



CERTIFICATION TEST REPORT

Report Number. : 12720909-E2V3

Applicant : VeriFone, Inc.
1400 WEST STANFORD RANCH ROAD
ROCKLIN, CA, 95765, U.S.A.

Model : M440

FCC ID : B32M440

IC : 787C-M440

EUT Description : Point-of-Interaction Terminal

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

Date of Issue:
August 06, 2019

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	7/9/2019	Initial Issue	---
V2	7/24/2019	Updated Company name	Tri Pham
V3	8/6/2019	Updated XYZ statement	Tri Pham

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: VeriFone, Inc.
1400 WEST STANFORD RANCH ROAD
ROCKLIN, CA, 95765, U.S.A.

EUT DESCRIPTION: Point-of-Interaction Terminal

MODEL: M440

SERIAL NUMBER: 346522674 (Radiated), 346522625 (Conducted)

DATE TESTED: May 28, 2019 to June 10, 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.

Approved & Released For
UL Verification Services Inc. By:



Frank Ibrahim
Operations Leader
Consumer Technology Division
UL Verification Services Inc.

Reviewed By:



Tri Pham
Project Engineer
Consumer Technology Division
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, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

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

47173 Benicia Street	47266 Benicia Street	47658 Kato Road
☐ Chamber A	☐ Chamber D	☒ Chamber I
☐ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☒ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code: 2324A.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 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%.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The M440 is an integrated countertop Point-of-Interaction (POI) terminal designed to process online and offline transactions in an attended environment. The Multi-Lane (M440) product is part of the two-chip Carbon family (Android applications and Engage payment engine). It accepts all payment methods - MSR, PSCR, Contactless, and wallets. The radio communication mechanisms available in the system include WiFi dual band 802.11 a/b/g/n and Bluetooth 4.1 BLE (BT4.2 on Android 7.1 or later versions), and CTLS (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	3.36	2.17

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dual band stamped metal antenna, with a maximum gain of 2.47 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Qualcomm Radio Control Tool, Version 4.0.00123.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated bandedge, harmonics, and spurious emissions from 1 GHz to 18GHz were performed with EUT set to transmit at the Low/Middle/High channels.

Radiated emission 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.

The fundamental of the EUT was investigated in two orthogonal orientations X and Z, it was determined that X-axis was the worst case orientation, therefore all final radiated testing was performed with the EUT in X(flatbed) position.

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

BLE: 1 Mbps.

BLE and Wifi bands do not transmit simultaneously.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC
Laptop AC/DC Adapter	Dell	LA65NM130	CN-0JNKWD-72438-61M-0728-A03	DoC
Laptop	Dell	Latitude E7450	H24JN72	DoC
AC/DC Adapter	Verifone	2AAJ012F US	A1914000013	DoC
Base Plug	Verifone	M400 BAS	445-101-01-A REV:A00	DoC
Debug Board	Verifone	LBL445-003-01-A	445-113-01-A	DoC

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	0.9	AC Mains to AC/DC Adapter
2	DC	1	DC	Unshielded	1.85	AC/DC Adapter to Laptop
3	USB	1	USB Type-C to Type-A	Shielded	1	Laptop to Debug Board
4	USB	1	USB Type-C	Shielded	1.5	Base Plug to EUT
5	DC	5	DC	Unshielded	1.8	AC/DC Adapter to Base Plug
6	Antenna	1	SMA	Unshielded	0.08	To spectrum analyzer

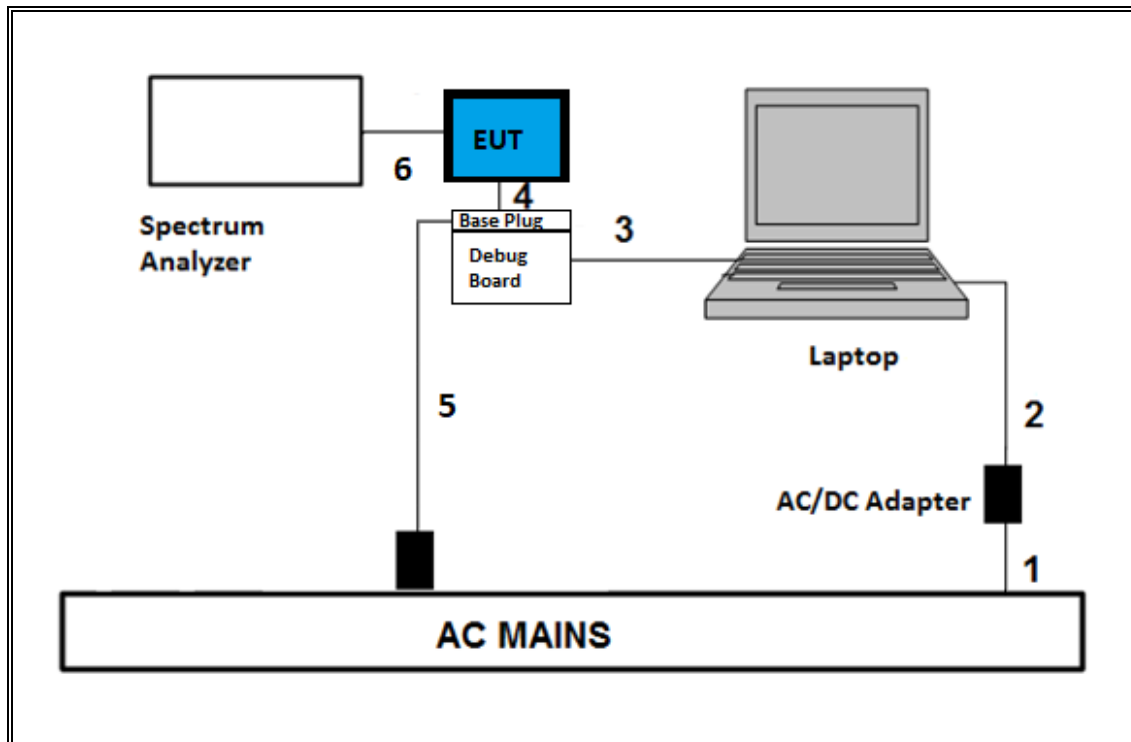
I/O CABLES (AC POWER CONDUCTED TEST AND RADIATED TEST)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	0.9	AC Mains to AC/DC Adapter
2	DC	1	DC	Unshielded	1.85	AC/DC Adapter to Laptop
3	USB	1	USB Type-C to Type-A	Shielded	1	Laptop to Debug Board
4	USB	1	USB Type-C	Shielded	1.5	Base Plug to EUT
5	DC	5	DC	Unshielded	1.8	AC/DC Adapter to Base Plug

TEST SETUP-CONDUCTED TEST

The EUT was connected to a Base Plug and powered by the Base Plug. Test software exercised the EUT.

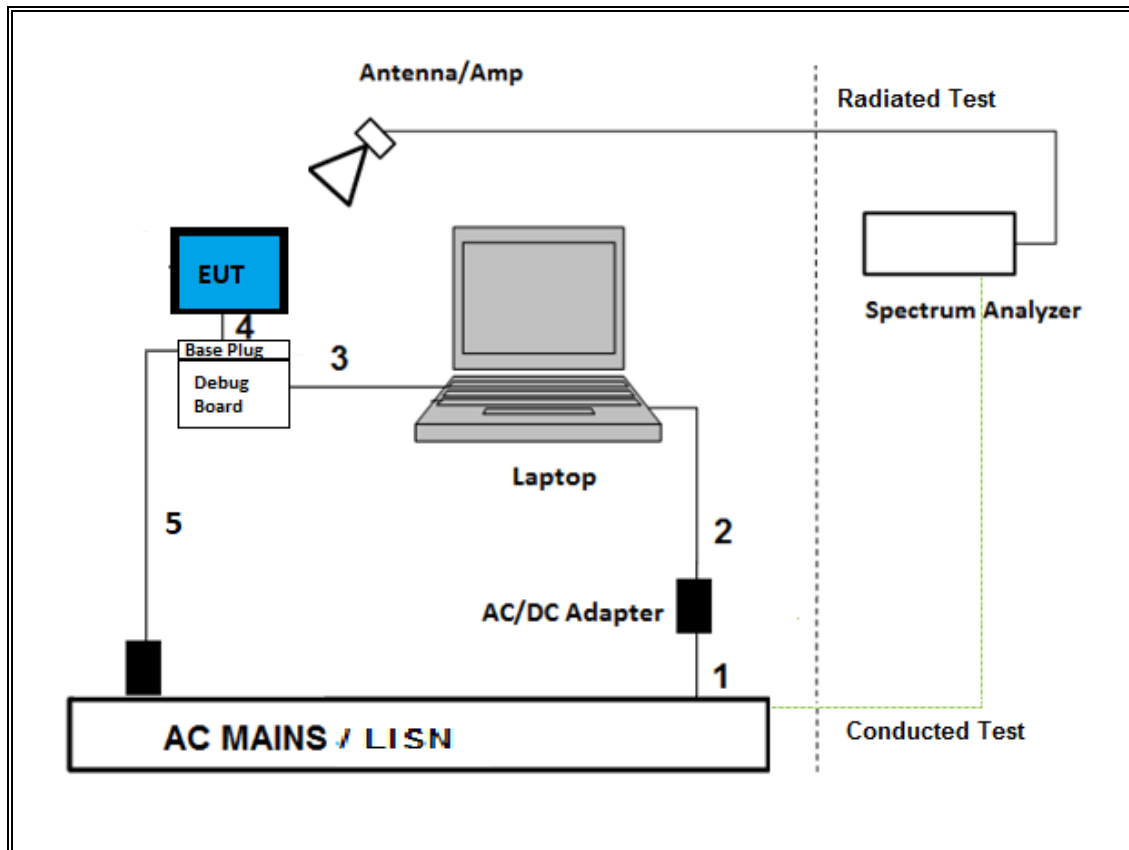
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED TEST AND RADIATED TEST

The EUT was connected to a Base Plug and powered by the Base Plug. Test software exercised the EUT.

SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
6 port rf switch, 1-18GHz	Pasternack	PE7159	171455	08/01/2019	08/01/2018
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1271	07/26/2019	07/26/2018
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1224	10/09/2019	10/09/2018
Antenna, Passive Loop 30Hz – 1MHz	Electro-Metrics	EM-6871	PRE0179465	05/31/2020	05/31/2019
Antenna, Passive Loop 100kHz – 30MHz	Electro-Metrics	EM-6872	PRE0179467	05/31/2020	05/31/2019
Antenna, Horn 700MHz-18GHz	AH Systems Inc.	SAS-571	PRE0190810	07/10/2019	07/10/2017
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179377	02/15/2020	02/15/2019
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179376	02/14/2020	02/14/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1450	01/24/2020	01/24/2019
Amplifier, 1-18GHz	MITIQ	AFS42-00101800-25-S-42	PRE0181078	08/01/2019	08/01/2018
Amplifier, 9kHz to 1GHz, 32 dB	Sonoma Instrument	310	PRE0186650	12/13/2019	12/13/2018
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184052	10/24/2019	10/24/2018
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
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	06/15/2019	06/15/2018
Test Software List					
Radiated Software	UL	UL EMC		Ver 9.5, June 22, 2018	
Antenna Port Software	UL	UL RF		Ver 9.6, April 18, 2019	
AC Line Conducted Software	UL	UL EMC		Ver 9.5, May 26, 2015	

* Testing performed before calibration due date.

7. MEASUREMENT METHOD

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 PKPM1 Peak power meter method

Average 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 Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle 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

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

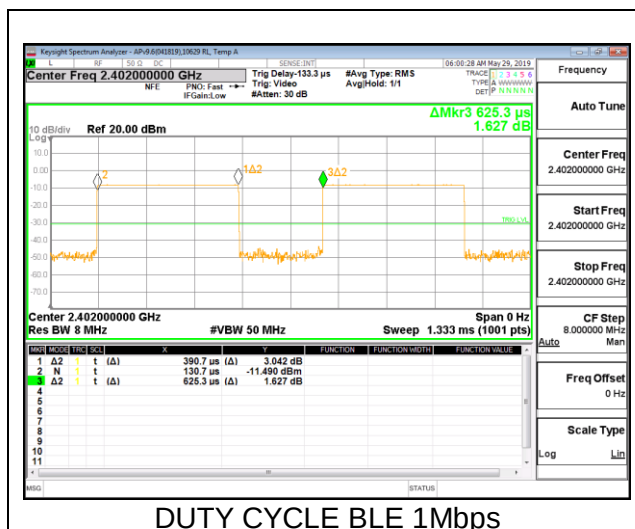
PROCEDURE

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 1Mbps	0.39	0.63	0.625	62.48%	2.04	2.560

DUTY CYCLE PLOTS



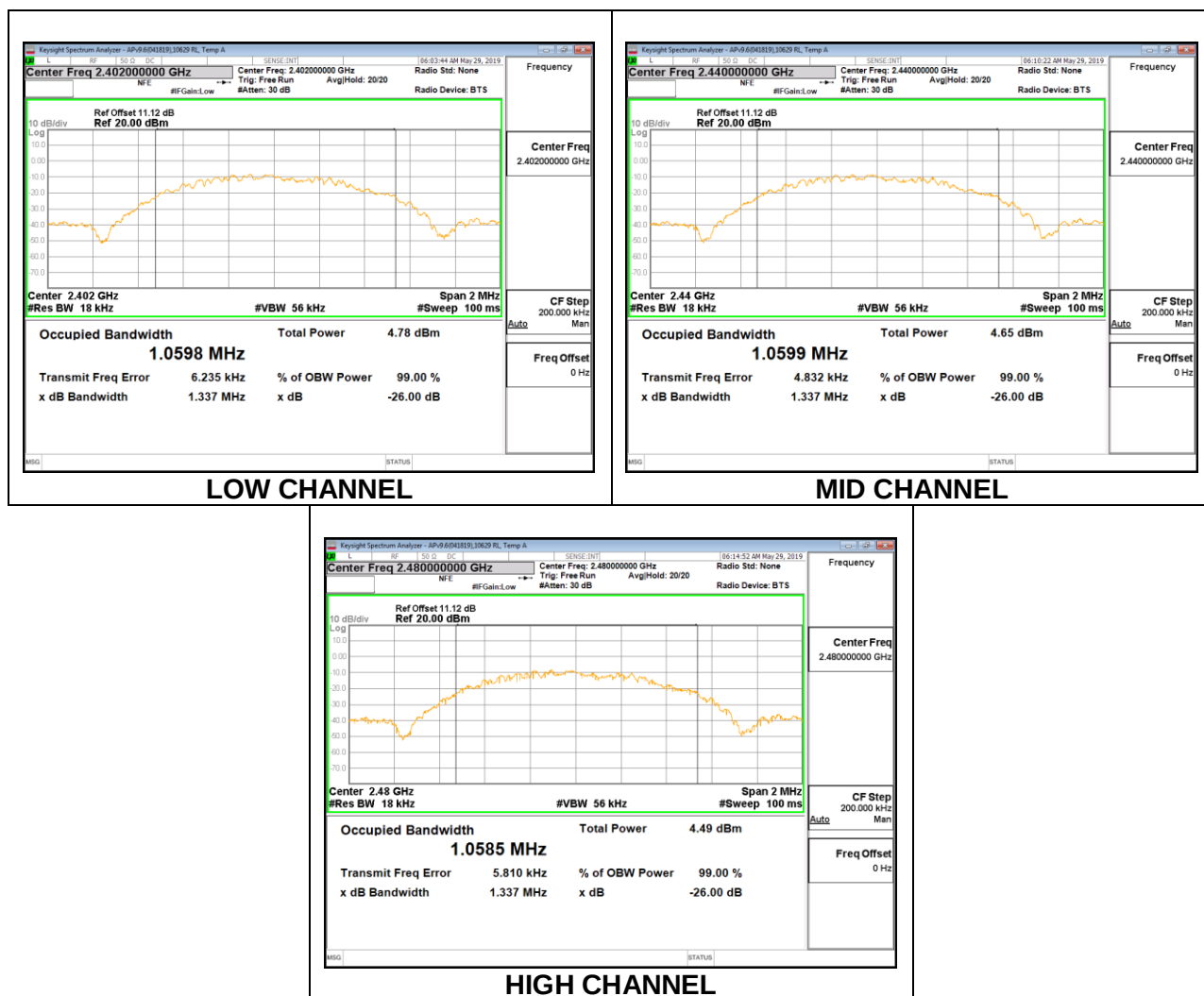
8.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.060
Middle	2440	1.060
High	2480	1.059



8.3. 6 dB BANDWIDTH

LIMITS

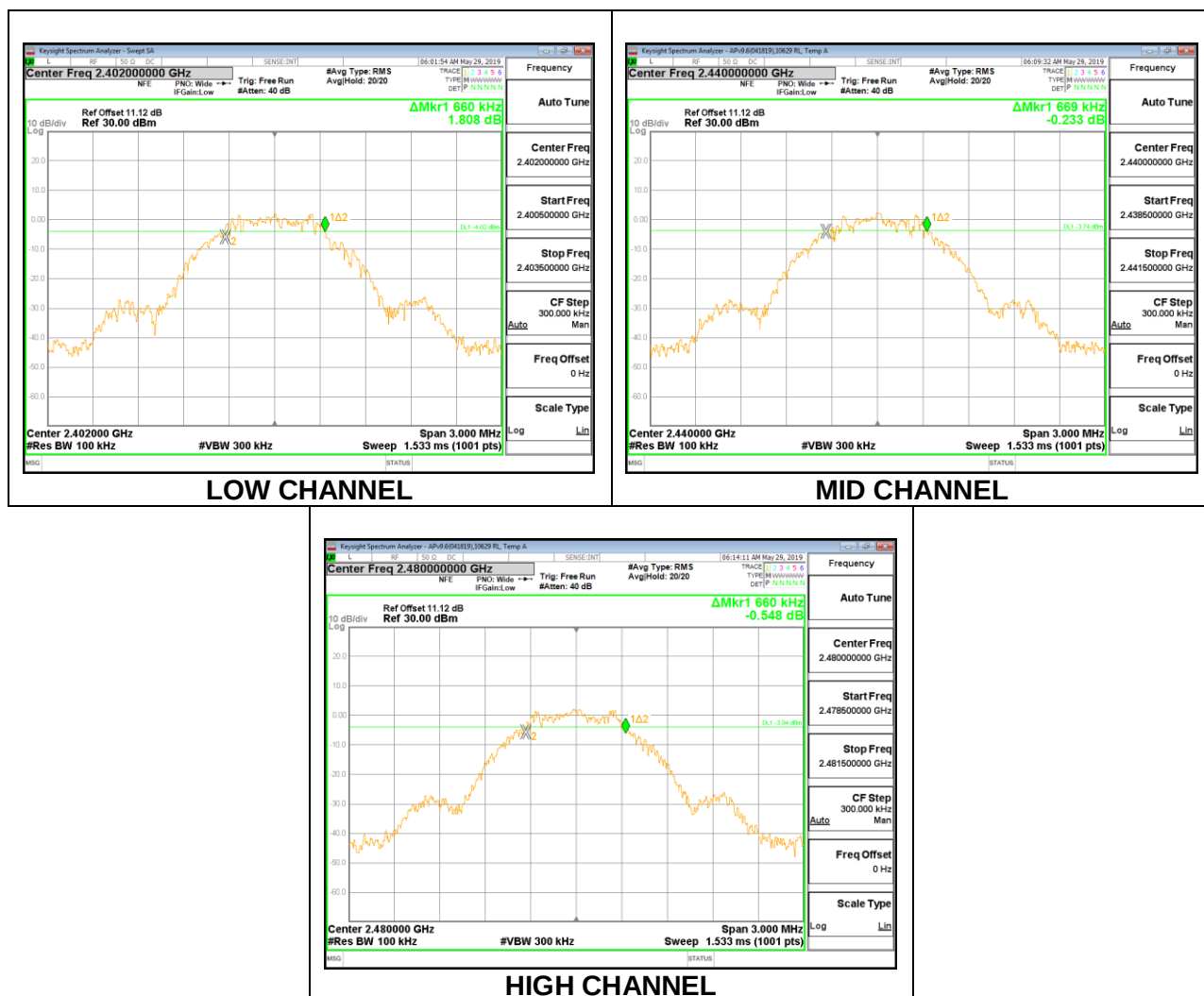
FCC §15.247 (a) (2)

RSS-247 5.2 (a)

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.660	0.5
Middle	2440	0.669	0.5
High	2480	0.660	0.5



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 gated peak reading of power.

RESULTS

Tested By:	10629 RL
Date:	5/28/2019

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	3.36	30	-26.640
Middle	2440	3.21	30	-26.790
High	2480	3.28	30	-26.720

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 of 10.3 dB (including 10 dB pad and 0.3 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

Tested By:	10629 RL
Date:	5/28/2019

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.08
Middle	2440	2.94
High	2480	2.99

8.6. POWER SPECTRAL DENSITY

LIMITS

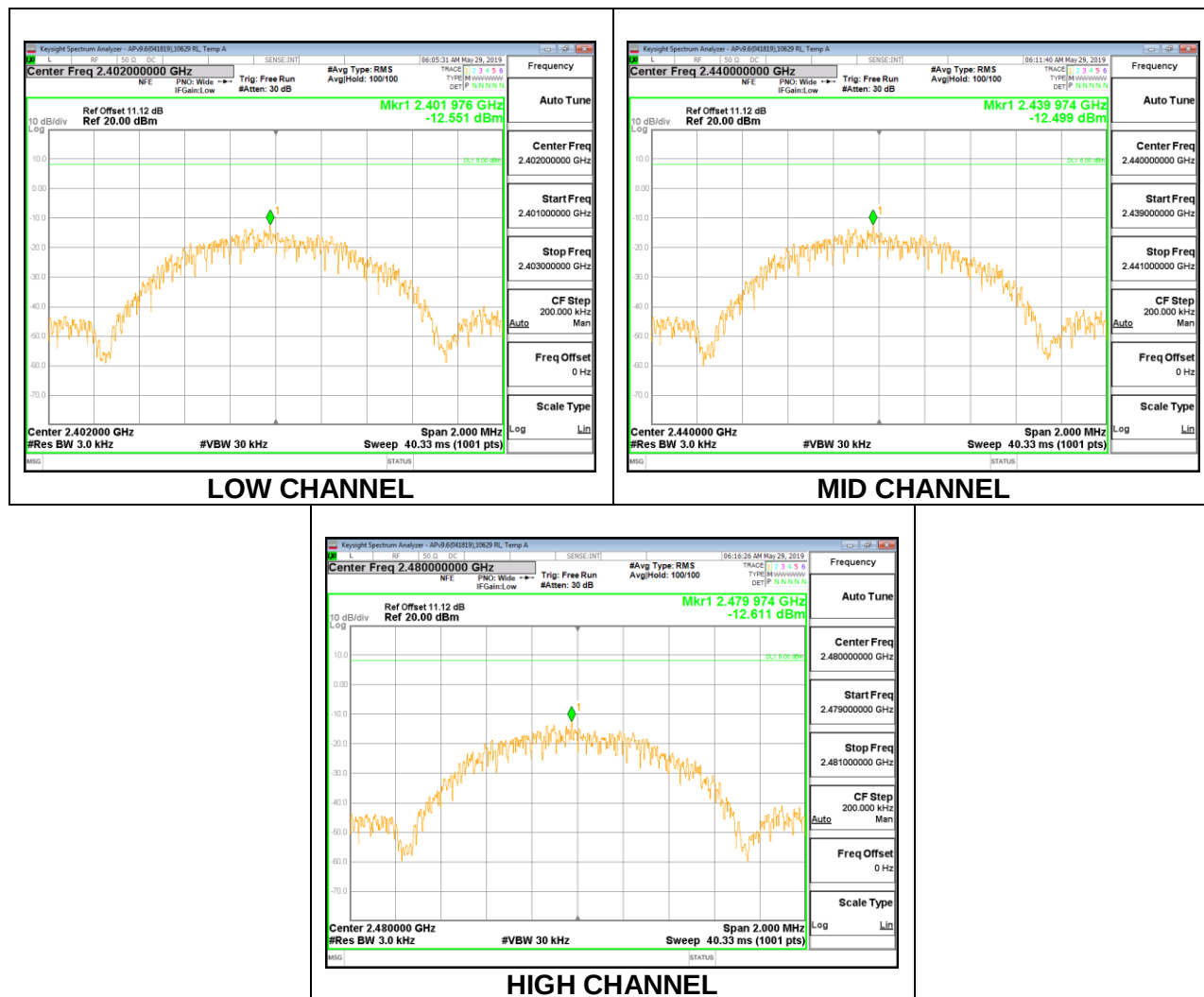
FCC §15.247 (e)

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

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-7.43	8	-15.43
Middle	2440	-7.11	8	-15.11
High	2480	-6.78	8	-14.78



8.7. CONDUCTED SPURIOUS EMISSIONS

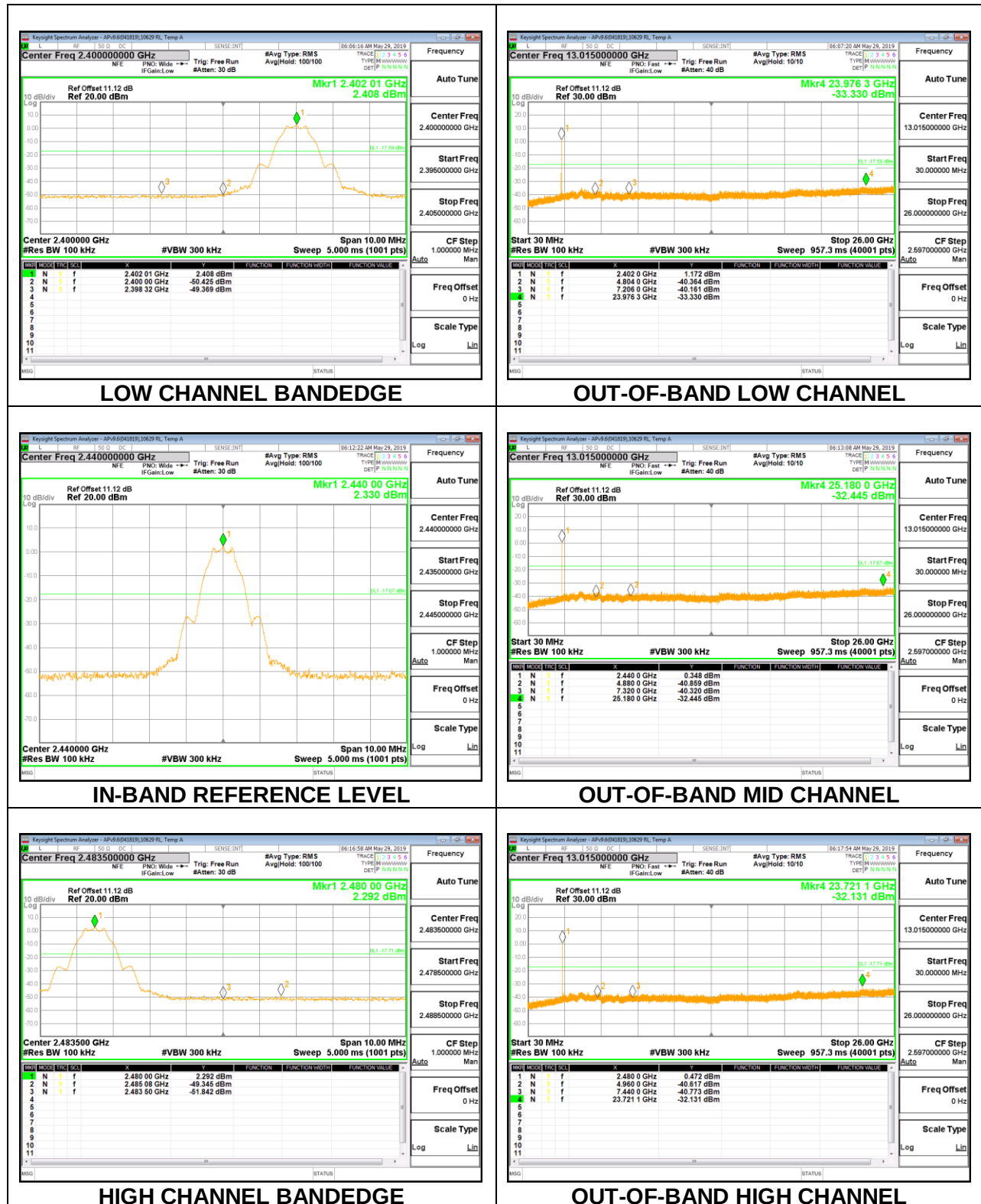
LIMITS

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



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 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.

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

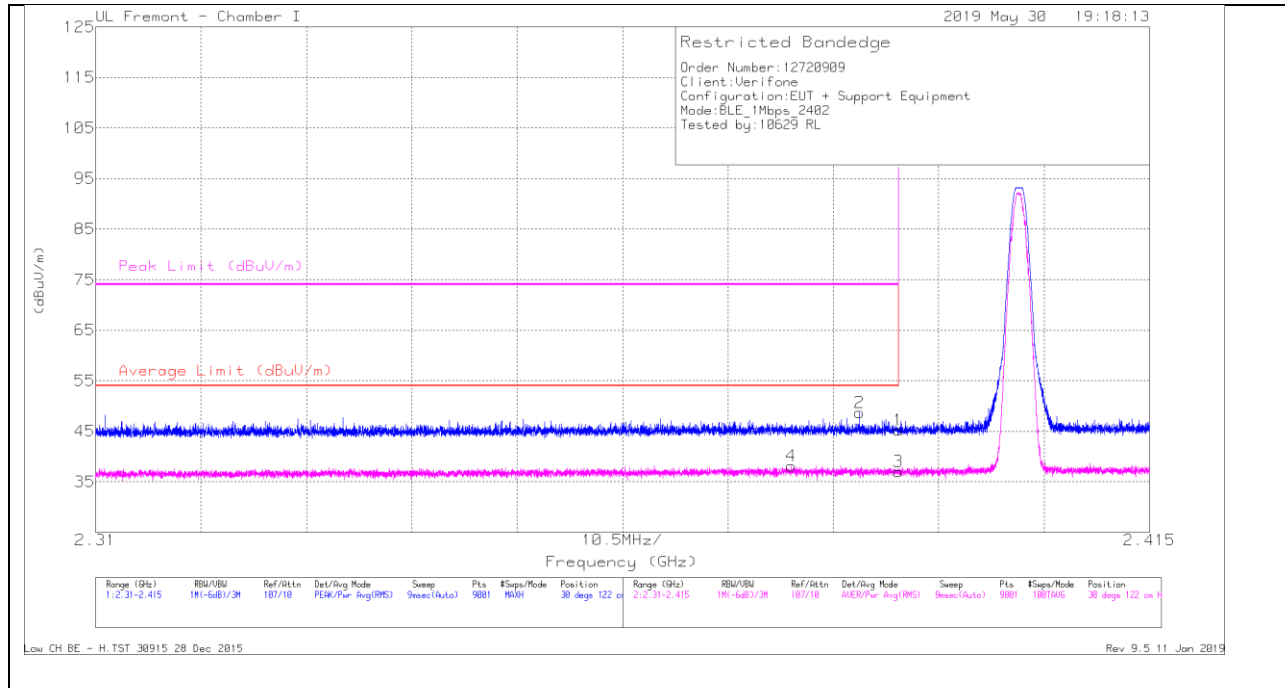
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

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

9.2. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

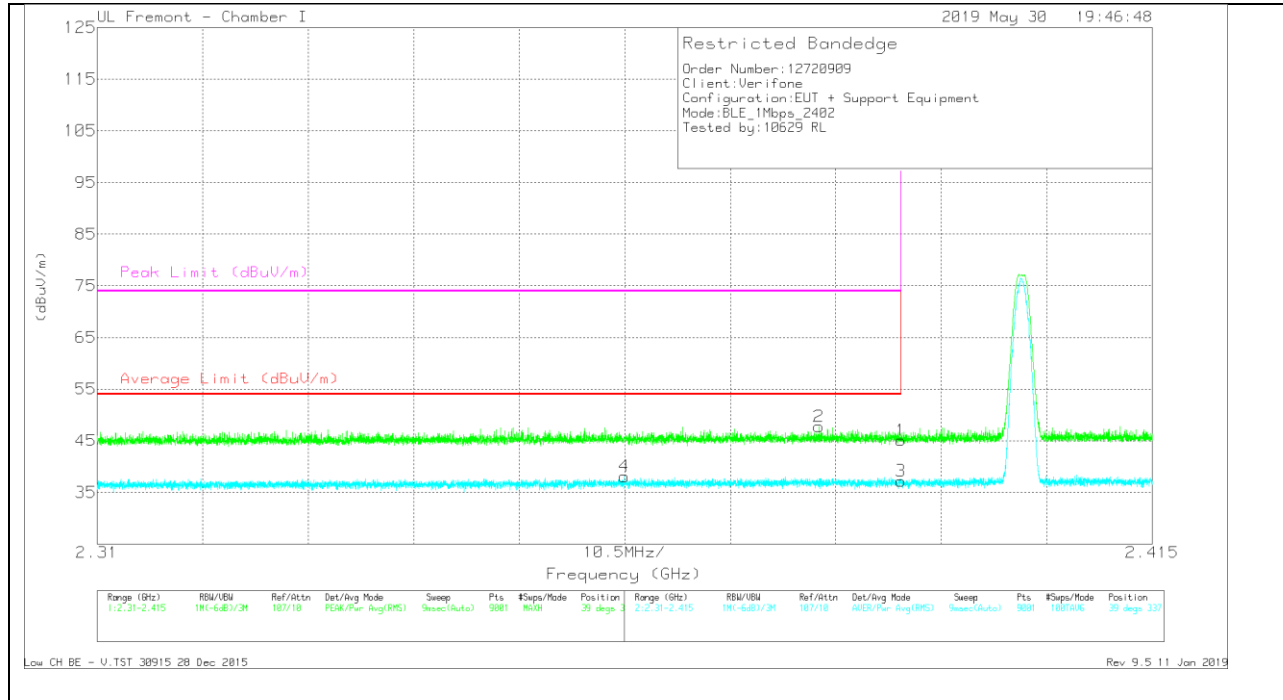
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0100810 (dBm)	Amp/Cbl/Ftr/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.85	Pk	28.9	-21.6	0	45.15	-	-	74	-28.85	30	122	H
2	* 2.386	41.34	Pk	28.9	-21.6	0	48.64	-	-	74	-25.36	30	122	H
3	* 2.39	27.68	RMS	28.9	-21.6	2.04	37.02	54	-16.98	-	-	30	122	H
4	* 2.379	28.66	RMS	28.9	-21.5	2.04	38.1	54	-15.9	-	-	30	122	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 PRE0100010 (dBm)	Amp/CBI/Ftr/Pa d (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	37.77	Pk	28.9	-21.6	0	45.07	-	-	74	-28.93	39	337	V
2	* 2.382	40.43	Pk	28.9	-21.6	0	47.73	-	-	74	-26.27	39	337	V
3	* 2.39	27.84	RMS	28.9	-21.6	2.04	37.18	54	-16.82	-	-	39	337	V
4	* 2.362	28.86	RMS	28.7	-21.5	2.04	38.1	54	-15.9	-	-	39	337	V

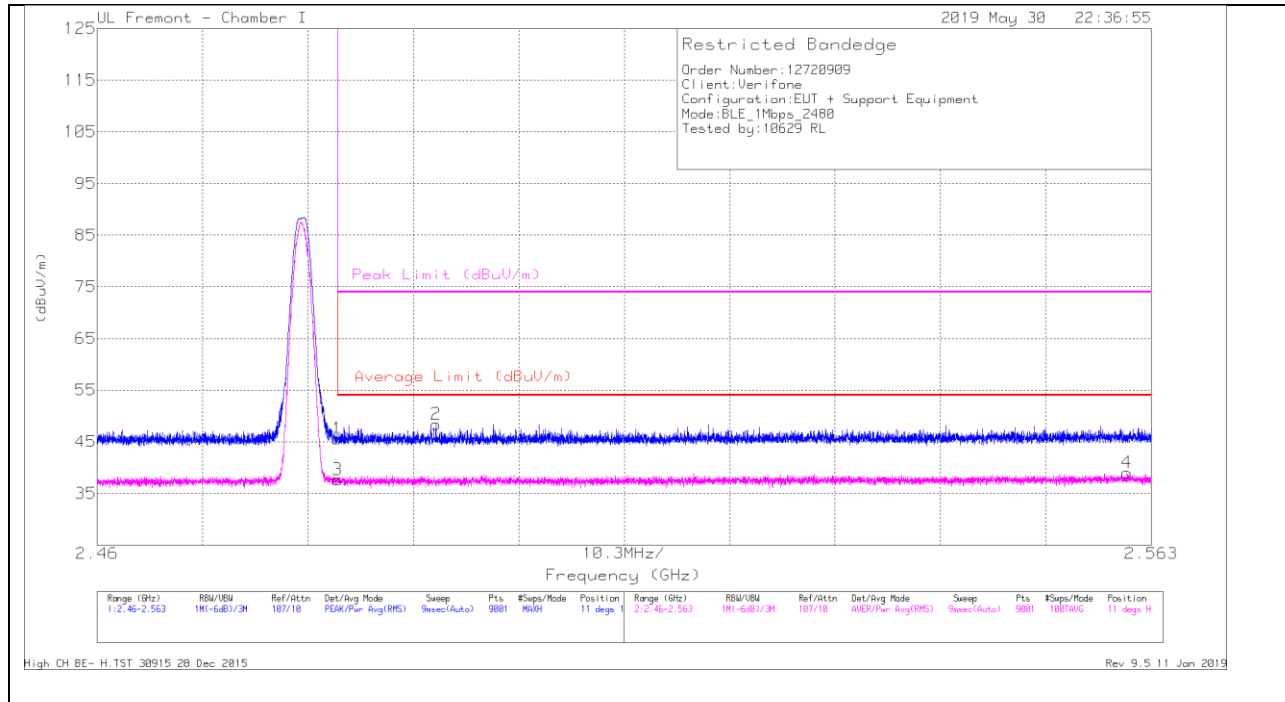
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

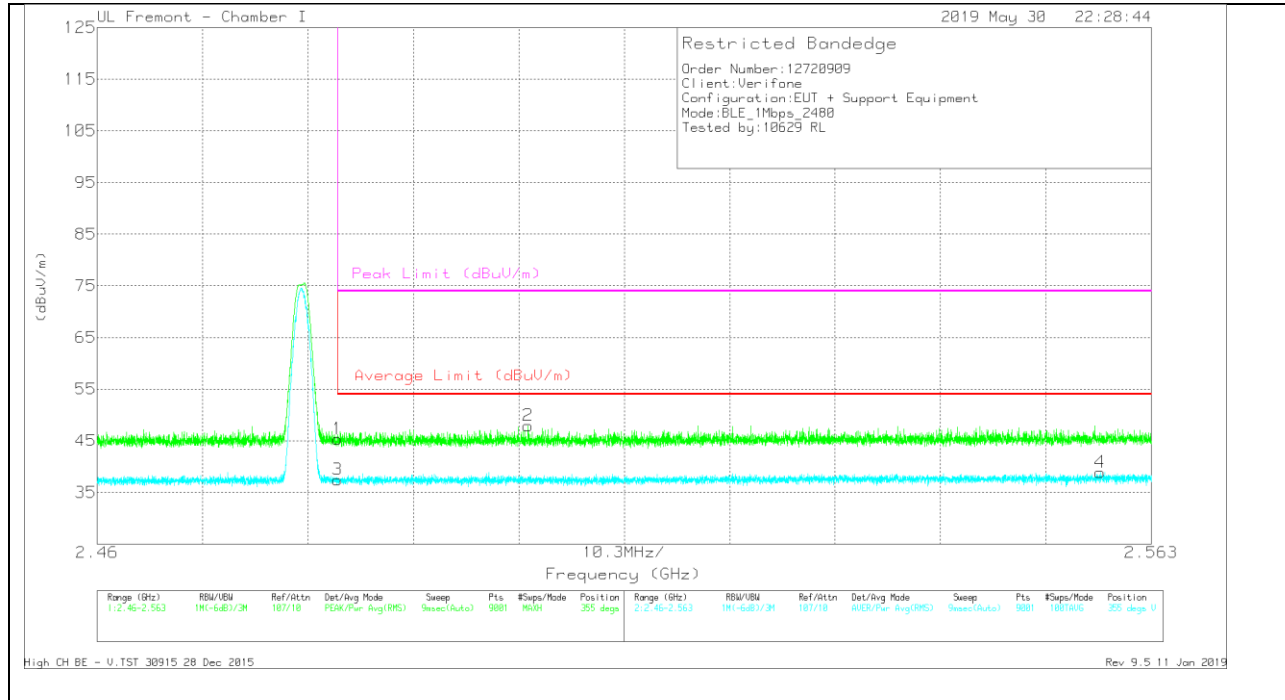
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0190810 (dBm)	Amp/Cbl/Filr/Pa d (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	37.9	PK	29.4	-21.7	0	45.6	-	-	74	-28.4	11	195	H
2	* 2.493	40.71	PK	29.4	-21.7	0	48.41	-	-	74	-25.59	11	195	H
3	* 2.484	27.93	RMS	29.4	-21.7	2.04	37.67	54	-16.33	-	-	11	195	H
4	2.561	28.89	RMS	29.7	-21.6	2.04	39.03	54	-14.97	-	-	11	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 PRE0100010 (dBm)	Amp/CbI/Ftr/Pa d (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	37.67	Pk	29.4	-21.7	0	45.37	-	-	74	-28.63	355	144	V
2	2.502	40.14	Pk	29.5	-21.7	0	47.94	-	-	74	-26.06	355	144	V
3	* 2.484	27.72	RMS	29.4	-21.7	2.04	37.46	54	-16.54	-	-	355	144	V
4	2.558	28.84	RMS	29.6	-21.6	2.04	38.88	54	-15.12	-	-	355	144	V

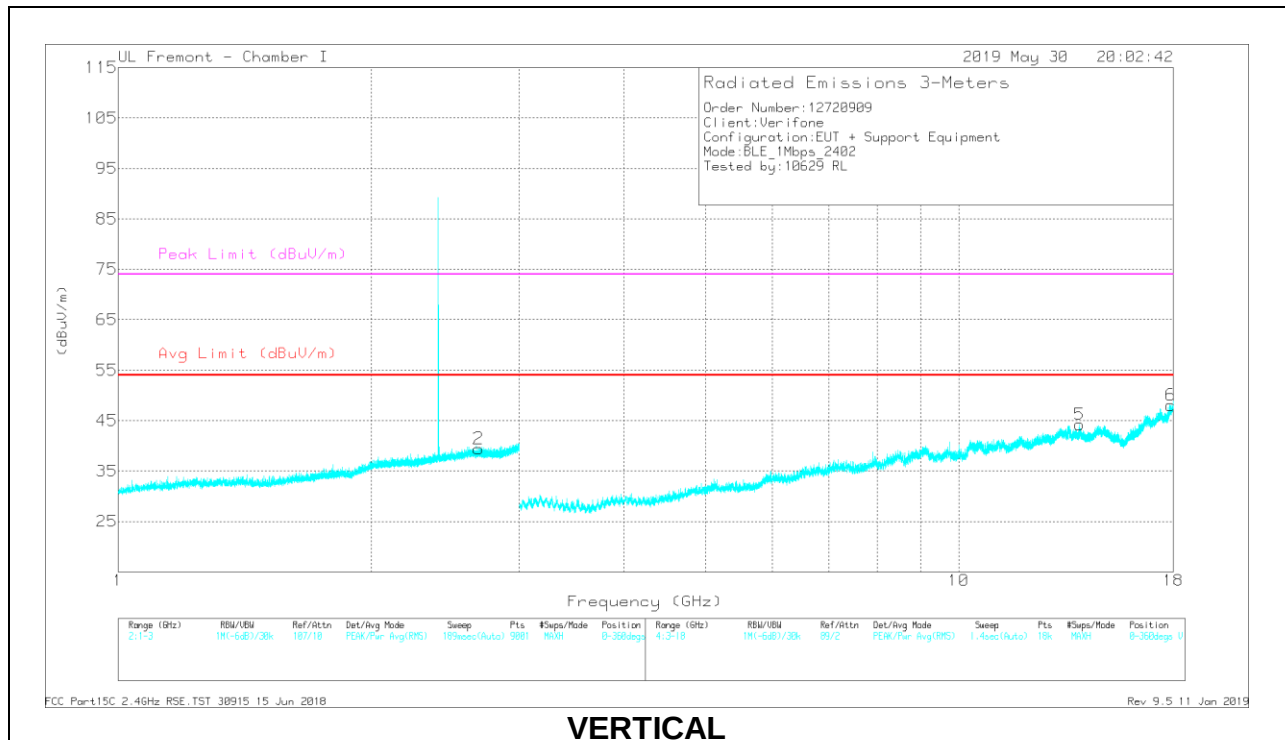
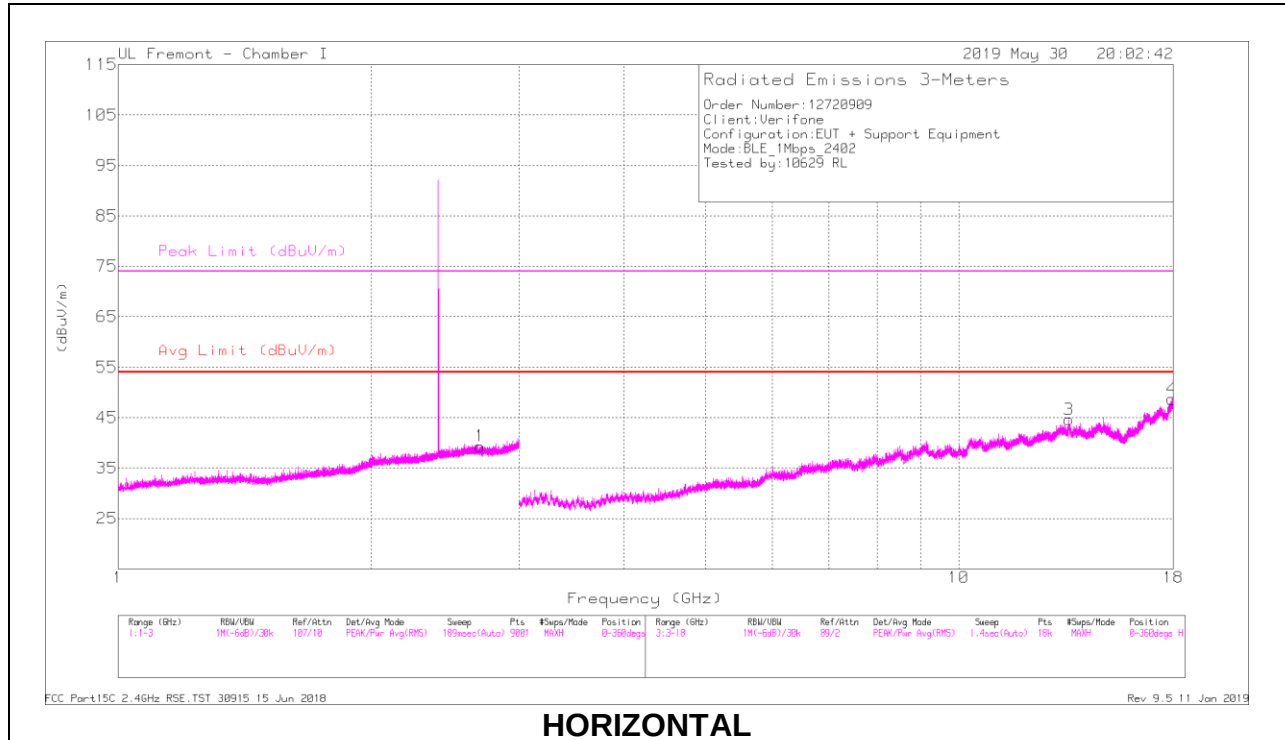
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

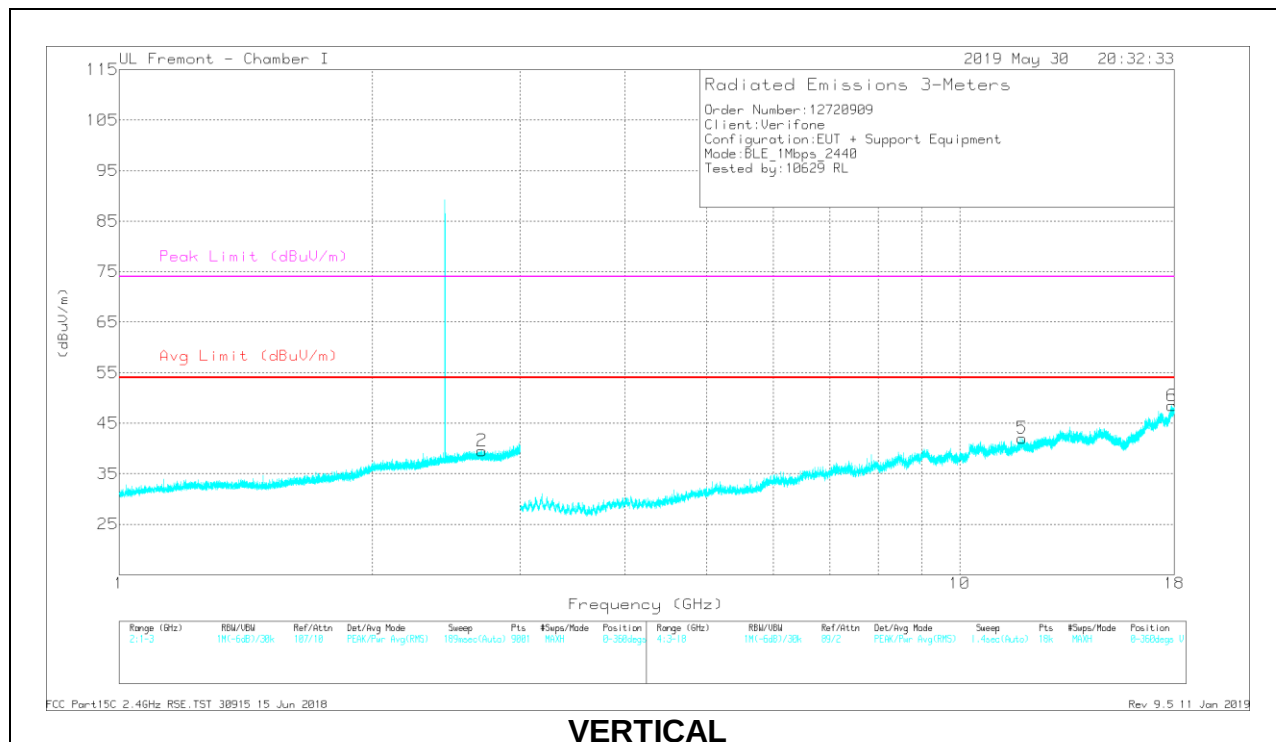
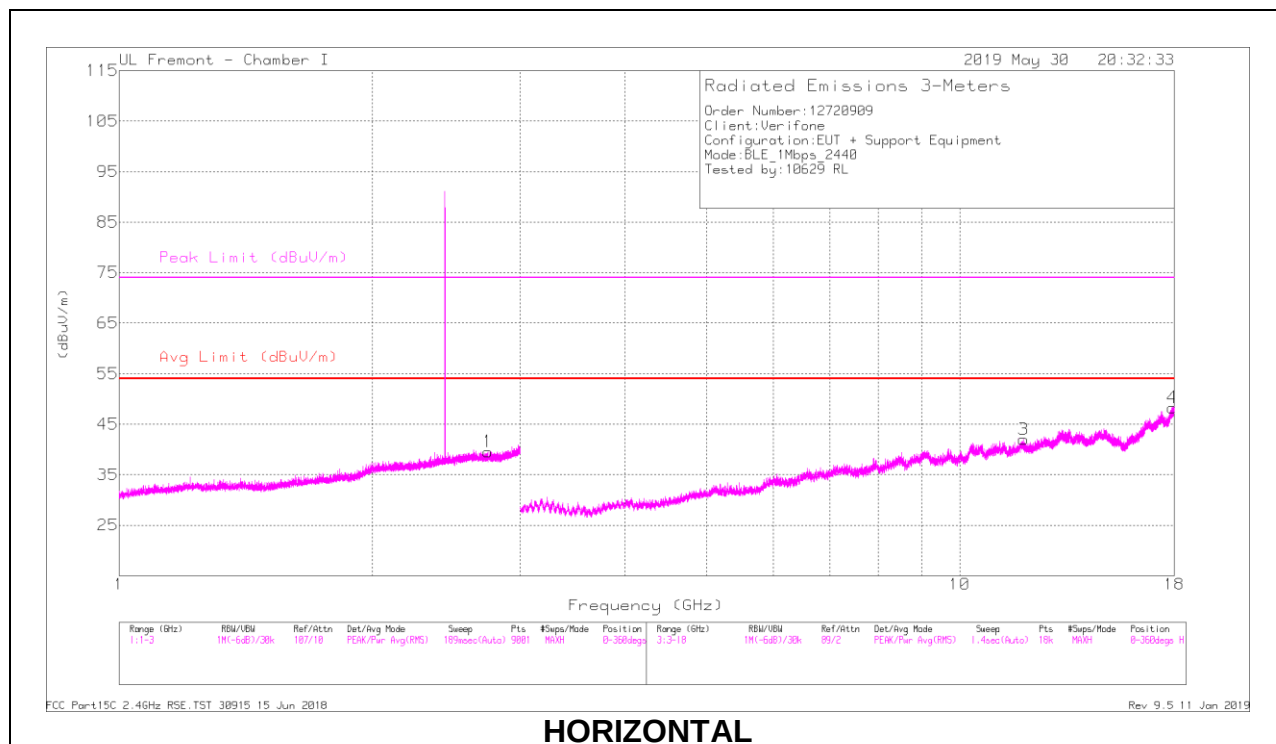
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0190810 (dB/m)	Amp/Cbl/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.693	38.43	PK2	29.5	-21.2	0	46.73	-	-	74	-27.27	187	174	H
	* 2.693	28.12	MAV1	29.5	-21.2	2.04	38.46	54	-15.54	-	-	187	174	H
2	* 2.684	37.5	PK2	29.5	-21.2	0	45.8	-	-	74	-28.2	20	279	V
	* 2.684	27.73	MAV1	29.5	-21.2	2.04	38.07	54	-15.93	-	-	20	279	V
3	13.518	30.58	PK2	41	-21.1	0	50.48	-	-	-	-	210	174	H
4	* 17.945	27.52	PK2	43.1	-15.5	0	55.12	-	-	74	-18.88	294	113	H
	* 17.942	18.37	MAV1	43.1	-15.5	2.04	48.01	54	-5.99	-	-	294	113	H
5	13.931	30.6	PK2	40.6	-21.5	0	49.7	-	-	-	-	143	375	V
6	* 17.881	26.73	PK2	42.8	-15	0	54.53	-	-	74	-19.47	352	167	V
	* 17.882	17.82	MAV1	42.8	-15	2.04	47.66	54	-6.34	-	-	352	167	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

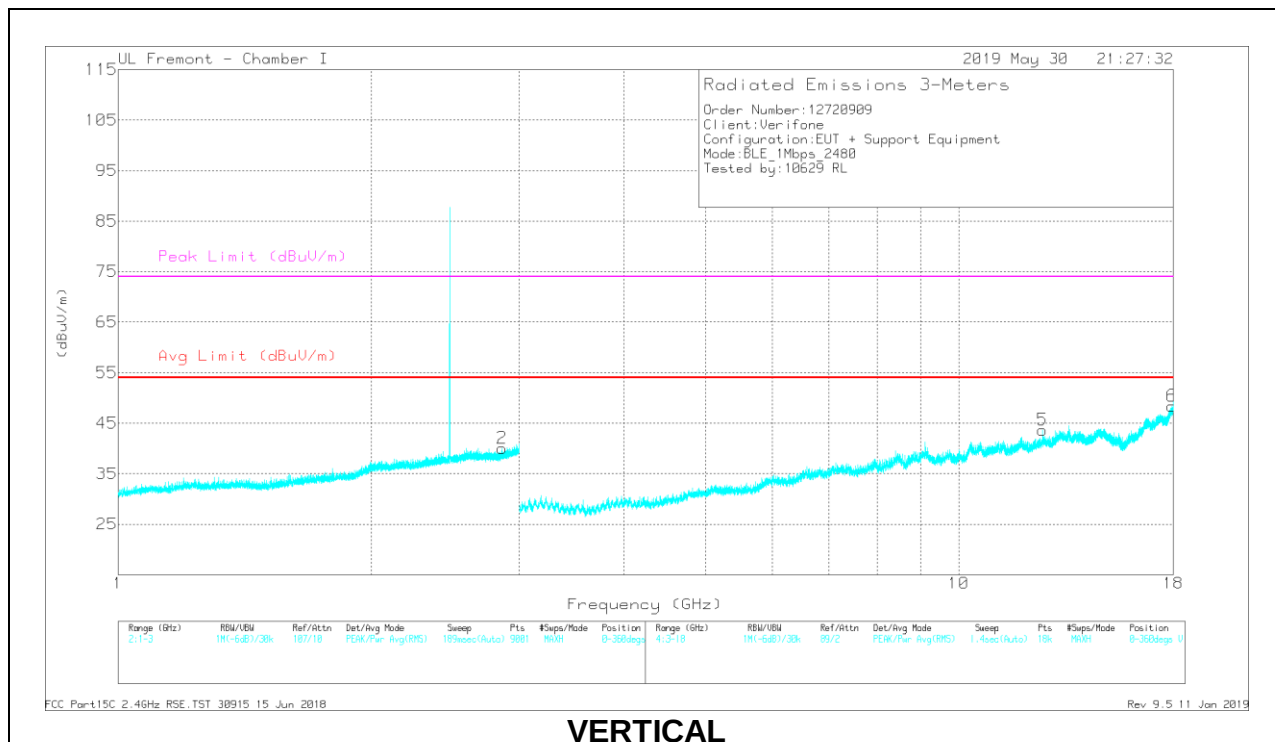
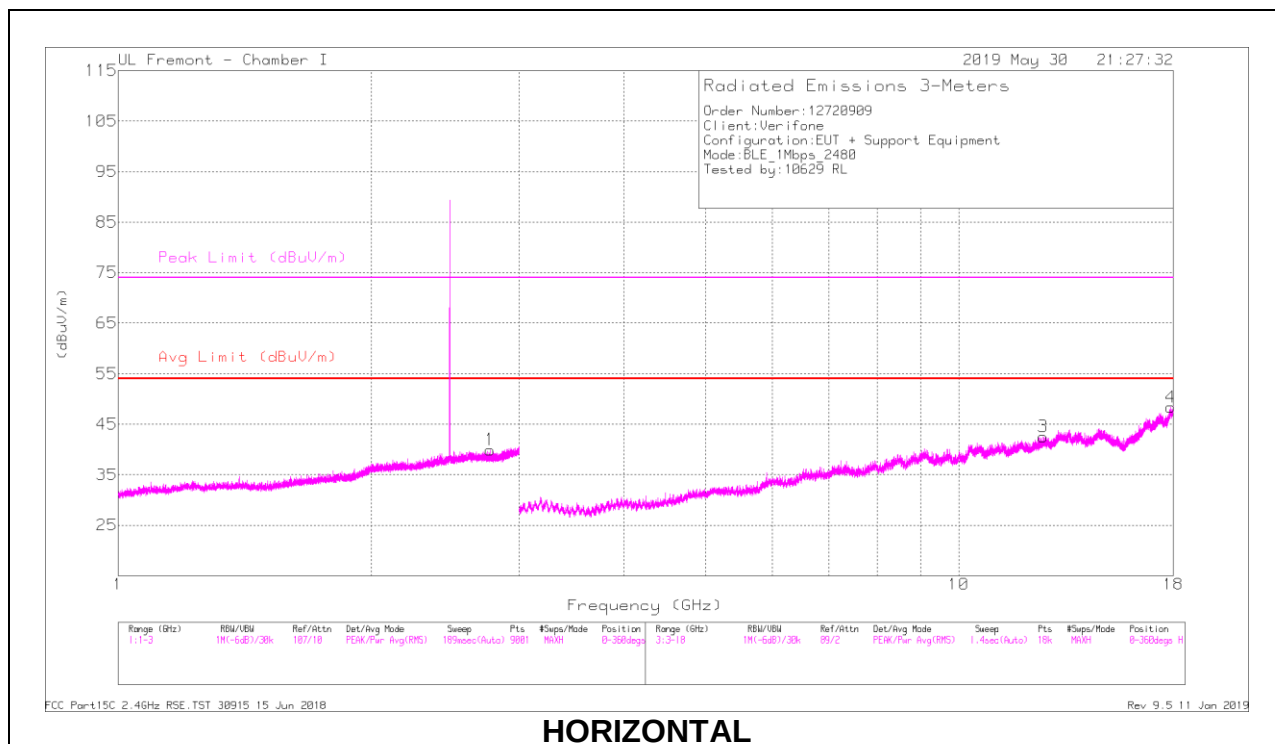


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0190810 (dB/m)	Amp/Cbl/Fitr/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	* 2.745	37.97	PK2	29.4	-21	0	46.37	-	-	74	-27.63	138	106	H
	* 2.743	28.53	MAV1	29.4	-21	2.04	38.97	54	-15.03	-	-	138	106	H
	* 2.703	38.18	PK2	29.5	-21.1	0	46.58	-	-	74	-27.42	25	236	V
2	* 2.699	28.48	MAV1	29.5	-21.1	2.04	38.92	54	-15.08	-	-	25	236	V
	* 11.915	30.05	PK2	39.1	-21	0	48.15	-	-	74	-25.85	117	339	H
	* 11.915	21.09	MAV1	39.1	-21	2.04	41.23	54	-12.77	-	-	117	339	H
4	* 17.909	27.36	PK2	43	-15.4	0	54.96	-	-	74	-19.04	62	313	H
	* 17.912	17.27	MAV1	43	-15.4	2.04	46.91	54	-7.09	-	-	62	313	H
	* 11.861	29.79	PK2	39.1	-20.7	0	48.19	-	-	74	-25.81	16	236	V
5	* 11.864	20.71	MAV1	39.1	-20.7	2.04	41.15	54	-12.85	-	-	16	236	V
	* 17.886	27.26	PK2	42.8	-15.1	0	54.96	-	-	74	-19.04	151	250	V
	* 17.886	17.11	MAV1	42.8	-15.1	2.04	46.85	54	-7.15	-	-	151	250	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 RESULTS



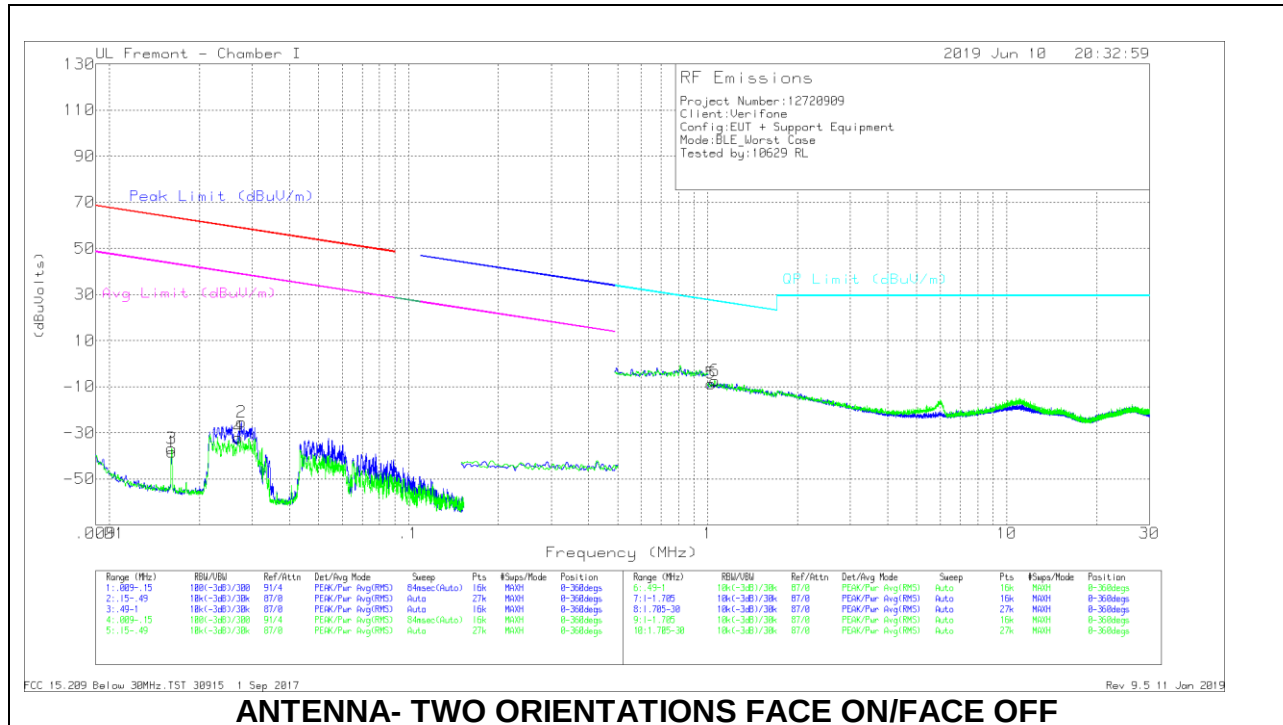
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE0190810 (dB/m)	Amp/CbI/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
1	* 2.77	38.07	PK2	29.3	-20.9	0	46.47	-	-	74	-27.53	272	183	H
	* 2.77	28.09	MAV1	29.3	-20.9	2.04	38.53	54	-15.47	-	-	272	183	H
	* 2.863	37.1	PK2	29.5	-20.9	0	45.7	-	-	74	-28.3	149	246	V
2	* 2.865	27.94	MAV1	29.5	-20.9	2.04	38.58	54	-15.42	-	-	149	246	V
	* 12.609	30.64	PK2	40.1	-21.1	0	49.64	-	-	74	-24.36	314	139	H
	* 12.607	20.92	MAV1	40.1	-21.1	2.04	41.96	54	-12.04	-	-	314	139	H
4	* 17.864	26.61	PK2	42.7	-14.8	0	54.51	-	-	74	-19.49	269	303	H
	* 17.863	17.39	MAV1	42.7	-14.8	2.04	47.33	54	-6.67	-	-	269	303	H
	* 12.585	30.44	PK2	40.1	-21.3	0	49.24	-	-	74	-24.76	22	147	V
5	* 12.588	20.77	MAV1	40.1	-21.3	2.04	41.61	54	-12.39	-	-	22	147	V
	* 17.941	27.07	PK2	43.1	-15.5	0	54.67	-	-	74	-19.33	13	145	V
	* 17.939	18.09	MAV1	43.1	-15.4	2.04	47.83	54	-6.17	-	-	13	145	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAV1 - KDB558074 Option 1 Maximum RMS Average

9.3. 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)	Cables w/ PRE0180175 (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01616	14.72	Pk	59.3	-32.4	-80	-38.38	63.42	-101.8	43.42	-81.8	-	-	0-360
2	.02763	29.07	Pk	58	-32.3	-80	-25.23	58.76	-83.99	38.76	-63.99	-	-	0-360
3	.01616	16.25	Pk	59.3	-32.4	-80	-36.85	63.42	-100.27	43.42	-80.27	-	-	0-360
4	.02699	22.17	Pk	58	-32.3	-80	-32.13	58.96	-91.09	38.96	-71.09	-	-	0-360

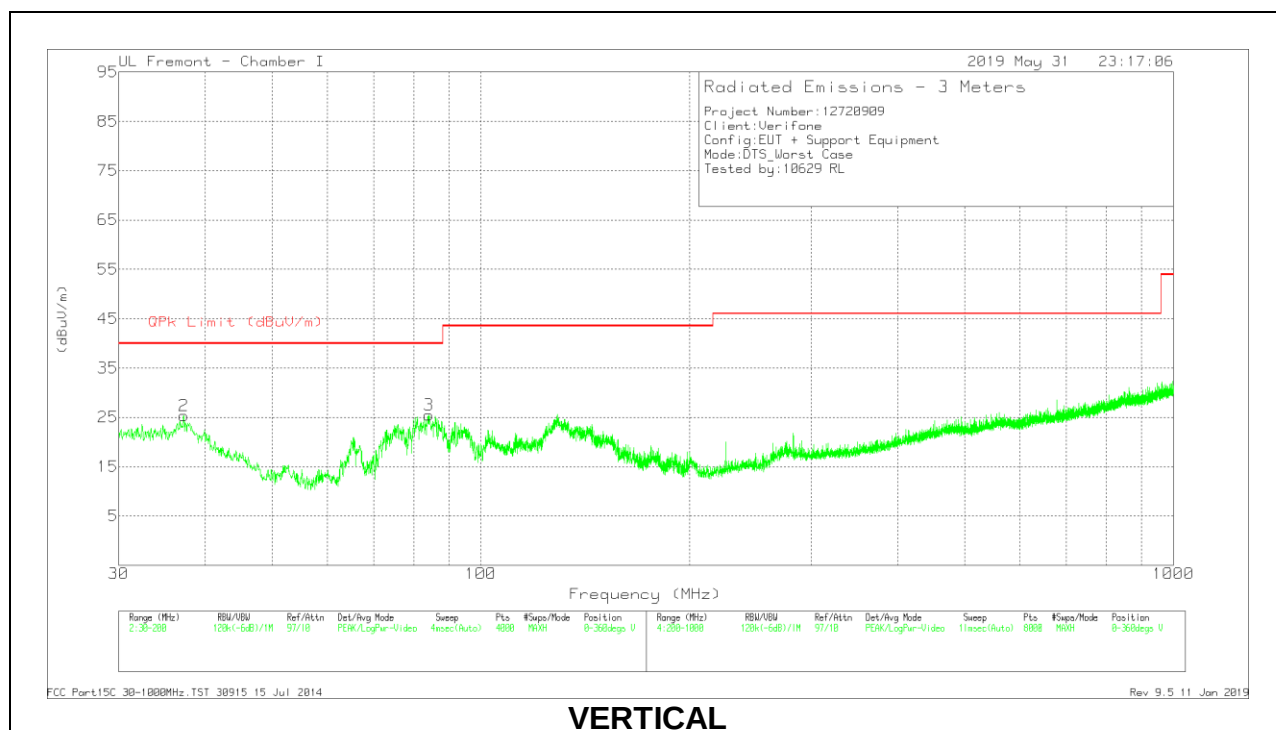
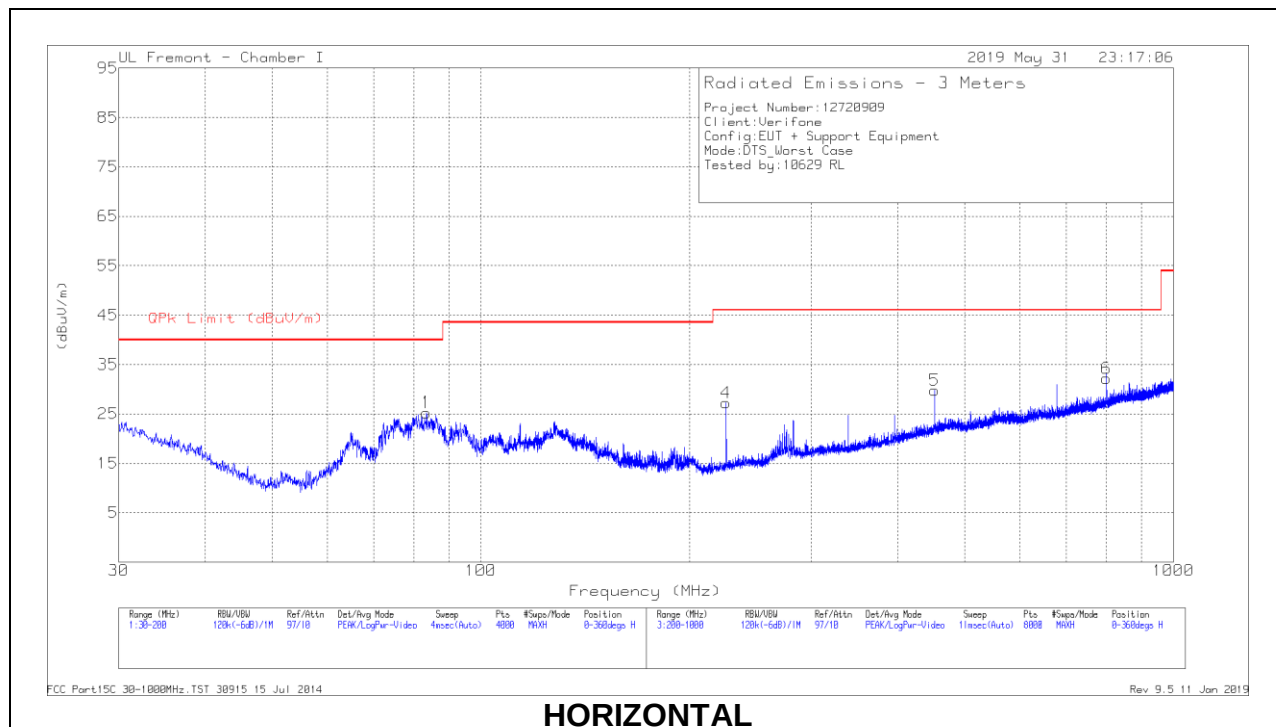
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0180175 (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	1.02968	16.62	Pk	46.6	-31.8	-40	-8.58	-	-	-	-	27.37	-35.95	0-360
6	1.05826	17.82	Pk	46.5	-31.8	-40	-7.48	-	-	-	-	27.13	-34.61	0-360

Pk - Peak detector

9.4. WORST CASE BELOW 1 GHZ

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



Below 1GHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	83.4363	42.88	Pk	13.3	-30.9	25.28	40	-14.72	0-360	200	H
2	37.2269	35.08	Pk	21.6	-31.3	25.38	40	-14.62	0-360	101	V
3	84.2015	43.17	Pk	13.2	-30.9	25.47	40	-14.53	0-360	101	V
4	226.0034	40.55	Pk	16.8	-30.1	27.25	46.02	-18.77	0-360	101	H
5	452.1328	36.5	Pk	22.7	-29.4	29.8	46.02	-16.22	0-360	101	H
6	799.6779	33.54	Pk	27	-28.3	32.24	46.02	-13.78	0-360	101	H

Pk - Peak detector

Radiated Emissions

Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
83.6511	43.89	Pk	13.2	-30.9	26.19	40	-13.81	215	235	H
83.6511	39.91	Qp	13.2	-30.9	22.21	40	-17.79	215	235	H
* 37.529	35.39	Pk	21.4	-31.3	25.49	40	-14.51	276	129	V
* 37.529	30.23	Qp	21.4	-31.3	20.33	40	-19.67	276	129	V
84.7405	42.85	Pk	13.2	-30.9	25.15	40	-14.85	264	141	V
84.7405	38.38	Qp	13.2	-30.9	20.68	40	-19.32	264	141	V
226.0918	41.88	Pk	16.8	-30.1	28.58	46.02	-17.44	228	147	H
226.0918	40.28	Qp	16.8	-30.1	26.98	46.02	-19.04	228	147	H
452.1618	37.45	Pk	22.7	-29.4	30.75	46.02	-15.27	151	104	H
452.1618	34.71	Qp	22.7	-29.4	28.01	46.02	-18.01	151	104	H
799.6879	35.09	Pk	27	-28.3	33.79	46.02	-12.23	109	123	H
799.6879	30.65	Qp	27	-28.3	29.35	46.02	-16.67	109	123	H

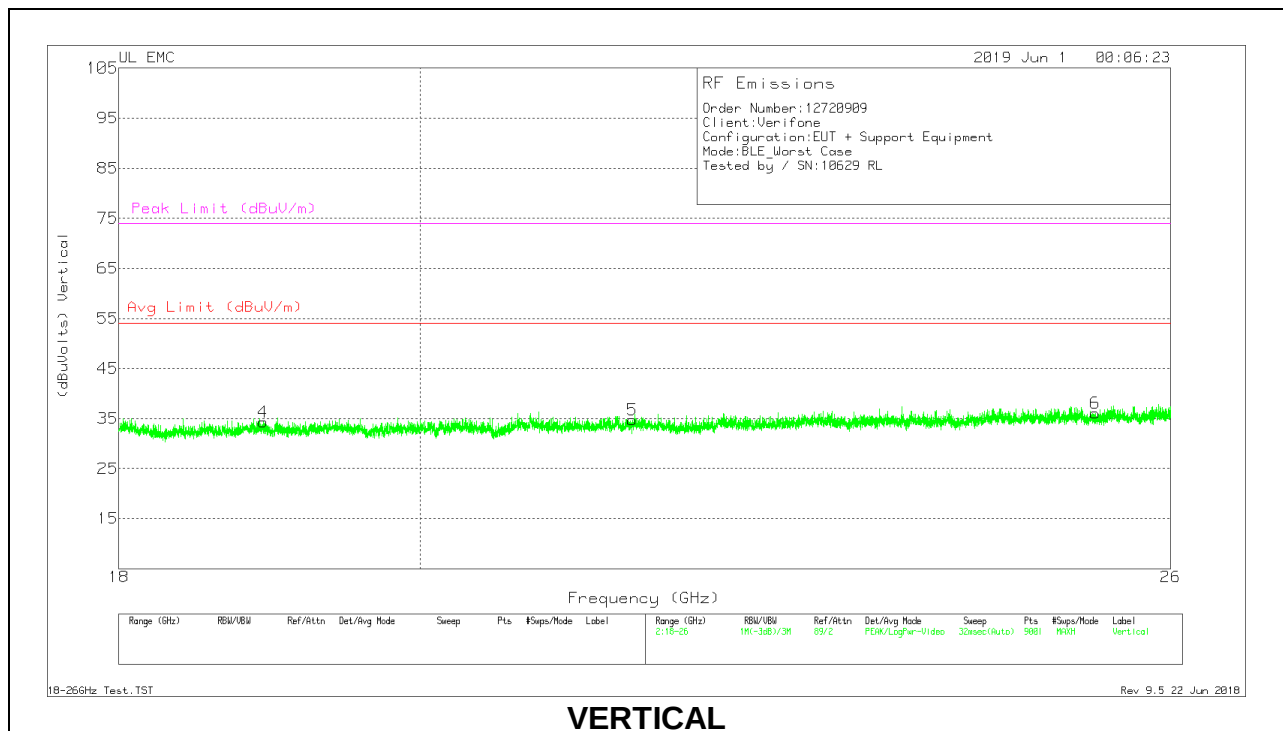
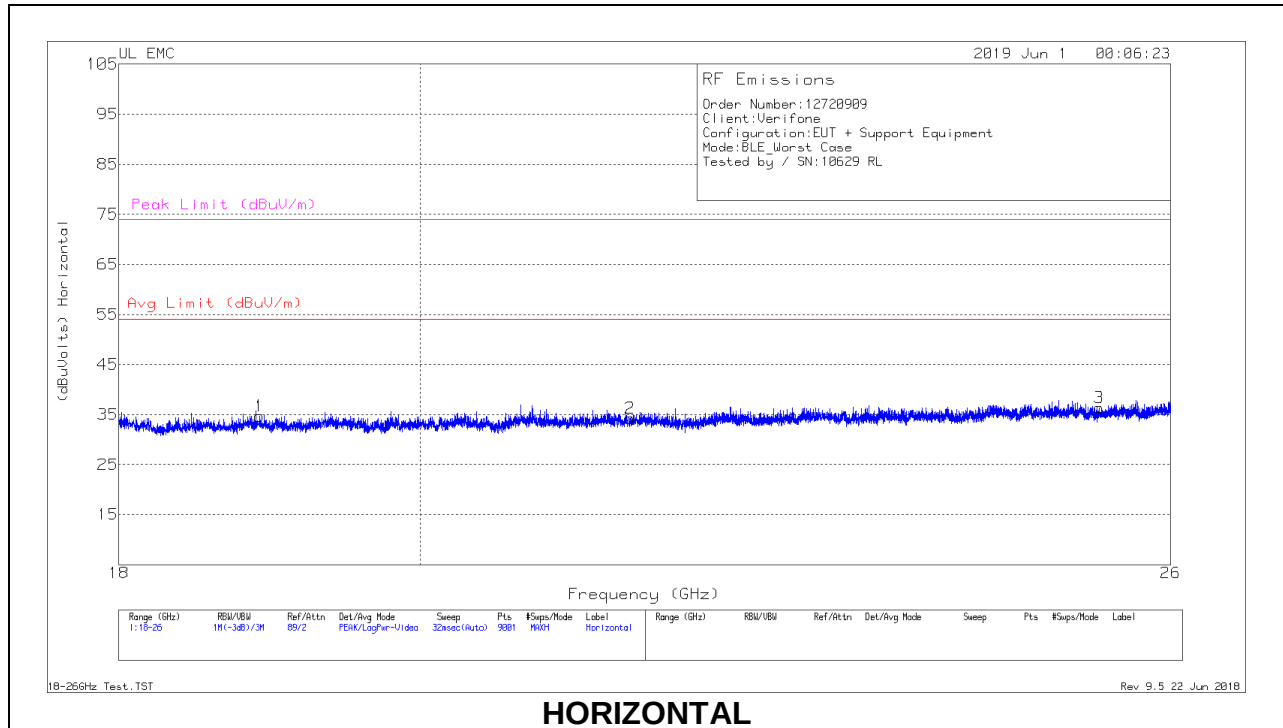
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

9.5. WORST CASE 18-26 GHZ

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 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	18.908	68.95	Pk	33.3	-58.1	-9.5	34.65	54	-19.35	74	-39.35
2	21.524	67.13	Pk	33.8	-57.2	-9.5	34.23	54	-19.77	74	-39.77
3	25.358	66.16	Pk	35	-55.3	-9.5	36.36	54	-17.64	74	-37.64
4	18.931	68.41	Pk	33.3	-57.9	-9.5	34.31	54	-19.69	74	-39.69
5	21.539	67.51	Pk	33.8	-57.1	-9.5	34.71	54	-19.29	74	-39.29
6	25.324	65.86	Pk	35.1	-55.4	-9.5	36.06	54	-17.94	74	-37.94

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.

TEST PROCEDURE

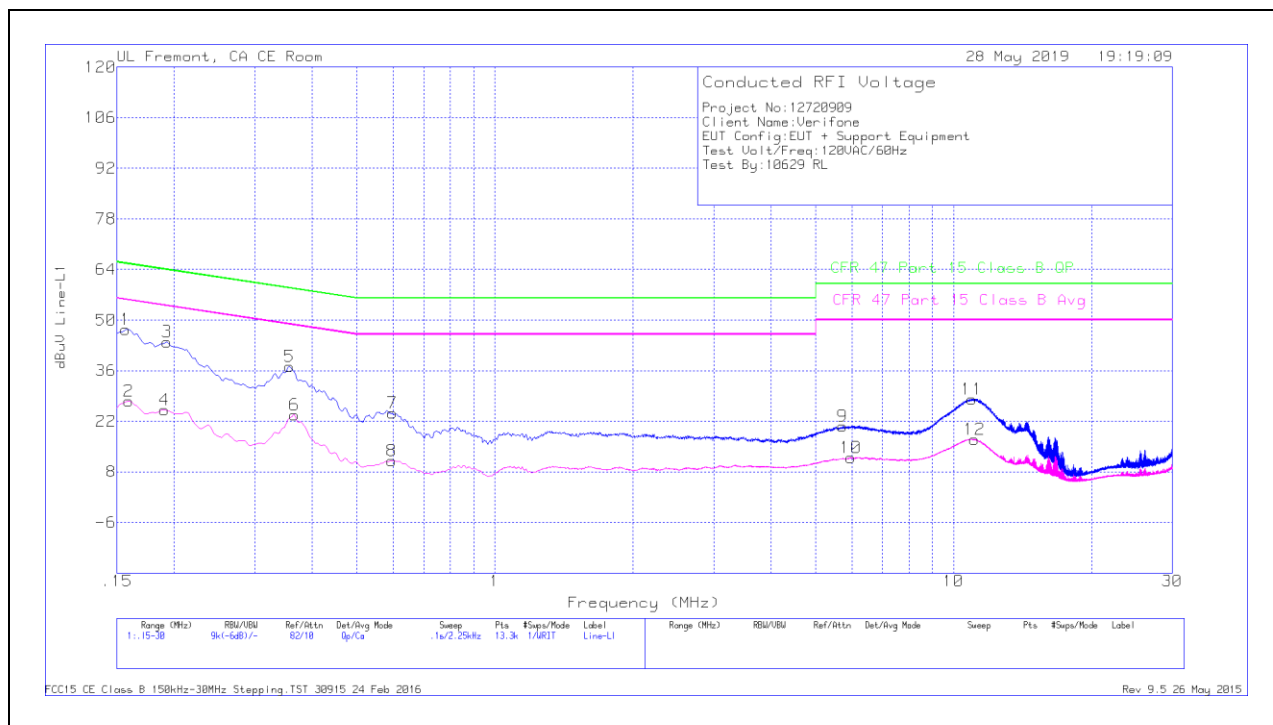
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

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

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

RESULTS

LINE 1 RESULTS

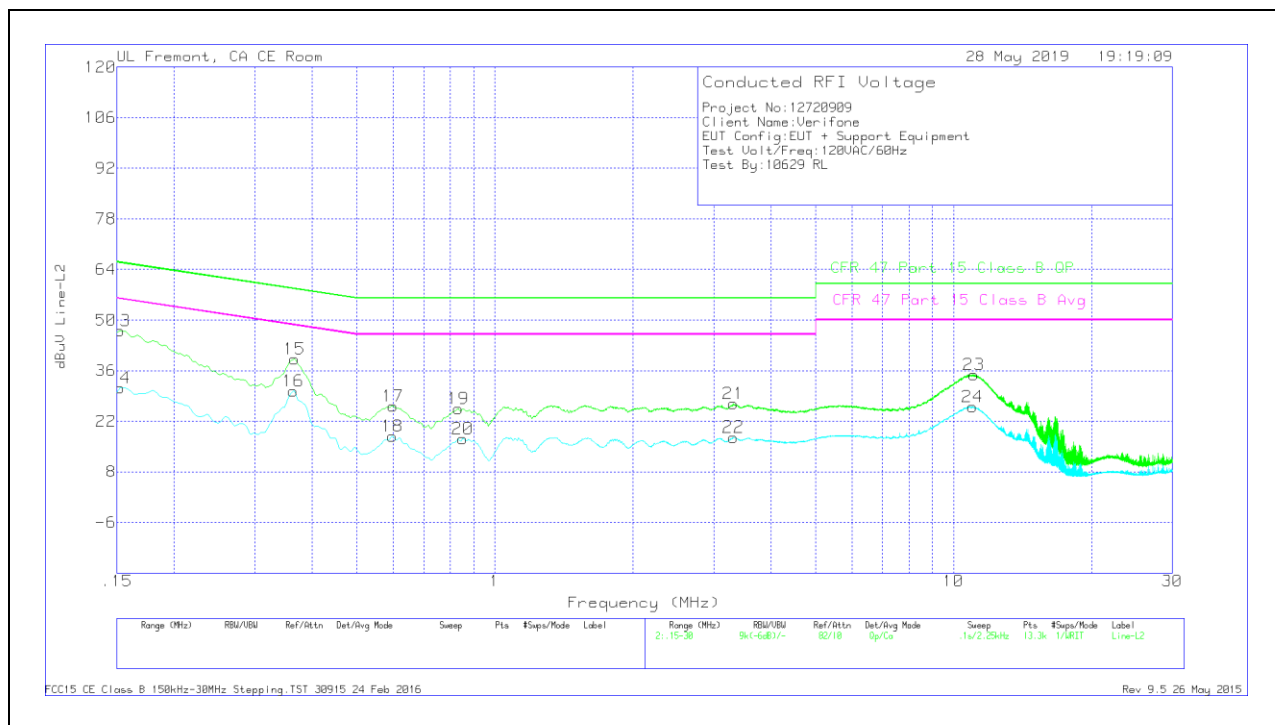


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.15675	37.19	Qp	.1	0	10.1	47.39	65.63	-18.24	-	-
2	.159	17.31	Ca	.1	0	10.1	27.51	-	-	55.52	-28.01
3	.19275	33.9	Qp	0	0	10.1	44	63.92	-19.92	-	-
4	.1905	15.09	Ca	0	0	10.1	25.19	-	-	54.01	-28.82
5	.357	26.97	Qp	0	0	10.1	37.07	58.8	-21.73	-	-
6	.366	13.58	Ca	0	0	10.1	23.68	-	-	48.59	-24.91
7	.59775	14.13	Qp	0	0	10.1	24.23	56	-31.77	-	-
8	.59662	1.04	Ca	0	0	10.1	11.14	-	-	46	-34.86
9	5.73	10.26	Qp	0	.2	10.2	20.66	60	-39.34	-	-
10	5.97975	1.54	Ca	0	.2	10.2	11.94	-	-	50	-38.06
11	10.9725	17.76	Qp	0	.2	10.2	28.16	60	-31.84	-	-
12	11.103	6.54	Ca	.1	.2	10.2	17.04	-	-	50	-32.96

Qp - Quasi-Peak detector

Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.15225	36.8	Qp	.1	0	10.1	47	65.88	-18.88	-	-
14	.15225	21.09	Ca	.1	0	10.1	31.29	-	-	55.88	-24.59
15	.366	29.05	Qp	0	0	10.1	39.15	58.59	-19.44	-	-
16	.36375	20.31	Ca	0	0	10.1	30.41	-	-	48.64	-18.23
17	.6	16.13	Qp	0	0	10.1	26.23	56	-29.77	-	-
18	.59775	7.71	Ca	0	0	10.1	17.81	-	-	46	-28.19
19	.83175	15.31	Qp	0	0	10.1	25.41	56	-30.59	-	-
20	.852	7.11	Ca	0	0	10.1	17.21	-	-	46	-28.79
21	3.309	16.62	Qp	0	.1	10.1	26.82	56	-29.18	-	-
22	3.31013	7.38	Ca	0	.1	10.1	17.58	-	-	46	-28.42
23	11.08275	24.41	Qp	.1	.2	10.2	34.91	60	-25.09	-	-
24	11.0175	15.51	Ca	.1	.2	10.2	26.01	-	-	50	-23.99

Qp - Quasi-Peak detector

Ca - CISPR average detection