



CERTIFICATION TEST REPORT C2PC

Report Number. : 12552285-E1V1

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

Model : S22

FCC ID : SBVRM016

IC : 5373A-RM016

EUT Description : 802.11 a/b/g/n HT20 CLIENT DEVICE

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

Date Of Issue:
April 12, 2019

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	4/12/2019	Initial Issue	-

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY	6
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	6
4.2. <i>SAMPLE CALCULATION</i>	6
4.3. <i>MEASUREMENT UNCERTAINTY</i>	6
5. EQUIPMENT UNDER TEST	7
5.1. <i>EUT DESCRIPTION</i>	7
5.2. <i>MAXIMUM OUTPUT POWER</i>	7
5.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	7
5.4. <i>SOFTWARE AND FIRMWARE</i>	7
5.5. <i>WORST-CASE CONFIGURATION AND MODE</i>	8
5.6. <i>DESCRIPTION OF CLASS II PERMISSIVE CHANGE</i>	8
5.7. <i>DESCRIPTION OF TEST SETUP</i>	9
6. MEASUREMENT METHOD	11
7. TEST AND MEASUREMENT EQUIPMENT	12
8. ANTENNA PORT TEST RESULTS	13
8.1. <i>ON TIME AND DUTY CYCLE</i>	13
8.2. <i>OUTPUT POWER</i>	14
9. RADIATED TEST RESULTS	15
9.1. <i>LIMITS AND PROCEDURE</i>	15
9.2. <i>TRANSMITTER ABOVE 1 GHz</i>	17
9.3. <i>Worst Case Below 30 MHz</i>	27
9.4. <i>Worst Case Below 1 GHz</i>	28
9.5. <i>Worst Case 18-26 GHz</i>	30
10. AC POWER LINE CONDUCTED EMISSIONS	32
11. SETUP PHOTOS	33

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONOS INC.
614 CHAPALA STREET
SANTA BARBARA, CA 93101, U.S.A

EUT DESCRIPTION: 802.11a/b/g/n HT20 CLIENT DEVICE

MODEL: S22

SERIAL NUMBER: 48-A6-B8-10-00-B0-2 (Radiated Sample)

DATE TESTED: January 23 – February 07, 2019

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

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

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

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

Approved & Released For
UL Verification Services Inc. By:

Reviewed By:



DAN CORONIA
CONSUMER TECHNOLOGY DIVISION
OPERATIONS LEADER
UL Verification Services Inc.



Kiya Kedida
CONSUMER TECHNOLOGY DIVISION
PROJECT ENGINEER
UL Verification Services Inc

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v5, ANSI C63.10-2013, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input checked="" type="checkbox"/> Chamber I (ISED:2324A-5)
<input checked="" type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber J (ISED:2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED:2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED:2324A-3)
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned}\text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ \text{Cable Loss (dB)} &- \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m}\end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is 802.11a/b/g/n HT20 CLIENT DEVICE.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	-0.96	0.80

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes Printed Circuit Board (PCB) antenna, with a maximum gain of 4.1 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT software ware installed during testing was 44.2-53220-RF-Complianc_20180523.

The test utility software used during testing was Sonos Compliance GUI V2.2.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated bandage, harmonics, and spurious emissions from 1 GHz to 18GHz were performed. The EUT was set to transmit at the Low/Middle/High channels with designed (target) output powers.

Radiated emission below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was set to transmit at the channel with highest output power as worst-case scenario.

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

5.6. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

This is to request a class II permissive change for FCC ID: SBVRM016 original grated on 12/31/2018.

The major change filed under this application is:

Change#1: The S18 and S22 share the same MediaTek MT7615 radio board. The 18 is 3x3 where as the S22 is a 2x2, both models use the same Chain 0 and 1 antennas.

Change#2 Antenna gain has changed as shown below:

S18 Max Antenna Gain dBi				
Frequency	Chain 0	Chain 1	Chain 2	Type
2412 - 2472	2.1	1.4	1.17	WLAN
5180 - 5859	0.6	2.6	NA	
2412 - 2472	3.9	NA	NA	BLE

S22 Max Antenna Gain dBi				
Frequency	Chain 0	Chain 1		Type
2412 - 2472	1.4	0.1		WLAN
5180 - 5859	1.65	1.7		
2412 - 2472	4.1	NA		BLE

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	X230	SON-00001034	N/A
AC Adapter	Lenovo	ADLX65NCT2A	11S36200293ZZ10034A2ZK	N/A

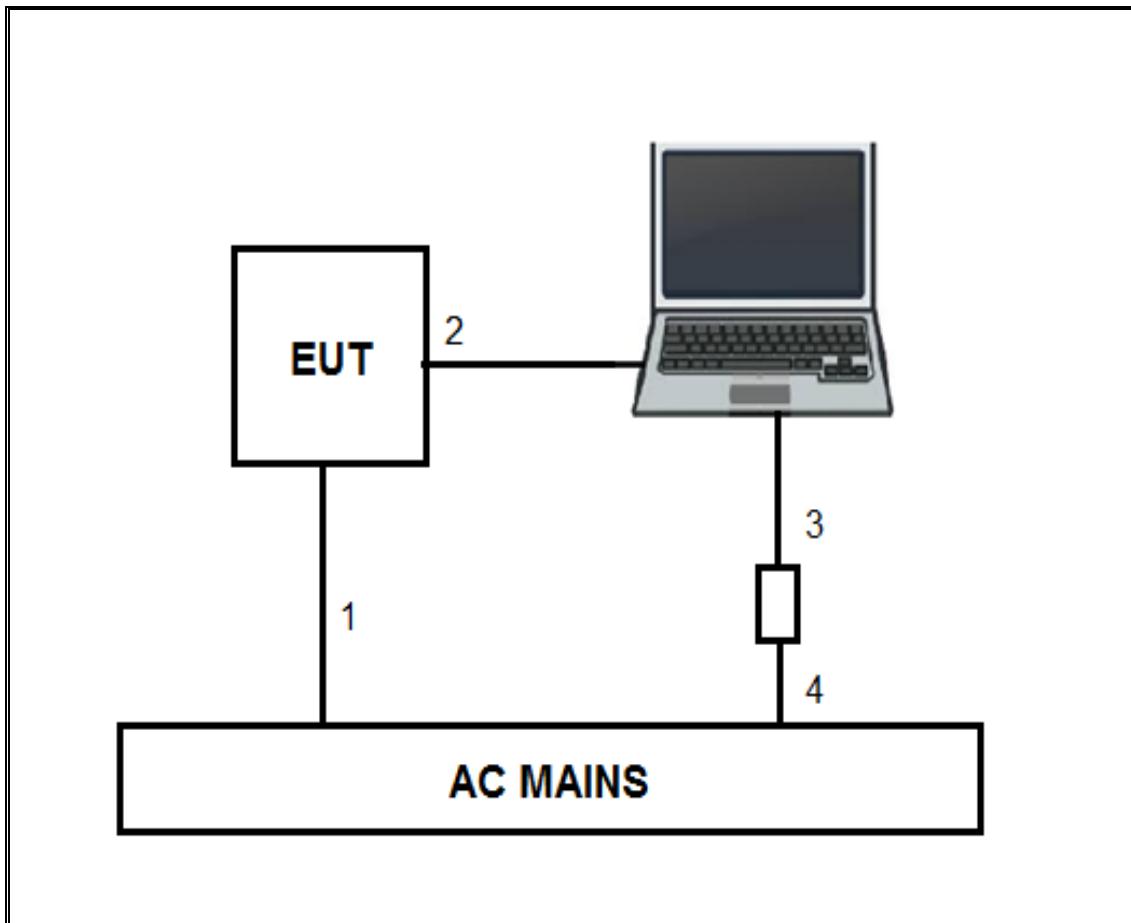
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC Power	1	AC	Unshielded	2	AC Mains to EUT
2	Ethernet	1	RJ45	Unshielded	10	EUT to Laptop
3	DC Power	1	DC	Shielded	1.2	AC/DC Adapter to Laptop
4	AC Power	1	AC	Unshielded	1	AC Mains to AC/DC Adapter

TEST SETUP

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

SETUP DIAGRAM



6. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6.

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

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

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

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.

7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	ID Num	Cal Due
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	PRE0180175	07/09/2019
Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0184971	11/13/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/24/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	171460	08/01/2019
Amplifier 1-8GHz 30dB gain	L3 Narda	AMF-4D-01000800-30-29P	167494	04/03/2019
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	04/25/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1271	07/17/2019
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1225	04/10/2019
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	PRE0165308	01/08/2020
18 - 26.5 GHz Horn Antenna	ARA	MWH-1826/B	T447	06/16/2019
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	03/09/2019

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018
Antenna Port Software	UL	UL RF	Ver 8.4, June 12, 2018

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

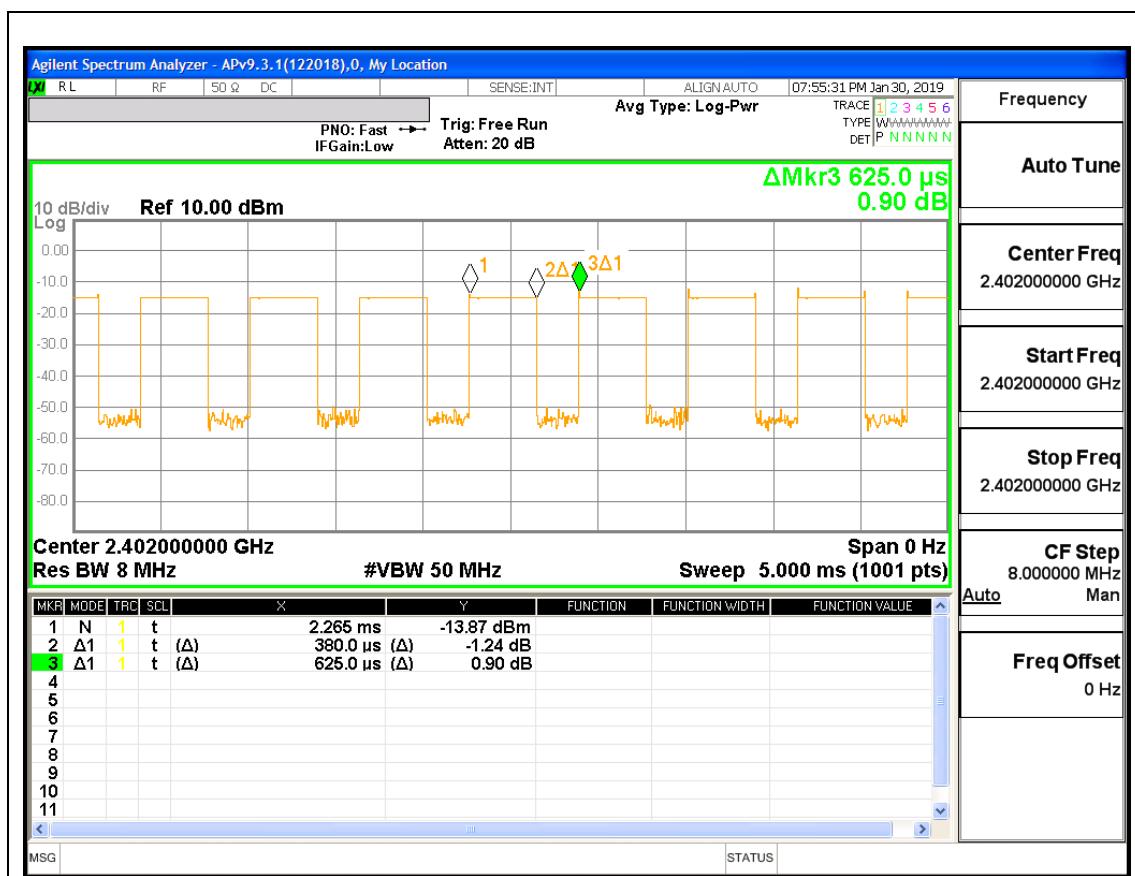
None; for reporting purposes only.

PROCEDURE

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)
BLE	0.380	0.625	0.608	60.80%	2.16	2.632

DUTY CYCLE PLOTS



8.2. 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 cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

RESULTS

Tested By:	16069_OG
Date:	7/25/2018

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-1.020	30	-31.020
Middle	2440	-0.964	30	-30.964
High	2480	-1.107	30	-31.107

Note: Please refer to UL 12166253-E1 report for the rest of conducted test items (99% bandwidth, 6dB bandwidth, Power Density, Conducted Spurious Emissions & AC Power Line Conducted Emissions)

9. RADIATED TEST RESULTS

9.1. 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. 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 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.

KDB 414788 OATS and Chamber Correlation Justification

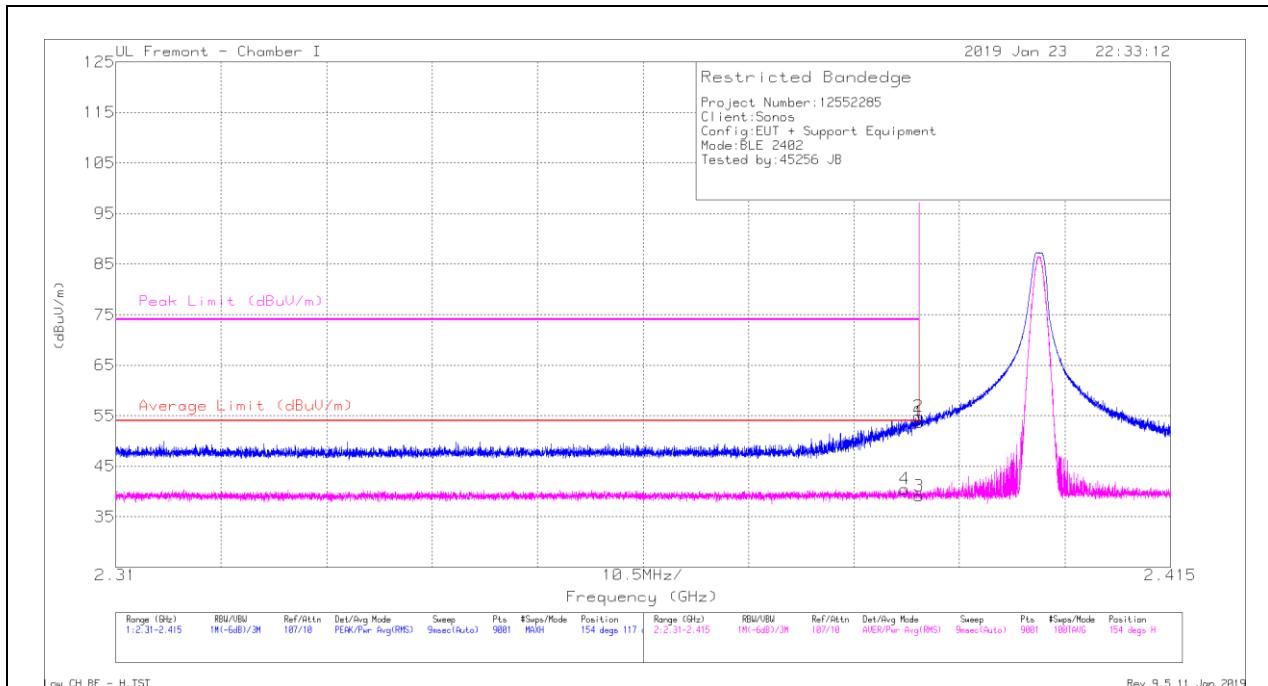
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

9.2. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



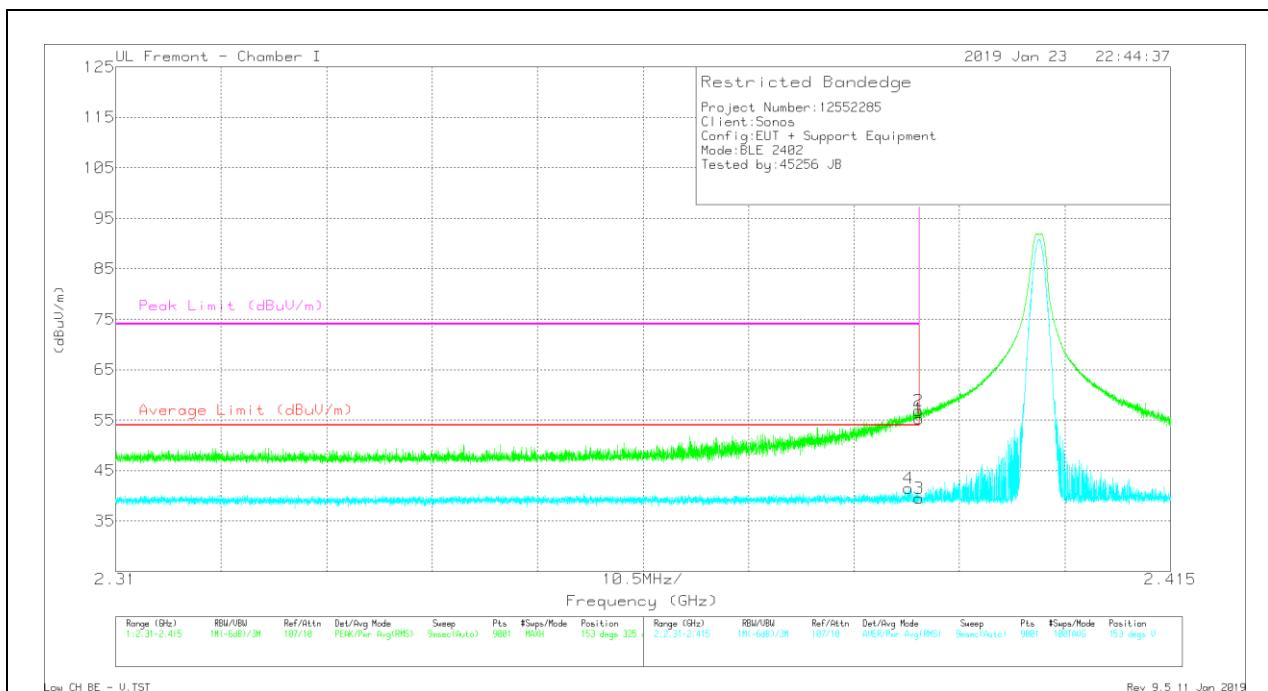
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*2.39	43.39	Pk	31.8	-21.6	0	53.59	-	-	74	-20.41	154	117	H
2	*2.39	44.71	Pk	31.8	-21.6	0	64.91	-	-	74	-19.09	154	117	H
3	*2.39	26.83	RMS	31.8	-21.6	2.16	39.19	54	-14.81	-	-	154	117	H
4	*2.389	28.22	RMS	31.8	-21.6	2.16	40.56	54	-13.42	-	-	154	117	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuVm)	Average Limit (dBuVm)	Margin (dB)	Peak Limit (dBuVm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 2.39	45.03	Pk	31.8	-21.6	0	55.23	-	-	74	-18.77	153	325	V
2	* 2.39	46.71	Pk	31.8	-21.6	0	56.91	-	-	74	-17.09	153	325	V
3	* 2.39	27.21	RMS	31.8	-21.6	2.16	39.57	54	-14.43	-	-	153	325	V
4	* 2.389	29.15	RMS	31.8	-21.6	2.16	41.51	54	-12.49	-	-	153	325	V

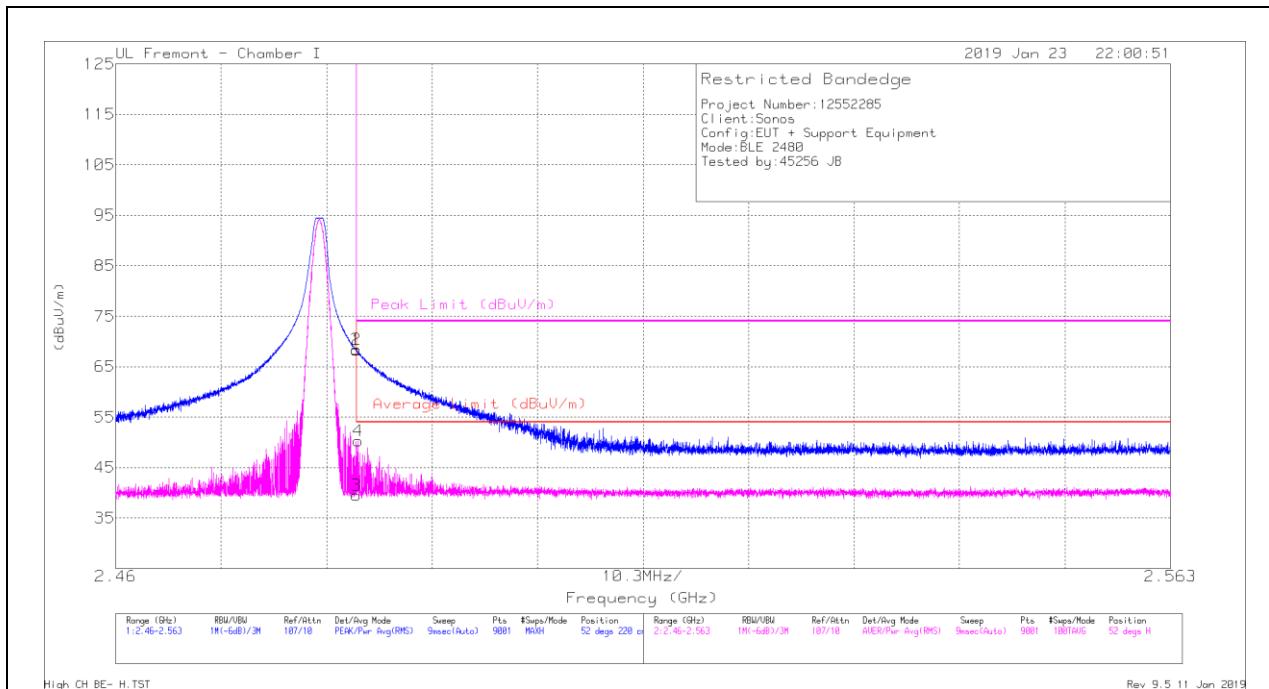
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



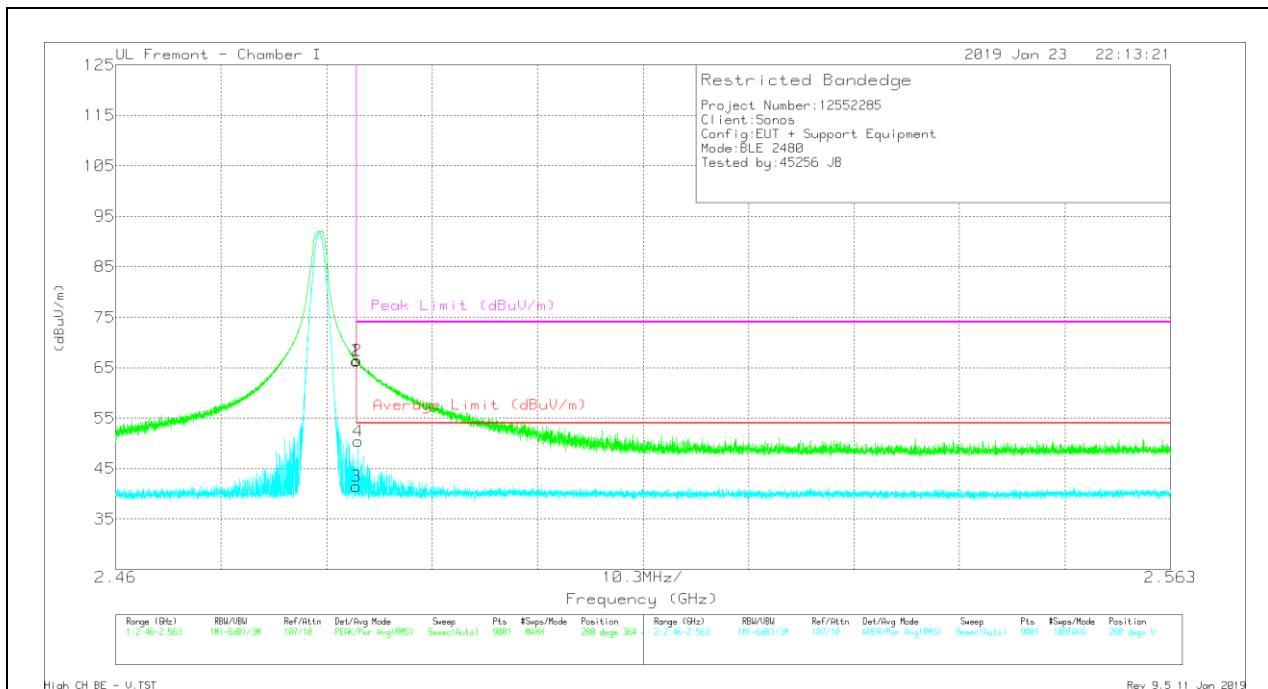
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	*2.484	57.57	Pk	32.4	-21.7	0	68.27	-	-	74	-5.73	52	220	H
2	*2.484	57.7	Pk	32.4	-21.7	0	68.4	-	-	74	-5.6	52	220	H
3	*2.484	26.64	RMS	32.4	-21.7	2.16	39.5	54	-14.5	-	-	52	220	H
4	*2.484	37.42	RMS	32.4	-21.7	2.16	50.28	54	-3.72	-	-	52	220	H

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

Pk - Peak detector

RMS - RMS detection

VERTICAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Chl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuVm)	Average Limit (dBuVm)	Margin (dB)	Peak Limit (dBuVm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	55.57	Pk	32.4	-21.7	0	66.27	-	-	74	-7.73	288	364	V
2	* 2.484	55.69	Pk	32.4	-21.7	0	66.39	-	-	74	-7.61	288	364	V
3	* 2.484	28.67	RMS	32.4	-21.7	2.16	41.53	54	-12.47	-	-	288	364	V
4	* 2.484	37.57	RMS	32.4	-21.7	2.16	50.43	54	-3.57	-	-	288	364	V

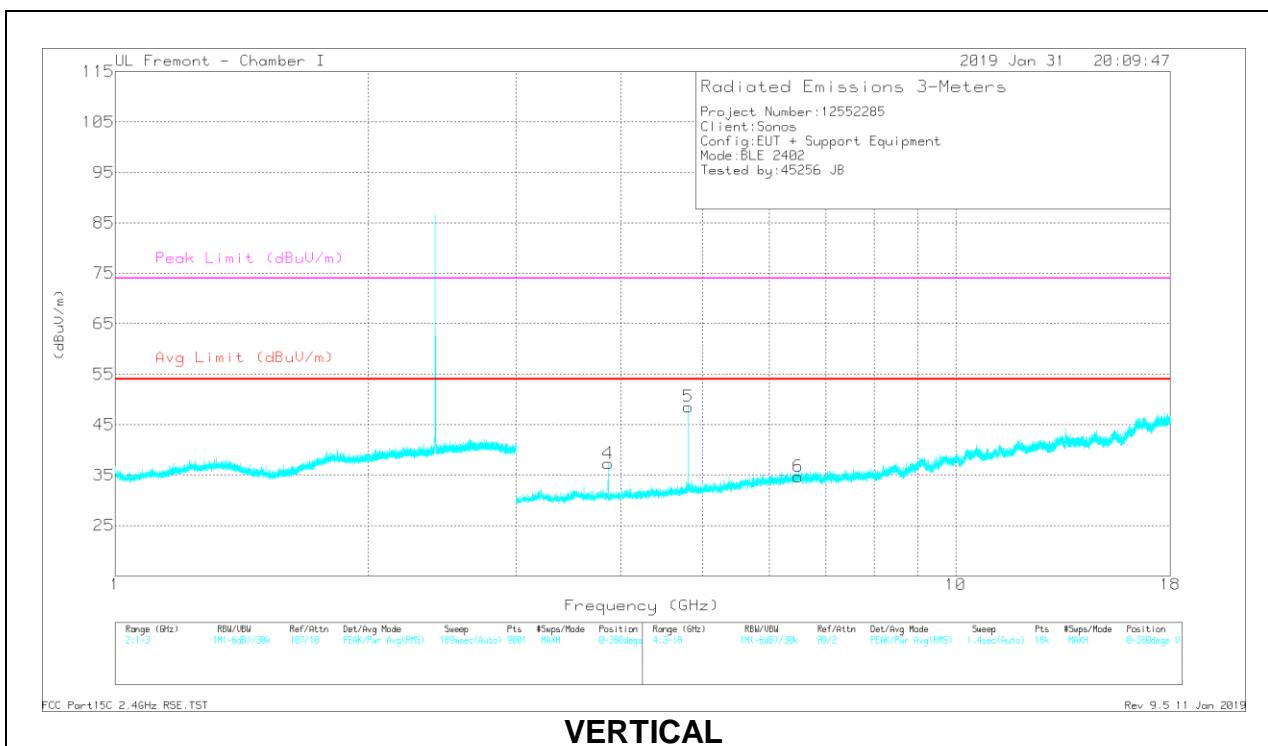
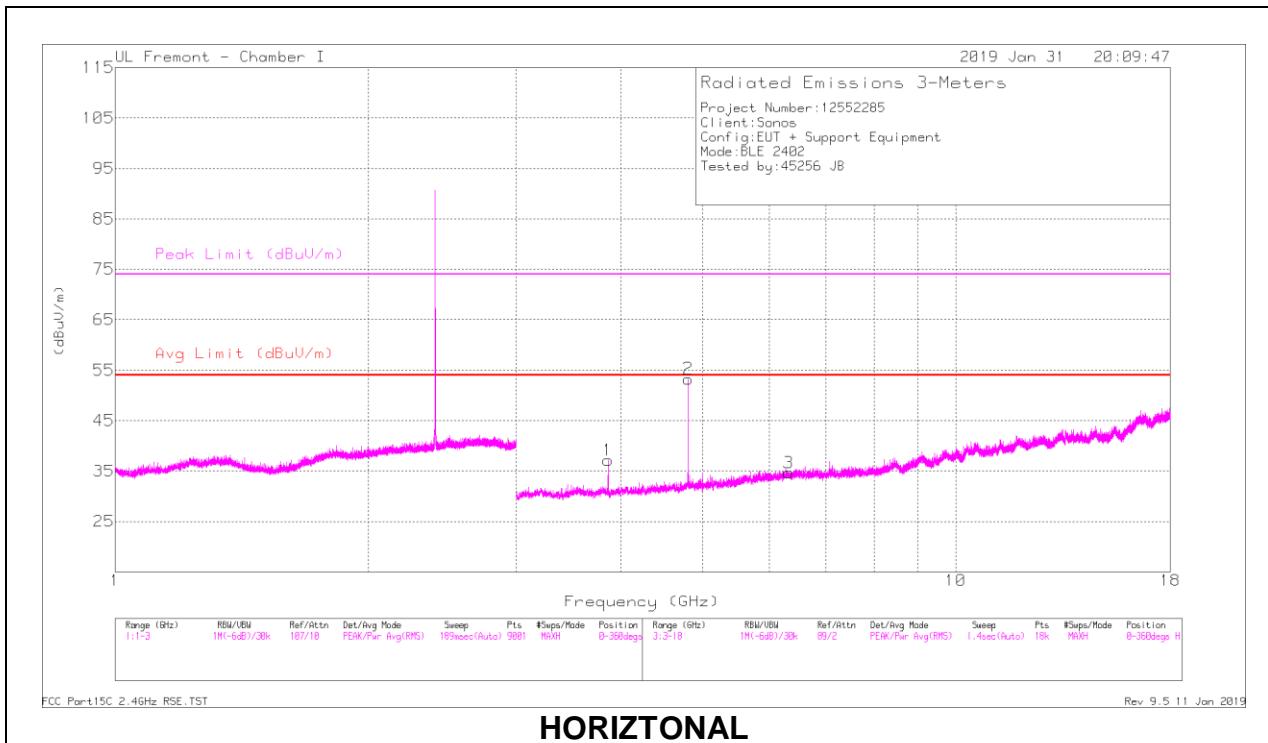
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

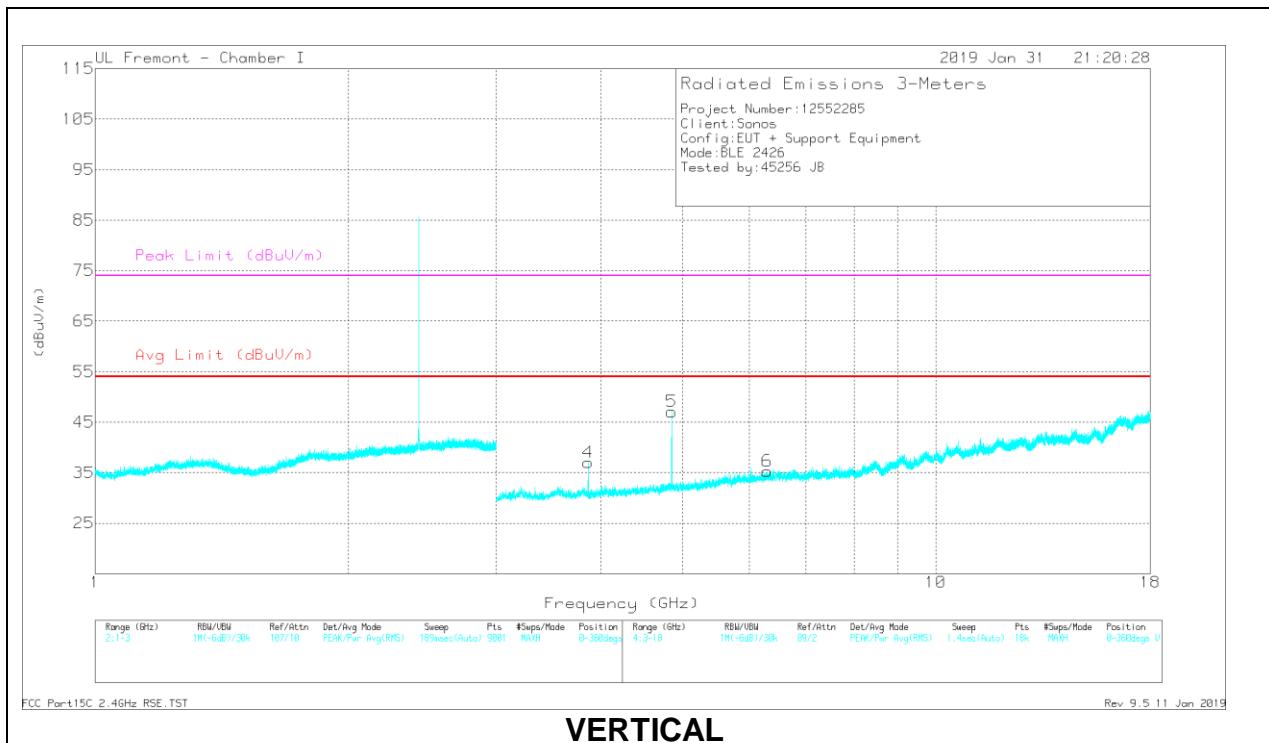
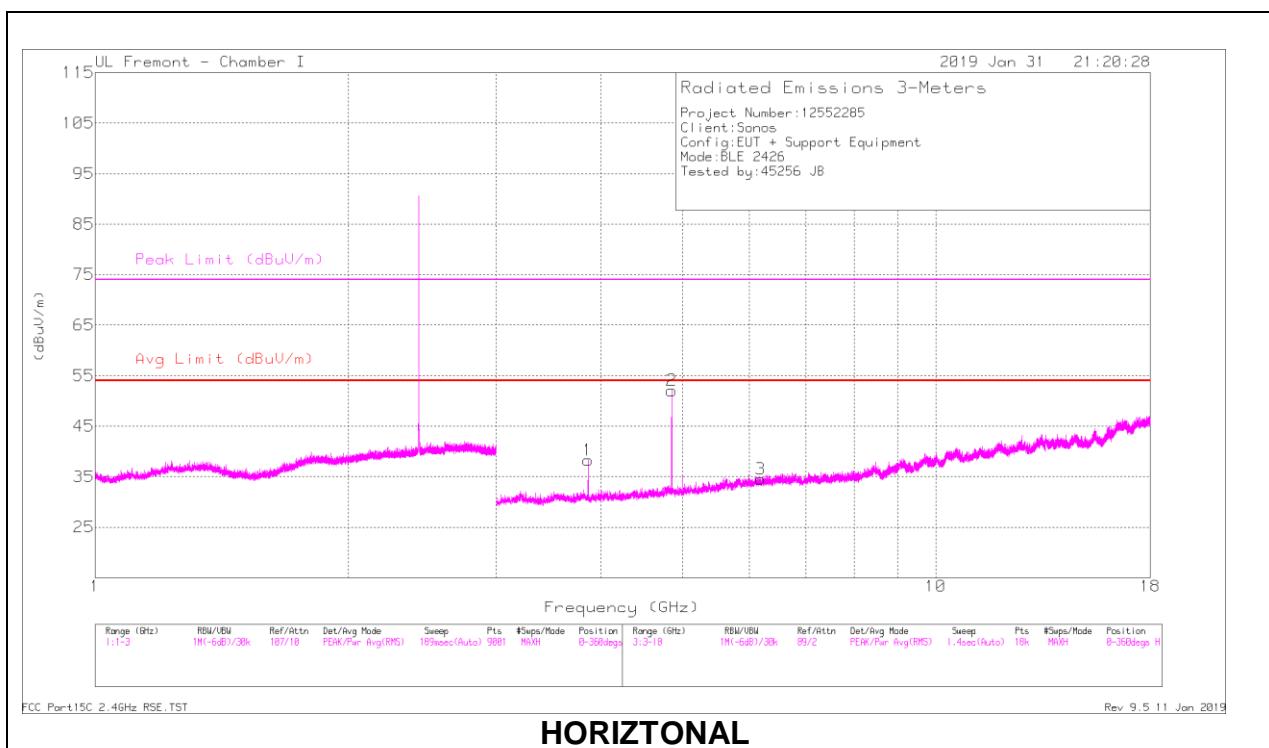
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.859	38.31	PK2	33	-29.6	0	41.71	-	-	74	-32.29	36	110	H
* 3.859	33.53	MAv1	33	-29.6	2.16	39.09	54	-14.91	-	-	36	110	H
* 4.804	49.61	PK2	34.3	-28	0	55.91	-	-	74	-18.09	24	300	H
* 4.804	43.84	MAv1	34.3	-28	2.16	52.3	54	-1.7	-	-	24	300	H
* 3.859	37.49	PK2	33	-29.6	0	40.89	-	-	74	-33.11	147	100	V
* 3.859	31.83	MAv1	33	-29.6	2.16	37.39	54	-16.61	-	-	147	100	V
* 4.803	42.71	PK2	34.3	-28	0	49.01	-	-	74	-24.99	282	373	V
* 4.804	35.51	MAv1	34.3	-28	2.16	43.97	54	-10.03	-	-	282	373	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

Radiated Emissions

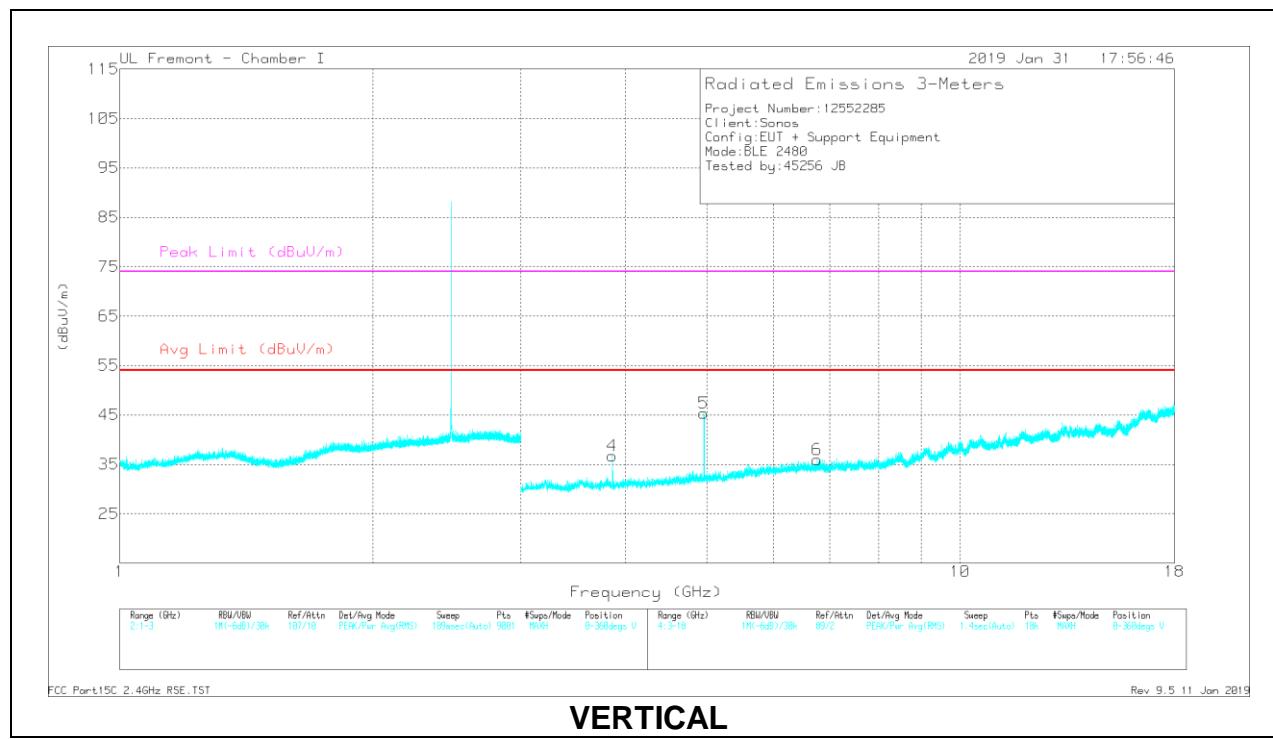
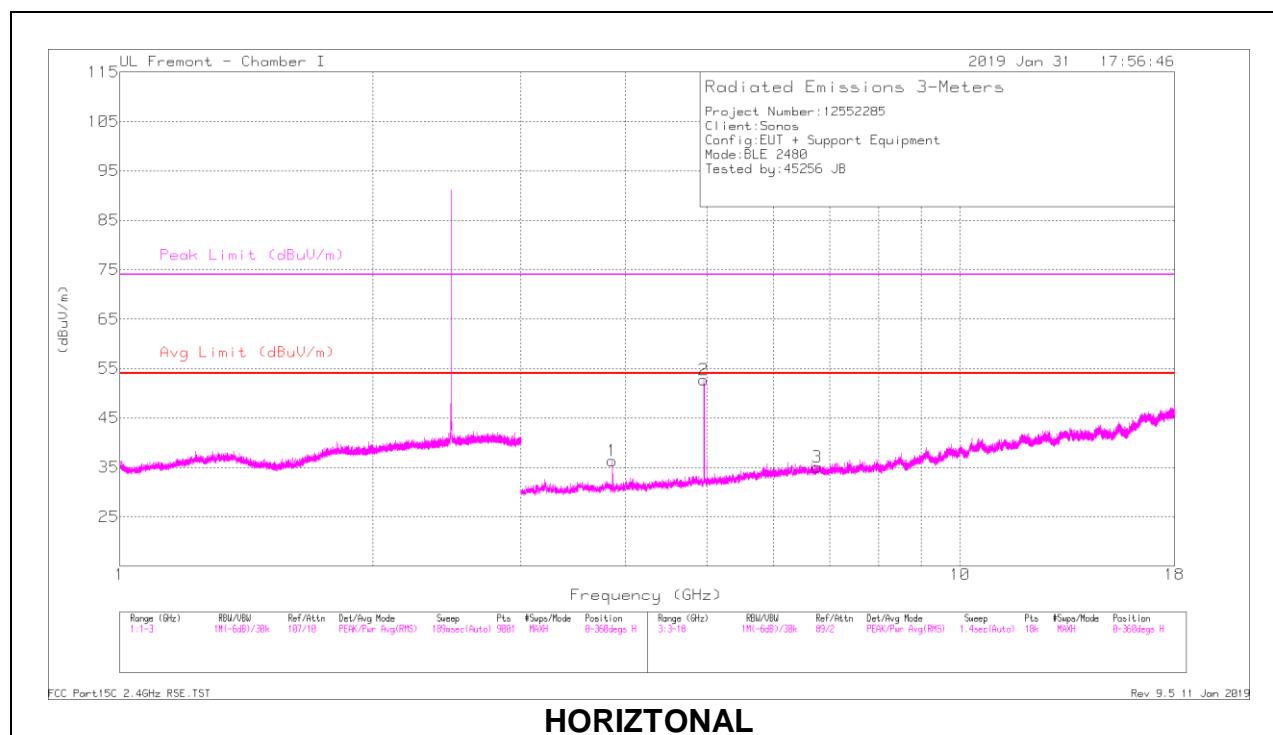
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 3.859	38.51	PK2	33	-29.6	0	41.91	-	-	74	-32.09	34	108	H
* 3.859	33.53	MAv1	33	-29.6	2.16	39.09	54	-14.91	-	-	34	108	H
* 4.852	49.61	PK2	34.2	-28.2	0	55.61	-	-	74	-18.39	25	267	H
* 4.852	43.62	MAv1	34.2	-28.2	2.16	51.78	54	-2.22	-	-	25	267	H
* 3.859	38	PK2	33	-29.6	0	41.4	-	-	74	-32.6	145	100	V
* 3.859	32.3	MAv1	33	-29.6	2.16	37.86	54	-16.14	-	-	145	100	V
* 4.852	43.55	PK2	34.2	-28.2	0	49.55	-	-	74	-24.45	338	325	V
* 4.852	36.78	MAv1	34.2	-28.2	2.16	44.94	54	-9.06	-	-	338	325	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

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Fl tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.959	49.99	PK2	34.2	-29	0	55.19	-	-	74	-18.81	17	255	H
* 4.96	43.82	MAv1	34.2	-29	2.16	51.18	54	-2.82	-	-	17	255	H
* 3.859	38.05	PK2	33	-29.6	0	41.45	-	-	74	-32.55	40	119	H
* 3.859	33.1	MAv1	33	-29.6	2.16	38.66	54	-15.34	-	-	40	119	H
* 3.859	38.17	PK2	33	-29.6	0	41.57	-	-	74	-32.43	21	115	V
* 3.859	33.06	MAv1	33	-29.6	2.16	38.62	54	-15.38	-	-	21	115	V
* 4.959	43.86	PK2	34.2	-29	0	49.06	-	-	74	-24.94	333	187	V
* 4.96	36.95	MAv1	34.2	-29	2.16	44.31	54	-9.69	-	-	333	187	V

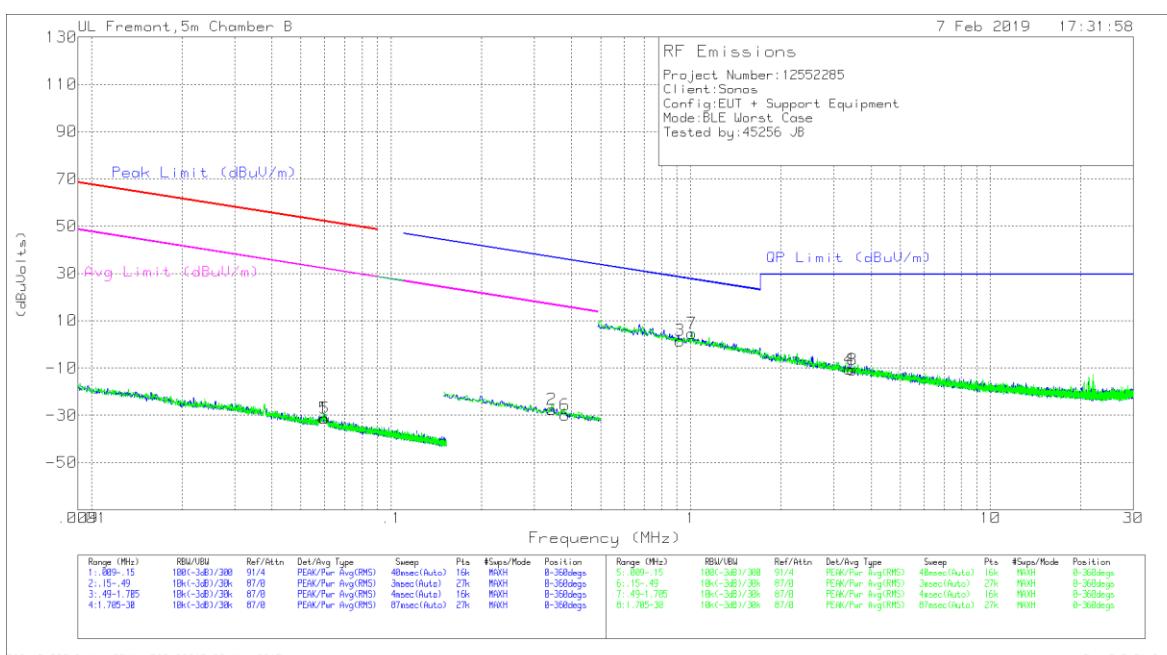
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

9.3. Worst Case Below 30 MHz

SPURIOUS EMISSIONS 9 kHz TO 30 MHz (WORST-CASE CONFIGURATION)



NOTE: KDB 414788 OFS and Chamber Correlation Justification

- Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Below 30 MHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.05969	36.97	Pk	11.8	0	-80	-31.23	52.07	-83.3	32.07	-63.3	-	-	-	-	0-360
5	.05998	36.96	Pk	11.8	0	-80	-31.24	52.03	-83.27	32.03	-63.27	-	-	-	-	0-360
2	.34383	41.57	Pk	10.9	.1	-80	-27.43	-	-	-	-	36.88	-64.31	16.88	-44.31	0-360
6	.38049	39.18	Pk	10.9	.1	-80	-29.82	-	-	-	-	36	-65.82	16	-45.82	0-360

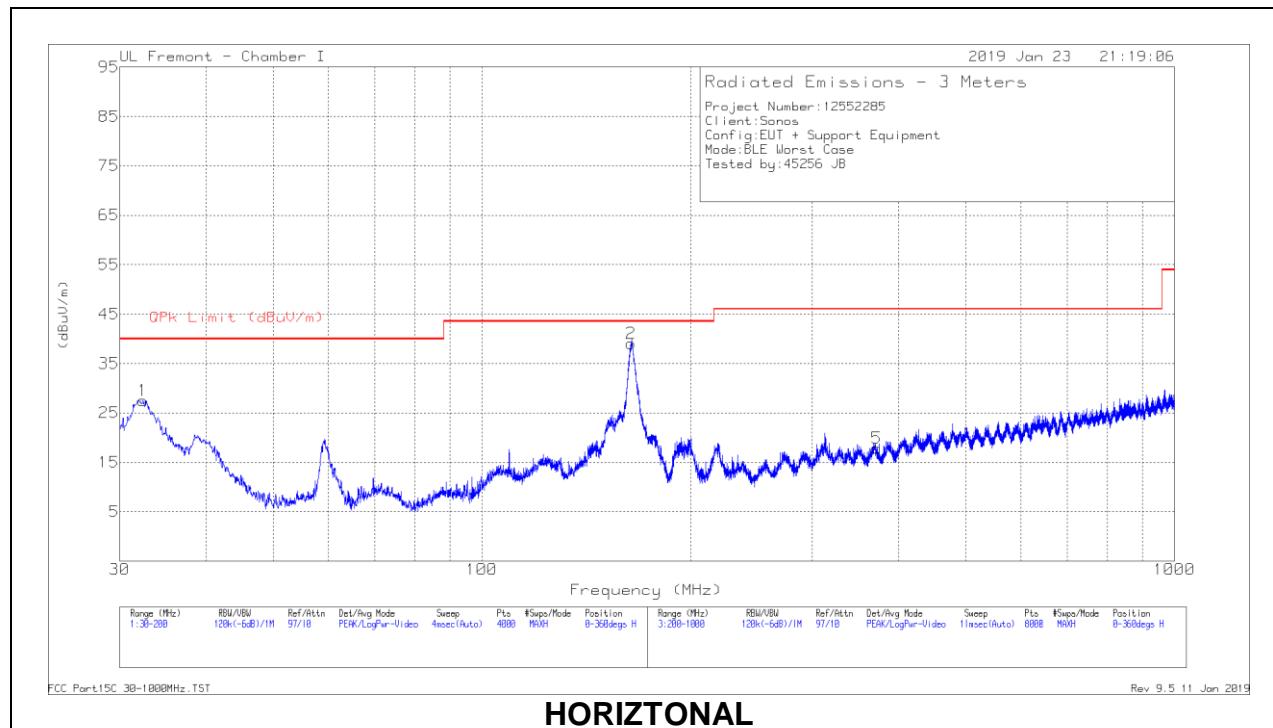
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.91955	30.38	Pk	11.1	.1	-40	1.58	28.35	-26.77	0-360
7	1.00862	33.26	Pk	11.3	.1	-40	4.66	27.55	-22.89	0-360
4	3.38809	17.9	Pk	11.3	.2	-40	-10.6	29.5	-40.1	0-360
8	3.4625	17.63	Pk	11.3	.2	-40	-10.87	29.5	-40.37	0-360

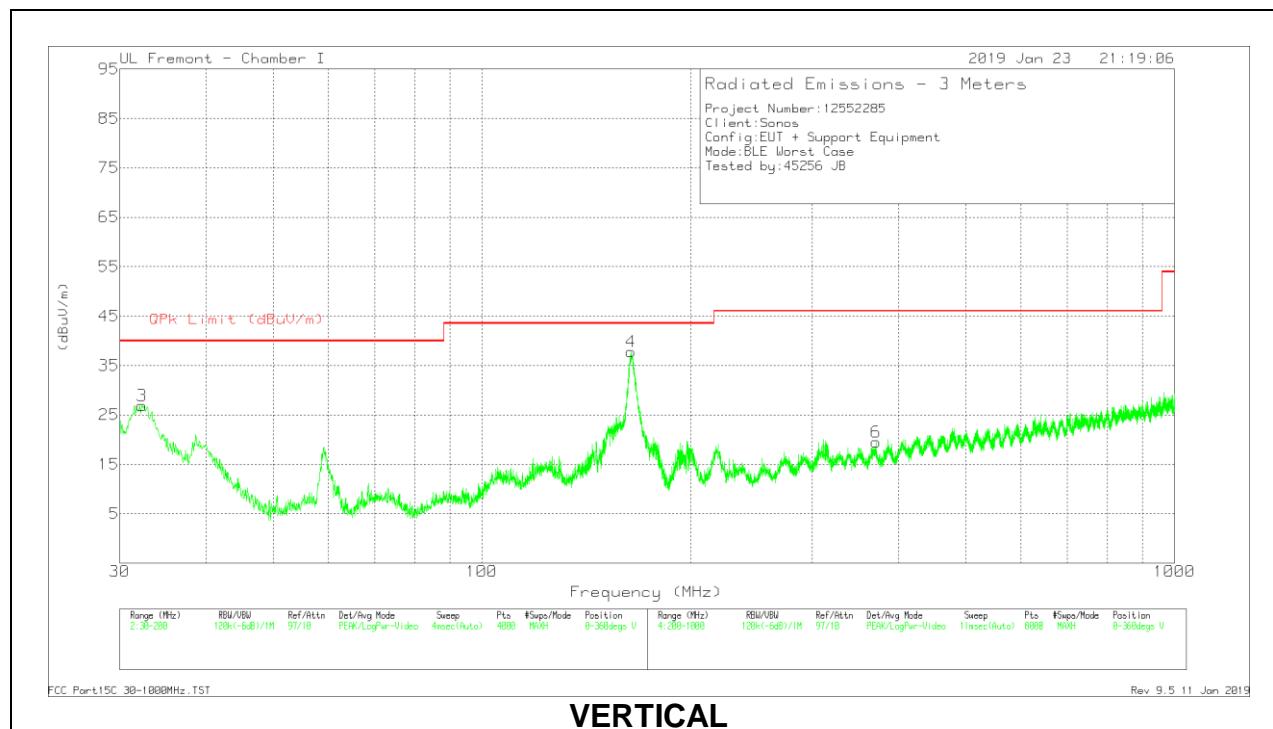
Pk - Peak detector

9.4. Worst Case Below 1 GHz

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



HORIZONTAL



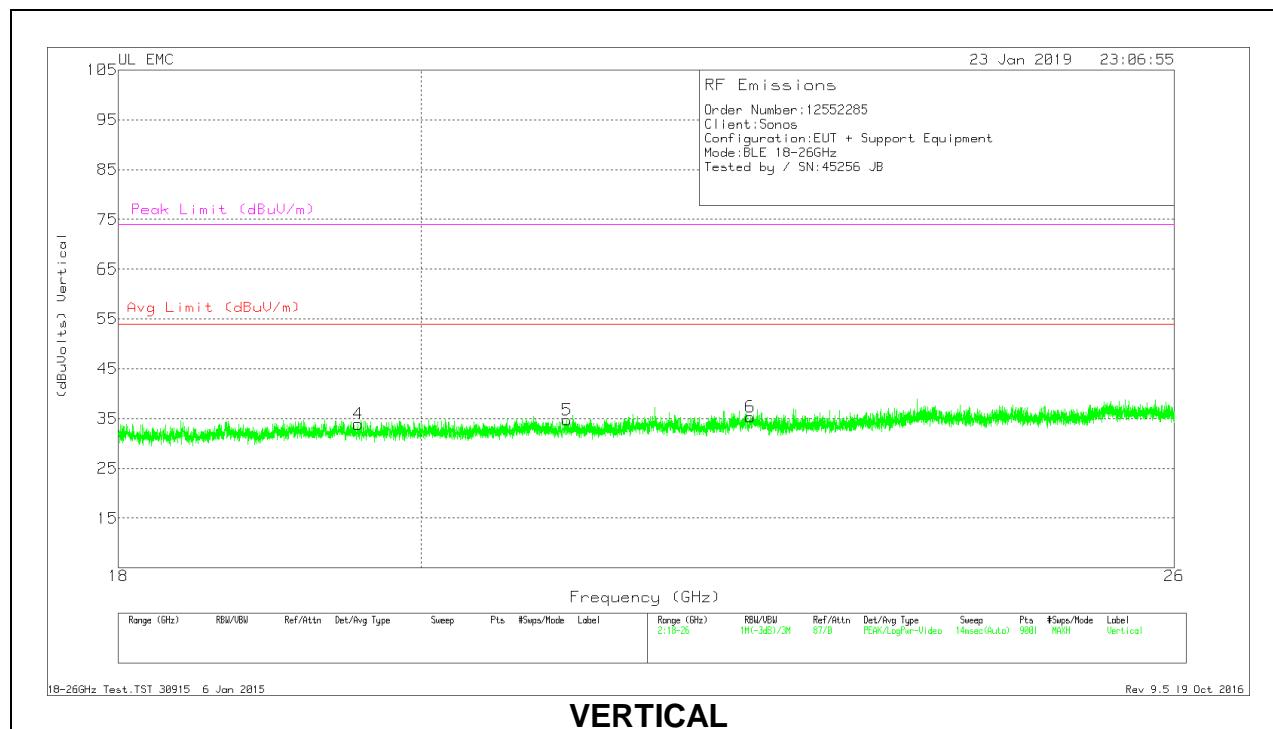
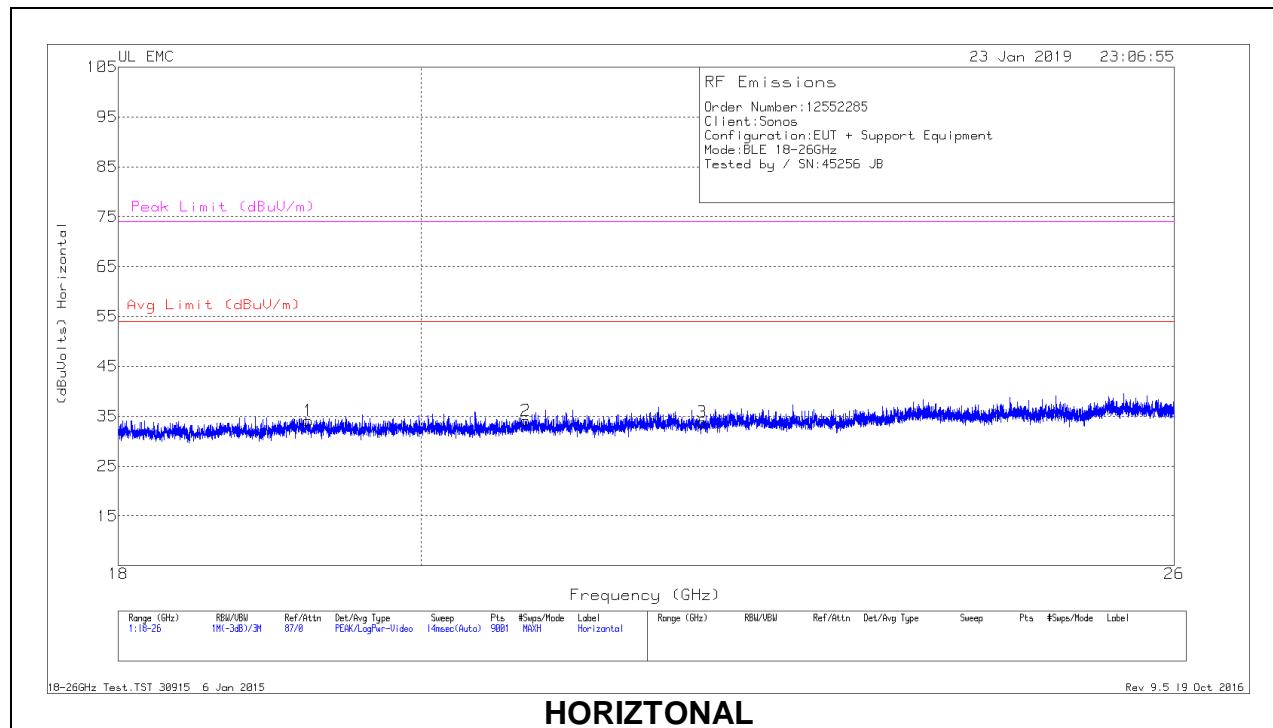
VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.4231	33.97	Pk	24.8	-31.3	27.47	40	-12.53	0-360	101	H
2	* 164.0797	51.56	Pk	17.8	-30.3	39.06	43.52	-4.46	0-360	299	H
	* 164.3104	49.77	Qp	17.8	-30.3	37.27	43.52	-4.13	120	128	H
3	32.2956	33.32	Pk	24.9	-31.3	26.92	40	-13.08	0-360	101	V
4	* 164.2497	50.26	Pk	17.8	-30.3	37.76	43.52	-5.76	0-360	101	V
	* 164.2214	49.95	Qp	17.8	-30.3	37.45	43.52	-3.95	126	379	V
5	371.4223	26.69	Pk	20.8	-29.6	17.89	46.02	-28.13	0-360	399	H
6	370.6222	28.29	Pk	20.8	-29.6	19.49	46.02	-26.53	0-360	101	V

9.5. Worst Case 18-26 GHz

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



18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T447 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.23	35.67	Pk	32.7	-24.8	-9.5	34.07	54	-19.93	74	-39.93
2	20.744	35.82	Pk	33	-25.2	-9.5	34.12	54	-19.88	74	-39.88
3	22.058	35.29	Pk	33.3	-25.3	-9.5	33.79	54	-20.21	74	-40.21
4	19.567	35.7	Pk	32.8	-25.1	-9.5	33.9	54	-20.1	74	-40.1
5	21.042	36.32	Pk	33.1	-25.2	-9.5	34.72	54	-19.28	74	-39.28
6	22.43	36.22	Pk	33.5	-24.9	-9.5	35.32	54	-18.68	74	-38.68

Pk - Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

Please refer to report, UL 12166253-E1.