



TEST REPORT

Report Number. : 13740710-E1V1

Applicant : LEVITON MANUFACTURING CO., INC.
10385 SW AVERY
TUALATIN, OR 97062-2210
USA

Model : BLE-B8789

Brand : LEVITON

FCC ID : 2ASLN-ZLD1Z

IC : 25037-ZLD1Z

EUT Description : FMS LOGIC BOARD BLE-B8789

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
ISED RSS-247 ISSUE 2
ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:

June 28, 2021

Prepared by:

UL VERIFICATION SERVICES

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	6/28/2021	Initial Issue	---

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LEVITON MANUFACTURING CO., INC.
10385 SW AVERY
TUALATIN, OR 97062-2210
USA

EUT DESCRIPTION: FMS LOGIC BOARD BLE-B8789

MODEL: BLE-B8789

BRAND: LEVITON

SERIAL NUMBER: 1MC (Conducted)
1MR (Radiated)

SAMPLE RECEIPT DATE: MARCH 22 – MAY 21, 2021

DATE TESTED: APRIL 4 – MAY 21, 2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	complies	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	complies	None.

3. 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, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	208313
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	208313

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{Lab}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Field Strength (dBuV/m)} = \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)}$$

$$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

$$\text{Final Voltage (dBuV)} = \text{Measured Voltage (dBuV)} + \text{Cable Loss (dB)} + \text{Limiter Factor (dB)} + \text{LISN Insertion Loss.}$$

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a BLE logic board module. It is a limited module and tested in a host model number: ZLD1Z-ID. This application will cover two hosts model number: ZLD1Z-ID and model number: ZLD1Z-I0. Both hosts are identical in terms of enclosure and PCB board, the only difference is where Model number: ZLD1Z-ID has some proprietary protocol features that Model number: ZLD1Z-I0 are disabled.

6.2. 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	4.45	2.79

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna gain(s) and type, as provided by the manufacturer, are as follows:

The radio utilizes a chip antenna, with a maximum gain of 1.5 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was SiLabs Railtest firmware version # 2.8.6

The test utility software used during testing was RealTerm version 2.0.0.70

6.5. 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.

A metal plate(for end product installation purposes) was attached to the host per applicant's request. The orientation of the EUT provided by the applicant was X orientation with the sensor facing downwards, therefore, all final radiated testing was performed with the EUT in X orientation with the sensor facing downwards.

BLE only supports 1Mbps data rate.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Asus	EeePC1101HAB	-	DoC
FTDI to USB Cable	-	-	-	-

I/O CABLES (CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	3-prong	Unshielded	2	AC Main to EUT
2	Antenna Port	1	SMA	Unshielded	0.2	EUT to Analyzer
3	FTDI	1	USB	Unshielded	1.8	EUT to Laptop (maintenance cable)

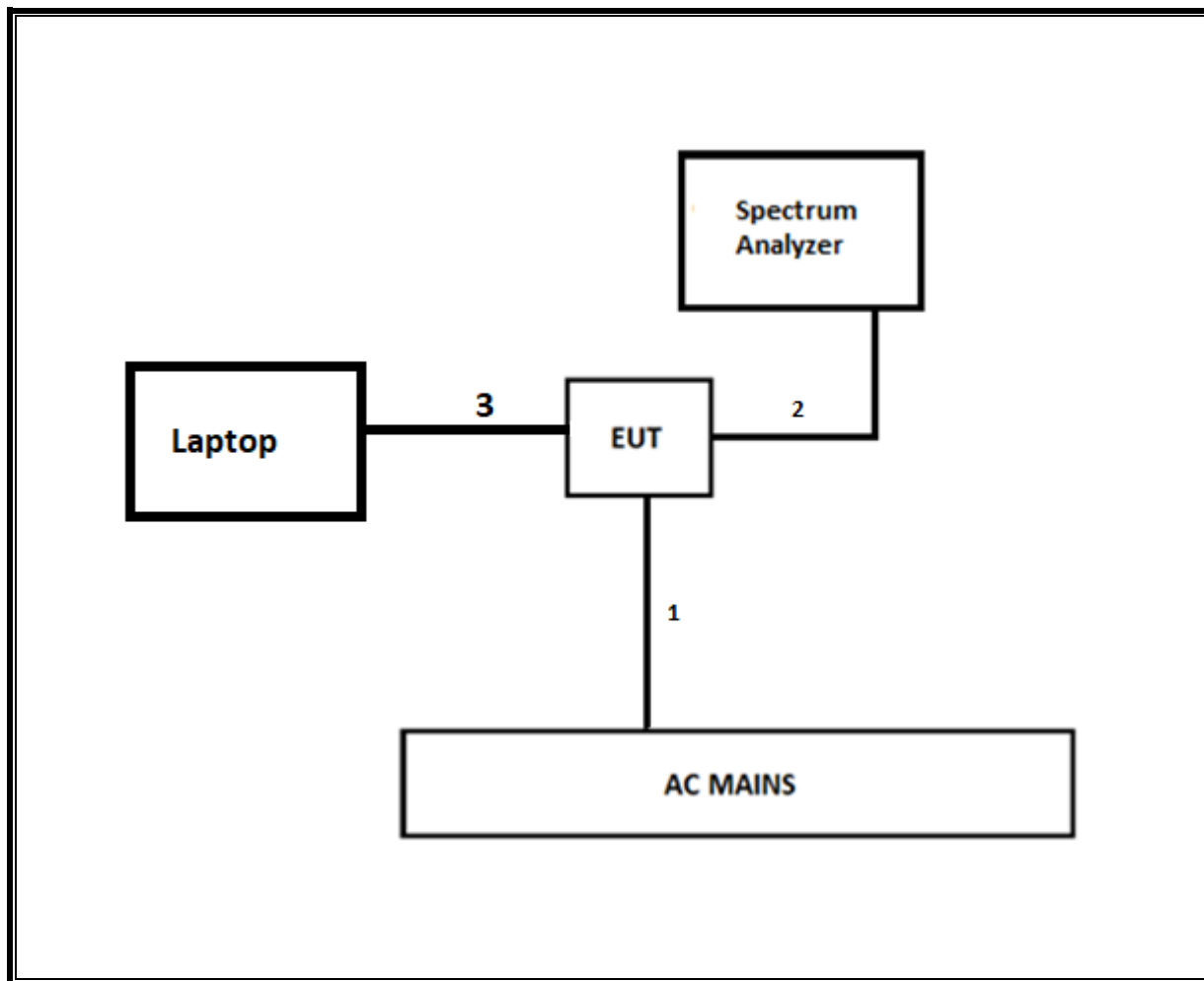
I/O CABLES (RADIATED EMISSIONS AND AC POWER LINE CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	3-prong	Unshielded	2	AC Main to EUT
2	FTDI	1	USB	Unshielded	1.8	EUT to Laptop (maintenance cable)

SETUP DIAGRAM FOR CONDUCTED TESTS

TEST SETUP

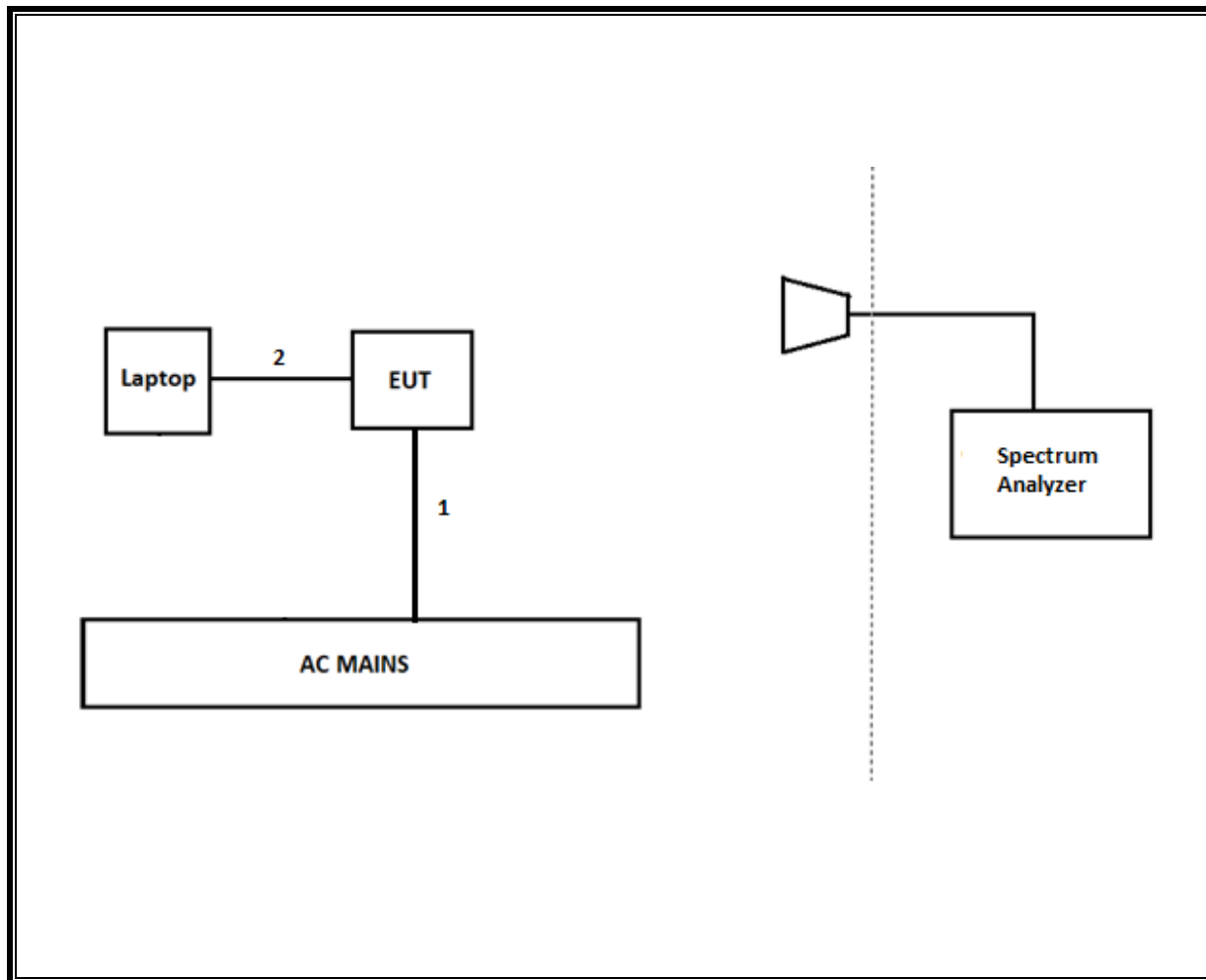
The EUT is powered by AC. Test software exercised the radio card.



SETUP DIAGRAM FOR RADIATED TESTS (1GHz to 18GHz)

TEST SETUP

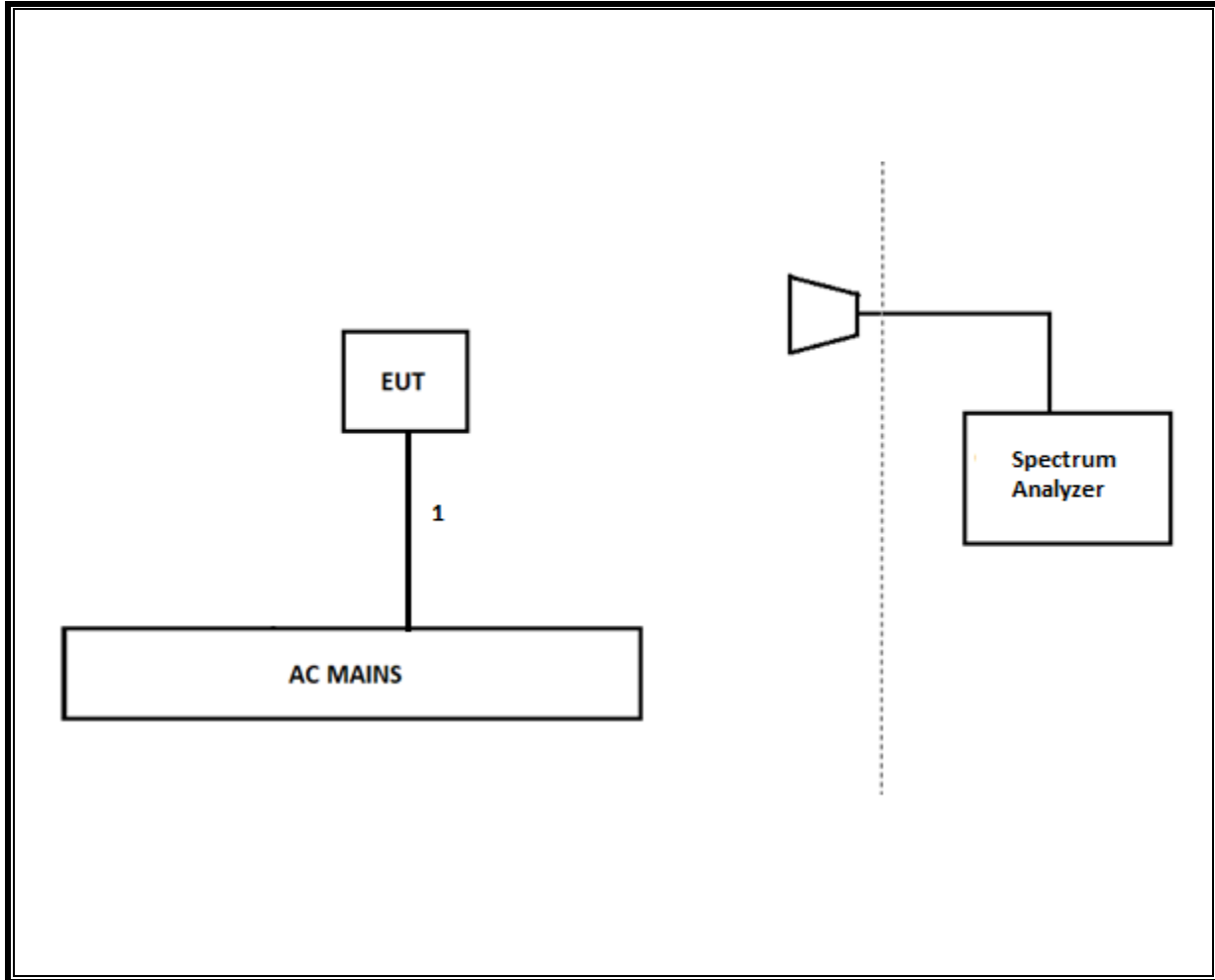
The EUT is powered by AC. Test software exercised the radio card.



SETUP DIAGRAM FOR RADIATED TESTS (WORST CASE TEST AND AC POWER LINE CONDUCTED EMISSIONS)

TEST SETUP

The EUT is powered by AC. Test software exercised the radio card. The laptop was used for setup and removed during testing.



7. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Section 11.8.1

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

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

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

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

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

Radiated emissions restricted frequency bands: ANSI C63.10 Section -11.12.1 and KDB558074 Section 11, Question 3 (a)

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

Band-edge: ANSI C63.10 Section 6.10

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. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	2/21/2022	2/21/2021
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	8/31/2021	8/31/2020
Amplifier, 100MHz-18GHz	AMPLICAL	AMP0.1G18-47-20	PRE0197319	4/8/2022	4/8/2021
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	T477 (81560)	9/24/2021	9/24/2020
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	1/21/2022	1/21/2021
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	PRE0179466	5/27/2021	5/27/2020
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	PRE0179468	5/27/2021	5/27/2020
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight Technologies Inc	E4446A	T123	1/22/2022	1/22/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90392	1/28/2022	1/28/2021
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1269	1/25/2022	1/25/2021
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	9/24/2021	9/24/2020
Rf Amplifier, 18-26.5GHz, 60dB gain	AMPLICAL	AMP18G26.5-60	171590	5/21/2022	5/21/2021
AC Line					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
LISN	FCC INC.	FCC-LISN-50/250-25-2-01-480V	PRE0186446	1/20/2022	1/20/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESR	T1436	2/19/2022	2/19/2021
Transient Limiter	COM-POWER	LIT-930	T1457	1/20/2022	1/20/2021
Thermometer	Control Company	14-650-118	175736	8/26/2021	6/26/2020
Test Software List					
Description	Manufacturer	Model	Version		
Radiated Software	UL	UL EMC	Rev 9.5, April 30, 2020 (below 30MHz, below 1G, 1-18G radiated emissions) , Oct 21, 2019 (above 18G radiated emissions)		
Antenna Port Software	UL	UL RF	AP 2021.4.1 & AP 2021.5.13		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, July 07, 2020		

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

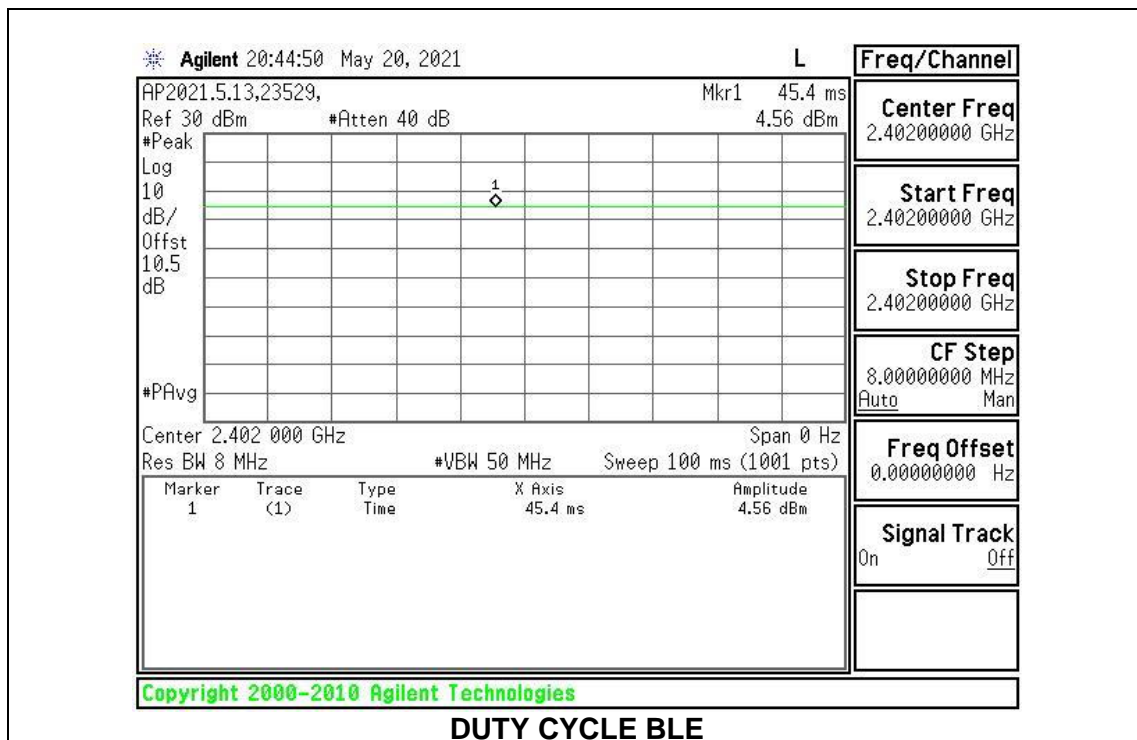
KDB 558074 Zero-Span Spectrum Analyzer Method.

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	45.4	45.4	1.000	100	0.00	0.010

Note: For testing purposes, the EUT is transmitting continuously
 For DCCF used for radiated harmonic average measurements, DCCF is based on
 manufacturer's declared operational duty cycle of 28.28%
 $DCCF = 20 \cdot \log(0.2828) = -10.97 \text{ dB}$

DUTY CYCLE PLOTS



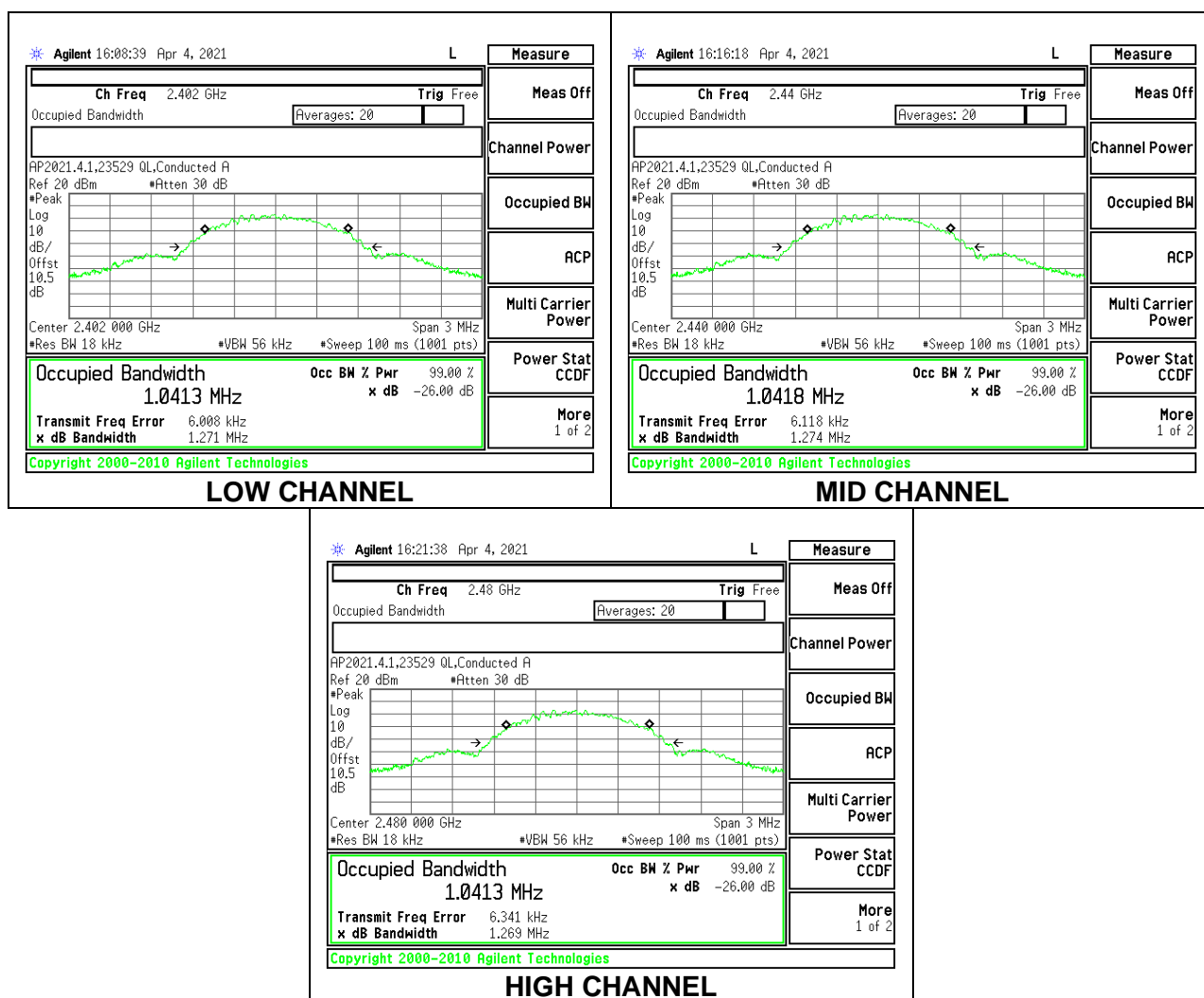
9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0413
Middle	2440	1.0418
High	2480	1.0413



9.3. 6 dB BANDWIDTH

LIMITS

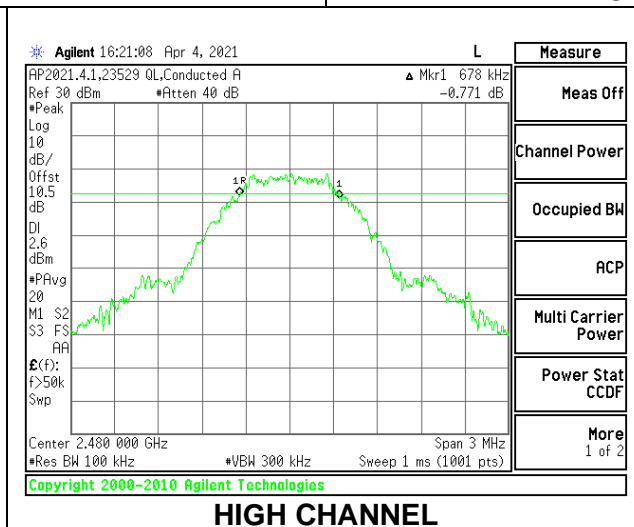
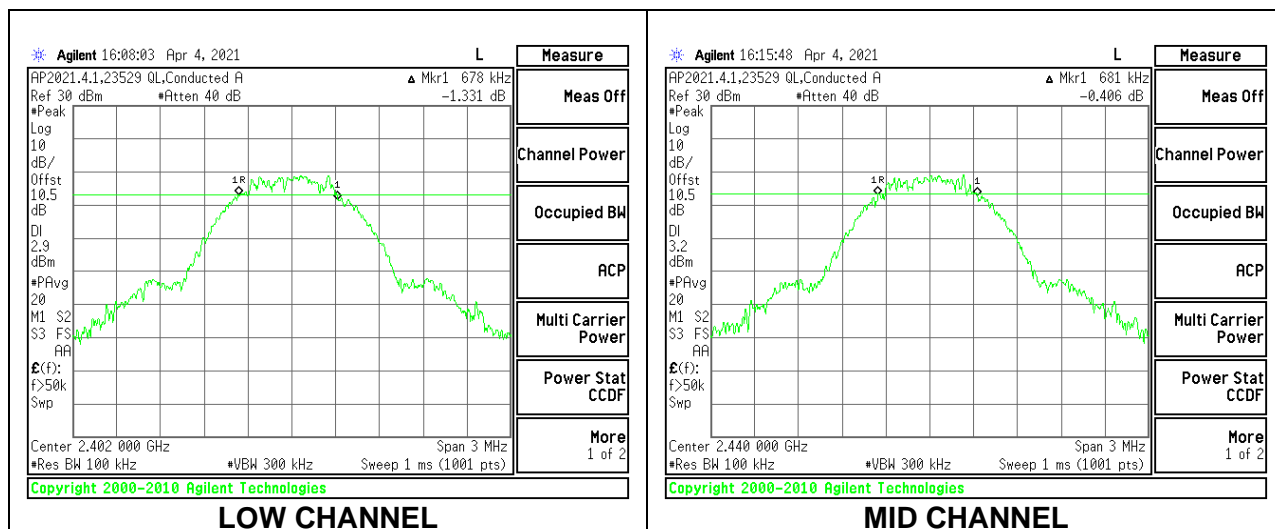
FCC §15.247 (a) (2)

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	0.678	0.5
Middle	2440	0.681	0.5
High	2480	0.678	0.5



9.4. 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 power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter

RESULTS

Tested By:	23529 QL
Date:	5/21/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.45	30	-25.550
Middle	2440	4.38	30	-25.620
High	2480	4.13	30	-25.870

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

RESULTS

Tested By:	23529 QL
Date:	5/21/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	4.05
Middle	2440	4.08
High	2480	4.01

9.6. POWER SPECTRAL DENSITY

LIMITS

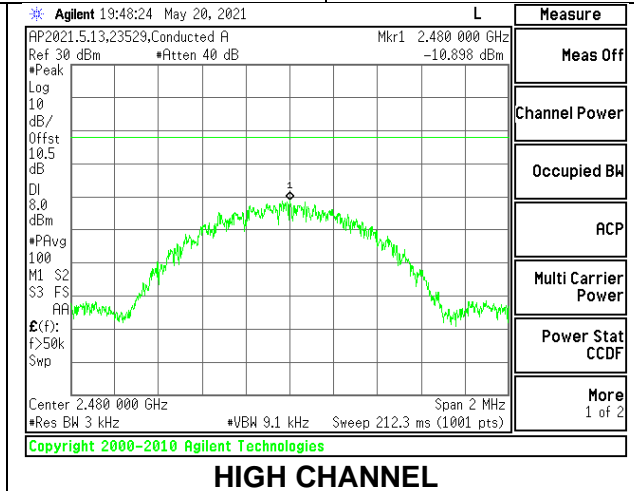
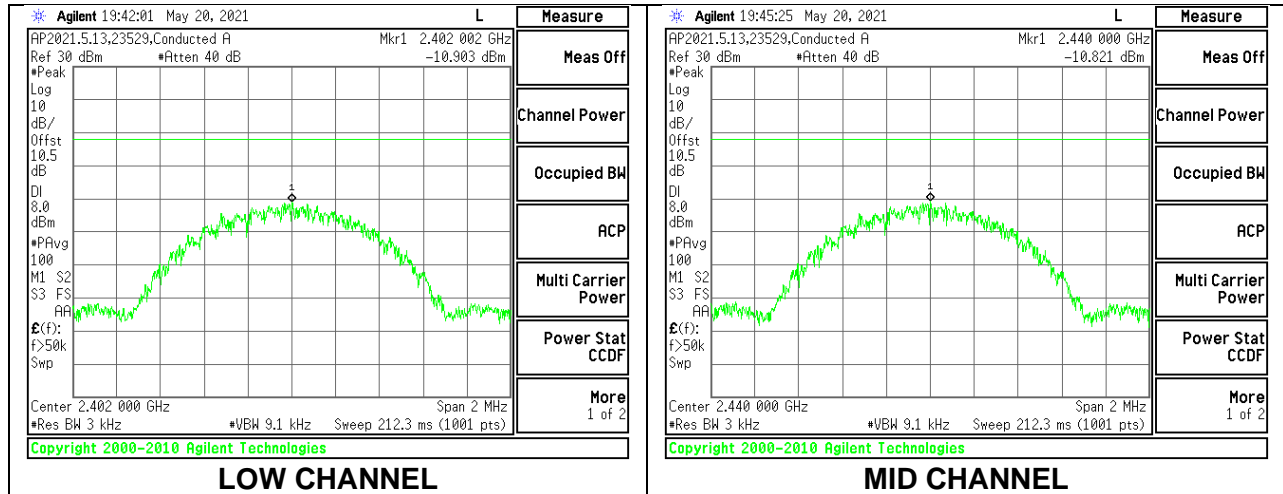
FCC §15.247 (e)

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	-10.90	8	-18.90
Middle	2440	-10.82	8	-18.82
High	2480	-10.90	8	-18.90



9.7. CONDUCTED SPURIOUS EMISSIONS

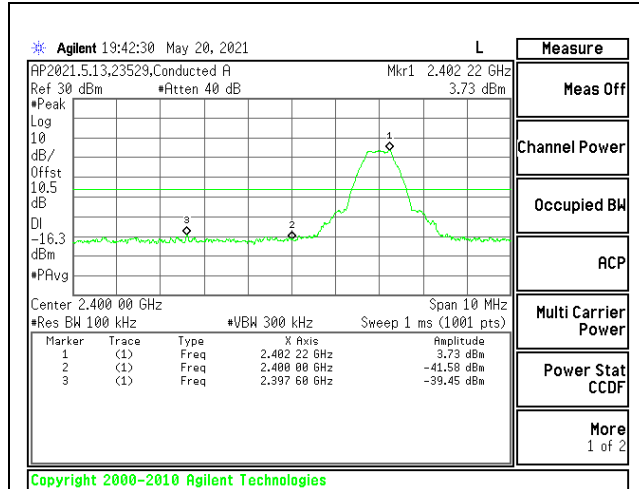
LIMITS

FCC §15.247 (d)

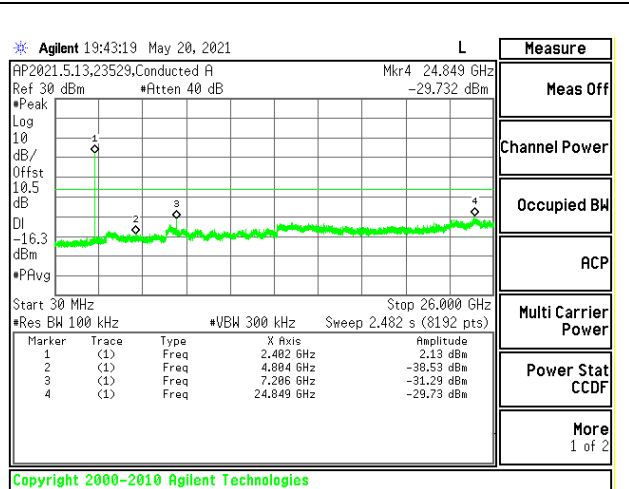
RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore, spurious emissions are required to be 20 dBc.

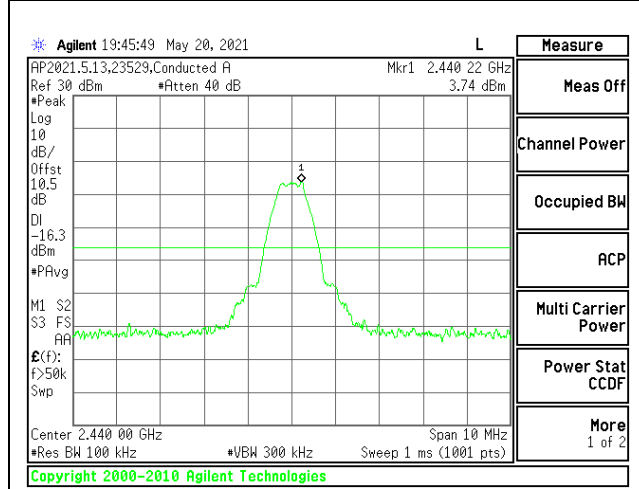
RESULTS



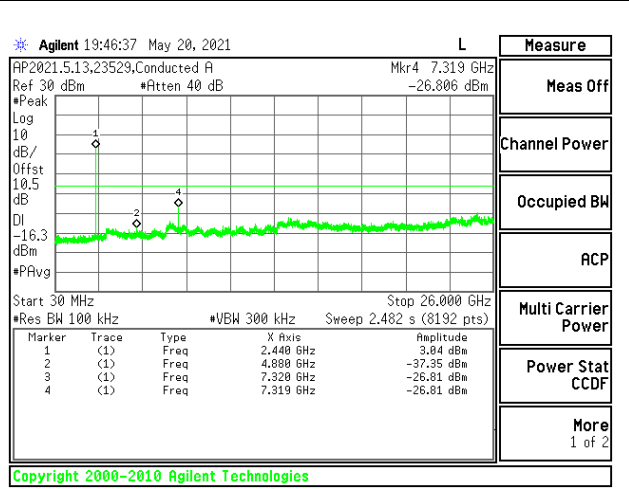
LOW CHANNEL BANDEDGE



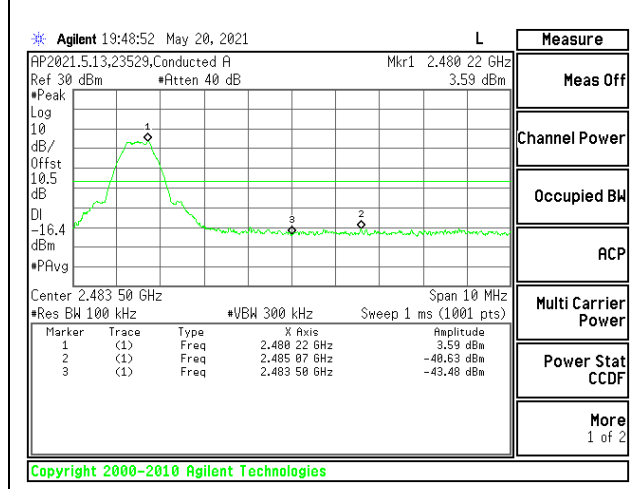
OUT-OF-BAND LOW CHANNEL



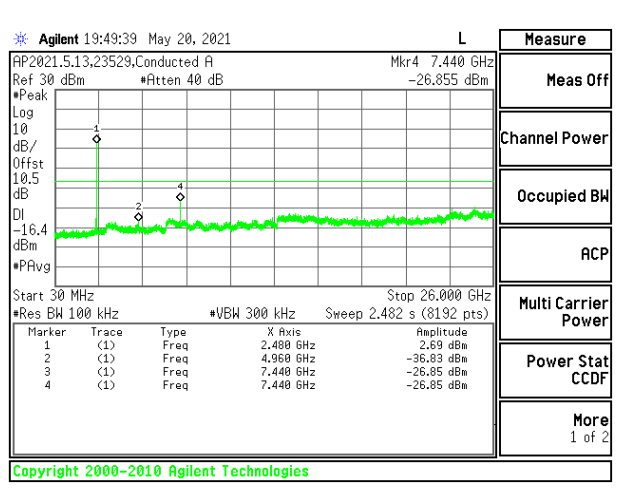
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. 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 in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only. Blue color trace on plots: Parallel orientation. Green color trace on plots: Perpendicular orientation.

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.

The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance of 377 Ohms. For example the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to $Y - 51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

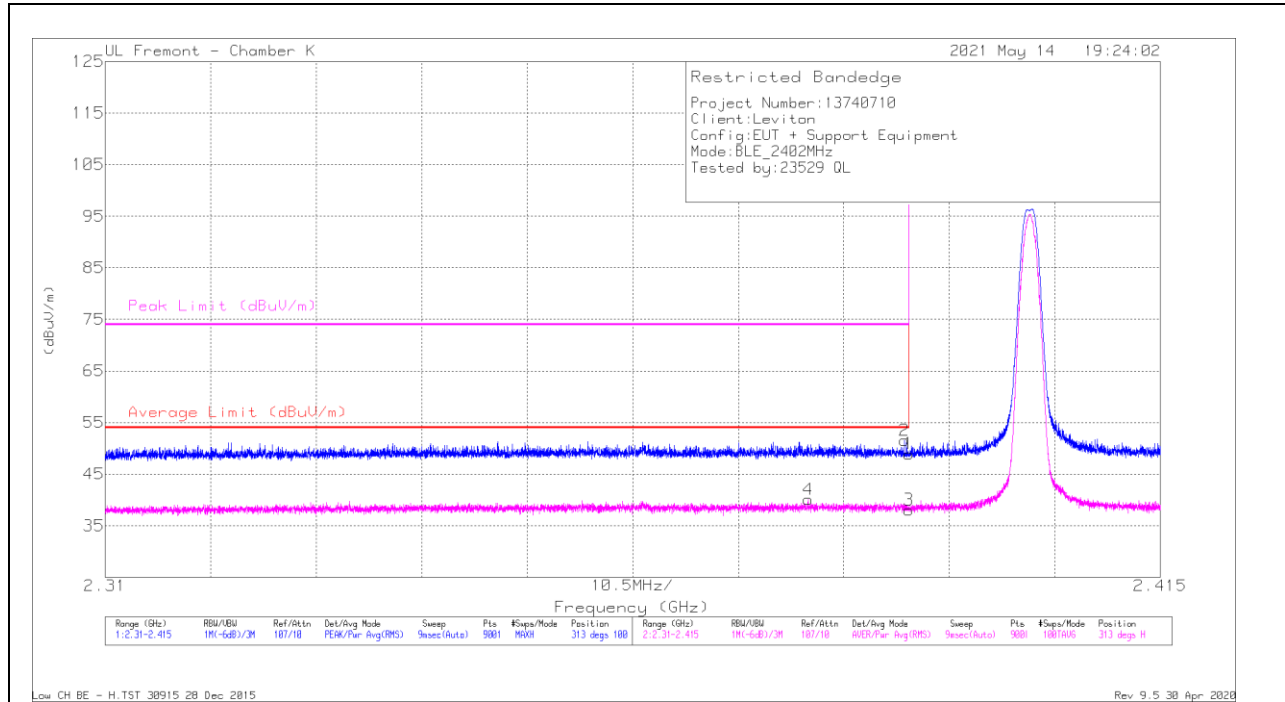
KDB 414788 Open Field Site(OFS) and Chamber Correlation Justification

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

10.2. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

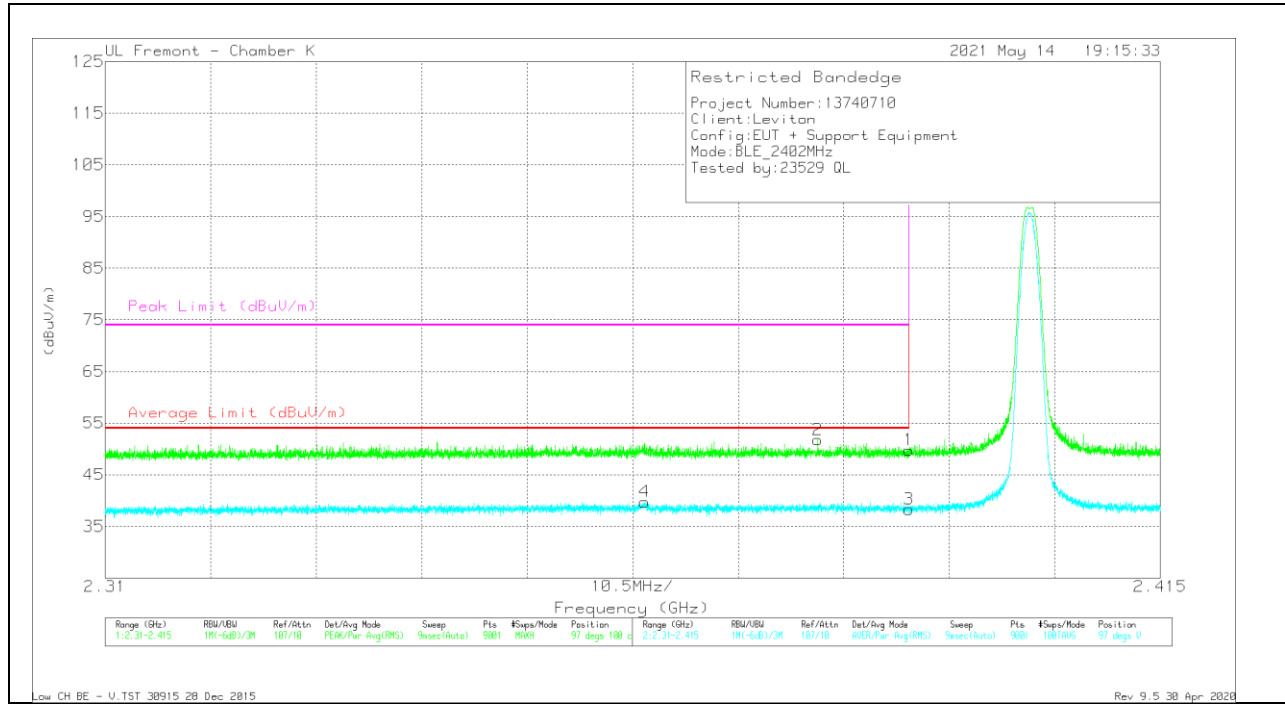
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	50.92	Pk	32.4	-34.4	48.92	-	-	74	-25.08	313	100	H
2	* 2.38955	53.52	Pk	32.4	-34.4	51.52	-	-	74	-22.48	313	100	H
3	* 2.38999	40.04	RMS	32.4	-34.4	38.04	54	-15.96	-	-	313	100	H
4	* 2.37997	42.18	RMS	32.4	-34.5	40.08	54	-13.92	-	-	313	100	H

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

VERTICAL RESULT

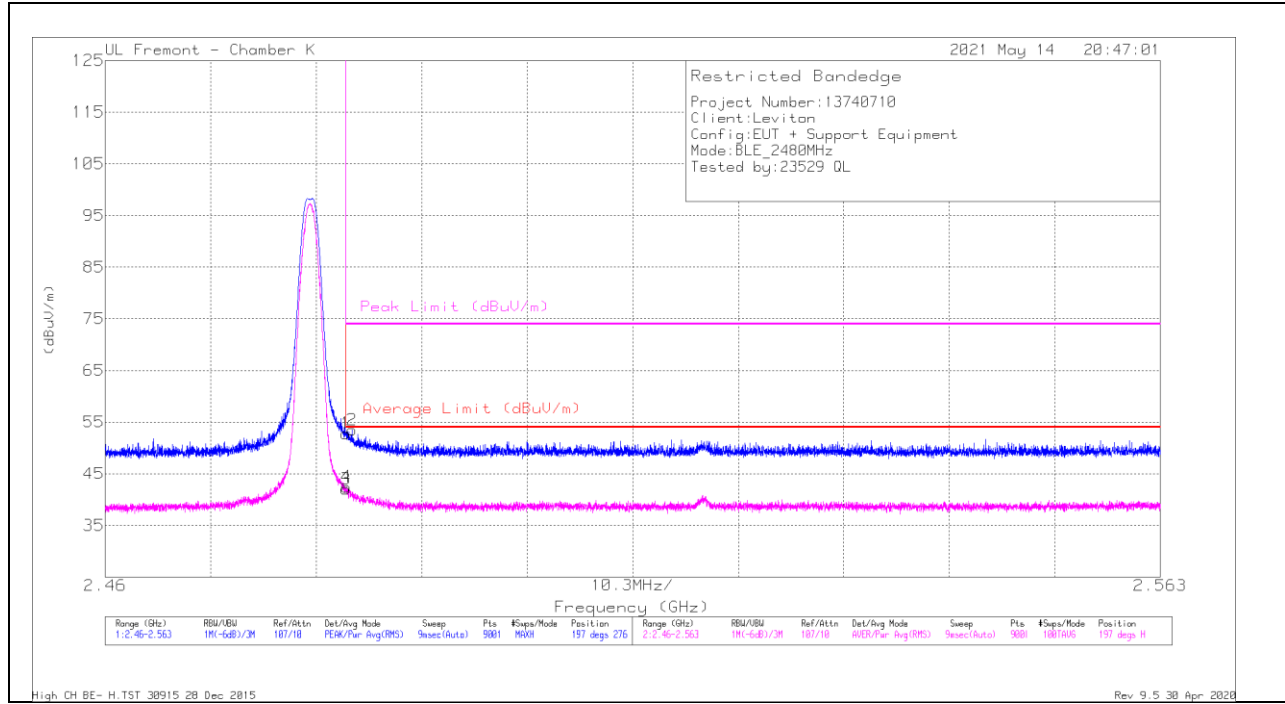


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	51.77	Pk	32.4	-34.4	49.77	-	-	74	-24.23	97	100	V
2	* 2.3809	53.76	Pk	32.4	-34.4	51.76	-	-	74	-22.24	97	100	V
3	* 2.38999	40.34	RMS	32.4	-34.4	38.34	54	-15.66	-	-	97	100	V
4	* 2.36368	41.88	RMS	32.4	-34.5	39.78	54	-14.22	-	-	97	100	V

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

BANDEDGE (HIGH CHANNEL)

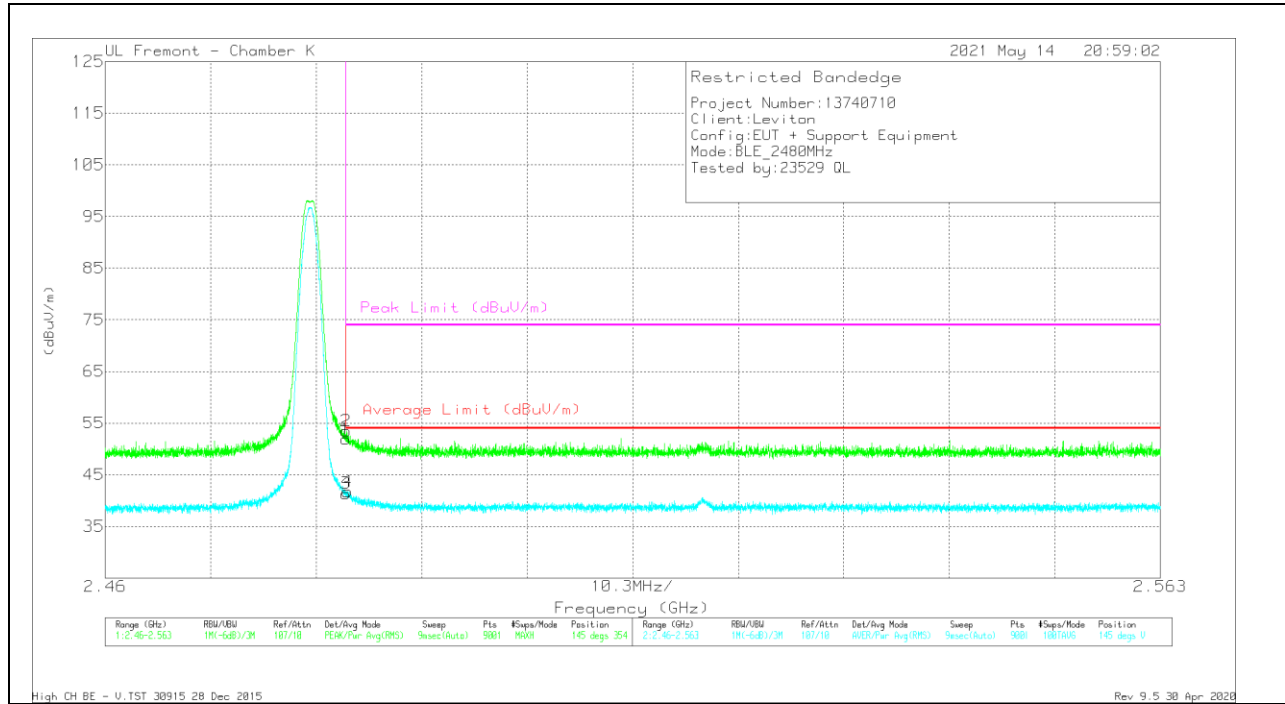
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	54.29	Pk	32.5	-34	52.79	-	-	74	-21.21	197	276	H
2	* 2.48409	54.97	Pk	32.5	-34	53.47	-	-	74	-20.53	197	276	H
3	* 2.48351	43.53	RMS	32.5	-34	42.03	54	-11.97	-	-	197	276	H
4	* 2.48356	43.91	RMS	32.5	-34	42.41	54	-11.59	-	-	197	276	H

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

VERTICAL RESULT

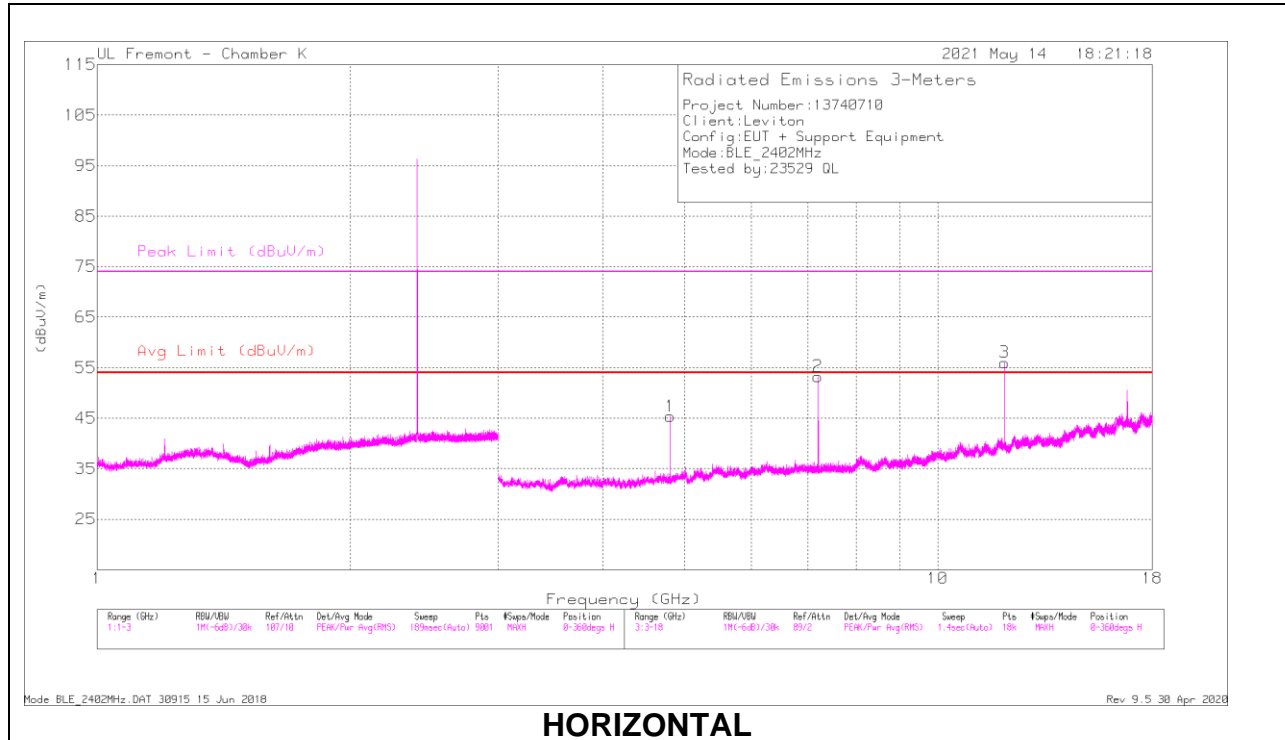


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	53.38	Pk	32.5	-34	51.88	-	-	74	-22.12	145	354	V
2	* 2.48352	54.96	Pk	32.5	-34	53.46	-	-	74	-20.54	145	354	V
3	* 2.48351	42.86	RMS	32.5	-34	41.36	54	-12.64	-	-	145	354	V
4	* 2.48364	43.26	RMS	32.5	-34	41.76	54	-12.24	-	-	145	354	V

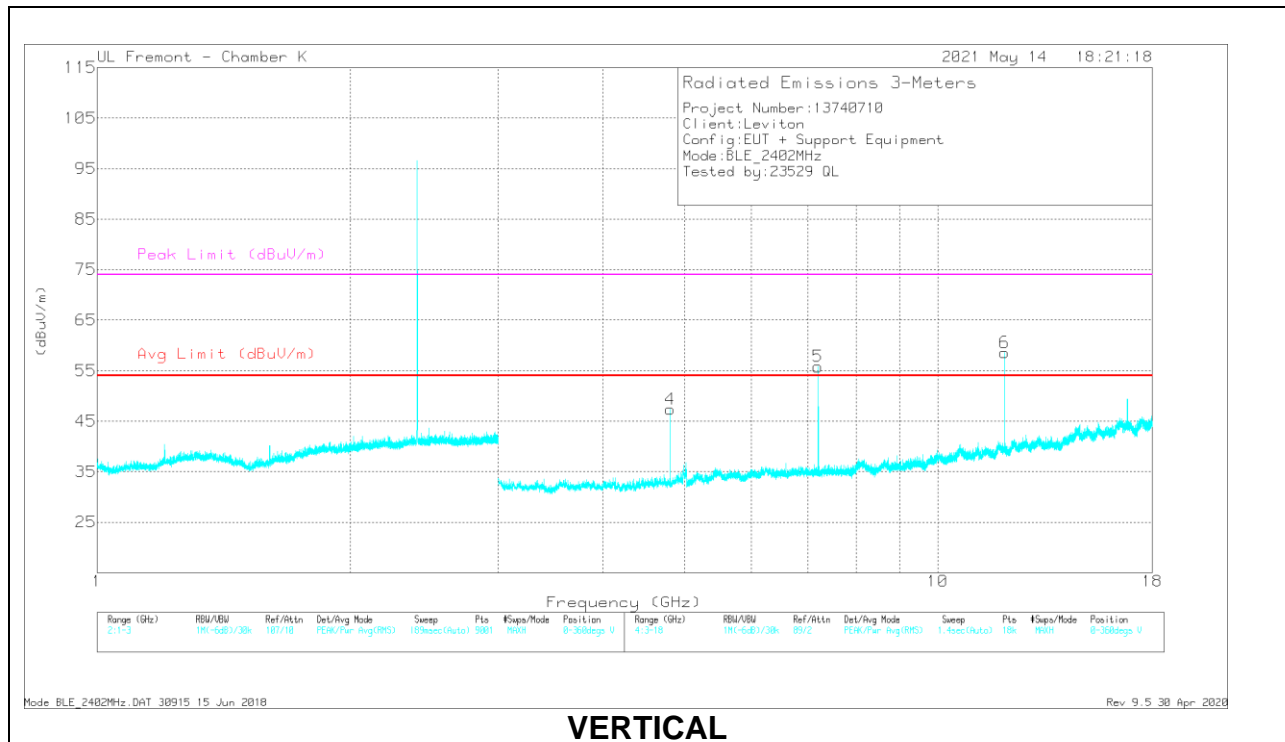
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



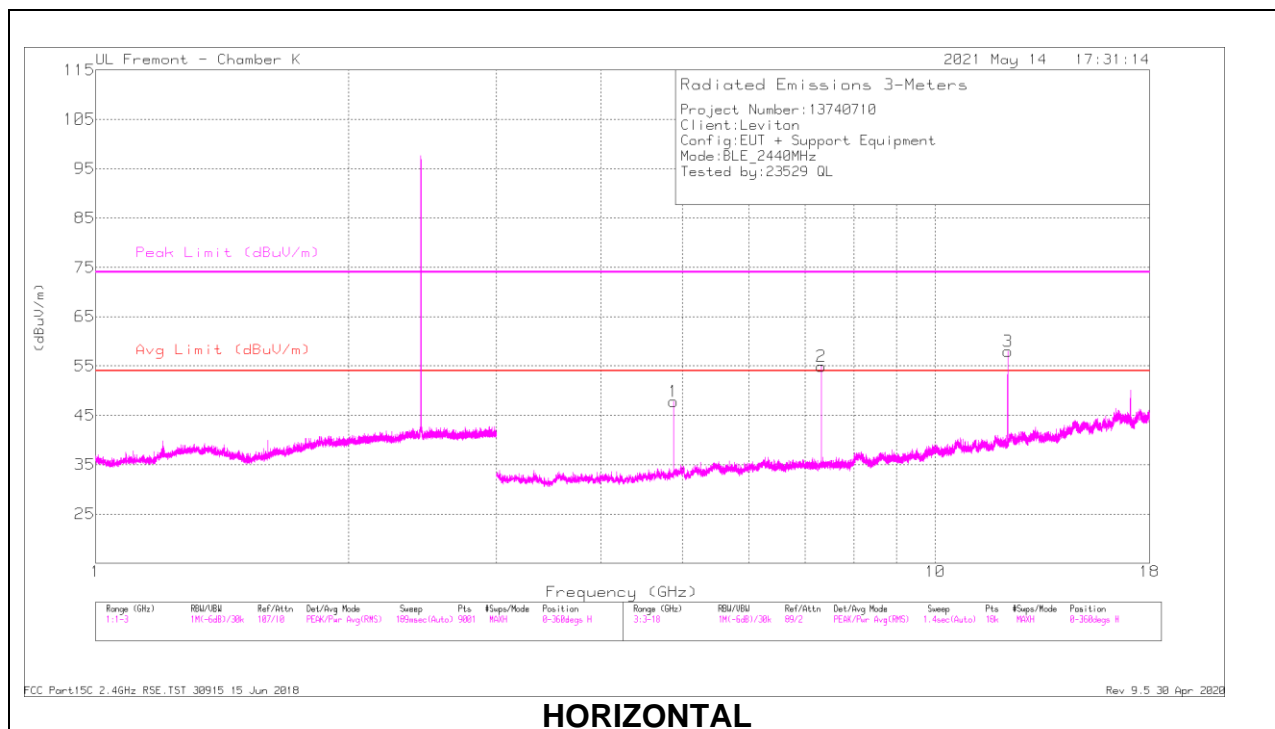
VERTICAL

RADIATED EMISSIONS

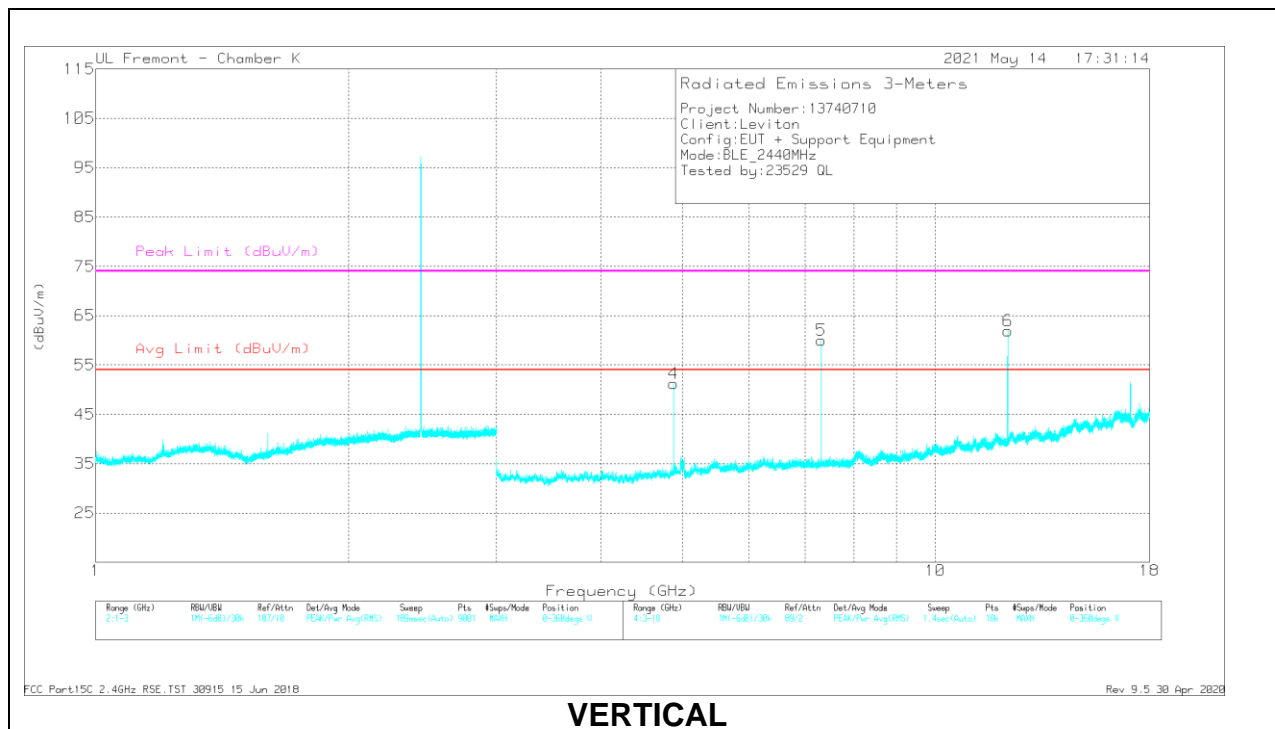
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 12.0112	55.35	PK2	39	-33.7	0	60.65	-	-	74	-13.35	310	102	H
	* 12.0112	-	AV	-	-	-10.97	49.68	54	-4.32	-	-	310	102	H
2	7.20676	61.85	PK2	36	-37.8	0	60.05	-	-	-	-	244	355	H
1	* 4.80349	53.07	PK2	34.4	-40	0	47.47	-	-	74	-26.53	74	99	H
	* 4.80349	-	AV	-	-	-10.97	36.5	54	-17.5	-	-	74	99	H
6	* 12.01111	59.73	PK2	39	-33.8	0	64.93	-	-	74	-9.07	286	96	V
	* 12.01111	-	AV	-	-	-10.97	53.96	54	-0.04	-	-	286	96	V
5	7.20672	62.26	PK2	36	-37.8	0	60.46	-	-	-	-	291	96	V
4	* 4.80445	54.97	PK2	34.4	-40	0	49.37	-	-	74	-24.63	237	99	V
	* 4.80445	-	AV	-	-	-10.97	38.4	54	-15.6	-	-	237	99	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 AV = Peak reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (a))
 Duty Cycle Correction Factor = -10.97 dB. Refer to Section 9.1

MID CHANNEL RESULTS



HORIZONTAL



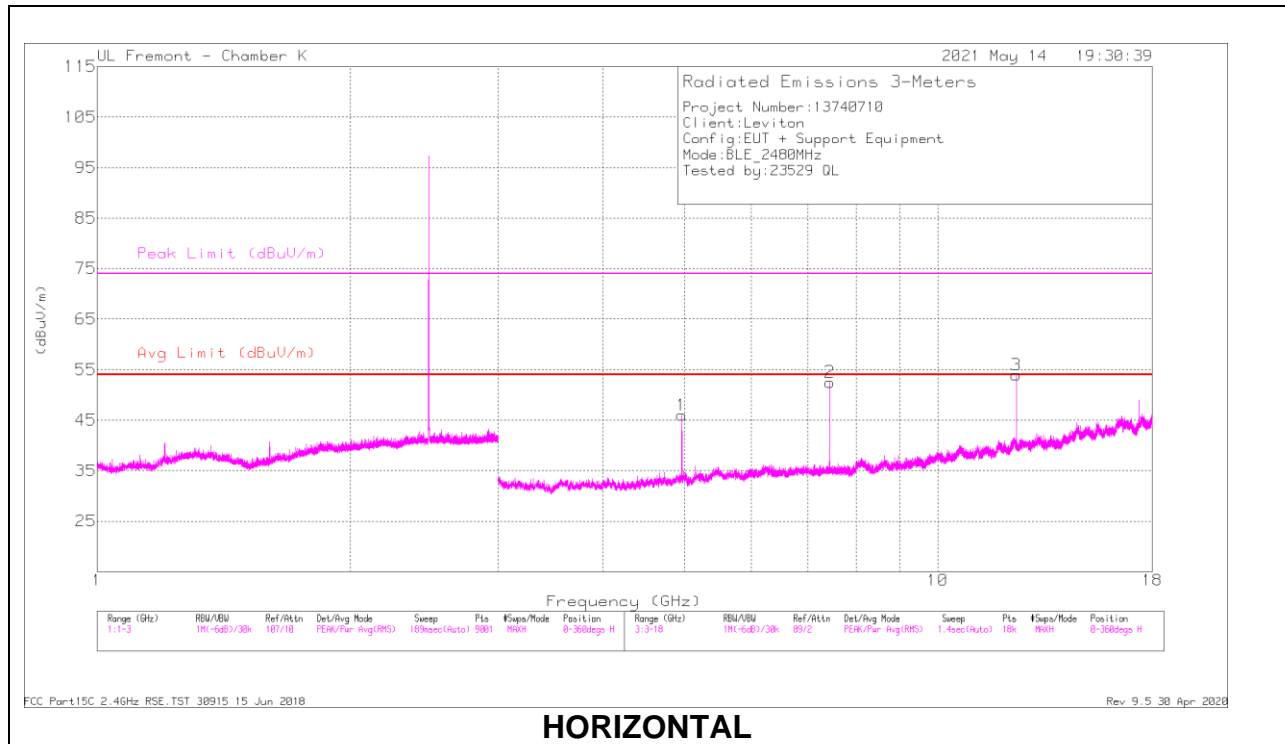
VERTICAL

RADIATED EMISSIONS

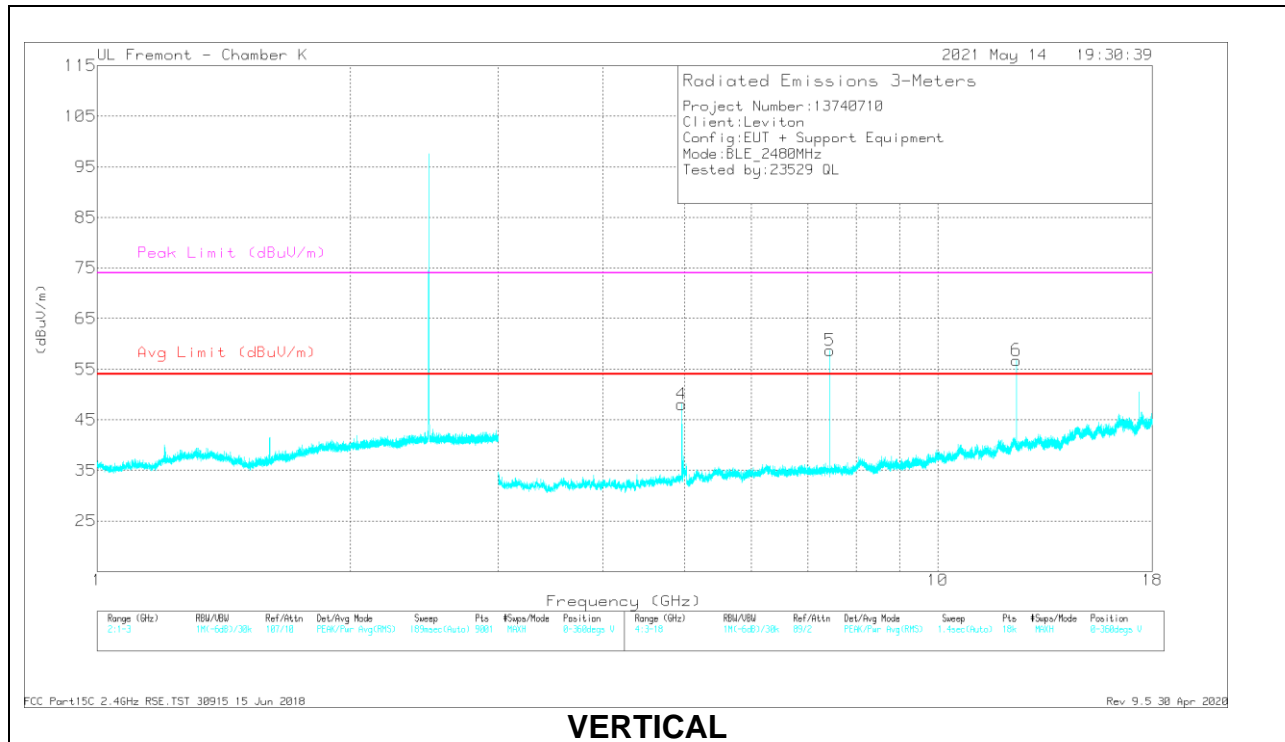
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.87951	56.81	PK2	34.4	-39.8	0	51.41	-	-	74	-22.59	299	376	H
	* 4.87951	-	AV	-	-	-10.97	40.44	54	-13.56	-	-	299	376	H
2	* 7.31927	63.54	PK2	36	-37.4	0	62.14	-	-	74	-11.86	252	388	H
	* 7.31927	-	AV	-	-	-10.97	51.17	54	-2.83	-	-	252	388	H
3	* 12.20114	55.4	PK2	39.2	-33.9	0	60.7	-	-	74	-13.3	307	97	H
	* 12.20114	-	AV	-	-	-10.97	49.73	54	-4.27	-	-	307	97	H
6	* 12.20117	59.09	PK2	39.2	-33.9	0	64.39	-	-	74	-9.61	282	97	V
	* 12.20117	-	AV	-	-	-10.97	53.42	54	-0.58	-	-	282	97	V
5	* 7.31922	63.58	PK2	36	-37.4	0	62.18	-	-	74	-11.82	277	403	V
	* 7.31922	-	AV	-	-	-10.97	51.21	54	-2.79	-	-	277	403	V
4	* 4.87959	55.53	PK2	34.4	-39.8	0	50.13	-	-	74	-23.87	192	341	V
	* 4.87959	-	AV	-	-	-10.97	39.16	54	-14.84	-	-	192	341	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 AV = Peak reading + Duty Cycle Correction Factor(KDB558074 Section 11, Question 3 (a))
 Duty Cycle Correction Factor = -10.97 dB. Refer to Section 9.1

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

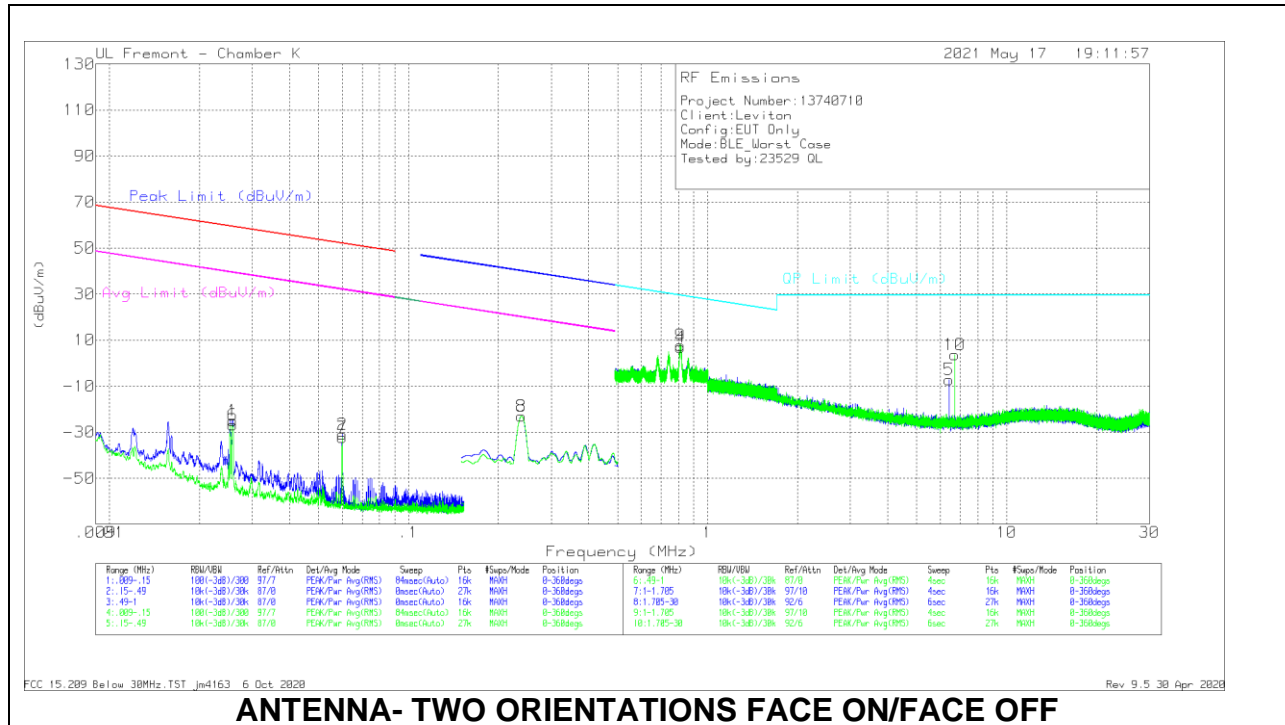
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/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
3	* 12.39878	52.93	PK2	39.3	-33.4	0	58.83	-	-	74	-15.17	304	97	H
	* 12.39878	-	AV	-	-	-10.97	47.86	54	-6.14	-	-	304	97	H
2	* 7.44074	62.98	PK2	36.1	-37.2	0	61.88	-	-	74	-12.12	249	404	H
	* 7.44074	-	AV	-	-	-10.97	50.91	54	-3.09	-	-	249	404	H
1	* 4.96043	58.35	PK2	34.3	-39.9	0	52.75	-	-	74	-21.25	225	263	H
	* 4.96043	-	AV	-	-	-10.97	41.78	54	-12.22	-	-	225	263	H
5	* 7.43922	64.77	PK2	36.1	-37.2	0	63.67	-	-	74	-10.33	289	96	V
	* 7.43922	-	AV	-	-	-10.97	52.7	54	-1.3	-	-	289	96	V
6	* 12.39876	55.86	PK2	39.3	-33.4	0	61.76	-	-	74	-12.24	289	100	V
	* 12.39876	-	AV	-	-	-10.97	50.79	54	-3.21	-	-	289	100	V
4	* 4.95951	58.45	PK2	34.3	-39.9	0	52.85	-	-	74	-21.15	207	96	V
	* 4.95951	-	AV	-	-	-10.97	41.88	54	-12.12	-	-	207	96	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 AV = Peak reading + Duty Cycle Correction Factor (KDB558074 Section 11, Question 3 (a))
 Duty Cycle Correction Factor = -10.97 dB. Refer to Section 9.1

10.3. 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 (E ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	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)
1	.02589	28.88	Pk	58.4	-32.1	-80	-24.82	59.32	-84.14	39.32	-64.14	-	-	-	-	0-360
2	.06006	25.1	Pk	56.2	-32.3	-80	-31	52.01	-83.01	32.01	-63.01	-	-	-	-	0-360
3	.23873	32.92	Pk	56.3	-32.2	-80	-22.98	-	-	-	-	40.06	-63.04	20.06	-43.04	0-360
6	.02588	26.98	Pk	58.4	-32.1	-80	-26.72	59.32	-86.04	39.32	-66.04	-	-	-	-	0-360
7	.06003	23.76	Pk	56.2	-32.3	-80	-32.34	52.02	-84.36	32.02	-64.36	-	-	-	-	0-360
8	.23876	32.91	Pk	56.3	-32.2	-80	-22.99	-	-	-	-	40.06	-63.05	20.06	-43.05	0-360

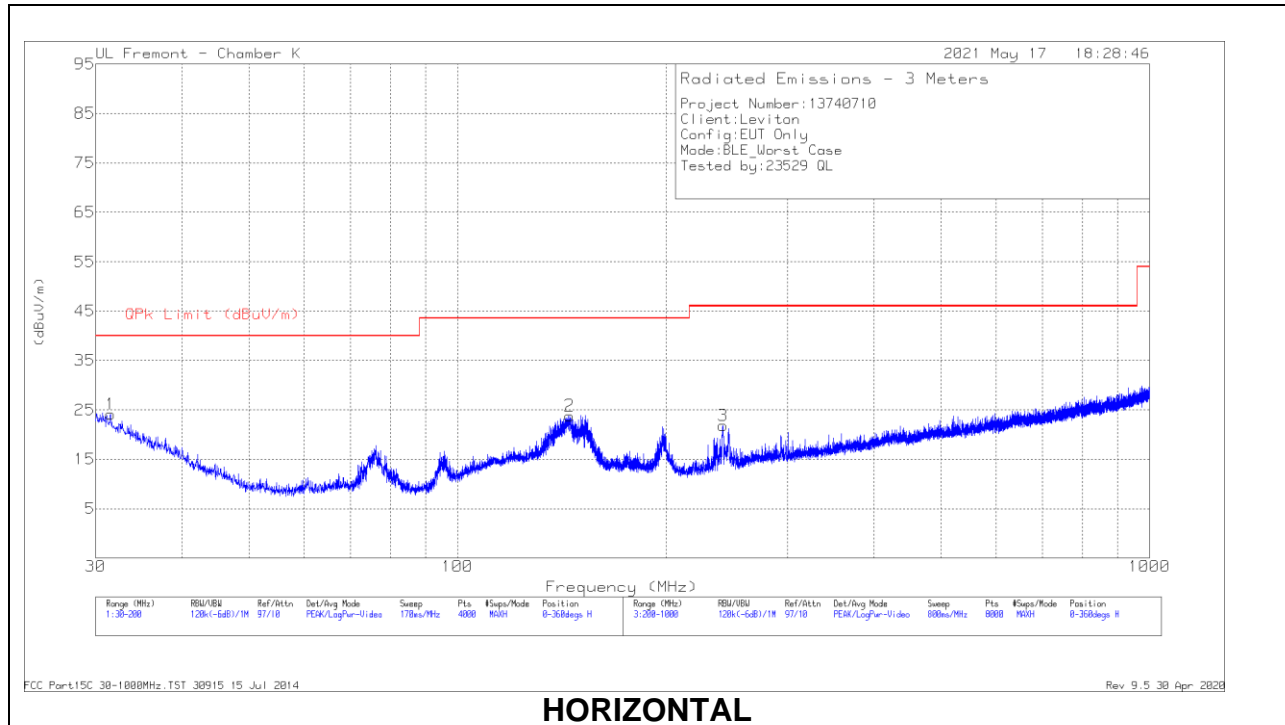
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (E ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.81162	22.79	Pk	56.3	-32.2	-40	6.89	29.43	-22.54	0-360
9	.81134	23.69	Pk	56.3	-32.2	-40	7.79	29.43	-21.64	0-360
5	6.40214	29.8	Pk	35	-31.9	-40	-7.1	29.5	-36.6	0-360
10	6.69662	40.64	Pk	34.9	-31.9	-40	3.64	29.5	-25.86	0-360

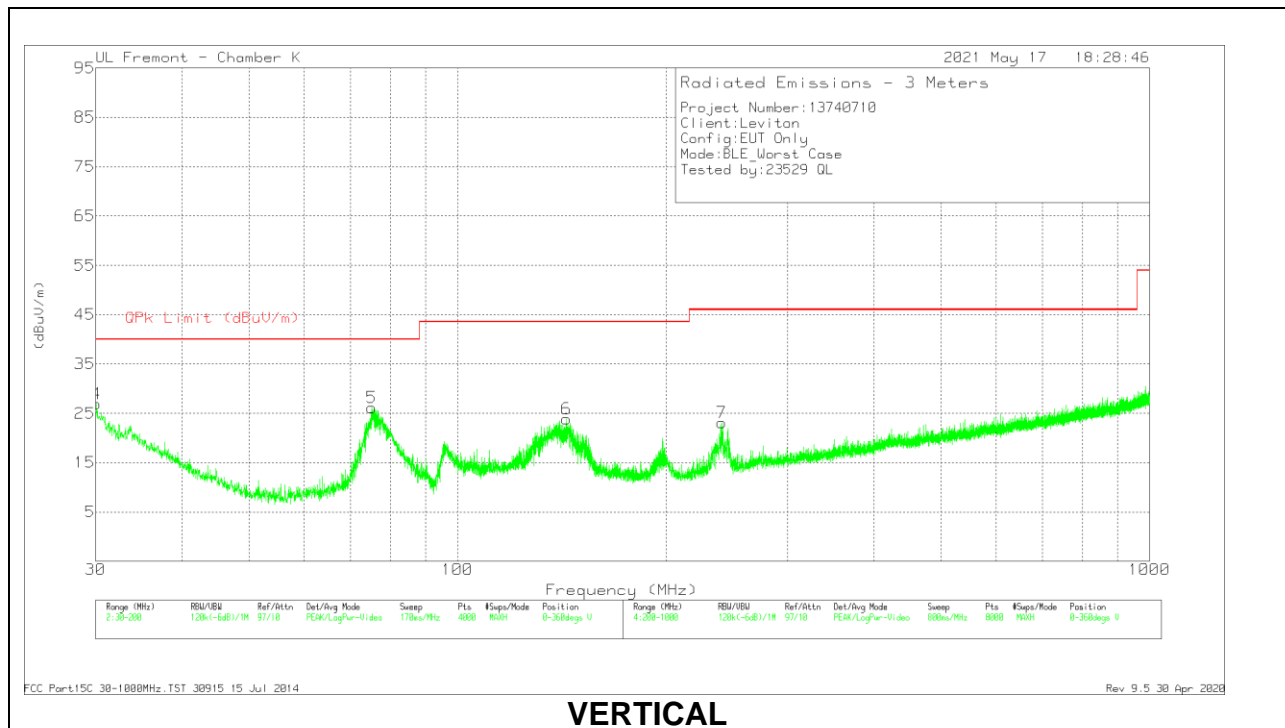
Pk - Peak detector

10.4. WORST CASE BELOW 1 GHz

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



HORIZONTAL



VERTICAL

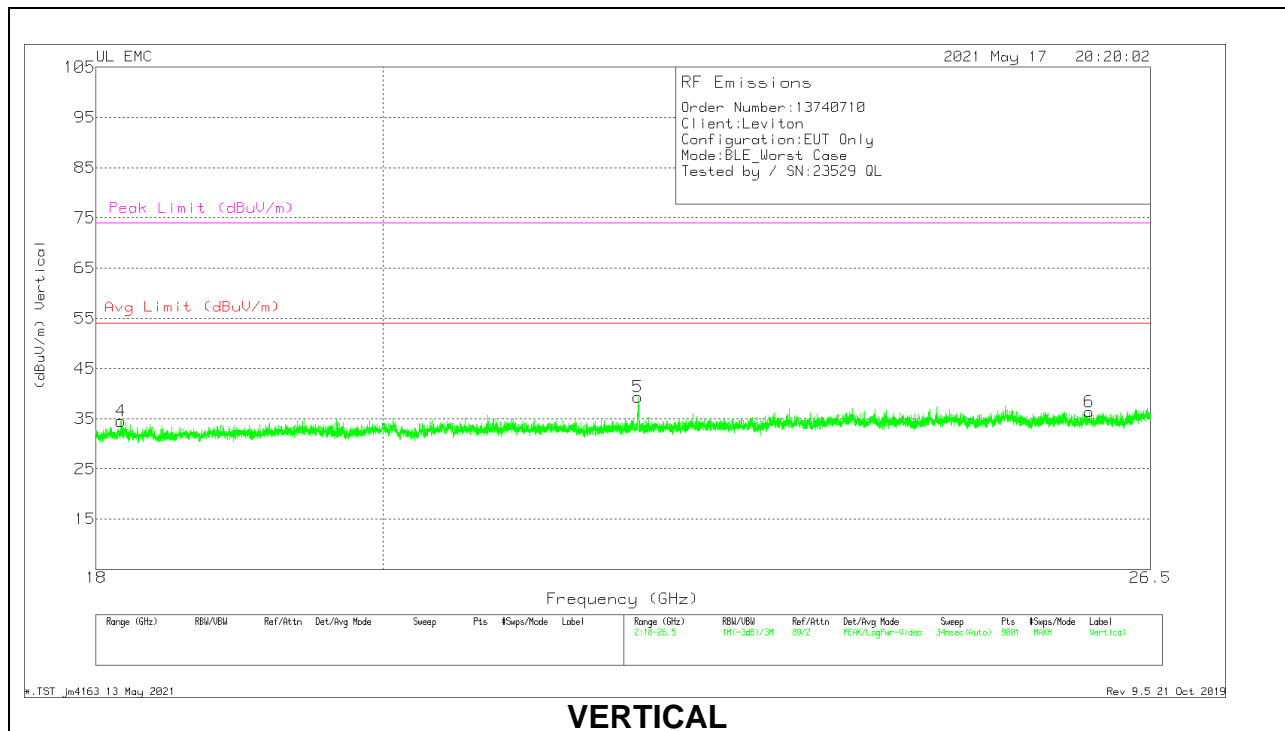
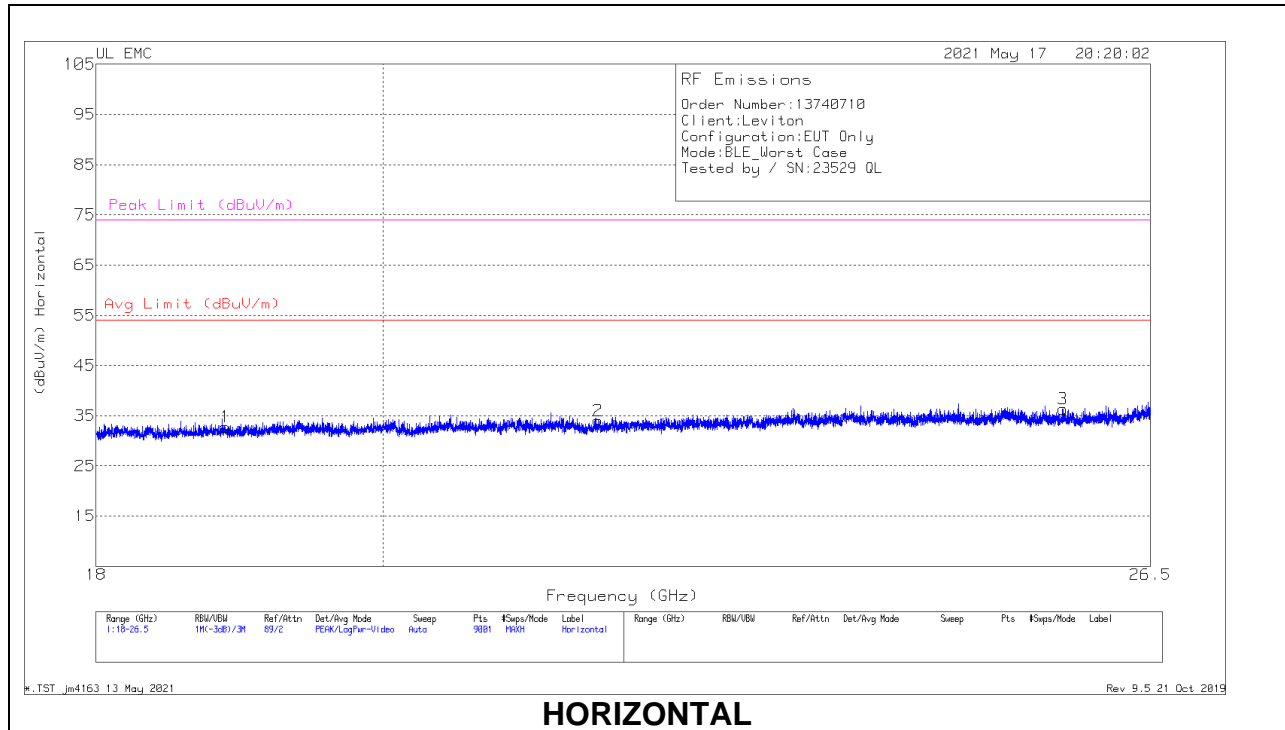
Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF 81560 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.5304	28.91	Pk	26.8	-31.6	24.11	40	-15.89	0-360	199	H
2	145.2898	35.51	Pk	18.9	-30.6	23.81	43.52	-19.71	0-360	199	H
4	30.085	30.6	Pk	27.9	-31.6	26.9	40	-13.1	0-360	100	V
5	75.6617	43.63	Pk	14.1	-31.1	26.63	40	-13.37	137	111	V
	75.5059	36.24	Qp	14.1	-31.1	19.24	40	-20.76	137	111	V
6	143.6744	35.56	Pk	18.9	-30.6	23.86	43.52	-19.66	0-360	100	V
3	241.9054	33.92	Pk	18	-30.1	21.82	46.02	-24.2	0-360	100	H
7	240.8053	35.18	Pk	18	-30.1	23.08	46.02	-22.94	0-360	199	V

Pk - Peak detector
 Qp - Quasi-Peak detector

10.5. WORST CASE 18-26 GHz

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



18 – 26 GHz Data

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T447 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.87361	67.94	Pk	32.4	-58.1	-9.5	32.74	54	-21.26	74	-41.26
2	21.63894	67.72	Pk	33.2	-57.4	-9.5	34.02	54	-19.98	74	-39.98
3	25.66322	66.33	Pk	34.4	-54.9	-9.5	36.33	54	-17.67	74	-37.67
4	18.16433	71.61	Pk	32.3	-59.9	-9.5	34.51	54	-19.49	74	-39.49
5	21.95816	72.93	Pk	33.4	-57.5	-9.5	39.33	54	-14.67	74	-34.67
6	25.91066	66.89	Pk	34.4	-55.4	-9.5	36.39	54	-17.61	74	-37.61

Pk - Peak detector

11. 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

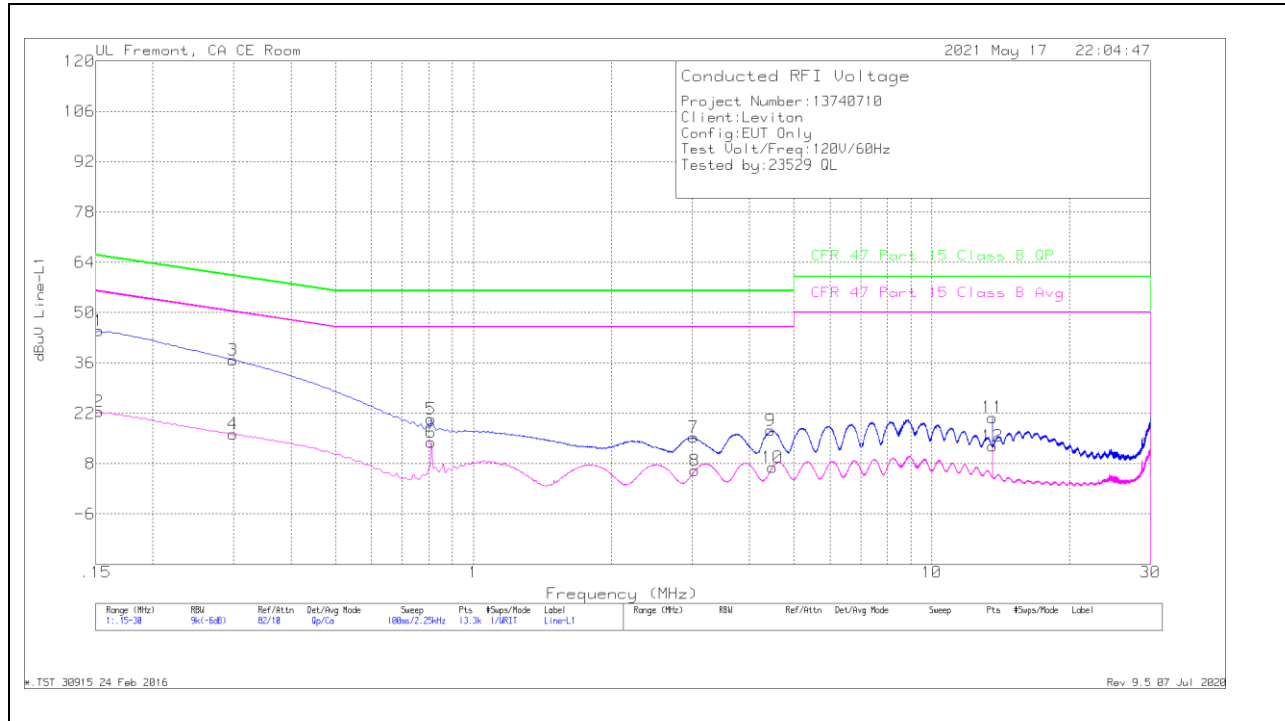
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

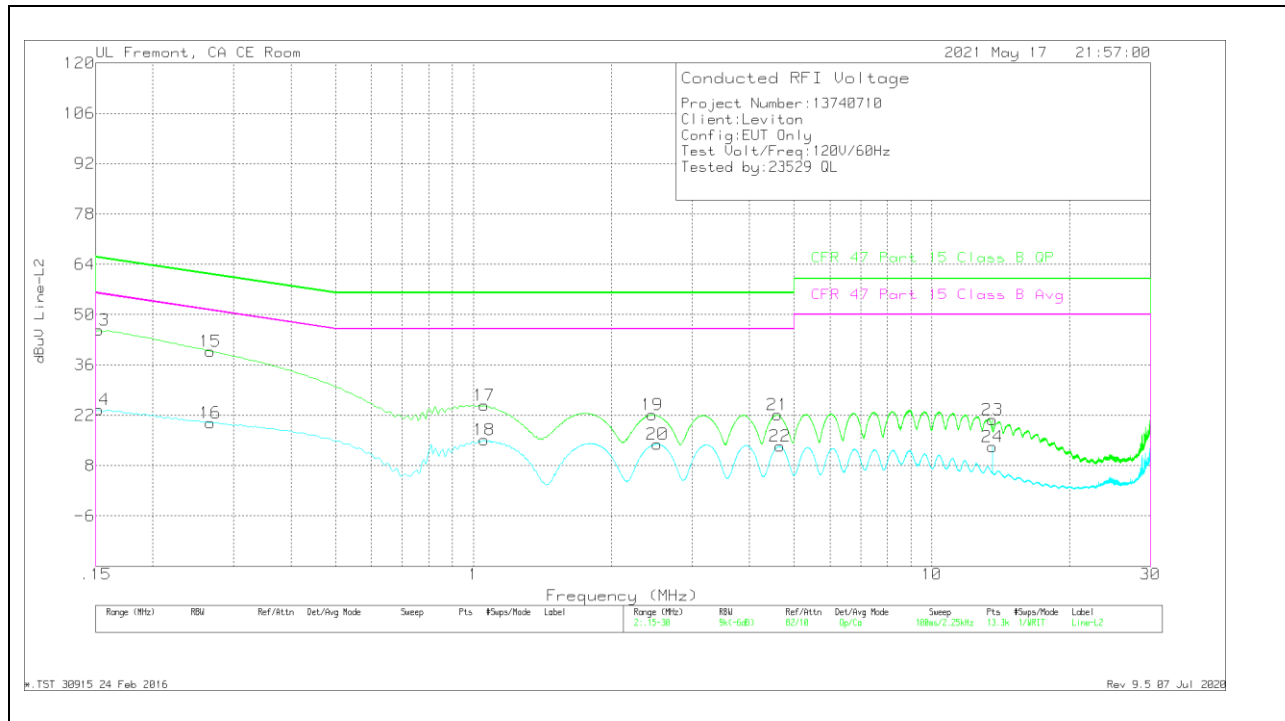
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 L1	LC Cables C1&C3 dB	Limiter	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	.15225	34.81	Qp	.1	0	10.1	45.01	65.88	-20.87	-	-
2	.15225	12.31	Ca	.1	0	10.1	22.51	-	-	55.88	-33.37
3	.2985	26.78	Qp	0	0	10.1	36.88	60.28	-23.4	-	-
4	.2985	6.15	Ca	0	0	10.1	16.25	-	-	50.28	-34.03
5	.80925	10.17	Qp	0	.1	10.1	20.37	56	-35.63	-	-
6	.80925	3.82	Ca	0	.1	10.1	14.02	-	-	46	-31.98
7	3.02325	4.98	Qp	0	.1	10.2	15.28	56	-40.72	-	-
8	3.039	-4.19	Ca	0	.1	10.2	6.11	-	-	46	-39.89
9	4.4565	6.91	Qp	0	.1	10.2	17.21	56	-38.79	-	-
10	4.49475	-3.25	Ca	0	.1	10.2	7.05	-	-	46	-38.95
11	13.56	10.35	Qp	.1	.2	10.2	20.85	60	-39.15	-	-
12	13.56	2.38	Ca	.1	.2	10.2	12.88	-	-	50	-37.12

Qp - Quasi-Peak detector
 Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 L2	LC Cables C2&C3 dB	Limiter	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	35.54	Qp	0	0	10.1	45.64	65.88	-20.24	-	-
14	.15225	13.45	Ca	0	0	10.1	23.55	-	-	55.88	-32.33
15	.267	29.76	Qp	0	0	10.1	39.86	61.21	-21.35	-	-
16	.267	9.81	Ca	0	0	10.1	19.91	-	-	51.21	-31.3
17	1.05563	14.6	Qp	0	.1	10.1	24.8	56	-31.2	-	-
18	1.0545	5.01	Ca	0	.1	10.1	15.21	-	-	46	-30.79
19	2.454	11.92	Qp	0	.1	10.1	22.12	56	-33.88	-	-
20	2.5215	3.79	Ca	0	.1	10.1	13.99	-	-	46	-32.01
21	4.60725	11.79	Qp	0	.1	10.2	22.09	56	-33.91	-	-
22	4.6635	3.09	Ca	0	.1	10.2	13.39	-	-	46	-32.61
23	13.56	10.34	Qp	.1	.2	10.2	20.84	60	-39.16	-	-
24	13.56	2.72	Ca	.1	.2	10.2	13.22	-	-	50	-36.78

Qp - Quasi-Peak detector
 Ca - CISPR average detection