

# FCC TEST REPORT

**REPORT NO.:** RF110217E03

**MODEL NO.:** TGPBA0010260

**FCC ID:** ZAR-TGPBA0010260

**RECEIVED:** Feb. 17, 2011

**TESTED:** Feb. 25 to Mar. 01, 2011

**ISSUED:** Mar. 07, 2011

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Jabil Design Services Branch

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## Table of Contents

RELEASE CONTROL RECORD.....	4
1. CERTIFICATION.....	5
2. SUMMARY OF TEST RESULTS.....	6
2.1 MEASUREMENT UNCERTAINTY .....	7
3. GENERAL INFORMATION .....	8
3.1 GENERAL DESCRIPTION OF EUT.....	8
3.2 DESCRIPTION OF TEST MODES.....	9
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	10
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	12
3.4 DESCRIPTION OF SUPPORT UNITS.....	13
3.5 CONFIGURATION OF SYSTEM UNDER TEST .....	13
4. TEST TYPES AND RESULTS.....	14
4.1 CONDUCTED EMISSION MEASUREMENT .....	14
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	14
4.1.2 TEST INSTRUMENTS .....	14
4.1.3 TEST PROCEDURES.....	15
4.1.4 DEVIATION FROM TEST STANDARD .....	15
4.1.5 TEST SETUP .....	16
4.1.6 EUT OPERATING CONDITIONS.....	16
4.1.7 TEST RESULTS.....	17
4.2 RADIATED EMISSION MEASUREMENT .....	19
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT.....	19
4.2.2 TEST INSTRUMENTS .....	20
4.2.3 TEST PROCEDURES.....	21
4.2.4 DEVIATION FROM TEST STANDARD .....	21
4.2.5 TEST SETUP .....	22
4.2.6 EUT OPERATING CONDITIONS.....	22
4.2.7 TEST RESULTS.....	23
4.3 6dB BANDWIDTH MEASUREMENT .....	30
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT .....	30
4.3.2 TEST INSTRUMENTS .....	30
4.3.3 TEST PROCEDURE .....	30
4.3.4 DEVIATION FROM TEST STANDARD .....	30
4.3.5 TEST SETUP .....	30
4.3.6 EUT OPERATING CONDITIONS.....	30
4.3.7 TEST RESULTS.....	31
4.4 MAXIMUM PEAK OUTPUT POWER .....	32



A D T

4.4.1	LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT .....	32
4.4.2	INSTRUMENTS .....	32
4.4.3	TEST PROCEDURES .....	32
4.4.4	DEVIATION FROM TEST STANDARD .....	32
4.4.5	TEST SETUP .....	32
4.4.6	EUT OPERATING CONDITIONS .....	32
4.4.7	TEST RESULTS .....	33
4.5	POWER SPECTRAL DENSITY MEASUREMENT .....	34
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT .....	34
4.5.2	TEST INSTRUMENTS .....	34
4.5.3	TEST PROCEDURE .....	34
4.5.4	DEVIATION FROM TEST STANDARD .....	34
4.5.5	TEST SETUP .....	34
4.5.6	EUT OPERATING CONDITION .....	34
4.5.7	TEST RESULTS .....	35
4.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT .....	36
4.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT .....	36
4.6.2	TEST INSTRUMENTS .....	36
4.6.3	TEST PROCEDURE .....	36
4.6.4	DEVIATION FROM TEST STANDARD .....	36
4.6.5	EUT OPERATING CONDITION .....	36
4.6.6	TEST RESULTS .....	36
5.	INFORMATION ON THE TESTING LABORATORIES .....	39
6.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	40



## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	NA	Mar. 07, 2011



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## 1. CERTIFICATION

**PRODUCT:** ZigBee Interface Module  
**BRAND NAME:** Jabil  
**MODEL NO.:** TGPBA0010260  
**TEST SAMPLE:** R&D SAMPLE  
**APPLICANT:** Taiwan Green Point Enterprises Co., Ltd. Jabil Design Services Branch  
**TESTED:** Feb. 25 to Mar. 01, 2011  
**STANDARDS:** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (Model: TGPBA0010260) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Midoli Peng, **DATE:** Mar. 07, 2011  
(Midoli Peng, Specialist)

**APPROVED BY :** May Chen, **DATE:** Mar. 07, 2011  
(May Chen, Deputy Manager)

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -3.28dB at 0.190MHz
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System Limit: min. 500kHz	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power Limit: max. 30dBm	PASS	Meet the requirement of limit.
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -0.5dB at 2483.5MHz
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Meet the requirement of limit.
15.247(d)	Conducted Out-Band Emission Measurement Limit: 20dB less than the peak value of fundamental frequency	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

## 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.3 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.55 dB

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	ZigBee Interface Module
MODEL NO.	TGPBA0010260
FCC ID	ZAR-TGPBA0010260
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	O-QPSK
MODULATION TECHNOLOGY	DSSS
TRANSFER RATE	250kbps
OPERATING FREQUENCY	2405 ~ 2480MHz
NUMBER OF CHANNEL	16
MAXIMUM OUTPUT POWER	169.8mW
ANTENNA TYPE	PCB antenna without connector (antenna gain 2dBi)
DATA CABLE	NA
I/O PORTS	USB port x 1
ASSOCIATED DEVICES	NA

#### NOTE:

1. There is ZigBee technology used for the EUT.
2. For radiated test , the EUT was pre-tested under the following modes:

Pre-test Mode	Description
<b>Mode A</b>	<b>X-Y plane</b>
Mode B	Z-X plane
<b>Mode C</b>	<b>Z-Y plane</b>

From the above modes, the worst radiated (below 1GHz) was found in **Mode C** and the worst radiated (above 1GHz) was found in **Mode A**. Therefore the test data of the mode was recorded in this report.

3. The above EUT information was declared by the manufacturer and for more detailed feature descriptions, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

Sixteen channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
11	2405	15	2425	19	2445	23	2465
12	2410	16	2430	20	2450	24	2470
13	2415	17	2435	21	2455	25	2475
14	2420	18	2440	22	2460	26	2480

**NOTE:**

1. Below 1 GHz, the channel 11, 19, and 26 were pre-tested in chamber. The channel 1, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 11, 19, and 26 were tested individually.

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	OBE	
-	√	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz  
**RE ≥ 1G**: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement  
**OBE**: Conducted Out-Band Emission measurement

#### **POWER LINE CONDUCTED EMISSION TEST:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
11 to 26	11	O-QPSK

#### **RADIATED EMISSION TEST (BELOW 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
11 to 26	11	O-QPSK

#### **RADIATED EMISSION TEST (ABOVE 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
11 to 26	11,19, 26	O-QPSK

### **CONDUCTED OUT-BAND EMISSION MEASUREMENT:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
11 to 26	11, 26	O-QPSK

### **ANTENNA PORT CONDUCTED MEASUREMENT:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
11 to 23	11, 19, 26	O-QPSK

### **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	25deg. C, 70%RH, 1024 hPa	120Vac, 60Hz	Timmy Hu
RE <sup>3</sup> 1G	20deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Frank Liu
RE<1G	20deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Kent Liu
APCM	25deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Wen Yu
OBE	25deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Wen Yu

### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.247)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

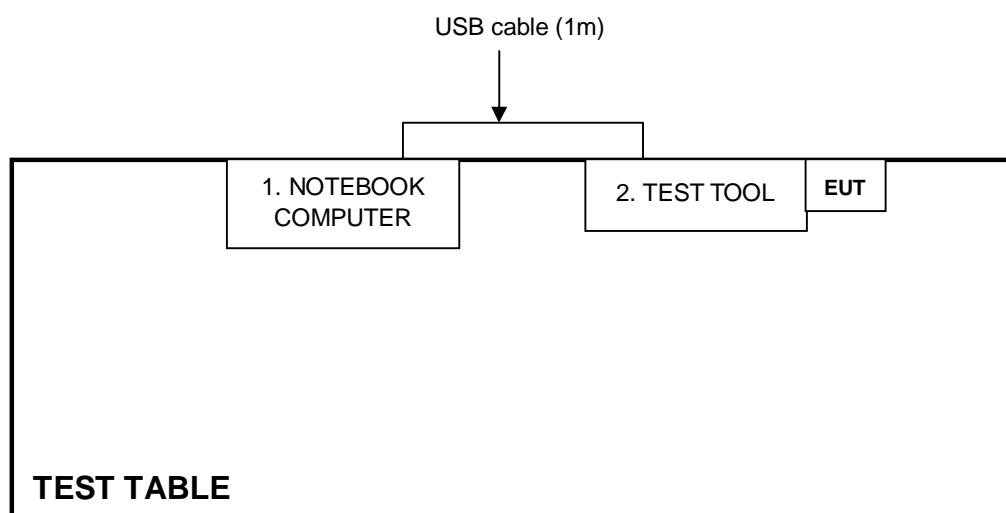
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP19L	CN-OHC416-70166-5CA-0448	PIW632500516610
2	TEST TOOL	Jabil	NA	NA	NA

No.	Signal cable description
1	USB cable(shielded, 1m)
2	NA

Note: The power cords of the above support units were unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST



## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
0.15-0.5 0.5-5 5-30	Quasi-peak	Average
	66 to 56	56 to 46
	56	46
	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 08, 2010	Sep. 07, 2011
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 03, 2010	Nov. 02, 2011
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 30, 2010	Aug. 29, 2011
50 ohms Terminator	50	3	Nov. 03, 2010	Nov. 02, 2011
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.

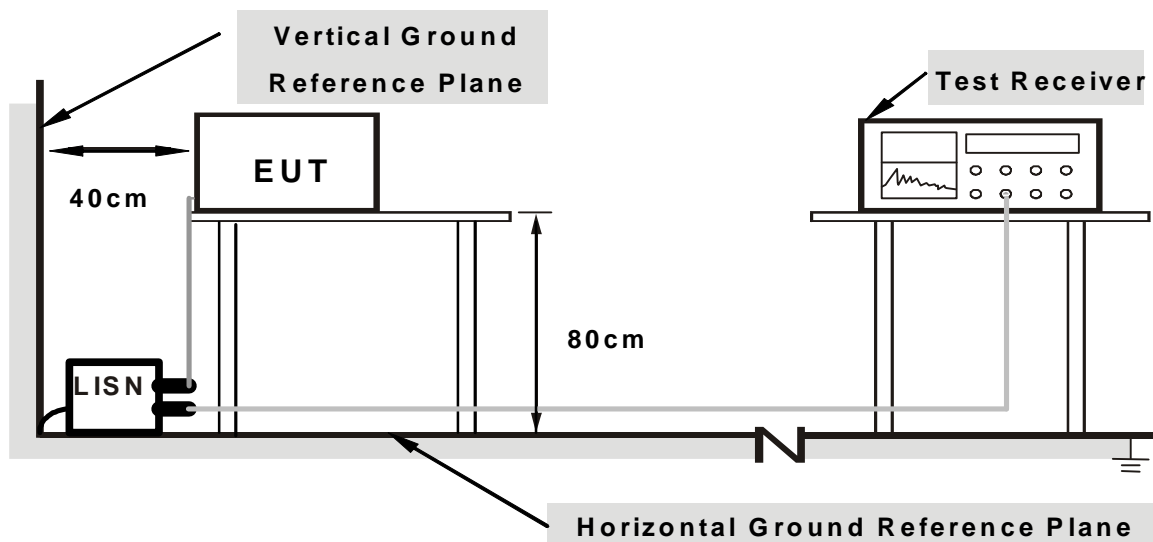
#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



**Note: 1.Support units were connected to second LISN.**

**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on the test table.
2. The support unit 1 (Notebook Computer) runs test program “Hyper terminal” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

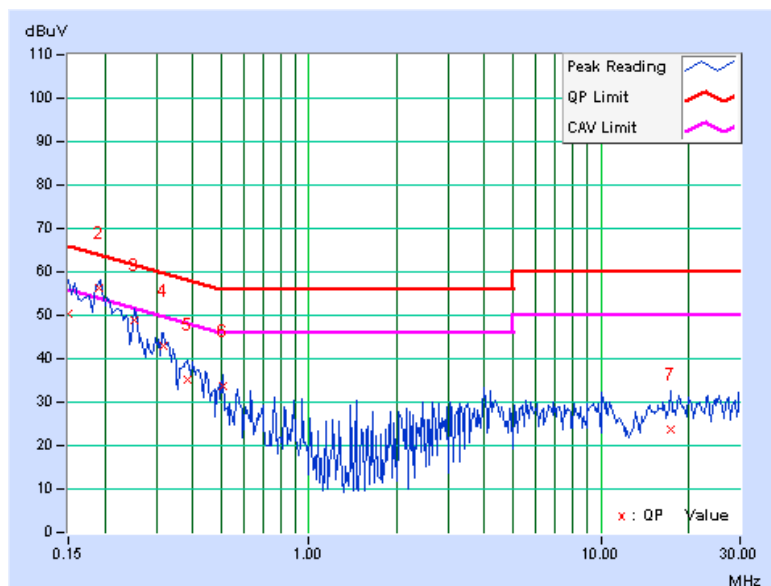


#### 4.1.7 TEST RESULTS

PHASE	Line (L)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	50.18	-	50.28	-	66.00	56.00	-15.72	-
2	0.190	0.13	56.05	50.62	56.18	50.75	64.03	54.03	-7.85	-3.28
3	0.253	0.13	48.71	-	48.84	-	61.65	51.65	-12.81	-
4	0.318	0.13	42.78	-	42.91	-	59.76	49.76	-16.85	-
5	0.384	0.13	35.01	-	35.14	-	58.18	48.18	-23.04	-
6	0.505	0.13	33.69	-	33.82	-	56.00	46.00	-22.18	-
7	17.398	0.61	22.92	-	23.53	-	60.00	50.00	-36.47	-

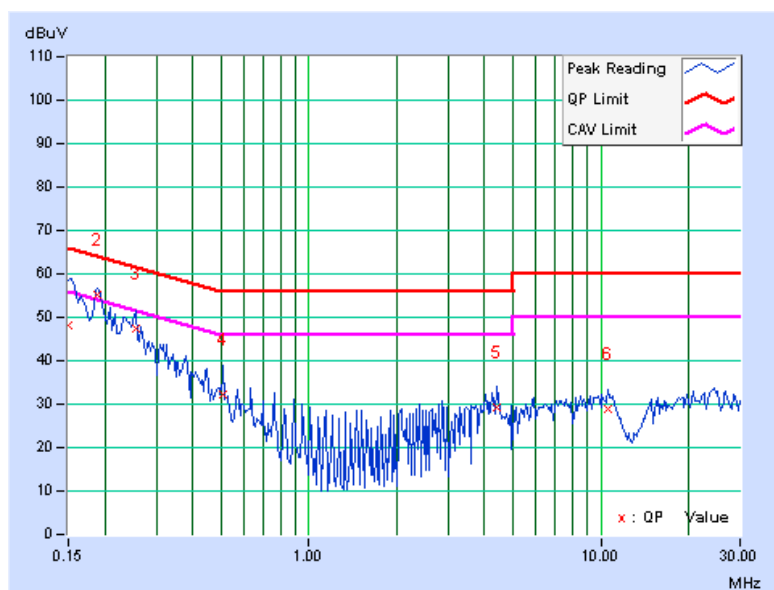
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.  
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.  
3. The emission levels of other frequencies were very low against the limit.  
4. Margin value = Emission level - Limit value  
5. Correction factor = Insertion loss + Cable loss  
6. Emission Level = Correction Factor + Reading Value.



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.12	47.87	-	47.99	-	66.00	56.00	-18.01	-
2	0.189	0.13	54.98	49.97	55.11	50.10	64.08	54.08	-8.96	-3.97
3	0.255	0.14	47.23	-	47.37	-	61.58	51.58	-14.20	-
4	0.509	0.15	32.20	-	32.35	-	56.00	46.00	-23.65	-
5	4.430	0.32	29.07	-	29.39	-	56.00	46.00	-26.61	-
6	10.637	0.87	28.11	-	28.98	-	60.00	50.00	-31.02	-

- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.  
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.  
3. The emission levels of other frequencies were very low against the limit.  
4. Margin value = Emission level - Limit value  
5. Correction factor = Insertion loss + Cable loss  
6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.



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#### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 14, 2010	July 13, 2011
Agilent Pre-Selector	N9039A	MY46520311	July 14, 2010	July 13, 2011
Agilent Signal Generator	N5181A	MY49060517	July 14, 2010	July 13, 2011
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 16, 2010	Nov. 15, 2011
Agilent Pre-Amplifier	8449B	3008A02578	July 05, 2010	July 04, 2011
Miteq Pre-Amplifier	AFS33-1800265 0-30-8P-44	881786	NA	NA
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 29, 2010	Apr. 28, 2011
AISI Horn_Antenna	AIH.8018	000032009111 0	Nov. 12, 2010	Nov. 11, 2011
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 08, 2010	Oct. 07, 2011
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	NA	NA
Software	ADT_Radiated_ V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.

### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

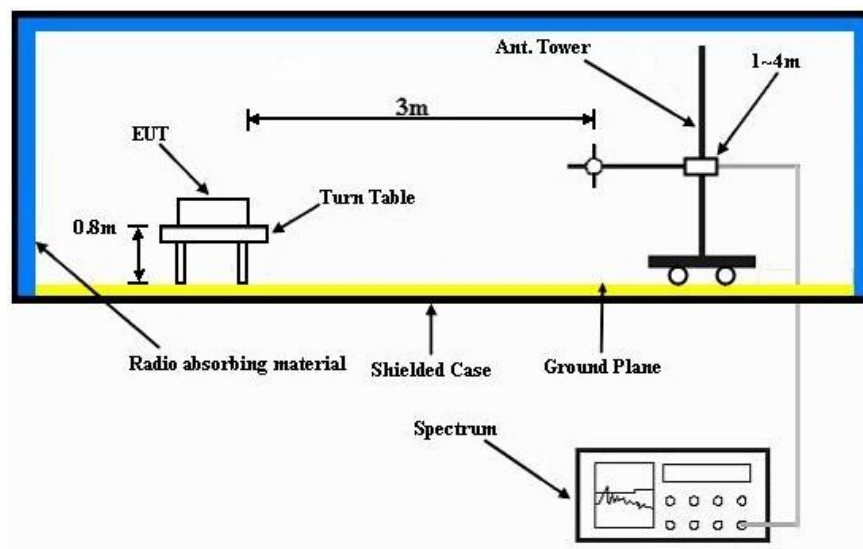
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

## 4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

## 4.2.7 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 1024 hPa	TESTED BY	Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	133.26	35.63 QP	43.50	-7.87	2.00 H	63	22.07	13.56
2	196.62	40.20 QP	43.50	-3.30	1.00 H	329	29.19	11.01
3	223.98	38.64 QP	46.00	-7.36	1.00 H	251	26.57	12.07
4	377.81	34.47 QP	46.00	-11.53	1.00 H	168	17.28	17.19
5	575.93	35.37 QP	46.00	-10.63	1.50 H	229	13.54	21.83
6	601.39	35.27 QP	46.00	-10.73	1.00 H	293	12.87	22.40
7	624.01	35.87 QP	46.00	-10.13	1.00 H	299	13.17	22.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	54.16	29.95 QP	40.00	-10.05	1.00 V	260	16.14	13.81
2	196.62	34.26 QP	43.50	-9.24	1.50 V	276	23.25	11.01
3	431.93	31.23 QP	46.00	-14.77	1.00 V	295	12.78	18.45
4	480.01	31.56 QP	46.00	-14.44	1.50 V	322	11.95	19.61
5	575.93	35.42 QP	46.00	-10.58	1.00 V	260	13.59	21.83
6	671.97	34.17 QP	46.00	-11.83	1.50 V	256	10.85	23.32
7	912.01	35.77 QP	46.00	-10.23	1.00 V	209	8.87	26.90

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

# ABOVE 1GHz WORST-CASE DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 1024 hPa	TESTED BY	Frank Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.90 PK	74.00	-11.10	1.48 H	236	31.24	31.66
2	2390.00	42.90 AV	54.00	-11.10	1.48 H	236	11.24	31.66
3	*2405.00	118.60 PK			1.41 H	249	86.89	31.71
4	*2405.00	98.60 AV			1.41 H	249	66.89	31.71
5	4810.00	55.20 PK	74.00	-18.80	1.44 H	35	16.28	38.92
6	4810.00	35.20 AV	54.00	-18.80	1.44 H	35	-3.72	38.92
7	12025.00	63.80 PK	74.00	-10.20	1.30 H	190	15.63	48.17
8	12025.00	43.80 AV	54.00	-10.20	1.30 H	190	-4.37	48.17
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.50 PK	74.00	-14.50	1.00 V	11	27.84	31.66
2	2390.00	39.50 AV	54.00	-14.50	1.00 V	11	7.84	31.66
3	*2405.00	114.80 PK			1.00 V	11	83.09	31.71
4	*2405.00	94.80 AV			1.00 V	11	63.09	31.71
5	4810.00	55.30 PK	74.00	-18.70	1.00 V	333	16.38	38.92
6	4810.00	35.30 AV	54.00	-18.70	1.00 V	333	-3.62	38.92
7	12025.00	65.00 PK	74.00	-9.00	1.23 V	12	16.83	48.17
8	12025.00	45.00 AV	54.00	-9.00	1.23 V	12	-3.17	48.17

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. The other emission levels were very low against the limit.  
4. Margin value = Emission level – Limit value.  
5. “ \* ”: Fundamental frequency.  
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
20 log (Duty cycle) = 20 log (1.167 ms / 11.67 ms) = -20 dB  
Please see page 27 for plotted duty.





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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 19	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 1024 hPa	TESTED BY	Frank Liu

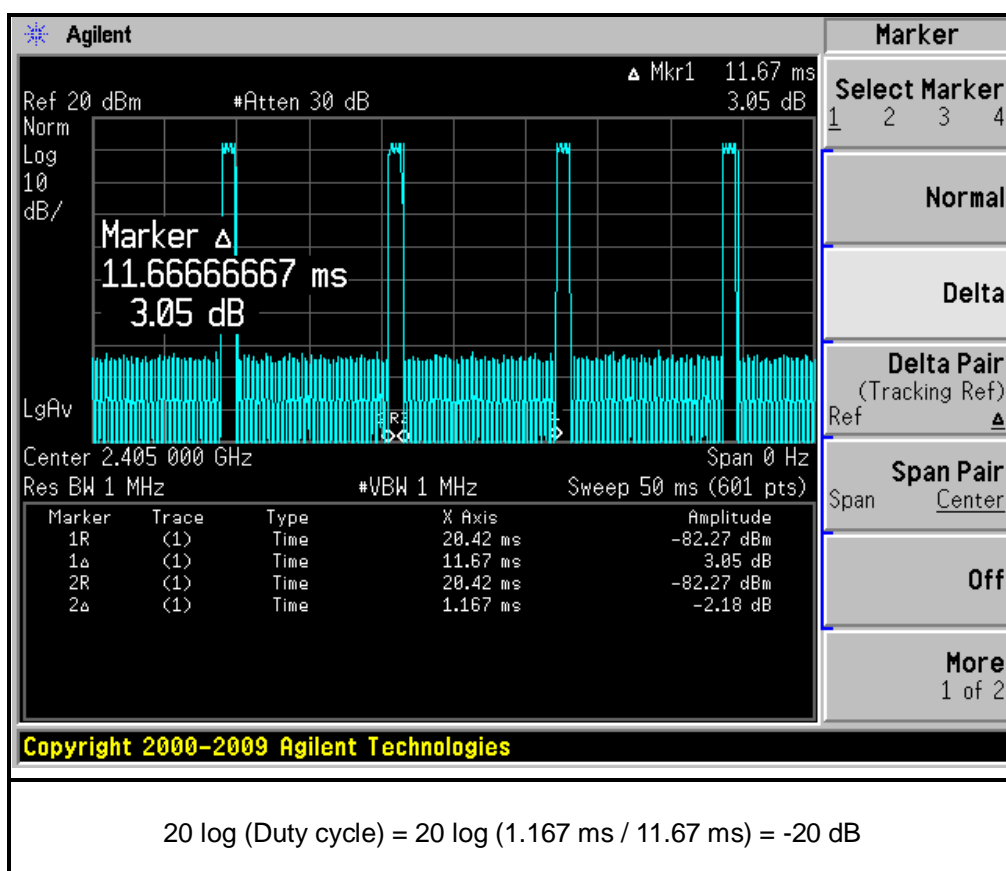
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2445.00	118.70 PK			1.44 H	243	86.86	31.84
2	*2445.00	98.70 AV			1.44 H	243	66.86	31.84
3	4890.00	56.70 PK	74.00	-17.30	1.41 H	38	17.50	39.20
4	4890.00	36.70 AV	54.00	-17.30	1.41 H	38	-2.50	39.20
5	7335.00	62.10 PK	74.00	-11.90	1.05 H	126	15.48	46.62
6	7335.00	42.10 AV	54.00	-11.90	1.05 H	126	-4.52	46.62
7	12225.00	60.90 PK	74.00	-13.10	1.30 H	248	12.45	48.45
8	12225.00	40.90 AV	54.00	-13.10	1.30 H	248	-7.55	48.45
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2445.00	114.60 PK			1.00 V	11	82.76	31.84
2	*2445.00	94.60 AV			1.00 V	11	62.76	31.84
3	4890.00	57.80 PK	74.00	-16.20	1.00 V	4	18.60	39.20
4	4890.00	37.80 AV	54.00	-16.20	1.00 V	4	-1.40	39.20
5	7335.00	63.30 PK	74.00	-10.70	1.10 V	265	16.68	46.62
6	7335.00	43.30 AV	54.00	-10.70	1.10 V	265	-3.32	46.62
7	12225.00	62.70 PK	74.00	-11.30	1.26 V	12	14.25	48.45
8	12225.00	42.70 AV	54.00	-11.30	1.26 V	12	-5.75	48.45

**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. The other emission levels were very low against the limit.  
4. Margin value = Emission level – Limit value.  
5. “ \* ”: Fundamental frequency.  
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
20 log (Duty cycle) = 20 log (1.167 ms / 11.67 ms) = -20 dB  
Please see page 27 for plotted duty.

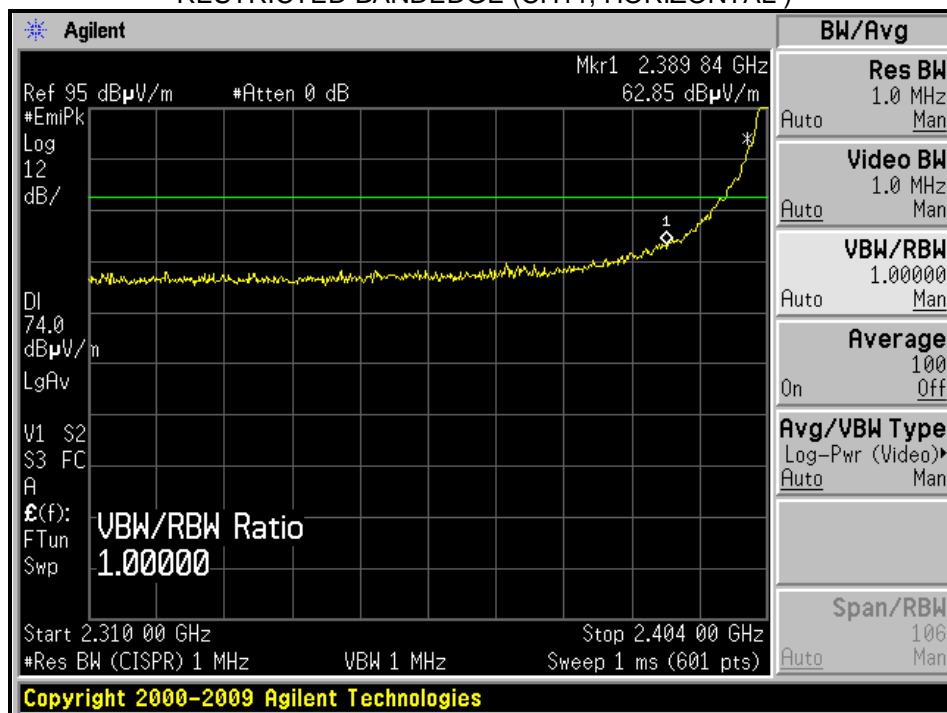
EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 26	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	20deg. C, 60%RH 1024 hPa	TESTED BY	Frank Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	106.40 PK			1.44 H	246	74.45	31.95
2	*2480.00	86.40 AV			1.44 H	246	54.45	31.95
3	2483.50	73.50 PK	74.00	-0.50	1.42 H	242	41.53	31.97
4	2483.50	53.50 AV	54.00	-0.50	1.42 H	242	21.53	31.97
5	4960.00	49.40 PK	74.00	-24.60	1.40 H	64	9.98	39.42
6	4960.00	29.40 AV	54.00	-24.60	1.40 H	64	-10.02	39.42
7	7440.00	54.20 PK	74.00	-19.80	1.03 H	213	7.64	46.56
8	7440.00	34.20 AV	54.00	-19.80	1.03 H	213	-12.36	46.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	103.20 PK			1.00 V	7	71.25	31.95
2	*2480.00	83.20 AV			1.00 V	7	51.25	31.95
3	2483.50	70.60 PK	74.00	-3.40	1.00 V	10	38.63	31.97
4	2483.50	50.60 AV	54.00	-3.40	1.00 V	10	18.63	31.97
5	4960.00	49.60 PK	74.00	-24.40	1.39 V	167	10.18	39.42
6	4960.00	29.60 AV	54.00	-24.40	1.39 V	167	-9.82	39.42
7	7440.00	54.00 PK	74.00	-20.00	1.00 V	124	7.44	46.56
8	7440.00	34.00 AV	54.00	-20.00	1.00 V	124	-12.56	46.56

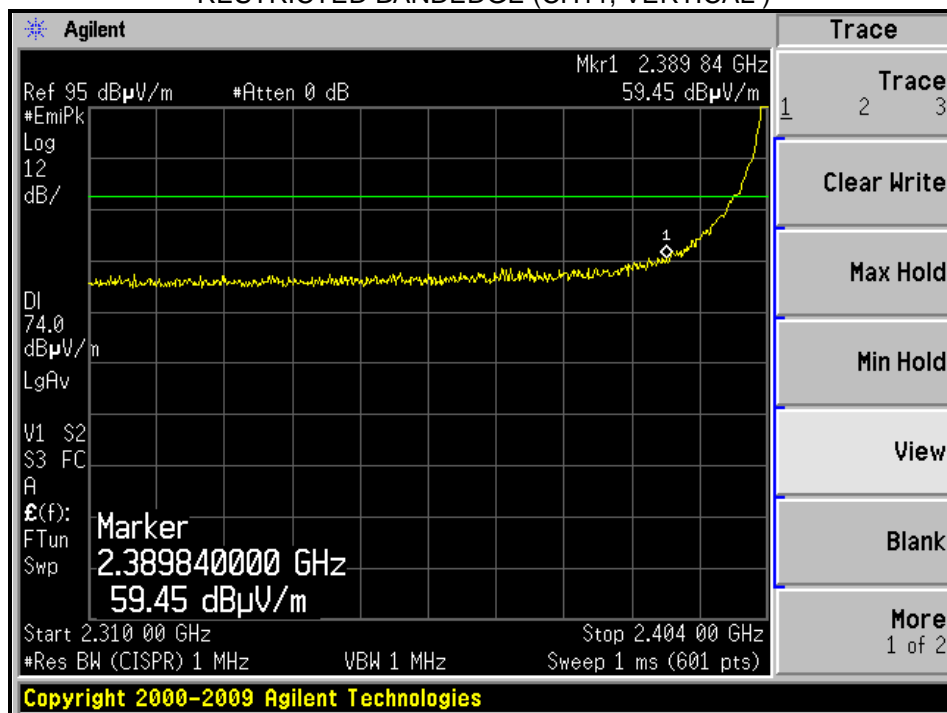
**REMARKS:** 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).  
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
3. The other emission levels were very low against the limit.  
4. Margin value = Emission level – Limit value.  
5. “ \* ”: Fundamental frequency.  
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:  
 $20 \log (\text{Duty cycle}) = 20 \log (1.167 \text{ ms} / 11.67 \text{ ms}) = -20 \text{ dB}$   
Please see page 27 for plotted duty.



# RESTRICTED BANDEDGE (CH11, HORIZONTAL )

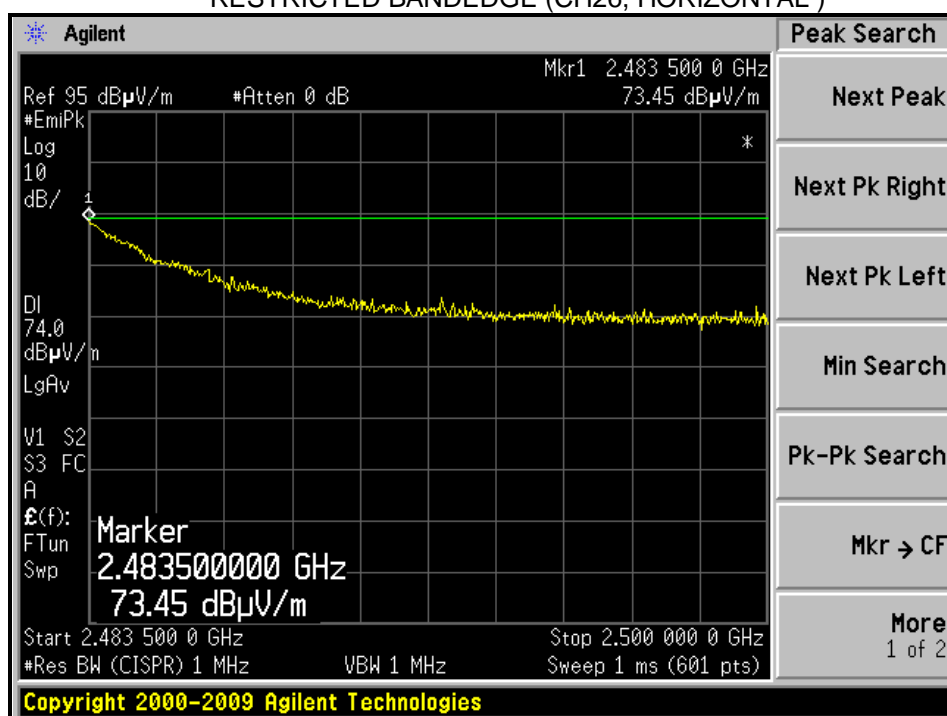


# RESTRICTED BANDEDGE (CH11, VERTICAL )

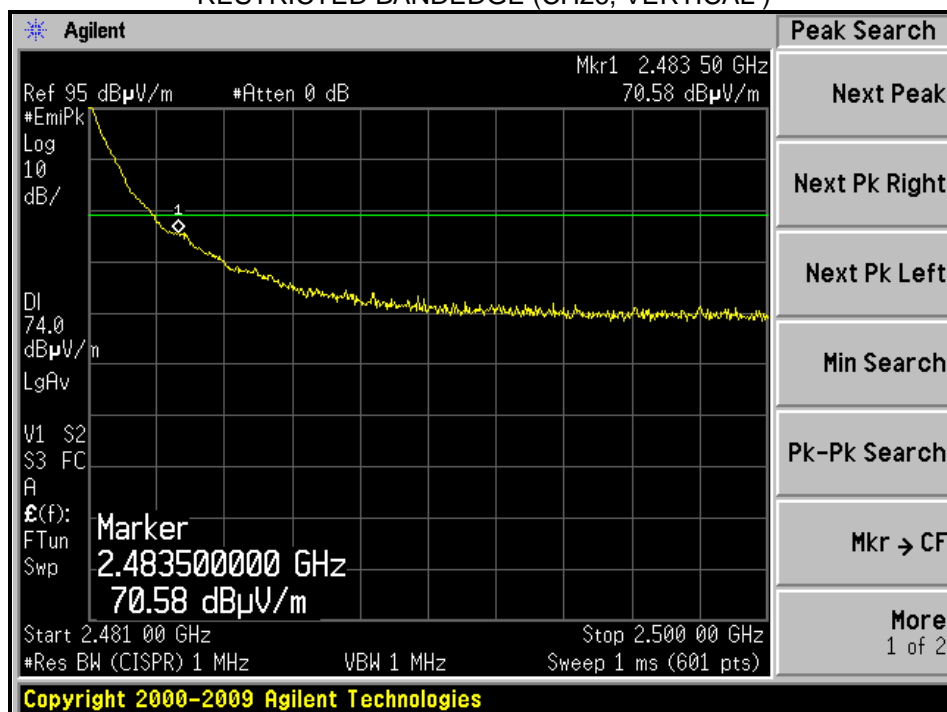


\* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle).  
And it meets the requirement of limit.

# RESTRICTED BANDEDGE (CH26, HORIZONTAL )



# RESTRICTED BANDEDGE (CH26, VERTICAL )



\* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle).  
And it meets the requirement of limit.

### 4.3 6dB BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.3.3 TEST PROCEDURE

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

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



#### 4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



#### 4.4 MAXIMUM PEAK OUTPUT POWER

##### 4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

##### 4.4.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Peak Power Meter	ML2495A	0824006	May 04, 2010	May 03, 2011
Power Sensor	MA2411B	0738172	May 04, 2010	May 03, 2011

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

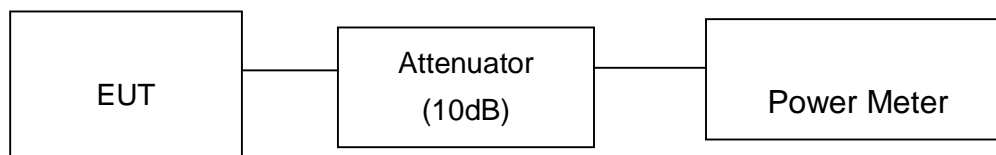
##### 4.4.3 TEST PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator; the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the power level.

##### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation

##### 4.4.5 TEST SETUP



##### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6





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#### 4.4.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS / FAIL
11	2405	169.8	22.3	30	PASS
19	2445	144.5	21.6	30	PASS
26	2480	11.7	10.7	30	PASS



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## 4.5 POWER SPECTRAL DENSITY MEASUREMENT

### 4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

### 4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

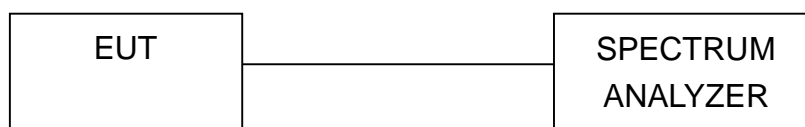
### 4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, 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.

### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5.5 TEST SETUP



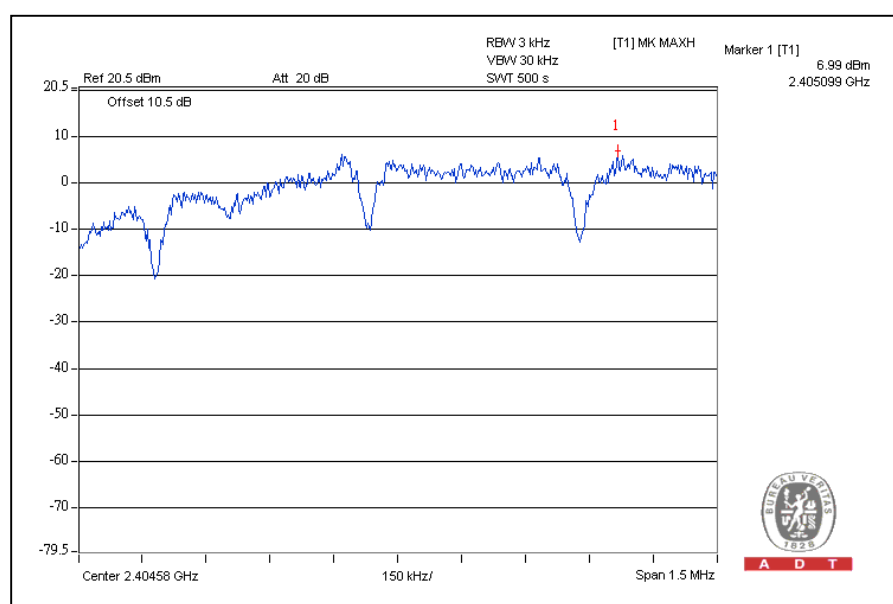
### 4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

## 4.5.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz )	RF POWER LEVEL IN 3kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS / FAIL
11	2405	7.0	8	PASS
19	2445	5.6	8	PASS
26	2480	-5.8	8	PASS

### CH11



## 4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

### 4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer	FSP 40	100060	May 17, 2010	May 16, 2011

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set RBW of spectrum analyzer to 100kHz and VBW of spectrum analyzer to 300kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges were measured and recorded.

The spectrum plots (RBW = 100kHz, VBW = 300kHz) are attached on the following pages.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

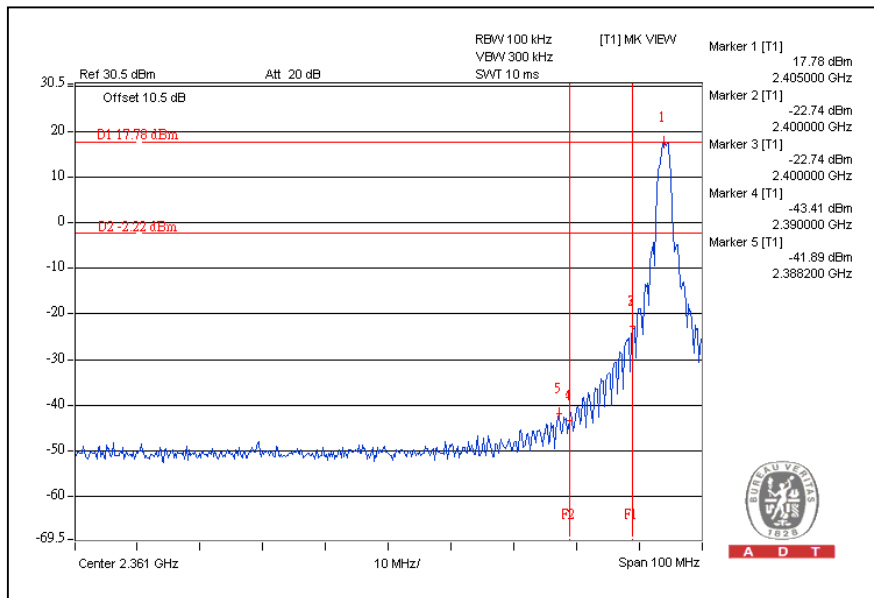
### 4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

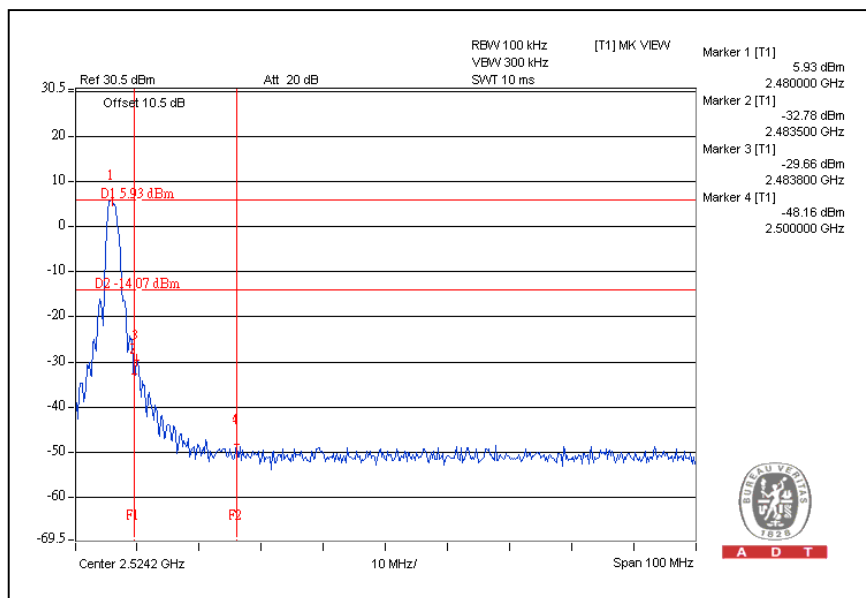
### 4.6.6 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

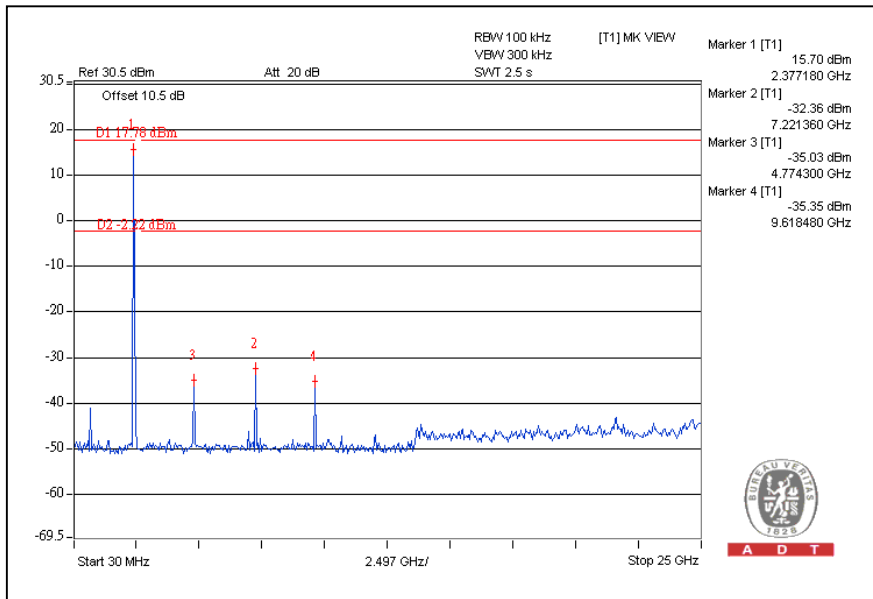
## CH11



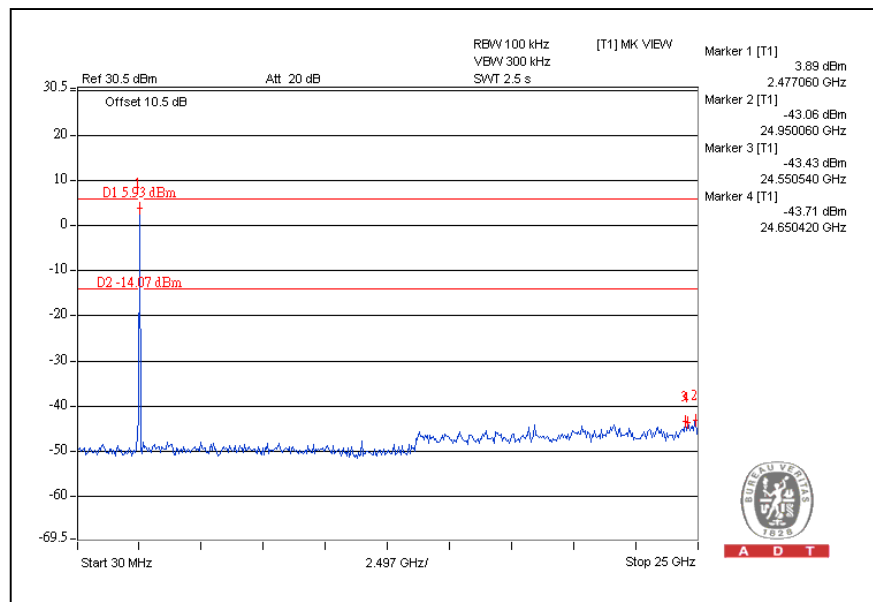
## CH26



## CH11



## CH26



## 5. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:  
[www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml). If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**  
Tel: 886-2-26052180  
Fax: 886-2-26052943

**Hsin Chu EMC/RF Lab:**  
Tel: 886-3-5935343  
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Telecom Lab:**  
Tel: 886-3-3183232  
Fax: 886-3-3185050

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also



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## **6.APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**--- END ---**