

TEST REPORT

Report Number. : 14516849-E2V4

Applicant : SONOS INC.
614 CHAPALA ST.
SANTA BARBARA, CA, 93101, U.S.A.

Model : S44

Brand : SONOS

FCC ID : SBVRM044

IC : 5373A-RM044

EUT Description : 802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE

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

Date Of Issue:

2023-05-25

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	2023-04-18	Initial Issue	
V2	2023-05-05	Updated Section 6.6, 9.5 and 10.3	Kiya Kedida
V3	2023-05-17	Updated Section 6.6	Kiya Kedida
V4	2023-05-25	Section 6.6 updated the setup diagram and the description of test setup cable #3	Glenn Escano

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	8
4. FACILITIES AND ACCREDITATION.....	8
5. DECISION RULES AND MEASUREMENT UNCERTAINTY.....	9
5.1. METROLOGICAL TRACEABILITY	9
5.2. DECISION RULES	9
5.3. MEASUREMENT UNCERTAINTY	9
5.4. SAMPLE CALCULATION.....	10
6. EQUIPMENT UNDER TEST	11
6.1. EUT DESCRIPTION.....	11
6.2. MAXIMUM OUTPUT POWER.....	11
6.3. DESCRIPTION OF AVAILABLE ANTENNAS	11
6.4. SOFTWARE AND FIRMWARE	11
6.5. WORST-CASE CONFIGURATION AND MODE.....	11
6.6. DESCRIPTION OF TEST SETUP.....	12
7. MEASUREMENT METHOD	14
8. TEST AND MEASUREMENT EQUIPMENT	15
9. ANTENNA PORT TEST RESULTS	16
9.1. ON TIME AND DUTY CYCLE	16
9.2. 99% BANDWIDTH.....	17
9.2.1. BLE (1Mbps)	17
9.2.2. BLE (2Mbps)	18
9.3. 6 dB BANDWIDTH	19
9.3.1. BLE (1Mbps)	20
9.3.2. BLE (2Mbps)	21
9.4. OUTPUT POWER	22
9.4.1. BLE (1Mbps)	22
9.4.2. BLE (2Mbps)	22
9.5. AVERAGE POWER.....	23

9.5.1.	BLE (1Mbps)	23
9.5.2.	BLE (2Mbps)	23
9.6.	<i>POWER SPECTRAL DENSITY</i>	24
9.6.1.	BLE (1Mbps)	25
9.6.2.	BLE (2Mbps)	26
9.7.	<i>CONDUCTED SPURIOUS EMISSIONS</i>	27
9.7.1.	BLE (1Mbps)	28
9.7.2.	BLE (2Mbps)	29
10.	RADIATED TEST RESULTS	30
10.1.	<i>LIMITS AND PROCEDURE</i>	30
10.2.	<i>TRANSMITTER ABOVE 1 GHz</i>	32
10.2.1.	BLE (1Mbps).....	32
10.2.2.	BLE (2Mbps).....	42
10.3.	<i>WORST CASE BELOW 30MHz</i>	52
10.4.	<i>WORST CASE BELOW 1 GHz</i>	54
10.5.	<i>WORST CASE 18-26 GHz</i>	56
11.	AC POWER LINE CONDUCTED EMISSIONS	58
12.	SETUP PHOTOS	61

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Sonos Inc.
614 Chapala St.
Santa Barbara, CA, 93101, U.S.A.

EUT DESCRIPTION: 802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE

MODEL: S44

BRAND: Sonos

SERIAL NUMBER: Radiated Sample: A100 2301WC C4-38-75-00-0F-40-9
Conducted: A100 2301WC C4-38-75-00-0E-7C:0,

SAMPLE RECEIPT DATE: 2023-02-20

DATE TESTED: 2023-02-22 TO 2023-04-10

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

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

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

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

Approved & Released For
UL Verification Services Inc. By:



Dan Corona
Operations Leader
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Glenn Escano
Senior Test Engineer
Consumer Technology Division
UL Verification Services Inc.

1st Reviewed By:



Vien Tran
Senior Laboratory Engineer
Consumer Technology Division
UL Verification Services Inc.

2nd Reviewed By:



Kiya Kedida
Senior Project Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST RESULTS SUMMARY

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

Below is a list of the data provided by the customer:

- 1) Antenna gain and type (see section 6.3)

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

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by 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, U.S.A	US0104	2324A	550739
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	550739
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	550739

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}
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Power Spectral Density	2.47 dB
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)
Unwanted Emissions, Conducted	1.94 dB
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
Time Domain Measurements	3.39%
Temperature	0.57°C
Humidity	3.39%
DC Supply Voltages	0.57%

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an 802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Peak	
		Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	11.60	14.45

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes a Monopole antenna, with a maximum gain of 1.8 dBi.

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 74.0-39150-1-41.

The test utility software installed during testing was PrimaComplianceGUIInstaller_TESTBUILD3_17Nov22.

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 can only be setup in desktop orientation; therefore, all radiated testing was performed with the EUT in desktop orientation.

Worst-case data rates as provided by the client were:

BLE (1Mbps): 1Mbps
BLE (2Mbps): 2 Mbps

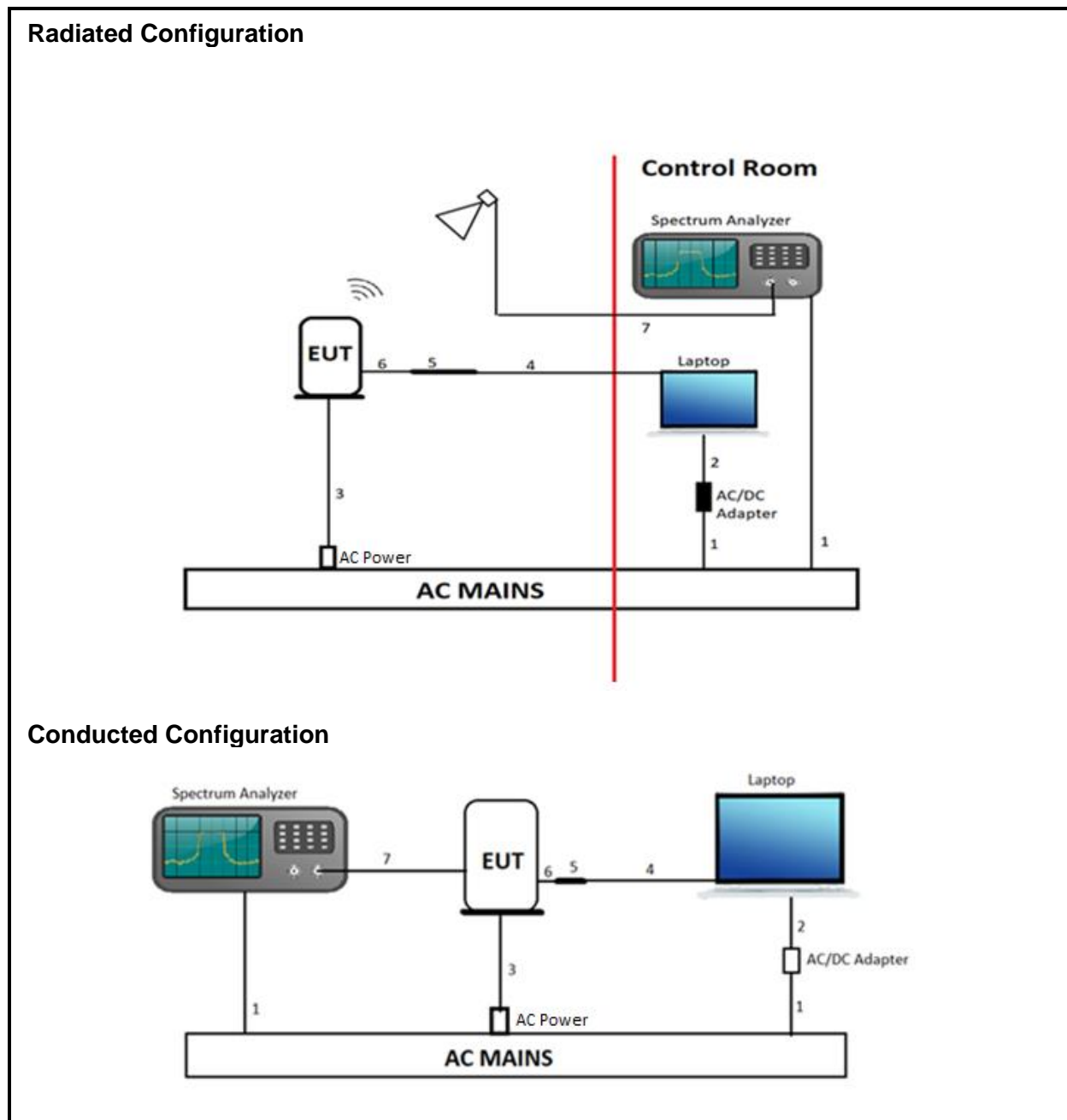
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description	Manufacturer	Model	Serial Number	FCC ID/ DoC		
Laptop	Lenovo	T460s	PC0JMBF8	Doc		
Laptop AC/DC AC/DC Adapter	Lenovo	ADLX90NLC2A	11S45N0247Z1ZSHH448JEY	Doc		
AC Power	Sonos	CPS045180250U	N/A	Doc		
Power Supply	Sonos	EC2Y5EB	N/A	Doc		
USB-A to Ethernet Adapter	Plugable	USB2-E100	8CAE4CE46AFA	Doc		
USB-C to USB-A Female Adapter	Amazon Basics	L6LUC160-CS-R	N/A	Doc		
I/O CABLES (CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	3	AC	Un-shielded	1.25	AC Mains to Spectrum Analyzer/AC/DC Adapter
2	DC	1	DC	Un-shielded	1	AC/DC Adapter to Laptop
3	USB-C	1	USB-C	Un-shielded	1.5	EUT to AC Power
4	Ethernet	1	RJ45	Un-shielded	1.5	Laptop to USB Ethernet Adapter
5	USB-A	1	USB-A	Shielded	0.05	USB Ethernet Adapter to USB
6	USB-C	1	USB-C	Shielded	0.05	EUT to USB-C/USB-A Female Adapter
7	SMA Cable	1	SMA	Un-Shielded	1.0	EUT to Spectrum Analyzer
I/O CABLES (RADIATED TEST)						
Cable No.	Port	# Of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	3	AC	Un-shielded	1.25	AC Mains to Spectrum Analyzer/AC/DC Adapter
2	DC	1	DC	Un-shielded	1	AC/DC Adapter to Laptop
3	USB-C	1	USB-C	Un-shielded	1.5	EUT to AC Power
4	Ethernet	1	RJ45	Un-shielded	10	Laptop to USB Ethernet Adapter
5	USB-A	1	USB-A	Shielded	0.05	USB Ethernet Adapter to USB
6	USB-C	1	USB-C	Shielded	0.05	EUT to USB-C/USB-A Female Adapter
7	SMA Cable	1	SMA	Un-Shielded	10	EUT to Horn Antenna

TEST SETUP

The EUT is a stand-alone unit, and the radio is exercised remotely by Sonos Compliance GUI test utility software via ethernet.

SETUP DIAGRAM



7. 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

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

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 Subclause -11.13.3.2 Integration method -Peak detection

Band-edge: ANSI C63.10 Subclause -11.13.3.4 Integration method -Trace averaging across ON and OFF times DC correction

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

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

8. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Broadband Hybrid, 30MHz to 2GHz	Sunol Sciences Corp.	JB1	171862	2023-09-08	2022-09-08
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	29654	2023-04-24	2022-04-24
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80404	2023-10-07	2022-10-07
RF Filter Box, 1-18GHz	FREMONT	SAC-L1	171013	2023-06-24	2022-06-24
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	191429	2024-02-29	2023-02-15
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	225688	2024-02-29	2023-02-14
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	199659	2023-06-12	2022-06-12
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2024-03-29	2023-03-18
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	170014	2023-07-19	2022-07-19
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	170016	2023-07-19	2022-07-19
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent Technologies	N9030A	80396	2024-01-31	2023-01-27
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90719	2024-01-31	2023-01-26
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	81319	2024-01-31	2023-01-25
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	N/A	Verified	Verified
AC Line Conducted					
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	175765	2024-01-31	2023-01-31
EMI TEST RECEIVER	Rohde & Schwarz	ESR	171646	2024-02-29	2023-02-29
Transient Limiter	TE	TBFL1	207996	2023-07-15	2022-07-15
UL TEST SOFTWARE LIST					
Radiated Software	UL	UL EMC	Rev 2015-12-29, 2020-04-15 & 2023-01-18		
Antenna Port Software	UL	UL RF	Ver 2022-08-16		
AC Line Conducted Software	UL	UL EMC	Rev 2022-02-17		

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
BLE (1Mbps)	0.381	0.625	0.608	60.84%	2.16	2.628
BLE (2Mbps)	1.069	1.876	0.570	56.97	2.44	0.936

DUTY CYCLE PLOTS



9.2. 99% BANDWIDTH

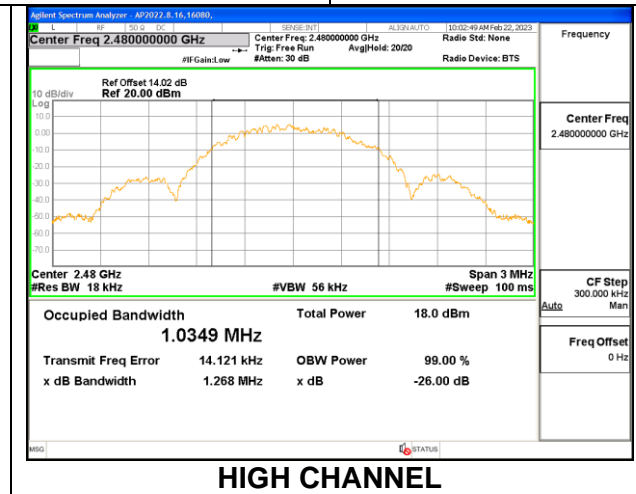
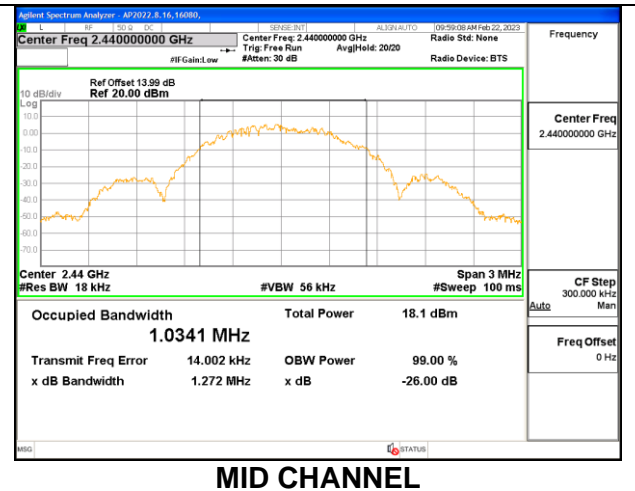
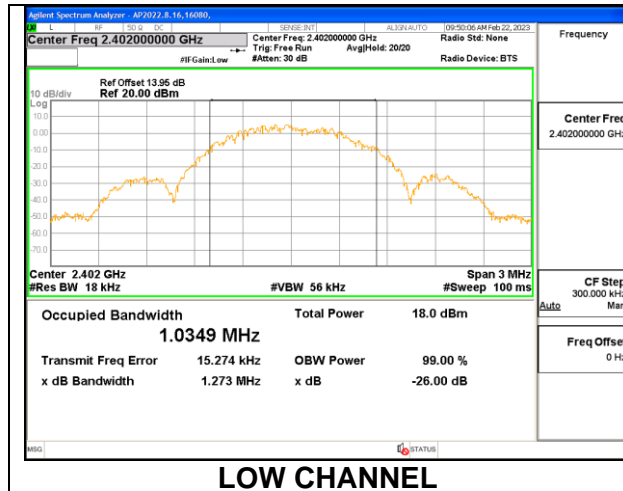
LIMITS

None; for reporting purposes only.

RESULTS

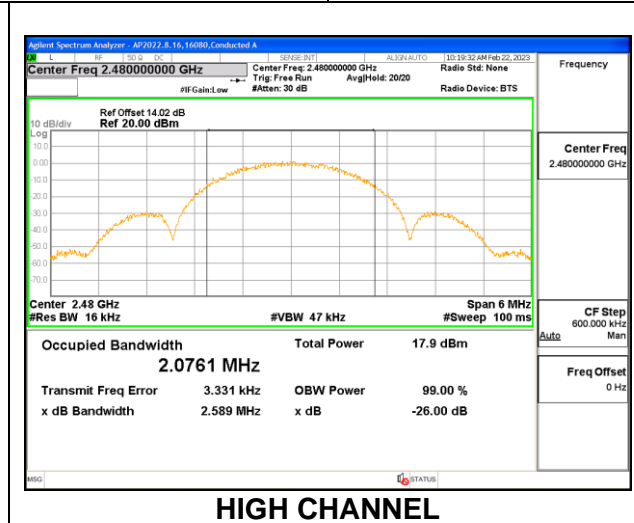
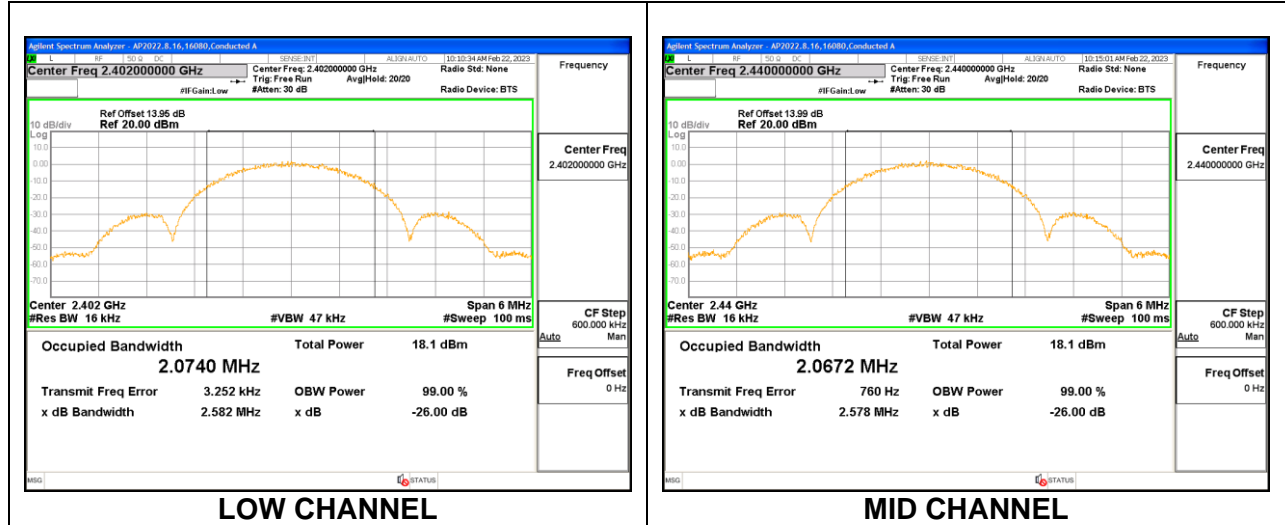
9.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0349
Middle	2440	1.0341
High	2480	1.0349



9.2.2. BLE (2Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	2.0740
Middle	2440	2.0672
High	2480	2.0761



9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

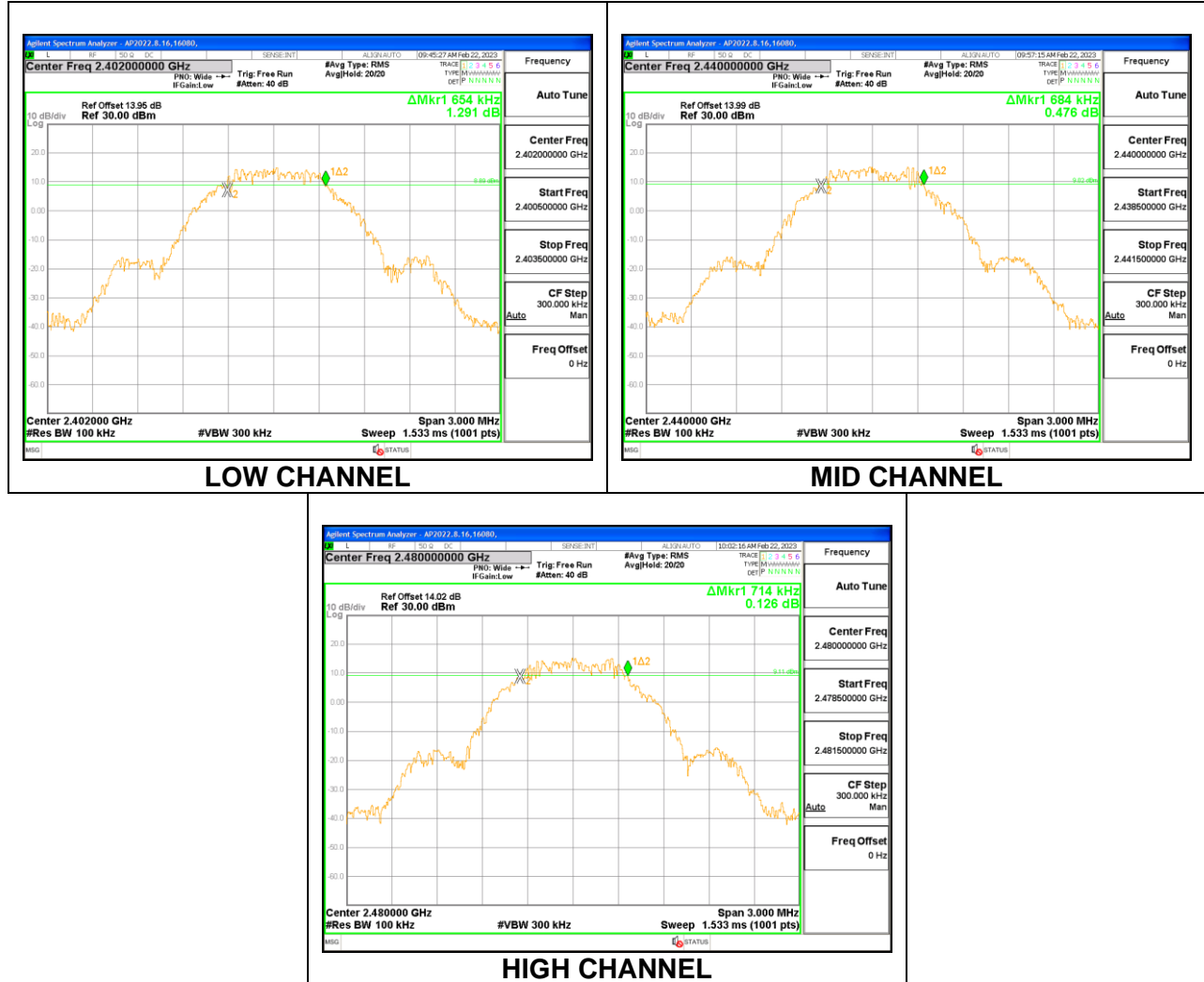
RSS-247 5.2 (a)

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

RESULTS

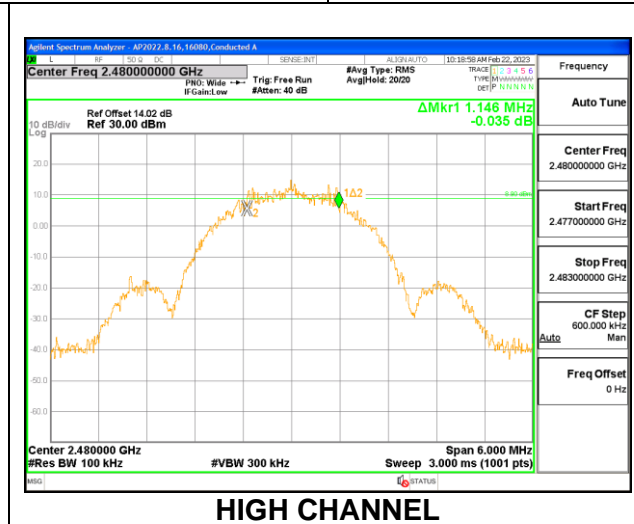
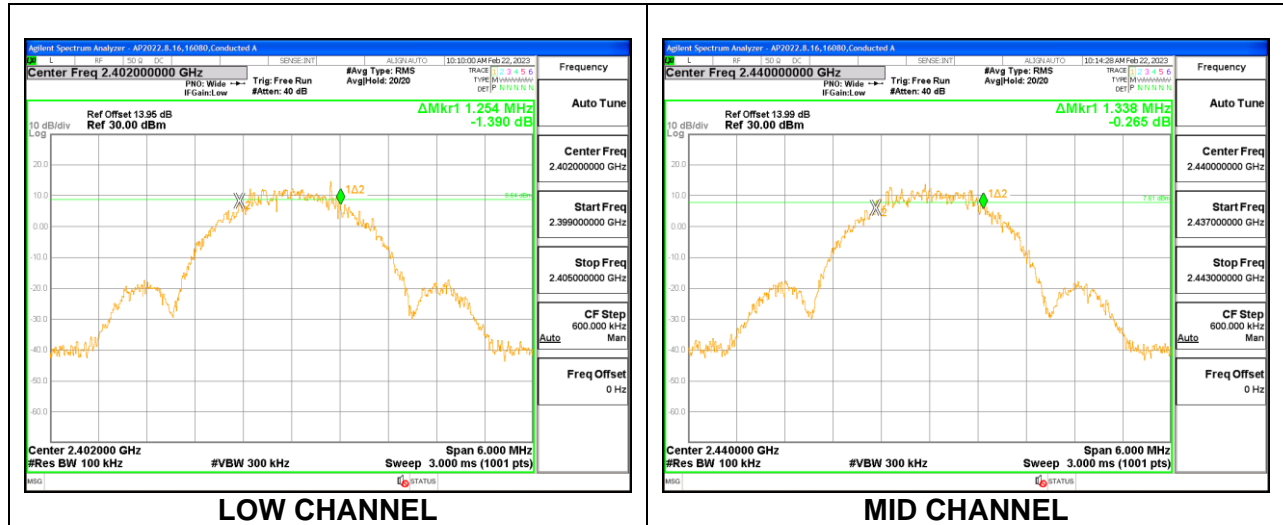
9.3.1. BLE (1Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.654	0.5
Middle	2440	0.684	0.5
High	2480	0.714	0.5



9.3.2. BLE (2Mbps)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	1.254	0.5
Middle	2440	1.338	0.5
High	2480	1.146	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

9.4.1. BLE (1Mbps)

Tested By:	ZS 16080
Date:	2023-04-10

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.60	30	-18.400
Middle	2440	11.50	30	-18.500
High	2480	11.48	30	-18.520

9.4.2. BLE (2Mbps)

Tested By:	ZS 16080
Date:	2023-04-10

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	11.40	30	-18.600
Middle	2440	11.30	30	-18.700
High	2480	11.27	30	-18.730

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

9.5.1. BLE (1Mbps)

Tested By:	ZS 16080
Date:	2023-04-10

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	11.35
Middle	2440	11.32
High	2480	11.31

9.5.2. BLE (2Mbps)

Tested By:	ZS 16080
Date:	2023-04-10

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	11.28
Middle	2440	11.26
High	2480	11.11

9.6. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

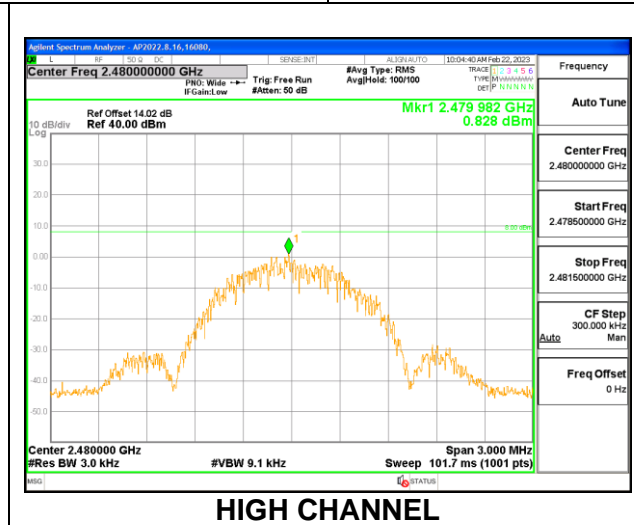
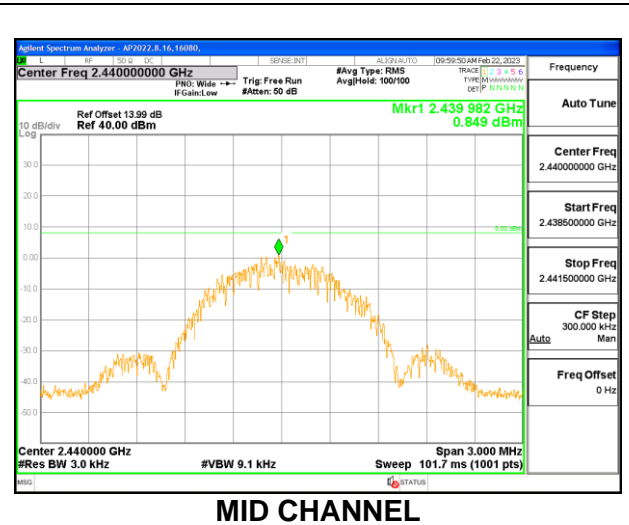
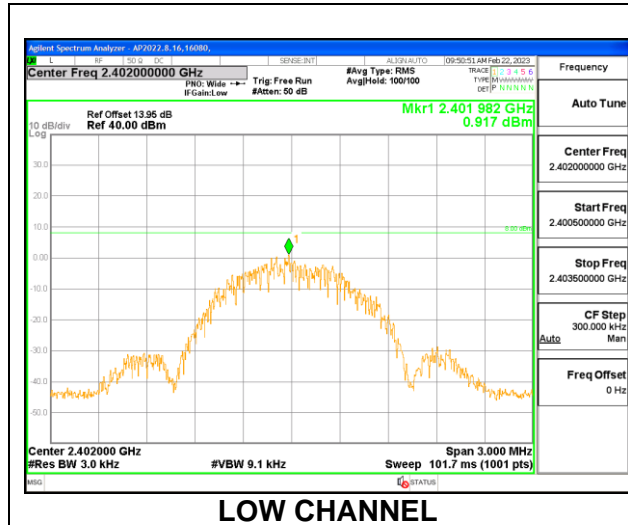
RSS-247 (5.2) (b)

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

RESULTS

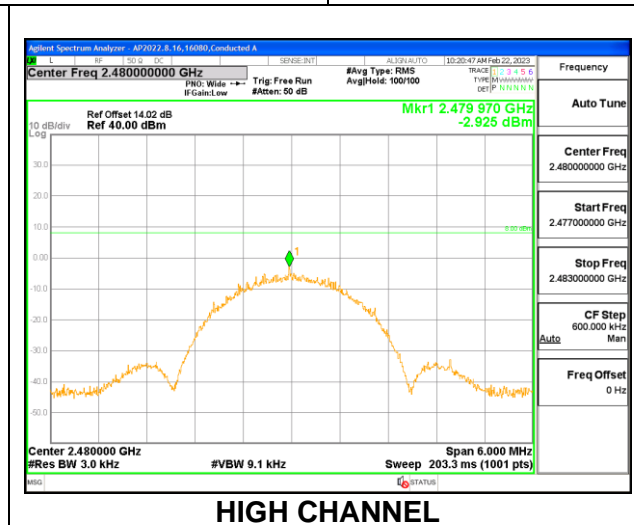
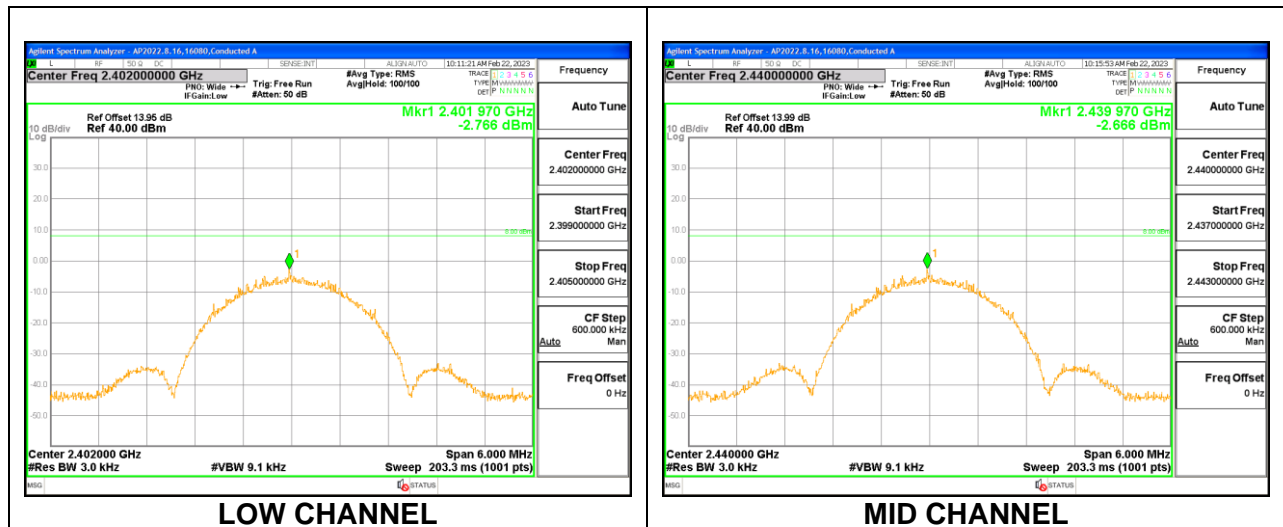
9.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	0.917	8	-7.08
Middle	2440	0.849	8	-7.15
High	2480	0.828	8	-7.17



9.6.2. BLE (2Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-2.766	8	-10.77
Middle	2440	-2.666	8	-10.67
High	2480	-2.925	8	-10.93



9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

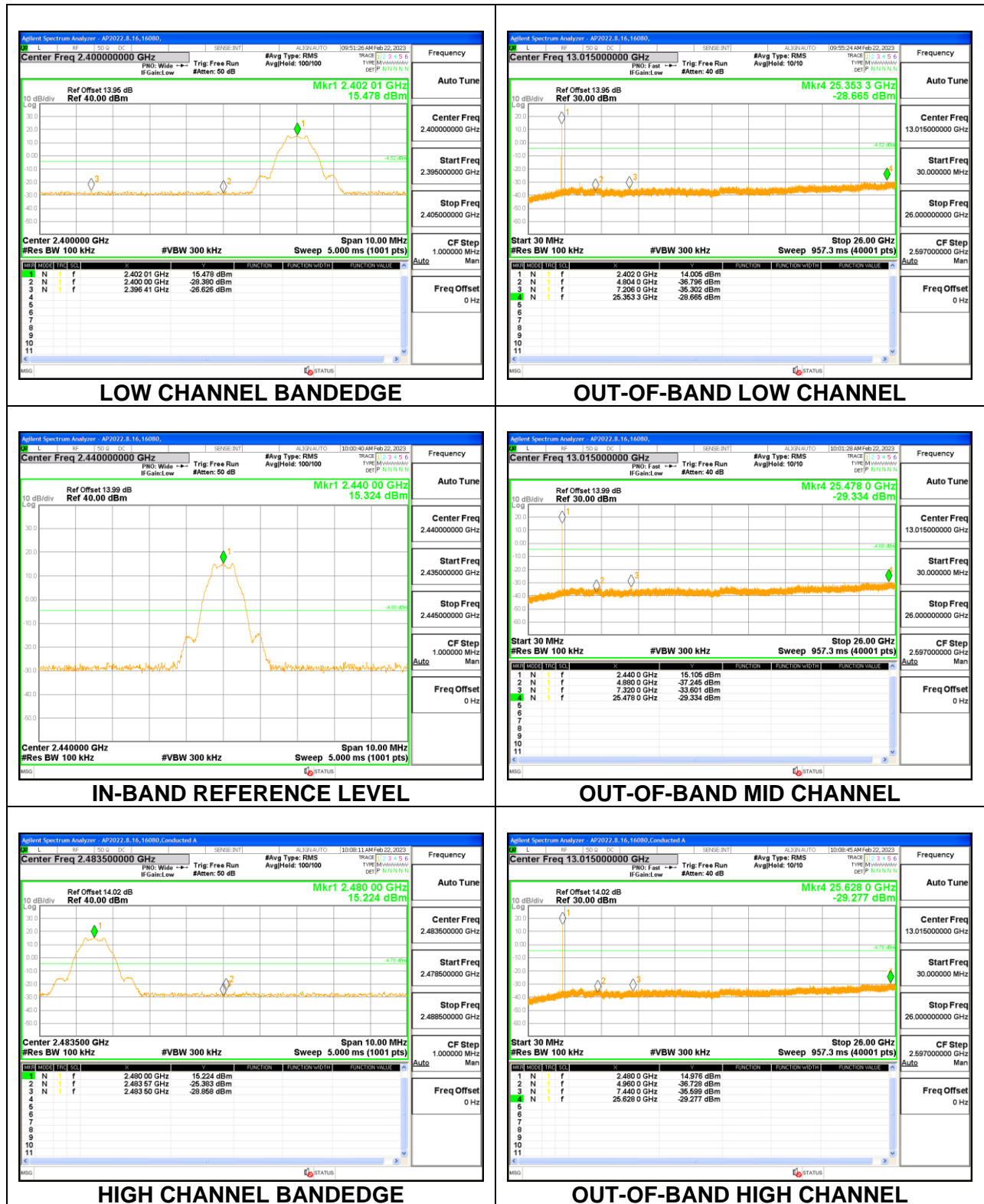
FCC §15.247 (d)

RSS-247 5.5

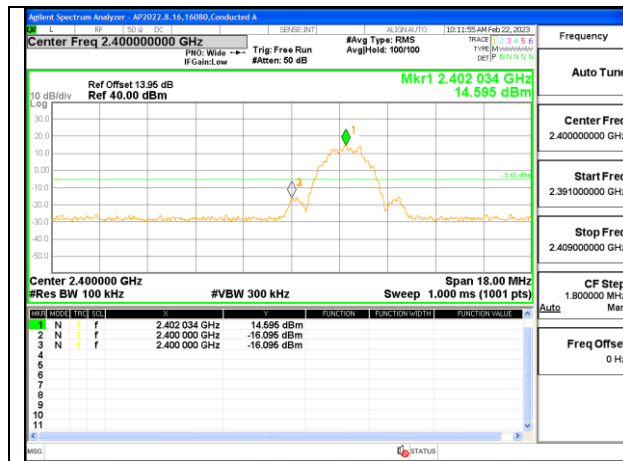
Output power was measured based on the use of a peak measurement; therefore the required attenuation is 20 dB.

RESULTS

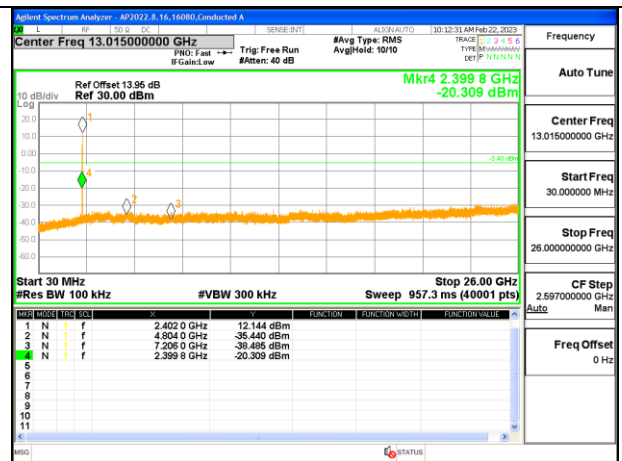
9.7.1. BLE (1Mbps)



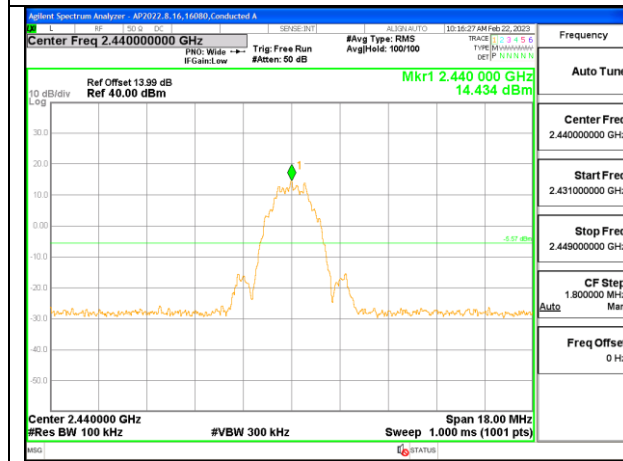
9.7.2. BLE (2Mbps)



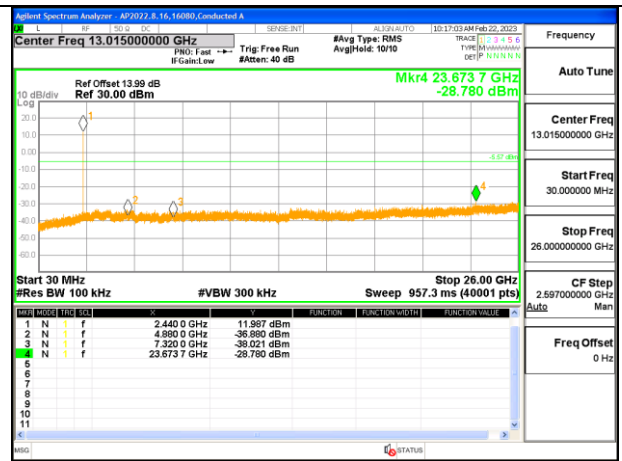
LOW CHANNEL BANDEDGE



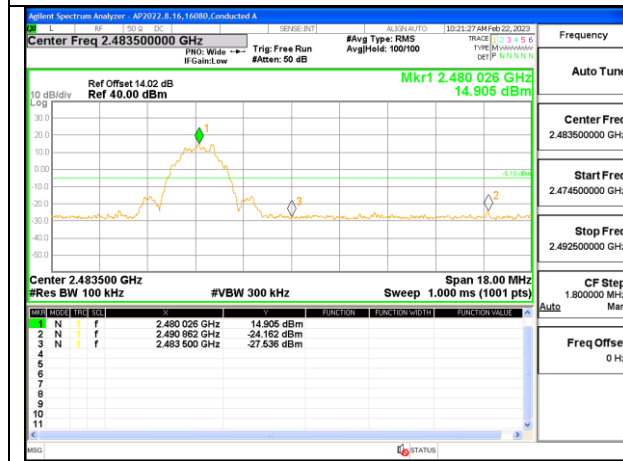
OUT-OF-BAND LOW CHANNEL



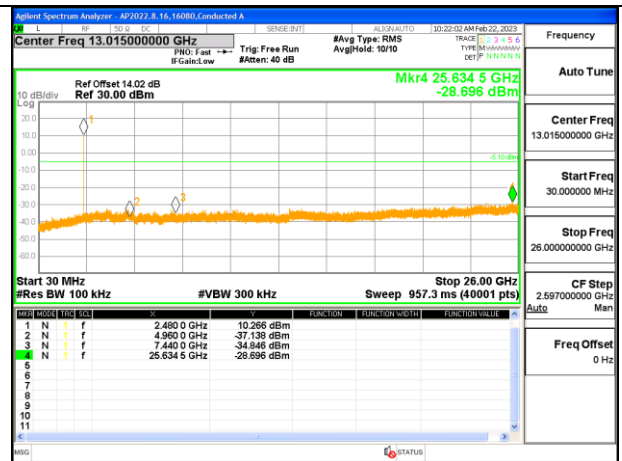
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

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

TEST PROCEDURE

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

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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

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

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

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

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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.

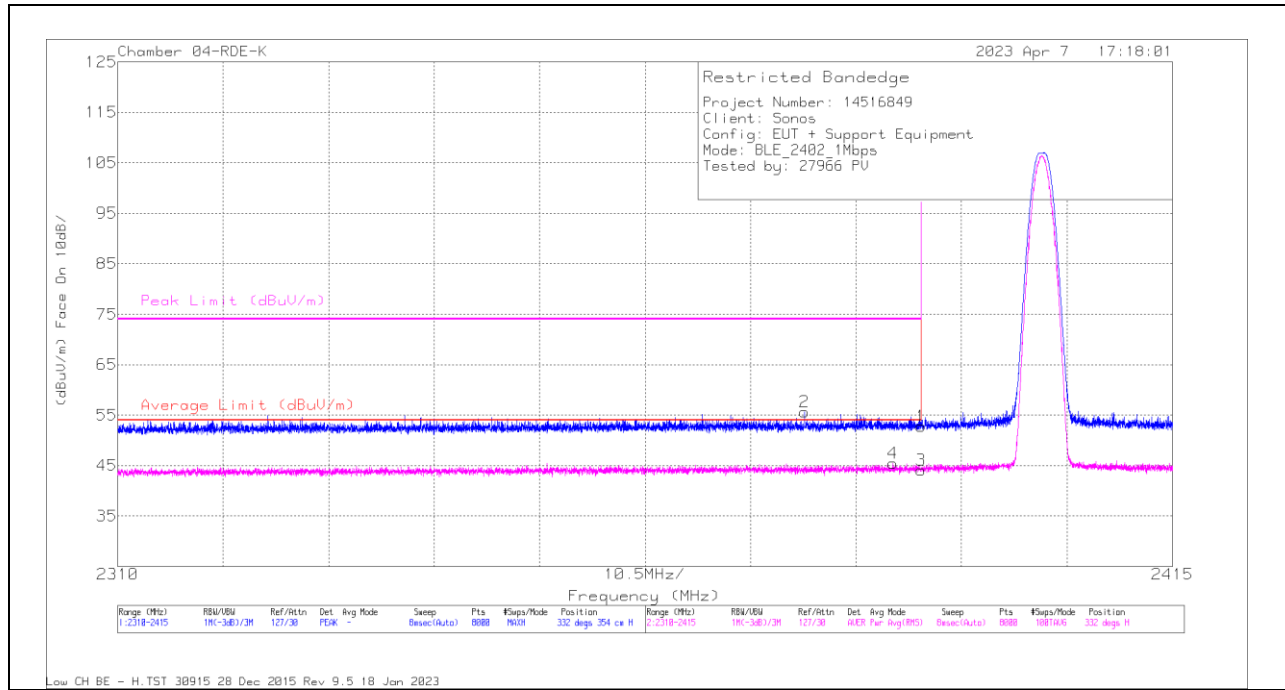
NOTE: The limits in FCC 47 CFR, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance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

10.2. TRANSMITTER ABOVE 1 GHz

10.2.1. BLE (1Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

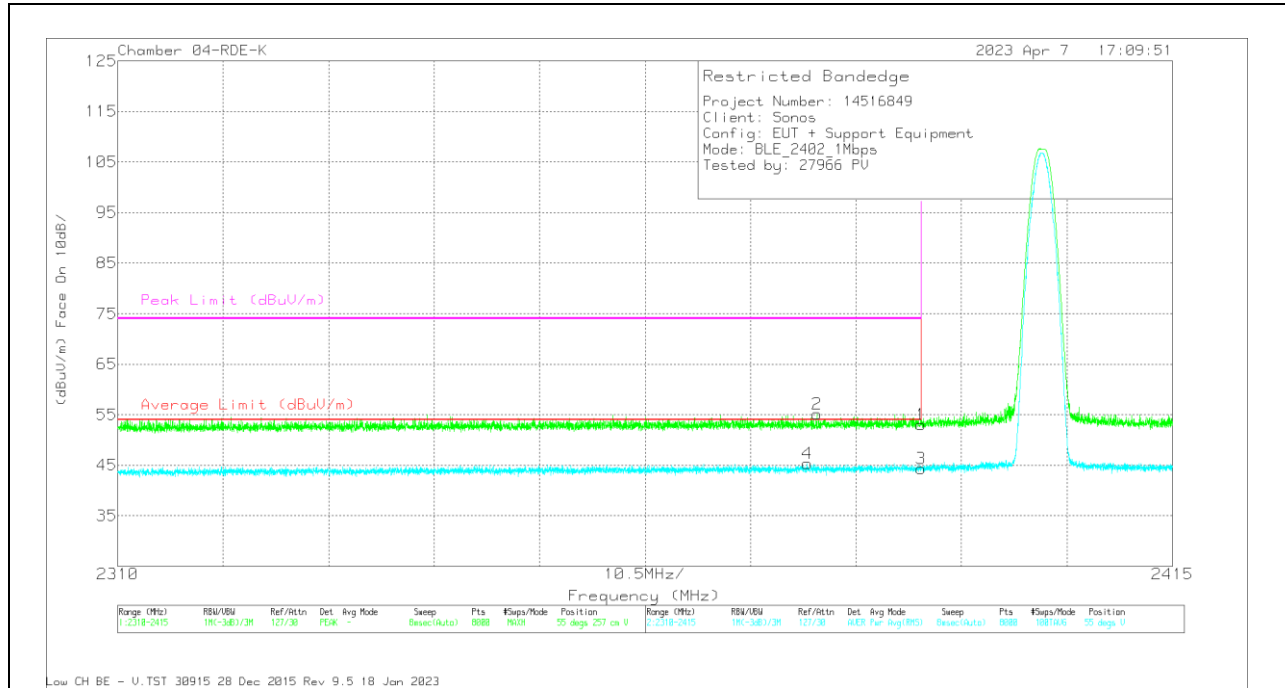
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	22083 ACF (dB) 3mH	Amp/Cb/Ped (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	55.83	Pk	31.8	-34.9	0	52.73	-	-	74	-21.27	332	354	H
2	* 2378.379	58.78	Pk	31.7	-34.9	0	55.58	-	-	74	-18.42	332	354	H
3	* 2390	45.03	RMS	31.8	-34.9	2.16	44.09	54	-9.91	-	-	332	354	H
4	* 2387.147	46.36	RMS	31.8	-34.9	2.16	45.42	54	-8.58	-	-	332	354	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



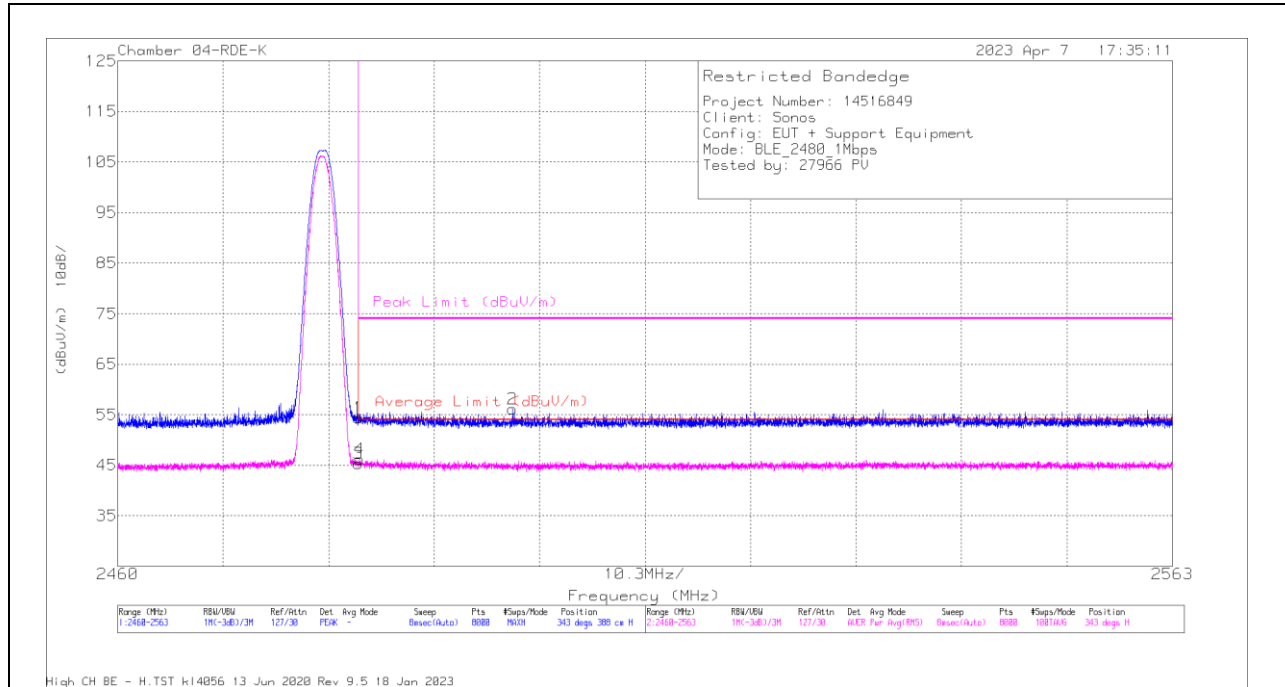
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	22083 ACF (dB) 3mH	Amp/Cbi/Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	56.09	Pk	31.8	-34.9	0	52.99	-	-	74	-21.01	55	257	V
2	* 2379.599	58.29	Pk	31.8	-34.9	0	55.19	-	-	74	-18.81	55	257	V
3	* 2390	45.27	RMS	31.8	-34.9	2.16	44.33	54	-9.67	-	-	55	257	V
4	* 2378.654	46.39	RMS	31.7	-34.9	2.16	45.35	54	-8.65	-	-	55	257	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



Trace Markers

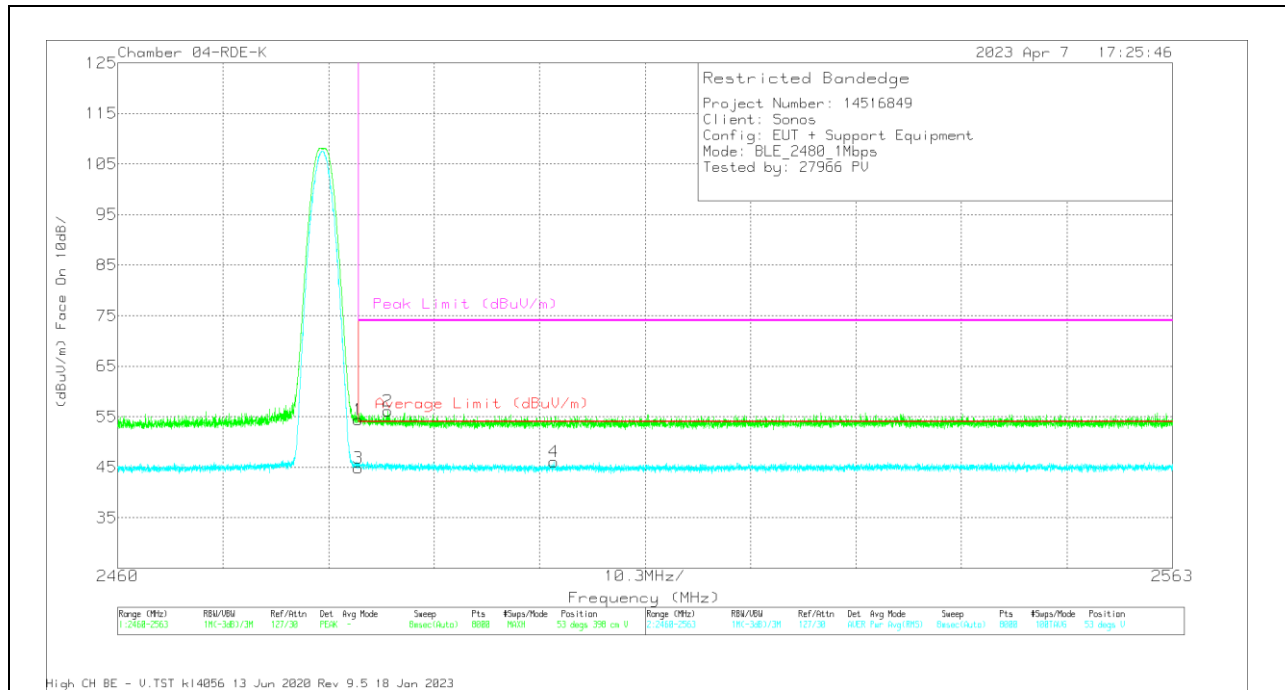
Marker	Frequency (MHz)	Meter Reading (dBu/m)	Det	223083 ACF (dB) 3mH	Ampl/Cbl/Pad (dB)	DCCF (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	56.73	Pk	32.2	-34.5	0	54.43	-	-	74	-19.57	343	388	H
2	* 2498.579	58.35	Pk	32.2	-34.4	0	56.15	-	-	74	-17.85	343	388	H
3	* 2483.5	45.49	RMS	32.2	-34.5	2.16	45.35	54	-8.65	-	-	343	388	H
4	* 2483.616	46.3	RMS	32.2	-34.5	2.16	46.16	54	-7.84	-	-	343	388	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



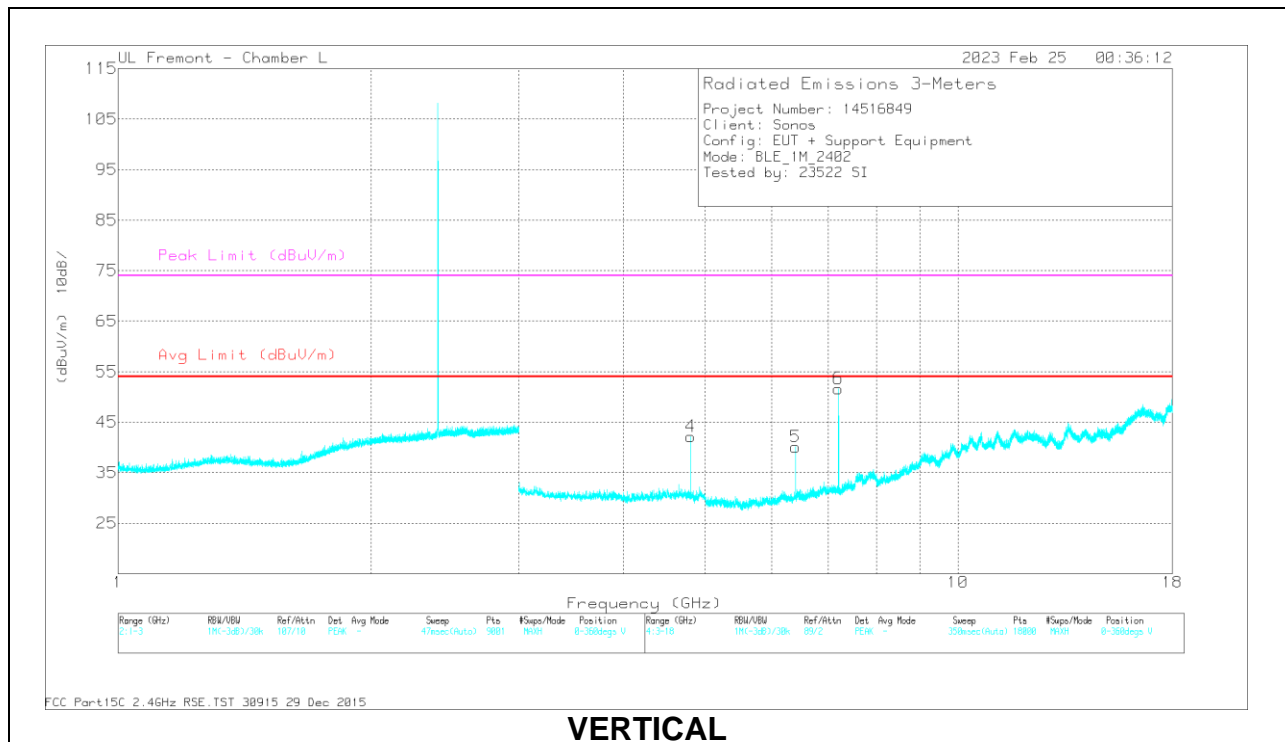
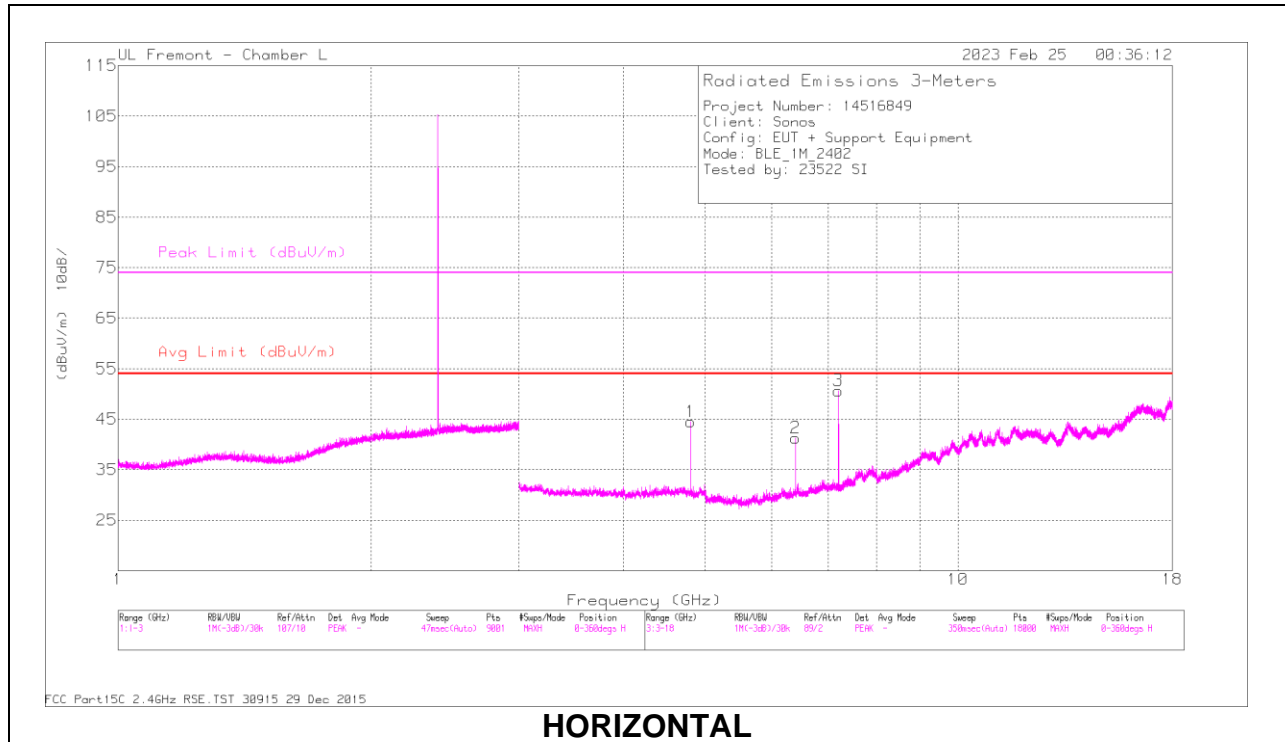
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	223083 ACF (dB) 3mH	Amp/Cbl/Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	56.73	Pk	32.2	-34.5	0	54.43	-	-	74	-19.57	53	398	V
2	* 2486.346	58.39	Pk	32.2	-34.5	0	56.09	-	-	74	-17.91	53	398	V
3	* 2483.5	44.91	RMS	32.2	-34.5	2.16	44.77	54	-9.23	-	-	53	398	V
4	2502.571	46.11	RMS	32.2	-34.4	2.16	46.07	54	-7.93	-	-	53	398	V

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

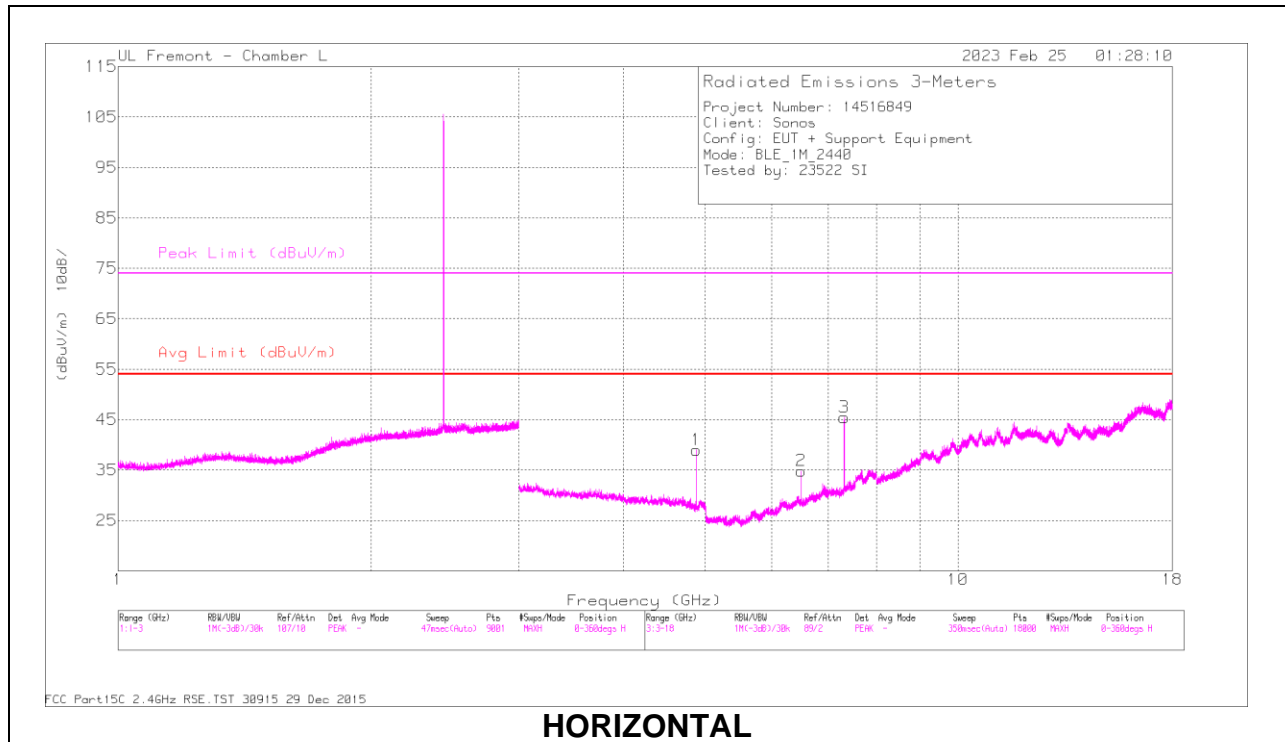
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/Fitr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.804354	43.11	PK2	34.5	-26.5	0	51.11	-	-	74	-22.89	235	101	H
	* 4.803939	36.77	MAV1	34.5	-26.5	2.16	46.93	54	-7.07	-	-	235	101	H
2	6.405314	37.64	PK2	35.8	-24	0	49.44	-	-	-	-	169	105	H
3	7.205266	43.67	PK2	35.9	-23	0	56.57	-	-	-	-	170	103	H
4	* 4.803557	34.86	PK2	34.5	-26.5	0	42.86	-	-	74	-31.14	320	102	V
	* 4.80379	27.22	MAV1	34.5	-26.5	2.16	37.38	54	-16.62	-	-	320	102	V
5	6.405299	32.33	PK2	35.8	-24	0	44.13	-	-	-	-	240	114	V
6	7.206594	40.71	PK2	35.9	-23	0	53.61	-	-	-	-	257	218	V

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

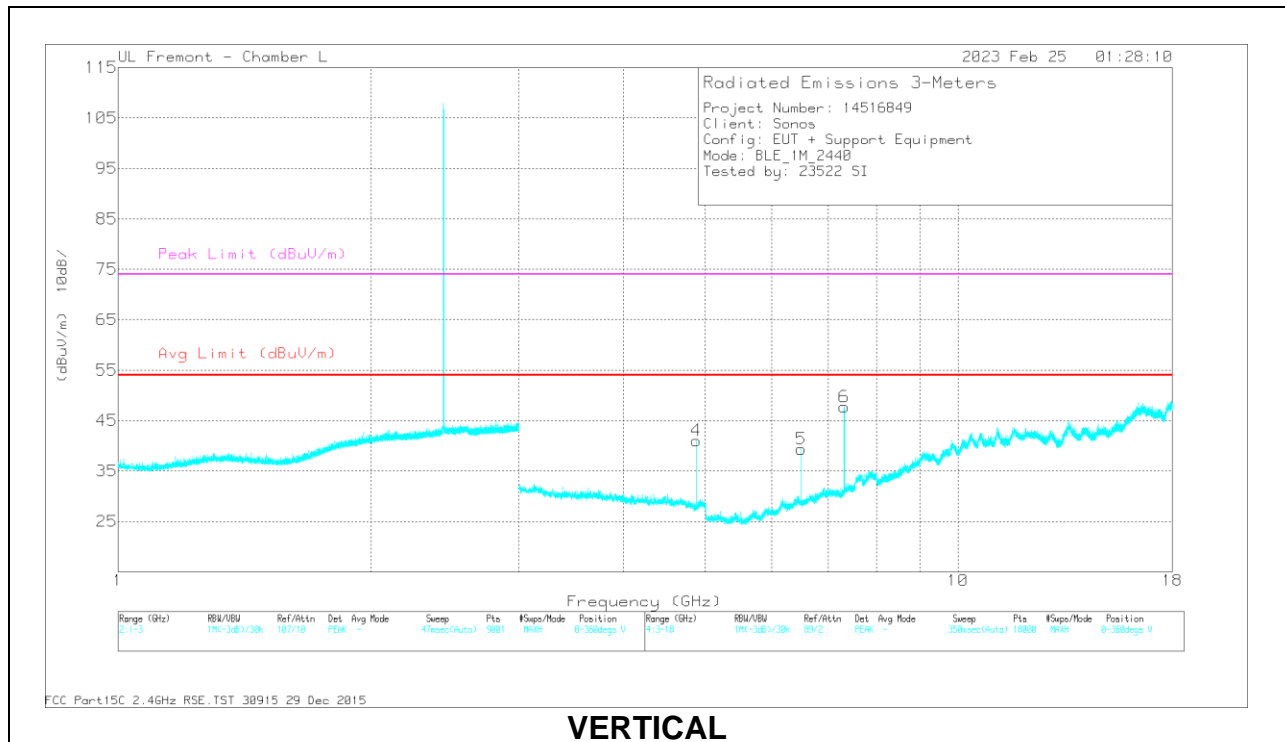
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



HORIZONTAL



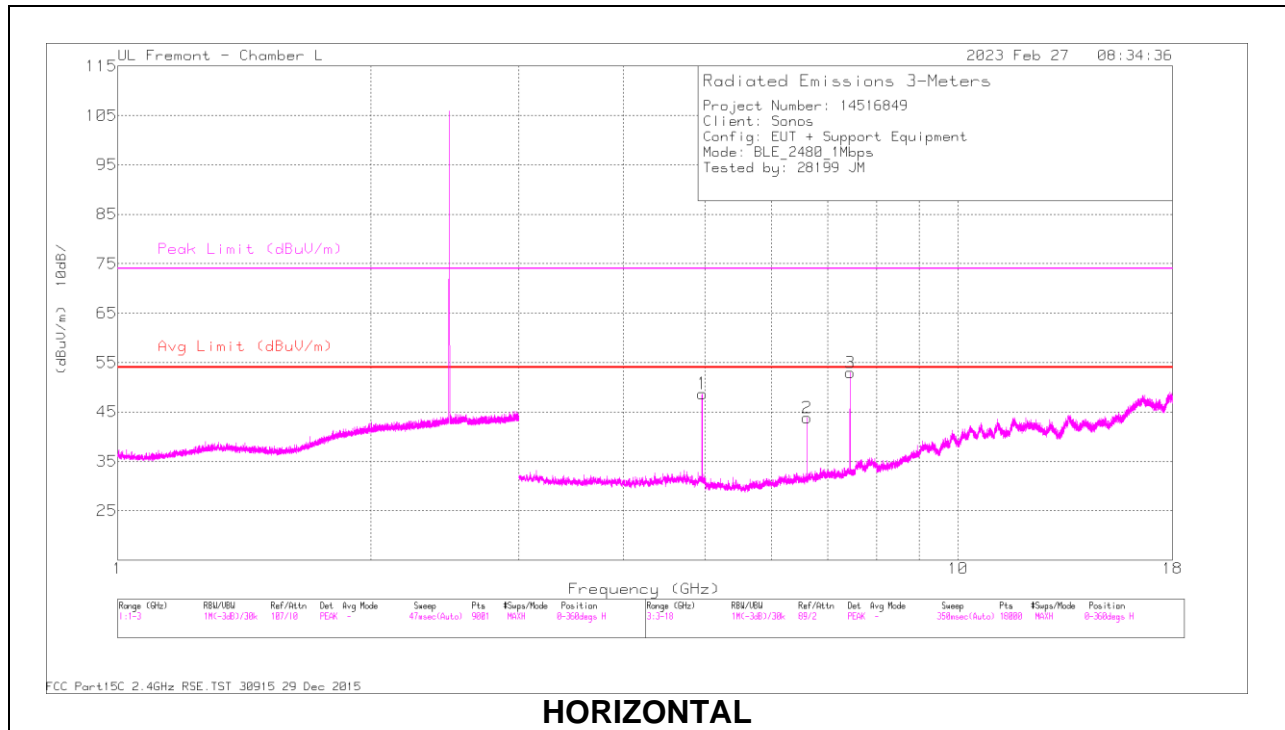
VERTICAL

RADIATED EMISSIONS

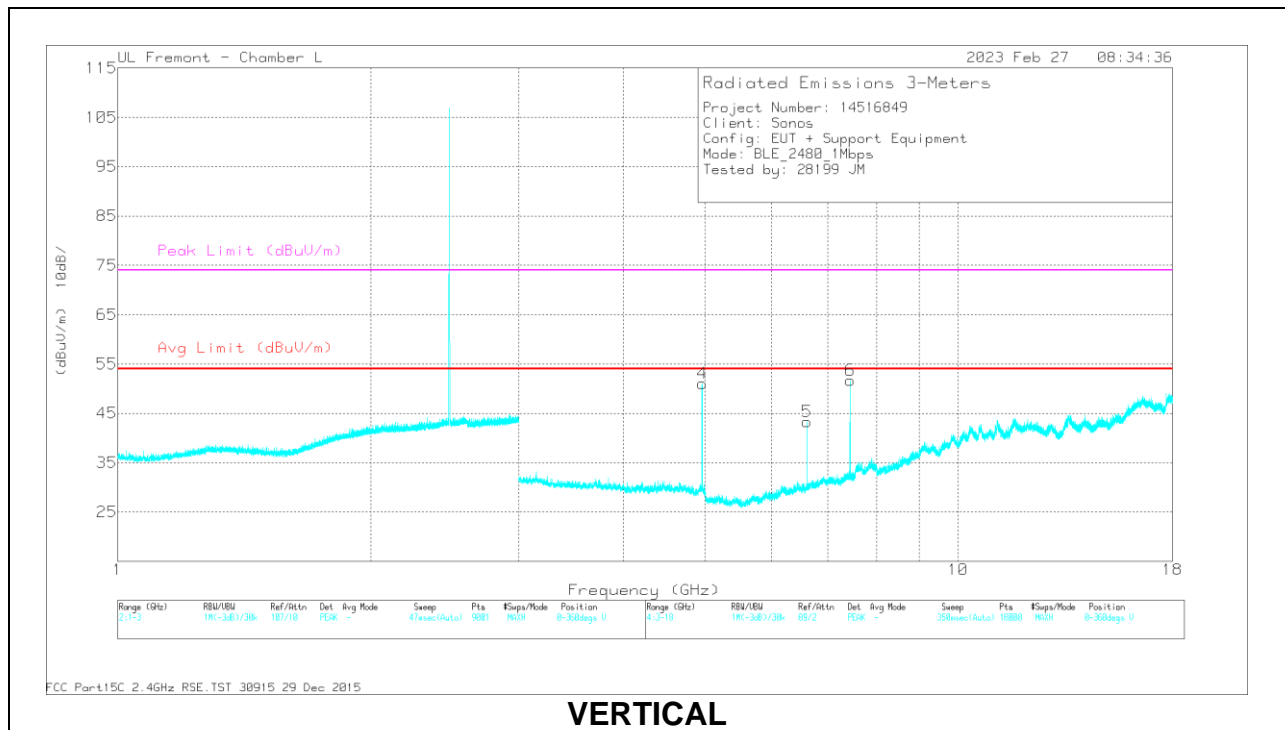
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/Filtr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.880353	41.09	PK2	34.4	-26.4	0	49.09	-	-	74	-24.91	332	334	H
	* 4.879755	34.95	MAv1	34.4	-26.4	2.16	45.11	54	-8.89	-	-	332	334	H
2	6.506593	35.94	PK2	35.8	-24.1	0	47.64	-	-	-	-	178	106	H
3	* 7.319392	40.4	PK2	35.9	-22.7	0	53.6	-	-	74	-20.4	265	136	H
	* 7.319568	34.32	MAv1	35.9	-22.7	2.16	49.68	54	-4.32	-	-	265	136	H
4	* 4.879667	43.7	PK2	34.4	-26.4	0	51.7	-	-	74	-22.3	252	108	V
	* 4.879879	37.8	MAv1	34.4	-26.4	2.16	47.96	54	-6.04	-	-	252	108	V
5	6.506726	31.88	PK2	35.8	-24.1	0	43.58	-	-	-	-	224	328	V
6	* 7.320692	41.35	PK2	35.9	-22.8	0	54.45	-	-	74	-19.55	22	161	V
	* 7.319245	35.19	MAv1	35.9	-22.7	2.16	50.55	54	-3.45	-	-	22	161	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/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	* 4.960406	42.69	PK2	34.4	-25.4	0	51.69	-	-	74	-22.31	291	114	H
	* 4.959917	37.44	MAv1	34.4	-25.4	2.16	48.6	54	-5.4	-	-	291	114	H
2	6.613265	32.68	PK2	35.7	-23.7	0	44.68	-	-	-	-	189	112	H
3	* 7.439391	42.09	PK2	36	-22.5	0	55.59	-	-	74	-18.41	256	167	H
	* 7.439474	36.3	MAv1	36	-22.5	2.16	51.96	54	-2.04	-	-	256	167	H
4	* 4.959512	44.94	PK2	34.4	-25.4	0	53.94	-	-	74	-20.06	222	107	V
	* 4.959872	40.41	MAv1	34.4	-25.4	2.16	51.57	54	-2.43	-	-	222	107	V
5	6.613269	32.51	PK2	35.7	-23.7	0	44.51	-	-	-	-	238	132	V
6	* 7.440476	42.93	PK2	36	-22.5	0	56.43	-	-	74	-17.57	19	145	V
	* 7.439357	37.06	MAv1	36	-22.5	2.16	52.72	54	-1.28	-	-	19	145	V

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

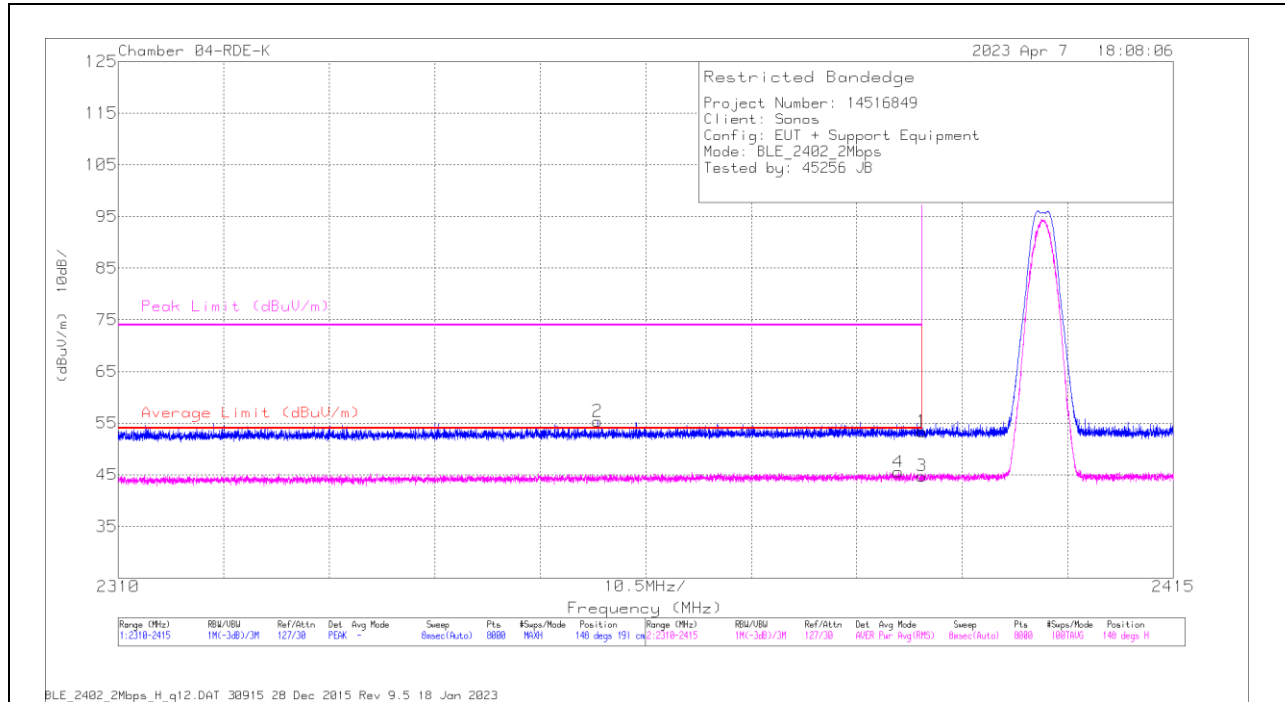
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

10.2.2. BLE (2Mbps)

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

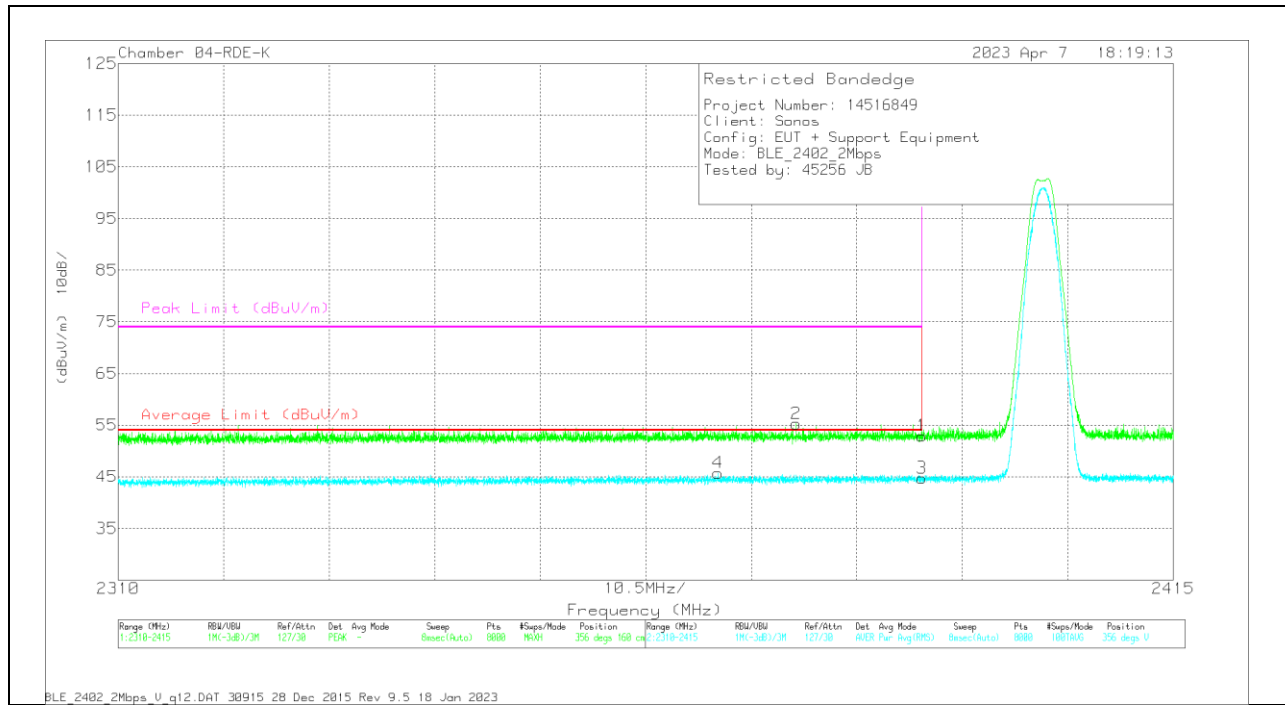


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cbl/Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	56.5	Pk	31.8	-34.9	0	53.4	-	-	74	-20.6	148	191	H
2	* 2357.69	58.76	Pk	31.6	-35	0	55.36	-	-	74	-18.64	148	191	H
3	* 2390	45.44	RMS	31.8	-34.9	2.44	44.78	54	-9.22	-	-	148	191	H
4	* 2387.633	46.2	RMS	31.8	-34.9	2.44	45.54	54	-8.46	-	-	148	191	H

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

VERTICAL RESULT



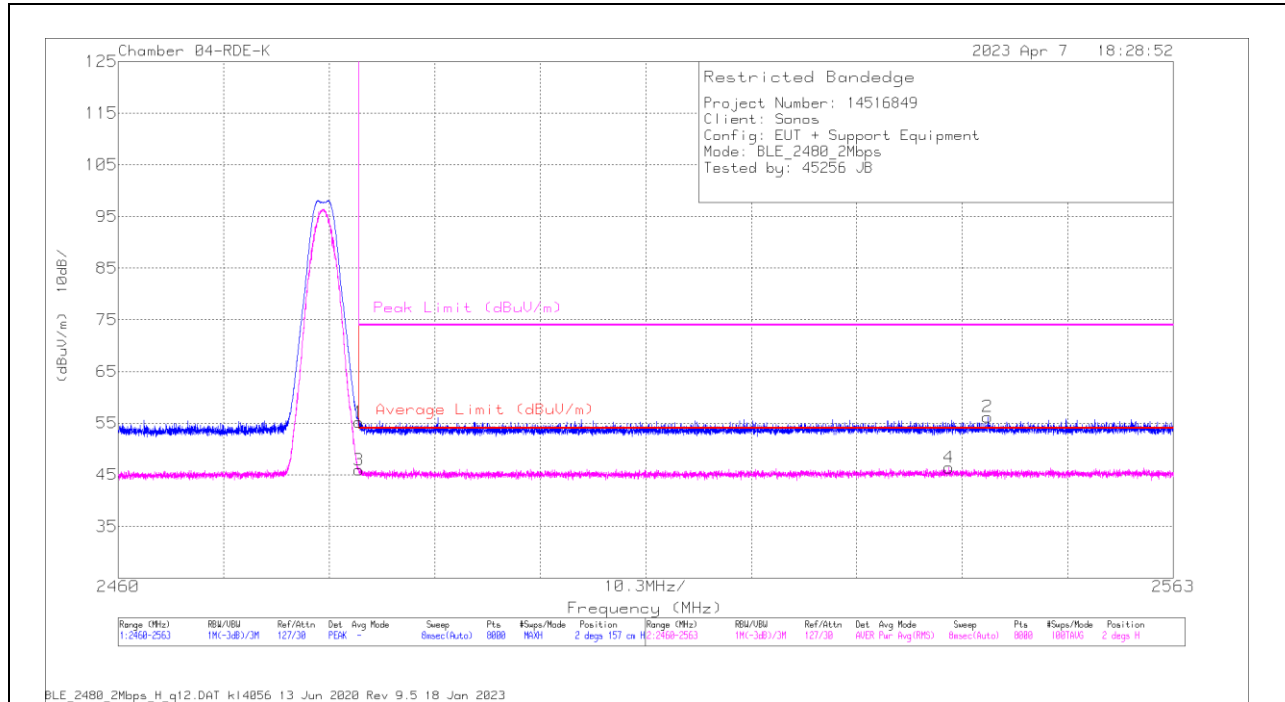
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cbl/Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	56.03	Pk	31.8	-34.9	0	52.93	-	-	74	-21.07	356	160	V
2	* 2377.473	58.47	PK	31.7	-34.9	0	55.27	-	-	74	-18.73	356	160	V
3	* 2390	45.39	RMS	31.8	-34.9	2.44	44.73	54	-9.27	-	-	356	160	V
4	* 2369.688	46.5	RMS	31.7	-34.9	2.44	45.74	54	-8.26	-	-	356	160	V

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

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

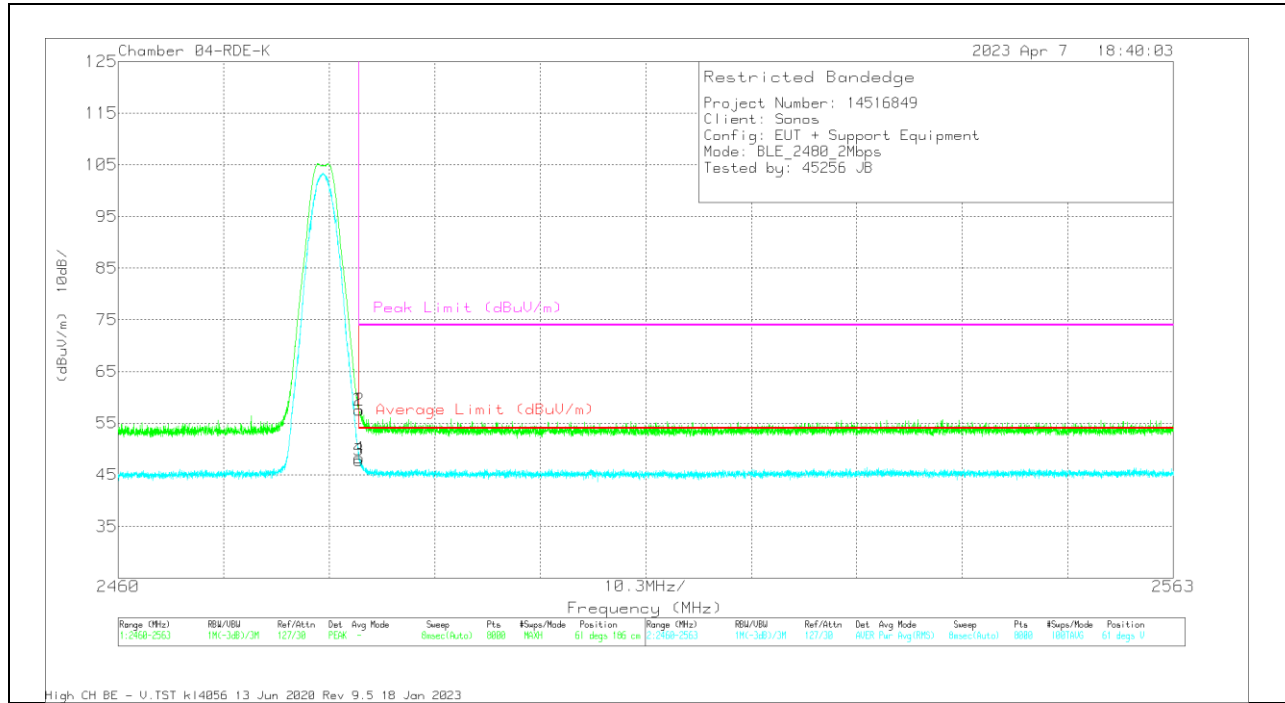


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	57.47	PK	32.2	-34.5	0	55.17	-	-	74	-18.83	2	157	H
2	2544.872	58.23	PK	32.2	-34.2	0	56.23	-	-	74	-17.77	2	157	H
3	* 2483.5	45.78	RMS	32.2	-34.5	2.44	45.92	54	-8.08	-	-	2	157	H
4	2541.112	45.94	RMS	32.2	-34.2	2.44	46.38	54	-7.62	-	-	2	157	H

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

VERTICAL RESULT



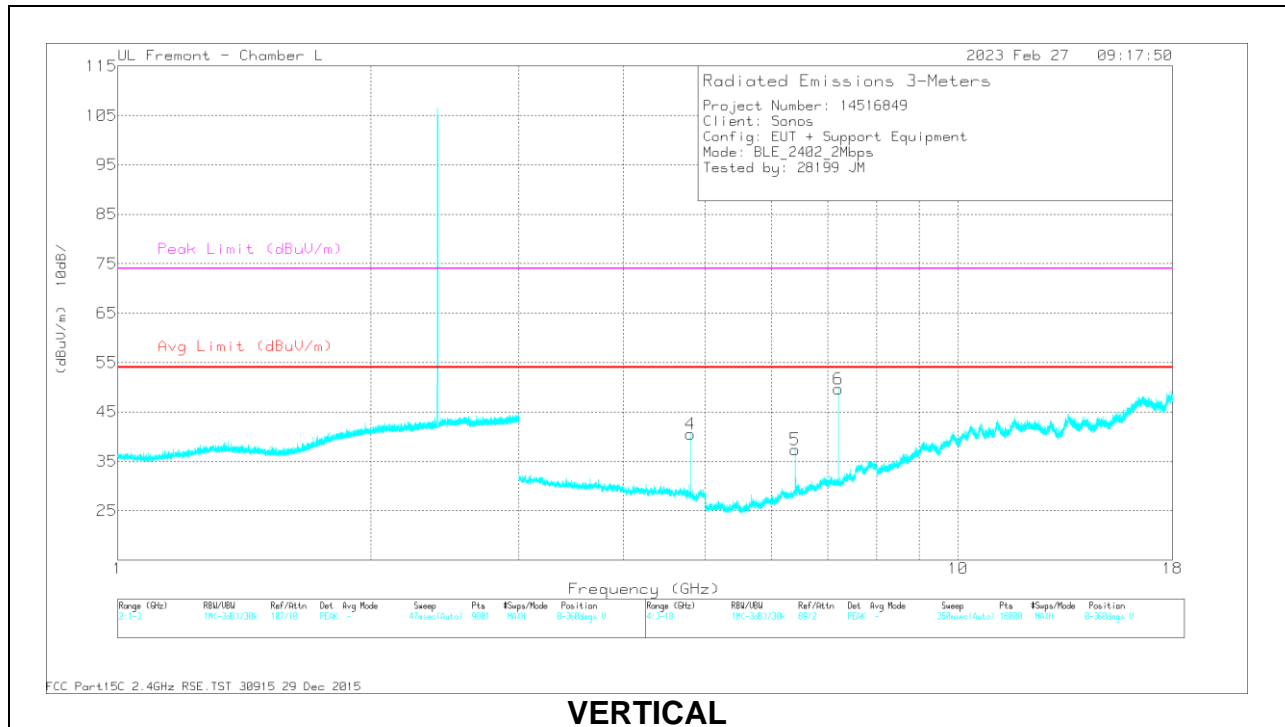
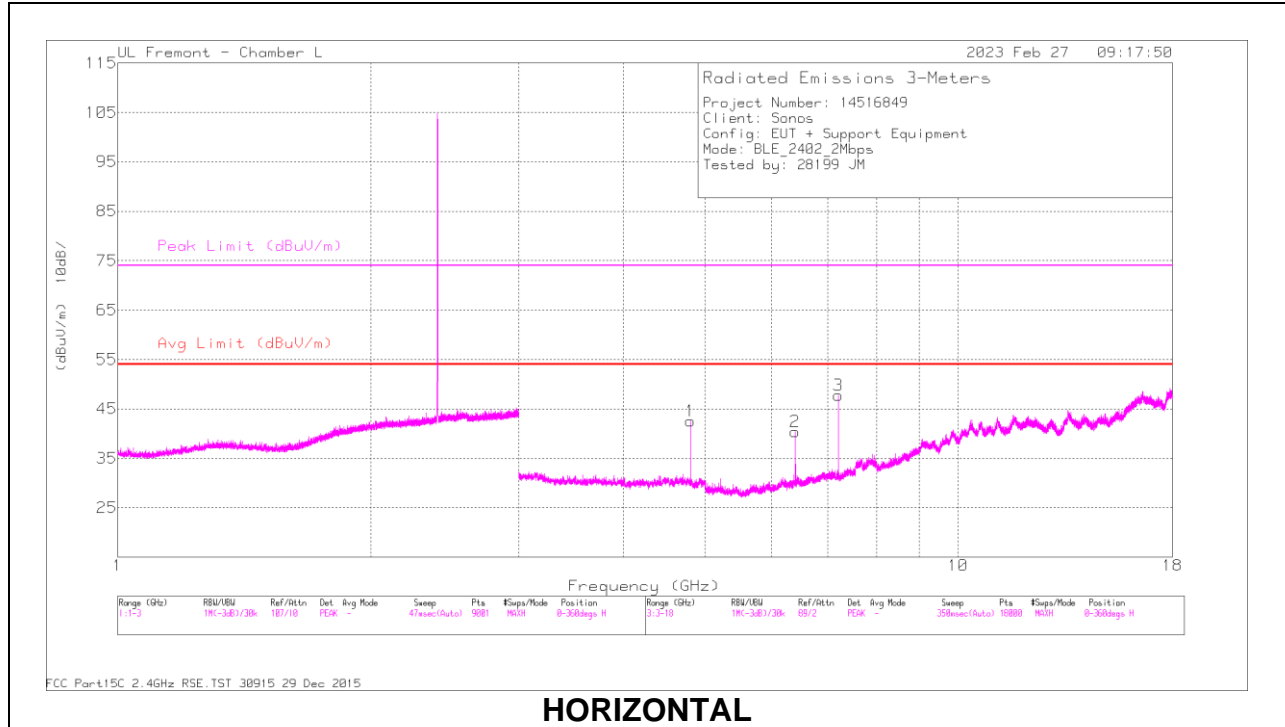
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cbl/Pad (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	59.83	Pk	32.2	-34.5	0	57.53	-	-	74	-16.47	61	186	V
2	* 2483.513	59.83	PK	32.2	-34.5	0	57.53	-	-	74	-16.47	61	186	V
3	* 2483.5	47.68	RMS	32.2	-34.5	2.44	47.82	54	-6.18	-	-	61	186	V
4	* 2483.513	48.1	RMS	32.2	-34.5	2.44	48.24	54	-5.76	-	-	61	186	V

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

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

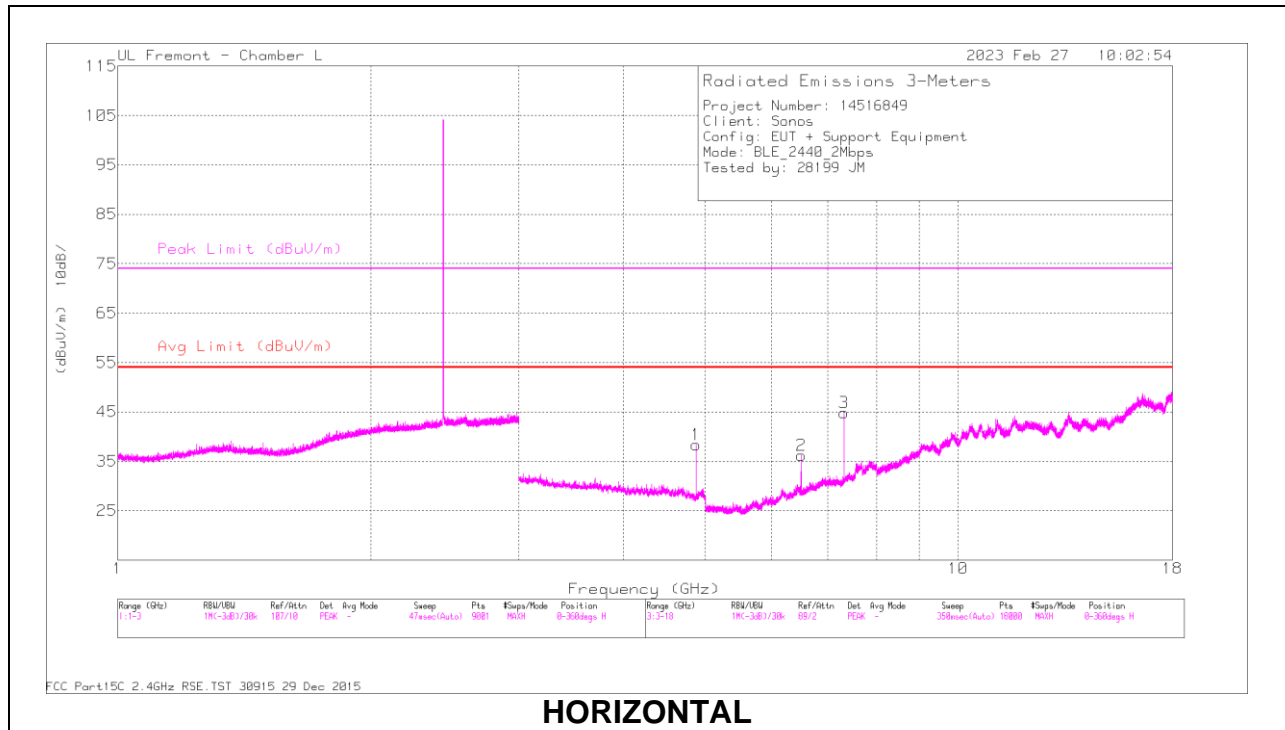
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/Filtr (dB)	DCCF (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.803177	39.91	PK2	34.5	-26.5	0	47.91	-	-	74	-26.09	233	287	H
	* 4.802857	31.3	MAV1	34.5	-26.5	2.44	41.74	54	-12.26	-	-	233	287	H
2	6.40541	31.44	PK2	35.8	-24	0	43.24	-	-	-	-	172	326	H
3	7.20762	42.72	PK2	35.9	-23	0	55.62	-	-	-	-	293	217	H
4	* 4.80326	41.25	PK2	34.5	-26.5	0	49.25	-	-	74	-24.75	38	328	V
	* 4.803187	33.63	MAV1	34.5	-26.5	2.44	44.07	54	-9.93	-	-	38	328	V
5	6.405283	32.41	PK2	35.8	-24	0	44.21	-	-	-	-	241	102	V
6	7.207569	41.23	PK2	35.9	-23	0	54.13	-	-	-	-	258	208	V

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

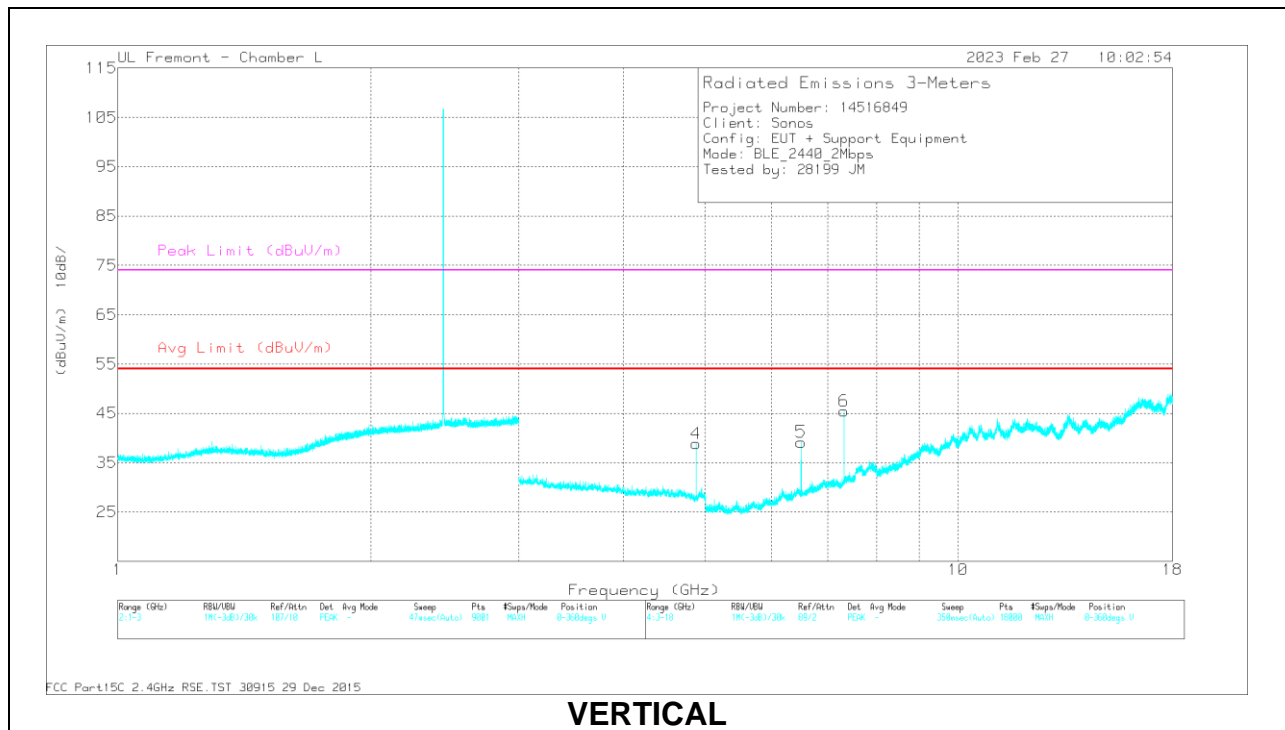
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



HORIZONTAL



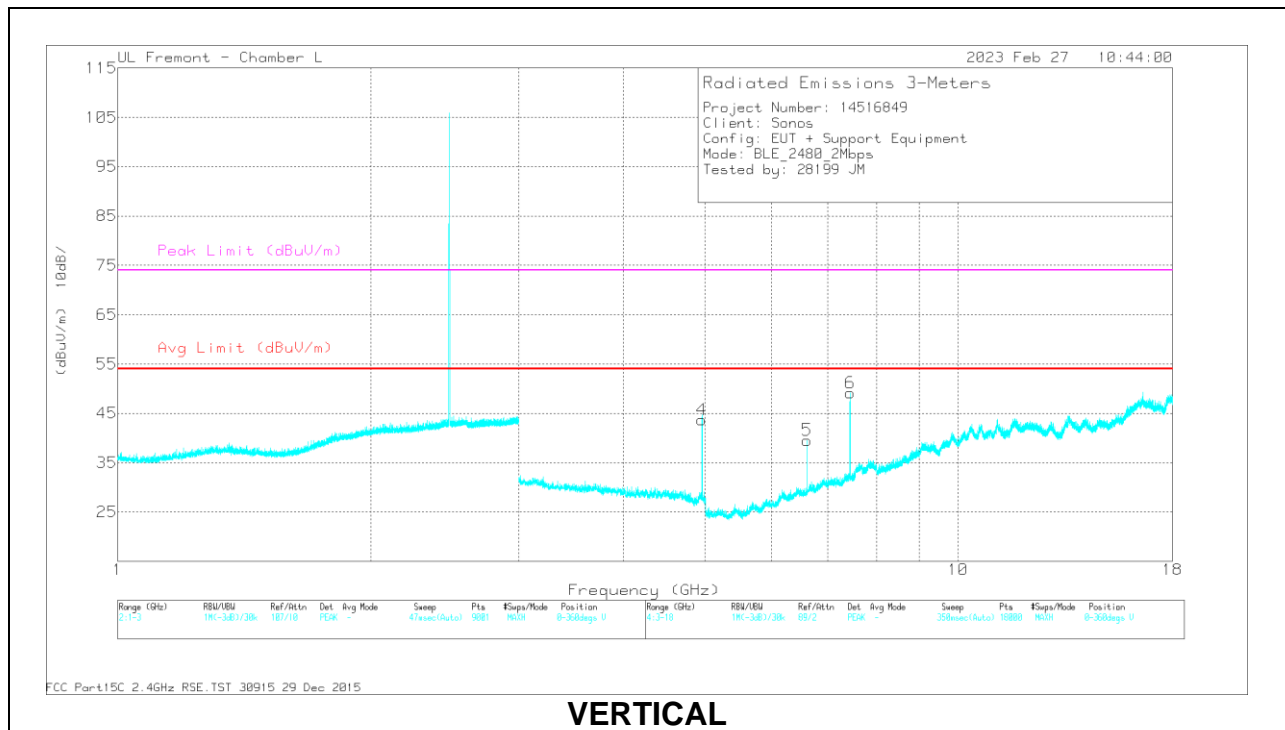
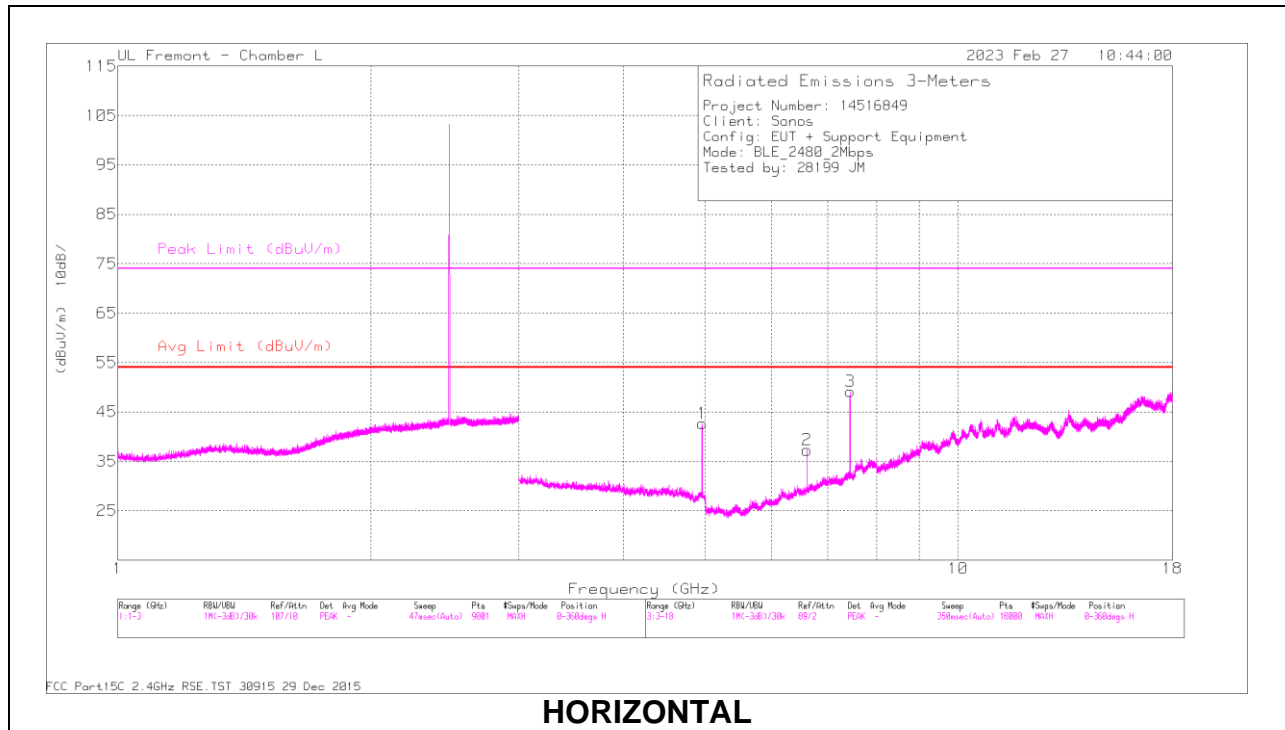
VERTICAL

RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/Fitr (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	* 4.880977	35.37	PK2	34.4	-26.4	0	43.37	-	-	74	-30.63	30	101	H
	* 4.880901	26.72	MAv1	34.4	-26.4	2.44	37.16	54	-16.84	-	-	30	101	H
2	6.5065	35.03	PK2	35.8	-24.1	0	46.73	-	-	-	-	175	110	H
3	* 7.318437	40.58	PK2	35.9	-22.7	0	53.78	-	-	74	-20.22	259	151	H
	* 7.318673	33.76	MAv1	35.9	-22.7	2.44	49.4	54	-4.6	-	-	259	151	H
4	* 4.879796	38.77	PK2	34.4	-26.4	0	46.77	-	-	74	-27.23	32	323	V
	* 4.880921	30.74	MAv1	34.4	-26.4	2.44	41.18	54	-12.82	-	-	32	323	V
5	6.506608	32.69	PK2	35.8	-24.1	0	44.39	-	-	-	-	225	329	V
6	* 7.318526	40.86	PK2	35.9	-22.7	0	54.06	-	-	74	-19.94	24	164	V
	* 7.318897	33.45	MAv1	35.9	-22.7	2.44	49.09	54	-4.91	-	-	24	164	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Horn 1mH	Amp/Cb/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	* 4.95903	44.24	PK2	34.4	-25.4	0	53.24	-	-	74	-20.76	295	398	H
	* 4.959146	37.86	MAv1	34.4	-25.4	2.44	49.3	54	-4.7	-	-	295	398	H
2	6.613268	31.4	PK2	35.7	-23.7	0	43.4	-	-	-	-	187	103	H
3	* 7.441454	41.23	PK2	36	-22.5	0	54.73	-	-	74	-19.27	288	201	H
	* 7.438727	34.38	MAv1	36	-22.5	2.44	50.32	54	-3.68	-	-	288	201	H
4	* 4.959099	43.96	PK2	34.4	-25.4	0	52.96	-	-	74	-21.04	223	108	V
	* 4.960701	37.67	MAv1	34.4	-25.4	2.44	49.11	54	-4.89	-	-	223	108	V
5	6.613329	33.23	PK2	35.7	-23.7	0	45.23	-	-	-	-	238	101	V
6	* 7.438584	41.61	PK2	36	-22.5	0	55.11	-	-	74	-18.89	28	197	V
	* 7.441276	34.84	MAv1	36	-22.5	2.44	50.78	54	-3.22	-	-	28	197	V

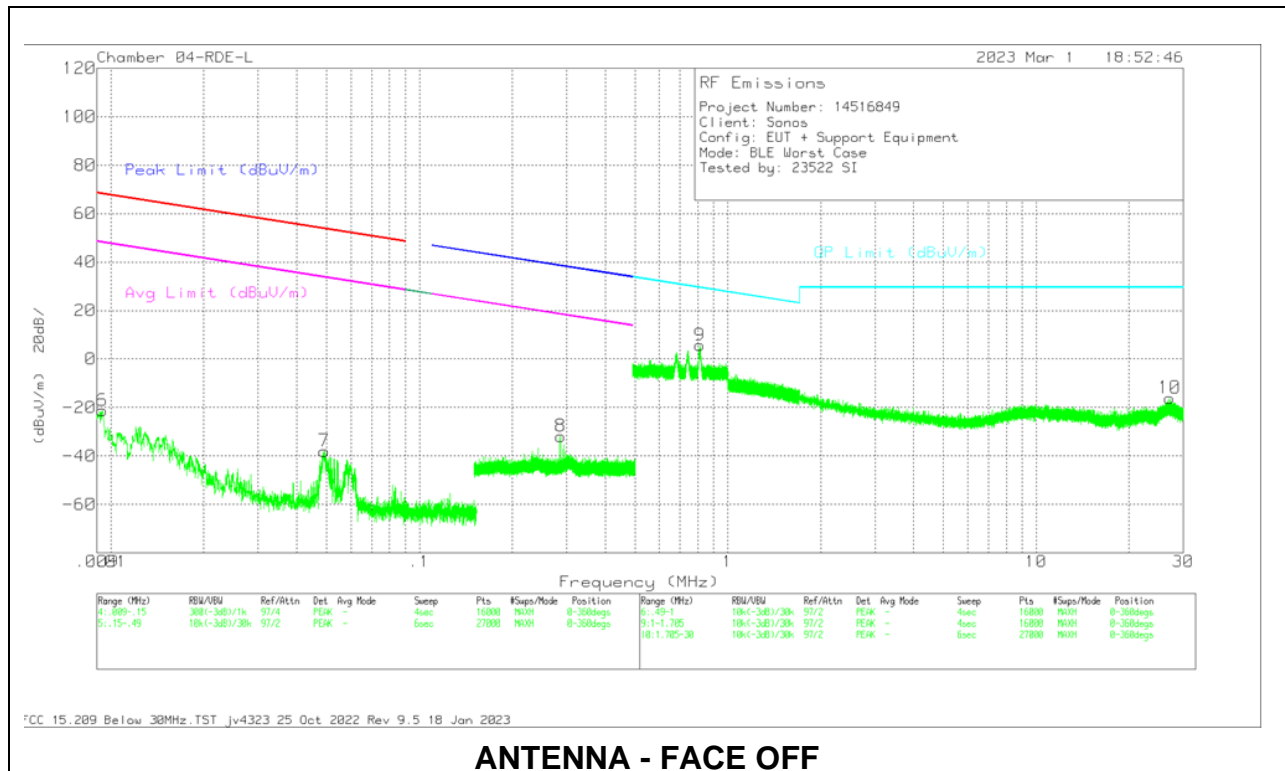
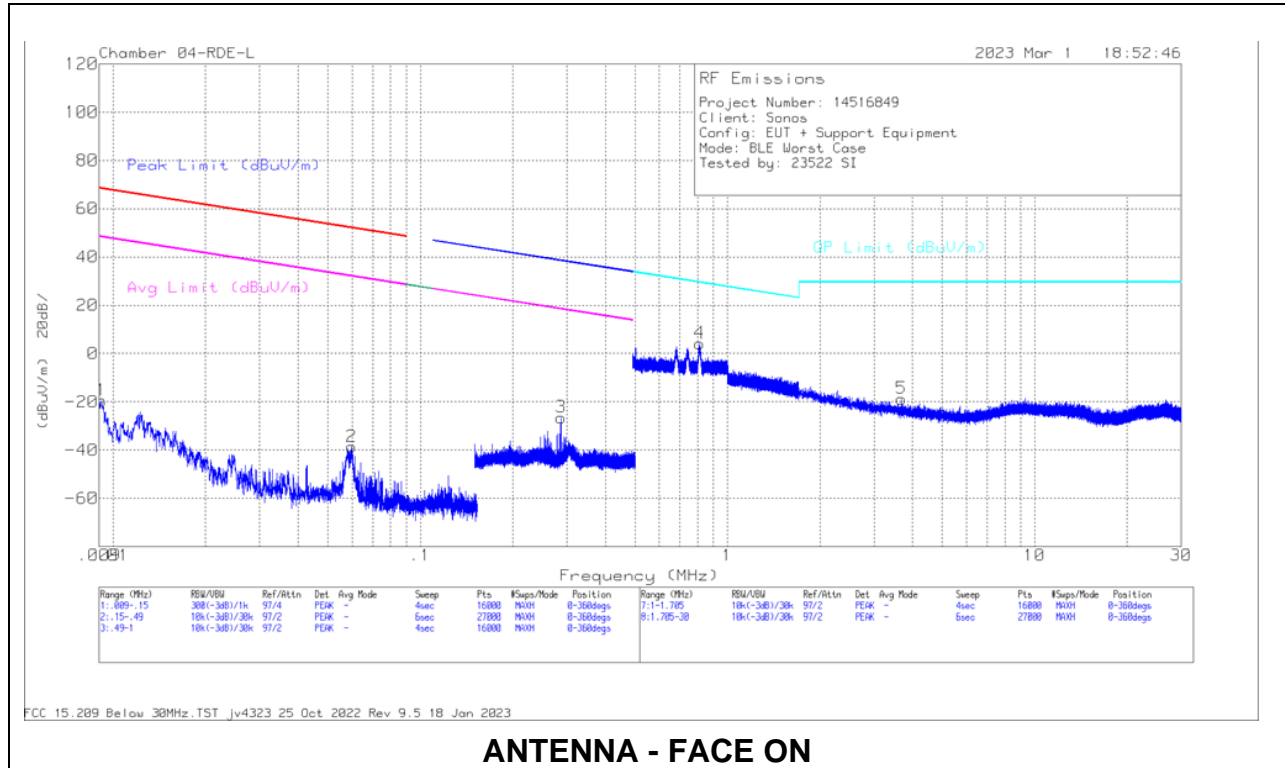
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

10.3. WORST CASE BELOW 30MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



Below 30MHz Data

Range 1: Face On .009 - .15MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
1	.0092	28.3	Pk	60.9	-28.7	-80	-19.5	68.34	-87.84	48.34	-67.84	0-360	0-deg
2	.0598	17.15	Pk	56.1	-31.9	-80	-38.65	52.06	-90.71	32.06	-70.71	0-360	0-deg

Range 2: Face On .15 - .49MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
3	.2878	29.53	Pk	56	-32	-80	-26.47	38.43	-64.9	18.43	-44.9	0-360	0-deg

Range 3: Face On .49 - 1MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
4	.8125	20.01	Pk	56.1	-31.9	-40	4.21	29.42	-25.21	0-360	0-deg		

Range 4: Face Off .009 - .15MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
6	.0094	26.85	Pk	60.7	-28.8	-80	-21.25	68.15	-89.4	48.15	-69.4	0-360	90-degs
7	.0492	16.96	Pk	56.9	-31.9	-80	-38.04	53.75	-91.79	33.75	-71.79	0-360	90-degs

Range 5: Face Off .15 - .49MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
8	.2871	24.16	Pk	56	-32	-80	-31.84	38.45	-70.29	18.45	-50.29	0-360	90-degs

Range 6: Face Off .49 - 1MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
9	.8122	21.48	Pk	56.1	-31.9	-40	5.68	29.42	-23.74	0-360	90-degs		

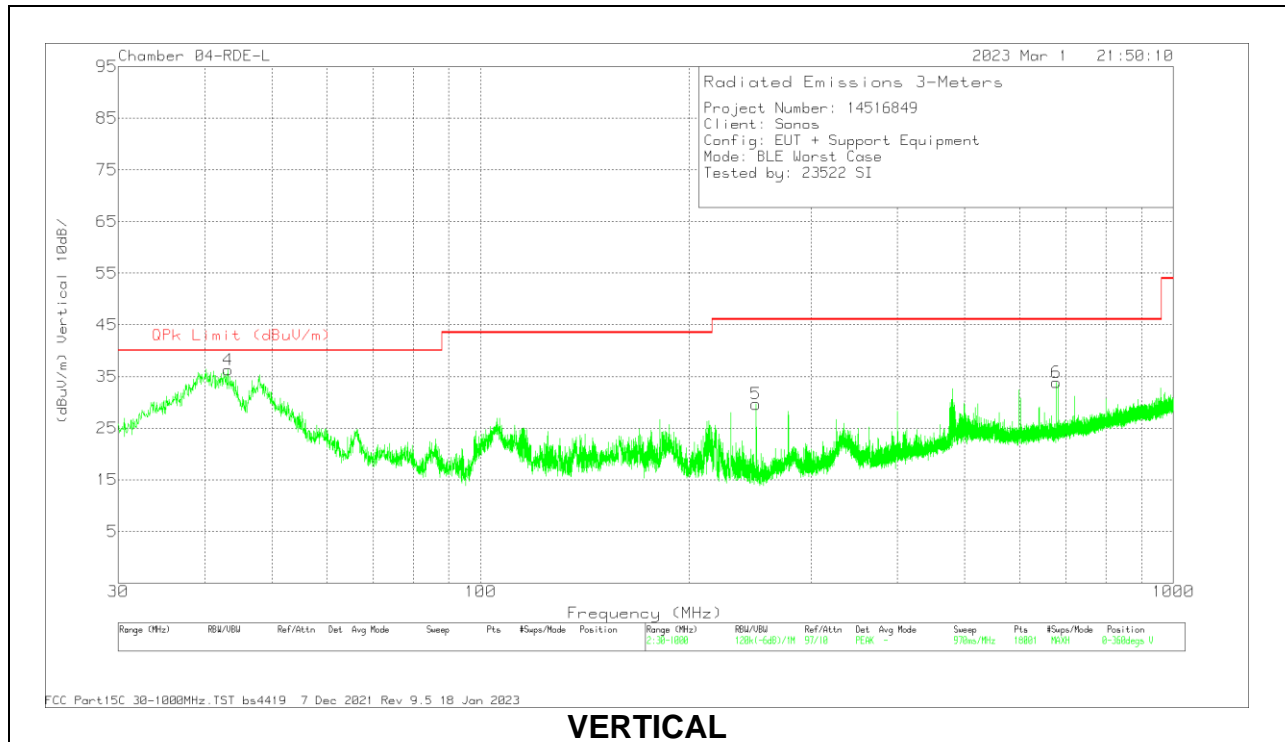
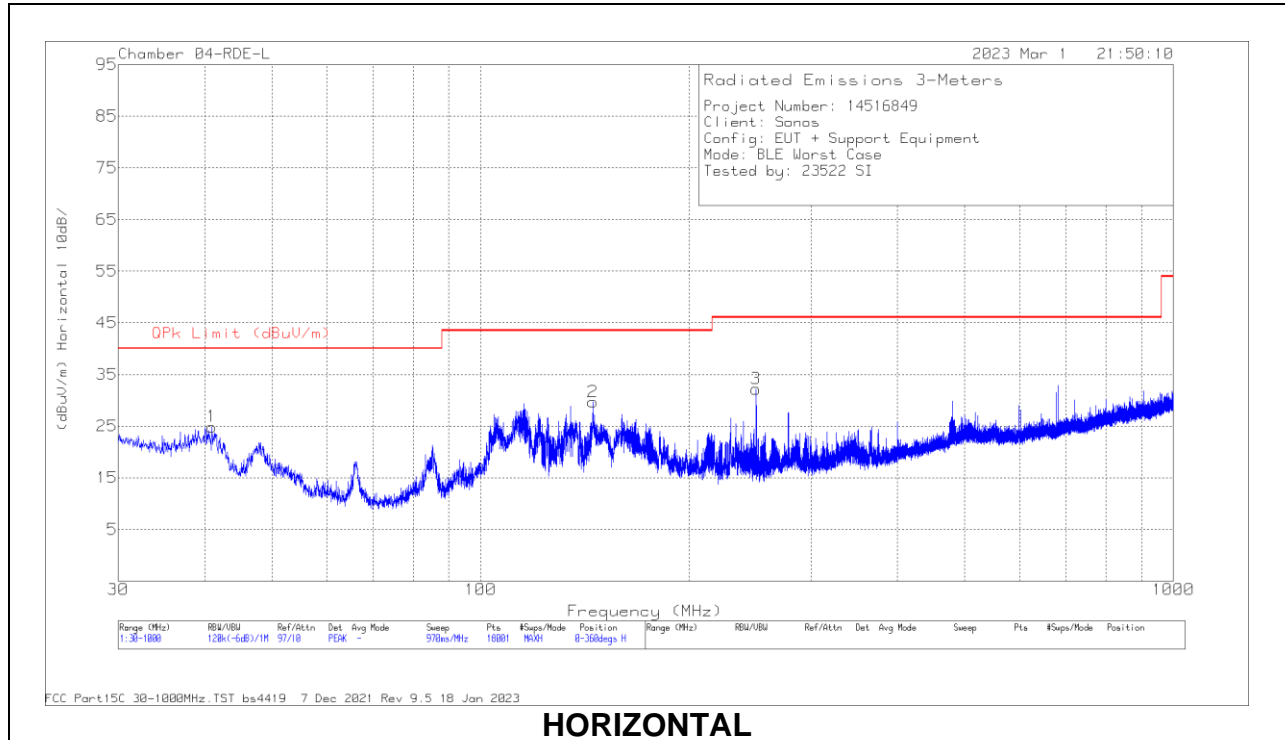
Range 8: Face On 1.705 - 30MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
5	3.6889	15.47	Pk	37.6	-31.8	-40	-18.73	29.42	-23.74	0-360	0-deg		

Range 10: Face Off 1.705 - 30MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
10	27.0697	21.92	Pk	33.3	-31.3	-40	-16.08	29.5	-45.58	0-360	90-degs		

Pk - Peak detector

10.4. WORST CASE BELOW 1 GHz

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



Below 1GHz Data

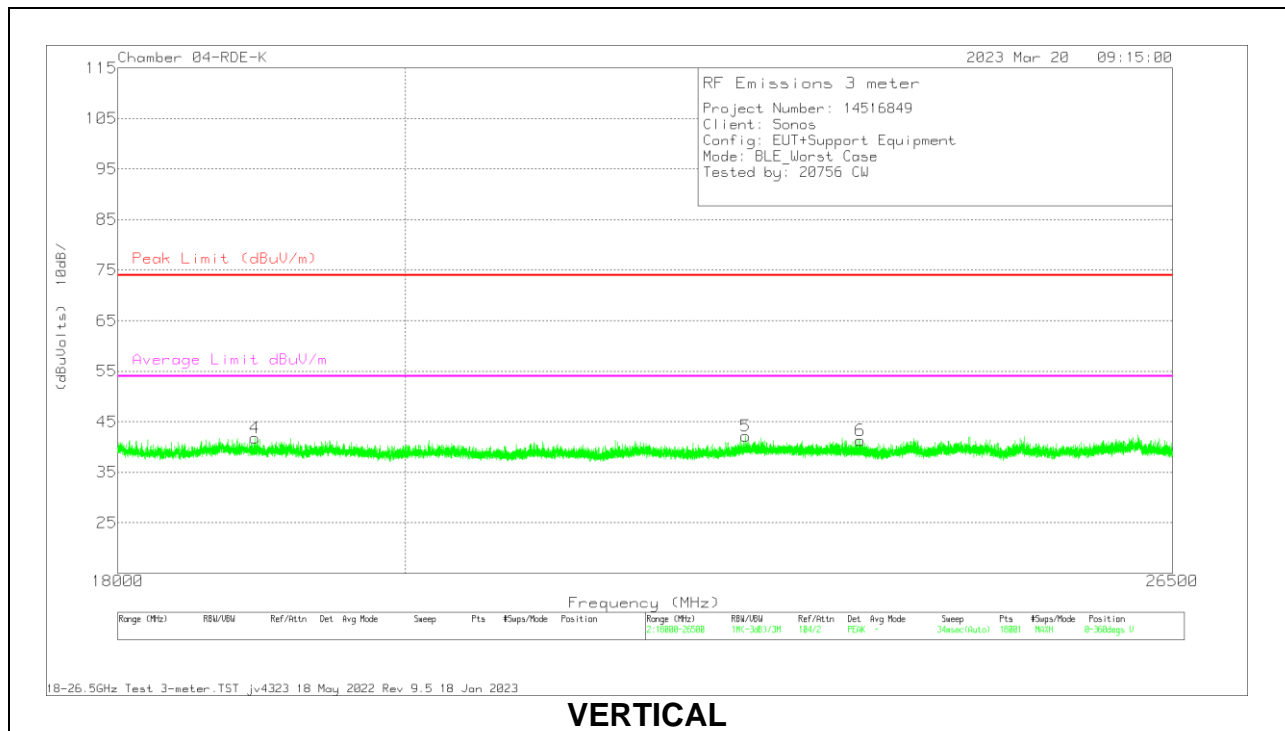
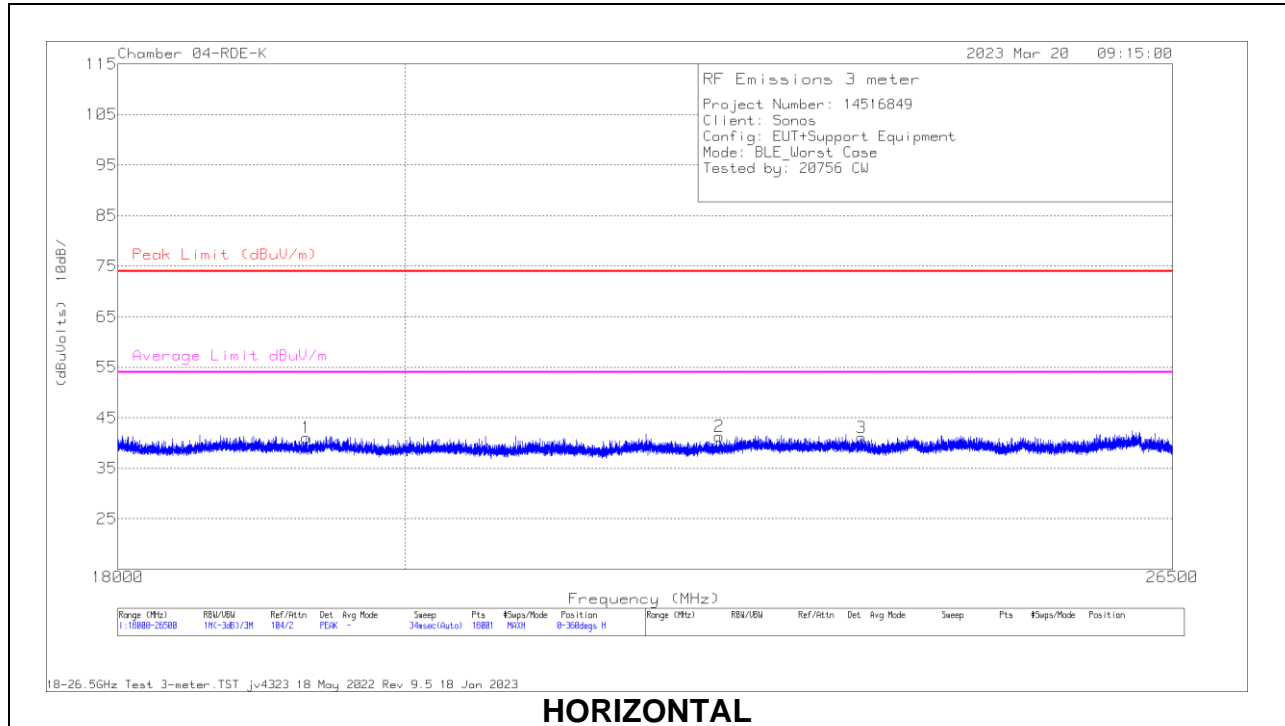
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80293 ACF (dB)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.9395	36.98	Pk	19.1	-31.2	24.88	40	-15.12	0-360	399	H
2	145.322	41.48	Pk	18.5	-30.3	29.68	43.52	-13.84	0-360	399	H
3	249.975	44.7	Pk	17.2	-29.7	32.2	46.02	-13.82	0-360	101	H
4	43.1823	50.65	Pk	17.4	-31.2	36.85	40	-3.15	95	148	V
	43.1823	44.47	Qp	17.4	-31.2	30.67	40	-9.33	95	148	V
5	249.975	42.16	Pk	17.2	-29.7	29.66	46.02	-16.36	0-360	101	V
6	678.123	36.71	Pk	25.4	-28.3	33.81	46.02	-12.21	0-360	101	V

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 (MHz)	Meter Reading (dBuV)	Det	199659 ACF (dB)	234683 Amp/Cbl (dB)	Cables (dB)	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19289.166	51.82	Pk	33.4	-62.7	18.5	41.02	74	-32.98	54	-12.98	0-360	101	H
2	* 22444.081	50.96	Pk	33.1	-62.6	19.8	41.26	74	-32.74	54	-12.74	0-360	101	H
3	* 23643.525	50.21	Pk	33.2	-62.7	20.3	41.01	74	-32.99	54	-12.99	0-360	200	H
4	* 18927.916	52.49	Pk	33.5	-62.5	18.3	41.79	74	-32.21	54	-12.21	0-360	101	V
5	* 22660.359	51.64	Pk	33.1	-62.5	19.9	42.14	74	-31.86	54	-11.86	0-360	101	V
6	* 23633.608	50.43	Pk	33.2	-62.7	20.3	41.23	74	-32.77	54	-12.77	0-360	199	V

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

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

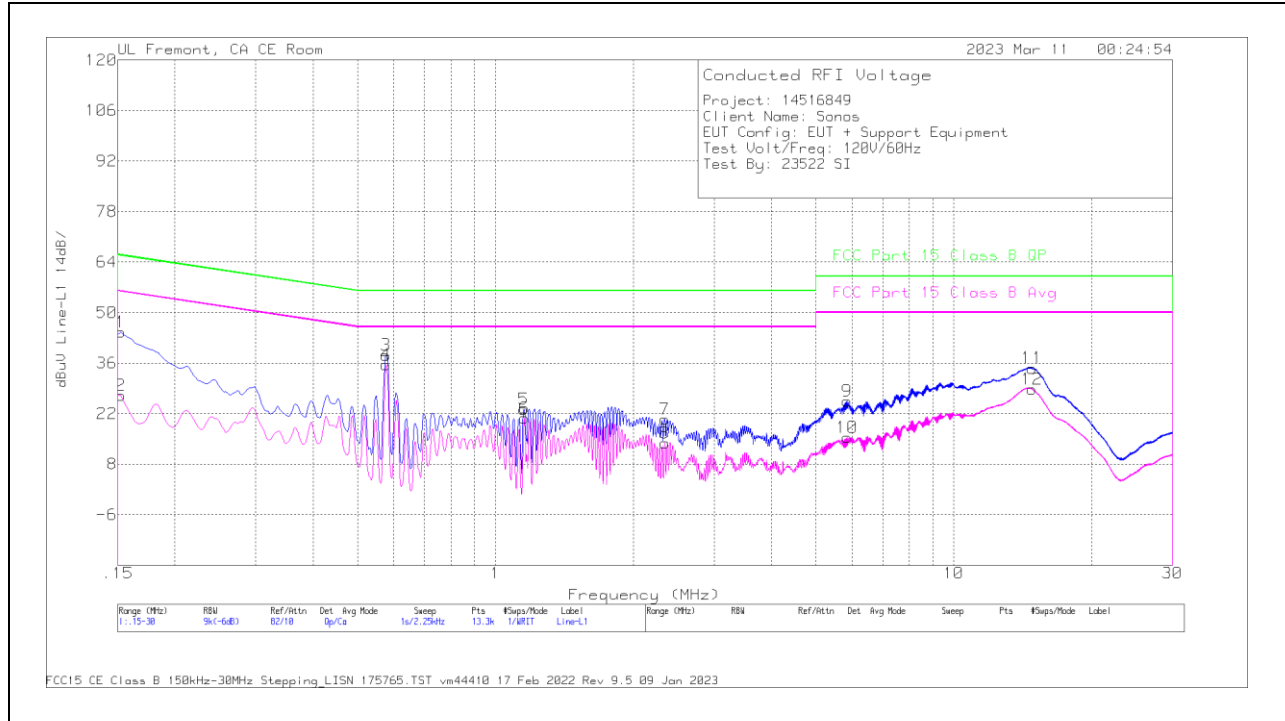
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 [*]	56 to 46 [*]
0.5-5	56	46
5-30	60	50

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

RESULTS

AC Power Line Norm

LINE 1 RESULTS

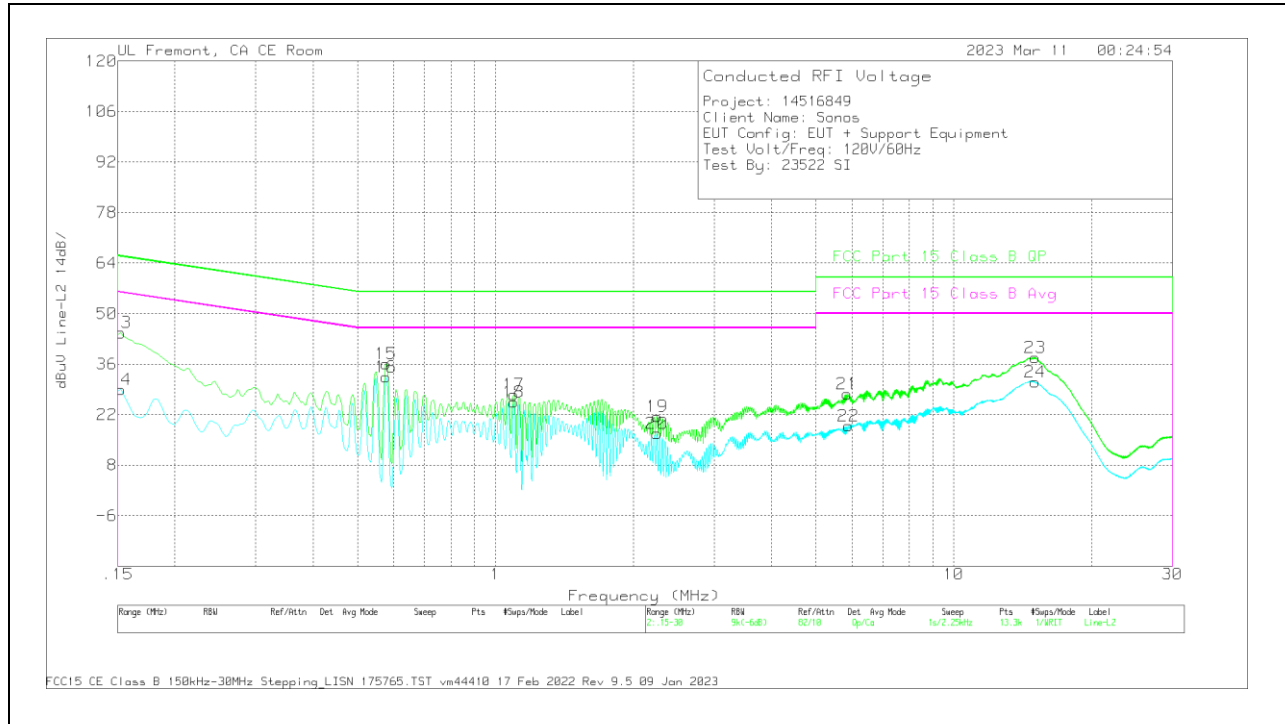


Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L1	C1&C3 cable path loss	207996 Limiter with short cabl	Corrected Reading dBuV	FCC Part 15 Class B QP	QP Margin (dB)	FCC Part 15 Class B Avg	Av(CISPR)Margin (dB)
2	.1523	17.61	Ca	.1	0	9.4	27.11	-	-	55.88	-28.77
4	.5775	26.13	Ca	0	.1	9.3	35.53	-	-	46	-10.47
6	1.1558	11.36	Ca	0	.1	9.3	20.76	-	-	46	-25.24
8	2.3415	4.43	Ca	0	.1	9.3	13.83	-	-	46	-32.17
10	5.8583	6.01	Ca	0	.1	9.3	15.41	-	-	50	-34.59
12	14.8313	19.23	Ca	.1	.2	9.3	28.83	-	-	50	-21.17
1	.1523	35.11	Qp	.1	0	9.4	44.61	65.88	-21.27	-	-
3	.5775	28.86	Qp	0	.1	9.3	38.26	56	-17.74	-	-
5	1.1535	13.87	Qp	0	.1	9.3	23.27	56	-32.73	-	-
7	2.3393	11.11	Qp	0	.1	9.3	20.51	56	-35.49	-	-
9	5.8583	16.01	Qp	0	.1	9.3	25.41	60	-34.59	-	-
11	14.8313	25.01	Qp	.1	.2	9.3	34.61	60	-25.39	-	-

Qp - Quasi-Peak detector
 Ca - CISPR average detection

LINE 2 RESULTS



Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	175765 LISN L2	C2&C3 cable path loss	207996 Limiter with short cabl	Corrected Reading dBuV	FCC Part 15 Class B QP	QP Margin (dB)	FCC Part 15 Class B Avg	Av(CISPR)Margin (dB)
14	.1523	19.54	Ca	.1	0	9.4	29.04	-	-	55.88	-26.84
16	.5775	23.09	Ca	0	.1	9.3	32.49	-	-	46	-13.51
18	1.095	16.05	Ca	0	.1	9.3	25.45	-	-	46	-20.55
20	2.2515	7.34	Ca	0	.1	9.3	16.74	-	-	46	-29.26
22	5.8898	9.44	Ca	0	.1	9.3	18.84	-	-	50	-31.16
24	15.036	21.47	Ca	.1	.2	9.3	31.07	-	-	50	-18.93
13	.1523	35.2	Qp	.1	0	9.4	44.7	65.88	-21.18	-	-
15	.5775	26.65	Qp	0	.1	9.3	36.05	56	-19.95	-	-
17	1.0973	18.23	Qp	0	.1	9.3	27.63	56	-28.37	-	-
19	2.2538	12.06	Qp	0	.1	9.3	21.46	56	-34.54	-	-
21	5.8583	18.38	Qp	0	.1	9.3	27.78	60	-32.22	-	-
23	15.0473	28.28	Qp	.1	.2	9.3	37.88	60	-22.12	-	-

Qp - Quasi-Peak detector
 Ca - CISPR average detection