



# **CERTIFICATION TEST REPORT C2PC**

**Report Number. :** 12361600-E1V3

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

**Model :** PLAY:1 & S20

**FCC ID :** SBVRM007

**IC :** 5373A-RM007

**EUT Description :** 802.11 b/g/n 2x2 CLIENT DEVICE

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 4

**Date Of Issue:**

November 07, 2018

**Prepared by:**

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NVLAP Lab code: 200065-0

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## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	9/27/2018	Initial Issue	-
V2	10/5/2018	Updated Section 1 & 9.4	K.Kedida
V3	11/7/2018	Updated Referenece Report Versions from 1C to 1B	K.Kedida

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# 1. ATTESTATION OF TEST RESULTS

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

**EUT DESCRIPTION:** 802.11 b/g/n 2x2 CLIENT DEVICE

**MODEL:** PLAY:1 & S20

**SERIAL NUMBER:** 000937DAEEBD (Condcuted) , 7828CA800016C (Radiated)

**DATE TESTED:** AUGUST 6 – AUGUST 16, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
ISED RSS-247 Issue 2	Pass
ISED RSS-GEN Issue 4	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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.

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC KDB 662911 D01 Multiple Transmitter Output v02r01, FCC KDB 789033 D02 v02r01, 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 type="checkbox"/> Chamber K (ISED: 2324A-1)
<input checked="" type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber L (ISED: 2324A-3)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	
	<input type="checkbox"/> Chamber G (ISED:22541-4)	
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED company address code 22541 with site numbers 22541 -1 through 22541-5, respectively. Chambers K and L are covered under ISED company address code 2324A with site numbers 2324A-1 and 2324A-3, respectively.

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

EUT is an 802.11 b/g/n 2x2 CLIENT DEVICE.

### 5.2. MAXIMUM OUTPUT POWER

*Please refer to report, UL 13U14836-1B*

*The output powers were verified and measured at same or lower power setting compared to the original certification testing level.*

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes dipole PCB antennas, with a maximum gain as below:

Frequency (MHz)	CH 0 Max. Peak Gain (dBi)	CH 1 Max. Peak Gain (dBi)
2400-2483.5	1.91	2.97

### 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was v.– 46.0-54140

The test utility software used during testing was ART2-GUI v2.3



## **5.5. WORST-CASE CONFIGURATION AND MODE**

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

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The EUT is for desktop applications; all radiated testing was performed with EUT laid out in desktop configuration.

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

802.11b mode: 11 Mbps  
802.11g mode: 24 Mbps (16 QAM)  
802.11n HT20mode: 26 Mbps (QPSK, MCS9)

The EUT was placed on normal orientation, standing position and all radiated emissions were performed with the EUT as shown on the setup photo.

## **5.6. DESCRIPTION OF CLASS II PERMISSIVE CHANGE**

This is to request a class II permissive change for FCC ID:SBVRM007 original granted on 9/10/2013, with Class II permissive change granted 03/01/2016 and 10/18/2016.

The major change filed under this application is:

- Change #1 Changes to chassis 1. Added fixturing for light bulb to top.
- Change #1 Changed to chassis 2. Removed metal speaker grill and replaced with plastic surround covered in fabric.
- Change #3 Change to chassis 3. Moved user interface buttons from top of product to saucer assembly on bottom.
- Change #4 Add model number S20 to grant SBVRM007
- Change #5 Antenna changes: Increased copper deposition on both antenna elements, mirrored Chain1 antenna to resemble Chain 0 element, increased FPC/PSA area on both antenna elements. Both Chain 0 and Chain 1 antennas are dual band (2.4 and 5GHz) and the same type antennas as the original grant antennas.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
Laptop	Lenovo	X200	R9-OYM4F
AC/DC Adapter	Lenovo	ADLX90NCT2A	11S45N0311Z1ZLZ632KDK

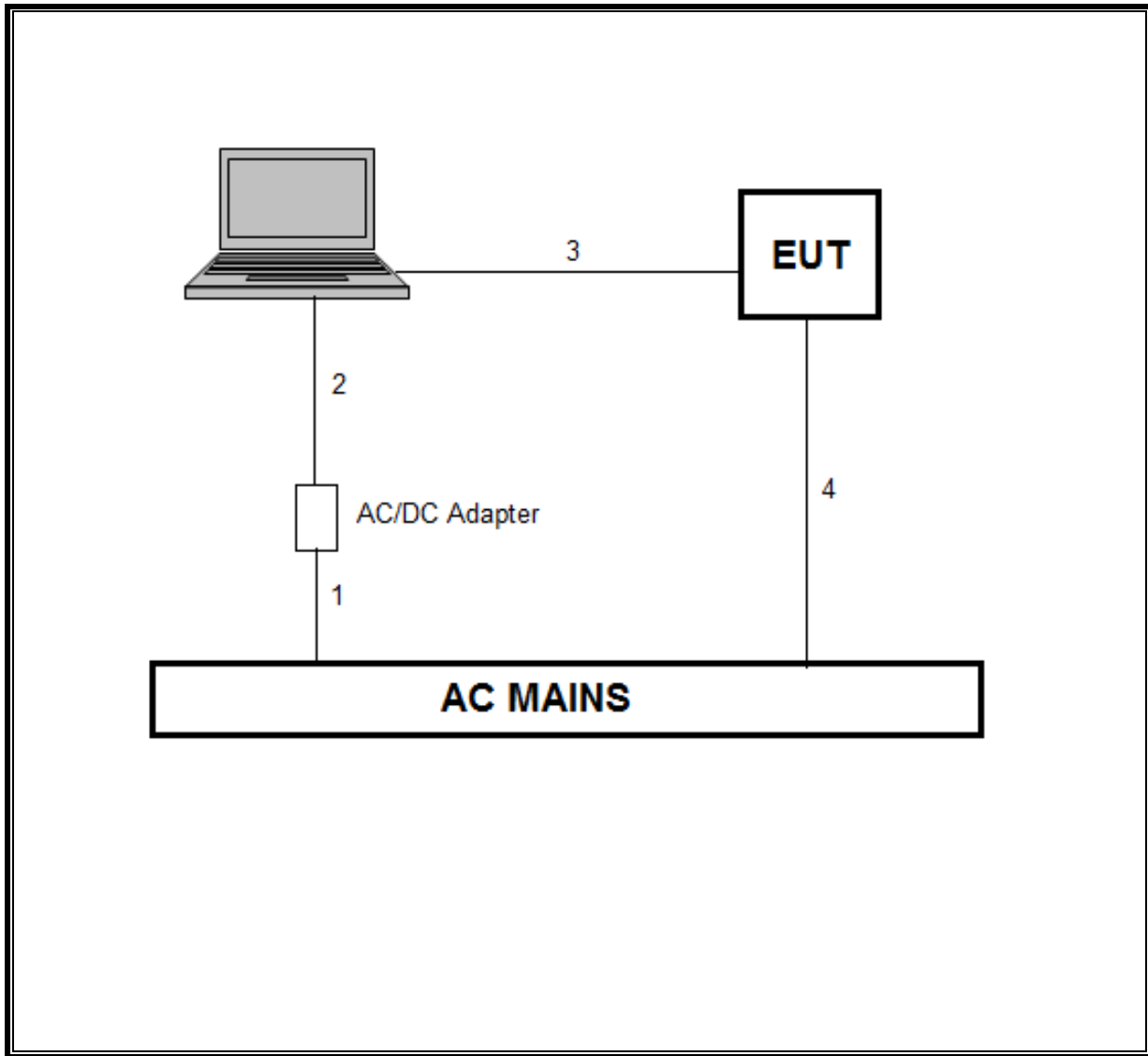
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC Power	1	AC	Unsheilded	1	AC Mains to AC/DC Adapter
2	DC Power	1	DC	Sheilded	1.2	AC/DC Adapter to Laptop
3	Ethernet	1	RJ45	Unsheilded	1.5	Laptop to EUT
4	AC Power	1	AC	Unsheilded	1.2	AC Mains to EUT

### TEST SETUP

The EUT and the support laptop were connected during the tests. A command prompt was used to select channels and power settings from a list of commands to exercise the radio card.

**SETUP DIAGRAM FOR TESTS**



## 6. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.1 (b).

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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, 100kHz to 1GHz, 32dB	Hewlet Packard	8447D	T10	02/14/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	T407	05/10/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	06/21/2019
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T493	04/03/2019
Amplifier, 1 to 8GHz, 35dB	Miteq Inc.	AMF-4D-01000800-30-29P	T1156	04/03/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1450	02/05/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018
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	T1866	10/10/2018
18 - 26.5 GHz Horn Antenna	Seavey Division	MWH-1826/B	T89	01/18/2019
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	03/09/2019
EMI Reciever	Rohde & Schwarz	ESR	T1436	02/21/2019
L.I.S.N.	FCC INC.	FCC LISN 50/250	T1310	06/15/2019

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

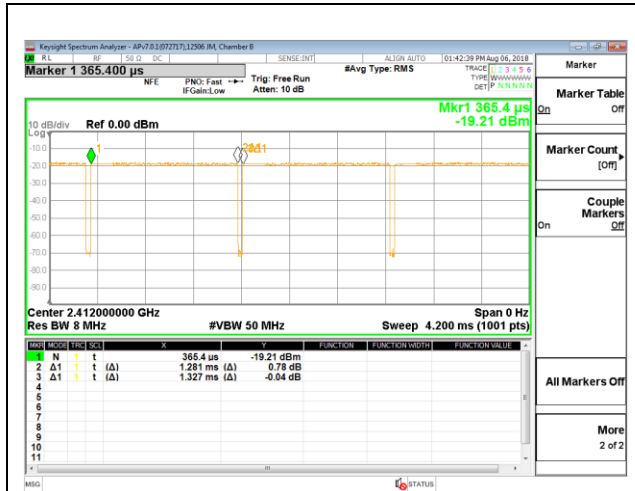
None; for reporting purposes only.

#### PROCEDURE

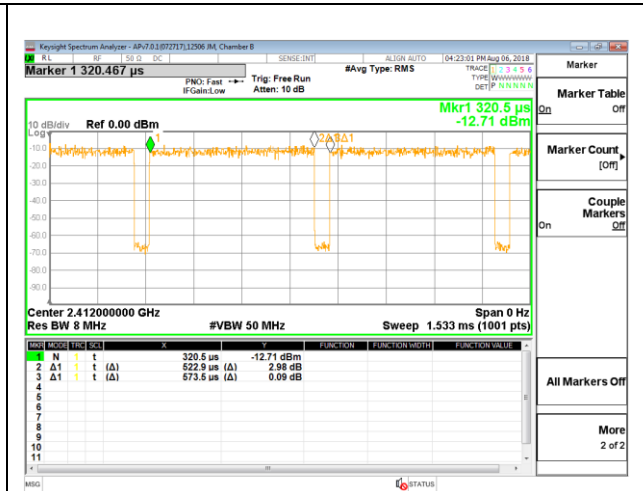
KDB 789033 Zero-Span Spectrum Analyzer Method.

#### 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)
<b>2.4GHz Band</b>						
802.11b 2TX	1.281	1.327	0.965	96.53%	0.15	0.781
802.11g 2TX	0.523	0.574	0.912	91.18%	0.40	1.912
802.11n HT20 2TX	0.505	0.555	0.909	90.88%	0.42	1.982



DUTY CYCLE 802.11b 2TX MODE



DUTY CYCLE 802.11g 2TX MODE



DUTY CYCLE 802.11n HT20 2TX MODE

## **8.2. 99% BANDWIDTH**

### **LIMITS**

None; for reporting purposes only.

### **Results**

*Please refer to report, UL 13U14836-1B.*



### **8.3. 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**

*Please refer to report, UL 13U14836-1B.*

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## 8.4. OUTPUT POWER

### LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Results

*Please refer to report, UL 13U14836-1B.*

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## 8.5. 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**

*Please refer to report, UL 13U14836-1B*

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## **8.6. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

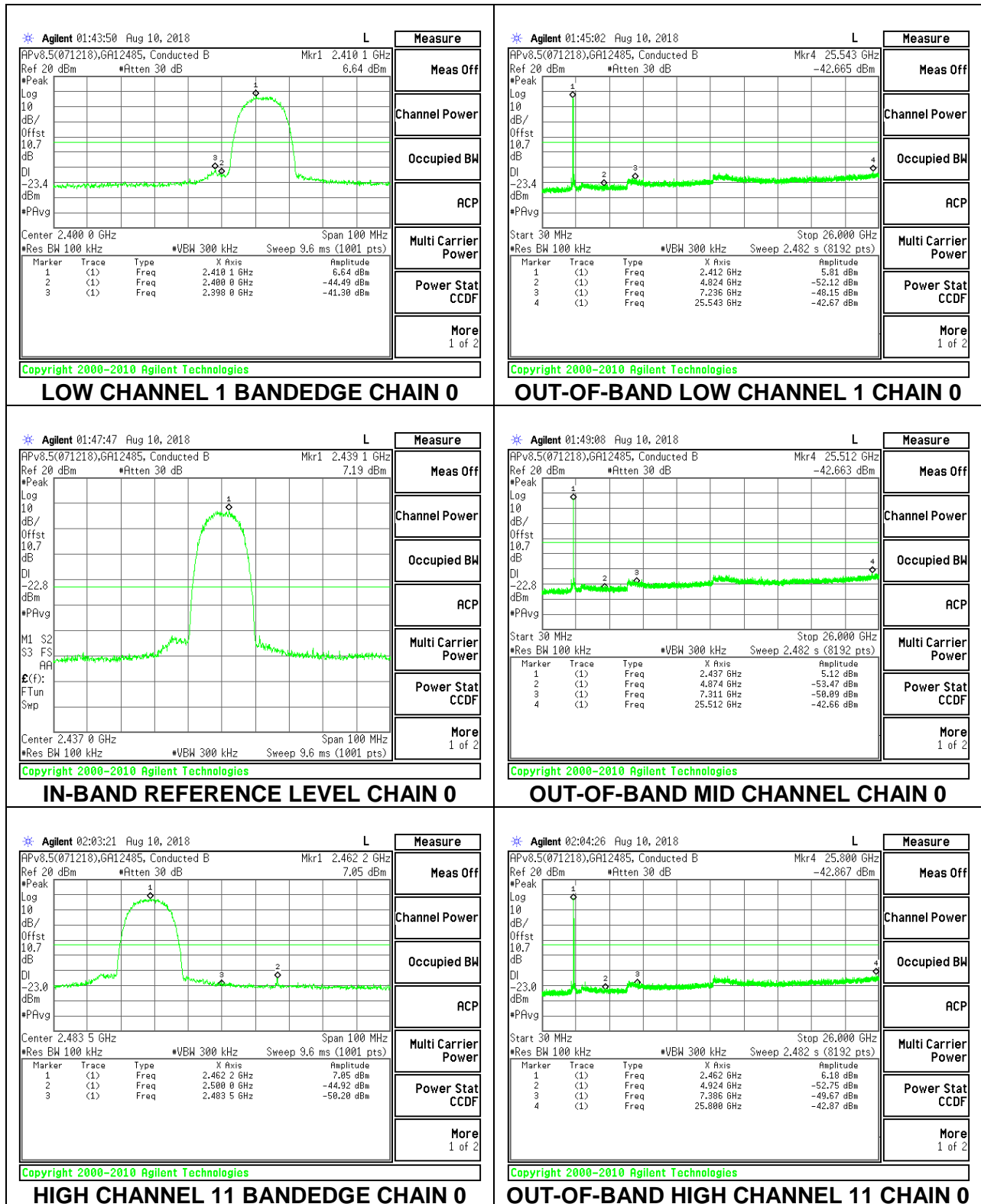
RSS-247 5.5

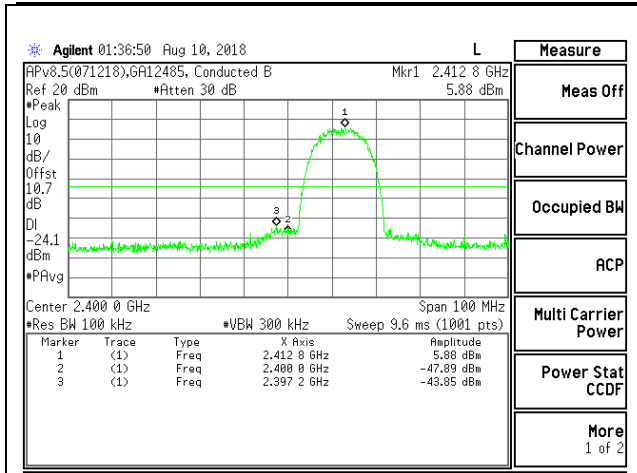
Output power was measured based on the use of average measurement, therefore the required attenuation is 30 dB.

### **RESULTS**

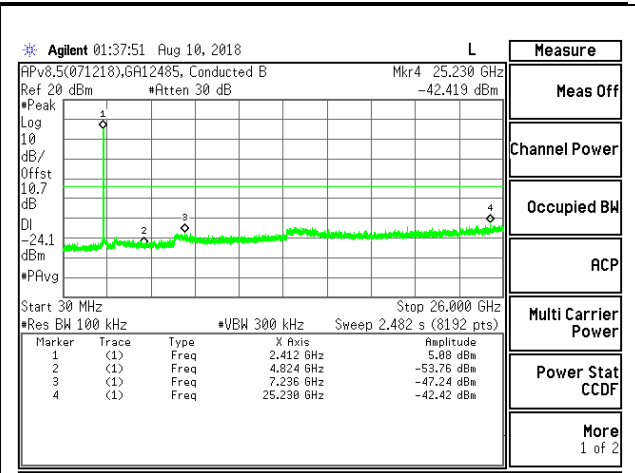
8.6.1. 802.11b MODE

2TX CDD MODE

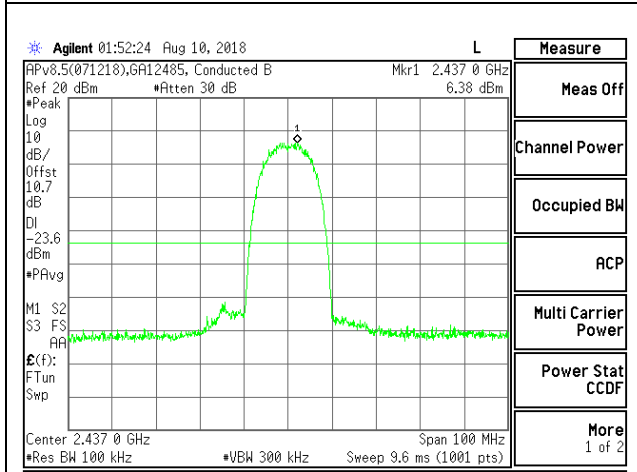




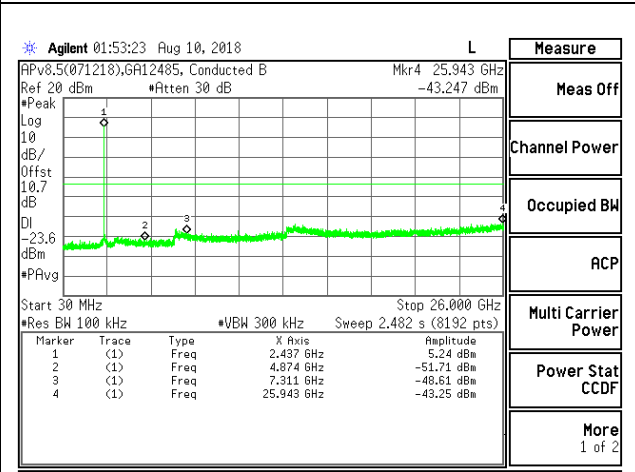
**LOW CHANNEL 1 BANDEDGE CHAIN 1**



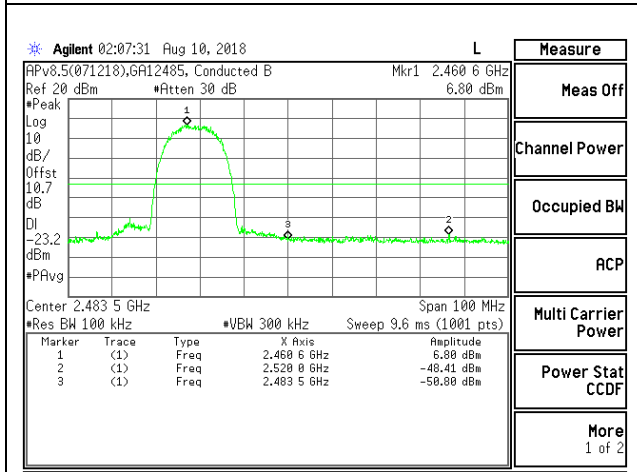
**OUT-OF-BAND LOW CHANNEL 1 CHAIN 1**



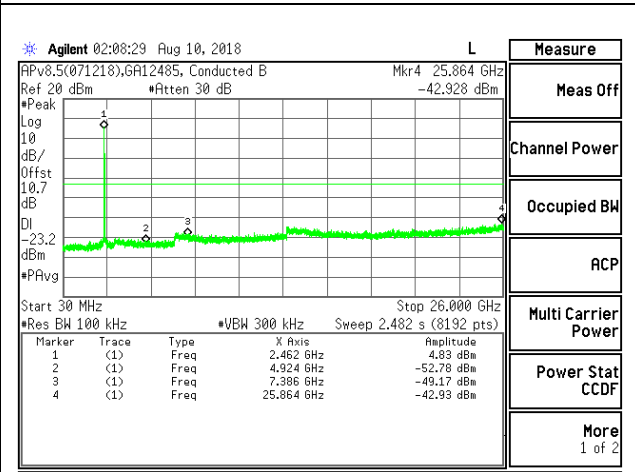
**IN-BAND REFERENCE LEVEL CHAIN 1**



**OUT-OF-BAND MID CHANNEL 1 CHAIN 1**



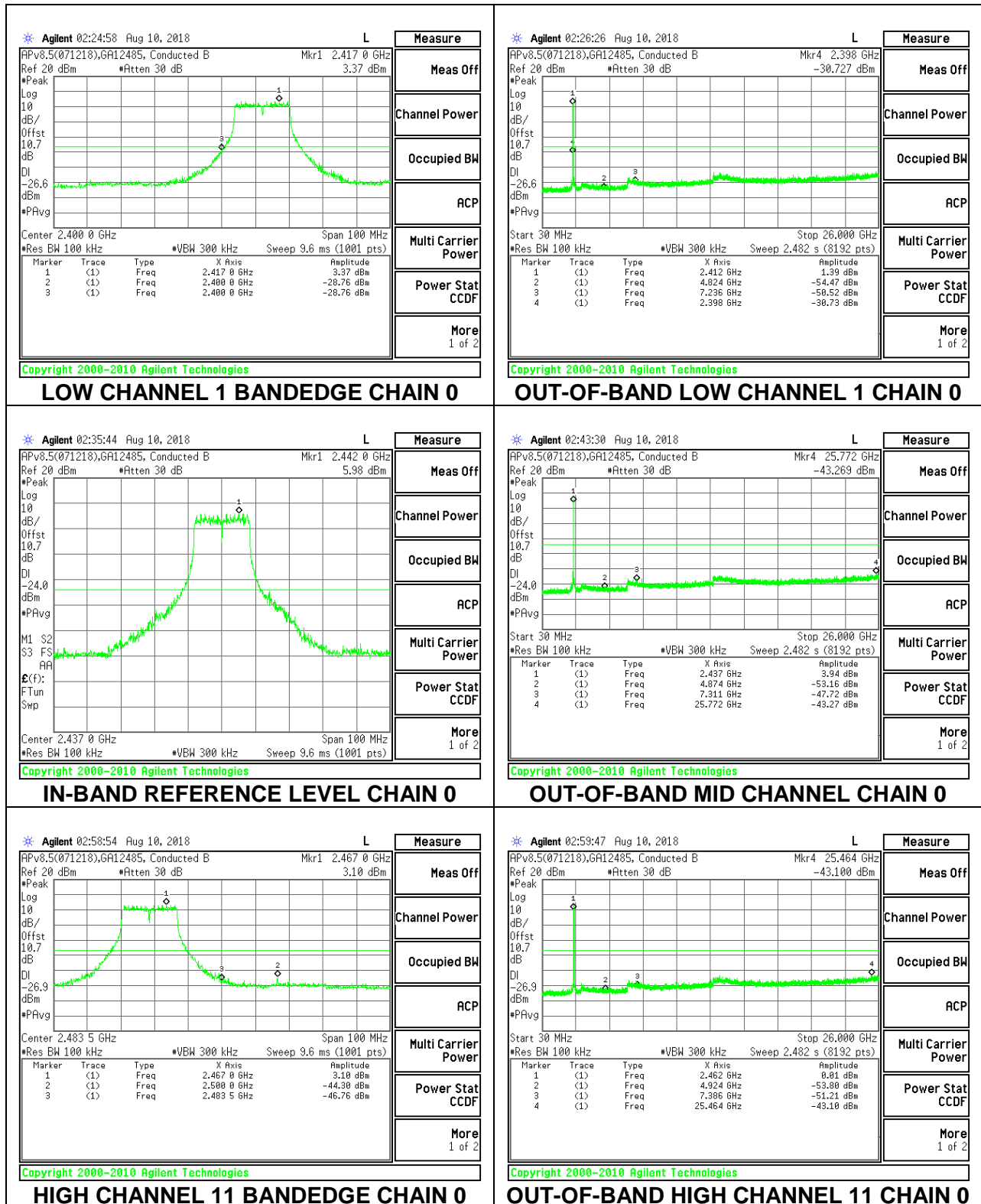
**HIGH CHANNEL 11 BANDEDGE CHAIN 1**

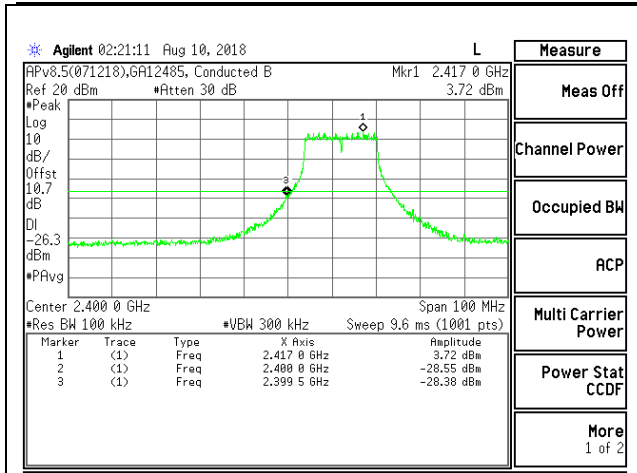


**OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1**

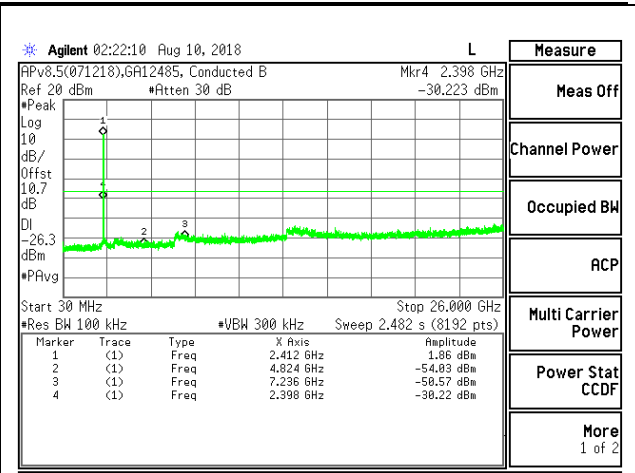
**8.6.2. 802.11g MODE**

**2TX CDD MODE**

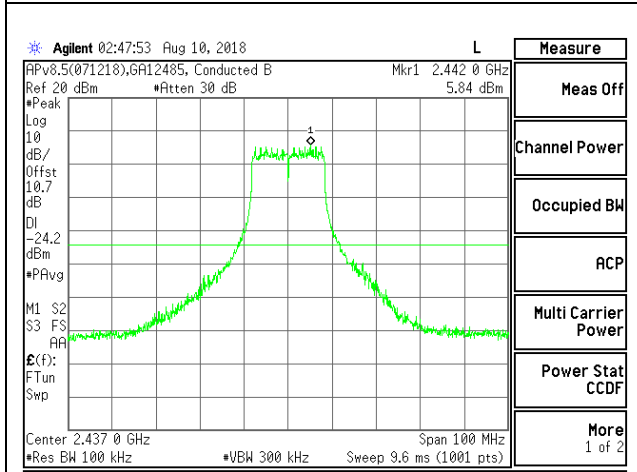




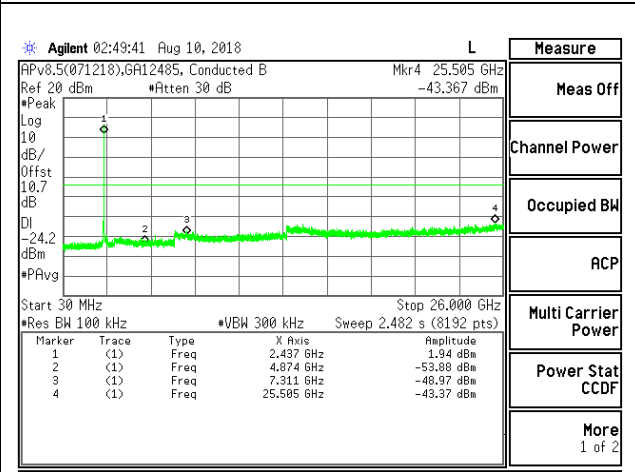
**LOW CHANNEL 1 BANDEDGE CHAIN 1**



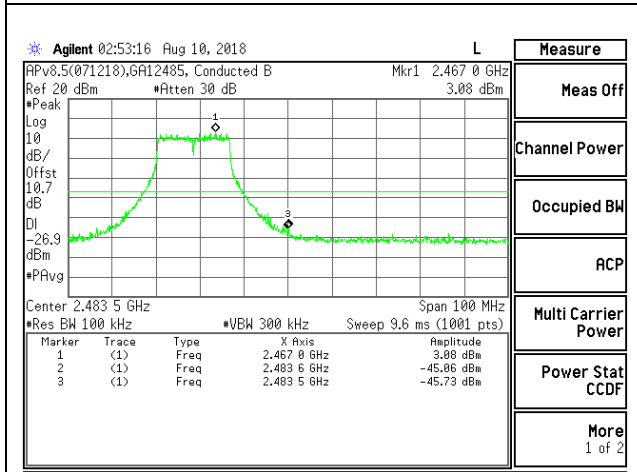
**OUT-OF-BAND LOW CHANNEL 1 CHAIN 1**



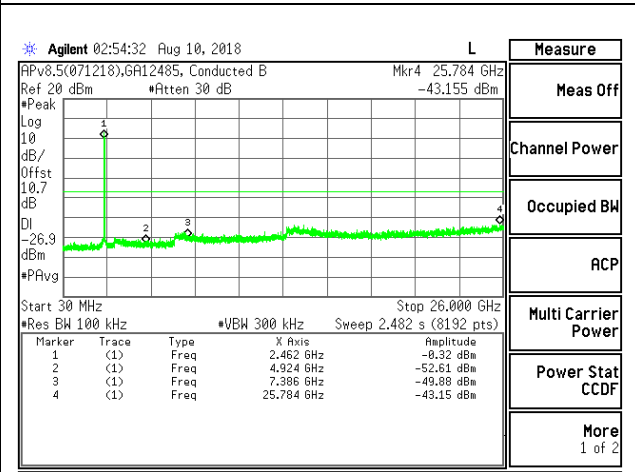
**IN-BAND REFERENCE LEVEL CHAIN 1**



**OUT-OF-BAND MID CHANNEL 1 CHAIN 1**



**HIGH CHANNEL 11 BANDEDGE CHAIN 1**

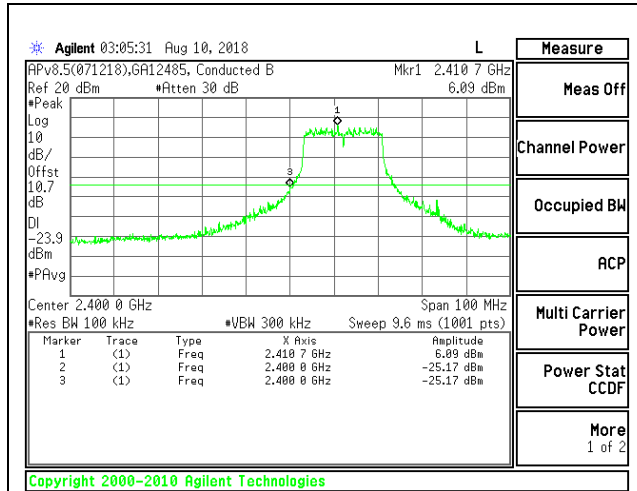


**OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1**

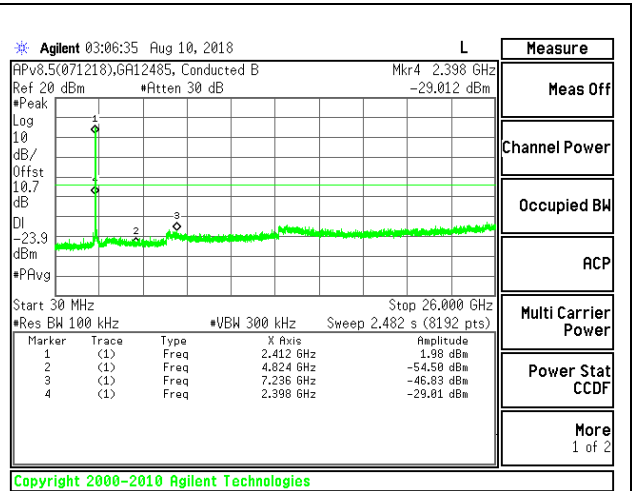


**8.6.3. 802.11n HT20 MODE**

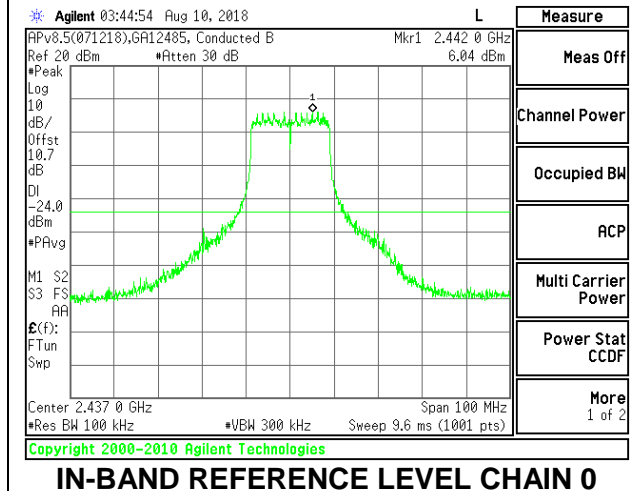
**2TX CDD MODE**



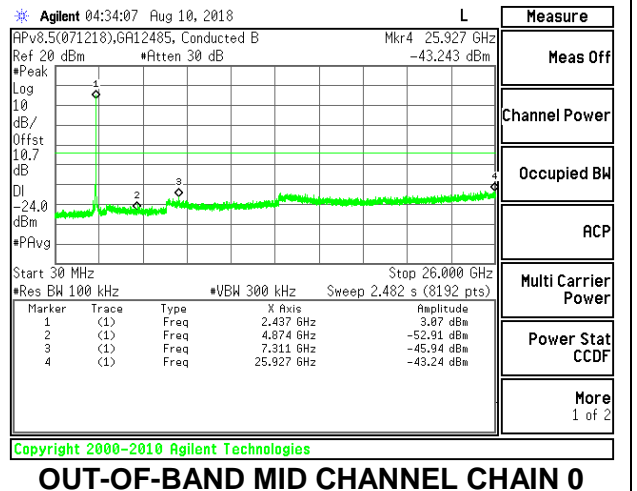
**LOW CHANNEL 1 BANDEDGE CHAIN 0**



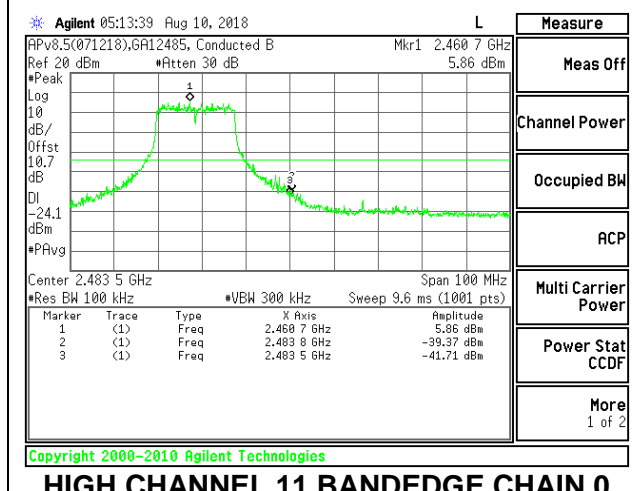
**OUT-OF-BAND LOW CHANNEL 1 CHAIN 0**



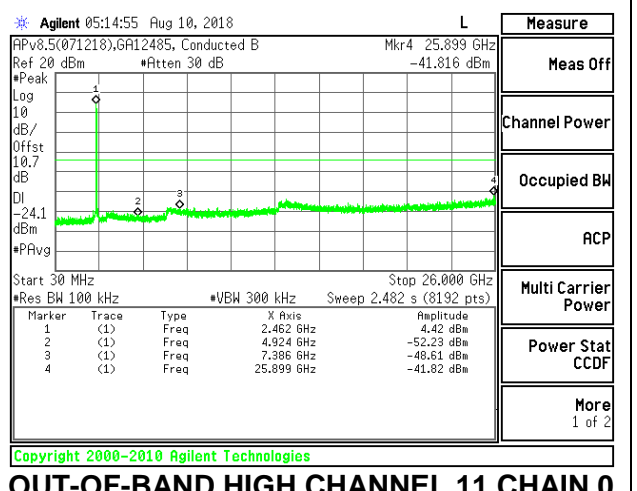
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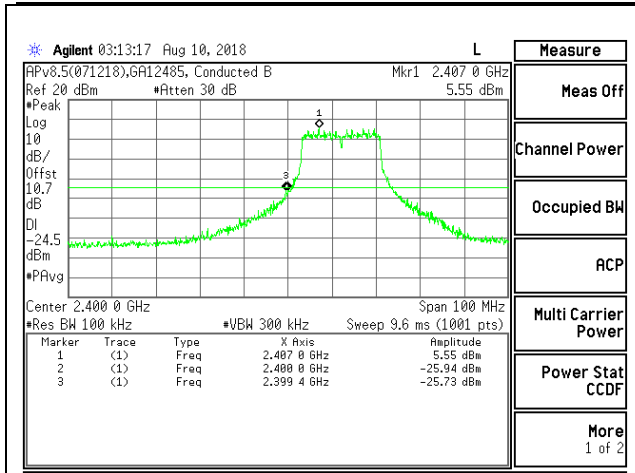
**OUT-OF-BAND MID CHANNEL CHAIN 0**



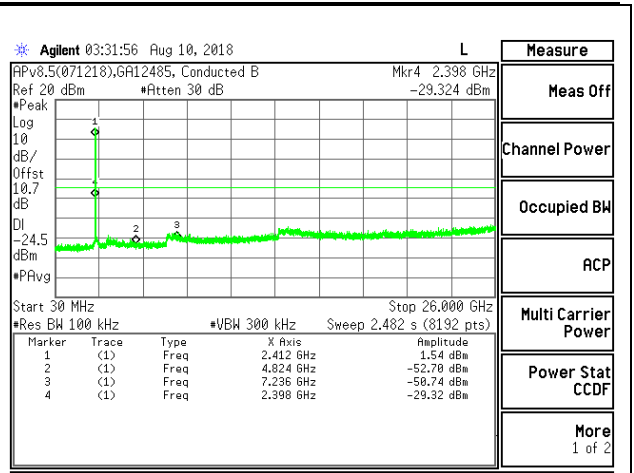
**HIGH CHANNEL 11 BANDEDGE CHAIN 0**



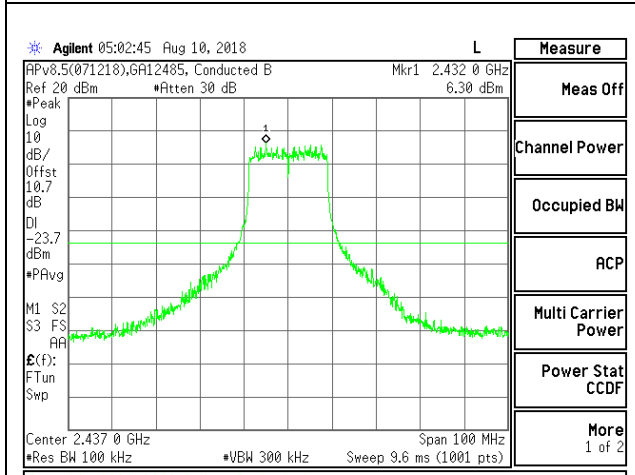
**OUT-OF-BAND HIGH CHANNEL 11 CHAIN 0**



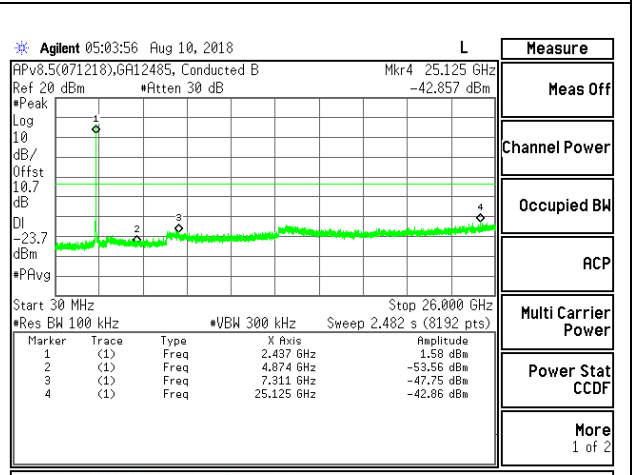
**LOW CHANNEL 1 BANDEDGE CHAIN 1**



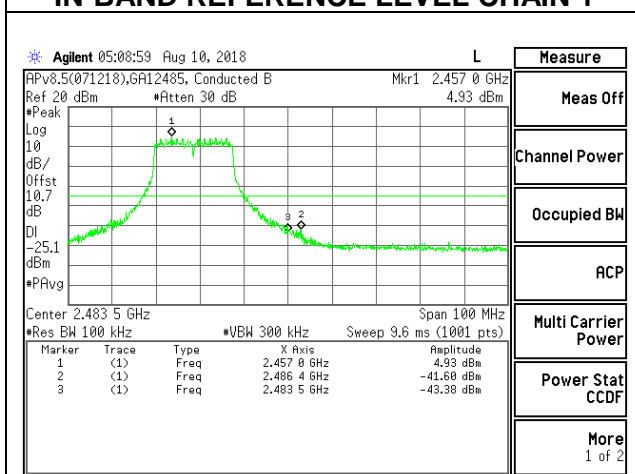
**OUT-OF-BAND LOW CHANNEL 1 CHAIN 1**



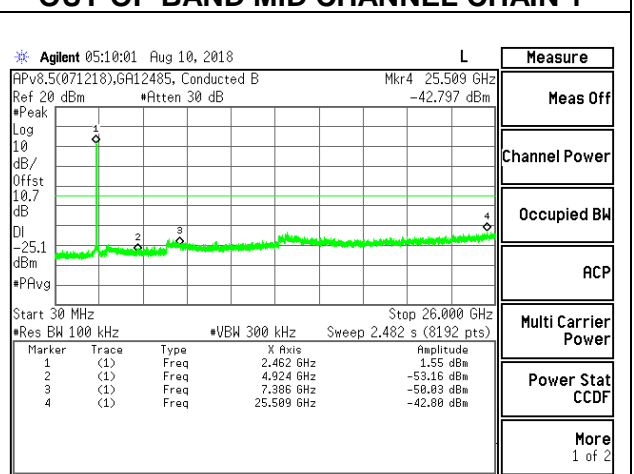
**IN-BAND REFERENCE LEVEL CHAIN 1**



**OUT-OF-BAND MID CHANNEL CHAIN 1**



**HIGH CHANNEL 11 BANDEDGE CHAIN 1**



**OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1**

## 9. RADIATED TEST RESULTS

### 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.

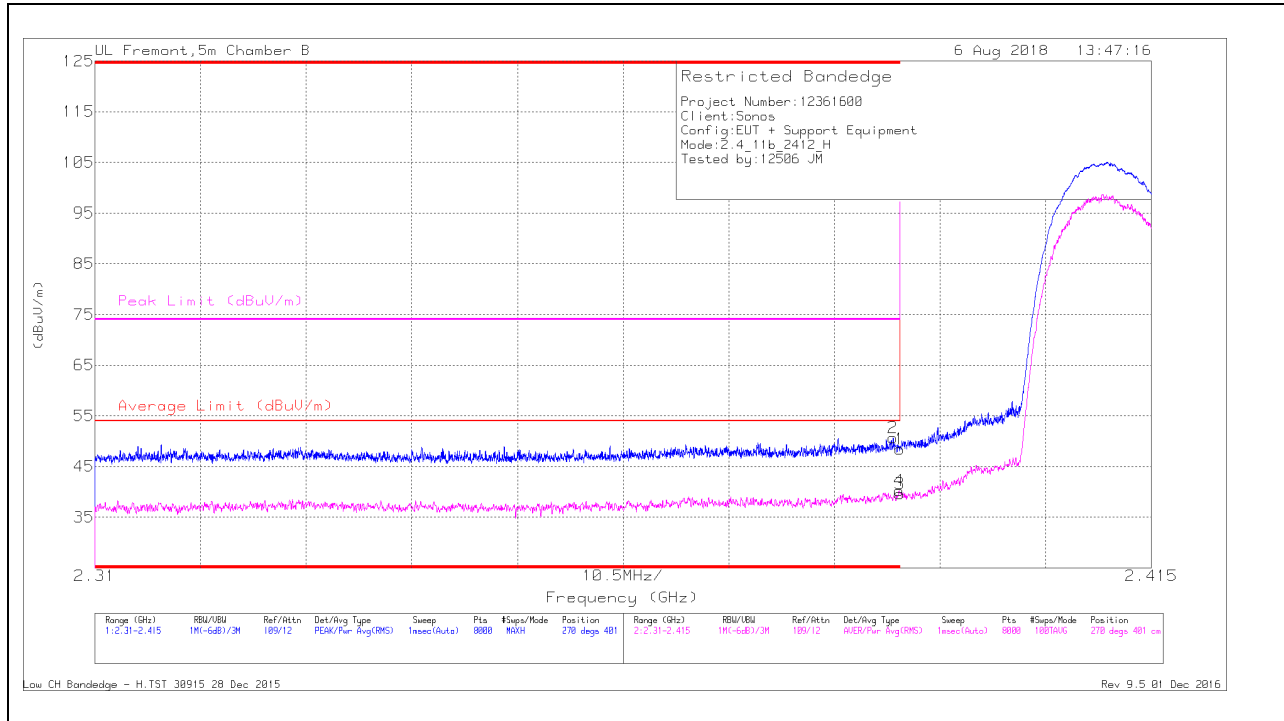
## 9.1. TRANSMITTER ABOVE 1 GHz

### 9.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

#### 2TX CDD MODE

#### BANDEDGE (LOW CHANNEL, CH 1)

#### HORIZONTAL RESULT



#### Trace Markers

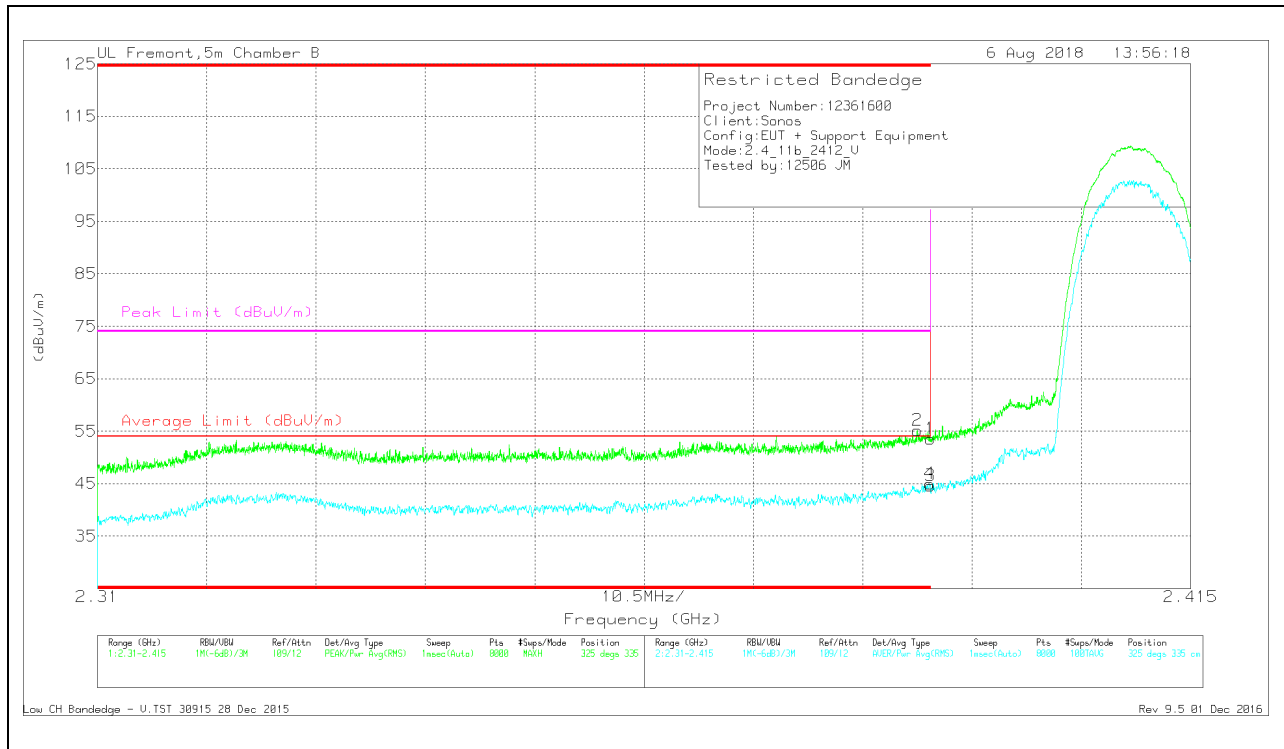
Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.389	39.81	Pk	32.3	-21.5	0	50.61	-	-	74	-23.39	270	401	H
1	* 2.39	37.61	Pk	32.3	-21.5	0	48.41	-	-	74	-25.59	270	401	H
3	* 2.39	28.71	RMS	32.3	-21.5	.15	39.66	54	-14.34	-	-	270	401	H
4	* 2.39	29.3	RMS	32.3	-21.5	.15	40.25	54	-13.75	-	-	270	401	H

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

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



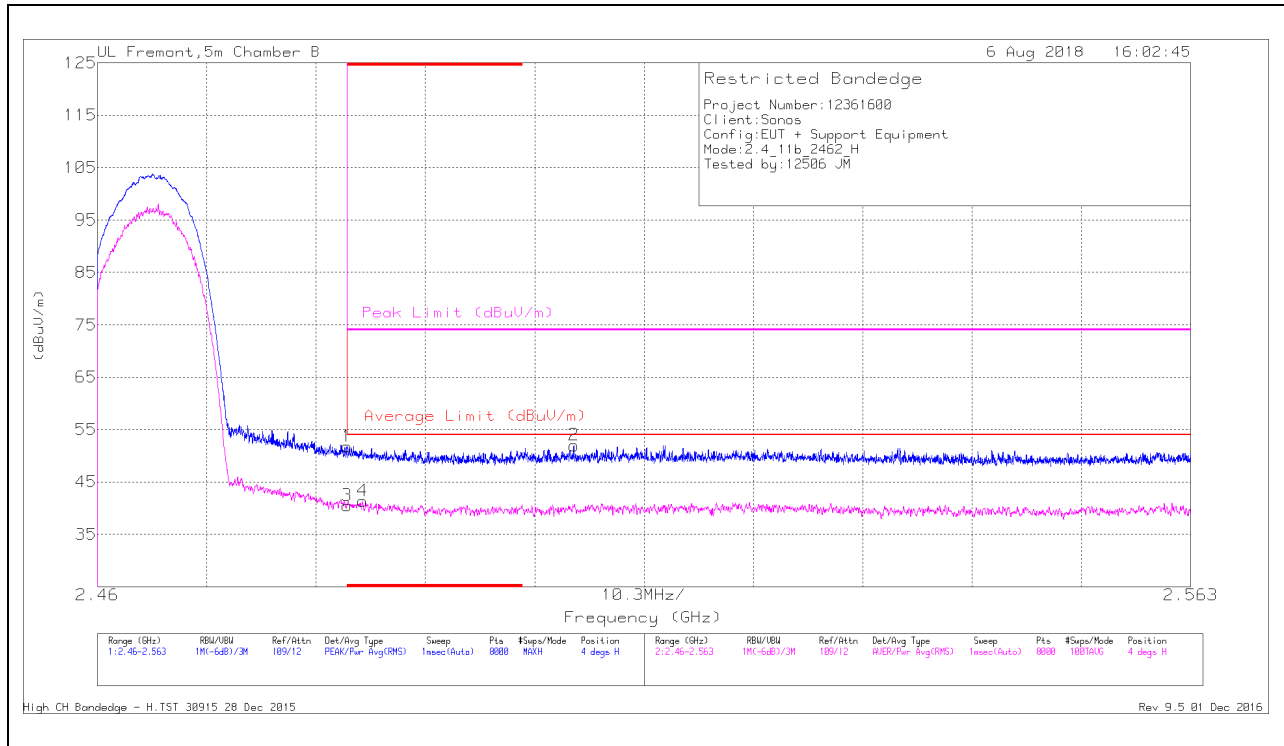
### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/Fitr/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
2	* 2.389	44.28	Pk	32.3	-21.5	0	55.08	-	-	74	-18.92	325	335	V
1	* 2.39	42.69	Pk	32.3	-21.5	0	53.49	-	-	74	-20.51	325	335	V
3	* 2.39	33.62	RMS	32.3	-21.5	.15	44.57	54	-9.43	-	-	325	335	V
4	* 2.39	33.98	RMS	32.3	-21.5	.15	44.93	54	-9.07	-	-	325	335	V

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

**BANDEDGE (HIGH CHANNEL, CH 11)**

**HORIZONTAL RESULT**



**Trace Markers**

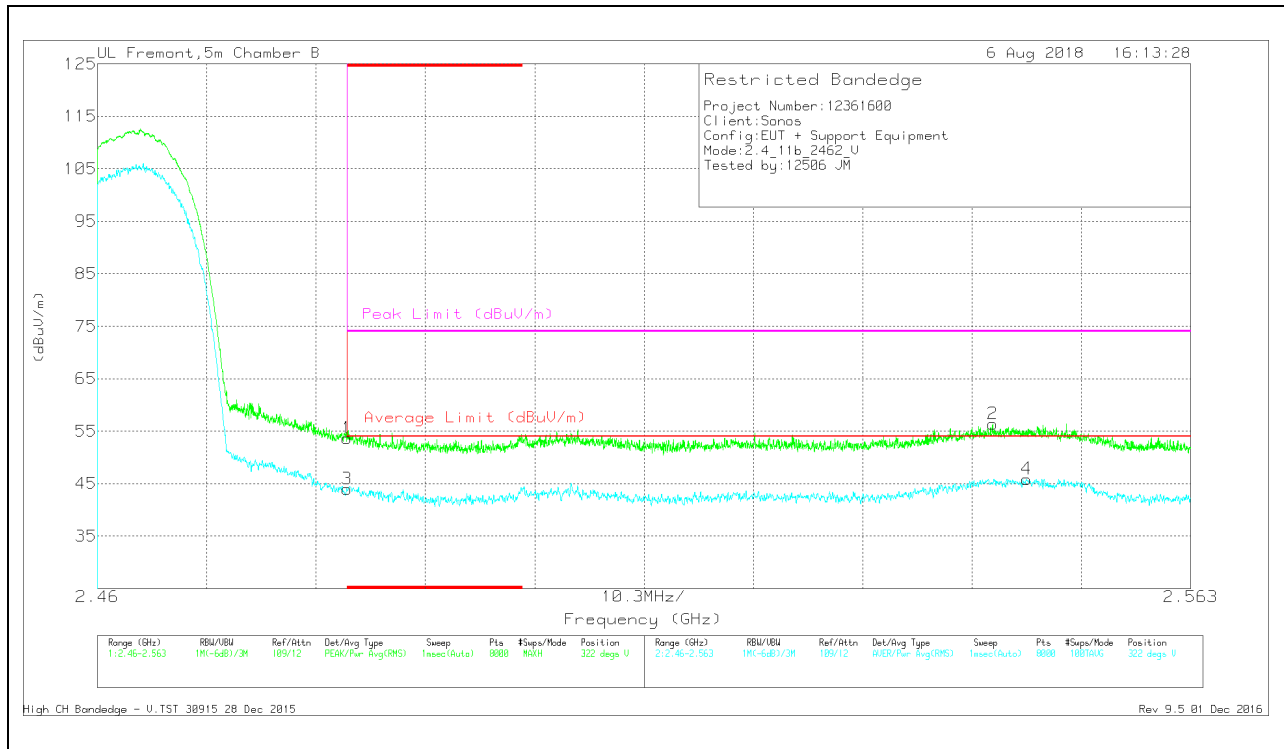
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF 1863 (dBm)	Amp/CbV/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	40.72	Pk	32.6	-21.5	0	51.82	-	-	74	-22.18	4	361	H
3	* 2.484	29.18	RMS	32.6	-21.5	.15	40.43	54	-13.57	-	-	4	361	H
4	* 2.485	30.08	RMS	32.6	-21.5	.15	41.33	54	-12.67	-	-	4	361	H
2	2.505	40.67	Pk	32.7	-21.4	0	51.97	-	-	74	-22.03	4	361	H

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

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



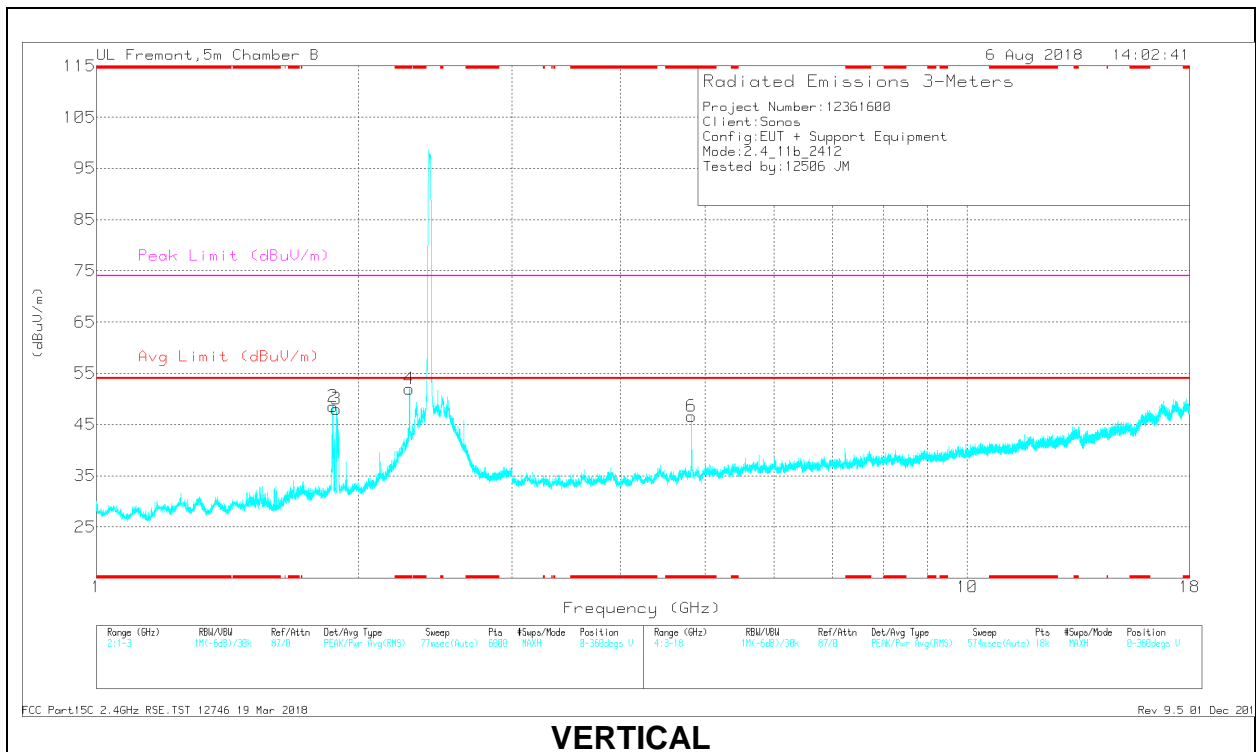
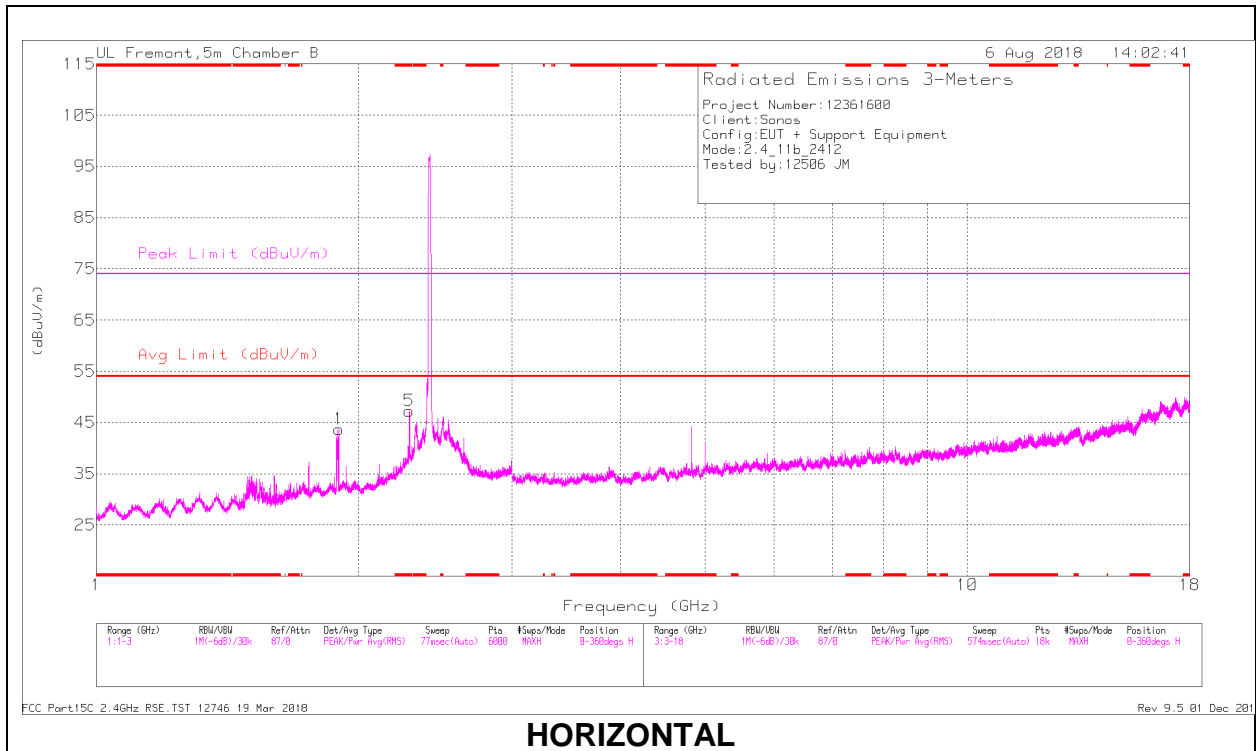
### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cb/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	* 2.484	42.6	Pk	32.6	-21.5	0	53.7	-	-	74	-20.3	322	357	V
3	* 2.484	32.74	RMS	32.6	-21.5	.15	43.99	54	-10.01	-	-	322	357	V
2	2.544	45.04	Pk	32.7	-21.4	0	56.34	-	-	74	-17.66	322	357	V
4	2.548	34.43	RMS	32.7	-21.4	.15	45.88	54	-8.12	-	-	322	357	V

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

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL, CH 1 RESULTS**





## RADIATED EMISSIONS

### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/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
5	* 2.288	37.02	Pk	31.9	-21.7	0	47.22	-	-	74	-26.78	0-360	102	H
4	* 2.288	41.78	Pk	31.9	-21.7	0	51.98	-	-	74	-22.02	0-360	200	V
6	* 4.823	43.34	Pk	34.1	-30.8	0	46.64	-	-	74	-27.36	0-360	200	V
2	1.868	39.02	Pk	30.9	-21.4	0	48.52	-	-	-	-	0-360	101	V
3	1.886	38.39	Pk	31	-21.4	0	47.99	-	-	-	-	0-360	101	V
1	1.897	33.98	Pk	31.1	-21.4	0	43.68	-	-	-	-	0-360	199	H

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

Pk - Peak detector

### Radiated Emissions

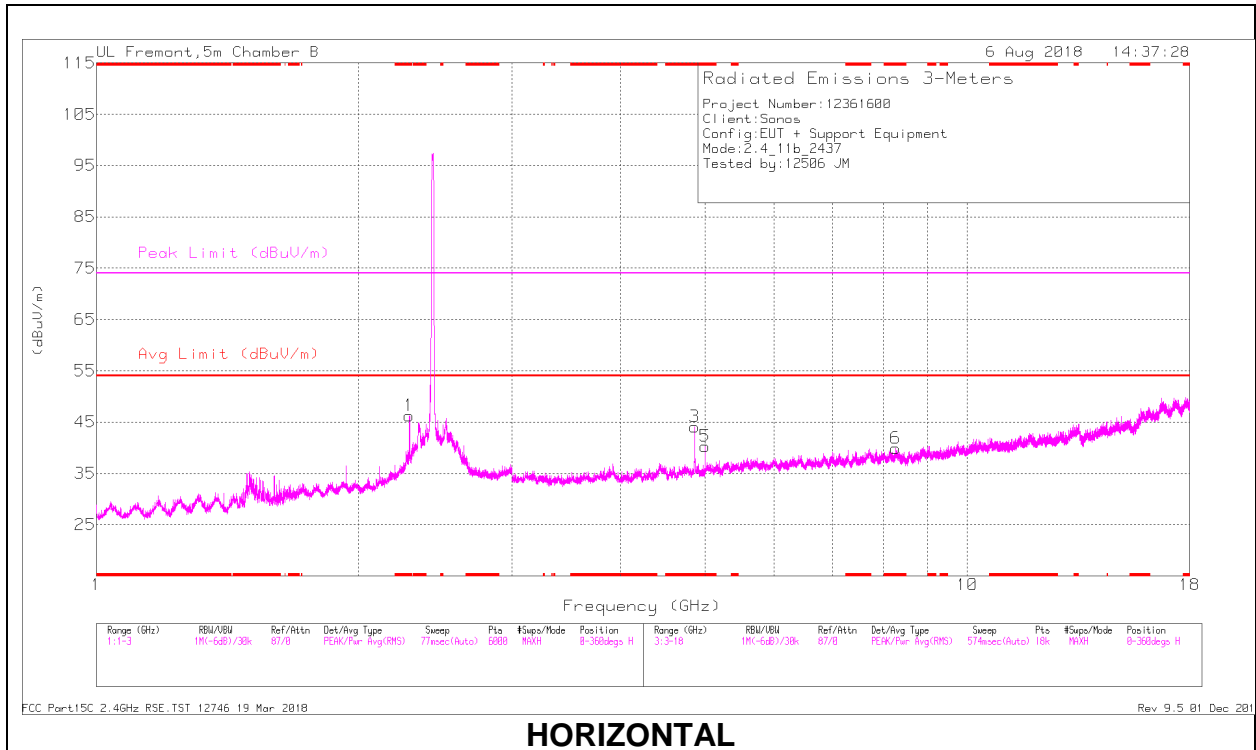
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.288	42.4	PK2	31.9	-21.7	0	52.6	-	-	74	-21.4	309	107	H
* 2.288	35.35	MAv1	31.9	-21.7	.15	45.7	54	-8.3	-	-	309	107	H
* 2.288	47.26	PK2	31.9	-21.7	0	57.46	-	-	74	-16.54	36	201	V
* 2.288	40.31	MAv1	31.9	-21.7	.15	50.66	54	-3.34	-	-	36	201	V
* 4.824	46.98	PK2	34.1	-30.8	0	50.28	-	-	74	-23.72	62	232	V
* 4.824	38.17	MAv1	34.1	-30.8	.15	41.62	54	-12.38	-	-	62	232	V

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

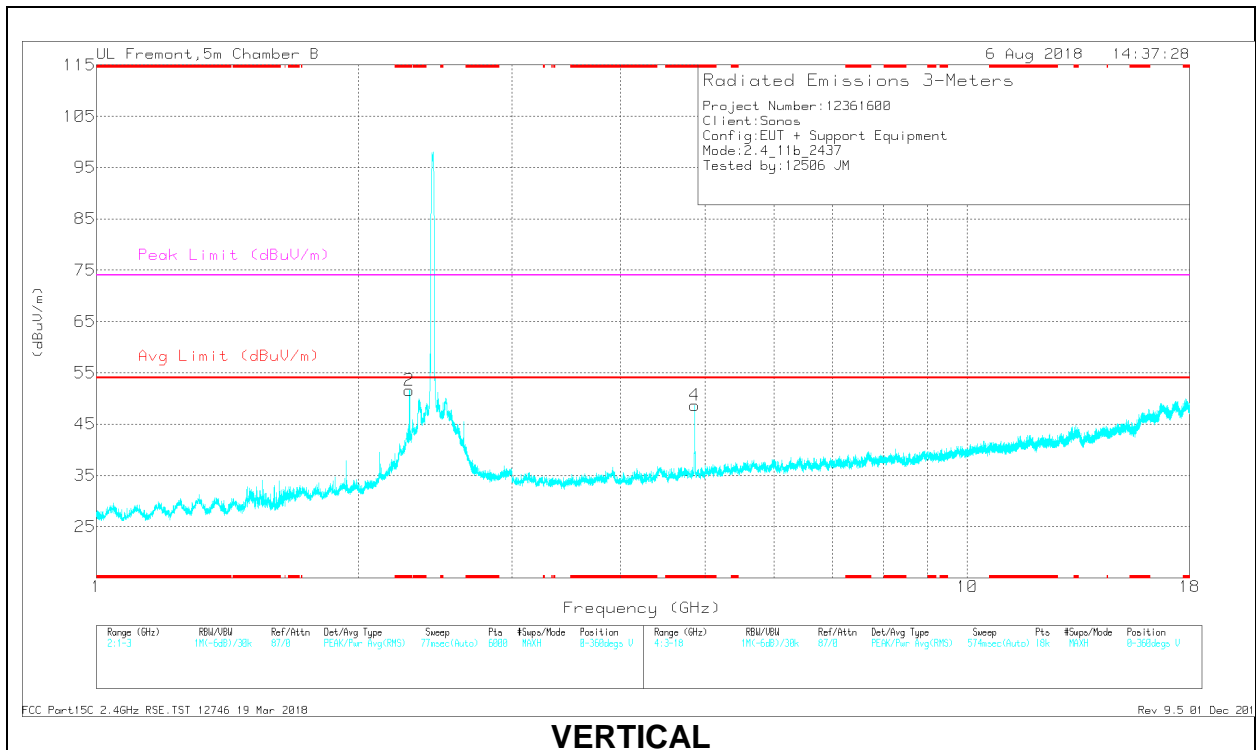
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### MID CHANNEL, CH 6 RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/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
1	* 2.288	36.01	Pk	31.9	-21.7	0	46.21	-	-	74	-27.79	0-360	102	H
2	* 2.288	41.38	Pk	31.9	-21.7	0	51.58	-	-	74	-22.42	0-360	200	V
3	* 4.863	41.12	Pk	34.2	-31.2	0	44.12	-	-	74	-29.88	0-360	199	H
5	* 5	35.25	Pk	34.6	-29.6	0	40.25	-	-	74	-33.75	0-360	199	H
6	* 8.273	29.93	Pk	36.4	-26.4	0	39.93	-	-	74	-34.07	0-360	199	H
4	* 4.864	45.6	Pk	34.2	-31.2	0	48.6	-	-	74	-25.4	0-360	102	V

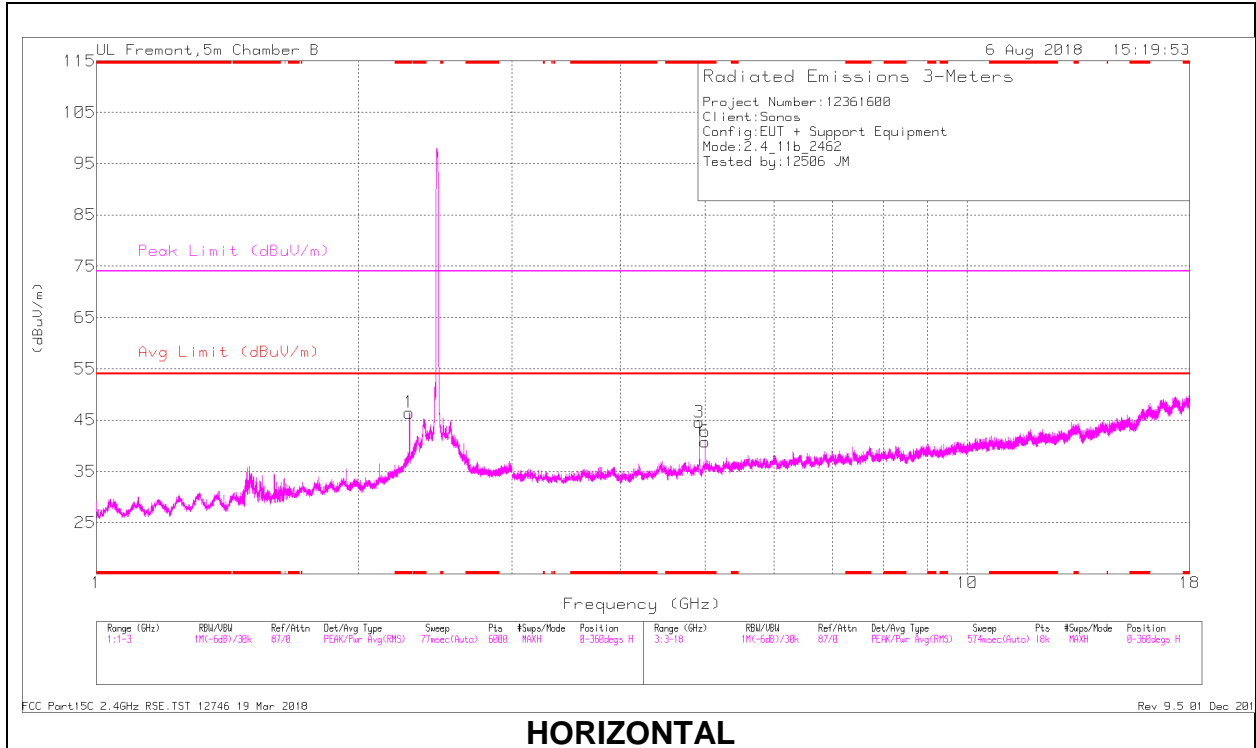
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector

#### \Radiated Emissions

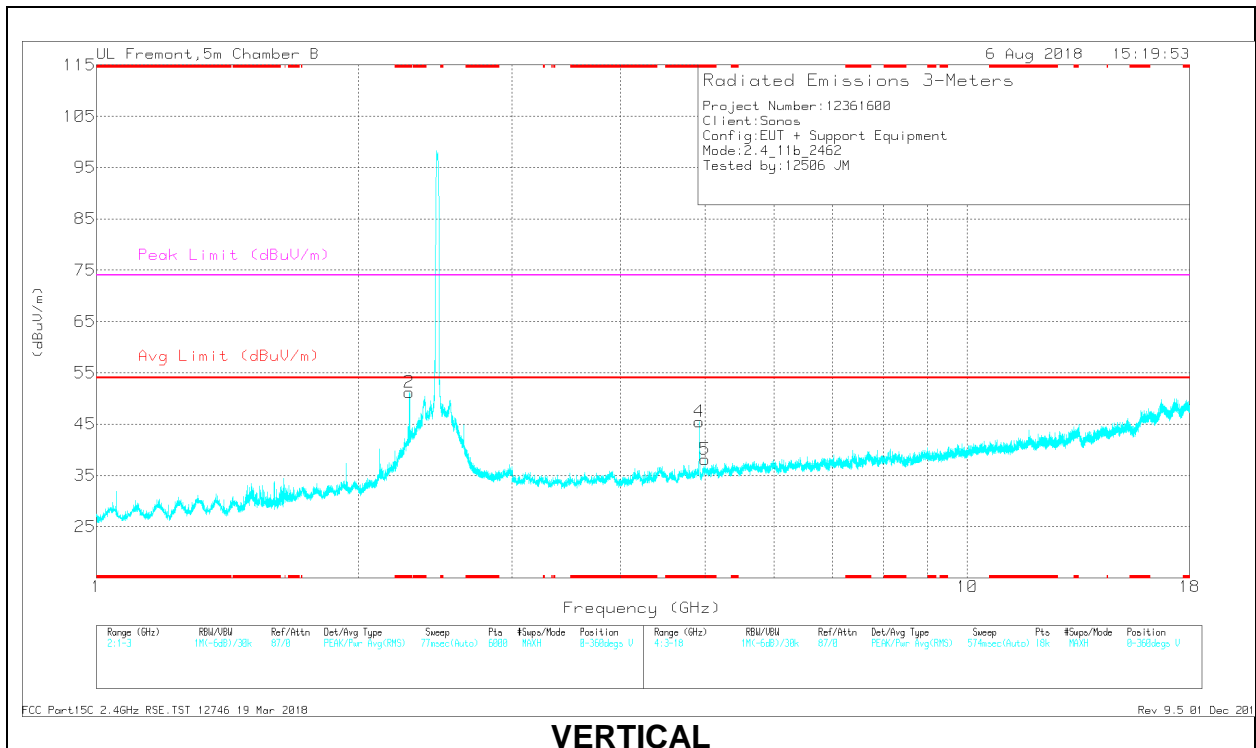
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.288	40.07	PK2	31.9	-21.7	0	50.27	-	-	74	-23.73	332	117	H
* 2.288	34.45	MAv1	31.9	-21.7	.15	44.8	54	-9.2	-	-	332	117	H
* 2.288	45.12	PK2	31.9	-21.7	0	55.32	-	-	74	-18.68	37	206	V
* 2.288	39.73	MAv1	31.9	-21.7	.15	50.08	54	-3.92	-	-	37	206	V
* 4.864	45.2	PK2	34.2	-31.2	0	48.2	-	-	74	-25.8	274	219	H
* 4.864	35.84	MAv1	34.2	-31.2	.15	38.99	54	-15.01	-	-	274	219	H
* 5	41.33	PK2	34.6	-29.6	0	46.33	-	-	74	-27.67	86	234	H
* 5	34.79	MAv1	34.6	-29.6	.15	39.94	54	-14.06	-	-	86	234	H
* 8.273	36.23	PK2	36.4	-26.4	0	46.23	-	-	74	-27.77	293	261	H
* 8.271	24.23	MAv1	36.4	-26.4	.15	34.38	54	-19.62	-	-	293	261	H
* 4.864	45.7	PK2	34.2	-31.2	0	48.7	-	-	74	-25.3	334	179	V
* 4.864	36.04	MAv1	34.2	-31.2	.15	39.19	54	-14.81	-	-	334	179	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, CH 11 RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
1	* 2.288	36.23	Pk	31.9	-21.7	0	46.43	-	-	74	-27.57	0-360	102	H
2	* 2.288	40.93	Pk	31.9	-21.7	0	51.13	-	-	74	-22.87	0-360	200	V
3	* 4.924	41.59	Pk	34.4	-31.4	0	44.59	-	-	74	-29.41	0-360	102	H
6	* 5	35.77	Pk	34.6	-29.6	0	40.77	-	-	74	-33.23	0-360	102	H
4	* 4.924	42.52	Pk	34.4	-31.4	0	45.52	-	-	74	-28.48	0-360	200	V
5	* 5	33.14	Pk	34.6	-29.6	0	38.14	-	-	74	-35.86	0-360	200	V

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

#### Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
* 2.288	40.32	PK2	31.9	-21.7	0	50.52	-	-	74	-23.48	331	102	H
* 2.288	34.78	MAv1	31.9	-21.7	.15	45.13	54	-8.87	-	-	331	102	H
* 2.288	44.87	PK2	31.9	-21.7	0	55.07	-	-	74	-18.93	35	204	V
* 2.288	39.74	MAv1	31.9	-21.7	.15	50.09	54	-3.91	-	-	35	204	V
* 4.924	45.17	PK2	34.4	-31.4	0	48.17	-	-	74	-25.83	122	213	H
* 4.924	36.45	MAv1	34.4	-31.4	.15	39.6	54	-14.4	-	-	122	213	H
* 5	40.74	PK2	34.6	-29.7	0	45.64	-	-	74	-28.36	120	235	H
* 5	33.03	MAv1	34.6	-29.6	.15	38.18	54	-15.82	-	-	120	235	H
* 4.924	45.93	PK2	34.4	-31.4	0	48.93	-	-	74	-25.07	60	295	V
* 4.924	36.91	MAv1	34.4	-31.4	.15	40.06	54	-13.94	-	-	60	295	V
* 5	37.32	PK2	34.6	-29.6	0	42.32	-	-	74	-31.68	0	202	V
* 5	27.16	MAv1	34.6	-29.6	.15	32.31	54	-21.69	-	-	0	202	V

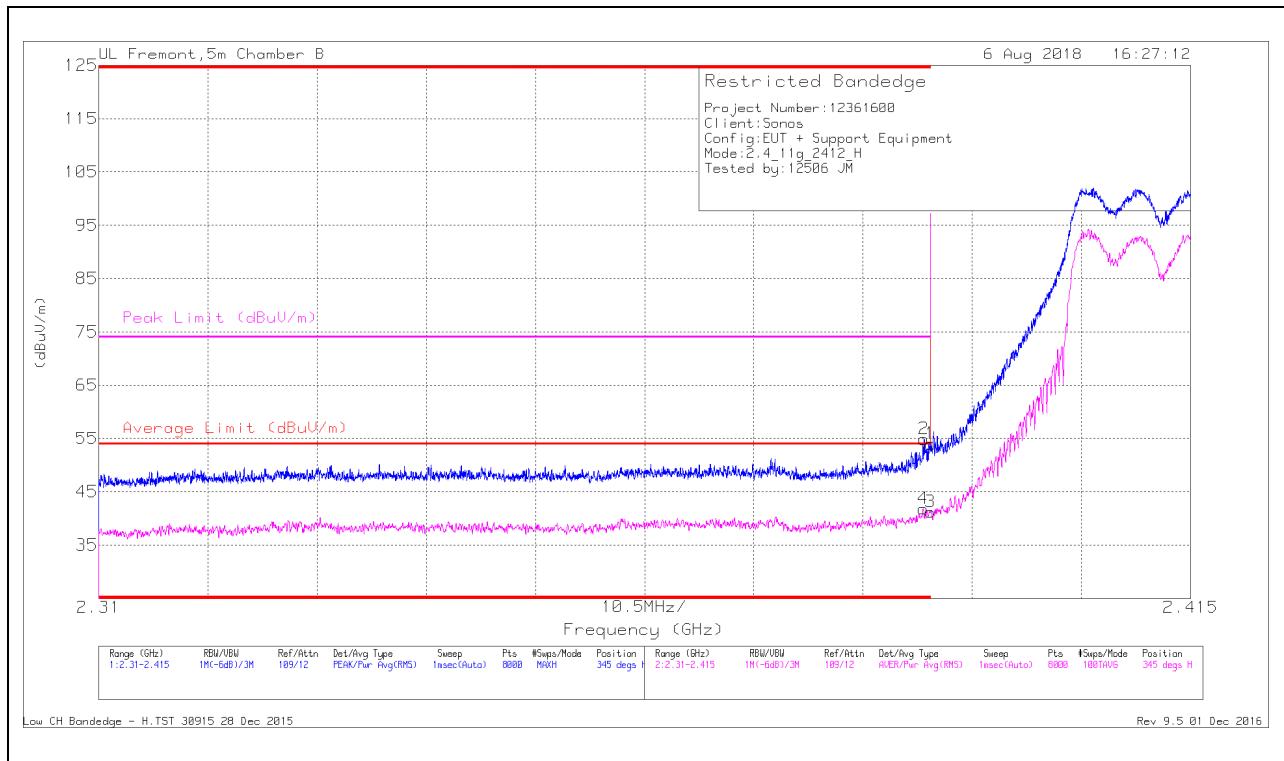
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average

**9.1.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND**

**2TX CDD MODE**

**BANDEDGE (LOW CHANNEL, CH 1)**

**HORIZONTAL RESULT**



**Trace Markers**

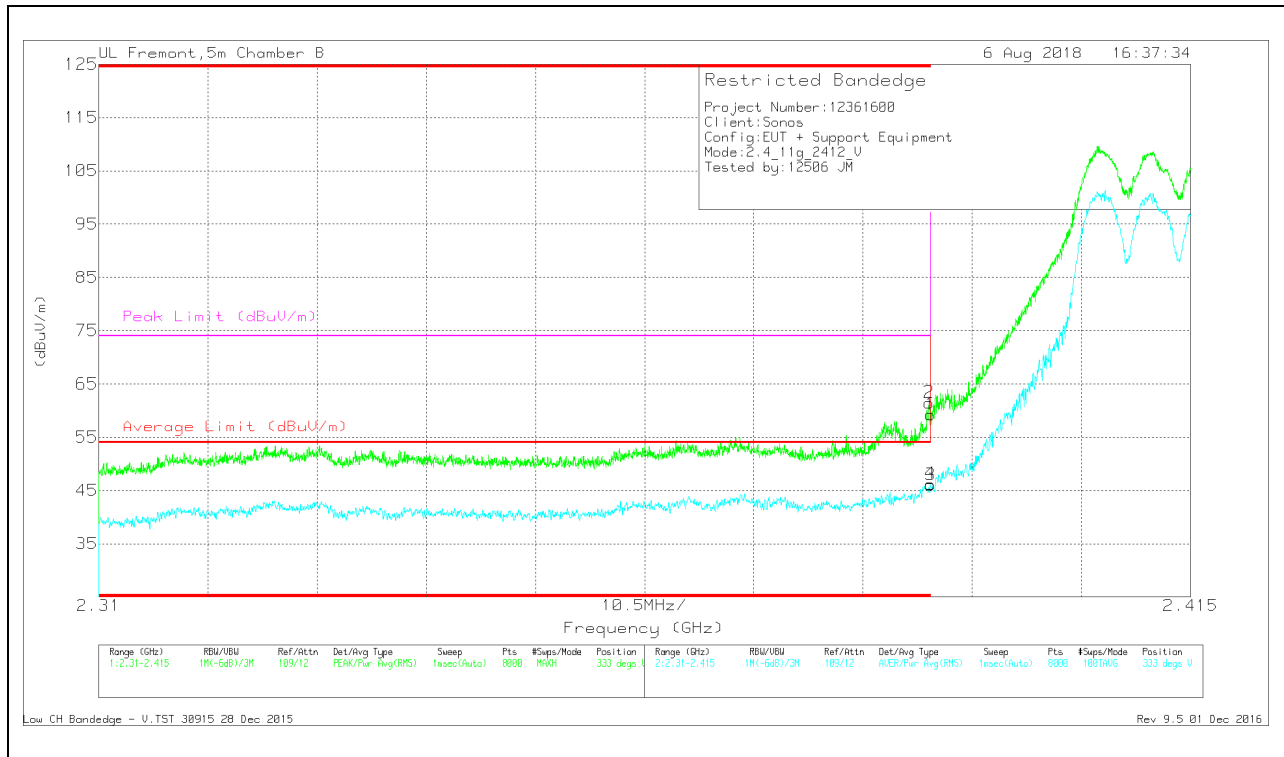
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.389	44.07	Pk	32.3	-21.5	0	54.87	-	-	74	-19.13	345	320	H
4	* 2.389	30.6	RMS	32.3	-21.5	-4	41.8	54	-12.2	-	-	345	320	H
1	* 2.39	43.21	Pk	32.3	-21.5	0	54.01	-	-	74	-19.99	345	320	H
3	* 2.39	30.02	RMS	32.3	-21.5	-4	41.22	54	-12.78	-	-	345	320	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	AF T863 (dBm)	Amp/CbI/Ftr/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	48.51	Pk	32.3	-21.5	0	59.31	-	-	74	-14.69	333	326	V
2	* 2.39	50.67	Pk	32.3	-21.5	0	61.47	-	-	74	-12.53	333	326	V
3	* 2.39	34.86	RMS	32.3	-21.5	.4	46.06	54	-7.94	-	-	333	326	V
4	* 2.39	35.03	RMS	32.3	-21.5	.4	46.23	54	-7.77	-	-	333	326	V

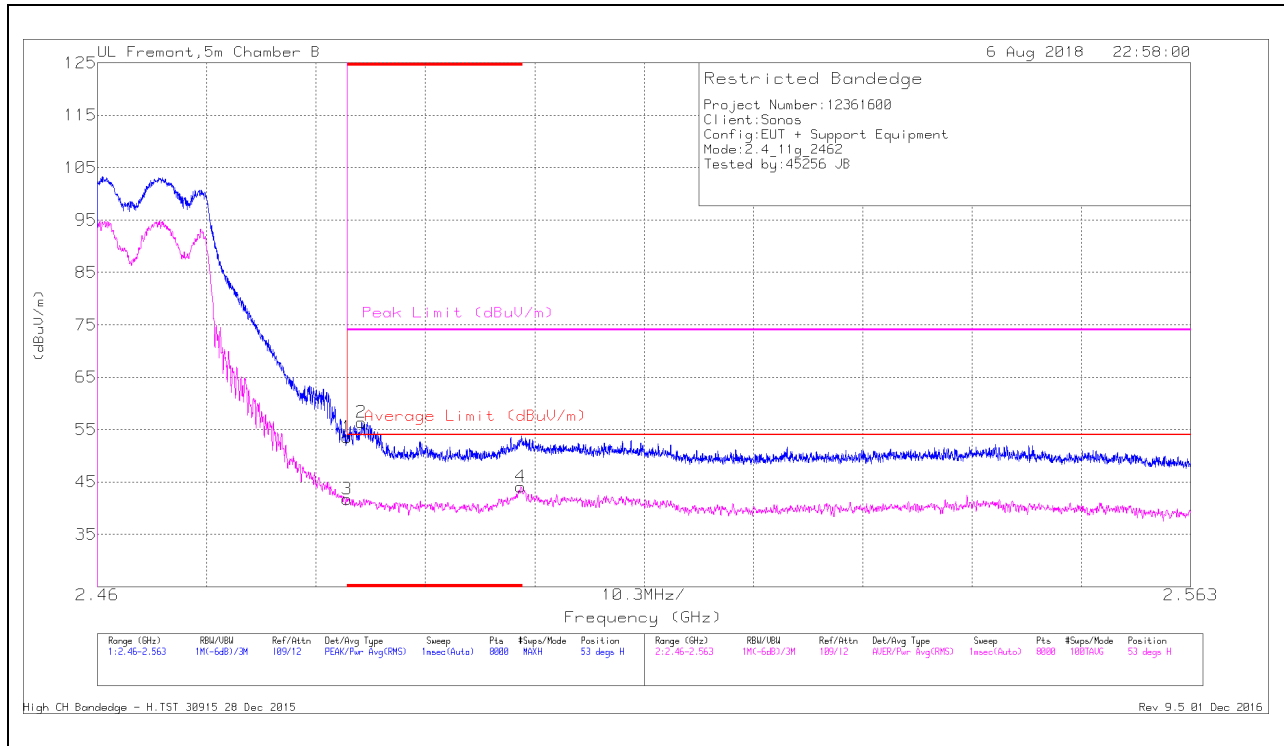
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**BANDEGE (HIGH CHANNEL, CH 11)**

**HORIZONTAL RESULT**



**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/CbV/Filtr/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	* 2.484	42.4	Pk	32.6	-21.5	0	53.5	-	-	74	-20.5	53	103	H
2	* 2.485	45.28	Pk	32.6	-21.5	0	56.38	-	-	74	-17.62	53	103	H
3	* 2.484	30.2	RMS	32.6	-21.5	.4	41.7	54	-12.3	-	-	53	103	H
4	* 2.5	32.34	RMS	32.7	-21.4	.4	44.04	54	-9.96	-	-	53	103	H

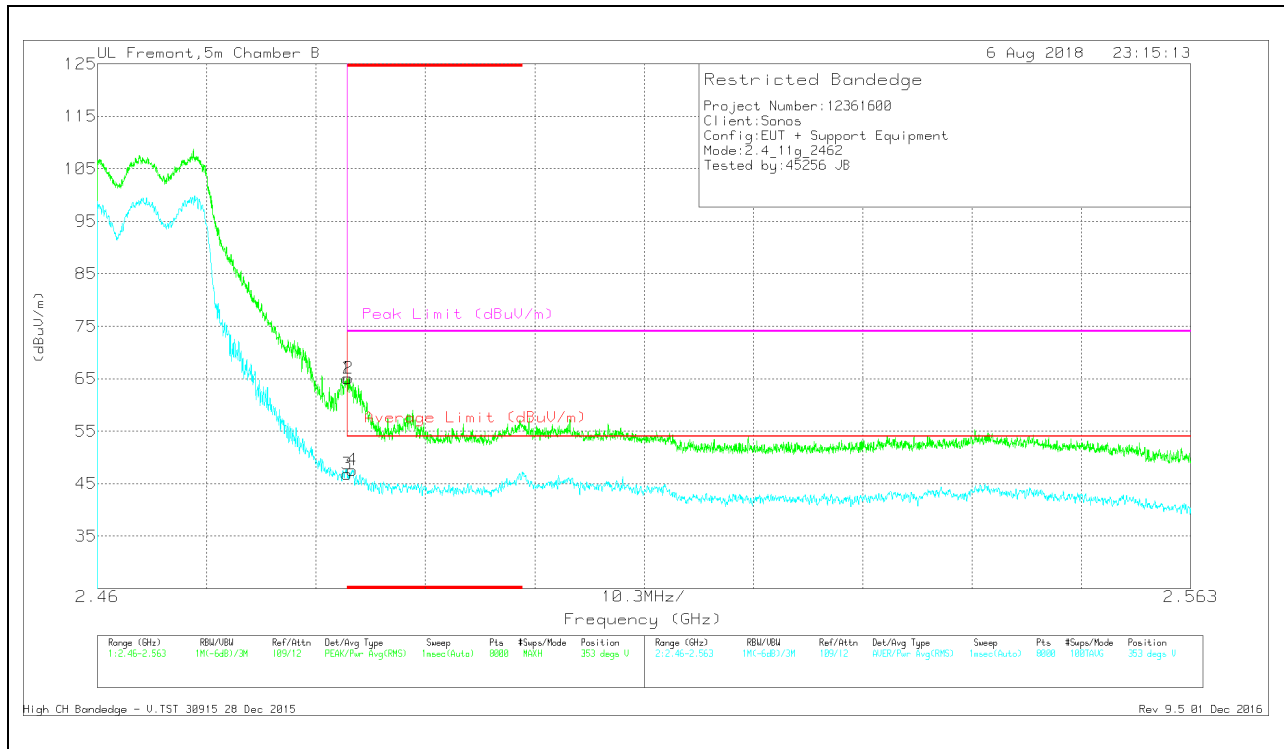
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection



### VERTICAL RESULT



### Trace Markers

Marker	Frequenc y (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/CB/Filtr/Pad (dB)	DC Corr (dB)	Correcte d Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	53.96	Pk	32.6	-21.5	0	65.06	-	-	74	-8.94	353	169	V
2	* 2.484	53.91	Pk	32.6	-21.5	0	65.01	-	-	74	-8.99	353	169	V
3	* 2.484	35.31	RMS	32.6	-21.5	.4	46.81	54	-7.19	-	-	353	169	V
4	* 2.484	36.1	RMS	32.6	-21.5	.4	47.6	54	-6.4	-	-	353	169	V

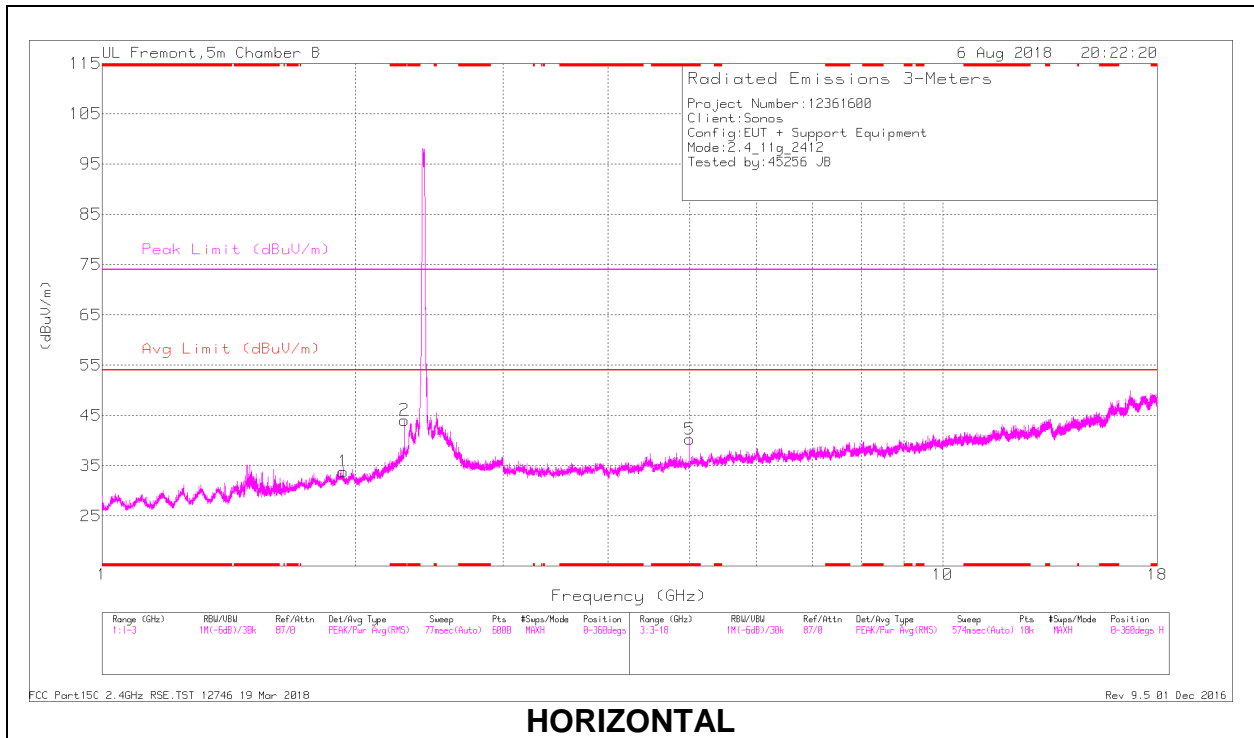
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

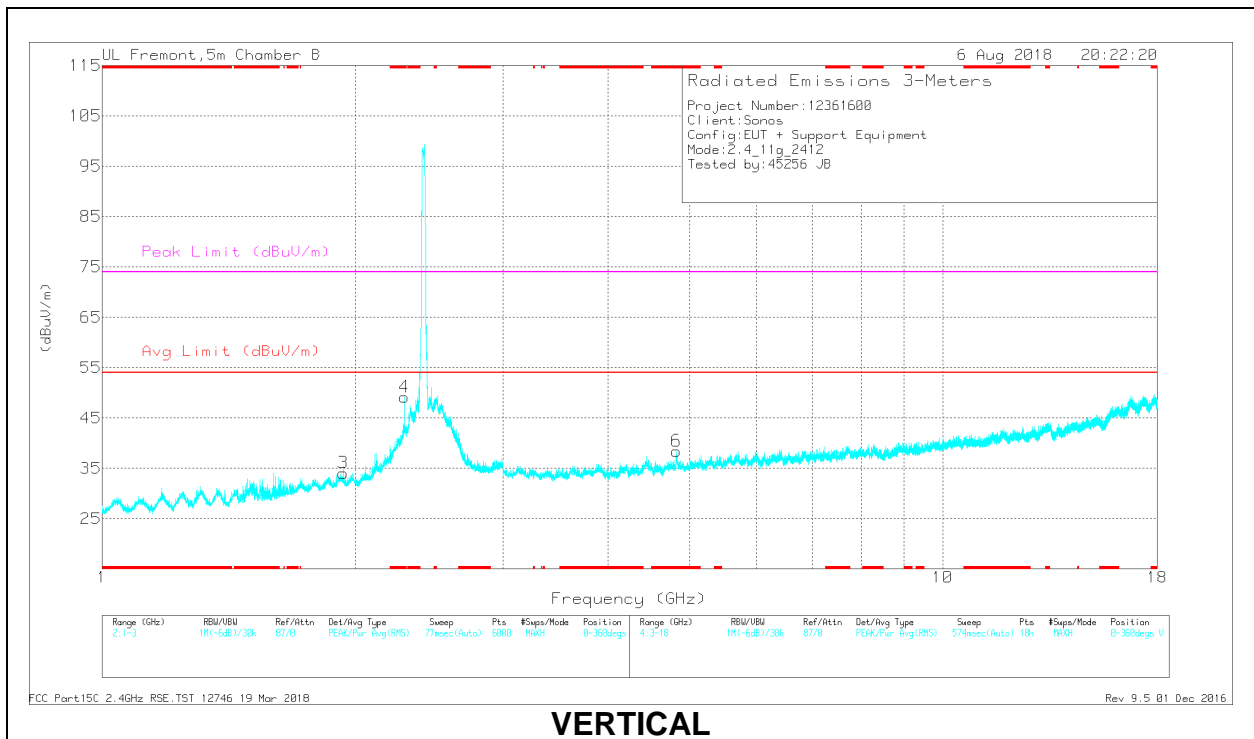
RMS - RMS detection

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL, CH 1 RESULTS**



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
2	* 2.288	33.88	Pk	31.9	-21.7	0	44.08	-	-	74	-29.92	0-360	102	H
4	* 2.288	38.97	Pk	31.9	-21.7	0	49.17	-	-	74	-24.83	0-360	200	V
5	* 5	35.26	Pk	34.6	-29.6	0	40.26	-	-	74	-33.74	0-360	199	H
6	* 4.823	35.04	Pk	34.1	-30.7	0	38.44	-	-	74	-35.56	0-360	200	V
1	1.935	24.04	Pk	31	-21.2	0	33.84	-	-	-	-	0-360	199	H
3	1.935	24.29	Pk	31	-21.2	0	34.09	-	-	-	-	0-360	102	V

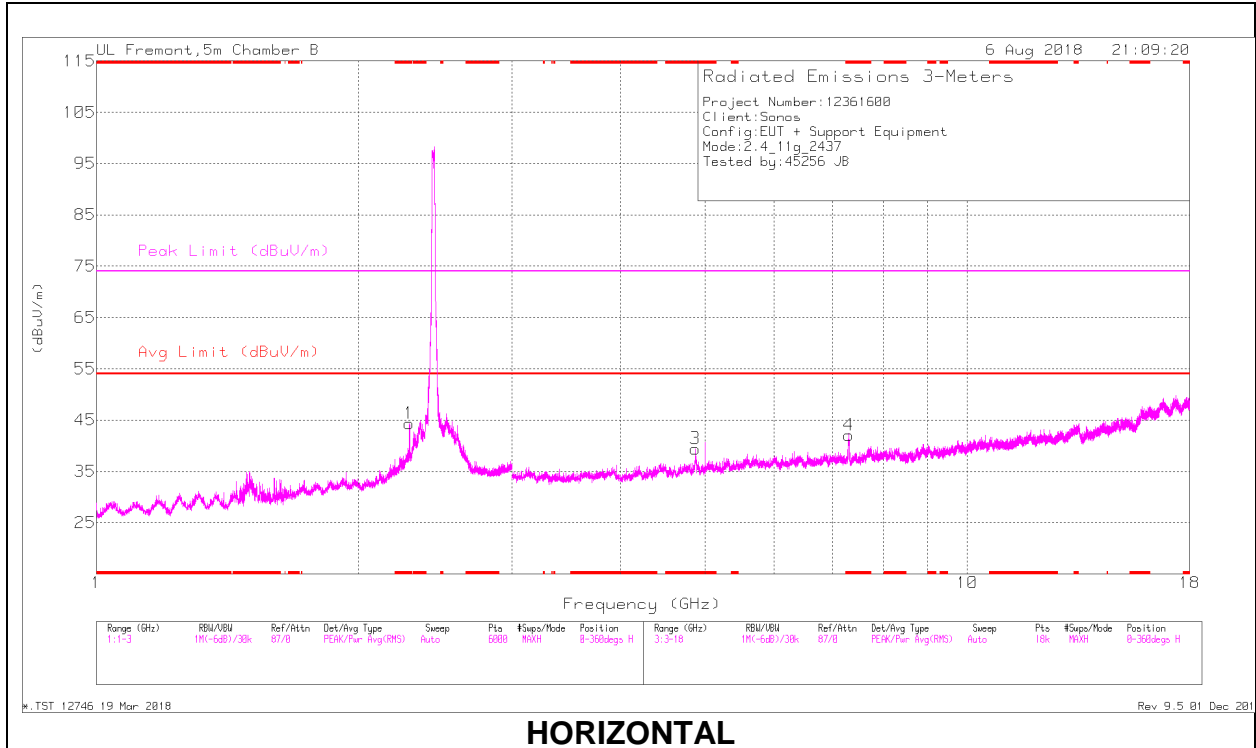
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector

#### Radiated Emissions

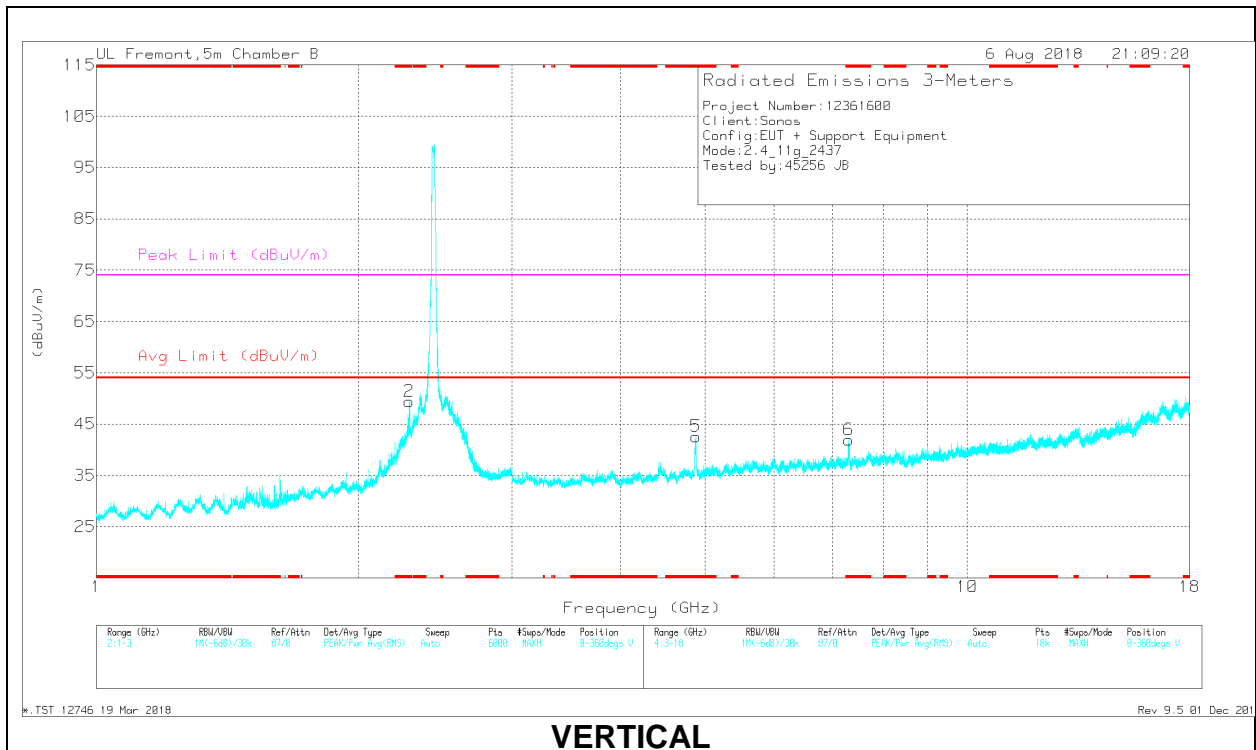
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.288	39.71	PK2	31.9	-21.7	0	49.91	-	-	74	-24.09	330	117	H
* 2.288	32.04	MAv1	31.9	-21.7	.4	42.64	54	-11.36	-	-	330	117	H
* 2.288	40.15	PK2	31.9	-21.7	0	50.35	-	-	74	-23.65	199	329	V
* 2.288	31.21	MAv1	31.9	-21.7	.4	41.81	54	-12.19	-	-	199	329	V
* 5	41.18	PK2	34.6	-29.7	0	46.08	-	-	74	-27.92	87	224	H
* 5	34.29	MAv1	34.6	-29.7	.4	39.59	54	-14.41	-	-	87	224	H
* 4.821	40.37	PK2	34.1	-30.7	0	43.77	-	-	74	-30.23	119	356	H
* 4.821	28.15	MAv1	34.1	-30.7	.4	31.95	54	-22.05	-	-	119	356	H

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

### MID CHANNEL, CH 6 RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
1	* 2.288	34.1	Pk	31.9	-21.7	0	44.3	-	-	74	-29.7	0-360	102	H
2	* 2.288	39.23	Pk	31.9	-21.7	0	49.43	-	-	74	-24.57	0-360	200	V
3	* 4.871	36.34	Pk	34.3	-31.2	0	39.44	-	-	74	-34.56	0-360	102	H
4	* 7.314	35.2	Pk	35.9	-29	0	42.1	-	-	74	-31.9	0-360	199	H
5	* 4.882	39.61	Pk	34.3	-31.4	0	42.51	-	-	74	-31.49	0-360	200	V
6	* 7.312	34.91	Pk	35.9	-28.9	0	41.91	-	-	74	-32.09	0-360	200	V

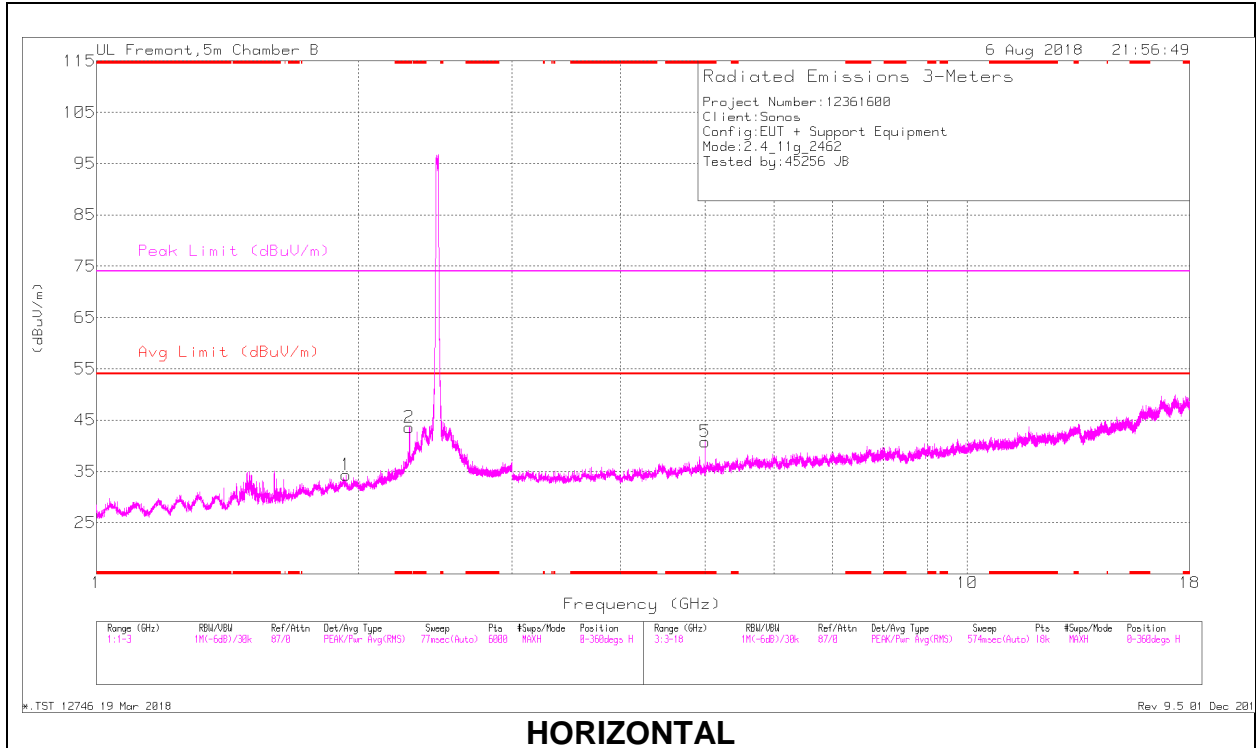
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector

#### Radiated Emissions

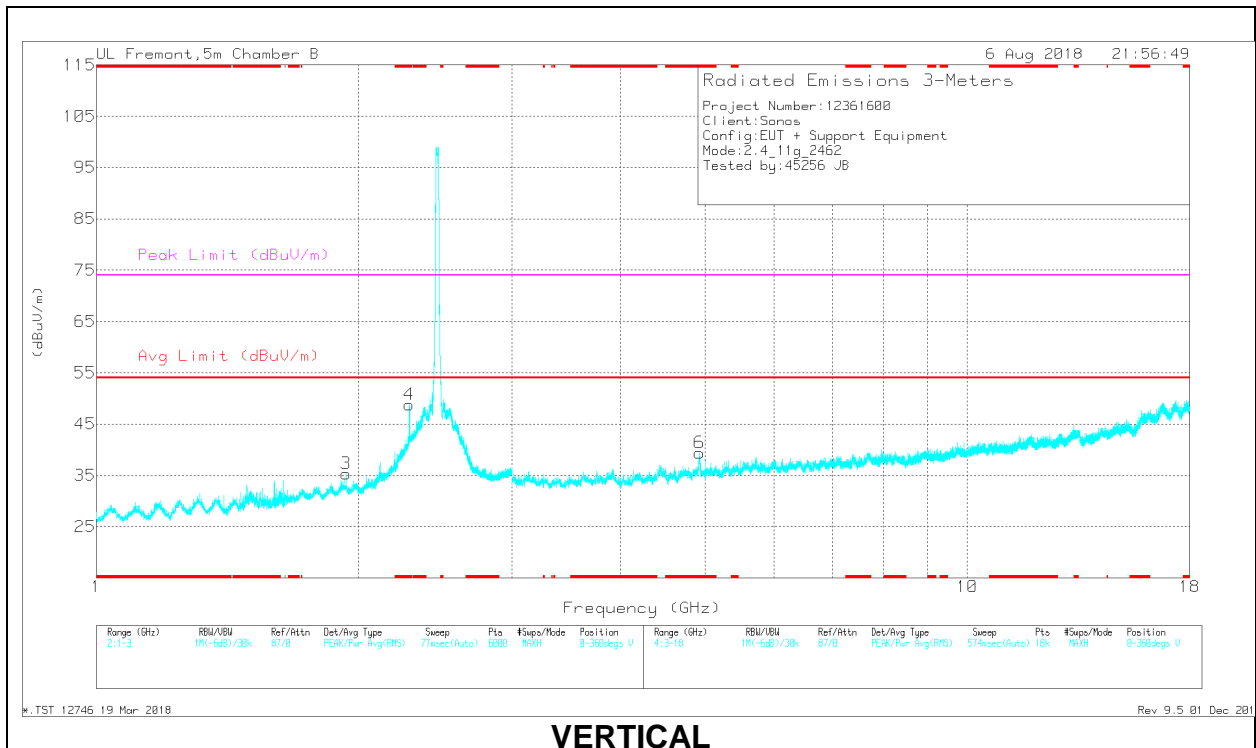
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.288	38.18	PK2	31.9	-21.7	0	48.38	-	-	74	-25.62	335	103	H
* 2.288	30.7	MAv1	31.9	-21.7	.4	41.3	54	-12.7	-	-	127	251	H
* 2.288	40.63	PK2	31.9	-21.7	0	50.83	-	-	74	-23.17	51	226	V
* 2.288	31.84	MAv1	31.9	-21.7	.4	42.44	54	-11.56	-	-	333	115	V
* 4.87	44.42	PK2	34.3	-31.2	0	47.52	-	-	74	-26.48	127	105	H
* 4.87	31.38	MAv1	34.3	-31.2	.4	34.88	54	-19.12	-	-	175	149	H
* 7.314	44.79	PK2	35.9	-29	0	51.69	-	-	74	-22.31	79	283	V
* 7.314	30.42	MAv1	35.9	-29	.4	37.72	54	-16.28	-	-	122	373	V
* 4.88	44.23	PK2	34.3	-31.4	0	47.13	-	-	74	-26.87	121	102	H
* 4.88	31.79	MAv1	34.3	-31.4	.4	35.09	54	-18.91	-	-	125	204	H
* 7.313	44.28	PK2	35.9	-29	0	51.18	-	-	74	-22.82	82	260	V
* 7.313	30.08	MAv1	35.9	-29	.4	37.38	54	-16.62	-	-	236	148	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, CH 11 RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
2	* 2.288	33.33	Pk	31.9	-21.7	0	43.53	-	-	74	-30.47	0-360	102	H
4	* 2.288	38.63	Pk	31.9	-21.7	0	48.83	-	-	74	-25.17	0-360	200	V
5	* 5	35.72	Pk	34.6	-29.6	0	40.72	-	-	74	-33.28	0-360	199	H
6	* 4.926	36.41	Pk	34.4	-31.4	0	39.41	-	-	74	-34.59	0-360	102	V
1	1.936	24.55	Pk	31	-21.2	0	34.35	-	-	-	-	0-360	199	H
3	1.936	25.52	Pk	31	-21.2	0	35.32	-	-	-	-	0-360	101	V

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

#### Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
* 2.288	38.35	PK2	31.9	-21.7	0	48.55	-	-	74	-25.45	331	102	H
* 2.288	31.64	MAV1	31.9	-21.7	.4	42.24	54	-11.76	-	-	331	102	H
* 2.288	43.29	PK2	31.9	-21.7	0	53.49	-	-	74	-20.51	20	208	V
* 2.288	36.58	MAV1	31.9	-21.7	.4	47.18	54	-6.82	-	-	20	208	V
* 4.926	41.11	PK2	34.6	-29.7	0	46.01	-	-	74	-27.99	117	229	H
* 4.926	33.99	MAV1	34.6	-29.6	.4	39.39	54	-14.61	-	-	117	229	H
* 5	47.27	PK2	34.4	-31.4	0	50.27	-	-	74	-23.73	185	120	V
* 5	33.01	MAV1	34.4	-31.4	.4	36.41	54	-17.59	-	-	185	120	V

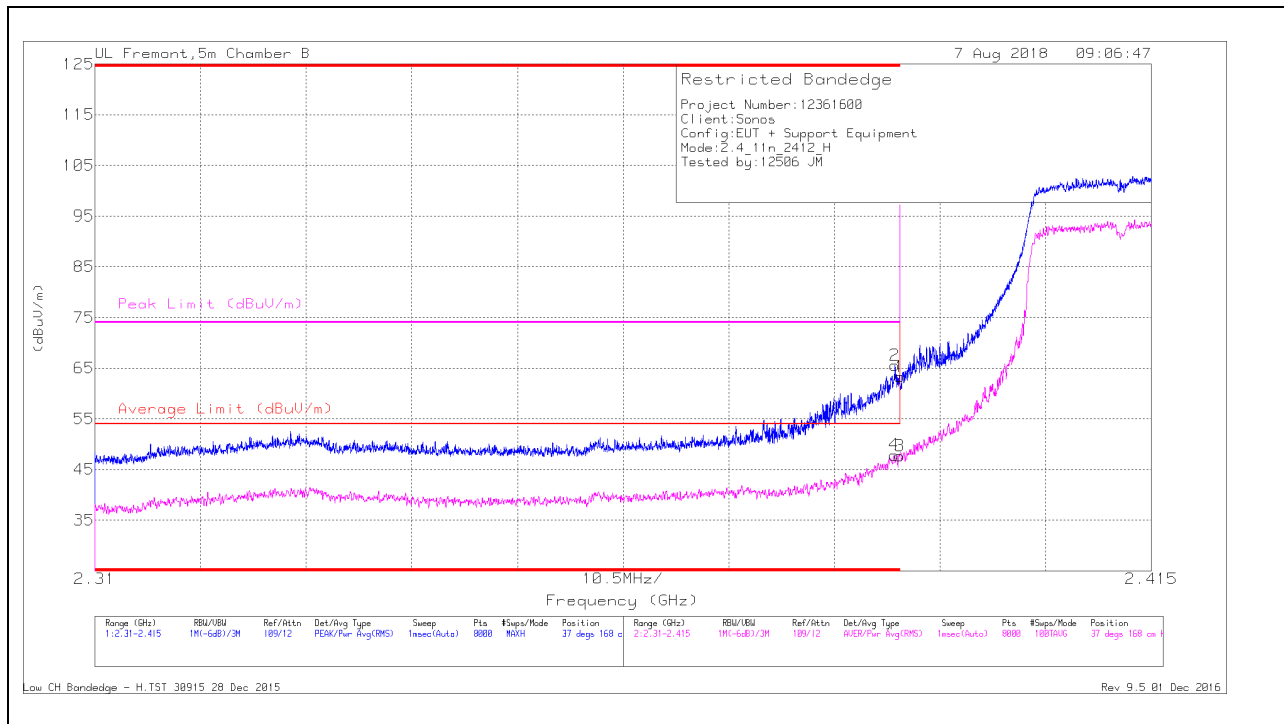
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK2 - KDB558074 Method: Maximum Peak  
 MAV1 - KDB558074 Option 1 Maximum RMS Average

**9.1.3. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND**

**2TX CDD MODE**

**BANDEDGE (LOW CHANNEL, CH 1)**

**HORIZONTAL RESULT**



**Trace Markers**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Chl/Fitr/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	52.54	Pk	32.3	-21.5	0	63.34	-	-	74	-10.66	37	168	H
2	* 2.39	54.81	Pk	32.3	-21.5	0	65.61	-	-	74	-8.39	37	168	H
3	* 2.39	36.47	RMS	32.3	-21.5	.42	47.69	54	-6.31	-	-	37	168	H
4	* 2.389	36.65	RMS	32.3	-21.5	.42	47.87	54	-6.13	-	-	37	168	H

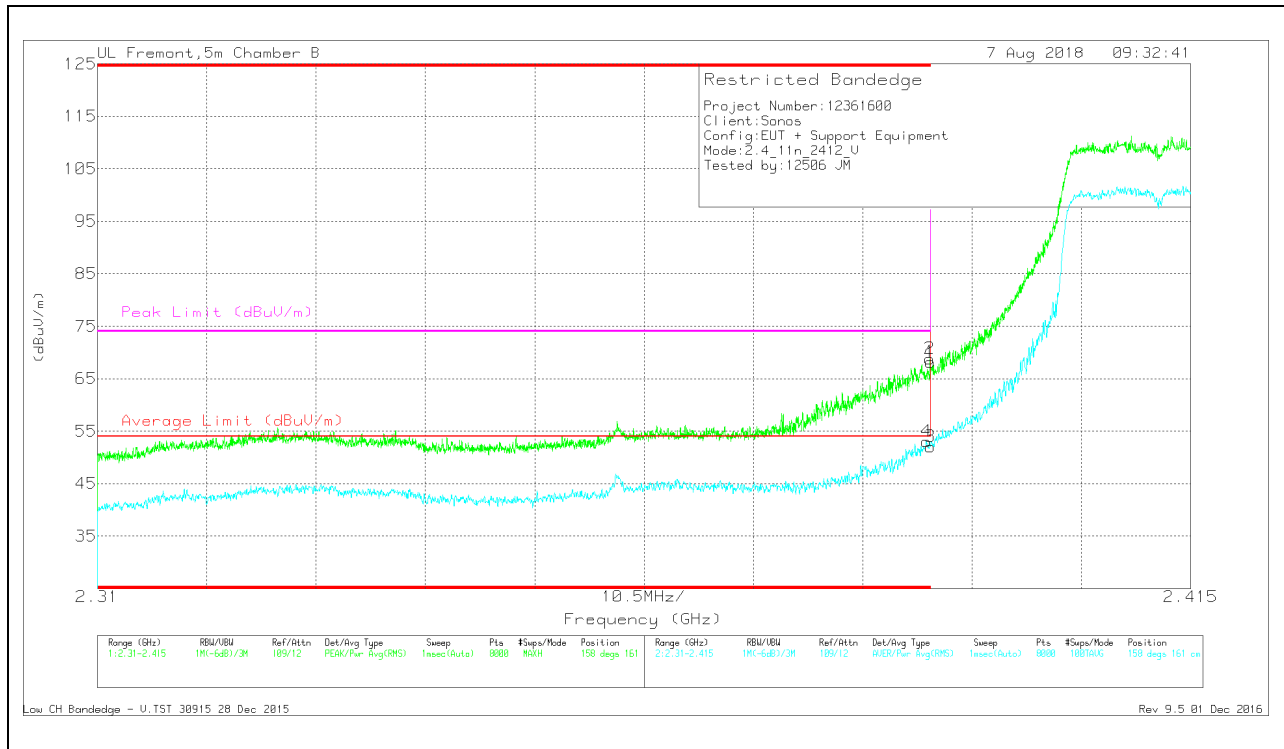
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection



### VERTICAL RESULT



### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cb/IFtr/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	57.36	Pk	32.3	-21.5	0	68.16	-	-	74	-5.84	158	161	V
2	* 2.39	57.99	Pk	32.3	-21.5	0	68.79	-	-	74	-5.21	158	161	V
3	* 2.39	40.76	RMS	32.3	-21.5	.42	51.98	54	-2.02	-	-	158	161	V
4	* 2.39	41.82	RMS	32.3	-21.5	.42	53.04	54	-.96	-	-	158	161	V

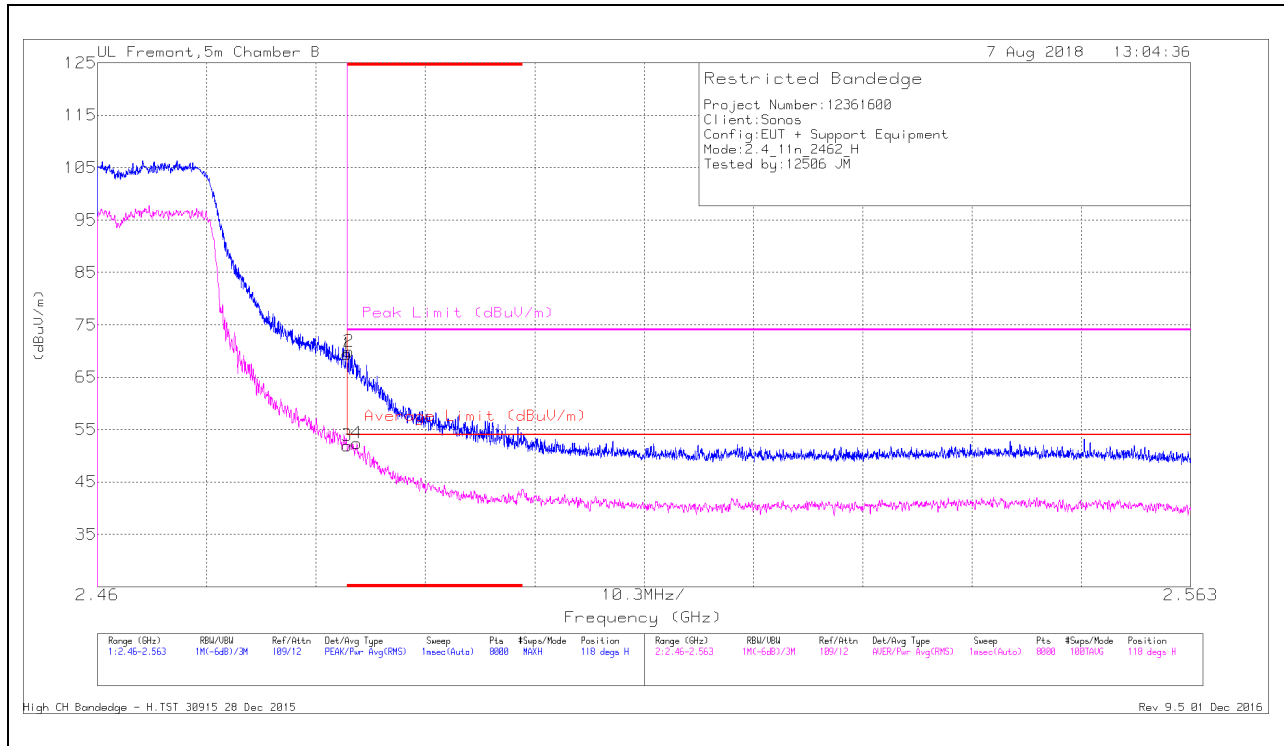
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**BANDEGE (HIGH CHANNEL, CH 11)**

**HORIZONTAL RESULT**



**Trace Markers**

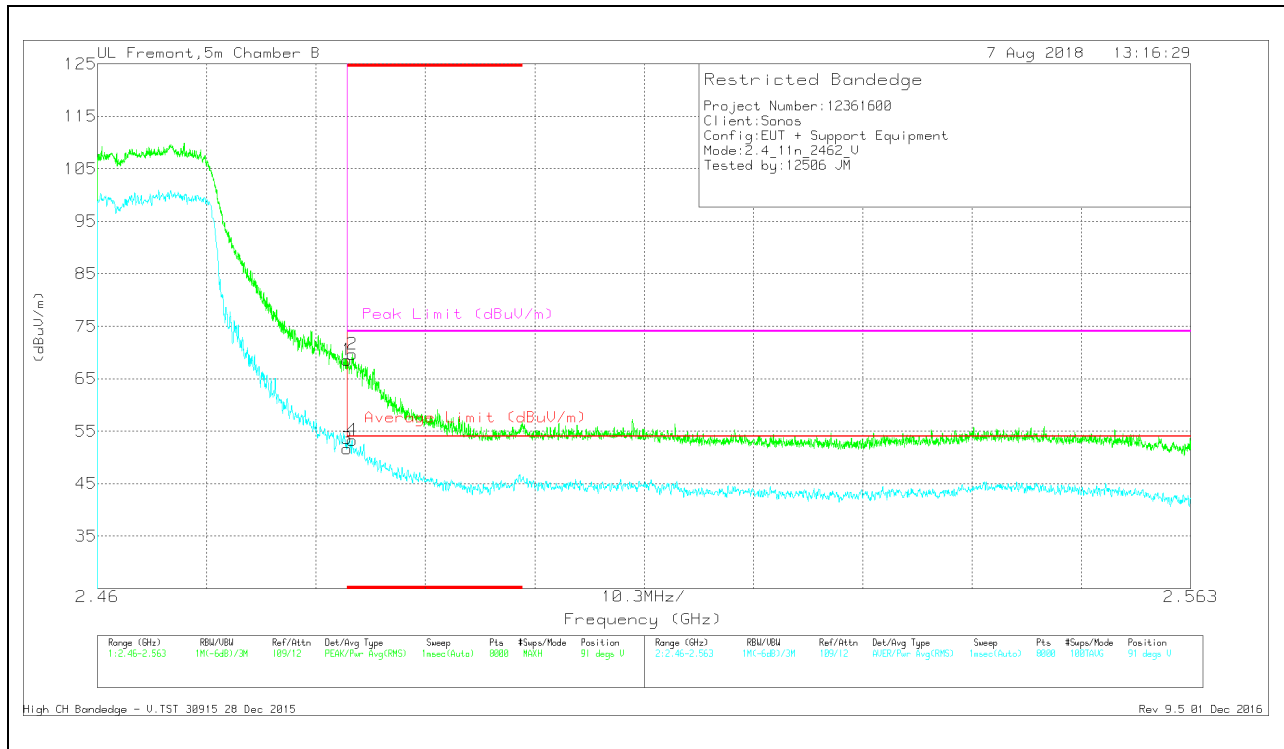
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/CbVftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	58.3	Pk	32.6	-21.5	0	69.4	-	-	74	-4.6	118	193	H
2	* 2.484	58.79	Pk	32.6	-21.5	0	69.89	-	-	74	-4.11	118	193	H
3	* 2.484	40.35	RMS	32.6	-21.5	.42	51.87	54	-2.13	-	-	118	193	H
4	* 2.484	40.84	RMS	32.6	-21.5	.42	52.36	54	-1.64	-	-	118	193	H

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

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



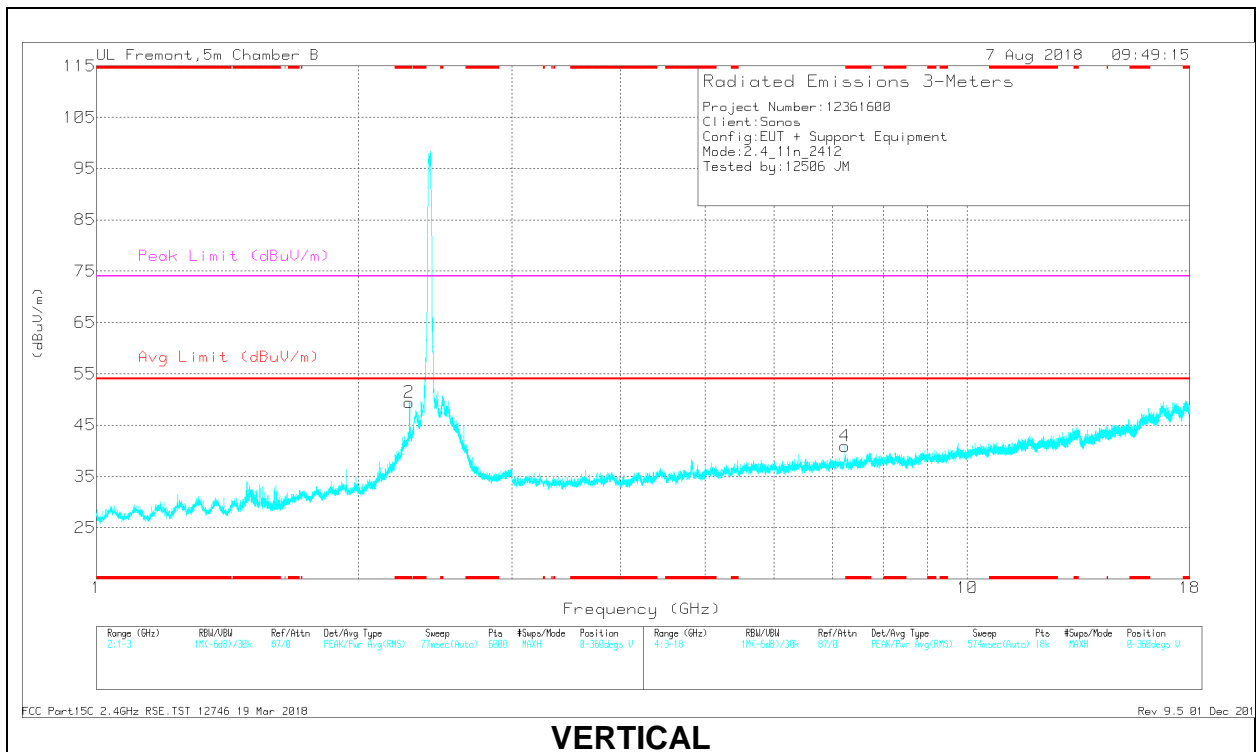
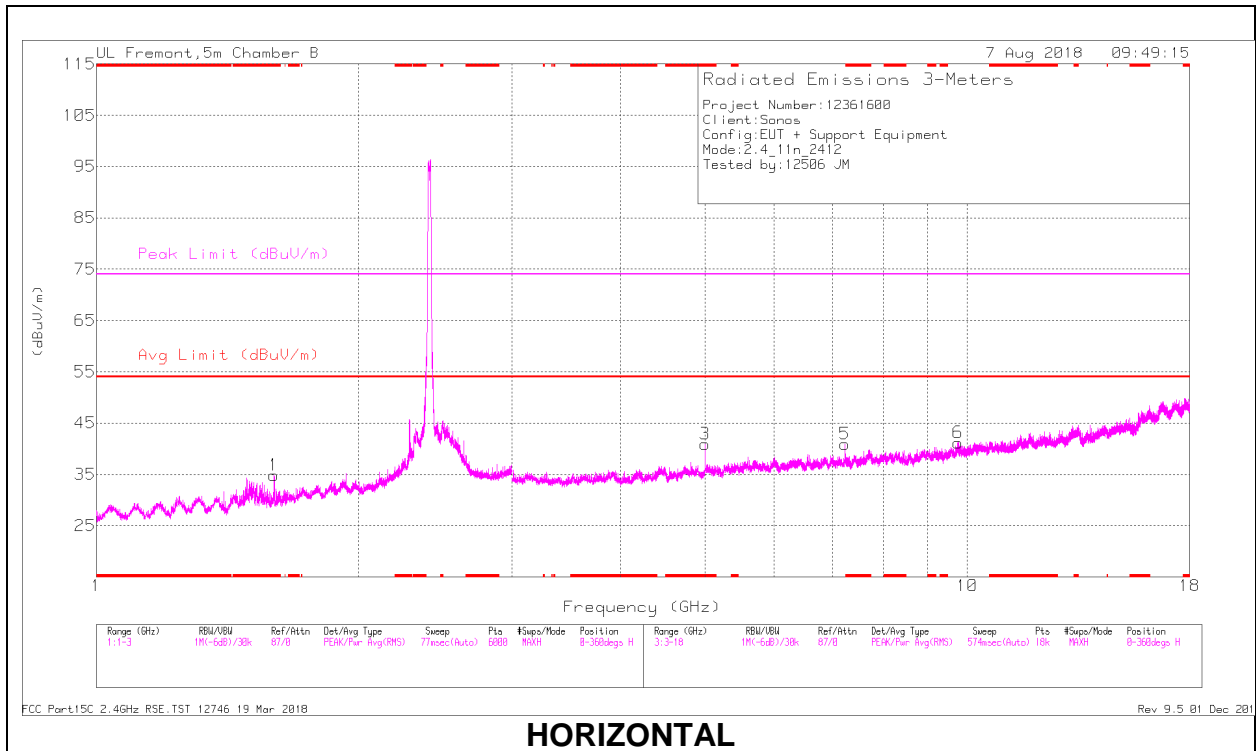
### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cb/IFtr/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	* 2.484	57.4	Pk	32.6	-21.5	0	68.5	-	-	74	-3.5	91	190	V
2	* 2.484	58.6	Pk	32.6	-21.5	0	69.7	-	-	74	-4.3	91	190	V
3	* 2.484	40.11	RMS	32.6	-21.5	.42	51.63	54	-2.37	-	-	91	190	V
4	* 2.484	41.79	RMS	32.6	-21.5	.42	53.31	54	-69	-	-	91	190	V

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

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL, CH 1 RESULTS**



### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/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
1	* 1.6	28.96	Pk	27.7	-21.9	0	34.76	-	-	74	-39.24	0-360	102	H
2	* 2.288	39.21	Pk	31.9	-21.7	0	49.41	-	-	74	-24.59	0-360	200	V
3	* 5	35.86	Pk	34.6	-29.6	0	40.86	-	-	74	-33.14	0-360	199	H
5	7.239	33.68	Pk	35.9	-28.7	0	40.88	-	-	-	-	0-360	102	H
4	7.239	33.67	Pk	35.9	-28.7	0	40.87	-	-	-	-	0-360	101	V
6	9.752	28.64	Pk	37.3	-24.8	0	41.14	-	-	-	-	0-360	199	H

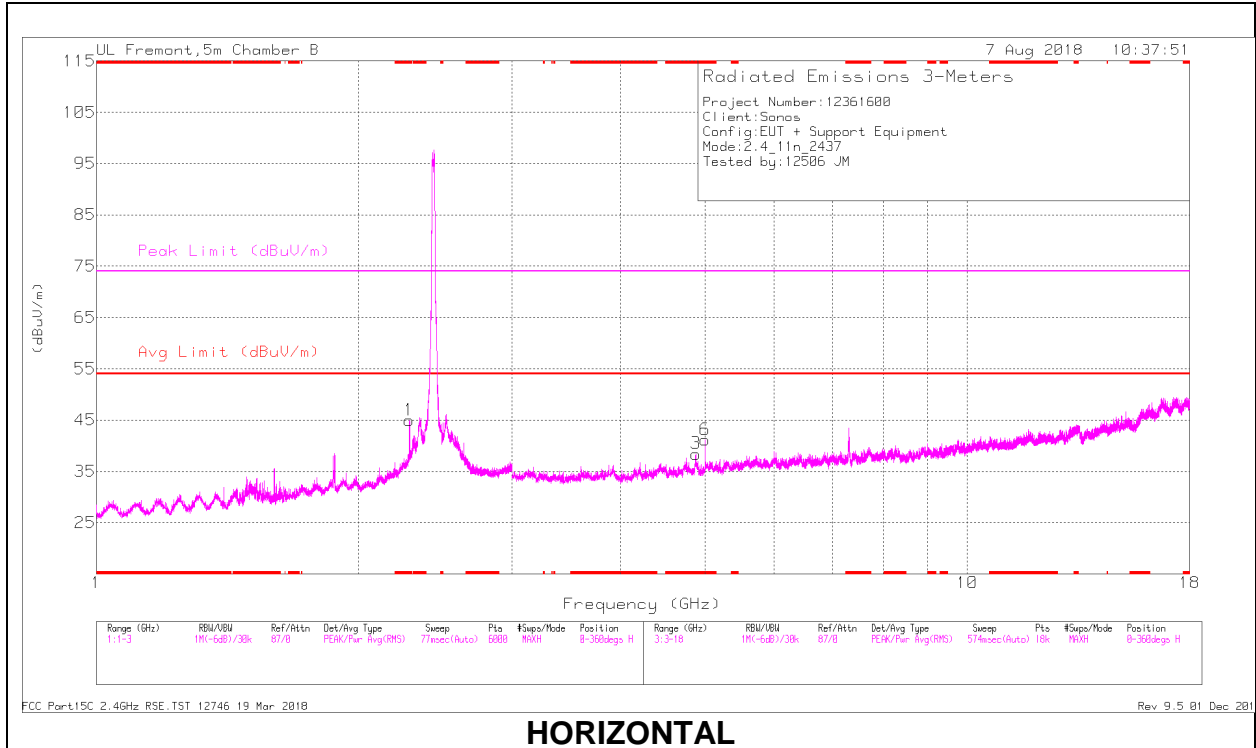
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector

#### Radiated Emissions

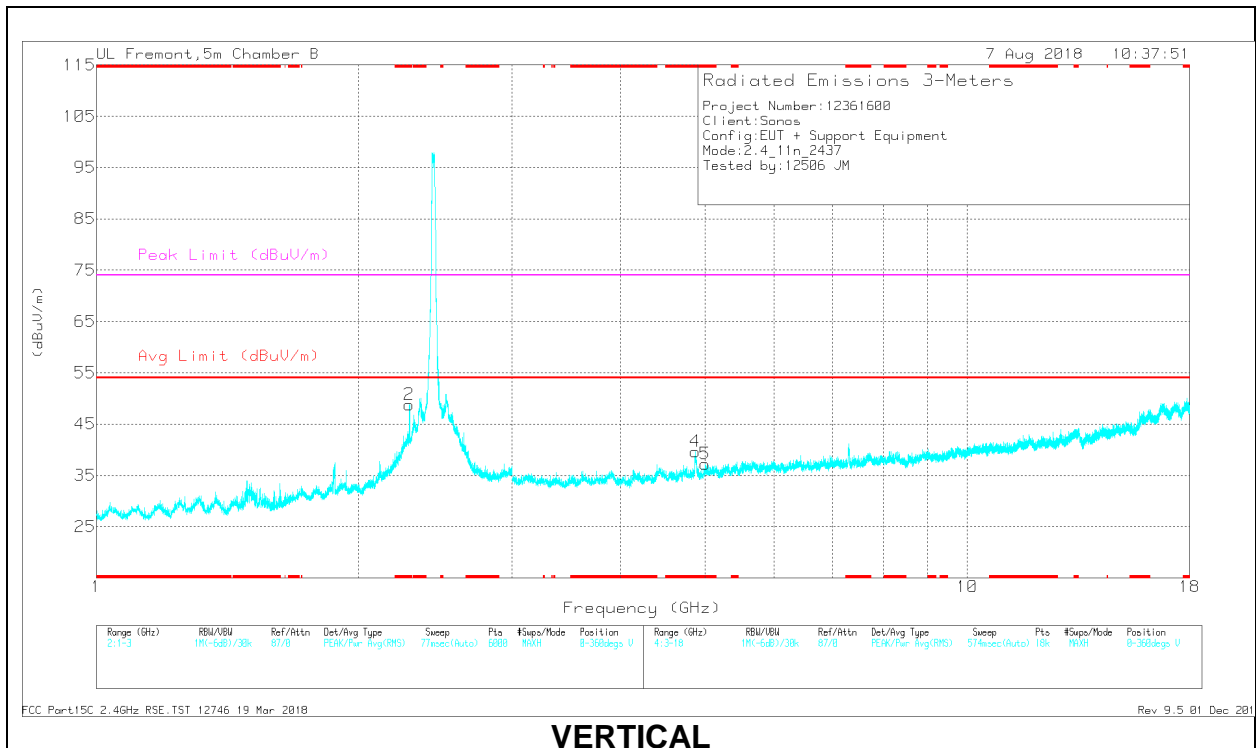
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.6	35.23	PK2	27.7	-21.9	0	41.03	-	-	74	-32.97	313	112	H
* 1.6	27.98	MAv1	27.7	-21.9	.42	34.2	54	-19.8	-	-	313	112	H
* 2.288	45.23	PK2	31.9	-21.7	0	55.43	-	-	74	-18.57	31	184	V
* 2.288	37.21	MAv1	31.9	-21.7	.42	47.83	54	-6.17	-	-	31	184	V
* 5	41.55	PK2	34.6	-29.7	0	46.45	-	-	74	-27.55	87	235	H
* 5	34.34	MAv1	34.6	-29.6	.42	39.76	54	-14.24	-	-	87	235	H
7.239	37.76	PK2	35.9	-28.7	0	44.96	-	-	-	-	346	149	V
7.24	26.94	MAv1	35.9	-28.7	.42	34.56	-	-	-	-	94	120	H
7.24	26.71	MAv1	35.9	-28.7	.42	34.33	-	-	-	-	346	149	V
7.241	38.85	PK2	35.9	-28.8	0	45.95	-	-	-	-	94	120	H
9.752	23.53	MAv1	37.3	-24.8	.42	36.45	-	-	-	-	353	124	H
9.753	34.58	PK2	37.3	-24.7	0	47.18	-	-	-	-	353	124	H

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

### MID CHANNEL, CH 6 RESULTS



**HORIZONTAL**



**VERTICAL**

### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Filtr/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
1	* 2.288	34.81	Pk	31.9	-21.7	0	45.01	-	-	74	-28.99	0-360	102	H
2	* 2.288	38.63	Pk	31.9	-21.7	0	48.83	-	-	74	-25.17	0-360	200	V
3	* 4.876	35.43	Pk	34.3	-31.3	0	38.43	-	-	74	-35.57	0-360	102	H
6	* 5	36.12	Pk	34.6	-29.6	0	41.12	-	-	74	-32.88	0-360	199	H
4	* 4.873	36.49	Pk	34.3	-31.2	0	39.59	-	-	74	-34.41	0-360	101	V
5	* 5	32.17	Pk	34.6	-29.6	0	37.17	-	-	74	-36.83	0-360	200	V

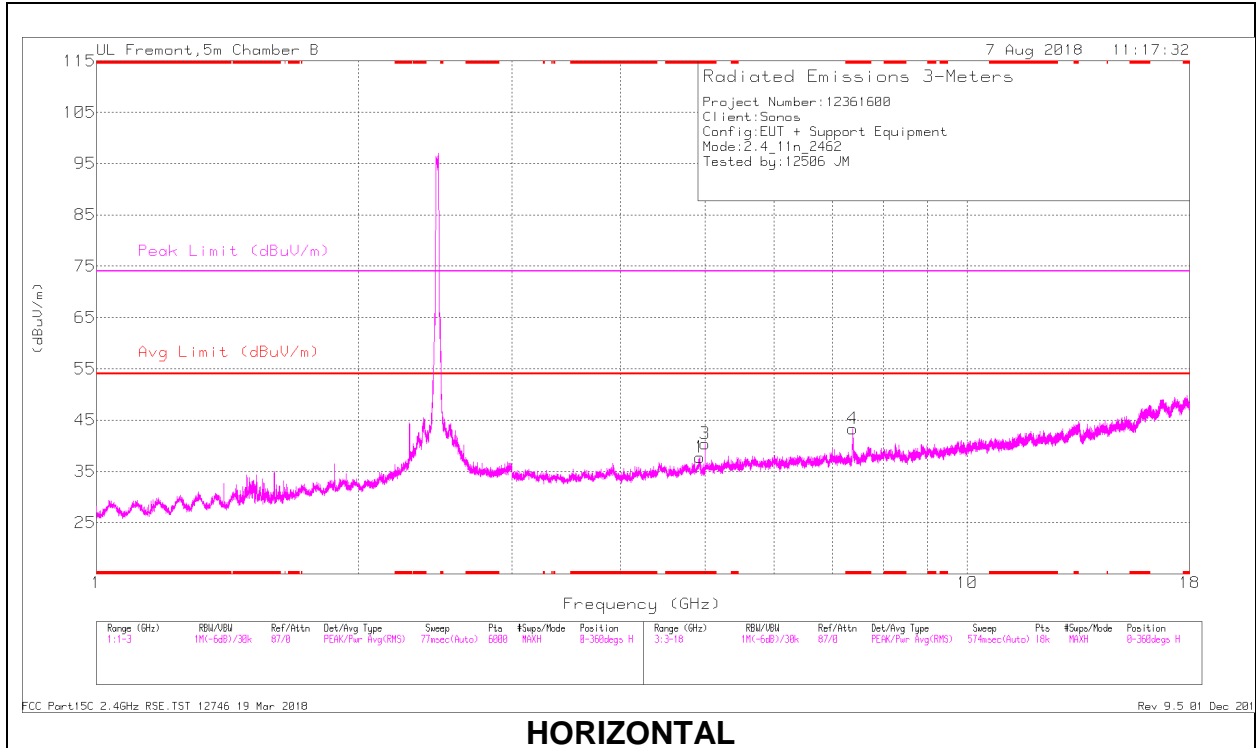
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector

#### Radiated Emissions

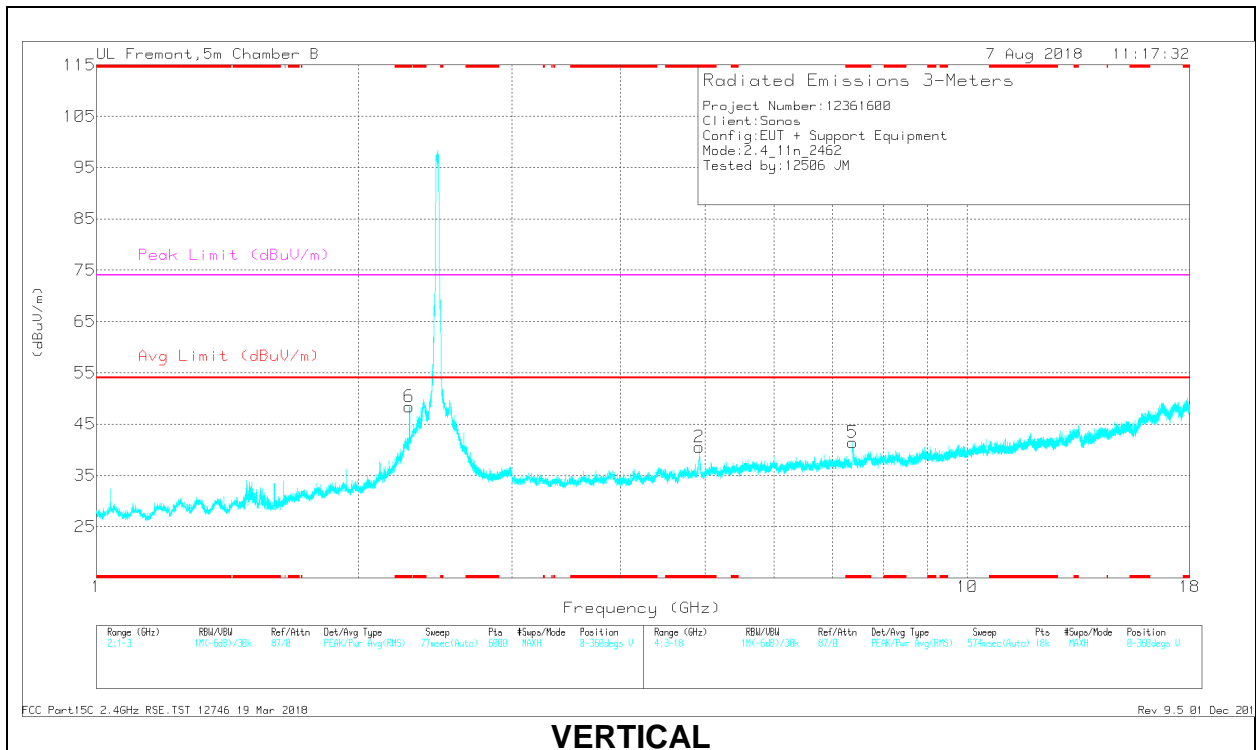
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.288	39.22	PK2	31.9	-21.7	0	49.42	-	-	74	-24.58	321	103	H
* 2.288	32.61	MAv1	31.9	-21.7	.42	43.23	54	-10.77	-	-	321	103	H
* 2.288	43.52	PK2	31.9	-21.7	0	53.72	-	-	74	-20.28	29	189	V
* 2.288	37.19	MAv1	31.9	-21.7	.42	47.81	54	-6.19	-	-	29	189	V
* 4.877	43.34	PK2	34.3	-31.3	0	46.34	-	-	74	-27.66	122	102	H
* 4.875	31.55	MAv1	34.3	-31.3	.42	34.97	54	-19.03	-	-	122	102	H
* 5	41.74	PK2	34.6	-29.7	0	46.64	-	-	74	-27.36	90	238	H
* 5	34.96	MAv1	34.6	-29.6	.42	40.38	54	-13.62	-	-	90	238	H
* 4.875	43.63	PK2	34.3	-31.3	0	46.63	-	-	74	-27.37	97	117	V
* 4.873	31.69	MAv1	34.3	-31.2	.42	35.21	54	-18.79	-	-	97	117	V
* 5	38.47	PK2	34.6	-29.6	0	43.47	-	-	74	-30.53	237	218	V
* 5	28.47	MAv1	34.6	-29.6	.42	33.89	54	-20.11	-	-	237	218	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, CH 11 RESULTS



**HORIZONTAL**



**VERTICAL**



### RADIATED EMISSIONS

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Filtr/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
6	* 2.288	38.23	Pk	31.9	-21.7	0	48.43	-	-	74	-25.57	0-360	200	V
1	* 4.927	34.76	Pk	34.4	-31.4	0	37.76	-	-	74	-36.24	0-360	102	H
3	* 5	35.37	Pk	34.6	-29.6	0	40.37	-	-	74	-33.63	0-360	199	H
4	* 7.382	35.57	Pk	36.1	-28.3	0	43.37	-	-	74	-30.63	0-360	102	H
2	* 4.923	37.54	Pk	34.4	-31.4	0	40.54	-	-	74	-33.46	0-360	101	V
5	* 7.384	33.64	Pk	36.1	-28.3	0	41.44	-	-	74	-32.56	0-360	101	V

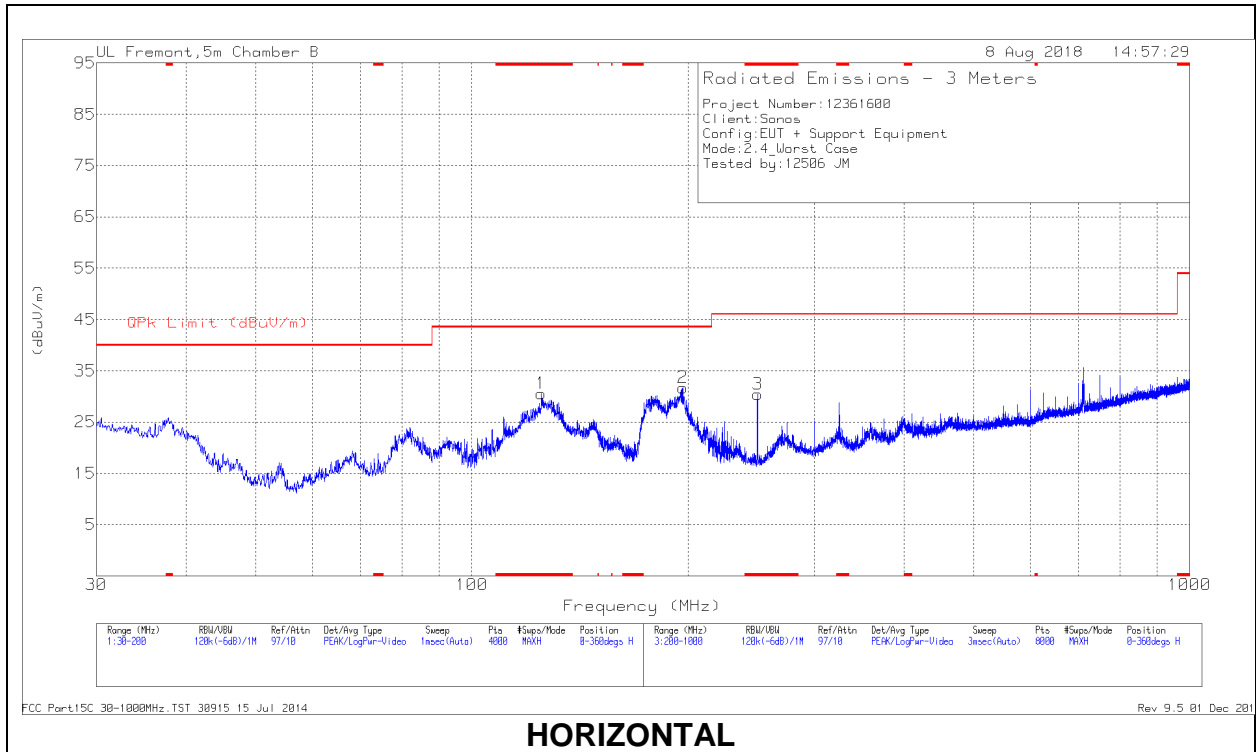
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector

#### Radiated Emissions

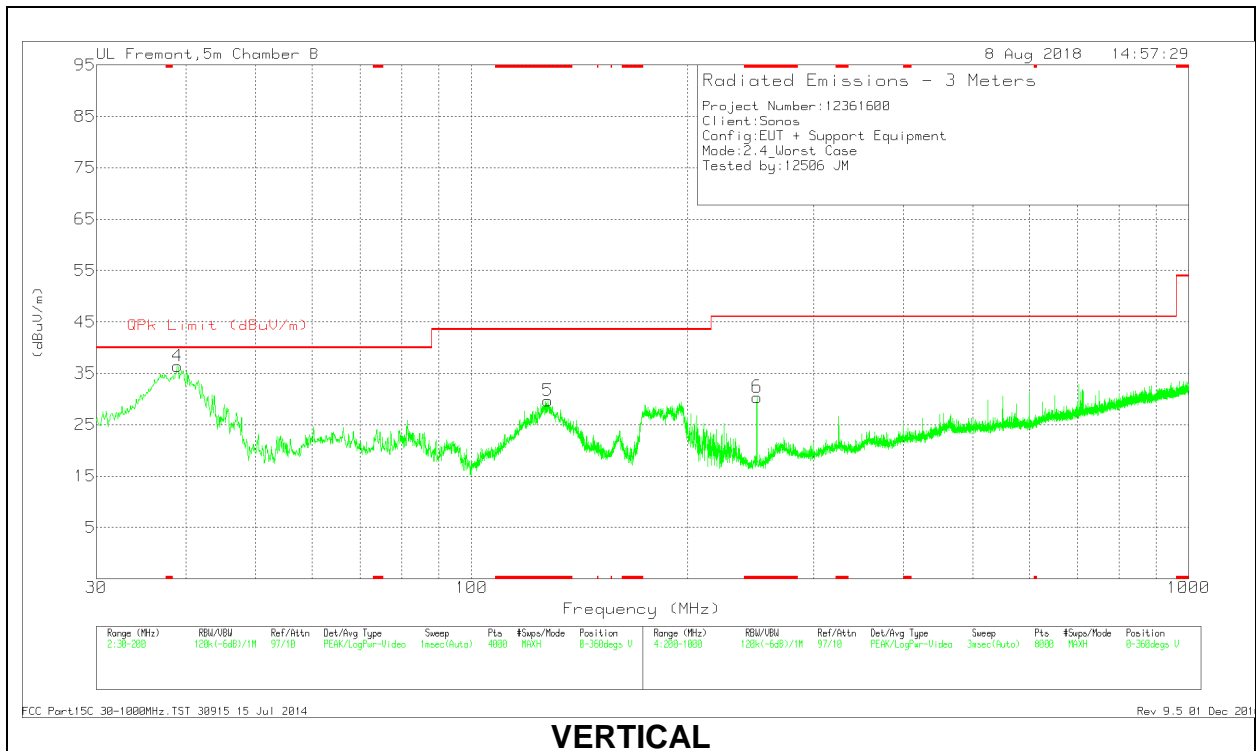
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dBm)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.288	43.03	PK2	31.9	-21.7	0	53.23	-	-	74	-20.77	33	187	V
* 2.288	36.86	MAv1	31.9	-21.7	.42	47.48	54	-6.52	-	-	33	187	V
* 4.926	40.58	PK2	34.4	-31.4	0	43.58	-	-	74	-30.42	40	114	H
* 4.927	28.49	MAv1	34.4	-31.4	.42	31.91	54	-22.09	-	-	40	114	H
* 5	42.27	PK2	34.6	-29.7	0	47.17	-	-	74	-26.83	84	234	H
* 5	35.64	MAv1	34.6	-29.7	.42	40.96	54	-13.04	-	-	84	234	H
* 7.382	43.71	PK2	36.1	-28.3	0	51.51	-	-	74	-22.49	40	104	H
* 7.383	29.48	MAv1	36.1	-28.3	.42	37.7	54	-16.3	-	-	40	104	H
* 4.922	40.4	PK2	34.4	-31.5	0	43.3	-	-	74	-30.7	275	116	V
* 4.924	28.91	MAv1	34.4	-31.4	.42	32.33	54	-21.67	-	-	275	116	V
* 7.383	39.57	PK2	36.1	-28.3	0	47.37	-	-	74	-26.63	289	132	V
* 7.385	27.3	MAv1	36.1	-28.3	.42	35.52	54	-18.48	-	-	289	132	V

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

### 9.2. Worst Case Below 1 GHz



**HORIZONTAL**



**VERTICAL**

**Below 1GHz DATA**

Trace Markers

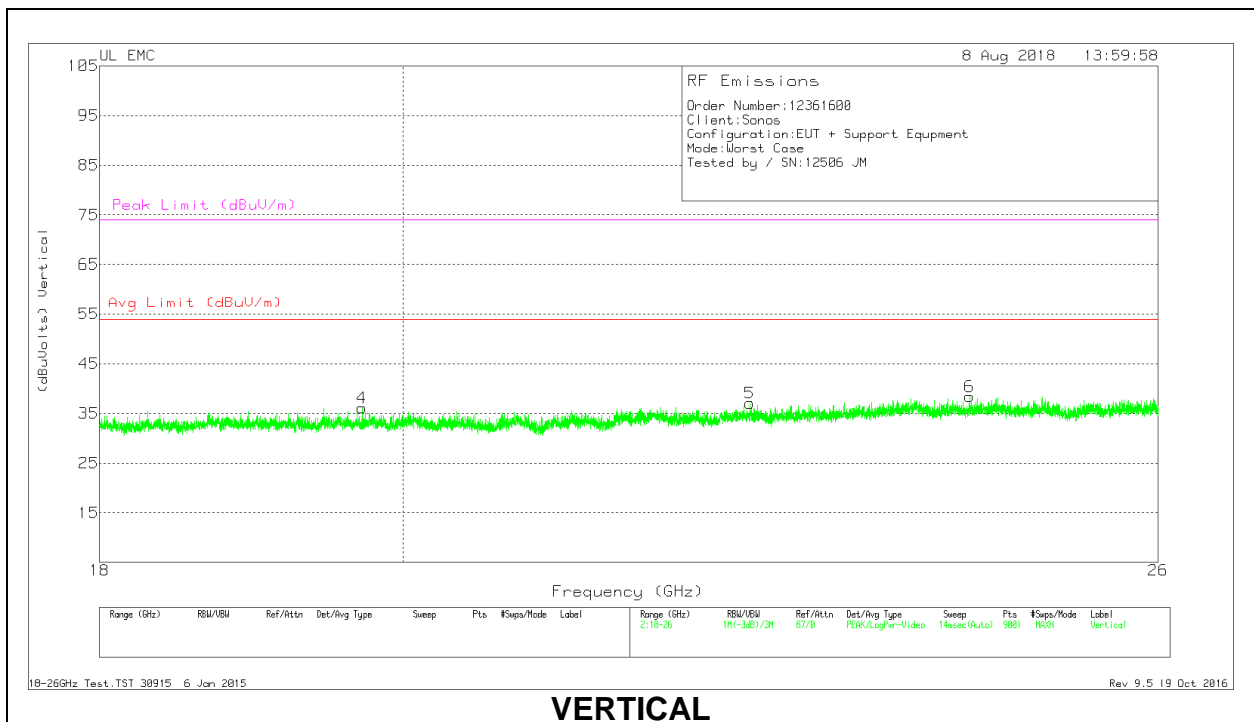
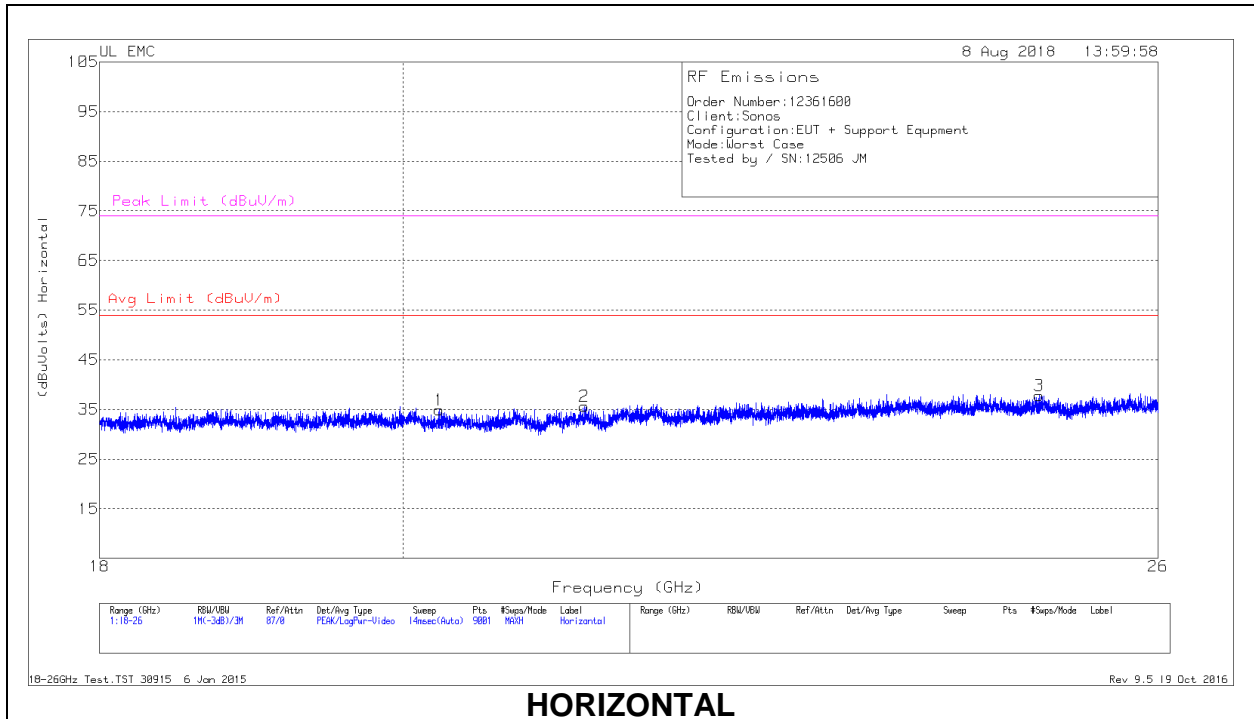
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T407 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 125.0121	40.32	Pk	17.9	-27.7	30.52	43.52	-13	0-360	200	H
5	* 127.9028	39.52	Pk	17.8	-27.6	29.72	43.52	-13.8	0-360	100	V
3	* 250.0065	41.25	Pk	15.5	-26.3	30.45	46.02	-15.57	0-360	100	H
6	* 250.0065	41.16	Pk	15.5	-26.3	30.36	46.02	-15.66	0-360	100	V
2	196.8557	42.44	Pk	16.1	-26.9	31.64	43.52	-11.88	0-360	100	H
4	38.9273	46.29	Pk	18.8	-28.7	36.39	40	-3.61	0-360	100	V
	38.9417	43.14	Qp	18.7	-28.7	33.14	40	-6.86	103	100	V

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

Pk - Peak detector

Qp - Quasi-Peak detector

### 9.3. Worst Case 18-26 GHz



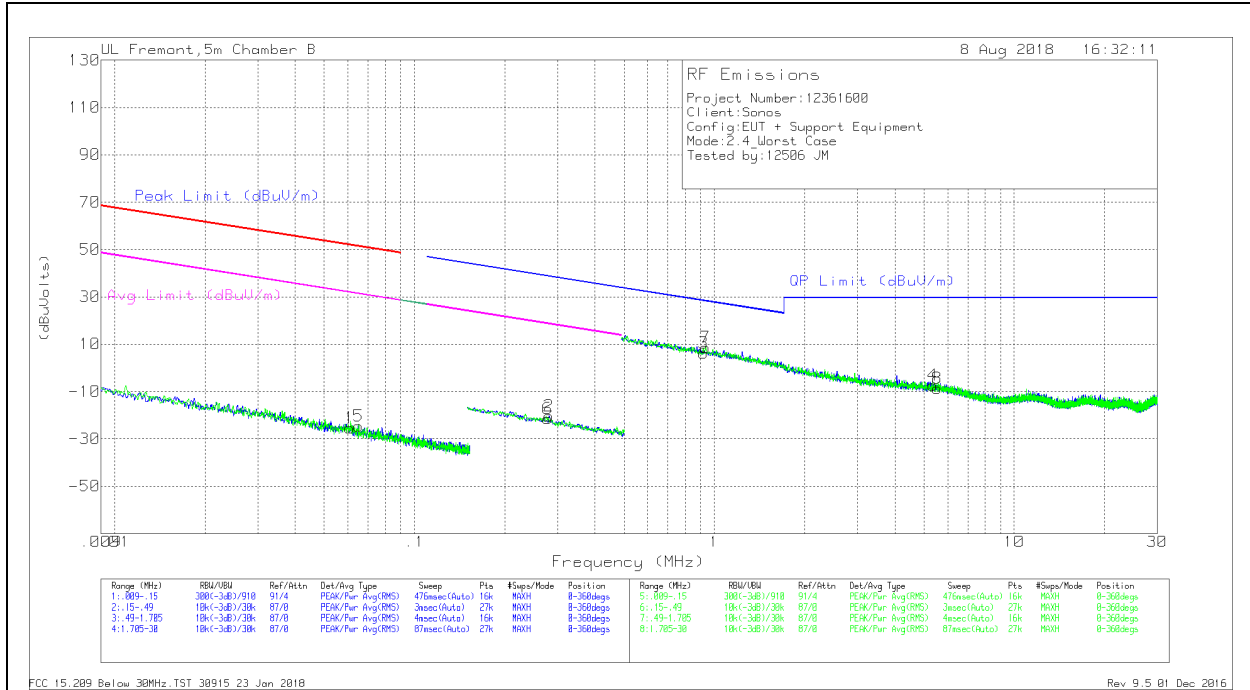
**18 – 26GHz DATA**

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 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	20.254	37.09	Pk	32.5	-25.2	-9.5	34.89	54	-19.11	74	-39.11
2	21.301	37.31	Pk	33.2	-25.4	-9.5	35.61	54	-18.39	74	-38.39
3	24.947	37.72	Pk	34.1	-24.5	-9.5	37.82	54	-16.18	74	-36.18
4	19.718	38.21	Pk	32.5	-25.1	-9.5	36.11	54	-17.89	74	-37.89
5	22.563	38.07	Pk	33.3	-24.8	-9.5	37.07	54	-16.93	74	-36.93
6	24.351	38.78	Pk	33.7	-24.6	-9.5	38.38	54	-15.62	74	-35.62

Pk - Peak detector

### 9.4. Worst Case Below 30 MHz



FCC 15.209 Below 30MHz TST 30915 23 Jan 2018

Rev 9.5 01 Dec 2016

NOTE: KDB 414788 OATS 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.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

### Below 30MHz DATA

#### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 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	20.254	37.09	Pk	32.5	-25.2	-9.5	34.89	54	-19.11	74	-39.11
2	21.301	37.31	Pk	33.2	-25.4	-9.5	35.61	54	-18.39	74	-38.39
3	24.947	37.72	Pk	34.1	-24.5	-9.5	37.82	54	-16.18	74	-36.18
4	19.718	38.21	Pk	32.5	-25.1	-9.5	36.11	54	-17.89	74	-37.89
5	22.563	38.07	Pk	33.3	-24.8	-9.5	37.07	54	-16.93	74	-36.93
6	24.351	38.78	Pk	33.7	-24.6	-9.5	38.38	54	-15.62	74	-35.62

Pk - Peak detector

## 10. 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.

### 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.

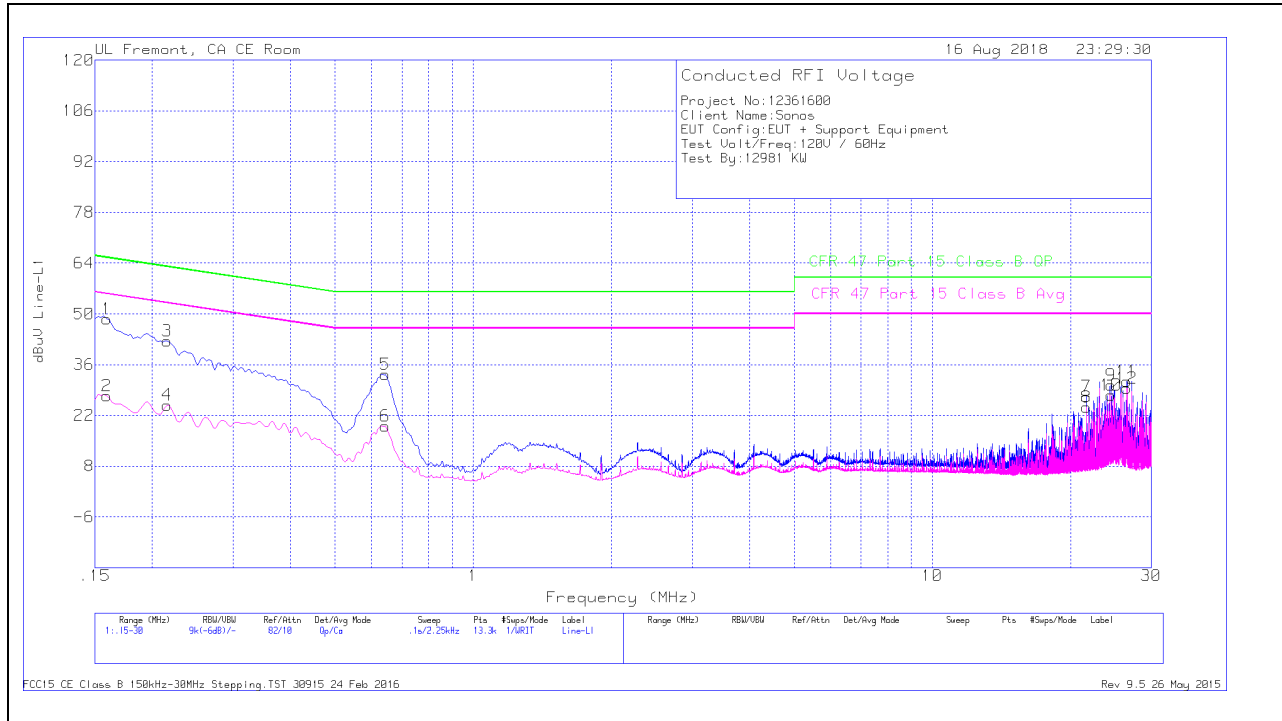
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

### RESULTS

10.1.1. AC Power Line Norm

LINE 1 RESULTS



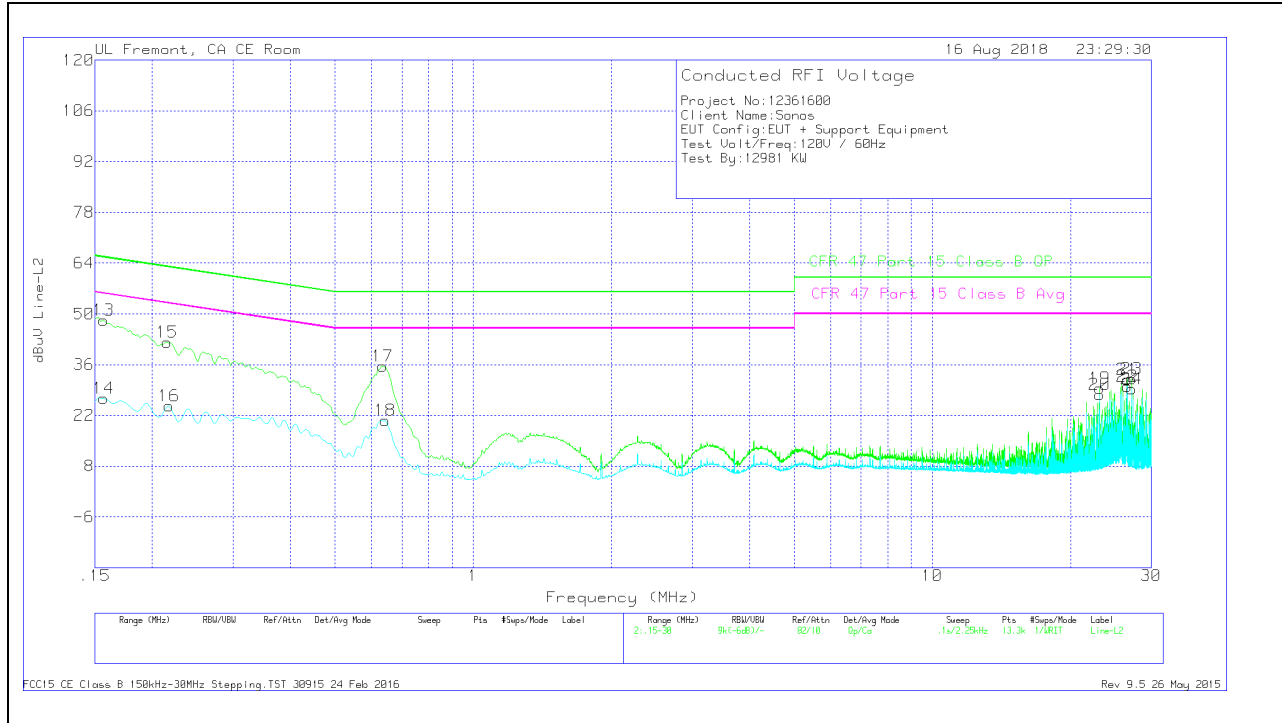
Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.159	38.48	Qp	.1	0	10.1	48.68	65.52	-16.84	-	-
2	.159	17.22	Ca	.1	0	10.1	27.42	-	-	55.52	-28.1
3	.21525	32.44	Qp	0	0	10.1	42.54	63	-20.46	-	-
4	.21525	14.78	Ca	0	0	10.1	24.88	-	-	53	-28.12
5	.64275	23.14	Qp	0	0	10.1	33.24	56	-22.76	-	-
6	.64275	8.88	Ca	0	0	10.1	18.98	-	-	46	-27.02
7	21.66225	16.46	Qp	.1	.3	10.4	27.26	60	-32.74	-	-
8	21.66225	13.41	Ca	.1	.3	10.4	24.21	-	-	50	-25.79
9	24.531	19.46	Qp	.1	.3	10.5	30.36	60	-29.64	-	-
10	24.53325	16.72	Ca	.1	.3	10.5	27.62	-	-	50	-22.38
11	26.48625	20.47	Qp	.1	.3	10.5	31.37	60	-28.63	-	-
12	26.48625	18.59	Ca	.1	.3	10.5	29.49	-	-	50	-20.51

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	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.15675	38.01	Qp	.1	0	10.1	48.21	65.63	-17.42	-	-
14	.15675	16.44	Ca	.1	0	10.1	26.64	-	-	55.63	-28.99
15	.21525	32.05	Qp	0	0	10.1	42.15	63	-20.85	-	-
16	.2175	14.45	Ca	0	0	10.1	24.55	-	-	52.91	-28.36
17	.63487	25.51	Qp	0	0	10.1	35.61	56	-20.39	-	-
18	.64275	10.46	Ca	0	0	10.1	20.56	-	-	46	-25.44
19	23.12925	18.72	Qp	.1	.3	10.4	29.52	60	-30.48	-	-
20	23.12925	16.9	Ca	.1	.3	10.4	27.7	-	-	50	-22.3
21	26.60775	21.03	Qp	.1	.3	10.5	31.93	60	-28.07	-	-
22	26.61	19.15	Ca	.1	.3	10.5	30.05	-	-	50	-19.95
23	27.159	21.13	Qp	.1	.4	10.5	32.13	60	-27.87	-	-
24	27.159	18.3	Ca	.1	.4	10.5	29.3	-	-	50	-20.7

Qp - Quasi-Peak detector  
 Ca - CISPR average detection