



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

**TEST REPORT**

**For**

**Air Dongle**

**Model: UD-02b**



**Brand: cideko**

**Issued for**

**Holy Investment Co., Ltd.**

**1F., No.2, Lane 25, Yong-an 2nd St., Yongkang City, Tainan County 710, Taiwan**

**Issued by**

**Compliance Certification Services Inc.**

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Total Page: 50



**REVISION HISTORY**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 28, 2009	Initial Issue	ALL	Leah Peng



**TABLE OF CONTENTS**

**1. TEST REPORT CERTIFICATION ..... 4**

**2. EUT DESCRIPTION ..... 5**

    2.1 DESCRIPTION OF EUT & POWER .....5

**3. DESCRIPTION OF TEST MODES..... 6**

**4. TEST METHODOLOGY..... 7**

**5. FACILITIES AND ACCREDITATIONS..... 7**

    5.1 FACILITIES.....7

    5.2 EQUIPMENT .....7

    5.3 LABORATORY ACCREDITATIONS LISTINGS.....7

    5.4 TABLE OF ACCREDITATIONS AND LISTINGS .....8

**6. CALIBRATION AND UNCERTAINTY ..... 9**

    6.1 MEASURING INSTRUMENT CALIBRATION.....9

    6.2 MEASUREMENT UNCERTAINTY .....9

**7. SETUP OF EQUIPMENT UNDER TEST ..... 10**

    7.1 SETUP CONFIGURATION OF EUT .....10

    7.2 SUPPORT EQUIPMENT .....10

**8. APPLICABLE LIMITS AND TEST RESULTS..... 11**

    8.1 6DB BANDWIDTH.....11

    8.2 MAXIMUM PEAK OUTPUT POWER .....15

    8.3 MAXIMUM PERMISSIBLE EXPOSURE .....19

    8.4 POWER SPECTRAL DENSITY .....21

    8.5 CONDUCTED SPURIOUS EMISSION .....24

    8.6 RADIATED EMISSIONS.....28

    8.7 POWERLINE CONDUCTED EMISSIONS .....43

**9. ANTENNA REQUIREMENT..... 47**


    9.1 STANDARD APPLICABLE .....47

    9.2 ANTENNA CONNECTED CONSTRUCTION .....47

**APPENDIX SETUP PHOTOS..... 48**



# 1. TEST REPORT CERTIFICATION

**Applicant** : Holy Investment Co., Ltd.  
**Address** : 1F., No.2, Lane 25, Yong-an 2nd St., Yongkang City, Tainan County 710,  
 Taiwan  
**Manufacture** : Jow Tong Technology CO., LTD.  
**Address** : 46, Lane 337, Chung Cheng Rd., Yung Kang City, Tainan County 710,  
 Taiwan, R.O.C.  
**Equipment Under Test** : Air Dongle  
**Model Number** : UD-02b  
  
**Brand Name** : cideko  
**Date of Test** : September 10, 2009~ November 17, 2009

APPLICABLE STANDARD	
STANDARD	TEST RESULT
FCC Part 15 Subpart C : 2004 AND ANSI C63.4 : 2003	No non-compliance noted

*Approved by:*



*Reviewed by:*




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

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

## 2. EUT DESCRIPTION

### 2.1 DESCRIPTION OF EUT & POWER

<b>Product Name</b>	Air Dongle
<b>Model Number</b>	UD-02b
<b>Brand Name</b>	 cideko
<b>Frequency Range</b>	TX Mode : 2402MHz~2474MHz
<b>Transmit Power</b>	TX Mode : -9.23dBm (0.119399 mW)
<b>Channel Spacing</b>	TX Mode: 3MHz
<b>Channel Number</b>	TX Mode :15 Channels
<b>Transmit Data Rate</b>	TX Mode : 250kbps
<b>Type of Modulation</b>	TX Mode : GFSK
<b>Frequency Selection</b>	By software / firmware
<b>Antenna Type</b>	<b>Antenna (1)TX&amp;RX:</b> Manufacture: Yageo Taiwan/High Frequency Ceramic Department Model: 8010, Type: Chip Antenna Gain: 3dBi
<b>Power Source</b>	Powered from host device (5Vdc)
<b>Temperature Range</b>	0 ~ +55°C

- NOTE:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **XV3UD02B** filing to comply with Section 15.207,15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the User's manual of the EUT.
4. To add a series model is for business necessary. The different of the each model is shown as below:



### 3. DESCRIPTION OF TEST MODES

The EUT is an Wlan Air Dongle

The RF chipset is manufactured by TEXAS,INSTRUMENTS

The antenna peak gain 3dBi (highest gain) were chosen for full testing.

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2402
Middle	2438
High	2474

TX mode : 250kbps data rate were chosen for full testing.

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2438 MHz.



## **4. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

## **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 preselectors 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 LISTINGS**

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 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 TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW-1037).

### 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 TW-1037
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	 C-2882 R-2635
Taiwan	TAF	CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, EN 60601-1-2, CISPR 22, CNS 13438, EN 55022, EN 55024, AS/NZS CISPR 22 CISPR 14, EN 55014-1, EN 55014-2, CNS 13783-1, CISPR 22, CNS 13439, EN 55013, FCC Method-47 CFR Part 15 Subpart B, IC ICES-003, VCCI V-3 & V-4 FCC Method-47 CFR Part 15 Subpart C and ANSI C63.4, LP 0002 EN / IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8 / -11 EN 61000-3-2, EN 61000-3-3 EN 61000-6-3, EN 61000-6-1, AS/NZS 4251.1, EN 61000-6-4, EN 61000-6-2, AS/NZS 4251.2, EN 61204-3, EN 50130-4, EN 62040-2, EN 50371, EN 50385, AS/NZS 4268, ETSI EN 300 386 ETSI EN 300 328, ETSI EN 301 489-1/-3/-9/-17 ETSI EN 301 893, ETSI EN 300 220-2/-1 ETSI EN 300 440-2/-1 ETSI EN 301 357-2/-1 RSS-310, RSS-210 Issue 7, RSS-Gen Issue 2	 
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS13439	 SL2-IN-E-0039 SL2-R1/R2-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS210, Issue 7	 IC 2324H-1

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





## 6. CALIBRATION AND UNCERTAINTY

### 6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 6.2 MEASUREMENT UNCERTAINTY

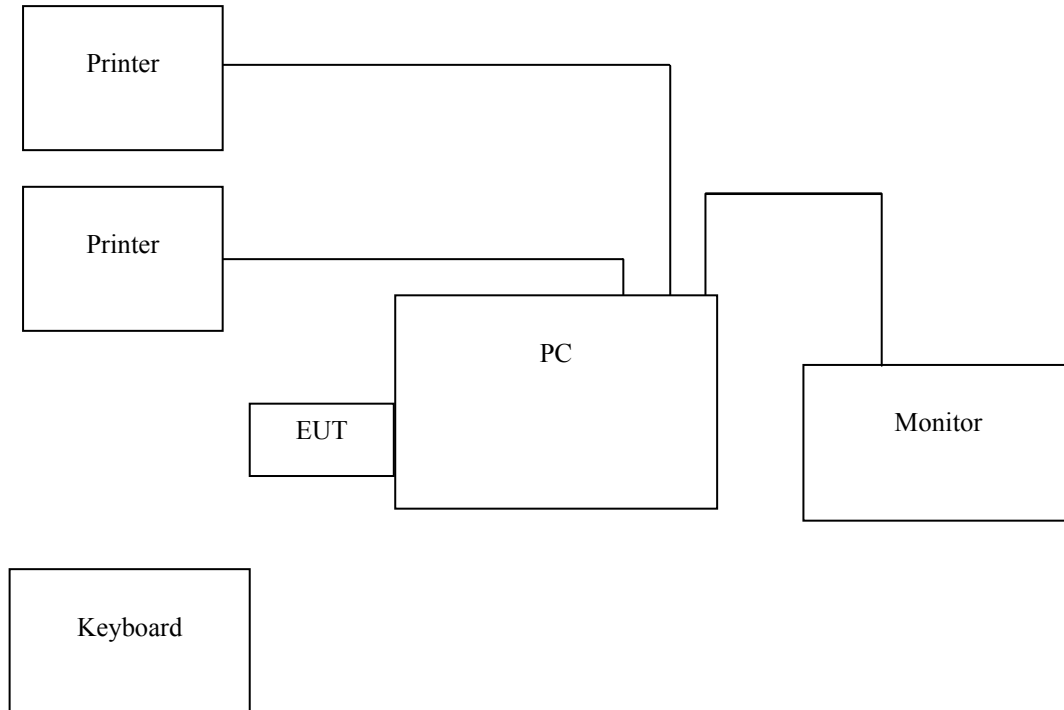
Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 1000 MHz	+/- 3.2 dB
Radiated Emission, 1 to 26.5 GHz	+/- 3.2 dB
Power Line Conducted Emission	+/- 2.1 dB

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

## 7. SETUP OF EQUIPMENT UNDER TEST

### 7.1 SETUP CONFIGURATION OF EUT



### 7.2 SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	FCC ID	Signal Cable
1.	PC	Acer	Aspire M3630	DoC	Power cable, unshd, 1.6m
2.	LCD Monitor	BenQ	FP731	DoC	VGA cable, shd, 1.8m
3.	Modem	LEMEL	MD-56K	3882B582	RS232 cable, shd, 1.1m
4.	Printer	HP	C2164A	DoC	Printer cable, shd, 1.8m
5.	Keyboard	Jow Tong	AVK-02b	XV3AVK02B	-

No.	Signal cable description
-	-

**Remark:**

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



## 8. APPLICABLE LIMITS AND TEST RESULTS

### 8.1 6DB BANDWIDTH

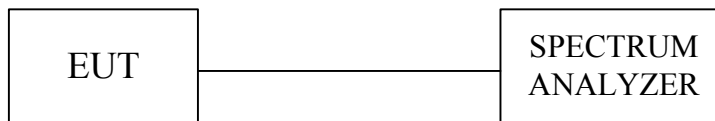
#### LIMIT

§ 15.247(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

#### TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	OCT. 14, 2010

#### TEST SETUP



#### TEST PROCEDURE

The transmitter output was connected to a spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 100 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.



**TEST RESULTS**

No non-compliance noted

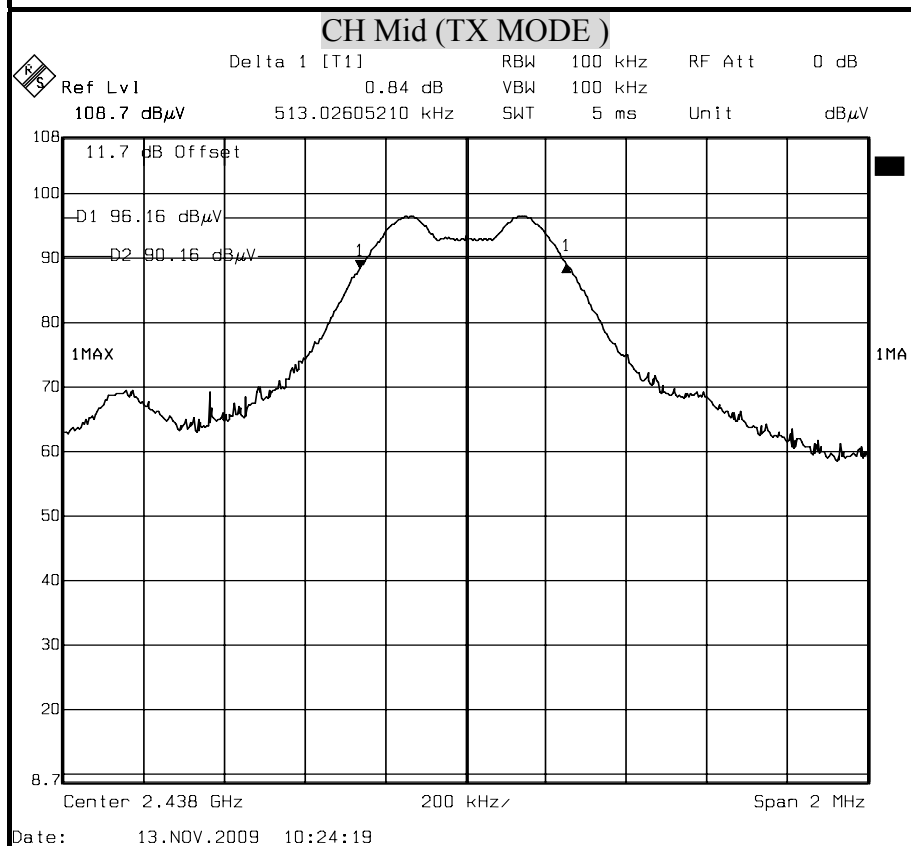
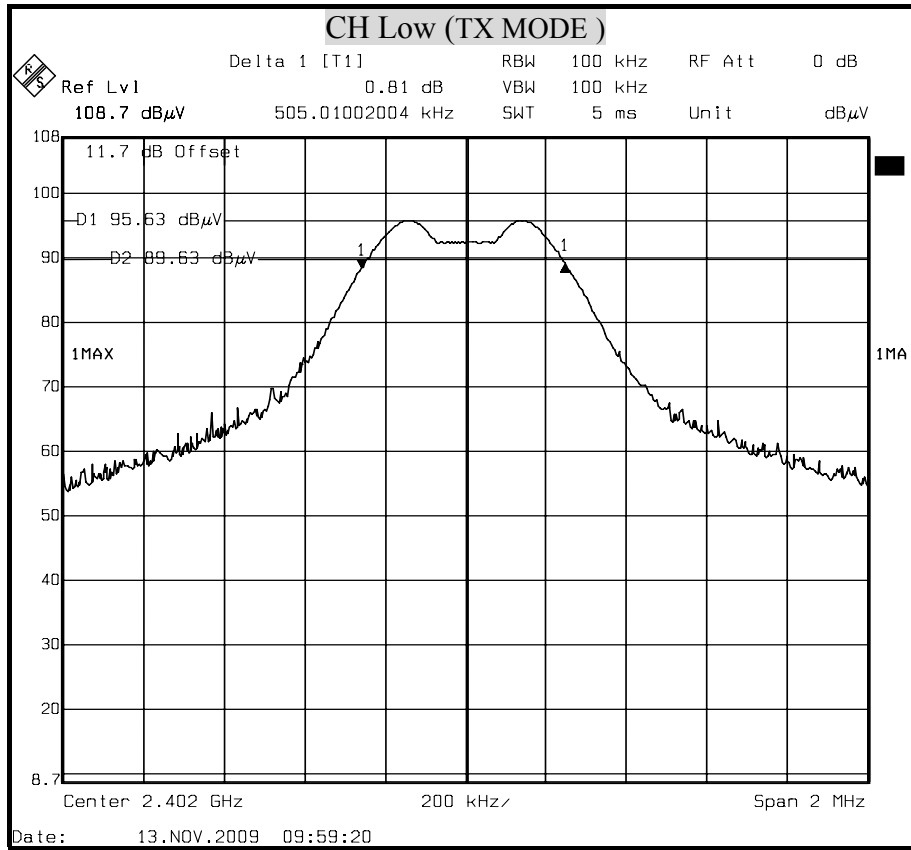
**TX mode**

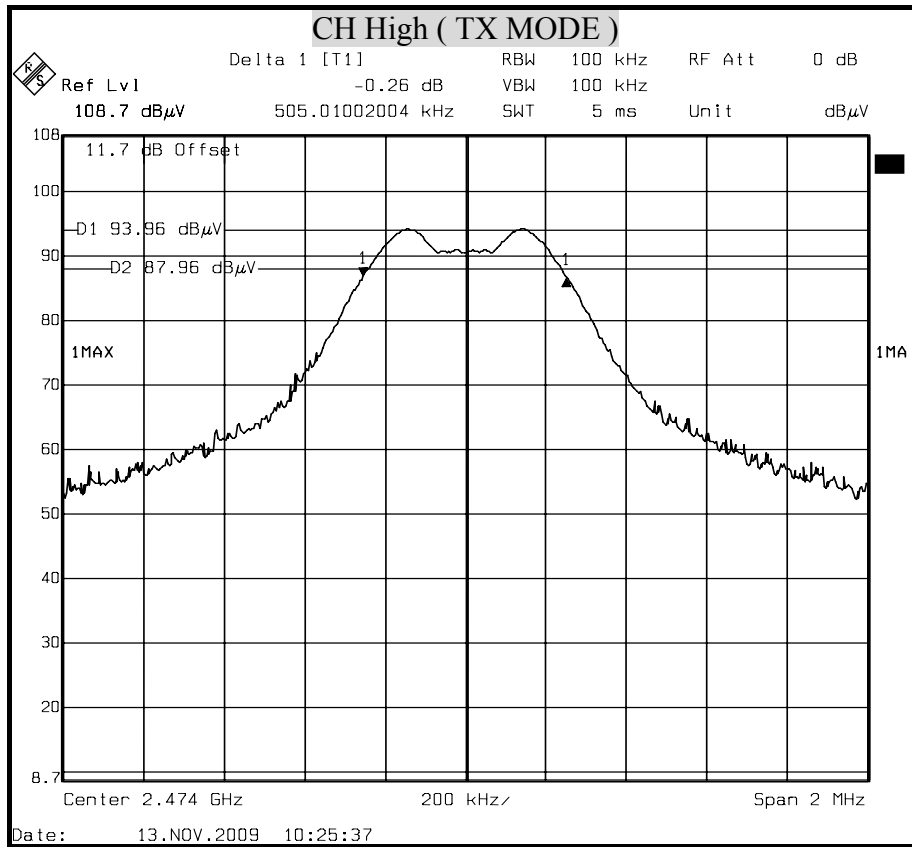
<b>Channel</b>	<b>Channel Frequency (MHz)</b>	<b>6dB Bandwidth (kHz)</b>	<b>Minimum Limit (kHz)</b>	<b>Pass / Fail</b>
Low	2402	505.01	500	PASS
Middle	2438	513.02	500	PASS
High	2474	505.01	500	PASS

- Note :
1. At final test to get the worst-case emission at 250kbps.
  2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.



**6dB BANDWIDTH (TX MODE)**





## 8.2 MAXIMUM PEAK OUTPUT POWER

### LIMIT

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

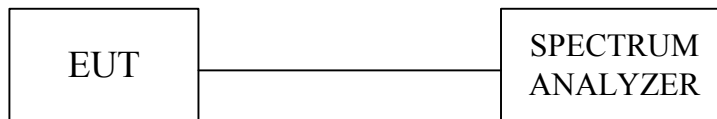
§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 15.247(b) (4) Except as shown in paragraphs (c) 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), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	OCT. 14, 2010

### TEST SETUP



### TEST PROCEDURE

- The spectrum shall be set as follows :
  - Span : 1.5 times channel integration bandwidth.
  - RBW : 1MHz
  - VBW : 3MHz
  - Detector : Peak
  - Sweep : Single trace



## TEST RESULTS

No non-compliance noted

### **TX mode**

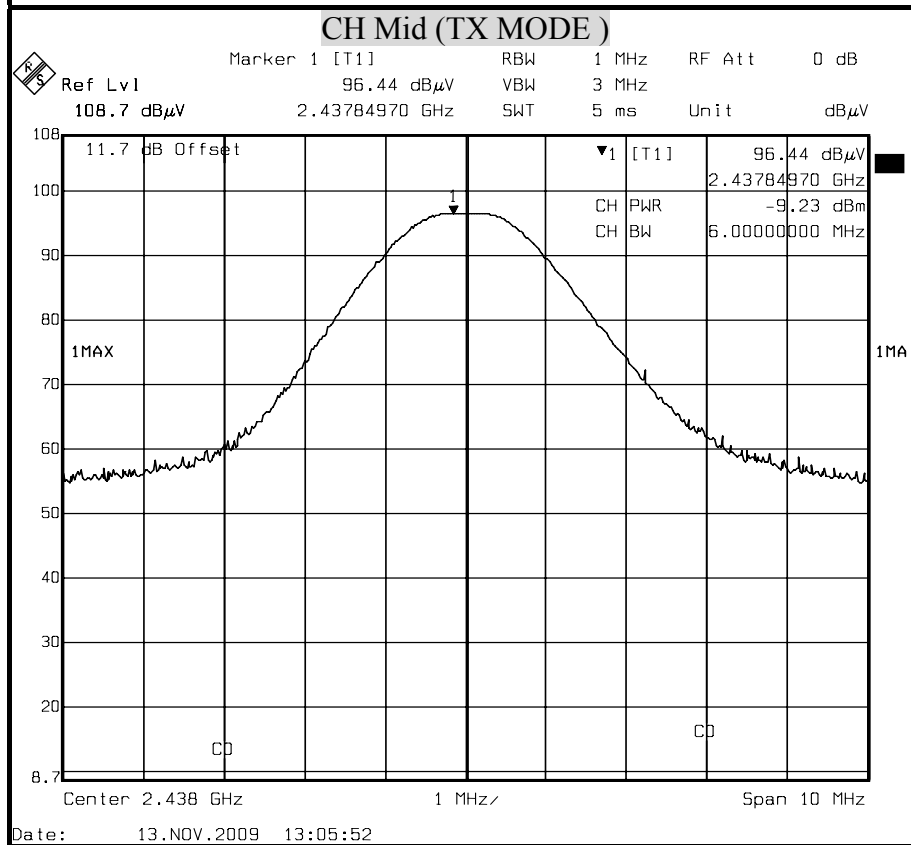
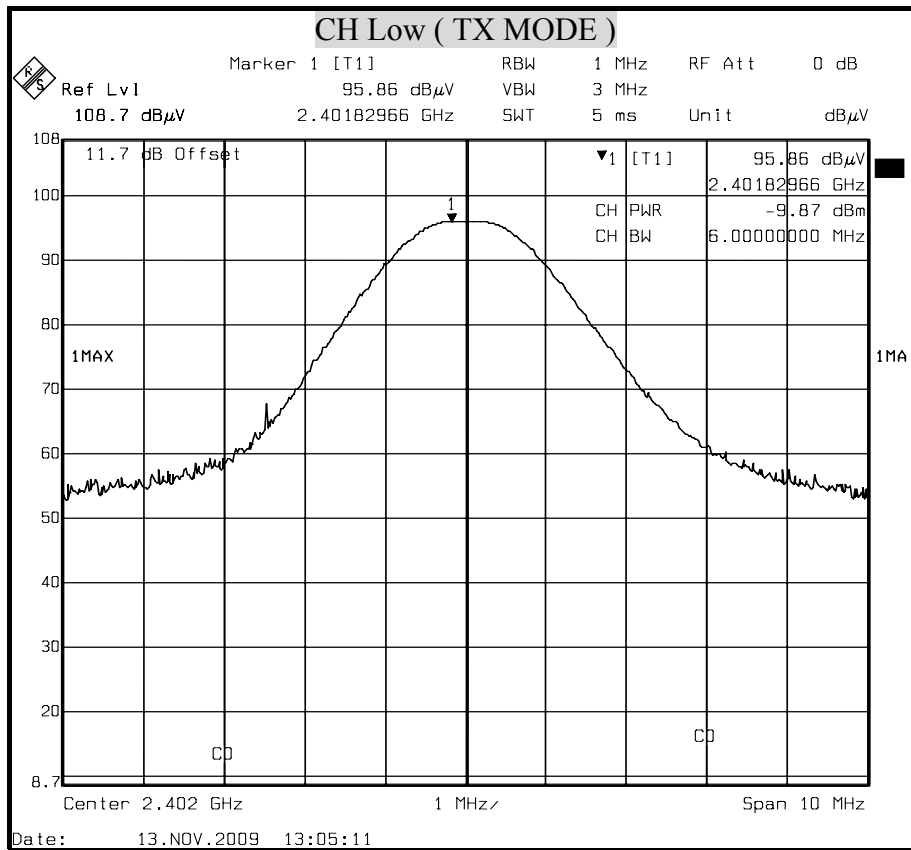
<b>Channel</b>	<b>Channel Frequency (MHz)</b>	<b>Peak Power (dBm)</b>	<b>Peak Power Limit (dBm)</b>	<b>Pass / Fail</b>
Low	2402	-9.87	30	PASS
Middle	2438	-9.23	30	PASS
High	2474	-11.70	30	PASS

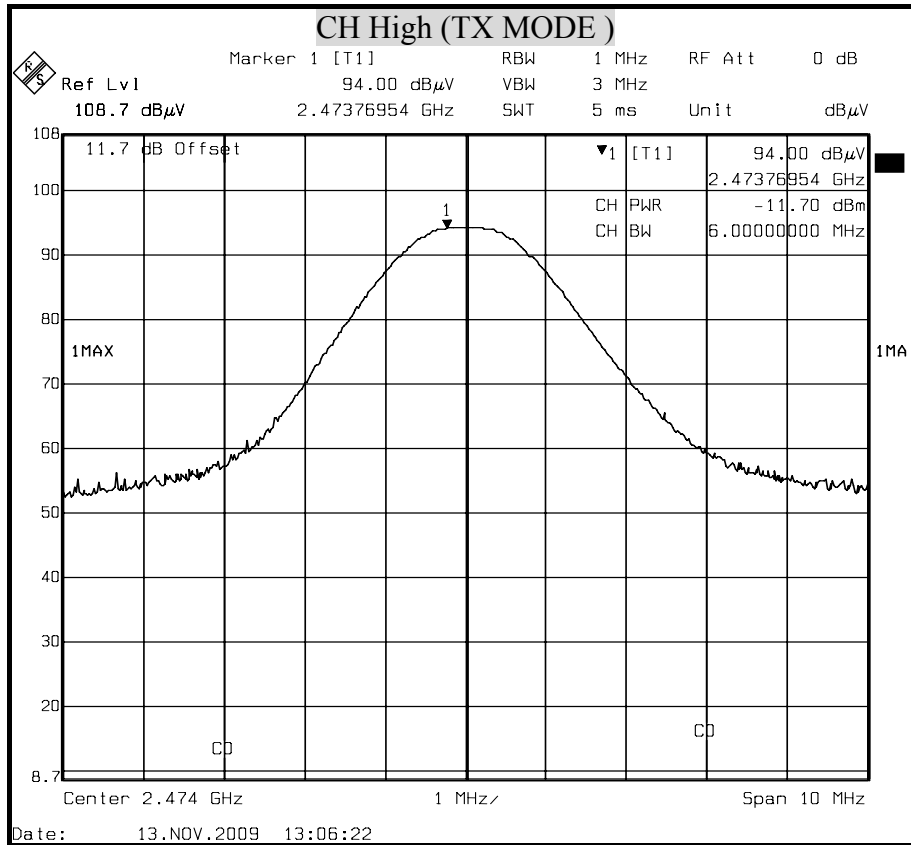
Note : 1. At final test to get the worst-case emission at 250kbps.  
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.





### MAXIMUM PEAK OUTPUT POWER (TX MODE)





### 8.3 MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b) LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

### CALCULATIONS

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

Where  $E =$  Field strength in Volts / meter

$P =$  Power in Watts

$G =$  Numeric antenna gain

$d =$  Distance in meters

$S =$  Power density in milliwatts / square centimeter

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

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$

Where  $d =$  Distance in cm

$P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>

**LIMIT**

60/f(GHz)mW

**TEST RESULTS**

No non-compliance noted

And according to KDB447498 Section 1) c) Unless excluded by specific FCC test procedures, portable devices with output power > 60/f(GHz)mW shall include SAR data for equipment approval.

Details please refer to FCC Part 2 and attached KDB447498.

Please note the low power threshold is based upon average output power. If the average output power is below 60/f(GHz), then SAR evaluation is not required. In addition, since this device is a Bluetooth device, you may use source-based averaging duty cycle to adjust the average power.

After the adjustment, if the average power is greater than 60/f(GHz), then SAR is required.

60/f(GHz)mW f(the highest frequency) f=2.462GHz

$60/2.462=24.37\text{mW}=\left(\log_{10}24.37\right)*10\text{dBm}=13.8686\text{dBm}$

Mode	Output Power (dBm)	Limit (dBm)	Result
CH Low Mode	-9.87	13.8686	Compliance
CH Mid Mode	-9.23	13.8686	Compliance
CH High Mode	-11.70	13.8686	Compliance



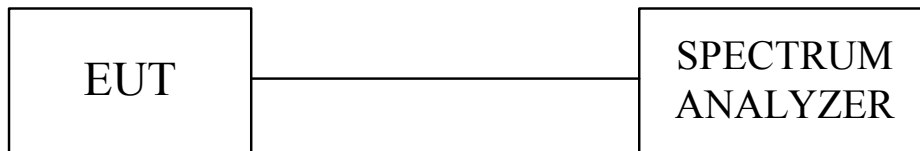
## 8.4 POWER SPECTRAL DENSITY

### LIMIT

§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### TEST EQUIPMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	OCT. 14, 2010



### TEST SETUP

### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=3KHz and VBW ≥ RBW, set sweep time=span / 3KHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

### TEST RESULTS

No non-compliance noted

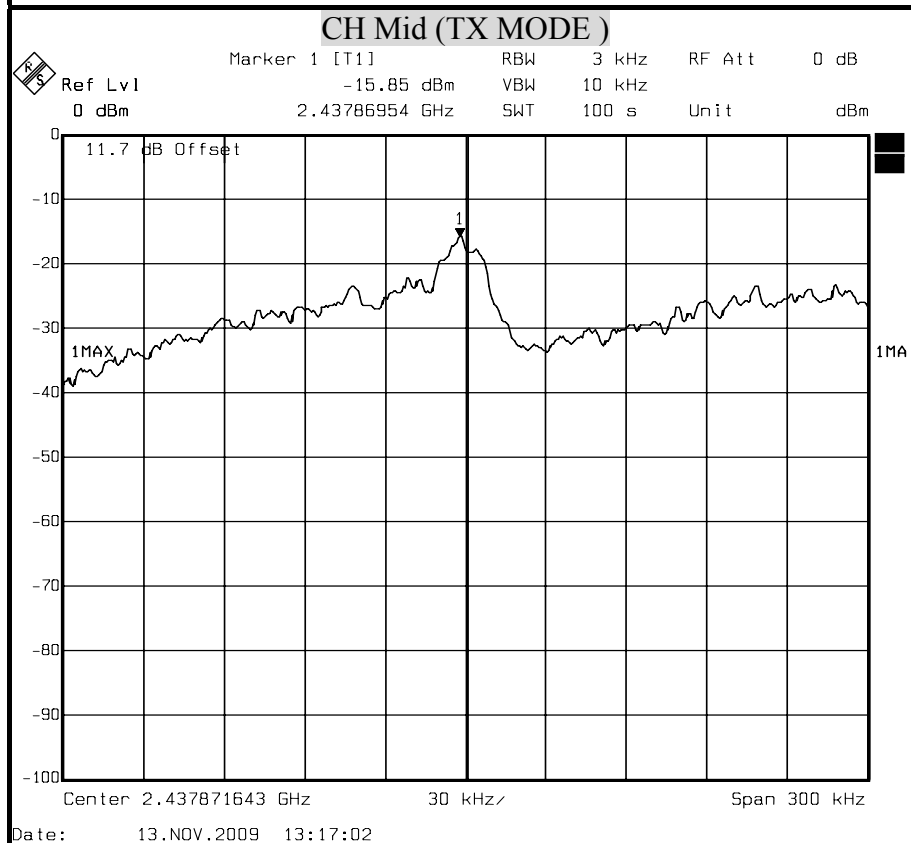
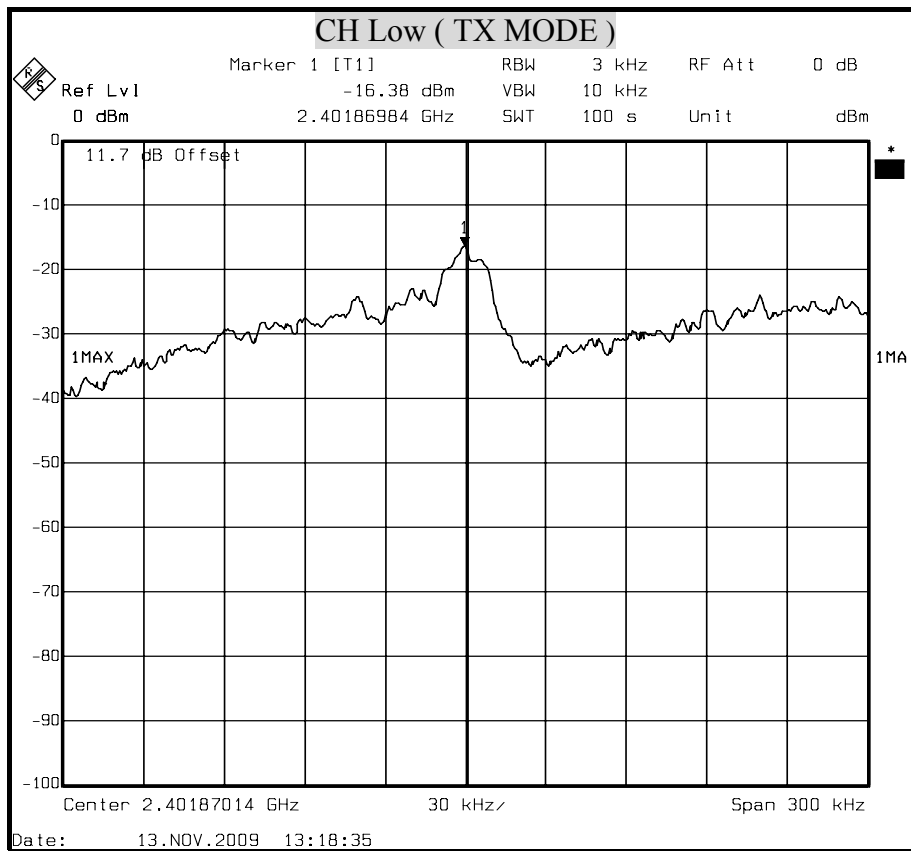
#### **TX mode**

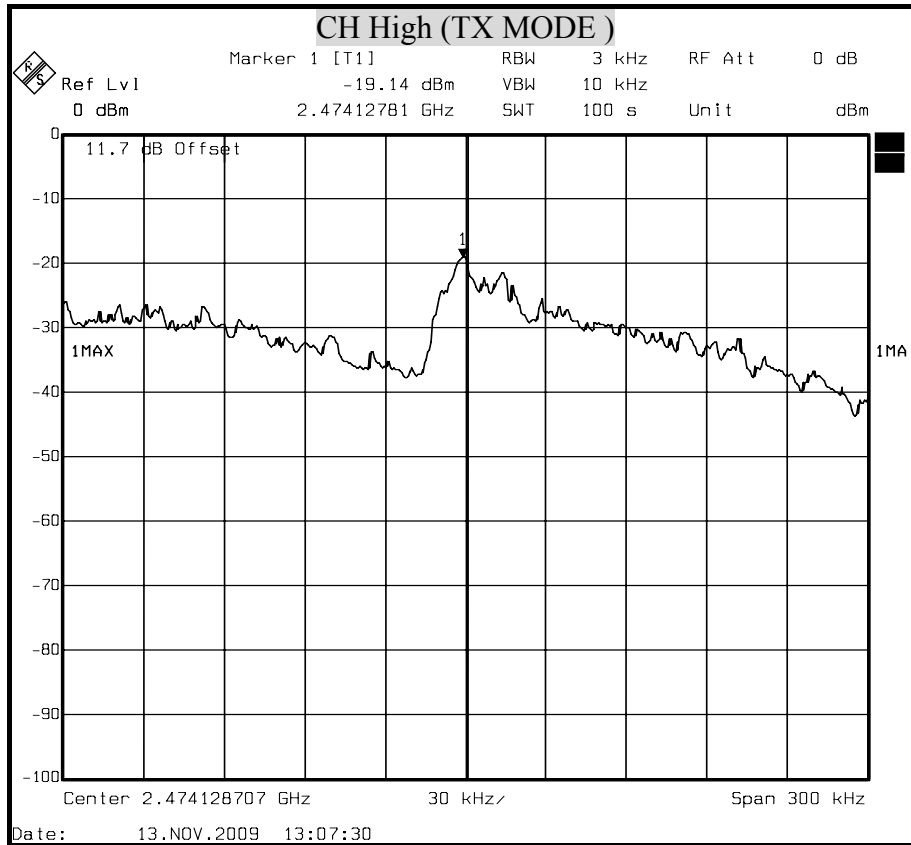
Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2402	-16.38	8	PASS
Middle	2438	-15.85	8	PASS
High	2474	-19.14	8	PASS

- Note :
1. At final test to get the worst-case emission at 250kbps.
  2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.



**POWER SPECTRAL DENSITY ( TX MODE )**





## 8.5 CONDUCTED SPURIOUS EMISSION

### LIMITS

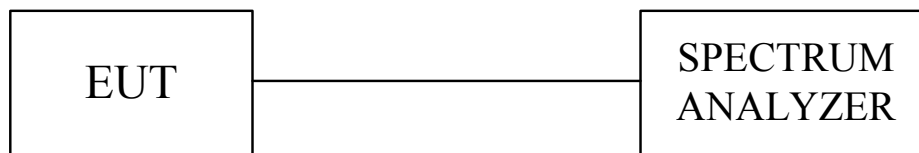
§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. 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) (see § 15.205(c)).

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

### TEST SETUP



### TEST RESULTS

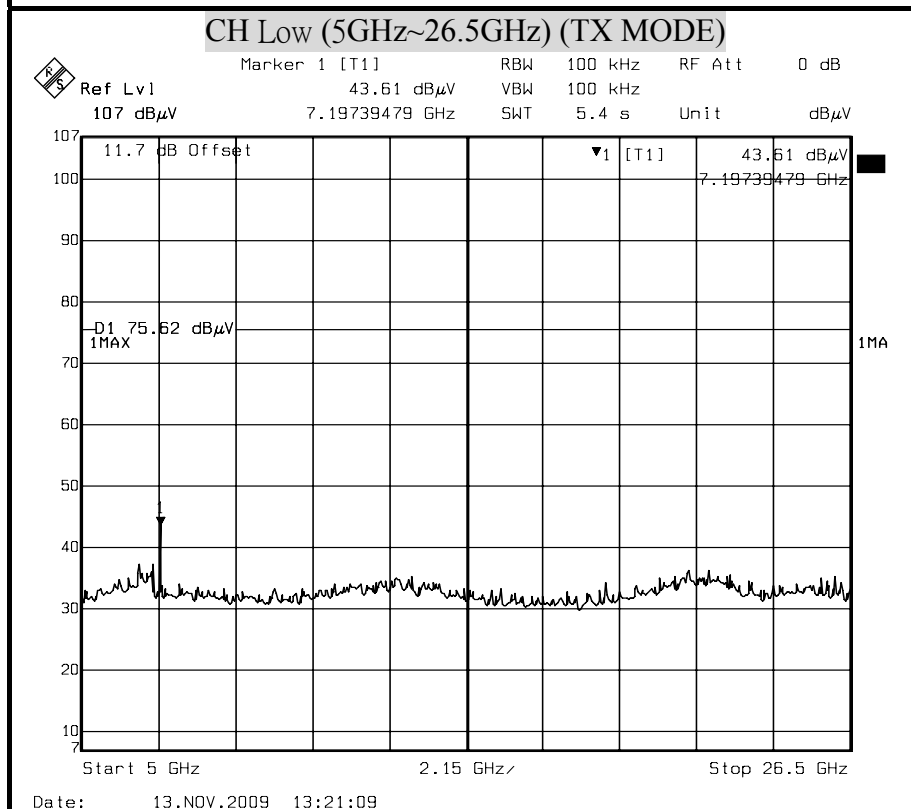
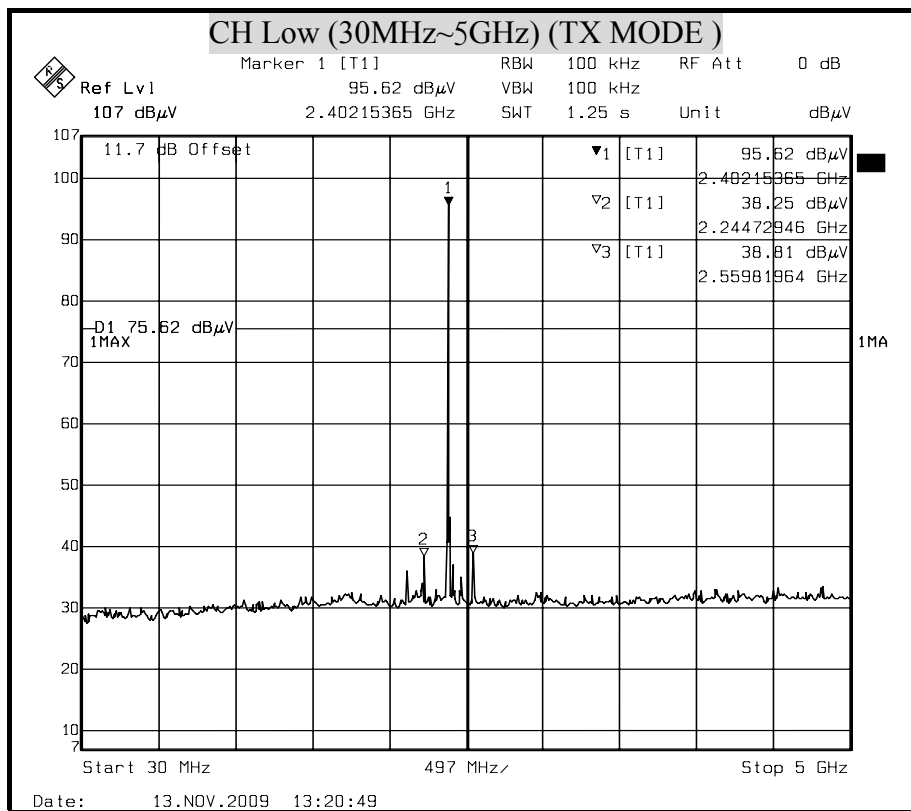
No non-compliance noted

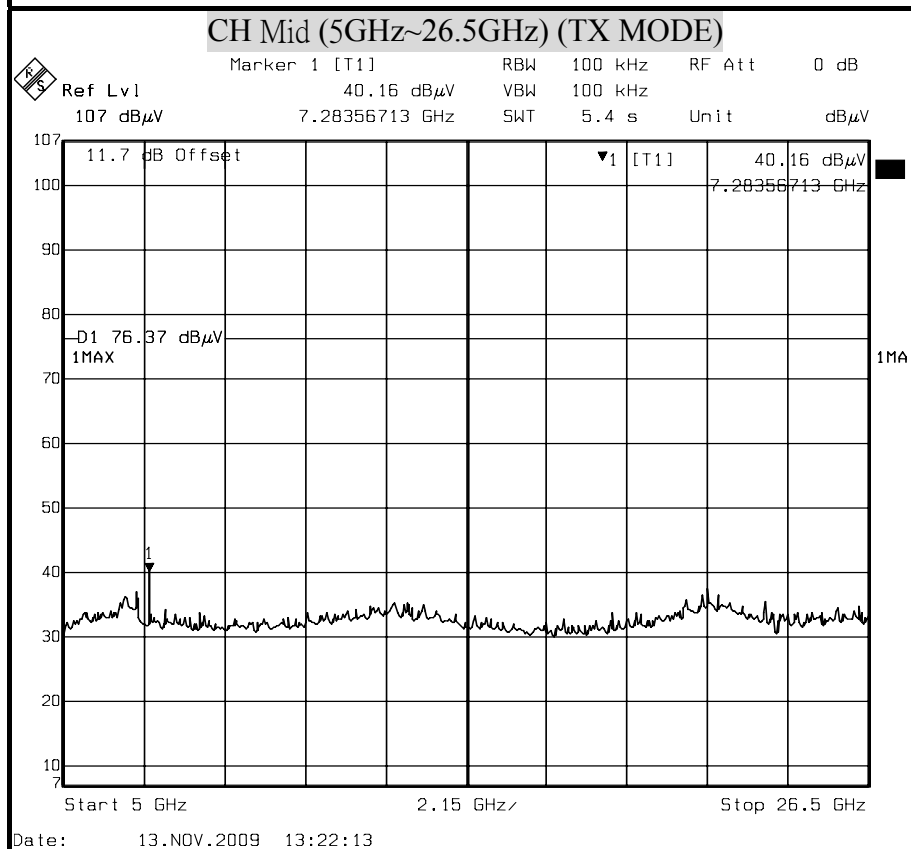
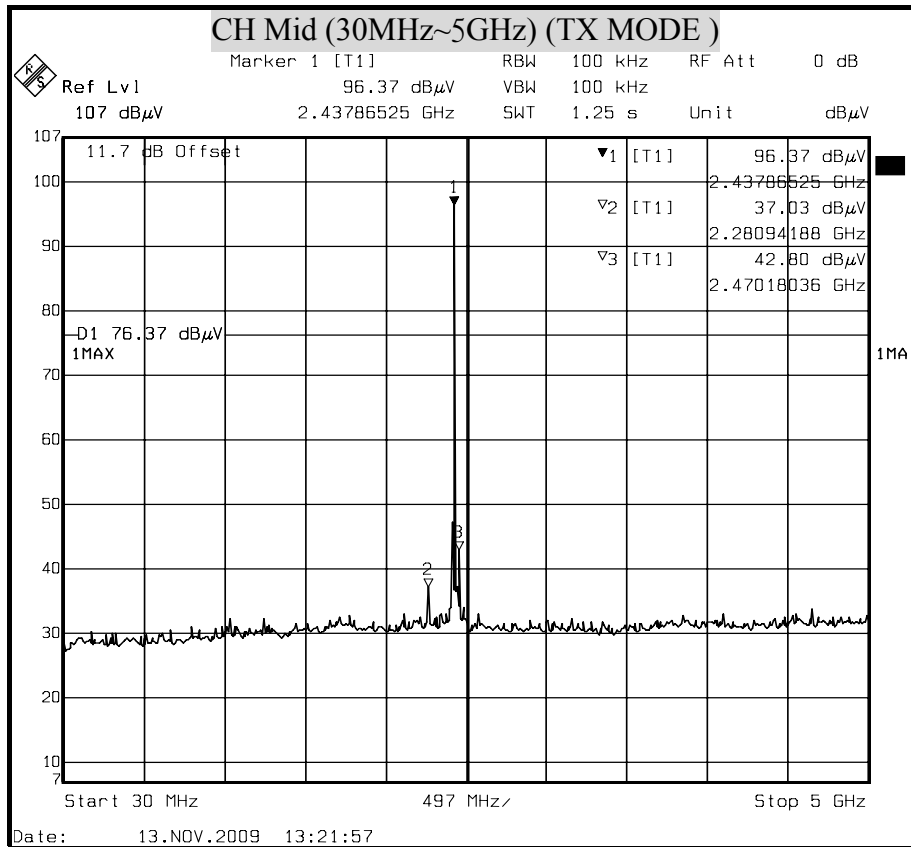


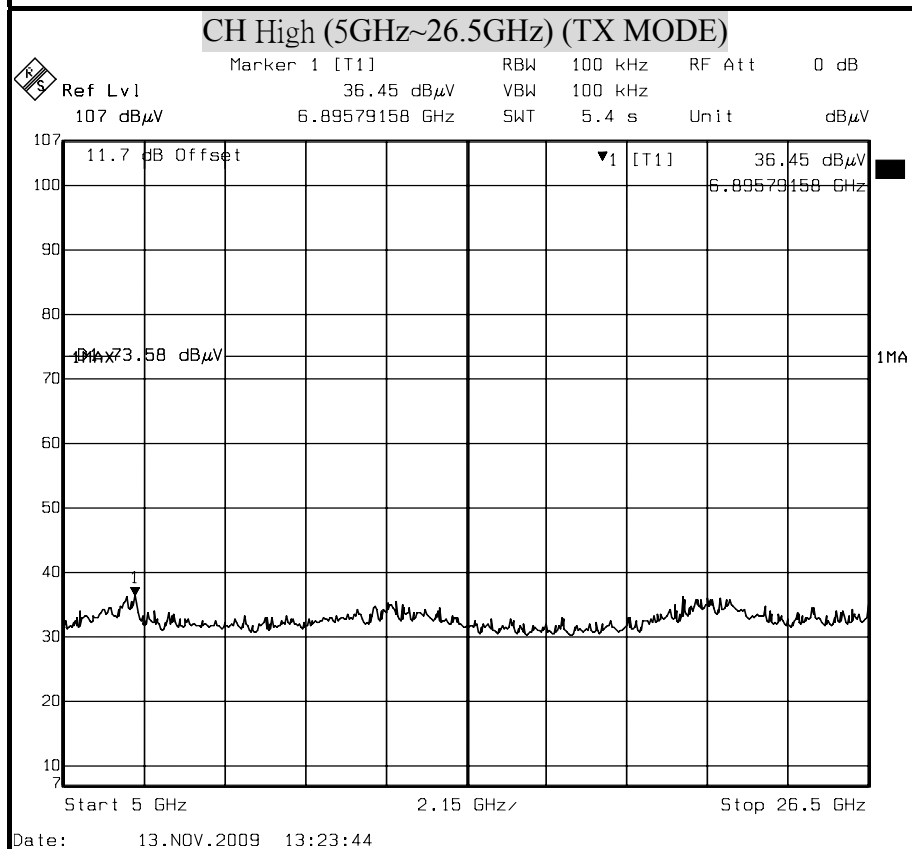
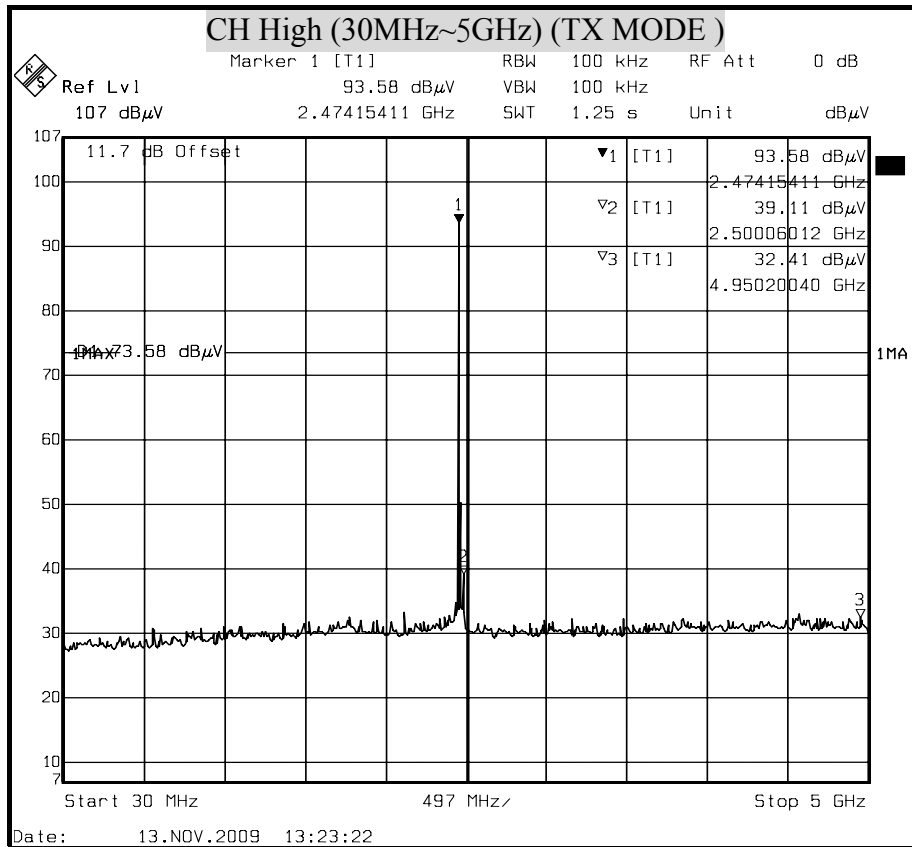


### OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT

( TX MODE )









## 8.6 RADIATED EMISSIONS

### 8.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

#### LIMITS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

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

<sup>2</sup> Above 38.6

§ 15.205 (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.



§ 15.209 (a) 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 (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* 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.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

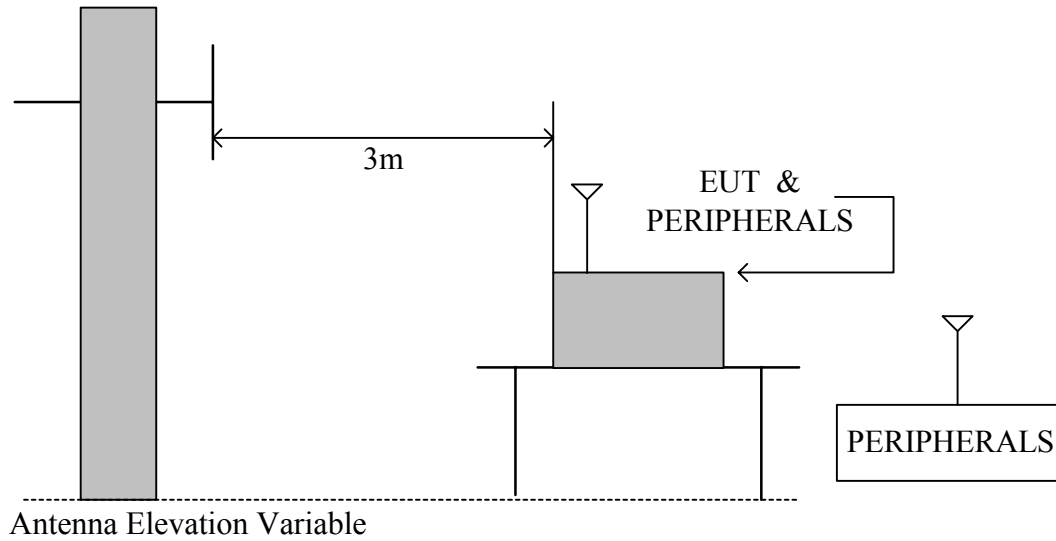
### **TEST EQUIPMENTS**

The following test equipments are utilized in making the measurements contained in this report.

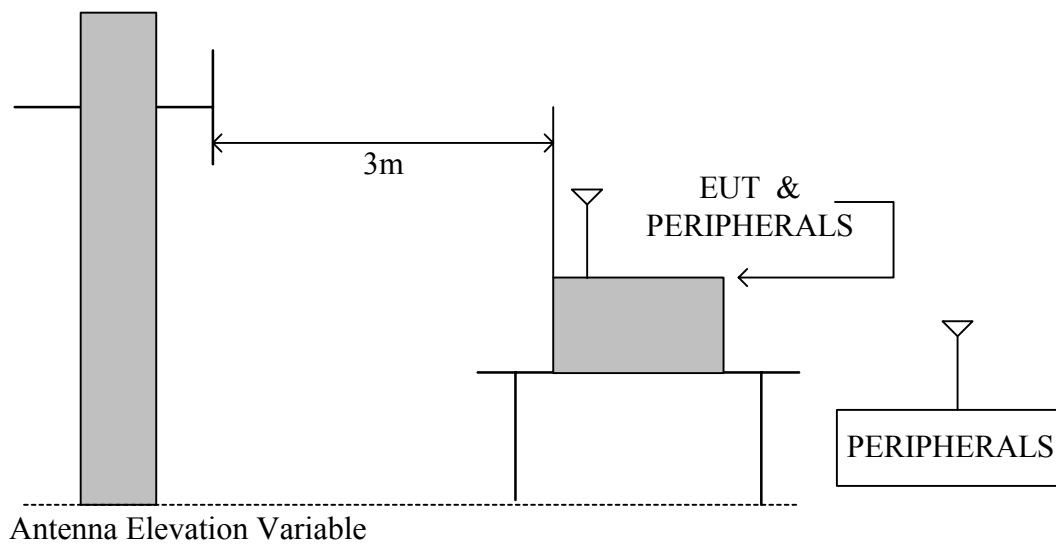
<b>Open Area Test Site # 6</b>				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSEK 30	835253/002	OCT. 14, 2010
Temp./Humidity Chamber	K.SON	THS-M1	242	AUG. 12, 2010
EMI Test Receiver	R&S	ESVS10	833206/012	APR. 28, 2010
Pre-Amplifier	HP	8447F	2944A03817	NOV. 01, 2010
Amplifier	MITEQ	AFSYY-00108650-42-10P-44	1205908	OCT. 23, 2010
Bilog Antenna	Sunol	JB1	A013105-1	SEP. 16, 2010
Horn Antenna	Com-Power	AH-118	71032	DEC. 22, 2009
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 Swicth	E-INSTRUMENT TELH LTD	ERS-180-1-2	EC1204141	N.C.R
Power Meter	Anritsu	ML2487A	6K00003888	APR. 26, 2010
Power Sensor	Anritsu	MA2491A	33265	APR. 26, 2010
AC Power Source	T-POWER	TFC-3020	N930010	N.C.R
DC Power Source	LOKO	DSP-5050	L1507009282	N.C.R

**TEST SETUP**

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.





## TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

### Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
4. **No emission is found between lowest internal used/generated frequencies to 30MHz (9 kHz~30MHz).**

## TEST RESULTS

No non-compliance noted

**8.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz**

<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/18
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	Normal operating (worst case)	<b>TEMP&amp; Humidity</b>	26.8°C, 51%

*Horizontal*

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Level	Limits	Margin	Detector Mode
(MHz)	(dB $\mu$ V)	(dB/M)	(dB)	(dB $\mu$ V/M)	(dB $\mu$ V/M)	(dB)	PK/QP
68.59	13.20	7.77	1.53	22.49	40.00	-17.51	QP
120.02	15.40	13.77	2.08	31.25	43.50	-12.25	QP
240.00	16.20	12.13	3.01	31.34	46.00	-14.66	QP
372.24	13.70	15.52	3.66	32.89	46.00	-13.11	QP
491.33	12.80	17.85	4.43	35.08	46.00	-10.92	QP
524.24	9.60	18.34	4.65	32.59	46.00	-13.41	QP
633.57	7.40	19.78	5.26	32.44	46.00	-13.56	QP
N/A	-----	-----	-----	-----	-----	-----	-----

*Vertical*

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Level	Limits	Margin	Detector Mode
(MHz)	(dB $\mu$ V)	(dB/M)	(dB)	(dB $\mu$ V/M)	(dB $\mu$ V/M)	(dB)	PK/QP
82.40	17.56	7.73	1.80	27.09	40.00	-12.91	QP
120.00	17.40	13.77	2.08	33.25	43.50	-10.25	QP
240.00	16.30	12.13	3.01	31.44	46.00	-14.56	QP
312.24	11.20	14.22	3.30	28.72	46.00	-17.28	QP
450.29	10.70	17.08	4.16	31.94	46.00	-14.06	QP
524.23	10.20	18.34	4.65	33.19	46.00	-12.81	QP
720.00	6.40	20.85	5.57	32.82	46.00	-13.18	QP
N/A	-----	-----	-----	-----	-----	-----	-----

**Remark:** Emission level (dB $\mu$ V/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dB $\mu$ V).



**8.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz**

<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/10
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	TX (CH Low)	<b>TEMP&amp; Humidity</b>	26.8°C, 49%

*Horizontal*

	TX mode / CH Low				Measurement Distance at 3m				Horizontal polarity	
	Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
*	4804.09	56.98	32.77	3.69	41.31	0.69	52.82	74.00	-21.18	P
*	4804.09	52.94	32.77	3.69	41.31	0.69	48.78	54.00	-5.22	A
	7206.01	52.94	38.79	4.92	41.47	1.37	56.55	74.00	-17.45	P
	7206.01	45.01	38.79	4.92	41.47	1.37	48.62	54.00	-5.38	A
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**Remark:**

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:  
 $Level = Reading + AF + Cable - Preamp + Filter$ ,  $Margin = Level - Limit$
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/10
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	TX (CH Low)	<b>TEMP&amp; Humidity</b>	26.8°C, 49%

*Vertical*

	TX mode / CH Low				Measurement Distance at 3m				Vertical polarity	
	Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
*	4804.11	54.25	32.77	3.69	41.31	0.69	50.09	74.00	-23.91	P
*	4804.11	50.25	32.77	3.69	41.31	0.69	46.09	54.00	-7.91	A
	7206.08	51.22	38.79	4.92	41.47	1.37	54.83	74.00	-19.17	P
	7206.08	42.36	38.79	4.92	41.47	1.37	45.96	54.00	-8.04	A
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**Remark:**

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:  
 $Level = Reading + AF + Cable - Preamp + Filter$  ,  $Margin = Level - Limit$
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/10
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	TX (CH Middle)	<b>TEMP&amp; Humidity</b>	26.8°C, 49%

*Horizontal*

	TX mode / CH Middle				Measurement Distance at 3m				Horizontal polarity	
	Freq. (MHz)	Reading (dBμV)	AF (dB/m)	Cable Loss (dB)	Pre-amp (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)
*	4876.01	58.74	32.93	3.73	41.41	0.71	54.70	74.00	-19.30	P
*	4876.01	55.06	32.93	3.73	41.41	0.71	51.02	54.00	-2.98	A
*	7314.14	51.65	38.94	4.96	41.31	1.60	55.84	74.00	-18.16	P
*	7314.14	42.02	38.94	4.96	41.31	1.60	46.21	54.00	-7.79	A
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	P
	N/A	-----	-----	-----	-----	-----	-----	-----	-----	A

**Remark:**

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:  
 $Level = Reading + AF + Cable - Preamp + Filter$ ,  $Margin = Level - Limit$
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/10
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	TX (CH Middle)	<b>TEMP&amp; Humidity</b>	26.8°C, 49%

*Vertical*

TX mode / CH Middle				Measurement Distance at 3m Vertical polarity						
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	
* 4876.15	56.22	32.93	3.73	41.41	0.71	52.18	74.00	-21.82	P	
* 4876.15	52.87	32.93	3.73	41.41	0.71	48.83	54.00	-5.17	A	
* 7314.19	50.44	38.94	4.96	41.31	1.60	54.63	74.00	-19.37	P	
* 7314.19	41.24	38.94	4.96	41.31	1.60	45.43	54.00	-8.57	A	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A	

**Remark:**

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:  
 $Level = Reading + AF + Cable - Preamp + Filter$ ,  $Margin = Level - Limit$
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/10
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	TX (CH High)	<b>TEMP&amp; Humidity</b>	26.8°C, 49%

*Horizontal*

TX mode / CH High				Measurement Distance at 3m				Horizontal polarity		
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	
* 4949.96	59.27	33.09	3.77	41.52	0.74	55.35	74.00	-18.65	P	
* 4949.96	56.16	33.09	3.77	41.52	0.74	52.24	54.00	-1.76	A	
* 7421.94	51.24	39.09	5.01	41.16	1.83	56.01	74.00	-17.99	P	
* 7421.94	41.86	39.09	5.01	41.16	1.83	46.63	54.00	-7.37	A	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A	

**Remark:**

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:  
 $Level = Reading + AF + Cable - Preamp + Filter$ ,  $Margin = Level - Limit$
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.



<b>Product Name</b>	Air Dongle	<b>Test Date</b>	2009/11/10
<b>Model</b>	UD-02b	<b>Test By</b>	Eric Yang
<b>Test Mode</b>	TX (CH High)	<b>TEMP&amp; Humidity</b>	26.8°C, 49%

*Vertical*

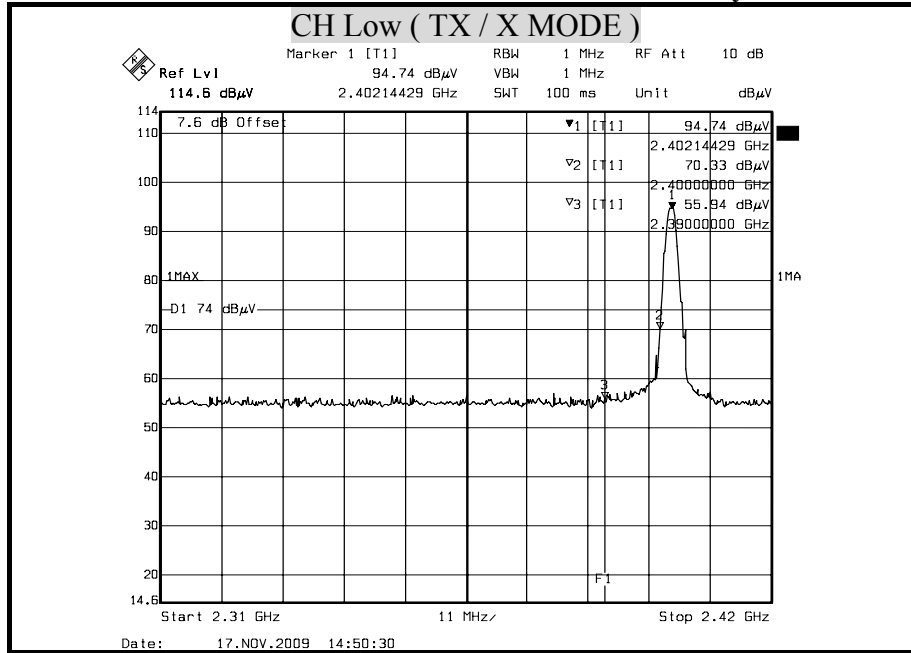
TX mode / CH High				Measurement Distance at 3m				Vertical polarity		
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark	
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)	
* 4947.89	57.24	33.09	3.77	41.52	0.74	53.32	74.00	-20.68	P	
* 4947.89	53.50	33.09	3.77	41.52	0.74	49.58	54.00	-4.42	A	
* 7421.89	50.25	39.09	5.01	41.16	1.83	55.02	74.00	-18.98	P	
* 7421.89	39.98	39.09	5.01	41.16	1.83	44.75	54.00	-9.25	A	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	P	
N/A	-----	-----	-----	-----	-----	-----	-----	-----	A	

**Remark:**

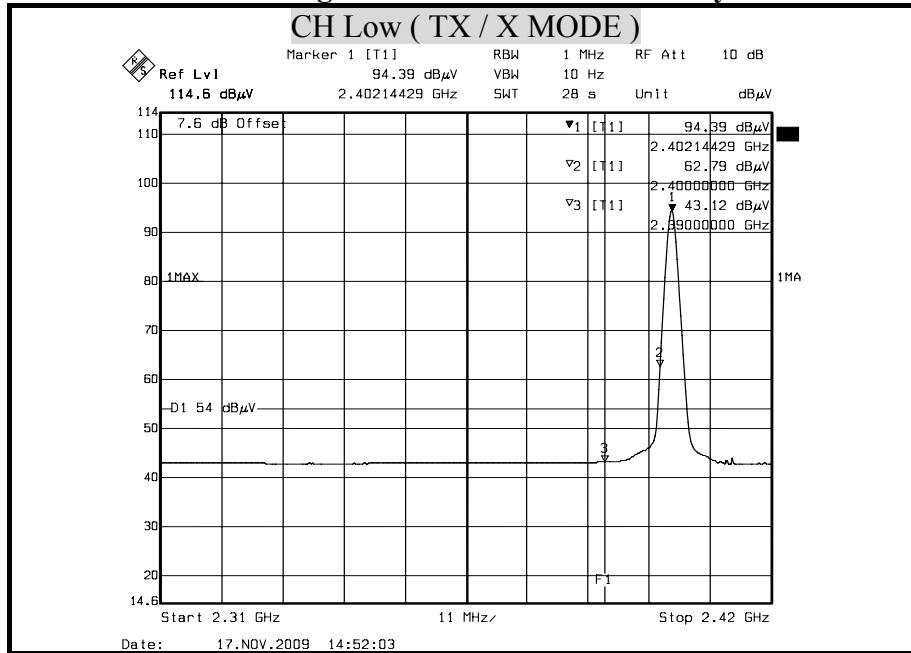
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow:  
 $Level = Reading + AF + Cable - Preamp + Filter$ ,  $Margin = Level - Limit$
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

### 8.6.4 RESTRICTED BAND EDGES

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



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



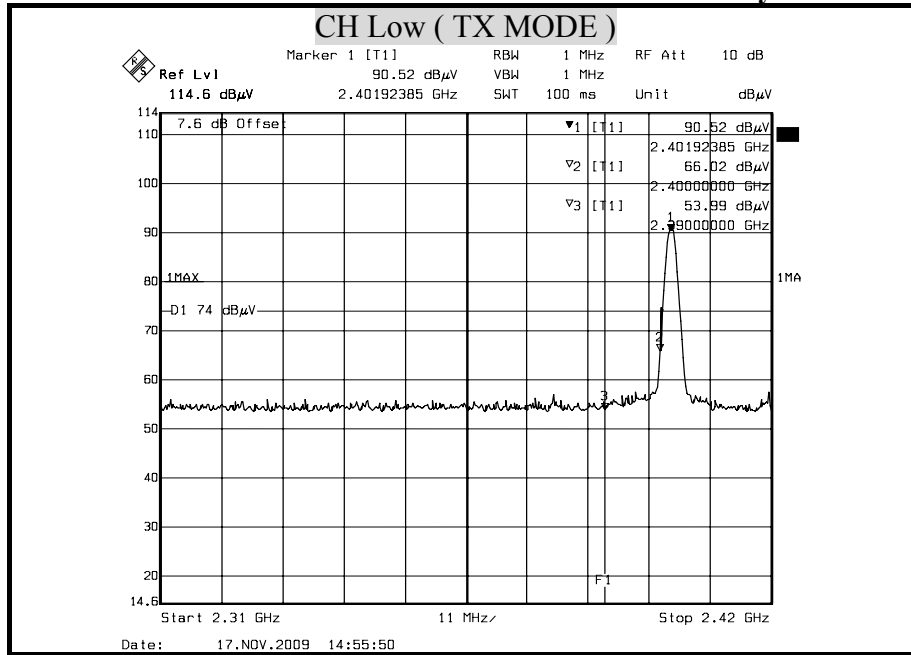
**Remark:**

1. Display Line = 54/74 dB μ V/m.
2. 2390MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.6(dB)
3. 2483.5MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.62(dB)



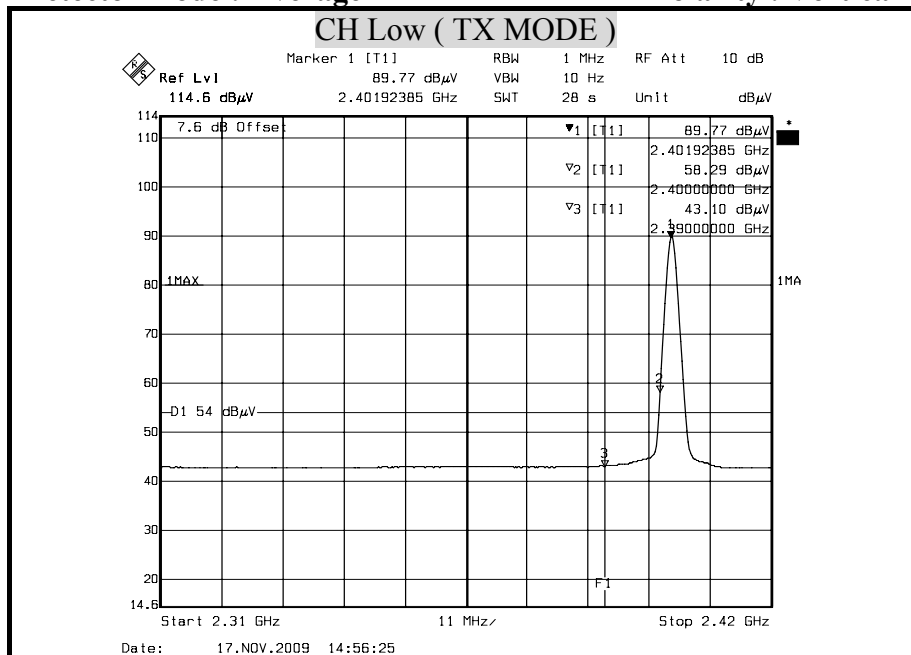
Detector mode : Peak

Polarity : Vertical



Detector mode : Average

Polarity : Vertical



**Remark:**

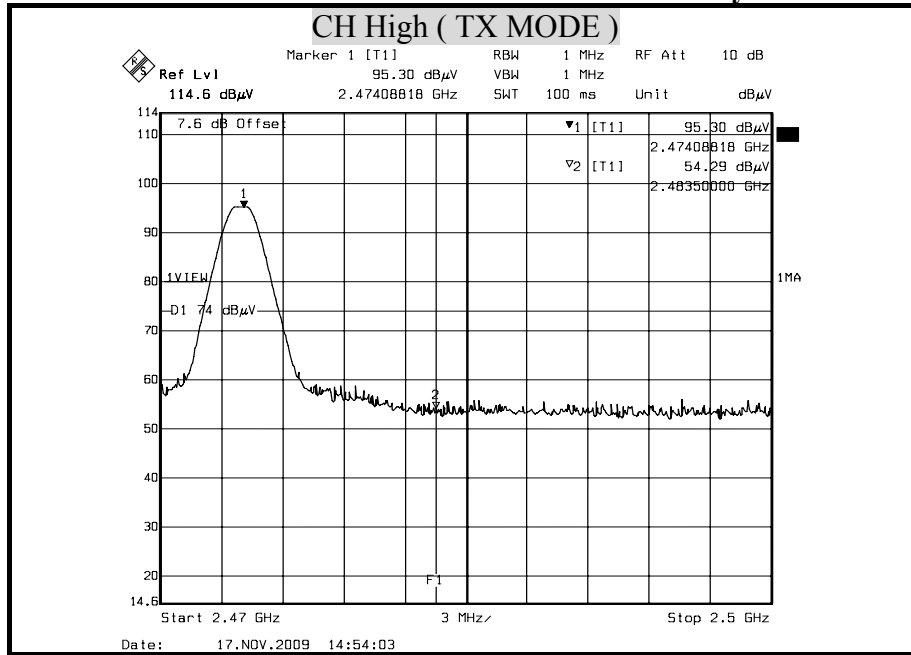
1. Display Line = 54/74 dB μ V/m.
2. 2390MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.6(dB)
3. 2483.5MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.62(dB)





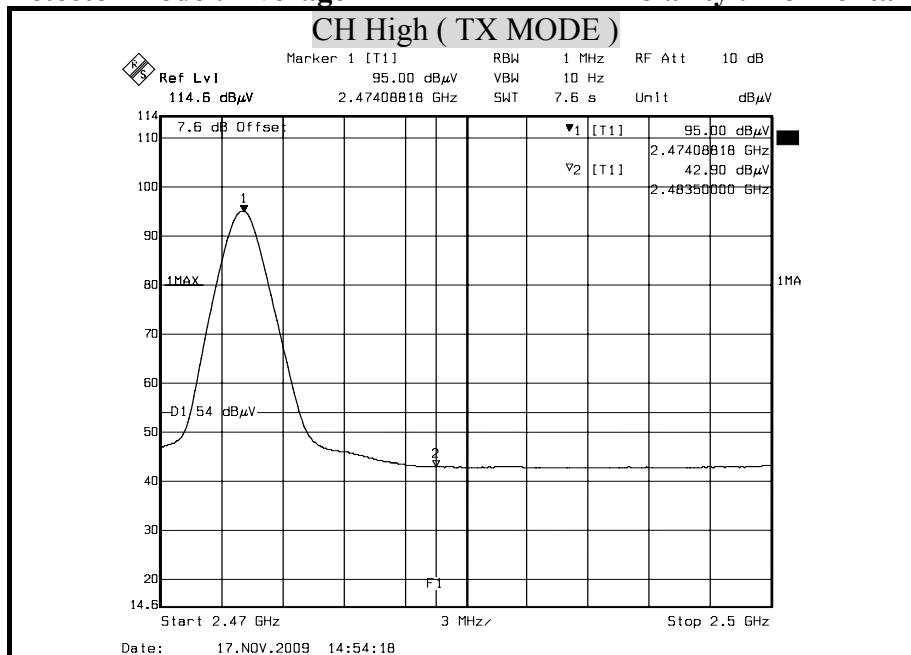
**Detector mode : Peak**

**Polarity : Horizontal**



**Detector mode : Average**

**Polarity : Horizontal**



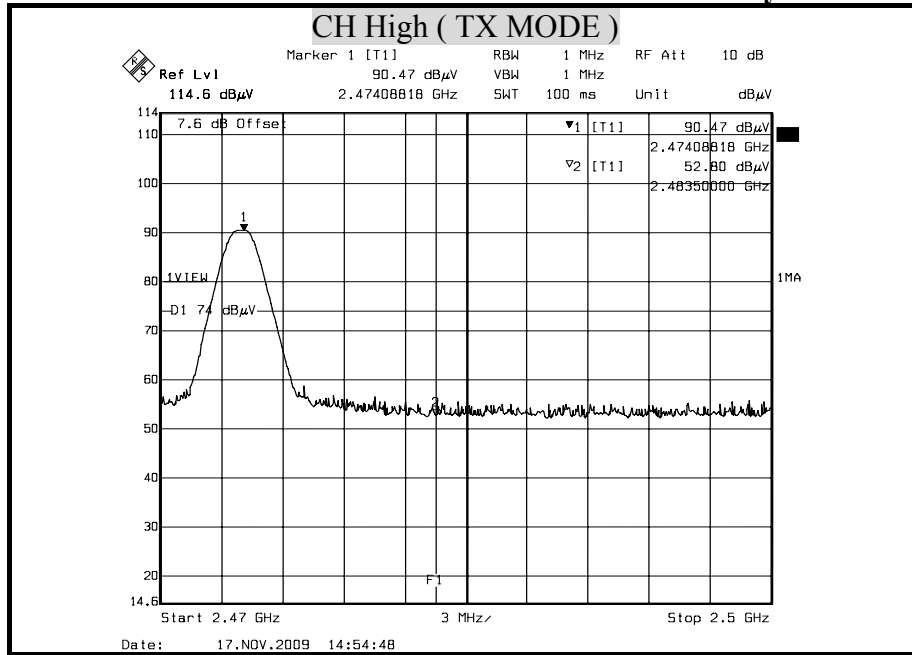
**Remark:**

1. Display Line = 54/74 dB μ V/m.
2. 2390MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.6(dB)
3. 2483.5MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.62(dB)



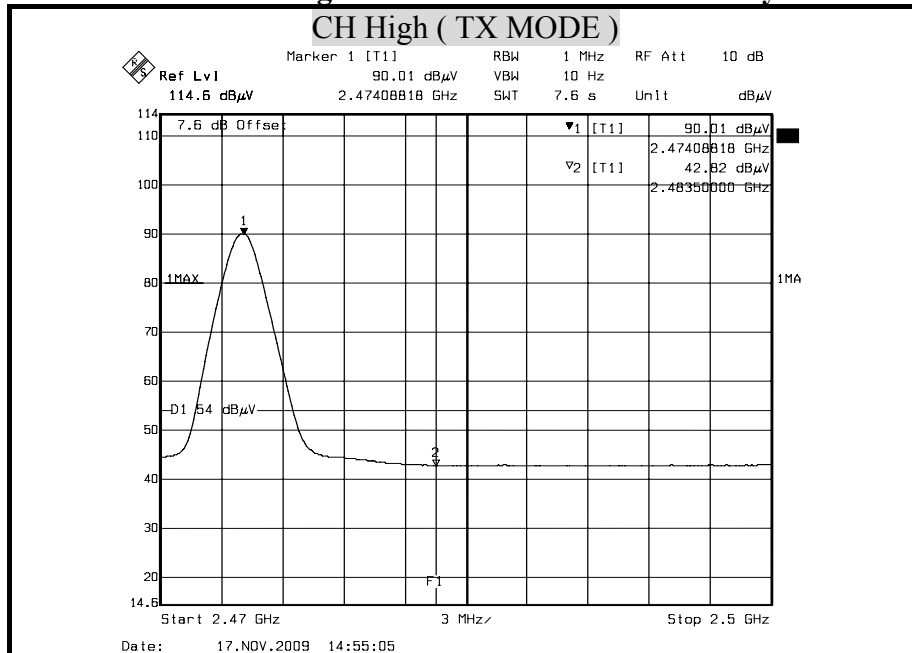
**Detector mode : Peak**

**Polarity : Vertical**



**Detector mode : Average**

**Polarity : Vertical**



**Remark:**

1. Display Line = 54/74 dB μ V/m.
2. 2390MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.6(dB)
3. 2483.5MHz Offset(dB) = Antenna Factor(dB/m) + Cable Loss(dB) - Pre-Amplifier(dB) + Attenuator(dB)=7.62(dB)



## 8.7 POWERLINE CONDUCTED EMISSIONS

### LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

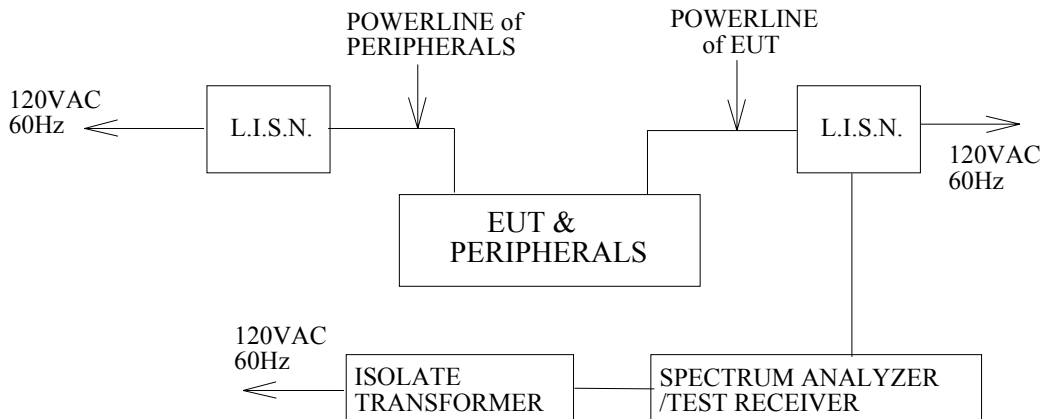
Frequency of Emission (MHz)	Conducted limit (dB $\mu$ v)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

### TEST EQUIPMENTS

The following test equipments are used during the conducted power line tests:

Conducted Emission room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N.	SCHWARZBECK	NNLK 8121	8121-446	NOV. 19, 2010 For Insertion loss
	Rohde & Schwarz	ESH 3-Z5	840062/021	OCT. 05, 2010
TEST RECEIVER	Rohde & Schwarz	ESCS 30	100348	JUL. 16, 2010
TYPE N COAXIAL CABLE	CCS	BNC50	11	JAN. 14, 2010
Test S/W	e-3 (5.04211c) R&S (2.27)			

**TEST SETUP**



**TEST PROCEDURE**

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

**TEST RESULTS**

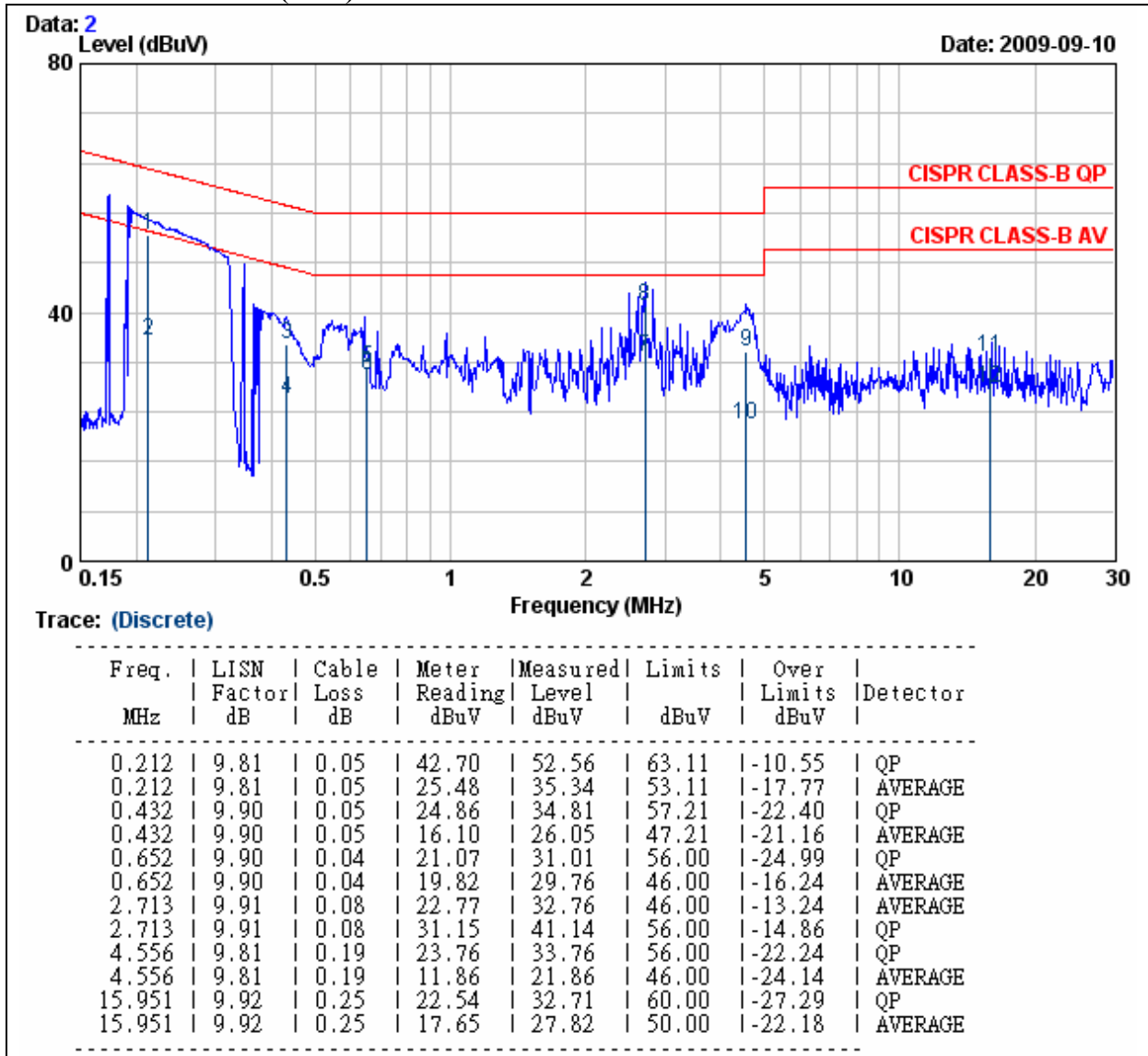
No non-compliance noted



**TEST DATA**

**Operation Mode:** TX + RX mode      **Test Date:** September 10, 2009  
**Temperature:** 27.3°C                 **Humidity:** 57% RH  
**Tested by:** John Chen                 **Test Mode:** Normal Link

**Conducted emissions (Line)**

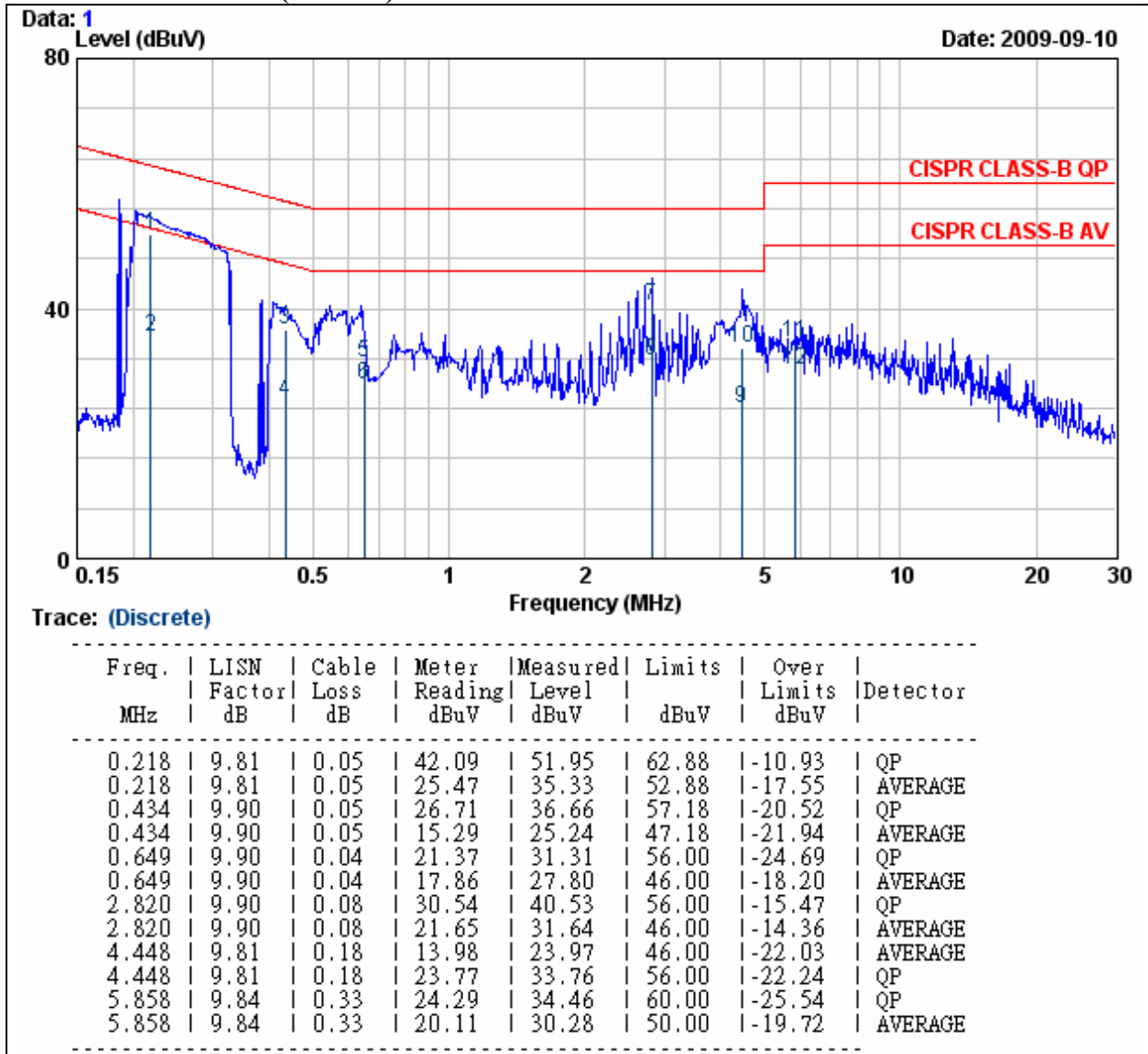


**Remark:**

- 1 Measuring frequencies from 0.15 MHz to 30MHz.
- 2 The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
- 3 The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
- 4 a. Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB)  
b. Over Limit value (dB) = Level (dBUV) – Limit Line (dBUV)



**Operation Mode:** TX + RX mode      **Test Date:** September 10, 2009  
**Temperature:** 27.3°C      **Humidity:** 57% RH  
**Tested by:** John Chen      **Test Mode:** Normal Link

**Conducted emissions (Neutral)****Remark:**

- 1 Measuring frequencies from 0.15 MHz to 30MHz.
- 2 The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
- 3 The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
- 4 a. Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB)  
b. Over Limit value (dB) = Level (dBuV) – Limit Line (dBuV)



## **9. ANTENNA REQUIREMENT**

### **9.1 STANDARD APPLICABLE**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **9.2 ANTENNA CONNECTED CONSTRUCTION**

The antennas used for this product are chip antenna.

The peak Gain of these antennas is 3 dBi