FCC Test Report

Report No.:	RF150921C13-1
FCC ID:	A8J-EMR3000
Test Model:	EMR3000
Received Date:	Sep. 10, 2015
Test Date:	Oct. 08, ~ Oct. 17, 2015
Issued Date:	Oct. 21, 2015
Applicant:	EnGenius Technologies
Address:	1580 Scenic Avenue, Costa Mesa, CA92626
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 Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RF150921C13-1	Original release.	Oct. 21, 2015

1 Certificate of Conformity

Product:	Mesh Router
Brand:	EnGenius
Test Model:	EMR3000
Sample Status:	Engineering sample
Applicant:	EnGenius Technologies
Test Date:	Oct. 08, ~ Oct. 17, 2015
Standards:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2013

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 : Celine Chou , **Date:** Oct. 21, 2015

Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Oct. 21, 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
15.207 15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -8.60dB at 0.35703MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.1dB at 5714.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is IPEX not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports0	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	Mesh Router
Brand	EnGenius
Test Model	EMR3000
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from adapter
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 867Mbps
Operating Frequency	5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Output Power	5180 ~ 5240MHz: 581.767mW 5745 ~ 5825MHz: 306.766mW
Antenna Type	PIFA antenna with 5dBi gain
Antenna Connector	IPEX
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. 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 (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT80)	2TX

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT consumes power from the following adapter.

Adapter	
Brand	Powertron Electronics Corp.
Model	PA1015-120DUB150
Input Power	100-240Vac, 50-60Hz, 0.4A
Output Power	12Vdc, 1.5A, 18W Max
Power Line	1.5m power cable without core attached on adapter

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	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11ac (VHT80)		42	42	OFDM	BPSK	65.0
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0
-	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)
-	802.11a	5180-5240	36 to 48	36	OFDM	BPSK	6.0
		5745-5825	149 to 165				

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36	OFDM	BPSK	6.0
		5745-5825	149 to 165				

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11ac (VHT80)		42	42	OFDM	BPSK	65.0
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0
-	802.11ac (VHT80)		155	155	OFDM	BPSK	65.0

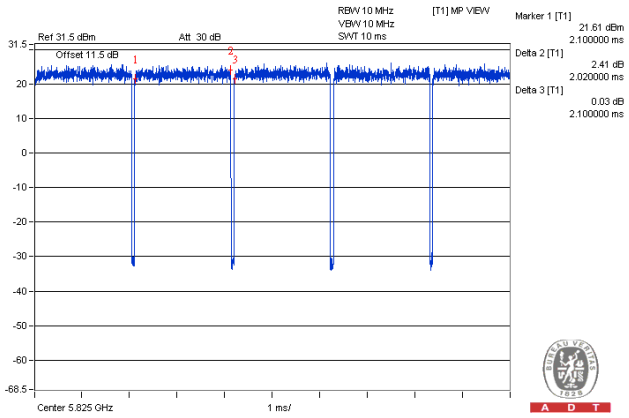
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
RE<1G	22deg. C, 70%RH	120Vac, 60Hz	Jones Chang
PLC	18deg. C, 70%RH	120Vac, 60Hz	Nick Hsu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Ted Chang

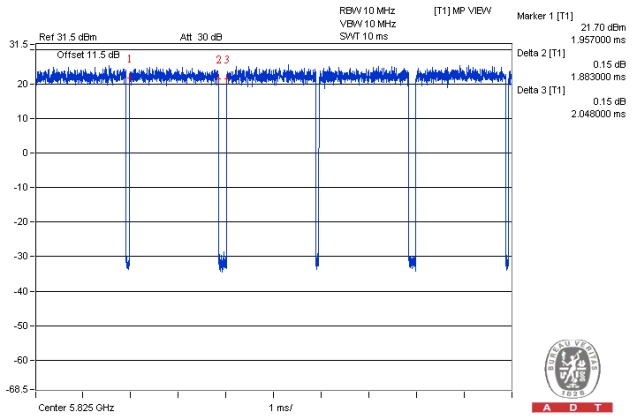
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %, duty factor is required.
802.11a: Duty cycle = 2.020/2.100 = 0.962, Duty factor = 10 * log(1/0.962) = 0.17
802.11n (HT20): Duty cycle = 1.883/2.048 = 0.919, Duty factor = 10 * log(1/0.919) = 0.36
802.11n (HT40): Duty cycle = 0.920/0.992 = 0.927, Duty factor = 10 * log(1/0.927) = 0.33
802.11ac (VHT80): Duty cycle = 4.135/4.227 = 0.978, Duty factor = 10 * log(1/0.978) = 0.10

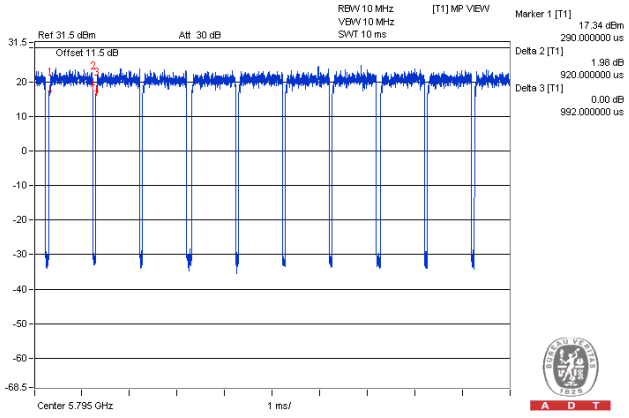
802.11a



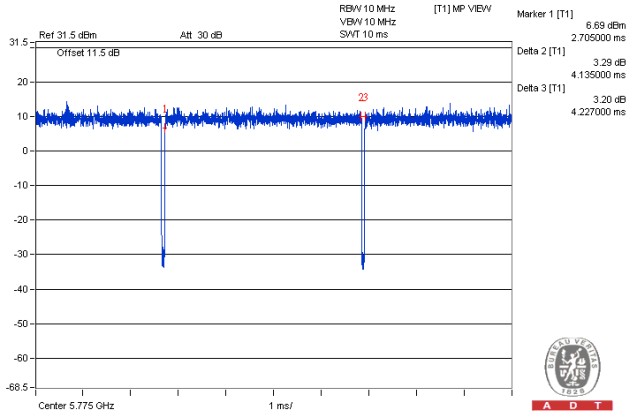
802.11n (HT20)



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.

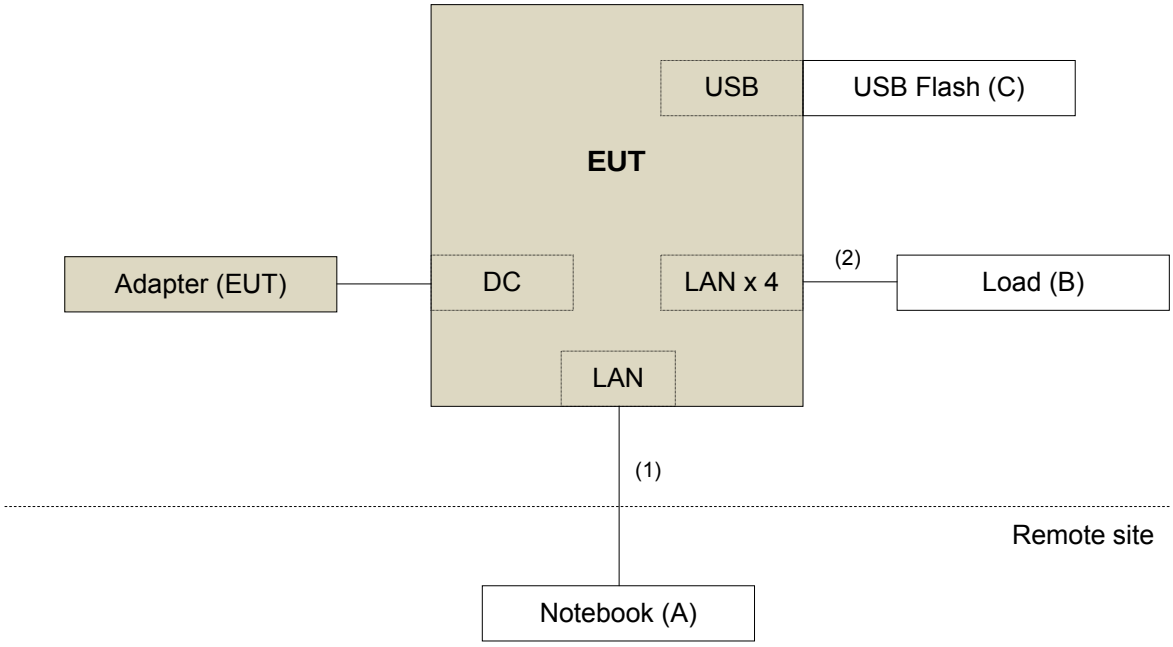
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	USB Flash	Transcend	V85	538455 4489	FCC DoC Approved	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A 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.	LAN cable	4	1.5	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart E (15.407)
789033 D02 General UNII Test Procedures New Rules v01
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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 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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
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, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03(214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03(309224+ 12738)	Aug. 22, 2015	Aug. 21, 2016
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. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 08, 2015	Jun. 07, 2016

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 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 Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) 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:

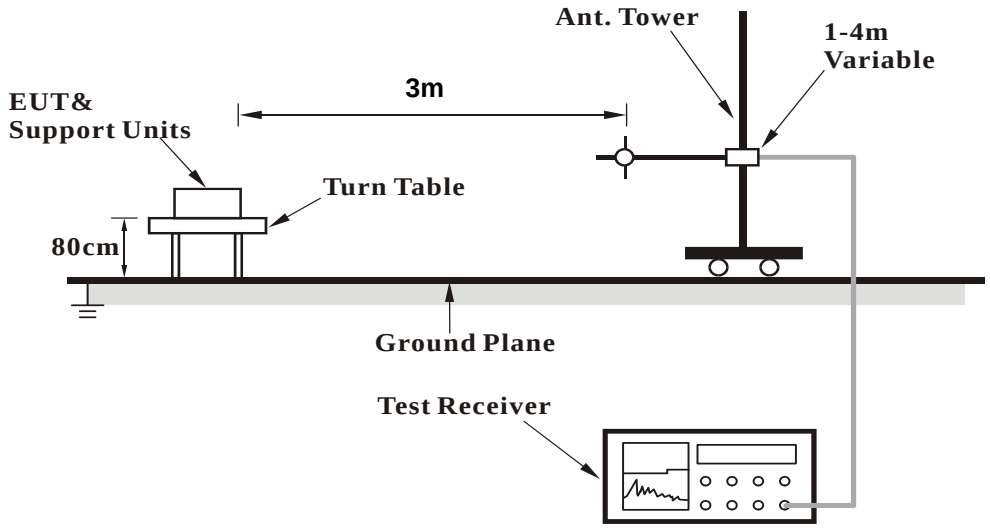
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. 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/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

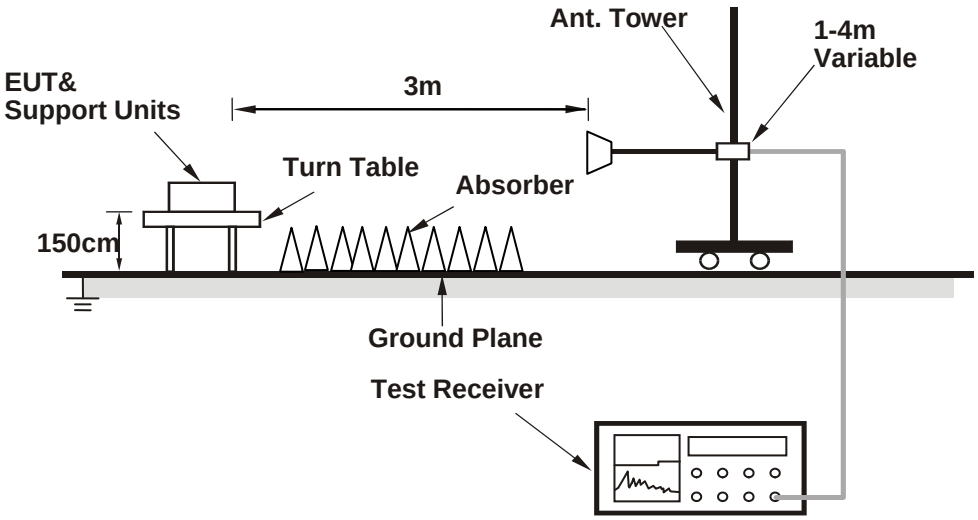
No deviation.

4.1.5 Test Set Up

<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 Conditions

a. Placed the EUT on the testing table.
b. Prepared 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.

4.1.7 Test Results

Above 1GHz Worst-Case Data:

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.0 PK	74.0	-7.0	1.79 H	321	60.80	6.20
2	5150.00	52.2 AV	54.0	-1.8	1.79 H	321	46.00	6.20
3	*5180.00	119.0 PK			1.67 H	313	79.50	39.50
4	*5180.00	108.4 AV			1.67 H	313	68.90	39.50
5	#10360.00	59.2 PK	74.0	-14.8	1.54 H	163	42.20	17.00
6	#10360.00	46.3 AV	54.0	-7.7	1.54 H	163	29.30	17.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.8 PK	74.0	-11.2	1.32 V	314	56.60	6.20
2	5150.00	48.8 AV	54.0	-5.2	1.32 V	314	42.60	6.20
3	*5180.00	113.4 PK			1.10 V	0	73.90	39.50
4	*5180.00	103.6 AV			1.10 V	0	64.10	39.50
5	#10360.00	59.6 PK	74.0	-14.4	1.39 V	27	42.60	17.00
6	#10360.00	46.5 AV	54.0	-7.5	1.39 V	27	29.50	17.00

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	120.7 PK			1.47 H	311	81.10	39.60
2	*5200.00	110.3 AV			1.47 H	311	70.70	39.60
3	#10400.00	57.6 PK	74.0	-16.4	1.34 H	138	40.60	17.00
4	#10400.00	45.9 AV	54.0	-8.1	1.34 H	138	28.90	17.00
5	15600.00	62.2 PK	74.0	-11.8	1.64 H	117	43.30	18.90
6	15600.00	49.5 AV	54.0	-4.5	1.64 H	117	30.60	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	*5200.00	116.9 PK			1.32 V	358	77.30	39.60
2	*5200.00	106.8 AV			1.32 V	358	67.20	39.60
3	#10400.00	59.8 PK	74.0	-14.2	1.75 V	258	42.80	17.00
4	#10400.00	47.4 AV	54.0	-6.6	1.75 V	258	30.40	17.00
5	15600.00	64.2 PK	74.0	-9.8	2.10 V	352	45.30	18.90
6	15600.00	52.3 AV	54.0	-1.7	2.10 V	352	33.40	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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	120.5 PK			1.55 H	311	80.90	39.60
2	*5240.00	110.0 AV			1.55 H	311	70.40	39.60
3	5400.00	60.1 PK	74.0	-13.9	1.65 H	297	53.40	6.70
4	5400.00	48.6 AV	54.0	-5.4	1.65 H	297	41.90	6.70
5	#10480.00	60.2 PK	74.0	-13.8	2.05 H	19	42.20	18.00
6	#10480.00	47.3 AV	54.0	-6.7	2.05 H	19	29.30	18.00
7	15720.00	63.2 PK	74.0	-10.8	1.75 H	163	44.70	18.50
8	15720.00	50.9 AV	54.0	-3.1	1.75 H	163	32.40	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	115.5 PK			1.10 V	320	75.90	39.60
2	*5240.00	106.1 AV			1.10 V	320	66.50	39.60
3	5400.00	60.0 PK	74.0	-14.0	1.40 V	359	53.30	6.70
4	5400.00	48.2 AV	54.0	-5.8	1.40 V	359	41.50	6.70
5	#10480.00	62.5 PK	74.0	-11.5	2.34 V	356	44.50	18.00
6	#10480.00	49.5 AV	54.0	-4.5	2.34 V	356	31.50	18.00
7	15720.00	63.6 PK	74.0	-10.4	2.34 V	356	45.10	18.50
8	15720.00	52.4 AV	54.0	-1.6	2.34 V	356	33.90	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 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	67.5 PK	74.0	-6.5	1.56 H	322	60.30	7.20
2	#5714.00	52.2 AV	54.0	-1.8	1.56 H	322	45.00	7.20
3	#5722.00	72.4 PK	78.2	-5.8	1.81 H	285	65.20	7.20
4	#5725.00	62.8 PK	78.2	-15.4	1.81 H	324	55.60	7.20
5	*5745.00	114.5 PK			1.67 H	320	74.10	40.40
6	*5745.00	104.6 AV			1.67 H	320	64.20	40.40
7	11490.00	63.0 PK	74.0	-11.0	1.87 H	263	44.70	18.30
8	11490.00	50.1 AV	54.0	-3.9	1.87 H	263	31.80	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	61.8 PK	74.0	-12.2	1.80 V	323	54.60	7.20
2	#5714.00	48.7 AV	54.0	-5.3	1.80 V	323	41.50	7.20
3	#5722.00	69.4 PK	78.2	-8.8	1.65 V	328	62.20	7.20
4	#5725.00	58.9 PK	78.2	-19.3	1.65 V	328	51.70	7.20
5	*5745.00	111.8 PK			1.10 V	334	71.40	40.40
6	*5745.00	102.0 AV			1.10 V	334	61.60	40.40
7	11490.00	65.3 PK	74.0	-8.7	1.99 V	355	47.00	18.30
8	11490.00	52.5 AV	54.0	-1.5	1.99 V	355	34.20	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 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	117.3 PK			1.67 H	328	76.80	40.50
2	*5785.00	107.8 AV			1.67 H	328	67.30	40.50
3	11570.00	64.5 PK	74.0	-9.5	1.19 H	0	46.30	18.20
4	11570.00	51.6 AV	54.0	-2.4	1.19 H	0	33.40	18.20
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	*5785.00	116.2 PK			2.00 V	307	75.70	40.50
2	*5785.00	106.0 AV			2.00 V	307	65.50	40.50
3	11570.00	65.5 PK	74.0	-8.5	1.50 V	4	47.30	18.20
4	11570.00	52.4 AV	54.0	-1.6	1.50 V	4	34.20	18.20

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	115.8 PK			1.66 H	324	75.30	40.50
2	*5825.00	105.6 AV			1.66 H	324	65.10	40.50
3	#5850.00	57.3 PK	78.2	-20.9	1.63 H	329	49.80	7.50
4	#5853.00	67.6 PK	78.2	-10.6	1.63 H	329	60.00	7.60
5	#5861.00	59.1 PK	74.0	-14.9	1.52 H	324	51.50	7.60
6	#5861.00	48.2 AV	54.0	-5.8	1.52 H	324	40.60	7.60
7	11650.00	63.2 PK	74.0	-10.8	1.88 H	260	44.50	18.70
8	11650.00	50.2 AV	54.0	-3.8	1.88 H	260	31.50	18.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	114.5 PK			1.72 V	0	74.00	40.50
2	*5825.00	104.7 AV			1.72 V	0	64.20	40.50
3	#5850.00	57.8 PK	78.2	-20.4	1.71 V	2	50.30	7.50
4	#5853.00	69.4 PK	78.2	-8.8	1.71 V	2	61.80	7.60
5	#5861.00	60.7 PK	74.0	-13.3	1.78 V	328	53.10	7.60
6	#5861.00	48.5 AV	54.0	-5.5	1.78 V	328	40.90	7.60
7	11650.00	66.6 PK	74.0	-7.4	2.00 V	355	47.90	18.70
8	11650.00	52.3 AV	54.0	-1.7	2.00 V	355	33.60	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.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.0 PK	74.0	-9.0	1.33 H	313	58.80	6.20
2	5150.00	52.8 AV	54.0	-1.2	1.33 H	313	46.60	6.20
3	*5180.00	118.2 PK			1.50 H	313	78.70	39.50
4	*5180.00	108.2 AV			1.50 H	313	68.70	39.50
5	#10360.00	57.8 PK	74.0	-16.2	1.24 H	276	40.80	17.00
6	#10360.00	45.5 AV	54.0	-8.5	1.24 H	276	28.50	17.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.5 PK	74.0	-14.5	1.74 V	140	53.30	6.20
2	5150.00	47.7 AV	54.0	-6.3	1.74 V	140	41.50	6.20
3	*5180.00	115.1 PK			1.04 V	0	75.60	39.50
4	*5180.00	105.0 AV			1.04 V	0	65.50	39.50
5	#10360.00	58.5 PK	74.0	-15.5	1.34 V	164	41.50	17.00
6	#10360.00	45.5 AV	54.0	-8.5	1.34 V	164	28.50	17.00

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.8 PK	74.0	-6.2	1.55 H	306	61.60	6.20
2	5150.00	52.4 AV	54.0	-1.6	1.55 H	306	46.20	6.20
3	*5200.00	121.8 PK			1.59 H	309	82.20	39.60
4	*5200.00	111.0 AV			1.59 H	309	71.40	39.60
5	#10400.00	59.1 PK	74.0	-14.9	1.06 H	128	42.10	17.00
6	#10400.00	47.1 AV	54.0	-6.9	1.06 H	128	30.10	17.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.2 PK	74.0	-9.8	1.43 V	359	58.00	6.20
2	5150.00	48.1 AV	54.0	-5.9	1.43 V	359	41.90	6.20
3	*5200.00	118.5 PK			1.65 V	356	78.90	39.60
4	*5200.00	107.9 AV			1.65 V	356	68.30	39.60
5	#10400.00	58.4 PK	74.0	-15.6	1.48 V	316	41.40	17.00
6	#10400.00	46.4 AV	54.0	-7.6	1.48 V	316	29.40	17.00

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	121.1 PK			1.36 H	313	81.50	39.60
2	*5240.00	110.3 AV			1.36 H	313	70.70	39.60
3	5350.00	59.8 PK	74.0	-14.2	1.46 H	322	53.40	6.40
4	5350.00	47.4 AV	54.0	-6.6	1.46 H	322	41.00	6.40
5	#10480.00	58.1 PK	74.0	-15.9	1.20 H	246	40.10	18.00
6	#10480.00	46.1 AV	54.0	-7.9	1.20 H	246	28.10	18.00
7	15720.00	64.8 PK	74.0	-9.2	1.20 H	116	46.30	18.50
8	15720.00	52.5 AV	54.0	-1.5	1.20 H	116	34.00	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	*5240.00	117.2 PK			1.41 V	358	77.60	39.60
2	*5240.00	107.3 AV			1.41 V	358	67.70	39.60
3	5350.00	58.6 PK	74.0	-15.4	1.49 V	312	52.20	6.40
4	5350.00	46.1 AV	54.0	-7.9	1.49 V	312	39.70	6.40
5	#10480.00	59.1 PK	74.0	-14.9	1.39 V	57	41.10	18.00
6	#10480.00	46.9 AV	54.0	-7.1	1.39 V	57	28.90	18.00
7	15720.00	63.9 PK	74.0	-10.1	1.77 V	165	45.40	18.50
8	15720.00	51.0 AV	54.0	-3.0	1.77 V	165	32.50	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 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	65.9 PK	74.0	-8.1	1.52 H	323	58.70	7.20
2	#5714.00	52.1 AV	54.0	-1.9	1.52 H	323	44.90	7.20
3	#5722.00	70.7 PK	78.2	-7.5	1.62 H	321	63.50	7.20
4	#5725.00	60.8 PK	78.2	-17.4	1.62 H	321	53.60	7.20
5	*5745.00	116.1 PK			1.94 H	325	75.70	40.40
6	*5745.00	106.5 AV			1.94 H	325	66.10	40.40
7	11490.00	61.5 PK	74.0	-12.5	1.48 H	336	43.20	18.30
8	11490.00	48.4 AV	54.0	-5.6	1.48 H	336	30.10	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	65.4 PK	74.0	-8.6	1.83 V	24	58.20	7.20
2	#5714.00	50.7 AV	54.0	-3.3	1.83 V	24	43.50	7.20
3	#5722.00	70.7 PK	78.2	-7.5	1.25 V	16	63.50	7.20
4	#5725.00	61.7 PK	78.2	-16.5	1.25 V	16	54.50	7.20
5	*5745.00	114.5 PK			1.90 V	315	74.10	40.40
6	*5745.00	104.9 AV			1.90 V	315	64.50	40.40
7	11490.00	64.6 PK	74.0	-9.4	1.51 V	2	46.30	18.30
8	11490.00	51.8 AV	54.0	-2.2	1.51 V	2	33.50	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 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	116.9 PK			1.69 H	329	76.40	40.50
2	*5785.00	107.1 AV			1.69 H	329	66.60	40.50
3	11570.00	62.6 PK	74.0	-11.4	1.53 H	331	44.40	18.20
4	11570.00	49.6 AV	54.0	-4.4	1.53 H	331	31.40	18.20
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	*5785.00	115.6 PK			1.99 V	309	75.10	40.50
2	*5785.00	105.9 AV			1.99 V	309	65.40	40.50
3	11570.00	65.5 PK	74.0	-8.5	1.60 V	5	47.30	18.20
4	11570.00	52.7 AV	54.0	-1.3	1.60 V	5	34.50	18.20

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	116.9 PK			1.56 H	331	76.40	40.50
2	*5825.00	106.8 AV			1.56 H	331	66.30	40.50
3	#5850.00	62.0 PK	78.2	-16.2	1.79 H	328	54.50	7.50
4	#5853.00	70.6 PK	78.2	-7.6	1.79 H	328	63.00	7.60
5	#5861.00	64.3 PK	74.0	-9.7	1.45 H	1	56.70	7.60
6	#5861.00	49.4 AV	54.0	-4.6	1.45 H	1	41.80	7.60
7	11650.00	61.9 PK	74.0	-12.1	1.31 H	298	43.20	18.70
8	11650.00	49.5 AV	54.0	-4.5	1.31 H	298	30.80	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	*5825.00	115.3 PK			2.04 V	309	74.80	40.50
2	*5825.00	104.8 AV			2.04 V	309	64.30	40.50
3	#5850.00	57.1 PK	78.2	-21.1	2.01 V	312	49.60	7.50
4	#5853.00	71.0 PK	78.2	-7.2	2.01 V	312	63.40	7.60
5	#5861.00	65.1 PK	74.0	-8.9	1.70 V	19	57.50	7.60
6	#5861.00	48.2 AV	54.0	-5.8	1.70 V	19	40.60	7.60
7	11650.00	66.3 PK	74.0	-7.7	1.60 V	3	47.60	18.70
8	11650.00	52.6 AV	54.0	-1.4	1.60 V	3	33.90	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.

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.6 PK	74.0	-6.4	1.69 H	48	61.40	6.20
2	5150.00	52.6 AV	54.0	-1.4	1.69 H	48	46.40	6.20
3	*5190.00	111.9 PK			1.63 H	32	72.40	39.50
4	*5190.00	102.0 AV			1.63 H	32	62.50	39.50
5	#10360.00	58.9 PK	74.0	-15.1	1.55 H	19	41.90	17.00
6	#10360.00	45.9 AV	54.0	-8.1	1.55 H	19	28.90	17.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.3 PK	74.0	-13.7	1.70 V	313	54.10	6.20
2	5150.00	49.0 AV	54.0	-5.0	1.70 V	313	42.80	6.20
3	*5190.00	107.8 PK			1.10 V	0	68.30	39.50
4	*5190.00	98.1 AV			1.10 V	0	58.60	39.50
5	#10380.00	59.0 PK	74.0	-15.0	1.98 V	200	42.00	17.00
6	#10380.00	45.8 AV	54.0	-8.2	1.98 V	200	28.80	17.00

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.5 PK	74.0	-11.5	1.72 H	45	56.30	6.20
2	5150.00	52.3 AV	54.0	-1.7	1.72 H	45	46.10	6.20
3	*5230.00	116.9 PK			1.70 H	39	77.30	39.60
4	*5230.00	106.5 AV			1.70 H	39	66.90	39.60
5	#10460.00	59.4 PK	74.0	-14.6	1.67 H	152	41.60	17.80
6	#10460.00	46.3 AV	54.0	-7.7	1.67 H	152	28.50	17.80
7	15690.00	62.7 PK	74.0	-11.3	1.68 H	34	44.00	18.70
8	15690.00	50.6 AV	54.0	-3.4	1.68 H	34	31.90	18.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.1 PK	74.0	-14.9	2.01 V	295	52.90	6.20
2	5150.00	47.3 AV	54.0	-6.7	2.01 V	295	41.10	6.20
3	*5230.00	112.3 PK			1.09 V	0	72.70	39.60
4	*5230.00	102.3 AV			1.09 V	0	62.70	39.60
5	#10460.00	60.4 PK	74.0	-13.6	2.00 V	323	42.60	17.80
6	#10460.00	46.2 AV	54.0	-7.8	2.00 V	323	28.40	17.80
7	15690.00	62.4 PK	74.0	-11.6	1.66 V	134	43.70	18.70
8	15690.00	50.4 AV	54.0	-3.6	1.66 V	134	31.70	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 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	68.0 PK	74.0	-6.0	1.54 H	319	60.80	7.20
2	**#5714.00**	**52.9 AV**	**54.0**	**-1.1**	**1.54 H**	**319**	**45.70**	**7.20**
3	#5722.00	72.7 PK	78.2	-5.5	1.79 H	310	65.50	7.20
4	#5725.00	61.4 PK	78.2	-16.8	1.79 H	310	54.20	7.20
5	*5755.00	108.9 PK			1.60 H	319	68.40	40.50
6	*5755.00	99.7 AV			1.60 H	319	59.20	40.50
7	11510.00	59.7 PK	74.0	-14.3	1.80 H	255	41.50	18.20
8	11510.00	46.7 AV	54.0	-7.3	1.80 H	255	28.50	18.20
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	#5714.00	66.9 PK	74.0	-7.1	2.01 V	307	59.70	7.20
2	#5714.00	51.8 AV	54.0	-2.2	2.01 V	307	44.60	7.20
3	#5722.00	69.4 PK	78.2	-8.8	1.94 V	309	62.20	7.20
4	#5725.00	57.2 PK	78.2	-21.0	1.94 V	309	50.00	7.20
5	*5755.00	107.4 PK			1.75 V	12	66.90	40.50
6	*5755.00	98.0 AV			1.75 V	12	57.50	40.50
7	11510.00	60.4 PK	74.0	-13.6	1.42 V	18	42.20	18.20
8	11510.00	47.2 AV	54.0	-6.8	1.42 V	18	29.00	18.20

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	115.0 PK			1.55 H	319	74.50	40.50
2	*5795.00	104.8 AV			1.55 H	319	64.30	40.50
3	#5850.00	56.6 PK	78.2	-21.6	1.60 H	327	49.10	7.50
4	#5853.00	65.8 PK	78.2	-12.4	1.60 H	327	58.20	7.60
5	#5861.00	62.7 PK	74.0	-11.3	1.76 H	323	55.10	7.60
6	#5861.00	49.5 AV	54.0	-4.5	1.76 H	323	41.90	7.60
7	11590.00	61.0 PK	74.0	-13.0	1.78 H	248	42.70	18.30
8	11590.00	48.2 AV	54.0	-5.8	1.78 H	248	29.90	18.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	113.2 PK			1.76 V	13	72.70	40.50
2	*5795.00	103.0 AV			1.76 V	13	62.50	40.50
3	#5850.00	55.4 PK	78.2	-22.8	1.95 V	19	47.90	7.50
4	#5853.00	64.8 PK	78.2	-13.4	1.95 V	19	57.20	7.60
5	#5861.00	61.0 PK	74.0	-13.0	1.46 V	5	53.40	7.60
6	#5861.00	48.1 AV	54.0	-5.9	1.46 V	5	40.50	7.60
7	11590.00	64.6 PK	74.0	-9.4	2.01 V	357	46.30	18.30
8	11590.00	52.1 AV	54.0	-1.9	2.01 V	357	33.80	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.

802.11ac (VHT80)

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.7 PK	74.0	-9.3	2.07 H	317	58.50	6.20
2	5150.00	52.2 AV	54.0	-1.8	2.07 H	317	46.00	6.20
3	*5210.00	104.8 PK			1.72 H	37	65.20	39.60
4	*5210.00	94.7 AV			1.72 H	37	55.10	39.60
5	#10420.00	58.7 PK	74.0	-15.3	1.66 H	134	41.50	17.20
6	#10420.00	45.5 AV	54.0	-8.5	1.66 H	134	28.30	17.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.2 PK	74.0	-13.8	1.76 V	34	54.00	6.20
2	5150.00	48.4 AV	54.0	-5.6	1.76 V	34	42.20	6.20
3	*5210.00	99.0 PK			1.03 V	19	59.40	39.60
4	*5210.00	88.5 AV			1.03 V	19	48.90	39.60
5	#10420.00	58.2 PK	74.0	-15.8	1.76 V	210	41.00	17.20
6	#10420.00	45.3 AV	54.0	-8.7	1.76 V	210	28.10	17.20

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.

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.00	67.5 PK	74.0	-6.5	1.57 H	323	60.30	7.20
2	**#5714.00**	**52.9 AV**	**54.0**	**-1.1**	**1.57 H**	**323**	**45.70**	**7.20**
3	#5722.00	61.8 PK	78.2	-16.4	1.63 H	307	54.60	7.20
4	#5725.00	60.5 PK	78.2	-17.7	1.63 H	307	53.30	7.20
5	*5775.00	104.4 PK			1.63 H	323	63.90	40.50
6	*5775.00	94.2 AV			1.63 H	323	53.70	40.50
7	11550.00	59.2 PK	74.0	-14.8	1.50 H	278	41.00	18.20
8	11550.00	46.3 AV	54.0	-7.7	1.50 H	278	28.10	18.20
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	#5714.00	62.7 PK	74.0	-11.3	1.65 V	326	55.50	7.20
2	#5714.00	48.7 AV	54.0	-5.3	1.65 V	326	41.50	7.20
3	#5722.00	69.9 PK	78.2	-8.3	1.88 V	4	62.70	7.20
4	#5725.00	56.7 PK	78.2	-21.5	1.88 V	4	49.50	7.20
5	*5775.00	103.1 PK			1.82 V	10	62.60	40.50
6	*5775.00	92.2 AV			1.82 V	10	51.70	40.50
7	11550.00	59.7 PK	74.0	-14.3	1.42 V	359	41.50	18.20
8	11550.00	46.6 AV	54.0	-7.4	1.42 V	359	28.40	18.20

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.

Below 1GHz Worst-Case Data: 802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	86.28	32.9 QP	40.0	-7.1	2.00 H	275	52.60	-19.70
2	197.11	39.8 QP	43.5	-3.7	1.50 H	99	56.40	-16.60
3	280.71	38.7 QP	46.0	-7.3	1.00 H	91	51.60	-12.90
4	374.04	32.0 QP	46.0	-14.0	1.00 H	129	43.00	-11.00
5	624.85	36.3 QP	46.0	-9.7	1.50 H	126	41.70	-5.40
6	960.00	42.1 QP	46.0	-3.9	2.00 H	331	41.50	0.60
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	39.62	35.4 QP	40.0	-4.6	1.01 V	16	50.60	-15.20
2	84.34	32.6 QP	40.0	-7.4	1.51 V	215	52.00	-19.40
3	197.11	36.5 QP	43.5	-7.0	1.01 V	75	53.10	-16.60
4	280.71	32.2 QP	46.0	-13.8	1.51 V	204	45.10	-12.90
5	624.85	37.0 QP	46.0	-9.0	1.01 V	238	42.40	-5.40
6	960.00	39.4 QP	46.0	-6.6	1.51 V	277	38.80	0.60

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

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Apr. 27, 2015	Apr. 26, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2014	Dec. 29, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 21, 2015	Jul. 20, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

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

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

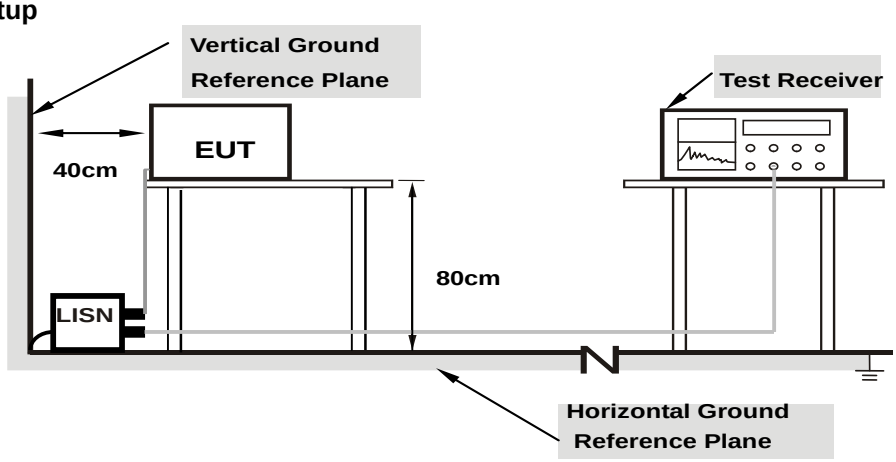
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

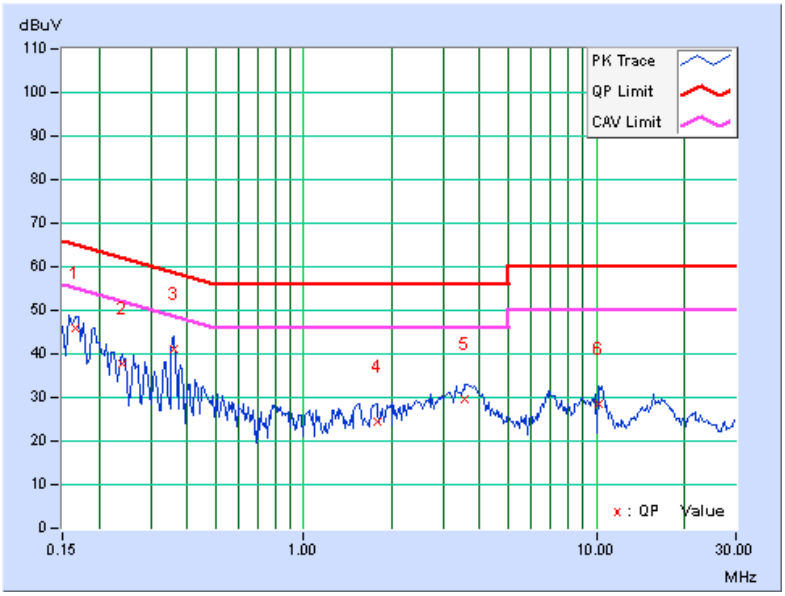
Worst-Case Data: 802.11a

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.94	35.91	22.35	45.85	32.29	65.18	55.18	-19.33	-22.89
2	0.23984	9.95	27.99	18.54	37.94	28.49	62.10	52.10	-24.16	-23.61
3	0.36094	9.95	31.28	28.96	41.23	38.91	58.71	48.71	-17.48	-9.80
4	1.77734	10.14	14.23	4.84	24.37	14.98	56.00	46.00	-31.63	-31.02
5	3.56641	10.25	19.41	12.24	29.66	22.49	56.00	46.00	-26.34	-23.51
6	10.17969	10.43	18.01	7.84	28.44	18.27	60.00	50.00	-31.56	-31.73

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.

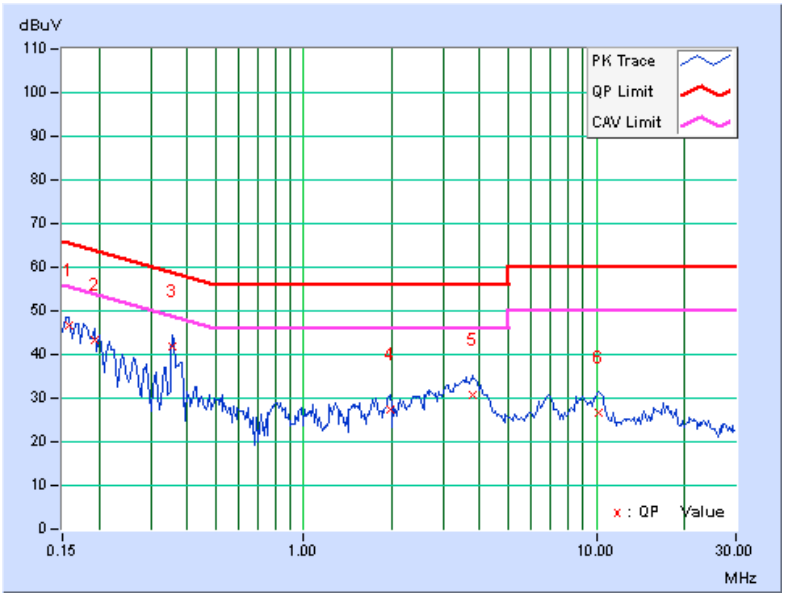


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.95	36.75	19.25	46.70	29.20	65.58	55.58	-18.88	-26.38
2	0.19297	9.96	33.46	18.70	43.42	28.66	63.91	53.91	-20.48	-25.24
3	**0.35703**	**9.99**	**31.81**	**30.20**	**41.80**	**40.19**	**58.80**	**48.80**	**-16.99**	**-8.60**
4	1.98438	10.19	17.17	12.88	27.36	23.07	56.00	46.00	-28.64	-22.93
5	3.76563	10.29	20.57	12.11	30.86	22.40	56.00	46.00	-25.14	-23.60
6	10.19141	10.50	16.14	6.98	26.64	17.48	60.00	50.00	-33.36	-32.52

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 Measurment

4.3.1 Limits of Transmit Power Measurement

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

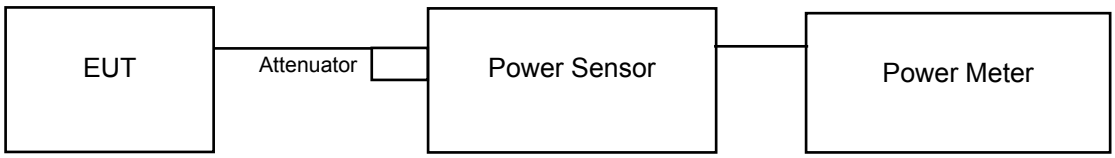
*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 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 $N_{ANT} \geq 5$.

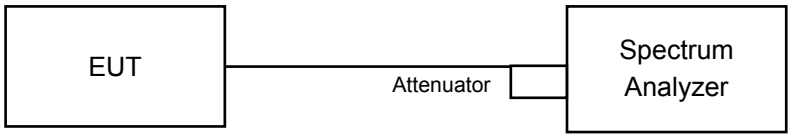
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

For 802.11a, 802.11n (HT20), 802.11n (HT40), 802.11ac (VHT20), 802.11ac (VHT40)



For 802.11ac (VHT80)



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), 802.11ac (VHT20), 802.11ac (VHT40)
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)

a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
b. Set sweep trigger to “free run”.
c. Set RBW = 1 MHz.
d. Set VBW ≥ 3 MHz
e. Number of points in sweep ≥ 2 Span / RBW.
f. Sweep time ≤ (number of points in sweep) * T
g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
h. Detector = RMS.
i. Trace mode = max hold.
j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

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	22.16	22.50	342.265	25.34	30	Pass
40	5200	24.04	24.20	516.540	27.13	30	Pass
48	5240	24.20	24.68	556.792	27.46	30	Pass
149	5745	19.85	20.20	201.318	23.04	30	Pass
157	5785	20.87	21.15	252.497	24.02	30	Pass
165	5825	20.84	21.18	252.559	24.02	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	22.25	22.36	340.067	25.32	30	Pass
40	5200	24.24	24.76	564.687	27.52	30	Pass
48	5240	24.38	24.88	**581.767**	27.65	30	Pass
149	5745	20.34	20.38	217.287	23.37	30	Pass
157	5785	20.79	21.10	248.775	23.96	30	Pass
165	5825	20.68	21.04	244.007	23.87	30	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	17.65	17.57	115.358	20.62	30	Pass
46	5230	23.63	23.98	480.710	26.82	30	Pass
151	5755	17.93	18.11	126.801	21.03	30	Pass
159	5795	21.70	22.01	**306.766**	24.87	30	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	15.01	15.21	64.885	18.12	30	Pass
155	5775	14.62	15.00	60.596	17.82	30	Pass

26dB Bandwidth:

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
36	5180	22.29	21.39	Pass
40	5200	25.23	22.72	Pass
48	5240	23.92	23.62	Pass

802.11n (HT20)

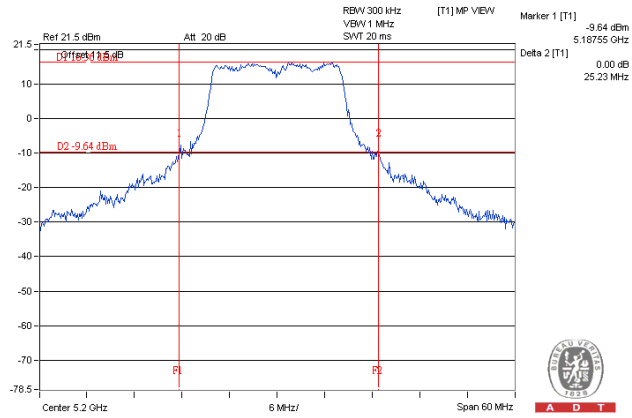
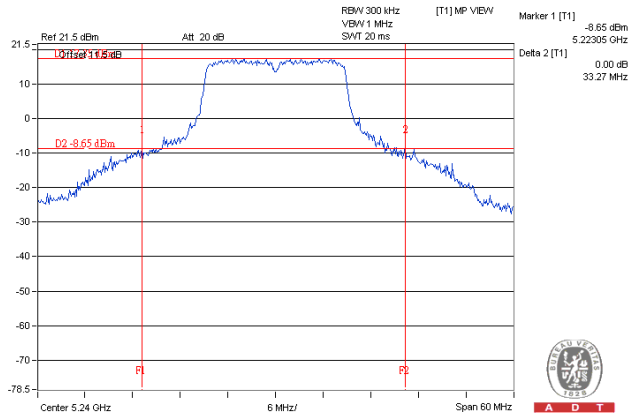
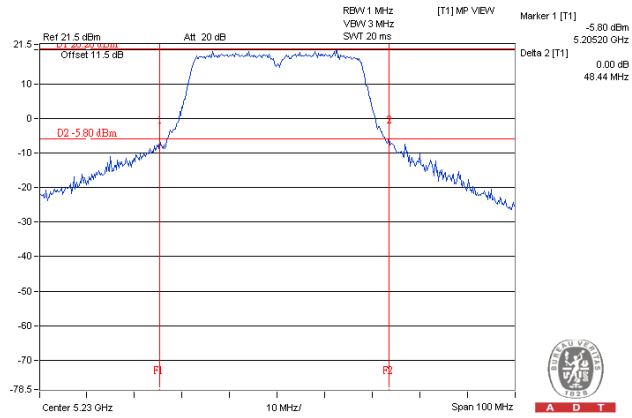
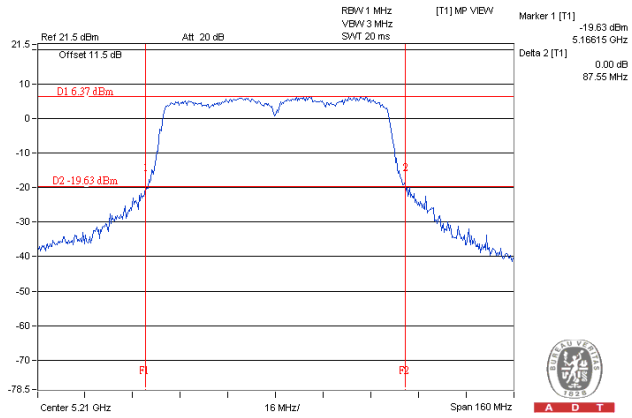
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
36	5180	22.56	23.01	Pass
40	5200	25.50	30.54	Pass
48	5240	27.09	33.27	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
38	5190	45.65	45.59	Pass
46	5230	48.06	48.44	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
42	5210	87.55	87.04	Pass

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

Occupied Bandwidth:

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.80	16.68
40	5200	16.92	16.80
48	5240	16.80	16.68
149	5745	16.80	16.80
157	5785	16.80	16.80
165	5825	16.68	16.68

802.11n (HT20)

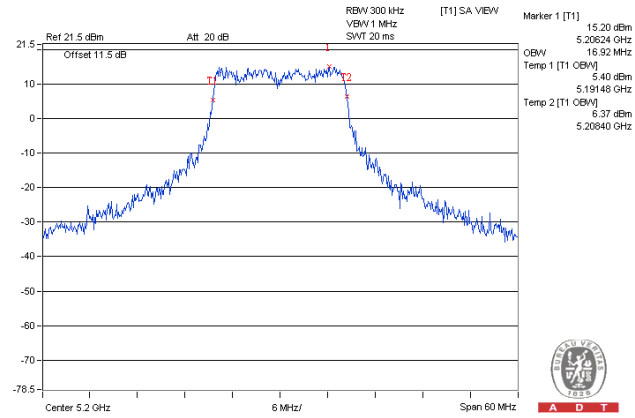
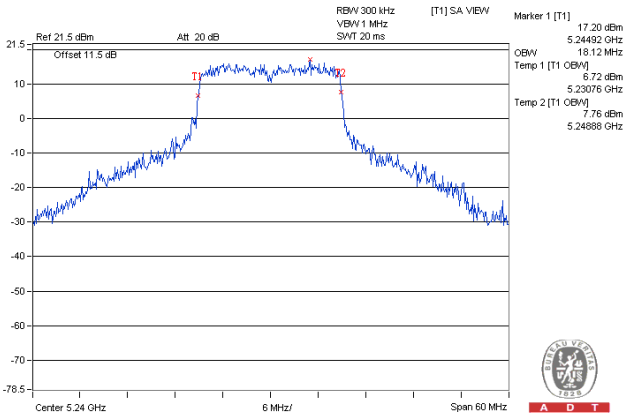
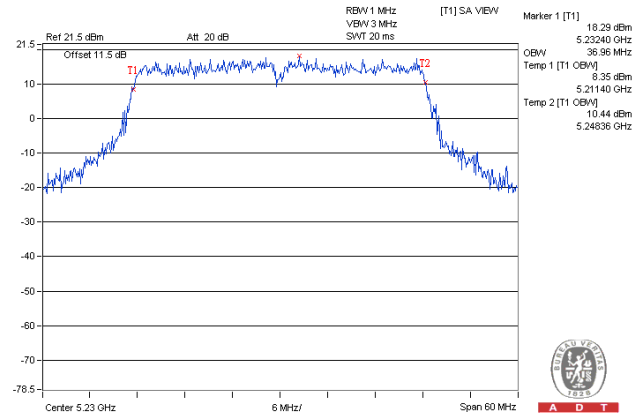
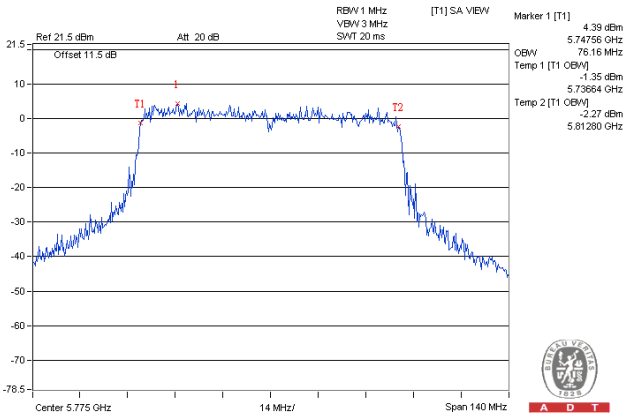
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.76	17.88
40	5200	17.88	18.00
48	5240	17.88	18.12
149	5745	17.88	17.76
157	5785	18.00	18.00
165	5825	18.00	17.88

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.72	36.72
46	5230	36.96	36.72
151	5755	36.84	36.60
159	5795	36.72	36.84

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.88	75.60
155	5775	76.16	75.88

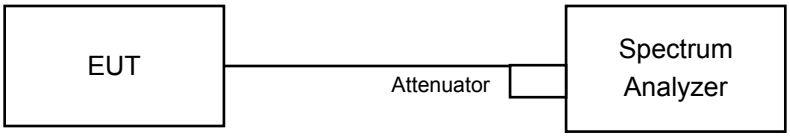
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

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 Procedures

For U-NII-1 band:
Using method SA-2

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
c. Sweep time = auto, trigger set to “free run”.
d. Trace average at least 100 traces in power averaging mode.
e. Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
d. 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 = 10log(500 kHz/300kHz)
e. Sweep time = auto, trigger set to “free run”.
f. Trace average at least 100 traces in power averaging mode.
g. 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 Item 4.3.6.

4.4.7 Test Results

For U-NII-1 Band

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	9.11	8.97	12.05	0.17	12.22	14.99	Pass
40	5200	11.58	10.88	14.25	0.17	14.42	14.99	Pass
48	5240	11.61	11.15	14.39	0.17	14.56	14.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 17-(8.01-6) = 14.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

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	8.69	8.40	11.56	0.36	11.92	14.99	Pass
40	5200	11.22	11.06	14.16	0.36	14.52	14.99	Pass
48	5240	11.23	11.36	14.31	0.36	14.67	14.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 17-(8.01-6) = 14.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

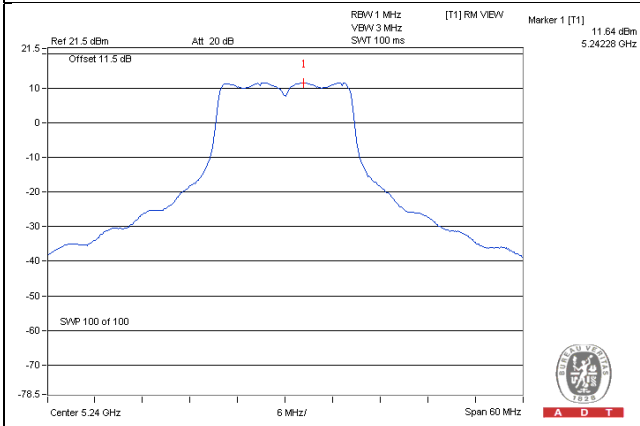
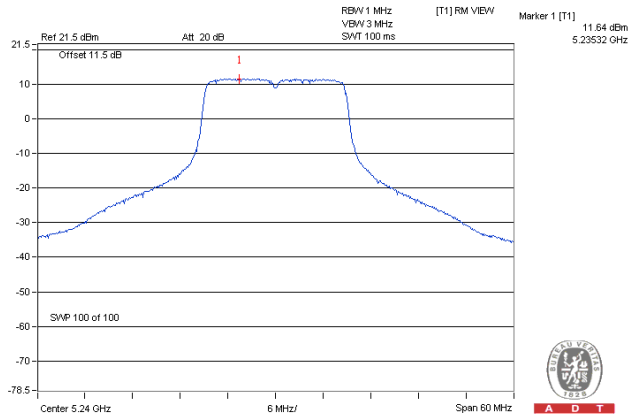
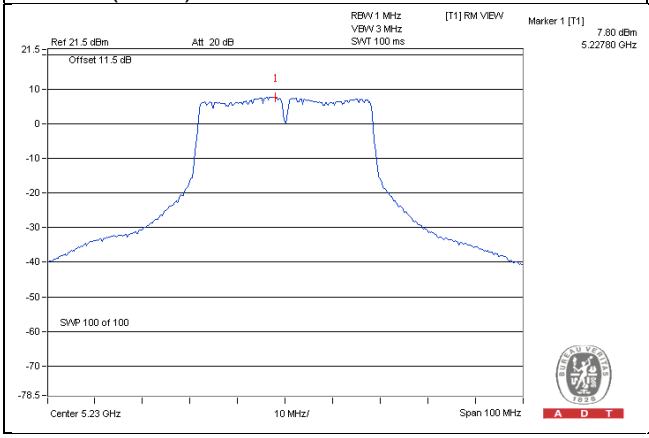
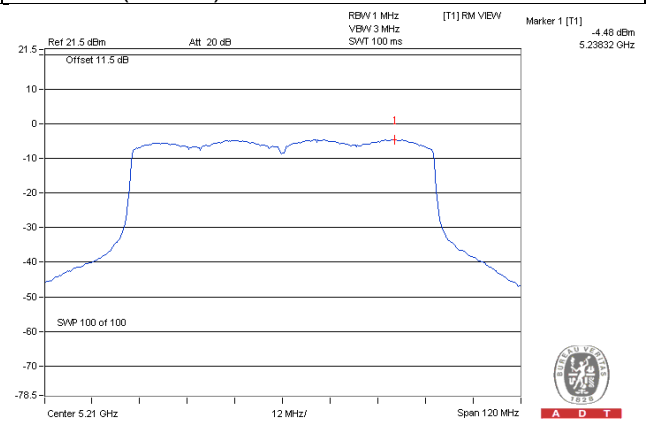
Chan.	Freq. (MHz)	PSD (dBm)		Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1					
38	5190	0.92	0.23	3.60	0.33	3.93	14.99	Pass
46	5230	7.76	7.16	10.48	0.33	10.81	14.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 17-(8.01-6) = 14.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

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					
42	5210	-4.78	-5.48	-2.11	0.10	-2.01	14.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 17-(8.01-6) = 14.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a / Chain 0 / CH 48	802.11n (HT20) / Chain 1 / CH 48
	
802.11n (HT40) / Chain 0 / CH 46	802.11ac (VHT80) / Chain 0 / CH 42
	

For U-NII-3 Band

802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	-1.77	0.45	3.01	0.17	3.63	27.99	Pass
	157	5785	-0.94	1.28	3.01	0.17	4.46	27.99	Pass
	165	5825	-1.18	1.04	3.01	0.17	4.22	27.99	Pass
1	149	5745	-1.44	0.78	3.01	0.17	3.96	27.99	Pass
	157	5785	-0.36	1.86	3.01	0.17	5.04	27.99	Pass
	165	5825	-1.45	0.77	3.01	0.17	3.95	27.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 30-(8.01-6) = 27.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	-1.70	0.52	3.01	0.36	3.89	27.99	Pass
	157	5785	-1.43	0.79	3.01	0.36	4.16	27.99	Pass
	165	5825	-1.57	0.65	3.01	0.36	4.02	27.99	Pass
1	149	5745	-1.37	0.85	3.01	0.36	4.22	27.99	Pass
	157	5785	-1.37	0.85	3.01	0.36	4.22	27.99	Pass
	165	5825	-1.61	0.61	3.01	0.36	3.98	27.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 30-(8.01-6) = 27.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

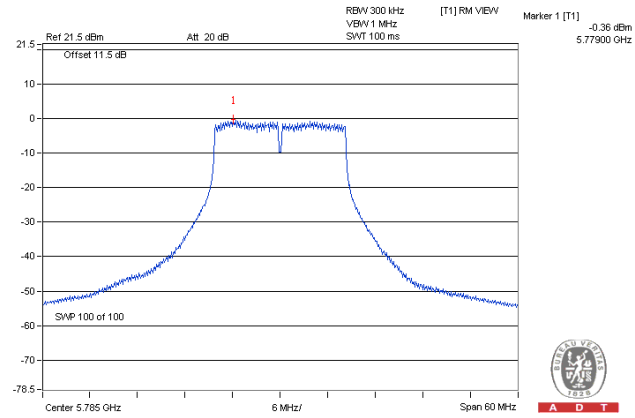
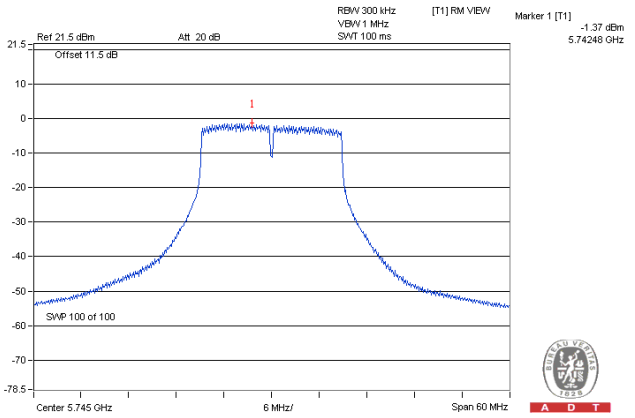
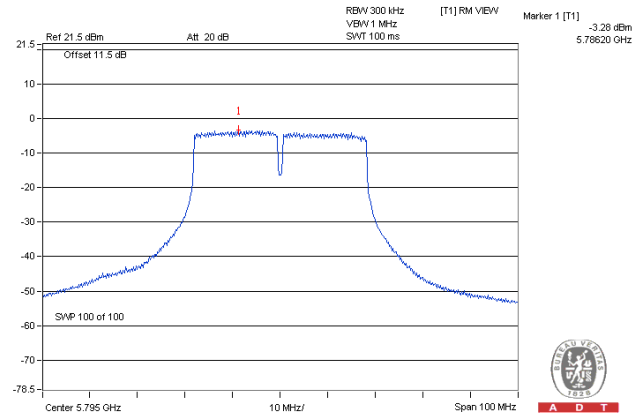
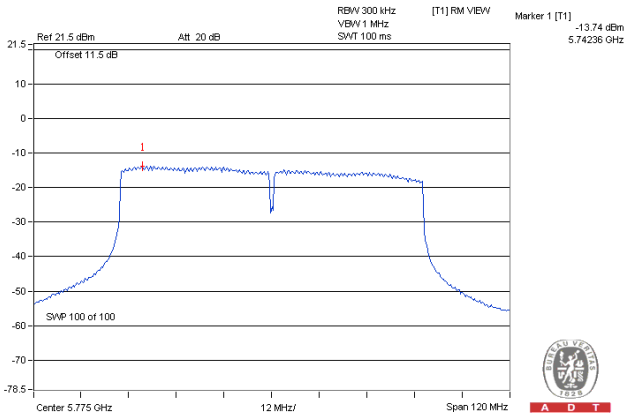
TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	151	5755	-7.85	-5.63	3.01	0.33	-2.29	27.99	Pass
	159	5795	-3.56	-1.34	3.01	0.33	2.00	27.99	Pass
1	151	5755	-7.20	-4.98	3.01	0.33	-1.64	27.99	Pass
	159	5795	-3.28	-1.06	3.01	0.33	2.28	27.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 30-(8.01-6) = 27.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=3) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	155	5775	-14.14	-11.92	3.01	0.10	-8.81	27.99	Pass
1	155	5775	-13.74	-11.52	3.01	0.10	-8.41	27.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5dBi + 10log(2) = 8.01dBi > 6dBi , so the power density limit shall be reduced to 30-(8.01-6) = 27.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

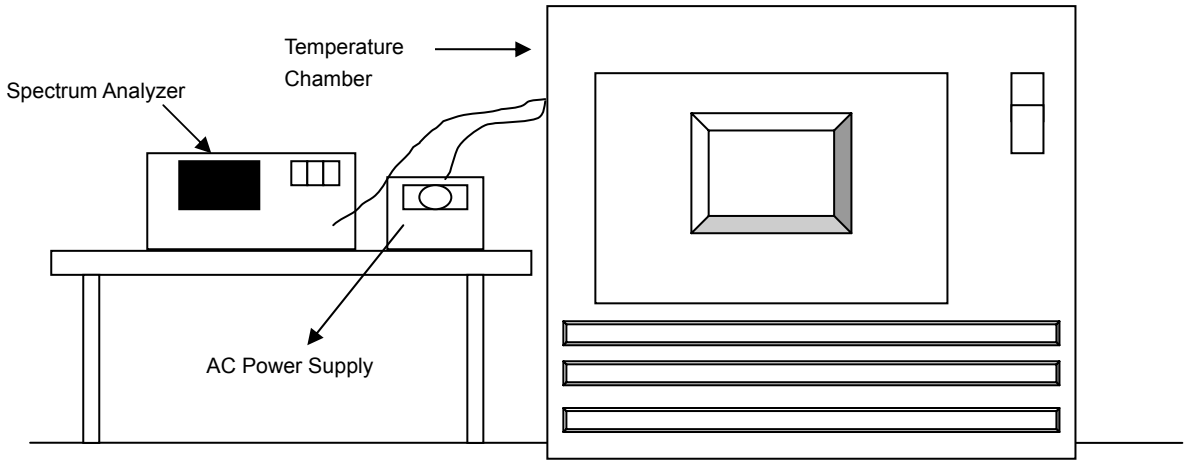
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Frequency Stability

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

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.

b. Turn the EUT on and couple its output to a spectrum analyzer.

c. Turn the EUT off and set the chamber to the highest temperature specified.

d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.

e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Frequemcy Stability Versus Temp.									
Operating Frequency: 5240MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5239.9903	-0.00019	5239.9896	-0.00020	5239.9912	-0.00017	5239.9913	-0.00017
40	120	5240.0023	0.00004	5240.0021	0.00004	5240.0035	0.00007	5240.0025	0.00005
30	120	5239.9894	-0.00020	5239.9902	-0.00019	5239.9923	-0.00015	5239.9895	-0.00020
20	120	5239.9781	-0.00042	5239.9763	-0.00045	5239.9751	-0.00048	5239.9796	-0.00039
10	120	5240.0018	0.00003	5240.0019	0.00004	5240.004	0.00008	5240.0045	0.00009
0	120	5239.985	-0.00029	5239.9844	-0.00030	5239.9838	-0.00031	5239.9877	-0.00023
-10	120	5239.9976	-0.00005	5240.0008	0.00002	5239.9979	-0.00004	5239.9984	-0.00003
-20	120	5239.9832	-0.00032	5239.9798	-0.00039	5239.9817	-0.00035	5239.982	-0.00034
-30	120	5240.0076	0.00015	5240.0068	0.00013	5240.0063	0.00012	5240.0098	0.00019

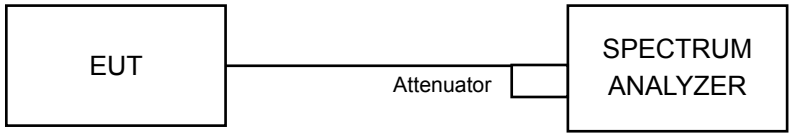
Frequemcy Stability Versus Temp.									
Operating Frequency: 5240MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5239.9786	-0.00041	5239.9758	-0.00046	5239.9753	-0.00047	5239.9797	-0.00039
	120	5239.9781	-0.00042	5239.9763	-0.00045	5239.9751	-0.00048	5239.9796	-0.00039
	102	5239.9778	-0.00042	5239.9773	-0.00043	5239.9753	-0.00047	5239.9798	-0.00039

4.6 6dB Bandwidth Measurment

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

a. Set resolution bandwidth (RBW) = 100kHz

b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.

c. Trace mode = max hold.

d. Sweep = auto couple.

e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating 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

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.42	16.46	0.5	Pass
157	5785	16.41	16.45	0.5	Pass
165	5825	16.40	16.46	0.5	Pass

802.11n (HT20)

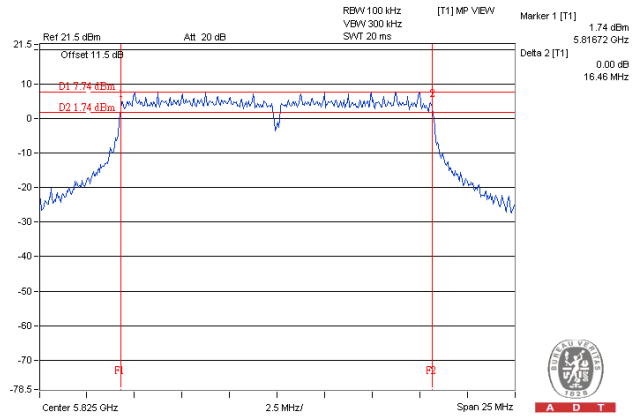
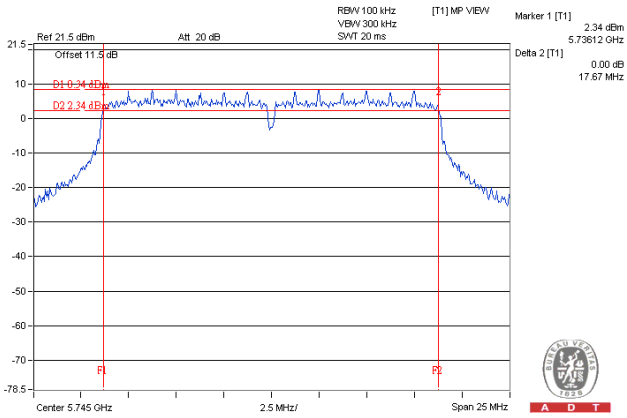
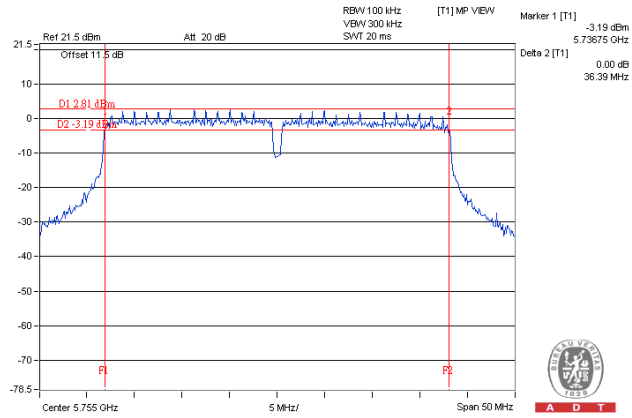
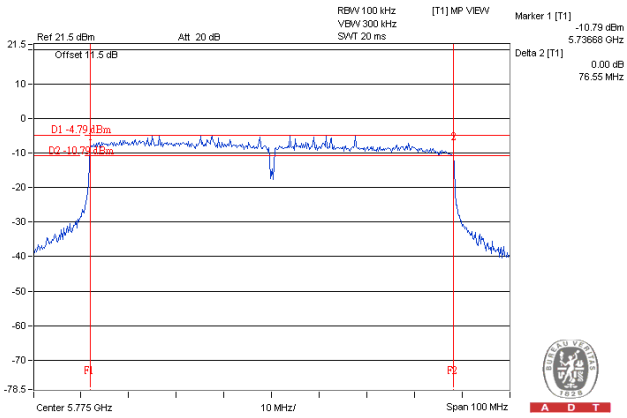
Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.67	17.62	0.5	Pass
157	5785	17.65	17.67	0.5	Pass
165	5825	17.64	17.63	0.5	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	36.39	36.15	0.5	Pass
159	5795	36.34	36.36	0.5	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.55	74.71	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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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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