FCC Test Report

Report No.:	RF141003E10E-1
FCC ID:	PY314300283
Test Model:	EX6150
Received Date:	July 16, 2015
Test Date:	Sep. 17 to 23, 2015
Issued Date:	Oct. 01, 2015
Applicant:	NETGEAR, Inc.
Address:	350 East Plumeria Drive San Jose, CA 95134
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (3):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF141003E10E-1	Original release.	Oct. 01, 2015

1 Certificate of Conformity

Product:	AC1200 WiFi Range Extender
Brand:	NETGEAR
Test Model:	EX6150
Sample Status:	ENGINEERING SAMPLE
Applicant:	NETGEAR, Inc.
Test Date:	Sep. 17 to 23, 2015
Standard:	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 : _____ , **Date:** Oct. 01, 2015

Claire Kuan / Specialist

Approved by : _____ , **Date:** Oct. 01, 2015

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.3dB at 5725.00MHz, 5860.00MHz
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 i-pex not a standard connector.

NOTE: 1. This report is prepared for FCC Class II change. (Upgrade the standard to section 15.407 under new rule for U-NII-3 band)

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) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.37 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.65 dB
	6GHz ~ 18GHz	3.88 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1200 WiFi Range Extender
Brand	NETGEAR
Test Model	EX6150
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	AC 100-240V, 0.2A, 50-60Hz
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	**For 15.407** 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20), VHT20 7 for 802.11n (HT40), VHT40
Output Power	**For 15.407 (U-NII-3 band)** 802.11a: 350.003mW 802.11ac (VHT20): 307.697mW 802.11ac (VHT40): 243.588mW 802.11ac (VHT80): 76.481mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC Class II change. The difference compared with the Report No.: RF141003E10-1 design is as the following:
   - ◆ Upgrade the standard to section 15.407 under new rule for U-NII-3 band.
2. According to above conditions, all test items of U-NII-3 band (except for Conducted Emission test item) need to be performed. And all data was verified to meet the requirements.
3. 2.4GHz and 5GHz technology can transmit at same time.
4. The emission of the simultaneous operation (2.4GHz & 5GHz) has been evaluated and no non-compliance was found.

5. The antennas provided to the EUT, please refer to the following table:

PCB Chain No.	Brand	Model	Antenna Gain(dBi) < including cable loss>	Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type	Cable Length (mm)
Chain 0	NETGEAR	NA	3.1	2400~2500	Dipole	i-pex	50
			2.7	5150~5250			
			2.9	5250~5350			
			2.2	5470~5725			
			2.6	5725~5850			
Chain 1	NETGEAR	NA	3.1	2400~2500	Dipole	i-pex	50
			2.7	5150~5250			
			2.9	5250~5350			
			2.2	5470~5725			
			2.6	5725~5850			

6. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS 0~8, Nss=1	2TX	2RX
	MCS 0~8, Nss=2	2TX	2RX
802.11ac (VHT40)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX
802.11ac (VHT80)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX

Note: 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)

7. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 Description of Test Modes

FOR 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 **RE<1G:** Radiated Emission below 1GHz
APCM: Antenna Port Conducted Measurement

NOTE:
1. "-" means no effect.
2. The test mode was reference to the worst case in the original test report.

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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	157	OFDM	BPSK	6

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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

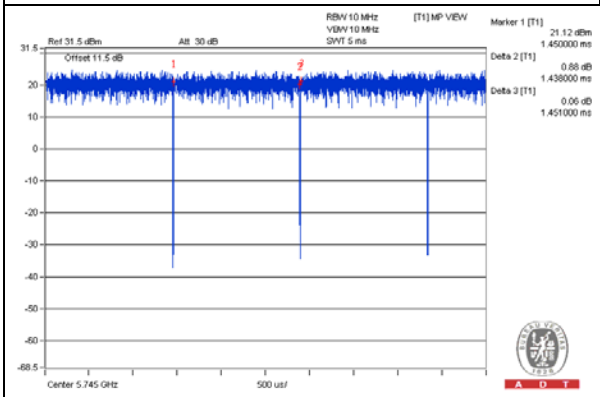
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	26deg. C, 70%RH	120Vac, 60Hz	Andy Ho
RE<1G	22deg. C, 69%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

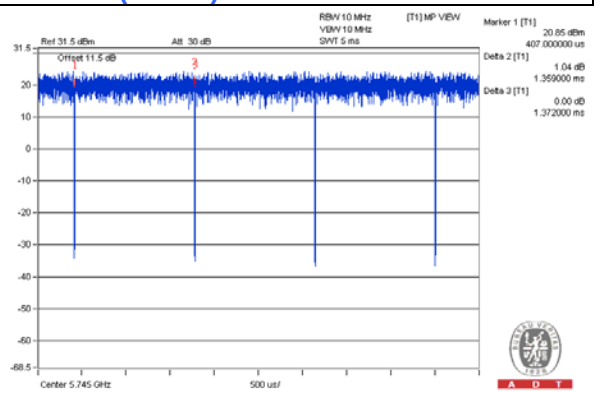
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 1.438 ms/1.451 ms = 0.991
802.11ac(VHT20): Duty cycle = 1.359 ms/1.372 ms = 0.991
802.11ac(VHT40): Duty cycle = 0.674 ms/0.684 ms = 0.985
802.11ac(VHT80): Duty cycle = 0.336 ms/0.344 ms = 0.977, Duty factor = 10 * log[(1/(0.46/0.478)]= 0.1

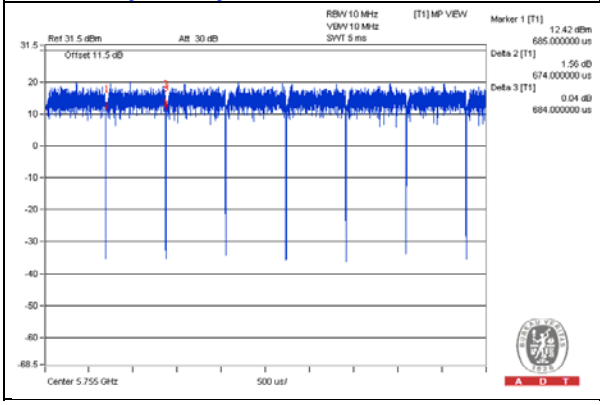
802.11a



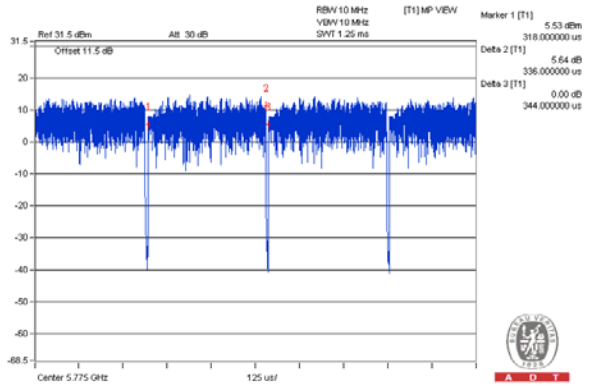
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.4 Description of Support Units

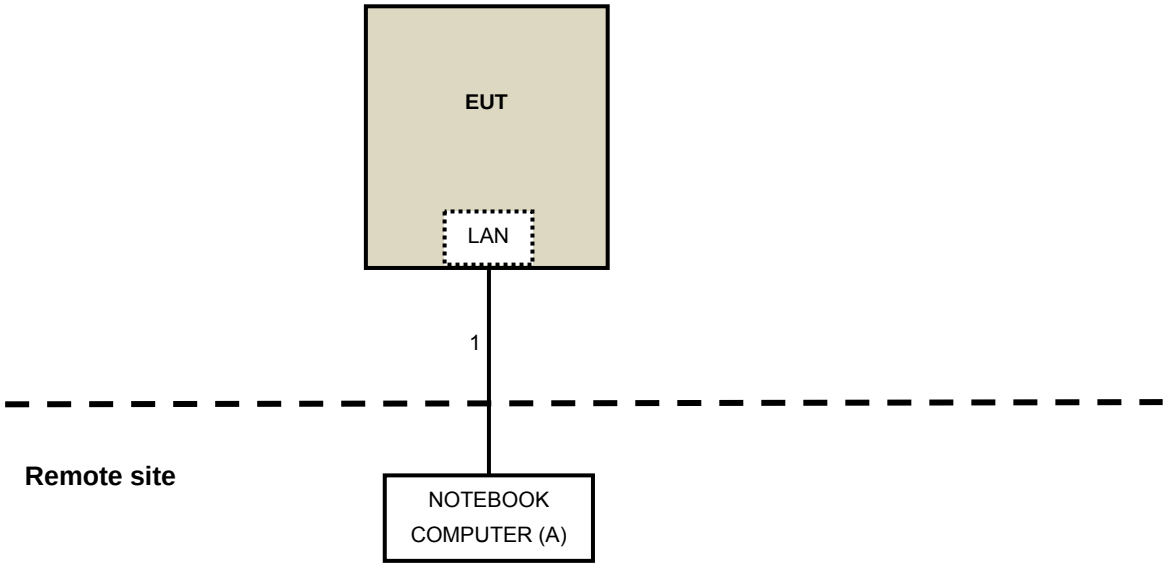
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab

NOTE:
1. All power cords of the above support units are non-shielded (1.8 m).

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	RJ-45	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

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

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	**LIMIT**	
789033 D02 General UNII Test Procedure New Rules v01	FIELD STRENGTH AT 3m	
	PK:74 (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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
Pre-Amplifier Mini-Circuits	ZFL-1000VH 2B	AMP-ZFL-03	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 06, 2015	Feb. 05, 2016
RF Cable	8D-FB	CHGCAB-001-1 CHGCAB-001-2	Oct. 04, 2014	Oct. 03, 2015
	RF-141	CHGCAB-004	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Feb. 09, 2015	Feb. 08, 2016
Pre-Amplifier Agilent	8449B	3008A02578	June 23, 2015	June 22, 2016
RF Cable	NA	131205 131216 131217 SNMY23684/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	June 26, 2015	June 25, 2016
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Spectrum Analyzer R&S	FSP 40	100060	May 08, 2015	May 07, 2016
Power meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 12, 2015	Jan. 11, 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 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The VCCI Site Registration No. is G-137.
5. The CANADA Site Registration No. is IC 7450H-2.
6. Tested Date: Sep. 22 to 23, 2015

4.1.3 Test Procedure

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:

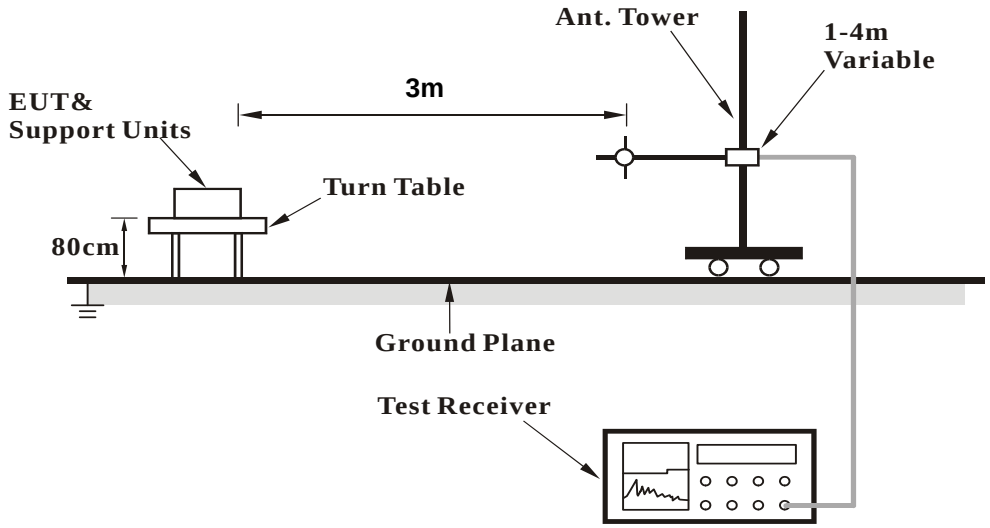
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

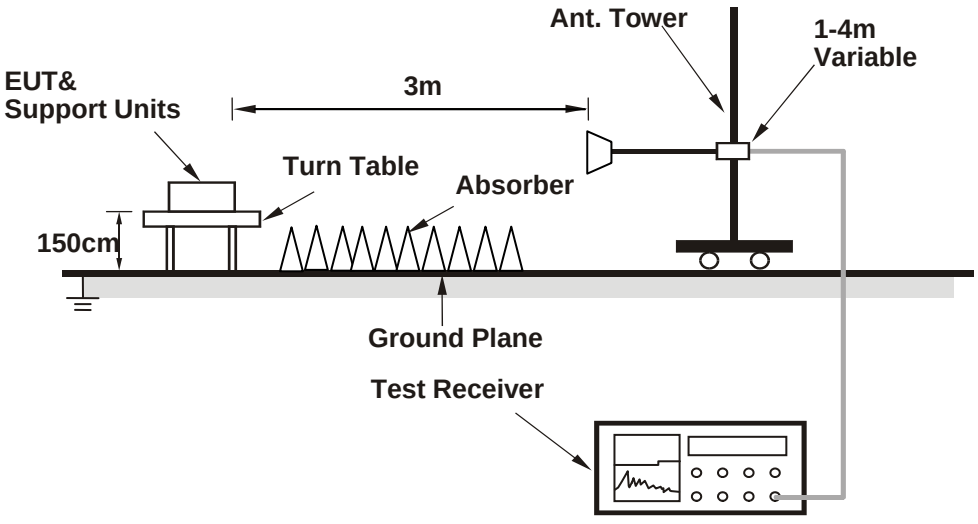
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Condition

1. Placed the EUT on testing table.
2. Prepared computer system (support unit A) to act as communication partner.
3. The communication partner ran test program "(MT76xxE_AP.exe)" to enable EUT under transmission/receiving condition continuously.

4.1.7 Test Results

Above 1GHz Data

802.11a

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	#5715.00	61.8 PK	74.0	-12.2	1.67 H	125	50.27	11.53
2	#5715.00	42.4 AV	54.0	-11.6	1.67 H	125	30.87	11.53
3	#5725.00	74.3 PK	78.2	-3.9	1.67 H	125	62.75	11.55
4	*5745.00	108.0 PK			1.67 H	125	96.37	11.63
5	*5745.00	97.3 AV			1.67 H	125	85.67	11.63
6	11490.00	46.5 PK	74.0	-27.5	1.19 H	321	29.20	17.30
7	11490.00	39.2 AV	54.0	-14.8	1.19 H	321	21.90	17.30
8	#17235.00	54.3 PK	74.0	-19.7	1.15 H	344	27.49	26.81
9	#17235.00	41.1 AV	54.0	-12.9	1.15 H	344	14.29	26.81
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	#5715.00	65.0 PK	74.0	-9.0	1.89 V	50	53.47	11.53
2	#5715.00	45.4 AV	54.0	-8.6	1.89 V	50	33.87	11.53
3	#5725.00	77.5 PK	78.2	-0.7	1.89 V	50	65.95	11.55
4	*5745.00	111.2 PK			1.89 V	50	99.57	11.63
5	*5745.00	100.4 AV			1.89 V	50	88.77	11.63
6	11490.00	52.2 PK	74.0	-21.8	1.04 V	55	34.90	17.30
7	11490.00	40.3 AV	54.0	-13.7	1.04 V	55	23.00	17.30
8	#17235.00	55.6 PK	74.0	-18.4	1.02 V	105	28.79	26.81
9	#17235.00	43.8 AV	54.0	-10.2	1.02 V	105	16.99	26.81

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) – Pre-Amplifier 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	#5715.00	54.7 PK	74.0	-19.3	1.67 H	124	43.17	11.53
2	#5715.00	41.3 AV	54.0	-12.7	1.67 H	124	29.77	11.53
3	#5725.00	56.6 PK	78.2	-21.6	1.67 H	124	45.05	11.55
4	*5785.00	110.8 PK			1.67 H	124	99.06	11.74
5	*5785.00	100.4 AV			1.67 H	124	88.66	11.74
6	#5850.00	55.5 PK	78.2	-22.7	1.67 H	124	43.75	11.75
7	#5860.00	53.9 PK	74.0	-20.1	1.67 H	124	42.15	11.75
8	#5860.00	40.1 AV	54.0	-13.9	1.67 H	124	28.35	11.75
9	11570.00	48.3 PK	74.0	-25.7	1.19 H	326	30.39	17.91
10	11570.00	41.0 AV	54.0	-13.0	1.19 H	326	23.09	17.91
11	#17355.00	56.0 PK	74.0	-18.0	1.10 H	337	28.86	27.14
12	#17355.00	43.5 AV	54.0	-10.5	1.10 H	337	16.36	27.14
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	#5715.00	57.0 PK	74.0	-17.0	1.63 V	46	45.47	11.53
2	#5715.00	43.0 AV	54.0	-11.0	1.63 V	46	31.47	11.53
3	#5725.00	56.6 PK	78.2	-21.6	1.63 V	46	45.05	11.55
4	*5785.00	114.5 PK			1.63 V	46	102.76	11.74
5	*5785.00	103.7 AV			1.63 V	46	91.96	11.74
6	#5850.00	57.6 PK	78.2	-20.6	1.63 V	46	45.85	11.75
7	#5860.00	54.6 PK	74.0	-19.4	1.63 V	46	42.85	11.75
8	#5860.00	41.5 AV	54.0	-12.5	1.63 V	46	29.75	11.75
9	11570.00	54.2 PK	74.0	-19.8	1.55 V	205	36.29	17.91
10	11570.00	42.2 AV	54.0	-11.8	1.55 V	205	24.29	17.91
11	#17355.00	57.6 PK	74.0	-16.4	1.25 V	119	30.46	27.14
12	#17355.00	45.4 AV	54.0	-8.6	1.25 V	119	18.26	27.14

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) – Pre-Amplifier 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	110.4 PK			1.65 H	120	98.62	11.78
2	*5825.00	100.2 AV			1.65 H	120	88.42	11.78
3	#5850.00	74.8 PK	78.2	-3.4	1.65 H	120	63.05	11.75
4	#5860.00	67.5 PK	74.0	-6.5	1.65 H	120	55.75	11.75
5	#5860.00	46.4 AV	54.0	-7.6	1.65 H	120	34.65	11.75
6	11650.00	48.5 PK	74.0	-25.5	1.24 H	339	30.34	18.16
7	11650.00	41.3 AV	54.0	-12.7	1.24 H	339	23.14	18.16
8	#17475.00	55.9 PK	74.0	-18.1	1.05 H	332	27.98	27.92
9	#17475.00	43.4 AV	54.0	-10.6	1.05 H	332	15.48	27.92
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	113.9 PK			1.97 V	302	102.12	11.78
2	*5825.00	103.7 AV			1.97 V	302	91.92	11.78
3	**#5850.00**	**77.9 PK**	**78.2**	**-0.3**	**1.97 V**	**302**	**66.15**	**11.75**
4	#5860.00	70.9 PK	74.0	-3.1	1.97 V	302	59.15	11.75
5	#5860.00	49.6 AV	54.0	-4.4	1.97 V	302	37.85	11.75
6	11650.00	54.6 PK	74.0	-19.4	1.52 V	197	36.44	18.16
7	11650.00	42.6 AV	54.0	-11.4	1.52 V	197	24.44	18.16
8	#17475.00	57.6 PK	74.0	-16.4	1.23 V	131	29.68	27.92
9	#17475.00	45.6 AV	54.0	-8.4	1.23 V	131	17.68	27.92

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) – Pre-Amplifier 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 (VHT20)

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	#5715.00	66.7 PK	74.0	-7.3	1.68 H	120	55.17	11.53
2	#5715.00	46.3 AV	54.0	-7.7	1.68 H	120	34.77	11.53
3	#5725.00	74.7 PK	78.2	-3.5	1.68 H	120	63.15	11.55
4	*5745.00	107.2 PK			1.68 H	120	95.57	11.63
5	*5745.00	93.9 AV			1.68 H	120	82.27	11.63
6	11490.00	46.3 PK	74.0	-27.7	1.16 H	324	29.00	17.30
7	11490.00	39.1 AV	54.0	-14.9	1.16 H	324	21.80	17.30
8	#17235.00	53.8 PK	74.0	-20.2	1.13 H	348	26.99	26.81
9	#17235.00	40.8 AV	54.0	-13.2	1.13 H	348	13.99	26.81
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	#5715.00	69.8 PK	74.0	-4.2	2.14 V	234	58.27	11.53
2	#5715.00	49.3 AV	54.0	-4.7	2.14 V	234	37.77	11.53
3	**#5725.00**	**77.9 PK**	**78.2**	**-0.3**	**2.14 V**	**234**	**66.35**	**11.55**
4	*5745.00	110.4 PK			2.14 V	234	98.77	11.63
5	*5745.00	97.1 AV			2.14 V	234	85.47	11.63
6	11490.00	55.5 PK	74.0	-18.5	1.02 V	93	38.20	17.30
7	11490.00	43.9 AV	54.0	-10.1	1.02 V	93	26.60	17.30
8	#17235.00	65.5 PK	74.0	-8.5	1.83 V	41	38.69	26.81
9	#17235.00	45.7 AV	54.0	-8.3	1.83 V	41	18.89	26.81

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) – Pre-Amplifier 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	#5715.00	52.4 PK	74.0	-21.6	1.70 H	134	40.87	11.53
2	#5715.00	39.5 AV	54.0	-14.5	1.70 H	134	27.97	11.53
3	#5725.00	55.9 PK	78.2	-22.3	1.70 H	134	44.35	11.55
4	*5785.00	110.6 PK			1.70 H	134	98.86	11.74
5	*5785.00	100.3 AV			1.70 H	134	88.56	11.74
6	#5850.00	56.4 PK	78.2	-21.8	1.70 H	134	44.65	11.75
7	#5860.00	56.4 PK	74.0	-17.6	1.70 H	134	44.65	11.75
8	#5860.00	40.2 AV	54.0	-13.8	1.70 H	134	28.45	11.75
9	11570.00	48.4 PK	74.0	-25.6	1.23 H	323	30.49	17.91
10	11570.00	41.2 AV	54.0	-12.8	1.23 H	323	23.29	17.91
11	#17355.00	56.2 PK	74.0	-17.8	1.04 H	331	29.06	27.14
12	#17355.00	43.6 AV	54.0	-10.4	1.04 H	331	16.46	27.14
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	#5715.00	55.7 PK	74.0	-18.3	2.00 V	234	44.17	11.53
2	#5715.00	42.3 AV	54.0	-11.7	2.00 V	234	30.77	11.53
3	#5725.00	59.1 PK	78.2	-19.1	2.00 V	234	47.55	11.55
4	*5785.00	113.3 PK			2.00 V	234	101.56	11.74
5	*5785.00	103.4 AV			2.00 V	234	91.66	11.74
6	#5850.00	59.3 PK	78.2	-18.9	2.00 V	234	47.55	11.75
7	#5860.00	59.3 PK	74.0	-14.7	2.00 V	234	47.55	11.75
8	#5860.00	43.1 AV	54.0	-10.9	2.00 V	234	31.35	11.75
9	11570.00	54.8 PK	74.0	-19.2	1.56 V	208	36.89	17.91
10	11570.00	42.7 AV	54.0	-11.3	1.56 V	208	24.79	17.91
11	#17355.00	57.8 PK	74.0	-16.2	1.28 V	109	30.66	27.14
12	#17355.00	45.7 AV	54.0	-8.3	1.28 V	109	18.56	27.14

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) – Pre-Amplifier 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	109.4 PK			1.70 H	120	97.62	11.78
2	*5825.00	98.8 AV			1.70 H	120	87.02	11.78
3	#5850.00	73.7 PK	78.2	-4.5	1.70 H	120	61.95	11.75
4	#5860.00	70.4 PK	74.0	-3.6	1.70 H	120	58.65	11.75
5	#5860.00	45.2 AV	54.0	-8.8	1.70 H	120	33.45	11.75
6	11650.00	48.3 PK	74.0	-25.7	1.17 H	334	30.14	18.16
7	11650.00	40.8 AV	54.0	-13.2	1.17 H	334	22.64	18.16
8	#17475.00	55.8 PK	74.0	-18.2	1.09 H	333	27.88	27.92
9	#17475.00	43.2 AV	54.0	-10.8	1.09 H	333	15.28	27.92
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	112.5 PK			1.66 V	301	100.72	11.78
2	*5825.00	101.8 AV			1.66 V	301	90.02	11.78
3	#5850.00	76.9 PK	78.2	-1.3	1.66 V	301	65.15	11.75
4	#5860.00	73.4 PK	74.0	-0.6	1.66 V	301	61.65	11.75
5	#5860.00	48.4 AV	54.0	-5.6	1.66 V	301	36.65	11.75
6	11650.00	54.0 PK	74.0	-20.0	1.54 V	210	35.84	18.16
7	11650.00	41.8 AV	54.0	-12.2	1.54 V	210	23.64	18.16
8	#17475.00	57.7 PK	74.0	-16.3	1.19 V	109	29.78	27.92
9	#17475.00	45.4 AV	54.0	-8.6	1.19 V	109	17.48	27.92

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) – Pre-Amplifier 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 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	#5715.00	64.4 PK	74.0	-9.6	1.71 H	121	52.87	11.53
2	#5715.00	50.4 AV	54.0	-3.6	1.71 H	121	38.87	11.53
3	#5725.00	70.3 PK	78.2	-7.9	1.71 H	121	58.75	11.55
4	*5755.00	102.5 PK			1.71 H	121	90.86	11.64
5	*5755.00	92.8 AV			1.71 H	121	81.16	11.64
6	11510.00	53.9 PK	74.0	-20.1	1.02 H	288	36.60	17.30
7	11510.00	41.4 AV	54.0	-12.6	1.02 H	288	24.10	17.30
8	#17265.00	57.4 PK	74.0	-16.6	1.45 H	157	30.69	26.71
9	#17265.00	46.4 AV	54.0	-7.6	1.45 H	157	19.69	26.71
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	#5715.00	67.5 PK	74.0	-6.5	1.70 V	36	55.97	11.53
2	#5715.00	53.5 AV	54.0	-0.5	1.70 V	36	41.97	11.53
3	#5725.00	73.6 PK	78.2	-4.6	1.70 V	36	62.05	11.55
4	*5755.00	105.7 PK			1.70 V	36	94.06	11.64
5	*5755.00	96.0 AV			1.70 V	36	84.36	11.64
6	11510.00	55.4 PK	74.0	-18.6	1.04 V	71	38.10	17.30
7	11510.00	43.0 AV	54.0	-11.0	1.04 V	71	25.70	17.30
8	#17265.00	56.5 PK	74.0	-17.5	1.02 V	75	29.79	26.71
9	#17265.00	44.3 AV	54.0	-9.7	1.02 V	75	17.59	26.71

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) – Pre-Amplifier 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	109.1 PK			1.70 H	141	97.32	11.78
2	*5795.00	98.1 AV			1.70 H	141	86.32	11.78
3	#5850.00	69.8 PK	78.2	-8.4	1.70 H	141	58.05	11.75
4	#5860.00	66.5 PK	74.0	-7.5	1.70 H	141	54.75	11.75
5	#5860.00	50.4 AV	54.0	-3.6	1.70 H	141	38.65	11.75
6	11590.00	47.4 PK	74.0	-26.6	1.17 H	319	29.29	18.11
7	11590.00	40.2 AV	54.0	-13.8	1.17 H	319	22.09	18.11
8	#17385.00	55.4 PK	74.0	-18.6	1.12 H	332	27.95	27.45
9	#17385.00	42.2 AV	54.0	-11.8	1.12 H	332	14.75	27.45
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	112.5 PK			2.09 V	300	100.72	11.78
2	*5795.00	101.3 AV			2.09 V	300	89.52	11.78
3	#5850.00	72.9 PK	78.2	-5.3	2.09 V	300	61.15	11.75
4	#5860.00	69.9 PK	74.0	-4.1	2.09 V	300	58.15	11.75
5	**#5860.00**	**53.7 AV**	**54.0**	**-0.3**	**2.09 V**	**300**	**41.95**	**11.75**
6	11590.00	52.4 PK	74.0	-21.6	1.51 V	220	34.29	18.11
7	11590.00	40.5 AV	54.0	-13.5	1.51 V	220	22.39	18.11
8	#17385.00	56.4 PK	74.0	-17.6	1.18 V	104	28.95	27.45
9	#17385.00	44.3 AV	54.0	-9.7	1.18 V	104	16.85	27.45

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) 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	#5715.00	64.2 PK	74.0	-9.8	1.71 H	162	52.67	11.53
2	#5715.00	50.4 AV	54.0	-3.6	1.71 H	162	38.87	11.53
3	#5725.00	66.5 PK	78.2	-11.7	1.71 H	162	54.95	11.55
4	*5775.00	98.9 PK			1.71 H	162	87.18	11.72
5	*5775.00	88.4 AV			1.71 H	162	76.68	11.72
6	#5850.00	56.4 PK	78.2	-21.8	1.71 H	162	44.65	11.75
7	#5860.00	56.4 PK	74.0	-17.6	1.71 H	162	44.65	11.75
8	#5860.00	44.3 AV	54.0	-9.7	1.71 H	162	32.55	11.75
9	11550.00	53.8 PK	74.0	-20.2	1.00 H	298	36.09	17.71
10	11550.00	41.5 AV	54.0	-12.5	1.00 H	298	23.79	17.71
11	#17325.00	57.2 PK	74.0	-16.8	1.48 H	160	30.35	26.85
12	#17325.00	46.5 AV	54.0	-7.5	1.48 H	160	19.65	26.85
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	#5715.00	67.2 PK	74.0	-6.8	1.90 V	40	55.67	11.53
2	#5715.00	53.4 AV	54.0	-0.6	1.90 V	40	41.87	11.53
3	#5725.00	69.4 PK	78.2	-8.8	1.90 V	40	57.85	11.55
4	*5775.00	102.1 PK			1.90 V	40	90.38	11.72
5	*5775.00	91.5 AV			1.90 V	40	79.78	11.72
6	#5850.00	59.3 PK	78.2	-18.9	1.90 V	40	47.55	11.75
7	#5860.00	59.5 PK	74.0	-14.5	1.90 V	40	47.75	11.75
8	#5860.00	47.5 AV	54.0	-6.5	1.90 V	40	35.75	11.75
9	11550.00	56.0 PK	74.0	-18.0	1.02 V	83	38.29	17.71
10	11550.00	43.3 AV	54.0	-10.7	1.02 V	83	25.59	17.71
11	#17325.00	56.2 PK	74.0	-17.8	1.02 V	81	29.35	26.85
12	#17325.00	44.1 AV	54.0	-9.9	1.02 V	81	17.25	26.85

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) – Pre-Amplifier 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 Data

802.11a

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 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	82.30	27.3 QP	40.0	-12.7	1.80 H	145	27.30	0.00
2	144.90	27.6 QP	43.5	-15.9	2.10 H	219	27.61	0.00
3	219.15	27.4 QP	46.0	-18.6	1.10 H	261	27.42	0.00
4	374.91	26.5 QP	46.0	-19.5	1.10 H	219	26.50	0.00
5	500.12	31.9 QP	46.0	-14.1	2.10 H	205	31.90	0.00
6	799.90	26.5 QP	46.0	-19.5	1.10 H	116	26.50	0.00
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	41.77	36.1 QP	40.0	-3.9	1.20 V	231	49.83	-13.70
2	70.59	33.7 QP	40.0	-6.3	1.30 V	232	49.33	-15.65
3	82.68	30.2 QP	40.0	-9.8	1.52 V	136	49.00	-18.79
4	375.13	30.7 QP	46.0	-15.3	2.00 V	139	40.95	-10.23
5	500.11	34.2 QP	46.0	-11.8	2.10 V	231	41.57	-7.36
6	924.00	30.9 QP	46.0	-15.1	1.20 V	319	30.22	0.65

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Transmit Power Measurment

4.2.1 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.

4.2.2 Test Setup

4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

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

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

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

4.2.7 Test Result

POWER OUTPUT:

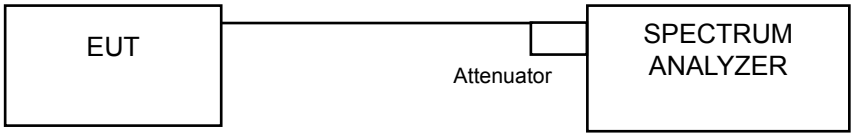
Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
802.11a							
149	5745	20.40	20.48	221.334	23.45	30	Pass
157	5785	22.37	22.49	350.003	25.44	30	Pass
165	5825	21.63	21.79	296.554	24.72	30	Pass
802.11ac (VHT20)							
149	5745	20.36	20.32	216.29	23.35	30	Pass
157	5785	21.78	21.96	307.697	24.88	30	Pass
165	5825	20.19	20.35	212.865	23.28	30	Pass
802.11ac (VHT40)							
151	5755	17.86	17.91	122.896	20.90	30	Pass
159	5795	20.75	20.96	243.588	23.87	30	Pass
802.11ac (VHT80)							
155	5775	15.78	15.87	76.481	18.84	30	Pass

4.3 Peak Power Spectral Density Measurement

4.3.1 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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For 802.11a, 802.11ac (VHT20) & 802.11ac (VHT40):

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. 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(500kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

For 802.11ac (VHT80):

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. 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(500kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value and add 10 log (1/duty cycle)

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

Same as Item 4.2.6.

4.3.7 Test Results

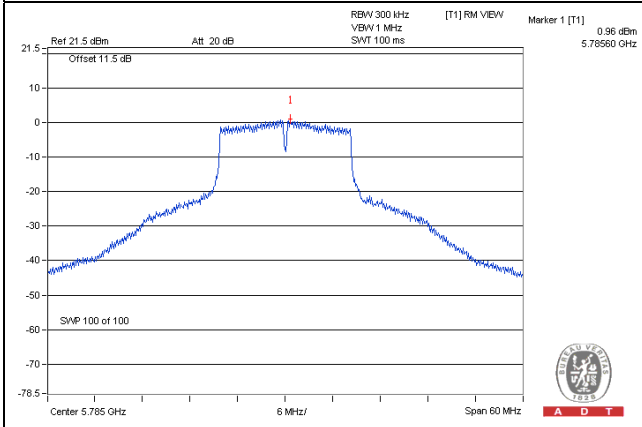
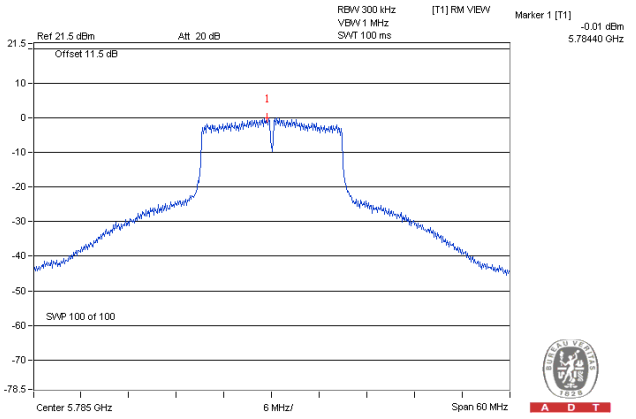
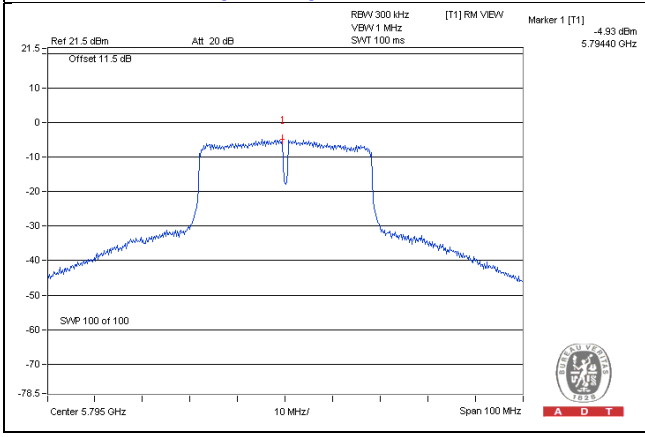
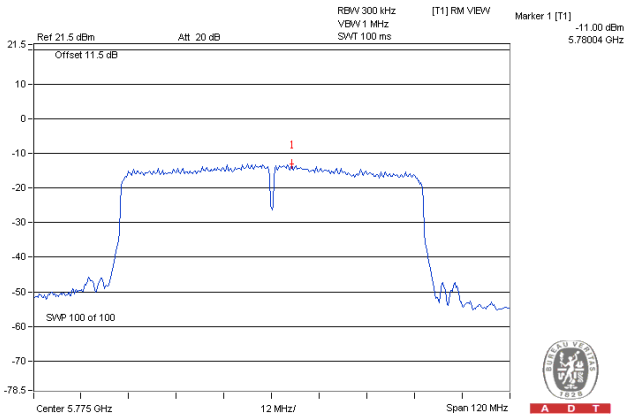
CDD Mode

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=3) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
802.11a								
0	149	5745	-0.81	1.41	3.01	4.42	30.00	Pass
	157	5785	0.96	3.18	3.01	6.19	30.00	Pass
	165	5825	0.02	2.24	3.01	5.25	30.00	Pass
1	149	5745	-0.94	1.28	3.01	4.29	30.00	Pass
	157	5785	0.43	2.65	3.01	5.66	30.00	Pass
	165	5825	-0.41	1.81	3.01	4.82	30.00	Pass
802.11ac (VHT20)								
0	149	5745	-2.03	0.19	3.01	3.20	30.00	Pass
	157	5785	-0.01	2.21	3.01	5.22	30.00	Pass
	165	5825	-2.12	0.10	3.01	3.11	30.00	Pass
1	149	5745	-2.27	-0.05	3.01	2.96	30.00	Pass
	157	5785	-2.09	0.13	3.01	3.14	30.00	Pass
	165	5825	-2.46	-0.24	3.01	2.77	30.00	Pass
802.11ac (VHT40)								
0	151	5755	-7.83	-5.61	3.01	-2.60	30.00	Pass
	159	5795	-4.93	-2.71	3.01	0.30	30.00	Pass
1	151	5755	-8.42	-6.20	3.01	-3.19	30.00	Pass
	159	5795	-5.00	-2.78	3.01	0.23	30.00	Pass

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=3) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
802.11ac (VHT80)									
0	155	5775	-11.00	-8.78	3.01	0.1	-5.67	30.00	Pass
1	155	5775	-12.84	-10.62	3.01	0.1	-7.51	30.00	Pass
2	155	5775	-11.00	-8.78	3.01	0.1	-5.67	30.00	Pass

Note: 1. Directional gain = 2.6dBi + 10log(2) = 5.61dBi < 6dBi , so the power limit shall not be reduced.

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

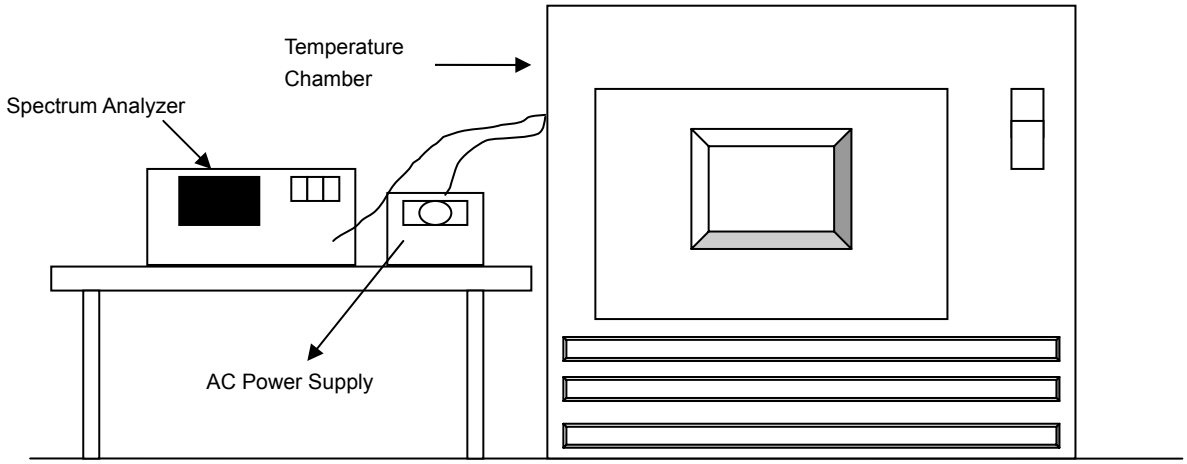
Spectrum Plot of Worst Value	
802.11a – Chain 0: CH 157	**802.11ac (VHT20) – Chain 0: CH 157**
	
802.11ac (VHT40) – Chain 0: CH 159	**802.11ac (VHT80) – Chain 0: CH 155**
	

4.4 Frequency Stability Measurement

4.4.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

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.
.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

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

4.4.7 Test Results

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5745MHz									
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	5744.972	-0.00049	5744.9715	-0.00050	5744.973	-0.00047	5744.973	-0.00047
40	120	5744.9854	-0.00025	5744.9827	-0.00030	5744.9848	-0.00026	5744.9851	-0.00026
30	120	5744.9706	-0.00051	5744.9714	-0.00050	5744.9713	-0.00050	5744.9716	-0.00049
20	120	5745.0024	0.00004	5744.9998	0.00000	5744.9968	-0.00006	5745.0013	0.00002
10	120	5744.9971	-0.00005	5744.9985	-0.00003	5744.9971	-0.00005	5744.9963	-0.00006
0	120	5744.9793	-0.00036	5744.9778	-0.00039	5744.9784	-0.00038	5744.9766	-0.00041
-10	120	5744.9869	-0.00023	5744.9885	-0.00020	5744.9885	-0.00020	5744.987	-0.00023
-20	120	5745.0091	0.00016	5745.0075	0.00013	5745.0108	0.00019	5745.0077	0.00013
-30	120	5744.9811	-0.00033	5744.977	-0.00040	5744.9806	-0.00034	5744.9825	-0.00030

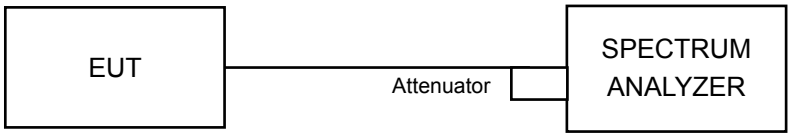
FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5745MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5745.0019	0.00003	5745.0004	0.00001	5744.9963	-0.00006	5745.0017	0.00003
	120	5745.0024	0.00004	5744.9998	0.00000	5744.9968	-0.00006	5745.0013	0.00002
	102	5745.0024	0.00004	5744.999	-0.00002	5744.9958	-0.00007	5745.0017	0.00003

4.5 6dB Bandwidth Measurment

4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

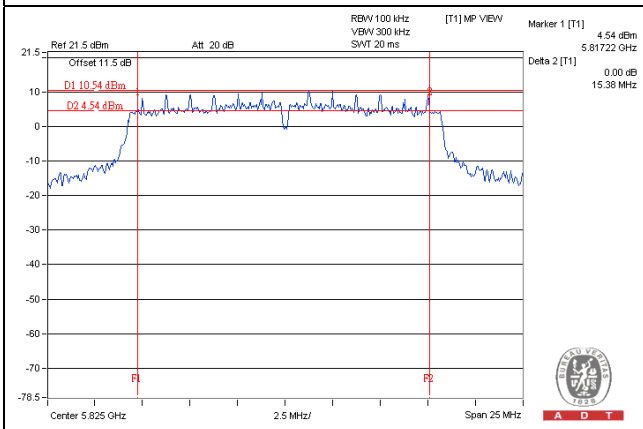
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

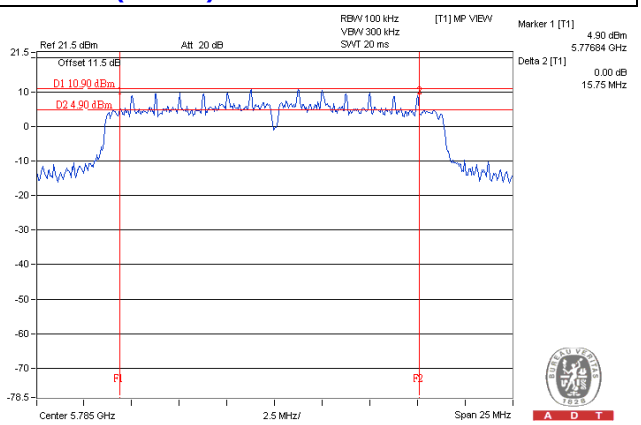
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
802.11a					
149	5745	16.09	16.35	0.5	Pass
157	5785	15.82	15.50	0.5	Pass
165	5825	15.38	15.79	0.5	Pass
802.11ac (VHT20)					
149	5745	16.93	17.03	0.5	Pass
157	5785	15.75	16.93	0.5	Pass
165	5825	16.94	16.81	0.5	Pass
802.11ac (VHT40)					
151	5755	35.34	35.29	0.5	Pass
159	5795	35.33	35.34	0.5	Pass
802.11ac (VHT80)					
155	5775	75.40	75.37	0.5	Pass

SPECTRUM PLOT OF WORST VALUE

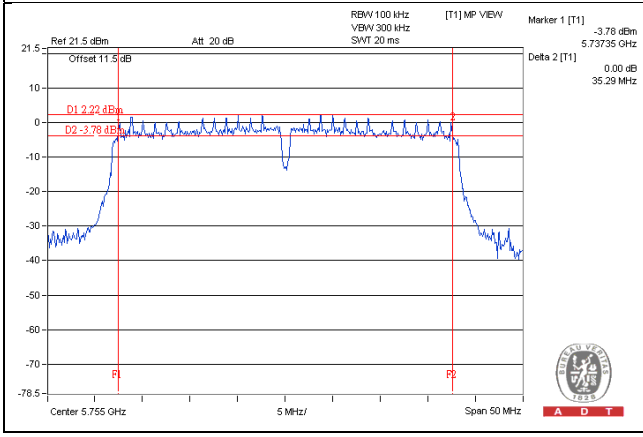
802.11a – Chain 0: CH 165



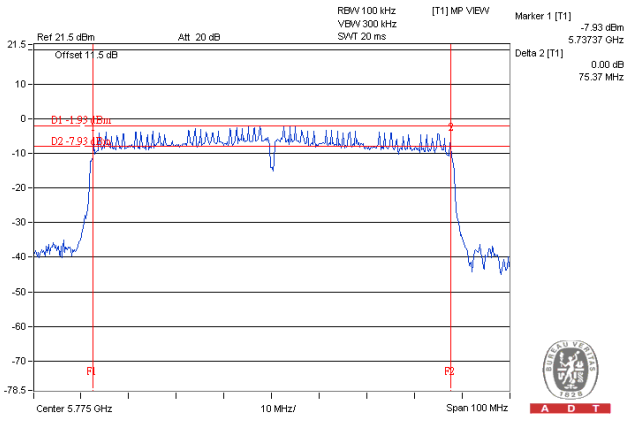
802.11ac (VHT20) – Chain 0: CH157



802.11ac (VHT40) – Chain 1: CH151



802.11ac (VHT80) – Chain 1: CH155



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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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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