

FCC TEST REPORT (15.407)

REPORT NO.: RF141016C15-1

MODEL NO.: FORTIAP-112Dxxxxxx(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 the more details)

FCC ID: TVE-121233

RECEIVED: Oct. 15, 2014

TESTED: Oct. 15 ~ Nov. 28, 2014

ISSUED: Dec. 02, 2014

APPLICANT: Fortinet Inc.

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141016C15-1	Original release.	Dec. 02, 2014

1. CERTIFICATION

PRODUCT: Secured Wireless Access Point

MODEL: FORTIAP-112Dxxxxxx
(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 the more details)

BRAND: Fortinet Inc.

APPLICANT: Fortinet Inc.

TESTED: Oct. 15 ~ Nov. 28, 2014

TEST SAMPLE: ENGINEERING SAMPLE

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

The above equipment (model: FORTIAP-112D) 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 :** Dec. 02, 2014
Pettie Chen / Senior Specialist

APPROVED BY :  , **DATE :** Dec. 02, 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 -6.86dB at 0.54951MHz.
15.407(b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5714.00MHz.
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	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 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-112Dxxxxxx (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 the more details)
POWER SUPPLY	48Vdc (PoE)
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 150.0Mbps
OPERATING FREQUENCY	5180 ~ 5240MHz, 5745 ~ 5825MHz
NUMBER OF CHANNEL	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
OUTPUT POWER	5180 ~ 5240MHz: 22.336mW 5745 ~ 5825MHz: 91.622mW
ANTENNA TYPE	Printed antenna with 7.5dBi gain
ANTENNA CONNECTOR	IPEX
DATA CABLE	NA
I/O PORTS	Refer to user’s manual
ACCESSORY DEVICES	PoE

NOTE:

1. All models are listed as below.

Brand	Model	Difference
Fortinet Inc.	FORTIAP-112Dxxxxxx	where “x” can be used as “A-Z”, or “0-9”, or “-”, or blank for software changes or marketing purposes only
	FortiAP-112Dxxxxxx	
	FAP-112Dxxxxxx	

*Model: FORTIAP-112D was the final model.

2. The EUT provides one completed transmitter and one receiver.

MODULATION MODE	TX FUNCTION
802.11a	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX

3. The EUT use following PoE.

PoE	
Brand:	EnGenius
Model:	EPE-48GR
Input:	48Vdc

Adapter of PoE	
Brand:	Powertron Electronics Corp.
Model:	PA1040-480IB080
P/N:	PA1040-480IB080-324
Input:	100-240Vac~50-60Hz, 1.5A
Output:	48Vdc, 0.8A, 38.4W Max
Power Cord:	1.5m cable with one core

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

3.2 DESCRIPTION OF TEST MODES

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20):

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

2 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

FOR 5745 ~ 5825MHz

5 channels are provided for 802.11a, 802.11n (HT20):

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

2 channels are provided for 802.11n (HT40):

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 $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

NOTE:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-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	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 (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (HT40)		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 (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)		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	5180-5240, 5745-5825	36 to 48, 149 to 165	157	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	5180-5240, 5745-5825	36 to 48, 149 to 165	157	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 (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (HT40)		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 (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE $\geq$ 1G	21deg. C, 67%RH	120Vac, 60Hz	Jones Chang
RE<1G	21deg. C, 71%RH	120Vac, 60Hz	Nick Hsu
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. 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 = $1.355/1.422 = 0.953$, Duty factor = $10 * \log(1/0.953) = 0.21$

802.11n (HT20): Duty cycle = $1.269/1.334 = 0.951$, Duty factor = $10 * \log(1/0.951) = 0.22$

802.11n (HT40): Duty cycle = $0.625/0.668 = 0.936$, Duty factor = $10 * \log(1/0.936) = 0.29$



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.

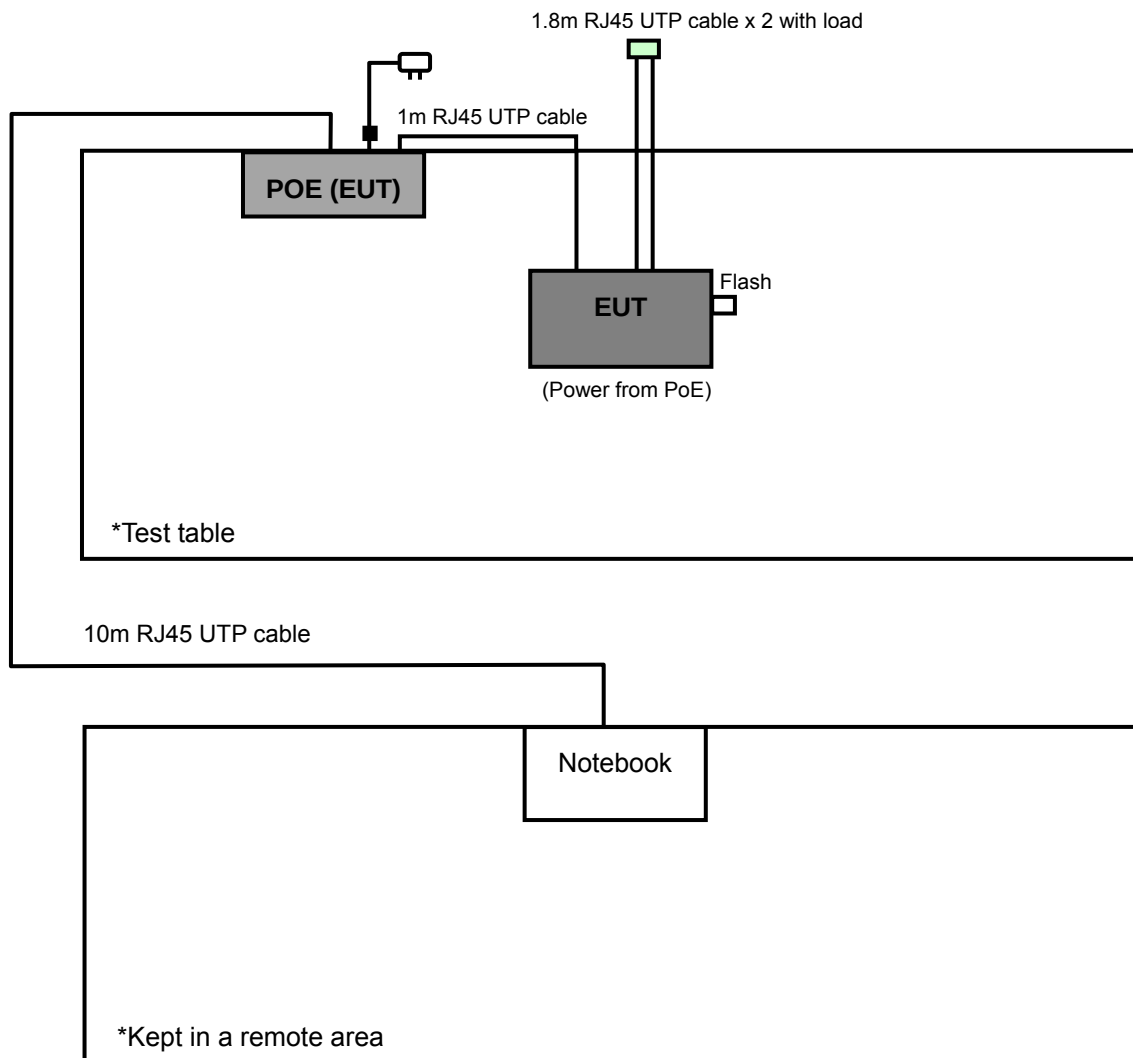
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved
2	Flash	Transcend	V85	538455 4490	NA

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

NOTE:

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

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the 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

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 (dBuV/m)	AV: 54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK: -27 (dBm/MHz) ^{*1} PK: -17 (dBm/MHz) ^{*2}	PK: 68.2 (dBuV/m) ^{*1} PK: 78.2 (dBuV/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:

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

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	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	Aug. 25, 2014	Aug. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Preamplifier Agilent	8447D	2944A10738	Oct.18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
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, 2014	Oct. 17, 2015
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 9, 2014	Jun. 08, 2015

- 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 chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

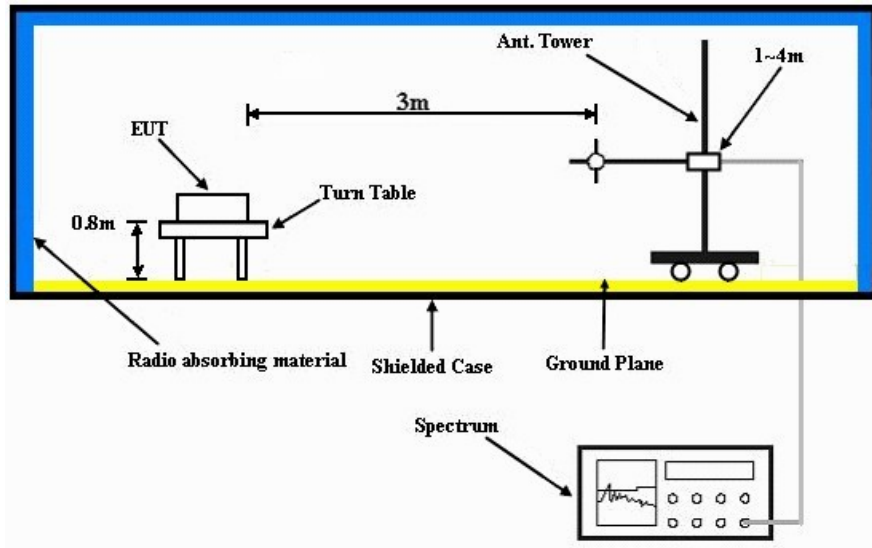
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

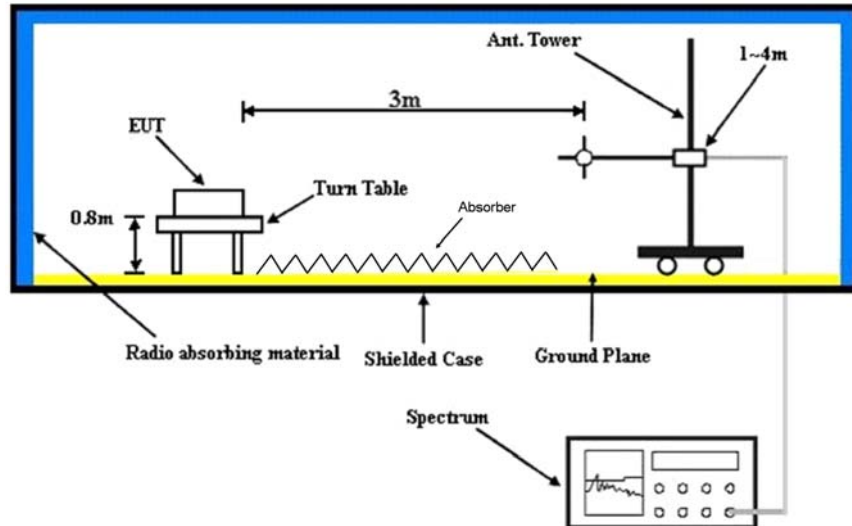
No deviation.

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

802.11a

CHANNEL	TX Channel 36	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	62.9 PK	74.0	-11.1	1.10 H	315	56.50	6.40
2	5150.00	46.5 AV	54.0	-7.5	1.10 H	315	40.10	6.40
3	*5180.00	107.9 PK			1.09 H	315	68.00	39.90
4	*5180.00	96.6 AV			1.09 H	315	56.70	39.90
5	#10360.00	62.7 PK	74.0	-11.3	1.00 H	33	44.00	18.70
6	#10360.00	49.6 AV	54.0	-4.4	1.00 H	33	30.90	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	63.5 PK	74.0	-10.5	1.00 V	70	57.10	6.40
2	5150.00	47.2 AV	54.0	-6.8	1.00 V	70	40.80	6.40
3	*5180.00	104.9 PK			1.33 V	8	65.00	39.90
4	*5180.00	94.6 AV			1.33 V	8	54.70	39.90
5	#10360.00	63.5 PK	74.0	-10.5	1.13 V	8	44.80	18.70
6	#10360.00	47.8 AV	54.0	-6.2	1.13 V	8	29.10	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 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	*5200.00	106.7 PK			1.00 H	323	66.70	40.00
2	*5200.00	95.7 AV			1.00 H	323	55.70	40.00
3	#10400.00	61.7 PK	74.0	-12.3	1.16 H	24	42.70	19.00
4	#10400.00	47.8 AV	54.0	-6.2	1.16 H	24	28.80	19.00
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	*5200.00	106.9 PK			1.34 V	2	66.90	40.00
2	*5200.00	95.7 AV			1.34 V	2	55.70	40.00
3	#10400.00	61.1 PK	74.0	-12.9	1.04 V	19	42.10	19.00
4	#10400.00	48.2 AV	54.0	-5.8	1.04 V	19	29.20	19.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out 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	106.1 PK			1.08 H	315	66.10	40.00
2	*5240.00	95.9 AV			1.08 H	315	55.90	40.00
3	5350.00	58.2 PK	74.0	-15.8	1.15 H	330	51.80	6.40
4	5350.00	46.0 AV	54.0	-8.0	1.15 H	330	39.60	6.40
5	#10480.00	62.5 PK	74.0	-11.5	1.02 H	32	43.30	19.20
6	#10480.00	48.8 AV	54.0	-5.2	1.02 H	32	29.60	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	*5240.00	107.0 PK			1.21 V	18	67.00	40.00
2	*5240.00	96.4 AV			1.21 V	18	56.40	40.00
3	5350.00	58.0 PK	74.0	-16.0	1.05 V	78	51.60	6.40
4	5350.00	44.8 AV	54.0	-9.2	1.05 V	78	38.40	6.40
5	#10480.00	60.4 PK	74.0	-13.6	1.00 V	136	41.20	19.20
6	#10480.00	47.7 AV	54.0	-6.3	1.00 V	136	28.50	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.

802.11n (HT20)

CHANNEL	TX Channel 36	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	59.9 PK	74.0	-14.1	1.00 H	318	53.50	6.40
2	5150.00	47.3 AV	54.0	-6.7	1.00 H	318	40.90	6.40
3	*5180.00	106.4 PK			1.00 H	313	66.50	39.90
4	*5180.00	95.7 AV			1.00 H	313	55.80	39.90
5	#10360.00	62.3 PK	74.0	-11.7	1.11 H	22	43.60	18.70
6	#10360.00	49.0 AV	54.0	-5.0	1.11 H	22	30.30	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	60.1 PK	74.0	-13.9	1.05 V	270	53.70	6.40
2	5150.00	47.1 AV	54.0	-6.9	1.05 V	270	40.70	6.40
3	*5180.00	104.3 PK			1.00 V	72	64.40	39.90
4	*5180.00	94.3 AV			1.00 V	72	54.40	39.90
5	#10360.00	60.9 PK	74.0	-13.1	1.00 V	19	42.20	18.70
6	#10360.00	48.2 AV	54.0	-5.8	1.00 V	19	29.50	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 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	*5200.00	106.2 PK			1.06 H	289	66.20	40.00
2	*5200.00	94.8 AV			1.06 H	289	54.80	40.00
3	#10400.00	63.7 PK	74.0	-10.3	1.17 H	24	44.70	19.00
4	#10400.00	49.2 AV	54.0	-4.8	1.17 H	24	30.20	19.00
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	*5200.00	105.2 PK			1.34 V	285	65.20	40.00
2	*5200.00	94.6 AV			1.34 V	285	54.60	40.00
3	#10400.00	61.7 PK	74.0	-12.3	1.00 V	19	42.70	19.00
4	#10400.00	48.7 AV	54.0	-5.3	1.00 V	19	29.70	19.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out 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	105.7 PK			1.17 H	321	65.70	40.00
2	*5240.00	94.9 AV			1.17 H	321	54.90	40.00
3	5350.00	58.5 PK	74.0	-15.5	1.08 H	313	52.10	6.40
4	5350.00	46.8 AV	54.0	-7.2	1.08 H	313	40.40	6.40
5	#10480.00	63.5 PK	74.0	-10.5	1.15 H	32	44.30	19.20
6	#10480.00	49.6 AV	54.0	-4.4	1.15 H	32	30.40	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	*5240.00	104.2 PK			1.29 V	50	64.20	40.00
2	*5240.00	94.1 AV			1.29 V	50	54.10	40.00
3	5350.00	59.7 PK	74.0	-14.3	1.33 V	41	53.30	6.40
4	5350.00	47.4 AV	54.0	-6.6	1.33 V	41	41.00	6.40
5	#10480.00	62.2 PK	74.0	-11.8	1.00 V	23	43.00	19.20
6	#10480.00	49.0 AV	54.0	-5.0	1.00 V	23	29.80	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.

802.11n (HT40)

CHANNEL	TX Channel 38	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	69.3 PK	74.0	-4.7	1.31 H	310	62.90	6.40
2	5150.00	52.1 AV	54.0	-1.9	1.31 H	310	45.70	6.40
3	*5190.00	103.3 PK			1.41 H	308	63.40	39.90
4	*5190.00	93.2 AV			1.41 H	308	53.30	39.90
5	#10380.00	61.4 PK	74.0	-12.6	1.18 H	101	42.60	18.80
6	#10380.00	47.9 AV	54.0	-6.1	1.18 H	101	29.10	18.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.0 PK	74.0	-5.0	1.00 V	73	62.60	6.40
2	5150.00	50.6 AV	54.0	-3.4	1.00 V	73	44.20	6.40
3	*5190.00	101.5 PK			1.01 V	0	61.60	39.90
4	*5190.00	91.1 AV			1.01 V	0	51.20	39.90
5	#10380.00	59.1 PK	74.0	-14.9	1.04 V	128	40.30	18.80
6	#10380.00	46.0 AV	54.0	-8.0	1.04 V	128	27.20	18.80

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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	57.7 PK	74.0	-16.3	1.00 H	321	51.30	6.40
2	5150.00	46.9 AV	54.0	-7.1	1.00 H	321	40.50	6.40
3	*5230.00	103.5 PK			1.00 H	324	63.50	40.00
4	*5230.00	92.6 AV			1.00 H	324	52.60	40.00
5	#10460.00	61.1 PK	74.0	-12.9	1.20 H	26	42.00	19.10
6	#10460.00	49.3 AV	54.0	-4.7	1.20 H	26	30.20	19.10
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	58.2 PK	74.0	-15.8	1.00 V	70	51.80	6.40
2	5150.00	46.7 AV	54.0	-7.3	1.00 V	70	40.30	6.40
3	*5230.00	102.3 PK			1.28 V	69	62.30	40.00
4	*5230.00	92.5 AV			1.28 V	69	52.50	40.00
5	#10460.00	58.9 PK	74.0	-15.1	1.03 V	270	39.80	19.10
6	#10460.00	45.9 AV	54.0	-8.1	1.03 V	270	26.80	19.10

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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	72.3 PK	74.0	-1.7	1.06 H	328	65.30	7.00
2	#5714.00	52.1 AV	54.0	-1.9	1.06 H	328	45.10	7.00
3	#5722.00	74.2 PK	78.2	-4.0	1.06 H	321	67.20	7.00
4	#5725.00	64.2 PK	78.2	-14.0	1.16 H	329	57.10	7.10
5	*5745.00	110.5 PK			1.05 H	320	69.90	40.60
6	*5745.00	100.5 AV			1.05 H	320	59.90	40.60
7	11490.00	59.0 PK	74.0	-15.0	1.16 H	294	40.30	18.70
8	11490.00	46.2 AV	54.0	-7.8	1.16 H	294	27.50	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	#5714.00	73.0 PK	74.0	-1.0	1.10 V	345	66.00	7.00
2	#5714.00	52.4 AV	54.0	-1.6	1.10 V	345	45.40	7.00
3	#5722.00	77.0 PK	78.2	-1.2	1.28 V	349	70.00	7.00
4	#5725.00	70.5 PK	78.2	-7.7	1.10 V	348	63.40	7.10
5	*5745.00	112.0 PK			1.08 V	337	71.40	40.60
6	*5745.00	101.4 AV			1.08 V	337	60.80	40.60
7	11490.00	59.5 PK	74.0	-14.5	1.00 V	182	40.80	18.70
8	11490.00	46.5 AV	54.0	-7.5	1.00 V	182	27.80	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 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	113.6 PK			1.14 H	316	72.90	40.70
2	*5785.00	103.0 AV			1.14 H	316	62.30	40.70
3	11570.00	59.2 PK	74.0	-14.8	1.14 H	184	40.40	18.80
4	11570.00	46.9 AV	54.0	-7.1	1.14 H	184	28.10	18.80
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	*5785.00	113.8 PK			1.00 V	348	73.10	40.70
2	*5785.00	103.7 AV			1.00 V	348	63.00	40.70
3	11570.00	58.7 PK	74.0	-15.3	1.03 V	253	39.90	18.80
4	11570.00	45.7 AV	54.0	-8.3	1.03 V	253	26.90	18.80

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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	111.8 PK			1.13 H	310	71.10	40.70
2	*5825.00	101.0 AV			1.13 H	310	60.30	40.70
3	#5850.00	58.3 PK	78.2	-19.9	1.13 H	315	51.30	7.00
4	#5853.00	76.5 PK	78.2	-1.7	1.14 H	314	69.40	7.10
5	#5861.00	68.2 PK	74.0	-5.8	1.13 H	307	61.10	7.10
6	#5861.00	51.4 AV	54.0	-2.6	1.13 H	307	44.30	7.10
7	11650.00	60.1 PK	74.0	-13.9	1.14 H	164	40.90	19.20
8	11650.00	47.6 AV	54.0	-6.4	1.14 H	164	28.40	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	*5825.00	111.9 PK			1.08 V	338	71.20	40.70
2	*5825.00	101.3 AV			1.08 V	338	60.60	40.70
3	#5850.00	58.5 PK	78.2	-19.7	1.08 V	340	51.50	7.00
4	#5853.00	76.9 PK	78.2	-1.3	1.07 V	342	69.80	7.10
5	#5861.00	68.2 PK	74.0	-5.8	1.00 V	337	61.10	7.10
6	#5861.00	51.3 AV	54.0	-2.7	1.00 V	337	44.20	7.10
7	11650.00	60.2 PK	74.0	-13.8	1.02 V	243	41.00	19.20
8	11650.00	47.6 AV	54.0	-6.4	1.02 V	243	28.40	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.

802.11n (HT20)

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	69.7 PK	74.0	-4.3	1.06 H	317	62.70	7.00
2	#5714.00	49.1 AV	54.0	-4.9	1.06 H	317	42.10	7.00
3	#5722.00	74.0 PK	78.2	-4.2	1.00 H	315	67.00	7.00
4	#5725.00	61.0 PK	78.2	-17.2	1.17 H	321	53.90	7.10
5	*5745.00	108.4 PK			1.15 H	312	67.80	40.60
6	*5745.00	97.8 AV			1.15 H	312	57.20	40.60
7	11490.00	57.7 PK	74.0	-16.3	1.10 H	213	39.00	18.70
8	11490.00	44.8 AV	54.0	-9.2	1.10 H	213	26.10	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	#5714.00	70.6 PK	74.0	-3.4	1.00 V	71	63.60	7.00
2	#5714.00	49.3 AV	54.0	-4.7	1.00 V	71	42.30	7.00
3	#5722.00	77.1 PK	78.2	-1.1	1.07 V	70	70.10	7.00
4	#5725.00	63.6 PK	78.2	-14.6	1.07 V	73	56.50	7.10
5	*5745.00	110.0 PK			1.17 V	72	69.40	40.60
6	*5745.00	100.1 AV			1.17 V	72	59.50	40.60
7	11490.00	58.2 PK	74.0	-15.8	1.03 V	101	39.50	18.70
8	11490.00	45.1 AV	54.0	-8.9	1.03 V	101	26.40	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 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	112.5 PK			1.15 H	312	71.80	40.70
2	*5785.00	102.2 AV			1.15 H	312	61.50	40.70
3	11570.00	59.4 PK	74.0	-14.6	1.12 H	164	40.60	18.80
4	11570.00	46.3 AV	54.0	-7.7	1.12 H	164	27.50	18.80
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	*5785.00	114.2 PK			1.09 V	349	73.50	40.70
2	*5785.00	102.9 AV			1.09 V	349	62.20	40.70
3	11570.00	59.0 PK	74.0	-15.0	1.00 V	251	40.20	18.80
4	11570.00	45.9 AV	54.0	-8.1	1.00 V	251	27.10	18.80

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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	111.0 PK			1.13 H	306	70.30	40.70
2	*5825.00	100.4 AV			1.13 H	306	59.70	40.70
3	#5850.00	59.0 PK	78.2	-19.2	1.14 H	315	52.00	7.00
4	#5853.00	74.8 PK	78.2	-3.4	1.15 H	316	67.70	7.10
5	#5861.00	68.4 PK	74.0	-5.6	1.02 H	306	61.30	7.10
6	#5861.00	51.8 AV	54.0	-2.2	1.02 H	306	44.70	7.10
7	11650.00	59.8 PK	74.0	-14.2	1.12 H	94	40.60	19.20
8	11650.00	46.7 AV	54.0	-7.3	1.12 H	94	27.50	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	*5825.00	111.7 PK			1.08 V	336	71.00	40.70
2	*5825.00	101.3 AV			1.08 V	336	60.60	40.70
3	#5850.00	57.6 PK	78.2	-20.6	1.00 V	339	50.60	7.00
4	#5853.00	74.4 PK	78.2	-3.8	1.09 V	341	67.30	7.10
5	#5861.00	70.3 PK	74.0	-3.7	1.00 V	342	63.20	7.10
6	#5861.00	52.4 AV	54.0	-1.6	1.00 V	342	45.30	7.10
7	11650.00	59.9 PK	74.0	-14.1	1.03 V	282	40.70	19.20
8	11650.00	47.3 AV	54.0	-6.7	1.03 V	282	28.10	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.

802.11n (HT40)

CHANNEL	TX Channel 151	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	70.6 PK	74.0	-3.4	1.00 H	321	63.60	7.00
2	#5714.00	52.9 AV	54.0	-1.1	1.00 H	321	45.90	7.00
3	#5722.00	74.6 PK	78.2	-3.6	1.07 H	316	67.60	7.00
4	#5725.00	58.6 PK	78.2	-19.6	1.18 H	325	51.50	7.10
5	*5755.00	103.9 PK			1.16 H	314	63.20	40.70
6	*5755.00	93.7 AV			1.16 H	314	53.00	40.70
7	11510.00	58.4 PK	74.0	-15.6	1.10 H	203	39.70	18.70
8	11510.00	45.3 AV	54.0	-8.7	1.10 H	203	26.60	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	#5714.00	71.8 PK	74.0	-2.2	1.34 V	76	64.80	7.00
2	#5714.00	52.7 AV	54.0	-1.3	1.34 V	76	45.70	7.00
3	#5722.00	76.4 PK	78.2	-1.8	1.34 V	77	69.40	7.00
4	#5725.00	60.9 PK	78.2	-17.3	1.34 V	86	53.80	7.10
5	*5755.00	105.1 PK			1.19 V	349	64.40	40.70
6	*5755.00	94.5 AV			1.19 V	349	53.80	40.70
7	11510.00	58.3 PK	74.0	-15.7	1.02 V	249	39.60	18.70
8	11510.00	45.3 AV	54.0	-8.7	1.02 V	249	26.60	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 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	108.7 PK			1.12 H	306	68.00	40.70
2	*5795.00	99.0 AV			1.12 H	306	58.30	40.70
3	#5850.00	56.6 PK	78.2	-21.6	1.14 H	309	49.60	7.00
4	#5853.00	72.2 PK	78.2	-6.0	1.12 H	315	65.10	7.10
5	#5861.00	69.9 PK	74.0	-4.1	1.04 H	313	62.80	7.10
6	#5861.00	52.8 AV	54.0	-1.2	1.04 H	313	45.70	7.10
7	11590.00	58.0 PK	74.0	-16.0	1.15 H	216	39.10	18.90
8	11590.00	45.5 AV	54.0	-8.5	1.15 H	216	26.60	18.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	109.8 PK			1.09 V	346	69.10	40.70
2	*5795.00	99.8 AV			1.09 V	346	59.10	40.70
3	#5850.00	56.7 PK	78.2	-21.5	1.17 V	343	49.70	7.00
4	#5853.00	71.4 PK	78.2	-6.8	1.17 V	341	64.30	7.10
5	#5861.00	69.9 PK	74.0	-4.1	1.16 V	346	62.80	7.10
6	#5861.00	52.4 AV	54.0	-1.6	1.16 V	346	45.30	7.10
7	11590.00	58.8 PK	74.0	-15.2	1.00 V	261	39.90	18.90
8	11590.00	45.6 AV	54.0	-8.4	1.00 V	261	26.70	18.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 157	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	31.6 QP	40.0	-8.4	1.50 H	30	46.10	-14.50
2	125.17	28.9 QP	43.5	-14.6	1.50 H	235	44.60	-15.70
3	177.67	30.0 QP	43.5	-13.5	1.50 H	151	44.70	-14.70
4	249.60	30.4 QP	46.0	-15.6	1.00 H	113	44.50	-14.10
5	624.85	33.5 QP	46.0	-12.5	1.00 H	64	38.80	-5.30
6	875.67	35.4 QP	46.0	-10.6	1.50 H	179	36.20	-0.80
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	35.42	37.9 QP	40.0	-2.1	1.00 V	64	53.50	-15.60
2	49.34	37.4 QP	40.0	-2.6	1.49 V	14	51.80	-14.40
3	62.95	37.7 QP	40.0	-2.3	1.49 V	315	52.80	-15.10
4	136.84	28.3 QP	43.5	-15.2	1.00 V	262	42.90	-14.60
5	375.98	30.0 QP	46.0	-16.0	1.49 V	204	40.50	-10.50
6	480.56	41.1 QP	46.0	-4.9	1.00 V	254	49.60	-8.50

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
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. 21, 2014	Jul. 20, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

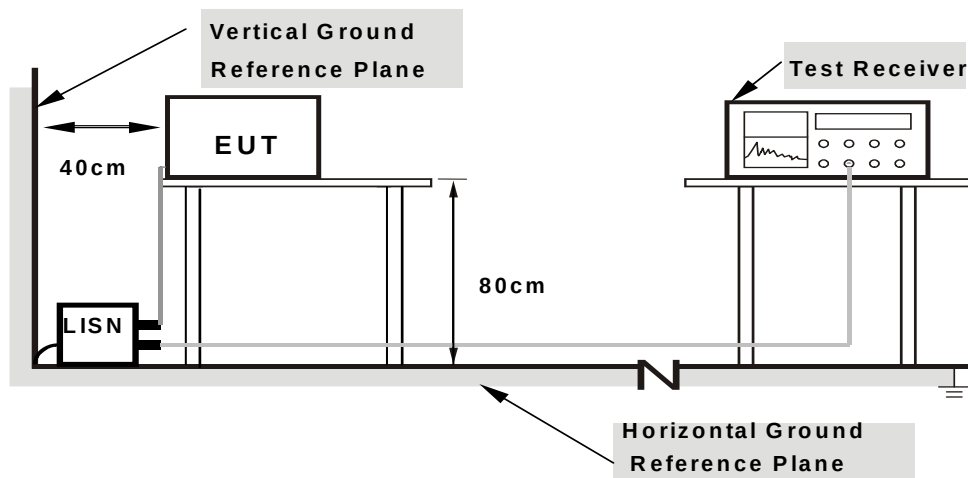
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) 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 cm 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

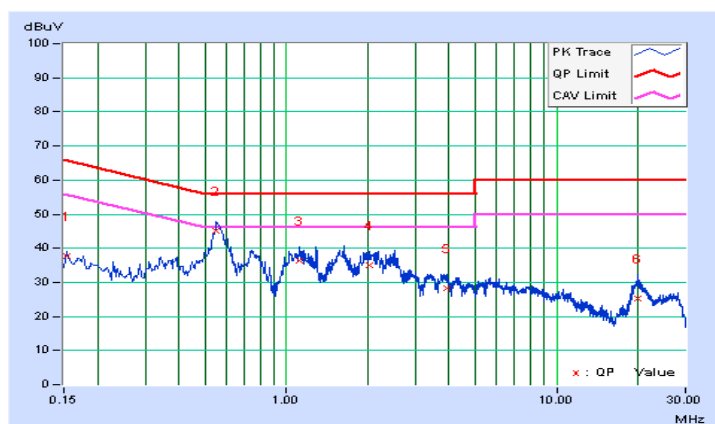
CONDUCTED WORST-CASE DATA: 802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.08	37.51	29.74	37.59	29.82	65.79	55.79	-28.20	-25.97
2	0.54951	0.09	44.87	39.05	44.96	39.14	56.00	46.00	-11.04	-6.86
3	1.11186	0.11	36.25	30.47	36.36	30.58	56.00	46.00	-19.64	-15.42
4	2.01898	0.15	34.80	29.37	34.95	29.52	56.00	46.00	-21.05	-16.48
5	3.90751	0.23	28.05	23.12	28.28	23.35	56.00	46.00	-27.72	-22.65
6	19.89159	1.03	24.25	18.27	25.28	19.30	60.00	50.00	-34.72	-30.70

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

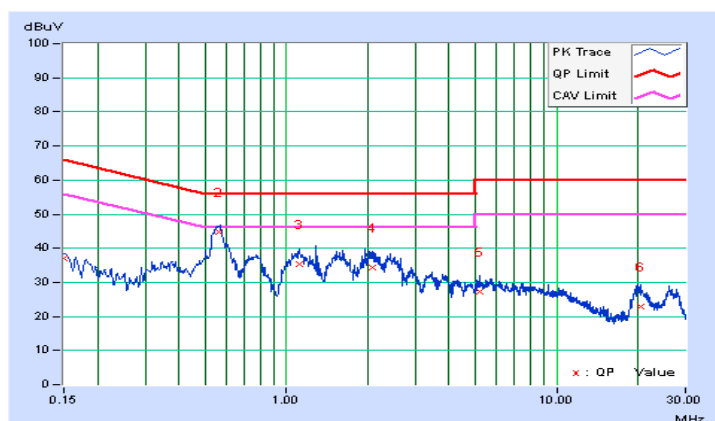


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	36.97	28.63	37.02	28.68	66.00	56.00	-28.98	-27.32
2	0.55974	0.08	44.55	38.58	44.63	38.66	56.00	46.00	-11.37	-7.34
3	1.11968	0.10	35.40	29.74	35.50	29.84	56.00	46.00	-20.50	-16.16
4	2.06981	0.14	34.09	28.74	34.23	28.88	56.00	46.00	-21.77	-17.12
5	5.16653	0.25	26.95	21.92	27.20	22.17	60.00	50.00	-32.80	-27.83
6	20.45072	0.92	21.82	15.03	22.74	15.95	60.00	50.00	-37.26	-34.05

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



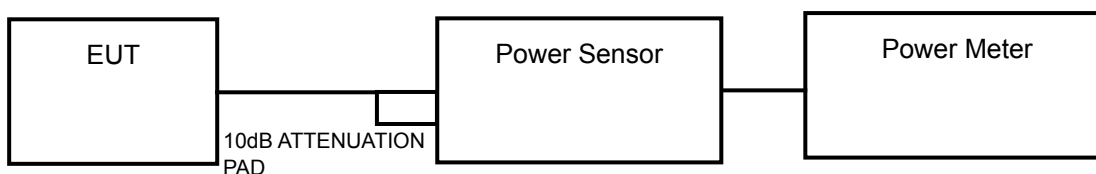
4.3 TRANSMIT POWER MEASUREMENT

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

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

For U-NII-1 Band (Outdoor Access Point)

802.11a

CHAN.	FREQ. (MHz)	CONDUCTED POWER (mW)	CONDUCTED POWER (dBm)	CONDUCTED POWER LIMIT (dBm)	GAIN (dBi)	EIRP (dBm)	EIRP LIMIT (dBm)	PASS / FAIL
36	5180	21.232	13.27	28.5	7.5	20.77	21	PASS
40	5200	21.528	13.33	28.5	7.5	20.83	21	PASS
48	5240	22.131	13.45	28.5	7.5	20.95	21	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the conducted power limit shall be reduced to $30-(7.5-6) = 28.5\text{dBm}$.

802.11n (HT20)

CHAN.	FREQ. (MHz)	CONDUCTED POWER (mW)	CONDUCTED POWER (dBm)	CONDUCTED POWER LIMIT (dBm)	GAIN (dBi)	EIRP (dBm)	EIRP LIMIT (dBm)	PASS / FAIL
36	5180	21.478	13.32	28.5	7.5	20.82	21	PASS
40	5200	21.878	13.40	28.5	7.5	20.90	21	PASS
48	5240	22.336	13.49	28.5	7.5	20.99	21	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the conducted power limit shall be reduced to $30-(7.5-6) = 28.5\text{dBm}$.

802.11n (HT40)

CHAN.	FREQ. (MHz)	CONDUCTED POWER (mW)	CONDUCTED POWER (dBm)	CONDUCTED POWER LIMIT (dBm)	GAIN (dBi)	EIRP (dBm)	EIRP LIMIT (dBm)	PASS / FAIL
38	5190	22.131	13.45	28.5	7.5	20.95	21	PASS
46	5230	21.330	13.29	28.5	7.5	20.79	21	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the conducted power limit shall be reduced to $30-(7.5-6) = 28.5\text{dBm}$.

For U-NII-3 Band

POWER OUTPUT:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	MAXIMUM CONDUCTED POWER (mW)	MAXIMUM CONDUCTED POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
149	5745	49.431	16.94	28.5	PASS
157	5785	91.622	19.62	28.5	PASS
165	5825	67.143	18.27	28.5	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the conducted power limit shall be reduced to $30-(7.5-6) = 28.5\text{dBm}$.

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	MAXIMUM CONDUCTED POWER (mW)	MAXIMUM CONDUCTED POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
149	5745	32.659	15.14	28.5	PASS
157	5785	90.782	19.58	28.5	PASS
165	5825	65.766	18.18	28.5	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the conducted power limit shall be reduced to $30-(7.5-6) = 28.5\text{dBm}$.

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	MAXIMUM CONDUCTED POWER (mW)	MAXIMUM CONDUCTED POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
151	5755	18.281	12.62	28.5	PASS
159	5795	70.469	18.48	28.5	PASS

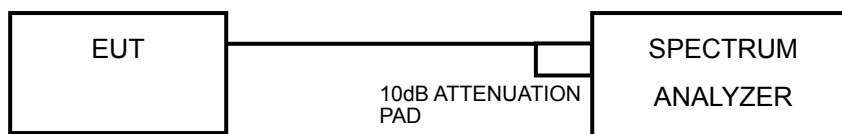
NOTE: Gain = 7.5dBi > 6dBi, so the conducted power limit shall be reduced to $30-(7.5-6) = 28.5\text{dBm}$.

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/ 500kHz

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 $\geq$ 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add 10 log (1/duty cycle)

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 $\geq$ 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 $10 \log (1/\text{duty cycle})$
- 6) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where
$$\text{BWCF} = 10\log(500 \text{ kHz}/300\text{kHz})$$

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	-0.58	0.21	-0.37	15.50	PASS
40	5200	-0.45	0.21	-0.24	15.50	PASS
48	5240	-0.27	0.21	-0.06	15.50	PASS

NOTE:

1. Gain = 7.5dBi > 6dBi, so the power density limit shall be reduced to $17-(7.5-6) = 15.5\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	-1.26	0.22	-1.04	15.50	PASS
40	5200	-0.72	0.22	-0.50	15.50	PASS
48	5240	-0.49	0.22	-0.27	15.50	PASS

NOTE:

1. Gain = 7.5dBi > 6dBi, so the power density limit shall be reduced to $17-(7.5-6) = 15.5\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

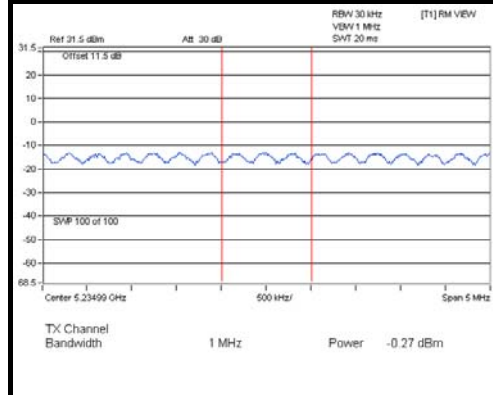
CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
38	5190	-3.82	0.29	-3.53	15.50	PASS
46	5230	-3.92	0.29	-3.63	15.50	PASS

NOTE:

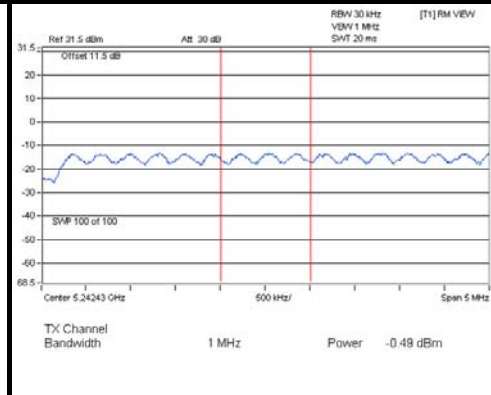
1. Gain = 7.5dBi > 6dBi, so the power density limit shall be reduced to $17-(7.5-6) = 15.5\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

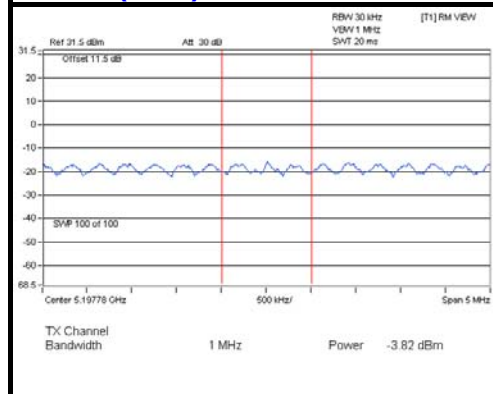
802.11a



802.11n (HT20)



802.11n (HT40)



For U-NII-3 Band

802.11a

Chan.	Freq. (MHz)	PSD W/O DUTY FACTOR (dBm/300kHz)	PSD W/ODUTY FACTOR (dBm/500kHz)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
149	5745	-5.36	-3.14	0.21	-2.93	28.5	PASS
157	5785	-3.03	-0.81	0.21	-0.60	28.5	PASS
165	5825	-4.92	-2.70	0.21	-2.49	28.5	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the power density limit shall be reduced to $30-(7.5-6) = 28.5$ dBm.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD W/O DUTY FACTOR (dBm/300kHz)	PSD W/ODUTY FACTOR (dBm/500kHz)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
149	5745	-7.14	-4.92	0.22	-4.70	28.5	PASS
157	5785	-3.29	-1.07	0.22	-0.85	28.5	PASS
165	5825	-5.09	-2.87	0.22	-2.65	28.5	PASS

NOTE: Gain = 7.5dBi > 6dBi, so the power density limit shall be reduced to $30-(7.5-6) = 28.5$ dBm.

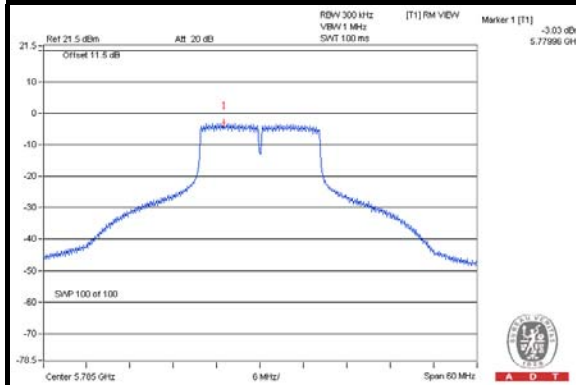
802.11n (HT40)

Chan.	Freq. (MHz)	PSD W/O DUTY FACTOR (dBm/300kHz)	PSD W/ODUTY FACTOR (dBm/500kHz)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
151	5755	-13.03	-10.81	0.29	-10.52	28.5	PASS
159	5795	-7.45	-5.23	0.29	-4.94	28.5	PASS

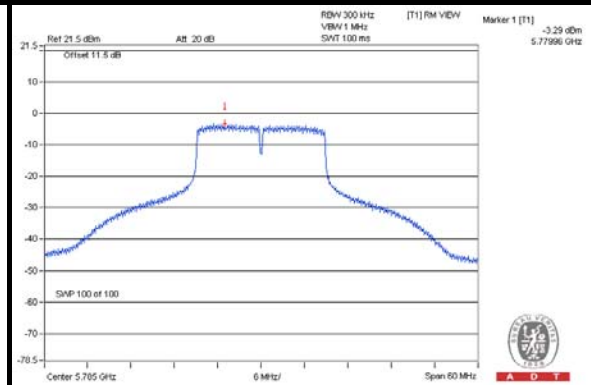
NOTE: Gain = 7.5dBi > 6dBi, so the power density limit shall be reduced to $30-(7.5-6) = 28.5$ dBm.

SPECTRUM PLOT OF WORST VALUE

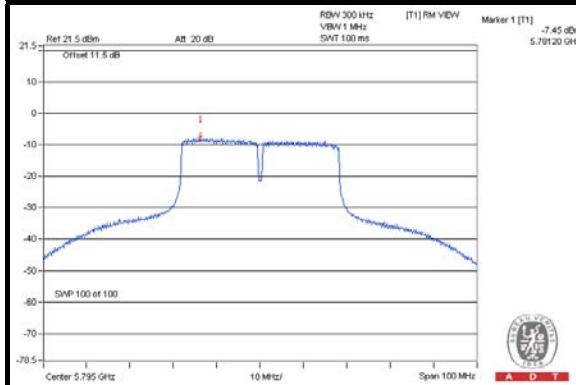
802.11a



802.11n (HT20)



802.11n (HT40)

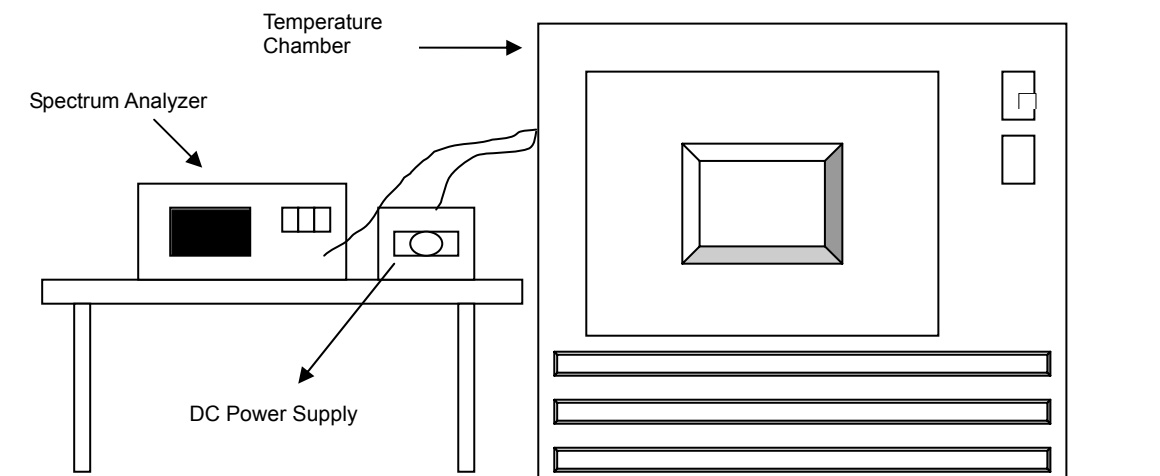


4.5 FREQUENCY STABILITY

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

4.5.5 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

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vdc)	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	48	5240.0089	0.00017	5240.0094	0.00018	5240.0089	0.00017	5240.0053	0.00010
40	48	5239.9757	-0.00046	5239.9748	-0.00048	5239.9732	-0.00051	5239.9748	-0.00048
30	48	5239.9995	-0.00001	5239.9997	-0.00001	5240.0023	0.00004	5240.0012	0.00002
20	48	5240.0244	0.00047	5240.0224	0.00043	5240.0250	0.00048	5240.0247	0.00047
10	48	5239.9770	-0.00044	5239.9751	-0.00048	5239.9742	-0.00049	5239.9737	-0.00050
0	48	5239.9891	-0.00021	5239.9867	-0.00025	5239.9865	-0.00026	5239.9883	-0.00022
-10	48	5240.0185	0.00035	5240.0161	0.00031	5240.0185	0.00035	5240.0164	0.00031
-20	48	5240.0146	0.00028	5240.0162	0.00031	5240.0165	0.00031	5240.0180	0.00034
-30	48	5239.9851	-0.00028	5239.9821	-0.00034	5239.9844	-0.00030	5239.9852	-0.00028

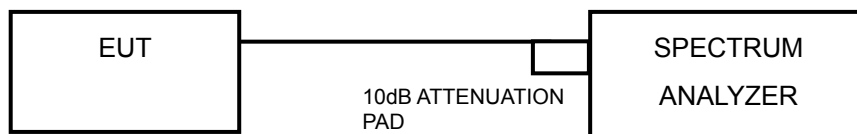
FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vdc)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	55.2	5240.0253	0.00048	5240.0232	0.00044	5240.0255	0.00049	5240.0257	0.00049
	48	5240.0244	0.00047	5240.0224	0.00043	5240.0250	0.00048	5240.0247	0.00047
	40.8	5240.0234	0.00045	5240.0229	0.00044	5240.0244	0.00047	5240.0251	0.00048

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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
149	5745	16.39	0.5	PASS
157	5785	16.37	0.5	PASS
165	5825	16.12	0.5	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	17.61	0.5	PASS
157	5785	17.21	0.5	PASS
165	5825	17.19	0.5	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
151	5755	36.11	0.5	PASS
159	5795	35.90	0.5	PASS

802.11a



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/Telecom Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety 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---