



A D T

CO-TRANSMISSION

SUPPLEMENTARY TEST REPORT

REPORT NO.: RF991130E02-2

MODEL NO.: PHS2000W

FCC ID: UXX-PHS2000W

RECEIVED: Nov. 30, 2010

TESTED: Dec. 15 to 26, 2010

ISSUED: Jan. 26, 2011

APPLICANT: Cradlepoint, Inc.

ADDRESS: 805 W. Franklin Street, Boise, ID 83702

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

LAB LOCATION: No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

This test report consists of 32 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.





A D T

Table of Contents

1	CERTIFICATION	3
2	SUMMARY OF TEST RESULTS.....	4
2.1	MEASUREMENT UNCERTAINTY	4
3	GENERAL INFORMATION	5
3.1	GENERAL DESCRIPTION OF EUT	5
3.2	DESCRIPTION OF TEST MODES	9
3.3	TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:	10
3.4	GENERAL DESCRIPTION OF APPLIED STANDARDS	12
3.5	DESCRIPTION OF SUPPORT UNITS.....	13
3.6	CONFIGURATION OF SYSTEM UNDER TEST	14
4	TEST TYPES AND RESULTS.....	16
4.1	CONDUCTED EMISSION MEASUREMENT	16
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT	16
4.1.2	TEST INSTRUMENTS.....	16
4.1.3	TEST PROCEDURES	17
4.1.4	DEVIATION FROM TEST STANDARD	17
4.1.5	TEST SETUP	17
4.1.6	EUT OPERATING CONDITIONS.....	18
4.1.7	TEST RESULTS(MODE 1)	19
4.1.8	TEST RESULTS(MODE 2)	21
4.2	RADIATED EMISSION MEASUREMENT	23
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	23
4.2.2	TEST INSTRUMENTS.....	24
4.2.3	TEST PROCEDURES	25
4.2.4	TEST SETUP	26
4.2.5	EUT OPERATING CONDITIONS.....	26
4.2.6	TEST RESULTS	27
5	INFORMATION ON THE TESTING LABORATORIES	31
6	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	32



A D T

1 CERTIFICATION

PRODUCT : TableRock

BRAND NAME : Cradlepoint

MODEL NO. : PHS2000W

TESTED : Dec. 15 to 26, 2010

APPLICANT : Cradlepoint, Inc.

TEST SAMPLE : ENGINEERING SAMPLE

STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247)

ANSI C63.4-2003

ANSI C63.10-2009

The above equipment (Model: PHS2000W) 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 : , **DATE:** Jan. 26, 2011
(Claire Kuan, Specialist)

APPROVED BY : , **DATE:** Jan. 26, 2011
(May Chen, Deputy Manager)



A D T

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR 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 -0.90 dB at 0.330MHz
15.247(d)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -8.5 dB at 44.6 MHz

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)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB



A D T

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	TableRock
MODEL NO.	PHS2000W
FCC ID	UXX-PHS2000W
POWER SUPPLY	DC 5V from adapter or DC 5V from dock or DC 3.7V from battery
ANTENNA TYPE	Please see note 1
DATA CABLE	Micro USB cable (Shielded, 1.0m)
I/O PORTS	USB port x 1 Micro USB port x 1 10 pin connector port x 1 Antenna port x 2
ASSOCIATED DEVICES	Adapter x 1 Battery x 1 Micro USB cable x 1 Dock x 1
FOR WIMAX INFORMATION:	
MODULATION TECHNOLOGY	OFDMA
MODULATION TYPE	Up-Link: QPSK-1/2, -3/4, 16QAM-1/2, 3/4 Down-Link: QPSK-1/2, -3/4, 16QAM-1/2, 3/4, 64QAM-1/2, -2/3, -3/4, -5/6
OPERATING FREQUENCY	5MHz: 2498.5MHz ~ 2687.5MHz 10MHz: 2501MHz ~ 2685MHz
CHANNEL BANDWIDTH	5MHz & 10MHz
MAX. EIRP POWER	5MHz: 27.1dBm 10MHz: 26.8dBm
MAX. CONDUCTED POWER	5MHz: 23.9dBm 10MHz: 23.5dBm



A D T

FOR WiFi INFORMATION:

MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11 / 5.5 / 2 / 1Mbps 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps 802.11n (20MHz, 800ns GI): 130 / 117 / 104 / 78 / 65 / 58.5 / 52 / 39 / 26 / 19.5 / 13 / 6.5Mbps 802.11n (40MHz, 800ns GI): 270 / 243 / 216 / 162 / 135 / 121.5 / 108 / 81 / 54 / 40.5 / 27 / 13.5Mbps
OPERATING FREQUENCY	2412MHz ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
MAXIMUM OUTPUT POWER	802.11b: 26.3mW 802.11g: 46.8mW 802.11n (20MHz): 44.7mW 802.11n (40MHz): 39.8mW

NOTE:

1. There are two sets of antennas provided to this EUT, please refer to the following table:

Set 1 for WiMAX antenna						
Antenna	Antenna Type	Antenna Connector	Gain (dBi)	Cable Length(mm)	Frequency range (MHz)	Diversity Function
1	PCB	I-PEX	2	30	2500~2700	YES
2	PCB	I-PEX	2	45	2500~2700	YES
Set 2 for WIFI antenna						
Antenna	Antenna Type	Antenna Connector	Gain (dBi)	Cable Length(mm)	Frequency range (MHz)	Diversity Function
1	PIFA	NA	1	NA	2412~2472	YES
2	PIFA	NA	1	NA	2412~2472	YES

2. There is one set of antenna provided to this dock, please refer to the following table:

Antenna	Antenna Type	Antenna Connector	Gain (dBi)	Cable Length(mm)	Frequency range (MHz)	Diversity Function
1	PCB	TS-9	5	140	2500~2700	YES
2	PCB	TS-9	5	140	2500~2700	YES



A D T

3. The EUT could be supplied with 3.7V battery, dock or the following power adapter which will be sold together with the EUT:

Item	Brand	Model No.	Spec.
Adapter	Tenpao	S012UM0500180	AC I/P: 100-240V, 50/60Hz, 400mA DC O/P: 5V, 1800mA
Battery	ETI CA	0340-1371080001 (BP08-000720)	DC 3.7V, 1900mAh
Dock	Cradlepoint	PHS2000WD	

4. The EUT could be applied with one 3G card and following three different models could be chosen: <only for test, not for sale>

No.	Brand	Model No.	FCC ID
1	SIERRA WIRELESS	AirCard 875U	N7N-MC8775U
2	HUAWEI	E169u	QISE169
3	D-Link	DWM-156	KA2WM156A2

The EUT was pre-tested in chamber with above 3G cards, the worst case was found in model no.: **AirCard 875U**. Therefore only the test data of the mode was recorded in this report.

5. The EUT was pre-tested under the following test modes for three different axes placements:

Test Mode	Description
Mode A	X-Y plane
Mode B	Y-Z plane
Mode C	X-Z plane

From the above modes, the radiated emissions Test (Below 1 GHz), worse case was found in **Mode B**. For radiated emissions Test (Above 1 GHz), worse case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.



A D T

For WiMAX:

1. For the EUT Modulation type and coding rate. After pre-testing items of output power and spurious emissions, QPSK-1/2 was found to be 5MHz worst case, and was selected for the final test configuration.

Up Link		Down Link		
Modulation	Coding rate	Modulation	Coding rate	
QPSK	1/2	QPSK	1/2	
	3/4		3/4	
16QAM	1/2	16QAM	1/2	
	3/4		3/4	
		64QAM	1/2	
			2/3	
			3/4	
			5/6	

2. The EUT is 1 * 2 spatial SIMO (1Tx & 2Rx) without beam forming function.
3. The EUT embedded a firmware for testing that needs to control from Notebook computer to let EUT with different DL/UL ration.
4. The device has different DL/UL ration in normal operation. It was tested with (DL:UL= 29:18) duty cycle mode for 5MHz and 10MHz, which is the worse mode, and controlled by software.
5. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

For WiFi:

1. The EUT incorporates a SIMO function with 802.11n.
2. The EUT is 1 * 2 spatial SIMO (1Tx & 2Rx) without beam forming function. The 11b/g legacy mode is limited to single transmitter only.
3. The EUT complies with 802.11n standards and backwards compatible with 802.11b, 802.11g products.
4. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



A D T

3.2 DESCRIPTION OF TEST MODES

For WiMAX:

CHANNEL BANDWIDTH: 5MHz

Low channel (L): 2498.5MHz.

Middle channel (M): 2587MHz.

High channel (H): 2687.5MHz.

CHANNEL BANDWIDTH: 10MHz

Low channel (L): 2501MHz.

Middle channel (M): 2593MHz.

High channel (H): 2685MHz.

For WiFi:

Operated in 2400 ~ 2483.5MHz band:

Eleven channels are provided for 802.11b, 802.11g, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

Seven channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2422MHz	5	2442MHz
2	2427MHz	6	2447MHz
3	2432MHz	7	2452MHz
4	2437MHz		



A D T

3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	
MODE 1	✓	✓	✓	Co-location mode: EUT + Battery + Dock + Adapter
MODE 2	✓	✓	✓	Co-location mode: EUT + Battery + Adapter with 3G card

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz

RE ³ 1G: Radiated Emission above 1GHz

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.

MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
MODE 1	WiMAX:5MHz M / Wi-Fi: 11g CH 6	WiMAX: OFDMA / Wi-Fi: OFDM	WiMAX: QPSK-1/2 / Wi-Fi: BPSK
MODE 2	3G card: CH 810 / Wi-Fi: 11g CH 6	3G card: PCS1900 / Wi-Fi: OFDM	3G card: GSM / Wi-Fi: BPSK

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.

MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
MODE 1	WiMAX:5MHz M / Wi-Fi: 11g CH 6	WiMAX: OFDMA / Wi-Fi: OFDM	WiMAX: QPSK-1/2 / Wi-Fi: BPSK
MODE 2	3G card: CH 810 / Wi-Fi: 11g CH 6	3G card: PCS1900 / Wi-Fi: OFDM	3G card: GSM / Wi-Fi: BPSK



A D T

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.

MODE	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
MODE 1	WiMAX:5MHz M / Wi-Fi: 11g CH 6	WiMAX: OFDMA / Wi-Fi: OFDM	WiMAX: QPSK-1/2 / Wi-Fi: BPSK
MODE 2	3G card: CH 810 / Wi-Fi: 11g CH 6	3G card: PCS1900 / Wi-Fi: OFDM	3G card: GSM / Wi-Fi: BPSK

※ **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE ³ 1G	20deg. C, 72%RH, 1022 hPa	120Vac, 60Hz	Wen Yu
RE<1G	18deg. C, 63%RH, 1022 hPa / 20deg. C, 72%RH, 1022 hPa	120Vac, 60Hz	Wen Yu / Frank Liu
PLC	19deg. C, 47%RH, 1022 hPa	120Vac, 60Hz	Moris Lin



A D T

3.4 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:

47 CFR Part 15, Subpart C. (15.247)

ANSI C63.4 : 2003

ANSI C63.10-2009

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



A D T

3.5 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.

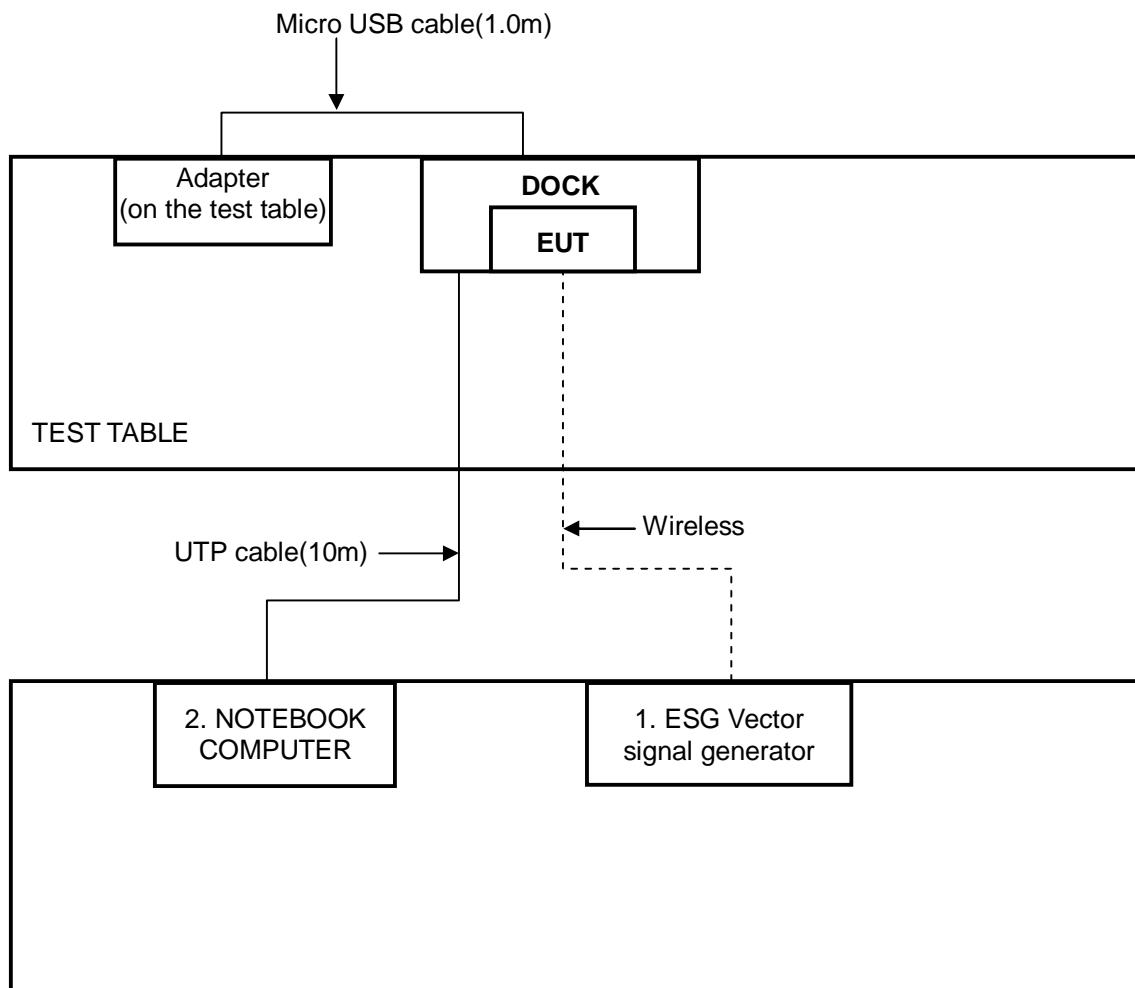
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	ESG Vector signal generator	Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	NA
2	NOTEBOOK COMPUTER	DELL	D531	CN-0XM006-48643 -86L-4472	QDS-BRCM10 19

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	UTP cable(10m)

NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

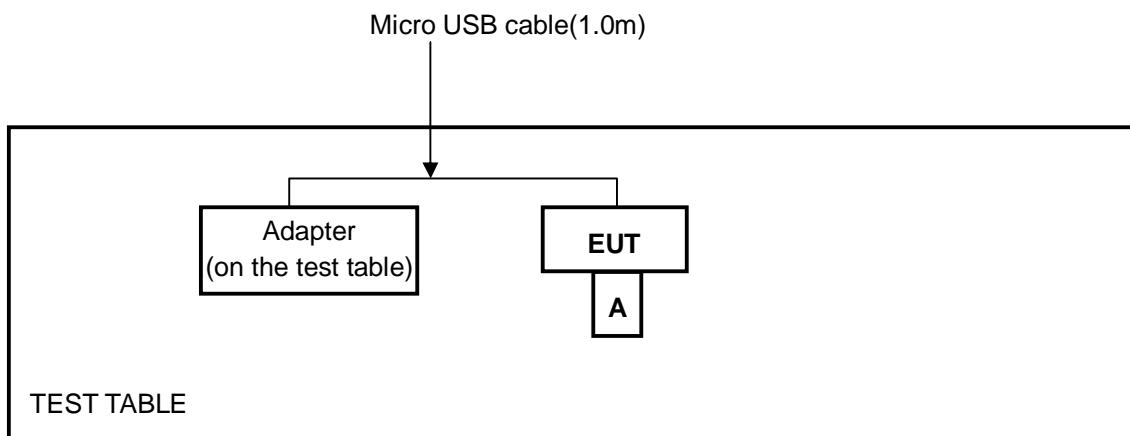
For WiMAX+WiFi





A D T

For WiFi+3G card



NOTE: 1. Item A is the 3G card.



A D T

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 μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	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
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 01, 2010	Feb. 28, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-523	Sep. 17, 2010	Sep. 16, 2011
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 11, 2010	June 10, 2011
RF Cable (JYEBAO)	5DFB	CONCAB-003	Aug. 06, 2010	Aug. 05, 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. A.
3. The VCCI Con A Registration No. is C-817.

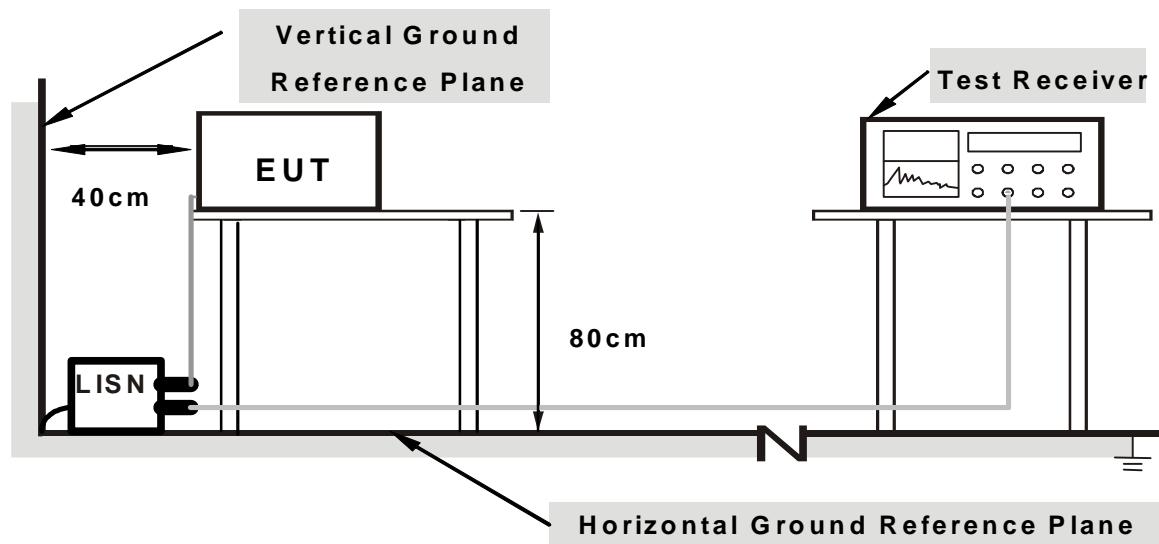
4.1.3 TEST PROCEDURES

- 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 cm from other units and other metal planes

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



A D T

4.1.6 EUT OPERATING CONDITIONS

For WiMAX+WiFi

1. Prepared other computer system support unit 1 (Notebook Computer) to act as communication partners and placed them outside of testing area.
2. The communication partners ran test program “Ping.exe” to enable EUT under transmission/receiving condition continuously via one UTP cable.
3. Support unit 2 (ESG Vector signal generator) ran test program “Beceem Diagnostic Control Panel 3.4.0” to enable EUT under transmission/receiving condition continuously via wireless transmission.

For WiFi+3G card

1. Placed the EUT on testing table.
2. The notebook computer ran test program to enable EUT under transmission/receiving condition continuously at specific channel frequency via wireless.

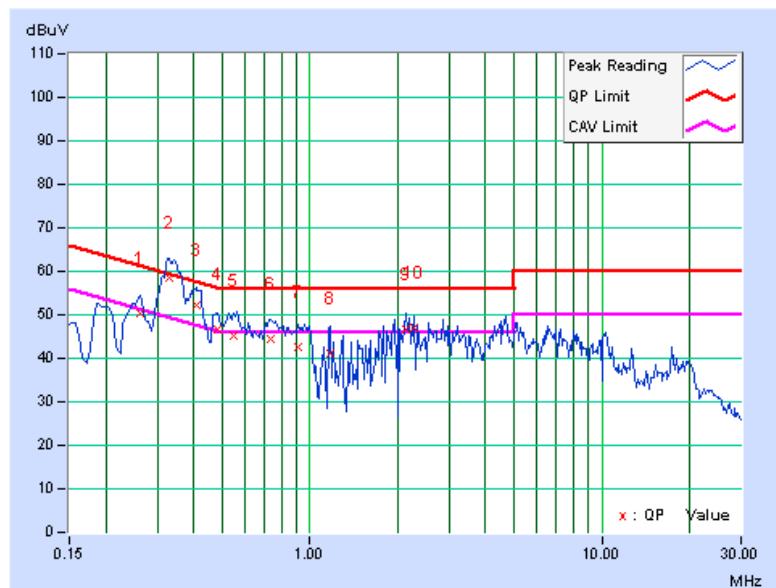
4.1.7 TEST RESULTS(MODE 1)

EUT TEST CONDITION			MEASUREMENT DETAIL		
CHANNEL		WiMAX: 5MHz M Wi-Fi: 11g CH 6			PHASE Line (L)
INPUT POWER		120Vac, 60 Hz			6dB BANDWIDTH 9 kHz
ENVIRONMENTAL CONDITIONS		19deg. C, 47%RH, 1022hPa			TESTED BY Moris Lin

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.263	0.36	50.16	-	50.52	-	61.33	51.33	-10.81	-
2	0.330	0.36	58.20	46.29	58.56	46.65	59.46	49.46	-0.90	-2.81
3	0.408	0.36	51.70	37.57	52.06	37.93	57.69	47.69	-5.63	-9.76
4	0.482	0.37	46.16	30.35	46.53	30.72	56.30	46.30	-9.78	-15.59
5	0.548	0.37	44.98	-	45.35	-	56.00	46.00	-10.65	-
6	0.732	0.39	44.02	-	44.41	-	56.00	46.00	-11.59	-
7	0.912	0.40	42.12	-	42.52	-	56.00	46.00	-13.48	-
8	1.176	0.42	40.73	-	41.15	-	56.00	46.00	-14.85	-
9	2.137	0.46	46.22	31.95	46.68	32.41	56.00	46.00	-9.32	-13.59
10	2.262	0.47	46.63	32.40	47.10	32.87	56.00	46.00	-8.90	-13.13

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.

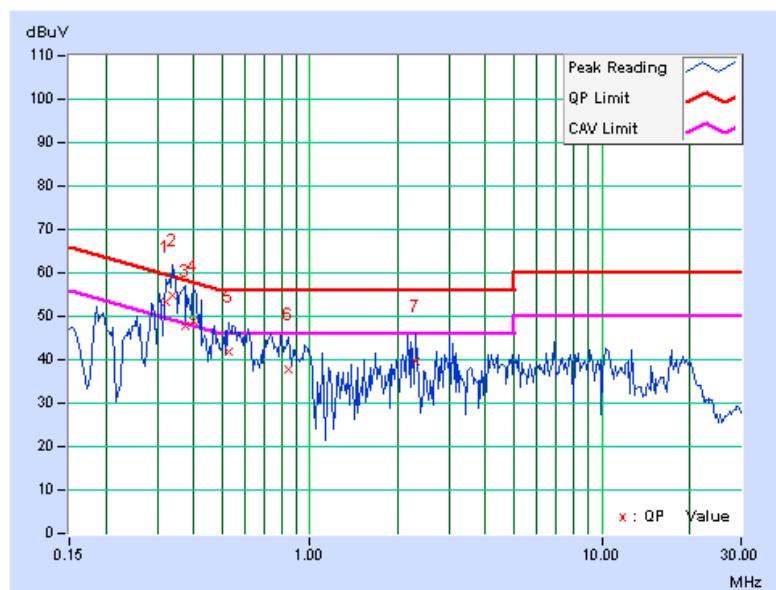


EUT TEST CONDITION			MEASUREMENT DETAIL		
CHANNEL		WiMAX: 5MHz M Wi-Fi: 11g CH 6			PHASE Neutral (N)
INPUT POWER		120Vac, 60 Hz			6dB BANDWIDTH 9 kHz
ENVIRONMENTAL CONDITIONS		19deg. C, 47%RH, 1022hPa			TESTED BY Moris Lin

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.322	0.11	53.39	36.74	53.50	36.85	59.66	49.66	-6.16	-12.81
2	0.338	0.11	54.74	38.62	54.85	38.73	59.26	49.26	-4.42	-10.54
3	0.373	0.11	47.80	-	47.91	-	58.44	48.44	-10.53	-
4	0.400	0.11	48.93	32.63	49.04	32.74	57.85	47.85	-8.81	-15.11
5	0.525	0.12	41.77	-	41.89	-	56.00	46.00	-14.11	-
6	0.845	0.15	37.60	-	37.75	-	56.00	46.00	-18.25	-
7	2.301	0.21	39.39	-	39.60	-	56.00	46.00	-16.40	-

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.



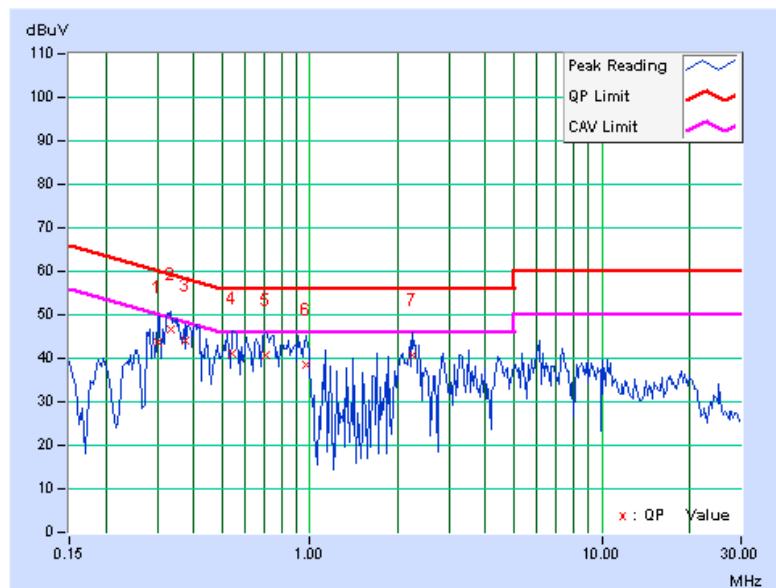
4.1.8 TEST RESULTS(MODE 2)

EUT TEST CONDITION			MEASUREMENT DETAIL		
CHANNEL		3G card: CH 810 Wi-Fi: 11g CH 6	PHASE		Line (L)
INPUT POWER		120Vac, 60 Hz	6dB BANDWIDTH		9 kHz
ENVIRONMENTAL CONDITIONS		19deg. C, 47%RH, 1022hPa	TESTED BY		Moris Lin

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.302	0.36	43.38	-	43.74	-	60.18	50.18	-16.44	-
2	0.334	0.36	46.35	-	46.71	-	59.36	49.36	-12.65	-
3	0.373	0.36	43.78	-	44.14	-	58.44	48.44	-14.30	-
4	0.545	0.37	40.79	-	41.16	-	56.00	46.00	-14.84	-
5	0.709	0.39	40.44	-	40.83	-	56.00	46.00	-15.17	-
6	0.966	0.41	38.13	-	38.54	-	56.00	46.00	-17.46	-
7	2.242	0.47	40.41	-	40.88	-	56.00	46.00	-15.12	-

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.

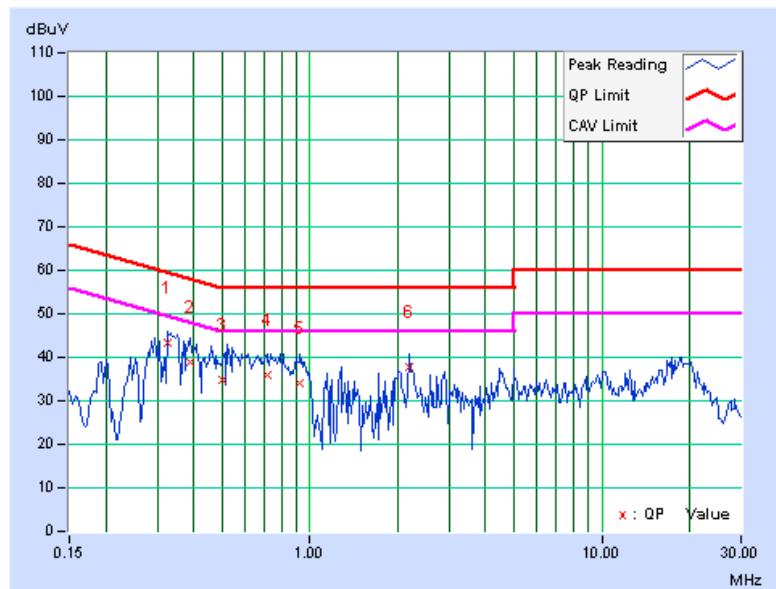


EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	3G card: CH 810 Wi-Fi: 11g CH 6	PHASE	Neutral (N)
INPUT POWER	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	19deg. C, 47%RH, 1022hPa	TESTED BY	Moris Lin

No	Freq. [MHz]	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.
1	0.326	0.11	43.08	-	43.19	-	59.56	49.56	-16.37	-
2	0.388	0.11	38.91	-	39.02	-	58.10	48.10	-19.08	-
3	0.500	0.12	34.82	-	34.94	-	56.00	46.00	-21.06	-
4	0.713	0.14	35.91	-	36.05	-	56.00	46.00	-19.95	-
5	0.923	0.15	33.77	-	33.92	-	56.00	46.00	-22.08	-
6	2.195	0.20	37.58	-	37.78	-	56.00	46.00	-18.22	-

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.





A D T

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 (dB_{uV/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.
5. For WiMAX device the out of band emission shall comply with the FCC 27.53(m). For mobile digital stations, the attenuation factor shall be not less than $43 + 10 \log (P)$ dB at the channel edge and $55 + 10 \log (P)$ dB at 5.5 MHz from the channel edges. The limit of emission equal to -13dBm (82.2dB_{uV/m} at 3m) & -25dBm(70.2dB_{uV/m} at 3m).
6. For 3G device the out of band emission shall comply with the FCC 22.917(a). The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The limit of emission equal to -13dBm (82.2dB_{uV/m} at 3m).



A D T

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 08, 2010	Dec. 07, 2011
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	May 12 , 2010	May 11 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 01, 2010	Oct. 31, 2011
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 03, 2010	Sep. 02, 2011
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 17, 2010	Dec. 16, 2011
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 104+ Sucoflex 106	RF104-101+R F106-101	Aug. 24, 2010	Aug. 23, 2011
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
Software	ADT_Radiated_V7.6.15.9.2	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) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. C.

4. The FCC Site Registration No. is 656396.

5. The VCCI Site Registration No. is R-1626.

6. The CANADA Site Registration No. is IC 7450G-3.



A D T

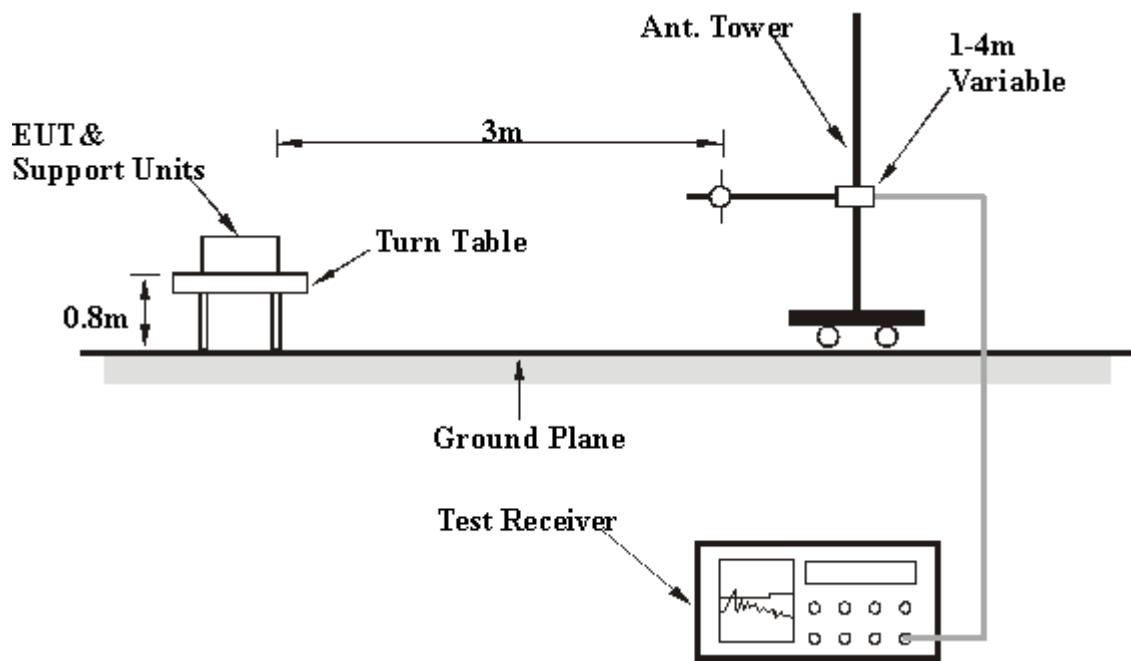
4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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 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 120kHz 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 at 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.

4.2.4 TEST SETUP



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

4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.6



A D T

4.2.6 TEST RESULTS(BELOW 1GHz, MODE 1)

BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	WiMAX: 5MHz M Wi-Fi: 11g CH 6	FREQUENCY RANGE	30-1000 MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH 1022hPa	TESTED BY	Wen Yu

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	122.90	27.6 QP	43.50	-15.9	1.24 H	125	15.02	12.58
2	150.80	31.6 QP	43.50	-11.9	1.55 H	127	17.38	14.18
3	181.40	29.4 QP	43.50	-14.1	1.15 H	142	17.73	11.69
4	267.20	30.3 QP	46.00	-15.8	1.26 H	114	15.95	14.30
5	396.70	30.7 QP	46.00	-15.3	1.54 H	221	12.64	18.10
6	855.60	31.7 QP	46.00	-14.3	1.21 H	210	5.17	26.52
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	44.60	31.6 QP	40.00	-8.5	1.00 V	214	17.86	13.69
2	120.00	30.3 QP	43.50	-13.2	1.00 V	25	18.09	12.20
3	131.30	26.6 QP	43.50	-17.0	1.00 V	54	12.85	13.70
4	160.00	27.7 QP	43.50	-15.8	1.00 V	54	12.19	15.47
5	200.00	26.6 QP	43.50	-16.9	1.00 V	154	15.63	10.95
6	250.00	27.9 QP	46.00	-18.1	1.00 V	166	14.31	13.57
7	375.00	28.7 QP	46.00	-17.3	1.00 V	91	11.14	17.55

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.



A D T

4.2.7 TEST RESULTS(BELOW 1GHz, MODE 2)

BELOW 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	3G card: CH 810 Wi-Fi: 11g CH 6	FREQUENCY RANGE	30-1000 MHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 72%RH 1022hPa	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	122.90	25.0 QP	43.50	-18.5	1.00 H	279	12.14	12.87
2	150.93	29.8 QP	43.50	-13.7	1.00 H	0	15.28	14.50
3	181.27	27.9 QP	43.50	-15.6	1.00 H	0	15.93	12.01
4	267.25	25.7 QP	46.00	-20.3	1.00 H	95	11.08	14.64
5	396.61	29.5 QP	46.00	-16.6	1.00 H	165	10.91	18.54
6	855.50	31.7 QP	46.00	-14.3	1.00 H	20	4.22	27.52
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	44.60	31.3 QP	40.00	-8.7	1.00 V	280	17.49	13.80
2	120.00	30.3 QP	43.50	-13.3	1.00 V	19	17.77	12.48
3	131.27	23.4 QP	43.50	-20.1	1.00 V	214	9.36	14.00
4	160.00	27.3 QP	43.50	-16.2	1.00 V	213	11.56	15.75
5	200.00	19.5 QP	43.50	-24.0	1.00 V	38	8.28	11.20
6	250.00	24.0 QP	46.00	-22.1	1.00 V	76	10.06	13.89
7	375.00	23.6 QP	46.00	-22.4	1.00 V	97	5.59	17.98

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.



A D T

4.2.8 TEST RESULTS(ABOVE 1GHz, MODE 1)

Above 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		FREQUENCY RANGE		1 ~25GHz
INPUT POWER		DETECTOR FUNCTION		Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		TESTED BY		Wen Yu

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	4874.00	44.00 PK	74.00	-30.0	1.25 H	271	6.77	37.23
2	4874.00	36.10 AV	54.00	-17.9	1.25 H	271	-1.13	37.23
3	5174.30	49.90 PK	70.20	-20.3	1.22 H	51	12.00	37.90
4	7311.00	50.50 PK	74.00	-23.5	1.06 H	61	6.14	44.36
5	7311.00	39.50 AV	54.00	-14.5	1.06 H	61	-4.86	44.36
6	7760.40	49.30 PK	70.20	-20.9	1.54 H	110	4.07	45.23
7	10349.00	43.50 PK	70.20	-26.7	1.55 H	123	-5.71	49.21
8	12936.10	44.20 PK	70.20	-26.0	1.05 H	124	-5.92	50.12
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	4874.00	43.70 PK	74.00	-30.3	1.15 V	156	6.47	37.23
2	4874.00	34.80 AV	54.00	-19.2	1.15 V	156	-2.43	37.23
3	5174.30	49.00 PK	70.20	-21.2	1.14 V	106	11.10	37.90
4	7311.00	50.30 PK	74.00	-23.7	1.07 V	36	5.94	44.36
5	7311.00	39.20 AV	54.00	-14.8	1.07 V	36	-5.16	44.36
6	7760.40	48.10 PK	70.20	-22.1	1.26 V	251	2.87	45.23
7	10349.00	45.60 PK	70.20	-24.6	1.10 V	52	-3.61	49.21
8	12936.10	49.20 PK	70.20	-21.0	1.00 V	256	-0.92	50.12

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.



A D T

4.2.9 TEST RESULTS(ABOVE 1GHz, MODE 2)

Above 1GHz WORST-CASE DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL		FREQUENCY RANGE		1 ~25GHz
INPUT POWER		DETECTOR FUNCTION		Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS		TESTED BY		Wen Yu

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	3819.6	53.2 PK	82.20	-29.0	1.06 H	115	18.84	34.36
2	4874.00	44.1 PK	74.00	-29.9	1.26 H	280	6.87	37.23
3	4874.00	35.2 AV	54.00	-18.8	1.26 H	280	-2.03	37.23
4	5729.40	51.4 PK	82.20	-30.8	1.12 H	54	12.20	39.20
5	7311.00	50.4 PK	74.00	-23.6	1.06 H	60	6.04	44.36
6	7311.00	39.3 AV	54.00	-14.7	1.06 H	60	-5.06	44.36
7	7639.20	50.2 PK	82.20	-32.0	1.55 H	120	5.10	45.10
8	9549.00	47.8 PK	82.20	-34.4	1.85 H	152	-0.71	48.51
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	3819.60	52.6 PK	82.20	-29.6	1.13 V	125	18.24	34.36
2	4874.00	43.7 PK	74.00	-30.3	1.15 V	156	6.47	37.23
3	4874.00	34.8 AV	54.00	-19.2	1.15 V	156	-2.43-	37.23
4	5729.40	52.1 PK	82.20	-30.1	1.15 V	120	12.90	39.20
5	7311.00	50.3 PK	74.00	-23.7	1.07 V	36	5.94	44.36
6	7311.00	39.2 AV	54.00	-14.8	1.07 V	36	-5.16	44.36
7	7639.20	49.8 PK	82.20	-32.4	1.02 V	261	4.70	45.10
8	9549.00	48.2 PK	82.20	-34.0	1.11 V	57	-0.31	48.51

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.



A D T

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.

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

Email: service@adt.com.tw

Web Site: www.adt.com.tw

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



A D T

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 ---