



# **CERTIFICATION TEST REPORT**

**Report Number. :** 13144555 –E2V1

**Applicant :** PLANTRONICS INC.  
345 ENCINAL ST  
SANTA CRUZ, CA 95060 U.S.A.

**Model :** V4240T

**FCC ID :** AL8-V4240T

**IC :** 457A-V4240T

**EUT Description :** BLUETOOTH HEADSET

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

**Date Of Issue:**  
January 23, 2020

**Prepared by:**  
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**REPORT REVISION HISTORY**

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	1/23/2020	Initial Issue	

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** PLANTRONICS INC.  
345 ENCINAL ST  
SANTA CRUZ, CA 95060 U.S.A.

**EUT DESCRIPTION:** BLUETOOTH HEADSET

**MODEL:** V4240T

**SERIAL NUMBER:** f4b6 88 131599 (CONDUCTED)  
f4b6 88 131563 (RADIATED)

**DATE TESTED:** January 07, 2020 - January 22, 2020

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  
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Consumer Technology Division  
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Prepared By:



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Test Engineer  
Consumer Technology Division  
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, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, 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	<input type="checkbox"/> Chamber D	<input type="checkbox"/> Chamber I
<input type="checkbox"/> Chamber B	<input type="checkbox"/> Chamber E	<input type="checkbox"/> Chamber J
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F	<input checked="" type="checkbox"/> Chamber K
	<input type="checkbox"/> Chamber G	<input type="checkbox"/> Chamber L
	<input type="checkbox"/> Chamber H	<input type="checkbox"/> Chamber M

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: 2324A.

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

#### 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.

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

### 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	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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



## 5. EQUIPMENT UNDER TEST

### 5.1. EUT DESCRIPTION

The EUT is a Bluetooth headset.

### 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	9.04	8.02

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Meandered Inverted-F antenna, with a maximum gain of -1.4 dBi.

### 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was V67.

### 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 fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

For below 1GHz and AC line conducted emission, test was investigated EUT with charging cradle mode as worst case, and radiated emissions above 1GHz was tested with EUT only as worst case.

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

BLE 1Mbps

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charging Stand	Plantronics	Voyager 4245 Office	1EPYA6	NA
Power Supply	Plantronics	SSC-090100	203382-01	NA
Testing Laptop	Lenovo	T440	E152AF75	NA
AC Adapter	Lenovo	ADLX90NCC2A	36200287	NA

### I/O CABLES FOR CONDUCTED

I/O Cable List						
Cable No	Port	# of identical ports	Connect or Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shield	0.8	to AC adapter
2	DC	1	DC	Un-shield	1.2	to Laptop
3	USB	1	DC	Un-shield	1	Laptop to Debug Board
4	SMA	1	SMA	Un-shield	0.2	EUT to Analyzer

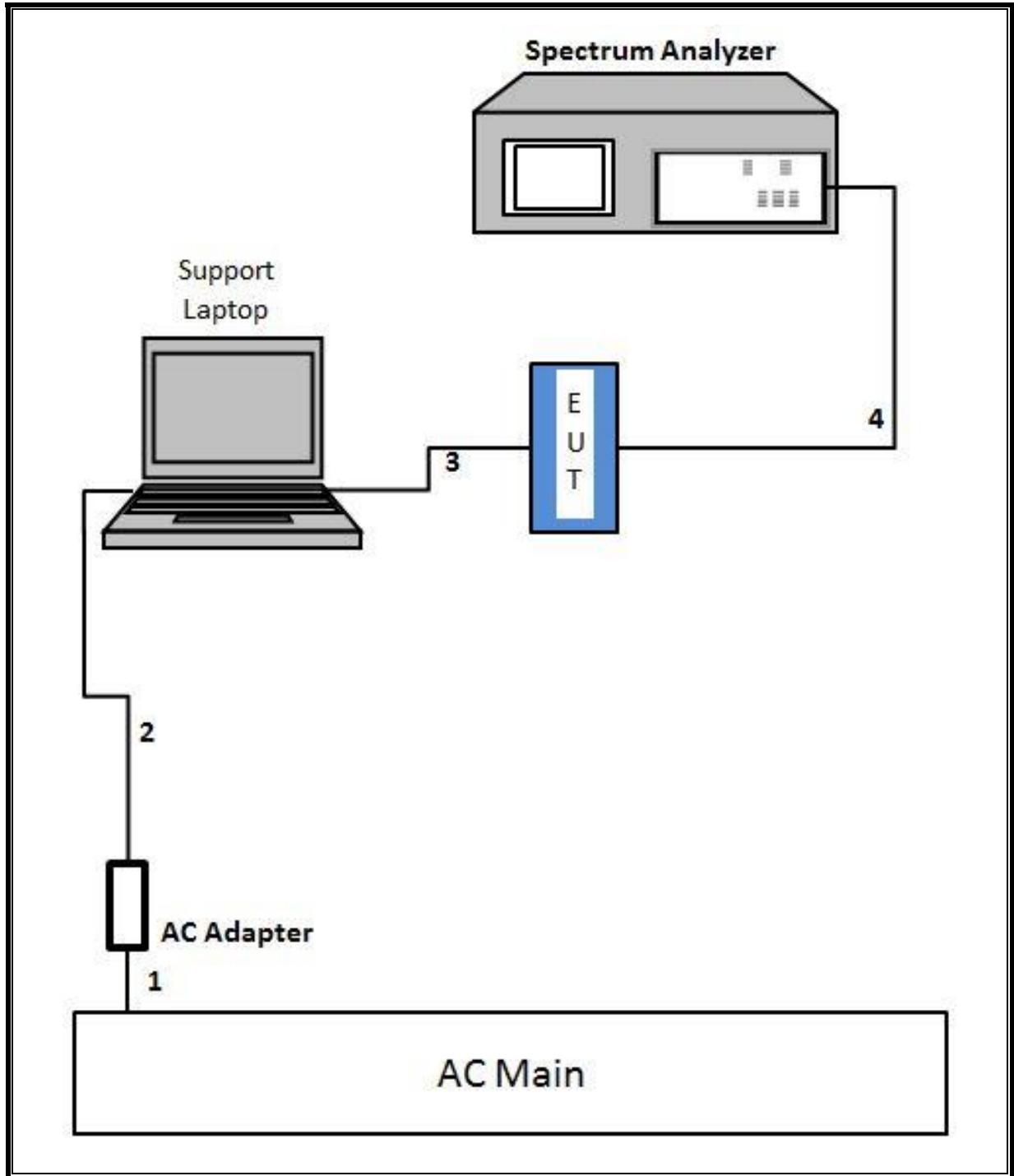
### I/O CABLES FOR RADIATED AND AC LINE CONDUCTED

I/O Cable List						
Cable No	Port	# of identical ports	Connect or Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shield	1.5	to Charger

### TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

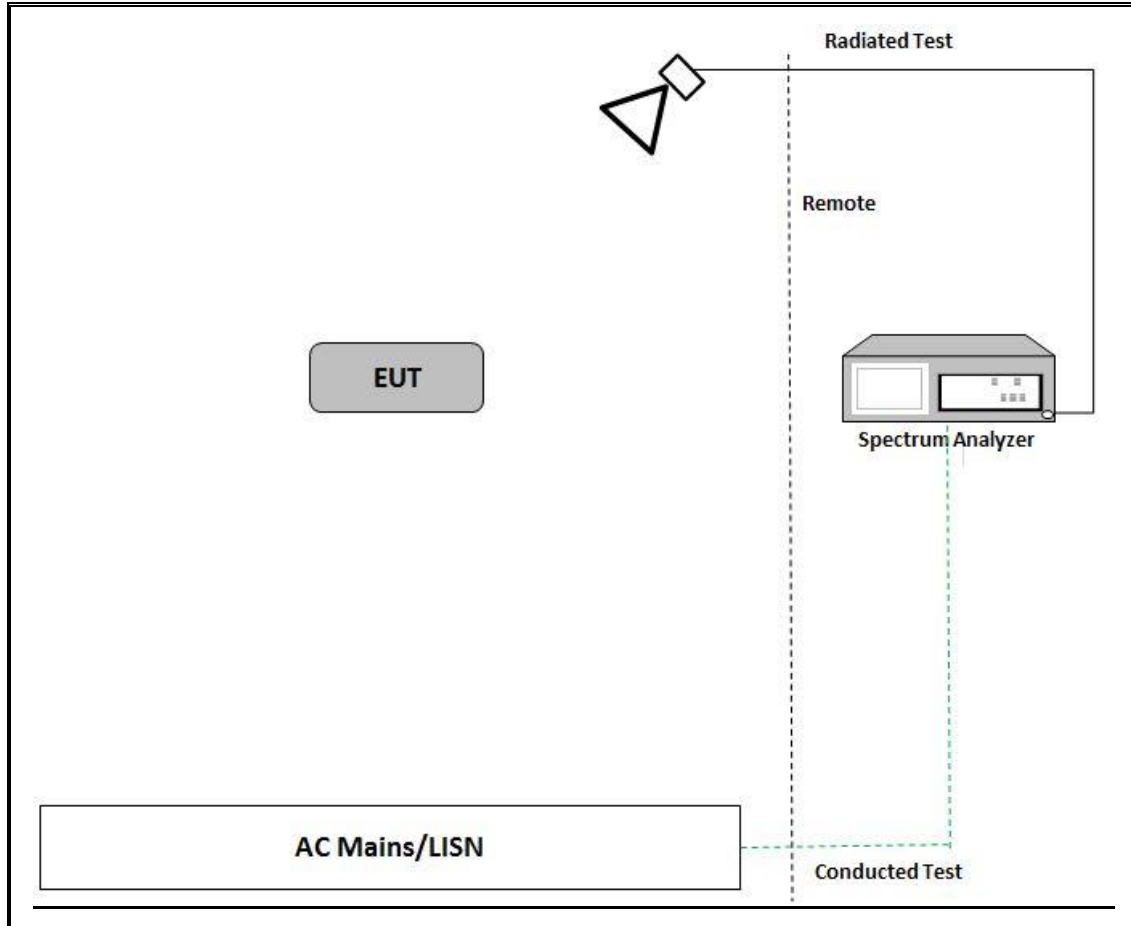
**CONDUCTED TEST SETUP DIAGRAM**



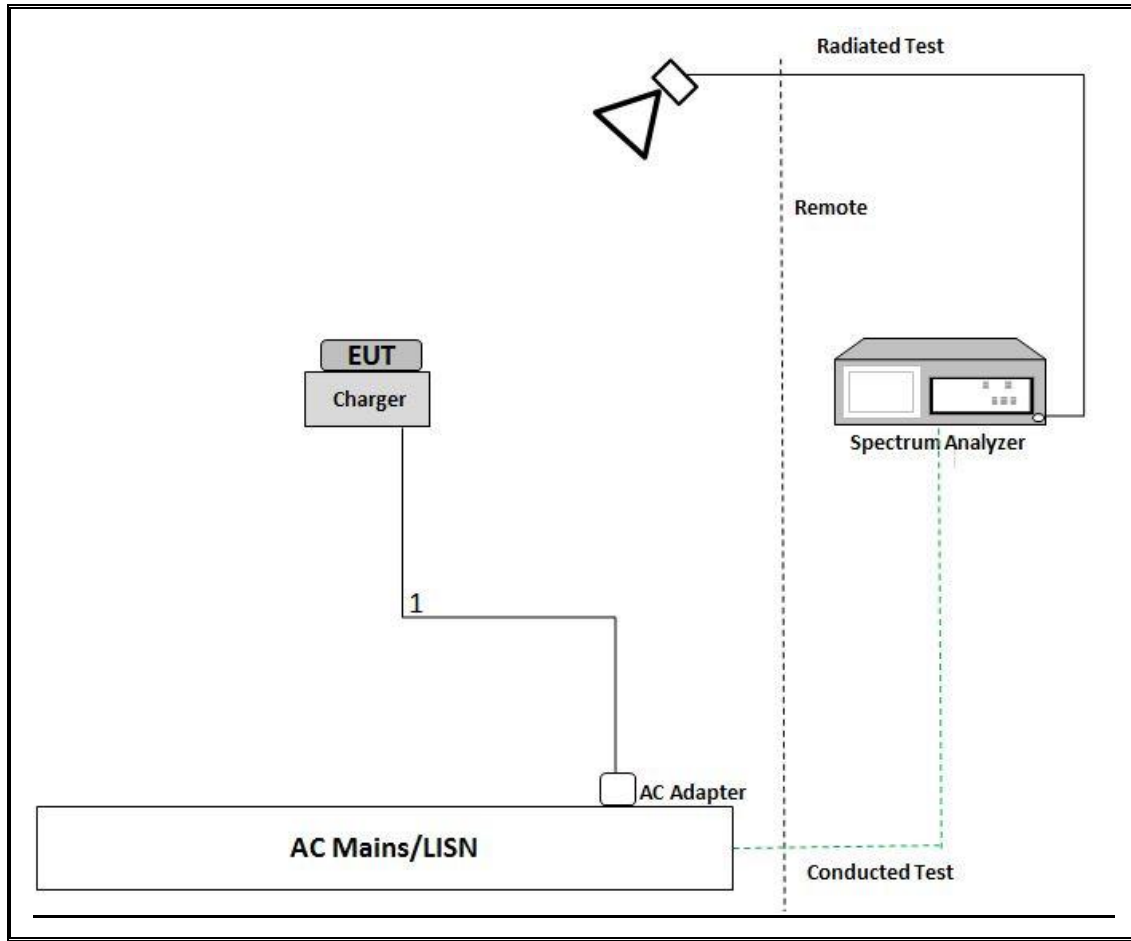
**TEST SETUP**

For conducted tests: the EUT was connected laptop. The test software exercises the radio.

**RADIATED ABOVE 1GHz EMISSIONS SETUP DIAGRAM**



**RADIATED BELOW 1GHz AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM**



**TEST SETUP**

For radiated tests: EUT is connected to earphone. The test software exercises the radio.

## 6. MEASUREMENT METHOD

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

6 dB BW: ANSI C63.10 Section -11.8.1 (RBW  $\geq$  DTS BW)

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

Output Power: ANSI C63.10 Section -11.9.1.3 (Method PKPM1 Peak-reading power meter)

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

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

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

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

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

Band-edge: ANSI C63.10 Section - 6.10

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

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

## 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	Asset	Cal Due
Antenna, Passive Loop 30Hz to 1MHz	ELETRO METRICS	EM-6871	PRE0179466	05/31/2020
Antenna, Passive Loop 100KHz to 30MHz	ELETRO METRICS	EM-6872	PRE0179468	05/31/2020
Antenna, Horn 1-18GHz	ETS Lindgren	3117	EMC4294	06/14/2020
Amplifier, 1 to 18GHz	Amplical	AMP1G18-35	T1569	05/04/2020
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences	JB3	PRE0181574	10/14/2020
Amplifier, 9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	PRE0186650	12/13/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	E9030A	T917	01/24/2020
Antenna Horn, 18 to 26.5GHz	ARA	MWH-1826/B	T447	08/13/2020
Pre-Amp 1-26.5 GHz	AMPLICAL	AMP18G26.5-60	PRE0181238	05/01/2020
EMI Test Receiver	Rohde&Schwarz	ESW44	PRE0179367	05/16/2020
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T229	01/31/2020
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1226	02/06/2020
AC Line Conducted				
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/14/2020
LISN for Conducted Emissions CISPR-16	FCC INC.	FCC LISN 50/250	T1310	01/24/2020
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, Sep 24, 2019	
Antenna Port Software	UL	UL RF	Ver 2019.11.13	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

### NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

#### PROCEDURE

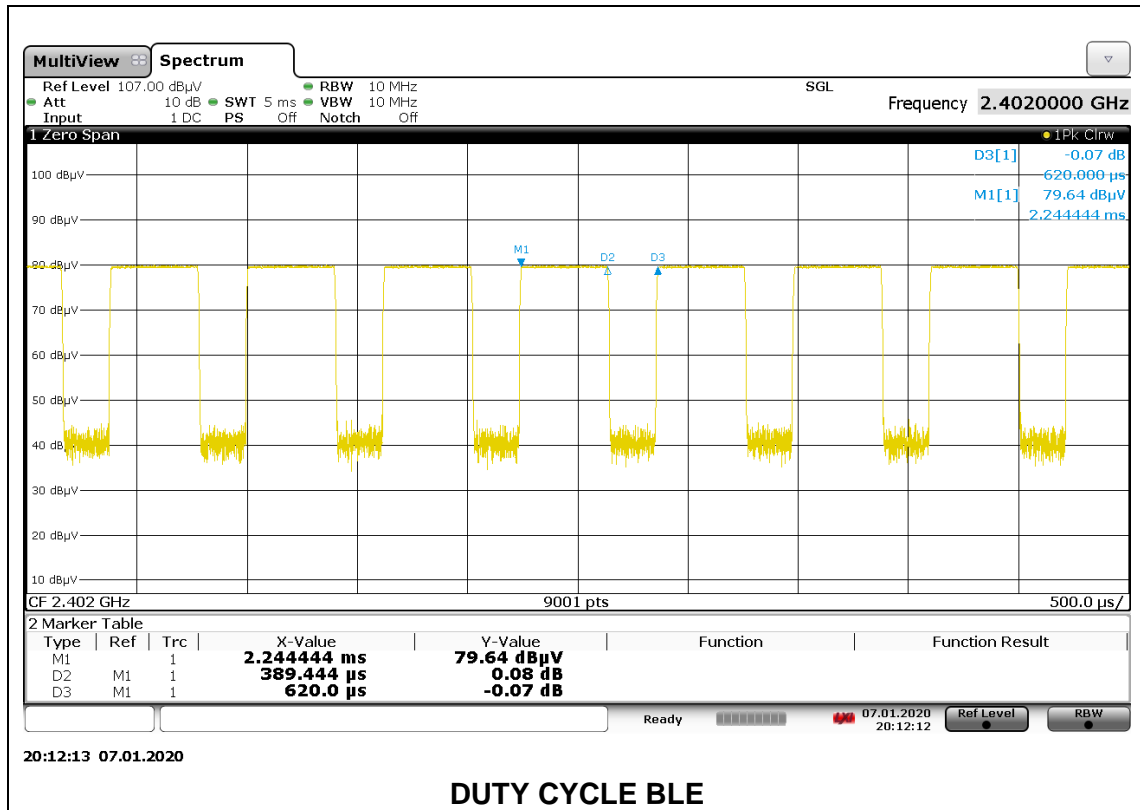
KDB 558074 Zero-Span Spectrum Analyzer Method.

#### ON TIME AND DUTY CYCLE RESULTS

Test Engineer	19498 ER
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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>						
BLE	0.389	0.620	0.627	62.74%	2.02	2.571





## 8.2. 99% BANDWIDTH

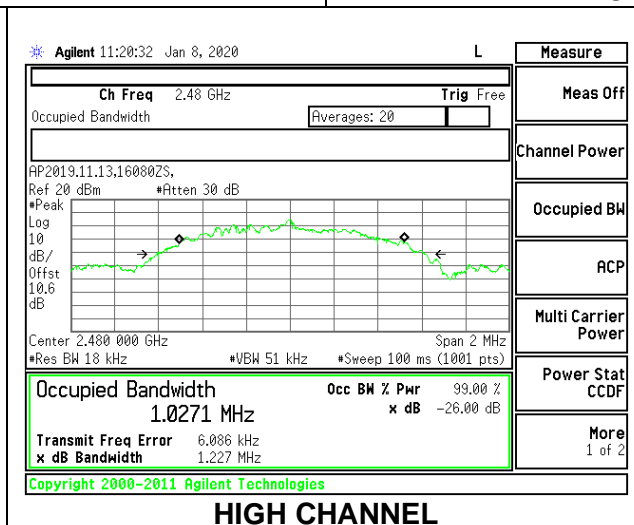
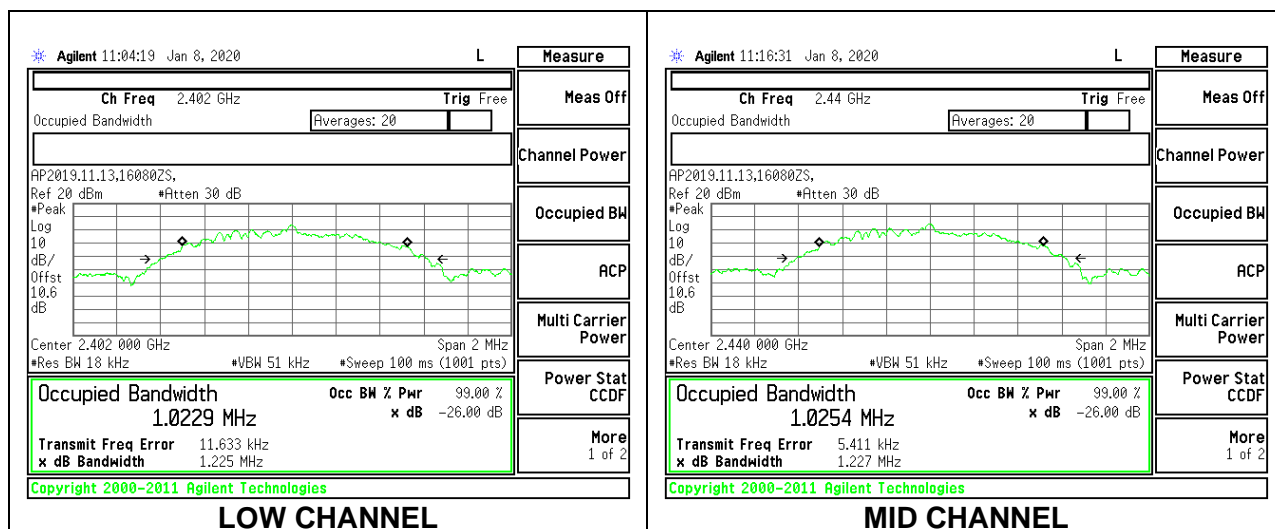
### LIMITS

None; for reporting purposes only.

### RESULTS

#### 8.2.1. BLE (1Mbps)

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.023
Middle	2440	1.025
High	2480	1.027



### **8.3. 6 dB BANDWIDTH**

#### **LIMITS**

FCC §15.247 (a) (2)

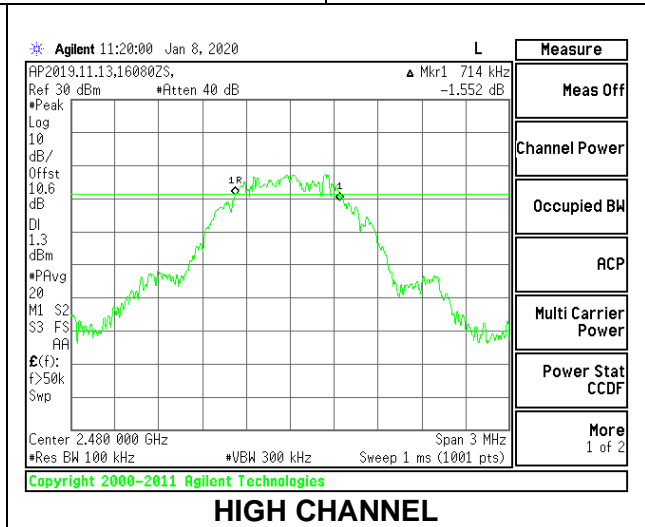
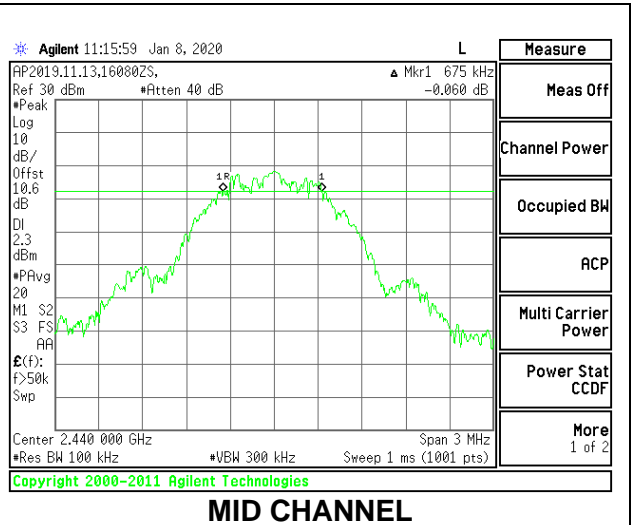
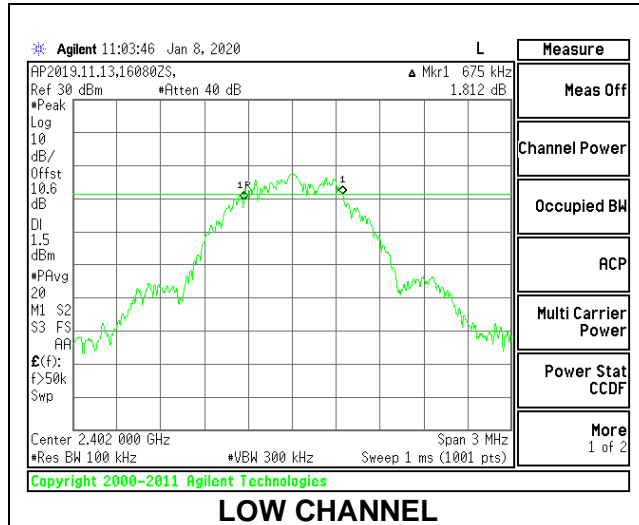
RSS-247 5.2 (a)

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

#### **RESULTS**

##### **8.3.1. BLE (1Mbps)**

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>6 dB Bandwidth (MHz)</b>	<b>Minimum Limit (MHz)</b>
Low	2402	0.675	0.5
Middle	2440	0.675	0.5
High	2480	0.714	0.5



## 8.4. 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 cable assembly insertion loss was entered as an offset in the power meter to allow for a gated peak reading of power.

### RESULTS

#### 8.4.1. BLE (1Mbps)

<b>Tested By:</b>	16080 ZS
<b>Date:</b>	1/8/2020

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Power Reading (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Low	2402	7.59	30	-22.410
Middle	2440	9.04	30	-20.960
High	2480	9.02	30	-20.980

## 8.5. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated average reading of power.

### RESULTS

#### 8.5.1. BLE (1Mbps)

<b>Tested By:</b>	16080 ZS
<b>Date:</b>	1/8/2020

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>AV power (dBm)</b>
Low	2402	6.52
Middle	2440	7.84
High	2480	7.82

## **8.6. POWER SPECTRAL DENSITY**

### **LIMITS**

FCC §15.247 (e)

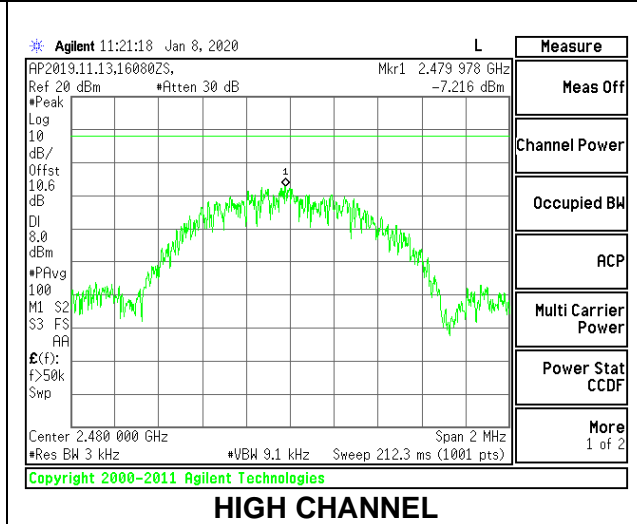
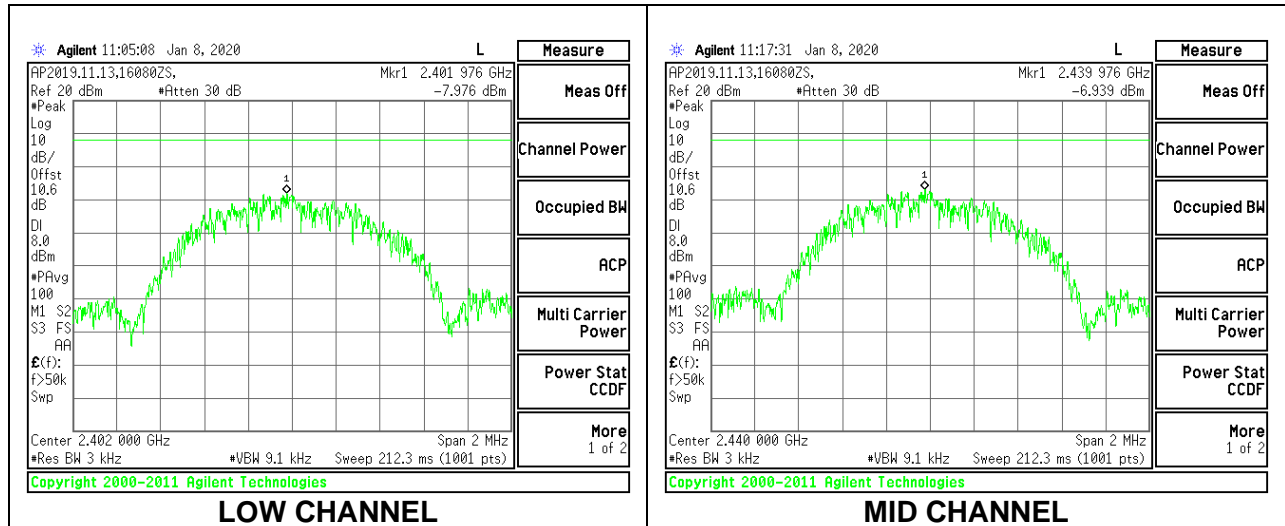
RSS-247 (5.2) (b)

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**

### 8.6.1. BLE (1Mbps)

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-7.98	8	-15.98
Middle	2440	-6.94	8	-14.94
High	2480	-7.22	8	-15.22





## **8.7. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

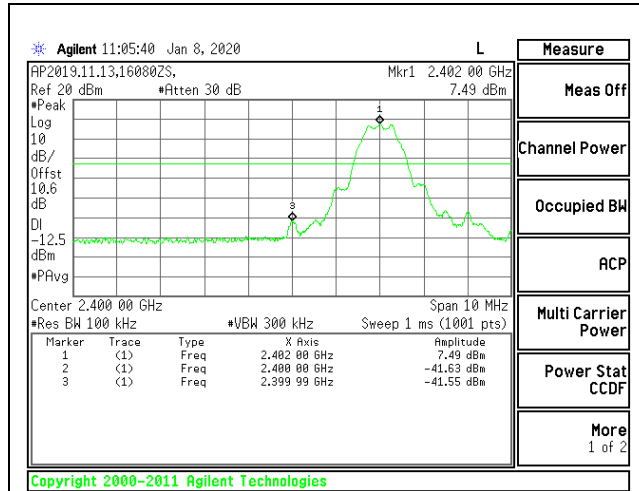
FCC §15.247 (d)

RSS-247 5.5

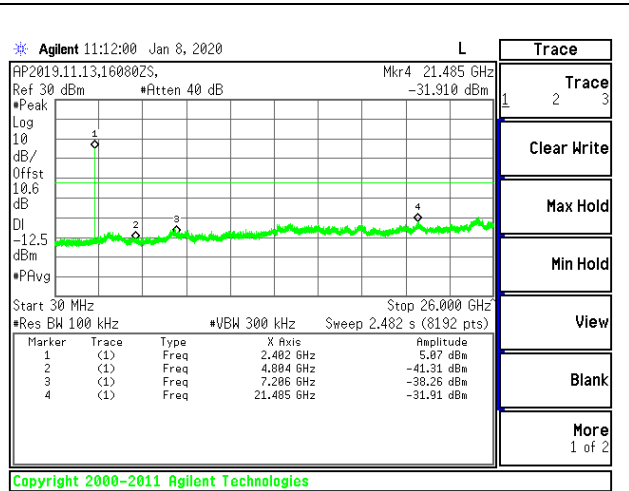
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

### **RESULTS**

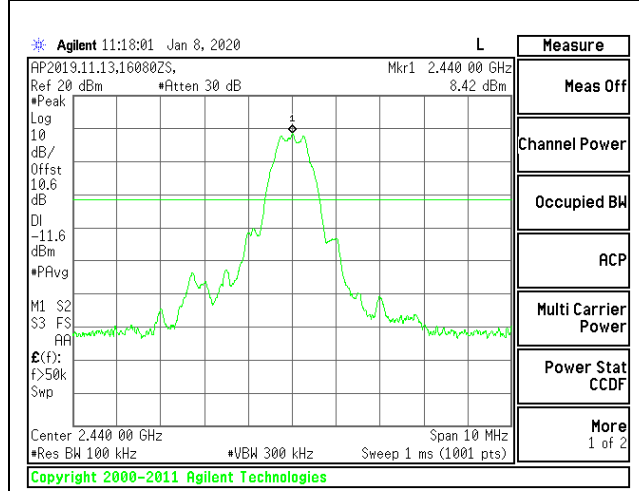
### 8.7.1. BLE (1Mbps)



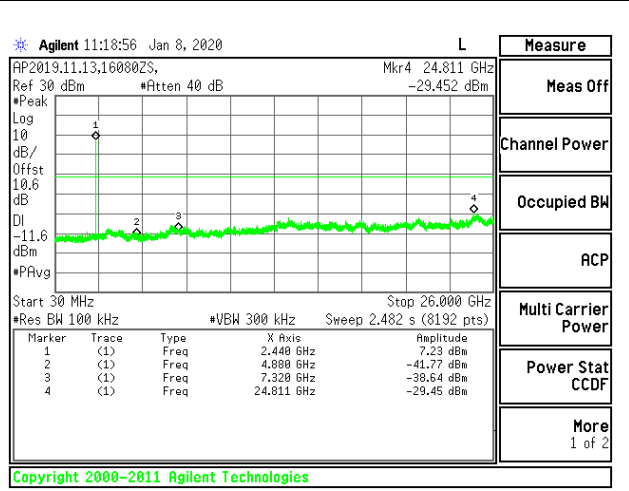
**LOW CHANNEL BANDEDGE**



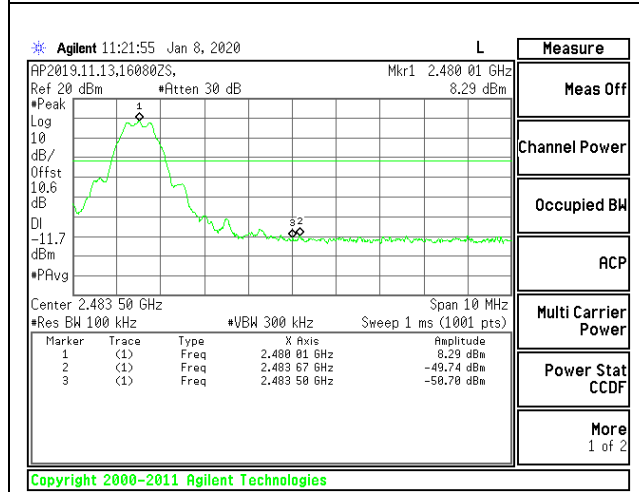
**OUT-OF-BAND LOW CHANNEL**



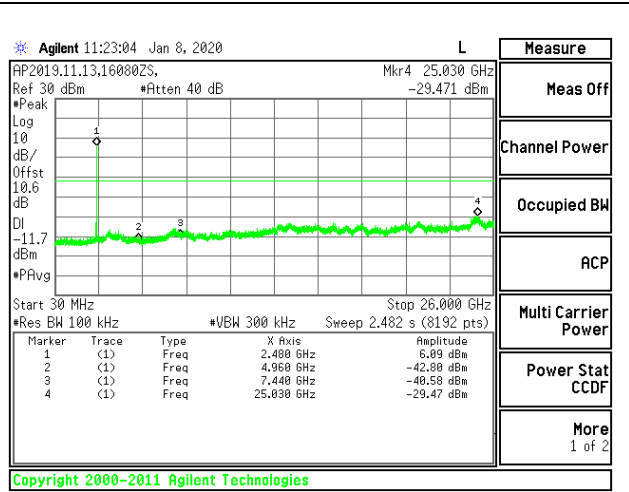
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND MID CHANNEL**



**HIGH CHANNEL BANDEDGE**



**OUT-OF-BAND HIGH CHANNEL**

## 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 Open Field Site(OFS) 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.

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

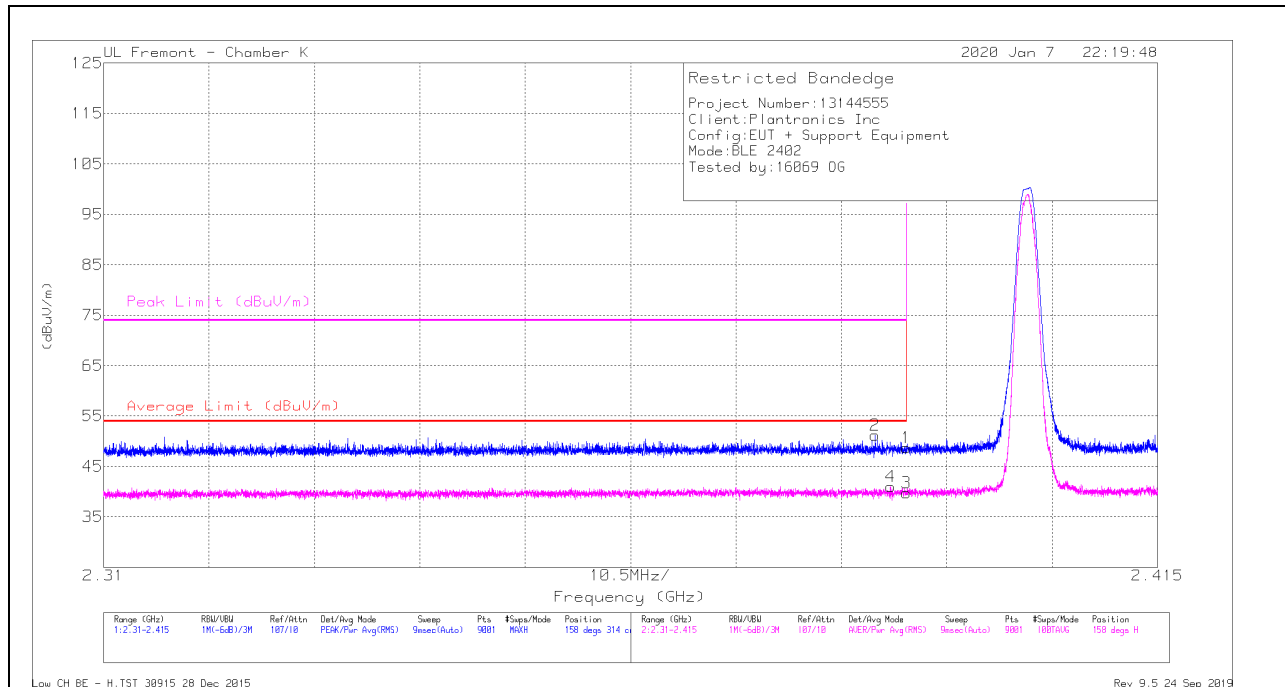
## 9.2. TRANSMITTER ABOVE 1 GHz

### 9.2.1. BLE (1Mbps)

#### Antenna 1

#### BANDEDGE (LOW CHANNEL)

#### HORIZONTAL RESULT



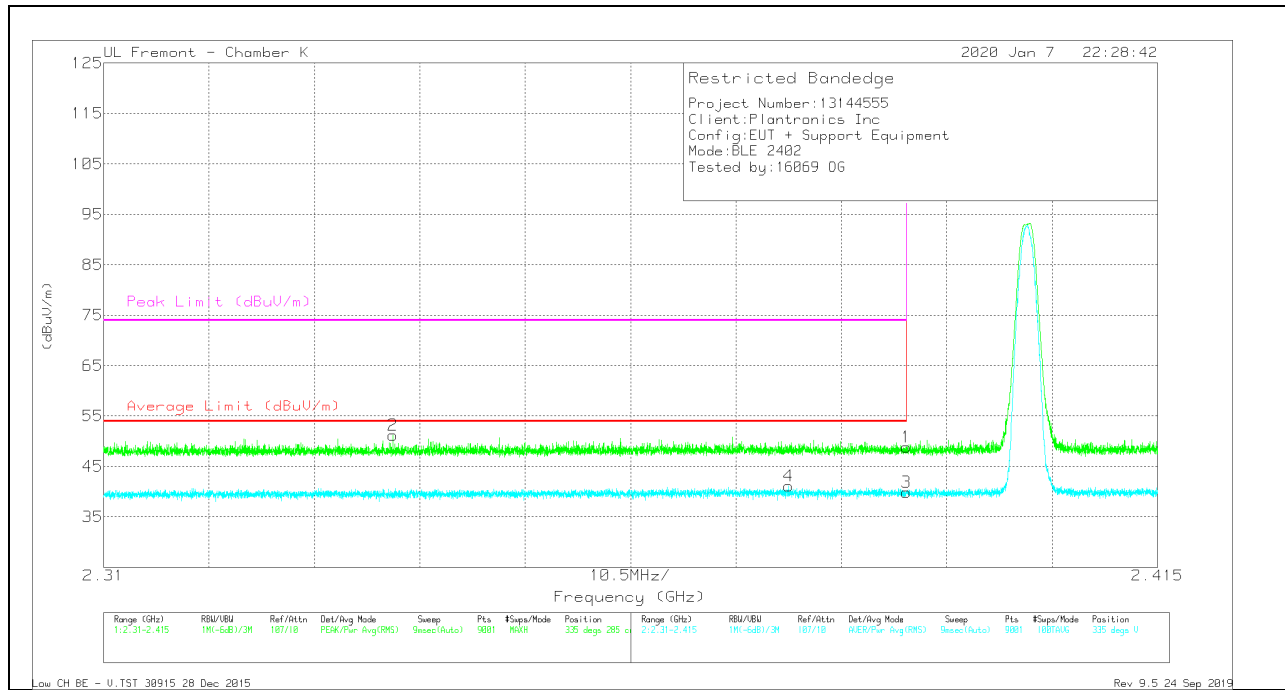
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dBm)	Amp/CB/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.38999	41.47	Pk	31.9	-24.7	0	48.67	-	-	74	-25.33	158	314	H
2	* 2.38687	43.87	Pk	31.9	-24.6	0	51.17	-	-	74	-22.83	158	314	H
3	* 2.38999	30.54	RMS	31.9	-24.7	2.02	39.76	54	-14.24	-	-	158	314	H
4	* 2.38839	31.69	RMS	31.9	-24.6	2.02	41.01	54	-12.99	-	-	158	314	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 EMC4294 (dBm)	Amp/CN/Filt/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	* 2.38999	41.64	Pk	31.9	-24.7	0	48.84	-	-	74	-25.16	335	285	V
2	* 2.33884	44.24	Pk	31.7	-24.7	0	51.24	-	-	74	-22.76	335	285	V
3	* 2.38999	30.7	RMS	31.9	-24.7	2.02	39.92	54	-14.08	-	-	335	285	V
4	* 2.37823	31.97	RMS	31.9	-24.7	2.02	41.19	54	-12.81	-	-	335	285	V

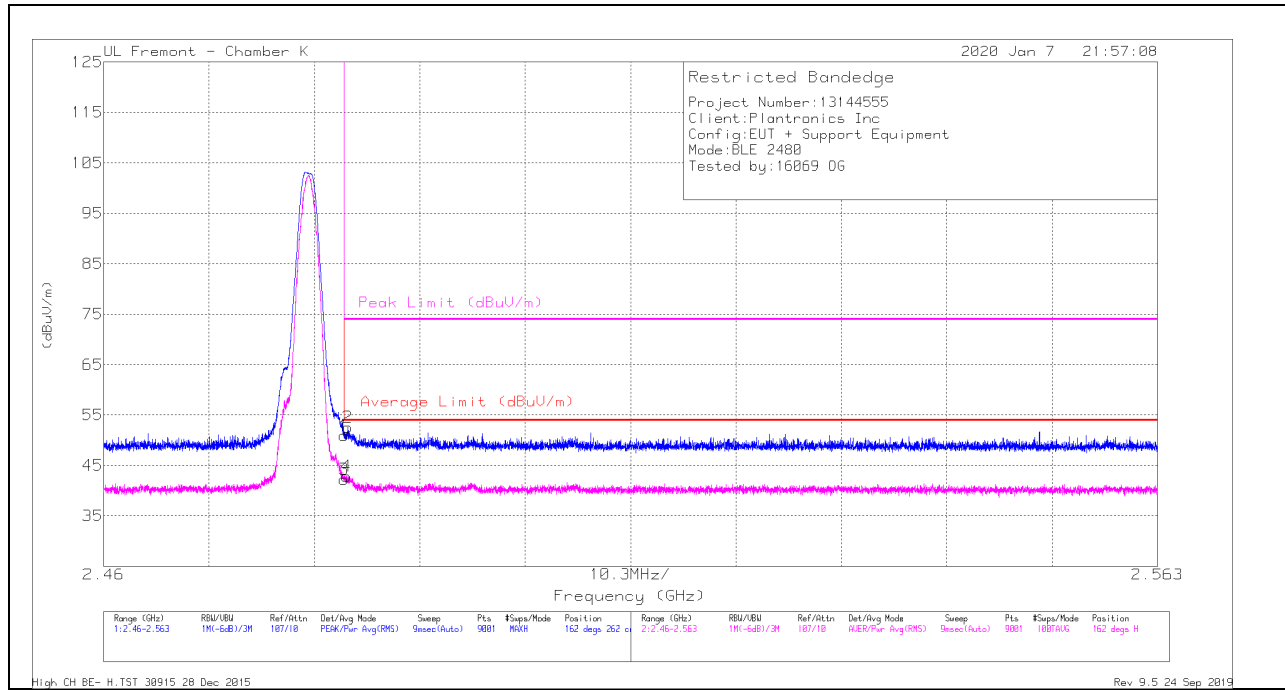
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**BANDEDGE (HIGH CHANNEL)**

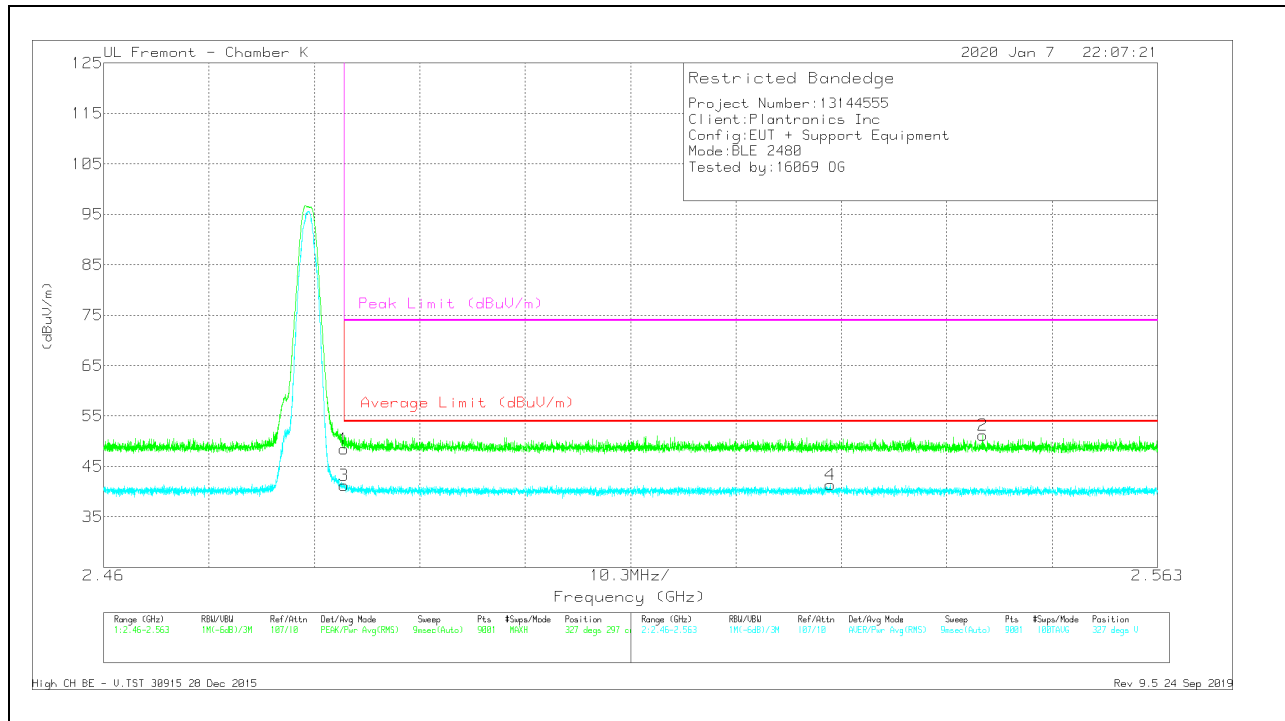
**HORIZONTAL RESULT**



Marker	Frequency (GHz)	Meter Reading (dBu)	Det	AF EMC4294 (dBm)	Amp/Cat/Prot/Pad (dB)	DC Corr (dB)	Corrected Reading (dBu/m)	Average Limit (dBu/m)	Margin (dB)	Peak Limit (dBu/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.24	Pk	32.5	-24.8	0	50.94	-	-	74	-23.06	162	262	H
2	* 2.4839	44.87	Pk	32.5	-24.8	0	52.57	-	-	74	-21.43	162	262	H
3	* 2.48351	32.58	RMS	32.5	-24.8	2.02	42.3	54	-11.7	-	-	162	262	H
4	* 2.48372	33.2	RMS	32.5	-24.8	2.02	42.92	54	-11.08	-	-	162	262	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 EMC4294 (dBm)	Amp/GM/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	* 2.48351	40.76	Pk	32.5	-24.8	0	48.46	-	-	74	-25.54	327	297	V
2	2.54593	43.66	Pk	32.4	-24.8	0	51.26	-	-	74	-22.74	327	297	V
3	* 2.48351	31.49	RMS	32.5	-24.8	2.02	41.21	54	-12.79	-	-	327	297	V
4	2.53102	31.7	RMS	32.4	-24.7	2.02	41.42	54	-12.58	-	-	327	297	V

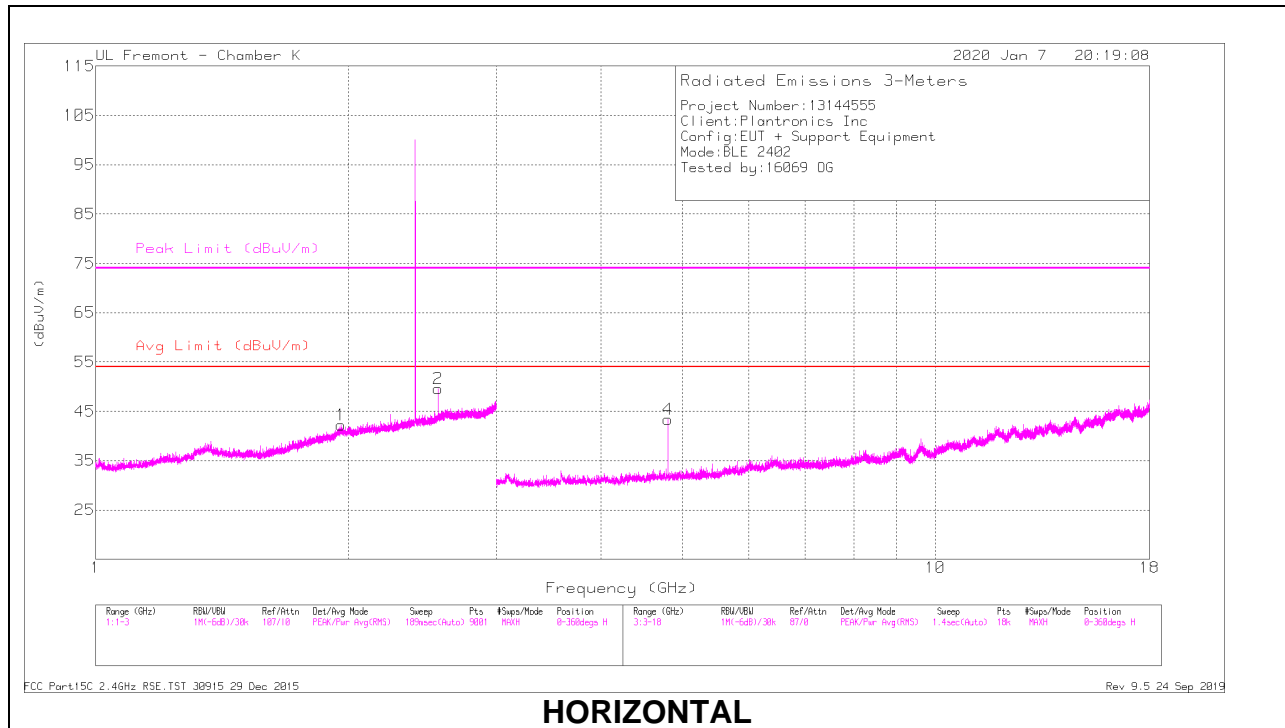
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector  
 RMS - RMS detection

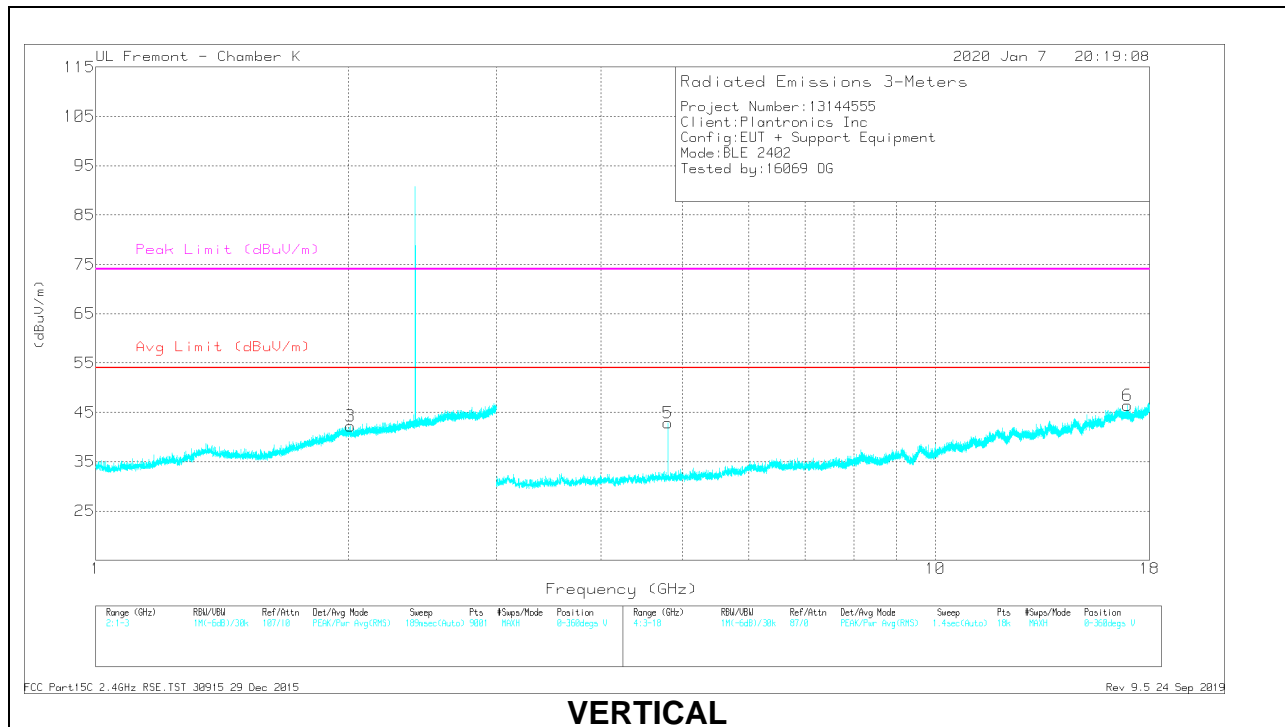


**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL RESULTS**



**HORIZONTAL**



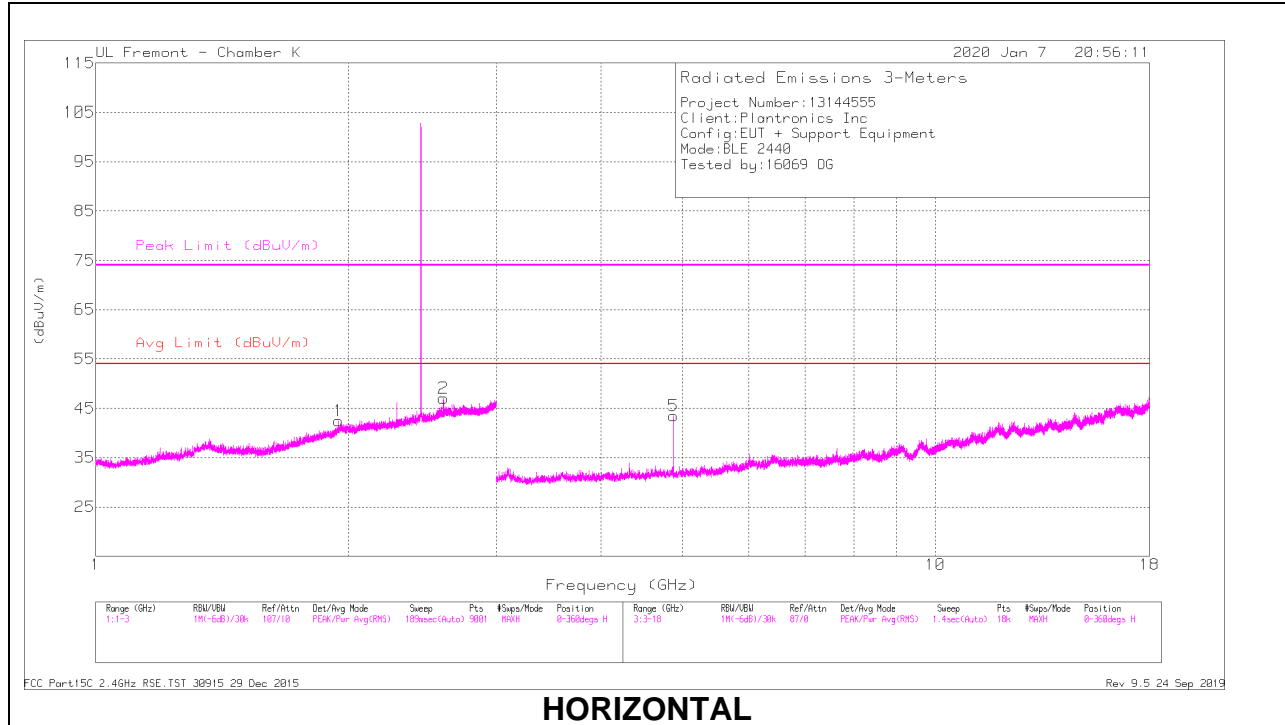
**VERTICAL**

**RADIATED EMISSIONS**

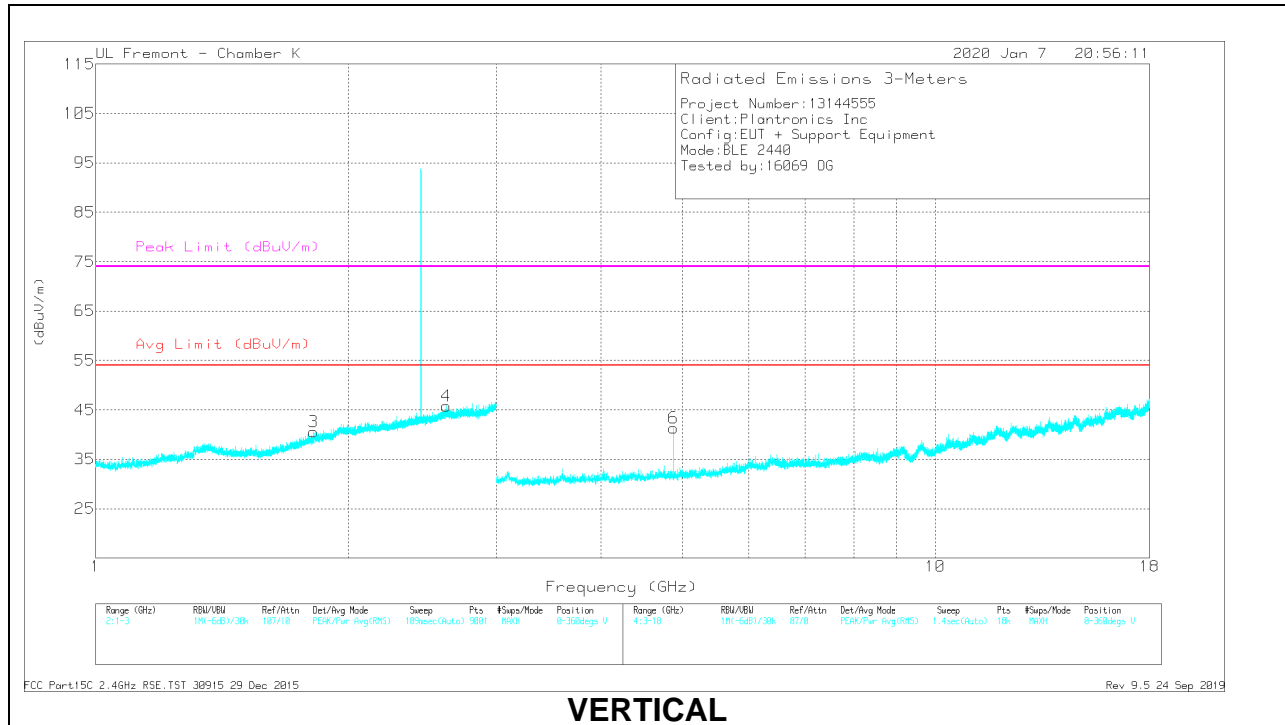
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dBm)	AmpCbl/Ftr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limt (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.96067	25.9	Pk	31.5	-15.2	0	42.2	-	-	-	-	0-360	101	H
2	2.558	30.85	Pk	32.5	-13.7	0	49.65	-	-	-	-	0-360	101	H
3	2.01067	25.87	Pk	31.5	-15.1	0	42.27	-	-	-	-	0-360	199	V
4	* 4.80405	25.73	PK2	34.2	-30.3	0	29.63	-	-	74	-44.37	61	98	H
	* 4.80377	33.73	MAv1	34.2	-30.3	2.02	39.65	54	-14.35	-	-	61	98	H
5	* 4.80345	43.58	PK2	34.2	-30.3	0	47.48	-	-	74	-26.52	270	108	V
	* 4.8041	34.19	MAv1	34.2	-30.3	2.02	40.11	54	-13.89	-	-	270	108	V
6	16.93578	22.44	Pk	40.7	-16.7	0	46.44	-	-	-	-	0-360	199	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 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	AF EMC4294 (dBm)	Amp/Cbl/Ftr/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	1.94689	26.26	Pk	31.3	-15.1	0	42.46	-	-	-	-	0-360	199	H
2	2.596	28.05	Pk	32.7	-13.7	0	47.05	-	-	-	-	0-360	102	H
3	1.81667	25.85	Pk	30.4	-15.7	0	40.55	-	-	-	-	0-360	101	V
4	2.61755	26.79	Pk	32.7	-13.7	0	45.79	-	-	-	-	0-360	199	V
5	* 4.8794	43.59	PK2	34.1	-30.5	0	47.19	-	-	74	-26.81	243	111	H
	* 4.87992	34.6	MAV1	34.1	-30.5	2.02	40.22	54	-13.78	-	-	243	111	H
6	* 4.87951	42.27	PK2	34.1	-30.5	0	45.87	-	-	74	-28.13	269	243	V
	* 4.88019	32.47	MAV1	34.1	-30.5	2.02	38.09	54	-15.91	-	-	269	243	V

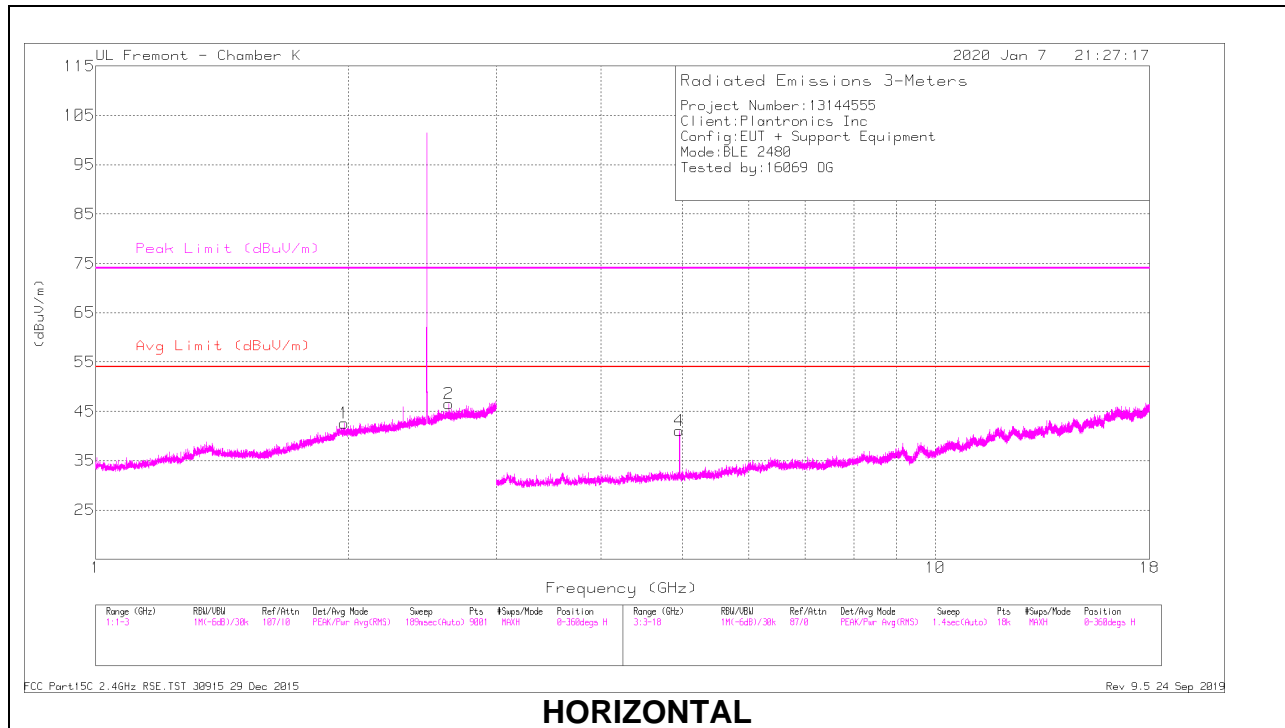
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

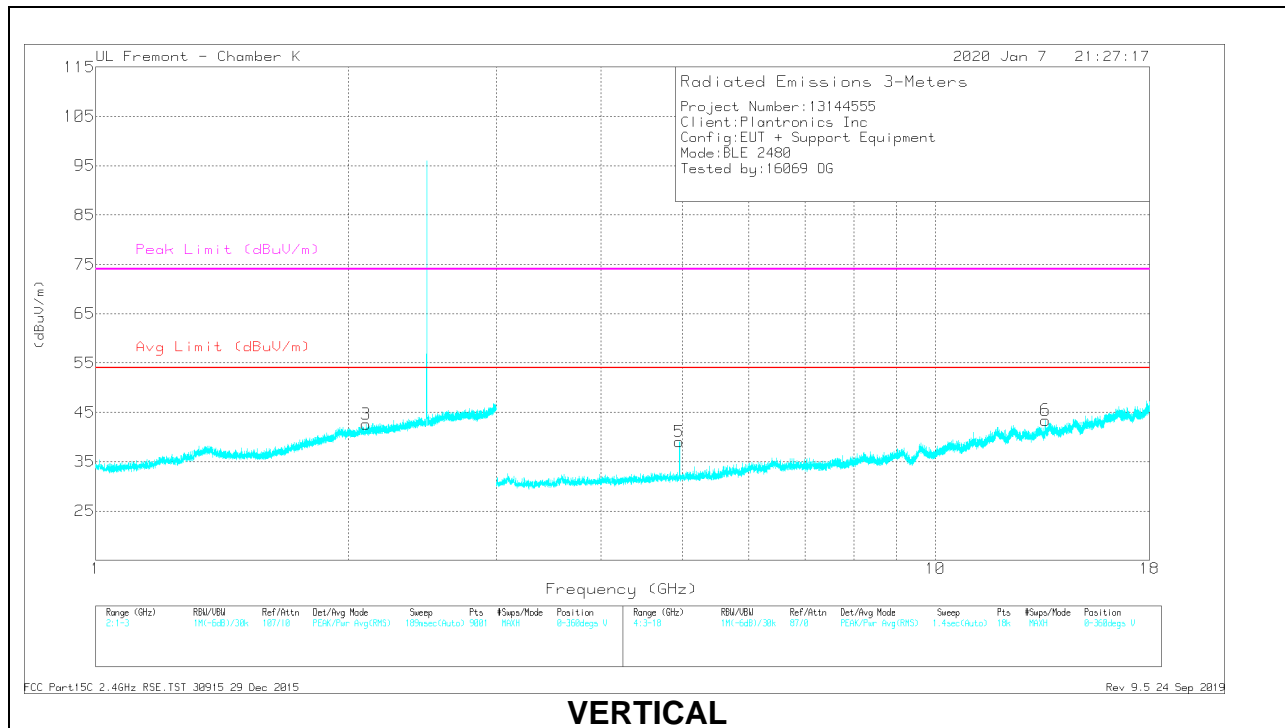
PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

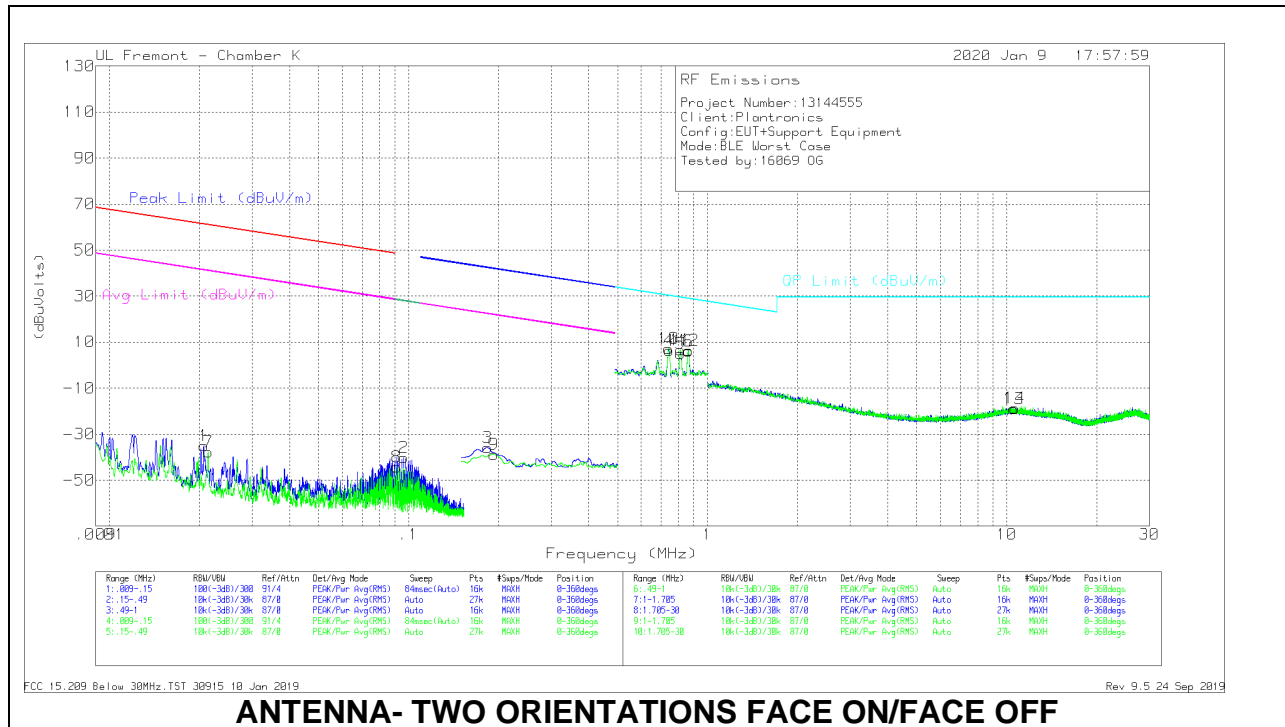
**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dBm)	Amp/Cbl/Ftr/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	1.97867	26.36	Pk	31.5	-15.3	0	42.56	-	-	-	-	0-360	199	H
2	2.636	27.48	Pk	32.7	-13.6	0	46.58	-	-	-	-	0-360	101	H
3	2.10022	26.28	Pk	31.4	-15.1	0	42.58	-	-	-	-	0-360	199	V
4	* 4.95942	42.17	PK2	34.1	-30.6	0	45.67	-	-	74	-28.33	225	96	H
	* 4.95992	32.47	MAv1	34.1	-30.6	2.02	37.99	54	-16.01	-	-	225	96	H
5	* 4.9595	42.22	PK2	34.1	-30.6	0	45.72	-	-	74	-28.28	266	251	V
	* 4.95994	32.88	MAv1	34.1	-30.6	2.02	38.4	54	-15.6	-	-	266	251	V
6	13.52392	23.83	Pk	38.8	-19.2	0	43.43	-	-	-	-	0-360	199	V

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

### 9.3. WORST CASE BELOW 30MHZ

#### SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



**ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF**

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186650	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.02068	18.28	Pk	58.7	-32	-80	-35.02	61.27	-96.29	41.27	-76.29	-	-	-	-	-	-	0-360
2	.09642	16.63	Pk	55.5	-32.2	-80	-40.07	-	-	-	-	27.92	-67.99	-	-	-	-	0-360
3	.18374	20.3	Pk	56	-32.1	-80	-35.8	-	-	-	-	-	-	42.34	-78.14	22.34	-58.14	0-360
7	.02139	15.68	Pk	58.6	-32.1	-80	-37.82	60.98	-98.8	40.98	-78.8	-	-	-	-	-	-	0-360
8	.09146	12.29	Pk	55.6	-32.2	-80	-44.31	-	-	-	-	28.36	-72.67	-	-	-	-	0-360
9	.19283	17.29	Pk	56	-32.1	-80	-38.81	-	-	-	-	-	-	41.92	-80.73	21.92	-60.73	0-360

Pk - Peak detector

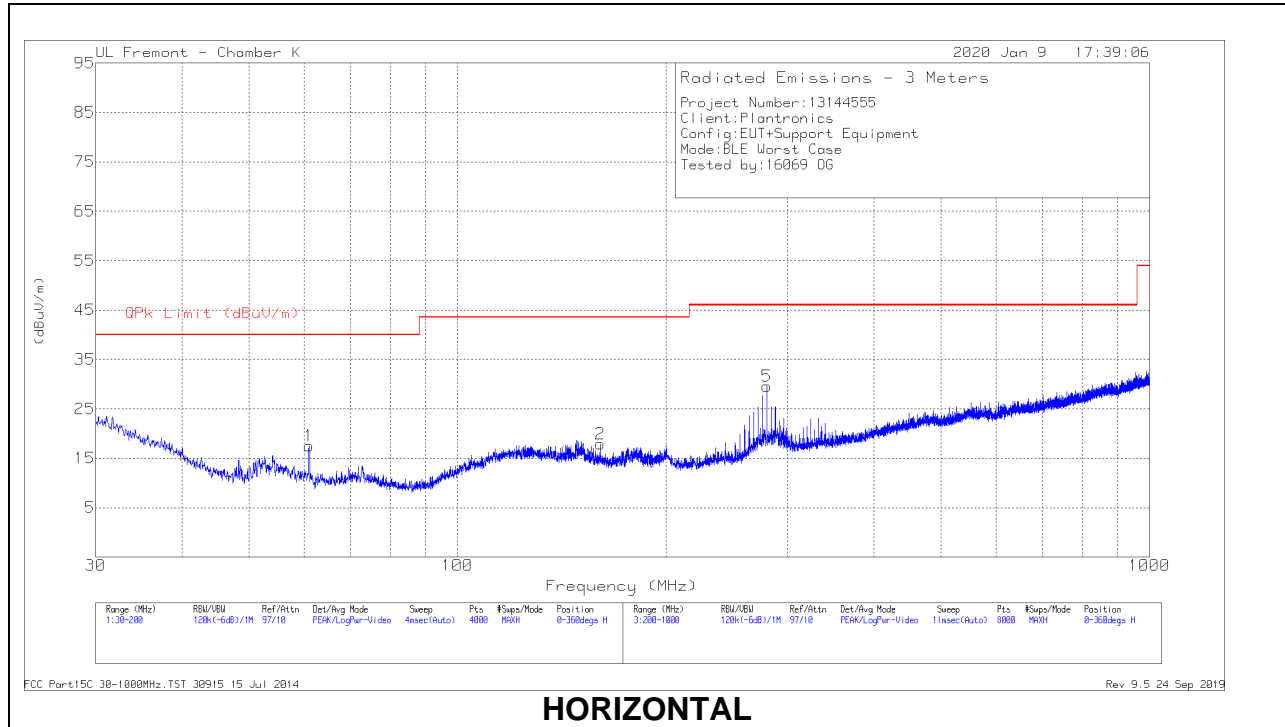
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186650	Dist Corr 300m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.7436	22.42	Pk	56.1	-32.1	-40	6.42	30.19	-23.77	0-360
5	.81104	21.14	Pk	56.1	-32.1	-40	5.14	29.44	-24.3	0-360
6	.8635	22.16	Pk	56.1	-32.1	-40	6.16	28.89	-22.73	0-360
10	.74096	23.26	Pk	56.1	-32.1	-40	7.26	30.22	-22.96	0-360
11	.81139	22.61	Pk	56.1	-32.1	-40	6.61	29.43	-22.82	0-360
12	.8635	22.44	Pk	56.1	-32.1	-40	6.44	28.89	-22.45	0-360
13	10.5213	18.35	Pk	34.4	-31.8	-40	-19.05	29.5	-48.55	0-360
14	10.64444	18.78	Pk	34.4	-31.8	-40	-18.62	29.5	-48.12	0-360

Pk - Peak detector

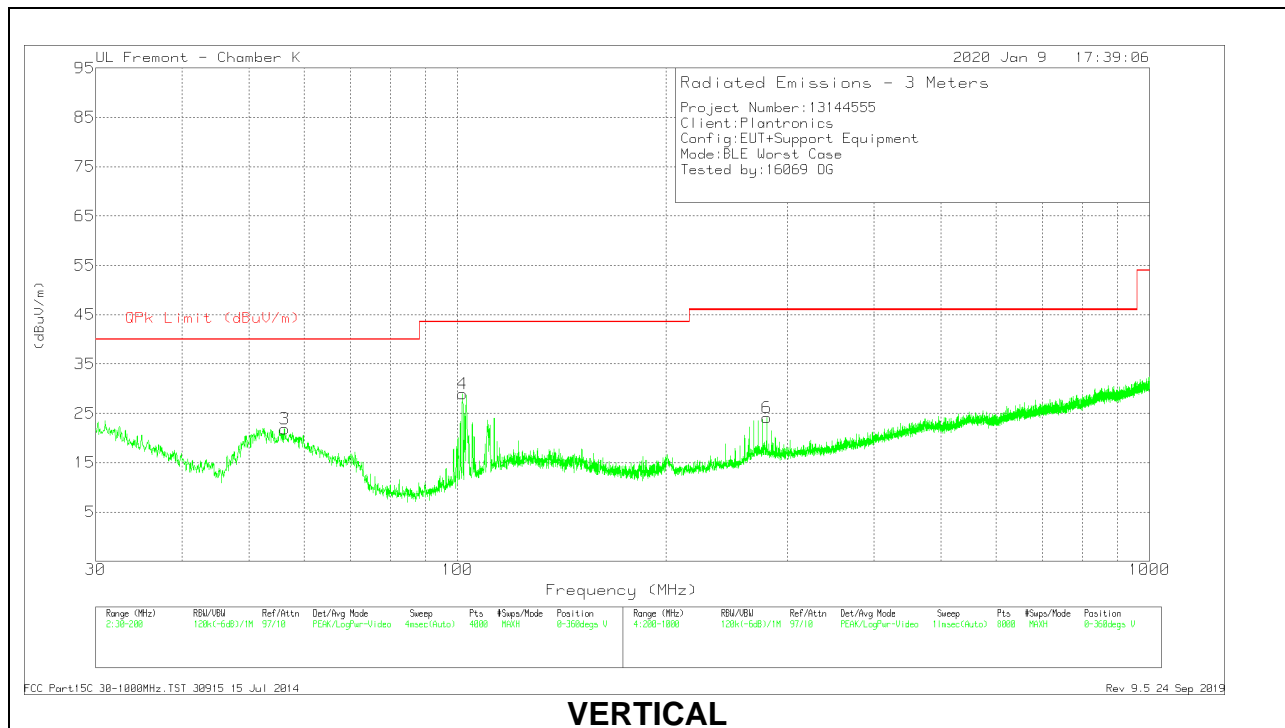


### 9.4. WORST CASE BELOW 1 GHZ

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



**HORIZONTAL**



**VERTICAL**

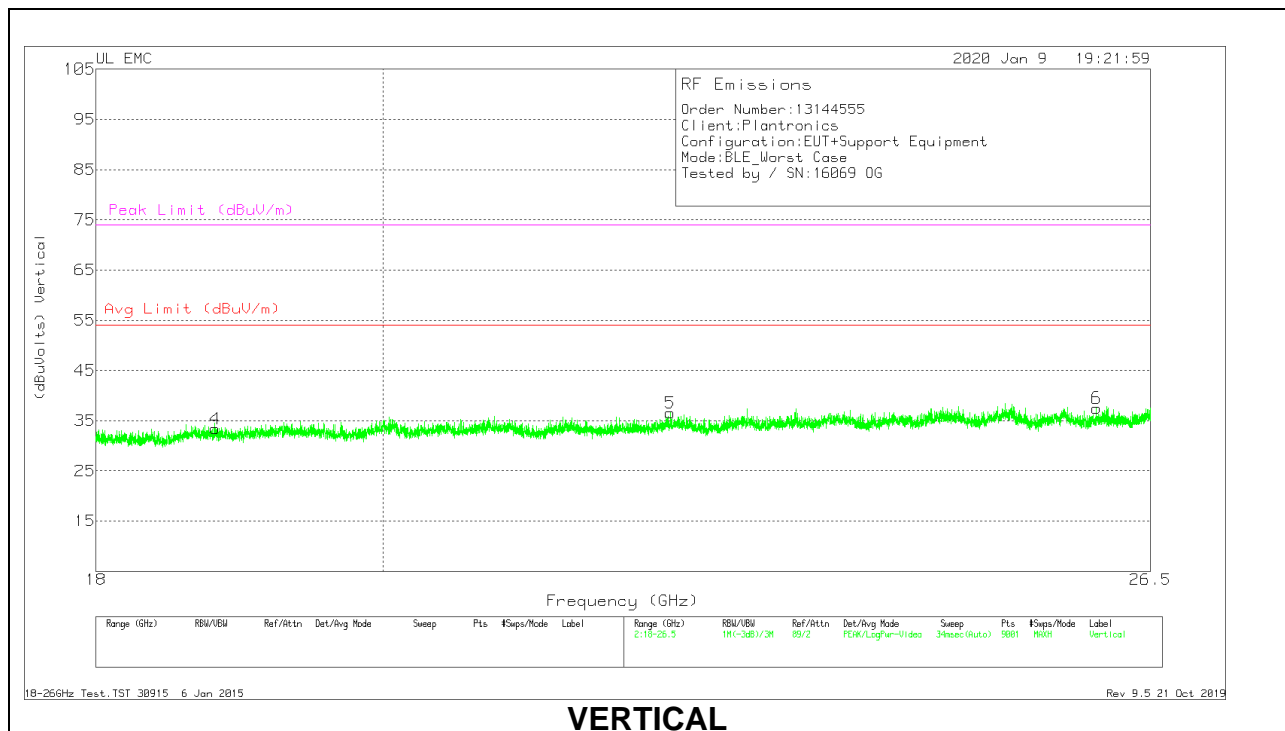
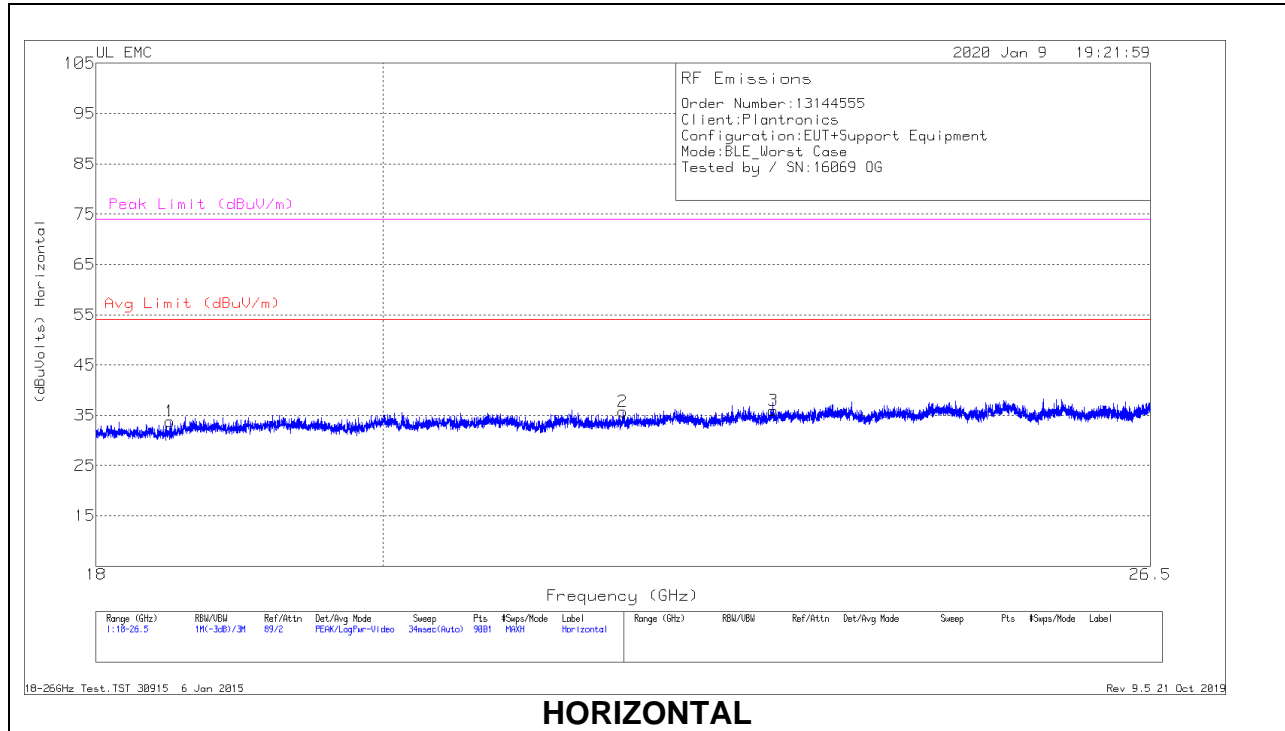
**Below 1GHz Data**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0181574 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	61.033	35.29	Pk	13.4	-31.2	17.49	40	-22.51	0-360	199	H
2	160.7638	30.29	Pk	18.1	-30.5	17.89	43.52	-25.63	0-360	199	H
3	56.2293	40.1	Pk	13.1	-31.3	21.9	40	-18.1	0-360	95	V
4	101.9296	29.6	Pk	16.8	-30.9	15.5	43.52	-28.02	8	167	V
	101.5743	21.5	Qp	16.7	-30.9	7.3	43.52	-36.22	8	167	V
5	* 279.9104	40.42	Pk	19.2	-30	29.62	46.02	-16.4	0-360	99	H
6	* 279.9104	34.93	Pk	19.2	-30	24.13	46.02	-21.89	0-360	199	V

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

### 9.1. 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	18.49489	70.06	Pk	32.4	-59.2	-9.5	33.76	54	-20.24	74	-40.24
2	21.83728	69.32	Pk	33.3	-57.4	-9.5	35.72	54	-18.28	74	-38.28
3	23.0745	68.97	Pk	33.8	-57.3	-9.5	35.97	54	-18.03	74	-38.03
4	18.80561	68.91	Pk	32.4	-58.4	-9.5	33.41	54	-20.59	74	-40.59
5	22.22072	70.25	Pk	33.5	-57.7	-9.5	36.55	54	-17.45	74	-37.45
6	25.97961	67.58	Pk	34.5	-55.1	-9.5	37.48	54	-16.52	74	-36.52

Pk - Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

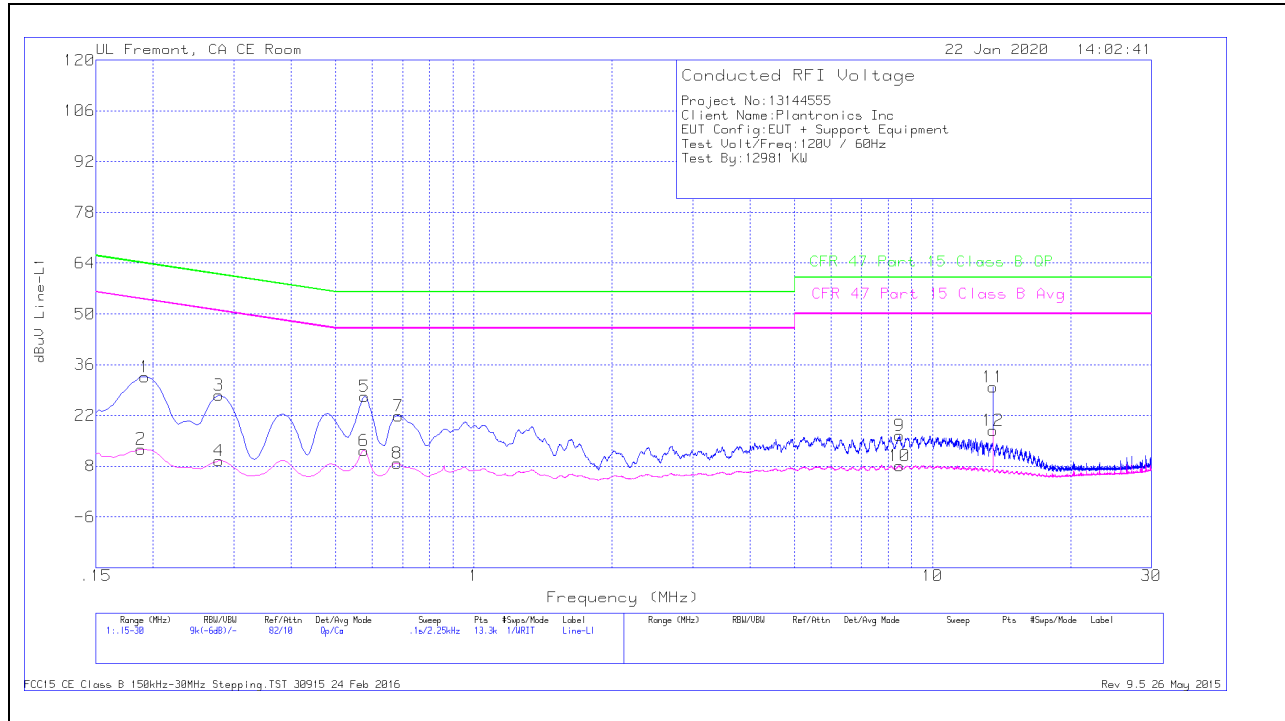
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### RESULTS

### 10.1.1. AC Power Line Norm

### LINE 1 RESULTS

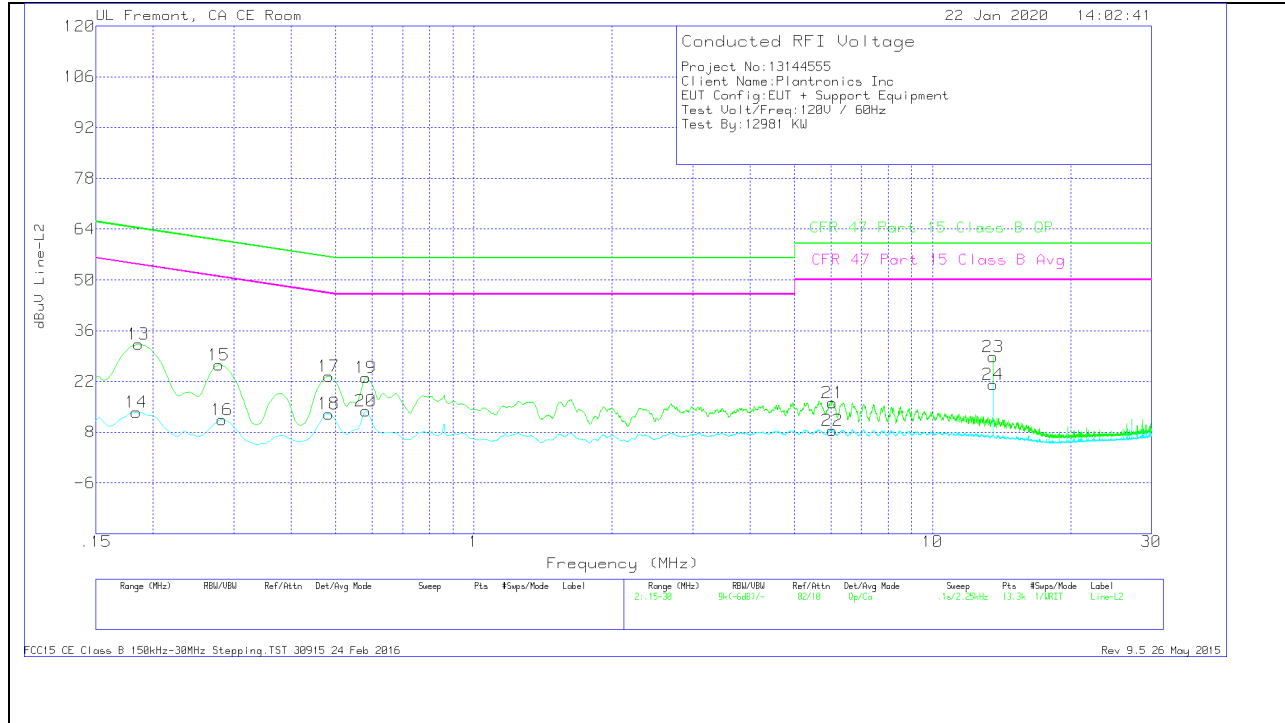


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.19163	22.5	Qp	0	0	10.1	32.6	63.97	-31.37	-	-
2	.18825	2.61	Ca	0	0	10.1	12.71	-	-	54.11	-41.4
3	.27825	17.45	Qp	0	0	10.1	27.55	60.87	-33.32	-	-
4	.27825	-6	Ca	0	0	10.1	9.5	-	-	50.87	-41.37
5	.5775	17.15	Qp	0	0	10.1	27.25	56	-28.75	-	-
6	.57525	2.24	Ca	0	0	10.1	12.34	-	-	46	-33.66
7	.6855	11.74	Qp	0	0	10.1	21.84	56	-34.16	-	-
8	.67987	-1.26	Ca	0	0	10.1	8.84	-	-	46	-37.16
9	8.47725	6.08	Qp	0	.2	10.2	16.48	60	-43.52	-	-
10	8.484	-2.27	Ca	0	.2	10.2	8.13	-	-	50	-41.87
11	13.56	19.37	Qp	.1	.2	10.2	29.87	60	-30.13	-	-
12	13.56	7.36	Ca	.1	.2	10.2	17.86	-	-	50	-32.14

Qp - Quasi-Peak detector

Ca - CISPR average detection

### LINE 2 RESULTS



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	.186	22.1	Qp	0	0	10.1	32.2	64.21	-32.01	-	-
14	.18375	3.44	Ca	0	0	10.1	13.54	-	-	54.31	-40.77
15	.27825	16.45	Qp	0	0	10.1	26.55	60.87	-34.32	-	-
16	.28275	1.29	Ca	0	0	10.1	11.39	-	-	50.73	-39.34
17	.483	13.35	Qp	0	0	10.1	23.45	56.29	-32.84	-	-
18	.483	2.96	Ca	0	0	10.1	13.06	-	-	46.29	-33.23
19	.582	12.98	Qp	0	0	10.1	23.08	56	-32.92	-	-
20	.582	3.68	Ca	0	0	10.1	13.78	-	-	46	-32.22
21	6.05625	5.78	Qp	0	.2	10.2	16.18	60	-43.82	-	-
22	6.054	-1.99	Ca	0	.2	10.2	8.41	-	-	50	-41.59
23	13.56	18.34	Qp	.1	.2	10.2	28.84	60	-31.16	-	-
24	13.56	10.57	Ca	.1	.2	10.2	21.07	-	-	50	-28.93

Qp - Quasi-Peak detector

Ca - CISPR average detection