

FCC Test Report

Report No.: RF150316C01-1

FCC ID: A8J-ECB1200

Test Model: ECB1200

Received Date: Mar. 16, 2015

Test Date: Mar. 18 ~ Apr. 21, 2015

Issued Date: May 07, 2015

Applicant: EnGenius Technologies

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Release Control Record

Issue No.	Description	Date Issued
RF150316C01-1	Original release.	May 07, 2015

1 Certificate of Conformity

Product: 2.4GHz b/g/n, 5GHz ac/a/n Indoor AP

Brand: EnGenius

Test Model: ECB1200


Sample Status: Engineering sample

Applicant: EnGenius Technologies

Test Date: Mar. 18 ~ Apr. 21, 2015

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2009

The above equipment 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:** _____ May 07, 2015
Pettie Chen / Senior Specialist

Approved by :  _____, **Date:** _____ May 07, 2015
Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -9.19dB at 0.18122MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.3dB at 15720.00MHz.
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 RSMA not a standard connector.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	2.4GHz b/g/n, 5GHz ac/a/n Indoor AP
Brand	EnGenius
Test Model	ECB1200
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from adapter 48Vdc from PoE
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
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 300Mbps 802.11ac: up to 866.6Mbps
Operating Frequency	5180 ~ 5240MHz & 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20), 802.11n (VHT20) 2 for 802.11n (HT40), 802.11n (VHT40) 1 for 802.11ac (VHT80) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20), 802.11n (VHT20) 2 for 802.11n (HT40), 802.11n (VHT40) 1 for 802.11ac (VHT80)
Output Power	5180 ~ 5240MHz: 488.295mW 5745 ~ 5825MHz: 405.478mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Data Cable Supplied	0.5m RJ45 non-shielded cable without core

Note:

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

Modulation Mode	TX FUNCTION
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT uses following adapter and PoE.

Adapter	
Brand	Powertron Electronics Corp.
Model	PA1024-2HUB PA1024-120HUB200
Input Power	100-240Vac~50-60Hz 0.6A
Output Power	12Vdc / 2.0A 24W Max
Power Line	1.5m cable with 1 core

PoE (Support unit)	
Brand	EnGenius
Model	EPE-48GR
Rating	48Vdc / 0.38A 18.24W

Adapter of PoE (Support unit)	
Brand	Powertron Electronics Corp.
Model	PA1040-480IB080
Input Power	100-240Vac~50-60Hz 1.5A
Output Power	48Vdc / 0.8A 38.4W Max
Power Line	1.6m cable with 1 core

3. The following antenna was provided to the EUT.

Antenna Type	Dipole		
Antenna Connector	RSMA		
Gain (dBi)	Frequency (MHz)		
	5150	5550	5850
	4.6	4.2	5.31

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), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

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

NOTE:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **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 (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
A	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	15.0
A	802.11ac (VHT80)		42	42	OFDM	BPSK	65.0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0
A	802.11ac (VHT80)		155	155	OFDM	BPSK	65.0

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	802.11n (HT20)	5180-5320	36 to 64	40	OFDM	BPSK	7.2
A, B	802.11n (HT20)	5745-5825	149 to 165		OFDM	BPSK	7.2

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11n (HT20)	5180-5320	36 to 64	40	OFDM	BPSK	7.2
A, B	802.11n (HT20)	5745-5825	149 to 165		OFDM	BPSK	7.2

Antenna Port Conducted Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	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 (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
A	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	15.0
A	802.11ac (VHT80)		42	42	OFDM	BPSK	65.0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
A	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0
A	802.11ac (VHT80)		155	155	OFDM	BPSK	65.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
RE $<$ 1G	18deg. C, 70%RH	120Vac, 60Hz 48Vdc	Nick Hsu
PLC	24deg. C, 68%RH	120Vac, 60Hz 48Vdc	Kevin Kuo
APCM	25deg. C, 60%RH	120Vac, 60Hz	Leo Tsai

3.3 Duty Cycle of Test Signal

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

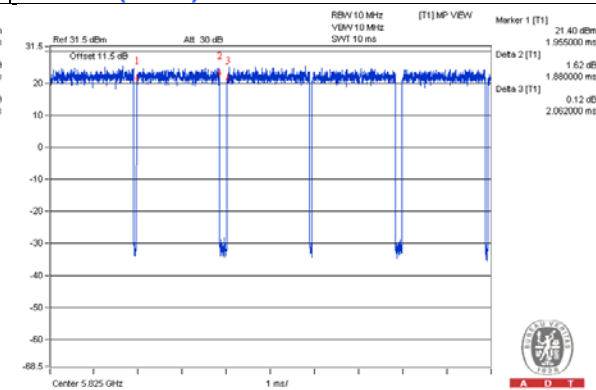
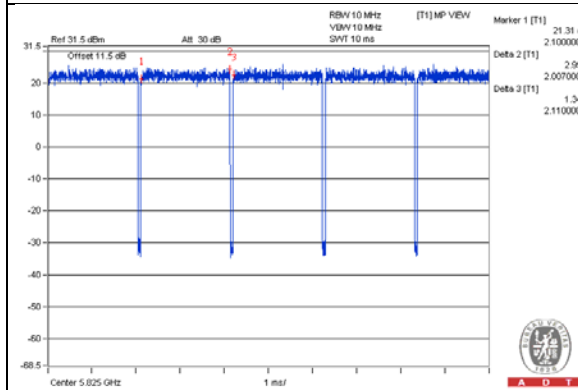
802.11a: Duty cycle = $2.007/2.11 = 0.951$, Duty factor = $10 * \log(1/0.951) = 0.22$

802.11n (HT20): Duty cycle = $1.88/2.062 = 0.912$, Duty factor = $10 * \log(1/0.912) = 0.40$

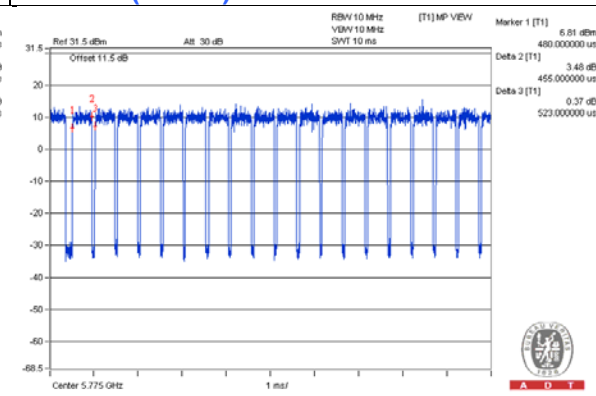
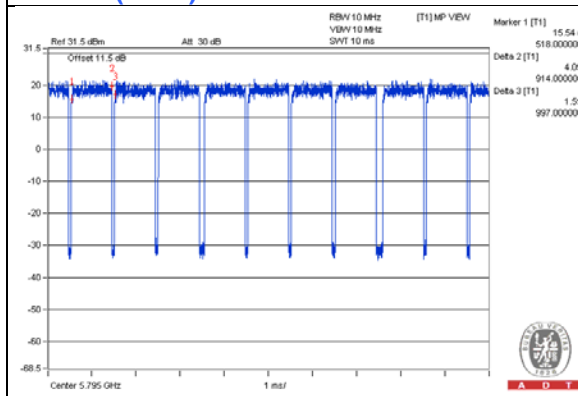
802.11n (HT40): Duty cycle = $0.914/0.997 = 0.917$, Duty factor = $10 * \log(1/0.917) = 0.38$

802.11ac (VHT80): Duty cycle = $0.455/0.523 = 0.87$, Duty factor = $10 * \log(1/0.87) = 0.60$

802.11a **802.11n (HT20)**



802.11n (HT40) **802.11ac (VHT80)**



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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	PoE	EnGenius	EPE-48GR	-	-	Provided by client
C.	Adapter of PoE	Powertron Electronics Corp.	PA1040-480IB080	-	-	Provided by client

Note:

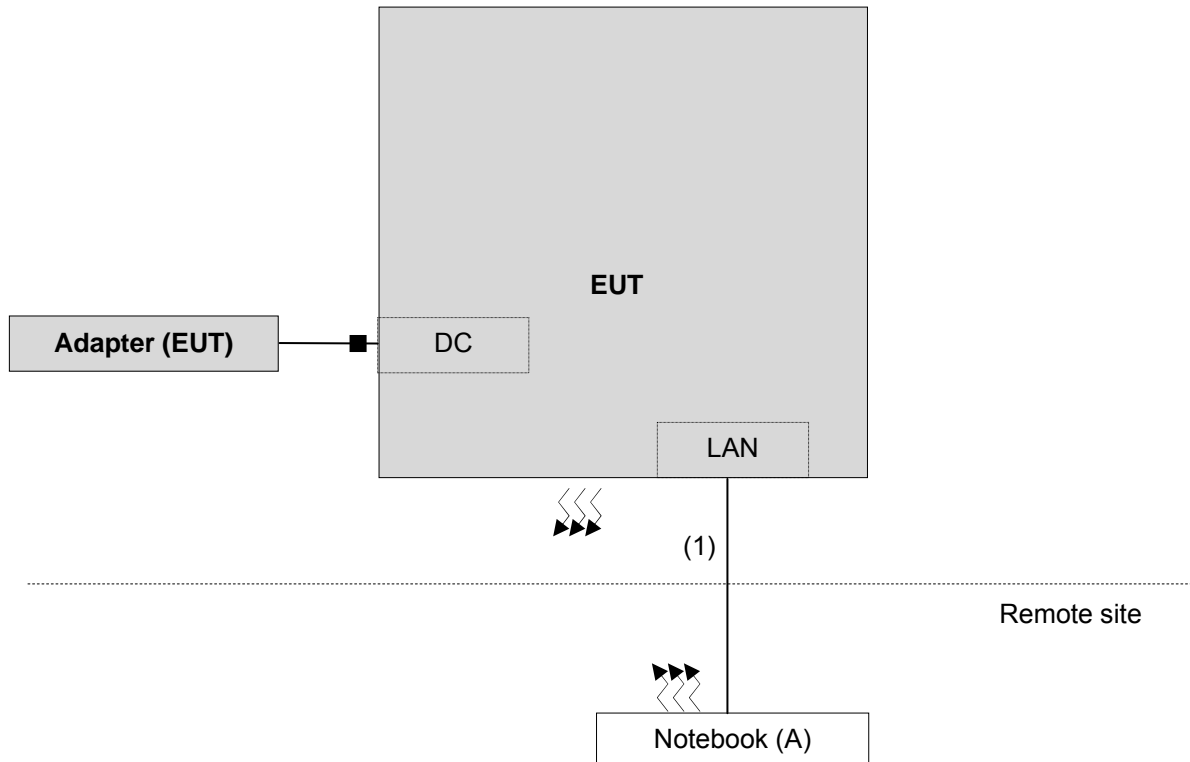
1. All power cords of the above support units are non-shielded (1.8m).
2. Items A~C acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable	1	3	N	0	-
2.	DC cable	1	1.6	N	1	Provided by client
3.	LAN cable	1	0.5	N	0	-

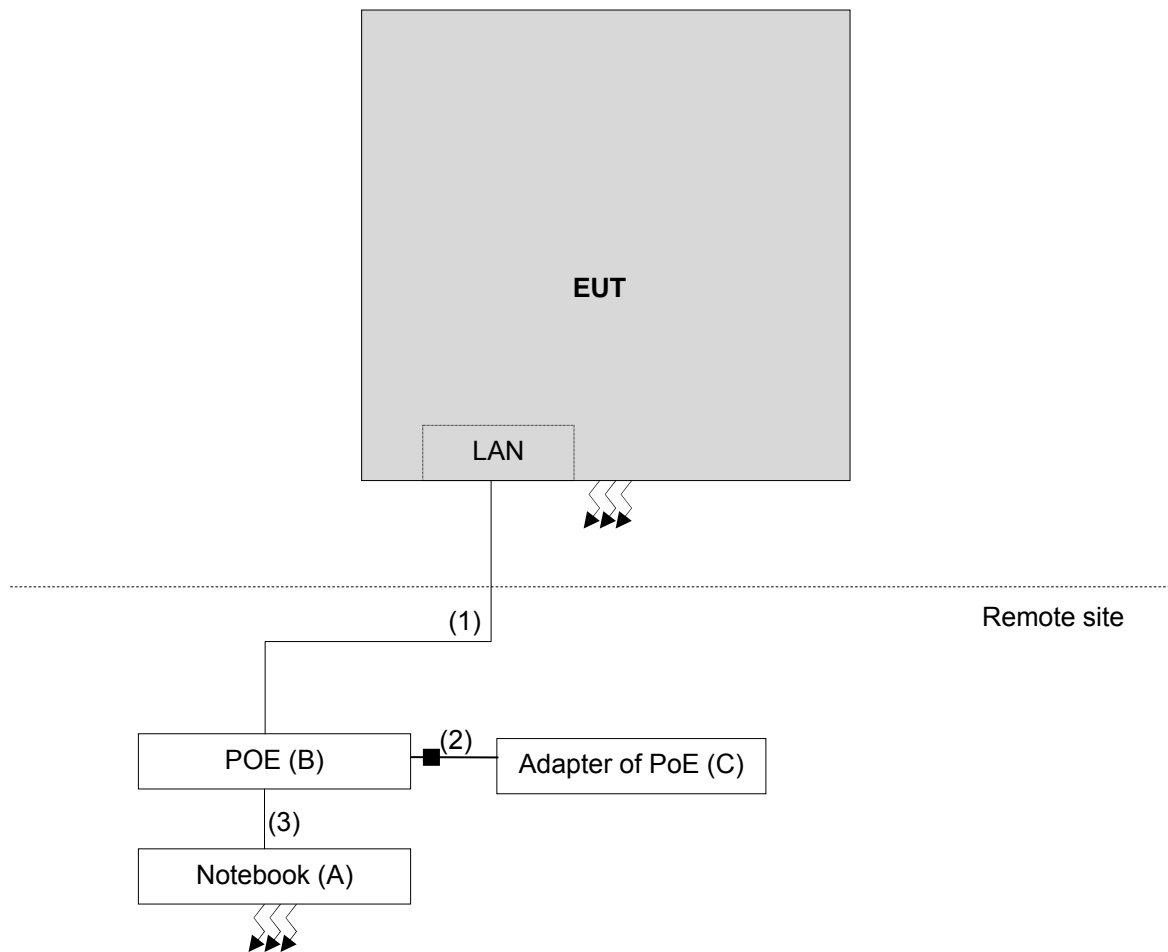
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

Test Mode A



Test Mode B



3.5 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

- FCC Part 15, Subpart E (15.407)**
- 789033 D02 General UNII Test Procedure 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.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedure 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:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Aug. 29, 2014	Aug. 28, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
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 BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	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. 09, 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.

4.1.3 Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. 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 height of antenna 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

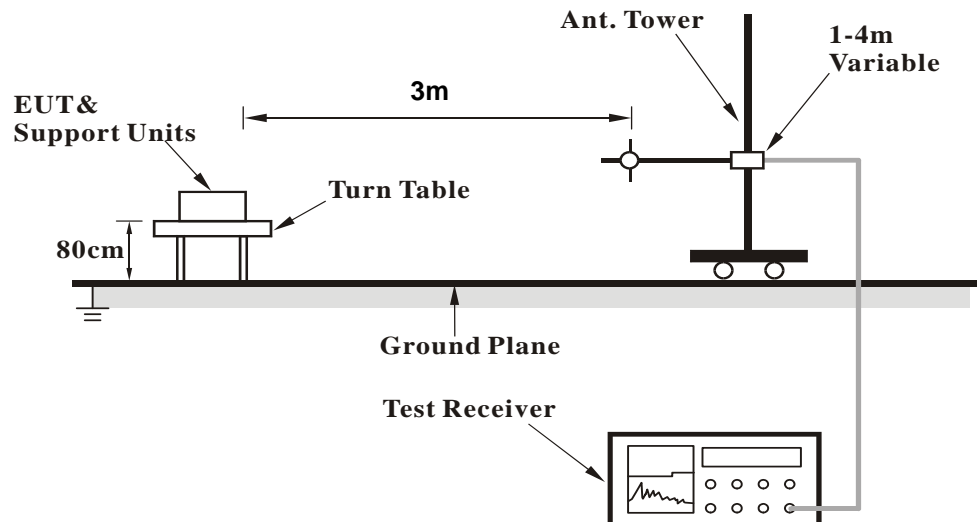
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

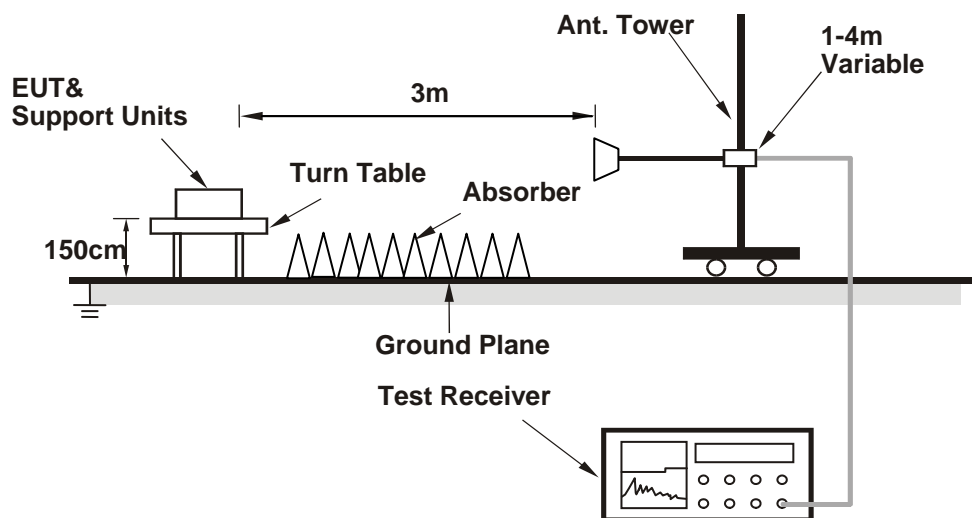
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Condition

- a. Placed the EUT on the testing table.
- b. Prepared notebook to act as a 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.

4.1.7 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	67.6 PK	74.0	-6.4	1.62 H	163	61.60	6.00
2	5150.00	52.4 AV	54.0	-1.6	1.62 H	163	46.40	6.00
3	*5180.00	117.4 PK			1.83 H	173	77.90	39.50
4	*5180.00	107.2 AV			1.83 H	173	67.70	39.50
5	#10360.00	60.7 PK	74.0	-13.3	1.65 H	53	42.30	18.40
6	#10360.00	47.1 AV	54.0	-6.9	1.65 H	53	28.70	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.0 PK	74.0	-16.0	1.04 V	296	52.00	6.00
2	5150.00	45.7 AV	54.0	-8.3	1.04 V	296	39.70	6.00
3	*5180.00	108.5 PK			1.00 V	299	69.00	39.50
4	*5180.00	98.5 AV			1.00 V	299	59.00	39.50
5	#10360.00	59.7 PK	74.0	-14.3	1.01 V	108	41.30	18.40
6	#10360.00	47.2 AV	54.0	-6.8	1.01 V	108	28.80	18.40

REMARKS:

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

CHANNEL	TX Channel 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	120.7 PK			1.70 H	171	81.10	39.60
2	*5200.00	110.8 AV			1.70 H	171	71.20	39.60
3	#10400.00	60.9 PK	74.0	-13.1	1.39 H	43	42.40	18.50
4	#10400.00	49.3 AV	54.0	-4.7	1.39 H	43	30.80	18.50
5	15600.00	64.2 PK	74.0	-9.8	1.70 H	351	45.40	18.80
6	15600.00	52.3 AV	54.0	-1.7	1.70 H	351	33.50	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	*5200.00	112.2 PK			1.00 V	294	72.60	39.60
2	*5200.00	102.6 AV			1.00 V	294	63.00	39.60
3	#10400.00	61.2 PK	74.0	-12.8	1.20 V	48	42.70	18.50
4	#10400.00	49.1 AV	54.0	-4.9	1.20 V	48	30.60	18.50
5	15600.00	65.0 PK	74.0	-9.0	1.61 V	343	46.20	18.80
6	15600.00	52.5 AV	54.0	-1.5	1.61 V	343	33.70	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 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	121.3 PK			1.46 H	170	81.70	39.60
2	*5240.00	111.0 AV			1.46 H	170	71.40	39.60
3	5350.00	60.8 PK	74.0	-13.2	1.50 H	173	54.70	6.10
4	5350.00	47.5 AV	54.0	-6.5	1.50 H	173	41.40	6.10
5	#10480.00	61.0 PK	74.0	-13.0	1.41 H	315	42.00	19.00
6	#10480.00	49.2 AV	54.0	-4.8	1.41 H	315	30.20	19.00
7	15720.00	65.1 PK	74.0	-8.9	1.48 H	321	46.60	18.50
8	15720.00	52.2 AV	54.0	-1.8	1.48 H	321	33.70	18.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	111.7 PK			1.00 V	295	72.10	39.60
2	*5240.00	102.6 AV			1.00 V	295	63.00	39.60
3	5350.00	58.2 PK	74.0	-15.8	1.00 V	296	52.10	6.10
4	5350.00	44.8 AV	54.0	-9.2	1.00 V	296	38.70	6.10
5	#10480.00	60.4 PK	74.0	-13.6	1.57 V	117	41.40	19.00
6	#10480.00	48.4 AV	54.0	-5.6	1.57 V	117	29.40	19.00
7	15720.00	66.0 PK	74.0	-8.0	1.70 V	349	47.50	18.50
8	15720.00	52.7 AV	54.0	-1.3	1.70 V	349	34.20	18.50

REMARKS:

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

802.11n (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	67.8 PK	74.0	-6.2	1.30 H	166	61.80	6.00
2	5150.00	52.3 AV	54.0	-1.7	1.30 H	166	46.30	6.00
3	*5180.00	115.1 PK			1.37 H	168	75.60	39.50
4	*5180.00	105.2 AV			1.37 H	168	65.70	39.50
5	#10360.00	61.3 PK	74.0	-12.7	1.67 H	329	42.90	18.40
6	#10360.00	47.7 AV	54.0	-6.3	1.67 H	329	29.30	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	57.5 PK	74.0	-16.5	1.00 V	77	51.50	6.00
2	5150.00	45.9 AV	54.0	-8.1	1.00 V	77	39.90	6.00
3	*5180.00	107.0 PK			1.00 V	85	67.50	39.50
4	*5180.00	97.3 AV			1.00 V	85	57.80	39.50
5	#10360.00	60.5 PK	74.0	-13.5	1.22 V	224	42.10	18.40
6	#10360.00	47.7 AV	54.0	-6.3	1.22 V	224	29.30	18.40

REMARKS:

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



CHANNEL	TX Channel 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	120.3 PK			1.85 H	165	80.70	39.60
2	*5200.00	110.3 AV			1.85 H	165	70.70	39.60
3	#10400.00	60.3 PK	74.0	-13.7	1.47 H	279	41.80	18.50
4	#10400.00	47.0 AV	54.0	-7.0	1.47 H	279	28.50	18.50
5	15600.00	63.6 PK	74.0	-10.4	1.42 H	319	44.80	18.80
6	15600.00	50.4 AV	54.0	-3.6	1.42 H	319	31.60	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	*5200.00	111.0 PK			1.00 V	293	71.40	39.60
2	*5200.00	100.6 AV			1.00 V	293	61.00	39.60
3	#10400.00	59.9 PK	74.0	-14.1	1.42 V	216	41.40	18.50
4	#10400.00	48.1 AV	54.0	-5.9	1.42 V	216	29.60	18.50
5	15600.00	64.9 PK	74.0	-9.1	1.59 V	352	46.10	18.80
6	15600.00	52.2 AV	54.0	-1.8	1.59 V	352	33.40	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 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	120.5 PK			1.65 H	173	80.90	39.60
2	*5240.00	110.2 AV			1.65 H	173	70.60	39.60
3	5350.00	58.5 PK	74.0	-15.5	1.54 H	178	52.40	6.10
4	5350.00	46.8 AV	54.0	-7.2	1.54 H	178	40.70	6.10
5	#10480.00	61.8 PK	74.0	-12.2	1.22 H	326	42.80	19.00
6	#10480.00	48.5 AV	54.0	-5.5	1.22 H	326	29.50	19.00
7	15720.00	64.2 PK	74.0	-9.8	1.61 H	294	45.70	18.50
8	15720.00	52.2 AV	54.0	-1.8	1.61 H	294	33.70	18.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.7 PK			1.00 V	299	71.10	39.60
2	*5240.00	101.1 AV			1.00 V	299	61.50	39.60
3	5350.00	56.9 PK	74.0	-17.1	1.11 V	293	50.80	6.10
4	5350.00	44.8 AV	54.0	-9.2	1.11 V	293	38.70	6.10
5	#10480.00	60.2 PK	74.0	-13.8	1.24 V	166	41.20	19.00
6	#10480.00	48.0 AV	54.0	-6.0	1.24 V	166	29.00	19.00
7	15720.00	63.2 PK	74.0	-10.8	1.43 V	244	44.70	18.50
8	15720.00	51.2 AV	54.0	-2.8	1.43 V	244	32.70	18.50

REMARKS:

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

802.11n (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	64.0 PK	74.0	-10.0	1.56 H	357	58.00	6.00
2	5150.00	52.2 AV	54.0	-1.8	1.56 H	357	46.20	6.00
3	*5190.00	108.4 PK			1.67 H	166	68.90	39.50
4	*5190.00	98.5 AV			1.67 H	166	59.00	39.50
5	#10380.00	59.5 PK	74.0	-14.5	1.52 H	141	41.00	18.50
6	#10380.00	46.5 AV	54.0	-7.5	1.52 H	141	28.00	18.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.1 PK	74.0	-13.9	1.57 V	258	54.10	6.00
2	5150.00	46.6 AV	54.0	-7.4	1.57 V	258	40.60	6.00
3	*5190.00	98.2 PK			1.00 V	296	58.70	39.50
4	*5190.00	89.2 AV			1.00 V	296	49.70	39.50
5	#10380.00	59.6 PK	74.0	-14.4	1.24 V	241	41.10	18.50
6	#10380.00	46.8 AV	54.0	-7.2	1.24 V	241	28.30	18.50

REMARKS:

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

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	67.2 PK	74.0	-6.8	1.70 H	174	61.20	6.00
2	5150.00	52.4 AV	54.0	-1.6	1.70 H	174	46.40	6.00
3	*5230.00	115.8 PK			1.32 H	168	76.20	39.60
4	*5230.00	105.6 AV			1.32 H	168	66.00	39.60
5	#10460.00	61.3 PK	74.0	-12.7	1.27 H	293	42.40	18.90
6	#10460.00	48.6 AV	54.0	-5.4	1.27 H	293	29.70	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	5150.00	60.7 PK	74.0	-13.3	1.41 V	248	54.70	6.00
2	5150.00	46.9 AV	54.0	-7.1	1.41 V	248	40.90	6.00
3	*5230.00	106.3 PK			1.07 V	292	66.70	39.60
4	*5230.00	96.8 AV			1.07 V	292	57.20	39.60
5	#10460.00	59.1 PK	74.0	-14.9	1.17 V	116	40.20	18.90
6	#10460.00	46.7 AV	54.0	-7.3	1.17 V	116	27.80	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.

802.11ac (VHT80)

CHANNEL	TX Channel 42	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	64.9 PK	74.0	-9.1	1.94 H	164	58.90	6.00
2	5150.00	52.2 AV	54.0	-1.8	1.94 H	164	46.20	6.00
3	*5210.00	105.5 PK			1.98 H	164	65.90	39.60
4	*5210.00	93.3 AV			1.98 H	164	53.70	39.60
5	#10420.00	59.8 PK	74.0	-14.2	1.67 H	76	41.20	18.60
6	#10420.00	46.7 AV	54.0	-7.3	1.67 H	76	28.10	18.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	57.2 PK	74.0	-16.8	1.93 V	43	51.20	6.00
2	5150.00	45.0 AV	54.0	-9.0	1.93 V	43	39.00	6.00
3	*5210.00	97.4 PK			1.93 V	77	57.80	39.60
4	*5210.00	87.2 AV			1.93 V	77	47.60	39.60
5	#10420.00	59.4 PK	74.0	-14.6	1.25 V	89	40.80	18.60
6	#10420.00	46.7 AV	54.0	-7.3	1.25 V	89	28.10	18.60

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	68.0 PK	74.0	-6.0	1.48 H	169	61.20	6.80
2	#5714.00	52.2 AV	54.0	-1.8	1.48 H	169	45.40	6.80
3	#5722.00	69.2 PK	78.2	-9.0	1.48 H	163	62.40	6.80
4	#5725.00	59.8 PK	78.2	-18.4	1.63 H	168	53.00	6.80
5	*5745.00	117.0 PK			1.46 H	166	76.60	40.40
6	*5745.00	106.9 AV			1.46 H	166	66.50	40.40
7	11490.00	61.7 PK	74.0	-12.3	1.58 H	315	43.30	18.40
8	11490.00	49.8 AV	54.0	-4.2	1.58 H	315	31.40	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	57.9 PK	74.0	-16.1	1.00 V	134	51.10	6.80
2	#5714.00	45.7 AV	54.0	-8.3	1.00 V	134	38.90	6.80
3	#5722.00	62.6 PK	78.2	-15.6	1.18 V	82	55.80	6.80
4	#5725.00	52.2 PK	78.2	-26.0	1.37 V	259	45.40	6.80
5	*5745.00	105.9 PK			1.00 V	48	65.50	40.40
6	*5745.00	96.8 AV			1.00 V	48	56.40	40.40
7	11490.00	58.2 PK	74.0	-15.8	1.81 V	326	39.80	18.40
8	11490.00	45.8 AV	54.0	-8.2	1.81 V	326	27.40	18.40

REMARKS:

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

CHANNEL	TX Channel 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	119.3 PK			1.15 H	167	78.80	40.50
2	*5785.00	109.4 AV			1.15 H	167	68.90	40.50
3	11570.00	65.1 PK	74.0	-8.9	1.34 H	323	46.70	18.40
4	11570.00	52.6 AV	54.0	-1.4	1.34 H	323	34.20	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	114.3 PK			1.56 V	256	73.80	40.50
2	*5785.00	104.5 AV			1.56 V	256	64.00	40.50
3	11570.00	64.0 PK	74.0	-10.0	1.01 V	75	45.60	18.40
4	11570.00	51.6 AV	54.0	-2.4	1.01 V	75	33.20	18.40

REMARKS:

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

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	118.3 PK			1.60 H	183	77.80	40.50
2	*5825.00	108.4 AV			1.60 H	183	67.90	40.50
3	#5850.00	57.6 PK	78.2	-20.6	1.86 H	168	50.70	6.90
4	#5853.00	73.2 PK	78.2	-5.0	2.10 H	173	66.20	7.00
5	#5861.00	68.7 PK	74.0	-5.3	1.94 H	174	61.70	7.00
6	#5861.00	52.5 AV	54.0	-1.5	1.94 H	174	45.50	7.00
7	11650.00	64.6 PK	74.0	-9.4	1.00 H	21	45.70	18.90
8	11650.00	52.4 AV	54.0	-1.6	1.00 H	21	33.50	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	*5825.00	113.0 PK			1.74 V	259	72.50	40.50
2	*5825.00	102.8 AV			1.74 V	259	62.30	40.50
3	#5850.00	52.1 PK	78.2	-26.1	2.09 V	262	45.20	6.90
4	#5853.00	65.2 PK	78.2	-13.0	1.61 V	257	58.20	7.00
5	#5861.00	60.1 PK	74.0	-13.9	1.38 V	259	53.10	7.00
6	#5861.00	46.9 AV	54.0	-7.1	1.38 V	259	39.90	7.00
7	11650.00	60.5 PK	74.0	-13.5	1.75 V	337	41.60	18.90
8	11650.00	49.0 AV	54.0	-5.0	1.75 V	337	30.10	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.

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	67.6 PK	74.0	-6.4	1.56 H	0	60.80	6.80
2	#5714.00	52.4 AV	54.0	-1.6	1.56 H	0	45.60	6.80
3	#5722.00	70.2 PK	78.2	-8.0	1.57 H	345	63.40	6.80
4	#5725.00	60.2 PK	78.2	-18.0	1.67 H	346	53.40	6.80
5	*5745.00	116.7 PK			1.60 H	344	76.30	40.40
6	*5745.00	106.7 AV			1.60 H	344	66.30	40.40
7	11490.00	61.4 PK	74.0	-12.6	1.64 H	349	43.00	18.40
8	11490.00	48.9 AV	54.0	-5.1	1.64 H	349	30.50	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	60.2 PK	74.0	-13.8	1.09 V	80	53.40	6.80
2	#5714.00	47.6 AV	54.0	-6.4	1.09 V	80	40.80	6.80
3	#5722.00	64.5 PK	78.2	-13.7	1.25 V	78	57.70	6.80
4	#5725.00	51.7 PK	78.2	-26.5	1.32 V	76	44.90	6.80
5	*5745.00	106.5 PK			1.00 V	45	66.10	40.40
6	*5745.00	96.9 AV			1.00 V	45	56.50	40.40
7	11490.00	60.6 PK	74.0	-13.4	1.00 V	68	42.20	18.40
8	11490.00	48.3 AV	54.0	-5.7	1.00 V	68	29.90	18.40

REMARKS:

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



CHANNEL	TX Channel 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	120.2 PK			1.66 H	346	79.70	40.50
2	*5785.00	110.1 AV			1.66 H	346	69.60	40.50
3	11570.00	67.0 PK	74.0	-7.0	1.27 H	324	48.60	18.40
4	11570.00	52.7 AV	54.0	-1.3	1.27 H	324	34.30	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	109.5 PK			1.00 V	124	69.00	40.50
2	*5785.00	99.6 AV			1.00 V	124	59.10	40.50
3	11570.00	62.3 PK	74.0	-11.7	1.14 V	350	43.90	18.40
4	11570.00	50.4 AV	54.0	-3.6	1.14 V	350	32.00	18.40

REMARKS:

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



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	117.9 PK			1.64 H	171	77.40	40.50
2	*5825.00	107.8 AV			1.64 H	171	67.30	40.50
3	#5850.00	60.1 PK	78.2	-18.1	1.54 H	346	53.20	6.90
4	#5853.00	72.7 PK	78.2	-5.5	1.31 H	348	65.70	7.00
5	#5861.00	69.1 PK	74.0	-4.9	1.18 H	344	62.10	7.00
6	#5861.00	52.5 AV	54.0	-1.5	1.18 H	344	45.50	7.00
7	11650.00	65.4 PK	74.0	-8.6	1.72 H	143	46.50	18.90
8	11650.00	52.4 AV	54.0	-1.6	1.72 H	143	33.50	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	*5825.00	111.4 PK			1.45 V	252	70.90	40.50
2	*5825.00	101.2 AV			1.45 V	252	60.70	40.50
3	#5850.00	53.7 PK	78.2	-24.5	1.63 V	257	46.80	6.90
4	#5853.00	66.8 PK	78.2	-11.4	2.00 V	264	59.80	7.00
5	#5861.00	62.0 PK	74.0	-12.0	1.32 V	260	55.00	7.00
6	#5861.00	47.3 AV	54.0	-6.7	1.32 V	260	40.30	7.00
7	11650.00	62.0 PK	74.0	-12.0	1.03 V	346	43.10	18.90
8	11650.00	49.7 AV	54.0	-4.3	1.03 V	346	30.80	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.

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	67.0 PK	74.0	-7.0	1.43 H	0	60.20	6.80
2	#5714.00	52.2 AV	54.0	-1.8	1.43 H	0	45.40	6.80
3	#5722.00	70.0 PK	78.2	-8.2	1.46 H	346	63.20	6.80
4	#5725.00	57.1 PK	78.2	-21.1	1.46 H	348	50.30	6.80
5	*5755.00	111.1 PK			1.59 H	344	70.60	40.50
6	*5755.00	101.1 AV			1.59 H	344	60.60	40.50
7	11510.00	60.3 PK	74.0	-13.7	1.47 H	88	42.00	18.30
8	11510.00	46.7 AV	54.0	-7.3	1.47 H	88	28.40	18.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	58.0 PK	74.0	-16.0	1.06 V	26	51.20	6.80
2	#5714.00	46.1 AV	54.0	-7.9	1.06 V	26	39.30	6.80
3	#5722.00	62.4 PK	78.2	-15.8	1.74 V	73	55.60	6.80
4	#5725.00	49.3 PK	78.2	-28.9	1.68 V	75	42.50	6.80
5	*5755.00	101.2 PK			1.00 V	45	60.70	40.50
6	*5755.00	91.9 AV			1.00 V	45	51.40	40.50
7	11510.00	59.7 PK	74.0	-14.3	1.33 V	121	41.40	18.30
8	11510.00	46.6 AV	54.0	-7.4	1.33 V	121	28.30	18.30

REMARKS:

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

CHANNEL	TX Channel 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	114.5 PK			1.59 H	163	74.00	40.50
2	*5795.00	104.6 AV			1.59 H	163	64.10	40.50
3	#5850.00	53.9 PK	78.2	-24.3	1.40 H	346	47.00	6.90
4	#5853.00	72.0 PK	78.2	-6.2	1.52 H	347	65.00	7.00
5	#5861.00	65.1 PK	74.0	-8.9	1.31 H	344	58.10	7.00
6	#5861.00	52.2 AV	54.0	-1.8	1.31 H	344	45.20	7.00
7	11590.00	63.0 PK	74.0	-11.0	1.60 H	142	44.50	18.50
8	11590.00	49.6 AV	54.0	-4.4	1.60 H	142	31.10	18.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	108.8 PK			1.89 V	252	68.30	40.50
2	*5795.00	98.5 AV			1.89 V	252	58.00	40.50
3	#5850.00	51.3 PK	78.2	-26.9	1.62 V	258	44.40	6.90
4	#5853.00	65.9 PK	78.2	-12.3	1.63 V	265	58.90	7.00
5	#5861.00	61.3 PK	74.0	-12.7	1.46 V	253	54.30	7.00
6	#5861.00	48.0 AV	54.0	-6.0	1.46 V	253	41.00	7.00
7	11590.00	61.0 PK	74.0	-13.0	1.54 V	265	42.50	18.50
8	11590.00	48.8 AV	54.0	-5.2	1.54 V	265	30.30	18.50

REMARKS:

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

802.11ac (VHT80)

CHANNEL	TX Channel 155	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	66.0 PK	74.0	-8.0	1.35 H	170	59.20	6.80
2	#5714.00	52.5 AV	54.0	-1.5	1.35 H	170	45.70	6.80
3	#5722.00	75.1 PK	78.2	-3.1	1.58 H	0	68.30	6.80
4	#5725.00	65.8 PK	78.2	-12.4	1.39 H	87	59.00	6.80
5	*5775.00	109.3 PK			1.75 H	344	68.80	40.50
6	*5775.00	97.5 AV			1.75 H	344	57.00	40.50
7	#5850.00	53.8 PK	78.2	-24.4	1.69 H	87	46.90	6.90
8	#5853.00	59.8 PK	78.2	-18.4	1.29 H	349	52.80	7.00
9	#5861.00	58.9 PK	74.0	-15.1	1.26 H	103	51.90	7.00
10	#5861.00	47.0 AV	54.0	-7.0	1.26 H	103	40.00	7.00
11	11550.00	60.3 PK	74.0	-13.7	1.58 H	74	41.90	18.40
12	11550.00	47.1 AV	54.0	-6.9	1.58 H	74	28.70	18.40

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	61.8 PK	74.0	-12.2	1.11 V	76	55.00	6.80
2	#5714.00	48.3 AV	54.0	-5.7	1.11 V	76	41.50	6.80
3	#5722.00	65.8 PK	78.2	-12.4	1.17 V	87	59.00	6.80
4	#5725.00	53.7 PK	78.2	-24.5	1.58 V	44	46.90	6.80
5	*5775.00	101.9 PK			2.23 V	252	61.40	40.50
6	*5775.00	90.7 AV			2.23 V	252	50.20	40.50
7	#5850.00	45.9 PK	78.2	-32.3	1.36 V	74	39.00	6.90
8	#5853.00	57.6 PK	78.2	-20.6	1.17 V	41	50.60	7.00
9	#5861.00	59.6 PK	74.0	-14.4	1.29 V	63	52.60	7.00
10	#5861.00	47.0 AV	54.0	-7.0	1.29 V	63	40.00	7.00
11	11550.00	58.7 PK	74.0	-15.3	1.26 V	85	40.30	18.40
12	11550.00	46.2 AV	54.0	-7.8	1.26 V	85	27.80	18.40

REMARKS:

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

BELOW 1GHz WORST-CASE DATA
802.11n (HT20)

CHANNEL	TX Channel 40	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	57.12	32.6 QP	40.0	-7.4	1.99 H	55	47.20	-14.60
2	175.72	36.9 QP	43.5	-6.6	1.99 H	204	51.70	-14.80
3	500.42	38.3 QP	46.0	-7.7	1.49 H	300	46.70	-8.40
4	624.85	39.5 QP	46.0	-6.5	1.00 H	114	45.10	-5.60
5	751.23	32.9 QP	46.0	-13.1	1.00 H	136	36.10	-3.20
6	875.67	41.9 QP	46.0	-4.1	1.49 H	201	43.00	-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	33.79	36.6 QP	40.0	-3.4	1.00 V	36	52.40	-15.80
2	70.73	30.8 QP	40.0	-9.2	1.00 V	186	47.00	-16.20
3	185.44	34.7 QP	43.5	-8.8	1.00 V	171	50.70	-16.00
4	500.42	31.4 QP	46.0	-14.6	1.00 V	310	39.80	-8.40
5	624.85	36.4 QP	46.0	-9.6	1.00 V	8	42.00	-5.60
6	875.67	44.4 QP	46.0	-1.6	1.00 V	5	45.50	-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

CHANNEL	TX Channel 40	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	32.3 QP	40.0	-7.7	2.00 H	41	46.90	-14.60
2	140.72	27.8 QP	43.5	-15.7	2.00 H	114	42.60	-14.80
3	189.33	26.4 QP	43.5	-17.1	2.00 H	303	42.70	-16.30
4	500.42	38.1 QP	46.0	-7.9	1.51 H	125	46.50	-8.40
5	624.85	38.4 QP	46.0	-7.6	1.01 H	138	44.00	-5.60
6	875.67	38.3 QP	46.0	-7.7	1.51 H	7	39.40	-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	30.00	34.7 QP	40.0	-5.3	1.00 V	15	50.40	-15.70
2	39.62	34.7 QP	40.0	-5.3	1.00 V	38	49.70	-15.00
3	191.28	30.6 QP	43.5	-12.9	1.00 V	38	47.10	-16.50
4	624.85	37.2 QP	46.0	-8.8	1.00 V	110	42.80	-5.60
5	714.29	39.7 QP	46.0	-6.3	1.99 V	14	44.00	-4.30
6	875.67	42.6 QP	46.0	-3.4	1.00 V	351	43.70	-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 (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 11, 2014	Nov. 10, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 02, 2015	Mar. 01, 2016
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 Procedure

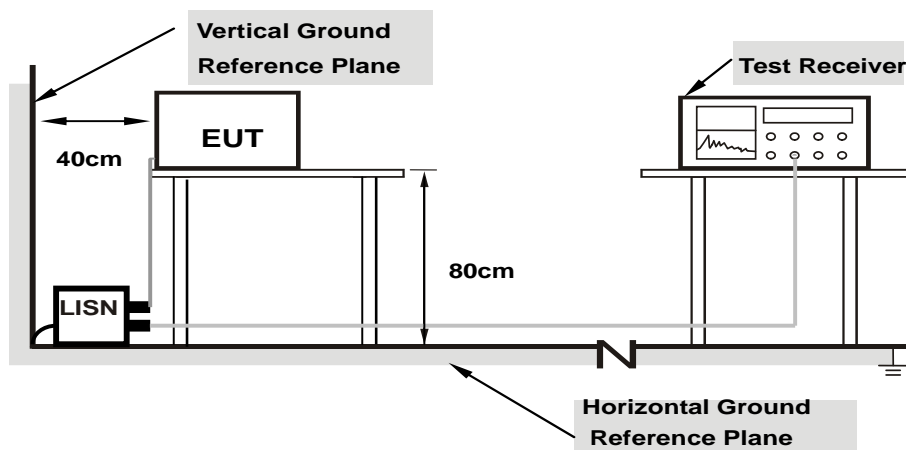
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

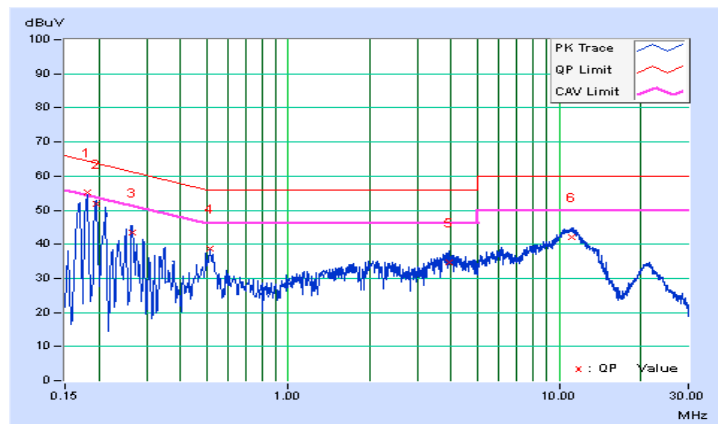
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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	0.18122	0.06	55.18	36.35	55.24	36.41	64.43	54.43	-9.19	-18.02
2	0.19613	0.06	51.78	33.91	51.84	33.97	63.77	53.77	-11.93	-19.80
3	0.26415	0.06	43.47	25.79	43.53	25.85	61.30	51.30	-17.77	-25.45
4	0.51363	0.06	38.56	31.45	38.62	31.51	56.00	46.00	-17.38	-14.49
5	3.91924	0.19	34.58	26.56	34.77	26.75	56.00	46.00	-21.23	-19.25
6	11.13744	0.50	41.65	36.65	42.15	37.15	60.00	50.00	-17.85	-12.85

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.

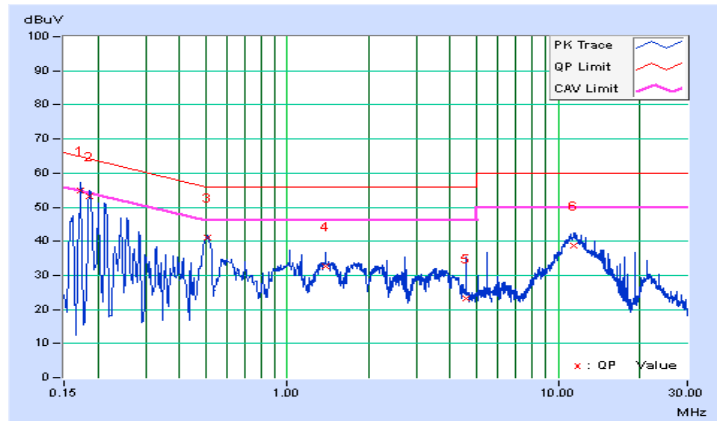


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.17346	0.05	54.76	37.61	54.81	37.66	64.79
2	0.18519	0.05	53.13	35.38	53.18	35.43	64.25	54.25	-11.07	-18.82
3	0.51043	0.06	41.04	34.02	41.10	34.08	56.00	46.00	-14.90	-11.92
4	1.38947	0.09	32.70	25.84	32.79	25.93	56.00	46.00	-23.21	-20.07
5	4.56830	0.21	23.11	16.29	23.32	16.50	56.00	46.00	-32.68	-29.50
6	11.41862	0.46	38.10	33.38	38.56	33.84	60.00	50.00	-21.44	-16.16

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.

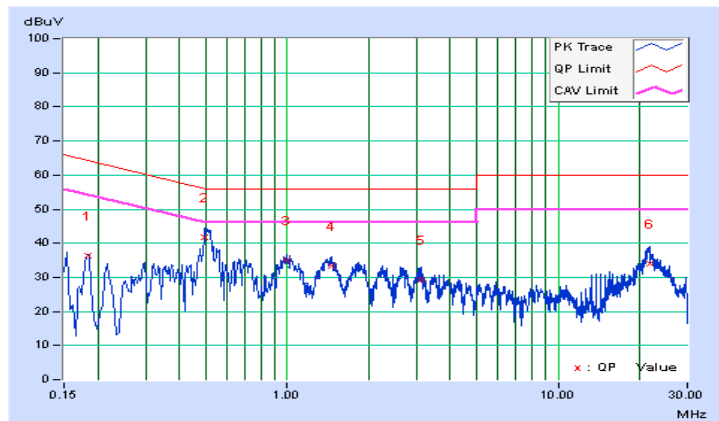


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.18411	0.06	36.34	29.05	36.40	29.11	64.30
2	0.49799	0.06	41.56	29.10	41.62	29.16	56.03	46.03	-14.41	-16.87
3	0.99456	0.08	34.89	25.43	34.97	25.51	56.00	46.00	-21.03	-20.49
4	1.46055	0.10	33.17	23.62	33.27	23.72	56.00	46.00	-22.73	-22.28
5	3.10596	0.16	29.26	22.32	29.42	22.48	56.00	46.00	-26.58	-23.52
6	21.71756	0.95	33.12	24.03	34.07	24.98	60.00	50.00	-25.93	-25.02

REMARKS:

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

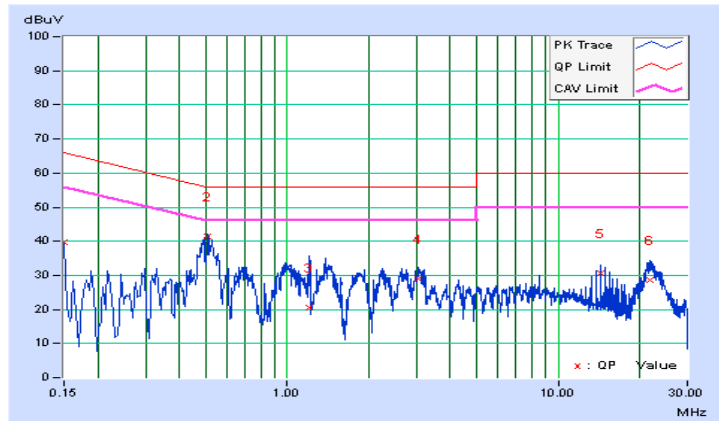


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	0.05	39.61	26.93	39.66	26.98	66.00
2	0.50774	0.06	41.20	30.25	41.26	30.31	56.00	46.00	-14.74	-15.69
3	1.20961	0.09	20.60	10.20	20.69	10.29	56.00	46.00	-35.31	-35.71
4	3.03949	0.15	28.95	21.10	29.10	21.25	56.00	46.00	-26.90	-24.75
5	14.32766	0.55	30.08	29.65	30.63	30.20	60.00	50.00	-29.37	-19.80
6	21.95607	0.76	27.73	18.31	28.49	19.07	60.00	50.00	-31.51	-30.93

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 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

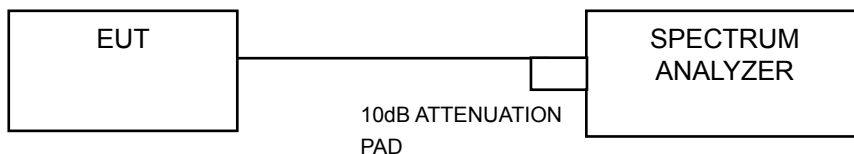
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

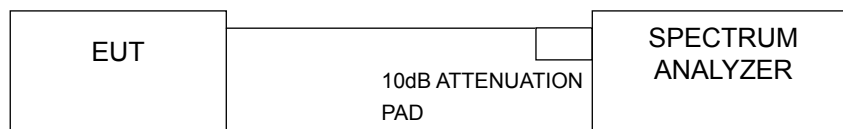
For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.3.2 Test Setup

FOR AVERAGE POWER MEASUREMENT



FOR OCCUPIED BANDWIDTH



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

FOR AVERAGE POWER MEASUREMENT

For 802.11a, 802.11n (HT20), 802.11n (HT40)

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

For 802.11ac (VHT80)

- 1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- 2) Set sweep trigger to "free run".
- 3) Set RBW = 1 MHz.
- 4) Set VBW \geq 3 MHz
- 5) Number of points in sweep \geq 2 Span / RBW.
- 6) Sweep time \leq (number of points in sweep) * T
- 7) Detector = RMS.
- 8) Trace mode = max hold.
- 9) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

FOR OCCUPIED BANDWIDTH

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300 kHz RBW and 1MHz VBW. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

POWER OUTPUT:

802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	19.26	19.11	165.803	22.20	30	Pass
40	5200	23.76	23.91	483.721	26.85	30	Pass
48	5240	23.29	23.28	426.118	26.30	30	Pass
149	5745	19.10	19.47	169.795	22.30	30	Pass
157	5785	22.61	23.25	393.739	25.95	30	Pass
165	5825	20.80	21.78	270.887	24.33	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	19.22	19.19	166.545	22.22	30	Pass
40	5200	23.76	23.99	488.295	26.89	30	Pass
48	5240	23.72	23.68	468.851	26.71	30	Pass
149	5745	19.14	19.42	169.533	22.29	30	Pass
157	5785	22.87	23.26	405.478	26.08	30	Pass
165	5825	20.64	21.82	267.933	24.28	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.42	15.38	69.348	18.41	30	Pass
46	5230	22.75	22.93	384.701	25.85	30	Pass
151	5755	16.83	16.98	98.083	19.92	30	Pass
159	5795	19.68	20.79	212.847	23.28	30	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	13.81	13.98	49.047	16.91	30	Pass
155	5775	14.91	15.31	64.937	18.12	30	Pass

26dB BANDWIDTH:
802.11a

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
36	5180	22.34	21.63	Pass
40	5200	25.30	26.87	Pass
48	5240	26.71	34.26	Pass

802.11n (HT20)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
36	5180	23.10	23.25	Pass
40	5200	23.00	28.00	Pass
48	5240	26.16	32.79	Pass

802.11n (HT40)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
38	5190	45.61	46.08	Pass
46	5230	52.73	47.76	Pass

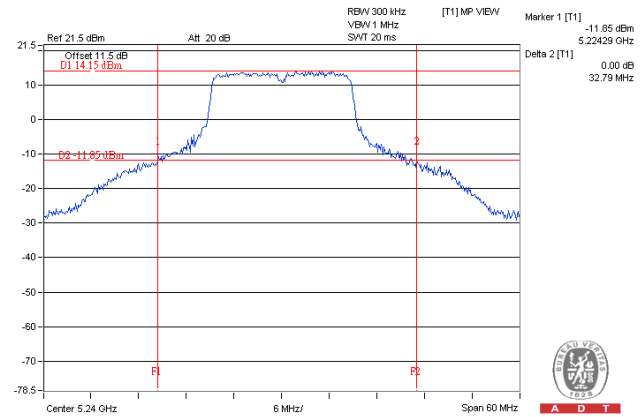
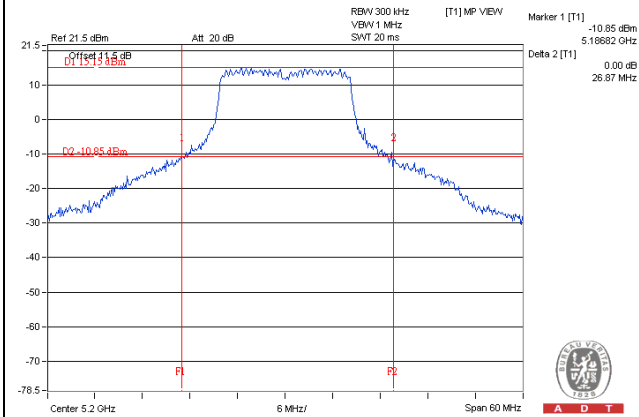
802.11ac (VHT80)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
42	5210	88.76	85.16	Pass

SPECTRUM PLOT OF WORST VALUE

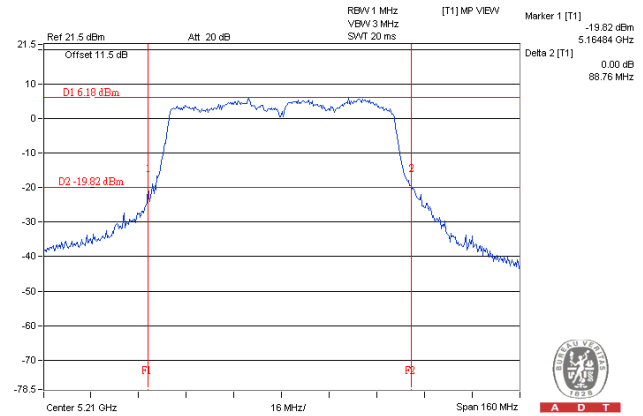
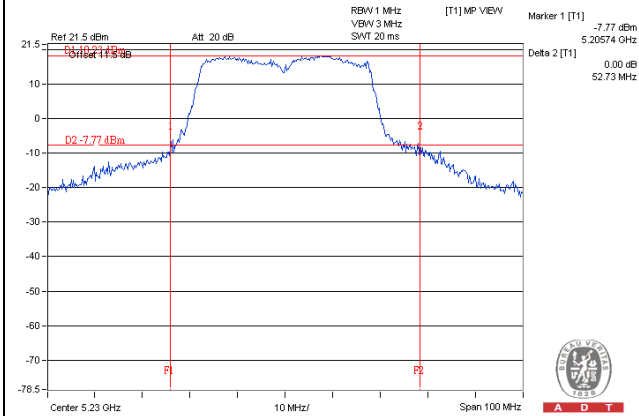
802.11a

802.11n (HT20)



802.11n (HT40)

802.11ac (VHT80)



OCCUPIED BANDWIDTH:
802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
36	5180	16.61	16.70	Pass
40	5200	17.04	17.04	Pass
48	5240	17.04	17.88	Pass
149	5745	16.80	16.80	Pass
157	5785	17.16	22.44	Pass
165	5825	16.68	16.80	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
36	5180	18.00	17.88	Pass
40	5200	17.88	18.12	Pass
48	5240	18.24	18.24	Pass
149	5745	17.88	17.88	Pass
157	5785	18.36	23.28	Pass
165	5825	17.88	17.88	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
38	5190	36.60	36.60	Pass
46	5230	36.60	36.96	Pass
151	5755	36.96	36.72	Pass
159	5795	36.72	36.60	Pass

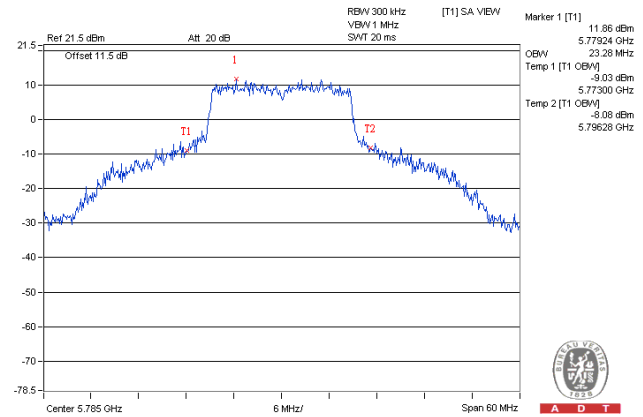
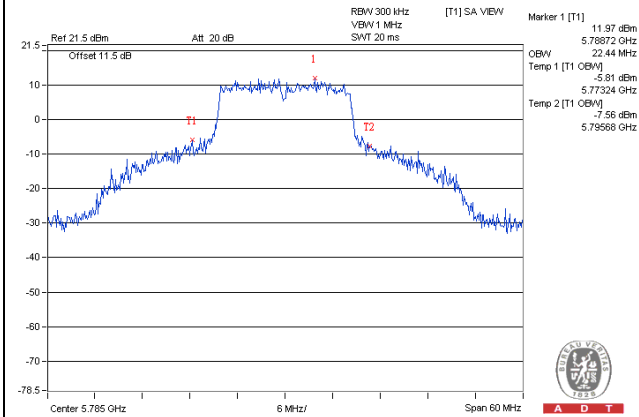
802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
42	5210	75.84	76.08	Pass
155	5775	76.08	75.84	Pass

SPECTRUM PLOT OF WORST VALUE

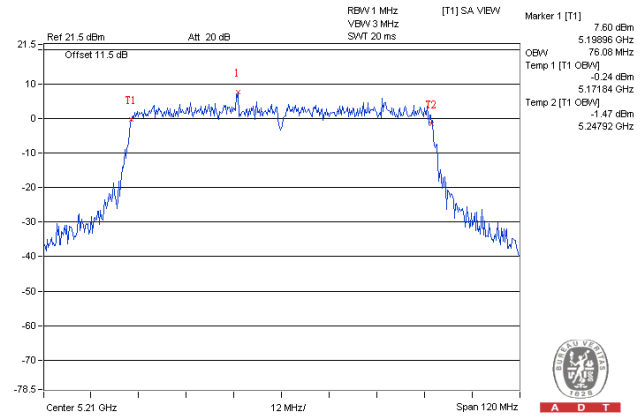
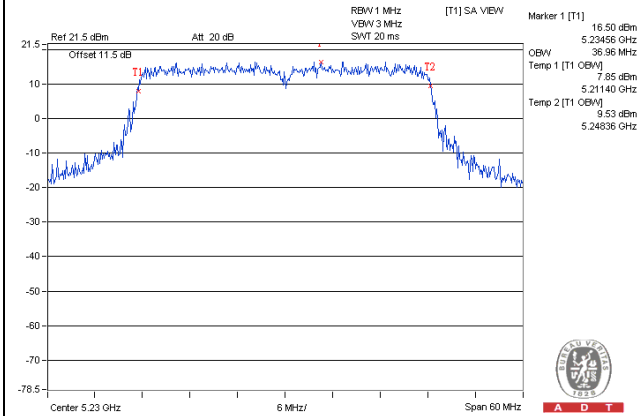
802.11a

802.11n (HT20)



802.11n (HT40)

802.11ac (VHT80)

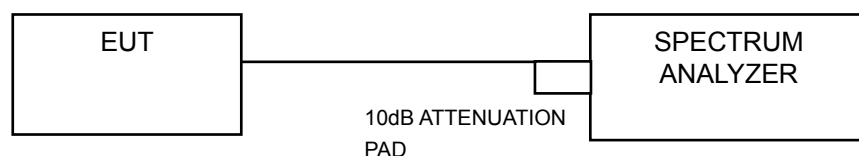


4.4 Peak Power Spectral Density Measurement

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 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

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

For U-NII-3 band:

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
- 3) Sweep time = auto, trigger set to “free run”.
- 4) Trace average at least 100 traces in power averaging mode.
- 5) Record the max value and add 10 log (1/duty cycle)
- 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 $BWCF = 10\log(500\text{kHz}/300\text{kHz})$



4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-1 Band 802.11a

Channel	Frequency (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	4.96	4.97	7.97	0.22	8.19	15.39	Pass
40	5200	9.37	9.02	12.21	0.22	12.43	15.39	Pass
48	5240	9.22	8.98	12.11	0.22	12.33	15.39	Pass

NOTE: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. For U-NII-1 Band:

Directional gain = 4.6dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.

3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Channel	Frequency (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	4.62	4.09	7.37	0.40	7.77	15.39	Pass
40	5200	8.78	8.25	11.53	0.40	11.93	15.39	Pass
48	5240	8.30	8.14	11.23	0.40	11.63	15.39	Pass

NOTE: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. For U-NII-1 Band:

Directional gain = 4.6dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.

3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

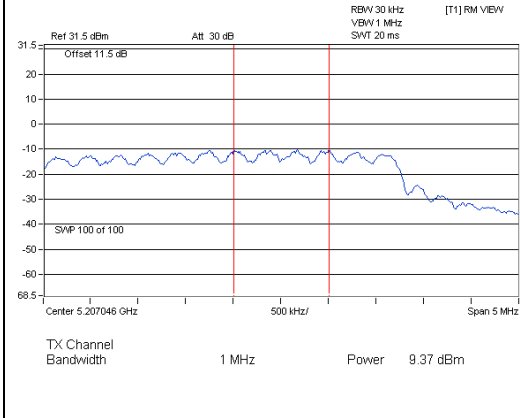
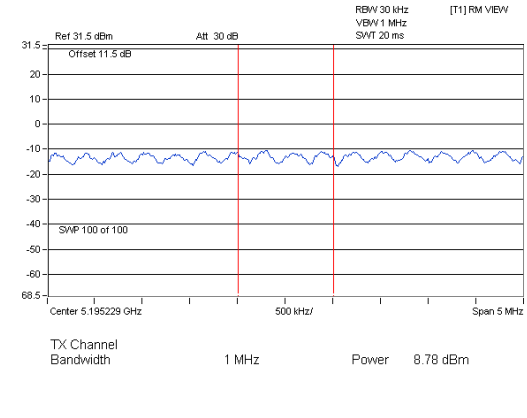
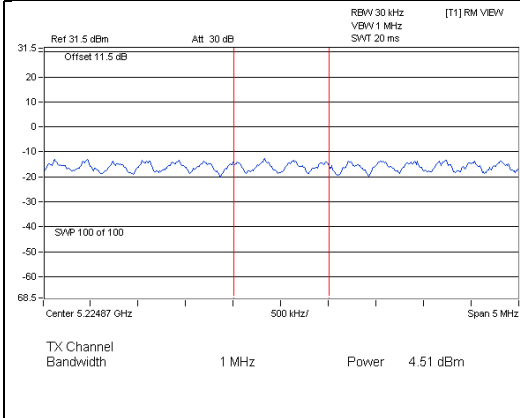
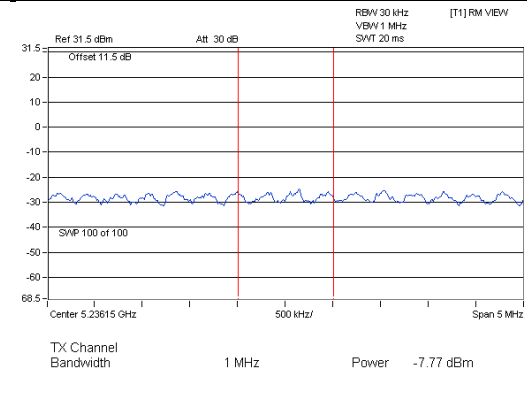
Channel	Frequency (MHz)	PSD (dBm)		Total PSD w/o Duty Factor (dBm)	Duty Factor	Total PSD with Duty Factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1					
38	5190	-1.07	-2.86	1.13	0.38	1.51	15.39	Pass
46	5230	4.45	4.51	7.49	0.38	7.87	15.39	Pass

- NOTE:** 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1 Band:**
 Directional gain = 4.6dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Channel	Frequency (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					
42	5210	-7.77	-7.82	-4.79	0.60	-4.19	15.39	Pass

- NOTE:** 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1 Band:**
 Directional gain = 4.6dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE**802.11a****802.11n (HT20)****A D T****A D T****802.11n (HT40)****802.11ac (VHT80)****A D T****A D T**

For U-NII-3 Band

802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm /300kHz)	PSD (dBm /500kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)	Pass /Fail
0	149	5745	-2.51	-0.29	3.01	0.22	2.94	27.68	Pass
	157	5785	0.41	2.63	3.01	0.22	5.86	27.68	Pass
	165	5825	-1.63	0.59	3.01	0.22	3.82	27.68	Pass
1	149	5745	-2.79	-0.57	3.01	0.22	2.66	27.68	Pass
	157	5785	-0.48	1.74	3.01	0.22	4.97	27.68	Pass
	165	5825	-0.21	2.01	3.01	0.22	5.24	27.68	Pass

NOTE:

- Directional gain = $5.31\text{dBi} + 10\log(2) = 8.32\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.32-6) = 27.68\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm /300kHz)	PSD (dBm /500kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)	Pass /Fail
0	149	5745	-3.25	-1.03	3.01	0.40	2.38	27.68	Pass
	157	5785	0.04	2.26	3.01	0.40	5.67	27.68	Pass
	165	5825	-2.14	0.08	3.01	0.40	3.49	27.68	Pass
1	149	5745	-3.62	-1.40	3.01	0.40	2.01	27.68	Pass
	157	5785	-1.07	1.15	3.01	0.40	4.56	27.68	Pass
	165	5825	-0.70	1.52	3.01	0.40	4.93	27.68	Pass

NOTE:

- Directional gain = $5.31\text{dBi} + 10\log(2) = 8.32\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.32-6) = 27.68\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Chan.	Freq. (MHz)	PSD (dBm /300kHz)	PSD (dBm /500kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)	Pass /Fail
0	151	5755	-8.47	-6.25	3.01	0.38	-2.86	27.68	Pass
	159	5795	-5.26	-3.04	3.01	0.38	0.35	27.68	Pass
1	151	5755	-7.32	-5.10	3.01	0.38	-1.71	27.68	Pass
	159	5795	-3.99	-1.77	3.01	0.38	1.62	27.68	Pass

NOTE:

- Directional gain = $5.31\text{dBi} + 10\log(2) = 8.32\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.32-6) = 27.68\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

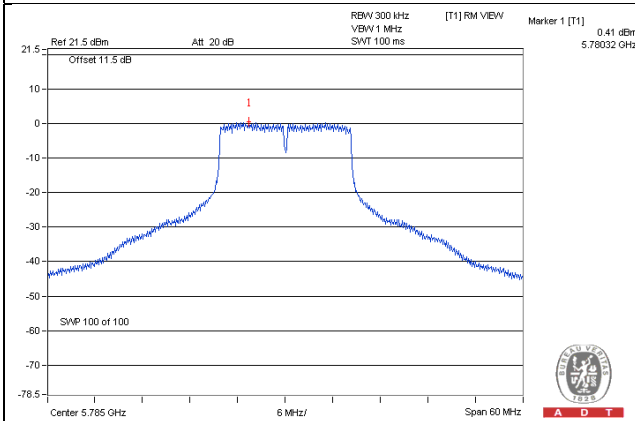
TX chain	Chan.	Freq. (MHz)	PSD (dBm /300kHz)	PSD (dBm /500kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm /500kHz)	Limit (dBm /500kHz)	Pass /Fail
0	155	5775	-13.39	-11.17	3.01	0.60	-7.56	27.68	Pass
1	155	5775	-11.99	-9.77	3.01	0.60	-6.16	27.68	Pass

NOTE:

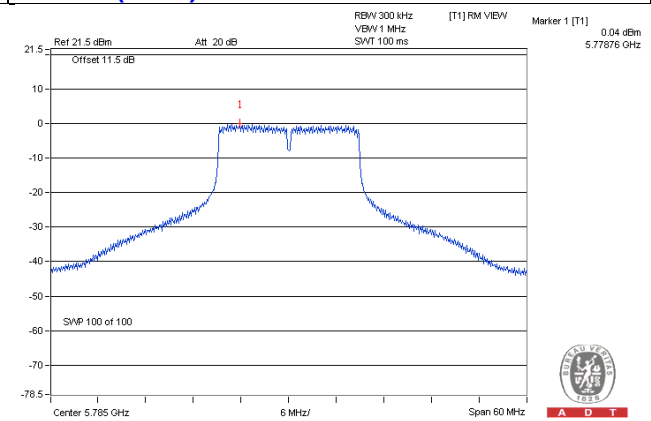
1. Directional gain = 5.31dBi + 10log(2) = 8.32dBi > 6dBi, so the power density limit shall be reduced to 30-(8.32-6) = 27.68dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

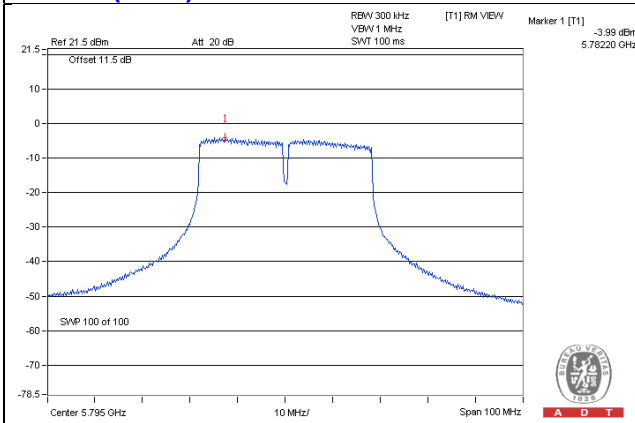
802.11a



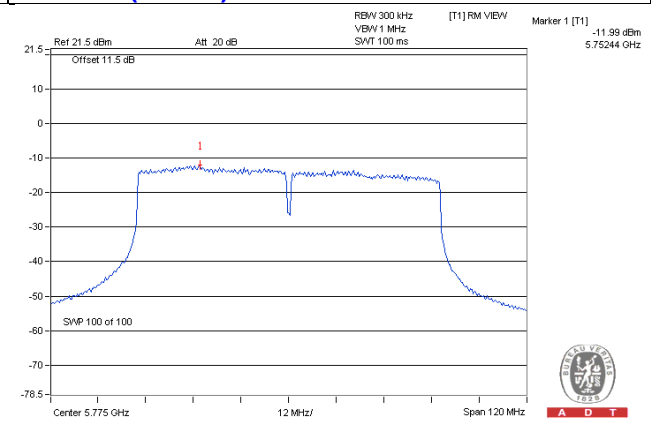
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

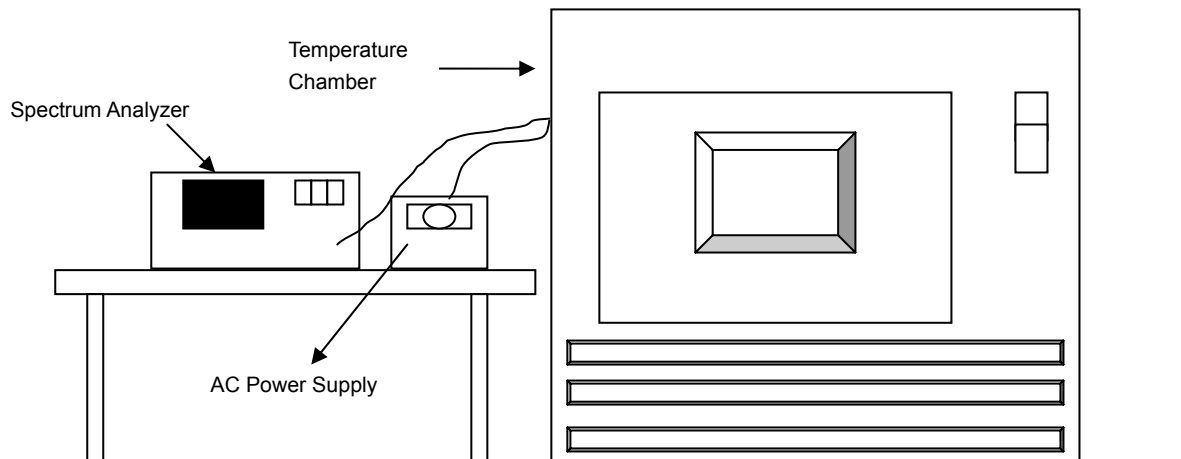


4.5 Frequency Stability Measurement

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 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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: 5180MHz									
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 (%)
50	120	5179.9746	-0.00049	5179.9727	-0.00053	5179.9755	-0.00047	5179.9736	-0.00051
40	120	5179.9964	-0.00007	5179.9996	-0.00001	5179.9989	-0.00002	5179.9949	-0.00010
30	120	5179.9773	-0.00044	5179.9803	-0.00038	5179.9811	-0.00036	5179.9761	-0.00046
20	120	5180.0154	0.00030	5180.0188	0.00036	5180.0178	0.00034	5180.0164	0.00032
10	120	5180.0028	0.00005	5180.0003	0.00001	5180.0010	0.00002	5180.0020	0.00004
0	120	5179.9817	-0.00035	5179.9820	-0.00035	5179.9854	-0.00028	5179.9826	-0.00034
-10	120	5180.0212	0.00041	5180.0238	0.00046	5180.0256	0.00049	5180.0234	0.00045
-20	120	5179.9906	-0.00018	5179.9917	-0.00016	5179.9913	-0.00017	5179.9915	-0.00016
-30	120	5180.0239	0.00046	5180.0227	0.00044	5180.0215	0.00042	5180.0222	0.00043

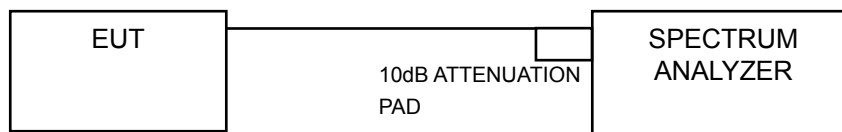
FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5180.0160	0.00031	5180.0187	0.00036	5180.0186	0.00036	5180.0154	0.00030
	120	5180.0154	0.00030	5180.0188	0.00036	5180.0178	0.00034	5180.0164	0.00032
	102	5180.0144	0.00028	5180.0186	0.00036	5180.0182	0.00035	5180.0160	0.00031

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

MEASUREMENT PROCEDURE REF

- 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 Condition

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	16.40	16.43	0.5	Pass
157	5785	16.40	16.40	0.5	Pass
165	5825	16.40	16.42	0.5	Pass

802.11n (HT20)

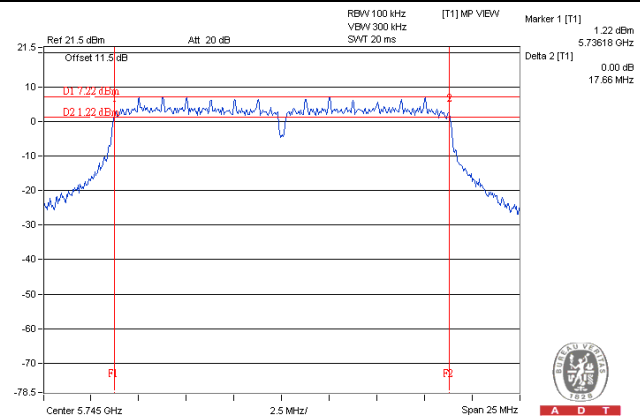
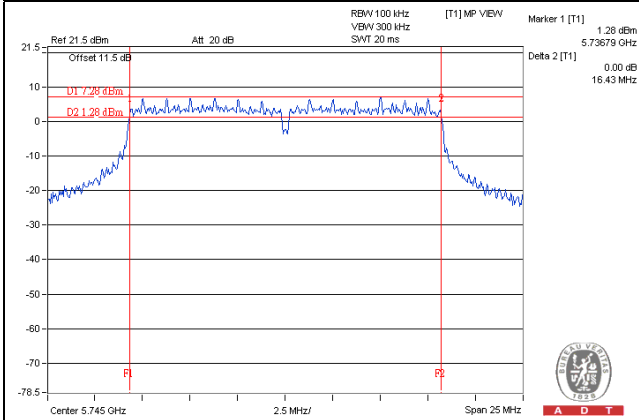
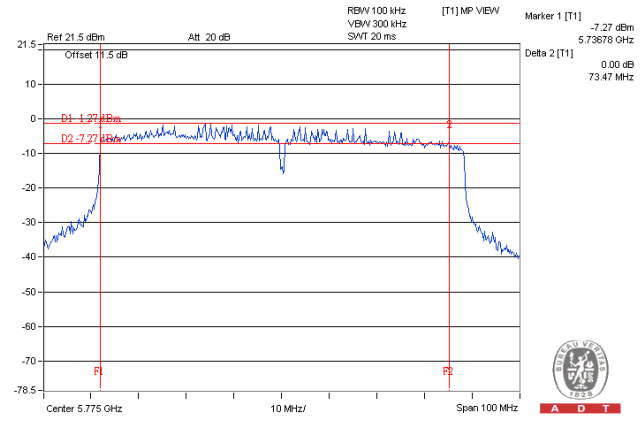
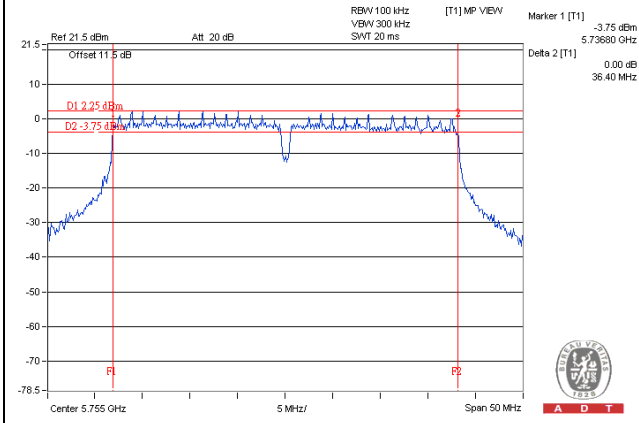
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.66	17.65	0.5	Pass
157	5785	17.64	17.63	0.5	Pass
165	5825	17.63	17.64	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	36.40	36.06	0.5	Pass
159	5795	36.24	35.89	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	72.86	73.47	0.5	Pass

SPECTRUM PLOT OF WORST VALUE**802.11a****802.11n (HT20)****802.11n (HT40)****802.11ac (VHT80)**

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).



Appendix – 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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Fax: 886-2-26051924

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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.

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