

FCC TEST REPORT (15.407)

REPORT NO.: RF121019C06-1
MODEL NO.: MBR1400v2
FCC ID: UXX-MBR1400V2
RECEIVED: Oct. 19, 2012
TESTED: Oct. 23 ~ Nov. 16, 2012
ISSUED: Nov. 21, 2012

APPLICANT: CradlePoint, Inc.

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

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

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,
New Taipei City, Taiwan, R.O.C.

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

This report should not be used by the client to claim
product certification, approval, or endorsement by
TAF or any government agencies.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.



TABLE OF CONTENTS

RELEASE CONTROL RECORD	4
1. CERTIFICATION.....	5
2. SUMMARY OF TEST RESULTS	6
2.1 MEASUREMENT UNCERTAINTY	6
3. GENERAL INFORMATION.....	7
3.1 GENERAL DESCRIPTION OF EUT.....	7
3.2 DESCRIPTION OF TEST MODES.....	8
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	9
3.3 DUTY CYCLE OF TEST SIGNAL.....	11
3.4 DESCRIPTION OF SUPPORT UNITS.....	12
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST.....	13
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	14
4. TEST TYPES AND RESULTS	15
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT	15
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT	15
4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS	15
4.1.3 TEST INSTRUMENTS.....	16
4.1.4 TEST PROCEDURES	17
4.1.5 DEVIATION FROM TEST STANDARD	17
4.1.6 TEST SETUP.....	18
4.1.7 EUT OPERATING CONDITION	18
4.1.8 TEST RESULTS	19
4.2 CONDUCTED EMISSION MEASUREMENT	29
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	29
4.2.2 TEST INSTRUMENTS.....	29
4.2.3 TEST PROCEDURES	30
4.2.4 DEVIATION FROM TEST STANDARD	30
4.2.5 TEST SETUP.....	30
4.2.6 EUT OPERATING CONDITIONS.....	30
4.2.7 TEST RESULTS	31
4.3 PEAK TRANSMIT POWER MEASUREMENT	33
4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT	33
4.3.2 TEST SETUP.....	33
4.3.3 TEST INSTRUMENTS.....	33
4.3.4 TEST PROCEDURE.....	34
4.3.5 DEVIATION FROM TEST STANDARD	34
4.3.6 EUT OPERATING CONDITIONS.....	34
4.3.7 TEST RESULTS	35
4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT	37
4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT	37
4.4.2 TEST SETUP.....	37
4.4.3 TEST INSTRUMENTS.....	37
4.4.4 TEST PROCEDURES	38
4.4.5 DEVIATION FROM TEST STANDARD	38
4.4.6 EUT OPERATING CONDITIONS.....	38
4.4.7 TEST RESULTS	39
4.5 PEAK POWER EXCURSION MEASUREMENT	40
4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT	40
4.5.2 TEST SETUP.....	40
4.5.3 TEST INSTRUMENTS.....	40
4.5.4 TEST PROCEDURE.....	40
4.5.5 DEVIATION FROM TEST STANDARD	40
4.5.6 EUT OPERATING CONDITIONS.....	40
4.5.7 TEST RESULTS	41



A D T

4.6	FREQUENCY STABILITY	44
4.6.1	LIMITS OF FREQUENCY STABILITY MEASUREMENT.....	44
4.6.2	TEST SETUP.....	44
4.6.3	TEST INSTRUMENTS.....	44
4.6.4	TEST PROCEDURE.....	45
4.6.5	DEVIATION FROM TEST STANDARD	45
4.6.6	EUT OPERATING CONDITION	45
4.6.7	TEST RESULTS	46
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION	47
6.	INFORMATION ON THE TESTING LABORATORIES.....	48
7.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	49



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121019C06-1	Original release	Nov. 21, 2012

1. CERTIFICATION

PRODUCT: Dual band Router

MODEL: MBR1400v2

BRAND: CradlePoint, Inc.

APPLICANT: CradlePoint, Inc.

TESTED: Oct. 23 ~ Nov. 16, 2012


TEST SAMPLE: ENGINEERING SAMPLE

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

ANSI C63.10-2009

The above equipment (model: MBR1400v2) 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 :


Pettie Chen / Senior Specialist

, DATE : Nov. 21, 2012

APPROVED BY :


Ken Liu / Manager

, DATE : Nov. 21, 2012

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	RESULT	REMARK
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.68dB at 0.19613MHz.
15.407(b/1/2/3)(b)(6)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.0dB at 86.28MHz.
15.407(a/1/2)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is RSMA not a standard connector.

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	3.34 dB
	200MHz ~1000MHz	3.35 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 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

EUT	Dual band Router
MODEL NO.	MBR1400v2
POWER SUPPLY	12Vdc (Adapter)
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
OPERATING FREQUENCY	5180.0 ~ 5240.0MHz
NUMBER OF CHANNEL	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	40.195mW
ANTENNA TYPE	Refer to NOTE
ANTENNA CONNECTOR	Refer to NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

- The EUT provides three completed transmitters and three receivers.

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11a	1TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX

- The following antennas were provided to the EUT.

Antenna item	Type	Connector	Brand	Model	Gain
1	Dipole	R-SMA	Joymax	IWX-1511RSXX-711	5dBi
2	Dipole		Joymax	KWX-3621RSXX-711	5dBi

3. The EUT consumes power from the following adapter.

ADAPTER 1	
BRAND:	Leader
MODEL:	MU18-D120150-A1
INPUT:	100-240Vac, 50/60Hz, 0.6A
OUTPUT:	12Vdc, 1.5A
POWER LINE:	1.5m non-shielded cable without core

ADAPTER 2	
BRAND:	TENPAO
MODEL:	S018EM1200150
INPUT:	100-240Vac, 50/60Hz, 500mA
OUTPUT:	12Vdc, 1500mA
POWER LINE:	1.8m non-shielded cable without core

4. The above EUT information is 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, 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 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Power from adapter 1
B	-	√	-	-	Power from adapter 2

Where **RE \geq 1G**: Radiated Emission above 1GHz
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

NOTE:
The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
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, 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)
A	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	7.2
A	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	15.0

RADIATED EMISSION TEST (BELOW 1GHz):

- ☒ 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)
A, B	802.11n (20MHz)	36 to 48	40	OFDM	BPSK	7.2

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)
A	802.11n (20MHz)	36 to 48	40	OFDM	BPSK	7.2

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.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	7.2
A	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	24deg. C, 67%RH	120Vac, 60Hz	Chris Lin
RE<1G	24deg. C, 67%RH	120Vac, 60Hz	Martin Lee
PLC	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

3.3 DUTY CYCLE OF TEST SIGNAL

For 802.11a, 802.11n (20MHz)

Duty cycle of test signal is > 98 %, duty factor is not required.

802.11a: Duty cycle = $1.439/1.463 = 0.984 \times 100\% = 98.4\%$

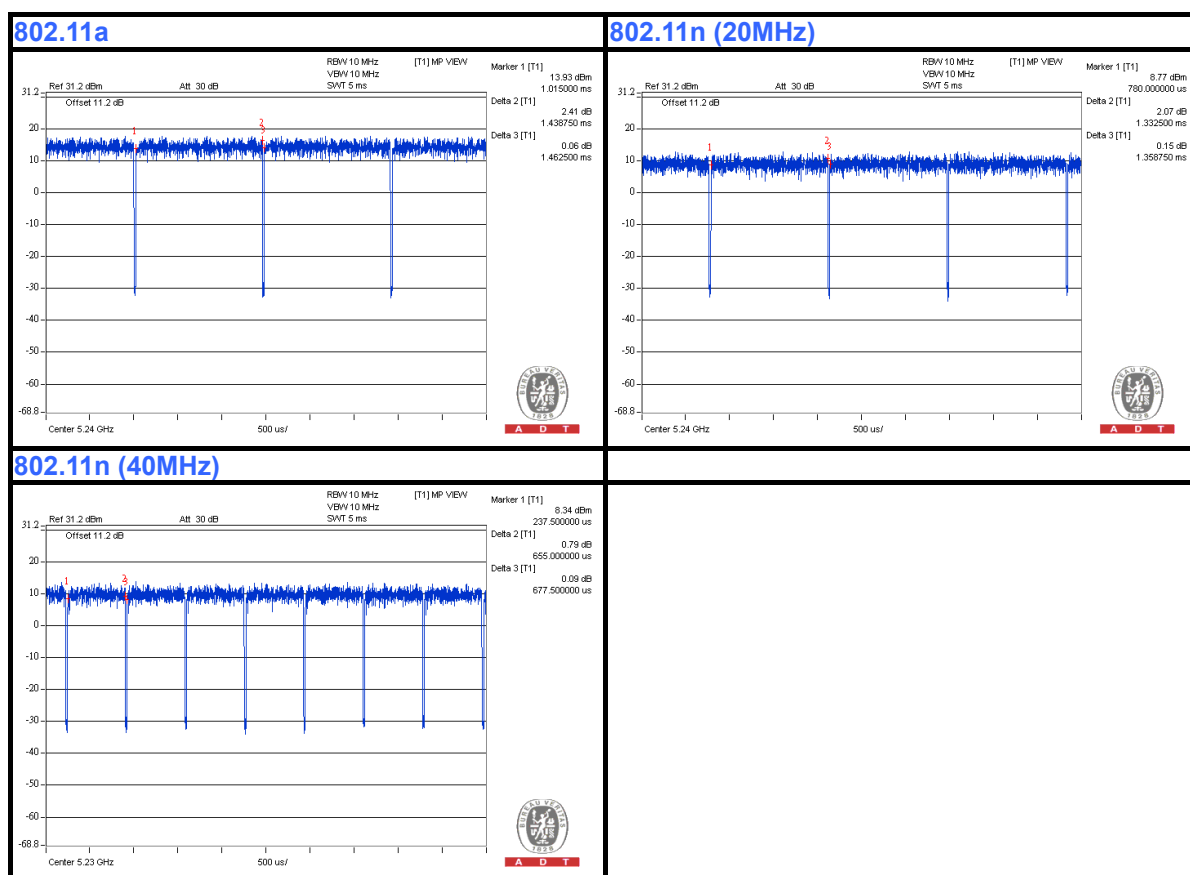
802.11n (20MHz): Duty cycle = $1.333/1.359 = 0.981 \times 100\% = 98.1\%$

For 802.11n (40MHz)

If duty cycle is < 98%, duty factor shall be considered.

802.11n (40MHz): Duty cycle = $655.0/677.5 = 0.967 \times 100\% = 96.7\%$,

Duty factor = $10 * \log(1/0.967) = 0.15$



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.

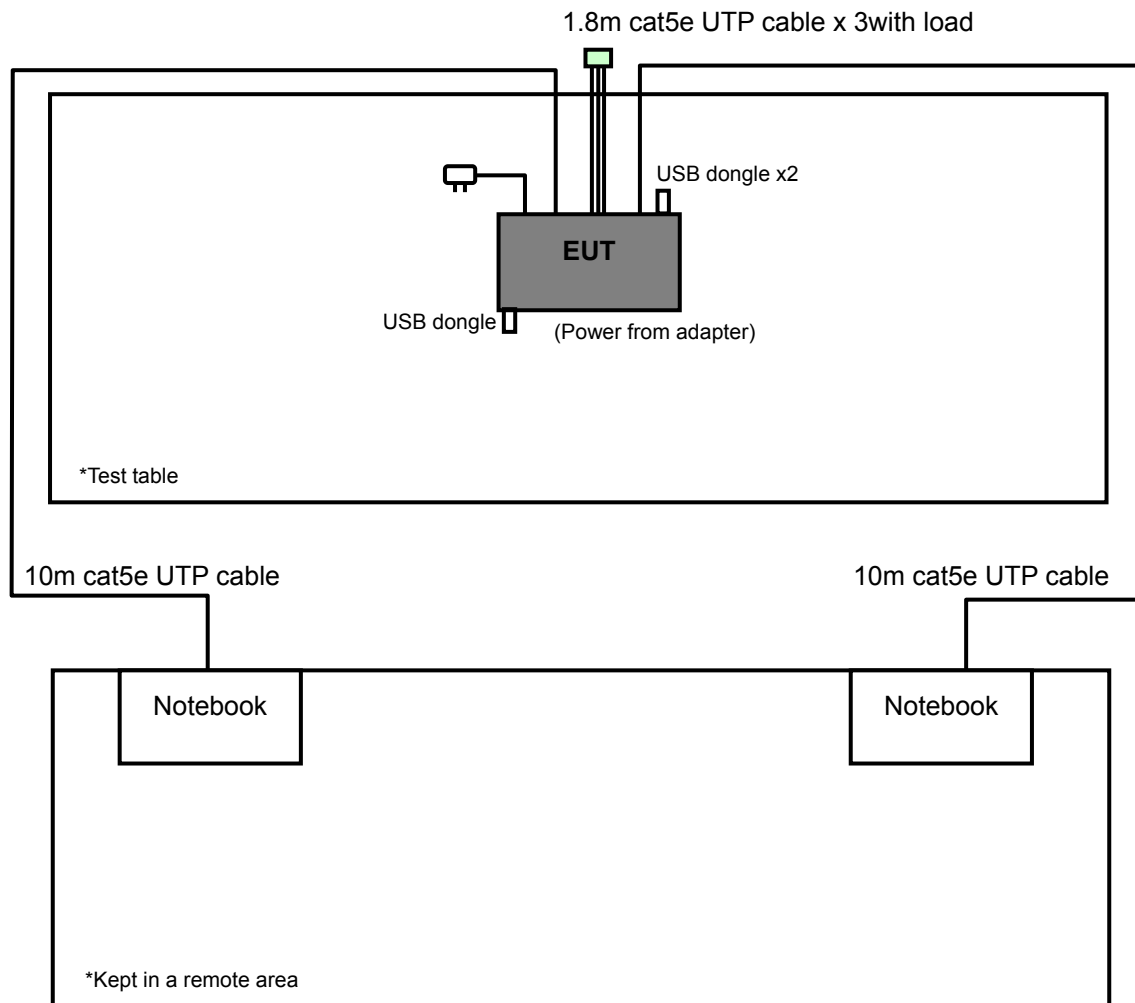
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	USB Dongle	Transcend	V85	538455 4481	NA
2	USB Dongle	Transcend	V85	569992-8271	NA
3	USB Dongle	Transcend	V85	569992-8208	NA
4	Load	NA	NA	NA	NA
5	Notebook	DELL	D531	CN-0XM006-48643-8 1U-2610	QDS-BRCM1020
6	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	NA
4	1.8m Cat5e UTP cable x 3 with load connected to EUT
5	10m Cat5e UTP cable
6	10m Cat5e UTP cable

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 5, 6 acted as communication partner to transfer data.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



3.5 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)

789033 D01 General UNII Test Procedures v01 r02

662911 D01 Multiple Transmitter Output v01 r02

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.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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. 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

APPLICABLE TO	LIMIT	
√	FIELD STRENGTH AT 3m (dBμV/m)	
	PK	AV
	74	54
	EIRP LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBμV/m)
	PK	PK
	-27	68.3

NOTE: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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



A D T

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	Aug. 06, 2012	Aug. 05, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 03, 2012	Feb. 02, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 06, 2012	Apr. 05, 2013
HORN Antenna SCHWARZBECK	9120D	209	Sep. 03, 2012	Sep. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10639	Oct. 23, 2012	Oct. 22, 2013
Preamplifier Agilent	8449B	3008A01976	Jun. 27, 2012	Jun. 26, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/ 4	Aug. 28, 2012	Aug. 27, 2013
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table ADT.	TT100	TT93021703	NA	NA
Turn Table Controller ADT.	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 2013
High Speed Peak Power Meter	ML2495A	0842014	Apr. 28, 2012	Apr. 27, 2013
Power Sensor	MA2411B	0738404	Apr. 28, 2012	Apr. 27, 2013

- 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 3.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
5. The FCC Site Registration No. is 988962.
6. The IC Site Registration No. is IC 7450F-3.

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.

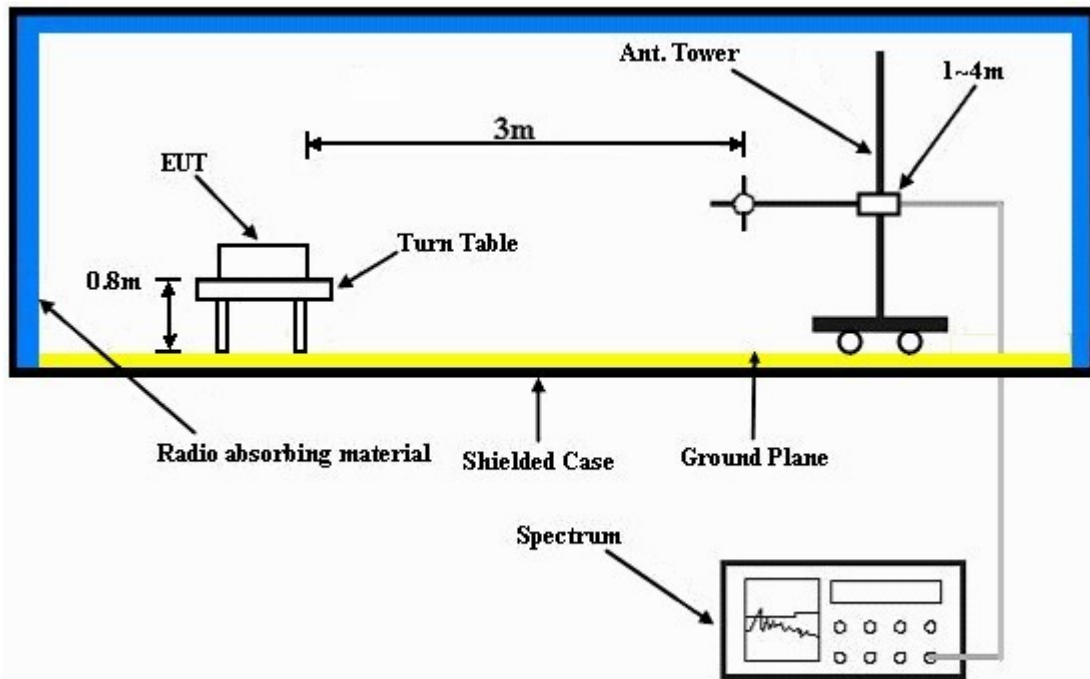
NOTE:

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 1kHz 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

- Placed the EUT on the testing table.
- Prepared two notebooks to act as communication partner and placed them outside of testing area.
- The communication partners connected with EUT via a RJ45 cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partners sent data to EUT by command "PING".
- The necessary accessories enable the system in full functions.



A D T

4.1.8 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA :

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Chris 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	5150.00	46.5 PK	74.0	-27.5	1.32 H	44	8.80	37.70
2	5150.00	34.8 AV	54.0	-19.2	1.32 H	44	-2.90	37.70
3	*5180.00	95.9 PK			1.27 H	125	58.20	37.70
4	*5180.00	85.6 AV			1.27 H	125	47.90	37.70
5	#10360.00	59.6 PK	74.0	-14.4	1.14 H	214	10.80	48.80
6	#10360.00	46.4 AV	54.0	-7.6	1.14 H	214	-2.40	48.80
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	5150.00	52.2 PK	74.0	-21.8	1.05 V	14	14.50	37.70
2	5150.00	40.3 AV	54.0	-13.7	1.05 V	14	2.60	37.70
3	*5180.00	105.7 PK			1.02 V	163	68.00	37.70
4	*5180.00	95.6 AV			1.02 V	163	57.90	37.70
5	#10360.00	60.8 PK	74.0	-13.2	1.22 V	35	12.00	48.80
6	#10360.00	46.5 AV	54.0	-7.5	1.22 V	35	-2.30	48.80

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.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Chris 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	*5200.00	93.8 PK			1.26 H	303	56.00	37.80
2	*5200.00	83.8 AV			1.26 H	303	46.00	37.80
3	#10400.00	58.0 PK	74.0	-16.0	1.00 H	24	9.10	48.90
4	#10400.00	44.6 AV	54.0	-9.4	1.00 H	24	-4.30	48.90
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	*5200.00	104.3 PK			1.13 V	36	66.50	37.80
2	*5200.00	94.0 AV			1.13 V	36	56.20	37.80
3	#10400.00	59.9 PK	74.0	-14.1	1.47 V	25	11.00	48.90
4	#10400.00	45.2 AV	54.0	-8.8	1.47 V	25	-3.70	48.90

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.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



A D T

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	24deg. C, 67%RH	TESTED BY	Chris 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	*5240.00	95.7 PK			1.00 H	123	57.90	37.80
2	*5240.00	86.2 AV			1.00 H	123	48.40	37.80
3	5350.00	47.3 PK	74.0	-26.7	1.32 H	6	9.30	38.00
4	5350.00	37.1 AV	54.0	-16.9	1.32 H	6	-0.90	38.00
5	#10480.00	60.4 PK	74.0	-13.6	1.35 H	55	11.20	49.20
6	#10480.00	46.9 AV	54.0	-7.1	1.35 H	55	-2.30	49.20
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	*5240.00	104.3 PK			1.13 V	299	66.50	37.80
2	*5240.00	95.0 AV			1.13 V	299	57.20	37.80
3	5350.00	49.7 PK	74.0	-24.3	1.05 V	55	11.70	38.00
4	5350.00	38.3 AV	54.0	-15.7	1.05 V	55	0.30	38.00
5	#10480.00	59.9 PK	74.0	-14.1	1.32 V	52	10.70	49.20
6	#10480.00	47.1 AV	54.0	-6.9	1.32 V	52	-2.10	49.20

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 of the restricted band.

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Chris 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	5150.00	55.2 PK	74.0	-18.8	1.11 H	129	17.50	37.70
2	5150.00	41.5 AV	54.0	-12.5	1.11 H	129	3.80	37.70
3	*5180.00	99.8 PK			1.00 H	118	62.10	37.70
4	*5180.00	89.7 AV			1.00 H	118	52.00	37.70
5	#10360.00	59.8 PK	74.0	-14.2	1.10 H	96	11.00	48.80
6	#10360.00	46.6 AV	54.0	-7.4	1.10 H	96	-2.20	48.80
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	5150.00	56.0 PK	74.0	-18.0	1.00 V	271	18.30	37.70
2	5150.00	43.0 AV	54.0	-11.0	1.00 V	271	5.30	37.70
3	*5180.00	107.6 PK			1.00 V	294	69.90	37.70
4	*5180.00	97.0 AV			1.00 V	294	59.30	37.70
5	#10360.00	59.6 PK	74.0	-14.4	1.14 V	85	10.80	48.80
6	#10360.00	46.9 AV	54.0	-7.1	1.14 V	85	-1.90	48.80

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.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Chris 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	*5200.00	99.3 PK			1.10 H	118	61.50	37.80
2	*5200.00	89.0 AV			1.10 H	118	51.20	37.80
3	#10400.00	59.3 PK	74.0	-14.7	1.10 H	96	10.40	48.90
4	#10400.00	46.1 AV	54.0	-7.9	1.10 H	96	-2.80	48.90
5	15600.00	62.5 PK	74.0	-11.5	1.10 H	185	13.80	48.70
6	15600.00	47.5 AV	54.0	-6.5	1.10 H	185	-1.20	48.70
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	*5200.00	106.9 PK			1.02 V	141	69.10	37.80
2	*5200.00	97.3 AV			1.02 V	141	59.50	37.80
3	#10400.00	59.9 PK	74.0	-14.1	1.14 V	23	11.00	48.90
4	#10400.00	46.2 AV	54.0	-7.8	1.14 V	23	-2.70	48.90
5	15600.00	62.5 PK	74.0	-11.5	1.10 V	63	13.80	48.70
6	15600.00	48.4 AV	54.0	-5.6	1.10 V	63	-0.30	48.70

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 of the restricted band.



A D T

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	24deg. C, 67%RH	TESTED BY	Chris 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	*5240.00	99.1 PK			1.23 H	121	61.30	37.80
2	*5240.00	89.4 AV			1.23 H	121	51.60	37.80
3	5350.00	58.1 PK	74.0	-15.9	1.10 H	85	20.10	38.00
4	5350.00	45.5 AV	54.0	-8.5	1.10 H	85	7.50	38.00
5	#10480.00	59.0 PK	74.0	-15.0	1.06 H	178	9.80	49.20
6	#10480.00	46.3 AV	54.0	-7.7	1.06 H	178	-2.90	49.20
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	*5240.00	107.2 PK			1.09 V	296	69.40	37.80
2	*5240.00	97.6 AV			1.09 V	296	59.80	37.80
3	5350.00	59.1 PK	74.0	-14.9	1.10 V	309	21.10	38.00
4	5350.00	45.4 AV	54.0	-8.6	1.10 V	309	7.40	38.00
5	#10480.00	59.4 PK	74.0	-14.6	1.10 V	260	10.20	49.20
6	#10480.00	46.2 AV	54.0	-7.8	1.10 V	260	-3.00	49.20

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 of the restricted band.

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Chris 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	5150.00	60.0 PK	74.0	-14.0	1.10 H	127	22.30	37.70
2	5150.00	45.5 AV	54.0	-8.5	1.10 H	127	7.80	37.70
3	*5190.00	99.5 PK			1.26 H	117	61.80	37.70
4	*5190.00	89.6 AV			1.26 H	117	51.90	37.70
5	#10380.00	59.1 PK	74.0	-14.9	1.10 H	52	10.20	48.90
6	#10380.00	47.1 AV	54.0	-6.9	1.10 H	52	-1.80	48.90
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	5150.00	63.0 PK	74.0	-11.0	1.00 V	70	25.30	37.70
2	5150.00	47.4 AV	54.0	-6.6	1.00 V	70	9.70	37.70
3	*5190.00	106.9 PK			1.00 V	288	69.20	37.70
4	*5190.00	96.9 AV			1.00 V	288	59.20	37.70
5	#10380.00	59.7 PK	74.0	-14.3	1.10 V	117	10.80	48.90
6	#10380.00	46.7 AV	54.0	-7.3	1.10 V	117	-2.20	48.90

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.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 46	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Chris 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	*5230.00	101.2 PK			1.00 H	112	63.40	37.80
2	*5230.00	91.6 AV			1.00 H	112	53.80	37.80
3	5350.00	57.5 PK	74.0	-16.5	1.10 H	129	19.50	38.00
4	5350.00	45.0 AV	54.0	-9.0	1.10 H	129	7.00	38.00
5	#10460.00	59.7 PK	74.0	-14.3	1.10 H	136	10.60	49.10
6	#10460.00	46.6 AV	54.0	-7.4	1.10 H	136	-2.50	49.10
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	*5230.00	107.9 PK			1.00 V	288	70.10	37.80
2	*5230.00	98.1 AV			1.00 V	288	60.30	37.80
3	5350.00	58.0 PK	74.0	-16.0	1.10 V	245	20.00	38.00
4	5350.00	45.8 AV	54.0	-8.2	1.10 V	245	7.80	38.00
5	#10460.00	59.9 PK	74.0	-14.1	1.10 V	63	10.80	49.10
6	#10460.00	46.8 AV	54.0	-7.2	1.10 V	63	-2.30	49.10

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 of the restricted band.



A D T

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	24deg. C, 67%RH	TESTED BY	Martin Lee
TEST MODE	A		

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	146.56	30.1 QP	43.5	-13.4	1.20 H	73	16.10	14.00
2	374.04	29.3 QP	46.0	-16.7	1.00 H	128	12.40	16.90
3	500.42	31.8 QP	46.0	-14.2	1.95 H	208	11.80	20.00
4	624.85	31.2 QP	46.0	-14.8	2.03 H	345	8.90	22.30
5	842.61	31.6 QP	46.0	-14.4	1.12 H	135	5.50	26.10
6	961.21	37.5 QP	54.0	-16.5	1.74 H	117	10.10	27.40
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	51.29	36.6 QP	40.0	-3.4	1.33 V	329	22.60	14.00
2	86.28	37.0 QP	40.0	-3.0	1.49 V	126	28.20	8.80
3	125.17	33.5 QP	43.5	-10.0	1.58 V	199	21.20	12.30
4	500.42	38.5 QP	46.0	-7.5	1.47 V	307	18.50	20.00
5	624.85	33.3 QP	46.0	-12.7	1.99 V	273	11.00	22.30
6	961.21	40.8 QP	54.0	-13.2	2.14 V	147	13.40	27.40

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24deg. C, 67%RH	TESTED BY	Martin Lee
TEST MODE	B		

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	125.17	34.9 QP	43.5	-8.6	1.33 H	264	22.60	12.30
2	249.60	29.6 QP	46.0	-16.4	1.42 H	276	16.60	13.00
3	374.04	32.2 QP	46.0	-13.8	1.85 H	109	15.30	16.90
4	500.42	39.5 QP	46.0	-6.5	1.66 H	178	19.50	20.00
5	624.85	31.2 QP	46.0	-14.8	1.87 H	146	8.90	22.30
6	961.21	44.9 QP	54.0	-9.1	1.12 H	107	17.50	27.40
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	51.29	36.6 QP	40.0	-3.4	1.32 V	316	22.60	14.00
2	70.73	36.1 QP	40.0	-3.9	1.00 V	204	24.00	12.10
3	374.04	30.4 QP	46.0	-15.6	1.42 V	357	13.50	16.90
4	500.42	39.7 QP	46.0	-6.3	1.52 V	153	19.70	20.00
5	624.85	32.2 QP	46.0	-13.8	1.87 V	177	9.90	22.30
6	961.21	41.7 QP	54.0	-12.3	1.14 V	151	14.30	27.40

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 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 0.50MHz.
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. 23, 2011	Nov. 22, 2012
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 29, 2011	Dec. 28, 2012
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 02, 2012	Jul. 01, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 07, 2012	Feb. 06, 2013
Software ADT	BV ADT_Cond_ V7.3.7.3	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

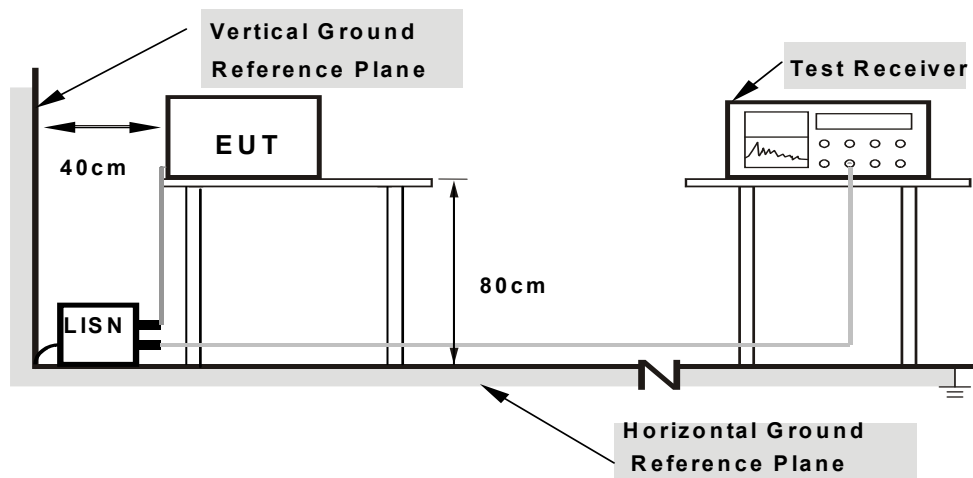
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

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.

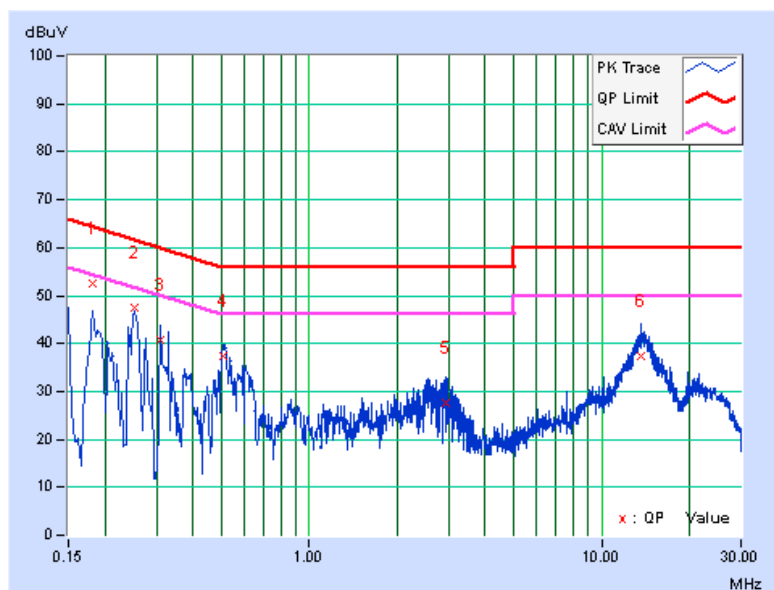
4.2.7 TEST RESULTS

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

PHASE	Line 1	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

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	0.18122	0.12	52.25	34.67	52.37	34.79	64.43	54.43	-12.06	-19.64
2	0.25192	0.13	47.21	34.18	47.34	34.31	61.69	51.69	-14.35	-17.38
3	0.31031	0.13	40.73	25.75	40.86	25.88	59.96	49.96	-19.10	-24.08
4	0.50581	0.14	37.39	26.47	37.53	26.61	56.00	46.00	-18.47	-19.39
5	2.91828	0.28	27.38	16.79	27.66	17.07	56.00	46.00	-28.34	-28.93
6	13.65905	0.83	36.57	30.15	37.40	30.98	60.00	50.00	-22.60	-19.02

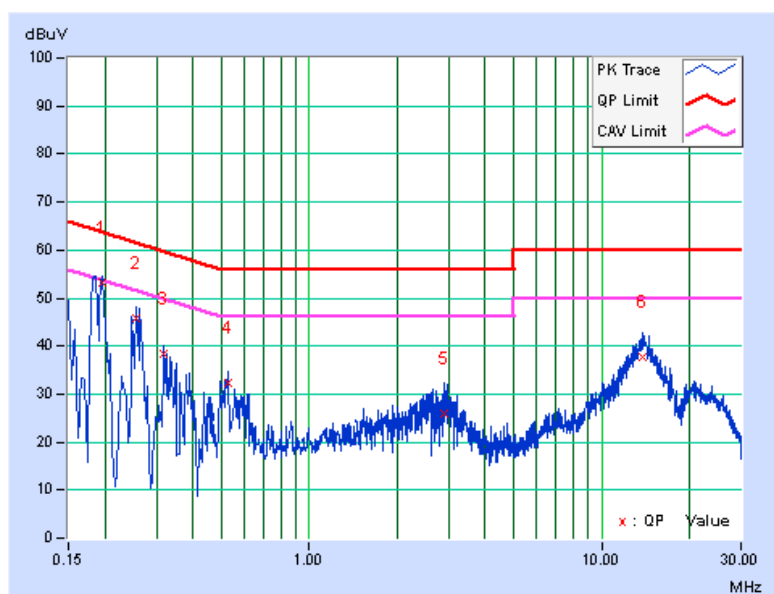
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor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



PHASE	Line 2	6dB BANDWIDTH	9kHz
-------	--------	---------------	------

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	0.19613	0.14	52.95	39.12	53.09	39.26	63.77	53.77	-10.68	-14.51
2	0.25557	0.14	45.79	31.48	45.93	31.62	61.57	51.57	-15.64	-19.95
3	0.31813	0.15	38.37	23.15	38.52	23.30	59.76	49.76	-21.24	-26.46
4	0.52544	0.16	32.06	17.49	32.22	17.65	56.00	46.00	-23.78	-28.35
5	2.90655	0.28	25.80	14.72	26.08	15.00	56.00	46.00	-29.92	-31.00
6	13.88192	0.74	37.00	30.54	37.74	31.28	60.00	50.00	-22.26	-18.72

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



4.3 PEAK TRANSMIT POWER MEASUREMENT

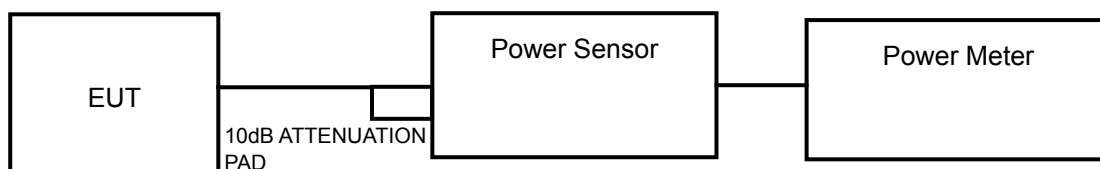
4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB

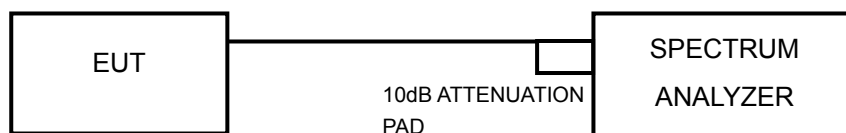
NOTE: Where B is the 26dB emission bandwidth in MHz.

4.3.2 TEST SETUP

FOR POWER OUTPUT MEASUREMENT



FOR 26dB BANDWIDTH



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.3.4 TEST PROCEDURE

FOR AVERAGE POWER MEASUREMENT

For 802.11a, 802.11n (20MHz)

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

For 802.11n (40MHz)

Duty cycle of test signal is < 98 %. Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

FOR 26dB BANDWIDTH

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.3.7 TEST RESULTS

POWER OUTPUT: 802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	18.323	12.63	17	PASS
40	5200	18.408	12.65	17	PASS
48	5240	17.579	12.45	17	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	7.63	7.45	7.83	17.420	12.41	17	PASS
40	5200	7.74	7.92	8.09	18.579	12.69	17	PASS
48	5240	7.48	7.82	7.64	17.459	12.42	17	PASS

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
38	5190	11.26	10.40	11.36	38.008	15.80	17	PASS
46	5230	11.11	11.17	11.52	40.195	16.04	17	PASS

26dB BANDWIDTH: 802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
36	5180	21.58	PASS
40	5200	20.73	PASS
48	5240	21.58	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
36	5180	20.07	20.06	20.07	PASS
40	5200	21.14	20.67	20.11	PASS
48	5240	20.94	20.07	20.18	PASS

802.11n (40MHz)

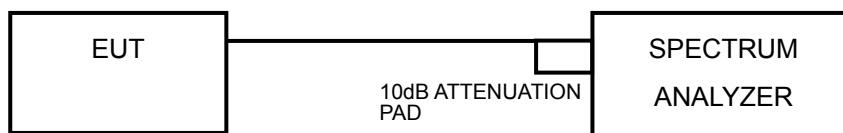
CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
38	5190	43.73	43.04	44.61	PASS
46	5230	45.26	42.69	42.99	PASS

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	4dBm

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.4.4 TEST PROCEDURES

For 802.11a, 802.11n(20MHz)

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 KHz, Set VBW \geq 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value

For 802.11n(40MHz)

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 KHz, Set VBW \geq 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add 10 log (1/duty cycle)

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6.

4.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	0.10	4	PASS
40	5200	-0.18	4	PASS
48	5240	-0.35	4	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
36	5180	-5.29	-5.12	-5.03	-0.37	0.23	PASS
40	5200	-5.31	-5.27	-5.71	-0.65	0.23	PASS
48	5240	-5.55	-5.09	-4.94	-0.41	0.23	PASS

- NOTE:** 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $5\text{dBi} + 10\log(3) = 9.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $4 - (9.77 - 6) = 0.23\text{dBm}$.

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2					
38	5190	-4.60	-5.47	-4.52	-0.07	0.15	0.08	0.23	PASS
46	5230	-5.02	-5.29	-4.63	-0.20	0.15	-0.05	0.23	PASS

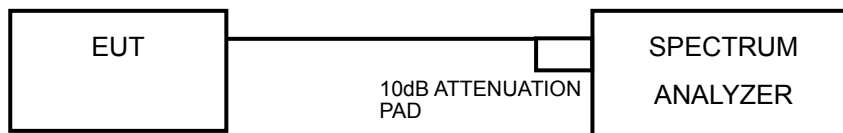
- NOTE:**
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $5\text{dBi} + 10\log(3) = 9.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $4 - (9.77 - 6) = 0.23\text{dBm}$.
3. Refer to section 3.3 for duty cycle spectrum plot.

4.5 PEAK POWER EXCURSION MEASUREMENT

4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.5.4 TEST PROCEDURE

- 1) Set RBW = 1 MHz, VBW \geq 3 MHz, Detector = peak.
- 2) Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
- 3) Use the peak search function to find the peak of the spectrum.
- 4) Measure the PPSD.
- 5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

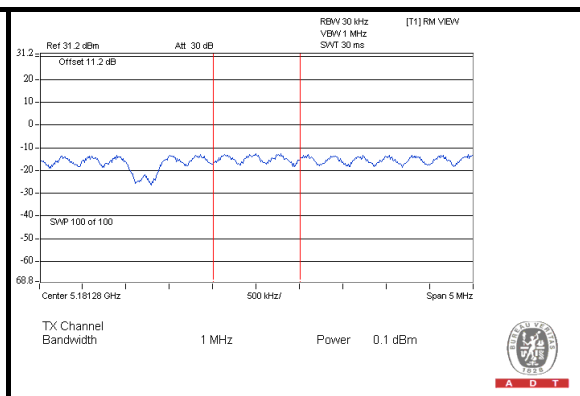
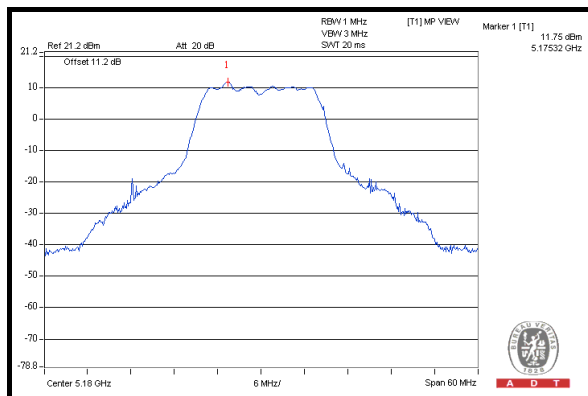
4.5.6 EUT OPERATING CONDITIONS

Same as 4.2.6

4.5.7 TEST RESULTS

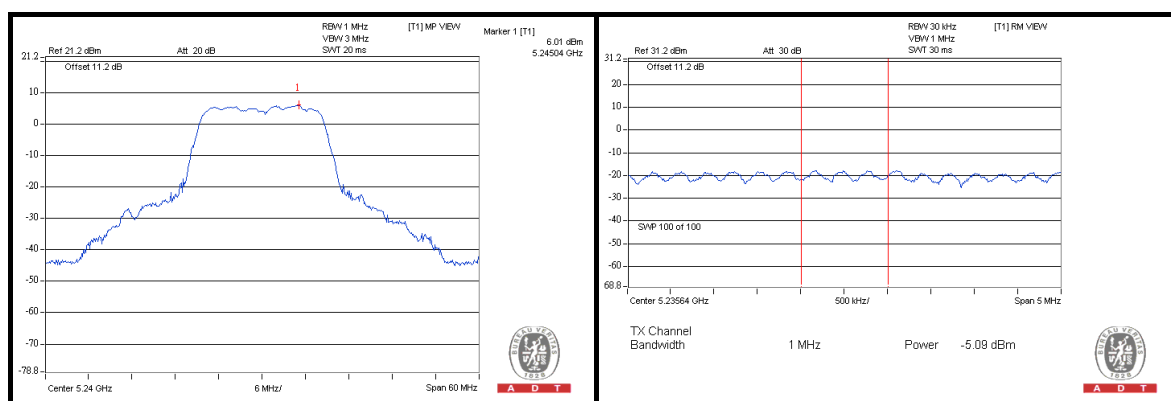
802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS/FAIL
36	5180	11.75	0.10	11.65	13	PASS
40	5200	11.14	-0.18	11.32	13	PASS
48	5240	11.27	-0.35	11.62	13	PASS



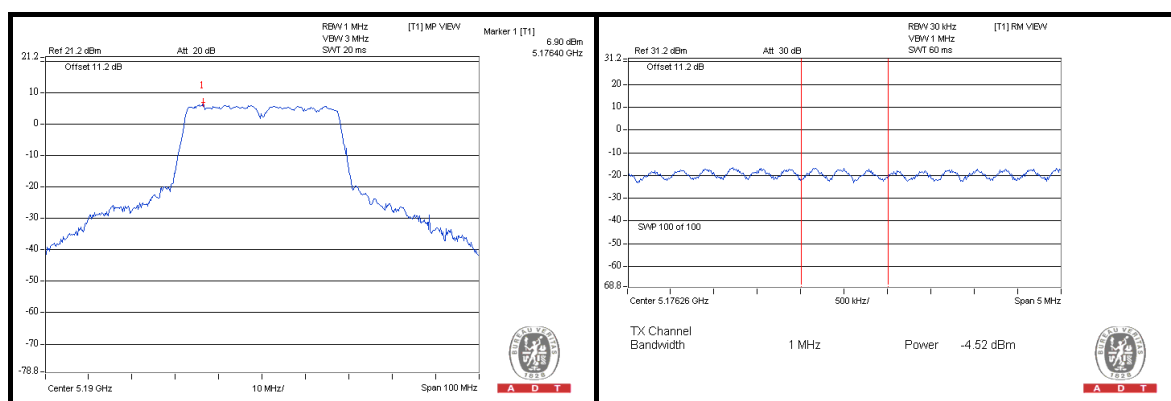
802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
36	5180	5.00	5.34	5.20	-5.29	-5.12	-5.03	10.29	10.46	10.23	13	PASS
40	5200	4.82	5.24	5.01	-5.31	-5.27	-5.71	10.13	10.51	10.72	13	PASS
48	5240	5.01	6.01	5.80	-5.55	-5.09	-4.94	10.56	11.10	10.74	13	PASS



802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)			PPSD WITHOUT DUTY FACTOR (dBm)			PPSD WITH DUTY FACTOR (dBm)			PEAK EXCURSION (dB)			LIMIT (dB)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 0	CHAIN 1	CHAIN 2		
38	5190	6.01	5.12	6.90	-4.60	-5.47	-4.52	-4.45	-5.32	-4.37	10.46	10.44	11.27	13	PASS
46	5230	5.22	5.65	5.51	-5.02	-5.29	-4.63	-4.87	-5.14	-4.48	10.09	10.79	9.99	13	PASS

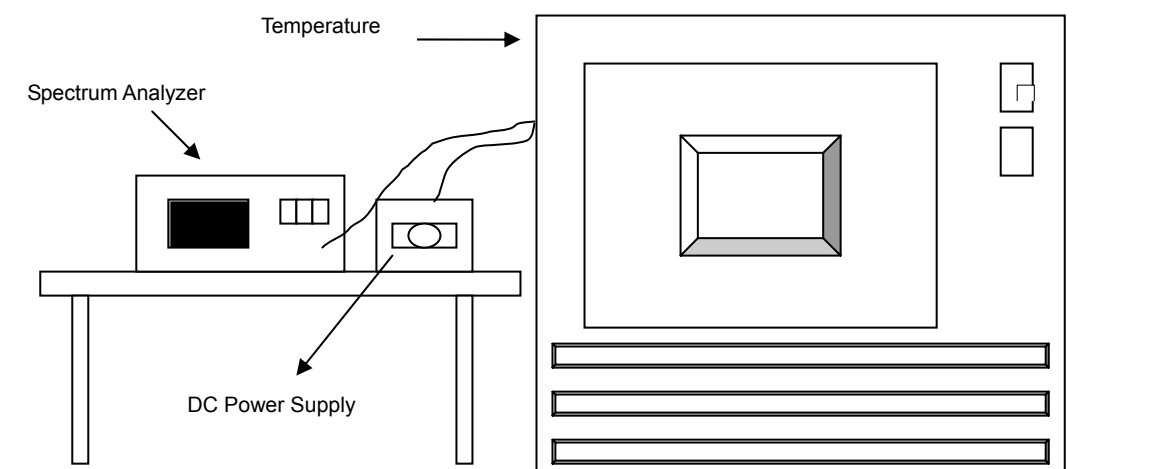


4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.6.4 TEST PROCEDURE

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.



A D T

4.6.7 TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5200MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
60	120.0	5199.9741	-4.9808	5200.0229	4.4038	5199.9742	-4.9615	5200.0220	4.2308
50	120.0	5200.0217	4.1731	5200.0230	4.4231	5200.0232	4.4615	5200.0223	4.2885
40	120.0	5200.0114	2.1923	5200.0031	0.5962	5200.0034	0.6538	5200.0067	1.2885
30	120.0	5199.9831	-3.2500	5199.9827	-3.3269	5199.9894	-2.0385	5199.9852	-2.8462
20	120.0	5200.0178	3.4231	5200.0103	1.9808	5200.0105	2.0192	5200.0157	3.0192
10	120.0	5199.9779	-4.2500	5199.9769	-4.4423	5199.9695	-5.8654	5199.9765	-4.5192
0	120.0	5200.0077	1.4808	5200.0069	1.3269	5200.0069	1.3269	5200.0042	0.8077
-10	120.0	5200.0045	0.8654	5200.0046	0.8846	5200.0065	1.2500	5200.0095	1.8269
-20	120.0	5199.9749	-4.8269	5199.9772	-4.3846	5199.9792	-4.0000	5199.9795	-3.9423
-30	120.0	5199.9986	-0.2692	5200.0084	1.6154	5199.9992	-0.1538	5199.9972	-0.5385

FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5200MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	138.0	5200.0170	3.2692	5200.0108	2.0769	5200.0107	2.0577	5200.0150	2.8846
	120.0	5200.0178	3.4231	5200.0103	1.9808	5200.0105	2.0192	5200.0157	3.0192
	102.0	5200.0166	3.1923	5200.0105	2.0192	5200.0104	2.0000	5200.0156	3.0000

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.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

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: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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 modifications were made to the EUT by the lab during the test.

---END---