CERTIFICATION TEST REPORT

Report Number. : 12371351-E3V1

Applicant	**:**	SONY MOBILE COMMUNICATIONS, INC. 4-12-3 HIGASHI-SHINAGAWA SHINAGAWA-KU, TOKYO, 140-0002, JAPAN
FCC ID	**:**	PY7-26828G
EUT Description	**:**	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC
Test Standard(s)	**:**	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
July 06, 2018

Prepared by:
UL Verification Services Inc.
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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	7/6/2018	Initial Issue	

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1. ATTESTATION OF TEST RESULTS

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

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

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

DATE TESTED: June 21 – July 2, 2018

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

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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CONSUMER TECHNOLOGY DIVISION
Operations Leader
UL Verification Services Inc.

Reviewed By:

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CONSUMER TECHNOLOGY DIVISION
Project Engineer
UL Verification Services Inc

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v4 and ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and at 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

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

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

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

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

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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

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

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

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE (1Mbps)	5.88	3.87
2402 - 2480	BLE (2Mbps)	6.19	4.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was s_atp_0_ 00436_A_12_16
The test utility software used during testing was Tera Term Ver 4.79

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

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

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

I/O CABLES (CONDUCTED TEST)

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

I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

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

TEST SETUP

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

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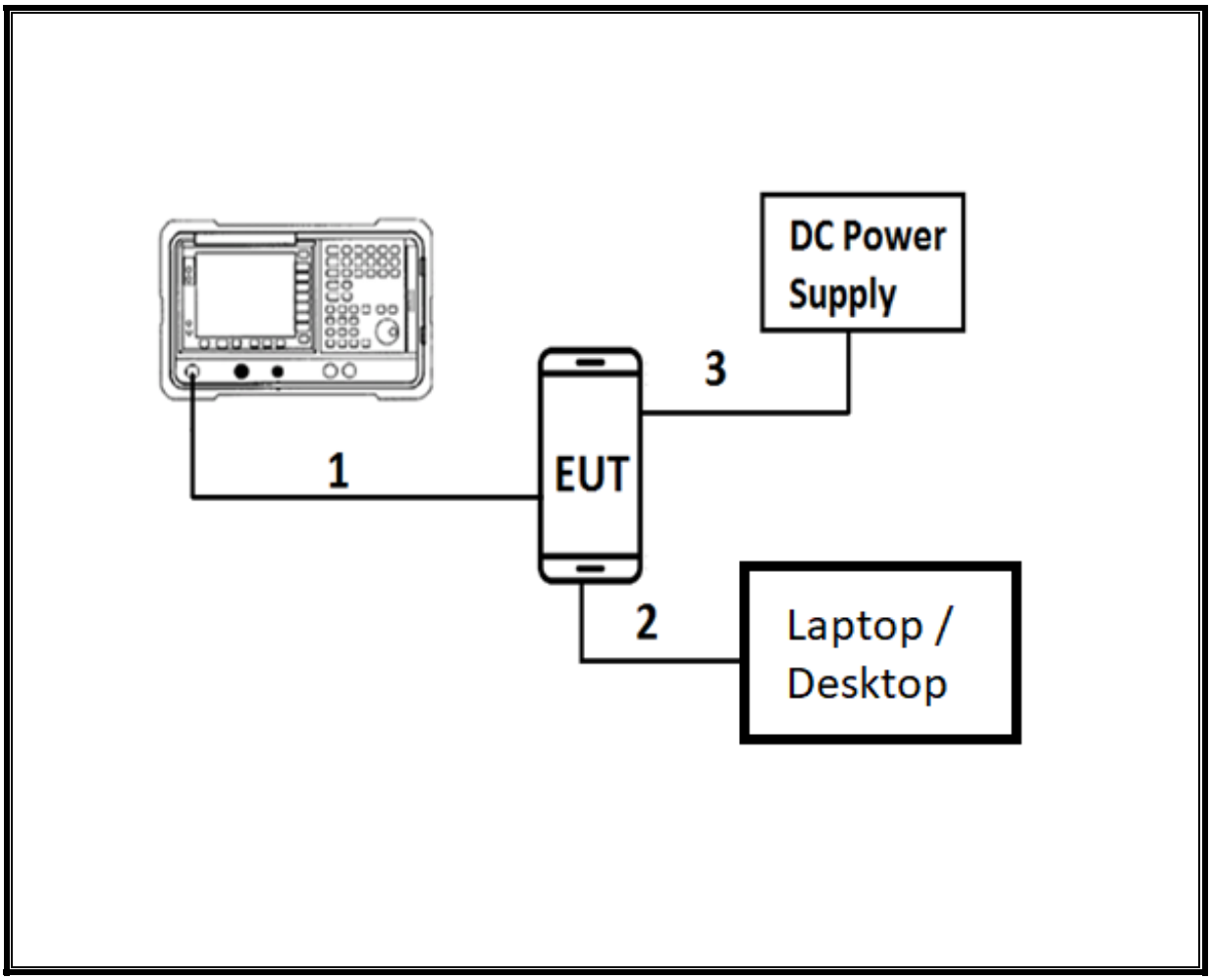
CONDCUTED TEST SETUP DIAGRAM



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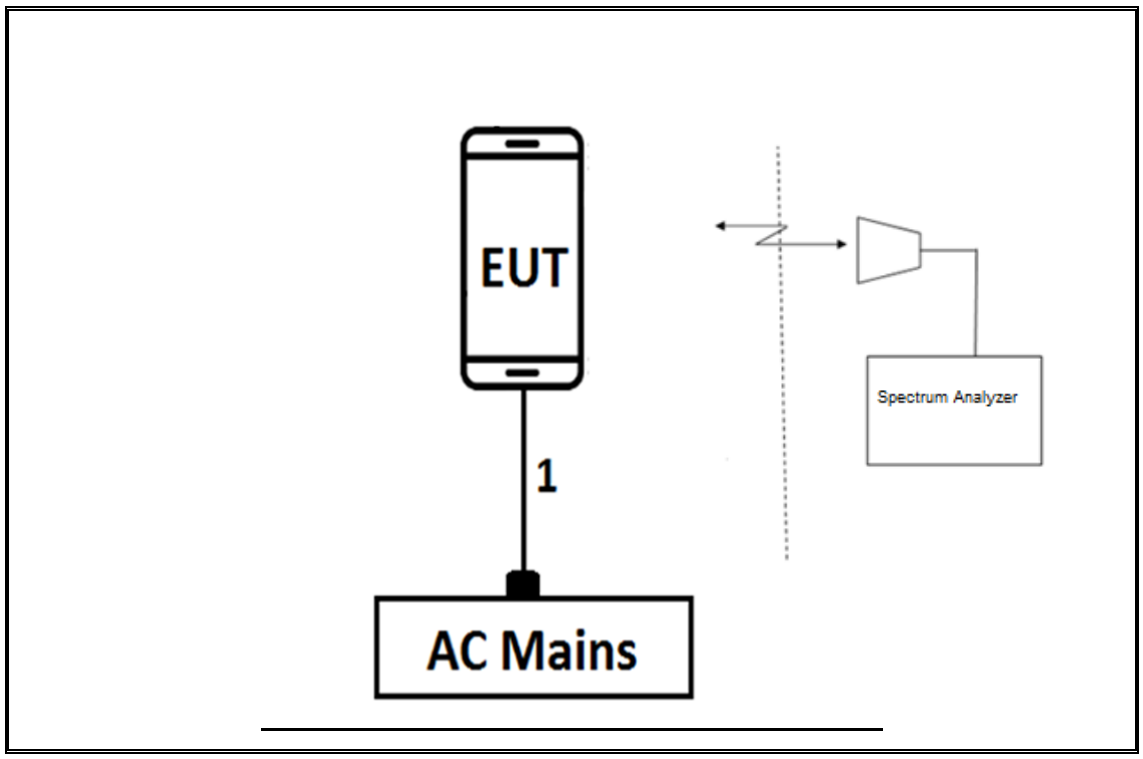
RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



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6. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB BW: KDB 558074 D01 v04, Section 8.1.

Output Power: KDB 558074 D01 v04, Section 9.1.3.

Power Spectral Density: KDB 558074 D01 v04, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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

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

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

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

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 (1Mbps)	2.140	2.500	0.856	85.60%	0.68	0.467
BLE (2Mbps)	1.078	1.876	0.575	57.46%	2.41	0.928

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DUTY CYCLE PLOTS

BLE (1Mbps)

BLE (2Mbps)

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8.2. 99% BANDWIDTH

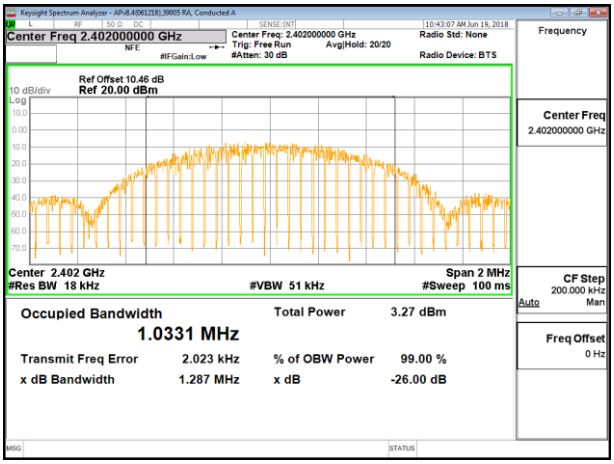
LIMITS

None; for reporting purposes only.

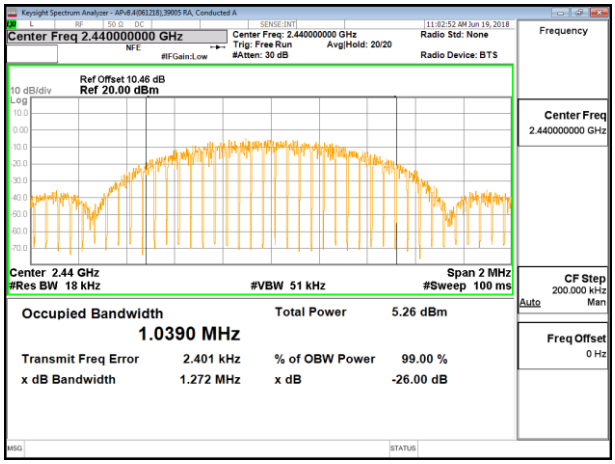
RESULTS

8.2.1. BLE (1Mbps)

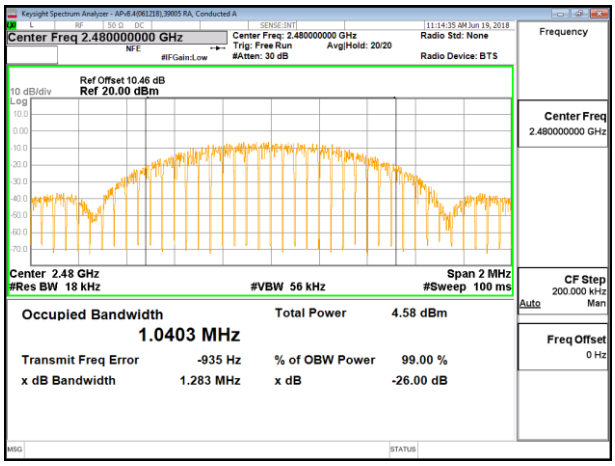
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0331
Middle	2440	1.0390
High	2480	**1.0403**



LOW CHANNEL



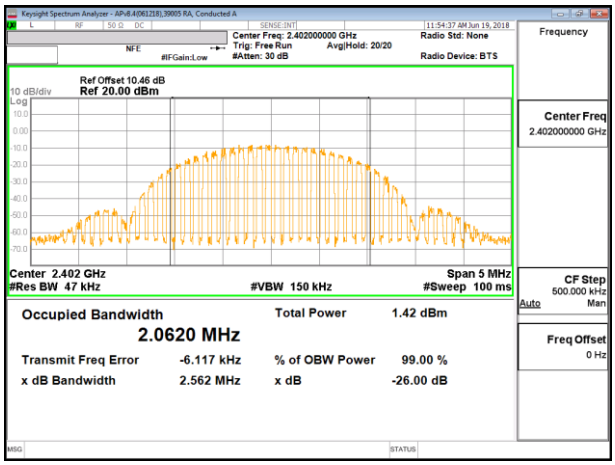
MID CHANNEL



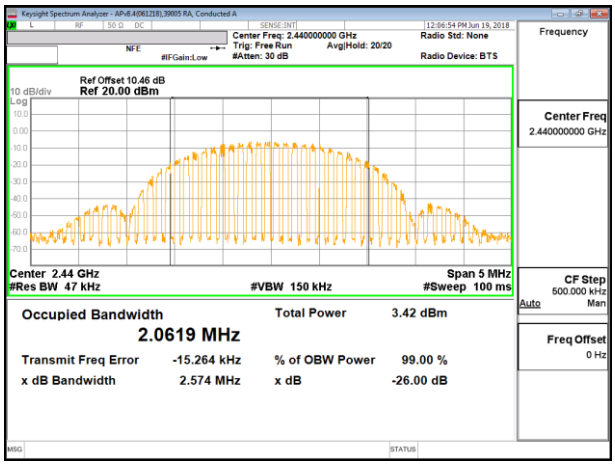
HIGH CHANNEL

8.2.2. BLE (2Mbps)

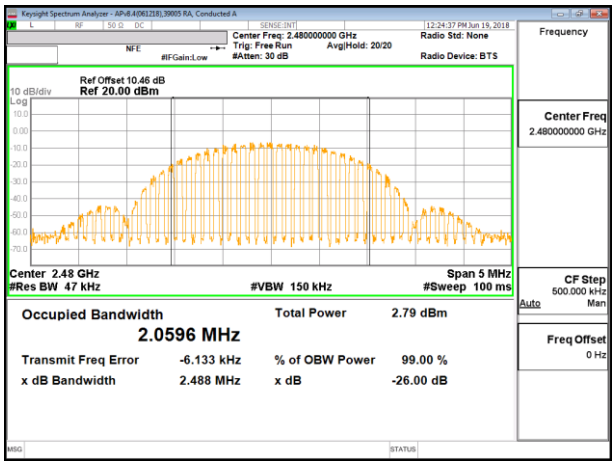
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	**2.0620**
Middle	2440	2.0619
High	2480	2.0596



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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8.3. 6 dB BANDWIDTH

LIMITS

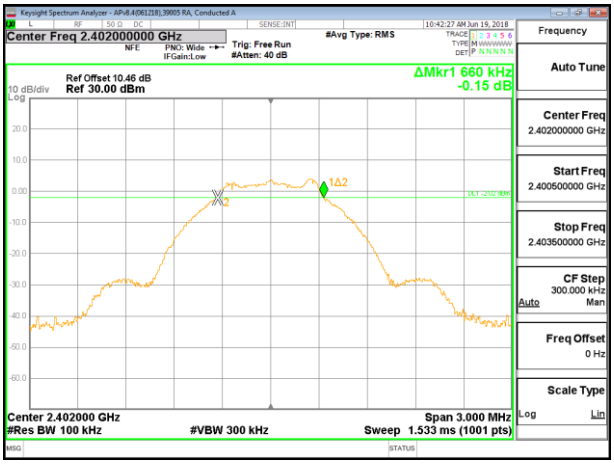
FCC §15.407 (e)

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

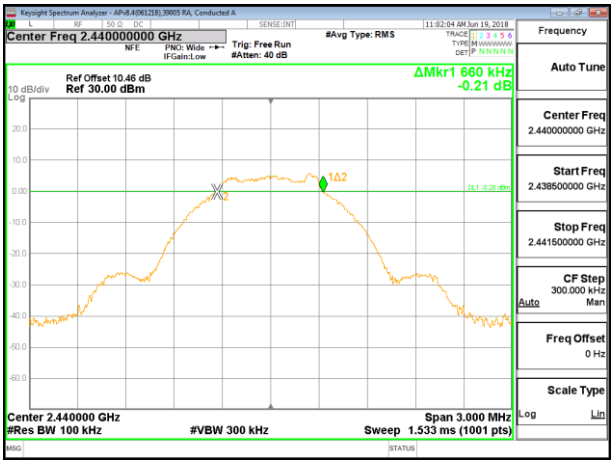
RESULTS

8.3.1. BLE (1Mbps)

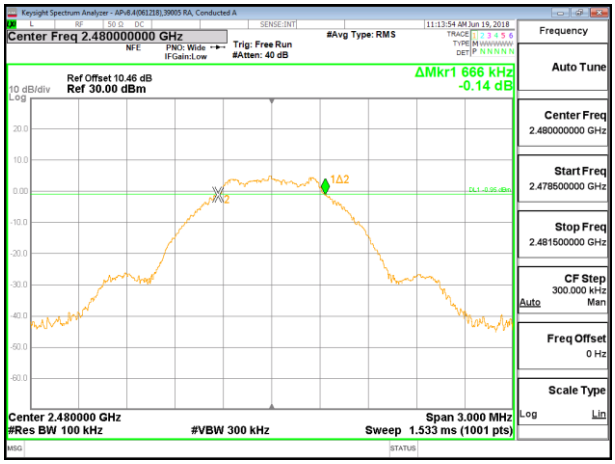
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.660	0.5
Middle	2440	0.660	0.5
High	2480	**0.666**	0.5



LOW CHANNEL



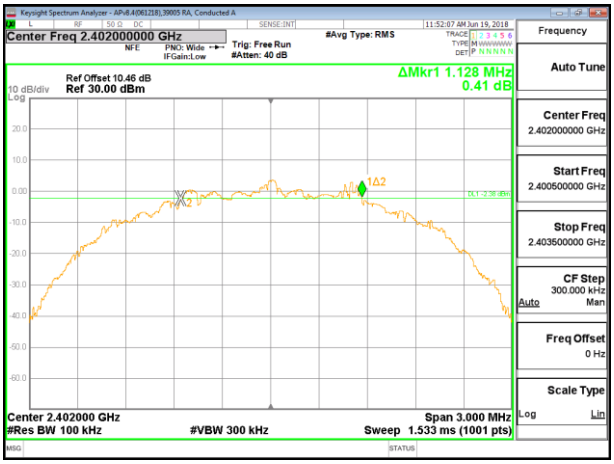
MID CHANNEL



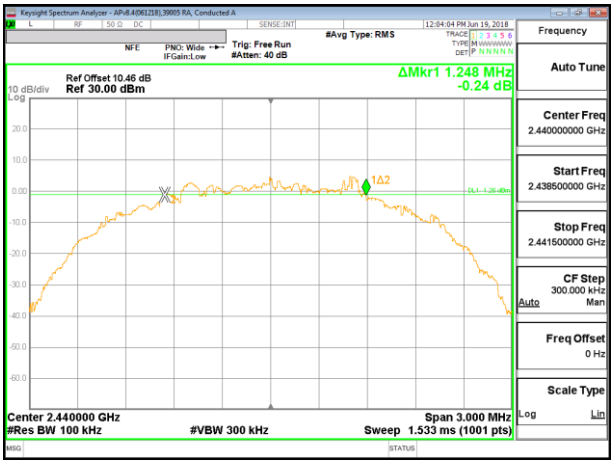
HIGH CHANNEL

8.3.2. BLE (2Mbps)

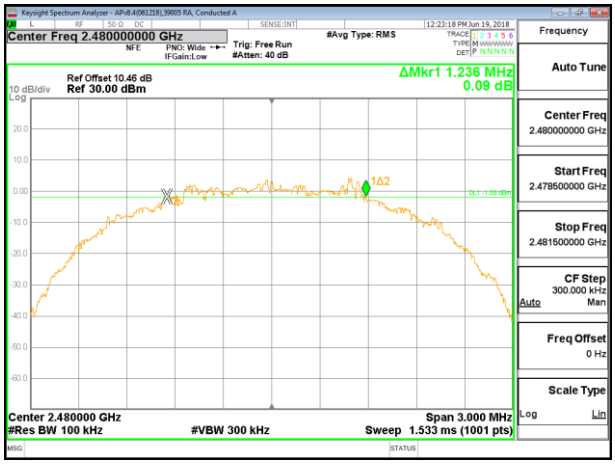
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.128	0.5
Middle	2440	**1.248**	0.5
High	2480	1.236	0.5



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

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 gated peak reading of power.

RESULTS

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8.4.1. BLE (1Mbps)

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

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.90	30	-26.100
Middle	2440	**5.88**	30	-24.120
High	2480	5.40	30	-24.600

8.4.2. BLE (2Mbps)

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

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.20	30	-25.800
Middle	2440	**6.19**	30	-23.810
High	2480	5.74	30	-24.260

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

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8.5.1. BLE (1Mbps)

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

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.69
Middle	2440	**5.67**
High	2480	5.19

8.5.2. BLE (2Mbps)

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

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.68
Middle	2440	**5.71**
High	2480	5.21

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8.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

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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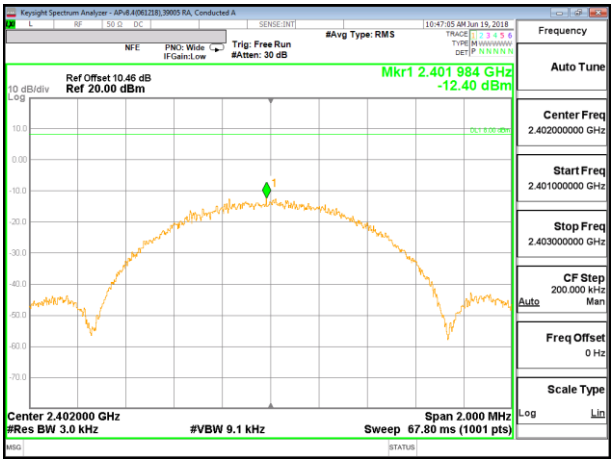
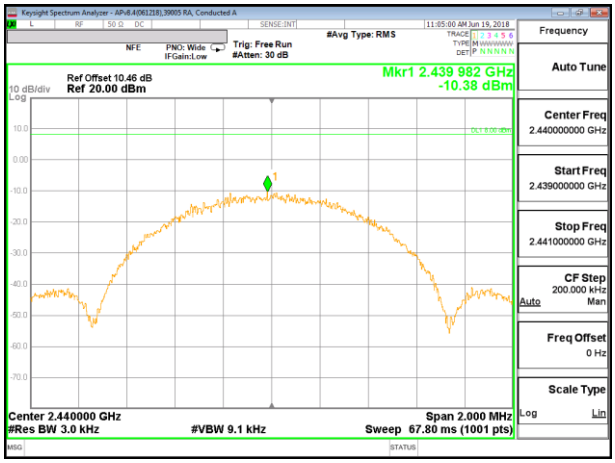
8.6.1. BLE (1Mbps)

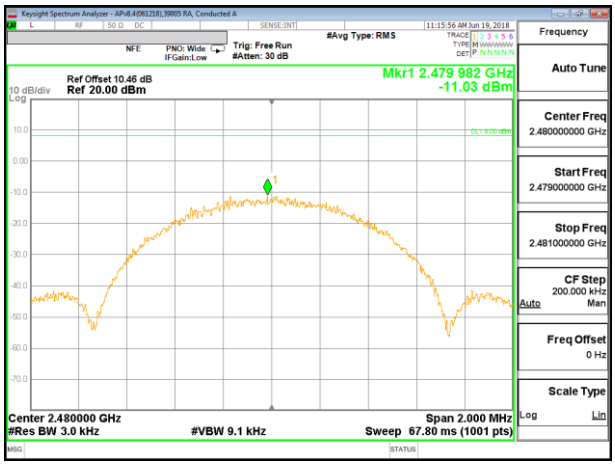
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-12.40	8	-20.40
Middle	2440	**-10.38**	8	-18.38
High	2480	-11.03	8	-19.03



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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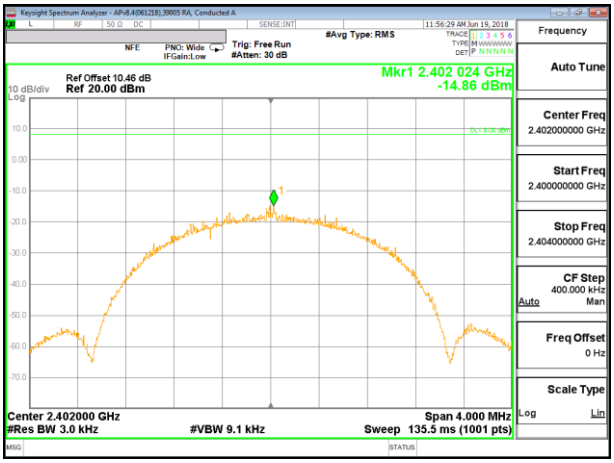
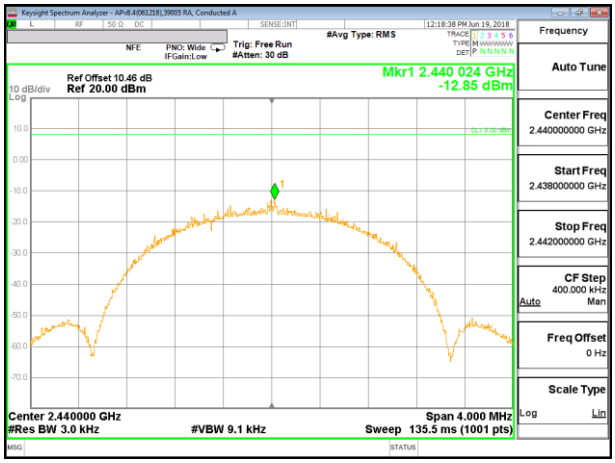
8.6.2. BLE (2Mbps)

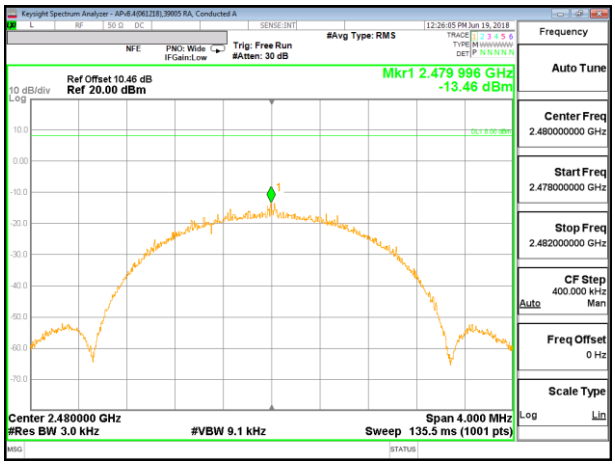
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-14.86	8	-22.86
Middle	2440	**-12.85**	8	-20.85
High	2480	-13.46	8	-21.46



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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8.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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

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.

RESULTS

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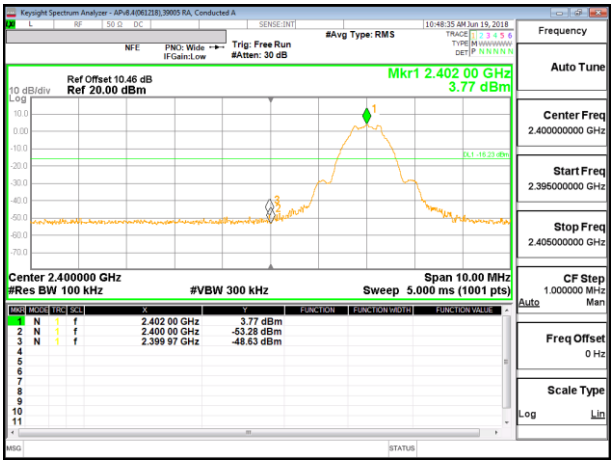
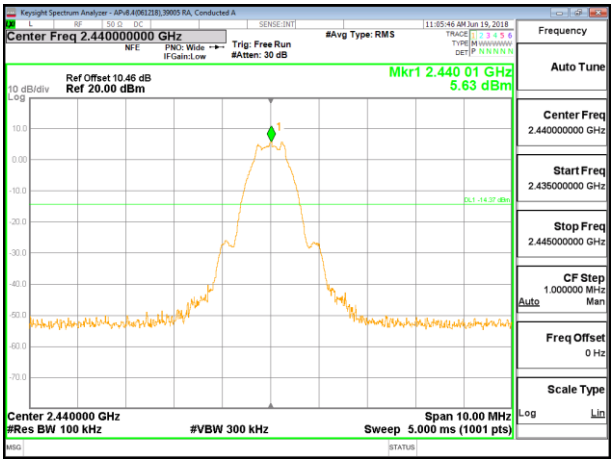
8.7.1. BLE (1Mbps)



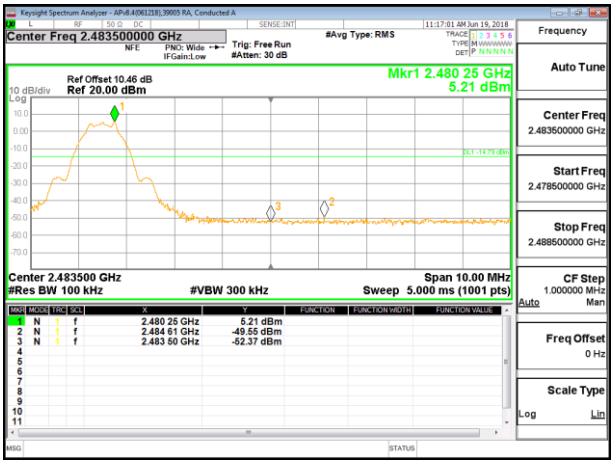
LOW CHANNEL BANDEDGE

OUT-OF-BAND LOW CHANNEL

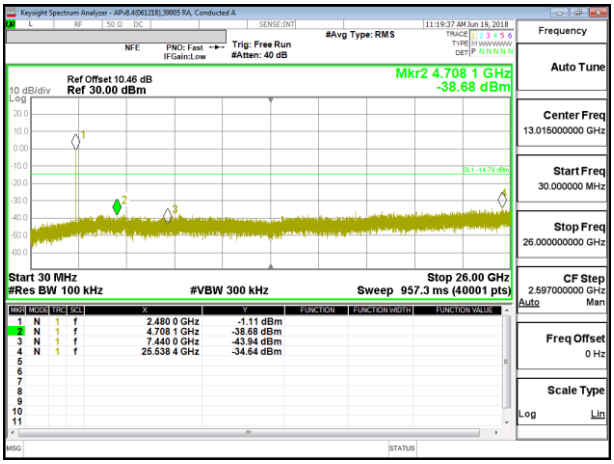


IN-BAND REFERENCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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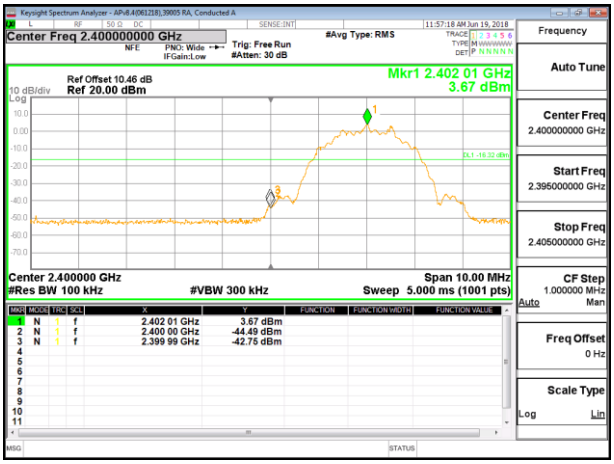
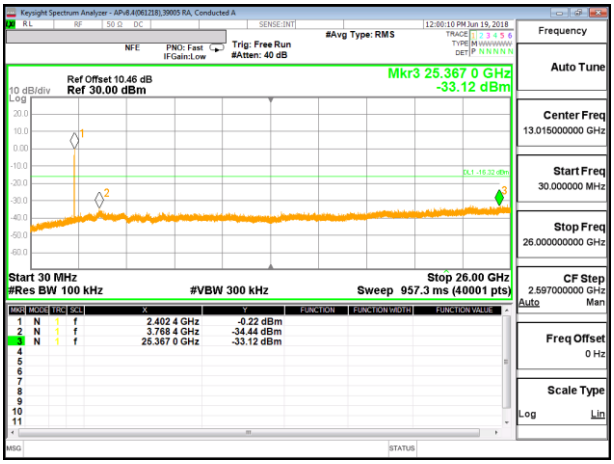
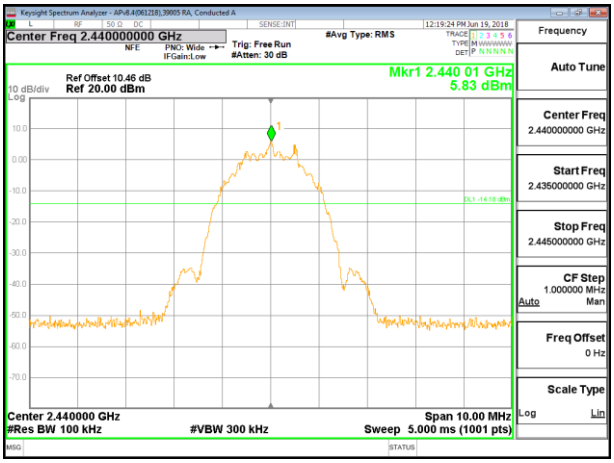
8.7.2. BLE (2Mbps)



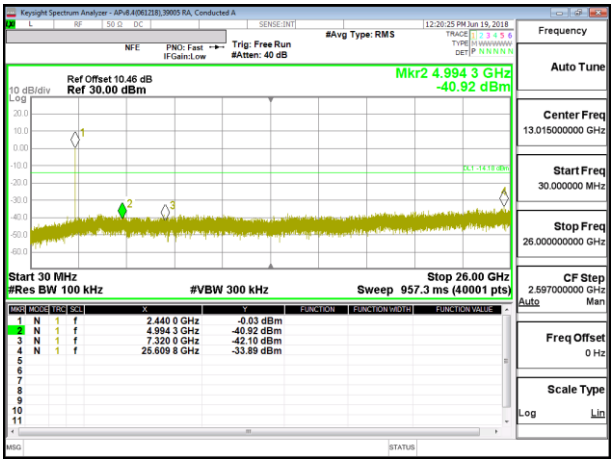
LOW CHANNEL BANDEDGE



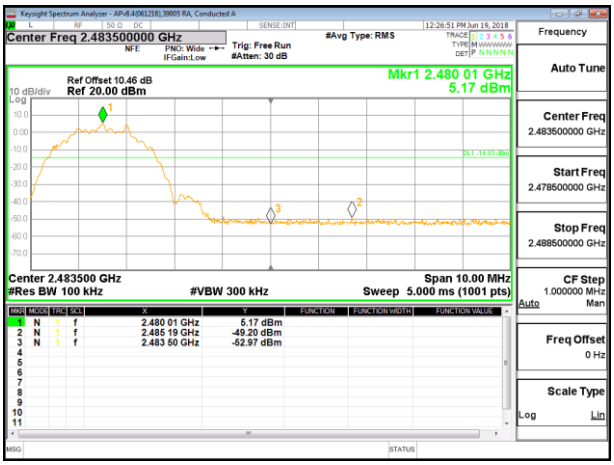
OUT-OF-BAND LOW CHANNEL



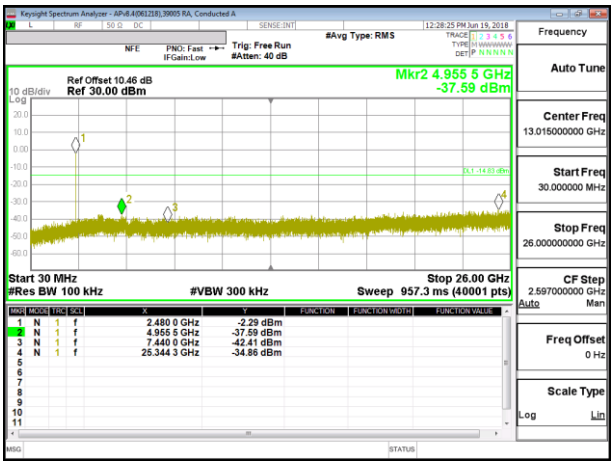
IN-BAND REFERENCE LEVEL



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

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 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.

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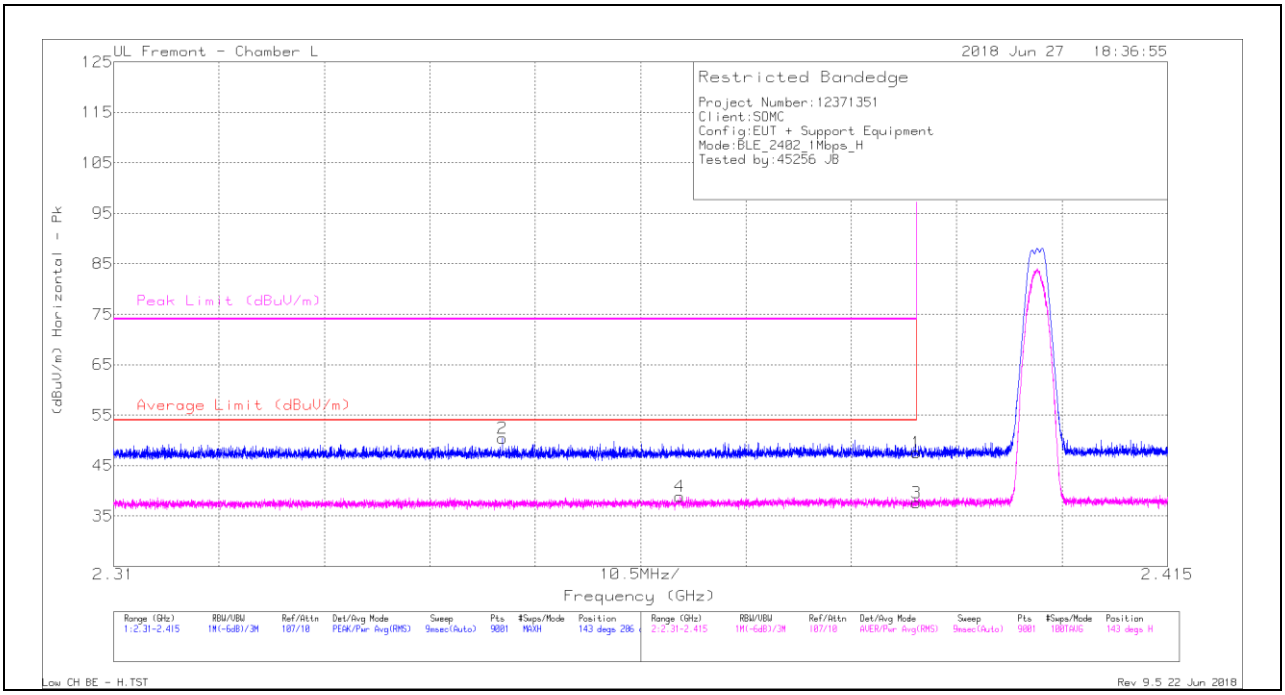
9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

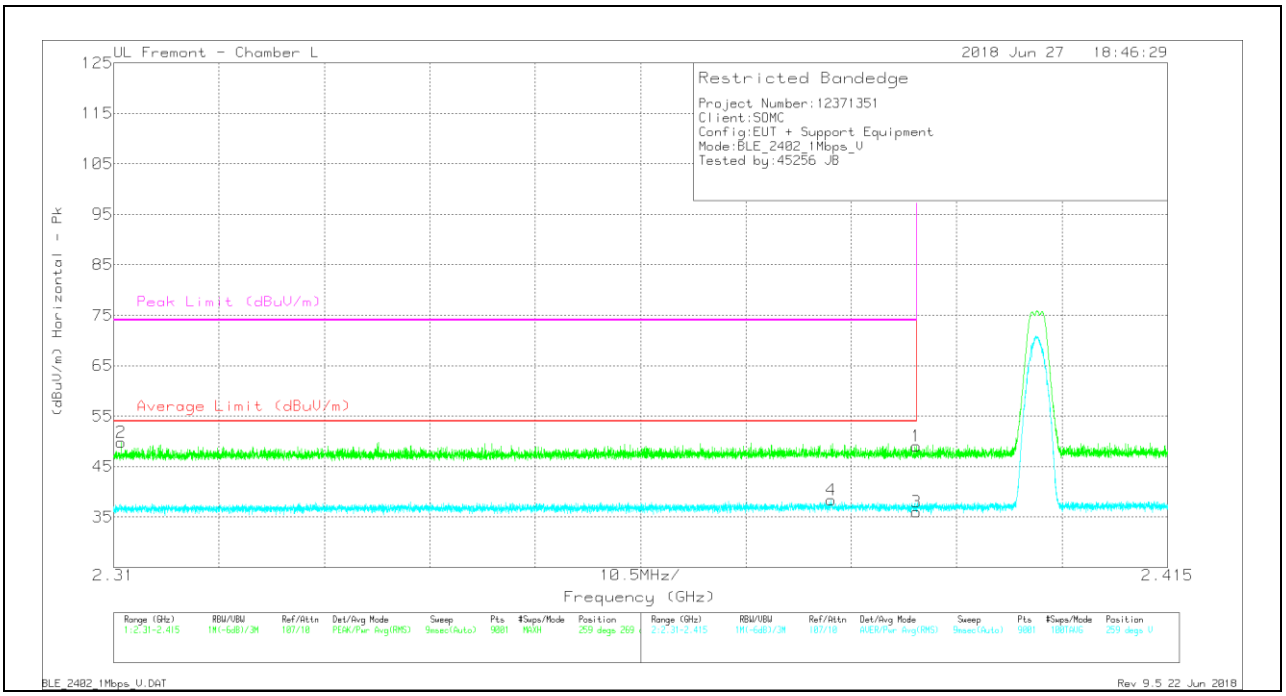


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.39	38.63	Pk	31.8	-22.9	0	47.53	-	-	74	-26.47	143	286	H
2	* 2.349	41.92	Pk	31.5	-23	0	50.42	-	-	74	-23.58	143	286	H
3	* 2.39	28.03	RMS	31.8	-22.9	.68	37.61	54	-16.39	-	-	143	286	H
4	* 2.366	29.51	RMS	31.6	-22.9	.68	38.89	54	-15.11	-	-	143	286	H

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

VERTICAL RESULT



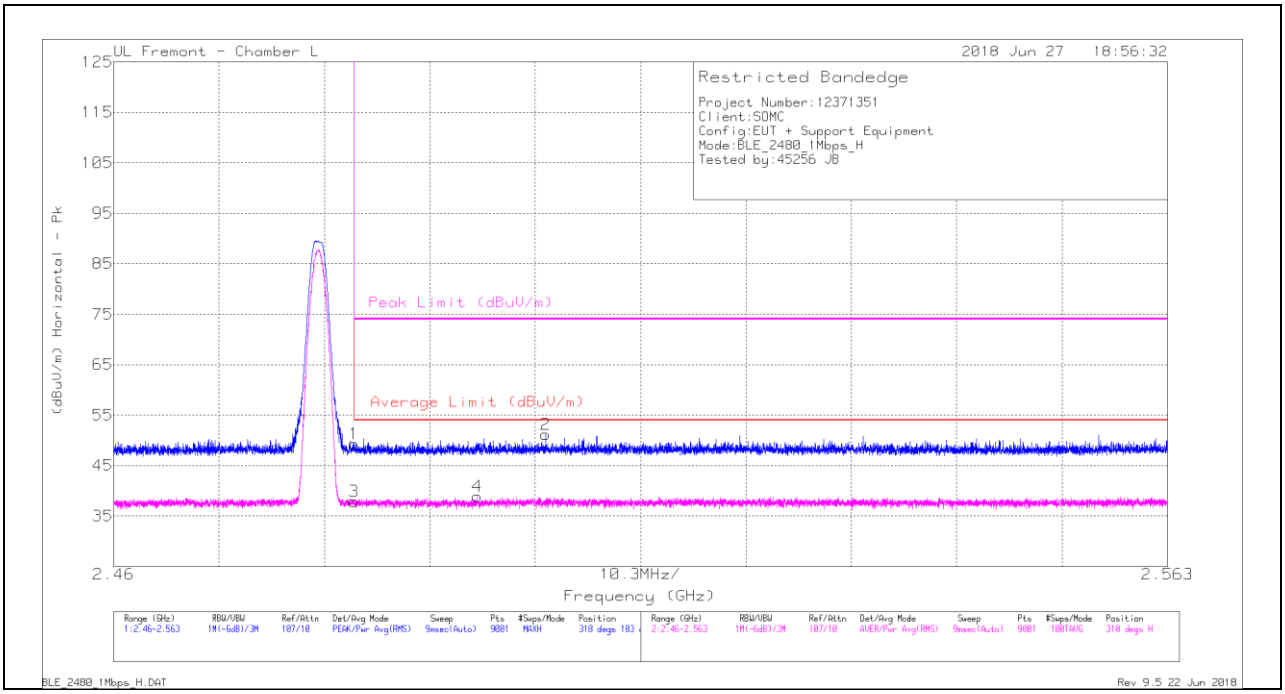
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.39	40.11	Pk	31.8	-22.9	0	49.01	-	-	74	-24.99	259	269	V
2	* 2.311	41.44	Pk	31.5	-23.1	0	49.84	-	-	74	-24.16	259	269	V
3	* 2.39	27.16	RMS	31.8	-22.9	.68	36.74	54	-17.26	-	-	259	269	V
4	* 2.381	29.53	RMS	31.7	-22.9	.68	39.01	54	-14.99	-	-	259	269	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

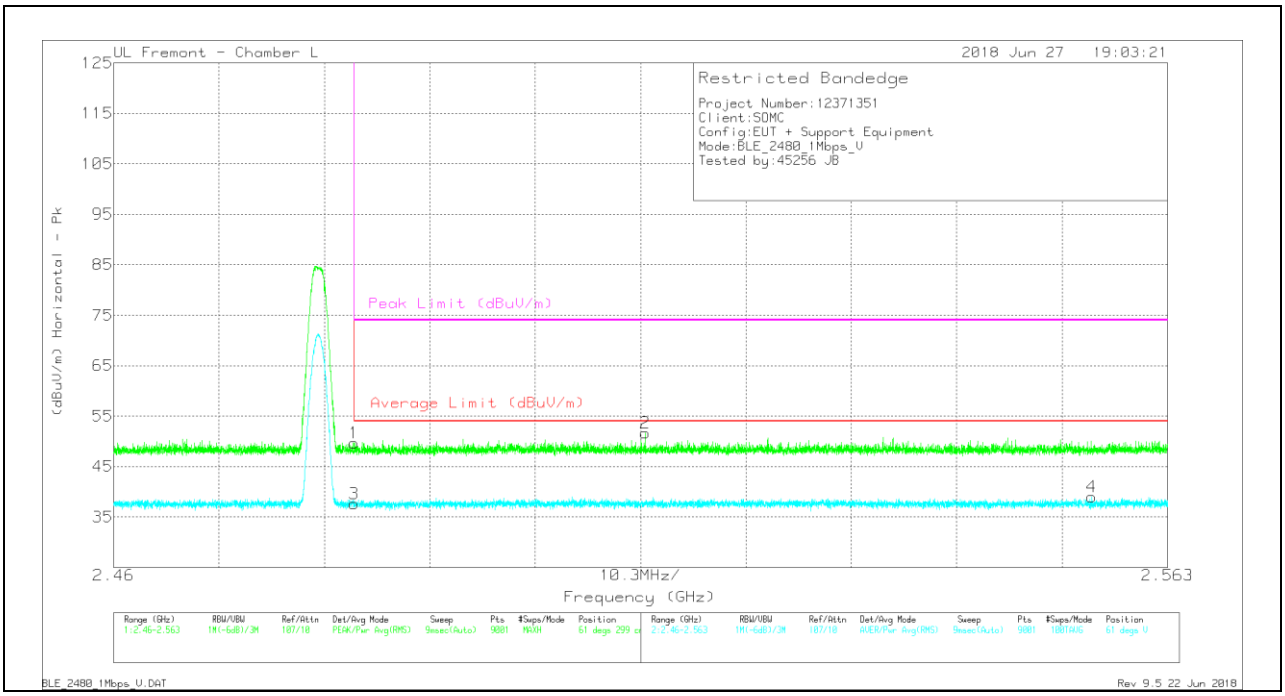


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.484	39.65	Pk	32.3	-22.7	0	49.25	-	-	74	-24.75	318	183	H
2	2.502	41.48	Pk	32.3	-22.6	0	51.18	-	-	74	-22.82	318	183	H
3	* 2.484	28.23	RMS	32.3	-22.7	.68	38.51	54	-15.49	-	-	318	183	H
4	* 2.496	29.28	RMS	32.3	-22.7	.68	39.56	54	-14.44	-	-	318	183	H

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

VERTICAL RESULT



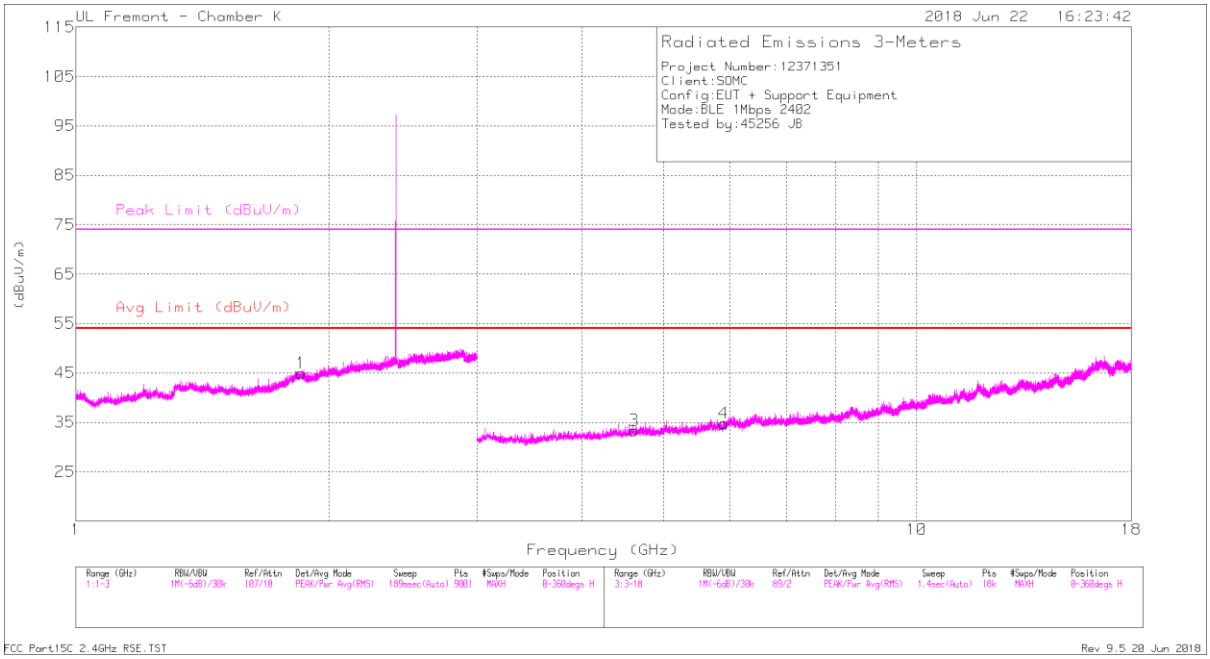
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.484	40.08	Pk	32.3	-22.7	0	49.68	-	-	74	-24.32	61	299	V
2	2.512	41.93	Pk	32.3	-22.6	0	51.63	-	-	74	-22.37	61	299	V
3	* 2.484	28.03	RMS	32.3	-22.7	.68	38.31	54	-15.69	-	-	61	299	V
4	2.556	29.32	RMS	32.4	-22.7	.68	39.7	54	-14.3	-	-	61	299	V

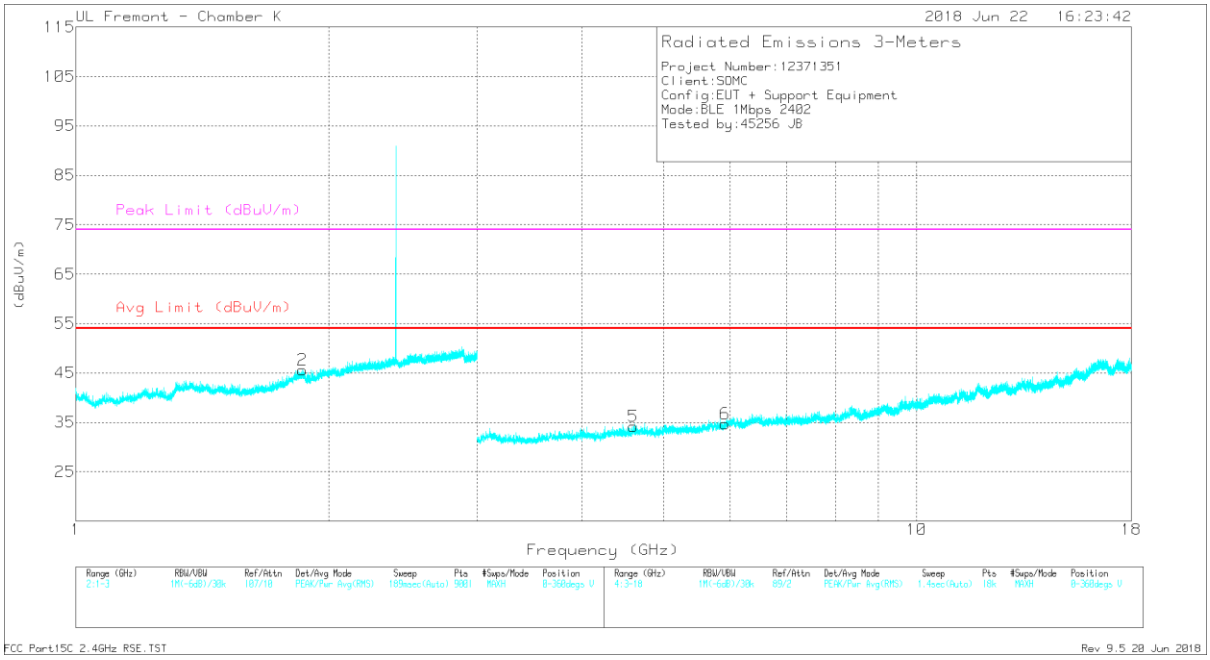
* - indicates frequency in CFR47 Pt 15 Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZTONAL



VERTICAL

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RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB)	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	1.853	30.25	PK2	30.4	-9	0	51.65	-	-	-	-	31	157	H
2	1.861	30.1	PK2	30.4	-9.1	0	51.4	-	-	-	-	12	246	V
3	* 4.613	38.04	PK2	34.1	-31.4	0	40.74	-	-	74	-33.26	51	244	H
	* 4.614	28.73	MAv1	34.1	-31.5	.68	32.01	54	-21.99	-	-	51	244	H
4	5.896	36.78	PK2	35.1	-29.3	0	42.58	-	-	-	-	259	300	H
5	* 4.602	38.64	PK2	34.1	-31.5	0	41.24	-	-	74	-32.76	352	167	V
	* 4.602	29.09	MAv1	34.1	-31.5	.68	32.37	54	-21.63	-	-	352	167	V
6	5.918	36.5	PK2	35.1	-29.2	0	42.4	-	-	-	-	132	310	V

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

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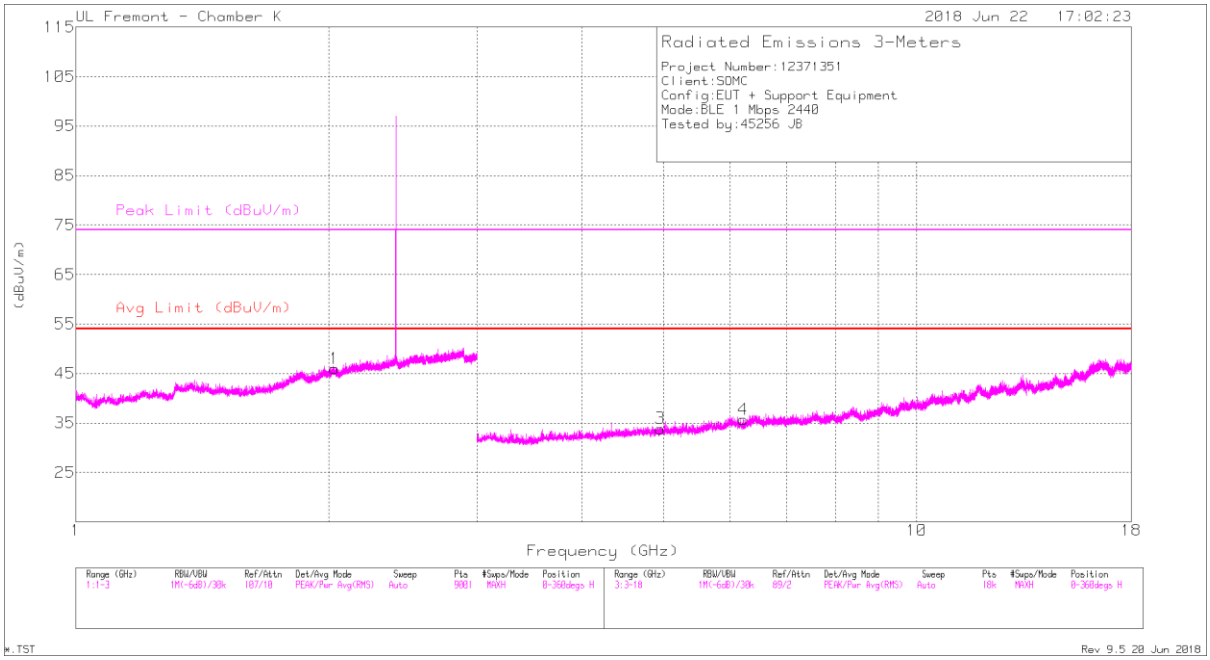
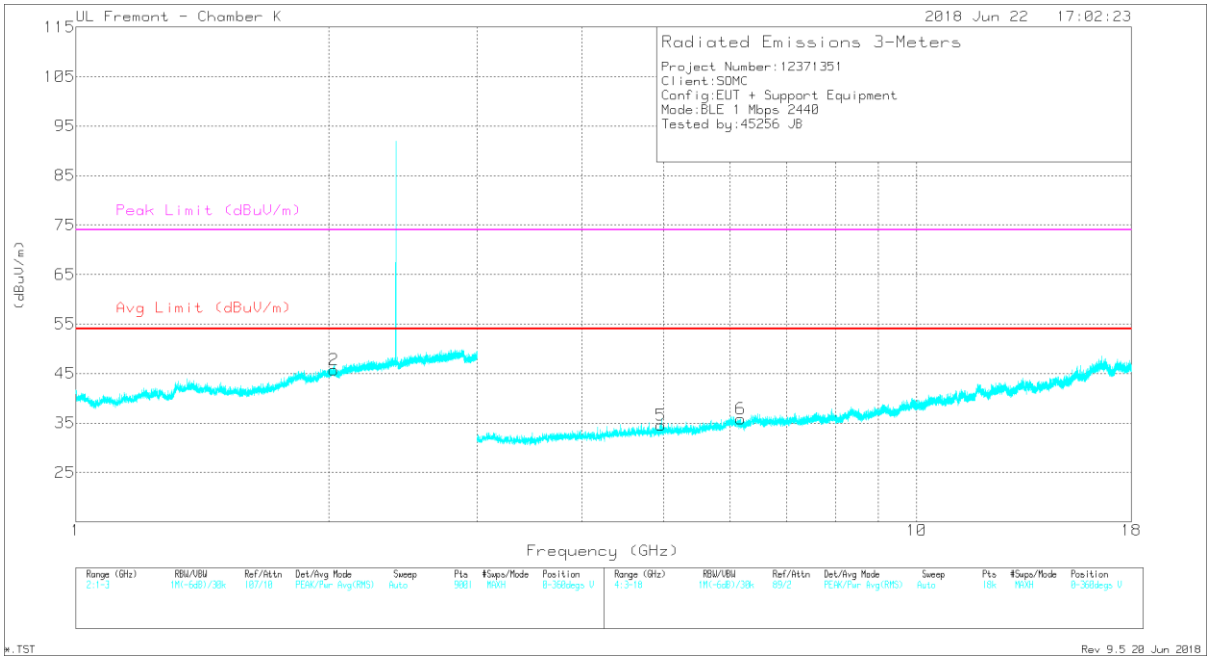
MID CHANNEL RESULTS



HORIZTONAL



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RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB)	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	2.033	29.19	PK2	31.2	-8.6	0	51.79	-	-	-	-	281	291	H
2	2.027	28.91	PK2	31.1	-8.5	0	51.51	-	-	-	-	38	107	V
3	* 4.954	38.05	PK2	34.2	-31.2	0	41.05	-	-	74	-32.95	298	108	H
	* 4.954	28.59	MAv1	34.2	-31.2	.68	32.27	54	-21.73	-	-	298	108	H
4	6.217	36.25	PK2	35.2	-28.6	0	42.85	-	-	-	-	280	276	H
5	* 4.968	38.23	PK2	34.2	-31.2	0	41.23	-	-	74	-32.77	187	268	V
	* 4.967	28.99	MAv1	34.2	-31.2	.68	32.67	54	-21.33	-	-	187	268	V
6	6.175	37.24	PK2	35.3	-28.4	0	44.14	-	-	-	-	205	363	V

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

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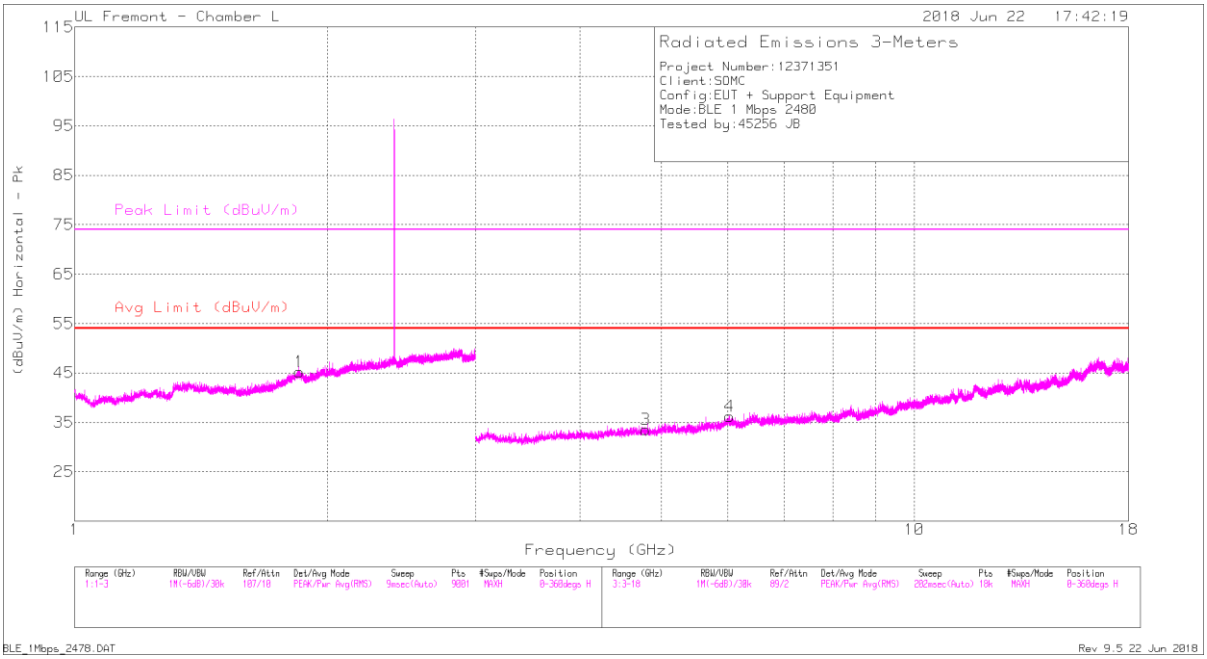
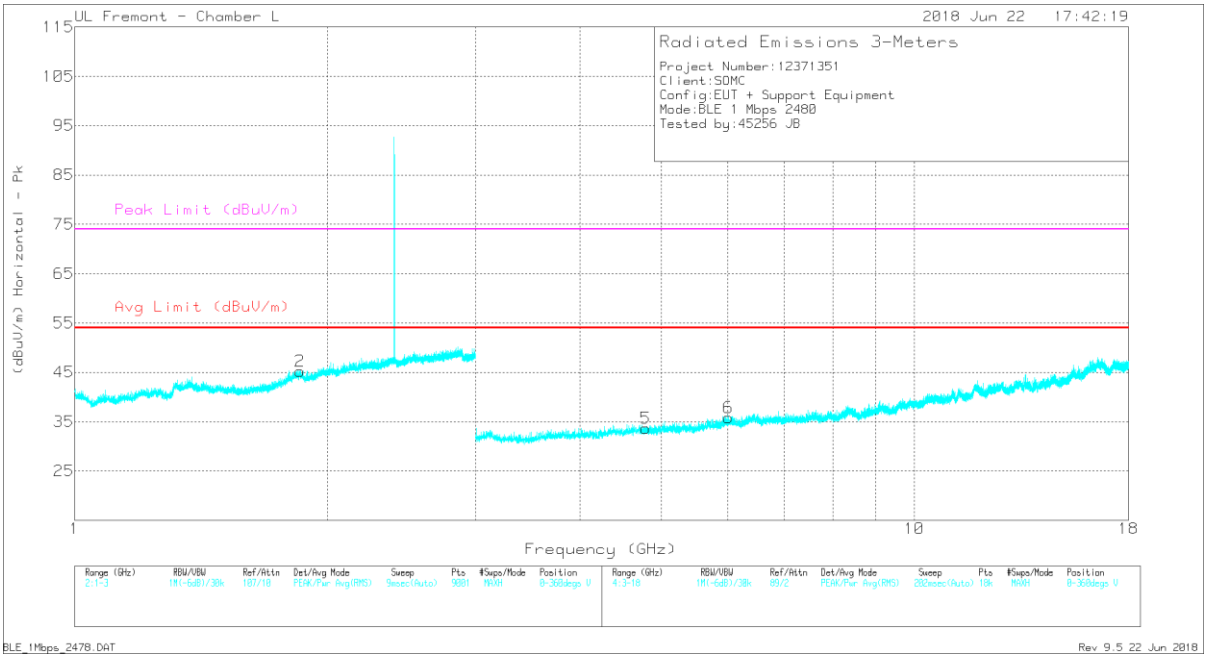
HIGH CHANNEL RESULTS



HORIZTONAL



VERTICAL

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RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB)	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	1.852	31.38	PK2	30.4	-9	0	52.78	-	-	-	-	351	170	H
2	1.856	30.23	PK2	30.4	-9.1	0	51.53	-	-	-	-	140	322	V
3	* 4.793	37.7	PK2	34.2	-30.8	0	41.1	-	-	74	-32.9	110	158	H
	* 4.791	28.09	MAv1	34.2	-30.8	.68	32.17	54	-21.83	-	-	110	158	H
4	6.025	35.45	PK2	35.2	-28.1	0	42.55	-	-	-	-	101	392	H
5	* 4.79	38.01	PK2	34.2	-30.7	0	41.51	-	-	74	-32.49	349	147	V
	* 4.789	28.01	MAv1	34.2	-30.7	.68	32.19	54	-21.81	-	-	349	147	V
6	6.008	35.93	PK2	35.2	-28.1	0	43.03	-	-	-	-	0	232	V

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

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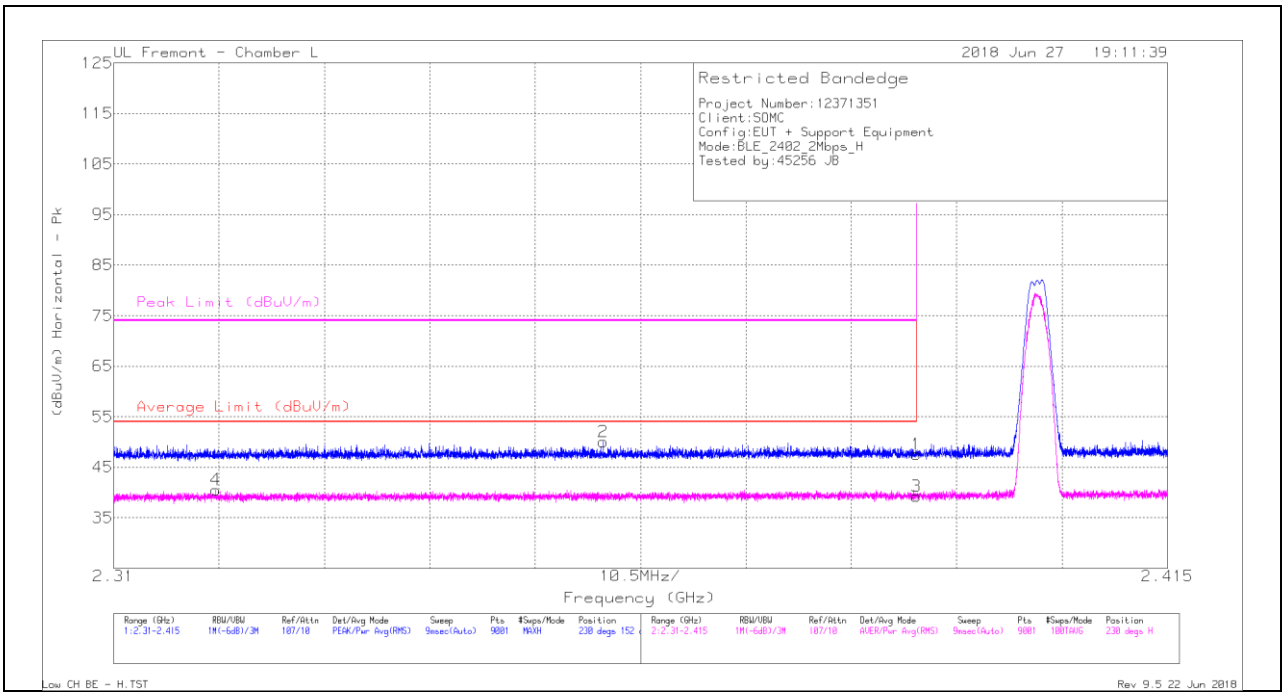
9.2.2. BLE (2Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

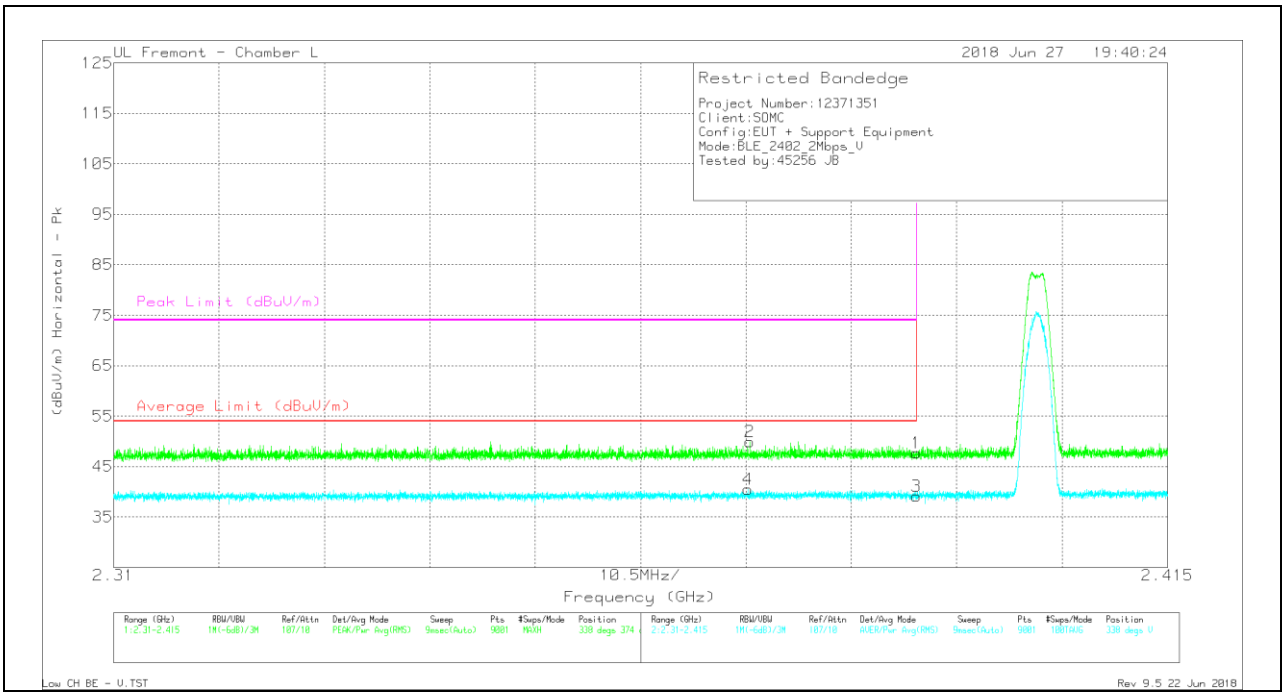


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.39	38.68	Pk	31.8	-22.9	0	47.58	-	-	74	-26.42	230	152	H
2	* 2.359	41.35	Pk	31.6	-22.9	0	50.05	-	-	74	-23.95	230	152	H
3	* 2.39	27.95	RMS	31.8	-22.9	2.41	39.26	54	-14.74	-	-	230	152	H
4	* 2.32	29.73	RMS	31.5	-23.1	2.41	40.54	54	-13.46	-	-	230	152	H

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.39	38.77	Pk	31.8	-22.9	0	47.67	-	-	74	-26.33	338	374	V
2	* 2.373	41.14	Pk	31.7	-22.9	0	49.94	-	-	74	-24.06	338	374	V
3	* 2.39	27.86	RMS	31.8	-22.9	2.41	39.17	54	-14.83	-	-	338	374	V
4	* 2.373	29.28	RMS	31.7	-22.9	2.41	40.49	54	-13.51	-	-	338	374	V

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

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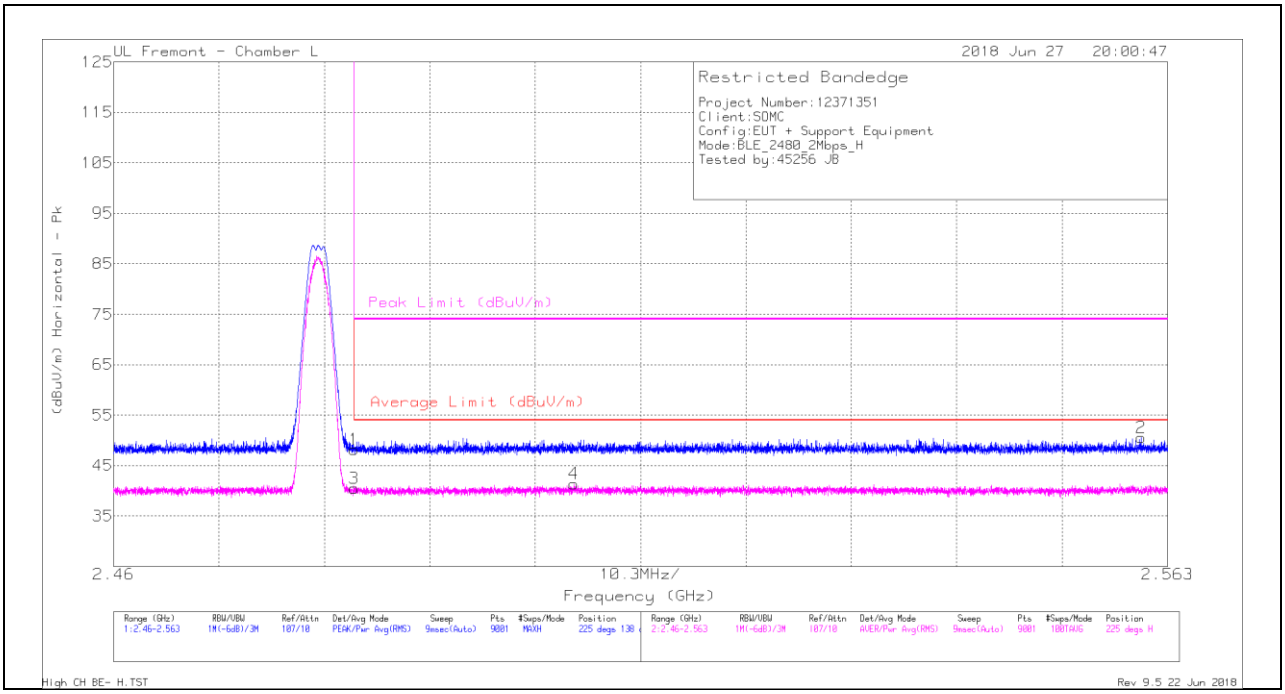
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

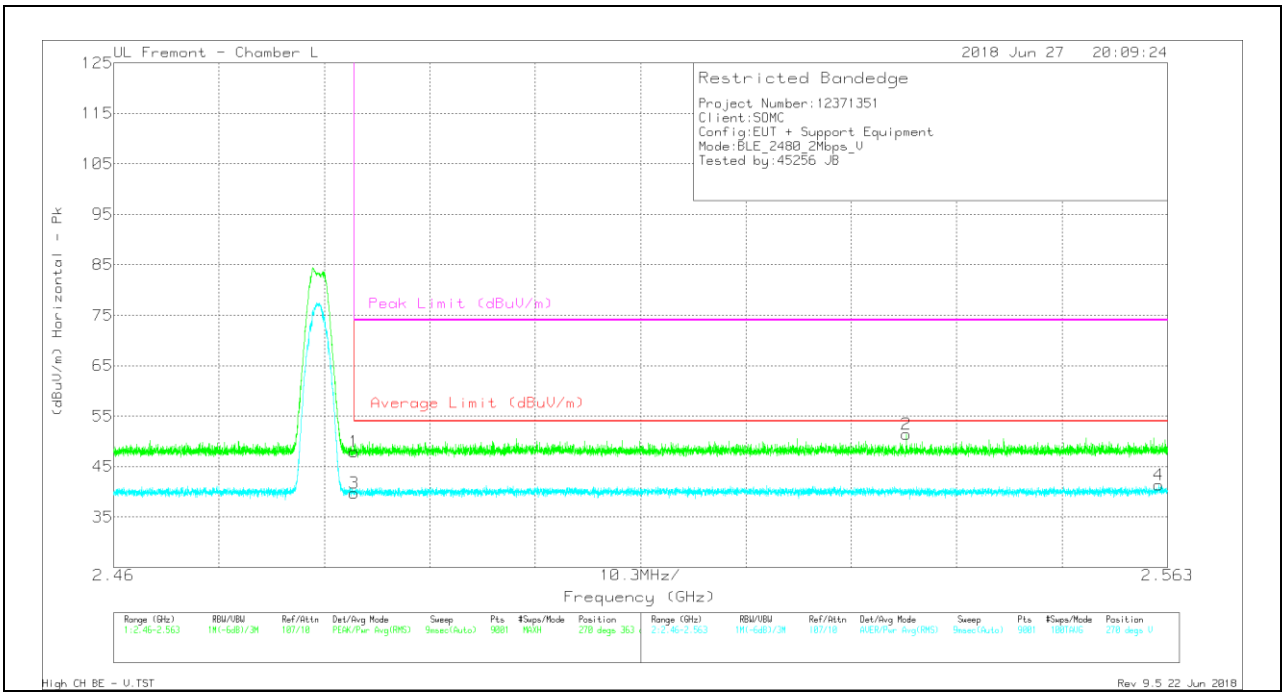


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.484	38.6	Pk	32.3	-22.7	0	48.2	-	-	74	-25.8	225	138	H
2	2.56	40.77	Pk	32.4	-22.6	0	50.57	-	-	74	-23.43	225	138	H
3	* 2.484	28.43	RMS	32.3	-22.7	2.41	40.44	54	-13.56	-	-	225	138	H
4	2.505	29.3	RMS	32.3	-22.6	2.41	41.41	54	-12.59	-	-	225	138	H

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

VERTICAL RESULT



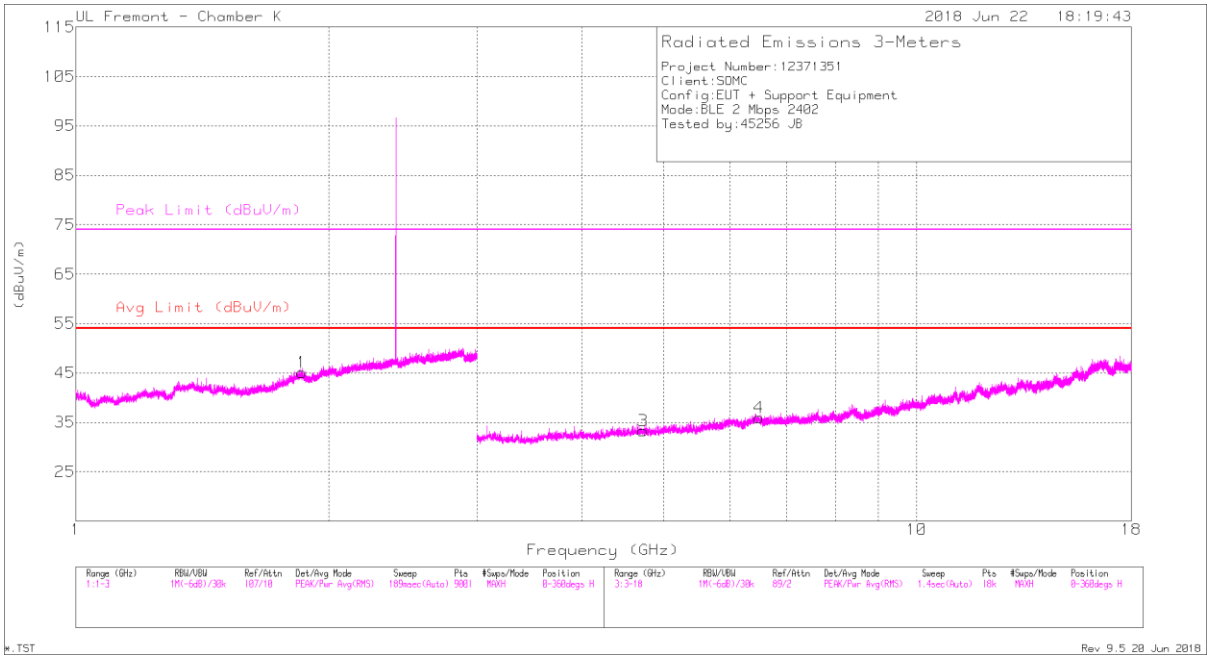
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (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	* 2.484	38.36	Pk	32.3	-22.7	0	47.96	-	-	74	-26.04	270	363	V
2	2.537	41.81	Pk	32.3	-22.7	0	51.41	-	-	74	-22.59	270	363	V
3	* 2.484	27.73	RMS	32.3	-22.7	2.41	39.74	54	-14.26	-	-	270	363	V
4	2.562	29.17	RMS	32.4	-22.6	2.41	41.38	54	-12.62	-	-	270	363	V

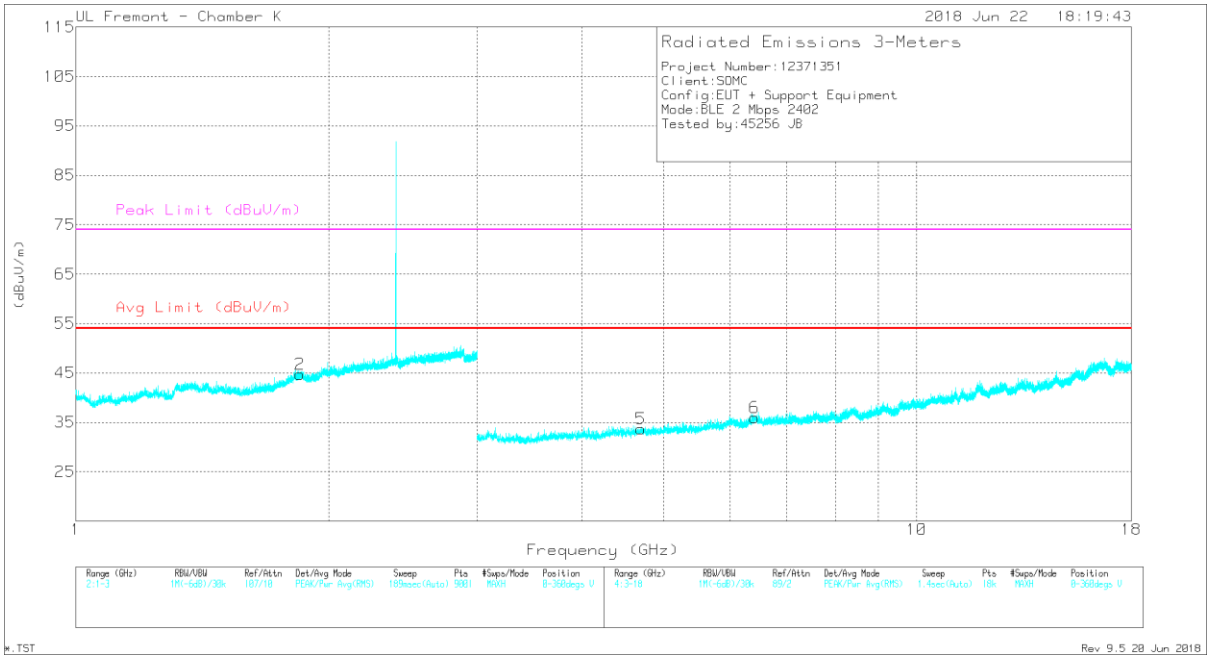
* - indicates frequency in CFR47 Pt 15 Restricted Band
Pk - Peak detector
RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB)	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	1.857	30.64	PK2	30.4	-9.1	0	51.94	-	-	-	-	29	124	H
2	1.845	29.71	PK2	30.4	-9	0	51.11	-	-	-	-	342	274	V
3	* 4.726	37.38	PK2	34.1	-30.8	0	40.68	-	-	74	-33.32	95	289	H
	* 4.728	28.38	MAv1	34.1	-30.7	2.41	34.19	54	-19.81	-	-	95	289	H
4	6.494	34.9	PK2	35.4	-27	0	43.3	-	-	-	-	260	178	H
5	* 4.7	38.24	PK2	34.1	-31.1	0	41.24	-	-	74	-32.76	248	272	V
	* 4.698	28.36	MAv1	34.1	-31.1	2.41	33.77	54	-20.23	-	-	248	272	V
6	6.413	35.01	PK2	35.4	-27	0	43.41	-	-	-	-	186	109	V

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

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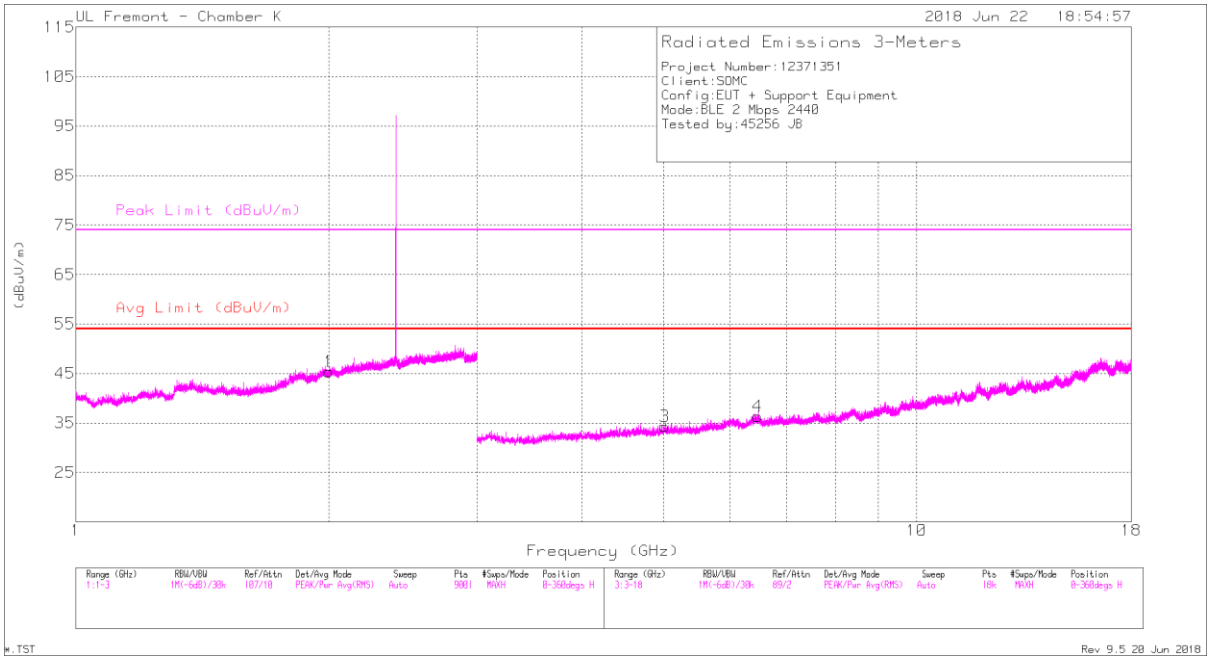
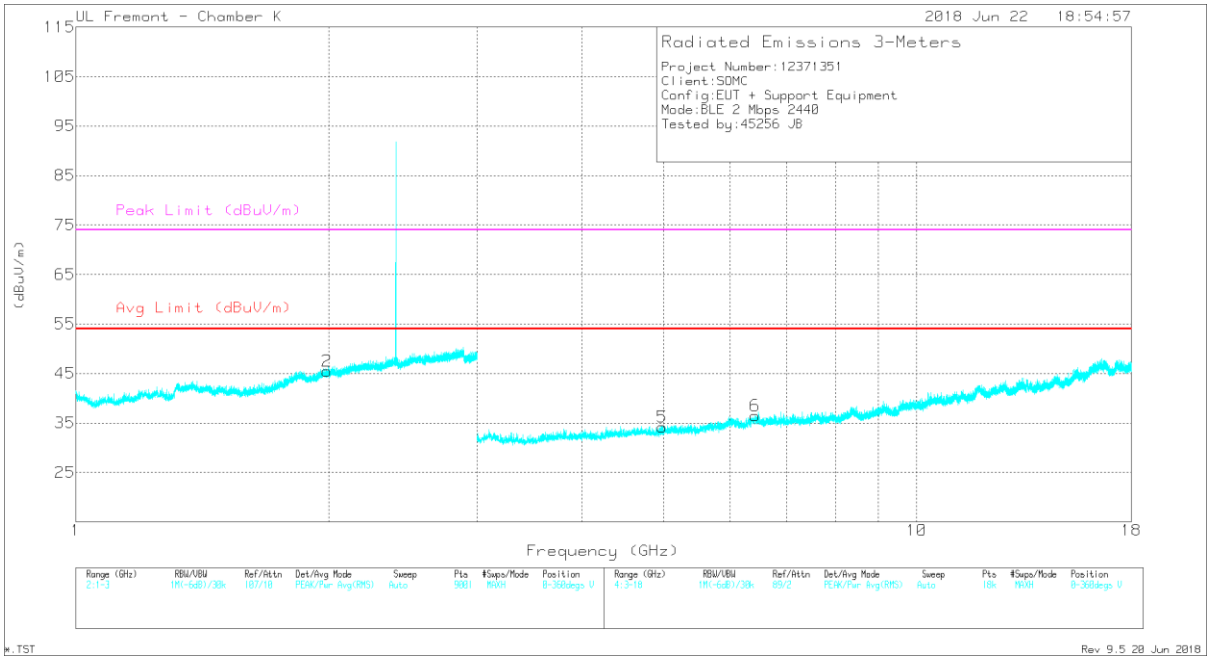
MID CHANNEL RESULTS



HORIZTONAL



VERTICAL

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RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB)	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	2	31.09	PK2	31	-8.6	0	53.49	-	-	-	-	310	236	H
2	1.991	29.48	PK2	31	-8.8	0	51.68	-	-	-	-	235	351	V
3	* 5.015	37.7	PK2	34.3	-31	0	41	-	-	74	-33	45	322	H
	* 5.015	28.87	MAv1	34.3	-31	2.41	34.58	54	-19.42	-	-	45	322	H
4	6.47	34.67	PK2	35.4	-27	0	43.07	-	-	-	-	197	258	H
5	* 4.98	37.72	PK2	34.2	-31	0	40.92	-	-	74	-33.08	303	204	V
	* 4.98	28.32	MAv1	34.2	-31	2.41	33.93	54	-20.07	-	-	303	204	V
6	6.424	34.68	PK2	35.4	-26.9	0	43.18	-	-	-	-	230	179	V

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

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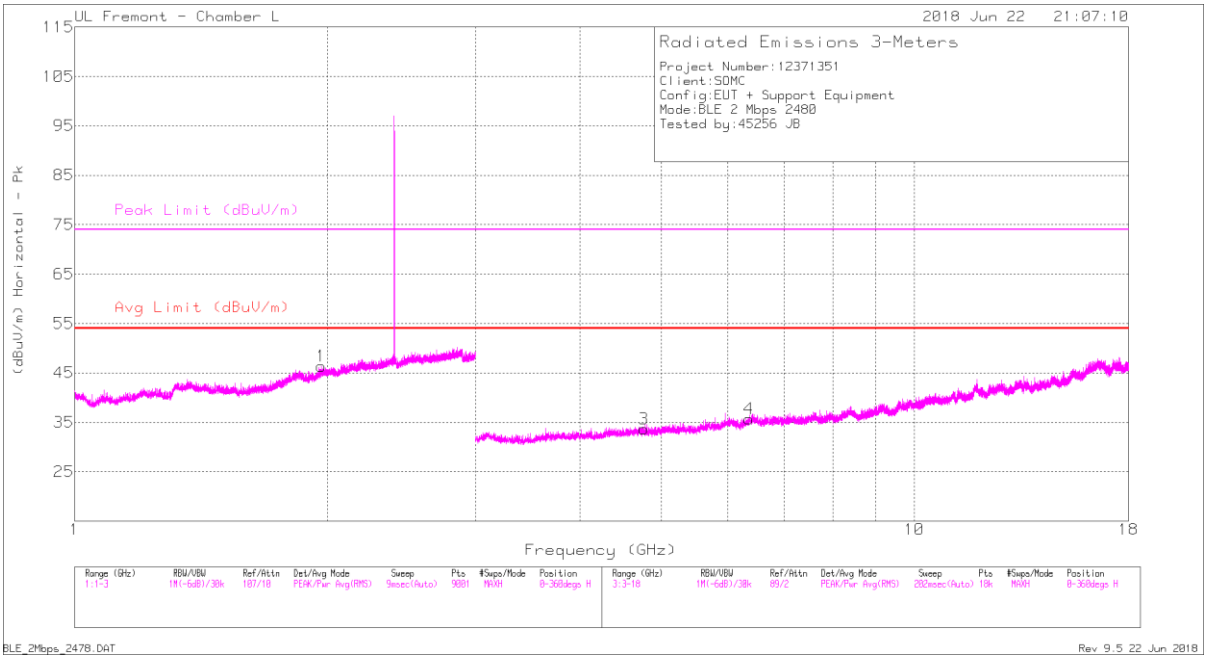
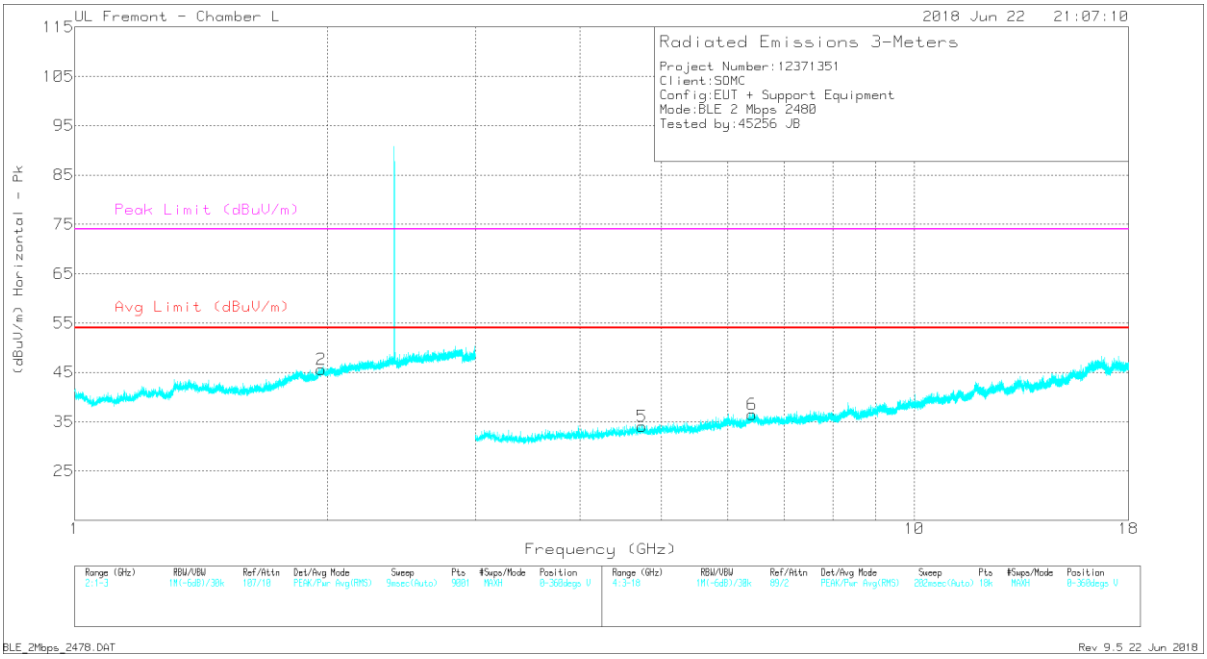
HIGH CHANNEL RESULTS



HORIZTONAL



VERTICAL

RADIATED EMISSIONS

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB)	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	1.966	29.62	PK2	30.9	-8.6	0	51.92	-	-	-	-	28	217	H
2	1.964	29.18	PK2	30.9	-8.7	0	51.38	-	-	-	-	242	262	V
3	* 4.763	38.17	PK2	34.1	-30.8	0	41.47	-	-	74	-32.53	33	302	H
	* 4.762	28.45	MAv1	34.1	-30.8	2.41	34.16	54	-19.84	-	-	33	302	H
4	6.357	35.35	PK2	35.4	-27.6	0	43.15	-	-	-	-	296	276	H
5	* 4.735	37.65	PK2	34.1	-30.9	0	40.85	-	-	74	-33.15	255	226	V
	* 4.738	28.23	MAv1	34.1	-30.9	2.41	33.84	54	-20.16	-	-	255	226	V
6	6.413	35.95	PK2	35.4	-27	0	44.35	-	-	-	-	197	236	V

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

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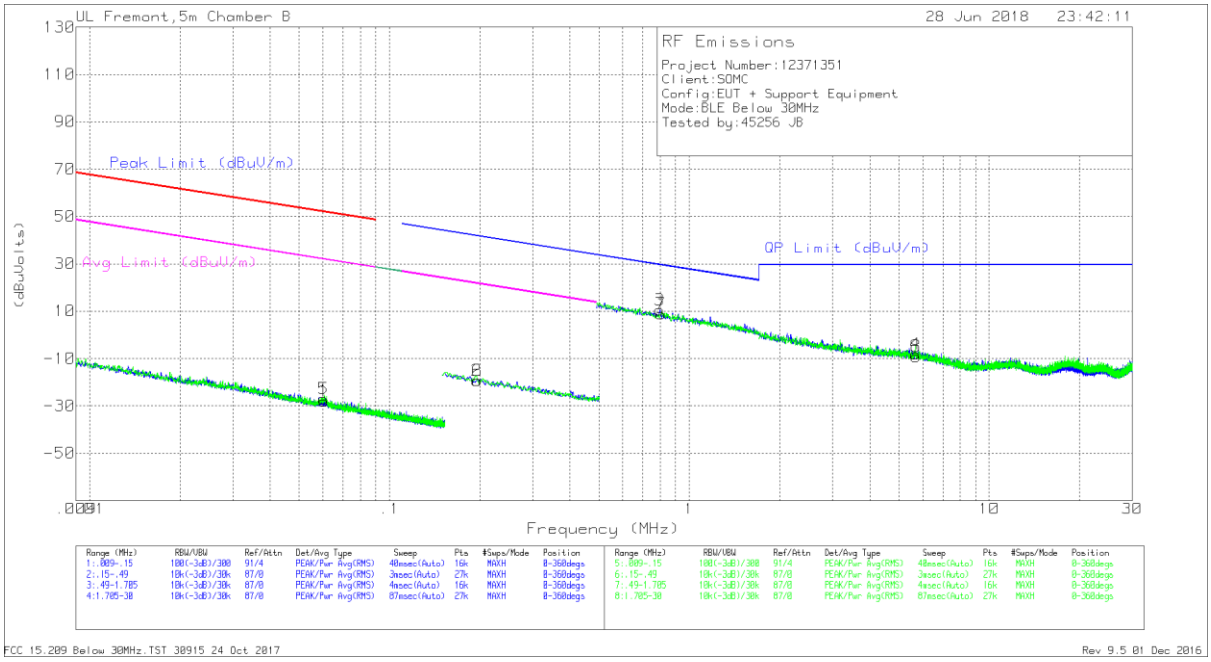
9.3. Worst Case Below 30 MHz

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



HORIZTONAL AND VERTICAL PLOT

Below 30 MHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.06022	37.07	Pk	14.5	1.4	-80	-27.03	51.99	-79.02	31.99	-59.02	-	-	-	-	0-360
1	.06056	36.17	Pk	14.5	1.4	-80	-27.93	51.94	-79.87	31.94	-59.87	-	-	-	-	0-360
2	.19532	45.33	Pk	13.9	1.5	-80	-19.27	-	-	-	-	41.8	-61.07	21.8	-41.07	0-360
6	.19635	45.36	Pk	13.9	1.5	-80	-19.24	-	-	-	-	41.76	-61	21.76	-41	0-360

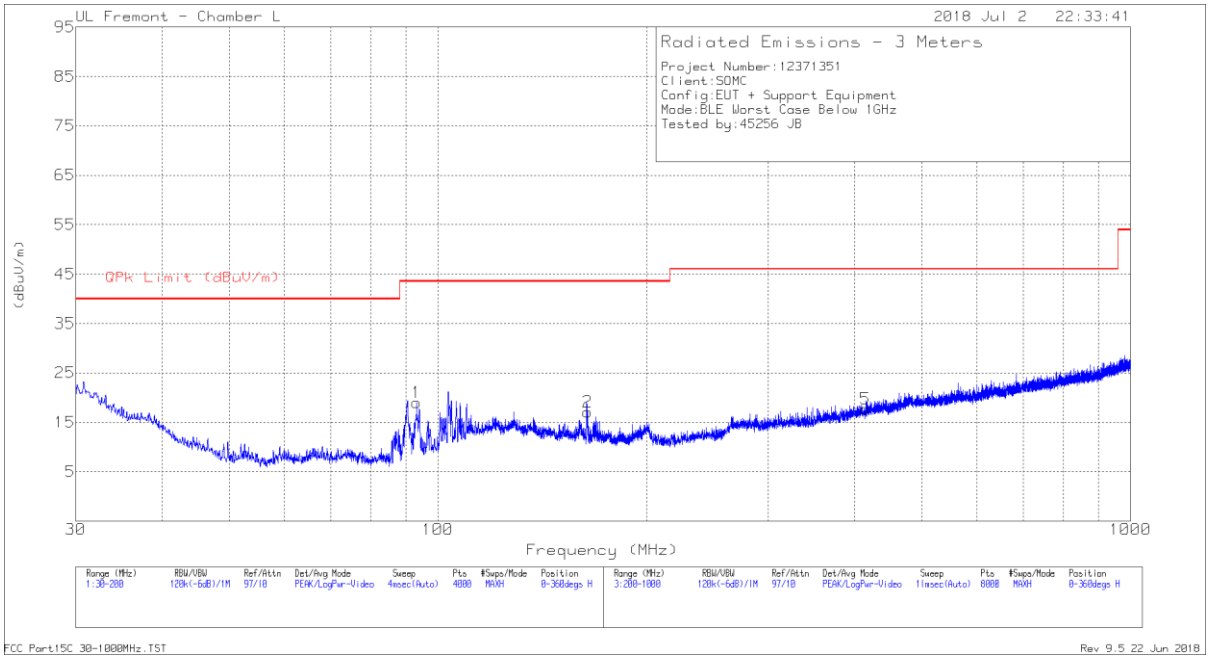
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.79715	35.07	Pk	14	1.5	-40	10.57	29.59	-19.02	-	-	-	-	0-360
7	.80399	33.36	Pk	14	1.5	-40	8.86	29.51	-20.65	-	-	-	-	0-360
4	5.66225	15.99	Pk	14.4	1.5	-40	-8.11	29.5	-37.61	-	-	-	-	0-360
8	5.70417	15.04	Pk	14.4	1.5	-40	-9.06	29.5	-38.56	-	-	-	-	0-360

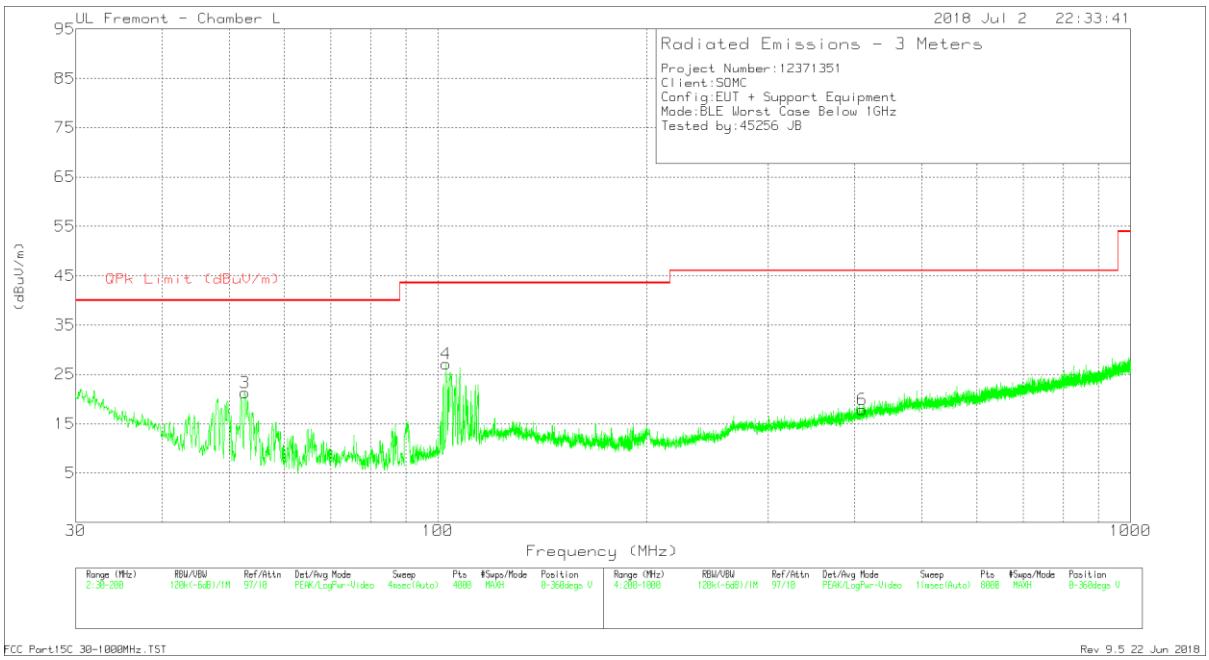
Pk - Peak detector

9.4. Worst Case Below 1 GHz

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



HORIZTONAL



VERTICAL

Below 1GHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T477 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	93.1713	37.24	Pk	12.8	-31	19.04	43.52	-24.48	0-360	199	H
2	* 164.5898	31.17	Pk	16.4	-30.5	17.07	43.52	-26.45	0-360	199	H
3	52.6159	40.51	Pk	12.1	-31.3	21.31	40	-18.69	0-360	100	V
4	102.7363	42.72	Pk	15.4	-31	27.12	43.52	-16.4	0-360	100	V
5	414.0278	27.16	Pk	20.3	-29.7	17.76	46.02	-28.26	0-360	199	H
6	410.2273	27.26	Pk	20.3	-29.7	17.86	46.02	-28.16	0-360	100	V

* - indicates frequency in CFR47 Pt 15 Restricted Band
Pk - Peak detector

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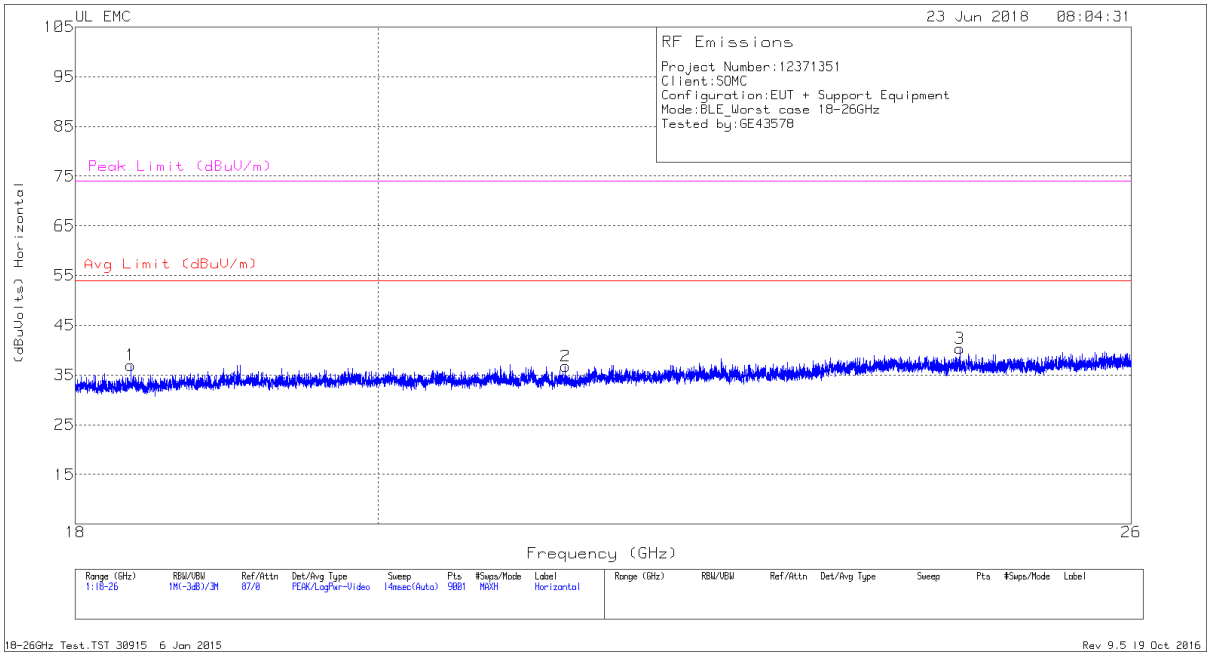
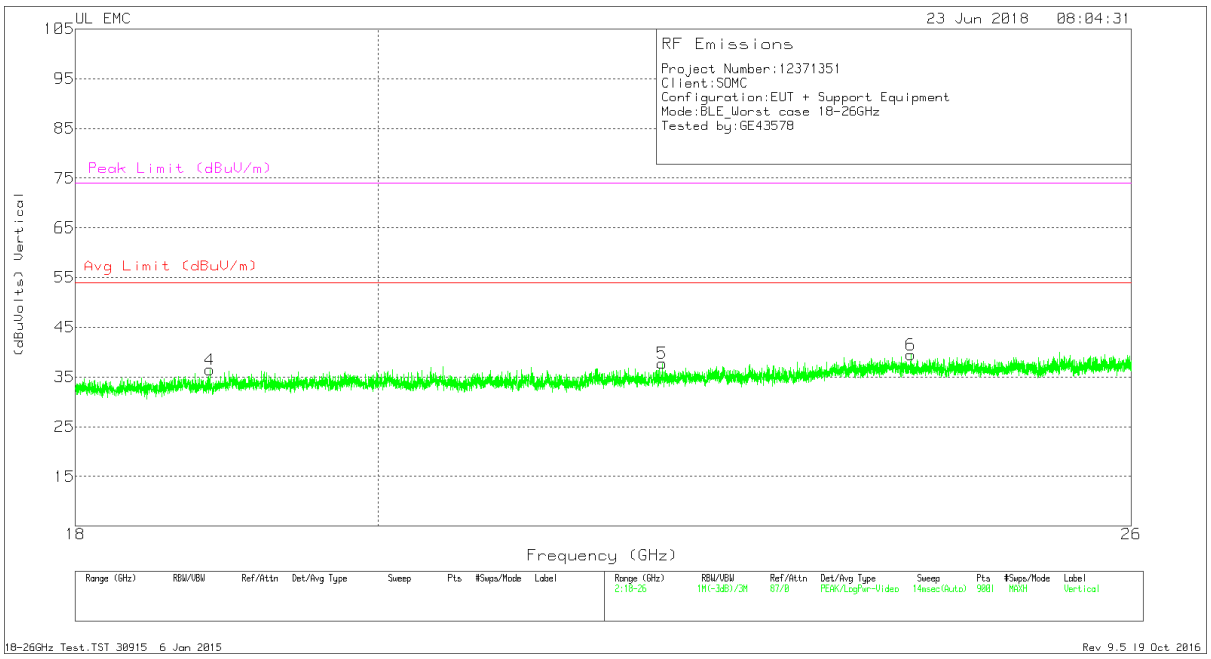
9.5. Worst Case 18-26 GHz

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



HORIZTONAL



VERTICAL

18 – 26GHz DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.35	39.33	Pk	32.3	-25.2	-9.5	36.93	54	-17.07	74	-37.07
2	21.349	38.67	Pk	33.1	-25.5	-9.5	36.77	54	-17.23	74	-37.23
3	24.492	40.12	Pk	34	-24.3	-9.5	40.32	54	-13.68	74	-33.68
4	18.862	38.76	Pk	32.4	-25.2	-9.5	36.46	54	-17.54	74	-37.54
5	22.081	39.23	Pk	33.4	-25.4	-9.5	37.73	54	-16.27	74	-36.27
6	24.077	39.36	Pk	33.9	-24.3	-9.5	39.46	54	-14.54	74	-34.54

Pk - Peak detector

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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

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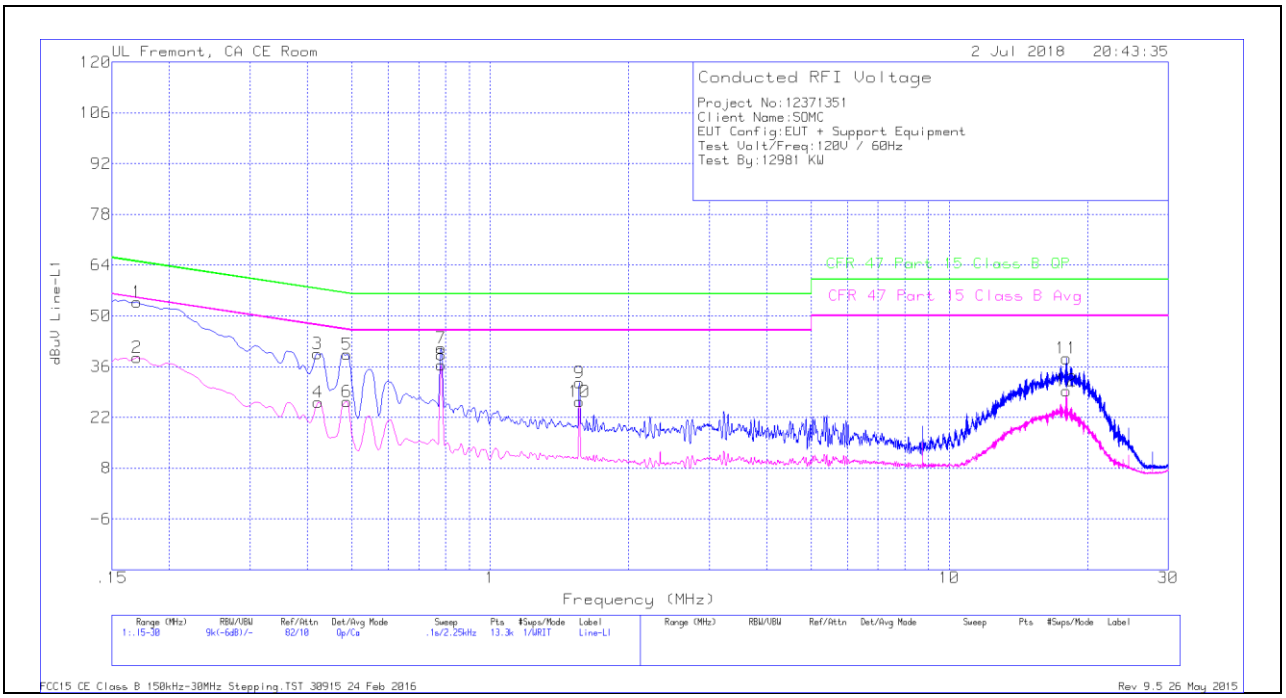
10.1.1. AC Power Line Norm

LINE 1 RESULTS



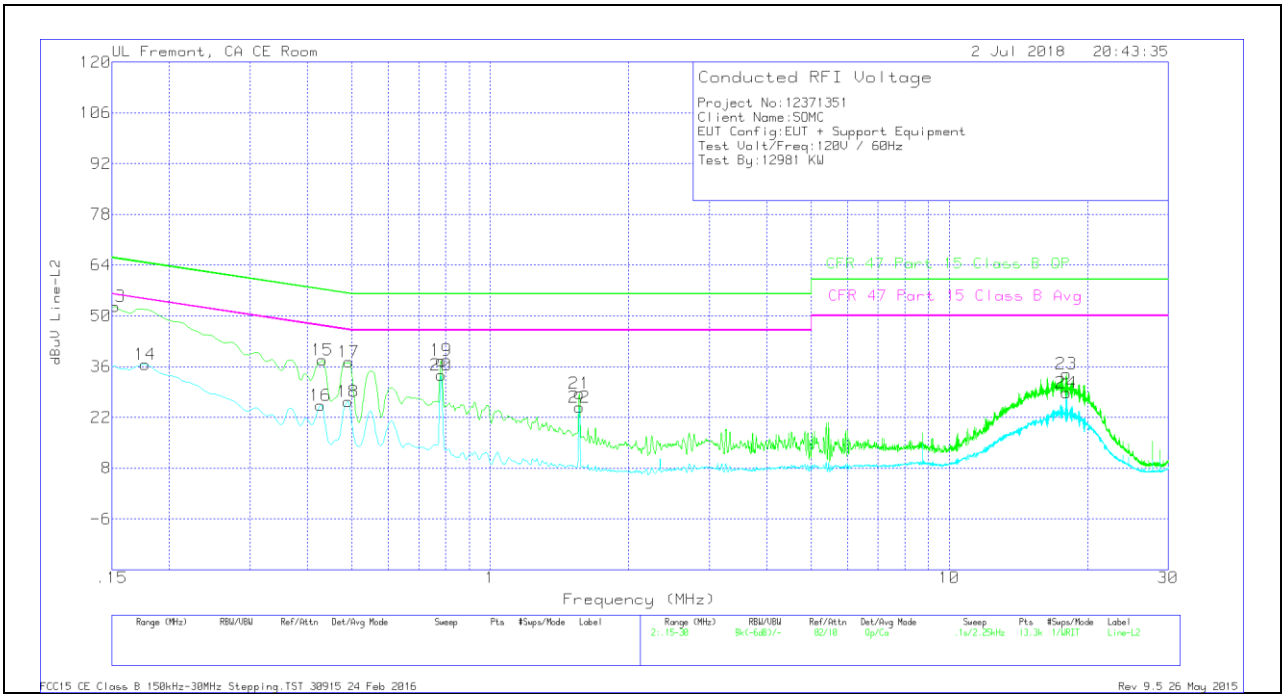
Trace Markers

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	.17025	43.66	Qp	0	0	10.1	53.76	64.95	-11.19	-	-
2	.17025	28.37	Ca	0	0	10.1	38.47	-	-	54.95	-16.48
3	.42	29.5	Qp	0	0	10.1	39.6	57.45	-17.85	-	-
4	.42225	16.01	Ca	0	0	10.1	26.11	-	-	47.4	-21.29
5	.4875	29.24	Qp	0	0	10.1	39.34	56.21	-16.87	-	-
6	.4875	16.3	Ca	0	0	10.1	26.4	-	-	46.21	-19.81
7	.78225	31.11	Qp	0	0	10.1	41.21	56	-14.79	-	-
8	.78225	26.4	Ca	0	0	10.1	36.5	-	-	46	-9.5
9	1.563	21.39	Qp	0	.1	10.1	31.59	56	-24.41	-	-
10	1.56525	16.18	Ca	0	.1	10.1	26.38	-	-	46	-19.62
11	17.988	27.57	Qp	.1	.3	10.3	38.27	60	-21.73	-	-
12	17.988	18.7	Ca	.1	.3	10.3	29.4	-	-	50	-20.6

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.15225	42.48	Qp	.1	0	10.1	52.68	65.88	-13.2	-	-
14	.177	26.59	Ca	0	0	10.1	36.69	-	-	54.63	-17.94
15	.43125	27.68	Qp	0	0	10.1	37.78	57.23	-19.45	-	-
16	.42675	15.18	Ca	0	0	10.1	25.28	-	-	47.32	-22.04
17	.492	27.17	Qp	0	0	10.1	37.27	56.13	-18.86	-	-
18	.48975	16.25	Ca	0	0	10.1	26.35	-	-	46.17	-19.82
19	.78225	27.64	Qp	0	0	10.1	37.74	56	-18.26	-	-
20	.78225	23.59	Ca	0	0	10.1	33.69	-	-	46	-12.31
21	1.563	18.44	Qp	0	.1	10.1	28.64	56	-27.36	-	-
22	1.563	14.54	Ca	0	.1	10.1	24.74	-	-	46	-21.26
23	17.99925	23.38	Qp	.1	.3	10.3	34.08	60	-25.92	-	-
24	17.99925	18.03	Ca	.1	.3	10.3	28.73	-	-	50	-21.27

Qp - Quasi-Peak detector

Ca - CISPR average detection

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