



## **FCC 47 CFR PART 15 SUBPART C**

### **TEST REPORT**

**For**

**Mobile Phone**

**Model: K105, P32D**

**Trade Name: B-mobile**

**Prepared for**

**Global Mobile Communication (HK) Ltd.**

**7/F, Kin On Commercial Building, 49-51 Jervois Street, Sheung Wan, Hong Kong, China**

**Issued by**

**COMPLIANCE CERTIFICATION SERVICES (KUNSHAN) INC.**

**10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone**

**Kunshan city JiangSu, (215300) CHINA**

**TEL: 86-512-57355888**

**FAX: 86-512-57370818**



**Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.



## TABLE OF CONTENTS

<b>1</b>	<b>TEST RESULT CERTIFICATION.....</b>	<b>3</b>
<b>2</b>	<b>EUT DESCRIPTION .....</b>	<b>4</b>
<b>3</b>	<b>TEST METHODOLOGY .....</b>	<b>5</b>
3.1.	EUT CONFIGURATION .....	5
3.2.	EUT EXERCISE.....	5
3.3.	GENERAL TEST PROCEDURES.....	5
3.4.	MODIFICATION .....	5
3.5.	FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS.....	6
3.6.	DESCRIPTION OF TEST MODES .....	6
<b>4</b>	<b>INSTRUMENT CALIBRATION.....</b>	<b>6</b>
<b>5</b>	<b>FACILITIES AND ACCREDITATIONS .....</b>	<b>7</b>
5.1.	FACILITIES.....	7
5.2.	EQUIPMENT.....	7
5.3.	LABORATORY ACCREDITATIONS AND LISTING.....	7
5.4.	TABLE OF ACCREDITATIONS AND LISTINGS.....	8
<b>6</b>	<b>SETUP OF EQUIPMENT UNDER TEST .....</b>	<b>9</b>
6.1.	SETUP CONFIGURATION OF EUT.....	9
6.2.	SUPPORT EQUIPMENT .....	9
<b>7</b>	<b>FCC PART 15.247 REQUIREMENTS.....</b>	<b>10</b>
7.1.	PEAK POWER.....	10
7.2.	BAND EDGES MEASUREMENT .....	12
7.3.	PEAK POWER SPECTRAL DENSITY .....	19
7.4.	FREQUENCY SEPARATION .....	20
7.5.	NUMBER OF HOPPING FREQUENCY.....	23
7.6.	TIME OF OCCUPANCY (DWELL TIME) .....	25
7.7.	SPURIOUS EMISSIONS.....	29
	Conducted Measurement.....	29
	Radiated Emissions.....	33
7.8.	POWERLINE CONDUCTED EMISSIONS.....	41



# 1 TEST RESULT CERTIFICATION

**Applicant:** Global Mobile Communication (HK) Ltd.  
7/F, Kin On Commercial Building, 49-51 Jervois Street, Sheung Wan, Hong Kong, China

**Equipment Under Test:** Mobile Phone

**Trade Name:** B-mobile

**Model:** K105, P32D

**Date of Test:** April 14, 2011

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

## We here by 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 the requirements of FCC Rules Part 15.207, 15.209, 15.247.

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

**Approved by:**

---

Hadiif Hoo  
RF Manager  
Compliance Certification Services Inc.

**Tested by:**

---

Star Yao  
Test Engineer  
Compliance Certification Services Inc.



## 2 EUT DESCRIPTION

<b>Product</b>	Mobile Phone
<b>Trade Name</b>	B-mobile
<b>Model Number</b>	K105, P32D
<b>Model Discrepancy</b>	Differences as the market segmentation model
<b>Power Supply</b>	Powered from an AC/DC power adapter Model Number :UTC-24 Input:100-240V 200mA 50-60Hz Output:5.0V 500mA Battery Model: BL-5B Standard Voltage:3.7V Rating Capacity:600mAh
<b>Frequency Range</b>	2402 ~ 2480 MHz
<b>Transmit Power</b>	1.45dBm
<b>Modulation Technique</b>	FHSS
<b>Transmit Data Rate</b>	GFSK(1 Mbps)
<b>Number of Channels</b>	79 Channels
<b>Antenna Specification</b>	Max Gain: 1 dBi (Excuse for non-standard)

**Remark:** This submittal(s) (test report) is intended for **FCC ID:ZFT-K105** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### **3 TEST METHODOLOGY**

The tests documented in this report were performed in accordance with

ANSI C63.4 :2009 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

#### **3.1. EUT CONFIGURATION**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### **3.2. EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### **3.3. GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4:2009 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4:2009.

#### **3.4. MODIFICATION**

N/A



### 3.5. FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 3.6. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below GFSK(1M) these was chosen for full testing.

## 4 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



## **5 FACILITIES AND ACCREDITATIONS**

### **5.1. FACILITIES**

All measurement facilities used to collect the measurement data are located at CCS China Kunshan Lab at 10#Weiye Rd, Innovation Park Eco. & Tec. Development Zone

Kunshan city JiangSu, (215300), CHINA.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22.

### **5.2. EQUIPMENT**

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.



All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3. LABORATORY ACCREDITATIONS AND LISTING**

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 200581-0 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC5743 for 10m chamber 10m, IC5743 for 10m chamber 3m.



## 5.4. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	47 CFR FCC Part 15/18 (using ANSI C63.4:2003); VCCI V3; CNS 13438; CNS 13439; CNS 13803; CISPR 11; EN 55011; CISPR 13; EN 55013; CISPR 22:2005; CISPR 22:1997 +A1 :2000+A2 :2002; EN 55022:2006; EN55022 :1998 +A1 :2001+A2 :2003; EN 61000-6-3 (excluding discontinuous interference); EN 61000-6-4; AS/NZS CISPR 22; CAN/CSA-CEI/IEC CISPR 22; EN 61000-3-2; EN 61000-3-3; EN550024; EN 61000-4-2; EN 61000-4-3; EN61000-4-4; EN 61000-4-5; EN 61000-4-6; IEC 61000-4-8; EN 61000-4-11; IEC61000-3-2; IEC61000-3-3; IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4; IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-8; IEC 61000-4-11; EN 300 220-3; EN 300 328; EN 300 330-2; EN 300 440-1; EN 300-440-2; EN 300 893; EN 301 489-01; EN 301 489-3; EN 301 489-07; EN 301 489-17; 47 CFR FCC Part 15, 22, 24	 ACCREDITED TESTING CERT #2541.01
USA	FCC	3/10 meter Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	3/10 meter Sites and conducted test sites to perform radiated/conducted measurements	<b>VCCI</b> R-1600 C-1707

*\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*





## 6 SETUP OF EQUIPMENT UNDER TEST

### 6.1. SETUP CONFIGURATION OF EUT

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

### 6.2. SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



## 7 FCC PART 15.247 REQUIREMENTS

### 7.1. PEAK POWER

#### LIMIT

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

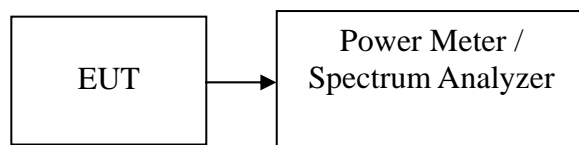
1. According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping 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.
2. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
3. According to §15.247(b)(4), 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	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011
Peak and Avg Power Sensor	Agilent	E9327A	US40441788	07/29/2011
EPM-P Series Power Meter	Agilent	E4416A	QB41292714	05/26/2011

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

#### Test Configuration



#### TEST PROCEDURE

The transmitter output is connected to the Power Meter.

**TEST RESULTS***No non-compliance noted***Test Data**

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-0.05	1.50	<b>1.45</b>	0.00140	0.125	PASS
Mid	2441	-0.40	1.50	1.10	0.00129		PASS
High	2480	-0.27	1.50	1.23	0.00133		PASS



## 7.2. BAND EDGES MEASUREMENT

### LIMIT

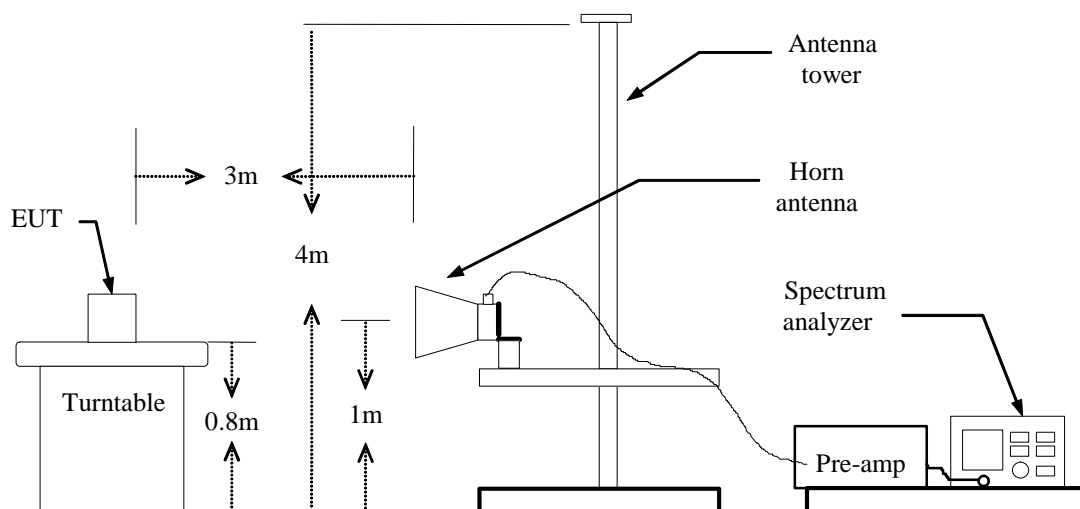
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains 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

3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011
Spectrum Analyzer	Agilent	E4446A	US44300398	05/26/2011
EMI Test Receiver	R&S	ESPI3	101026	05/26/2011
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	04/29/2011
Pre-Amplifier	Miteq	NSP4000-NF	870731	04/29/2011
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2011
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	12/04/2011
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	05/26/2011
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2012

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

### 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=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

**TEST RESULTS****CH LOW**

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2390.00	V	44.99	31.69	4.80	49.79	36.49	74	54	-24.21	-17.51
2390.00	H	43.72	31.62	4.80	48.52	36.42	74	54	-25.48	-17.58

**CH HIGH**

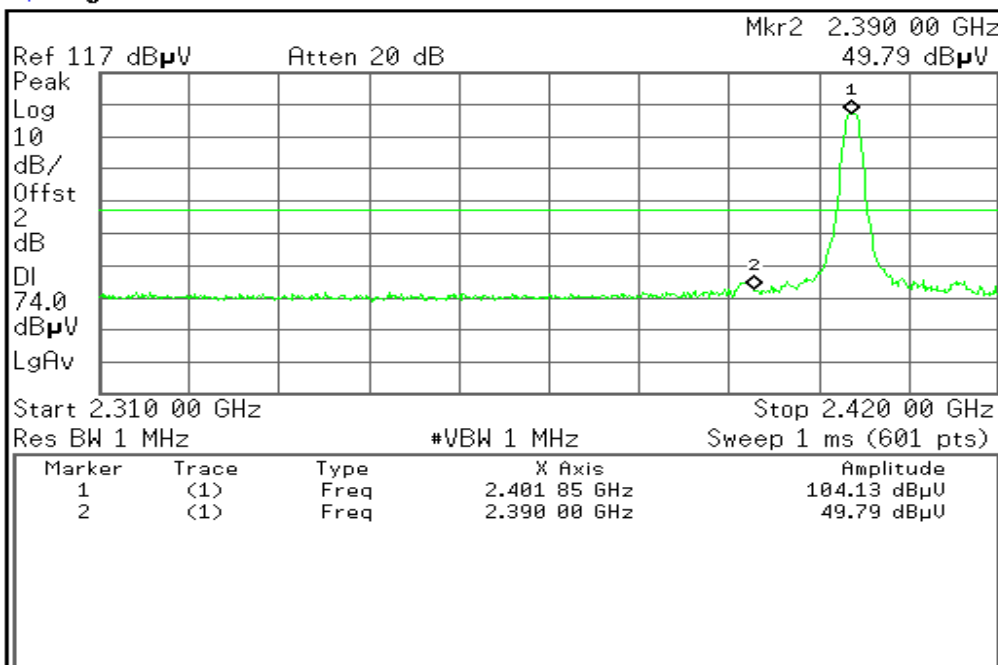
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Peak Margin (dB)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)				
2483.50	V	49.80	31.89	4.80	54.60	36.69	74	54	-19.40	-17.31
2483.50	H	49.38	31.89	4.80	54.18	36.69	74	54	-19.82	-17.31

Refer to attach spectrum analyzer data chart.

**Band Edges (CH Low)****Detector mode: Peak****Polarity: Vertical**

Agilent

R T

**System**

Show Errors

Power On/  
Preset

Time/Date

Alignments

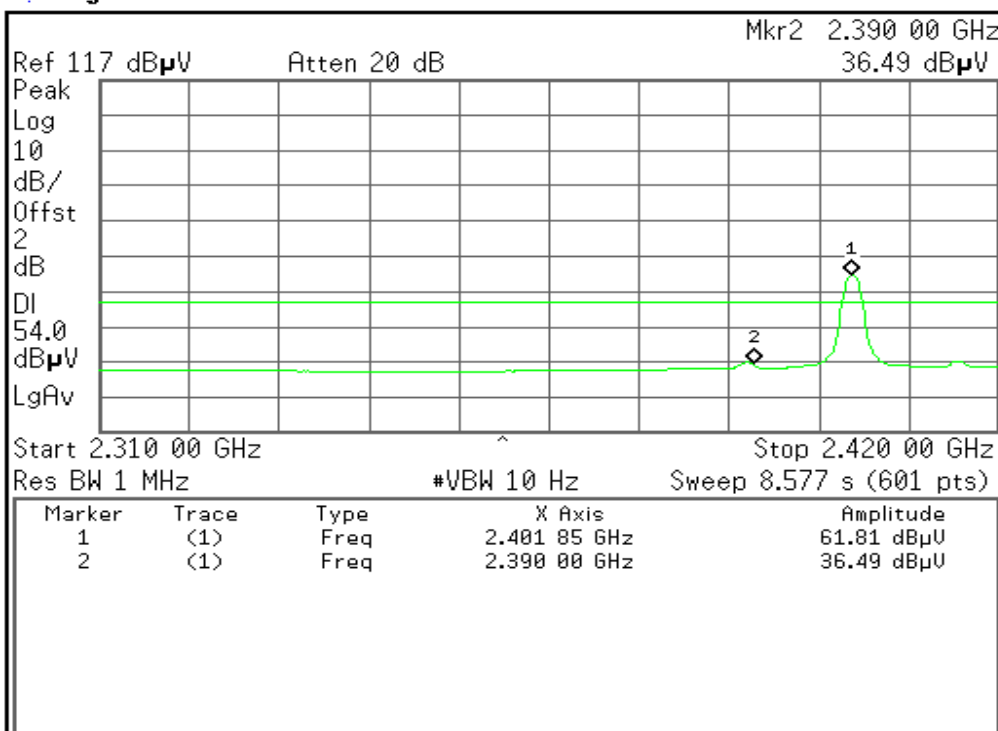
Config I/O

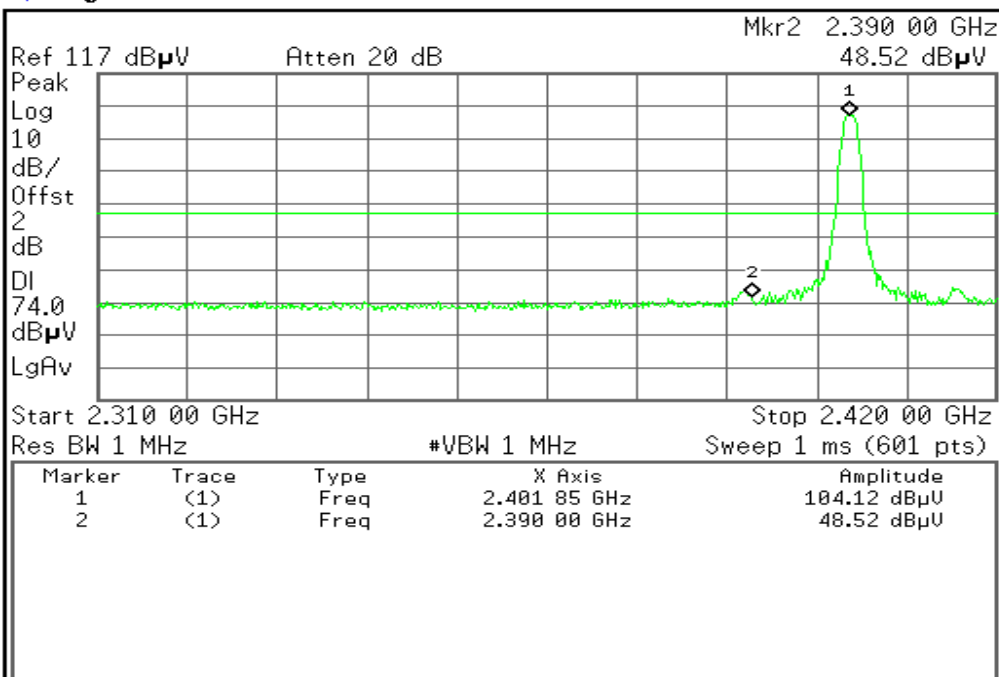
Reference

More  
1 of 3**Detector mode: Average****Polarity: Vertical**

Agilent

R T

**Freq/Channel****Center Freq**  
2.36500000 GHz**Start Freq**  
2.31000000 GHz**Stop Freq**  
2.42000000 GHz**CF Step**  
11.0000000 MHz  
Auto Man**Freq Offset**  
0.00000000 Hz**Signal Track**  
On Off

**Detector mode: Peak****Polarity: Horizontal**\* **Agilent****R T****Display****Full Screen****Display Line**74.00 dB $\mu$ V

On

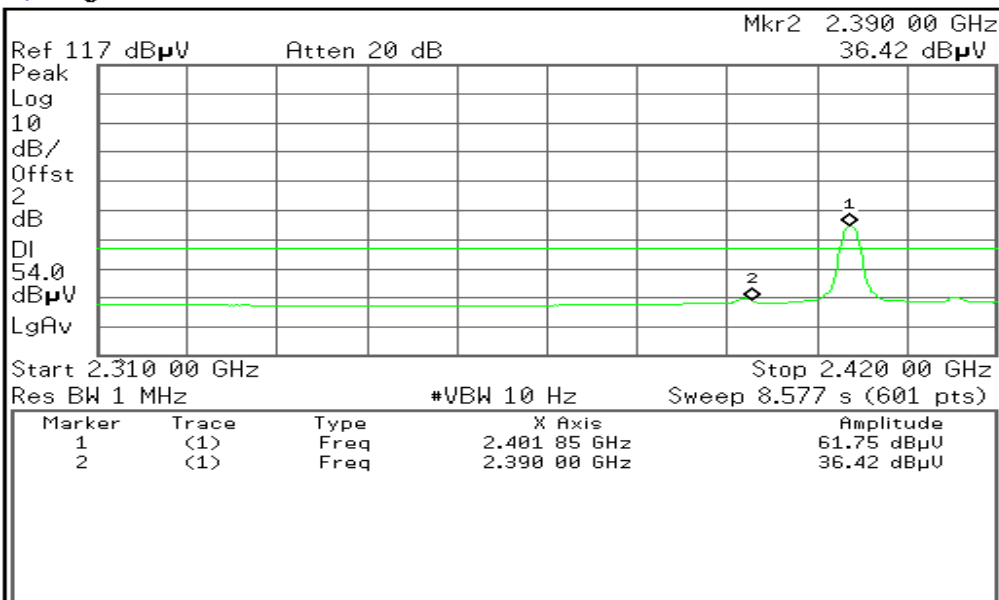
Off

**Limits****Active Fctn****Position**

Center

**Title****Preferences**

Copyright 2000–2008 Agilent Technologies

**Detector mode: Average****Polarity: Horizontal**\* **Agilent****R T****Trace****Trace****Clear Write****Max Hold****Min Hold****View****Blank****More**  
1 of 2

Copyright 2000–2008 Agilent Technologies

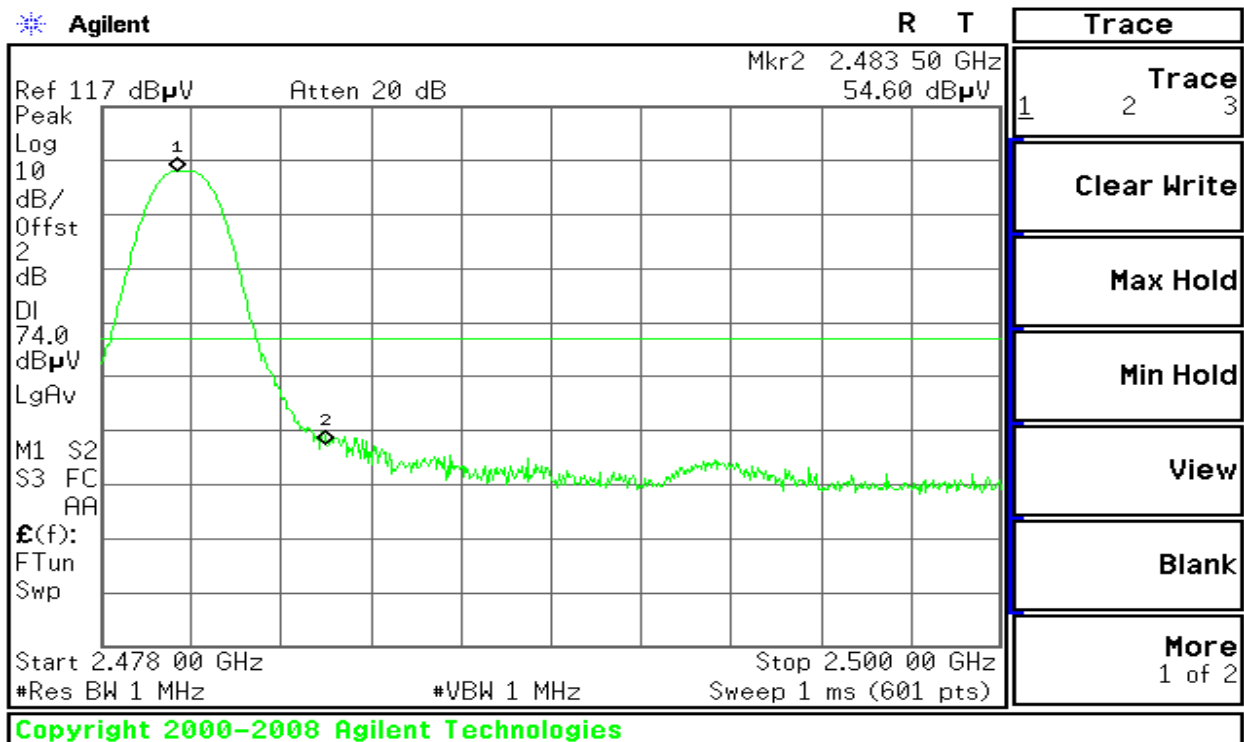




## Band Edges (CH High)

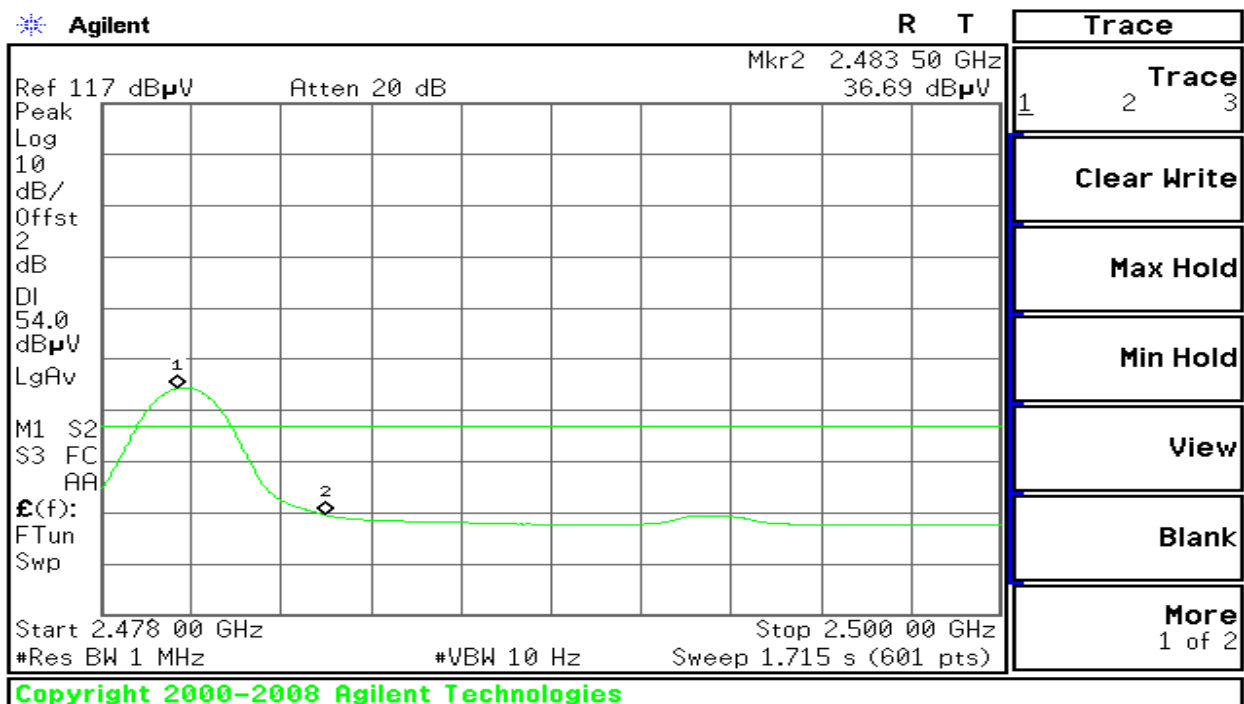
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical



**Detector mode: Peak****Polarity: Horizontal** **Agilent****R T****Trace**Ref 117 dB $\mu$ V

Atten 20 dB

Mkr2 2.483 50 GHz  
54.18 dB $\mu$ V

Peak

Log

10

dB/

Offst

2

dB

DI

74.0

dB $\mu$ V

LgAv

M1 S2

S3 FC

AA

 $\mathcal{E}(f)$ :

FTun

Swp

Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 1 MHz

Stop 2.500 00 GHz

Sweep 1 ms (601 pts)

**Copyright 2000–2008 Agilent Technologies**

1 2 3

**Clear Write****Max Hold****Min Hold****View****Blank****More**  
1 of 2**Detector mode: Average****Polarity: Horizontal** **Agilent****R T****Freq/Channel**Ref 117 dB $\mu$ V

Atten 20 dB

Mkr2 2.483 50 GHz  
36.64 dB $\mu$ V

Peak

Log

10

dB/

Offst

2

dB

DI

54.0

dB $\mu$ V

LgAv

M1 S2

S3 FC

AA

 $\mathcal{E}(f)$ :

FTun

Swp

Swp

Start 2.478 00 GHz

#Res BW 1 MHz

#VBW 10 Hz

Stop 2.500 00 GHz

Sweep 1.715 s (601 pts)

**Copyright 2000–2008 Agilent Technologies****Center Freq**  
2.48900000 GHz**Start Freq**  
2.47800000 GHz**Stop Freq**  
2.50000000 GHz**CF Step**  
2.20000000 MHz  
Auto Man**Freq Offset**  
0.00000000 Hz**Signal Track**  
On Off



### 7.3. PEAK POWER SPECTRAL DENSITY

#### LIMIT

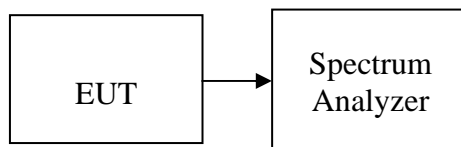
1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping 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	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011

**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

NA (this test item is not required for FHSS modulation technical)



## 7.4. FREQUENCY SEPARATION

### LIMIT

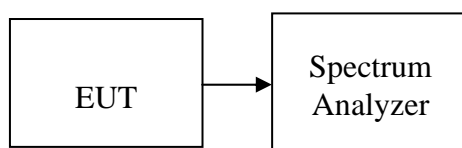
According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel 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	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011

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

### Test Configuration



### TEST PROCEDURE

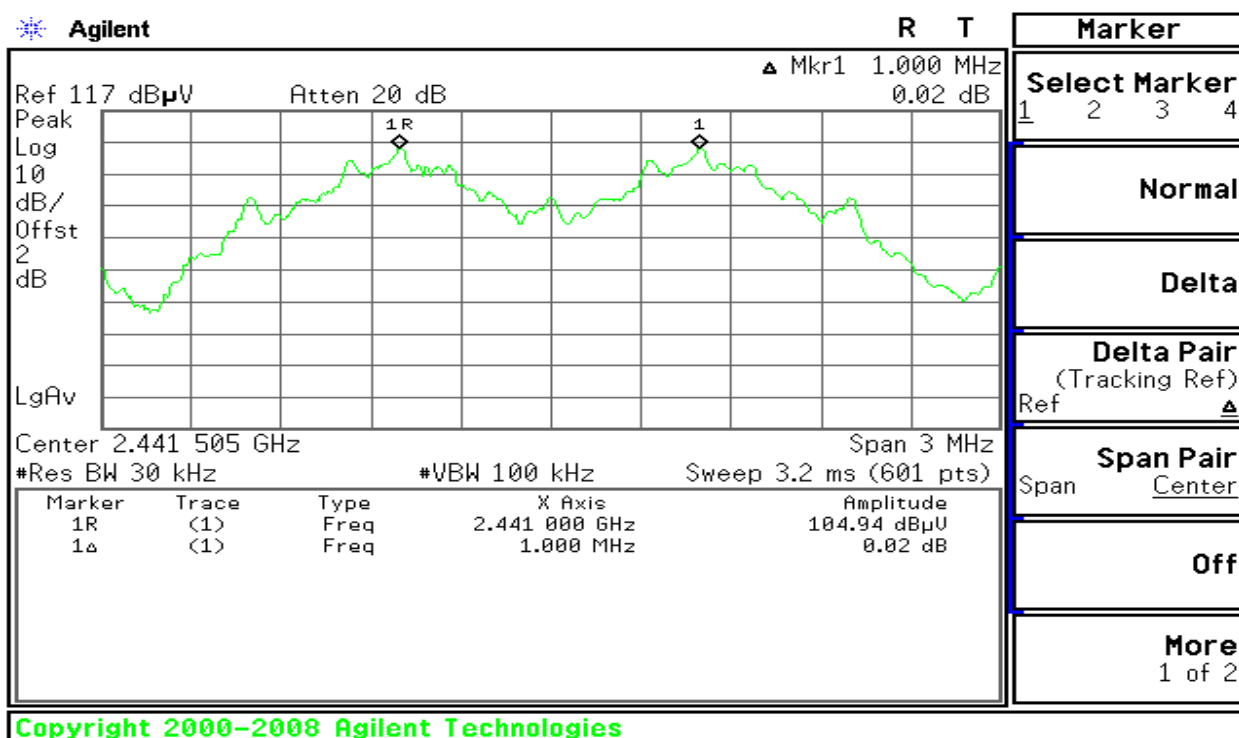
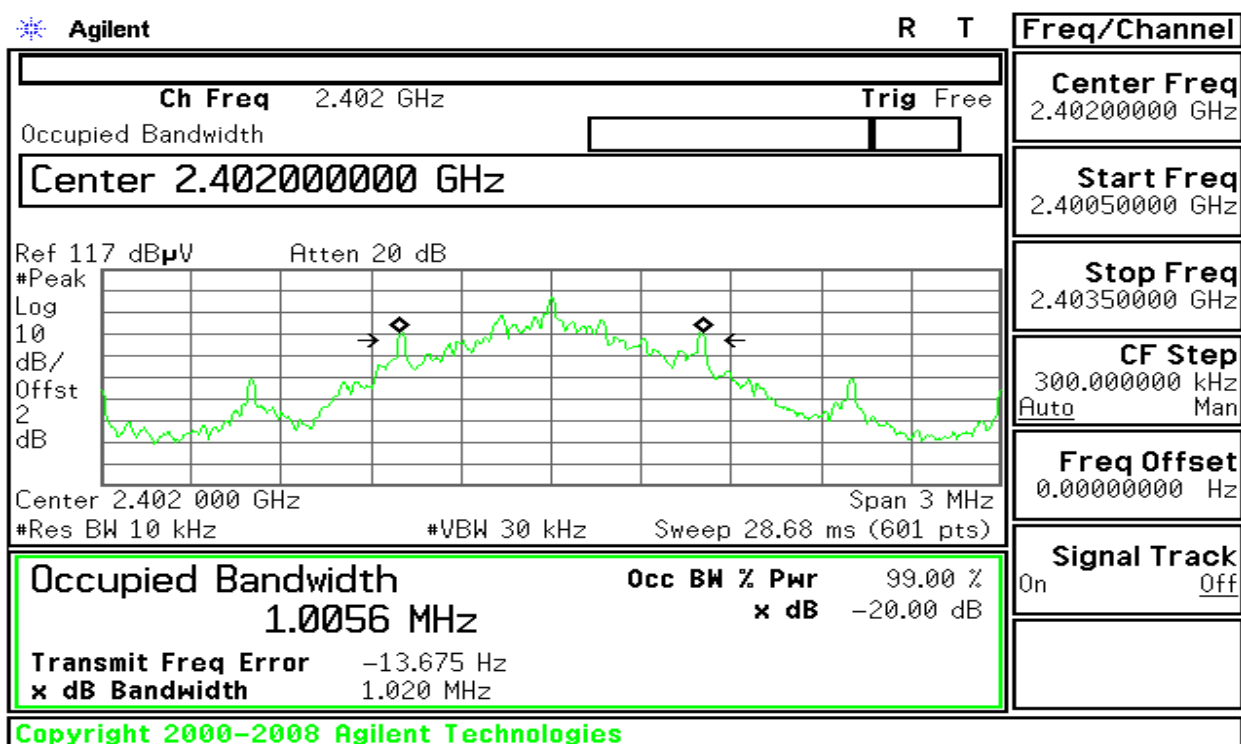
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW = 30kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
5. Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

### TEST RESULTS

*No non-compliance noted*

#### Test Data

Channel Separation	20dB Bandwidth	two-thirds of the 20 dB bandwidth	Result
(MHz)	(kHz)	(kHz)	
1.000	1005.6	670.4	Pass

**Test Plot****Measurement of Channel Separation****Measurement of 20dB Bandwidth****Channel low**

**Channel middle**

\* Agilent

R T

Freq/Channel

Ch Freq 2.441 GHz Trig Free  
Occupied Bandwidth

Center Freq  
2.44100000 GHz

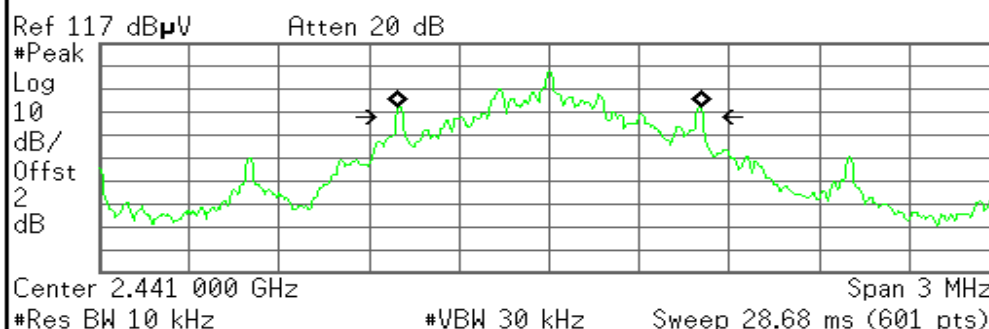
Start Freq  
2.43950000 GHz

Stop Freq  
2.44250000 GHz

CF Step  
300.000000 kHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

**Occupied Bandwidth**

Occ BW % Pwr 99.00 %

1.0054 MHz

x dB -20.00 dB

Transmit Freq Error -180.967 Hz

x dB Bandwidth 1.020 MHz

Copyright 2000-2008 Agilent Technologies

**Channel high**

\* Agilent

R T

Meas Setup

Ch Freq 2.48 GHz Trig Free  
Occupied Bandwidth

Avg Number  
10  
On Off

Avg Mode  
Exp Repeat

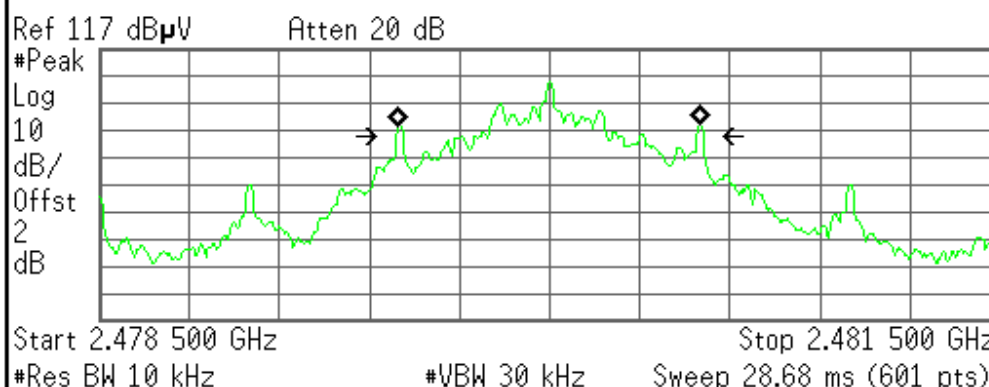
Max Hold  
On Off

Occ BW % Pwr  
99.00 %

OBW Span  
3.00000000 MHz

x dB  
-20.00 dB

Optimize  
Ref Level

**Occupied Bandwidth**

Occ BW % Pwr 99.00 %

1.0052 MHz

x dB -20.00 dB

Transmit Freq Error -112.381 Hz

x dB Bandwidth 1.020 MHz

Copyright 2000-2008 Agilent Technologies



## 7.5. NUMBER OF HOPPING FREQUENCY

### LIMIT

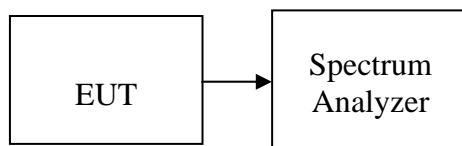
According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011

**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=2400MHz, Stop = 2441.5MHz, Sweep = auto and Start=2441.5MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=100kHz.
5. Max hold, view and count how many channel in the band.

### TEST RESULTS

*No non-compliance noted*

### Test Data

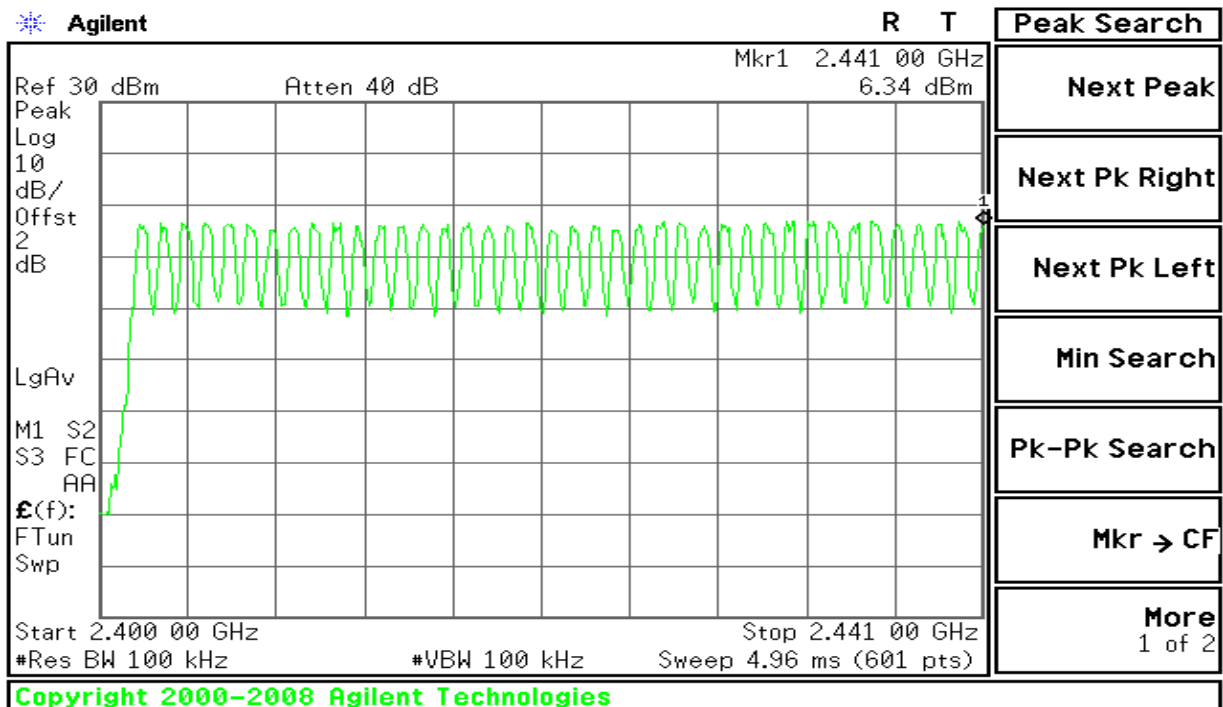
Result (No. of CH)	Limit (No. of CH)	Result
79	>15	PASS



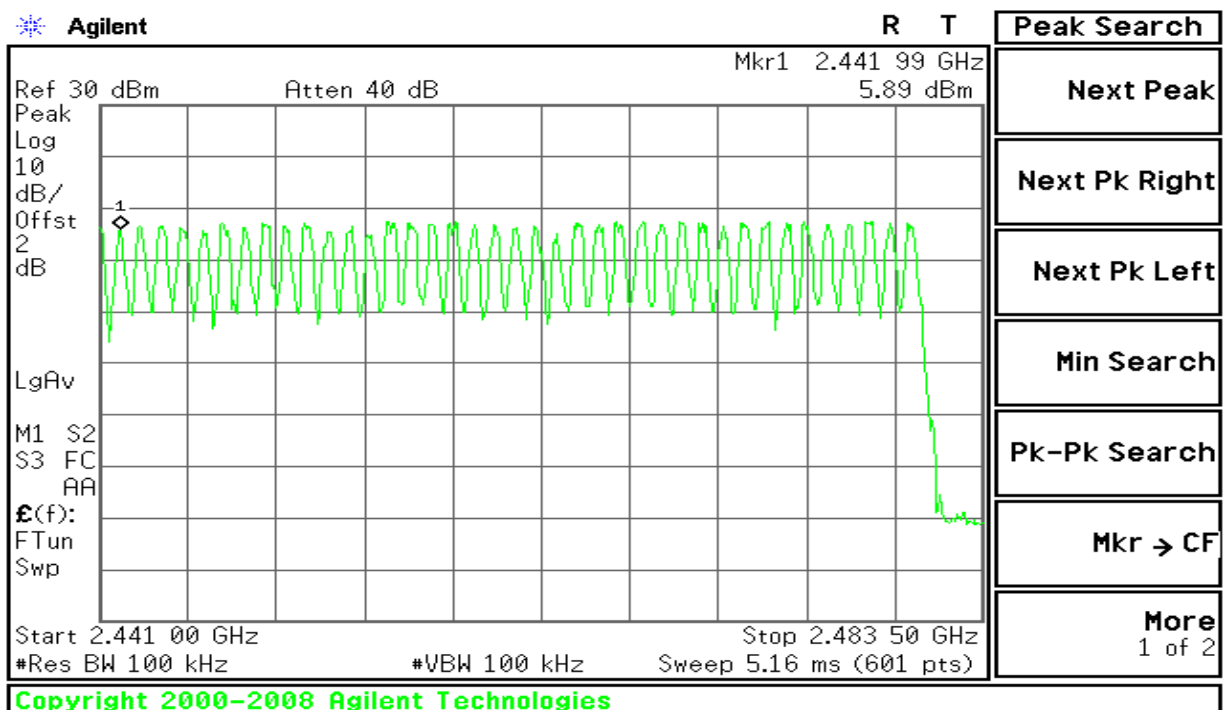
## Test Plot

### Channel Number

### 2.4 GHz – 2.4415 GHz



### 2.4415 GHz – 2.4835 GHz







## 7.6. TIME OF OCCUPANCY (DWELL TIME)

### LIMIT

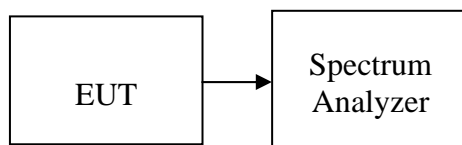
According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011

**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****DH 1**

$$0.400 * (1600/2)/79 * 31.6 = 128.00 \text{ (ms)}$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.400	128.00	31.60	400	PASS

**DH 3**

$$1.67 * (1600/4)/79 * 31.6 = 267.2 \text{ (ms)}$$

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.67	283.20	31.60	400	PASS

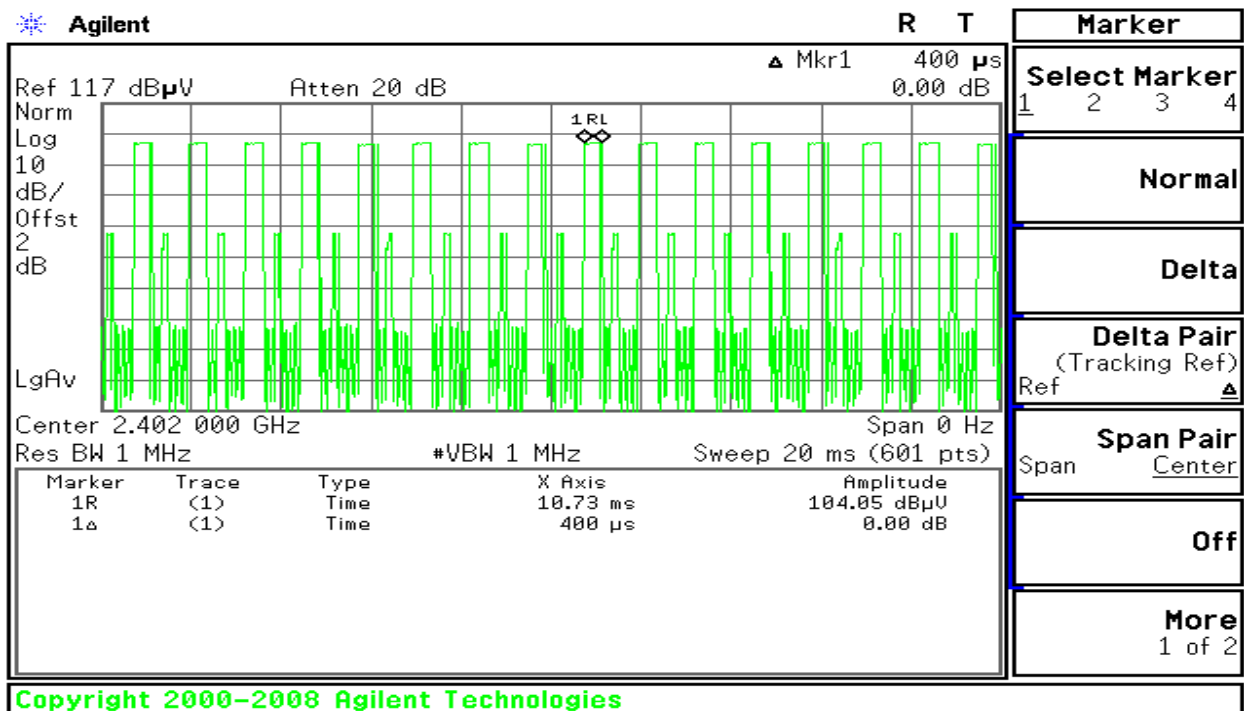
**DH 5**

$$2.87 * (1600/6)/79 * 31.6 = 306.1 \text{ (ms)}$$

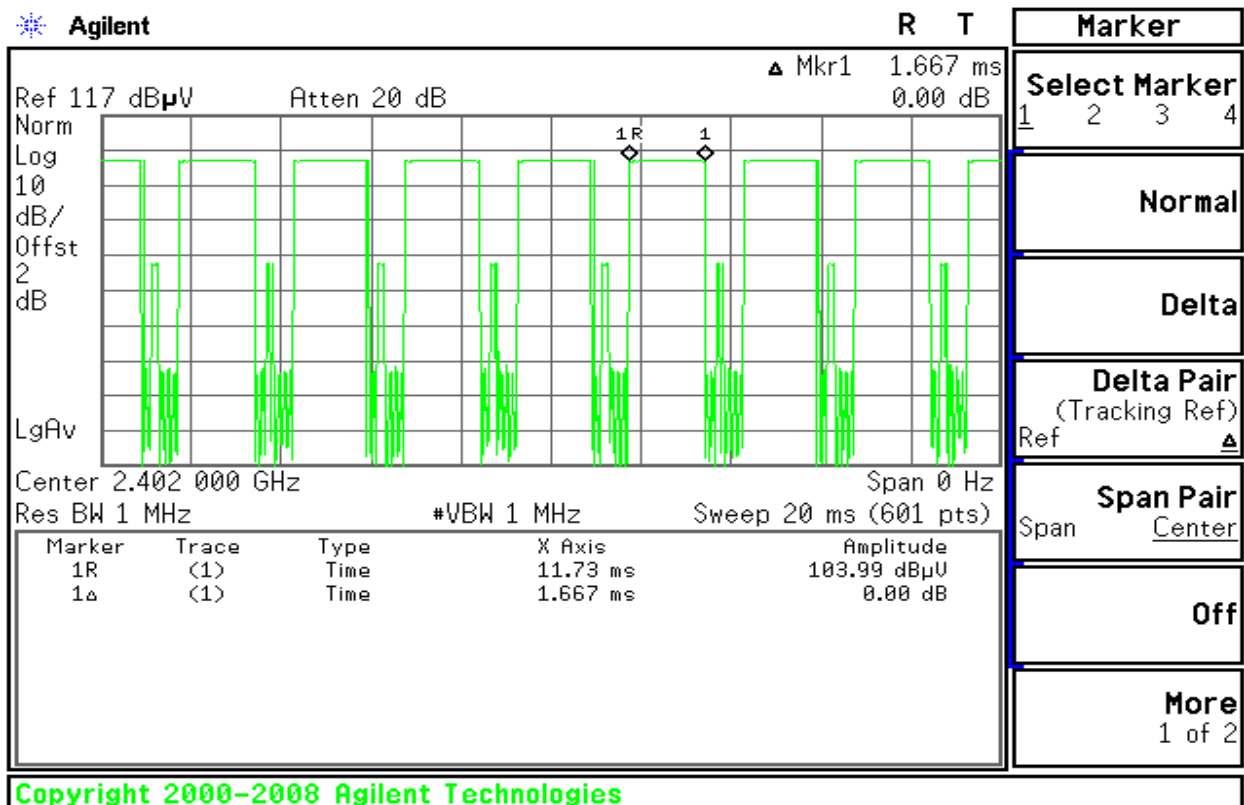
Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.87	306.1	31.60	400	PASS

**Test Plot****DH 1**

Agilent

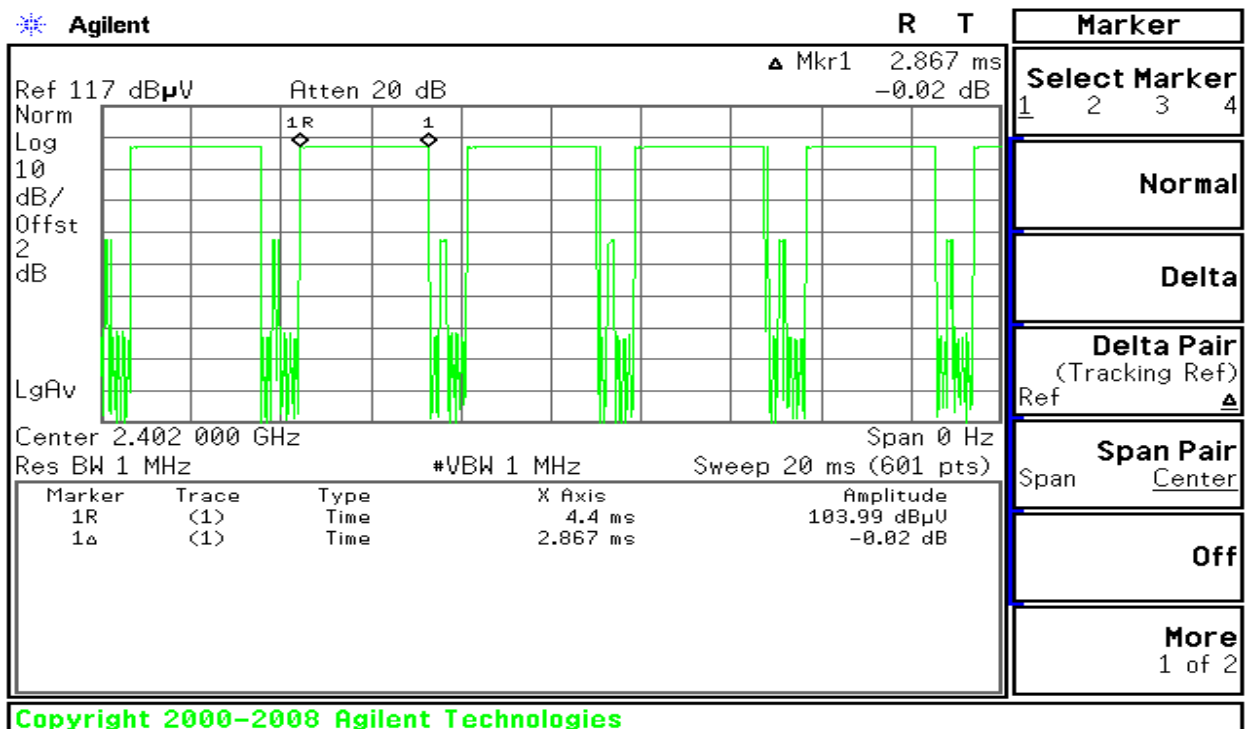
**DH 3**

Agilent



**DH 5**

Agilent





## 7.7. SPURIOUS EMISSIONS

### Conducted Measurement

#### LIMIT

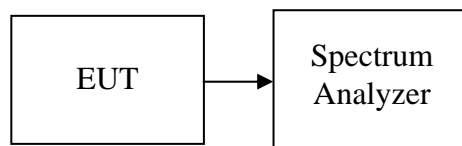
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011

**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.

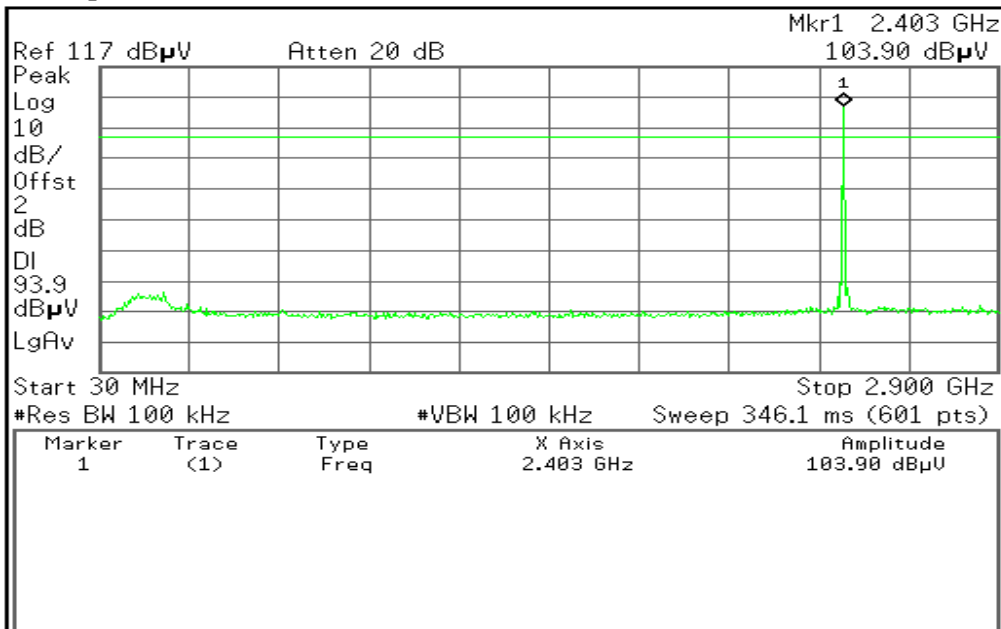
#### TEST RESULTS

*No non-compliance noted*

**Test Plot****CH Low****30MHz ~ 2.9GHz**

\* Agilent

R T

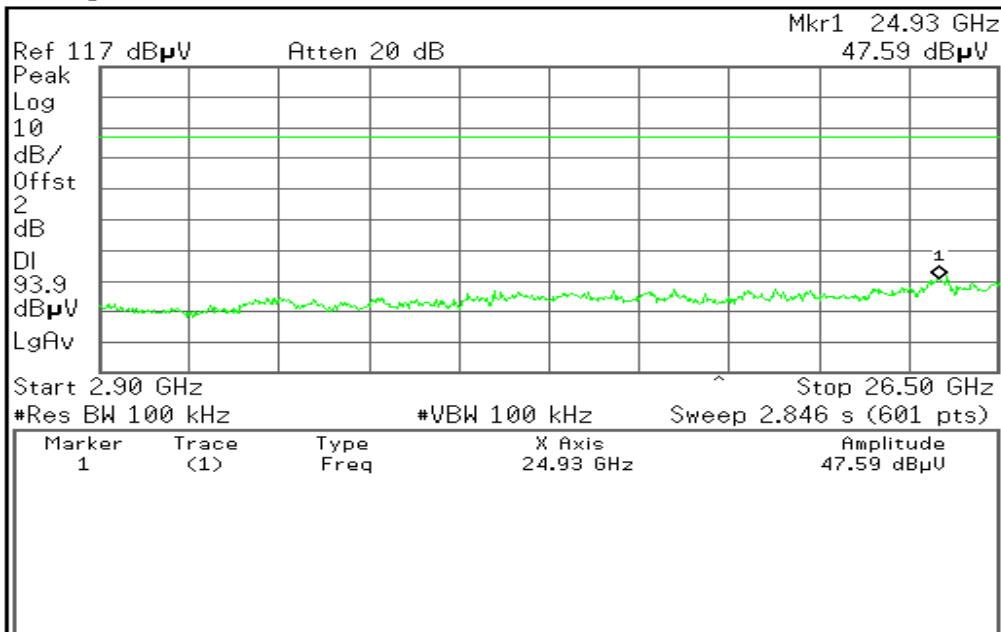
**Display****Full Screen****Display Line**On 93.90 dB $\mu$ V Off**Limits****Active Fctn  
Position**  
Center**Title****Preferences**

Copyright 2000–2008 Agilent Technologies

**2.9GHz ~ 26.5GHz**

\* Agilent

R T

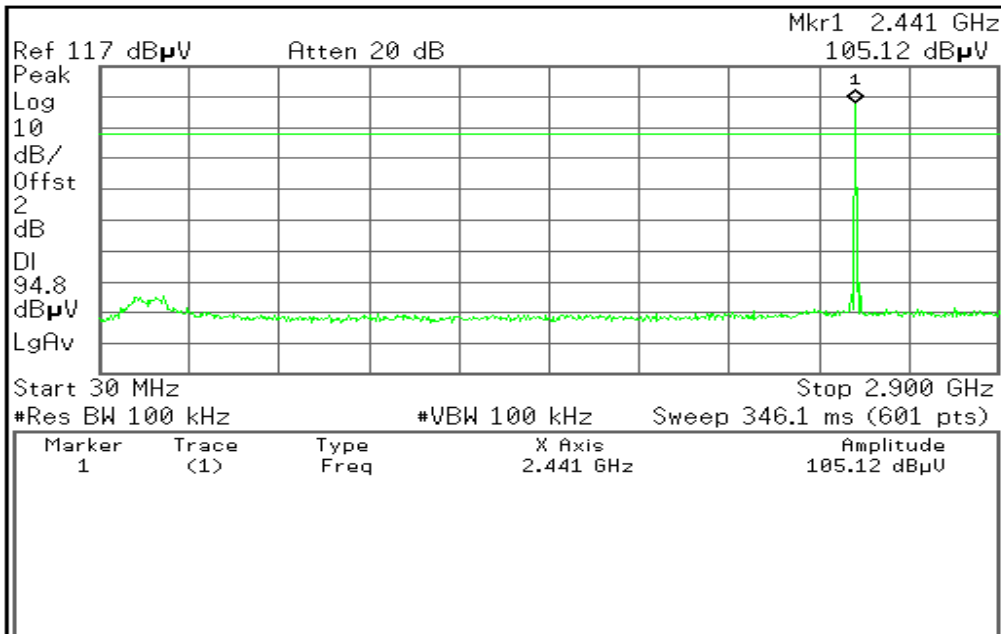
**Peak Search****Next Peak****Next Pk Right****Next Pk Left****Min Search****Pk-Pk Search****Mkr → CF****More**  
1 of 2

Copyright 2000–2008 Agilent Technologies

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

Agilent

R T



Display

Full Screen

Display Line

94.76 dB $\mu$ V

On

Off

Limits&gt;

Active Fctn  
Position>

Center

Title&gt;

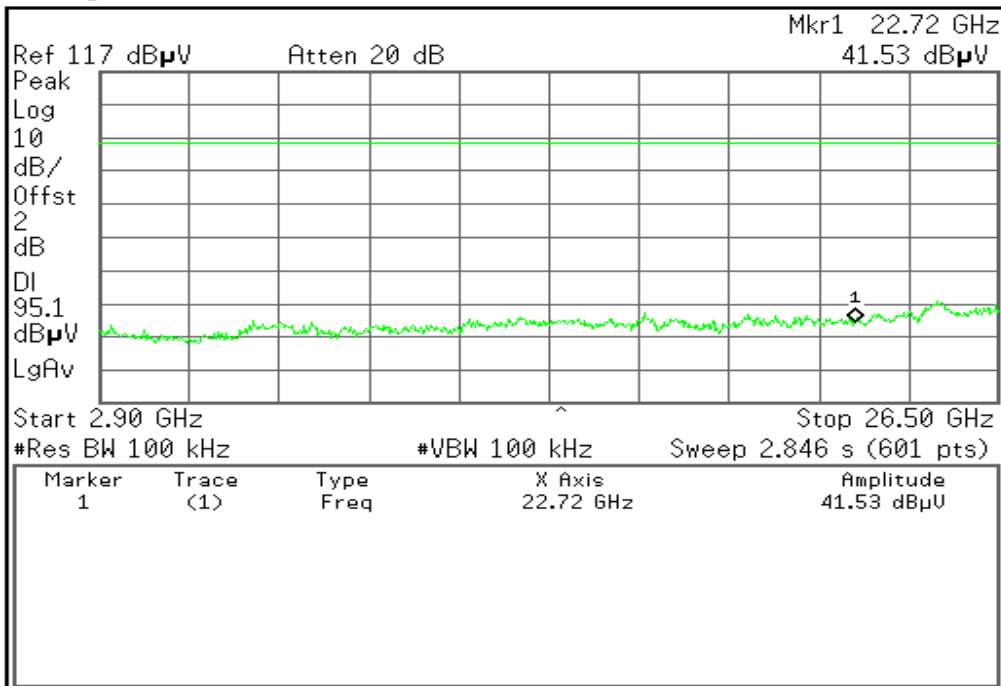
Preferences&gt;

Copyright 2000-2008 Agilent Technologies

**2.9GHz ~ 26.5GHz**

Agilent

R T



Freq/Channel

Center Freq

14.7000000 GHz

Start Freq

2.90000000 GHz

Stop Freq

26.5000000 GHz

CF Step

2.36000000 GHz

Auto

Man

Freq Offset

0.00000000 Hz

Signal Track

On

Off

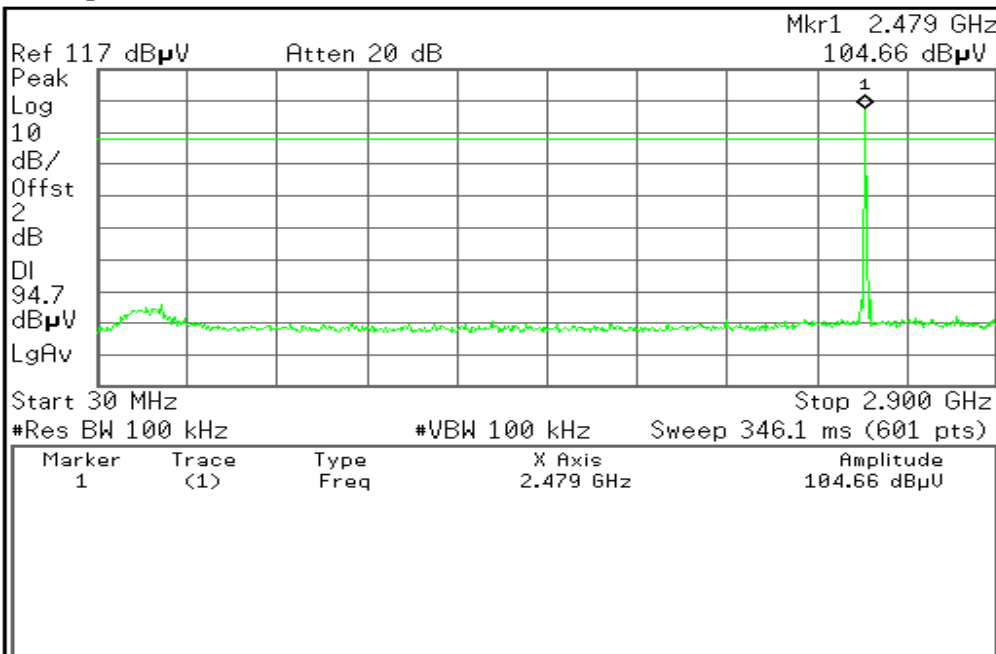
Copyright 2000-2008 Agilent Technologies

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

\* Agilent

R T

Freq/Channel



<b>Center Freq</b> 1.46500000 GHz
<b>Start Freq</b> 30.0000000 MHz
<b>Stop Freq</b> 2.90000000 GHz
<b>CF Step</b> 287.000000 MHz Auto Man
<b>Freq Offset</b> 0.00000000 Hz
<b>Signal Track</b> On Off

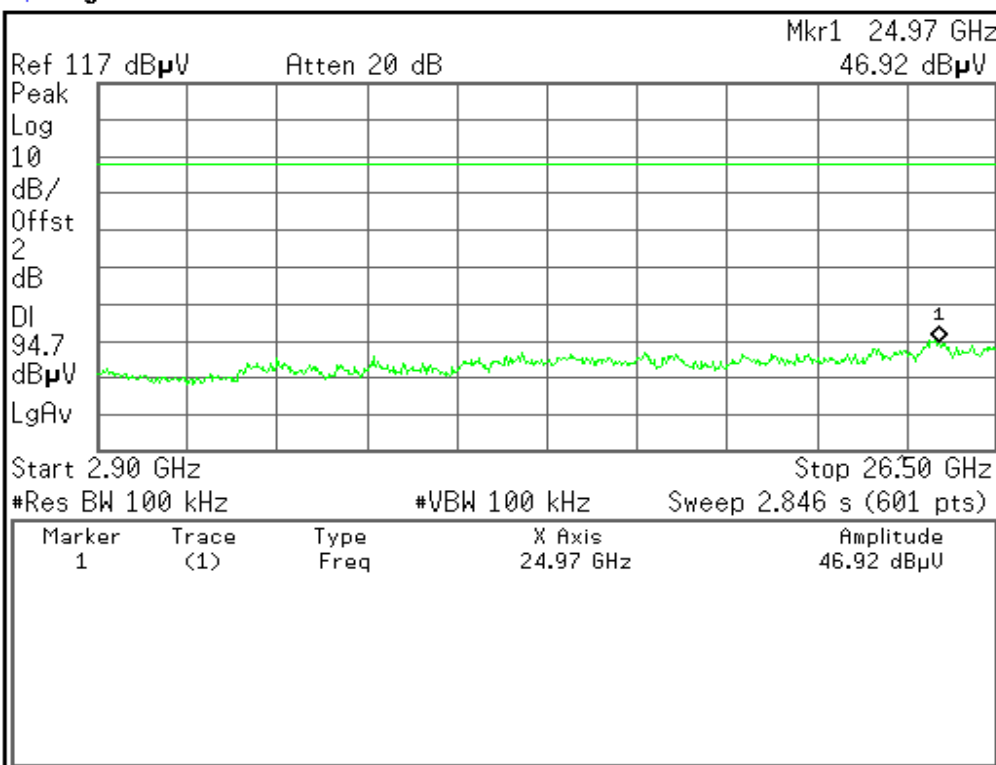
Copyright 2000–2008 Agilent Technologies

**2.9GHz ~ 26.5GHz**

\* Agilent

R T

Peak Search



<b>Next Peak</b>
<b>Next Pk Right</b>
<b>Next Pk Left</b>
<b>Min Search</b>
<b>Pk-Pk Search</b>
<b>Mkr → CF</b>
<b>More</b> 1 of 2

Copyright 2000–2008 Agilent Technologies





## 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)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** 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.

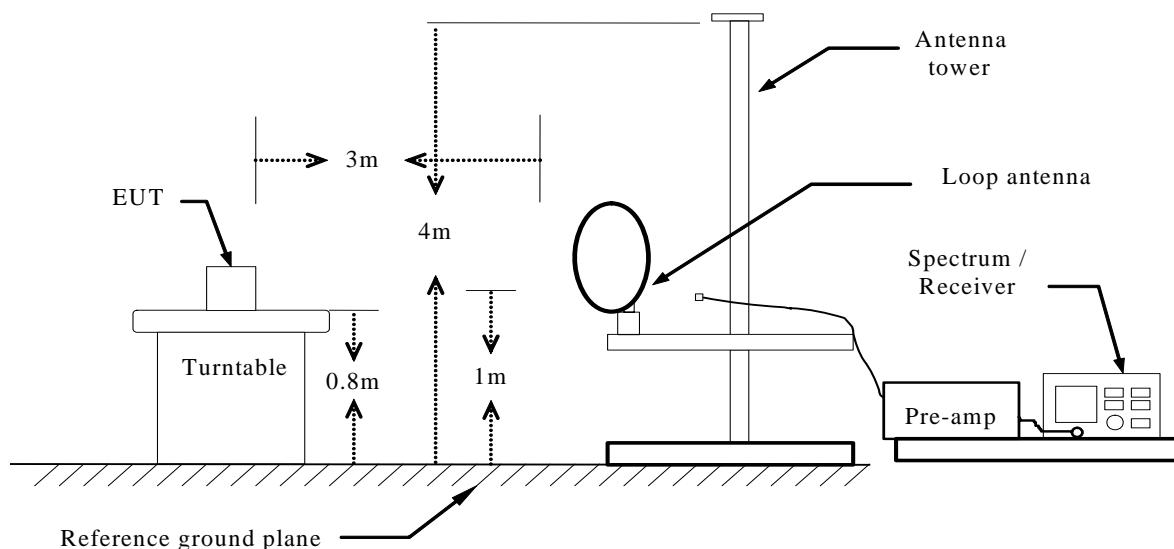
2. In the above emission table, the tighter limit applies at the band edges.

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**

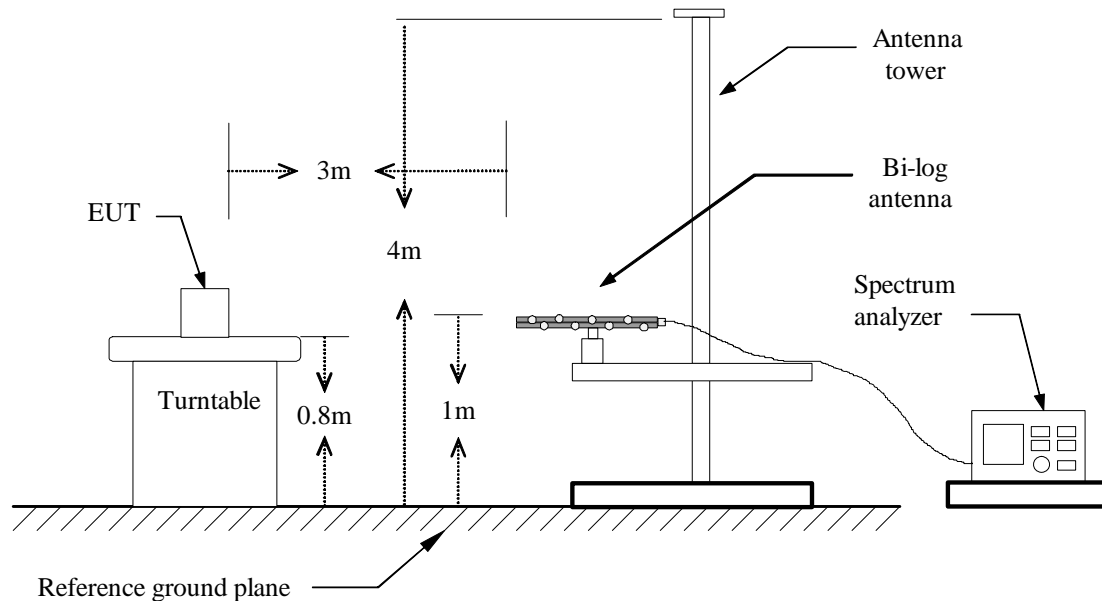
3M Semi Anechoic Chamber (977)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY44020154	05/26/2011
Spectrum Analyzer	Agilent	E4446A	US44300398	05/26/2011
EMI Test Receiver	R&S	ESPI3	101026	05/26/2011
Pre-Amplifier	MINI	ZFL-1000VH2	d041703	04/29/2011
Pre-Amplifier	Miteq	NSP4000-NF	870731	04/29/2011
Bilog Antenna	Sunol	JB1	A110204-2	11/22/2011
Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	12/04/2011
PSG Analog Signal Generator	Agilent	E8257C	MY43321570	05/26/2011
Turn Table	CT	CT123	4165	N.C.R
Antenna Tower	CT	CTERG23	3256	N.C.R
Controller	CT	CT100	95637	N.C.R
Site NSA	CCS	N/A	N/A	04/06/2012
Loop Antenna	ARA	PLA-1030/B	1029	04/29/2011

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

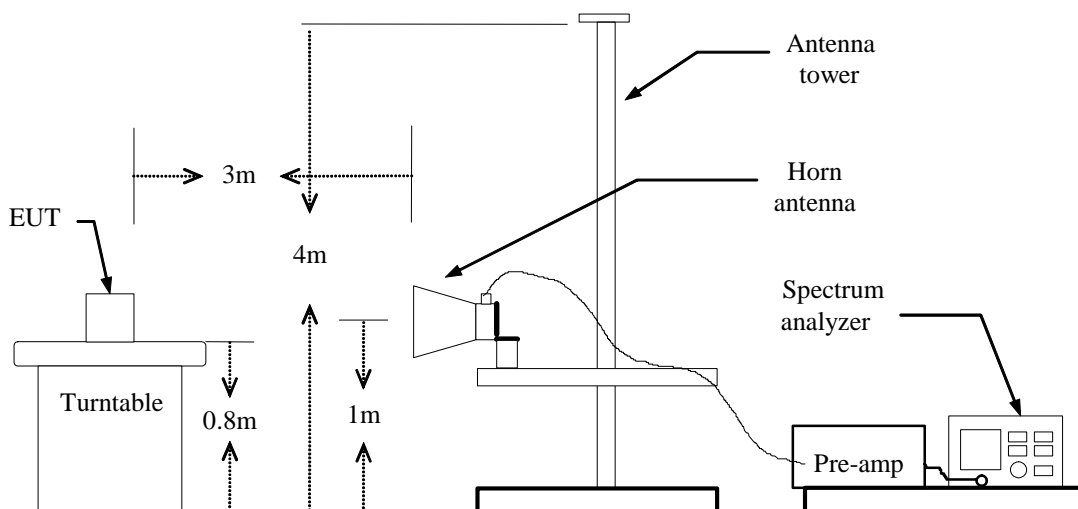
**Test Configuration****Below 30MHz**



## 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. Set the spectrum analyzer in the following setting as:



Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

**TEST RESULTS****Below 1 GHz****Operation Mode:** Normal Link**Test Date:** April 14, 2011**Temperature:** 23°C**Tested by:** Star**Humidity:** 50 % RH**Polarity:** Ver. / Hor.

Freq.	Ant.Pol.	Detector	Reading	Factor	Actual FS	Limit 3m	Safe Margin
(MHz)	H/V	Mode	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
		(PK/QP)					
37.65	V	Peak	40.56	-6.24	34.32	40.0	-5.68
109.67	V	Peak	43.65	-10.41	33.24	43.5	-10.26
183.22	V	Peak	45.91	-10.77	35.14	43.5	-8.36
272.33	V	Peak	48.34	-8.03	40.31	46.0	-5.69
412.58	V	Peak	41.2	-4.18	37.02	46.0	-8.98
961.77	V	Peak	39.75	4.55	44.3	54.0	-9.7
41.67	H	Peak	42.57	-10.78	31.79	40	-8.21
90.36	H	Peak	47.9	-14.92	32.98	43.5	-10.52
188.49	H	Peak	45.64	-10.83	34.81	43.5	-8.69
233.82	H	Peak	48.72	-9.81	38.91	46.0	-7.09
372.89	H	Peak	43.05	-5.28	37.77	46.0	-8.23
962.57	H	Peak	39.77	4.56	44.33	54.0	-9.67

**Notes:**

1. Measuring frequencies from 9 KHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9 KHz to 1000MHz were made with an instrument using Peak detector mode.
3. 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.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

## Above 1 GHz

**Operation Mode:** TX/ CH Low

**Test Date:** April 14,2011

**Temperature:** 23°C

**Tested by:** Star

**Humidity:** 50 % RH

**Polarity:** Ver. / Hor.

[illegible]

**Remark:**

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 to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.

**Operation Mode:** TX/ CH Mid

**Test Date:** April 14, 2011

**Temperature:** 23°C

**Tested by:** Star

**Humidity:** 50 % RH

**Polarity:** Ver. / Hor.

[illegible]

**Remark:**

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 to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



**Operation Mode:** TX/ CH High  
**Temperature:** 23°C  
**Humidity:** 50 % RH

**Test Date:** April 14, 2011**Tested by:** Star**Polarity:** Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak	AV	Ant. / CL	Actual Fs		Peak	AV	Margin	Remark
		Reading	Reading	CF			Limit	Limit	(dB)	
		(dBuV)	(dBuV)	(dB)	Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)	(dBuV/m)		
4958.36	V	39.84	30.48	11.32	51.16	41.8	74	54	-12.2	average
7326.45	V	40.59	24.25	19.56	60.15	43.81	74	54	-10.19	average
4959.81	H	39.84	29.69	11.32	51.16	41.01	74	54	-12.99	average
7324.56	H	40.92	25.72	19.56	60.48	45.28	74	54	-8.72	average

**Remark:**

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 to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
  - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.





## 7.8. 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 (dB $\mu$ V)	
	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

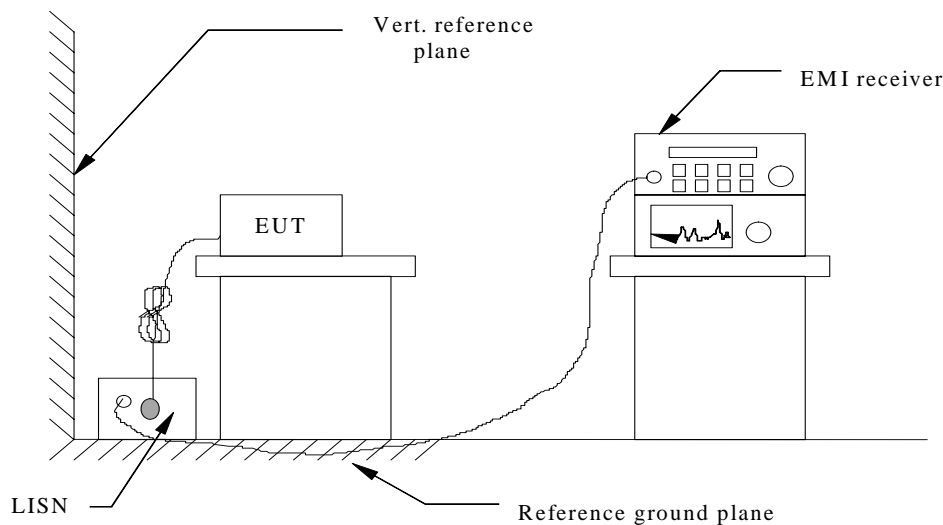
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### MEASUREMENT EQUIPMENT USED

Conducted Emission				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMC Analyzer	R&S	ESCI3	100781	05/26/2011
V (V-LISN)	Schwarzbeck	NNLK 8129	8129-143	05/26/2011
LISN (EUT)	FCC	FCC-LISN-50/250-50-2-02	SN:05012	05/26/2011
TRANSIENT LIMITER	SCHAFFNER	CFL9206	1710	05/26/2011

**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.

### **Note:**

*Freq.* = Emission frequency in KHz

*Factor (dB)* = cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER  
(The TRANSIENT LIMITER included 10 dB ATTENUATION)

*Amptd dBuV* = Uncorrected Analyzer/Receiver reading + cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER,  
if it > 0.5 dB

*Limit dBuV* = Limit stated in standard

*Margin dB* = Reading in reference to limit

### **Calculation Formula**

*Margin (dB)* = *Amptd (dBuV)* – *Limit (dBuV)*

## **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

Model: K105

Temperature: 25°C

Tested by: Star

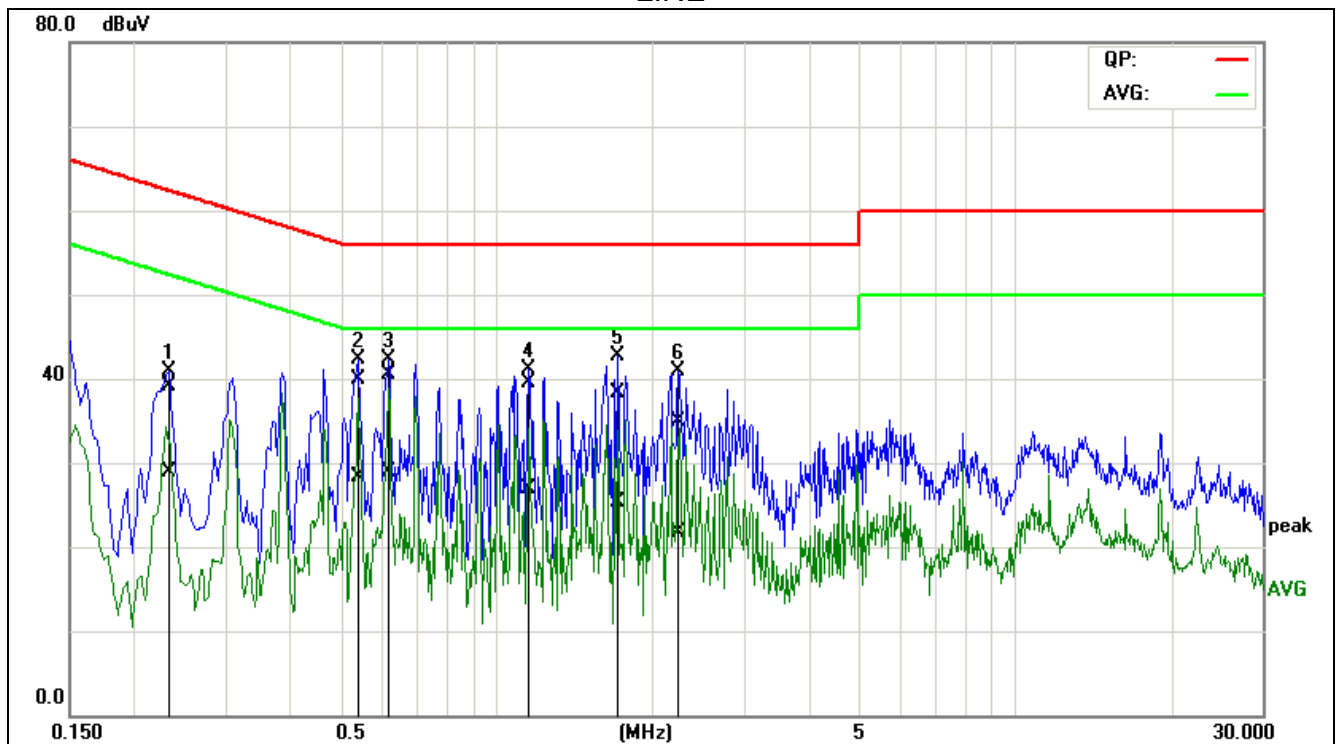
## Test Plot

Test Mode: Normal Link

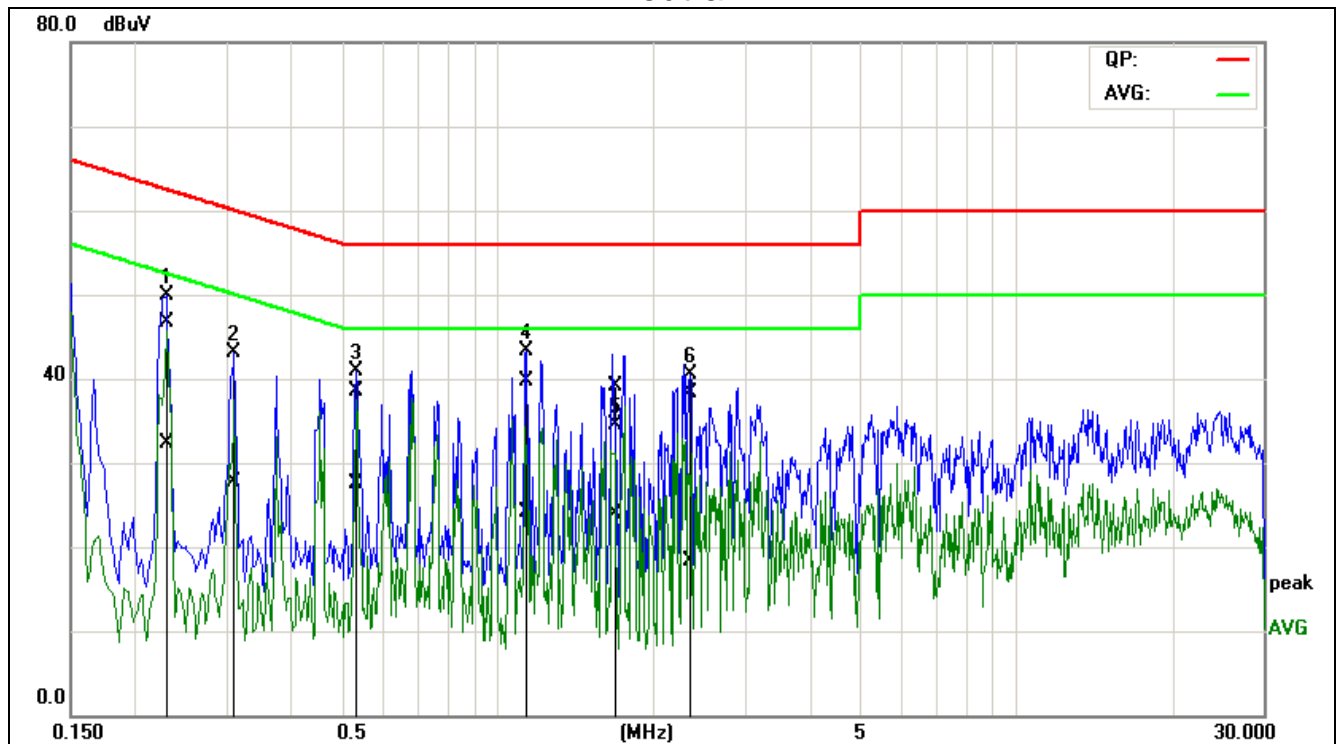
Humidity: 43% RH

Test Results: Pass

LINE



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.2314	28.85	18.69	10.16	39.01	28.85	62.40	52.40	-23.39	-23.55	Pass
2	0.5396	29.02	17.39	10.84	39.86	28.23	56.00	46.00	-16.14	-17.77	Pass
3*	0.6182	29.58	18.04	10.89	40.47	28.93	56.00	46.00	-15.53	-17.07	Pass
4	1.1599	28.45	15.81	11.03	39.48	26.84	56.00	46.00	-16.52	-19.16	Pass
5	1.7018	27.14	14.31	11.07	38.21	25.38	56.00	46.00	-17.79	-20.62	Pass
6	2.2418	23.80	10.64	11.10	34.90	21.74	56.00	46.00	-21.10	-24.26	Pass

**Neutral**

No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.2281	36.48	22.07	10.17	46.65	32.24	62.52	52.52	-15.87	-20.28	Pass
2	0.3077	32.93	17.56	10.16	43.09	27.72	60.03	50.03	-16.94	-22.31	Pass
3	0.5370	28.32	17.45	10.14	38.46	27.59	56.00	46.00	-17.54	-18.41	Pass
4	1.1413	29.53	13.89	10.26	39.79	24.15	56.00	46.00	-16.21	-21.85	Pass
5	1.6899	28.72	13.40	10.46	39.18	23.86	56.00	46.00	-16.82	-22.14	Pass
6	2.3197	27.75	7.67	10.63	38.38	18.30	56.00	46.00	-17.62	-27.70	Pass

**Remark:**

1. The measuring frequencies range between 0.15 MHz and 30 MHz.
2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.
3. "---" denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.
4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.