



FCC TEST REPORT

(15.407)

REPORT NO.: RF140822C02-1
MODEL NO.: FORTIAP-24Dxxxxxx (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-121203
RECEIVED: Aug. 22, 2014
TESTED: Aug. 28 ~ Sep. 18, 2014
ISSUED: Sep. 25, 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. 47-2, 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.

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TABLE OF CONTENTS

RELEASE CONTROL RECORD4

1. CERTIFICATION.....5

2. SUMMARY OF TEST RESULTS6

2.1 MEASUREMENT UNCERTAINTY6

3. GENERAL INFORMATION.....7

3.1 GENERAL DESCRIPTION OF EUT7

3.2 DESCRIPTION OF TEST MODES9

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL10

3.3 DUTY CYCLE OF TEST SIGNAL12

3.4 DESCRIPTION OF SUPPORT UNITS13

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST14

3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS16

4. TEST TYPES AND RESULTS17

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT17

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT17

4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS.....17

4.1.3 TEST INSTRUMENTS18

4.1.4 TEST PROCEDURES.....19

4.1.5 DEVIATION FROM TEST STANDARD19

4.1.6 TEST SETUP20

4.1.7 EUT OPERATING CONDITION21

4.1.8 TEST RESULTS22

4.2 CONDUCTED EMISSION MEASUREMENT40

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....40

4.2.2 TEST INSTRUMENTS40

4.2.3 TEST PROCEDURES.....41

4.2.4 DEVIATION FROM TEST STANDARD41

4.2.5 TEST SETUP41

4.2.6 EUT OPERATING CONDITIONS.....41

4.2.7 TEST RESULTS42

4.3 TRANSMIT POWER MEASUREMENT46

4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT.....46

4.3.2 TEST SETUP46

4.3.3 TEST INSTRUMENTS47

4.3.4 TEST PROCEDURE47

4.3.5 DEVIATION FROM TEST STANDARD47

4.3.6 EUT OPERATING CONDITIONS.....47

4.3.7 TEST RESULTS48

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT49

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT.....49

4.4.2 TEST SETUP49

4.4.3 TEST INSTRUMENTS49

4.4.4 TEST PROCEDURES.....50

4.4.5 DEVIATION FROM TEST STANDARD50

4.4.6 EUT OPERATING CONDITIONS.....50

4.4.7 TEST RESULTS51

4.5 FREQUENCY STABILITY55

4.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT55

4.5.2 TEST SETUP55

4.5.3 TEST INSTRUMENTS55

4.5.4 TEST PROCEDURE56

4.5.5 DEVIATION FROM TEST STANDARD56

4.5.6 EUT OPERATING CONDITION56

4.5.7 TEST RESULTS57



A D T

4.6	6dB BANDWIDTH MEASUREMENT	58
4.6.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	58
4.6.2	TEST SETUP	58
4.6.3	TEST INSTRUMENTS	58
4.6.4	TEST PROCEDURE	58
4.6.5	DEVIATION FROM TEST STANDARD	58
4.6.6	EUT OPERATING CONDITIONS.....	58
4.6.7	TEST RESULTS	59
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION	61
6.	INFORMATION ON THE TESTING LABORATORIES	62
7.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	63



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140822C02-1	Original release	Sep. 25, 2014



1. CERTIFICATION

PRODUCT: Secured Wireless Access Point

MODEL: FORTIAP-24Dxxxxxx (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: Aug. 28 ~ Sep. 18, 2014

TEST SAMPLE: ENGINEERING SAMPLE

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

The above equipment (model: FORTIAP-24D) 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 :** Sep. 25, 2014
Pettie Chen / Senior Specialist

APPROVED BY :  , **DATE :** Sep. 25, 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 -2.62dB at 0.50242MHz.
15.407(b)(1/2/3/4/6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5400.00, 5440.00, 10360.00, 10400.00, 10480.00MHz.
15.407(b)(1/2/3/4/6)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.6dB 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	3.86 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-24Dxxxxxx (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	12Vdc from adapter 48Vdc from 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 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	99.054mW for 5180 ~ 5240MHz 38.994mW for 5745 ~ 5825MHz
ANTENNA TYPE	Ant. 1: PCB antenna with 5.13dBi gain Ant. 2: PCB antenna with 5.34dBi gain
ANTENNA CONNECTOR	IPEX
POWER CORD	NA
DATA CABLE	NA
I/O PORTS	Refer to user’s manual
ACCESSORY DEVICES	NA

NOTE:

- All models are listed as below.

Brand	Model	Difference
Fortinet Inc.	FortiAP-24Dxxxxxx	where “x” can be used as “A-Z”, or “0-9”, or “-”, or blank for software changes or marketing purposes only
	FORTIAP-24Dxxxxxx	
	FAP-24Dxxxxxx	

*Model: FORTIAP-24D was the final model.

- 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 EUT use following adapter and PoE. (Support units only)

Adapter	
Brand:	Powertron Electronics Corp.
Model:	PA1024-2HUB PA1024-2HU PA1024-120HUB200
Input:	100-240Vac~50-60Hz 0.6A
Output:	12Vdc / 2.0A 24W Max
Power Cord:	1.5m cable with one core

PoE	
Brand:	EnGenius
Model:	NPE-4818
Rating:	48Vdc, 0.375A

Adapter of PoE	
Brand:	Powertron Electronics Corp.
Model:	PA1040-4DU
Input:	100-240Vac~50-60Hz, 0.6A
Output:	48Vdc, 0.38A, 18.24W Max
Power Cord:	1.55m cable with one core

4. 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 \geq 1G	RE $<$ 1G	PLC	APCM	
A	√	√	√	√	Power from adapter
B	-	√	√	-	Power from PoE

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)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	15.0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	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)
A, B	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)
A, B	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)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	15.0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Jones Chang
PLC	21deg. C, 72%RH	120Vac, 60Hz	Nick Hsu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee



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3.3 DUTY CYCLE OF TEST SIGNAL

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

802.11a: Duty cycle = 1.36/1.422 = 0.956, Duty factor = $10 * \log(1/0.956) = 0.19$

802.11n (20MHz): Duty cycle = 1.27/1.322 = 0.961, Duty factor = $10 * \log(1/0.961) = 0.17$

802.11n (40MHz): Duty cycle = 0.63/0.679 = 0.928, Duty factor = $10 * \log(1/0.928) = 0.33$



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	JetFlash V85 4GB	Transcend	V85	569992-8209	NA
3	Adapter	Powertron Electronics Corp.	PA1024-2HUB PA1024-2HU PA1024-120HUB200	NA	NA
4	PoE	EnGenius	NPE-4818	NA	NA
5	Adapter of PoE	Powertron Electronics Corp.	PA1040-4DU	NA	NA

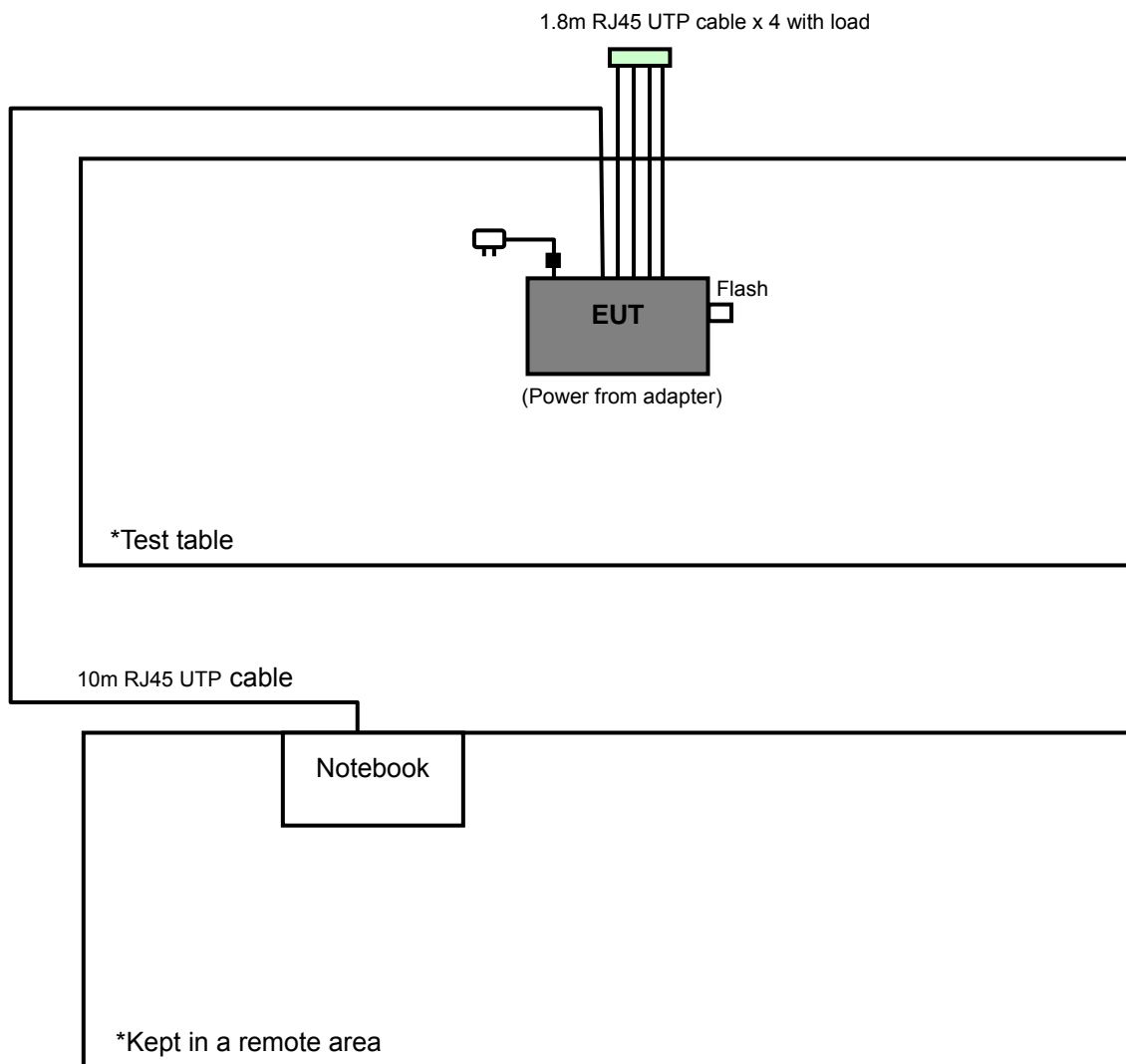
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable
2	NA
3	NA
4	10m RJ45 UTP cable
5	NA

NOTE:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1, 4, 5 acted as communication partners to transfer data.

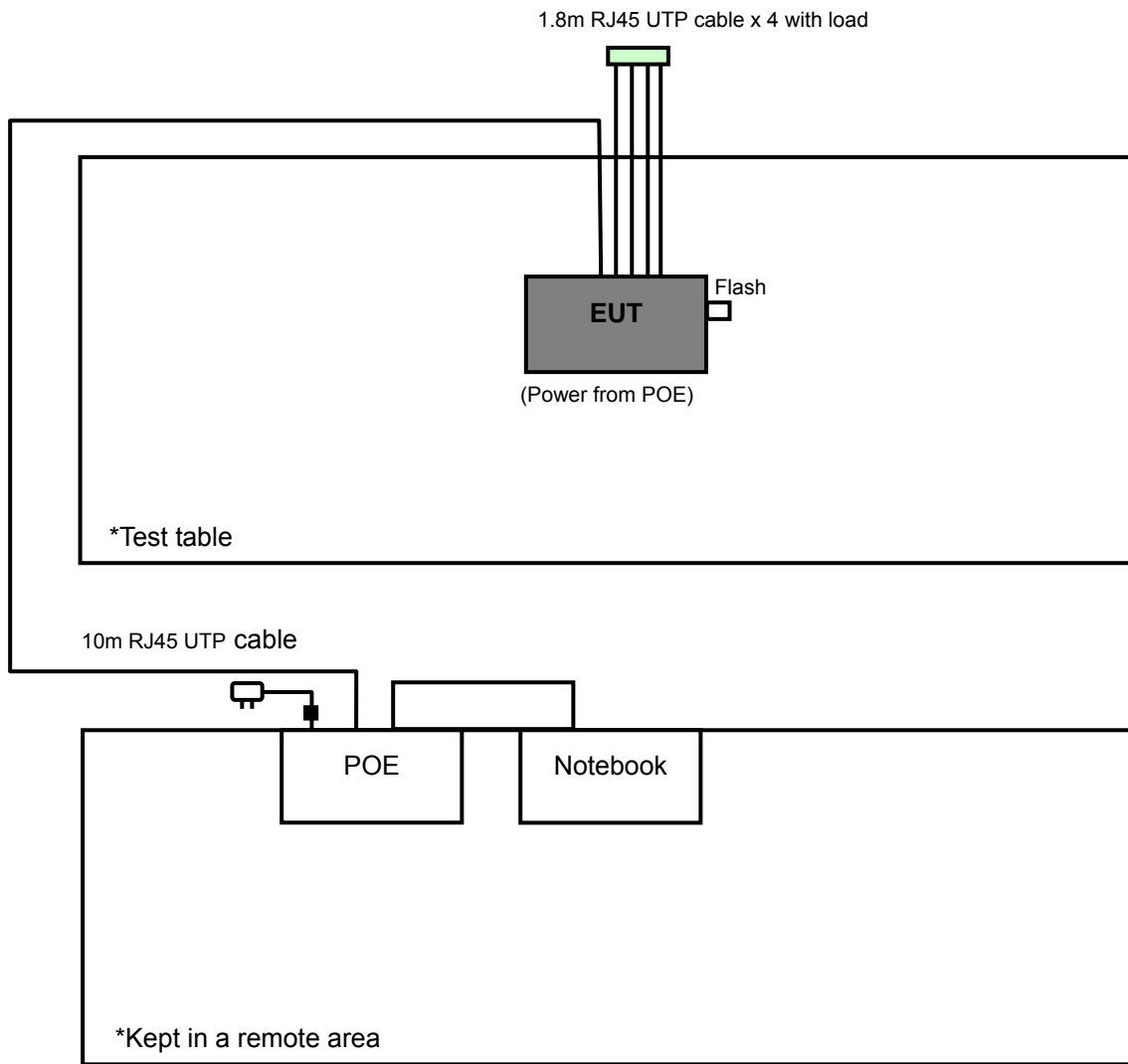
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

Test Mode A





Test Mode B



3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the 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: 68.2 (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: 68.2 (dBµV/m) ^{*1} PK: 78.2 (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:

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

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	BBHA 9120D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Preamplifier Agilent	8447D	2944A10633	Oct. 07, 2013	Oct. 06, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 09, 2014	Aug. 08, 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
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
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 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 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:

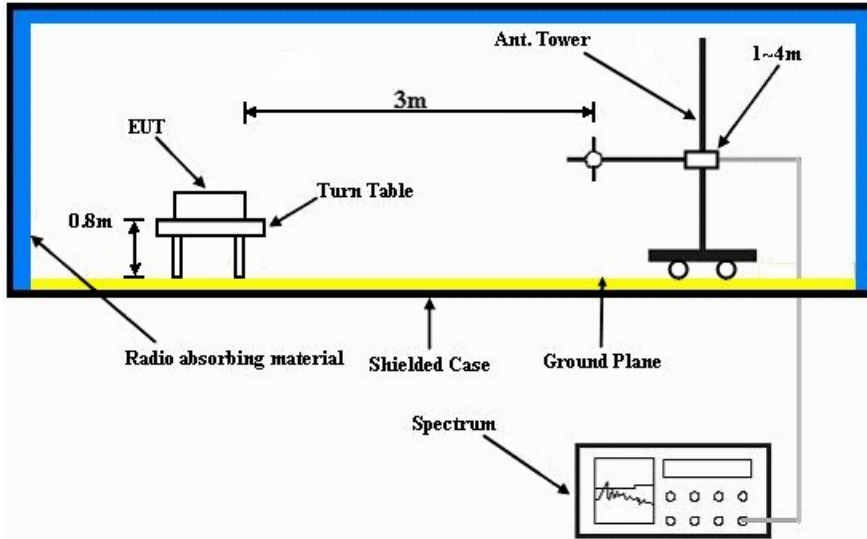
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

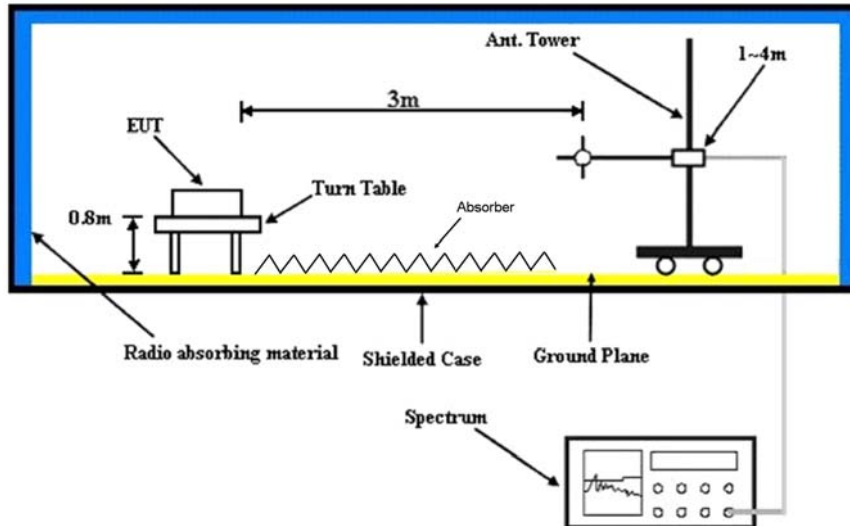
No deviation.

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	71.8 PK	74.0	-2.2	1.16 H	218	65.40	6.40
2	5150.00	50.1 AV	54.0	-3.9	1.16 H	218	43.70	6.40
3	*5180.00	108.5 PK			1.03 H	220	68.60	39.90
4	*5180.00	98.9 AV			1.03 H	220	59.00	39.90
5	#10360.00	69.4 PK	74.0	-4.6	1.15 H	102	50.70	18.70
6	#10360.00	52.7 AV	54.0	-1.3	1.15 H	102	34.00	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	66.8 PK	74.0	-7.2	1.20 V	218	60.40	6.40
2	5150.00	48.7 AV	54.0	-5.3	1.20 V	218	42.30	6.40
3	*5180.00	108.0 PK			1.14 V	89	68.10	39.90
4	*5180.00	97.9 AV			1.14 V	89	58.00	39.90
5	#10360.00	63.2 PK	74.0	-10.8	1.20 V	188	44.50	18.70
6	#10360.00	49.1 AV	54.0	-4.9	1.20 V	188	30.40	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 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	109.1 PK			1.14 H	209	69.10	40.00
2	*5200.00	99.3 AV			1.14 H	209	59.30	40.00
3	#10400.00	69.2 PK	74.0	-4.8	1.17 H	103	50.20	19.00
4	#10400.00	53.0 AV	54.0	-1.0	1.17 H	103	34.00	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	108.8 PK			1.12 V	71	68.80	40.00
2	*5200.00	98.9 AV			1.12 V	71	58.90	40.00
3	#10400.00	62.5 PK	74.0	-11.5	1.21 V	189	43.50	19.00
4	#10400.00	49.0 AV	54.0	-5.0	1.21 V	189	30.00	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.



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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	109.6 PK			1.06 H	184	69.60	40.00
2	*5240.00	99.7 AV			1.06 H	184	59.70	40.00
3	5460.00	57.9 PK	74.0	-16.1	1.06 H	101	51.20	6.70
4	5460.00	47.4 AV	54.0	-6.6	1.06 H	101	40.70	6.70
5	#10480.00	69.4 PK	74.0	-4.6	1.12 H	105	50.20	19.20
6	#10480.00	53.0 AV	54.0	-1.0	1.12 H	105	33.80	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	109.2 PK			1.24 V	88	69.20	40.00
2	*5240.00	98.8 AV			1.24 V	88	58.80	40.00
3	5440.00	60.0 PK	74.0	-14.0	1.20 V	114	53.40	6.60
4	5440.00	48.9 AV	54.0	-5.1	1.20 V	114	42.30	6.60
5	#10480.00	62.4 PK	74.0	-11.6	1.19 V	187	43.20	19.20
6	#10480.00	49.1 AV	54.0	-4.9	1.19 V	187	29.90	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.



A D T

802.11n (20MHz)

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	71.3 PK	74.0	-2.7	1.04 H	207	64.90	6.40
2	5150.00	49.3 AV	54.0	-4.7	1.04 H	207	42.90	6.40
3	*5180.00	109.4 PK			1.04 H	217	69.50	39.90
4	*5180.00	98.9 AV			1.04 H	217	59.00	39.90
5	#10360.00	67.7 PK	74.0	-6.3	1.16 H	102	49.00	18.70
6	#10360.00	53.0 AV	54.0	-1.0	1.16 H	102	34.30	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	66.7 PK	74.0	-7.3	1.11 V	200	60.30	6.40
2	5150.00	48.0 AV	54.0	-6.0	1.11 V	200	41.60	6.40
3	*5180.00	107.4 PK			1.20 V	214	67.50	39.90
4	*5180.00	97.3 AV			1.20 V	214	57.40	39.90
5	#10360.00	61.5 PK	74.0	-12.5	1.28 V	187	42.80	18.70
6	#10360.00	48.3 AV	54.0	-5.7	1.28 V	187	29.60	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 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	107.9 PK			1.05 H	216	67.90	40.00
2	*5200.00	97.7 AV			1.05 H	216	57.70	40.00
3	#10400.00	68.4 PK	74.0	-5.6	1.15 H	103	49.40	19.00
4	#10400.00	52.8 AV	54.0	-1.2	1.15 H	103	33.80	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	106.8 PK			1.20 V	216	66.80	40.00
2	*5200.00	96.8 AV			1.20 V	216	56.80	40.00
3	#10400.00	61.7 PK	74.0	-12.3	1.22 V	191	42.70	19.00
4	#10400.00	48.8 AV	54.0	-5.2	1.22 V	191	29.80	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	108.8 PK			1.02 H	218	68.80	40.00
2	*5240.00	98.7 AV			1.02 H	218	58.70	40.00
3	5460.00	57.7 PK	74.0	-16.3	1.04 H	211	51.00	6.70
4	5460.00	46.8 AV	54.0	-7.2	1.04 H	211	40.10	6.70
5	#10480.00	67.7 PK	74.0	-6.3	1.16 H	103	48.50	19.20
6	#10480.00	52.6 AV	54.0	-1.4	1.16 H	103	33.40	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	108.1 PK			1.26 V	84	68.10	40.00
2	*5240.00	98.0 AV			1.26 V	84	58.00	40.00
3	5440.00	59.7 PK	74.0	-14.3	1.18 V	112	53.10	6.60
4	5440.00	48.6 AV	54.0	-5.4	1.18 V	112	42.00	6.60
5	#10480.00	62.2 PK	74.0	-11.8	1.20 V	189	43.00	19.20
6	#10480.00	48.9 AV	54.0	-5.1	1.20 V	189	29.70	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.



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802.11n (40MHz)

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	72.4 PK	74.0	-1.6	1.16 H	218	66.00	6.40
2	5150.00	52.3 AV	54.0	-1.7	1.16 H	218	45.90	6.40
3	*5190.00	103.6 PK			1.13 H	209	63.70	39.90
4	*5190.00	93.3 AV			1.13 H	209	53.40	39.90
5	#10380.00	60.8 PK	74.0	-13.2	1.15 H	103	42.00	18.80
6	#10380.00	47.5 AV	54.0	-6.5	1.15 H	103	28.70	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	70.2 PK	74.0	-3.8	1.22 V	214	63.80	6.40
2	5150.00	49.6 AV	54.0	-4.4	1.22 V	214	43.20	6.40
3	*5190.00	101.6 PK			1.21 V	212	61.70	39.90
4	*5190.00	91.9 AV			1.21 V	212	52.00	39.90
5	#10380.00	60.5 PK	74.0	-13.5	1.17 V	185	41.70	18.80
6	#10380.00	47.3 AV	54.0	-6.7	1.17 V	185	28.50	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	*5230.00	107.2 PK			1.03 H	216	67.20	40.00
2	*5230.00	96.7 AV			1.03 H	216	56.70	40.00
3	5350.00	60.5 PK	74.0	-13.5	1.13 H	190	54.10	6.40
4	5350.00	49.0 AV	54.0	-5.0	1.13 H	190	42.60	6.40
5	#10460.00	66.9 PK	74.0	-7.1	1.13 H	105	47.80	19.10
6	#10460.00	52.6 AV	54.0	-1.4	1.13 H	105	33.50	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	*5230.00	105.7 PK			1.30 V	219	65.70	40.00
2	*5230.00	95.0 AV			1.30 V	219	55.00	40.00
3	5440.00	62.7 PK	74.0	-11.3	1.15 V	242	56.10	6.60
4	5440.00	51.5 AV	54.0	-2.5	1.15 V	242	44.90	6.60
5	#10460.00	61.1 PK	74.0	-12.9	1.18 V	210	42.00	19.10
6	#10460.00	48.0 AV	54.0	-6.0	1.18 V	210	28.90	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	5440.00	60.7 PK	74.0	-13.3	1.00 H	148	54.10	6.60
2	5440.00	49.4 AV	54.0	-4.6	1.00 H	148	42.80	6.60
3	#5714.00	72.0 PK	74.0	-2.0	1.17 H	179	65.00	7.00
4	#5714.00	51.3 AV	54.0	-2.7	1.17 H	179	44.30	7.00
5	#5722.00	76.0 PK	78.2	-2.2	1.18 H	177	69.00	7.00
6	#5725.00	63.9 PK	78.2	-14.3	1.20 H	180	56.80	7.10
7	*5745.00	105.1 PK			1.05 H	200	64.50	40.60
8	*5745.00	95.5 AV			1.05 H	200	54.90	40.60
9	11490.00	62.9 PK	74.0	-11.1	1.16 H	183	44.20	18.70
10	11490.00	49.3 AV	54.0	-4.7	1.16 H	183	30.60	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	5440.00	62.8 PK	74.0	-11.2	1.13 V	225	56.20	6.60
2	5440.00	53.0 AV	54.0	-1.0	1.13 V	225	46.40	6.60
3	#5714.00	65.9 PK	74.0	-8.1	1.24 V	222	58.90	7.00
4	#5714.00	47.6 AV	54.0	-6.4	1.24 V	222	40.60	7.00
5	#5722.00	75.9 PK	78.2	-2.3	1.26 V	229	68.90	7.00
6	#5725.00	67.4 PK	78.2	-10.8	1.26 V	231	60.30	7.10
7	*5745.00	105.8 PK			1.27 V	229	65.20	40.60
8	*5745.00	95.3 AV			1.27 V	229	54.70	40.60
9	11490.00	60.2 PK	74.0	-13.8	1.20 V	177	41.50	18.70
10	11490.00	47.5 AV	54.0	-6.5	1.20 V	177	28.80	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	5400.00	62.8 PK	74.0	-11.2	1.06 H	198	56.20	6.60
2	5400.00	52.2 AV	54.0	-1.8	1.06 H	198	45.60	6.60
3	*5785.00	107.2 PK			1.06 H	197	66.50	40.70
4	*5785.00	97.4 AV			1.06 H	197	56.70	40.70
5	11570.00	63.5 PK	74.0	-10.5	1.21 H	148	44.70	18.80
6	11570.00	49.1 AV	54.0	-4.9	1.21 H	148	30.30	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	5400.00	66.4 PK	74.0	-7.6	1.12 V	225	59.80	6.60
2	5400.00	53.0 AV	54.0	-1.0	1.12 V	225	46.40	6.60
3	*5785.00	107.3 PK			1.29 V	224	66.60	40.70
4	*5785.00	96.1 AV			1.29 V	224	55.40	40.70
5	11570.00	60.8 PK	74.0	-13.2	1.18 V	181	42.00	18.80
6	11570.00	48.0 AV	54.0	-6.0	1.18 V	181	29.20	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.

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	5400.00	62.4 PK	74.0	-11.6	1.06 H	168	55.80	6.60
2	5400.00	51.3 AV	54.0	-2.7	1.06 H	168	44.70	6.60
3	*5825.00	107.3 PK			1.03 H	197	66.60	40.70
4	*5825.00	97.1 AV			1.03 H	197	56.40	40.70
5	#5850.00	68.3 PK	78.2	-9.9	1.03 H	199	61.30	7.00
6	#5853.00	75.4 PK	78.2	-2.8	1.02 H	193	68.30	7.10
7	#5861.00	67.3 PK	74.0	-6.7	1.05 H	201	60.20	7.10
8	#5861.00	48.6 AV	54.0	-5.4	1.05 H	201	41.50	7.10
9	11650.00	62.0 PK	74.0	-12.0	1.17 H	110	42.80	19.20
10	11650.00	48.3 AV	54.0	-5.7	1.17 H	110	29.10	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	5400.00	63.8 PK	74.0	-10.2	1.13 V	226	57.20	6.60
2	5400.00	53.0 AV	54.0	-1.0	1.13 V	226	46.40	6.60
3	*5825.00	107.0 PK			1.03 V	197	66.30	40.70
4	*5825.00	96.5 AV			1.03 V	197	55.80	40.70
5	#5850.00	68.3 PK	78.2	-9.9	1.03 V	199	61.30	7.00
6	#5853.00	76.4 PK	78.2	-1.8	1.02 V	193	69.30	7.10
7	#5861.00	67.3 PK	74.0	-6.7	1.05 V	201	60.20	7.10
8	#5861.00	48.6 AV	54.0	-5.4	1.05 V	201	41.50	7.10
9	11650.00	62.0 PK	74.0	-12.0	1.17 V	110	42.80	19.20
10	11650.00	48.3 AV	54.0	-5.7	1.17 V	110	29.10	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.



A D T

802.11n (20MHz)

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	5400.00	59.5 PK	74.0	-14.5	1.00 H	149	52.90	6.60
2	5400.00	47.4 AV	54.0	-6.6	1.00 H	149	40.80	6.60
3	#5714.00	60.5 PK	74.0	-13.5	1.05 H	200	53.50	7.00
4	#5714.00	45.3 AV	54.0	-8.7	1.05 H	200	38.30	7.00
5	#5722.00	73.0 PK	78.2	-5.2	1.00 H	209	66.00	7.00
6	#5725.00	58.5 PK	78.2	-19.7	1.00 H	176	51.40	7.10
7	*5745.00	107.9 PK			1.06 H	196	67.30	40.60
8	*5745.00	95.5 AV			1.06 H	196	54.90	40.60
9	11490.00	57.7 PK	74.0	-16.3	1.29 H	225	39.00	18.70
10	11490.00	45.4 AV	54.0	-8.6	1.29 H	225	26.70	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	5400.00	62.1 PK	74.0	-11.9	1.20 V	117	55.50	6.60
2	5400.00	52.5 AV	54.0	-1.5	1.20 V	117	45.90	6.60
3	#5714.00	59.4 PK	74.0	-14.6	1.29 V	226	52.40	7.00
4	#5714.00	44.3 AV	54.0	-9.7	1.29 V	226	37.30	7.00
5	#5722.00	72.0 PK	78.2	-6.2	1.21 V	216	65.00	7.00
6	#5725.00	57.5 PK	78.2	-20.7	1.31 V	224	50.40	7.10
7	*5745.00	104.7 PK			1.00 V	207	64.10	40.60
8	*5745.00	93.2 AV			1.00 V	207	52.60	40.60
9	11490.00	58.4 PK	74.0	-15.6	1.09 V	121	39.70	18.70
10	11490.00	45.2 AV	54.0	-8.8	1.09 V	121	26.50	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 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	5460.00	50.1 PK	74.0	-23.9	1.00 H	194	43.40	6.70
2	5460.00	50.0 AV	54.0	-4.0	1.00 H	194	43.30	6.70
3	*5785.00	107.3 PK			1.04 H	196	66.60	40.70
4	*5785.00	95.4 AV			1.04 H	196	54.70	40.70
5	11570.00	60.2 PK	74.0	-13.8	1.13 H	196	41.40	18.80
6	11570.00	45.9 AV	54.0	-8.1	1.13 H	196	27.10	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	5460.00	64.0 PK	74.0	-10.0	1.14 V	223	57.30	6.70
2	5460.00	52.3 AV	54.0	-1.7	1.14 V	223	45.60	6.70
3	*5785.00	104.7 PK			1.10 V	208	64.00	40.70
4	*5785.00	93.4 AV			1.10 V	208	52.70	40.70
5	11570.00	57.6 PK	74.0	-16.4	1.05 V	238	38.80	18.80
6	11570.00	44.6 AV	54.0	-9.4	1.05 V	238	25.80	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	#5480.00	59.6 PK	74.0	-14.4	1.01 H	178	52.90	6.70
2	#5480.00	46.9 AV	54.0	-7.1	1.01 H	178	40.20	6.70
3	*5825.00	105.0 PK			1.00 H	169	64.30	40.70
4	*5825.00	93.3 AV			1.00 H	169	52.60	40.70
5	#5850.00	48.2 PK	78.2	-30.0	1.04 H	194	41.20	7.00
6	#5853.00	61.0 PK	78.2	-17.2	1.03 H	200	53.90	7.10
7	#5861.00	55.7 PK	74.0	-18.3	1.05 H	207	48.60	7.10
8	#5861.00	43.4 AV	54.0	-10.6	1.05 H	207	36.30	7.10
9	11650.00	59.2 PK	74.0	-14.8	1.16 H	120	40.00	19.20
10	11650.00	46.2 AV	54.0	-7.8	1.16 H	120	27.00	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	#5480.00	63.2 PK	74.0	-10.8	1.25 V	223	56.50	6.70
2	#5480.00	52.4 AV	54.0	-1.6	1.25 V	223	45.70	6.70
3	*5825.00	105.0 PK			1.09 V	207	64.30	40.70
4	*5825.00	93.0 AV			1.09 V	207	52.30	40.70
5	#5850.00	46.2 PK	78.2	-32.0	1.29 V	164	39.20	7.00
6	#5853.00	56.4 PK	78.2	-21.8	1.18 V	195	49.30	7.10
7	#5861.00	56.2 PK	74.0	-17.8	1.28 V	170	49.10	7.10
8	#5861.00	43.4 AV	54.0	-10.6	1.28 V	170	36.30	7.10
9	11650.00	58.2 PK	74.0	-15.8	1.17 V	156	39.00	19.20
10	11650.00	45.0 AV	54.0	-9.0	1.17 V	156	25.80	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 (40MHz)

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	5400.00	60.1 PK	74.0	-13.9	1.10 H	229	53.50	6.60
2	5400.00	48.9 AV	54.0	-5.1	1.10 H	229	42.30	6.60
3	#5714.00	70.8 PK	74.0	-3.2	1.00 H	204	63.80	7.00
4	#5714.00	52.8 AV	54.0	-1.2	1.00 H	204	45.80	7.00
5	#5722.00	76.1 PK	78.2	-2.1	1.00 H	201	69.10	7.00
6	#5725.00	74.7 PK	78.2	-3.5	1.00 H	180	67.60	7.10
7	*5755.00	103.4 PK			1.06 H	203	62.70	40.70
8	*5755.00	93.2 AV			1.06 H	203	52.50	40.70
9	11510.00	60.6 PK	74.0	-13.4	1.13 H	245	41.90	18.70
10	11510.00	47.4 AV	54.0	-6.6	1.13 H	245	28.70	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	5400.00	62.6 PK	74.0	-11.4	1.16 V	221	56.00	6.60
2	5400.00	52.3 AV	54.0	-1.7	1.16 V	221	45.70	6.60
3	#5714.00	67.1 PK	74.0	-6.9	1.00 V	200	60.10	7.00
4	#5714.00	49.5 AV	54.0	-4.5	1.00 V	200	42.50	7.00
5	#5722.00	72.6 PK	78.2	-5.6	1.00 V	200	65.60	7.00
6	#5725.00	70.3 PK	78.2	-7.9	1.00 V	201	63.20	7.10
7	*5755.00	99.8 PK			1.11 V	199	59.10	40.70
8	*5755.00	89.6 AV			1.11 V	199	48.90	40.70
9	11510.00	60.3 PK	74.0	-13.7	1.21 V	180	41.60	18.70
10	11510.00	47.0 AV	54.0	-7.0	1.21 V	180	28.30	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.



A D T

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	5400.00	59.5 PK	74.0	-14.5	1.10 H	189	52.90	6.60
2	5400.00	48.0 AV	54.0	-6.0	1.10 H	189	41.40	6.60
3	*5795.00	102.3 PK			1.06 H	216	61.60	40.70
4	*5795.00	92.3 AV			1.06 H	216	51.60	40.70
5	#5850.00	64.0 PK	78.2	-14.2	1.20 H	203	57.00	7.00
6	#5853.00	62.2 PK	78.2	-16.0	1.20 H	203	55.10	7.10
7	#5861.00	60.2 PK	74.0	-13.8	1.18 H	196	53.10	7.10
8	#5861.00	49.1 AV	54.0	-4.9	1.18 H	196	42.00	7.10
9	11590.00	60.3 PK	74.0	-13.7	1.09 H	222	41.40	18.90
10	11590.00	47.5 AV	54.0	-6.5	1.09 H	222	28.60	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	5400.00	62.1 PK	74.0	-11.9	1.14 V	224	55.50	6.60
2	5400.00	52.2 AV	54.0	-1.8	1.14 V	224	45.60	6.60
3	*5795.00	102.3 PK			1.16 V	225	61.60	40.70
4	*5795.00	92.0 AV			1.16 V	225	51.30	40.70
5	#5850.00	60.5 PK	78.2	-17.7	1.19 V	202	53.50	7.00
6	#5853.00	59.3 PK	78.2	-18.9	1.20 V	199	52.20	7.10
7	#5861.00	59.3 PK	74.0	-14.7	1.16 V	189	52.20	7.10
8	#5861.00	48.7 AV	54.0	-5.3	1.16 V	189	41.60	7.10
9	11590.00	59.9 PK	74.0	-14.1	1.22 V	188	41.00	18.90
10	11590.00	46.9 AV	54.0	-7.1	1.22 V	188	28.00	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 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	51.29	35.6 QP	40.0	-4.4	1.49 H	71	50.10	-14.50
2	109.62	40.9 QP	43.5	-2.6	1.49 H	112	58.10	-17.20
3	183.50	38.7 QP	43.5	-4.8	1.49 H	291	54.30	-15.60
4	237.94	38.2 QP	46.0	-7.8	1.49 H	88	53.00	-14.80
5	675.40	41.2 QP	46.0	-4.8	1.00 H	8	46.00	-4.80
6	875.67	40.6 QP	46.0	-5.4	1.00 H	8	41.70	-1.10
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	49.90	36.8 QP	40.0	-3.2	1.50 V	101	51.30	-14.50
2	113.50	35.7 QP	43.5	-7.8	1.50 V	100	52.50	-16.80
3	290.43	35.0 QP	46.0	-11.0	1.50 V	116	47.60	-12.60
4	375.98	39.6 QP	46.0	-6.4	1.50 V	173	50.30	-10.70
5	788.17	34.9 QP	46.0	-11.1	1.50 V	283	37.10	-2.20
6	875.67	36.7 QP	46.0	-9.3	1.00 V	5	37.80	-1.10

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



A D T

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	32.4 QP	40.0	-7.6	1.99 H	100	47.00	-14.60
2	125.17	34.5 QP	43.5	-9.0	1.99 H	88	50.30	-15.80
3	239.88	37.0 QP	46.0	-9.0	1.00 H	275	51.70	-14.70
4	374.04	37.1 QP	46.0	-8.9	1.00 H	195	47.80	-10.70
5	675.40	41.9 QP	46.0	-4.1	1.00 H	151	46.70	-4.80
6	875.67	40.0 QP	46.0	-6.0	1.49 H	124	41.10	-1.10

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	51.55	36.3 QP	40.0	-3.7	1.00 V	28	50.80	-14.50
2	237.94	40.5 QP	46.0	-5.5	1.00 V	164	55.30	-14.80
3	374.04	34.8 QP	46.0	-11.2	1.50 V	19	45.50	-10.70
4	624.85	35.8 QP	46.0	-10.2	1.00 V	251	41.30	-5.50
5	675.40	33.8 QP	46.0	-12.2	1.00 V	210	38.60	-4.80
6	875.67	36.8 QP	46.0	-9.2	1.00 V	10	37.90	-1.10

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	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. 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

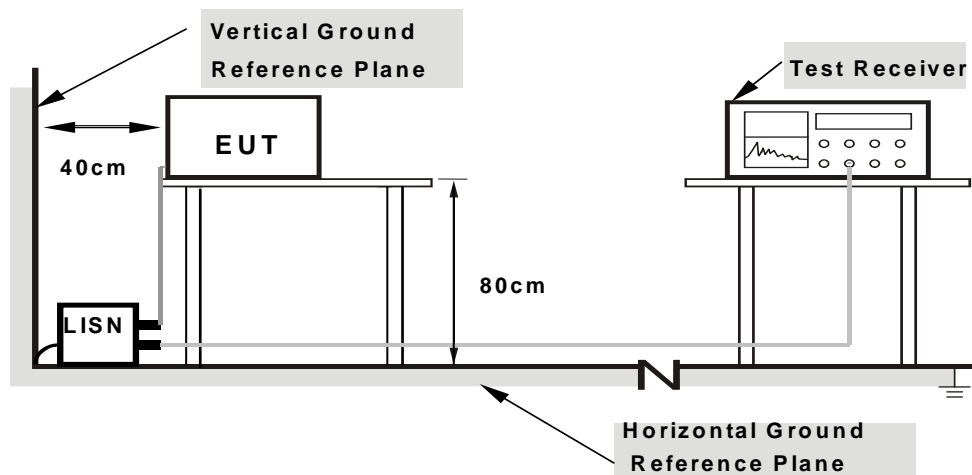
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

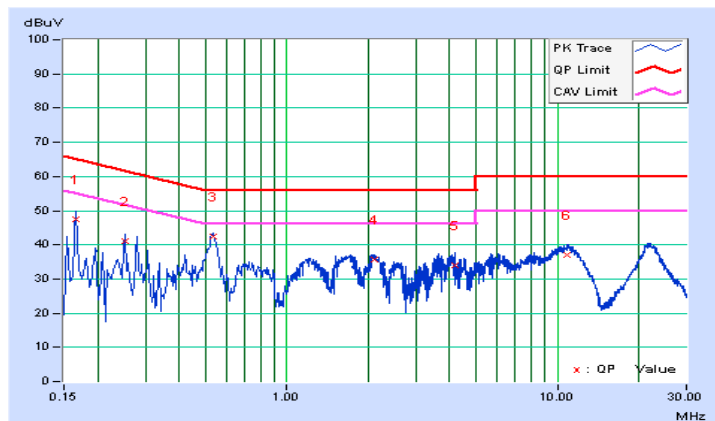
CONDUCTED WORST-CASE DATA: 802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	0.10	47.39	31.76	47.49	31.86	65.18	55.18	-17.68	-23.31
2	0.25166	0.10	40.94	29.55	41.04	29.65	61.70	51.70	-20.67	-22.06
3	0.53240	0.13	42.39	35.47	42.52	35.60	56.00	46.00	-13.48	-10.40
4	2.10500	0.25	35.51	29.02	35.76	29.27	56.00	46.00	-20.24	-16.73
5	4.20076	0.27	33.60	24.57	33.87	24.84	56.00	46.00	-22.13	-21.16
6	10.91423	0.60	36.49	31.18	37.09	31.78	60.00	50.00	-22.91	-18.22

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





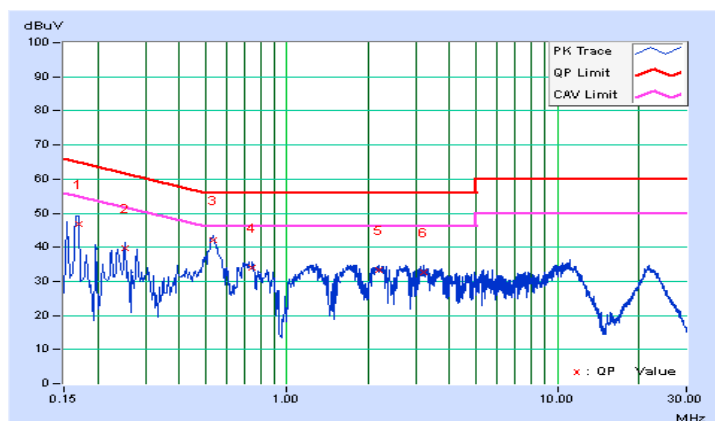
A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16955	0.07	46.78	31.17	46.85	31.24	64.98	54.98	-18.14	-23.75
2	0.25166	0.11	39.49	28.73	39.60	28.84	61.70	51.70	-22.10	-22.86
3	0.53381	0.18	41.95	35.27	42.13	35.45	56.00	46.00	-13.87	-10.55
4	0.74823	0.20	33.93	25.54	34.13	25.74	56.00	46.00	-21.87	-20.26
5	2.19493	0.22	33.00	26.59	33.22	26.81	56.00	46.00	-22.78	-19.19
6	3.19589	0.24	32.57	29.70	32.81	29.94	56.00	46.00	-23.19	-16.06

REMARKS:

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

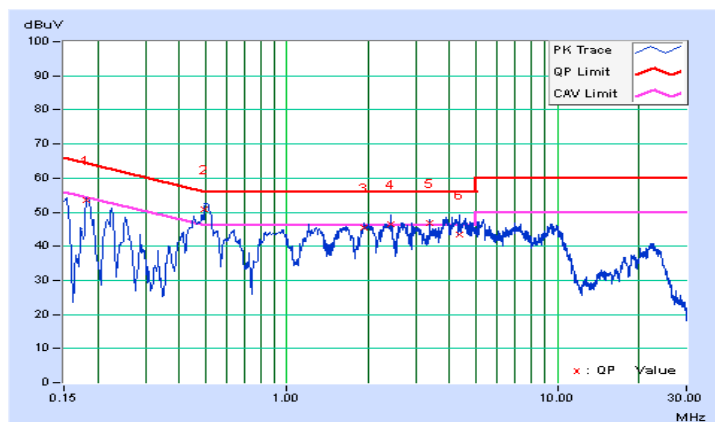


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [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	0.18128	0.10	53.39	43.14	53.49	43.24	64.43	54.43	-10.94	-11.19
2	0.49799	0.13	50.70	39.81	50.83	39.94	56.03	46.03	-5.21	-6.10
3	1.93114	0.25	45.35	39.65	45.60	39.90	56.00	46.00	-10.40	-6.10
4	2.41389	0.25	46.15	41.34	46.40	41.59	56.00	46.00	-9.60	-4.41
5	3.37966	0.26	46.62	42.79	46.88	43.05	56.00	46.00	-9.12	-2.95
6	4.34934	0.28	43.03	37.08	43.31	37.36	56.00	46.00	-12.69	-8.64

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





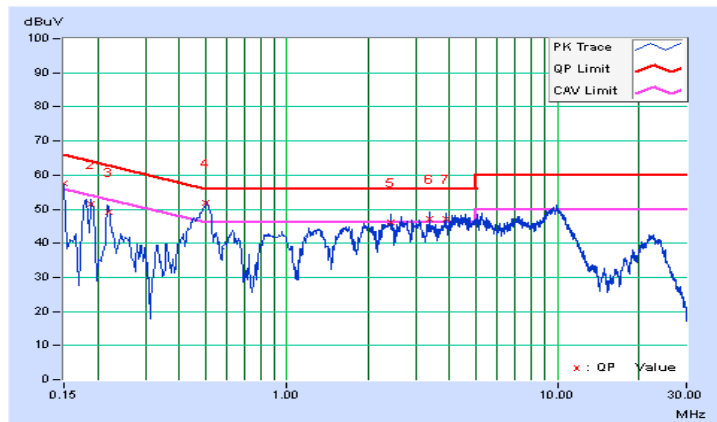
A D T

PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	57.60	45.24	57.65	45.29	66.00	56.00	-8.35	-10.71
2	0.18910	0.08	51.27	37.17	51.35	37.25	64.08	54.08	-12.72	-16.82
3	0.22038	0.10	49.12	40.70	49.22	40.80	62.80	52.80	-13.59	-12.01
4	0.50242	0.18	51.52	43.20	51.70	43.38	56.00	46.00	-4.30	-2.62
5	2.41389	0.23	46.00	41.16	46.23	41.39	56.00	46.00	-9.77	-4.61
6	3.37966	0.25	46.81	42.60	47.06	42.85	56.00	46.00	-8.94	-3.15
7	3.86162	0.26	47.04	42.53	47.30	42.79	56.00	46.00	-8.70	-3.21

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 \leq 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,

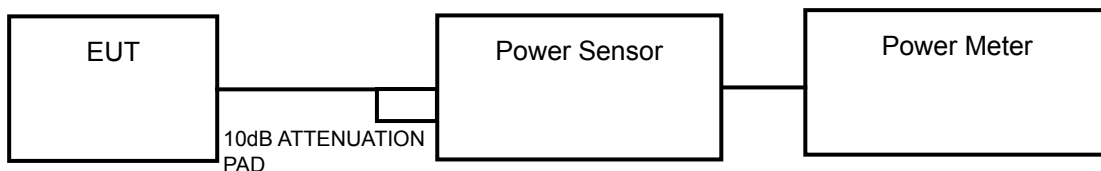
Array Gain = 0 dB (i.e., no array gain) for NANT \leq 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths \geq 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 \geq 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	15.72	16.53	82.303	19.15	30.00	PASS
40	5200	16.41	17.07	94.685	19.76	30.00	PASS
48	5240	16.47	17.02	94.711	19.76	30.00	PASS
149	5745	12.05	12.77	34.955	15.44	30.00	PASS
157	5785	12.70	13.05	38.805	15.89	30.00	PASS
165	5825	12.51	13.00	37.777	15.77	30.00	PASS

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	15.38	15.64	71.158	18.52	30.00	PASS
40	5200	15.30	15.53	69.611	18.43	30.00	PASS
48	5240	16.50	16.01	84.570	19.27	30.00	PASS
149	5745	12.13	12.71	34.995	15.44	30.00	PASS
157	5785	12.37	12.47	34.918	15.43	30.00	PASS
165	5825	12.60	13.18	38.994	15.91	30.00	PASS

802.11n (40MHz)

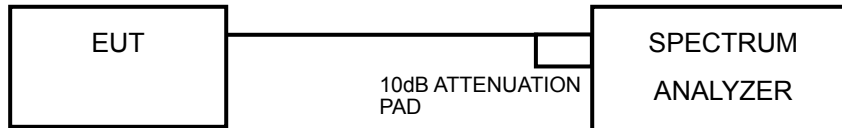
CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	13.16	13.56	43.400	16.37	30.00	PASS
46	5230	16.67	17.21	99.054	19.96	30.00	PASS
151	5755	11.25	12.00	29.184	14.65	30.00	PASS
159	5795	11.59	12.05	30.453	14.84	30.00	PASS

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	
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 \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 = 300 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/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	2.59	2.56	5.59	0.19	5.78	14.75	PASS
40	5200	2.84	3.38	6.13	0.19	6.32	14.75	PASS
48	5240	2.75	3.32	6.05	0.19	6.25	14.75	PASS

NOTE:

- 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.
- For U-NII-1 Band:**
Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$ = 8.25dBi > 6dBi , so the power density limit shall be reduced to $17-(8.25-6) = 14.75\text{dBm}$.
- 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	2.34	2.57	5.47	0.17	5.64	14.75	PASS
40	5200	1.27	2.20	4.77	0.17	4.94	14.75	PASS
48	5240	1.97	2.84	5.44	0.17	5.61	14.75	PASS

NOTE:

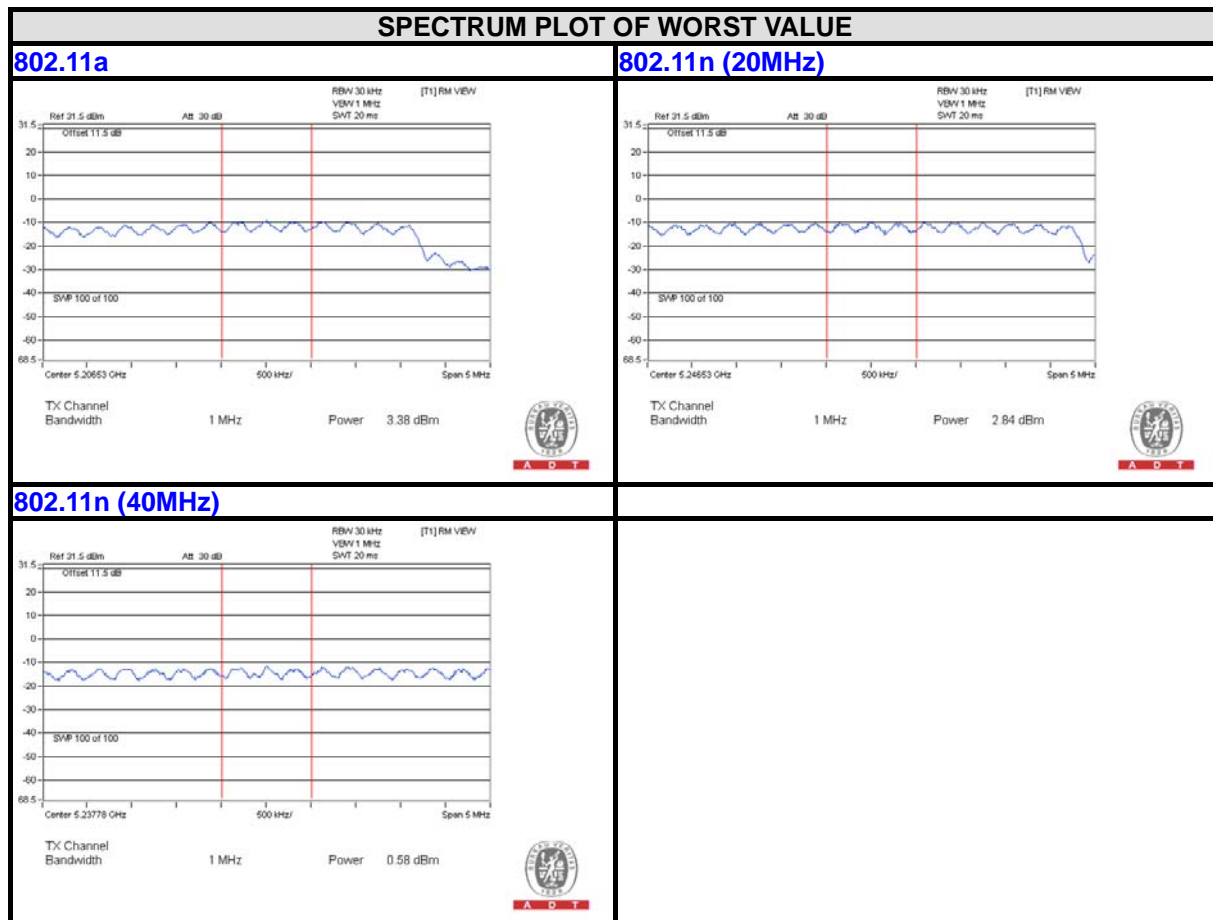
- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- For U-NII-1 Band:**
Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$ = 8.25dBi > 6dBi , so the power density limit shall be reduced to $17-(8.25-6) = 14.75\text{dBm}$.
- 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	-3.84	-3.03	-0.41	0.33	-0.08	14.75	PASS
46	5230	0.57	0.58	3.59	0.33	3.91	14.75	PASS

NOTE:

- 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.
- For U-NII-1 Band:**
 Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$ = 8.25dBi > 6dBi , so the power density limit shall be reduced to $17-(8.25-6) = 14.75\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.



For U-NII-3 Band

802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	-10.00	-7.78	3.01	-4.77	27.75	PASS
	157	5785	-9.55	-7.33	3.01	-4.32	27.75	PASS
	165	5825	-9.43	-7.21	3.01	-4.20	27.75	PASS
1	149	5745	-10.69	-8.47	3.01	-5.46	27.75	PASS
	157	5785	-9.76	-7.54	3.01	-4.53	27.75	PASS
	165	5825	-9.42	-7.20	3.01	-4.19	27.75	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$ = 8.25dBi > 6dBi , so the power density limit shall be reduced to $30-(8.25-6) = 27.75$ dBm.

802.11n (20MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	-10.18	-7.96	3.01	-4.95	27.75	PASS
	157	5785	-10.16	-7.94	3.01	-4.93	27.75	PASS
	165	5825	-9.71	-7.49	3.01	-4.48	27.75	PASS
1	149	5745	-10.75	-8.53	3.01	-5.52	27.75	PASS
	157	5785	-10.28	-8.06	3.01	-5.05	27.75	PASS
	165	5825	-10.24	-8.02	3.01	-5.01	27.75	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$ = 8.25dBi > 6dBi , so the power density limit shall be reduced to $30-(8.25-6) = 27.75$ dBm.

802.11n (40MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	151	5755	-14.09	-11.87	3.01	-8.86	27.75	PASS
	159	5795	-13.95	-11.73	3.01	-8.72	27.75	PASS
1	151	5755	-14.70	-12.48	3.01	-9.47	27.75	PASS
	159	5795	-14.56	-12.34	3.01	-9.33	27.75	PASS

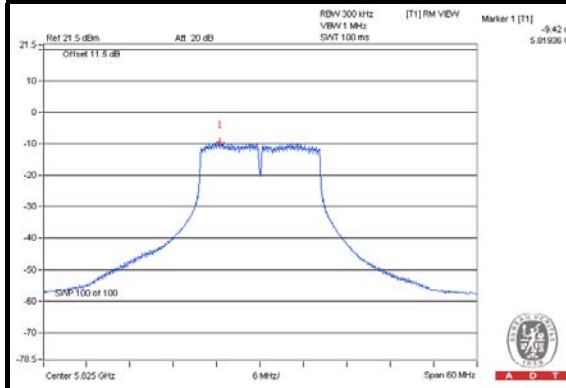
NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2]$ = 8.25dBi > 6dBi , so the power density limit shall be reduced to $30-(8.25-6) = 27.75$ dBm.



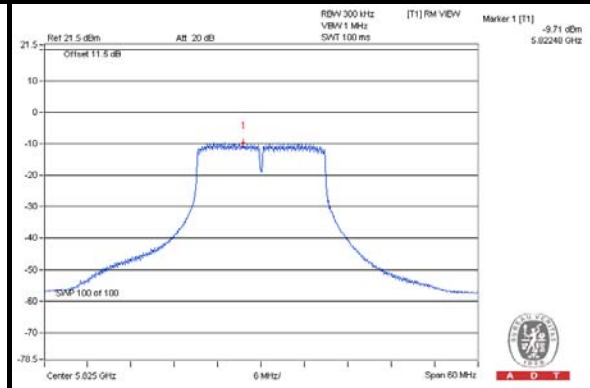
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SPECTRUM PLOT OF WORST VALUE

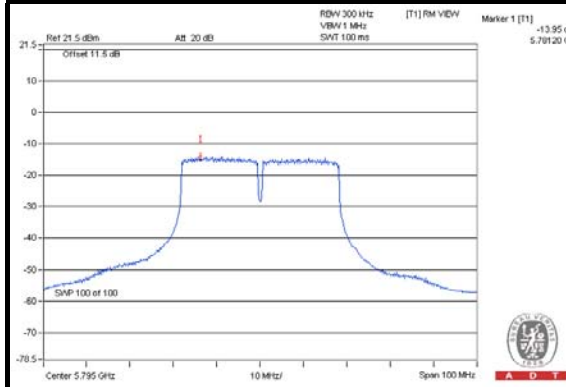
802.11a



802.11n (20MHz)



802.11n (40MHz)

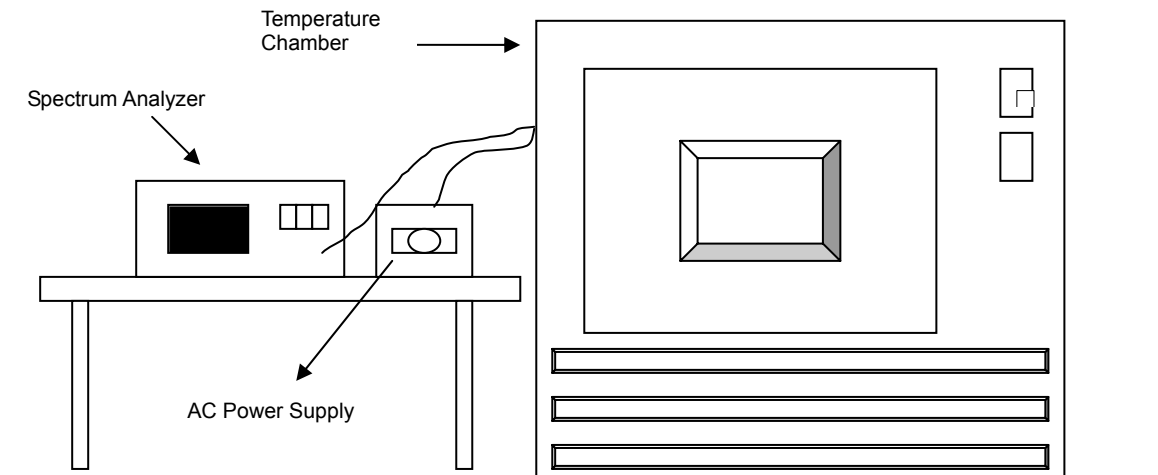


4.5 FREQUENCY STABILITY

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

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	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 (%)
40	120	5239.9847	-0.00029	5239.9845	-0.00030	5239.9875	-0.00024	5239.9852	-0.00028
30	120	5240.0076	0.00015	5240.0113	0.00022	5240.0076	0.00015	5240.0118	0.00023
20	120	5240.0101	0.00019	5240.0129	0.00025	5240.0091	0.00017	5240.0124	0.00024
10	120	5240.0241	0.00046	5240.0243	0.00046	5240.0267	0.00051	5240.0234	0.00045
0	120	5240.0142	0.00027	5240.0129	0.00025	5240.0115	0.00022	5240.0138	0.00026

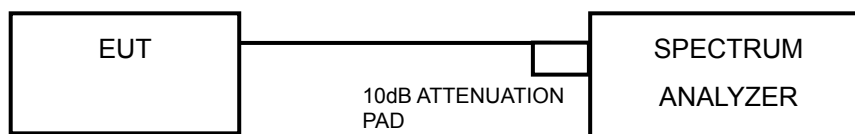
FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5240.0245	0.00047	5240.0251	0.00048	5240.0263	0.00050	5240.0237	0.00045
	120	5240.0241	0.00046	5240.0243	0.00046	5240.0267	0.00051	5240.0234	0.00045
	102	5240.0235	0.00045	5240.0245	0.00047	5240.0275	0.00052	5240.0238	0.00045

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) $\geq 3 \times$ 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	16.41	16.38	0.5	PASS
157	5785	16.41	16.34	0.5	PASS
165	5825	16.39	16.35	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	17.59	16.95	0.5	PASS
157	5785	17.60	16.98	0.5	PASS
165	5825	17.62	17.64	0.5	PASS

802.11n (40MHz)

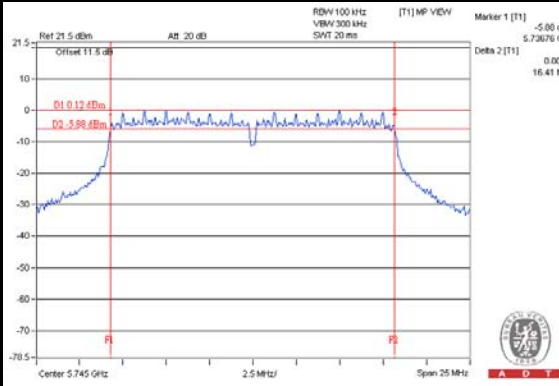
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.10	35.83	0.5	PASS
159	5795	36.38	36.14	0.5	PASS



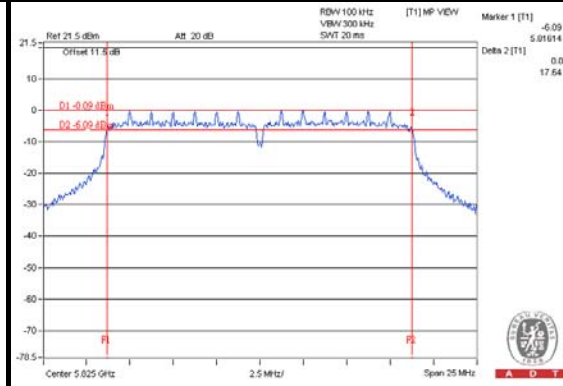
A D T

SPECTRUM PLOT OF WORST VALUE

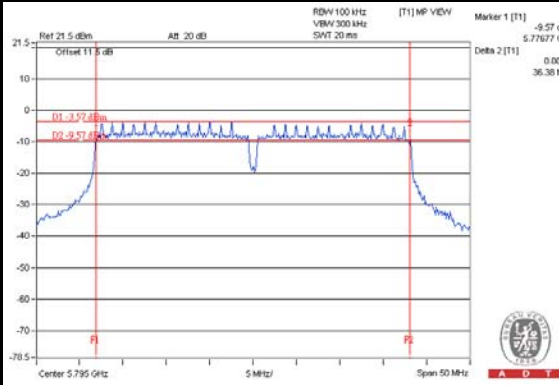
802.11a



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:

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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---