FCC Test Report

Report No.:	RF150802C01-1
FCC ID:	MSQ-CMBT00
Test Model:	CM-32_AC2600
Received Date:	Aug. 02, 2015
Test Date:	Nov. 19 ~ Nov. 30, 2015
Issued Date:	Nov. 30, 2015
Applicant:	ASUSTek COMPUTER INC.
Address:	4F, NO. 150, LI-TE RD. PEITOU, TAIPEI 112, TAIWAN
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.)

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF150802C01-1	Original release.	Nov. 30, 2015

1 Certificate of Conformity

Product:	Wireless-AC3100 Dual Band Gigabit Router
Brand:	ASUS
Test Model:	CM-32_AC2600
Sample Status:	Engineering sample
Applicant:	ASUSTek COMPUTER INC.
Test Date:	Nov. 19 ~ Nov. 30, 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:** Nov. 30, 2015

Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Nov. 30, 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 -10.22dB at 0.41451MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.2dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 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	Wireless-AC3100 Dual Band Gigabit Router
Brand	ASUS
Test Model	CM-32_AC2600
Status of EUT	Engineering sample
Power Supply Rating	19Vdc from adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 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 800.0Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	5180 ~ 5240MHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Output Power	Beamforming off Mode: 172.936mW Beamforming on Mode: 154.857mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Adapter
Data Cable Supplied	1.4m non-shielded RJ45 cable without core

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Band	Modulation Mode	TX Function	Beamforming Mode
5GHz	802.11a	4TX	Not Support
	802.11n (HT20)	4TX	Not Support
	802.11n (HT40)	4TX	Not Support
	802.11ac (VHT20)	4TX	Support
	802.11ac (VHT40)	4TX	Support
	802.11ac (VHT80)	4TX	Support

* 802.11a, 802.11n (HT20) and 802.11n (HT40), the EUT doesn't support Beamforming mode.

* 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.

Brand	ASUS
Model	ADP-45BW B
Input Power	100-240Vac, 50-60Hz, 1.2A
Output Power	19Vdc, 2.37A
Power Line	2.25m power cable without core attached on adapter

3. The EUT with follow antennas gain is listed as table below.

No.	Antenna type	Model	Manufacturer	connector	Gain(dBi)		
					2.4GHz	5.18- 5.24GHz	5.745-5.825 GHz
1	Dipole	AREEE-000002	ACON	RSMA	2.70	-	-
	Dipole	AREEE-000002	ACON	RSMA	-	2.1	3.60
2	Dipole	C1335-51008-A	Whayu	RSMA	2.45	-	-
	Dipole	C1335-51008-A	Whayu	RSMA	-	3.39	4.35
3	Dipole	C1335-51008-A	Whayu	RSMA	2.37	-	-
	Dipole	C1335-51008-A	Whayu	RSMA	-	3.26	3.10

* Ant. 2 was chosen for final test.

3.2 Description of Test Modes

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

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 **X-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	6.5
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT80)		42	42	OFDM	BPSK	29.3

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

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

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	6.5
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT80)		42	42	OFDM	BPSK	29.3

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Tank Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Tank Wu
PLC	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee

3.3 Duty Cycle of Test Signal

Beamforming off Mode

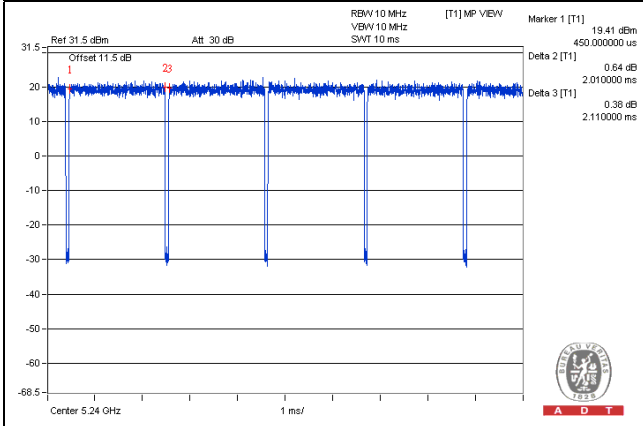
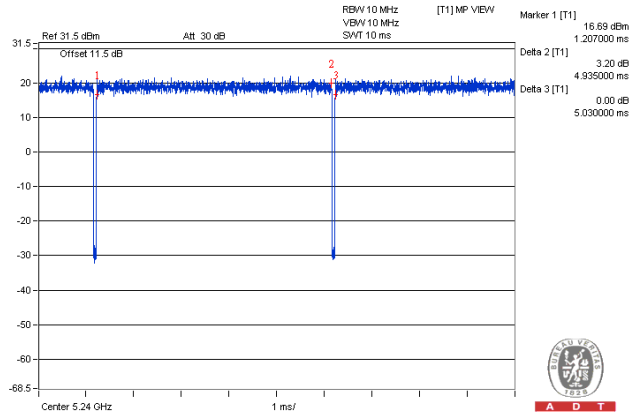
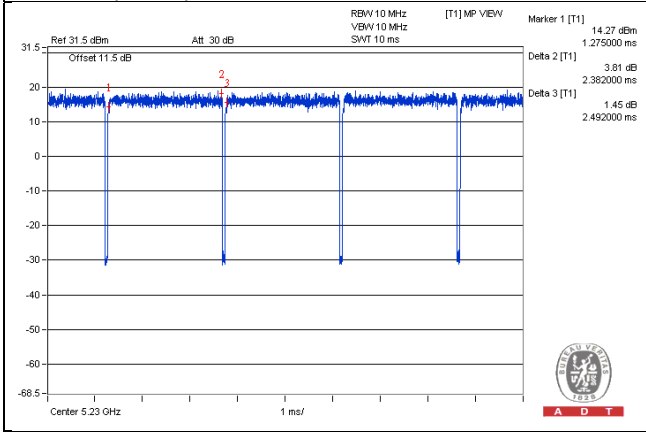
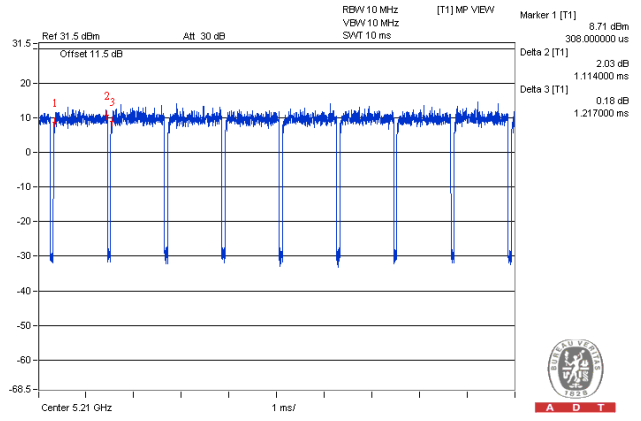
802.11a, 802.11n (HT40), 802.11ac (VHT80): Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11n (HT20): Duty cycle of test signal is > 98%, duty factor is not request.

802.11a: Duty cycle = 2.010/2.110 = 0.953, Duty factor = 10 * log(1/0.953) = 0.21

802.11n (HT40): Duty cycle = 2.382/2.492 = 0.956, Duty factor = 10 * log(1/0.956) = 0.20

802.11ac (VHT80): Duty cycle = 1.114/1.217 = 0.915, Duty factor = 10 * log(1/0.915) = 0.39

802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

Beamforming on Mode

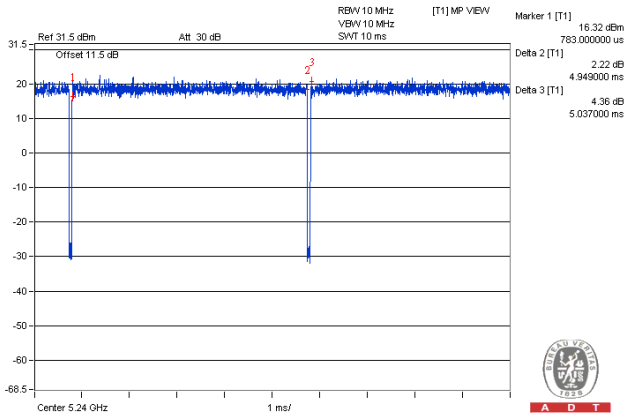
802.11ac (VHT20): Duty cycle of test signal is > 98%, duty factor is not request.

802.11ac (VHT40), 802.11ac (VHT80): Duty cycle of test signal is < 98 %, duty factor shall be considered.

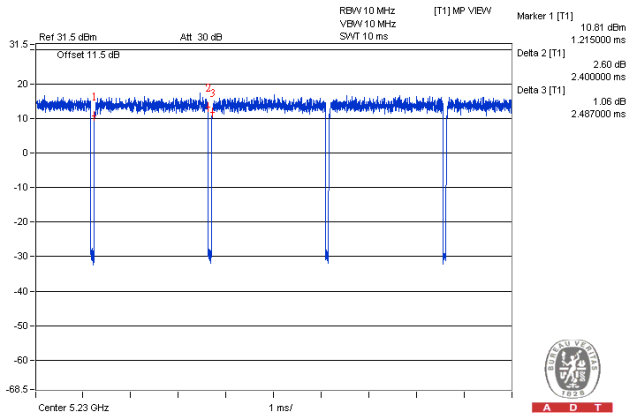
802.11ac (VHT40): Duty cycle = 2.400/2.487 = 0.965, Duty factor = 10 * log(1/0.965) = 0.15

802.11ac (VHT80): Duty cycle = 1.122/1.215 = 0.923, Duty factor = 10 * log(1/0.923) = 0.35

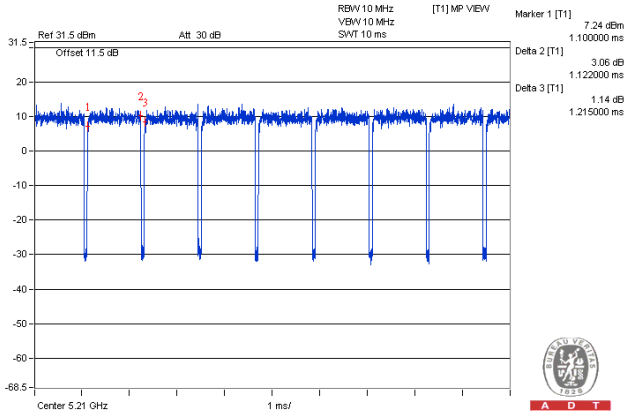
802.11ac (VHT20)



802.11ac (VHT40)



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.

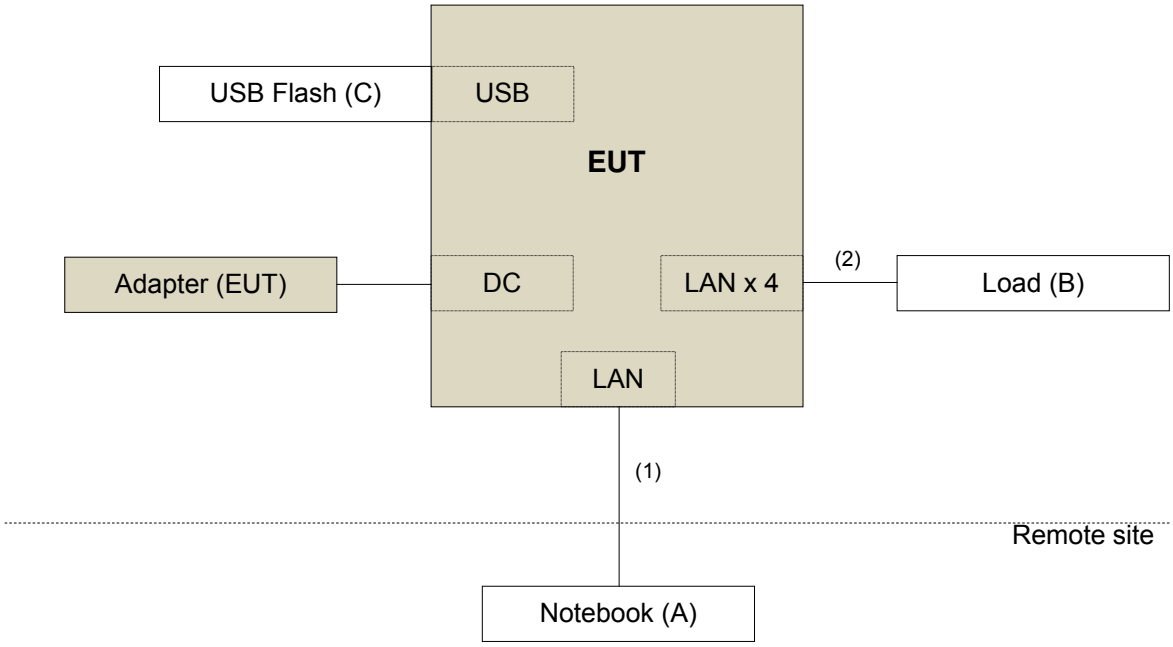
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	D531	CN-0XM006-48643-81U-2610	QDS-BRCM1020	-
B.	Load	NA	NA	NA	NA	-
C.	USB Flash	HP	v250W	01	NA	-

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	1.8	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 Procedure 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	ESCS30	100289	Dec. 01, 2014	Nov. 30, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Mar. 30, 2015	Mar. 29, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2015	Aug. 08, 2016
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02(309222 +248780)	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-03(274092)	Aug. 09, 2015	Aug. 08, 2016
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 11, 2015	Aug. 10, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2015	Oct. 17, 2016
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 9.
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 215374.
5. The IC Site Registration No. is IC 7450F-9.

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:

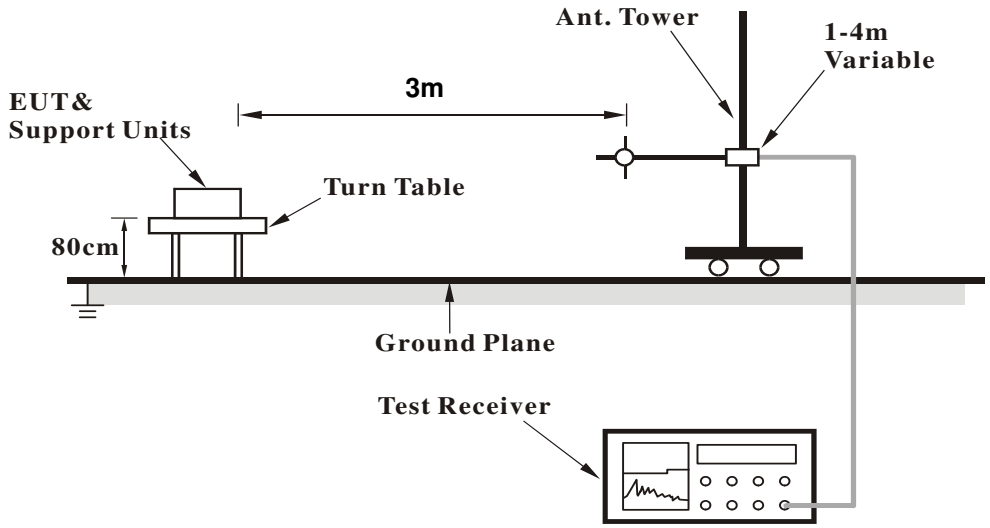
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

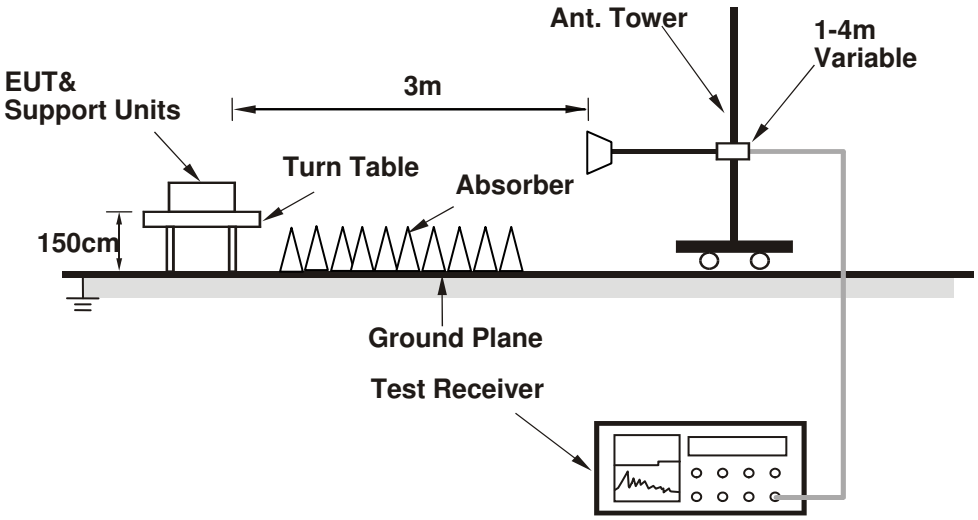
No deviation.

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:

Beamforming off Mode

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	58.3 PK	74.0	-15.7	1.01 H	306	54.40	3.90
2	5150.00	45.2 AV	54.0	-8.8	1.01 H	306	41.30	3.90
3	*5180.00	100.5 PK			1.01 H	306	59.00	41.50
4	*5180.00	90.4 AV			1.01 H	306	48.90	41.50
5	#6906.00	54.6 PK	68.2	-13.6	2.09 H	158	45.80	8.80
6	#10360.00	60.1 PK	74.0	-13.9	1.82 H	312	44.80	15.30
7	#10360.00	47.3 AV	54.0	-6.7	1.82 H	312	32.00	15.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.6 PK	74.0	-14.4	2.54 V	337	55.70	3.90
2	5150.00	46.9 AV	54.0	-7.1	2.54 V	337	43.00	3.90
3	*5180.00	115.7 PK			2.54 V	337	74.20	41.50
4	*5180.00	104.9 AV			2.54 V	337	63.40	41.50
5	#6906.00	59.4 PK	68.2	-8.8	1.54 V	190	50.60	8.80
6	#10360.00	67.1 PK	74.0	-6.9	2.34 V	154	51.80	15.30
7	#10360.00	52.0 AV	54.0	-2.0	2.34 V	154	36.70	15.30

Remarks:

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

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) 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	102.6 PK			1.11 H	307	61.10	41.50
2	*5200.00	92.1 AV			1.11 H	307	50.60	41.50
3	#6934.00	55.5 PK	68.2	-12.7	3.10 H	278	46.60	8.90
4	#10400.00	62.8 PK	74.0	-11.2	2.18 H	122	47.30	15.50
5	#10400.00	48.4 AV	54.0	-5.6	2.18 H	122	32.90	15.50
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	*5200.00	116.9 PK			2.41 V	335	75.40	41.50
2	*5200.00	105.9 AV			2.41 V	335	64.40	41.50
3	#6934.00	58.6 PK	68.2	-9.6	1.46 V	189	49.70	8.90
4	#10400.00	66.9 PK	74.0	-7.1	3.06 V	161	51.40	15.50
5	#10400.00	51.9 AV	54.0	-2.1	3.06 V	161	36.40	15.50

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 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	102.2 PK			1.16 H	307	60.60	41.60
2	*5240.00	91.9 AV			1.16 H	307	50.30	41.60
3	5350.00	58.9 PK	74.0	-15.1	1.16 H	308	54.90	4.00
4	5350.00	45.5 AV	54.0	-8.5	1.16 H	308	41.50	4.00
5	#6986.00	54.3 PK	68.2	-13.9	3.16 H	277	45.10	9.20
6	#10480.00	63.5 PK	74.0	-10.5	2.40 H	122	47.70	15.80
7	#10480.00	50.3 AV	54.0	-3.7	2.40 H	122	34.50	15.80
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	*5240.00	118.1 PK			2.49 V	334	76.50	41.60
2	*5240.00	107.0 AV			2.49 V	334	65.40	41.60
3	5350.00	59.3 PK	74.0	-14.7	2.49 V	334	55.30	4.00
4	5350.00	46.0 AV	54.0	-8.0	2.49 V	334	42.00	4.00
5	#6986.00	58.9 PK	68.2	-9.3	1.52 V	188	49.70	9.20
6	#10480.00	67.3 PK	74.0	-6.7	2.15 V	158	51.50	15.80
7	#10480.00	52.0 AV	54.0	-2.0	2.15 V	158	36.20	15.80

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.

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	58.8 PK	74.0	-15.2	1.36 H	306	54.90	3.90
2	5150.00	45.1 AV	54.0	-8.9	1.36 H	306	41.20	3.90
3	*5180.00	100.4 PK			1.36 H	306	58.90	41.50
4	*5180.00	90.4 AV			1.36 H	306	48.90	41.50
5	#6906.00	54.5 PK	68.2	-13.7	2.00 H	161	45.70	8.80
6	#10360.00	60.0 PK	74.0	-14.0	1.79 H	331	44.70	15.30
7	#10360.00	47.4 AV	54.0	-6.6	1.79 H	331	32.10	15.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.5 PK	74.0	-14.5	2.58 V	334	55.60	3.90
2	5150.00	47.4 AV	54.0	-6.6	2.58 V	334	43.50	3.90
3	*5180.00	114.8 PK			2.58 V	334	73.30	41.50
4	*5180.00	104.3 AV			2.58 V	334	62.80	41.50
5	#6906.00	58.9 PK	68.2	-9.3	1.38 V	188	50.10	8.80
6	#10360.00	66.5 PK	74.0	-7.5	2.06 V	152	51.20	15.30
7	#10360.00	52.0 AV	54.0	-2.0	2.06 V	152	36.70	15.30

Remarks:

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

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) 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	102.2 PK			1.13 H	307	60.70	41.50
2	*5200.00	91.8 AV			1.13 H	307	50.30	41.50
3	#6934.00	55.4 PK	68.2	-12.8	3.08 H	269	46.50	8.90
4	#10400.00	62.6 PK	74.0	-11.4	2.21 H	124	47.10	15.50
5	#10400.00	48.3 AV	54.0	-5.7	2.21 H	124	32.80	15.50
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	*5200.00	116.0 PK			2.52 V	334	74.50	41.50
2	*5200.00	105.6 AV			2.52 V	334	64.10	41.50
3	#6934.00	59.2 PK	68.2	-9.0	1.40 V	190	50.30	8.90
4	#10400.00	66.4 PK	74.0	-7.6	3.03 V	162	50.90	15.50
5	#10400.00	51.8 AV	54.0	-2.2	3.03 V	162	36.30	15.50

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 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	102.7 PK			1.02 H	304	61.10	41.60
2	*5240.00	93.4 AV			1.02 H	304	51.80	41.60
3	5350.00	58.5 PK	74.0	-15.5	1.02 H	304	54.50	4.00
4	5350.00	45.5 AV	54.0	-8.5	1.02 H	304	41.50	4.00
5	#6986.00	54.3 PK	68.2	-13.9	3.11 H	259	45.10	9.20
6	#10480.00	63.6 PK	74.0	-10.4	2.34 H	117	47.80	15.80
7	#10480.00	50.5 AV	54.0	-3.5	2.34 H	117	34.70	15.80
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	*5240.00	116.7 PK			2.50 V	335	75.10	41.60
2	*5240.00	106.7 AV			2.50 V	335	65.10	41.60
3	5350.00	59.3 PK	74.0	-14.7	2.50 V	335	55.30	4.00
4	5350.00	45.9 AV	54.0	-8.1	2.50 V	335	41.90	4.00
5	#6986.00	58.7 PK	68.2	-9.5	1.44 V	188	49.50	9.20
6	#10480.00	66.7 PK	74.0	-7.3	2.78 V	152	50.90	15.80
7	#10480.00	52.0 AV	54.0	-2.0	2.78 V	152	36.20	15.80

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.

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	58.0 PK	74.0	-16.0	1.01 H	304	54.10	3.90
2	5150.00	45.2 AV	54.0	-8.8	1.01 H	304	41.30	3.90
3	*5190.00	98.6 PK			1.01 H	304	57.10	41.50
4	*5190.00	89.5 AV			1.01 H	304	48.00	41.50
5	#6920.00	53.8 PK	74.0	-20.2	2.09 H	155	44.90	8.90
6	#6920.00	43.2 AV	54.0	-10.8	2.09 H	155	34.30	8.90
7	#10380.00	60.4 PK	74.0	-13.6	1.65 H	288	45.00	15.40
8	#10380.00	47.1 AV	54.0	-6.9	1.65 H	288	31.70	15.40
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	66.9 PK	74.0	-7.1	2.54 V	334	63.00	3.90
2	5150.00	52.6 AV	54.0	-1.4	2.54 V	334	48.70	3.90
3	*5190.00	112.7 PK			2.54 V	334	71.20	41.50
4	*5190.00	102.8 AV			2.54 V	334	61.30	41.50
5	#6920.00	57.9 PK	74.0	-16.1	1.38 V	188	49.00	8.90
6	#6920.00	52.3 AV	54.0	-1.7	1.38 V	188	43.40	8.90
7	#10380.00	66.4 PK	74.0	-7.6	2.44 V	152	51.00	15.40
8	#10380.00	51.8 AV	54.0	-2.2	2.44 V	152	36.40	15.40

Remarks:

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

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK) 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	*5230.00	100.5 PK			2.46 H	48	58.90	41.60
2	*5230.00	90.8 AV			2.46 H	48	49.20	41.60
3	5350.00	58.9 PK	74.0	-15.1	2.46 H	48	54.90	4.00
4	5350.00	45.5 AV	54.0	-8.5	2.46 H	48	41.50	4.00
5	#6973.00	55.0 PK	68.2	-13.2	1.38 H	252	45.80	9.20
6	#10460.00	61.3 PK	74.0	-12.7	2.64 H	118	45.80	15.50
7	#10460.00	48.6 AV	54.0	-5.4	2.64 H	118	33.10	15.50
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	*5230.00	114.6 PK			2.51 V	334	73.00	41.60
2	*5230.00	105.0 AV			2.51 V	334	63.40	41.60
3	5350.00	59.0 PK	74.0	-15.0	2.51 V	334	55.00	4.00
4	5350.00	45.9 AV	54.0	-8.1	2.51 V	334	41.90	4.00
5	#6973.00	59.1 PK	68.2	-9.1	1.38 V	187	49.90	9.20
6	#10460.00	66.1 PK	74.0	-7.9	2.77 V	147	50.60	15.50
7	#10460.00	52.0 AV	54.0	-2.0	2.77 V	147	36.50	15.50

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 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	58.7 PK	74.0	-15.3	1.01 H	303	54.80	3.90
2	5150.00	45.1 AV	54.0	-8.9	1.01 H	303	41.20	3.90
3	*5210.00	93.0 PK			1.01 H	303	51.40	41.60
4	*5210.00	83.2 AV			1.01 H	303	41.60	41.60
5	#6946.00	54.3 PK	74.0	-19.7	1.40 H	276	45.30	9.00
6	#6946.00	43.5 AV	54.0	-10.5	1.40 H	276	34.50	9.00
7	#10420.00	59.6 PK	74.0	-14.4	1.66 H	301	44.10	15.50
8	#10420.00	46.2 AV	54.0	-7.8	1.66 H	301	30.70	15.50
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	69.6 PK	74.0	-4.4	2.55 V	334	65.70	3.90
2	5150.00	52.7 AV	54.0	-1.3	2.55 V	334	48.80	3.90
3	*5210.00	108.0 PK			2.55 V	334	66.40	41.60
4	*5210.00	97.9 AV			2.55 V	334	56.30	41.60
5	#6946.00	58.4 PK	74.0	-15.6	1.46 V	187	49.40	9.00
6	#6946.00	52.1 AV	54.0	-1.9	1.46 V	187	43.10	9.00
7	#10420.00	60.7 PK	74.0	-13.3	2.47 V	188	45.20	15.50
8	#10420.00	47.5 AV	54.0	-6.5	2.47 V	188	32.00	15.50

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.

Beamforming on Mode

802.11ac (VHT20)

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	58.1 PK	74.0	-15.9	2.63 H	315	54.20	3.90
2	5150.00	46.6 AV	54.0	-7.4	2.63 H	315	42.70	3.90
3	*5180.00	105.2 PK			2.63 H	315	63.70	41.50
4	*5180.00	93.9 AV			2.63 H	315	52.40	41.50
5	#6906.00	57.5 PK	68.2	-10.7	1.97 H	142	48.70	8.80
6	#10360.00	66.2 PK	74.0	-7.8	1.88 H	132	50.90	15.30
7	#10360.00	51.0 AV	54.0	-3.0	1.88 H	132	35.70	15.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.2 PK	74.0	-14.8	2.42 V	333	55.30	3.90
2	5150.00	47.5 AV	54.0	-6.5	2.42 V	333	43.60	3.90
3	*5180.00	116.1 PK			2.42 V	333	74.60	41.50
4	*5180.00	104.7 AV			2.42 V	333	63.20	41.50
5	#6906.00	61.8 PK	68.2	-6.4	1.65 V	229	53.00	8.80
6	#10360.00	67.1 PK	74.0	-6.9	2.48 V	153	51.80	15.30
7	#10360.00	51.8 AV	54.0	-2.2	2.48 V	153	36.50	15.30

Remarks:

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

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) 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	106.2 PK			2.30 H	240	64.70	41.50
2	*5200.00	94.7 AV			2.30 H	240	53.20	41.50
3	#6933.00	57.2 PK	68.2	-11.0	2.11 H	136	48.30	8.90
4	#10400.00	64.8 PK	74.0	-9.2	2.20 H	115	49.30	15.50
5	#10400.00	51.5 AV	54.0	-2.5	2.20 H	115	36.00	15.50
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	*5200.00	117.8 PK			1.58 V	182	76.30	41.50
2	*5200.00	105.5 AV			1.58 V	182	64.00	41.50
3	#6933.00	61.4 PK	68.2	-6.8	1.43 V	191	52.50	8.90
4	#10400.00	66.4 PK	74.0	-7.6	1.56 V	143	50.90	15.50
5	#10400.00	52.0 AV	54.0	-2.0	1.56 V	143	36.50	15.50

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 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	5150.00	58.1 PK	74.0	-15.9	1.67 H	258	54.20	3.90
2	5150.00	46.0 AV	54.0	-8.0	1.67 H	258	42.10	3.90
3	*5240.00	105.0 PK			1.67 H	258	63.40	41.60
4	*5240.00	92.9 AV			1.67 H	258	51.30	41.60
5	#6986.00	54.9 PK	68.2	-13.3	3.21 H	248	45.70	9.20
6	#10480.00	65.7 PK	74.0	-8.3	2.23 H	176	49.90	15.80
7	#10480.00	51.2 AV	54.0	-2.8	2.23 H	176	35.40	15.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.2 PK	74.0	-14.8	1.47 V	180	55.30	3.90
2	5150.00	46.5 AV	54.0	-7.5	1.47 V	180	42.60	3.90
3	*5240.00	116.3 PK			1.47 V	180	74.70	41.60
4	*5240.00	104.3 AV			1.47 V	180	62.70	41.60
5	#6986.00	59.2 PK	68.2	-9.0	3.20 V	44	50.00	9.20
6	#10480.00	66.8 PK	74.0	-7.2	3.21 V	167	51.00	15.80
7	#10480.00	51.9 AV	54.0	-2.1	3.21 V	167	36.10	15.80

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.

802.11ac (VHT40)

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	59.8 PK	74.0	-14.2	1.00 H	242	55.90	3.90
2	5150.00	46.8 AV	54.0	-7.2	1.00 H	242	42.90	3.90
3	*5190.00	101.1 PK			1.00 H	242	59.60	41.50
4	*5190.00	89.0 AV			1.00 H	242	47.50	41.50
5	#6920.00	54.5 PK	68.2	-13.7	2.11 H	156	45.60	8.90
6	#10380.00	61.0 PK	74.0	-13.0	1.22 H	321	45.60	15.40
7	#10380.00	47.5 AV	54.0	-6.5	1.22 H	321	32.10	15.40
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	64.7 PK	74.0	-9.3	1.13 V	222	60.80	3.90
2	**5150.00**	**52.8 AV**	**54.0**	**-1.2**	**1.13 V**	**222**	**48.90**	**3.90**
3	*5190.00	114.1 PK			1.13 V	222	72.60	41.50
4	*5190.00	102.0 AV			1.13 V	222	60.50	41.50
5	#6920.00	60.2 PK	68.2	-8.0	1.60 V	190	51.30	8.90
6	#10380.00	66.1 PK	74.0	-7.9	2.56 V	152	50.70	15.40
7	#10380.00	51.9 AV	54.0	-2.1	2.56 V	152	36.50	15.40

Remarks:

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

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK) 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	*5230.00	100.0 PK			2.11 H	66	58.40	41.60
2	*5230.00	90.2 AV			2.11 H	66	48.60	41.60
3	5350.00	58.6 PK	74.0	-15.4	2.11 H	66	54.60	4.00
4	5350.00	45.8 AV	54.0	-8.2	2.11 H	66	41.80	4.00
5	#6973.00	55.3 PK	68.2	-12.9	1.22 H	266	46.10	9.20
6	#10460.00	61.4 PK	74.0	-12.6	2.12 H	133	45.90	15.50
7	#10460.00	48.9 AV	54.0	-5.1	2.12 H	133	33.40	15.50
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	*5230.00	113.6 PK			2.38 V	320	72.00	41.60
2	*5230.00	102.8 AV			2.38 V	320	61.20	41.60
3	5350.00	60.4 PK	74.0	-13.6	2.38 V	320	56.40	4.00
4	5350.00	47.0 AV	54.0	-7.0	2.38 V	320	43.00	4.00
5	#6973.00	60.8 PK	68.2	-7.4	1.54 V	189	51.60	9.20
6	#10460.00	66.2 PK	74.0	-7.8	2.62 V	150	50.70	15.50
7	#10460.00	52.0 AV	54.0	-2.0	2.62 V	150	36.50	15.50

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 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	58.3 PK	74.0	-15.7	1.00 H	336	54.40	3.90
2	5150.00	45.2 AV	54.0	-8.8	1.00 H	336	41.30	3.90
3	*5210.00	97.5 PK			1.00 H	336	55.90	41.60
4	*5210.00	84.0 AV			1.00 H	336	42.40	41.60
5	#6946.00	54.9 PK	68.2	-13.3	1.44 H	271	45.90	9.00
6	#10420.00	60.8 PK	74.0	-13.2	1.67 H	322	45.30	15.50
7	#10420.00	47.6 AV	54.0	-6.4	1.67 H	322	32.10	15.50
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	69.2 PK	74.0	-4.8	2.66 V	305	65.30	3.90
2	5150.00	52.6 AV	54.0	-1.4	2.66 V	305	48.70	3.90
3	*5210.00	109.1 PK			2.66 V	305	67.50	41.60
4	*5210.00	97.9 AV			2.66 V	305	56.30	41.60
5	#6946.00	58.2 PK	68.2	-10.0	1.48 V	191	49.20	9.00
6	#10420.00	61.0 PK	74.0	-13.0	2.21 V	193	45.50	15.50
7	#10420.00	48.1 AV	54.0	-5.9	2.21 V	193	32.60	15.50

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.

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	30.00	30.8 QP	40.0	-9.2	1.26 H	18	46.40	-15.60
2	138.64	23.3 QP	43.5	-20.2	2.00 H	96	38.00	-14.70
3	167.74	23.3 QP	43.5	-20.2	1.50 H	258	37.30	-14.00
4	249.22	29.7 QP	46.0	-16.3	1.00 H	279	44.10	-14.40
5	499.48	40.1 QP	46.0	-5.9	1.50 H	131	48.70	-8.60
6	802.12	34.9 QP	46.0	-11.1	1.00 H	209	37.60	-2.70
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	32.97	30.8 QP	40.0	-9.2	1.00 V	175	46.50	-15.70
2	59.10	29.6 QP	40.0	-10.4	1.24 V	109	44.20	-14.60
3	70.74	29.1 QP	40.0	-10.9	1.99 V	199	45.20	-16.10
4	128.94	27.5 QP	43.5	-16.0	1.49 V	341	42.90	-15.40
5	499.48	38.5 QP	46.0	-7.5	1.00 V	23	47.10	-8.60
6	875.84	35.3 QP	46.0	-10.7	1.24 V	16	37.00	-1.70

Remarks:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (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	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 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 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

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

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

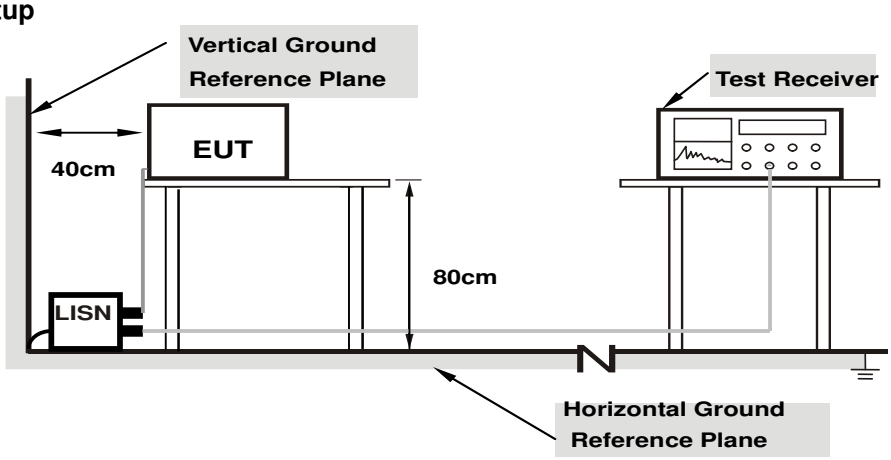
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

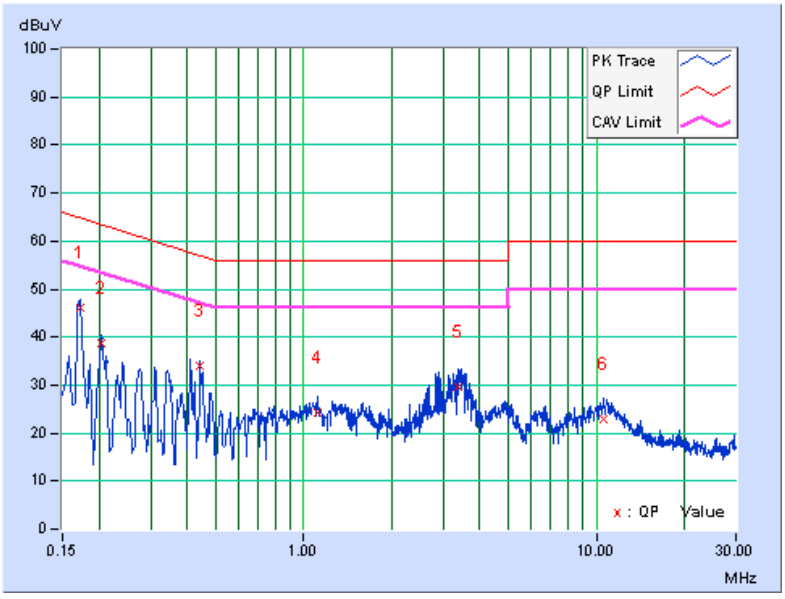
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17147	9.83	36.18	27.73	46.01	37.56	64.89	54.89	-18.88	-17.33
2	0.20474	9.84	28.78	18.50	38.62	28.34	63.42	53.42	-24.80	-25.08
3	0.44325	9.88	24.22	15.00	34.10	24.88	57.00	47.00	-22.90	-22.12
4	1.11186	9.94	14.21	7.00	24.15	16.94	56.00	46.00	-31.85	-29.06
5	3.38357	10.09	19.39	8.40	29.48	18.49	56.00	46.00	-26.52	-27.51
6	10.60925	10.55	12.48	6.81	23.03	17.36	60.00	50.00	-36.97	-32.64

Remarks:

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

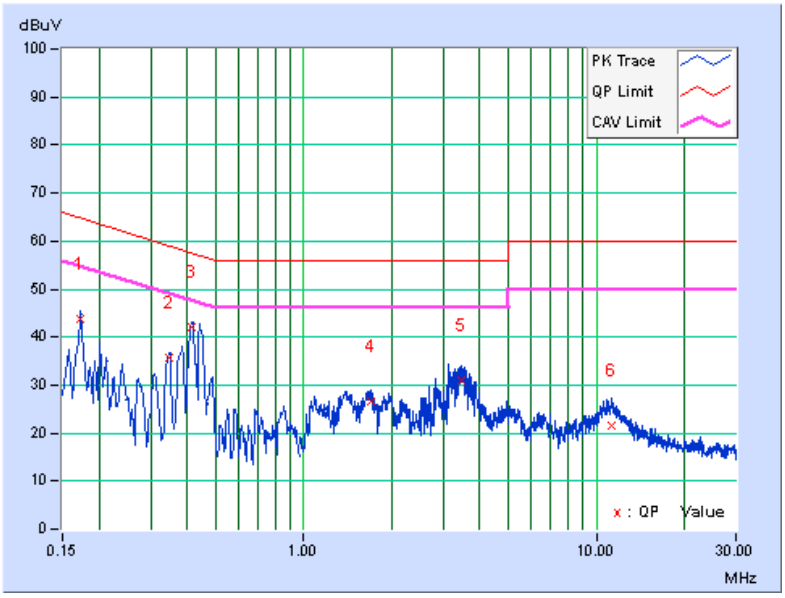


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.17346	9.82	34.10	26.66	43.92	36.48	64.79	54.79	-20.87	-18.31
2	0.34742	9.87	25.90	20.35	35.77	30.22	59.02	49.02	-23.26	-18.81
3	**0.41451**	**9.88**	**32.18**	**27.46**	**42.06**	**37.34**	**57.56**	**47.56**	**-15.50**	**-10.22**
4	1.70620	9.97	16.53	10.36	26.50	20.33	56.00	46.00	-29.50	-25.67
5	3.44222	10.09	20.82	11.05	30.91	21.14	56.00	46.00	-25.09	-24.86
6	11.34042	10.54	11.07	5.32	21.61	15.86	60.00	50.00	-38.39	-34.14

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

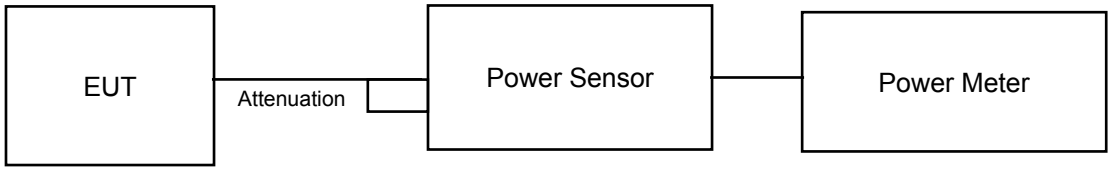
Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client 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*

*B is the 26 dB emission bandwidth in megahertz

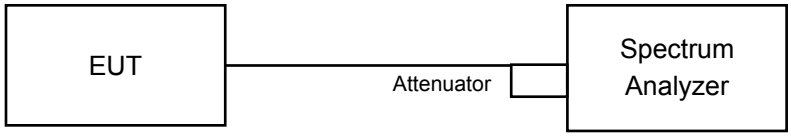
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz 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 Power Output Measurement



For 26dB and 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)

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.

k. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’ s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

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:

Beamforming off Mode

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	14.80	14.84	14.99	15.41	126.983	21.04	30	Pass
40	5200	16.22	16.38	16.11	16.70	**172.936**	22.38	30	Pass
48	5240	15.82	16.18	15.98	16.58	164.816	22.17	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	Chain 2	Chain 3				
36	5180	14.78	14.87	14.00	14.00	110.989	20.45	30	Pass
40	5200	16.02	16.21	16.01	16.74	168.885	22.28	30	Pass
48	5240	15.68	16.16	15.85	16.41	160.499	22.05	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	Chain 2	Chain 3				
38	5190	14.83	15.40	15.02	15.50	132.333	21.22	30	Pass
46	5230	15.90	16.50	16.20	16.20	166.947	22.23	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	Chain 2	Chain 3				
42	5210	13.46	13.97	13.71	14.13	96.506	19.85	30	Pass

Beamforming on Mode

802.11ac (VHT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	14.45	14.65	14.56	14.24	112.157	20.50	26.59	Pass
40	5200	15.62	16.10	15.81	15.97	**154.857**	21.90	26.59	Pass
48	5240	15.22	15.64	15.85	15.53	144.096	21.59	26.59	Pass

Note: Directional gain = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power limit shall be reduced to 30-(9.41-6) = 26.59dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	13.14	13.99	14.00	13.87	95.164	19.78	26.59	Pass
46	5230	14.10	14.50	15.00	14.75	115.365	20.62	26.59	Pass

Note: Directional gain = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power limit shall be reduced to 30-(9.41-6) = 26.59dBm.

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	Chain 2	Chain 3				
42	5210	13.25	13.21	13.31	12.58	81.618	19.12	26.59	Pass

Note: Directional gain = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power limit shall be reduced to 30-(9.41-6) = 26.59dBm.

26dB Bandwidth:

Beamforming off Mode

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
36	5180	19.69	19.44	19.57	19.34	Pass
40	5200	19.69	19.43	19.46	19.38	Pass
48	5240	19.70	19.58	19.41	19.38	Pass

802.11n (HT20)

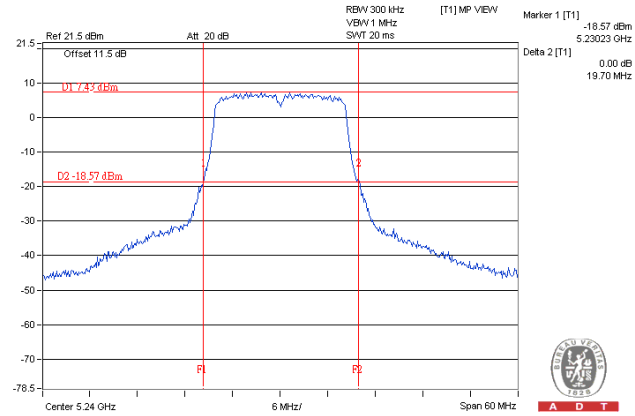
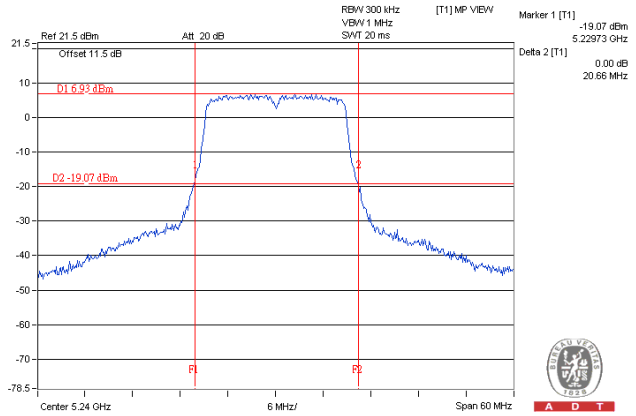
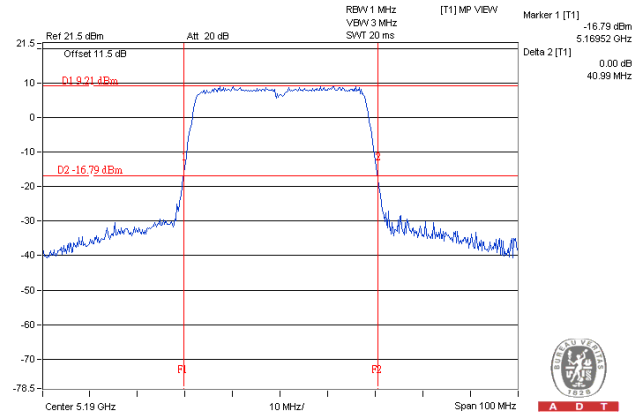
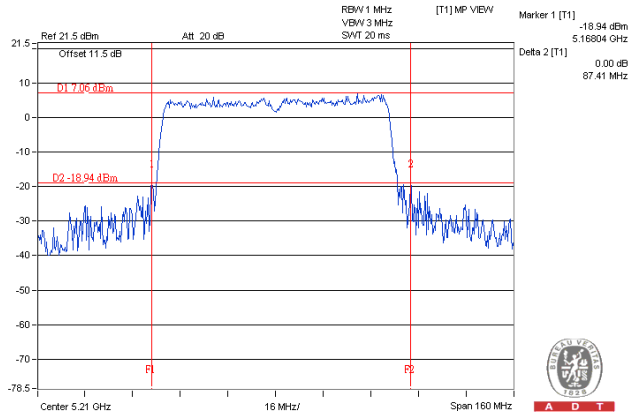
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
36	5180	20.51	20.51	19.35	20.21	Pass
40	5200	20.64	20.54	20.55	20.40	Pass
48	5240	20.66	20.41	20.49	20.39	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
38	5190	40.99	40.59	40.41	40.60	Pass
46	5230	40.71	40.75	40.53	40.48	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
42	5210	87.30	83.21	82.99	87.41	Pass

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

Beamforming on Mode

802.11ac (VHT20)

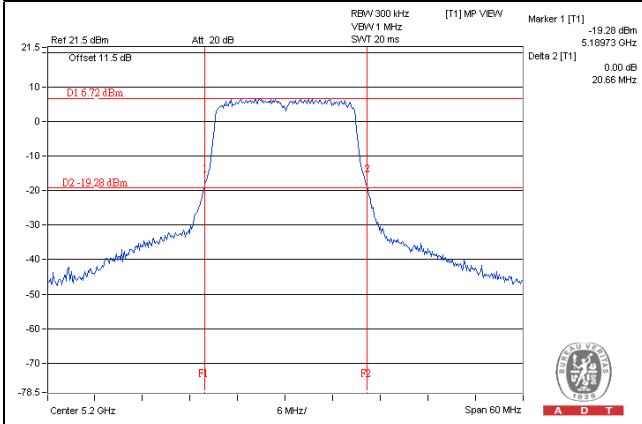
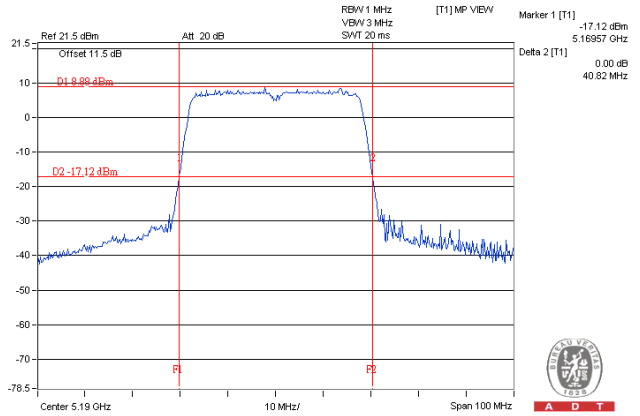
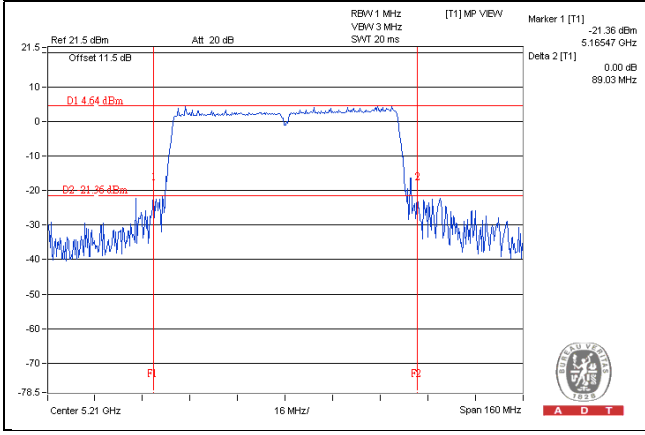
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
36	5180	20.65	20.45	20.46	20.34	Pass
40	5200	20.66	20.46	20.47	20.47	Pass
48	5240	20.47	20.39	20.30	20.54	Pass

802.11ac (VHT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
38	5190	40.82	40.68	40.53	40.49	Pass
46	5230	40.79	40.68	40.33	40.64	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)				Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3	
42	5210	89.03	87.77	84.31	83.11	Pass

Spectrum Plot of Worst Value	
802.11ac (VHT20)	802.11ac (VHT40)
	
802.11ac (VHT80)	
	

Occupied Bandwidth:

Beamforming off Mode

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	16.44	16.44	16.44	16.44
40	5200	16.44	16.44	16.44	16.44
48	5240	16.44	16.44	16.44	16.44

802.11n (HT20)

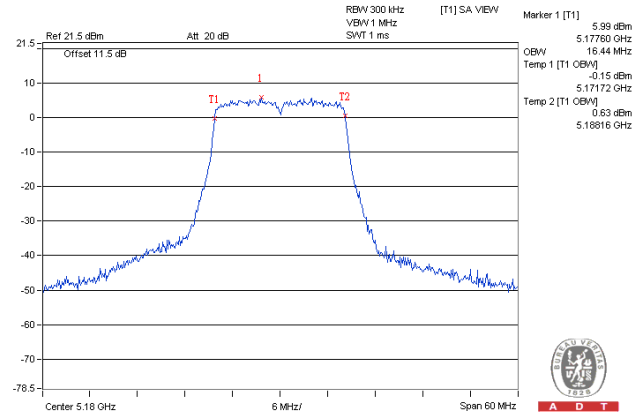
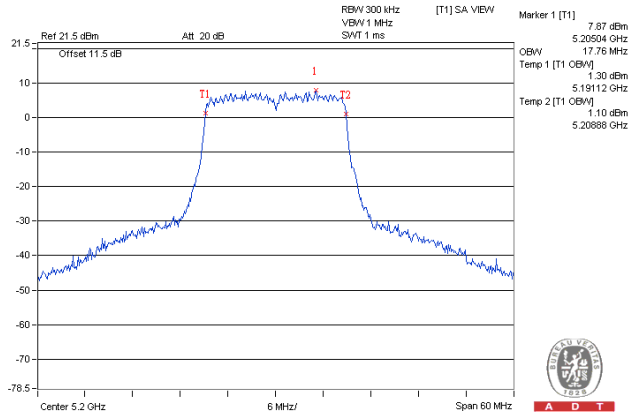
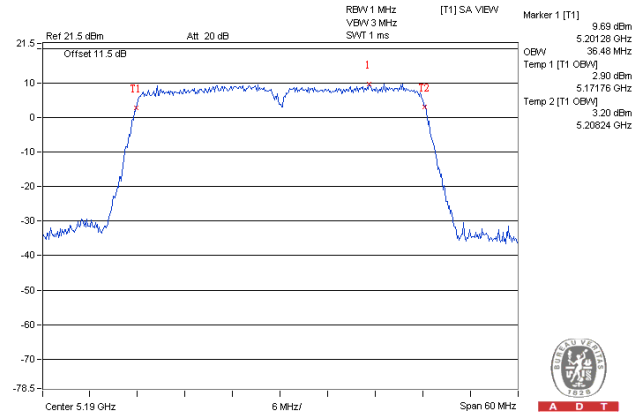
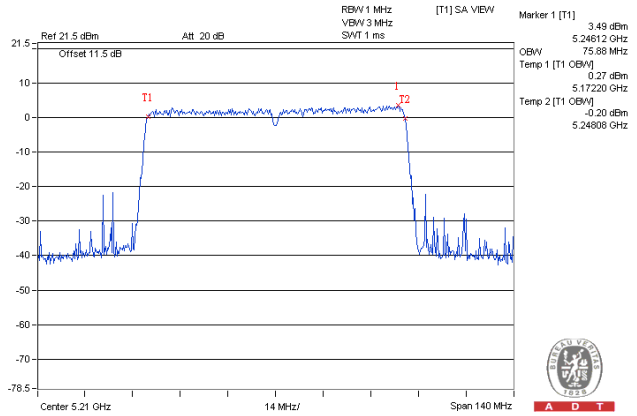
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	17.64	17.64	16.44	17.64
40	5200	17.64	17.64	17.64	17.76
48	5240	17.64	17.64	17.64	17.52

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.36	36.48	36.24	36.24
46	5230	36.36	36.48	36.24	36.48

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	75.88	75.60	75.60	75.60

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

Beamforming on Mode

802.11ac (VHT20)

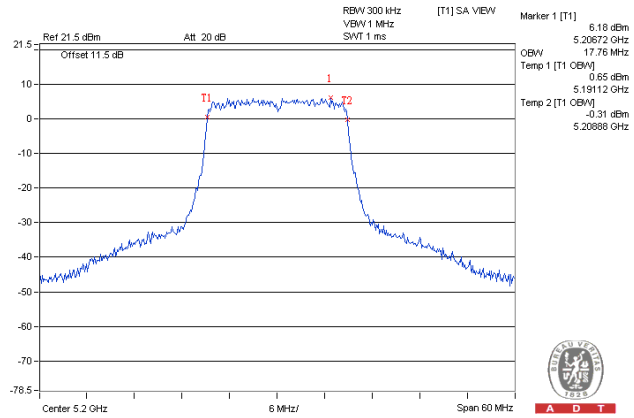
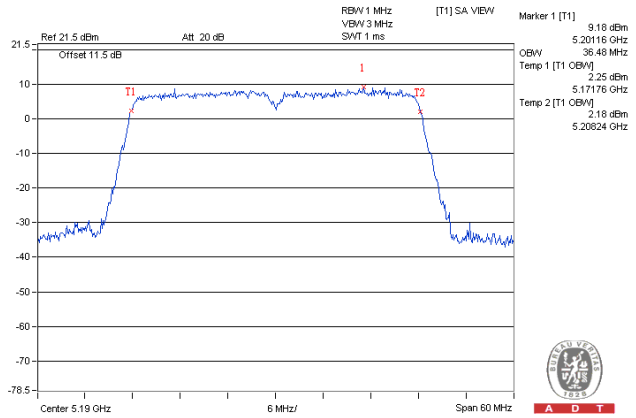
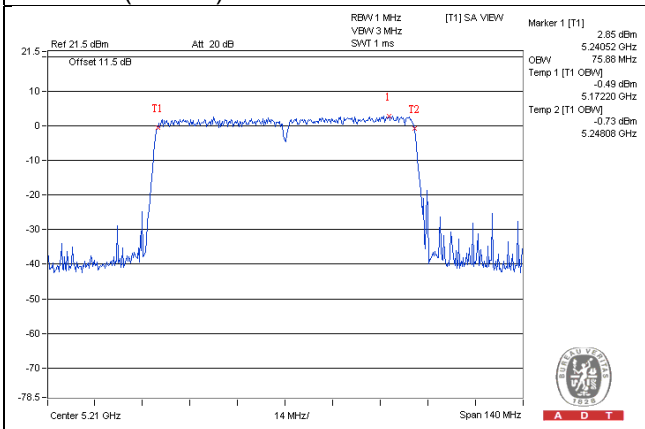
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	17.64	17.64	17.64	17.64
40	5200	17.64	17.64	17.64	17.76
48	5240	17.64	17.64	17.64	17.64

802.11ac (VHT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.36	36.48	36.24	36.36
46	5230	36.36	36.48	36.24	36.36

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	75.88	75.60	75.60	75.60

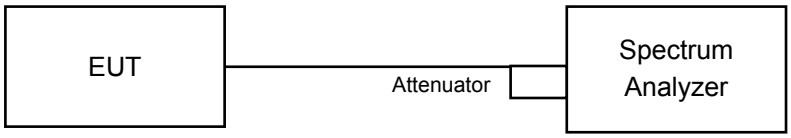
Spectrum Plot of Worst Value	
802.11ac (VHT20)	802.11ac (VHT40)
	
802.11ac (VHT80)	
	

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

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

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)

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

Beamforming off Mode

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	Chain 2	Chain 3					
36	5180	-1.27	-2.77	-1.69	-0.66	4.49	0.21	4.70	13.59	Pass
40	5200	0.21	0.12	0.08	0.46	6.25	0.21	6.46	13.59	Pass
48	5240	-0.58	-0.80	0.33	-0.88	5.57	0.21	5.78	13.59	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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD (dBm)				Total PSD (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	-2.40	0.26	-2.92	-0.34	4.87	13.59	Pass
40	5200	0.75	0.52	1.34	0.62	6.84	13.59	Pass
48	5240	0.24	0.64	-1.64	2.59	6.74	13.59	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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.

802.11n (HT40)

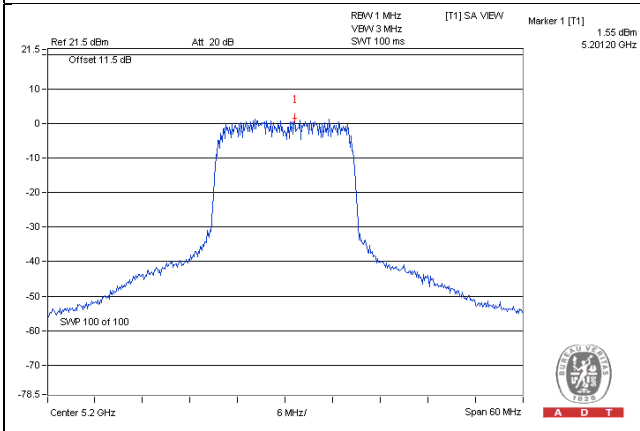
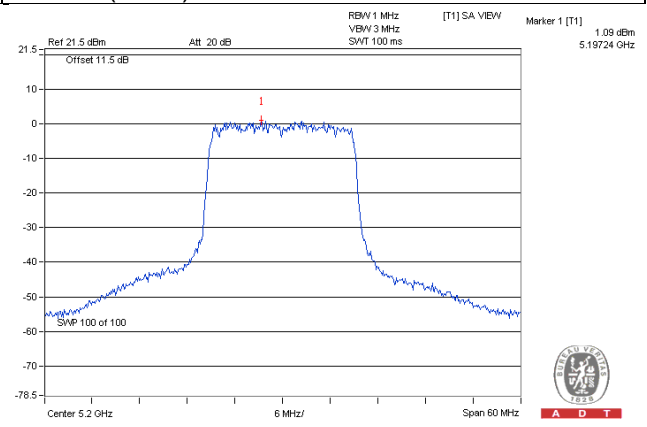
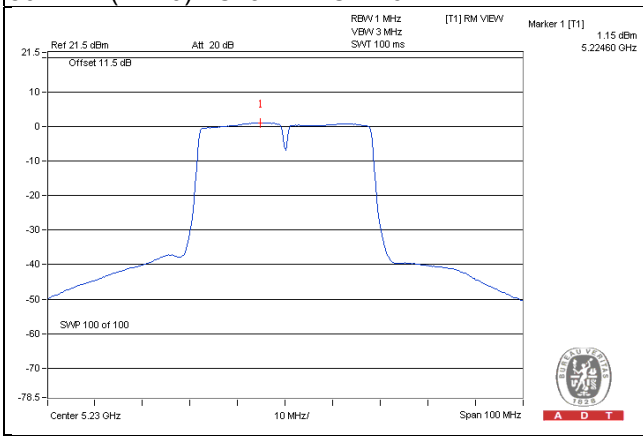
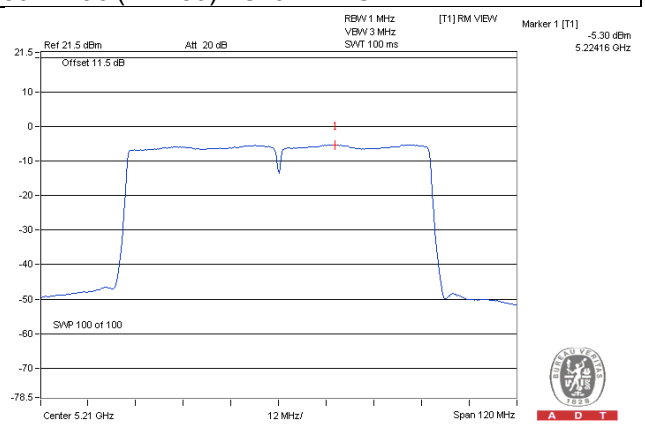
Chan.	Freq. (MHz)	PSD (dBm)				Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3					
38	5190	-1.99	-0.62	-1.66	-0.90	4.76	0.20	4.96	13.59	Pass
46	5230	-0.73	1.13	-0.14	0.45	6.25	0.20	6.45	13.59	Pass

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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.
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	Chain 2	Chain 3					
42	5210	-6.33	-5.43	-6.35	-5.58	0.12	0.39	0.51	13.59	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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a / Chain 3 / CH 40	802.11n (HT20) / Chain 0 / CH 40
	
802.11n (HT40) / Chain 1 / CH 46	802.11ac (VHT80) / Chain 1 / CH 42
	

Beamforming on Mode

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm)				Total PSD (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	0.17	-0.75	-3.98	-1.28	4.81	13.59	Pass
40	5200	-0.19	1.57	-2.16	-1.01	5.79	13.59	Pass
48	5240	-0.01	-0.45	-1.17	-0.09	5.61	13.59	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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.

802.11ac (VHT40)

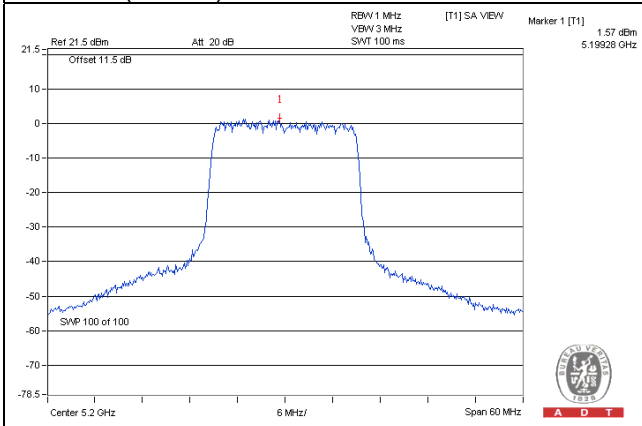
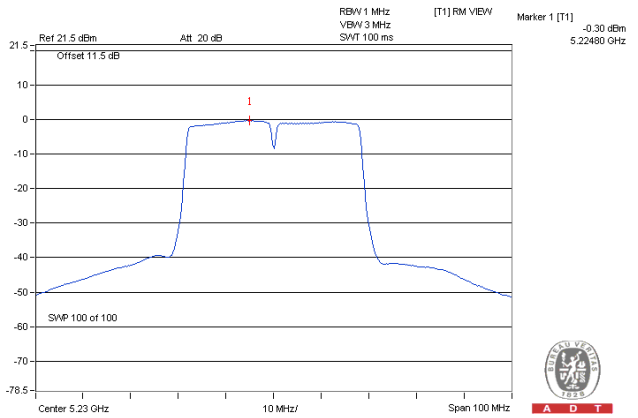
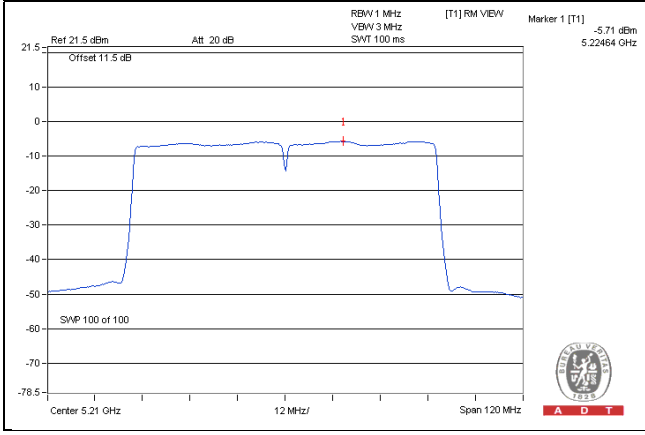
Chan.	Freq. (MHz)	PSD (dBm)				Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3					
38	5190	-2.58	-1.62	-1.46	-2.50	4.01	0.15	4.16	13.59	Pass
46	5230	-3.12	-0.49	-1.57	-1.53	4.44	0.15	4.59	13.59	Pass

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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.
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	Chain 2	Chain 3					
42	5210	-6.91	-5.80	-6.89	-6.87	-0.57	0.35	-0.22	13.59	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 = 3.39dBi + 10log(4) = 9.41dBi > 6dBi, so the power density limit shall be reduced to 17-(9.41-6) = 13.59dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

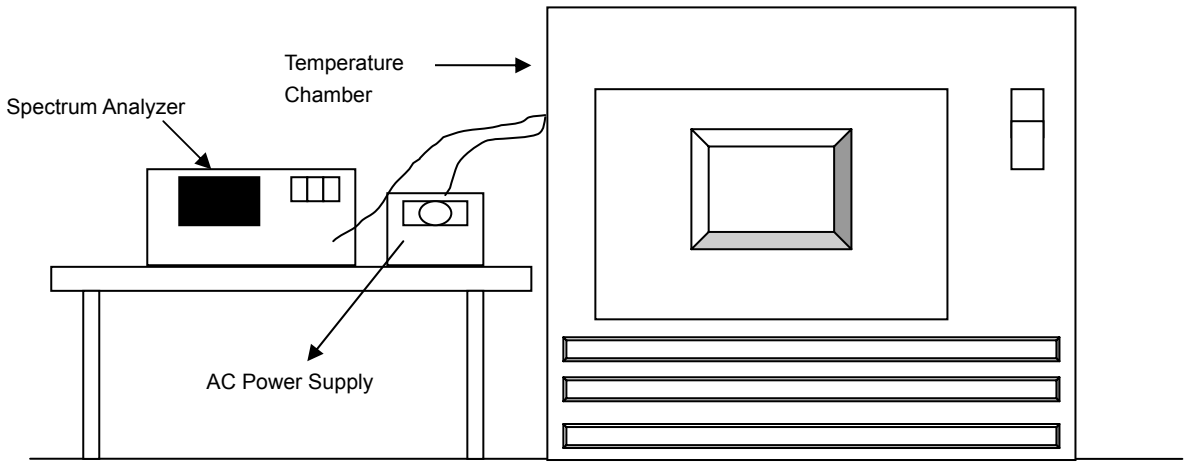
Spectrum Plot of Worst Value	
802.11ac (VHT20) / Chain 1 / CH 40	802.11ac (VHT40) / Chain 1 / CH 46
	
802.11ac (VHT80) / Chain 1 / CH 42	
	

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

Beamforming off Mode

Frequemcy Stability Versus Temp.									
Operating Frequency: 5180MHz									
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	5179.9939	-0.00012	5179.9923	-0.00015	5179.9923	-0.00015	5179.9943	-0.00011
40	120	5179.9789	-0.00041	5179.9823	-0.00034	5179.9801	-0.00038	5179.9830	-0.00033
30	120	5180.0002	0.00000	5179.9999	0.00000	5179.9983	-0.00003	5180.0012	0.00002
20	120	5180.0046	0.00009	5180.0025	0.00005	5180.0022	0.00004	5180.0049	0.00009
10	120	5180.0196	0.00038	5180.0181	0.00035	5180.0208	0.00040	5180.0165	0.00032
0	120	5179.9918	-0.00016	5179.9915	-0.00016	5179.9922	-0.00015	5179.9907	-0.00018
-10	120	5179.9832	-0.00032	5179.9848	-0.00029	5179.9848	-0.00029	5179.9867	-0.00026
-20	120	5179.9788	-0.00041	5179.9755	-0.00047	5179.9772	-0.00044	5179.9790	-0.00041
-30	120	5180.0038	0.00007	5180.0022	0.00004	5180.0052	0.00010	5180.0056	0.00011

Frequemcy Stability Versus Temp.									
Operating Frequency: 5180MHz									
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	5180.0037	0.00007	5180.0025	0.00005	5180.0020	0.00004	5180.0045	0.00009
	120	5180.0046	0.00009	5180.0025	0.00005	5180.0022	0.00004	5180.0049	0.00009
	102	5180.0043	0.00008	5180.0032	0.00006	5180.0021	0.00004	5180.0042	0.00008

Beamforming on Mode

Frequemcy Stability Versus Temp.									
Operating Frequency: 5180MHz									
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	5180.0207	0.00040	5180.0217	0.00042	5180.0196	0.00038	5180.0217	0.00042
40	120	5180.0017	0.00003	5180.0033	0.00006	5180.0005	0.00001	5180.0031	0.00006
30	120	5180.0088	0.00017	5180.0098	0.00019	5180.0124	0.00024	5180.0094	0.00018
20	120	5180.0082	0.00016	5180.0081	0.00016	5180.0083	0.00016	5180.0098	0.00019
10	120	5179.9850	-0.00029	5179.9808	-0.00037	5179.9815	-0.00036	5179.9822	-0.00034
0	120	5179.9877	-0.00024	5179.989	-0.00021	5179.9891	-0.00021	5179.9923	-0.00015
-10	120	5179.9831	-0.00033	5179.9826	-0.00034	5179.9867	-0.00026	5179.9832	-0.00032
-20	120	5180.0080	0.00015	5180.0080	0.00015	5180.0066	0.00013	5180.0076	0.00015
-30	120	5180.0055	0.00011	5180.0051	0.00010	5180.0047	0.00009	5180.0041	0.00008

Frequemcy Stability Versus Temp.									
Operating Frequency: 5180MHz									
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	5180.0080	0.00015	5180.0080	0.00015	5180.0089	0.00017	5180.0101	0.00019
	120	5180.0082	0.00016	5180.0081	0.00016	5180.0083	0.00016	5180.0098	0.00019
	102	5180.0079	0.00015	5180.0088	0.00017	5180.0092	0.00018	5180.0104	0.00020

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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The address and road map of all our labs can be found in our web site also.

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