FCC TEST REPORT (15.407)

REPORT NO.:	RF131204C01-1
MODEL NO.:	P1802-T
FCC ID:	MSQP1802T
RECEIVED:	Dec. 04, 2013
TESTED:	Dec. 14 ~ Dec. 20, 2013
ISSUED:	Dec. 27, 2013

APPLICANT:	ASUSTeK COMPUTER INC.
ADDRESS:	4F, No. 150, LI-TE Rd., PEITOU, TAIPEI 112, TAIWAN

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.

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131204C01-1	Original release	Dec. 27, 2013

1. CERTIFICATION

PRODUCT: ASUS Portable AiO
MODEL: P1802-T
BRAND: ASUS
APPLICANT: ASUSTeK COMPUTER INC.
TESTED: Dec. 14 ~ Dec. 20, 2013
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart E (Section 15.407)**
ANSI C63.10-2009

The above equipment (model: P1802-T) 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 : Celine Chou **, DATE :** Dec. 27, 2013
Celine Chou / Specialist

APPROVED BY : Ken Liu **, DATE :** Dec. 27, 2013
Ken Liu / Senior Manager

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 -7.46dB at 0.15000MHz.
15.407(b/1/2/3) (b)(6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.6dB at 743.97MHz.
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 I-PEX MHF 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	3.19 dB
	200MHz ~1000MHz	3.21 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	ASUS Portable AiO
MODEL NO.	P1802-T
POWER SUPPLY	19Vdc from adapter 19.5Vdc from ASUS All-in-One PC 7.4Vdc from battery
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 300.0Mbps
OPERATING FREQUENCY	5180 ~ 5240MHz
NUMBER OF CHANNEL	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	24.466mW
ANTENNA TYPE	Refer to note
ANTENNA CONNECTOR	I-PEX MHF
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter, ASUS All-in-One PC, USB Dongle, Keyboard, Mouse, Remote Controller

NOTE:

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

MODULATION MODE	TX FUNCTION	ANTENNA
802.11b	1TX	Main
802.11g	1TX	Main
802.11a	1TX	Main
802.11n (20MHz)	2TX	Main / AUX
802.11n (40MHz)	2TX	Main / AUX

2. The EUT with follow antennas gain is listed as table below.

Ant.	Antenna Type	Connector	Gain(dBi)	
			2.4GHz	5GHz
Main	PIFA	I-PEX MHF	2.42	1.20
AUX			2.08	2.13

3. The EUT consumes power from the following adapter and battery.

ADAPTER	
BRAND:	PIE (ASUS)
MODEL:	AD890326
INPUT:	100-240Vac, 50/60Hz, 0.8A
OUTPUT:	19Vdc, 1.75A
POWER LINE:	2.35m cable without core attached on adapter

BATTERY	
BRAND:	SIMPLO
MODEL:	C21-P1801
POWER RATING:	7.4 Vdc, 5136 mAh

4. The EUT contains the following accessories.

Part	Specification	Vendor	Model
ASUS All-in-One PC	-	ASUS	P1802
USB Dongle	-	CHICONY	RG-123
Keyboard	-	CHICONY	KG-1230
Mouse	-	CHICONY	MG-1231
Remote Control	-	ASUS	TSGV-1RO1
Adapter (for ASUS All-in-One PC)	I/P: 100-240Vac, 50-60Hz, 2.5A O/P: 19.5Vdc, 9.23A 1.7m cable with a core attached on adapter	Flextronics (ASUS)	FA180PM111

5. 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≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	EUT only
B	-	√	√	-	EUT + ASUS All-in-One PC

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

NOTE:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.
2. "-"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	36	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 & B	802.11n (20MHz)	36 to 48	36	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≥1G	22deg. C, 69%RH	120Vac, 60Hz	Jones Chang
RE<1G	22deg. C, 69%RH	120Vac, 60Hz	Jones Chang
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

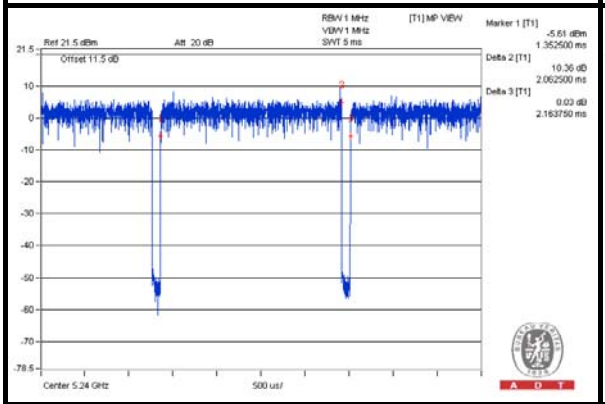
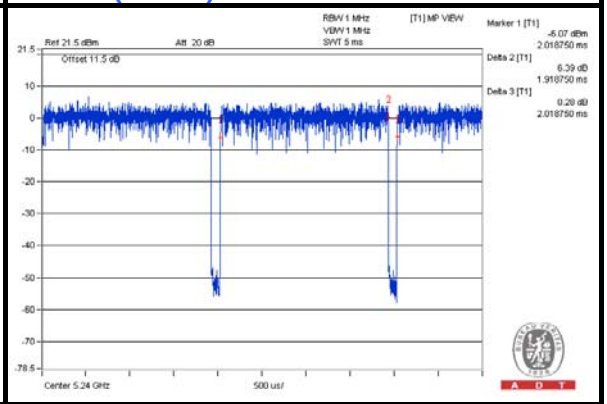
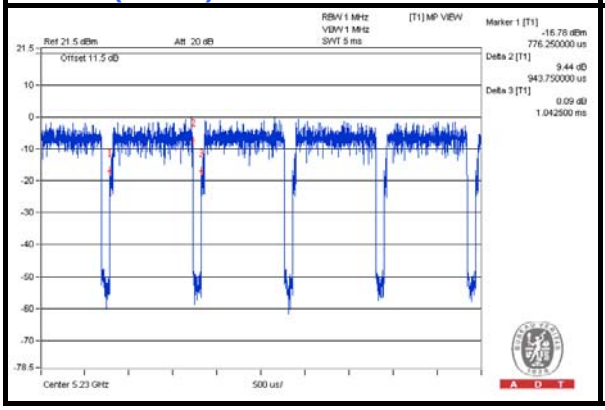
MODULATION TYPE: BPSK

Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 2.062/2.164 = 0.953, Duty factor = 10 * log(1/0.953) = 0.21

802.11n (20MHz): Duty cycle = 1.919/2.019 = 0.950, Duty factor = 10 * log(1/0.950) = 0.22

802.11n (40MHz): Duty cycle = 0.944/1.042 = 0.906, Duty factor = 10 * log(1/0.906) = 0.43

802.11a	802.11n (20MHz)
	
802.11n (40MHz)	
	

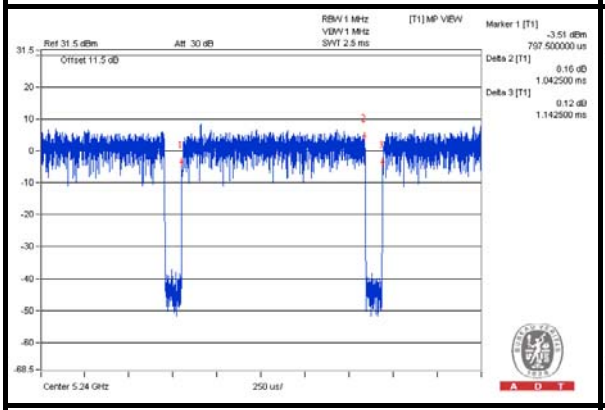
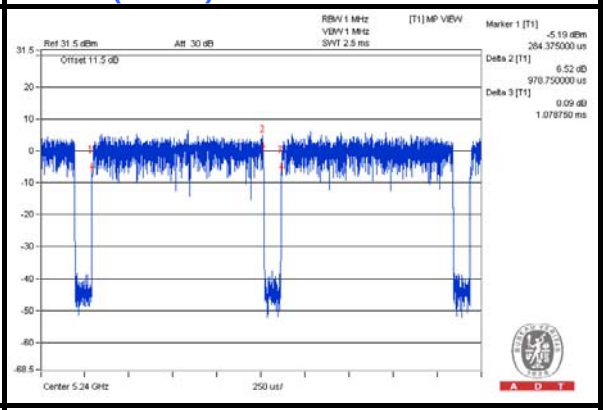
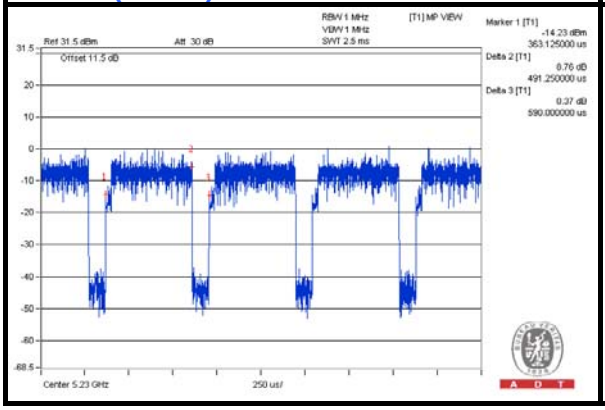
MODULATION TYPE: QPSK

Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 1.042/1.142 = 0.912, Duty factor = 10 * log(1/0.912) = 0.40

802.11n (20MHz): Duty cycle = 0.979/1.079 = 0.907, Duty factor = 10 * log(1/0.907) = 0.42

802.11n (40MHz): Duty cycle = 0.491/0.590 = 0.832, Duty factor = 10 * log(1/0.832) = 0.80

802.11a	802.11n (20MHz)
	
802.11n (40MHz)	
	

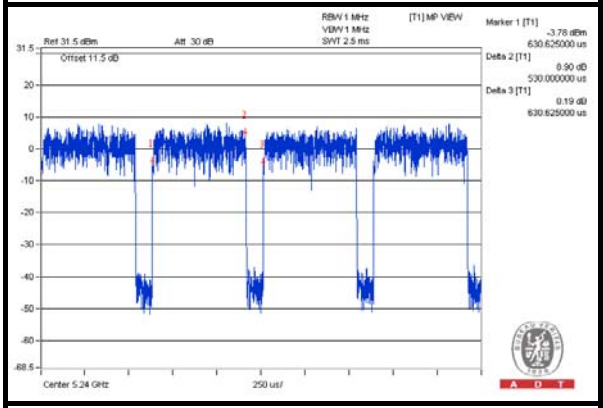
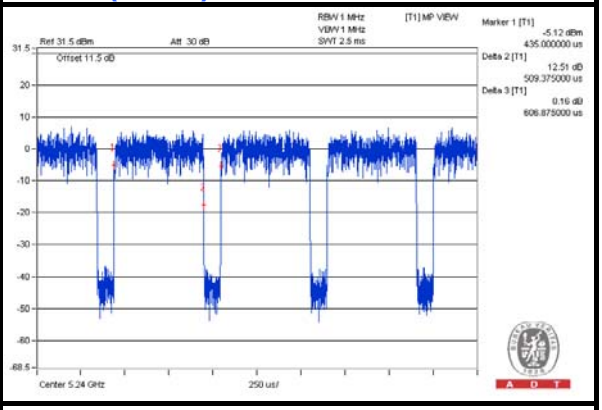
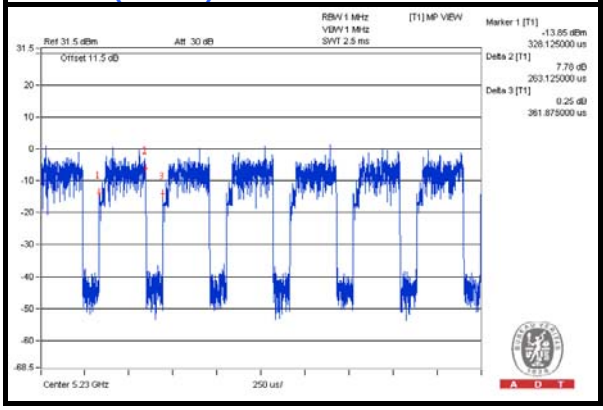
MODULATION TYPE: 16QAM

Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 0.530/0.631 = 0.840, Duty factor = 10 * log(1/0.840) = 0.76

802.11n (20MHz): Duty cycle = 0.509/0.607 = 0.839, Duty factor = 10 * log(1/0.839) = 0.76

802.11n (40MHz): Duty cycle = 0.263/0.362 = 0.727, Duty factor = 10 * log(1/0.727) = 1.39

802.11a	802.11n (20MHz)
	
802.11n (40MHz)	
	

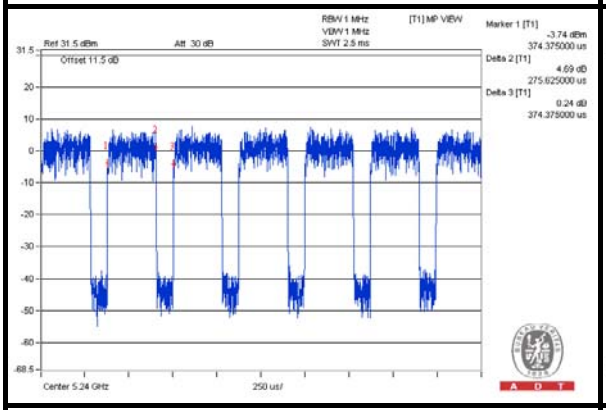
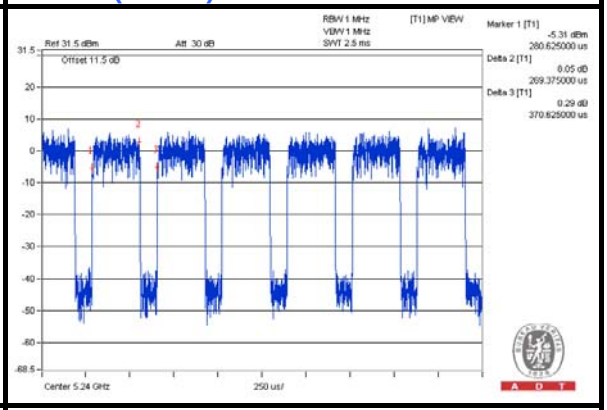
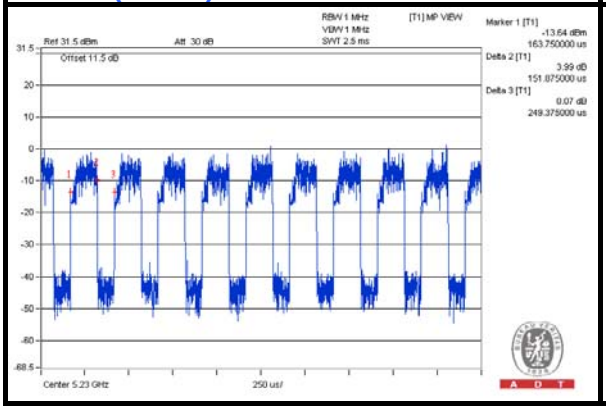
MODULATION TYPE: 64QAM

Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 0.276/0.374 = 0.738, Duty factor = 10 * log(1/0.738) = 1.32

802.11n (20MHz): Duty cycle = 0.269/0.371 = 0.725, Duty factor = 10 * log(1/0.725) = 1.40

802.11n (40MHz): Duty cycle = 0.152/0.249 = 0.610, Duty factor = 10 * log(1/0.610) = 2.14

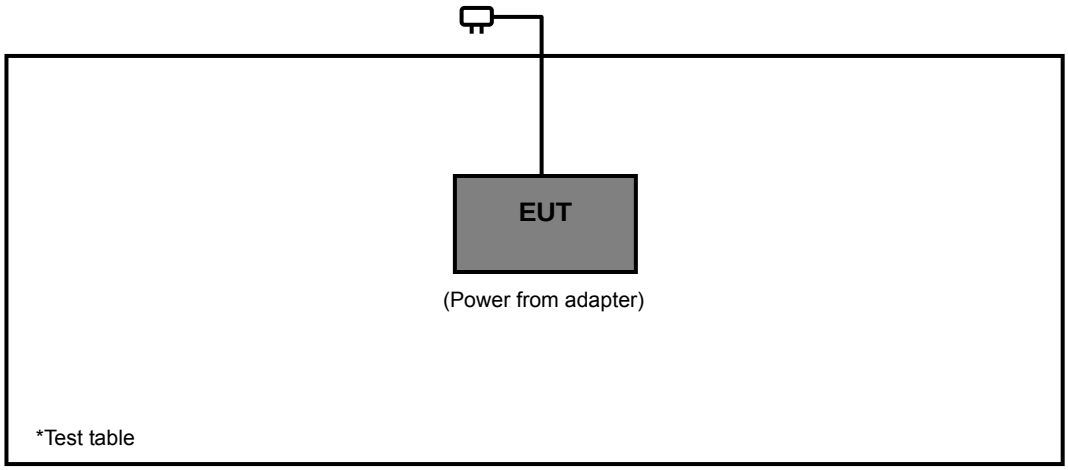
802.11a	802.11n (20MHz)
	
802.11n (40MHz)	
	

3.4 DESCRIPTION OF SUPPORT UNITS

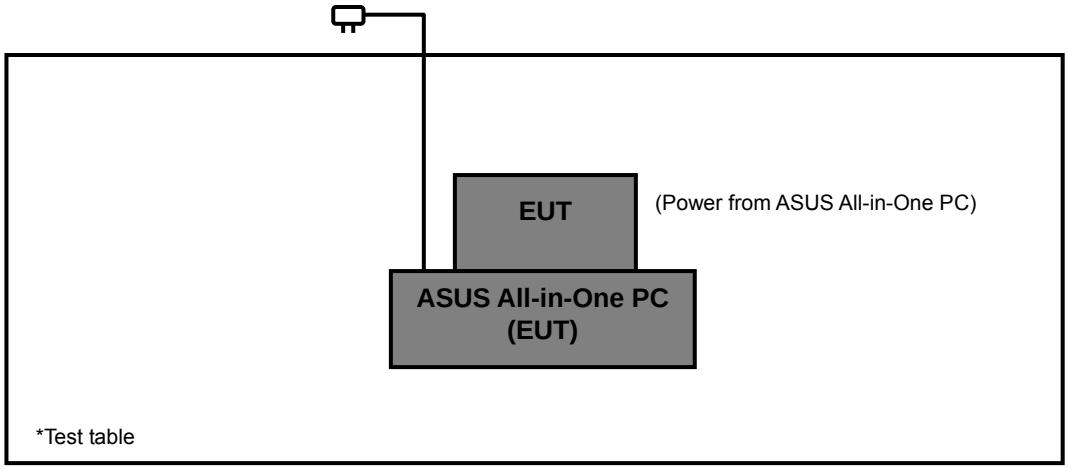
The EUT has been tested as an independent unit.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A



TEST MODE B



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 r03
662911 D01 Multiple Transmitter Output v02
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:

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

4.1.3 TEST INSTRUMENTS

Tested Date: Dec. 14, 2013

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Sep. 09, 2013	Sep. 08, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2012	Dec. 17, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Dec. 22, 2012	Dec. 21, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 13, 2013	Jun. 12, 2014

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 4.

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 IC7450F-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 camber. 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:

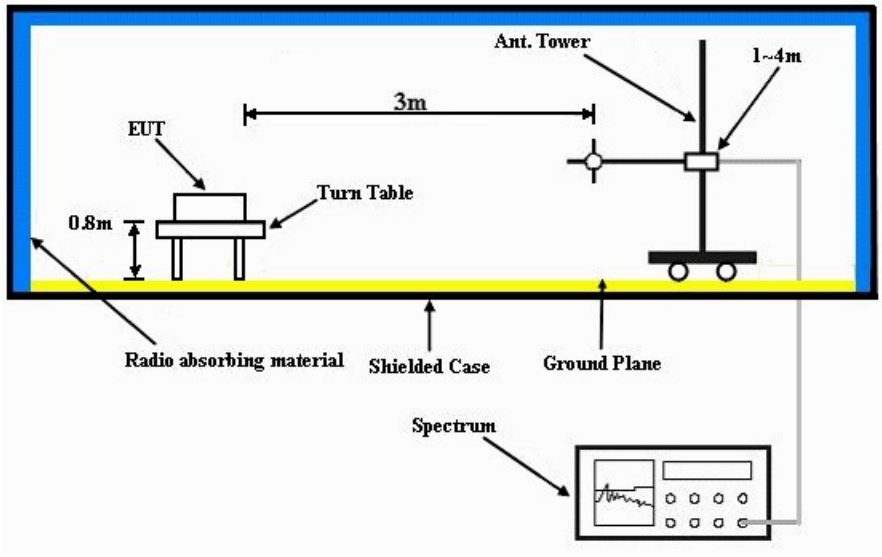
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) 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

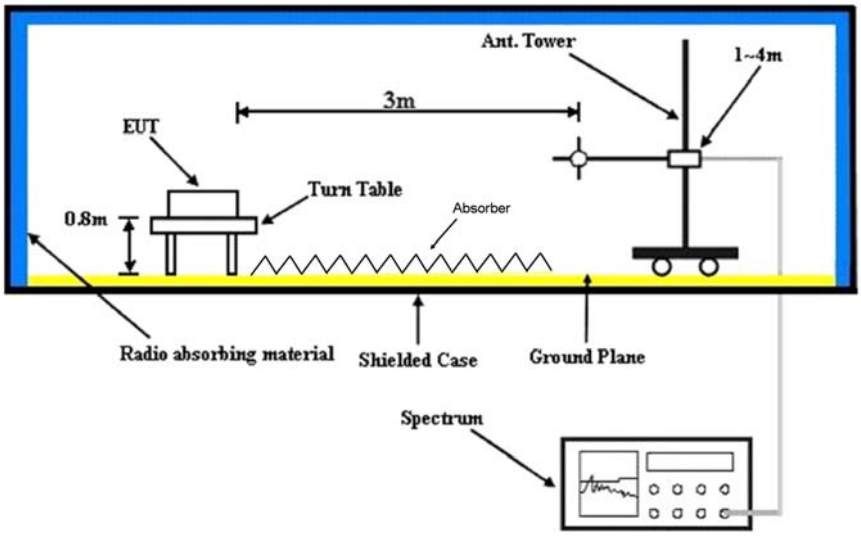
No deviation.

4.1.6 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



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

4.1.7 EUT OPERATING CONDITION

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.8 TEST RESULTS

ABOVE 1GHz DATA：

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	58.4 PK	74.0	-15.6	1.01 H	81	53.00	5.40
2	5150.00	43.5 AV	54.0	-10.5	1.01 H	81	38.10	5.40
3	*5180.00	99.5 PK			1.11 H	81	60.20	39.30
4	*5180.00	89.0 AV			1.11 H	81	49.70	39.30
5	#10360.00	59.3 PK	74.0	-14.7	1.00 H	339	43.30	16.00
6	#10360.00	46.1 AV	54.0	-7.9	1.00 H	339	30.10	16.00
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	5150.00	50.1 PK	74.0	-23.9	1.00 V	202	44.70	5.40
2	5150.00	45.9 AV	54.0	-8.1	1.00 V	202	40.50	5.40
3	*5180.00	103.5 PK			1.00 V	102	64.20	39.30
4	*5180.00	92.9 AV			1.00 V	102	53.60	39.30
5	#10360.00	60.6 PK	74.0	-13.4	1.00 V	233	44.60	16.00
6	#10360.00	48.1 AV	54.0	-5.9	1.00 V	233	32.10	16.00

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) – Pre-Amplifier 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	99.1 PK			1.13 H	86	59.80	39.30
2	*5200.00	88.8 AV			1.13 H	86	49.50	39.30
3	#10400.00	58.3 PK	74.0	-15.7	1.21 H	229	42.10	16.20
4	#10400.00	47.2 AV	54.0	-6.8	1.21 H	229	31.00	16.20
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	*5200.00	103.2 PK			1.00 V	204	63.90	39.30
2	*5200.00	92.9 AV			1.00 V	204	53.60	39.30
3	#10400.00	60.5 PK	74.0	-13.5	1.01 V	33	44.30	16.20
4	#10400.00	48.3 AV	54.0	-5.7	1.01 V	33	32.10	16.20

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) – Pre-Amplifier 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	99.8 PK			1.08 H	88	60.50	39.30
2	*5240.00	88.4 AV			1.08 H	88	49.10	39.30
3	5350.00	55.8 PK	74.0	-18.2	1.10 H	84	50.30	5.50
4	5350.00	44.3 AV	54.0	-9.7	1.10 H	84	38.80	5.50
5	#10480.00	59.2 PK	74.0	-14.8	1.05 H	17	42.40	16.80
6	#10480.00	46.8 AV	54.0	-7.2	1.05 H	17	30.00	16.80
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	*5240.00	102.3 PK			1.00 V	203	62.91	39.34
2	*5240.00	91.6 AV			1.00 V	203	52.26	39.34
3	5350.00	57.3 PK	74.0	-16.7	1.00 V	203	51.79	5.52
4	5350.00	46.2 AV	54.0	-7.8	1.00 V	203	40.67	5.52
5	#10480.00	59.8 PK	74.0	-14.2	1.00 V	337	43.06	16.73
6	#10480.00	48.4 AV	54.0	-5.6	1.00 V	337	31.70	16.73

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) – Pre-Amplifier 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.

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	56.6 PK	74.0	-17.4	1.10 H	86	51.20	5.40
2	5150.00	44.1 AV	54.0	-9.9	1.10 H	86	38.70	5.40
3	*5180.00	98.9 PK			1.10 H	79	59.60	39.30
4	*5180.00	87.4 AV			1.10 H	79	48.10	39.30
5	#10360.00	58.6 PK	74.0	-15.4	1.05 H	289	42.60	16.00
6	#10360.00	46.2 AV	54.0	-7.8	1.05 H	289	30.20	16.00
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	5150.00	57.8 PK	74.0	-16.2	1.01 V	201	52.40	5.40
2	5150.00	45.3 AV	54.0	-8.7	1.01 V	201	39.90	5.40
3	*5180.00	101.7 PK			1.01 V	201	62.40	39.30
4	*5180.00	91.8 AV			1.01 V	201	52.50	39.30
5	#10360.00	58.6 PK	74.0	-15.4	1.05 V	289	42.60	16.00
6	#10360.00	46.2 AV	54.0	-7.8	1.05 V	289	30.20	16.00

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) – Pre-Amplifier 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	98.1 PK			1.11 H	76	58.80	39.30
2	*5200.00	87.5 AV			1.11 H	76	48.20	39.30
3	#10400.00	57.3 PK	74.0	-16.7	1.01 H	231	41.10	16.20
4	#10400.00	45.1 AV	54.0	-8.9	1.01 H	231	28.90	16.20
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	*5200.00	102.0 PK			1.00 V	196	62.70	39.30
2	*5200.00	92.1 AV			1.00 V	196	52.80	39.30
3	#10400.00	59.2 PK	74.0	-14.8	1.31 V	201	43.00	16.20
4	#10400.00	46.7 AV	54.0	-7.3	1.31 V	201	30.50	16.20

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) – Pre-Amplifier 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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			1.02 H	77	59.80	39.30
2	*5240.00	87.6 AV			1.02 H	77	48.30	39.30
3	5350.00	55.0 PK	74.0	-19.0	1.07 H	89	49.50	5.50
4	5350.00	43.9 AV	54.0	-10.1	1.07 H	89	38.40	5.50
5	#10480.00	58.2 PK	74.0	-15.8	1.00 H	352	41.40	16.80
6	#10480.00	46.6 AV	54.0	-7.4	1.00 H	352	29.80	16.80
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	*5240.00	102.2 PK			1.00 V	205	62.90	39.30
2	*5240.00	92.3 AV			1.00 V	205	53.00	39.30
3	5350.00	55.7 PK	74.0	-18.3	1.00 V	205	50.20	5.50
4	5350.00	44.3 AV	54.0	-9.7	1.00 V	205	38.80	5.50
5	#10480.00	59.1 PK	74.0	-14.9	1.05 V	122	42.30	16.80
6	#10480.00	47.8 AV	54.0	-6.2	1.05 V	122	31.00	16.80

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) – Pre-Amplifier 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.

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	56.4 PK	74.0	-17.6	1.15 H	38	51.00	5.40
2	5150.00	46.3 AV	54.0	-7.7	1.15 H	38	40.90	5.40
3	*5190.00	94.4 PK			1.15 H	38	55.10	39.30
4	*5190.00	84.3 AV			1.15 H	38	45.00	39.30
5	#10380.00	57.4 PK	74.0	-16.6	1.00 H	299	41.30	16.10
6	#10380.00	46.4 AV	54.0	-7.6	1.00 H	299	30.30	16.10
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	5150.00	60.2 PK	74.0	-13.8	1.00 V	205	54.80	5.40
2	5150.00	51.1 AV	54.0	-2.9	1.00 V	205	45.70	5.40
3	*5190.00	98.2 PK			1.00 V	205	58.90	39.30
4	*5190.00	89.1 AV			1.00 V	205	49.80	39.30
5	#10380.00	59.4 PK	74.0	-14.6	1.21 V	328	43.30	16.10
6	#10380.00	48.2 AV	54.0	-5.8	1.21 V	328	32.10	16.10

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) – Pre-Amplifier 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.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 46	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang

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	94.1 PK			1.14 H	0	54.80	39.30
2	*5230.00	84.6 AV			1.14 H	39	45.30	39.30
3	5350.00	49.1 PK	74.0	-24.9	1.14 H	39	43.60	5.50
4	5350.00	39.6 AV	54.0	-14.4	1.14 H	39	34.10	5.50
5	11460.00	59.4 PK	74.0	-14.6	1.23 H	94	41.30	18.10
6	11460.00	47.6 AV	54.0	-6.4	1.23 H	94	29.50	18.10
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	98.0 PK			1.00 V	207	58.70	39.30
2	*5230.00	88.8 AV			1.00 V	207	49.50	39.30
3	5350.00	53.0 PK	74.0	-21.0	1.00 V	207	47.50	5.50
4	5350.00	43.8 AV	54.0	-10.2	1.00 V	207	38.30	5.50
5	11460.00	59.9 PK	74.0	-14.1	1.03 V	212	41.80	18.10
6	11460.00	48.2 AV	54.0	-5.8	1.03 V	212	30.10	18.10

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang
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	142.44	19.3 QP	43.5	-24.2	1.01 H	124	33.50	-14.20
2	179.31	18.6 QP	43.5	-24.9	1.50 H	9	33.50	-14.90
3	225.88	20.0 QP	46.0	-26.0	1.01 H	12	36.60	-16.60
4	881.74	34.8 QP	46.0	-11.2	1.50 H	9	36.80	-2.00
5	906.96	30.4 QP	46.0	-15.6	1.01 H	201	31.70	-1.30
6	961.29	30.8 QP	54.0	-23.2	1.50 H	195	31.30	-0.50
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	35.72	24.1 QP	40.0	-15.9	1.00 V	28	38.80	-14.70
2	57.07	20.9 QP	40.0	-19.1	1.00 V	19	35.60	-14.70
3	70.65	19.2 QP	40.0	-20.8	1.00 V	28	35.10	-15.90
4	130.80	19.0 QP	43.5	-24.5	1.00 V	8	34.50	-15.50
5	421.86	24.2 QP	46.0	-21.8	1.00 V	8	34.60	-10.40
6	883.68	28.6 QP	46.0	-17.4	1.50 V	13	30.60	-2.00

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) – Pre-Amplifier 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 36	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH	TESTED BY	Jones Chang
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	165.73	36.9 QP	43.5	-6.6	1.49 H	272	51.30	-14.40
2	196.77	37.5 QP	43.5	-6.0	2.00 H	116	54.20	-16.70
3	264.69	40.1 QP	46.0	-5.9	2.00 H	167	54.00	-13.90
4	594.01	44.1 QP	46.0	-1.9	1.48 H	303	51.30	-7.20
5	**743.97**	**44.4 QP**	**46.0**	**-1.6**	**1.00 H**	**70**	**48.50**	**-4.10**
6	891.44	37.4 QP	46.0	-8.6	1.49 H	179	39.20	-1.80
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	55.13	32.1 QP	40.0	-7.9	2.00 V	54	46.20	-14.10
2	266.63	36.6 QP	46.0	-9.4	1.00 V	157	50.40	-13.80
3	334.54	34.3 QP	46.0	-11.7	1.50 V	247	46.20	-11.90
4	445.15	35.9 QP	46.0	-10.1	1.50 V	1	45.70	-9.80
5	594.56	44.3 QP	46.0	-1.7	1.50 V	164	51.40	-7.10
6	743.97	44.2 QP	46.0	-1.8	1.00 V	168	48.30	-4.10
7	891.44	42.8 QP	46.0	-3.2	1.00 V	185	44.60	-1.80

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) – Pre-Amplifier 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 (dBμV)	
	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	100288	Nov. 17, 2013	Nov. 16, 2014
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 21, 2012	Dec. 20, 2013
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 17, 2013	Jul. 16, 2014
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 2.

3. The VCCI Site Registration No. is C-2047.

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.

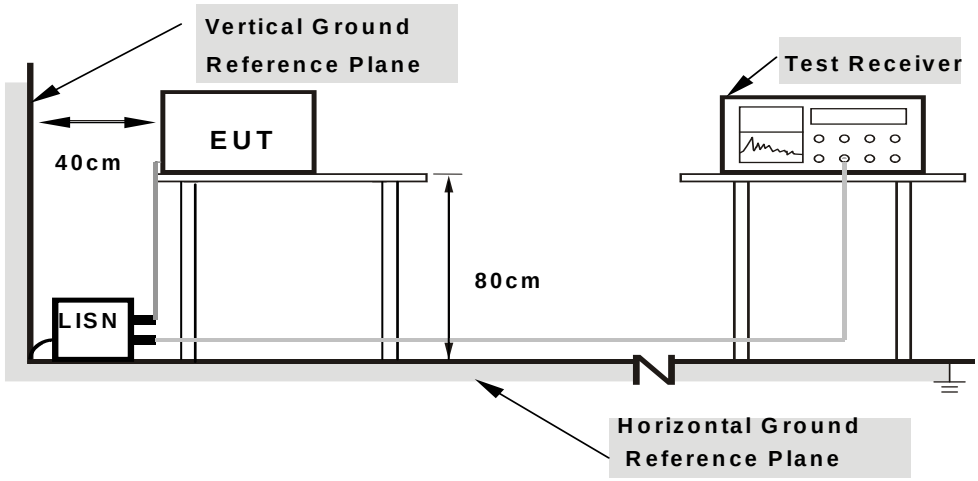
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

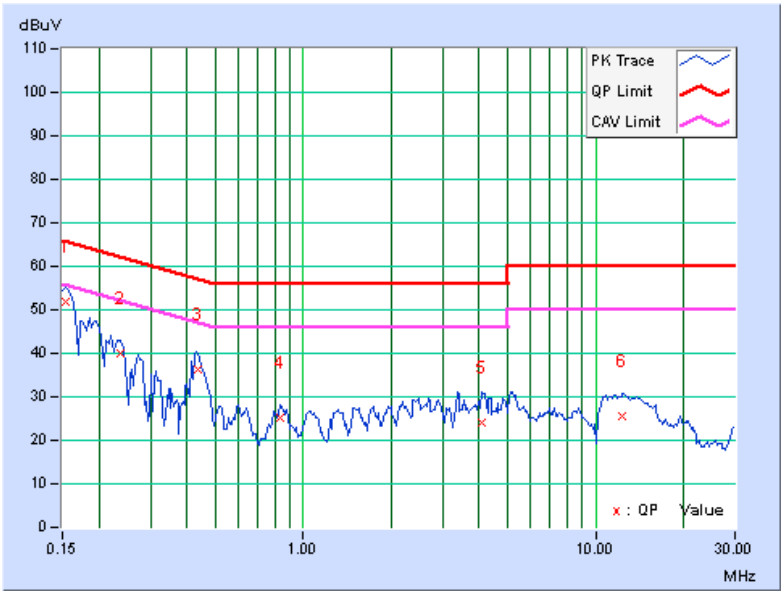
CONDUCTED WORST-CASE DATA：802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.17	51.74	34.11	51.91	34.28	65.79	55.79	-13.87	-21.50
2	0.23594	0.18	39.98	27.07	40.16	27.25	62.24	52.24	-22.08	-24.99
3	0.43761	0.21	35.97	31.98	36.18	32.19	57.11	47.11	-20.92	-14.91
4	0.83750	0.25	24.86	18.64	25.11	18.89	56.00	46.00	-30.89	-27.11
5	4.06641	0.37	23.72	12.00	24.09	12.37	56.00	46.00	-31.91	-33.63
6	12.35938	0.48	25.13	19.82	25.61	20.30	60.00	50.00	-34.39	-29.70

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

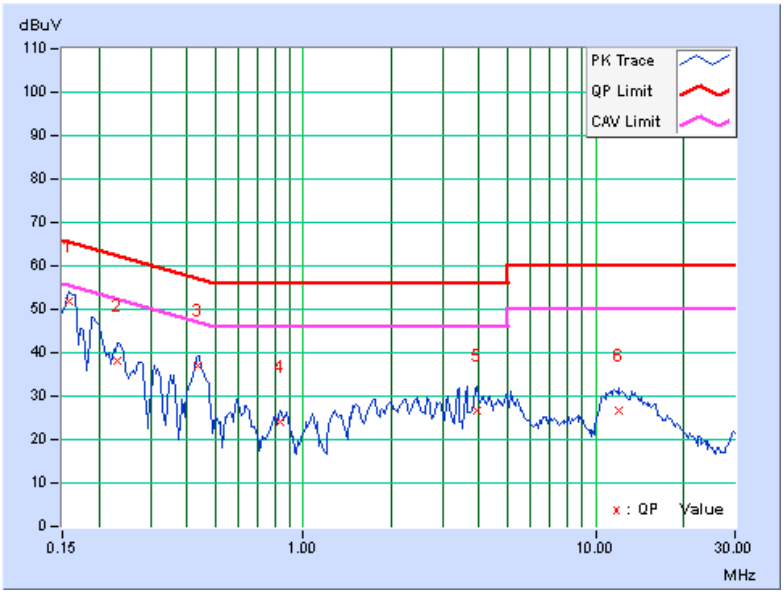


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.18	51.83	37.19	52.01	37.37	65.58	55.58	-13.56	-18.20
2	0.23203	0.19	37.91	21.82	38.10	22.01	62.38	52.38	-24.28	-30.37
3	0.43516	0.25	36.74	33.14	36.99	33.39	57.15	47.15	-20.16	-13.76
4	0.83750	0.24	23.72	17.93	23.96	18.17	56.00	46.00	-32.04	-27.83
5	3.92578	0.39	26.13	12.25	26.52	12.64	56.00	46.00	-29.48	-33.36
6	11.94531	0.53	26.18	20.89	26.71	21.42	60.00	50.00	-33.29	-28.58

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

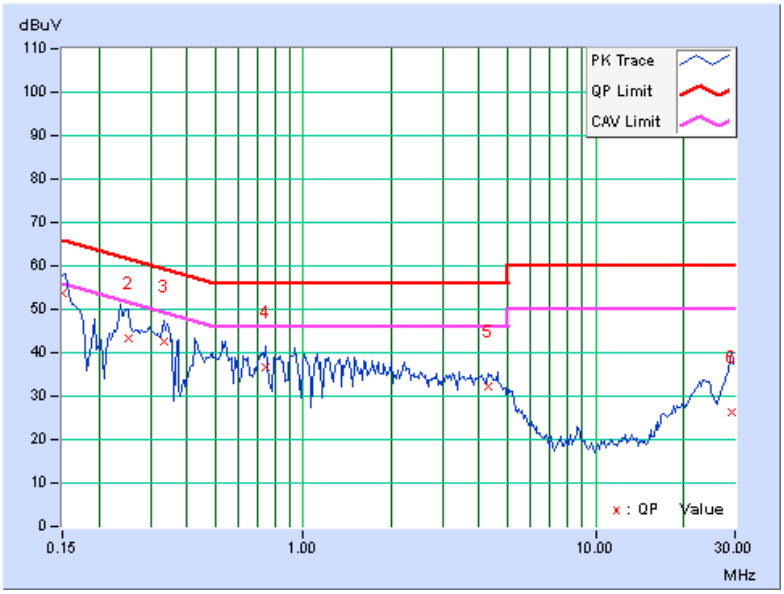


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**0.18**	**53.34**	**48.36**	**53.52**	**48.54**	**66.00**	**56.00**	**-12.48**	**-7.46**
2	0.25156	0.18	43.06	36.43	43.24	36.61	61.71	51.71	-18.47	-15.10
3	0.33359	0.20	42.43	32.90	42.63	33.10	59.36	49.36	-16.73	-16.26
4	0.73984	0.24	36.39	26.79	36.63	27.03	56.00	46.00	-19.37	-18.97
5	4.29688	0.37	31.96	22.97	32.33	23.34	56.00	46.00	-23.67	-22.66
6	29.17969	0.52	25.60	16.56	26.12	17.08	60.00	50.00	-33.88	-32.92

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

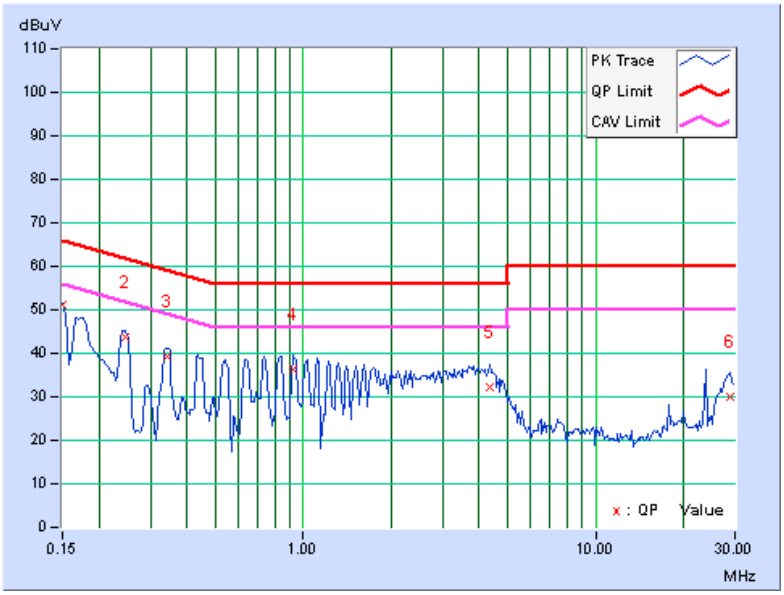


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.19	50.90	47.48	51.09	47.67	66.00	56.00	-14.91	-8.33
2	0.24766	0.20	43.42	39.41	43.62	39.61	61.84	51.84	-18.22	-12.23
3	0.34141	0.23	39.21	35.87	39.44	36.10	59.17	49.17	-19.73	-13.07
4	0.92344	0.23	35.96	26.22	36.19	26.45	56.00	46.00	-19.81	-19.55
5	4.37500	0.40	31.75	24.19	32.15	24.59	56.00	46.00	-23.85	-21.41
6	28.89063	0.62	29.52	19.52	30.14	20.14	60.00	50.00	-29.86	-29.86

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.

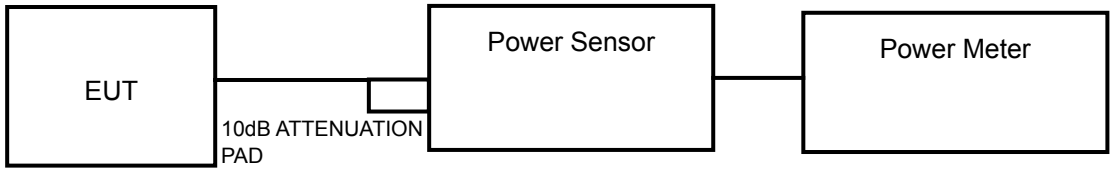
Per KDB 662911 D01 Multiple Transmitter Output v02 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

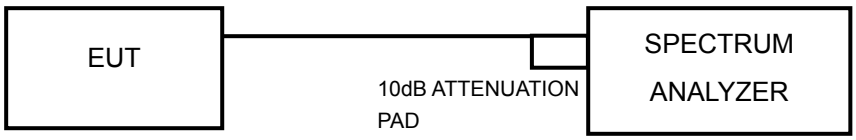
For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

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

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	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	16.144	12.08	16.72	PASS
40	5200	16.144	12.08	16.67	PASS
48	5240	16.032	12.05	16.73	PASS

NOTE:
1. 4dBm + 10log (18.72) = 16.72 < 17dBm
2. 4dBm + 10log (18.48) = 16.67 < 17dBm
3. 4dBm + 10log (18.76) = 16.73 < 17dBm

802.11n (20MHz)

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	10.93	10.82	24.466	13.89	16.71	PASS
40	5200	10.88	10.77	24.186	13.84	16.78	PASS
48	5240	10.77	10.69	23.662	13.74	16.86	PASS

NOTE:
CHAIN 0
1. 4dBm + 10log (18.65) = 16.71 < 17dBm
2. 4dBm + 10log (18.95) = 16.78 < 17dBm
3. 4dBm + 10log (19.41) = 16.88 < 17dBm

CHAIN 1
1. 4dBm + 10log (19.11) = 16.81 < 17dBm
2. 4dBm + 10log (19.12) = 16.81 < 17dBm
3. 4dBm + 10log (19.33) = 16.86 < 17dBm

802.11n (40MHz)

CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	10.72	10.64	23.391	13.69	17	PASS
46	5230	10.97	10.65	24.117	13.82	17	PASS

NOTE:
CHAIN 0
1. 4dBm + 10log (45.17) = 20.55 > 17dBm
2. 4dBm + 10log (45.91) = 20.62 > 17dBm

CHAIN 1
1. 4dBm + 10log (45.81) = 20.61 > 17dBm
2. 4dBm + 10log (44.75) = 20.51 > 17dBm

26dB BANDWIDTH:

802.11a

CHANNEL	FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
36	5180	18.72	PASS
40	5200	18.48	PASS
48	5240	18.76	PASS

802.11n (20MHz)

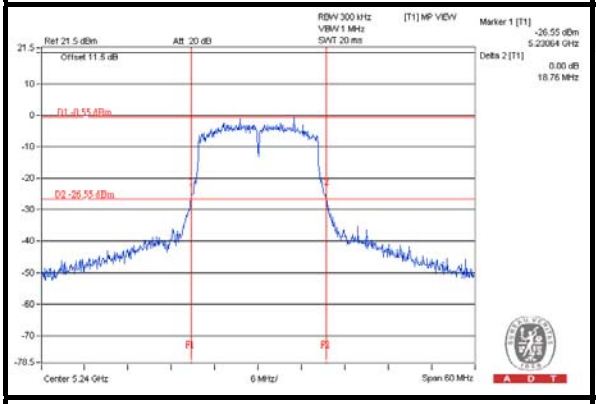
CHANNEL	FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
36	5180	18.65	19.11	PASS
40	5200	18.95	19.12	PASS
48	5240	19.41	19.33	PASS

802.11n (40MHz)

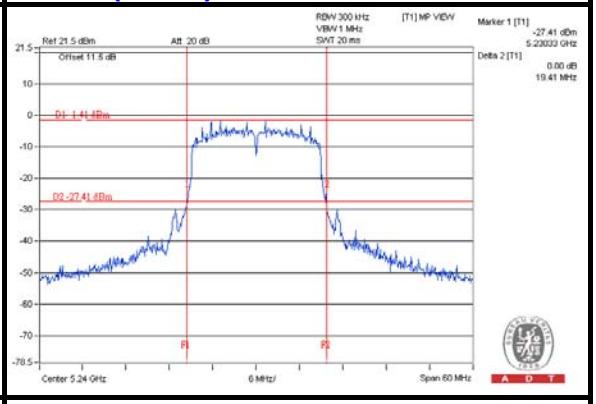
CHANNEL	FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
38	5190	45.17	45.81	PASS
46	5230	45.91	44.75	PASS

SPECTRUM PLOT OF WORST VALUE

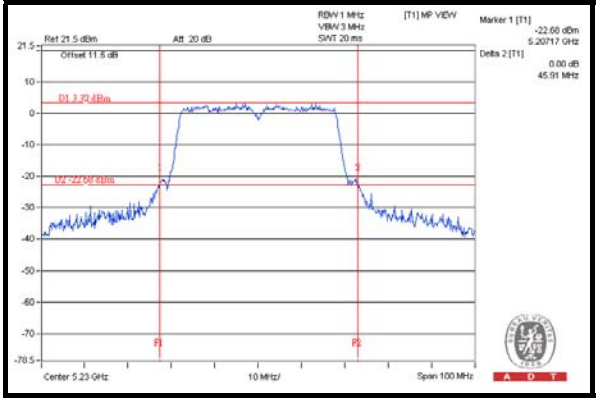
802.11a



802.11n (20MHz)



802.11n (40MHz)

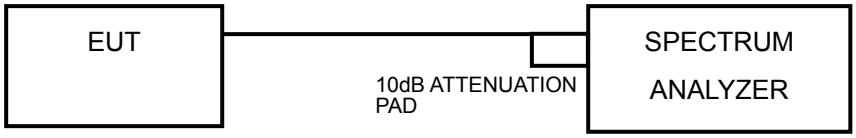


4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

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

Using method SA-2

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 30 KHz, Set VBW ≥ 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 W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	-0.97	0.21	-0.76	4	PASS
40	5200	-1.05	0.21	-0.84	4	PASS
48	5240	-1.46	0.21	-1.25	4	PASS

NOTE: Refer to section 3.3 for duty cycle spectrum plot.

802.11n (20MHz)

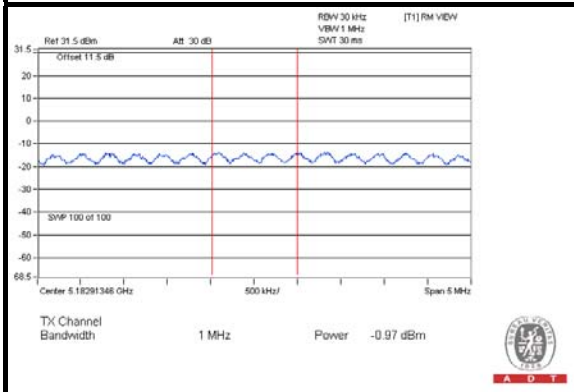
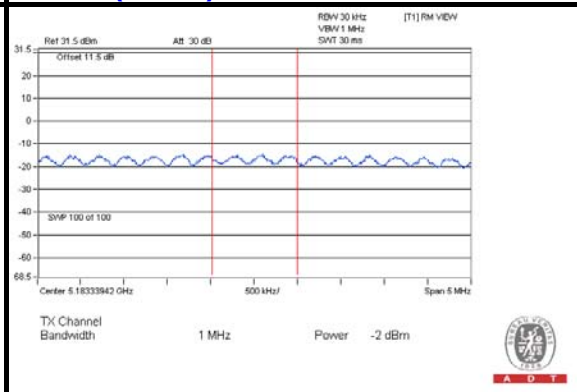
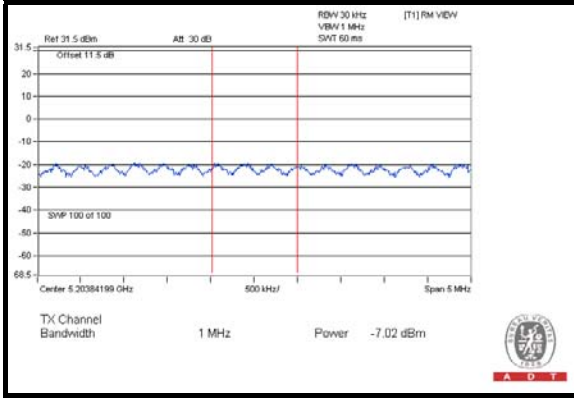
CHAN.	FREQ. (MHz)	PSD (dBm)		TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
36	5180	-2.00	-2.76	0.65	0.22	0.87	4	PASS
40	5200	-2.49	-2.86	0.34	0.22	0.56	4	PASS
48	5240	-3.02	-3.53	-0.24	0.22	-0.04	4	PASS

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 = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 4.69 < 6dBi, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (40MHz)

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					
38	5190	-7.02	-7.42	-4.21	0.43	-3.78	4	PASS
46	5230	-7.14	-8.23	-4.64	0.43	-4.21	4	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 = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 4.69 < 6dBi, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

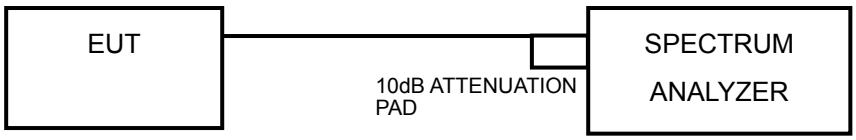
SPECTRUM PLOT OF WORST VALUE	
802.11a	**802.11n (20MHz)**
	
802.11n (40MHz)	
	

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 ≥ 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. Find the worst channel and modulation mode as above test procedure, and follow KDB 789033 D01 General UNII Test Procedures v01r03 and repeat step 1 to 5 for final testing of each modulation mode on a single channel (all modulation types) in a single operating band to compliance with the peak excursion requirement.

4.5.5 DEVIATION FROM TEST STANDARD

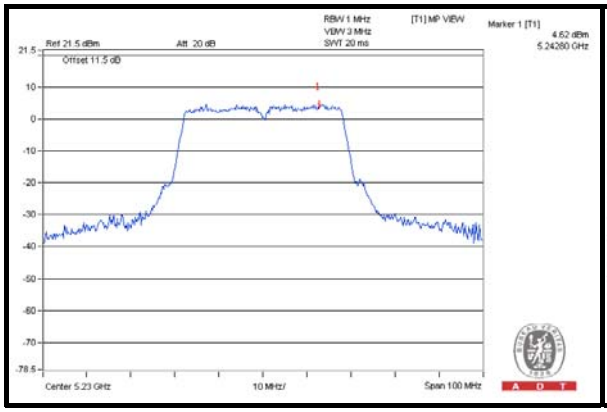
No deviation.

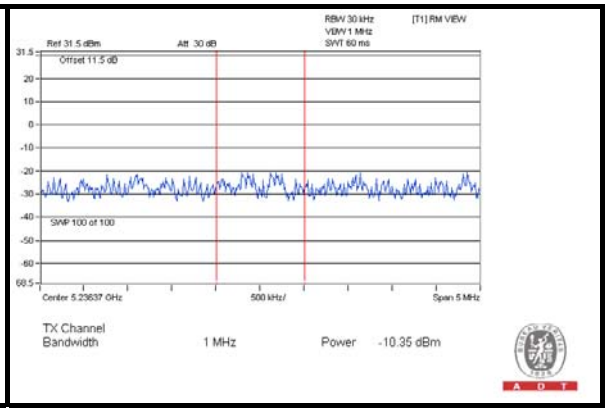
4.5.6 EUT OPERATING CONDITIONS

Same as 4.2.6

4.5.7 TEST RESULTS

MODULATION MODE	MODULATION TYPE	FREQ. (MHz)	PEAK VALUE (dBm)	PPSD WITHOUT DUTY FACTOR (dBm)	PPSD WITH DUTY FACTOR (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
802.11a	BPSK	5240	8.48	-1.46	-1.25	9.73	13	PASS
	QPSK		9.44	-1.58	-1.18	10.62	13	PASS
	16QAM		9.50	-2.71	-1.95	11.45	13	PASS
	64QAM		9.52	-4.18	-2.86	12.38	13	PASS
802.11n (20MHz)	BPSK	5240	7.19	-3.02	-2.80	9.99	13	PASS
	QPSK		8.51	-2.73	-2.31	10.82	13	PASS
	16QAM		8.76	-4.18	-3.42	12.18	13	PASS
	64QAM		8.59	-5.59	-4.19	12.78	13	PASS
802.11n (40MHz)	BPSK	5230	3.79	-7.14	-6.71	10.50	13	PASS
	QPSK		4.72	-7.95	-7.15	11.87	13	PASS
	16QAM		4.72	-9.34	-7.95	12.67	13	PASS
	64QAM		4.62	-10.35	-8.21	12.83	13	PASS



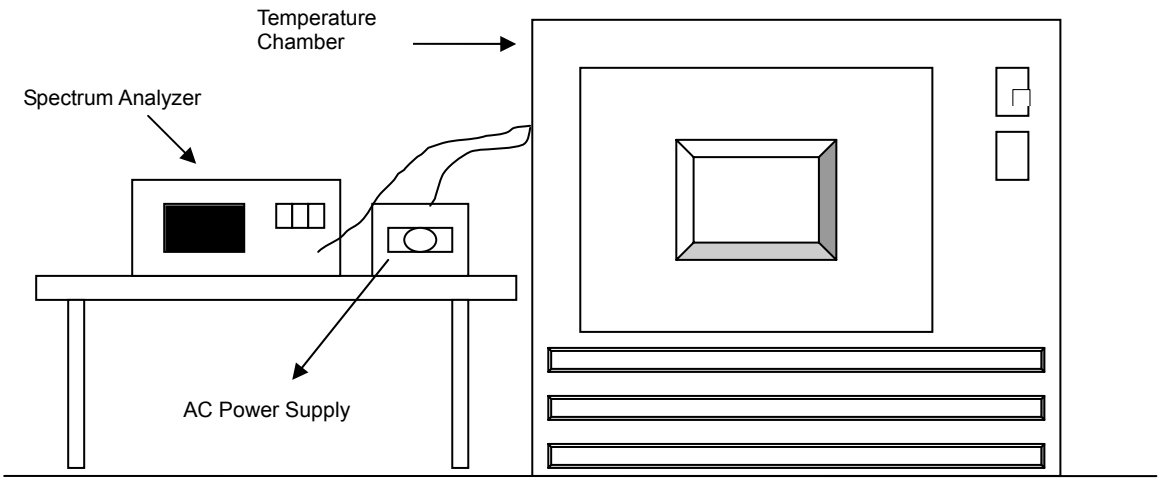


4.6 FREQUENCY STABILITY

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 AC 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.

4.6.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5200MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5199.9801	-0.00038	5199.9748	-0.00048	5199.9788	-0.00041	5199.9762	-0.00046
40	120	5199.9825	-0.00034	5199.9847	-0.00029	5199.9774	-0.00043	5199.9865	-0.00026
30	120	5199.983	-0.00033	5199.977	-0.00044	5199.977	-0.00044	5199.9834	-0.00032
20	120	5199.9952	-0.00009	5199.995	-0.00010	5199.9935	-0.00013	5199.9889	-0.00021
10	120	5200.0124	0.00024	5200.0157	0.00030	5200.0139	0.00027	5200.0176	0.00034
0	120	5199.9831	-0.00032	5199.9812	-0.00036	5199.9799	-0.00039	5199.9766	-0.00045
-10	120	5199.9986	-0.00003	5199.9975	-0.00005	5199.9965	-0.00007	5199.9978	-0.00004
-20	120	5200.0185	0.00036	5200.0134	0.00026	5200.0162	0.00031	5200.021	0.00040
-30	120	5199.9834	-0.00032	5199.9854	-0.00028	5199.987	-0.00025	5199.9883	-0.00023

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5200MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5199.9946	-0.00010	5199.9951	-0.00009	5199.994	-0.00012	5199.9887	-0.00022
	120	5199.9952	-0.00009	5199.995	-0.00010	5199.9935	-0.00013	5199.9889	-0.00021
	102	5199.995	-0.00010	5199.9955	-0.00009	5199.9935	-0.00013	5199.9894	-0.00020

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---