



CERTIFICATION TEST REPORT

Report Number. : 11692709-E6V2

Applicant : QUALCOMM TECHNOLOGIES, INC.
5770 MOREHOUSE DRIVE,
SAN DIEGO, CA 92121, USA

FCC ID : J9C2NET2LTE
IC : 2723A-2NET2LTE

Model Number : QCL-HUB-2.0-US

EUT Description : WIRELESS DATA HUB

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS - 247 ISSUE 2

Date Of Issue:

September 15, 2017

Prepared by:

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/08/17	Initial Issue	--
V2	09/15/17	Updated Section 8	Eric Yu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: QUALCOMM TECHNOLOGIES, INC.
5770 MOREHOUSE DRIVE,
SAN DIEGO, CA 92121 USA

EUT DESCRIPTION: WIRELESS DATA HUB

SERIAL NUMBER: QUALC001TN10M1RP74, QUALC001TN10M1RN3C

DATE TESTED: AUGUST 03 to SEPTEMBER 08, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

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 any government.

Approved & Released For
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FRANK IBRAHIM
PROGRAM MANAGER
UL VERIFICATION SERVICES INC.

Prepared By:



TOM CHEN
LABORATORY 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 v04, ANSI C63.10-2013, RSS-GEN Issue 4, 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, 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
☒ Chamber A(IC: 2324B-1)	☒ Chamber D(IC: 22541-1)
☒ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 22541-2)
☐ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 22541-3)
	☐ Chamber G(IC: 22541-4)
	☐ Chamber H(IC: 22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

This EUT is a 2net2 device (LTE North American Version AT&T) that has the following radio modules:

- Wistron WWAN module, M14Q2FG.
- Qualcomm Unlicensed Module, QCA WCN 3660.

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	1.71	1.48

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Monopole antenna with a maximum gain of 2.1dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was adb Ver.1.0.26, QPSR Ver.5.4

5.5. WORST-CASE CONFIGURATION AND MODE

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

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

The worst-case data rate as provided by the client was 1Mbps.

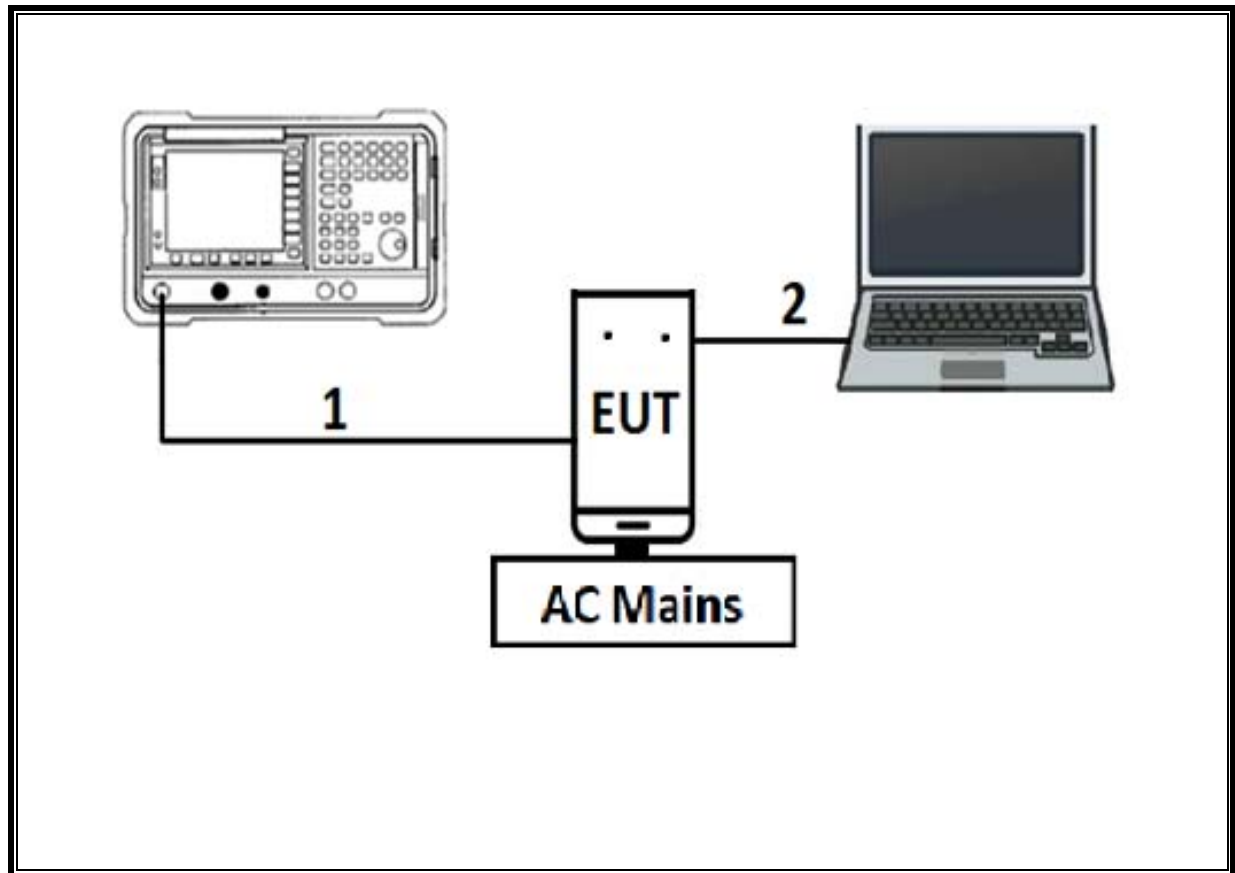
5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	HP	PPP012D-S	WCNXF0AAR4QOCS	N/A
Laptop	HP	EliteBook 6930p	2CE00821BZ	N/A

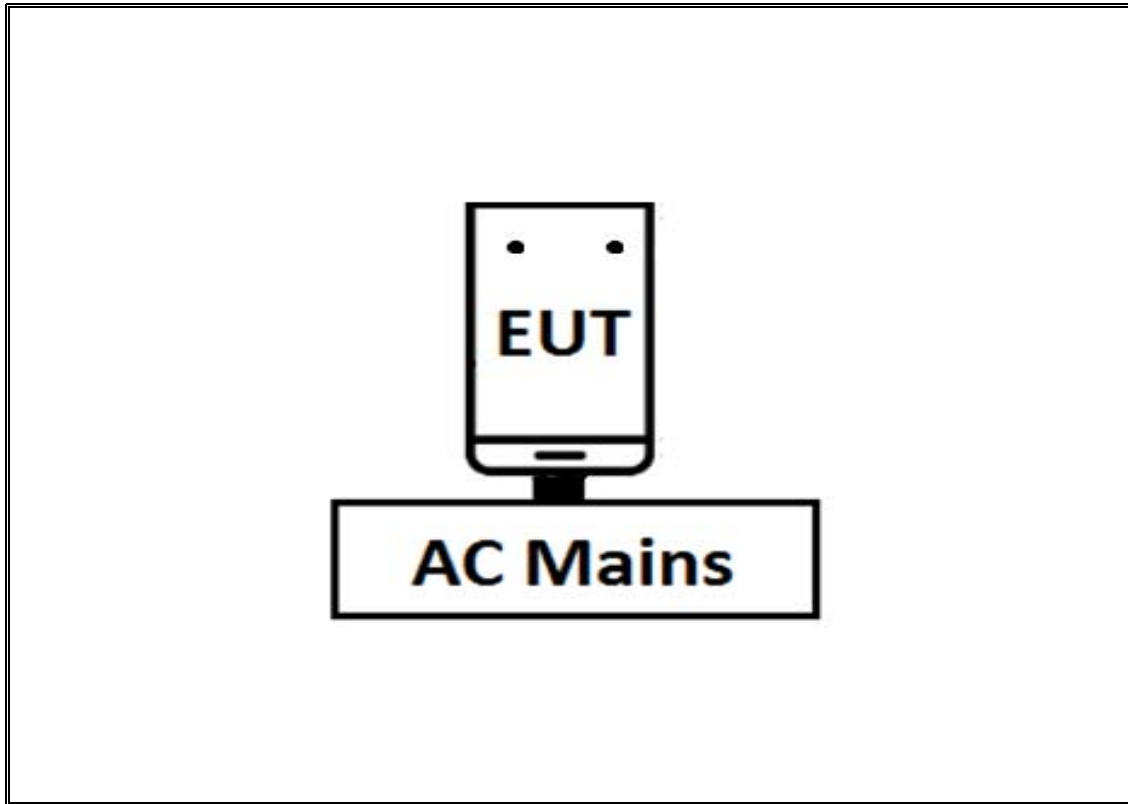
I/O CABLES (CONDUCTED TEST)

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	Un-shielded	1m	Laptop to EUT

CONDUCTED TEST SETUP DIAGRAM

TEST SETUP

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad	Sunol Sciences Corp.	JB3	T477	06/22/2018
Antenna, Active Loop 9kHz-30MHz	ETS-Lindgren	6502	T1683	02/17/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T712	01/30/2018
Antenna, Horn 18-26.5GHz	ARA	MWH-1826/B	T449	06/12/2018
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1264	07/08/2018
Power Sensor, P – series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T413	06/20/2018
Amplifier, 1-26.5GHz	MITEQ	AFS42-00101800-25-S-42	T1165	08/01/2018
Amplifier, 1-26.5GHz	Agilent (Keysight) Technologies	8449B	T404	07/05/2018
Amplifier, 10kHz-1GHz	Agilent (Keysight) Technologies	8447D	T15	08/26/2017
Amplifier, 1-8 GHz	MITEQ	AMF-4D-01000800-30-29P	T1170	04/28/2018
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Agilent (Keysight) Technologies	E4440A	T908	04/13/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T907	01/23/2018
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Agilent (Keysight) Technologies	E9030A	T905	01/11/2018
LISN	FISCHER	FCC-LISN-50/250-25-2-01	T1310	06/08/2018

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, Apr 26, 2016
Antenna Port Software	UL	UL RF	Ver 6.8, June 08, 2017

7. MEASUREMENT METHODS

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 9.1.1.

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.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME, DUTY CYCLE

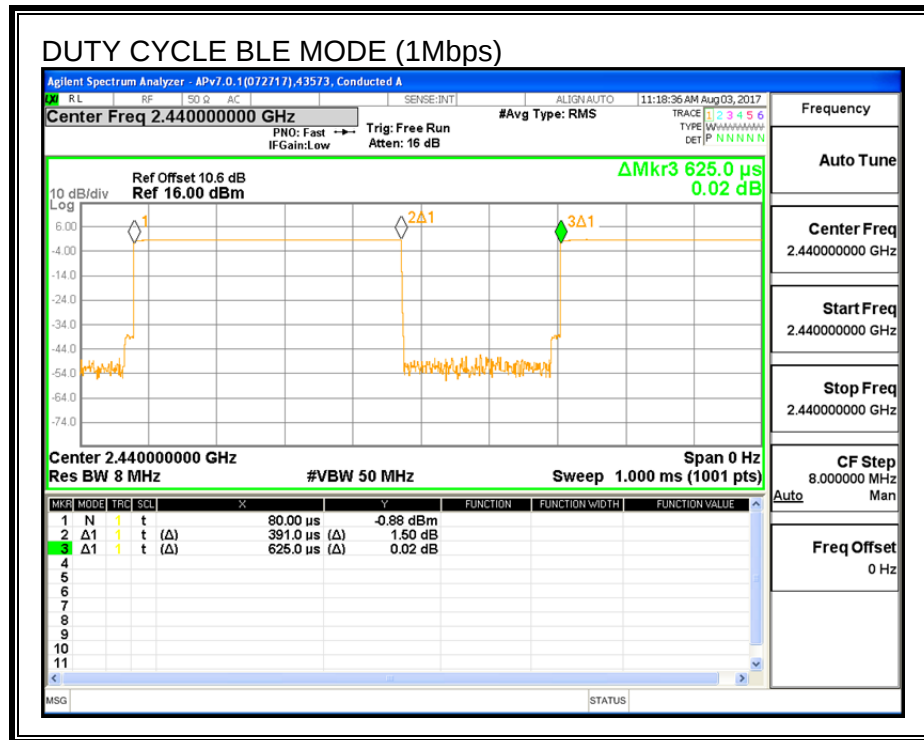
LIMITS

None; for reporting purposes only.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
BLE (1Mbps)	0.391	0.625	0.6256	62.56	2.04	0.255

DUTY CYCLE PLOT



8.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

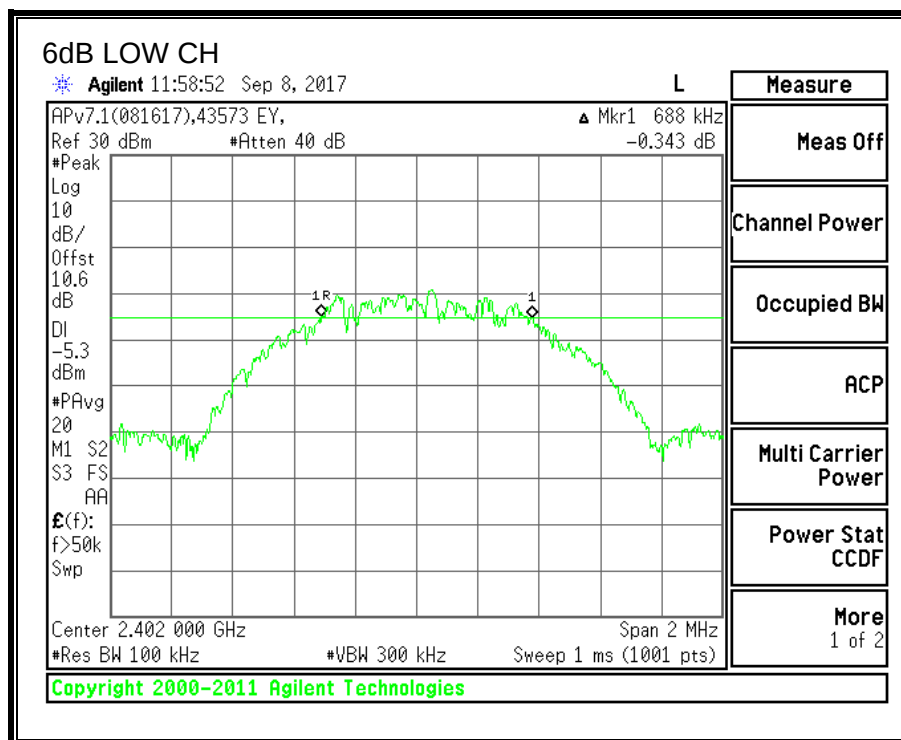
IC RSS-247 (5.2) (a)

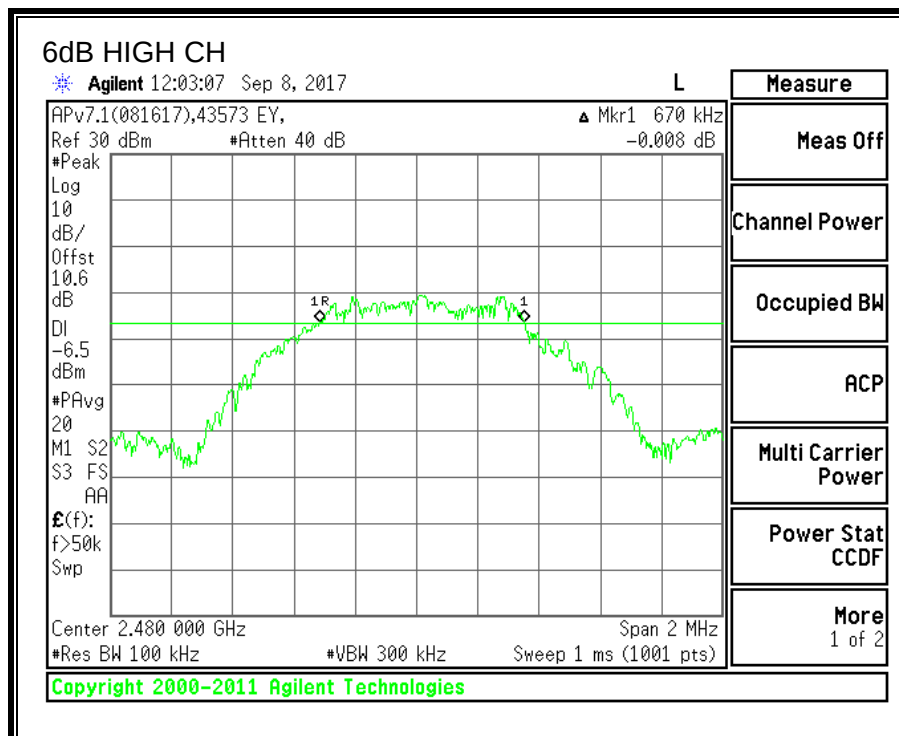
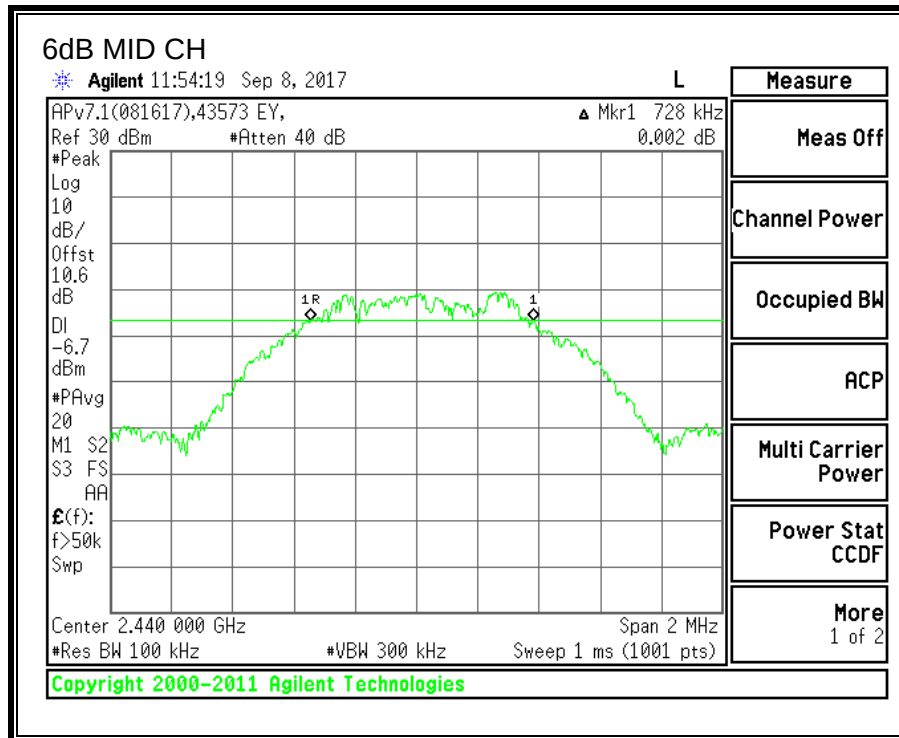
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

6 dB BANDWIDTH

Channel	Frequency	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.688	0.5
Middle	2440	0.728	0.5
High	2480	0.670	0.5





8.3. 99% BANDWIDTH

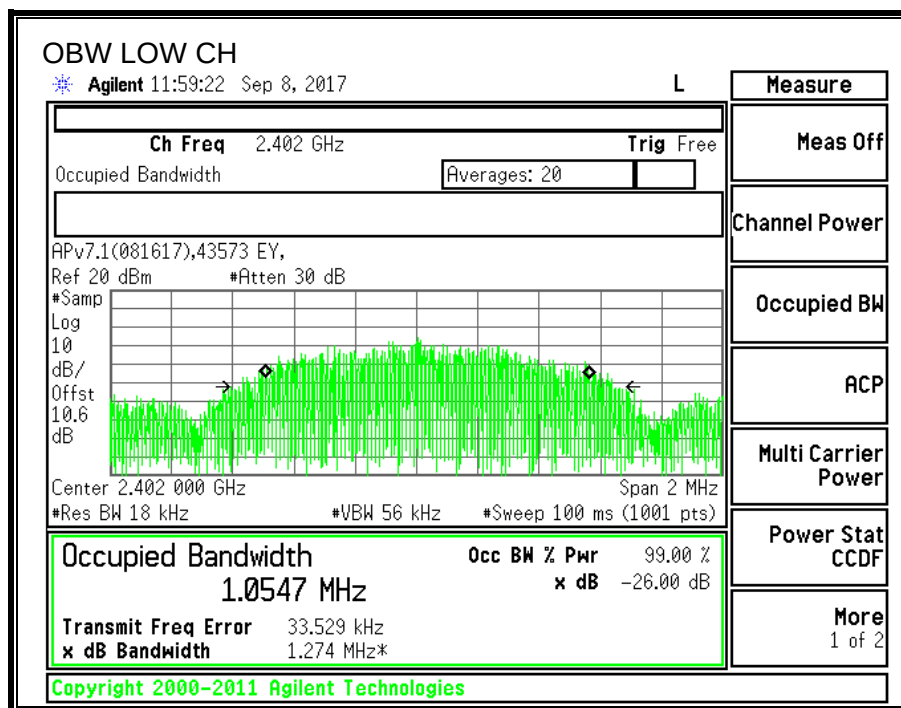
LIMITS

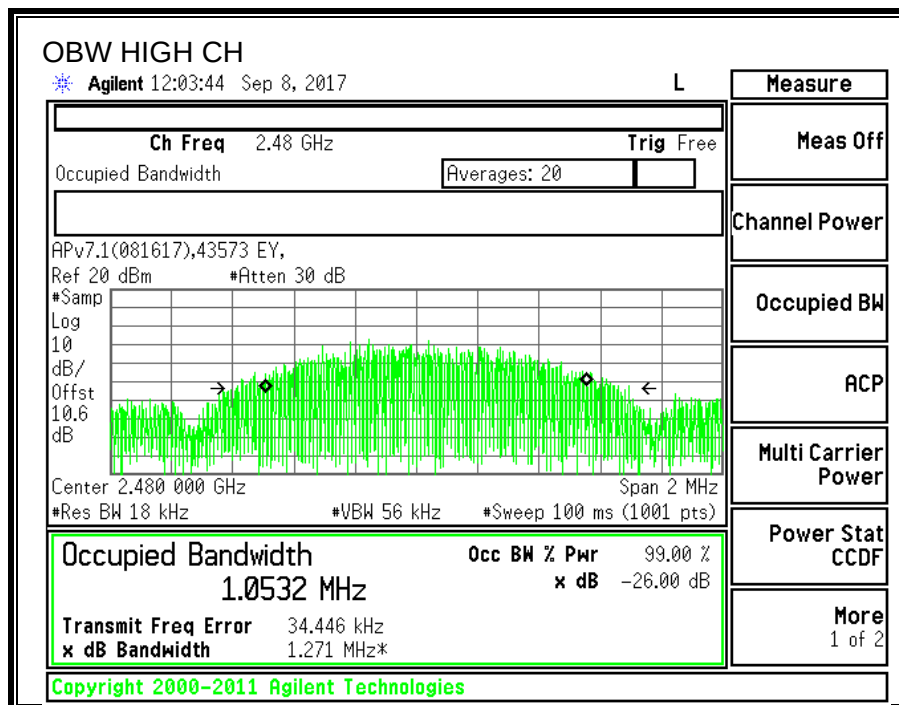
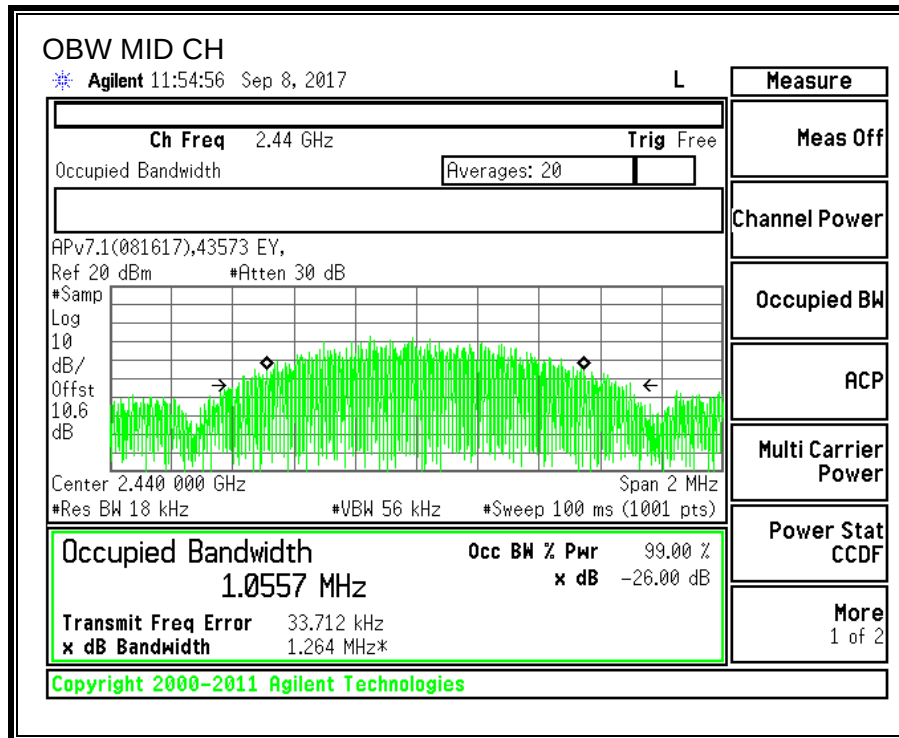
None; for reporting purposes only.

RESULTS

99% BANDWIDTH

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0547
Middle	2440	1.0557
High	2480	1.0532





8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-247 (5.4) (d)

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

RESULTS

TEST ENGINEER:	43573	Date:	08/03/17
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OUTPUT POWER

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.71	30	-28.290
Middle	2440	0.70	30	-29.300
High	2480	0.39	30	-29.610

8.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

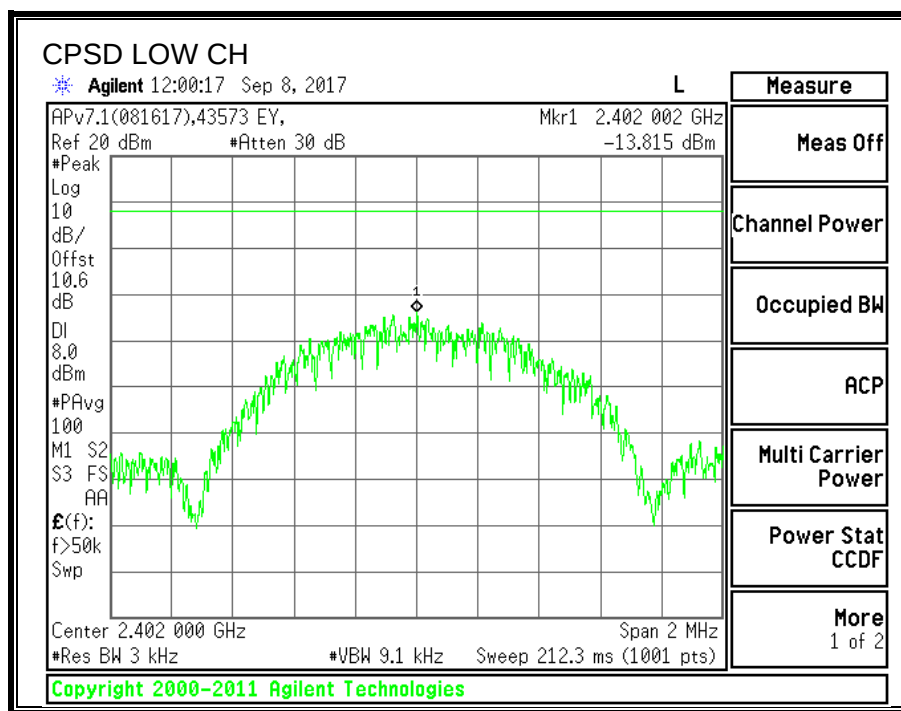
IC RSS-247 (5.2) (b)

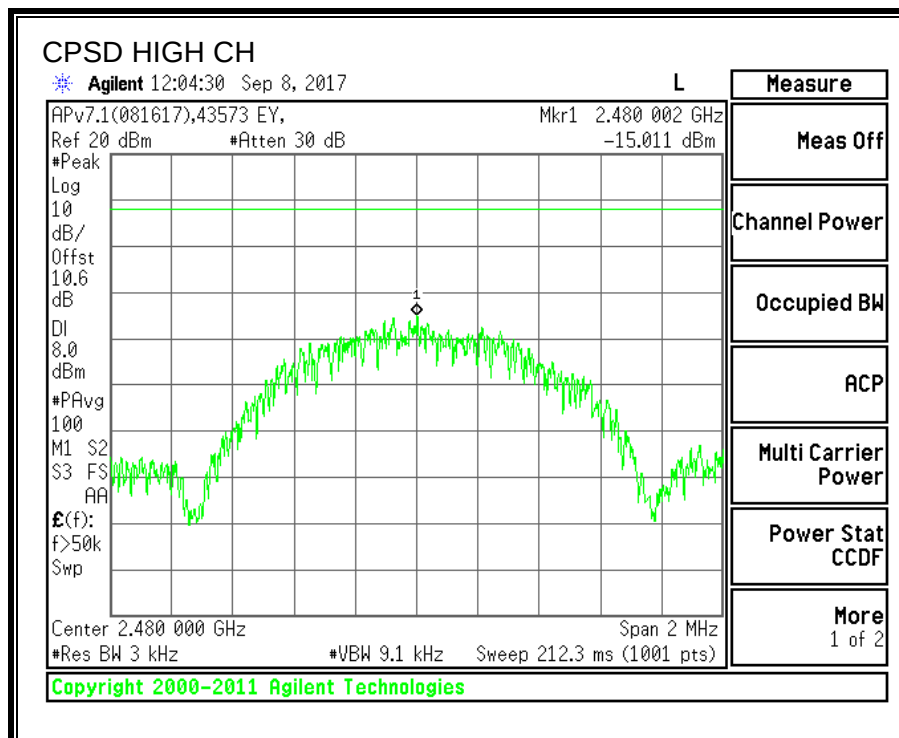
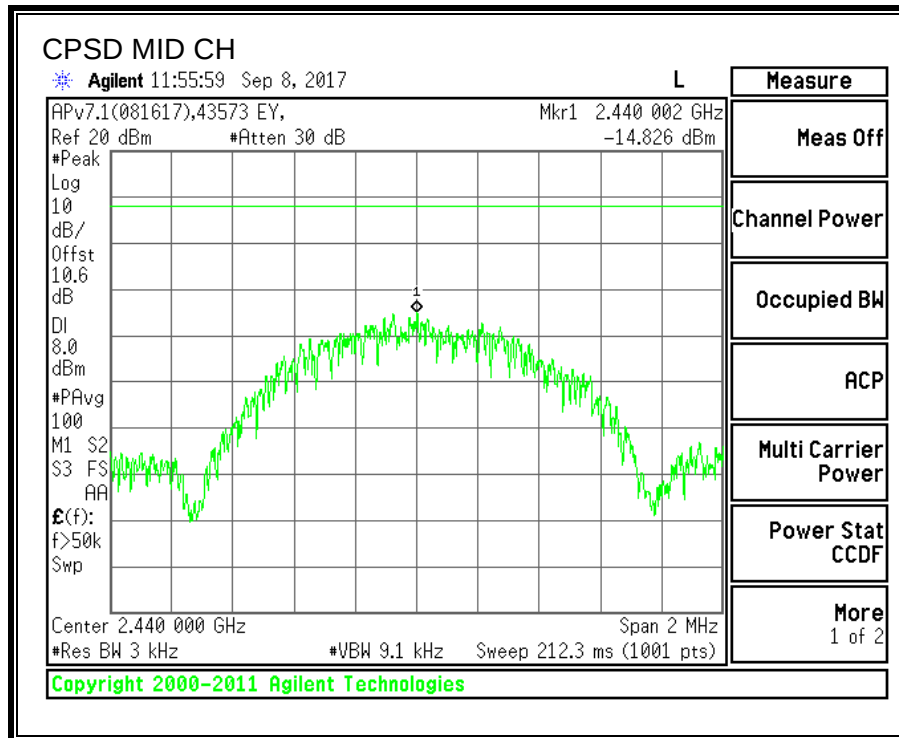
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

POWER SPECTRAL DENSITY

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-13.815	8	-21.815
Middle	2440	-14.826	8	-22.826
High	2480	-15.011	8	-23.011





8.6. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

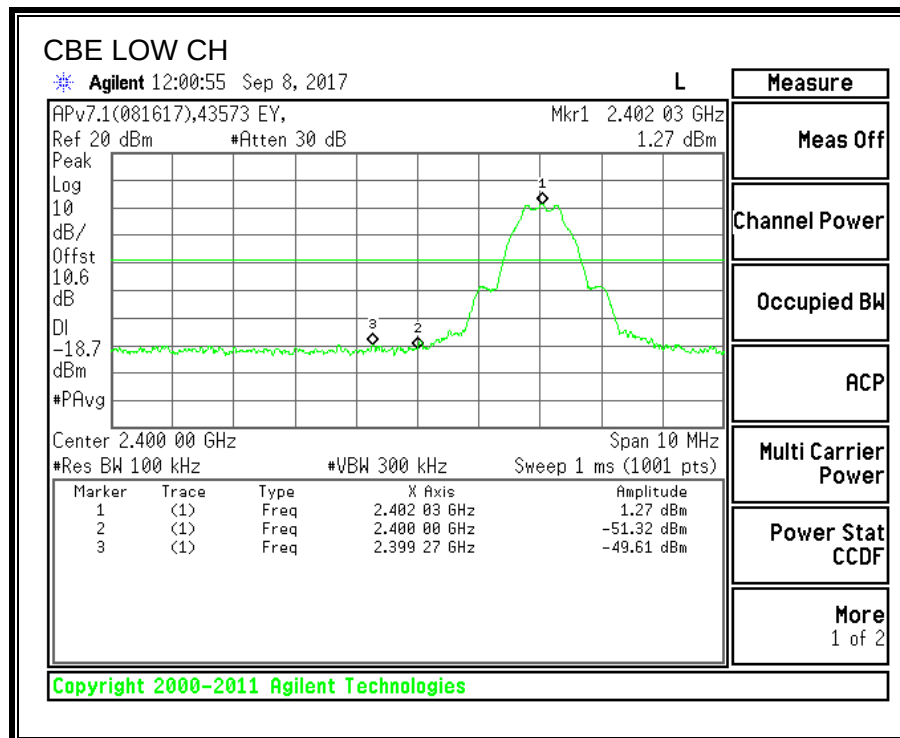
FCC §15.247 (d)

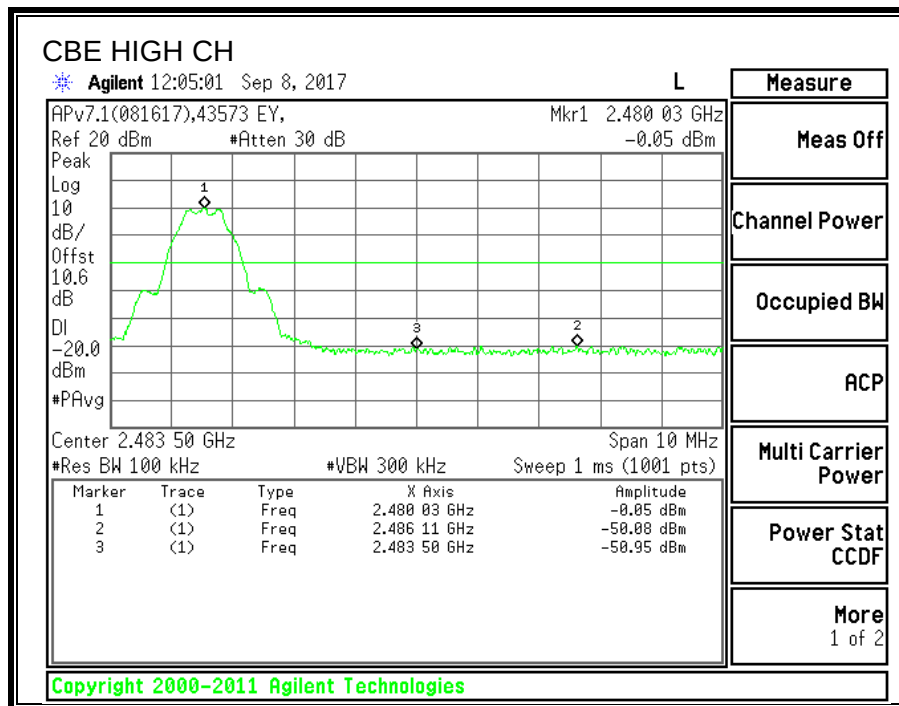
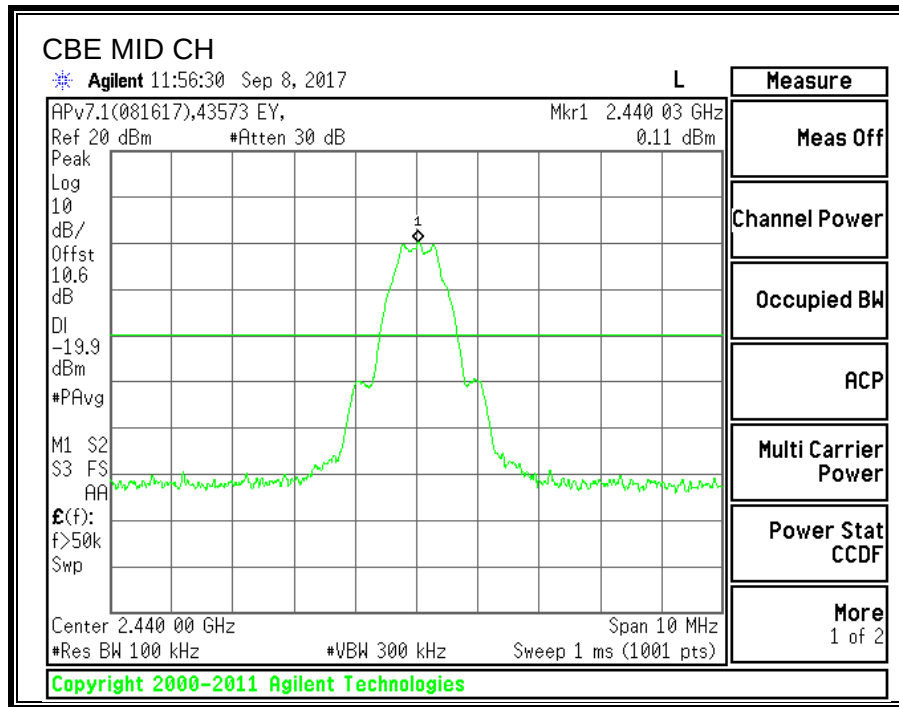
IC RSS-247 (5.5)

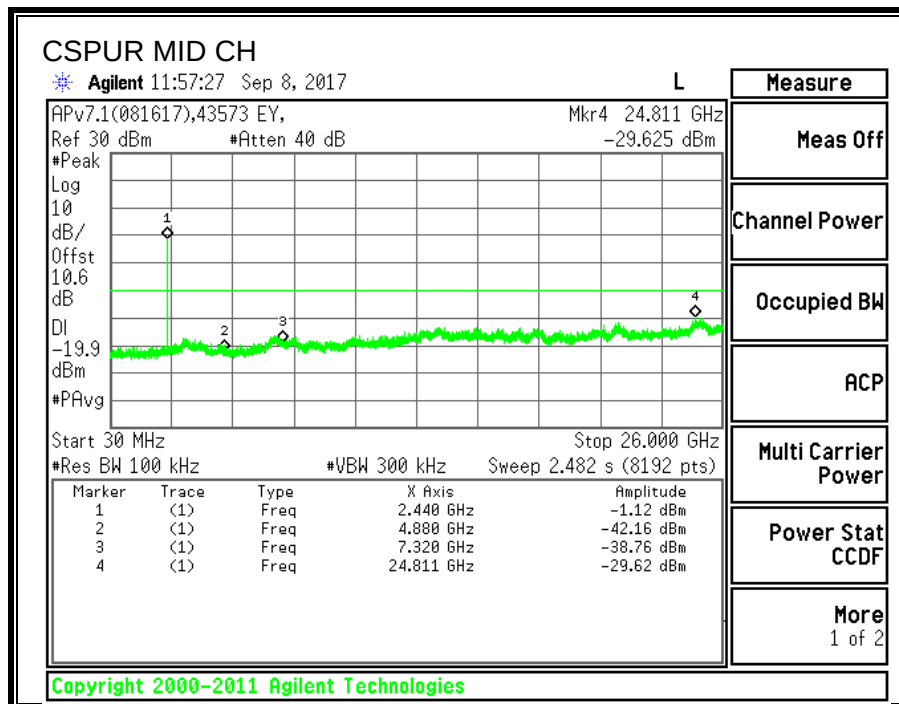
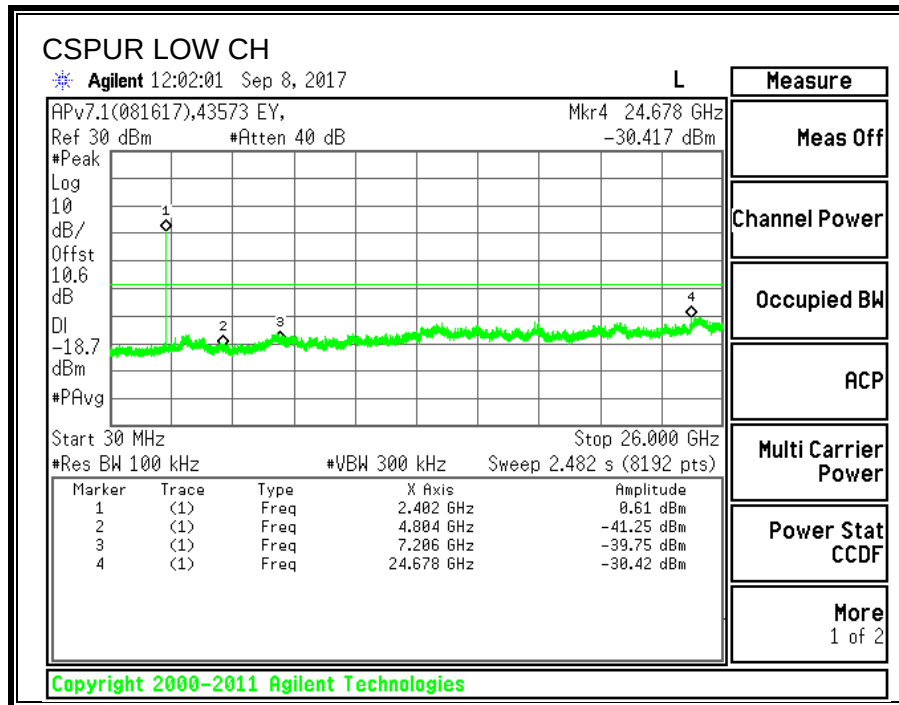
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

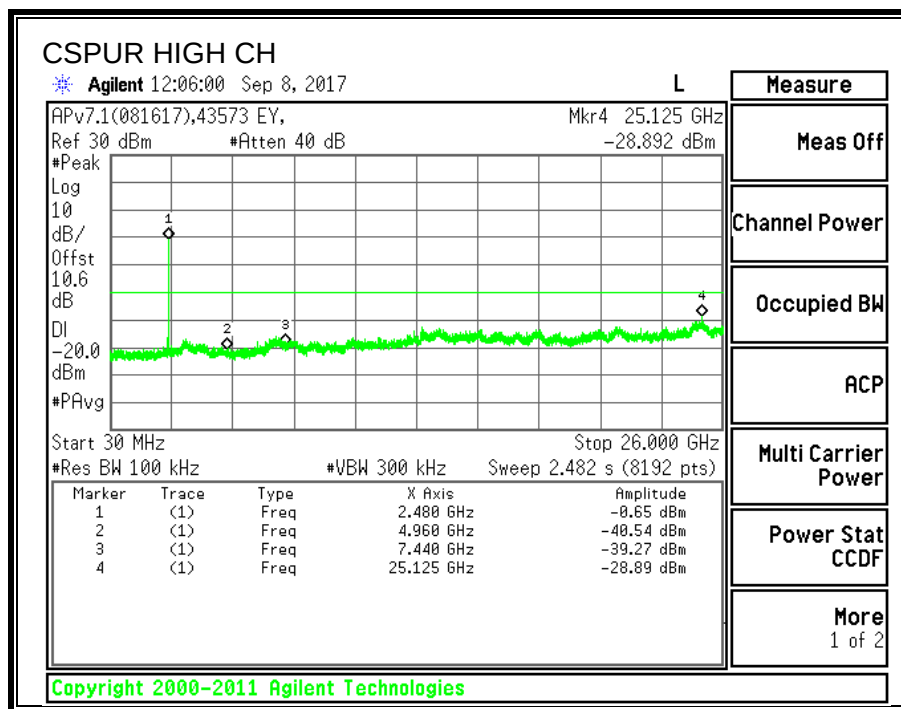
RESULTS

CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS









9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

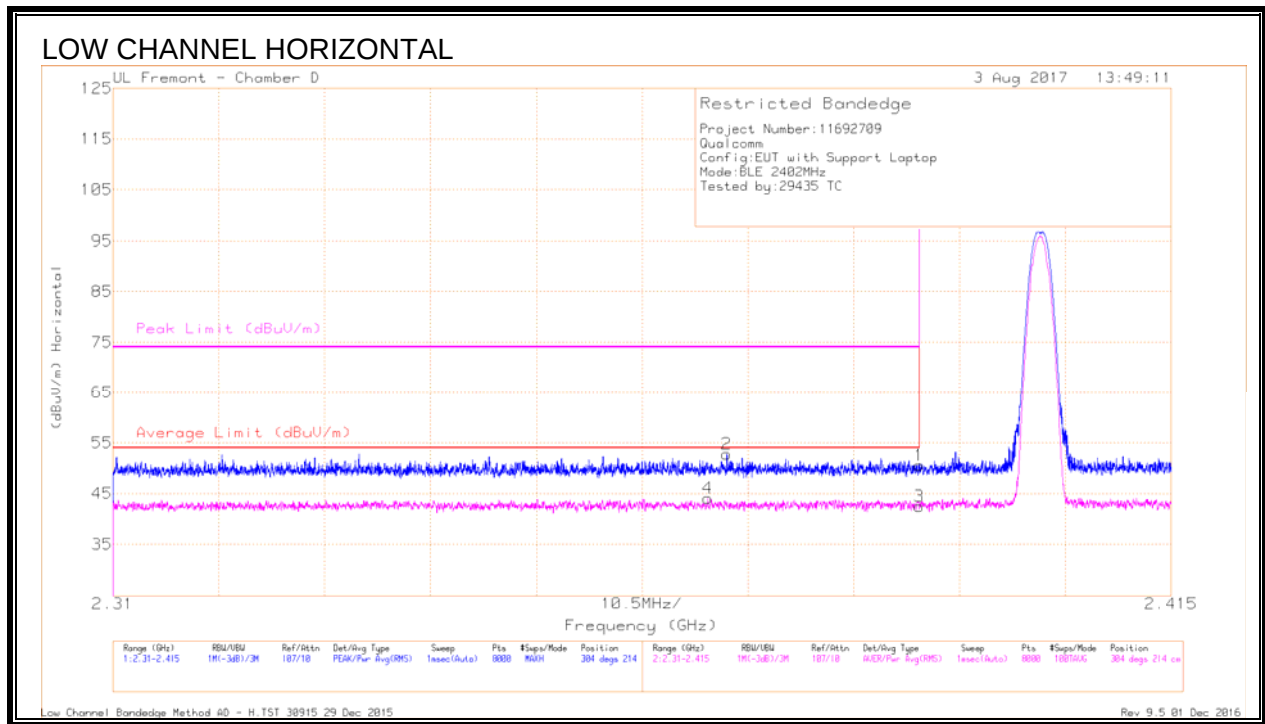
FCC §15.205 and §15.209
IC RSS-GEN, Section 8.9 and 8.10.

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

Results

9.2. TRANSMITTER ABOVE 1 GHz

9.2.1. RESTRICTED BANDEDGE (LOW CHANNEL)



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Az T111 (dB/m)	Amp/Ch/Flt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	39.16	Pk	32.1	-20.7	0	50.56	-	-	74	-23.44	304	214	H
2	* 2.371	41.56	Pk	32.1	-20.9	0	52.76	-	-	74	-21.24	304	214	H
3	* 2.39	29.06	RMS	32.1	-20.7	2.04	42.5	54	-11.5	-	-	304	214	H
4	* 2.369	30.82	RMS	32.1	-20.9	2.04	44.06	54	-9.94	-	-	304	214	H

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

Pk - Peak detector

RMS - RMS detection



Trace Markers

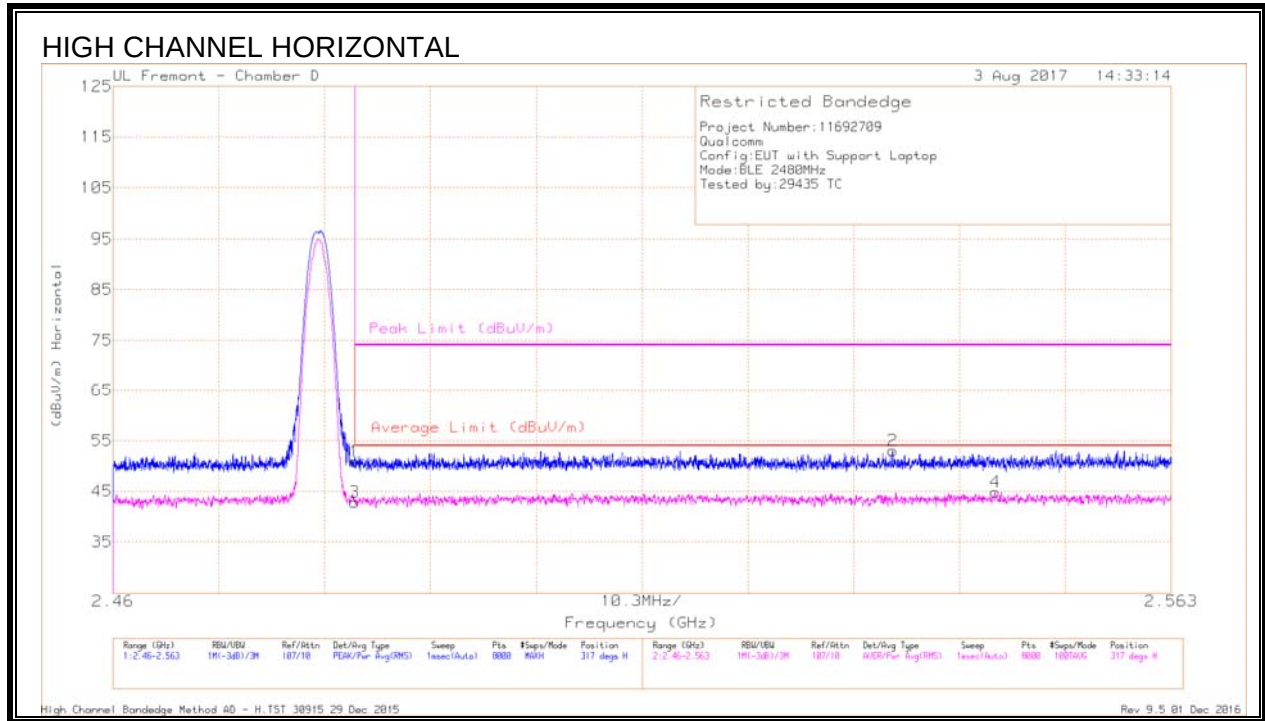
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.39	38.18	Pk	32.1	-20.7	0	49.58	-	-	74	-24.42	184	159	V
2	* 2.37	41.85	Pk	32.1	-20.9	0	53.05	-	-	74	-20.95	184	159	V
3	* 2.39	28.87	RMS	32.1	-20.7	2.04	42.31	54	-11.69	-	-	184	159	V
4	* 2.374	31.08	RMS	32.1	-20.8	2.04	44.42	54	-9.58	-	-	184	159	V

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

Pk - Peak detector

RMS - RMS detection

9.2.2. AUTHORIZED BANDEDGE (HIGH CHANNEL)



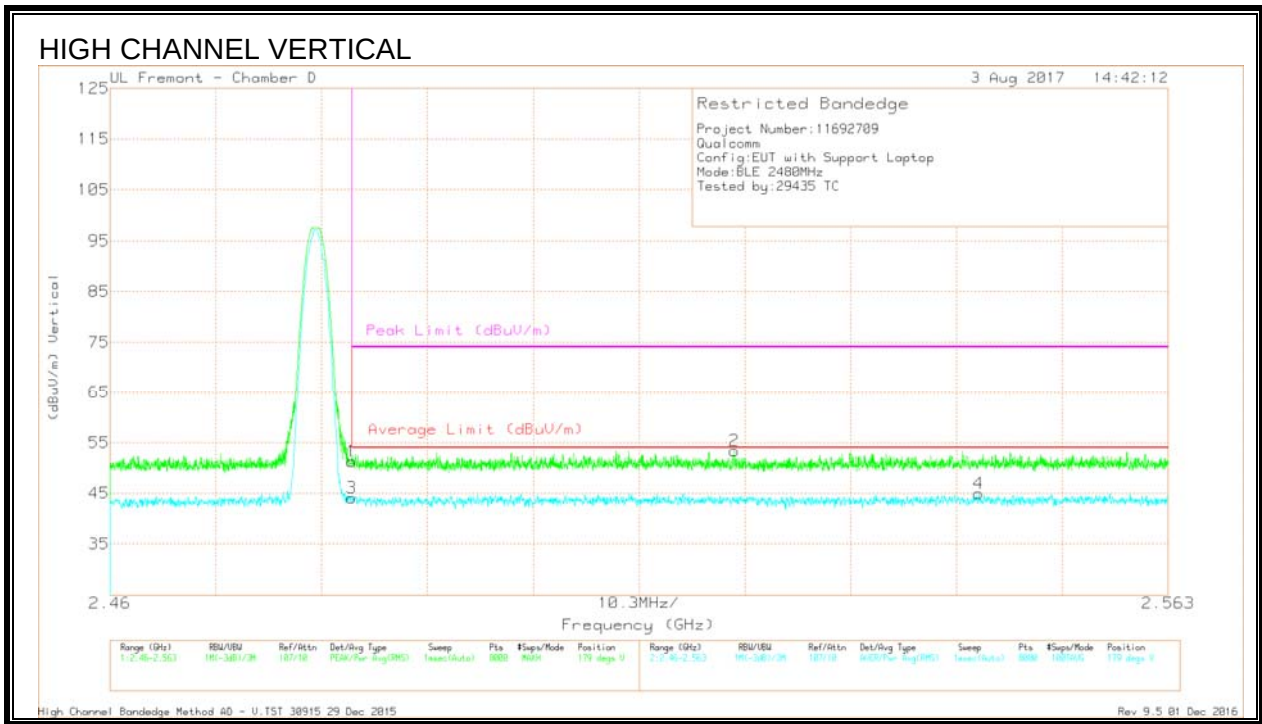
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Ch/Flt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	39.25	Pk	32.5	-20.8	0	50.95	-	-	74	-23.05	317	334	H
3	* 2.484	29.15	RMS	32.5	-20.8	2.04	42.89	54	-11.11	-	-	317	334	H
2	2.536	41.14	Pk	32.6	-20.7	0	53.04	-	-	74	-20.96	317	334	H
4	2.546	30.81	RMS	32.6	-20.6	2.04	44.85	54	-9.15	-	-	317	334	H

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

Pk - Peak detector

RMS - RMS detection



Trace Markers

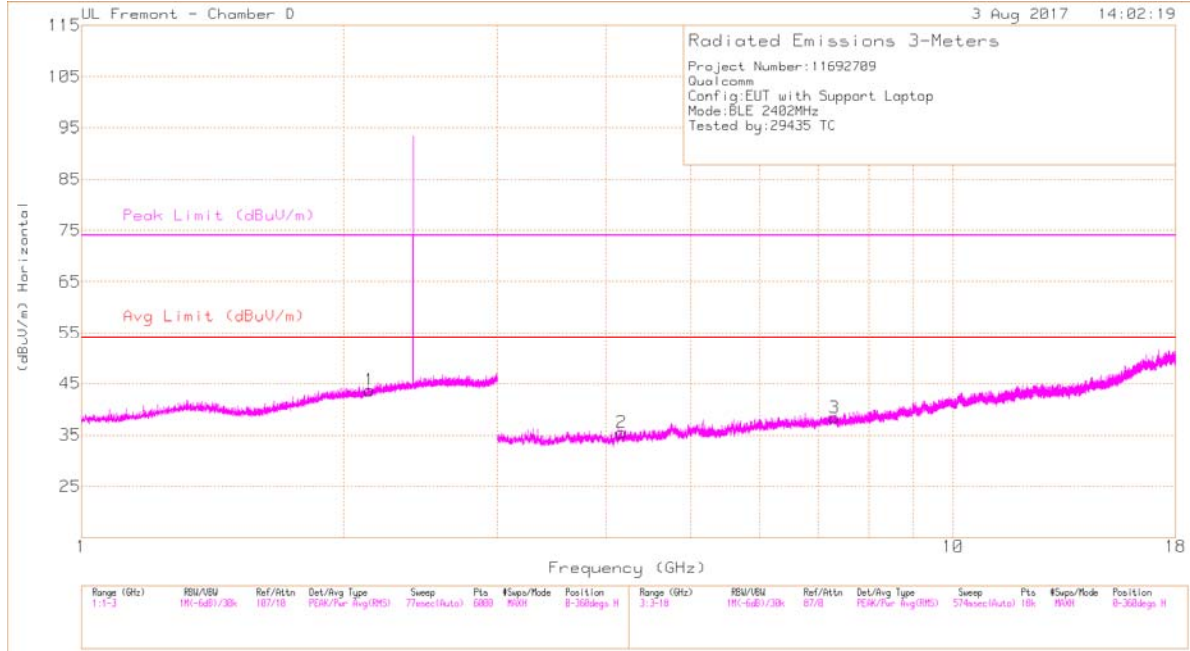
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cb/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	* 2.484	39.55	Pk	32.5	-20.8	0	51.25	-	-	74	-22.75	179	194	V
3	* 2.484	30.37	RMS	32.5	-20.8	2.04	44.11	54	-9.89	-	-	179	194	V
2	2.521	41.54	Pk	32.6	-20.7	0	53.44	-	-	74	-20.56	179	194	V
4	2.545	30.89	RMS	32.6	-20.6	2.04	44.93	54	-9.07	-	-	179	194	V

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

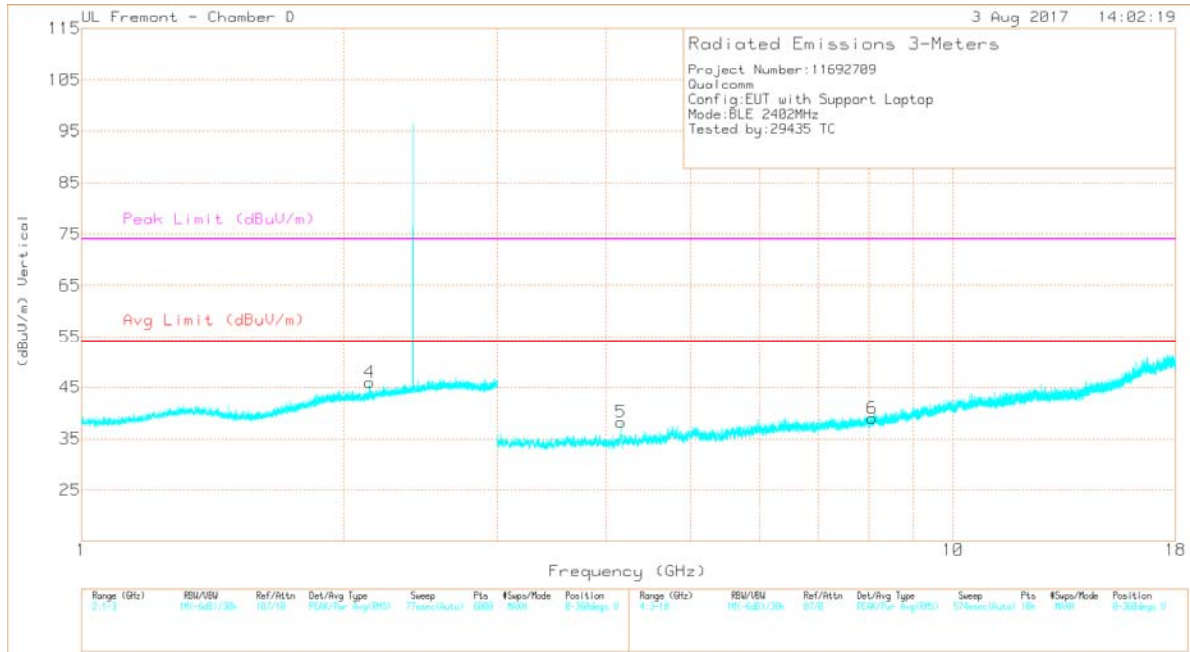
Pk - Peak detector

RMS - RMS detection

LOW CHANNEL HORIZONTAL



LOW CHANNEL VERTICAL



Radiated Emissions

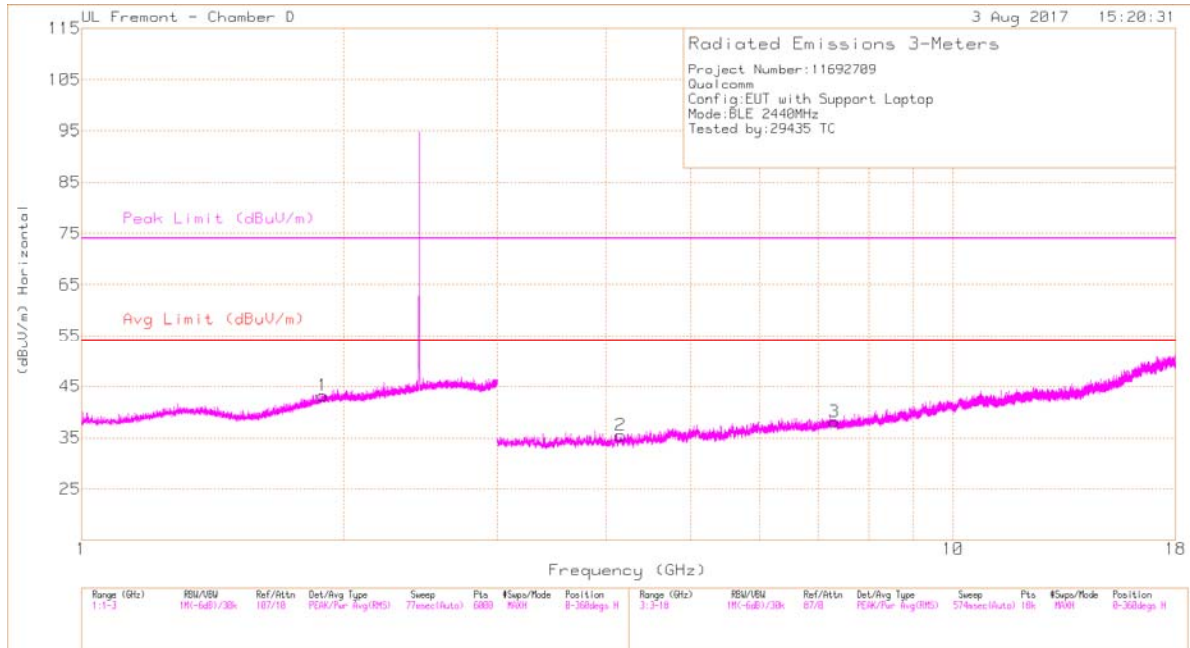
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.168	37.18	PK2	33.3	-28.1	0	42.38	-	-	74	-31.62	235	187	H
* 4.168	25.26	MAV1	33.3	-28.1	2.04	32.5	54	-21.5	-	-	235	187	H
* 7.309	33.99	PK2	35.5	-25.1	0	44.39	-	-	74	-29.61	269	207	H
* 7.307	23.56	MAV1	35.5	-24.9	2.04	36.2	54	-17.8	-	-	269	207	H
* 4.159	37.45	PK2	33.3	-28	0	42.75	-	-	74	-31.25	235	237	V
* 4.158	26.71	MAV1	33.3	-28	2.04	34.05	54	-19.95	-	-	235	237	V
* 8.074	33.45	PK2	35.6	-23.8	0	45.25	-	-	74	-28.75	266	273	V
* 8.074	22.65	MAV1	35.6	-23.8	2.04	36.49	54	-17.51	-	-	266	273	V
2.142	40.41	PK2	31.3	-20.9	0	50.81	-	-	74	-23.19	269	239	V
2.142	28.71	MAV1	31.3	-20.9	2.04	41.15	-	-	-	-	269	239	V
2.143	39.57	PK2	31.3	-20.9	0	49.97	-	-	74	-24.03	317	225	H
2.143	28.52	MAV1	31.3	-20.9	2.04	40.96	-	-	-	-	317	225	H

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

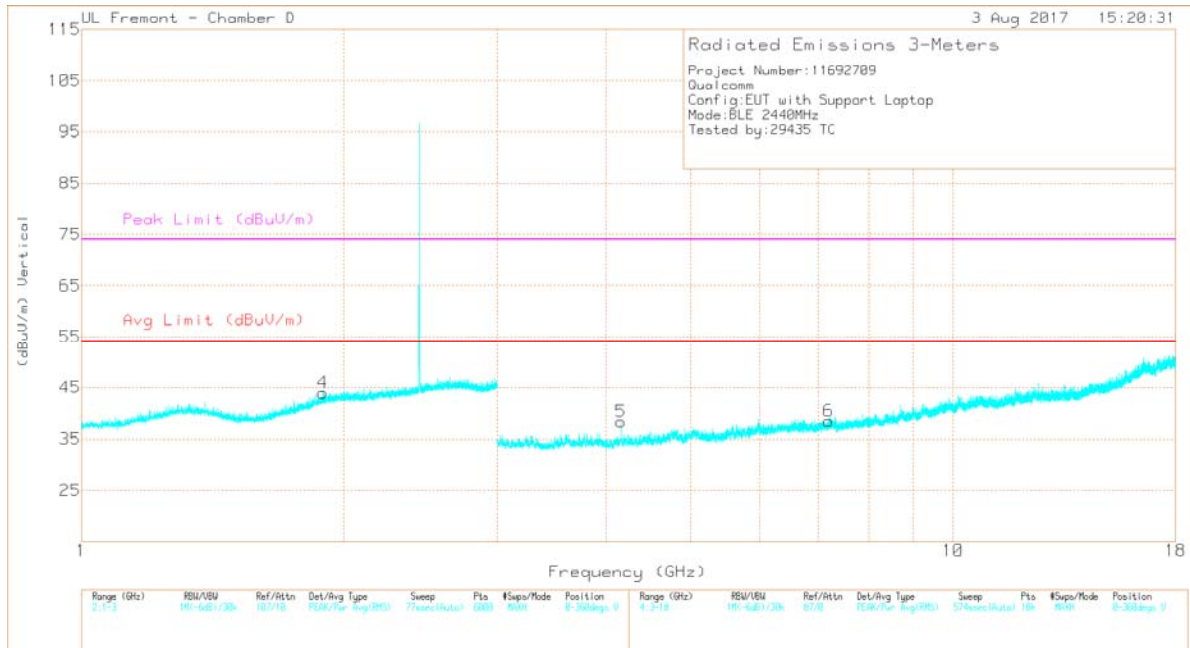
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL HORIZONTAL



MID CHANNEL VERTICAL



Radiated Emissions

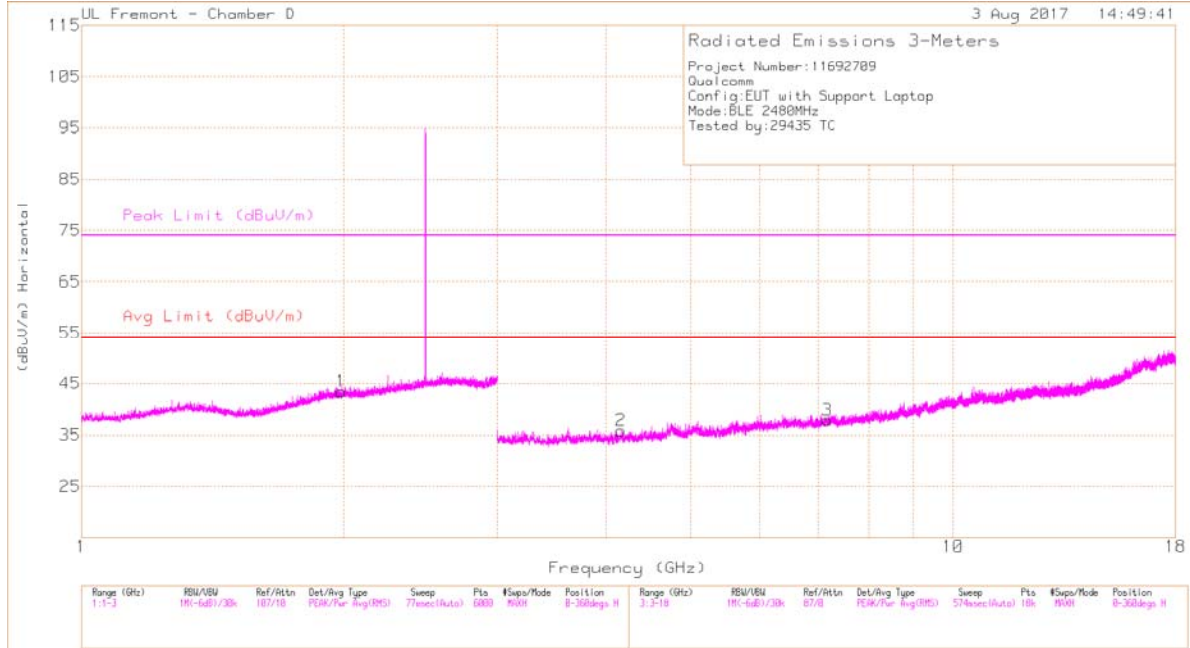
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.156	37.19	PK2	33.3	-28.1	0	42.39	-	-	74	-31.61	221	180	H
* 4.157	26.4	MAV1	33.3	-28.1	2.04	33.64	54	-20.36	-	-	221	180	H
* 7.306	34.64	PK2	35.5	-24.8	0	45.34	-	-	74	-28.66	171	214	H
* 7.307	23.56	MAV1	35.5	-24.9	2.04	36.2	54	-17.8	-	-	171	214	H
* 4.16	36.94	PK2	33.3	-28	0	42.24	-	-	74	-31.76	103	194	V
* 4.16	26.44	MAV1	33.3	-28	2.04	33.78	54	-20.22	-	-	103	194	V
1.89	39.97	PK2	31.2	-21.4	0	49.77	-	-	74	-24.23	262	146	V
1.891	28.62	MAV1	31.2	-21.4	2.04	40.46	-	-	-	-	262	146	V
1.892	28.04	MAV1	31.2	-21.4	2.04	39.88	-	-	-	-	222	116	H
1.894	40.09	PK2	31.3	-21.3	0	50.09	-	-	74	-23.91	222	116	H
7.195	34.61	PK2	35.5	-25.1	0	45.01	-	-	74	-28.99	107	141	V
7.195	22.85	MAV1	35.5	-25.1	2.04	35.29	-	-	-	-	107	141	V

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

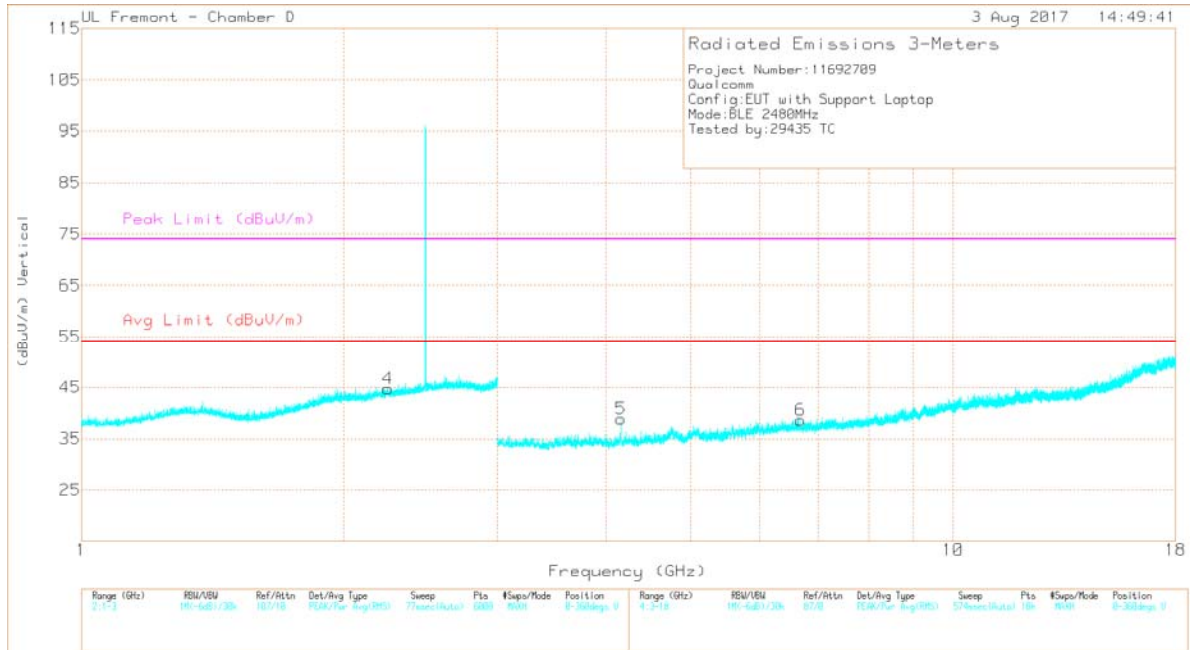
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL HORIZONTAL



HIGH CHANNEL VERTICAL



Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T711 (dB/m)	Amp/Cbl/Ftr/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
* 2.247	39.99	PK2	31.7	-21	0	50.69	-	-	74	-23.31	309	219	V
* 2.248	28.42	MAV1	31.7	-21	2.04	41.16	54	-12.84	-	-	309	219	V
* 4.157	37.32	PK2	33.3	-28	0	42.62	-	-	74	-31.38	255	247	H
* 4.158	26.29	MAV1	33.3	-28	2.04	33.63	54	-20.37	-	-	255	247	H
* 4.158	37.38	PK2	33.3	-28	0	42.68	-	-	74	-31.32	231	255	V
* 4.157	25.79	MAV1	33.3	-28	2.04	33.13	54	-20.87	-	-	231	255	V
1.986	28.46	MAV1	31.4	-21.4	2.04	40.5	-	-	-	-	93	176	H
1.989	39.82	PK2	31.4	-21.4	0	49.82	-	-	74	-24.18	93	176	H
6.682	34.9	PK2	35.6	-26.1	0	44.4	-	-	74	-29.6	171	299	V
6.682	23.94	MAV1	35.6	-26.1	2.04	35.48	-	-	-	-	171	299	V
7.17	34.26	PK2	35.5	-25.1	0	44.66	-	-	74	-29.34	315	210	H
7.17	23.37	MAV1	35.5	-25.1	2.04	35.81	-	-	-	-	315	210	H

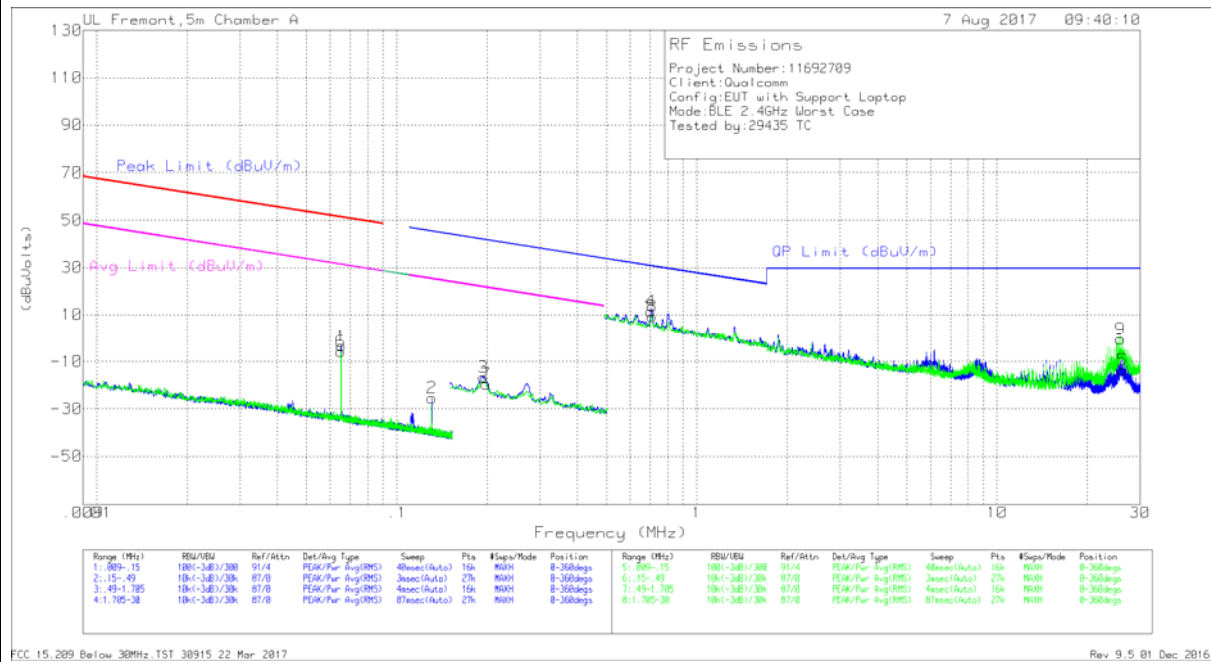
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

9.3. SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

HORIZONTAL AND VERTICAL PLOTS



NOTE: KDB 414788 OATS and Chamber Correlation Justification

- Based 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.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Trace Markers

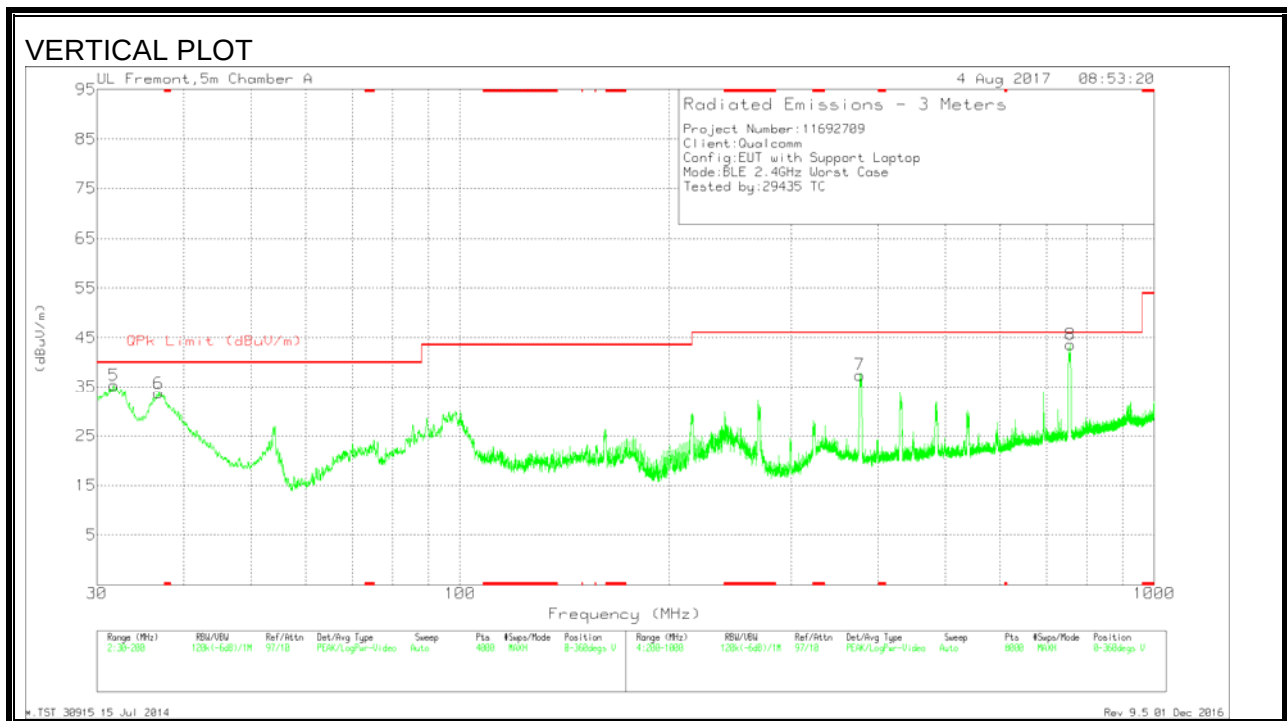
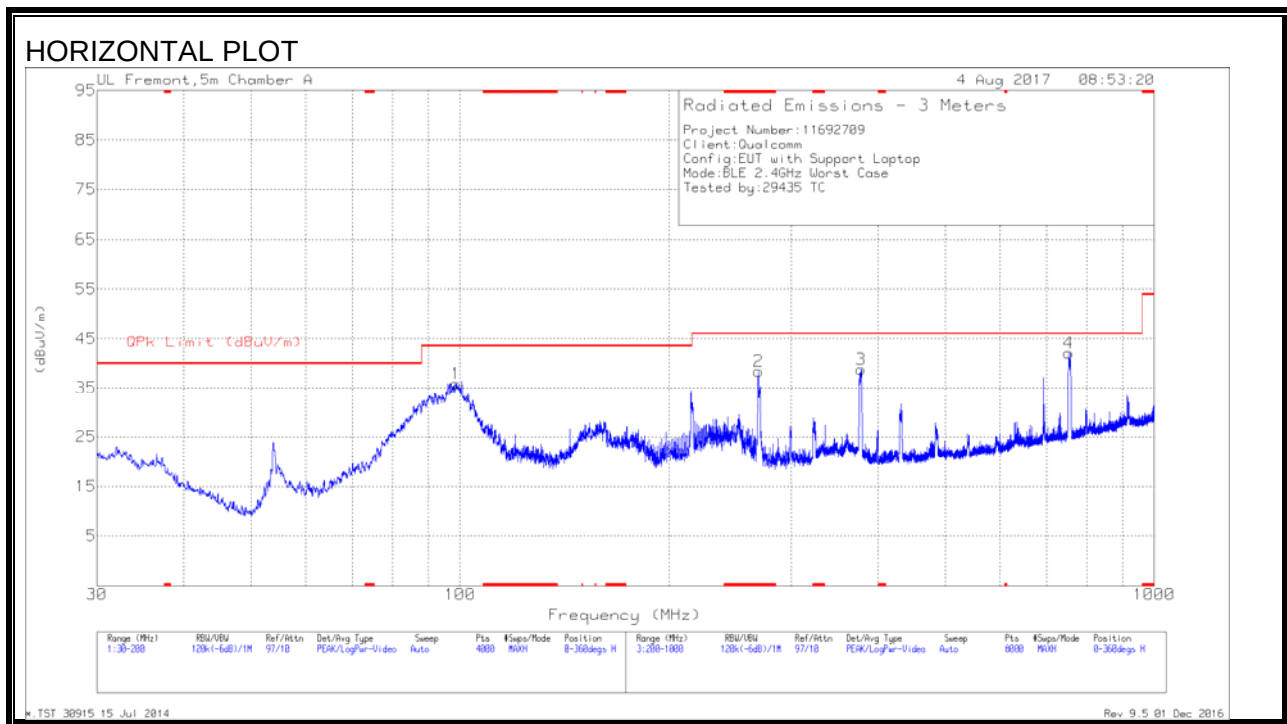
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
6	.06516	62.37	Pk	11.9	.1	-80	-5.63	51.31	-56.94	31.31	-36.94	-	-	-	-	0-360
1	.06525	64.55	Pk	11.9	.1	-80	-3.45	51.29	-54.74	31.29	-34.74	-	-	-	-	0-360
2	1.3084	42.93	Pk	11.6	.1	-80	-25.37	-	-	-	-	45.29	-70.66	25.29	-50.66	0-360
3	.19458	51.62	Pk	11.6	.1	-80	-16.68	-	-	-	-	41.84	-58.52	21.84	-38.52	0-360
7	.19826	48.83	Pk	11.6	.1	-80	-19.47	-	-	-	-	41.67	-61.14	21.67	-41.14	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.7025	39.92	Pk	11.6	.1	-40	11.62	30.68	-19.06	0-360
8	.70812	37.8	Pk	11.6	.1	-40	9.5	30.61	-21.11	0-360
9	25.77337	29.99	Pk	8.9	.7	-40	-41	29.5	-29.91	0-360
5	26.18366	16.6	Pk	8.9	.8	-40	-13.7	29.5	-43.2	0-360

Pk - Peak detector

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



Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 269.109	50.86	Pk	17.1	-29.5	38.46	46.02	-7.56	0-360	101	H
5	31.9241	33.73	Pk	23.2	-31.2	25.73	40	-14.27	14	396	V
	31.9241	29.56	Qp	23.2	-31.2	21.56	40	-18.44	14	396	V
6	36.823	44.68	Pk	20.2	-31.2	33.68	40	-6.32	0-360	100	V
1	98.7875	53.04	Pk	13.8	-30.6	36.24	43.52	-7.28	340	260	H
	98.7875	46.01	Qp	13.8	-30.6	29.21	43.52	-14.31	340	260	H
7	376.723	47.57	Pk	19	-29.1	37.47	46.02	-8.55	0-360	200	V
3	378.0231	48.89	Pk	19	-29.1	38.79	46.02	-7.23	0-360	101	H
4	752.7201	46.24	Pk	24.8	-28.1	42.94	46.02	-3.08	144	255	H
	752.7201	41.5	Qp	24.8	-28.1	38.2	46.02	-7.82	144	255	H
8	757.1937	28.58	Pk	24.8	-28	25.38	46.02	-20.64	284	400	V
	757.1937	24.29	Qp	24.8	-28	21.09	46.02	-24.93	284	400	V

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

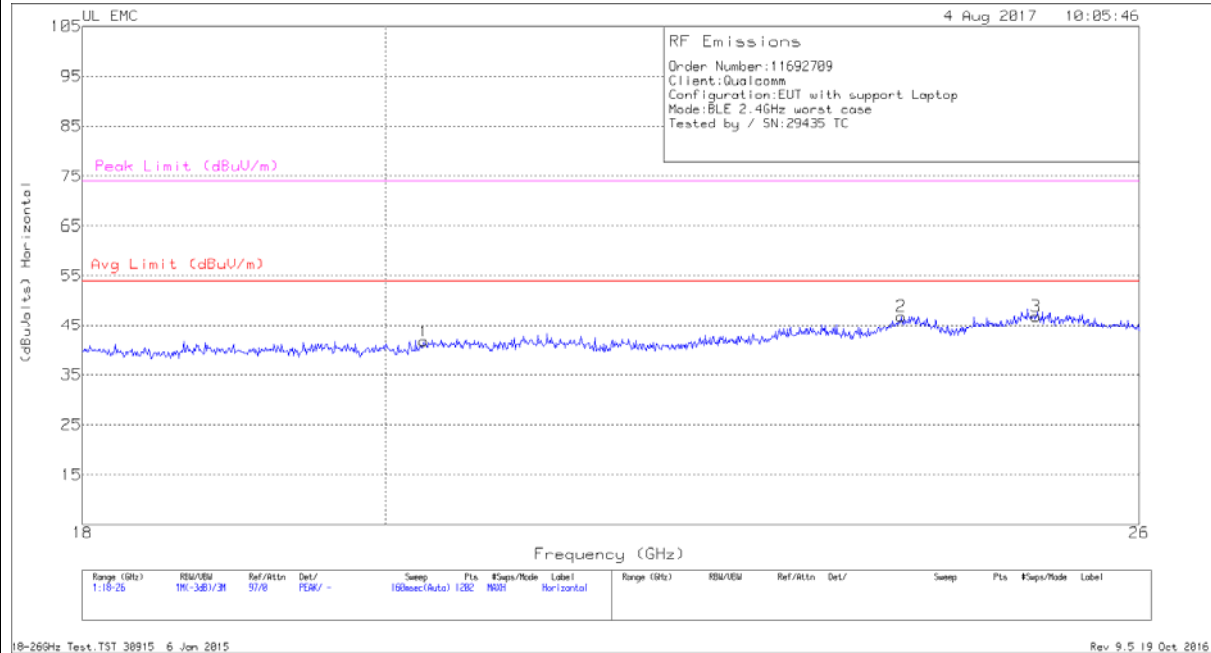
Pk - Peak detector

Qp - Quasi-Peak detector

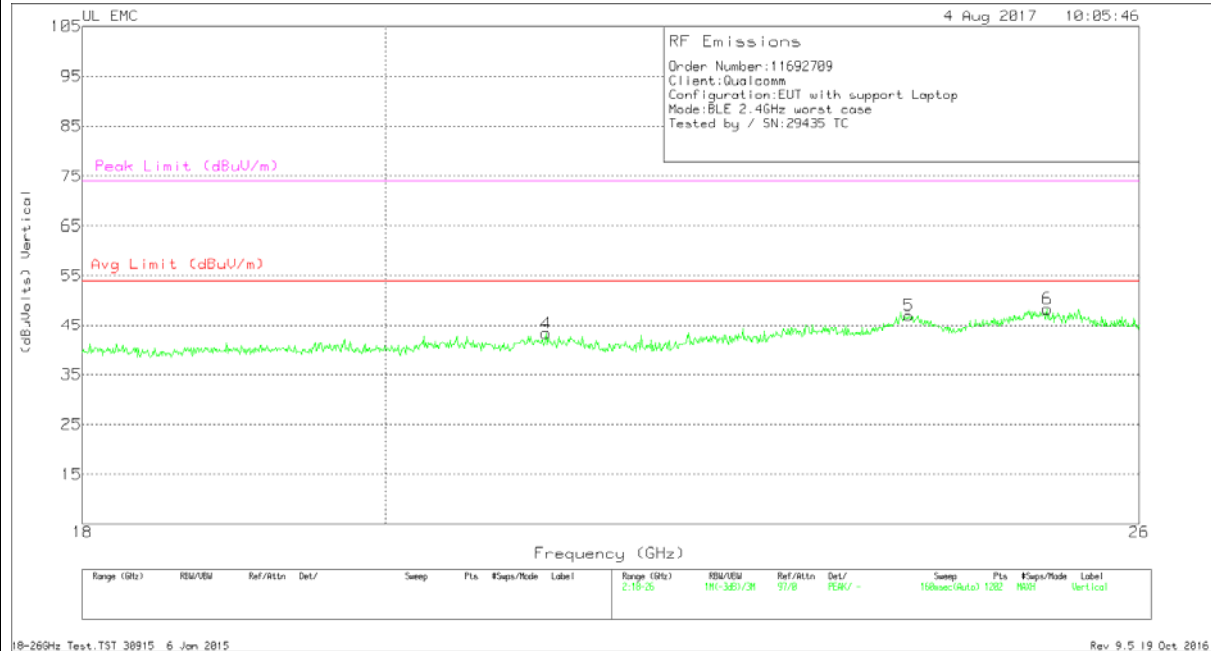
9.5. WORST-CASE 18 to 26 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

HORIZONTAL PLOT



VERTICAL PLOT



DATA

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 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	20.271	40.37	Pk	32.8	-22	-9.5	41.667	54	-12.333	74	-32.333
2	23.935	42.43	Pk	33.9	-20	-9.5	46.833	54	-7.1667	74	-27.167
3	25.081	42.33	Pk	34.3	-20.3	-9.5	46.8333	54	-7.1667	74	-27.167
4	21.151	41.33	Pk	33.1	-21.6	-9.5	43.3333	54	-10.667	74	-30.667
5	23.995	42.8	Pk	33.9	-20.2	-9.5	47	54	-7	74	-27
6	25.181	44.03	Pk	34.3	-20.5	-9.5	48.333	54	-5.667	74	-25.667

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

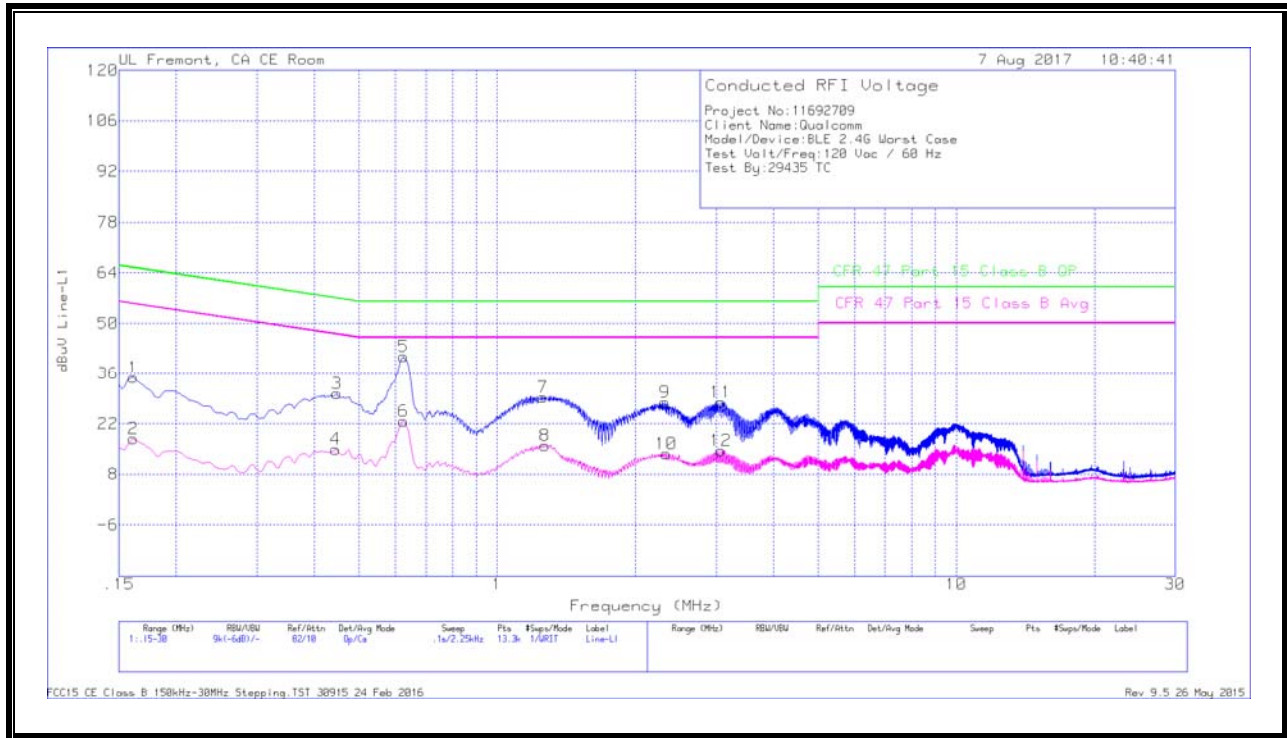
FCC §15.207 (a)
RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	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

LINE 1 RESULTS



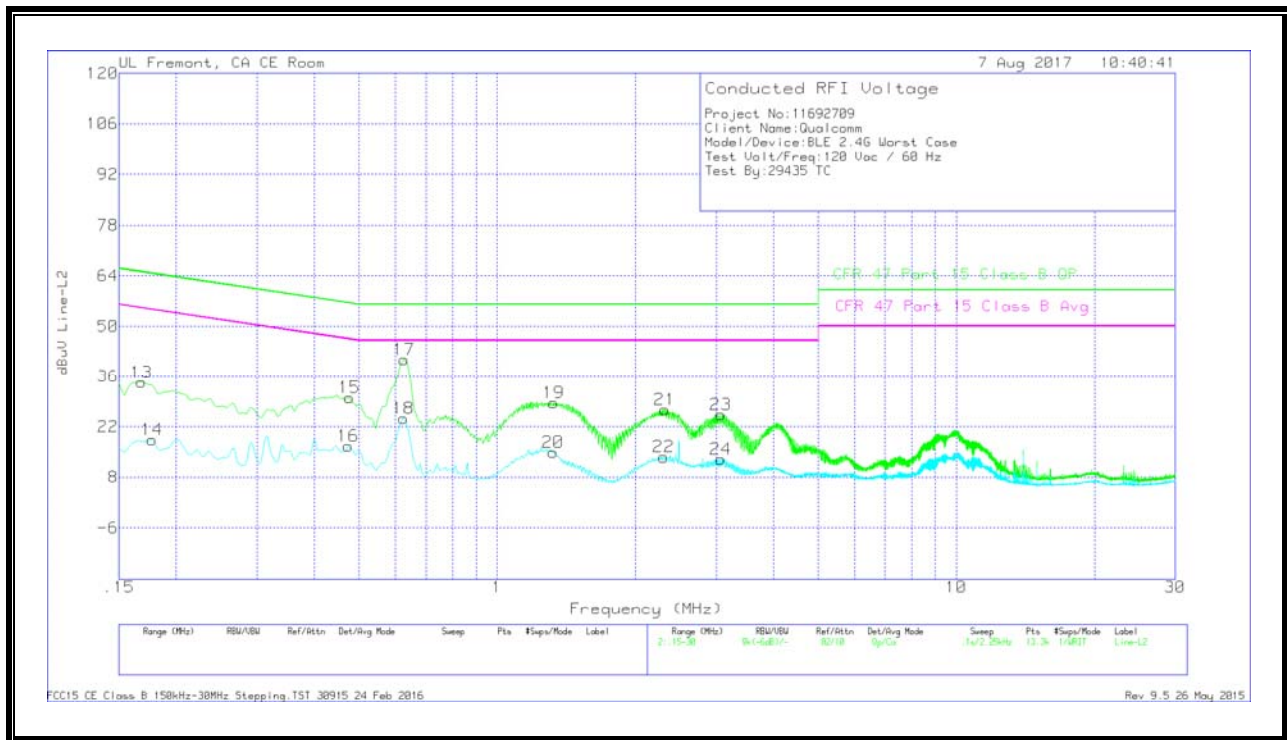
WORST EMISSIONS

Range 1: Line-L1 .15 - 30MHz												
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)	
1	.16125	24.58	Qp	.1	.1	10.1	34.88	65.4	-30.52	-	-	
2	.16125	7.49	Ca	.1	.1	10.1	17.79	-	-	55.4	-37.61	
3	.447	20.09	Qp	0	.1	10.1	30.29	56.93	-26.64	-	-	
4	.44475	4.77	Ca	0	.1	10.1	14.97	-	-	46.97	-32	
5	.62475	30.61	Qp	0	.1	10.1	40.81	56	-15.19	-	-	
6	.62475	12.53	Ca	0	.1	10.1	22.73	-	-	46	-23.27	
7	1.257	19.14	Qp	0	.1	10.1	29.34	56	-26.66	-	-	
8	1.2705	5.7	Ca	0	.1	10.1	15.9	-	-	46	-30.1	
9	2.32125	17.79	Qp	0	.1	10.1	27.99	56	-28.01	-	-	
10	2.3325	3.41	Ca	0	.1	10.1	13.61	-	-	46	-32.39	
11	3.06825	17.7	Qp	0	.1	10.1	27.9	56	-28.1	-	-	
12	3.06938	4.28	Ca	0	.1	10.1	14.48	-	-	46	-31.52	

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



WORST EMISSIONS

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	.168	24.26	Qp	0	0	10.1	34.36	65.06	-30.7	-	-
14	.177	8.22	Ca	0	.1	10.1	18.42	-	-	54.63	-36.21
15	.47625	19.89	Qp	0	.1	10.1	30.09	56.4	-26.31	-	-
16	.474	6.43	Ca	0	.1	10.1	16.63	-	-	46.44	-29.81
17	.627	30.63	Qp	0	.1	10.1	40.83	56	-15.17	-	-
18	.62475	14.08	Ca	0	.1	10.1	24.28	-	-	46	-21.72
19	1.32675	18.4	Qp	0	.1	10.1	28.6	56	-27.4	-	-
20	1.3245	4.71	Ca	0	.1	10.1	14.91	-	-	46	-31.09
21	2.32125	16.49	Qp	0	.1	10.1	26.69	56	-29.31	-	-
22	2.3055	3.39	Ca	0	.1	10.1	13.59	-	-	46	-32.41
23	3.06825	15.16	Qp	0	.1	10.1	25.36	56	-30.64	-	-
24	3.0705	2.76	Ca	0	.1	10.1	12.96	-	-	46	-33.04

Qp - Quasi-Peak detector

Ca - CISPR average detection