



TEST REPORT

Report Number. : 13575695-E1V1

Applicant : DISH TECHNOLOGIES L.L.C.
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112, UNITED STATES

Model : D25

FCC ID : DKNEA66

EUT Description : WHOLE HOME DVR ACCESSORY

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

Date Of Issue:

February 09, 2021

Prepared by:

UL VERIFICATION SERVICES

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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
1	2/9/2021	Initial Issue	---

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: DISH TECHNOLOGIES L.L.C.
90 INVERNESS CIRCLE EAST
ENGLEWOOD, CO 80112, UNITED STATES

EUT DESCRIPTION: WHOLE HOME DVR ACCESSORY

MODEL: D25

SERIAL NUMBER: CONDUCTED: R5EWSG00124L
RADIATED: R5EWSG00152L

DATE TESTED: JANUARY 12, 2021 – FEBRUARY 3, 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.

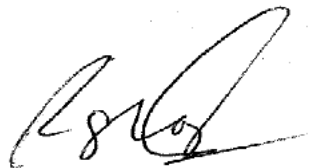
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This 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:



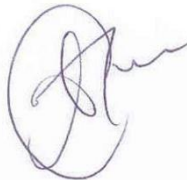
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2. TEST RESULTS SUMMARY

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.

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	US0104	2324A	208313
<input type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538	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	4.74 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 Whole Home DVR Accessory with BLE (2Mbps) and BT radios.

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	8.11	6.47

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PCB Inverted F antenna, with a maximum gain of 4.92 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was BCM 02.011.0330.0000.

The test utility software used during testing was cybluetool 0.1.55.1.

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.

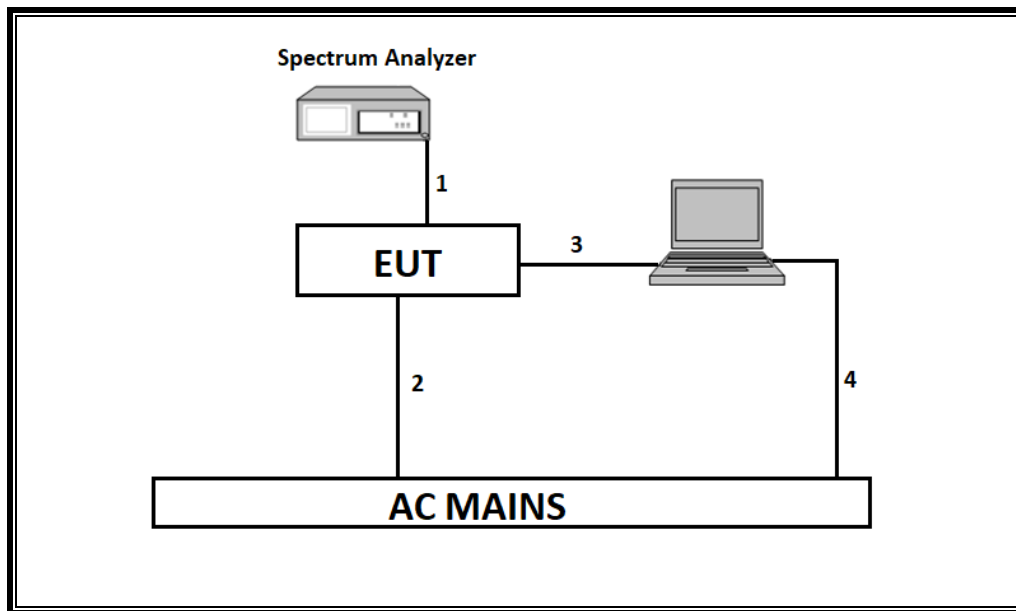
The EUT is a desktop device, therefore, all final radiated testing was performed with the EUT in X orientation.

EUT supports only 2Mbps data rate. Only this mode was investigated.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC		
Laptop	HP	EliteBook 740	N/A	DoC		
AC/DC Adapter	HP	N/A	N/A	DoC		
USB to UART cable	N/A	N/A	N/A	DoC		
AC/DC Adapter	LITEON	PB-1180-6ES1	ETC2003033761	DoC		
Monitor	HP	HP 2311x	N/A	Doc		
AC/DC Adapter	Asian Power Devices Inc.	NB-65B19	YE45315128015622300	Doc		
USB-C Dock Gen2	Lenovo	LDC-G2	N/A	Doc		
AC/DC Adapter	Lenovo	ADLX90NCC2A	N/A	Doc		
I/O CABLES (CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	RF	Un-shielded	0.2	To spectrum analyzer
2	two-pin	1	AC	Un-shielded	1	EUT to AC Mains
3	UART	1	USB	Shielded	1.5	
4	DC	1	AC	Un-shielded	3	
I/O CABLES (RADIATED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	two-pin	1	AC	Un-shielded	1	EUT to AC Mains
2	UART	1	USB	Shielded	1.5	EUT to Laptop
3	DC	1	AC	Un-shielded	2.5	
4	HDMI	1	HDMI	Shielded	2	EUT to Monitor
5	AC	1	AC	Un-shielded	2.5	
6	USB-C	1	USB-C	Shielded	2	EUT to USB Type C dock
7	DC	1	AC	Un-shielded	2.5	

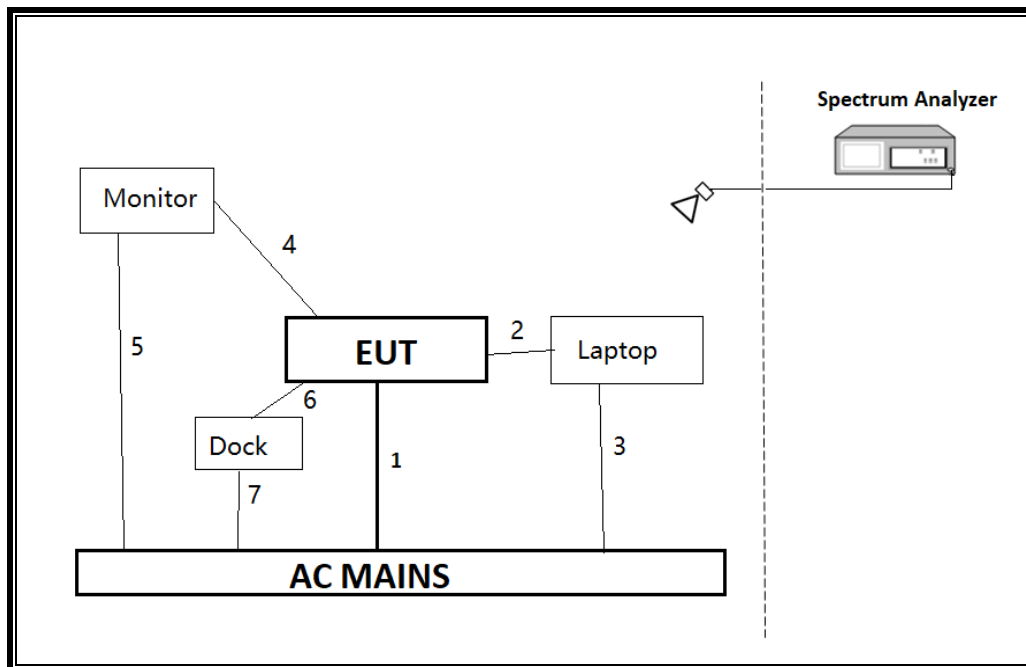
CONDUCTED TEST SETUP DIAGRAM



TEST SETUP

The EUT is connected to a test laptop by USB to UART cable adapter during the tests. Test software exercised the radio card.

RADIATED TEST SETUP DIAGRAM



TEST SETUP

The EUT is connected to support equipment and AC powered. Test software exercised the radio card.

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

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

Band-edge: ANSI C63.10 Section 6.10

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

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

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	2/26/2021	2/26/2020
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T344	5/26/2021	5/26/2020
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	4/14/2021	4/14/2020
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB3	PRE0184970 (174373)	12/2/2021	12/2/2020
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	T300*	1/23/2021	1/23/2020
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, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	T341	7/29/2021	7/29/2020
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	T1223	4/10/2021	4/10/2020
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1264*	1/21/2021	1/21/2020
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	PRE0181238	6/7/2021	6/7/2020
AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	PRE0186446	1/20/2022	1/20/2021
L.I.S.N	FCC INC.	FCC LISN 50/250	T24	1/20/2022	1/20/2021
EMI TEST RECEIVER 9kHz - 3.6GHz	Rohde & Schwarz	ESR3	PRE0181317	2/26/2021	2/26/2020
Transient Limiter	COM-POWER	LIT-930A	PRE0129246	1/20/2022	1/20/2021
Test Software List					
Description	Manufacturer	Model	Version		
Radiated Software	UL	UL EMC	Rev 9.5, April 30, 2020, , Oct 21, 2019		
Antenna Port Software	UL	UL RF	v2021.1.19		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, July 07, 2020		

*Test performed within calibration period.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

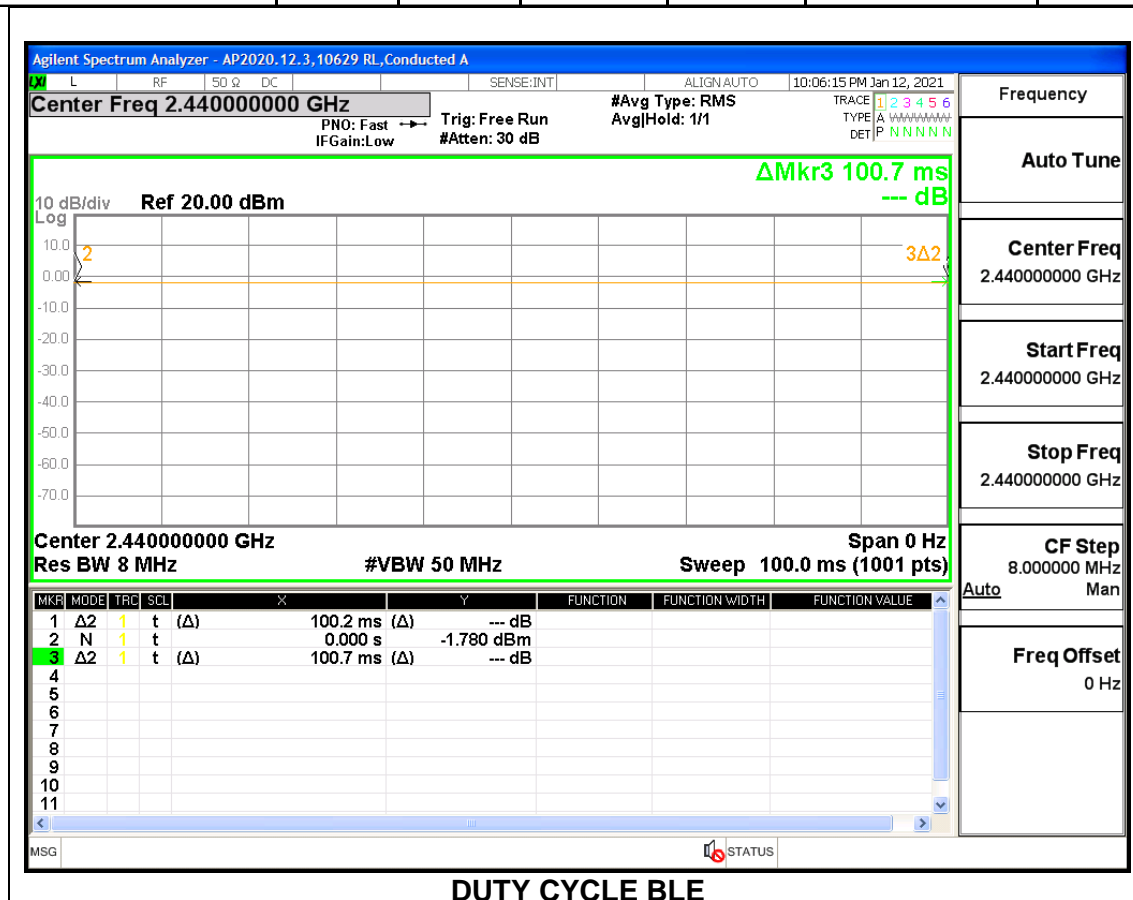
None; for reporting purposes only.

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	100.200	100.700	0.995	99.50%	0.00	0.010



9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.2293
Middle	2440	2.2292
High	2480	2.2293



9.3. 6 dB BANDWIDTH

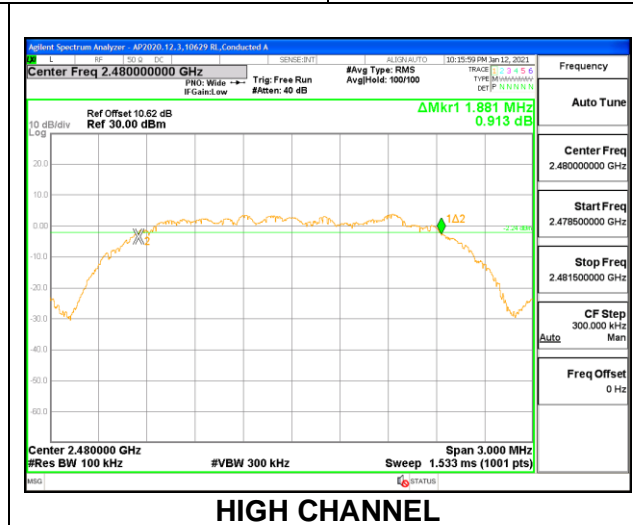
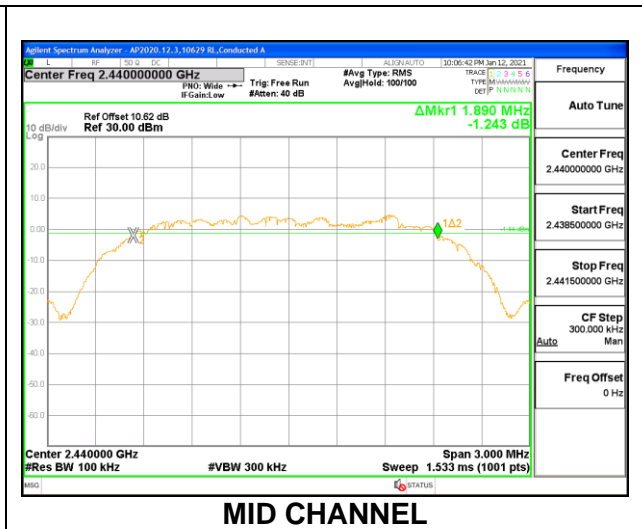
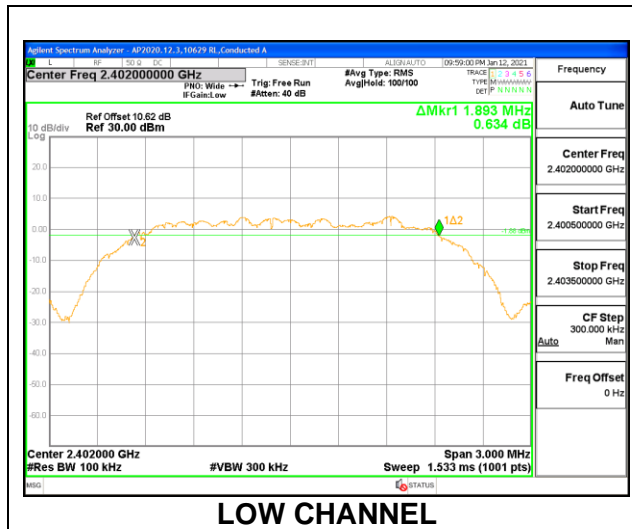
LIMITS

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	1.893	0.5
Middle	2440	1.890	0.5
High	2480	1.881	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.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.62 dB (including 10 dB pad and 0.62 dB cable) was entered as an offset in the power meter to allow for a peak reading of power.

RESULTS

Tested By:	10629
Date:	1/12/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.82	30	-22.180
Middle	2440	8.11	30	-21.890
High	2480	7.40	30	-22.600

9.5. 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 10.62 dB (including 10 dB attenuator and 0.62 dB cable loss) was entered as an offset in the power meter to allow for a gated average reading of power.

RESULTS

Tested By:	10629
Date:	1/12/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	7.39
Middle	2440	7.68
High	2480	6.94

9.6. POWER SPECTRAL DENSITY

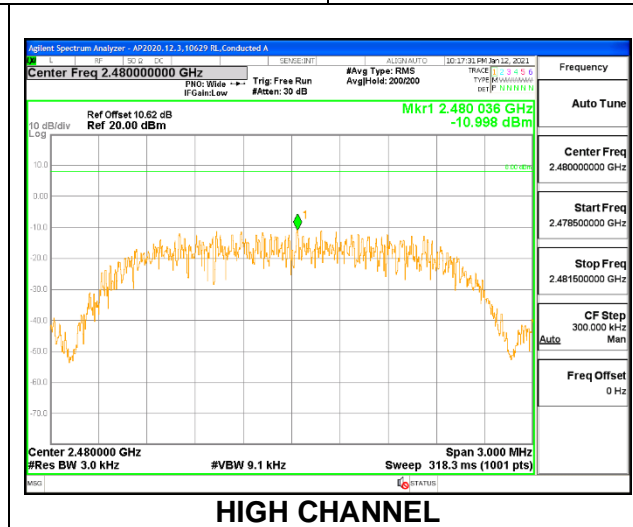
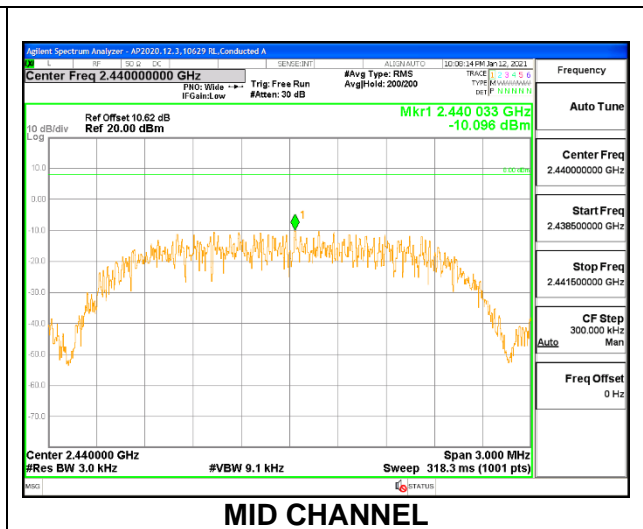
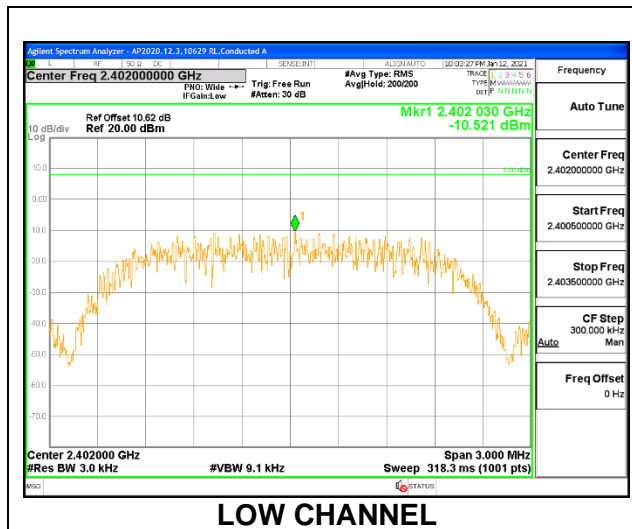
LIMITS

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	-10.52	8	-18.52
Middle	2440	-10.10	8	-18.10
High	2480	-11.00	8	-19.00



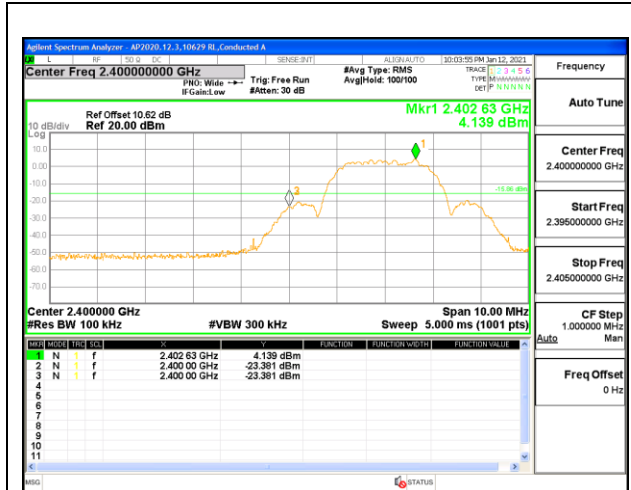
9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

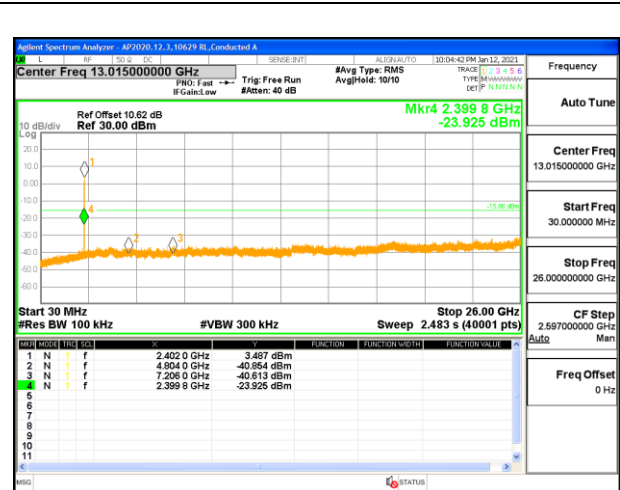
FCC §15.247 (d)

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

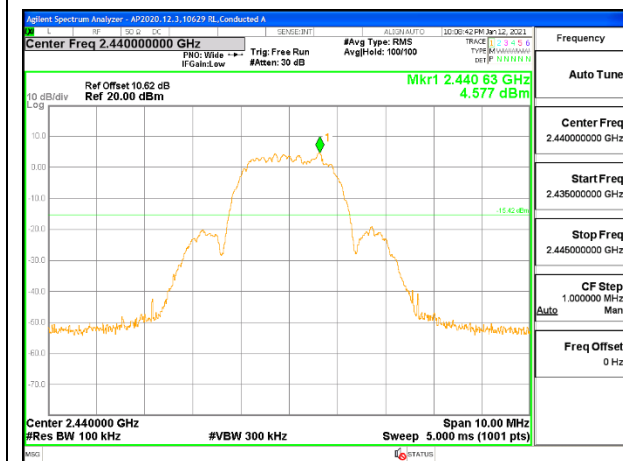
RESULTS



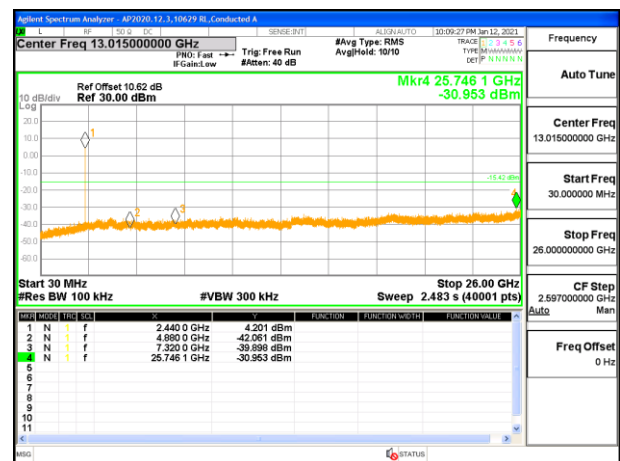
LOW CHANNEL BANDEDGE



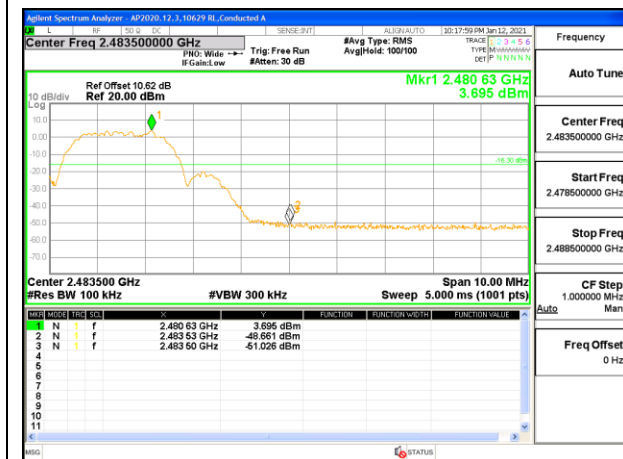
OUT-OF-BAND LOW CHANNEL



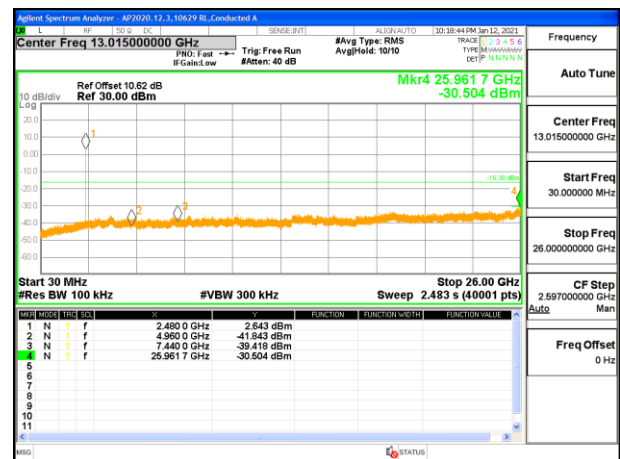
IN-BAND REFERENCE LEVEL



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

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 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector 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.

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

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.

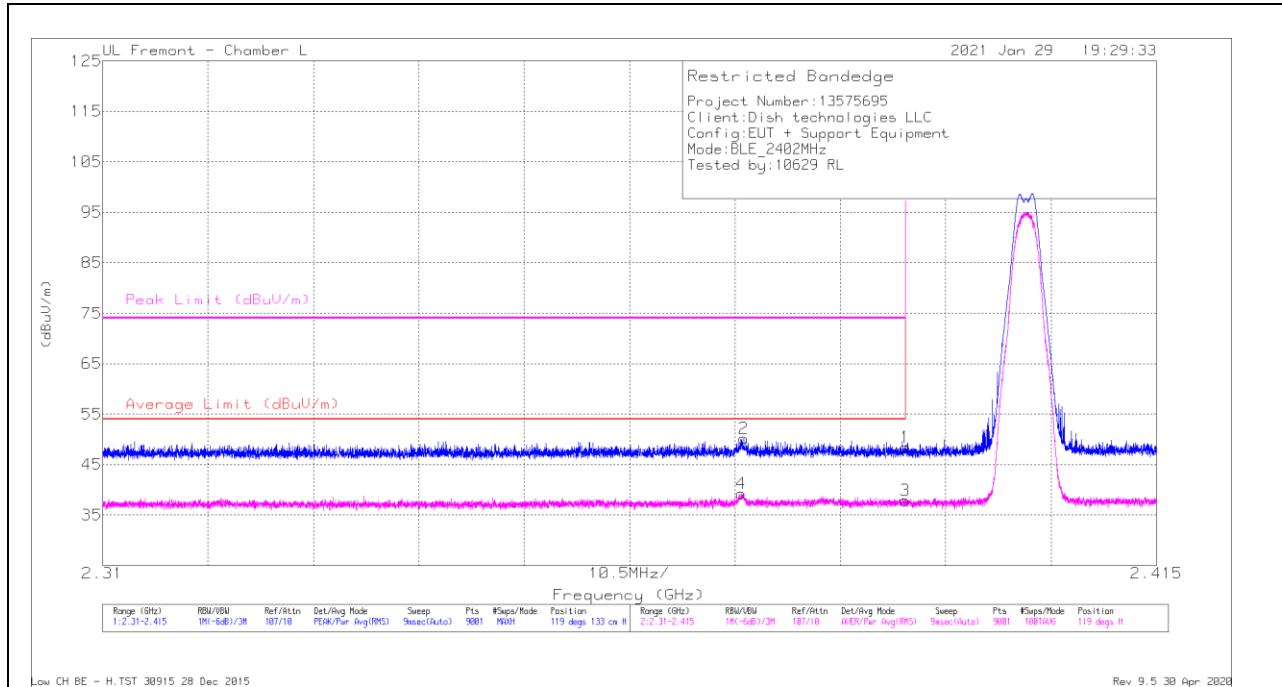
KDB 558074 D01 15.247 Meas Guidance v05r01

Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement. The maximum radiated field strength level represents the worst-case (maximum amplitude) RMS measurement of the emission(s) during continuous transmission (i.e., not including any time intervals during which the transmitter is off or is transmitting at a reduced power level). It is also acceptable to apply the DCCF to a measurement performed with a peak detector instead of the specified RMS power averaging detector. Note that Section 15.35(c) specifies that the DCCF shall represent the worst-case (greatest duty cycle) over any 100 msec transmission period.

10.2. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



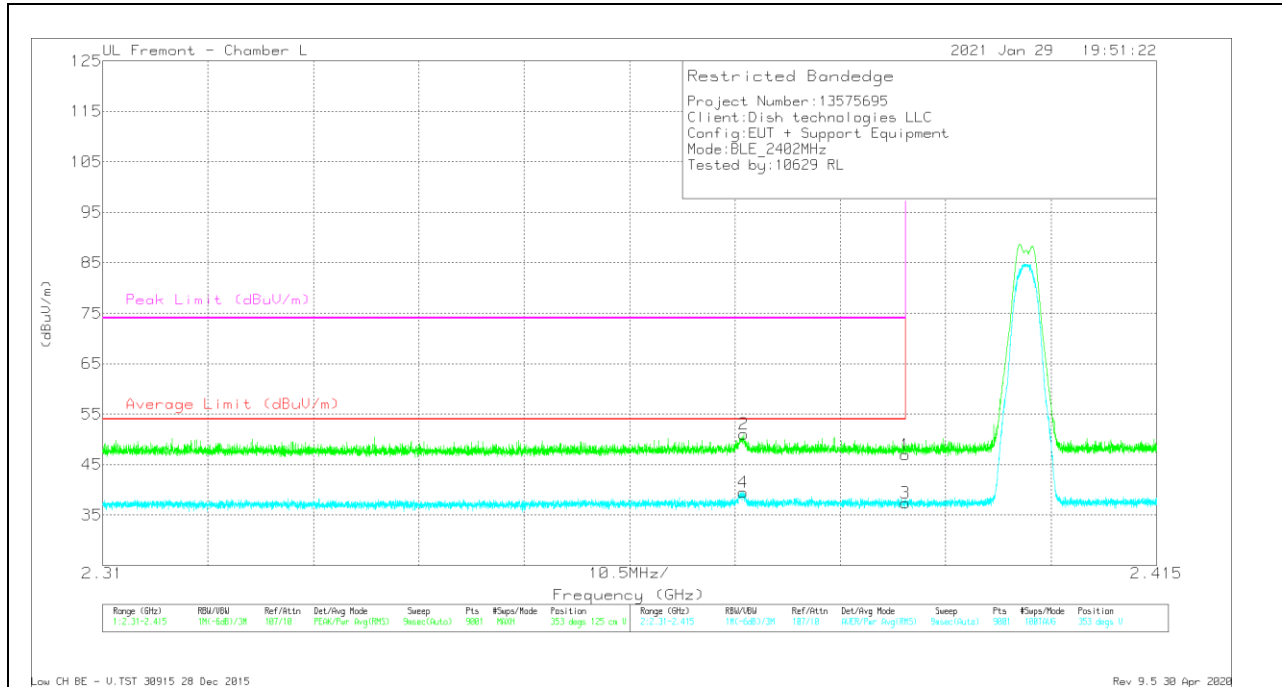
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/CbWFltr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	37.68	Pk	31.9	-21.1	48.48	-	-	74	-25.52	119	133	H
2	* 2.37388	39.53	Pk	31.8	-21.2	50.13	-	-	74	-23.87	119	133	H
3	* 2.38999	27.13	RMS	31.9	-21.1	37.93	54	-16.07	-	-	119	133	H
4	* 2.37366	28.59	RMS	31.8	-21.2	39.19	54	-14.81	-	-	119	133	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT

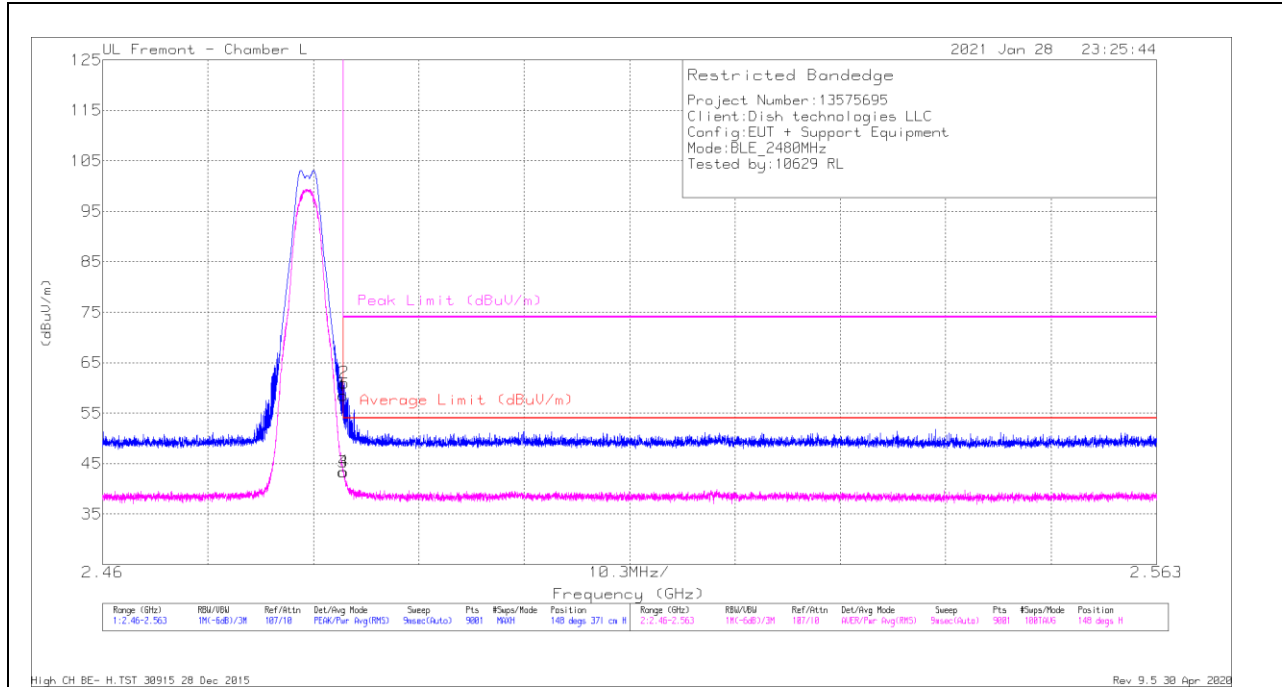


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/CbW/Ftr/Par d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	36.16	Pk	31.9	-21.1	46.96	-	-	74	-27.04	353	125	V
2	* 2.37389	40.48	Pk	31.8	-21.2	51.08	-	-	74	-22.92	353	125	V
3	* 2.38999	26.62	RMS	31.9	-21.1	37.42	54	-16.58	-	-	353	125	V
4	* 2.37384	28.88	RMS	31.8	-21.2	39.48	54	-14.52	-	-	353	125	V

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

BANDEDGE (HIGH CHANNEL)

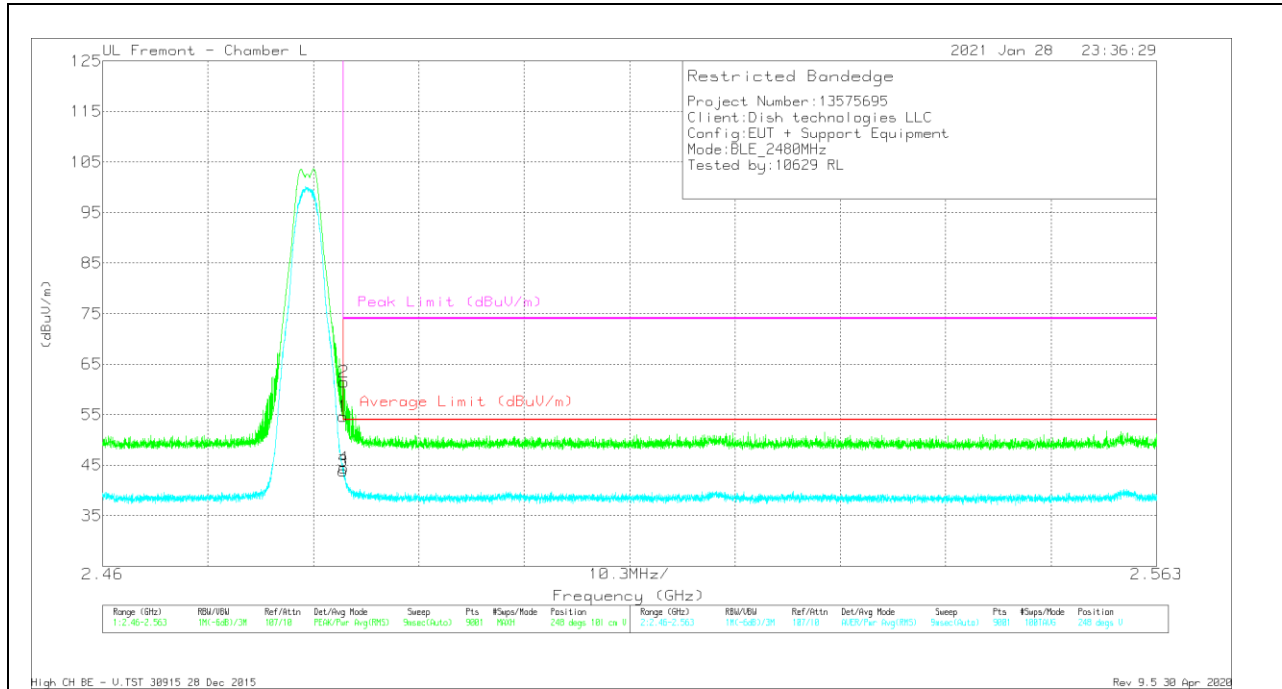
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cb/Fitr/Pa d (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	47.04	Pk	32.3	-20.9	58.44	-	-	74	-15.56	148	371	H
2	* 2.4836	49.63	Pk	32.3	-20.9	61.03	-	-	74	-12.97	148	371	H
3	* 2.48351	31.97	RMS	32.3	-20.9	43.37	54	-10.63	-	-	148	371	H
4	* 2.48354	32	RMS	32.3	-20.9	43.4	54	-10.6	-	-	148	371	H

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

VERTICAL RESULT

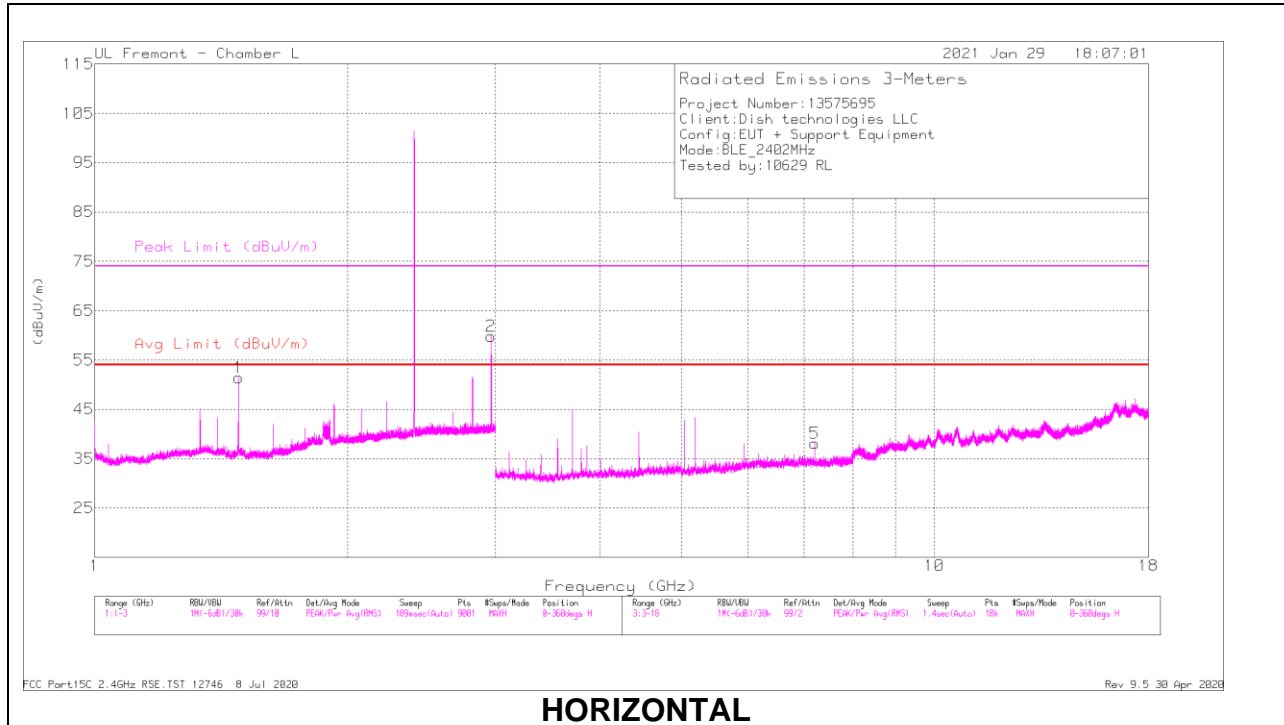


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/CbW/Ftr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.21	Pk	32.3	-20.9	54.61	-	-	74	-19.39	248	101	V
2	* 2.48359	50.08	Pk	32.3	-20.9	61.48	-	-	74	-12.52	248	101	V
3	* 2.48351	32.43	RMS	32.3	-20.9	43.83	54	-10.17	-	-	248	101	V
4	* 2.48355	33.07	RMS	32.3	-20.9	44.47	54	-9.53	-	-	248	101	V

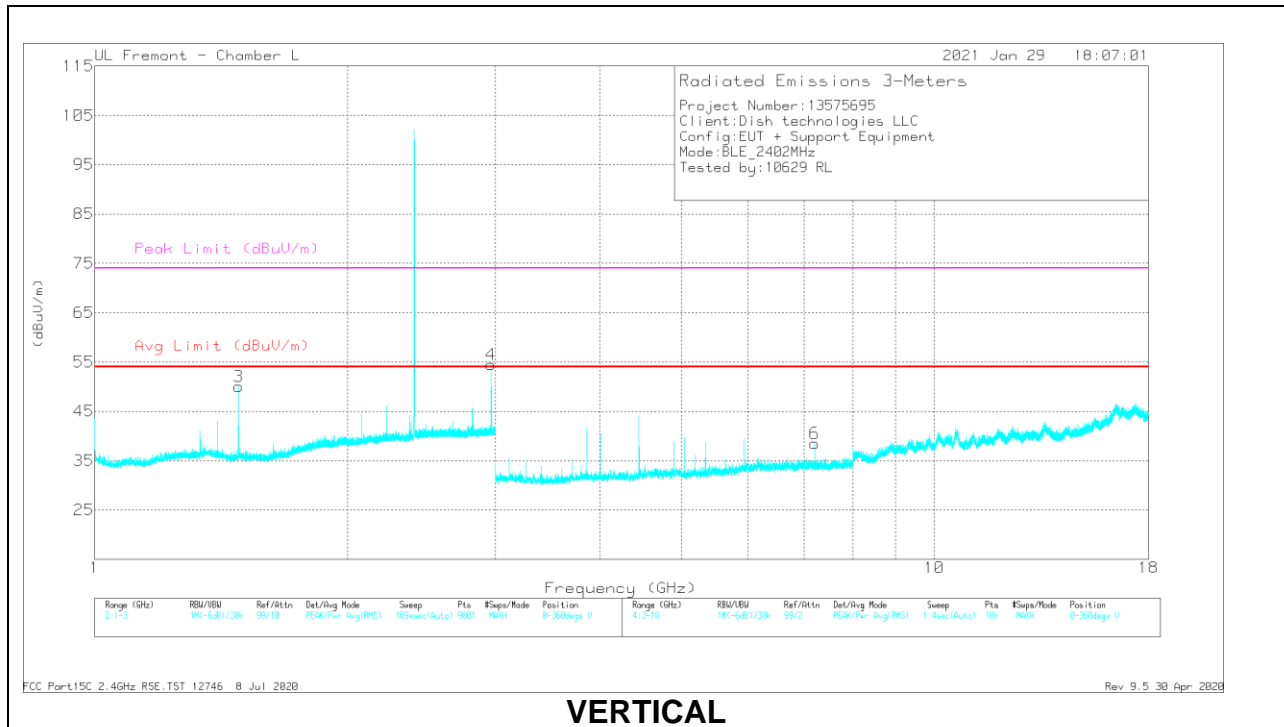
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 Pk - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



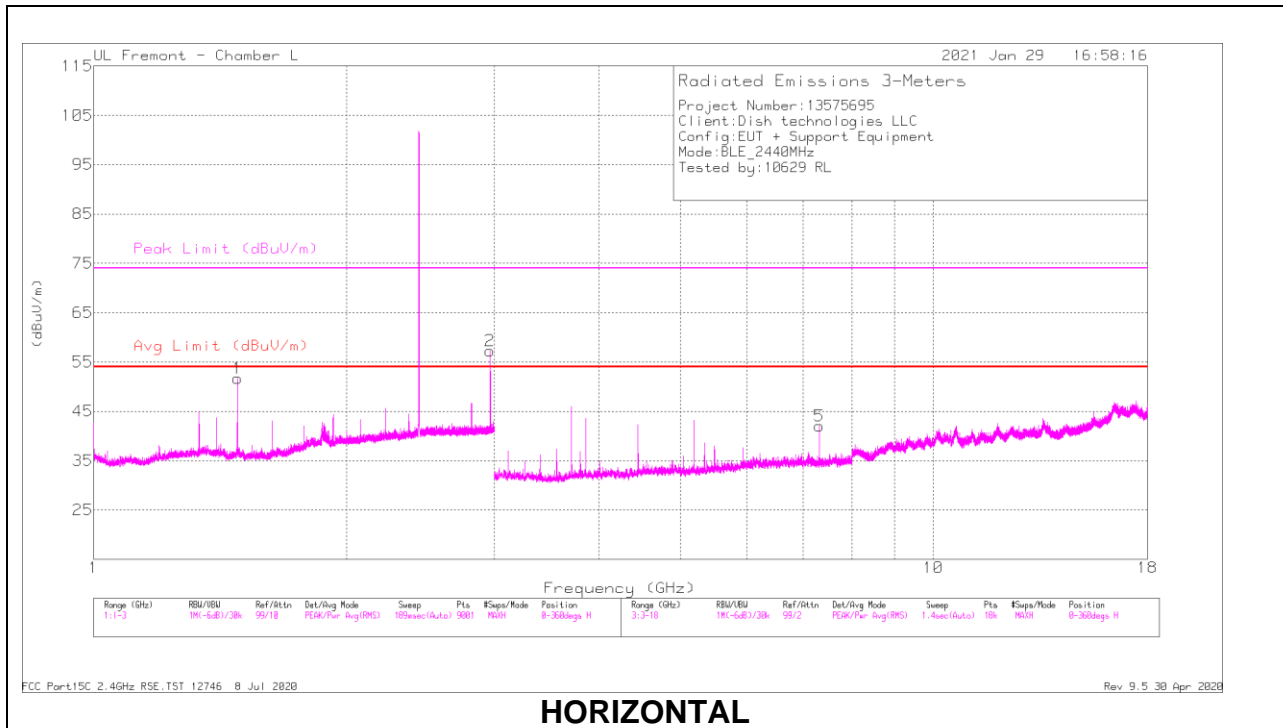
VERTICAL

Radiated Emissions

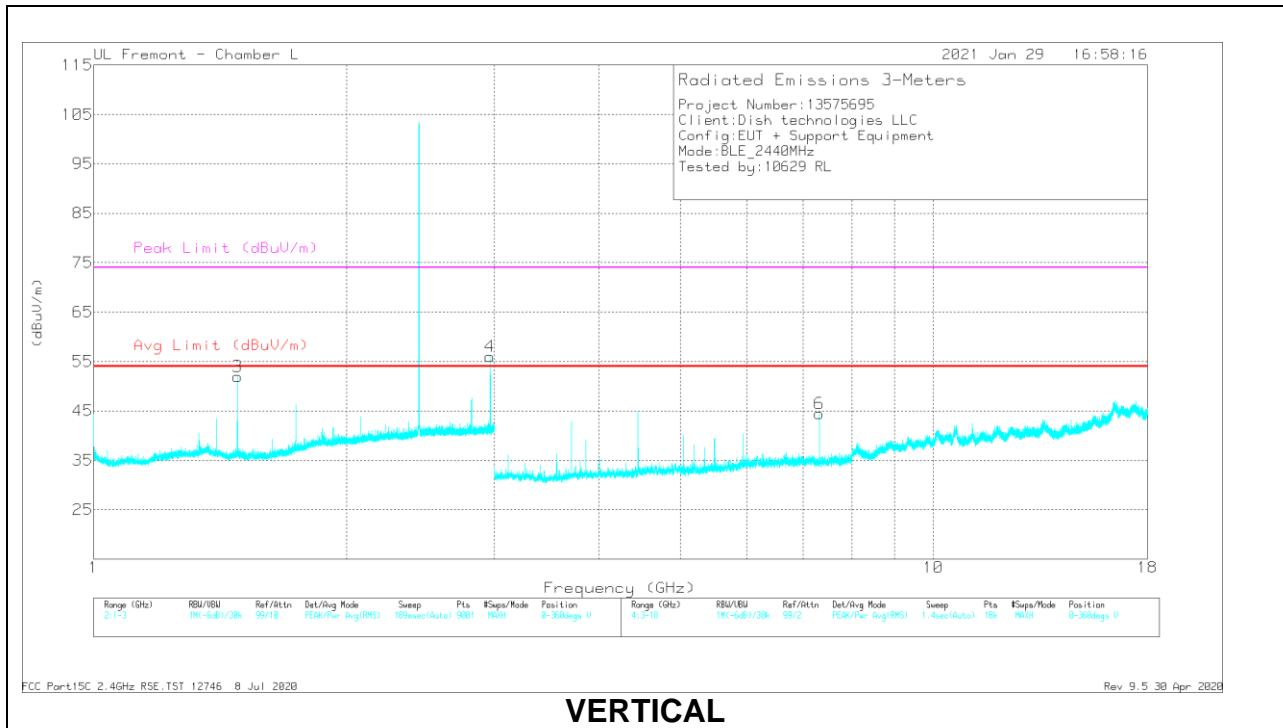
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Prod (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.48345	49.84	PK2	28.2	-23.1	54.94	-	-	74	-19.06	351	195	H
	* 1.48351	43.4	MAv1	28.2	-23.1	48.5	54	-5.5	-	-	351	195	H
2	2.967	47.6	PK2	32.6	-20.1	60.1	-	-	-	-	168	254	H
3	* 1.48348	49.2	PK2	28.2	-23.1	54.3	-	-	74	-19.7	62	101	V
	* 1.48356	41.82	MAv1	28.2	-23.1	46.92	54	-7.08	-	-	62	101	V
4	2.9671	47.39	PK2	32.6	-20.1	59.89	-	-	-	-	171	114	V
5	7.20787	31.88	PK2	35.5	-23.9	43.48	-	-	-	-	124	173	H
6	7.20777	36.64	PK2	35.5	-23.9	48.24	-	-	-	-	93	101	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



HORIZONTAL



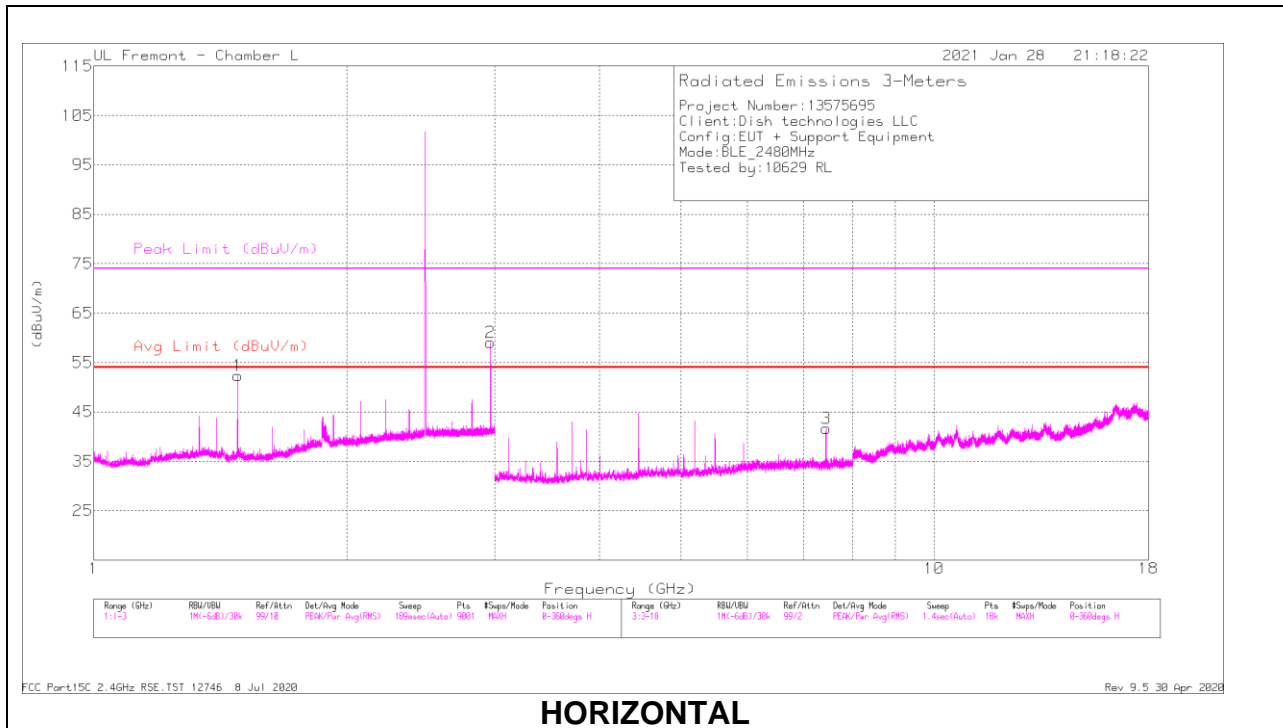
VERTICAL

Radiated Emissions

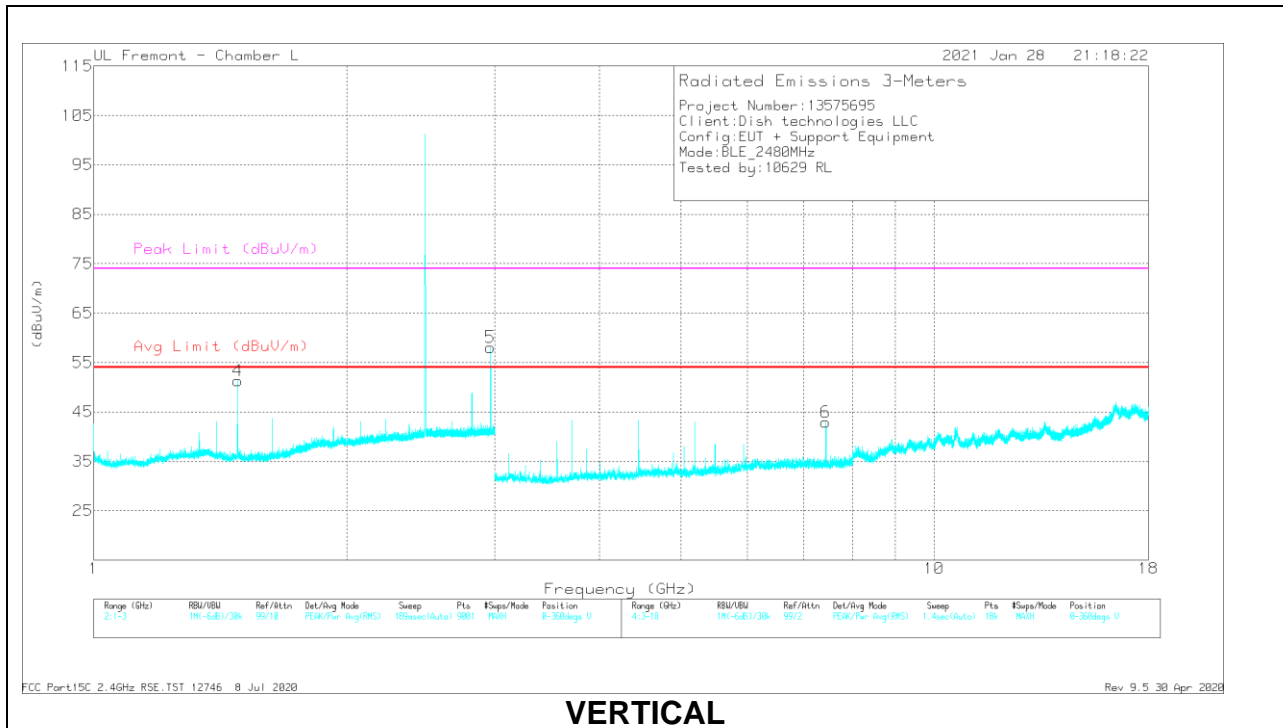
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.48339	50.15	PK2	28.2	-23.1	55.25	-	-	74	-18.75	355	196	H
	* 1.48359	43.96	MAv1	28.2	-23.1	49.06	54	-4.94	-	-	355	196	H
2	2.96715	47.95	PK2	32.6	-20.1	60.45	-	-	-	-	166	107	H
3	* 1.48346	49.82	PK2	28.2	-23.1	54.92	-	-	74	-19.08	35	393	V
	* 1.48348	42.93	MAv1	28.2	-23.1	48.03	54	-5.97	-	-	35	393	V
4	2.96706	47.06	PK2	32.6	-20.1	59.56	-	-	-	-	172	133	V
5	* 7.32199	36.44	PK2	35.5	-23.5	48.44	-	-	74	-25.56	56	109	H
	* 7.31818	27.8	MAv1	35.5	-23.6	39.7	54	-14.3	-	-	56	109	H
6	* 7.3181	38.71	PK2	35.5	-23.6	50.61	-	-	74	-23.39	88	101	V
	* 7.3181	30.64	MAv1	35.5	-23.6	42.54	54	-11.46	-	-	88	101	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



HORIZONTAL



VERTICAL

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 344 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.48357	50.23	PK2	28.2	-23.1	55.33	-	-	74	-18.67	231	144	H
	* 1.48344	44.16	MAv1	28.2	-23.1	49.26	54	-4.74	-	-	231	144	H
2	2.96706	50.78	PK2	32.6	-20.1	63.28	-	-	-	-	175	110	H
4	* 1.48353	53.15	PK2	28.2	-23.1	58.25	-	-	74	-15.75	221	277	V
	* 1.48361	47.47	MAv1	28.2	-23.1	52.57	54	-1.43	-	-	221	277	V
5	2.96709	48.17	PK2	32.6	-20.1	60.67	-	-	-	-	254	193	V
3	* 7.43817	36.96	PK2	35.6	-23.2	49.36	-	-	74	-24.64	29	111	H
	* 7.44183	28.64	MAv1	35.6	-23.2	41.04	54	-12.96	-	-	29	111	H
6	* 7.43823	40.02	PK2	35.6	-23.2	52.42	-	-	74	-21.58	87	101	V
	* 7.43822	32.54	MAv1	35.6	-23.2	44.94	54	-9.06	-	-	87	101	V

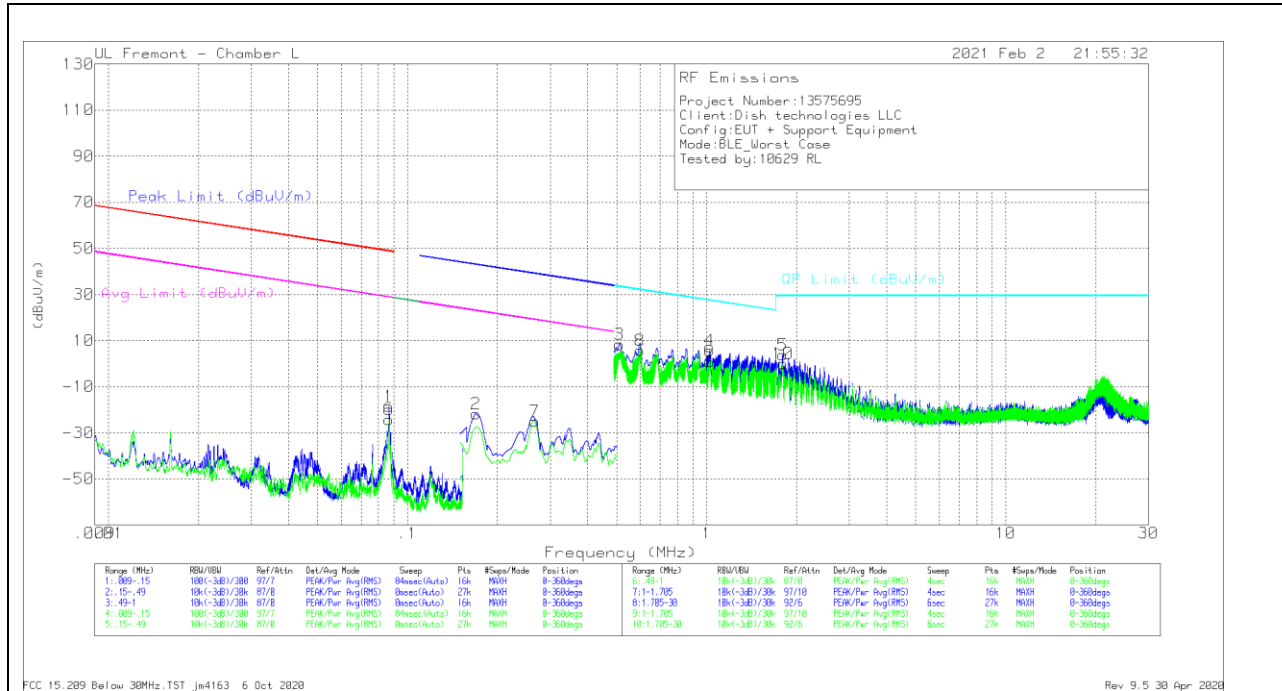
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

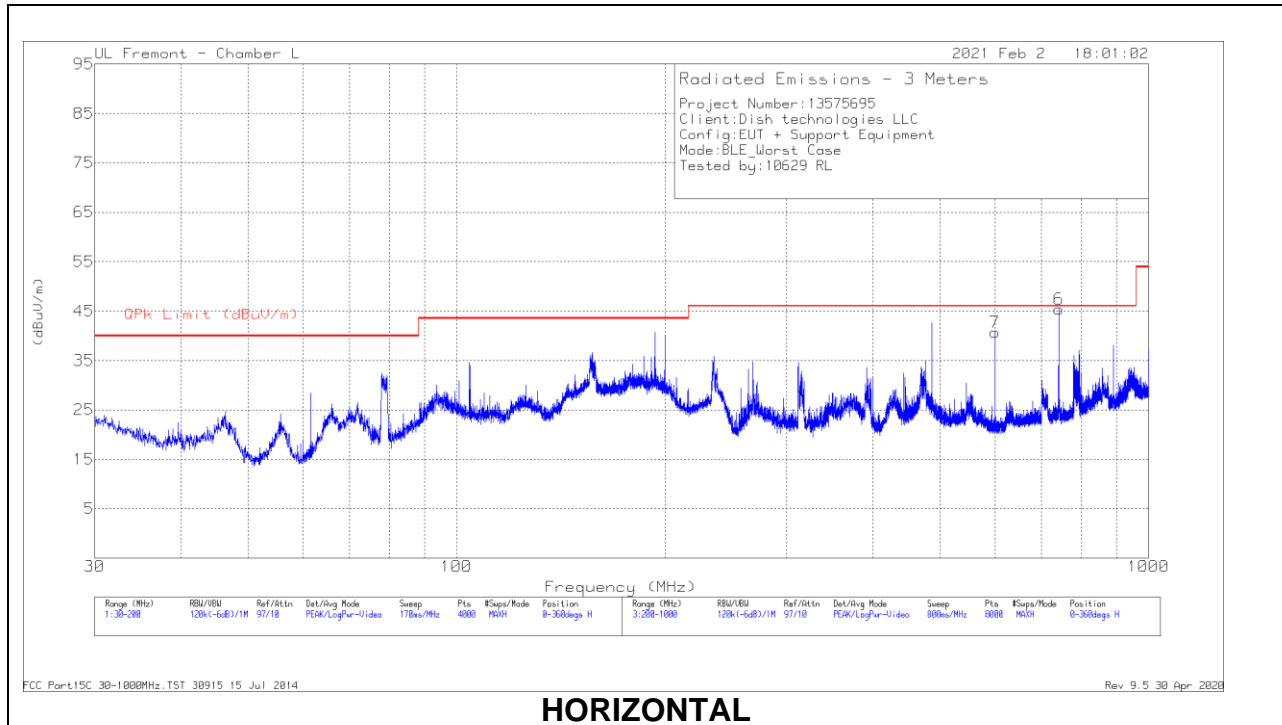
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.08676	38	Pk	55.8	-32.3	-80	-18.5	48.82	-67.32	28.82	-47.32	0-360
2	.16919	34.47	Pk	56.1	-32.3	-80	-21.73	43.05	-64.78	23.05	-44.78	0-360
6	.08676	32.4	Pk	55.8	-32.3	-80	-24.1	48.82	-72.92	28.82	-52.92	0-360
7	.26595	31.04	Pk	56.2	-32.3	-80	-25.06	39.12	-64.18	19.12	-44.18	0-360

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.51045	24.3	Pk	56.2	-32.2	-40	8.3	33.45	-25.15	0-360
8	.59742	21.72	Pk	56.2	-32.2	-40	5.72	32.08	-26.36	0-360
4	1.02372	31.23	Pk	46.8	-32.2	-40	5.83	27.42	-21.59	0-360
5	1.79303	33.15	Pk	42.7	-32.1	-40	3.75	29.5	-25.75	0-360
9	1.0235	26.14	Pk	46.8	-32.2	-40	.74	27.42	-26.68	0-360
10	1.79513	29.47	Pk	42.7	-32.1	-40	.07	29.5	-29.43	0-360

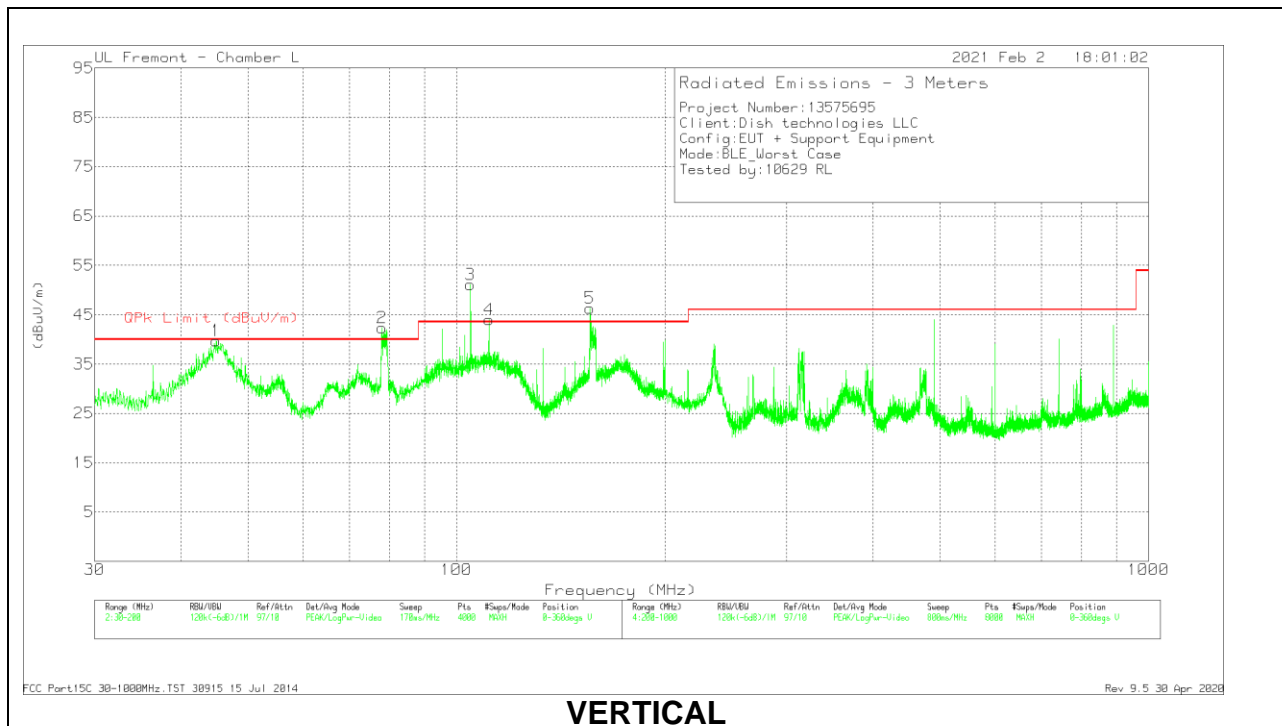
Pk - Peak detector

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 174373 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	44.9214	54.95	Pk	16	-31.2	39.75	40	-25	0-360	101	V
	45.6204	49.24	Qp	15.7	-31.2	33.74	40	-6.26	203	116	V
2	78.0799	59.55	Pk	13.7	-30.9	42.35	40	2.35	0-360	101	V
	79.3095	52.11	Qp	13.5	-30.9	34.71	40	-5.29	220	105	V
3	104.7768	64.53	Pk	17.3	-30.7	51.13	43.52	7.61	0-360	101	V
	105.5658	46.89	Qp	17.5	-30.7	33.69	43.52	-9.83	111	111	V
4	* 111.3661	56.16	Pk	18.6	-30.7	44.06	43.52	.54	0-360	101	V
	* 109.3581	46.52	Qp	18.2	-30.7	34.02	43.52	-9.5	113	109	V
5	155.9176	58.45	Pk	18.3	-30.4	46.35	43.52	2.83	0-360	101	V
	158.8641	50.49	Qp	18.2	-30.3	38.39	43.52	-5.13	176	103	V
** 6	741.7704	47.62	Pk	26.4	-28.6	45.42	46.02	-.6	0-360	199	H
	741.767	52.39	Qp	26.4	-28.6	50.19	---	---	129	114	H
7	600.052	45.03	Pk	24.1	-28.4	40.73	46.02	-5.29	0-360	101	H
	600.006	45.01	Qp	24.1	-28.4	40.71	46.02	-5.31	4	106	H

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

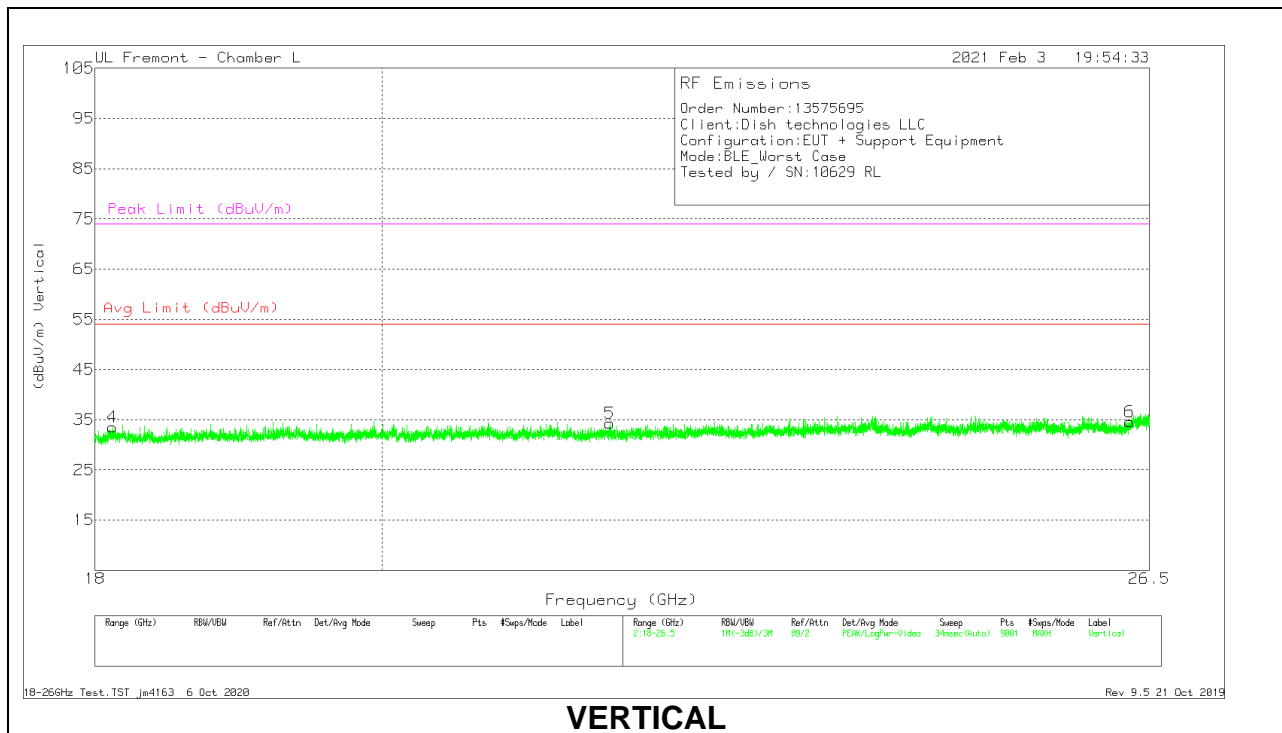
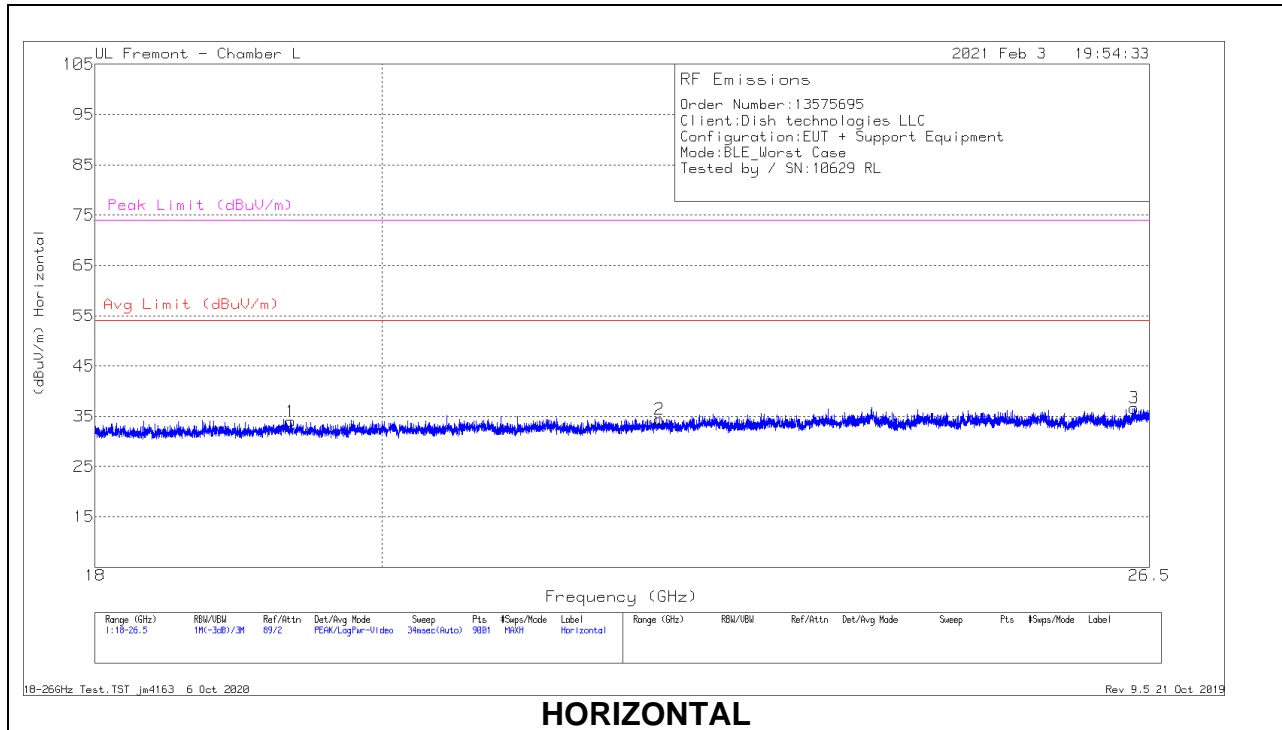
** Verification has been performed where support equipment monitor was turn on, the emission occurred. When the monitor was turned off or only EUT standalone powered by AC power only, this emission was not present. It was determined that this emission came from support equipment and not EUT related.

Pk - Peak detector

Qp - Quasi-Peak detector

10.5. WORST CASE 18-26 GHZ

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



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	19.33828	67.8	Pk	32.7	-57	-9.5	34	54	-20	74	-40
2	22.14233	68	Pk	33.5	-57.6	-9.5	34.4	54	-19.6	74	-39.6
3	26.35266	65.75	Pk	34.6	-54.2	-9.5	36.65	54	-17.35	74	-37.35
4	18.11522	70.74	Pk	32.4	-60.1	-9.5	33.54	54	-20.46	74	-40.46
5	21.74189	68	Pk	33.2	-57.4	-9.5	34.3	54	-19.7	74	-39.7
6	26.30922	64.39	Pk	34.6	-54.9	-9.5	34.59	54	-19.41	74	-39.41

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

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

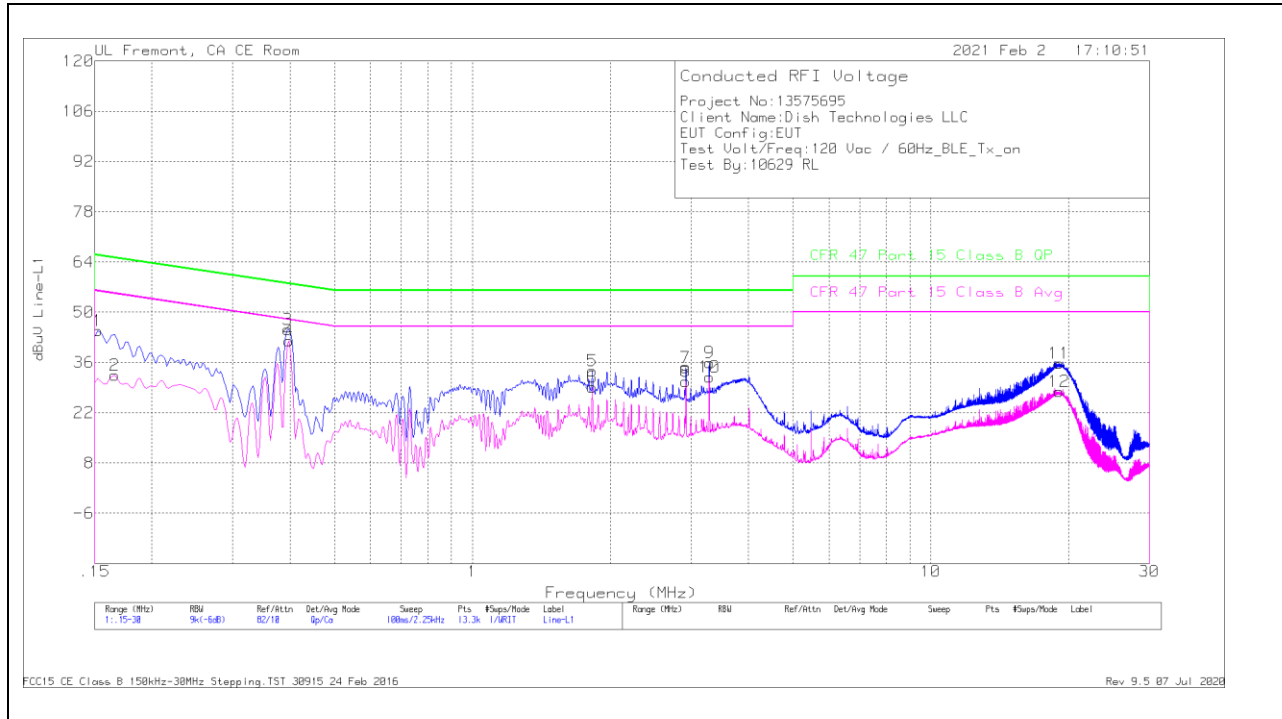
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

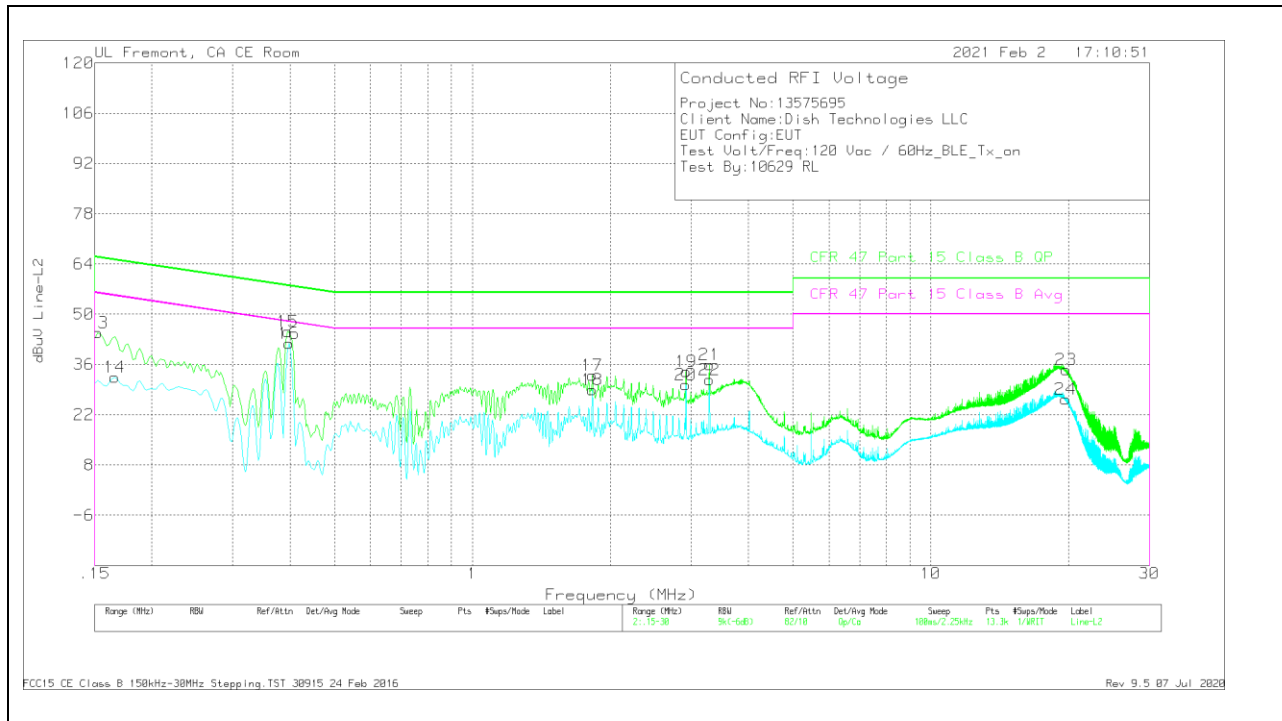
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L1	LC Cables C1&C3 dB	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	.15225	34.68	Qp	.1	0	10.1	44.88	65.88	-21	-	-
2	.16575	22.32	Ca	0	0	10.1	32.42	-	-	55.17	-22.75
3	.39525	35.16	Qp	0	0	10.1	45.26	57.95	-12.69	-	-
4	.3975	31.92	Ca	0	0	10.1	42.02	-	-	47.91	-5.89
5	1.82625	23.42	Qp	0	.1	10.1	33.62	56	-22.38	-	-
6	1.82625	19.02	Ca	0	.1	10.1	29.22	-	-	46	-16.78
7	2.922	24.3	Qp	0	.1	10.1	34.5	56	-21.5	-	-
8	2.922	20.55	Ca	0	.1	10.1	30.75	-	-	46	-15.25
9	3.2865	25.67	Qp	0	.1	10.2	35.97	56	-20.03	-	-
10	3.2865	21.57	Ca	0	.1	10.2	31.87	-	-	46	-14.13
11	19.03425	25.32	Qp	0	.2	10.3	35.82	60	-24.18	-	-
12	19.03425	17.46	Ca	0	.2	10.3	27.96	-	-	50	-22.04

Qp - Quasi-Peak detector
 Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L2	LC Cables C2&C3 dB	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	34.73	Qp	0	0	10.1	44.83	65.88	-21.05	-	-
14	.16575	22.41	Ca	0	0	10.1	32.51	-	-	55.17	-22.66
15	.39525	35.08	Qp	0	0	10.1	45.18	57.95	-12.77	-	-
16	.3975	31.79	Ca	0	0	10.1	41.89	-	-	47.91	-6.02
17	1.82625	22.74	Qp	0	.1	10.1	32.94	56	-23.06	-	-
18	1.82625	18.75	Ca	0	.1	10.1	28.95	-	-	46	-17.05
19	2.92425	23.85	Qp	0	.1	10.1	34.05	56	-21.95	-	-
20	2.922	20.09	Ca	0	.1	10.1	30.29	-	-	46	-15.71
21	3.28875	25.63	Qp	0	.1	10.2	35.93	56	-20.07	-	-
22	3.28875	21.47	Ca	0	.1	10.2	31.77	-	-	46	-14.23
23	19.73288	23.96	Qp	0	.2	10.4	34.56	60	-25.44	-	-
24	19.7025	15.79	Ca	0	.2	10.4	26.39	-	-	50	-23.61

Qp - Quasi-Peak detector
 Ca - CISPR average detection