDURE

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	2.87	3.75	0.765	76.5%	1.16	0.348
Bluetooth 8PSK	2.89	3.75	0.771	77.1%	1.13	0.346

DUTY CYCLE PLOTS



8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

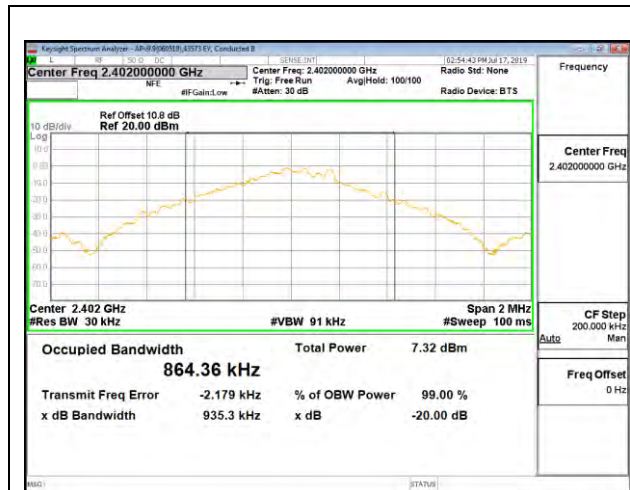
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 5% of the 20 dB and 99% bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

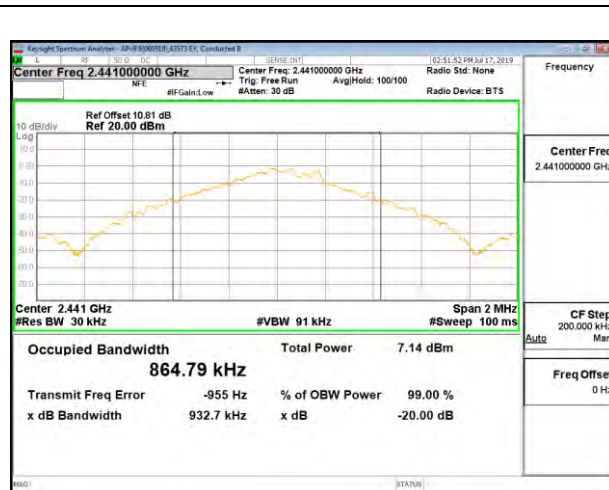
RESULTS

8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

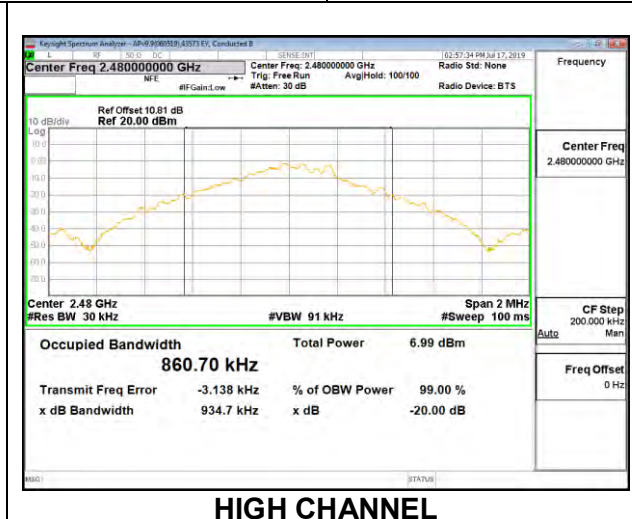
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.935	0.864
Mid	2441	0.933	0.865
High	2480	0.935	0.861



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.474	1.364
Mid	2441	1.481	1.363
High	2480	1.525	1.369



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.

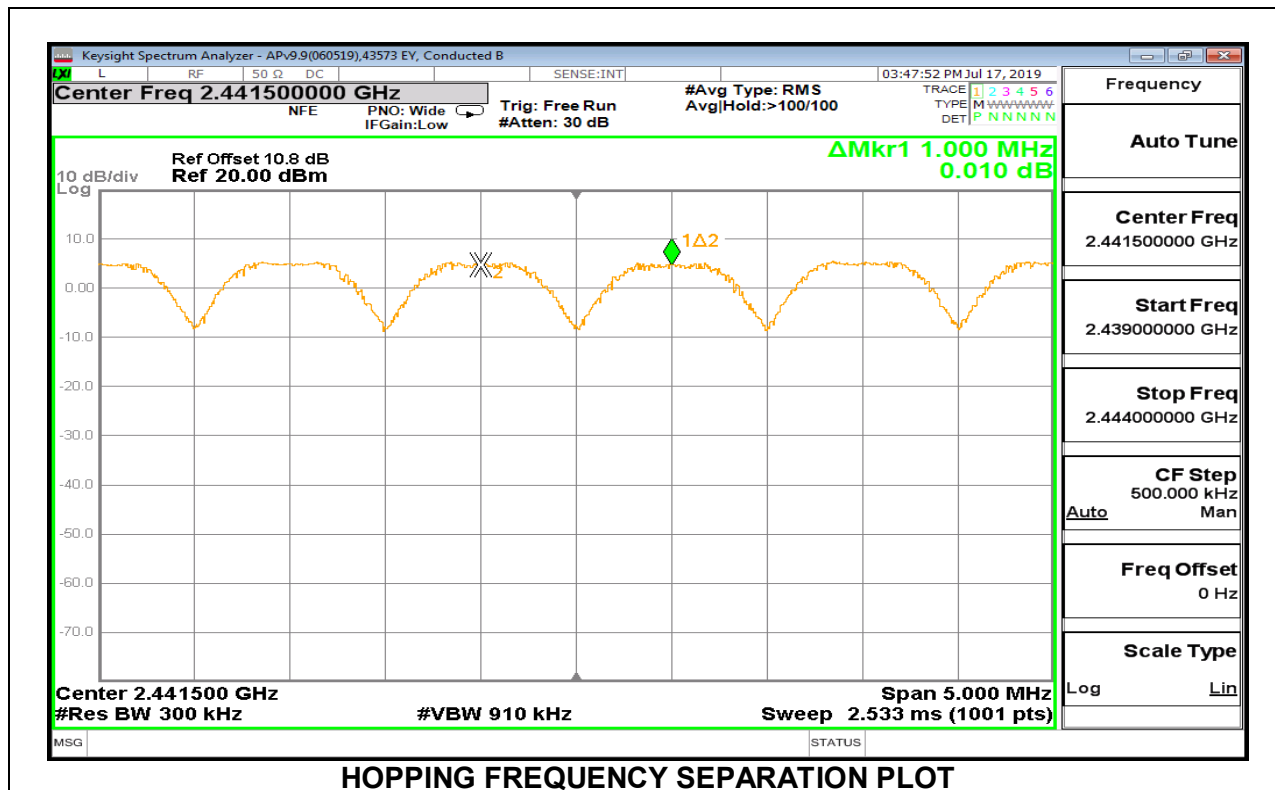
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

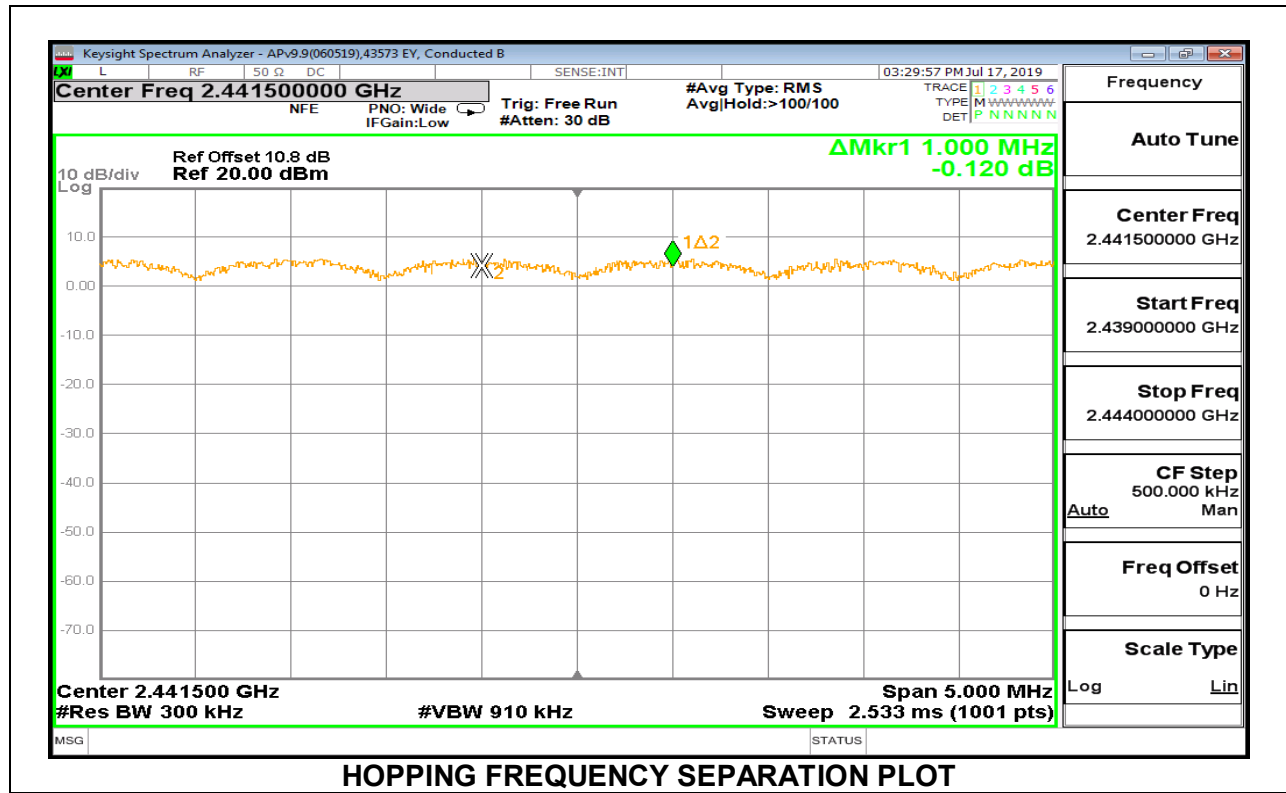
TEST PROCEDURE

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





8.4. 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.

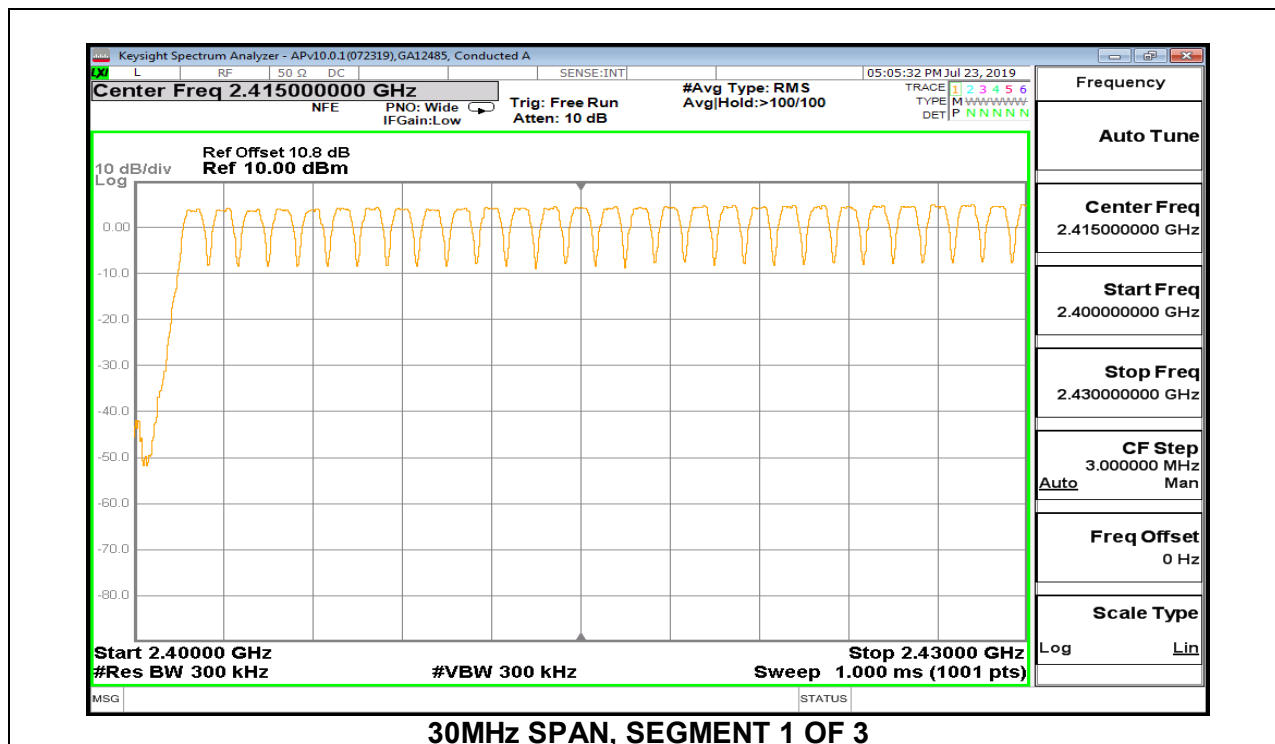
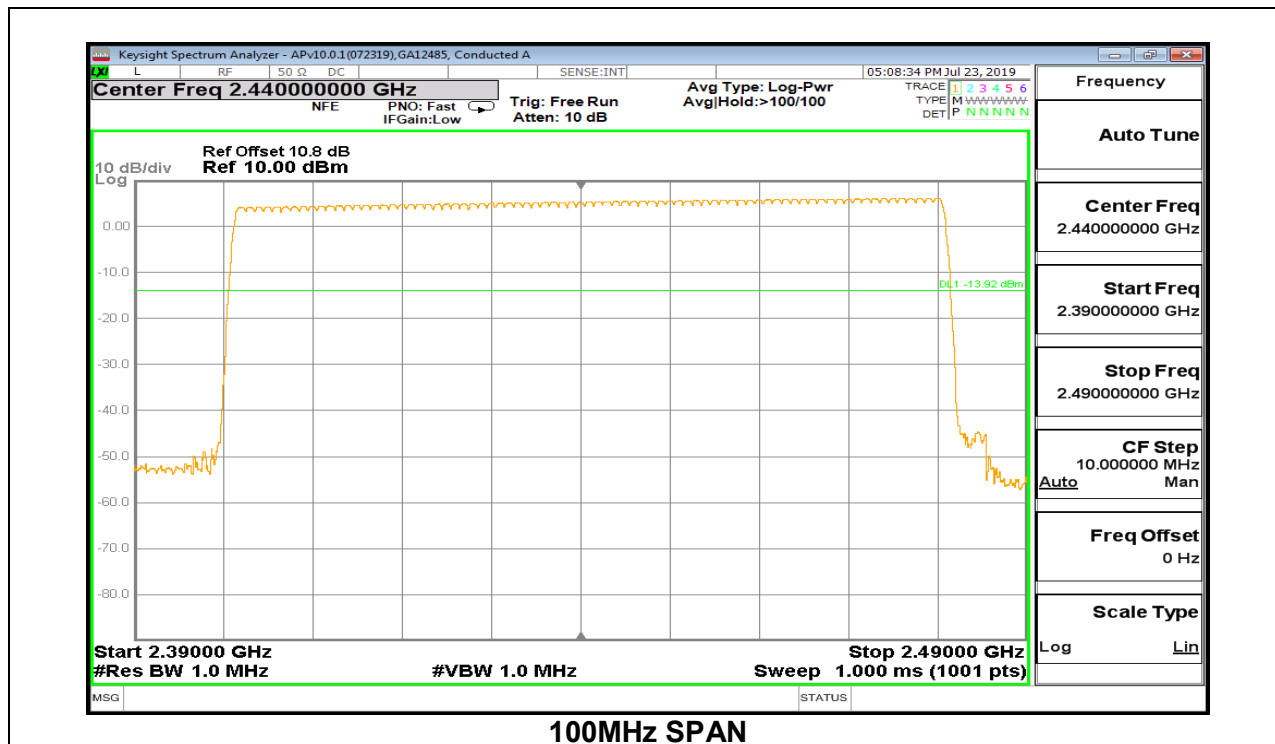
TEST PROCEDURE

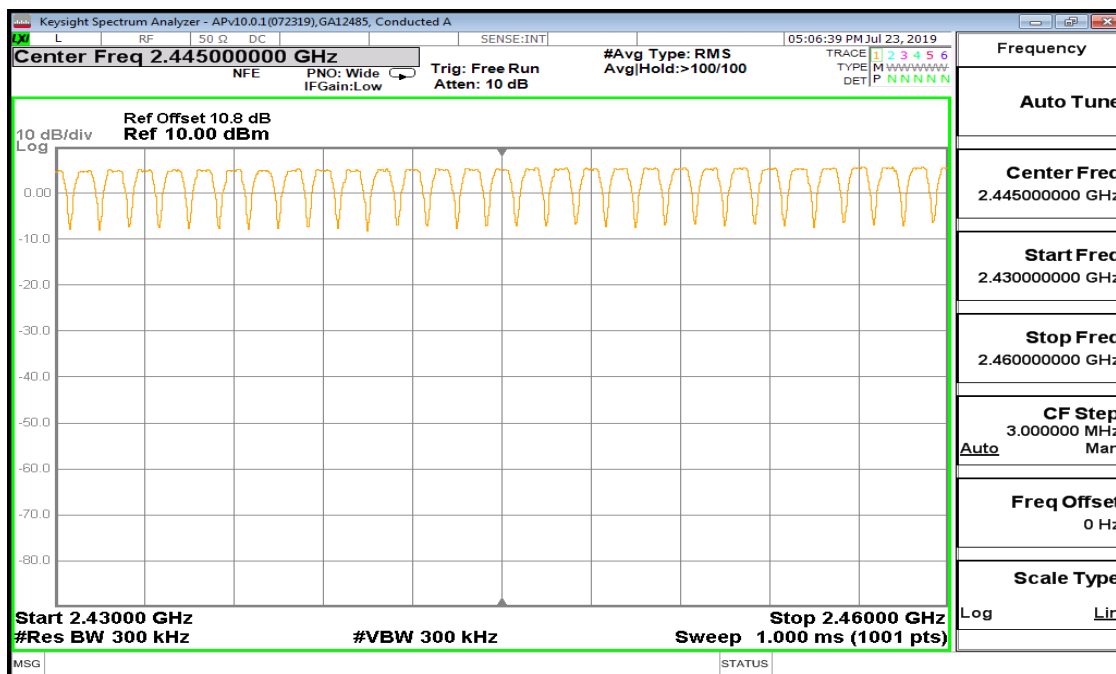
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 30% of the channel spacing (approx. 300kHz). The analyzer is set to Max Hold.

RESULTS

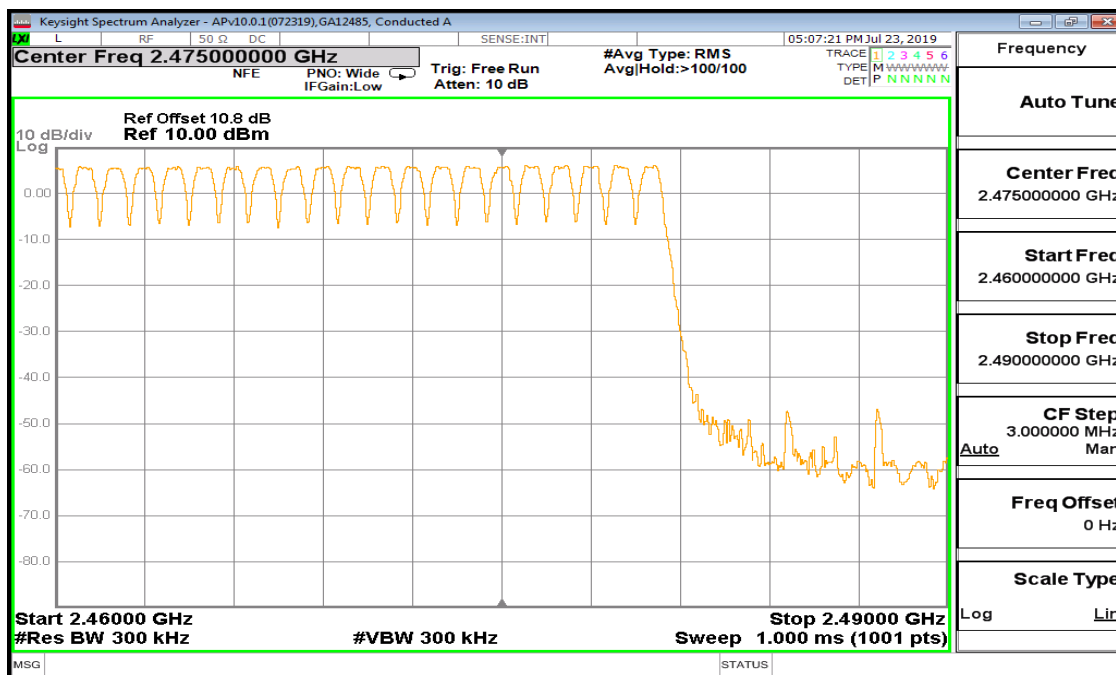
Normal Mode: 79 Channels Observed

8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



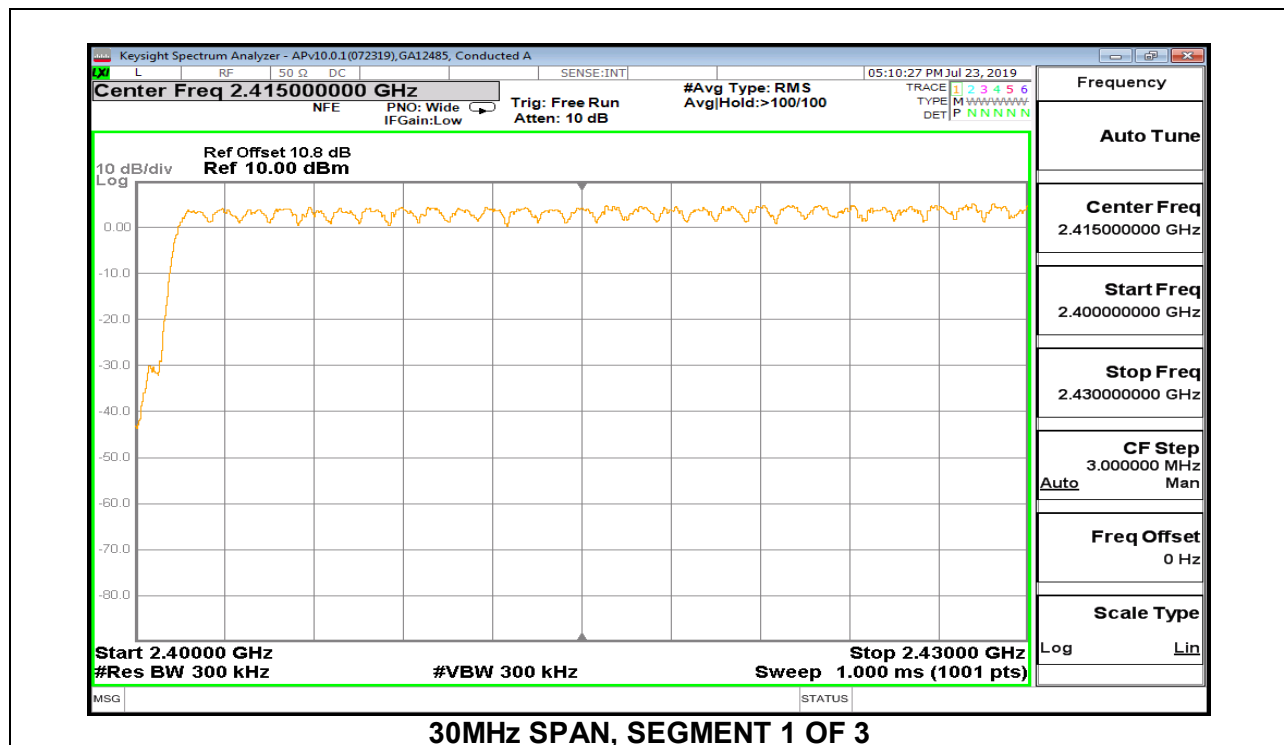
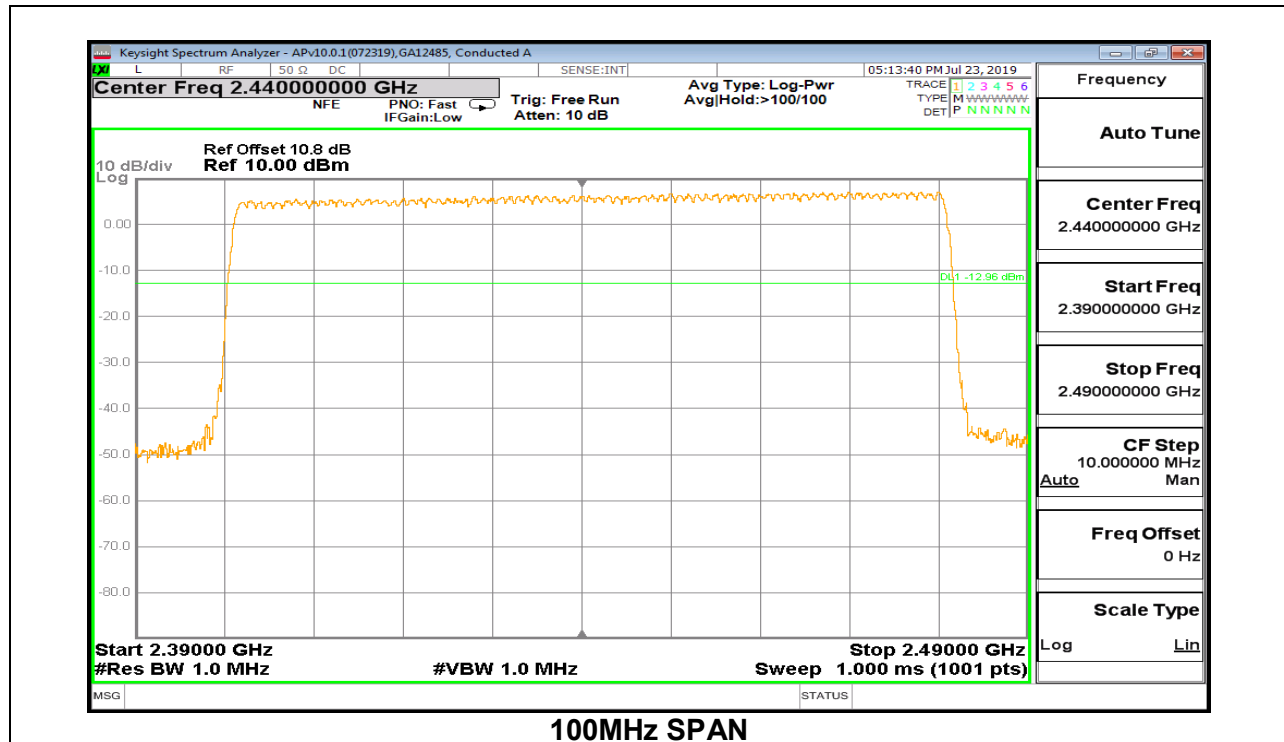


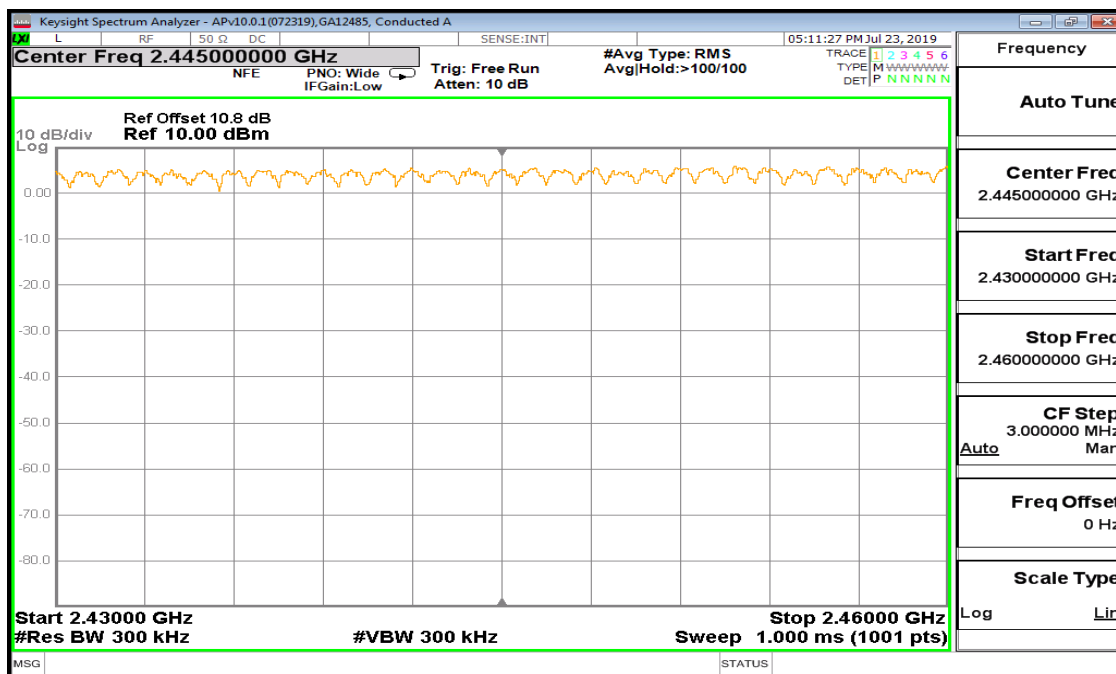
30MHz SPAN, SEGMENT 2 OF 3



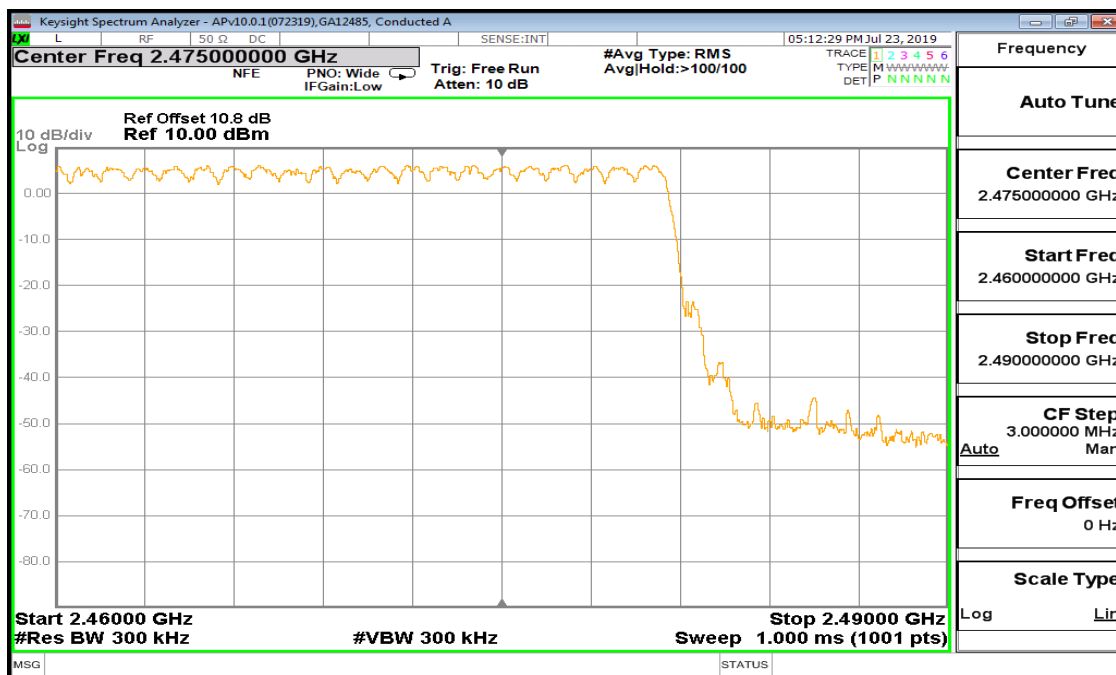
30MHz SPAN, SEGMENT 3 OF 3

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	0.38	32	0.1216	0.4	-0.2784
DH3	1.636	15	0.2454	0.4	-0.1546
DH5	2.884	7	0.2019	0.4	-0.1981
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	0.38	8	0.03040	0.4	-0.3696
DH3	1.636	3.75	0.06135	0.4	-0.3387
DH5	2.884	1.75	0.05047	0.4	-0.3495



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	0.387	32	0.12384	0.4	-0.27616
3DH3	1.640	15	0.246	0.4	-0.154
3DH5	2.892	8	0.23136	0.4	-0.16864

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.

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 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:	8/22/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.14	30	-27.86
Middle	2441	2.12	30	-27.88
High	2480	2.26	30	-27.74

8.6.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	10649 JR
Date:	8/22/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.68	30	-25.32
Middle	2441	4.8	30	-25.2
High	2480	4.86	30	-25.14

8.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	10649 JR
Date:	8/22/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.65	30	-25.35
Middle	2441	4.72	30	-25.28
High	2480	4.73	30	-25.27

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 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	8/22/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	2.02
Middle	2441	1.96
High	2480	2.11

8.7.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Tested By:	10649 JR
Date	8/22/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	2.15
Middle	2441	2.13
High	2480	2.09

8.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	10649 JR
Date	8/22/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	2.14
Middle	2441	2.1
High	2480	2.08

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.

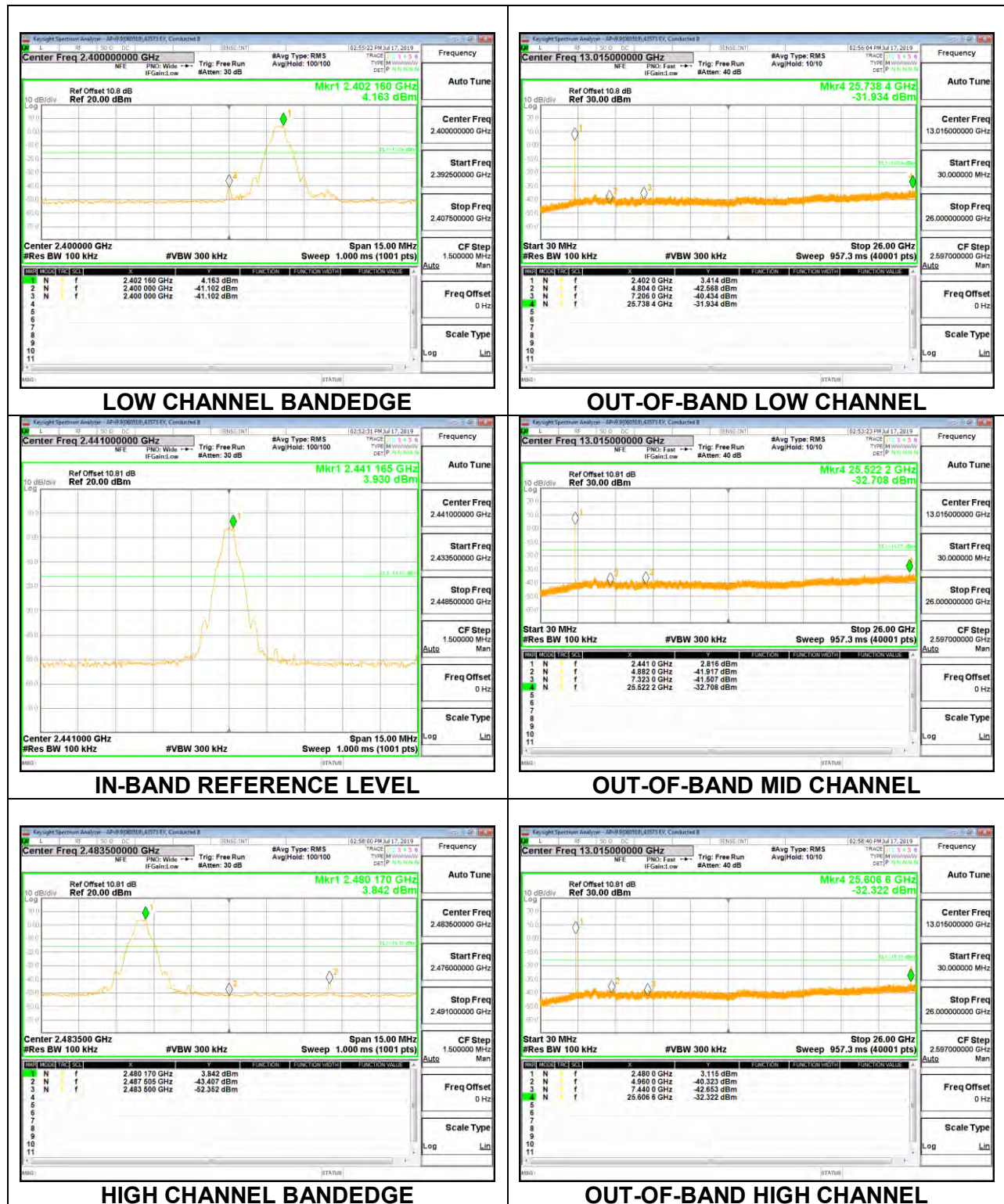
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

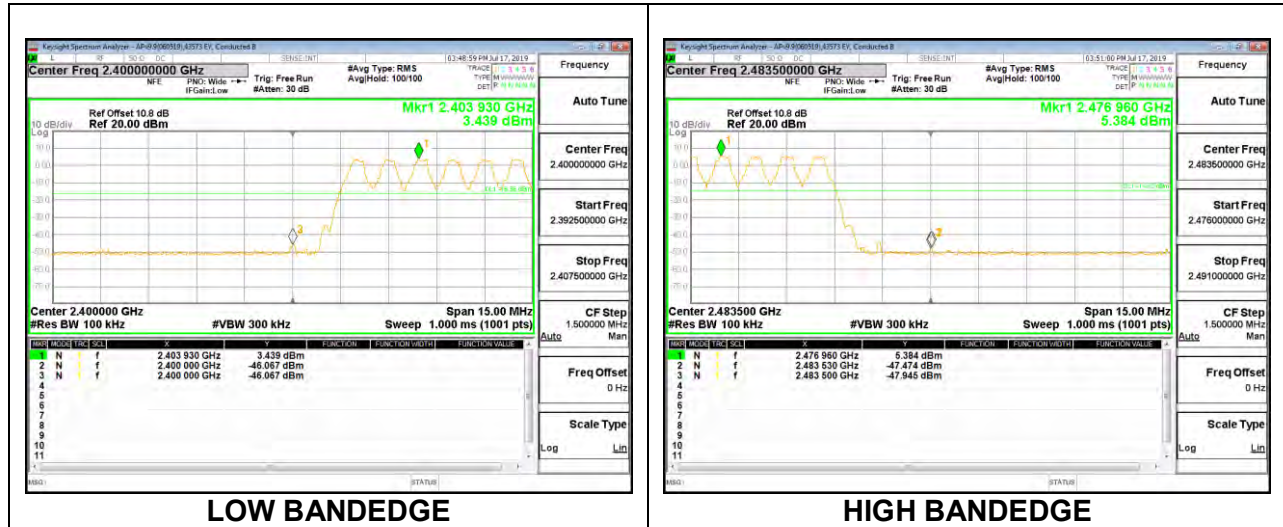
RESULTS

8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

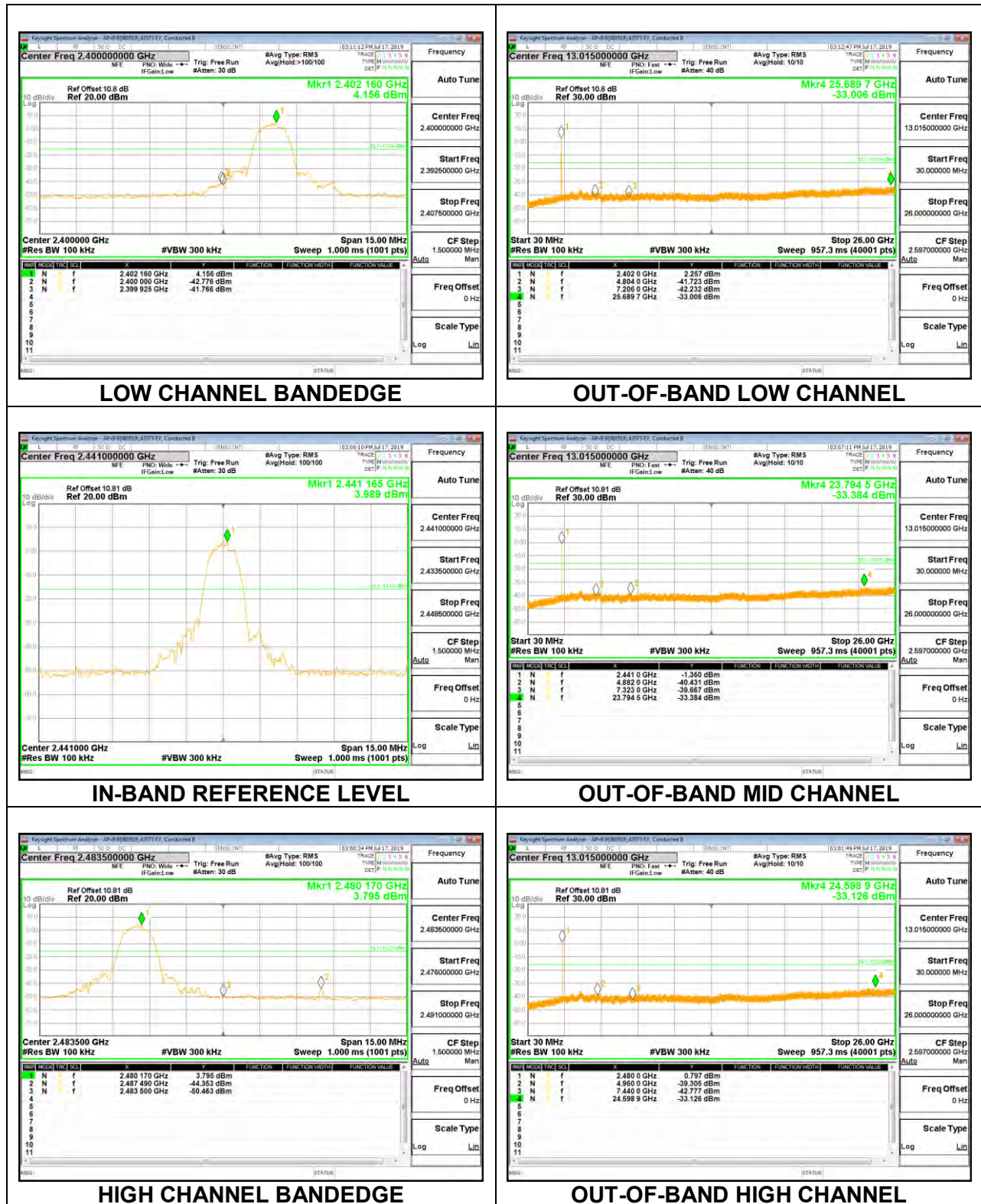


Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

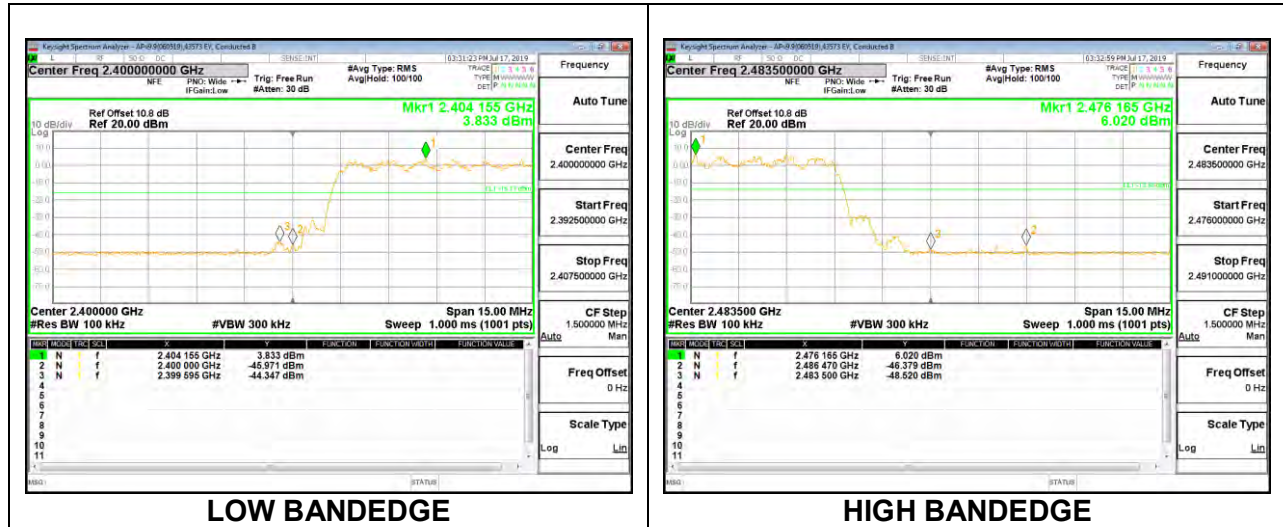


8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

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

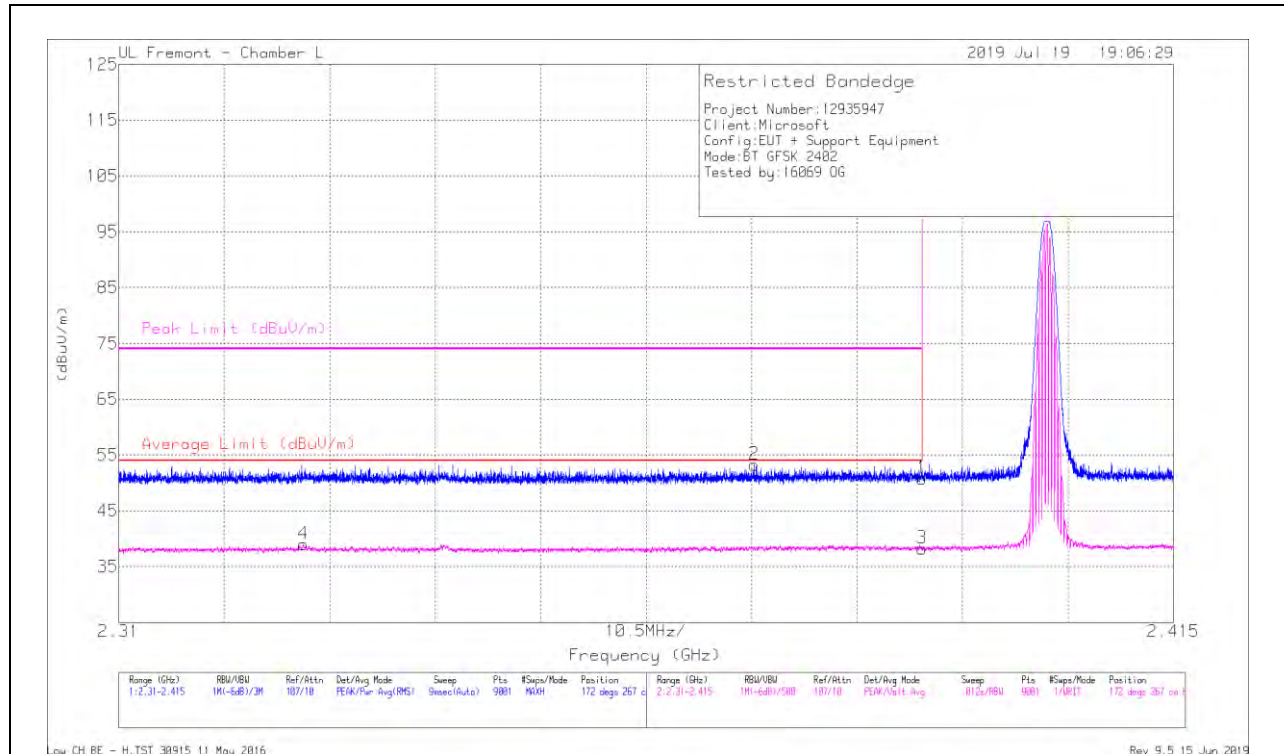
Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can 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



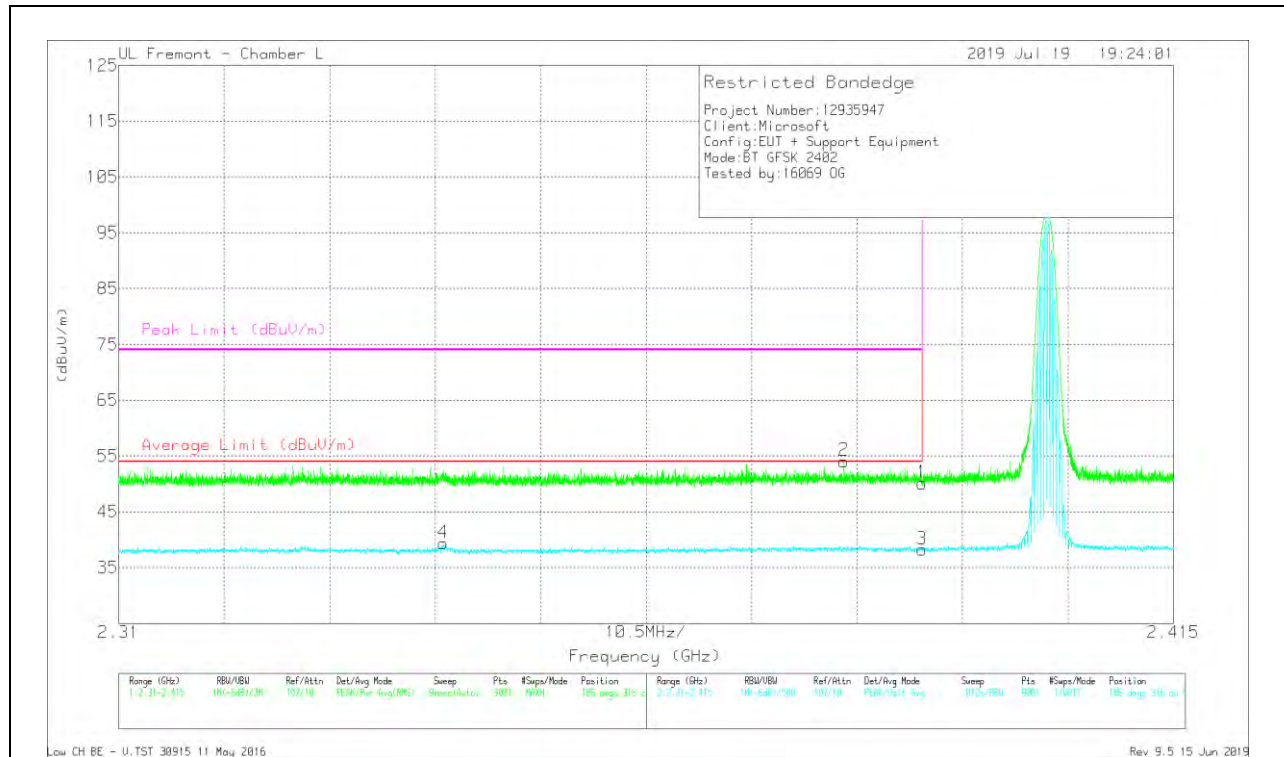
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	39.21	Pk	32	-20.4	50.81	-	-	74	-23.19	172	267	H
2	* 2.37324	41.69	Pk	32	-20.4	53.29	-	-	74	-20.71	172	267	H
3	* 2.38999	26.69	VA1T	32	-20.4	38.29	54	-15.71	-	-	172	267	H
4	* 2.3284	27.54	VA1T	31.9	-20.5	38.94	54	-15.06	-	-	172	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 T120 (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	* 2.38999	38.51	Pk	32	-20.4	50.11	-	-	74	-23.89	186	316	V
2	* 2.38217	42.38	Pk	32.1	-20.4	54.08	-	-	74	-19.92	186	316	V
3	* 2.38999	26.6	VA1T	32	-20.4	38.2	54	-15.8	-	-	186	316	V
4	* 2.34231	28.02	VA1T	31.8	-20.5	39.32	54	-14.68	-	-	186	316	V

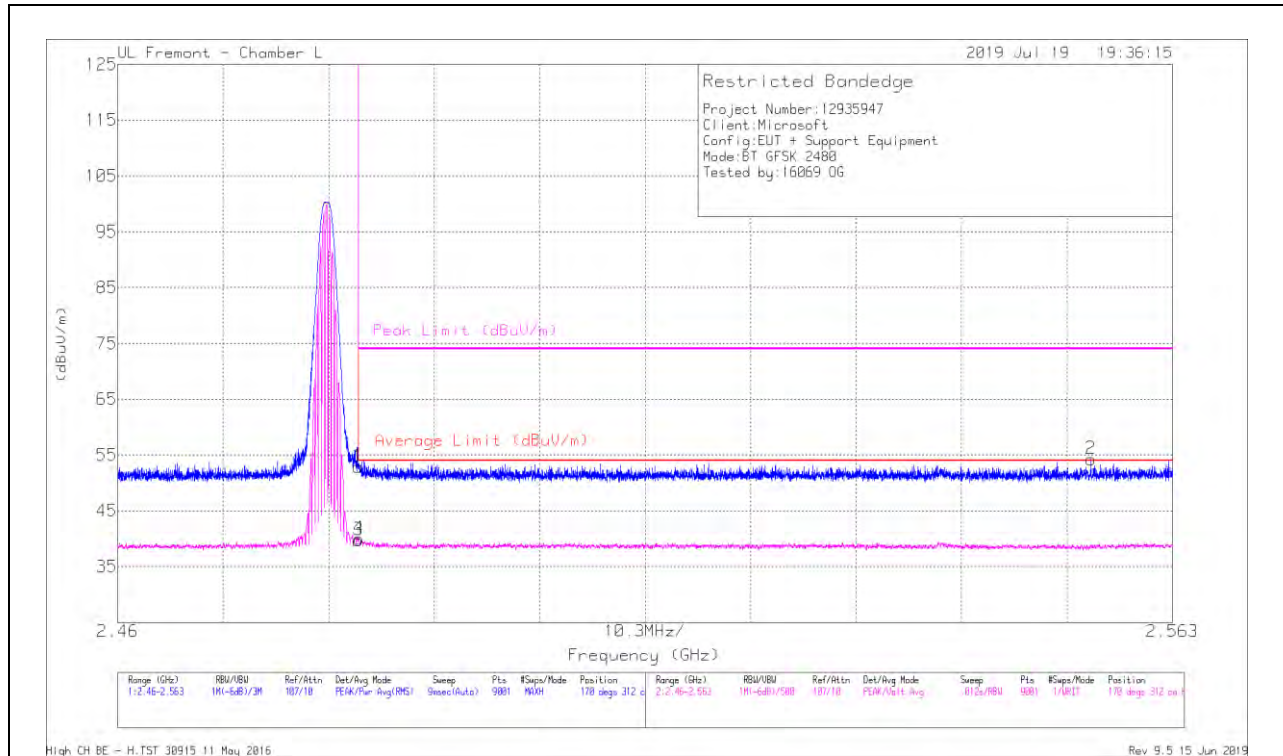
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



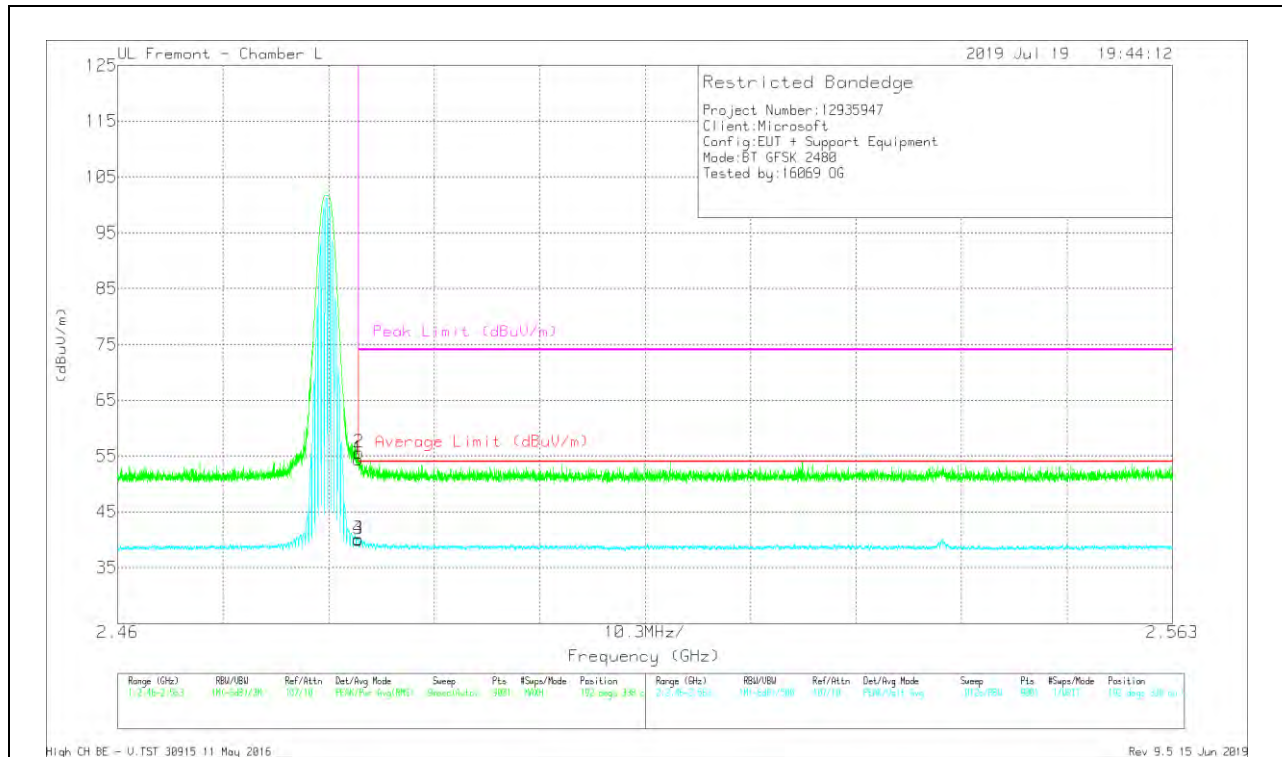
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	40.66	Pk	32.4	-20.2	52.86	-	-	74	-21.14	170	312	H
2	2.55504	41.98	Pk	32.4	-20.1	54.28	-	-	74	-19.72	170	312	H
3	* 2.48351	27.58	VA1T	32.4	-20.2	39.78	54	-14.22	-	-	170	312	H
4	* 2.48356	27.75	VA1T	32.4	-20.2	39.95	54	-14.05	-	-	170	312	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 T120 (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	* 2.48351	42.25	Pk	32.4	-20.2	54.45	-	-	74	-19.55	192	338	V
2	* 2.48353	43.43	Pk	32.4	-20.2	55.63	-	-	74	-18.37	192	338	V
3	* 2.48351	27.85	VA1T	32.4	-20.2	40.05	54	-13.95	-	-	192	338	V
4	* 2.48352	27.94	VA1T	32.4	-20.2	40.14	54	-13.86	-	-	192	338	V

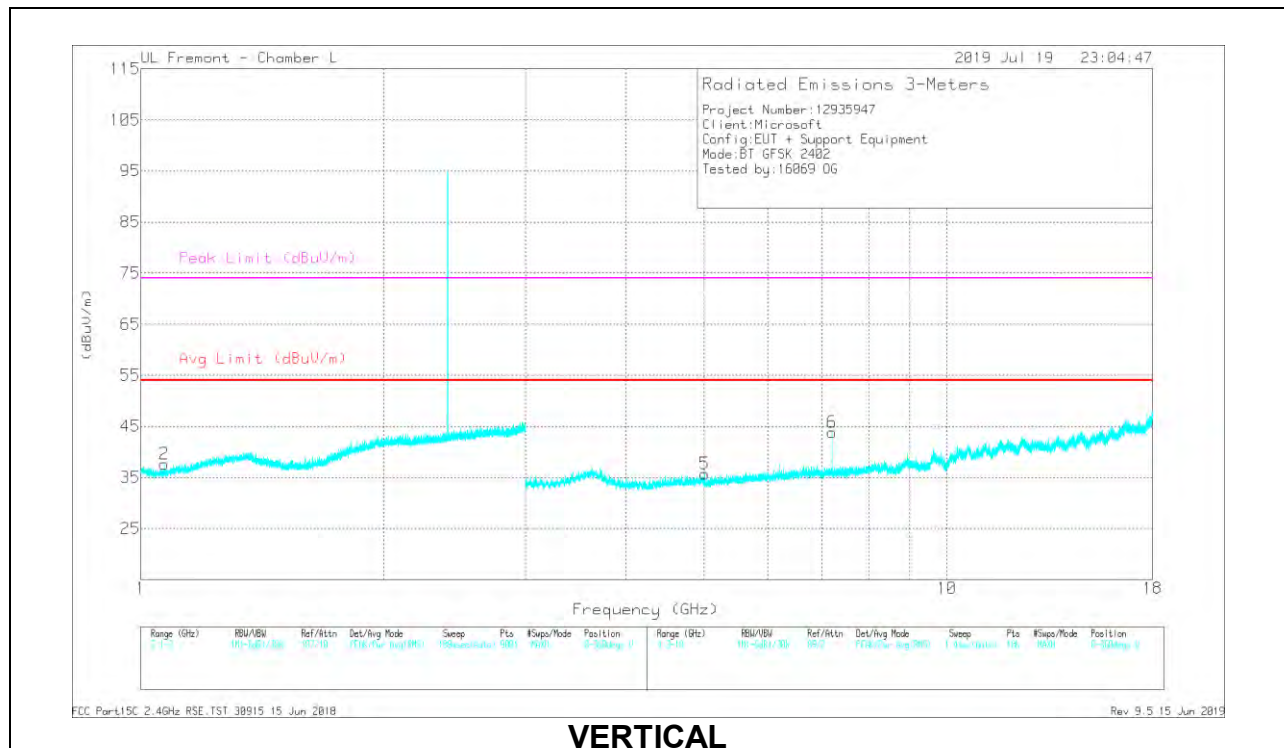
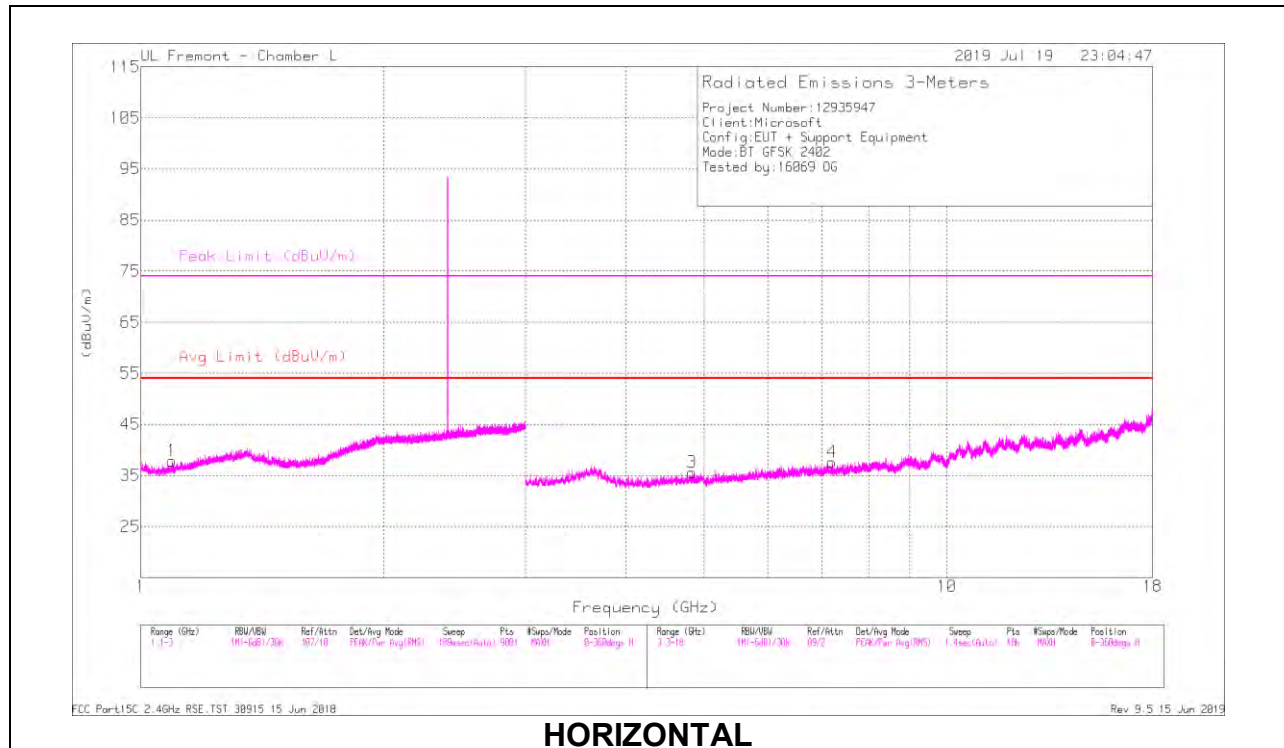
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



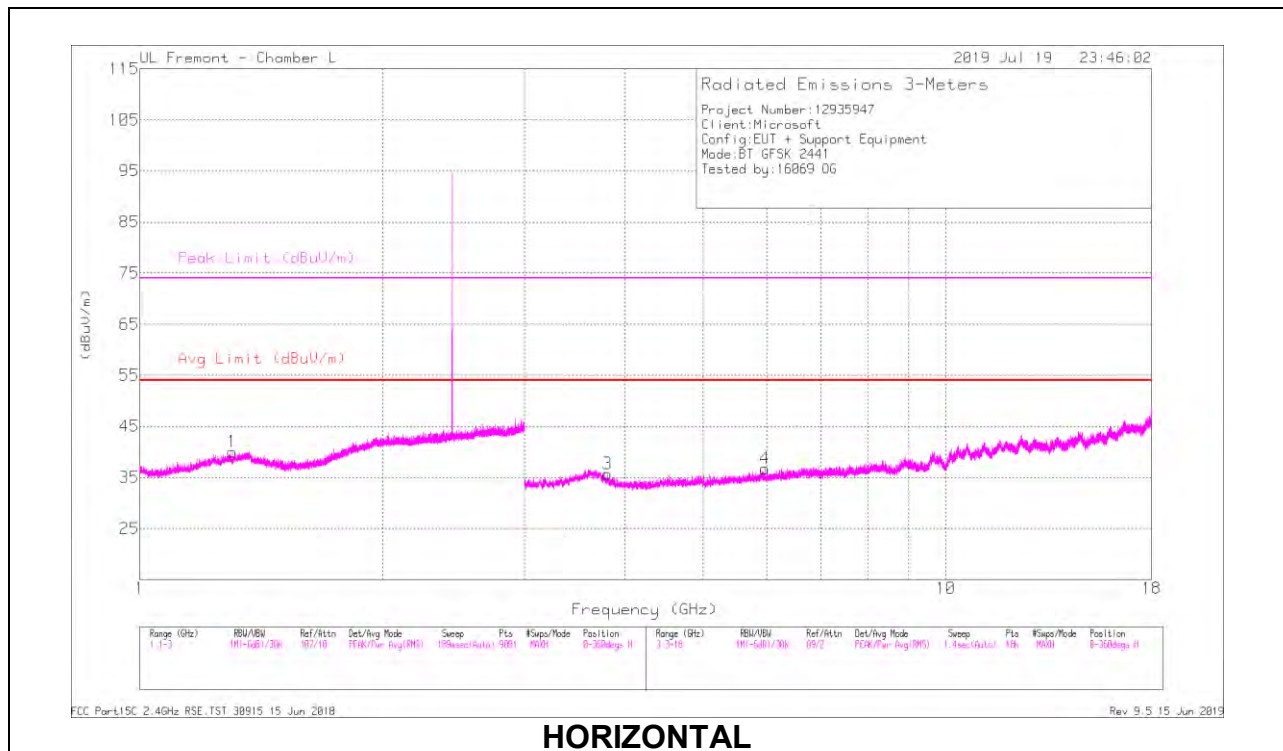
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/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	* 1.09446	41.08	PKFH	27.8	-24.2	44.68	-	-	74	-29.32	203	175	H
	* 1.09405	28.46	VA1T	27.8	-24.2	32.06	54	-21.94	-	-	203	175	H
2	* 1.06861	42.83	PKFH	27.3	-24.3	45.83	-	-	74	-28.17	230	146	V
	* 1.06806	28.55	VA1T	27.3	-24.3	31.55	54	-22.45	-	-	230	146	V
3	* 4.83076	36.18	PKFH	34	-27.4	42.78	-	-	74	-31.22	23	150	H
	* 4.83228	23.35	VA1T	34	-27.4	29.95	54	-24.05	-	-	23	150	H
4	7.20741	34.48	PKFH	35.5	-24.1	45.88	-	-	-	-	284	104	H
5	* 5.00634	35.41	PKFH	34.1	-27	42.51	-	-	74	-31.49	67	177	V
	* 5.00885	23.01	VA1T	34.1	-27.1	30.01	54	-23.99	-	-	67	177	V
6	7.20736	38.85	PKFH	35.5	-24.1	50.25	-	-	-	-	217	179	V

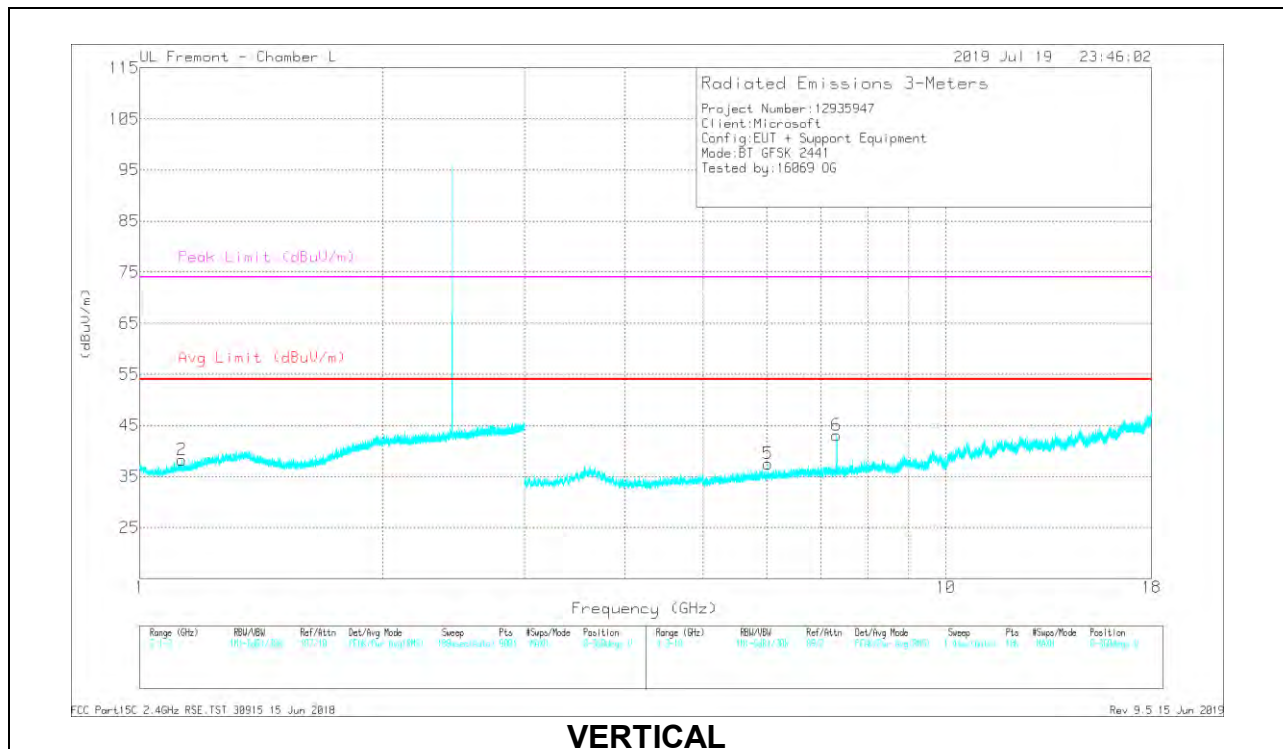
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

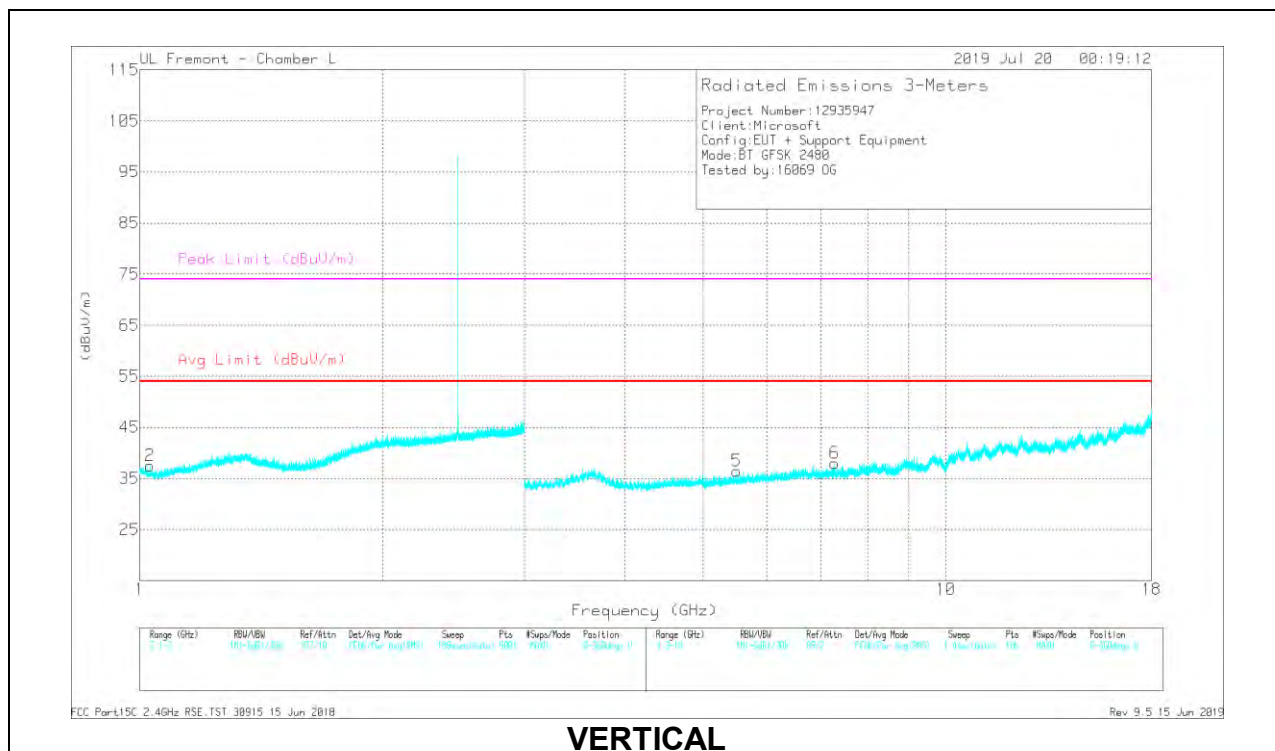
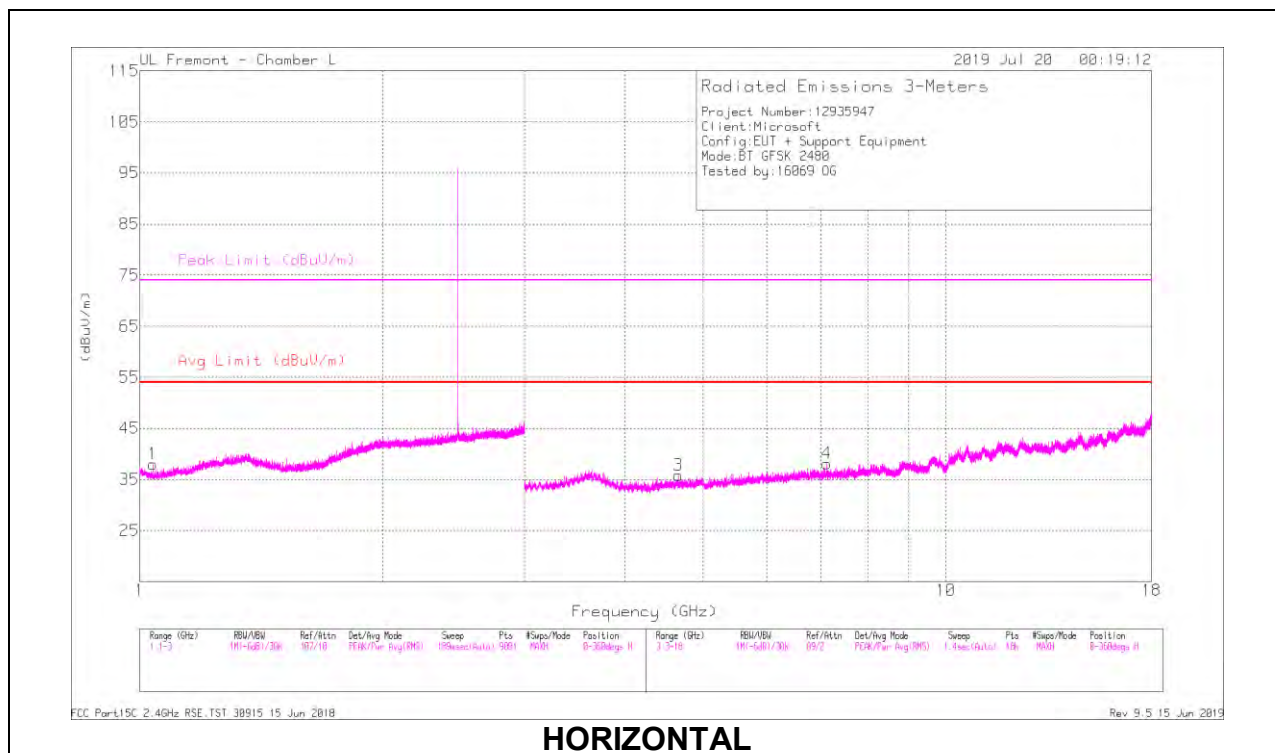
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	* 1.30244	41.35	PKFH	29.9	-23.6	47.65	-	-	74	-26.35	108	373	H
	* 1.30495	27.98	VA1T	30	-23.6	34.38	54	-19.62	-	-	108	373	H
2	* 1.12702	42.14	PKFH	28	-24.1	46.04	-	-	74	-27.96	233	271	V
	* 1.1251	28.55	VA1T	28.1	-24.2	32.45	54	-21.55	-	-	233	271	V
3	* 3.8052	37.28	PKFH	34.6	-28.8	43.08	-	-	74	-30.92	283	262	H
	* 3.80677	24.61	VA1T	34.6	-28.8	30.41	54	-23.59	-	-	283	262	H
4	5.96872	34.35	PKFH	35.1	-25.8	43.65	-	-	-	-	50	216	H
6	* 7.3237	37.01	PKFH	35.6	-23.8	48.81	-	-	74	-25.19	289	171	V
	* 7.32425	27.83	VA1T	35.6	-23.8	39.63	54	-14.37	-	-	289	171	V
5	6.01692	34.96	PKFH	35.2	-26	44.16	-	-	-	-	360	301	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 T120 (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	* 1.03834	41.19	PKFH	27.2	-24.4	43.99	-	-	74	-30.01	216	101	H
	* 1.03972	28.7	VA1T	27.2	-24.4	31.5	54	-22.5	-	-	216	101	H
2	* 1.02893	42.01	PKFH	27.4	-24.4	45.01	-	-	74	-28.99	20	147	V
	* 1.02803	28.67	VA1T	27.4	-24.4	31.67	54	-22.33	-	-	20	147	V
3	* 4.65471	36.04	PKFH	34.1	-27.4	42.74	-	-	74	-31.26	171	182	H
	* 4.65577	23.13	VA1T	34.1	-27.4	29.83	54	-24.17	-	-	171	182	H
4	7.11872	33.17	PKFH	35.6	-23.9	44.87	-	-	-	-	170	273	H
6	* 7.28466	32.98	PKFH	35.6	-24.1	44.48	-	-	74	-29.52	142	144	V
	* 7.28381	20.35	VA1T	35.6	-24.1	31.85	54	-22.15	-	-	142	144	V
5	5.50675	35.98	PKFH	34.5	-26.4	44.08	-	-	-	-	327	209	V

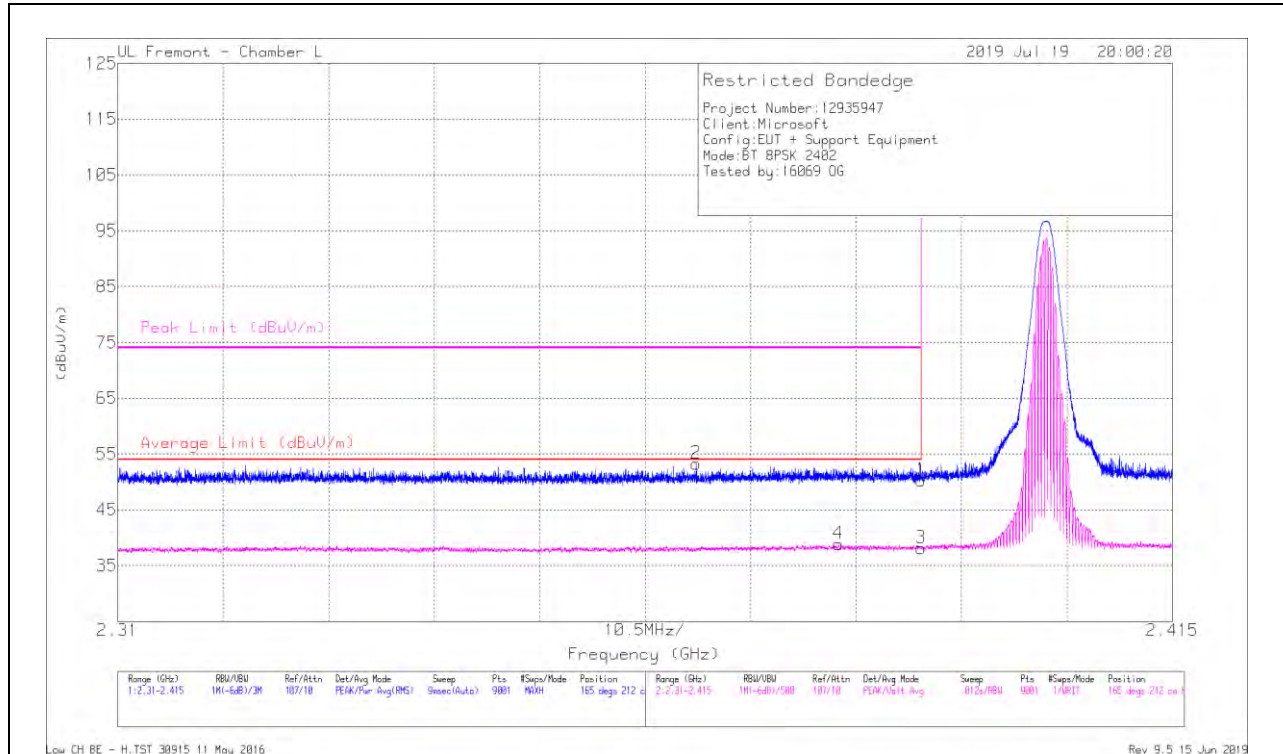
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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



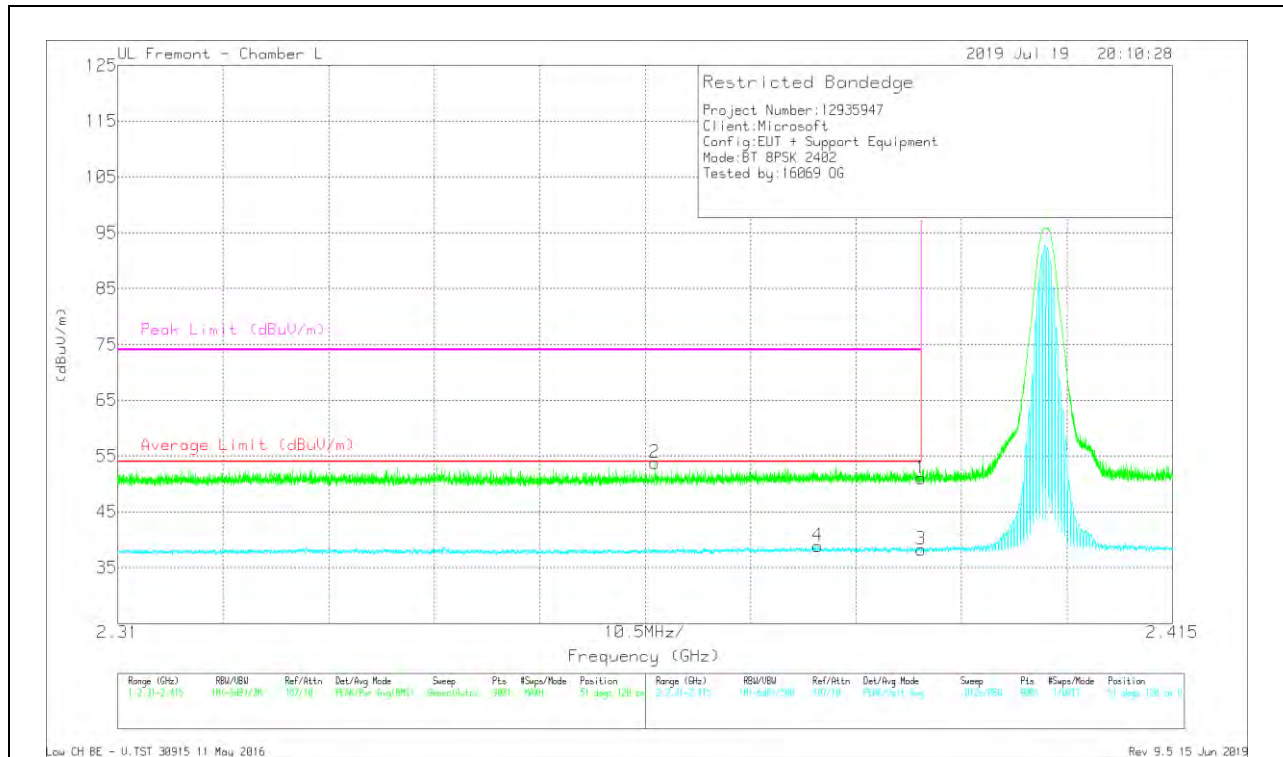
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.72	Pk	32	-20.4	50.32	-	-	74	-23.68	165	212	H
2	* 2.3676	41.8	Pk	31.9	-20.4	53.3	-	-	74	-20.7	165	212	H
3	* 2.38999	26.57	VA1T	32	-20.4	38.17	54	-15.83	-	-	165	212	H
4	* 2.38175	27.15	VA1T	32.1	-20.4	38.85	54	-15.15	-	-	165	212	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 T120 (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	* 2.38999	39.49	Pk	32	-20.4	51.09	-	-	74	-22.91	51	120	V
2	* 2.36346	42.27	Pk	31.9	-20.4	53.77	-	-	74	-20.23	51	120	V
3	* 2.38999	26.65	VA1T	32	-20.4	38.25	54	-15.75	-	-	51	120	V
4	* 2.37971	27.12	VA1T	32.1	-20.4	38.82	54	-15.18	-	-	51	120	V

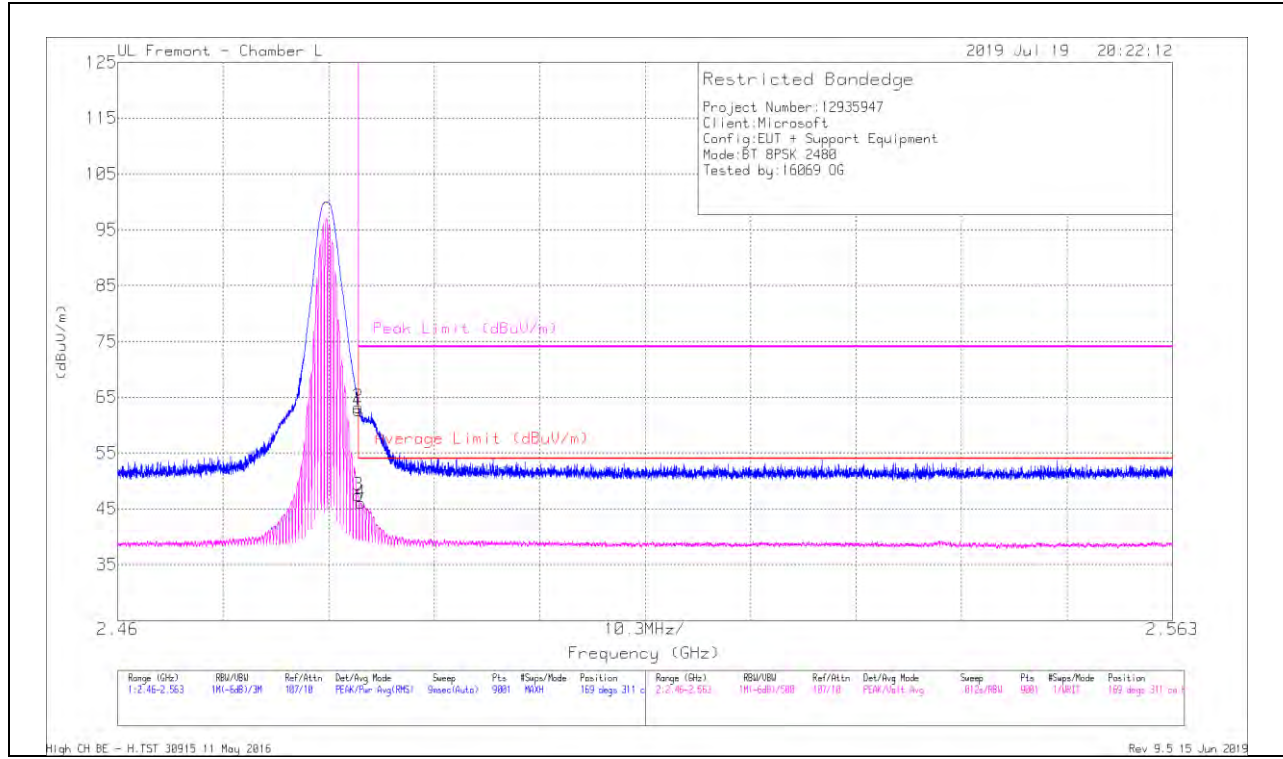
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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 T120 (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	* 2.48351	50.54	Pk	32.4	-20.2	62.74	-	-	74	-11.26	169	311	H
2	* 2.48352	50.96	Pk	32.4	-20.2	63.16	-	-	74	-10.84	169	311	H
3	* 2.48351	35.18	VA1T	32.4	-20.2	47.38	54	-6.62	-	-	169	311	H
4	* 2.48371	33.84	VA1T	32.4	-20.2	46.04	54	-7.96	-	-	169	311	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

UL Fremont - Chamber L

2019 Jul 19 20:32:59

Restricted Bandedge

Project Number: 12935947
Client: Microsoft
Config: EUT + Support Equipment
Made: BT 8PSK 2488
Tested by: 16069 OG

dBuV/m

Peak Limit (dBuV/m)

Average Limit (dBuV/m)

10.3MHz/

Frequency (GHz)

Range (GHz)	RBW/VBW	Ref/Att'n	Det/Avg Mode	Sweep	PLs	#Sps/Mode	Position	Range (GHz)	RBW/VBW	Ref/Att'n	Det/Avg Mode	Sweep	PLs	#Sps/Mode	Position
1.2740-2.563	10/-30dB/2.3K	137/10	PK/Pk (Per Avg) RMS	Green/Ref	1001	1000	10.3 MHz 22.2 dB	1.2740-2.563	10/-30dB/2.3K	137/10	PK/Pk (Per Avg) RMS	Green/Ref	1001	1000	10.3 MHz 22.2 dB

High CH BE - U.TST 30915 11 May 2016

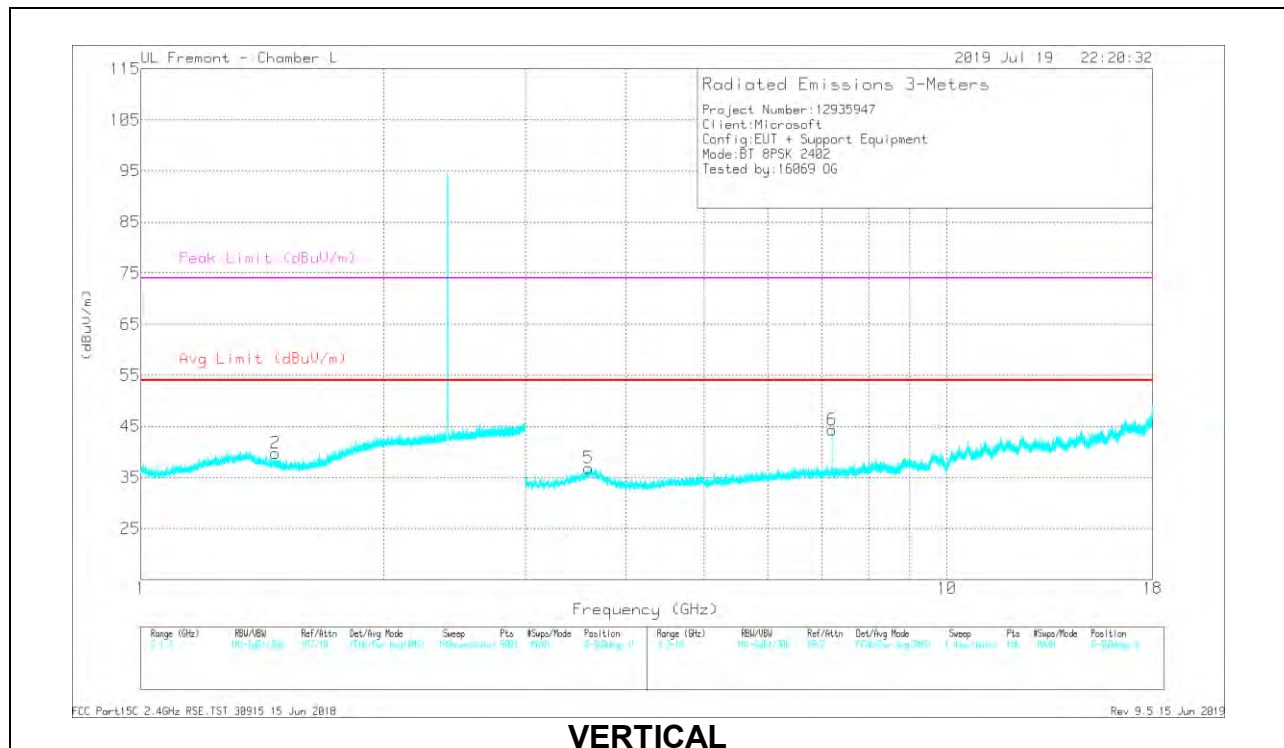
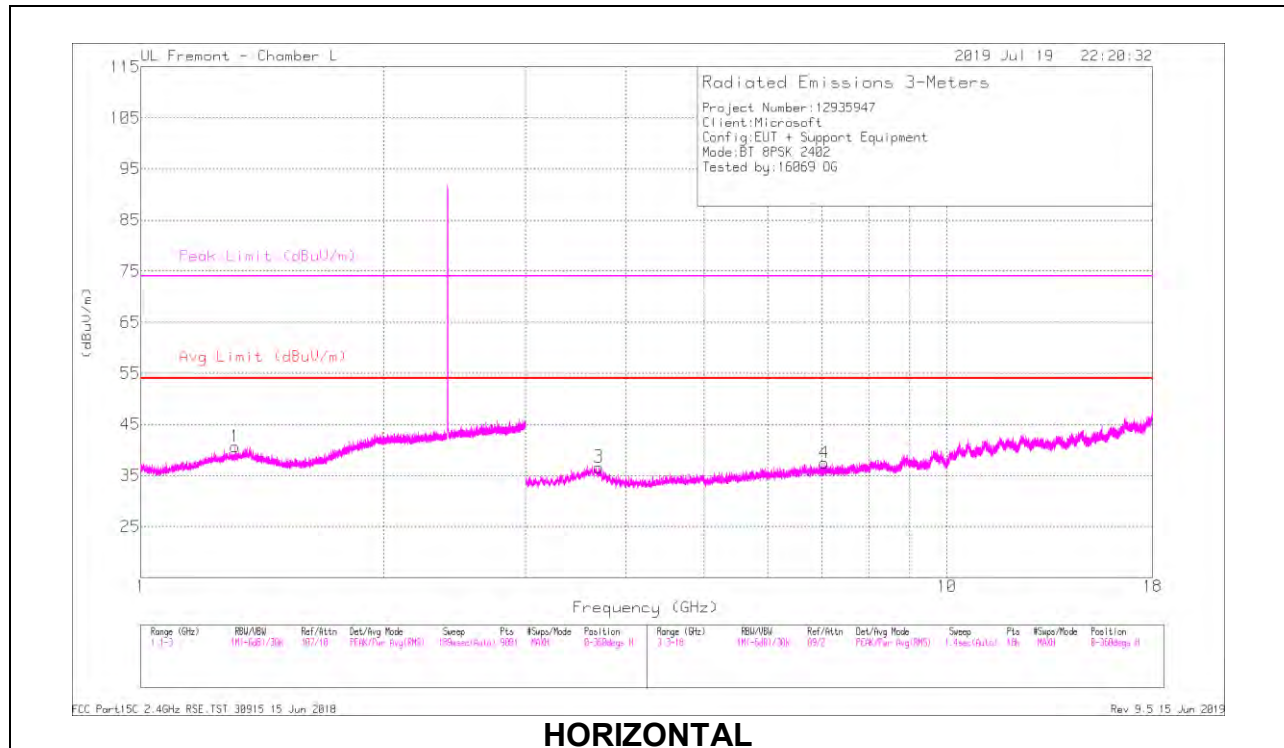
Rev 9.5 15 Jun 2019

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/CbU/Flt 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	* 2.48351	52.03	Pk	32.4	-20.2	64.23	-	-	74	-9.77	193	223	V
2	* 2.48356	51.85	Pk	32.4	-20.2	64.05	-	-	74	-9.95	193	223	V
3	* 2.48351	35.82	VA1T	32.4	-20.2	48.02	54	-5.98	-	-	193	223	V
4	* 2.48355	35.51	VA1T	32.4	-20.2	47.71	54	-6.29	-	-	193	223	V

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



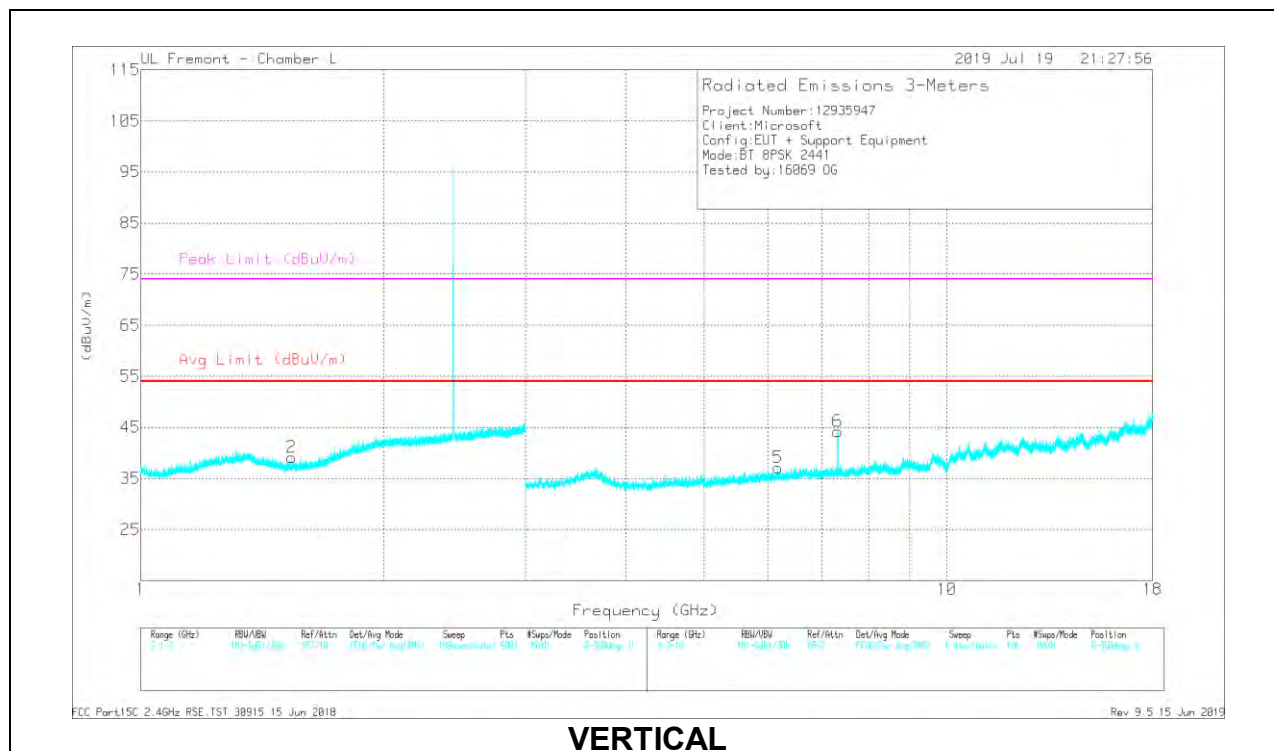
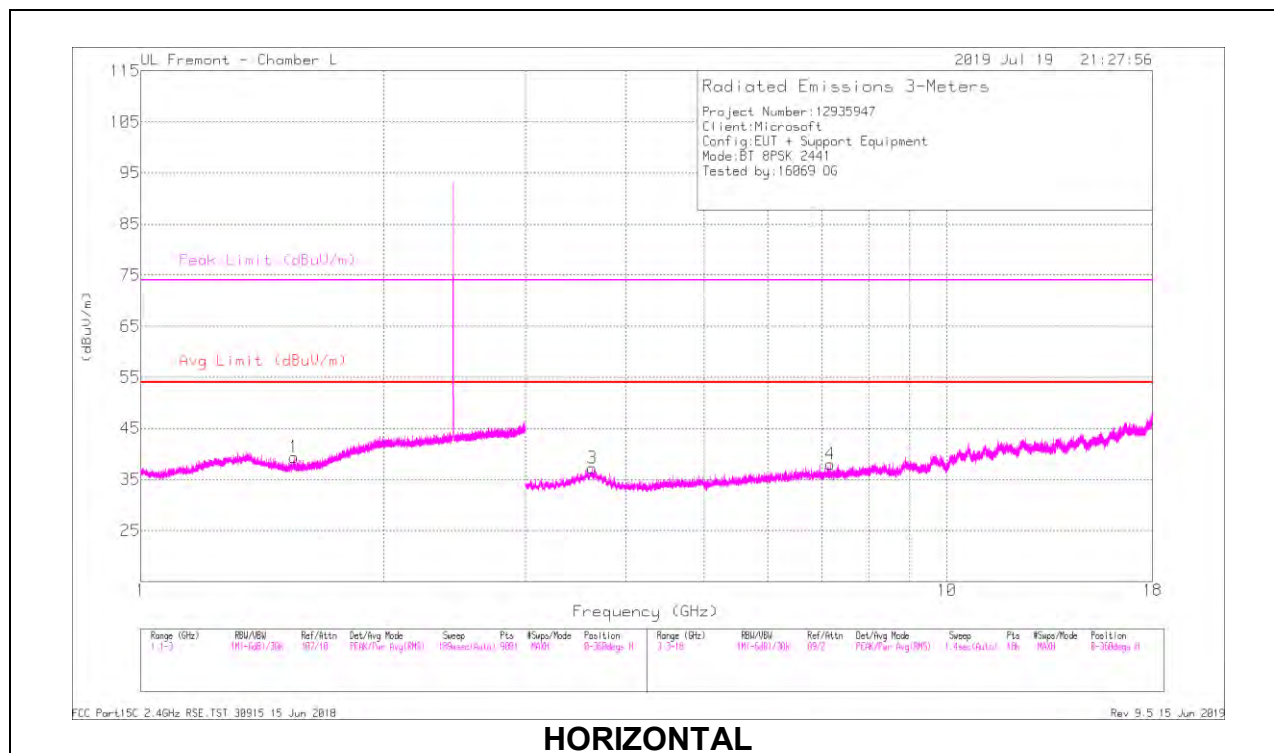
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/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	* 1.30953	40.67	PKFH	30	-23.6	47.07	-	-	74	-26.93	259	275	H
	* 1.30748	28.24	VA1T	30	-23.6	34.64	54	-19.36	-	-	259	275	H
2	* 1.46728	41.64	PKFH	28.5	-23.1	47.04	-	-	74	-26.96	221	286	V
	* 1.46764	28.13	VA1T	28.5	-23.1	33.53	54	-20.47	-	-	221	286	V
3	* 3.70528	36.23	PKFH	35.4	-27.7	43.93	-	-	74	-30.07	68	108	H
	* 3.70363	23.38	VA1T	35.4	-27.7	31.08	54	-22.92	-	-	68	108	H
4	7.04868	33.72	PKFH	35.6	-24.5	44.82	-	-	-	-	149	285	H
5	* 3.59736	36.37	PKFH	35.9	-28.4	43.87	-	-	74	-30.13	120	386	V
	* 3.59389	23.92	VA1T	35.8	-28.5	31.22	54	-22.78	-	-	120	386	V
6	7.20728	40.99	PKFH	35.5	-24.1	52.39	-	-	-	-	231	212	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



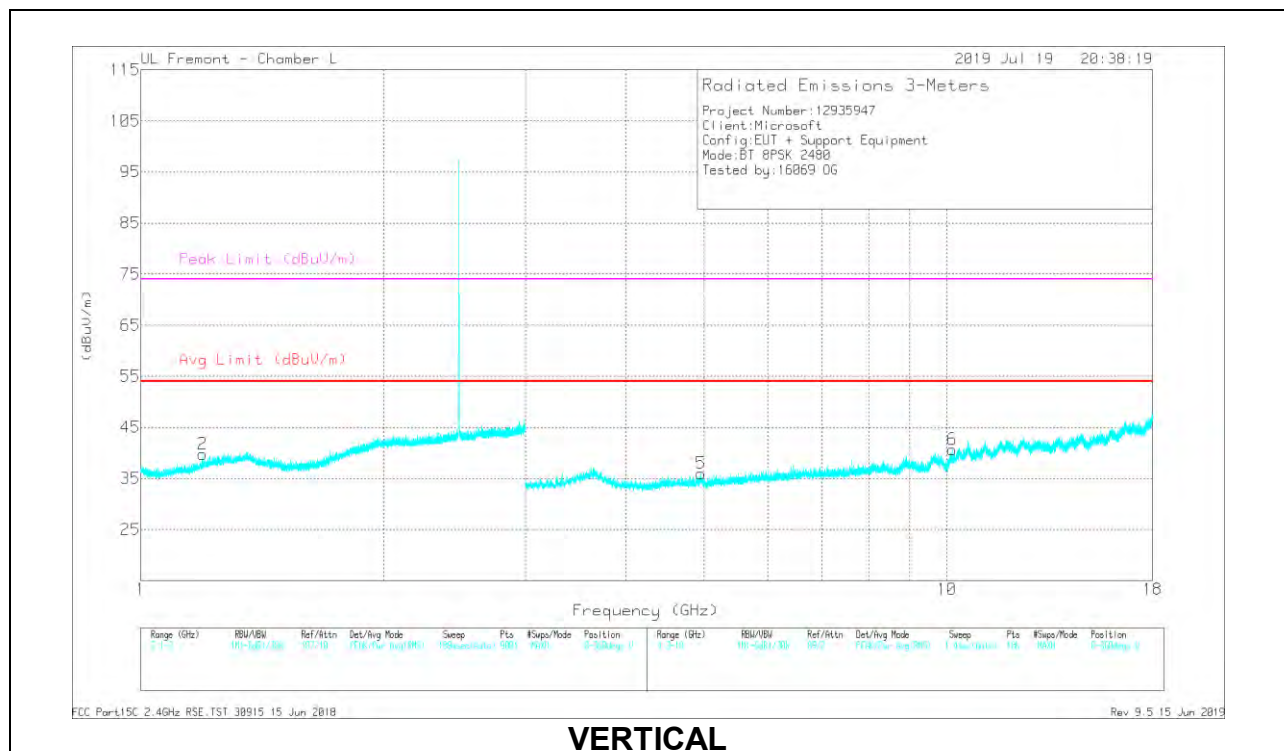
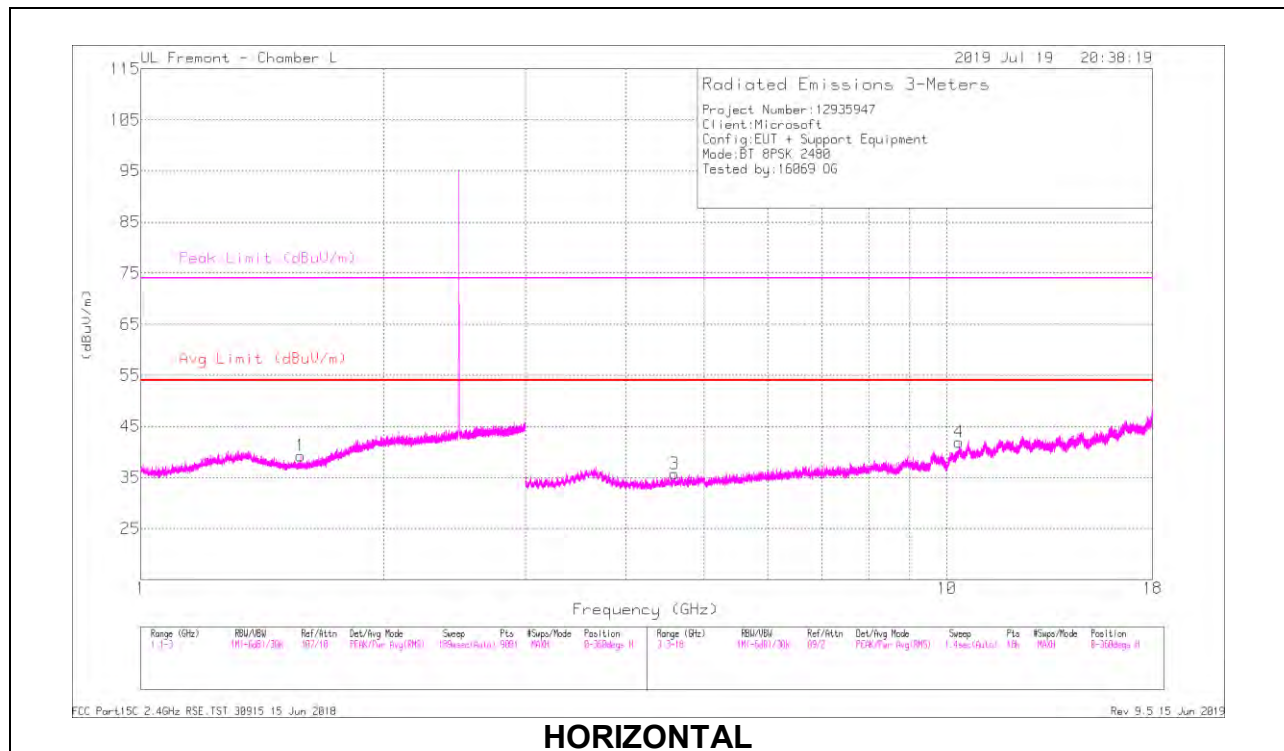
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (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	* 1.54877	41.21	PKFH	28.2	-22.9	46.51	-	-	74	-27.49	221	132	H
	* 1.54863	27.97	VA1T	28.2	-22.9	33.27	54	-20.73	-	-	221	132	H
2	* 1.53758	40.28	PKFH	28.1	-22.9	45.48	-	-	74	-28.52	118	265	V
	* 1.53697	27.94	VA1T	28.1	-22.9	33.14	54	-20.86	-	-	118	265	V
3	* 3.6312	38.08	PKFH	35.9	-28.4	45.58	-	-	74	-28.42	66	145	H
	* 3.62888	24.26	VA1T	35.9	-28.4	31.76	54	-22.24	-	-	66	145	H
4	7.17327	33.19	PKFH	35.5	-23.8	44.89	-	-	-	-	34	114	H
6	* 7.32432	39.63	PKFH	35.6	-23.8	51.43	-	-	74	-22.57	220	198	V
	* 7.32411	31.33	VA1T	35.6	-23.8	43.13	54	-10.87	-	-	220	198	V
5	6.17881	33.58	PKFH	35.4	-25.2	43.78	-	-	-	-	266	214	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 T120 (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	* 1.57726	40.55	PKFH	28.1	-22.8	45.85	-	-	74	-28.15	234	165	H
	* 1.57642	27.74	VA1T	28.1	-22.8	33.04	54	-20.96	-	-	234	165	H
2	* 1.19475	41.21	PKFH	28.9	-23.9	46.21	-	-	74	-27.79	99	363	V
	* 1.19548	28.41	VA1T	29	-23.9	33.51	54	-20.49	-	-	99	363	V
3	* 4.59071	36.55	PKFH	34.2	-27.8	42.95	-	-	74	-31.05	19	337	H
	* 4.59018	23.67	VA1T	34.2	-27.8	30.07	54	-23.93	-	-	19	337	H
4	10.35963	31.41	PKFH	37.5	-18.6	50.31	-	-	-	-	101	130	H
5	* 4.95544	35.13	PKFH	33.9	-26.1	42.93	-	-	74	-31.07	25	200	V
	* 4.95524	22.39	VA1T	33.9	-26.1	30.19	54	-23.81	-	-	25	200	V
6	10.15436	28.91	PKFH	37.2	-18.5	47.61	-	-	-	-	232	230	V

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

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

9.2. SPURIOUS EMISSIONS FOR COLLOCATION

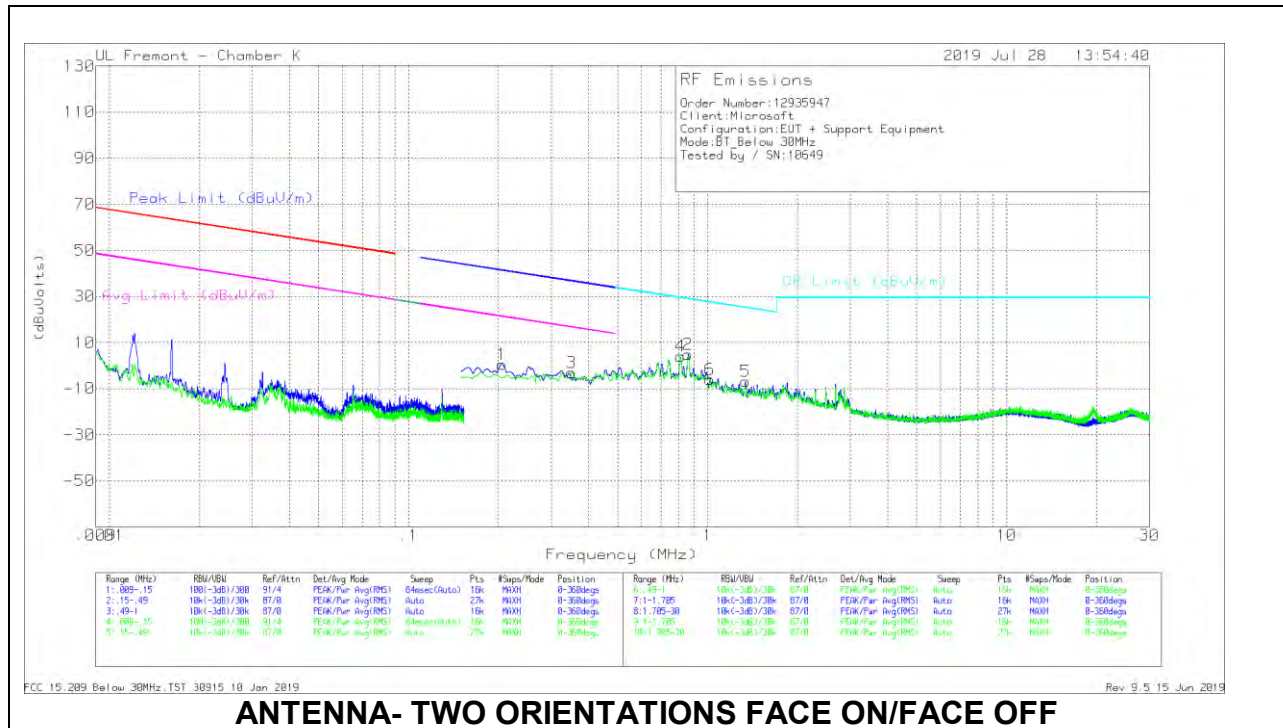
TEST-CASE CONDITIONS

Test Case #	Antenna	Mode	Frequency (MHz)
1	Chain 0	BT, 8PSK & WLAN 5GHz, 11a	2402 & 5745
	Chain 1	WLAN 5GHz, 11a	5745

For simultaneous transmission of any BT 8PSK (2.4GHz) and WLAN (5 GHz) bands, investigation has been performed and no noticeable new emission was found.

9.3. 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/ PRE018 6650	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.20539	16.62	Pk	56.1	-32.1	-80	-39.38	41.37	-80.75	21.37	-60.75	0-360
3	.35144	13.11	Pk	56	-32.1	-80	-42.99	36.69	-79.68	16.69	-59.68	0-360

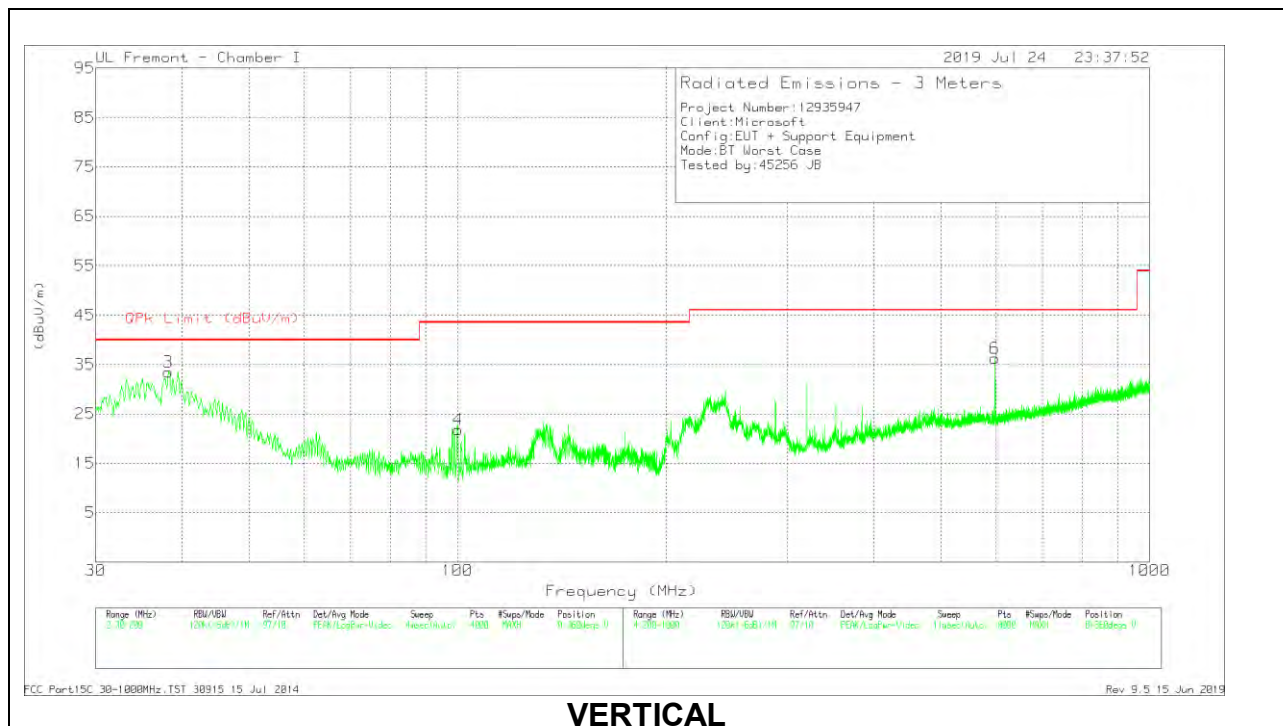
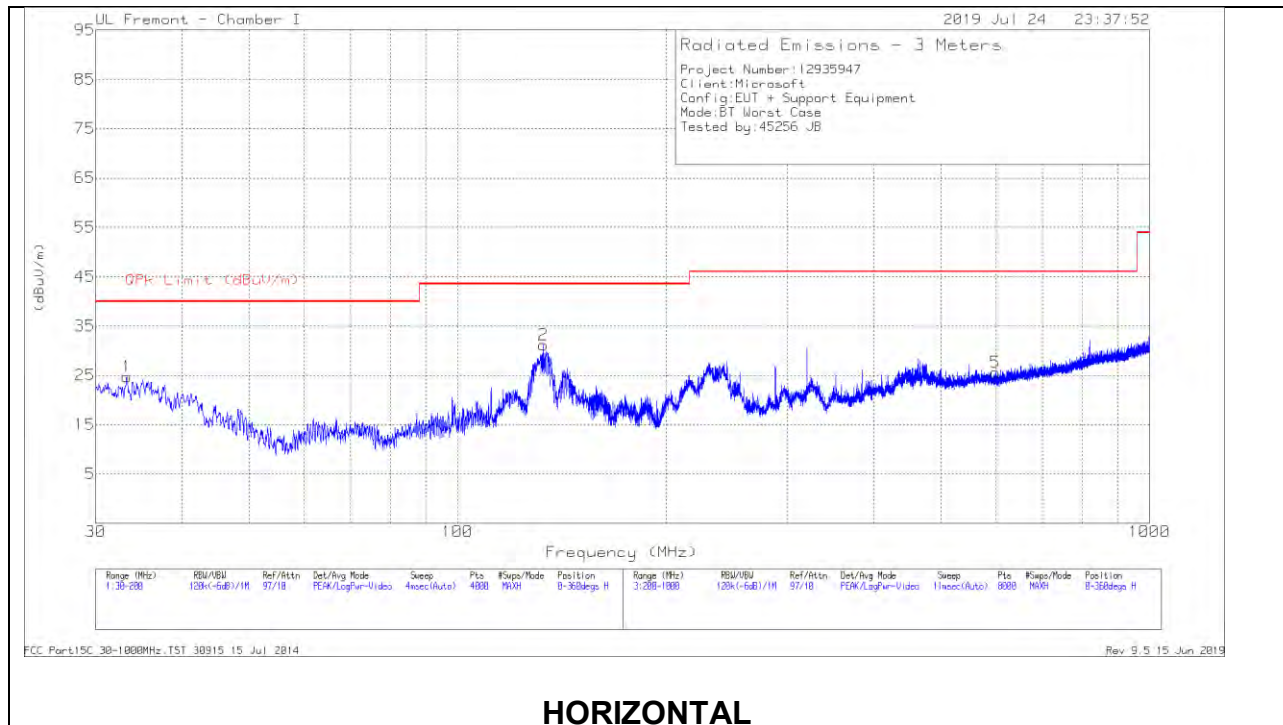
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE018 6650	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.8615	20.97	Pk	56.1	-32.1	-40	4.97	28.91	-23.94	0-360
4	.81117	20.02	Pk	56.1	-32.1	-40	4.02	29.43	-25.41	0-360
5	1.33777	20.22	Pk	45	-32	-40	-6.78	25.1	-31.88	0-360
6	1.01859	19.34	Pk	46.7	-32.1	-40	-6.06	27.46	-33.52	0-360

Pk - Peak detector

9.4. 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 PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	33.2733	31.73	Pk	24.4	-31.4	24.73	40	-15.27	0-360	300	H
2	* 133.0042	42.43	Pk	19.3	-30.6	31.13	43.52	-12.39	0-360	199	H
3	* 38.2046	43.8	Pk	21	-31.3	33.5	40	-6.5	0-360	100	V
	38.2057	42.88	Qp	20.8	-31.3	32.38	40	-7.62	157	117	V
4	100.2282	36.51	Pk	16.1	-30.8	21.81	43.52	-21.71	0-360	100	V
5	599.1519	30.44	Pk	24.2	-29.1	25.54	46.02	-20.48	0-360	199	H
6	598.0517	41.19	Pk	24.2	-29.1	36.29	46.02	-9.73	0-360	99	V

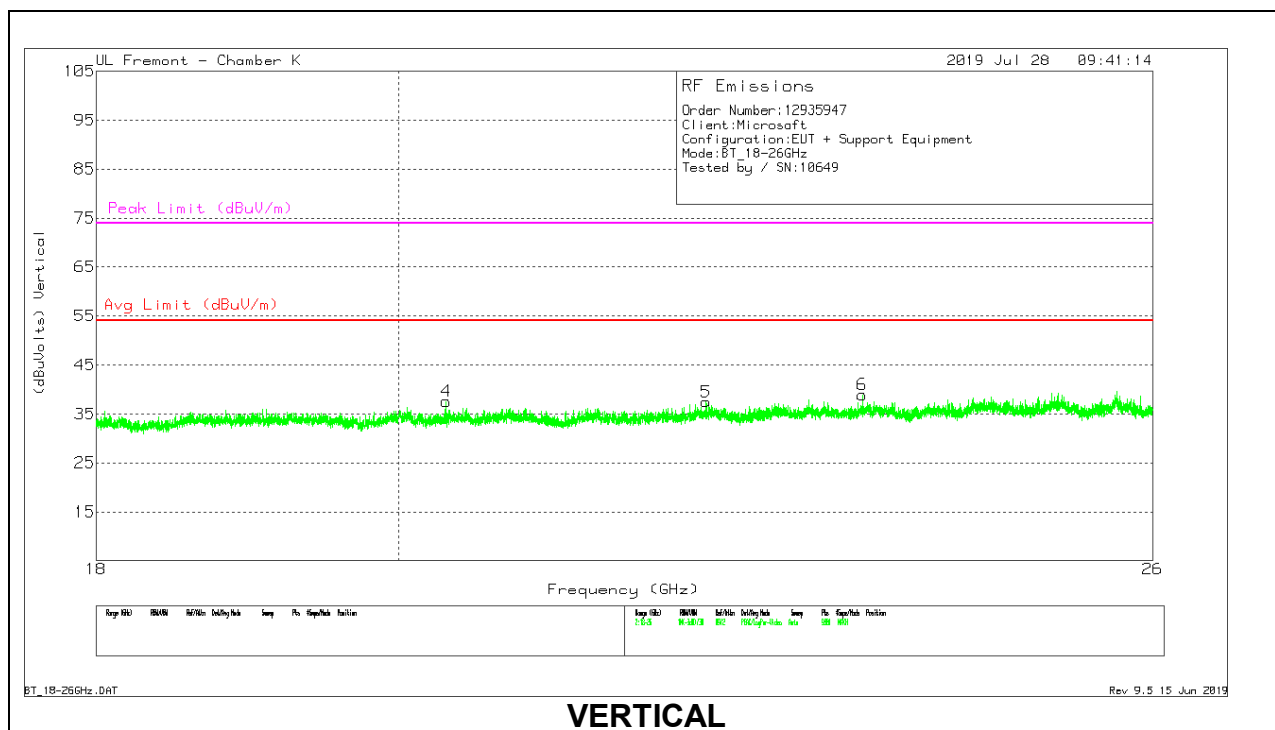
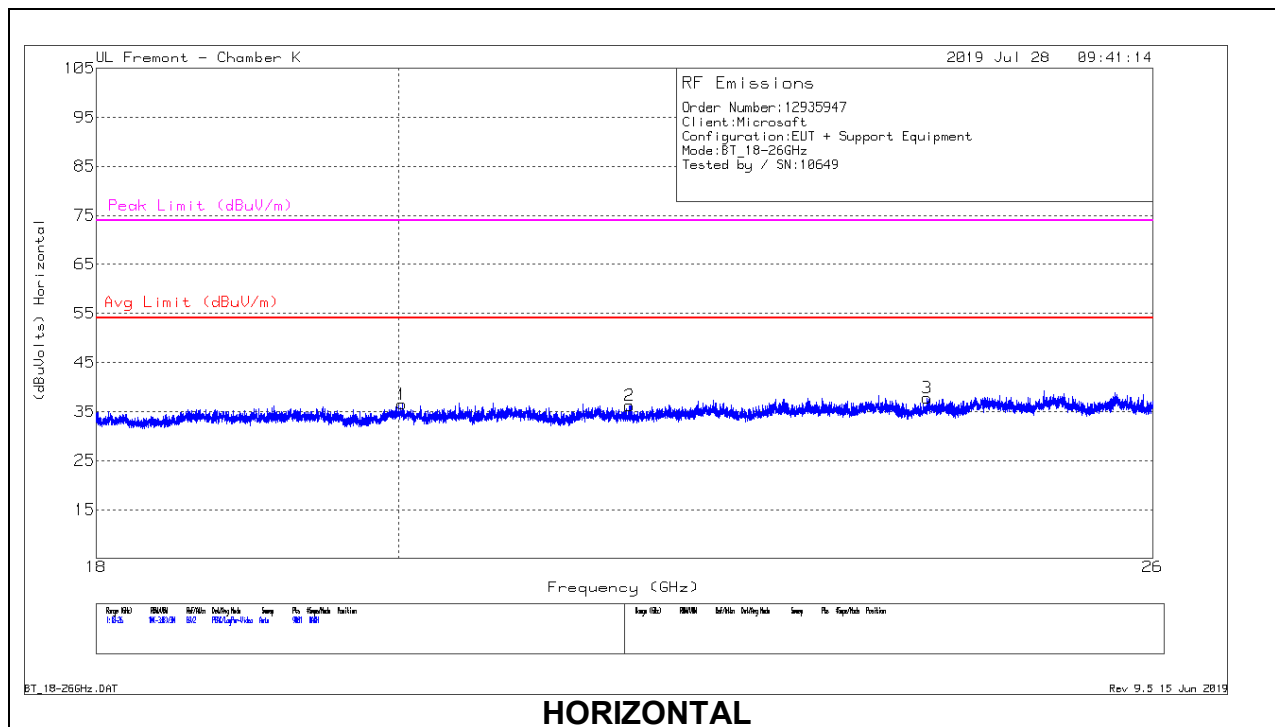
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

9.5. 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	20.024	69.69	Pk	33.4	-57.1	-9.5	36.49	54	-17.51	74	-37.51
2	21.67467	69.41	Pk	33.9	-57.6	-9.5	36.21	54	-17.79	74	-37.79
3	24.03733	69.35	Pk	34.5	-56.6	-9.5	37.75	54	-16.25	74	-36.25
4	20.33511	70.44	Pk	33.6	-57	-9.5	37.54	54	-16.46	74	-36.46
5	22.256	70.58	Pk	34	-57.6	-9.5	37.48	54	-16.52	74	-36.52
6	23.50311	71.12	Pk	34.6	-57.3	-9.5	38.92	54	-15.08	74	-35.08

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.

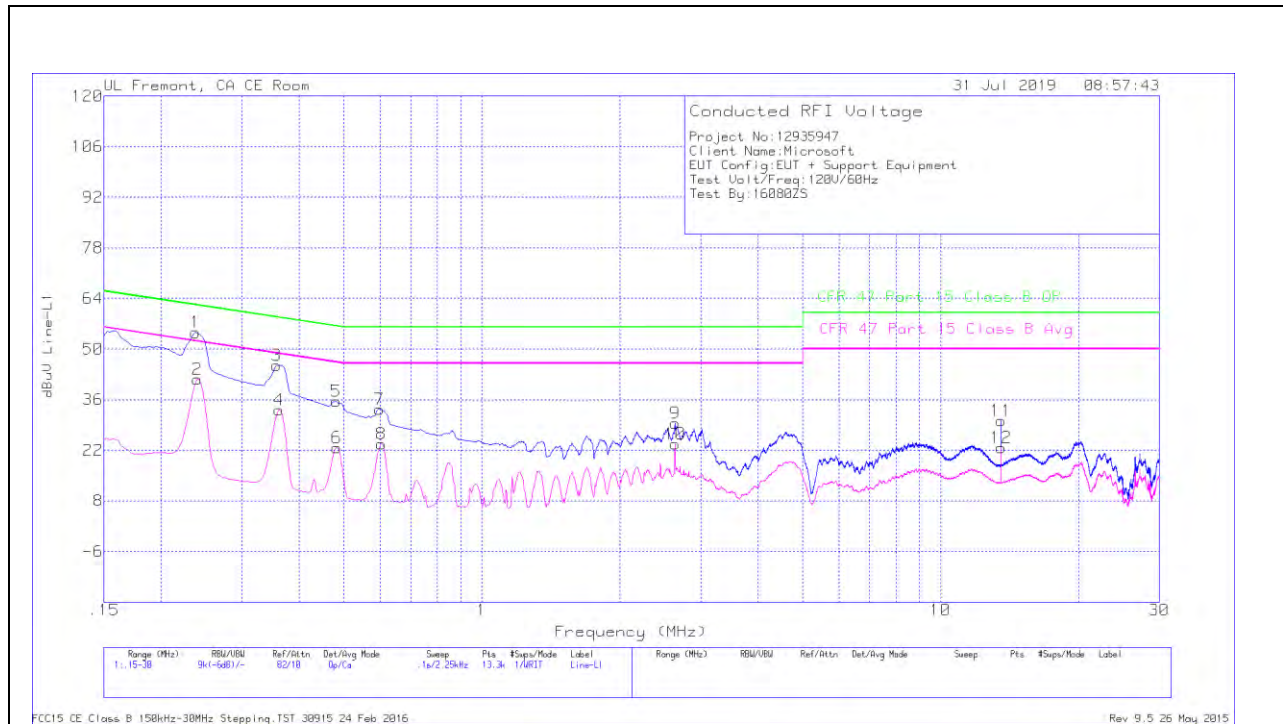
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS



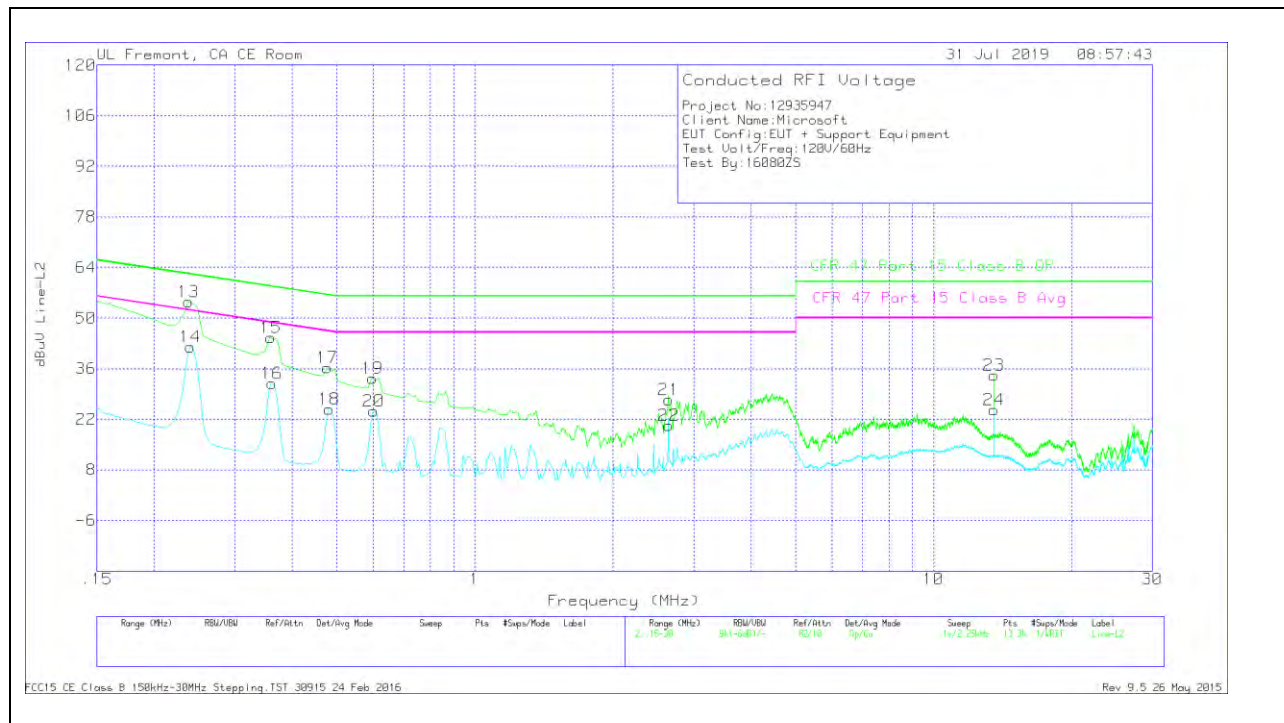
Range 1: Line=L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.23775	44.51	Qp	0	0	10.1	54.61	62.17	-7.56	-	-
2	.24	31.63	Ca	0	0	10.1	41.73	-	-	52.1	-10.37
3	.357	35.39	Qp	0	0	10.1	45.49	58.8	-13.31	-	-
4	.3615	23.01	Ca	0	0	10.1	33.11	-	-	48.69	-15.58
5	.48075	25.44	Qp	0	0	10.1	35.54	56.33	-20.79	-	-
6	.483	12.65	Ca	0	0	10.1	22.75	-	-	46.29	-23.54
7	.59775	23.27	Qp	0	0	10.1	33.37	56	-22.63	-	-
8	.6045	13.64	Ca	0	0	10.1	23.74	-	-	46	-22.26
9	2.6385	19.26	Qp	0	.1	10.1	29.46	56	-26.54	-	-
10	2.6385	13.48	Ca	0	.1	10.1	23.68	-	-	46	-22.32
11	13.56	19.68	Qp	.1	.2	10.2	30.18	60	-29.82	-	-
12	13.56	12.27	Ca	.1	.2	10.2	22.77	-	-	50	-27.23

Qp - Quasi-Peak detector

Ca - CISPR average detection

NOTE: Markers 11 and 12, 13.56MHz is an external NFC signal unrelated to the EUT.

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	.23775	44.48	Qp	0	0	10.1	54.58	62.17	-7.59	-	-
14	.24	31.86	Ca	0	0	10.1	41.96	-	-	52.1	-10.14
15	.35925	34.49	Qp	0	0	10.1	44.59	58.75	-14.16	-	-
16	.3615	21.85	Ca	0	0	10.1	31.95	-	-	48.69	-16.74
17	.47625	26.17	Qp	0	0	10.1	36.27	56.4	-20.13	-	-
18	.48075	14.76	Ca	0	0	10.1	24.86	-	-	46.33	-21.47
19	.59775	23.28	Qp	0	0	10.1	33.38	56	-22.62	-	-
20	.60225	14.13	Ca	0	0	10.1	24.23	-	-	46	-21.77
21	2.64525	17.13	Qp	0	.1	10.1	27.33	56	-28.67	-	-
22	2.64525	10.12	Ca	0	.1	10.1	20.32	-	-	46	-25.68
23	13.56	23.76	Qp	.1	.2	10.2	34.26	60	-25.74	-	-
24	13.56	14.08	Ca	.1	.2	10.2	24.58	-	-	50	-25.42

Qp - Quasi-Peak detector

Ca - CISPR average detection

NOTE: Markers 23 and 24, 13.56MHz is an external NFC signal unrelated to the EUT.

11. SETUP PHOTOS

Please refer to 12935947-EP1 for setup photos

END OF TEST REPORT