FCC TEST REPORT

(15.407)

REPORT NO.:	RF140514C27-1
MODEL NO.:	FortiAP-25Dxxxxxx (where “x” can be used as “A-Z”, or “0-9”, or “-“, or blank for software changes or marketing purposes only) (Refer to Item 3.1 for more detail)
FCC ID:	TVE-121213
RECEIVED:	May 14, 2014
TESTED:	May 29 ~ Jun. 12, 2014
ISSUED:	Jun. 20, 2014
APPLICANT:	Fortinet Inc.
ADDRESS:	899 Kifer Road Sunnyvale, CA 94086 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.

TABLE OF CONTENTS

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140514C27-1	Original release	Jun. 20, 2014

1. CERTIFICATION

PRODUCT: Secured Wireless Access Point

MODEL: FortiAP-25Dxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only) (Refer to Item 3.1 for more detail)

BRAND: Fortinet Inc.

APPLICANT: Fortinet Inc.

TESTED: May 29 ~ Jun. 12, 2014

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: **FCC Part 15, Subpart E (Section 15.407)**
ANSI C63.10-2009

The above equipment (model: FortiAP-25D) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ **, DATE :** Jun. 20, 2014
Pettie Chen / Senior Specialist

APPROVED BY : _____ **, DATE :** Jun. 20, 2014
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 Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -13.66dB at 0.49375MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5722.00MHz.
15.407(b) (1/2/3/4/6)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.5dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX 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	Secured Wireless Access Point
MODEL NO.	FortiAP-25Dxxxxxx (where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only) (Refer to NOTE for more detail)
POWER SUPPLY	100-240Vac, 0.25A, 50/60Hz
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 & 5745 ~ 5825MHz
NUMBER OF CHANNEL	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	168.854mW for 5180 ~ 5240MHz 108.825mW for 5745 ~ 5825MHz
ANTENNA TYPE	Ant. 1: PCB antenna with 6.1dBi gain Ant. 2: PCB antenna with 6.3dBi gain
ANTENNA CONNECTOR	IPEX
POWER CORD	NA
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	NA

NOTE:

1. All models are listed as below.

Brand	Model	Difference
Fortinet Inc.	FortiAP-25Dxxxxxx	where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only
	FAP-25Dxxxxxx	

*Model: FortiAP-25D was the final model.

2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

MODULATION MODE	TX FUNCTION
802.11a	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

3. The above EUT information is declared by manufacturer and for more detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

FOR 5180 ~ 5240MHz

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

FOR 5745 ~ 5825MHz

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

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

Where **RE≥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 **Z-plane**.

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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)		151 to 159	151, 159	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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5320, 5745-5825	36 to 64, 149 to 165	48	OFDM	BPSK	6.0

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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5320, 5745-5825	36 to 64, 149 to 165	48	OFDM	BPSK	6.0

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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	21deg. C, 69%RH	120Vac, 60Hz	Chris Lin
RE<1G	21deg. C, 69%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	21deg. C, 60%RH	120Vac, 60Hz	Nick Chen

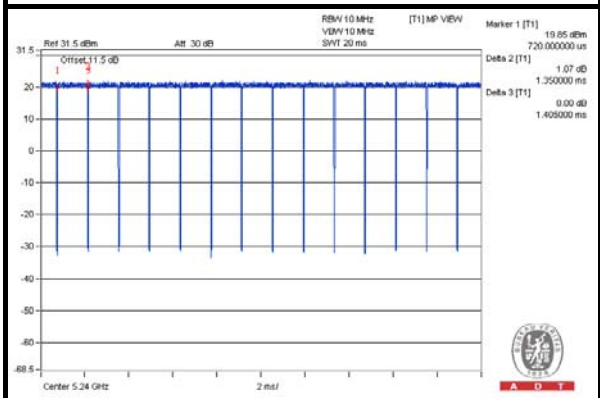
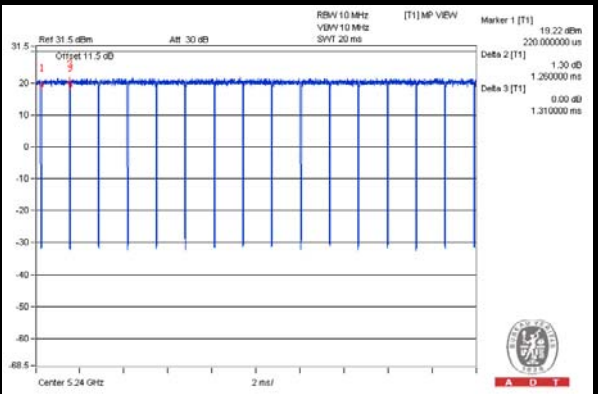
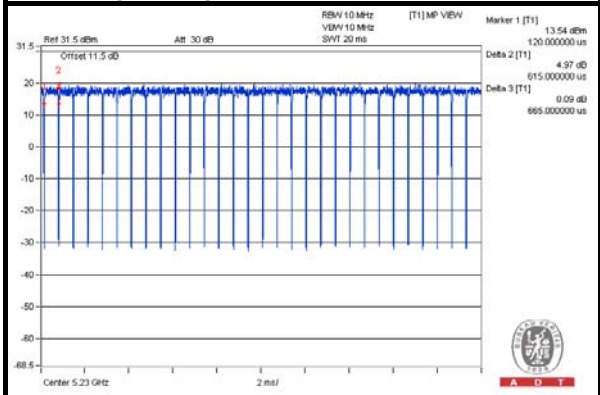
3.3 DUTY CYCLE OF TEST SIGNAL

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

802.11a: Duty cycle = 1.35/1.405 = 0.961, Duty factor = 10 * log(1/0.961) = 0.17

802.11n (20MHz): Duty cycle = 1.26/1.31 = 0.962, Duty factor = 10 * log(1/0.962) = 0.17

802.11n (40MHz): Duty cycle = 0.615/0.665 = 0.925, Duty factor = 10 * log(1/0.925) = 0.34

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

3.4 DESCRIPTION OF SUPPORT UNITS

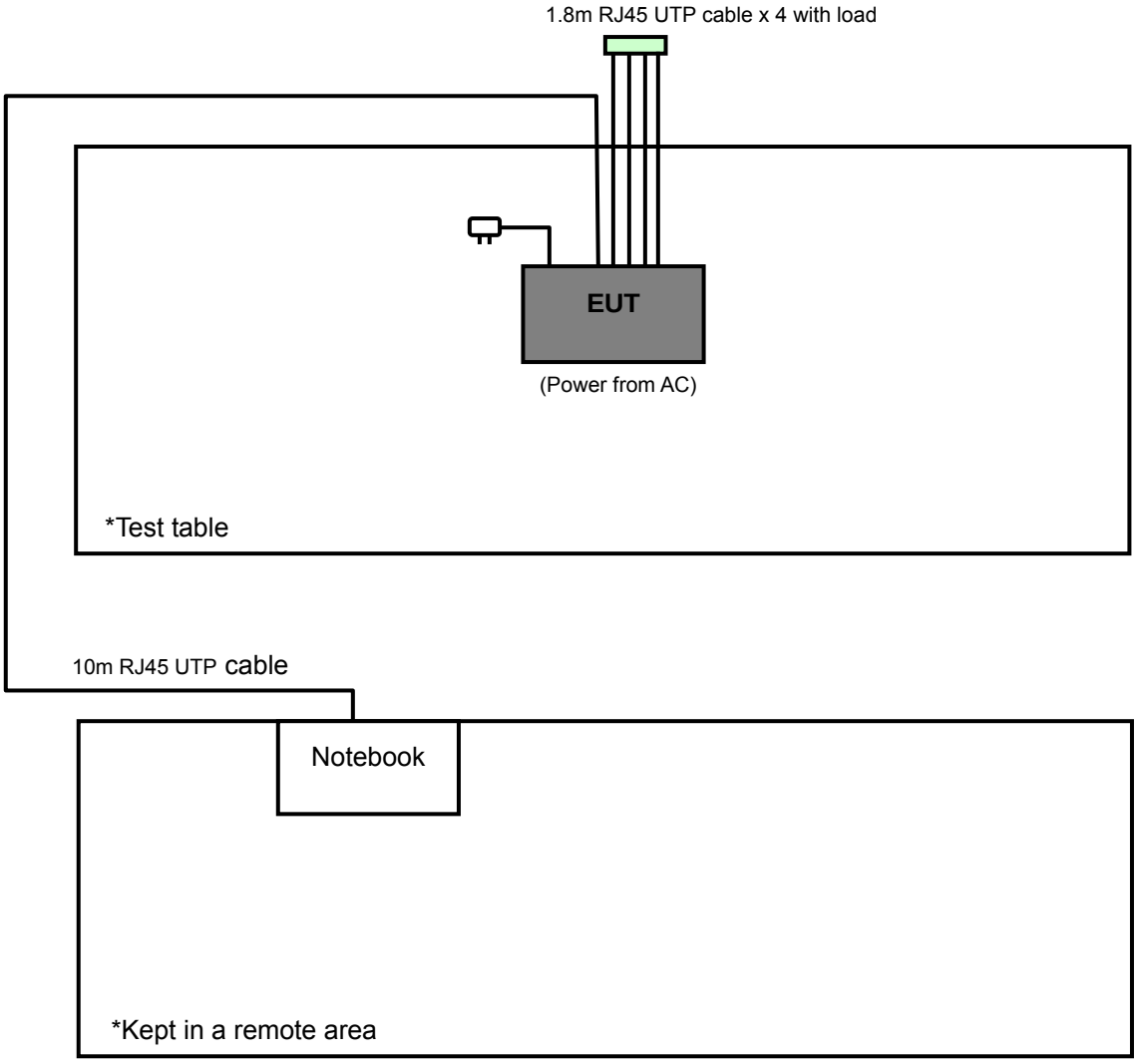
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable

NOTE:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as a 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 specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)
789033 D02 General UNII Test Procedures New Rules v01
662911 D01 Multiple Transmitter Output v02r01
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	
√	789033 D02 General UNII Test Procedures New Rules v01	FIELD STRENGTH AT 3m	
		PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
APPLICABLE TO		**EIRP LIMIT**	**EQUIVALENT FIELD STRENGTH AT 3m**
√	15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.3 (dBμV/m)
	15.407(b)(2)		
	15.407(b)(3)		
√	15.407(b)(4)	PK: -27 (dBm/MHz) *1 PK: -17 (dBm/MHz) *2	PK: 68.3 (dBμV/m) *1 PK: 78.3 (dBμV/m) *2

NOTE: *1 beyond 10MHz of the band edge *2 within 10 MHz of band edge

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Jan. 02, 2014	Jan. 01, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Mar. 03, 2014	Mar. 02, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	9120D	209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 07, 2013	Oct. 06, 2014
Preamplifier Agilent	8449B	3008A01964	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	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	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824011	Jul. 29, 2013	Jul. 28, 2014
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 2014
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 10, 2013	Jun. 09, 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 3.
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 988962.
5. 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 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:

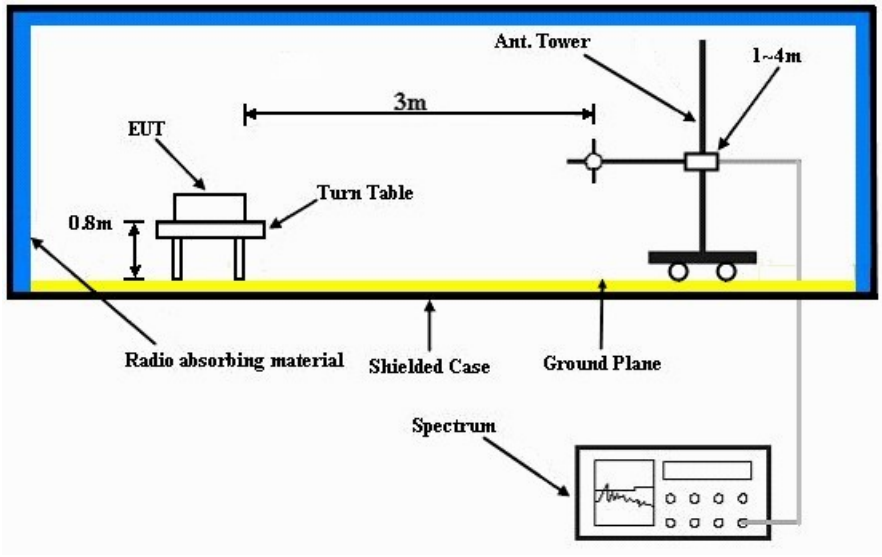
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

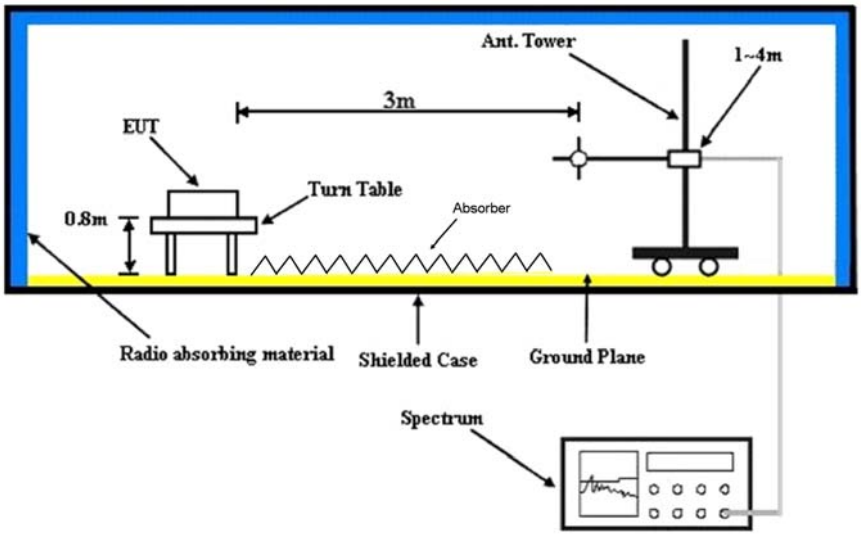
No deviation.

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 the testing table.
b. Prepared a notebook to act as communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".
e. The necessary accessories enable the system in full functions.

4.1.8 TEST RESULTS

ABOVE 1GHz DATA

For U-NII-1 Band

802.11a

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	54.6 PK	74.0	-19.4	1.12 H	39	49.50	5.10
2	5150.00	44.1 AV	54.0	-9.9	1.12 H	39	39.00	5.10
3	*5180.00	100.9 PK			1.18 H	243	63.20	37.70
4	*5180.00	91.4 AV			1.18 H	243	53.70	37.70
5	#10360.00	60.5 PK	68.3	-7.8	1.00 H	110	42.20	18.30
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	69.6 PK	74.0	-4.4	1.30 V	154	64.50	5.10
2	5150.00	52.5 AV	54.0	-1.5	1.30 V	154	47.40	5.10
3	*5180.00	116.9 PK			1.17 V	147	79.20	37.70
4	*5180.00	106.7 AV			1.17 V	147	69.00	37.70
5	#10360.00	60.2 PK	68.3	-8.1	1.12 V	206	41.90	18.30

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.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	55.8 PK	74.0	-18.2	1.16 H	87	50.70	5.10
2	5150.00	45.4 AV	54.0	-8.6	1.16 H	87	40.30	5.10
3	*5200.00	102.3 PK			1.00 H	117	64.50	37.80
4	*5200.00	92.2 AV			1.00 H	117	54.40	37.80
5	5350.00	56.0 PK	74.0	-18.0	1.07 H	122	50.60	5.40
6	5350.00	44.4 AV	54.0	-9.6	1.07 H	122	39.00	5.40
7	#10400.00	66.6 PK	68.3	-1.7	1.01 H	114	47.90	18.70
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	5150.00	70.2 PK	74.0	-3.8	1.17 V	171	65.10	5.10
2	5150.00	51.1 AV	54.0	-2.9	1.17 V	171	46.00	5.10
3	*5200.00	118.0 PK			1.17 V	195	80.20	37.80
4	*5200.00	108.2 AV			1.17 V	195	70.40	37.80
5	5350.00	57.5 PK	74.0	-16.5	1.00 V	232	52.10	5.40
6	5350.00	46.5 AV	54.0	-7.5	1.00 V	232	41.10	5.40
7	#10400.00	64.1 PK	68.3	-4.2	1.00 V	288	45.40	18.70

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.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	105.1 PK			1.09 H	251	67.20	37.90
2	*5240.00	95.1 AV			1.09 H	251	57.20	37.90
3	5350.00	56.0 PK	74.0	-18.0	1.16 H	74	50.60	5.40
4	5350.00	44.4 AV	54.0	-9.6	1.16 H	74	39.00	5.40
5	#10480.00	67.1 PK	68.3	-1.2	1.36 H	138	47.60	19.50
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	*5240.00	120.4 PK			1.27 V	202	82.50	37.90
2	*5240.00	110.0 AV			1.27 V	202	72.10	37.90
3	5350.00	58.1 PK	74.0	-15.9	1.51 V	225	52.70	5.40
4	5350.00	47.9 AV	54.0	-6.1	1.51 V	225	42.50	5.40
5	#10480.00	66.4 PK	68.3	-1.9	1.05 V	173	46.90	19.50

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)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	56.0 PK	74.0	-18.0	1.08 H	129	50.90	5.10
2	5150.00	44.8 AV	54.0	-9.2	1.08 H	129	39.70	5.10
3	*5180.00	103.4 PK			1.39 H	236	65.70	37.70
4	*5180.00	93.2 AV			1.39 H	236	55.50	37.70
5	#10360.00	60.2 PK	68.3	-8.1	1.32 H	58	41.90	18.30
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	72.1 PK	74.0	-1.9	1.09 V	187	67.00	5.10
2	5150.00	52.5 AV	54.0	-1.5	1.09 V	187	47.40	5.10
3	*5180.00	115.4 PK			1.17 V	196	77.70	37.70
4	*5180.00	105.6 AV			1.17 V	196	67.90	37.70
5	#10360.00	58.9 PK	68.3	-9.4	1.14 V	38	40.60	18.30

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.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	55.8 PK	74.0	-18.2	1.18 H	74	50.70	5.10
2	5150.00	43.8 AV	54.0	-10.2	1.18 H	74	38.70	5.10
3	*5200.00	101.5 PK			1.00 H	118	63.70	37.80
4	*5200.00	91.1 AV			1.00 H	118	53.30	37.80
5	5350.00	55.8 PK	74.0	-18.2	1.33 H	26	50.40	5.40
6	5350.00	44.1 AV	54.0	-9.9	1.33 H	26	38.70	5.40
7	#10400.00	66.8 PK	68.3	-1.5	1.51 H	141	48.10	18.70
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	5150.00	71.1 PK	74.0	-2.9	1.27 V	136	66.00	5.10
2	5150.00	50.8 AV	54.0	-3.2	1.27 V	136	45.70	5.10
3	*5200.00	118.1 PK			1.27 V	138	80.30	37.80
4	*5200.00	107.2 AV			1.27 V	138	69.40	37.80
5	5350.00	57.9 PK	74.0	-16.1	1.50 V	228	52.50	5.40
6	5350.00	46.9 AV	54.0	-7.1	1.50 V	228	41.50	5.40
7	#10400.00	64.3 PK	68.3	-4.0	1.00 V	284	45.60	18.70

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.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	103.4 PK			1.01 H	227	65.50	37.90
2	*5240.00	93.3 AV			1.01 H	227	55.40	37.90
3	5350.00	55.3 PK	74.0	-18.7	1.36 H	258	49.90	5.40
4	5350.00	44.3 AV	54.0	-9.7	1.36 H	258	38.90	5.40
5	#10480.00	67.0 PK	68.3	-1.3	1.89 H	205	47.50	19.50
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	*5240.00	117.2 PK			1.17 V	144	79.30	37.90
2	*5240.00	107.5 AV			1.17 V	144	69.60	37.90
3	5350.00	58.4 PK	74.0	-15.6	1.22 V	131	53.00	5.40
4	5350.00	48.4 AV	54.0	-5.6	1.22 V	131	43.00	5.40
5	#10480.00	62.4 PK	68.3	-5.9	1.00 V	320	42.90	19.50

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)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	55.8 PK	74.0	-18.2	1.09 H	66	50.70	5.10
2	5150.00	44.0 AV	54.0	-10.0	1.09 H	66	38.90	5.10
3	*5190.00	92.2 PK			1.30 H	245	54.40	37.80
4	*5190.00	82.4 AV			1.30 H	245	44.60	37.80
5	#10380.00	61.0 PK	68.3	-7.3	1.33 H	220	42.60	18.40
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	5150.00	69.5 PK	74.0	-4.5	1.51 V	179	64.40	5.10
2	5150.00	52.2 AV	54.0	-1.8	1.51 V	179	47.10	5.10
3	*5190.00	106.6 PK			1.28 V	195	68.80	37.80
4	*5190.00	96.6 AV			1.28 V	195	58.80	37.80
5	#10380.00	61.0 PK	68.3	-7.3	1.16 V	7	42.60	18.40

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

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	55.8 PK	74.0	-18.2	1.05 H	99	50.70	5.10
2	5150.00	44.0 AV	54.0	-10.0	1.05 H	99	38.90	5.10
3	*5230.00	99.8 PK			1.00 H	117	61.90	37.90
4	*5230.00	90.3 AV			1.00 H	117	52.40	37.90
5	5350.00	56.9 PK	74.0	-17.1	1.17 H	45	51.50	5.40
6	5350.00	45.1 AV	54.0	-8.9	1.17 H	45	39.70	5.40
7	#10460.00	61.2 PK	68.3	-7.1	1.19 H	63	42.00	19.20
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	5150.00	71.8 PK	74.0	-2.2	1.40 V	161	66.70	5.10
2	5150.00	52.2 AV	54.0	-1.8	1.40 V	161	47.10	5.10
3	*5230.00	113.5 PK			1.48 V	153	75.60	37.90
4	*5230.00	103.3 AV			1.48 V	153	65.40	37.90
5	5350.00	62.4 PK	74.0	-11.6	1.21 V	242	57.00	5.40
6	5350.00	48.4 AV	54.0	-5.6	1.21 V	242	43.00	5.40
7	#10460.00	61.8 PK	68.3	-6.5	1.16 V	30	42.60	19.20

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.

For U-NII-3 Band

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	#5714.00	56.7 PK	68.3	-11.6	1.36 H	87	50.70	6.00
2	#5722.00	57.7 PK	78.3	-20.6	1.29 H	207	51.70	6.00
3	#5725.00	44.4 PK	78.3	-33.9	1.16 H	320	38.40	6.00
4	*5745.00	97.4 PK			1.10 H	130	58.90	38.50
5	*5745.00	87.7 AV			1.10 H	130	49.20	38.50
6	11490.00	61.7 PK	74.0	-12.3	1.05 H	88	41.30	20.40
7	11490.00	47.9 AV	54.0	-6.1	1.05 H	88	27.50	20.40
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	#5714.00	65.9 PK	68.3	-2.4	1.49 V	233	59.90	6.00
2	#5722.00	77.2 PK	78.3	-1.1	1.22 V	208	71.20	6.00
3	#5725.00	60.0 PK	78.3	-18.3	1.39 V	224	54.00	6.00
4	*5745.00	111.3 PK			1.31 V	186	72.80	38.50
5	*5745.00	102.1 AV			1.31 V	186	63.60	38.50
6	11490.00	63.0 PK	74.0	-11.0	1.16 V	32	42.60	20.40
7	11490.00	49.1 AV	54.0	-4.9	1.16 V	32	28.70	20.40

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5785.00	102.1 PK			1.00 H	130	63.50	38.60
2	*5785.00	92.4 AV			1.00 H	130	53.80	38.60
3	11570.00	61.6 PK	74.0	-12.4	1.06 H	58	41.20	20.40
4	11570.00	49.0 AV	54.0	-5.0	1.06 H	58	28.60	20.40
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	*5785.00	113.9 PK			1.27 V	100	75.30	38.60
2	*5785.00	103.8 AV			1.27 V	100	65.20	38.60
3	11570.00	63.2 PK	74.0	-10.8	1.05 V	339	42.80	20.40
4	11570.00	50.3 AV	54.0	-3.7	1.05 V	339	29.90	20.40

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
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5825.00	98.5 PK			1.00 H	213	59.80	38.70
2	*5825.00	89.6 AV			1.00 H	213	50.90	38.70
3	#5850.00	41.1 PK	78.3	-37.2	1.47 H	85	34.90	6.20
4	#5853.00	59.1 PK	78.3	-19.2	1.09 H	147	52.70	6.40
5	#5861.00	58.6 PK	68.3	-9.7	1.10 H	51	52.20	6.40
6	11650.00	61.7 PK	74.0	-12.3	1.08 H	208	41.40	20.30
7	11650.00	47.9 AV	54.0	-6.1	1.08 H	208	27.60	20.30
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	*5825.00	111.8 PK			1.17 V	105	73.10	38.70
2	*5825.00	102.6 AV			1.17 V	105	63.90	38.70
3	#5850.00	54.9 PK	78.3	-23.4	1.37 V	227	48.70	6.20
4	#5853.00	70.5 PK	78.3	-7.8	1.32 V	95	64.10	6.40
5	#5861.00	66.5 PK	68.3	-1.8	1.37 V	228	60.10	6.40
6	11650.00	62.9 PK	74.0	-11.1	1.13 V	68	42.60	20.30
7	11650.00	48.2 AV	54.0	-5.8	1.13 V	68	27.90	20.30

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)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5714.00	57.1 PK	68.3	-11.2	1.07 H	49	51.10	6.00
2	#5722.00	58.7 PK	78.3	-19.6	1.26 H	305	52.70	6.00
3	#5725.00	43.6 PK	78.3	-34.7	1.37 H	45	37.60	6.00
4	*5745.00	96.0 PK			1.00 H	130	57.50	38.50
5	*5745.00	86.3 AV			1.00 H	130	47.80	38.50
6	11490.00	61.9 PK	74.0	-12.1	1.13 H	258	41.50	20.40
7	11490.00	47.8 AV	54.0	-6.2	1.13 H	258	27.40	20.40
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	#5714.00	66.1 PK	68.3	-2.2	1.24 V	199	60.10	6.00
2	**#5722.00**	**77.3 PK**	**78.3**	**-1.0**	**1.33 V**	**187**	**71.30**	**6.00**
3	#5725.00	64.6 PK	78.3	-13.7	1.10 V	236	58.60	6.00
4	*5745.00	110.3 PK			1.42 V	164	71.80	38.50
5	*5745.00	99.9 AV			1.42 V	164	61.40	38.50
6	11490.00	62.0 PK	74.0	-12.0	1.14 V	78	41.60	20.40
7	11490.00	48.0 AV	54.0	-6.0	1.14 V	78	27.60	20.40

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5785.00	102.4 PK			1.05 H	135	63.80	38.60
2	*5785.00	92.3 AV			1.05 H	135	53.70	38.60
3	11570.00	62.9 PK	74.0	-11.1	1.06 H	33	42.50	20.40
4	11570.00	49.0 AV	54.0	-5.0	1.06 H	33	28.60	20.40
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	*5785.00	114.5 PK			1.30 V	110	75.90	38.60
2	*5785.00	104.7 AV			1.30 V	110	66.10	38.60
3	11570.00	62.7 PK	74.0	-11.3	1.18 V	41	42.30	20.40
4	11570.00	49.1 AV	54.0	-4.9	1.18 V	41	28.70	20.40

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
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5825.00	98.6 PK			1.00 H	94	59.90	38.70
2	*5825.00	88.8 AV			1.00 H	94	50.10	38.70
3	#5850.00	44.2 PK	78.3	-34.1	1.08 H	15	38.00	6.20
4	#5853.00	58.4 PK	78.3	-19.9	1.05 H	127	52.00	6.40
5	#5861.00	59.2 PK	68.3	-9.1	1.06 H	18	52.80	6.40
6	11650.00	62.3 PK	74.0	-11.7	1.06 H	38	42.00	20.30
7	11650.00	48.2 AV	54.0	-5.8	1.06 H	38	27.90	20.30
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	*5825.00	112.6 PK			1.26 V	234	73.90	38.70
2	*5825.00	102.4 AV			1.26 V	234	63.70	38.70
3	#5850.00	54.2 PK	78.3	-24.1	1.20 V	159	48.00	6.20
4	#5853.00	70.5 PK	78.3	-7.8	1.38 V	224	64.10	6.40
5	#5861.00	66.8 PK	68.3	-1.5	1.26 V	244	60.40	6.40
6	11650.00	61.8 PK	74.0	-12.2	1.06 V	36	41.50	20.30
7	11650.00	47.9 AV	54.0	-6.1	1.06 V	36	27.60	20.30

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)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5714.00	56.3 PK	68.3	-12.0	1.06 H	197	50.30	6.00
2	#5722.00	56.6 PK	78.3	-21.7	1.16 H	210	50.60	6.00
3	#5725.00	44.7 PK	78.3	-33.6	1.18 H	223	38.70	6.00
4	*5755.00	85.1 PK			1.00 H	234	46.50	38.60
5	*5755.00	75.7 AV			1.00 H	234	37.10	38.60
6	11510.00	62.3 PK	74.0	-11.7	1.10 H	56	41.90	20.40
7	11510.00	48.4 AV	54.0	-5.6	1.10 H	56	28.00	20.40
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	#5714.00	67.2 PK	68.3	-1.1	1.28 V	111	61.20	6.00
2	#5722.00	70.0 PK	78.3	-8.3	1.21 V	199	64.00	6.00
3	#5725.00	54.8 PK	78.3	-23.5	1.22 V	195	48.80	6.00
4	*5755.00	102.8 PK			1.19 V	135	64.20	38.60
5	*5755.00	93.6 AV			1.19 V	135	55.00	38.60
6	11510.00	62.9 PK	74.0	-11.1	1.16 V	30	42.50	20.40
7	11510.00	49.1 AV	54.0	-4.9	1.16 V	30	28.70	20.40

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

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	*5795.00	93.2 PK			1.00 H	236	54.60	38.60
2	*5795.00	83.9 AV			1.00 H	236	45.30	38.60
3	#5850.00	44.6 PK	78.3	-33.7	1.17 H	45	38.40	6.20
4	#5853.00	57.1 PK	78.3	-21.2	1.21 H	22	50.70	6.40
5	#5861.00	57.0 PK	68.3	-11.3	1.15 H	10	50.60	6.40
6	11590.00	62.0 PK	74.0	-12.0	1.06 H	54	41.60	20.40
7	11590.00	47.9 AV	54.0	-6.1	1.06 H	54	27.50	20.40
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	*5795.00	111.3 PK			1.09 V	147	72.70	38.60
2	*5795.00	100.8 AV			1.09 V	147	62.20	38.60
3	#5850.00	56.6 PK	78.3	-21.7	1.47 V	146	50.40	6.20
4	#5853.00	68.5 PK	78.3	-9.8	1.01 V	214	62.10	6.40
5	#5861.00	67.2 PK	68.3	-1.1	1.26 V	209	60.80	6.40
6	11590.00	63.0 PK	74.0	-11.0	1.10 V	228	42.60	20.40
7	11590.00	49.4 AV	54.0	-4.6	1.10 V	228	29.00	20.40

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

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 48	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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	57.12	32.3 QP	40.0	-7.7	1.99 H	42	46.90	-14.60
2	125.17	36.6 QP	43.5	-6.9	1.50 H	214	52.40	-15.80
3	249.60	32.7 QP	46.0	-13.3	1.00 H	94	46.90	-14.20
4	374.04	28.8 QP	46.0	-17.2	1.00 H	143	39.50	-10.70
5	500.42	36.8 QP	46.0	-9.2	1.24 H	189	45.10	-8.30
6	624.85	29.3 QP	46.0	-16.7	1.00 H	305	34.80	-5.50
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	59.06	37.9 QP	40.0	-2.1	1.51 V	14	52.60	-14.70
2	125.17	37.8 QP	43.5	-5.7	1.00 V	53	53.60	-15.80
3	249.60	34.6 QP	46.0	-11.4	1.00 V	93	48.80	-14.20
4	374.04	28.7 QP	46.0	-17.3	1.25 V	112	39.40	-10.70
5	500.42	37.0 QP	46.0	-9.0	1.00 V	66	45.30	-8.30
6	675.40	32.5 QP	46.0	-13.5	1.25 V	260	37.30	-4.80
7	836.78	40.0 QP	46.0	-6.0	1.51 V	14	41.70	-1.70

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

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	100289	Nov. 29, 2013	Nov. 28, 2014
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
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 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

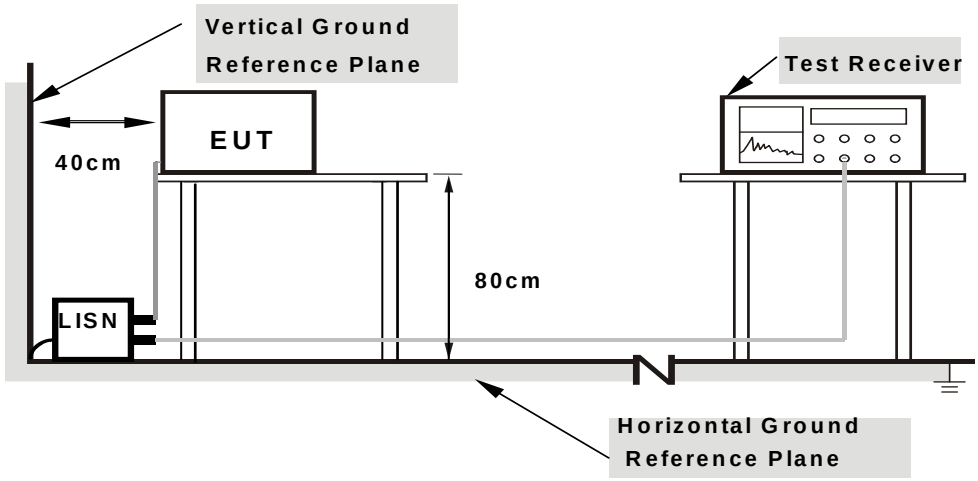
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

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

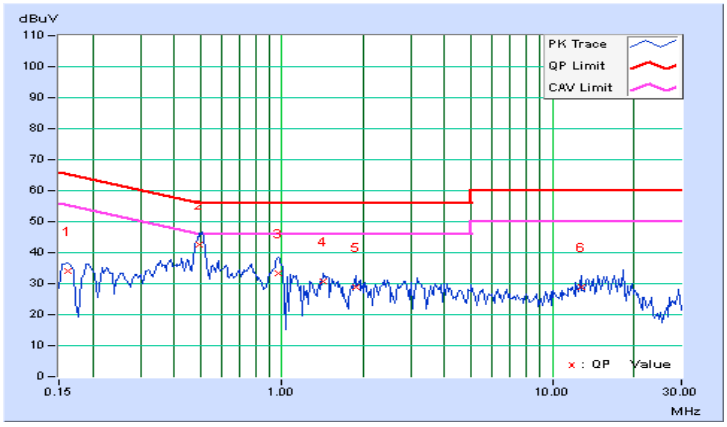
CONDUCTED WORST-CASE DATA: 802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz

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	0.16172	0.27	33.87	26.98	34.14	27.25	65.38	55.38	-31.24	-28.13
2	**0.49375**	**0.31**	**42.14**	**29.03**	**42.45**	**29.34**	**56.10**	**46.10**	**-13.66**	**-16.77**
3	0.97031	0.34	33.05	20.24	33.39	20.58	56.00	46.00	-22.61	-25.42
4	1.42578	0.35	30.29	20.63	30.64	20.98	56.00	46.00	-25.36	-25.02
5	1.87109	0.36	28.38	18.65	28.74	19.01	56.00	46.00	-27.26	-26.99
6	12.75000	0.52	28.50	22.68	29.02	23.20	60.00	50.00	-30.98	-26.80

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

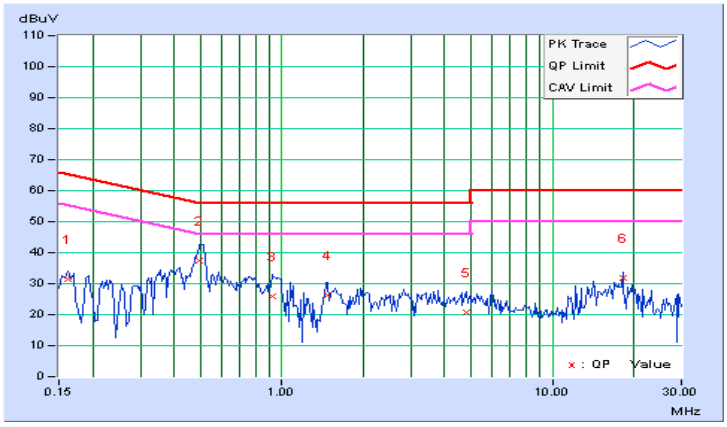


PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	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	0.16172	0.27	31.08	20.34	31.35	20.61	65.38	55.38	-34.03	-34.77
2	0.49766	0.31	37.12	21.63	37.43	21.94	56.04	46.04	-18.61	-24.10
3	0.91953	0.33	25.72	12.79	26.05	13.12	56.00	46.00	-29.95	-32.88
4	1.46875	0.35	26.13	14.11	26.48	14.46	56.00	46.00	-29.52	-31.54
5	4.81641	0.45	20.38	7.17	20.83	7.62	56.00	46.00	-35.17	-38.38
6	18.25391	0.61	31.31	27.90	31.92	28.51	60.00	50.00	-28.08	-21.49

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 TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A		---	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C		---	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√	---	1 Watt (30 dBm)

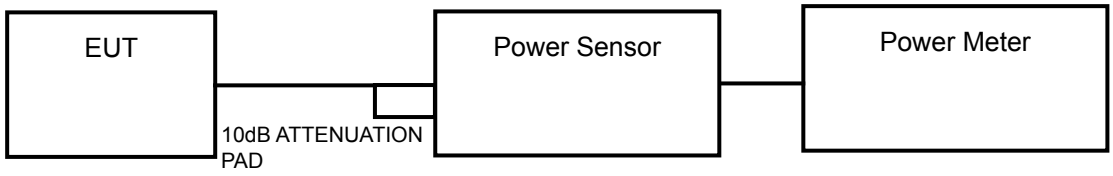
*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 D01 Multiple Transmitter Output v02r01 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



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.

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

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	16.25	16.69	88.836	19.49	29.70	PASS
40	5200	17.79	18.80	135.975	21.33	29.70	PASS
48	5240	18.83	19.66	**168.854**	22.28	29.70	PASS
149	5745	11.69	12.34	31.897	15.04	29.70	PASS
157	5785	17.68	16.07	99.072	19.96	29.70	PASS
165	5825	16.44	15.51	79.618	19.01	29.70	PASS

Max gain = 6.3 > 6dBi, so the conducted power limit shall be reduced to 30-(6.3-6) = 29.7dBm.

802.11n (20MHz)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	16.19	16.37	84.942	19.29	29.70	PASS
40	5200	18.52	19.46	159.429	22.03	29.70	PASS
48	5240	18.28	18.90	144.923	21.61	29.70	PASS
149	5745	10.22	9.41	19.250	12.84	29.70	PASS
157	5785	17.92	16.71	108.825	20.37	29.70	PASS
165	5825	15.51	15.44	70.558	18.49	29.70	PASS

Max gain = 6.3 > 6dBi, so the conducted power limit shall be reduced to 30-(6.3-6) = 29.7dBm.

802.11n (40MHz)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	9.55	9.47	17.867	12.52	29.70	PASS
46	5230	17.53	17.79	116.741	20.67	29.70	PASS
151	5755	5.83	5.71	7.552	8.78	29.70	PASS
159	5795	14.67	14.43	57.042	17.56	29.70	PASS

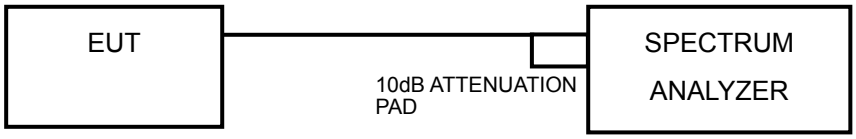
Max gain = 6.3 > 6dBi, so the conducted power limit shall be reduced to 30-(6.3-6) = 29.7dBm.

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
	√	Indoor Access Point	
		Mobile and Portable client device	11dBm/ MHz
U-NII-2A		---	11dBm/ MHz
U-NII-2C		---	11dBm/ MHz
U-NII-3	√	---	30dBm/ MHz

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 U-NII-1 band:

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)

For U-NII-3 band:

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
3) Sweep time = auto, trigger set to “free run”.
4) Trace average at least 100 traces in power averaging mode.
5) 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

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	3.14	2.92	6.04	0.17	6.21	13.79	PASS
40	5200	4.64	4.91	7.79	0.17	7.96	13.79	PASS
48	5240	5.58	5.54	8.57	0.17	8.74	13.79	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. **For U-NII-1 Band:**

   Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$]= 9.21dBi > 6dBi , so the power density limit shall be reduced to 17-(9.21-6) = 13.79dBm.
3. 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	2.39	2.52	5.47	0.17	5.63	13.79	PASS
40	5200	5.33	5.31	8.33	0.17	8.50	13.79	PASS
48	5240	4.94	4.97	7.97	0.17	8.13	13.79	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. **For U-NII-1 Band:**

   Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2$]= 9.21dBi > 6dBi , so the power density limit shall be reduced to 17-(9.21-6) = 13.79dBm.
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	-6.91	-6.93	-3.91	0.34	-3.57	13.79	PASS
46	5230	1.31	0.75	4.05	0.34	4.39	13.79	PASS

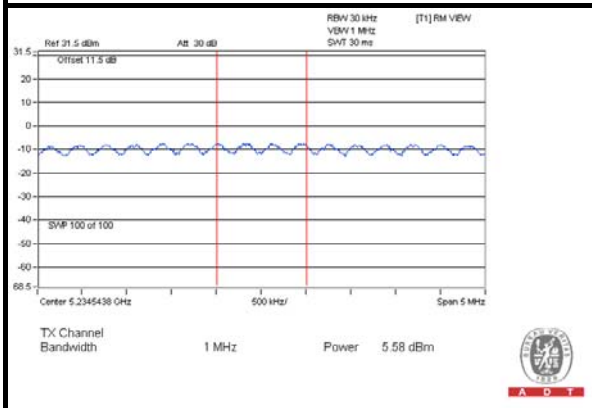
NOTE:

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. **For U-NII-1 Band:**

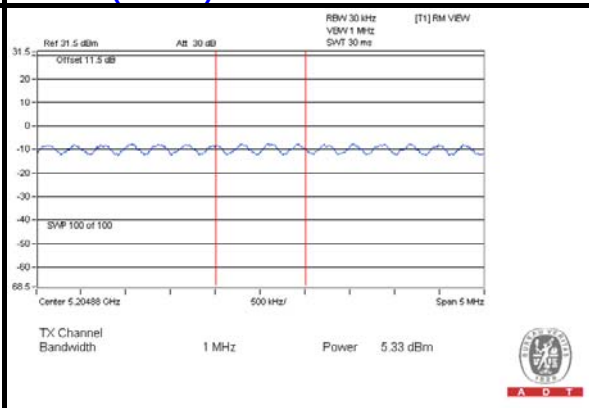
   Directional gain = 10 log[($10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20}$)^2]= 9.21dBi > 6dBi , so the power density limit shall be reduced to 17-(9.21-6) = 13.79dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

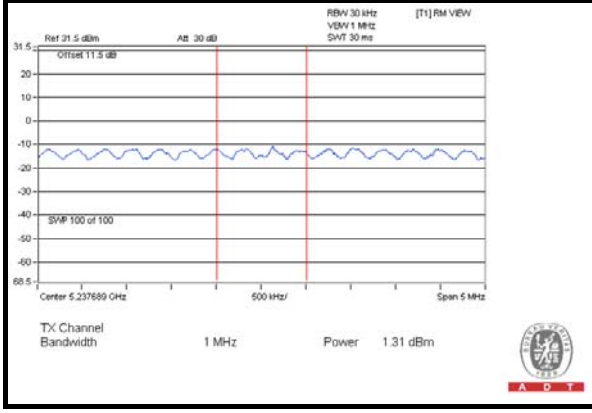
802.11a



802.11n (20MHz)



802.11n (40MHz)



For U-NII-3 Band

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	6.50	3.01	9.75	26.79	PASS
	157	5785	11.82	3.01	15.07	26.79	PASS
	165	5825	10.89	3.01	14.14	26.79	PASS
1	149	5745	6.93	3.01	10.18	26.79	PASS
	157	5785	9.74	3.01	12.99	26.79	PASS
	165	5825	8.75	3.01	12.00	26.79	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 9.21dBi > 6dBi, so the power density limit shall be reduced to 30-(9.21-6) = 26.79dBm.

802.11n (20MHz)

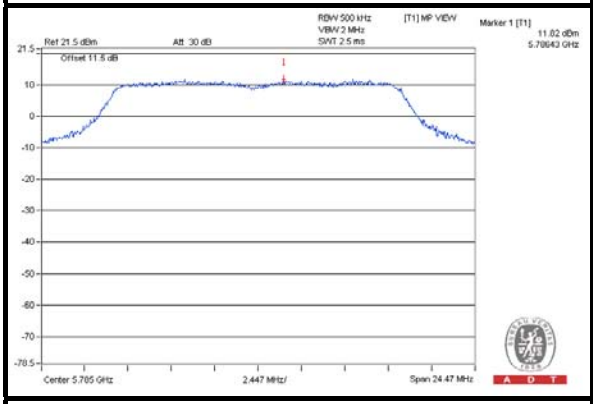
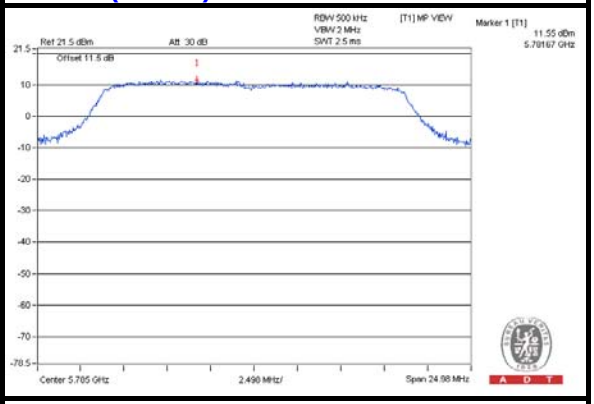
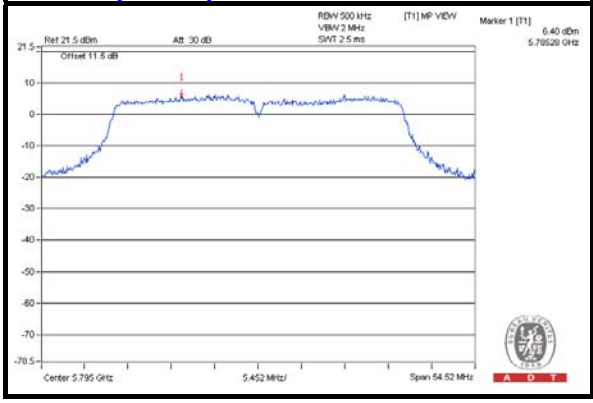
TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	4.58	3.01	7.81	26.79	PASS
	157	5785	11.55	3.01	14.78	26.79	PASS
	165	5825	9.75	3.01	12.98	26.79	PASS
1	149	5745	4.01	3.01	7.24	26.79	PASS
	157	5785	8.22	3.01	11.45	26.79	PASS
	165	5825	7.18	3.01	10.41	26.79	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 9.21dBi > 6dBi, so the power density limit shall be reduced to 30-(9.21-6) = 26.79dBm.

802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	151	5755	-3.82	3.01	-0.41	26.79	PASS
	159	5795	6.40	3.01	9.81	26.79	PASS
1	151	5755	-2.53	3.01	0.88	26.79	PASS
	159	5795	5.13	3.01	8.54	26.79	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 9.21dBi > 6dBi, so the power density limit shall be reduced to 30-(9.21-6) = 26.79dBm.

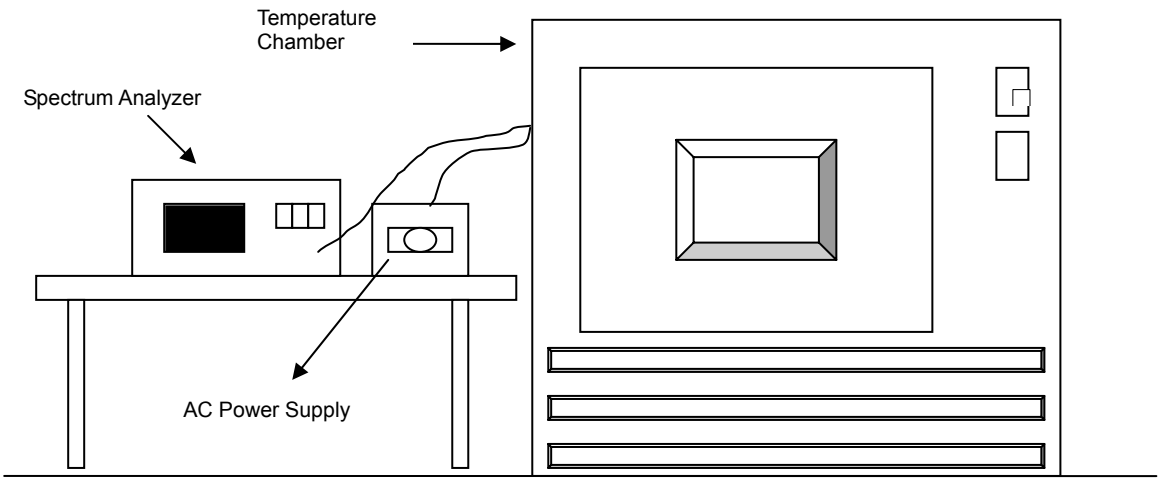
SPECTRUM PLOT OF WORST VALUE	
802.11a	**802.11n (20MHz)**
	
802.11n (40MHz)	
	

4.5 FREQUENCY STABILITY

4.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

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

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

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.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

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

4.5.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
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	5240.0080	0.00015	5240.0081	0.00015	5240.0099	0.00019	5240.0119	0.00023
40	120	5239.9913	-0.00017	5239.9902	-0.00019	5239.9915	-0.00016	5239.9933	-0.00013
30	120	5240.0043	0.00008	5240.0063	0.00012	5240.0071	0.00014	5240.0056	0.00011
20	120	5239.9823	-0.00034	5239.9811	-0.00036	5239.9808	-0.00037	5239.9799	-0.00038
10	120	5240.0090	0.00017	5240.0078	0.00015	5240.0059	0.00011	5240.0106	0.00020
0	120	5240.0197	0.00038	5240.0173	0.00033	5240.0195	0.00037	5240.0177	0.00034
-10	120	5240.0228	0.00044	5240.0202	0.00039	5240.0213	0.00041	5240.0229	0.00044
-20	120	5239.9985	-0.00003	5239.9990	-0.00002	5240.0024	0.00005	5240.0009	0.00002
-30	120	5239.9836	-0.00031	5239.9827	-0.00033	5239.9799	-0.00038	5239.9824	-0.00034

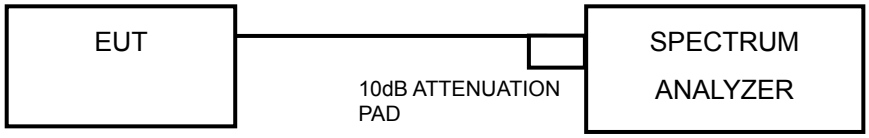
FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5239.9823	-0.00034	5239.9820	-0.00034	5239.9806	-0.00037	5239.9796	-0.00039
	120	5239.9823	-0.00034	5239.9811	-0.00036	5239.9808	-0.00037	5239.9799	-0.00038
	102	5239.9822	-0.00034	5239.9808	-0.00037	5239.9810	-0.00036	5239.9801	-0.00038

4.6 6dB BANDWIDTH MEASUREMENT

4.6.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITIONS

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

4.6.7 TEST RESULTS

802.11a

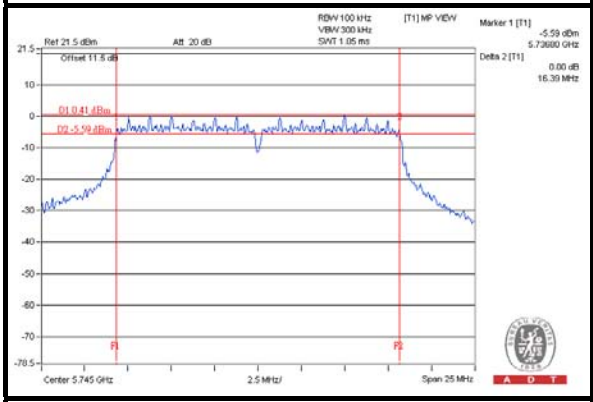
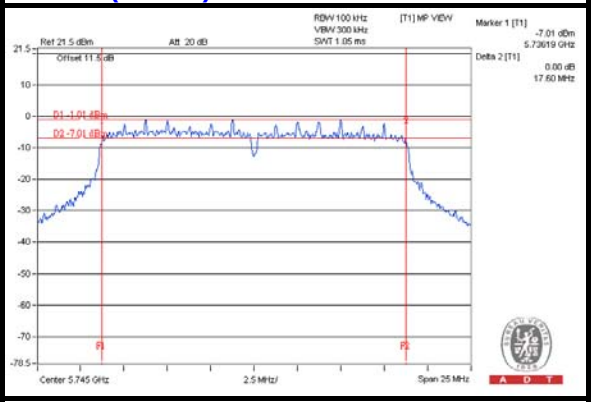
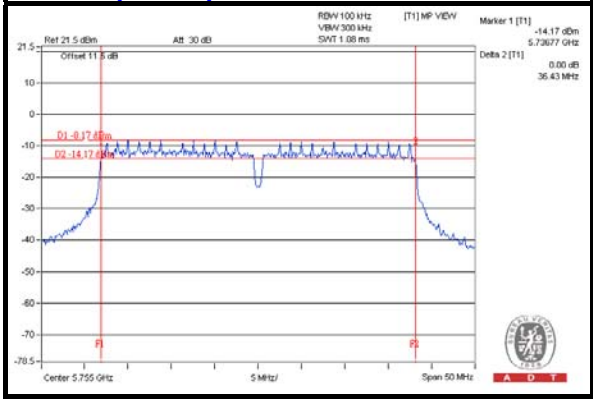
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.38	16.39	0.5	PASS
157	5785	16.32	16.39	0.5	PASS
165	5825	16.37	16.37	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.60	17.60	0.5	PASS
157	5785	16.66	17.09	0.5	PASS
165	5825	16.69	17.55	0.5	PASS

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.16	36.43	0.5	PASS
159	5795	36.35	35.84	0.5	PASS

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

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---