



# **CERTIFICATION TEST REPORT**

**Report Number. :** 12742033-E1V3

**Applicant :** APPLE, INC.  
1 APPLE PARK WAY  
CUPERTINO, CA 95014, U.S.A.

**Model :** A2047

**FCC ID :** BCGA2047

**IC :** 579C-A2047

**EUT Description :** LEFT EARBUD

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

**Date Of Issue:**

April 16, 2019

**Prepared by:**

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NVLAP Lab code: 200065-0

## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	4/10/2019	Initial Issue	Tony Li
V2	4/11/2019	Fixed FCC ID	Chin Pang
V3	4/16/19	Addressed TCB Questions	Tony Li

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE INC.  
1 APPLE PARK WAY  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** Left Earbud

**MODEL:** A2047

**SERIAL NUMBER:** CC2YC06CLYY4 (Conducted), CC2YC0B7LYY4 (Radiated)

**DATE TESTED:** MARCH 22 – APRIL 4, 2019

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

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

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

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

Approved & Released For  
UL Verification Services Inc. By:



Chin Pang  
Senior Engineer  
Consumer Technology Division  
UL Verification Services Inc.

Prepared By:



Tony Li  
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, RSS-GEN Issue 5, KDB558074 D01v05r02 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 I (ISED:2324A-5)
<input type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber J (ISED:2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED:2324A-1)
	<input checked="" type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED:2324A-3)
	<input checked="" type="checkbox"/> Chamber H (ISED:22541-5)	

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

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

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

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

### 4.2. SAMPLE CALCULATION

#### **RADIATED EMISSIONS**

Where relevant, the following sample calculation is provided:

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

#### **MAINS CONDUCTED EMISSIONS**

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Final Voltage (dBuV)} &= \text{Measured Voltage (dBuV)} + \text{Cable Loss (dB)} + \text{Limiter Factor (dB)} + \\ &\text{LISN Insertion Loss.} \\ 36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} &= 46.6 \text{ dBuV} \end{aligned}$$

### 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	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

A2047 is a Bluetooth earbud for the left ear. It has an integral battery, microphone and antenna. It can charge via bottom contacts with charging case.

### 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	12.72	18.71
2402 - 2480	Enhanced DQPSK	12.51	17.82
2402 - 2480	Enhanced 8PSK	13.26	21.18

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. For average power data please refer to section 8.7.

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)
2.4	-5.40

### 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 1A610

### 5.5. WORST-CASE CONFIGURATIONS

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT was set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that Z (Portrait) orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z (Portrait) orientation. There were no emissions found below 30MHz within 20dB of the limit.

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
Laptop	Apple	Macbook Pro	C02P41RZG086	FCC DoC
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	NA
Charger Case	Apple	A2078	CC2909500NDLYY13N	579C-A2078
10dB Fixed Attenuator	Pasternack	PE7087-10	Label ID: 178584	N/A

### I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	Lightning	Shielded	1	N/A
3	Antenna	1	SMA	Un-Shielded	0.3	To spectrum Analyzer / Power Meter

### I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
NA						

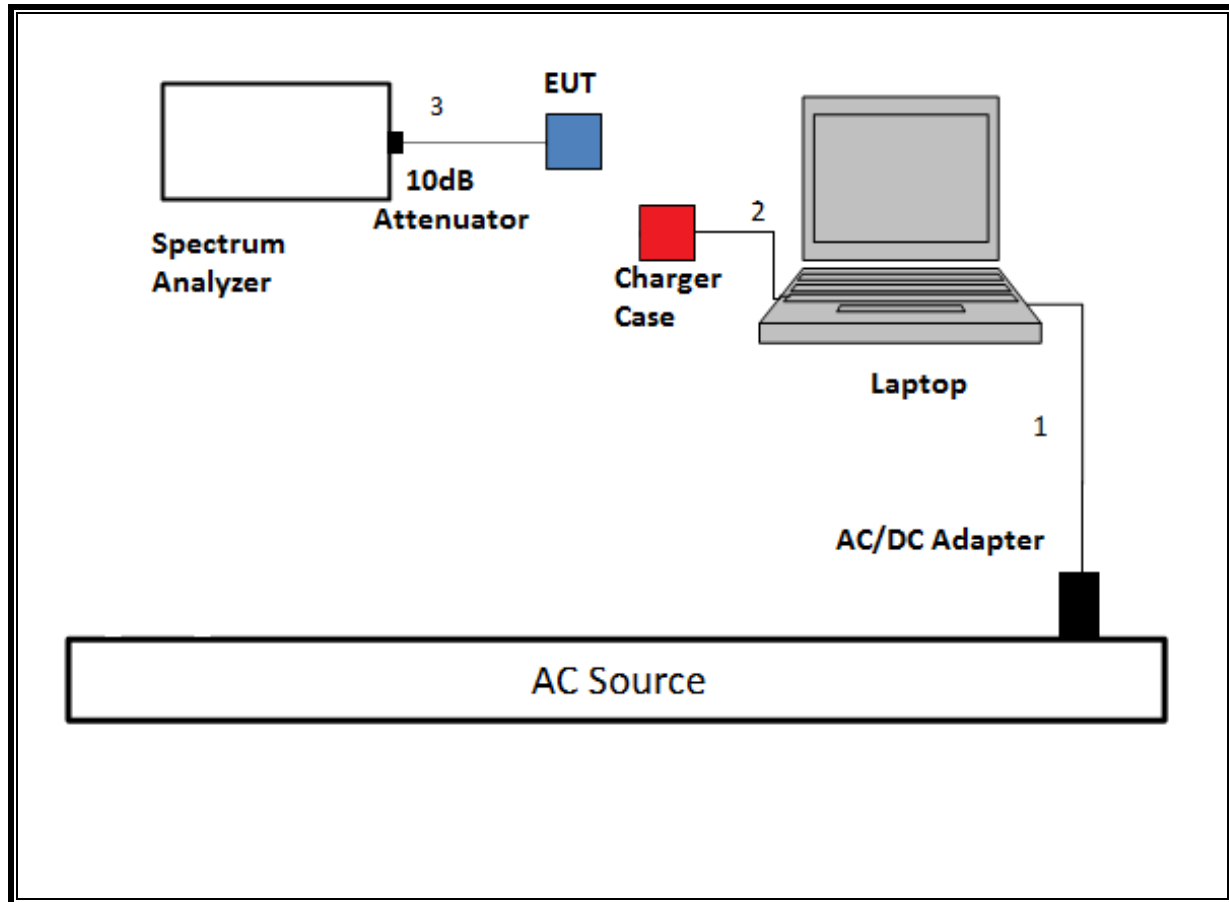
### I/O CABLES (BELOW 1GHz AND AC POWER LINE TEST WITH ADAPTER AND LAPTOP)

Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	1	N/A
2	USB	1	Lightning	Shielded	1	N/A

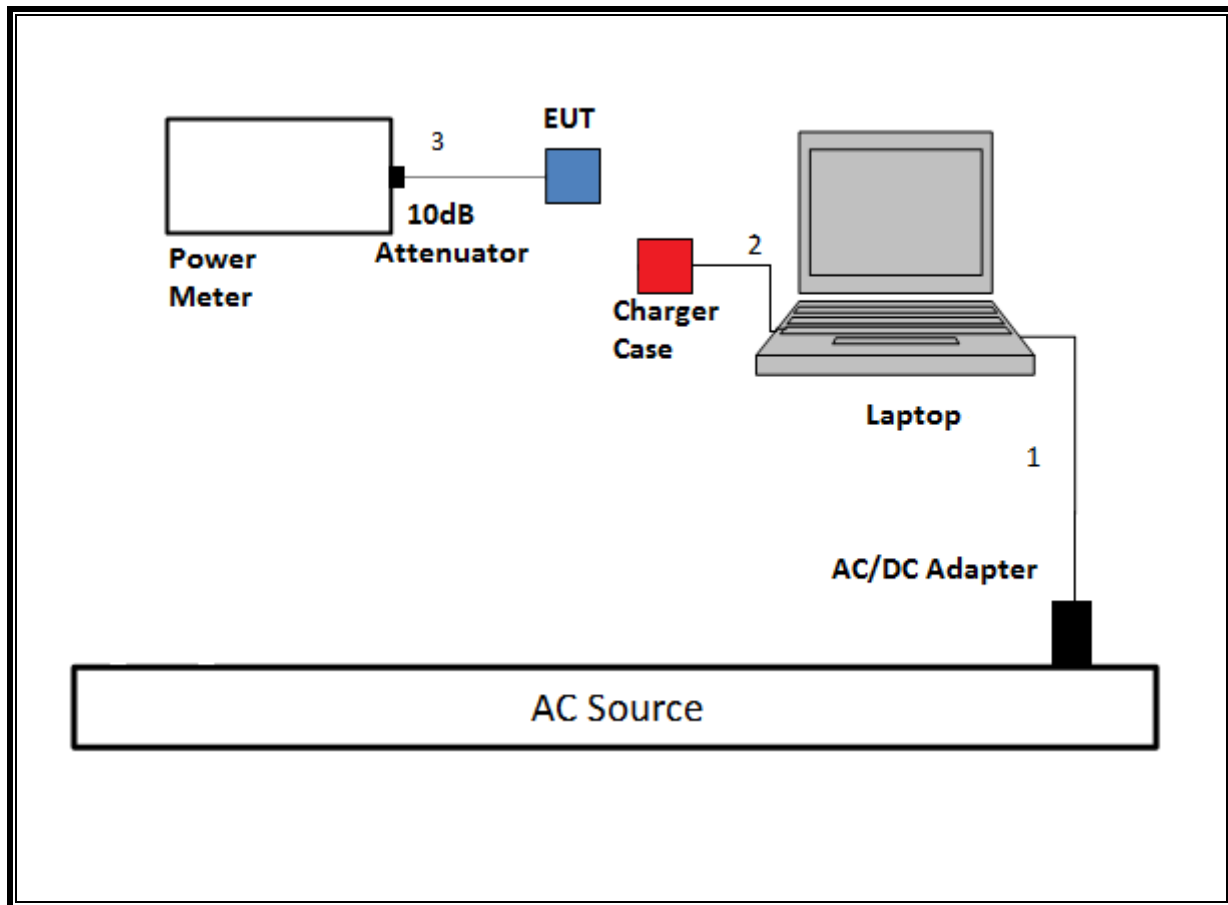
### TEST SETUP

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

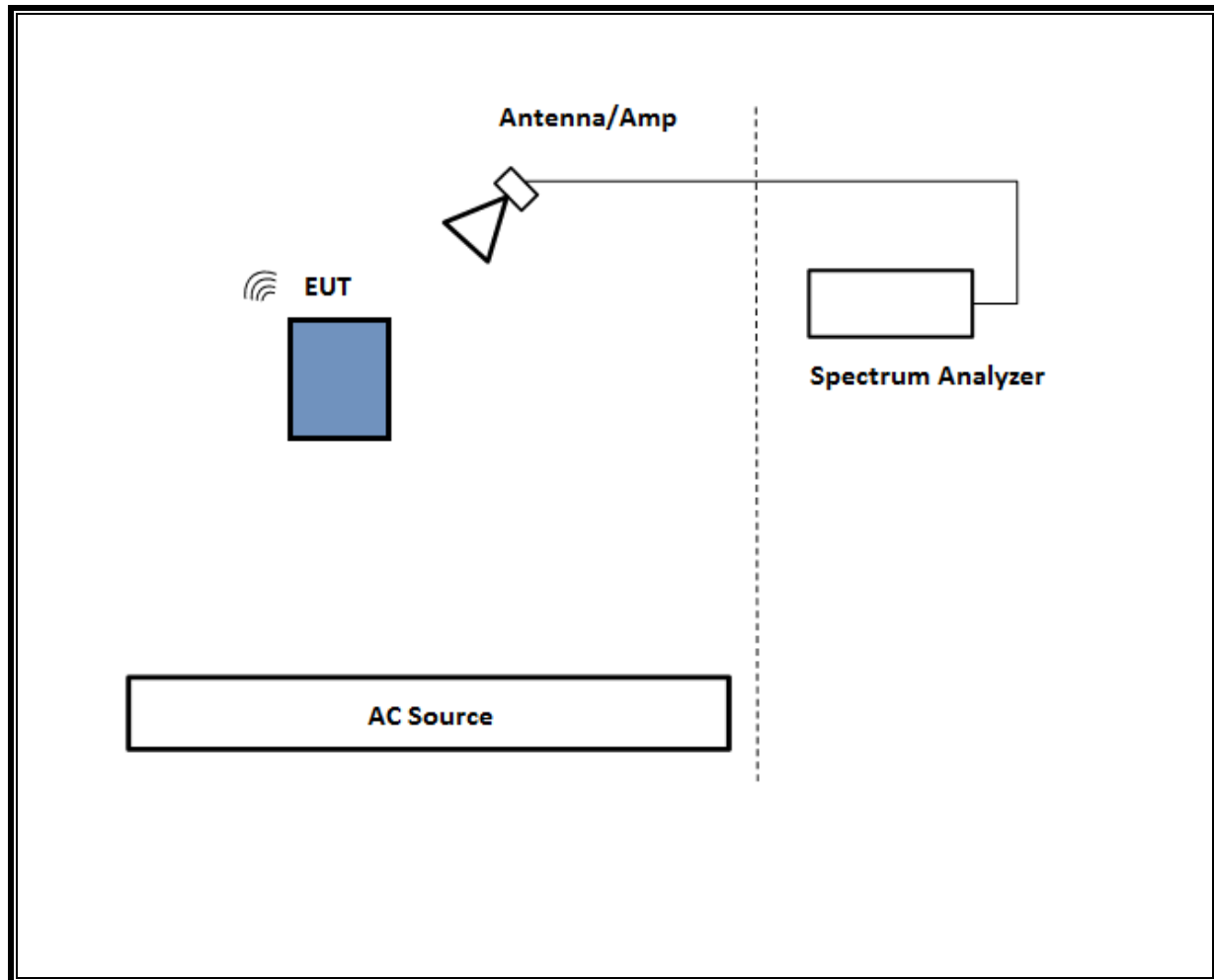
**SETUP DIAGRAM FOR CONDUCTED TESTS**



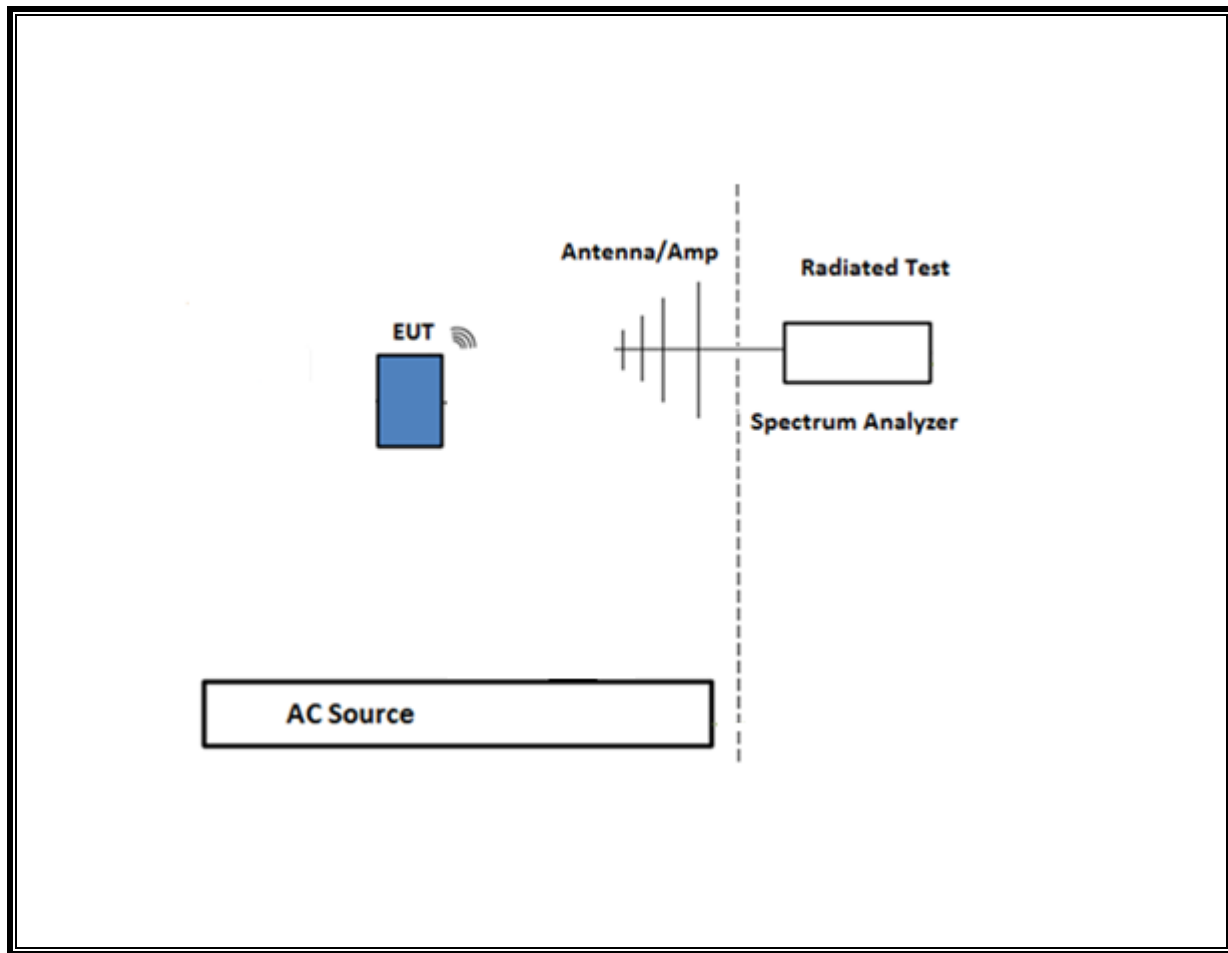
**SETUP DIAGRAM FOR CONDUCTED TESTS: POWER METER CONFIGURATION**



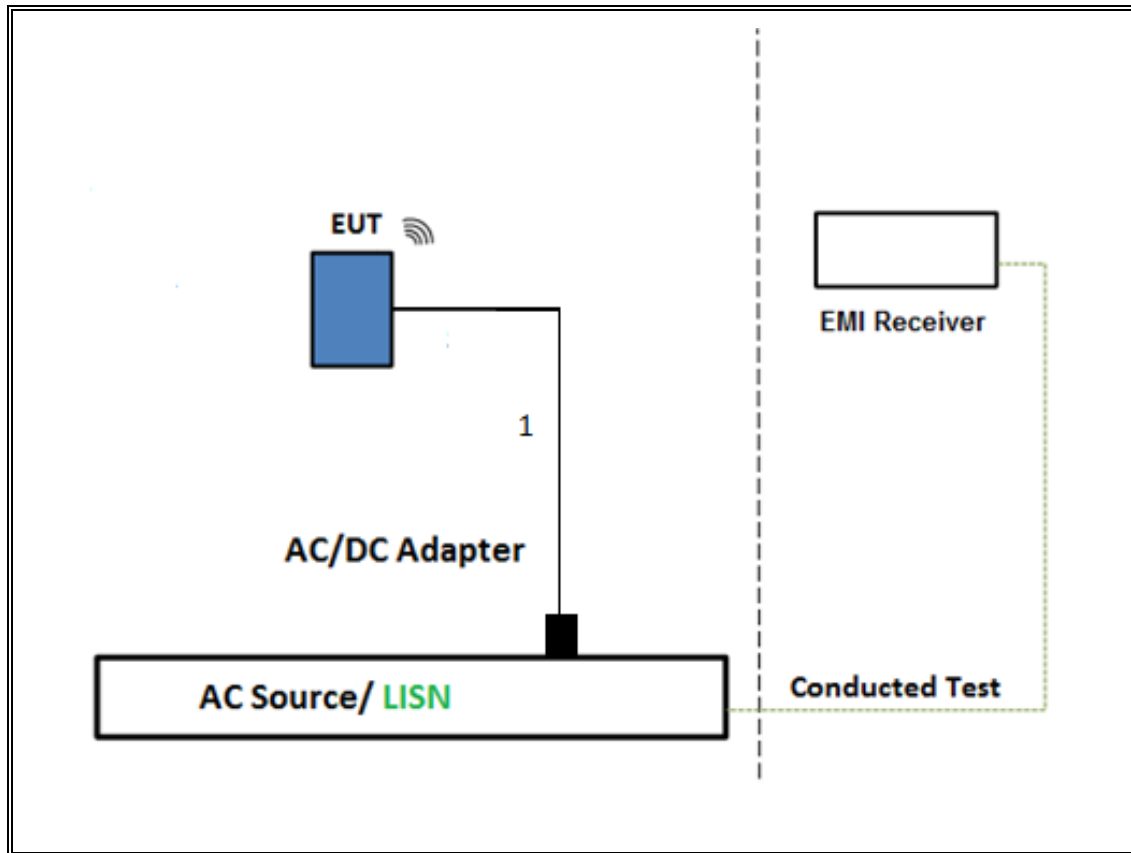
**SETUP DIAGRAM FOR RADIATED TESTS ABOVE 1GHz**



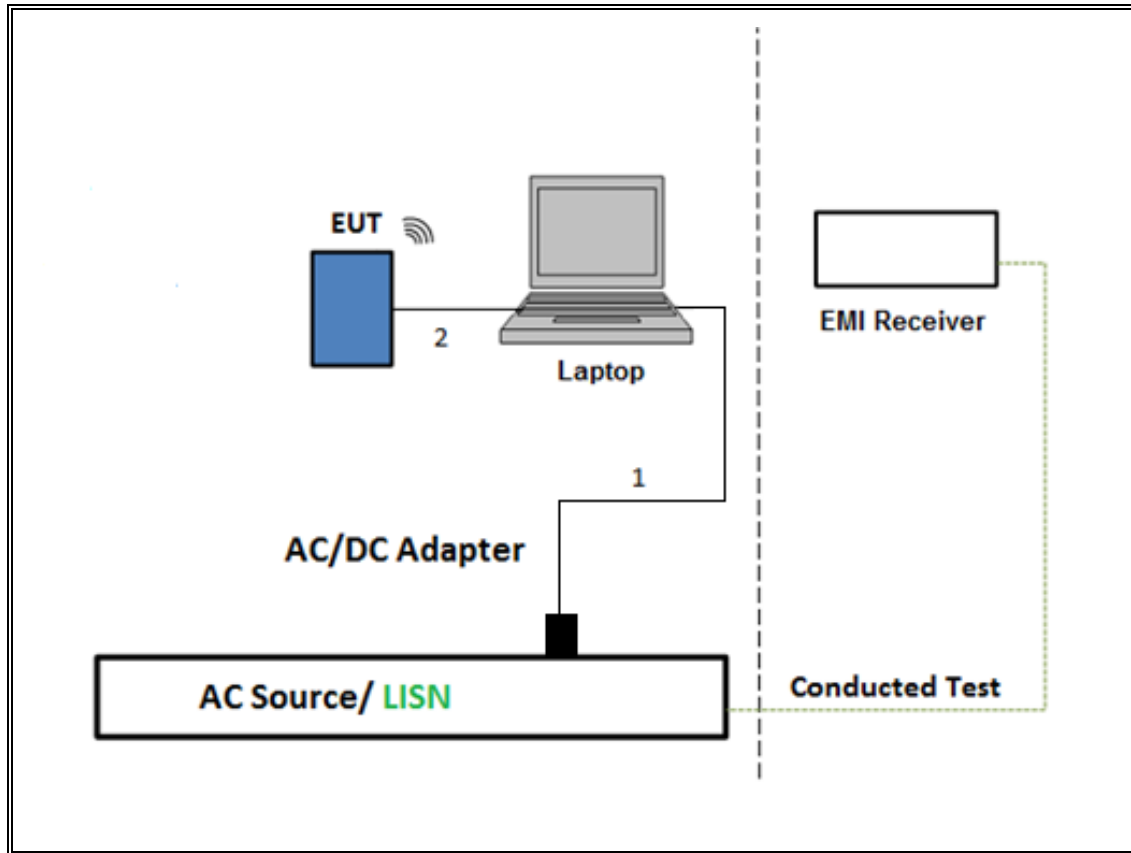
**SETUP DIAGRAM FOR BELOW 1GHz**



**TEST SETUP- AC LINE CONDUCTED: CHARGER CONFIGURATION**



**TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION**



## 6. 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, 1 – 18GHz	MITEQ	AFS42-00101800-25-S-42	T491	05/19/2019
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25-S-42	T1567	01/26/2020
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T1616	10/18/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	T185	04/19/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T120	07/02/2019
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T898	05/19/2019
Amplifier, 10KHz to 1GHz, 32dB	Sonoma Instrument Co.	310N	T834	06/04/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T136	07/02/2019
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	03/23/2020
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	06/16/2019
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T227	10/29/2019
Power Sensor	Power Sensor	Keysight	T1226	02/06/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T340	01/22/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A-544	T1113	01/22/2020
Thermometer	Control Company	14-650-118, 15557603	T1817	05/01/2019

AC Line Conducted				
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ESCI7	T1436	02/23/2020
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2019
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/19/2019
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016	
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	



## **7. 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.

## 8. ANTENNA PORT TEST RESULTS

### 8.1. DUTY CYCLE

#### PROCEDURE

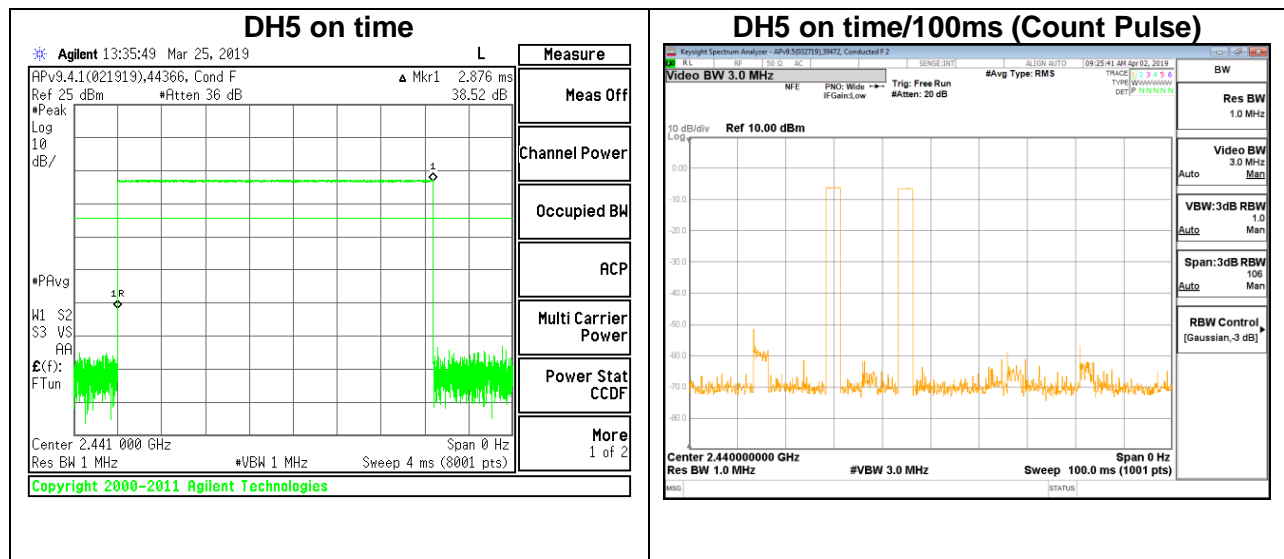
FCC Public Notice DA 00-705 measurement guidelines.

#### ON TIME AND DUTY CYCLE RESULTS

Duty cycle correction factor(dB) =  $20\log(\text{duty cycle})$

Duty cycle=on time/100 milliseconds

On time = dwell time \* hopping number in 100ms



Note: Duty Cycle = on time/100 milliseconds =  $2 \times 2.876 / 100 = 5.752\%$

Duty cycle correction factor =  $20 \times \log(\text{Duty cycle}) = -24.80 \text{ dB}$

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## **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**

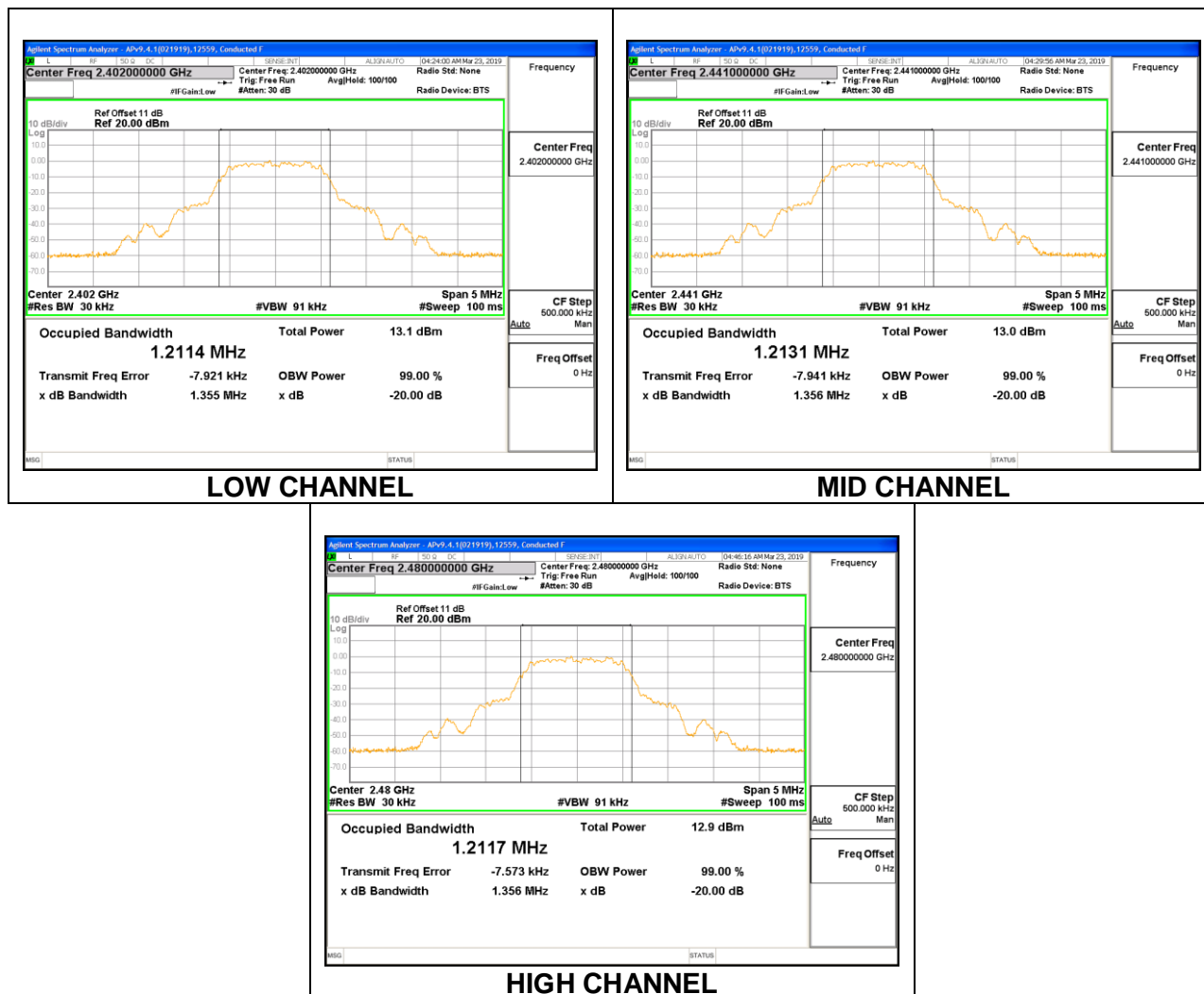
## 8.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.934	0.875
Mid	2441	0.936	0.876
High	2480	0.937	0.877



## 8.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.355	1.211
Mid	2441	1.356	1.213
High	2480	1.356	1.212



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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.

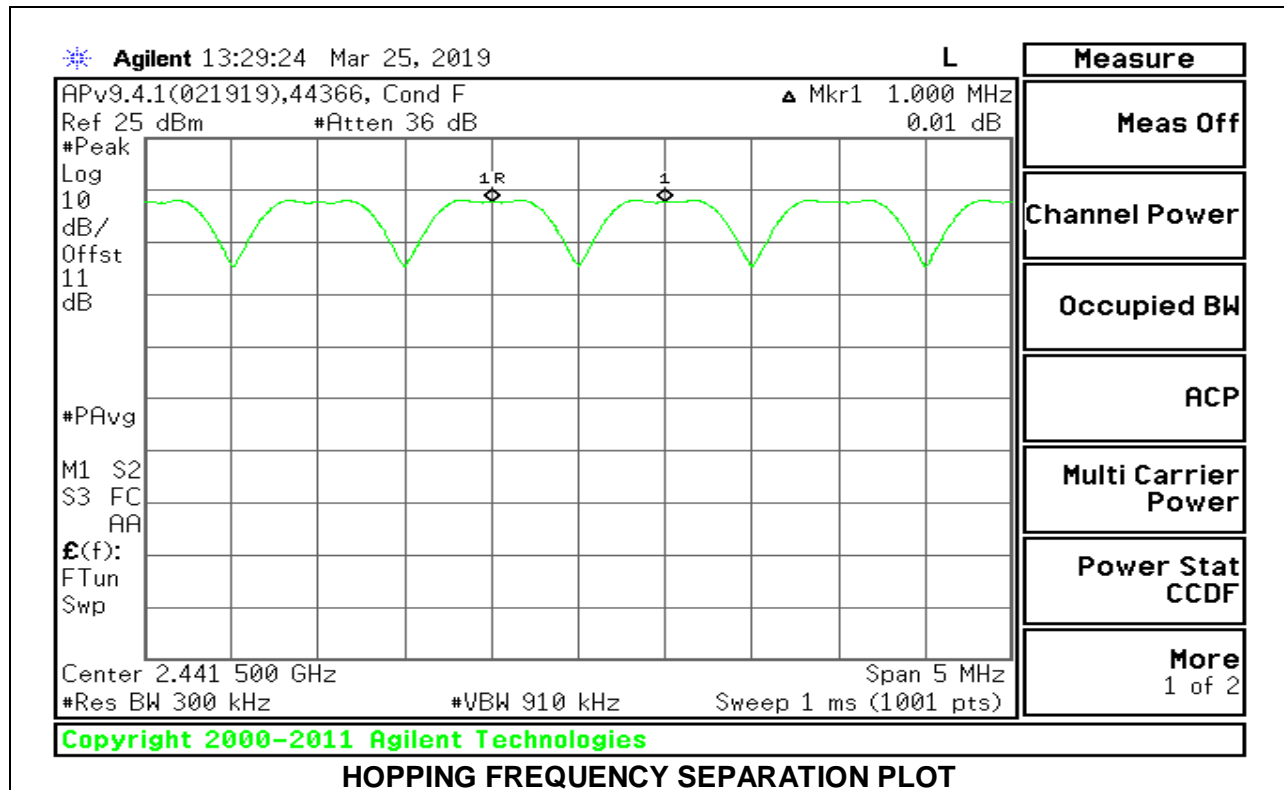
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

#### **TEST PROCEDURE**

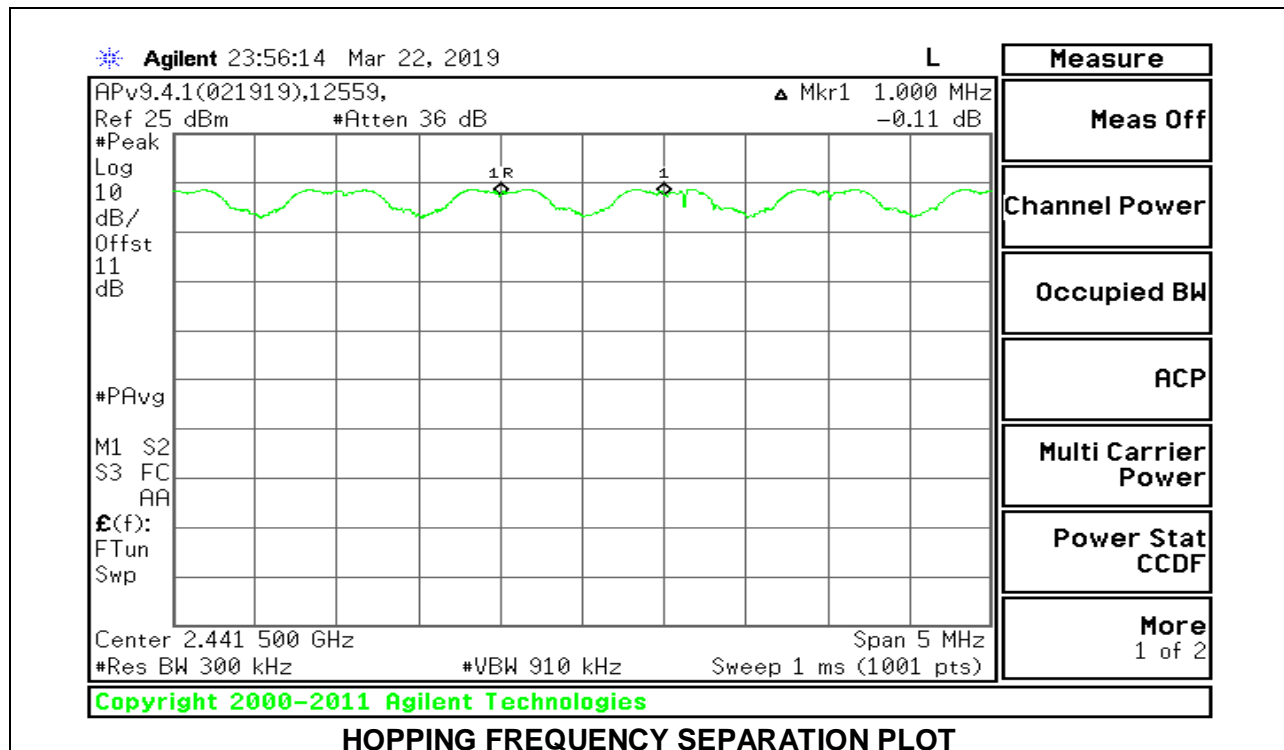
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 3x RBW. The sweep time is coupled.

#### **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**

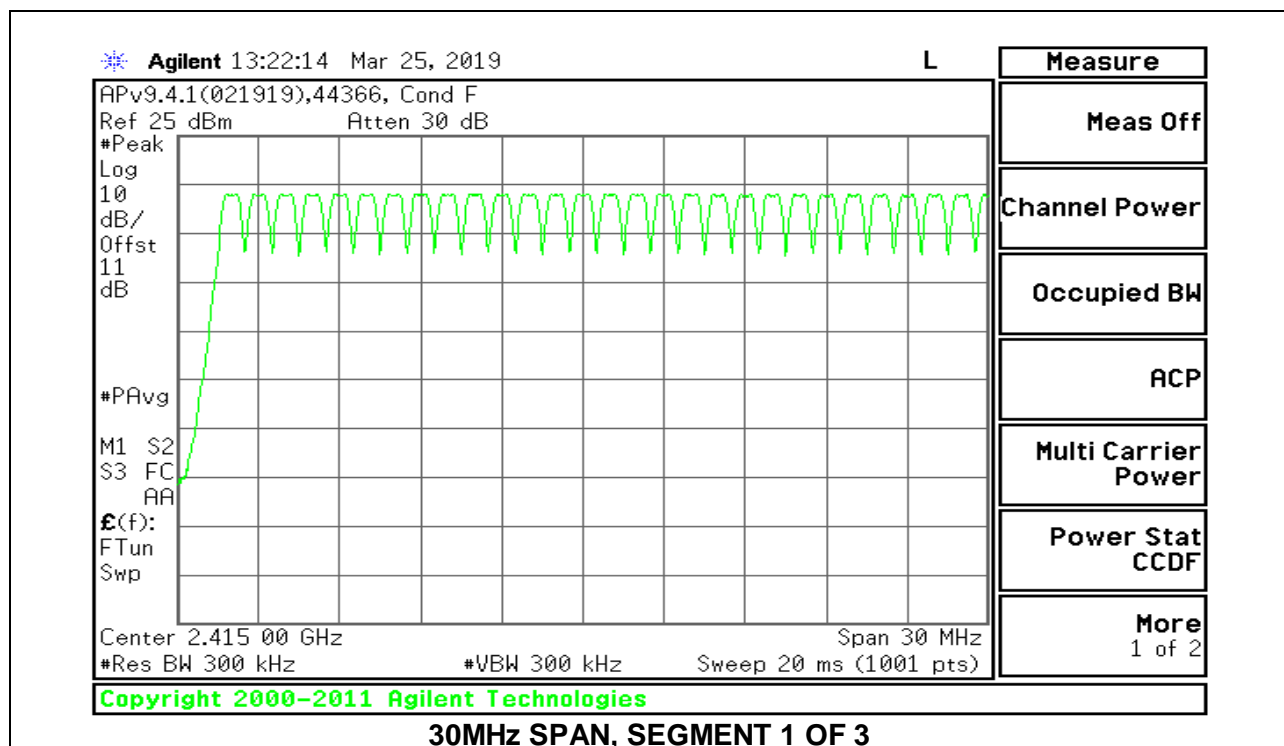
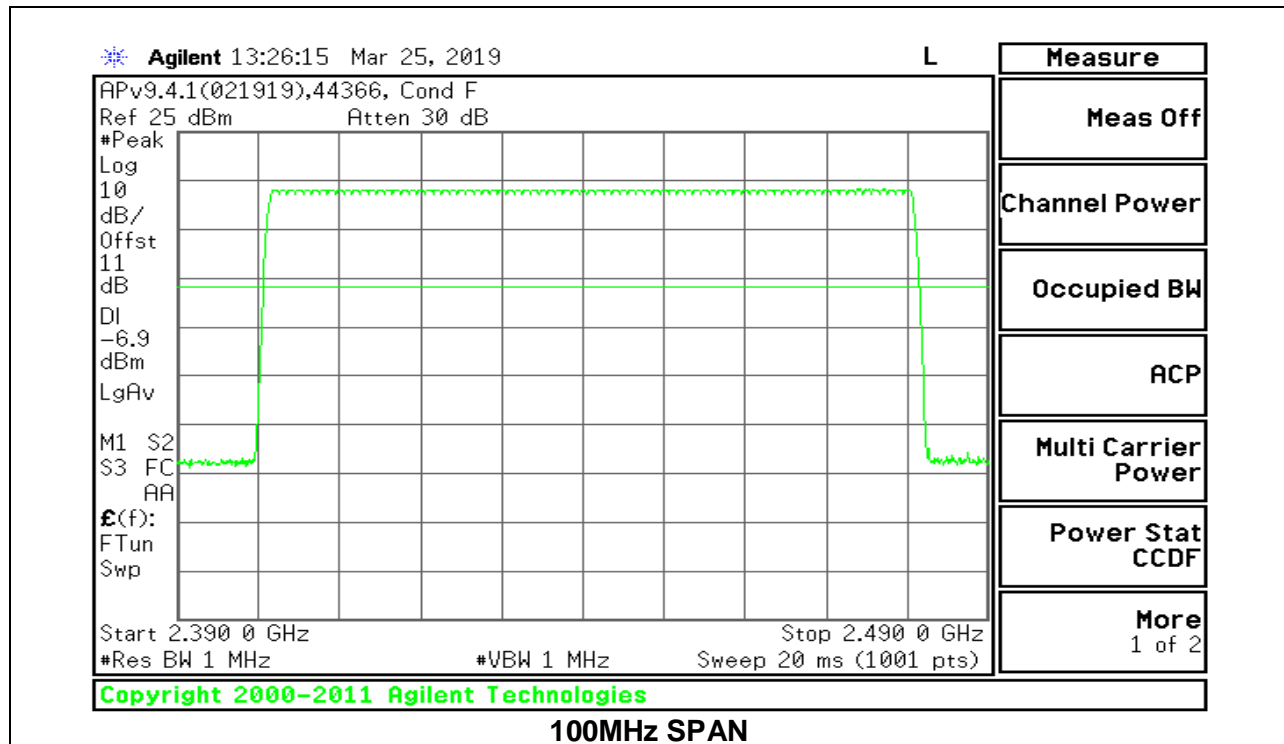
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

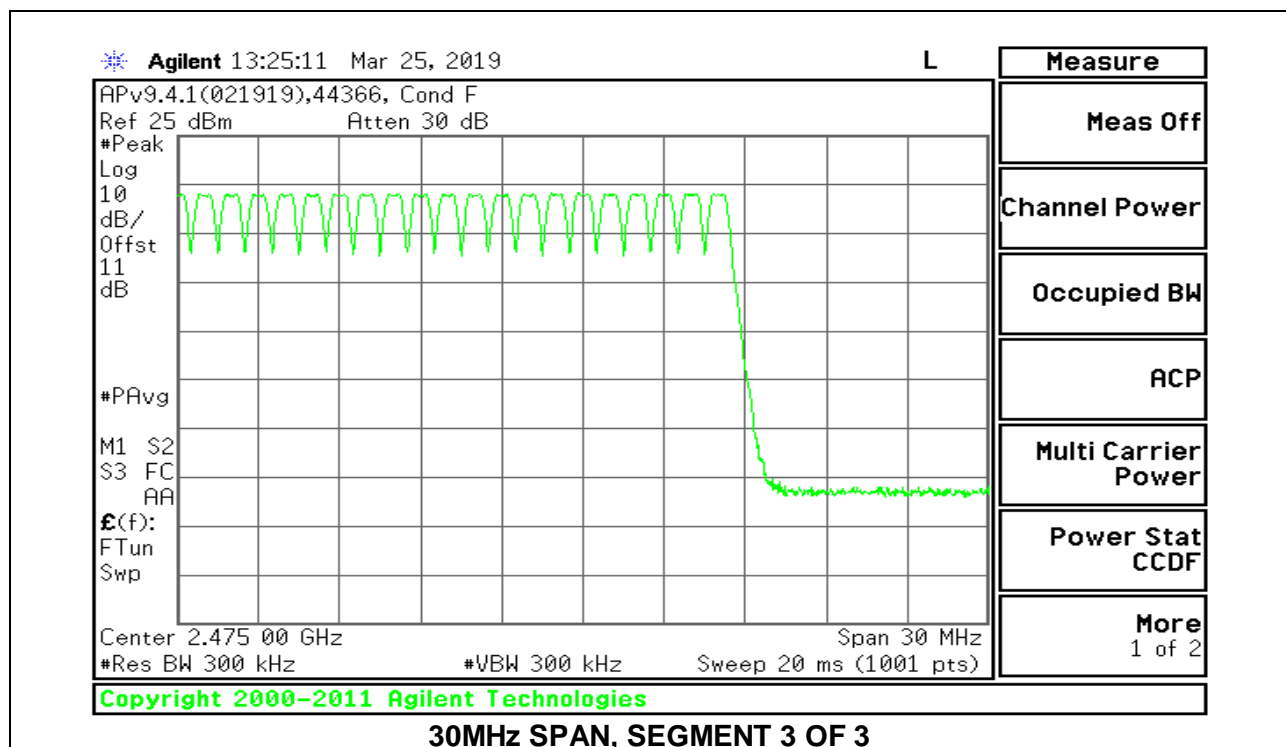
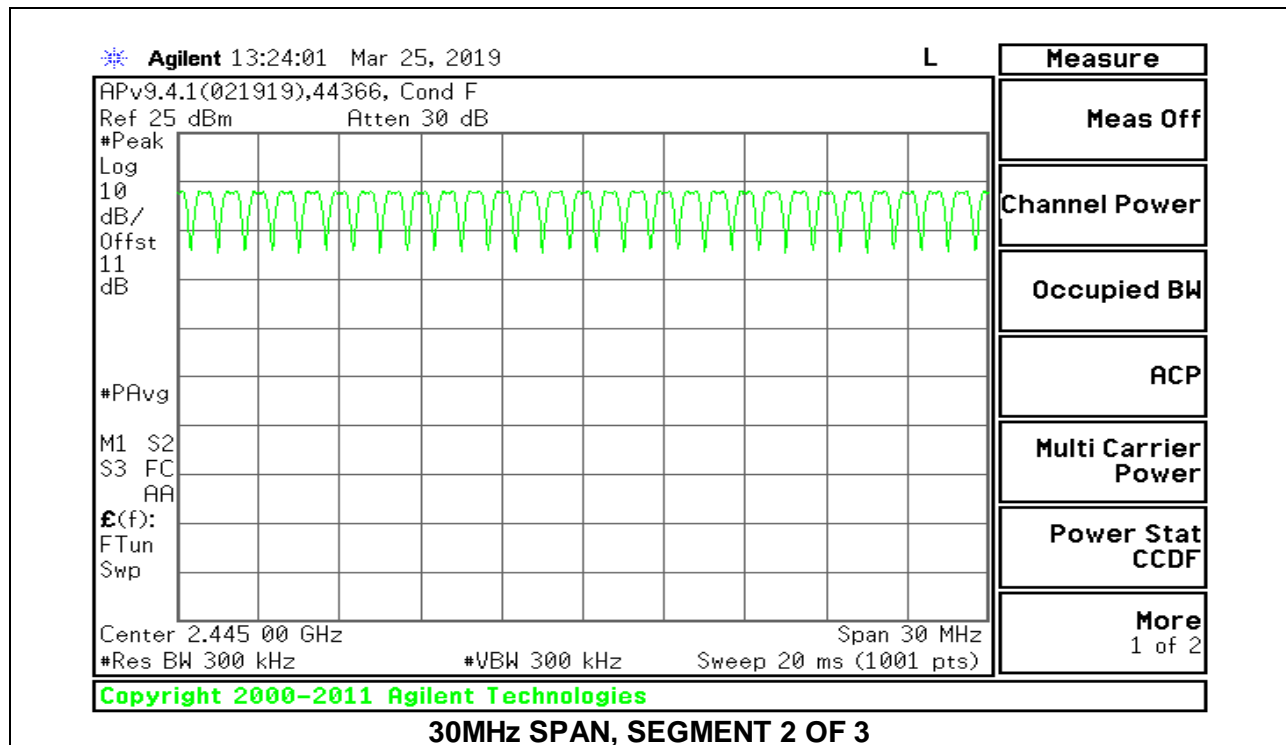
### **RESULTS**

Normal Mode: 79 Channels Observed

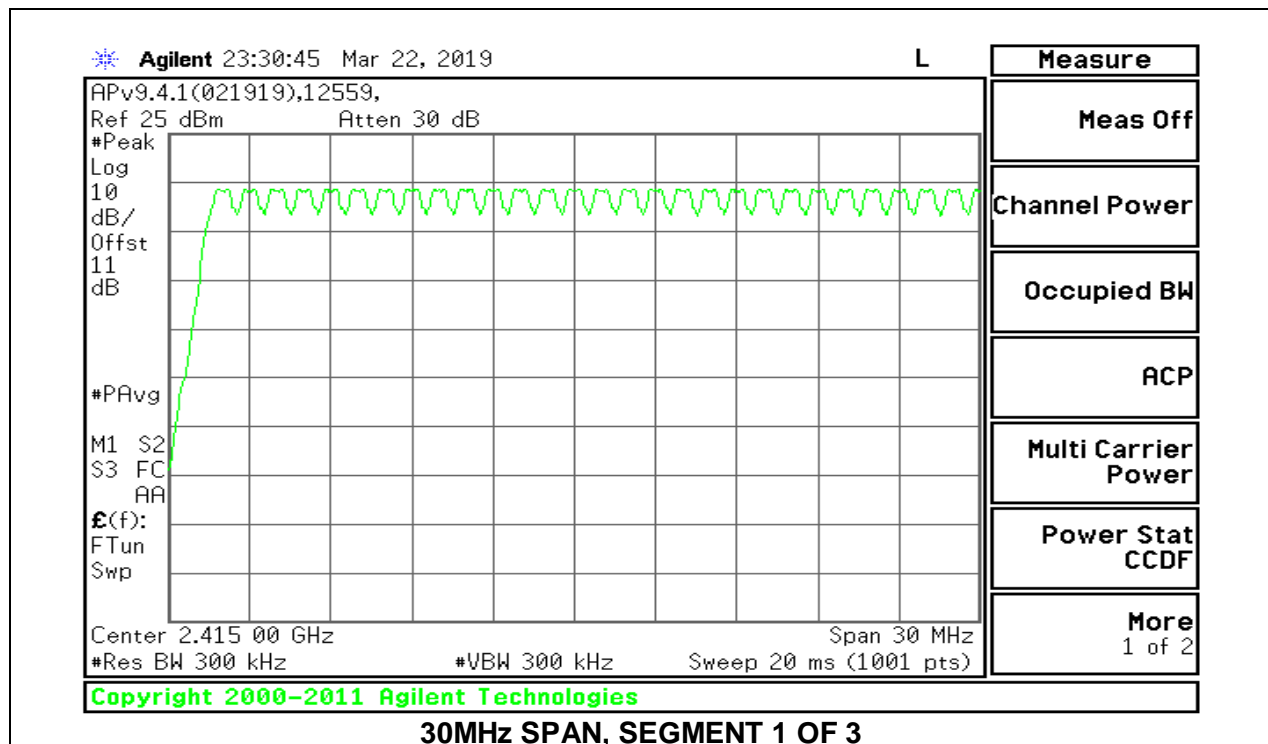
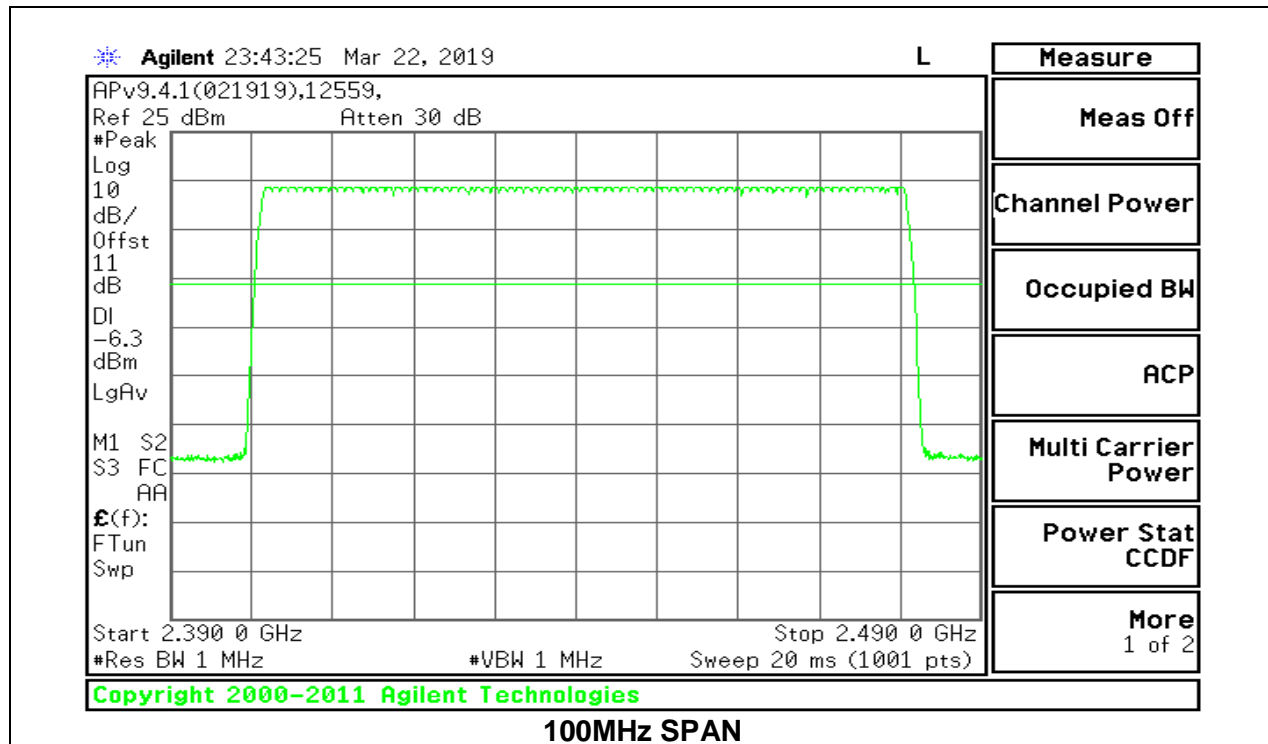


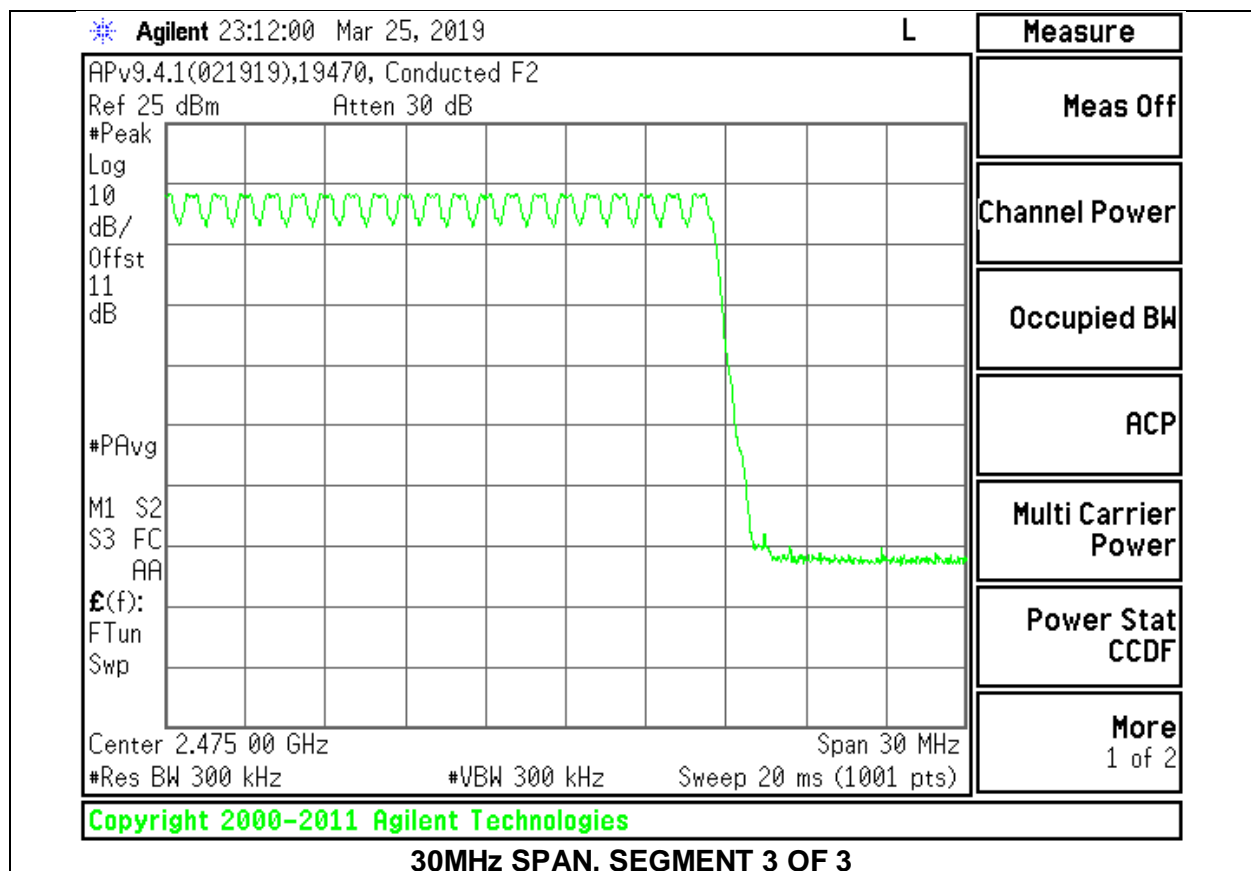
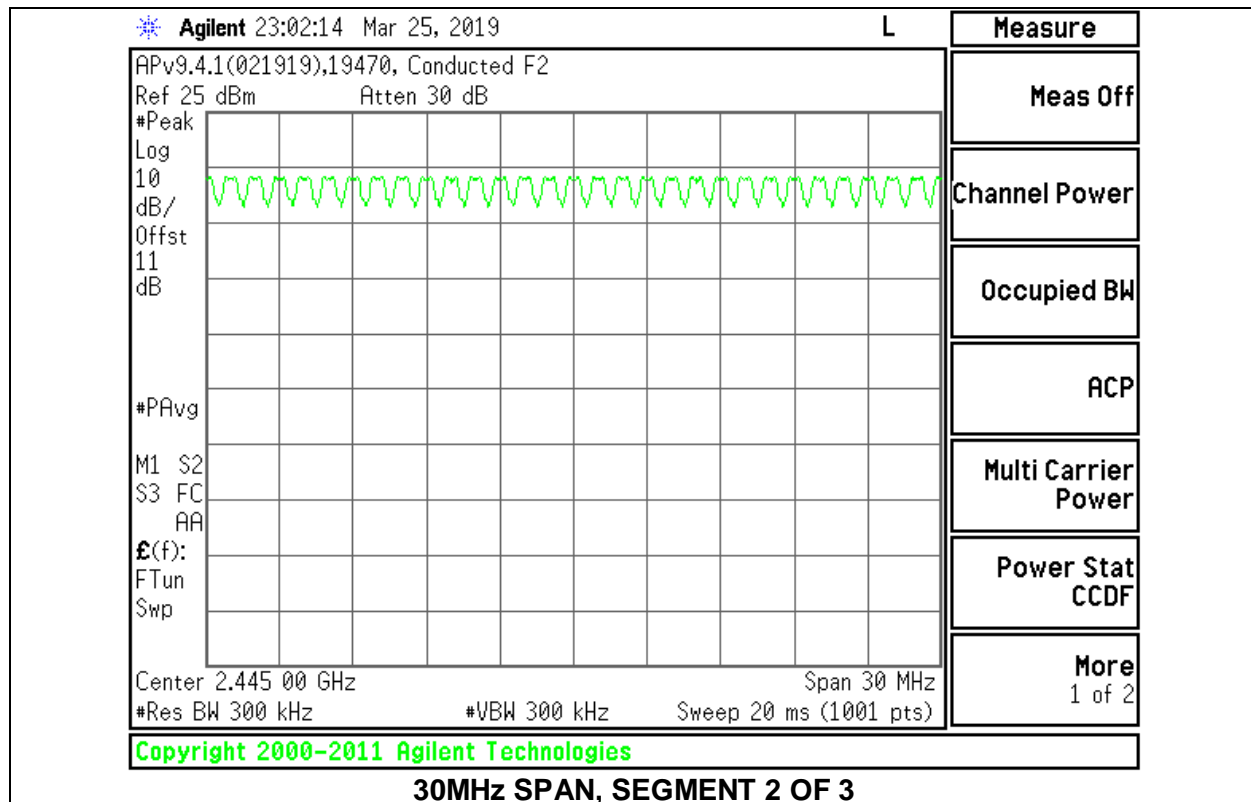
### 8.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION





## 8.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





## 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.

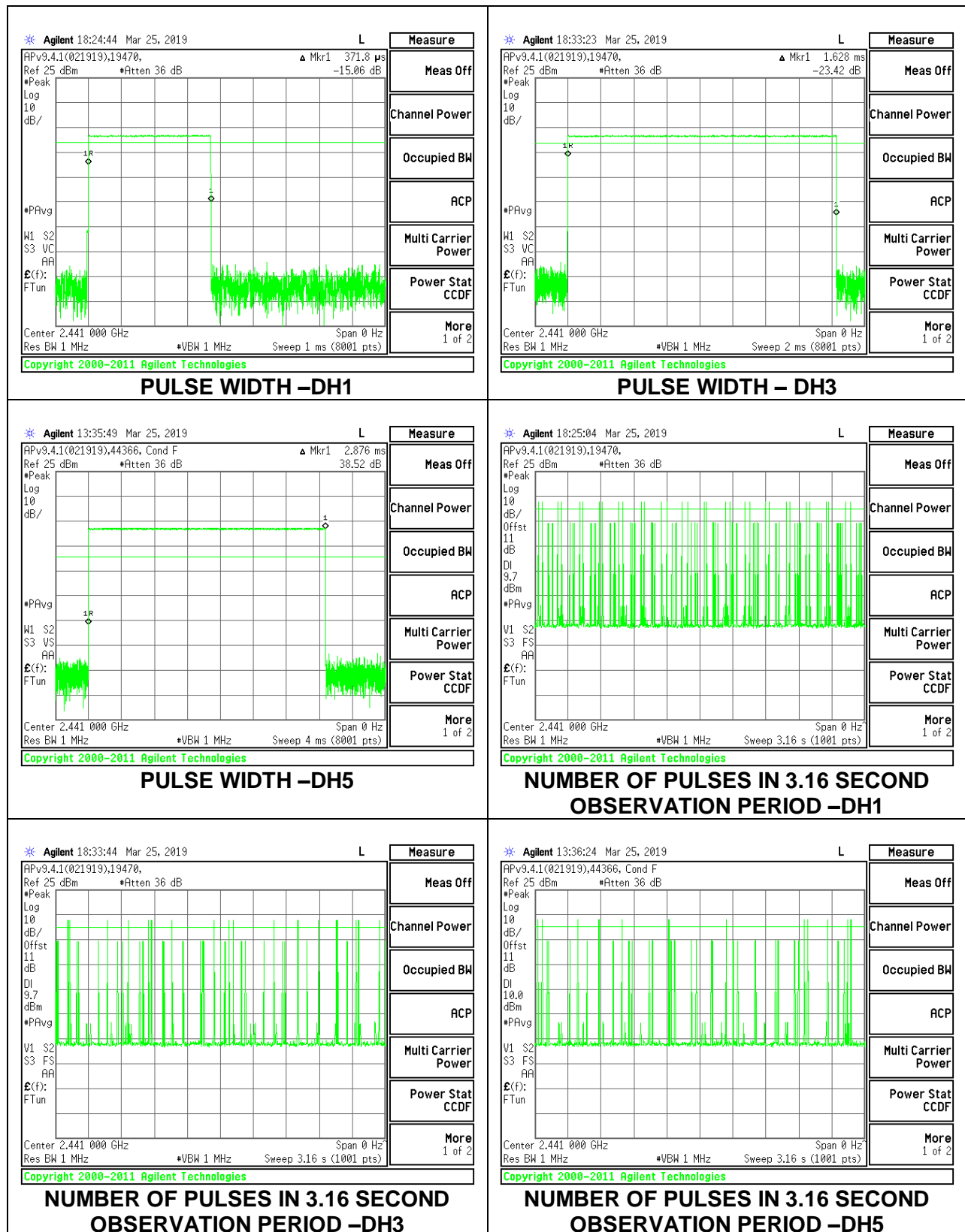
The average time of occupancy in the specified 3.16 second period (79 channels \* 0.4 s) is equal to  $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$ .

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

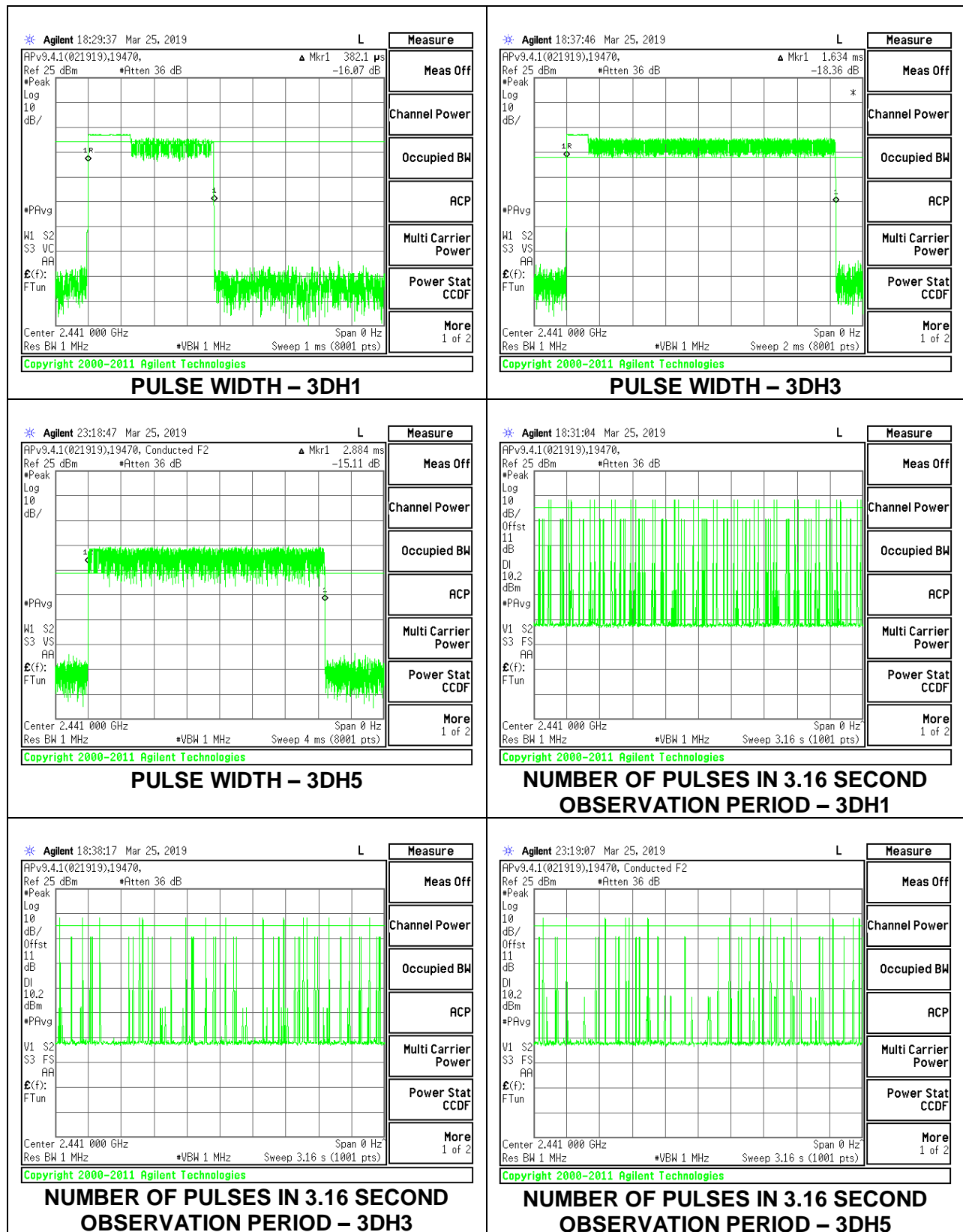
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.371	32	0.1187	0.4	-0.2813
DH3	1.628	18	0.2930	0.4	-0.1070
DH5	2.876	12	0.3451	0.4	-0.0549
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.371	8	0.02968	0.4	-0.3703
DH3	1.628	4.5	0.07326	0.4	-0.3267
DH5	2.876	3	0.08628	0.4	-0.3137



## 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	0.3821	32	0.122272	0.4	-0.27773
3DH3	1.634	15	0.2451	0.4	-0.1549
3DH5	2.884	13	0.37492	0.4	-0.02508

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.





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## **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.

### **TEST PROCEDURE**

Measurements perform using a wideband gated RF power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for a gated peak reading of power.

### **RESULTS**

### 8.6.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	44366
Date:	3/26/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.72	30	-17.28
Middle	2441	12.58	30	-17.42
High	2480	12.65	30	-17.35

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

Tested By:	44366
Date:	3/26/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	13.26	21	-7.74
Middle	2441	13.14	21	-7.86
High	2480	13.1	21	-7.9

### 8.6.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	44366
Date:	4/4/2019

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	12.51	21	-8.49
Middle	2441	12.23	21	-8.77
High	2480	12.13	21	-8.87

---

## **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 of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

### **RESULTS**

### 8.7.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Tested By:	44366
Date	3/26/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	12.48
Middle	2441	12.37
High	2480	12.47

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

Tested By:	44366
Date	3/26/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.95
Middle	2441	9.86
High	2480	9.84

### 8.7.3. BLUETOOTH ENHANCED DATA RATE DQPSK MODULATION

Tested By:	44366
Date	4/4/2019

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.69
Middle	2441	9.53
High	2480	9.46

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## **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 100 kHz. The video bandwidth is set to 300 kHz.

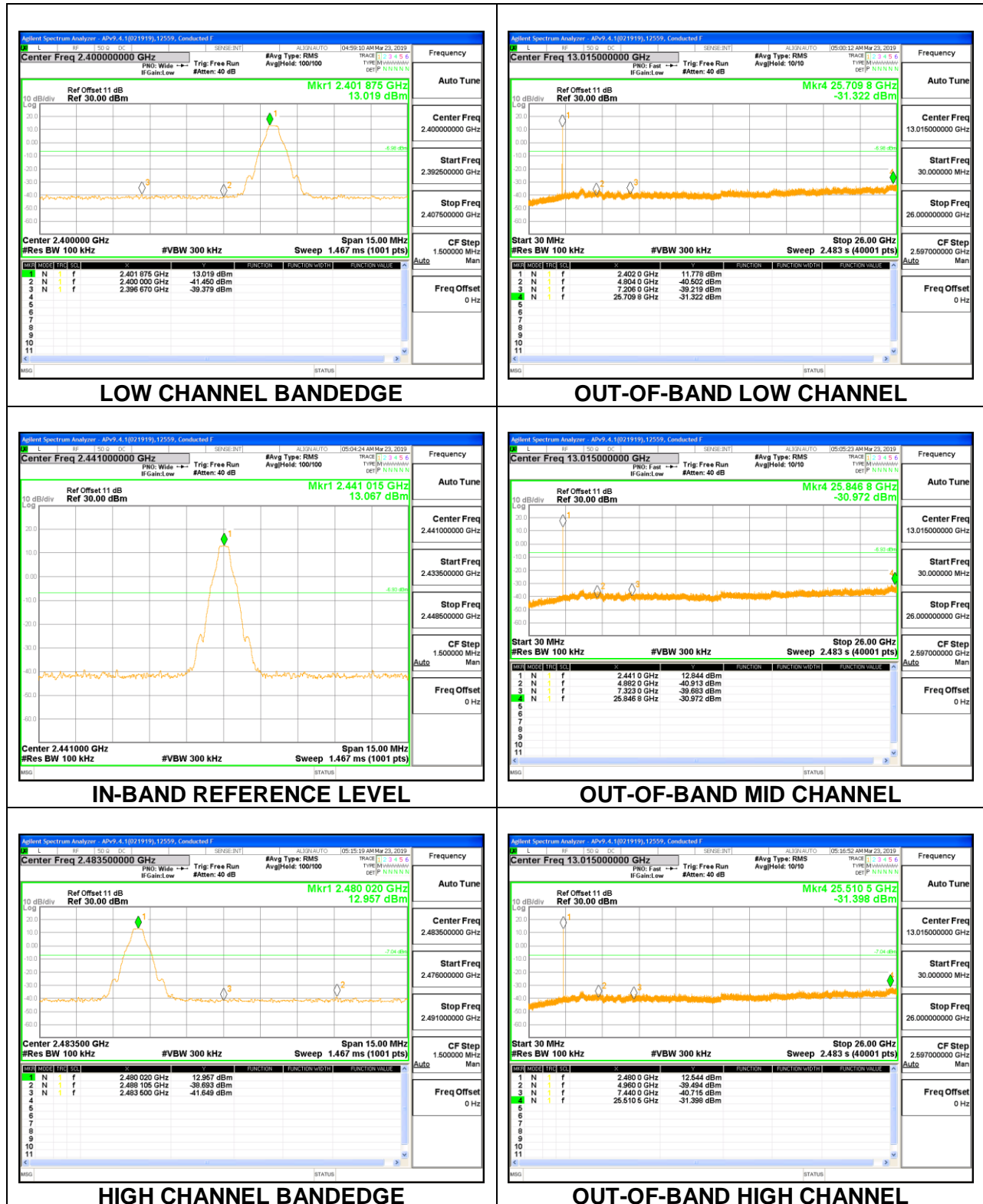
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

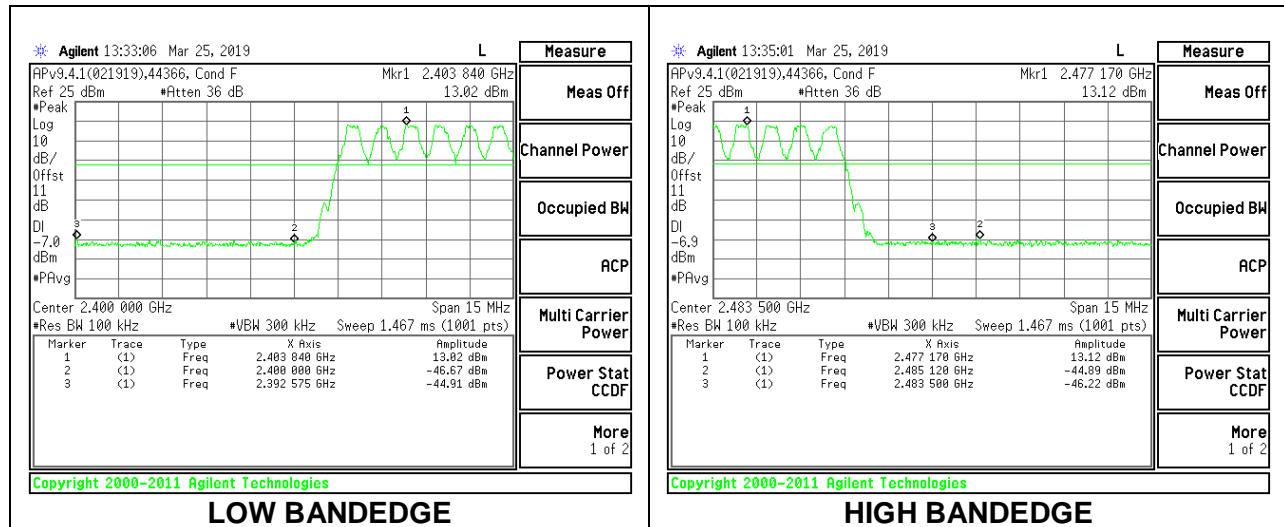
### **RESULTS**

## 8.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

### Antenna 1 SPURIOUS EMISSIONS, NON-HOPPING

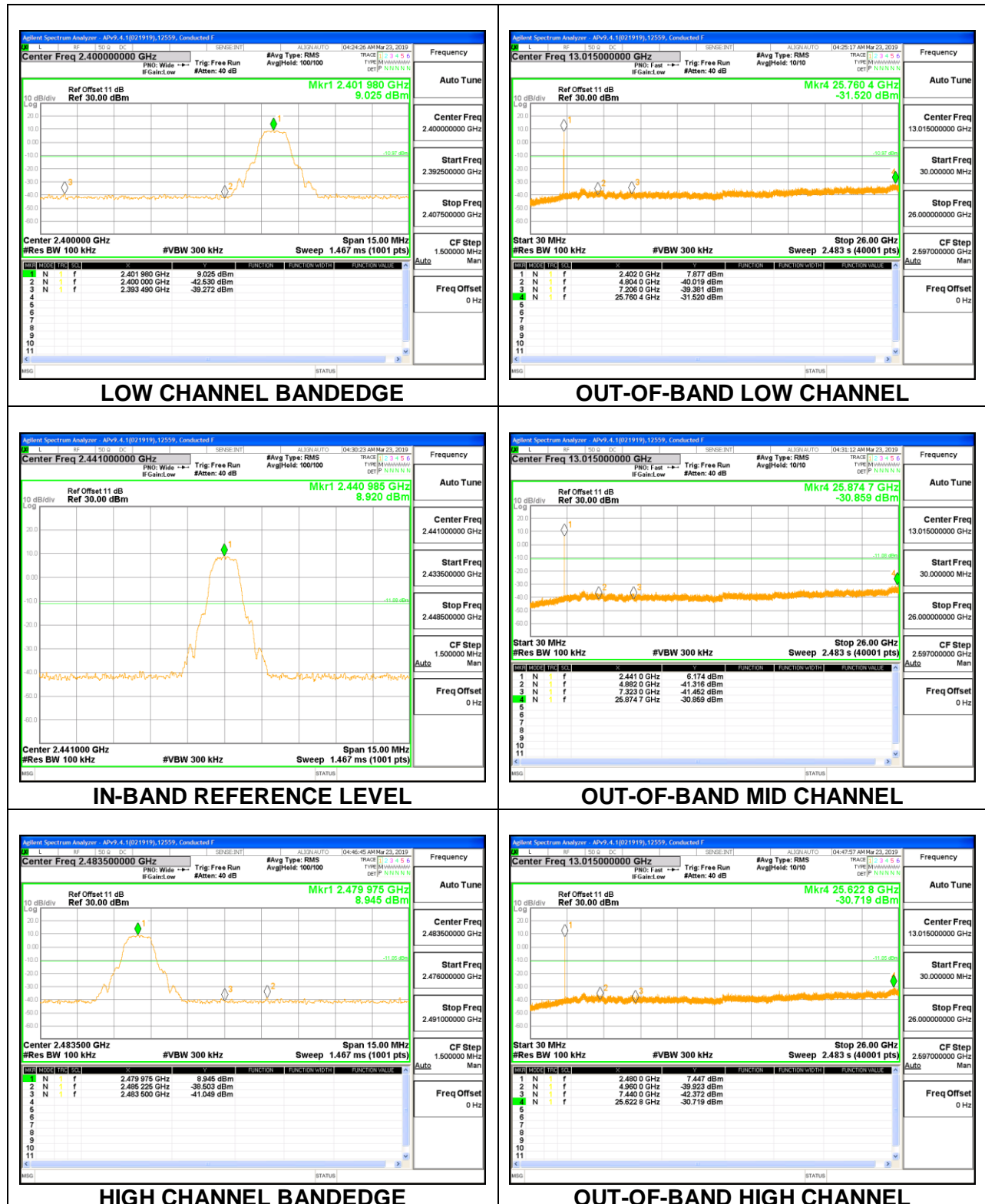


**Antenna 1 SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**



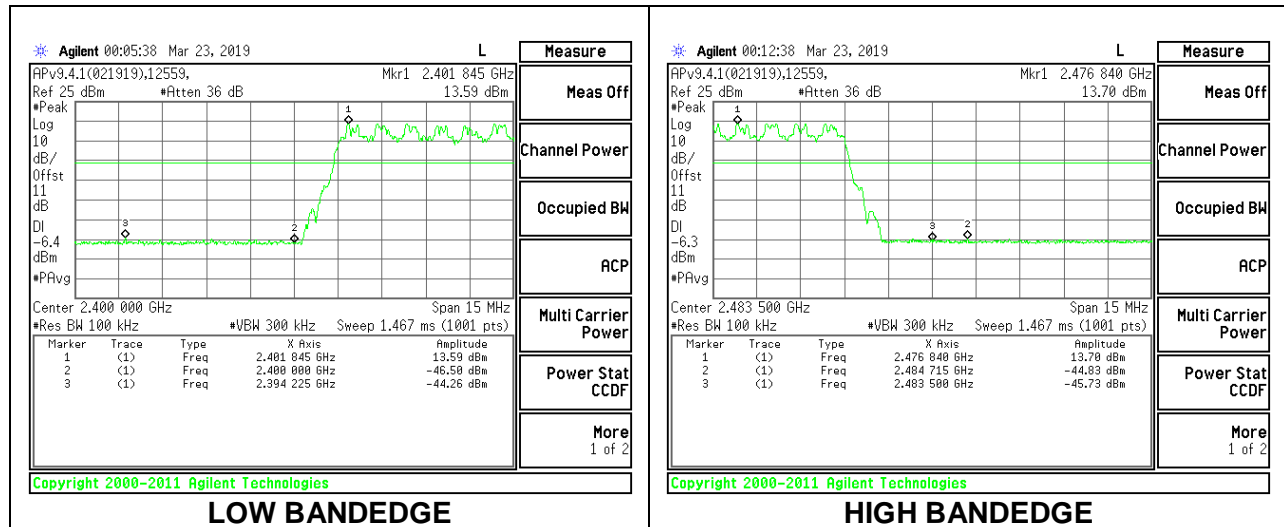
## 8.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

### 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 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.

For the final measurements above 1GHz radiated spurious harmonics and band edge measurement, there is no need for the average reading since the peak reading passed with the peak limit. The average reading = peak reading – duty cycle Correction Factor (DCCF) which is  $20 \log(\text{ON time}/100 \text{ milliseconds})$  and greater than 20dB.

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.

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.

#### **KDB 558074 D01 15.247 Meas Guidance v05r01**

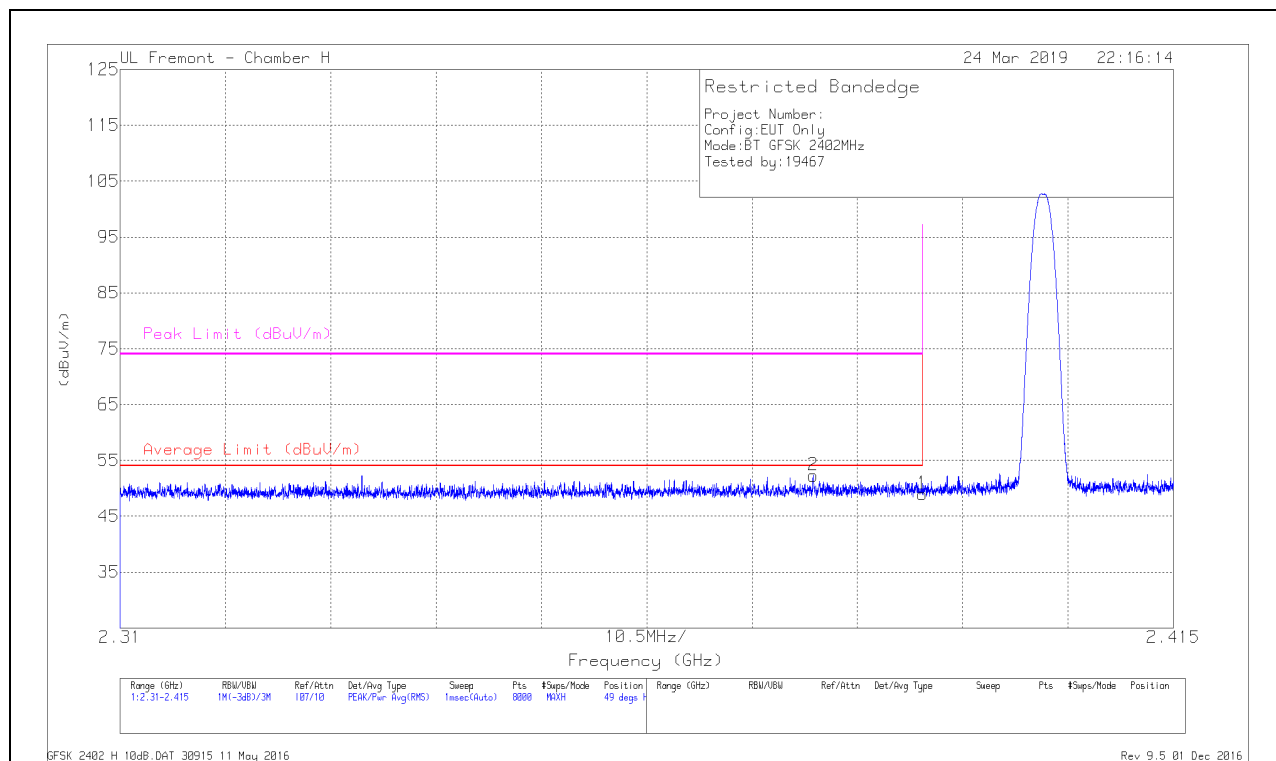
Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement. The maximum radiated field strength level represents the worst-case (maximum amplitude) RMS measurement of the emission(s) during continuous transmission (i.e., not including any time intervals during which the transmitter is off or is transmitting at a reduced power level). It is also acceptable to apply the DCCF to a measurement performed with a peak detector instead of the specified RMS power averaging detector. Note that Section 15.35(c) specifies that the DCCF shall represent the worst-case (greatest duty cycle) over any 100 msec transmission period.

## 9.1. TRANSMITTER ABOVE 1 GHz

### 9.1.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

#### BANDEDGE (LOW CHANNEL)

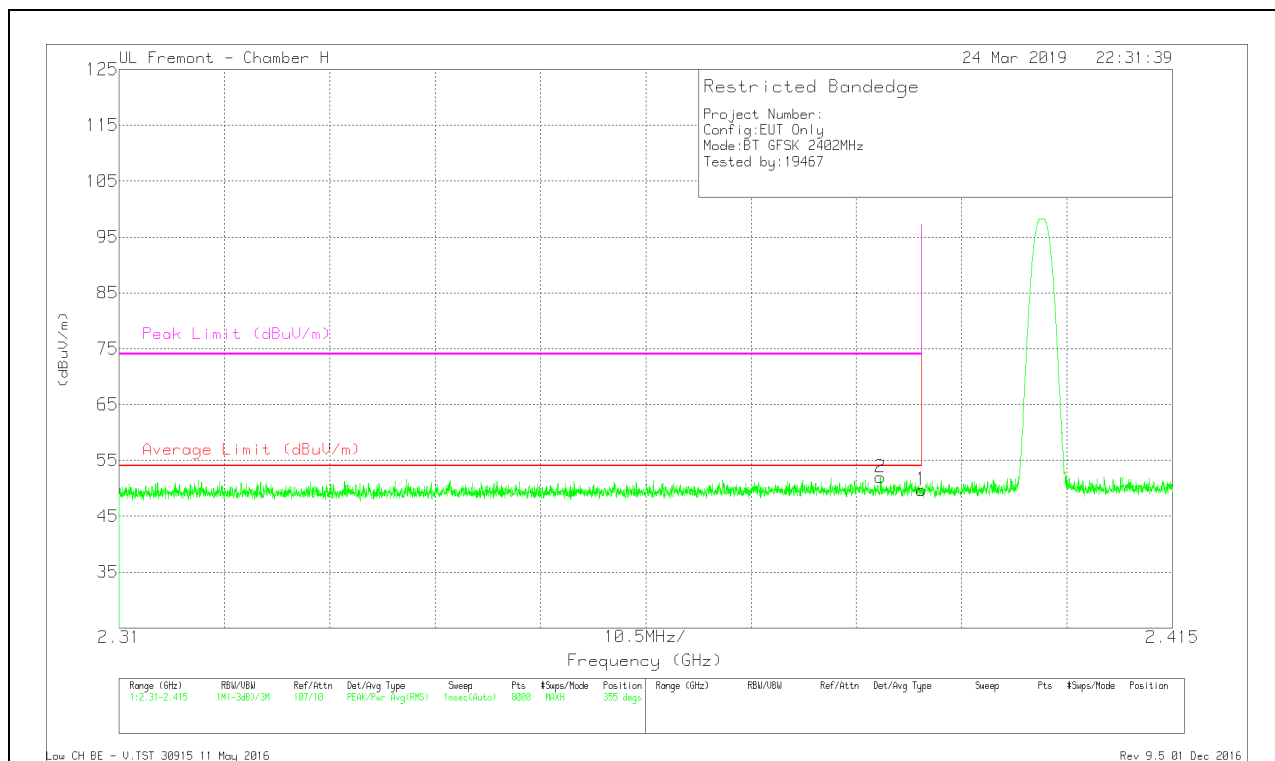
#### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Ftr/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.88	Pk	31.6	-23.5	48.98	74	-25.02	49	111	H
2	* 2.379	44.21	Pk	31.6	-23.5	52.31	74	-21.69	49	111	H

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

## VERTICAL RESULT

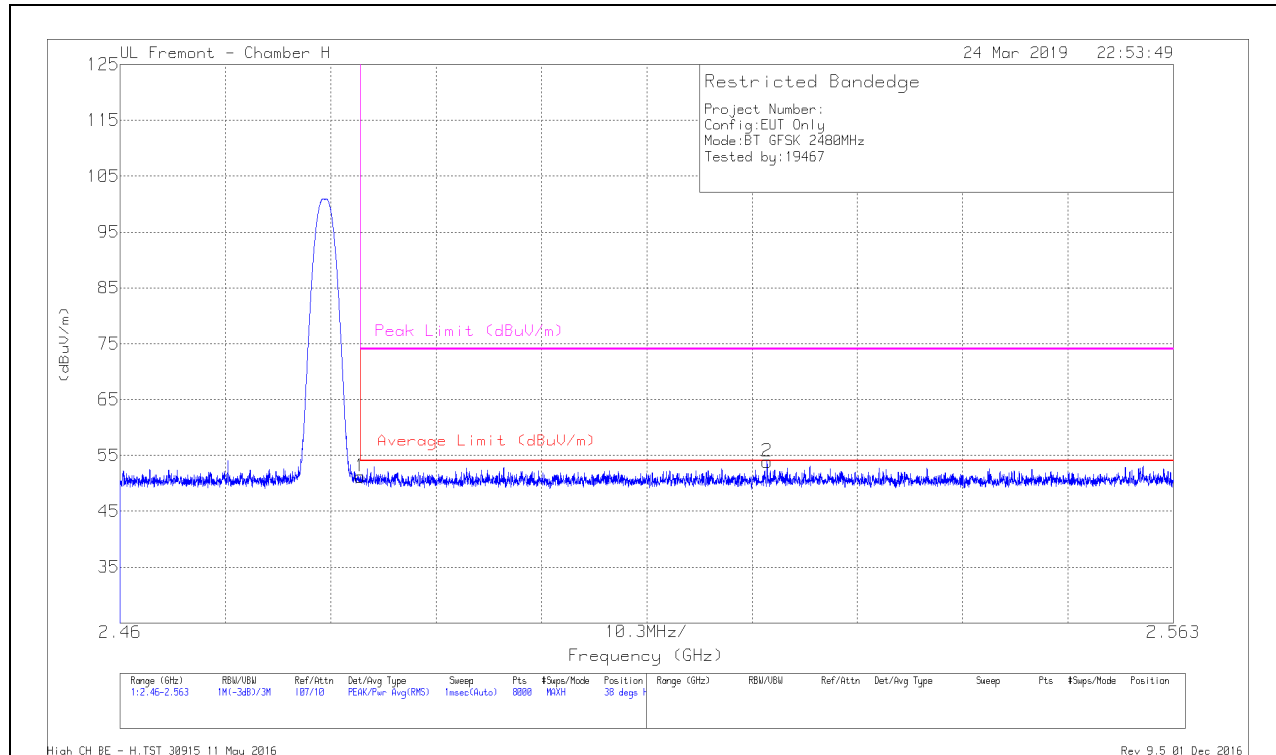


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/CbW/Filt/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.58	Pk	31.6	-23.5	49.68	74	-24.32	355	117	V
2	* 2.386	43.86	Pk	31.6	-23.5	51.96	74	-22.04	355	117	V

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

# **BANEDGE (HIGH CHANNEL)**

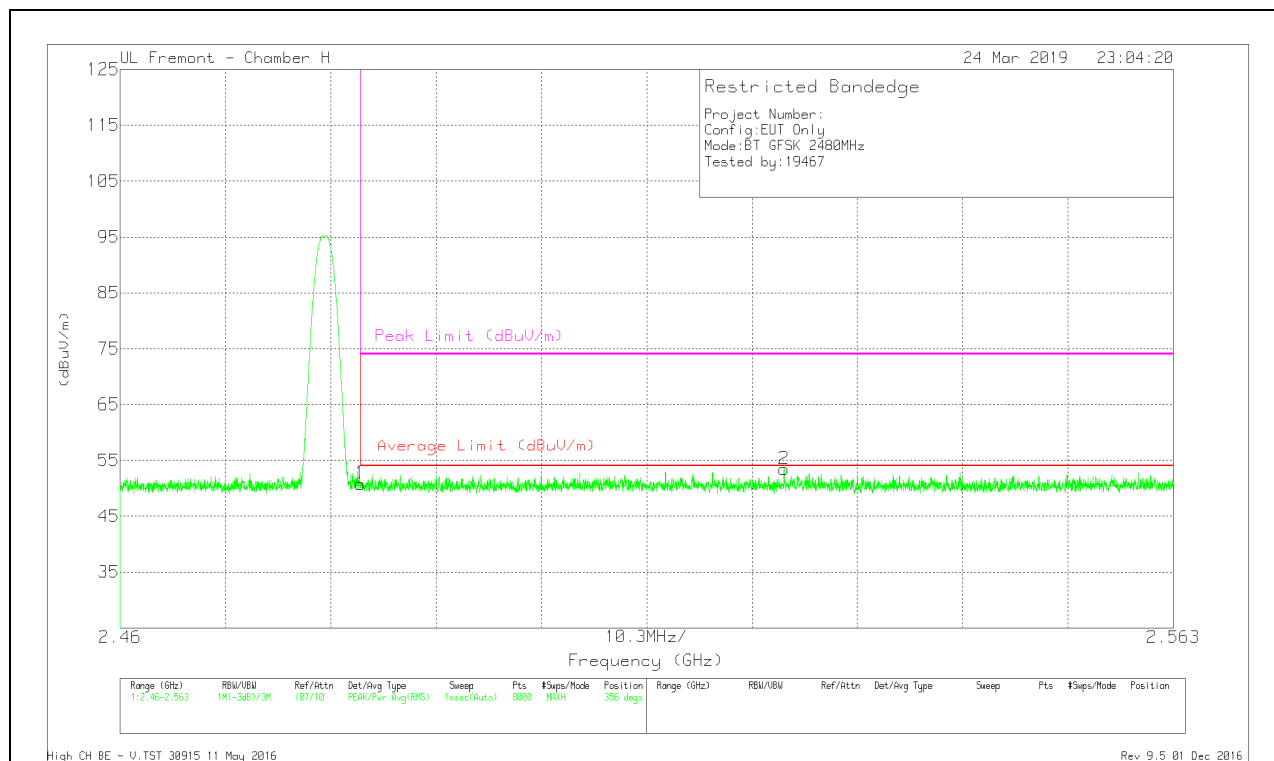
## **HORIZONTAL RESULT**



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.2	Pk	32.3	-23.3	51.2	74	-22.8	38	106	H
2	2.523	44.69	Pk	32.4	-23.2	53.89	74	-20.11	38	106	H

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

## VERTICAL RESULT

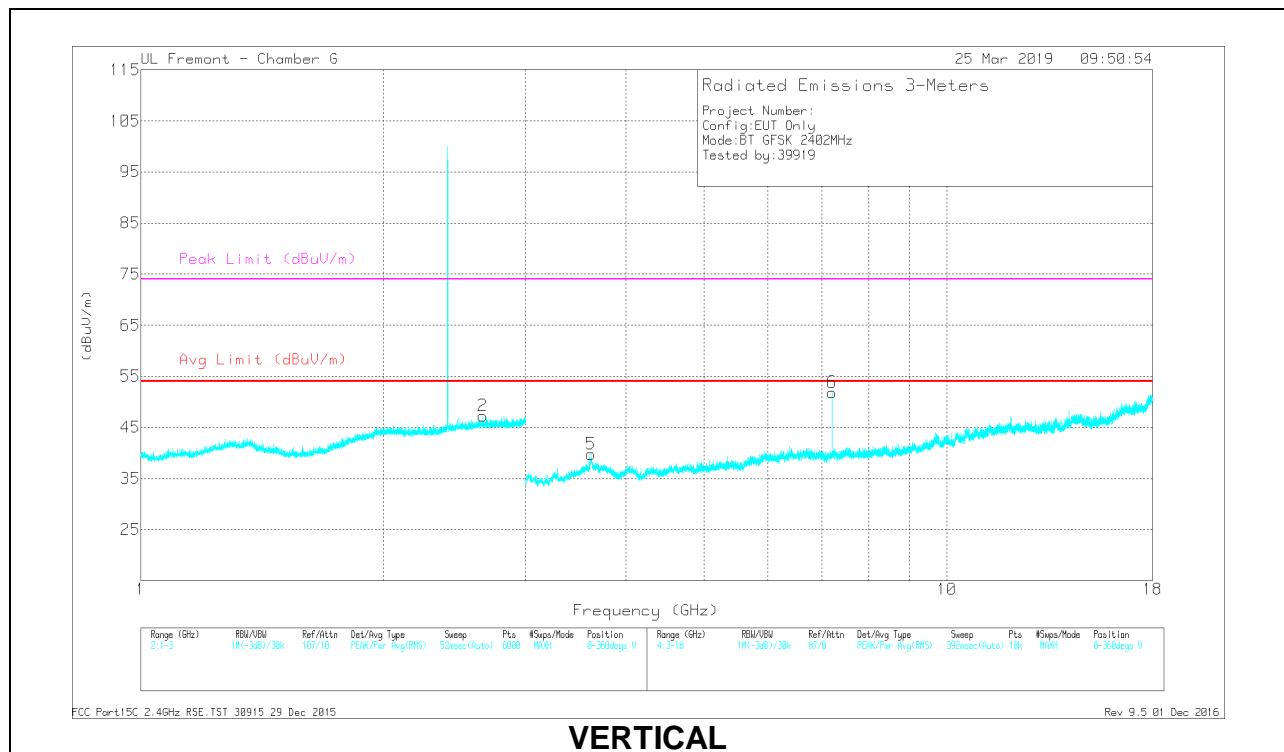
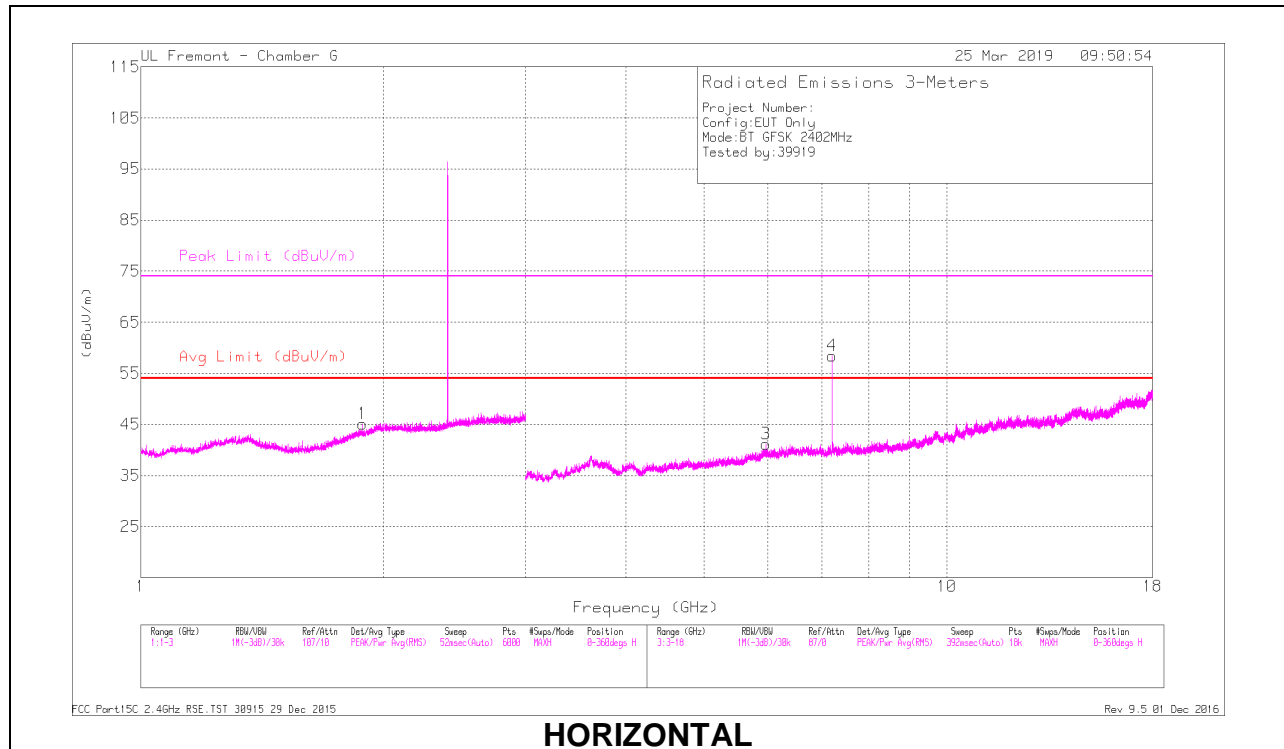


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filt/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.78	Pk	32.3	-23.3	50.78	74	-23.22	356	132	V
2	2.525	44.12	Pk	32.4	-23.1	53.42	74	-20.58	356	132	V

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

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS



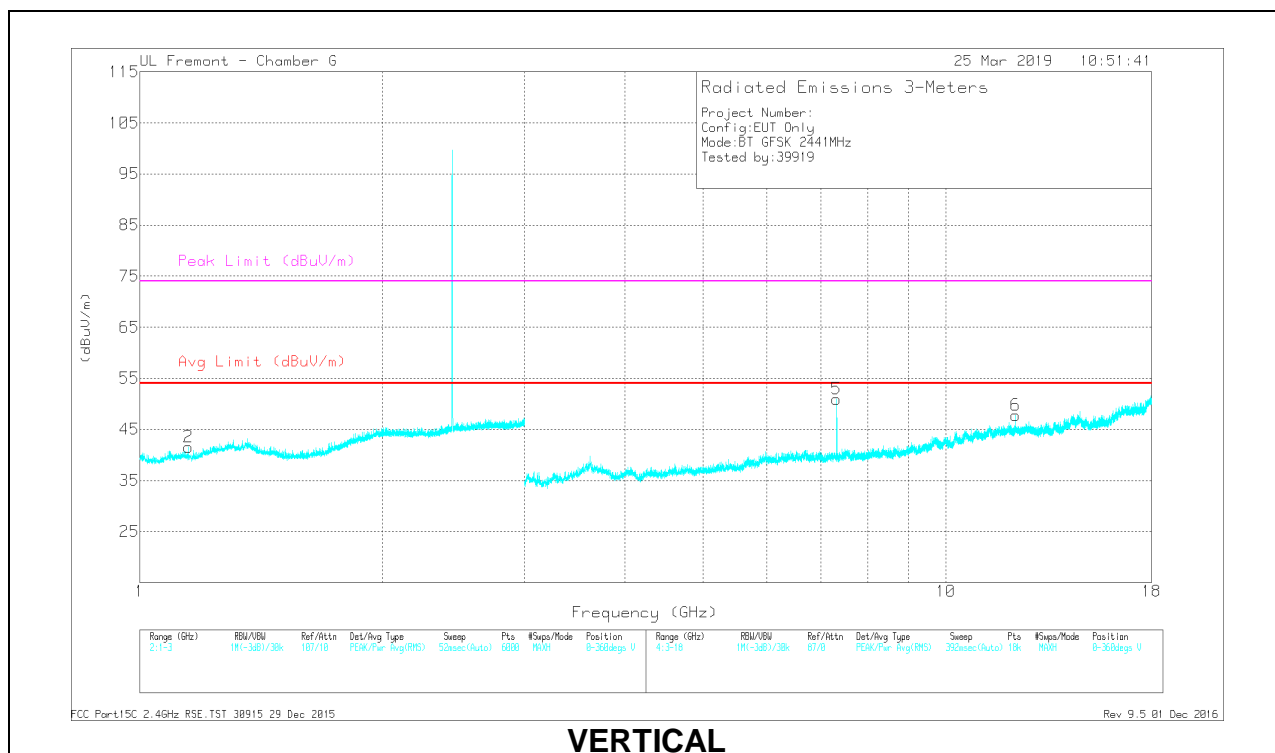
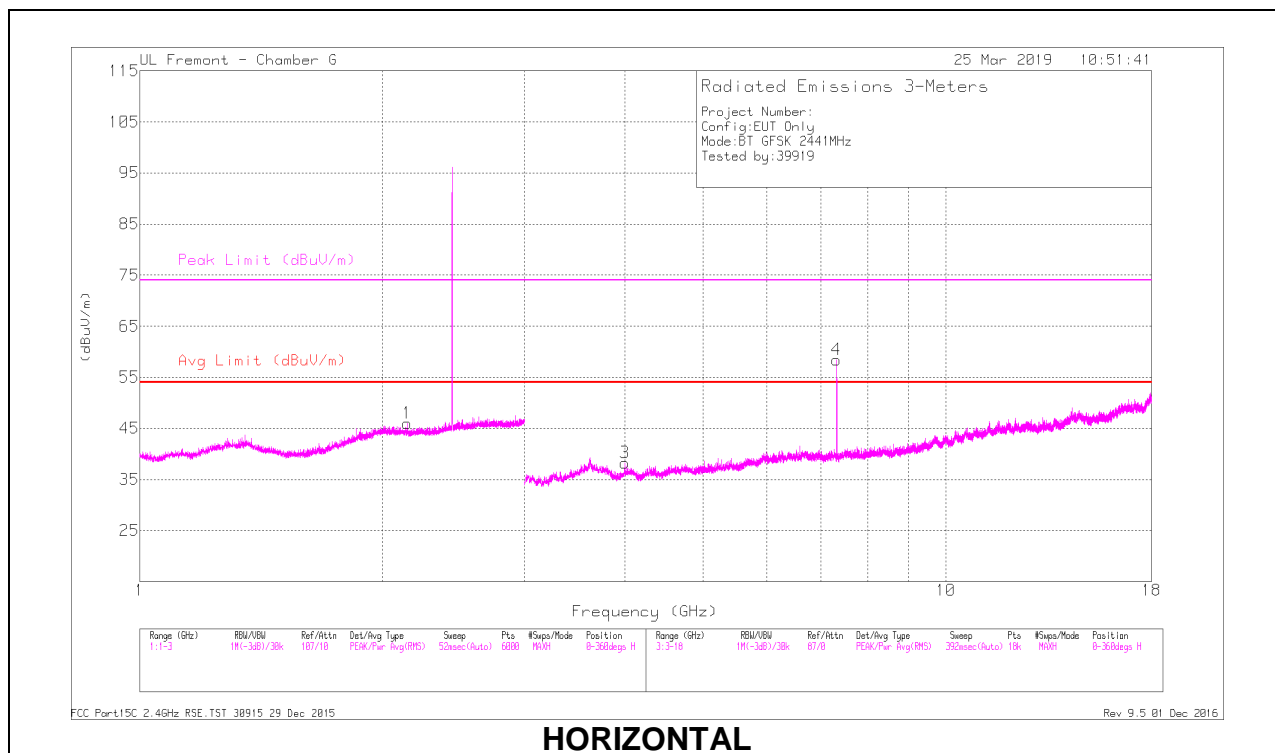


## RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.933	43.05	PKFH	32.6	-21.7	53.95	74	-20.05	183	227	V
2	* 3.619	39.96	PKFH	35.7	-30.2	45.46	74	-28.54	43	224	V
3	5.968	38.46	PKFH	35.5	-28.1	45.86	74	-28.14	109	136	H
4	7.206	51.96	PKFH	35.8	-27.8	59.96	74	-14.04	274	101	H
5	1.886	42.21	PKFH	31.3	-23	50.51	74	-23.49	334	111	H
6	7.207	46.89	PKFH	35.8	-27.8	54.89	74	-19.11	145	177	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

## MID CHANNEL RESULTS

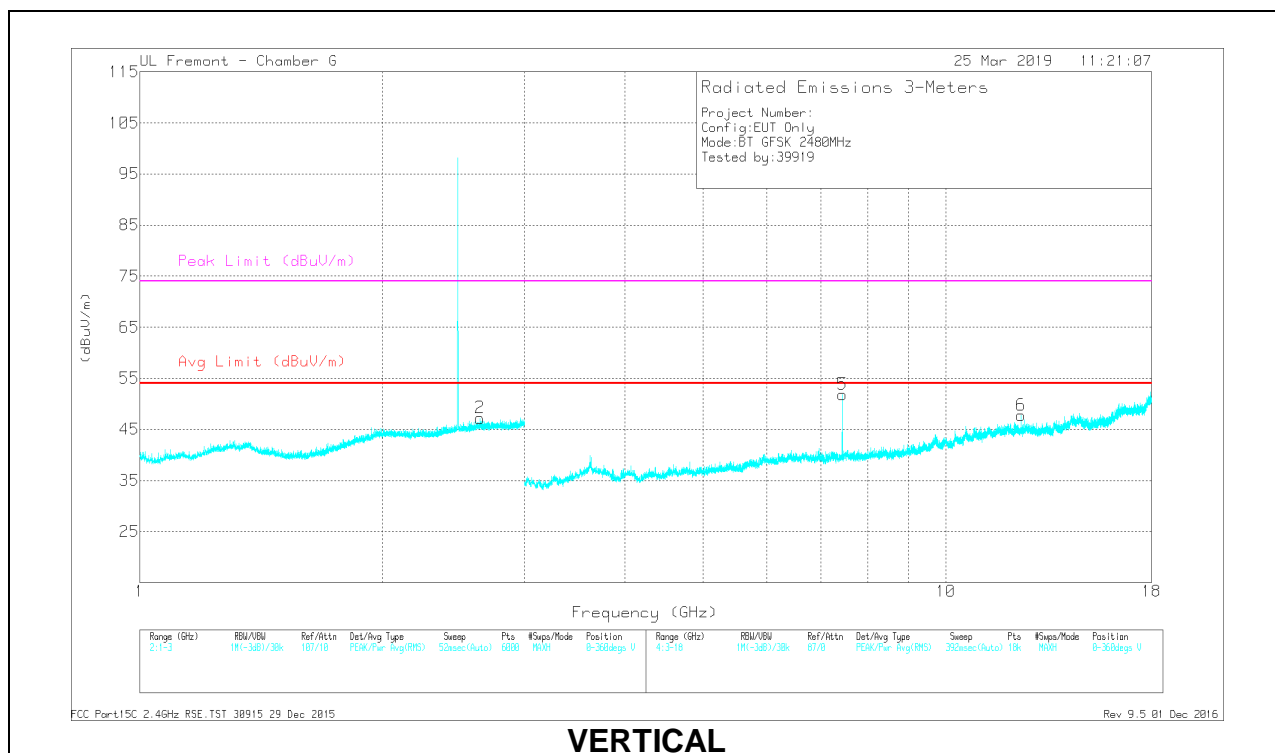
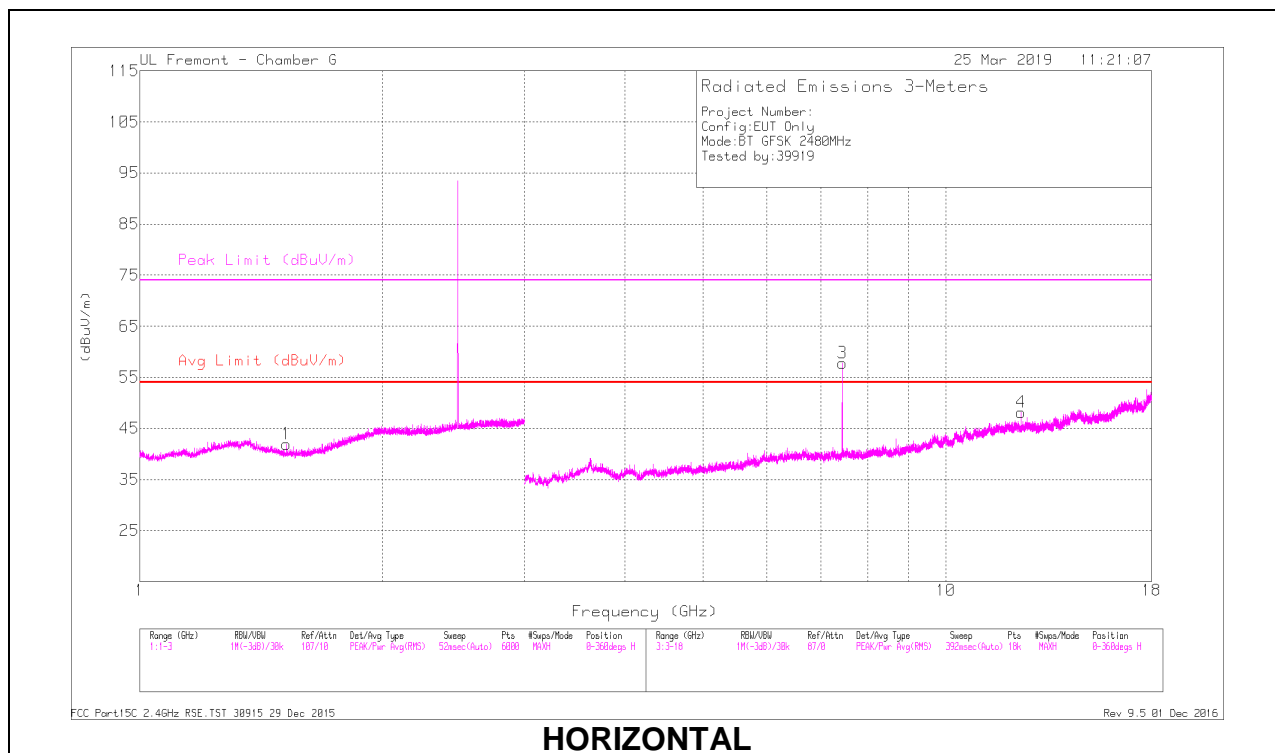


## RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cb/Filt/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.147	41.58	PKFH	31.7	-22.6	50.68	74	-23.32	359	202	H
2	* 1.149	42.57	PKFH	27.8	-23.9	46.47	74	-27.53	254	127	V
3	* 3.999	38.81	PKFH	33.6	-29.6	42.81	74	-31.19	192	225	H
4	* 7.323	51.73	PKFH	35.9	-27.6	60.03	74	-13.97	272	101	H
5	* 7.323	45.98	PKFH	35.9	-27.6	54.28	74	-19.72	152	182	V
6	* 12.206	36.37	PKFH	39.5	-22.8	53.07	74	-20.93	272	197	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

## HIGH CHANNEL RESULTS



## RADIATED EMISSIONS

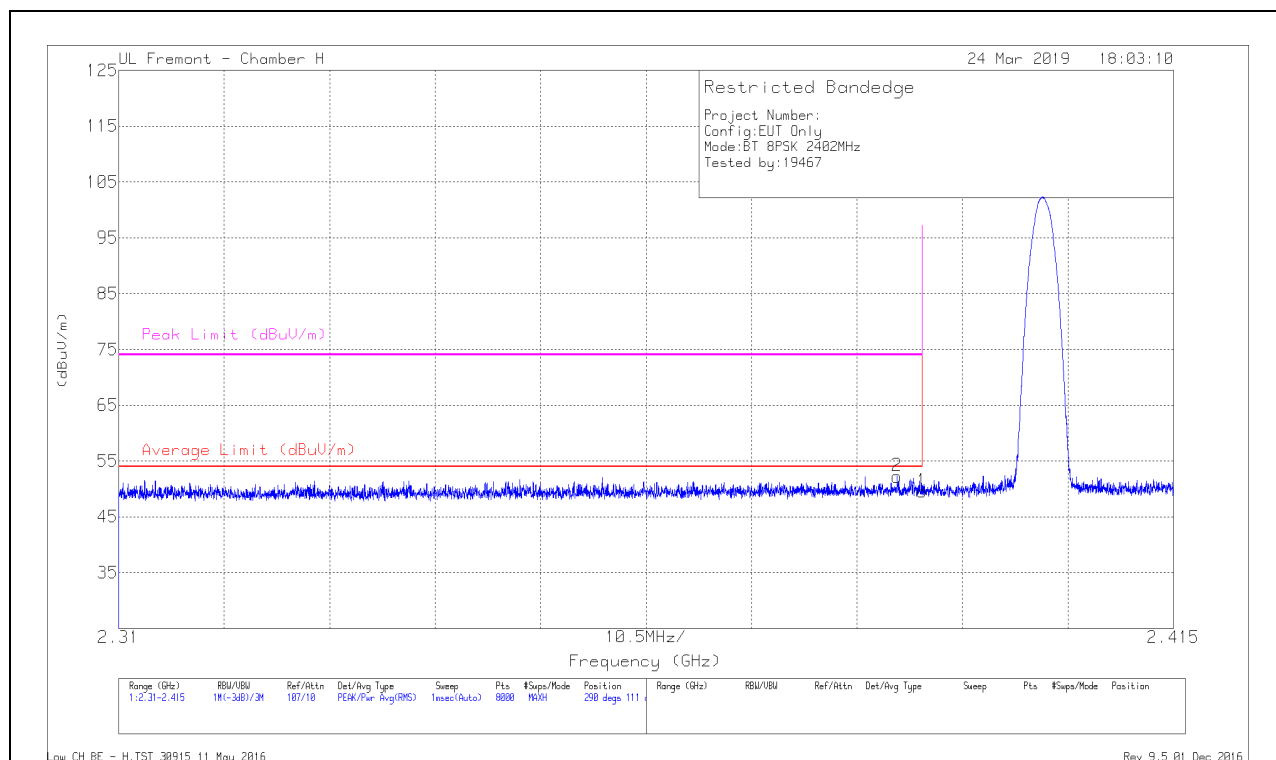
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Filtr/ Pad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.521	41.96	PKFH	27.7	-23.3	46.36	74	-27.64	212	152	H
2	2.644	41.12	PKFH	32.6	-22.1	51.62	74	-22.38	174	184	V
3	* 7.44	51.88	PKFH	36	-27.9	59.98	74	-14.02	274	105	H
4	* 12.4	35.6	PKFH	39.5	-23.6	51.5	74	-22.5	320	114	H
5	* 7.44	45.83	PKFH	36	-27.9	53.93	74	-20.07	134	212	V
6	* 12.401	37.71	PKFH	39.5	-23.6	53.61	74	-20.39	151	198	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

## 9.1.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

### BANDEDGE (LOW CHANNEL)

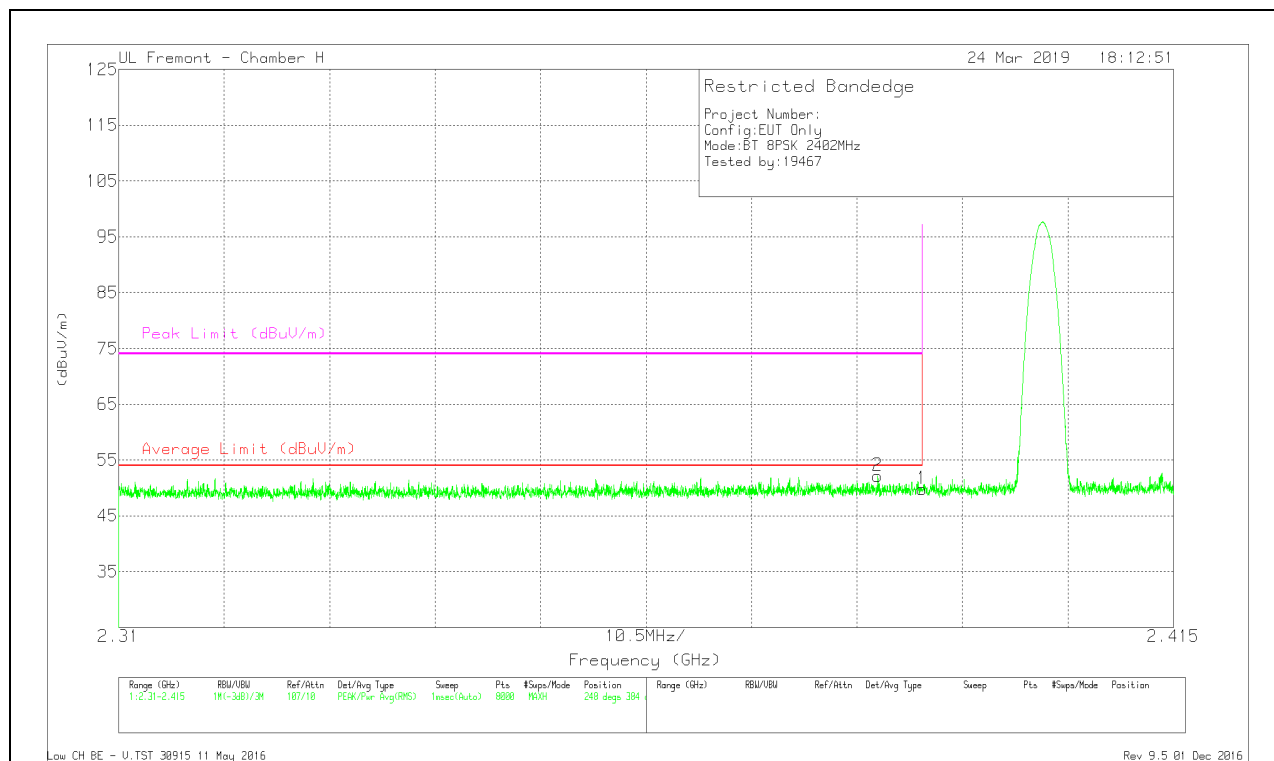
#### HORIZONTAL RESULT



Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filt/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.49	Pk	31.6	-23.5	49.59	74	-24.41	290	111	H
2	* 2.387	44.12	Pk	31.6	-23.5	52.22	74	-21.78	290	111	H

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

## VERTICAL RESULT

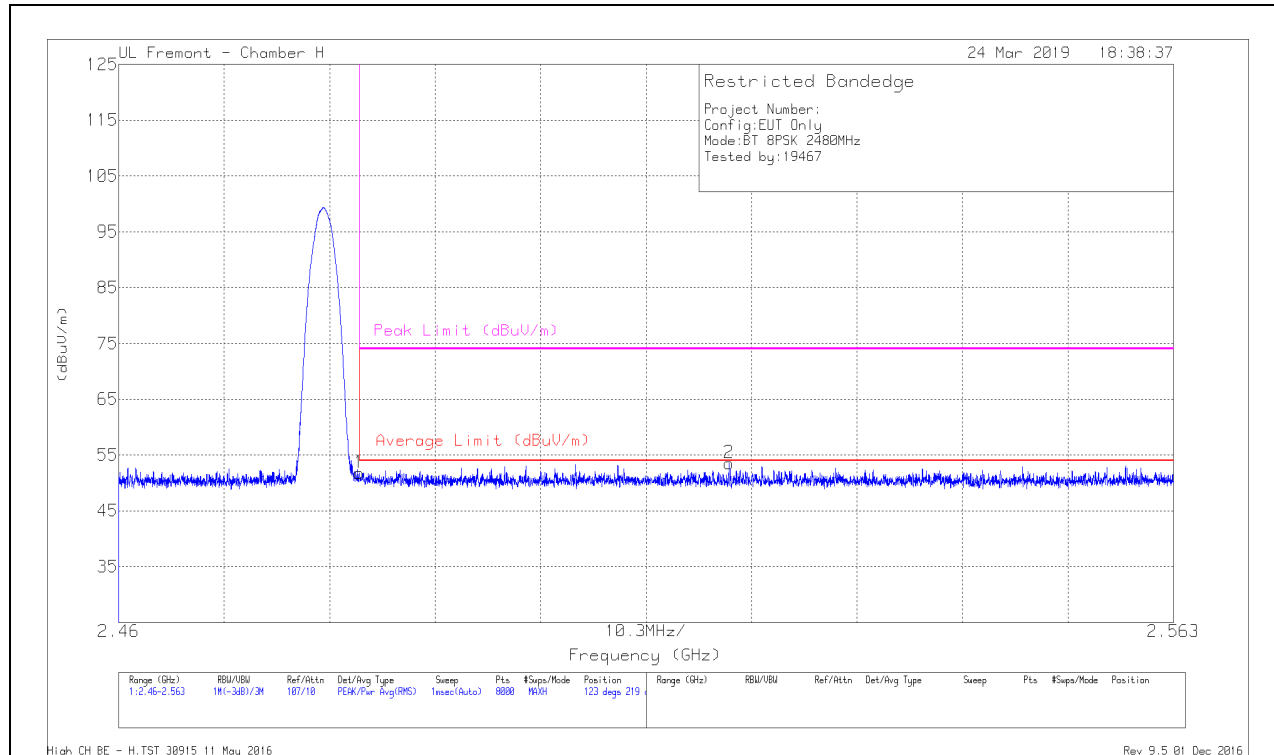


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr /Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	41.65	Pk	31.6	-23.5	49.75	-	-	74	-24.25	248	384	V
2	* 2.386	44.08	Pk	31.6	-23.5	52.18	-	-	74	-21.82	248	384	V

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

# **BANDEDGE (HIGH CHANNEL)**

## **HORIZONTAL RESULT**

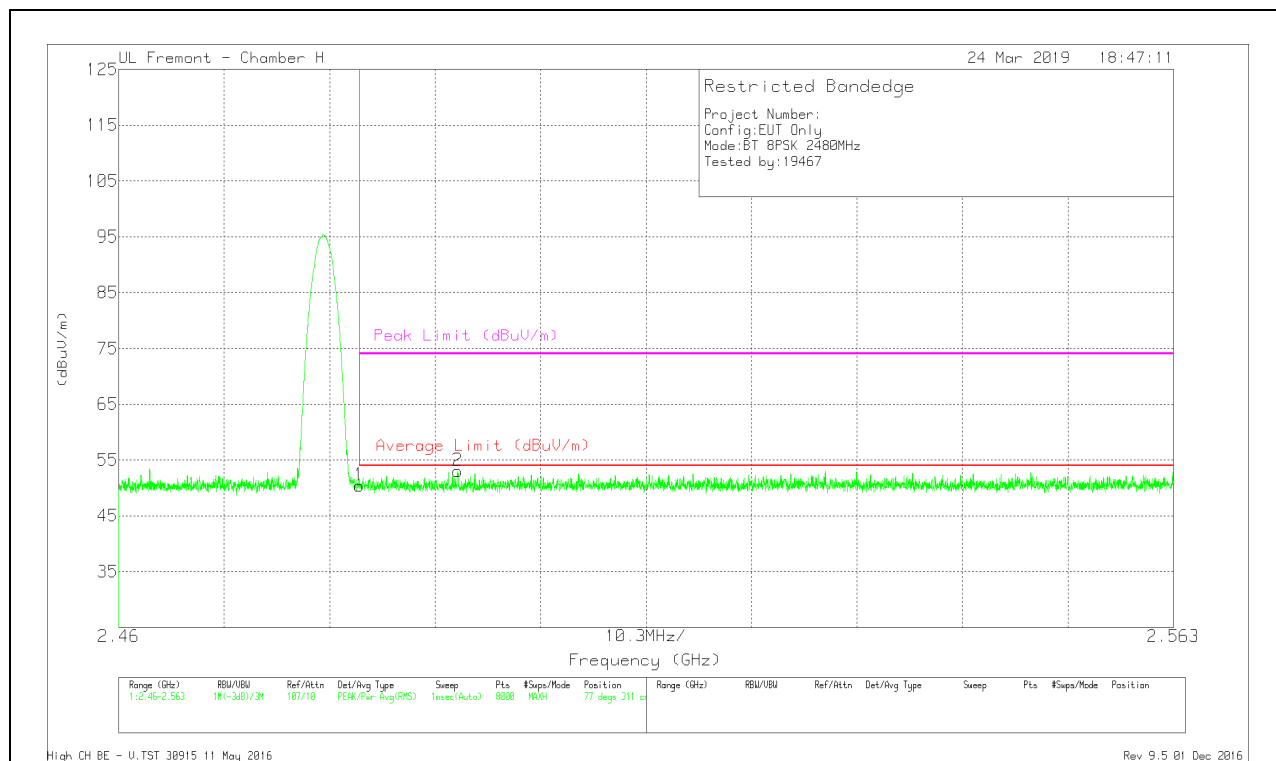


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filt/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	42.77	Pk	32.3	-23.3	51.77	74	-22.23	123	219	H
2	2.52	44.38	Pk	32.3	-23.2	53.48	74	-20.52	123	219	H

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



## VERTICAL RESULT

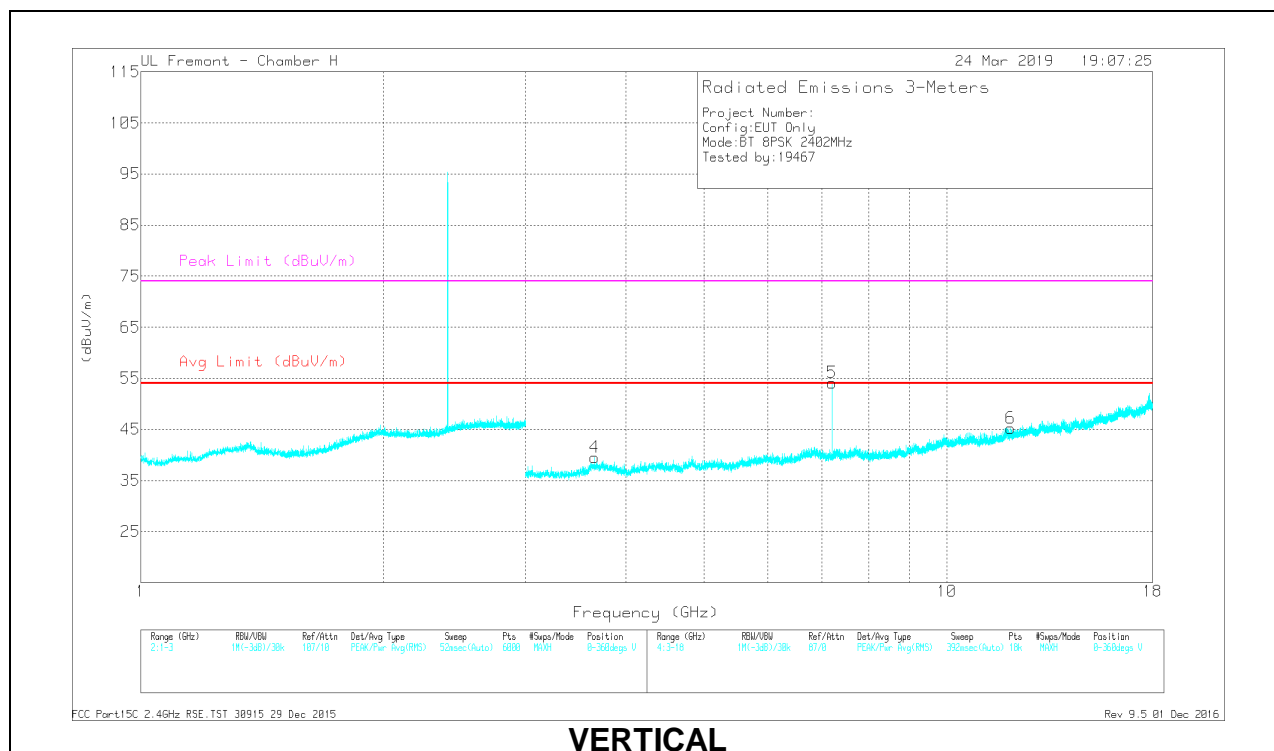
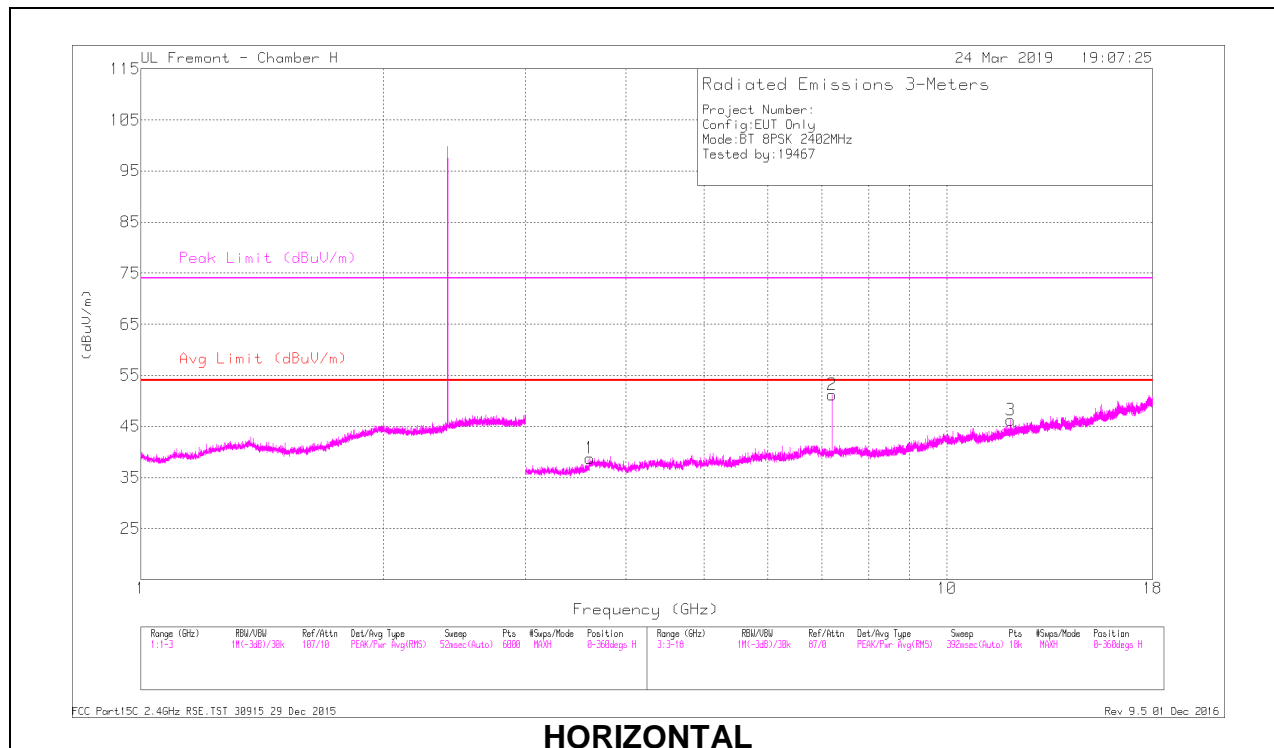


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filt/P ad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	41.43	Pk	32.3	-23.3	50.43	74	-23.57	77	311	V
2	* 2.493	44.02	Pk	32.3	-23.3	53.02	74	-20.98	77	311	V

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

## HARMONICS AND SPURIOUS EMISSIONS

### LOW CHANNEL RESULTS

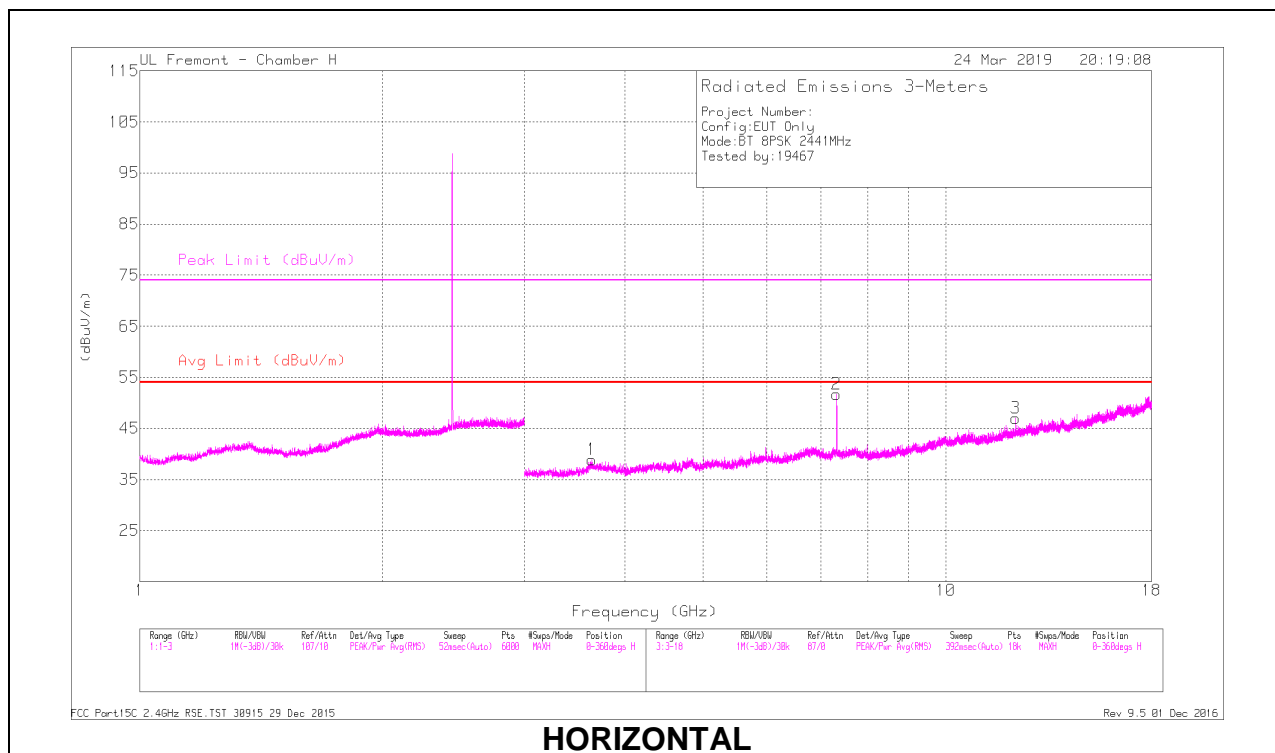


## RADIATED EMISSIONS

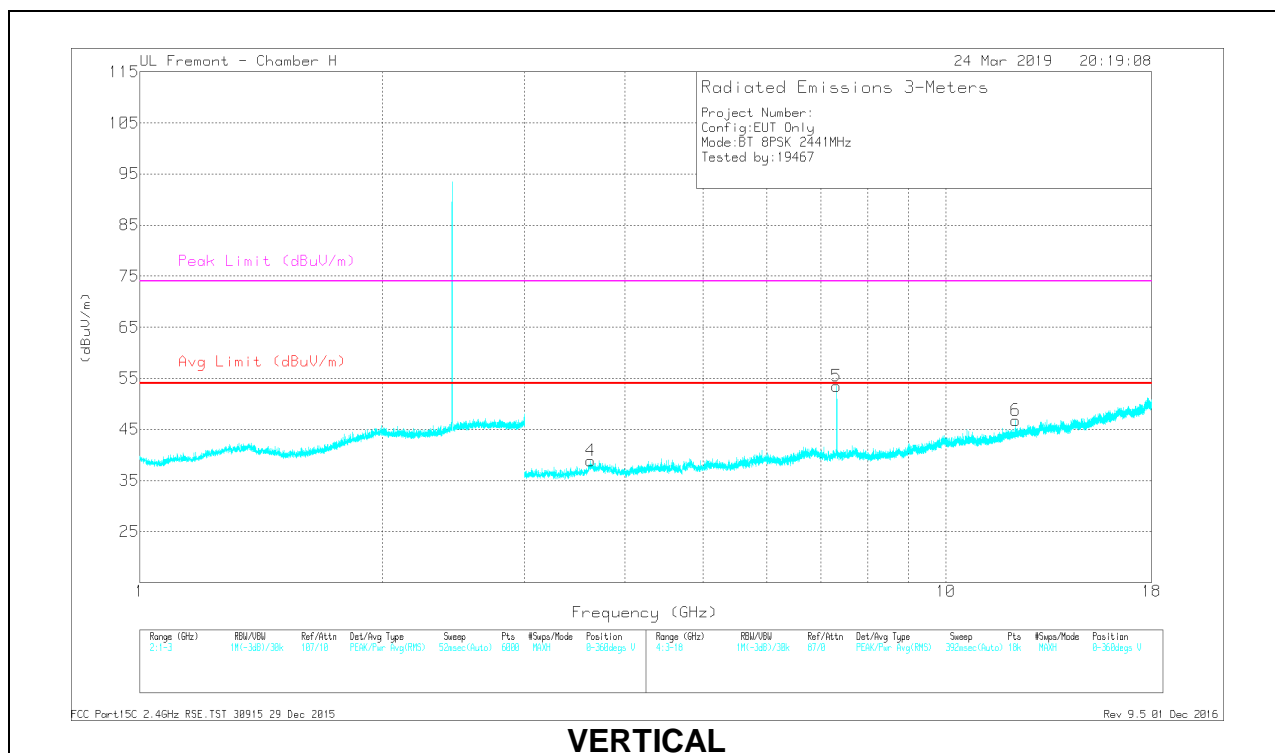
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.607	39.59	PKFH	33.1	-29.8	42.89	74	-31.11	303	117	H
2	7.206	47.73	PKFH	36.3	-28	56.03	-	-	74	103	H
3	* 12.009	36.57	PKFH	38.8	-23.2	52.17	74	-21.83	289	100	H
4	* 3.659	40.05	PKFH	33.1	-29.6	43.55	74	-30.45	258	304	V
5	7.206	51.04	PKFH	36.3	-28	59.34	-	-	260	244	V
6	* 12.011	37.9	PKFH	38.9	-23.2	53.6	74	-20.4	327	117	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

## MID CHANNEL RESULTS



## HORIZONTAL



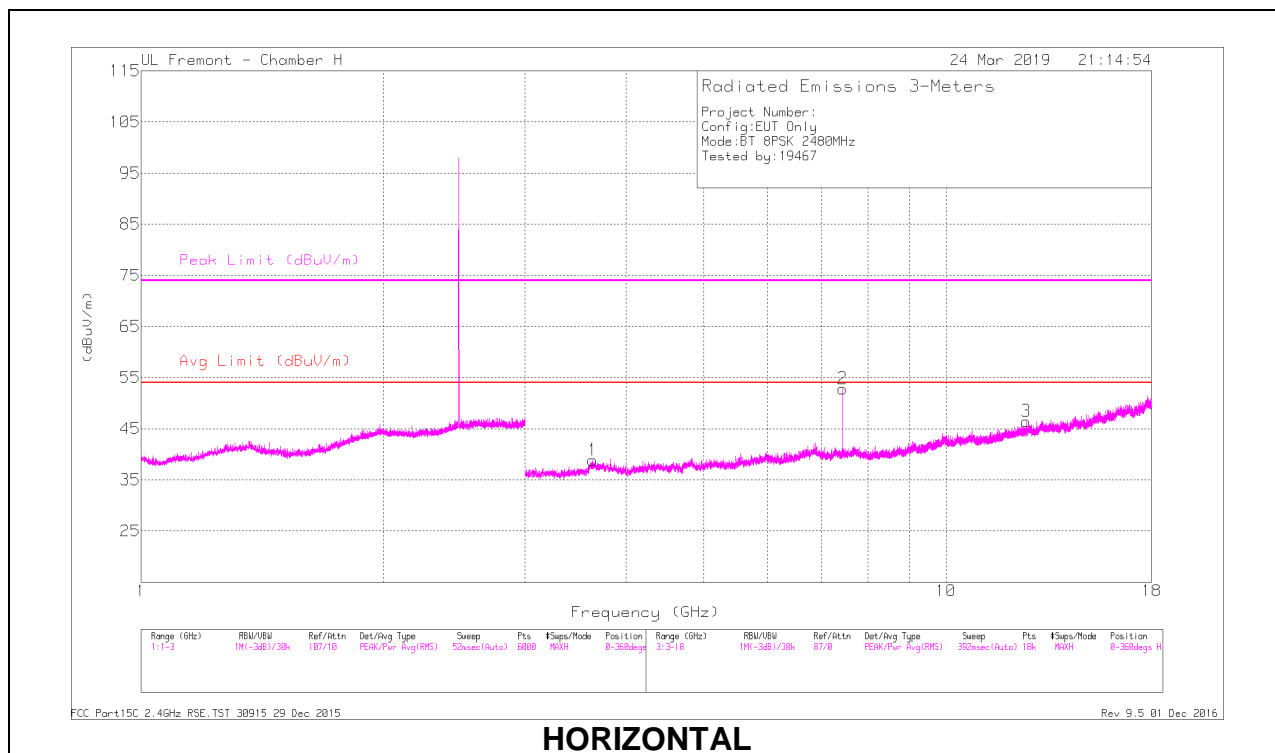
## VERTICAL

## RADIATED EMISSIONS

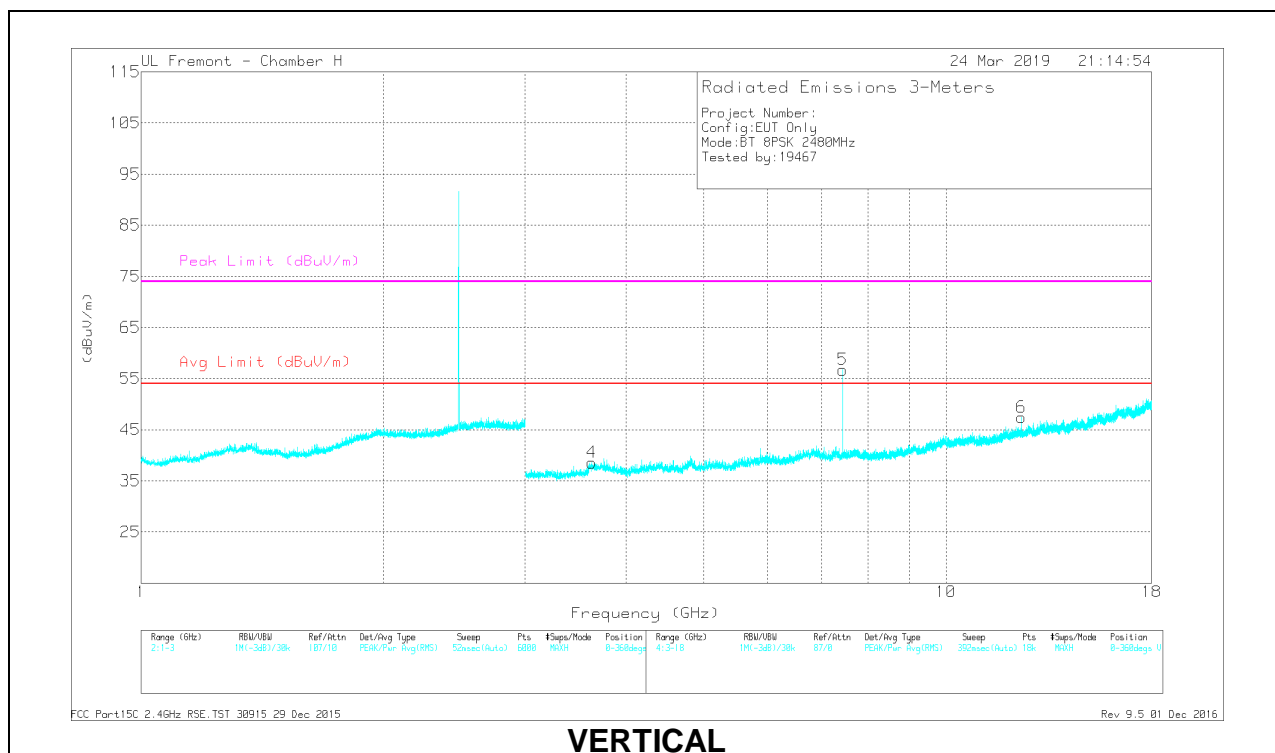
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.635	40.3	PKFH	33.1	-29.5	43.9	74	-30.1	314	382	H
2	* 7.323	46.8	PKFH	36.4	-26.6	56.6	74	-17.4	151	101	H
3	* 12.204	37.64	PKFH	39.1	-23	53.74	74	-20.26	44	111	H
4	* 3.629	40.24	PKFH	33.1	-29.7	43.64	74	-30.36	269	373	V
5	* 7.323	48.26	PKFH	36.4	-26.6	58.06	74	-15.94	146	101	V
6	* 12.205	37.22	PKFH	39.1	-23	53.32	74	-20.68	54	103	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

## HIGH CHANNEL RESULTS



## HORIZONTAL



## VERTICAL

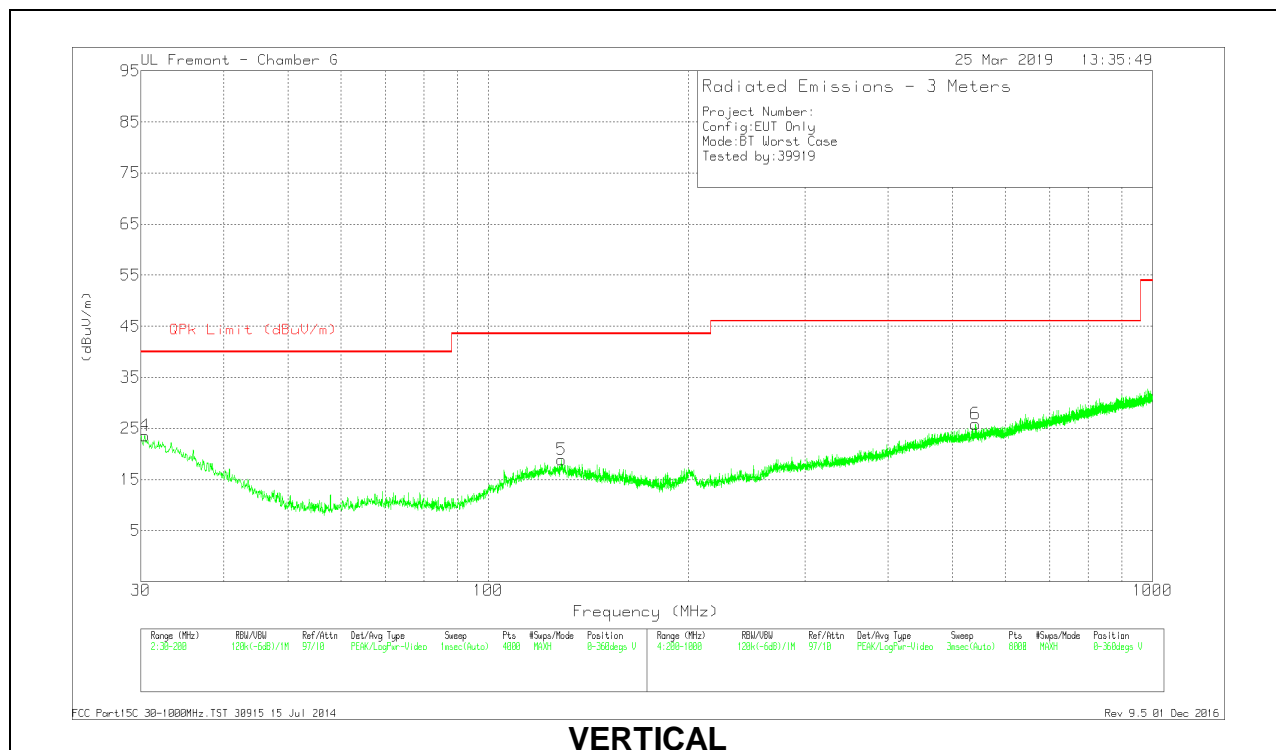
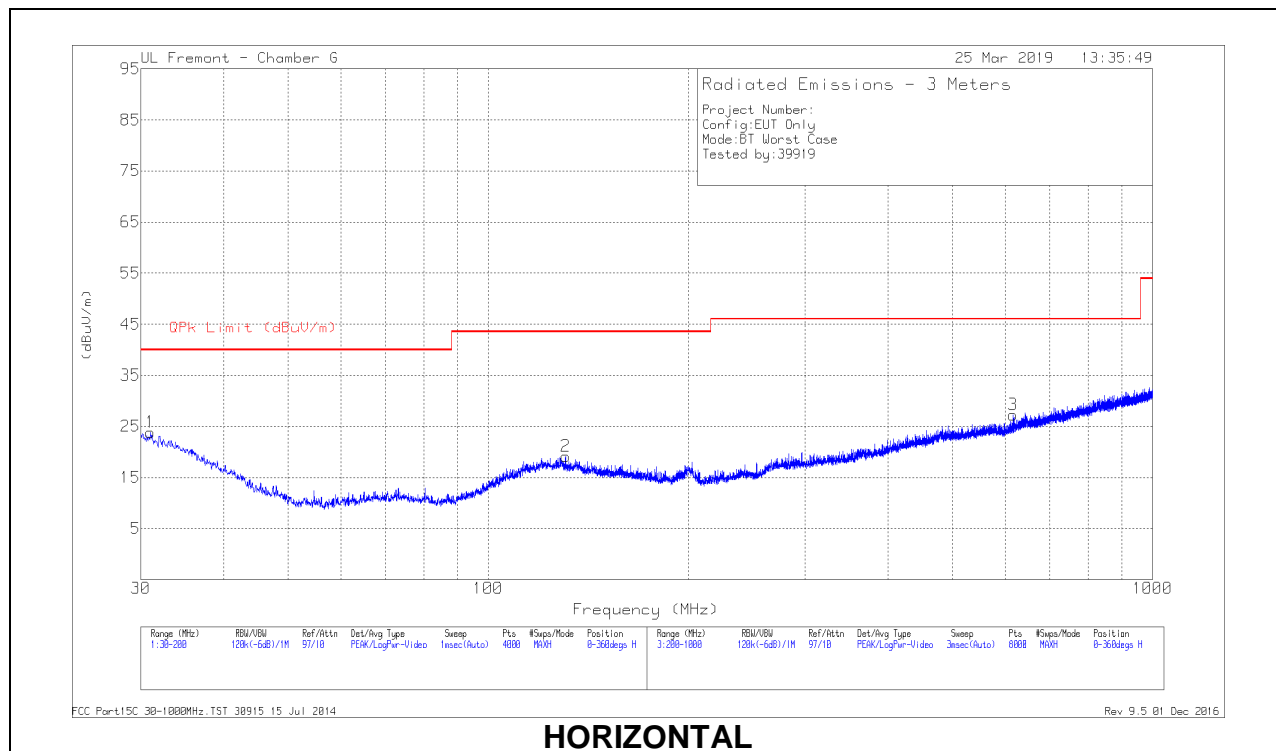
## RADIATED EMISSIONS

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T136 (dB/m)	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 3.639	40.63	PKFH	33.1	-29.5	44.23	74	-29.77	172	244	H
2	* 7.44	47.88	PKFH	36.5	-27.3	57.08	74	-16.92	229	103	H
3	* 12.581	35.22	PKFH	39.2	-22.8	51.62	74	-22.38	180	354	H
4	* 3.63	39.45	PKFH	33.1	-29.6	42.95	74	-31.05	189	330	V
5	* 7.44	52.15	PKFH	36.5	-27.3	61.35	74	-12.65	175	248	V
6	* 12.399	38.45	PKFH	39.1	-23.2	54.35	74	-19.65	254	108	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

## 9.2. WORST CASE BELOW 1 GHZ

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



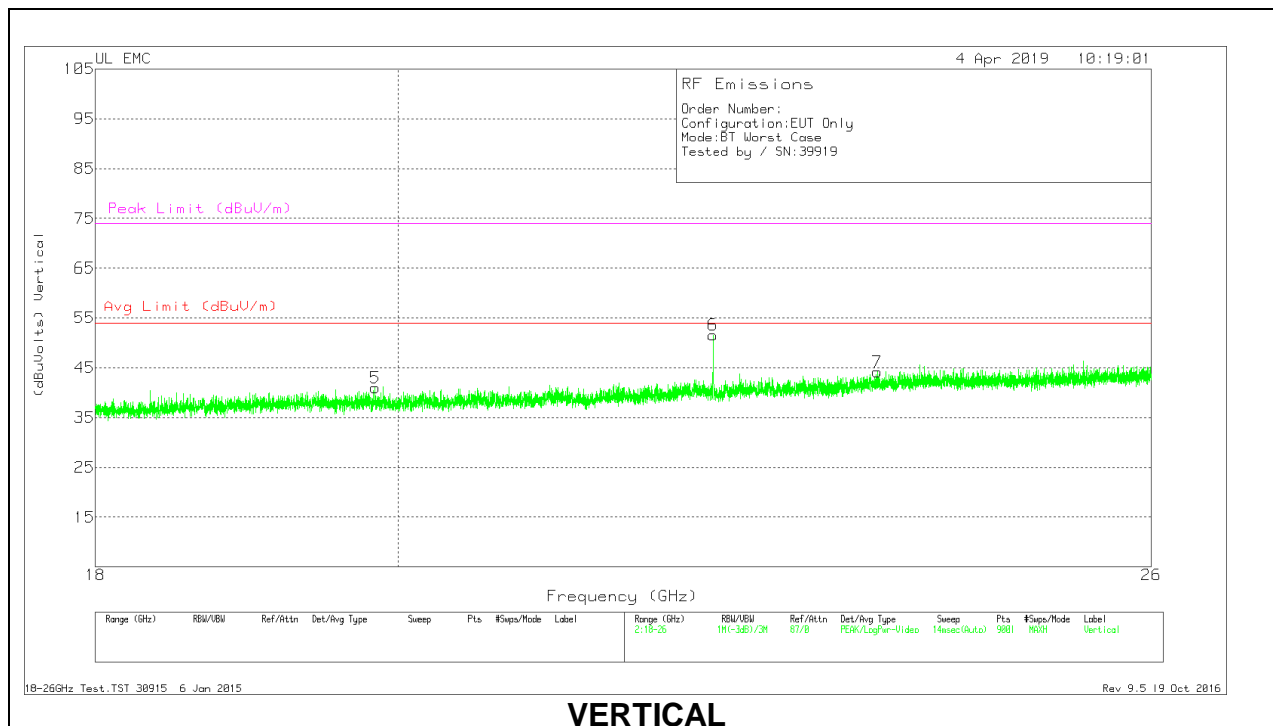
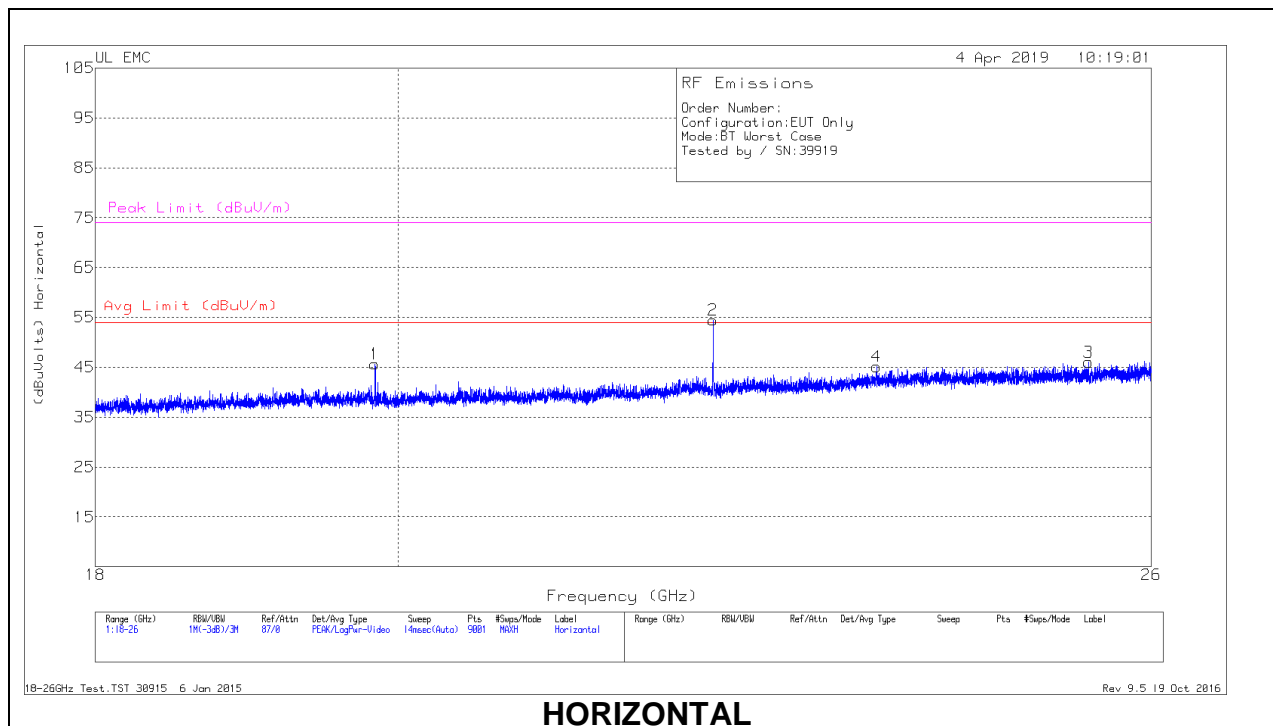


## Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.0203	29.08	Pk	26	-31.2	23.88	40	-16.12	0-360	300	H
2	* 130.7511	29.43	Pk	19.8	-30.1	19.13	43.52	-24.39	0-360	400	H
3	617.1542	29.83	Pk	24.8	-27.4	27.23	46.02	-18.79	0-360	400	H
4	30.4039	28.22	Pk	26.6	-31.2	23.62	40	-16.38	0-360	100	V
5	* 128.8806	29.21	Pk	19.9	-30.2	18.91	43.52	-24.61	0-360	100	V
6	541.3444	29.48	Pk	24.1	-27.7	25.88	46.02	-20.14	0-360	100	V

### 9.3. 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)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.839	43.92	Pk	32.7	-21.5	-9.5	45.62	74	-28.38
2	22.319	50.85	Pk	33.5	-20.4	-9.5	54.45	74	-19.55
3	25.437	40.93	Pk	34.5	-19.9	-9.5	46.03	74	-27.97
4	23.626	40.43	Pk	34.1	-19.9	-9.5	45.13	74	-28.87
5	19.842	39.27	Pk	32.7	-21.5	-9.5	40.97	74	-33.03
6	22.319	47.99	Pk	33.5	-20.4	-9.5	51.59	74	-22.41
7	23.632	39.39	Pk	34.1	-19.8	-9.5	44.19	74	-29.81

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

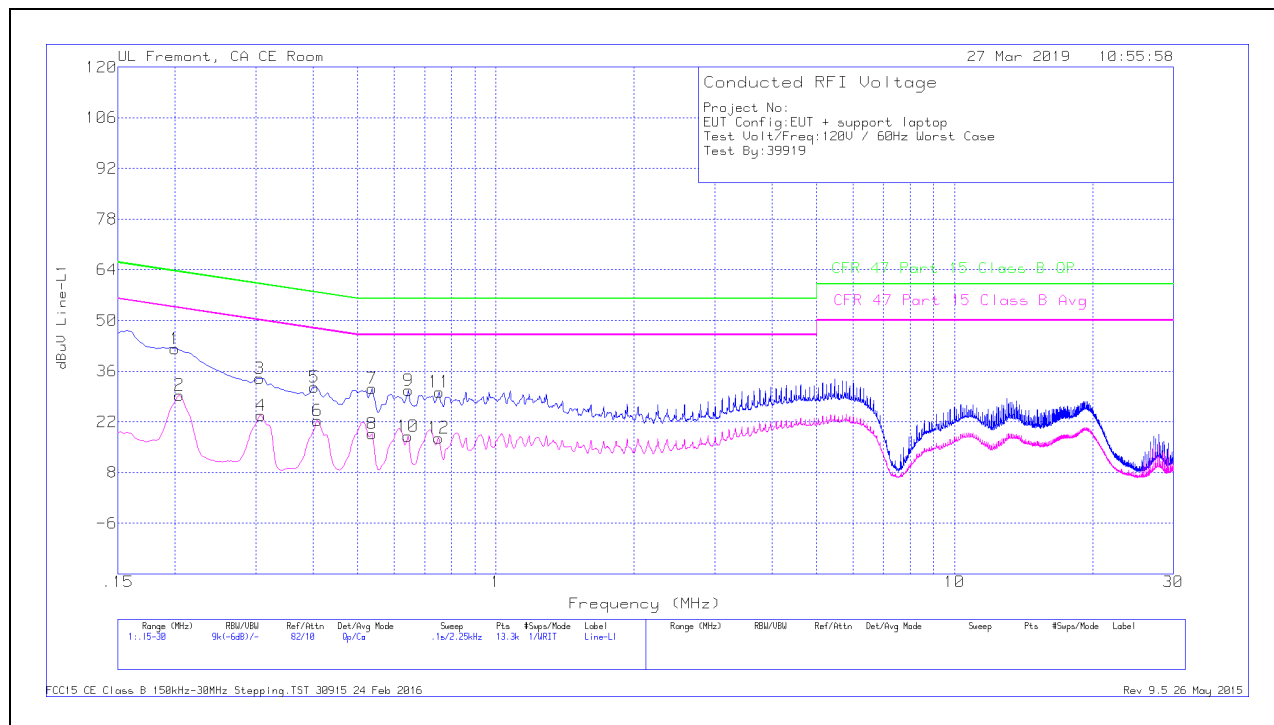
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

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

### RESULTS

## 10.1.1. AC Power Line Host

### LINE 1 RESULTS



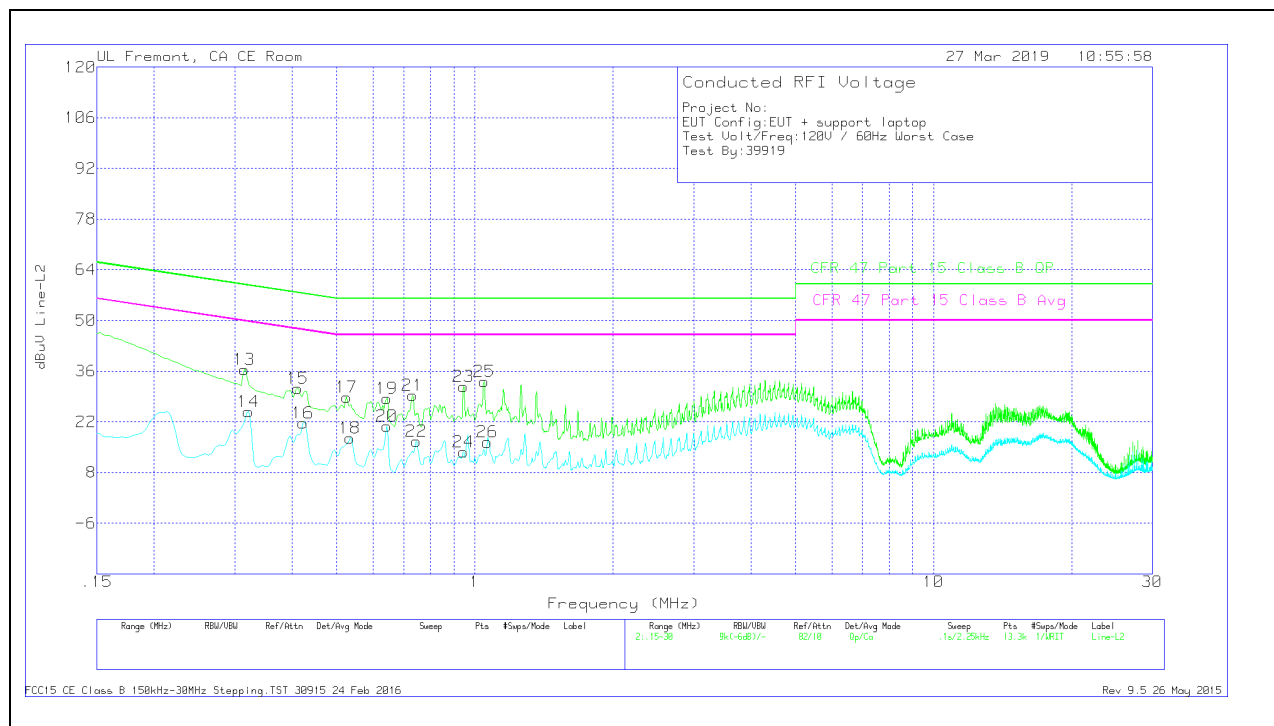
Range 1: Line-L1 .15 - 30MHz

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	.1995	32.13	Qp	0	0	10.1	42.23	63.63	-21.4	-	-
2	.204	19.3	Ca	0	0	10.1	29.4	-	-	53.45	-24.05
3	.30525	23.89	Qp	0	0	10.1	33.99	60.1	-26.11	-	-
4	.3075	13.72	Ca	0	0	10.1	23.82	-	-	50.04	-26.22
5	.402	21.55	Qp	0	0	10.1	31.65	57.81	-26.16	-	-
6	.40875	12.19	Ca	0	0	10.1	22.29	-	-	47.67	-25.38
7	.537	21.07	Qp	0	0	10.1	31.17	56	-24.83	-	-
8	.537	8.54	Ca	0	0	10.1	18.64	-	-	46	-27.36
9	.645	20.59	Qp	0	0	10.1	30.69	56	-25.31	-	-
10	.64275	7.92	Ca	0	0	10.1	18.02	-	-	46	-27.98
11	.753	20.17	Qp	0	0	10.1	30.27	56	-25.73	-	-
12	.75075	7.48	Ca	0	0	10.1	17.58	-	-	46	-28.42

Qp - Quasi-Peak detector

Ca - CISPR average detection

## LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz

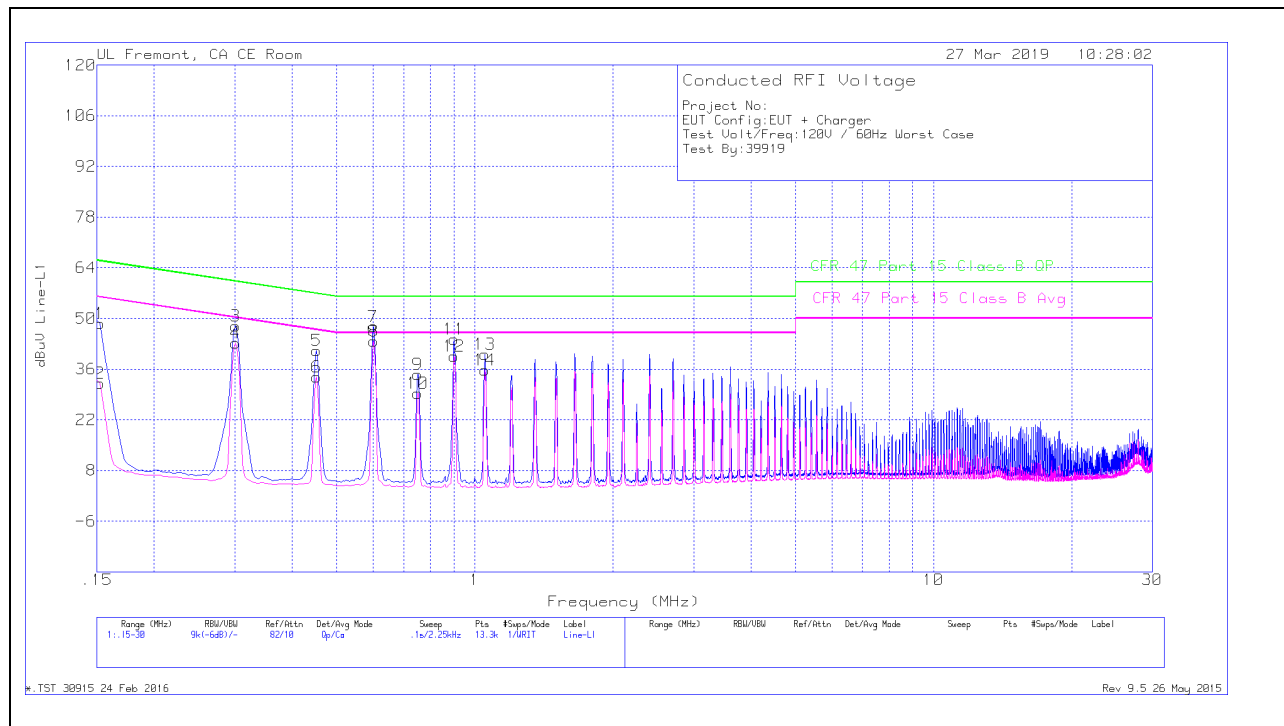
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.31425	26.41	Qp	0	0	10.1	36.51	59.86	-23.35	-	-
14	.321	14.62	Ca	0	0	10.1	24.72	-	-	49.68	-24.96
15	.411	21.11	Qp	0	0	10.1	31.21	57.63	-26.42	-	-
16	.42225	11.54	Ca	0	0	10.1	21.64	-	-	47.4	-25.76
17	.52575	18.76	Qp	0	0	10.1	28.86	56	-27.14	-	-
18	.53475	7.39	Ca	0	0	10.1	17.49	-	-	46	-28.51
19	.64275	18.37	Qp	0	0	10.1	28.47	56	-27.53	-	-
20	.64275	10.73	Ca	0	0	10.1	20.83	-	-	46	-25.17
21	.73275	19.24	Qp	0	0	10.1	29.34	56	-26.66	-	-
22	.74625	6.6	Ca	0	0	10.1	16.7	-	-	46	-29.3
23	.94425	21.58	Qp	0	.1	10.1	31.78	56	-24.22	-	-
24	.94425	3.41	Ca	0	.1	10.1	13.61	-	-	46	-32.39
25	1.04775	22.9	Qp	0	.1	10.1	33.1	56	-22.9	-	-
26	1.0635	6.17	Ca	0	.1	10.1	16.37	-	-	46	-29.63

Qp - Quasi-Peak detector

Ca - CISPR average detection

## 10.1.2. AC Power Line Norm

### LINE 1 RESULTS



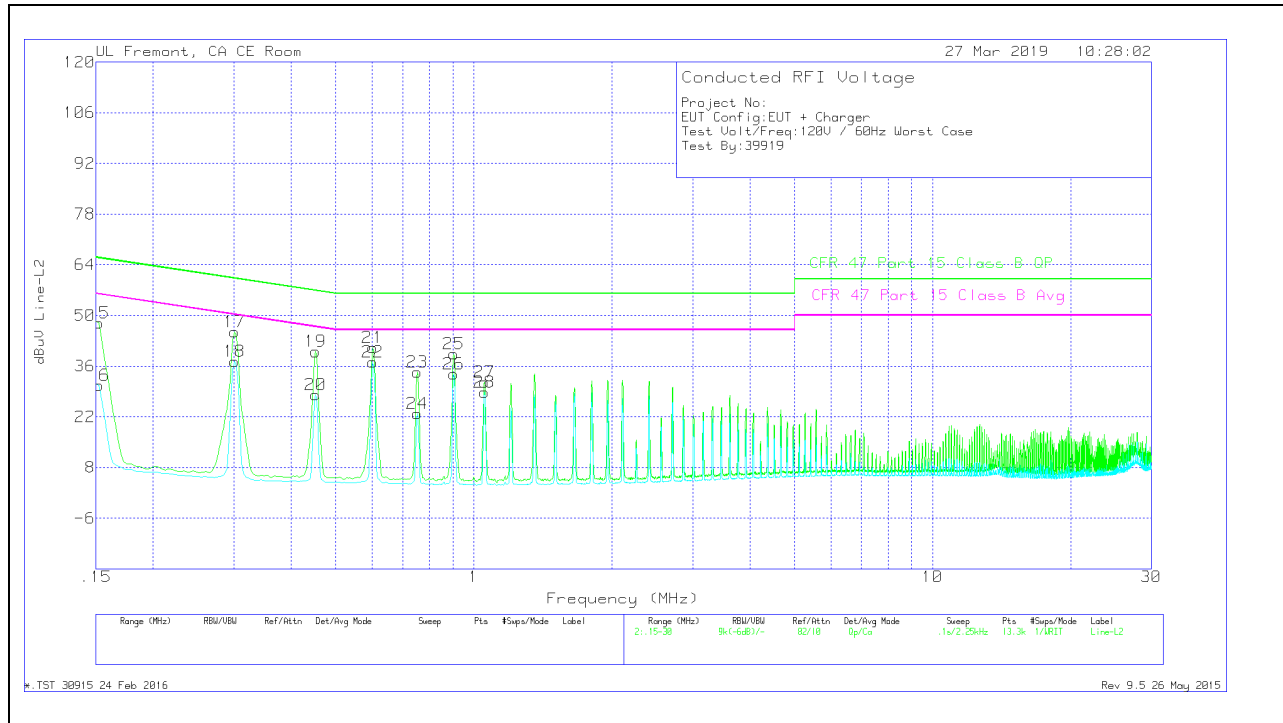
Range 1: Line-L1 .15 - 30MHz

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	.15225	38.4	Qp	.1	0	10.1	48.6	65.88	-17.28	-	-
2	.15225	21.93	Ca	.1	0	10.1	32.13	-	-	55.88	-23.75
3	.30075	37.79	Qp	0	0	10.1	47.89	60.22	-12.33	-	-
4	.30075	33.2	Ca	0	0	10.1	43.3	-	-	50.22	-6.92
5	.4515	31.06	Qp	0	0	10.1	41.16	56.85	-15.69	-	-
6	.4515	23.66	Ca	0	0	10.1	33.76	-	-	46.85	-13.09
7	.6	37.71	Qp	0	0	10.1	47.81	56	-8.19	-	-
8	.60225	33.59	Ca	0	0	10.1	43.69	-	-	46	-2.31
9	.75075	24.47	Qp	0	0	10.1	34.57	56	-21.43	-	-
10	.75075	19.21	Ca	0	0	10.1	29.31	-	-	46	-16.69
11	.9015	34.1	Qp	0	0	10.1	44.2	56	-11.8	-	-
12	.9015	29.49	Ca	0	0	10.1	39.59	-	-	46	-6.41
13	1.05225	29.91	Qp	0	.1	10.1	40.11	56	-15.89	-	-
14	1.05225	25.53	Ca	0	.1	10.1	35.73	-	-	46	-10.27

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)
15	.15225	37.71	Qp	.1	0	10.1	47.91	65.88	-17.97	-	-
16	.15225	20.49	Ca	.1	0	10.1	30.69	-	-	55.88	-25.19
17	.30075	35.42	Qp	0	0	10.1	45.52	60.22	-14.7	-	-
18	.30075	27.14	Ca	0	0	10.1	37.24	-	-	50.22	-12.98
19	.4515	29.91	Qp	0	0	10.1	40.01	56.85	-16.84	-	-
20	.4515	17.95	Ca	0	0	10.1	28.05	-	-	46.85	-18.8
21	.60225	31.02	Qp	0	0	10.1	41.12	56	-14.88	-	-
22	.60225	26.98	Ca	0	0	10.1	37.08	-	-	46	-8.92
23	.753	24.27	Qp	0	0	10.1	34.37	56	-21.63	-	-
24	.753	12.72	Ca	0	0	10.1	22.82	-	-	46	-23.18
25	.90375	29.22	Qp	0	0	10.1	39.32	56	-16.68	-	-
26	.90375	23.66	Ca	0	0	10.1	33.76	-	-	46	-12.24
27	1.0545	21.44	Qp	0	.1	10.1	31.64	56	-24.36	-	-
28	1.0545	18.54	Ca	0	.1	10.1	28.74	-	-	46	-17.26

Qp - Quasi-Peak detector

Ca - CISPR average detection



## **11. SETUP PHOTOS**

Please refer to 12742033-EP1V1 for setup photos

## **END OF TEST REPORT**