

TEST REPORT

Report Number: 14523771-E6V2

Applicant : APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A2849

Brand : APPLE

FCC ID : BCG-E8439A

IC : 579C-E8439A

EUT Description : SMARTPHONE

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

Date Of Issue:
August 18, 2023

Prepared by:
UL Verification Services Inc.
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	08/17/2023	Initial Issue	
V2	08/18/2023	Address TCB questions sections 3, 8, 9	Francisco Guarnero

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	5
2. TEST RESULT 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	9
6. EQUIPMENT UNDER TEST	9
6.1. EUT DESCRIPTION	9
6.2. MAXIMUM OUTPUT POWER.....	9
6.3. DESCRIPTION OF AVAILABLE ANTENNAS	10
6.4. SOFTWARE AND FIRMWARE.....	10
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	18
9.1. ON TIME AND DUTY CYCLE.....	18
9.2. 99% AND 26 dB BANDWIDTH	19
9.3. 6 dB BANDWIDTH.....	22
9.4. OUTPUT POWER AND PSD.....	24
9.4.1. HIGH POWER (1000 Kbps).....	26
9.4.2. LOW POWER (1000 Kbps).....	28
10. RADIATED TEST RESULTS.....	30
10.1. TRANSMITTER ABOVE 1 GHz.....	32
10.1.1. HIGH POWER 802.15.4ab IN THE UNII-5 BAND (1000Kbps).....	32
10.1.2. LOW POWER 802.15.4ab IN THE UNII-5 BAND (1000Kbps).....	52
10.2. WORST CASE BELOW 1 GHz	72
10.3. WORST CASE 18-26 GHz	74
10.4. WORST CASE 26-40 GHz	76

11. AC POWER LINE CONDUCTED EMISSIONS	78
11.1. AC Power Line WITH LAPTOP	79
11.2. AC Power Line WITH AC/DC Adapter	81
12. SETUP PHOTOS.....	83

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A

EUT DESCRIPTION: SMARTPHONE

MODEL: A2849

BRAND: APPLE

FCC ID: BCG-E8439A

SERIAL NUMBER: FYFYYWKPF7 (Radiated)
QXYQV96627 (Radiated)
VW79X72JFH (Conducted)

SAMPLE RECEIPT DATE: MAY 02, 2023

DATE TESTED: MARCH 15, 2023 – JULY 21, 2023

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

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

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

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

Approved & Released For
UL Verification Services Inc. By:

Prepared By:



Chin Pang
Senior Lab Engineer
Consumer Technology Division
UL Verification Services Inc.



Francisco Guarnero
Senior Test Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST RESULT SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
See Comment	RSS-GEN 6.7	26dB BW/99% OBW	Reporting purposes only	Per ANSI C63.10 Sections 6.9.2 and 6.9.3
15.407 (e)	RSS-247 6.2.4.1	6 dB BW	complies	None.
15.407 (a) (1-4), (h) (1)	RSS-247 6.2	Output Power	complies	None.
15.407 (a) (1-3, 5)	RSS-247 6.2	PSD	complies	None.
15.209, 15.205, 15.407 (b)	RSS-GEN 8.9, 8.10, RSS-247 6.2	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 15.407
- FCC CFR 47 Part 15
- FCC KDB 662911 D01 v02r01
- FCC KDB 789033 D02 v02r01
- ANSI C63.10-2013
- RSS-GEN Issue 5 + A1 +A2
- RSS-247 Issue 2.
- KDB 414788 D01 Radiated Test Site v01r01

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #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
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☒	Building 3: 843 Auburn Court, Fremont, CA 94538 USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538 USA			
☒	Building 5: 47670 Kato Rd, Fremont, CA 94538 USA			

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}
Conducted Antenna Port Emission Measurement	1.94 dB
Power Spectral Density	2.466 dB
Time Domain Measurements Using SA	3.39 dB
RF Power Measurement Direct Method Using Power Meter	0.450 dB (Peak), 1.3 dB (Ave)
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.2%
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	2.87 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:

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 Apple iPhone is a smartphone with cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G NR1, 5G NR2, IEEE 802.11a/b/g/n/ac/ax, Bluetooth (BT), Ultra-Wideband (UWB), GPS, NFC, NB UNII, 802.15.4, 802.15.4ab-NB and MSS technologies. The rechargeable battery is not user accessible.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.8 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8GHz Band 1TX, high power			
5728.75 - 5846.25	802.15.4ab	20.49	111.94
5.8GHz Band 1TX Low Power			
5728.75 - 5846.25	802.15.4ab	16.22	41.88

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:
The radio utilizes IFA Type.

Frequency Range	ANT 6 (Core 0)	ANT 5 (Core 1)
5728.75 - 5846.25	-2.0	-4.0

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was FW version: 210.1868000000100002.9

6.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z on Ant 6 and Ant 5. It was determined that X (flatbed) orientation was the worst-case orientation for Ant 6 and Z (portrait) was the worst-case for ANT 5.

There are 3 index on this 802.15.4ab technology with data rate on index 1, 250Kbps, index 2, 500Kbps and index 3, 1000Kbps. All data rate was investigated, and the worst case was determined based on the highest power on PSD and Index 3, 1000Kbps determined to be the worst case.

For radiated harmonics spurious below 1GHz, 1-18GHz L/M/H channels, 18-40GHz, and power line conducted emissions were performed with the EUT set at the worst-case scenario.

Below 1GHz tests were performed with EUT connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop. There were no emissions found below 30MHz within 20dB of the limit.

Simultaneous transmission with the Bluetooth was investigated, and no noticeable emission was found.

For radiated bandedge and emssions spurious, 1000Kbps is set as the worst-case data rates for final test

Note: Note: In the Radiated Plots and emissions data, ANT0=ANT6 and ANT1=ANT5.

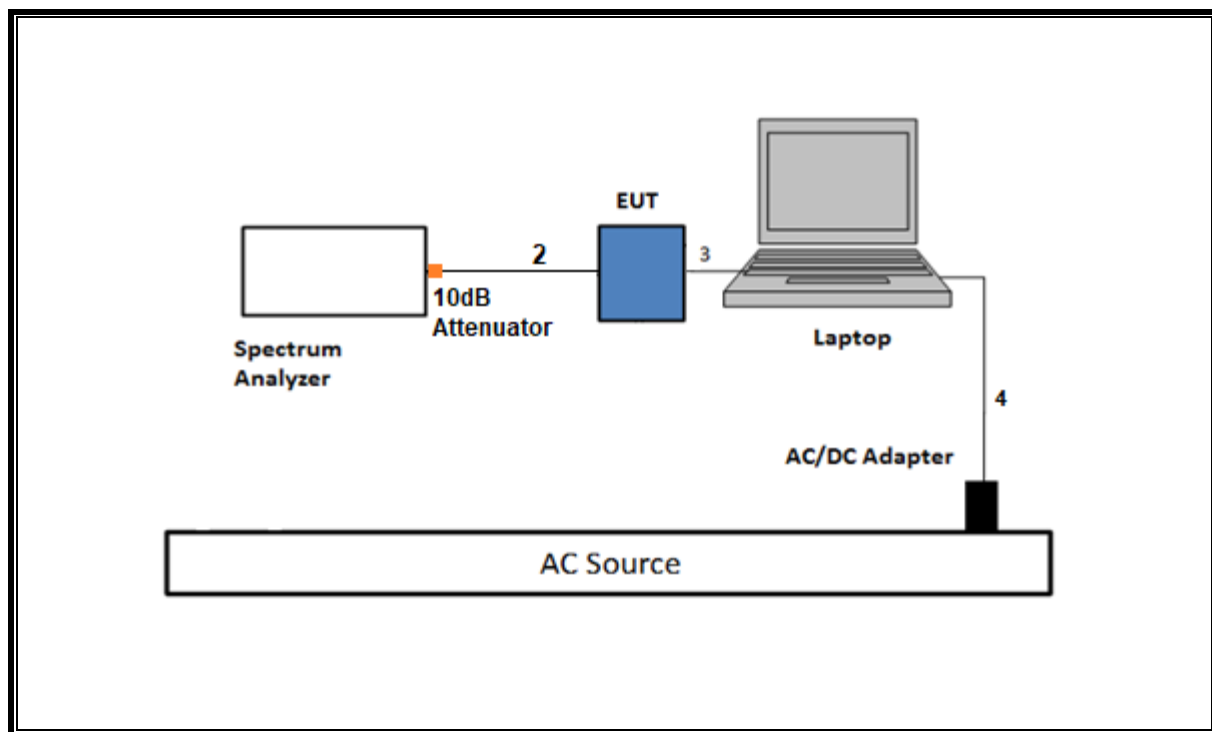
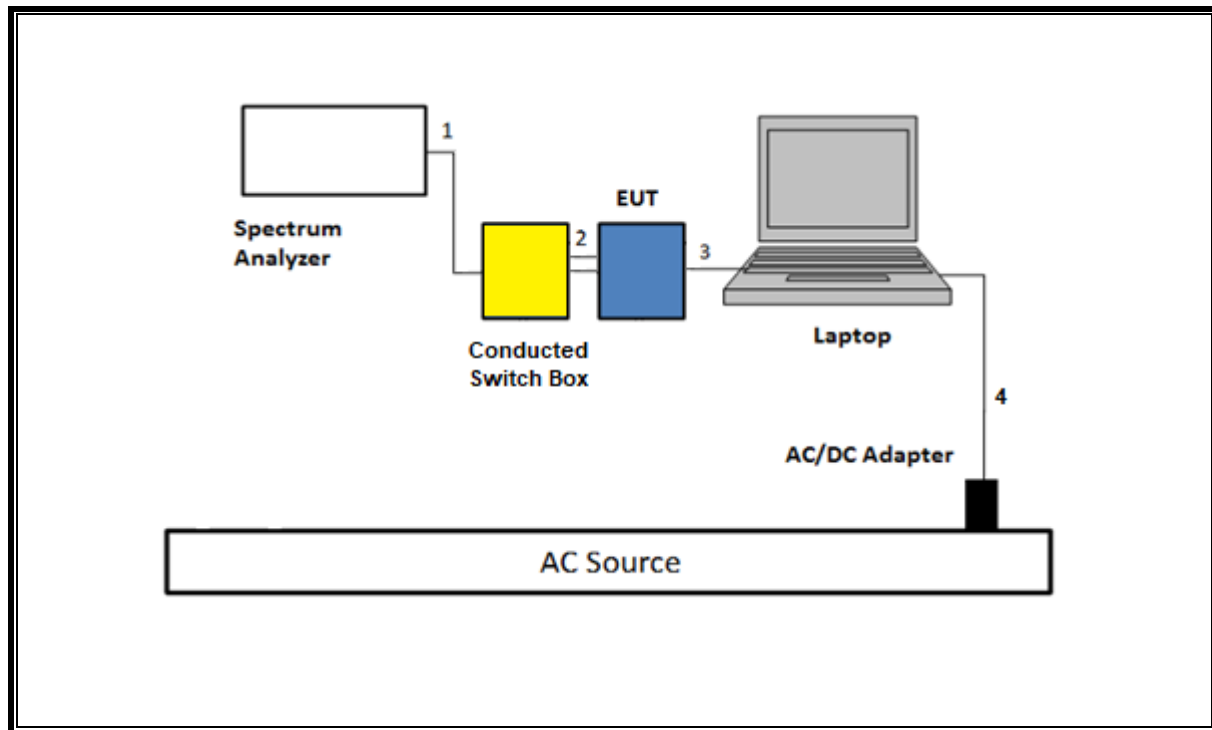
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number		FCC ID/ DoC
Laptop		Apple	Macbook Pro	C02VD7SAHV22		BCGA1708
Laptop AC/DC adapter		Liteon Technology	A1424	NSW25679		DoC
EUT AC/DC adapter		Apple	A1720	C3D8417A7R93KVPA8		DoC
Conducted Switch Box		UL	n/a	208281		N/A
10dB Fixed Attenuator, 2 Watts Up to 26.5 GHz		Pasternack Enterprises	PE7024-10	236358		N/A
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	SMA	1	SMA	Shielded	0.75	To spectrum Analyzer
2	Antenna	2	SMA	Un-shielded	0.2	To Conducted Switch Box
3	USB-C	1	USB-C	Shielded	1.0	N/A
4	AC	1	AC	Un-shielded	2	N/A
I/O CABLES (RF RADIATED AND AC LINE CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Shielded	1	N/A

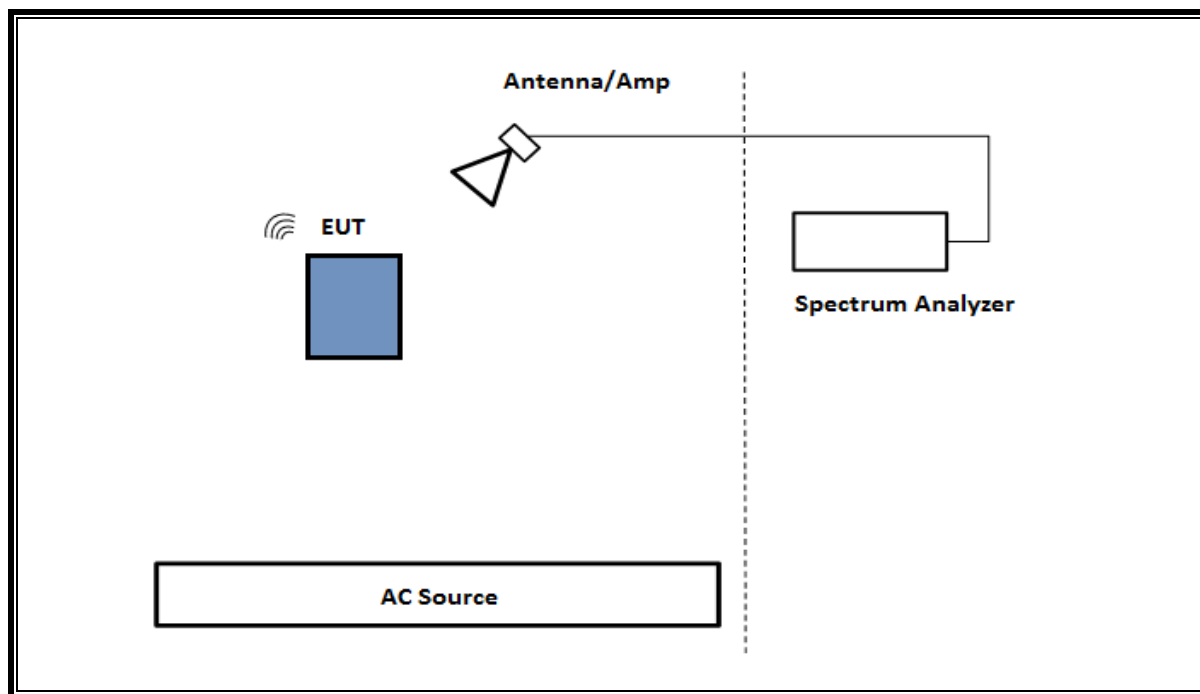
TEST SETUP

The EUT setup is shown as below. Test software exercised the radio card.

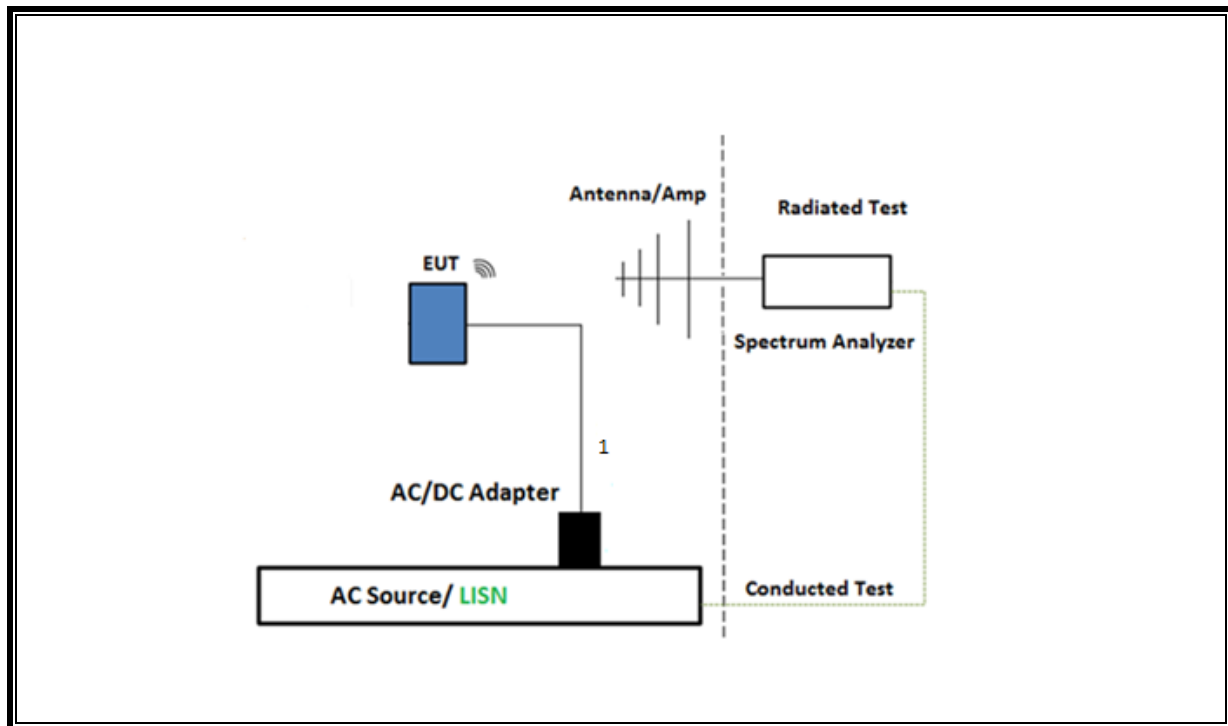
SETUP DIAGRAM FOR CONDUCTED TESTS



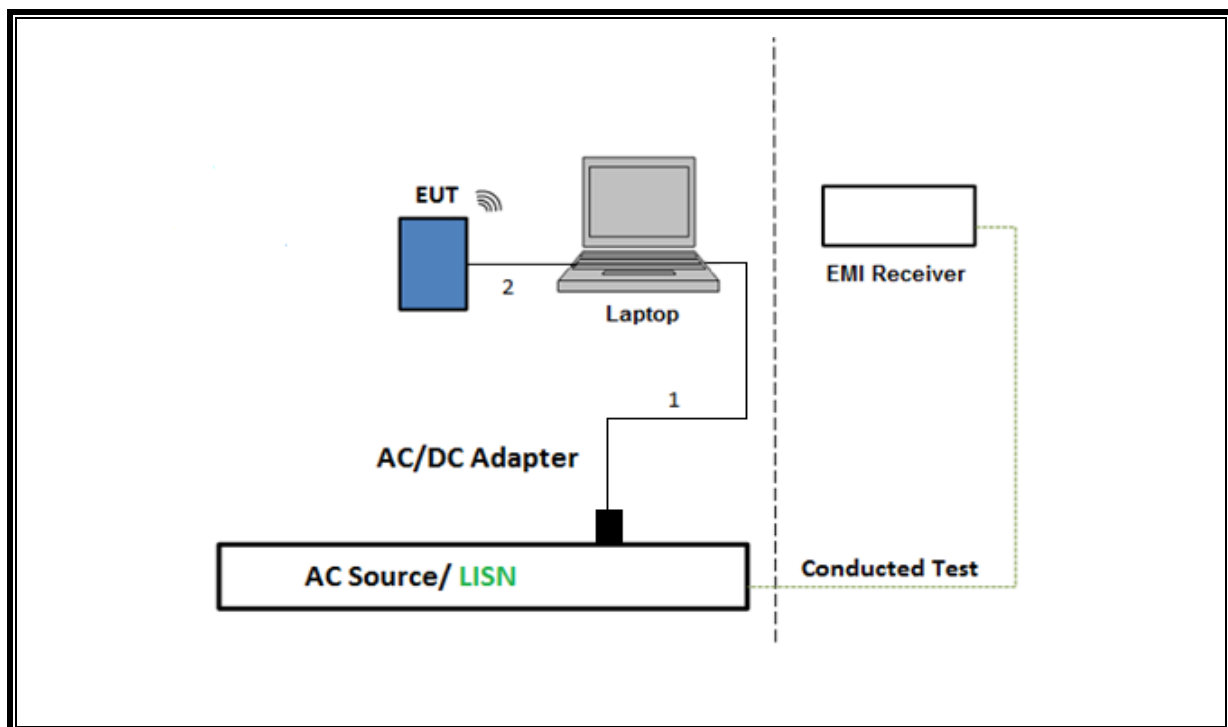
SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST



TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

6 dB Emission BW: KDB 789033 D02 v02r01, Section C.2

26 dB Emission BW: KDB 789033 D02 v02r01, Section C.1

99% Occupied BW: KDB 789033 D02 v02r01, Section D.

Conducted Output Power: KDB 789033 D02 v02r01

Power Spectral Density: KDB 789033 D02 v02r01, Section F

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.

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

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

8. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	230299	1/12/2024	1/12/2023
RF Filter Box, 1-18GHz, 12 Port.	UL-FR1	Frankenstein	231874	4/19/2024	4/19/2023
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179372	2/29/2024	2/29/2023
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	230300	1/12/2024	1/12/2023
RF Filter Box, 1-18GHz, 12 Port.	UL-FR1	Frankenstein	231875	2/27/2024	2/27/2023
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	170063	2/29/2024	2/29/2023
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	226672	1/9/2024	1/9/2023
RF Filter Box, 1-18GHz, 12 Port.	UL-FR1	Frankenstein	231876	2/27/2024	2/27/2023
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	235670	4/30/2024	4/30/2023
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	84797	9/20/2023	9/20/2022
RF Filter Box, 1-18GHz	UL-FR1	N/A	171389	5/31/2024	5/31/2023
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201497	2/29/2024	2/29/2023
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	170648	3/31/2024	3/31/2023
*Antenna, Passive Loop 30Hz to 1MHz	Electro-Metrics	EM-6871	170014	7/19/2023	7/19/2022
*Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170015	7/28/2023	7/28/2022
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	80714	10/6/2023	10/6/2022
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	199658	12/6/2023	12/6/2022
Antenna, Horn 26.5 to 40GHz	A.R.A.	MWH-2640/B	199660	12/6/2023	12/6/2022
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	223459	2/29/2024	2/29/2023
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	226078	2/29/2024	2/29/2023
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90756	1/31/2024	1/24/2023
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90389	1/31/2024	1/31/2023
*Conducted Switch Box	N/A	CSB	221008	6/21/2023	6/21/2022
10dB Fixed Attenuator, 2 Watts Up to 26.5 GHz	Pasternack Enterprises	PE7024-10	236358	Verified/Characterized before use	
10dB Fixed Attenuator, 2 Watts Up to 26.5 GHz	Pasternack Enterprises	PE7024-10	236355	Verified/Characterized before use	
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Keysight Technologies Inc	E4440A	81311	2/29/2024	2/29/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	80397	2/28/2024	2/28/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	85214	2/28/2024	2/28/2023
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A-544	87738	2/28/2024	2/28/2023

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	93091	2/29/2024	02/29/2023
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250- 25-2-01-480V	175764	1/31/2024	1/31/2023
*Transient Limiter	TE	TBFL1	207996	7/15/2023	7/15/2022
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, May 1 , 2023		
Conducted Software	UL	UL EMC	2020.8.16		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Mar 3, 2023		

*Testing is completed before equipment expiration date.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

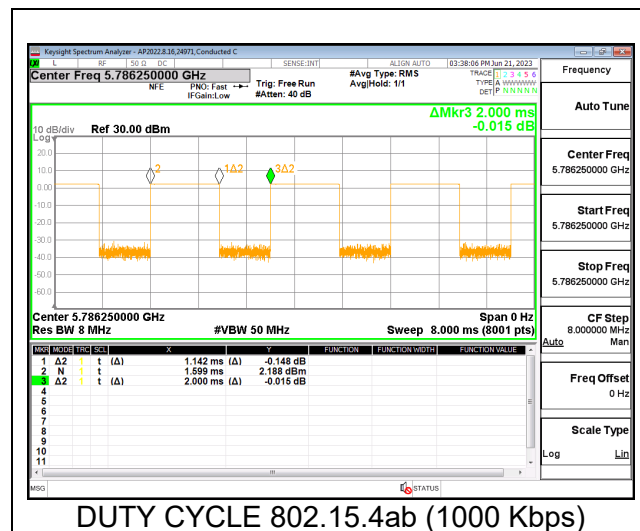
PROCEDURE

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)
802.15.4ab						
1000 Kbps	1.142	2.000	0.571	57.10%	2.43	0.876

DUTY CYCLE PLOTS



9.2. 99% AND 26 dB BANDWIDTH

LIMITS

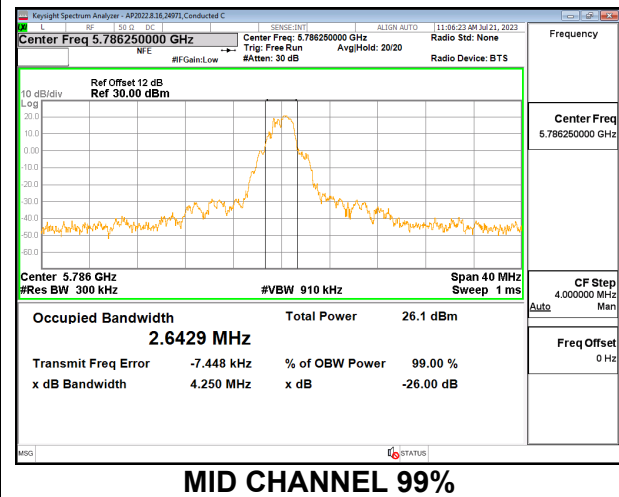
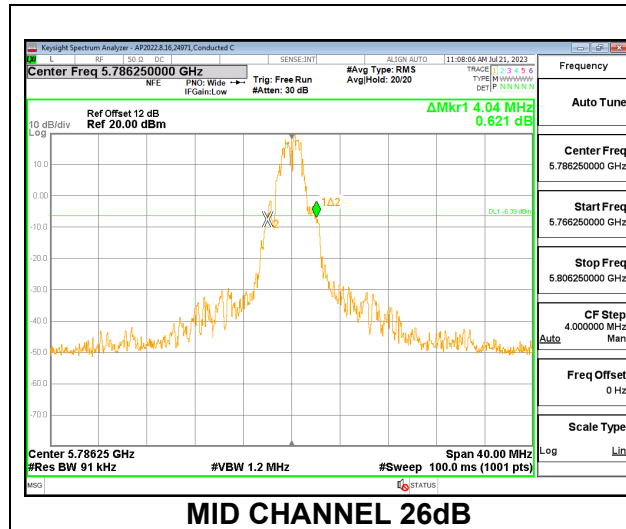
None; for reporting purposes only.

RESULTS

Only High Power modes (1000Kbps) result is reported, it covers all Low Power modes. Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

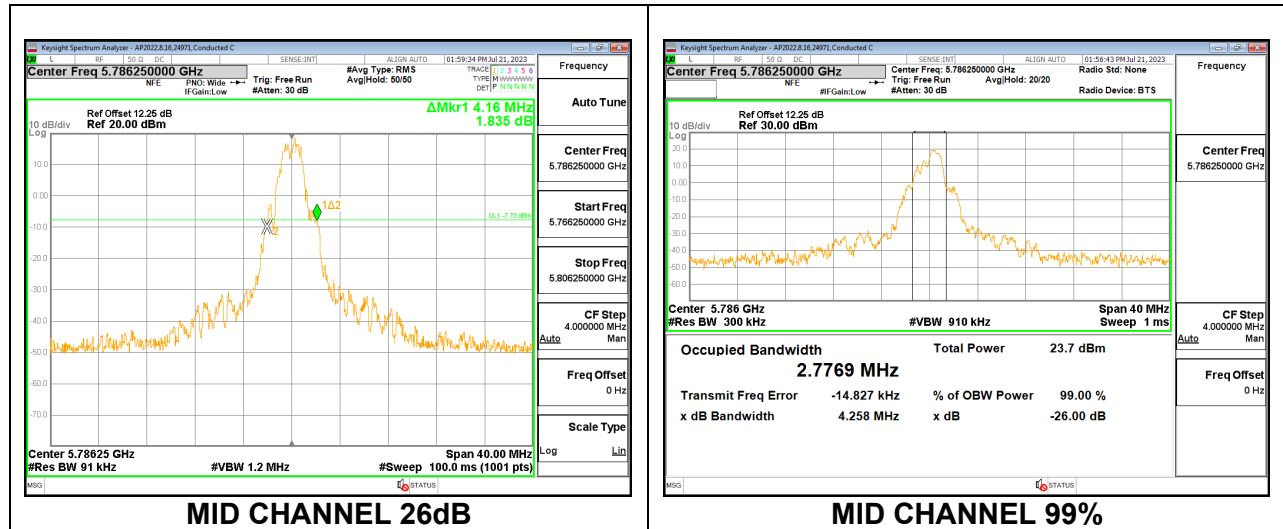
1TX Antenna 6 MODE

Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5728.75	3.88	2.7525
Mid	5786.25	4.04	2.6429
High	5846.25	4.16	2.5313



1TX Antenna 5 MODE

Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	5728.75	3.88	2.6648
Mid	5786.25	4.16	2.7769
High	5846.25	4.08	2.6250



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

RSS-247 6.2.4.1

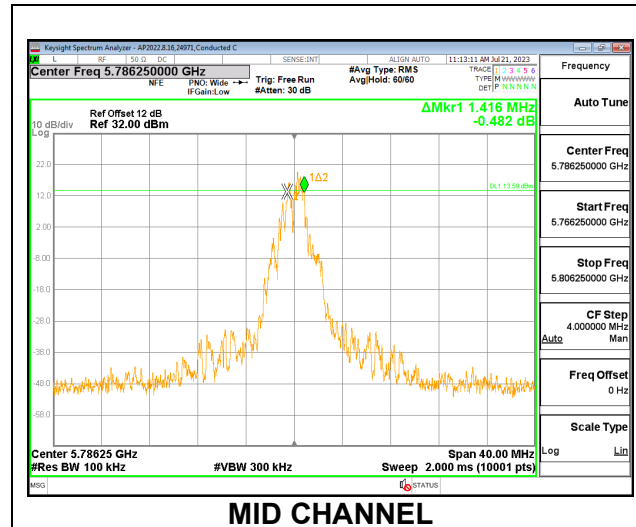
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Only High Power modes (1000Kbps) result is reported, it covers all Low Power modes. Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

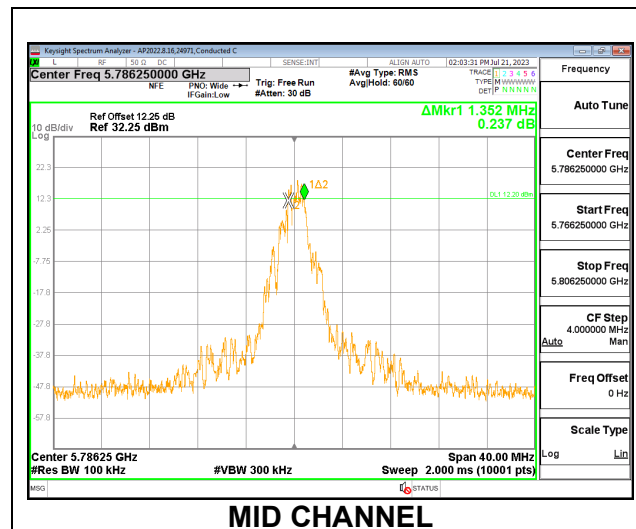
1TX Antenna 6 MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5728.75	1.284	0.5
Mid	5786.25	1.416	0.5
High	5846.25	1.556	0.5



1TX Antenna 5 MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	5728.75	1.476	0.5
Mid	5786.25	1.352	0.5
High	5846.25	1.412	0.5



9.4. OUTPUT POWER AND PSD

LIMITS

FCC §15.407

Band 5.725-5.85 GHz

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G).

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F.

RSS-247

Bands 5.47-5.6 GHz and 5.65-5.725 GHz

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10} B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

Band 5.725-5.85 GHz

The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G).

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F

Only Mid channel plot is reported to show setting parameter complies with testing method/procedure.

DIRECTIONAL ANTENNA GAIN

For 1 TX:

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

Band (GHz)	ANT 6 Gain (dBi)	ANT 5 Gain (dBi)
5.8	-2.0	-4.0

9.4.1. HIGH POWER (1000 Kbps)

1TX Antenna 6 MODE (FCC+IC)

Test Engineer:	24971
Test Date:	07/21/2023

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/500KHz)
Low	5728.75	-2.00	30.00	30.00
Mid	5786.25	-2.00	30.00	30.00
High	5846.25	-2.00	30.00	30.00

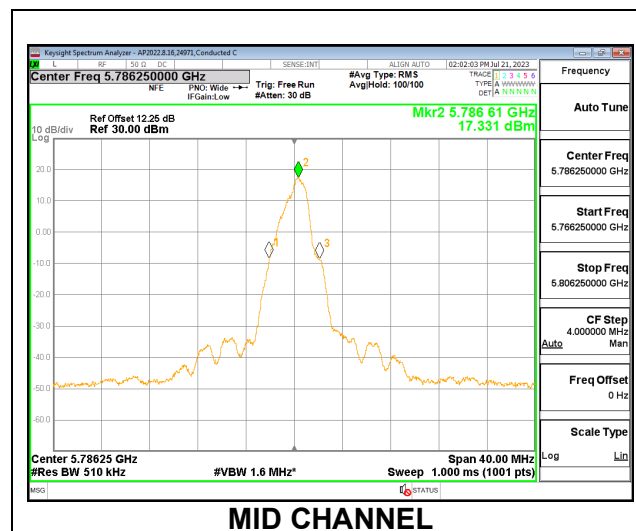
Duty Cycle CF (dB)	2.43	Included in Calculations of Corr'd PSD
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Output Power Results

Channel	Frequency (MHz)	Antenna 6 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5728.75	20.39	20.39	30.00	-9.61
Mid	5786.25	20.41	20.41	30.00	-9.59
High	5846.25	20.49	20.49	30.00	-9.51

PSD Results

Channel	Frequency (MHz)	Antenna 6 Meas PSD (dBm/500KHz)	Total Corr'd PSD (dBm/500KHz)	PSD Limit (dBm/500KHz)	PSD Margin (dB)
Low	5728.75	16.575	19.005	30.00	-11.00
Mid	5786.25	17.331	19.761	30.00	-10.24
High	5846.25	17.773	20.203	30.00	-9.80



1TX Antenna 5 MODE (FCC+IC)

Test Engineer:	24971
Test Date:	07/21/2023

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/500KHz)
Low	5728.75	-4.00	30.00	30.00
Mid	5786.25	-4.00	30.00	30.00
High	5846.25	-4.00	30.00	30.00

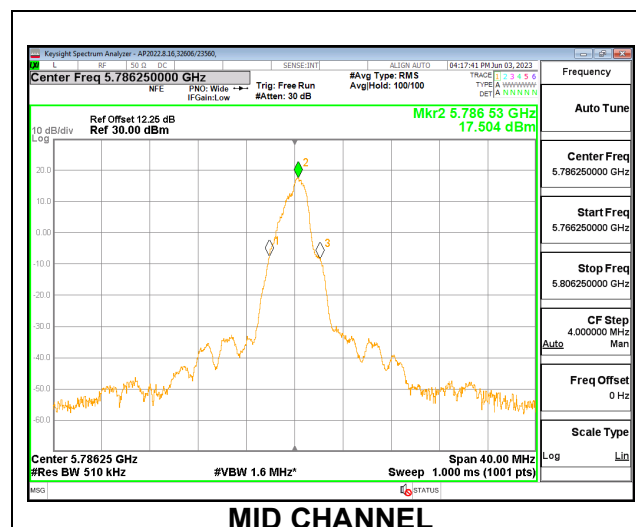
Duty Cycle CF (dB)	2.43	Included in Calculations of Corr'd PSD
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Output Power Results

Channel	Frequency (MHz)	Antenna 5 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5728.75	20.28	20.28	30.00	-9.72
Mid	5786.25	20.32	20.32	30.00	-9.68
High	5846.25	20.48	20.48	30.00	-9.52

PSD Results

Channel	Frequency (MHz)	Antenna 5 Meas PSD (dBm/500KHz)	Total Corr'd PSD (dBm/500KHz)	PSD Limit (dBm/500KHz)	PSD Margin (dB)
Low	5728.75	17.503	19.933	30.00	-10.07
Mid	5786.25	17.504	19.934	30.00	-10.07
High	5846.25	19.287	21.717	30.00	-8.28



9.4.2. LOW POWER (1000 Kbps)

1TX Antenna 6 MODE (FCC+IC)

Test Engineer:	24971
Test Date:	07/21/2023

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/500KHz)
Low	5728.75	-2.00	30.00	30.00
Mid	5786.25	-2.00	30.00	30.00
High	5846.25	-2.00	30.00	30.00

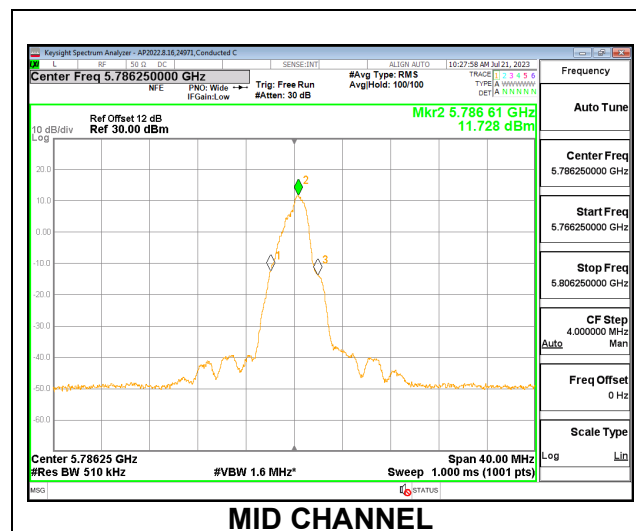
Duty Cycle CF (dB)	2.43	Included in Calculations of Corr'd PSD
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Output Power Results

Channel	Frequency (MHz)	Antenna 6 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5728.75	16.22	16.22	30.00	-13.78
Mid	5786.25	16.18	16.18	30.00	-13.82
High	5846.25	16.08	16.08	30.00	-13.92

PSD Results

Channel	Frequency (MHz)	Antenna 6 Meas PSD (dBm/500KHz)	Total Corr'd PSD (dBm/500KHz)	PSD Limit (dBm/500KHz)	PSD Margin (dB)
Low	5728.75	11.661	14.091	30.00	-15.91
Mid	5786.25	11.728	14.158	30.00	-15.84
High	5846.25	12.613	15.043	30.00	-14.96



1TX Antenna 5 MODE (FCC+IC)

Test Engineer:	24971
Test Date:	07/21/2023

Antenna Gain and Limit

Channel	Frequency (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm/500KHz)
Low	5728.75	-4.00	30.00	30.00
Mid	5786.25	-4.00	30.00	30.00
High	5846.25	-4.00	30.00	30.00

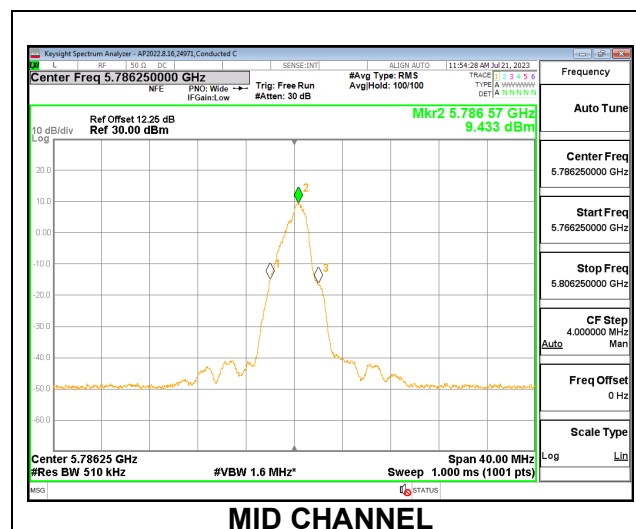
Duty Cycle CF (dB)	2.43	Included in Calculations of Corr'd PSD
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Output Power Results

Channel	Frequency (MHz)	Antenna 5 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5728.75	14.25	14.25	30.00	-15.75
Mid	5786.25	14.08	14.08	30.00	-15.92
High	5846.25	14.11	14.11	30.00	-15.89

PSD Results

Channel	Frequency (MHz)	Antenna 5 Meas PSD (dBm/500KHz)	Total Corr'd PSD (dBm/500KHz)	PSD Limit (dBm/500KHz)	PSD Margin (dB)
Low	5728.75	9.344	11.774	30.00	-18.23
Mid	5786.25	9.433	11.863	30.00	-18.14
High	5846.25	10.508	12.938	30.00	-17.06



10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209 -Restricted bands
FCC §15.407(b)(1-3) -Un-Restricted bands
RSS 247 Issue 2 Sections
6.2.1.2 (for 5150-5250 MHz band)
6.2.2.2 (for 5250-5350 MHz band)
6.2.3.2 (for 5470-5600 MHz and 5650-5725 MHz bands)
6.2.4.2 (for 5725-5850 MHz band)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 30 MHz to 1GHz and 18GHz to 40 GHz is investigated with the transmitter set to transmit at the channel with highest output power as worst-case scenario. 1GHz to 18GHz was set to the lowest, middle, and highest channels in the 5 GHz bands.

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.

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

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.

RESULTS

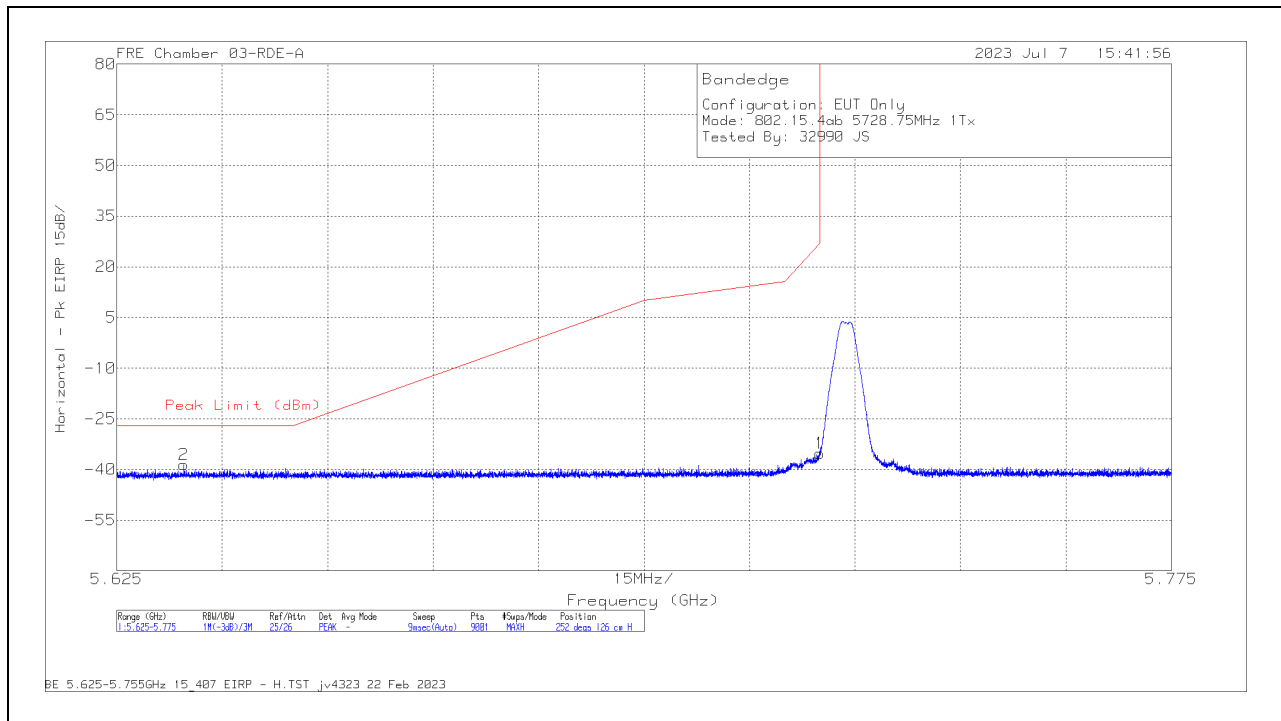
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. HIGH POWER 802.15.4ab IN THE UNII-5 BAND (1000Kbps)

ANT 6

BANDEDGE (LOW CHANNEL)

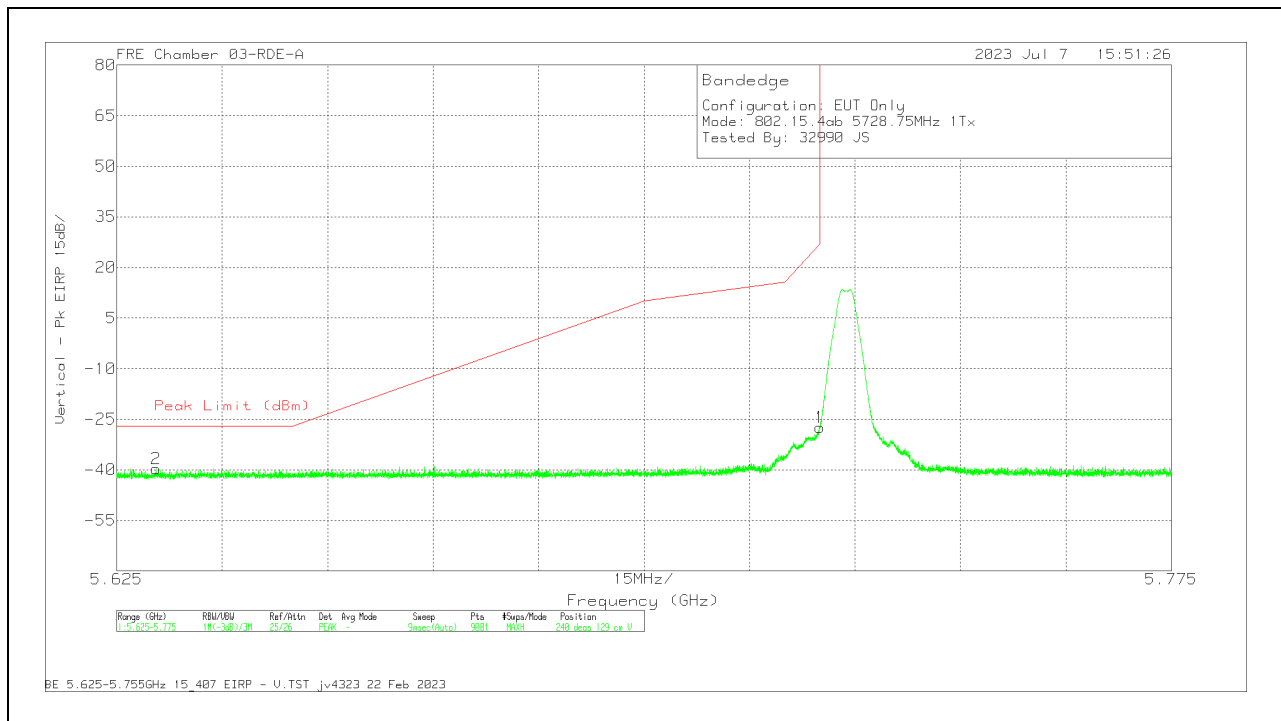
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	200897 ACF (dB) 3mH	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-43.79	Pk	34.5	11.8	0	-37.78	-35.27	27	-62.27	252	126	H
2	5.634567	-46.85	Pk	34.4	11.8	0	-37.95	-38.6	-27	-11.6	252	126	H

Pk - Peak detector

VERTICAL RESULT

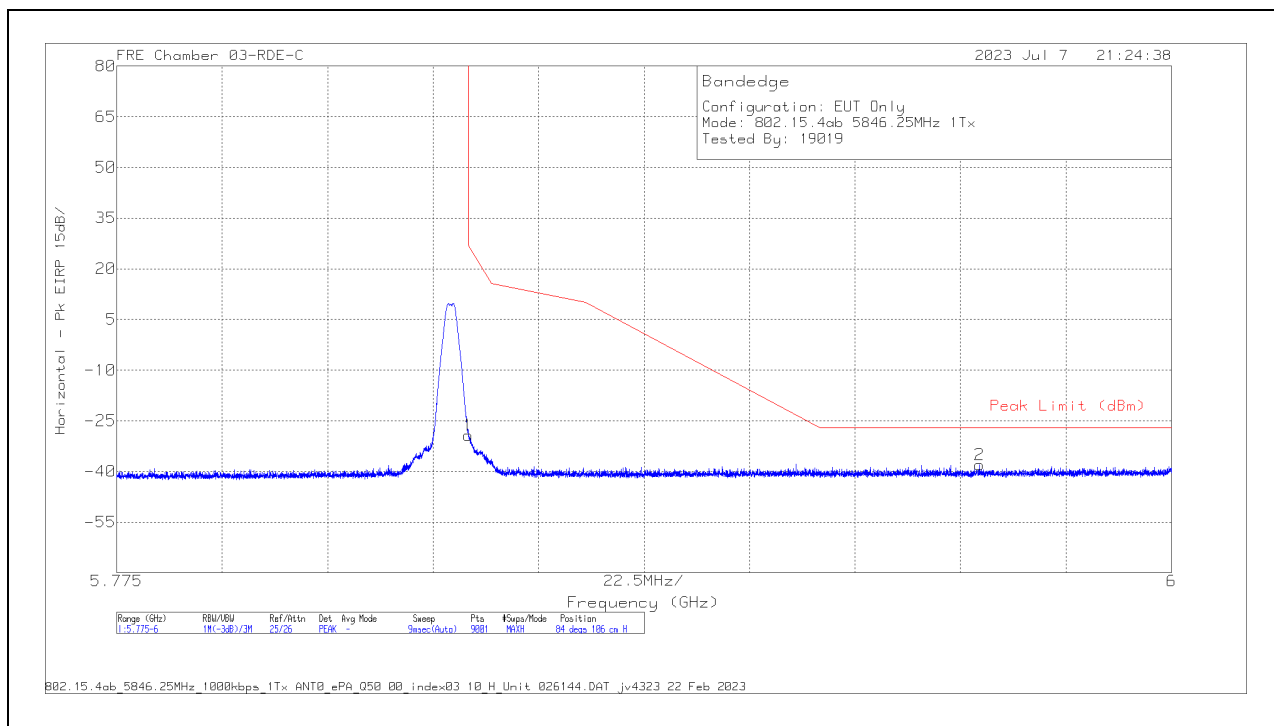


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	200897 ACF (dB) 3mH	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-36	Pk	34.5	11.8	0	-37.78	-27.48	27	-54.48	240	129	V
2	5.630617	-47.74	Pk	34.3	11.8	0	-37.98	-39.62	-27	-12.62	240	129	V

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

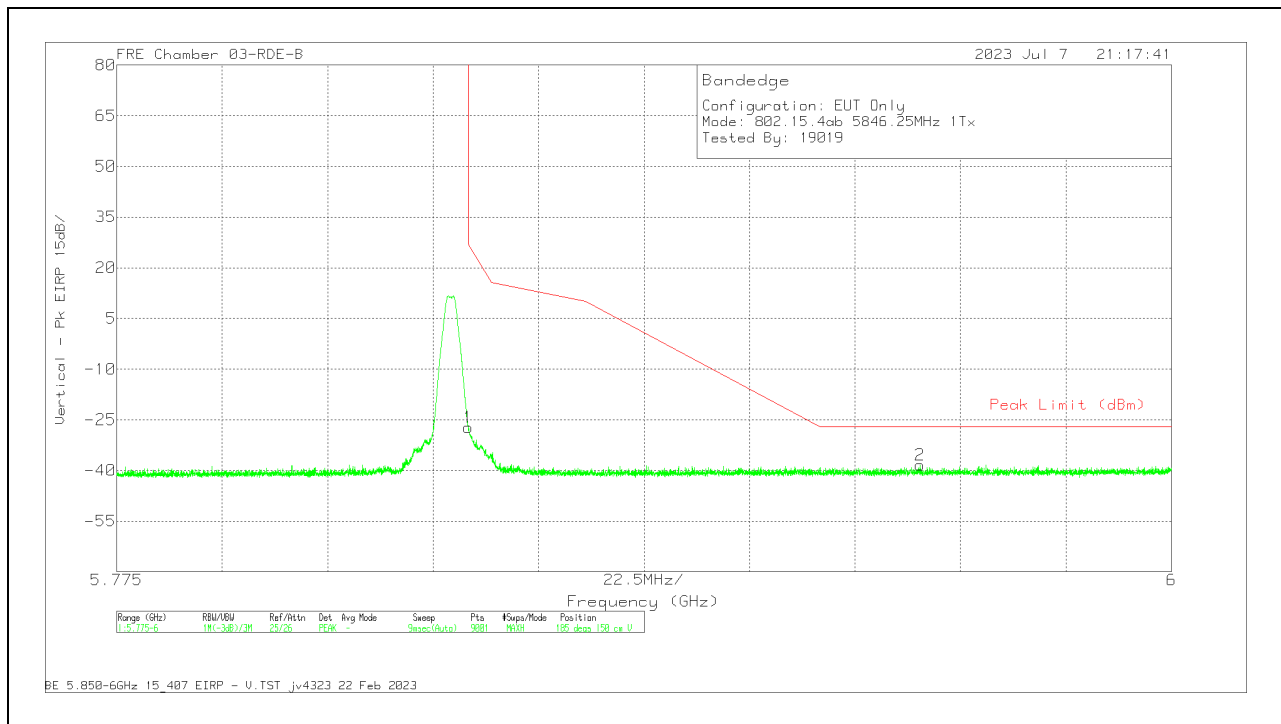
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-37.23	Pk	34.7	11.8	0	-46.1	-36.83	27	-63.83	84	106	H
2	5.95905	-46.5	Pk	34.9	11.8	0	-45.71	-45.51	-27	-18.51	84	106	H

Pk - Peak detector

VERTICAL RESULT

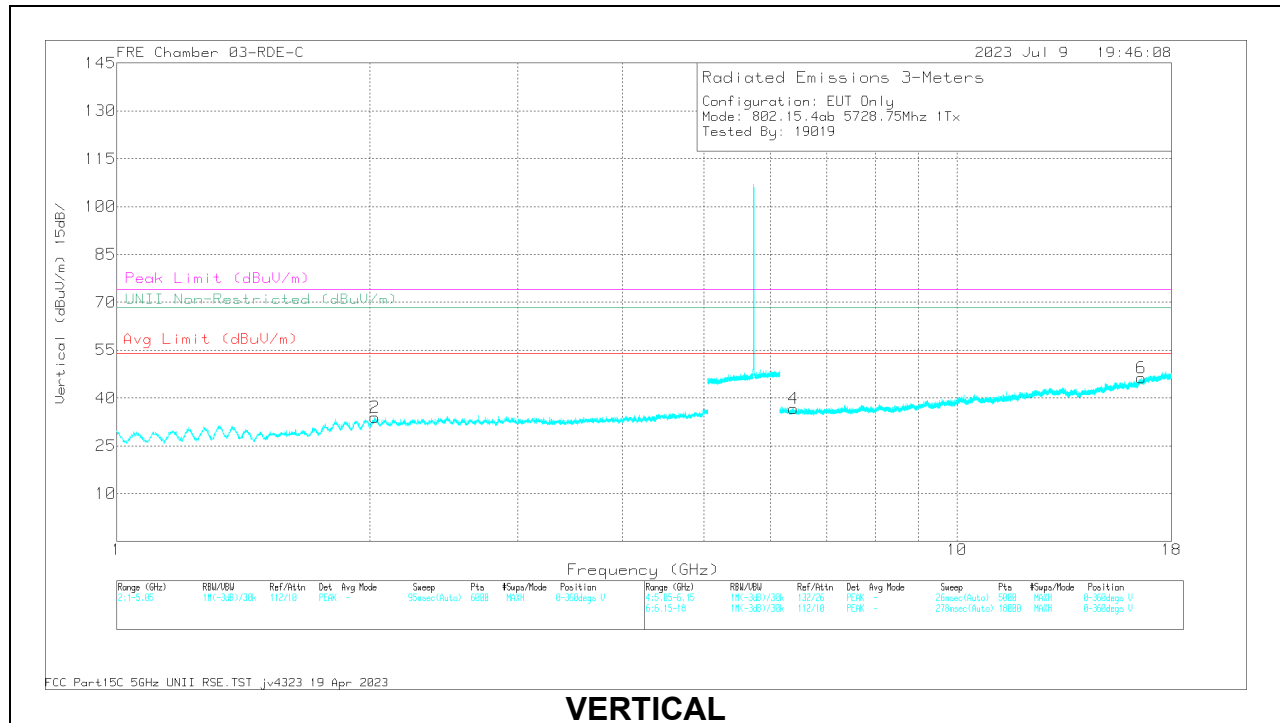
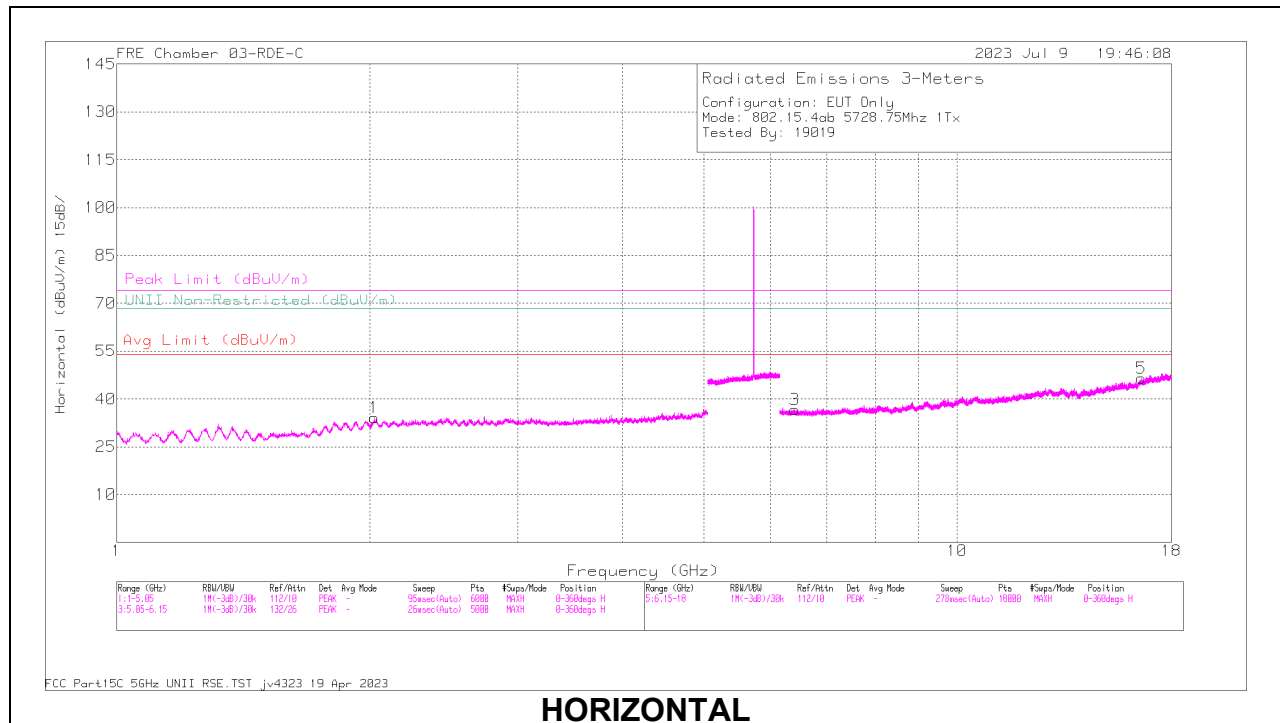


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-35.24	Pk	34.7	11.8	0	-38.5	-27.24	27	-54.24	185	150	V
2	5.9464	-46.74	Pk	34.9	11.8	0	-38.3	-38.34	-27	-11.34	185	150	V

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



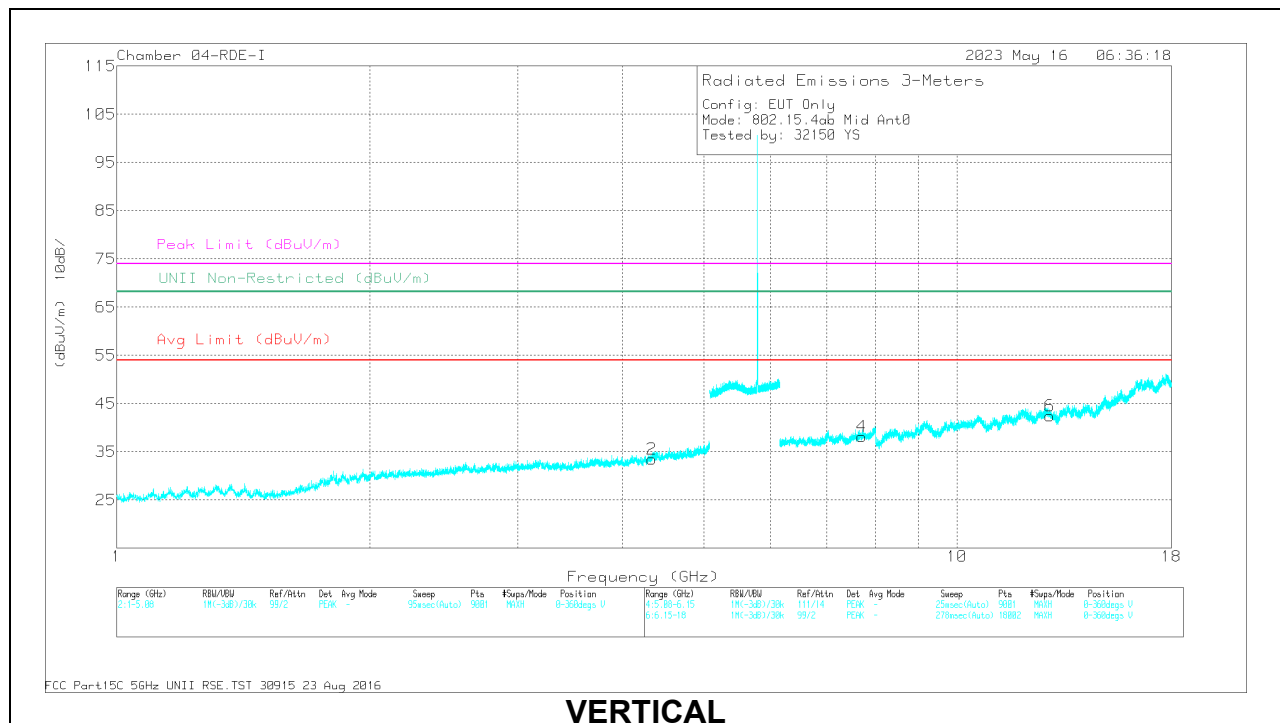
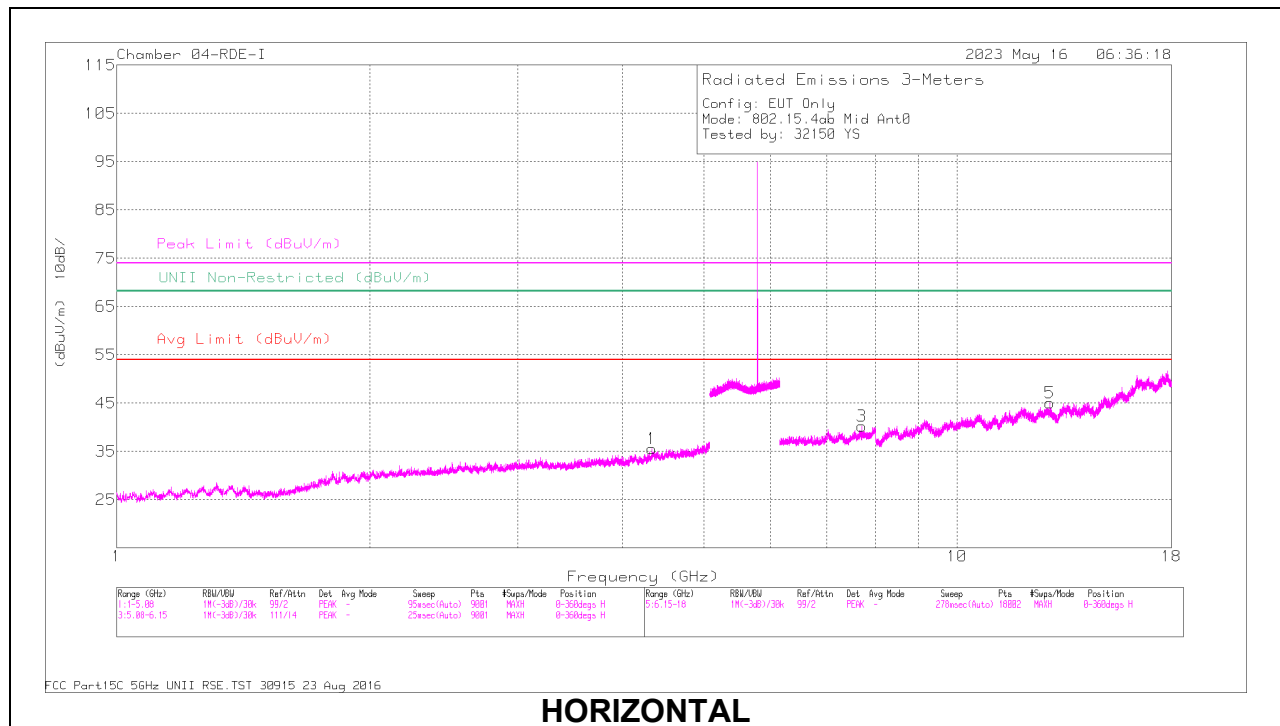
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.025772	60.16	PK-U	31.4	0	-48.2	43.36	68.2	-24.84	340	136	H
2	2.028809	60.78	PK-U	31.5	0	-48.12	44.16	68.2	-24.04	99	177	V
3	6.403684	56.05	PK-U	35.5	0	-45.3	46.25	68.2	-21.95	176	137	H
4	6.386781	57.01	PK-U	35.4	0	-45.12	47.29	68.2	-20.91	162	121	V
5	16.577803	57.44	PK-U	41.3	0	-42.9	55.84	68.2	-12.36	149	161	H
6	16.566182	57.04	PK-U	41.3	0	-42.92	55.42	68.2	-12.78	216	131	V

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

MID CHANNEL RESULTS



RADIATED EMISSIONS

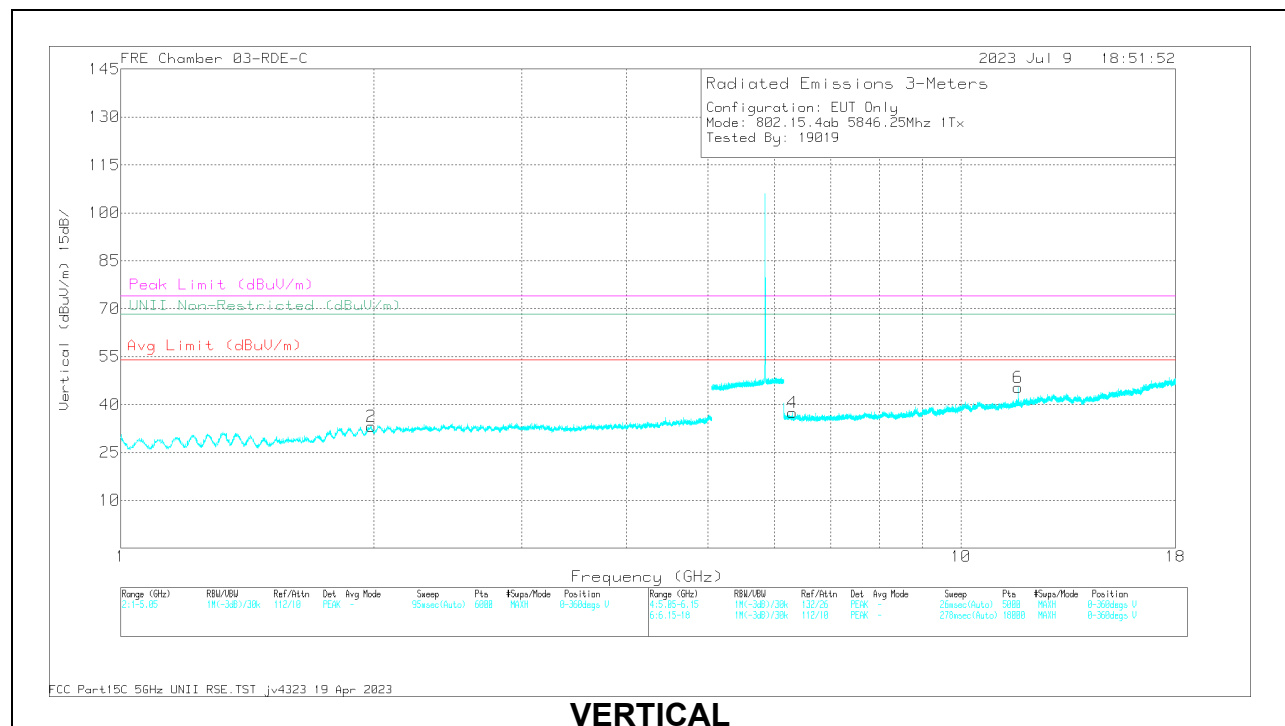
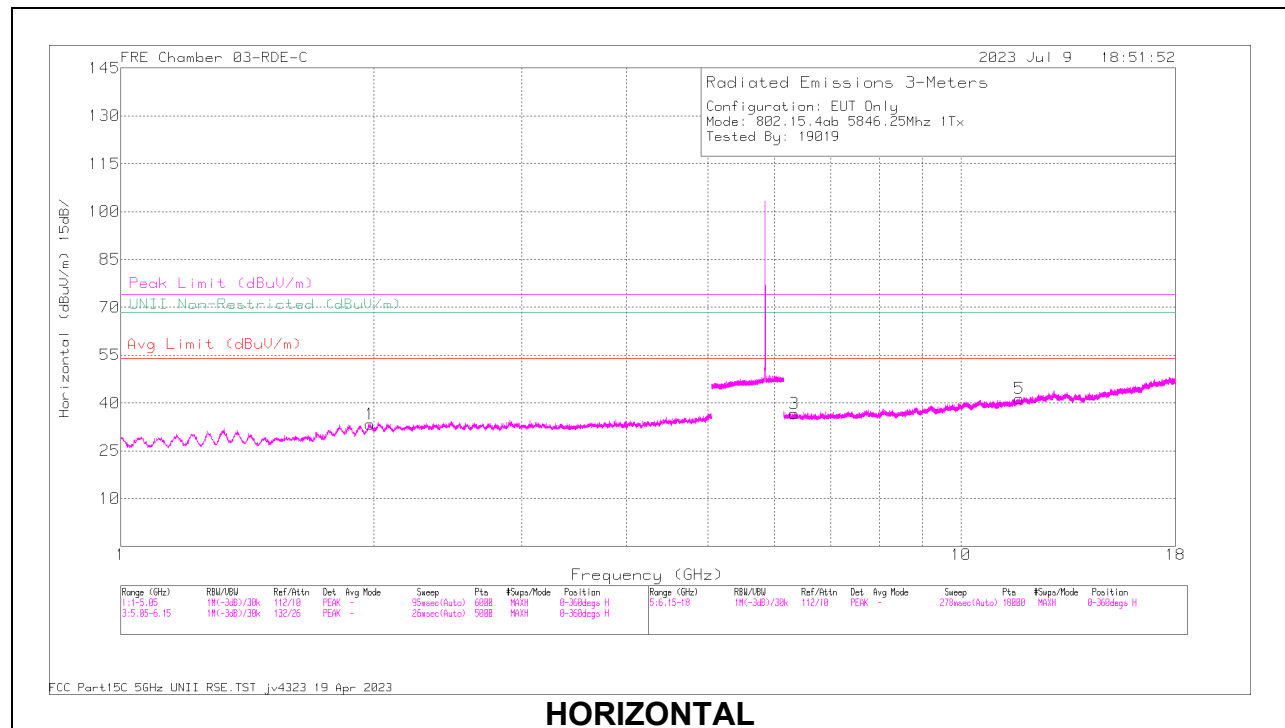
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	84797 ACF (dB) - 3mH	Amp/Cbl/ Fitr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.334639	38.96	PK-U	33.8	-27.5	0	45.26	-	-	74	-28.74	-	-	297	229	H
	* 4.336734	26.15	ADR	33.8	-27.5	2.43	34.88	54	-19.12	-	-	-	-	297	229	H
2	* 4.336464	38.76	PK-U	33.8	-27.5	0	45.06	-	-	74	-28.94	-	-	123	168	V
	* 4.338163	26.07	ADR	33.8	-27.4	2.43	34.9	54	-19.1	-	-	-	-	123	168	V
3	* 7.697677	33.36	PK-U	35.8	-20.8	0	48.36	-	-	74	-25.64	-	-	228	294	H
	* 7.700029	21.18	ADR	35.8	-20.8	2.43	38.61	54	-15.39	-	-	-	-	228	294	H
4	* 7.698378	33.43	PK-U	35.8	-20.8	0	48.43	-	-	74	-25.57	-	-	226	143	V
	* 7.697418	20.93	ADR	35.8	-20.8	2.43	38.36	54	-15.64	-	-	-	-	226	143	V
5	12.908935	33.36	PK-U	39.3	-19.5	0	53.16	-	-	-	-	68.2	-15.04	332	260	H
6	12.906244	32.76	PK-U	39.3	-19.4	0	52.66	-	-	-	-	68.2	-15.54	182	243	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.978962	60.63	PK-U	31.2	0	-48.2	43.63	-	-	-	-	68.2	-24.57	23	164	H
2	1.984576	60.55	PK-U	31.3	0	-48.24	43.61	-	-	-	-	68.2	-24.59	62	143	V
3	6.332771	56.28	PK-U	35.4	0	-45.32	46.36	-	-	-	-	68.2	-21.84	93	184	H
4	6.307331	56.34	PK-U	35.4	0	-45.37	46.37	-	-	-	-	68.2	-21.83	201	181	V
5	* 11.745157	55.2	PK-U	38.4	0	-43.3	50.3	-	-	74	-23.7	-	-	153	173	H
	* 11.743622	43.43	ADR	38.4	2.43	-43.24	41.02	54	-12.98	-	-	-	-	153	173	H
6	* 11.693566	58.15	PK-U	38.3	0	-43.26	53.19	-	-	74	-20.81	-	-	10	121	V
	* 11.693538	47.6	ADR	38.3	2.43	-43.25	45.08	54	-8.92	-	-	-	-	10	121	V

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

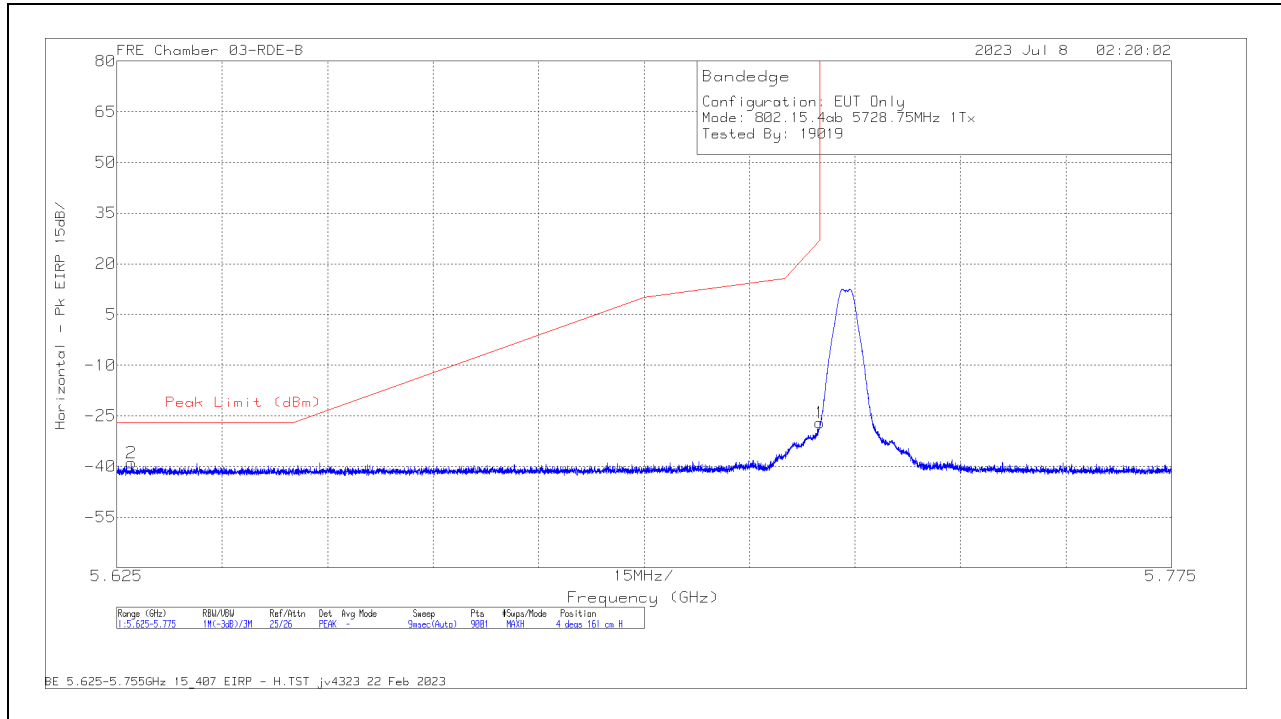
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

ANT 5

BANDEDGE (LOW CHANNEL)

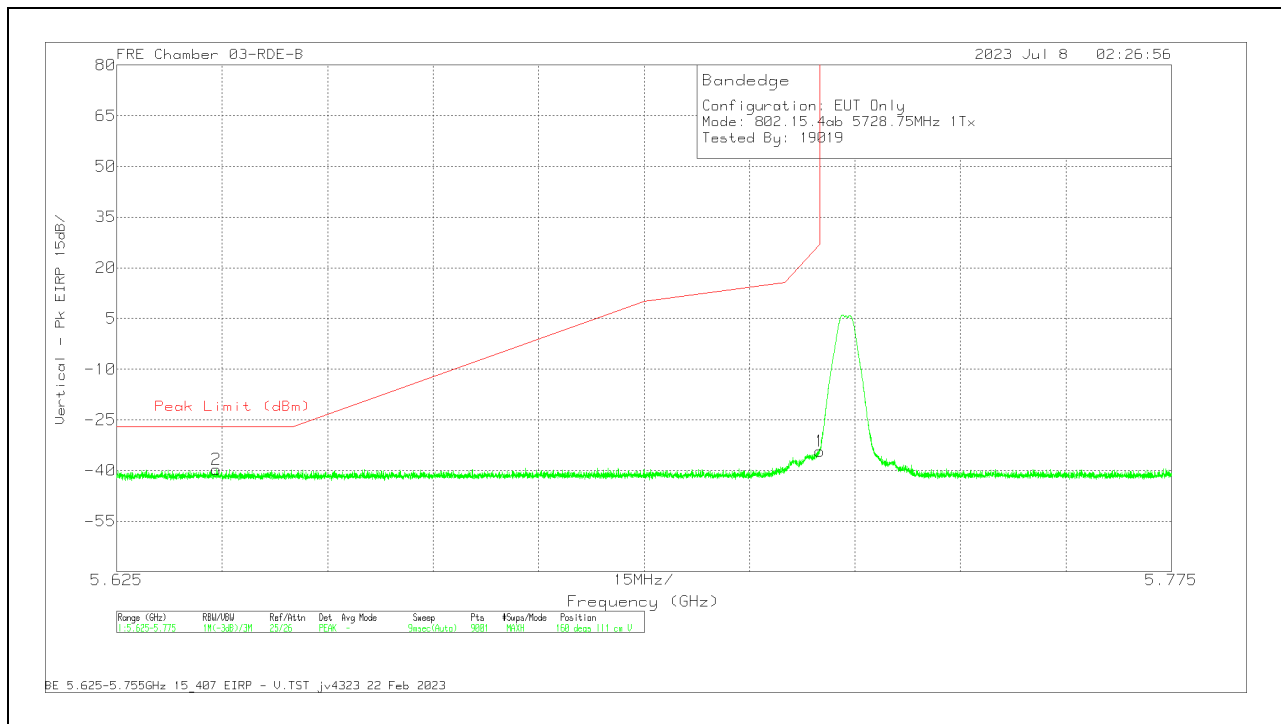
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-34.52	Pk	34.5	11.8	0	-38.8	-27.02	27	-54.02	4	161	H
2	5.627083	-46.06	Pk	34.4	11.8	0	-38.99	-38.85	-27	-11.85	4	161	H

Pk - Peak detector

VERTICAL RESULT

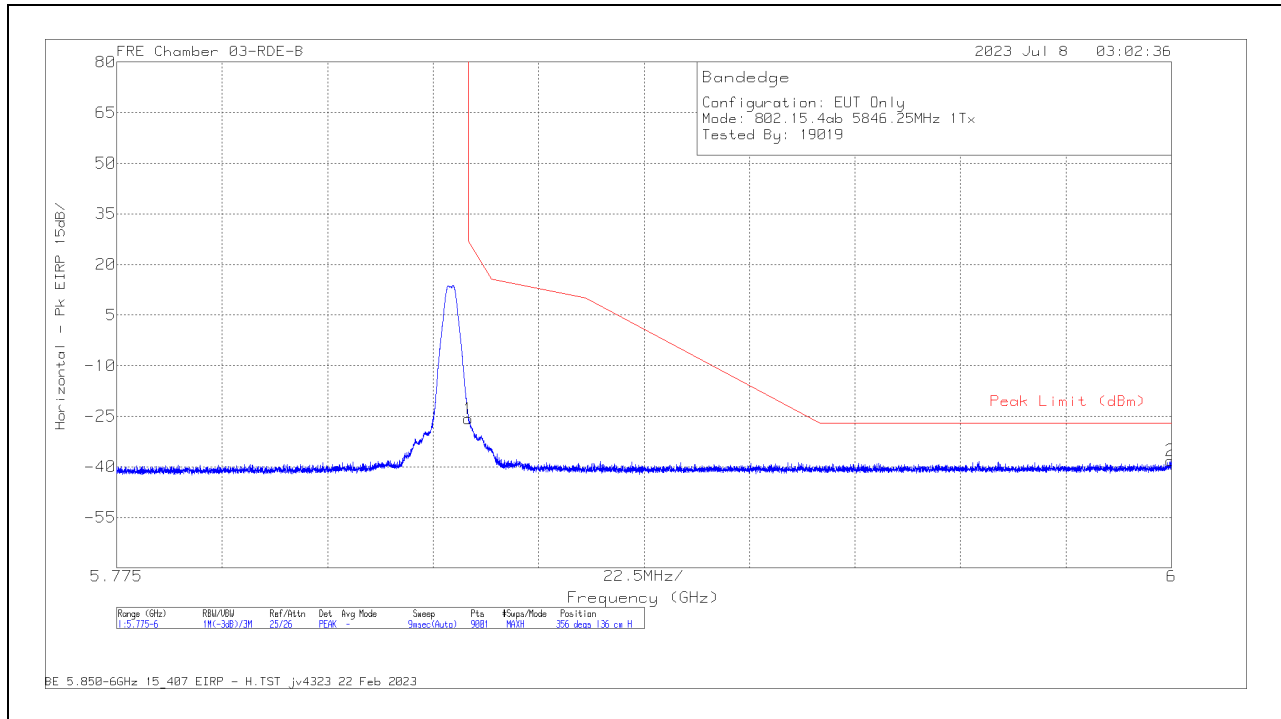


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-41.79	Pk	34.5	11.8	0	-38.8	-34.29	27	-61.29	160	111	V
2	5.639167	-47.1	Pk	34.4	11.8	0	-38.82	-39.72	-27	-12.72	160	111	V

Pk - Peak detector

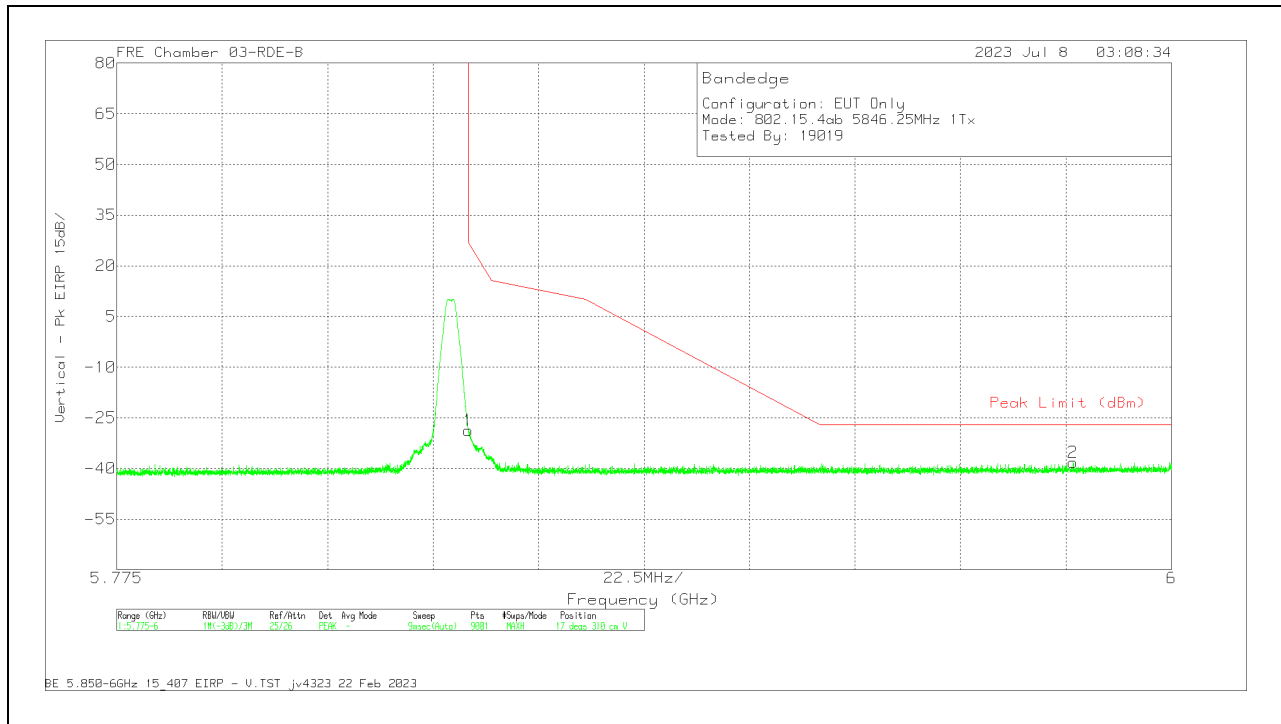
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Pk - Peak detector

VERTICAL RESULT

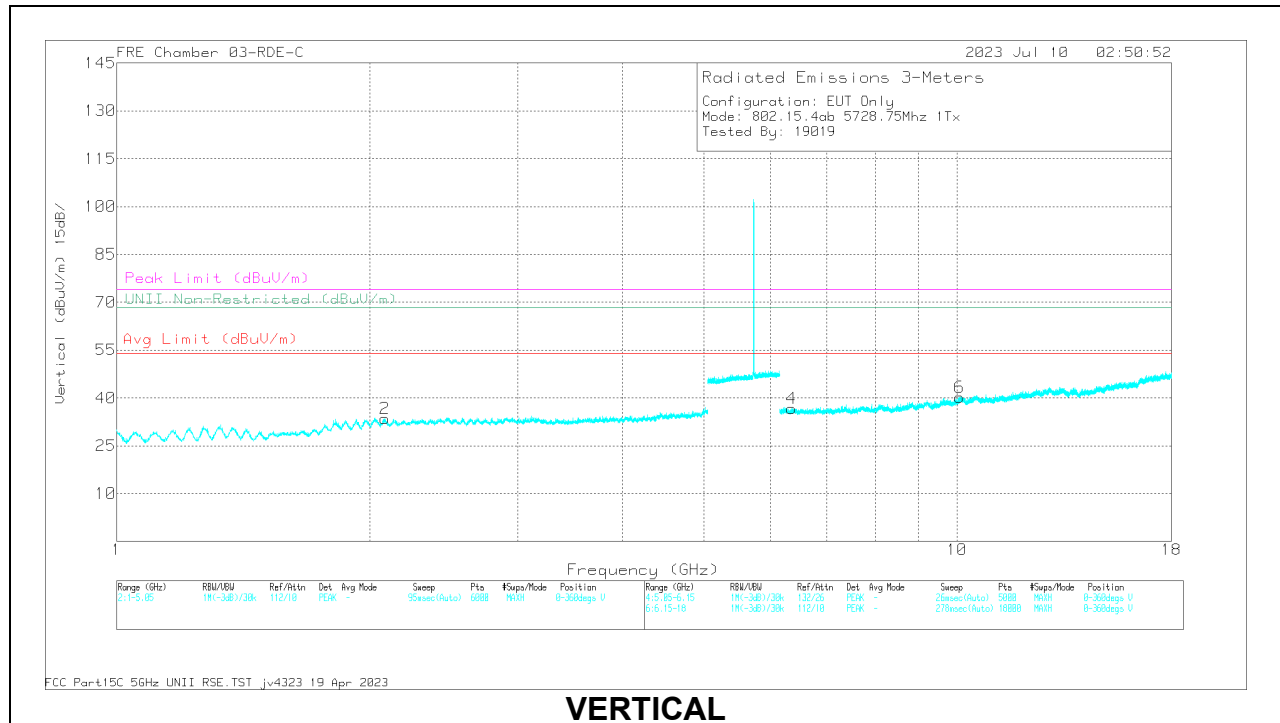
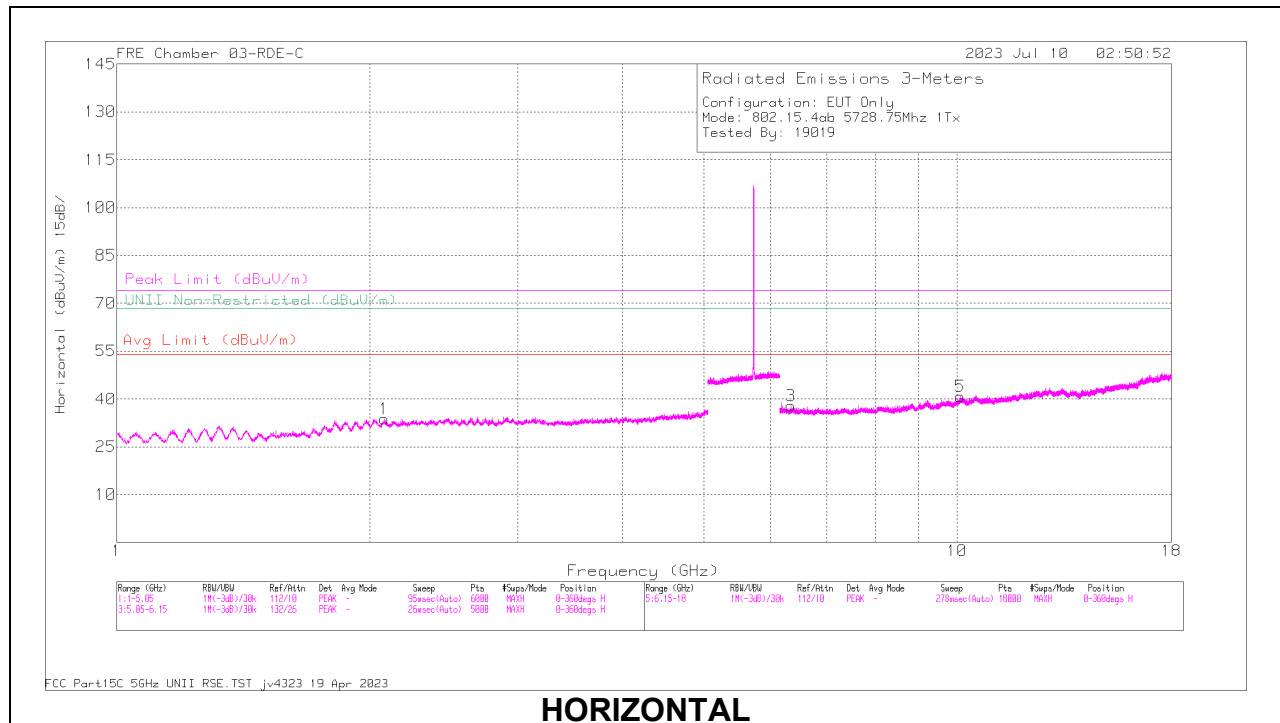


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-36.72	Pk	34.7	11.8	0	-38.5	-28.72	27	-55.72	17	310	V
2	5.97905	-46.87	Pk	35	11.8	0	-38.2	-38.27	-27	-11.27	17	310	V

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



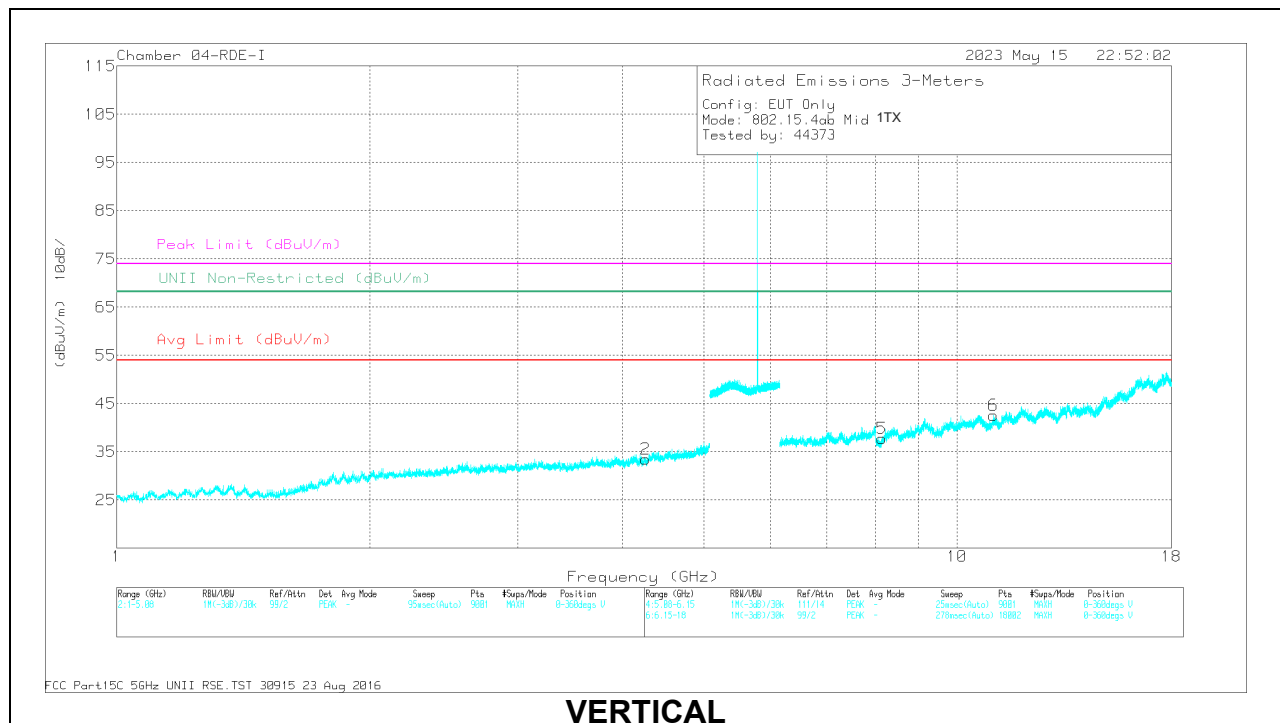
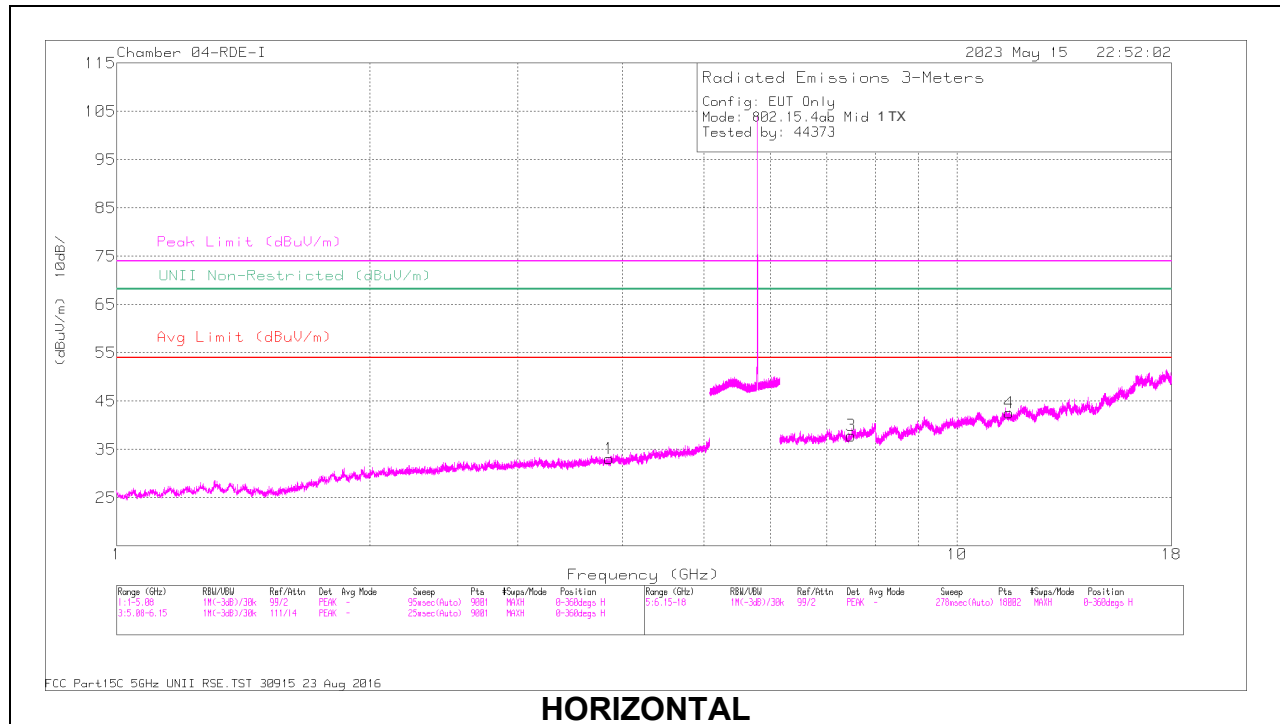
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.082804	59.69	PK-U	31.5	0	-48.18	43.01	68.2	-25.19	199	171	H
2	2.086714	59.76	PK-U	31.5	0	-48.13	43.13	68.2	-25.07	9	214	V
3	6.344162	56.21	PK-U	35.4	0	-45.38	46.23	68.2	-21.97	297	153	H
4	6.351304	56.43	PK-U	35.4	0	-45.2	46.63	68.2	-21.57	141	343	V
6	10.075888	57.73	PK-U	37.2	0	-44.79	50.14	68.2	-18.06	339	199	V
5	10.092276	57.35	PK-U	37.2	0	-44.57	49.98	68.2	-18.22	202	237	H

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

MID CHANNEL RESULTS



RADIATED EMISSIONS

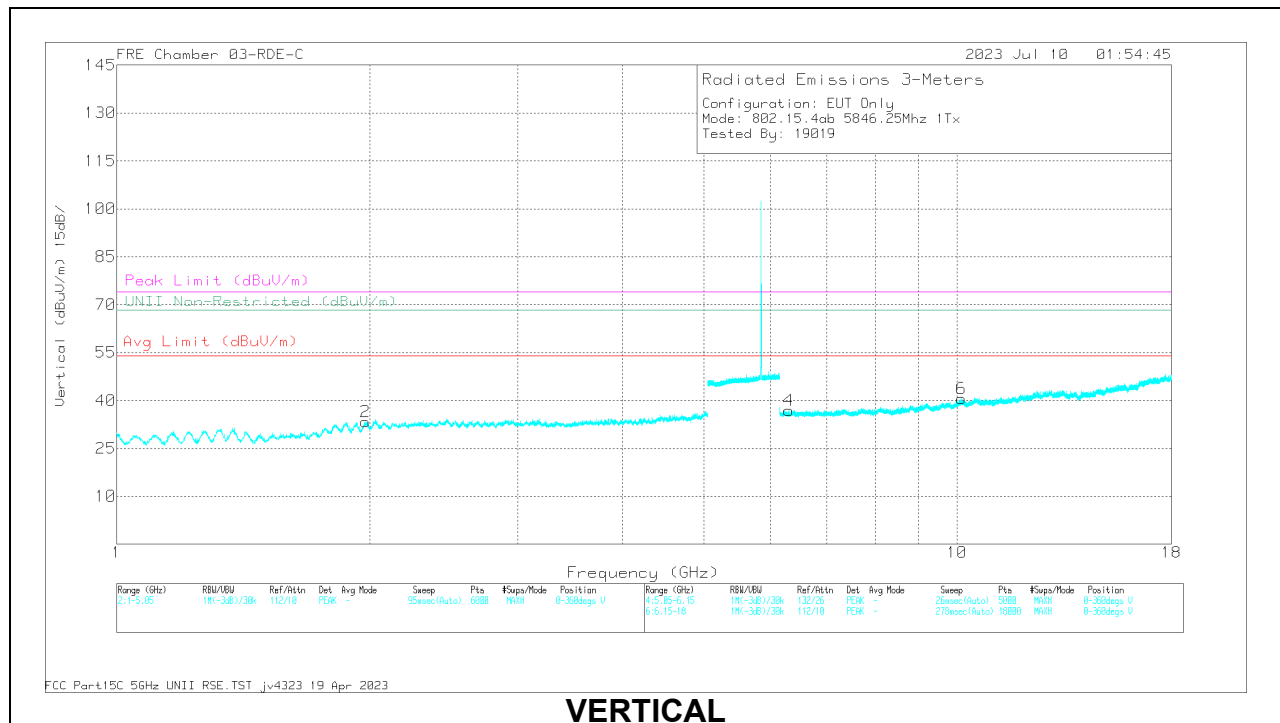
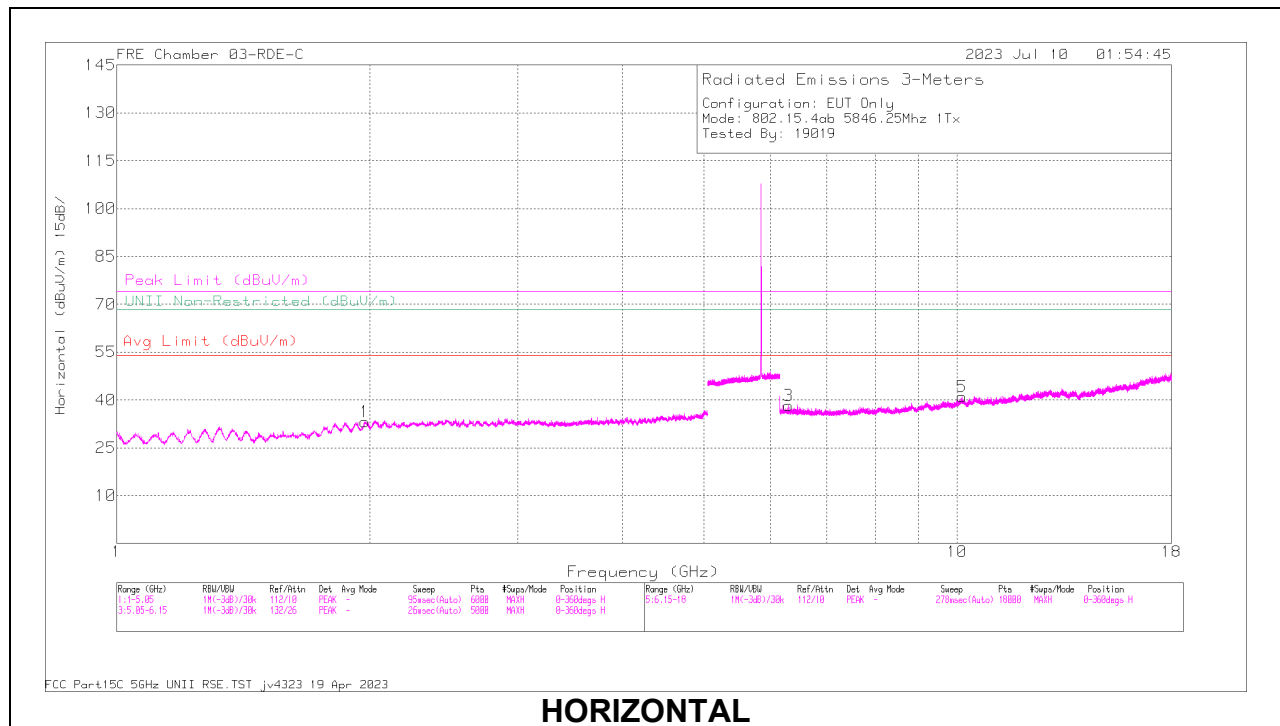
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	8479 7 ACF (dB) - 3mH	Amp/Cbl/Filtr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.856489	38.5	PK-U	33.2	-29.2	0	42.5	-	-	74	-31.5	0	101	H
	* 3.855363	26.56	ADR	33.2	-29.3	2.43	32.89	54	-21.11	-	-	0	101	H
2	* 4.258095	38.88	PK-U	33.6	-28.8	0	43.68	-	-	74	-30.32	0	101	V
	* 4.257871	26.54	ADR	33.6	-28.8	2.43	33.77	54	-20.23	-	-	0	101	V
3	* 7.477464	32.9	PK-U	35.6	-20.8	0	47.7	-	-	74	-26.3	0	101	H
	* 7.477052	20.87	ADR	35.6	-20.8	2.43	38.1	54	-15.9	-	-	0	101	H
4	* 11.540203	33.07	PK-U	38.1	-18.3	0	52.87	-	-	74	-21.13	0	101	H
	* 11.539961	20.44	ADR	38.1	-18.4	2.43	42.57	54	-11.43	-	-	0	101	H
5	* 8.138834	31.72	PK-U	35.8	-20.3	0	47.22	-	-	74	-26.78	0	200	V
	* 8.139961	19.78	ADR	35.8	-20.3	2.43	37.71	54	-16.29	-	-	0	200	V
6	* 11.056843	32.83	PK-U	37.6	-18.5	0	51.93	-	-	74	-22.07	0	101	V
	* 11.056667	20.28	ADR	37.6	-18.5	2.43	41.81	54	-12.19	-	-	0	101	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.975863	60.33	PK-U	31.2	0	-48.2	43.33	68.2	-24.87	31	136	H
2	1.97466	60.9	PK-U	31.2	0	-48.2	43.9	68.2	-24.3	185	357	V
3	6.307634	56.68	PK-U	35.4	0	-45.34	46.74	68.2	-21.46	242	333	H
4	6.307701	56.75	PK-U	35.4	0	-45.33	46.82	68.2	-21.38	86	174	V
5	10.146577	56.83	PK-U	37.2	0	-44.16	49.87	68.2	-18.33	142	273	H
6	10.127083	57.3	PK-U	37.2	0	-44.11	50.39	68.2	-17.81	39	196	V

PK-U - U-NII: Maximum Peak

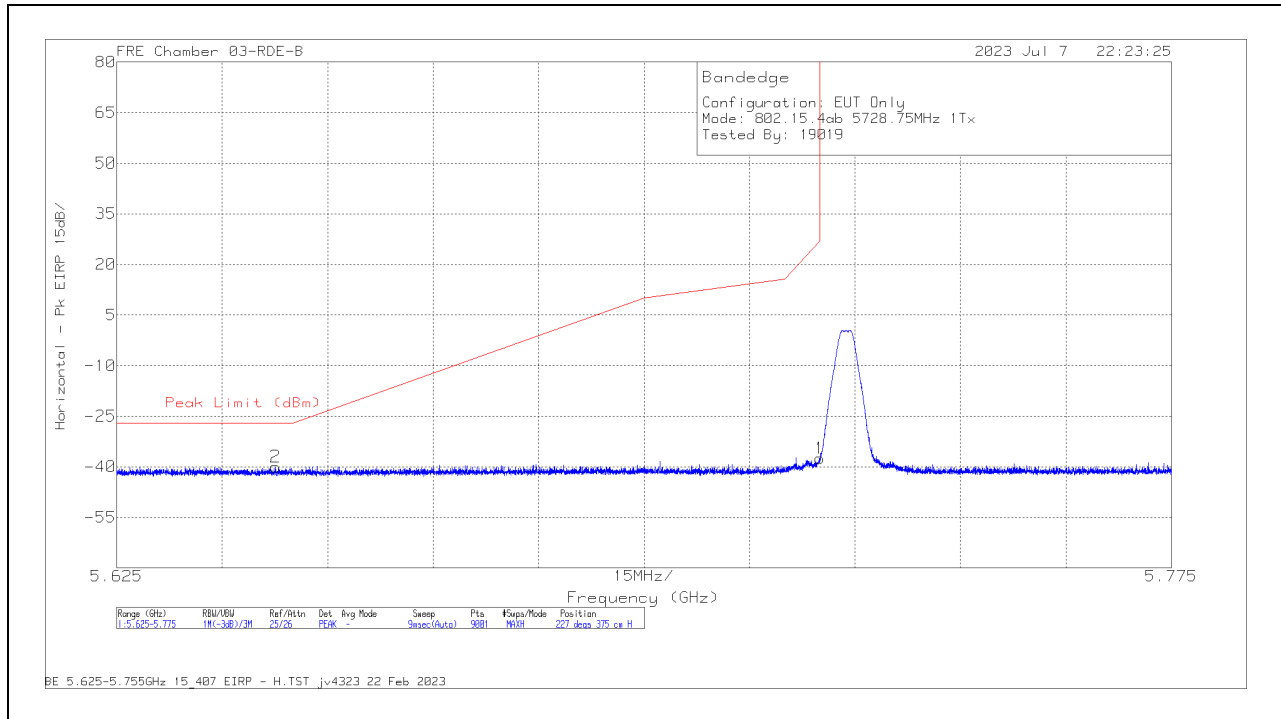
ADR - U-NII AD primary method, RMS average

10.1.2. LOW POWER 802.15.4ab IN THE UNII-5 BAND (1000Kbps)

ANT 6

BANDEDGE (LOW CHANNEL)

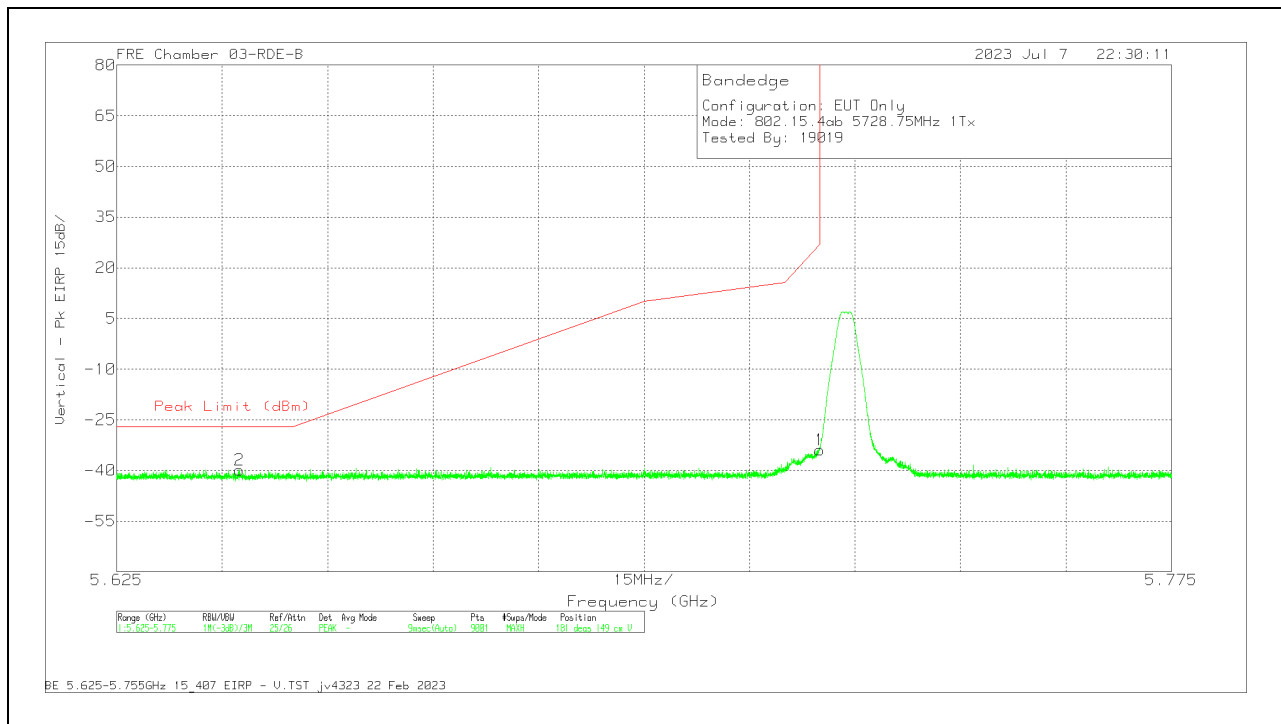
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-44.98	Pk	34.5	11.8	0	-38.8	-37.48	27	-64.48	227	375	H
2	5.647584	-47.29	Pk	34.4	11.8	0	-38.86	-39.95	-27	-12.95	227	375	H

Pk - Peak detector

VERTICAL RESULT

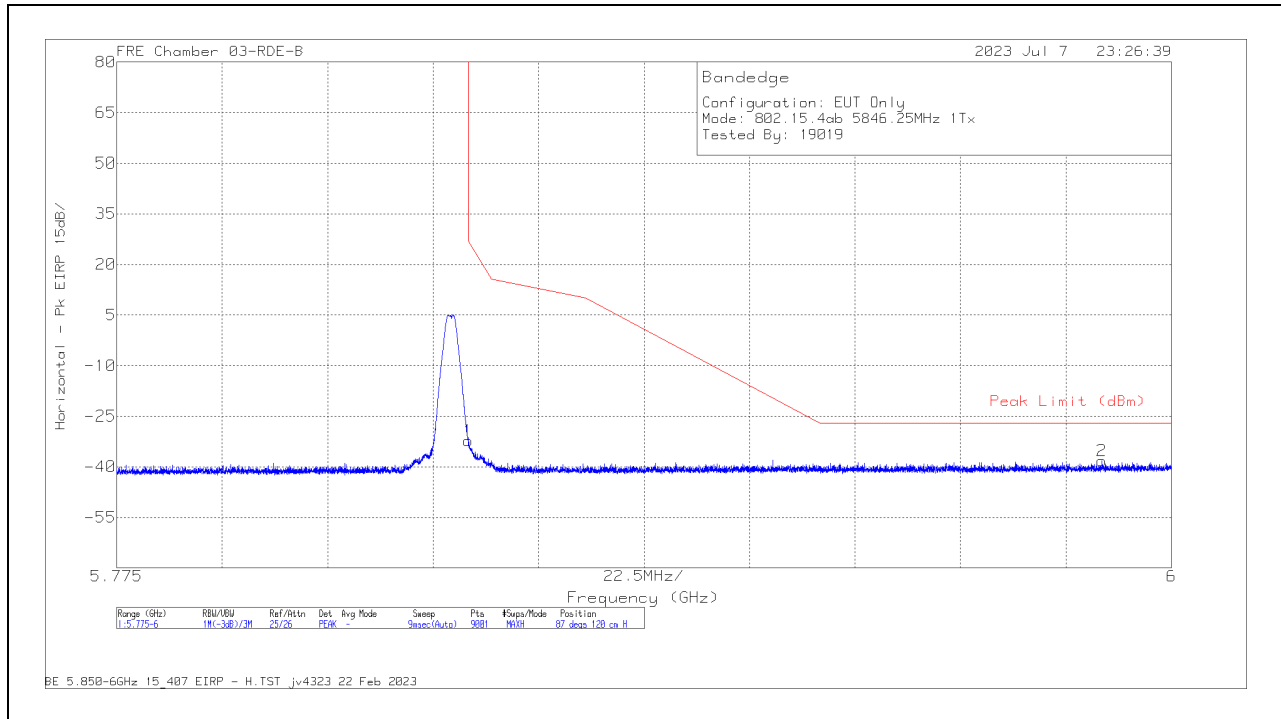


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-41.38	Pk	34.5	11.8	0	-38.8	-33.88	27	-60.88	181	149	V
2	5.642484	-47.14	Pk	34.4	11.8	0	-38.9	-39.84	-27	-12.84	181	149	V

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

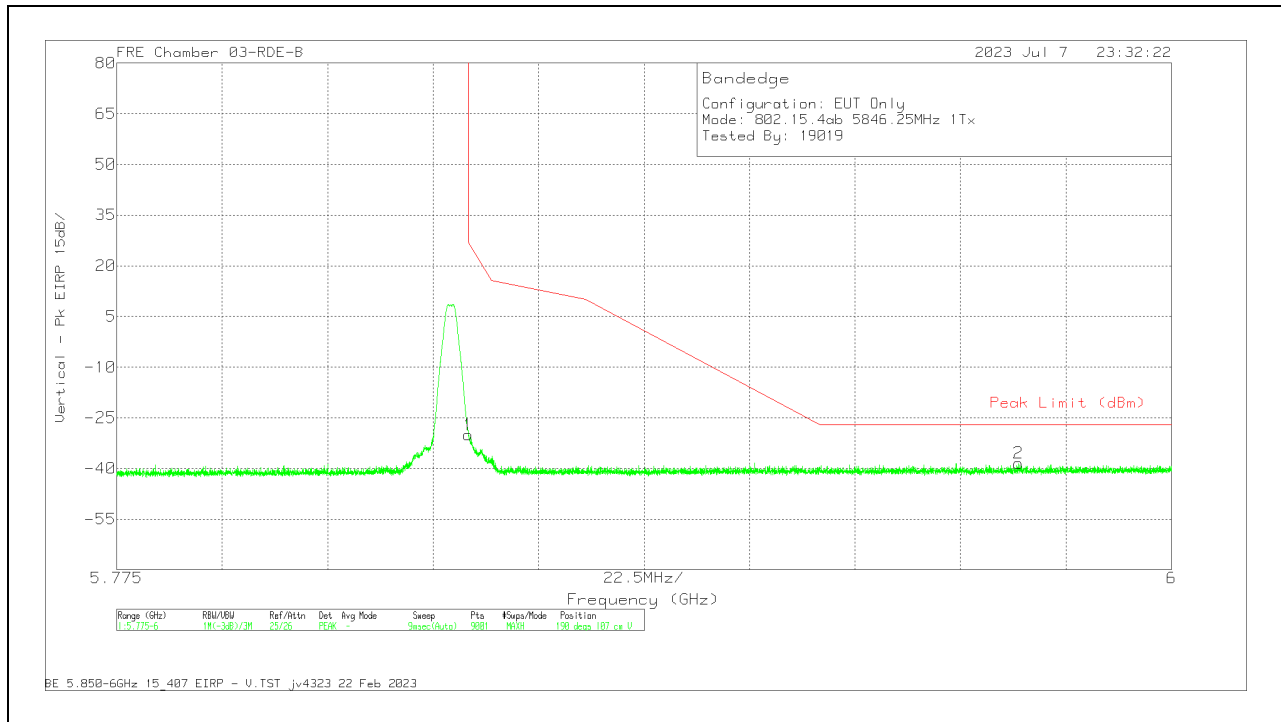
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-40.32	Pk	34.7	11.8	0	-38.5	-32.32	27	-59.32	87	120	H
2	5.985175	-46.86	Pk	35	11.8	0	-38.1	-38.16	-27	-11.16	87	120	H

Pk - Peak detector

VERTICAL RESULT

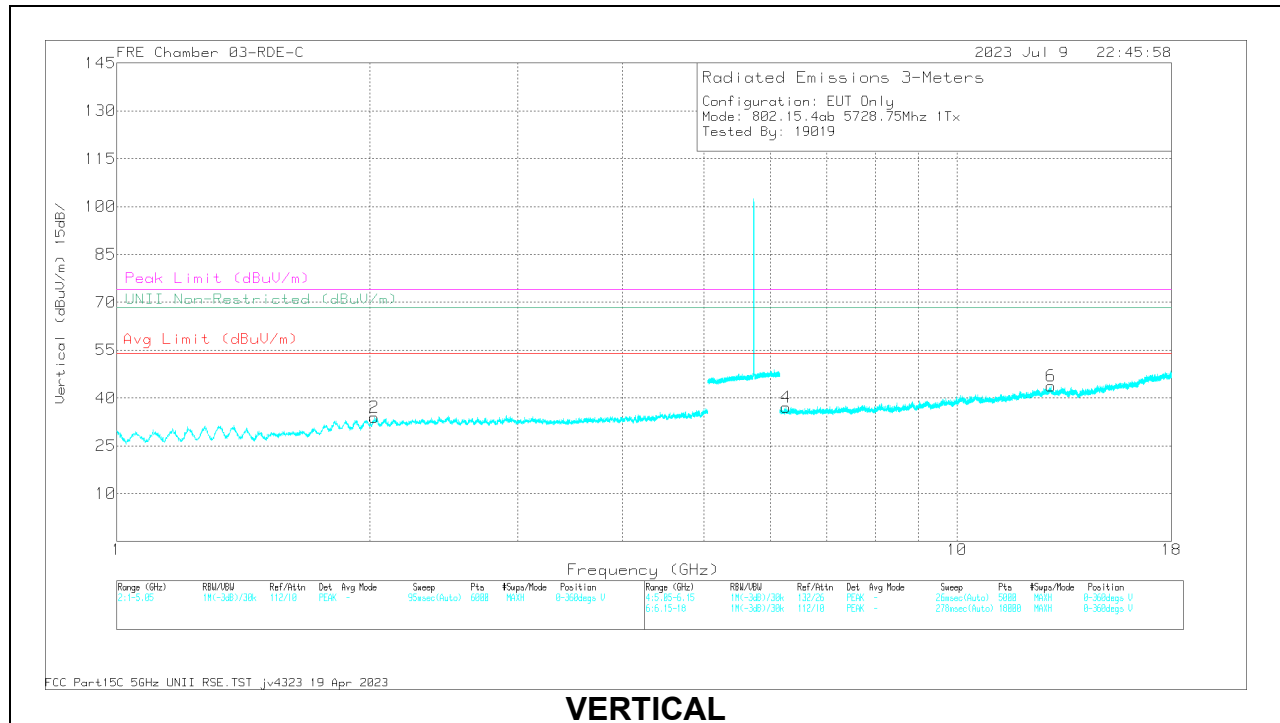
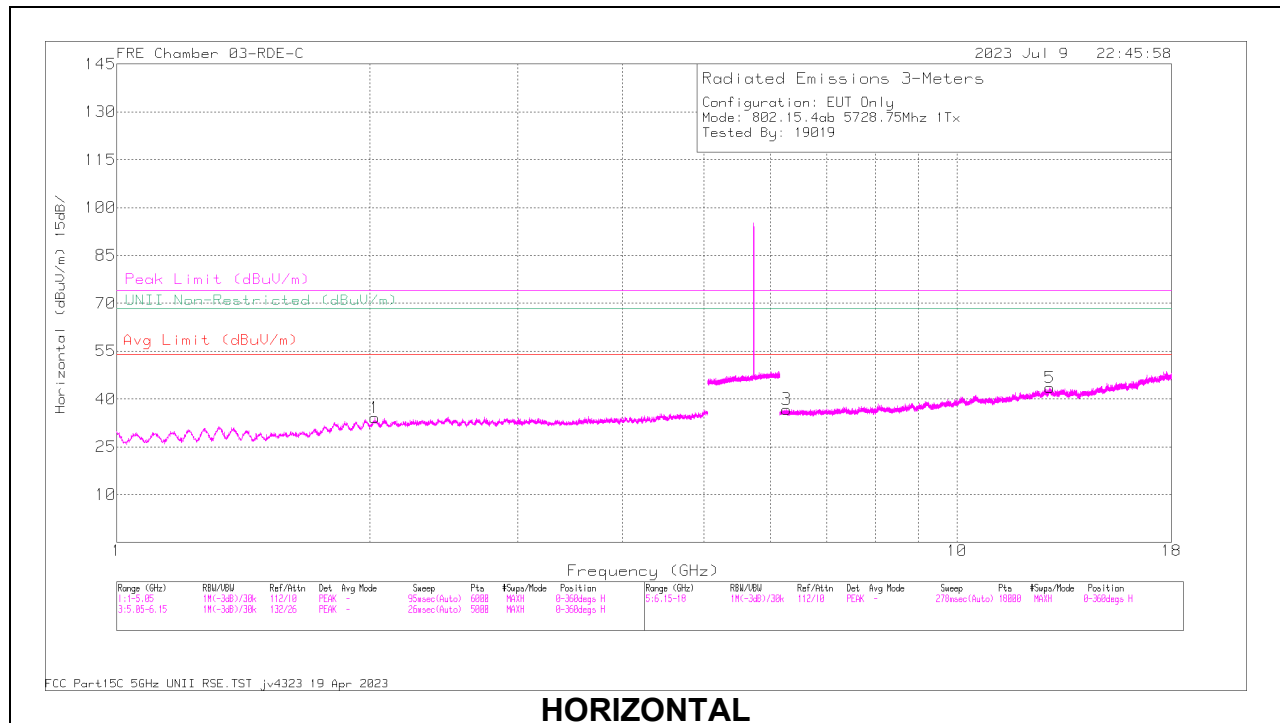


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-38.1	Pk	34.7	11.8	0	-38.5	-30.1	27	-57.1	190	107	V
2	5.967375	-47.06	Pk	35	11.8	0	-38.2	-38.46	-27	-11.46	190	107	V

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



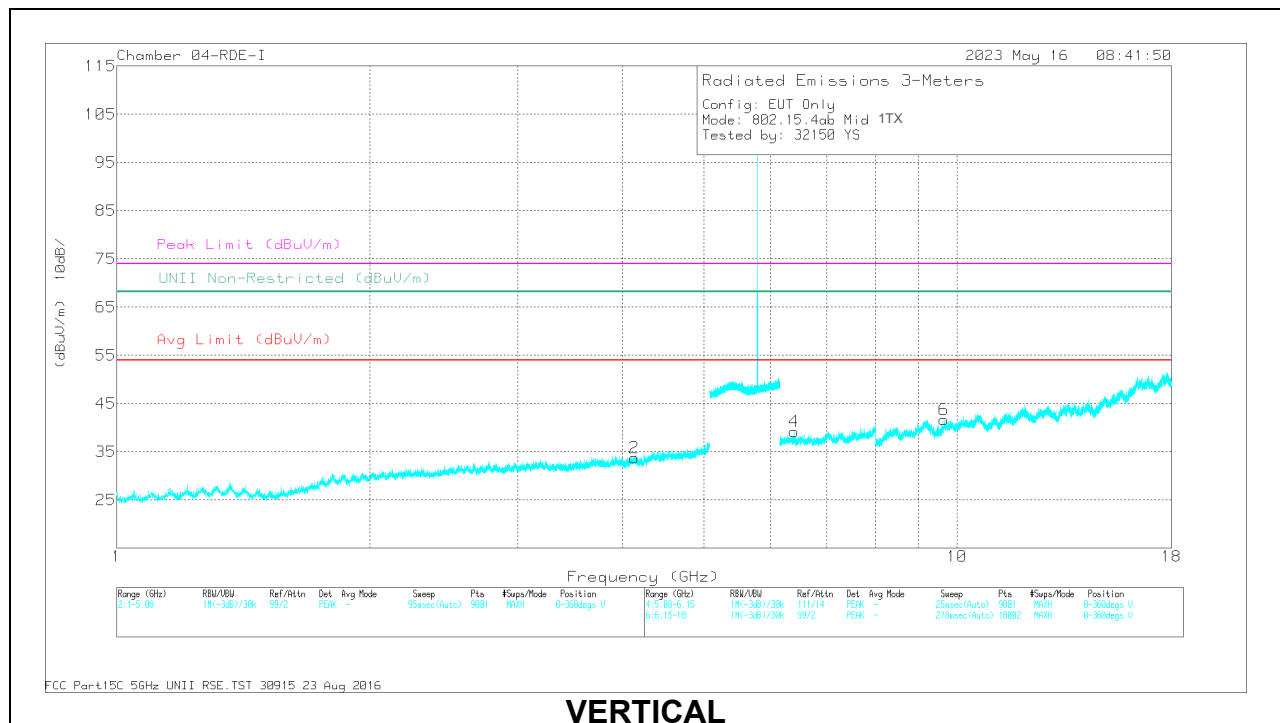
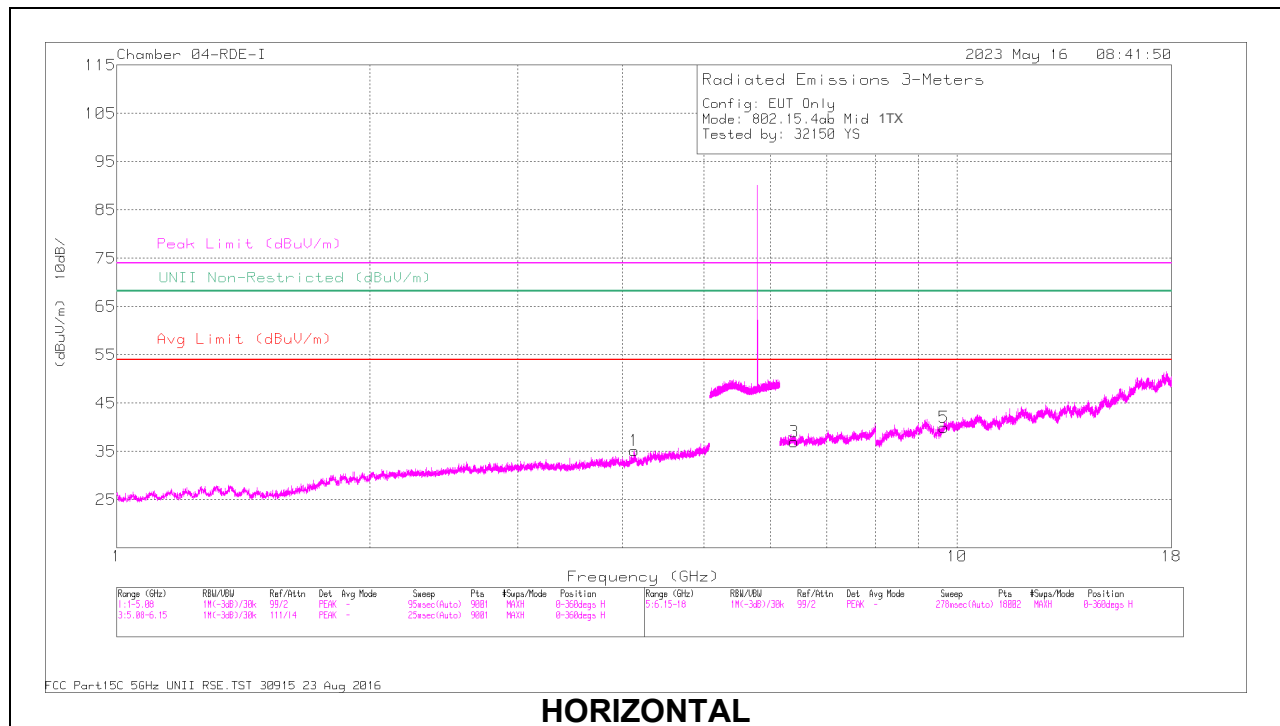
RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.029348	60.83	PK-U	31.5	0	-48.13	44.2	68.2	-24	266	129	H
2	2.026596	60.33	PK-U	31.4	0	-48.14	43.59	68.2	-24.61	77	249	V
3	6.268076	55.61	PK-U	35.4	0	-45.21	45.8	68.2	-22.4	329	347	H
4	6.254759	56.36	PK-U	35.4	0	-45.2	46.56	68.2	-21.64	257	156	V
5	12.905673	57.84	PK-U	39.2	0	-44.5	52.54	68.2	-15.66	195	164	H
6	12.949859	58.36	PK-U	39.2	0	-44.81	52.75	68.2	-15.45	114	323	V

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

MID CHANNEL RESULTS



RADIATED EMISSIONS

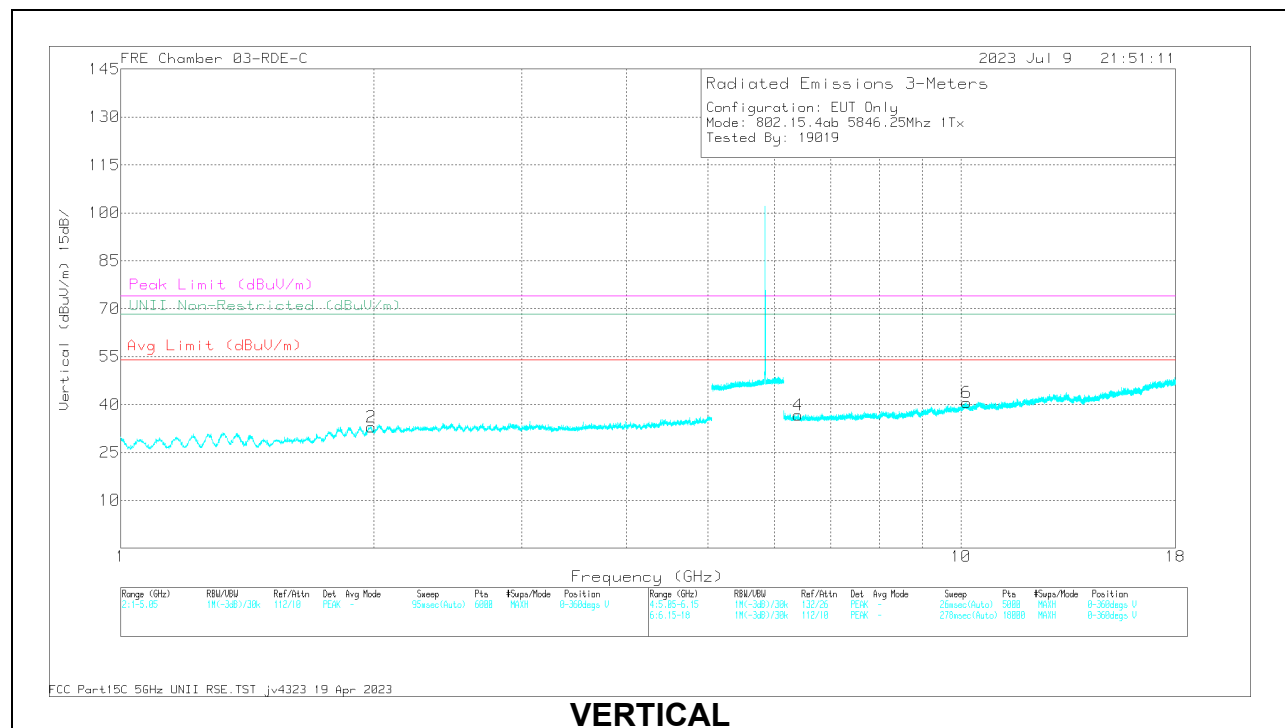
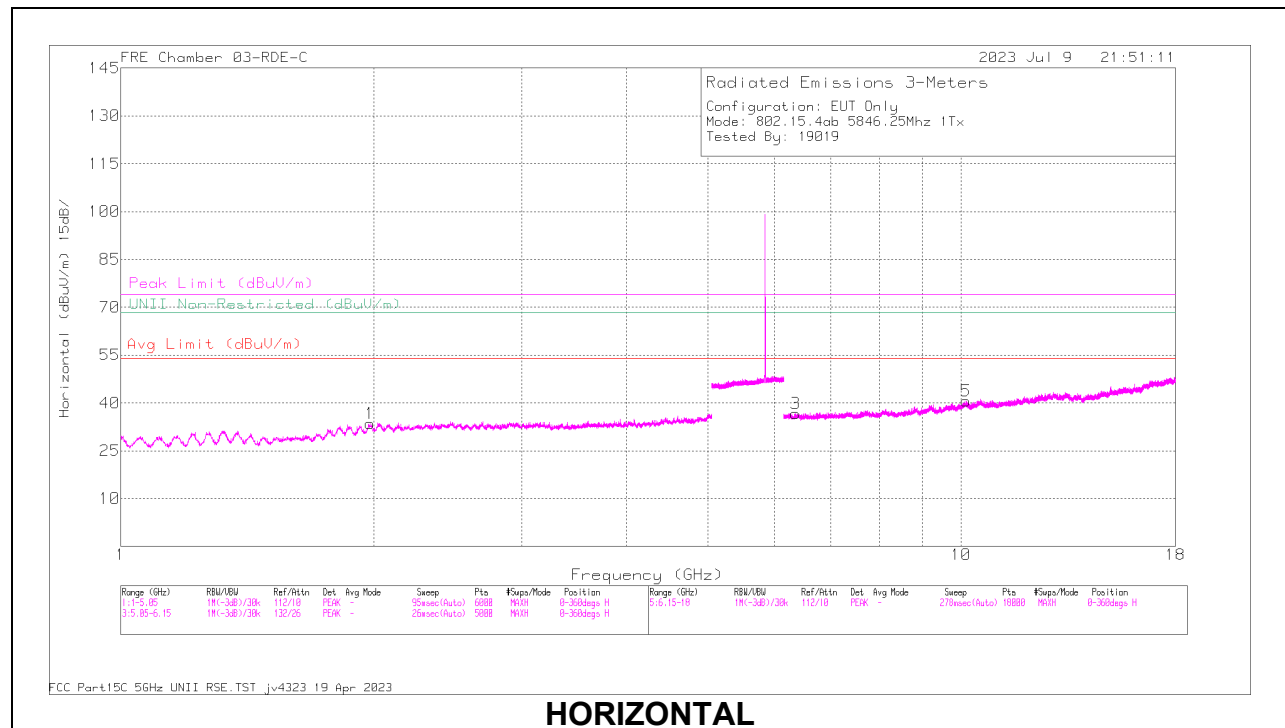
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	84797 ACF (dB) - 3mH	Amp/Cbl/Fitr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.128537	38.27	PK-U	33.4	-27.5	0	44.17	-	-	74	-29.83	-	-	302	169	H
	* 4.130655	25.77	ADR	33.4	-27.5	2.43	34.1	54	-19.90	-	-	-	-	302	169	H
2	* 4.12776	38.52	PK-U	33.4	-27.5	0	44.42	-	-	74	-29.58	-	-	177	320	V
	* 4.12824	25.91	ADR	33.4	-27.5	2.43	34.24	54	-19.76	-	-	-	-	177	320	V
3	6.397604	34.18	PK-U	35.7	-22.6	0	47.28	-	-	-	-	68.2	-20.92	231	215	H
4	6.400397	34.28	PK-U	35.7	-22.6	0	47.38	-	-	-	-	68.2	-20.82	215	278	V
5	9.649019	32.73	PK-U	36.6	-18.4	0	50.93	-	-	-	-	68.2	-17.27	326	178	H
6	9.650715	31.78	PK-U	36.6	-18.3	0	50.08	-	-	-	-	68.2	-18.12	116	233	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	226672 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.981268	60.51	PK-U	31.2	0	-48.2	43.51	68.2	-24.69	166	157	H
2	1.985327	60.23	PK-U	31.3	0	-48.2	43.33	68.2	-24.87	291	211	V
3	6.357285	56.09	PK-U	35.4	0	-45.27	46.22	68.2	-21.98	228	280	H
4	6.398461	56.71	PK-U	35.5	0	-45.15	47.06	68.2	-21.14	77	183	V
5	10.136376	56.66	PK-U	37.2	0	-44.28	49.58	68.2	-18.62	77	137	H
6	10.154092	57.87	PK-U	37.2	0	-44.1	50.97	68.2	-17.23	292	220	V

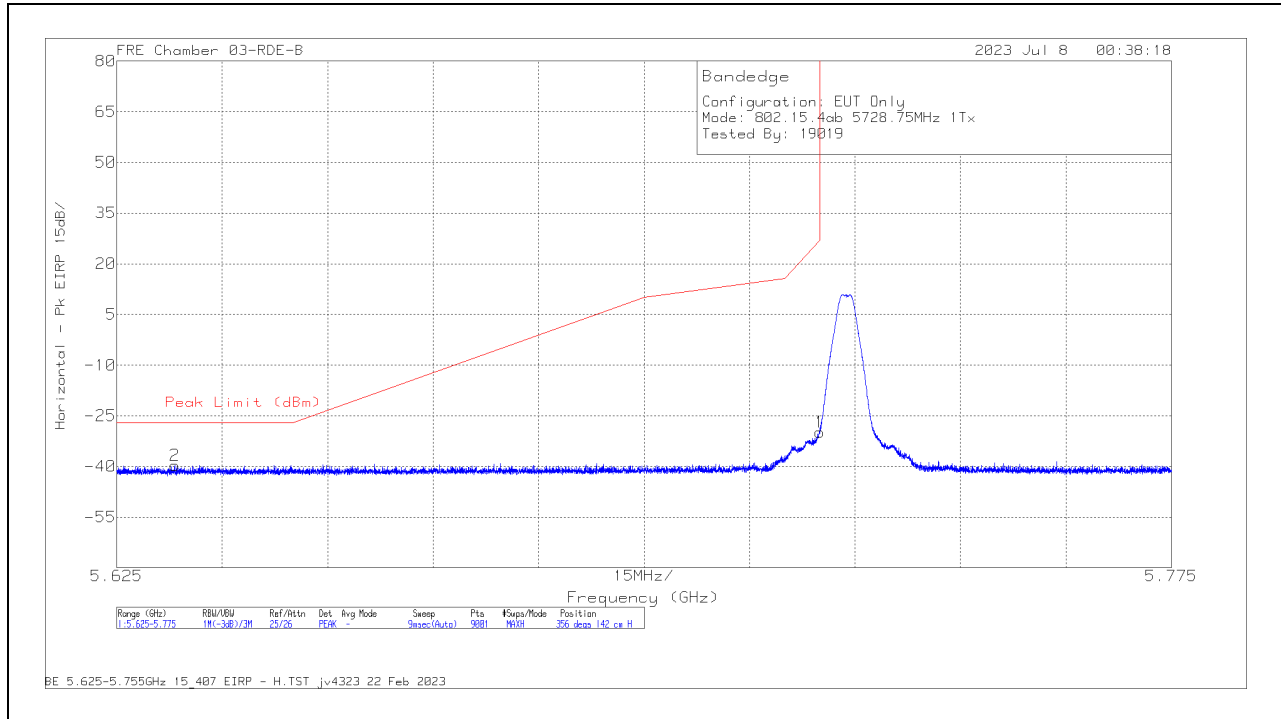
PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

ANT 5

BANDEDGE (LOW CHANNEL)

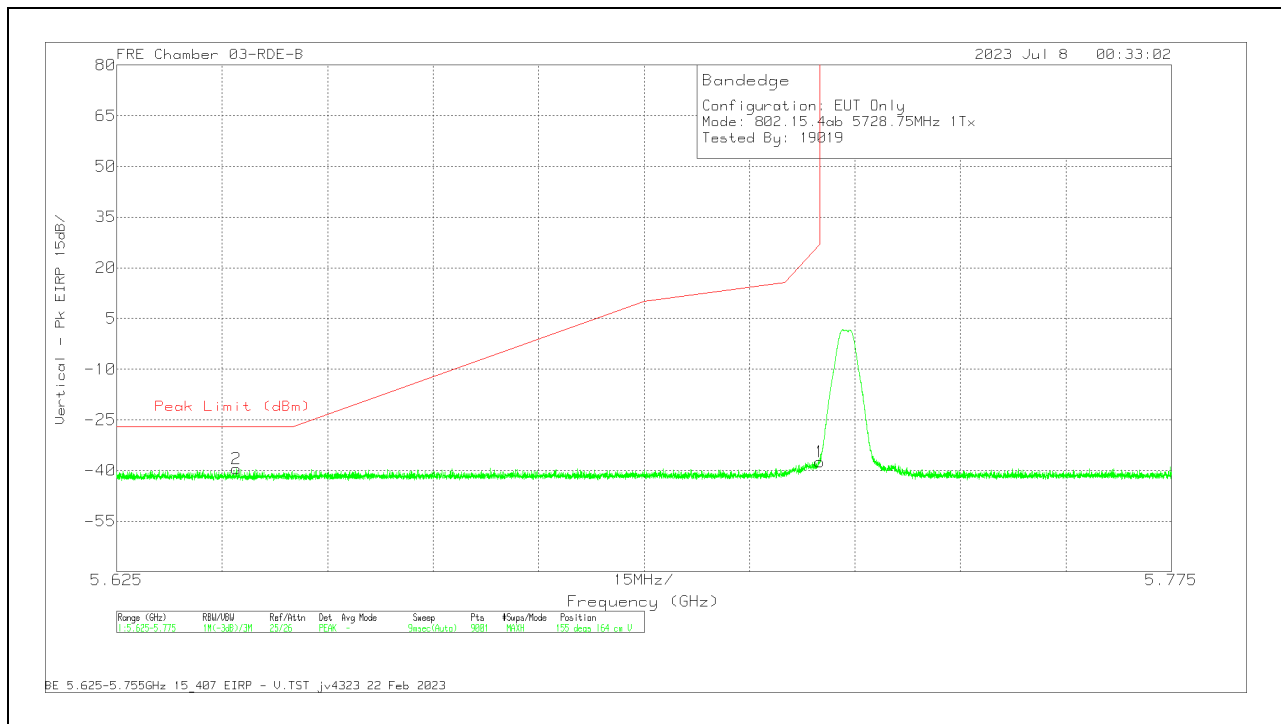
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	5.6333	-46.86	Pk	34.4	11.8	0	-38.97	-39.63	-27	-12.63	356	142	H
1	5.725	-37.36	Pk	34.5	11.8	0	-38.8	-29.86	27	-56.86	356	142	H

Pk - Peak detector

VERTICAL RESULT

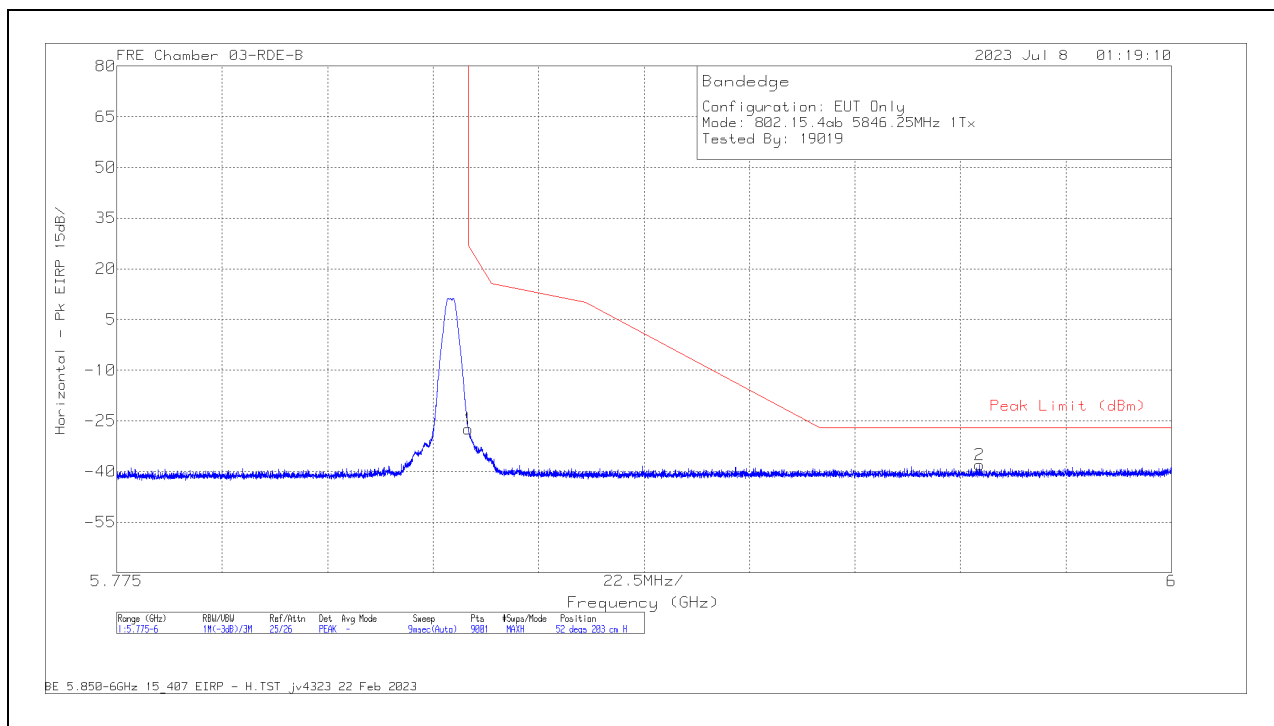


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.725	-44.94	Pk	34.5	11.8	0	-38.8	-37.44	27	-64.44	155	164	V
2	5.642017	-46.75	Pk	34.4	11.8	0	-38.9	-39.45	-27	-12.45	155	164	V

Pk - Peak detector

BANDEDGE (HIGH CHANNEL)

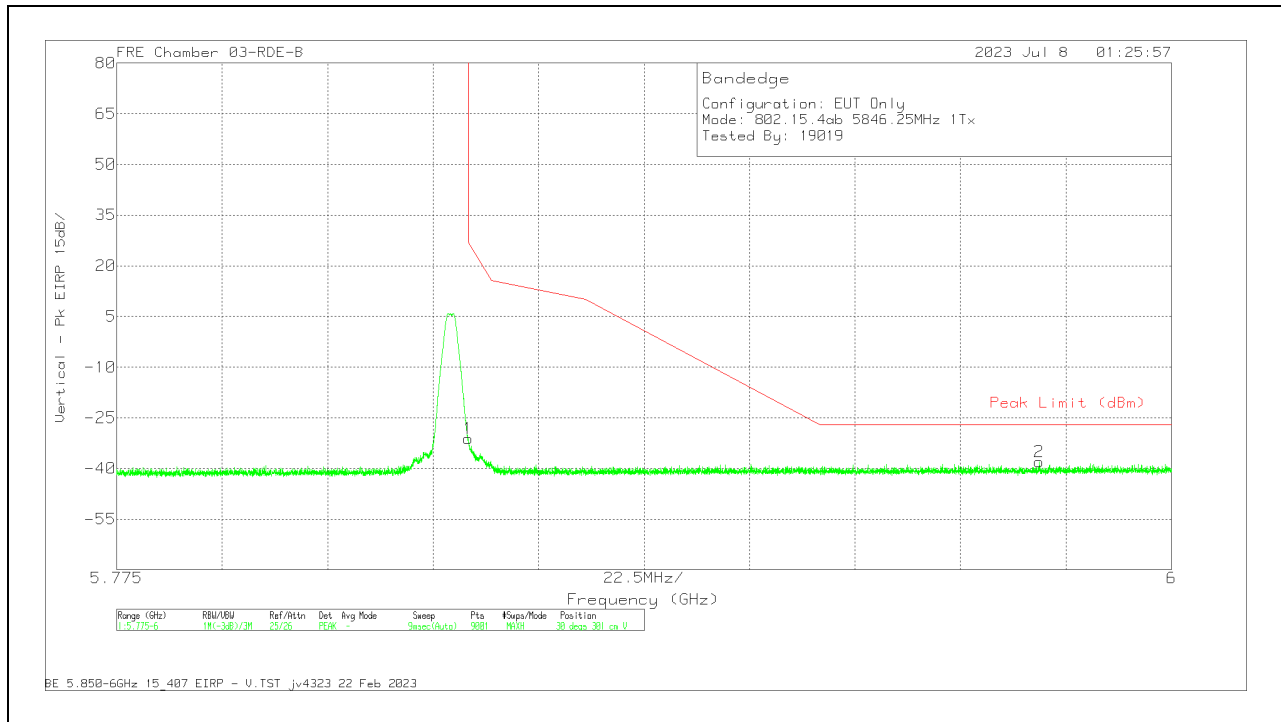
HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-35.35	Pk	34.7	11.8	0	-38.5	-27.35	27	-54.35	52	203	H
2	5.959125	-46.43	Pk	34.9	11.8	0	-38.2	-37.93	-27	-10.93	52	203	H

Pk - Peak detector

VERTICAL RESULT

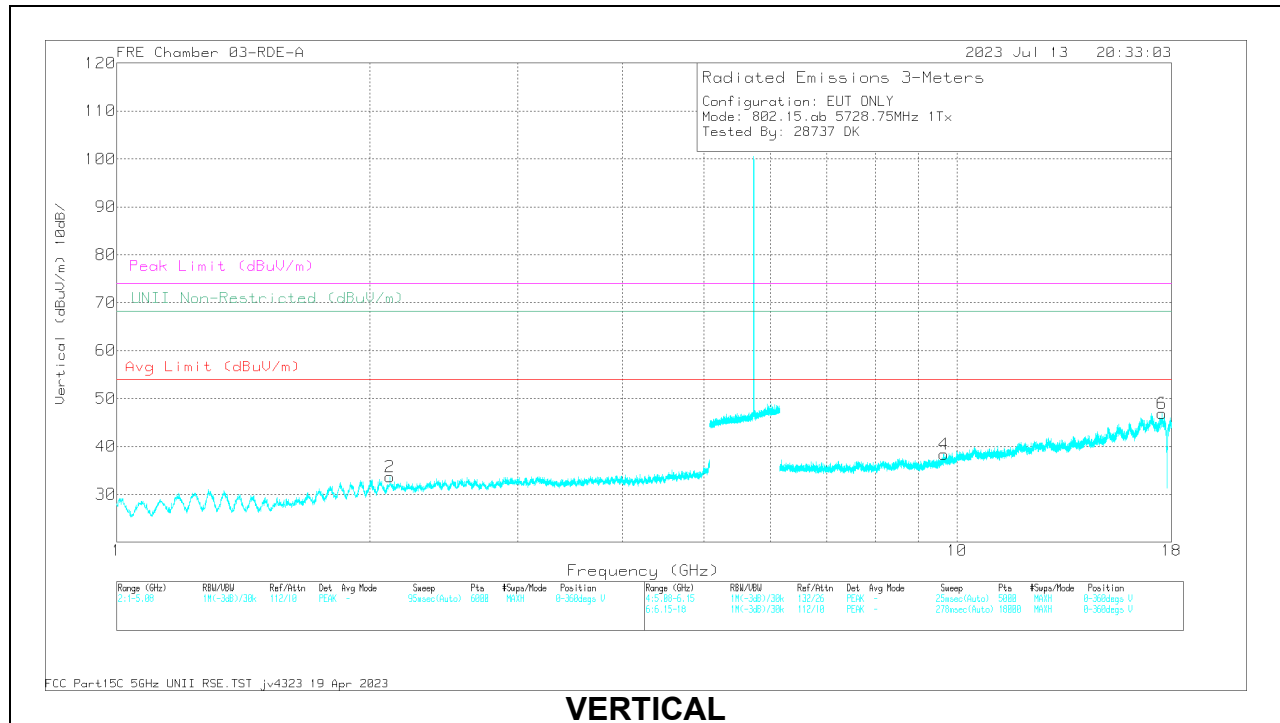
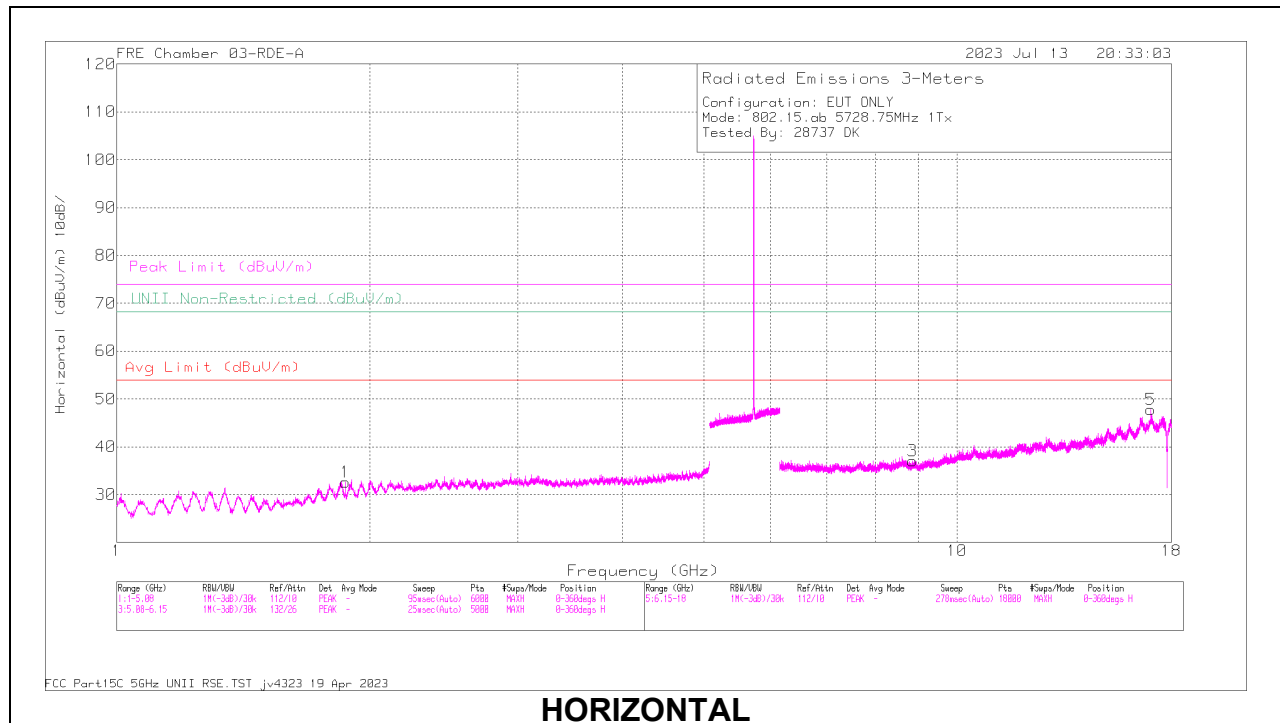


Marker	Frequency (GHz)	Meter Reading (dBm)	Det	230300 ACF (dB/m)	Conversion Factor (dB)	DCCF (dB)	Gain/Loss (dB)	Corrected Reading EIRP	Peak Limit (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	5.85	-39.17	Pk	34.7	11.8	0	-38.5	-31.17	27	-58.17	30	301	V
2	5.971775	-46.53	Pk	35	11.8	0	-38.2	-37.93	-27	-10.93	30	301	V

Pk - Peak detector

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS

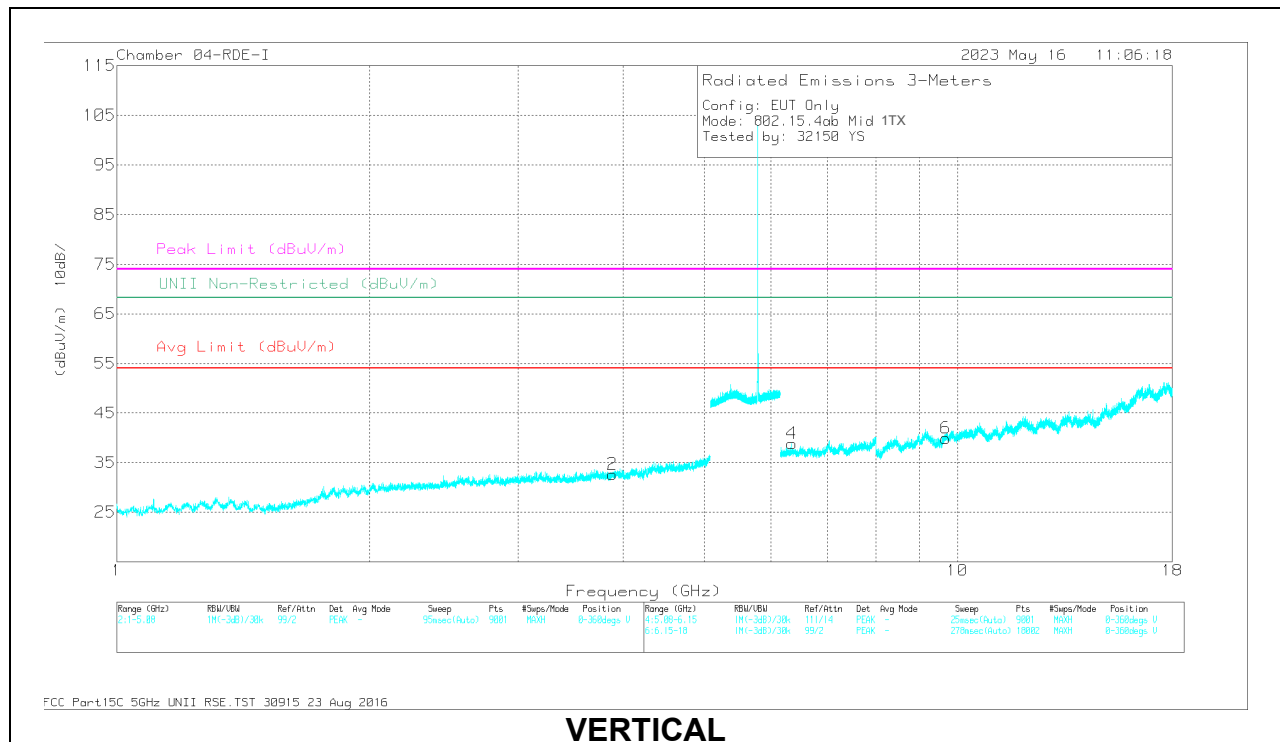
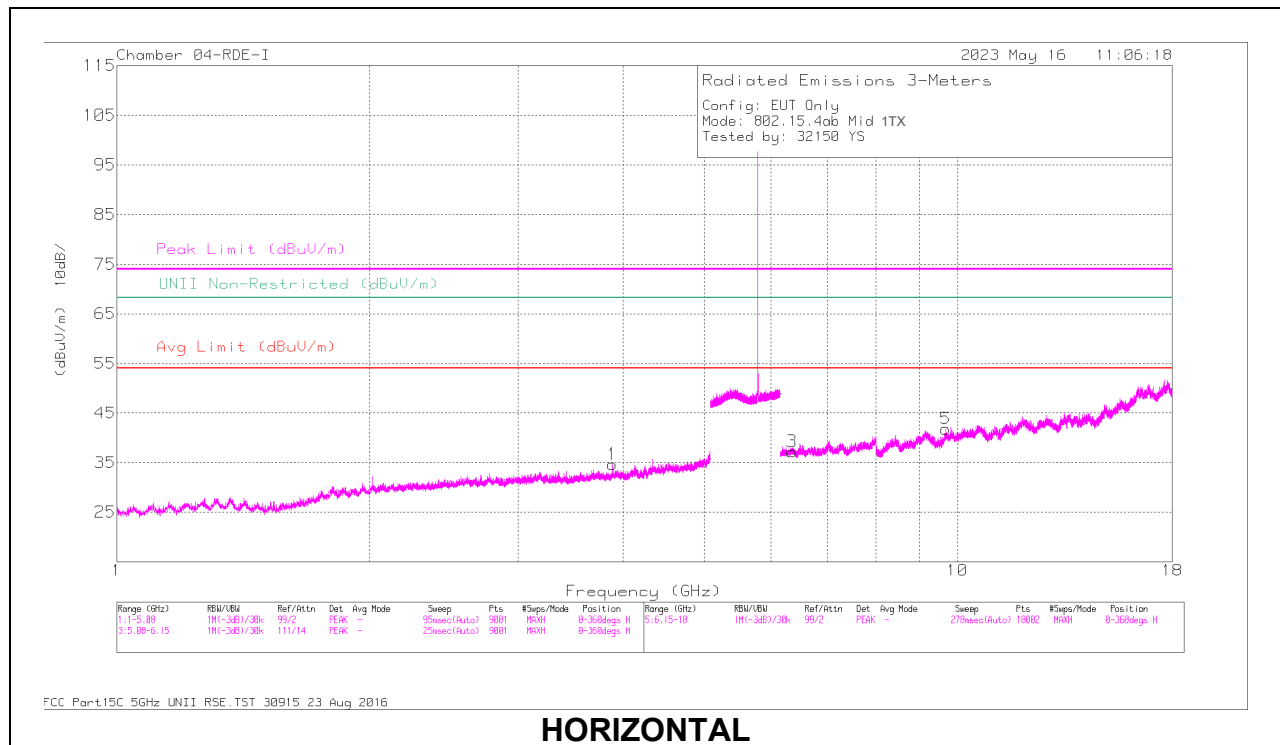


RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	200897 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.871129	58.09	PKFH	30.6	0	-50.1	38.59	68.2	-29.61	0	101	H
2	2.116134	61.19	PKFH	31.4	0	-50.37	42.22	68.2	-25.98	0	199	V
3	8.851046	55.62	PKFH	35.8	0	-45.5	45.92	68.2	-22.28	0	101	H
4	9.653572	56.19	PKFH	36.7	0	-46.79	46.1	68.2	-22.1	0	199	V
5	17.018136	53.62	PKFH	41.6	0	-42.85	52.37	68.2	-15.83	0	101	H
6	17.530386	53.61	PKFH	41.6	0	-42.21	53	68.2	-15.2	0	199	V

PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL RESULTS



RADIATED EMISSIONS

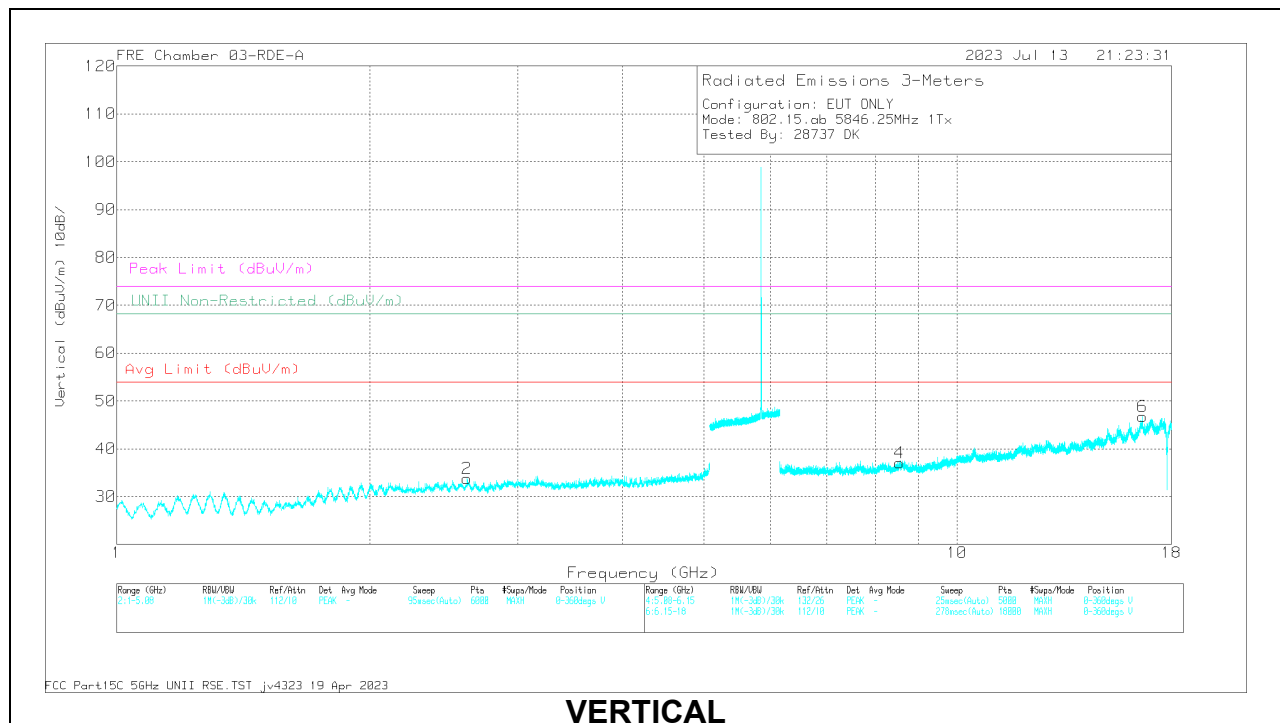
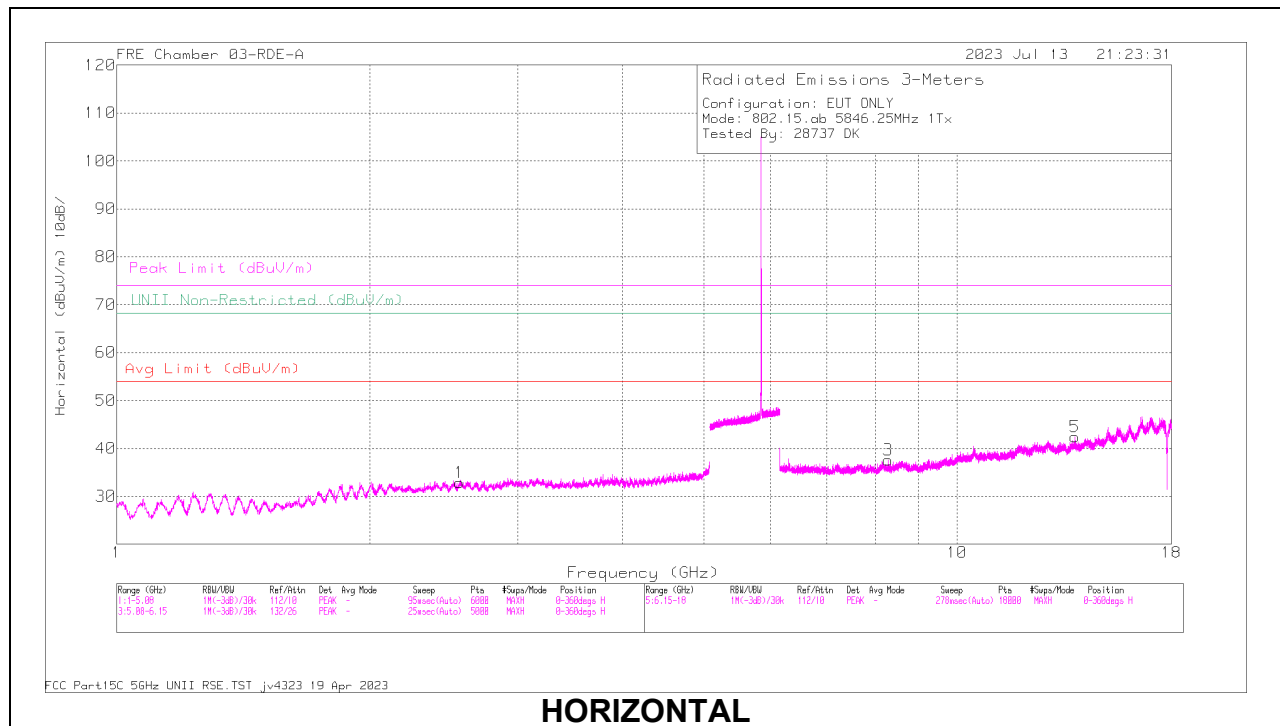
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	84797 ACF (dB) - 3mH	Amp/Cbl/Filtr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.887738	38.79	PK-U	33.2	-28.9	0	43.09	-	-	74	-30.91	-	-	258	174	H
	* 3.887046	26.85	ADR	33.2	-28.9	2.43	33.58	54	-20.42	-	-	-	-	258	174	H
2	* 3.888701	38.77	PK-U	33.2	-28.9	0	43.07	-	-	74	-30.93	-	-	324	278	V
	* 3.889156	26.48	ADR	33.2	-28.9	2.43	33.21	54	-20.79	-	-	-	-	324	278	V
3	6.355369	34.22	PK-U	35.7	-22.3	0	47.62	-	-	-	-	68.2	-20.58	106	317	H
4	6.353883	34.56	PK-U	35.7	-22.2	0	48.06	-	-	-	-	68.2	-20.14	269	334	V
5	9.680144	32.17	PK-U	36.6	-18.5	0	50.27	-	-	-	-	68.2	-17.93	176	142	H
6	9.680174	32.9	PK-U	36.6	-18.5	0	51	-	-	-	-	68.2	-17.2	46	130	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

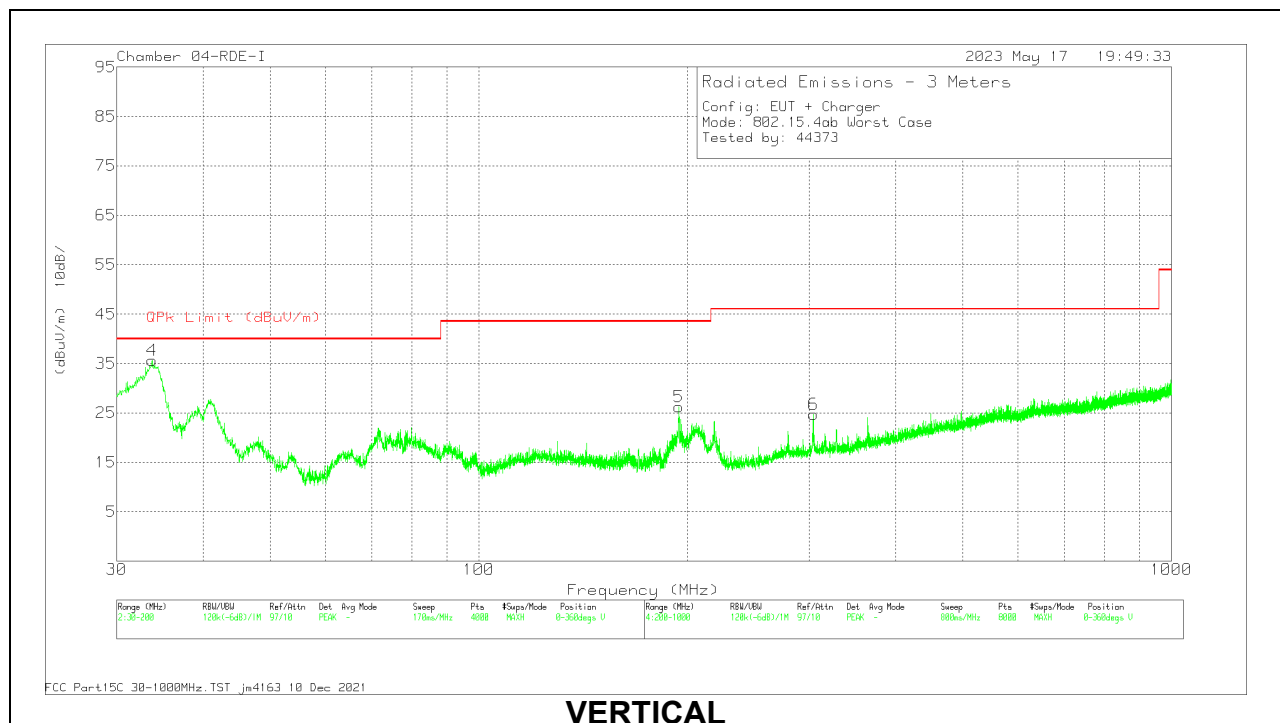
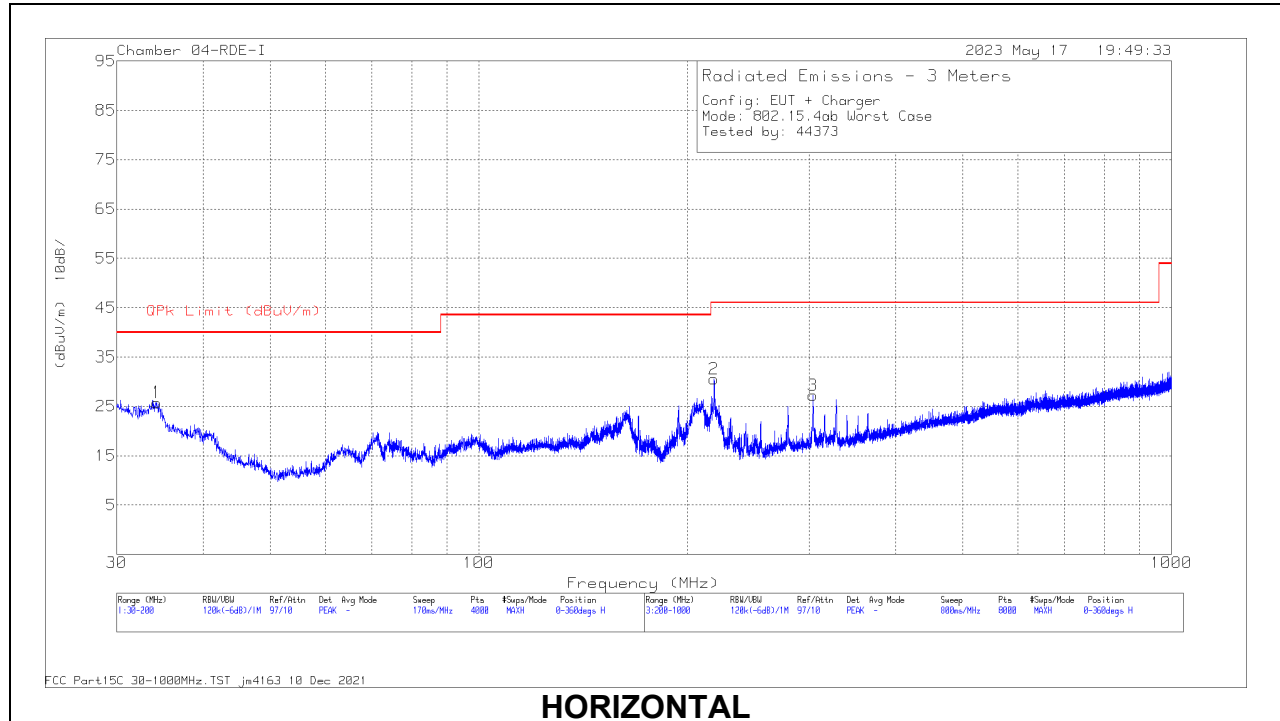
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	200897 ACF (dB) 3mH	DCCF (dB)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 8.287558	55.91	PKFH	35.7	0	-45.99	45.62	68.2	-22.58	0	101	H
2	2.559998	59.94	PKFH	32.2	0	-49.77	42.37	68.2	-25.83	0	201	H
3	2.611706	59.73	PKFH	32.3	0	-49.51	42.52	68.2	-25.68	0	101	V
4	8.547077	54.69	PKFH	35.7	0	-44.86	45.53	68.2	-22.67	0	199	V
5	13.82168	55.39	PKFH	38.6	0	-45.08	48.91	68.2	-19.29	0	101	H
6	16.625509	55.62	PKFH	41.4	0	-42.99	54.03	68.2	-14.17	0	199	V

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

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

10.2. WORST CASE BELOW 1 GHz



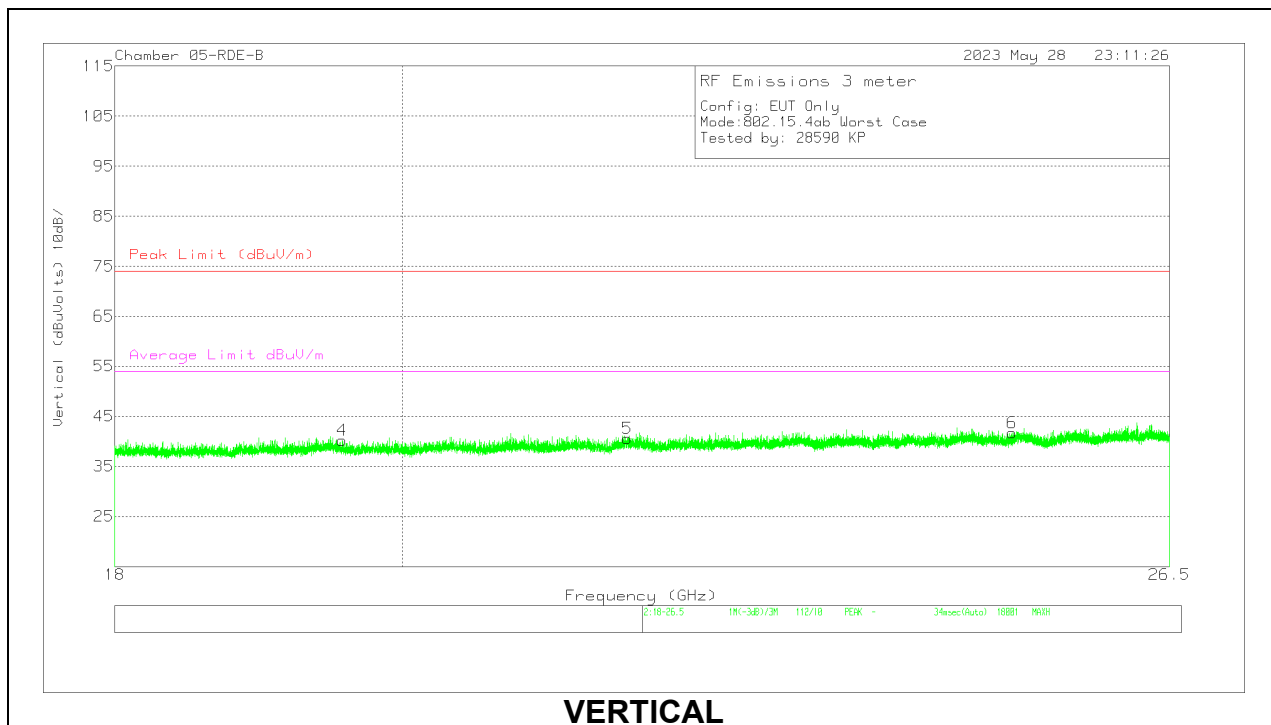
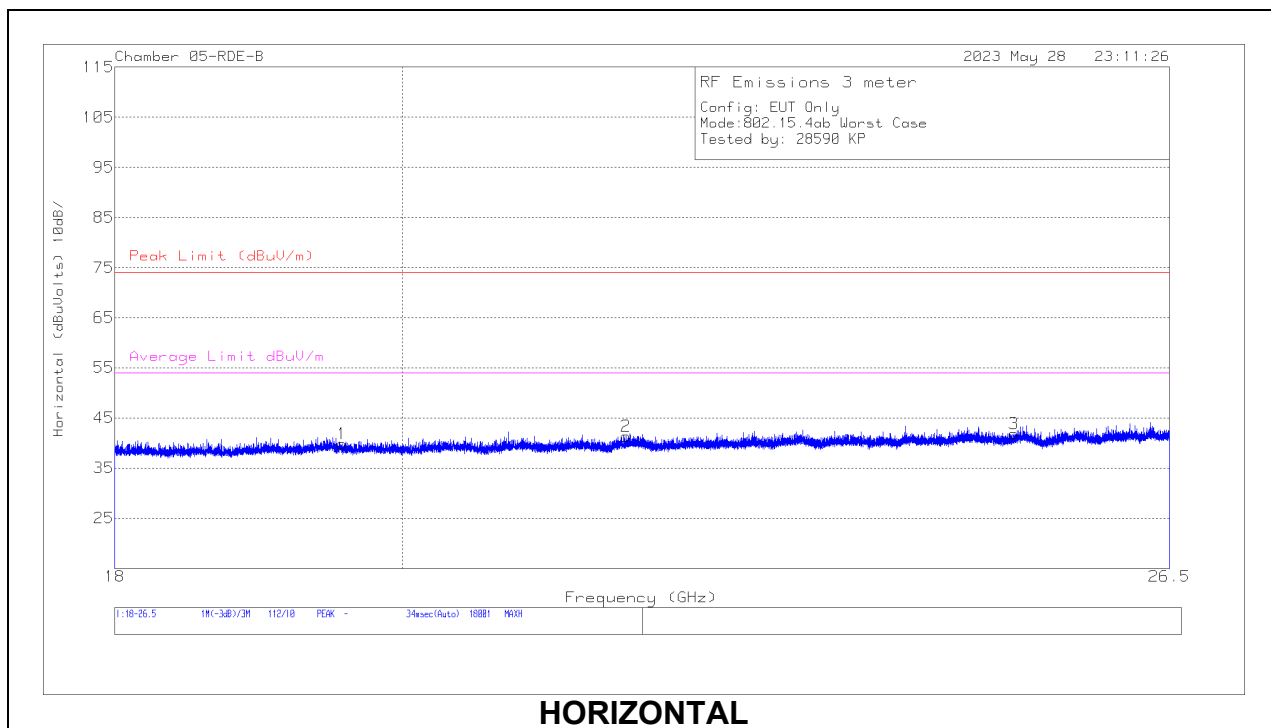
Below 1GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80714 ACF (dB) - 10mH	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	34.2936	32.19	Pk	24.7	-31.1	25.79	40	-14.21	0-360	398	H
2	218.502	44.23	Pk	16.3	-30	30.53	46.02	-15.49	0-360	101	H
3	303.813	37.7	Pk	19.2	-29.6	27.3	46.02	-18.72	0-360	101	H
4	33.741	41.59	Pk	25.1	-31.1	35.59	40	-4.41	0-360	101	V
	33.958	37.84	Qp	24.9	-31.1	31.64	40	-8.36	336	116	V
5	194.348	38.33	Pk	17.9	-30	26.23	43.52	-17.29	0-360	101	V
6	304.014	35.15	Pk	19.2	-29.6	24.75	46.02	-21.27	0-360	101	V

Pk - Peak detector

Qp - Quasi-Peak detector

10.3. WORST CASE 18-26 GHz



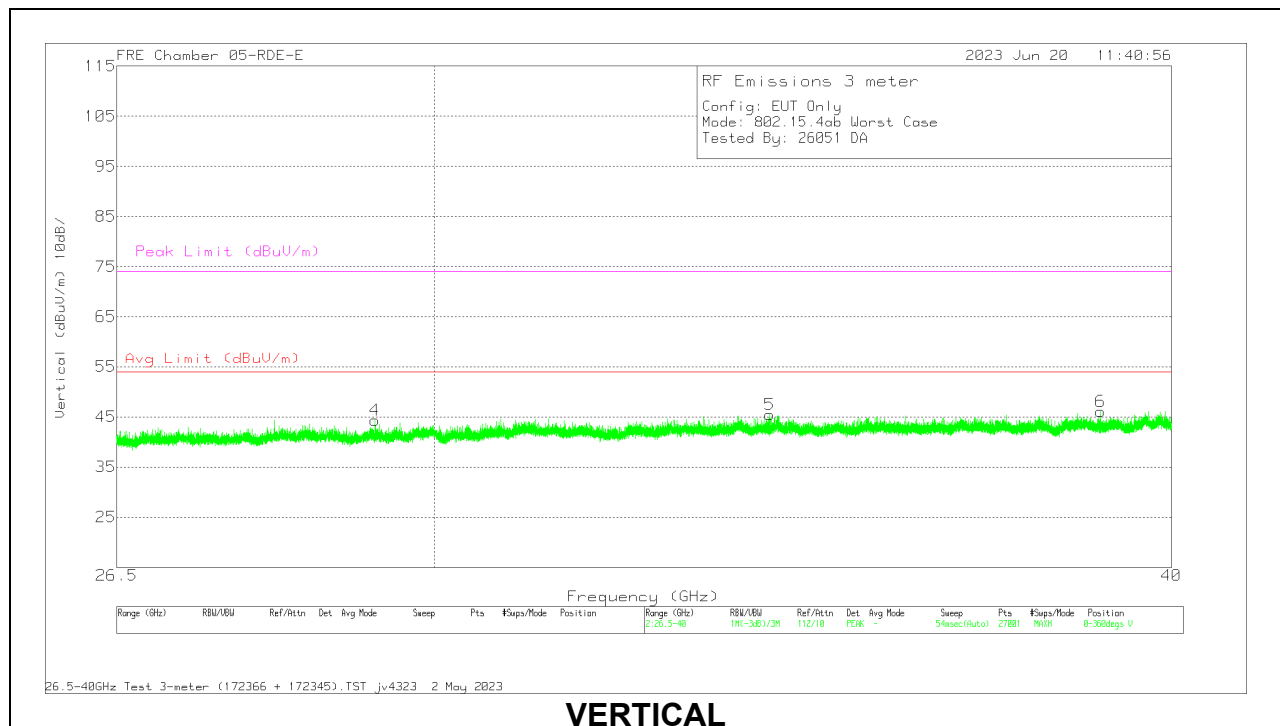
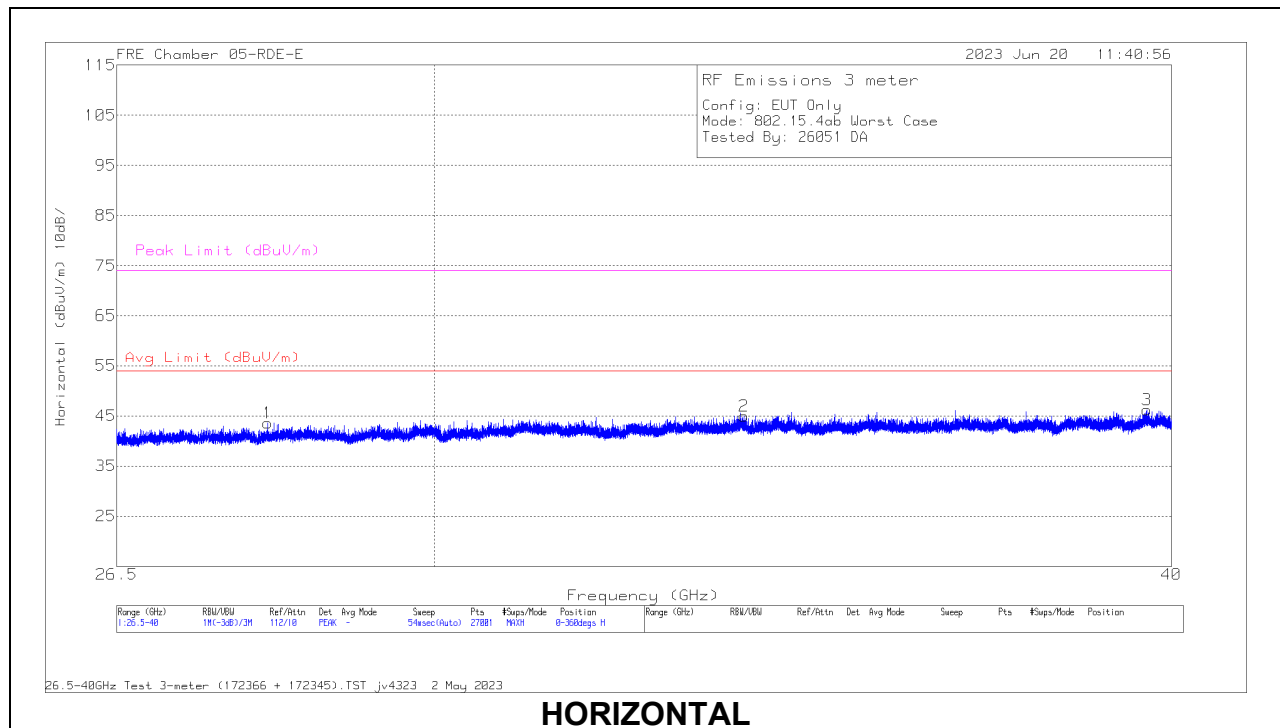
18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	172353 ACF (dB) - 3mH	171583 Amp Assembly (dB)	CBL/SWIT CH	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	19.565155	60.68	PK-U	33	-65.2	12.8	41.28	74	-32.72	-	-	360	101	H
	19.565401	49.24	ADR	33	-65.2	12.8	29.84	-	-	54	-24.16	360	101	H
2	19.564968	60.96	PK-U	33	-65.2	12.8	41.56	74	-32.44	-	-	360	199	V
	19.567022	49.12	ADR	33	-65.2	12.8	29.72	-	-	54	-24.28	360	199	V
3	21.712189	60.2	PK-U	33.6	-65	13.5	42.3	74	-31.7	-	-	360	101	H
	21.710858	48.59	ADR	33.6	-65	13.5	30.69	-	-	54	-23.31	360	101	H
4	21.725887	59.7	PK-U	33.6	-65	13.5	41.8	74	-32.2	-	-	360	199	V
	21.72531	48.62	ADR	33.6	-65	13.5	30.72	-	-	54	-23.28	360	199	V
5	25.033144	58.2	PK-U	34.6	-64.3	14.6	43.1	74	-30.9	-	-	360	199	H
	25.03321	46.67	ADR	34.6	-64.3	14.6	31.57	-	-	54	-22.43	360	199	H
6	25.012835	58.43	PK-U	34.6	-64.3	14.6	43.33	74	-30.67	-	-	360	199	V
	25.015067	46.66	ADR	34.6	-64.3	14.6	31.56	-	-	54	-22.44	360	199	V

PK-U - U-NII: Maximum Peak

ADR - U-NII AD primary method, RMS average

10.4. WORST CASE 26-40 GHz



26 – 40GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	172366 ACF (dB) 3mH	172345 Amp (dB)	CBL/SWITCH	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	28.106	64.69	Pk	35.9	-73.3	16.3	43.59	-	-	74	-30.41	0-360	101	H
2	33.8535	62.5	Pk	37.1	-72.6	18	45	-	-	74	-29	0-360	101	H
3	39.624	60.19	Pk	38.4	-72.3	19.9	46.19	-	-	74	-27.81	0-360	200	H
4	29.31	63.39	Pk	36.2	-71.8	16.6	44.39	-	-	74	-29.61	0-360	200	V
5	34.1925	63.31	Pk	37.2	-73.1	18.1	45.51	-	-	74	-28.49	0-360	101	V
6	38.9095	60.07	Pk	38.5	-72.1	19.6	46.07	-	-	74	-27.93	0-360	101	V

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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.

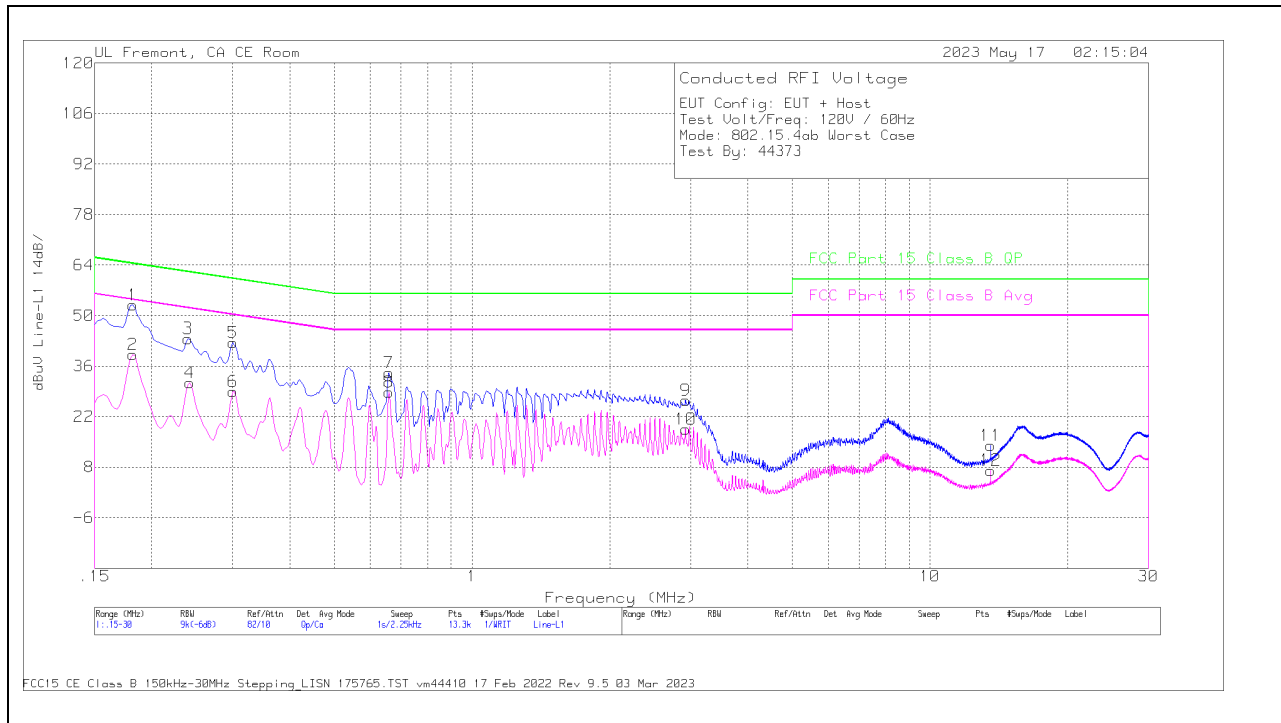
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

RESULTS

11.1. AC Power Line WITH LAPTOP

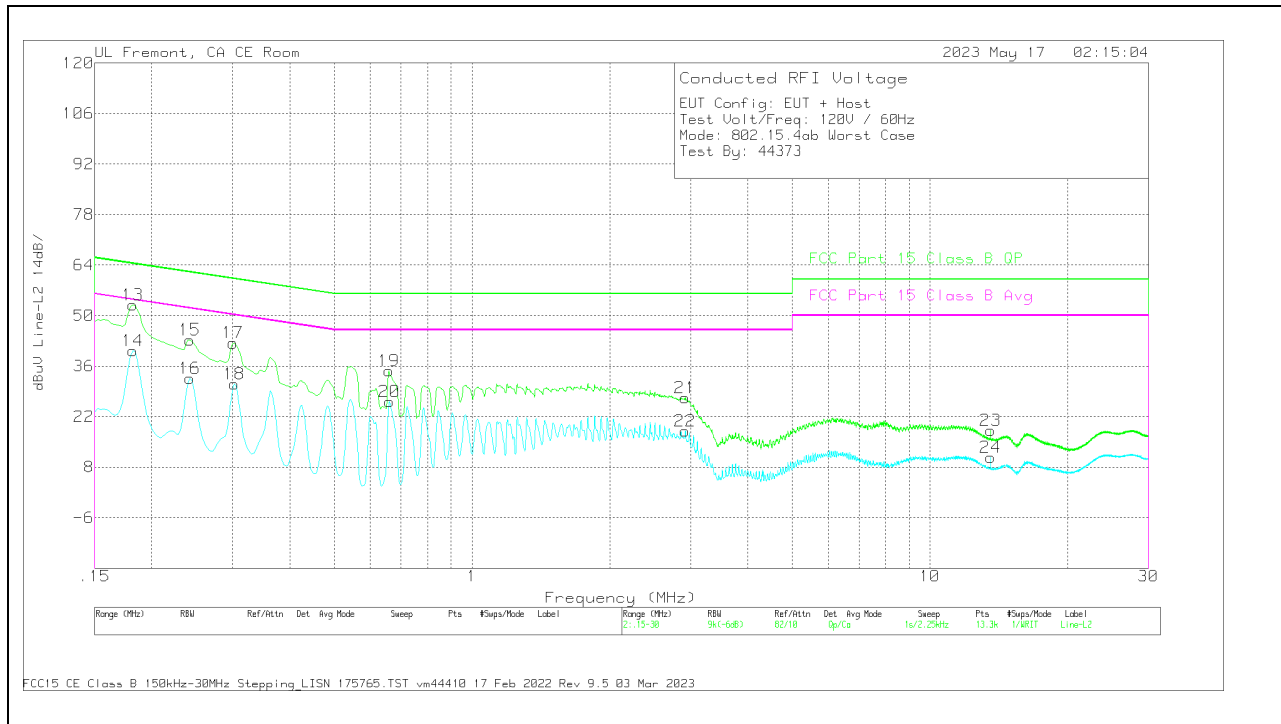
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dB	QP Margin (dB)	FCC Part 15 Class B Avg	Av(CISPR)M argin (dB)
1	.1815	43.5	Qp	0	0	9.4	52.9	64.42	-11.52	-	-
2	.1815	29.87	Ca	0	0	9.4	39.27	-	-	54.42	-15.15
3	.24	34.35	Qp	0	0	9.3	43.65	62.1	-18.45	-	-
4	.2423	22.03	Ca	0	0	9.3	31.33	-	-	52.02	-20.69
5	.3008	33.15	Qp	0	0	9.3	42.45	60.22	-17.77	-	-
6	.3008	19.71	Ca	0	0	9.3	29.01	-	-	50.22	-21.21
7	.6585	24.85	Qp	0	.1	9.3	34.25	56	-21.75	-	-
8	.6585	19.44	Ca	0	.1	9.3	28.84	-	-	46	-17.16
9	2.9243	17.06	Qp	0	.1	9.3	26.46	56	-29.54	-	-
10	2.9243	9.13	Ca	0	.1	9.3	18.53	-	-	46	-27.47
11	13.56	4.43	Qp	.1	.2	9.3	14.03	60	-45.97	-	-
12	13.56	-2.45	Ca	.1	.2	9.3	7.15	-	-	50	-42.85

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS

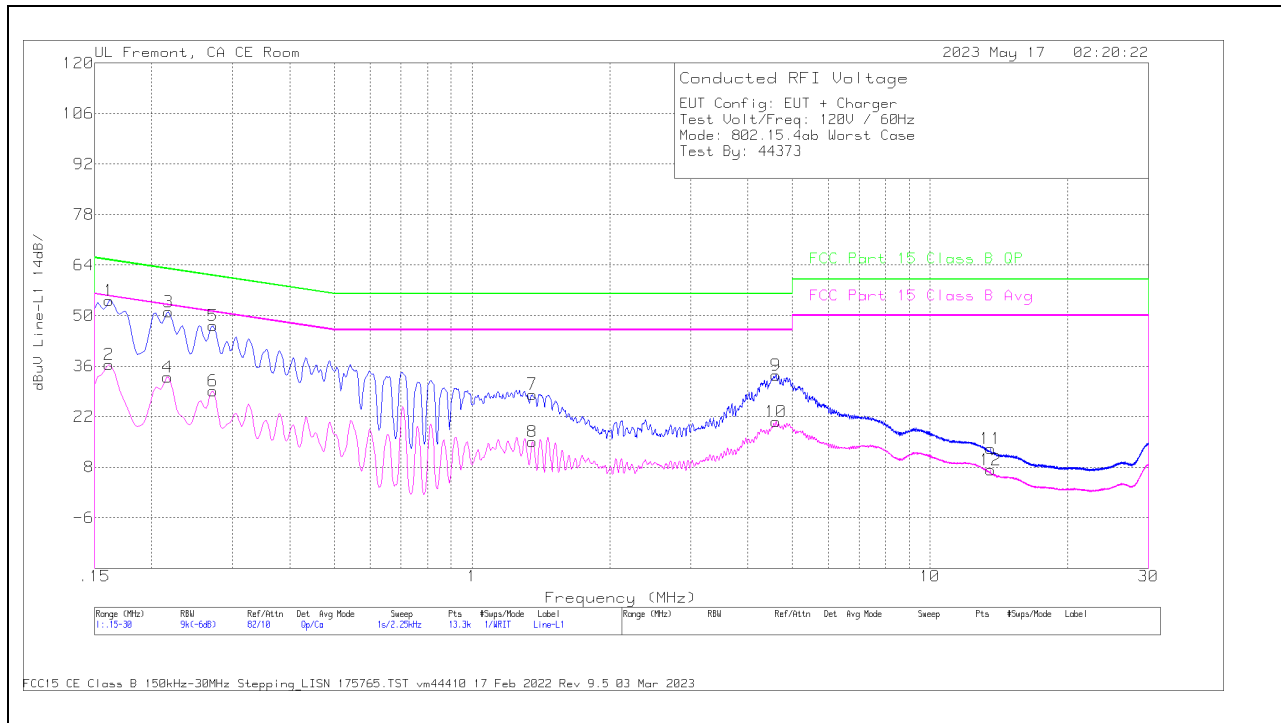


Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
13	.1815	43.49	Qp	0	0	9.4	52.89	64.42	-11.53	-	-
14	.1815	30.83	Ca	0	0	9.4	40.23	-	-	54.42	-14.19
15	.2423	34	Qp	0	0	9.3	43.3	62.02	-18.72	-	-
16	.2423	23.25	Ca	0	0	9.3	32.55	-	-	52.02	-19.47
17	.3008	33.14	Qp	0	0	9.3	42.44	60.22	-17.78	-	-
18	.303	21.78	Ca	0	0	9.3	31.08	-	-	50.16	-19.08
19	.6585	25.29	Qp	0	.1	9.3	34.69	56	-21.31	-	-
20	.6608	16.86	Ca	0	.1	9.3	26.26	-	-	46	-19.74
21	2.922	17.87	Qp	0	.1	9.3	27.27	56	-28.73	-	-
22	2.922	8.63	Ca	0	.1	9.3	18.03	-	-	46	-27.97
23	13.56	8.51	Qp	.1	.2	9.3	18.11	60	-41.89	-	-
24	13.56	1.04	Ca	.1	.2	9.3	10.64	-	-	50	-39.36

Qp - Quasi-Peak detector
Ca - CISPR average detection

11.2. AC Power Line WITH AC/DC Adapter

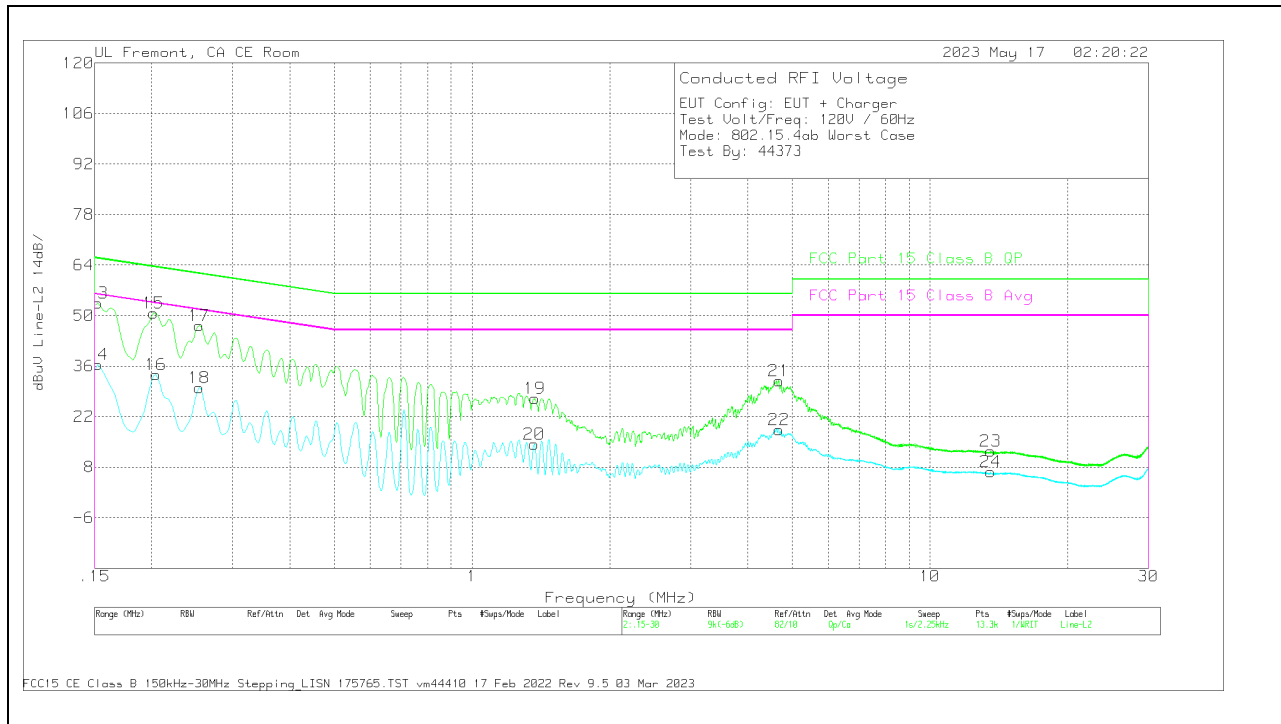
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L1_LISN.csv dB	C1&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dB	QP Margin (dB)	FCC Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.1613	44.77	Qp	0	0	9.4	54.17	65.4	-11.23	-	-
2	.1613	27.11	Ca	0	0	9.4	36.51	-	-	55.4	-18.89
3	.2175	41.73	Qp	0	0	9.3	51.03	62.91	-11.88	-	-
4	.2164	23.6	Ca	0	0	9.3	32.9	-	-	52.96	-20.06
5	.2715	37.96	Qp	0	0	9.3	47.26	61.07	-13.81	-	-
6	.2715	19.86	Ca	0	0	9.3	29.16	-	-	51.07	-21.91
7	1.3538	18.78	Qp	0	.1	9.3	28.18	56	-27.82	-	-
8	1.356	5.61	Ca	0	.1	9.3	15.01	-	-	46	-30.99
9	4.614	24.12	Qp	0	.1	9.3	33.52	56	-22.48	-	-
10	4.614	11.22	Ca	0	.1	9.3	20.62	-	-	46	-25.38
11	13.56	3.56	Qp	.1	.2	9.3	13.16	60	-46.84	-	-
12	13.56	-2.44	Ca	.1	.2	9.3	7.16	-	-	50	-42.84

Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	L2_LISN dB	C2&C3 cable path loss dB	207996 Limiter with short cabl dB	Corrected Reading dBuV	FCC Part 15 Class B QP dBuV	QP Margin (dB)	FCC Part 15 Class B Avg dBuV	Av(CISPR)M argin (dB)
13	.1523	44.11	Qp	0	0	9.4	53.51	65.88	-12.37	-	-
14	.1523	26.97	Ca	0	0	9.4	36.37	-	-	55.88	-19.51
15	.2018	41.28	Qp	0	0	9.4	50.68	63.54	-12.86	-	-
16	.204	24.18	Ca	0	0	9.4	33.58	-	-	53.45	-19.87
17	.2535	37.91	Qp	0	0	9.3	47.21	61.64	-14.43	-	-
18	.2535	20.76	Ca	0	0	9.3	30.06	-	-	51.64	-21.58
19	1.3695	17.59	Qp	0	.1	9.3	26.99	56	-29.01	-	-
20	1.3673	5.03	Ca	0	.1	9.3	14.43	-	-	46	-31.57
21	4.6748	22.46	Qp	0	.1	9.3	31.86	56	-24.14	-	-
22	4.6748	9.03	Ca	0	.1	9.3	18.43	-	-	46	-27.57
23	13.56	2.91	Qp	.1	.2	9.3	12.51	60	-47.49	-	-
24	13.56	-2.85	Ca	.1	.2	9.3	6.75	-	-	50	-43.25

Qp - Quasi-Peak detector
Ca - CISPR average detection

12. SETUP PHOTOS

Please refer to 14523771-EP1V1 FCC IC for setup photos

END OF TEST REPORT