CERTIFICATION TEST REPORT

Report Number. : 12802195-E1V1

Applicant	:	Microsoft Corp. One Microsoft Way Redmond, WA 98052
Model	:	1876
FCC ID	:	C3K1876
IC	:	3048A-1876
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:
August 08, 2019

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	8/8/2019	Initial Issue	---

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47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Portable Computing Device

MODEL: 1876

SERIAL NUMBER: Conducted: 005764692553
Radiated: 024269592753

DATE TESTED: JULY 18 – AUGUST 03, 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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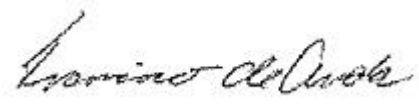
Approved & Released For
UL Verification Services Inc. By:



Francisco DeAnda
Operations Leader
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Glenn Escano
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

Reviewed By:

Henry Lau
Project Engineer
Consumer Technology Division
UL Verification Services Inc.

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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
☐ 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

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

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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	BLE	6.08	4.06

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna, with a maximum gain of 0.6 dBi.

5.4. SOFTWARE AND FIRMWARE

The operating system installed on the EUT is Windows 10 Pro build 18362.19h1_release.190318-1202.

The Bluetooth Driver installed on the EUT is version 3000.0.630.0.

The test utility software used during testing was QRCT v4.0.00108

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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, and four configurations with a keyboard at 45 degrees, 90 degrees, 180 degrees, and portrait, it was determined that 90 degrees with keyboard orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in 90 degrees with keyboard orientation.

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

BLE mode: 125kbps
BLE mode: 500kbps
BLE mode: 1Mbps
BLE mode: 2Mbps

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Keyboard	Microsoft	EV2BB01A	E2XEV2BB01A00042	DoC
AC/DC Adapter	Microsoft	1706	0C130J02JT396	DoC
Laptop	Lenovo	80S6	YD03NTTF	DoC
AC/DC Adapter	Lenovo	ADLX45NCC3A	N/A	DoC
Ethernet to USB Adapter	Linksys	USB3GIGV1	15710S08405610	DoC
USB Type C to USB Type A Adapter	Amazon Basics	L6LUC021-CS-R	N/A	N/A
USB Type C to Audio Jack	Sony	A1-0231	N/A	N/A
Earphone	Sony	AG1100	N/A	N/A

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-Shielded	0.2	to AC/DC Adapter
2	DC	1	DC	Shielded	1	to Laptop, to EUT
3	USB	1	Type C	Un-Shielded	0.2	USB-C to USB-A Adapter
4	USB	1	Type A	Un-shielded	0.1	USB-A to RJ45 converter
5	Ethernet	1	RJ45	Un-shielded	>3m	Laptop to EUT
6	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 Laptop, to EUT
3	USB	1	Type C	Un-shielded	0.2	USB-C to USB-A Adapter
4	USB	1	Type A	Un-shielded	0.1	USB-A to RJ45 converter
5	Ethernet	1	RJ45	Un-shielded	>3	Laptop to EUT
6	USB	1	Type C	Un-shielded	0.1	USB-C to Audio Jack converter
7	Earphone	1	3.5mm	Un-shielded	1	EUT to earphone

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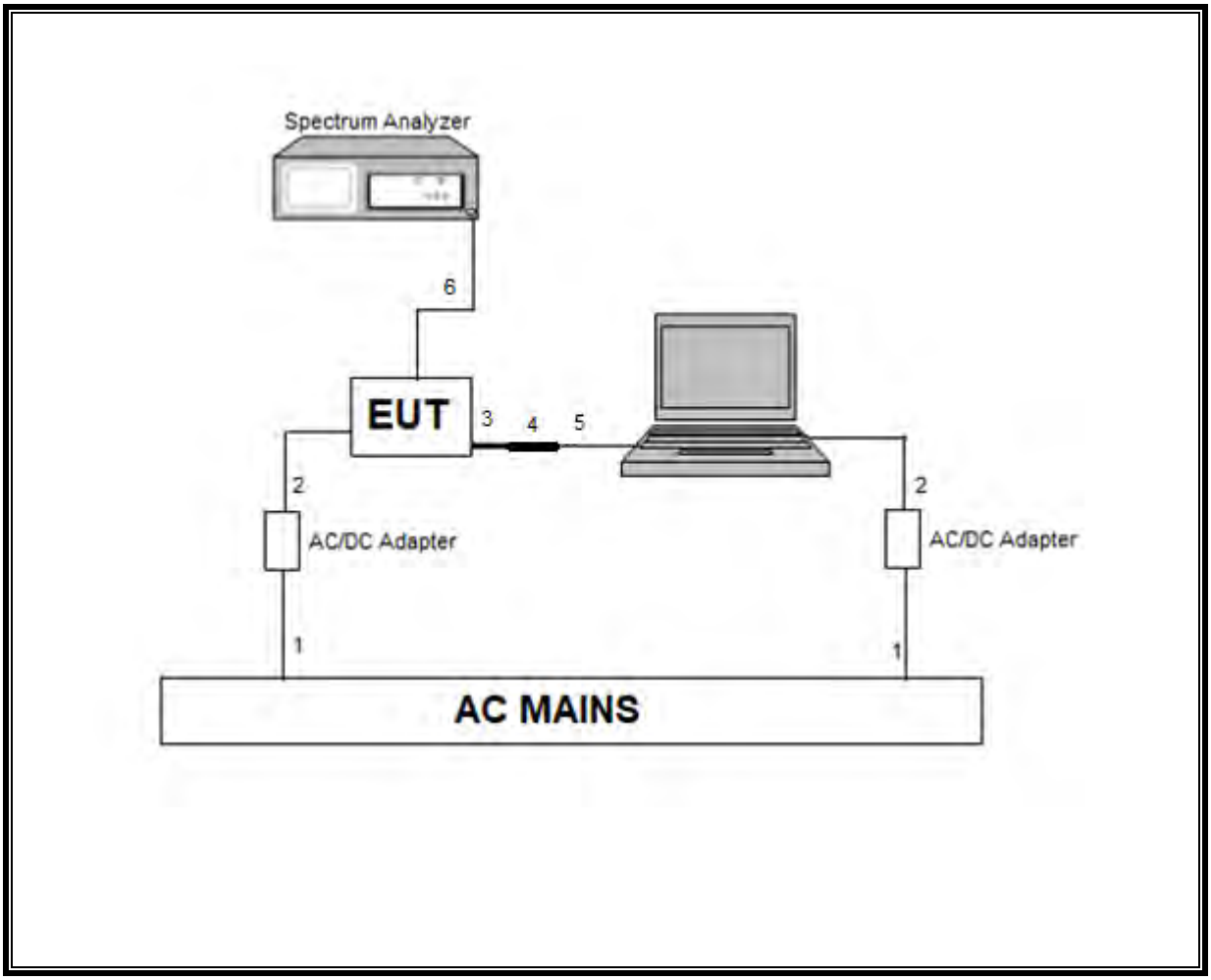
TEST SETUP

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

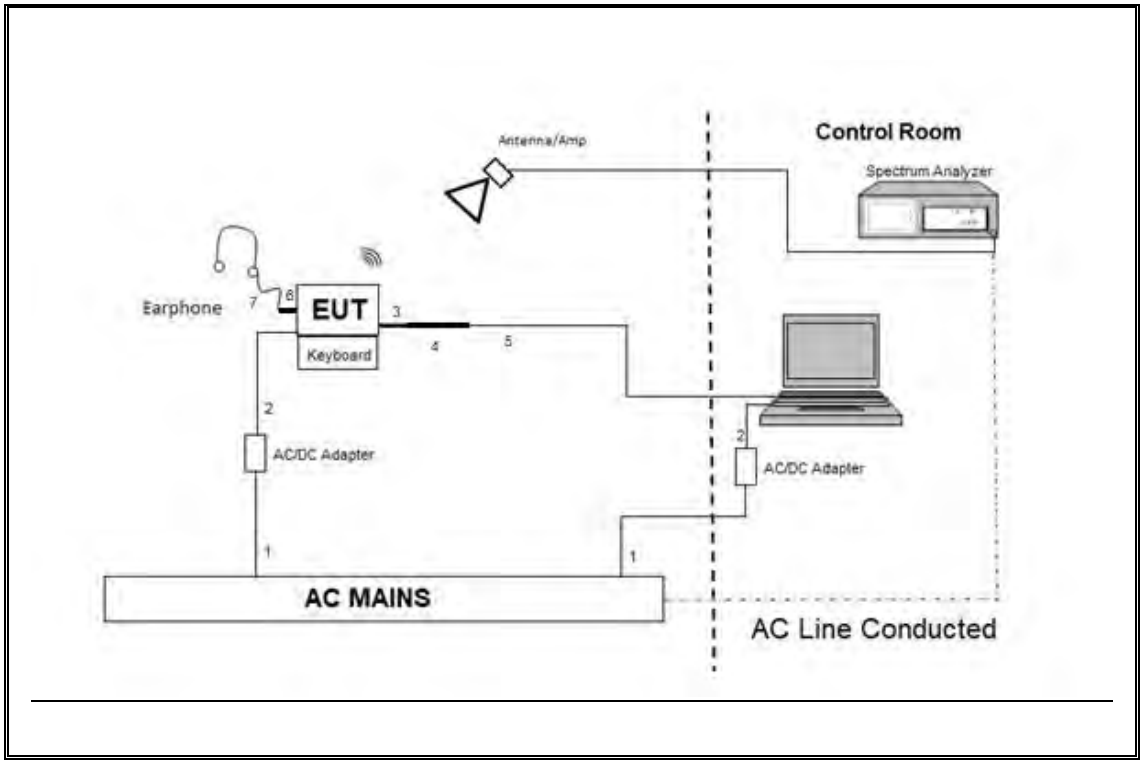
CONDUCTED TEST SETUP DIAGRAM



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 all support equipment. The test software exercises the radio.

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6. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause -11.8.1

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

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Subclause -11.13.3.4 Integration method -Trace averaging across ON and OFF times DC correction

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

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

7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**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	05/31/2020	05/31/2019
Antenna, Passive Loop 100kHz to 30MHz	ELETRO METRICS	EM-6872	PRE0179467	05/31/2020	05/31/2019
Antenna, Horn 1-18GHz	AR	AMPL-ATH1G18	PRE0189055	04/20/2020	04/20/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	EMC4294	06/14/2020	06/14/2019
Amplifier, 1 to 18GHz, 35dB	AMPLICAL	AMP1G18-35	T1571	05/28/2020	05/28/2019
Amplifier, 1 to 18GHz, 35dB	AMPLICAL	AMP1G18-35	T1569	05/04/2020	05/04/2019
Hybrid Antenna, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	PRE0181575	08/01/2019	08/01/2018
Hybrid Antenna, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	PRE0184052	10/24/2019	10/24/2018
Amplifier, 9kHz to 1GHz, 32 dB	SONOMA INSTRUMENT	310	PRE0180174	06/01/2020	06/01/2019
Amplifier, 9kHz to 1GHz, 32 dB	SONOMA INSTRUMENT	310	175953	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	05/16/2020	05/16/2019
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0179372	02/16/2020	02/16/2019
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	E4440A	T200	01/28/2020	01/28/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T917	01/24/2020	01/24/2019
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 9.9, June 05, 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.

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 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/B Minimum VBW (kHz)
2.4GHz Band						
BLE 125kbps	3.092	3.752	0.824	82.41%	0.84	0.323
BLE 500kbps	1.0660	1.8750	0.569	56.85%	2.45	0.938
BLE 1Mbps	0.390	0.624	0.625	62.50%	2.04	2.564
BLE 2Mbps	0.2064	0.6256	0.330	32.99%	4.82	4.845

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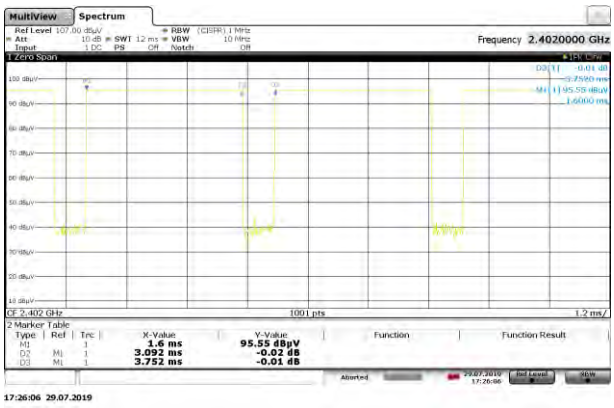
DUTY CYCLE PLOTS



BLE 125kbps

BLE 500kbps

BLE 1Mbps

BLE 2Mbps

8.2. 99% BANDWIDTH

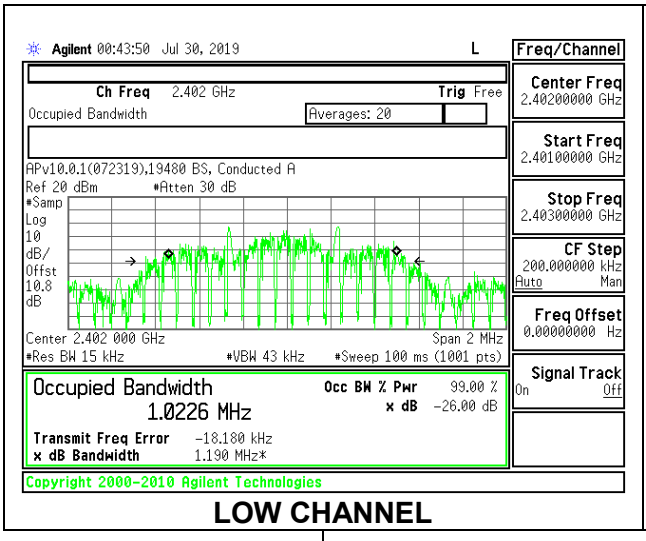
LIMITS

None; for reporting purposes only.

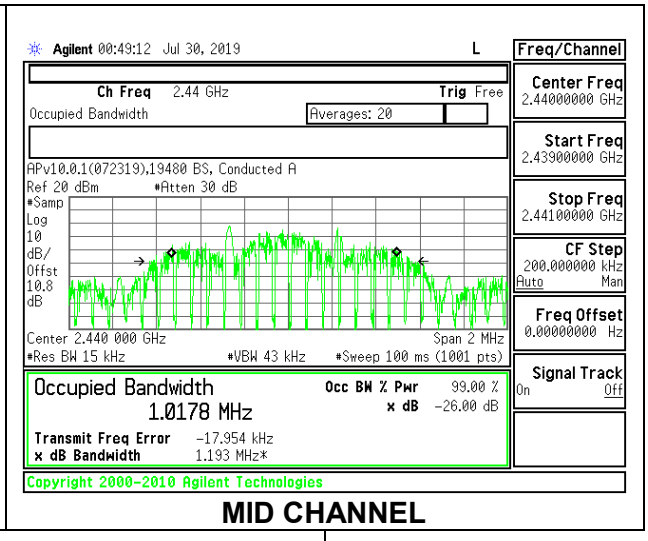
RESULTS

8.2.1. BLE 125kbps

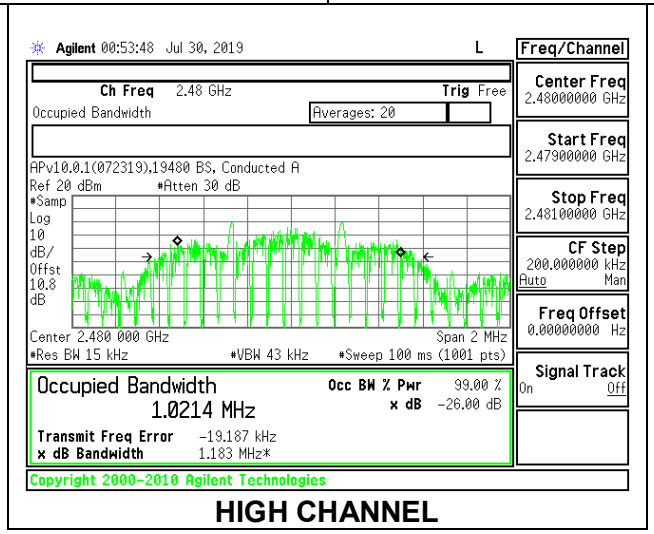
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0226
Middle	2440	1.0178
High	2480	1.0214



LOW CHANNEL



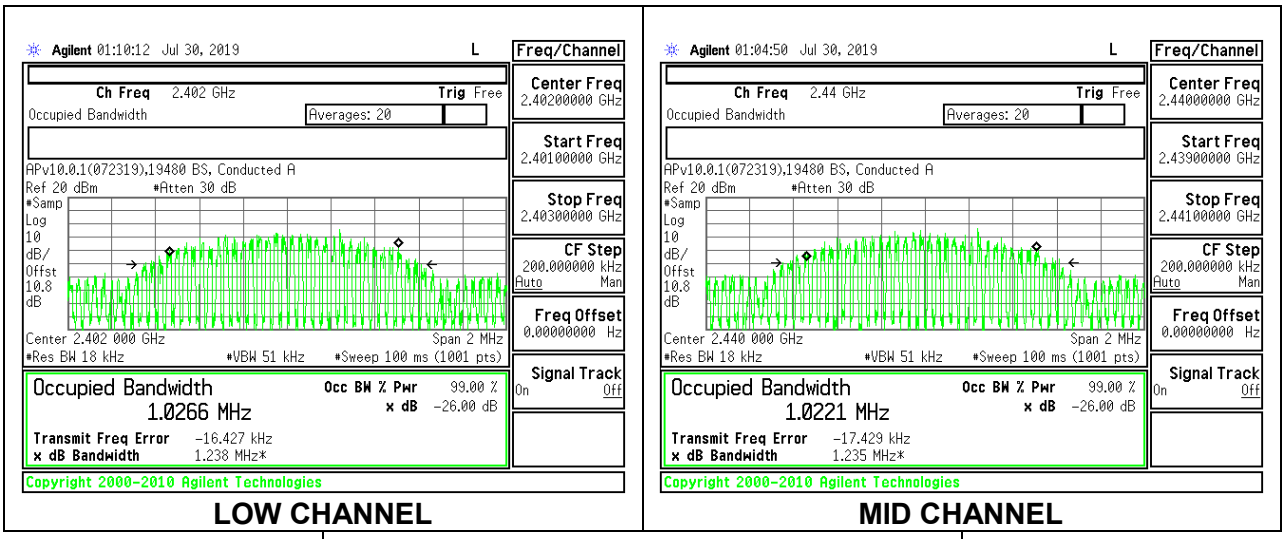
MID CHANNEL



HIGH CHANNEL

8.2.2. BLE 500kbps

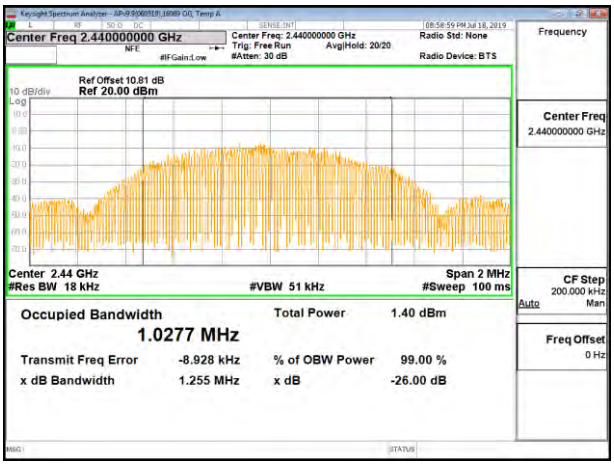
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0266
Middle	2440	1.0221
High	2480	1.0188



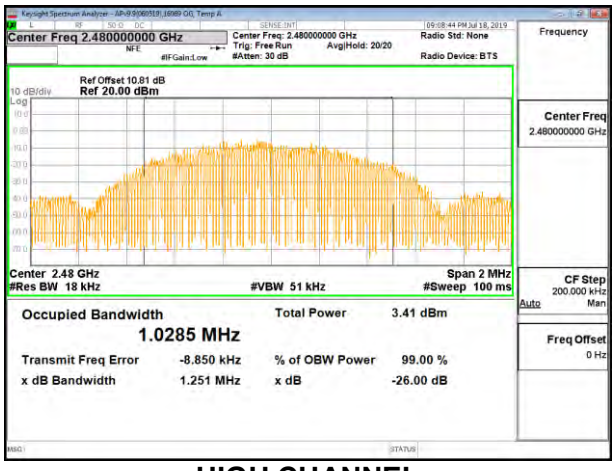
8.2.3. BLE 1Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0283
Middle	2440	1.0277
High	2480	1.0285

LOW CHANNEL



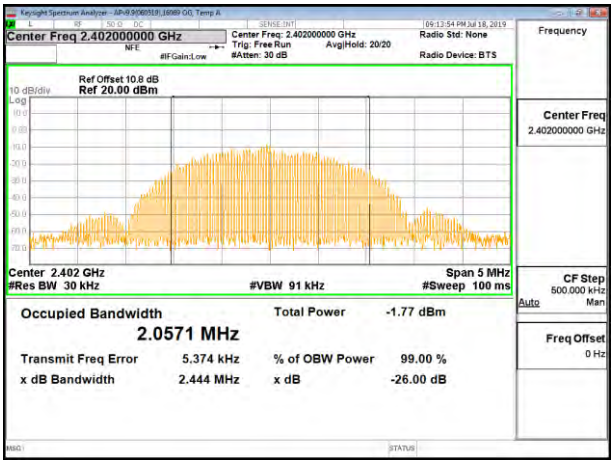
MID CHANNEL



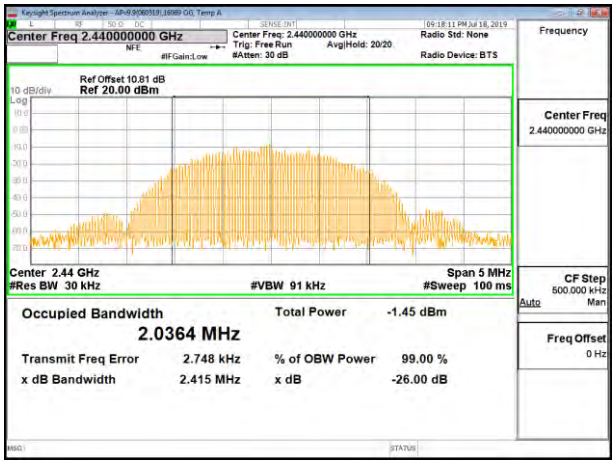
HIGH CHANNEL

8.2.4. BLE 2Mbps

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0571
Middle	2440	2.0364
High	2480	2.0379



LOW CHANNEL



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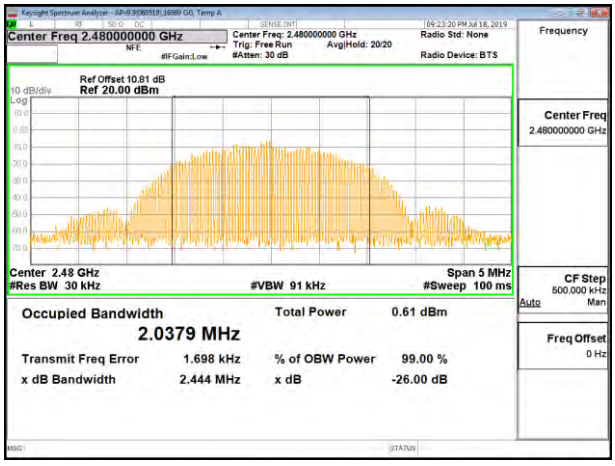

HIGH CHANNEL

8.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

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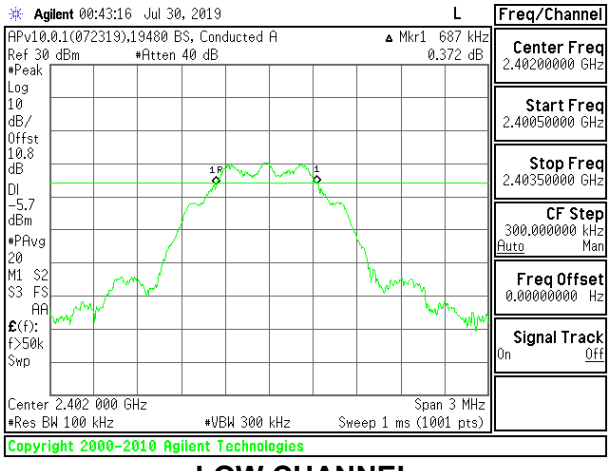
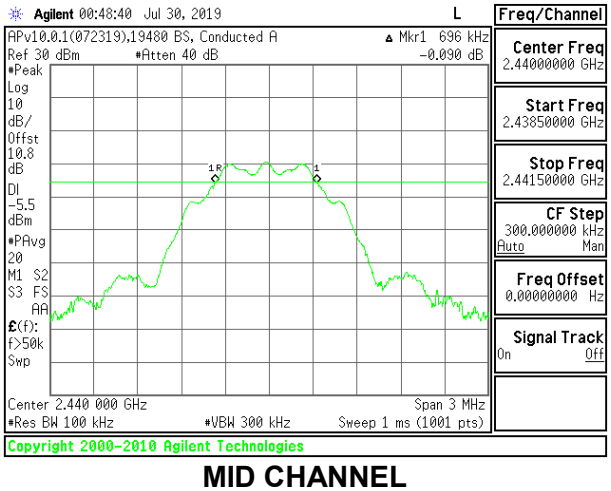
8.3.1. BLE 125kbps

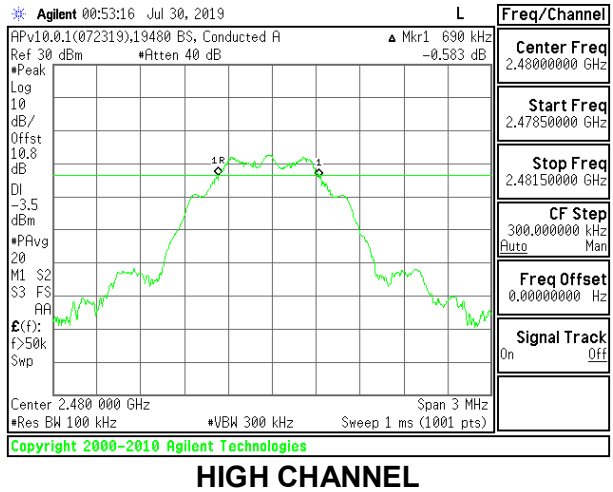
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.687	0.5
Middle	2440	0.696	0.5
High	2480	0.690	0.5



LOW CHANNEL



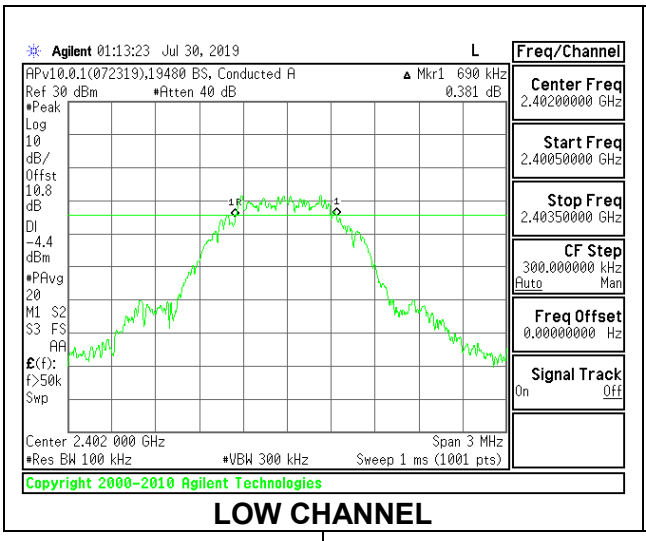
MID CHANNEL



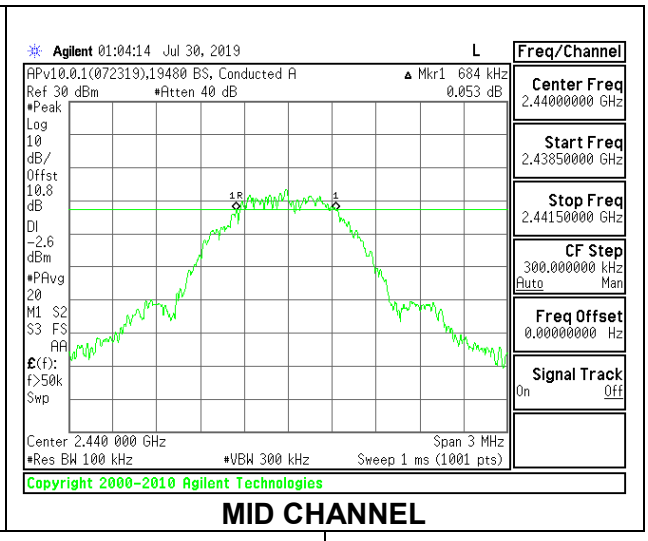
HIGH CHANNEL

8.3.2. BLE 500kbps

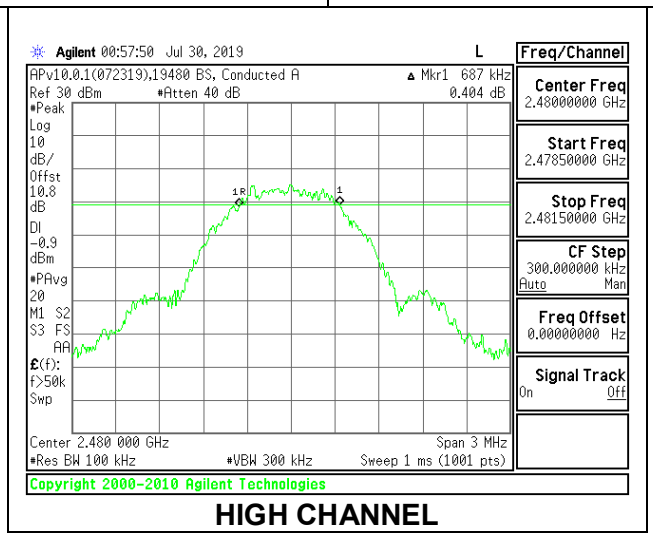
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.690	0.5
Middle	2440	0.684	0.5
High	2480	0.687	0.5



LOW CHANNEL



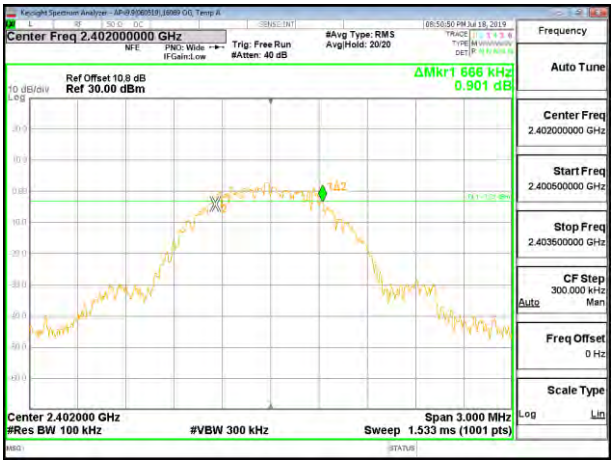
MID CHANNEL



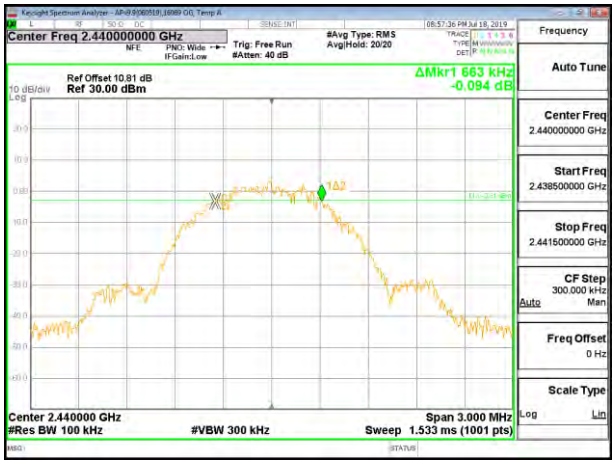
HIGH CHANNEL

8.3.3. BLE 1Mbps

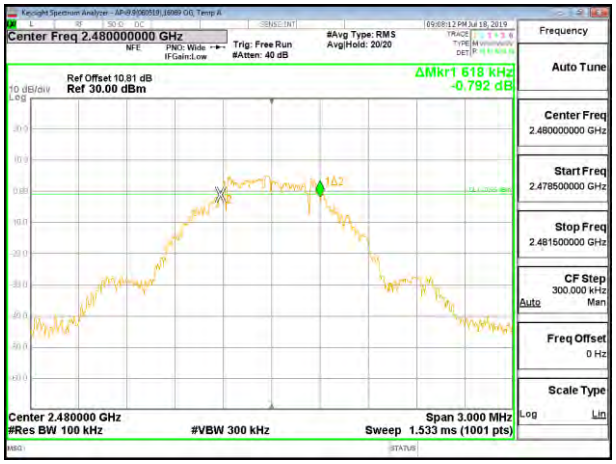
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.666	0.5
Middle	2440	0.663	0.5
High	2480	0.618	0.5



LOW CHANNEL



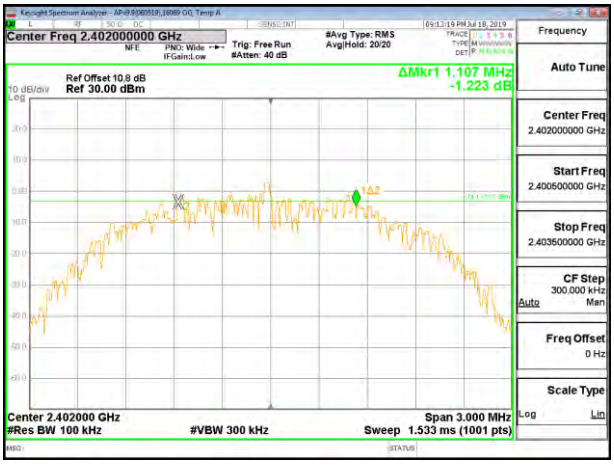
MID CHANNEL



HIGH CHANNEL

8.3.4. BLE 2Mbps

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.107	0.5
Middle	2440	1.128	0.5
High	2480	1.071	0.5



LOW CHANNEL

MID CHANNEL

HIGH CHANNEL

8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

TEST PROCEDURE
The transmitter output is connected to a power meter.

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

RESULTS

8.4.1. BLE 125kbps

Tested By:	BS19480
Date:	7/29/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.48	30	-26.520
Middle	2440	3.74	30	-26.260
High	2480	5.82	30	-24.180

8.4.2. BLE 500kbps

Tested By:	BS19480
Date:	7/29/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.50	30	-26.500
Middle	2440	3.79	30	-26.210
High	2480	5.85	30	-24.150

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8.4.3. BLE 1Mbps

Tested By:	GA12485
Date:	7/18/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.39	30	-26.610
Middle	2440	3.74	30	-26.260
High	2480	5.78	30	-24.220

8.4.4. BLE 2Mbps

Tested By:	GA12485
Date:	7/18/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.64	30	-26.360
Middle	2440	3.92	30	-26.080
High	2480	6.08	30	-23.920

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8.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE
The transmitter output is connected to a power meter.

The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

8.5.1. BLE 125kbps

Tested By:	BS19480
Date:	7/29/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.27
Middle	2440	3.55
High	2480	5.66

8.5.2. BLE 500kbps

Tested By:	BS19480
Date:	7/29/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.28
Middle	2440	3.58
High	2480	5.7

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8.5.3. BLE 1Mbps

Tested By:	GA12485
Date:	7/18/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.12
Middle	2440	3.45
High	2480	5.57

8.5.4. BLE 2Mbps

Tested By:	GA12485
Date:	7/18/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.06
Middle	2440	3.39
High	2480	5.54

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8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

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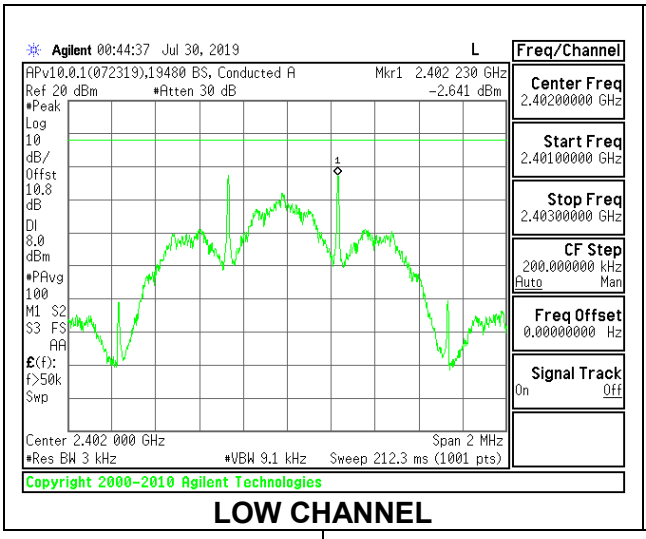
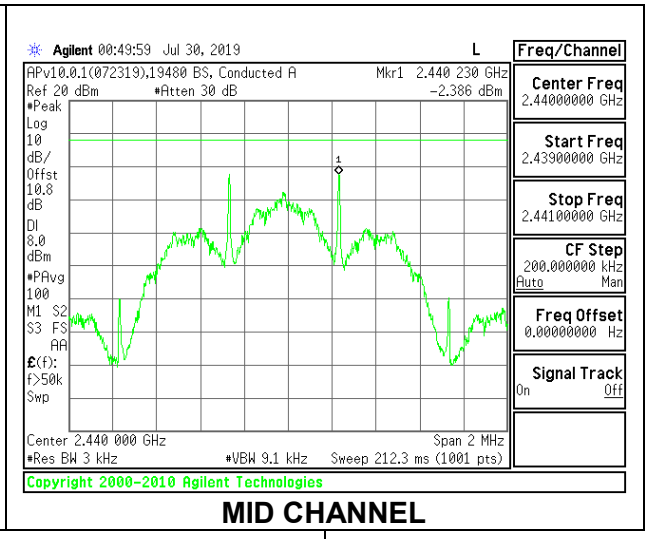
8.6.1. BLE 125kbps

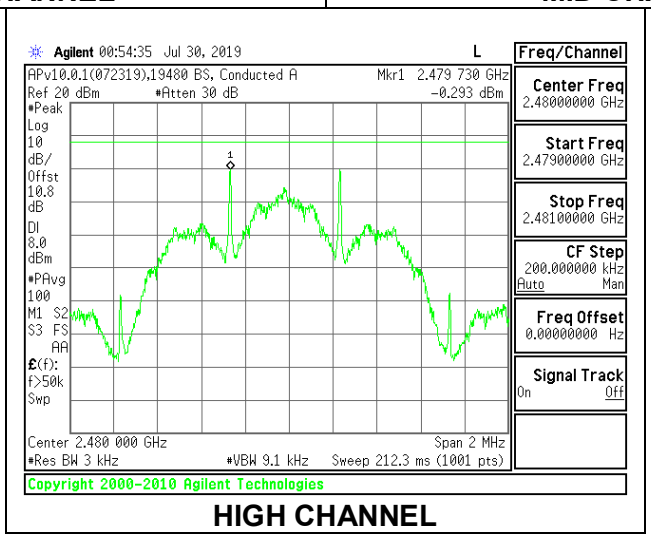
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.641	8	-10.64
Middle	2440	-2.386	8	-10.39
High	2480	-0.293	8	-8.29



LOW CHANNEL



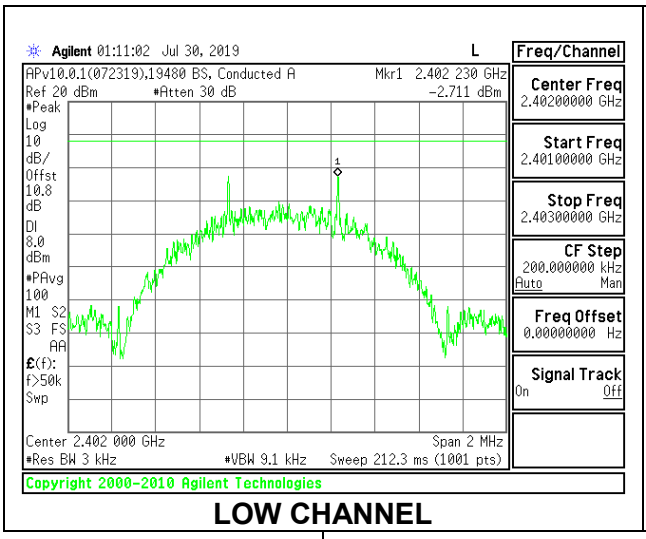
MID CHANNEL



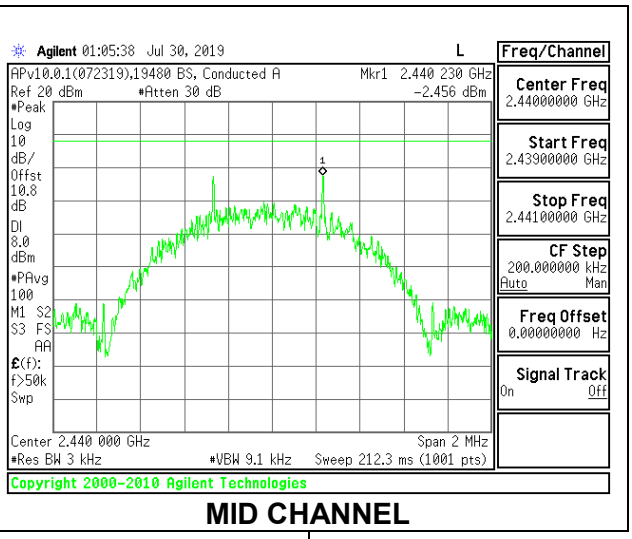
HIGH CHANNEL

8.6.2. BLE 500kbps

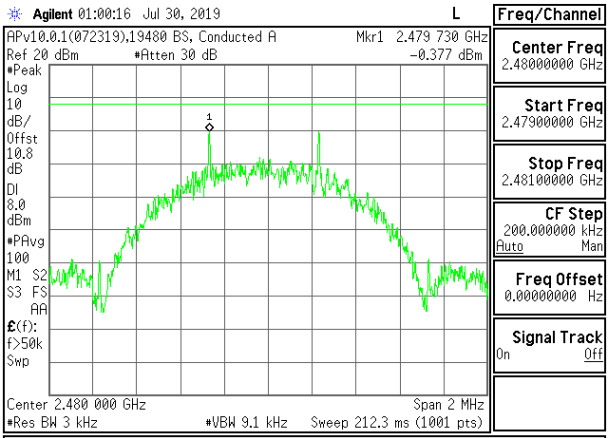
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.711	8	-10.71
Middle	2440	-2.456	8	-10.46
High	2480	-0.377	8	-8.38



LOW CHANNEL



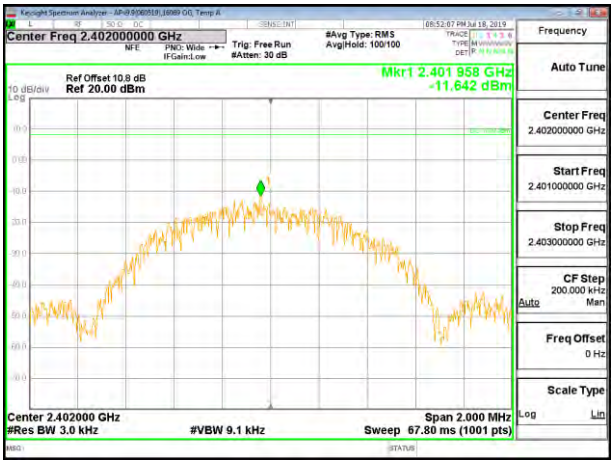
MID CHANNEL



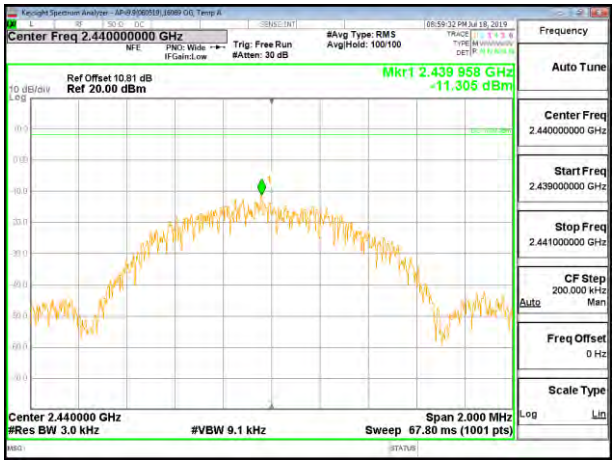
HIGH CHANNEL

8.6.3. BLE 1Mbps

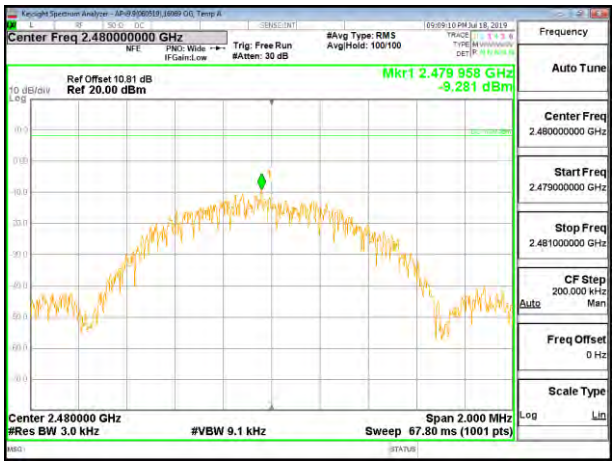
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-11.642	8	-19.64
Middle	2440	-11.305	8	-19.31
High	2480	-9.281	8	-17.28



LOW CHANNEL



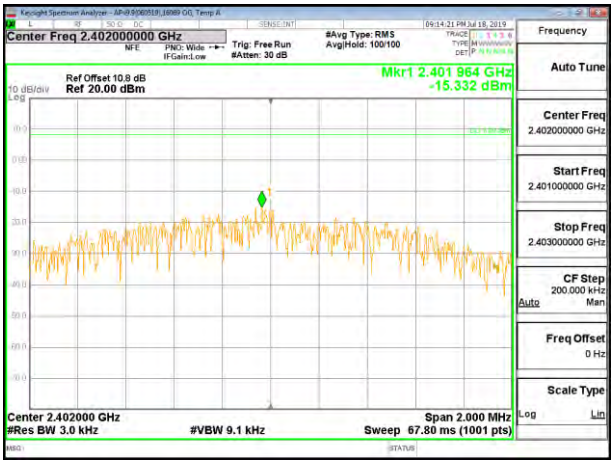
MID CHANNEL



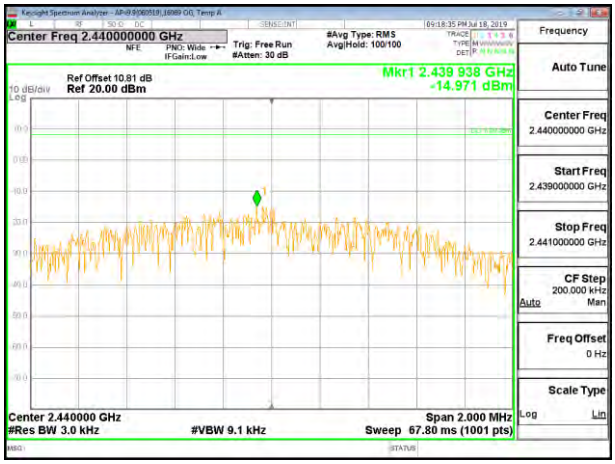
HIGH CHANNEL

8.6.4. BLE 2Mbps

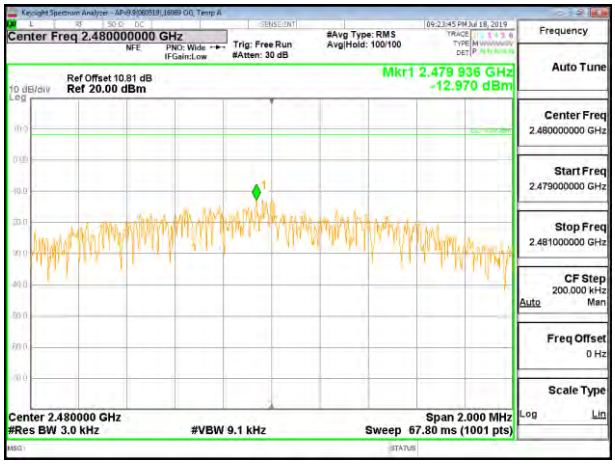
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-15.332	8	-23.33
Middle	2440	-14.971	8	-22.97
High	2480	-12.970	8	-20.97



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

RESULTS

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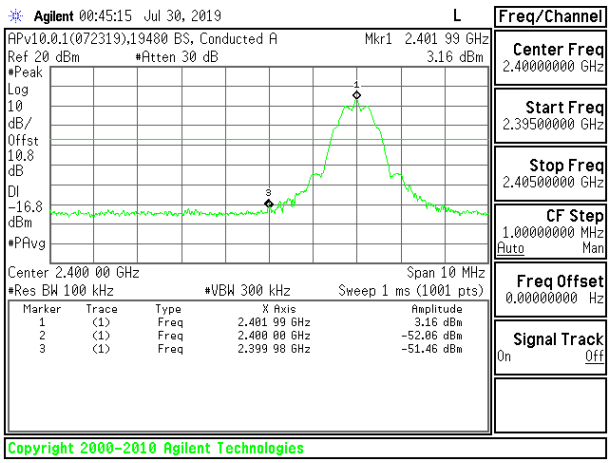
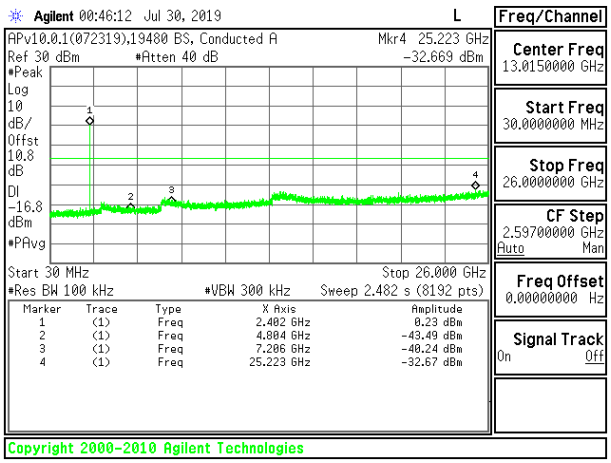
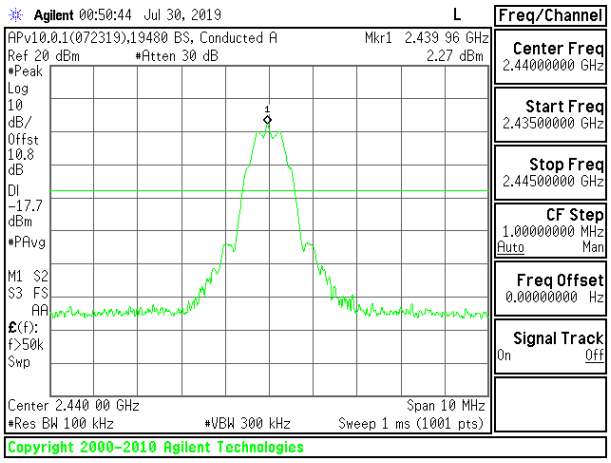
8.7.1. BLE 125kbps



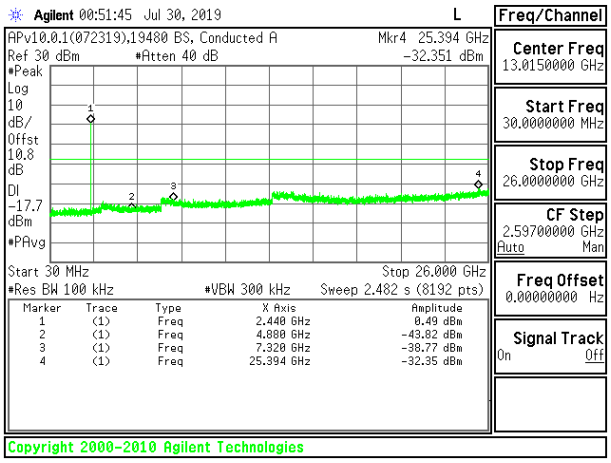
LOW CHANNEL BANDEDGE



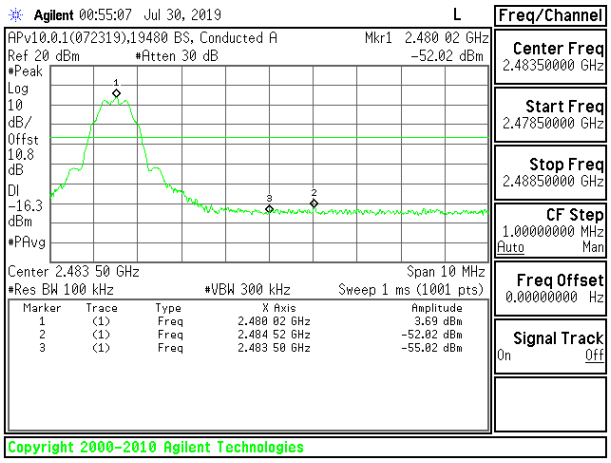
OUT-OF-BAND LOW CHANNEL



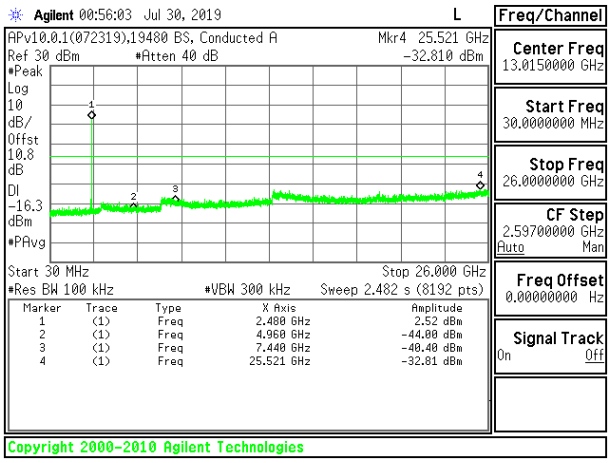
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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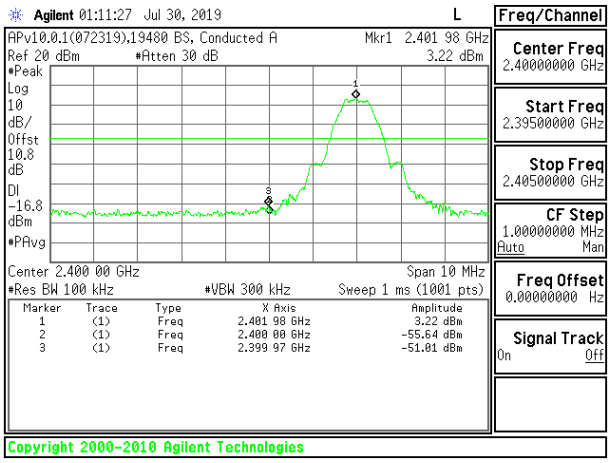
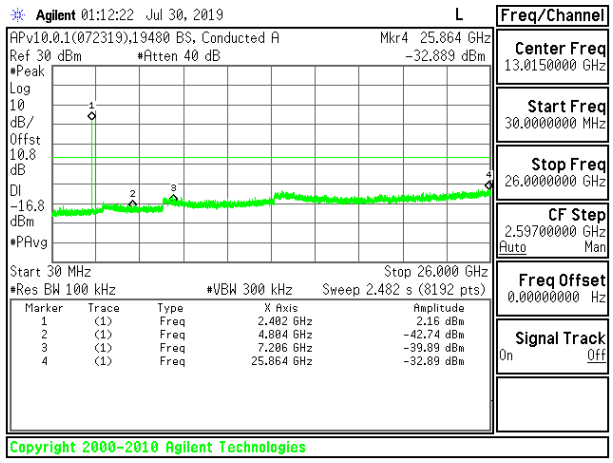
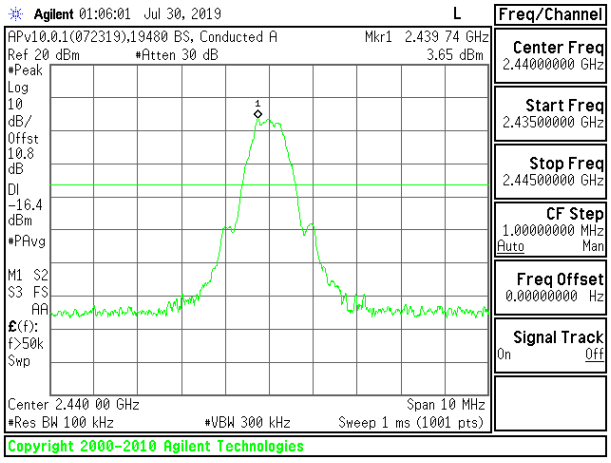
8.7.2. BLE 500kbps



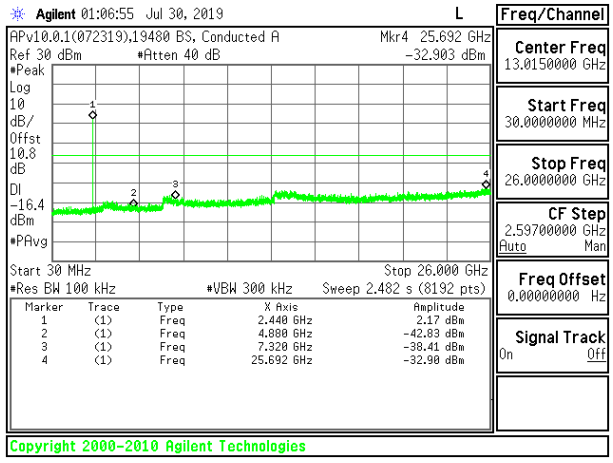
LOW CHANNEL BANDEDGE



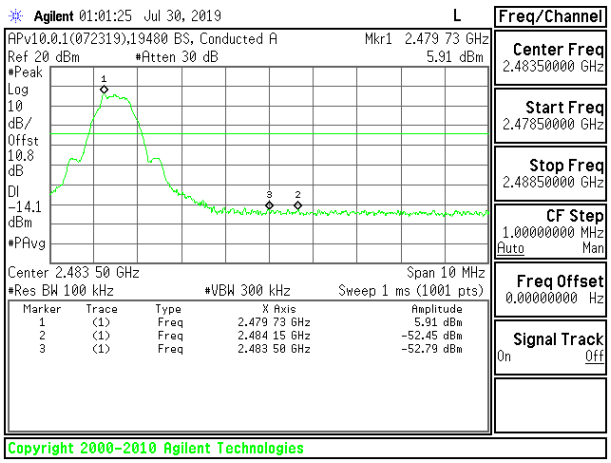
OUT-OF-BAND LOW CHANNEL



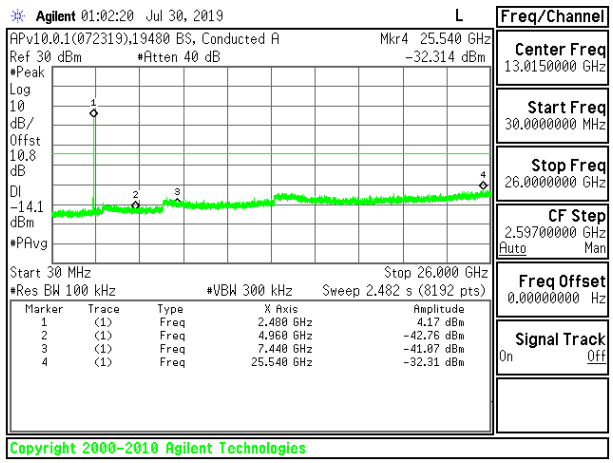
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL

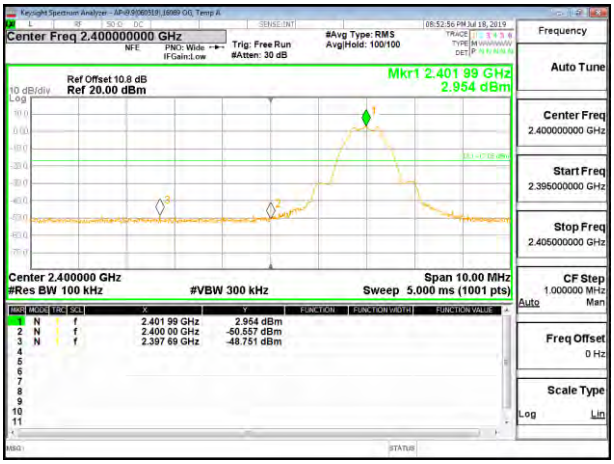


HIGH CHANNEL BANDEDGE



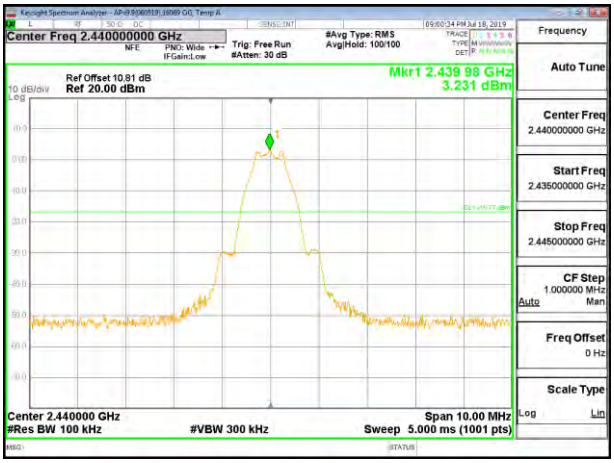
OUT-OF-BAND HIGH CHANNEL

8.7.3. BLE 1Mbps



LOW CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL



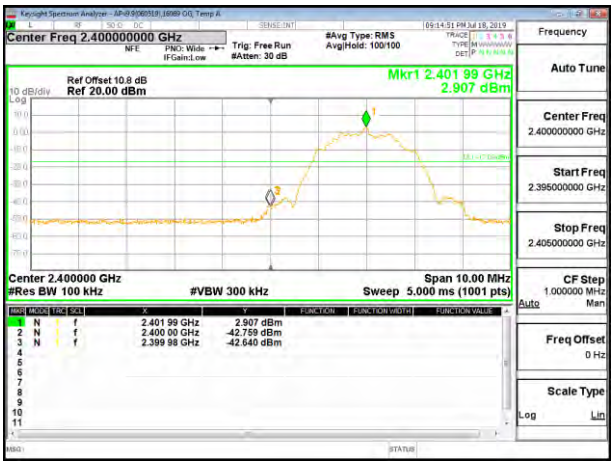
IN-BAND REFERENCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL BANDEDGE

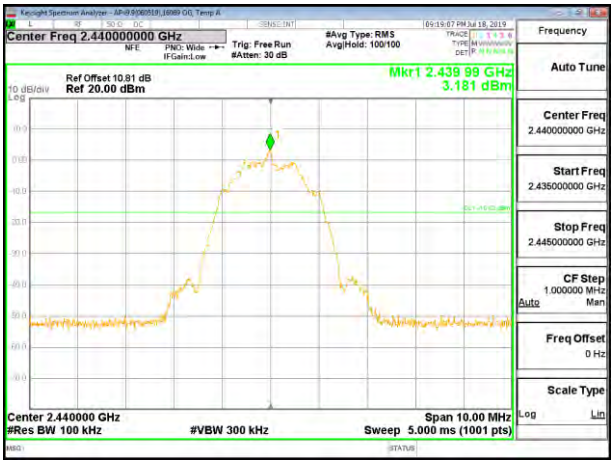
OUT-OF-BAND HIGH CHANNEL

8.7.4. BLE 2Mbps



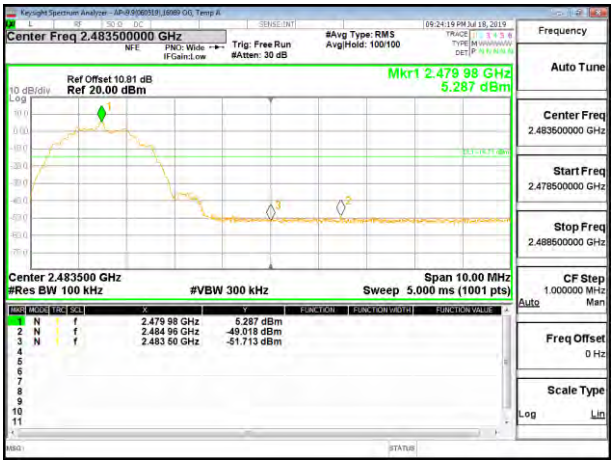
LOW CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL



IN-BAND REFERENCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE

OUT-OF-BAND HIGH CHANNEL

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

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 as applicable 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.

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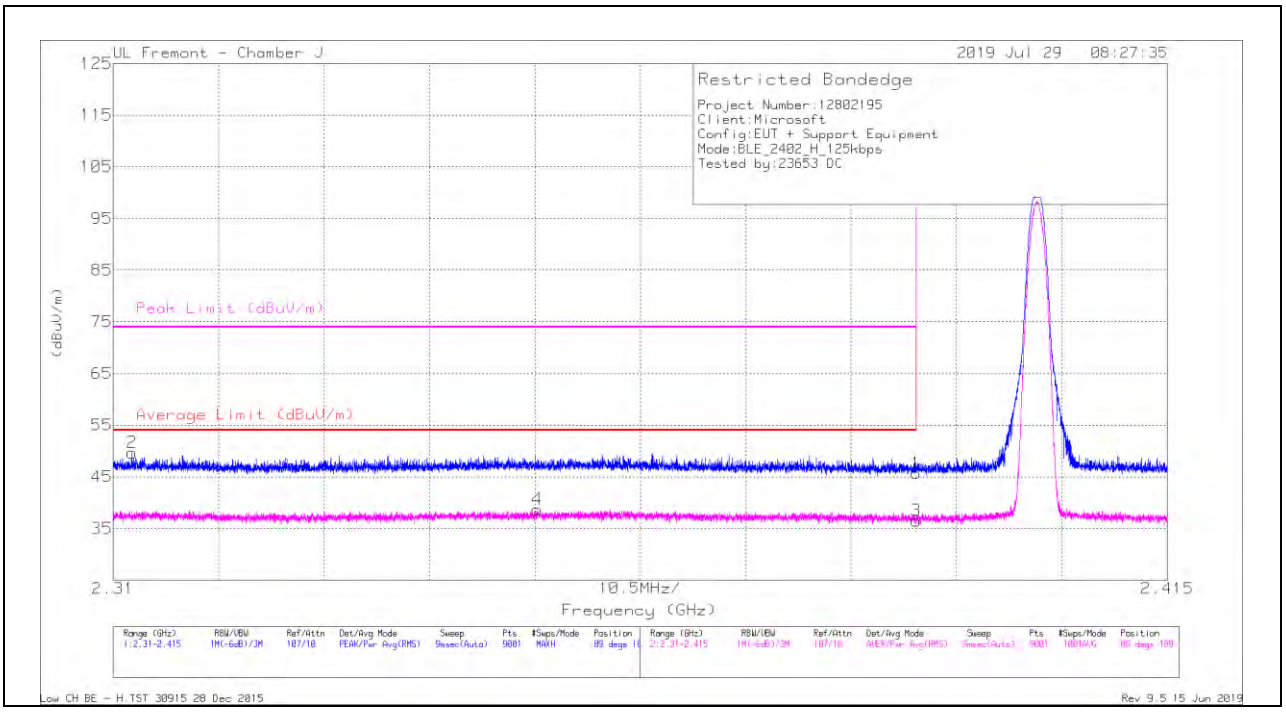
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BLE 125kbps

Chain 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

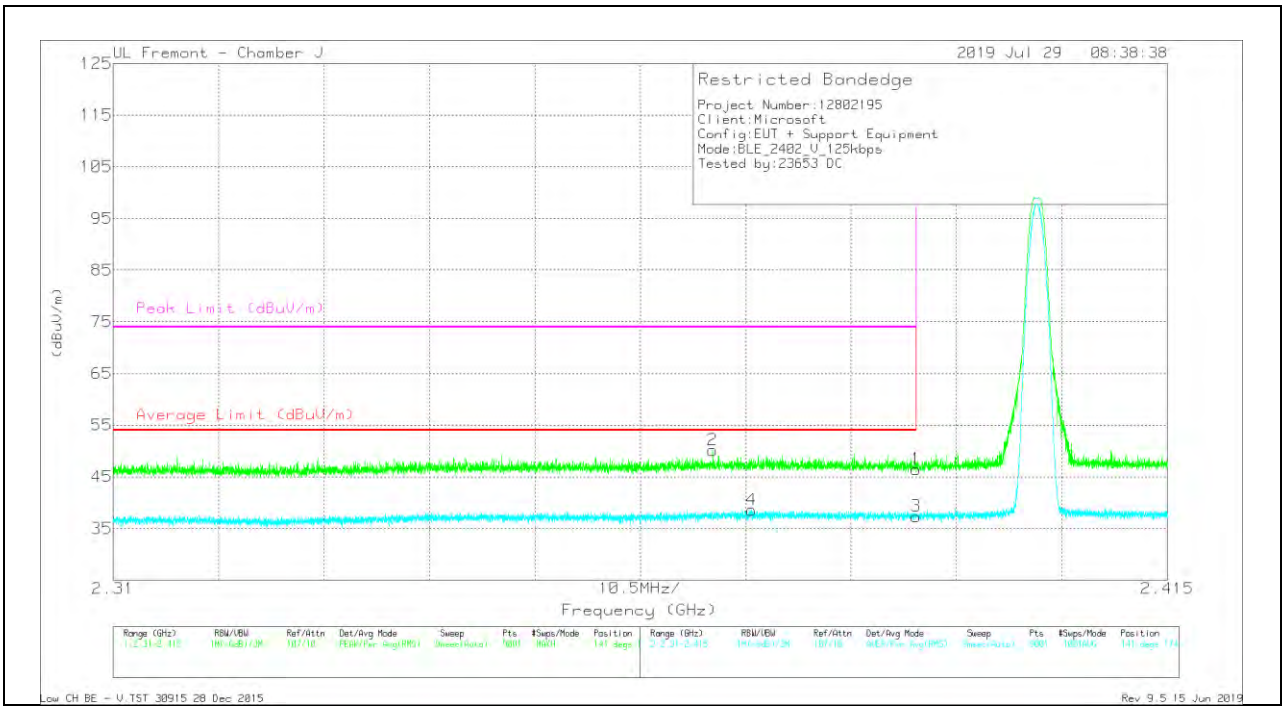


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	41.68	Pk	29.5	-25.5	0	45.68	-	-	74	-28.32	89	189	H
2	* 2.31186	46.56	Pk	28.7	-25.6	0	49.66	-	-	74	-24.34	89	189	H
3	* 2.38999	31.67	RMS	29.5	-25.5	.84	36.51	54	-17.49	-	-	89	189	H
4	* 2.35224	34.2	RMS	29.1	-25.5	.84	38.64	54	-15.36	-	-	89	189	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	42.45	Pk	29.5	-25.5	0	46.45	-	-	74	-27.55	141	174	V
2	* 2.3697	46.36	Pk	29.3	-25.5	0	50.16	-	-	74	-23.84	141	174	V
3	* 2.38999	32.51	RMS	29.5	-25.5	.84	37.35	54	-16.65	-	-	141	174	V
4	* 2.37357	33.93	RMS	29.3	-25.5	.84	38.57	54	-15.43	-	-	141	174	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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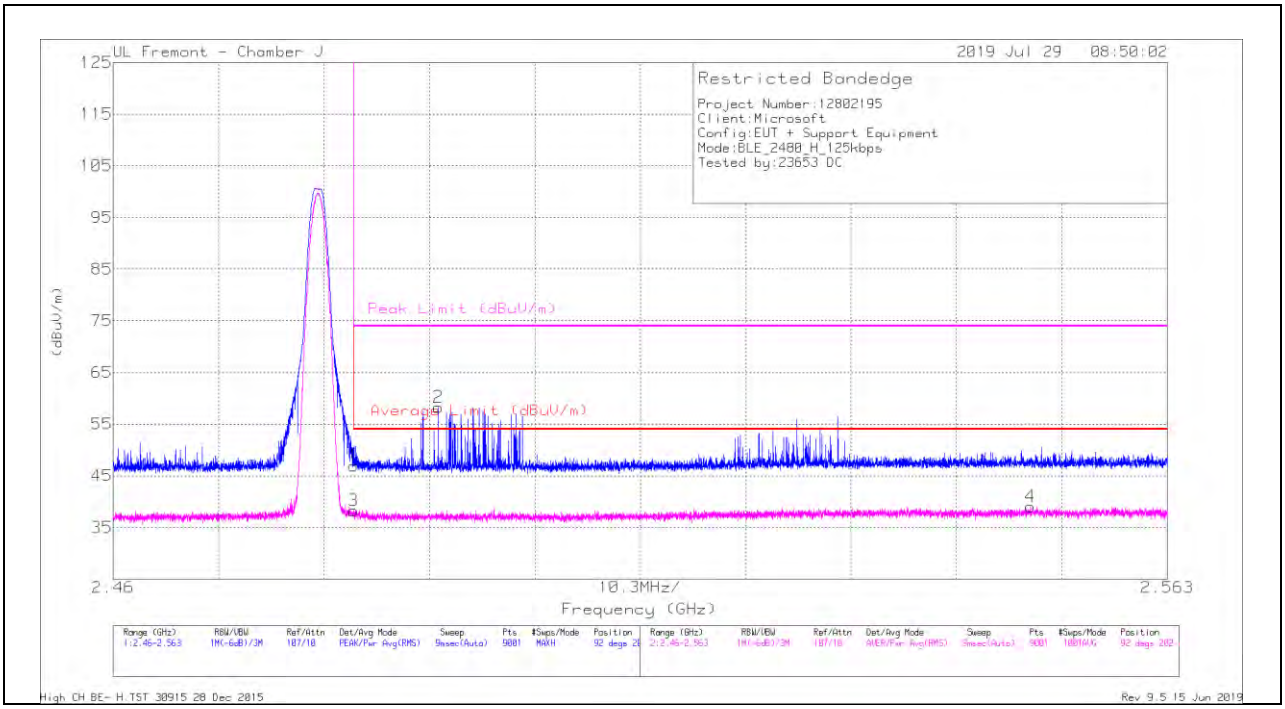
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

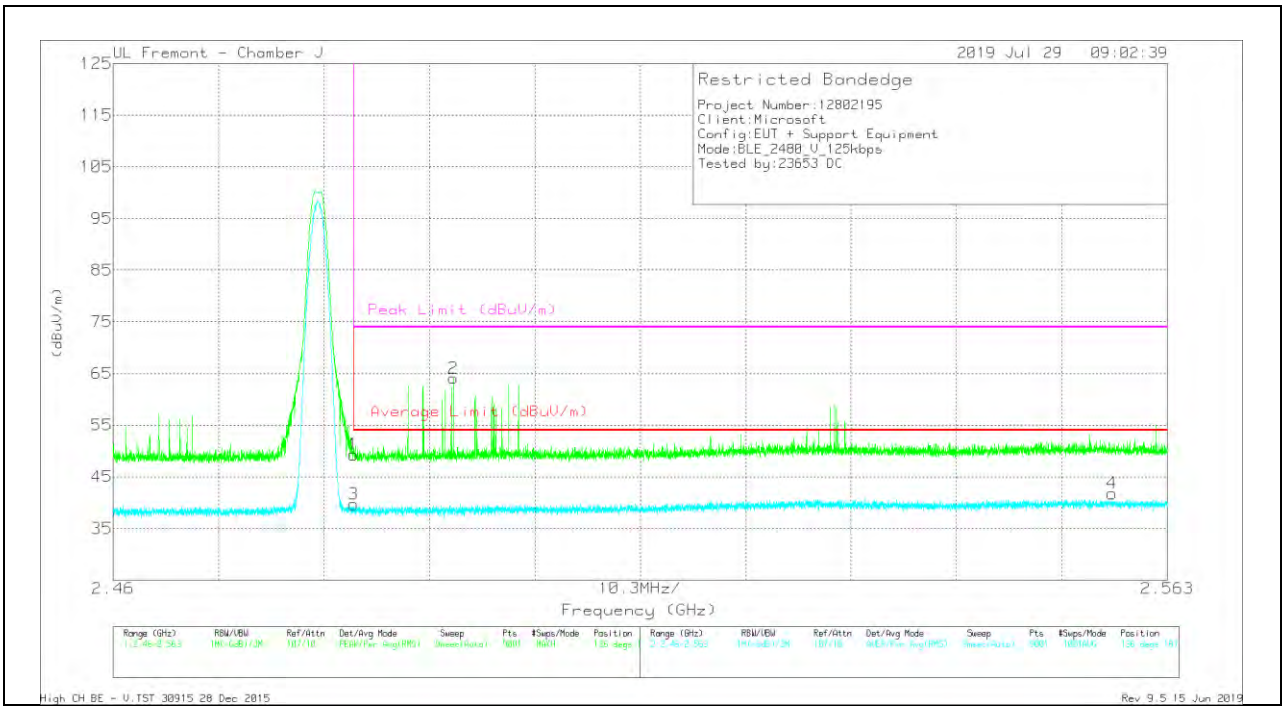


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	42.56	Pk	29.9	-25.5	0	46.96	-	-	74	-27.04	92	202	H
2	* 2.49176	53.85	Pk	29.9	-25.5	0	58.25	-	-	74	-15.75	92	202	H
3	* 2.48351	33	RMS	29.9	-25.5	.84	38.24	54	-15.76	-	-	92	202	H
4	2.54962	33.26	RMS	30.3	-25.4	.84	39	54	-15	-	-	92	202	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



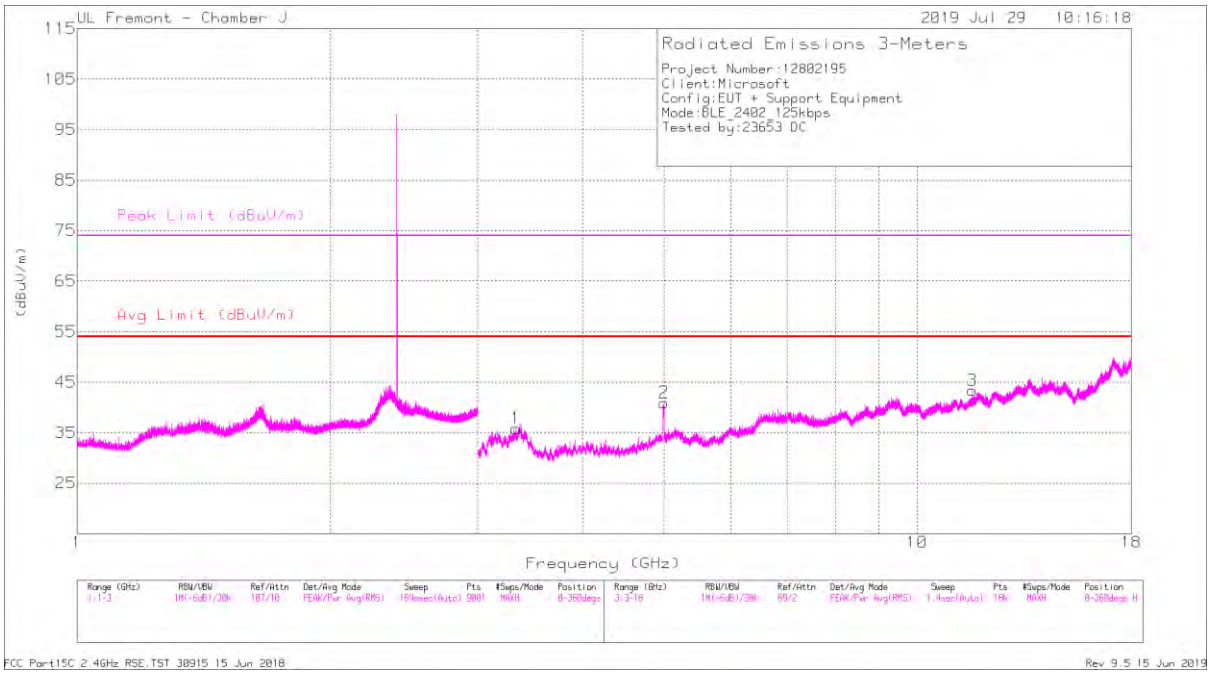
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	44.91	Pk	29.9	-25.5	0	49.31	-	-	74	-24.69	136	187	V
2	* 2.49325	59.68	Pk	29.9	-25.5	0	64.08	-	-	74	-9.92	136	187	V
3	* 2.48351	34.44	RMS	29.9	-25.5	.84	39.68	54	-14.32	-	-	136	187	V
4	2.55759	36.01	RMS	30.3	-25.4	.84	41.75	54	-12.25	-	-	136	187	V

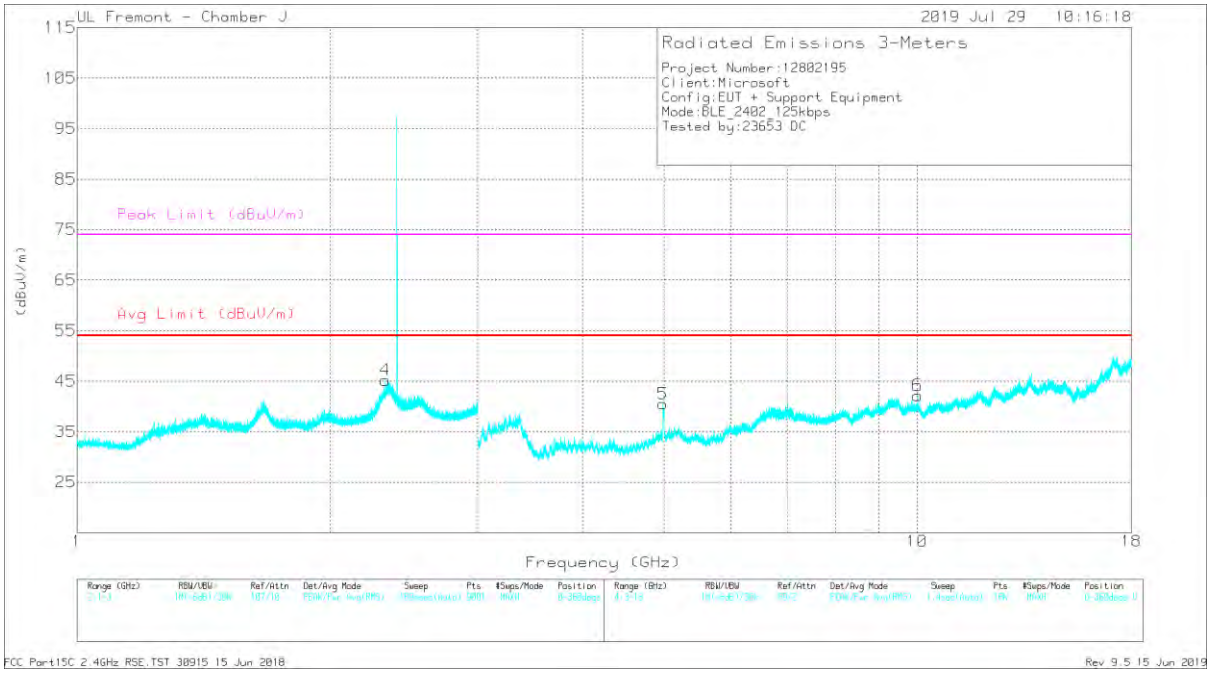
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.33604	51.1	PK2	29	-25.6	0	54.5	-	-	74	-19.5	19	165	V
	* 2.3335	39.74	MAv1	28.9	-25.6	.84	43.88	54	-10.12	-	-	19	165	V
1	* 3.33206	48.96	PK2	31.3	-33.7	0	46.56	-	-	74	-27.44	167	196	H
	*3.33321	36.5	MAv1	31.4	-33.8	.84	34.94	54	-19.06	-	-	167	196	H
2	* 4.98815	47	PK2	35	-30.1	0	51.9	-	-	74	-22.1	161	228	H
	* 4.98711	35.21	MAv1	35	-30.1	.84	40.95	54	-13.05	-	-	161	228	H
3	* 11.64827	33.63	PK2	39.7	-22.3	0	51.03	-	-	74	-22.97	217	196	H
	* 11.63995	22.12	MAv1	39.7	-22.2	.84	40.46	54	-13.54	-	-	217	196	H
5	* 4.99828	48.84	PK2	35.1	-30	0	53.94	-	-	74	-20.06	106	109	V
	* 4.9916	36.7	MAv1	35	-30	.84	42.54	54	-11.46	-	-	106	109	V
6	10.01659	33.28	PK2	38	-23	0	48.28	-	-	-	-	234	156	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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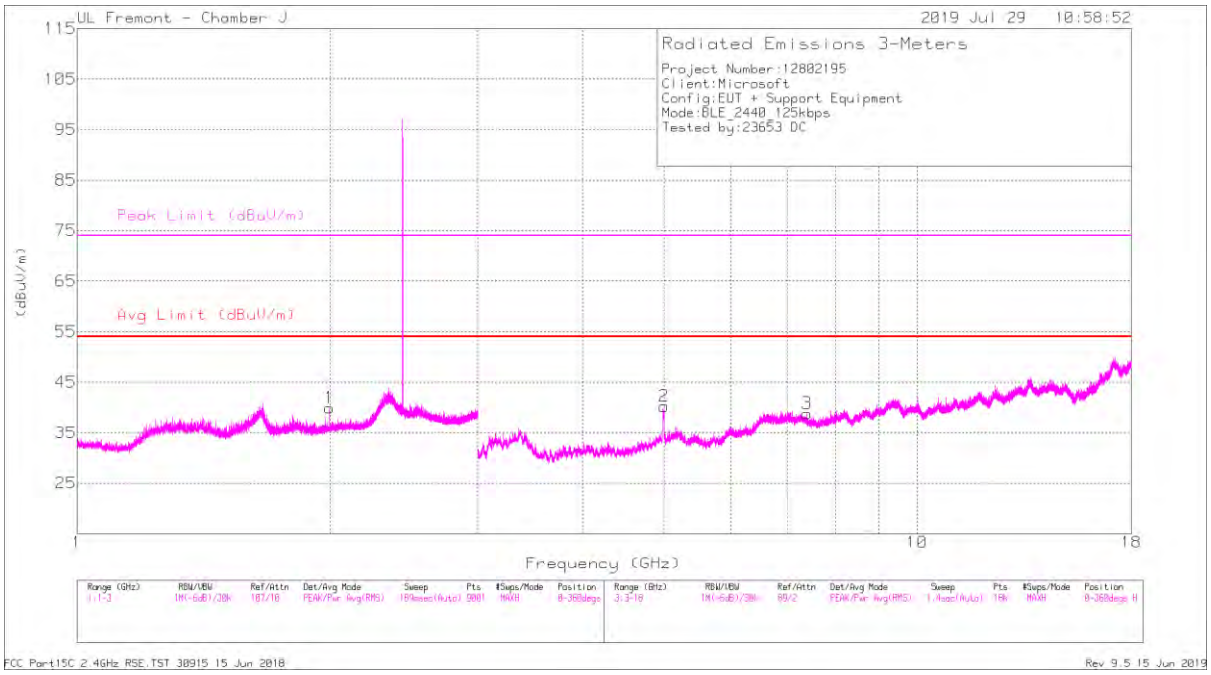
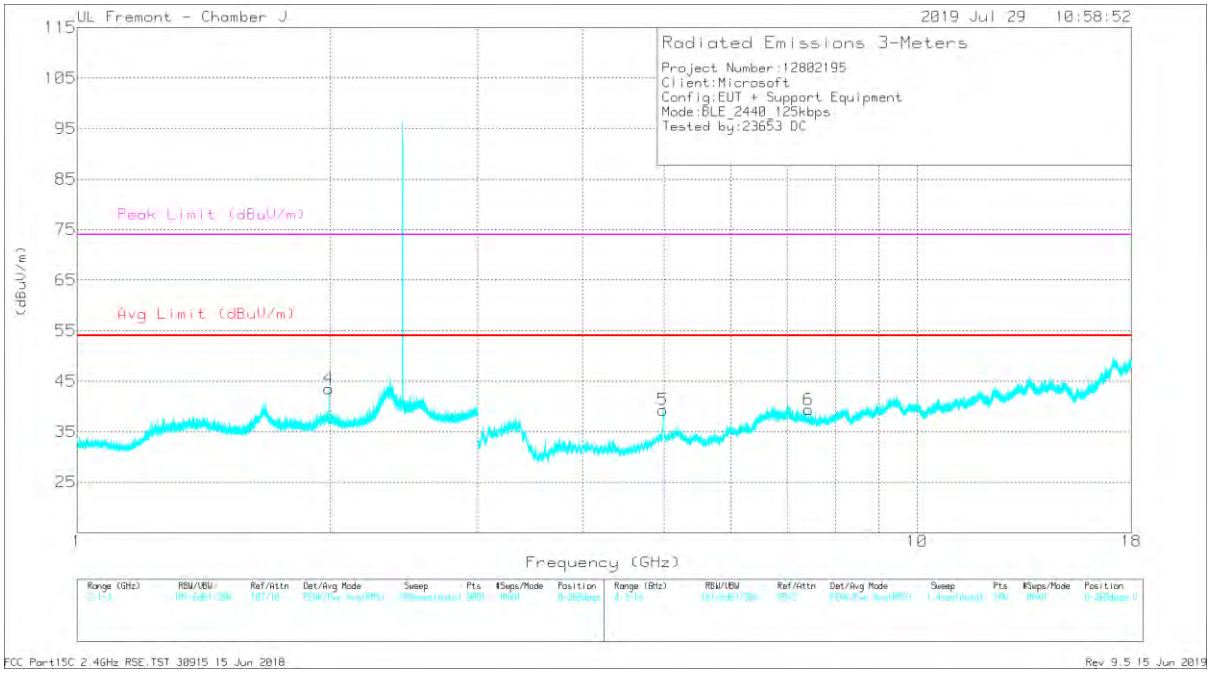
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.99899	54.58	PK2	27.9	-25.7	0	56.78	-	-	-	-	299	196	H
4	1.99616	57.71	PK2	27.9	-25.7	0	59.91	-	-	-	-	15	196	V
2	* 4.9935	46.97	PK2	35	-30	0	51.97	-	-	74	-22.03	88	109	H
	* 4.9919	35.39	MAv1	35	-30	.84	41.23	54	-12.77	-	-	88	109	H
3	* 7.3767	36.78	PK2	37.9	-27.2	0	47.48	-	-	74	-26.52	346	248	H
	* 7.38885	25.59	MAv1	37.8	-27.1	.84	37.13	54	-16.87	-	-	346	248	H
5	* 5.00012	45.14	PK2	35.1	-29.9	0	50.34	-	-	74	-23.66	275	229	V
	* 4.99449	33.29	MAv1	35	-30	.84	39.13	54	-14.87	-	-	275	229	V
6	* 7.43434	42.1	PK2	37.6	-27.2	0	52.5	-	-	74	-21.5	8	153	V
	* 7.42017	25.94	MAv1	37.7	-27.1	.84	37.38	54	-16.62	-	-	8	153	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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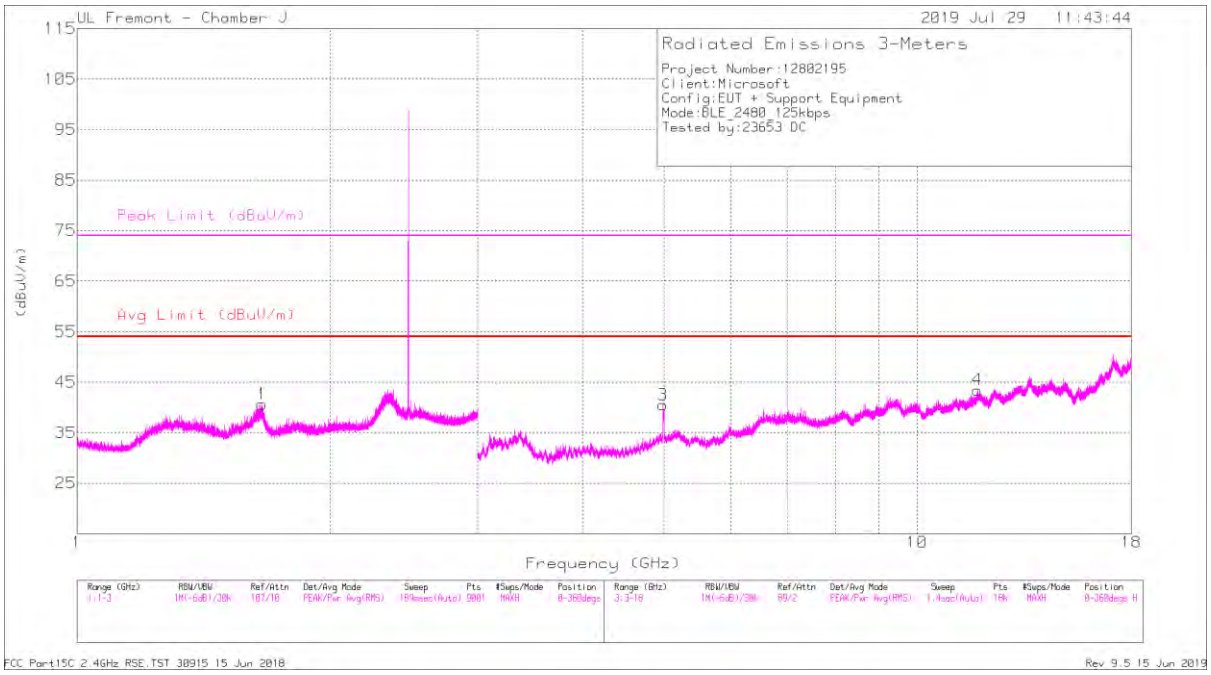
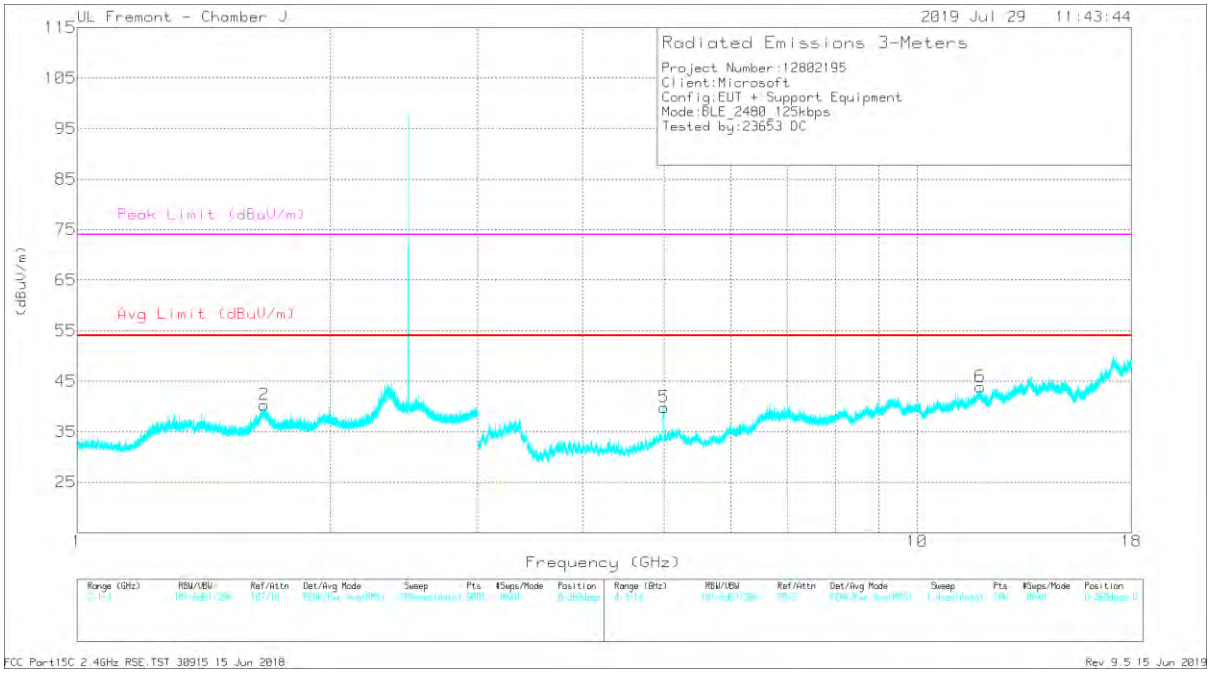
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.65885	48.81	PK2	25.7	-25.8	0	48.71	-	-	-	-	202	104	H
2	* 1.66993	49.22	PK2	25.8	-25.8	0	49.22	-	-	74	-24.78	357	226	V
	* 1.66907	38.94	MAv1	25.8	-25.8	.84	39.78	54	-14.22	-	-	357	226	V
3	* 4.99772	47.76	PK2	35.1	-30	0	52.86	-	-	74	-21.14	159	174	H
	* 4.98537	35.62	MAv1	35	-30.2	.84	41.26	54	-12.74	-	-	159	174	H
4	* 11.79746	32.27	PK2	40	-21.8	0	50.47	-	-	74	-23.53	259	247	H
	* 11.7972	22.02	MAv1	40	-21.8	.84	41.06	54	-12.94	-	-	259	247	H
5	* 4.99981	48.44	PK2	35.1	-29.9	0	53.64	-	-	74	-20.36	105	107	V
	* 4.9945	36.43	MAv1	35	-30	.84	42.27	54	-11.73	-	-	105	107	V
6	* 11.89972	34.07	PK2	39.9	-21.9	0	52.07	-	-	74	-21.93	340	331	V
	* 11.90174	22.21	MAv1	39.9	-21.9	.84	41.05	54	-12.95	-	-	340	331	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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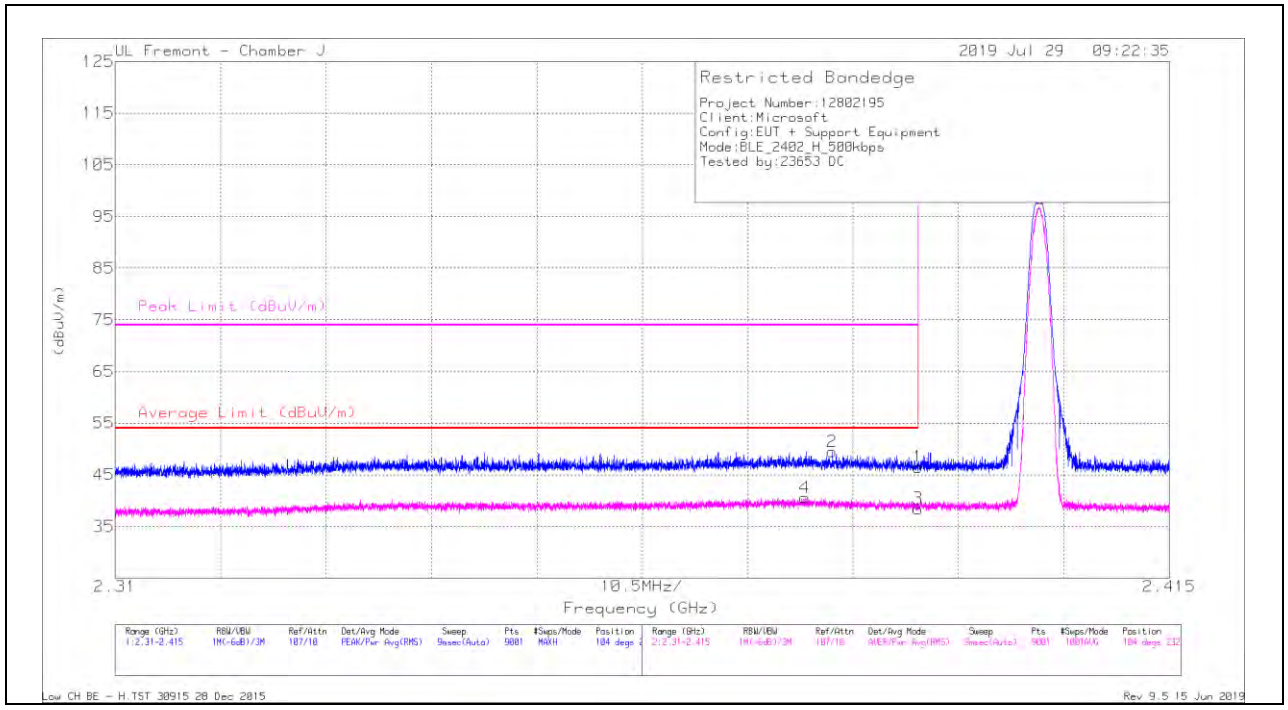
9.2.2. BLE 500kbps

Chain 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

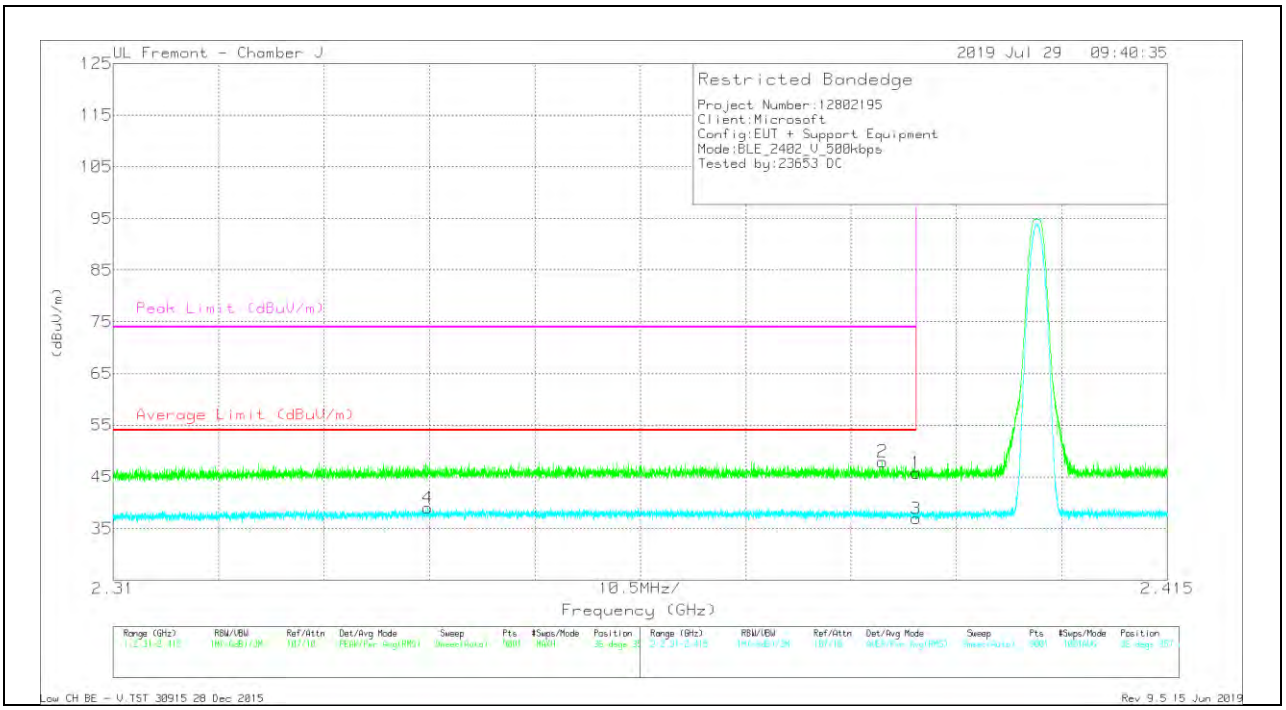


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	42.51	Pk	29.5	-25.5	0	46.51	-	-	74	-27.49	104	232	H
2	* 2.38141	45.55	Pk	29.4	-25.5	0	49.45	-	-	74	-24.55	104	232	H
3	* 2.38999	31.96	RMS	29.5	-25.5	2.45	38.41	54	-15.59	-	-	104	232	H
4	* 2.3787	34.2	RMS	29.4	-25.5	2.45	40.55	54	-13.45	-	-	104	232	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



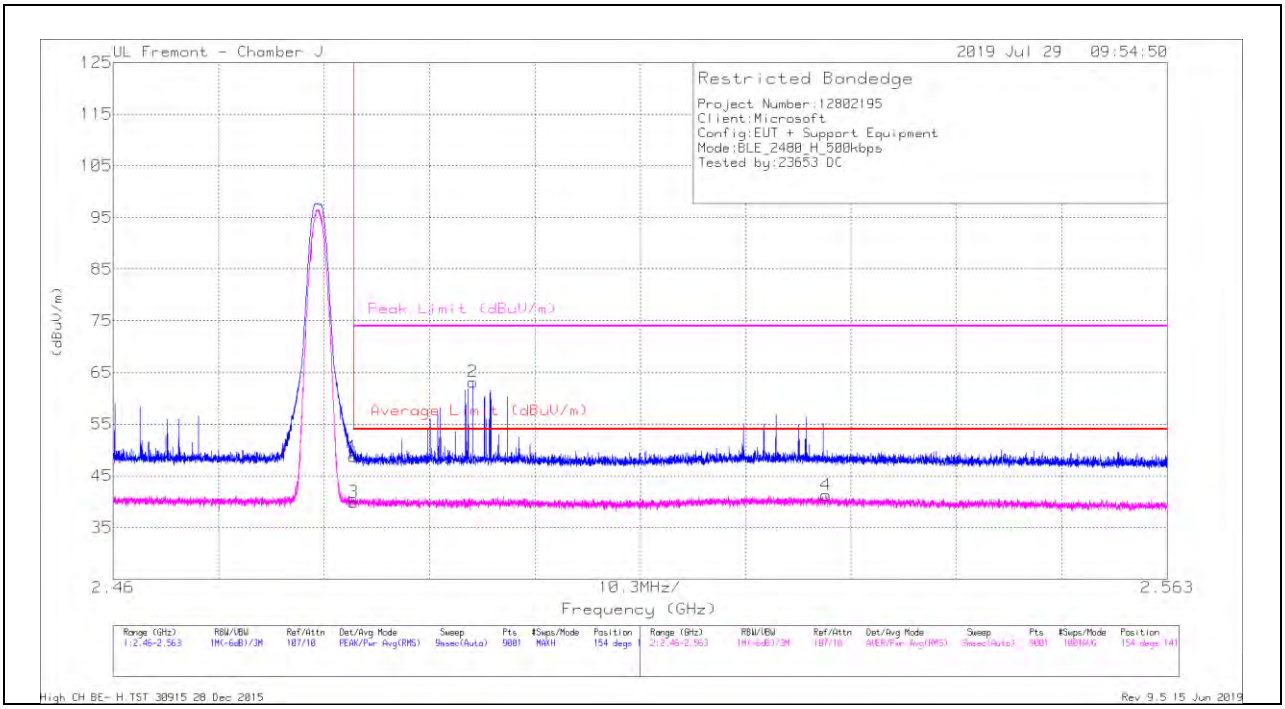
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	41.78	Pk	29.5	-25.5	0	45.78	-	-	74	-28.22	36	357	V
2	* 2.38663	43.92	Pk	29.5	-25.5	0	47.92	-	-	74	-26.08	36	357	V
3	* 2.38999	30.44	RMS	29.5	-25.5	2.45	36.89	54	-17.11	-	-	36	357	V
4	* 2.34134	33.13	RMS	29	-25.6	2.45	38.98	54	-15.02	-	-	36	357	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

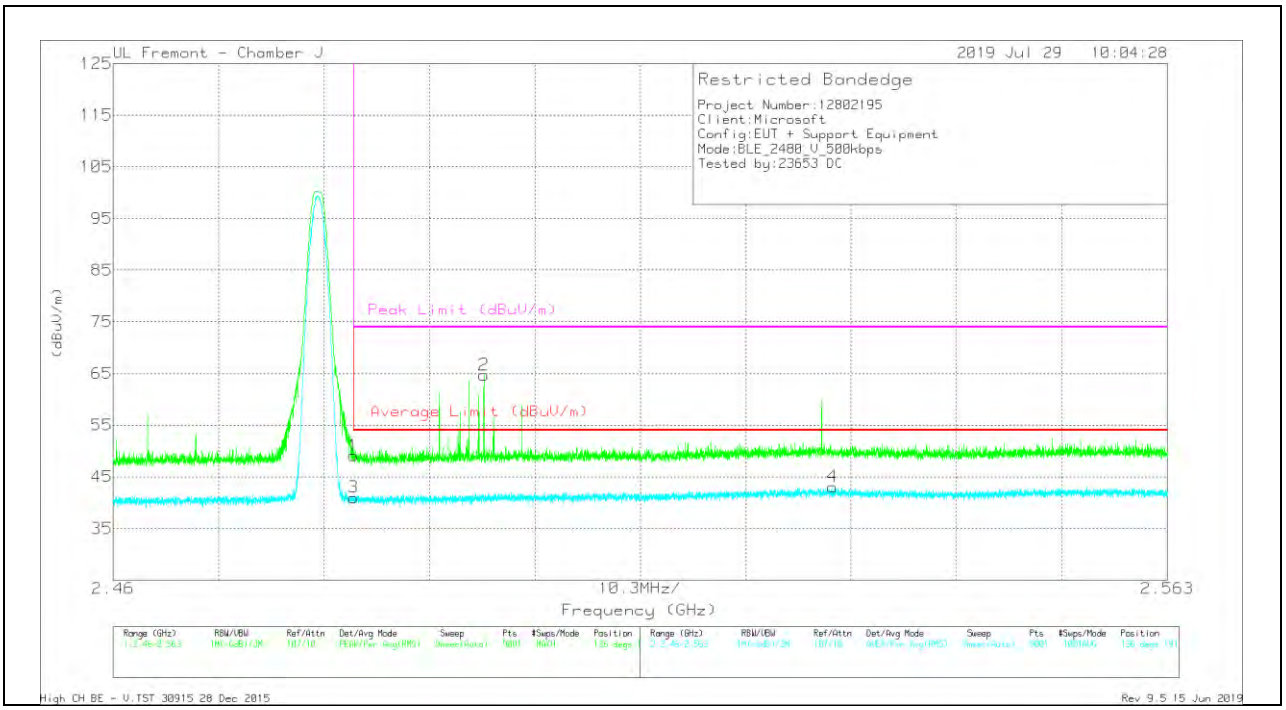


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	44.33	Pk	29.9	-25.5	0	48.73	-	-	74	-25.27	154	141	H
2	* 2.49516	58.66	Pk	30	-25.5	0	63.16	-	-	74	-10.84	154	141	H
3	* 2.48351	33.01	RMS	29.9	-25.5	2.45	39.86	54	-14.14	-	-	154	141	H
4	2.52965	34.1	RMS	30.1	-25.4	2.45	41.25	54	-12.75	-	-	154	141	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



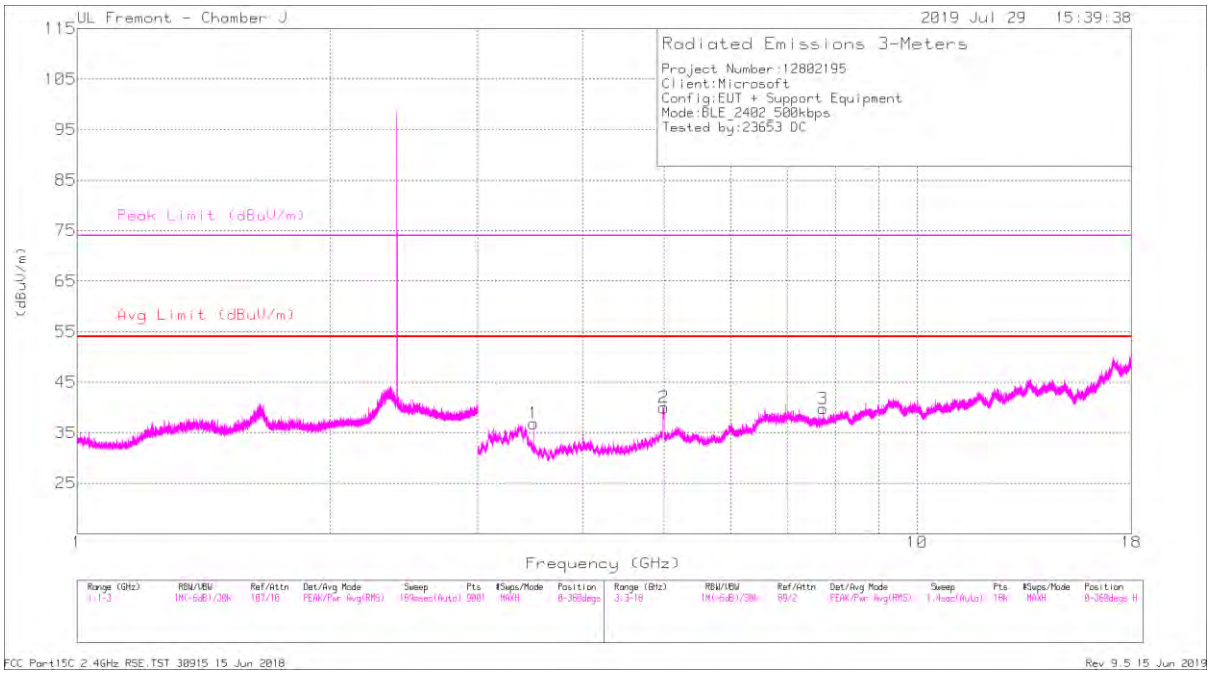
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	44.67	Pk	29.9	-25.5	0	49.07	-	-	74	-24.93	136	191	V
2	* 2.49622	60.2	Pk	30	-25.5	0	64.7	-	-	74	-9.3	136	191	V
3	* 2.48351	34.14	RMS	29.9	-25.5	2.45	40.99	54	-13.01	-	-	136	191	V
4	2.53029	35.8	RMS	30.2	-25.4	2.45	43.05	54	-10.95	-	-	136	191	V

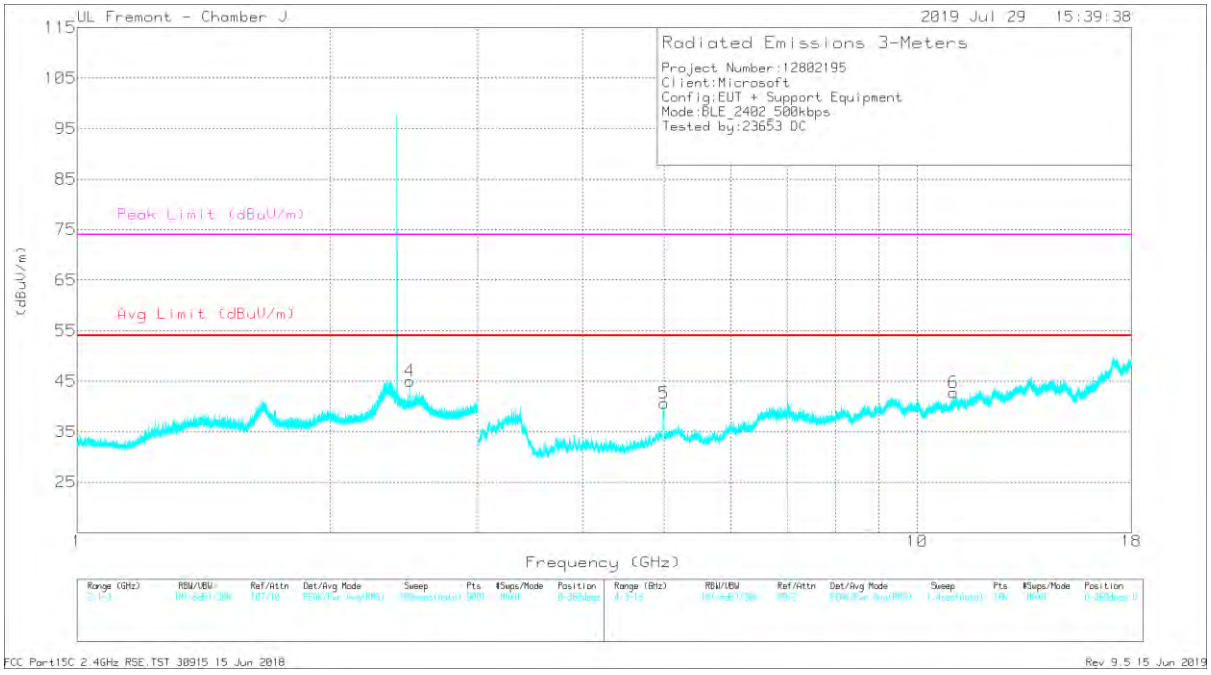
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



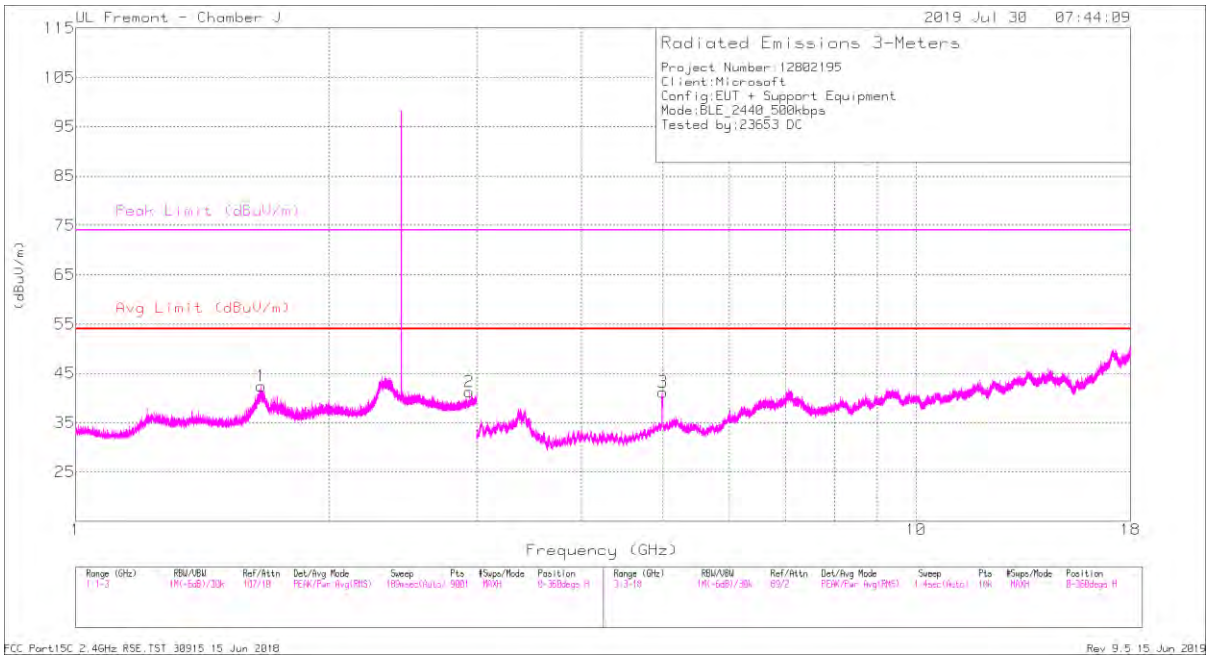
VERTICAL

RADIATED EMISSIONS

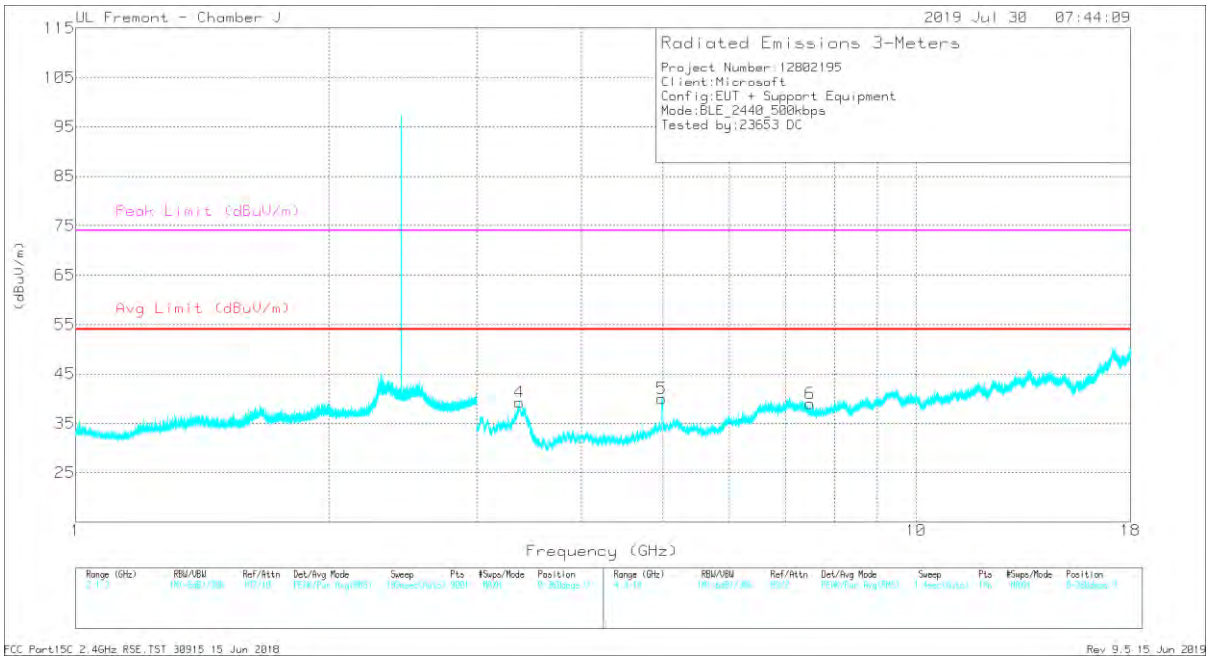
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.4914	61.05	PK2	29.9	-25.5	0	65.45	-	-	74	-8.55	126	228	V
	* 2.49041	34.73	MAv1	29.9	-25.5	2.45	41.58	54	-12.42	-	-	126	228	V
1	3.49363	53.06	PK2	30.4	-33.4	0	50.06	-	-	-	-	271	113	H
2	* 5.00002	48.15	PK2	35.1	-29.9	0	53.35	-	-	74	-20.65	159	175	H
	* 4.98731	36.14	MAv1	35	-30.1	2.45	43.49	54	-10.51	-	-	159	175	H
3	* 7.72036	36.98	PK2	37.5	-26.9	0	47.58	-	-	74	-26.42	174	232	H
	* 7.72542	25.07	MAv1	37.5	-26.9	2.45	38.12	54	-15.88	-	-	174	232	H
5	* 4.98662	47.23	PK2	35	-30.2	0	52.03	-	-	74	-21.97	108	106	V
	* 4.99334	35.18	MAv1	35	-30	2.45	42.63	54	-11.37	-	-	108	106	V
6	* 11.064	32.52	PK2	39.1	-22.8	0	48.82	-	-	74	-25.18	47	133	V
	* 11.0608	22.37	MAv1	39.1	-22.8	2.45	41.12	54	-12.88	-	-	47	133	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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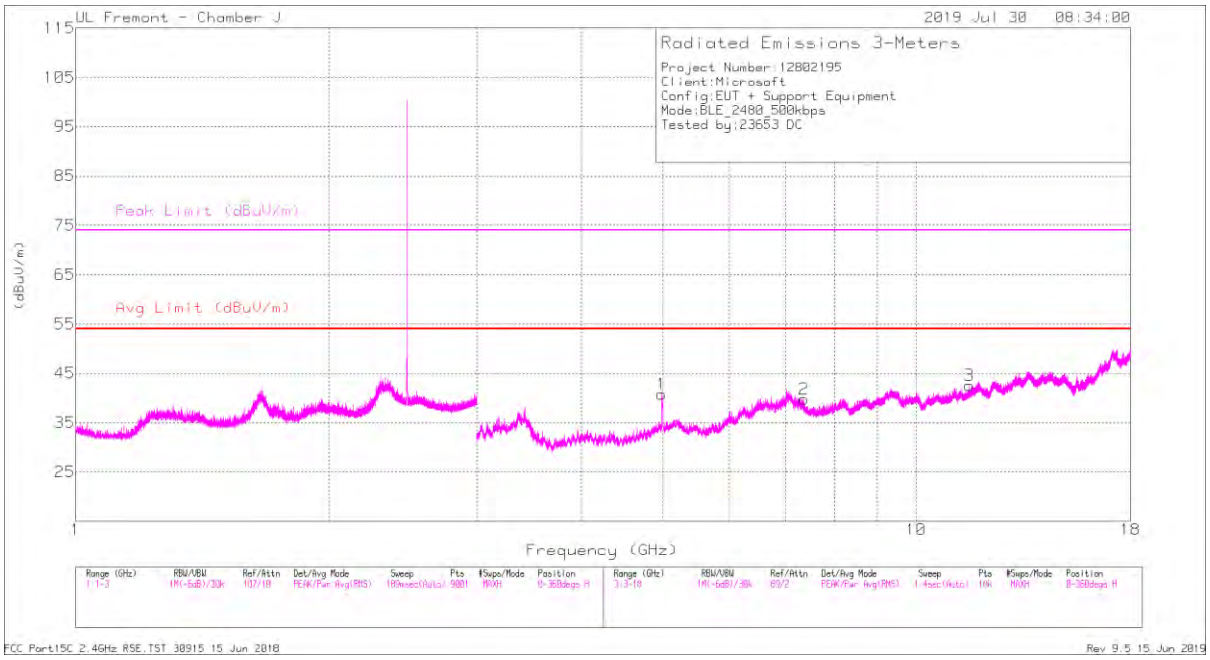
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	2.93918	42.41	PK2	30.1	-25	0	47.51	-	-	-	-	191	104	H
1	* 1.66387	51.03	PK2	25.8	-25.8	0	51.03	-	-	74	-22.97	185	207	H
	* 1.66797	40.11	MAv1	25.8	-25.8	2.45	42.56	54	-11.44	-	-	185	207	H
3	* 4.9943	47.46	PK2	35	-30	0	52.46	-	-	74	-21.54	212	218	H
	* 4.99282	35.42	MAv1	35	-30	2.45	42.87	54	-11.13	-	-	212	218	H
4	3.37169	50.7	PK2	31.1	-33.3	0	48.5	-	-	-	-	185	182	V
5	* 4.98563	45.81	PK2	35	-30.2	0	50.61	-	-	74	-23.39	240	160	V
	* 4.99037	33.87	MAv1	35	-30	2.45	41.32	54	-12.68	-	-	240	160	V
6	* 7.48141	45.13	PK2	37.5	-27.2	0	55.43	-	-	74	-18.57	101	318	V
	* 7.48046	25.94	MAv1	37.5	-27.2	2.45	38.69	54	-15.31	-	-	101	318	V

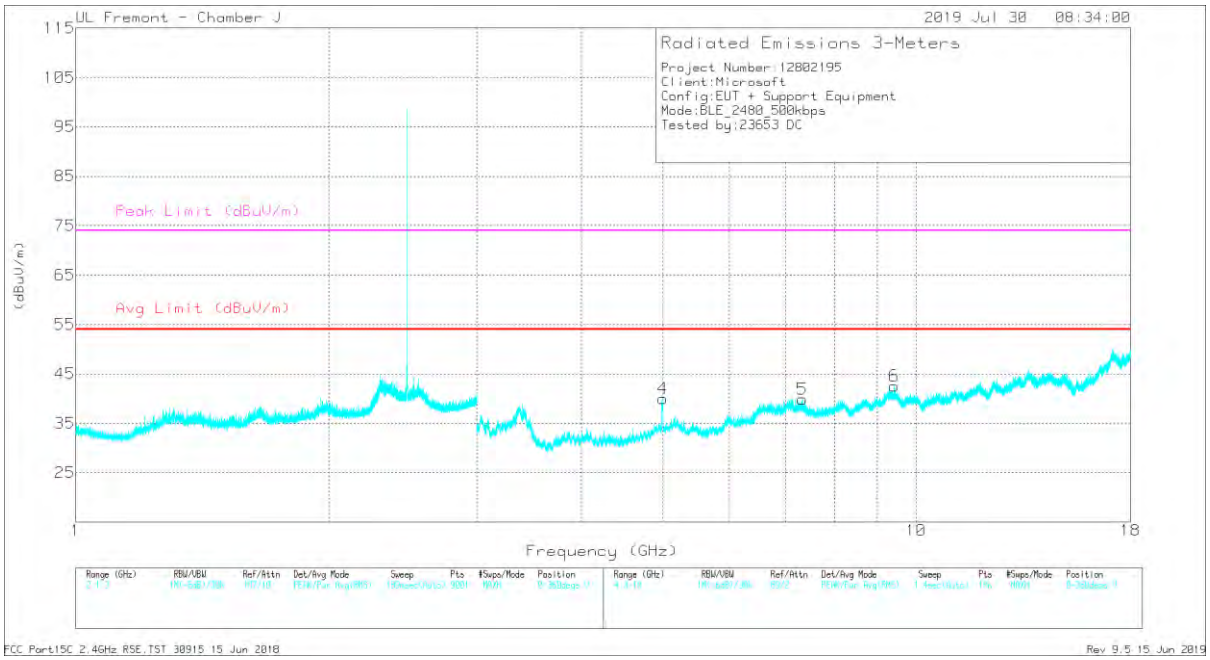
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.99167	46.77	PK2	35	-30	0	51.77	-	-	74	-22.23	189	237	H
	* 4.98819	34.77	MAv1	35	-30.1	2.45	42.12	54	-11.88	-	-	189	237	H
2	* 7.35879	37.05	PK2	38	-27.2	0	47.85	-	-	74	-26.15	288	171	H
	* 7.3592	26.51	MAv1	38	-27.2	2.45	39.76	54	-14.24	-	-	288	171	H
3	* 11.57251	32.44	PK2	39.5	-22.1	0	49.84	-	-	74	-24.16	17	106	H
	* 11.57157	21.63	MAv1	39.5	-22.1	2.45	41.48	54	-12.52	-	-	17	106	H
4	* 5.00009	47.45	PK2	35.1	-29.9	0	52.65	-	-	74	-21.35	158	224	V
	* 4.99348	35.71	MAv1	35	-30	2.45	43.16	54	-10.84	-	-	158	224	V
5	* 7.32486	36.58	PK2	38	-27.1	0	47.48	-	-	74	-26.52	343	103	V
	* 7.32473	26.76	MAv1	38	-27.1	2.45	40.11	54	-13.89	-	-	343	103	V
6	* 9.41403	33.11	PK2	39.7	-24.4	0	48.41	-	-	74	-25.59	303	272	V
	* 9.41534	23.35	MAv1	39.6	-24.4	2.45	41	54	-13	-	-	303	272	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

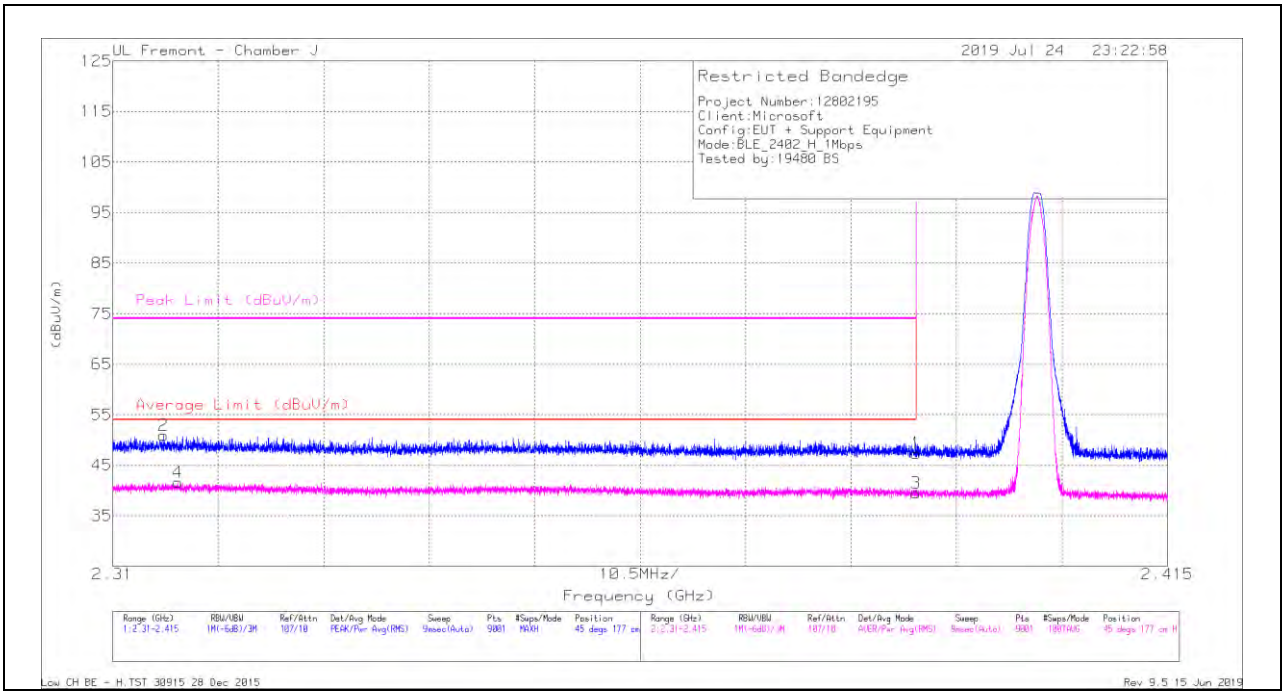
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.3. BLE 1Mbps

Chain 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

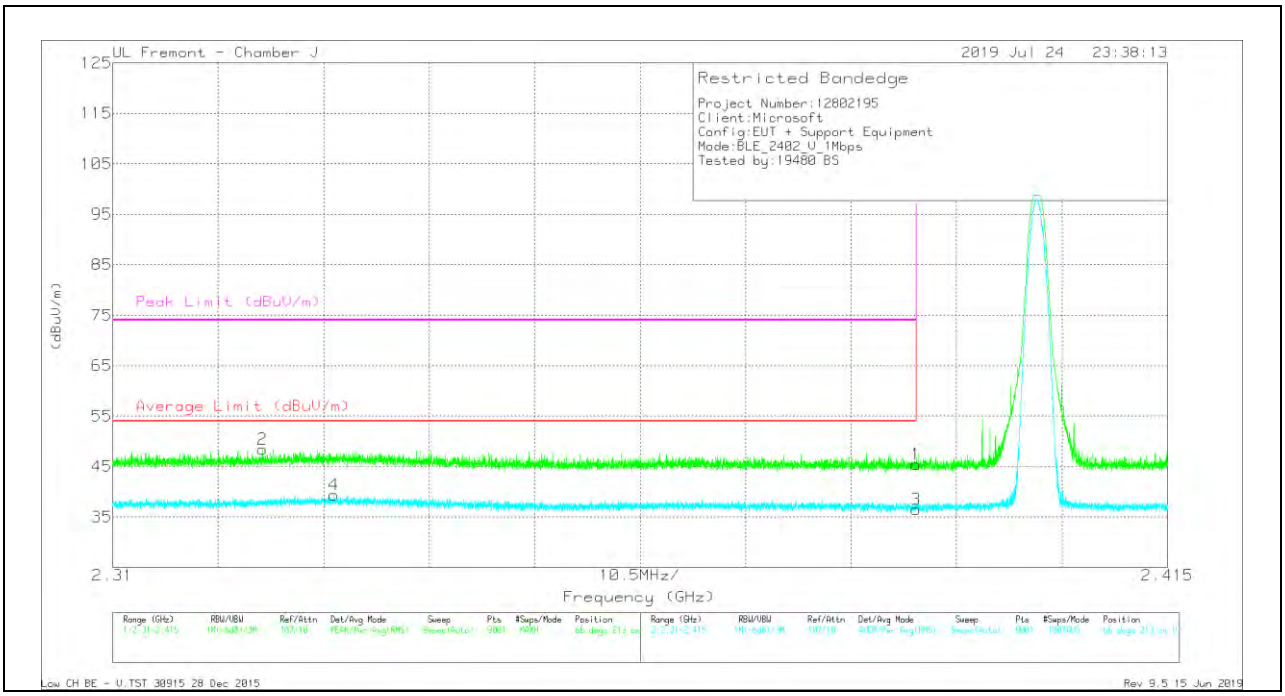


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	43.37	Pk	29.5	-25.5	0	47.37	-	-	74	-26.63	45	177	H
2	* 2.31503	47.85	Pk	28.7	-25.6	0	50.95	-	-	74	-23.05	45	177	H
3	* 2.38999	33.4	RMS	29.5	-25.5	2.04	39.44	54	-14.56	-	-	45	177	H
4	* 2.31649	36.41	RMS	28.7	-25.5	2.04	41.65	54	-12.35	-	-	45	177	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



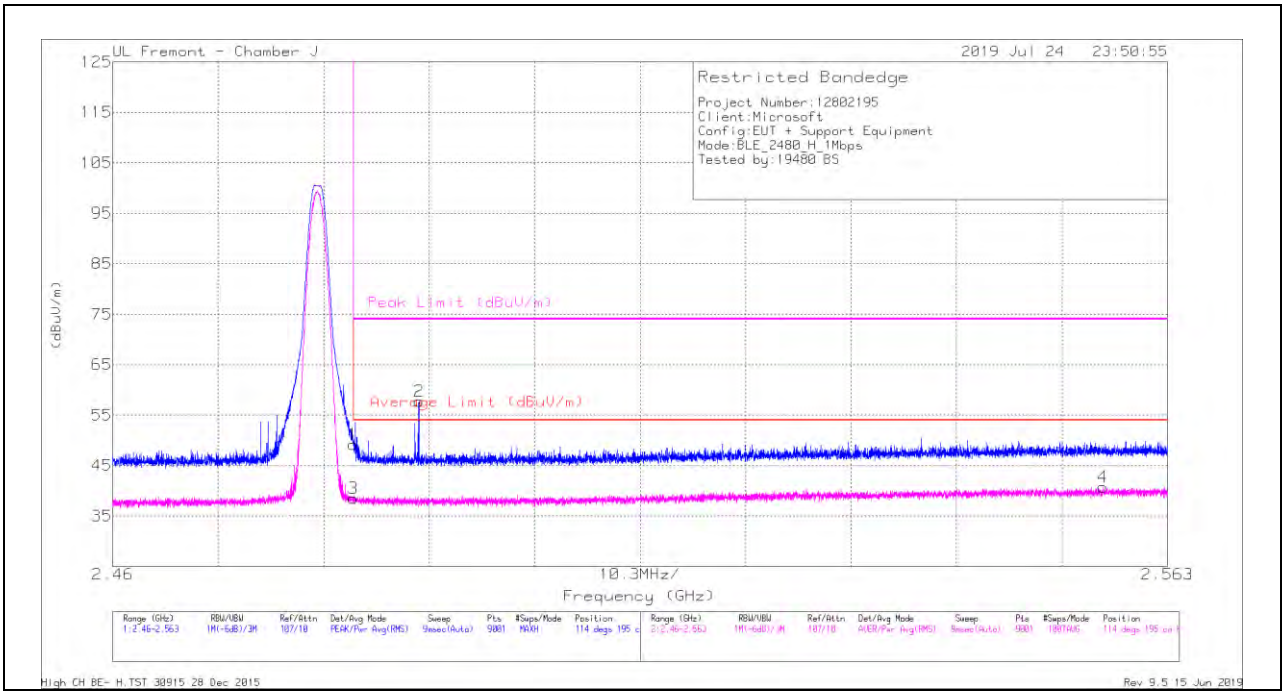
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	41.42	Pk	29.5	-25.5	0	45.42	-	-	74	-28.58	66	213	V
2	* 2.32489	45.27	Pk	28.8	-25.6	0	48.47	-	-	74	-25.53	66	213	V
3	* 2.38999	30.5	RMS	29.5	-25.5	2.04	36.54	54	-17.46	-	-	66	213	V
4	* 2.332	34.02	RMS	28.9	-25.6	2.04	39.36	54	-14.64	-	-	66	213	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

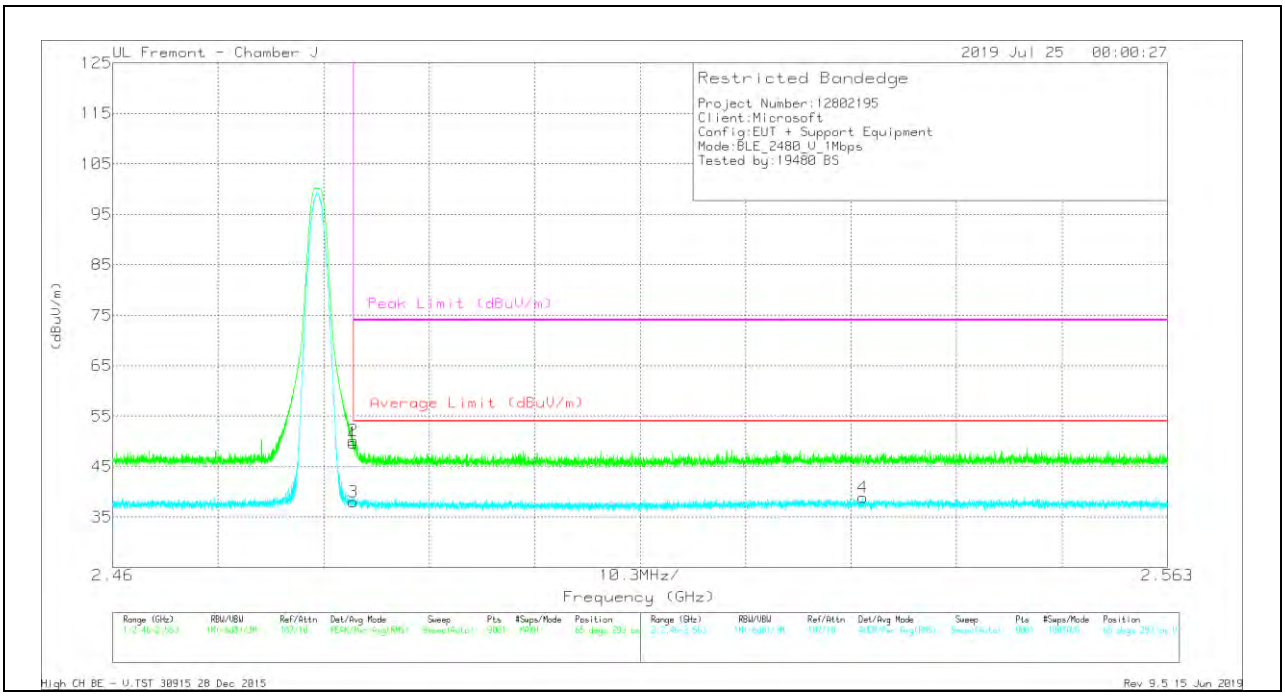


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	44.77	Pk	29.9	-25.5	0	49.17	-	-	74	-24.83	114	195	H
2	* 2.4899	53.31	Pk	29.9	-25.5	0	57.71	-	-	74	-16.29	114	195	H
3	* 2.48351	32.07	RMS	29.9	-25.5	2.04	38.51	54	-15.49	-	-	114	195	H
4	2.55669	33.82	RMS	30.3	-25.4	2.04	40.76	54	-13.24	-	-	114	195	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



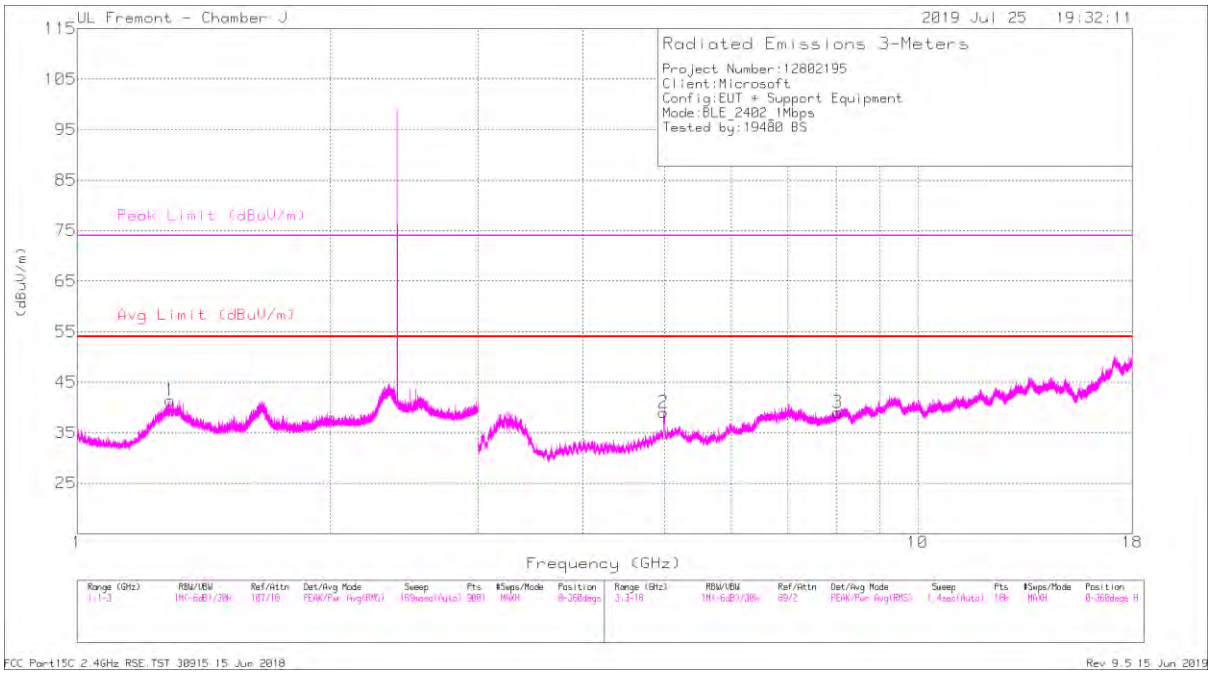
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	45.22	Pk	29.9	-25.5	0	49.62	-	-	74	-24.38	65	293	V
2	* 2.48352	45.77	Pk	29.9	-25.5	0	50.17	-	-	74	-23.83	65	293	V
3	* 2.48351	31.53	RMS	29.9	-25.5	2.04	37.97	54	-16.03	-	-	65	293	V
4	2.53328	32.15	RMS	30.2	-25.5	2.04	38.89	54	-15.11	-	-	65	293	V

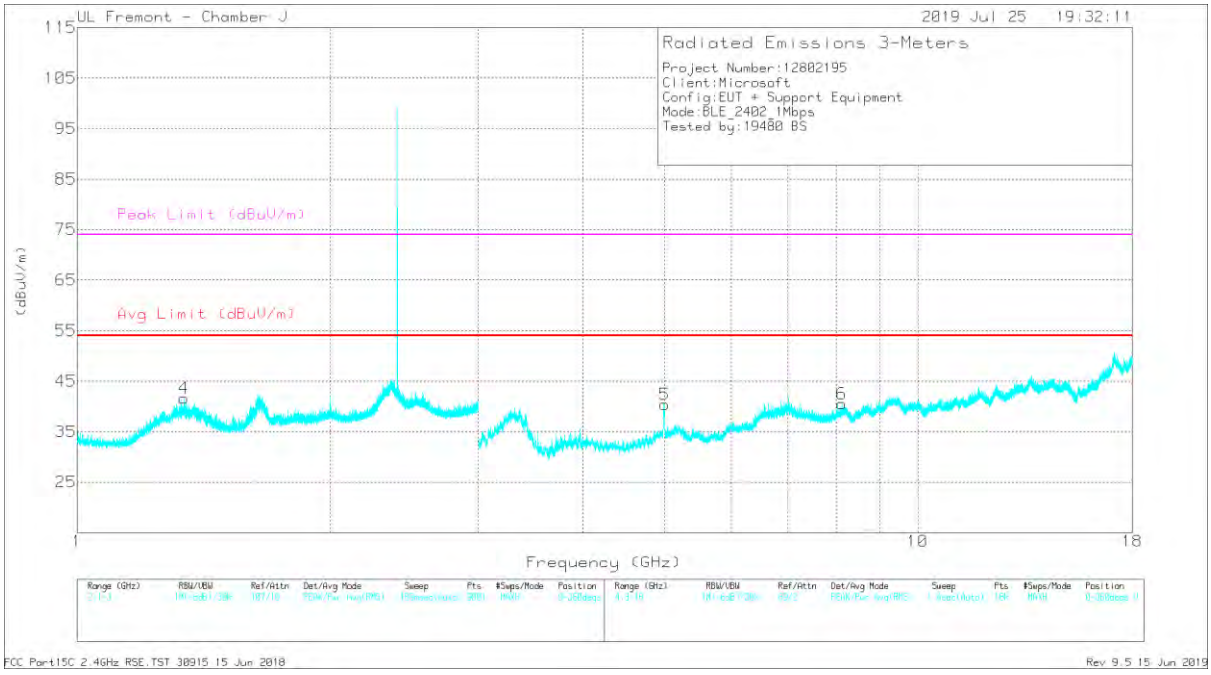
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.2881	53.28	PK2	24.4	-25.9	0	51.78	-	-	74	-22.22	236	240	H
	* 1.28912	42.36	MAv1	24.4	-25.9	2.04	42.9	54	-11.1	-	-	236	240	H
4	* 1.339	50.94	PK2	24.7	-25.8	0	49.84	-	-	74	-24.16	162	105	V
	* 1.34121	40.62	MAv1	24.7	-25.9	2.04	41.46	54	-12.54	-	-	162	105	V
2	* 4.98948	47.96	PK2	35	-30	0	52.96	-	-	74	-21.04	207	121	H
	* 4.99048	35.17	MAv1	35	-30	2.04	42.21	54	-11.79	-	-	207	121	H
3	* 8.02653	36.29	PK2	37.7	-26.8	0	47.19	-	-	74	-26.81	283	176	H
	* 8.02911	25.93	MAv1	37.7	-26.8	2.04	38.87	54	-15.13	-	-	283	176	H
5	* 4.99918	51.47	PK2	35.1	-29.9	0	56.67	-	-	74	-17.33	17	210	V
	* 4.99284	38.2	MAv1	35	-30	2.04	45.24	54	-8.76	-	-	17	210	V
6	* 8.12654	35.8	PK2	37.9	-26.4	0	47.3	-	-	74	-26.7	298	115	V
	* 8.12823	25.88	MAv1	37.9	-26.4	2.04	39.42	54	-14.58	-	-	298	115	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

UL VERIFICATION SERVICES INC.
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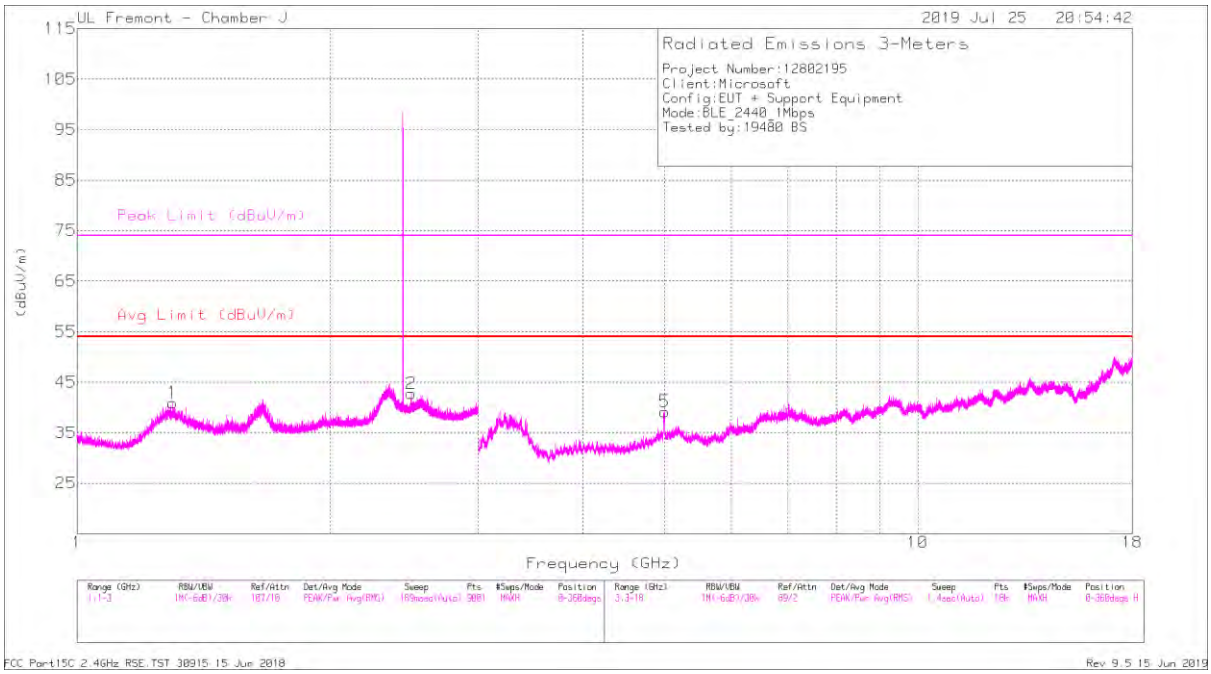
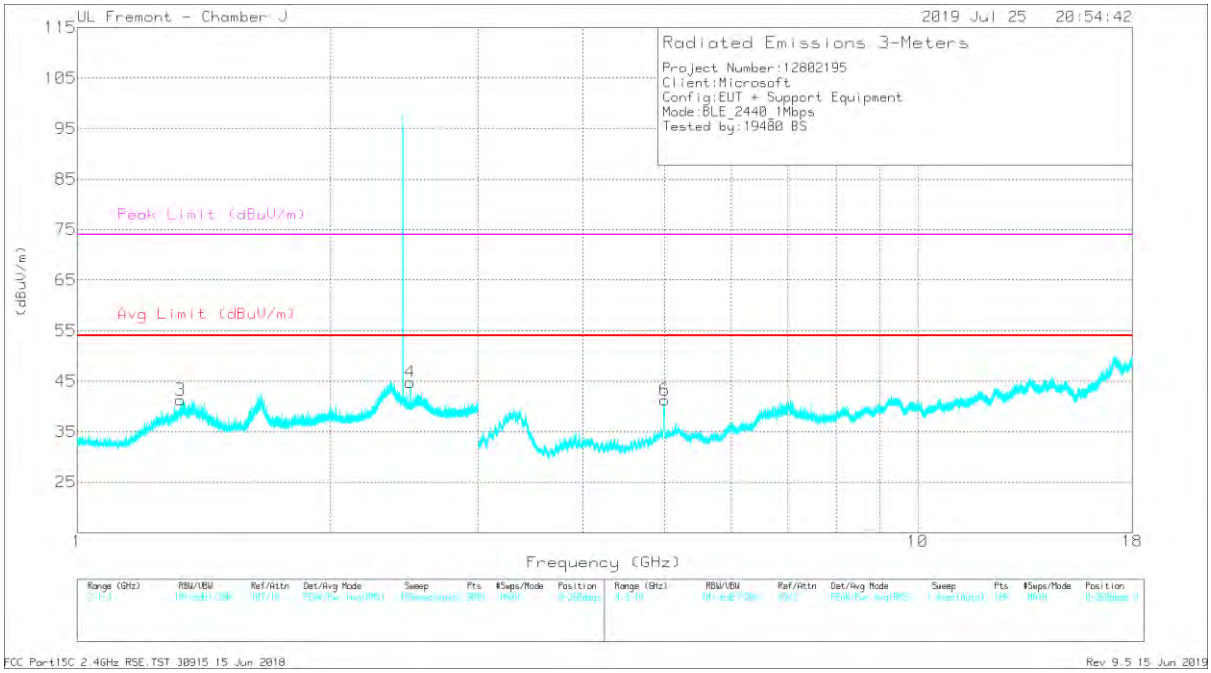
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

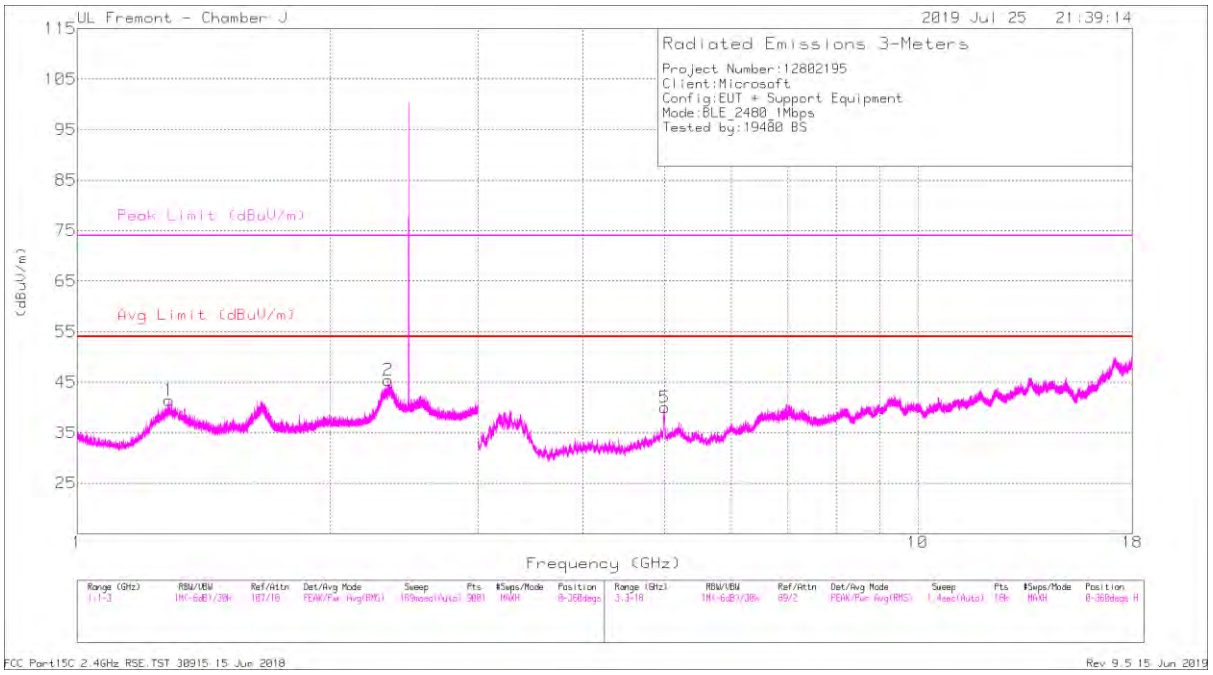
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.2978	51.94	PK2	24.5	-25.8	0	50.64	-	-	74	-23.36	235	238	H
	* 1.29687	41.49	MAv1	24.5	-25.8	2.04	42.23	54	-11.77	-	-	235	238	H
2	* 2.49512	59.73	PK2	30	-25.5	0	64.23	-	-	74	-9.77	137	115	H
	* 2.49514	35.32	MAv1	30	-25.5	2.04	41.86	54	-12.14	-	-	137	115	H
3	* 1.32806	52.6	PK2	24.6	-25.8	0	51.4	-	-	74	-22.6	164	113	V
	* 1.32744	41.99	MAv1	24.6	-25.8	2.04	42.83	54	-11.17	-	-	164	113	V
4	* 2.49108	46.11	PK2	29.9	-25.5	0	50.51	-	-	74	-23.49	359	117	V
	* 2.48937	35.74	MAv1	29.9	-25.5	2.04	42.18	54	-11.82	-	-	359	117	V
5	* 4.99597	46.7	PK2	35.1	-30	0	51.8	-	-	74	-22.2	102	204	H
	* 4.99768	32.94	MAv1	35.1	-30	2.04	40.08	54	-13.92	-	-	102	204	H
6	* 4.99625	49.59	PK2	35.1	-30	0	54.69	-	-	74	-19.31	19	215	V
	* 4.9968	35.63	MAv1	35.1	-30	2.04	42.77	54	-11.23	-	-	19	215	V

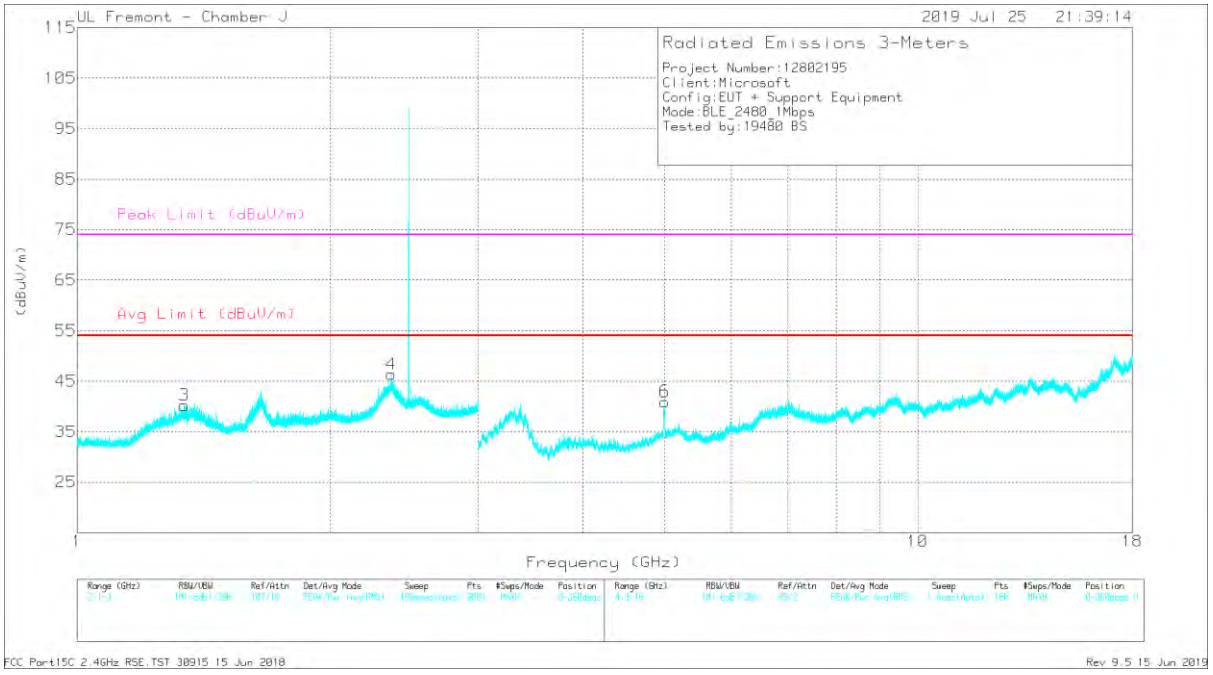
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.28649	51.49	PK2	24.4	-25.8	0	50.09	-	-	74	-23.91	235	245	H
	* 1.28811	41.17	MAv1	24.4	-25.9	2.04	41.71	54	-12.29	-	-	235	245	H
2	* 2.34706	50.01	PK2	29.1	-25.5	0	53.61	-	-	74	-20.39	151	175	H
	* 2.34562	39.82	MAv1	29.1	-25.6	2.04	45.36	54	-8.64	-	-	151	175	H
3	* 1.33889	50.91	PK2	24.7	-25.8	0	49.81	-	-	74	-24.19	165	110	V
	* 1.34182	41.1	MAv1	24.7	-25.9	2.04	41.94	54	-12.06	-	-	165	110	V
4	* 2.36689	50.68	PK2	29.3	-25.5	0	54.48	-	-	74	-19.52	360	106	V
	* 2.36372	40.06	MAv1	29.3	-25.5	2.04	45.9	54	-8.1	-	-	360	106	V
5	* 4.99917	46.63	PK2	35.1	-29.9	0	51.83	-	-	74	-22.17	103	197	H
	* 4.99597	33.18	MAv1	35.1	-30	2.04	40.32	54	-13.68	-	-	103	197	H
6	* 4.99747	48.79	PK2	35.1	-30	0	53.89	-	-	74	-20.11	26	242	V
	* 4.99627	33.9	MAv1	35.1	-30	2.04	41.04	54	-12.96	-	-	26	242	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

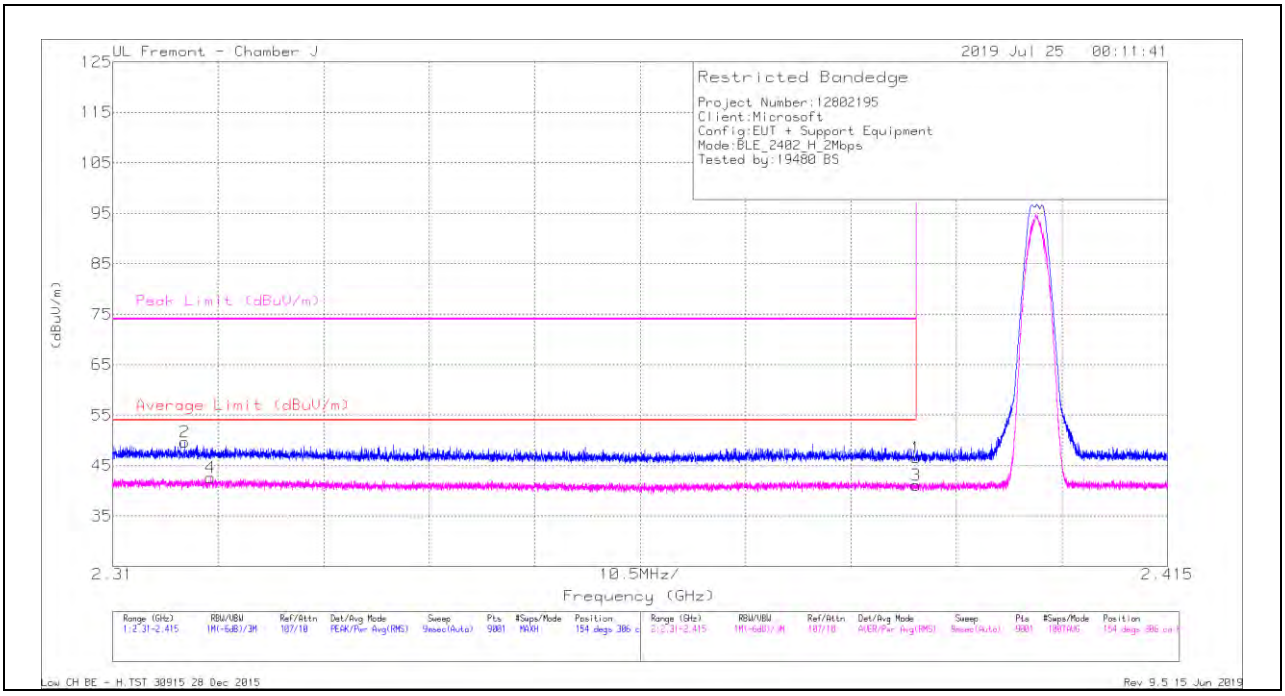
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.4. BLE 2Mbps

Chain 1

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

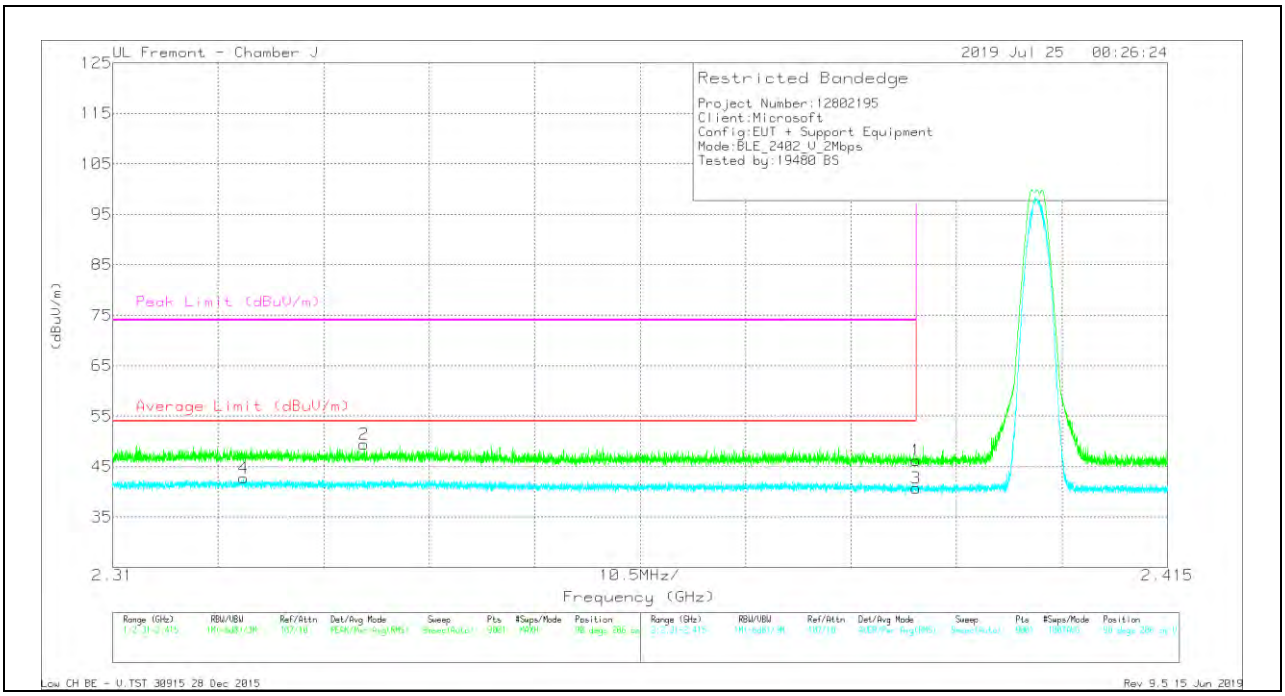


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	42.54	Pk	29.5	-25.5	0	46.54	-	-	74	-27.46	154	306	H
2	* 2.31716	46.43	Pk	28.7	-25.5	0	49.63	-	-	74	-24.37	154	306	H
3	* 2.38999	32.24	RMS	29.5	-25.5	4.82	41.06	54	-12.94	-	-	154	306	H
4	* 2.31973	34.56	RMS	28.8	-25.6	4.82	42.58	54	-11.42	-	-	154	306	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	42.23	Pk	29.5	-25.5	0	46.23	-	-	74	-27.77	90	286	V
2	* 2.335	46.13	Pk	28.9	-25.6	0	49.43	-	-	74	-24.57	90	286	V
3	* 2.38999	31.89	RMS	29.5	-25.5	4.82	40.71	54	-13.29	-	-	90	286	V
4	* 2.32301	34.7	RMS	28.8	-25.6	4.82	42.72	54	-11.28	-	-	90	286	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

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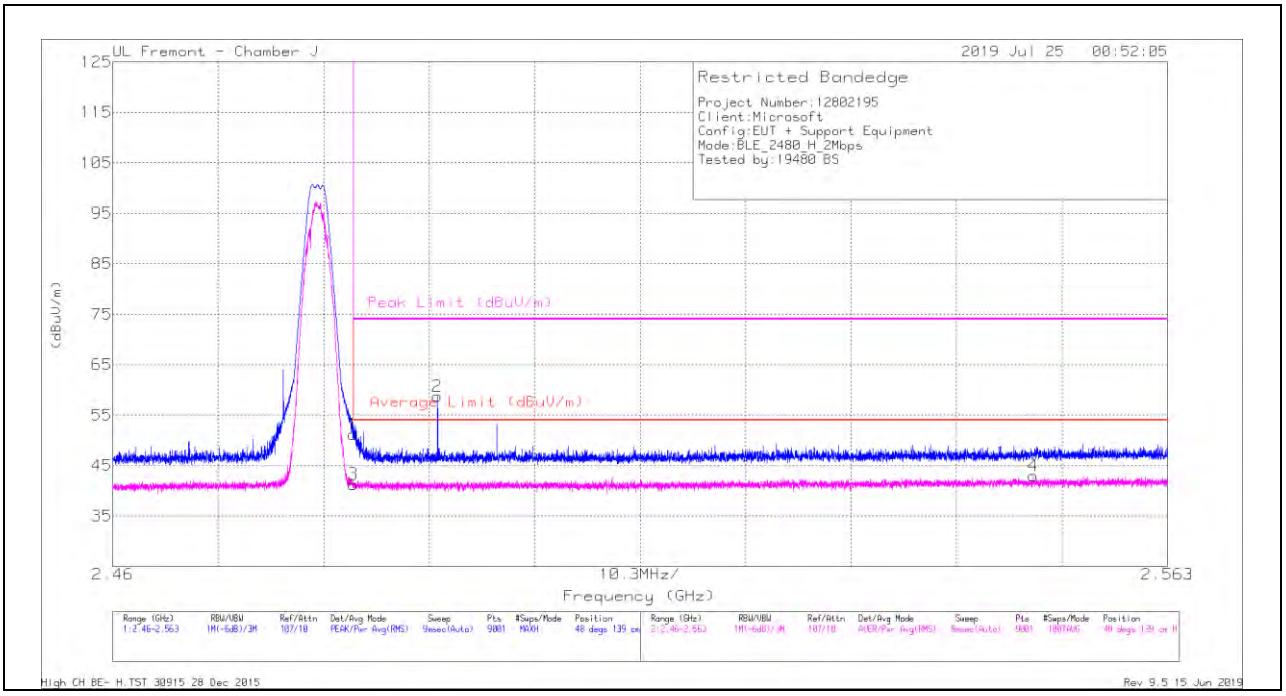
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

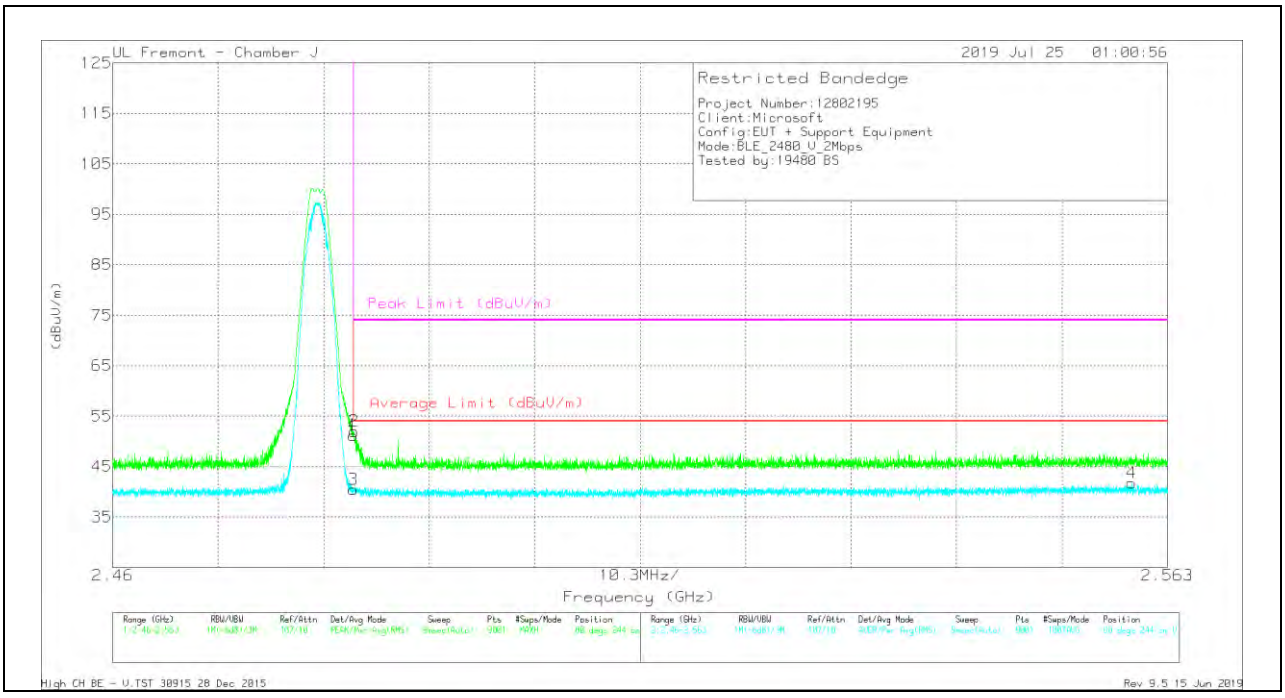


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	46.72	Pk	29.9	-25.5	0	51.12	-	-	74	-22.88	48	139	H
2	* 2.49172	54.29	Pk	29.9	-25.5	0	58.69	-	-	74	-15.31	48	139	H
3	* 2.48351	32.07	RMS	29.9	-25.5	4.82	41.29	54	-12.71	-	-	48	139	H
4	2.5499	33.3	RMS	30.3	-25.4	4.82	43.02	54	-10.98	-	-	48	139	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

VERTICAL RESULT



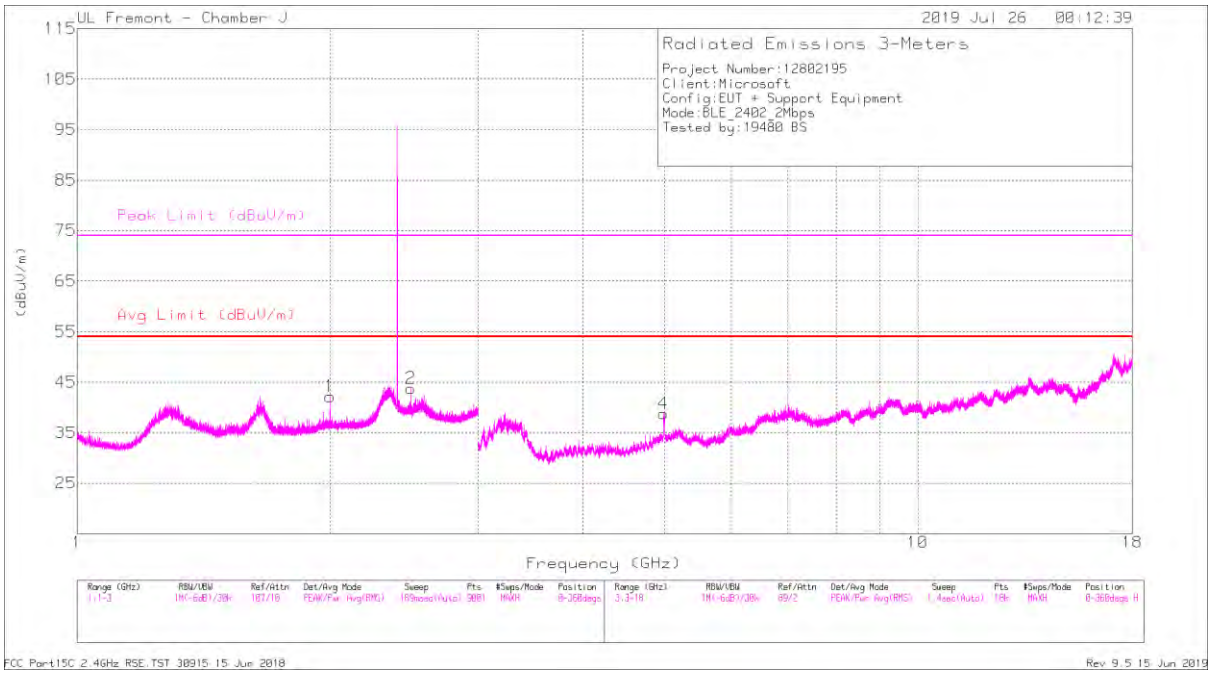
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (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	46.82	Pk	29.9	-25.5	0	51.22	-	-	74	-22.78	80	244	V
2	* 2.48356	47.57	Pk	29.9	-25.5	0	51.97	-	-	74	-22.03	80	244	V
3	* 2.48351	31.21	RMS	29.9	-25.5	4.82	40.43	54	-13.57	-	-	80	244	V
4	2.55949	31.99	RMS	30.3	-25.4	4.82	41.71	54	-12.29	-	-	80	244	V

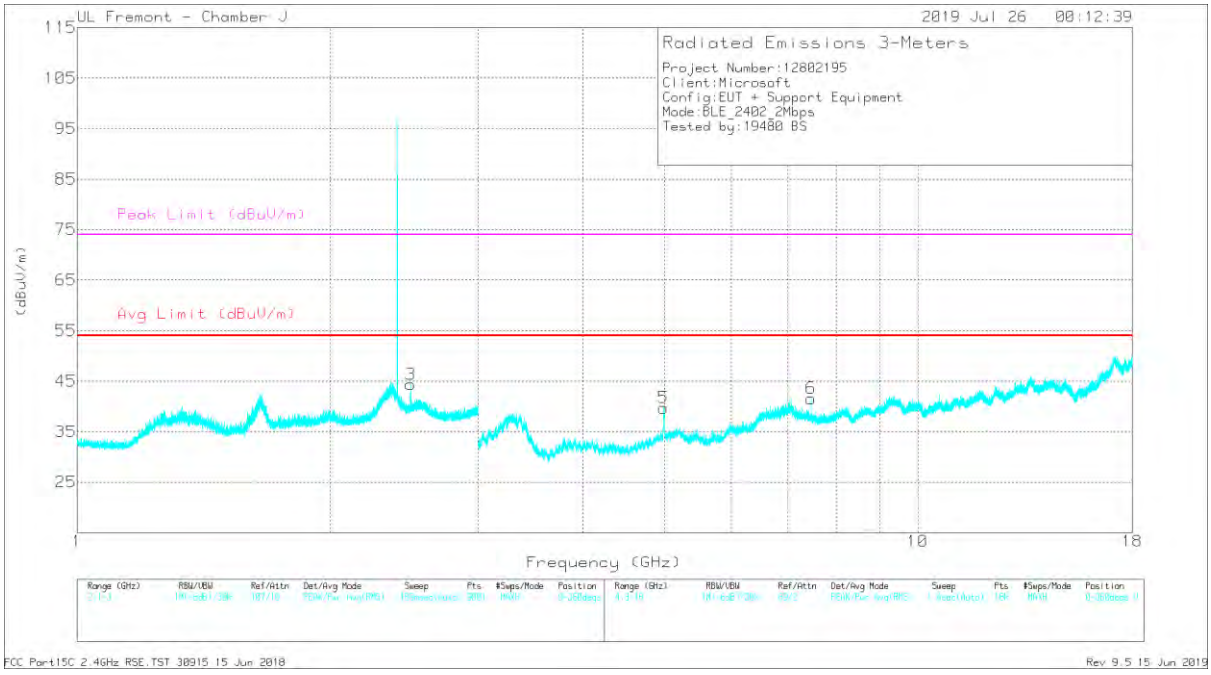
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.99712	43.42	PK2	27.9	-25.7	0	45.62	-	-	-	-	158	153	H
	2.00089	32.58	MAv1	27.9	-25.7	4.82	39.6	-	-	-	-	158	153	H
2	* 2.49508	56.9	PK2	30	-25.5	0	61.4	-	-	74	-12.6	44	175	H
	* 2.49367	34.05	MAv1	29.9	-25.5	4.82	43.27	54	-10.73	-	-	44	175	H
3	* 2.49387	44.24	PK2	29.9	-25.5	0	48.64	-	-	74	-25.36	22	103	V
	* 2.49141	33.02	MAv1	29.9	-25.5	4.82	42.24	54	-11.76	-	-	22	103	V
4	* 4.9843	48.16	PK2	35	-30.2	0	52.96	-	-	74	-21.04	87	248	H
	* 4.98369	34.38	MAv1	35	-30.2	4.82	44	54	-10	-	-	87	248	H
5	* 4.98078	48.97	PK2	35	-30.2	0	53.77	-	-	74	-20.23	20	221	V
	* 4.98269	34.16	MAv1	35	-30.2	4.82	43.78	54	-10.22	-	-	20	221	V
6	* 7.46714	36.14	PK2	37.5	-27.2	0	46.44	-	-	74	-27.56	123	106	V
	* 7.46753	27.28	MAv1	37.5	-27.2	4.82	42.4	54	-11.6	-	-	123	106	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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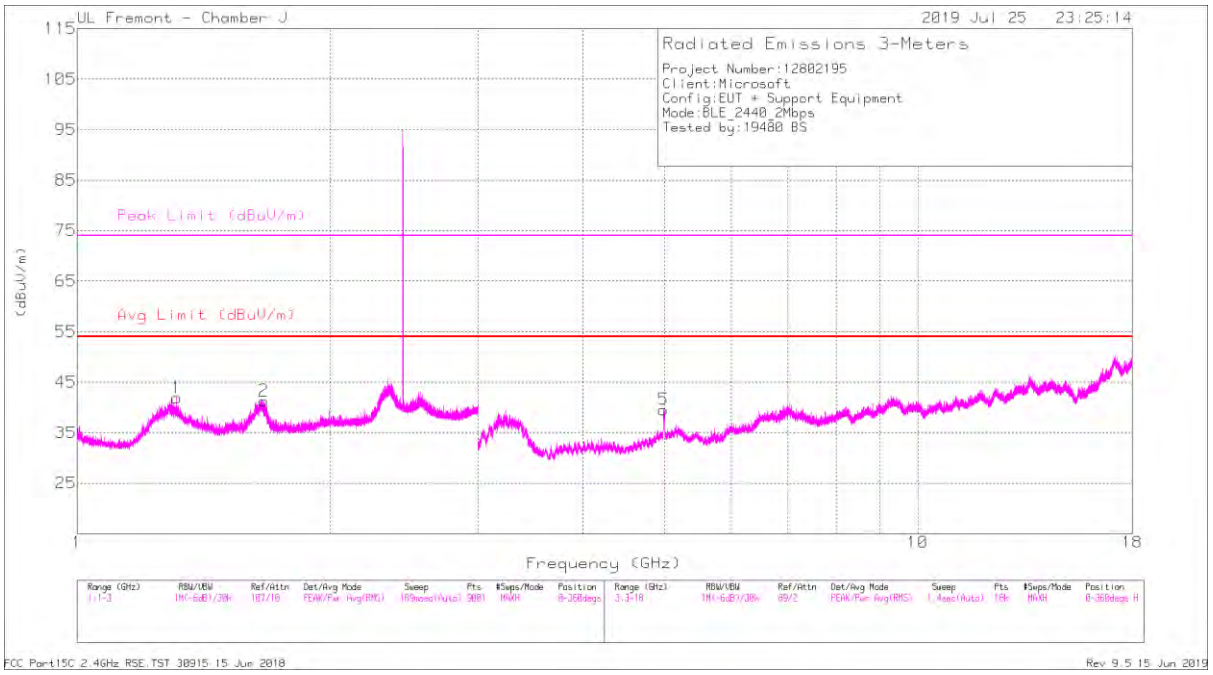
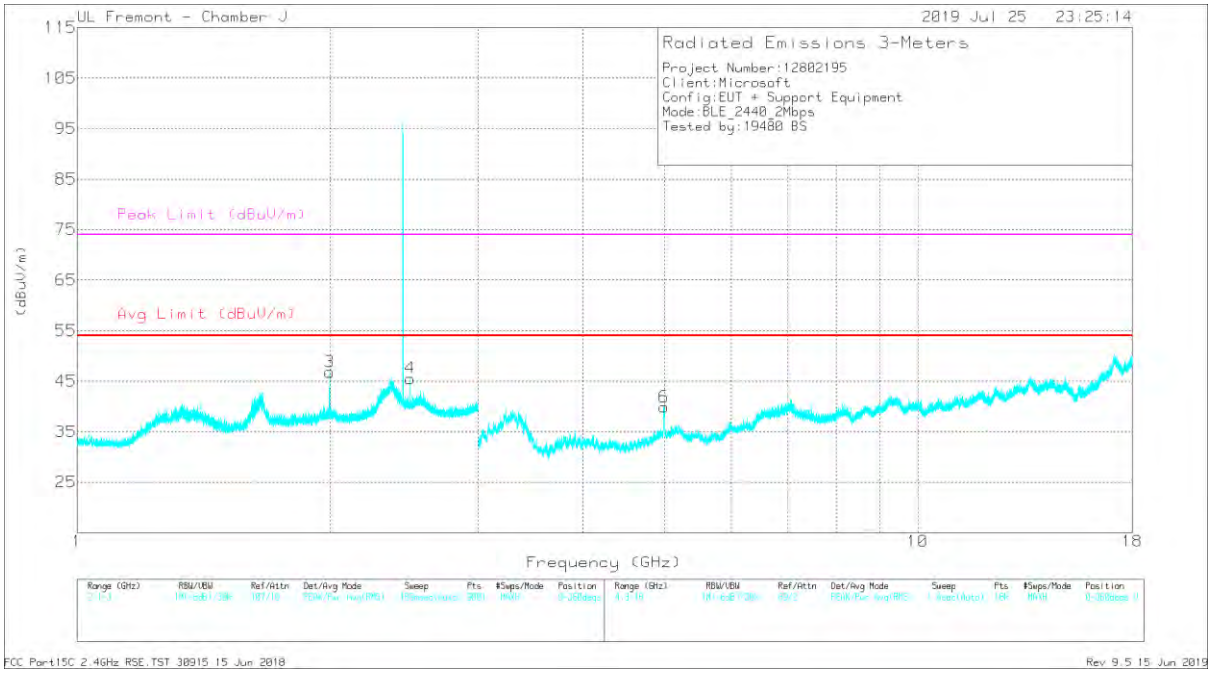
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.3124	50.59	PK2	24.5	-25.9	0	49.19	-	-	74	-24.81	234	185	H
	* 1.31378	41.2	MAv1	24.6	-25.8	4.82	44.82	54	-9.18	-	-	234	185	H
2	* 1.66911	50.06	PK2	25.8	-25.8	0	50.06	-	-	74	-23.94	197	105	H
	* 1.66806	39.63	MAv1	25.8	-25.8	4.82	44.45	54	-9.55	-	-	197	105	H
3	1.99742	45.57	PK2	27.9	-25.7	0	47.77	-	-	-	-	215	231	V
	1.99645	34.87	MAv1	27.9	-25.7	4.82	41.89	-	-	-	-	215	231	V
4	* 2.49027	45.05	PK2	29.9	-25.5	0	49.45	-	-	74	-24.55	343	205	V
	* 2.4886	34.69	MAv1	29.9	-25.5	4.82	43.91	54	-10.09	-	-	343	205	V
5	* 4.98156	45.66	PK2	35	-30.2	0	50.46	-	-	74	-23.54	204	103	H
	* 4.98373	32.01	MAv1	35	-30.2	4.82	41.63	54	-12.37	-	-	204	103	H
6	* 4.97978	50.49	PK2	34.9	-30.2	0	55.19	-	-	74	-18.81	18	224	V
	* 4.99117	38.07	MAv1	35	-30	4.82	47.89	54	-6.11	-	-	18	224	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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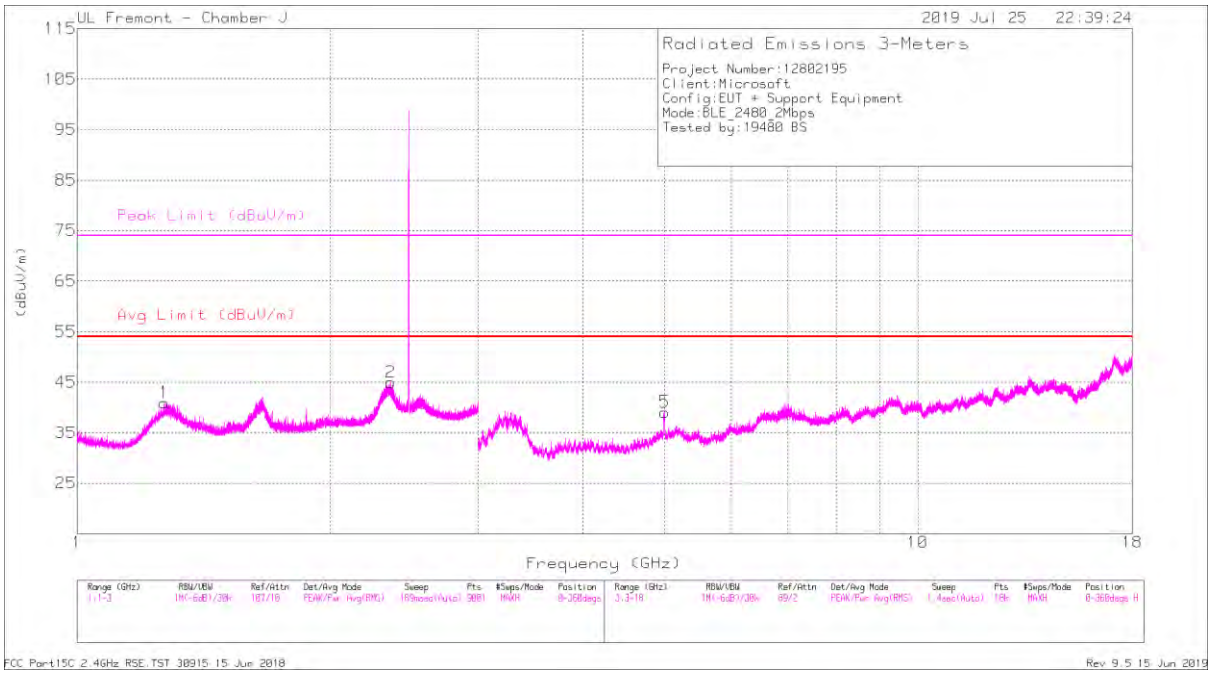
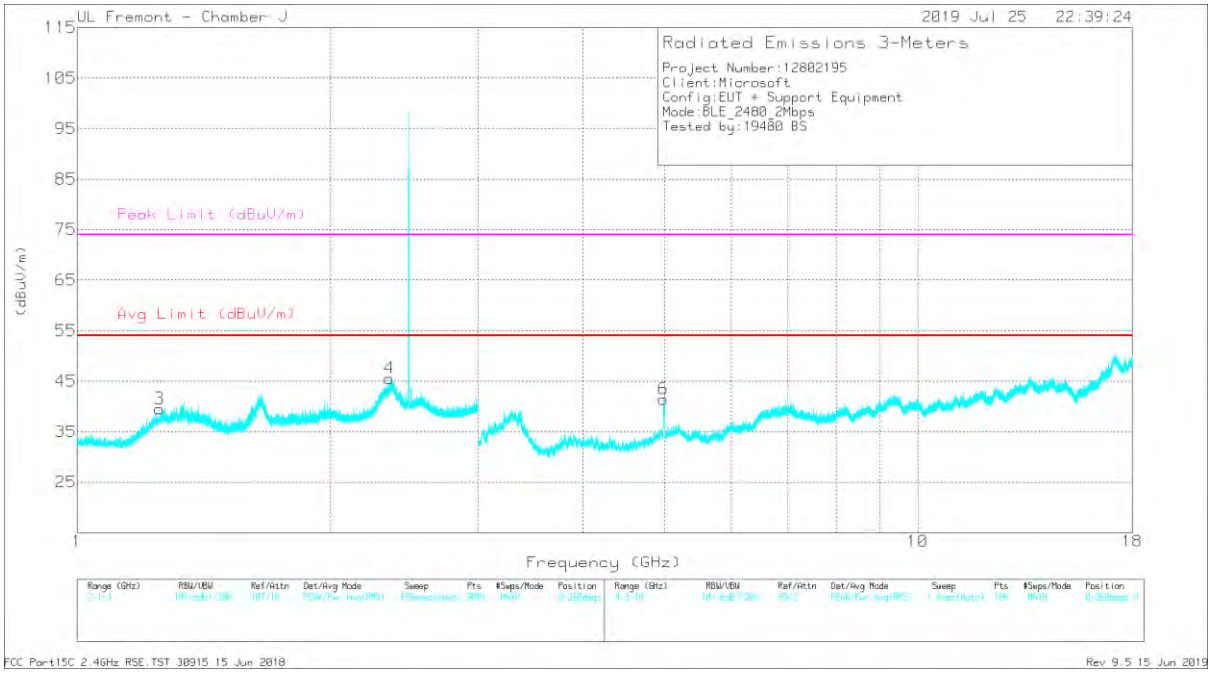
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0189055 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.26996	51.96	PK2	24.4	-25.8	0	50.56	-	-	74	-23.44	236	248	H
	* 1.26879	40.68	MAv1	24.4	-25.8	4.82	44.1	54	-9.9	-	-	236	248	H
2	* 2.35905	49.13	PK2	29.2	-25.5	0	52.83	-	-	74	-21.17	151	125	H
	* 2.36162	39.41	MAv1	29.2	-25.5	4.82	47.93	54	-6.07	-	-	151	125	H
3	* 1.25188	49.23	PK2	24.3	-25.8	0	47.73	-	-	74	-26.27	136	194	V
	* 1.25489	39.23	MAv1	24.4	-25.8	4.82	42.65	54	-11.35	-	-	136	194	V
4	* 2.3496	49.98	PK2	29.1	-25.5	0	53.58	-	-	74	-20.42	360	116	V
	* 2.35206	40.34	MAv1	29.1	-25.5	4.82	48.76	54	-5.24	-	-	360	116	V
5	* 4.99735	48.21	PK2	35.1	-30	0	53.31	-	-	74	-20.69	81	233	H
	* 4.99603	33.59	MAv1	35.1	-30	4.82	43.51	54	-10.49	-	-	81	233	H
6	* 4.98009	47.6	PK2	34.9	-30.2	0	52.3	-	-	74	-21.7	92	108	V
	* 4.98054	30.81	MAv1	35	-30.2	4.82	40.43	54	-13.57	-	-	92	108	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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9.3. SPURIOUS EMISSIONS FOR COLLOCATION

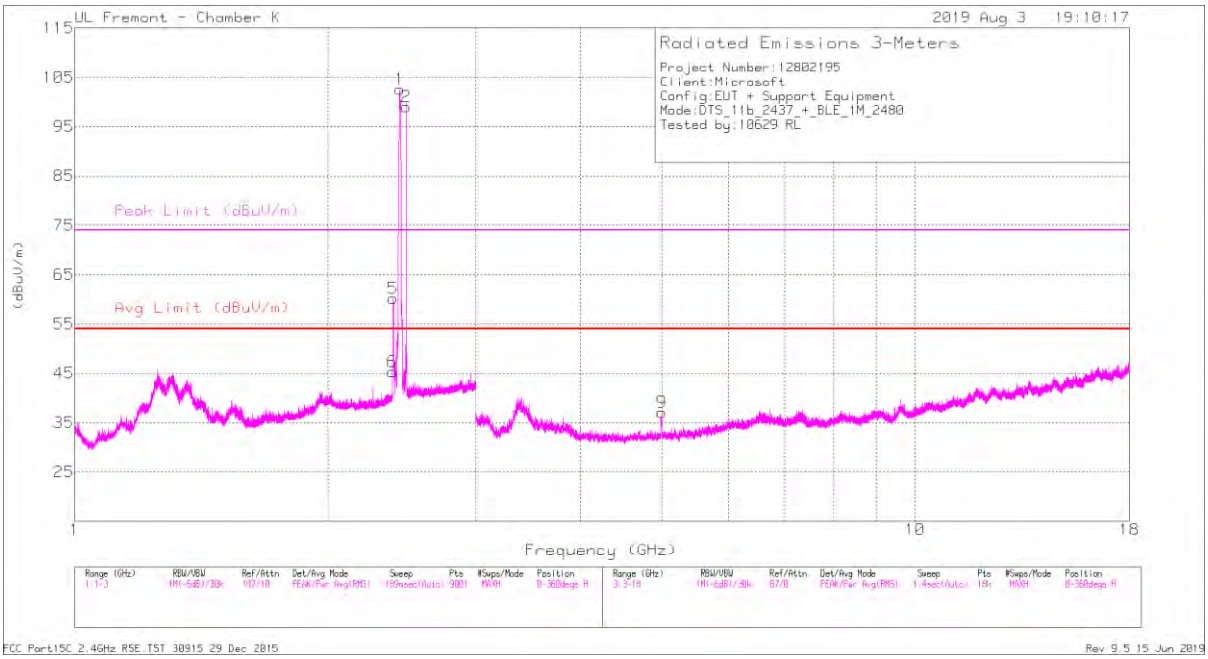
TEST-CASE CONDITIONS

Test Case #	Antenna	Mode	Frequency (MHz)
1	Chain 1	BLE 1Mbps	2480
	WWAN	LTE Band 7, QPSK (20MHz), 1RB	2510
2	Chain 1	BLE 1Mbps	2480
	WWAN	LTE Band 5, QPSK (10MHz), 1RB	836.5
3	Chain 1	BLE 1Mbps	2480
	Chain 2	WLAN 2.4GHz, 11b	2437
4	Chain 1	BLE 1Mbps	2480
	Chain 2	WLAN 5GHz, 11n HT20	5260

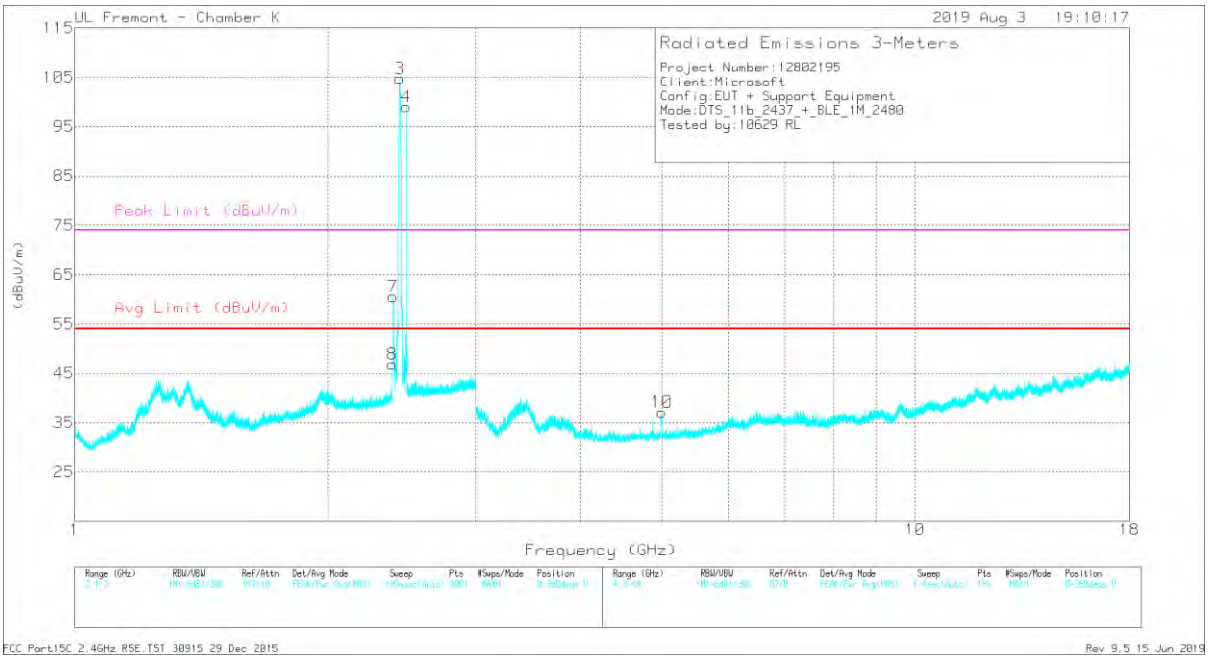
For simultaneous transmission of any BLE (2.4GHz) and WWAN bands, investigation has been performed and no noticeable new emission was found.

9.3.1. TEST CASE 3

Chain 1 BLE 1Mbps 2480MHz + Chain 2 WLAN 2.4GHz 802.11b 2437MHz



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fltr/ Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	**2.43644	84.37	Pk	32.3	-14.1	102.57	-	-	-	-	0-360	101	H
2	***2.47978	80.63	Pk	32.5	-14.1	99.03	-	-	-	-	0-360	101	H
5	2.39375	45.76	PK2	31.9	-14.2	63.46	-	-	-	-	117	121	H
	2.394	40.11	MAv1	31.9	-14.2	57.81	-	-	-	-	117	121	H
6	* 2.38975	36.11	PK2	31.9	-14.1	53.91	-	-	74	-20.09	117	138	H
	* 2.39	27.66	MAv1	31.9	-14.1	45.46	54	-8.54	-	-	117	138	H
3	**2.43644	86.52	Pk	32.3	-14.1	104.72	-	-	-	-	0-360	101	V
4	***2.48022	80.62	Pk	32.5	-14.1	99.02	-	-	-	-	0-360	101	V
7	2.3941	47.2	PK2	31.9	-14.2	64.9	-	-	-	-	184	129	V
	2.394	41.57	MAv1	31.9	-14.2	59.27	-	-	-	-	184	129	V
8	* 2.39	37.88	PK2	31.9	-14.1	55.68	-	-	74	-18.32	185	161	V
	* 2.39	29.71	MAv1	31.9	-14.1	47.51	54	-6.49	-	-	185	161	V
9	* 4.9991	47.18	PK2	34.2	-30.4	50.98	-	-	74	-23.02	211	200	H
	* 4.99328	34.2	MAv1	34.1	-30.4	37.9	54	-16.1	-	-	211	200	H
10	* 4.97982	48.66	PK2	34	-30.5	52.16	-	-	74	-21.84	5	101	V
	* 4.98766	36.56	MAv1	34.1	-30.4	40.26	54	-13.74	-	-	5	101	V

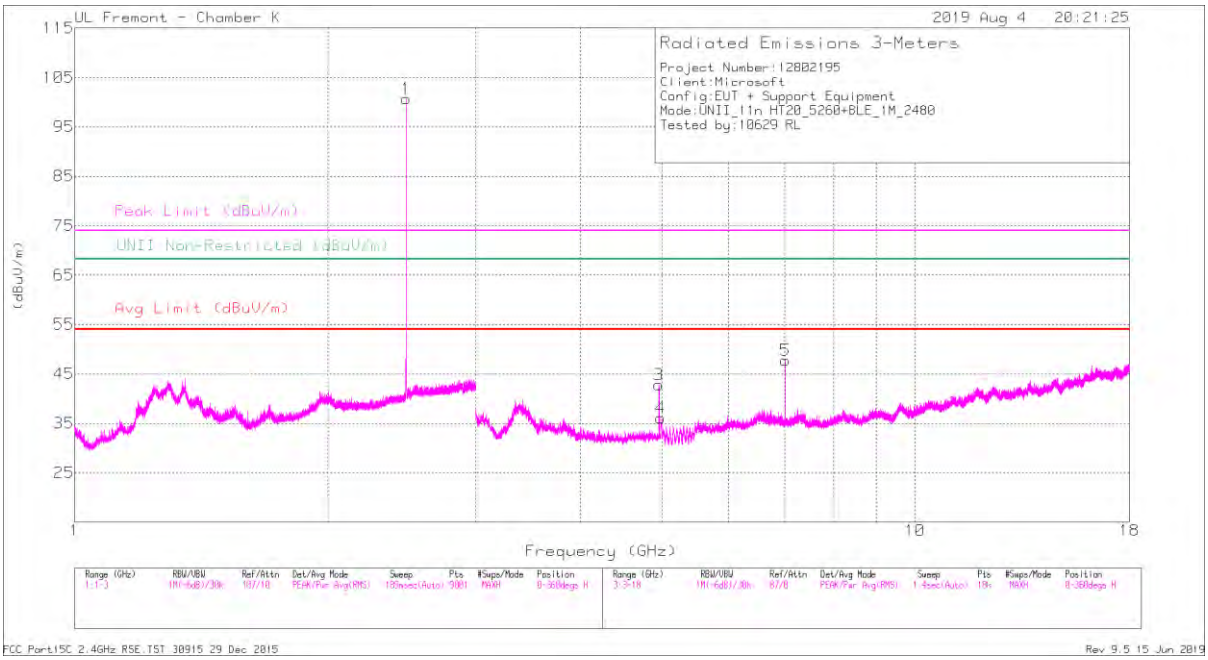
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - fundamental frequency of DTS 11b 2437MHz Channel
*** - fundamental frequency of BLE 1Mbps 2480MHz Channel

Pk - Peak detector
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

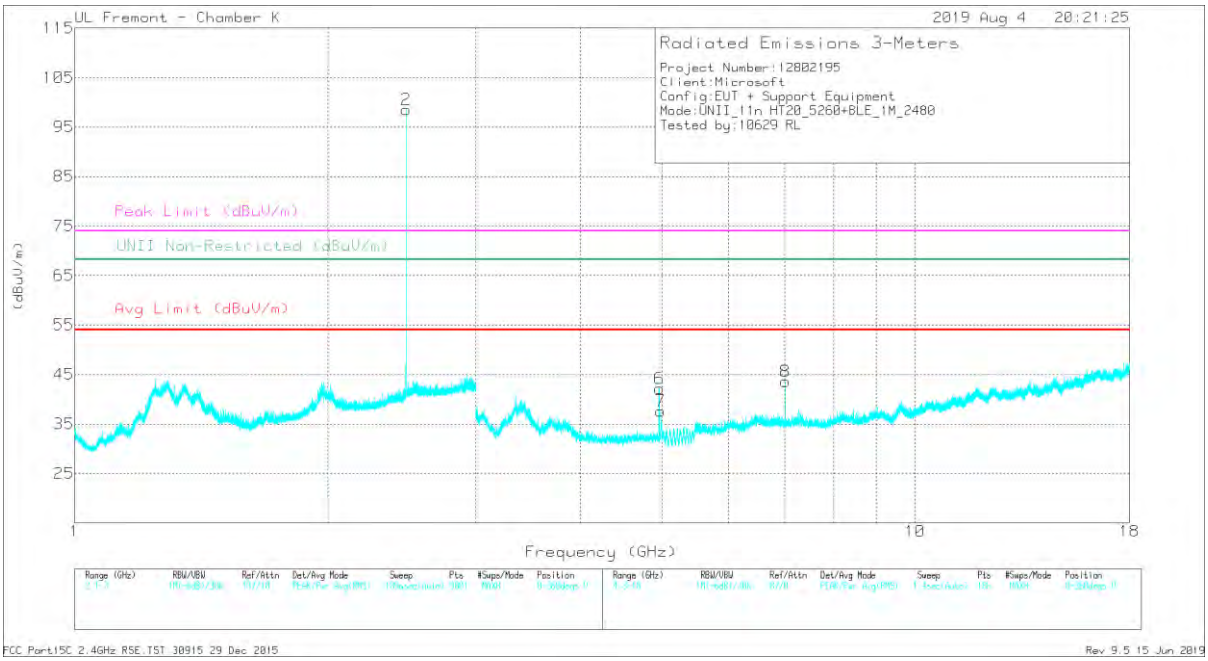
9.3.2. TEST CASE 4

Chain 1 BLE 1Mbps 2480MHz + Chain 2 WLAN 5GHz, 802.11n HT20 5260 MHz

A 5150 – 5350MHz Band Reject filter was utilized for this test.



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	** 2.48022	82.34	Pk	32.5	-12.1	102.74	-	-	-	-	-	-	0-360	200	H
2	** 2.48	80.09	Pk	32.5	-12.1	100.49	-	-	-	-	-	-	0-360	200	V
3	* 4.96049	44.77	PK-U	34.1	-28.6	50.27	-	-	74	-23.73	-	-	212	122	H
	* 4.95998	34.2	ADR	34.1	-28.6	39.7	54	-14.3	-	-	-	-	212	122	H
4	* 4.98006	46.91	PK-U	34.1	-28.5	52.51	-	-	74	-21.49	-	-	197	101	H
	* 4.98069	34.5	ADR	34.1	-28.5	40.1	54	-13.9	-	-	-	-	197	101	H
5	7.01332	41.16	PK-U	35.7	-24.8	52.06	-	-	-	-	68.2	-16.14	142	216	H
	7.01332	37.44	ADR	35.7	-24.8	48.34	-	-	-	-	-	-	142	216	H
6	* 4.95947	43.22	PK-U	34.1	-28.6	48.72	-	-	74	-25.28	-	-	290	200	V
	* 4.95977	33.71	ADR	34.1	-28.6	39.21	54	-14.79	-	-	-	-	290	200	V
7	* 4.97994	48.31	PK-U	34.1	-28.5	53.91	-	-	74	-20.09	-	-	5	104	V
	* 4.98091	35.79	ADR	34.1	-28.5	41.39	54	-12.61	-	-	-	-	5	104	V
8	7.01323	38.07	PK-U	35.7	-24.8	48.97	-	-	-	-	68.2	-19.23	176	102	V
	7.01333	32.43	ADR	35.7	-24.8	43.33	-	-	-	-	-	-	176	102	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
** - fundamental frequency of BLE 1Mbps 2480MHz Channel

Pk - Peak detector
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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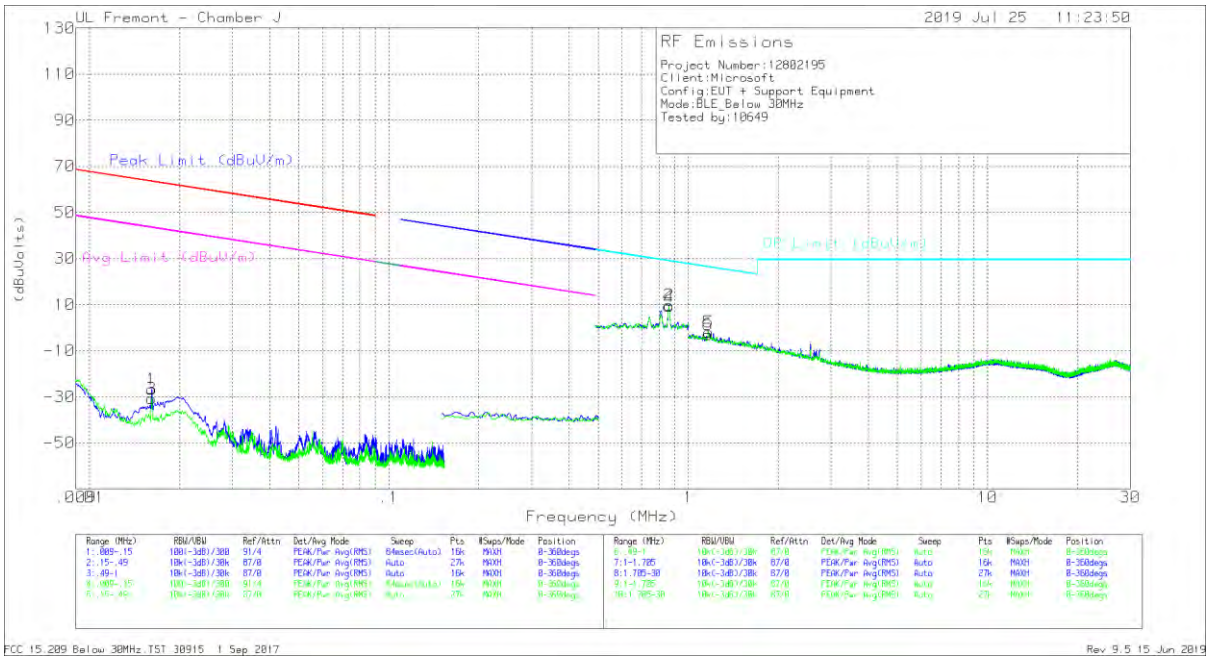
9.4. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01616	22.43	Pk	59.3	-28.5	-80	-26.77	63.42	-90.19	43.42	-70.19	0-360
3	.01615	18.47	Pk	59.3	-28.5	-80	-30.73	63.42	-94.15	43.42	-74.15	0-360

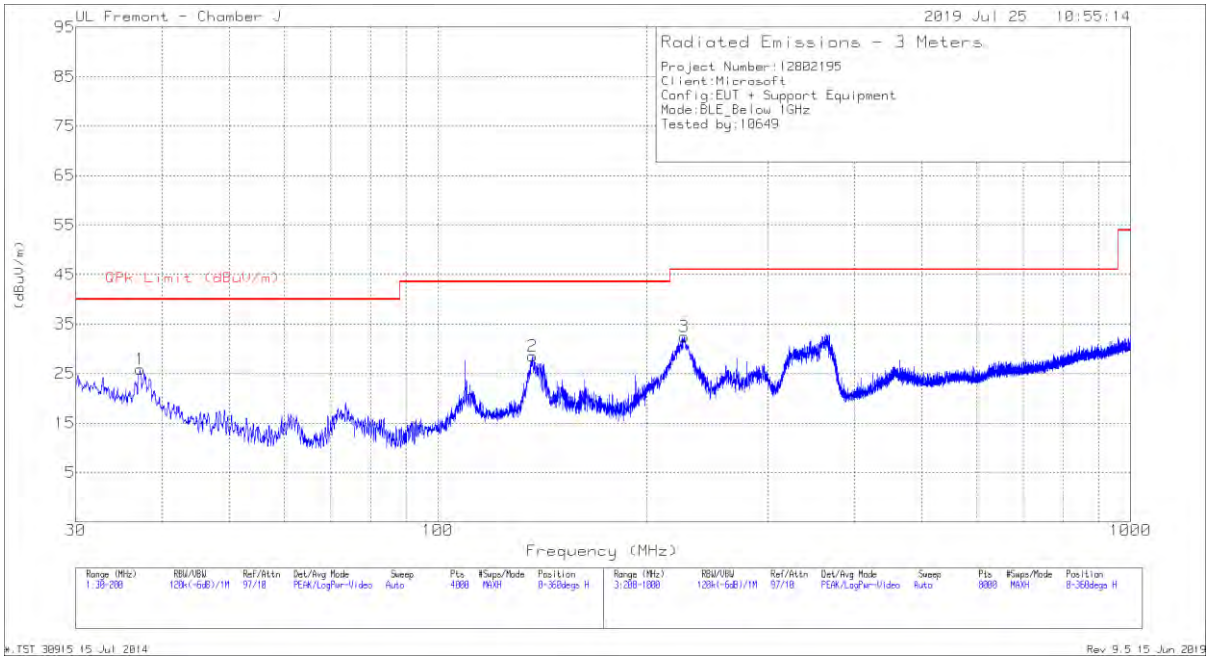
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
2	.86189	21.97	Pk	56.1	-28.4	-40	9.67	28.91	-19.24	0-360
4	.8617	21.51	Pk	56.1	-28.4	-40	9.21	28.91	-19.7	0-360
5	1.16947	20.6	Pk	45.9	-28.4	-40	-1.9	26.27	-28.17	0-360
6	1.16478	19.62	Pk	45.9	-28.4	-40	-2.88	26.3	-29.18	0-360

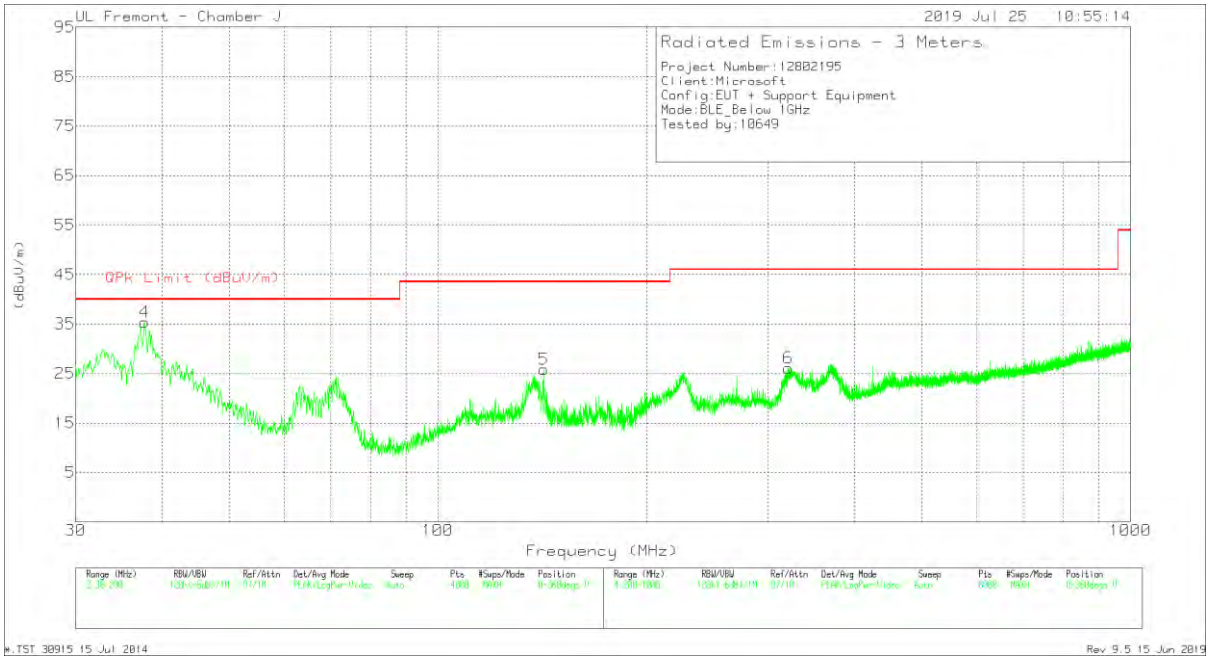
Pk - Peak detector

9.5. WORST CASE BELOW 1 GHZ

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



HORIZONTAL



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181575 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	37.1418	35.86	Pk	21.5	-31.5	25.86	40	-14.14	0-360	298	H
2	* 137.0427	40.17	Pk	19.1	-30.8	28.47	43.52	-15.05	0-360	198	H
4	* 37.6945	45.73	Pk	21.1	-31.5	35.33	40	-4.67	113	121	V
	* 37.7483	40.96	Qp	21.1	-31.5	30.56	40	-9.44	113	121	V
5	142.1653	37.91	Pk	18.7	-30.8	25.81	43.52	-17.71	0-360	101	V
3	226.6035	46.05	Pk	16.8	-30.4	32.45	46.02	-13.57	0-360	101	H
6	320.7157	36.35	Pk	19.8	-30	26.15	46.02	-19.87	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

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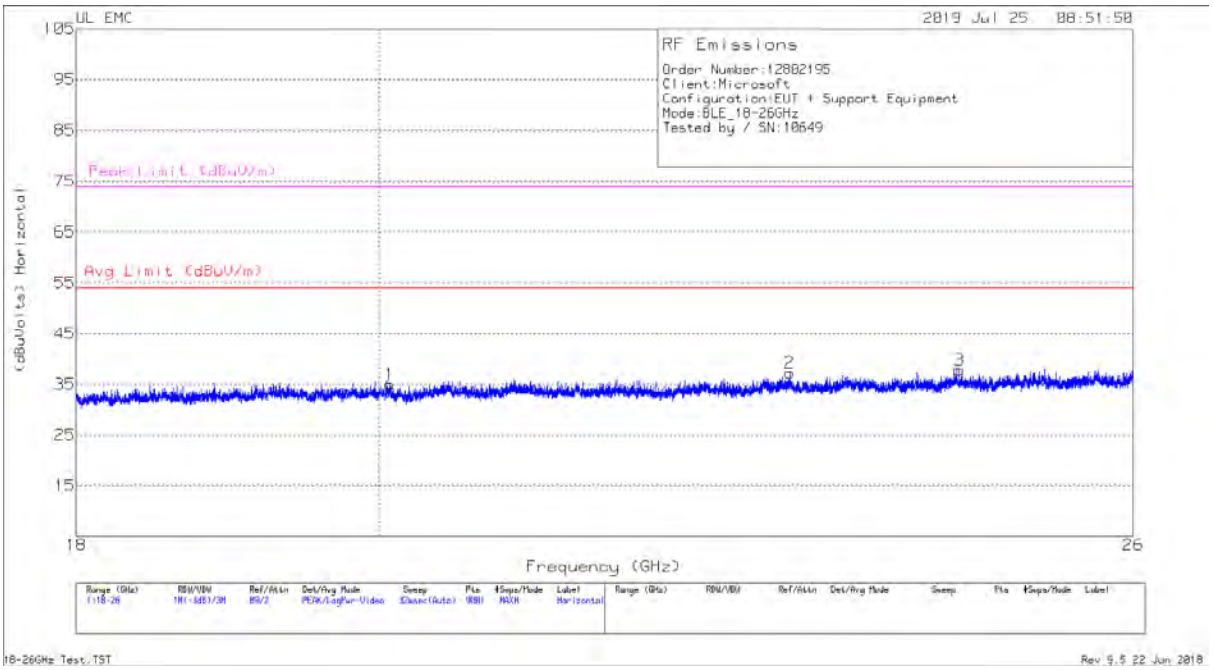
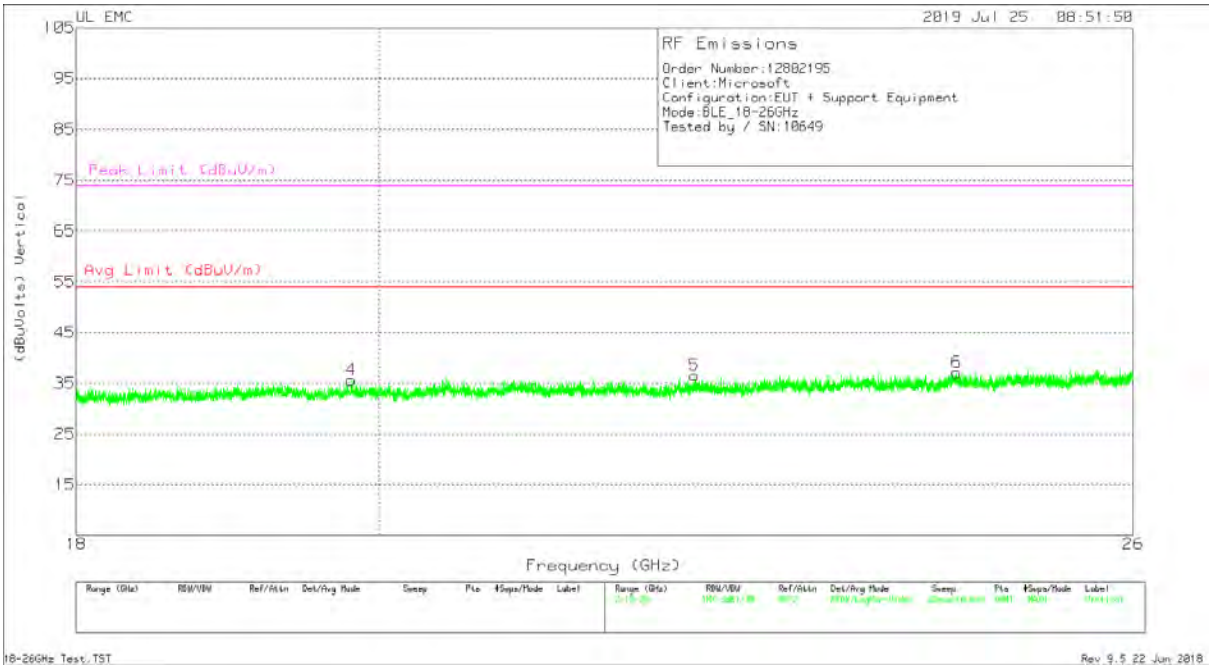
9.6. WORST CASE 18 – 26GHZ



HORIZONTAL



VERTICAL

18 – 26GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0182188 (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	20.076	67.56	Pk	33.2	-56.3	-9.5	34.96	54	-19.04	74	-39.04
2	23.071	69.72	Pk	34.3	-57.3	-9.5	37.22	54	-16.78	74	-36.78
3	24.474	69.29	Pk	34.6	-56.6	-9.5	37.79	54	-16.21	74	-36.21
4	19.807	68.62	Pk	33.5	-57	-9.5	35.62	54	-18.38	74	-38.38
5	22.321	69.69	Pk	34.2	-57.8	-9.5	36.59	54	-17.41	74	-37.41
6	24.452	68.26	Pk	34.6	-56.2	-9.5	37.16	54	-16.84	74	-36.84

Pk - Peak detector

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

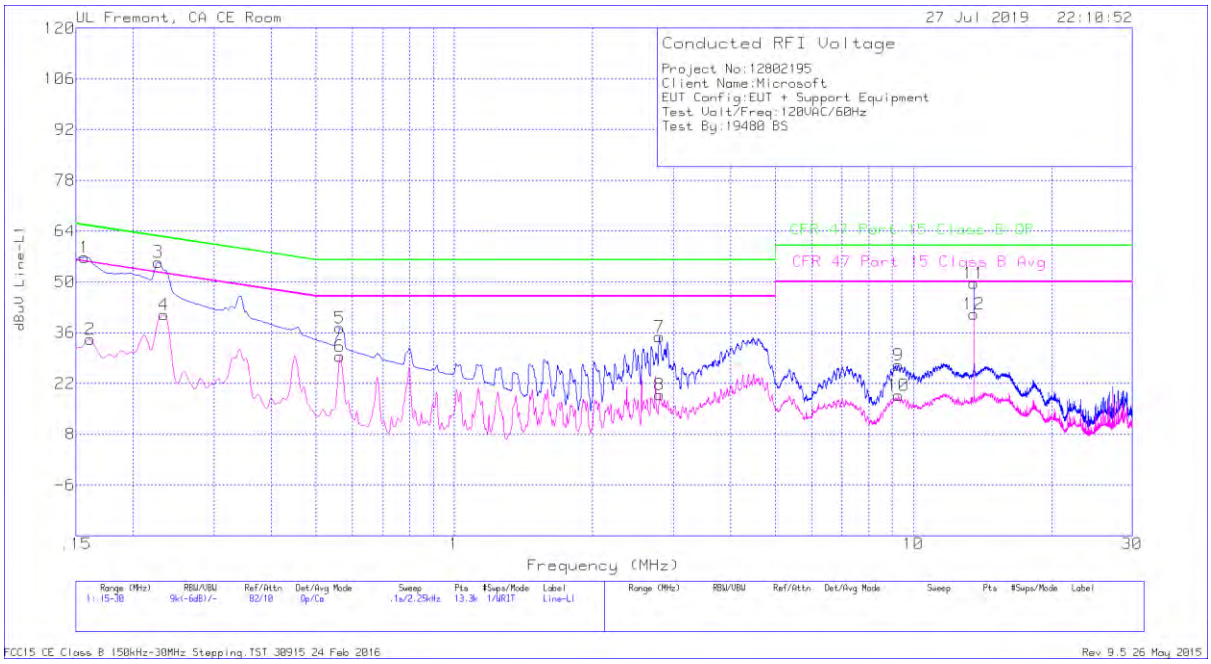
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS

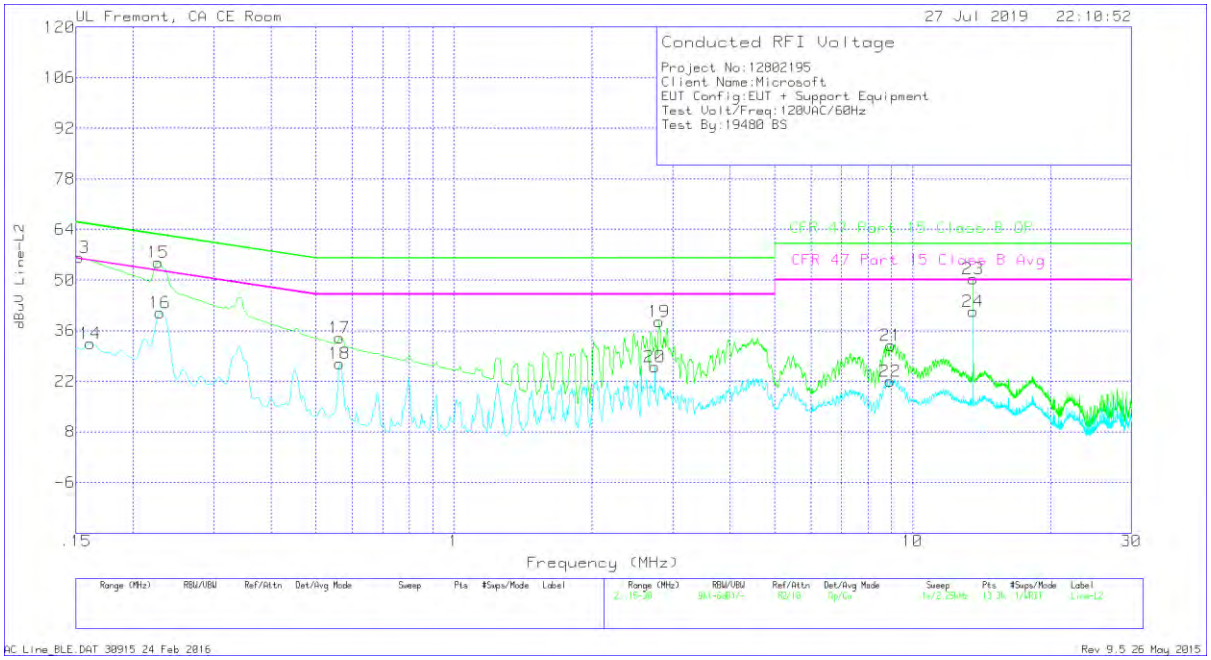


Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15675	46.63	Qp	.1	0	10.1	56.83	65.63	-8.8	-	-
2	.16125	23.94	Ca	.1	0	10.1	34.14	-	-	55.4	-21.26
3	.2265	45.37	Qp	0	0	10.1	55.47	62.58	-7.11	-	-
4	.23325	30.79	Ca	0	0	10.1	40.89	-	-	52.33	-11.44
5	.564	27.16	Qp	0	0	10.1	37.26	56	-18.74	-	-
6	.564	19.44	Ca	0	0	10.1	29.54	-	-	46	-16.46
7	2.79825	24.71	Qp	0	.1	10.1	34.91	56	-21.09	-	-
8	2.805	8.75	Ca	0	.1	10.1	18.95	-	-	46	-27.05
9	9.2895	16.7	Qp	0	.2	10.2	27.1	60	-32.9	-	-
10	9.2895	8.24	Ca	0	.2	10.2	18.64	-	-	50	-31.36
11	13.56	39.08	Qp	.1	.2	10.2	49.58	60	-10.42	-	-
12	13.56	30.62	Ca	.1	.2	10.2	41.12	-	-	50	-8.88

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



Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.15225	46.1	Qp	.1	0	10.1	56.3	65.88	-9.58	-	-
14	.16125	22.28	Ca	.1	0	10.1	32.48	-	-	55.4	-22.92
15	.2265	44.81	Qp	0	0	10.1	54.91	62.58	-7.67	-	-
16	.22875	30.83	Ca	0	0	10.1	40.93	-	-	52.49	-11.56
17	.564	23.83	Qp	0	0	10.1	33.93	56	-22.07	-	-
18	.564	16.72	Ca	0	0	10.1	26.82	-	-	46	-19.18
19	2.80275	28.28	Qp	0	.1	10.1	38.48	56	-17.52	-	-
20	2.74425	15.78	Ca	0	.1	10.1	25.98	-	-	46	-20.02
21	8.97225	21.54	Qp	0	.2	10.2	31.94	60	-28.06	-	-
22	8.93175	11.57	Ca	0	.2	10.2	21.97	-	-	50	-28.03
23	13.56	39.91	Qp	.1	.2	10.2	50.41	60	-9.59	-	-
24	13.56	30.88	Ca	.1	.2	10.2	41.38	-	-	50	-8.62

Qp - Quasi-Peak detector
Ca - CISPR average detection
NOTE: Markers 23 and 24, 13.56MHz is an external NFC signal unrelated to the EUT.