



# FCC TEST REPORT (15.407)

**REPORT NO.:** RF981212L01B-1

**MODEL NO.:** SBG6580 Diagnostic  
(refer to item 3.1 for more detail)

**FCC ID:** W5HSBG6580

**RECEIVED:** May 25, 2011

**TESTED:** May 29 ~ Jun. 21, 2011

**ISSUED:** Jun. 29, 2011

**APPLICANT:** GENERAL INSTRUMENT OF TAIWAN, LTD.

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

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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan,  
R.O.C.

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## TABLE OF CONTENTS

RELEASE CONTROL RECORD .....	3
1. CERTIFICATION .....	4
2. SUMMARY OF TEST RESULTS .....	5
2.1 MEASUREMENT UNCERTAINTY .....	5
3. GENERAL INFORMATION .....	6
3.1 GENERAL DESCRIPTION OF EUT .....	6
3.2 DESCRIPTION OF TEST MODES .....	8
3.2.1 CONFIGURATION OF SYSTEM UNDER TEST .....	8
3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL .....	9
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	10
3.4 DESCRIPTION OF SUPPORT UNITS .....	10
4. TEST TYPES AND RESULTS .....	11
4.1 RADIATED EMISSION MEASUREMENT .....	11
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....	11
4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS .....	11
4.1.3 TEST INSTRUMENTS .....	12
4.1.4 TEST PROCEDURES .....	13
4.1.5 DEVIATION FROM TEST STANDARD .....	13
4.1.6 TEST SETUP .....	14
4.1.7 EUT OPERATING CONDITION .....	14
4.1.8 TEST RESULTS .....	15
4.2 CONDUCTED EMISSION MEASUREMENT .....	19
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT .....	19
4.2.2 TEST INSTRUMENTS .....	19
4.2.3 TEST PROCEDURES .....	20
4.2.4 DEVIATION FROM TEST STANDARD .....	20
4.2.5 TEST SETUP .....	21
4.2.6 EUT OPERATING CONDITIONS .....	21
4.2.7 TEST RESULTS .....	22
5. PHOTOGRAPHS OF THE TEST CONFIGURATION .....	28
6. INFORMATION ON THE TESTING LABORATORIES .....	29
7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	30



## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Jun. 29, 2011



## 1. CERTIFICATION

**PRODUCT:** DOCSIS 3.0 Wi-Fi Gateway

**MODEL NO.:** SBG6580 Diagnostic (refer to item 3.1 for more detail)

**BRAND:** MOTOROLA

**APPLICANT:** GENERAL INSTRUMENT OF TAIWAN, LTD.

**TEST SAMPLE:** ENGINEERING SAMPLE

**TESTED:** May 29 ~ Jun. 21, 2011

**STANDARDS: FCC Part 15, Subpart E (Section 15.407)**

ANSI C63.4-2003

ANSI C63.10-2009

This report is issued as a supplementary report of RF981212L01-1. This report shall be used combined together with its original report.

PREPARED BY : Andrea Hsia , DATE: Jun. 29, 2011  
Andrea Hsia / Specialist

APPROVED BY : Gary Chang , DATE: Jun. 29, 2011  
Gary Chang / Assistant Manager

**NOTE:** The conducted emission & radiated emission tests were performed for the addendum.  
Refer to original report for the other test data.

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -5.98dB at 0.455MHz.
15.407(b)(1/2/3) (b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit. Minimum passing margin is -1.4dB at 2500.00MHz.
15.407(a)(1/2/3)	Peak Transmit Power	NA	Refer to Note
15.407(a)(6)	Peak Power Excursion	NA	Refer to Note
15.407(a)(1/2/3)	Peak Power Spectral Density	NA	Refer to Note
15.407(g)	Frequency Stability	NA	Refer to Note
15.203	Antenna Requirement	NA	Refer to Note

**NOTE:** The conducted emission & radiated emission tests were performed for the addendum. Refer to original report for the other test data.

### 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:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB

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

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	DOCSIS 3.0 Wi-Fi Gateway
<b>MODEL NO.</b>	SBG6580 Diagnostic
<b>FCC ID</b>	W5HSBG6580
<b>POWER SUPPLY</b>	12Vdc
<b>MODULATION TYPE</b>	64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	OFDM
<b>TRANSFER RATE</b>	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps
<b>OPERATING FREQUENCY</b>	5180.0 ~ 5240.0MHz
<b>NUMBER OF CHANNEL</b>	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>OUTPUT POWER</b>	42.8mW
<b>ANTENNA TYPE</b>	Printed antenna with 4.0dBi gain (Antenna A) Printed antenna with 5.5dBi gain (Antenna B)
<b>ANTENNA CONNECTOR</b>	UFL
<b>DATA CABLE</b>	1.8m non-shielded RJ45 cable without core 1.5m non-shielded Diag cable without core
<b>I/O PORTS</b>	Refer to User's manual
<b>ASSOCIATED DEVICES</b>	Adapter

**NOTE:**

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of BV ADT report no.: RF981212L01. The differences compared with original report are changing antenna switch (U9 & U10) adding 2 new adapters. Therefore, re-tested radiated emission test and conducted emission test and presented in the test report.
2. All models are list as below:

Brand Name	Model Name	Remark
MOTOROLA	SBG6580	without Diagnostic port
	SBG6580 Diagnostic	with Diagnostic port

\*\*After pre-tested found model: SBG6580 Diagnostic was the worst. Therefore chosen for final test and presented in the test report.

3. The EUT is a DOCSIS 3.0 Wi-Fi Gateway. The test data are separated into following test reports.

	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g, 802.11n	FCC Part 15, Subpart C (Section 15.247)	RF981212L01B
WLAN 802.11a, 802.11n (5745~5825 MHz)		
WLAN 802.11a, 802.11n (5180~ 5240MHz)	FCC Part 15, Subpart E (Section 15.407)	RF981212L01B-1

4. The frequency bands used in this EUT are listed as follows:

Frequency Band (MHz)	2412~2462	5180~5240	5745~5825
802.11b	√		
802.11g	√		
802.11a		√	√
802.11n (20MHz)	√	√	√
802.11n (40MHz)	√	√	√

5. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION	TX ANTENNA
802.11b	1TX	Only Ant A
802.11g	1TX	Ant A or B
802.11a	1TX	Ant A or B
802.11n (20MHz)	2TX	2 TX : Ant A & B
802.11n (40MHz)	2TX	2 TX : Ant A & B

6. The EUT were powered by the following adapters:

ADAPTER 1 (Original)	
<b>BRAND:</b>	DELTA
<b>MODEL:</b>	EADP-24MB A
<b>INPUT:</b>	100-240Vac, 50-60Hz, 0.6A
<b>OUTPUT:</b>	12Vdc, 2A
<b>POWER LINE:</b>	AC 1.8m non-shielded cable without core DC 1.5m non-shielded cable without core

ADAPTER 2 (New)	
<b>BRAND:</b>	DELTA ELECTRONICS, INC.
<b>MODEL:</b>	EADP-24FB A
<b>INPUT:</b>	100-240Vac, 50-60Hz, 1A
<b>OUTPUT:</b>	14Vdc, 1.7A
<b>POWER LINE:</b>	AC 1.8m non-shielded cable without core DC 1.5m non-shielded cable without core

ADAPTER 3(New)	
<b>BRAND:</b>	MOTOROLA
<b>MODEL:</b>	AA26220L
<b>INPUT:</b>	100-240Vac, 50-60Hz, 0.8A
<b>OUTPUT:</b>	12Vdc, 2A
<b>POWER LINE:</b>	AC 1.8m non-shielded cable without core DC 1.5m non-shielded cable without core

7. 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.

### 3.2 DESCRIPTION OF TEST MODES

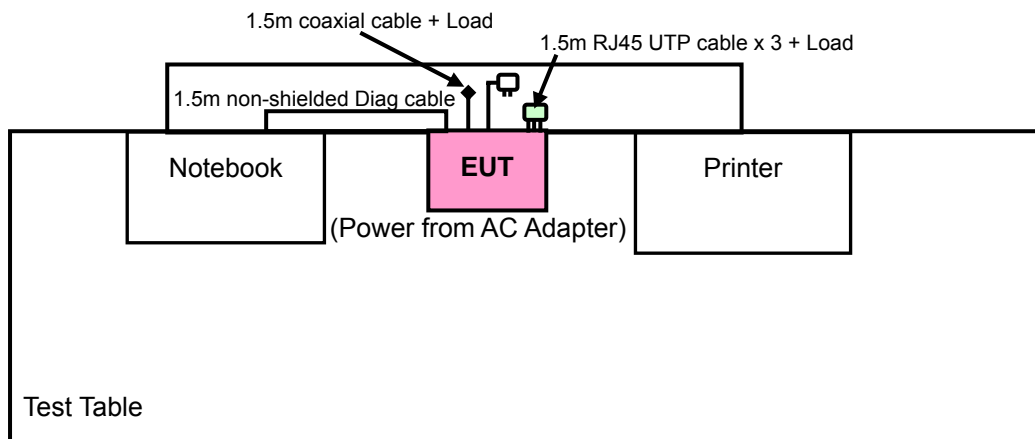
4 channels are provided for 802.11a and 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190MHz	46	5230MHz

#### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE $\geq$ 1G	RE $<$ 1G	PLC	
A	√	√	√	Power from Adapter 1
B	-	√	√	Power from Adapter 2
C	-	√	√	Power from Adapter 3

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz **RE $<$ 1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission **NOTE**: "-" means no effect.

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	AXIS	ANT.
A	802.11a	36 to 48	48	OFDM	BPSK	6.0	Z	A

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	AXIS	ANT.
A, B & C	802.11n (20MHz)	36 to 48	40	OFDM	BPSK	6.0	Z	A+B

#### 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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	ANT.
A, B & C	802.11n (20MHz)	36 to 48	40	OFDM	BPSK	6.0	A+B

#### TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 66%RH, 1010 hPa	120Vac, 60Hz	Brad Wu
RE $<$ 1G	25deg. C, 68%RH, 999 hPa	120Vac, 60Hz	Sun Lin
PLC	23deg. C, 70%RH, 988 hPa	120Vac, 60Hz	Scott Yang



### 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 E (15.407)**

**ANSI C63.4-2003**

**ANSI C63.10-2009**

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

### 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	HP	Nc6000	NA	NA
2	PRINTER	EPSON	LQ-300+	DCGY054011	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.5m non-shielded Diag cable without core
2	1.8m braid shielded wire, DB25 connector, w/o core.

**NOTE:** 1. All power cords of the above support units are non shielded (1.8m).  
2. Item 1 was supplied from client.

## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 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.

#### 4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

FREQUENCIES (MHz)	EIRP LIMIT (dBm)		EQUIVALENT FIELD STRENGTH AT 3m (dBµV/m) *NOTE 3	
	PK	AV	PK	AV
5150 ~ 5250	-7	-27	88.3	68.3

**NOTE:**

1. For frequencies 10MHz or greater above or below the band edge.
2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$



#### 4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Aug. 04, 2010	Aug. 03, 2011
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Jul. 09, 2010	Jul. 08, 2011
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 12, 2011	Apr. 11, 2012
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Aug. 02, 2010	Aug. 01, 2011
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 27, 2010	Dec. 26, 2011
Preamplifier Agilent	8449B	3008A01910	Sep. 09, 2010	Sep. 08, 2011
Preamplifier Agilent	8447D	2944A10638	Nov. 03, 2010	Nov. 02, 2011
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Sep 03, 2010	Sep 03, 2011
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 20, 2010	Aug. 19, 2011
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	07026401	Aug. 25, 2010	Aug. 24, 2011

- 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 HwaYa Chamber 9.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 460141.
  5. The IC Site Registration No. is IC 7450F-4.

#### 4.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 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 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 10dB 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 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

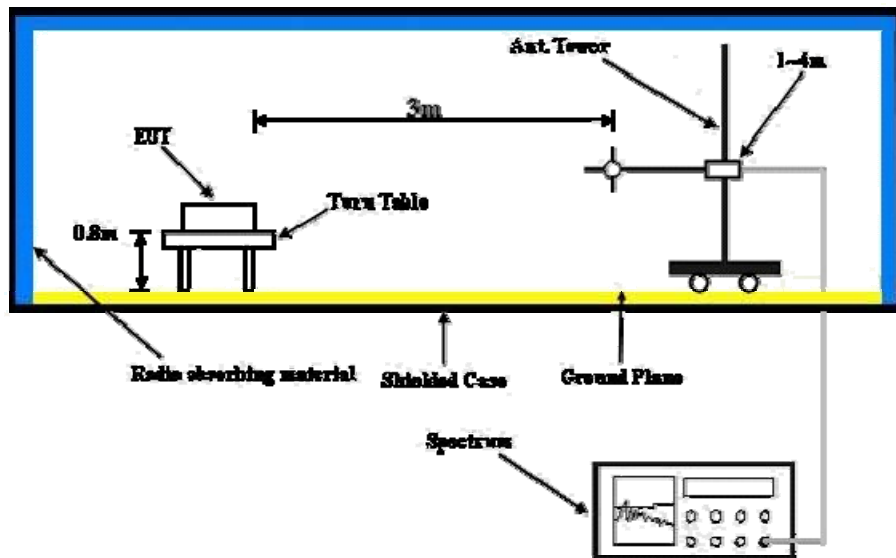
**NOTE:**

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 of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.5 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.6 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.7 EUT OPERATING CONDITION

- a. Connected EUT with notebook system and placed on a testing table.
- b. The communication partners connected with EUT and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- c. The necessary accessories enable the EUT in full functions.



#### 4.1.8 TEST RESULTS

ABOVR 1GHz DATA : 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 66%RH 1010 hPa	TESTED BY	Brad Wu

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	2500.00	59.8 PK	74.0	-14.2	1.05 H	113	27.40	32.40
2	2500.00	48.5 AV	54.0	-5.5	1.05 H	113	16.10	32.40
3	*5240.00	106.5 PK			1.05 H	341	67.10	39.40
4	*5240.00	93.4 AV			1.05 H	341	54.00	39.40
5	5350.00	52.3 PK	74.0	-21.7	1.05 H	341	12.80	39.50
6	5350.00	40.0 AV	54.0	-14.0	1.05 H	341	0.50	39.50
7	#10480.00	58.1 PK	68.3	-10.2	1.01 H	22	8.10	50.00
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	2500.00	59.3 PK	74.0	-14.7	1.04 V	100	26.90	32.40
2	2500.00	52.6 AV	54.0	-1.4	1.04 V	100	20.20	32.40
3	*5240.00	106.0 PK			1.10 V	261	66.60	39.40
4	*5240.00	92.6 AV			1.10 V	261	53.20	39.40
5	5350.00	52.3 PK	74.0	-21.7	1.10 V	261	12.80	39.50
6	5350.00	39.0 AV	54.0	-15.0	1.10 V	261	-0.50	39.50
7	#10480.00	59.1 PK	68.3	-9.2	1.06 V	45	9.10	50.00

- 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 radiated frequency is out the restricted band.



**BELOW 1GHz WORST-CASE DATA : 802.11n (20MHz)**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 999 hPa	TEST MODE	A
TESTED BY	Sun Lin		

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	132.95	38.2 QP	43.5	-5.3	1.50 H	304	25.20	13.00
2	201.00	38.8 QP	43.5	-4.7	1.00 H	247	28.40	10.40
3	267.10	36.6 QP	46.0	-9.4	2.00 H	115	23.30	13.30
4	500.42	38.7 QP	46.0	-7.3	1.50 H	235	19.00	19.70
5	669.57	37.8 QP	46.0	-8.2	1.00 H	220	14.90	22.90
6	753.18	38.1 QP	46.0	-7.9	1.00 H	220	14.30	23.80
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	55.18	36.2 QP	40.0	-3.8	1.50 V	10	23.10	13.10
2	62.95	34.5 QP	40.0	-5.5	1.00 V	4	22.10	12.40
3	132.95	39.7 QP	43.5	-3.8	1.00 V	73	26.70	13.00
4	166.00	37.4 QP	43.5	-6.1	1.50 V	34	23.90	13.50
5	500.42	38.3 QP	46.0	-7.7	1.00 V	94	18.60	19.70
6	751.23	36.9 QP	46.0	-9.1	2.00 V	118	13.10	23.80

- 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.





EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 999 hPa	TEST MODE	B
TESTED BY	Sun Lin		

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	183.50	31.1 QP	43.5	-12.4	1.25 H	295	20.00	11.10
2	300.16	32.6 QP	46.0	-13.4	1.00 H	343	17.90	14.70
3	391.54	31.0 QP	46.0	-15.0	1.25 H	10	14.20	16.80
4	500.42	41.8 QP	46.0	-4.2	1.50 H	94	22.10	19.70
5	669.57	35.9 QP	46.0	-10.1	1.00 H	238	13.00	22.90
6	751.23	38.4 QP	46.0	-7.6	1.00 H	229	14.60	23.80
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	61.01	34.2 QP	40.0	-5.8	1.00 V	10	21.50	12.70
2	183.50	33.7 QP	43.5	-9.8	1.25 V	211	22.60	11.10
3	395.43	38.6 QP	46.0	-7.4	1.00 V	202	21.70	16.90
4	500.42	42.3 QP	46.0	-3.7	1.00 V	229	22.60	19.70
5	669.57	32.1 QP	46.0	-13.9	1.25 V	157	9.20	22.90
6	751.23	36.8 QP	46.0	-9.2	1.00 V	61	13.00	23.80

- 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.



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 999 hPa	TEST MODE	C
TESTED BY	Sun Lin		

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	179.61	32.6 QP	43.5	-10.9	1.25 H	265	21.30	11.30
2	300.16	34.8 QP	46.0	-11.2	1.25 H	352	20.10	14.70
3	391.54	33.7 QP	46.0	-12.3	2.00 H	268	16.90	16.80
4	500.42	32.5 QP	46.0	-13.5	2.00 H	61	12.80	19.70
5	669.57	35.1 QP	46.0	-10.9	1.00 H	163	12.20	22.90
6	751.23	33.5 QP	46.0	-12.5	1.25 H	304	9.70	23.80
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	59.06	34.3 QP	40.0	-5.7	1.00 V	10	21.30	13.00
2	101.84	35.2 QP	43.5	-8.3	1.25 V	181	26.50	8.70
3	183.50	34.9 QP	43.5	-8.6	1.00 V	190	23.80	11.10
4	391.54	36.7 QP	46.0	-9.3	1.00 V	184	19.90	16.80
5	667.63	35.1 QP	46.0	-10.9	1.50 V	205	12.20	22.90
6	751.23	34.7 QP	46.0	-11.3	1.00 V	70	10.90	23.80

- 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.

## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- 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 0.50MHz.
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.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 30, 2010	Nov. 29, 2011
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 30, 2010	Dec. 29, 2011
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Jun. 28, 2010	Jun. 27, 2011
LISN ROHDE & SCHWARZ	ESH3-Z5	835239/001	Feb. 22, 2011	Feb. 21, 2012
V-LISN SCHWARZBECK	NNBL 8226-2	8226-142	Jul. 12, 2010	Jul. 11, 2011
Software ADT	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 HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

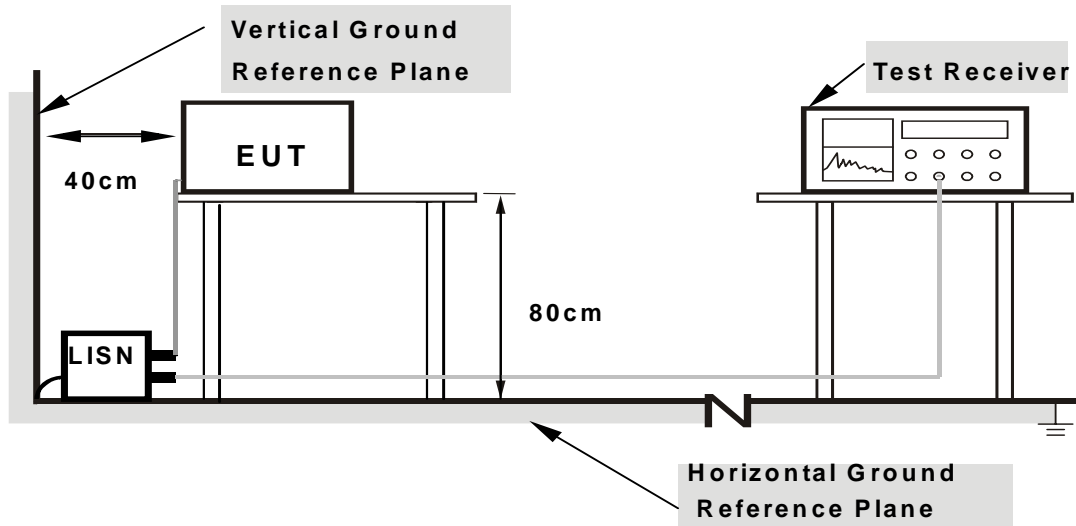
#### 4.2.3 TEST PROCEDURES

- 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) was not recorded.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.2.5 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 attached file (Test Setup Photo).

#### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

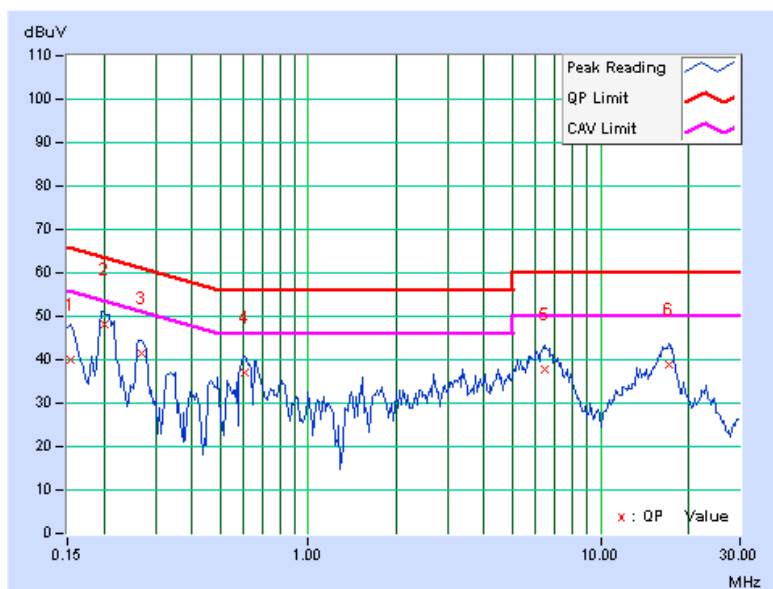
### 4.2.7 TEST RESULTS

#### CONDUCTED WORST-CASE DATA : 802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.12	39.81	-	39.93	-	65.79	55.79	-25.86	-
2	0.202	0.12	48.20	-	48.32	-	63.53	53.53	-15.21	-
3	0.268	0.12	41.46	-	41.58	-	61.17	51.17	-19.59	-
4	0.607	0.13	36.97	-	37.10	-	56.00	46.00	-18.90	-
5	6.434	0.45	37.42	-	37.87	-	60.00	50.00	-22.13	-
6	17.164	0.98	37.97	-	38.95	-	60.00	50.00	-21.05	-

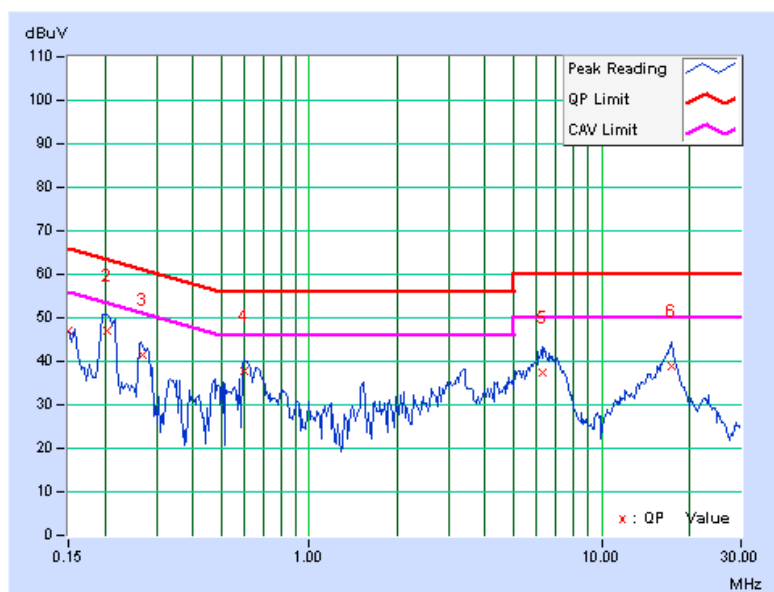
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



<b>PHASE</b>	Line 2	<b>6dB BANDWIDTH</b>	9kHz
<b>TEST MODE</b>	A		

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	0.150	0.12	46.89	-	47.01	-	66.00	56.00	-18.99	-
2	0.205	0.13	47.06	-	47.19	-	63.42	53.42	-16.23	-
3	0.268	0.13	41.34	-	41.47	-	61.17	51.17	-19.69	-
4	0.602	0.15	37.56	-	37.71	-	56.00	46.00	-18.29	-
5	6.277	0.43	36.94	-	37.37	-	60.00	50.00	-22.63	-
6	17.434	0.83	38.16	-	38.99	-	60.00	50.00	-21.01	-

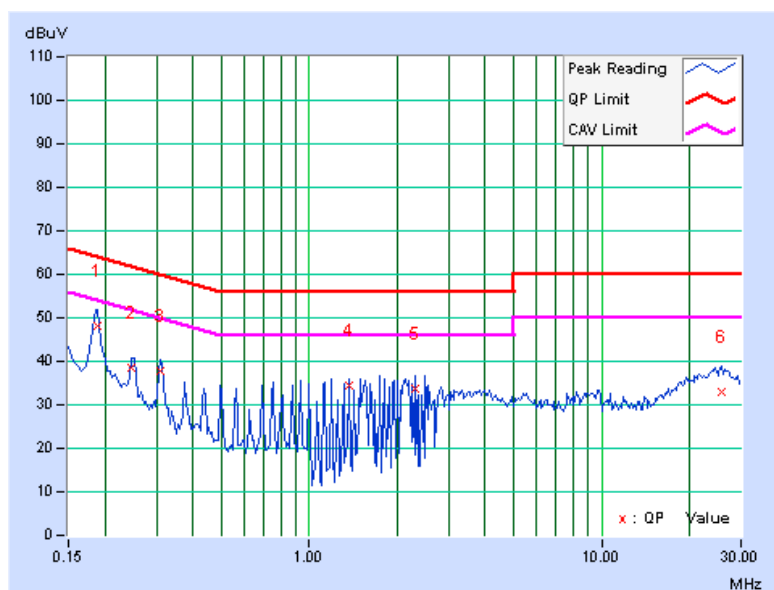
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value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



PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.189	0.12	48.03	-	48.15	-	64.08	54.08	-15.93	-
2	0.248	0.12	38.28	-	38.40	-	61.84	51.84	-23.44	-
3	0.310	0.12	37.71	-	37.83	-	59.97	49.97	-22.14	-
4	1.371	0.17	34.15	-	34.32	-	56.00	46.00	-21.68	-
5	2.313	0.21	33.38	-	33.59	-	56.00	46.00	-22.41	-
6	25.598	1.39	31.46	-	32.85	-	60.00	50.00	-27.15	-

- 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.





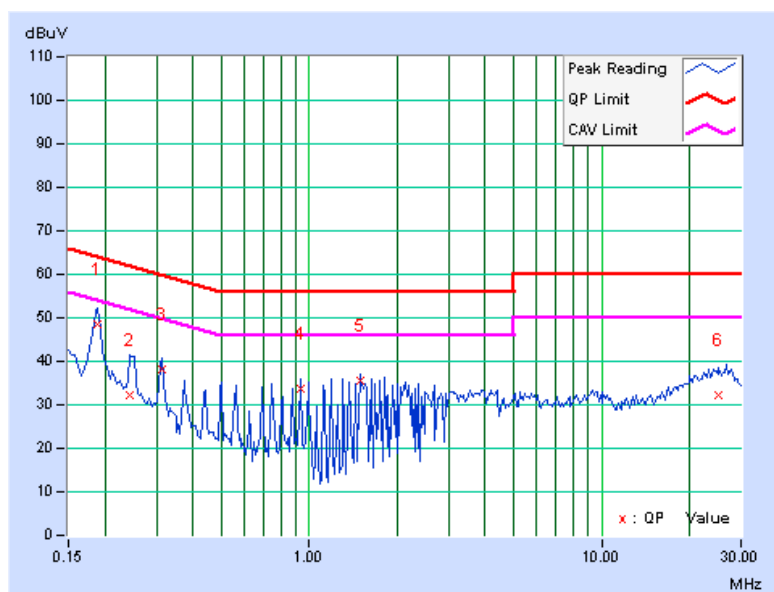


A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.189	0.13	48.37	-	48.50	-	64.08	54.08	-15.58	-
2	0.244	0.13	32.20	-	32.33	-	61.97	51.97	-29.64	-
3	0.314	0.14	37.83	-	37.97	-	59.86	49.86	-21.90	-
4	0.935	0.18	33.51	-	33.69	-	56.00	46.00	-22.31	-
5	1.500	0.19	35.39	-	35.58	-	56.00	46.00	-20.42	-
6	25.109	1.12	31.28	-	32.40	-	60.00	50.00	-27.60	-

- 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.



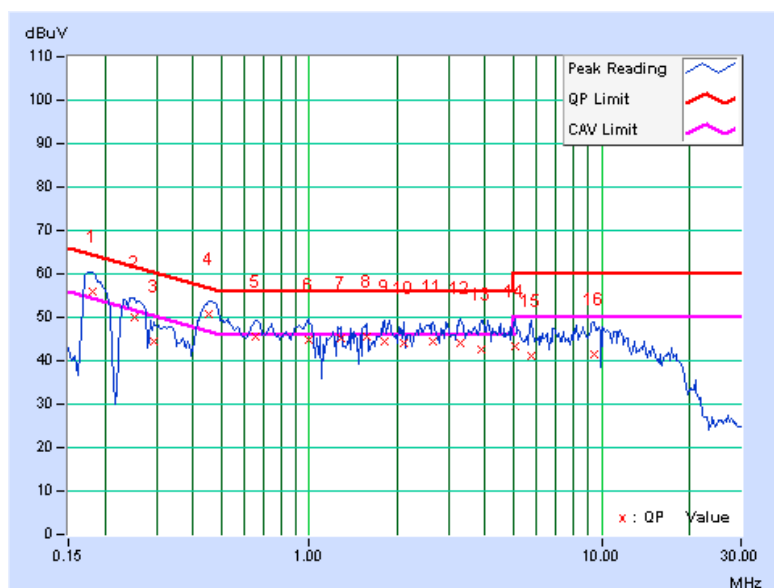


A D T

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	C		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.12	55.72	39.25	55.84	39.37	64.43	54.43	-8.59	-15.06
2	0.252	0.12	49.82	-	49.94	-	61.71	51.71	-11.77	-
3	0.295	0.12	44.22	-	44.34	-	60.40	50.40	-16.06	-
<b>4</b>	<b>0.455</b>	<b>0.12</b>	<b>50.69</b>	<b>37.14</b>	<b>50.81</b>	<b>37.26</b>	<b>56.79</b>	<b>46.79</b>	<b>-5.98</b>	<b>-9.53</b>
5	0.654	0.14	45.32	-	45.46	-	56.00	46.00	-10.54	-
6	0.994	0.16	44.50	-	44.66	-	56.00	46.00	-11.34	-
7	1.285	0.17	45.17	-	45.34	-	56.00	46.00	-10.66	-
8	1.574	0.18	45.42	-	45.60	-	56.00	46.00	-10.40	-
9	1.820	0.18	44.17	-	44.35	-	56.00	46.00	-11.65	-
10	2.098	0.20	44.05	-	44.25	-	56.00	46.00	-11.75	-
11	2.664	0.23	44.07	-	44.30	-	56.00	46.00	-11.70	-
12	3.285	0.27	43.71	-	43.98	-	56.00	46.00	-12.02	-
13	3.859	0.30	42.44	-	42.74	-	56.00	46.00	-13.26	-
14	5.070	0.37	42.85	-	43.22	-	60.00	50.00	-16.78	-
15	5.746	0.41	40.87	-	41.28	-	60.00	50.00	-18.72	-
16	9.441	0.63	40.89	-	41.52	-	60.00	50.00	-18.48	-

- 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.



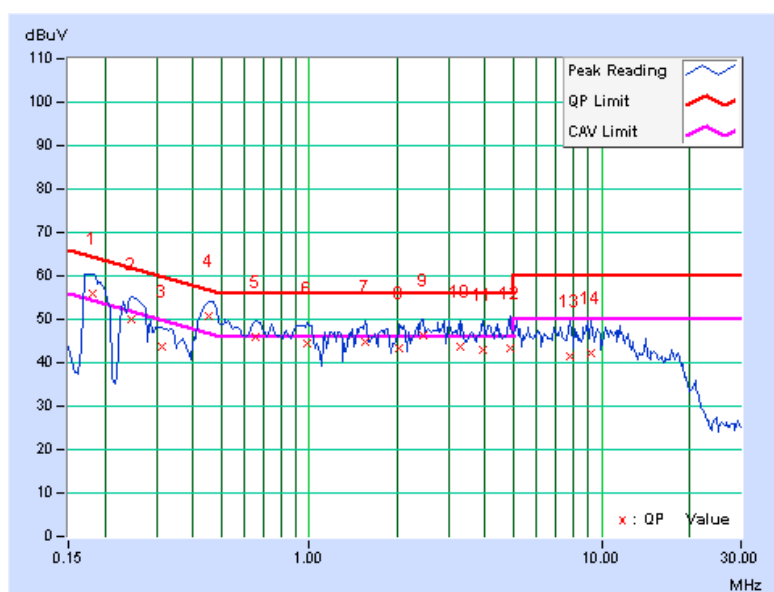


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PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	C		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.181	0.13	55.74	39.72	55.87	39.85	64.43	54.43	-8.56	-14.58
2	0.248	0.13	50.03	-	50.16	-	61.84	51.84	-11.67	-
3	0.314	0.14	43.68	-	43.82	-	59.86	49.86	-16.05	-
4	0.451	0.14	50.69	36.02	50.83	36.16	56.86	46.86	-6.03	-10.70
5	0.658	0.16	45.78	-	45.94	-	56.00	46.00	-10.06	-
6	0.982	0.18	44.28	-	44.46	-	56.00	46.00	-11.54	-
7	1.555	0.19	44.77	-	44.96	-	56.00	46.00	-11.04	-
8	2.039	0.20	43.20	-	43.40	-	56.00	46.00	-12.60	-
9	2.465	0.23	45.93	33.12	46.16	33.35	56.00	46.00	-9.84	-12.65
10	3.270	0.28	43.58	-	43.86	-	56.00	46.00	-12.14	-
11	3.953	0.32	42.77	-	43.09	-	56.00	46.00	-12.91	-
12	4.867	0.36	42.94	-	43.30	-	56.00	46.00	-12.70	-
13	7.816	0.50	41.14	-	41.64	-	60.00	50.00	-18.36	-
14	9.246	0.57	41.73	-	42.30	-	60.00	50.00	-17.70	-

- 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.





## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



## 6. 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:

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**Hsin Chu EMC/RF Lab:**

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**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.

## **7. 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---**