

FCC Test Report

Report No.: RF140812C13E-1

FCC ID: PY314100252

Test Model: C7100V-100NAS

Received Date: Mar. 18, 2016

Test Date: Mar. 18 to May 13, 2016

Issued Date: June 20, 2016

Applicant: NETGEAR INC

Address: 350 East Plumeria Drive, San Jose CA 96134, USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (1): E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
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.



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Release Control Record

Issue No.	Description	Date Issued
RF140812C13E-1	Original release.	June 20, 2016

1 Certificate of Conformity

Product: Wireless Cable Data Gateway

Brand: NETGEAR

Test Model: C7100V-100NAS

Sample Status: ENGINEERING SAMPLE

Applicant: NETGEAR INC

Test Date: Mar. 18 to May 13, 2016

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 : Wendy Wu., **Date:** June 20, 2016
Wendy Wu / Specialist

Approved by : May Chen, **Date:** June 20, 2016
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(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -0.13dB at 5984.15MHz.
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(MHF) not a standard connector.

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOB test plots were recorded in Annex A.

NOTE: 1. This report is prepared for FCC Class II change. (Upgrade the standard to section 15.407 under new rule (16-24) 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	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 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	Wireless Cable Data Gateway
Brand	NETGEAR
Test Model	C7100V-100NAS
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	Internal power supply
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and 11n (VHT20/40) mode in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
Operating Frequency	For 15.407 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50~5.70GHz, 5.745 ~ 5.825GHz For 15.247 2.412 ~ 2.462GHz
Number of Channel	For 15.407: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 21 802.11n (HT40), 802.11ac (VHT40): 11 802.11ac (VHT80): 5 For 15.247: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	5.18 ~ 5.24GHz 607.881mW 5.26 ~ 5.32GHz 185.197mW 5.50 ~ 5.70GHz 242.814mW 5.745 ~ 5.825GHz 606.638mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	RJ45 cable (Unshielded, 1.5m)

Note:

1. This report is prepared for FCC Class II change. The difference compared with the Report No.: RF140812C13C-1 is as the following:
 - ◆ Upgrade the standard to section 15.407 under new rule (16-24) for U-NII-3 band.
2. According to above conditions, all test items need to be performed, except for AC power conducted emission test item. And all data was verified to meet the requirements.
3. The EUT must be supplied with an internal power supply:

brand:	PEGATRON
Model:	UPM60N
Input:	100Vac~240Vac
Output:	12V/5A max.
Power Line:	AC cable (Unshielded, 2m)

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

2.4GHz antenna					
No.	Transmitter Circuit	Gain (dBi) (Include cable loss)	Frequency range (GHz to GHz)	Antenna Type	Connector Type
1	0	2.07	2.4~2.4835	PIFA	i-pex(MHF)
2	1	2.07	2.4~2.4835	PIFA	i-pex(MHF)
3	2	2.07	2.4~2.4835	PIFA	i-pex(MHF)
5GHz antenna					
No.	Transmitter Circuit	Gain (dBi) (Include cable loss)	Frequency range (GHz to GHz)	Antenna Type	Connector Type
4	0	3.33	5.15~5.25	PIFA	i-pex(MHF)
		3.32	5.25~5.35	PIFA	i-pex(MHF)
		3.29	5.47~5.725	PIFA	i-pex(MHF)
		3.28	5.725~5.850	PIFA	i-pex(MHF)
5	1	3.33	5.15~5.25	PIFA	i-pex(MHF)
		3.32	5.25~5.35	PIFA	i-pex(MHF)
		3.29	5.47~5.725	PIFA	i-pex(MHF)
		3.28	5.725~5.850	PIFA	i-pex(MHF)
6	2	3.33	5.15~5.25	PIFA	i-pex(MHF)
		3.32	5.25~5.35	PIFA	i-pex(MHF)
		3.29	5.47~5.725	PIFA	i-pex(MHF)
		3.28	5.725~5.850	PIFA	i-pex(MHF)

5. The EUT incorporates a MIMO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	3TX CDD	3RX
802.11g	6 ~ 54Mbps	3TX CDD	3RX
802.11n (HT20) 802.11n (HT40) (For 2.4GHz)	MCS 0~7	3TX CDD / beamforming	3RX
	MCS 8~15	3TX CDD / beamforming	3RX
	MCS 16~23	3TX / beamforming	3RX
802.11n (BW20) (For 2.4GHz)	MCS 0~8, Nss=1 (256QAM)	3TX CDD / beamforming	3RX
	MCS 0~8, Nss=2 (256QAM)	3TX CDD / beamforming	3RX
	MCS 0~9, Nss=3 (256QAM)	3TX / beamforming	3RX
802.11n (BW40) (For 2.4GHz)	MCS 0~9, Nss=1 (256QAM)	3TX CDD / beamforming	3RX
	MCS 0~9, Nss=2 (256QAM)	3TX CDD / beamforming	3RX
	MCS 0~9, Nss=3 (256QAM)	3TX / beamforming	3RX
802.11a	6 ~ 54Mbps	3TX CDD	3RX
802.11n (HT20), 802.11n (HT40) (For 5GHz)	MCS 0~7	3TX CDD / beamforming	3RX
	MCS 8~15	3TX CDD / beamforming	3RX
	MCS 16~23	3TX / beamforming	3RX
802.11ac (VHT20) (For 5GHz)	MCS 0~8, Nss=1	3TX CDD / beamforming	3RX
	MCS 0~8, Nss=2	3TX CDD / beamforming	3RX
	MCS 0~9, Nss=3	3TX / beamforming	3RX
802.11ac (VHT40) 802.11ac (VHT80) (For 5GHz)	MCS 0~9, Nss=1	3TX CDD / beamforming	3RX
	MCS 0~9, Nss=2	3TX CDD / beamforming	3RX
	MCS 0~9, Nss=3	3TX / beamforming	3RX

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)

6. The emission of the simultaneous operation (2.4GHz & 5GHz) has been evaluated and no non-compliance was found.
7. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

FOR 5745 ~ 5825MHz:

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

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

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

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 $\geq$ 1G	RE<1G	APCM	
-	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

APCM: Antenna Port Conducted Measurement

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
802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)		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$\geq$1G	23deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE<1G	25deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo
APCM	23deg. C, 62%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

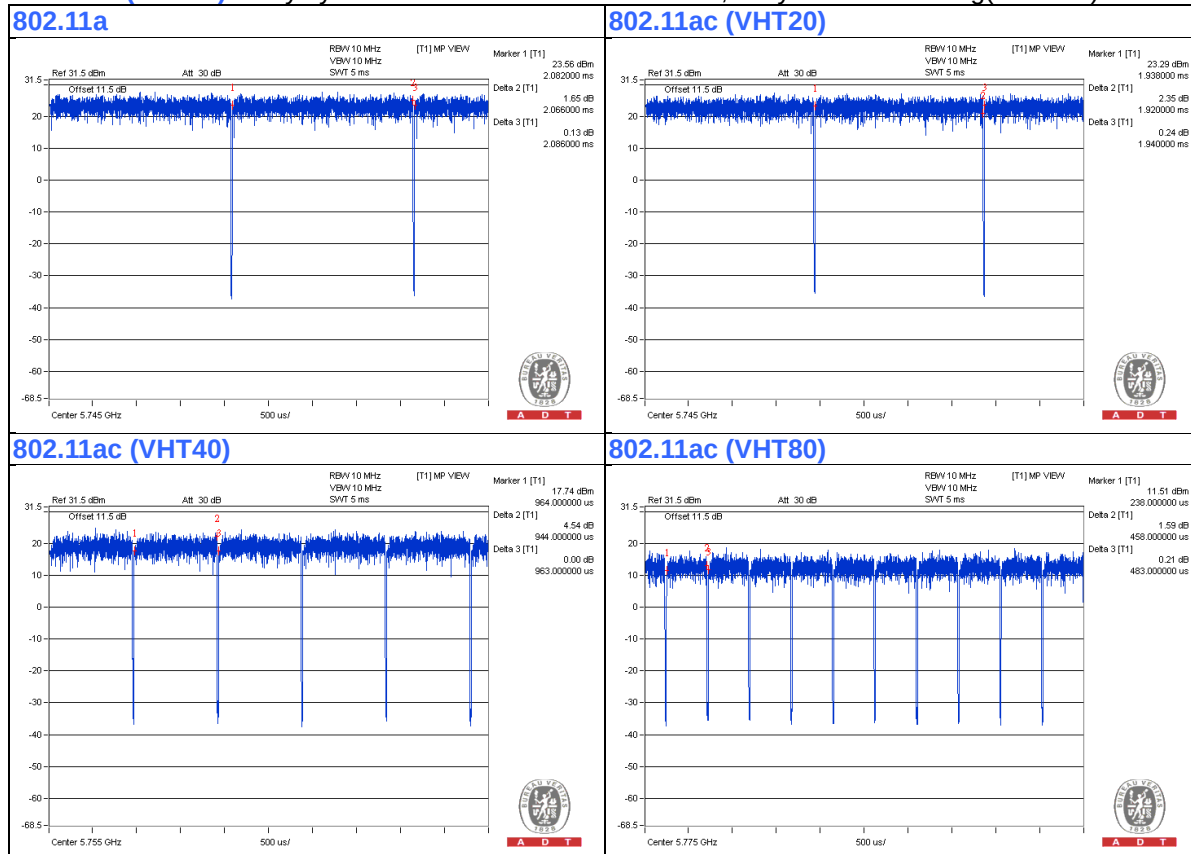
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11a: Duty cycle = $2.066 \text{ ms} / 2.086 \text{ ms} = 0.99$

802.11ac (VHT20): Duty cycle = $1.92 \text{ ms} / 1.94 \text{ ms} = 0.99$

802.11ac (VHT40): Duty cycle = $0.944 \text{ ms} / 0.963 \text{ ms} = 0.98$

802.11ac (VHT80): Duty cycle = $0.458 \text{ ms} / 0.483 \text{ ms} = 0.948$, Duty factor = $10 * \log(1/0.948) = 0.23$



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.

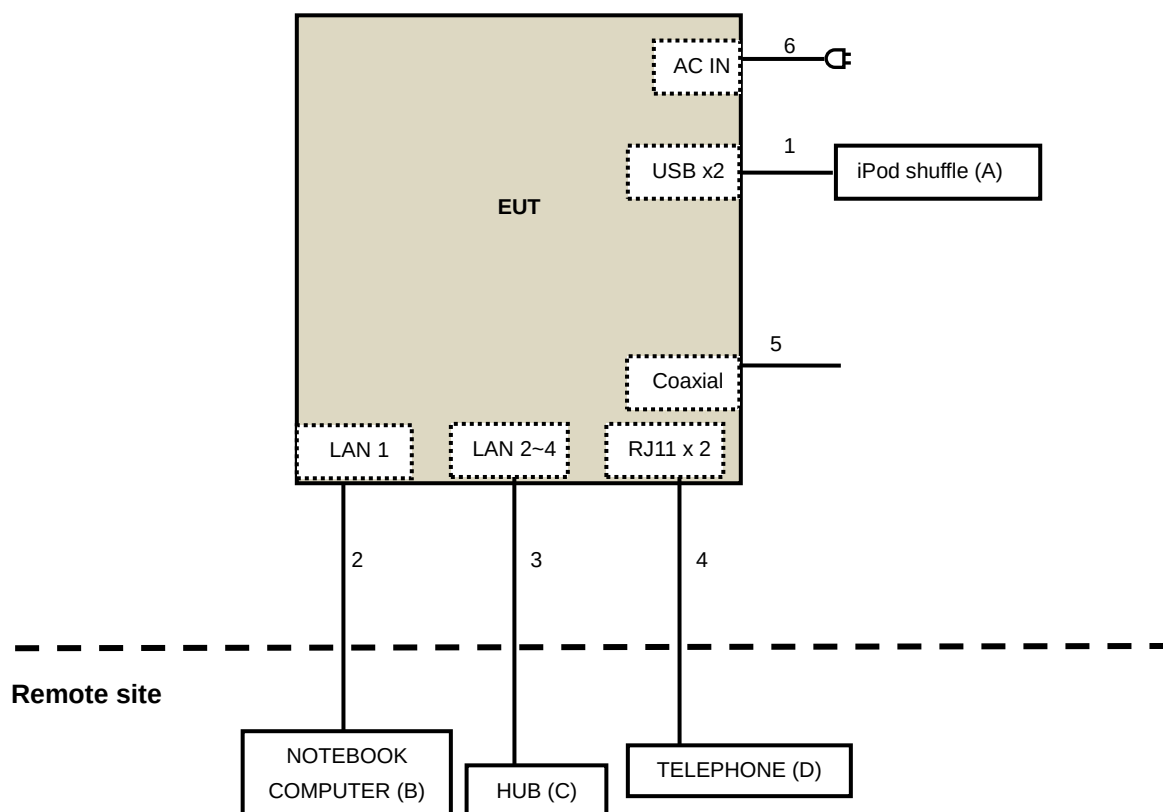
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	iPod shuffle	Apple	MD778TA/A	CC4JMCMTXF4T1	NA	Provided by Lab
	iPod shuffle	Apple	MD778TA/A	CC4JMH7LF4T1	NA	Provided by Lab
B	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
C	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab
D	TELEPHONE	WONDER	WD-303	8C17DA02825	NA	Provided by Lab
	TELEPHONE	WONDER	WD-303	8C17DA02763	NA	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.	USB	2	0.1	Yes	0	Provided by Lab
2.	RJ-45	1	10	No	0	Provided by Lab
3.	RJ-45	3	10	No	0	Provided by Lab
4.	RJ-11	2	10	No	0	Provided by Lab
5.	Coaxial	1	10	No	0	Provided by Lab
6.	AC	1	2	No	0	Supplied by client

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)

KDB 789033 D02 General UNII Test Procedure New Rules v01r02

KDB 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 has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits OF UNWANTED EMISSION OUT OF THE RESTRICTED Bands

Applicable To	Limit	
789033 D02 General UNII Test Procedure New Rules v01r02	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)(i)	PK:-27 (dBm/MHz) ^{*1} PK:10 (dBm/MHz) ^{*2} PK:15.6 (dBm/MHz) ^{*3} PK:27 (dBm/MHz) ^{*4}	PK: 68.2(dBμV/m) ^{*1} PK:105.2 (dBμV/m) ^{*2} PK: 110.8(dBμV/m) ^{*3} PK:122.2 (dBμV/m) ^{*4}
15.407(b)(4)(ii)	FIELD STRENGTH at 3m / § 15.247(d),	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
^{*1} beyond 75 MHz or more above of the band edge. ^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. ^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. ^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

NOTE:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

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

4.1.2 Test Instruments

For Radiated Emission (below 1GHz)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 16, 2015	Dec. 15, 2016
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Jan. 07, 2016	Jan. 06, 2017
RF Cable	8D-FB	CHHCAB-001-1 CHHCAB-001-2	Oct. 04, 2015	Oct. 03, 2016
	RF-141	CHHCAB-004	Oct. 04, 2015	Oct. 03, 2016
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	CM100	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Mar. 18, 2016

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
Horn_Antenna AISI	AIH.8018	0000320091110	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A02578	June 23, 2015	June 22, 2016
RF Cable	NA	131205 131216 131217 SNMY23684/4	Jan. 15, 2016	Jan. 14, 2017
Spectrum Analyzer Agilent	E4446A	MY48250254	Nov. 25, 2015	Nov. 24, 2016
Pre-Amplifier SPACEK LABS	SLKKA-48-6	9K16	Dec. 11, 2015	Dec. 10, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Jan. 18, 2016	Jan. 17, 2017
RF Cable	SUCOFLEX 102	36442/2 36434/2	Dec. 10, 2015	Dec.09, 2016
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	CM100	NA	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-WD01	NA	NA
Spectrum Analyzer R&S	FSP 40	100036	Jan. 27, 2016	Jan. 26, 2017
Power meter Anritsu	ML2495A	0824006	May 25, 2015	May 24, 2016
Power sensor Anritsu	MA2411B	0738172	May 25, 2015	May 24, 2016
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 15, 2016	Jan. 14, 2017
AC Power Source Extech Electronics	6502	1140503	NA	NA
True RMS Multimeter FLUKE	87III	73680266	Nov. 10, 2015	Nov. 09, 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: Apr. 30 to May 03, 2016

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:

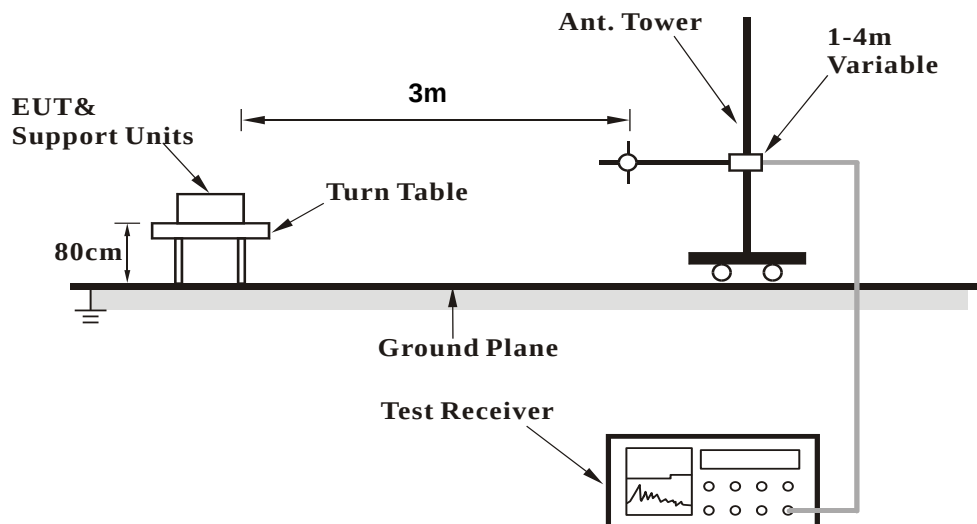
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

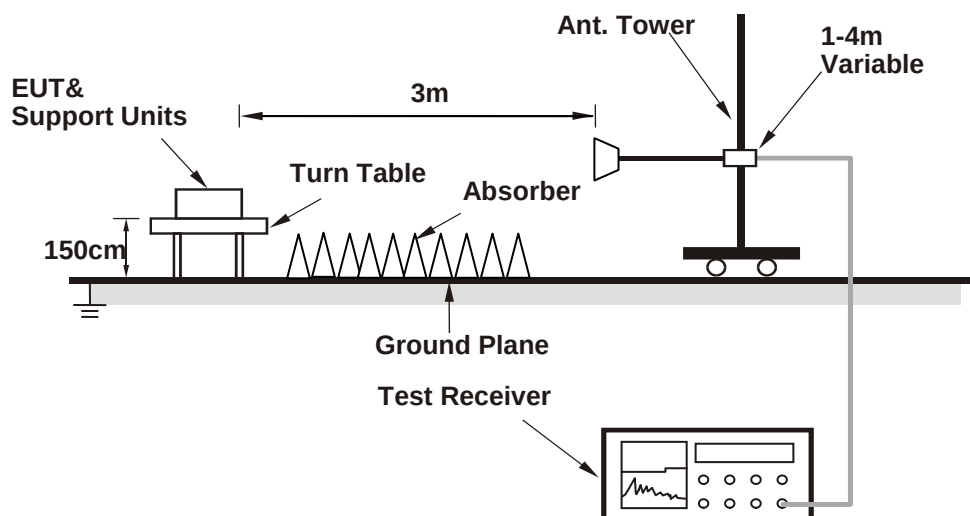
No deviation.

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 to act as communication partner.
3. The communication partner ran test program "Mtool.exe[2.0.1.1]" 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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5624.57	62.85 PK	68.20	-5.35	1.65 H	118	51.52	11.33
2	*5745.00	119.40 PK			1.65 H	118	107.79	11.61
3	*5745.00	111.50 AV			1.65 H	118	99.89	11.61
4	#5989.85	66.61 PK	68.20	-1.59	1.65 H	118	53.74	12.87
5	11490.00	65.80 PK	74.00	-8.20	1.50 H	29	47.88	17.92
6	11490.00	52.60 AV	54.00	-1.40	1.50 H	29	34.68	17.92
7	#17235.00	62.20 PK	74.00	-11.80	1.50 H	42	34.99	27.21
8	#17235.00	50.10 AV	54.00	-3.90	1.50 H	42	22.89	27.21
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	#5592.75	65.00 PK	68.20	-3.20	1.62 V	61	53.69	11.31
2	*5745.00	124.30 PK			1.62 V	61	112.69	11.61
3	*5745.00	115.70 AV			1.62 V	61	104.09	11.61
4	#5984.62	67.34 PK	68.20	-0.86	1.62 V	61	54.50	12.84
5	11490.00	66.10 PK	74.00	-7.90	1.78 V	33	48.18	17.92
6	11490.00	52.90 AV	54.00	-1.10	1.78 V	33	34.98	17.92
7	#17235.00	62.40 PK	74.00	-11.60	1.55 V	48	35.19	27.21
8	#17235.00	50.30 AV	54.00	-3.70	1.55 V	48	23.09	27.21

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5630.75	63.20 PK	68.20	-5.00	1.64 H	117	51.86	11.34
2	*5785.00	119.30 PK			1.64 H	117	107.49	11.81
3	*5785.00	111.80 AV			1.64 H	117	99.99	11.81
4	#5939.98	66.51 PK	68.20	-1.69	1.64 H	117	54.02	12.49
5	11570.00	65.80 PK	74.00	-8.20	1.46 H	34	47.76	18.04
6	11570.00	52.50 AV	54.00	-1.50	1.46 H	34	34.46	18.04
7	#17355.00	62.30 PK	74.00	-11.70	1.53 H	45	34.97	27.33
8	#17355.00	50.00 AV	54.00	-4.00	1.53 H	45	22.67	27.33
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	#5622.68	65.73 PK	68.20	-2.47	1.61 V	63	54.40	11.33
2	*5785.00	124.20 PK			1.61 V	63	112.39	11.81
3	*5785.00	115.80 AV			1.61 V	63	103.99	11.81
4	#5943.77	67.27 PK	68.20	-0.93	1.61 V	63	54.75	12.52
5	11570.00	66.40 PK	74.00	-7.60	1.80 V	25	48.36	18.04
6	11570.00	53.10 AV	54.00	-0.90	1.80 V	25	35.06	18.04
7	#17355.00	62.20 PK	74.00	-11.80	1.61 V	35	34.87	27.33
8	#17355.00	50.30 AV	54.00	-3.70	1.61 V	35	22.97	27.33

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5636.93	63.09 PK	68.20	-5.11	1.64 H	117	51.75	11.34
2	*5825.00	119.40 PK			1.64 H	117	107.43	11.97
3	*5825.00	110.90 AV			1.64 H	117	98.93	11.97
4	#5990.80	65.74 PK	68.20	-2.46	1.64 H	117	52.85	12.89
5	11650.00	65.70 PK	74.00	-8.30	1.53 H	28	47.75	17.95
6	11650.00	52.60 AV	54.00	-1.40	1.53 H	28	34.65	17.95
7	#17475.00	62.10 PK	74.00	-11.90	1.55 H	38	34.34	27.76
8	#17475.00	49.80 AV	54.00	-4.20	1.55 H	38	22.04	27.76
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	#5582.77	66.81 PK	68.20	-1.39	1.61 V	60	55.51	11.30
2	*5825.00	124.20 PK			1.61 V	60	112.23	11.97
3	*5825.00	114.80 AV			1.61 V	60	102.83	11.97
4	#5984.15	68.07 PK	68.20	-0.13	1.61 V	60	55.23	12.84
5	11650.00	66.40 PK	74.00	-7.60	1.80 V	32	48.45	17.95
6	11650.00	53.40 AV	54.00	-0.60	1.80 V	32	35.45	17.95
7	#17475.00	62.40 PK	74.00	-11.60	1.54 V	32	34.64	27.76
8	#17475.00	50.50 AV	54.00	-3.50	1.54 V	32	22.74	27.76

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5612.70	63.19 PK	68.20	-5.01	1.68 H	116	51.87	11.32
2	*5745.00	119.00 PK			1.68 H	116	107.39	11.61
3	*5745.00	108.90 AV			1.68 H	116	97.29	11.61
4	#5991.27	65.55 PK	68.20	-2.65	1.68 H	116	52.66	12.89
5	11490.00	65.50 PK	74.00	-8.50	1.55 H	35	47.58	17.92
6	11490.00	52.10 AV	54.00	-1.90	1.55 H	35	34.18	17.92
7	#17235.00	62.80 PK	74.00	-11.20	1.59 H	20	35.59	27.21
8	#17235.00	50.90 AV	54.00	-3.10	1.59 H	20	23.69	27.21
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	#5584.68	65.82 PK	68.20	-2.38	1.62 V	228	54.52	11.30
2	*5745.00	123.70 PK			1.62 V	228	112.09	11.61
3	*5745.00	113.20 AV			1.62 V	228	101.59	11.61
4	#5984.15	67.85 PK	68.20	-0.35	1.62 V	228	55.01	12.84
5	11490.00	65.90 PK	74.00	-8.10	1.78 V	37	47.98	17.92
6	11490.00	52.30 AV	54.00	-1.70	1.78 V	37	34.38	17.92
7	#17235.00	62.80 PK	74.00	-11.20	1.58 V	41	35.59	27.21
8	#17235.00	51.00 AV	54.00	-3.00	1.58 V	41	23.79	27.21

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5615.55	63.26 PK	68.20	-4.94	1.65 H	115	51.93	11.33
2	*5785.00	119.50 PK			1.65 H	115	107.69	11.81
3	*5785.00	109.10 AV			1.65 H	115	97.29	11.81
4	#5940.45	67.70 PK	68.20	-0.50	1.65 H	115	55.20	12.50
5	11570.00	65.60 PK	74.00	-8.40	1.53 H	28	47.56	18.04
6	11570.00	52.30 AV	54.00	-1.70	1.53 H	28	34.26	18.04
7	#17355.00	62.90 PK	74.00	-11.10	1.57 H	7	35.57	27.33
8	#17355.00	51.10 AV	54.00	-2.90	1.57 H	7	23.77	27.33
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	#5616.98	65.68 PK	68.20	-2.52	1.54 V	231	54.35	11.33
2	*5785.00	123.60 PK			1.54 V	231	111.79	11.81
3	*5785.00	113.10 AV			1.54 V	231	101.29	11.81
4	#5944.25	68.03 PK	68.20	-0.17	1.54 V	231	55.51	12.52
5	11570.00	65.80 PK	74.00	-8.20	1.74 V	27	47.76	18.04
6	11570.00	52.30 AV	54.00	-1.70	1.74 V	27	34.26	18.04
7	#17355.00	62.60 PK	74.00	-11.40	1.53 V	29	35.27	27.33
8	#17355.00	50.70 AV	54.00	-3.30	1.53 V	29	23.37	27.33

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5588.00	63.50 PK	68.20	-4.70	1.65 H	114	52.19	11.31
2	*5825.00	119.10 PK			1.65 H	114	107.13	11.97
3	*5825.00	109.10 AV			1.65 H	114	97.13	11.97
4	#5986.52	66.02 PK	68.20	-2.18	1.65 H	114	53.17	12.85
5	11650.00	65.90 PK	74.00	-8.10	1.58 H	32	47.95	17.95
6	11650.00	52.40 AV	54.00	-1.60	1.58 H	32	34.45	17.95
7	#17475.00	63.20 PK	74.00	-10.80	1.58 H	33	35.44	27.76
8	#17475.00	51.30 AV	54.00	-2.70	1.58 H	33	23.54	27.76
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	#5588.00	66.12 PK	68.20	-2.08	1.47 V	234	54.81	11.31
2	*5825.00	123.20 PK			1.47 V	234	111.23	11.97
3	*5825.00	113.10 AV			1.47 V	234	101.13	11.97
4	#5984.15	67.46 PK	68.20	-0.74	1.47 V	234	54.62	12.84
5	11650.00	66.50 PK	74.00	-7.50	1.73 V	31	48.55	17.95
6	11650.00	52.70 AV	54.00	-1.30	1.73 V	31	34.75	17.95
7	#17475.00	63.30 PK	74.00	-10.70	1.55 V	38	35.54	27.76
8	#17475.00	51.20 AV	54.00	-2.80	1.55 V	38	23.44	27.76

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5587.05	63.30 PK	68.20	-4.90	1.65 H	118	52.01	11.29
2	*5755.00	115.40 PK			1.66 H	118	103.73	11.67
3	*5755.00	104.60 AV			1.66 H	118	92.93	11.67
4	#5998.40	65.61 PK	68.20	-2.59	1.65 H	118	52.66	12.95
5	11510.00	65.50 PK	74.00	-8.50	1.58 H	22	47.54	17.96
6	11510.00	49.90 AV	54.00	-4.10	1.58 H	22	31.94	17.96
7	#17265.00	62.60 PK	74.00	-11.40	1.56 H	24	35.37	27.23
8	#17265.00	50.80 AV	54.00	-3.20	1.56 H	24	23.57	27.23
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	#5647.85	67.71 PK	68.20	-0.49	1.47 V	231	56.36	11.35
2	*5755.00	119.20 PK			1.47 V	231	107.53	11.67
3	*5755.00	108.10 AV			1.47 V	231	96.43	11.67
4	#5925.25	66.35 PK	68.20	-1.85	1.47 V	231	53.97	12.38
5	11510.00	64.20 PK	74.00	-9.80	1.78 V	33	46.24	17.96
6	11510.00	49.50 AV	54.00	-4.50	1.78 V	33	31.54	17.96
7	#17265.00	63.10 PK	74.00	-10.90	1.57 V	23	35.87	27.23
8	#17265.00	51.00 AV	54.00	-3.00	1.57 V	23	23.77	27.23

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5643.10	63.14 PK	68.20	-5.06	1.62 H	115	51.79	11.35
2	*5795.00	115.90 PK			1.62 H	115	104.04	11.86
3	*5795.00	105.30 AV			1.62 H	115	93.44	11.86
4	#5948.52	65.29 PK	68.20	-2.91	1.62 H	115	52.74	12.55
5	11590.00	66.10 PK	74.00	-7.90	1.53 H	18	48.02	18.08
6	11590.00	50.20 AV	54.00	-3.80	1.53 H	18	32.12	18.08
7	#17385.00	63.50 PK	74.00	-10.50	1.58 H	28	36.12	27.38
8	#17385.00	51.50 AV	54.00	-2.50	1.58 H	28	24.12	27.38
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	119.20 PK			1.45 V	230	107.34	11.86
2	*5795.00	108.30 AV			1.45 V	230	96.44	11.86
3	#5925.25	67.33 PK	68.20	-0.87	1.45 V	230	54.95	12.38
4	#5943.77	66.14 PK	68.20	-2.06	1.45 V	230	53.62	12.52
5	11590.00	63.60 PK	74.00	-10.40	1.78 V	45	45.52	18.08
6	11590.00	49.00 AV	54.00	-5.00	1.78 V	45	30.92	18.08
7	#17385.00	62.80 PK	74.00	-11.20	1.60 V	10	35.42	27.38
8	#17385.00	50.50 AV	54.00	-3.50	1.60 V	10	23.12	27.38

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5625.52	63.33 PK	68.20	-4.87	1.62 H	114	52.00	11.33
2	*5775.00	110.20 PK			1.62 H	114	98.43	11.77
3	*5775.00	98.30 AV			1.62 H	114	86.53	11.77
4	#6009.32	65.12 PK	68.20	-3.08	1.62 H	114	52.19	12.93
5	11550.00	65.40 PK	74.00	-8.60	1.59 H	31	47.39	18.01
6	11550.00	49.80 AV	54.00	-4.20	1.59 H	31	31.79	18.01
7	#17325.00	63.80 PK	74.00	-10.20	1.55 H	22	36.50	27.30
8	#17325.00	51.80 AV	54.00	-2.20	1.55 H	22	24.50	27.30
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	#5648.80	68.03 PK	68.20	-0.17	1.45 V	234	56.68	11.35
2	*5775.00	114.40 PK			1.45 V	234	102.63	11.77
3	*5775.00	102.70 AV			1.45 V	234	90.93	11.77
4	#5924.30	67.04 PK	68.72	-1.68	1.45 V	234	54.67	12.37
5	11550.00	64.10 PK	74.00	-9.90	1.73 V	36	46.09	18.01
6	11550.00	49.50 AV	54.00	-4.50	1.73 V	36	31.49	18.01
7	#17325.00	62.70 PK	74.00	-11.30	1.61 V	28	35.40	27.30
8	#17325.00	50.50 AV	54.00	-3.50	1.61 V	28	23.20	27.30

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) – 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	42.15	34.86 QP	40.00	-5.14	1.50 H	353	43.69	-8.83
2	375.00	39.14 QP	46.00	-6.86	1.00 H	68	43.81	-4.67
3	570.31	40.93 QP	46.00	-5.07	1.50 H	262	41.15	-0.22
4	625.00	41.35 QP	46.00	-4.65	1.50 H	112	40.09	1.26
5	800.03	41.71 QP	46.00	-4.29	1.00 H	332	37.64	4.07
6	880.01	38.56 QP	46.00	-7.44	1.00 H	77	33.26	5.30
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	46.24	36.33 QP	40.00	-3.67	1.00 V	6	45.00	-8.67
2	54.25	34.18 QP	40.00	-5.82	1.00 V	306	42.50	-8.32
3	64.98	33.21 QP	40.00	-6.79	1.00 V	289	42.59	-9.38
4	573.08	40.73 QP	46.00	-5.27	2.00 V	178	40.88	-0.15
5	720.03	39.05 QP	46.00	-6.95	1.50 V	74	36.57	2.48
6	801.03	37.01 QP	46.00	-8.99	1.50 V	112	32.87	4.14

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

4.2 Transmit Power Measurement

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 $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

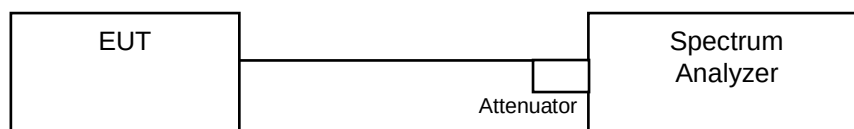
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.2.2 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

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
149	5745	22.95	23.05	23.12	604.195	27.81	27.95	Pass
157	5785	22.90	23.12	23.15	606.638	27.83	27.95	Pass
165	5825	22.78	23.14	23.21	605.145	27.82	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
149	5745	22.76	23.13	23.20	603.318	27.81	27.95	Pass
157	5785	22.88	23.10	23.18	606.233	27.83	27.95	Pass
165	5825	22.80	23.11	23.16	602.204	27.80	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
151	5755	22.01	22.67	22.68	529.135	27.24	27.95	Pass
159	5795	22.13	23.03	23.11	568.858	27.55	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
155	5775	19.23	19.81	20.06	280.863	24.48	27.95	Pass

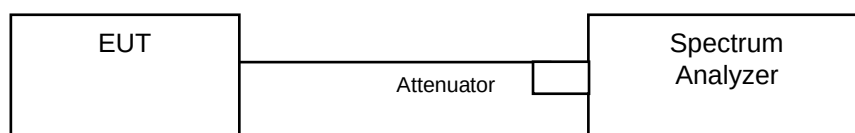
Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

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 $\geq$ 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 $BWCF = 10\log(500 \text{ kHz}/300\text{kHz})$
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 $\geq$ 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 $BWCF = 10\log(500 \text{ kHz}/300\text{kHz})$
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 $10 \log (1/\text{duty cycle})$

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

802.11a

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
0	149	5745	1.66	3.88	4.77	8.65	27.95	Pass
	157	5785	1.73	3.95	4.77	8.72	27.95	Pass
	165	5825	1.83	4.05	4.77	8.82	27.95	Pass
1	149	5745	2.30	4.52	4.77	9.29	27.95	Pass
	157	5785	2.32	4.54	4.77	9.31	27.95	Pass
	165	5825	2.41	4.63	4.77	9.40	27.95	Pass
2	149	5745	2.82	5.04	4.77	9.81	27.95	Pass
	157	5785	2.37	4.59	4.77	9.36	27.95	Pass
	165	5825	2.41	4.63	4.77	9.40	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

802.11ac (VHT20)

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
0	149	5745	1.36	3.58	4.77	8.35	27.95	Pass
	157	5785	1.49	3.71	4.77	8.48	27.95	Pass
	165	5825	1.53	3.75	4.77	8.52	27.95	Pass
1	149	5745	1.87	4.09	4.77	8.86	27.95	Pass
	157	5785	1.67	3.89	4.77	8.66	27.95	Pass
	165	5825	1.80	4.02	4.77	8.79	27.95	Pass
2	149	5745	2.36	4.58	4.77	9.35	27.95	Pass
	157	5785	1.74	3.96	4.77	8.73	27.95	Pass
	165	5825	1.87	4.09	4.77	8.86	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

802.11ac (VHT40)

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
0	151	5755	-3.02	-0.80	4.77	3.97	27.95	Pass
	159	5795	-2.52	-0.30	4.77	4.47	27.95	Pass
1	151	5755	-2.46	-0.24	4.77	4.53	27.95	Pass
	159	5795	-2.04	0.18	4.77	4.95	27.95	Pass
2	151	5755	-2.02	0.20	4.77	4.97	27.95	Pass
	159	5795	-1.86	0.36	4.77	5.13	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

802.11ac (VHT80)

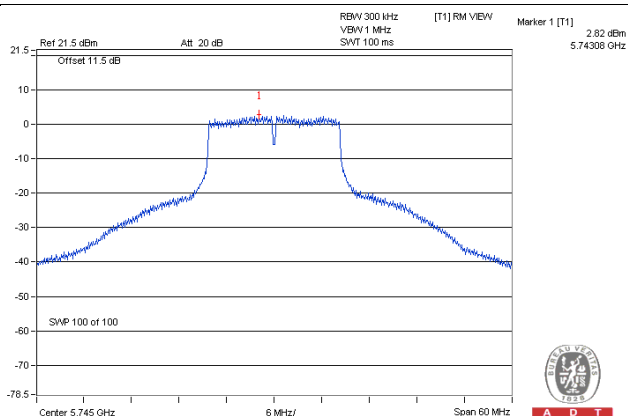
TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=3) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-9.26	-7.04	4.77	0.23	-2.04	27.95	Pass
1	155	5775	-8.88	-6.66	4.77	0.23	-1.66	27.95	Pass
2	155	5775	-8.39	-6.17	4.77	0.23	-1.17	27.95	Pass

Note: 1. Directional gain = $3.28\text{dBi} + 10\log(3) = 8.05\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(8.05-6) = 27.95\text{dBm}$.

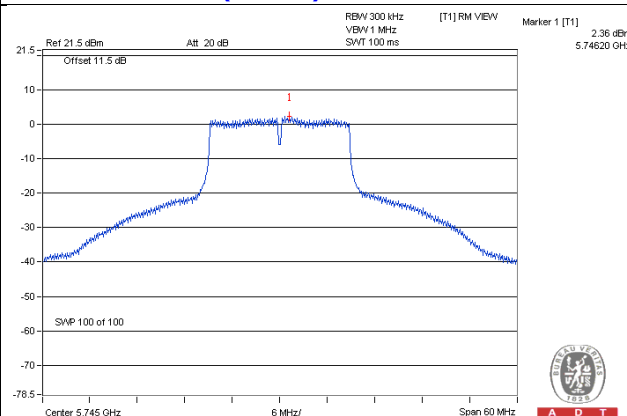
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

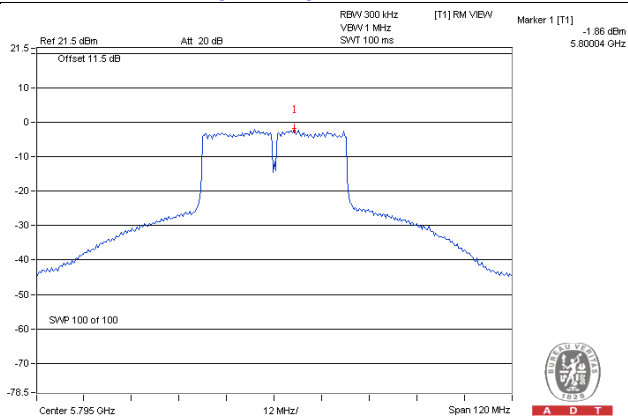
802.11a_Chain 2 / CH149



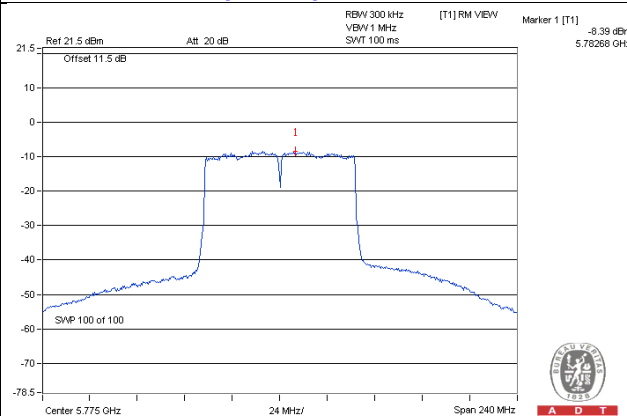
802.11ac (VHT20)_Chain 2 / CH149



802.11ac (VHT40)_Chain 2 / CH159



802.11ac (VHT80)_Chain 2 / CH155

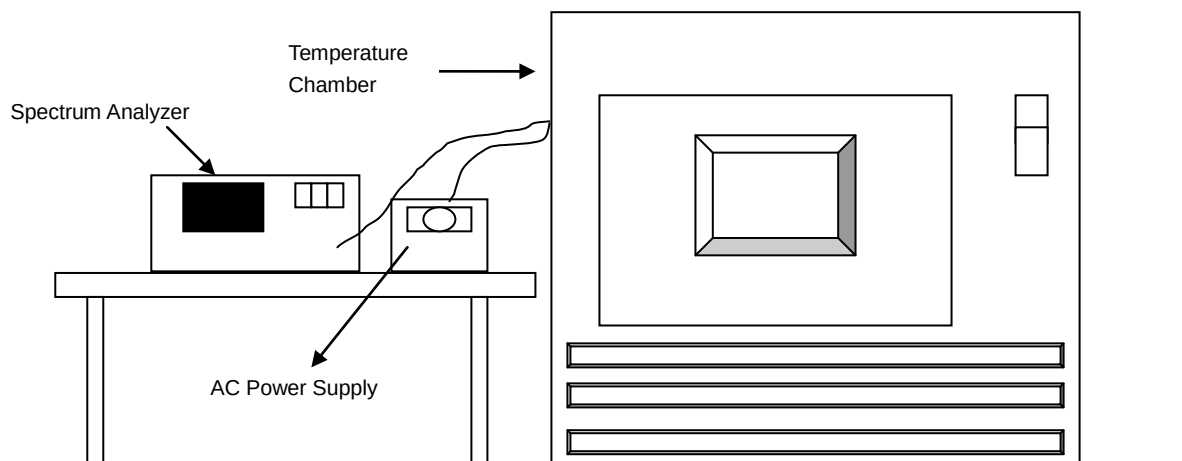


4.4 Frequency Stability Measurement

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

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.4.5 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

Frequency Stability Versus Temp.									
Operating Frequency: 5745 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5745.0238	Pass	5745.0242	Pass	5745.0239	Pass	5745.0202	Pass
40	120	5745.0032	Pass	5744.9991	Pass	5745.0017	Pass	5744.999	Pass
30	120	5744.9902	Pass	5744.9886	Pass	5744.9882	Pass	5744.989	Pass
20	120	5745.0214	Pass	5745.0233	Pass	5745.0235	Pass	5745.0251	Pass
10	120	5744.9939	Pass	5744.9938	Pass	5744.9925	Pass	5744.9939	Pass
0	120	5744.9936	Pass	5744.9937	Pass	5744.9976	Pass	5744.9956	Pass
-10	120	5745.0107	Pass	5745.0141	Pass	5745.0126	Pass	5745.0152	Pass
-20	120	5745.0247	Pass	5745.0267	Pass	5745.0247	Pass	5745.0273	Pass
-30	120	5745.0272	Pass	5745.0279	Pass	5745.024	Pass	5745.0278	Pass

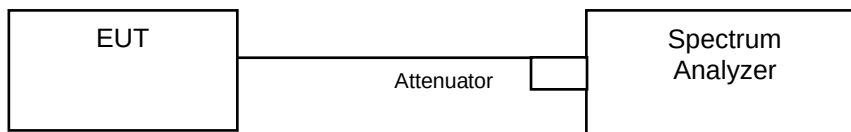
Frequency Stability Versus Voltage									
Operating Frequency: 5745 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5745.0203	Pass	5745.0225	Pass	5745.0243	Pass	5745.0244	Pass
	120	5745.0214	Pass	5745.0233	Pass	5745.0235	Pass	5745.0251	Pass
	102	5745.0225	Pass	5745.0228	Pass	5745.023	Pass	5745.0255	Pass

4.5 6dB Bandwidth Measurement

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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.5.5 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

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
149	5745	16.39	16.41	16.41	0.5	Pass
157	5785	16.36	16.44	16.42	0.5	Pass
165	5825	16.35	16.41	16.41	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
149	5745	17.64	17.69	17.67	0.5	Pass
157	5785	17.65	17.67	17.65	0.5	Pass
165	5825	17.64	17.65	17.64	0.5	Pass

802.11ac (VHT40)

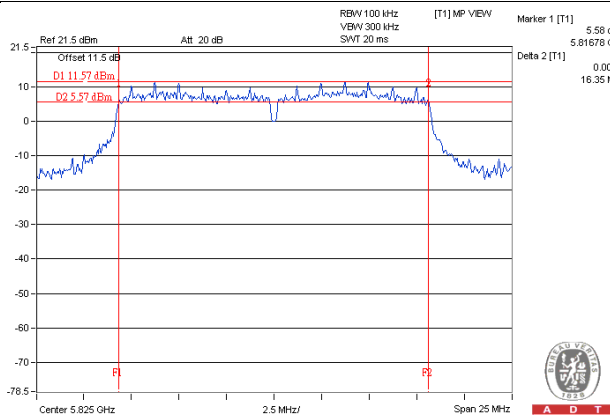
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
151	5755	36.25	36.46	36.45	0.5	Pass
159	5795	36.06	36.44	36.41	0.5	Pass

802.11ac (VHT80)

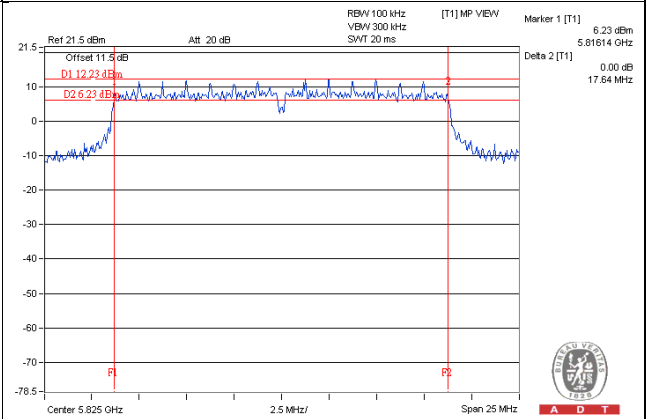
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
155	5775	75.99	76.15	76.41	0.5	Pass

Spectrum Plot of Worst Value

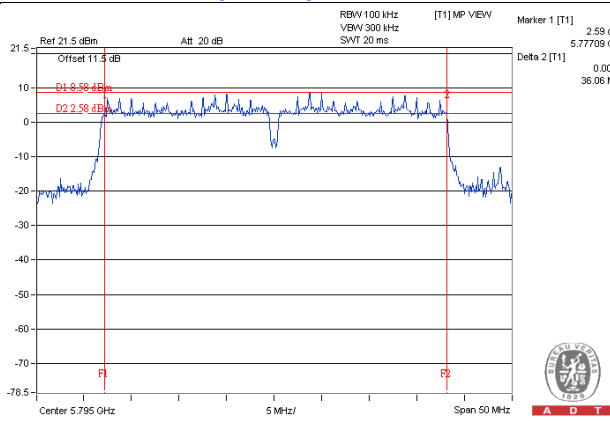
802.11a_Chain 0 / CH165



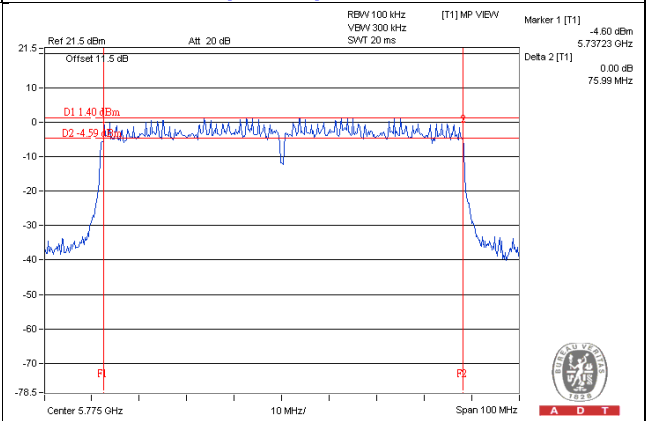
802.11ac (VHT20)_Chain 2 / CH165



802.11ac (VHT40)_Chain 0 / CH159



802.11ac (VHT80)_Chain 0 / CH155



5 Pictures of Test Arrangements

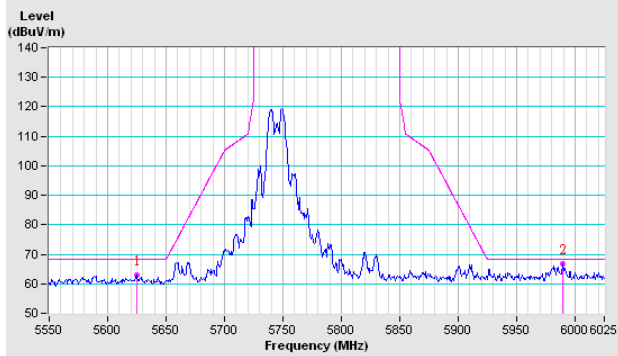
Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emisison (OOBE) Measurement (For U-NII-3 band)

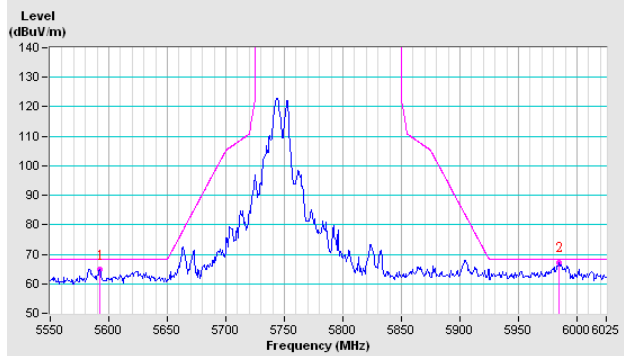
802.11a

CH 149 5745 MHz

Horizontal

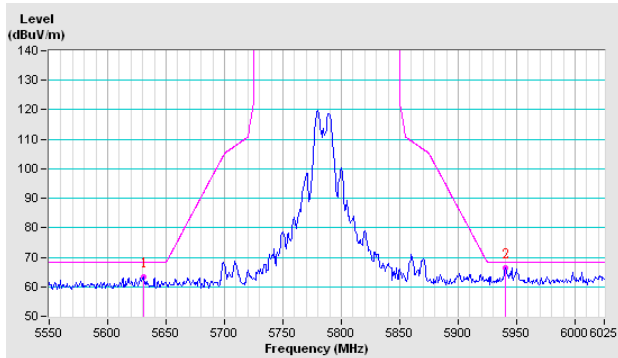


Vertical

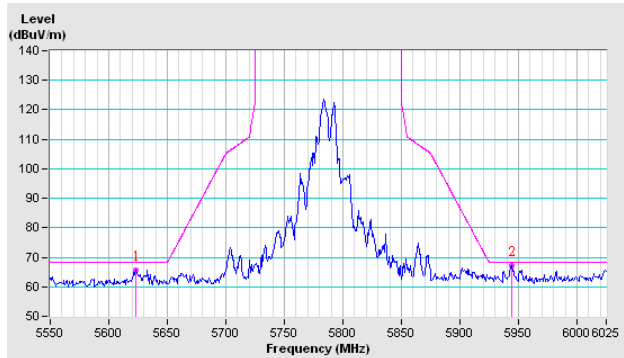


CH 157 5785 MHz

Horizontal

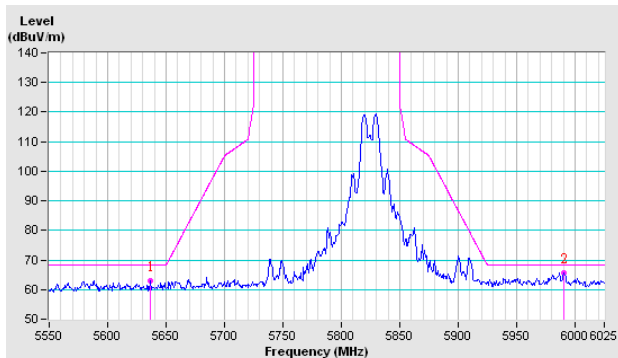


Vertical

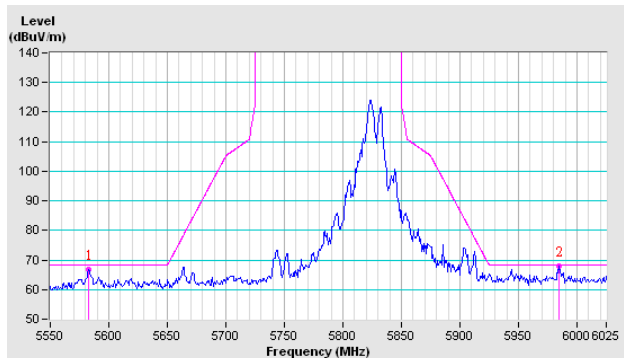


CH 165 5825 MHz

Horizontal



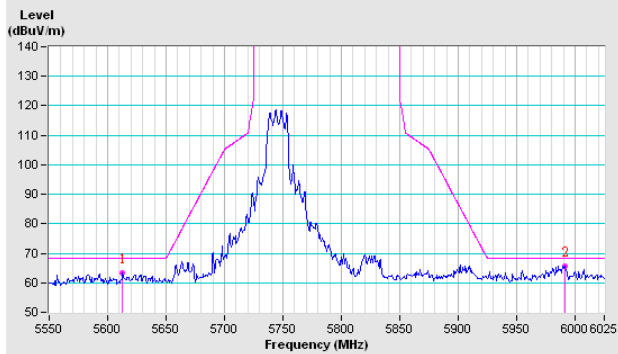
Vertical



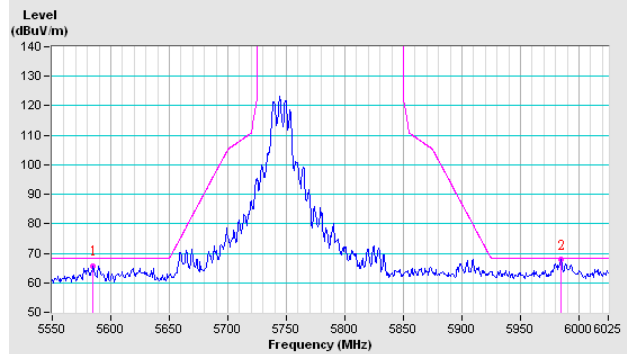
802.11ac (VHT20)

CH 149 5745 MHz

Horizontal

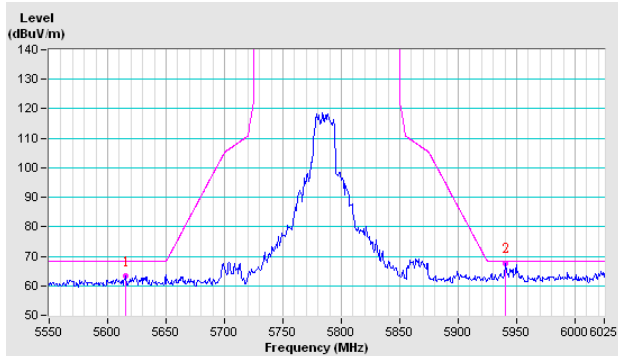


Vertical

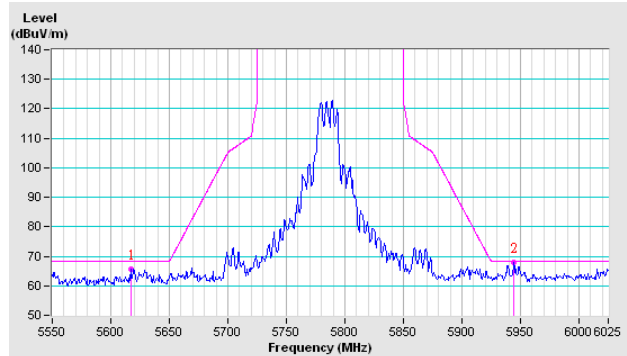


CH 157 5785 MHz

Horizontal

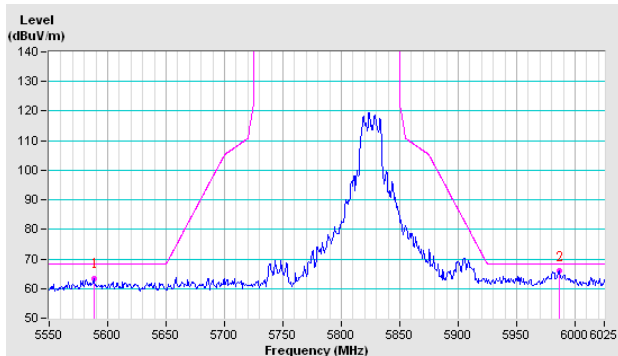


Vertical

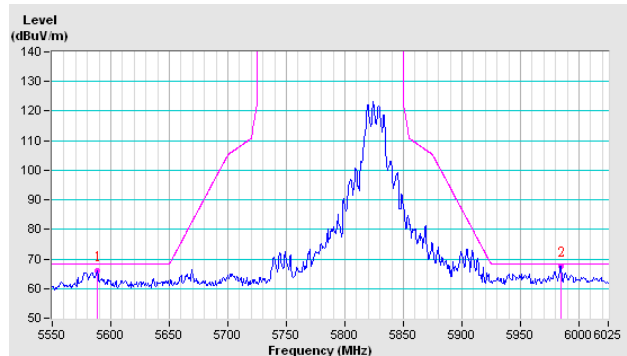


CH 165 5825 MHz

Horizontal



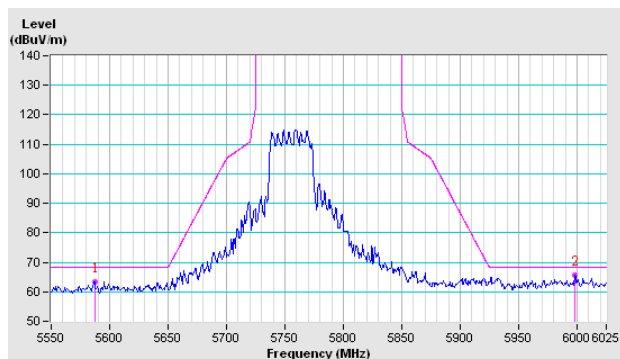
Vertical



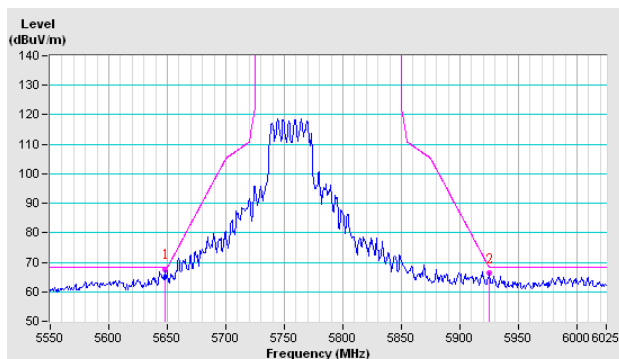
802.11ac (VHT40)

CH 151 5755 MHz

Horizontal

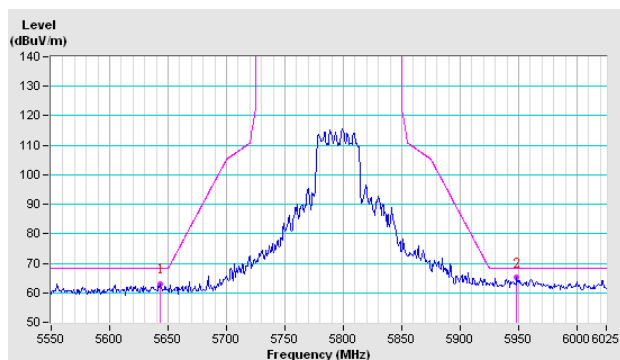


Vertical

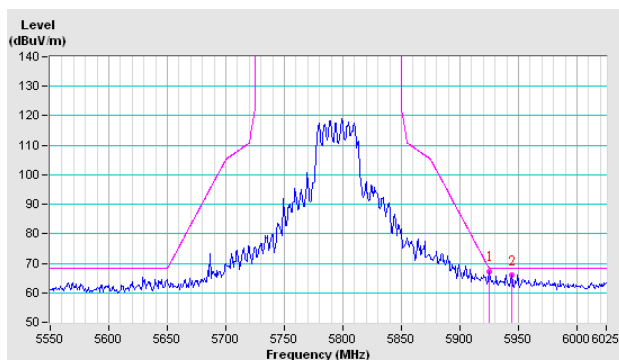


CH 159 5795 MHz

Horizontal



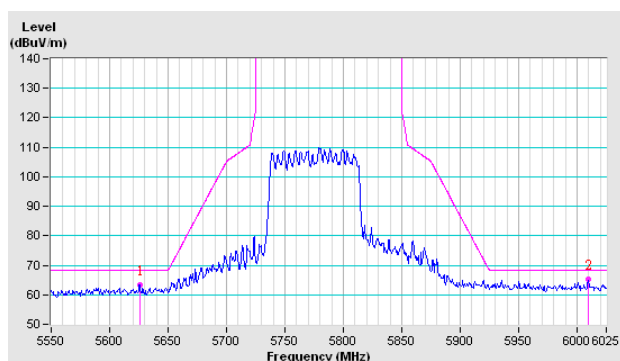
Vertical



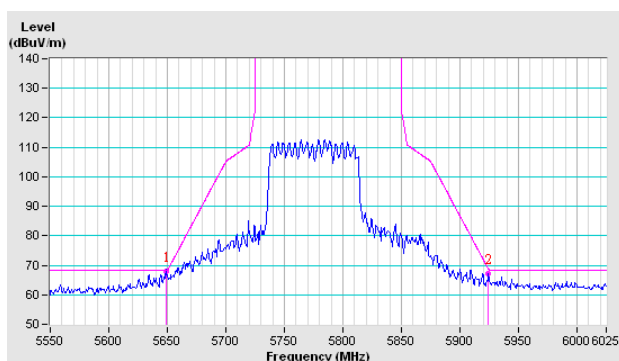
802.11ac (VHT80)

CH 155 5775 MHz

Horizontal



Vertical



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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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