



TEST REPORT

Report Number. : 13413797-E1V1

Applicant : Willow Innovations, Inc.
1975 W. El Camino Real, Suite 306
Mountain View, CA 94040, U.S.A.

Model : L01

FCC ID : 2AHRJ-L01

EUT Description : Breast Pump

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

June 03, 2021

Prepared by:

UL VERIFICATION SERVICES

47173 Benicia Street

Fremont, CA 94538 U.S.A.

TEL: (510) 319-4000

FAX: (510) 661-0888



NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	6/3/2021	Initial Issue	--

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULTS SUMMARY	6
3. TEST METHODOLOGY	7
4. FACILITIES AND ACCREDITATION	7
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	8
5.1. METROLOGICAL TRACEABILITY	8
5.2. DECISION RULES.....	8
5.3. MEASUREMENT UNCERTAINTY.....	8
5.4. SAMPLE CALCULATION	8
6. EQUIPMENT UNDER TEST	9
6.1. EUT DESCRIPTION	9
6.2. MAXIMUM OUTPUT POWER.....	9
6.3. DESCRIPTION OF AVAILABLE ANTENNAS	9
6.4. SOFTWARE AND FIRMWARE.....	9
6.5. WORST-CASE CONFIGURATION AND MODE	10
6.6. DESCRIPTION OF TEST SETUP.....	11
7. MEASUREMENT METHOD.....	15
8. TEST AND MEASUREMENT EQUIPMENT	16
9. ANTENNA PORT TEST RESULTS.....	17
9.1. ON TIME AND DUTY CYCLE.....	17
9.2. 99% BANDWIDTH.....	18
9.3. 6 dB BANDWIDTH.....	19
9.4. OUTPUT POWER.....	21
9.5. AVERAGE POWER	22
9.6. POWER SPECTRAL DENSITY	23
9.7. CONDUCTED SPURIOUS EMISSIONS.....	25
10. RADIATED TEST RESULTS	27
10.1. LIMITS AND PROCEDURE.....	27

10.2.	TRANSMITTER ABOVE 1 GHz (BLE 1 Mbps)	28
10.3.	WORST CASE BELOW 30MHZ	38
10.4.	WORST CASE BELOW 1 GHZ	40
10.5.	WORST CASE 18-26 GHZ	42
11.	AC POWER LINE CONDUCTED EMISSIONS	44
12.	SETUP PHOTOS	47

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Willow Innovations, Inc.
1975 W. El Camino Real, Suite 306
Mountain View, CA 94040, U.S.A.

EUT DESCRIPTION: Breast Pump

MODEL: L01

SERIAL NUMBER: PL7F1100002, PL7F1100010

DATE TESTED: JANUARY 25, 2021 – FEBRUARY 01, 2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	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
Staff Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Eric Yu
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

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	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	6dB BW	Complies	None.
15.247 (b) (3)	Output Power	Complies	None.
See Comment	Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	PSD	Complies	None.
15.247 (d)	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	Radiated Emissions	Complies	None.
15.207	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, and KDB 414788 D01 Radiated Test Site v01r01.

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
☐	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	208313
☐	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
☒	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	4.88 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:

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

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + 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 breast pump.

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	-10.50	0.09

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the following antenna:

Antenna Type: Chip RF Antenna, 2.4 to 2.5 GHz
Antenna Gain: 1.5 dBi

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was SWP-1041

The test utility software used during testing was BLE View for iOS 8+

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.

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

There are two modes: charging mode and battery mode. Battery mode was found as worst case for radiated emission.

BLE was tested at a fixed data rate of 1 Mbps.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer/Brand	Model	Serial Number	FCC ID
Laptop	Dell	Latitude E7240	669000298NB001	Doc
AC/DC Adapter	Dell	LP90PM111	CN-OY4M8K-72438-32Q-5B21-A00	Doc
AC/DC Adapter	Switching Power Supply	AO10A-050B	NA	Doc

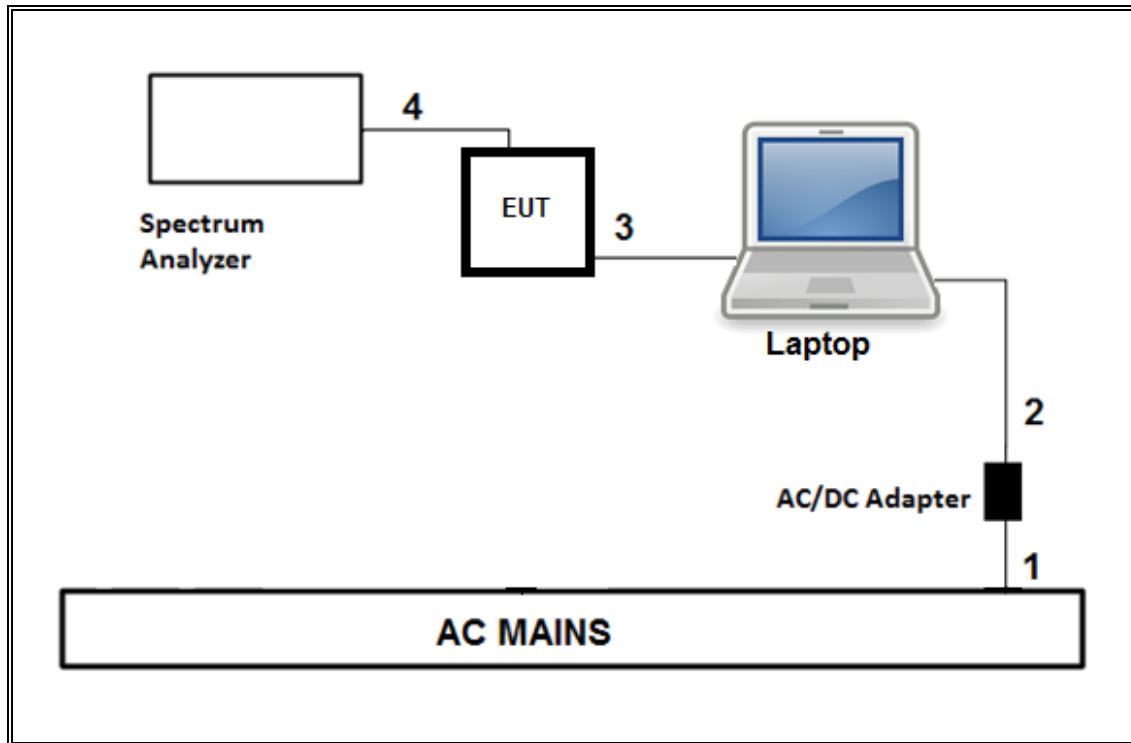
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	0.8	AC to laptop AC adapter
2	DC	1	DC	Shielded	1.2	to Laptop
3	USB	1	USB	Shielded	1	Laptop to EUT
4	Antenna	1	SMA	Shielded	0.3	EUT to Analyzer
5	USB	1	USB	Shielded	1.5	Aadpter to EUT

TEST SETUP- RF CONDUCTED TEST

The EUT was connected to the test laptop via USB cable. Test software exercised the EUT.

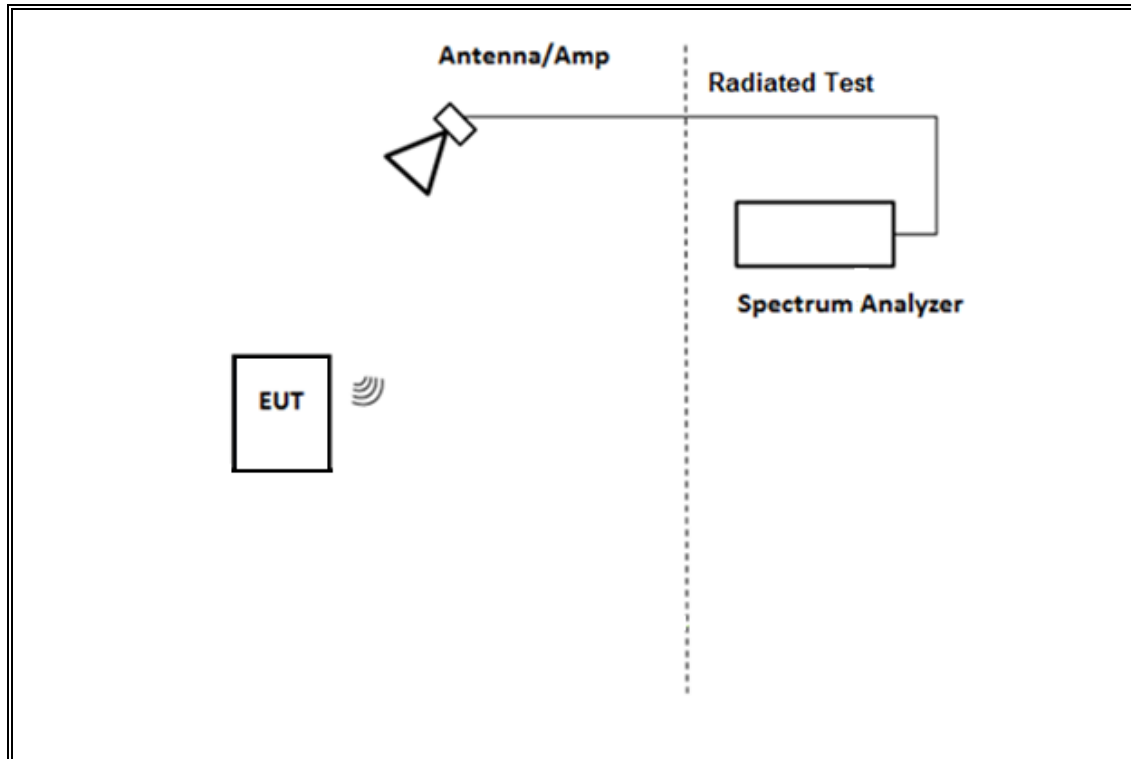
SETUP DIAGRAM



TEST SETUP- RADIATED TEST

The EUT was operated by battery. Test software exercised the EUT.

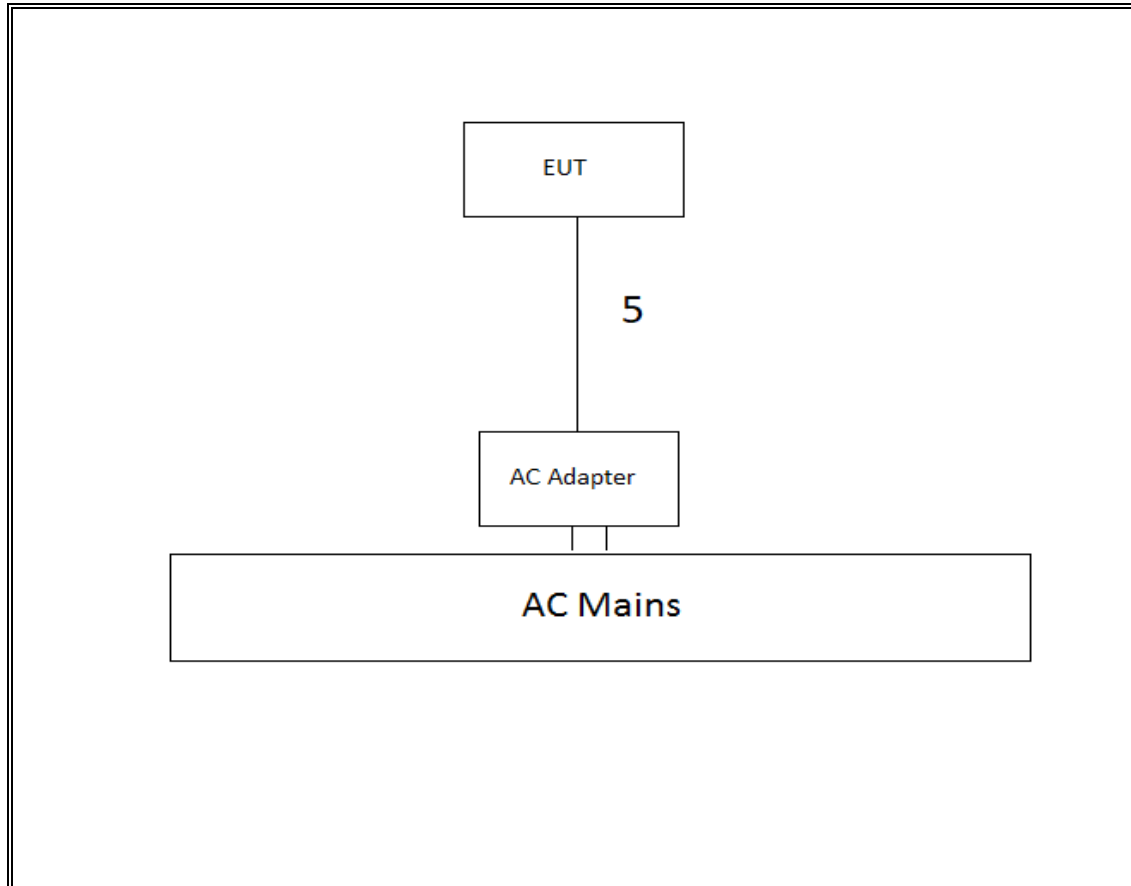
SETUP DIAGRAM



TEST SETUP- AC LINE CONDUCTED TEST

The EUT was connected Chime Kit, powered by a transformer. Test software exercised the EUT.

SETUP DIAGRAM



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)

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

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

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

Radiated emissions restricted frequency bands: ANSI C63.10 Section 11.12.1

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

Band-edge: ANSI C63.10 Section 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. 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	Asset	Cal Due
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	PRE0179465	07/27/2021
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	PRE0179467	07/27/2021
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	01/21/2022
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	08/31/2021
Amplifier, 100MHz-18GHz	AMPLICAL	AMP0.1G18-47-20	PRE0197319	05/04/2021
Antenna, Broadband Hybrid, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184052	11/19/2021
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	170647	12/29/2021
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179376	04/03/2021
Antenna Horn, 18 to 26GHz	ARA	SWH-28	T447	09/24/2021
High Frequency Amplifier Switch Box	Agilent Technology	8449B	PRE0183142	04/08/2021
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1268	01/20/2022
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	T413	02/26/2021
AC Line Conducted				
Description	Manufacturer	Model	ID Num	Cal Due
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	PRE0186446	01/20/2022
L.I.S.N	FCC INC.	FCC LISN 50/250	24	01/20/2022
EMI TEST RECEIVER	Rohde & Schwarz	ESR	T1436	02/20/2021
Transient Limiter	COM-POWER	LIT-930A	PRE0129246	01/20/2022
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Rev 9.5, 30 Apr, 2020	
Antenna Port Software	UL	UL RF	AP2020.9.1	
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 07 Jul 2020	

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

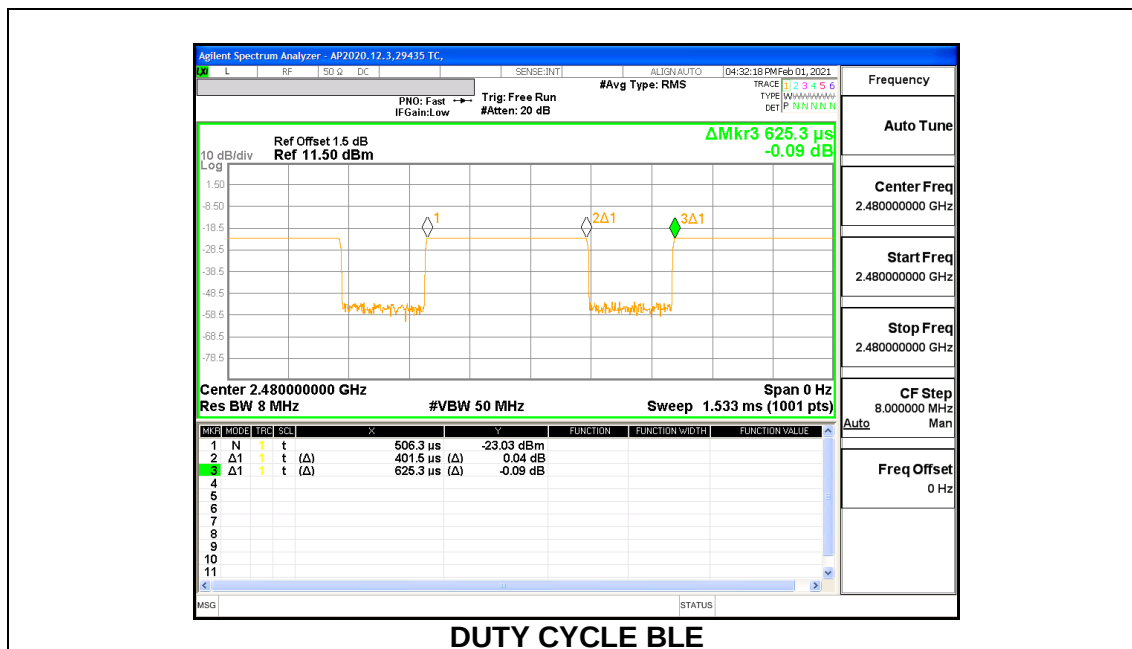
PROCEDURE

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	0.402	0.625	0.642	64.21%	1.92	2.491

DUTY CYCLE PLOTS



9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0369
Middle	2440	1.0358
High	2480	1.0356



9.3. 6 dB BANDWIDTH

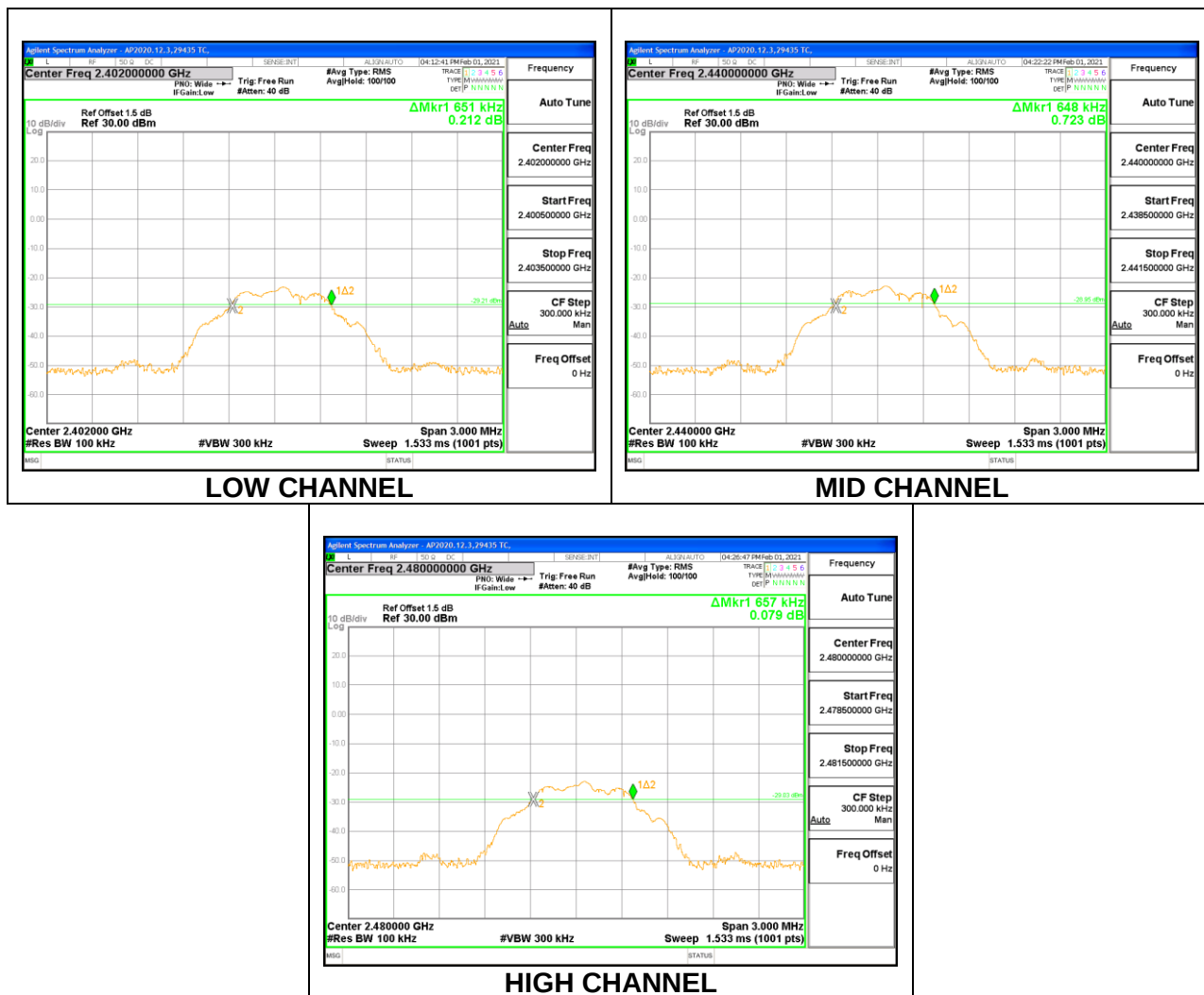
LIMITS

FCC §15.247 (a) (2)

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6510	0.5
Middle	2440	0.6480	0.5
High	2480	0.6570	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

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

RESULTS

Tested By:	29435 TC
Date:	2/1/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-10.73	30	-40.730
Middle	2440	-10.50	30	-40.500
High	2480	-10.84	30	-40.840

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

Tested By:	29435 TC
Date:	2/1/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-26.62
Middle	2440	-26.30
High	2480	-26.42

9.6. POWER SPECTRAL DENSITY

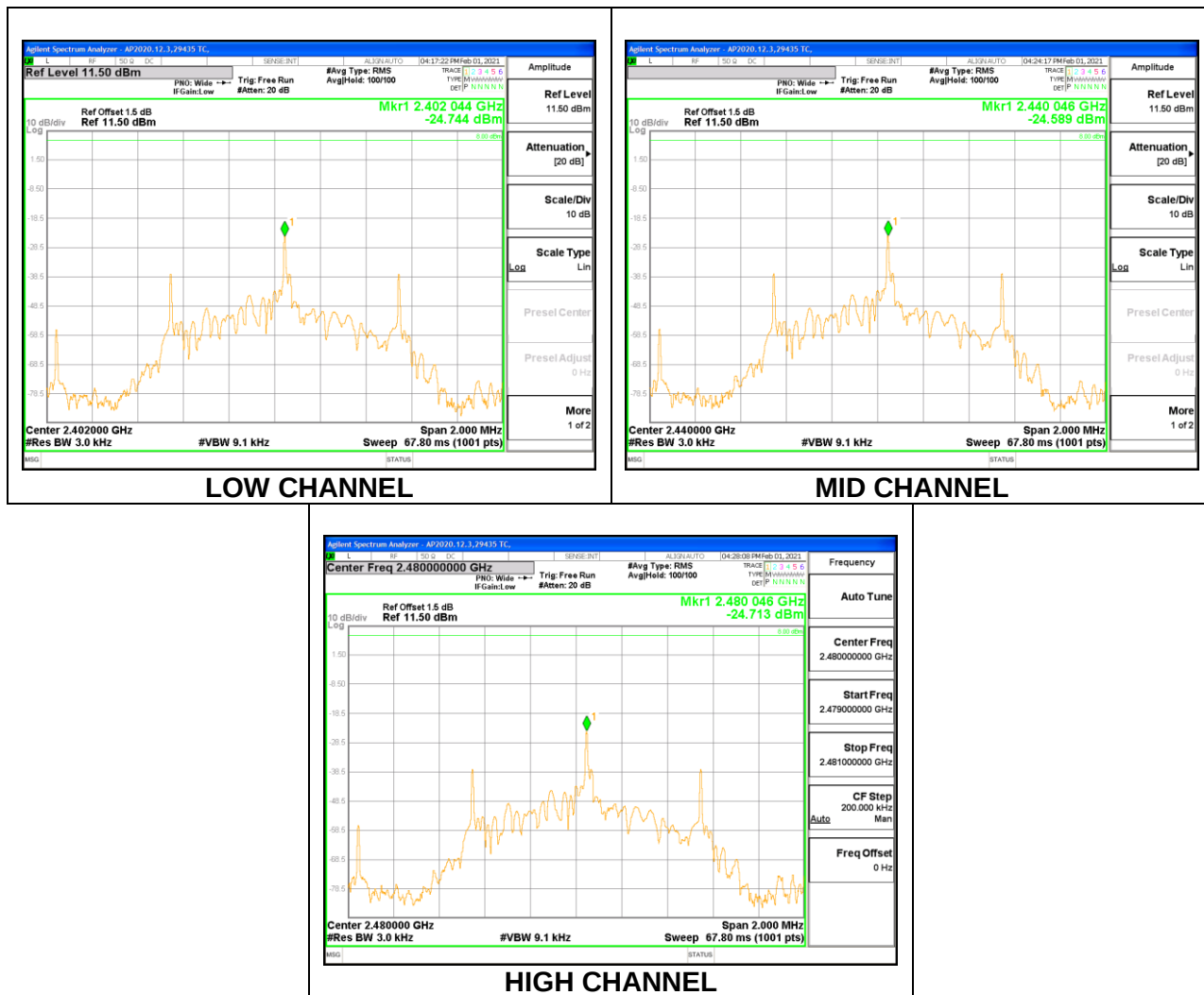
LIMITS

FCC §15.247 (e)

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

RESULTS

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-24.74	8	-32.74
Middle	2440	-24.59	8	-32.59
High	2480	-24.71	8	-32.71



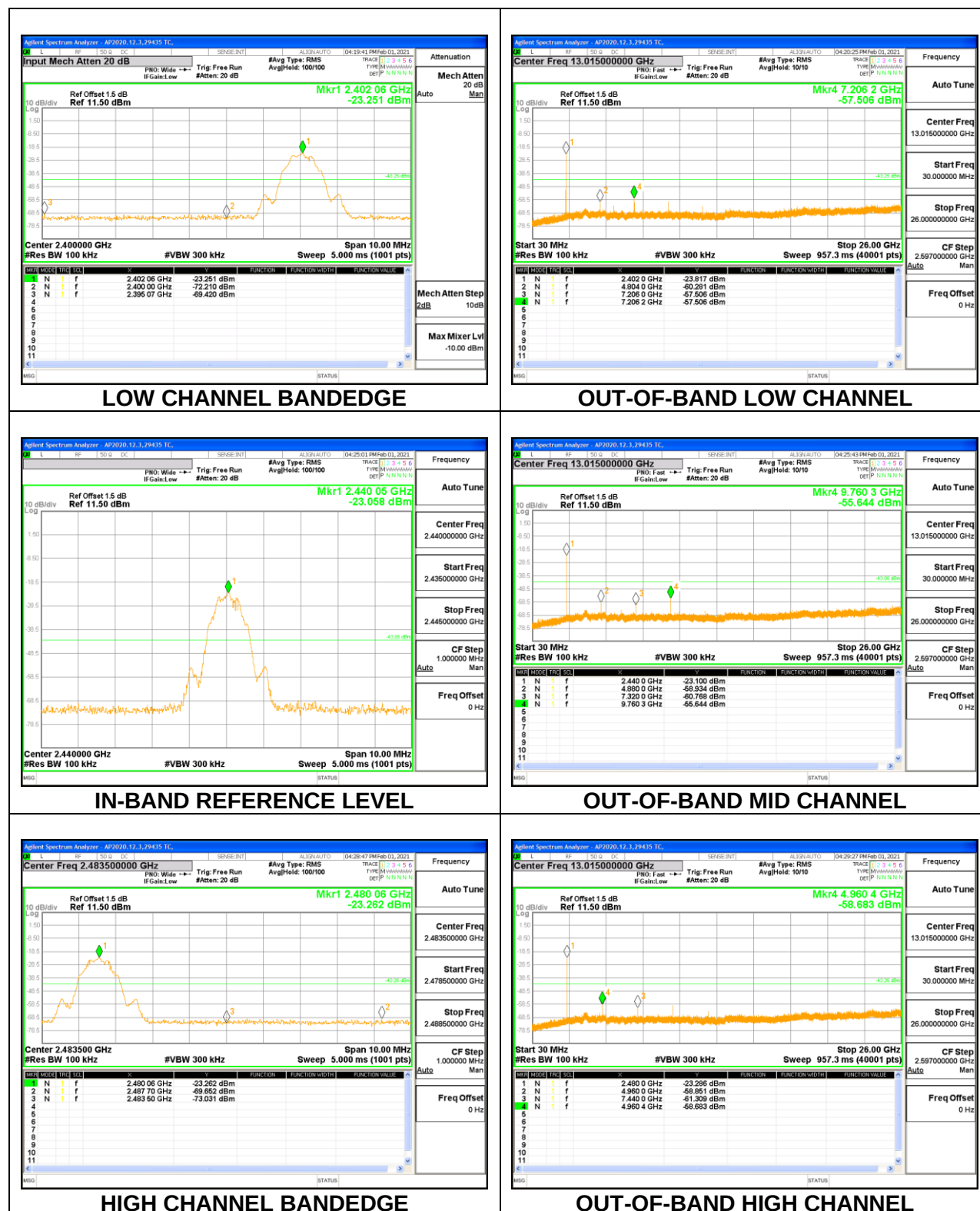
9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

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

RESULTS



10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

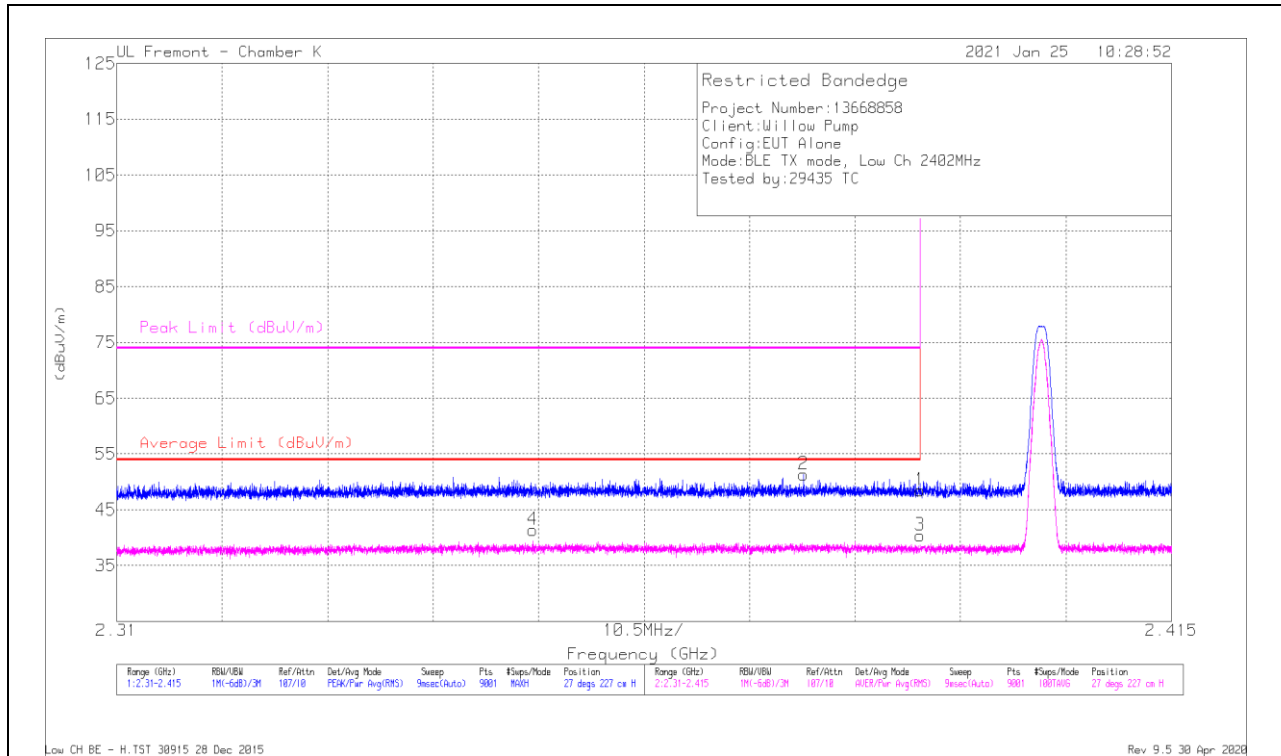
FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

10.2. TRANSMITTER ABOVE 1 GHz (BLE 1 Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



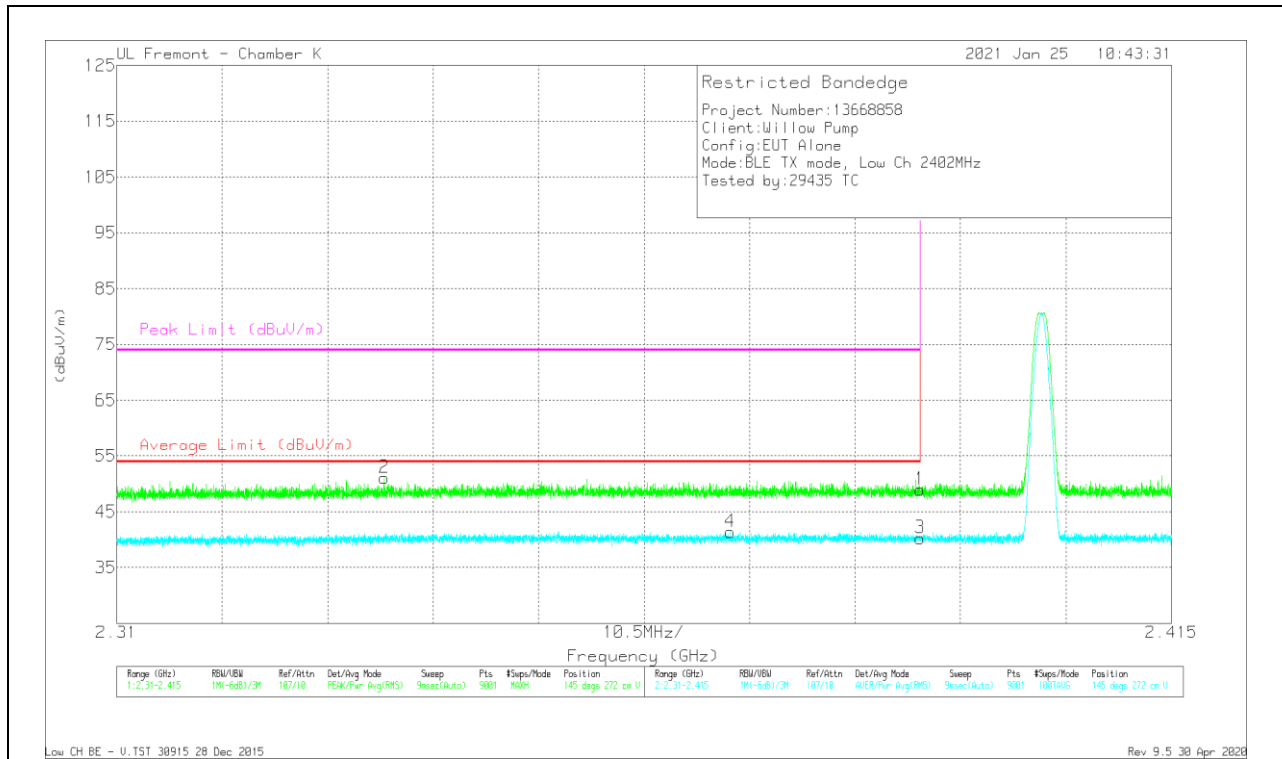
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 1063 (dBm)	Amp/Chd/Filt/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.30999	51.12	Pk	32.4	-35	0	48.52	-	-	74	-25.48	27	227	H
2	* 2.3784	53.98	Pk	32.4	-35.1	0	51.28	-	-	74	-22.72	27	227	H
3	* 2.30999	40.9	RMS	32.4	-35	1.92	40.22	54	-13.78	-	-	27	227	H
4	* 2.35145	42.14	RMS	32.4	-35.2	1.92	41.26	54	-12.74	-	-	27	227	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 1963 (dBm)	Amp/CM/Fit/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	* 2.36999	51.58	PK	32.4	-35	0	48.98	-	-	74	-25.02	145	272	V
2	* 2.36661	54.09	PK	32.2	-35.2	0	51.09	-	-	74	-22.91	145	272	V
3	* 2.36999	40.73	RMS	32.4	-35	1.92	40.05	54	-13.95	-	-	145	272	V
4	* 2.37109	42.03	RMS	32.4	-35.1	1.92	41.25	54	-12.75	-	-	145	272	V

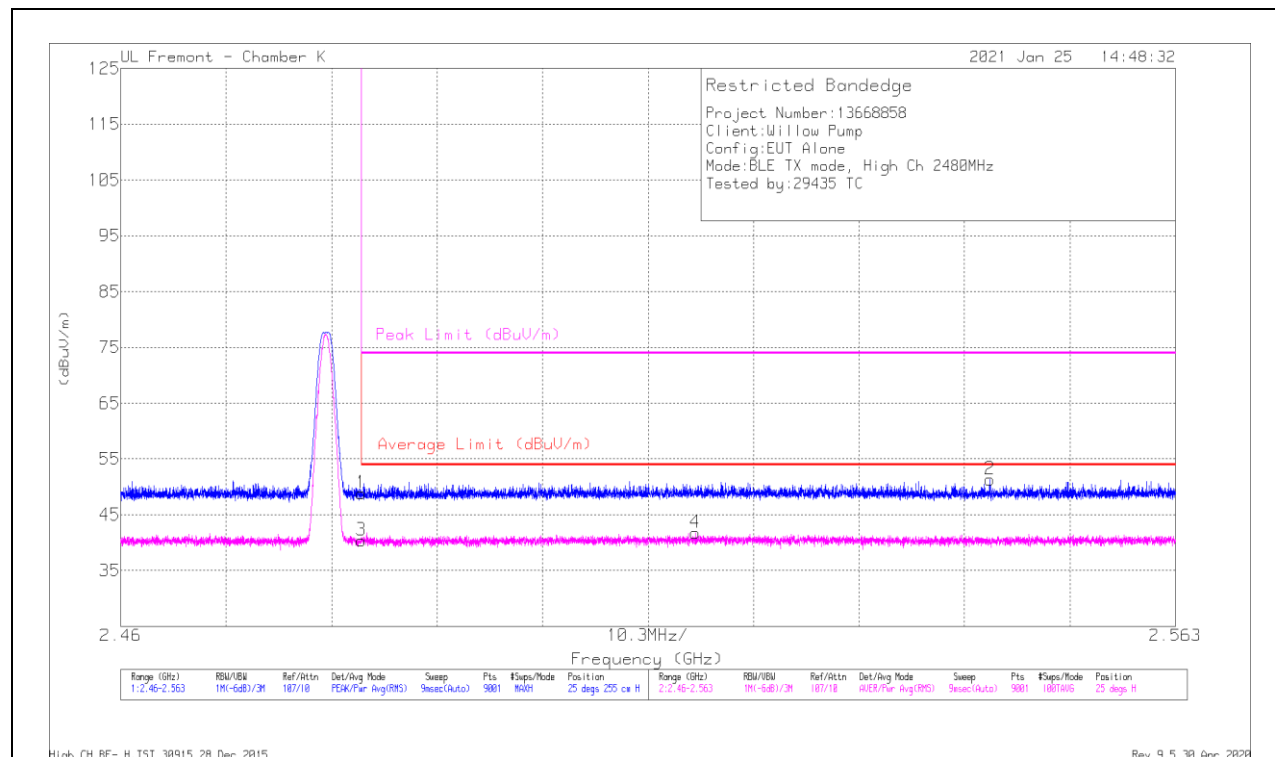
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



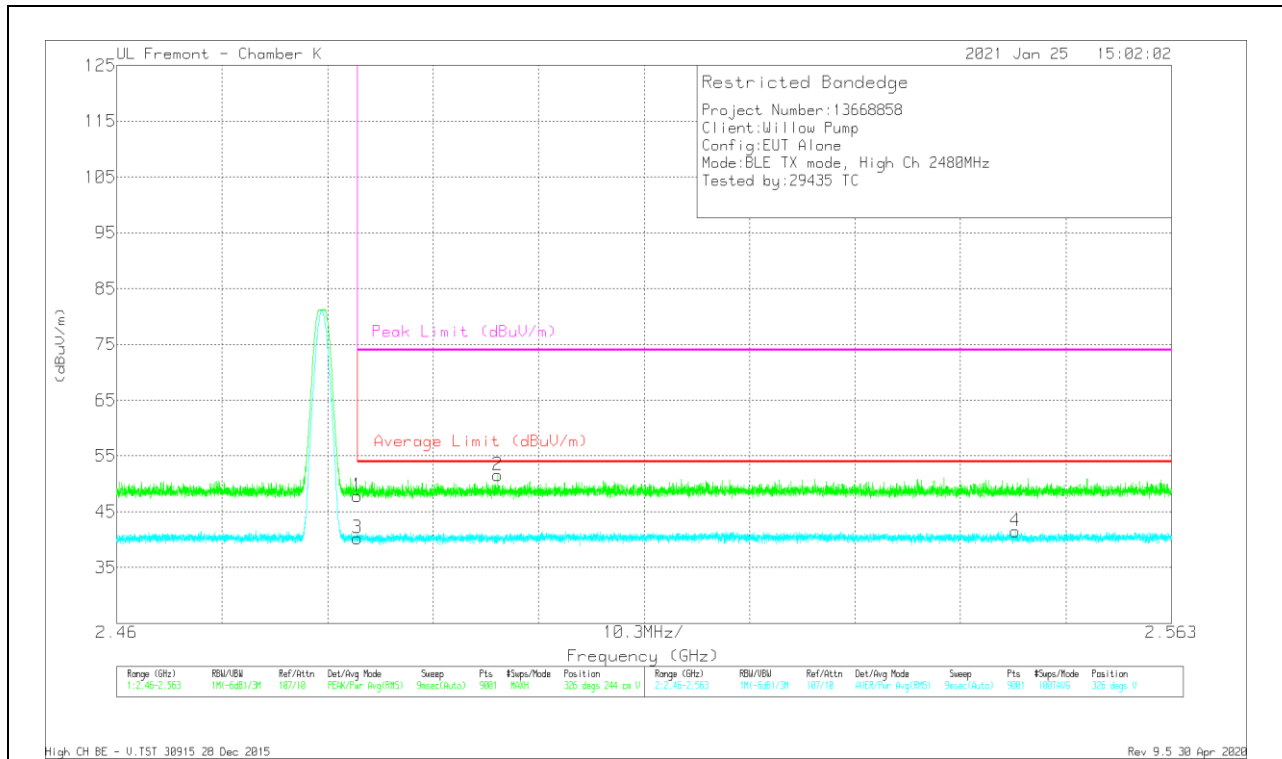
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Ampl/Cat/Fit/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	50.97	Pk	32.5	-34.6	0	48.87	-	-	74	-25.13	25	255	H
2	2.54486	53.04	Pk	32.7	-34.4	0	51.34	-	-	74	-22.66	25	255	H
3	* 2.48351	40.38	RMS	32.5	-34.6	1.92	40.2	54	-13.8	-	-	25	255	H
4	2.51614	41.5	RMS	32.7	-34.5	1.92	41.57	54	-12.43	-	-	25	255	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 T963 (dBm)	Amp/CM/Fit/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	* 2.48351	50	PK	32.5	-34.6	0	47.9	-	-	74	-26.1	326	244	V
2	* 2.4972	53.58	PK	32.6	-34.6	0	51.58	-	-	74	-22.42	326	244	V
3	* 2.48351	40.31	RMS	32.5	-34.6	1.92	40.13	54	-13.87	-	-	326	244	V
4	2.54774	41.16	RMS	32.7	-34.4	1.92	41.38	54	-12.62	-	-	326	244	V

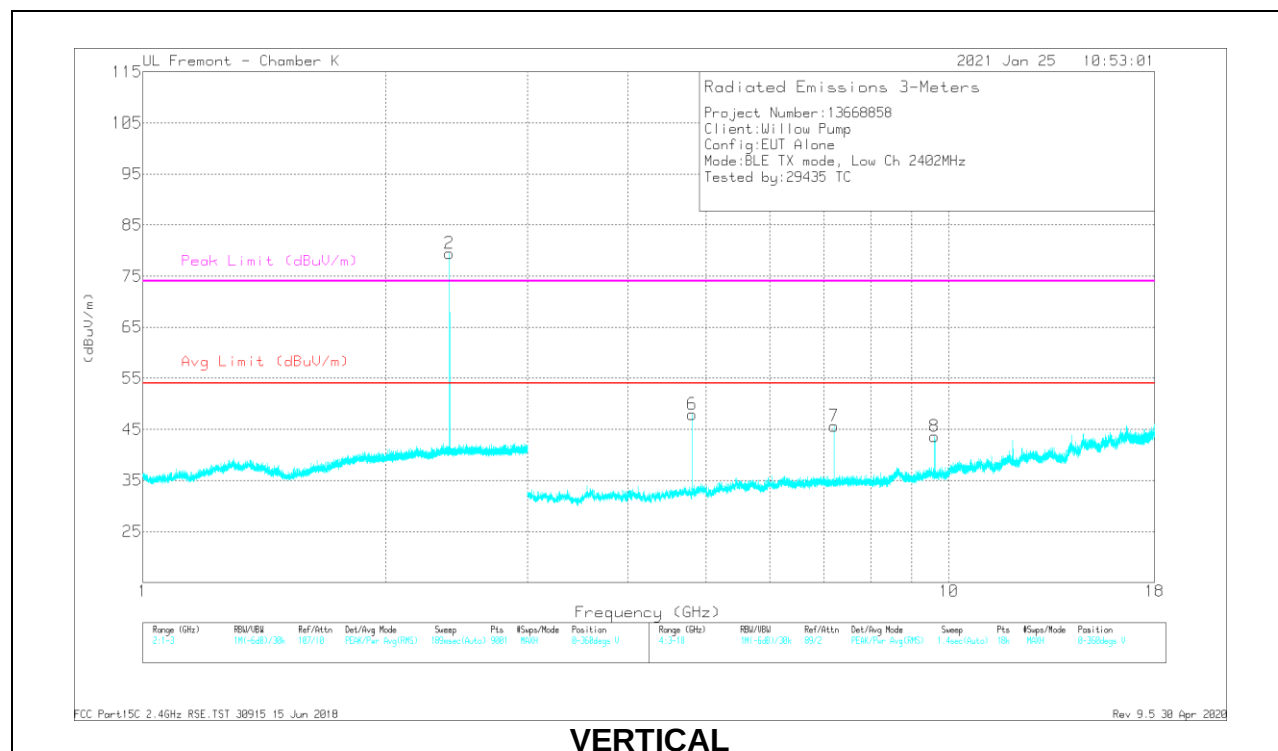
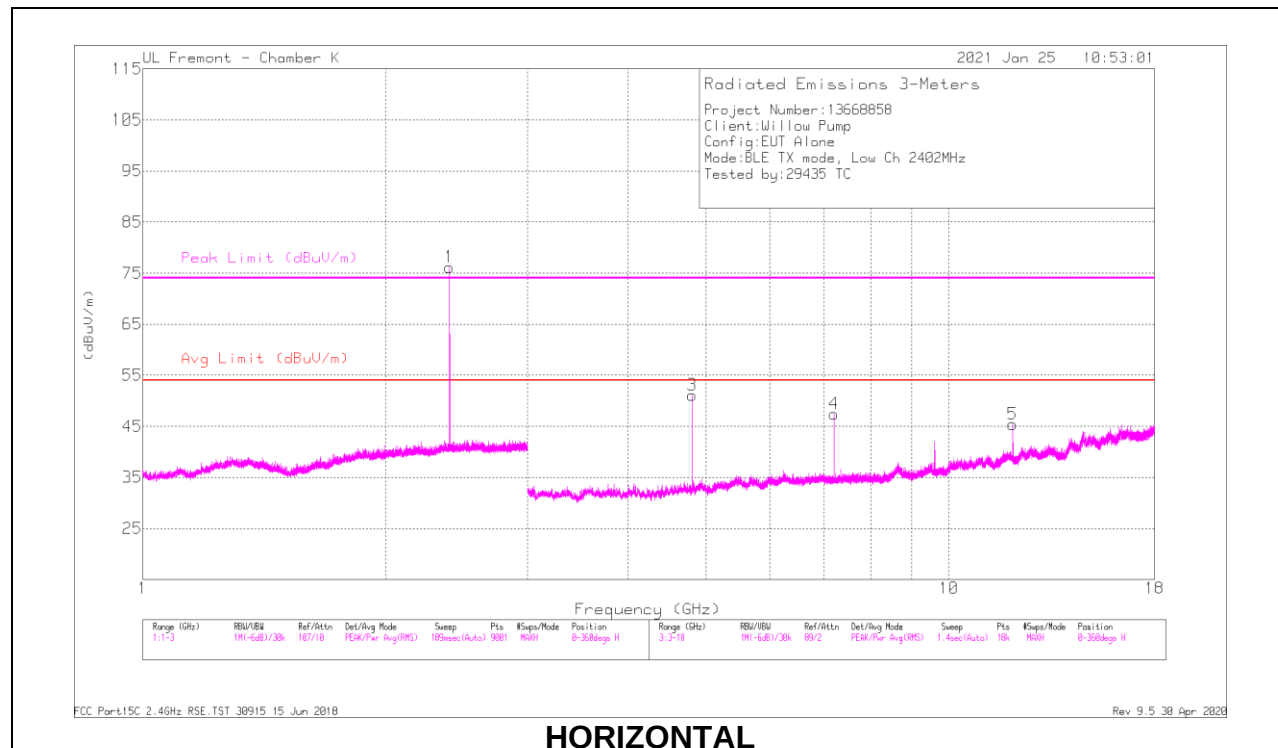
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

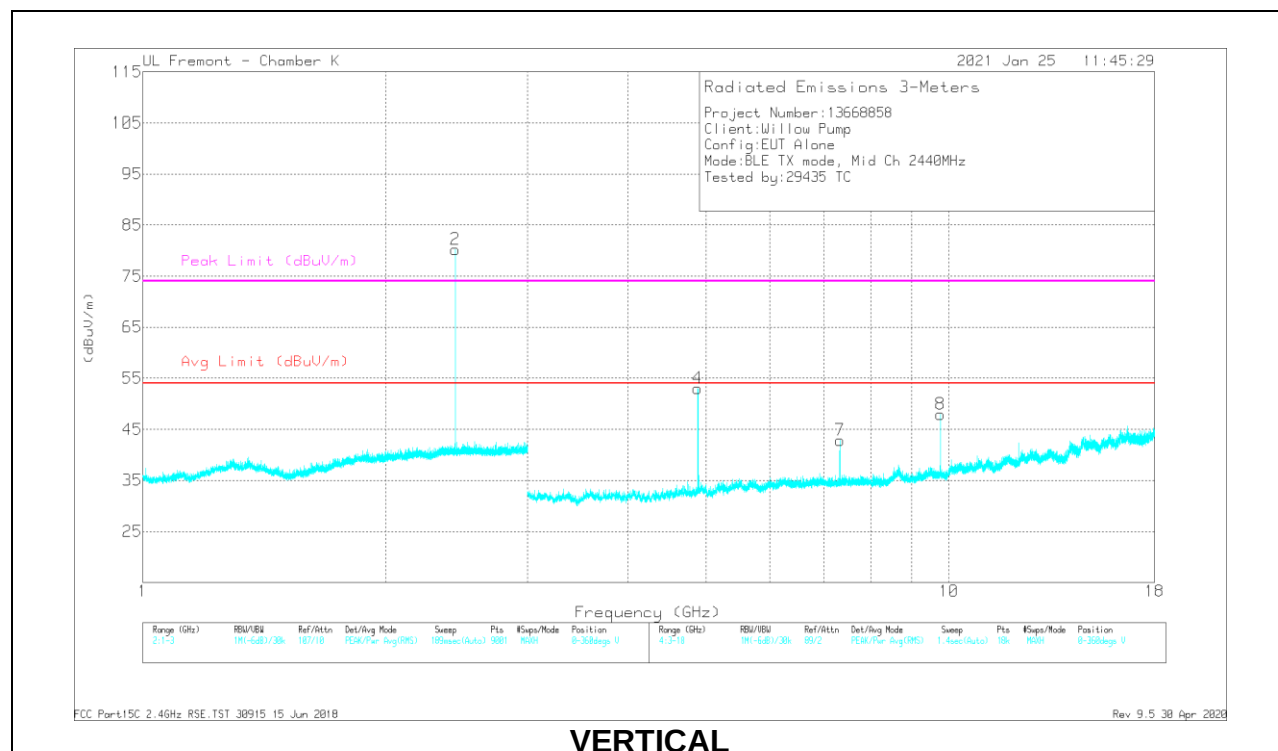
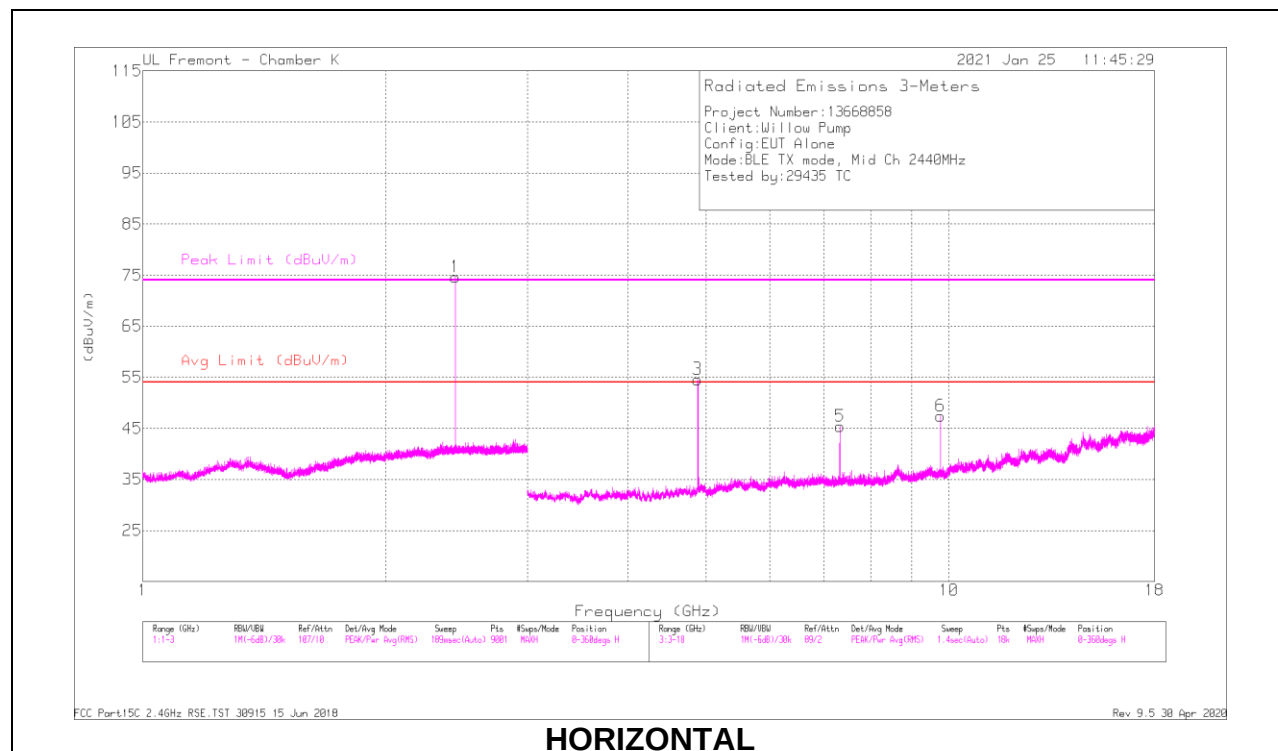
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.80421	59.1	PK2	34.4	-40.8	0	52.7	-	-	74	-21.3	201	231	H
* 4.80411	52.81	MAV1	34.4	-40.8	1.92	48.33	54	-5.67	-	-	201	231	H
7.20643	53.69	PK2	36	-38.6	0	51.09	-	-	-	-	239	223	H
7.20614	45.62	MAV1	36	-38.6	1.92	45.14	-	-	-	-	239	223	H
* 12.00936	46.9	PK2	38.9	-35	0	50.8	-	-	74	-23.2	224	183	H
* 12.00962	34.84	MAV1	38.9	-35	1.92	40.66	54	-13.34	-	-	224	183	H
* 4.80398	58.93	PK2	34.4	-40.8	0	52.53	-	-	74	-21.47	205	389	V
* 4.80408	53.02	MAV1	34.4	-40.8	1.92	48.54	54	-5.29	-	-	205	389	V
7.20587	52.1	PK2	36	-38.6	0	49.5	-	-	-	-	87	95	V
7.2061	43.83	MAV1	36	-38.6	1.92	43.15	-	-	-	-	87	95	V
9.60718	48.17	PK2	36.8	-36.7	0	48.27	-	-	-	-	204	165	V
9.60865	36.61	MAV1	36.8	-36.7	1.92	38.62	-	-	-	-	204	165	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

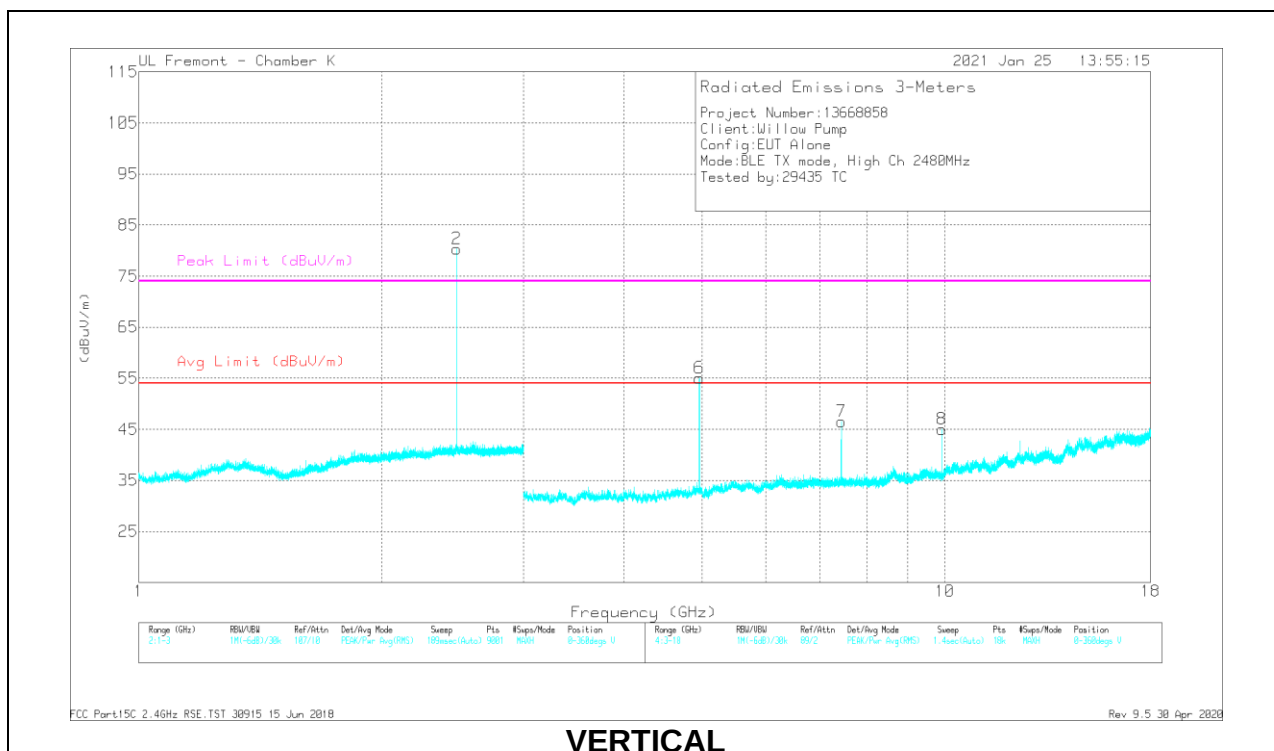
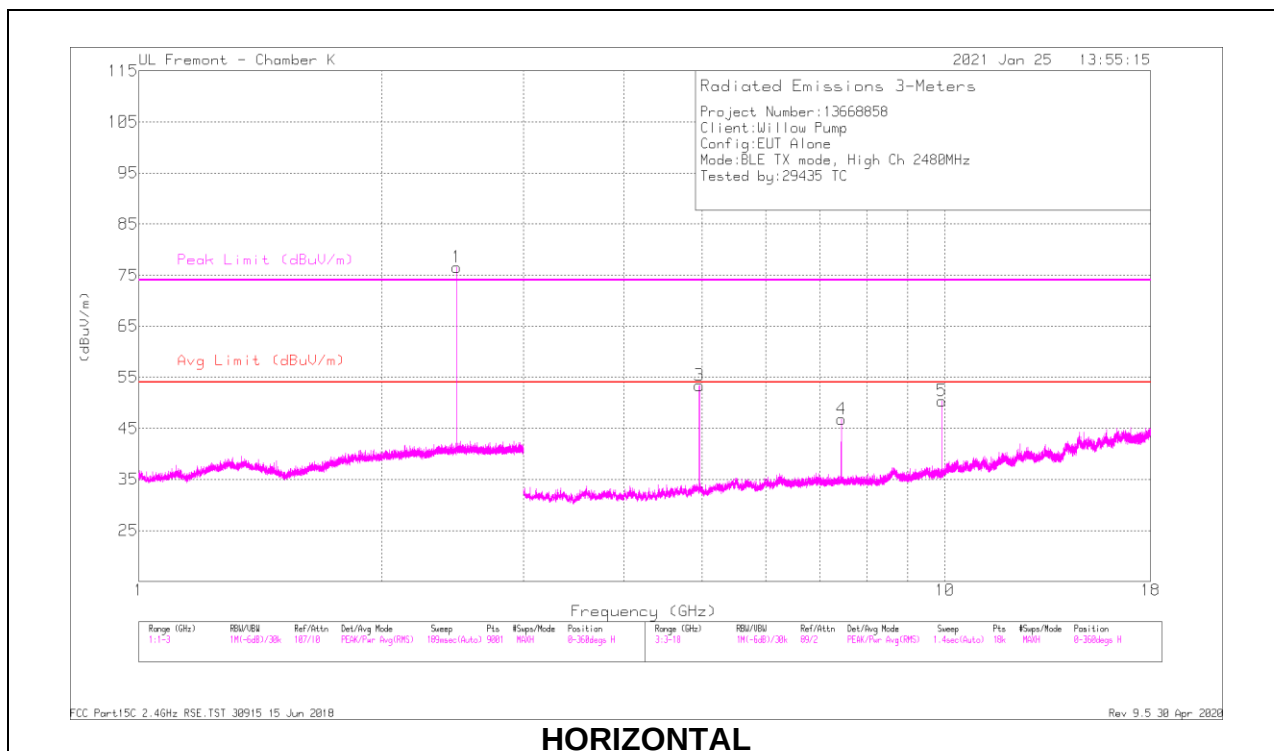
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Ftr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.88383	62.96	PK2	34.3	-40.6	0	56.66	-	-	74	-17.34	226	137	H
* 4.88407	57.5	MAV1	34.3	-40.6	1.92	53.12	54	-88	-	-	226	137	H
* 7.32678	45.27	PK2	36.1	-38.1	0	43.27	-	-	74	-30.73	330	286	H
* 7.32966	34.47	MAV1	36.1	-38.2	1.92	34.29	54	-19.71	-	-	330	286	H
9.766	45.56	PK2	37	-36.8	0	45.76	-	-	-	-	48	318	H
9.76933	34.04	MAV1	37	-36.7	1.92	36.26	-	-	-	-	48	318	H
* 4.88426	58.26	PK2	34.3	-40.6	0	51.96	-	-	74	-22.04	38	340	V
* 4.8841	52.36	MAV1	34.3	-40.6	1.92	49.92	54	-6.08	-	-	38	340	V
* 7.32564	52.08	PK2	36.1	-38.2	0	49.98	-	-	74	-24.02	74	162	V
* 7.32608	44.33	MAV1	36.1	-38.2	1.92	44.15	54	-9.68	-	-	74	162	V
9.7682	47.7	PK2	37	-36.7	0	48	-	-	-	-	188	161	V
9.76869	35.85	MAV1	37	-36.7	1.92	38.07	-	-	-	-	188	161	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

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (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
* 4.95986	62.29	PK2	34.3	-40.7	0	55.89	-	-	74	-18.11	247	384	H
* 4.96006	55.99	MAV1	34.3	-40.7	1.92	51.51	54	-2.49	-	-	247	384	H
* 7.44085	50.48	PK2	36.1	-37.9	0	48.68	-	-	74	-25.32	53	103	H
* 7.44012	41.06	MAV1	36.1	-38	1.92	41.08	54	-12.92	-	-	53	103	H
9.9193	50.7	PK2	37.1	-36.6	0	51.2	-	-	-	-	307	99	H
9.91972	40.78	MAV1	37.1	-36.6	1.92	43.2	-	-	-	-	307	99	H
* 4.95989	63.51	PK2	34.3	-40.7	0	57.11	-	-	74	-16.89	254	251	V
* 4.96009	57.3	MAV1	34.3	-40.7	1.92	52.87	54	-1.13	-	-	254	251	V
* 7.4407	50.34	PK2	36.1	-37.9	0	48.54	-	-	74	-25.46	77	162	V
* 7.44011	41.32	MAV1	36.1	-38	1.92	41.34	54	-12.66	-	-	77	162	V
9.92107	50.98	PK2	37.1	-36.6	0	51.48	-	-	-	-	156	298	V
9.91988	40.38	MAV1	37.1	-36.6	1.92	42.8	-	-	-	-	156	298	V

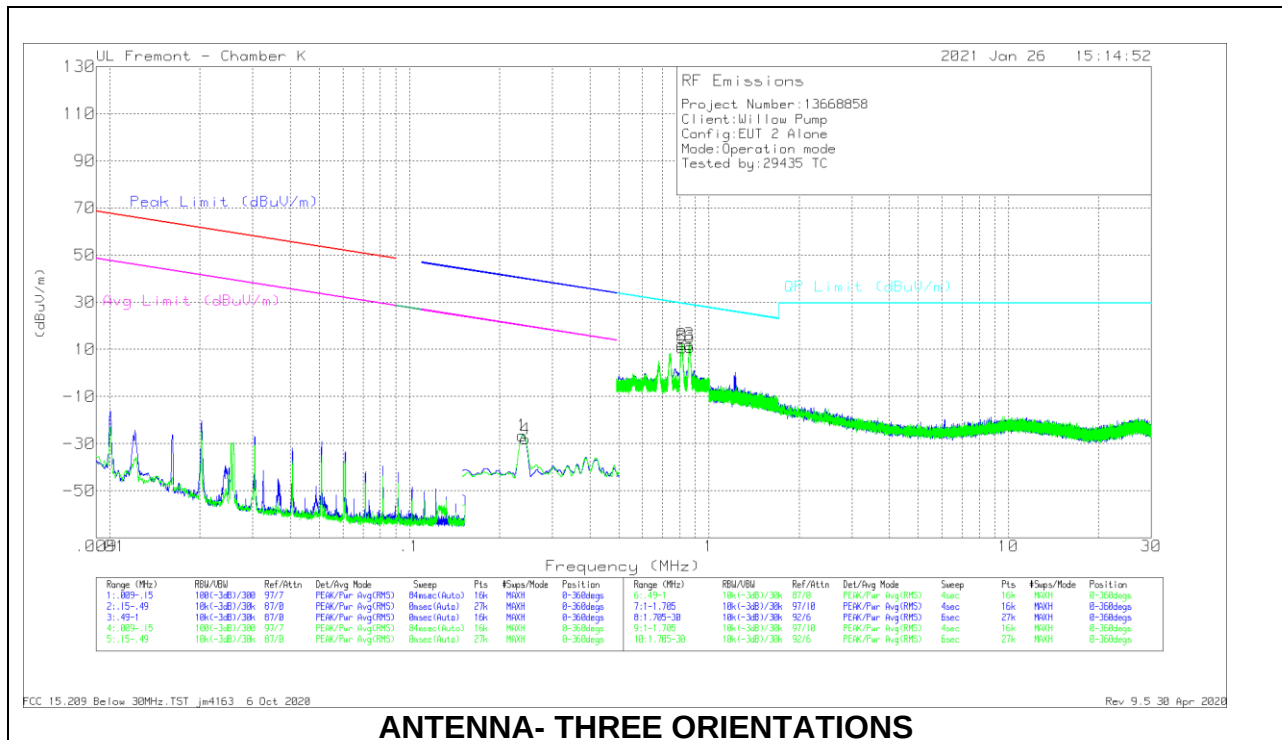
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

10.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



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)	Azimuth (Degs)
1	23796	29.34	Pk	56.3	-32.2	-80	-26.56	40.09	-66.65	20.09	-46.65	0-360
4	24421	27.77	Pk	56.3	-32.2	-80	-28.13	39.86	-67.99	19.86	-47.99	0-360

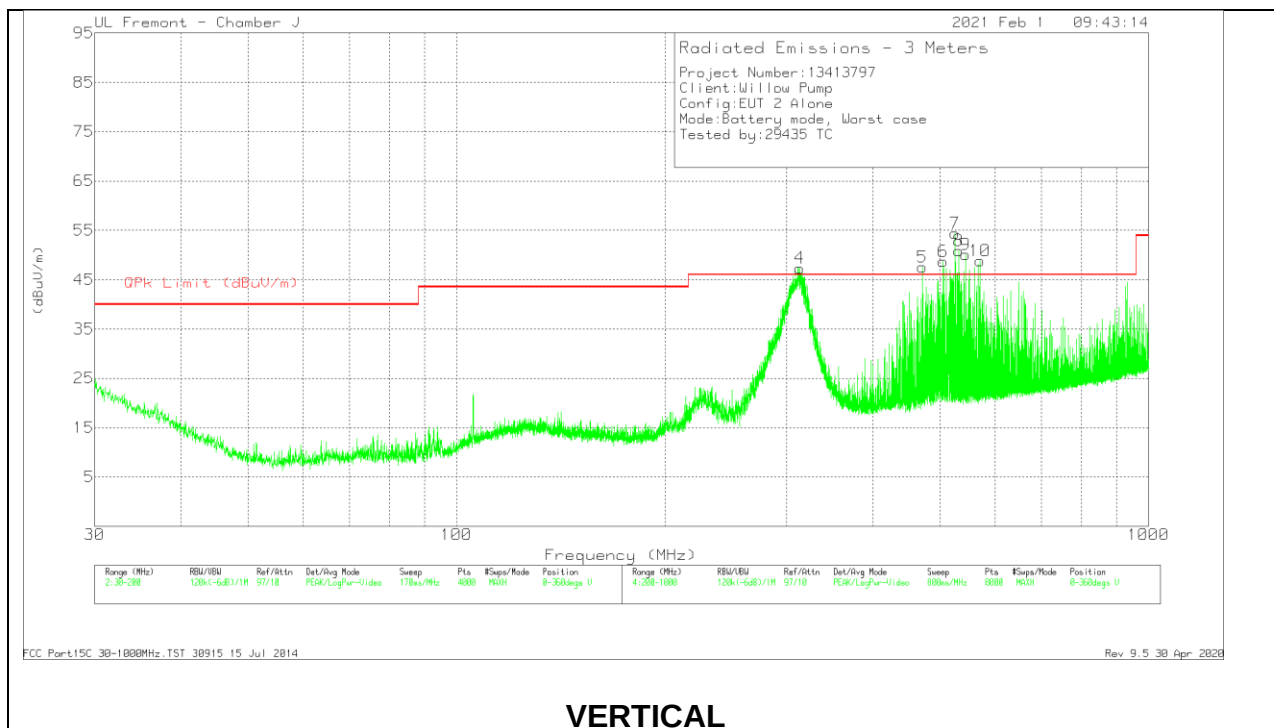
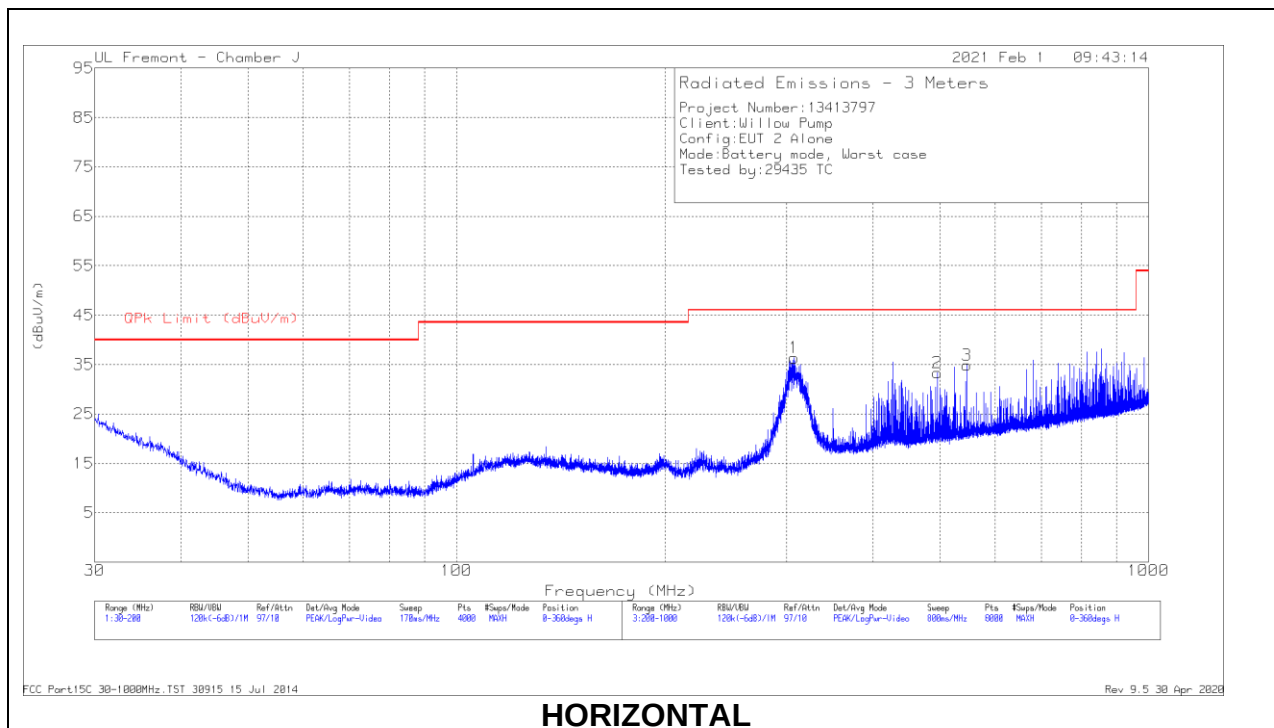
Pk - Peak detector

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)
2	.81182	27.83	Pk	56.3	-32.2	-40	11.93	29.43	-17.5	0-360
3	.86046	27.98	Pk	56.3	-32.2	-40	12.08	28.92	-16.84	0-360
5	.81362	26.63	Pk	56.3	-32.2	-40	10.73	29.41	-18.68	0-360
6	.86322	26.91	Pk	56.3	-32.2	-40	11.01	28.9	-17.89	0-360

Pk - Peak detector

10.4. WORST CASE BELOW 1 GHZ

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



Below 1GHz Data

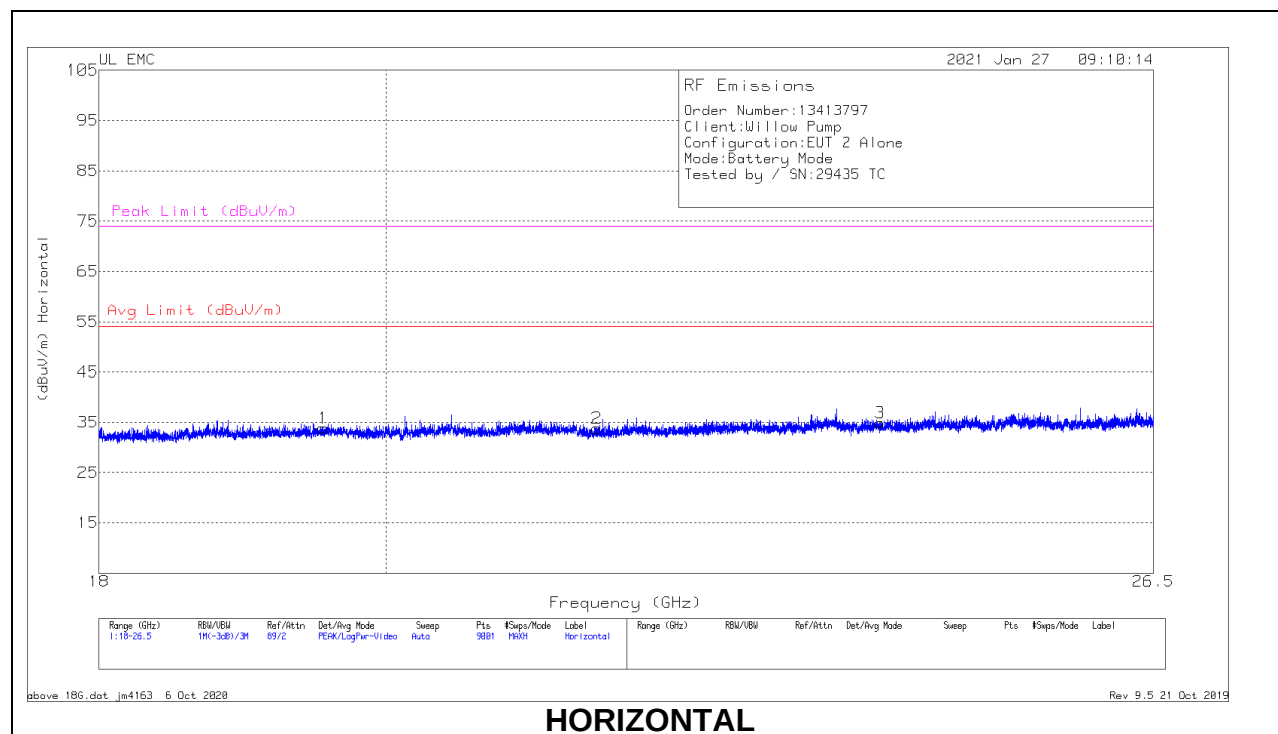
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184052 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	307.3139	46.23	Pk	20	-29.9	36.33	46.02	-9.69	0-360	199	H
2	495.1384	38.97	Pk	23.8	-29.4	33.37	46.02	-12.65	0-360	299	H
3	546.8451	39.69	Pk	24.5	-29.3	34.89	46.02	-11.13	0-360	299	H
4	313.5148	56.97	Pk	20.3	-29.9	47.37	46.02	-	0-360	199	V
	313.3551	50.52	Qp	20.2	-29.9	40.82	46.02	-5.2	327	142	V
5	471.3353	53.45	Pk	23.5	-29.4	47.55	46.02	-	0-360	98	V
	471.5544	30.9	Qp	23.6	-29.4	25.1	46.02	-20.92	54	108	V
6	505.3397	54.29	Pk	23.8	-29.4	48.69	46.02	-	0-360	98	V
	505.5564	39.32	Qp	23.8	-29.4	33.72	46.02	-12.3	7	104	V
7	525.7423	59.66	Pk	24.1	-29.3	54.46	46.02	-	0-360	98	V
	525.9461	36.08	Qp	24.1	-29.3	30.88	46.02	-15.14	190	100	V
8	532.3432	55.92	Pk	24.3	-29.3	50.92	46.02	-	0-360	98	V
	532.1715	36.31	Qp	24.3	-29.3	31.31	46.02	-14.71	64	109	V
9	544.5448	54.83	Pk	24.5	-29.2	50.13	46.02	-	0-360	98	V
	544.3842	34.78	Qp	24.5	-29.2	30.08	46.02	-15.94	349	109	V
10	570.7482	52.94	Pk	24.9	-29	48.84	46.02	-	0-360	98	V
	570.7621	28.66	Qp	24.9	-29	24.56	46.02	-21.46	275	110	V

Pk - Peak detector

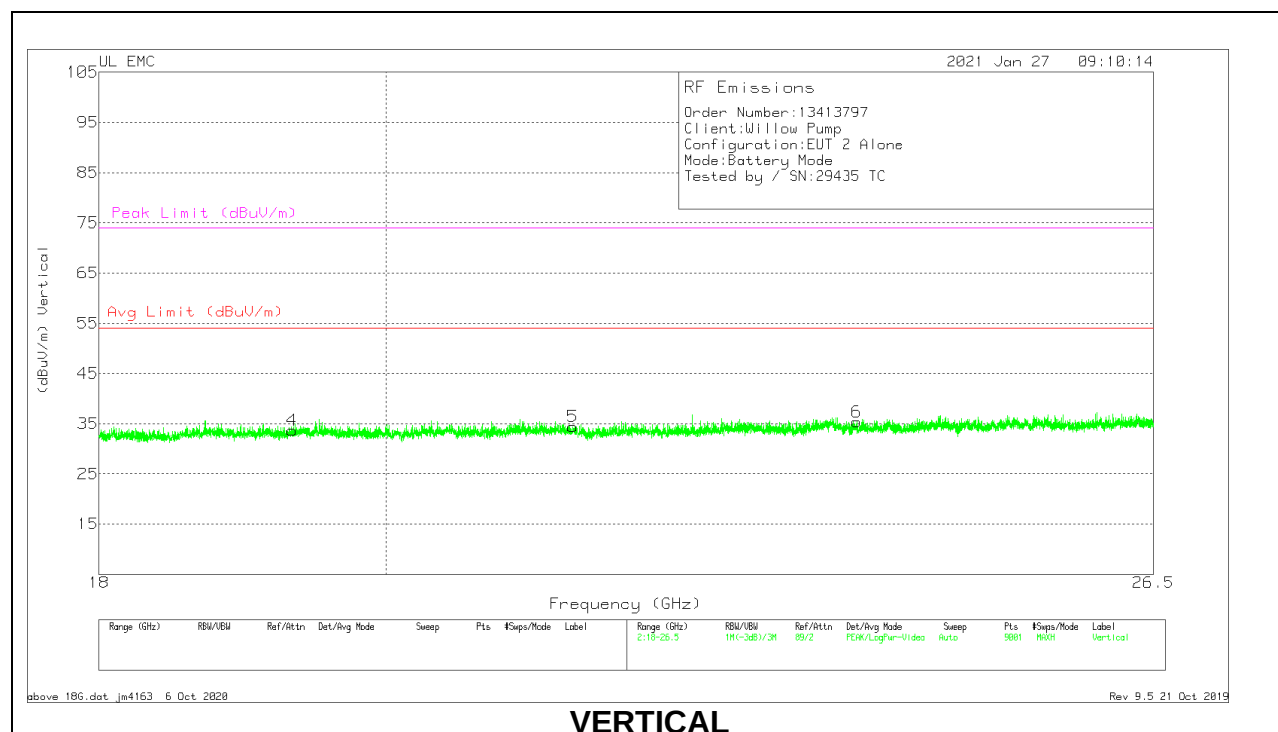
Qp - Quasi-Peak detector

10.5. WORST CASE 18-26 GHZ

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



HORIZONTAL



VERTICAL

18 – 26GHz 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	19.54133	67.76	Pk	32.8	-57.2	-9.5	33.86	54	-20.14	74	-40.14
2	21.60589	67.27	Pk	33.2	-57.2	-9.5	33.77	54	-20.23	74	-40.23
3	23.97361	67.07	Pk	34.4	-57.1	-9.5	34.87	54	-19.13	74	-39.13
4	19.32128	67.36	Pk	32.7	-56.9	-9.5	33.66	54	-20.34	74	-40.34
5	21.41605	67.61	Pk	33.2	-56.9	-9.5	34.41	54	-19.59	74	-39.59
6	23.76772	67.86	Pk	34.2	-57.2	-9.5	35.36	54	-18.64	74	-38.64

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

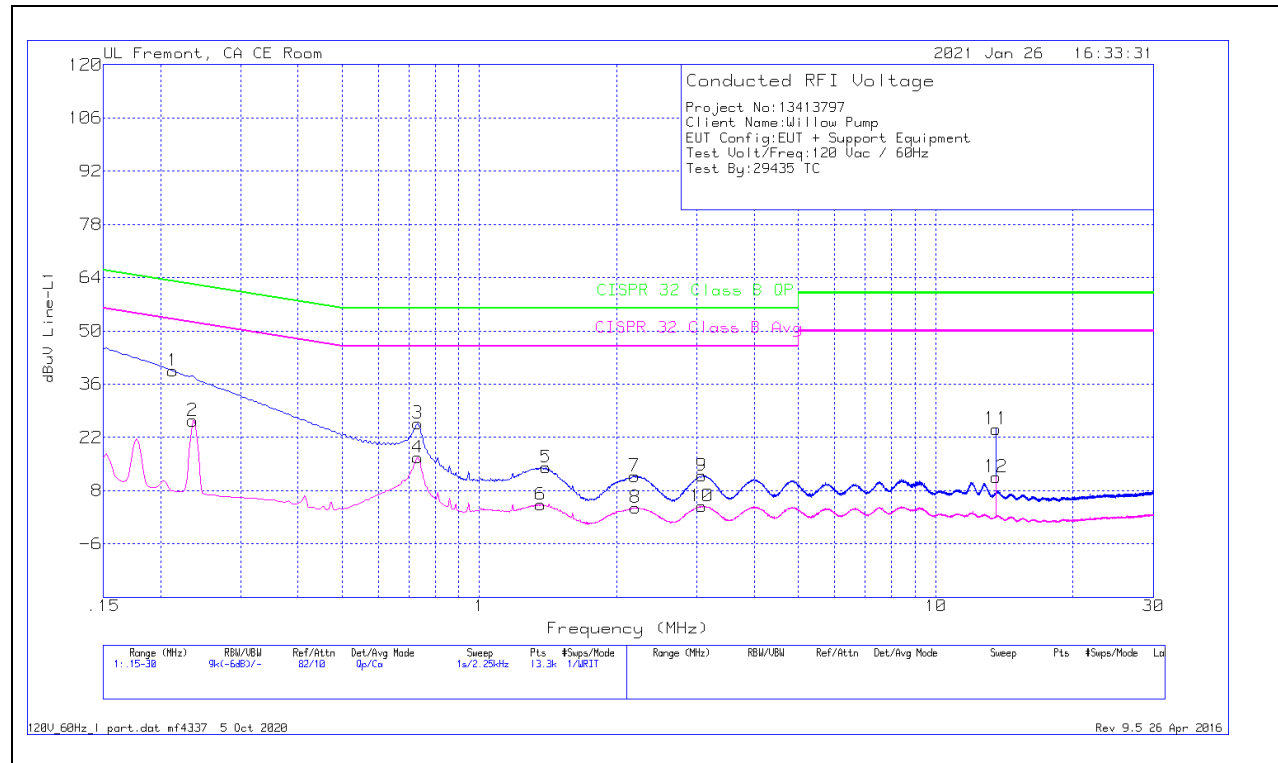
FCC §15.207 (a)

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

^{*} Decreases with the logarithm of the frequency.

RESULTS

LINE 1 RESULTS

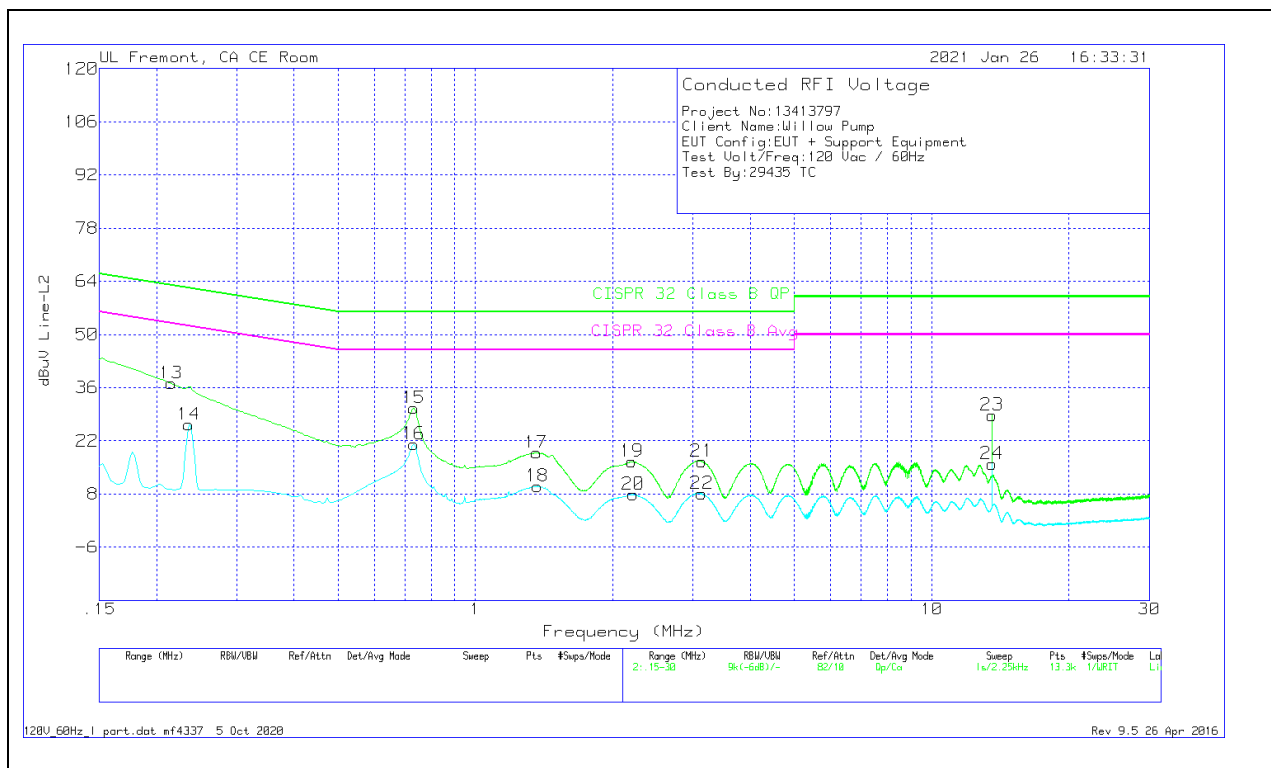


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE0186446 LISN L1	LC Cables C1&C3 dB	Limiter (dB)	Corrected Reading dBuV	CISPR 32 Class B QP	Margin (dB)	CISPR 32 Class B Avg	Margin (dB)
1	.213	29.43	Qp	0	0	10.1	39.53	63.09	-23.56	-	-
2	.2355	16.33	Ca	0	0	10.1	26.43	-	-	52.25	-25.82
3	.73275	15.57	Qp	0	0	10.1	25.67	56	-30.33	-	-
4	.73275	6.56	Ca	0	0	10.1	16.66	-	-	46	-29.34
5	1.39875	3.92	Qp	0	.1	10.1	14.12	56	-41.88	-	-
6	1.3605	-5.85	Ca	0	.1	10.1	4.35	-	-	46	-41.65
7	2.1885	1.63	Qp	0	.1	10.1	11.83	56	-44.17	-	-
8	2.1975	-6.71	Ca	0	.1	10.1	3.49	-	-	46	-42.51
9	3.07275	1.63	Qp	0	.1	10.2	11.93	56	-44.07	-	-
10	3.0705	-6.43	Ca	0	.1	10.2	3.87	-	-	46	-42.13
11	13.56	13.71	Qp	.1	.2	10.2	24.21	60	-35.79	-	-
12	13.56	1.11	Ca	.1	.2	10.2	11.61	-	-	50	-38.39

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 LISN L2	LC Cables C2&C3 dB	Limiter (dB)	Corrected Reading dBuV	CISPR 32 Class B QP	Margin (dB)	CISPR 32 Class B Avg	Margin (dB)
13	.21525	27.04	Qp	0	0	10.1	37.14	63	-25.86	-	-
14	.2355	16.18	Ca	0	0	10.1	26.28	-	-	52.25	-25.97
15	.73275	20.47	Qp	0	0	10.1	30.57	56	-25.43	-	-
16	.73275	11.01	Ca	0	0	10.1	21.11	-	-	46	-24.89
17	1.3605	8.67	Qp	0	.1	10.1	18.87	56	-37.13	-	-
18	1.36725	-1.19	Ca	0	.1	10.1	10.01	-	-	46	-35.99
19	2.202	6.33	Qp	0	.1	10.1	16.53	56	-39.47	-	-
20	2.21775	-2.33	Ca	0	.1	10.1	7.87	-	-	46	-38.13
21	3.13575	6.31	Qp	0	.1	10.2	16.61	56	-39.39	-	-
22	3.1335	-2.16	Ca	0	.1	10.2	8.14	-	-	46	-37.86
23	13.56	18.22	Qp	.1	.2	10.2	28.72	60	-31.28	-	-
24	13.56	5.43	Ca	.1	.2	10.2	15.93	-	-	50	-34.07

Qp - Quasi-Peak detector

Ca - CISPR average detection