FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

2.4GHz Digital Wireless Headphone(US Version)

Model: DHP390

Trade Name: ARKON

Prepared for

Uni-Art Precise Products Ltd
11-12/F, Yue Xiu Industrial Building, 87 Hung To Road, Kowloon, Hong Kong

Prepared by

COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.
(aka Compliance Engineering Service (China))
NO. 5, JINAO INDUSTRIAL PARK, NO. 35 JUKENG ROAD,
DASHUIKENG VILLAGE, GUANLAN TOWN, BAOAN
DISTRICT, SHENZHEN, CHINA
TEL: 86-755-28055000
FAX: 86-755-28055221

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

Applicant:	Uni-Art Precise Products Ltd 11-12/F, Yue Xiu Industrial Building, 87 Hung To Road,Kowloon, Hong Kong
Manufacturer:	Uni-Art Precise Products Ltd 11-12/F, Yue Xiu Industrial Building, 87 Hung To Road,Kowloon, Hong Kong
Equipment Under Test:	2.4GHz Digital Wireless Headphone(US Version)
Trade Name:	ARKON
Model:	DHP390
Date of Test:	January 15-March 31, 2008

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

We hereby certify that:

The above equipment was tested by Compliance Certification Services (Shenzhen) 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: 2003 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: ***Tested By:*** **Tom Gan**

Clinton Kao/ Manager
COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.

***Reviewed By*:** **Vincent Yao / Assistant manager**
COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.

2. EUT DESCRIPTION

Product	2.4GHz Digital Wireless Headphone(US Version)
Trade Name	ARKON
Model Number	DHP390
Model Difference	N/A
Power Supply	TX: DC9V Powered by the adapter Adapter Manufacturer / Model No.: SIL / UD090040B AC input:AC120V/60Hz,DC output: 9V/ 400mA DC Output Cable: Un-shielded, 1.80m
Frequency Range	2402 ~ 2479 MHz
Transmit Power	16.35 dBm
Modulation Technique	FHSS
Number of Channels	15 Channels
Antenna Specification	PCB Antenna Gain: 0 dBi (max)
Temperature Range	0 ~ +55°C

Note: *This submittal(s) (test report) is intended for FCC ID: MVADHP390-001T 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: 2003 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: 2003 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.

3.4 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
[1]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
2. 17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
2. 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 –	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.52525	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	156.7 – 156.9	3260 – 3267	23.6 – 24.0
12.29 – 12.293	162.0125 – 167.17	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	167.72 – 173.2	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	240 – 285	3600 – 4400	([2])
13.36 – 13.41	322 – 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] 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.

3.5DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

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

Channel Low , Channel Mid and Channel High were chosen for full testing.

The field strength of spurious radiation emission was measured in the following position: EUT stand-up position (Y mode) and lie-down position (X, Z mode) The following data show only the worst case setup.
The worst case (X axis) was reported.

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

No. 5, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4: 2003 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

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

USA	FCC
Japan	VCCI
Canada	INDUSTRY CANADA
Taiwan	TAF, BSMI

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

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	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	iPod	A1136	4J6050URTXK	N/A	iPod	N/A	N/A
2.	2.4GHz Digital Wireless Headphone (Receiver)	DHP390	N/A	MVADHP 390-001R	N/A	N/A	N/A

Notes:

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 20dB BANDWIDTH

LIMIT

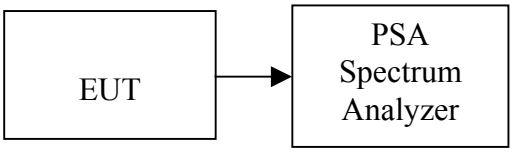
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2009

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

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW is set to 100 kHz and VBW is set 100kHz.

TEST RESULTS

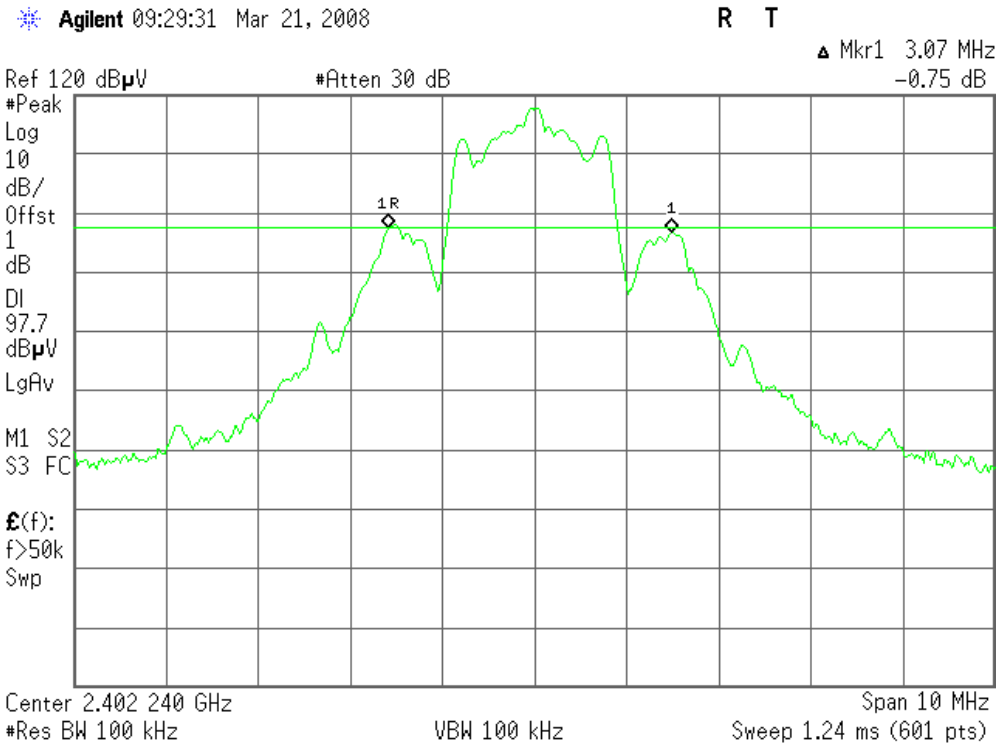
No non-compliance noted

Test Data

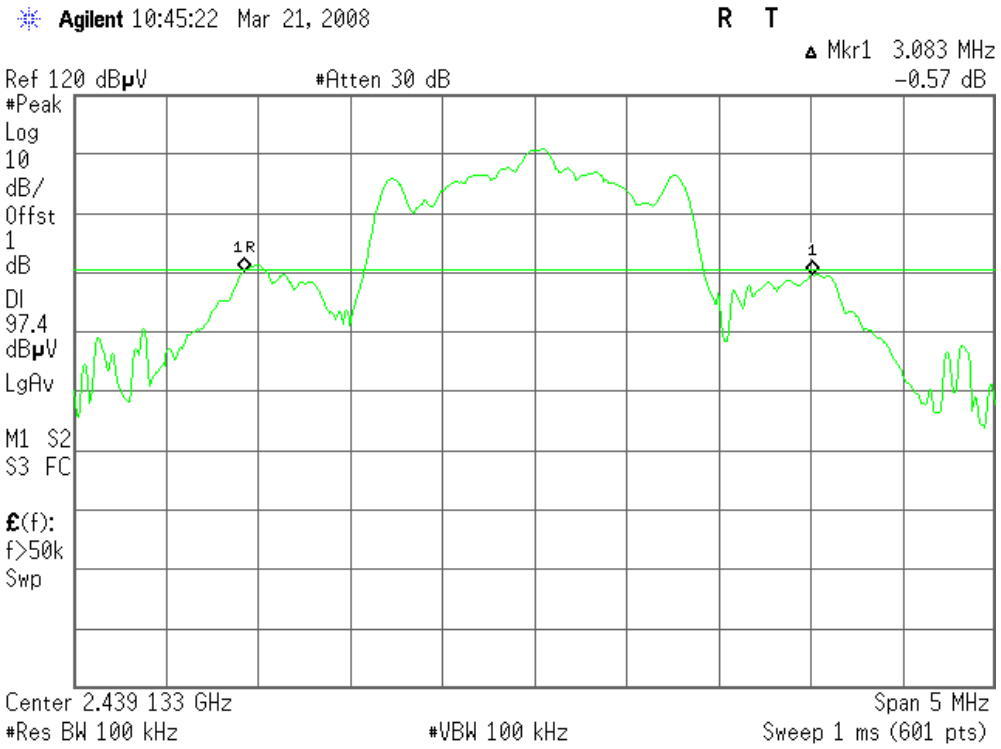
Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Result
Low	2402	3.07	PASS
Mid	2439	3.08	PASS
high	2479	3.13	PASS

Test Plot

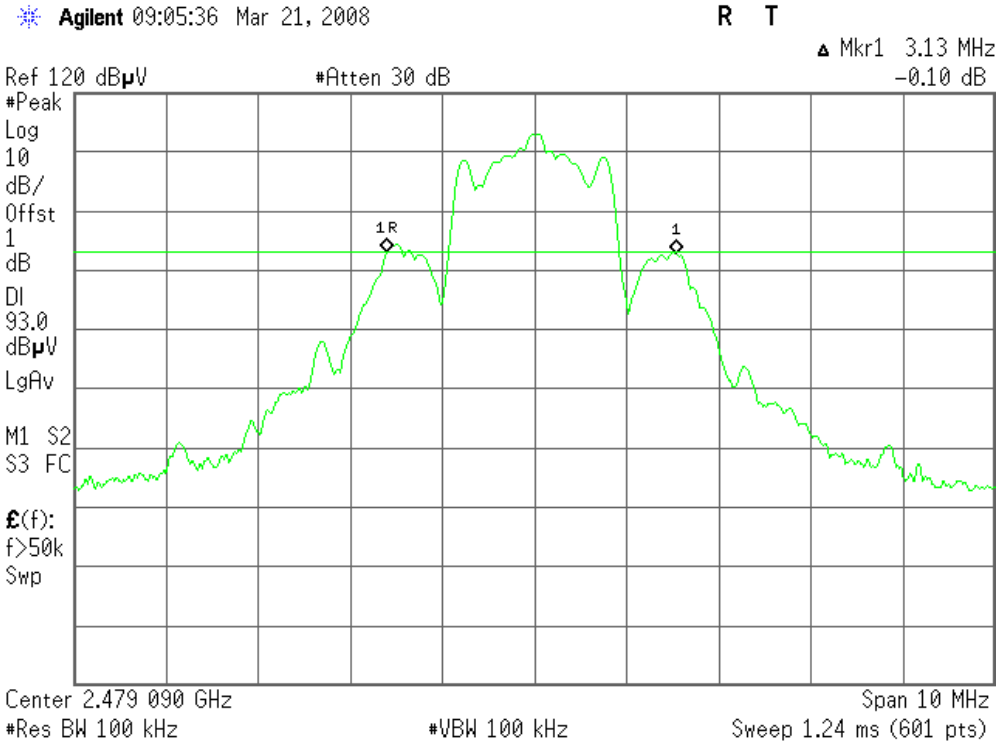
20dB Bandwidth (CH Low)



20dB Bandwidth (CH Mid)



20dB Bandwidth (CH High)



7.2FREQUENCY SEPARATION

LIMIT

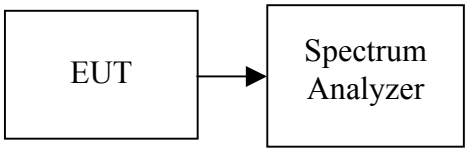
According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009
Spectrum Analyzer	R&S	FSP30	1093.4495.30	07/22/2008

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

Test Configuration



TEST PROCEDURE

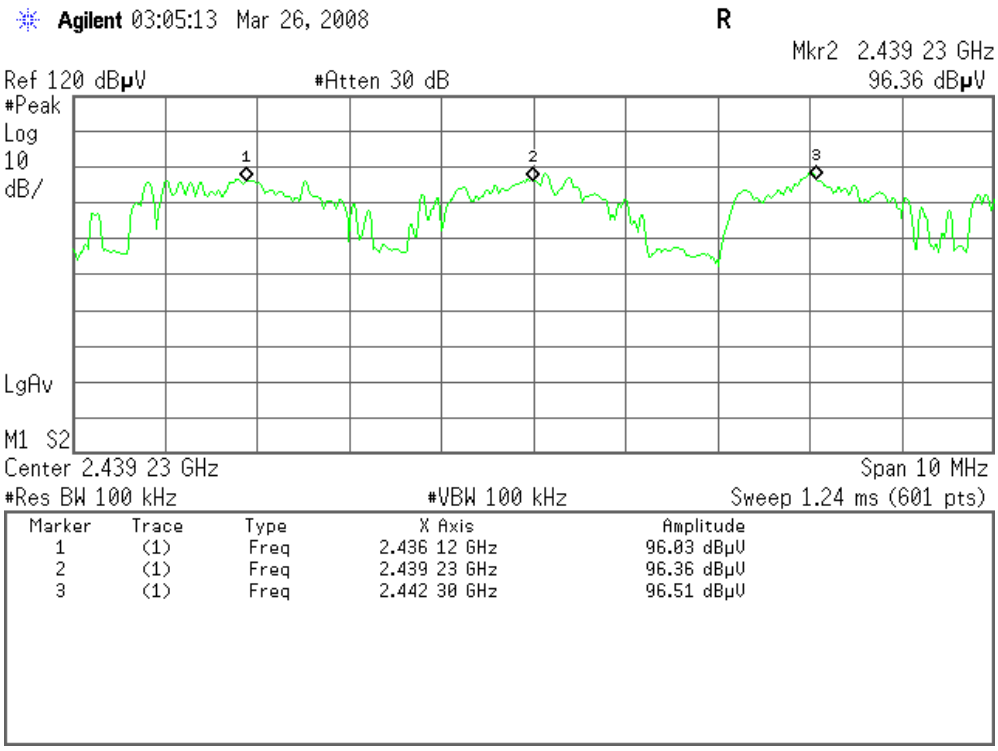
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel.
4. Set the spectrum analyzer as RBW, VBW=30kHz,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

Measurement of Channel Separation



7.3NUMBER OF HOPPING FREQUENCY

LIMIT

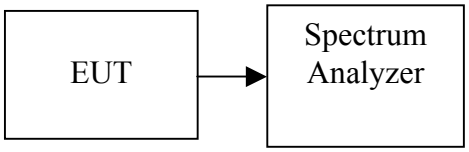
According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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 = 2480MHz, Sweep = 9.68ms.
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

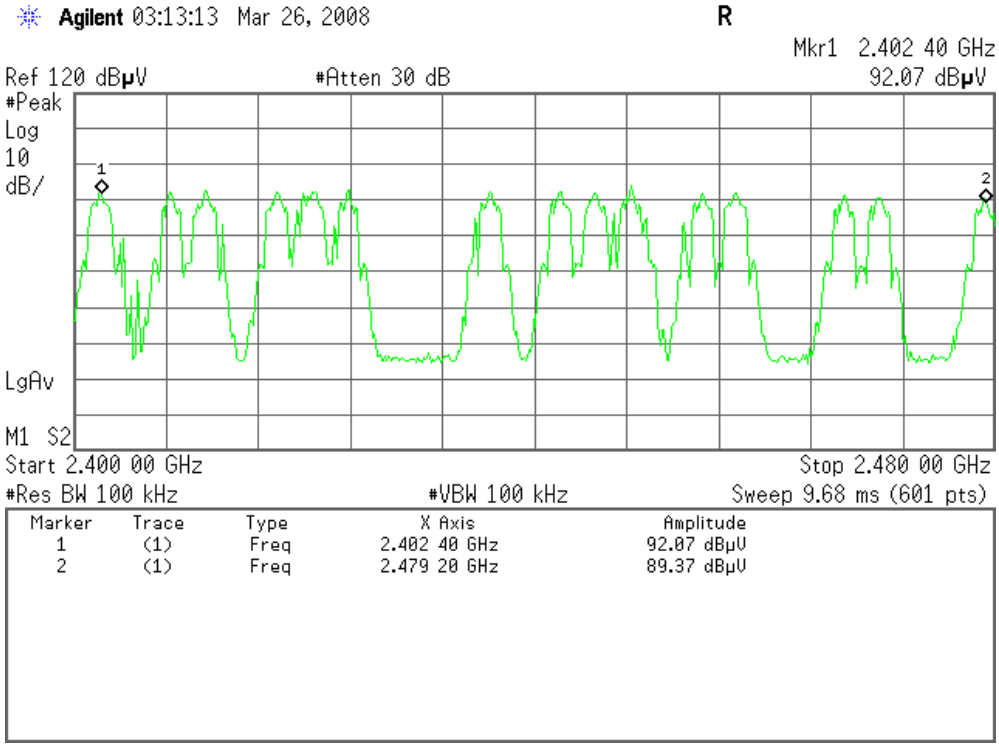
Test Data

Result (No. of CH)	Limit (No. of CH)	Result
15	⩾15	PASS

Test Plot

Channel Number

2.4 GHz – 2.480 GHz



7.4 TIME OF OCCUPANCY (DWELL TIME)

LIMIT

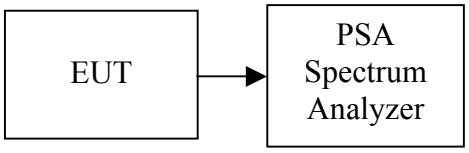
According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US44300399	02/24/2009

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

Test Configuration



TEST PROCEDURE

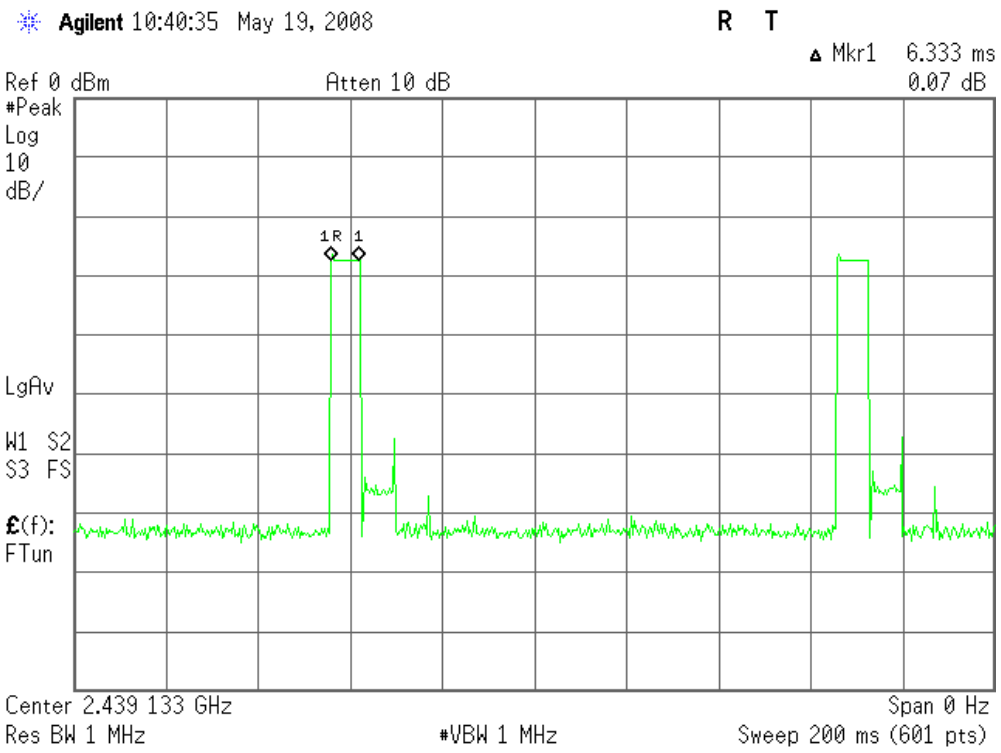
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span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

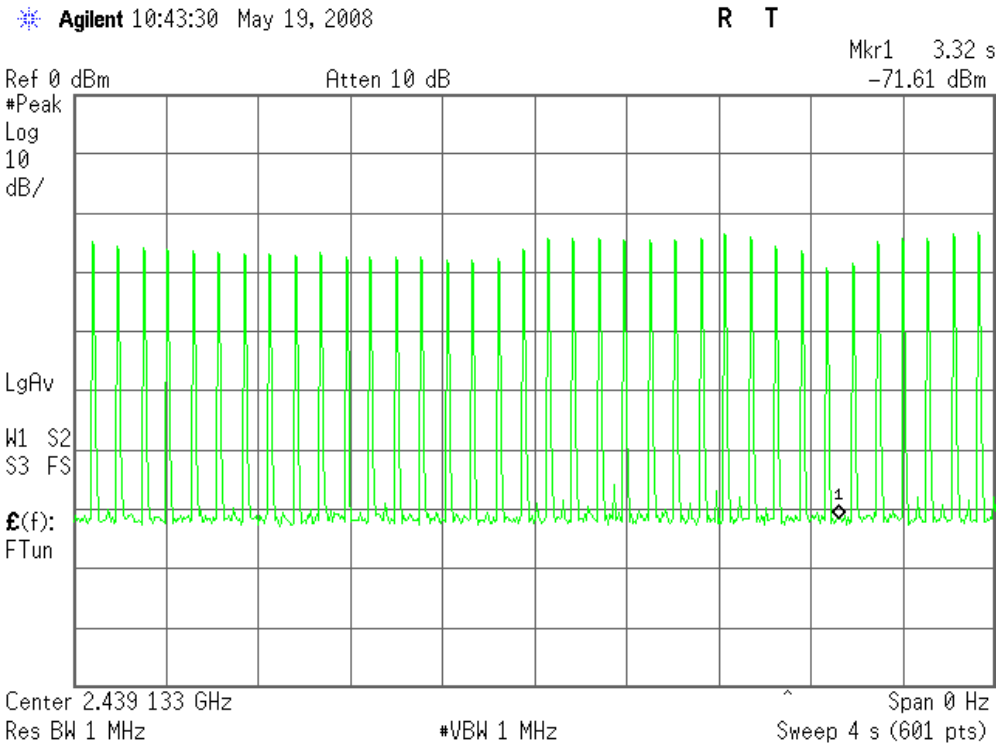
   Centered on a single selected hopping channel. The width of a single is measured in a fast scan. The number of pulse is measured in a 4 second scan, to enable resolution of each occurrence.

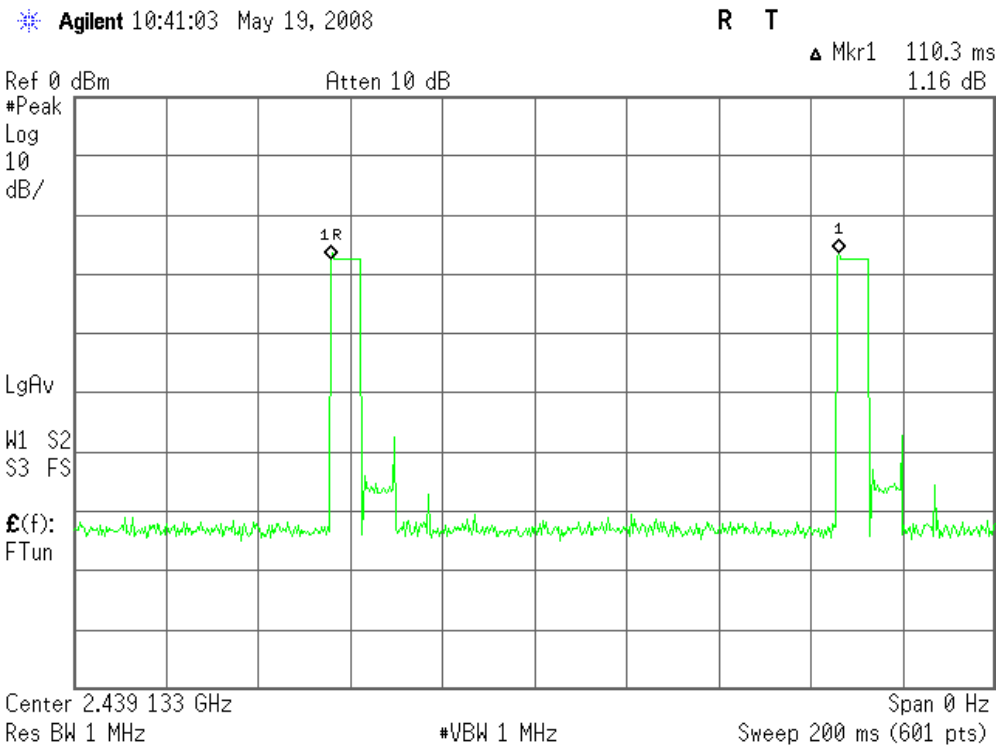
TEST RESULTS

No non-compliance noted

Test Plot







The average time of occupancy in the specified 6 second period (15 channel *0.4s) is equal to 6*(# of pulse in 4s/4)*pulse width.

Pulse width=6.333ms

#pulse in 4s=36

Time of occupancy=6* (36/4)* 6.333=341.98ms≤400ms

7.5 PEAK POWER

LIMIT

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

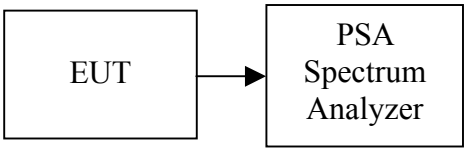
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional 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 6 dBi.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2009

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

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

TEST RESULTS

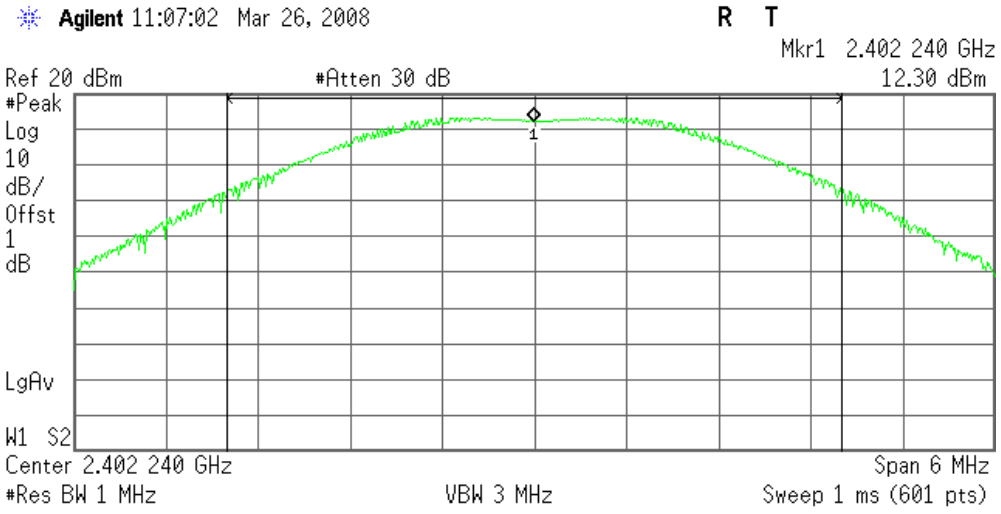
No non-compliance noted

Test Data

Channel	Frequency (MHz)	Output Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	14.56	1.00	15.56	0.03597	1	PASS
Mid	2439	15.21	1.00	16.21	0.04178		PASS
High	2479	15.35	1.00	16.35	0.04315		PASS

Test Plot

Peak power (CH Low)



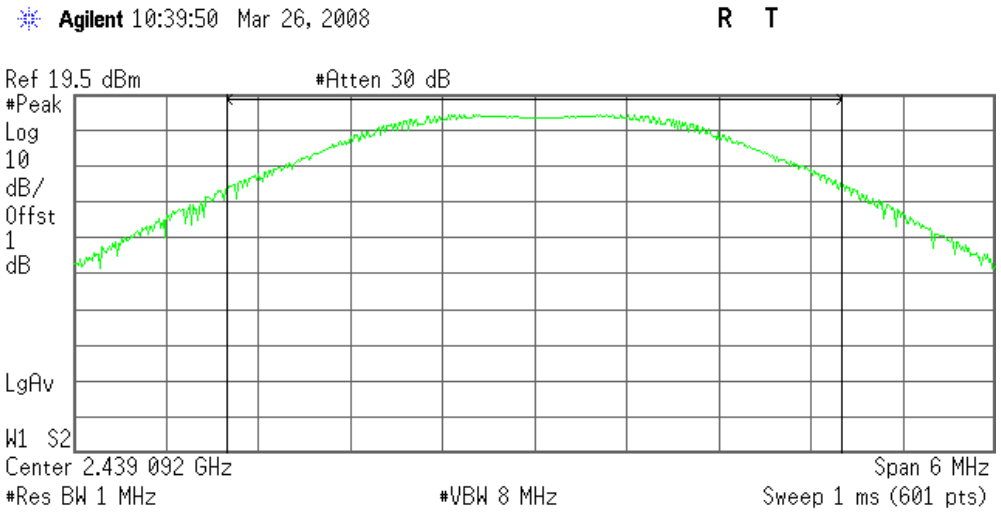
Channel Power

15.56 dBm /4.0000 MHz

Power Spectral Density

-50.46 dBm/Hz

Peak power (CH Mid)



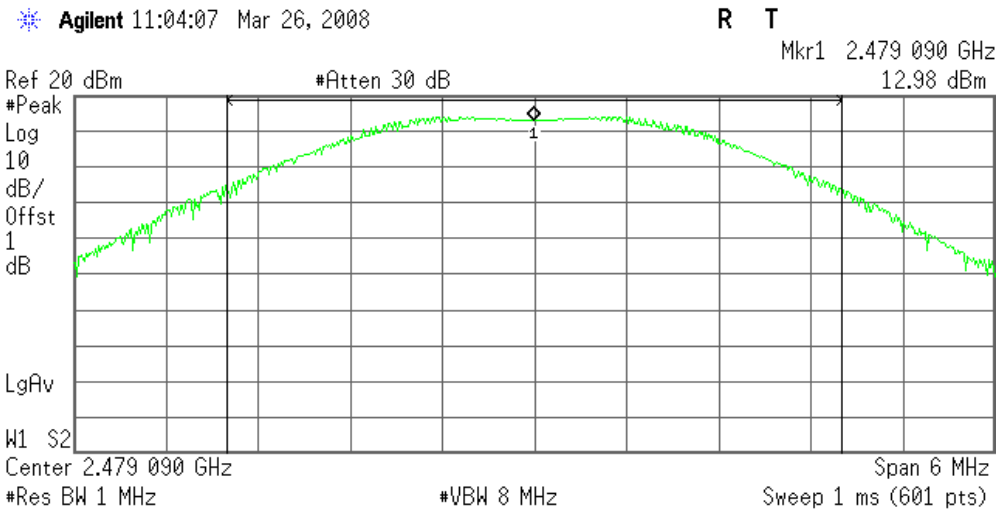
Channel Power

16.21 dBm /4.0000 MHz

Power Spectral Density

-49.81 dBm/Hz

Peak power (CH High)



Channel Power

16.35 dBm /4.0000 MHz

Power Spectral Density

-49.67 dBm/Hz

7.6 BAND EDGES MEASUREMENT

LIMIT

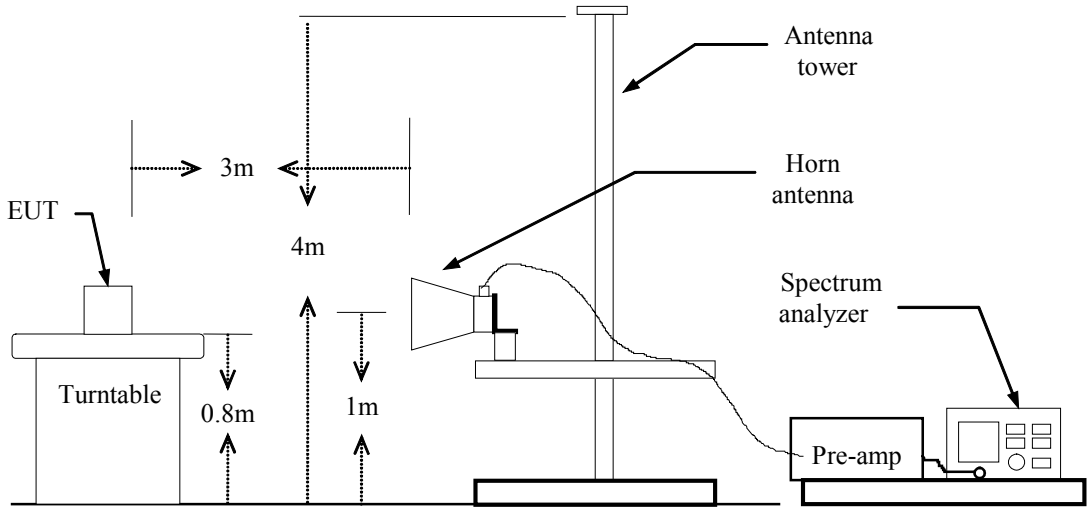
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains 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 in15.209(a).

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2009

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.

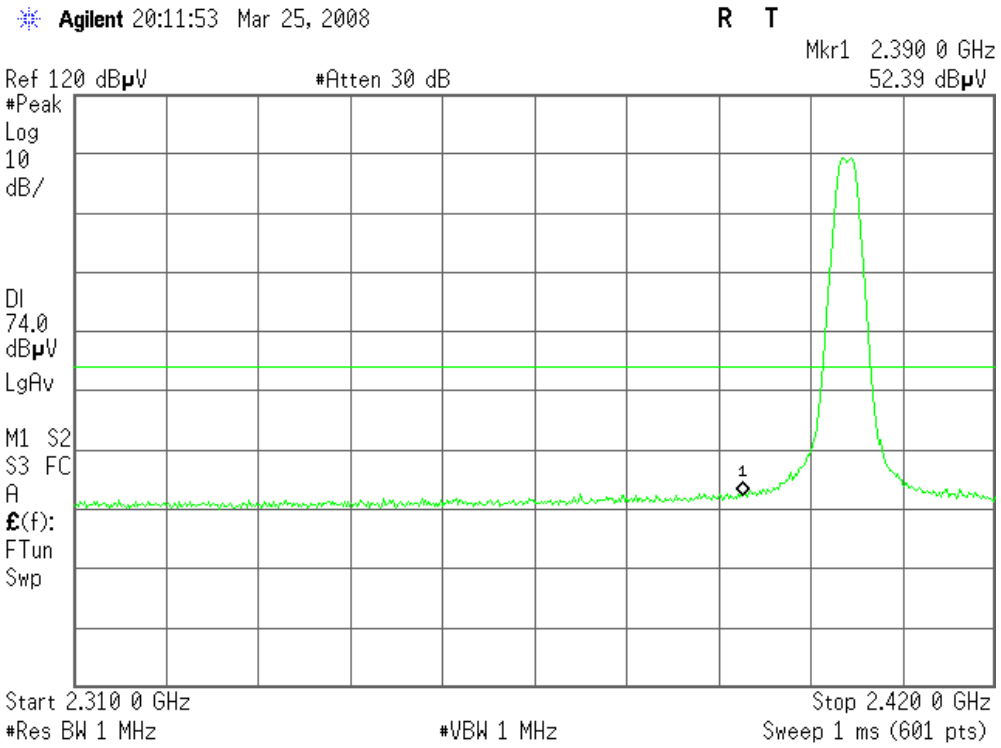
TEST RESULTS

Refer to attach spectrum analyzer data chart.

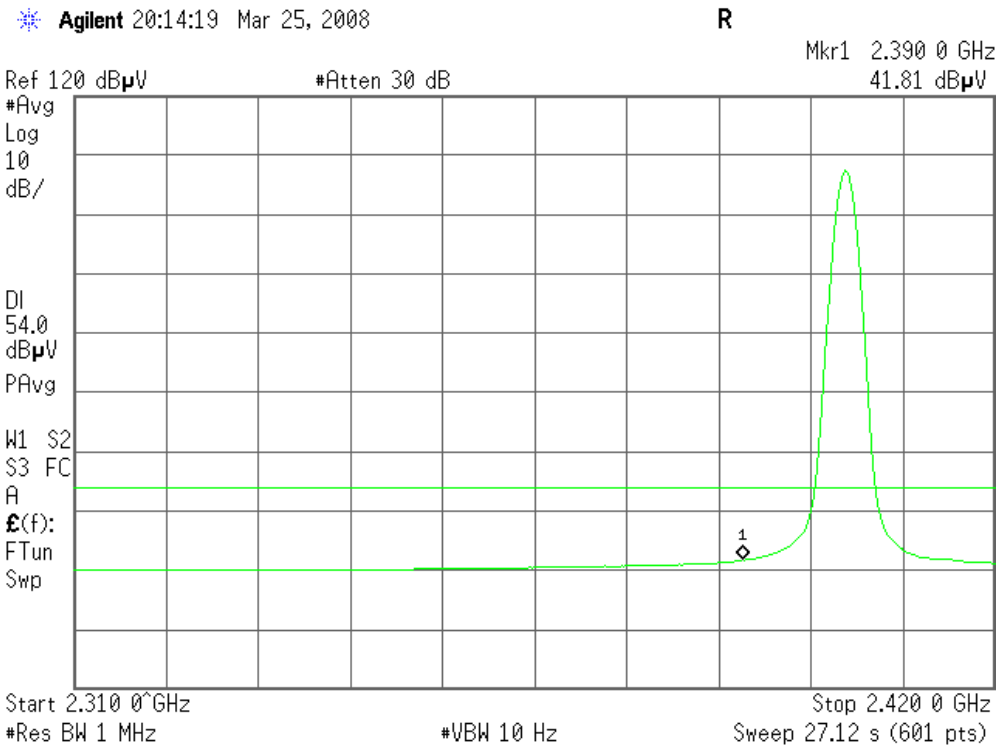
Test Data

Band Edges (CH-Low)

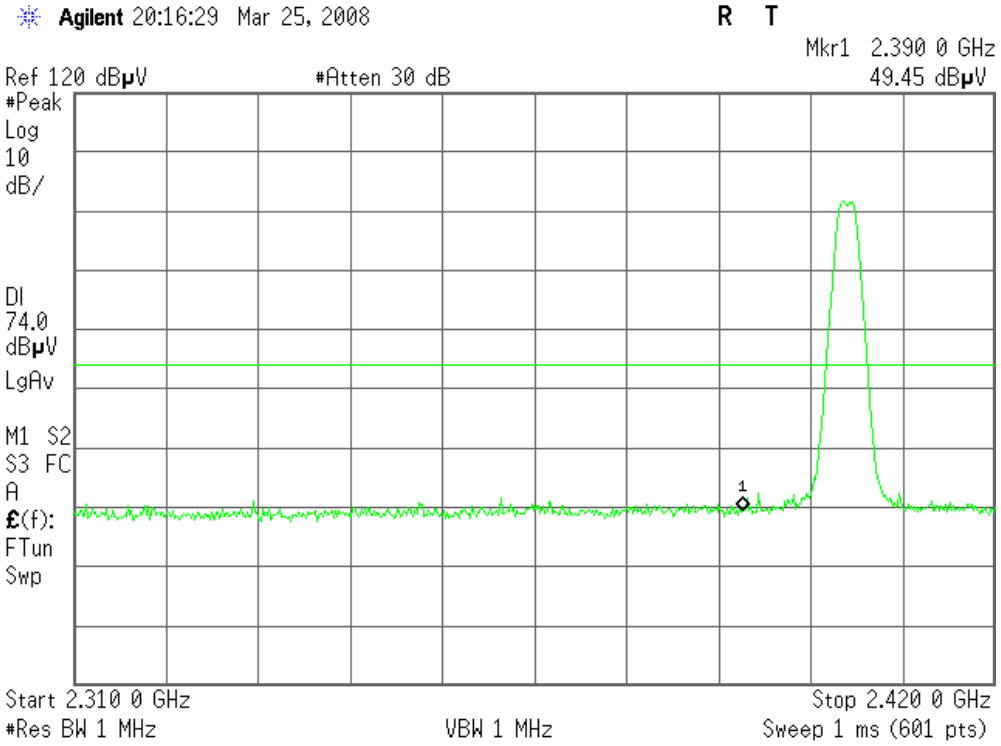
Detector mode: Peak **Polarity: Vertical**



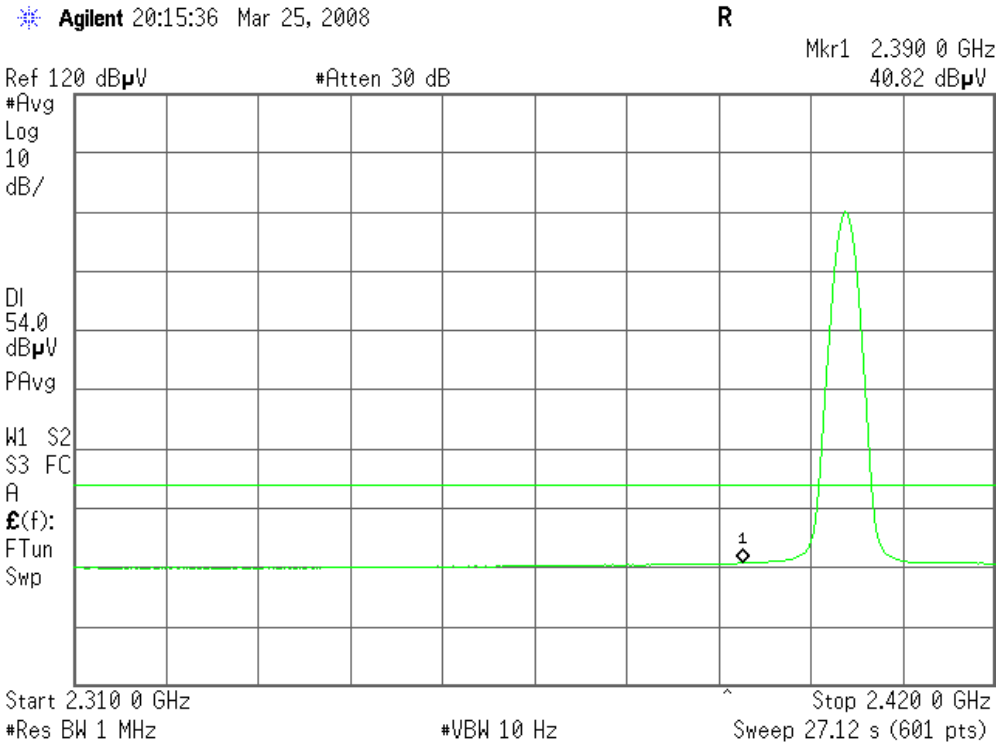
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

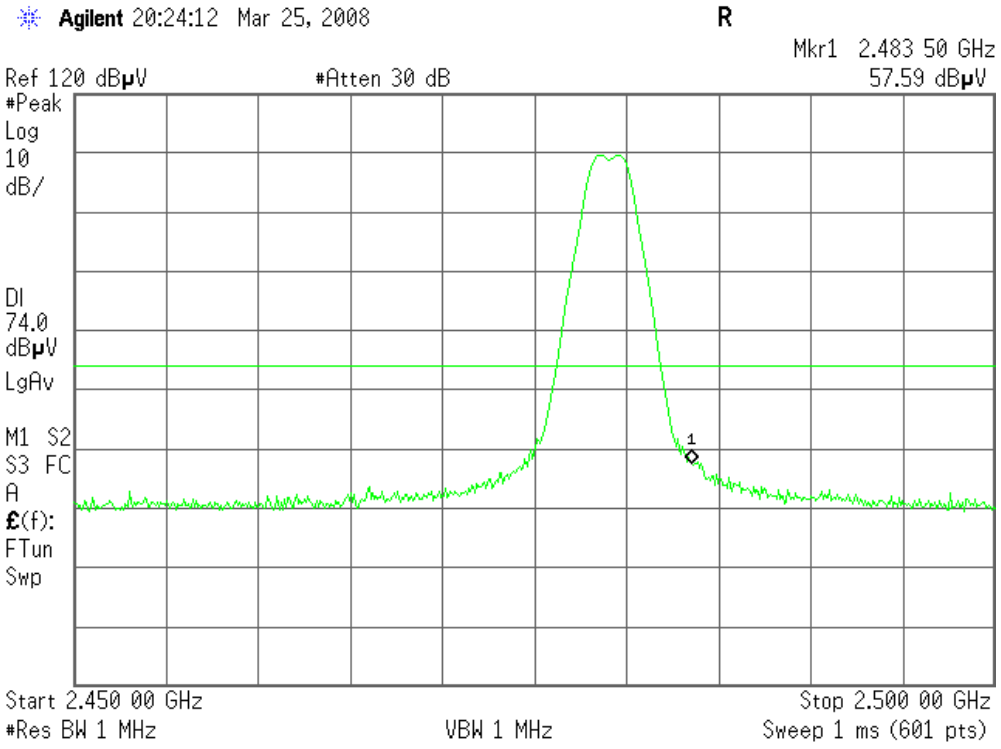


Detector mode: Average **Polarity: Horizontal**

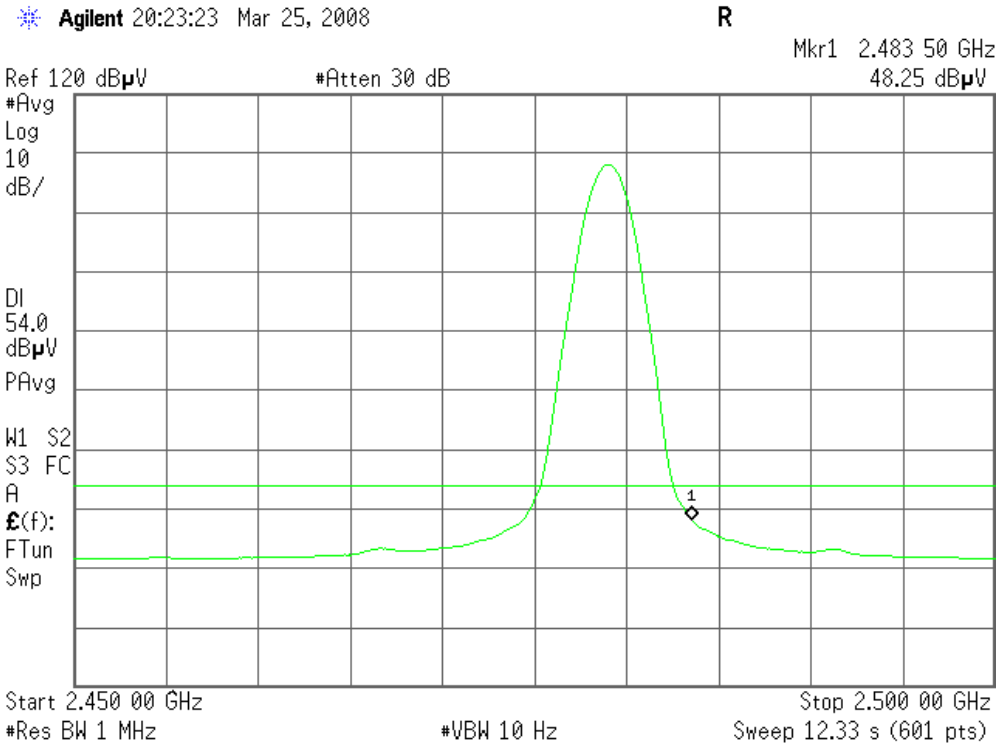


Band Edges (CH-High)

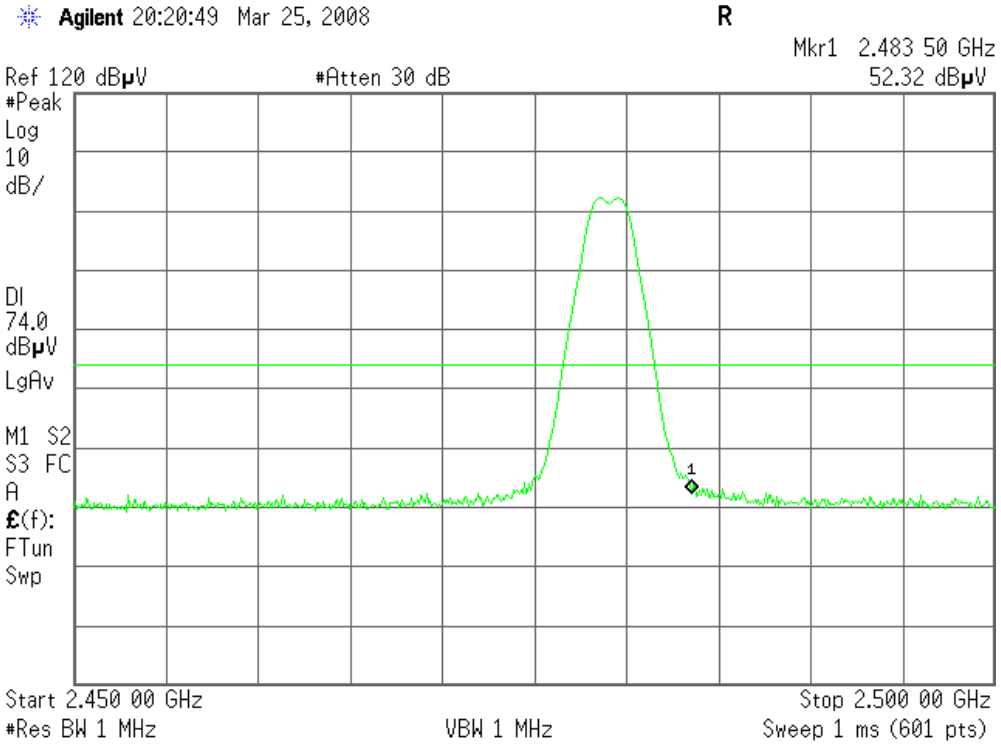
Detector mode: Peak **Polarity: Vertical**



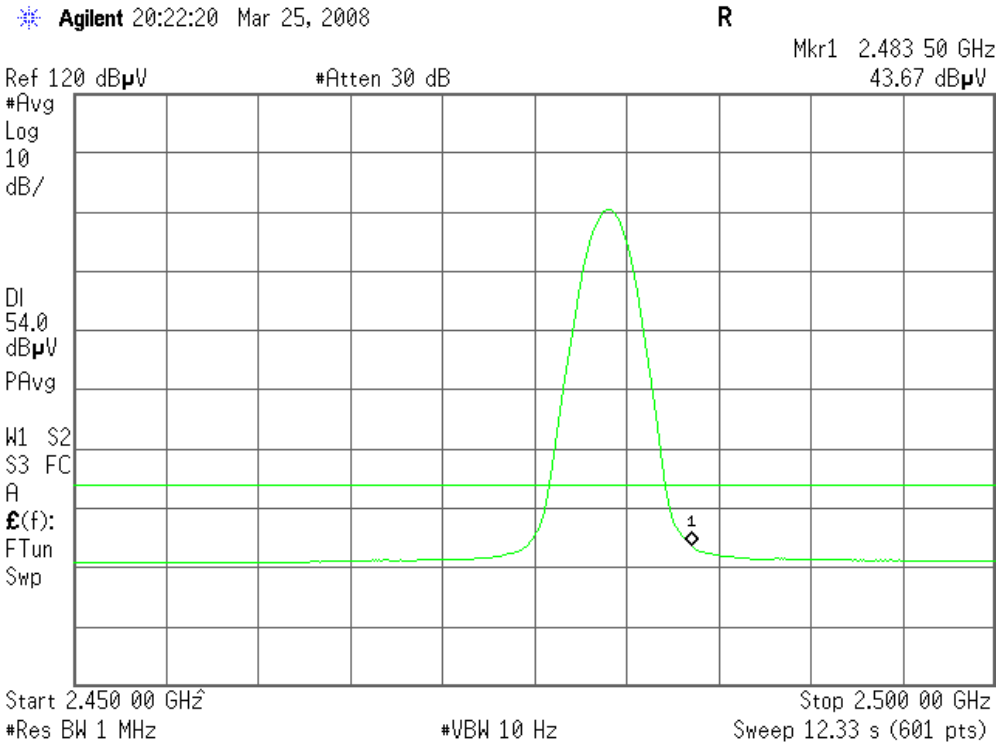
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



7.7 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.

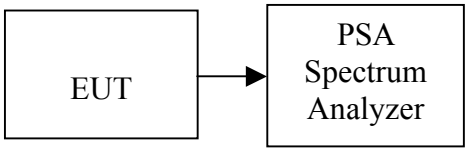
2. The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2009

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.
   Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s

3. Record the max. reading.

4. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

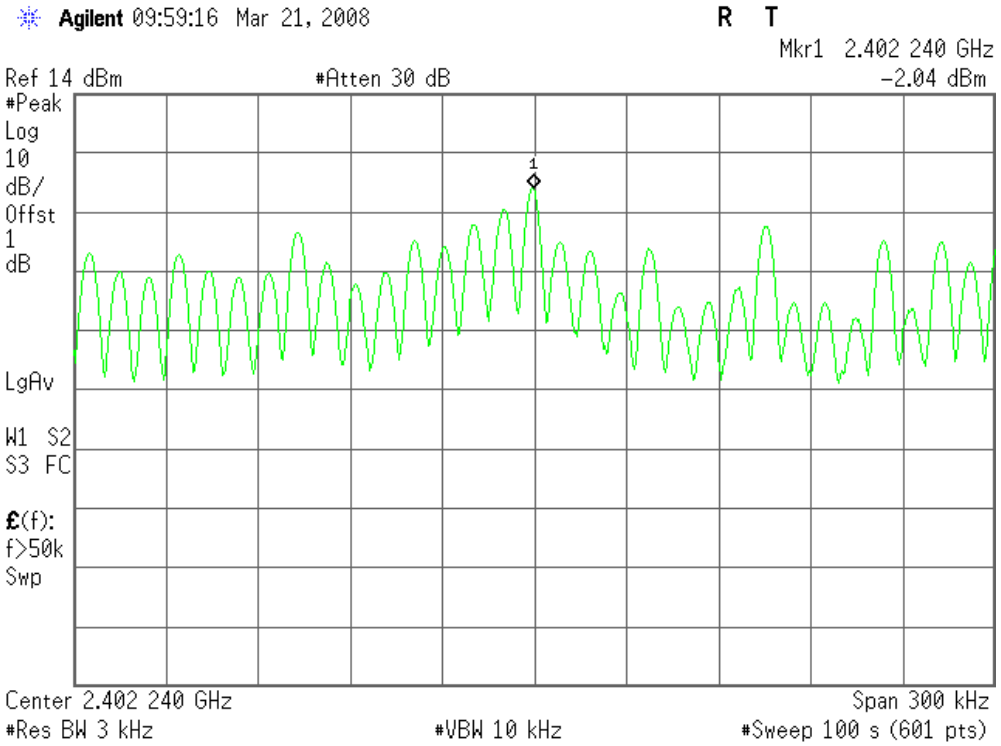
No non-compliance noted

Test Data

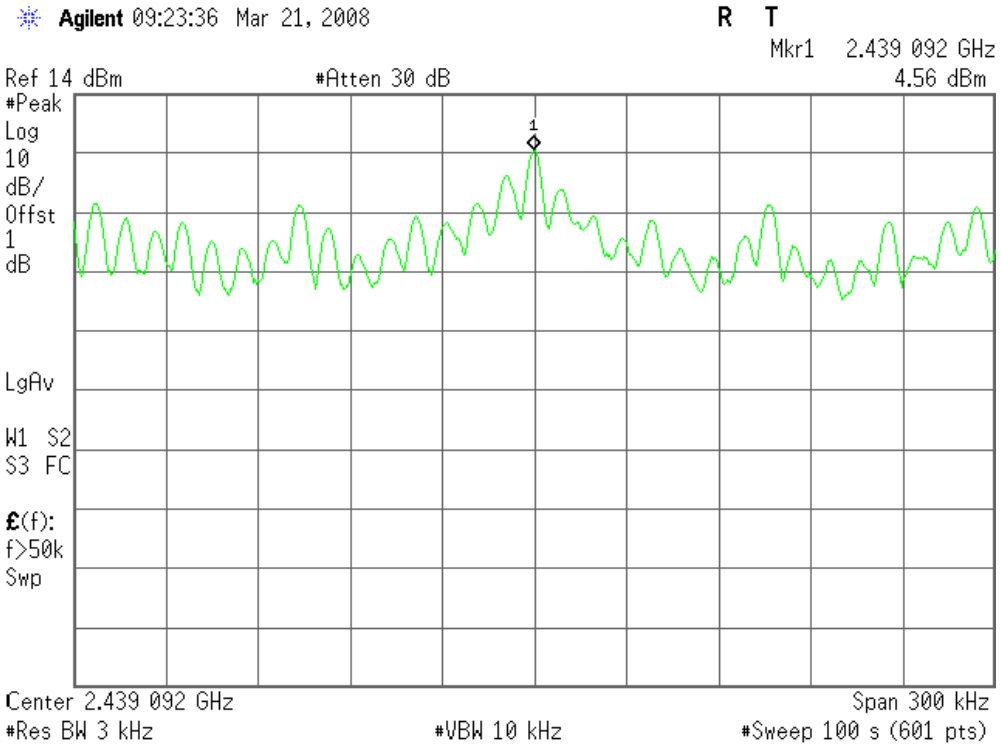
Channel	Frequency	Reading (dBm)	Factor (dB)	PPSD (dBm)	Limit (dBm)	Result
Low	2402	-3.04	1.00	-2.04	8.00	PASS
Mid	2439	3.56	1.00	4.56		PASS
High	2479	1.12	1.00	2.12		PASS

Test Plot

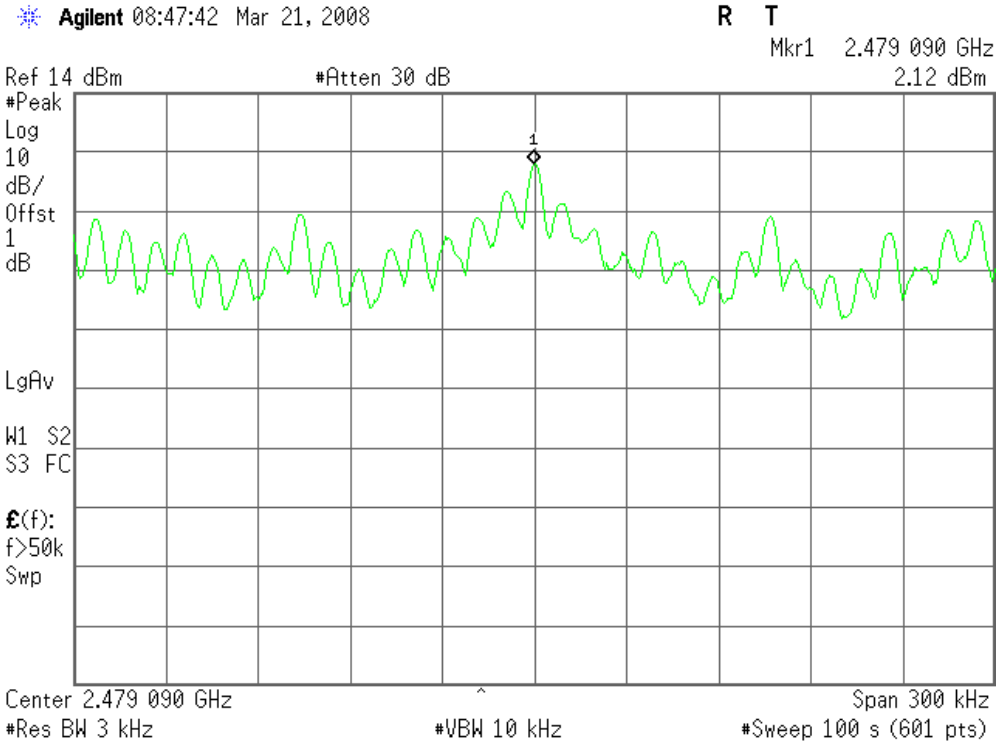
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)


Agilent 08:47:42 Mar 21, 2008
R T
Mkr1 2.479 090 GHz
2.12 dBm
Ref 14 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
1
dB
LgAv
W1 S2
S3 FC
£(f):
f>50k
Swp
Center 2.479 090 GHz
#Res BW 3 kHz
#VBW 10 kHz
Span 300 kHz
#Sweep 100 s (601 pts)

7.8 RADIO FREQUENCY EXPOSURE

LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §15.247(b)(4) and §1.1307(b)(1) of this chapter.

EUT Specification

EUT	2.4GHz Digital Wireless Headphone(US Version)
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5825GHz ☒ Others: 2.402GHz~2.479 GHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others _____
Exposure classification	☐ Occupational/Controlled exposure *(S = 5mW/cm^2)* ☒ General Population/Uncontrolled exposure *(S=1mW/cm^2)*
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	16.35 dBm (43.15mW)
Antenna gain (Max)	0 dBi (Numeric gain: 1)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation

Note:

1. *The maximum output power is 16.35 dBm (43.15mW) at 2479MHz (with 1 numeric antenna gain.)*
2. *For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.*

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \sqrt{\frac{30 \times P \times G}{d}}$ & $S = \frac{E^2}{3770}$

Where E = Field Strength in Volts / meter
P = Power in Watts
G=Numeric antenna gain
d=Distance in meters
S=Power Density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{\frac{30 \times P \times G}{3770 \times S}}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

*d (cm) =100 * d (m)*

Yields

$$d = 100 \times \sqrt{\frac{30 \times (P/1000) \times G}{3770 \times S}} = 0.282 \times \sqrt{\frac{P \times G}{S}}$$

Where d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW / cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and

G (numeric) = 10 ^ (G (dBi) / 10)

Yields

$$d = 0.282 \times \frac{10^{(P+G)/20}}{\sqrt{20}}$$ ***Equation 1***

Where d = MPE safe distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW / cm^2

Maximum Permissible Exposure (2.4 GHz Band)

S = Maximum power density (mW/cm^2)

P = Power input to the antenna (mW). = 43.15

G = Numeric power gain of the antenna = 1

R = Distance to the center of the radiation of the antenna (20cm = limit for MPE) = 0.02^2

The maximum permissible exposure (MPE) for the general population is 1.00 mW/cm^2.

$(43.15 * 1) / (4\pi * 0.02^2) = 0.0086$ mW/cm^2

The power density at 20cm does not exceed the 1 mW/cm^2 limit. Therefore, the exposure condition is compliant with FCC rules.

7.9 SPURIOUS EMISSIONS

7.6.1 Conducted Measurement

LIMIT

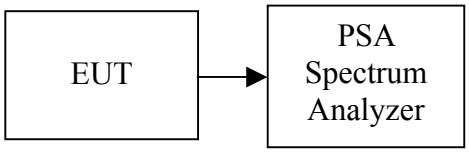
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2009

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 26GHzrange with the transmitter set to the lowest, middle, and highest channels.

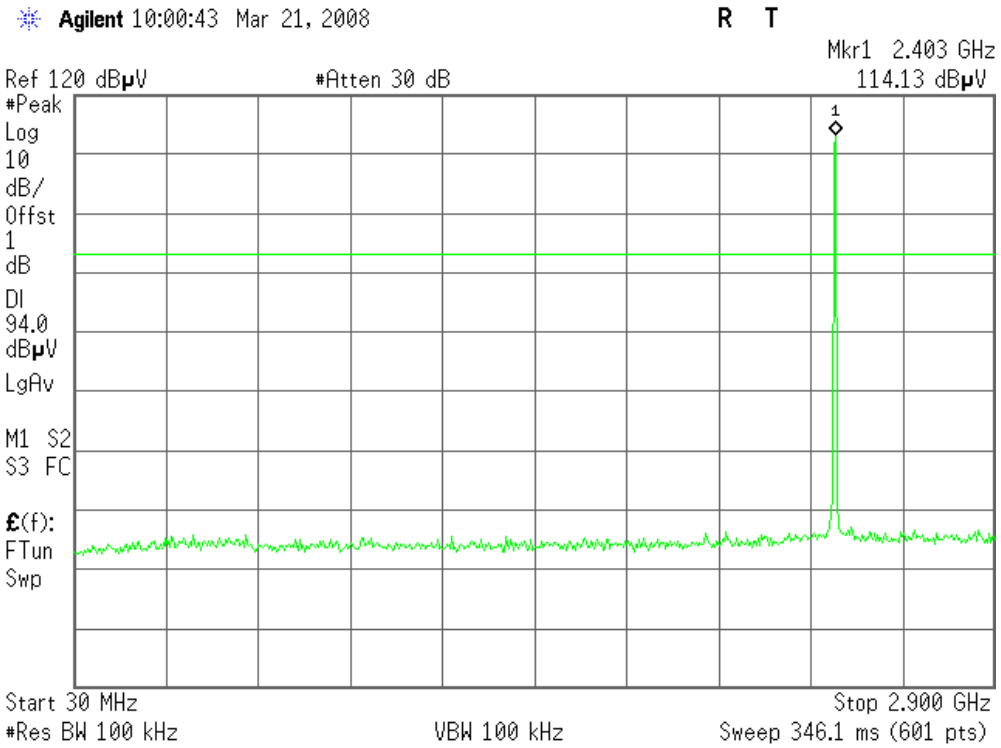
TEST RESULTS

No non-compliance noted

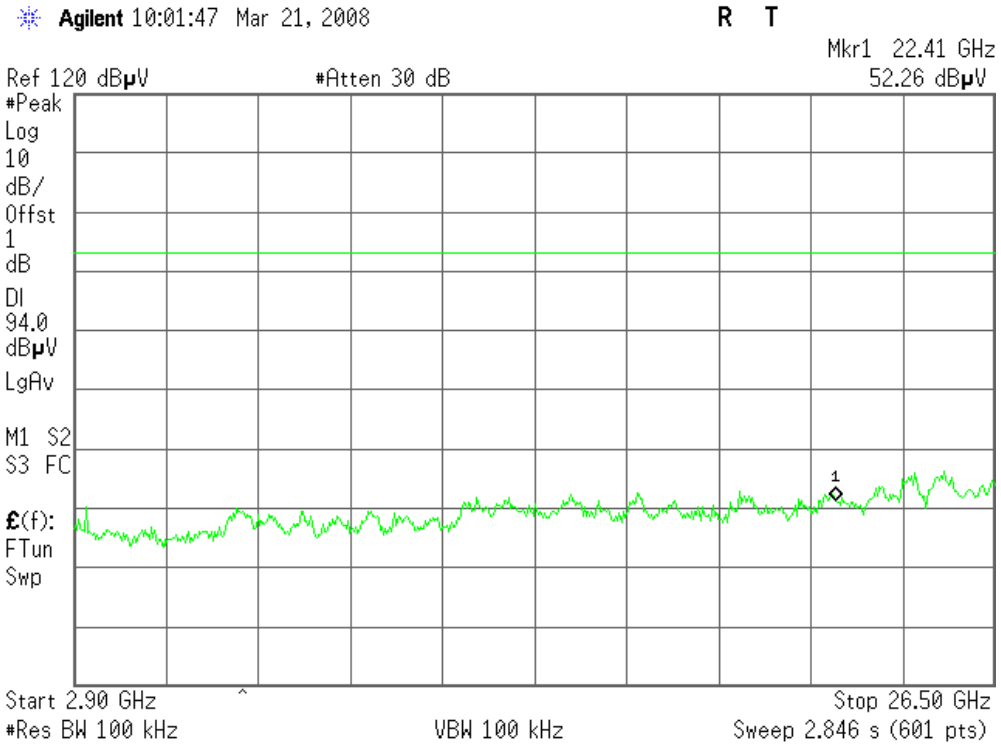
Test Plot

CH Low

30MHz – 2.9GHz

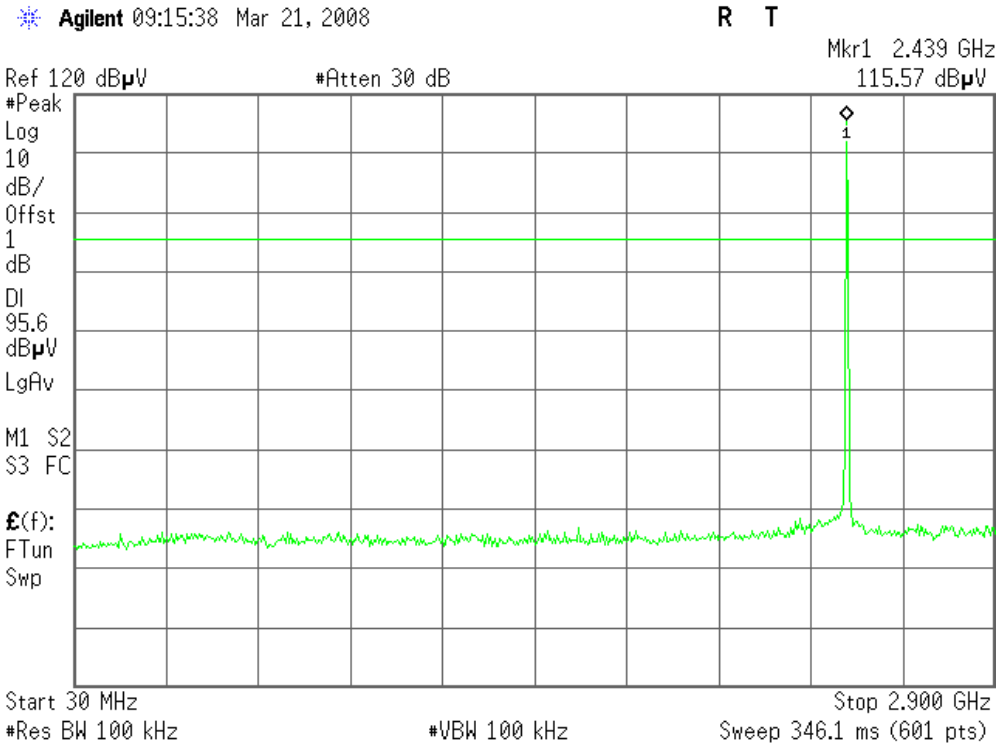


2.9GHz – 26.5GHz

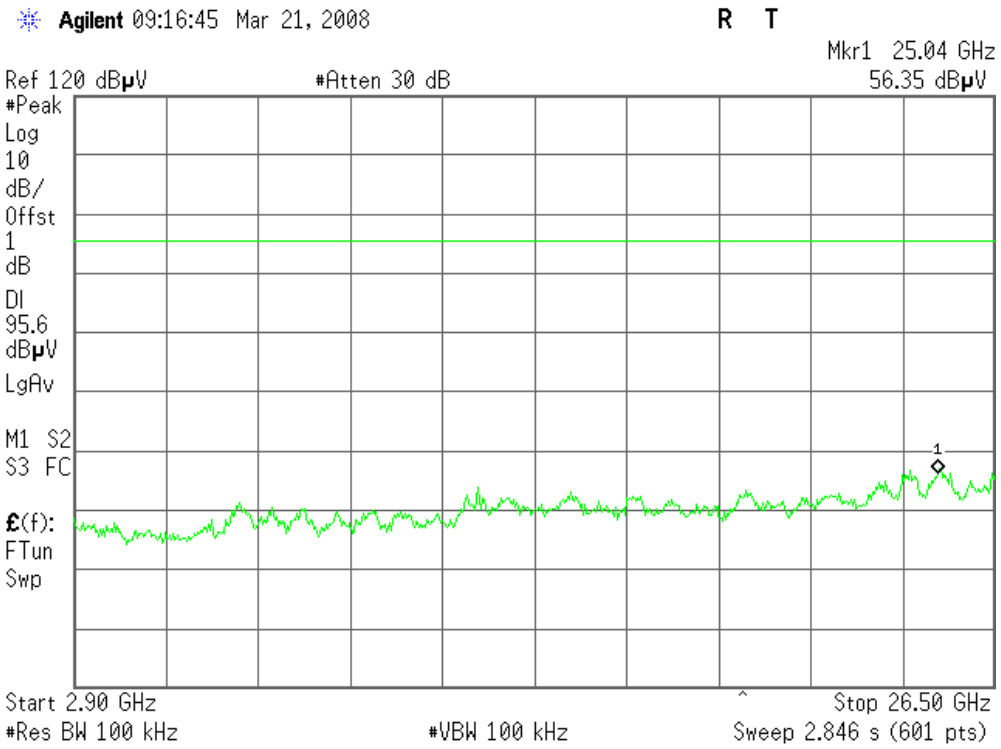


CH Mid

30MHz – 2.9GHz

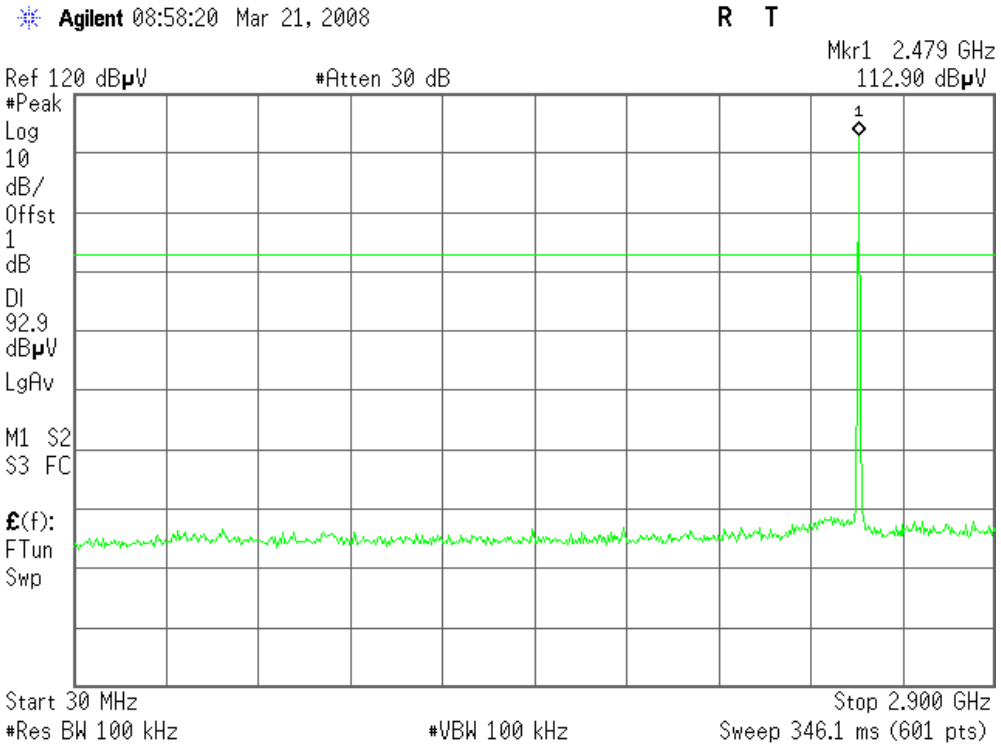


2.9GHz – 26.5GHz

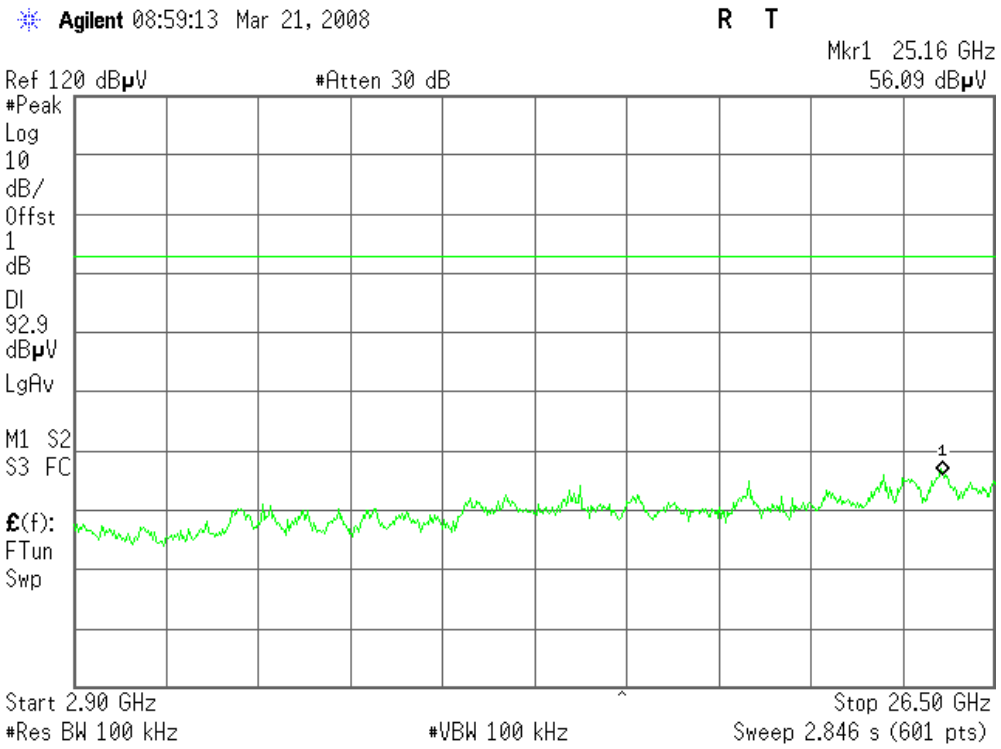


CH High

30MHz – 2.9GHz



2.9GHz – 26.5GHz



7.6.2 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)
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 (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

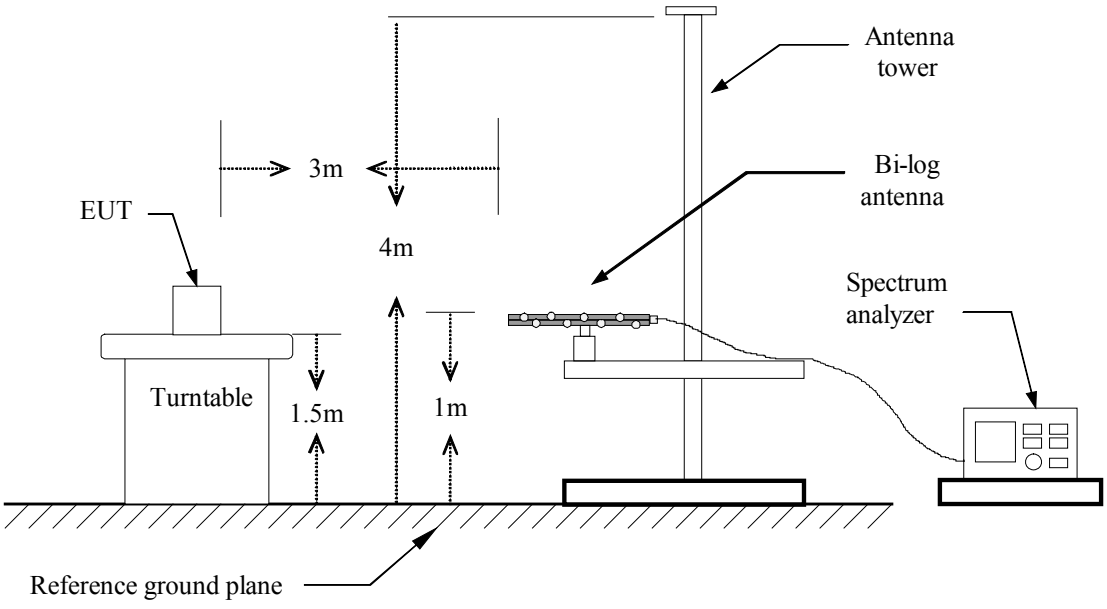
MEASUREMENT EQUIPMENT USED

966 RF CHAMBER 2				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2009
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2009
Pre-Amplifier	MITEQ	N/A	AFS42-00102650-42-10P-42	02/14/2009
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2008
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
RF Comm. Test set	HP	8920B	US36142090	N.C.R
Site NSA	C&C	N/A	N/A	06/09/2008
Horn Antenna	TRC	N/A	N/A	03/04/2009

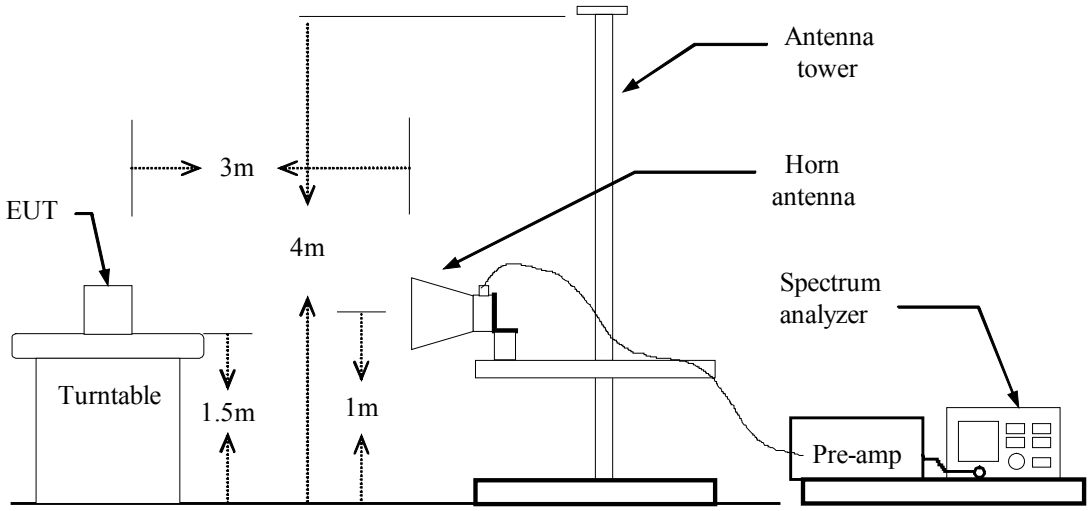
Remark: *Each piece of equipment is scheduled for calibration once a year.*

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: Normal Link **Test Date:** January 16,2008

Temperature: 25°C **Tested by:** Tom Gan

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
36.750	V	Peak	42.54	-9.67	32.87	40.00	-7.13
39.900	V	Peak	40.17	-11.59	28.58	40.00	-11.42
52.050	V	Peak	42.80	-15.88	26.92	40.00	-13.08
61.500	V	Peak	43.97	-17.40	26.57	40.00	-13.43
135.300	V	Peak	42.05	-16.57	25.48	43.50	-18.02
295.050	V	Peak	40.46	-11.05	29.41	46.00	-16.59
36.750	H	Peak	42.29	-9.67	32.62	40.00	-7.38
46.200	H	Peak	49.97	-14.13	35.84	40.00	-4.16
61.500	H	Peak	43.82	-17.40	26.42	40.00	-13.58
85.800	H	Peak	38.79	-16.29	22.50	40.00	-17.50
119.550	H	Peak	47.03	-16.67	30.36	43.50	-13.14
751.500	H	Peak	32.52	-4.33	28.19	46.00	-17.81

Notes:

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/Quasi-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:** March 21,2008

Temperature: 20°C **Tested by:** Tom Gan

Humidity: 70 % RH **Polarity:** Ver. / Hor.

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)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1553.33	V	55.70	---	-9.21	46.49	---	74.00	54.00	-7.51	Peak
1773.33	V	56.21	---	-8.35	47.86	---	74.00	54.00	-6.14	Peak
1980.00	V	56.37	---	-7.54	48.83	---	74.00	54.00	-5.17	Peak
4808.33	V	45.62	---	0.65	46.27	---	74.00	54.00	-7.73	Peak
N/A										
1830.00	H	50.52	---	-8.13	42.39	---	74.00	54.00	-11.61	Peak
2126.66	H	51.14	---	-6.96	44.18	---	74.00	54.00	-9.82	Peak
2723.33	H	50.30	---	-4.86	45.44	---	74.00	54.00	-8.56	Peak
4808.33	H	45.64	---	0.65	46.29	---	74.00	54.00	-7.71	Peak
N/A										

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 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX (CH Mid) **Test Date:** March 21,2008

Temperature: 20°C **Tested by:** Tom

Humidity: 70 % RH **Polarity:** Ver. / Hor.

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)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1263.33	V	57.37	---	-10.72	46.65	---	74.00	54.00	-7.35	Peak
1646.66	V	56.87	---	-8.85	48.02	---	74.00	54.00	-5.98	Peak
1866.66	V	58.36	---	-7.98	50.38	---	74.00	54.00	-3.62	Peak
4866.66	V	46.56	---	0.75	47.31	---	74.00	54.00	-6.69	Peak
N/A										
1746.66	H	56.37	---	-8.45	47.92	---	74.00	54.00	-6.08	Peak
1953.33	H	56.05	---	-7.64	48.41	---	74.00	54.00	-5.59	Peak
2160.00	H	57.54	---	-6.83	50.71	---	74.00	54.00	-3.29	Peak
4866.66	H	46.80	---	0.75	47.55	---	74.00	54.00	-6.45	Peak
N/A										

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 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

Operation Mode: TX (CH High) **Test Date:** March 21,2008

Temperature: 20°C **Tested by:** Tom

Humidity: 70 % RH **Polarity:** Ver. / Hor.

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)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1713.33	V	57.49	---	-8.58	48.91	---	74.00	54.00	-5.09	Peak
2083.33	V	58.05	---	-7.13	50.92	---	74.00	54.00	-3.08	Peak
2190.00	V	57.90	---	-6.71	51.19	---	74.00	54.00	-2.81	Peak
4933.33	V	46.12	---	0.87	46.99	---	74.00	54.00	-7.01	Peak
N/A										
1816.66	H	56.32	---	-8.18	48.14	---	74.00	54.00	-5.86	Peak
2163.33	H	57.06	---	-6.81	50.25	---	74.00	54.00	-3.75	Peak
2813.33	H	57.40	54.82	-4.61	52.79	50.21	74.00	54.00	-3.79	AVG.
4950.00	H	45.95	---	0.89	46.84	---	74.00	54.00	-7.16	Peak
N/A										

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 1GH z- 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.*

7.10 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 (dBμV)	
	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

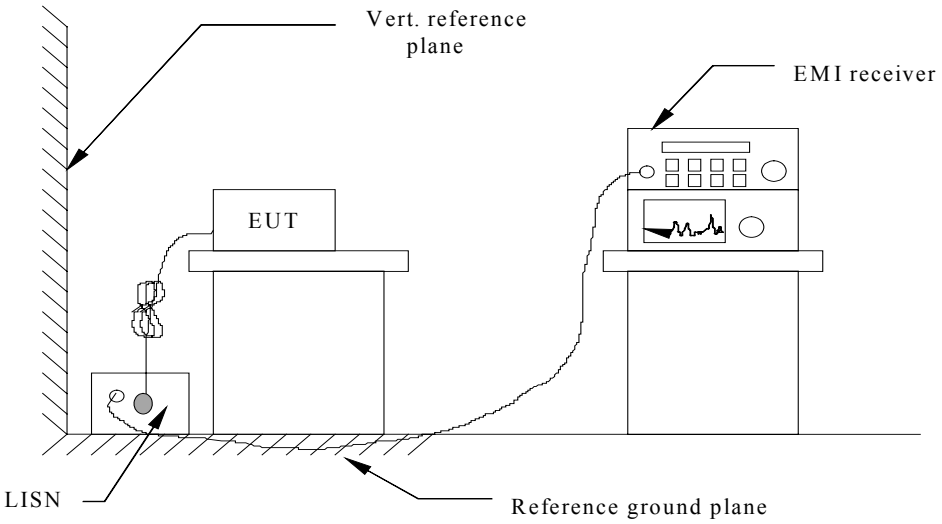
Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power Line (LINE and NEUTRAL) and ground at the power terminals.

MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site G				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	100088	02/05/2008
LISN	EMCO	3825/2	1371	02/05/2008
LISN	EMCO	3825/2	8901-1459	02/05/2008

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

Test Mode: Normal link	**Location:** Site G
Model Name: DHP390	**Test Date:** January 23, 2008
Tested by: Tom	**Test Results:** Passed

(The chart below shows the highest readings taken from the final data)

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.298	47.59	37.95	31.47	61.76	51.76	-23.81	-20.29	L1
0.368	53.59	48.38	40.06	59.75	49.75	-11.37	-9.69	L1
0.728	45.42	40.21	32.46	56.00	46.00	-15.79	-13.54	L1
1.180	33.30	---	---	56.00	46.00	---	-12.70	L1
9.863	31.82	---	---	60.00	50.00	---	-18.18	L1
13.791	27.53	---	---	60.00	50.00	---	-22.47	L1
0.157	58.77	49.49	41.57	65.79	55.79	-16.30	-14.22	L2
0.276	49.15	---	---	62.40	52.40	---	-3.25	L2
0.365	51.98	44.29	34.58	59.86	49.86	-15.57	-15.28	L2
0.754	43.00	37.46	31.02	56.00	46.00	-18.54	-14.98	L2
1.180	34.42	---	---	56.00	46.00	---	-11.58	L2
3.819	31.63	---	---	56.00	46.00	---	-14.37	L2

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.*
5. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

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,*

Limit dBuV *= Limit stated in standard*

Margin dB *= Reading in reference to limit*

Calculation Formula

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

Common Mode Conducted Emission

Not applicable

APPENDIX 1
PHOTOGRPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST

RADIATED EMISSION TEST