



TEST REPORT

Report Number. : 13988118-E1V2

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

Model : D25

Brand : DISH

FCC ID : DKNA43KF

EUT Description : WHOLE HOME DVR ACCESSORY

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

Date Of Issue:

November 05, 2021

Prepared by:

UL VERIFICATION SERVICES
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888



REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	10/26/2021	Initial Issue	---
V2	11/5/2021	Updated KDB version on page 23	Tina Chu

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULTS SUMMARY	7
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.....	9
6.6. DESCRIPTION OF TEST SETUP.....	10
7. TEST AND MEASUREMENT EQUIPMENT	13
8. MEASUREMENT METHOD.....	14
9. ANTENNA PORT TEST RESULTS	15
9.1. ON TIME AND DUTY CYCLE.....	15
9.2. 6 dB BANDWIDTH.....	16
9.3. OUTPUT POWER.....	17
9.4. AVERAGE POWER.....	18
9.5. POWER SPECTRAL DENSITY	19
9.6. CONDUCTED SPURIOUS EMISSIONS.....	20
10. RADIATED TEST RESULTS	22
10.1. LIMITS AND PROCEDURE.....	22
10.2. TRANSMITTER ABOVE 1 GHz.....	24

10.3.	WORST CASE BELOW 30MHZ.....	34
10.4.	WORST CASE BELOW 1 GHZ.....	35
10.5.	WORST CASE 18-26 GHZ.....	37
11.	AC POWER LINE CONDUCTED EMISSIONS	39
12.	SETUP PHOTOS	42

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

BRAND: DISH

SERIAL NUMBER: CONDUCTED: R523122H20024D
RADIATED: R522971H20190D

SAMPLE RECEIPT DATE: OCTOBER 04, 2021

DATE TESTED: OCTOBER 15, 2021 – OCTOBER 21, 2021

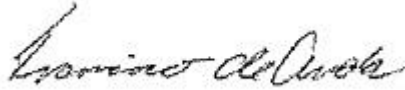
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies

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.

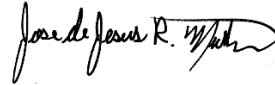
This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



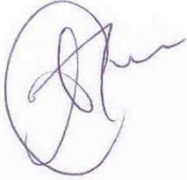
DAN CORONIA
OPERATIONS LEAD
UL Verification Services Inc.

Prepared By:



JOSE MARTINEZ
TEST ENGINEER
UL Verification Services Inc.

Reviewed By:



TINA CHU
SENIOR PROJECT ENGINEER
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.
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, KDB 414788 D01 Radiated Test Site v01r0.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number #0751.05, 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, USA	US0104	2324A	208313
<input type="checkbox"/>	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA	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 Whole Home DVR Accessory with BLE (1Mbps) 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	8.27	6.71

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

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 002.001.014.0647.0000.

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.

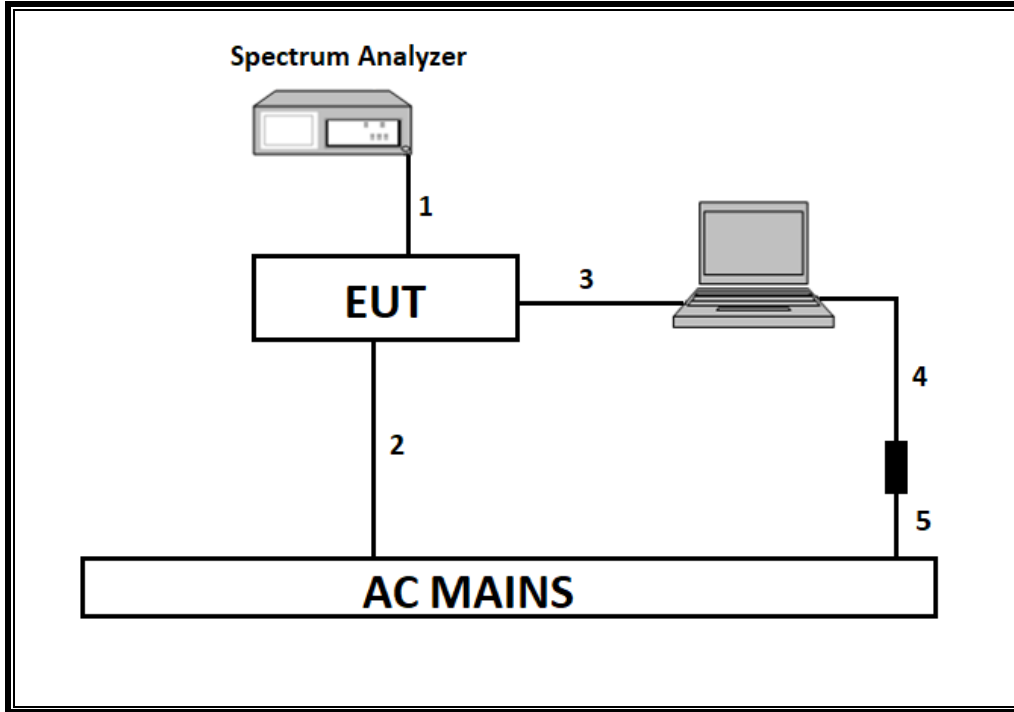
The EUT is a desktop device, therefore, all final radiated testing was performed with the EUT in X orientation.

EUT supports only 1Mbps 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	ETC2007008933	DoC		
TV Emulator	Dish	NA	D25-12	Doc		
USB-C Drive	SanDisk	SDCZ460	BM200126825Z	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	EUT to Laptop
4	DC	1	DC	Un-shielded	1	AC Adapter Laptop
5	AC	1	Two Prong	Un-shielded	1	AC adapter to AC Mains
I/O CABLES (RADIATED/ AC POWER LINE CONDUCTD EMISSIONS 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	HDMI	1	HDMI	Shielded	2	EUT to TV Emulator
4	DC	1	DC	Un-shielded	1	AC Adapter Laptop
5	AC	1	Two Prong	Un-shielded	1	AC adapter to AC Mains

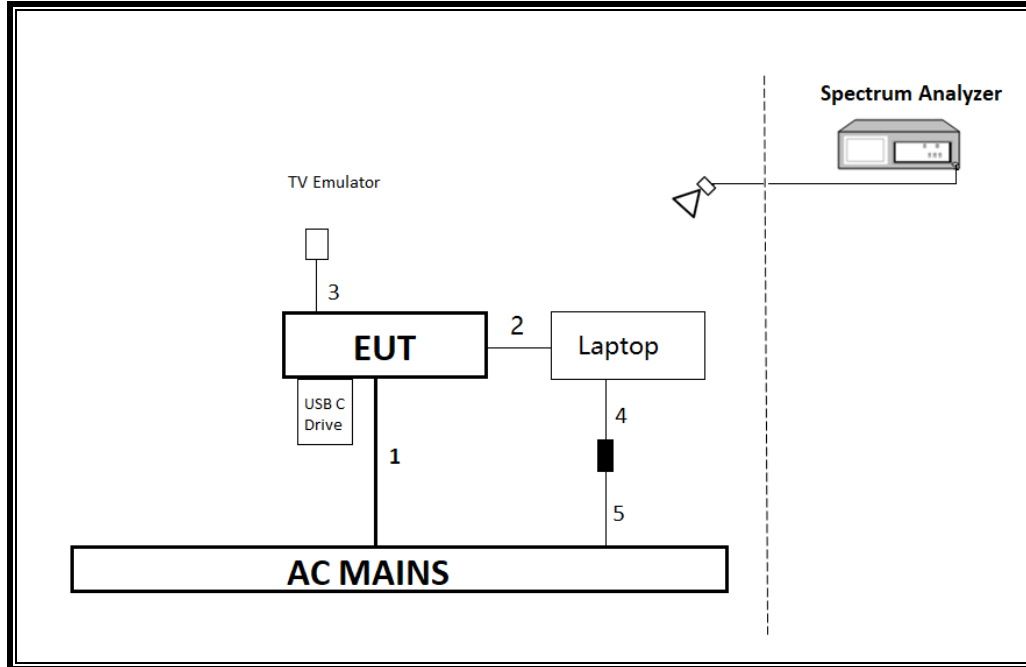
CONDUCTED TEST SETUP DIAGRAM



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/AC POWER LINE CONDUCTD EMISSIONS TEST SETUP DIAGRAM



TEST SETUP

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

7. 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, with B8 option	Rohde & Schwarz	ESW44	PRE0179377	2/23/2022	2/23/2021
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	T119	5/7/2022	5/7/2021
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	4/9/2022	4/9/2021
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	4/9/2022	4/9/2021
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	PRE0179465	7/29/2022	7/29/2021
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	PRE0179467	7/29/2022	7/29/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	T1228	6/17/2022	6/17/2021
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1268	1/27/2022	1/27/2021
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T448 (81139)	5/25/2022	5/25/2021
Rf Amplifier, 18-26.5GHz, 60dB gain	AMPLICAL	AMP18G26.5-60	171590	5/21/2022	5/21/2021
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Keysight Technologies Inc	E4440A	T198	5/13/2022	5/13/2021
AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver	Rohde & Schwarz	ESR	93091 (1436)	2/19/2022	2/19/2021
Transient Limiter	TekBox	TBFL1	207996	6/1/2022	6/1/2021
LISN	FCC	50/250	175764 (PRE0186446)	1/20/2022	1/20/2021
Digital Thermometer	FisherBrand	Traceable	170358	3/1/2022	3/1/2021
L.I.S.N	FCC INC.	FCC LISN 50/250	T24	1/20/2022	1/20/2021
Test Software List					
Description	Manufacturer	Model	Version		
Radiated Software	UL	UL EMC	Rev 9.5, Jan 03, 2020		
Antenna Port Software	UL	UL RF	AP2020.12.3/AP 2021.08.27		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, July 07, 2020		

8. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW \geq DTS BW

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

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

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

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

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

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

Band-edge: ANSI C63.10 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

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

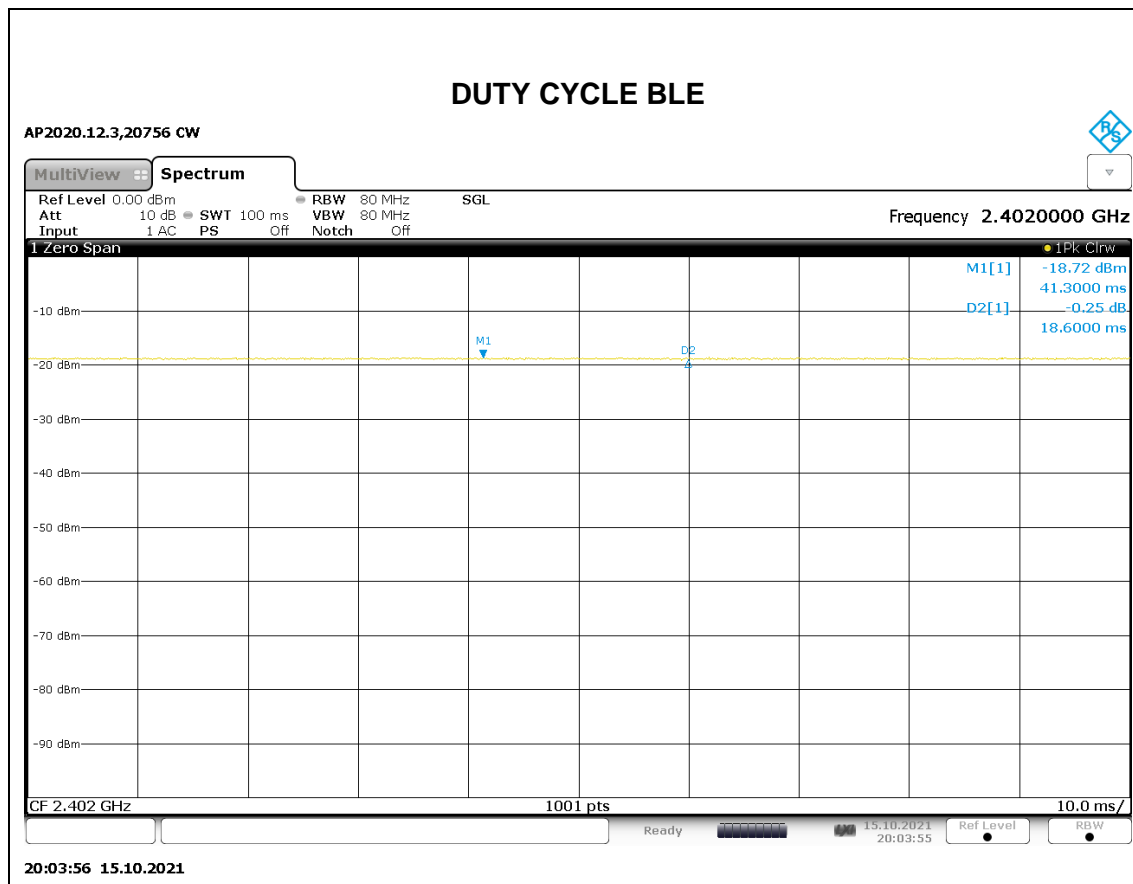
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Test Engineer:	20756 CW
----------------	----------

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	18.600	18.600	1.000	100.00	0.00	0.010



9.2. 6 dB BANDWIDTH

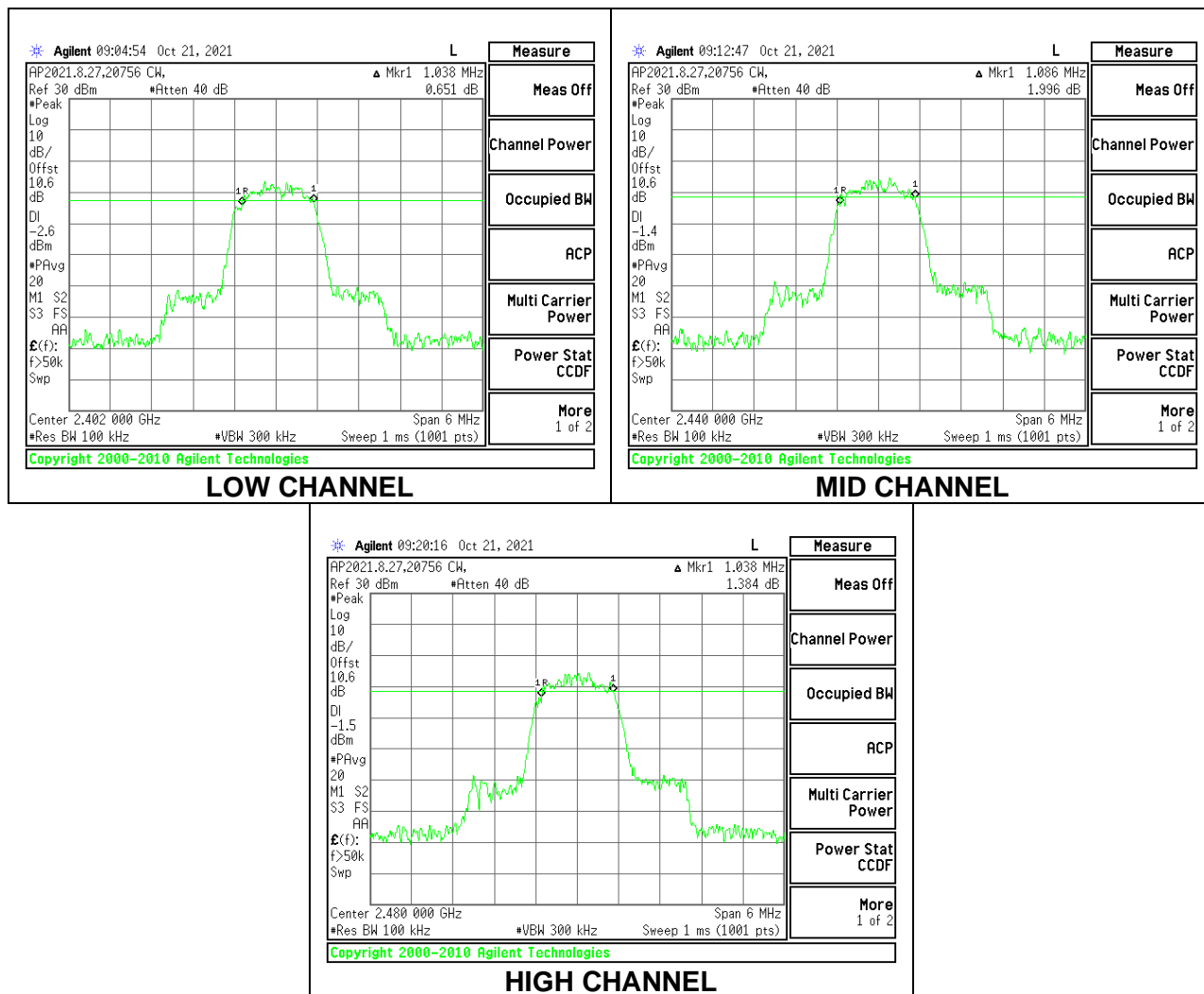
LIMITS

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	1.038	0.5
Middle	2440	1.086	0.5
High	2480	1.038	0.5



9.3. 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 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:	20756 CW
Date:	10/15/2021

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.95	30	-22.05
Middle	2440	8.20	30	-21.80
High	2480	8.27	30	-21.73

9.4. 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:	20756 CW
Date:	10/15/2021

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	5.7
Middle	2440	6.19
High	2480	6.26

9.5. POWER SPECTRAL DENSITY

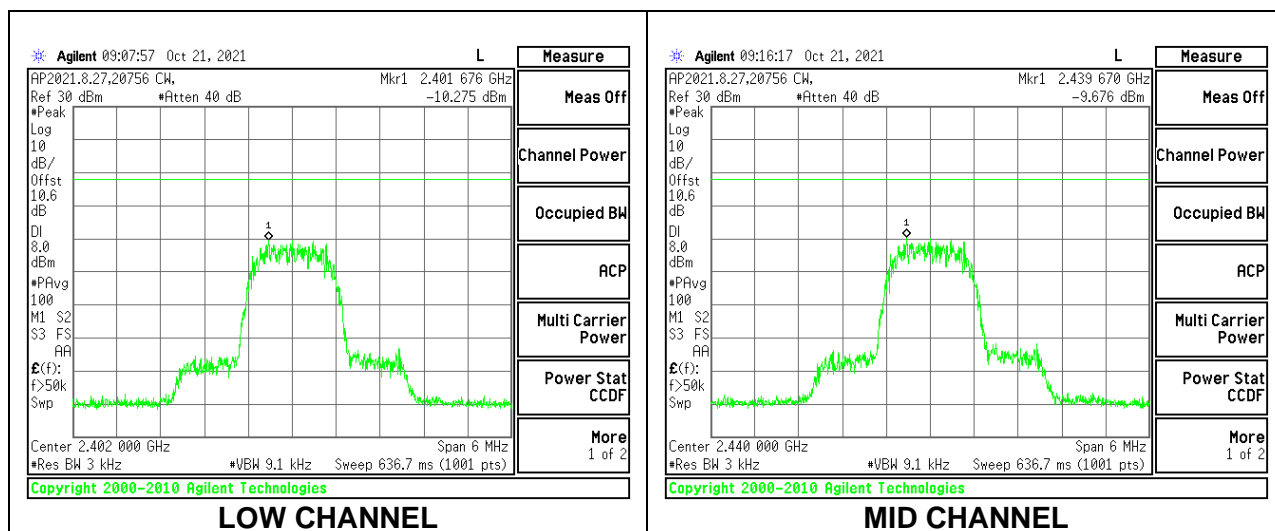
LIMITS

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.

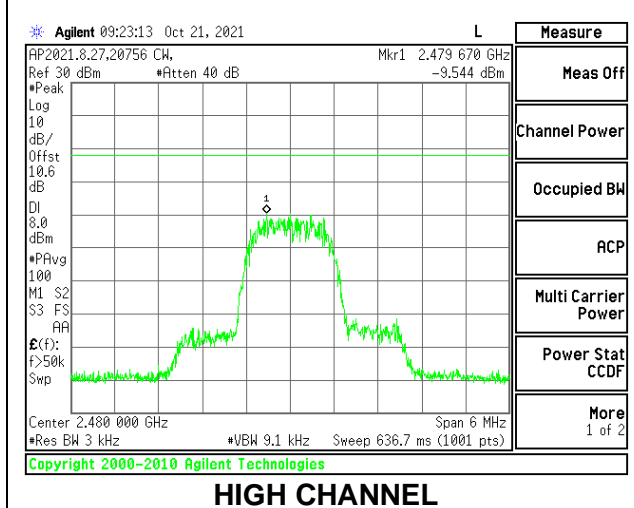
RESULTS

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-10.28	8	-18.28
Middle	2440	-9.68	8	-17.68
High	2480	-9.54	8	-17.54



LOW CHANNEL

MID CHANNEL



HIGH CHANNEL

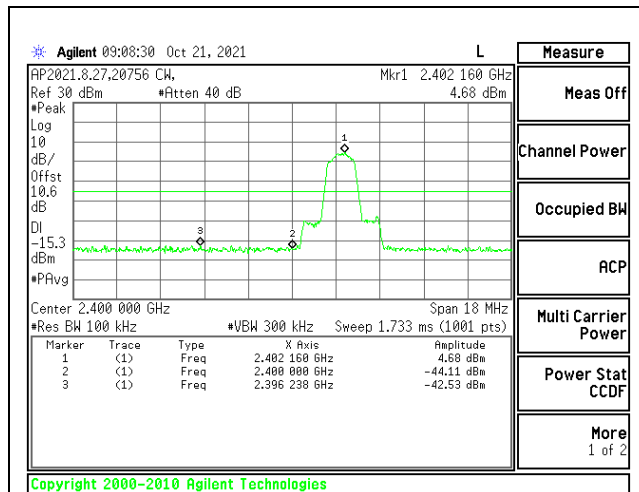
9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

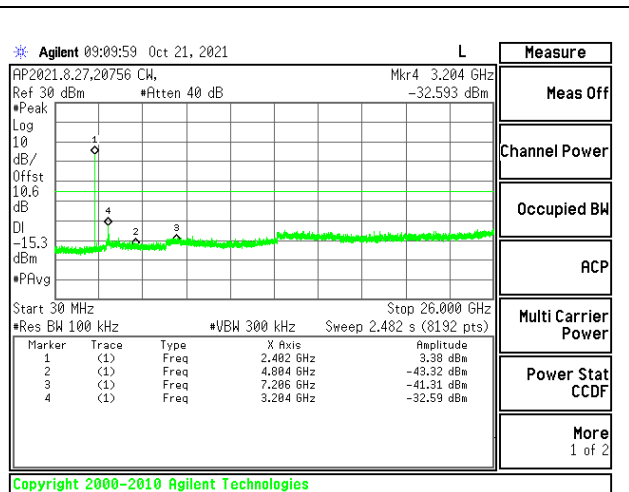
FCC §15.247 (d)

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

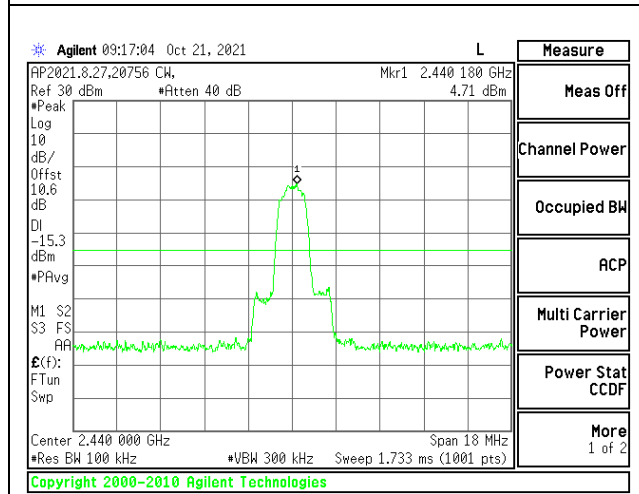
RESULTS



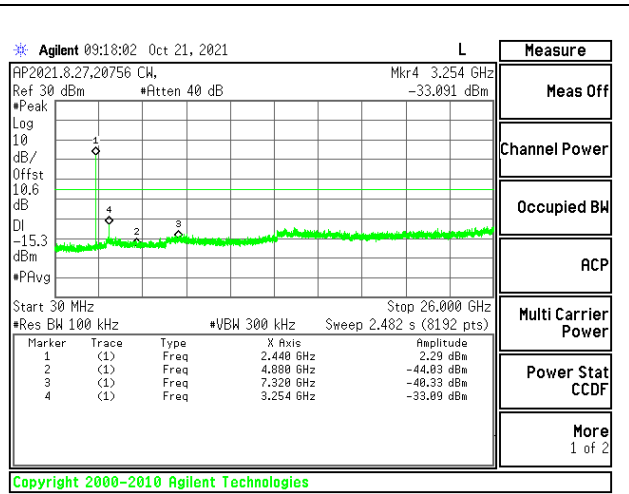
LOW CHANNEL BANDEGE



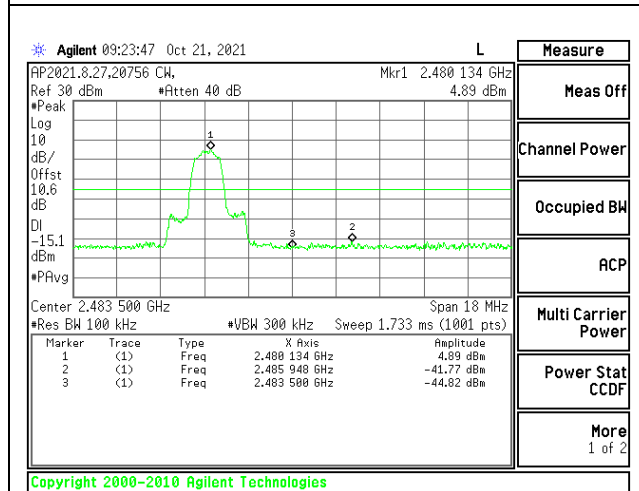
OUT-OF-BAND LOW CHANNEL



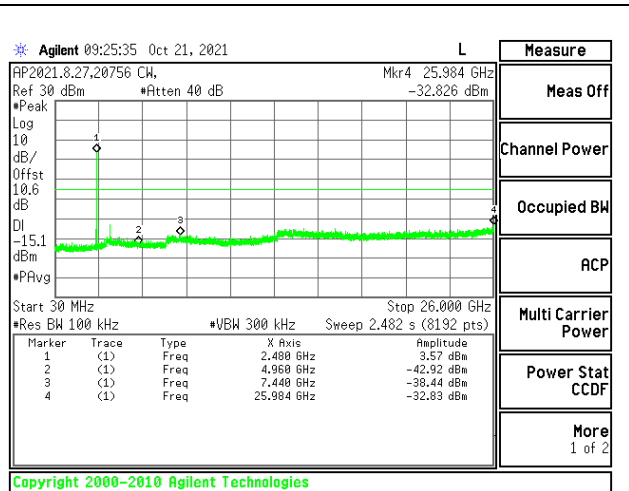
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEGE



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 as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only. 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.

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.

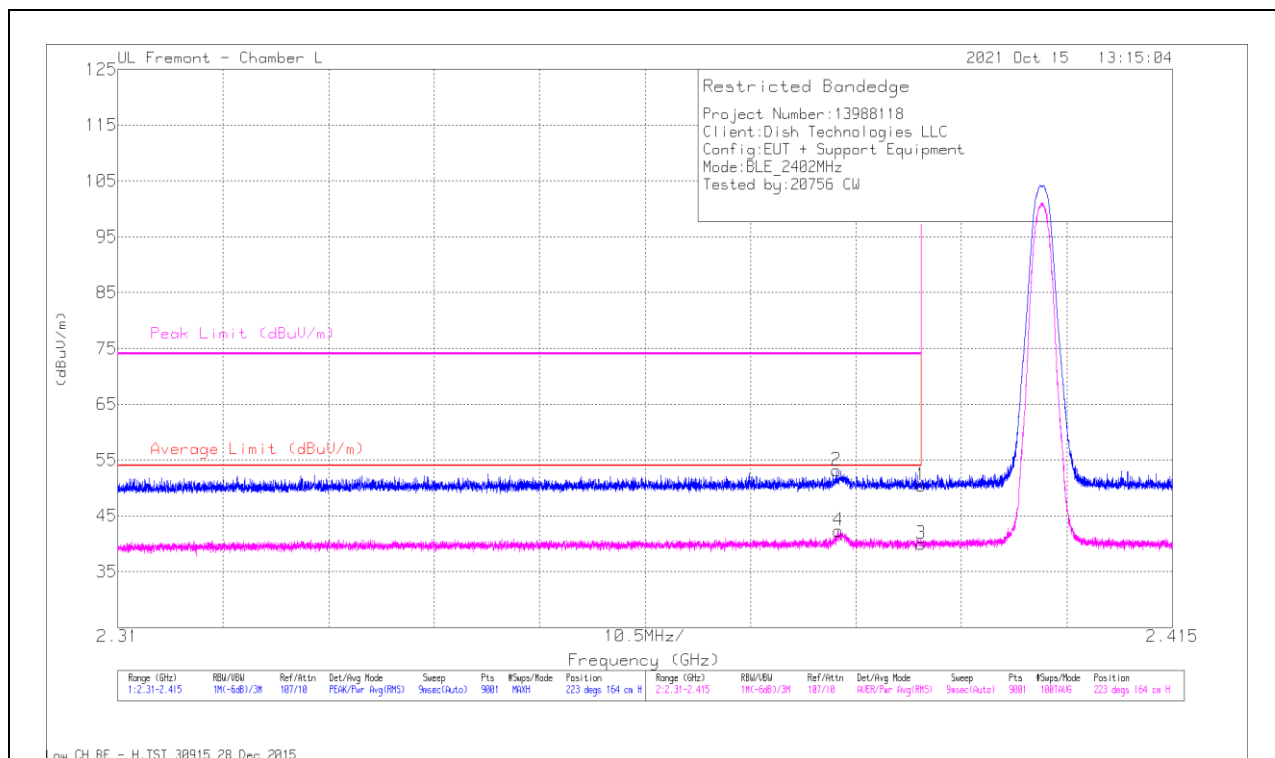
KDB 558074 D01 15.247 Meas Guidance v05r02

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)

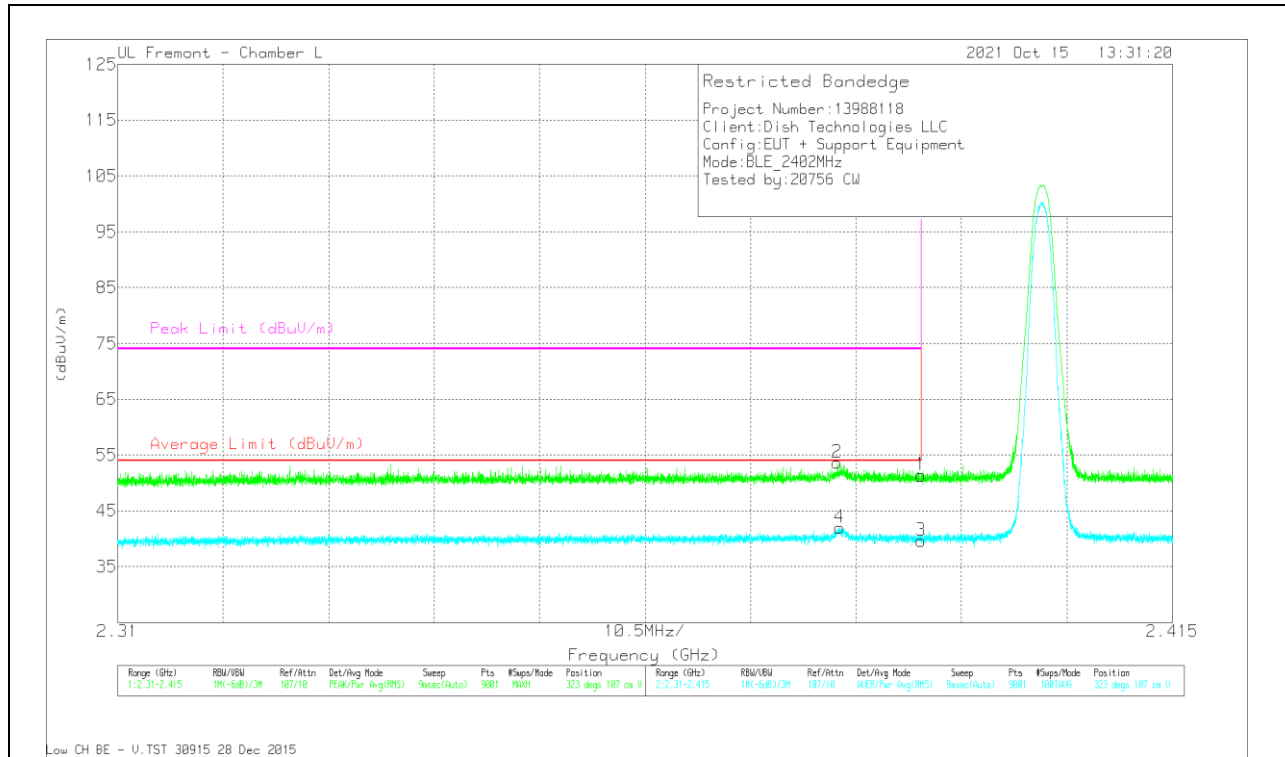
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/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	37.72	Pk	32	-19.3	50.42	-	-	74	-23.58	223	164	H
2	* 2.38154	40.43	Pk	32.1	-19.4	53.13	-	-	74	-20.87	223	164	H
3	* 2.38999	27.25	RMS	32	-19.3	39.95	54	-14.05	-	-	223	164	H
4	* 2.38172	29.7	RMS	32.1	-19.4	42.4	54	-11.6	-	-	223	164	H

* - indicates frequency in CFR47 Pt 15
 Pk - Peak detector
 RMS - RMS detection

VERTICAL RESULT

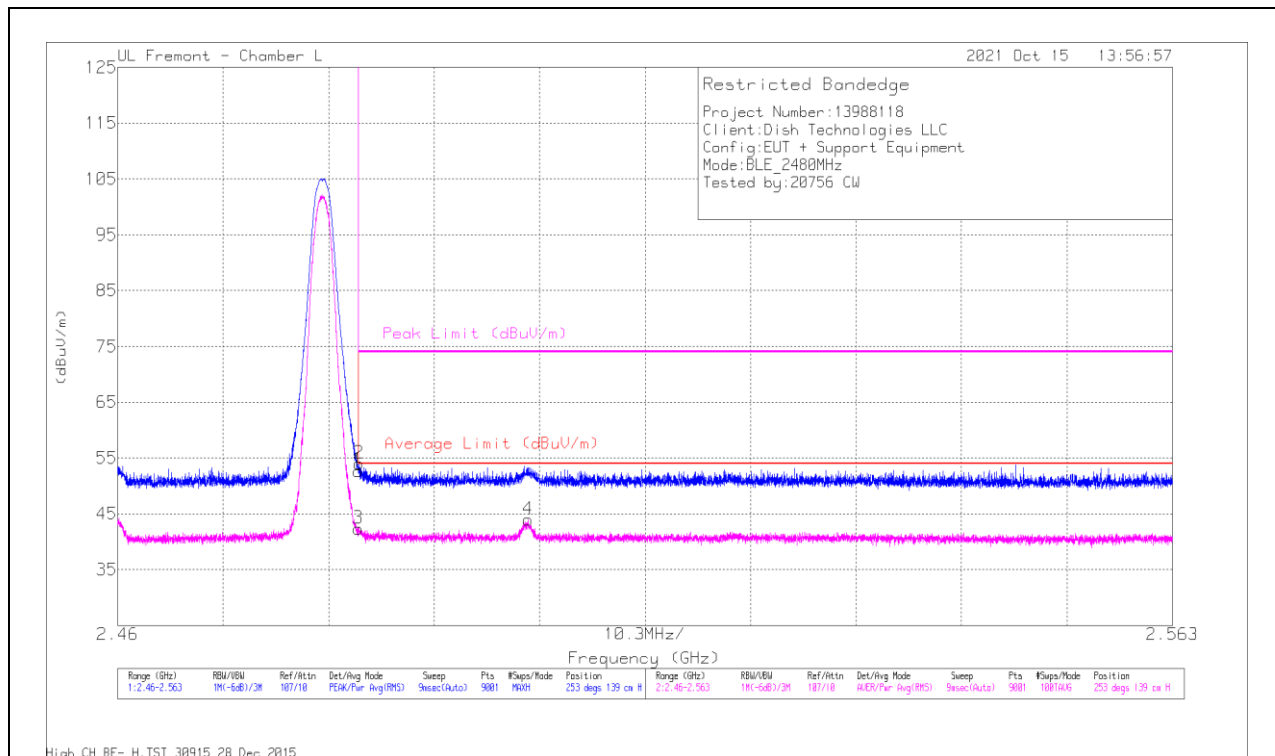


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	38.65	Pk	32	-19.3	51.35	-	-	74	-22.65	323	107	V
2	* 2.38161	40.89	Pk	32.1	-19.4	53.59	-	-	74	-20.41	323	107	V
3	* 2.38999	26.92	RMS	32	-19.3	39.62	54	-14.38	-	-	323	107	V
4	* 2.38186	29.25	RMS	32.1	-19.4	41.95	54	-12.05	-	-	323	107	V

* - indicates frequency in CFR47 Pt 15
 Pk - Peak detector
 RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

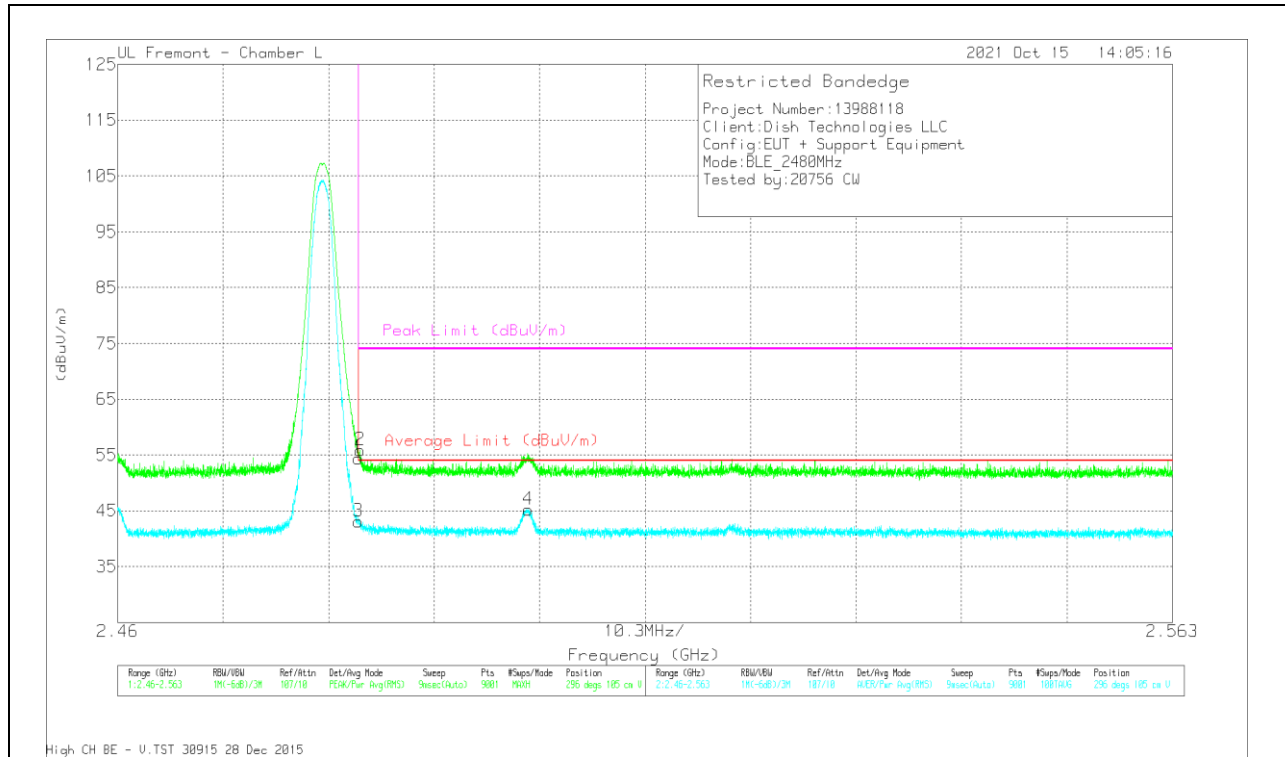
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Fltr/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	39.38	Pk	32.3	-19	52.68	-	-	74	-21.32	253	139	H
2	* 2.48353	40.71	Pk	32.3	-19	54.01	-	-	74	-19.99	253	139	H
3	* 2.48351	29.05	RMS	32.3	-19	42.35	54	-11.65	-	-	253	139	H
4	2.50007	30.64	RMS	32.4	-19.1	43.94	54	-10.06	-	-	253	139	H

* - indicates frequency in CFR47 Pt 15
 Pk - Peak detector
 RMS - RMS detection

VERTICAL RESULT

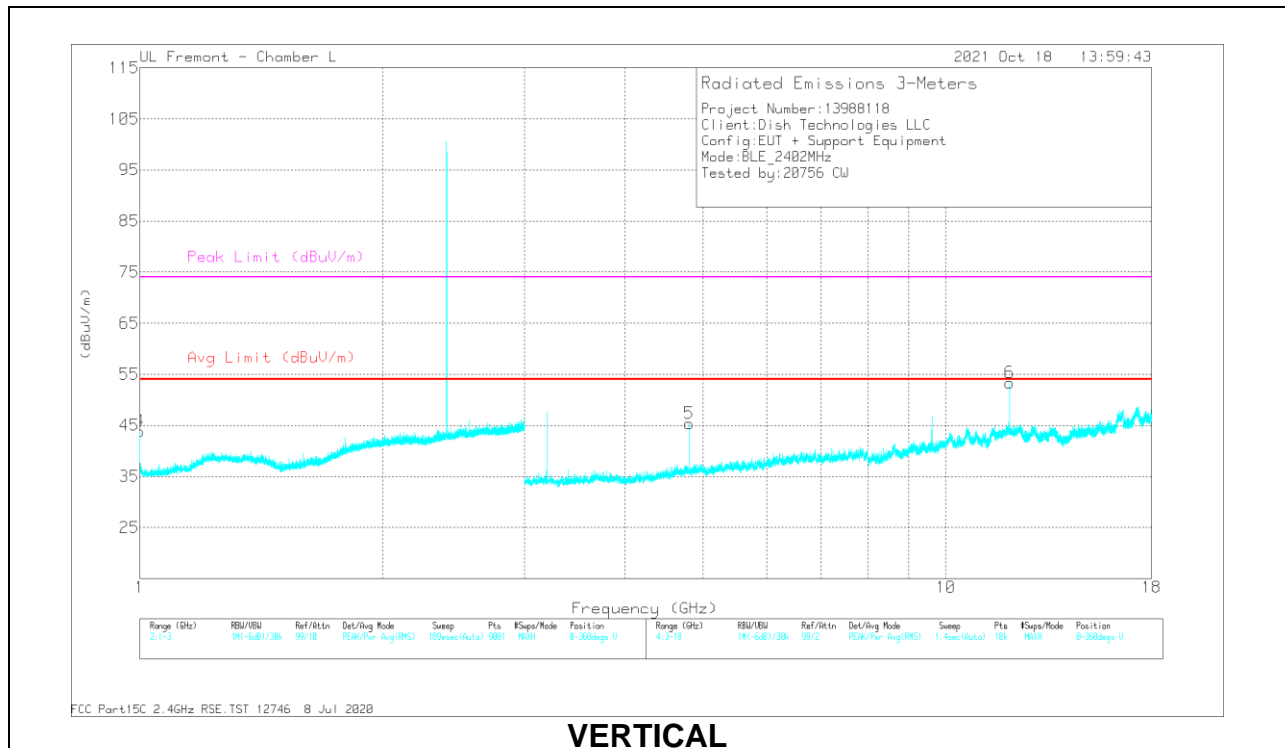
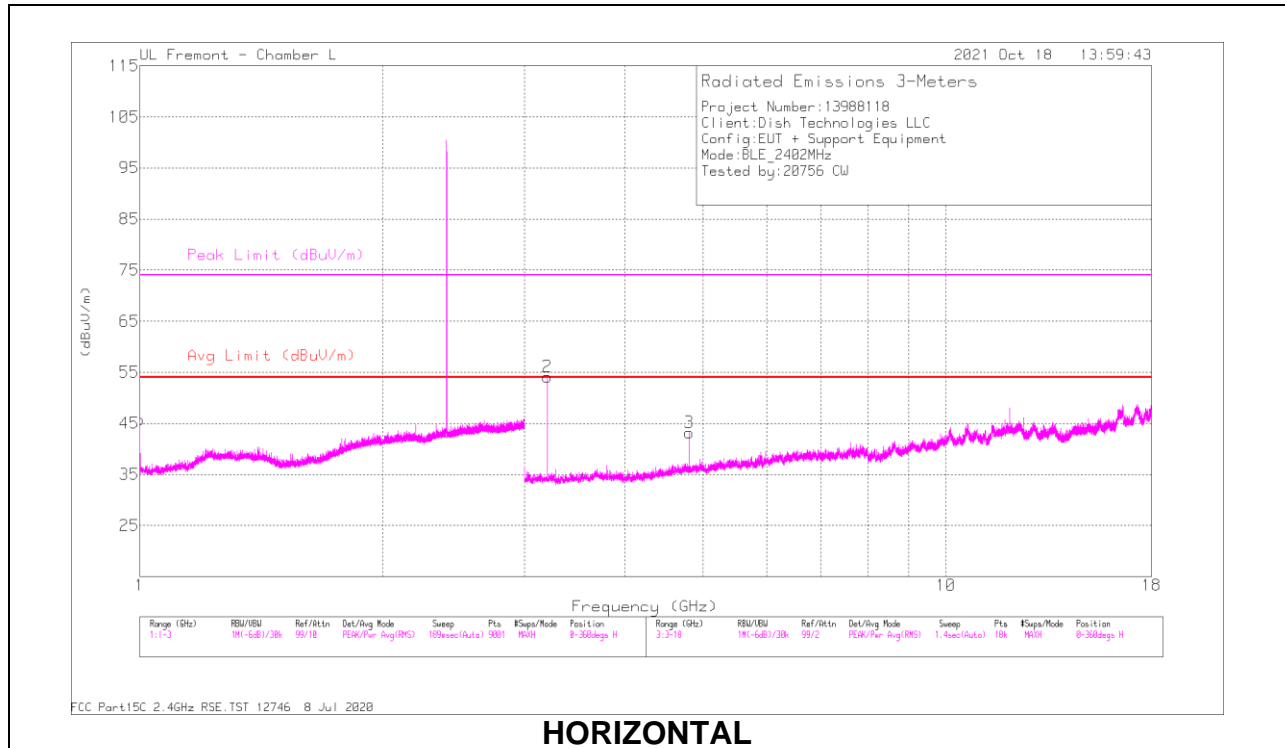


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cb/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.1	Pk	32.3	-19	54.4	-	-	74	-19.6	296	105	V
2	* 2.48369	42.53	Pk	32.3	-19	55.83	-	-	74	-18.17	296	105	V
3	* 2.48351	29.84	RMS	32.3	-19	43.14	54	-10.86	-	-	296	105	V
4	2.5001	31.93	RMS	32.4	-19.1	45.23	54	-8.77	-	-	296	105	V

* - indicates frequency in CFR47 Pt 15
 Pk - Peak detector
 RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS

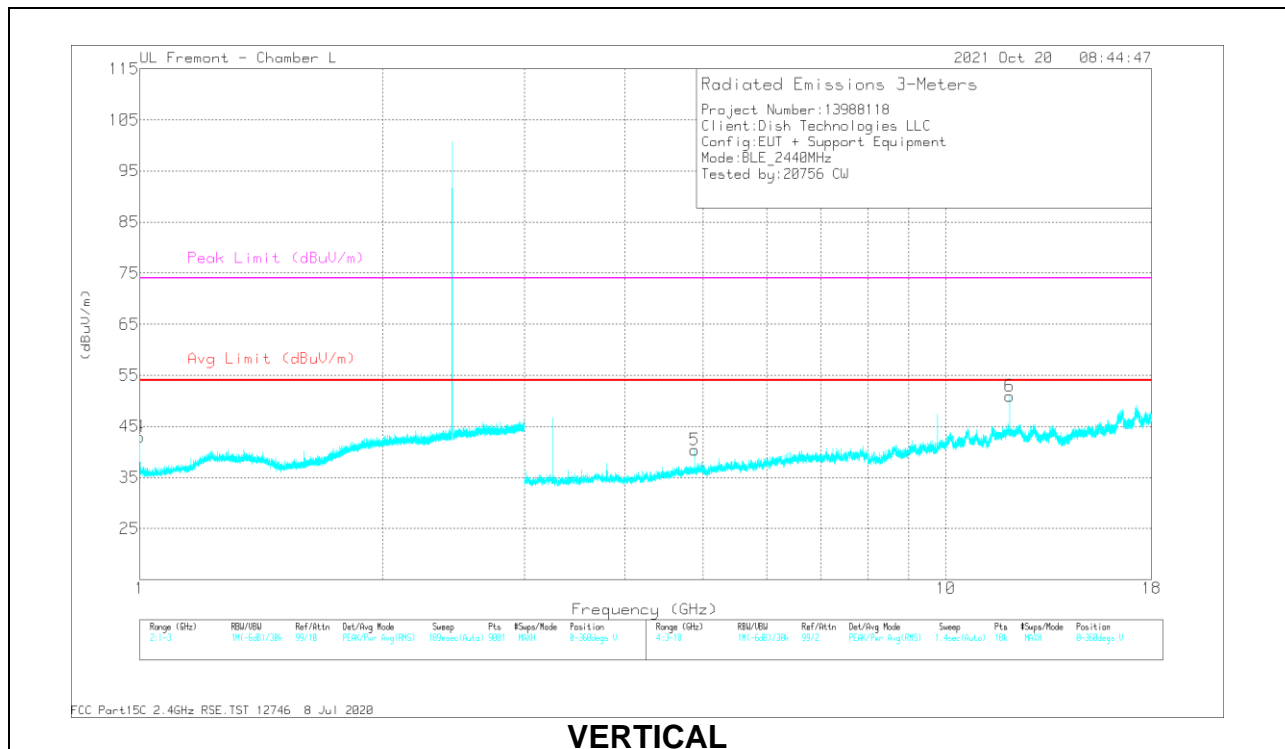
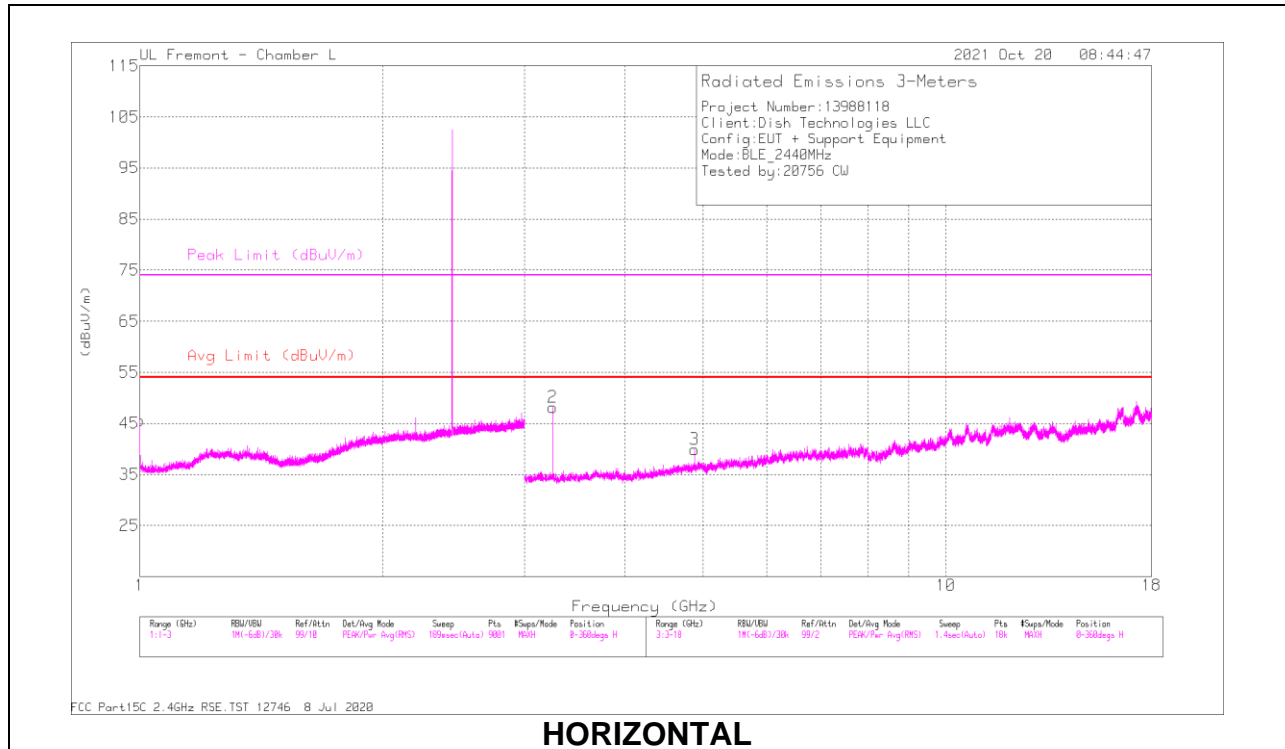


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.00001	42.51	PK2	27.5	-23.8	46.21	-	-	74	-27.79	85	113	H
	* 1.00004	42.87	MAv1	27.5	-23.8	46.57	54	-7.43	-	-	85	113	H
4	* 1.00006	46.09	PK2	27.5	-23.8	49.79	-	-	74	-24.21	279	196	V
	* 1.00007	40.39	MAv1	27.5	-23.8	44.09	54	-9.91	-	-	279	196	V
2	3.20259	49.74	PK2	32.9	-26.6	56.04	-	-	-	-	254	102	H
	3.20271	47.47	MAv1	32.9	-26.6	53.77	-	-	-	-	254	102	H
3	* 4.8037	41.11	PK2	34.1	-24.5	50.71	-	-	74	-23.29	300	101	H
	* 4.80378	33	MAv1	34.1	-24.5	42.6	54	-11.4	-	-	300	101	H
5	* 4.80437	43.44	PK2	34.1	-24.5	53.04	-	-	74	-20.96	93	101	V
	* 4.80399	35.7	MAv1	34.1	-24.5	45.3	54	-8.7	-	-	93	101	V
6	* 11.99998	34.12	PK2	39.2	-16.3	57.02	-	-	74	-16.98	168	101	V
	* 12.00004	28.24	MAv1	39.2	-16.3	51.14	54	-2.86	-	-	168	101	V

* - indicates frequency in CFR47 Pt 15
 PK2 - KDB558074 Method: Maximum Peak
 MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS

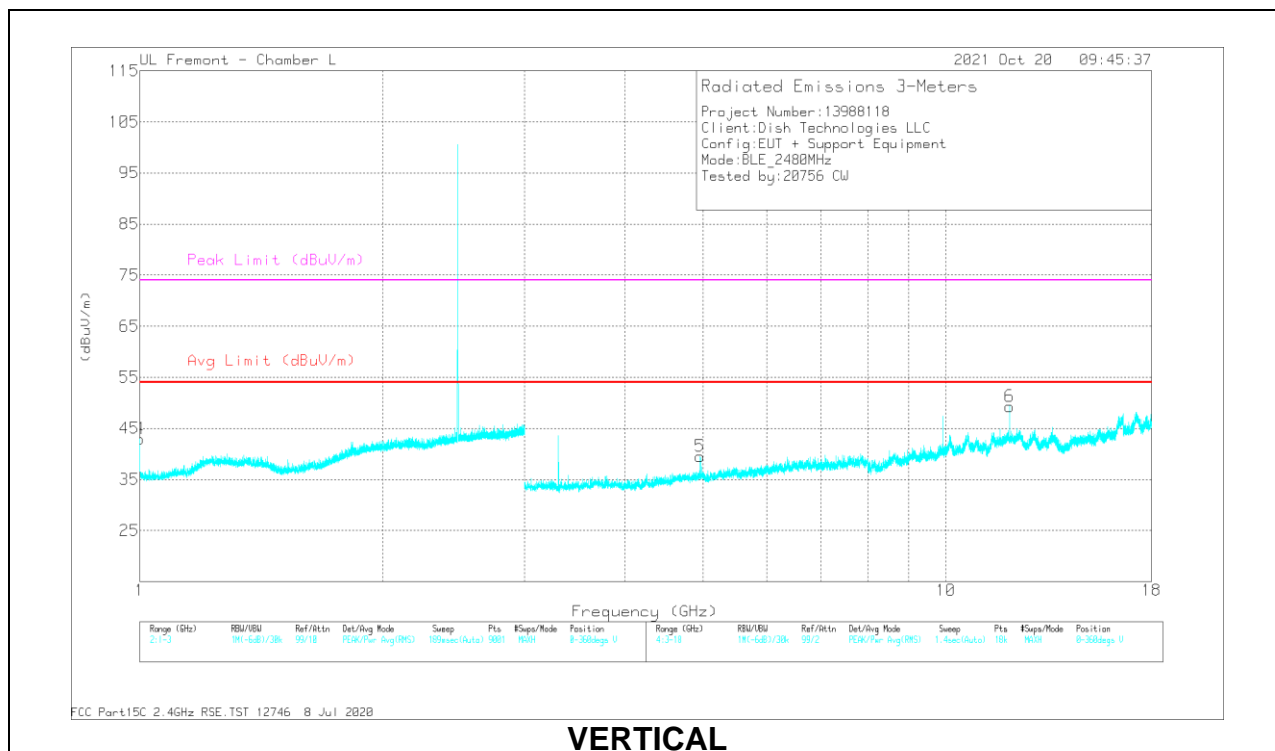
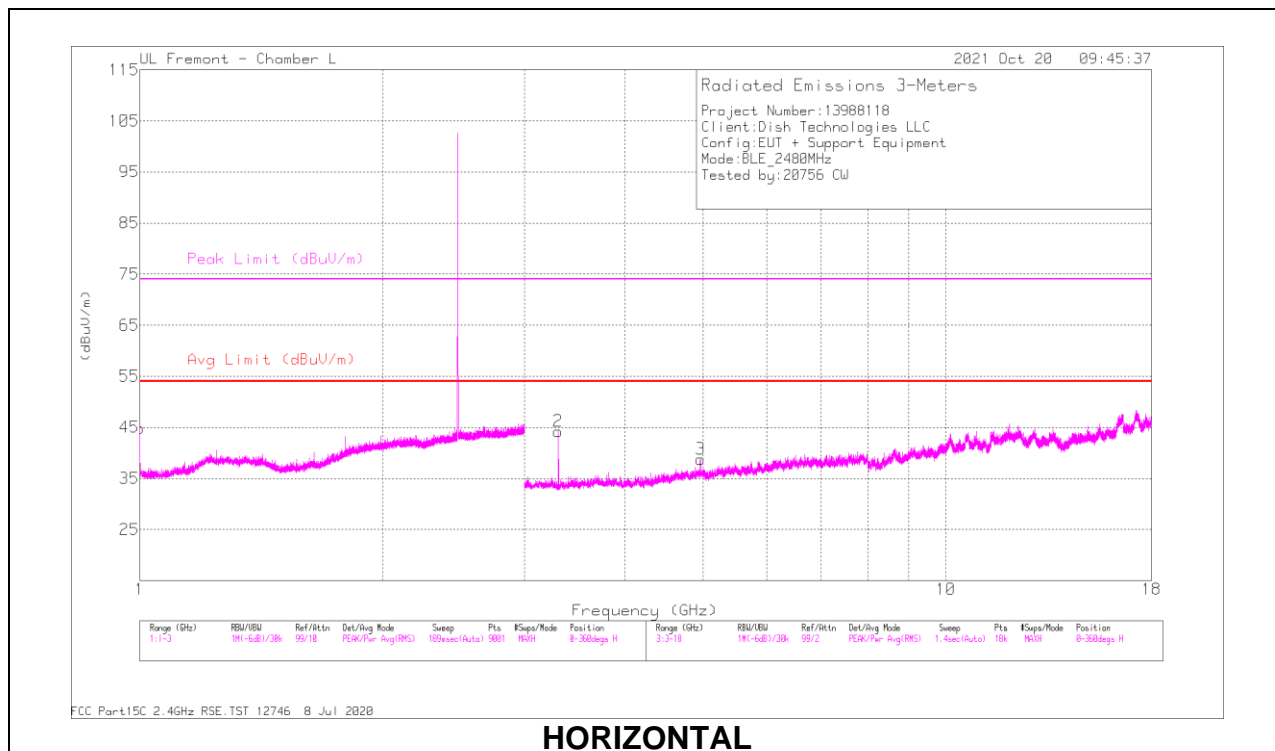


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (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	* 1.00002	46.98	PK2	27.5	-23.8	50.68	-	-	74	-23.32	70	188	H
	* 1.00001	41.35	MAv1	27.5	-23.8	45.05	54	-8.95	-	-	70	188	H
4	* 1.00031	46.84	PK2	27.5	-23.8	50.54	-	-	74	-23.46	284	245	V
	* 1.00002	39.52	MAv1	27.5	-23.8	43.22	54	-10.78	-	-	284	245	V
2	3.25474	46.08	PK2	33.1	-26.9	52.28	-	-	-	-	263	126	H
	3.25471	42.49	MAv1	33.1	-26.9	48.69	-	-	-	-	263	126	H
3	* 4.88188	39.69	PK2	34.2	-24.3	49.59	-	-	74	-24.41	306	103	H
	* 4.88193	30.76	MAv1	34.2	-24.3	40.66	54	-13.34	-	-	306	103	H
5	* 4.88234	41.04	PK2	34.2	-24.3	50.94	-	-	74	-23.06	261	112	V
	* 4.8816	30.93	MAv1	34.2	-24.3	40.83	54	-13.17	-	-	261	112	V
6	* 12.00005	33.09	PK2	39.2	-16.3	55.99	-	-	74	-18.01	170	101	V
	* 12.00004	26.65	MAv1	39.2	-16.3	49.55	54	-4.45	-	-	170	101	V

* - indicates frequency in CFR47 Pt 15
 PK2 - KDB558074 Method: Maximum Peak
 MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



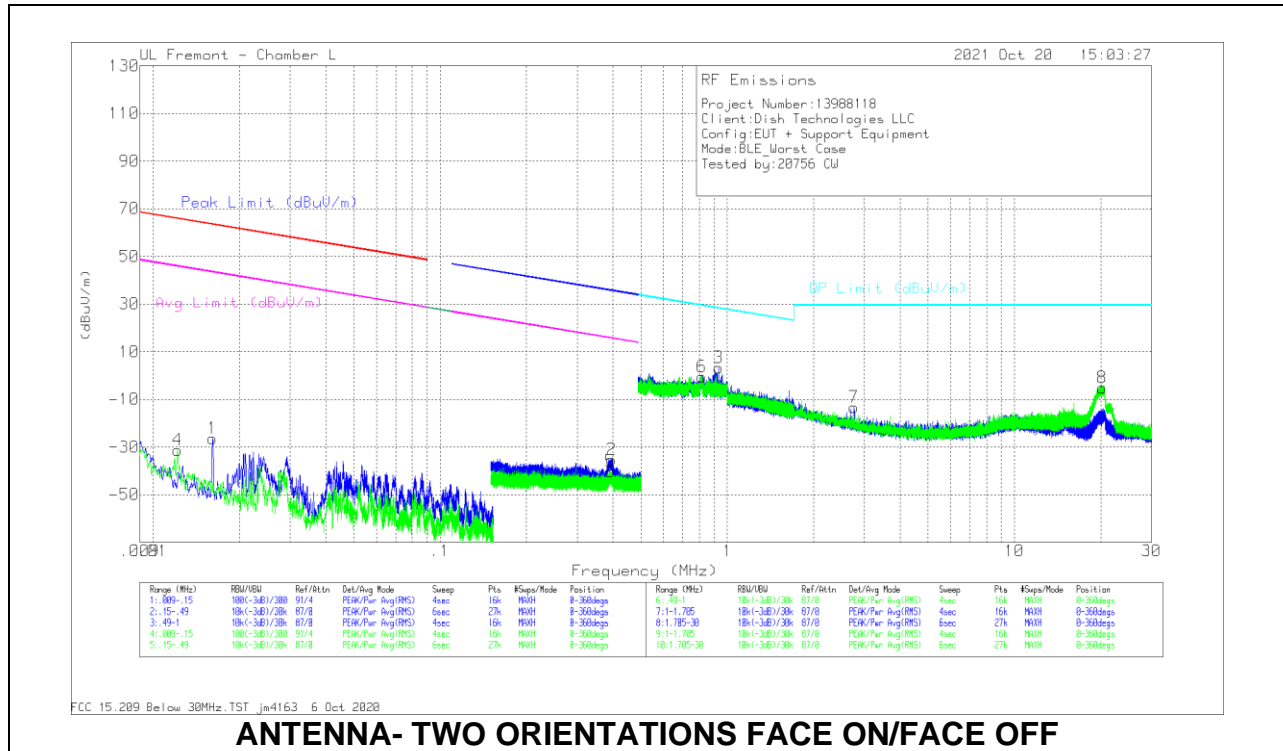
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T119 (dB/m)	Amp/Cbl/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.00015	46.66	PK2	27.5	-23.8	50.36	-	-	74	-23.64	67	201	H
	* 1.00002	40.89	MAv1	27.5	-23.8	44.59	54	-9.41	-	-	67	201	H
4	* 1.00014	46.12	PK2	27.5	-23.8	49.82	-	-	74	-24.18	280	249	V
	* 1.00002	39.68	MAv1	27.5	-23.8	43.38	54	-10.62	-	-	280	249	V
2	3.30663	44.42	PK2	32.5	-26.5	50.42	-	-	-	-	259	250	H
	3.30666	41.04	MAv1	32.5	-26.5	47.04	-	-	-	-	259	250	H
3	* 4.95953	37.2	PK2	34.2	-23.2	48.2	-	-	74	-25.8	307	105	H
	* 4.95986	27.33	MAv1	34.2	-23.2	38.33	54	-15.67	-	-	307	105	H
5	* 4.96018	37.93	PK2	34.2	-23.2	48.93	-	-	74	-25.07	266	121	V
	* 4.96006	27.92	MAv1	34.2	-23.2	38.92	54	-15.08	-	-	266	121	V
6	* 12.00018	33.74	PK2	39.2	-16.3	56.64	-	-	74	-17.36	171	102	V
	* 12.00009	27.77	MAv1	39.2	-16.3	50.67	54	-3.33	-	-	171	102	V

* - indicates frequency in CFR47 Pt 15
 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)



ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

Below 30MHz Data

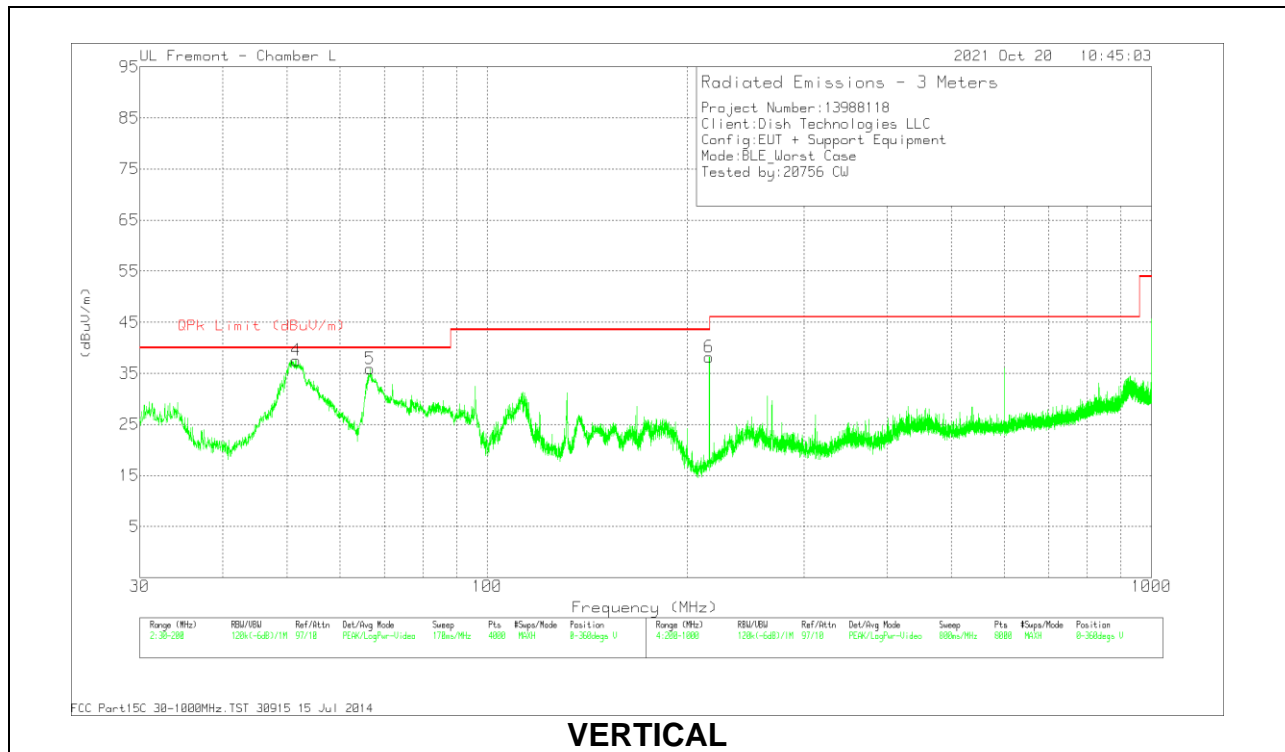
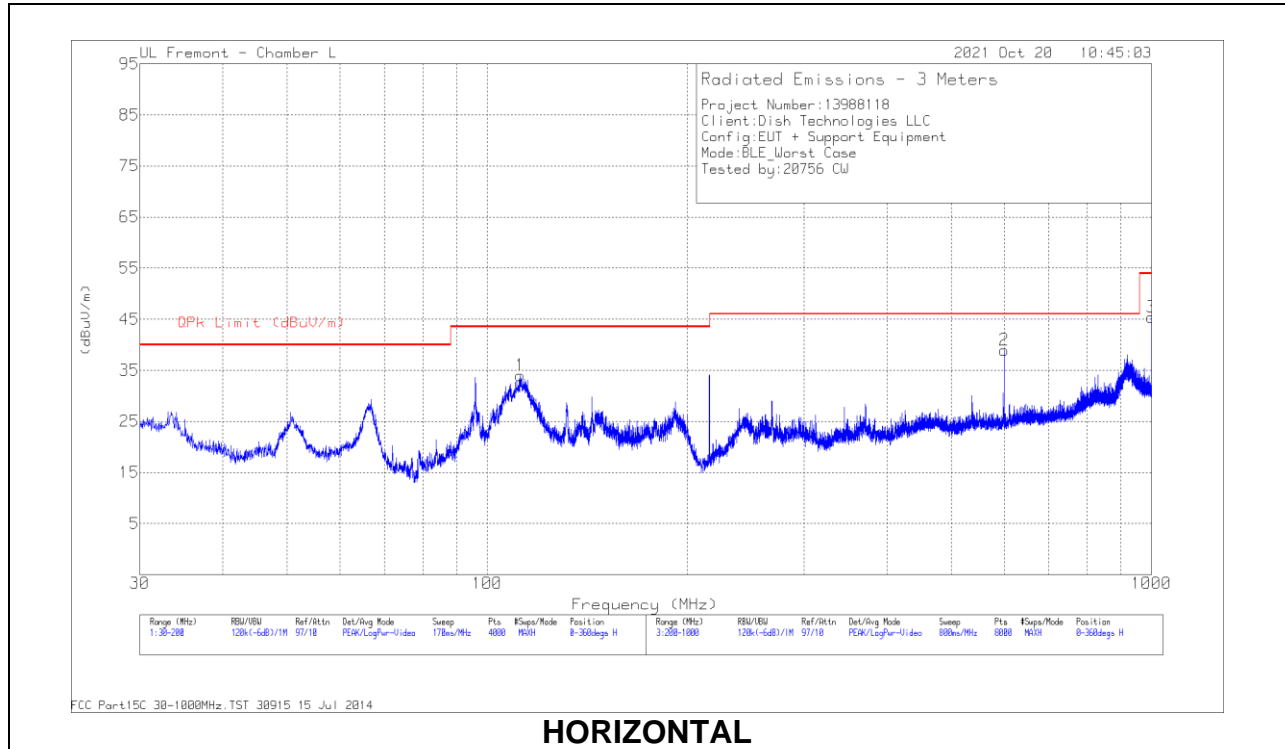
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01614	24.57	Pk	59.5	-30.4	-80	-26.33	63.43	-89.76	43.43	-69.76	-	-	-	-	0-360
2	.3947	20.34	Pk	56.2	-31.9	-80	-35.36	-	-	-	-	35.68	-71.04	15.68	-51.04	0-360
4	.01219	18.26	Pk	60	-29.6	-80	-31.34	65.87	-97.21	45.87	-77.21	-	-	-	-	0-360
5	.39103	15.41	Pk	56.2	-31.9	-80	-40.29	-	-	-	-	35.76	-76.05	15.76	-56.05	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	.93262	18.89	Pk	56.2	-31.9	-40	3.19	28.23	-25.04	0-360
6	.81381	15.06	Pk	56.2	-31.9	-40	-64	29.41	-30.05	0-360
7	2.76558	19.08	Pk	39.5	-31.8	-40	-13.22	29.5	-42.72	0-360
8	20.17495	31.71	Pk	34.5	-31.4	-40	-5.19	29.5	-34.69	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 174373 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 112.1313	45.85	Pk	18.7	-30.6	33.95	43.52	-9.57	0-360	299	H
4	50.7041	50.88	Qp	13.8	-31.2	33.48	40	-6.52	71	109	V
5	66.6622	49.7	Qp	13.8	-31	32.5	40	-7.5	342	104	V
2	600.052	43.11	Pk	24.1	-28.3	38.91	46.02	-7.11	0-360	101	H
3	* 1000	42.73	Pk	29.1	-26.4	45.43	53.97	-8.54	0-360	199	H
6	215.9971	52.15	Qp	16.4	-30	38.55	43.52	-4.97	176	101	V

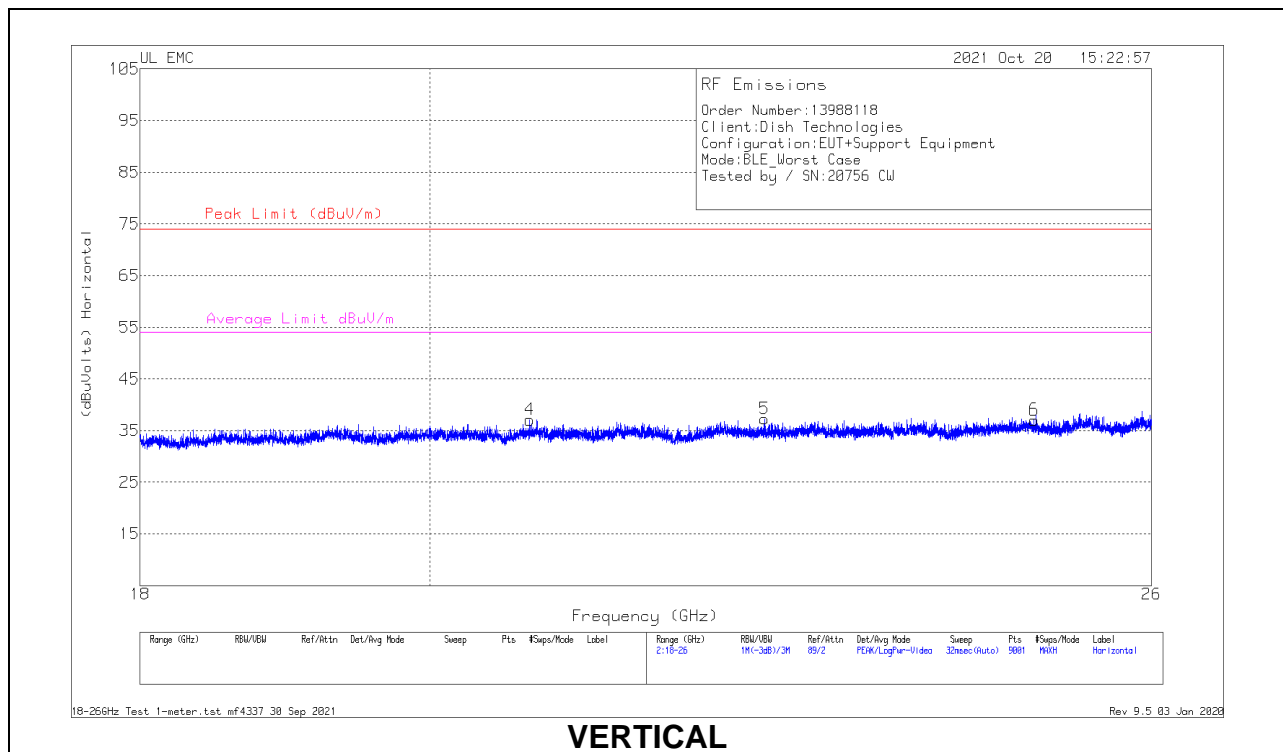
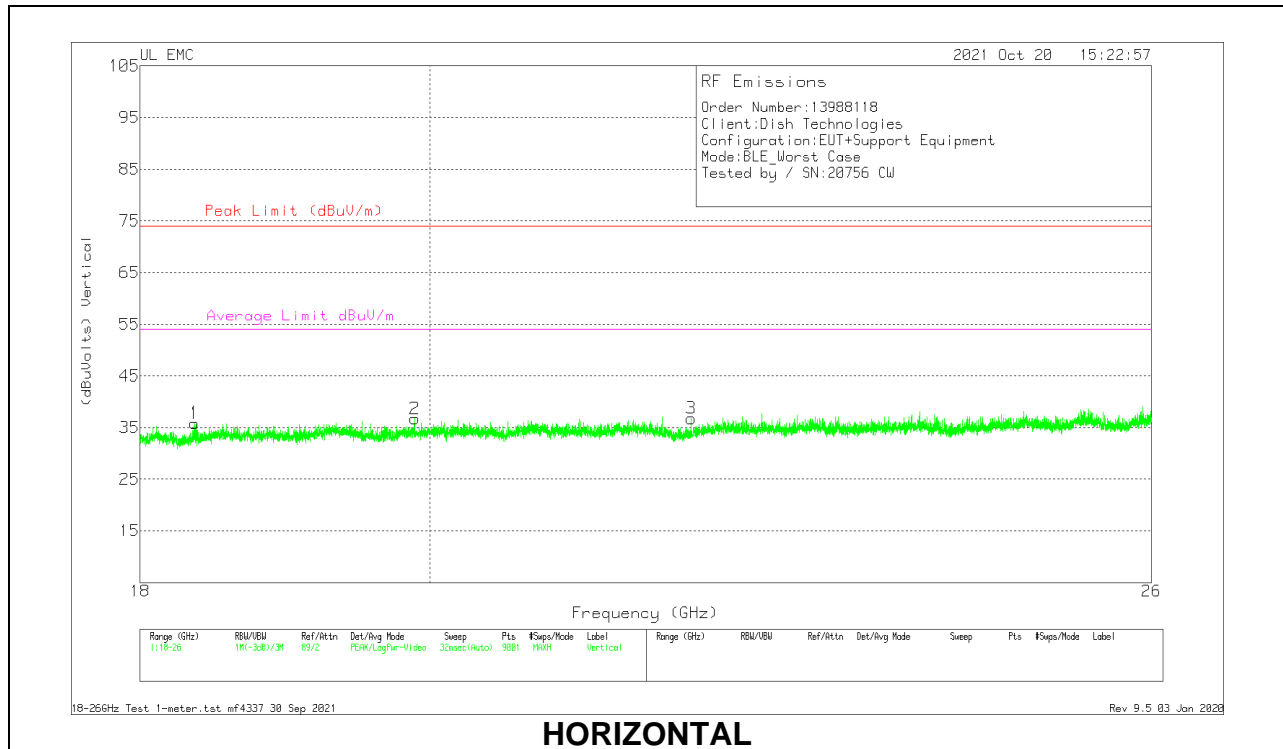
* - indicates frequency in CFR47 Pt 15

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	AF 81139 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)
1	18.36	71.73	Pk	32.9	-59.3	-9.5	35.83	74	-38.17	54	-18.17
2	19.89067	69.62	Pk	33.7	-57.1	-9.5	36.72	74	-37.28	54	-17.28
3	21.99289	70.05	Pk	33.9	-57.7	-9.5	36.75	74	-37.25	54	-17.25
4	20.73956	69.49	Pk	33.8	-56.7	-9.5	37.09	74	-36.91	54	-16.91
5	22.58578	70.08	Pk	34.2	-57.5	-9.5	37.28	74	-36.72	54	-16.72
6	24.912	67.34	Pk	34.9	-55.7	-9.5	37.04	74	-36.96	54	-16.96

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

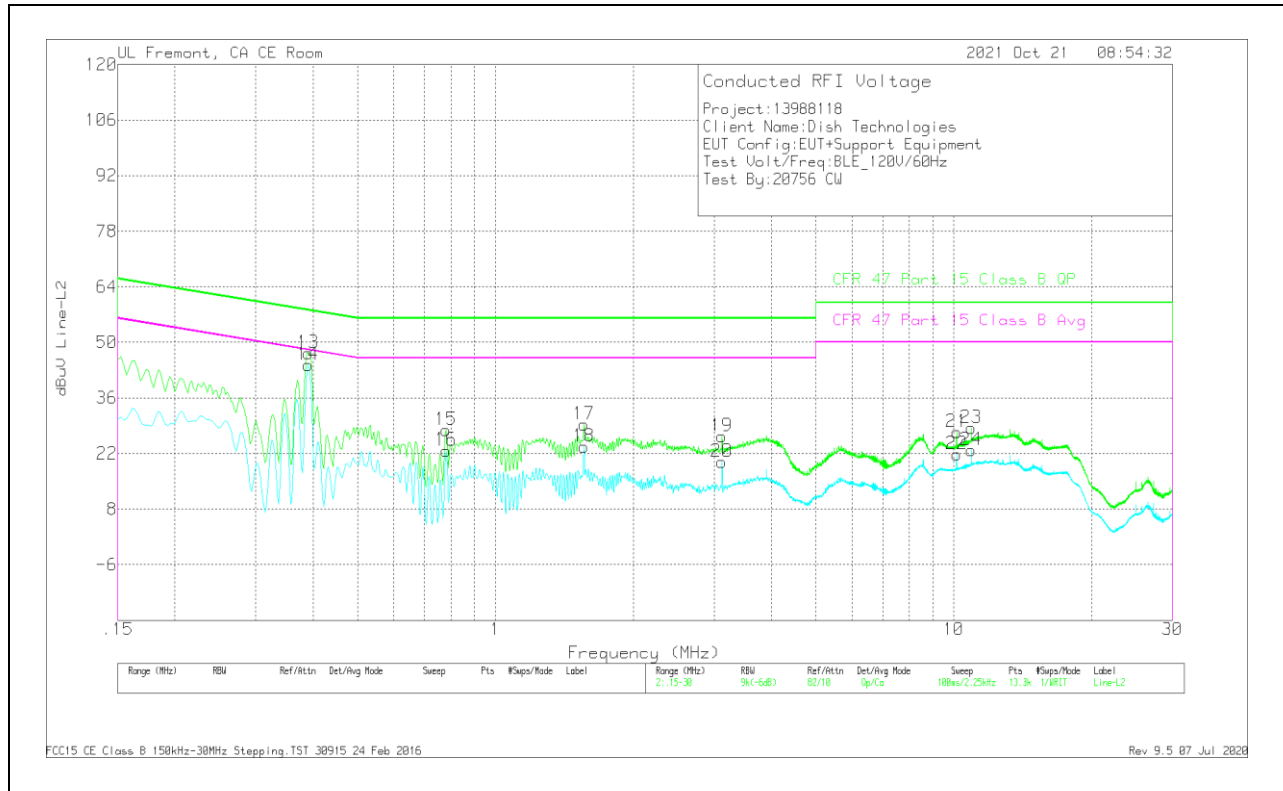
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	PRE018644 6 L1	LC Cables C1&C3 dB	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
2	.39075	35	Ca	0	0	9.3	44.3	-	-	48.05	-3.75
4	.78	11.15	Ca	0	.1	9.3	20.55	-	-	46	-25.45
6	1.56075	12.48	Ca	0	.1	9.3	21.88	-	-	46	-24.12
8	3.12	9.24	Ca	0	.1	9.3	18.64	-	-	46	-27.36
10	10.14225	10.97	Ca	0	.2	9.3	20.47	-	-	50	-29.53
12	10.92075	12.15	Ca	0	.2	9.3	21.65	-	-	50	-28.35
1	.3885	37.8	Qp	0	0	9.3	47.1	58.1	-11	-	-
3	.78	14.58	Qp	0	.1	9.3	23.98	56	-32.02	-	-
5	1.56075	17.24	Qp	0	.1	9.3	26.64	56	-29.36	-	-
7	3.12	15.04	Qp	0	.1	9.3	24.44	56	-31.56	-	-
9	10.14225	15.53	Qp	0	.2	9.3	25.03	60	-34.97	-	-
11	10.92075	16.65	Qp	0	.2	9.3	26.15	60	-33.85	-	-

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	TekBox Limiter TBFL1 Model 207	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
14	.39075	34.95	Ca	0	0	9.3	44.25	-	-	48.05	-3.8
16	.78	13.47	Ca	0	0	9.3	22.77	-	-	46	-23.23
18	1.56075	14.38	Ca	0	.1	9.3	23.78	-	-	46	-22.22
20	3.12	10.47	Ca	0	.1	9.3	19.87	-	-	46	-26.13
22	10.14225	12.38	Ca	0	.2	9.3	21.88	-	-	50	-28.12
24	10.923	13.38	Ca	0	.2	9.3	22.88	-	-	50	-27.12
13	.39075	38.04	Qp	0	0	9.3	47.34	58.05	-10.71	-	-
15	.78	18.69	Qp	0	0	9.3	27.99	56	-28.01	-	-
17	1.56075	19.9	Qp	0	.1	9.3	29.3	56	-26.7	-	-
19	3.12	16.94	Qp	0	.1	9.3	26.34	56	-29.66	-	-
21	10.14225	17.95	Qp	0	.2	9.3	27.45	60	-32.55	-	-
23	10.923	18.96	Qp	0	.2	9.3	28.46	60	-31.54	-	-

Qp - Quasi-Peak detector
 Ca - CISPR average detection