



## FCC 47 CFR PART 15 SUBPART C

### TEST REPORT

For

G-POP

WIRELESS TRAVEL SPEAKER

Model: G-20x, IP-4933, G-20xXXX

(“X”=Blank or stands for the alphabet from A to Z which is the abbreviation of different color)

Brand: G-Project, IMES, G-Project

Test Report Number:

C121129Z09-RP1

*Prepared for*

ACE INTERNATIONAL ELECTRONICS LTD.

Unit 2308,23th FLOOR RILEY HOUSE 88 LEI MUK ROAD, KWAI CHUNG,N.T HONG KONG

*Prepared by*

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Issued Date: December 11, 2012



TESTING CERT #2861.01

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## Revision History

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	C121129Z09-RP1	Initial Issue	ALL	Amay Tang



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## 1. TEST RESULT CERTIFICATION

<b>Product</b>	G-POP WIRELESS TRAVEL SPEAKER
<b>Model</b>	G-20x, IP-4933, G-20xXXX ("X"=Blank or stands for the alphabet from A to Z which is the abbreviation of different color)
<b>Brand</b>	G-Project, IMES, G-Project
<b>Tested</b>	November 29~December 10, 2012
<b>Applicant</b>	<b>ACE INTERNATIONAL ELECTRONICS LTD.</b> Unit 2308,23th FLOOR RILEY HOUSE 88 LEI MUK ROAD, KWAI CHUNG,N.T HONG KONG
<b>Manufacturer1#</b>	<b>GuangZhou Lei Deng Manufacture Ltd</b> 35 Number Li Jiang Road Shi Tou town ,PanYu District,GuangZhou City,China
<b>Manufacturer2#</b>	<b>GuangZhou GangJu Electronics Ltd.</b> Mei Hua Gang Industrial District ,Shi Lian Road,ShiLou Town,Pan Yu Guangzhou, China.

<b>APPLICABLE STANDARDS</b>	
<b>STANDARD</b>	<b>TEST RESULT</b>
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.207, 15.209 and 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

*Approved by:*

**Tom Gan**  
Supervisor of EMC Dept.  
Compliance Certification Service Inc.

*Reviewed by:*

**Ruby Zhang**  
Supervisor of Report Dept.  
Compliance Certification Service Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	G-POP WIRELESS TRAVEL SPEAKER
<b>Model Number</b>	G-20x, IP-4933, G-20xXXX (“X”=Blank or stands for the alphabet from A to Z which is the abbreviation of different color)
<b>Brand</b>	G-Project, IMES, G-Project
<b>Model Discrepancy</b>	All models except the model name, the appearance of color and the corresponding trademark is different. Others are the same. G-20x with brand G-Project, IP-4933 with brand IMES, G-20Xxxx with brand G-Project.
<b>Identify Number</b>	C121129Z09-RP1
<b>Power Supply</b>	DC3.7V supplied by the battery DC 5V supplied by the PC
<b>Received Date</b>	November 29, 2012
<b>Frequency Range</b>	2402 ~ 2480 MHz
<b>Transmit Power</b>	GFSK : -1.02dBm 8DPSK:-1.98dBm
<b>Modulation Technique</b>	FHSS (GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8DPSK for 3Mbps)
<b>Number of Channels</b>	79 Channels
<b>Antenna Specification</b>	PCB Antenna with 0dBi gain(Max)
<b>USB Cable</b>	Unshielded 0.50m
<b>Temperature Range</b>	0°C ~ +40°C

**Note:** This submittal(s) (test report) is intended for FCC ID: G3OG-20X filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### 3. TEST METHODOLOGY

#### 3.1 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

The following test mode(s) were scanned during the preliminary test below 1G:

Test Item	Test mode	Worse mode
Conducted Emission	Mode 1: Normal Link	<input checked="" type="checkbox"/>
Radiated Emission	Mode 1: TX	<input checked="" type="checkbox"/>

Above 1G, Channel Low (2402MHz)、Mid (2441MHz) and High (2480MHz) were chosen for full testing for GFSK and 8DPSK.



## 4. FACILITIES AND ACCREDITATIONS

### 4.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

**No.10-1, Mingkeda Logistics Park, No.18, Huanguan South Rd.,  
Guan Lan Town, Baoan District, Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.4:2009, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 4.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

<b>USA</b>	<b>A2LA</b>
<b>Taiwan</b>	<b>TAF</b>

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>USA</b>	<b>FCC</b>
<b>Japan</b>	<b>VCCI(C-3478, R-3135, T-652, G-624)</b>
<b>Canada</b>	<b>INDUSTRY CANADA</b>
<b>Taiwan</b>	<b>BSMI</b>
<b>Norway</b>	<b>Nemko</b>

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

### 4.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

<b>Measurement</b>	<b>Frequency</b>	<b>Uncertainty</b>
Conducted emissions	9kHz~30MHz	+/- 3.18dB
Radiated emissions	30MHz ~ 200MHz	+/- 3.79dB
	200MHz ~1000MHz	+/- 3.62dB
	Above 1000MHz	+/- 5.04dB
Band Edges		+/- 0.182 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

The measured result is above (below) the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95% level of confidence. However, the result indicates that compliance (non-compliance) is more probable than non-compliance) with the specification limit.



## 5. SETUP OF EQUIPMENT UNDER TEST

### 5.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### 5.2 SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC ID	Brand	Data Cable	Power Cord
1.	Notebook	992F2VG	62P7043	N/A	IBM	Shielded 1.50m	Unshielded 1.80m
2	Notebook	LENOVO	WB04591721	N/A	LENOVO	N/A	Unshielded 1.80m

**Notes:**

*Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



## 6. FCC PART 15.247 REQUIREMENTS

### 6.1 20DB BANDWIDTH

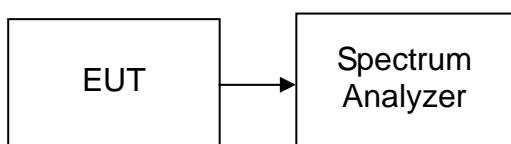
None; for reporting purpose only.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### TEST CONFIGURATION

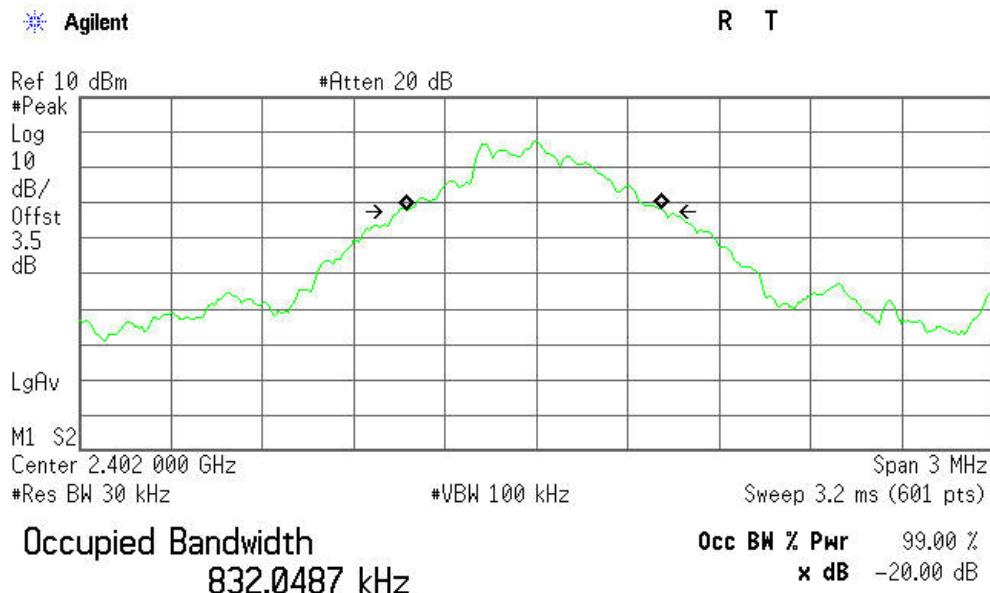


### TEST PROCEDURE

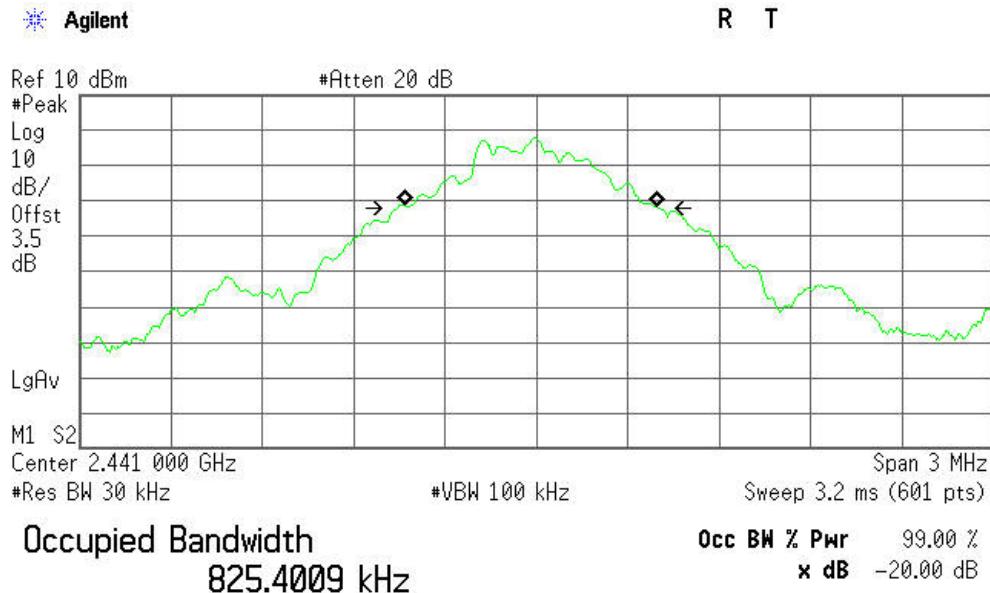
1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT, then connect a low loss RF cable from antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=30kHz, VBW=30kHz, Span=3MHz, Sweep = auto.
4. Mark the peak frequency and 20dB (upper and lower) frequency.
5. Repeat until all the test channels are investigated.

### TEST RESULTS

No non-compliance noted

**Test plot ( GFSK)****20dB Bandwidth (CH Low)**

Transmit Freq Error -6.591 kHz  
x dB Bandwidth 872.363 kHz

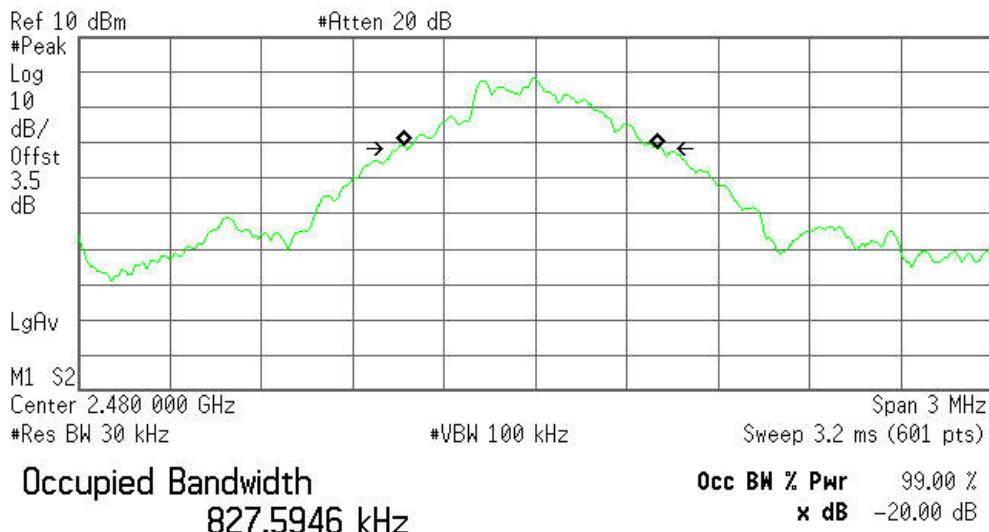
**20dB Bandwidth (CH Mid)**

Transmit Freq Error -15.785 kHz  
x dB Bandwidth 860.200 kHz

**20dB Bandwidth (CH High)**

Agilent

R T

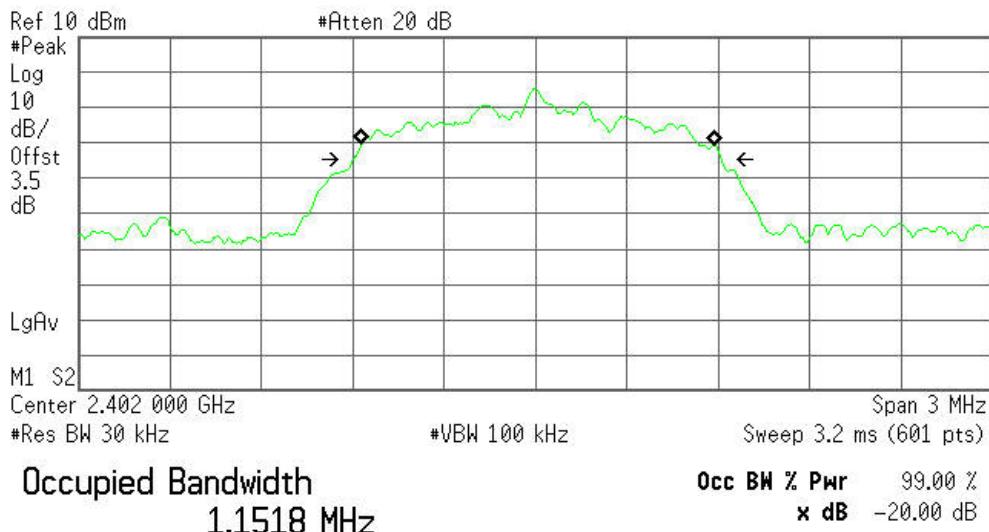


Transmit Freq Error      -13.768 kHz  
x dB Bandwidth      863.796 kHz

**Test plot ( 8DPSK )****20dB Bandwidth (CH Low)**

Agilent

R T



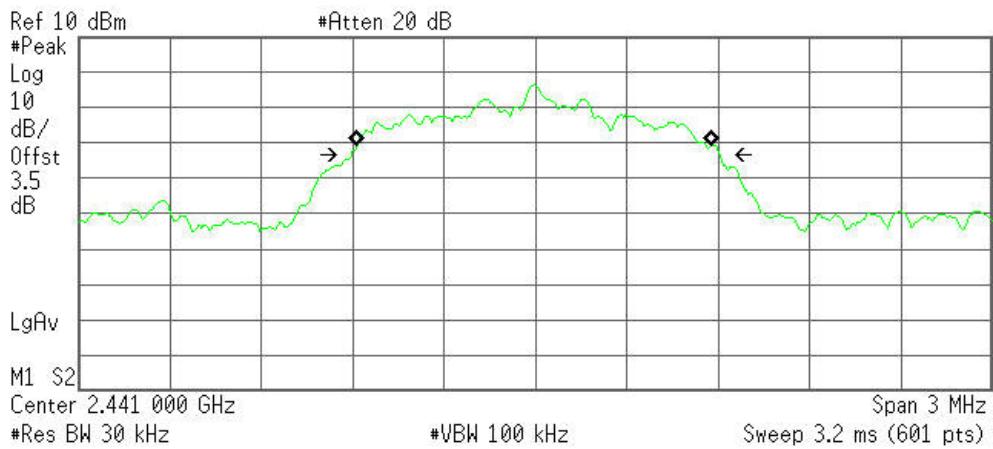
Transmit Freq Error      7.088 kHz  
x dB Bandwidth      1.211 MHz



## 20dB Bandwidth (CH Mid)

Agilent

R T

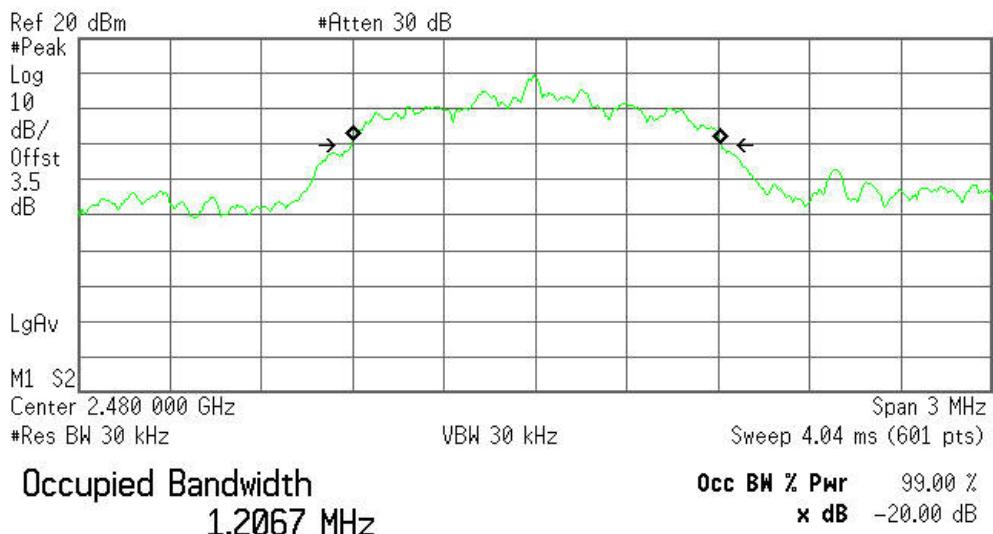


Transmit Freq Error -3.484 kHz  
x dB Bandwidth 1.213 MHz

## 20dB Bandwidth (CH High)

\* Agilent

R T



Transmit Freq Error 7.369 kHz  
x dB Bandwidth 1.221 MHz



## 6.2 PEAK POWER

### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

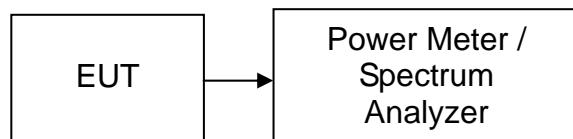
1. For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.
3. The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Power Meter	Anritsu	ML2487A	6K00001491	03/19/2012	03/19/2013
Power Sensor	Anritsu	MA2411B	1126150	01/27/2012	01/27/2013
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.



## **TEST RESULTS**

*No non-compliance noted*

### **Test Data**

#### **GFSK**

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-5.29	3.50	-1.79	0.00066	1	PASS
Mid	2441	-4.78	3.50	-1.28	0.00074		PASS
High	2480	-4.52	3.50	-1.02	0.00079		PASS

#### **8DPSK**

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-6.95	3.50	-3.45	0.00045	1	PASS
Mid	2441	-6.06	3.50	-2.56	0.00055		PASS
High	2480	-5.48	3.50	-1.98	0.00063		PASS



## 6.3 PEAK POWER SPECTRAL DENSITY

### LIMIT

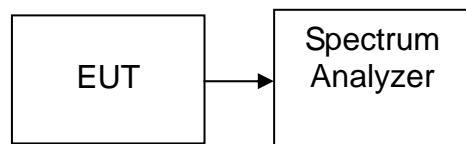
1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
4. Record the max. reading.
5. Repeat the above procedure until the measurements for all frequencies are completed.

### TEST RESULTS

*Not applicable. Since EUT is the Bluetooth device.*

## 6.4 BAND EDGES MEASUREMENT

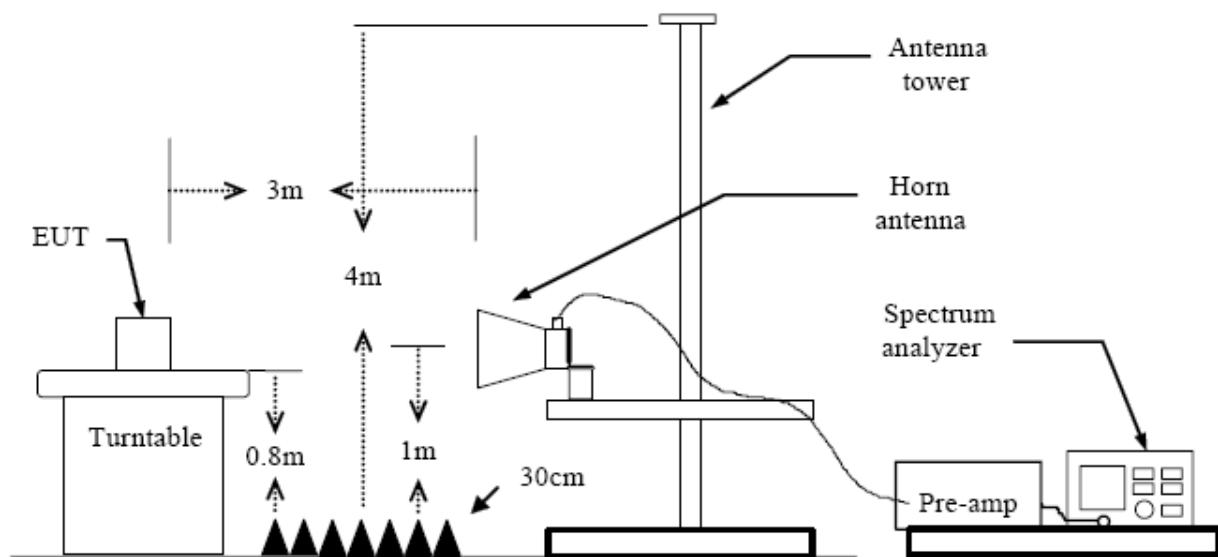
### LIMIT

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

### MEASUREMENT EQUIPMENT USED

Radiated Emission Test Site 966 (2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2012	03/18/2013
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2012	03/18/2013
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/17/2012	03/17/2013
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/17/2012	03/17/2013
Loop Antenna	A, R, A	PLA-1030/B	1029	03/23/2012	03/23/2013
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/19/2012	03/19/2013
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

### Test Configuration



**TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=510Hz/ Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

**TEST RESULTS**

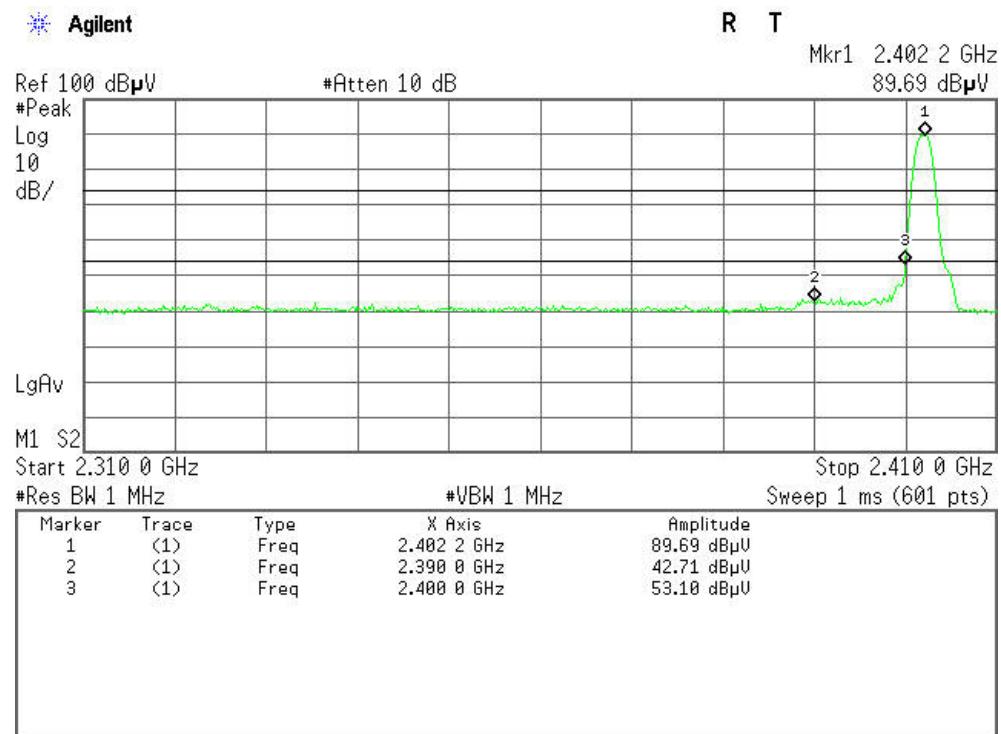
Refer to attach spectrum analyzer data chart.

Test Data ( GFSK )

## Band Edges (CH-Low)

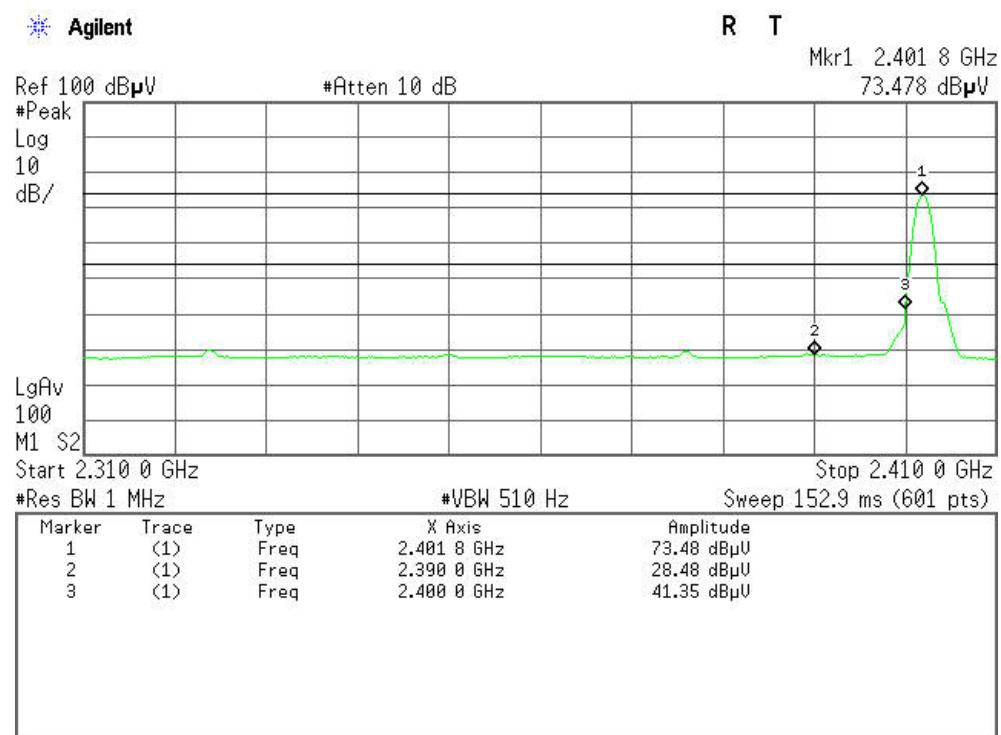
## Detector mode: Peak

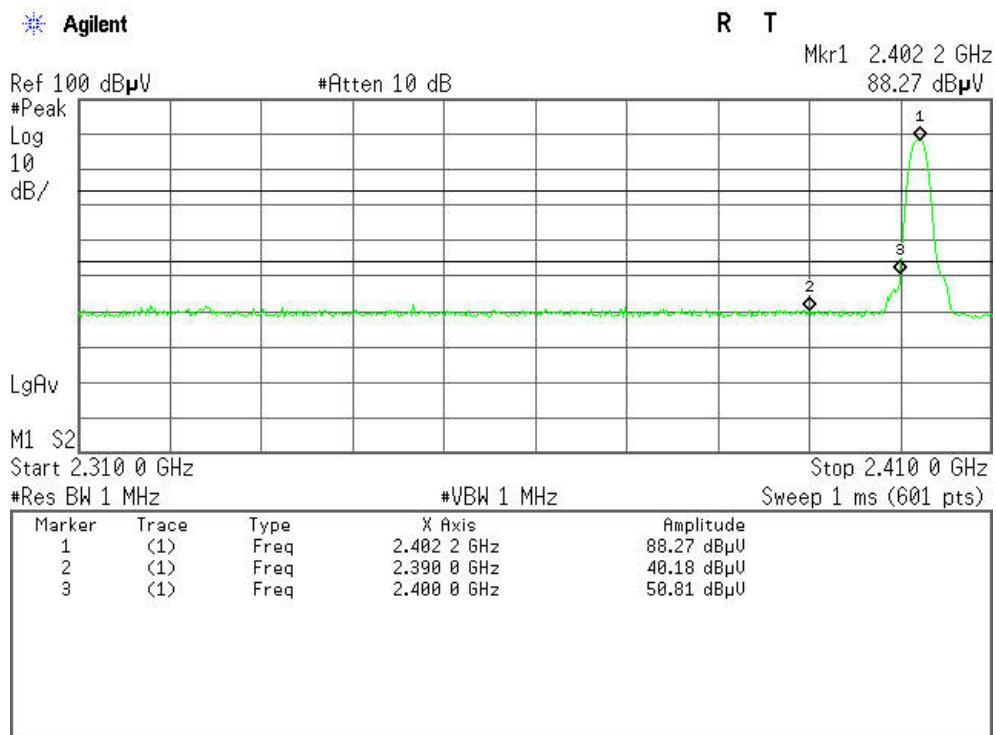
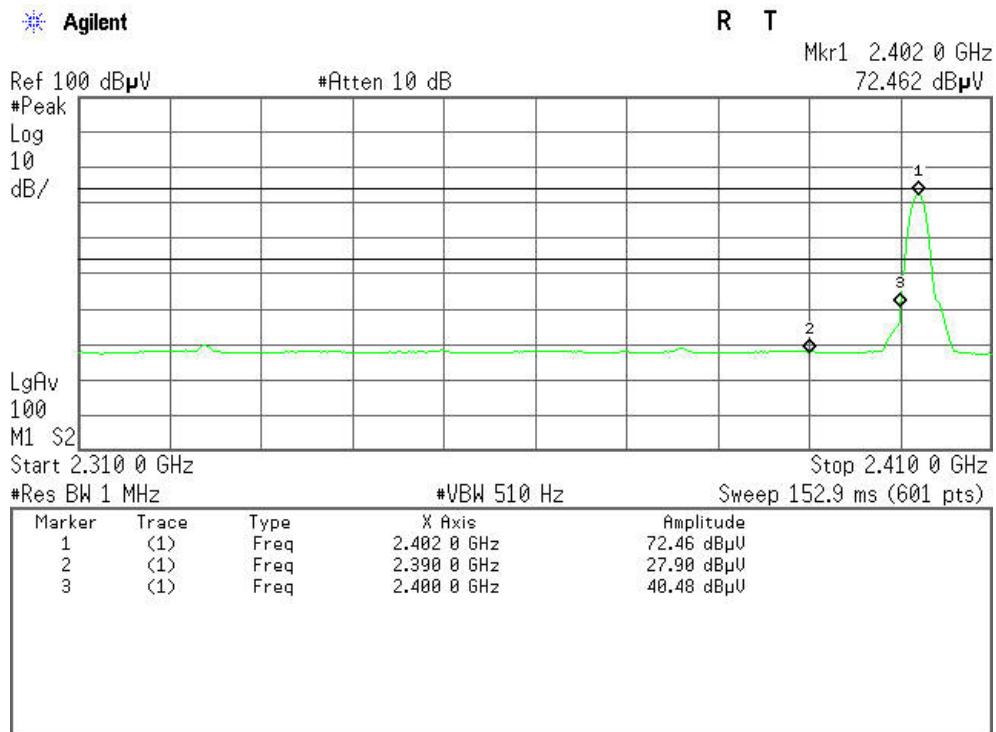
## Polarity: Vertical

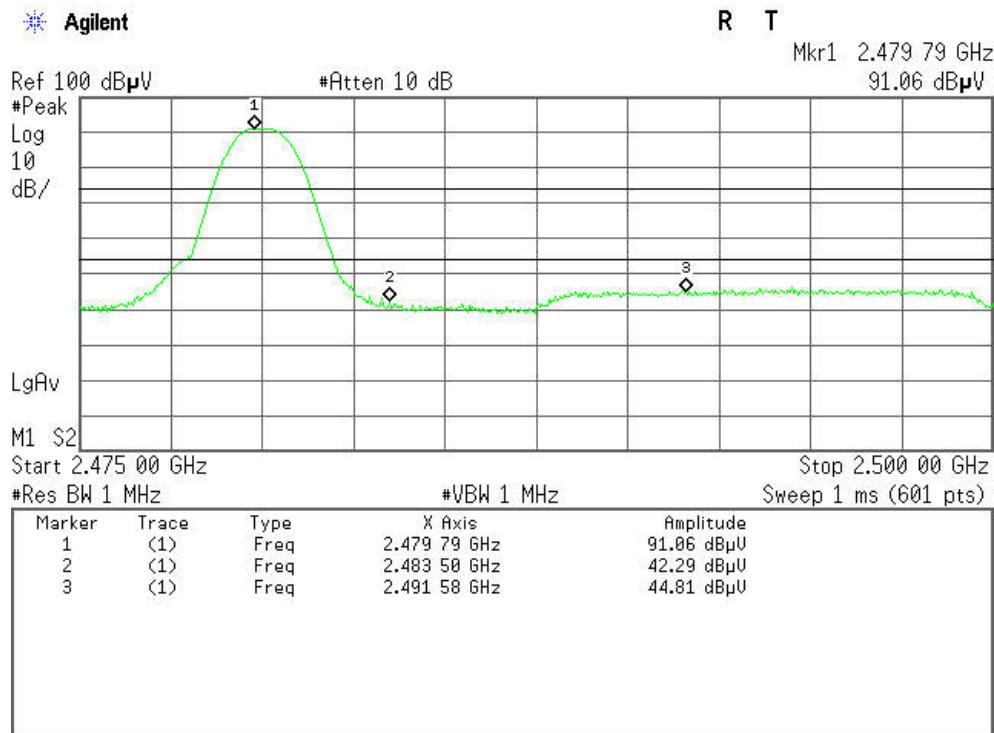
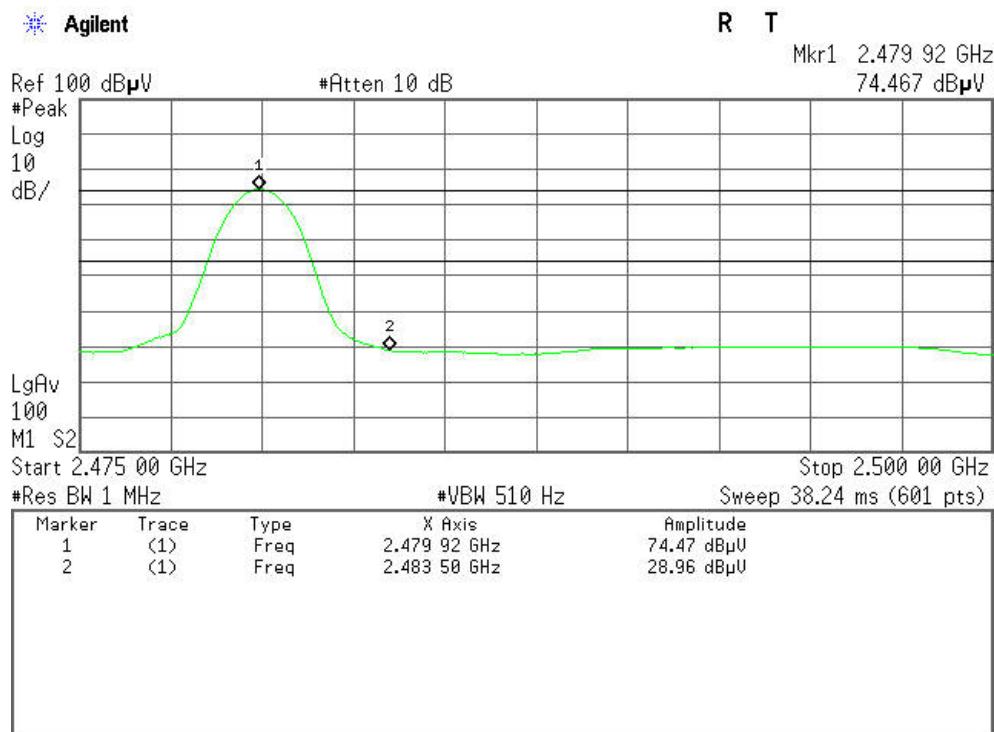


## Detector mode: Average

## Polarity: Vertical



**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (CH-High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal**

R T

Mkr1 2.479 83 GHz

90.18 dB $\mu$ VRef 100 dB $\mu$ V

#Atten 10 dB

#Peak

Log  
10  
dB/

LgAv

M1 S2

Start 2.475 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.479 83 GHz	90.18 dB $\mu$ V
2	(1)	Freq	2.483 50 GHz	40.78 dB $\mu$ V
3	(1)	Freq	2.490 96 GHz	44.96 dB $\mu$ V

**Detector mode: Average****Polarity: Horizontal**

R T

Mkr1 2.479 88 GHz

73.747 dB $\mu$ VRef 100 dB $\mu$ V

#Atten 10 dB

#Peak

Log  
10  
dB/

LgAv

100

M1 S2

Start 2.475 00 GHz

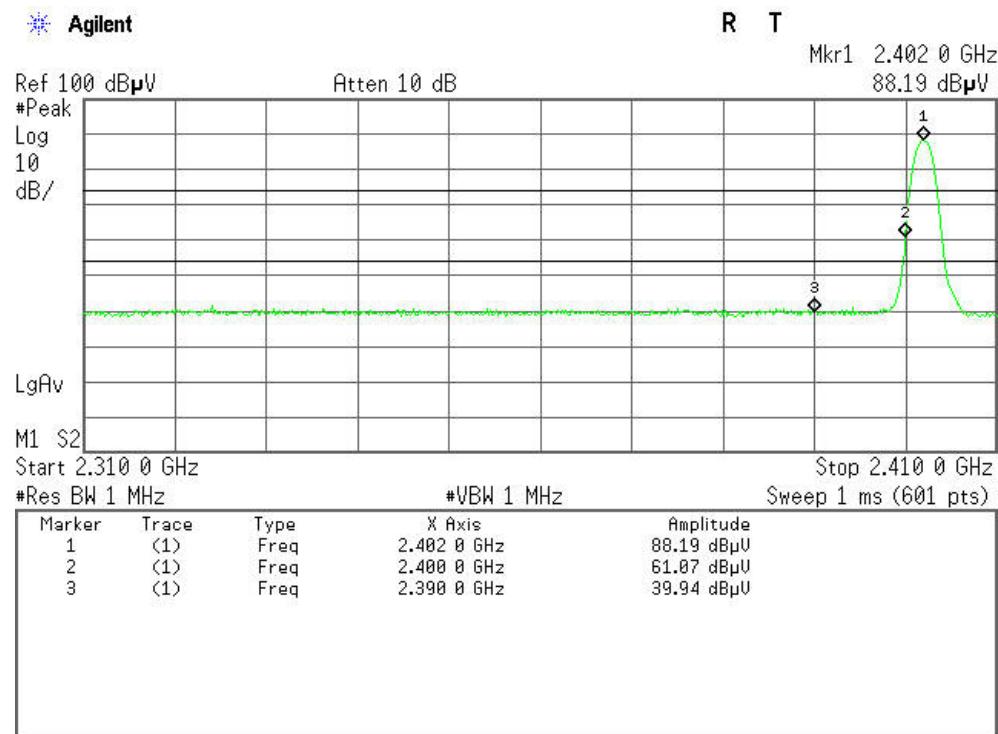
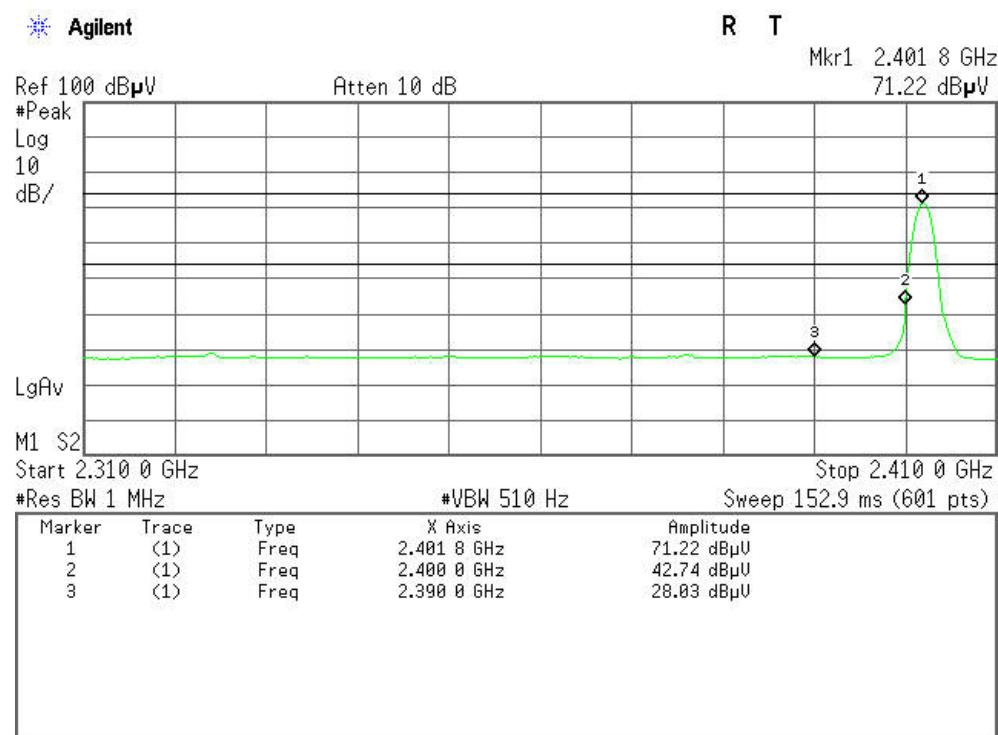
Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 510 Hz

Sweep 38.24 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.479 88 GHz	73.75 dB $\mu$ V
2	(1)	Freq	2.483 50 GHz	28.79 dB $\mu$ V

**Test Data ( 8DPSK )****Band Edges (CH-Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal**Ref 100 dB $\mu$ V

Atten 10 dB

T

Mkr1 2.402 0 GHz

88.10 dB $\mu$ V

#Peak

Log  
10  
dB/

LgAv

M1 S2

Start 2.310 0 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.410 0 GHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 0 GHz	88.10 dB $\mu$ V
2	(1)	Freq	2.400 0 GHz	60.77 dB $\mu$ V
3	(1)	Freq	2.398 0 GHz	42.70 dB $\mu$ V

**Detector mode: Average****Polarity: Horizontal**Ref 100 dB $\mu$ V

Atten 10 dB

R T

Mkr1 2.402 0 GHz

71.18 dB $\mu$ V

#Peak

Log  
10  
dB/

LgAv

M1 S2

Start 2.310 0 GHz

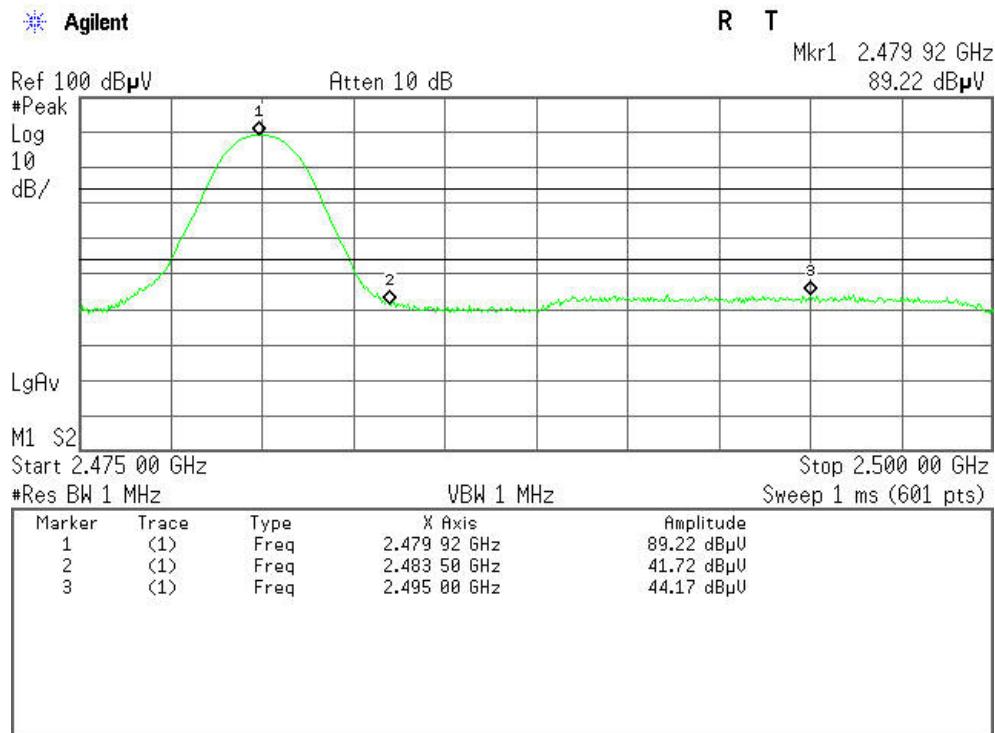
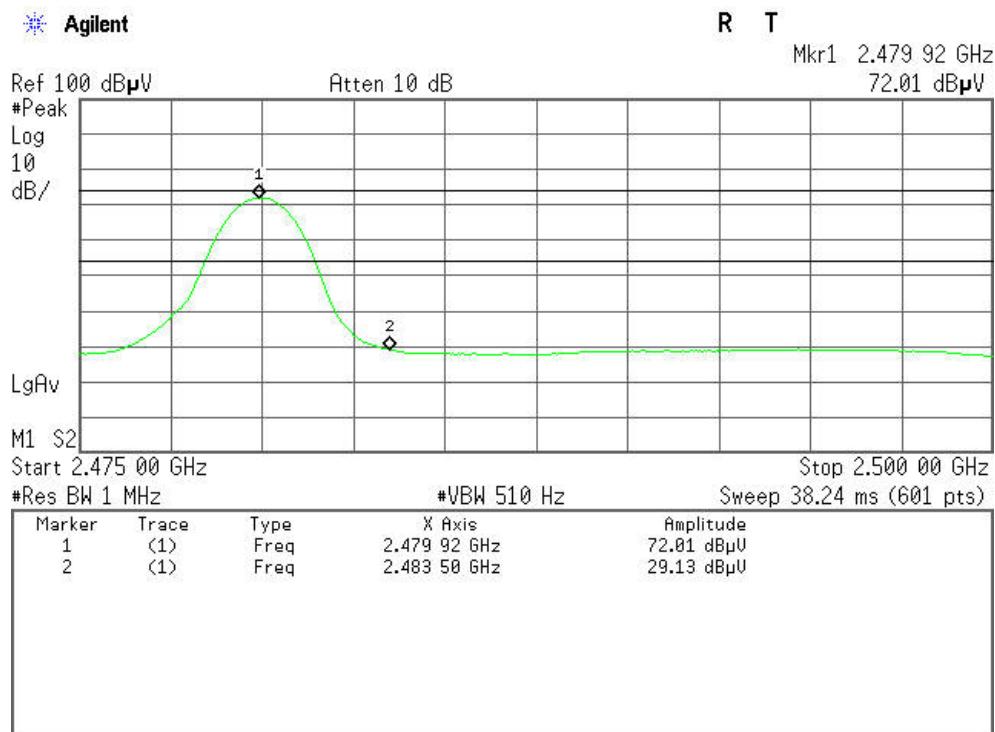
#Res BW 1 MHz

#VBW 510 Hz

Stop 2.410 0 GHz

#Sweep 152.9 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.402 0 GHz	71.18 dB $\mu$ V
2	(1)	Freq	2.400 0 GHz	42.62 dB $\mu$ V
3	(1)	Freq	2.398 0 GHz	28.87 dB $\mu$ V

**Band Edges (CH-High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal**

R T

Mkr1 2.480 00 GHz

90.78 dB $\mu$ VRef 100 dB $\mu$ V

Atten 10 dB

#Peak

Log  
10  
dB/

LgAv

M1 S2

Start 2.475 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 00 GHz	90.78 dB $\mu$ V
2	(1)	Freq	2.483 50 GHz	41.98 dB $\mu$ V
3	(1)	Freq	2.492 33 GHz	46.78 dB $\mu$ V

**Detector mode: Average****Polarity: Horizontal**

R T

Mkr1 2.480 00 GHz

73.30 dB $\mu$ VRef 100 dB $\mu$ V

Atten 10 dB

#Peak

Log  
10  
dB/

LgAv

M1 S2

Start 2.475 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 510 Hz

Sweep 38.24 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.480 00 GHz	73.30 dB $\mu$ V
2	(1)	Freq	2.483 50 GHz	29.60 dB $\mu$ V



## 6.5 FREQUENCY SEPARATION

### LIMIT

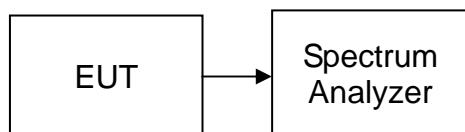
According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel 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.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW=30kHz, VBW=30kHz, Adjust Span to 4 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.



## **TEST RESULTS**

*No non-compliance noted*

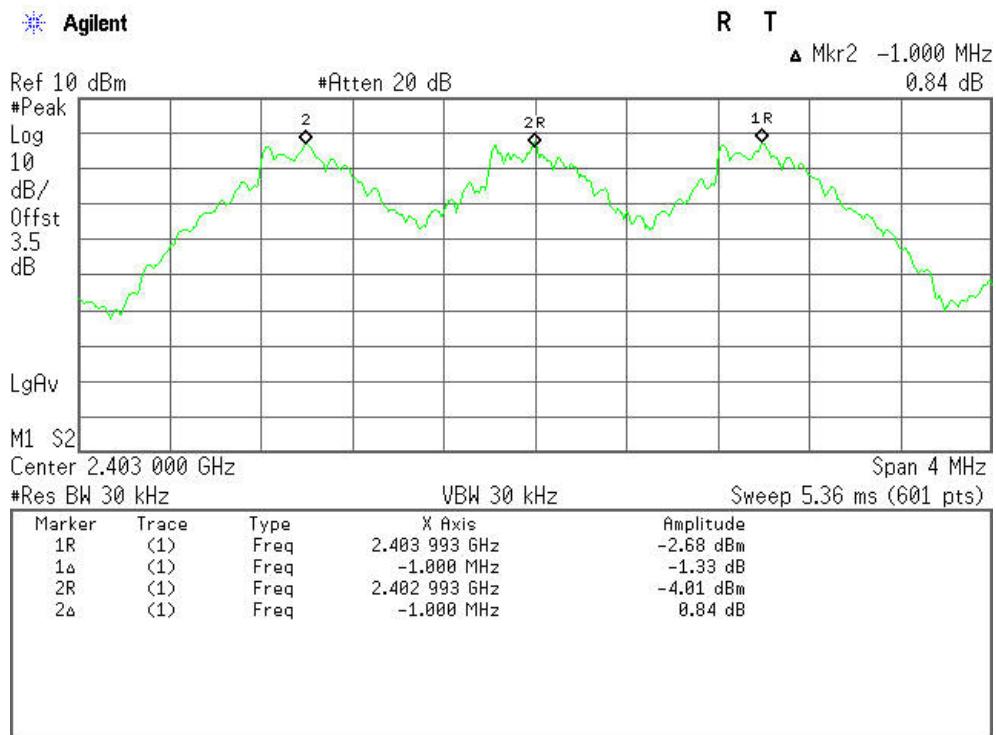
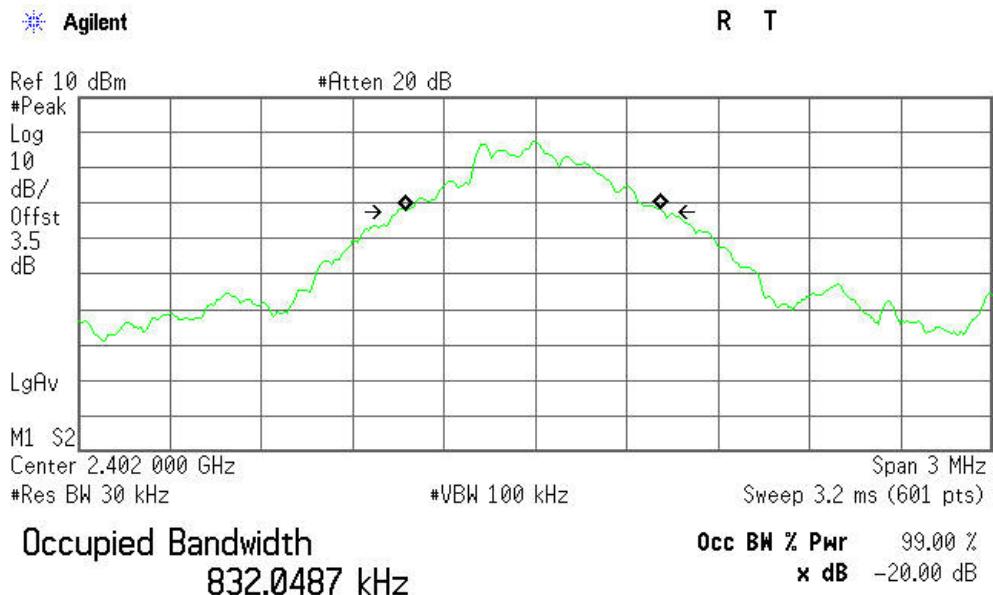
### **Test Data**

#### **GFSK**

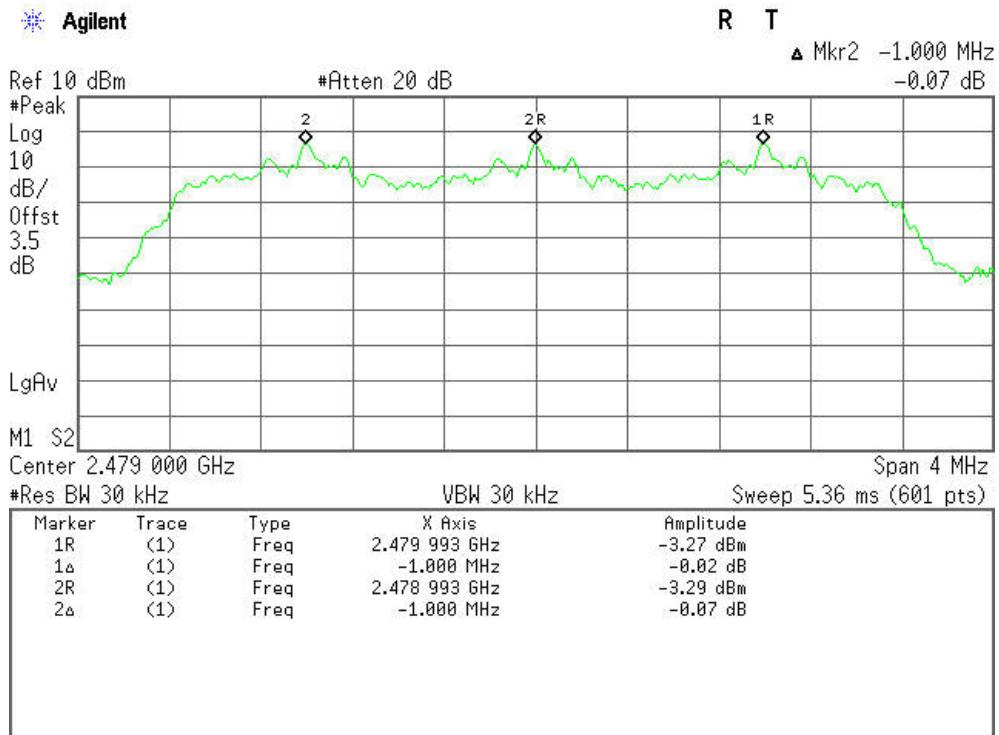
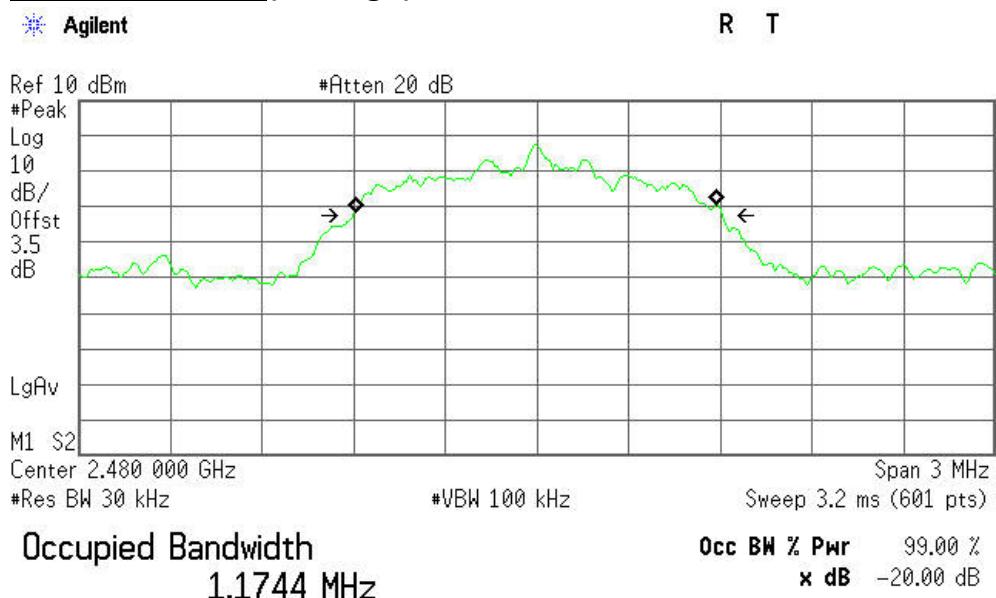
Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	581.575	> Two-thirds of the 20 dB Bandwidth	Pass

#### **8DPSK**

Channel Separation (MHz)	Two-thirds of the 20 dB Bandwidth (kHz)	Channel Separation Limit	Result
1.000	810.000	> Two-thirds of the 20 dB Bandwidth	Pass

GFSKTest PlotMeasurement of Channel Separation20 dB bandwidth(CH Low)

Transmit Freq Error -6.591 kHz  
x dB Bandwidth 872.363 kHz

**8DPSK****Test Plot****Measurement of Channel Separation****20 dB bandwidth(CH High)**

Transmit Freq Error      -1.639 kHz  
x dB Bandwidth      1.215 MHz



## 6.6 NUMBER OF HOPPING FREQUENCY

### LIMIT

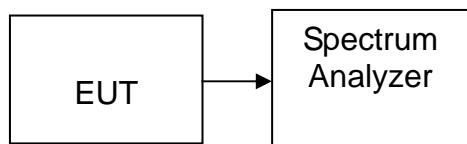
According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### Test Configuration



### TEST PROCEDURE

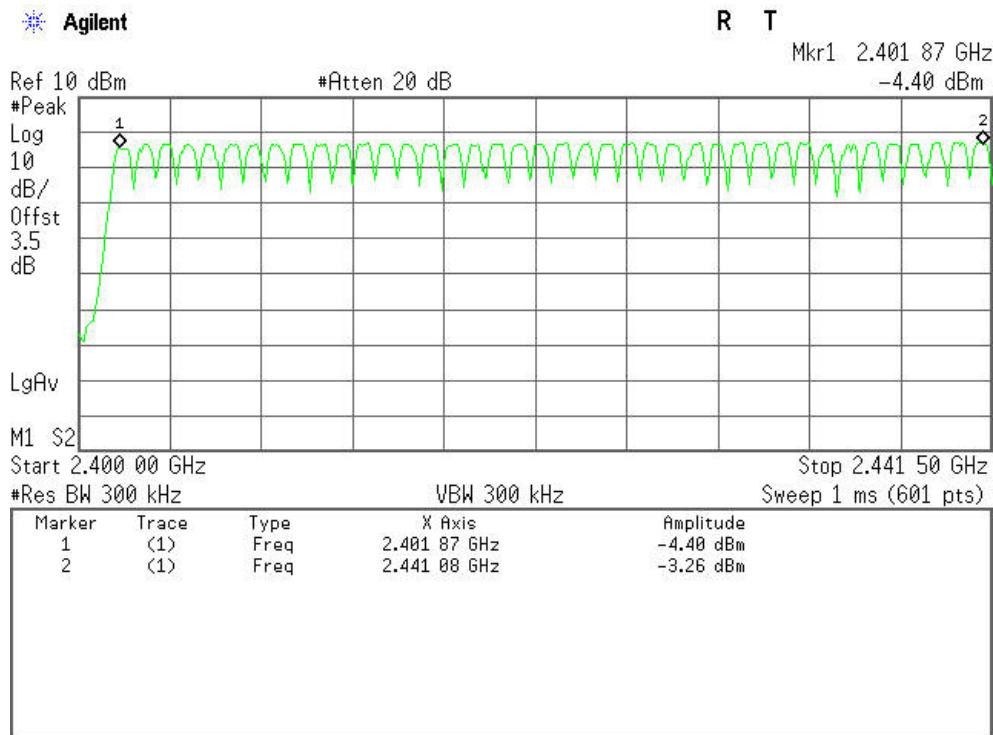
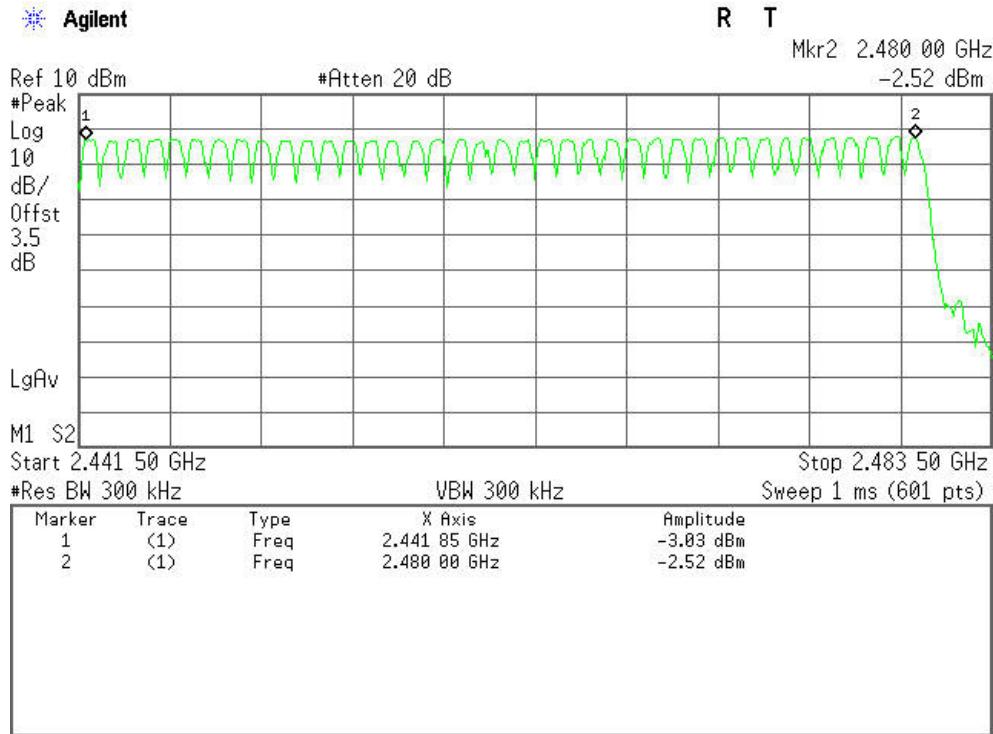
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2402MHz, Stop = 2441MHz, Sweep = 1ms and Start=2441MHz, Stop = 2483.5MHz, Sweep = 1ms.
4. Set the spectrum analyzer as RBW, VBW=300kHz,
5. Max hold, view and count how many channel in the band.

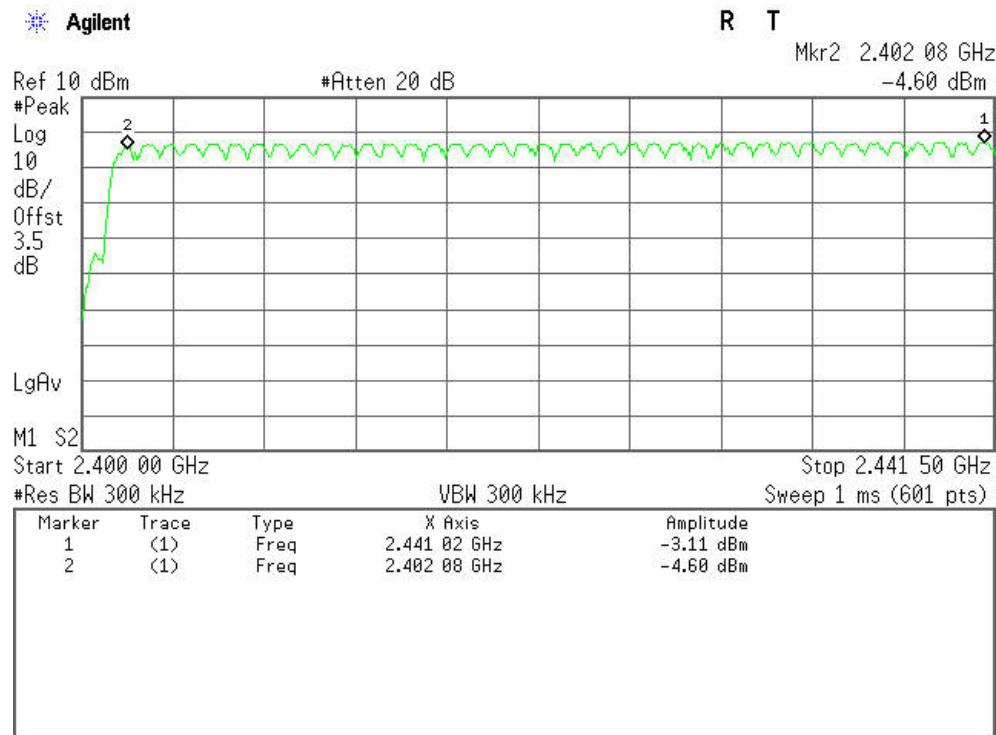
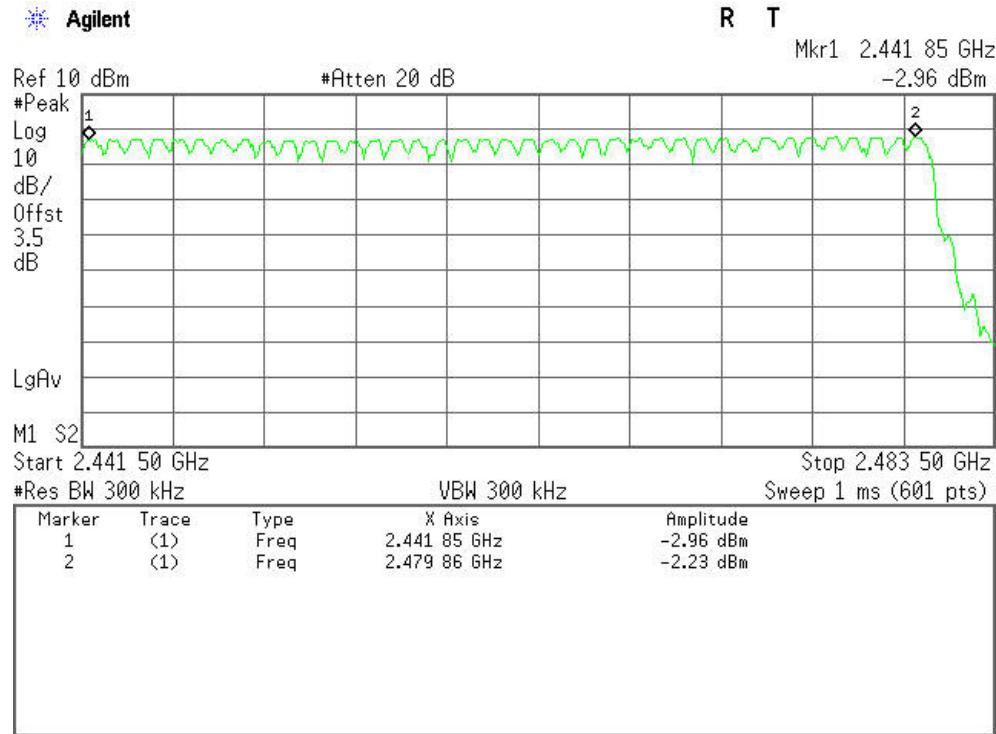
### TEST RESULTS

No non-compliance noted

### Test Data

Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS

Test Plot ( GFSK )Channel Number**2.400 GHz – 2.4415 GHz****2.4415 GHz –2.483GHz**

Test Plot (8DPSK)Channel Number**2.400 GHz – 2.4415 GHz****2.4415 GHz –2.483 GHz**



## 6.7 TIME OF OCCUPANCY (DWELL TIME)

### LIMIT

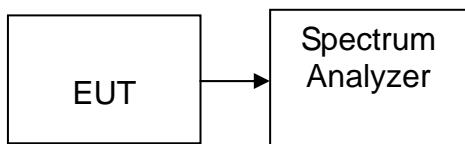
According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.



## TEST RESULTS

No non-compliance noted

### Test Data

#### GFSK

##### DH 1

CH Low:  $0.390 * (1600/2)/79 * 31.6 = 124.800$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.390	124.800	31.60	400.00	PASS

##### DH 3

CH Low:  $1.640 * (1600/4)/79 * 31.6 = 262.400$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.640	262.400	31.60	400.00	PASS

##### DH 5

CH Low:  $2.900 * (1600/6)/79 * 31.6 = 309.333$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.900	309.333	31.60	400.00	PASS

**Test Data****8DPSK****DH 1**

CH Low:  $0.400 * (1600/2)/79 * 31.6 = 128.000$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.400	128.000	31.60	400.00	PASS

**DH 3**

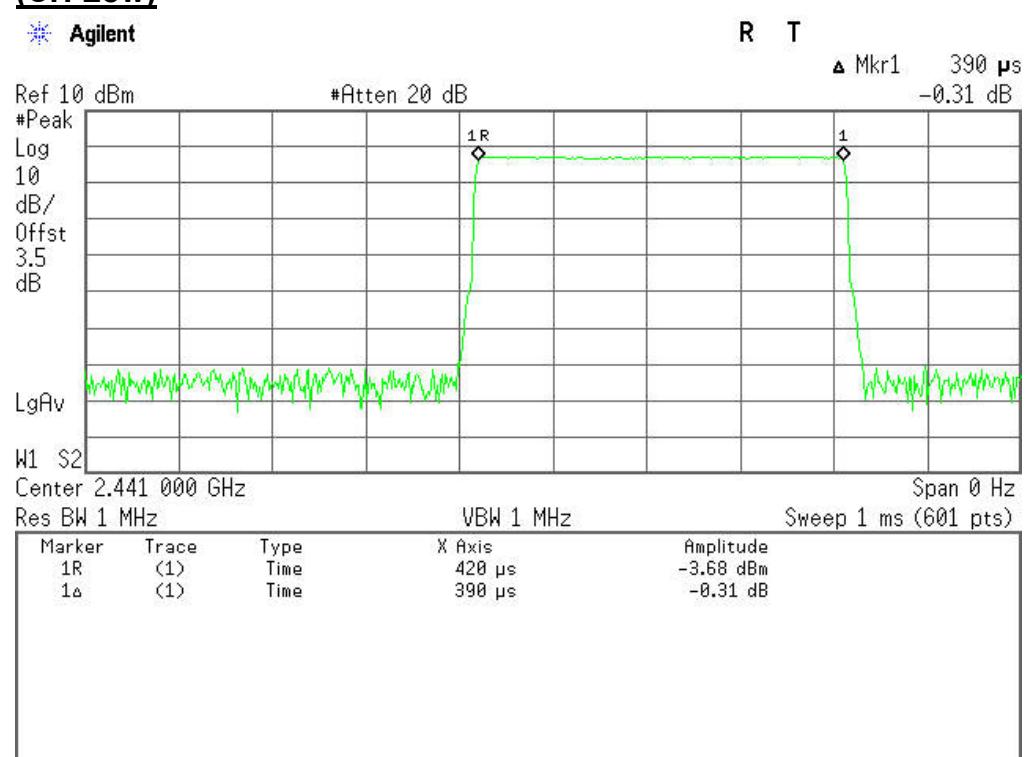
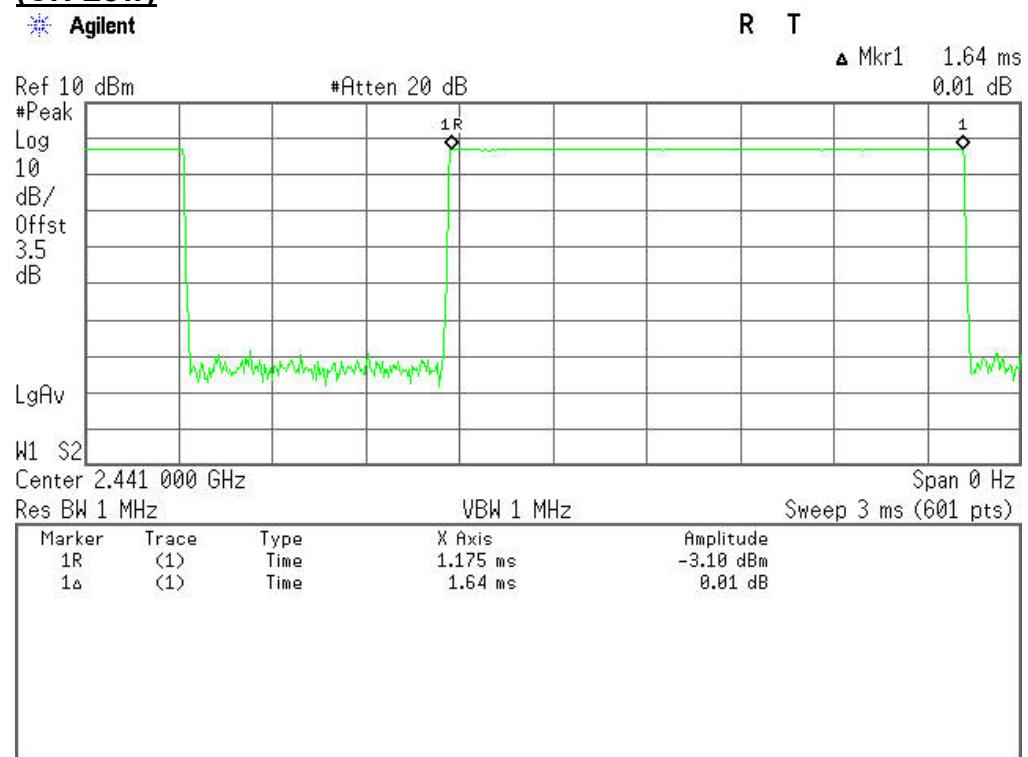
CH Low:  $1.650 * (1600/4)/79 * 31.6 = 264.000$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.650	264.000	31.60	400.00	PASS

**DH 5**

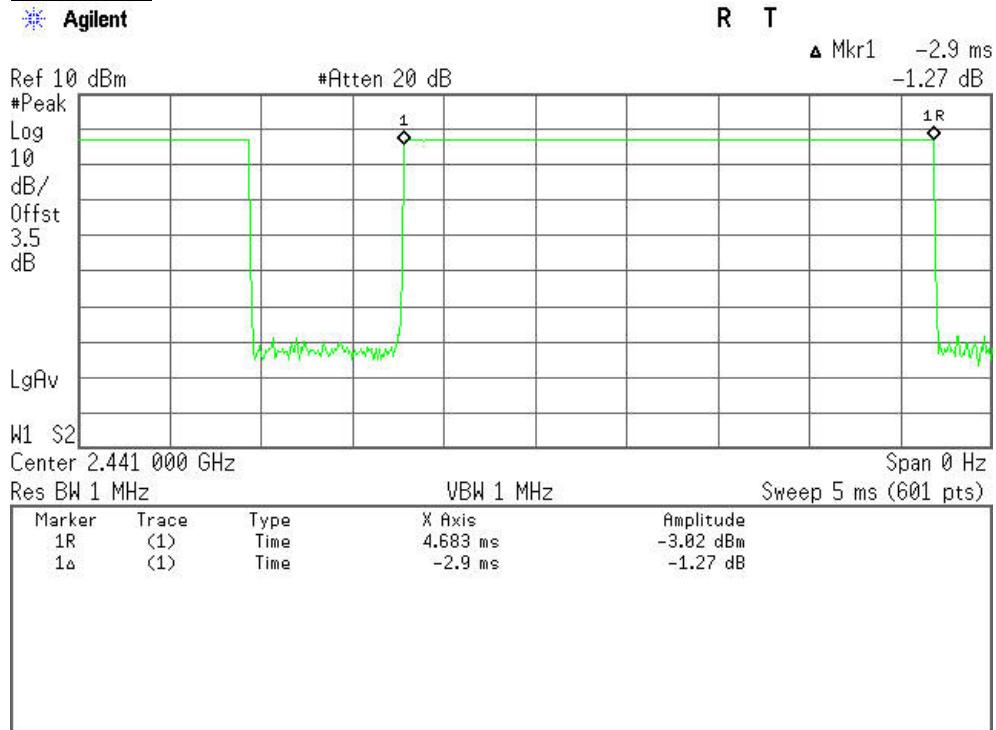
CH Low:  $2.900 * (1600/6)/79 * 31.6 = 309.333$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.900	309.333	31.60	400.00	PASS

Test PlotGFSKDH 1(CH Low)DH 3(CH Low)

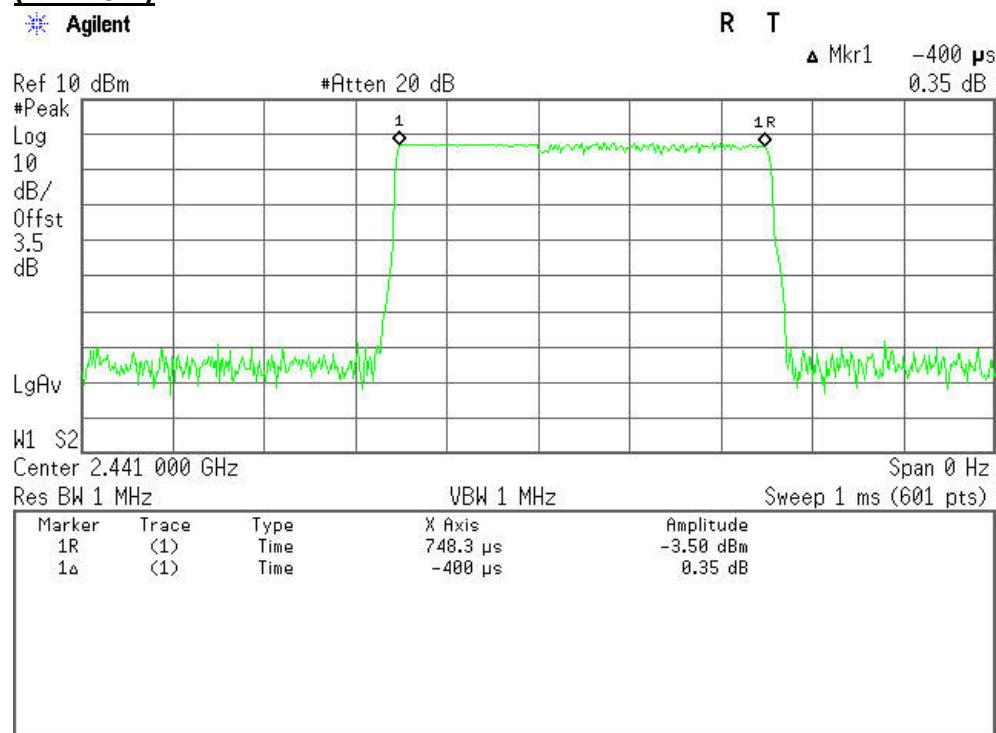
**DH 5****(CH Low)**

Agilent

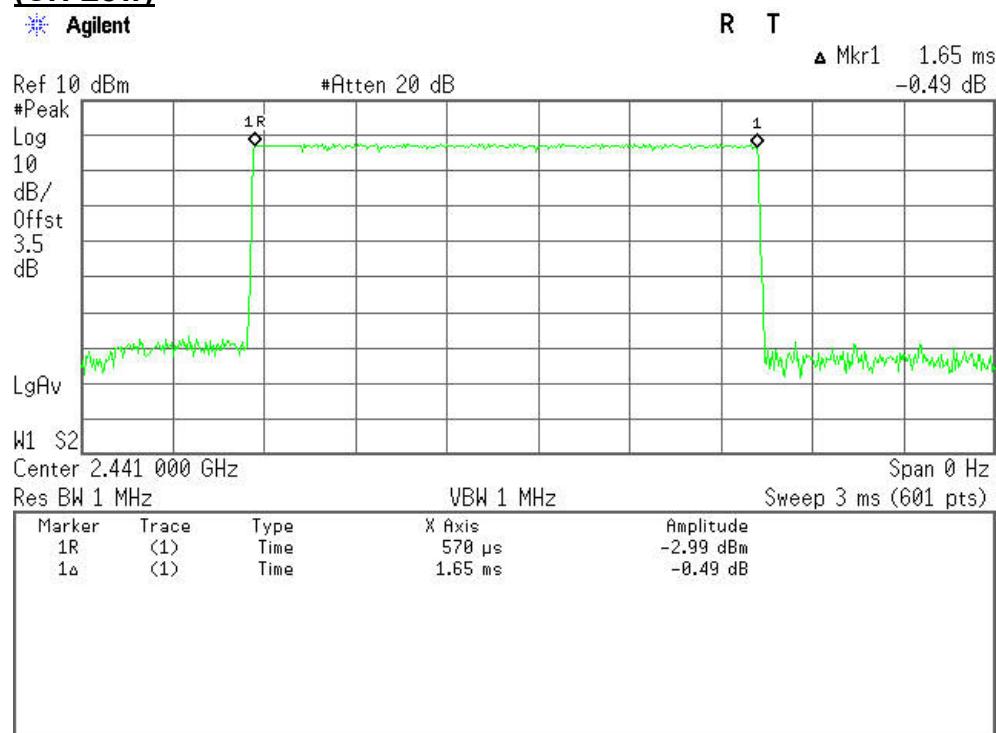


**Test Plot**  
**8DPSK****DH 1****(CH Low)**

Agilent

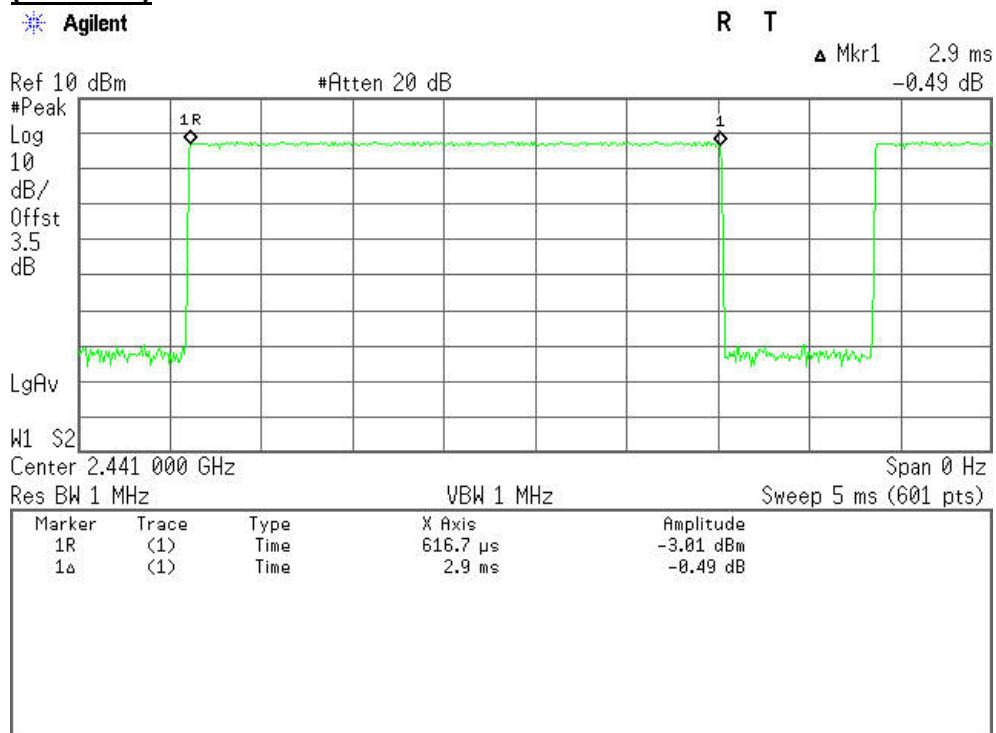
**DH 3****(CH Low)**

Agilent



**DH 5****(CH Low)**

Agilent





## 6.8 SPURIOUS EMISSIONS

### 6.8.1. Conducted Measurement

#### LIMIT

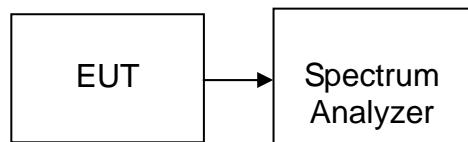
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

#### **MEASUREMENT EQUIPMENT USED**

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013

*Remark: Each piece of equipment is scheduled for calibration once a year.*

#### Test Configuration



#### **TEST PROCEDURE**

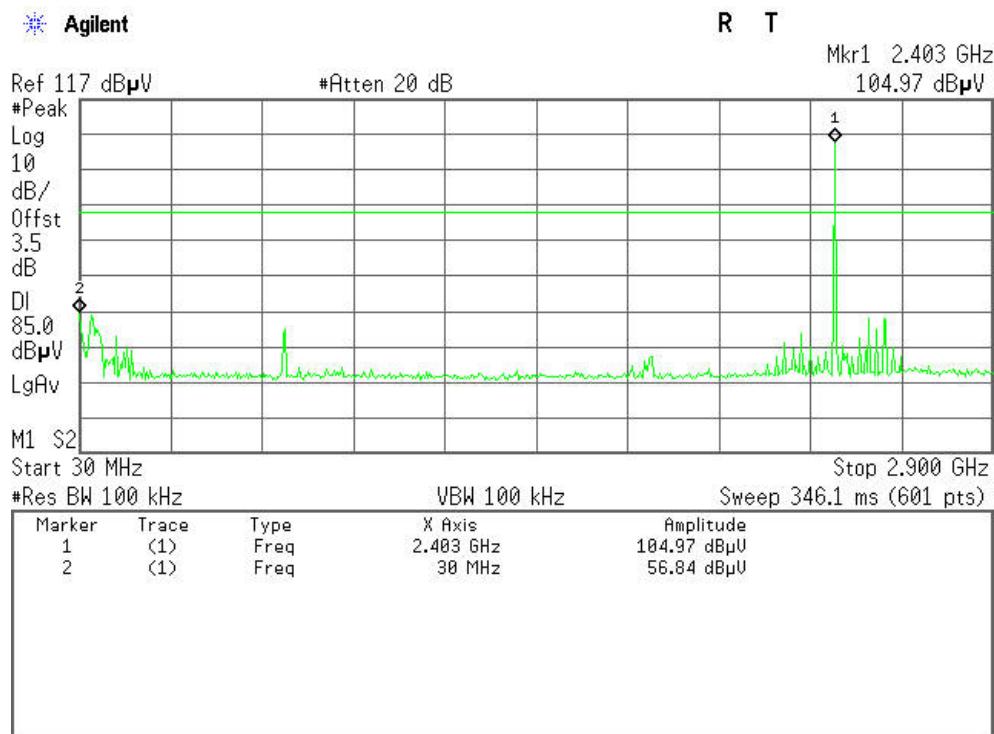
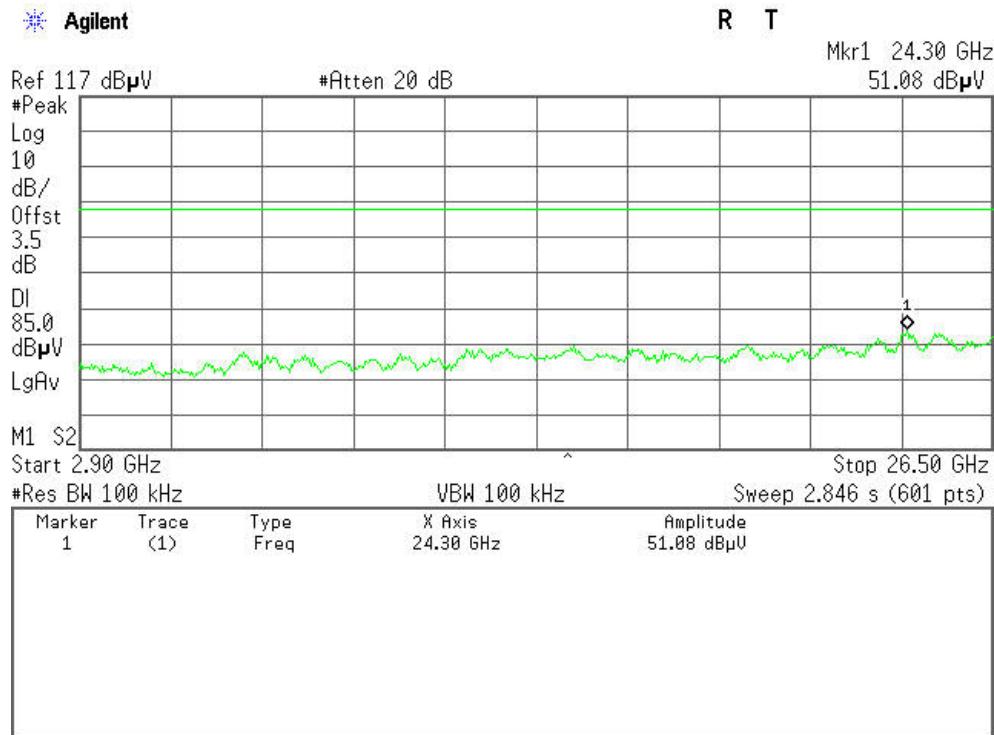
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

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

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

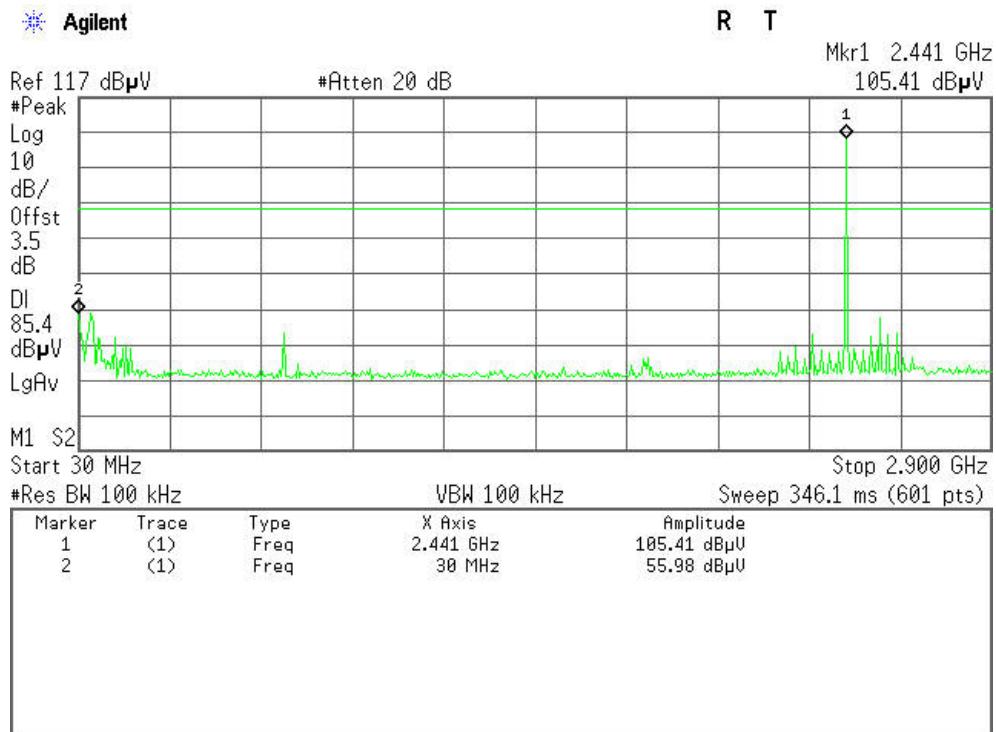
#### **TEST RESULTS**

*No non-compliance noted*

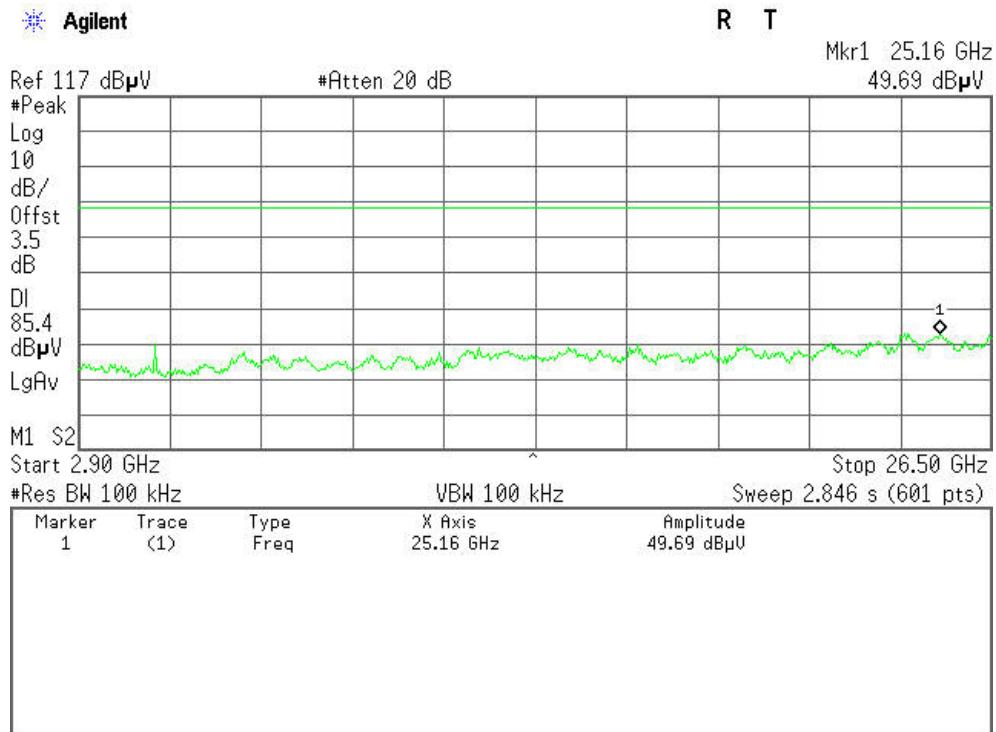
Test Plot ( GFSK )**CH Low****30MHz ~2.9GHz****2.9MHz ~26.5GHz**

**CH Mid****30MHz ~ 2.9GHz**

Agilent

**2.9GHz ~ 26.5GHz**

Agilent





## CH High

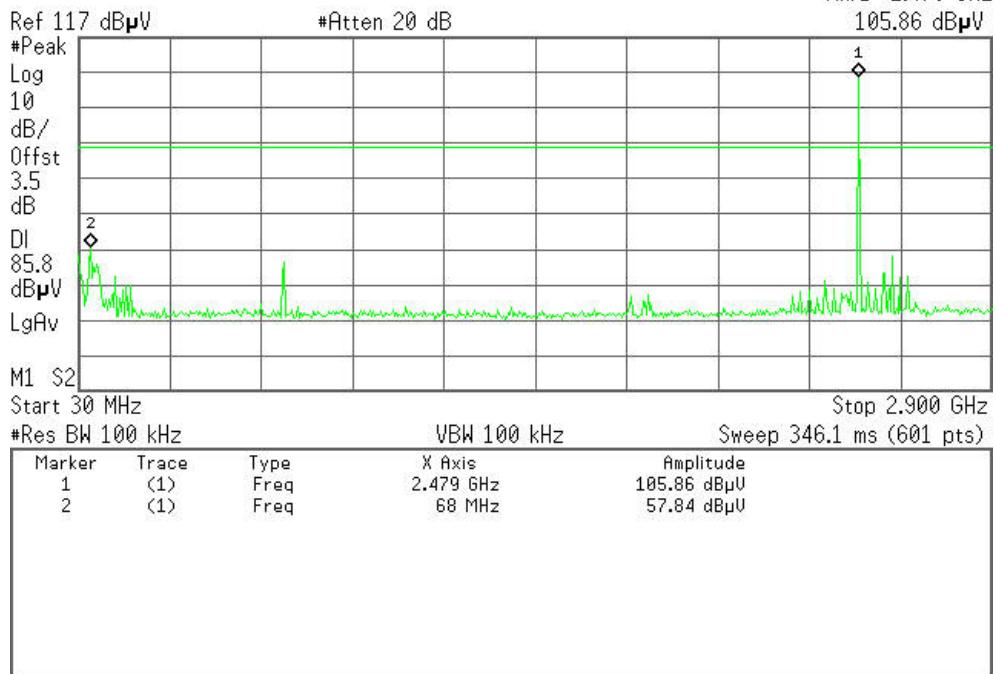
**30MHz ~ 2.9GHz**

\* Agilent

R T

Mkr1 2.479 GHz

105.86 dB $\mu$ V



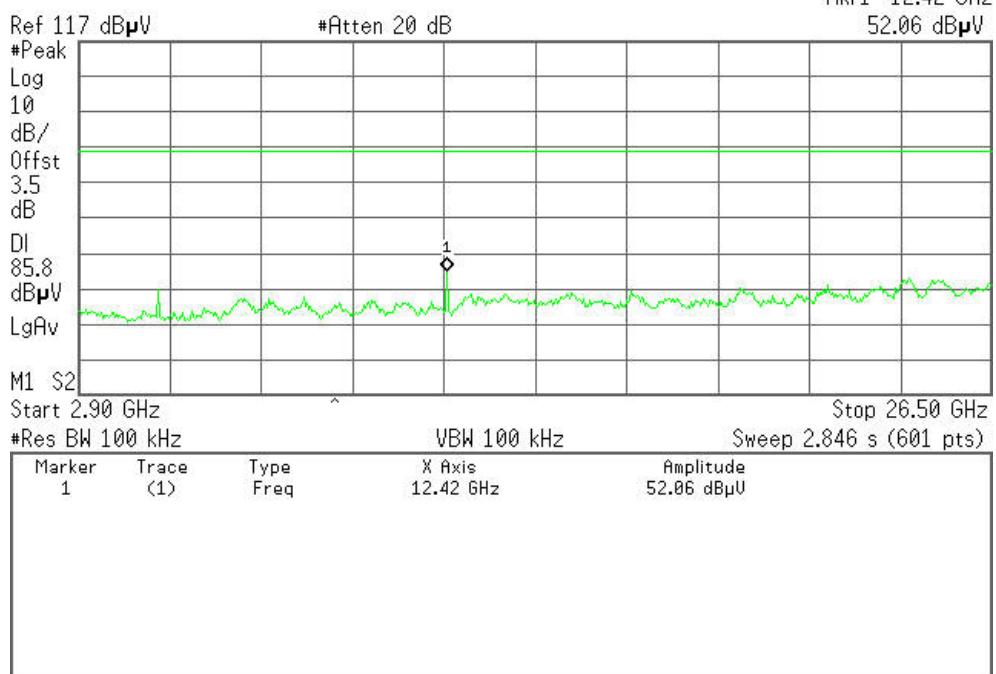
**2.9GHz ~ 26.5GHz**

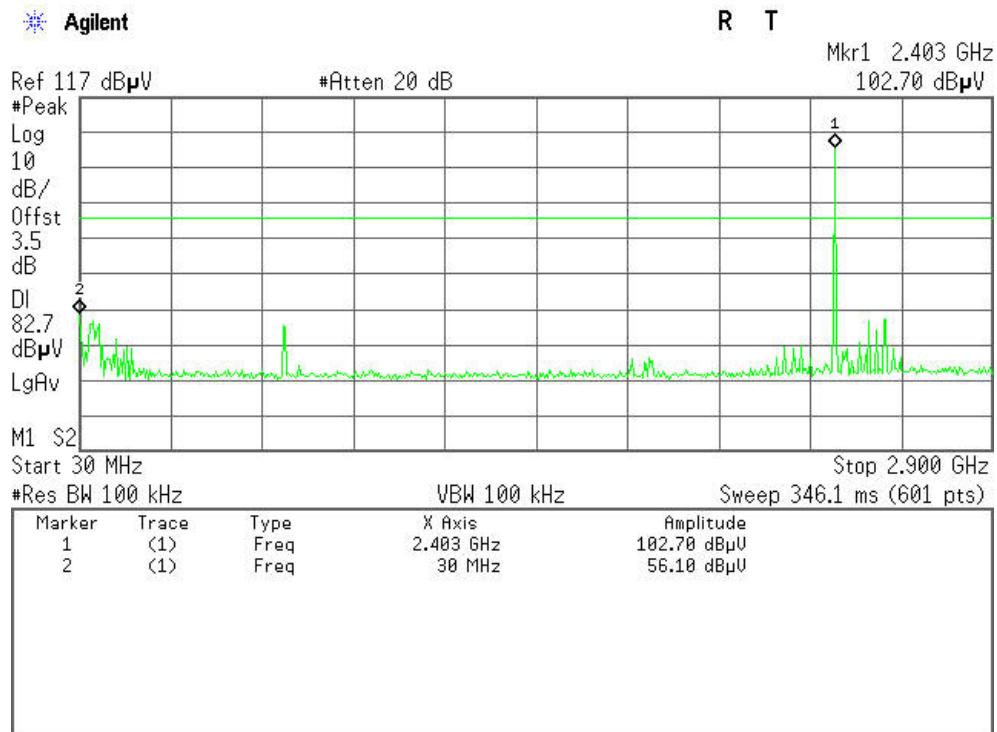
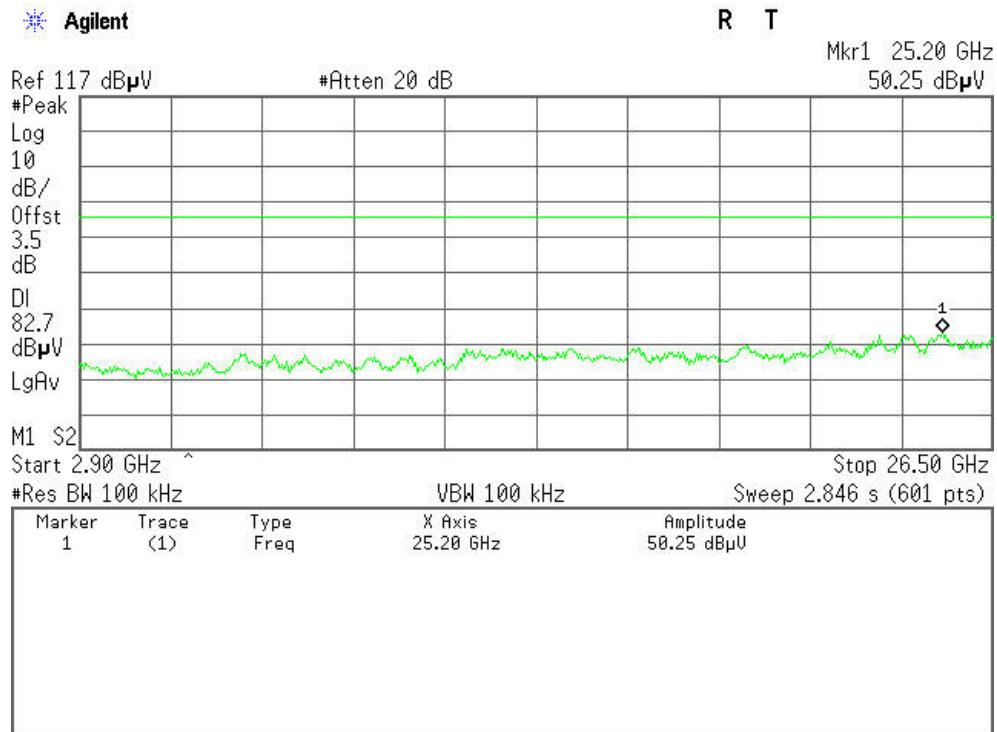
Agilent

R T

Mkr1 12.42 GHz

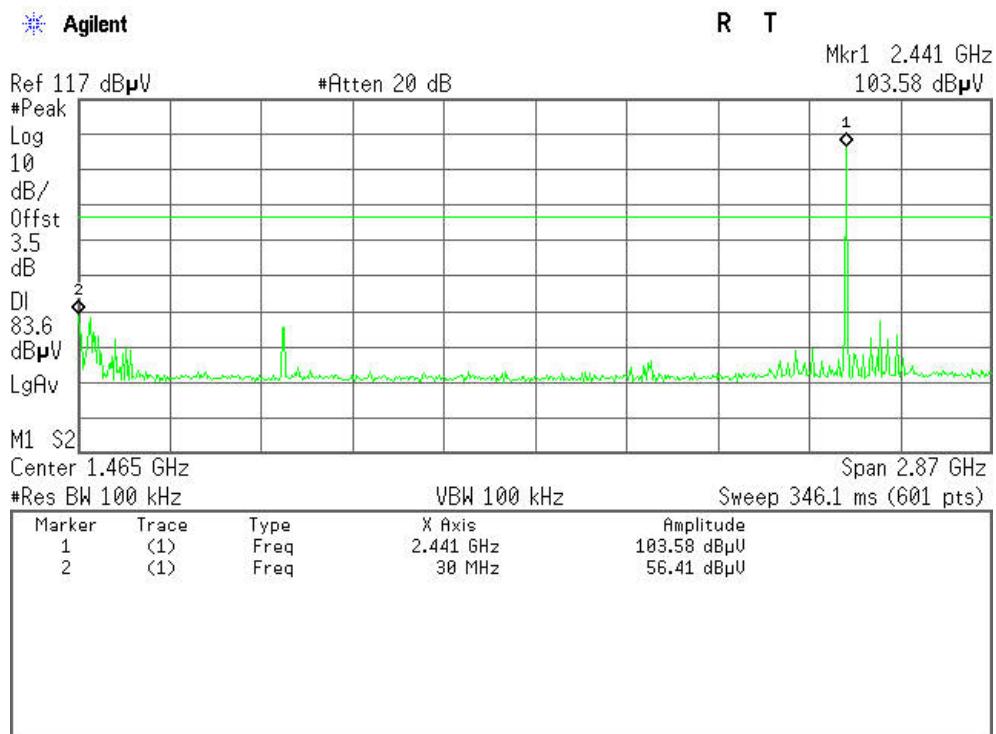
52.06 dBmV



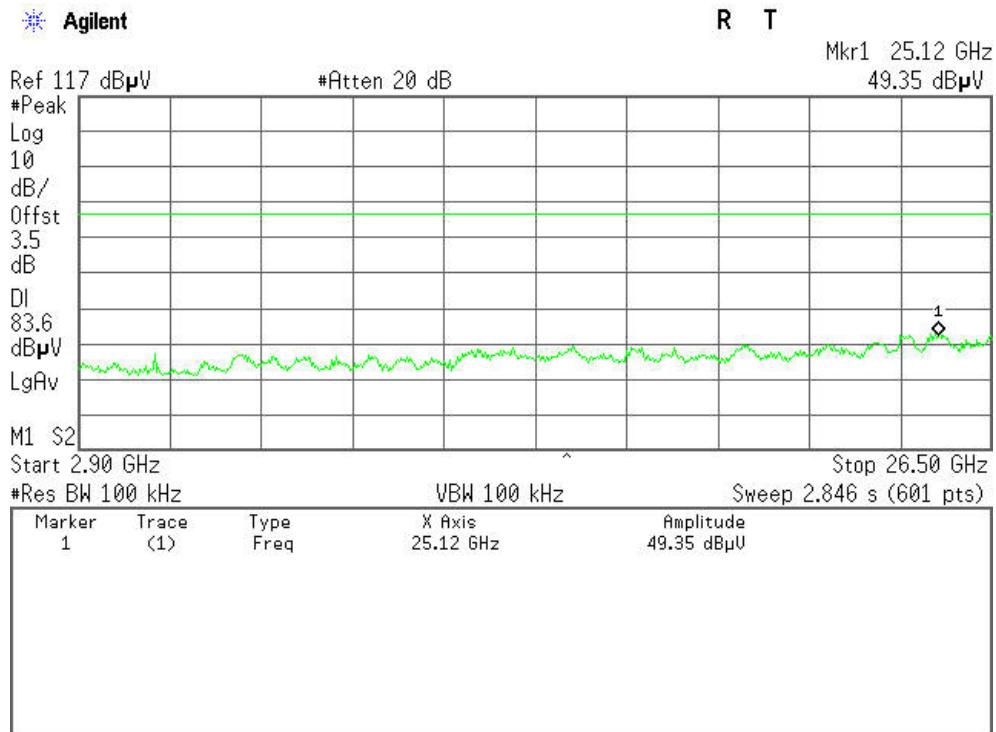
Test Plot (8DPSK )**CH Low****30MHz ~2.9GHz****2.9MHz ~26.5GHz**

**CH Mid****30MHz ~ 2.9GHz**

Agilent

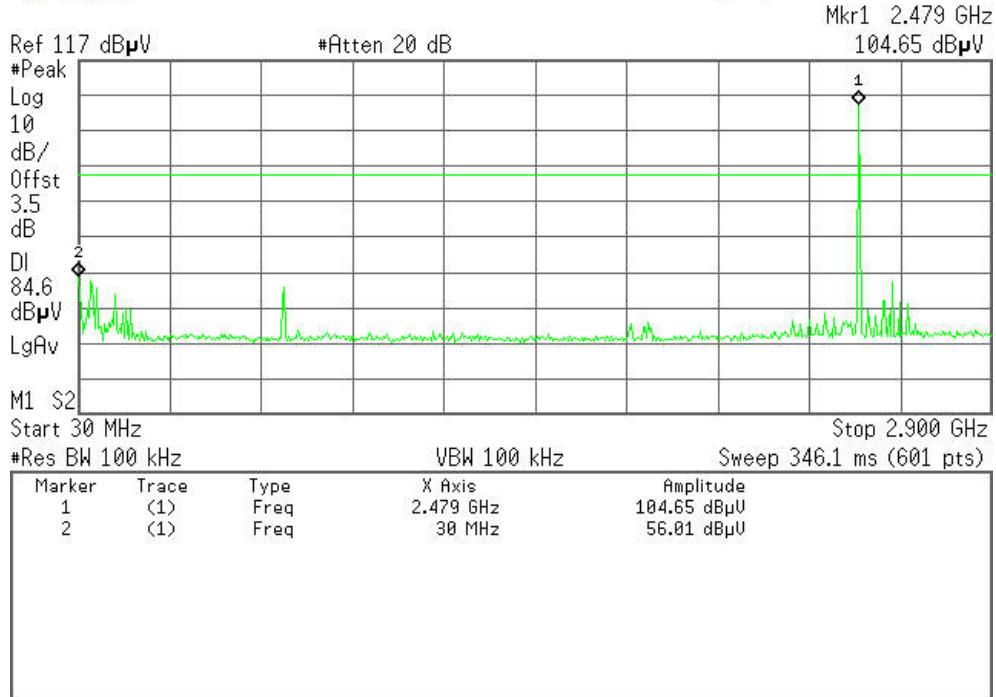
**2.9GHz ~ 26.5GHz**

Agilent

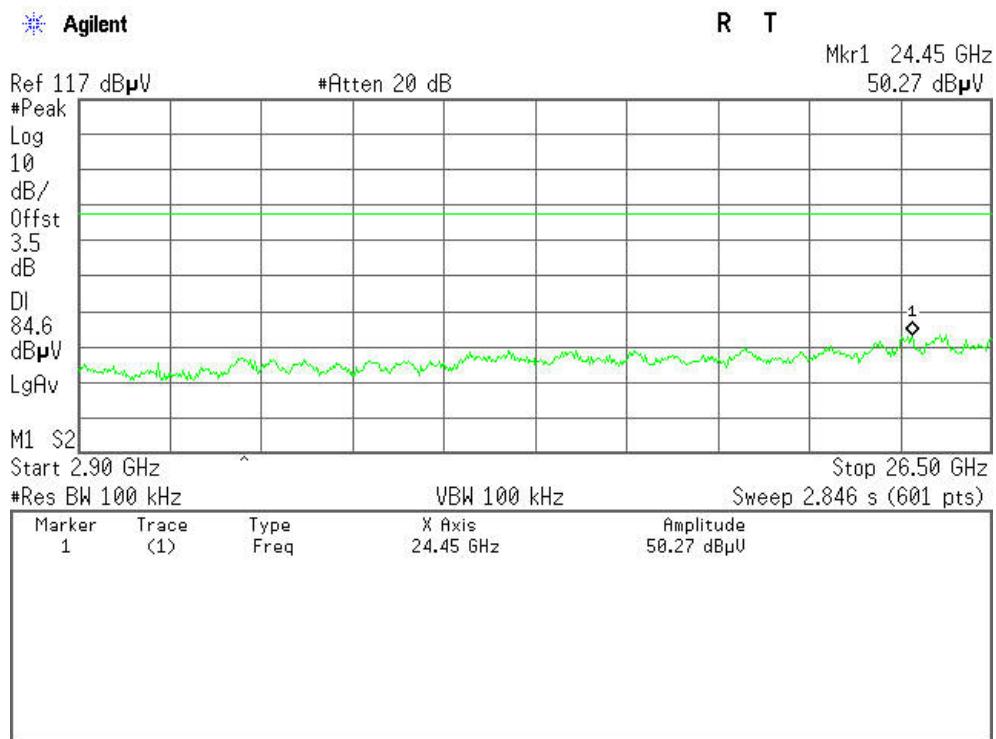


**CH High****30MHz ~ 2.9GHz**

Agilent

**2.9GHz ~ 26.5GHz**

Agilent





## 6.8.2. Radiated Emissions

### LIMIT

1. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Note:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

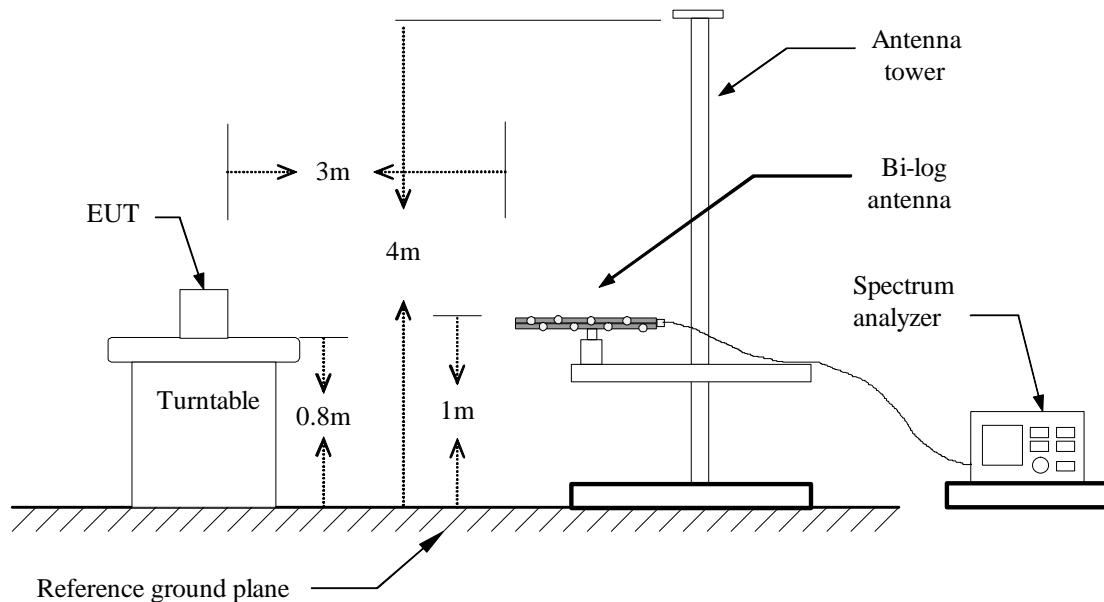
**MEASUREMENT EQUIPMENT USED**

<b>Radiated Emission Test Site 966 (2)</b>					
<b>Name of Equipment</b>	<b>Manufacturer</b>	<b>Model Number</b>	<b>Serial Number</b>	<b>Last Calibration</b>	<b>Due Calibration</b>
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/19/2012	03/19/2013
ESCI EMI TEST RECEIVE.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/17/2012	03/17/2013
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2012	03/18/2013
Turn Table	EMCO	2081-1.21	N/A	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2012	03/18/2013
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/17/2012	03/17/2013
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/17/2012	03/17/2013
Loop Antenna	A, R, A	PLA-1030/B	1029	03/23/2012	03/23/2013
Temp. / Humidity Meter	VICTOR	VC230	N/A	03/19/2012	03/19/2013
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD		LZ-RF / CCS-SZ-3A2		

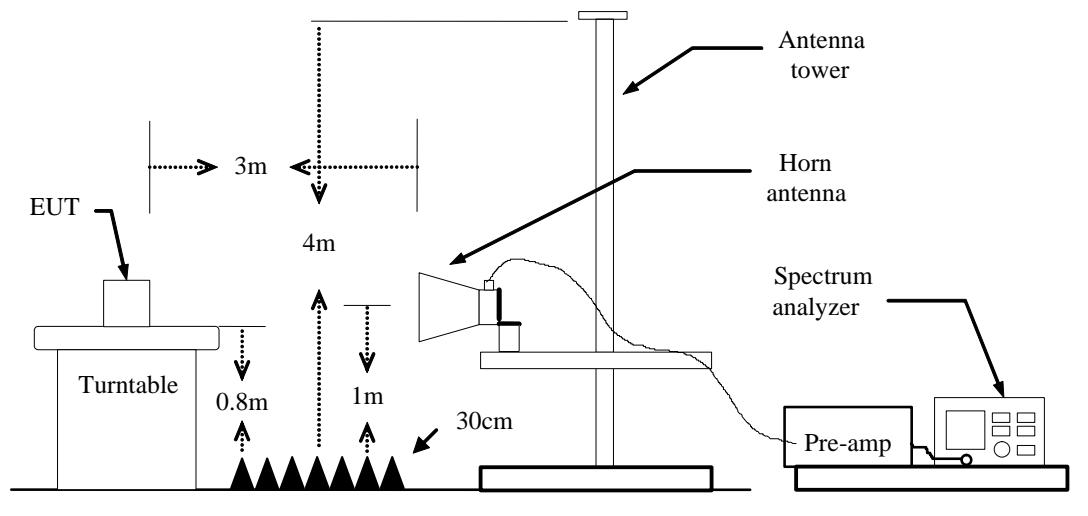
**Remark:** Each piece of equipment is scheduled for calibration once a year.

## Test Configuration

### Below 1 GHz



### Above 1 GHz





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.



## TEST RESULTS

### Below 1 GHz

**Operation Mode:** TX

**Test Date:** December 3, 2012

**Temperature:** 24°C

**Tested by:** Leevin Li

**Humidity:** 52% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
232.0833	49.67	-18.02	31.65	46.00	-14.35	V	QP
299.9833	58.71	-18.35	40.36	46.00	-5.64	V	QP
364.6500	48.45	-16.73	31.72	46.00	-14.28	V	QP
432.5500	54.77	-14.80	39.97	46.00	-6.03	V	QP
472.9667	49.20	-14.65	34.55	46.00	-11.45	V	QP
901.3833	45.72	-9.66	36.06	46.00	-9.94	V	QP
<hr/>							
165.8000	52.51	-18.71	33.80	43.50	-9.70	H	QP
233.7000	48.50	-17.77	30.73	46.00	-15.27	H	QP
299.9833	59.23	-18.35	40.88	46.00	-5.12	H	QP
366.2667	49.89	-16.71	33.18	46.00	-12.82	H	QP
432.5500	53.65	-14.80	38.85	46.00	-7.15	H	QP
472.9667	49.64	-14.65	34.99	46.00	-11.01	H	QP

### **Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Above 1 GHz****GFSK****Operation Mode:** TX(CH Low)**Test Date:** December 3, 2012**Temperature:** 24°C**Tested by:** Leevin Li**Humidity:** 52% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.0000	62.34	-9.72	52.62	74.00	-21.38	V	peak
1495.0000	46.29	-9.72	36.57	54.00	-17.43	V	AVG
1825.0000	50.83	-8.12	42.71	74.00	-31.29	V	peak
2995.0000	50.40	-5.85	44.55	74.00	-29.45	V	peak
3745.0000	46.83	-0.79	46.04	74.00	-27.96	V	peak
4450.0000	46.04	0.74	46.78	74.00	-27.22	V	peak
4810.0000	55.29	2.76	58.05	74.00	-15.95	V	peak
4810.0000	38.77	2.76	41.53	54.00	-12.47	V	AVG
1495.0000	52.74	-9.72	43.02	74.00	-30.98	H	peak
1855.0000	49.49	-7.86	41.63	74.00	-32.37	H	peak
2860.0000	48.99	-6.25	42.74	74.00	-31.26	H	peak
3385.0000	46.15	-2.14	44.01	74.00	-29.99	H	peak
3880.0000	46.58	-0.65	45.93	74.00	-28.07	H	peak
4810.0000	54.40	2.76	57.16	74.00	-16.84	H	peak
4810.0000	37.59	2.76	40.35	54.00	-13.65	H	AVG

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss - Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)  
Pk = Peak Reading  
AV. = Average Reading  
Remark = Mark Peak Reading or Average Reading

**Operation Mode:** TX(CH Mid)**Test Date:** December 3, 2012**Temperature:** 24°C**Tested by:** Leevin Li**Humidity:** 52% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.0000	61.02	-9.72	51.30	74.00	-22.70	V	peak
2995.0000	50.26	-5.85	44.41	74.00	-29.59	V	peak
3745.0000	47.47	-0.79	46.68	74.00	-27.32	V	peak
3955.0000	46.83	-0.58	46.25	74.00	-27.75	V	peak
4480.0000	46.29	0.82	47.11	74.00	-26.89	V	peak
4885.0000	55.74	3.22	58.96	74.00	-15.04	V	peak
4885.0000	38.57	3.22	41.79	54.00	-12.21	V	AVG
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1495.0000	52.85	-9.72	43.13	74.00	-30.87	H	peak
2860.0000	48.88	-6.25	42.63	74.00	-31.37	H	peak
3505.0000	46.40	-1.03	45.37	74.00	-28.63	H	peak
3910.0000	46.47	-0.62	45.85	74.00	-28.15	H	peak
4600.0000	45.12	1.49	46.61	74.00	-27.39	H	peak
4885.0000	57.65	3.22	60.87	74.00	-13.13	H	peak
4885.0000	39.40	3.22	42.62	54.00	-11.38	H	AVG

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss - Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)  
Pk = Peak Reading  
AV. = Average Reading  
Remark = Mark Peak Reading or Average Reading

**Operation Mode:** TX(CH High)**Test Date:** December 3, 2012**Temperature:** 24 °C**Tested by:** Leevin Li**Humidity:** 52% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.0000	61.19	-9.72	51.47	74.00	-22.53	V	peak
2065.0000	49.65	-6.69	42.96	74.00	-31.04	V	peak
2995.0000	50.15	-5.85	44.30	74.00	-29.70	V	peak
3745.0000	46.48	-0.79	45.69	74.00	-28.31	V	peak
4495.0000	46.48	0.87	47.35	74.00	-26.65	V	peak
4960.0000	55.81	3.68	59.49	74.00	-14.51	V	peak
4960.0000	38.36	3.68	42.04	54.00	-11.96	V	AVG
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1495.0000	52.24	-9.72	42.52	74.00	-31.48	H	Peak
2140.0000	48.22	-6.80	41.42	74.00	-32.58	H	Peak
3430.0000	45.93	-1.70	44.23	74.00	-29.77	H	Peak
3730.0000	45.91	-0.80	45.11	74.00	-28.89	H	Peak
4375.0000	45.48	0.53	46.01	74.00	-27.99	H	peak
4960.0000	53.75	3.68	57.43	74.00	-16.57	H	peak
4960.0000	36.58	3.68	40.26	54.00	-13.74	H	AVG

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss - Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)  
Pk = Peak Reading  
AV. = Average Reading  
Remark = Mark Peak Reading or Average Reading

**8DPSK****Operation Mode:** TX(CH Low)**Test Date:** December 3, 2012**Temperature:** 24°C**Tested by:** Leevin Li**Humidity:** 52% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.0000	61.01	-9.72	51.29	74.00	-22.71	V	peak
1915.0000	50.44	-7.34	43.10	74.00	-30.90	V	peak
2995.0000	50.23	-5.85	44.38	74.00	-29.62	V	peak
3745.0000	46.69	-0.79	45.90	74.00	-28.10	V	peak
4330.0000	45.61	0.40	46.01	74.00	-27.99	V	peak
4810.0000	46.51	2.76	49.27	74.00	-24.73	V	peak
1495.0000	53.01	-9.72	43.29	74.00	-30.71	H	peak
2125.0000	48.85	-6.78	42.07	74.00	-31.93	H	peak
2995.0000	48.66	-5.85	42.81	74.00	-31.19	H	peak
3325.0000	46.36	-2.71	43.65	74.00	-30.35	H	peak
3655.0000	47.28	-0.88	46.40	74.00	-27.60	H	peak
4810.0000	47.95	2.76	50.71	74.00	-23.29	H	peak

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss - Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)  
Pk = Peak Reading  
AV. = Average Reading  
Remark = Mark Peak Reading or Average Reading

**Operation Mode:** TX(CH Mid)**Test Date:** December 3, 2012**Temperature:** 24°C**Tested by:** Leevin Li**Humidity:** 52% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1495.0000	61.46	-9.72	51.74	74.00	-22.26	V	peak
1630.0000	52.83	-8.37	44.46	74.00	-29.54	V	peak
2995.0000	49.75	-5.85	43.90	74.00	-30.10	V	peak
3730.0000	47.64	-0.80	46.84	74.00	-27.16	V	peak
4495.0000	46.51	0.87	47.38	74.00	-26.62	V	peak
4885.0000	53.71	3.22	56.93	74.00	-17.07	V	peak
4885.0000	36.45	3.22	39.67	54.00	-14.33	V	AVG
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1495.0000	52.69	-9.72	42.97	74.00	-31.03	H	peak
2140.0000	48.66	-6.80	41.86	74.00	-32.14	H	peak
2815.0000	48.45	-6.39	42.06	74.00	-31.94	H	peak
3445.0000	46.28	-1.56	44.72	74.00	-29.28	H	peak
4300.0000	45.52	0.32	45.84	74.00	-28.16	H	peak
4885.0000	52.81	3.22	56.03	74.00	-17.97	H	peak
4885.0000	35.39	3.22	38.61	54.00	-15.39	H	AVG

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss - Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)  
Pk = Peak Reading  
AV. = Average Reading  
Remark = Mark Peak Reading or Average Reading

**Operation Mode:** TX(CH High)**Test Date:** December 3, 2012**Temperature:** 24 °C**Tested by:** Leevin Li**Humidity:** 52% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Pole (V/H)	Remark
1195.0000	53.65	-10.22	43.43	74.00	-30.57	V	peak
1495.0000	61.33	-9.72	51.61	74.00	-22.39	V	peak
1840.0000	51.06	-7.99	43.07	74.00	-30.93	V	peak
2995.0000	50.41	-5.85	44.56	74.00	-29.44	V	peak
3745.0000	46.67	-0.79	45.88	74.00	-28.12	V	peak
4960.0000	52.01	3.68	55.69	74.00	-18.31	V	peak
4960.0000	34.93	3.68	38.61	54.00	-15.39	V	AVG
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1495.0000	53.70	-9.72	43.98	74.00	-30.02	H	peak
1930.0000	49.27	-7.21	42.06	74.00	-31.94	H	peak
3160.0000	47.40	-4.30	43.10	74.00	-30.90	H	peak
3985.0000	46.67	-0.55	46.12	74.00	-27.88	H	peak
4630.0000	44.98	1.67	46.65	74.00	-27.35	H	peak
4960.0000	52.56	3.68	56.24	74.00	-17.76	H	peak
4960.0000	35.45	3.68	39.13	54.00	-14.87	H	AVG

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV/m) = Uncorrected Analyzer / Receiver Reading  
Correction Factor (dB) = Antenna factor + Cable loss - Amplifier gain  
Limit (dBuV/m) = Limit stated in standard  
Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)  
Pk = Peak Reading  
AV. = Average Reading  
Remark = Mark Peak Reading or Average Reading



## 6.9 POWERLINE CONDUCTED EMISSIONS

### LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

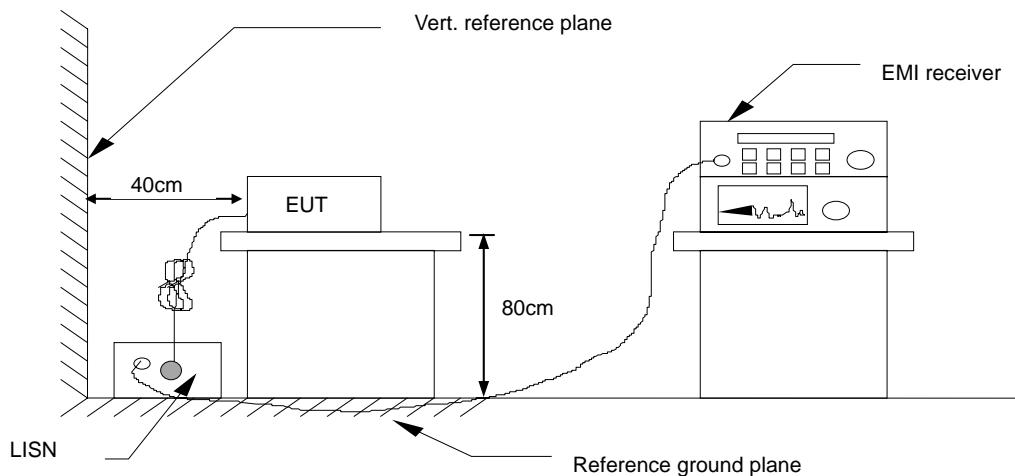
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
ESCI EMI TEST RECEIVE.ESCI	ROHDE&SCHWARZ	ESCI	100783	03/17/2012	03/17/2013
LISN	ROHDE&SCHWARZ	ENV216	101543	03/20/2012	03/20/2013
LISN	EMCO	3825/2	8901-1459	03/19/2012	03/19/2013
Temp. / Humidity Meter	VICTOR	HTC-1	2	03/20/2012	03/20/2013
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

*Remark: Each piece of equipment is scheduled for calibration once a year.*

## Test Configuration



See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

## TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

## TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

**Test Data**

**Operation Mode:** Normal Link      **Test Date:** December 10, 2012  
**Temperature:** 22°C      **Humidity:** 45% RH  
**Tested by:** Leevin Li

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Line (L1/L2)
0.1500	32.76	14.71	9.79	42.55	24.50	65.99	56.00	-23.44	-31.50	L1
0.7460	23.74	5.19	9.68	33.42	14.87	56.00	46.00	-22.58	-31.13	L1
2.2940	28.83	14.29	9.68	38.51	23.97	56.00	46.00	-17.49	-22.03	L1
9.8740	24.88	10.93	9.77	34.65	20.70	60.00	50.00	-25.35	-29.30	L1
18.6299	22.43	13.53	9.93	32.36	23.46	60.00	50.00	-27.64	-26.54	L1
27.9420	26.57	17.65	9.98	36.55	27.63	60.00	50.00	-23.45	-22.37	L1
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0.1539	37.01	16.31	9.51	46.52	25.82	65.78	55.79	-19.26	-29.97	L2
0.1980	33.74	7.93	9.61	43.35	17.54	63.69	53.69	-20.34	-36.15	L2
1.9700	29.96	15.29	9.69	39.65	24.98	56.00	46.00	-16.35	-21.02	L2
5.3940	22.25	9.01	9.79	32.04	18.80	60.00	50.00	-27.96	-31.20	L2
10.0900	23.81	10.15	9.80	33.61	19.95	60.00	50.00	-26.39	-30.05	L2
27.1660	27.61	19.07	10.10	37.71	29.17	60.00	50.00	-22.29	-20.83	L2

**Note:**

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Peak detector, Quasi-peak detector and average detector.
3. “--” denotes the emission level was or more than 2dB below the Average limit.
4. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
5. L1= Line One (Live Line)/ L2= Line Two (Neutral Line)