



**FCC 47 CFR PART 15 SUBPART C ANSI C63.4: 2003**

**TEST REPORT**

**For**

**AIR TUNE**

**Model Number: BTF-01**

*Issued to*

**J-LINK CO., LTD**

**NO. 28-12, GANGKOU, GANGNAN VILLAGE, ANDING TOWNSHIP,  
TAINAN COUNTY 745, TAIWAN**

*Issued by*

**Compliance Certification Services Inc.**

**Tainan Lab.**

**No. 8, Jiu Cheng Ling, Jiaokeng Village, Sinhua  
Township, Tainan Hsien 712, Taiwan R.O.C.**

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NVLAP LAB CODE 200627-0

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**Total Page: 60**



### **Revision History**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		July 9, 2007		Initial Issue	ALL	Leah Peng



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## 1. TEST RESULT CERTIFICATION

**Applicant** : J-LINK CO., LTD  
**Address** : NO. 28-12, GANGKOU, GANGNAN VILLAGE, ANDING TOWNSHIP, TAINAN COUNTY 745, TAIWAN  
**Manufacture** : J-LINK CO., LTD  
**Address** : NO. 28-12, GANGKOU, GANGNAN VILLAGE, ANDING TOWNSHIP, TAINAN COUNTY 745, TAIWAN  
**Equipment Under Test** : AIR TUNE  
**Model Number** : BTF-01  
**Date of Test** : May 31, 2007 ~ June 11, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C ANSI C63.4: 2003	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 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:*

*Reviewed by:*

**Jeter Wu**  
Section Manager  
Compliance Certification Services Inc.

July 9, 2007

**Eric Yang**  
Engineer  
Compliance Certification Services Inc.

July 9, 2007



## 2. EUT DESCRIPTION

<b>Product</b>	AIR TUNE
<b>Model Number</b>	BTF-01
<b>Model Discrepancy</b>	N/A
<b>Serial Number</b>	None
<b>Received Date</b>	May 9, 2007
<b>Power Source</b>	12VDC (Power from car)
<b>Frequency Range</b>	2402MHz to 2480MHz $f = 2402 + n\text{MHz}$ , $n = 0, \dots, 78$
<b>Transmit Power</b>	-2.28 dBm
<b>Type of Modulation</b>	Frequency Hopping Spread Spectrum
<b>Number of Channels</b>	79 Channels
<b>Channel Spacing</b>	1MHz
<b>Antenna Specification</b>	Bluetooth: 2.0 dBi
<b>Antenna Designation</b>	Bluetooth: Chip Antenna Manufacture: Johanson Technology
<b>Transmit Data Rate</b>	GFSK (1Mbps)
<b>Frequency Selection</b>	by software / firmware
<b>Transmitter Classification</b>	portable device
<b>RF Exposure Evaluation</b>	Since the EUT is classed portable device, and the maximum peak power is -2.28dBm (<13.6dBm), the MPE evaluation is not required and no SAR consideration applied.
<b>EUT Type</b>	<input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample, <input type="checkbox"/> Mass Product Sample.

**Remark:** This submittal(s) (test report) is intended for FCC ID: TVT-BTF-01 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 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 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.

#### 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 -	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	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<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 (model: **BTF-01**) has been tested under operating condition.

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

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

Channel Low (2402MHz) · Mid (2441MHz) and High (2480MHz) were chosen for full testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.



## **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. 8, Jiu Cheng Ling, Jiaokeng Village, Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, 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 National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200627-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (Registration no: 228014).



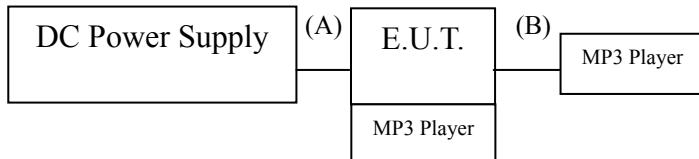
## 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP	EN 55014-1, AS/NZS 1044, CNS 13783-1, IEC/CISPR 14-1, IEC/CISPR 22, EN 55022, EN 61000-3-2, EN 61000-3-3, ANSI C63.4, AS/NZS CISPR 22, AS/NZS 3548, IEC 61000-4-2/3/4/5/6/8/11	 NVLAP LAB CODE 200627-0 200627-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	 R-1989 C-2142
Taiwan	TAF	CISPR 11 FCC METHOD-47 CFR Part 18 EN 55011 CNS 13803, CISPR 14 EN 55014 CNS 13783-1, CISPR 22 EN 55022 VCCI FCC Method-47 CFR Part 15 Subpart B CNS 13438	
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13803	 SL2-IS-E-0039 SL2-IN-E-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS212, Issue 1	

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

## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT



### 6.2 SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	MP3 Player	Acorp	1GB	R31720	N/A
2	MP3 Player	Acorp	256MB	R31720	N/A

No.	Signal cable description	
A	Power Cable	Unshielded, 0.8m, 2pcs.
B	Audio Cable	Unshielded, 1.5m, 1pcs.

#### **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:

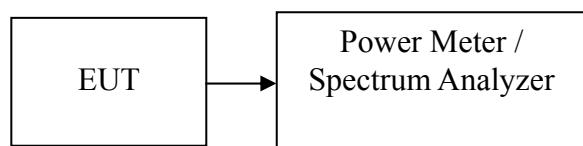
1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional 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
SPECTRUM ANALYZER	R&S	FSEM	829054/017	MAR. 13, 2008

*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. The Power Meter is set to the peak power detection.

#### TEST RESULTS

*No non-compliance noted*

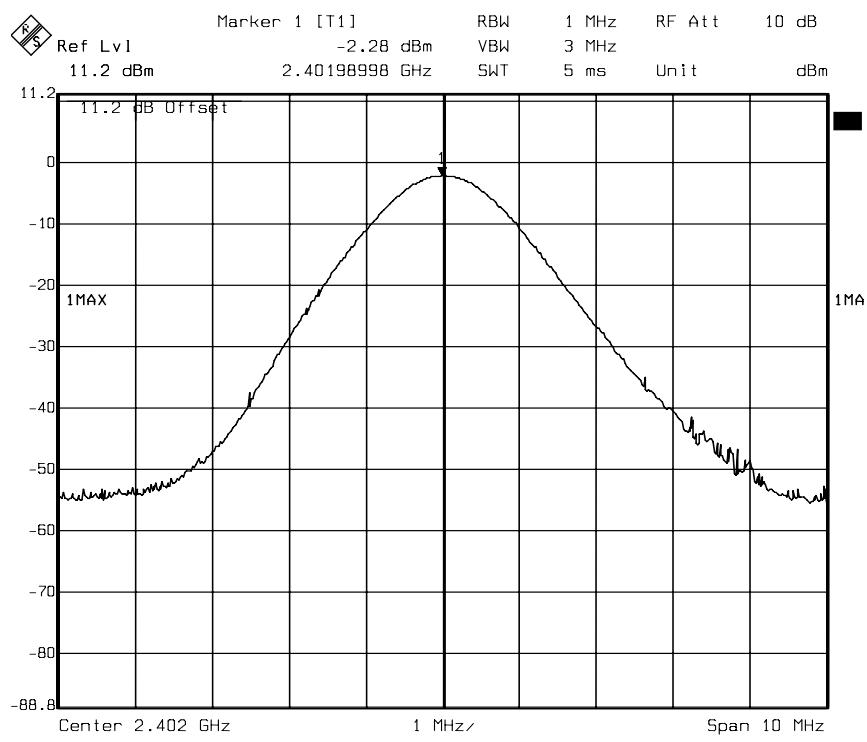
#### Test Data

##### **Test mode: Bluetooth**

Channel	Frequency (MHz)	Reading (dBm)	Factor (dB)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2402	-13.98	11.7	-2.28	0.00059	1	PASS
Middle	2441	-15.15	11.7	-3.45	0.00045		PASS
High	2480	-15.65	11.7	-3.95	0.00040		PASS

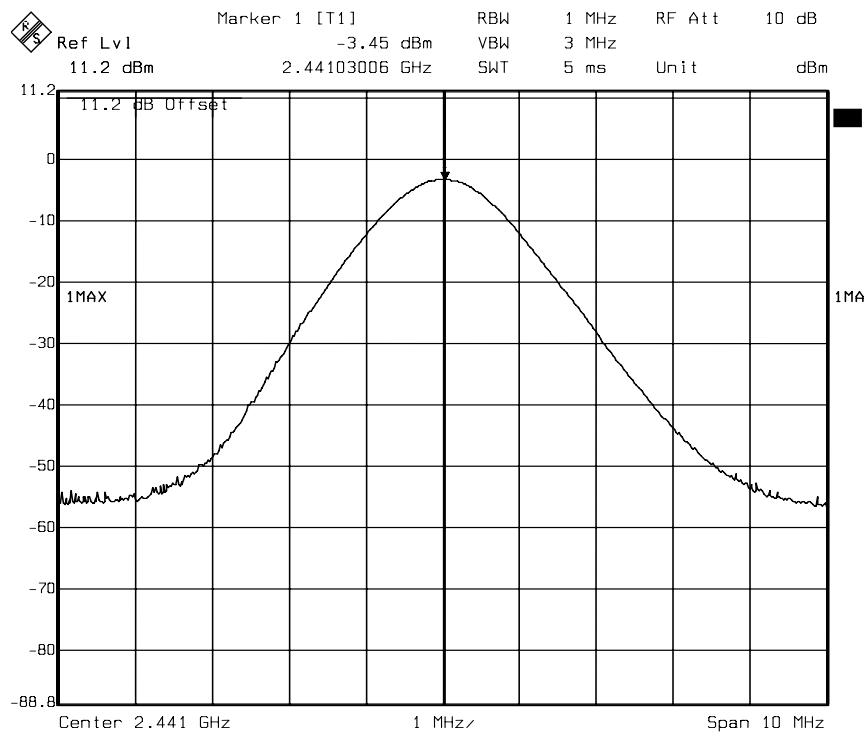
## Test Plot

### Peak power (CH Low)

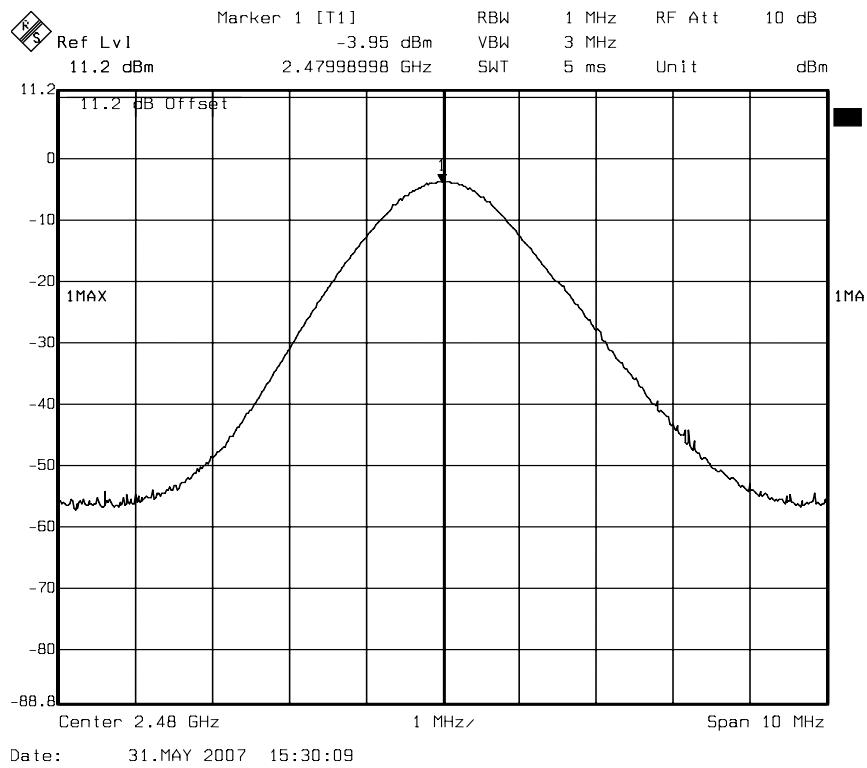


Date: 31.MAY 2007 15:32:33

### Peak power (CH Mid)



Date: 31.MAY 2007 15:30:43

**Peak power (CH High)**



## 7.2 BAND EDGES MEASUREMENT

### LIMIT

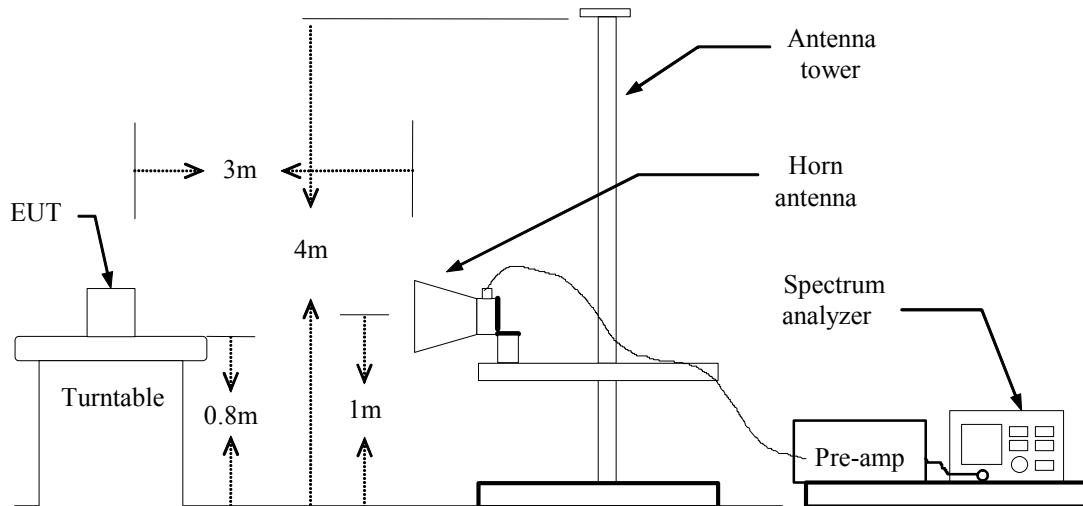
According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains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

Open Area Test Site # 6				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEM	829054/017	MAR. 13, 2008
Temp./Humidity Chamber	K.SON	THS-M1	242	JUN. 09, 2007
EMI Test Receiver	R&S	ESCI	100005	FEB.13, 2008
Pre-Amplifier	HP	8447F	2944A03817	SEP. 04, 2007
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	107326	AUG. 15, 2007
Bilog Antenna	Sunol	JB1	A070506-2	JUL. 11, 2007
Horn Antenna	Com-Power	AH-118	071032	NOV. 21, 2007
Turn Table	YO Chen	001	N/A	N.C.R
Antenna Tower	AR	TP100A	N/A	N.C.R
Controller	CT	SC101	N/A	N.C.R
RF Switch	E-INSTRUMENT TELH LTD	ERS-180-1-2	EC1204141	N.C.R
Site NSA	CCS	N/A	N/A	NOV. 01, 2007
Power Meter	Anritsu	ML2487A	6K00003888	MAR. 13, 2008
Power Sensor	Anritsu	MA2491A	33265	MAR. 13, 2008
AC Power Source	T-POWER	TFC-3020	N930010	N.C.R
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R
Signal Generator	HP	8648B	3642U01911	JAN. 01, 2008
Signal Generator	HP	8673C	2938A00663	JUL. 06, 2007
Substituted Dipole	SCHWAZBECK	VHAP/UHAP	998+999/981+982	JUN. 22, 2007
Substituted Horn	Com-Power	AH-118	071033	SEP. 05, 2007

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

## Test Configuration

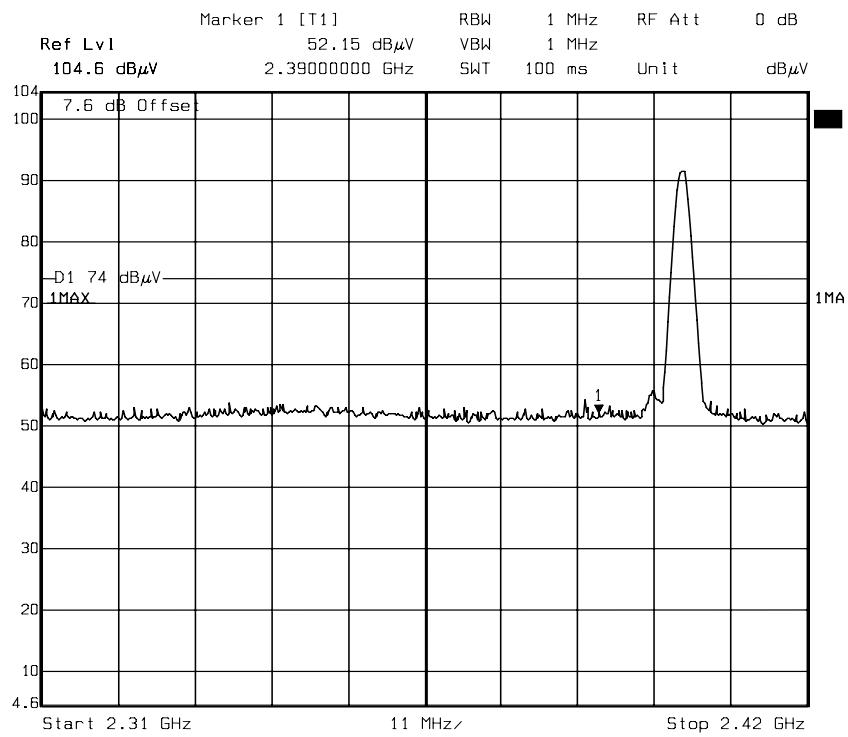


## TEST PROCEDURE

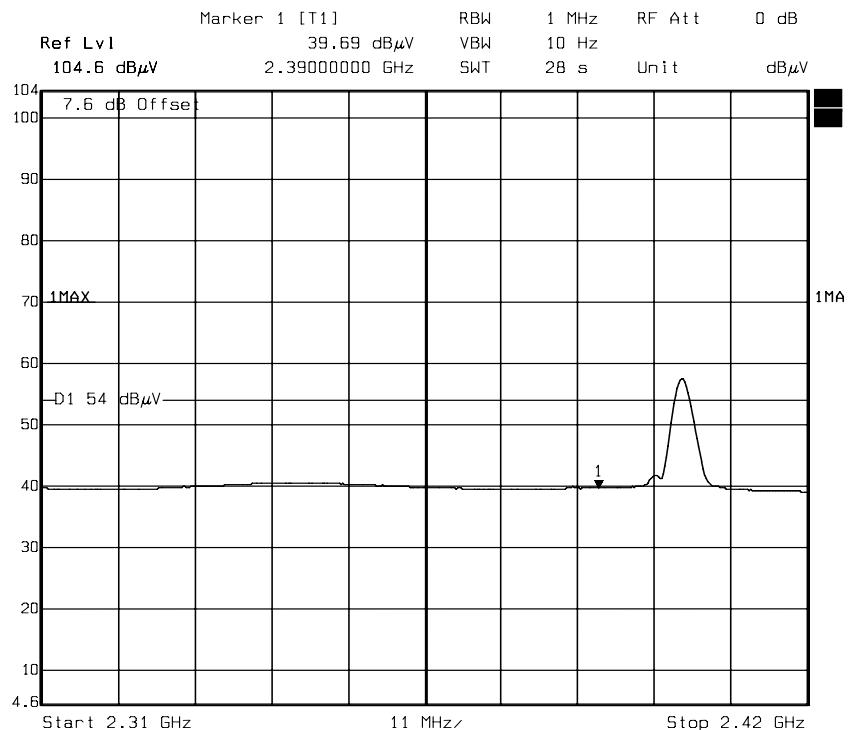
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the 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

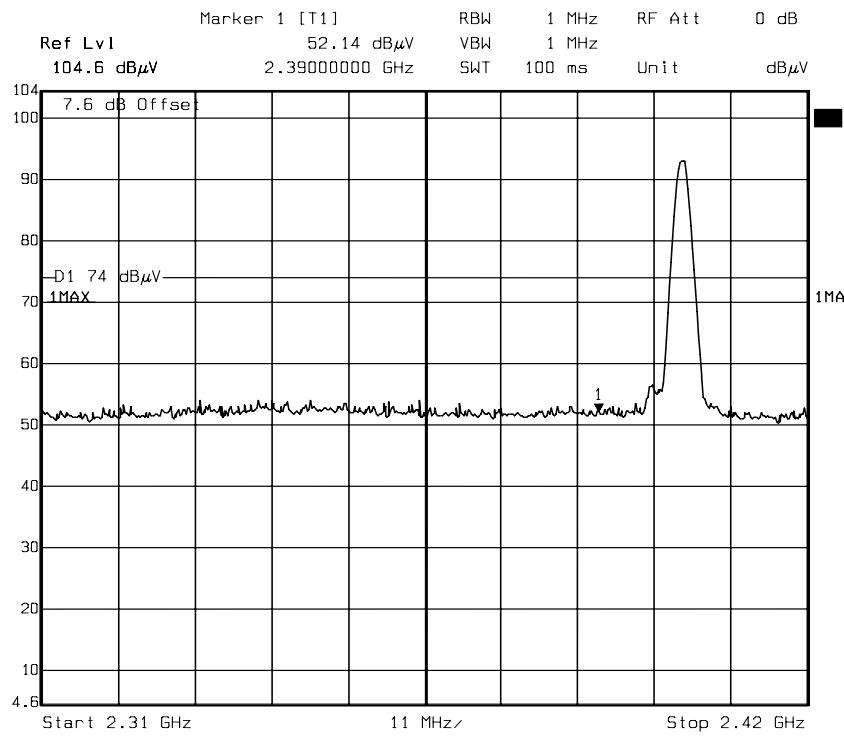
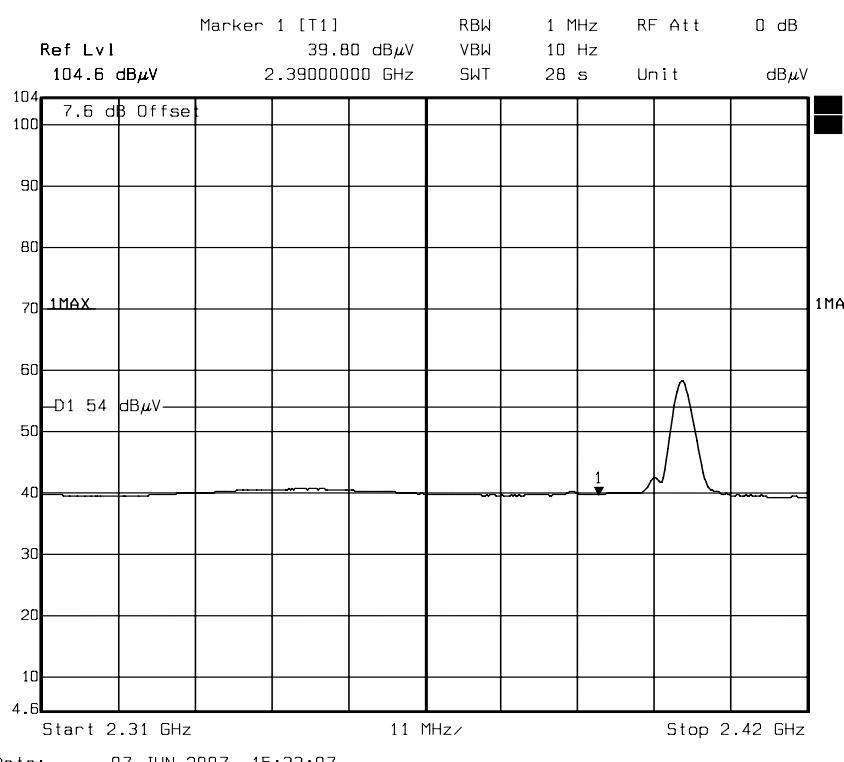
Refer to attach spectrum analyzer data chart.

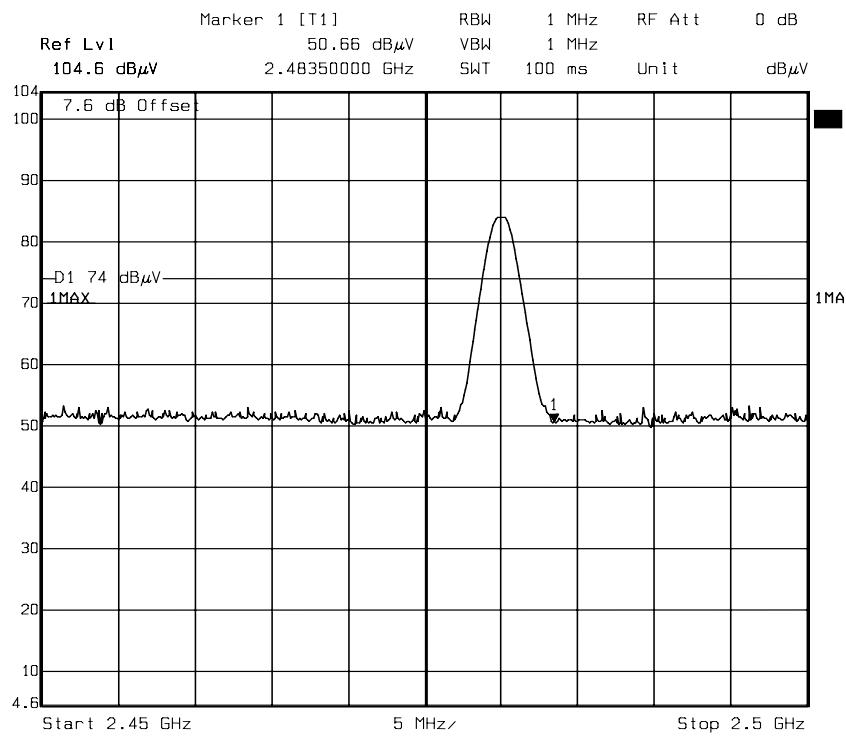
**Band Edges (CH Low)****Detector mode: Peak****Polarity: Vertical**

Date: 07.JUN.2007 15:14:38

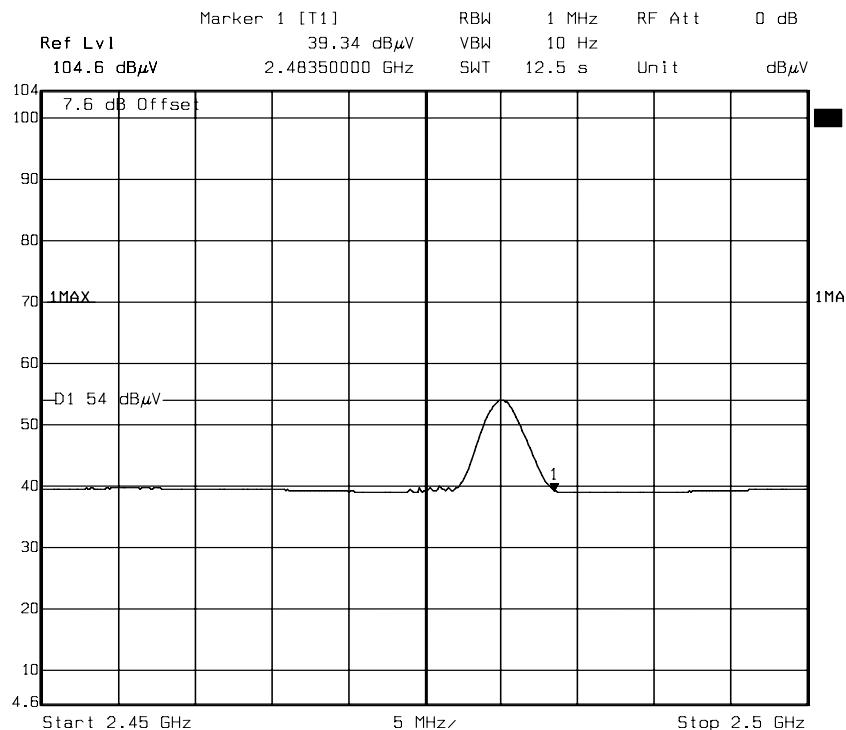
**Detector mode: Average****Polarity: Vertical**

Date: 07.JUN.2007 15:15:21

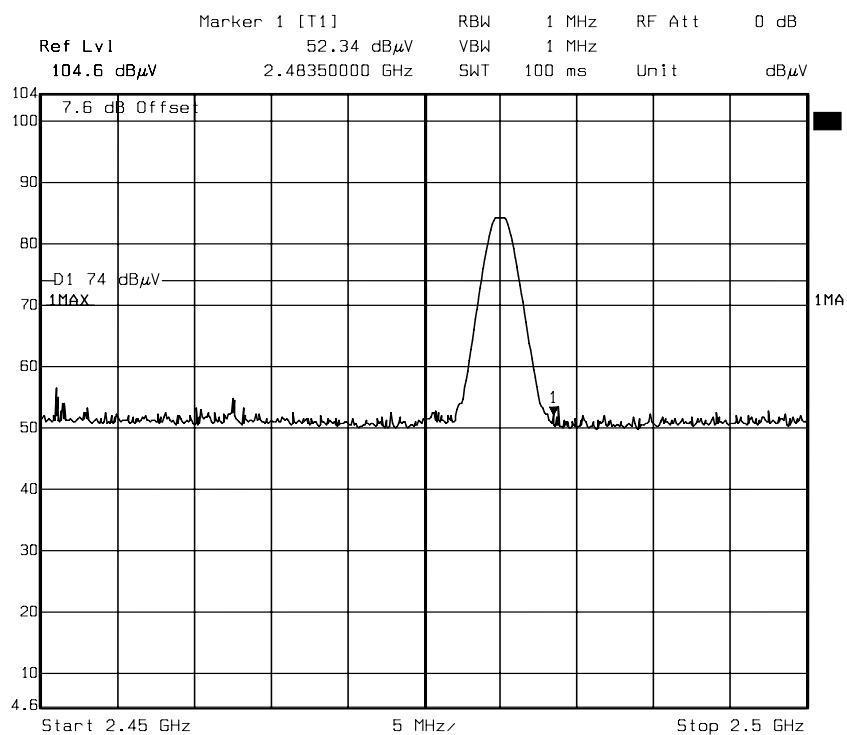
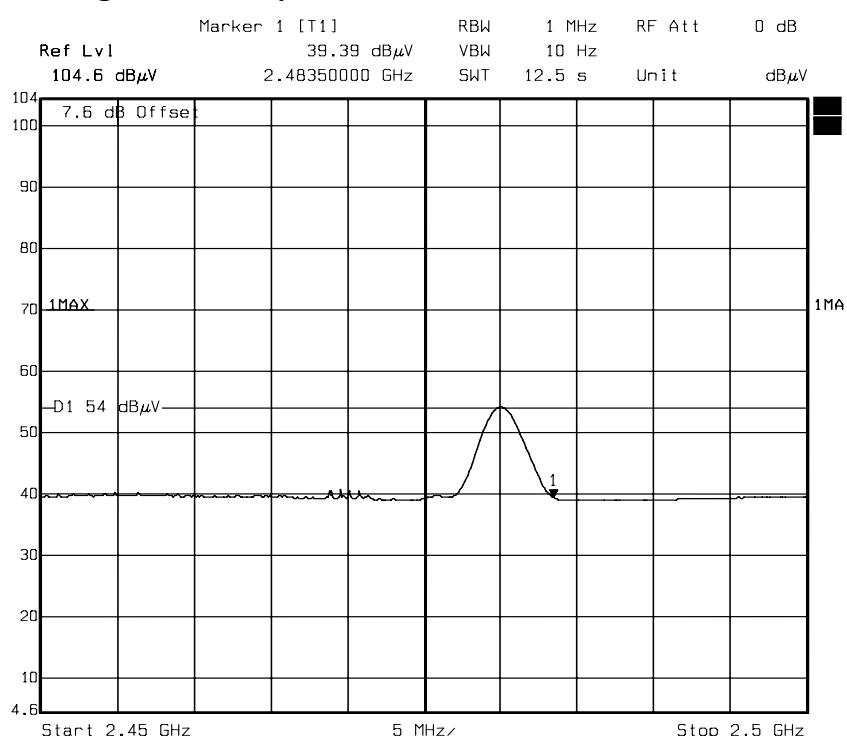
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

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

Date: 07.JUN.2007 15:17:37

**Detector mode: Average****Polarity: Vertical**

Date: 07.JUN.2007 15:18:03

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



## 7.3 FREQUENCY SEPARATION

### LIMIT

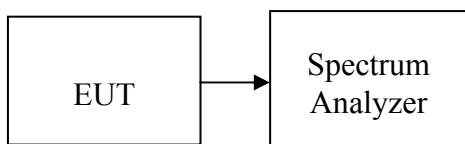
According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEM	829054/017	MAR. 13, 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 = 30kHz, VBW = 100kHz, Span = 3MHz, Sweep = auto.
5. Max hold, mark 3 peaks of hopping channel and record the 3 peaks frequency.

### TEST RESULTS

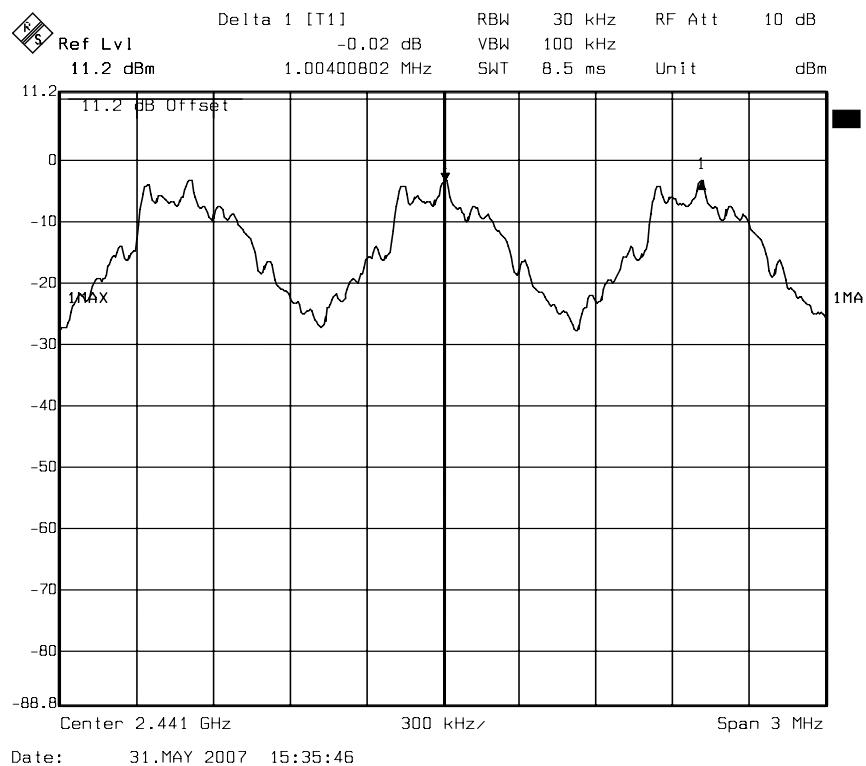
*No non-compliance noted*

### Test Data

Channel Separation (MHz)	20dB Bandwith (kHz)	Limit (kHz)	Result
1.00	886.77	>25	Pass

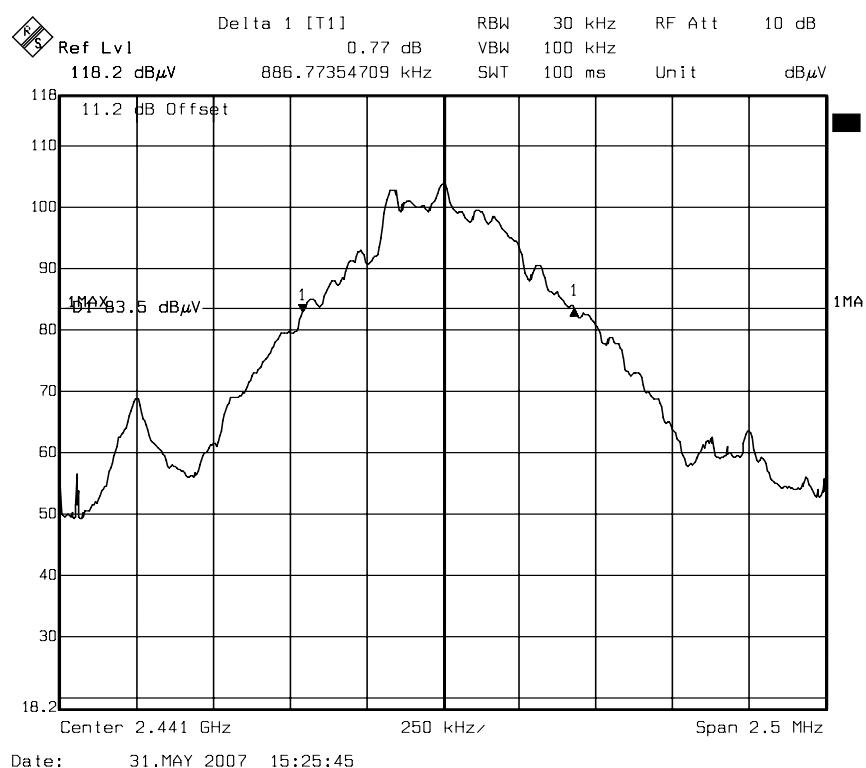
## Test Plot

### Measurement of Channel Separation



### Measurement of 20dB Bandwidth

#### (CH Mid)





## 7.4 NUMBER OF HOPPING FREQUENCY

### LIMIT

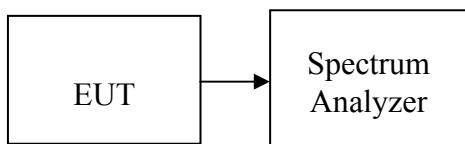
According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 75 hopping frequencies.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEM	829054/017	MAR. 13, 2008

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

### Test Configuration



### TEST PROCEDURE

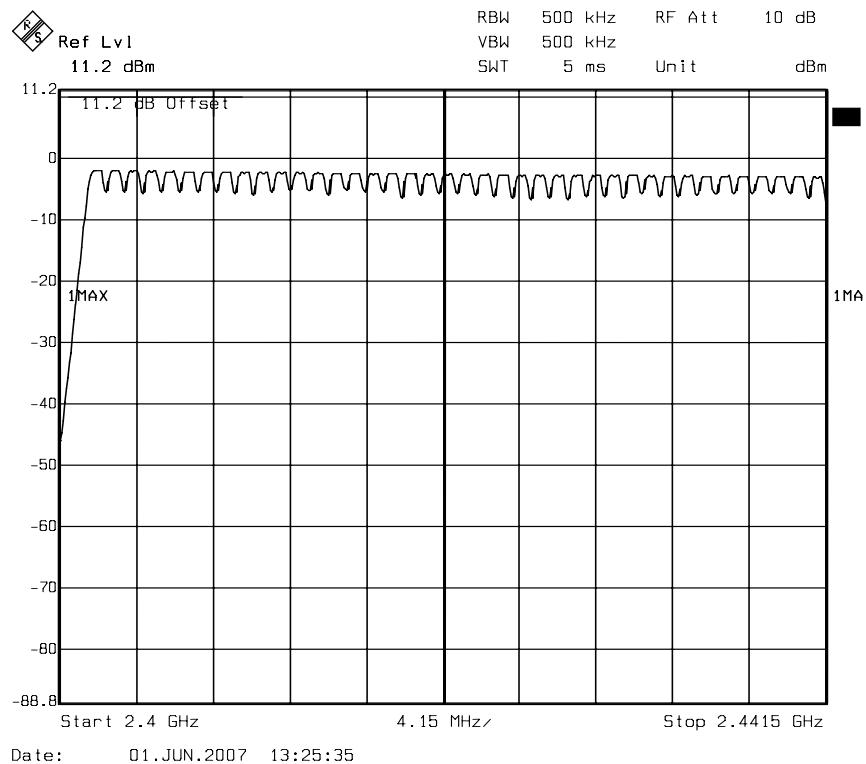
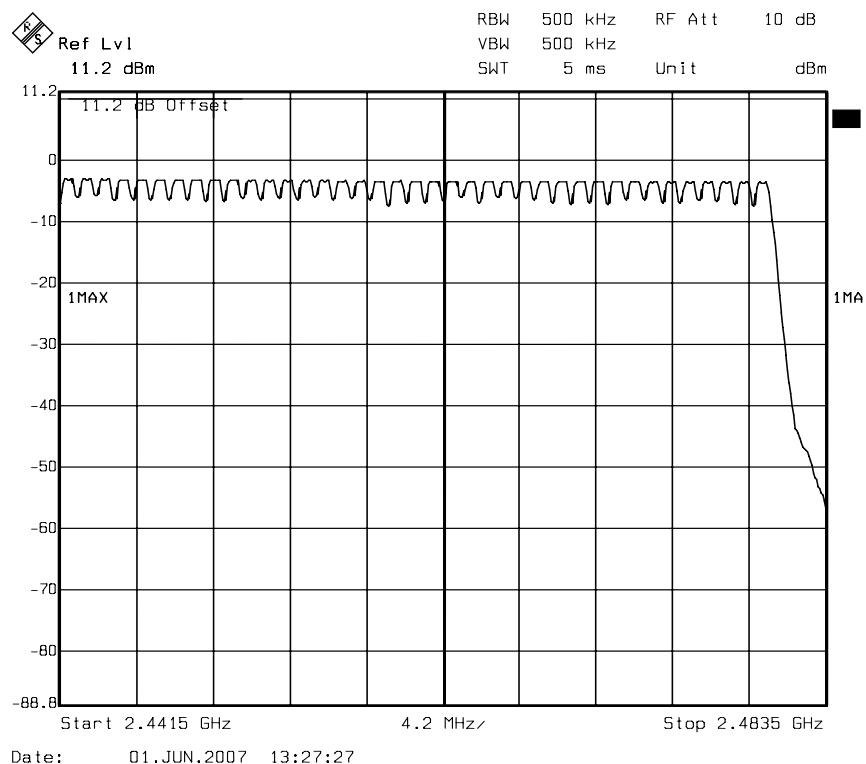
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2441.5MHz, Sweep = auto and Start=2441.5MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=510kHz.
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	>79	PASS

**Test Plot****Channel Number****2.4 GHz – 2.4415 GHz****2.4415 GHz – 2.4835 GHz**

## 7.5 TIME OF OCCUPANCY (DWELL TIME)

### LIMIT

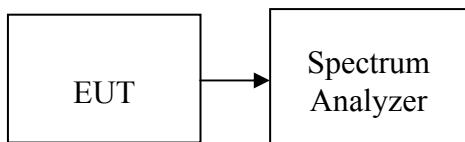
According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEM	829054/017	MAR. 13, 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 = 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

CH Low:  $0.390 * (1600/2)/79 * 31.6 = 124.80$  (ms)

CH Mid:  $0.390 * (1600/2)/79 * 31.6 = 124.80$  (ms)

CH High:  $0.390 * (1600/2)/79 * 31.6 = 124.80$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	0.39	124.80	31.60	400.00	PASS
Mid	0.39	124.80	31.60		PASS
High	0.39	124.80	31.60		PASS

#### DH 3

CH Low:  $1.64 * (1600/4)/79 * 31.6 = 262.40$  (ms)

CH Mid:  $1.65 * (1600/4)/79 * 31.6 = 264.00$  (ms)

CH High:  $1.65 * (1600/4)/79 * 31.6 = 264.00$  (ms)

CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	1.64	262.40	31.60	400.00	PASS
Mid	1.65	264.00	31.60		PASS
High	1.65	264.00	31.60		PASS

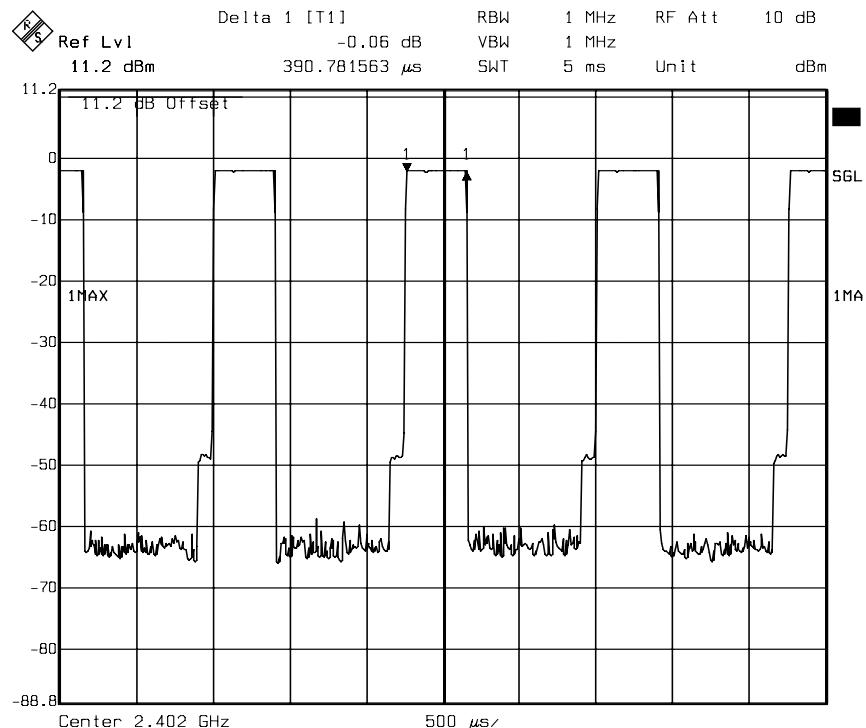
#### DH 5

CH Low:  $2.90 * (1600/6)/79 * 31.6 = 309.33$  (ms)

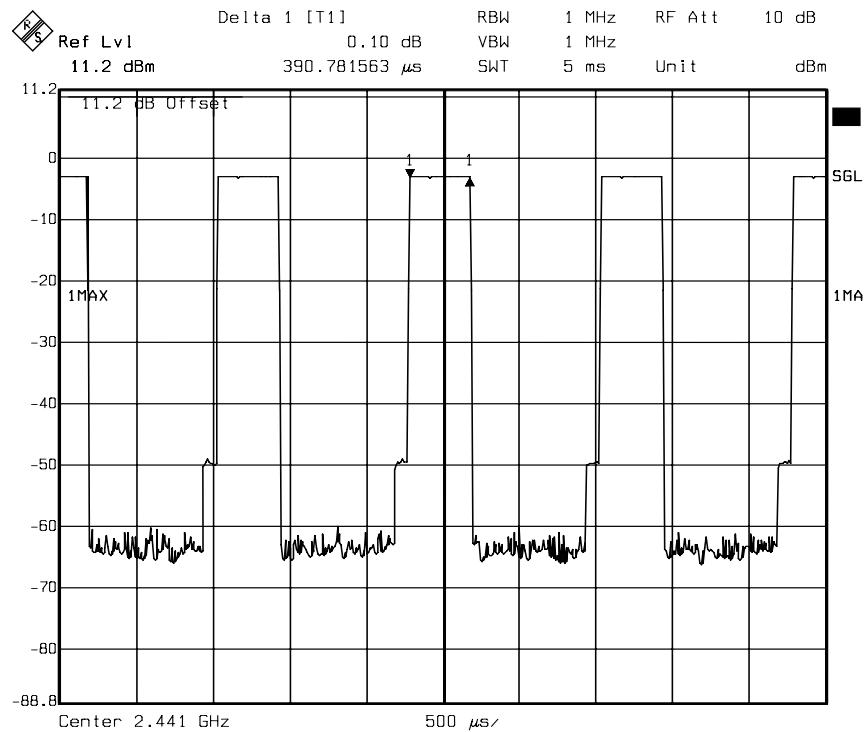
CH Mid:  $2.90 * (1600/6)/79 * 31.6 = 309.33$  (ms)

CH High:  $2.90 * (1600/6)/79 * 31.6 = 309.33$  (ms)

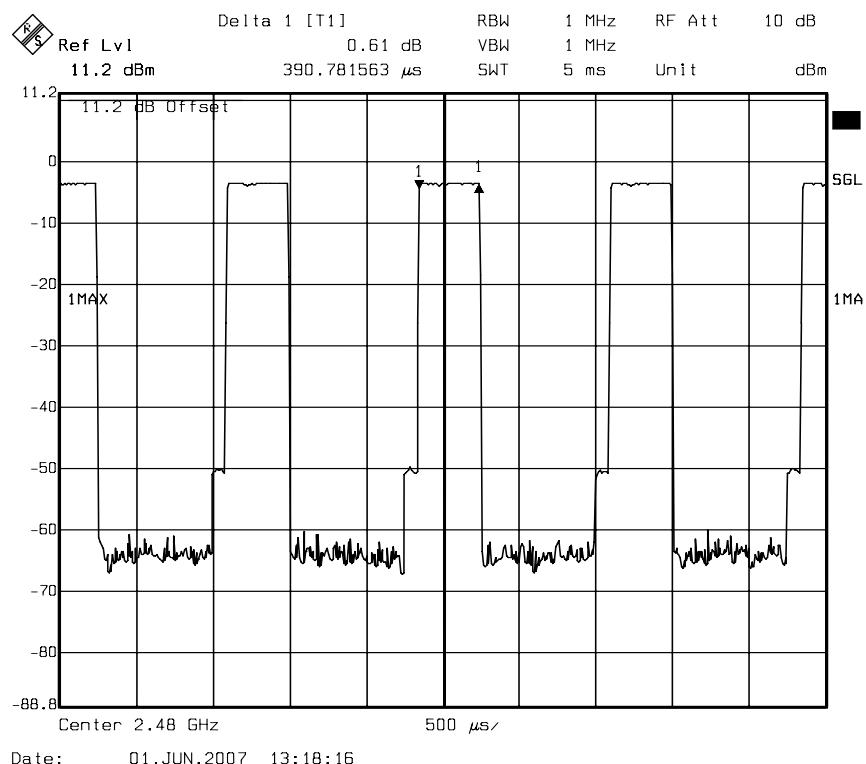
CH	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
Low	2.90	309.33	31.60	400.00	PASS
Mid	2.90	309.33	31.60		PASS
High	2.90	309.33	31.60		PASS

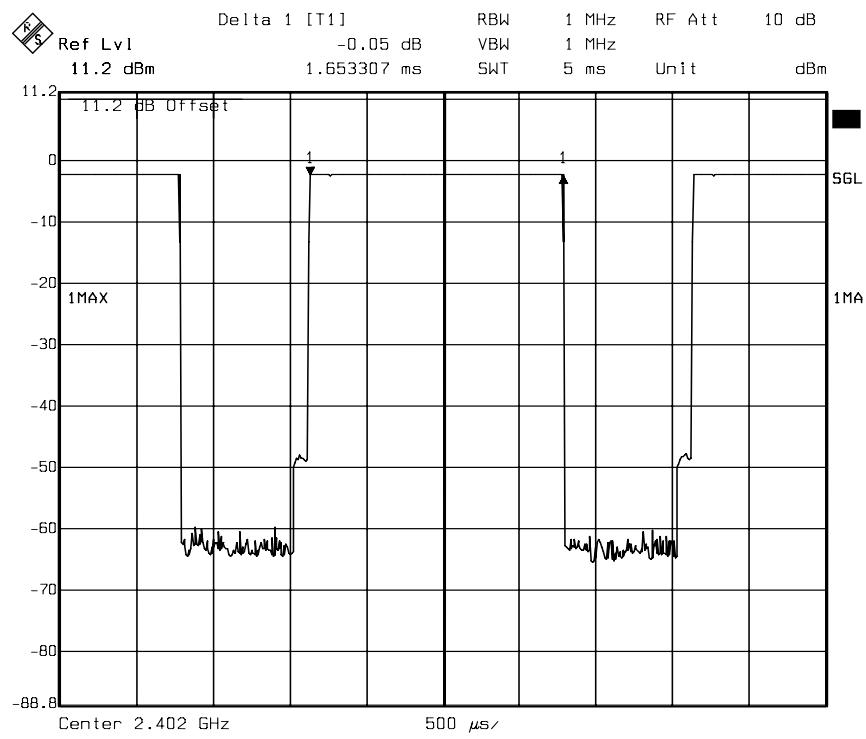
**Test Plot****DH 1****(CH Low)**

Date: 01.JUN.2007 13:16:24

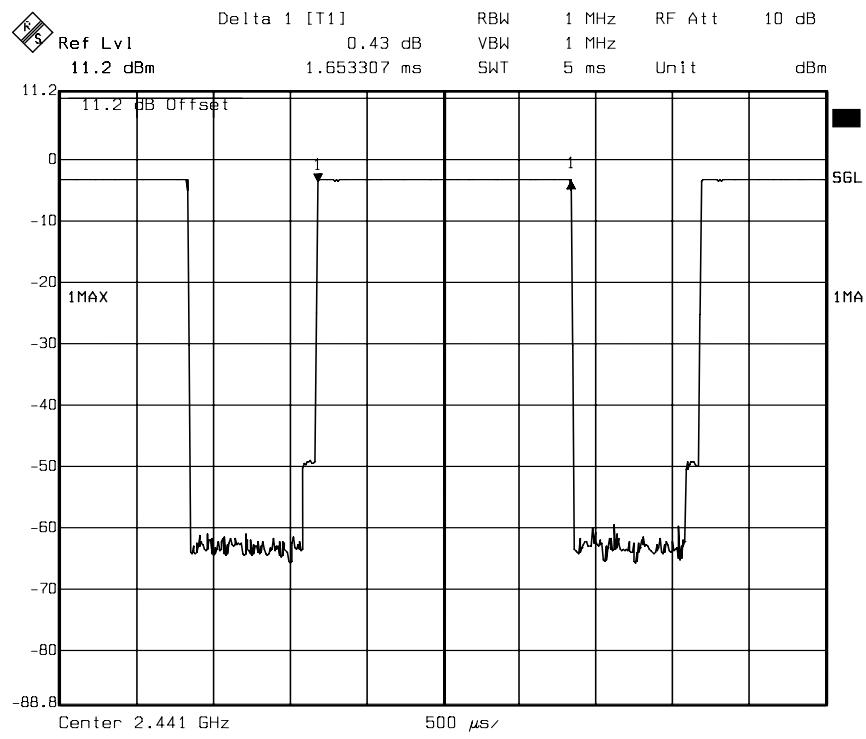
**(CH Mid)**

Date: 01.JUN.2007 13:17:19

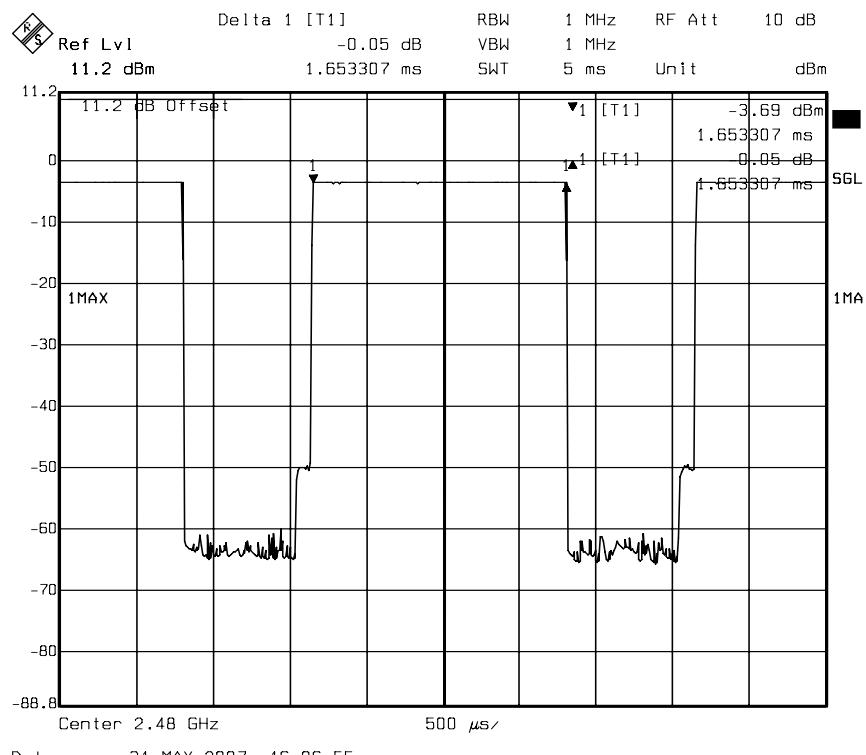
**(CH High)**

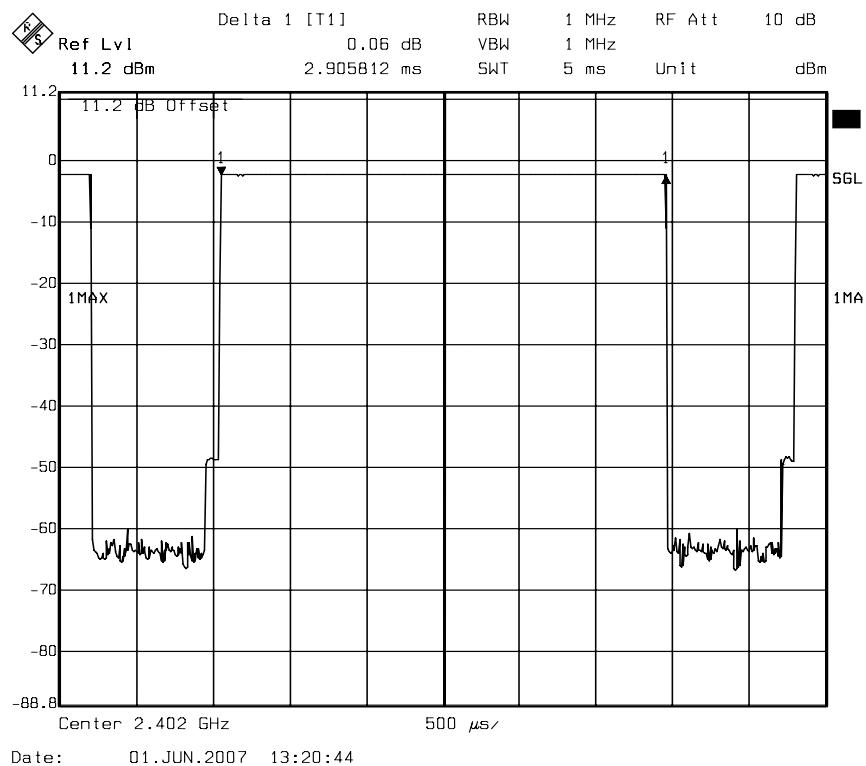
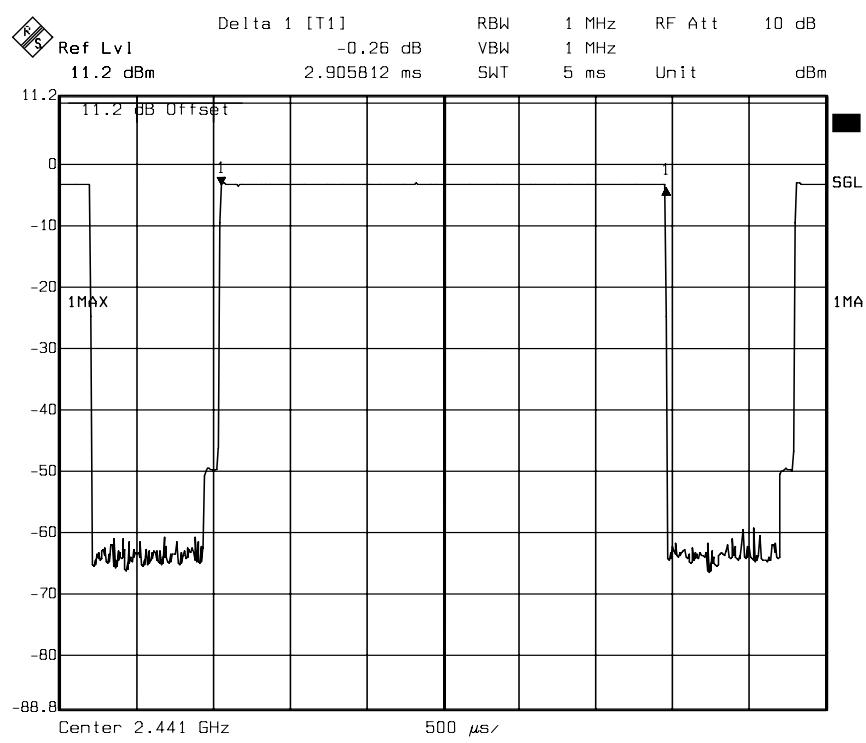
**DH 3****(CH Low)**

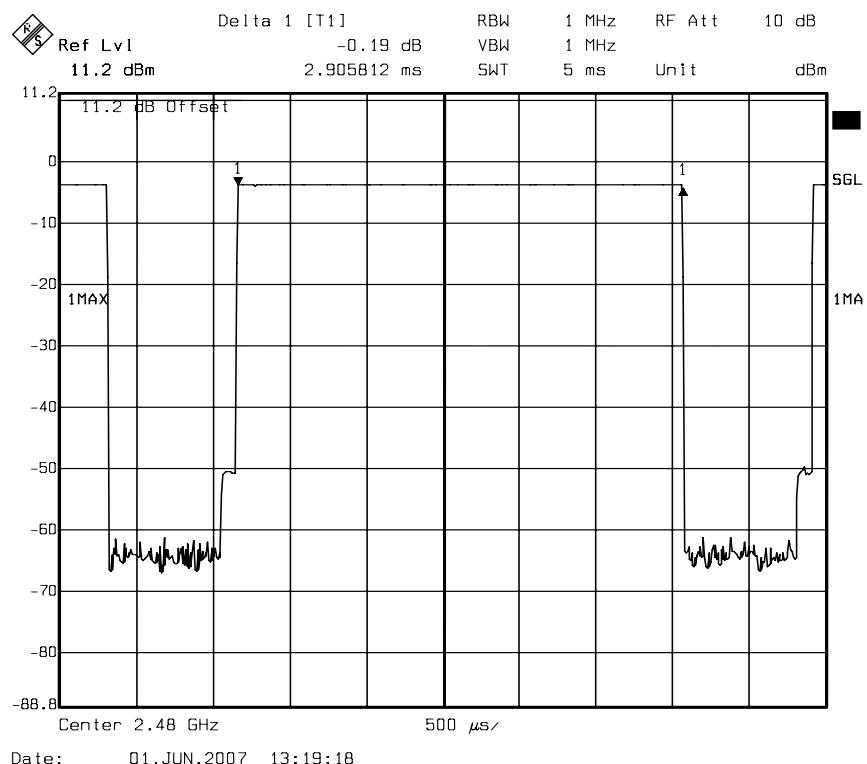
Date: 31.MAY 2007 16:11:23

**(CH Mid)**

Date: 31.MAY 2007 16:12:25

**(CH High)**

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

**(CH High)**



## 7.6 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	AIR TUNE
<b>Frequency band (Operating)</b>	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input checked="" type="checkbox"/> Others: <u>Bluetooth: 2.402GHz ~ 2.480GHz</u>
<b>Device category</b>	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input type="checkbox"/> Occupational/Controlled exposure ( $S = 5mW/cm^2$ ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ( $S=1mW/cm^2$ )
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	-2.28dBm (0.5916mW)
<b>Antenna gain (Max)</b>	2 dBi (Numeric gain: 1.584mW)
<b>Evaluation applied</b>	<input type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation <input checked="" type="checkbox"/> N/A
<b>Remark:</b>	
1. The maximum output power is <u>-2.28dBm (0.5916mW)</u> at <u>2402MHz</u> (with <u>1.584 numeric antenna gain</u> .)	
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.	
3. 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.

## 7.7 SPURIOUS EMISSIONS

### 7.7.1 Conducted Measurement

#### LIMIT

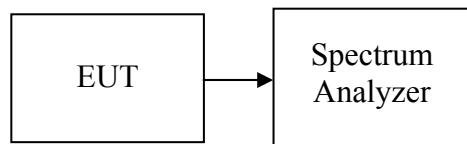
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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
Spectrum Analyzer	R&S	FSEM	829054/017	MAR. 13, 2008

*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.

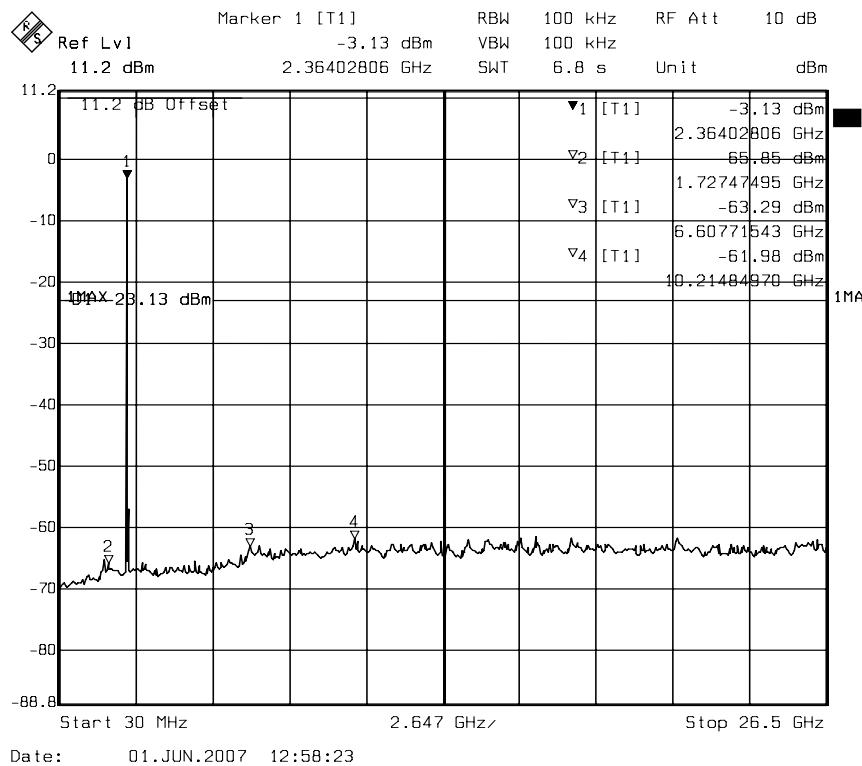
#### TEST RESULTS

*No non-compliance noted*

## Test Plot

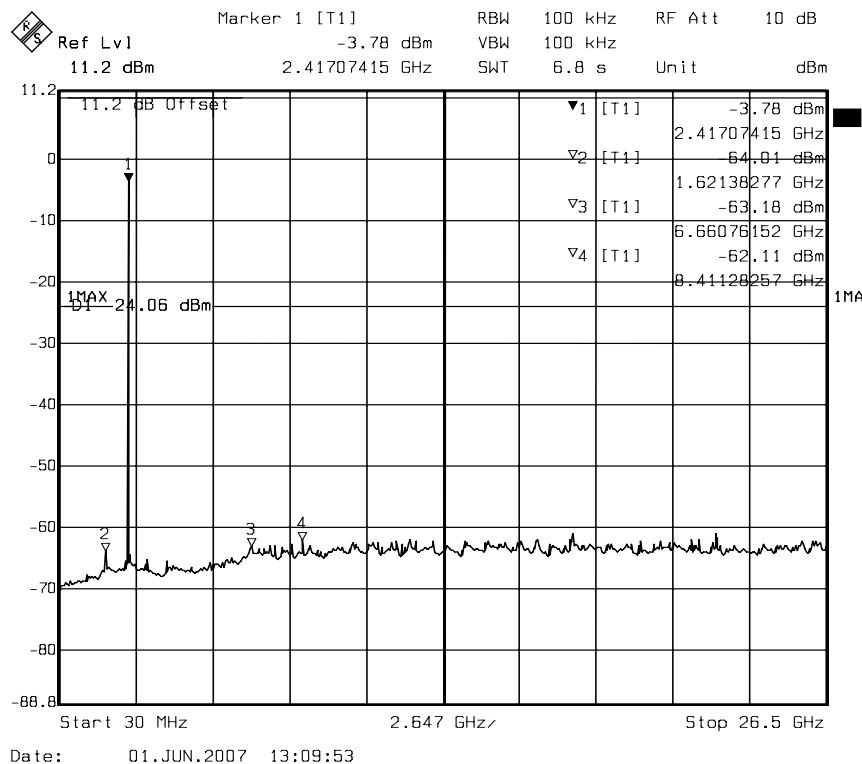
### CH Low

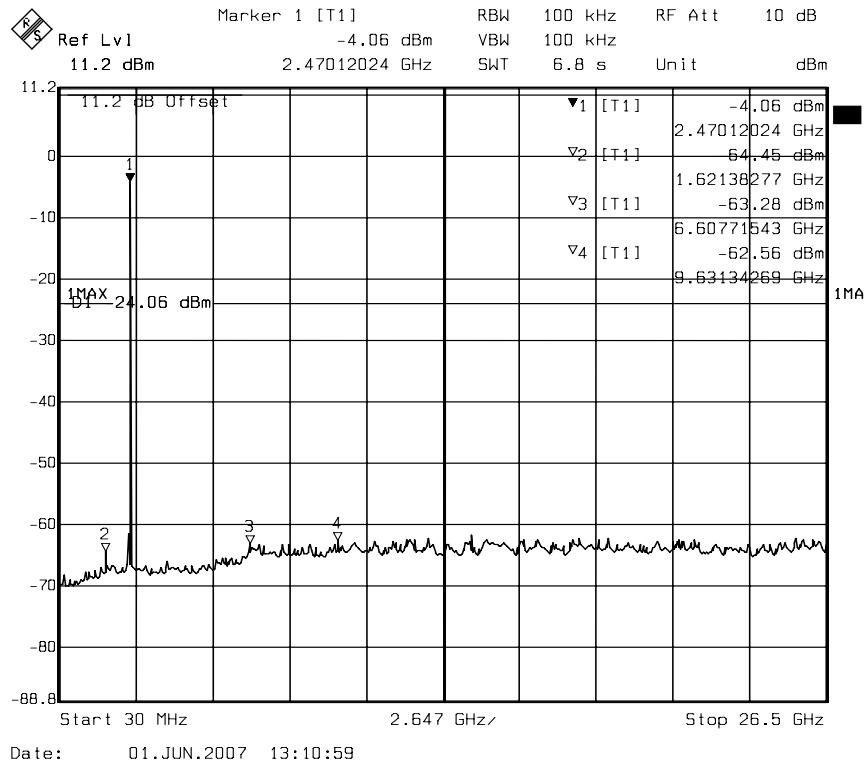
#### 30MHz ~ 26.5GHz



### CH Mid

#### 30MHz ~ 26.5GHz



**CH High****30MHz ~ 26.5GHz**



## 7.7.2 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

**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 (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

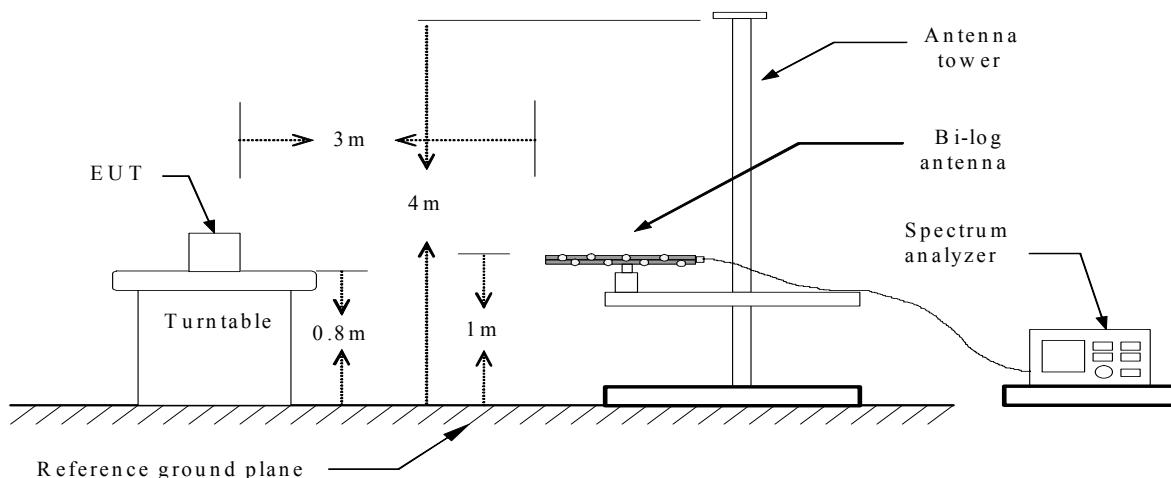
## MEASUREMENT EQUIPMENT USED

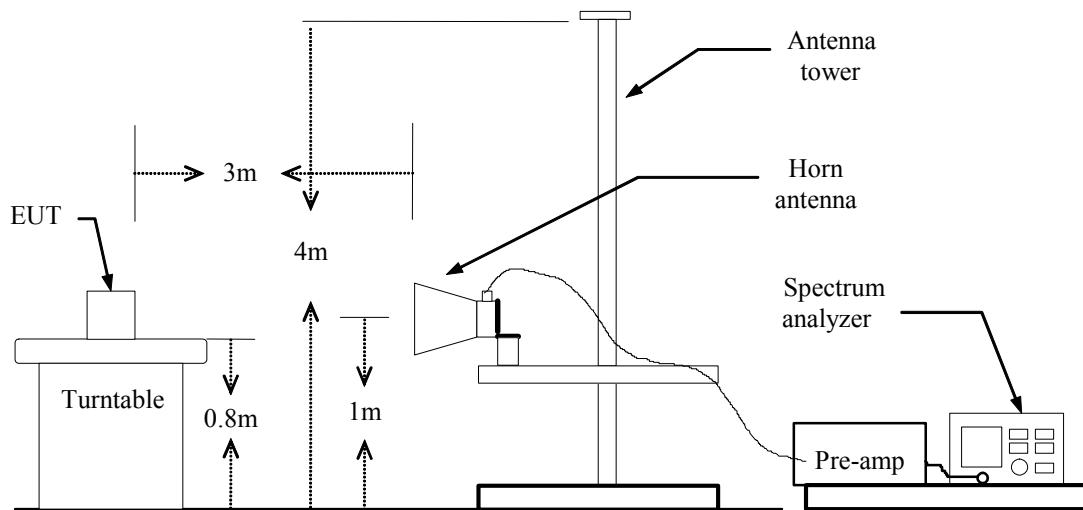
Open Area Test Site # 6				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEM	829054/017	MAR. 13, 2008
Temp./Humidity Chamber	K.SON	THS-M1	242	JUN. 09, 2007
EMI Test Receiver	R&S	ESCI	100005	FEB.13, 2008
Pre-Amplifier	HP	8447F	2944A03817	SEP. 04, 2007
Pre-Amplifier	MITEQ	AFS44-00102650-42-10P-44	107326	AUG. 15, 2007
Bilog Antenna	Sunol	JB1	A070506-2	JUL. 11, 2007
Horn Antenna	Com-Power	AH-118	071032	NOV. 21, 2007
Turn Table	YO Chen	001	N/A	N.C.R
Antenna Tower	AR	TP100A	N/A	N.C.R
Controller	CT	SC101	N/A	N.C.R
RF Switch	E-INSTRUMENT TELH LTD	ERS-180-1-2	EC1204141	N.C.R
Site NSA	CCS	N/A	N/A	NOV. 01, 2007
Power Meter	Anritsu	ML2487A	6K00003888	MAR. 13, 2008
Power Sensor	Anritsu	MA2491A	33265	MAR. 13, 2008
AC Power Source	T-POWER	TFC-3020	N930010	N.C.R
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R
Signal Generator	HP	8648B	3642U01911	JAN. 01, 2008
Signal Generator	HP	8673C	2938A00663	JUL. 06, 2007
Substituted Dipole	SCHWAZBECK	VHAP/UHAP	998+999/981+982	JUN. 22, 2007
Substituted Horn	Com-Power	AH-118	071033	SEP. 05, 2007

**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. 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

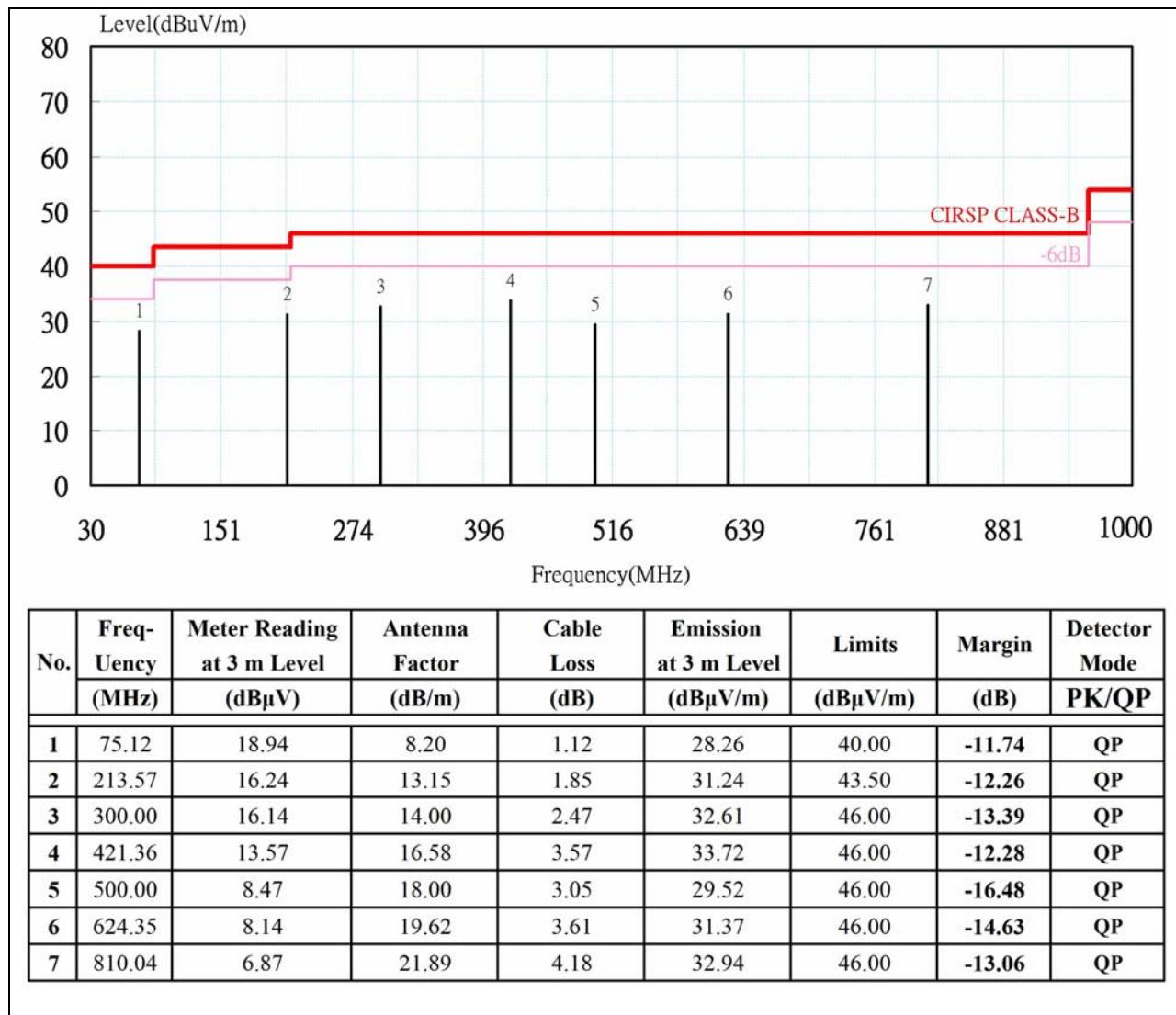
**Test Date:** June 7, 2007

**Temperature:** 29.9 °C

**Tested by:** Eric Yang

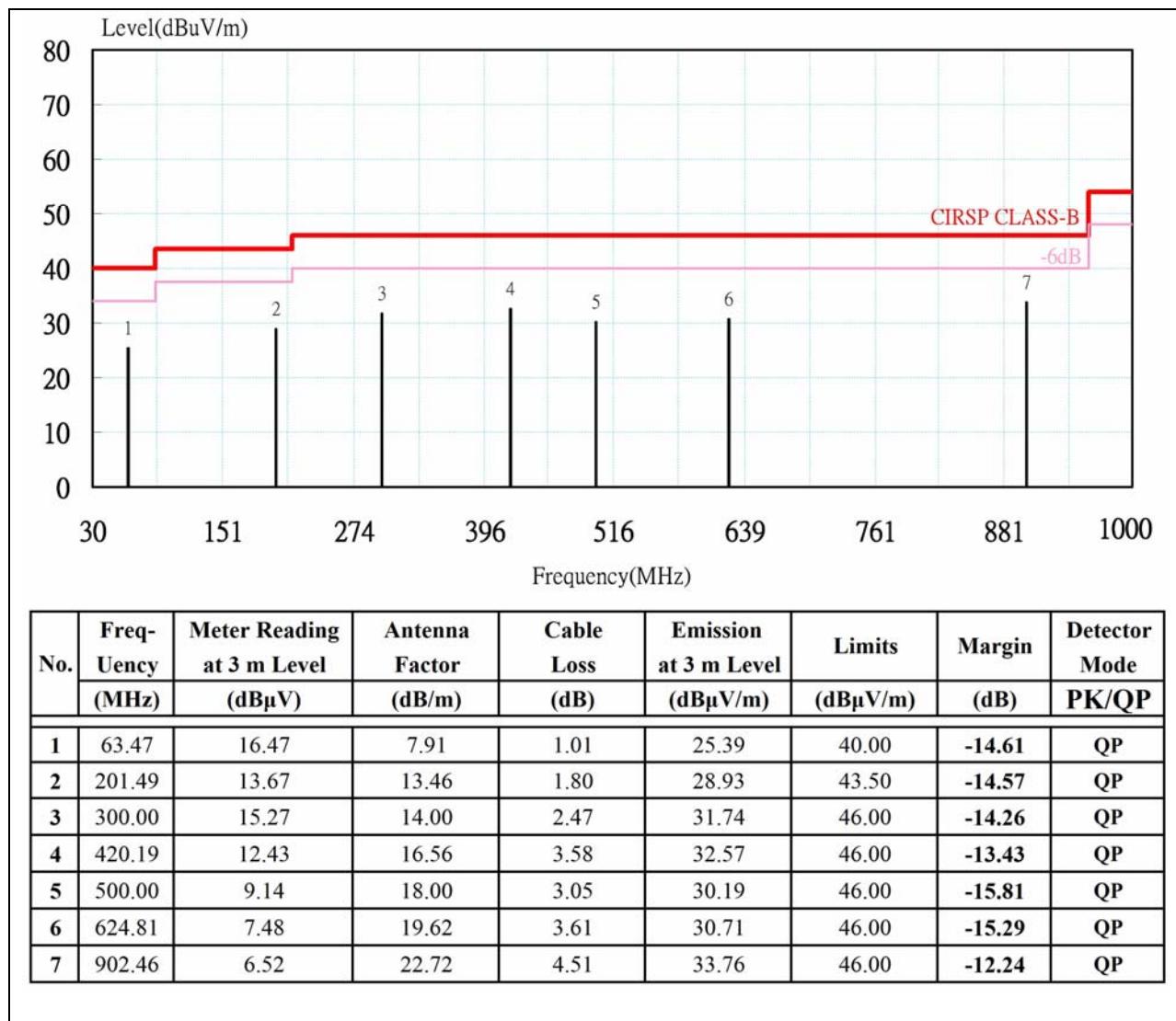
**Humidity:** 62 % RH

**Polarity:** Horizontal



### **Remark:**

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.

**Operation Mode:** Normal Link**Test Date:** June 7, 2007**Temperature:** 29.9 °C**Tested by:** Eric Yang**Humidity:** 62 % RH**Polarity:** Vertical**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
5. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
6. 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.
7. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.

**Above 1 GHz****Operation Mode:** TX / Bluetooth / CH Low**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Eric Yang**Humidity:** 57% RH**Polarity:** Horizontal

TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
2401.86	101.24	30.06	2.34	39.80	0.00	93.84	Fundamental Frequency	P	A
2401.86	100.96	30.06	2.34	39.80	0.00	93.56			
* 1600.70	56.91	27.27	2.11	39.86	0.84	47.27	74.00	-26.73	P
* 1600.70	54.58	27.27	2.11	39.86	0.84	44.94	54.00	-9.06	A
3203.51	45.69	30.02	2.75	40.21	1.28	39.53	74.00	-34.47	P
3203.51	38.51	30.02	2.75	40.21	1.28	32.35	73.56	-41.21	A
* 4804.01	47.69	32.77	3.69	41.31	0.69	43.53	74.00	-30.47	P
* 4804.01	38.52	32.77	3.69	41.31	0.69	34.36	54.00	-19.64	A
7205.77	48.69	38.79	4.92	41.47	1.37	52.30	74.00	-21.70	P
7205.77	37.15	38.79	4.92	41.47	1.37	40.76	73.56	-32.80	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** TX / Bluetooth / CH Low**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Eric Yang**Humidity:** 57% RH**Polarity:** Vertical

TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Vertical polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
2401.93	94.12	30.06	2.34	39.80	0.00	86.72	Fundamental Frequency	P	A
2401.93	94.53	30.06	2.34	39.80	0.00	87.13			
* 1600.63	56.13	27.26	2.11	39.86	0.84	46.49	74.00	-27.51	P
* 1600.63	53.86	27.26	2.11	39.86	0.84	44.22	54.00	-9.78	A
3201.32	45.98	30.02	2.74	40.20	1.28	39.82	74.00	-34.18	P
3201.32	38.49	30.02	2.74	40.20	1.28	32.33	67.13	-34.80	A
* 4804.51	54.32	32.77	3.69	41.31	0.69	50.16	74.00	-23.84	P
* 4804.51	41.18	32.77	3.69	41.31	0.69	37.02	54.00	-16.98	A
7205.48	48.24	38.79	4.92	41.47	1.37	51.85	74.00	-22.15	P
7205.48	37.49	38.79	4.92	41.47	1.37	41.10	67.13	-26.03	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** TX / Bluetooth / CH Mid**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Eric Yang**Humidity:** 57% RH**Polarity:** Horizontal

TX / IEEE 802.11b mode / CH Mid				Measurement Distance at 3m			Horizontal polarity		
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
2440.91	97.47	30.04	2.34	39.77	0.00	90.08	Fundamental Frequency	P	A
2440.91	97.15	30.04	2.34	39.77	0.00	89.76			
1626.80	57.98	27.46	2.12	39.87	0.85	48.54	74.00	-25.46	P
1626.80	55.89	27.46	2.12	39.87	0.85	46.45	69.76	-23.30	A
3253.34	45.67	30.05	2.83	40.25	1.21	39.51	74.00	-34.49	P
3253.34	35.49	30.05	2.83	40.25	1.21	29.33	69.76	-40.43	A
* 4882.15	47.69	32.94	3.74	41.42	0.72	43.66	74.00	-30.34	P
* 4882.15	38.51	32.94	3.74	41.42	0.72	34.48	54.00	-19.52	A
* 7323.26	47.29	38.95	4.97	41.30	1.62	51.53	74.00	-22.47	P
* 7323.26	27.46	38.95	4.97	41.30	1.62	31.70	54.00	-22.30	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** TX / Bluetooth / CH Mid**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Eric Yang**Humidity:** 57% RH**Polarity:** Vertical

TX / IEEE 802.11b mode / CH Mid				Measurement Distance at 3m				Vertical polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
2440.80	95.51	30.04	2.34	39.77	0.00	88.12	Fundamental Frequency	P	A
2440.80	94.88	30.04	2.34	39.77	0.00	87.49			
* 1623.68	61.72	27.44	2.12	39.87	0.85	52.26	74.00	-21.74	P
* 1623.68	60.34	27.44	2.12	39.87	0.85	50.88	54.00	-3.12	A
3253.16	44.96	30.05	2.82	40.25	1.21	38.80	74.00	-35.20	P
3253.16	34.69	30.05	2.82	40.25	1.21	28.53	67.49	-38.96	A
* 4881.35	53.28	32.94	3.74	41.42	0.71	49.25	74.00	-24.75	P
* 4881.35	40.58	32.94	3.74	41.42	0.71	36.55	54.00	-17.45	A
* 7323.49	46.28	38.95	4.97	41.30	1.62	50.52	74.00	-23.48	P
* 7323.49	37.11	38.95	4.97	41.30	1.62	41.35	54.00	-12.65	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** TX / Bluetooth / CH High**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Eric Yang**Humidity:** 57% RH**Polarity:** Horizontal

TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m			Horizontal polarity		
Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dB $\mu$ V)	(dB/m)	(dB)	(dB)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	(P/Q/A)
2480.08	94.61	30.01	2.34	39.74	0.00	87.23	Fundamental Frequency	P	A
2480.08	94.10	30.01	2.34	39.74	0.00	86.72			
1652.61	56.23	27.66	2.14	39.89	0.87	47.00	74.00	-27.00	P
1652.61	54.10	27.66	2.14	39.89	0.87	44.87	66.72	-21.84	A
3305.40	45.27	30.08	2.91	40.29	1.14	39.11	74.00	-34.89	P
3305.40	35.59	30.08	2.91	40.29	1.14	29.43	66.72	-37.29	A
* 4959.38	45.19	33.11	3.78	41.54	0.74	41.28	74.00	-32.72	P
* 4959.38	37.55	33.11	3.78	41.54	0.74	33.64	54.00	-20.36	A
* 7439.51	46.14	39.12	5.01	41.14	1.87	51.00	74.00	-23.00	P
* 7439.51	36.25	39.12	5.01	41.14	1.87	41.11	54.00	-12.89	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** TX / Bluetooth / CH High**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Eric Yang**Humidity:** 57% RH**Polarity:** Vertical

TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m				Vertical polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
2480.08	89.97	30.01	2.34	39.74	0.00	82.59	Fundamental Frequency	P	A
2480.08	89.62	30.01	2.34	39.74	0.00	82.24			
1652.78	61.43	27.66	2.14	39.89	0.87	52.20	74.00	-21.80	P
1652.78	60.39	27.66	2.14	39.89	0.87	51.16	62.24	-11.07	A
3305.31	45.26	30.08	2.91	40.29	1.14	39.10	74.00	-34.90	P
3305.31	36.25	30.08	2.91	40.29	1.14	30.09	62.24	-32.15	A
* 4960.15	45.81	33.11	3.78	41.54	0.74	41.91	74.00	-32.09	P
* 4960.15	37.14	33.11	3.78	41.54	0.74	33.24	54.00	-20.76	A
* 7439.85	46.27	39.12	5.01	41.14	1.87	51.14	74.00	-22.86	P
* 7439.85	36.21	39.12	5.01	41.14	1.87	41.08	54.00	-12.92	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** RX / Bluetooth / CH Low**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Jerry Chang**Humidity:** 57% RH**Polarity:** Horizontal

TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
1600.25	51.69	27.26	2.11	39.86	0.84	42.04	74	-31.96	P
1600.25	42.58	27.26	2.11	39.86	0.84	32.93	54	-21.07	A
3200.49	45.69	30.02	2.74	40.20	1.28	39.53	74	-34.47	P
3200.49	34.58	30.02	2.74	40.20	1.28	28.42	54	-25.58	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “ \*” means the Restricted band.

**Operation Mode:** RX / Bluetooth / CH Low**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Jerry Chang**Humidity:** 57% RH**Polarity:** Vertical

TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m				Vertical polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
1600.25	49.67	27.26	2.11	39.86	0.84	40.02	74	-33.98	P
1600.25	41.58	27.26	2.11	39.86	0.84	31.93	54	-22.07	A
3200.15	45.98	30.02	2.74	40.20	1.28	39.82	74	-34.18	P
3200.15	35.67	30.02	2.74	40.20	1.28	29.51	54	-24.49	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** RX / Bluetooth / CH Mid**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Jerry Chang**Humidity:** 57% RH**Polarity:** Horizontal

TX / IEEE 802.11b mode / CH Mid				Measurement Distance at 3m			Horizontal polarity		
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
1626.44	53.28	27.46	2.12	39.87	0.85	43.84	74	-30.16	P
1626.44	44.79	27.46	2.12	39.87	0.85	35.35	54	-18.65	A
3252.84	45.28	30.05	2.82	40.25	1.21	39.12	74	-34.88	P
3252.84	37.36	30.05	2.82	40.25	1.21	31.20	54	-22.80	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** RX / Bluetooth / CH Mid**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Jerry Chang**Humidity:** 57% RH**Polarity:** Vertical

TX / IEEE 802.11b mode / CH Mid				Measurement Distance at 3m				Vertical polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
2626.39	51.48	29.97	2.36	39.80	1.35	45.37	74	-28.63	P
2626.39	42.59	29.97	2.36	39.80	1.35	36.48	54	-17.52	A
3252.46	45.18	30.05	2.82	40.25	1.21	39.02	74	-34.98	P
3252.46	36.95	30.05	2.82	40.25	1.21	30.79	54	-23.21	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** RX / Bluetooth / CH High**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Jerry Chang**Humidity:** 57% RH**Polarity:** Horizontal

TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m			Horizontal polarity		
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
1652.48	53.26	27.66	2.14	39.89	0.87	44.03	74	-29.97	P
1652.48	46.28	27.66	2.14	39.89	0.87	37.05	54	-16.95	A
3304.18	45.29	30.08	2.90	40.29	1.14	39.13	74	-34.87	P
3304.18	35.81	30.08	2.90	40.29	1.14	29.65	54	-24.35	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.

**Operation Mode:** RX / Bluetooth / CH High**Test Date:** June 7, 2007**Temperature:** 32.9 °C**Tested by:** Jerry Chang**Humidity:** 57% RH**Polarity:** Vertical

TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m				Vertical polarity	
Freq. (MHz)	Reading (dB $\mu$ V)	AF (dB/m)	Closs (dB)	Pre-amp (dB)	Filter (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Mark (P/Q/A)
1652.36	51.49	27.66	2.14	39.89	0.87	42.26	74	-31.74	P
1652.36	44.71	27.66	2.14	39.89	0.87	35.48	54	-18.52	A
3304.25	45.92	30.08	2.90	40.29	1.14	39.76	74	-34.24	P
3304.25	36.11	30.08	2.90	40.29	1.14	29.95	54	-24.05	A
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**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, b. Sweep time = Auto.
5. Remark “\*” means the Restricted band.



## 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 Test				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N.	SCHWARZBECK Rohde & Schwarz	NNLK 8121	8121-446	OCT. 31, 2007 For Insertion loss
		ESH-Z5	840062/021	SEP. 21 , 2007
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUN. 17, 2007
TYPE N COAXIAL CABLE	SUHNER	-----	-----	FEB. 26, 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

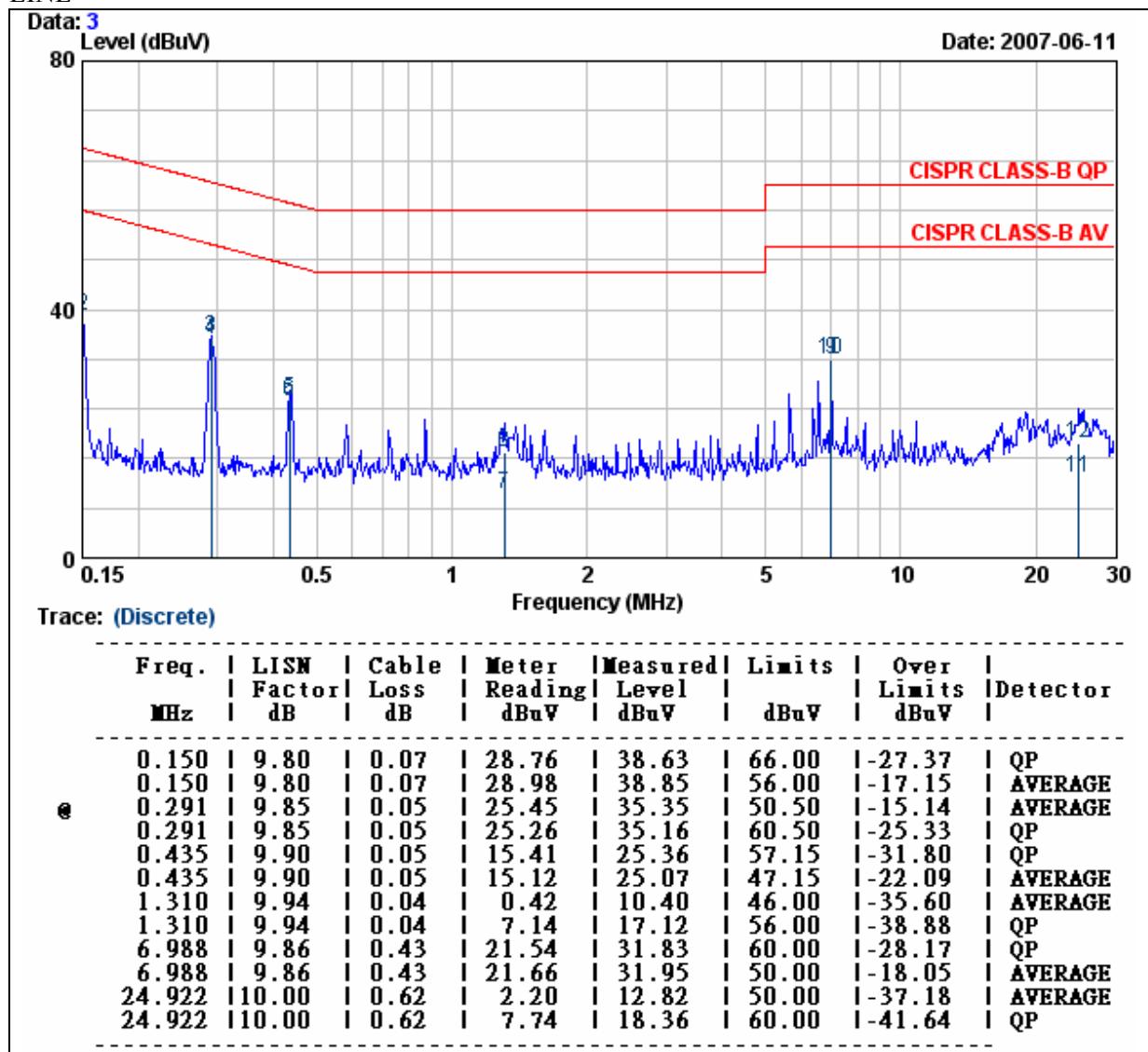
1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



## TEST RESULTS

Model No.	BTF-01	Resolution Bandwidth	9 kHz
Environmental Conditions	27.2°C, 47% RH,	Test Mode	Normal operation
Tested by:	Eric Yang		

LINE



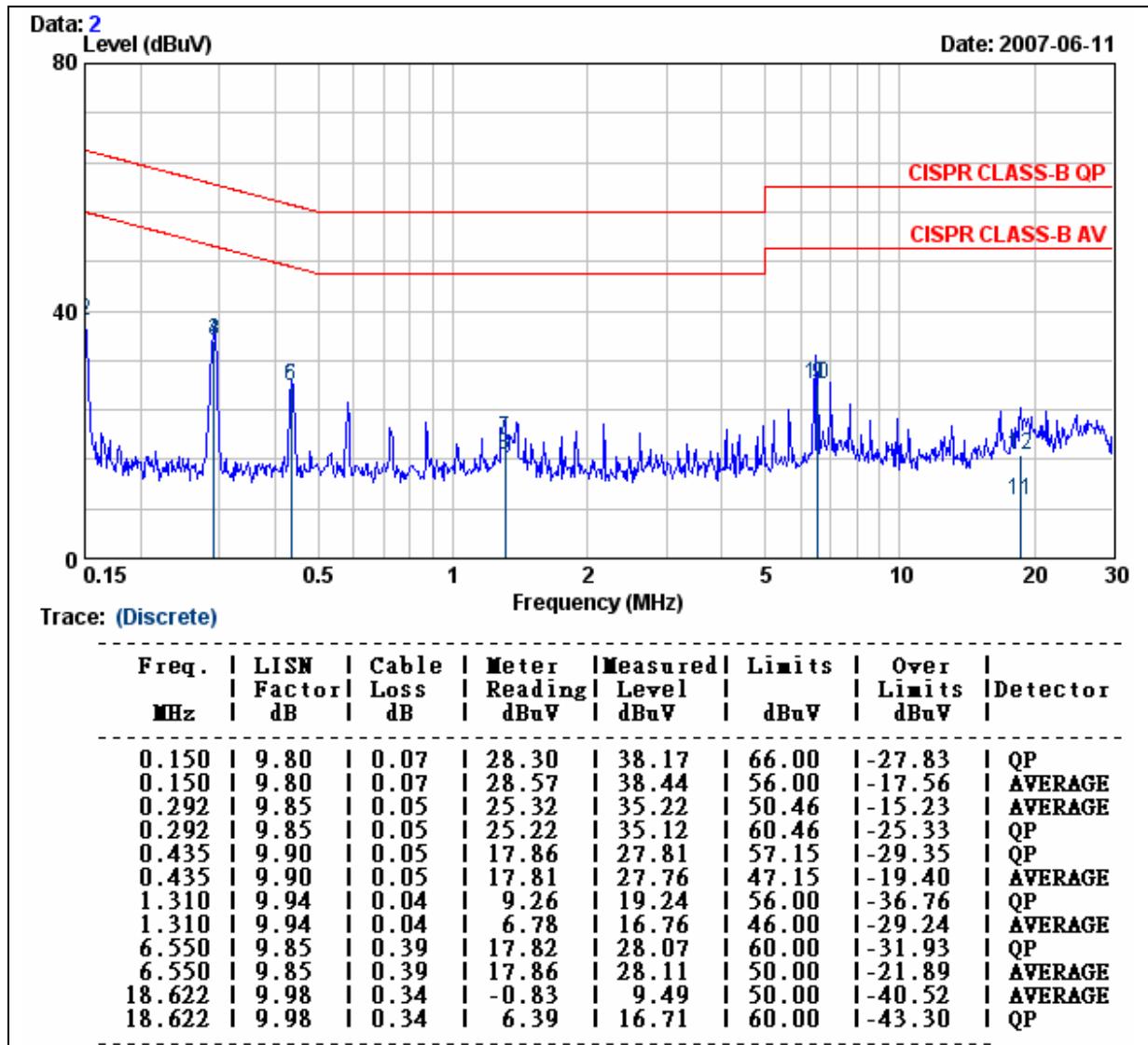
REMARKS : 1. Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2. Over Limit value (dB) = Level (dBuV/m)-Limit Line(dBuV/m)



Model No.	BTF-01	Resolution Bandwidth	9 kHz
Environmental Conditions	27.2°C, 47% RH,	Test Mode	Normal operation
Tested by:	Eric Yang		

## NEUTRAL



REMARKS : 1. Level (dBuV/m) = Read Level (dBuV) + Antenna Factor (dB/m) + Cable loss (dB)

2. Over Limit value (dB) = Level (dBuV/m) - Limit Line(dBuV/m)