



# **CERTIFICATION TEST REPORT**

**Report Number. :** 13144555-E1V1

**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

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NVLAP Lab code: 200065-0

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**REPORT REVISION HISTORY**

Rev.	Issue Date	Revisions	Revised By
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  
UL Verification Services Inc. By:



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Operations Leader  
Consumer Technology Division  
UL Verification Services Inc.

Prepared By:



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Eric Yu  
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 v05r01, 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 checked="" 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	Basic GFSK	17.68	58.61
2402 - 2480	Enhanced DQPSK	12.04	16.00
2402 - 2480	Enhanced 8PSK	12.38	17.30

Note: GFSK, DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to showing compliance.

### 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:

GFSK mode: DH5  
8PSK mode: 3-DH5

## 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

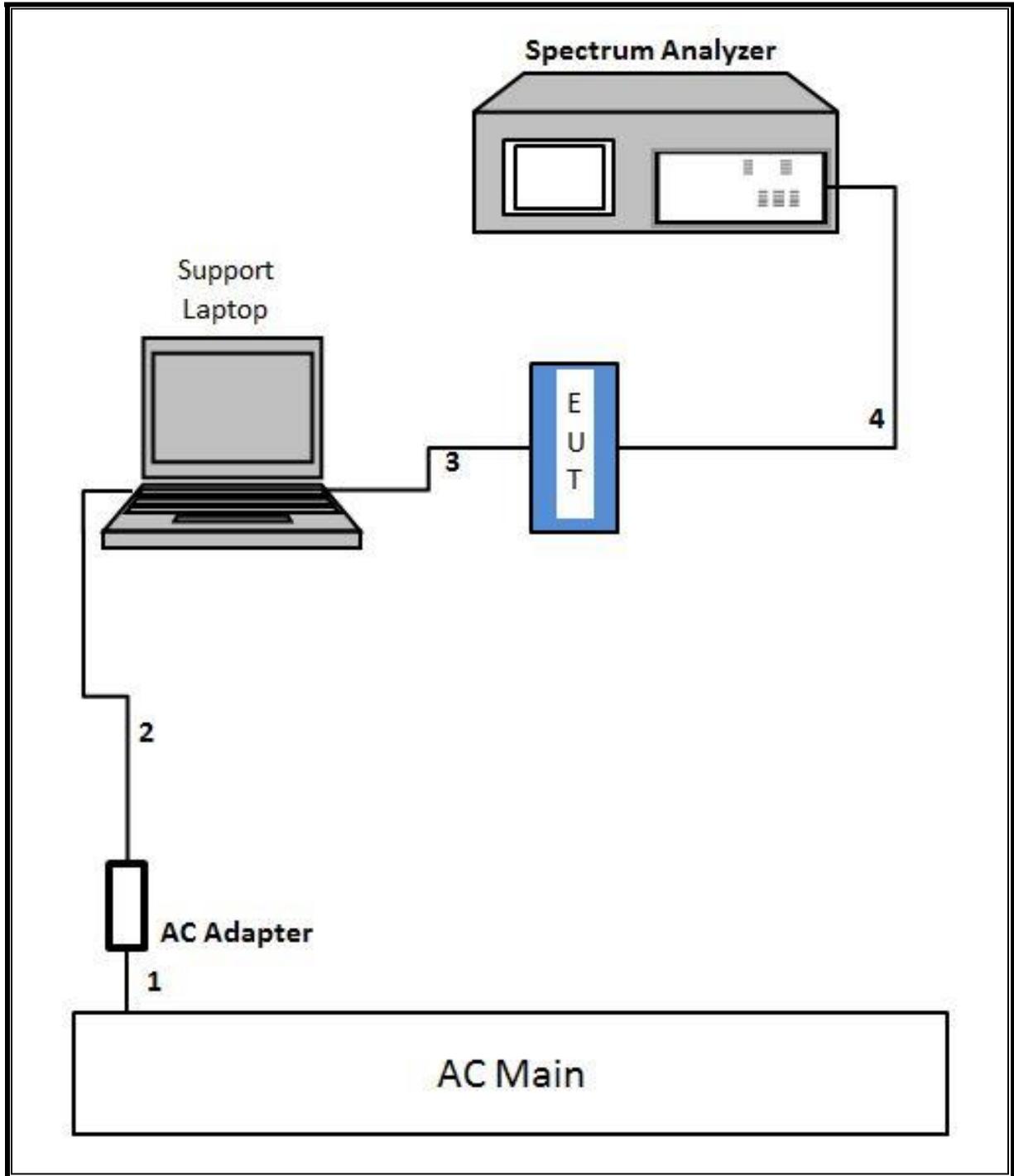
### I/O CABLES FOR RADIATED AND AC LINE CONDUCTED

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.

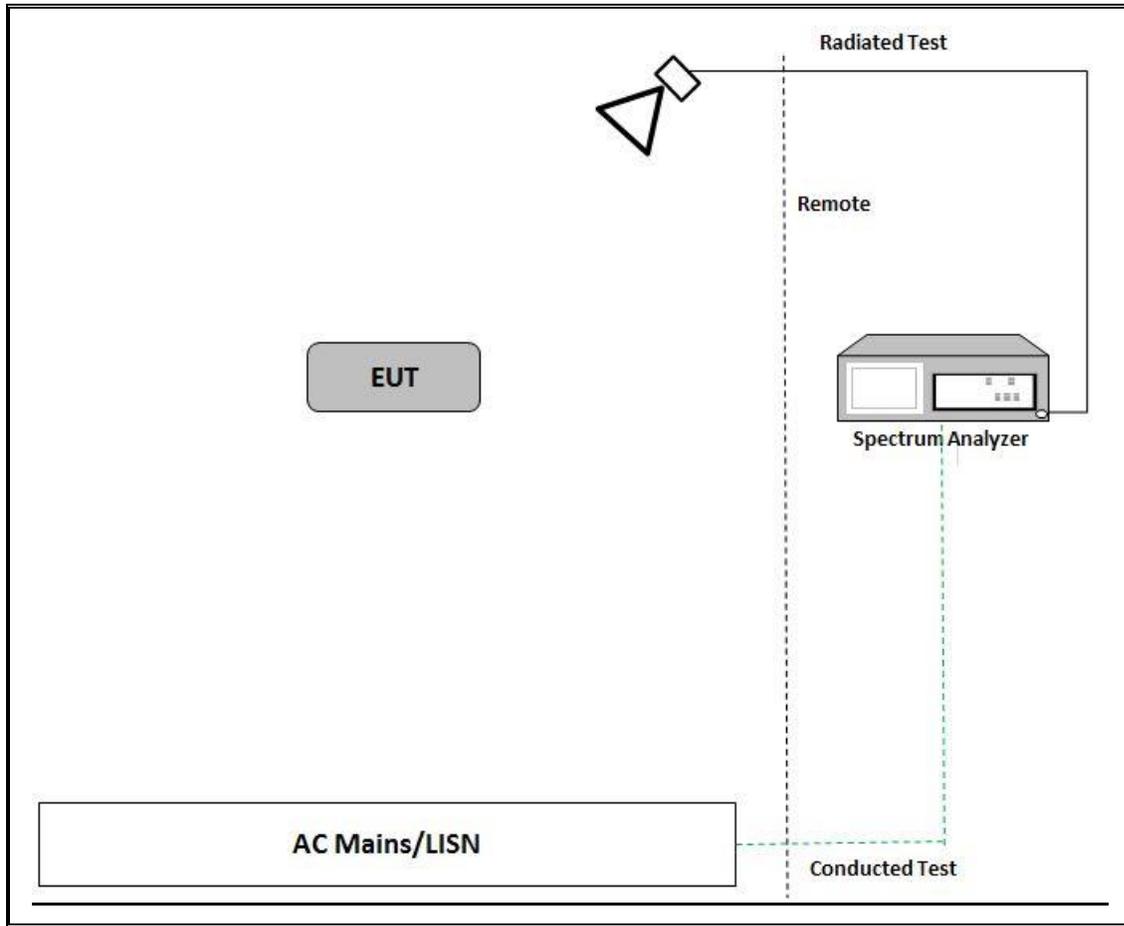
**CONDUCTED TEST SETUP DIAGRAM**



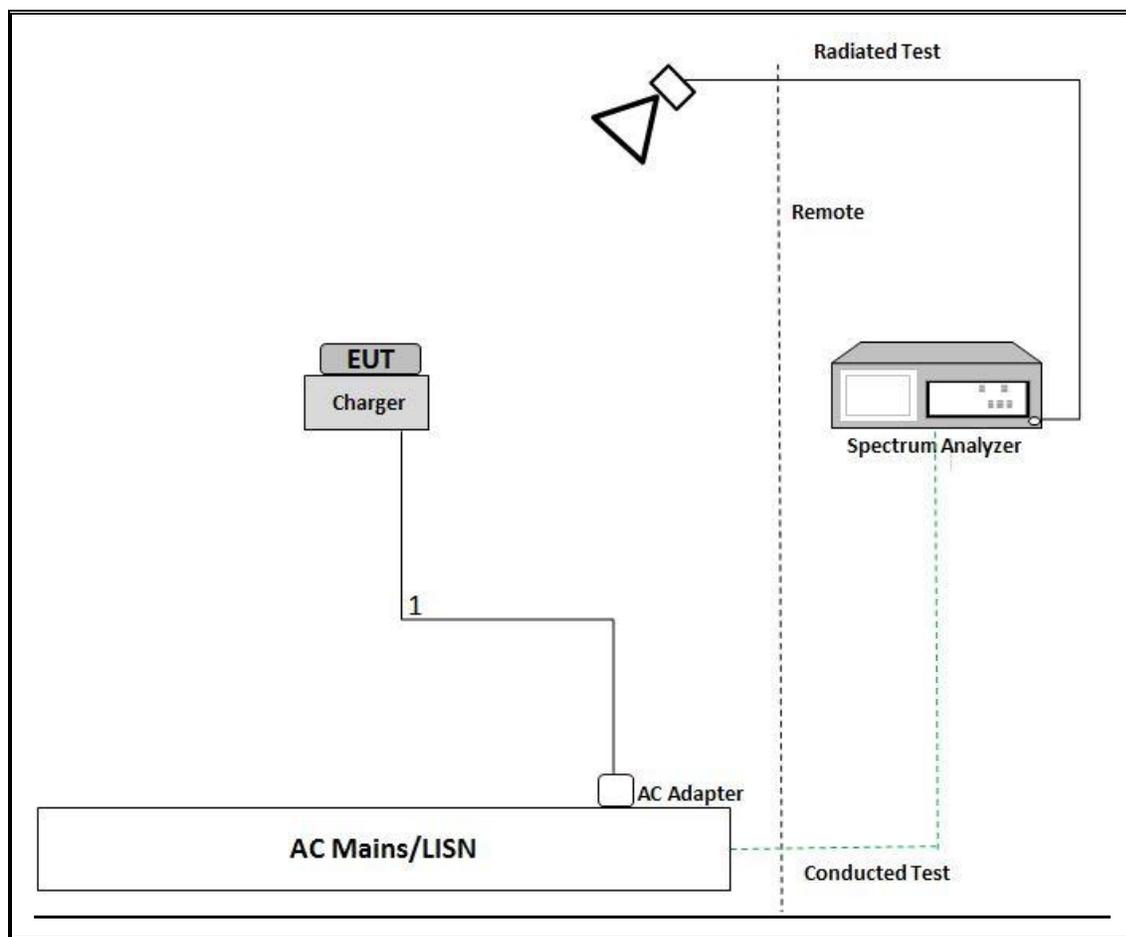
**TEST SETUP**

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 METHODS**

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

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

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

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

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

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

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	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
Amplifier, 1 to 18GHz	Amplical	AMP1G18-35	T1571	05/28/2020
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
EMI Test Receiver	Rohde&Schwarz	ESW44	PRE0179376	02/14/2020
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.

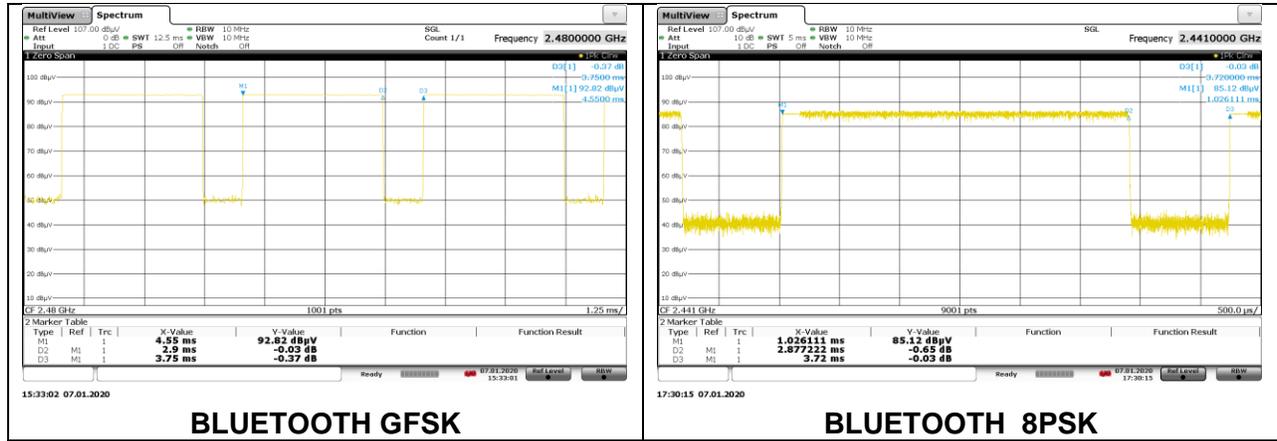
#### PROCEDURE

ANSI C63.10, Section 11.6 : 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/T Minimum VBW (kHz)
Bluetooth GFSK	2.90	3.75	0.773	77.3%	1.12	0.345
Bluetooth 8PSK	2.88	3.72	0.773	77.3%	1.12	0.348



## **8.2. 20 dB AND 99% BANDWIDTH**

### **LIMITS**

None; for reporting purposes only.

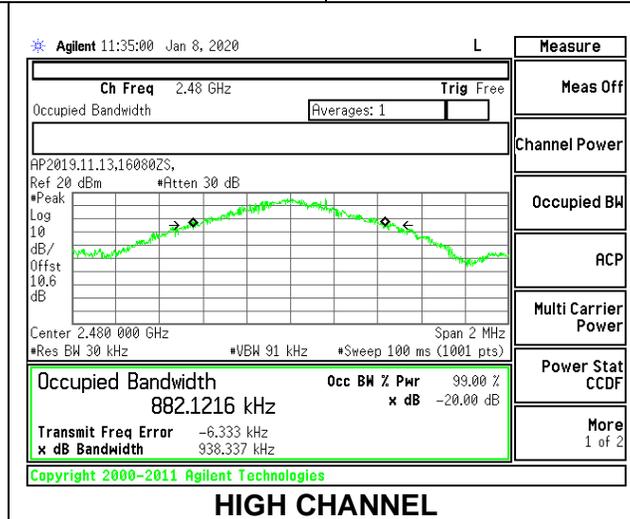
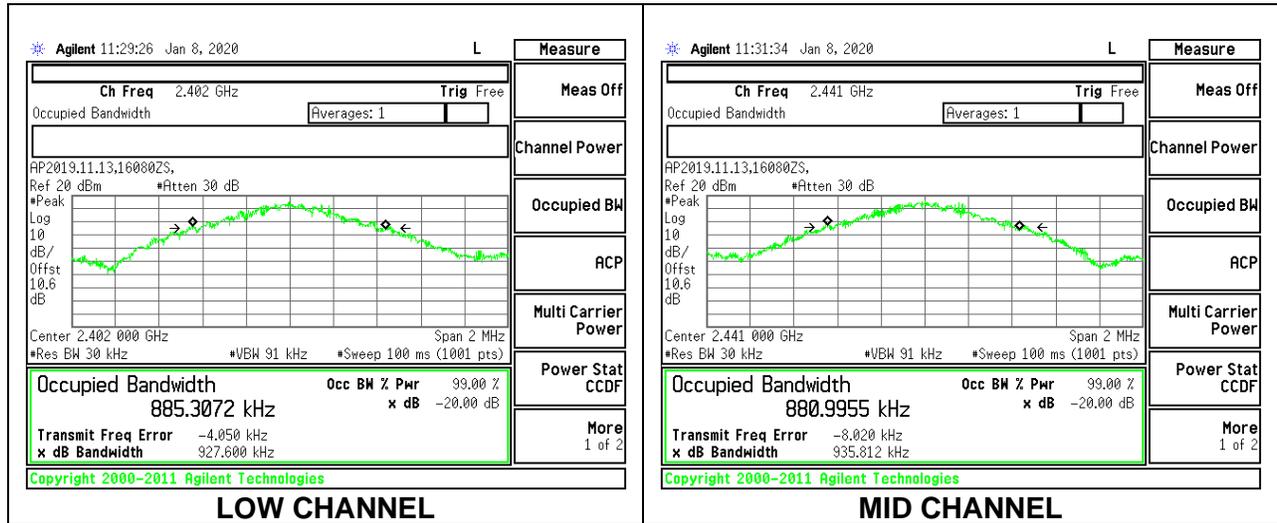
### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq 1\%$  of the 20 dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.

### **RESULTS**

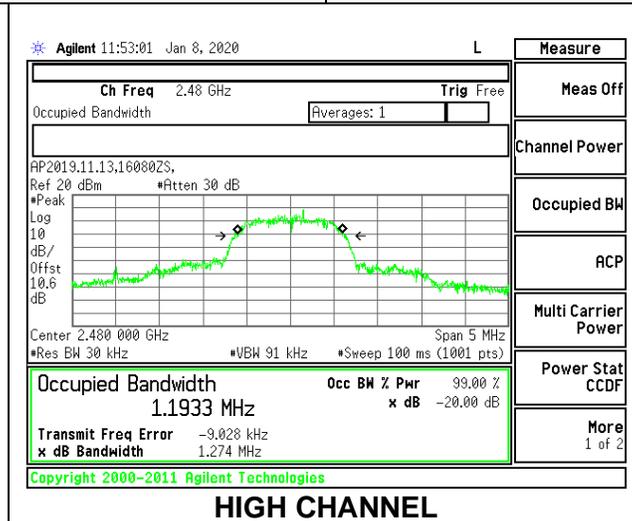
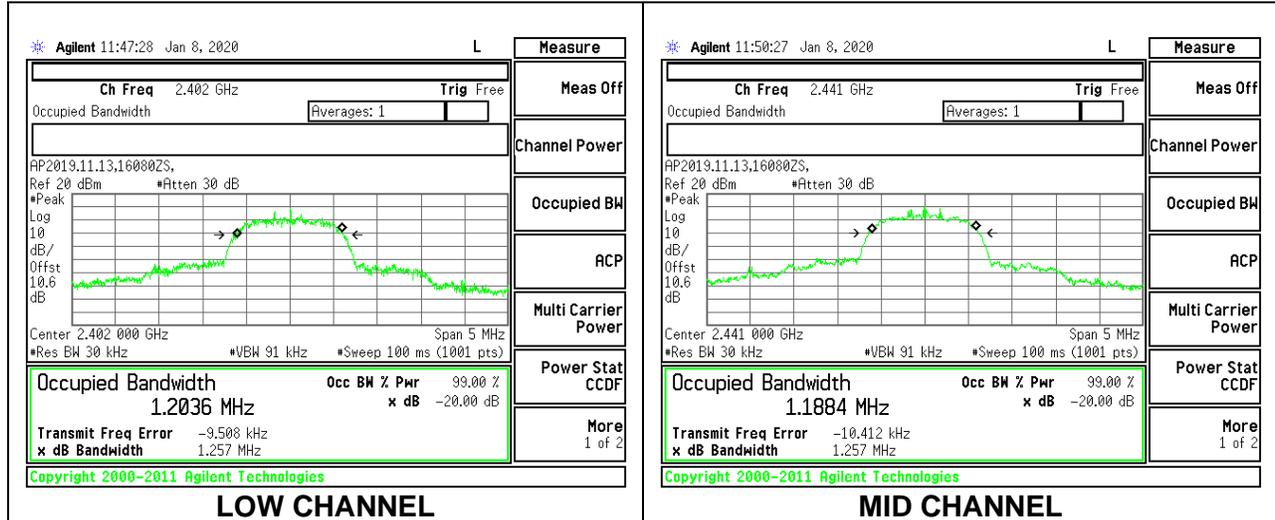
### 8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.928	0.885
Mid	2441	0.936	0.881
High	2480	0.938	0.882



## 8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.257	1.204
Mid	2441	1.257	1.188
High	2480	1.274	1.193



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### **8.3. HOPPING FREQUENCY SEPARATION**

#### **LIMITS**

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

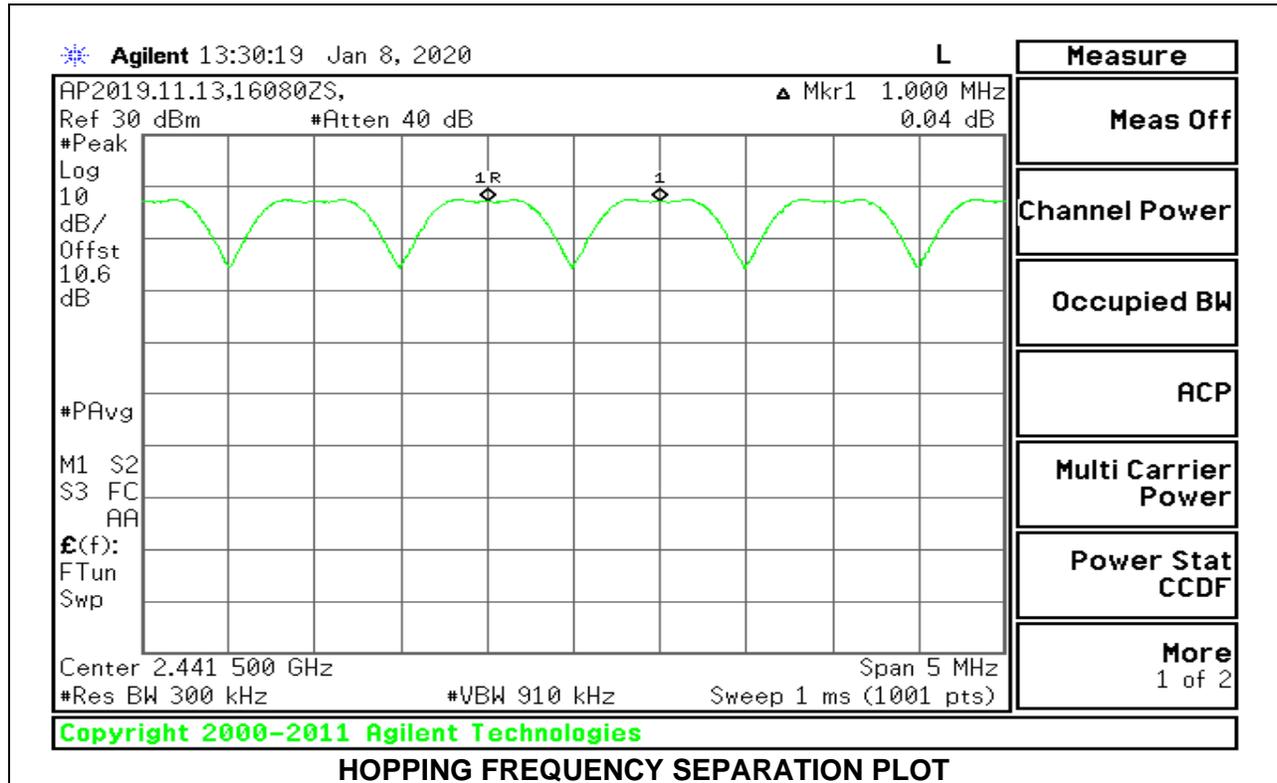
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

#### **TEST PROCEDURE**

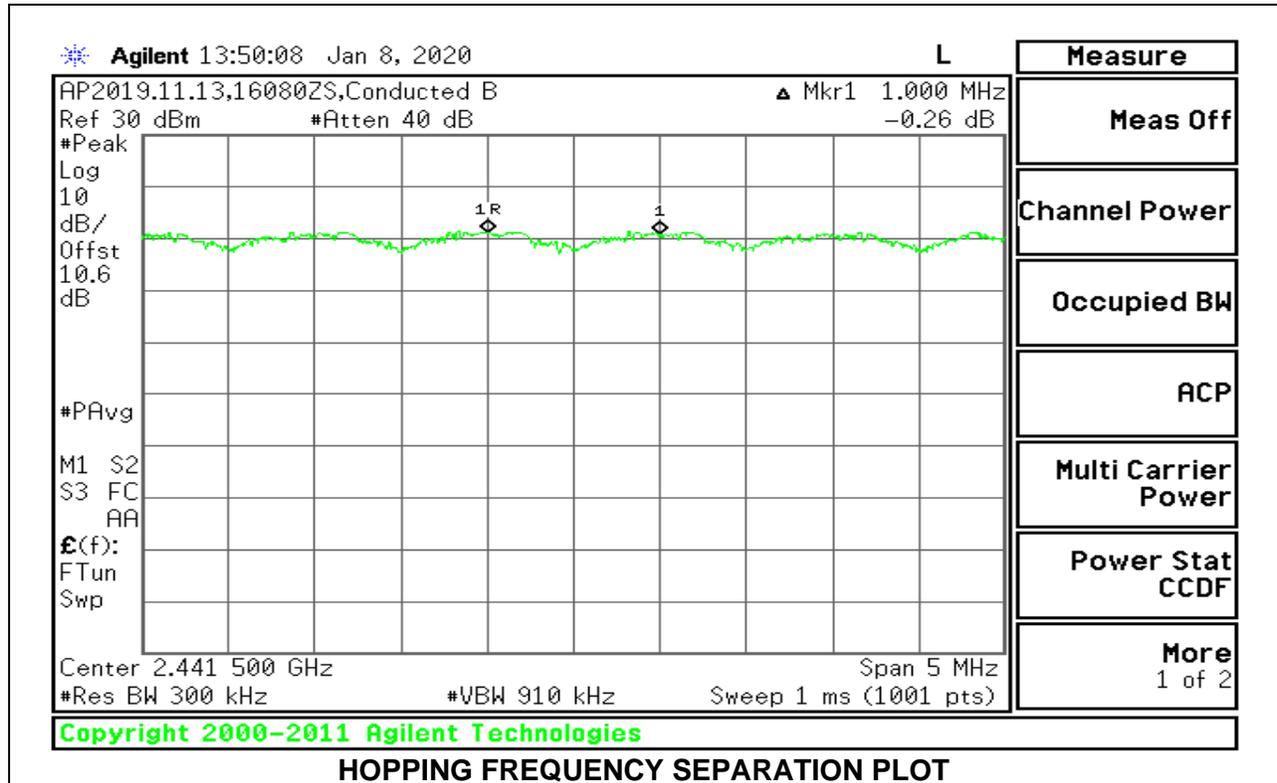
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to  $VBW \geq RBW$ . The sweep time is coupled.

#### **RESULTS**

### 8.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



### 8.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



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## **8.4. NUMBER OF HOPPING CHANNELS**

### **LIMITS**

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

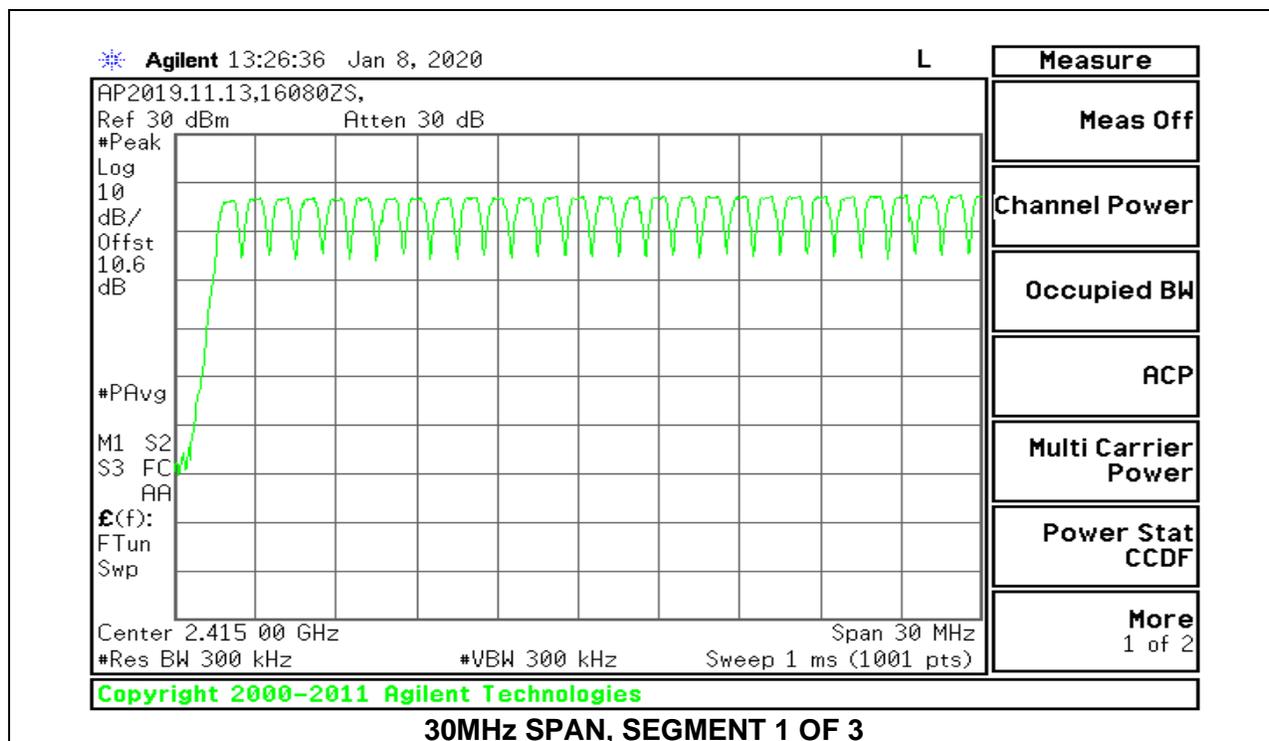
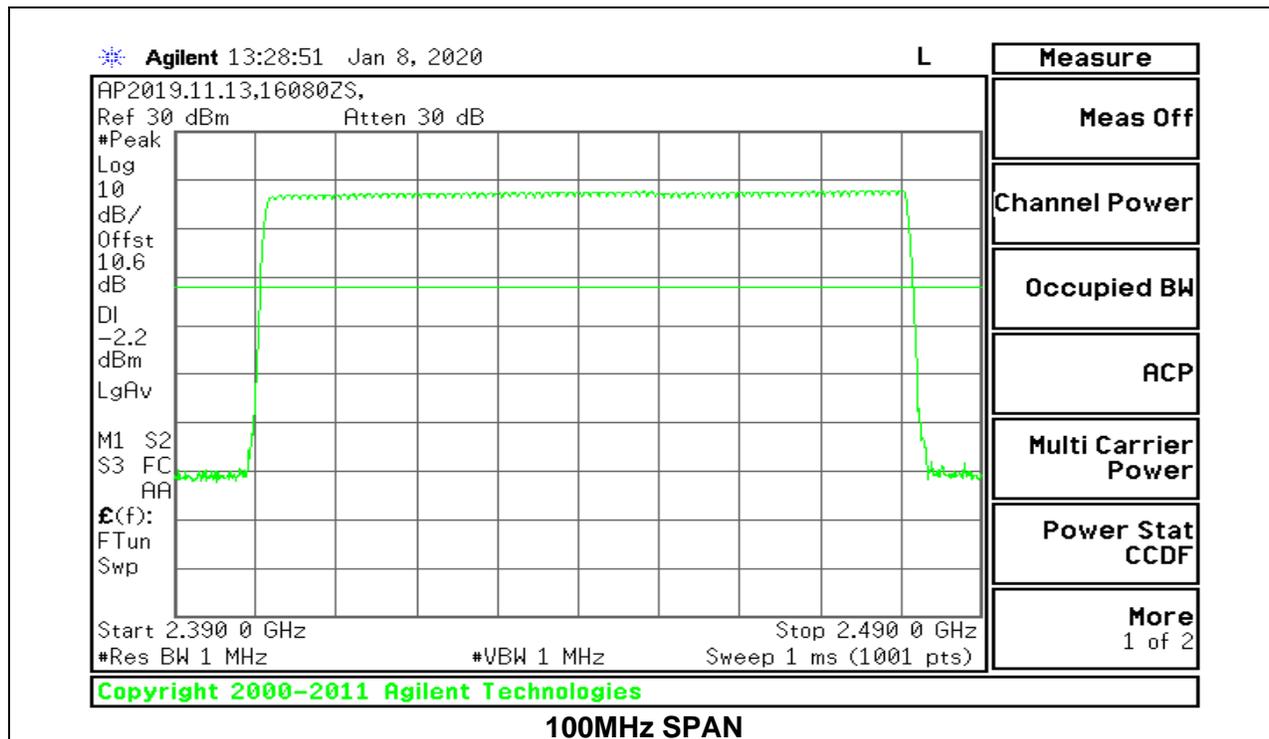
### **TEST PROCEDURE**

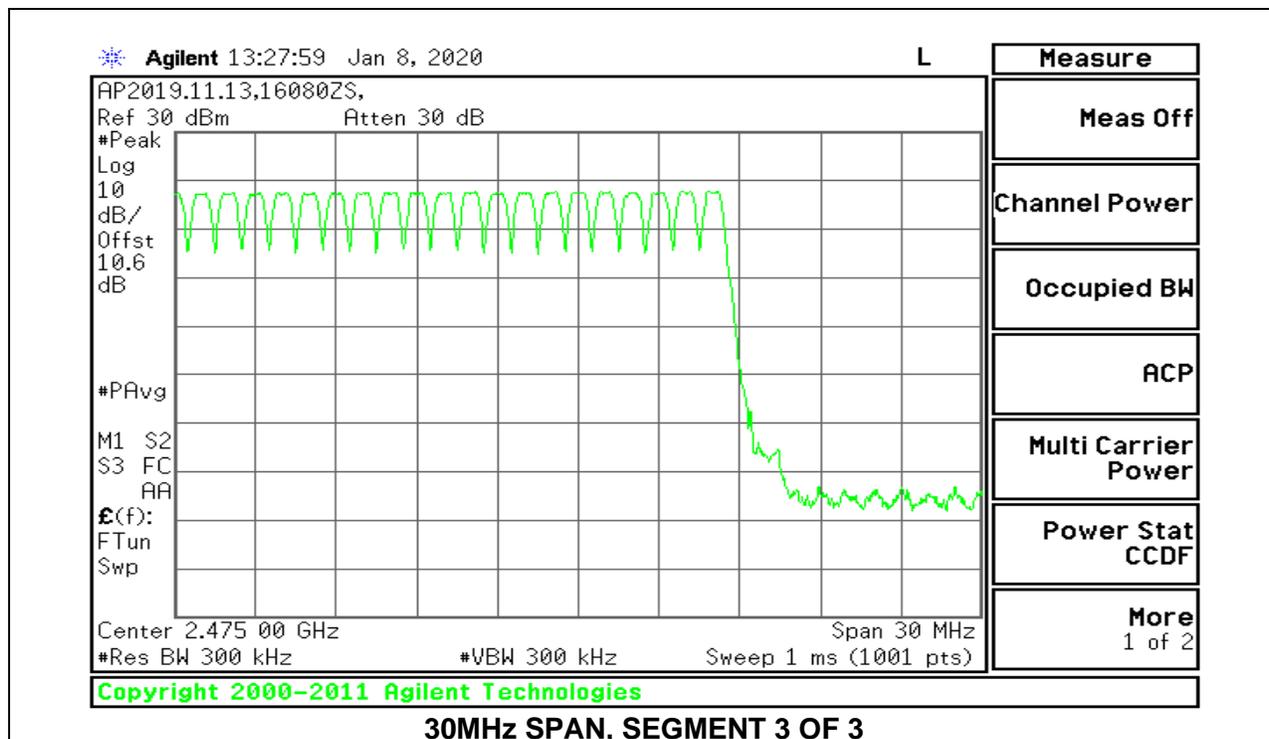
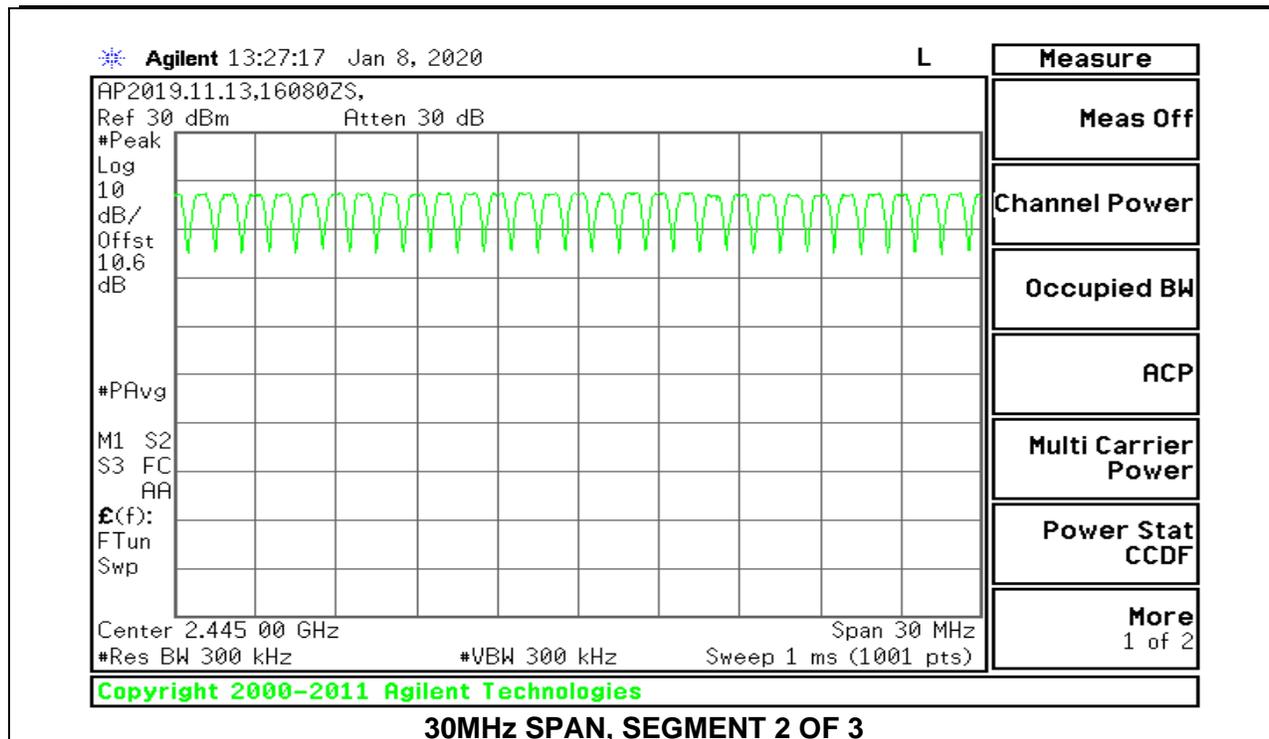
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

### **RESULTS**

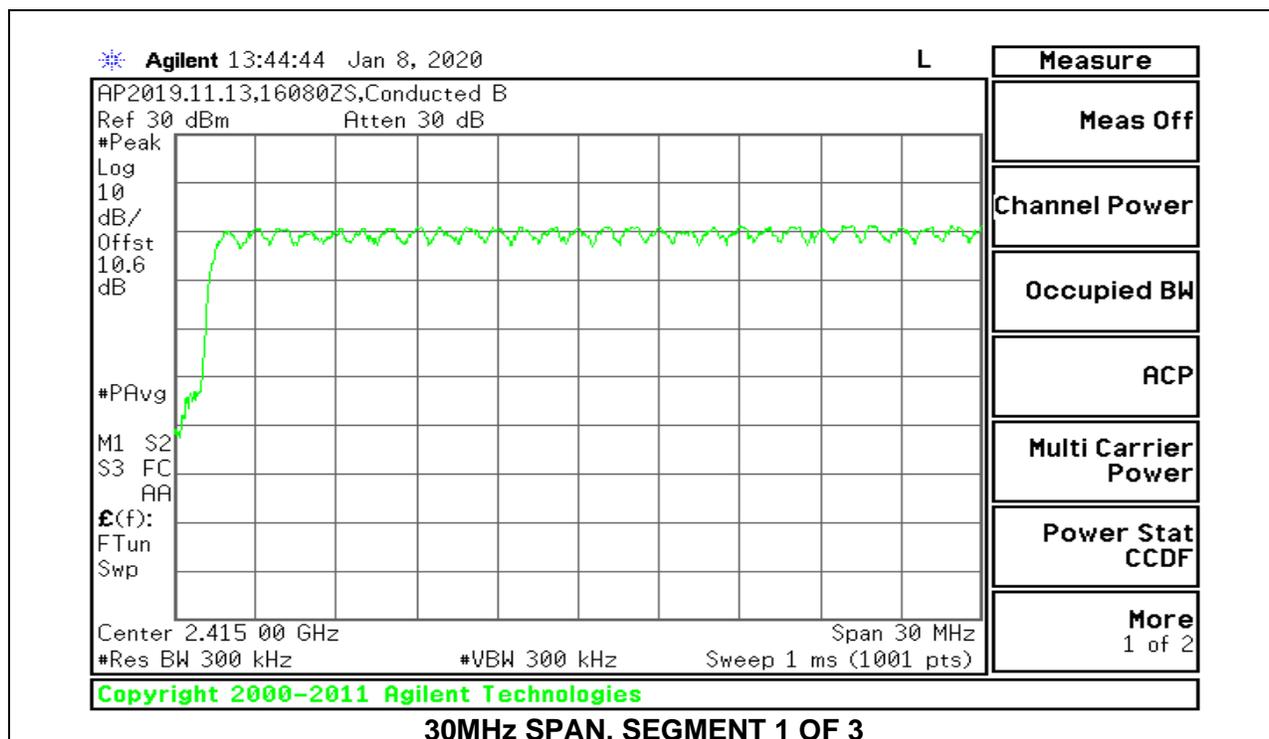
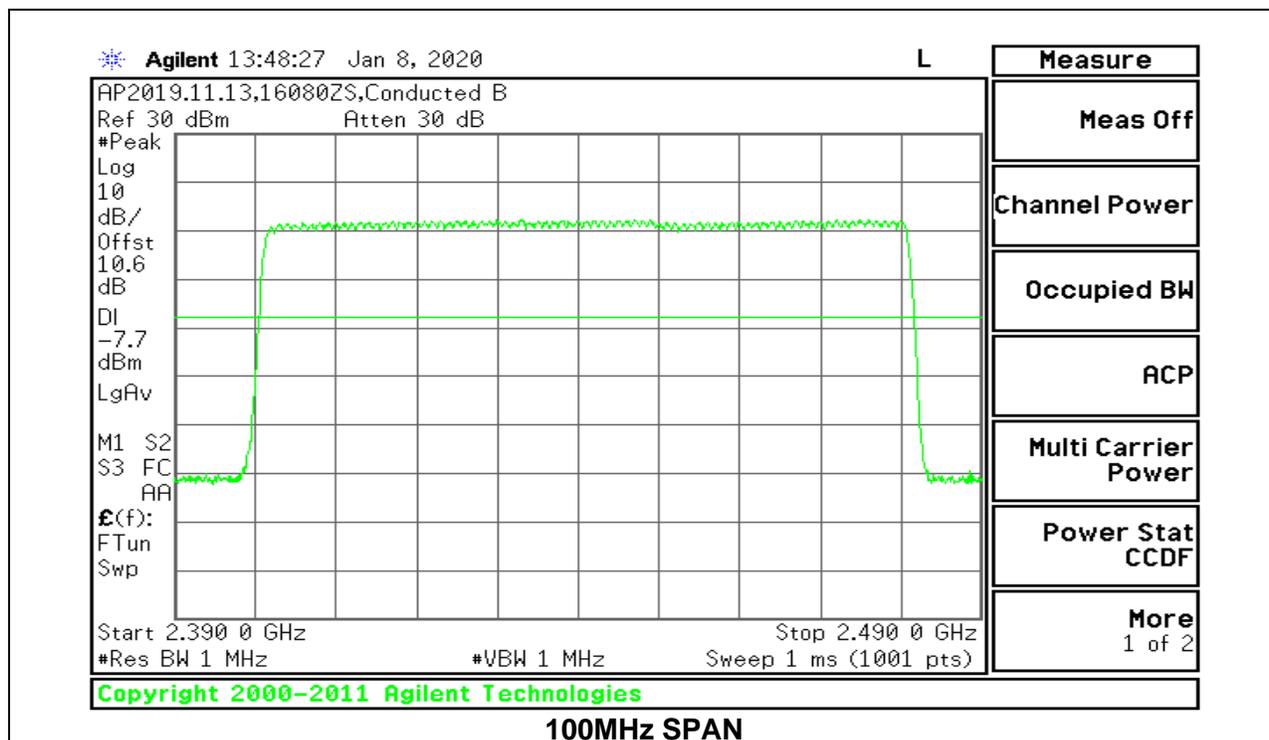
Normal Mode: 79 Channels Observed

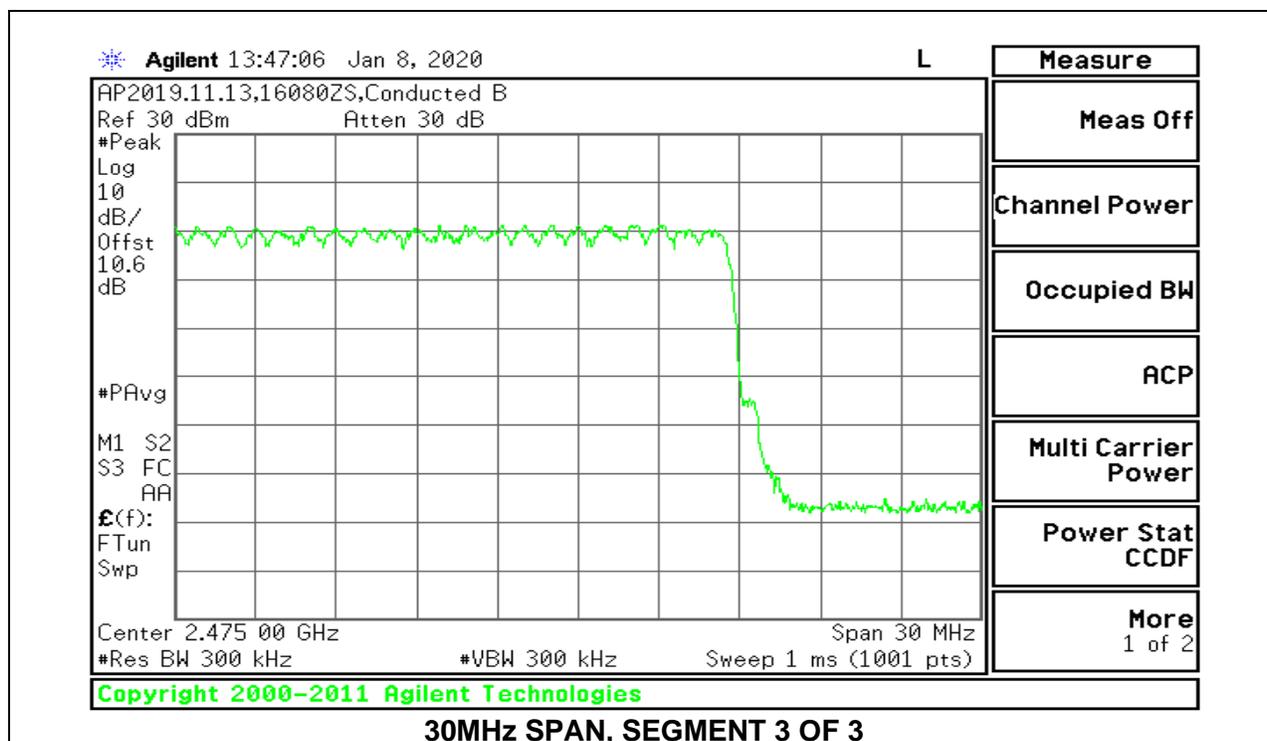
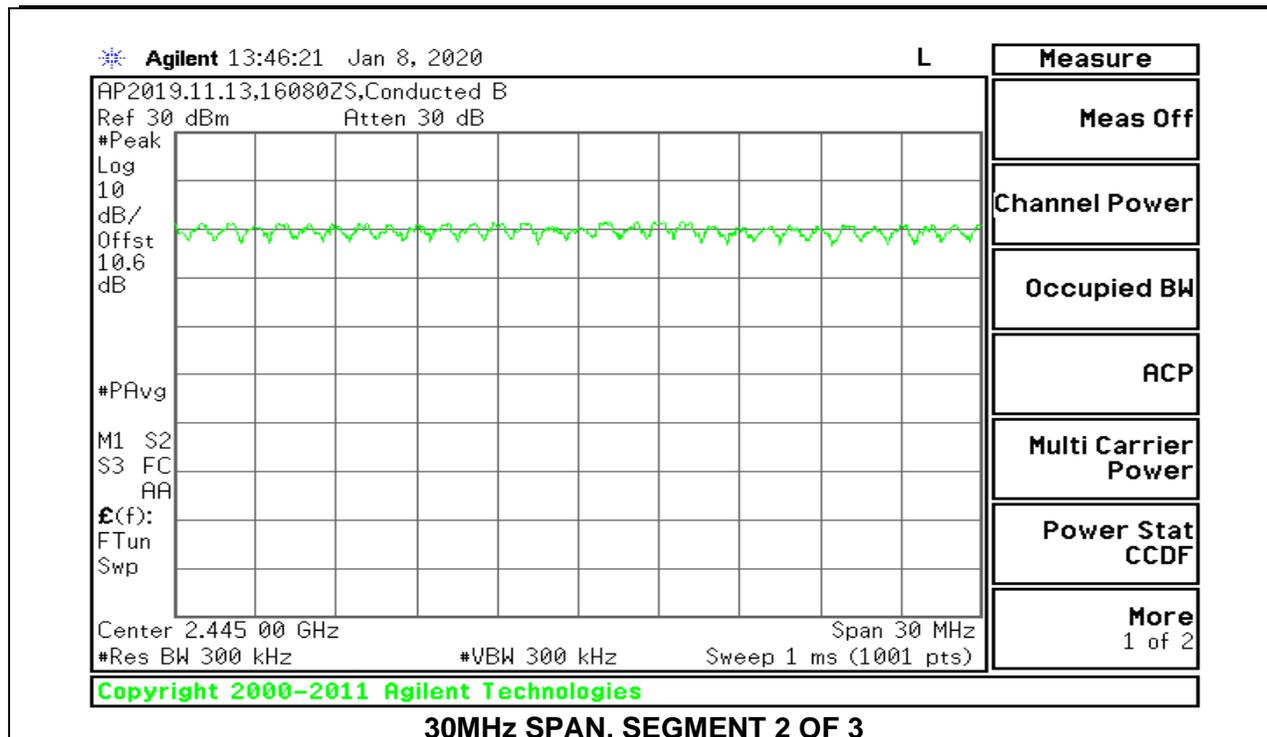
### 8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION





### 8.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





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## **8.5. AVERAGE TIME OF OCCUPANCY**

### **LIMITS**

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

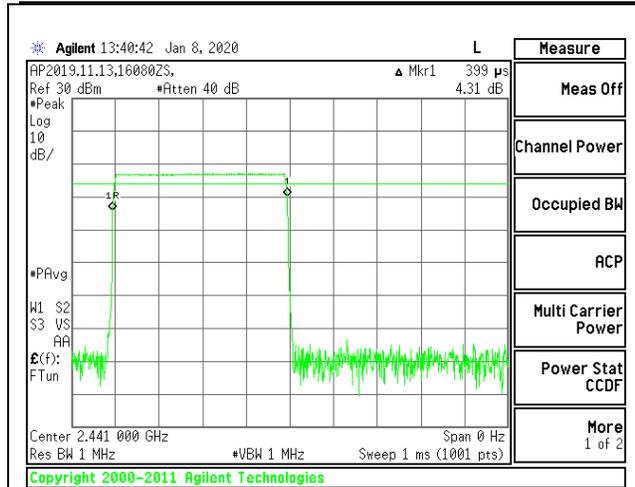
The average time of occupancy in the specified 3.16 second period (79 channels \* 0.4 s) is equal to  $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$ .

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels \* 0.4 seconds) is equal to  $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{ pulse width}$ .

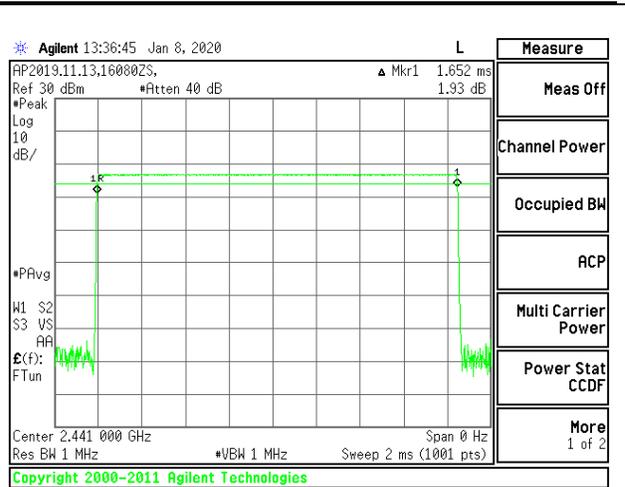
### **RESULTS**

### 8.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

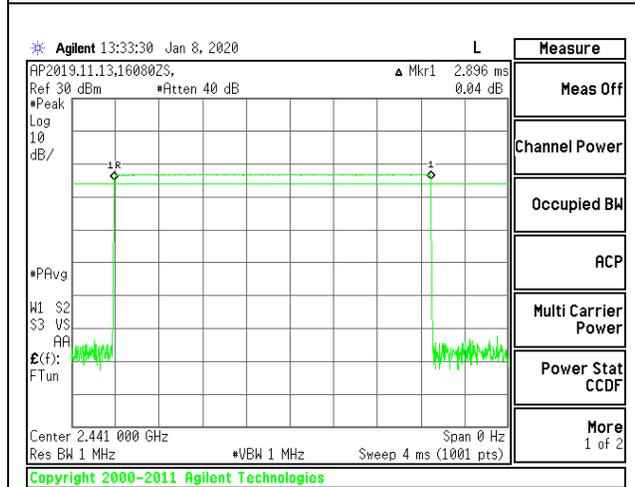
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
<b>GFSK Normal Mode</b>					
DH1	0.399	32	0.1277	0.4	-0.2723
DH3	1.652	16	0.2643	0.4	-0.1357
DH5	2.896	10	0.2896	0.4	-0.1104
<b>GFSK AFH Mode</b>					
DH Packet	Pulse Width (msec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
<b>GFSK AFH Mode</b>					
DH1	0.399	8	0.03192	0.4	-0.3681
DH3	1.652	4	0.06608	0.4	-0.3339
DH5	2.896	2.5	0.07240	0.4	-0.3276



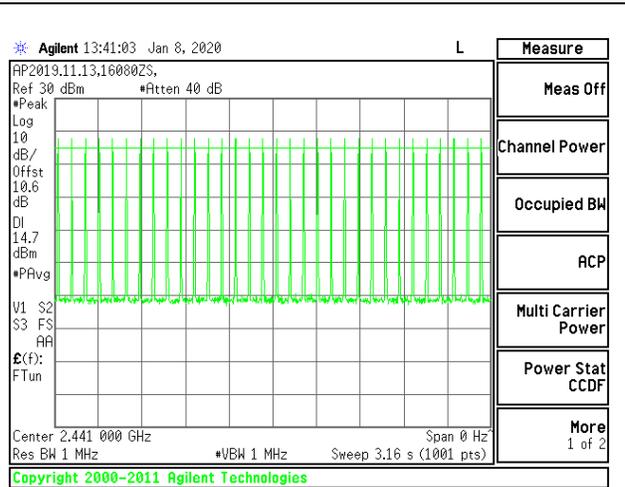
**PULSE WIDTH – DH1**



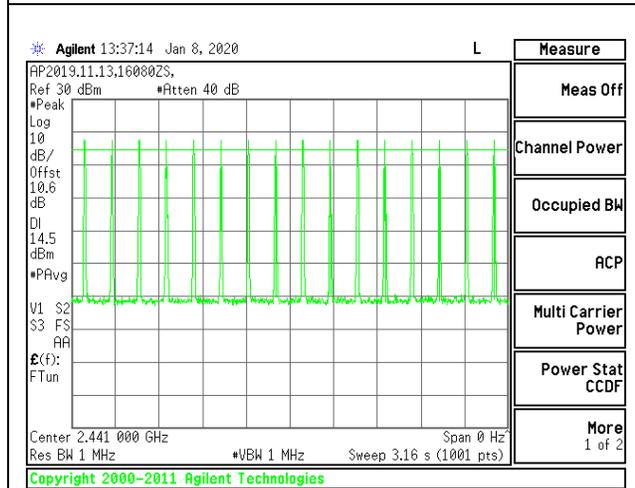
**PULSE WIDTH – DH3**



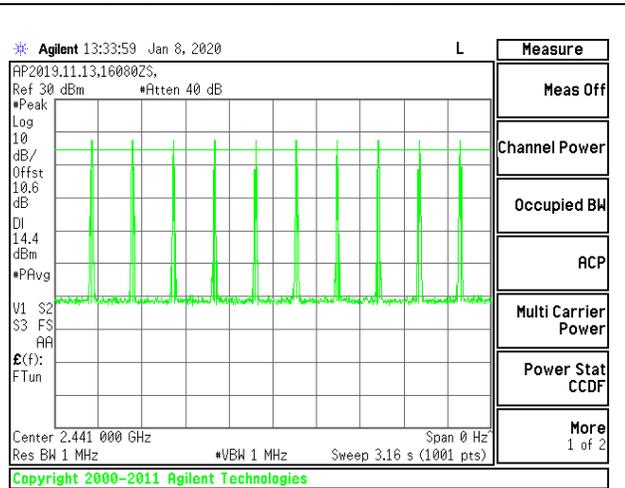
**PULSE WIDTH – DH5**



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1**



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3**

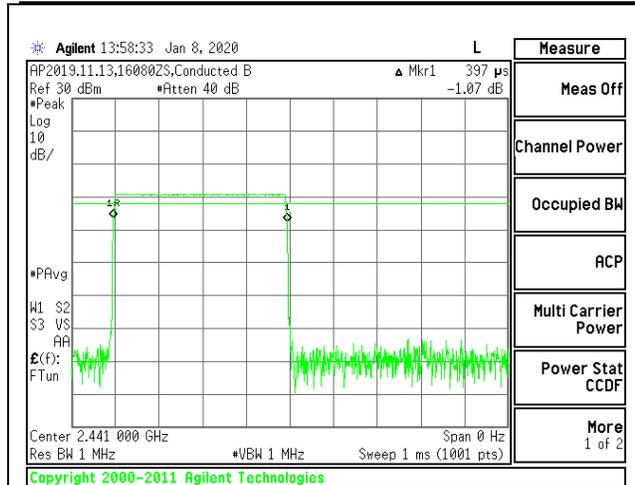


**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5**

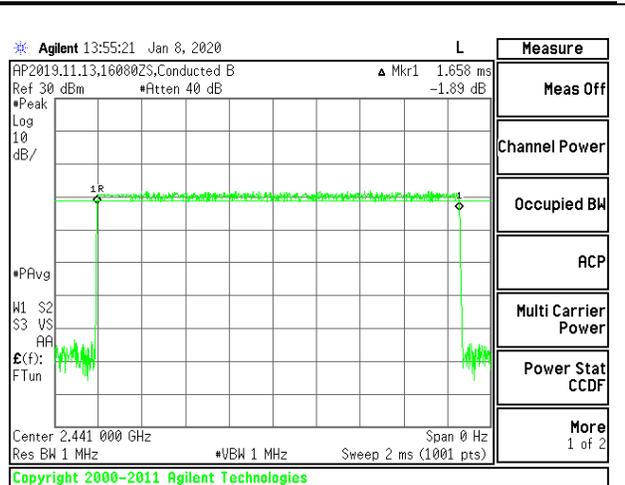
### 8.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.397	30	0.1191	0.4	-0.2809
3DH3	1.658	15	0.2487	0.4	-0.1513
3DH5	2.904	10	0.2904	0.4	-0.1096

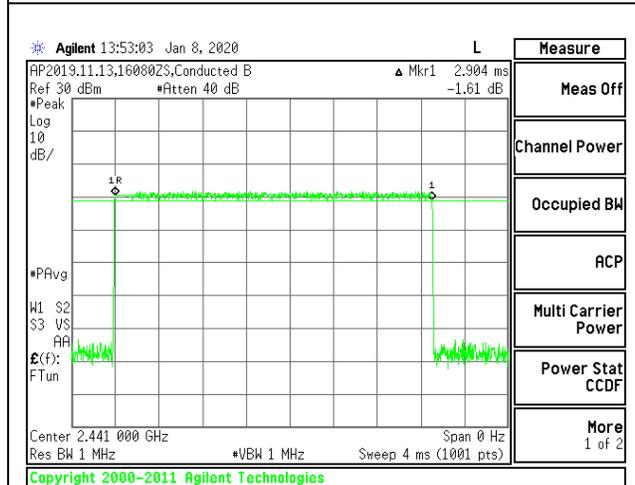
Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.



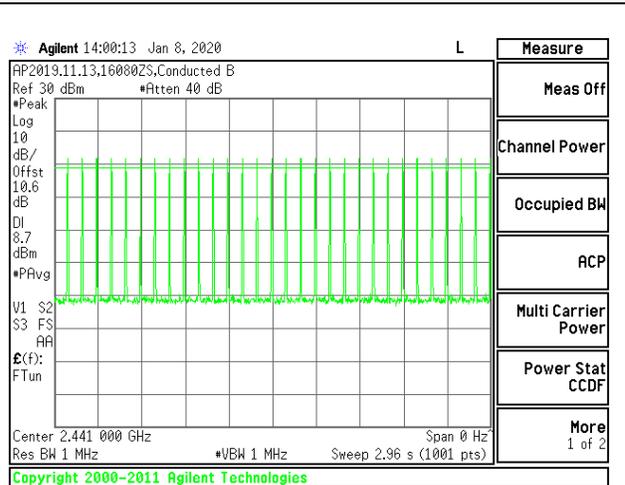
**PULSE WIDTH – 3DH1**



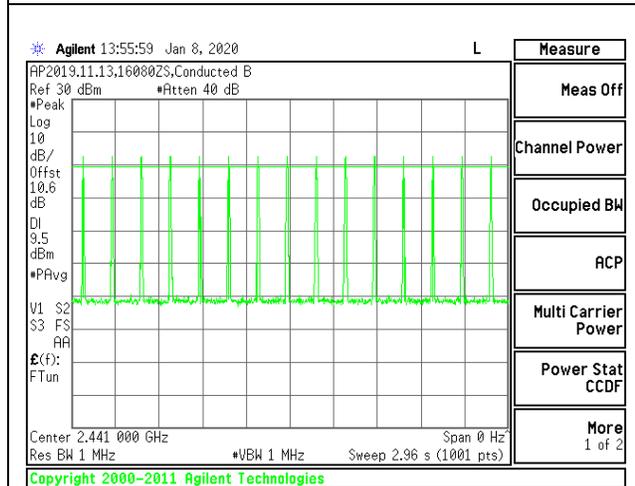
**PULSE WIDTH – 3DH3**



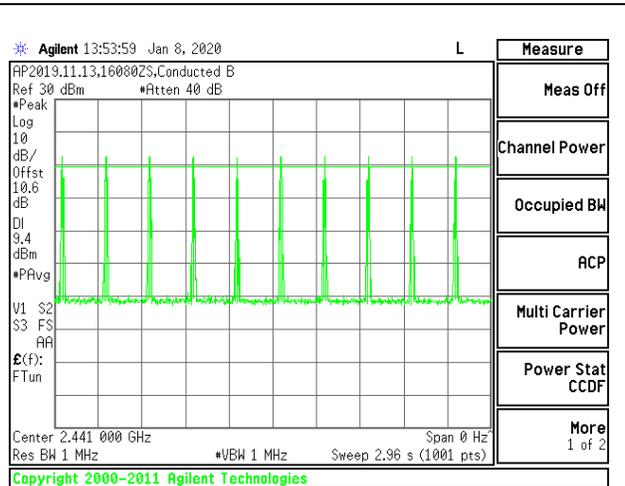
**PULSE WIDTH – 3DH5**



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1**



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3**



**NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5**

---

## **8.6. OUTPUT POWER**

### **LIMITS**

§15.247 (b) (1)

RSS-247 (5.4) (b)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts

### **TEST PROCEDURE**

Measurements perform using a wideband gated RF 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**

**RESULTS**

**8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION**

Tested By:	16080 ZS
Date:	1/8/2020

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.74	21	-4.26
Middle	2441	17.45	21	-3.55
High	2480	17.68	21	-3.32

**8.6.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION**

Tested By:	16080 ZS
Date:	1/8/2020

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.32	21	-10.68
Middle	2441	11.75	21	-9.25
High	2480	12.04	21	-8.96

**8.6.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION**

Tested By:	16080 ZS
Date:	1/8/2020

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.51	21	-10.49
Middle	2441	11.81	21	-9.19
High	2480	12.38	21	-8.62

## **8.7. AVERAGE POWER**

### **LIMITS**

None; for reporting purposes only

### **TEST PROCEDURE**

Measurements perform using a wideband gated RF 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**

**8.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION**

Tested By:	16080 ZS
Date	1/8/2020

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	16.62
Middle	2441	17.27
High	2480	17.55

**8.7.2. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION**

Tested By:	16080 ZS
Date	1/8/2020

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.96
Middle	2441	9.97
High	2480	10.21

**8.7.3. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION**

Tested By:	16080 ZS
Date	1/8/2020

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.07
Middle	2441	10.36
High	2480	10.74

## **8.8. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100kHz, and the video bandwidth is set to 300 kHz.

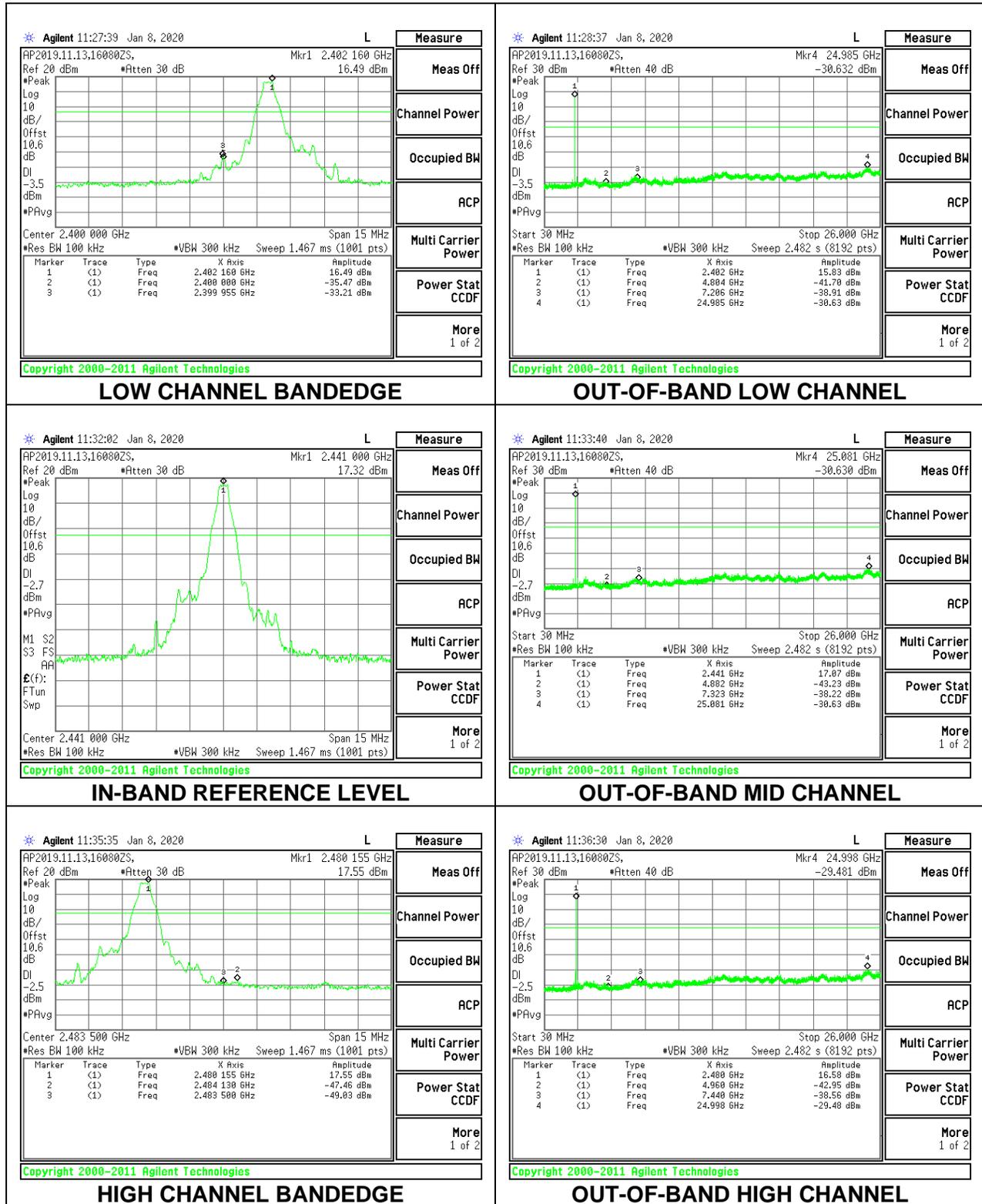
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

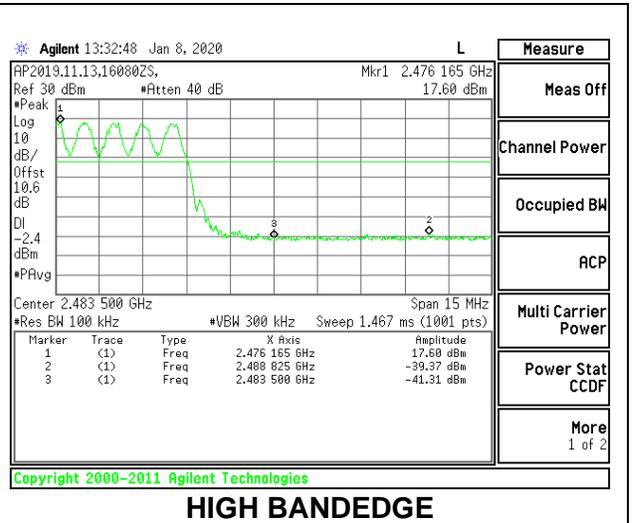
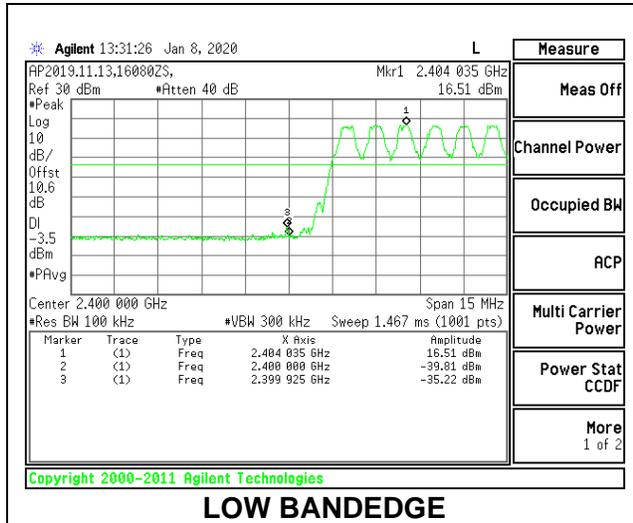
### **RESULTS**

### 8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

#### Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

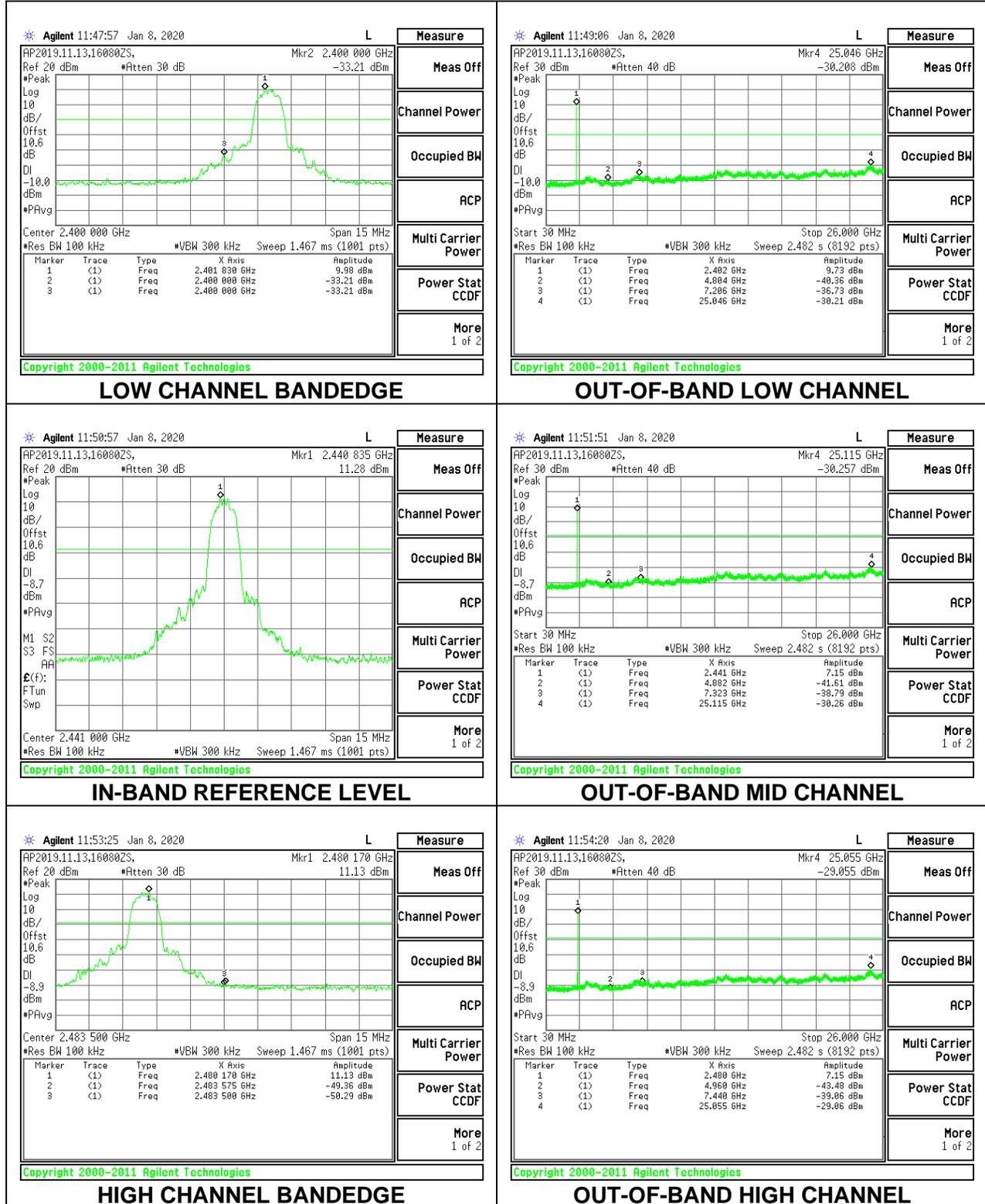


**Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**

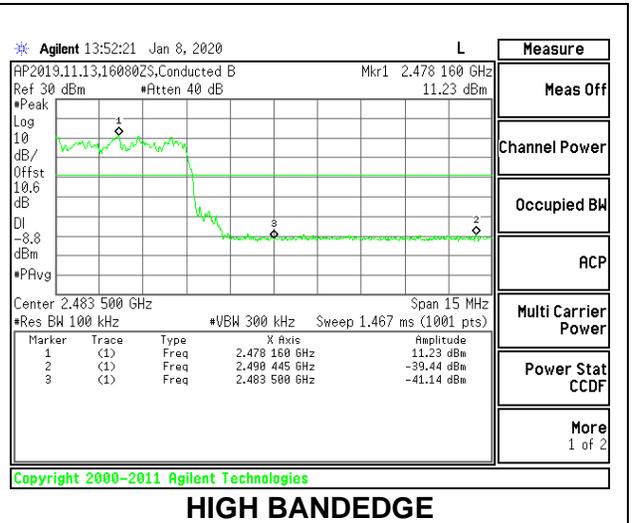
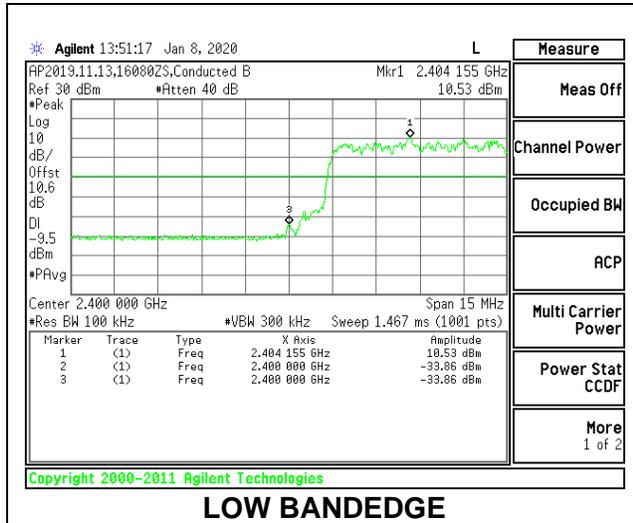


## 8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

### Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING



**Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**



## 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 30kHz 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 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector 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.

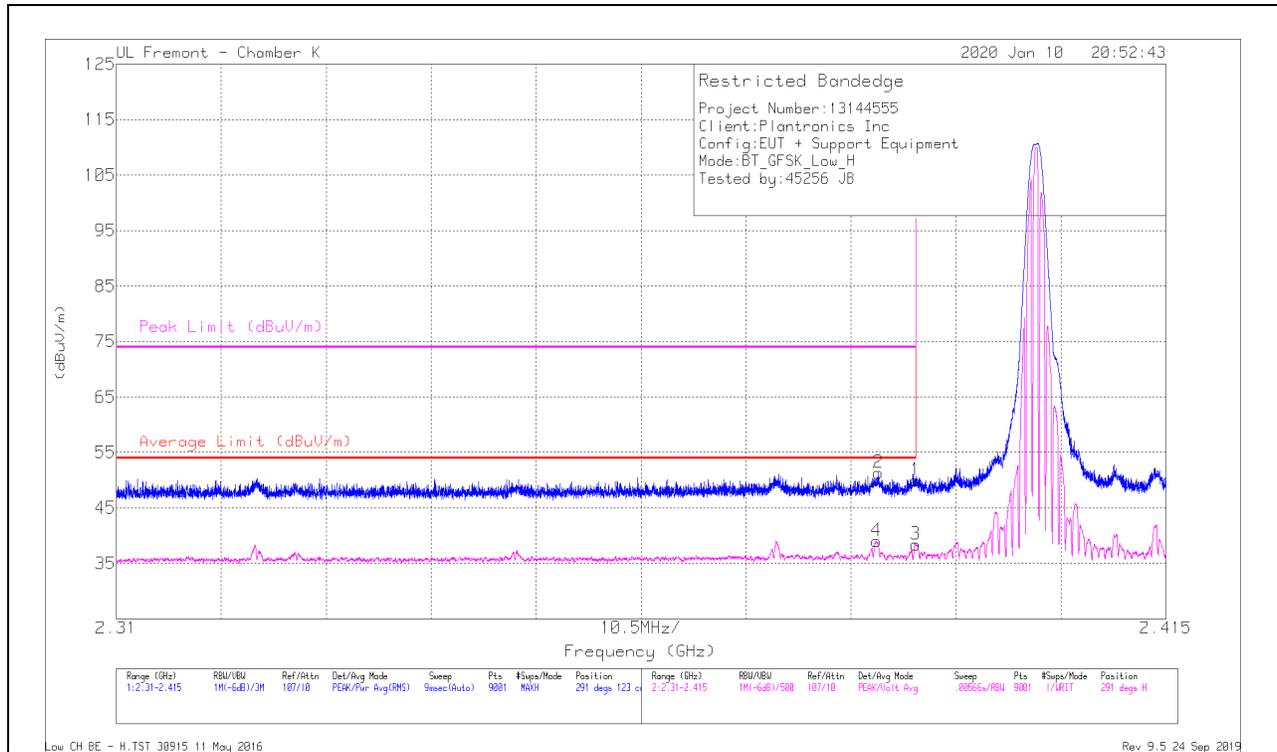
2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

## 9.1. TRANSMITTER ABOVE 1 GHz

### 9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

#### BANDEDGE (LOW CHANNEL)

#### HORIZONTAL RESULT

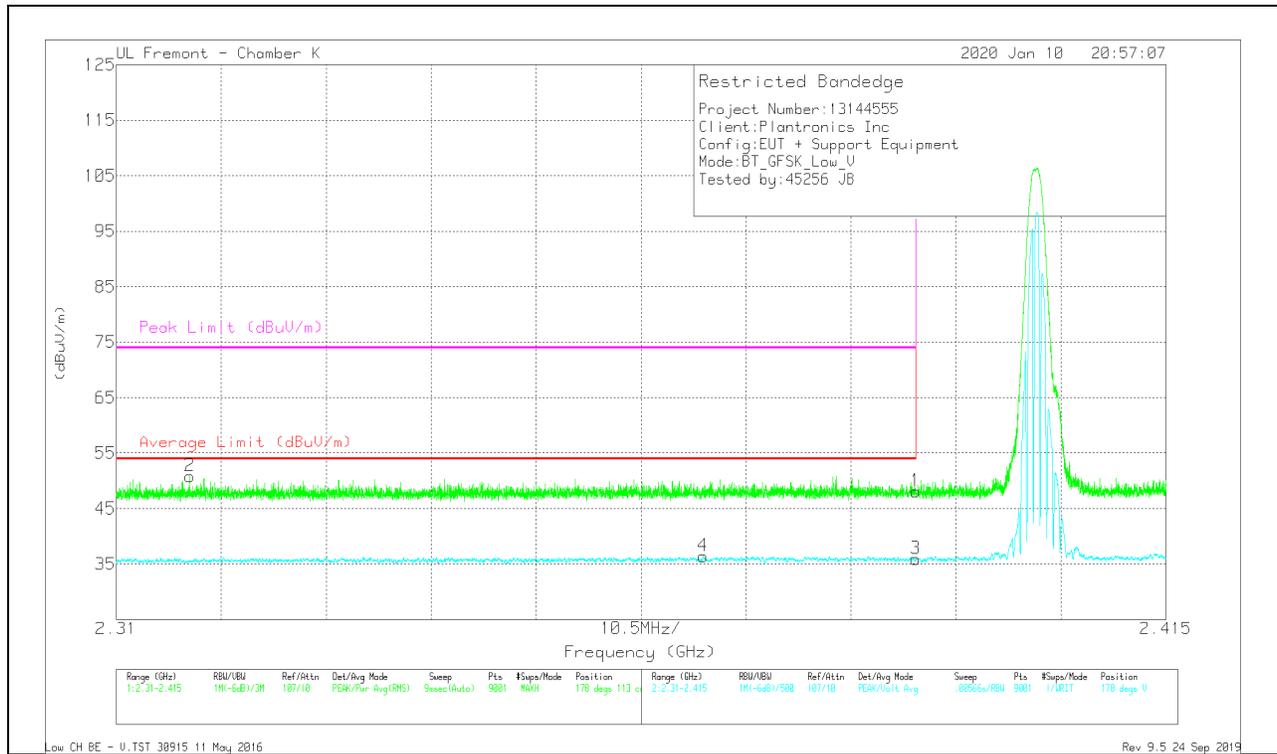


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.38999	42.8	Pk	31.9	-24.7	50	-	-	74	-24	291	123	H
2	2.38621	44.04	Pk	31.9	-24.6	51.34	-	-	74	-22.66	291	123	H
3	2.38999	31.2	VA1T	31.9	-24.7	38.4	54	-15.6	-	-	291	123	H
4	2.38607	31.73	VA1T	31.9	-24.6	39.03	54	-14.97	-	-	291	123	H

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

### VERTICAL RESULT



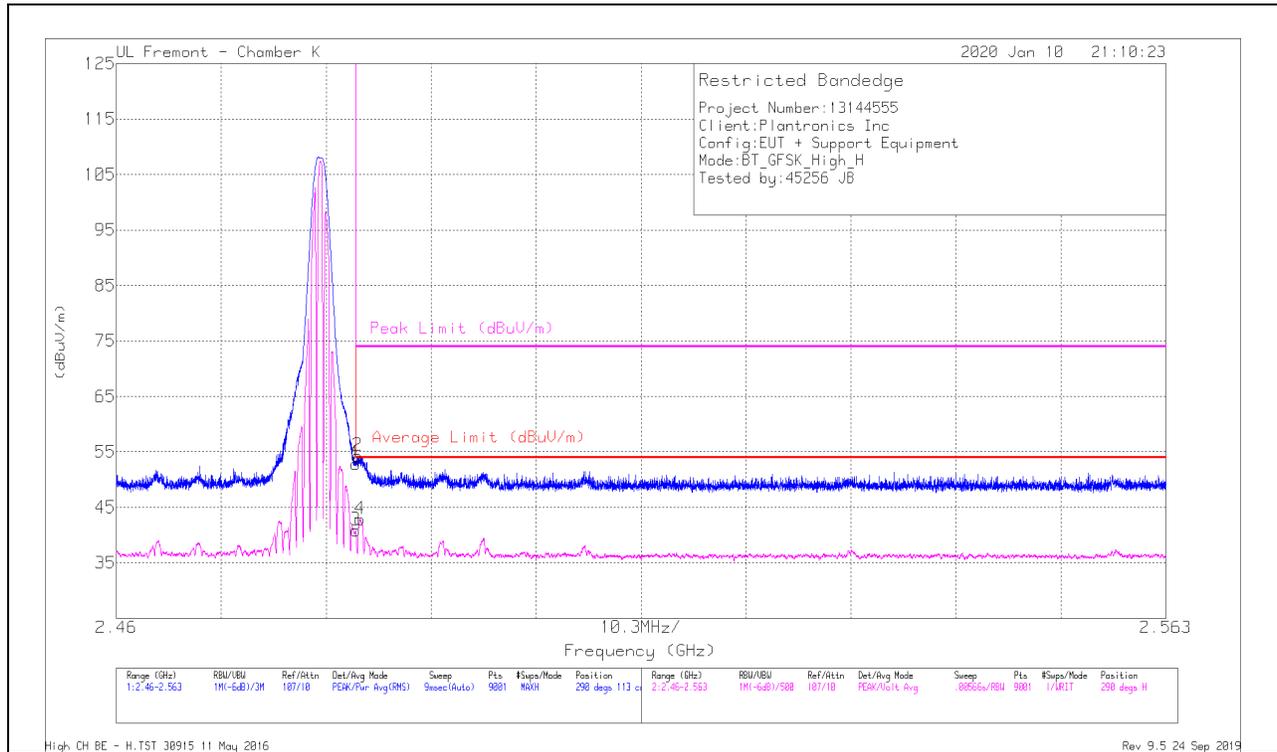
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.38999	40.91	Pk	31.9	-24.7	48.11	-	-	74	-25.89	178	113	V
2	2.31735	43.87	Pk	31.6	-24.6	50.87	-	-	74	-23.13	178	113	V
3	2.38999	28.74	VA1T	31.9	-24.7	35.94	54	-18.06	-	-	178	113	V
4	2.36871	29.07	VA1T	31.9	-24.6	36.37	54	-17.63	-	-	178	113	V

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**

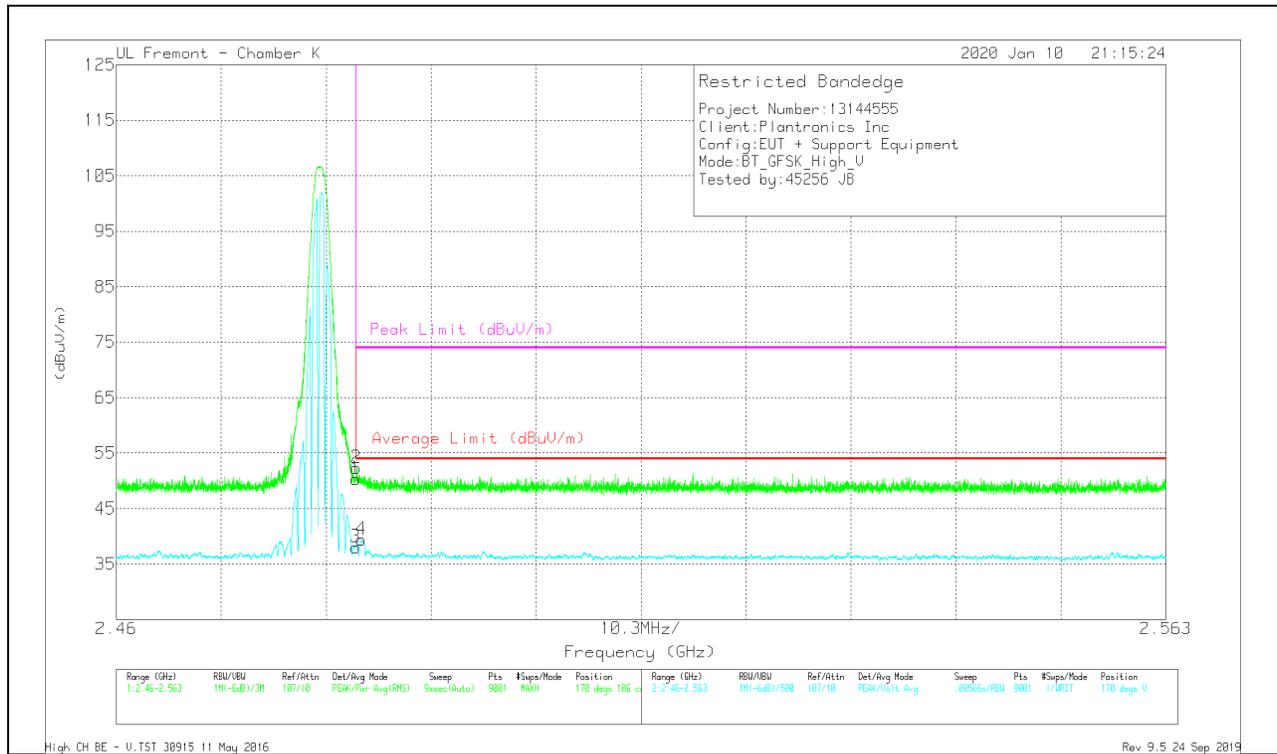


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.48351	45.11	Pk	32.5	-24.8	52.81	-	-	74	-21.19	290	113	H
2	2.48368	46.56	Pk	32.5	-24.8	54.26	-	-	74	-19.74	290	113	H
3	2.48351	33.18	VA1T	32.5	-24.8	40.88	54	-13.12	-	-	290	113	H
4	2.48394	35.23	VA1T	32.5	-24.8	42.93	54	-11.07	-	-	290	113	H

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

### VERTICAL RESULT



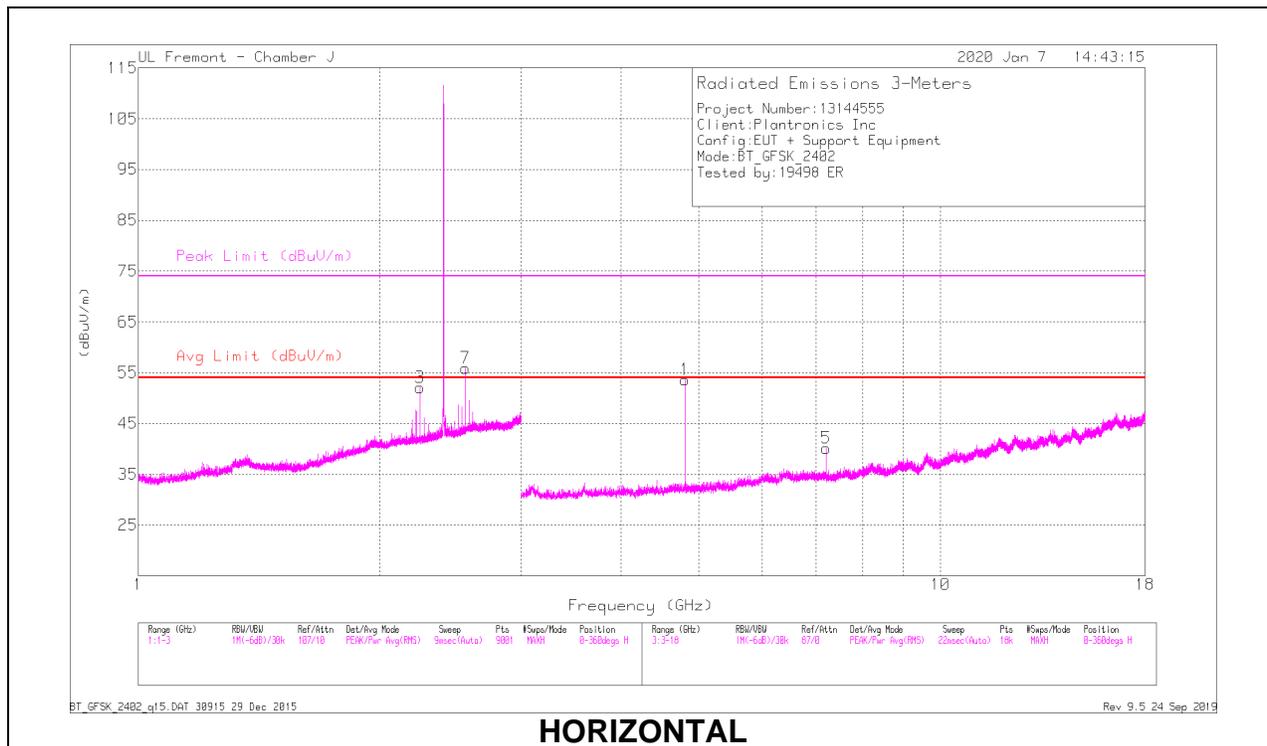
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.48351	42.69	Pk	32.5	-24.8	50.39	-	-	74	-23.61	170	106	V
2	2.48356	44.57	Pk	32.5	-24.8	52.27	-	-	74	-21.73	170	106	V
3	2.48351	30.31	VA1T	32.5	-24.8	38.01	54	-15.99	-	-	170	106	V
4	2.48408	31.7	VA1T	32.5	-24.8	39.4	54	-14.6	-	-	170	106	V

Pk - Peak detector

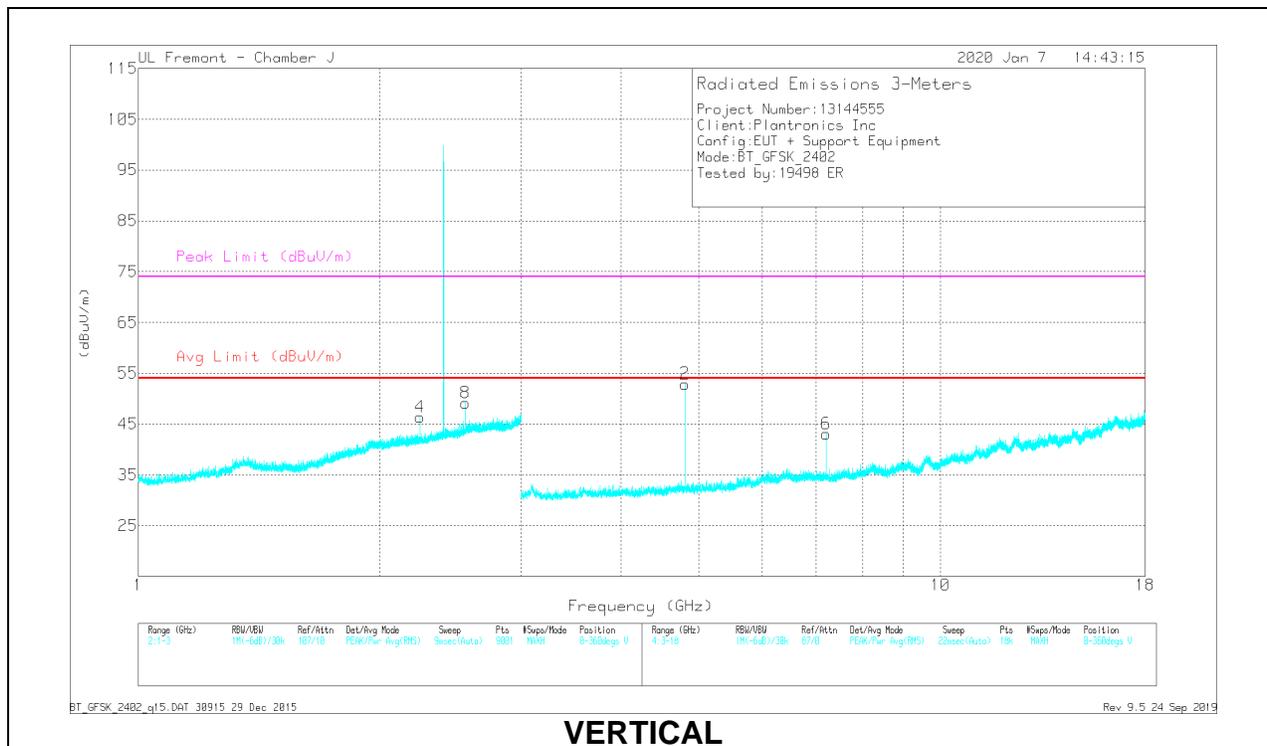
VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL RESULTS**



**HORIZONTAL**



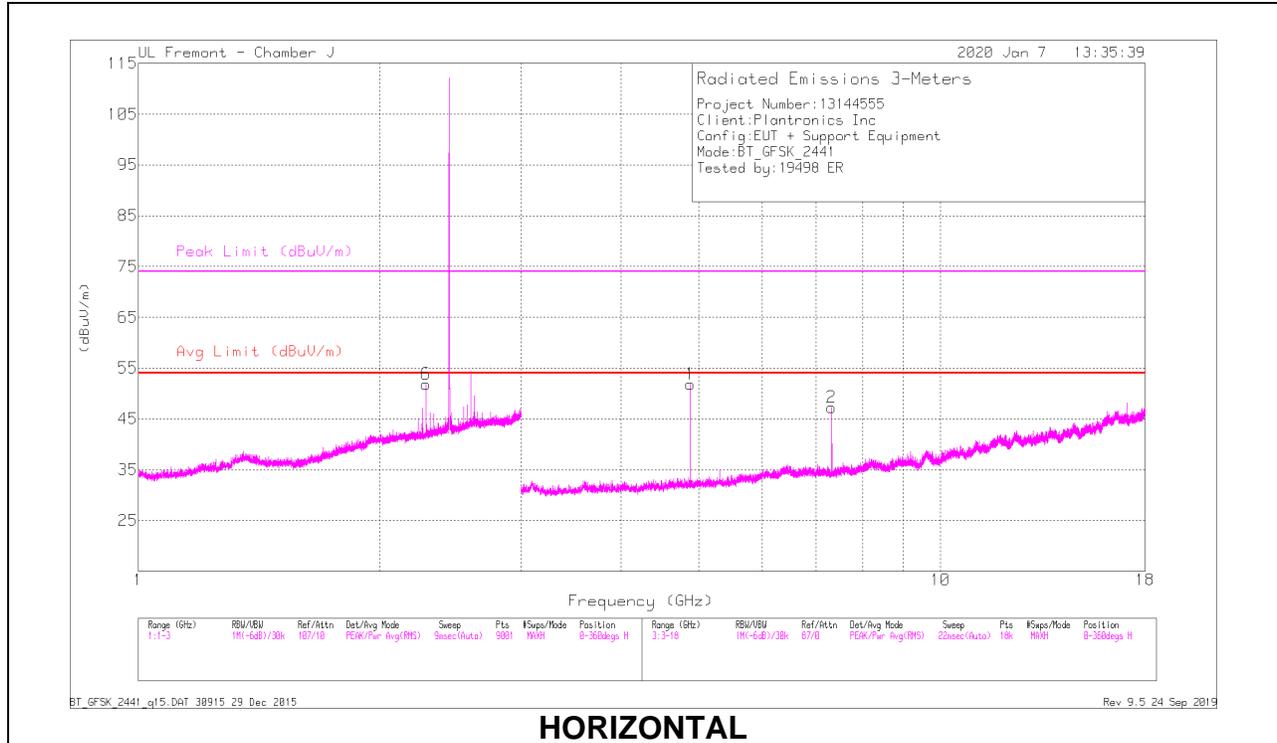
**VERTICAL**

**RADIATED EMISSIONS**

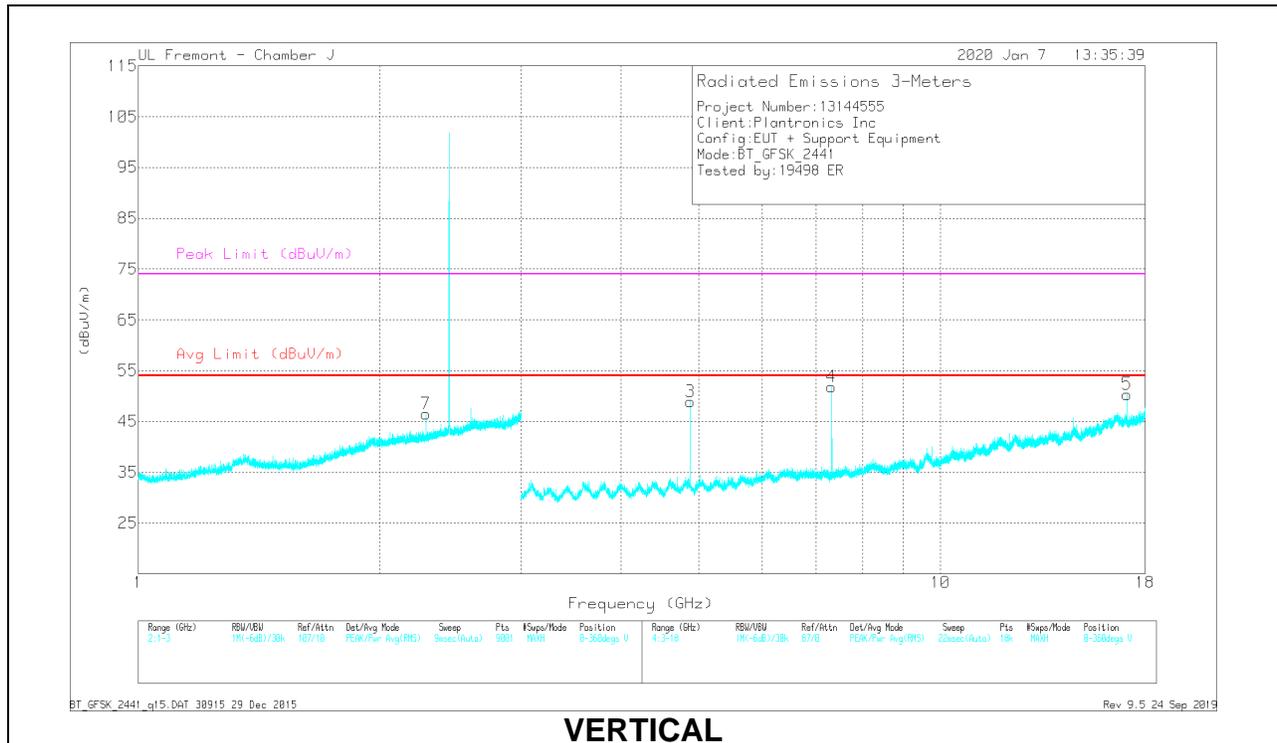
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 2.24619	39.97	PKFH	31.5	-14.7	56.77	-	-	74	-17.23	143	161	H
	* 2.24598	32.29	VA1T	31.5	-14.7	49.09	54	-4.91	-	-	143	161	H
7	2.55809	41.19	PKFH	32.5	-13.7	59.99	-	-	-	-	154	134	H
4	* 2.24587	36.68	PKFH	31.5	-14.7	53.48	-	-	74	-20.52	40	122	V
	* 2.24598	28.14	VA1T	31.5	-14.7	44.94	54	-9.06	-	-	40	122	V
8	2.55773	37.17	PKFH	32.5	-13.8	55.87	-	-	-	-	159	190	V
1	* 4.80436	54.74	PKFH	34.2	-30.3	58.64	-	-	74	-15.36	148	114	H
	* 4.80398	46.34	VA1T	34.2	-30.3	50.24	54	-3.76	-	-	148	114	H
5	7.20557	39.89	PKFH	35.6	-26.1	49.39	-	-	-	-	99	288	H
2	* 4.80438	54.88	PKFH	34.2	-30.3	58.78	-	-	74	-15.22	78	115	V
	* 4.80401	46.39	VA1T	34.2	-30.3	50.29	54	-3.71	-	-	78	115	V
6	7.20617	41.83	PKFH	35.6	-26.1	51.33	-	-	-	-	189	237	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

**MID CHANNEL RESULTS**



**HORIZONTAL**



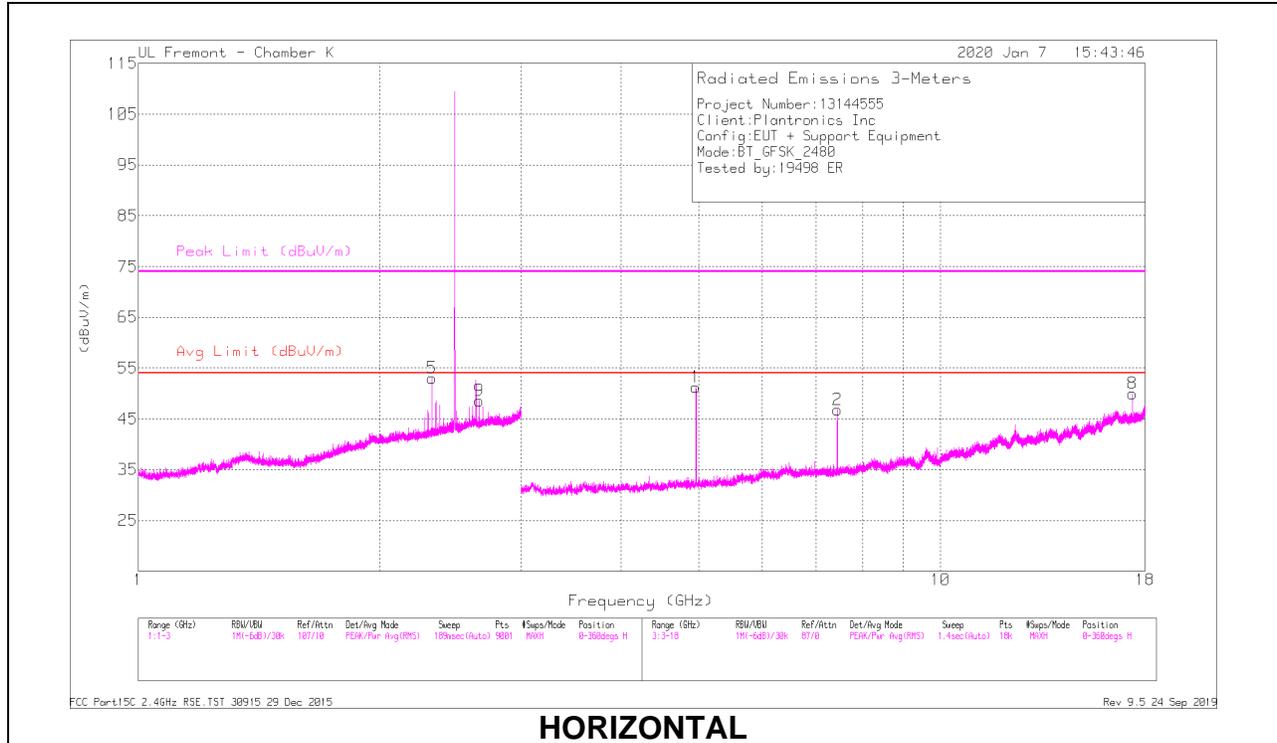
**VERTICAL**

**RADIATED EMISSIONS**

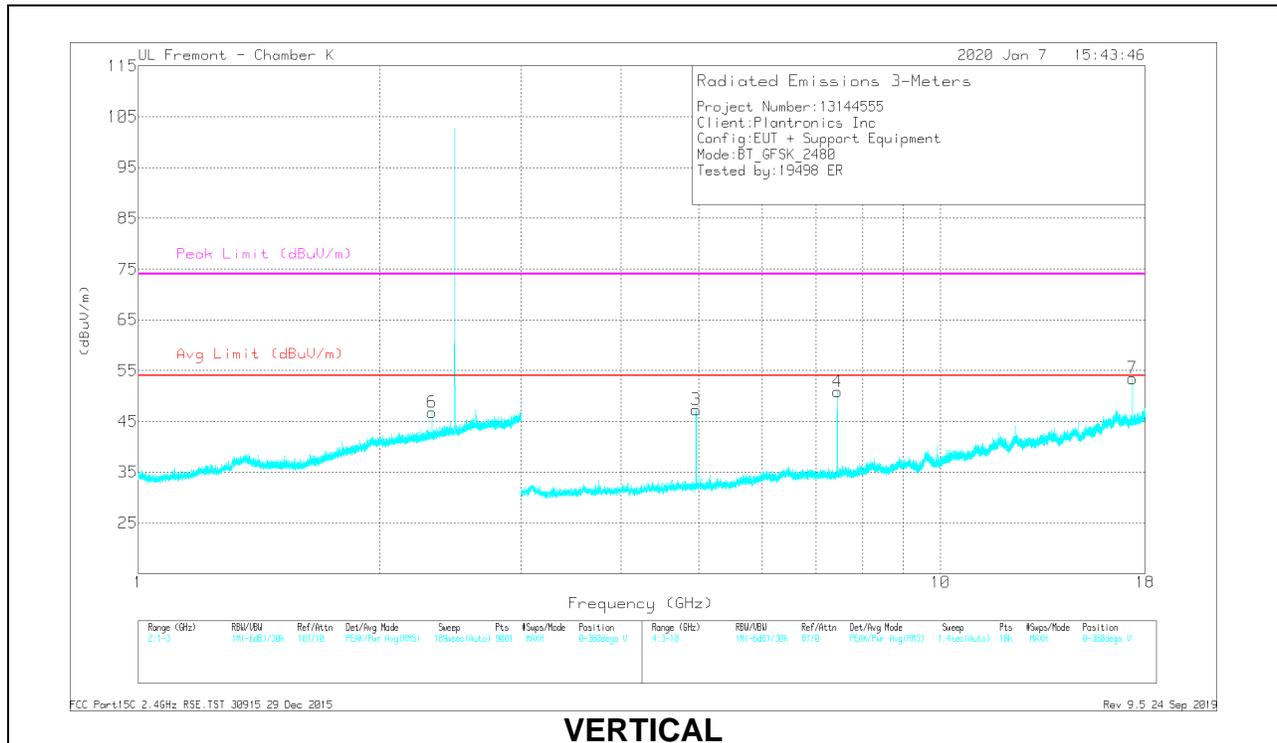
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
6	* 2.28517	38.51	PKFH	31.5	-14.7	55.31	-	-	74	-18.69	129	129	H
	* 2.285	30.96	VA1T	31.6	-14.7	47.86	54	-6.14	-	-	129	129	H
7	* 2.28495	35.66	PKFH	31.6	-14.7	52.56	-	-	74	-21.44	220	381	V
	* 2.28502	26.65	VA1T	31.6	-14.7	43.55	54	-10.45	-	-	220	381	V
1	* 4.88221	53.3	PKFH	34.1	-30.5	56.9	-	-	74	-17.1	130	122	H
	* 4.882	44.97	VA1T	34.1	-30.5	48.57	54	-5.43	-	-	130	122	H
2	* 7.32245	43.72	PKFH	35.6	-26.4	52.92	-	-	74	-21.08	96	264	H
	* 7.32296	33.47	VA1T	35.6	-26.4	42.67	54	-11.33	-	-	96	264	H
3	* 4.88174	52.43	PKFH	34.1	-30.5	56.03	-	-	74	-17.97	183	267	V
	* 4.88201	44.15	VA1T	34.1	-30.5	47.75	54	-6.25	-	-	183	267	V
4	* 7.32341	47.79	PKFH	35.6	-26.4	56.99	-	-	74	-17.01	168	269	V
	* 7.32299	38.06	VA1T	35.6	-26.4	47.26	54	-6.74	-	-	168	269	V
5	17.086	31.91	PKFH	40.4	-16.8	55.51	-	-	-	-	53	294	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

### HIGH CHANNEL RESULTS



### HORIZONTAL



### VERTICAL

**RADIATED EMISSIONS**

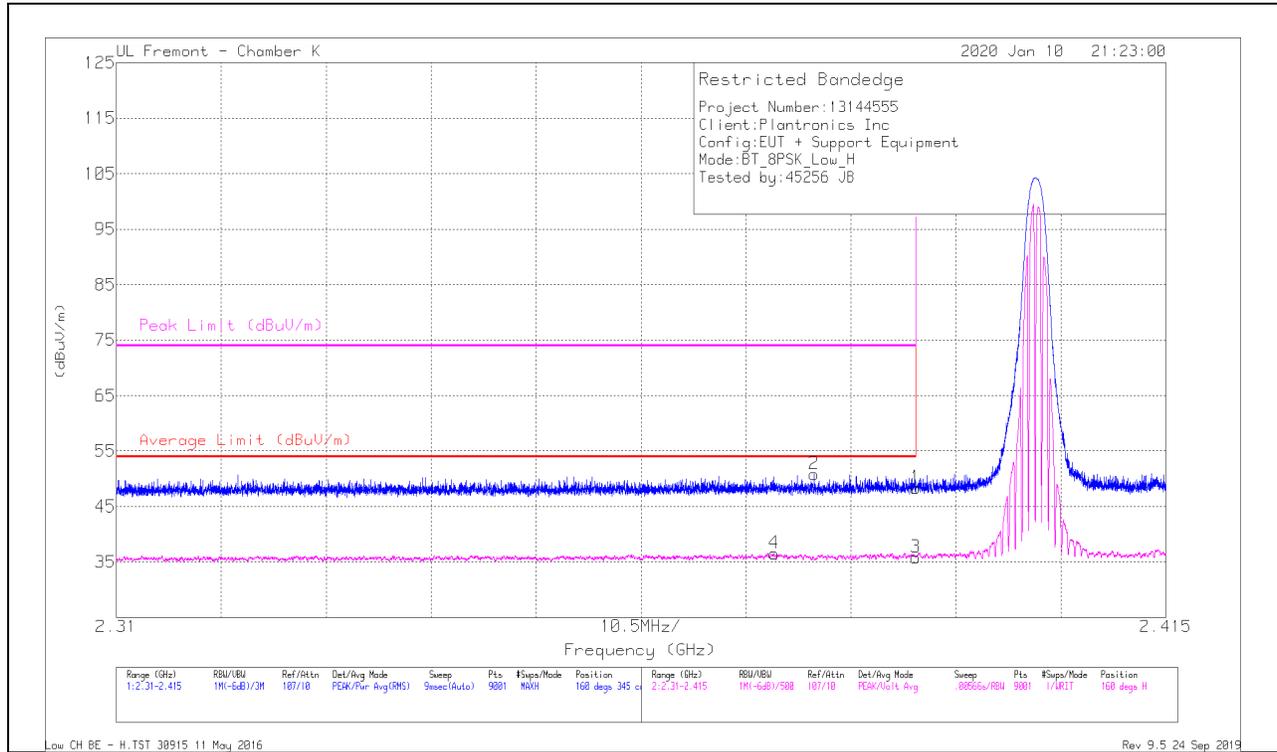
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fitr/Pa d (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	* 2.32415	39.01	PKFH	31.6	-14.5	56.11	-	-	74	-17.89	136	103	H
	* 2.324	34.93	VA1T	31.6	-14.5	52.03	54	-1.97	-	-	136	103	H
9	* 2.66187	34.97	PKFH	32.6	-13.7	53.87	-	-	74	-20.13	168	187	H
	* 2.66196	26.86	VA1T	32.6	-13.7	45.76	54	-8.24	-	-	168	187	H
6	* 2.3242	35.25	PKFH	31.6	-14.5	52.35	-	-	74	-21.65	119	106	V
	* 2.32399	26.4	VA1T	31.6	-14.5	43.5	54	-10.5	-	-	119	106	V
1	* 4.96037	49.66	PKFH	34.1	-30.6	53.16	-	-	74	-20.84	112	99	H
	* 4.96008	46.15	VA1T	34.1	-30.6	49.65	54	-4.35	-	-	112	99	H
2	* 7.44033	43.36	PKFH	35.7	-26.2	52.86	-	-	74	-21.14	261	363	H
	* 7.44	36.88	VA1T	35.7	-26.2	46.38	54	-7.62	-	-	261	363	H
8	17.36095	32.21	PKFH	40.5	-15.9	56.81	-	-	-	-	47	368	H
3	* 4.95993	46.38	PKFH	34.1	-30.6	49.88	-	-	74	-24.12	104	110	V
	* 4.95993	42.5	VA1T	34.1	-30.6	46	54	-8	-	-	104	110	V
4	* 7.43941	45.6	PKFH	35.7	-26.2	55.1	-	-	74	-18.9	208	250	V
	* 7.43993	40.5	VA1T	35.7	-26.2	50	54	-4	-	-	208	250	V
7	17.35883	34.06	PKFH	40.4	-15.9	58.56	-	-	-	-	43	197	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

### 9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

#### BANDEDGE (LOW CHANNEL)

#### HORIZONTAL RESULT

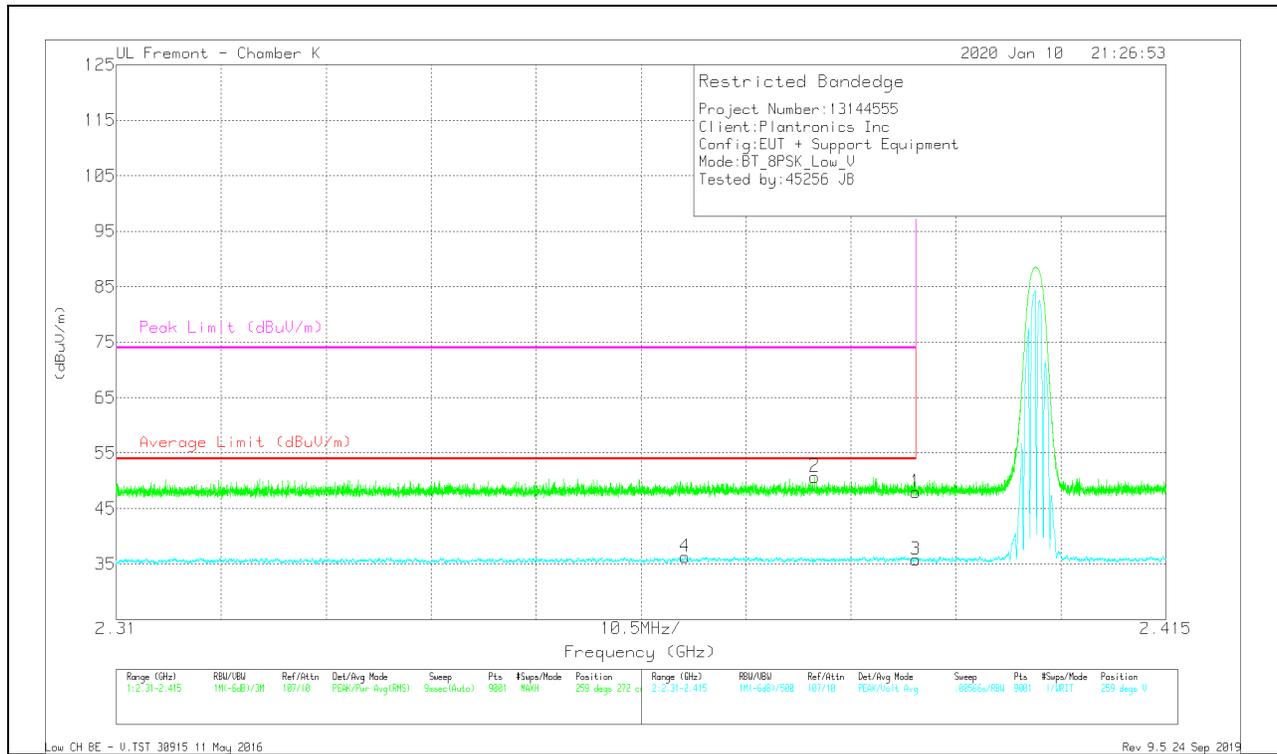


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.38999	41.13	Pk	31.9	-24.7	48.33	-	-	74	-25.67	160	345	H
2	2.37983	43.65	Pk	31.9	-24.7	50.85	-	-	74	-23.15	160	345	H
3	2.38999	28.55	VA1T	31.9	-24.7	35.75	54	-18.25	-	-	160	345	H
4	2.37579	29.4	VA1T	31.9	-24.7	36.6	54	-17.4	-	-	160	345	H

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

### VERTICAL RESULT



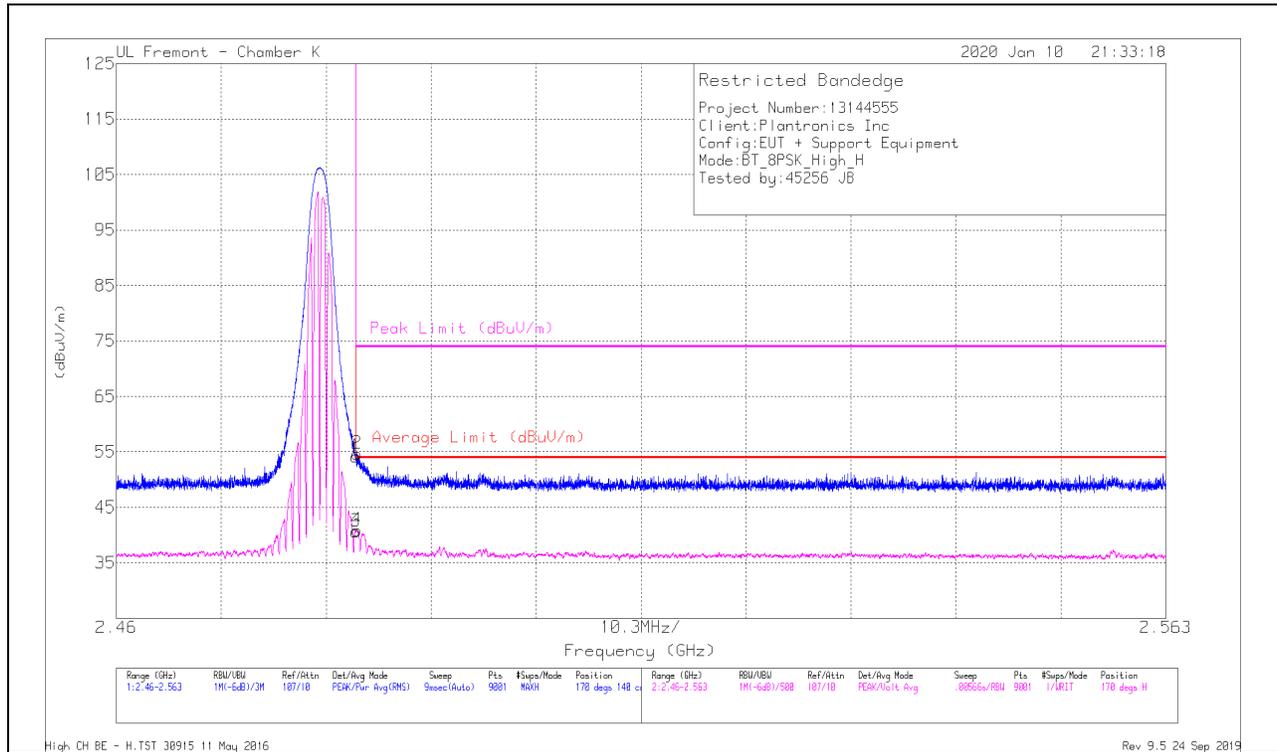
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.38999	40.78	Pk	31.9	-24.7	47.98	-	-	74	-26.02	259	272	V
2	2.37987	43.57	Pk	31.9	-24.7	50.77	-	-	74	-23.23	259	272	V
3	2.38999	28.6	VA1T	31.9	-24.7	35.8	54	-18.2	-	-	259	272	V
4	2.3669	29.14	VA1T	31.8	-24.6	36.34	54	-17.66	-	-	259	272	V

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**

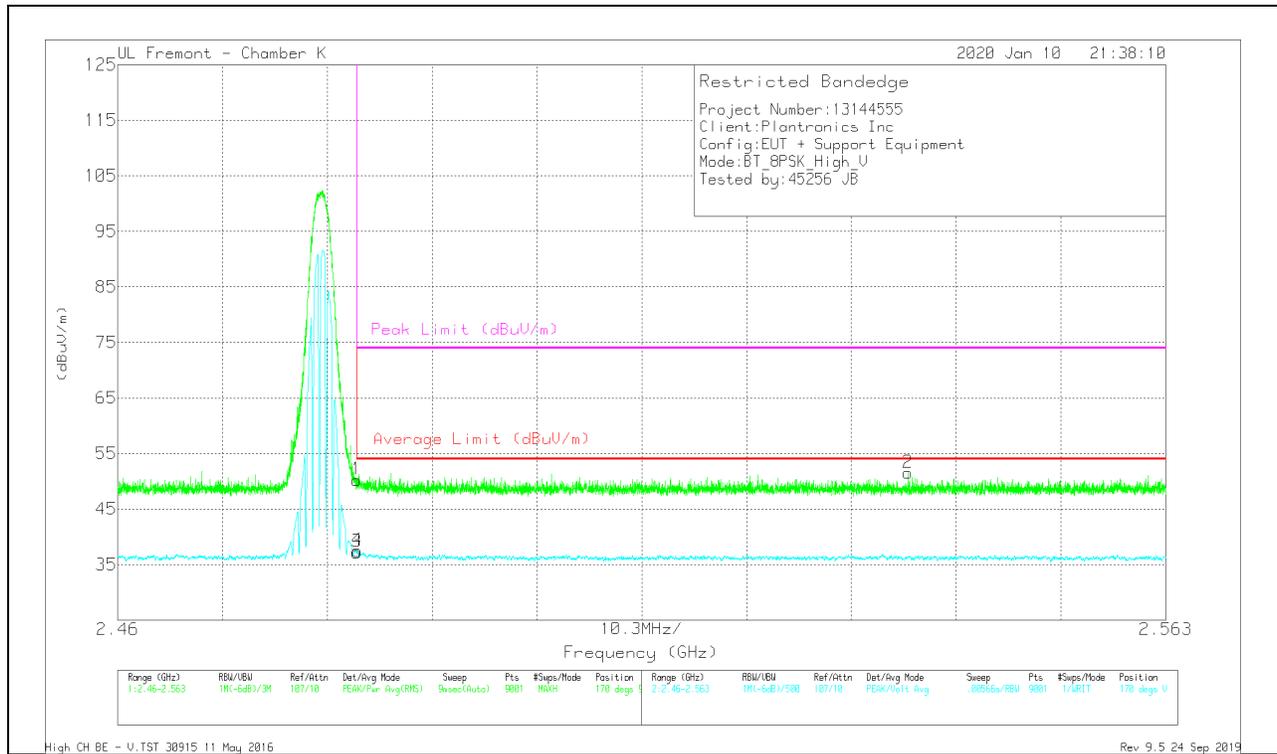


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.48351	46.48	Pk	32.5	-24.8	54.18	-	-	74	-19.82	170	140	H
2	2.4836	47.03	Pk	32.5	-24.8	54.73	-	-	74	-19.27	170	140	H
3	2.48351	32.96	VA1T	32.5	-24.8	40.66	54	-13.34	-	-	170	140	H
4	2.48363	33.21	VA1T	32.5	-24.8	40.91	54	-13.09	-	-	170	140	H

Pk - Peak detector

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

### VERTICAL RESULT



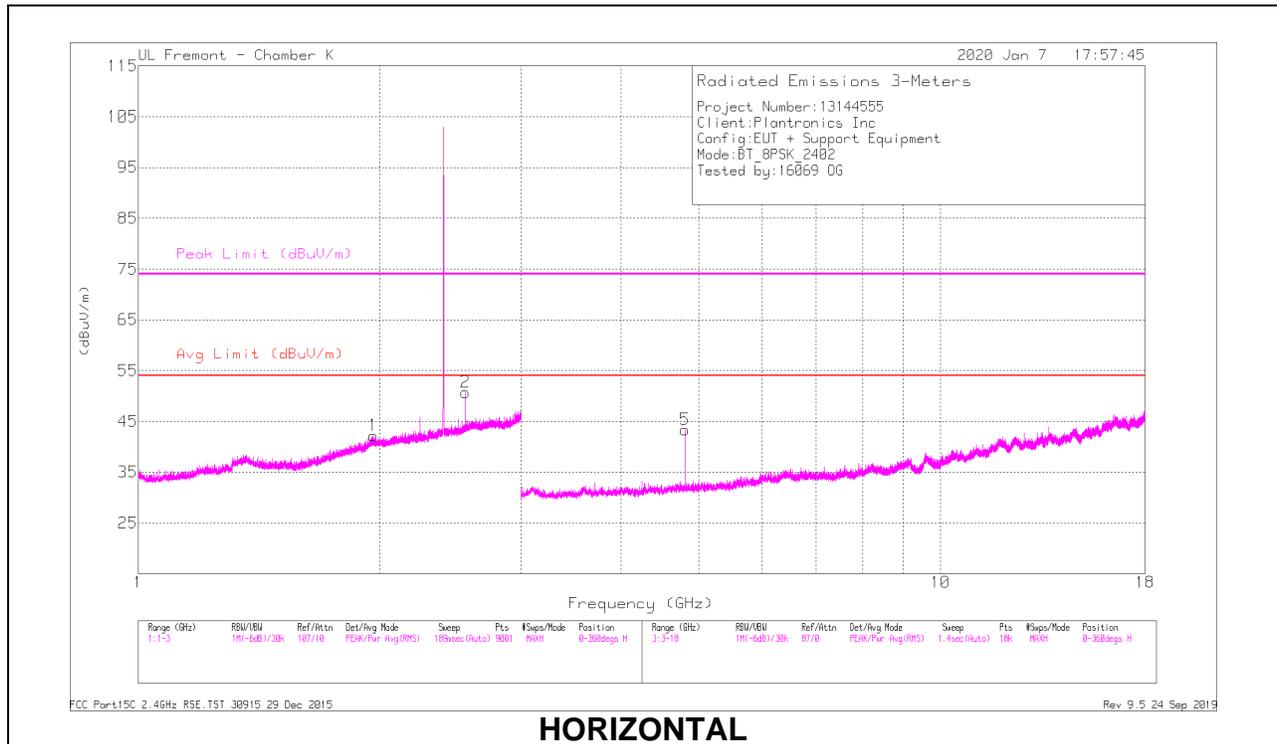
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Fit r/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.48351	42.55	Pk	32.5	-24.8	50.25	-	-	74	-23.75	170	99	V
2	2.53767	43.94	Pk	32.4	-24.8	51.54	-	-	74	-22.46	170	99	V
3	2.48351	29.54	VA1T	32.5	-24.8	37.24	54	-16.76	-	-	170	98	V
4	2.48354	29.78	VA1T	32.5	-24.8	37.48	54	-16.52	-	-	170	98	V

Pk - Peak detector

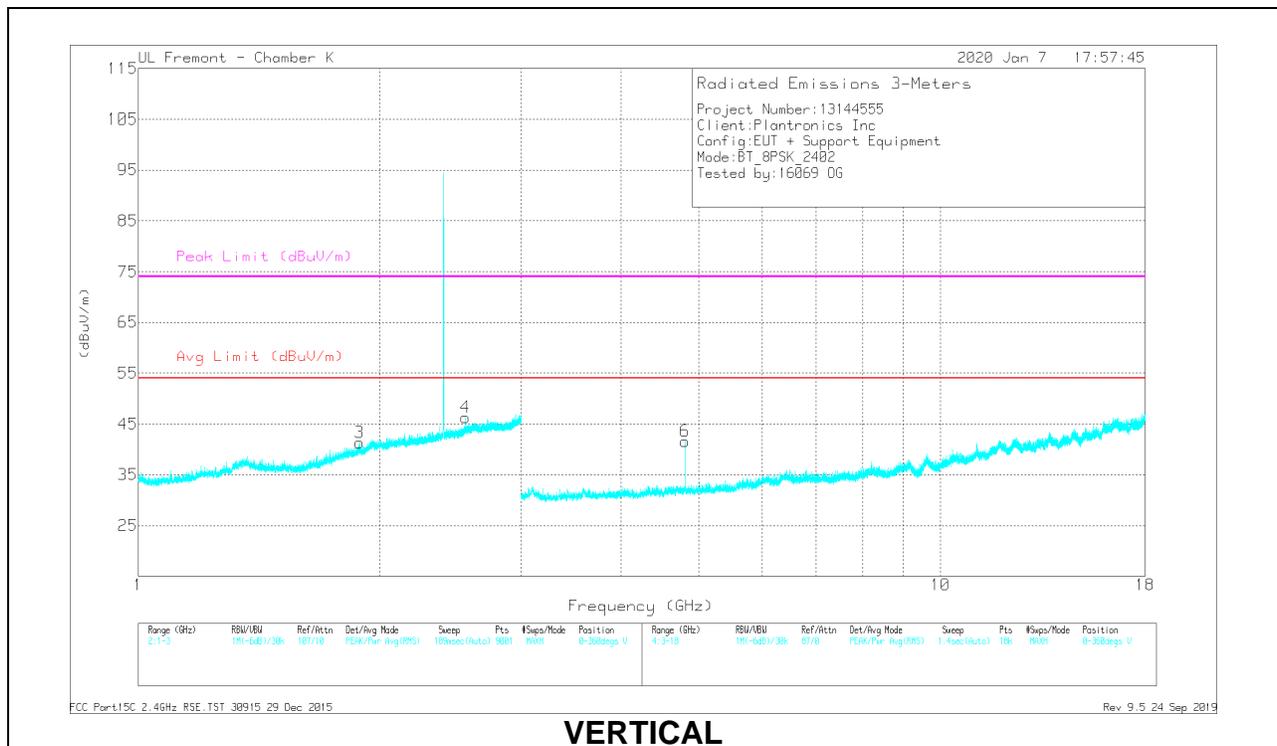
VA1T - FHSS: Linear Voltage Average  $V_B=1/T_{on}$  where:  $T_{on}$  is transmit duration

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL RESULTS**



**HORIZONTAL**



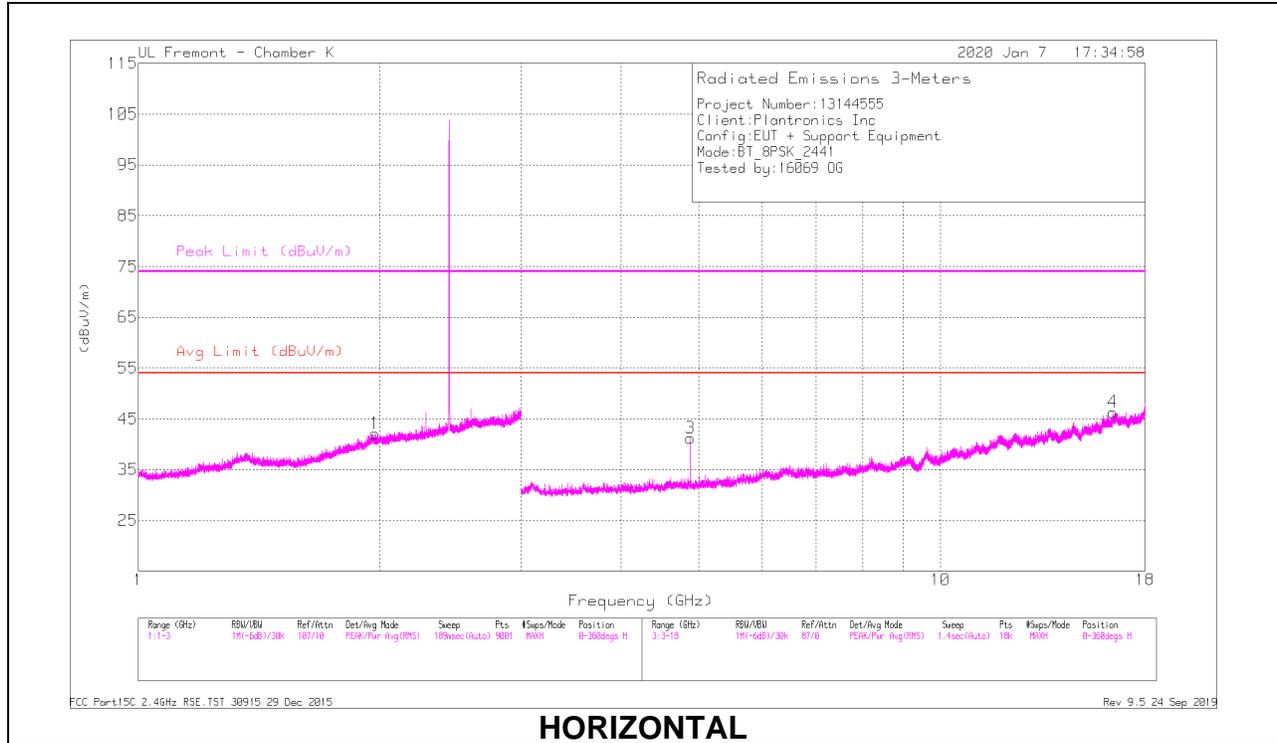
**VERTICAL**

**RADIATED EMISSIONS**

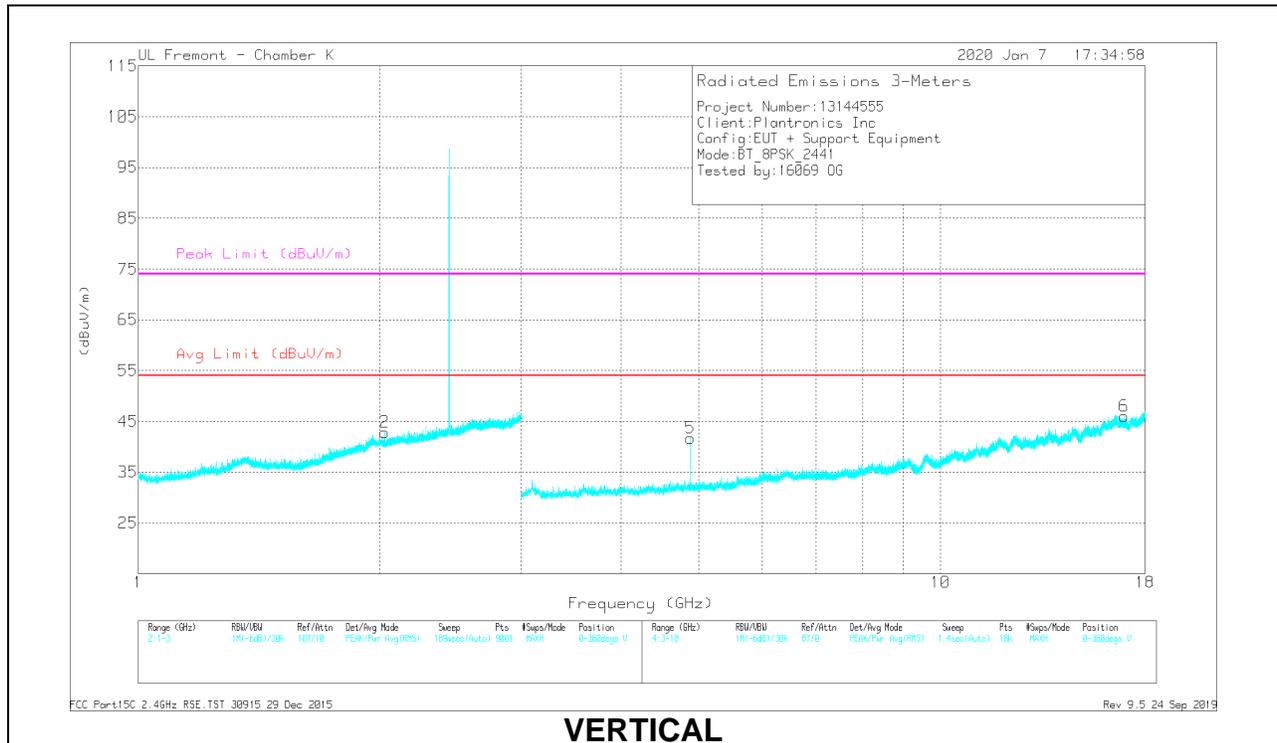
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5	* 4.8039	45.52	PKFH	34.2	-30.3	49.42	-	-	74	-24.58	56	103	H
	* 4.8042	37.42	VA1T	34.2	-30.3	41.32	54	-12.68	-	-	56	103	H
6	* 4.8043	45.04	PKFH	34.2	-30.3	48.94	-	-	74	-25.06	80	239	V
	* 4.80401	36.95	VA1T	34.2	-30.3	40.85	54	-13.15	-	-	80	239	V
1	1.96422	25.91	PKFH	31.6	-15.3	42.21	-	-	-	-	278	101	H
2	2.55778	31.98	PKFH	32.5	-13.8	50.68	-	-	-	-	193	101	H
3	1.88755	25.73	PKFH	31.1	-15.5	41.33	-	-	-	-	201	199	V
4	2.55822	27.51	PKFH	32.5	-13.7	46.31	-	-	-	-	92	199	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

### MID CHANNEL RESULTS



### HORIZONTAL



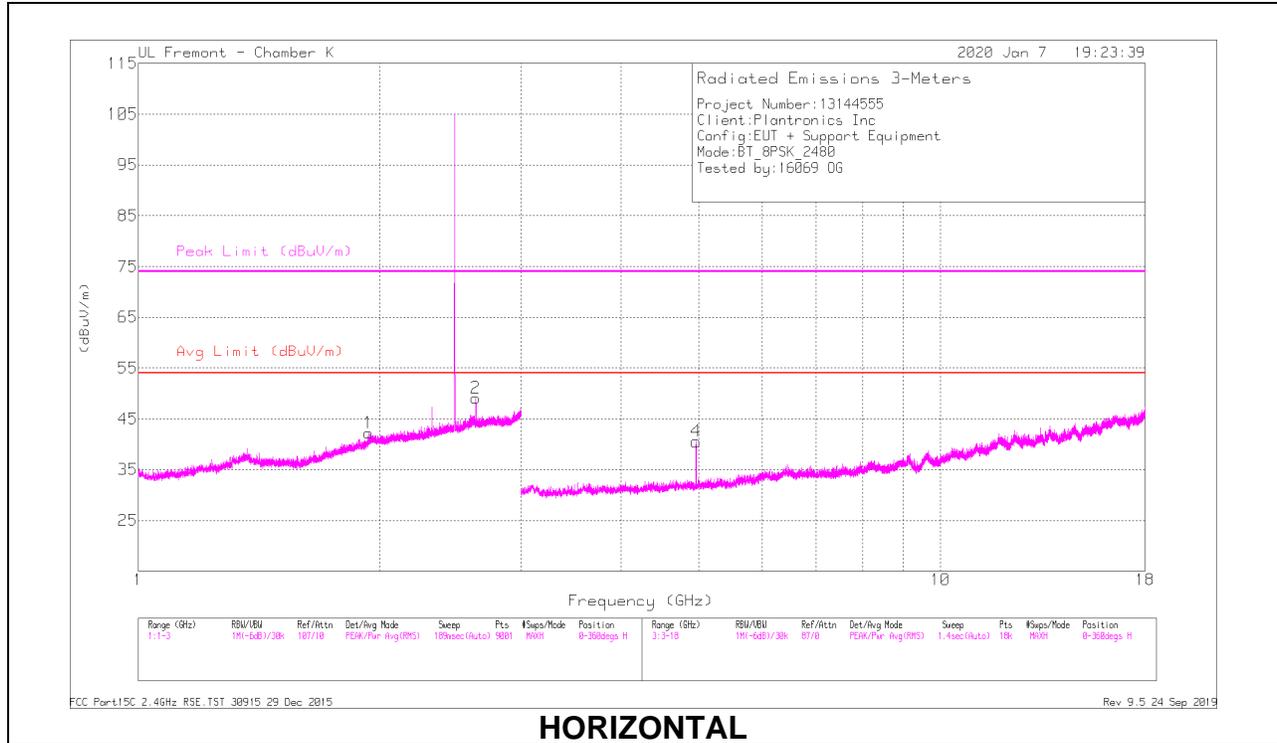
### VERTICAL

**RADIATED EMISSIONS**

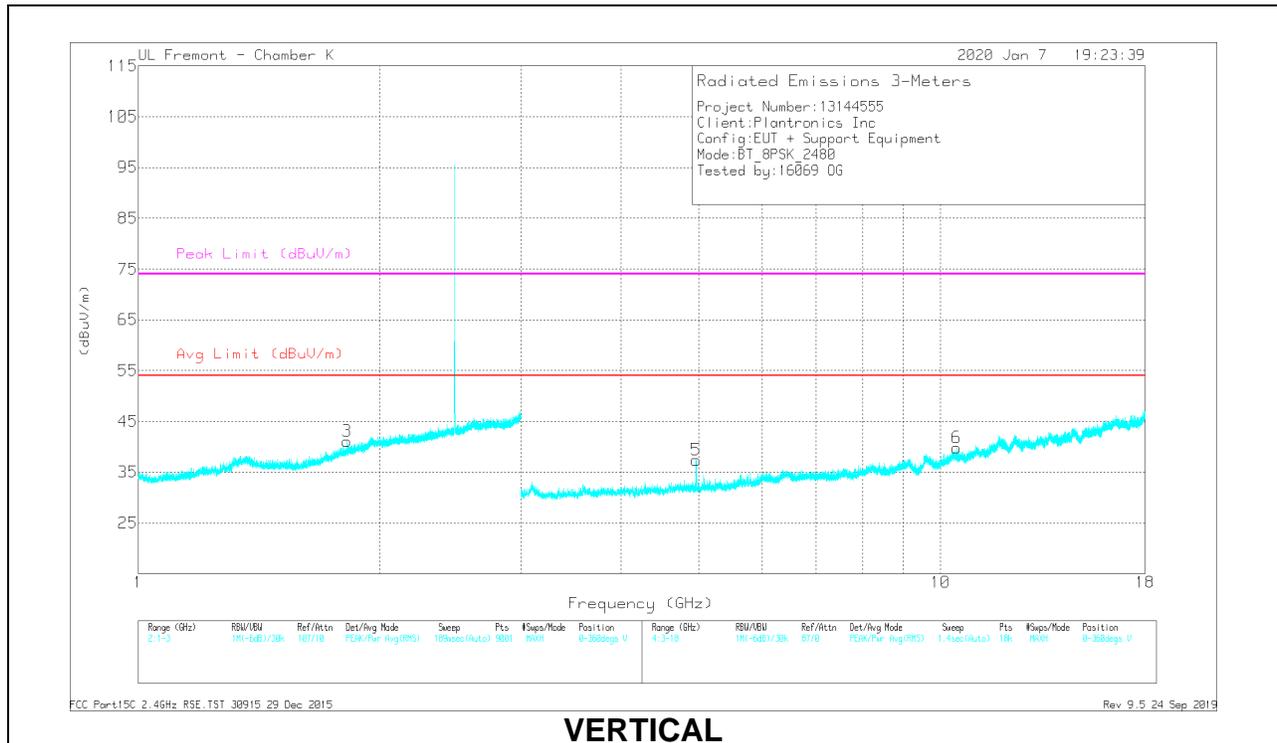
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.88148	44.07	PKFH	34.1	-30.5	47.67	-	-	74	-26.33	60	107	H
	* 4.88179	36.51	VA1T	34.1	-30.5	40.11	54	-13.89	-	-	60	107	H
5	* 4.88194	45.22	PKFH	34.1	-30.5	48.82	-	-	74	-25.18	76	266	V
	* 4.8821	37.1	VA1T	34.1	-30.5	40.7	54	-13.3	-	-	76	266	V
1	1.97467	25.76	PKFH	31.6	-15.3	42.06	-	-	-	-	228	101	H
2	2.02911	26.7	PKFH	31.4	-15.2	42.9	-	-	-	-	293	199	V
4	16.41492	22.65	PKFH	40.8	-17.1	46.35	-	-	-	-	301	199	H
6	16.95912	22.07	PKFH	40.7	-16.7	46.07	-	-	-	-	174	199	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

### HIGH CHANNEL RESULTS



### HORIZONTAL



### VERTICAL

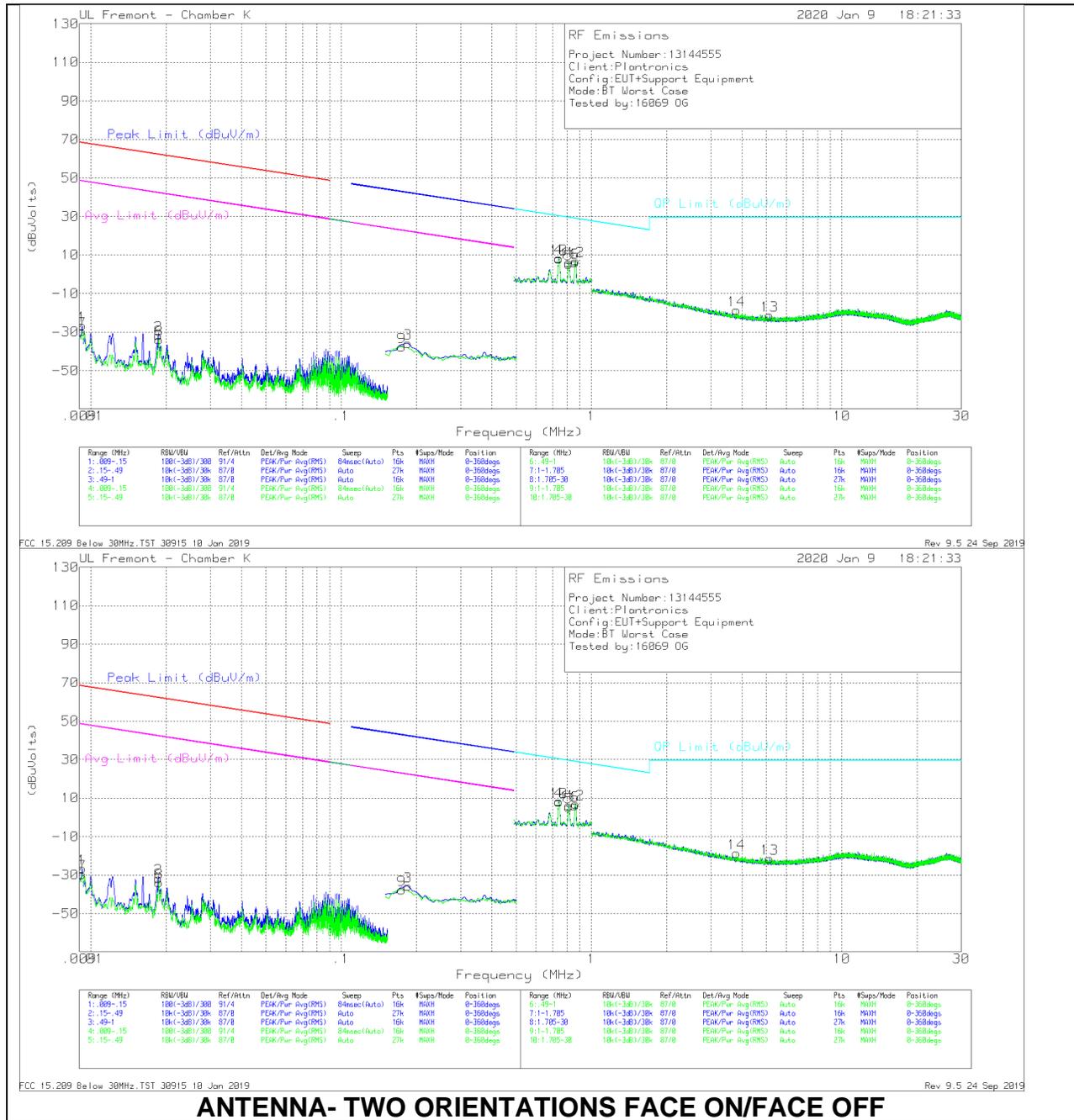
**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF EMC4294 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	* 4.95997	43.06	PKFH	34.1	-30.6	46.56	-	-	74	-27.44	119	143	H
	* 4.95983	34.88	VA1T	34.1	-30.6	38.38	54	-15.62	-	-	119	143	H
5	* 4.95995	43.64	PKFH	34.1	-30.6	47.14	-	-	74	-26.86	68	225	V
	* 4.96001	34.23	VA1T	34.1	-30.6	37.73	54	-16.27	-	-	68	225	V
1	1.93689	26.26	PKFH	31.2	-15.2	42.26	-	-	-	-	284	199	H
2	2.63622	29.93	PKFH	32.7	-13.6	49.03	-	-	-	-	266	101	H
3	1.82111	26.14	PKFH	30.5	-15.6	41.04	-	-	-	-	197	101	V
6	10.47375	25.03	PKFH	37.6	-22.8	39.83	-	-	-	-	135	199	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

## 9.2. WORST CASE BELOW 30MHZ

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



**Below 30MHz Data**

**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186650	Dist Corr 300m	Correct ed Reading (dBuVols)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.00923	24.15	Pk	61	-31.8	-80	-26.65	68.29	-94.94	48.29	-74.94	-	-	-	-	0-360
2	.01859	21.25	Pk	59	-32	-80	-31.75	62.2	-93.95	42.2	-73.95	-	-	-	-	0-360
3	.18452	20.14	Pk	56	-32.1	-80	-35.96	-	-	-	-	42.3	-78.26	22.3	-58.26	0-360
7	.00923	21.25	Pk	61	-31.8	-80	-29.55	68.28	-97.83	48.28	-77.83	-	-	-	-	0-360
8	.01868	19.02	Pk	59	-32	-80	-33.98	62.16	-96.14	42.16	-76.14	-	-	-	-	0-360
9	.17419	18.5	Pk	55.9	-32.1	-80	-37.7	-	-	-	-	42.8	-80.5	22.8	-60.5	0-360

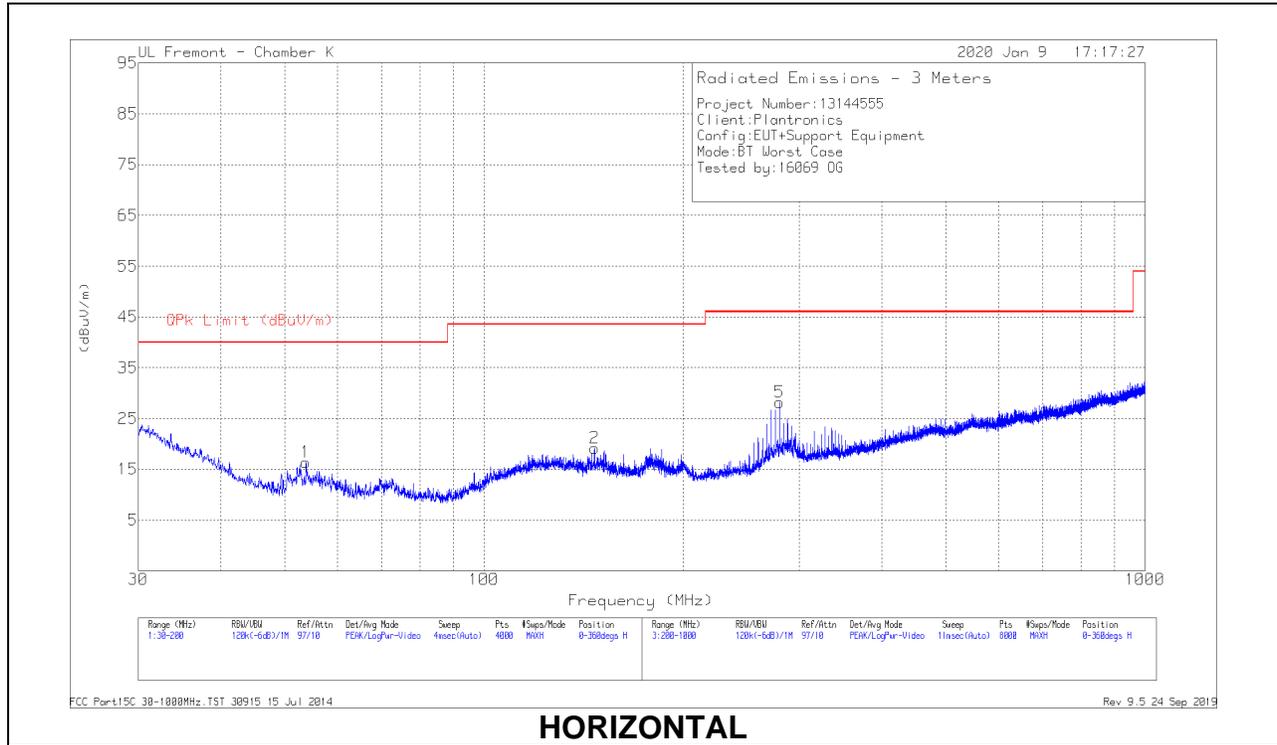
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0186650	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
4	.74098	24.28	Pk	56.1	-32.1	-40	8.28	30.22	-21.94	0-360
5	.81174	21.29	Pk	56.1	-32.1	-40	5.29	29.43	-24.14	0-360
6	.8603	22.1	Pk	56.1	-32.1	-40	6.1	28.92	-22.82	0-360
10	.74131	23.92	Pk	56.1	-32.1	-40	7.92	30.21	-22.29	0-360
11	.81171	22.13	Pk	56.1	-32.1	-40	6.13	29.43	-23.3	0-360
12	.86195	23.04	Pk	56.1	-32.1	-40	7.04	28.91	-21.87	0-360
13	5.13196	14.61	Pk	35.9	-32	-40	-21.49	29.5	-50.99	0-360
14	3.79471	15.75	Pk	37.5	-32	-40	-18.75	29.5	-48.25	0-360

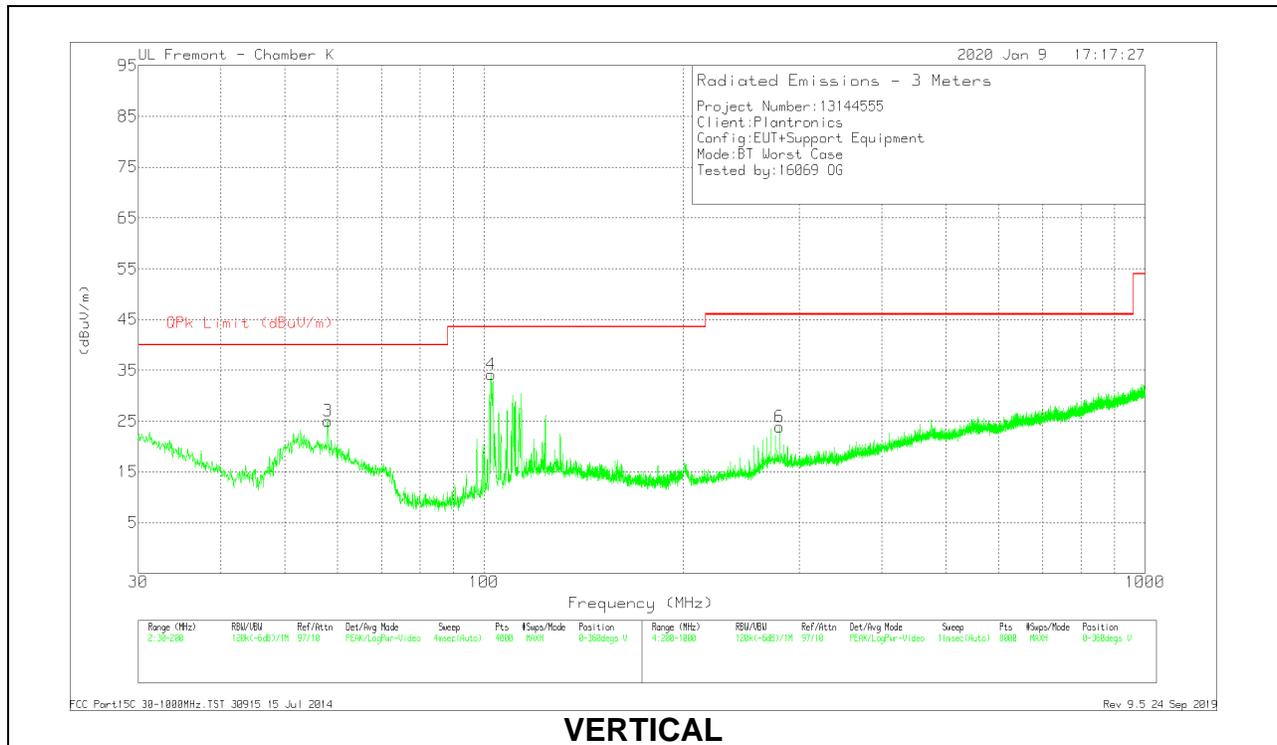
Pk - Peak detector

### 9.3. WORST CASE BELOW 1 GHZ

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



**HORIZONTAL**



**VERTICAL**

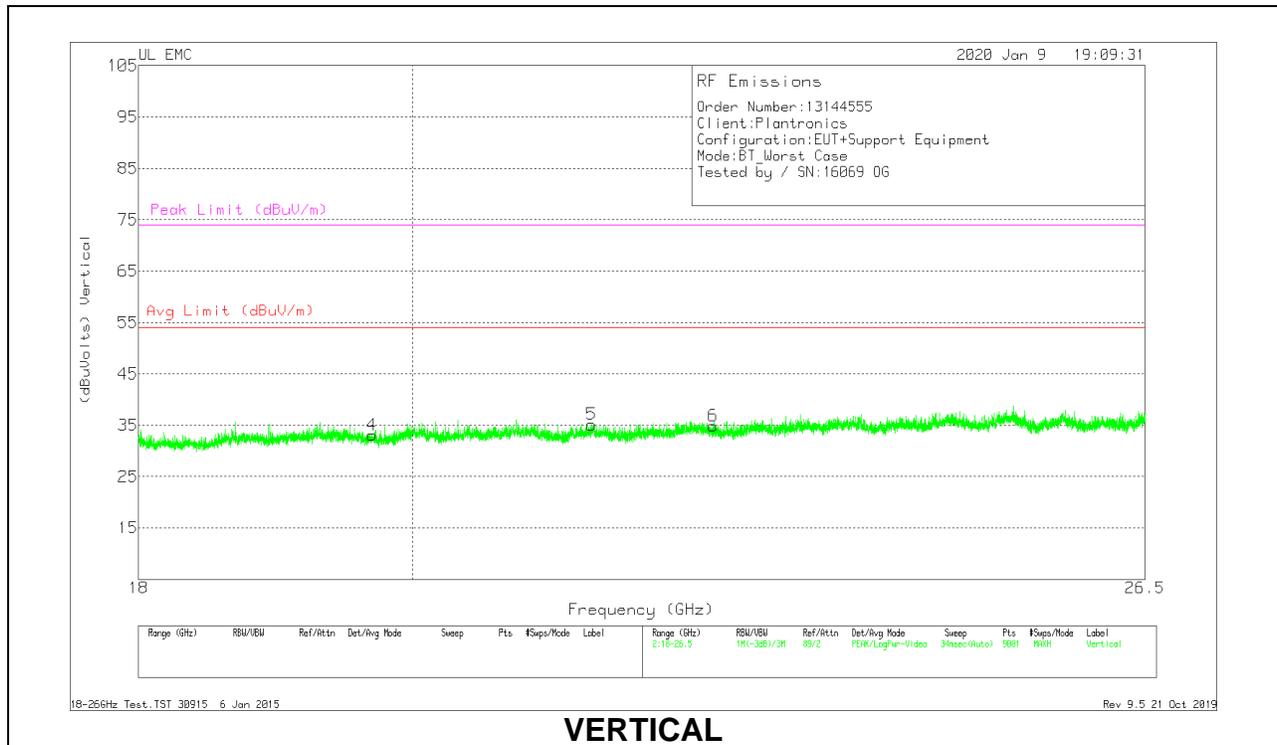
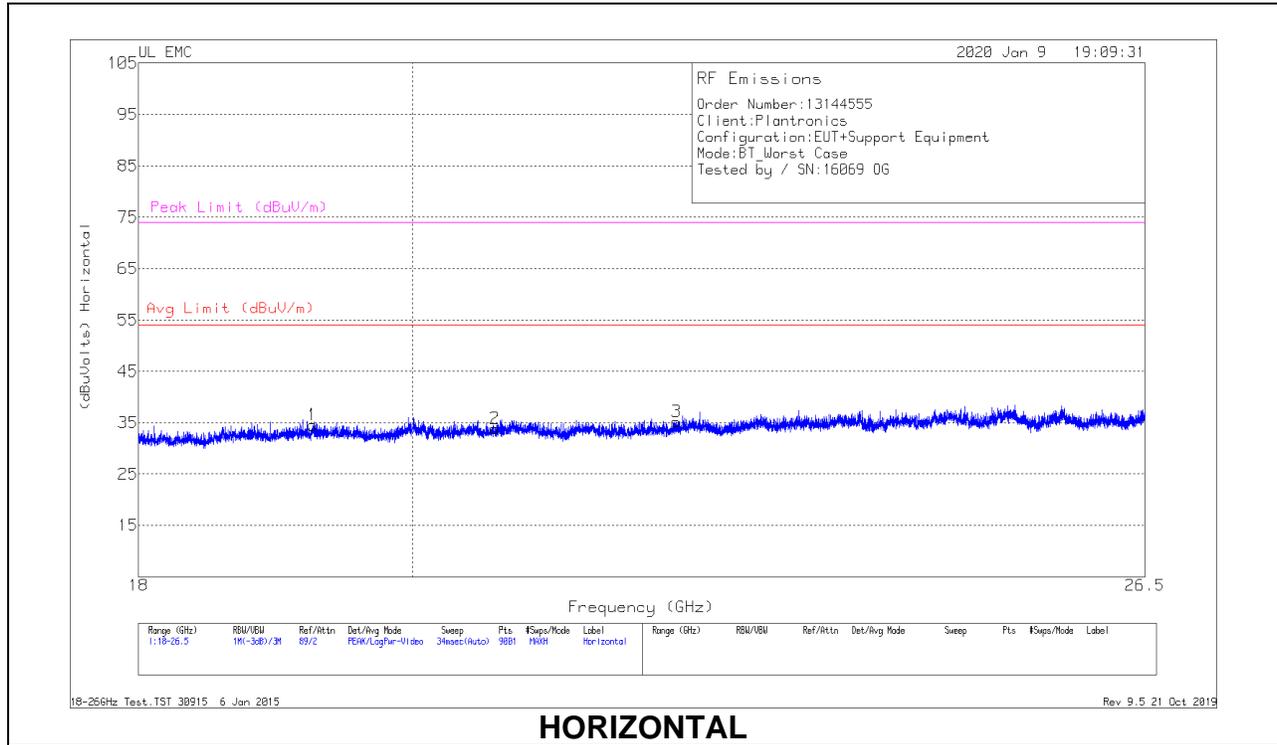
**Below 1GHz Data**

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	53.8062	34.47	Pk	13.2	-31.3	16.37	40	-23.63	0-360	399	H
2	146.9478	31.25	Pk	18.5	-30.6	19.15	43.52	-24.37	0-360	199	H
3	58.0147	43.16	Pk	13.2	-31.3	25.06	40	-14.94	0-360	100	V
4	102.333	30.09	Pk	16.9	-30.9	16.09	43.52	-27.43	353	361	V
	102.3972	21.64	Qp	16.9	-30.9	7.64	43.52	-35.88	353	361	V
5	* 279.9104	39.05	Pk	19.2	-30	28.25	46.02	-17.77	0-360	100	H
6	* 279.9104	34.73	Pk	19.2	-30	23.93	46.02	-22.09	0-360	199	V

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

### 9.4. WORST CASE 18-26 GHZ

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



**18 – 26GHz DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T447 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.24383	68.7	Pk	32.7	-57.4	-9.5	34.5	54	-19.5	74	-39.5
2	20.64161	67.35	Pk	33.1	-57.1	-9.5	33.85	54	-20.15	74	-40.15
3	22.13194	68.89	Pk	33.5	-57.7	-9.5	35.19	54	-18.81	74	-38.81
4	19.68867	66.51	Pk	32.8	-56.7	-9.5	33.11	54	-20.89	74	-40.89
5	21.42172	68.25	Pk	33.2	-56.8	-9.5	35.15	54	-18.85	74	-38.85
6	22.44644	68.49	Pk	33.6	-57.7	-9.5	34.89	54	-19.11	74	-39.11

Pk - Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

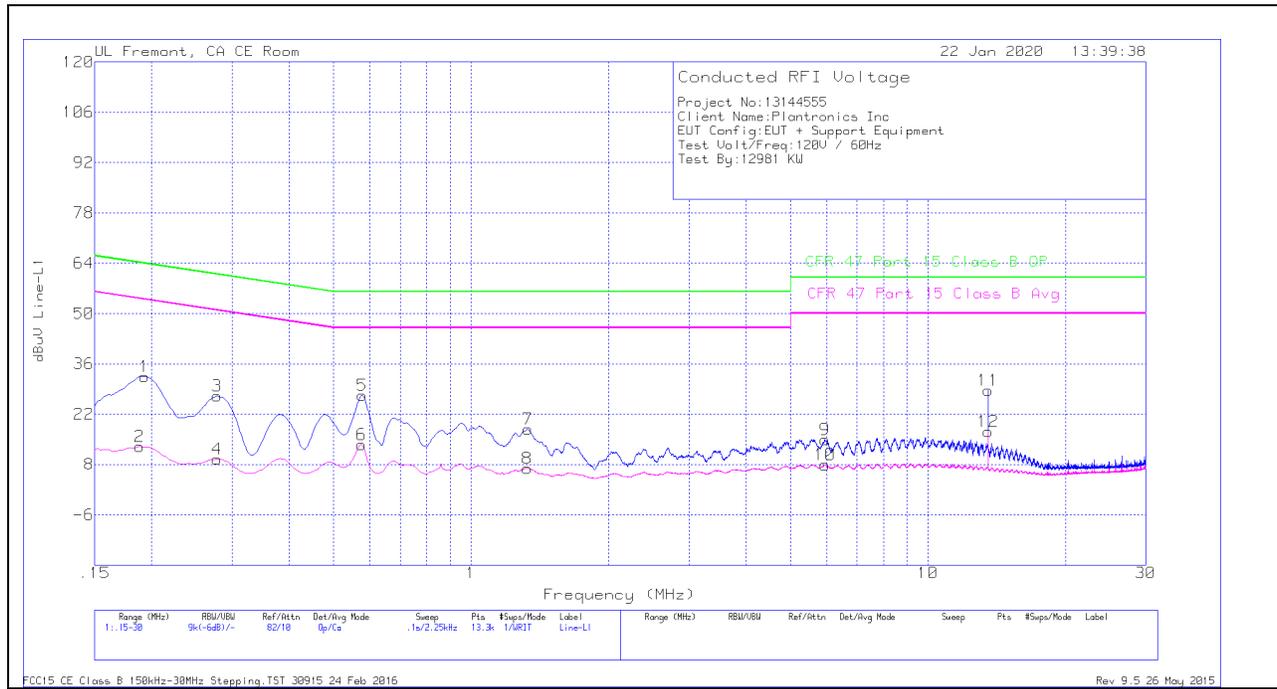
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### RESULTS

### 10.1.1. AC Power Line Norm

### LINE 1 RESULTS

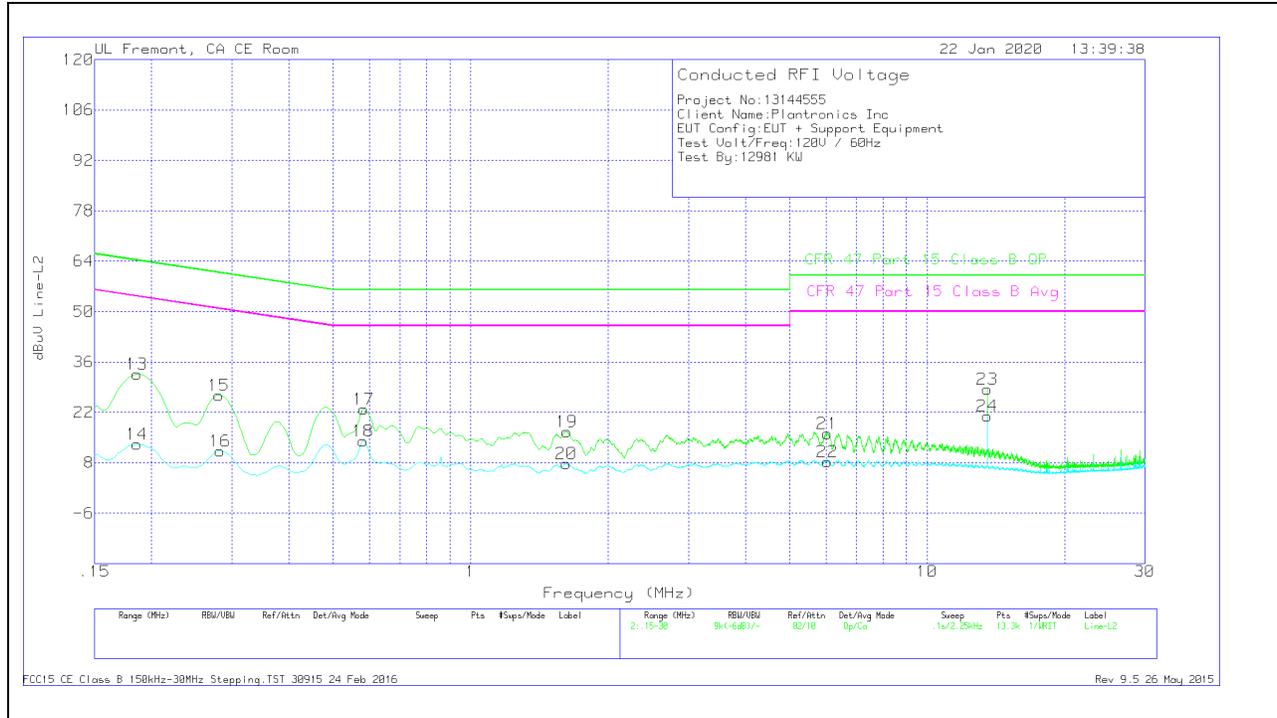


Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.19275	22.33	Qp	0	0	10.1	32.43	63.92	-31.49	-	-
2	.18825	2.8	Ca	0	0	10.1	12.9	-	-	54.11	-41.21
3	.27825	16.88	Qp	0	0	10.1	26.98	60.87	-33.89	-	-
4	.27825	-56	Ca	0	0	10.1	9.54	-	-	50.87	-41.33
5	.5775	17.1	Qp	0	0	10.1	27.2	56	-28.8	-	-
6	.57525	3.45	Ca	0	0	10.1	13.55	-	-	46	-32.45
7	1.33238	7.59	Qp	0	.1	10.1	17.79	56	-38.21	-	-
8	1.32675	-3.26	Ca	0	.1	10.1	6.94	-	-	46	-39.06
9	5.946	4.47	Qp	0	.2	10.2	14.87	60	-45.13	-	-
10	5.95838	-2.55	Ca	0	.2	10.2	7.85	-	-	50	-42.15
11	13.56	18.06	Qp	.1	.2	10.2	28.56	60	-31.44	-	-
12	13.56	6.69	Ca	.1	.2	10.2	17.19	-	-	50	-32.81

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	22.51	Qp	0	0	10.1	32.61	64.21	-31.6	-	-
14	.186	3	Ca	0	0	10.1	13.1	-	-	54.21	-41.11
15	.2805	16.62	Qp	0	0	10.1	26.72	60.8	-34.08	-	-
16	.28275	1.19	Ca	0	0	10.1	11.29	-	-	50.73	-39.44
17	.58312	12.83	Qp	0	0	10.1	22.93	56	-33.07	-	-
18	.582	3.92	Ca	0	0	10.1	14.02	-	-	46	-31.98
19	1.626	6.39	Qp	0	.1	10.1	16.59	56	-39.41	-	-
20	1.61925	-2.44	Ca	0	.1	10.1	7.76	-	-	46	-38.24
21	6.054	5.77	Qp	0	.2	10.2	16.17	60	-43.83	-	-
22	6.054	-2.09	Ca	0	.2	10.2	8.31	-	-	50	-41.69
23	13.56	17.93	Qp	.1	.2	10.2	28.43	60	-31.57	-	-
24	13.56	10.54	Ca	.1	.2	10.2	21.04	-	-	50	-28.96

Qp - Quasi-Peak detector

Ca - CISPR average detection