World Standardization Certification &Testing CO.,LTD
World Standardization Safety and EMC Testing Centre

FCC 47 CFR PART 15 SUBPART C

TEST REPORT

Report Number: WSCT08060123E-RF

For

WII 2.4G Wireless Left Joystick

Model: W-034

Trade Name: N/A

Prepared for

GT-COUPE(HK) ELECTRONIC CO.,LTD
A/10E,3/F9#,ZhuangBian GongYeYiRoad,ZhuangBian GongYeZone,
XiXiangTown,Baoan District Shenzhen,China

Prepared by

WORLD STANDARDIZATION CERTIFICATION & TESTING CO., LTD.
1-2/F, DACHONG KEJI BUILDING NO.25 OF TONGGU ROAD,
NANSHAN DISTRICT, SHENZHEN. PRC

TEL: 86-755-26996192
FAX: 86-755-26996253

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

Applicant:	GT-COUPE(HK) ELECTRONIC CO.,LTD #9, ZhuangBian GongYeYiRoad, ZhuangBianGongYeZone, XiXiangTown, BaoAn ShenZhen, China
Equipment Under Test:	WII 2.4G Wireless Left Joystick
Trade Name:	N/A
Model:	W-034
Date of Test:	July 01-07, 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 World Standardization Certification & Testing Co., Ltd. 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 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.

Tested By: Divan Dai (Divan Dai) Date: 2008.7.18

Check By: Joe Lin (Joe Lin) Date: 2008.7.18

Approved By: Sula Huang (Sula Huang) Date: 2008.7.18

2. EUT DESCRIPTION

Product	WII 2.4G Wireless Left Joystick
Trade Name	N/A
Model Number	W-034
Model Discrepancy	N/A
Power Supply	DC 3V Powered by built-in battery
Frequency Range	2402 ~ 2483MHz
Transmit Power	1.18 dBm
Modulation Technique	FHSS
Number of Channels	79
Antenna Specification	PCB Antenna Gain: -3dBi (max)
Temperature Range	0 ~ +50°C

Note: *This submittal(s) (test report) is intended for FCC ID: WHKW-034 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. Radiated testing was performed at an antenna to EUT distance 3 meters.

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.

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.

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. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.

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
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 -	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.

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.

Channel low, mid and high with highest data rate (worst case) are 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

FACILITIES

All measurement facilities used to collect the measurement data are located at 1-2/F, Dachong Science&Technology Building,No.28 of Tonggu Road,Nanshan District, ShenZhen.PRC.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

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.”

LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by FCC. Oct 06.2007. The certificate registration number is 276008 to perform Electromagnetic Interference tests according to FCC PART 15 and CISPR 22 requirements.

6. SETUP OF EQUIPMENT UNDER TEST

SETUP CONFIGURATION OF EUT

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

SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
Wii	Nintendo	RVL-001(JPN)	RVL-001(JPN)	POOWML-C43	Un-Shielded 1.5m	N/A
Wii	Nintendo	RVL-003	N/A	POOWML-C45	N/A	N/A
TV	TCL	1475s	N/A	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

PEAK POWER

LIMIT

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

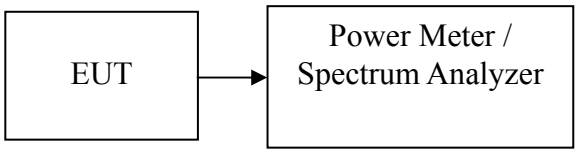
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional 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
RF Power Meter & Sensor	Anritsu	ML2487A	6K00001491	02/23/2009

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

Channel	Frequency (MHz)	Reading Power (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-0.16	1.00	0.84	0.00121	1	PASS
Mid	2441	0.14	1.00	1.14	0.00130		PASS
High	2480	0.18	1.00	1.18	0.00131		PASS

PEAK POWER SPECTRAL DENSITY

LIMIT

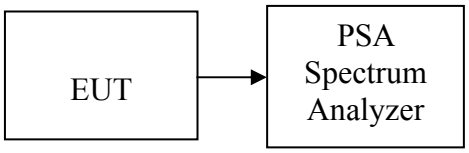
1. For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
2. The direct sequence operating of the hybrid system, with the frequency hopping 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	02/08/2009

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 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

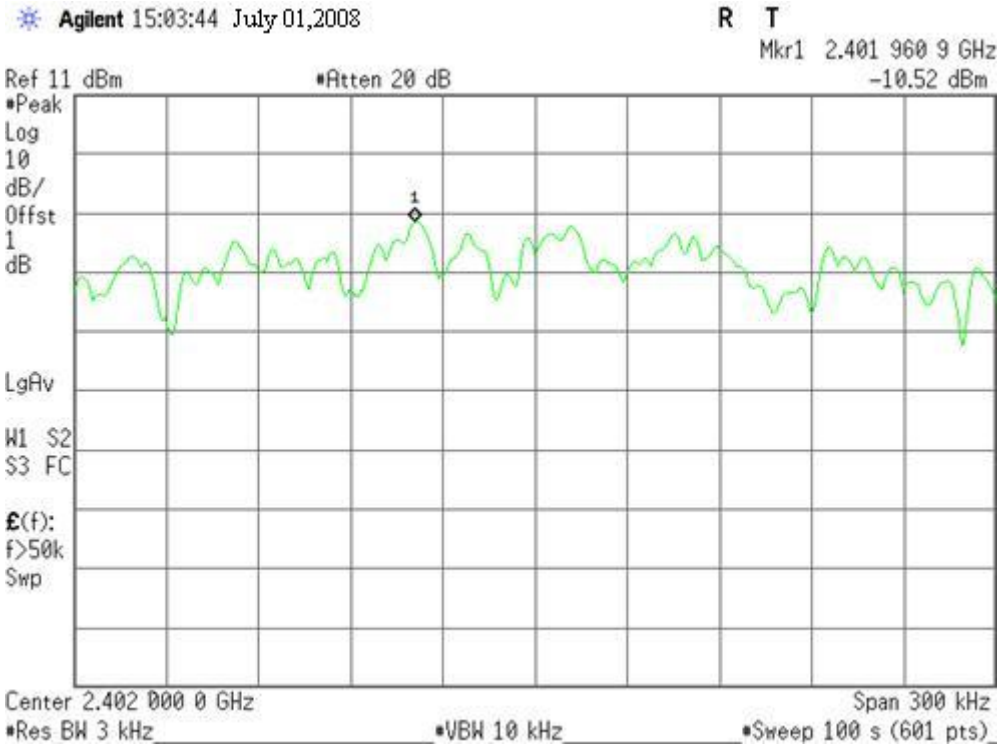
No non-compliance noted

Test Data

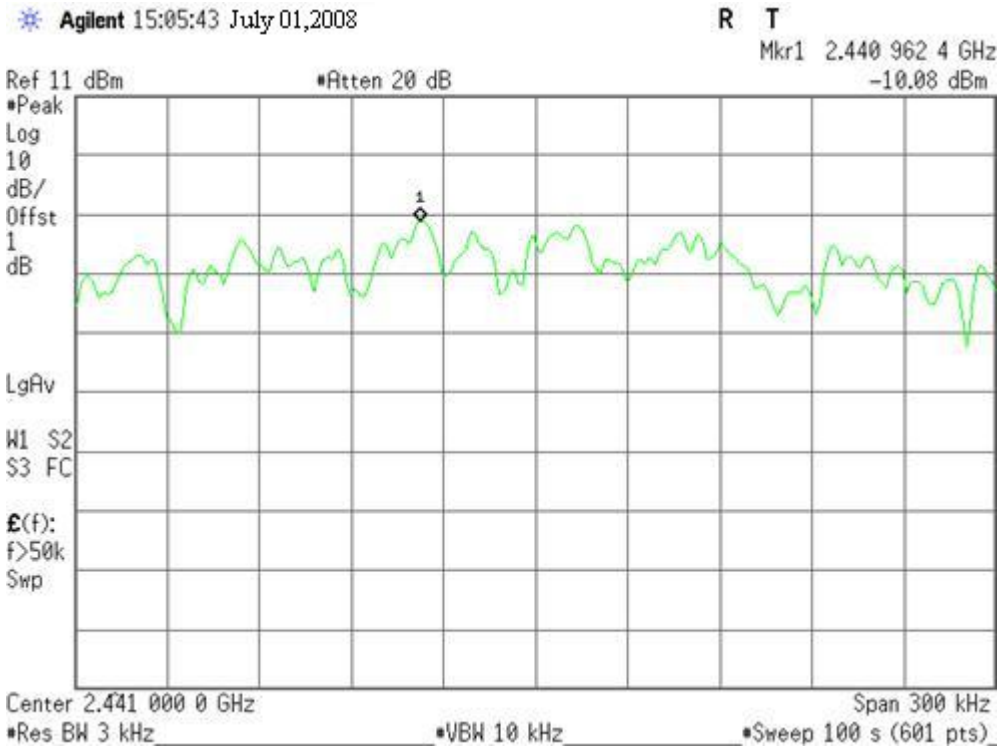
Channel	Frequency	Reading (dBm)	Factor (dB)	PPSD (dBm)	Limit (dBm)	Result
Low	2402	-11.52	1.00	-10.52	8.00	PASS
Mid	2441	-11.08	1.00	-10.08		PASS
High	2480	-11.02	1.00	-10.02		PASS

Test Plot

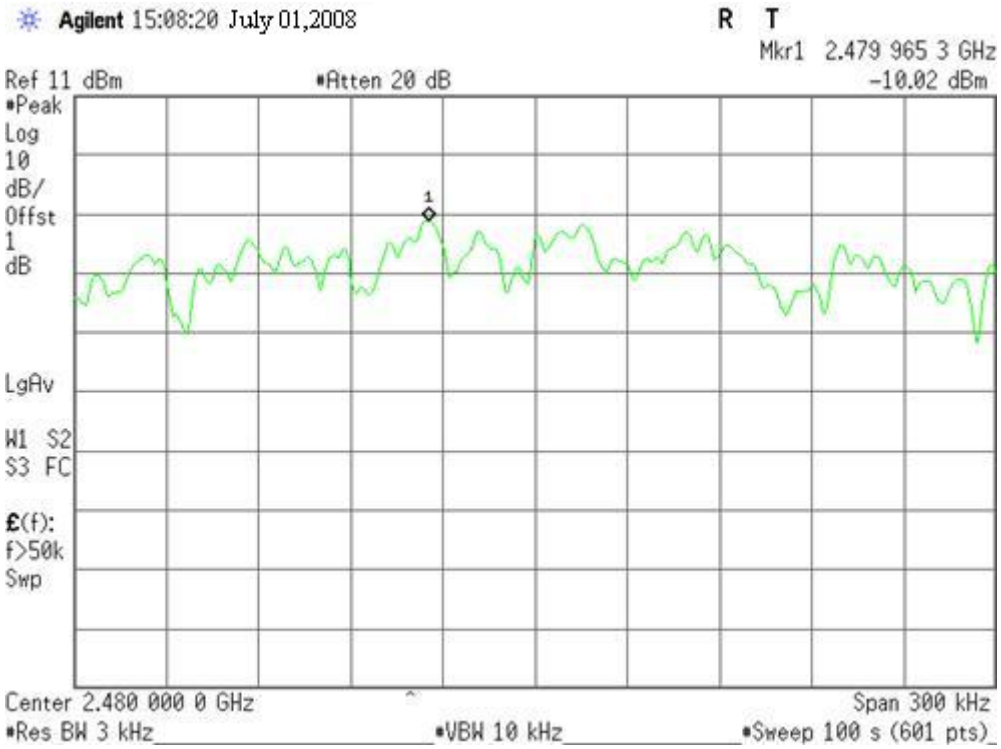
PPSD (CH Low)



PPSD (CH Mid)



PPSD (CH High)


Agilent 15:08:20 July 01,2008
R T
Mkr1 2.479 965 3 GHz
-10.02 dBm
Ref 11 dBm
#Atten 20 dB
#Peak
Log
10
dB/
Offst
1
dB
LgAv
W1 S2
S3 FC
£(f):
f>50k
Swp
Center 2.480 000 0 GHz
Span 300 kHz
#Res BW 3 kHz
#VBW 10 kHz
#Sweep 100 s (601 pts)

BAND EDGES MEASUREMENT

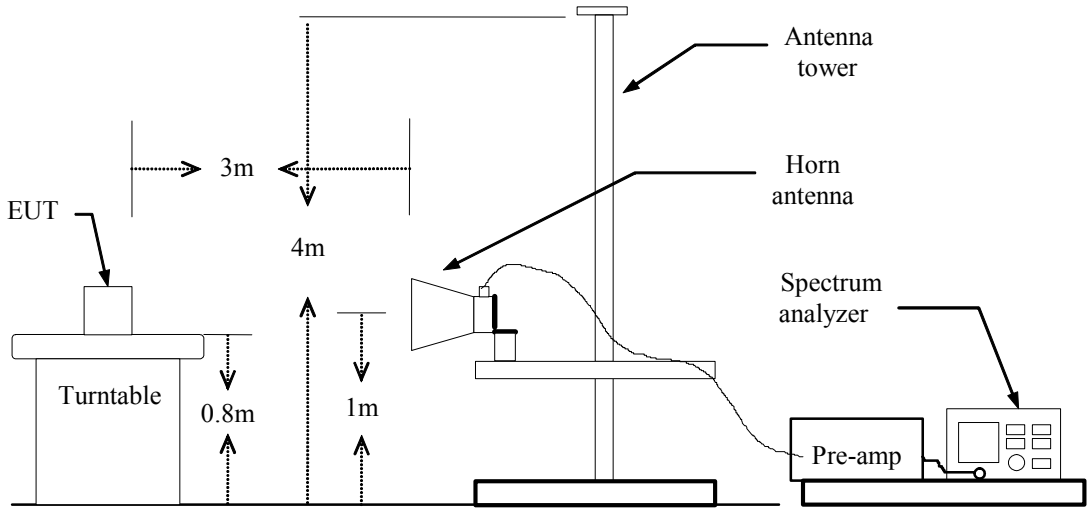
LIMIT

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	02/08/2009

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.

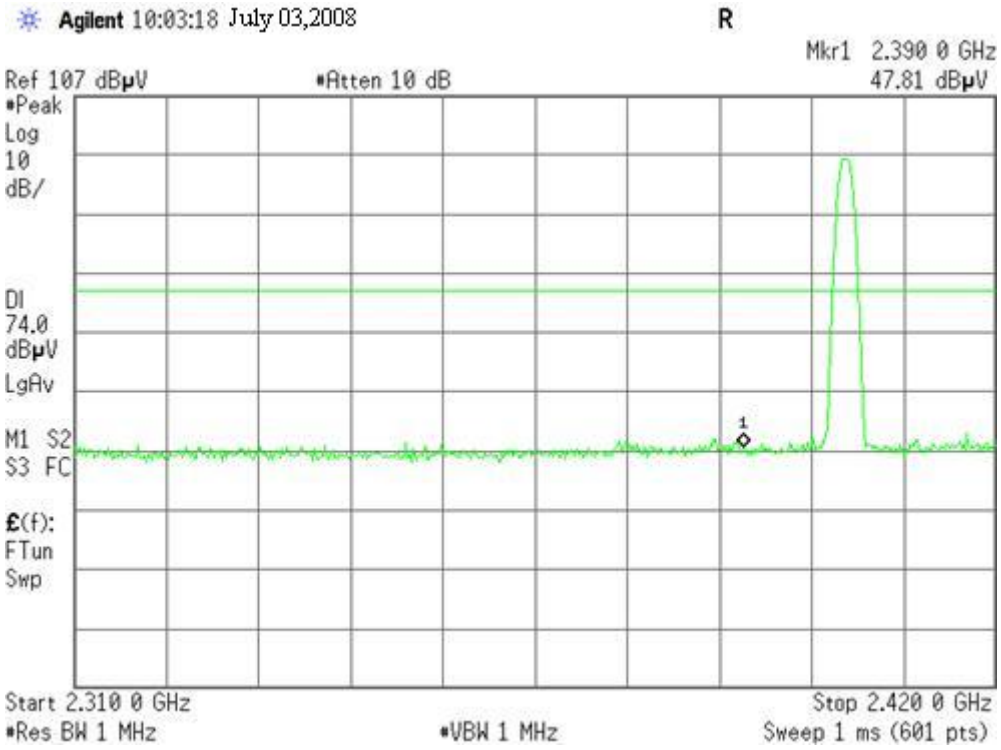
TEST RESULTS

Refer to attach spectrum analyzer data chart.

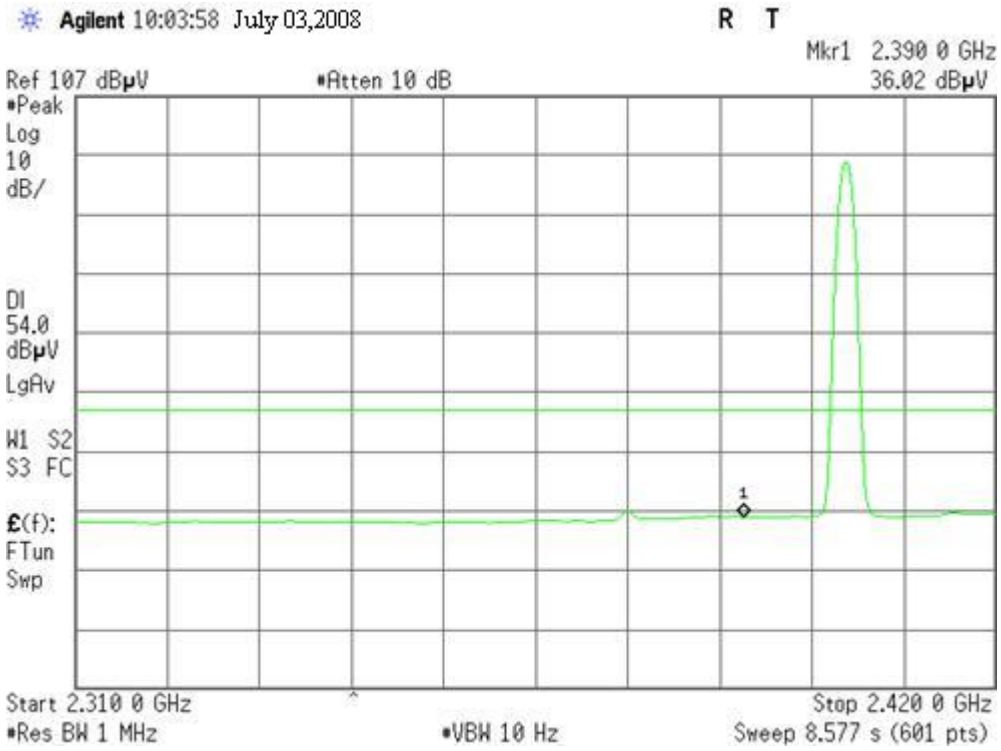
Test Data

Band Edges (CH-Low)

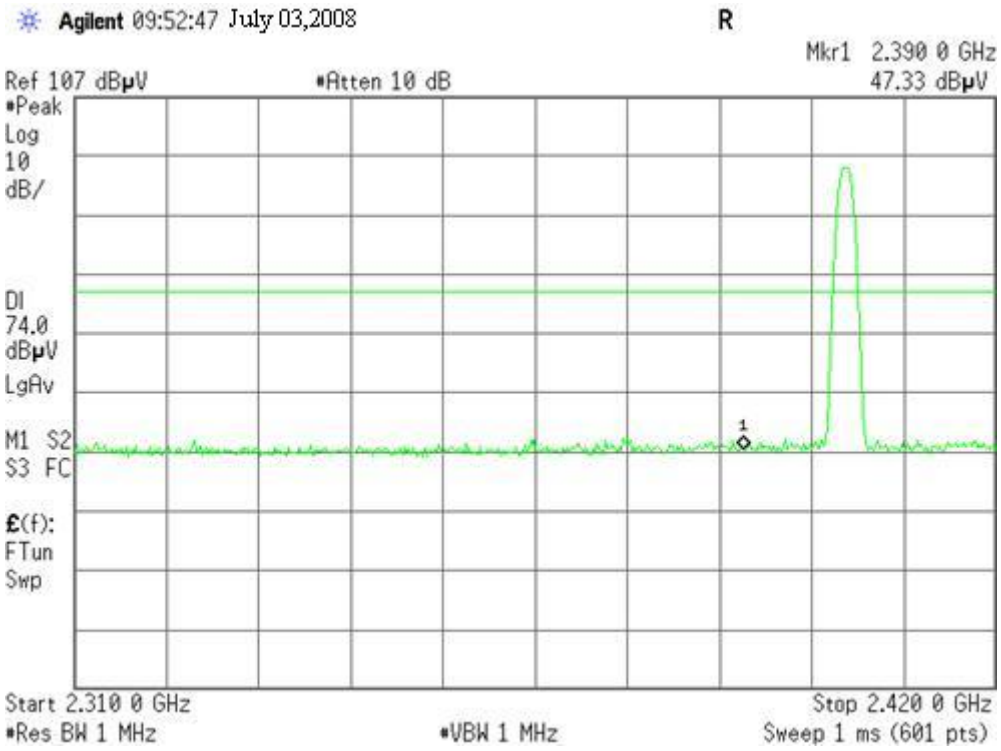
Detector mode: Peak **Polarity: Vertical**



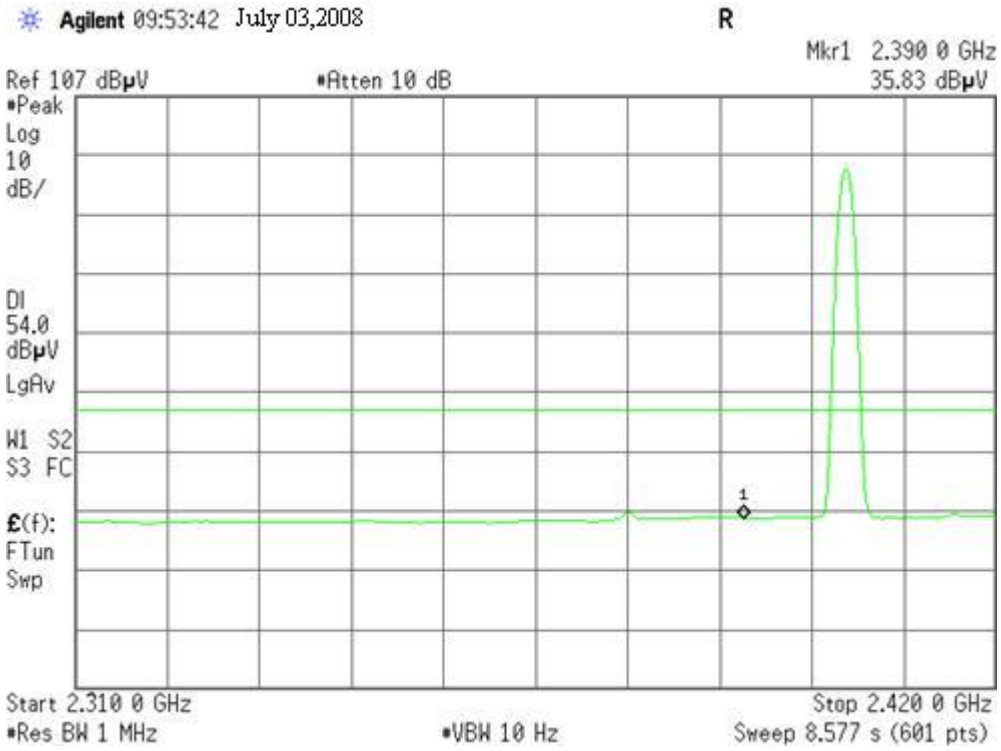
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**

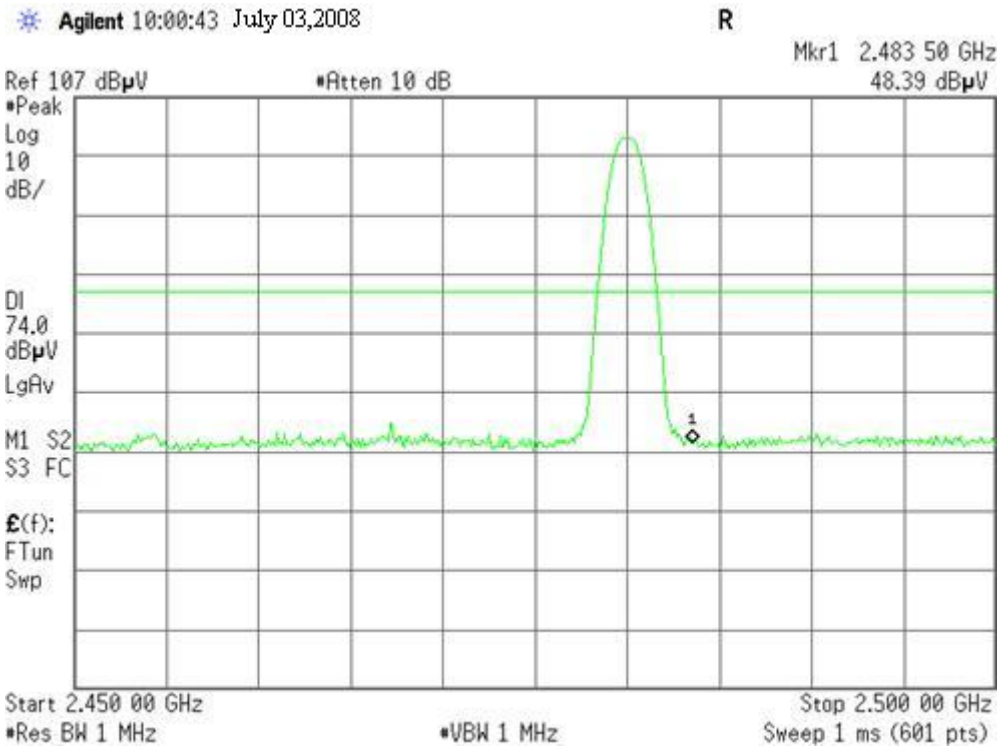


Detector mode: Average **Polarity: Horizontal**

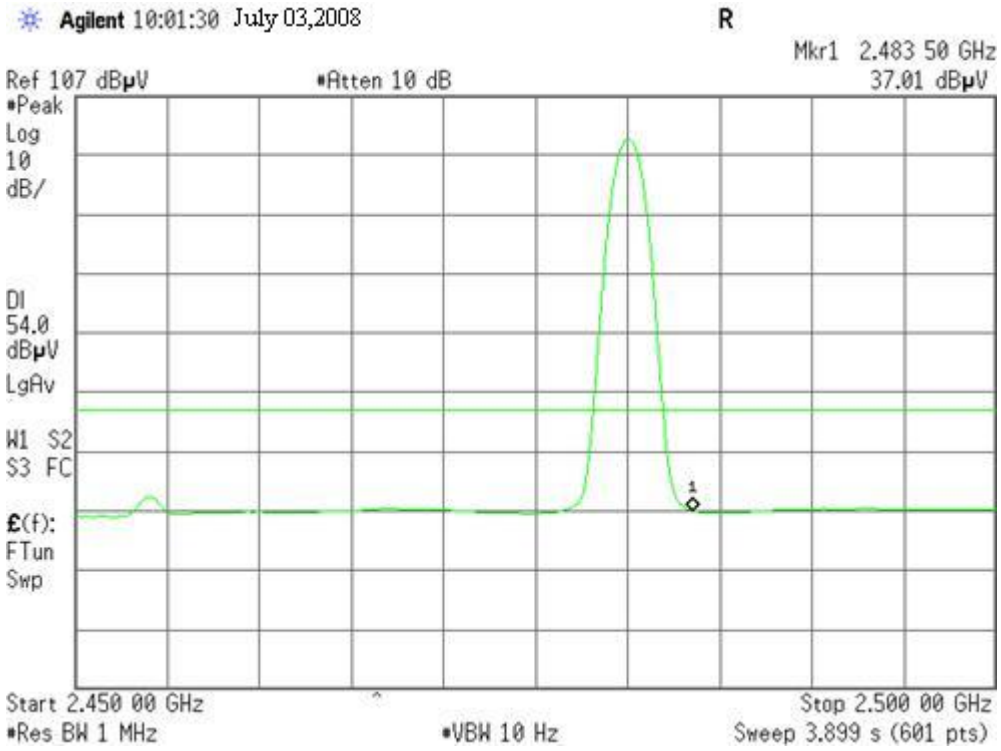


Band Edges (CH-High)

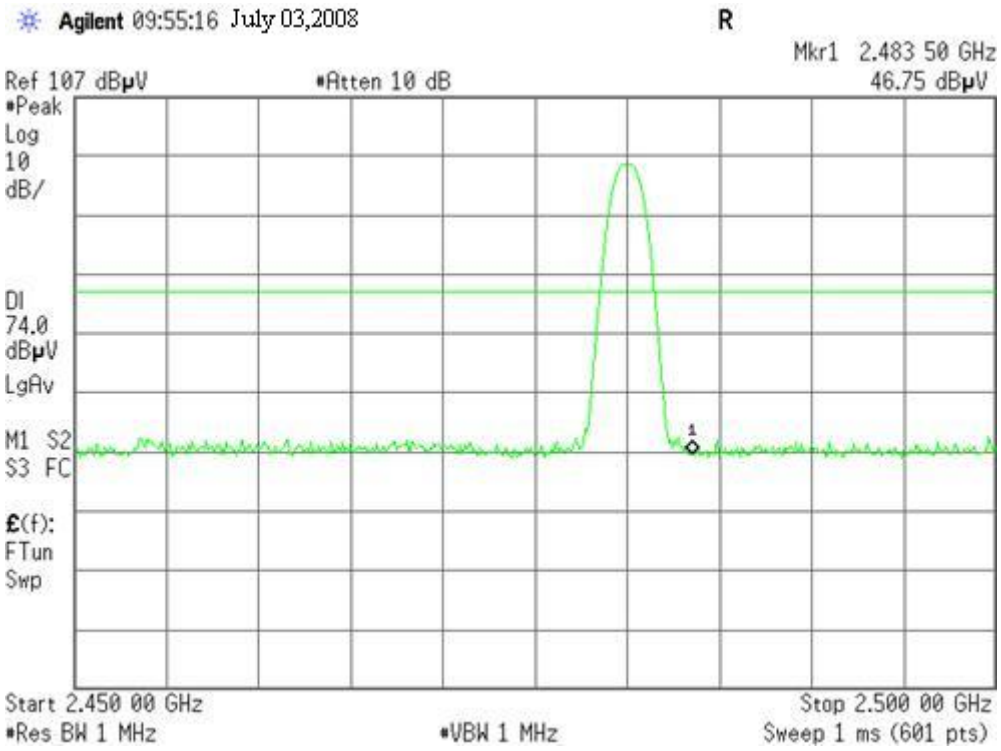
Detector mode: Peak **Polarity: Vertical**



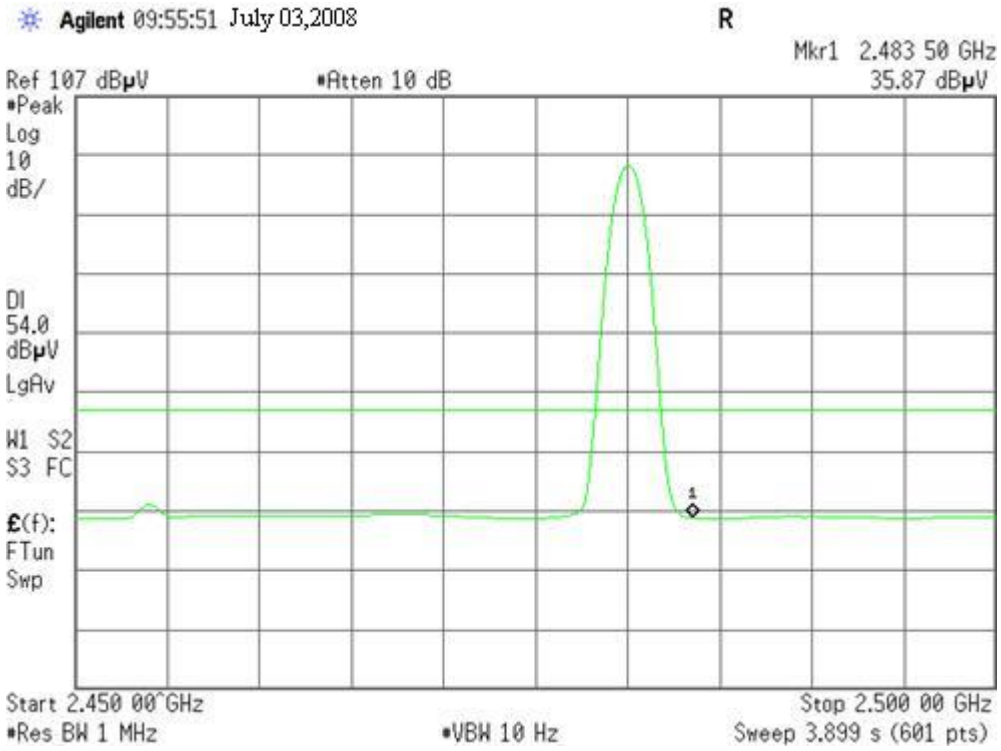
Detector mode: Average **Polarity: Vertical**



Detector mode: Peak **Polarity: Horizontal**



Detector mode: Average **Polarity: Horizontal**



FREQUENCY SEPARATION

LIMIT

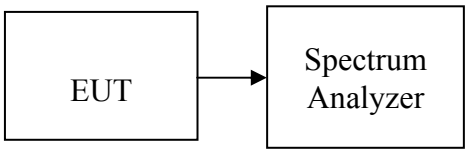
According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/08/2009
EMI Test Receiver	R&S	ESCI	100005	06/23/2009

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 = middle of hopping channel.
4. Set the spectrum analyzer as RBW, VBW=100kHz, Adjust Span to 5 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

TEST RESULTS

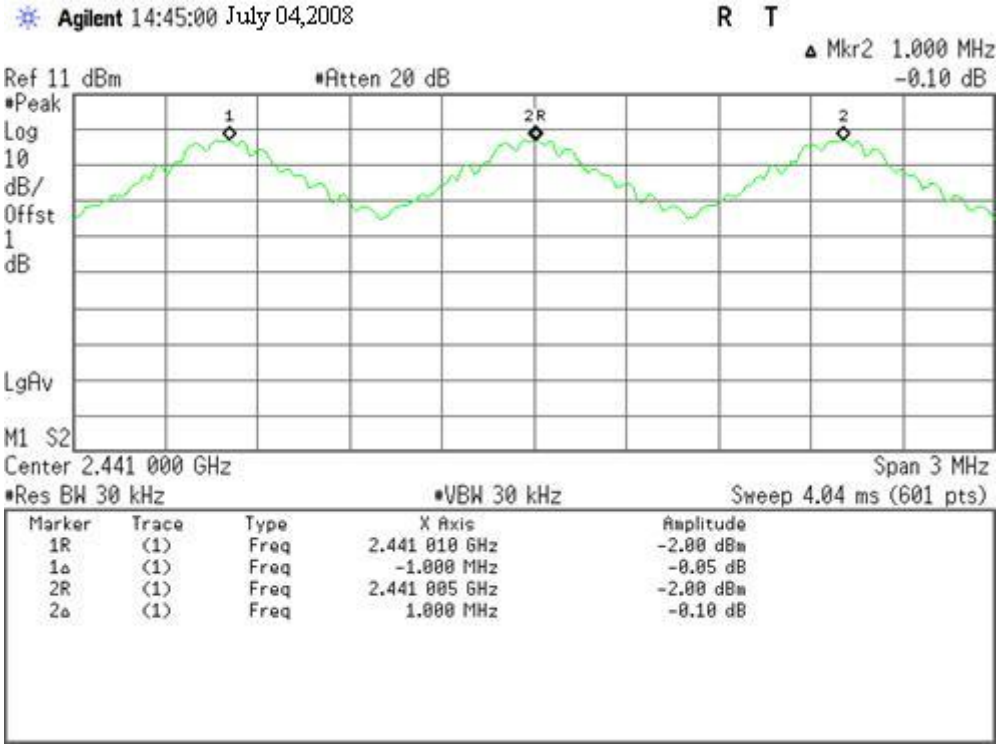
No non-compliance noted

Test Data

Channel Separation (MHz)	Limit (kHz)	Result
1.0	955kHz (20dB BW, Max)	Pass

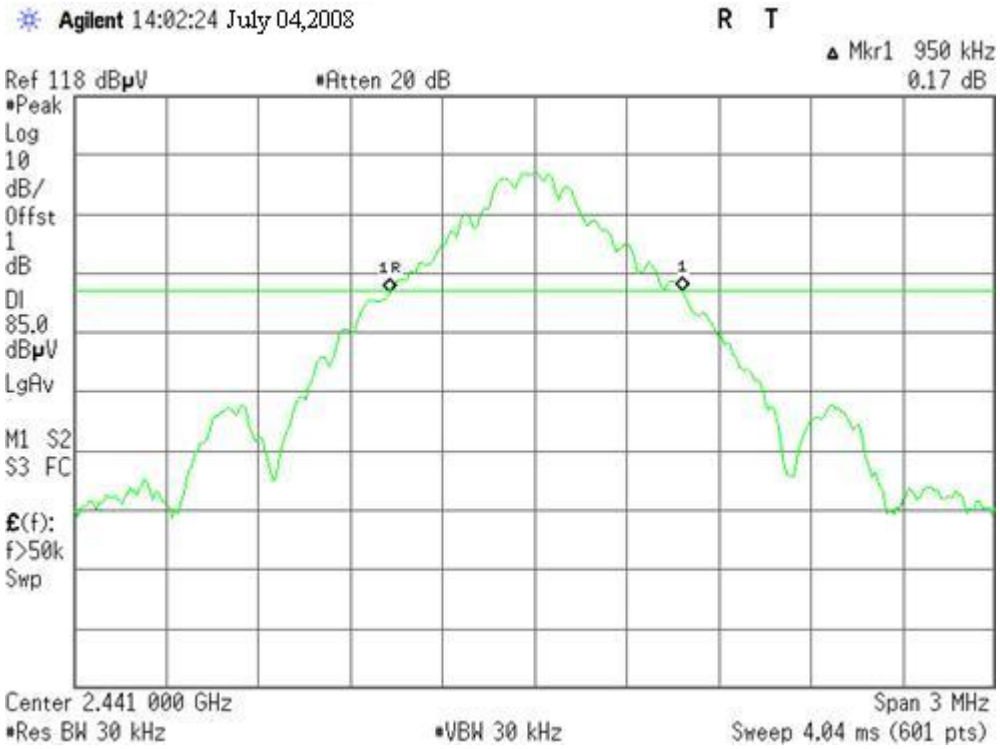
Test Plot

Measurement of Channel Separation

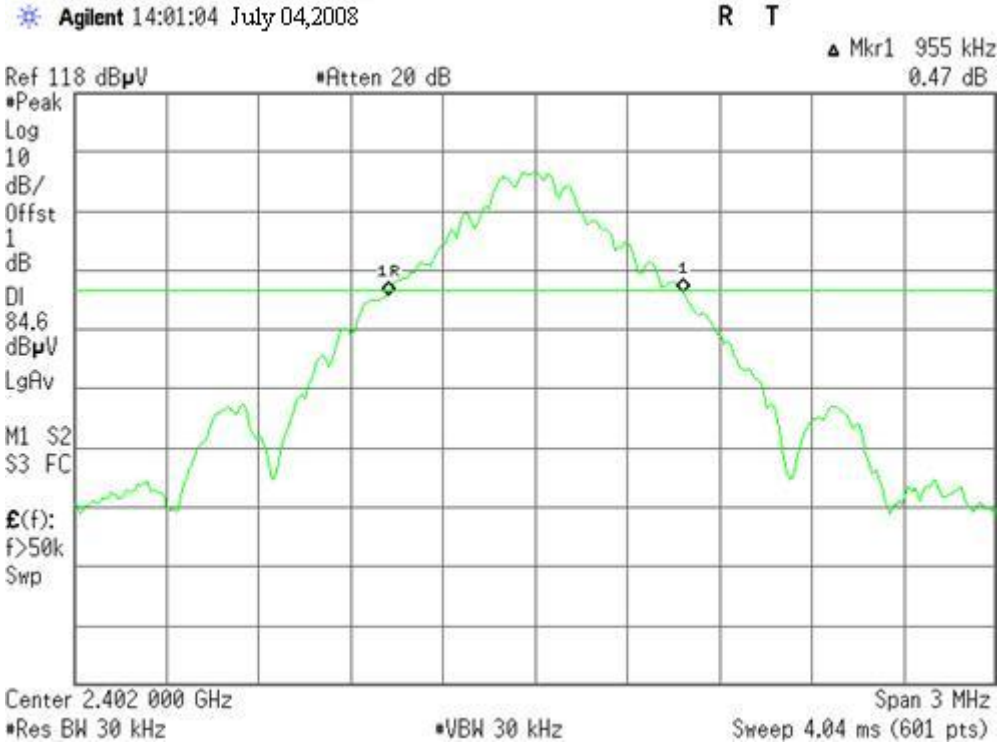


Test Plot

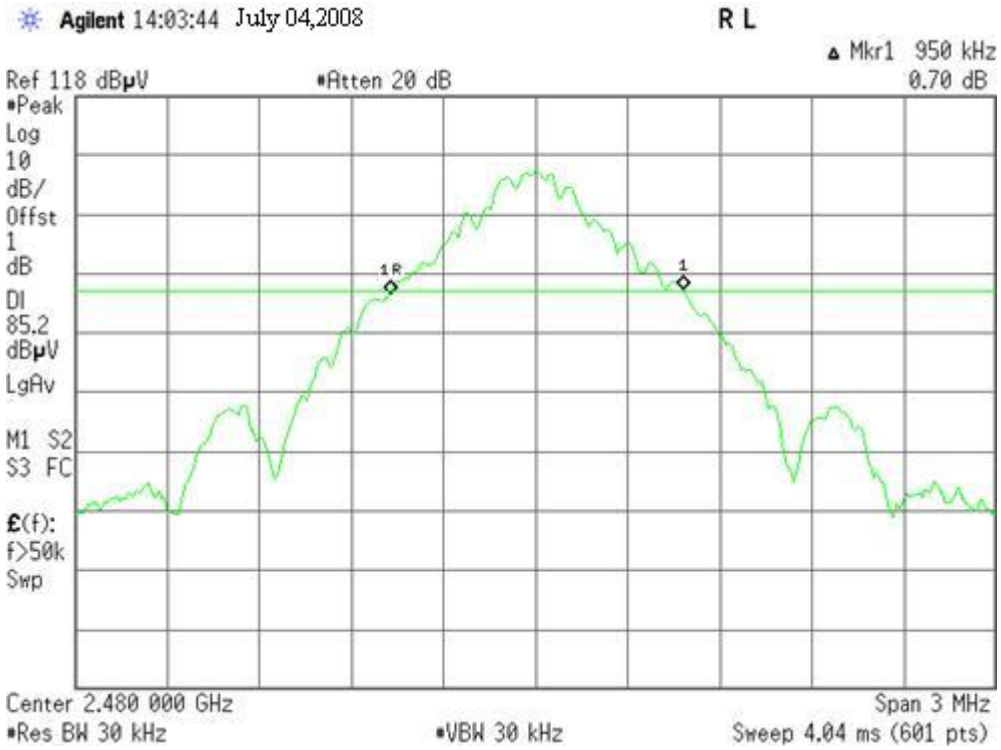
20 dB bandwidth(CH Mid)



20 dB bandwidth(CH Low)



20 dB bandwidth (CH High)



NUMBER OF HOPPING FREQUENCY

LIMIT

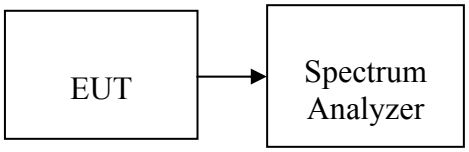
According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/23/2009

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 = 2483.5MHz, Sweep = 250s.
4. Set the spectrum analyzer as RBW, VBW=100kHz,
5. Max hold, view and count how many channel in the band.

TEST RESULTS

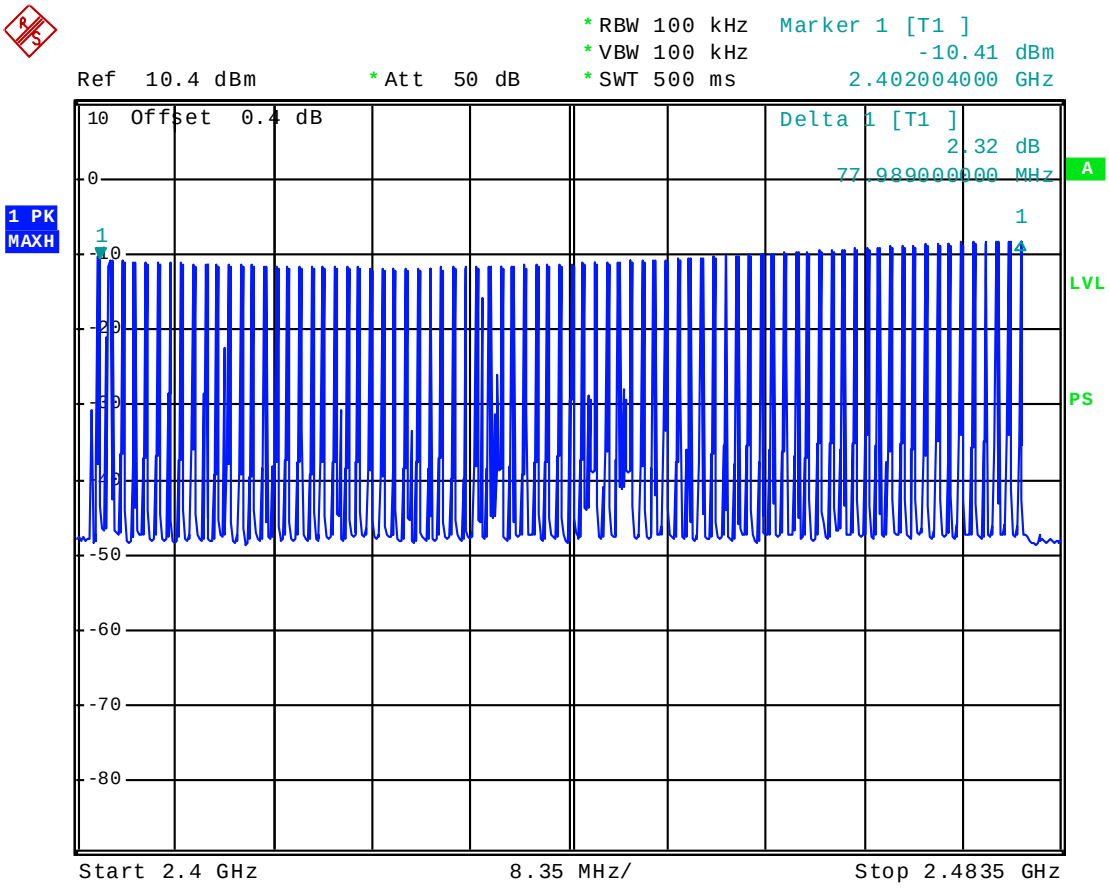
No non-compliance noted

Test Data

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

Test Plot

Channel Number



TIME OF OCCUPANCY (DWELL TIME)

LIMIT

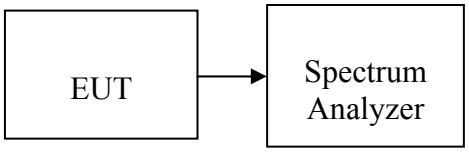
According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100005	06/23/2009

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=100KHz, VBW=300KHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

No non-compliance noted

Test Data

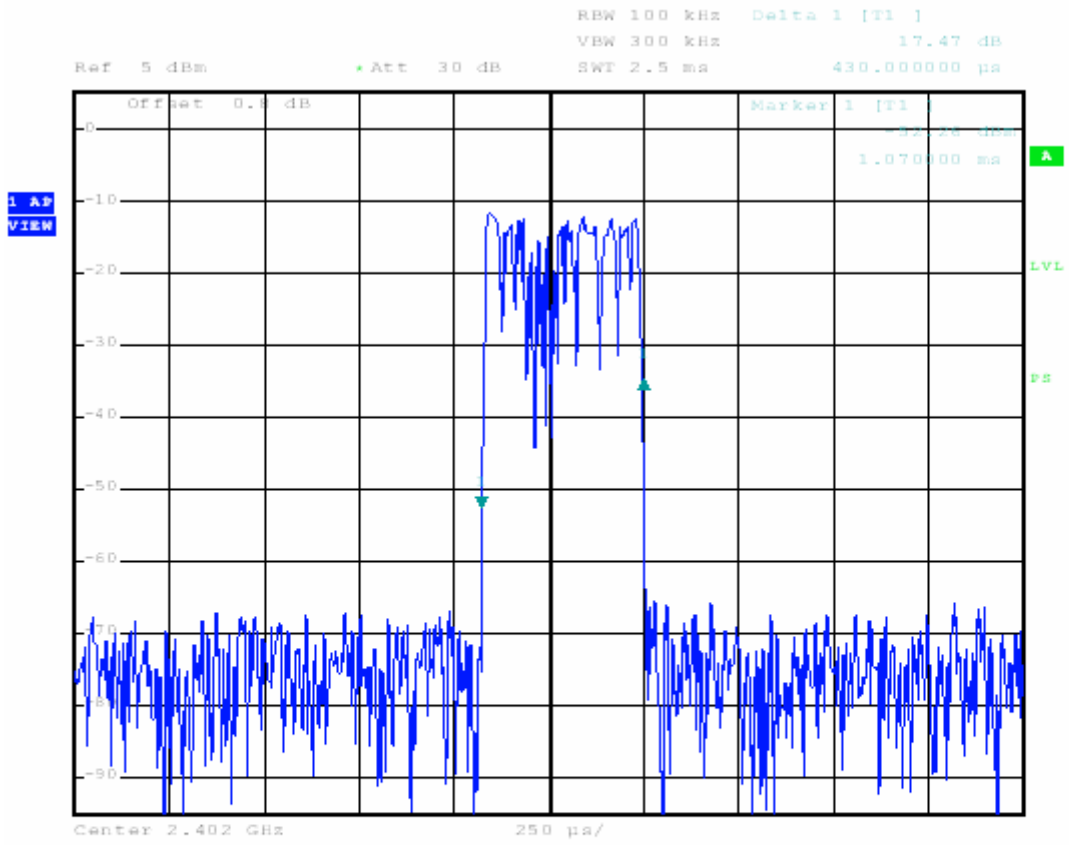
DH 1

CH Low: 0.43 * (1600/2)/79 * 31.6 = 137.6 (ms)
CH Mid: 0.43 * (1600/2)/79 * 31.6 = 137.6 (ms)
CH High: 0.425 * (1600/2)/79 * 31.6 = 136.0 (ms)

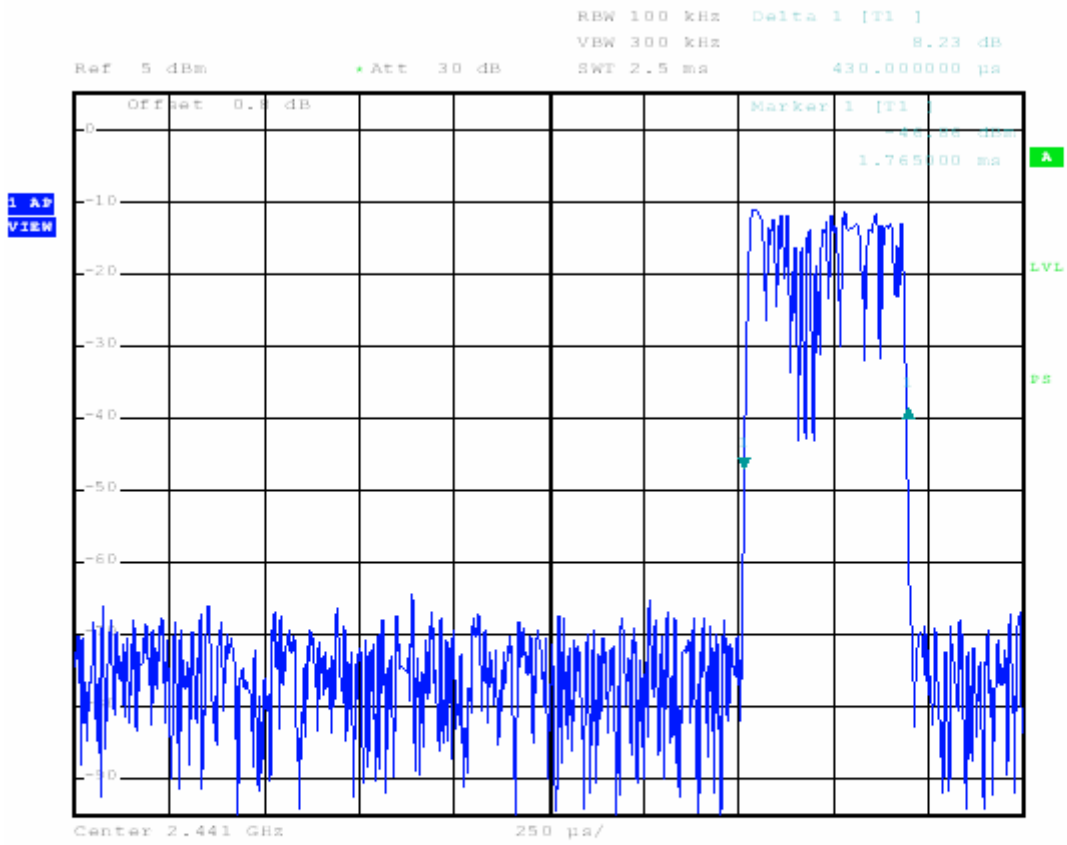
CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.43	137.6	31.60	400.00	PASS
Mid	0.43	137.6	31.60		PASS
High	0.425	136.0	31.60		PASS

Test Plot

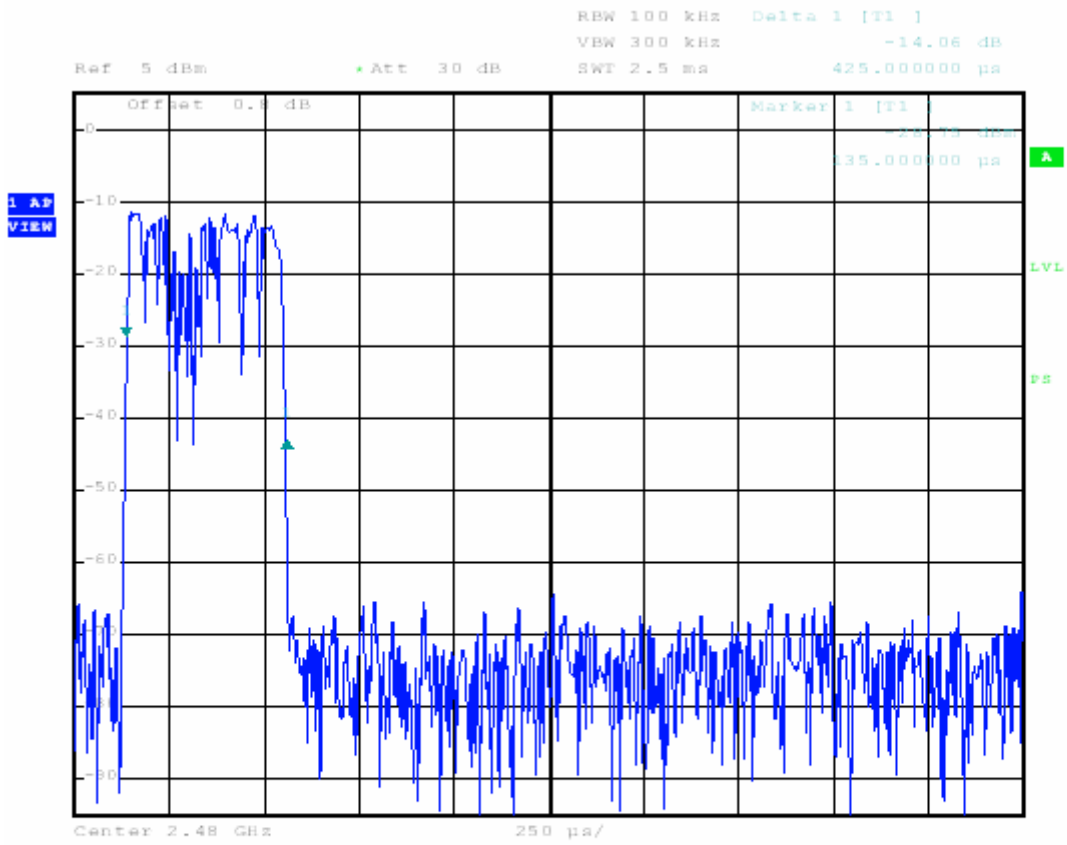
CH Low



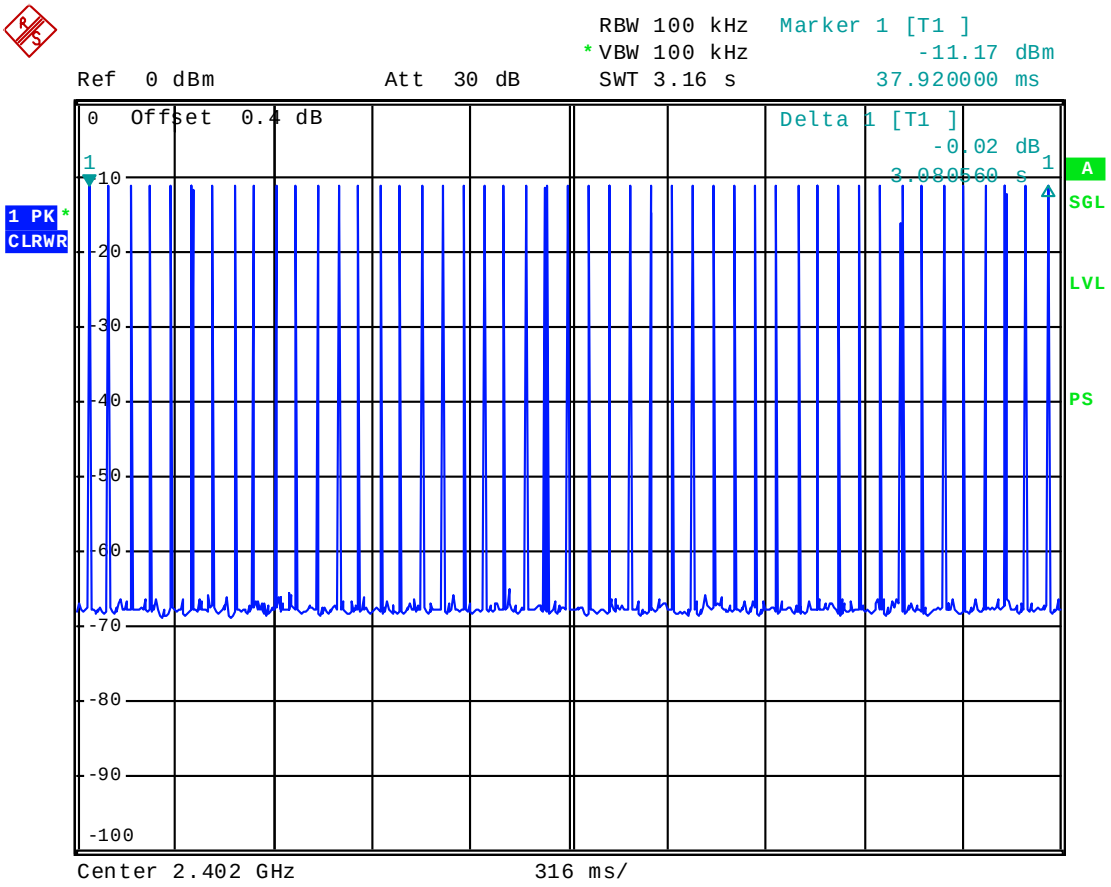
CH Mid


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Ref 5 dBm
Att 30 dB
Offset 0.5 dB
Marker 1 [T1]
1.765000 ms
Center 2.441 GHz
250 µs/
LVL

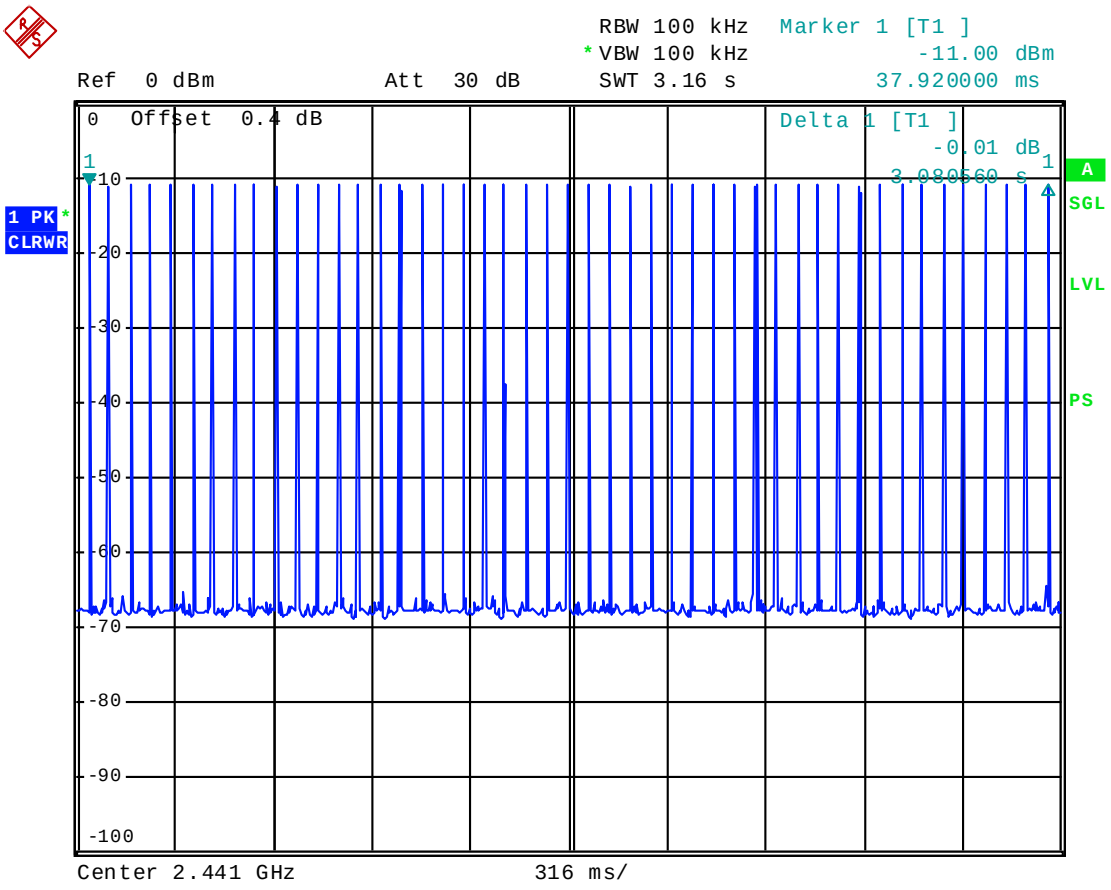
CH High


RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Ref 5 dBm
Att 30 dB
Offset 0.5 dB
Marker 1 [T1]
425.000000 µs
1 AP
VIEW
A
LVL
PS
Center 2.48 GHz
250 µs/

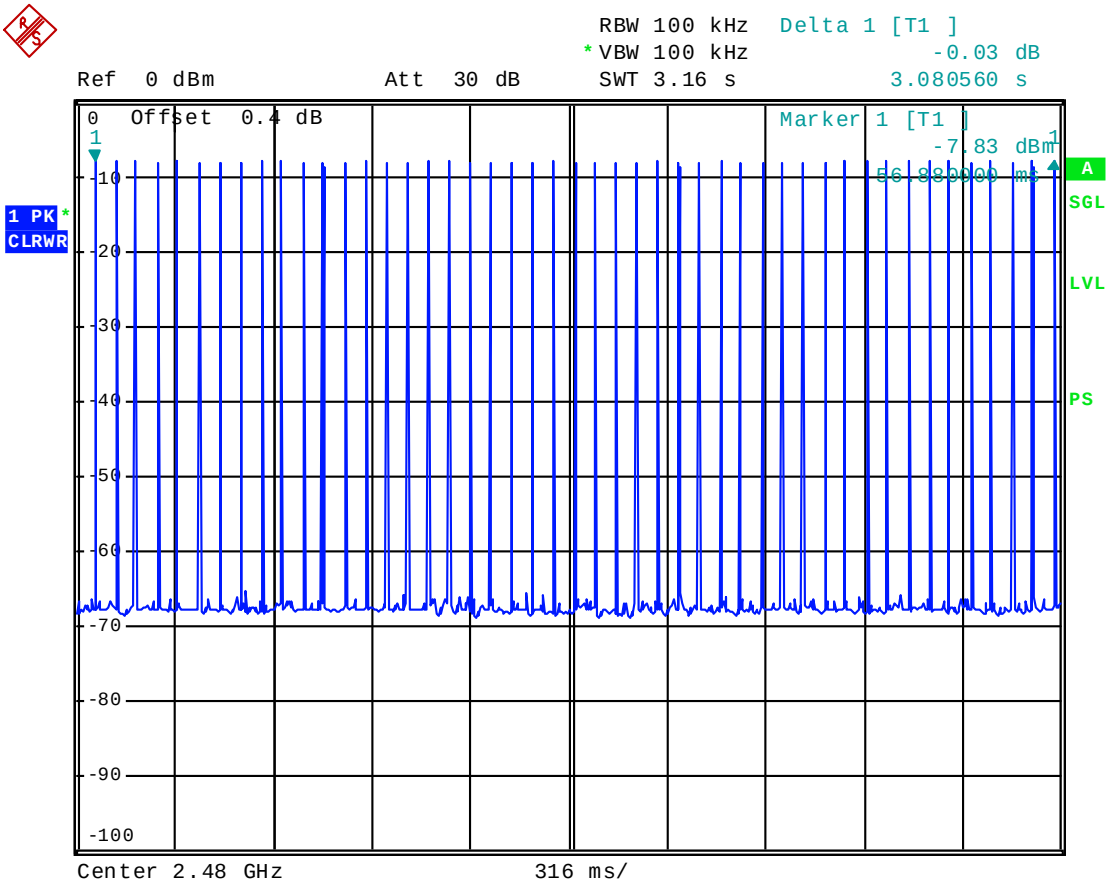
CH Low


RBW 100 kHz
*VBW 100 kHz
SWT 3.16 s
Marker 1 [T1]
-11.17 dBm
37.920000 ms
Ref 0 dBm
Att 30 dB
0 Offset 0.4 dB
Delta 1 [T1]
-0.02 dB
3.080560 s
1 PK
CLRWR
A
SGL
LVL
PS
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 2.402 GHz
316 ms/

CH Mid


RBW 100 kHz
*VBW 100 kHz
SWT 3.16 s
Marker 1 [T1]
-11.00 dBm
37.920000 ms
Ref 0 dBm
Att 30 dB
0 Offset 0.4 dB
Delta 1 [T1]
-0.01 dB
3.080560 s
1 PK*
CLRWR
A
SGL
LVL
PS
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 2.441 GHz
316 ms/

CH High


RBW 100 kHz
*VBW 100 kHz
SWT 3.16 s
Delta 1 [T1]
-0.03 dB
3.080560 s
Ref 0 dBm
Att 30 dB
Offset 0.4 dB
Marker 1 [T1]
-7.83 dBm
1 PK
CLRWR
A
SGL
LVL
PS
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 2.48 GHz
316 ms/

SPURIOUS EMISSIONS

7.7 Conducted Measurement

LIMIT

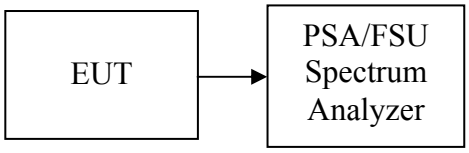
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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	02/08/2009

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.

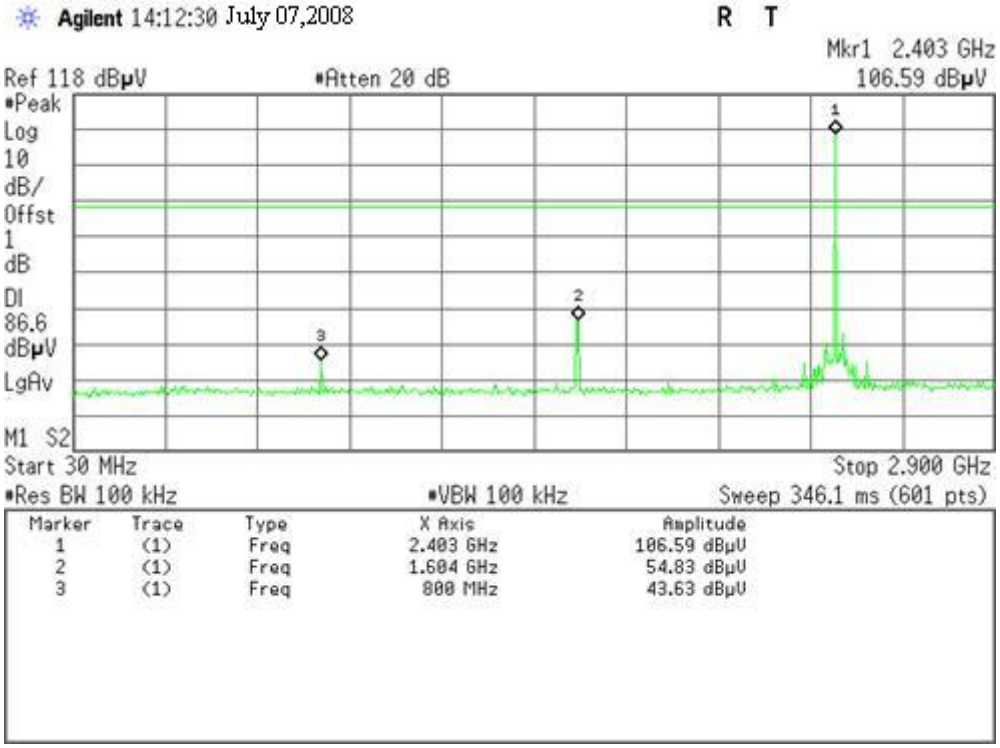
TEST RESULTS

No non-compliance noted

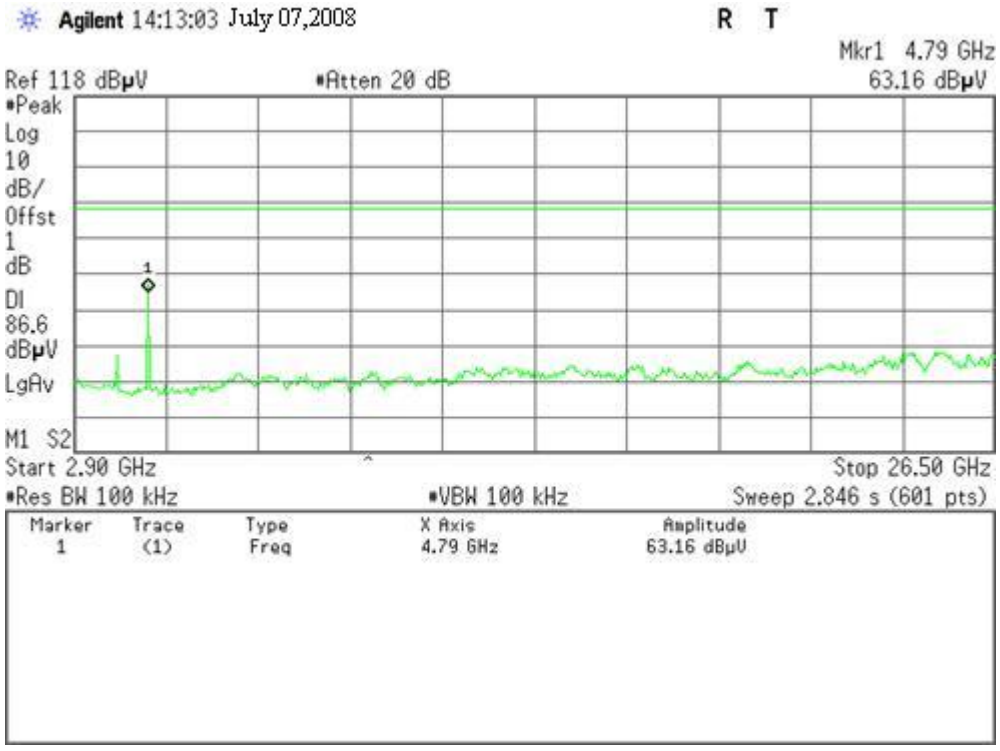
Test Plot

CH Low

30MHz – 2.9GHz

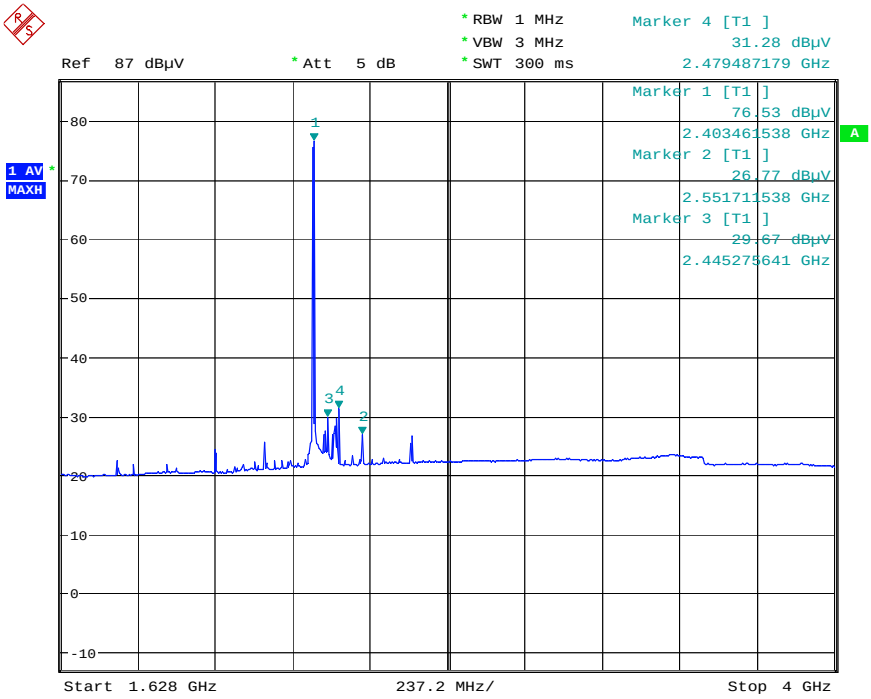


2.9GHz – 26.5GHz



CH Low(AVERAGE DETECTOR)

1.628GHz – 4.0GHz

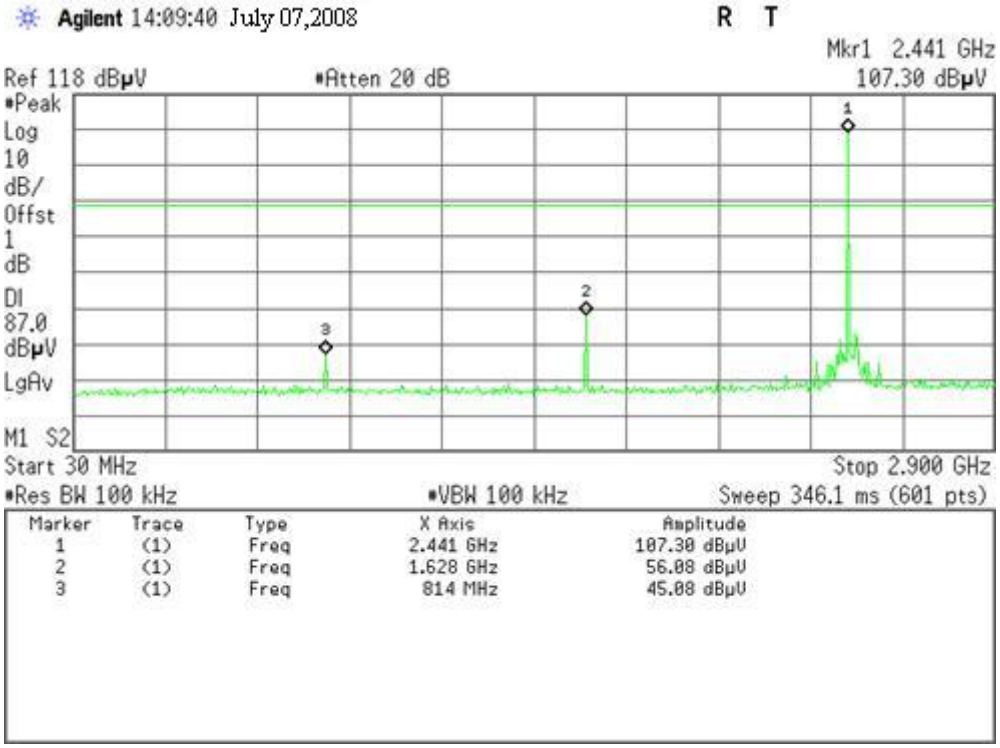


WHKW-034 CONDUCTED SPURIOUS EMISSIONS(CH LOW)

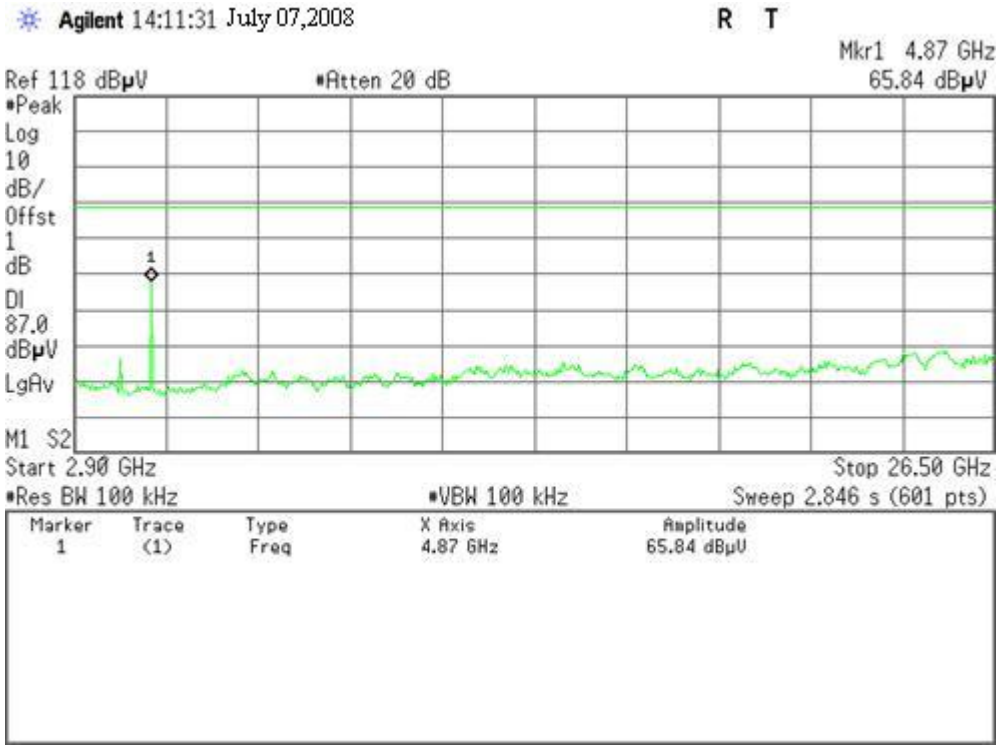
Date: 17.JUL.2008 09:49:22

CH Mid

30MHz – 2.9GHz

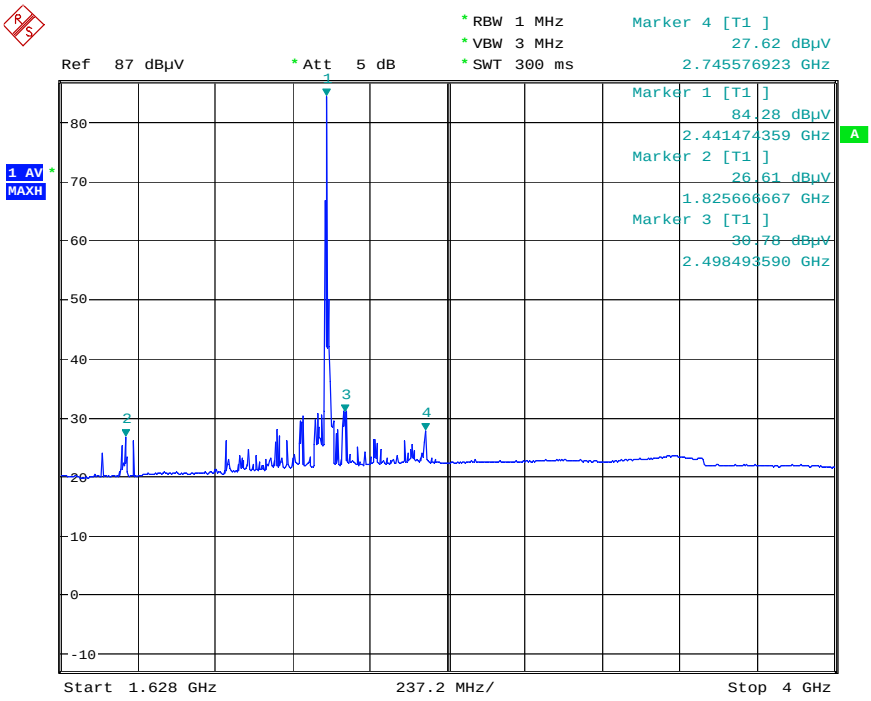


2.9GHz – 26.5GHz



CH Mid(AVERAGE DETECTOR)

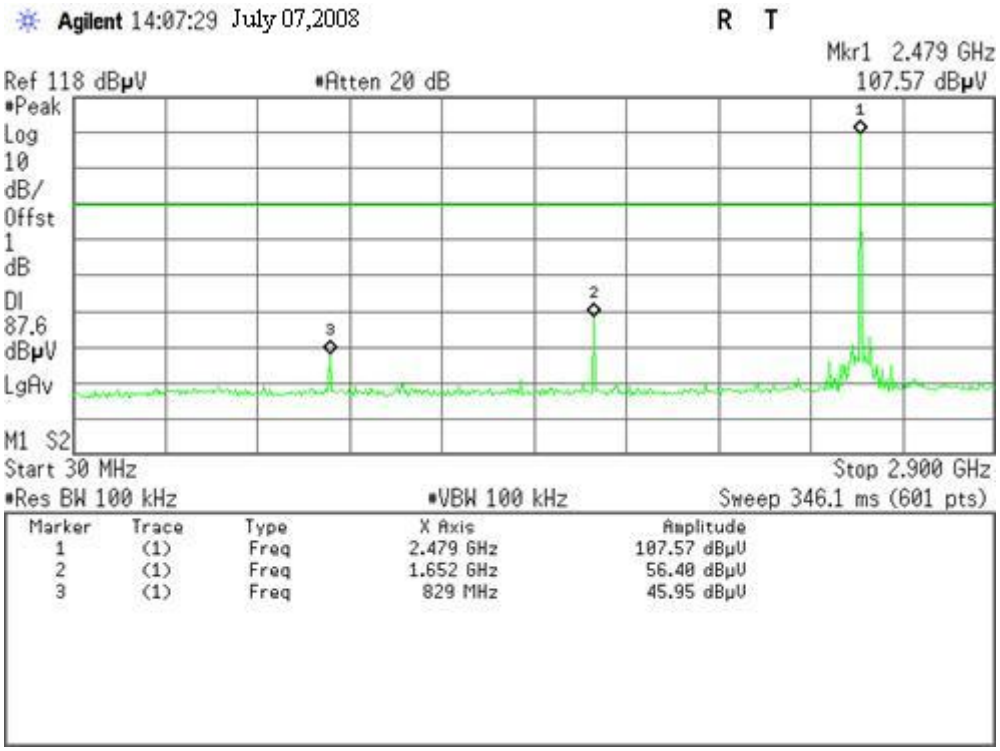
1.628GHz – 4.0GHz



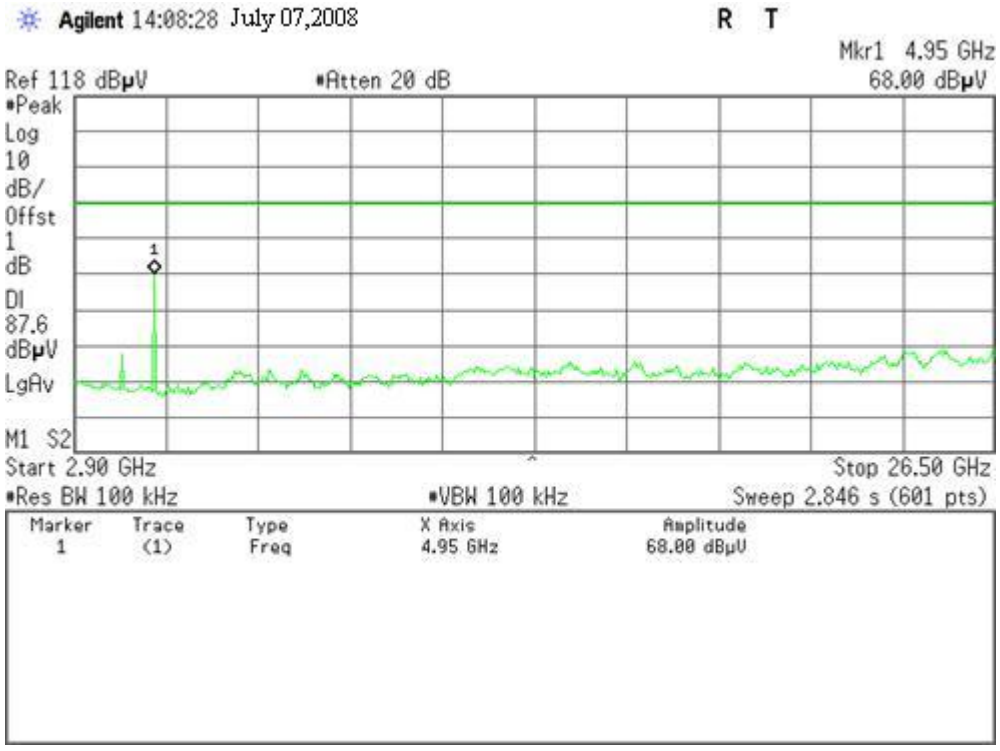
WHKW-034 CONDUCTED SPURIOUS EMISSIONS(CH MID)
Date: 17.JUL.2008 09:56:52

CH High

30MHz – 2.9GHz

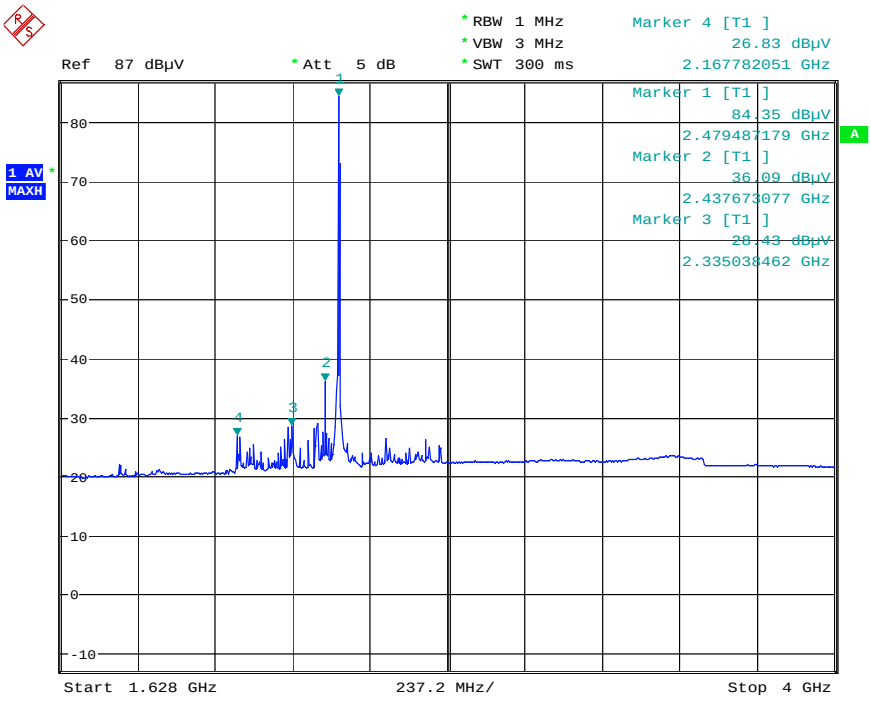


2.9GHz – 26.5GHz



CH High(AVERAGE DETECTOR)

1.628GHz – 4.0GHz



WHKW-034 CONDUCTED SPURIOUS EMISSIONS(CH HIGH)
Date: 17.JUL.2008 10:02:25

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

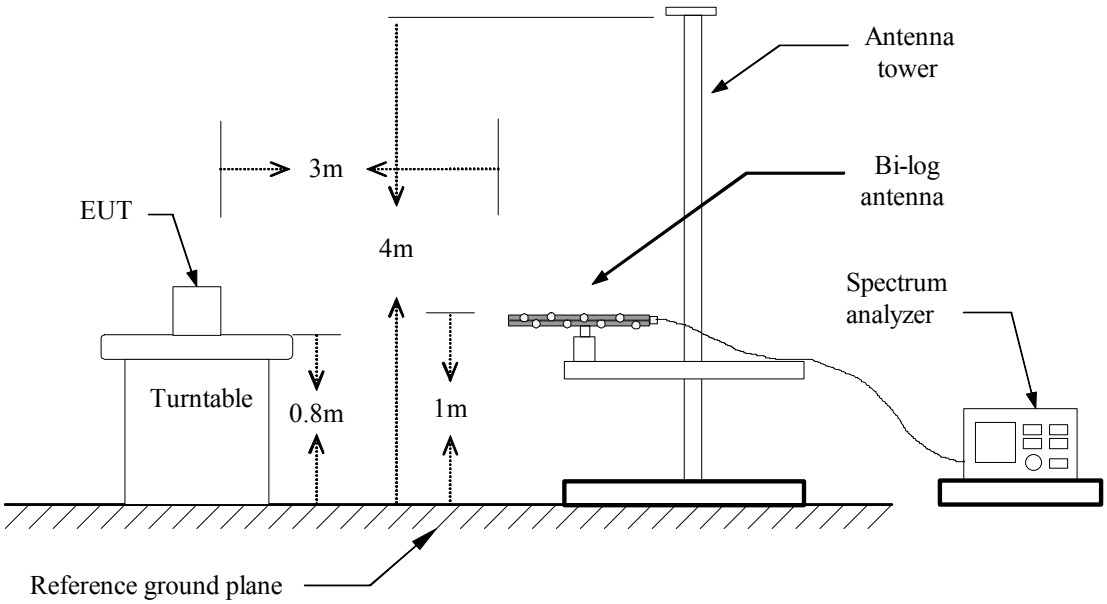
MEASUREMENT EQUIPMENT USED

966 RF CHAMBER				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/08/2009
EMI Test Receiver	R&S	ESCI	100005	06/23/2009
Pre Amplifier	HP	HP8447E	2945A02715	06/15/2009
Pre Amplifier	Agilent	8449B	N/A	06/04/2009
Bilog Antenna	SUNOL Sciences	JB3	A021907	06/10/2009
Horn Antenna	TRC	N/A	N/A	06/10/2009
Turn Table	CCS	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CCS	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	06/09/2009

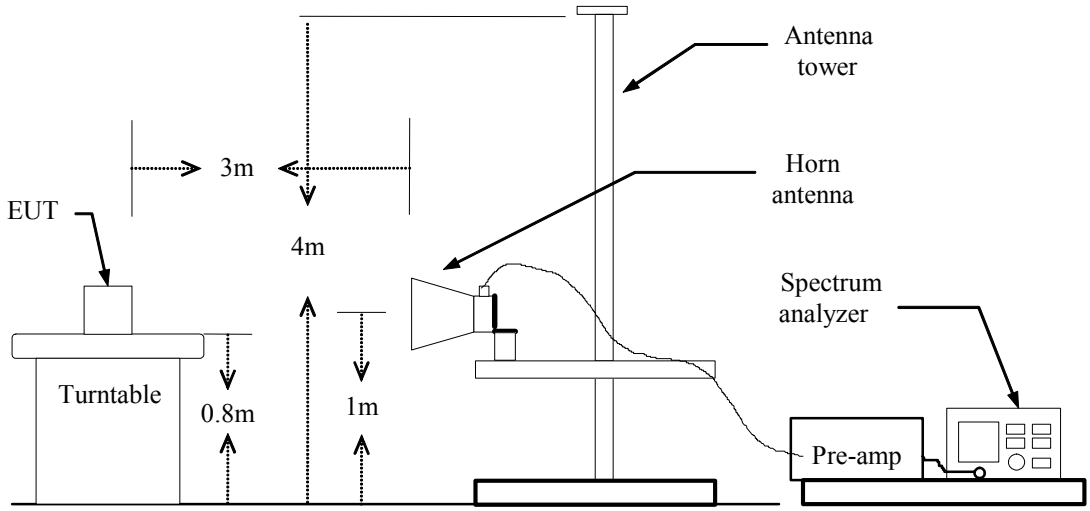
Remark: *Each piece of equipment is scheduled for calibration once a year.*

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: Tx
Temperature: 25°C
Humidity: 57 % RH

Test Date: July 03, 2008
Tested by: Divan
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)
115.500	V	Peak	35.96	-6.02	29.94	43.50	-13.56
200.100	V	Peak	33.64	-4.57	29.07	43.50	-14.43
268.513	V	Peak	35.29	-2.93	32.36	46.00	-13.64
319.833	V	Peak	35.42	-0.64	34.78	46.00	-11.22
332.670	V	Peak	33.64	-1.14	32.50	46.00	-13.50
666.333	V	Peak	29.86	4.32	34.18	46.00	-11.82
166.350	H	Peak	36.59	-4.99	31.60	43.50	-11.90
196.500	H	Peak	33.48	-4.10	29.38	43.50	-14.12
232.950	H	Peak	31.76	2.98	34.74	46.00	-11.26
499.500	H	Peak	30.75	1.45	32.20	46.00	-13.80
662.833	H	Peak	30.48	4.09	34.57	46.00	-11.43
729.330	H	Peak	30.53	3.73	34.26	46.00	-11.74

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 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:** July 03, 2008

Temperature: 25°C **Tested by:** Divan

Humidity: 57 % 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)				
1063.33	V	60.89	---	-11.82	49.07	---	74.00	54.00	-4.93	Peak
1593.33	V	55.94	---	-9.05	46.89	---	74.00	54.00	-7.11	Peak
1860.00	V	49.34	---	-8.01	41.33	---	74.00	54.00	-12.67	Peak
4800.00	V	46.35	---	0.64	46.99	---	74.00	54.00	-7.01	Peak
N/A										
1063.33	H	58.29	---	-11.82	46.47	---	74.00	54.00	-7.53	Peak
1596.66	H	54.25	---	-9.04	45.21	---	74.00	54.00	-8.79	Peak
2686.66	H	49.25	---	-4.96	44.29	---	74.00	54.00	-9.71	Peak
4800.00	H	53.43	52.75	0.64	54.07	53.39	74.00	54.00	-0.61	AVG.
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:** July 03, 2008

Temperature: 25°C **Tested by:** Divan

Humidity: 57 % 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)				
1056.66	V	56.20	---	-11.86	44.34	---	74.00	54.00	-9.66	Peak
1593.33	V	56.95	---	-9.05	47.90	---	74.00	54.00	-6.10	Peak
2466.66	V	50.05	---	-5.61	44.44	---	74.00	54.00	-9.56	Peak
4883.33	V	48.88	---	0.78	49.66	---	74.00	54.00	-4.34	Peak
N/A										
1060.00	H	55.43	---	-11.84	43.59	---	74.00	54.00	-10.41	Peak
1593.33	H	53.74	---	-9.05	44.69	---	74.00	54.00	-9.31	Peak
2593.33	H	49.30	---	-5.22	44.08	---	74.00	54.00	-9.92	Peak
4883.33	H	53.62	52.57	0.78	54.40	53.35	74.00	54.00	-0.65	AVG.
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:** July 03, 2008

Temperature: 25°C **Tested by:** Divan

Humidity: 57% 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)				
1063.33	V	60.23	---	-11.82	48.41	---	74.00	54.00	-5.59	Peak
1590.00	V	59.39	---	-9.07	50.32	---	74.00	54.00	-3.68	Peak
1856.66	V	49.95	---	-8.02	41.93	---	74.00	54.00	-12.07	Peak
4958.33	V	50.18	---	0.91	51.09	---	74.00	54.00	-2.91	Peak
N/A										
1063.33	H	59.44	---	-11.82	47.62	---	74.00	54.00	-6.38	Peak
1590.00	H	53.54	---	-9.07	44.47	---	74.00	54.00	-9.53	Peak
2806.66	H	48.69	---	-4.63	44.06	---	74.00	54.00	-9.94	Peak
4958.33	H	52.26	---	0.91	53.17	---	74.00	54.00	-0.83	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.*

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	R&S	ESCI	100005	06/23/2009
LISN	AFJ	LS16	16010222119	04/02/2009
LISN	Meestec	AN3016	04/10040	04/02/2009

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.

Operation Mode:	Normal	**Test Date:**	July 05, 2008
Temperature:	27°C	**Humidity:**	56% RH
Tested by:	Divan		

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
0.194	55.53	48.31	33.75	64.73	54.73	-16.42	-20.98	L1
0.402	47.59	44.64	29.84	58.80	48.80	-14.16	-18.96	L1
0.583	46.91	44.08	28.90	56.00	46.00	-11.92	-17.10	L1
0.761	48.12	45.20	29.51	56.00	46.00	-10.80	-16.49	L1
1.032	47.97	44.87	29.94	56.00	46.00	-11.13	-16.06	L1
9.238	48.86	43.18	37.23	60.00	50.00	-16.82	-12.77	L1
0.198	63.34	53.47	34.95	64.62	54.62	-11.15	-19.67	L2
0.242	57.28	48.25	30.21	63.35	53.35	-15.10	-23.14	L2
0.761	47.71	44.20	28.39	56.00	46.00	-11.80	-17.61	L2
1.050	47.38	44.18	28.85	56.00	46.00	-11.82	-17.15	L2
2.617	45.35	42.39	33.09	56.00	46.00	-13.61	-12.91	L2
8.997	48.36	43.18	35.76	60.00	50.00	-16.82	-14.24	L2

Note:

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)*

8. **RF EXPOSURE** (MPE CALCULATION)

Applicable Standard

According to 1.1310 of FCC rules, the power density limit for general population/ uncontroller exposure is 1mw /cm2 .As this is a mobile application the MPE shall be calculate at 20 cm to show compliance with the power density limit . the following formula was used to calculate the power density :

$S=PG/4\prod R^2$

Where:
S=Power Density
P=Output power at Antenna Terminals
G=Gain of transmit Antenna(linear gain)
R=Distance from transmitting Antenna

For this device ,the calculation as following:

BAND (MHz)	Antenna gain (numeric)	Peak output power (mw)	RF exposure at R=20cm (mw /cm^2)	Limit (mw /cm^2)
2480	3.0	1.31	0.000782	1.00

Base on the above calculation at 20cm the WII 2.4G Wireless Left Joystick is below the power density limit of 1mw /cm^2 .