FCC Test Report

Report No.:	RF170405E08-1
FCC ID:	I88NBG6604
Test Model:	NBG6604
Series Model:	NBG6602
Received Date:	Apr. 08, 2017
Test Date:	Apr. 20 to June 15, 2017
Issued Date:	July 26, 2017
Applicant:	Zyxel Communications Corporation
Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan
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
RF170405E08-1	Original release.	July 26, 2017

1 Certificate of Conformity

Product:	AC1200 Dual-Band Wireless Router
Brand:	ZYXEL
Test Model:	NBG6604
Series Model:	NBG6602
Sample Status:	ENGINEERING SAMPLE
Applicant:	Zyxel Communications Corporation
Test Date:	Apr. 20 to June 15, 2017
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:** July 26, 2017

Wendy Wu / Specialist

Approved by : _____ , **Date:** July 26, 2017

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)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -4.47dB at 0.35322MHz.
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 -0.6dB at 5150.00MHz, 10400.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
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 OOBE test plots were recorded in Annex A.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.32 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.14 dB
	6GHz ~ 18GHz	5.04 dB
	18GHz ~ 40GHz	5.25 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1200 Dual-Band Wireless Router
Brand	ZYXEL
Test Model	NBG6604
Series Model	NBG6602
RF CPU Model No.	MTK MT7628AN
RF Chip Model No.	MTK MT7612E
FW	V1.00(ABIR. 0)b4
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
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/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** 246.397mW **5.18 ~ 5.24GHz:** **CDD Mode:** 177.813mW **Beamforming Mode:** 177.813mW **5.745 ~ 5.825GHz:** **CDD Mode:** 469.373mW **Beamforming Mode:** 469.373mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ45 cable (Unshielded, 1m) x 1

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

2. All models are listed as below.

Model Name	I/O Port	Color	Remark
NBG6604	WAN (RJ45) x1 LAN (RJ45) x4 DC in x1	white	For Market request
NBG6602	WAN (RJ45) x1 LAN (RJ45) x1 DC in x1	charcoal grey	

From the above models, model: **NBG6604** was selected as representative model for the test and its data was recorded in this report.

3. The EUT uses following adapter.

Brand	Model No.	Spec.
Frecom	F12L28-120100SPAU	Input: 100-240V, 0.3A, 50/60Hz Output: 12V, 1A DC output cable (Unshielded, 1.5m)

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

2.4GHz							
Transmitter Circuit	Brand	Model No.	Antenna Net Gain (dBi)	Frequency Range (GHz toGHz)	Antenna Type	Connecter Type	Cable Length(mm)
Chain (0)	Aristotle	MiCAP-3324C	2.2	2.4~2.4835	Dipole	i-pex(MHF)	153
Chain (1)	Aristotle	MiCAP-3324C	2.55	2.4~2.4835	Dipole	i-pex(MHF)	41
5GHz							
Transmitter Circuit	Brand	Model No.	Antenna Net Gain (dBi)	Frequency Range (GHz toGHz)	Antenna Type	Connecter Type	Cable Length(mm)
Chain (0)	Aristotle	MiCAP-3324C	2.78	5.15~5.85	Dipole	i-pex(MHF)	150
Chain (1)	Aristotle	MiCAP-3324C	3	5.15~5.85	Dipole	i-pex(MHF)	43

5. 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)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX

Note:
1. All of modulation mode support beamforming function except 802.11a and 2.4GHz modulation mode.
2. 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)
3. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.

6. The power setting are list as below:

CDD Mode							
802.11a		**802.11ac (VHT20)**		**802.11ac (VHT40)**		**802.11ac (VHT80)**	
Frequency (MHz)	**Power Setting**	**Frequency (MHz)**	**Power Setting**	**Frequency (MHz)**	**Power Setting**	**Frequency (MHz)**	**Power Setting**
5180	20/20	5180	1F/1F	5190	11_/11	5210	0D/0D
5200	21/21	5200	22/22	5230	21/21	5775	19/19
5240	20/20	5240	22/22	5755	23/23		
5745	2B/2B	5745	2B/2B	5795	2B/2B		
5785	2B/2B	5785	2B/2B				
5825	2B/2B	5825	2B/2B				

Beamforming Mode					
802.11ac (VHT20)		**802.11ac (VHT40)**		**802.11ac (VHT80)**	
Frequency (MHz)	**Power Setting**	**Frequency (MHz)**	**Power Setting**	**Frequency (MHz)**	**Power Setting**
5180	1F/1F	5190	11_/11	5210	0D/0D
5200	22/22	5230	21/21	5775	19/19
5240	22/22	5755	23/23		
5745	2B/2B	5795	2B/2B		
5785	2B/2B				
5825	2B/2B				

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 5180 ~ 5240MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

NOTE:
1. The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **Y-plane**.

Radiated Emission Test (Above 1GHz):

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

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
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.

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5180-5320 5745-5825	38 to 46 151 to 159	159	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

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

CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT40)	5180-5320 5745-5825	38 to 46 151 to 159	159	OFDM	BPSK	13.5

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.

CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
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
Beamforming Mode (output power only)						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11ac (VHT20)	5745-5825	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	23deg. C, 74%RH	120Vac, 60Hz	Terry Huang
RE<1G	24deg. C, 66%RH	120Vac, 60Hz	Rey Chen
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	23deg. C, 66%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

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

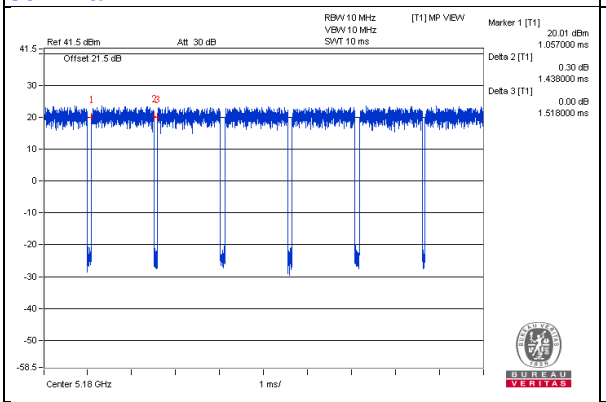
802.11a: Duty cycle = 1.438/1.518 = 0.962, Duty factor = 10 * log(1/0.947) = 0.24

802.11ac (VHT20): Duty cycle = 1.359/1.47 = 0.924, Duty factor = 10 * log(1/0.924) = 0.34

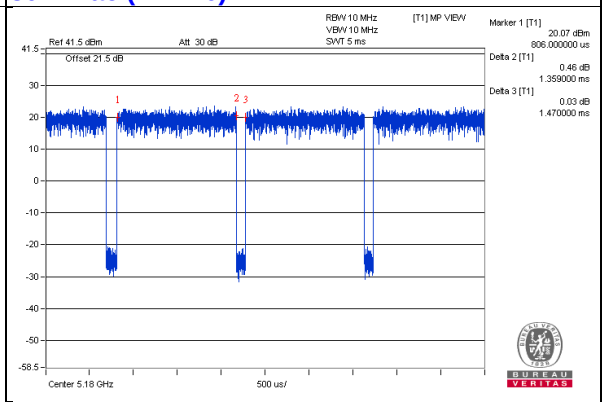
802.11ac (VHT40): Duty cycle = 0.675/0.857 = 0.788, Duty factor = 10 * log(1/0.788) = 1.04

802.11ac (VHT80): Duty cycle = 0.335/0.461 = 0.727, Duty factor = 10 * log(1/0.727) = 1.39

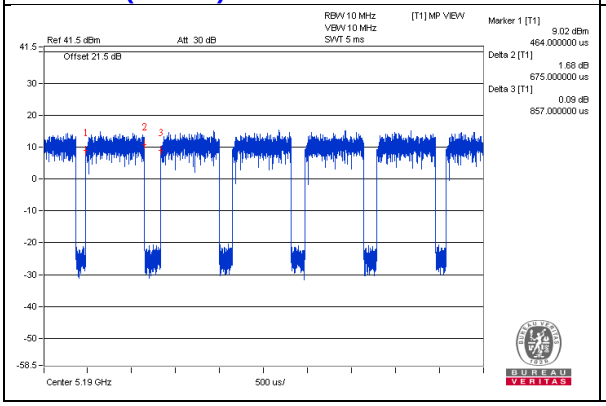
802.11a



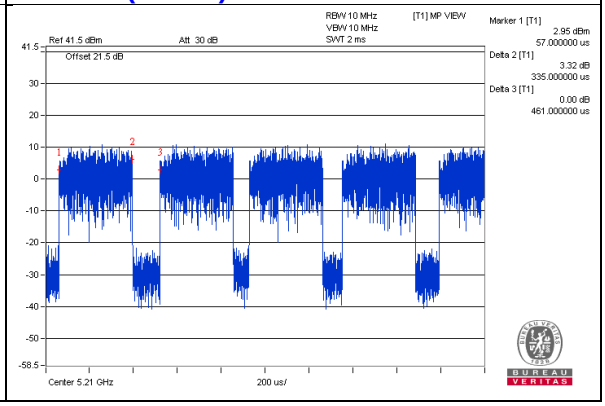
802.11ac (VHT20)



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.

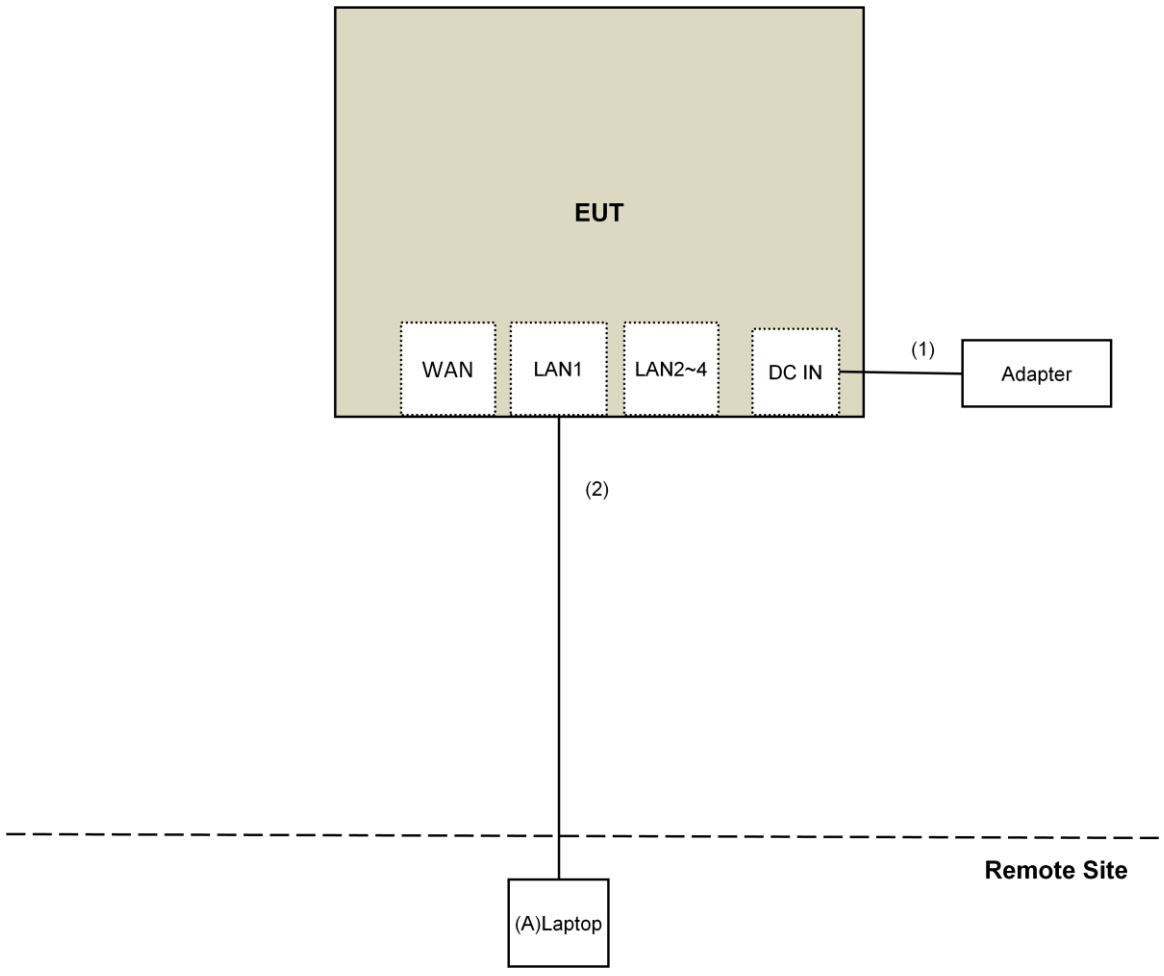
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.5	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



Note: The test configuration was defined by the client requirement.

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 v01r04
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

<table>
<tr><td colspan="2">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="2" rowspan="2">789033 D02 General UNII Test Procedure New Rules v01r04</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK:74 (dBμV/m)</td><td>AV:54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK:-27 (dBm/MHz)</td><td rowspan="3">PK:68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK:-27 (dBm/MHz) *1
PK:10 (dBm/MHz) *2
PK:15.6 (dBm/MHz) *3
PK:27 (dBm/MHz) *4</td><td>PK: 68.2(dBμV/m) *1
PK:105.2 (dBμV/m) *2
PK: 110.8(dBμV/m) *3
PK:122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="4">*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.</td></tr>
</table>

Note:

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

For below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Dec. 29, 2016	Dec. 28, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	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. 3.
4. The CANADA Site Registration No. is 20331-1
5 Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Apr. 20, 2017

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 28, 2016	Dec. 27, 2017
Pre-Amplifier EMCI	EMC12630SE	980384	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045SE	980386	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSv40	100964	June 28, 2016	June 27, 2017
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 11, 2017	Jan. 10, 2018
Digital Multimeter FLUKE	87III	73680266	Nov. 10, 2016	Nov. 09, 2017

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. 3.
3. The CANADA Site Registration No. is 20331-1
4. Tested Date: June 14 to 15, 2017

4.1.3 Test Procedure

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Both X and Y axes of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case 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.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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:

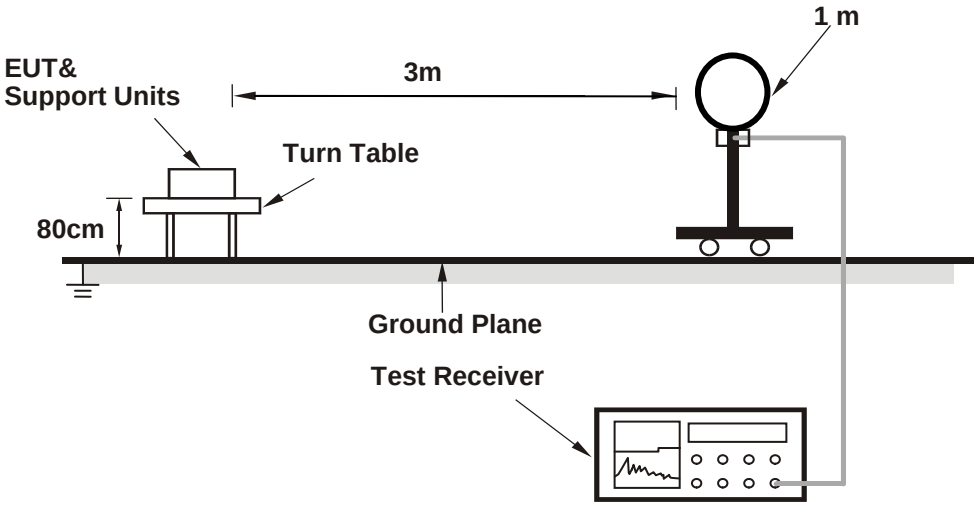
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

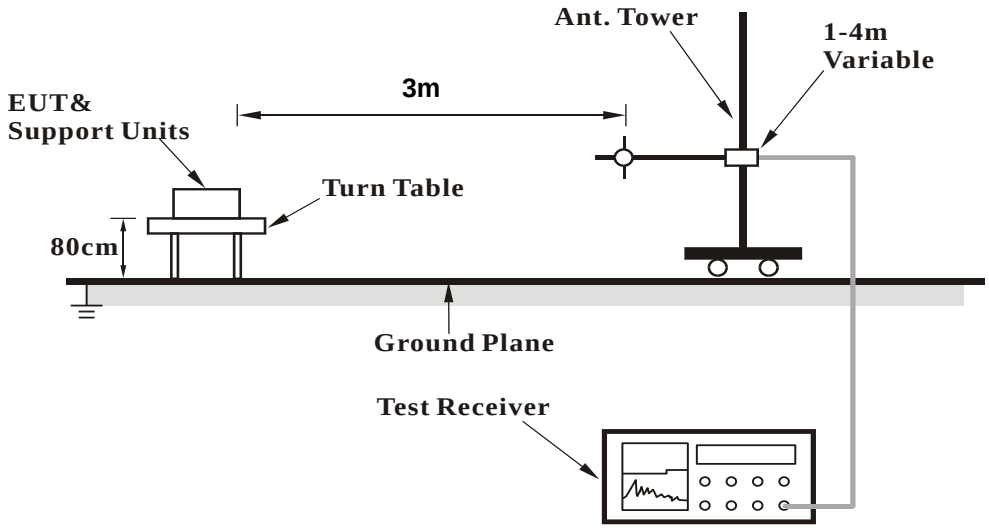
No deviation.

4.1.5 Test Setup

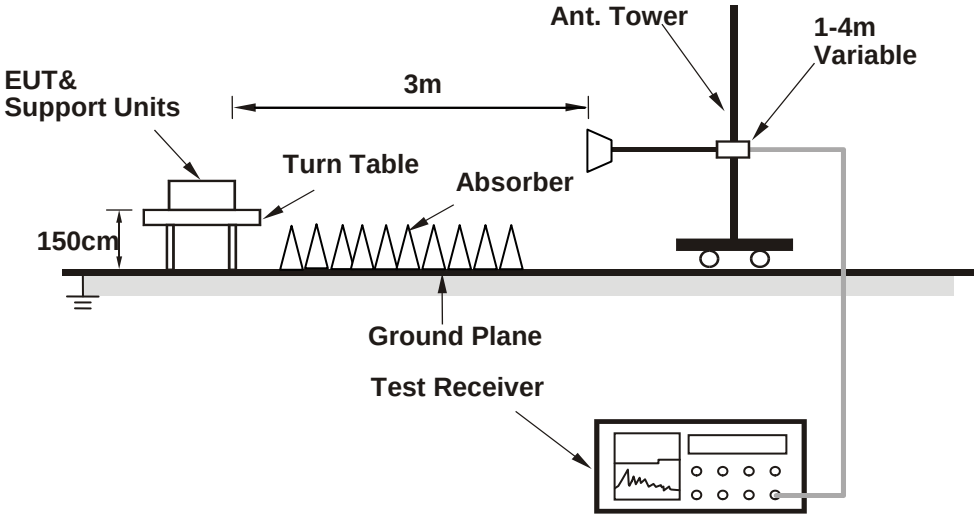
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Condition

a. Connected the EUT with the Laptop which is placed on remote site.
b. Contorlling software (MT7662_QA_V1.0.3.13) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data:

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	52.2 PK	74.0	-21.8	1.40 H	238	48.5	3.7
2	5150.00	39.8 AV	54.0	-14.2	1.40 H	238	36.1	3.7
3	*5180.00	100.7 PK			1.40 H	238	97.0	3.7
4	*5180.00	91.6 AV			1.40 H	238	87.9	3.7
5	#10360.00	64.4 PK	74.0	-9.6	1.91 H	131	51.4	13.0
6	#10360.00	51.9 AV	54.0	-2.1	1.91 H	131	38.9	13.0
7	15540.00	53.8 PK	74.0	-20.2	1.78 H	172	40.7	13.1
8	15540.00	40.6 AV	54.0	-13.4	1.78 H	172	27.5	13.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.5 PK	74.0	-6.5	1.69 V	115	63.8	3.7
2	**5150.00**	**53.4 AV**	**54.0**	**-0.6**	**1.69 V**	**115**	**49.7**	**3.7**
3	*5180.00	114.9 PK			1.69 V	115	111.2	3.7
4	*5180.00	106.1 AV			1.69 V	115	102.4	3.7
5	#10360.00	65.4 PK	74.0	-8.6	3.55 V	181	52.4	13.0
6	#10360.00	52.5 AV	54.0	-1.5	3.55 V	181	39.5	13.0
7	15540.00	51.8 PK	74.0	-22.2	1.69 V	121	38.7	13.1
8	15540.00	37.8 AV	54.0	-16.2	1.69 V	121	24.7	13.1

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	43.7 PK	74.0	-30.3	1.40 H	231	40.0	3.7
2	5150.00	34.2 AV	54.0	-19.8	1.40 H	231	30.5	3.7
3	*5200.00	101.7 PK			1.40 H	231	98.0	3.7
4	*5200.00	92.5 AV			1.40 H	231	88.8	3.7
5	5350.00	49.6 PK	74.0	-24.4	1.40 H	231	45.5	4.1
6	5350.00	35.1 AV	54.0	-18.9	1.40 H	231	31.0	4.1
7	#10400.00	65.7 PK	74.0	-8.3	1.94 H	139	52.7	13.0
8	**#10400.00**	**53.4 AV**	**54.0**	**-0.6**	**1.94 H**	**139**	**40.4**	**13.0**
9	15600.00	54.0 PK	74.0	-20.0	1.80 H	162	40.7	13.3
10	15600.00	40.5 AV	54.0	-13.5	1.80 H	162	27.2	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	56.8 PK	74.0	-17.2	1.67 V	294	53.1	3.7
2	5150.00	43.0 AV	54.0	-11.0	1.67 V	294	39.3	3.7
3	*5200.00	115.9 PK			1.67 V	294	112.2	3.7
4	*5200.00	107.0 AV			1.67 V	294	103.3	3.7
5	5350.00	51.0 PK	74.0	-23.0	1.67 V	294	46.9	4.1
6	5350.00	39.7 AV	54.0	-14.3	1.67 V	294	35.6	4.1
7	#10400.00	64.7 PK	74.0	-9.3	3.45 V	188	51.7	13.0
8	#10400.00	52.3 AV	54.0	-1.7	3.45 V	188	39.3	13.0
9	15600.00	51.7 PK	74.0	-22.3	1.67 V	108	38.4	13.3
10	15600.00	37.8 AV	54.0	-16.2	1.67 V	108	24.5	13.3

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	102.3 PK			1.36 H	241	98.5	3.8
2	*5240.00	93.0 AV			1.36 H	241	89.2	3.8
3	5350.00	48.2 PK	74.0	-25.8	1.36 H	241	44.1	4.1
4	5350.00	36.4 AV	54.0	-17.6	1.36 H	241	32.3	4.1
5	#10480.00	62.6 PK	74.0	-11.4	1.98 H	133	49.4	13.2
6	#10480.00	50.5 AV	54.0	-3.5	1.98 H	133	37.3	13.2
7	15720.00	53.6 PK	74.0	-20.4	1.82 H	162	40.0	13.6
8	15720.00	40.3 AV	54.0	-13.7	1.82 H	162	26.7	13.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.5 PK			1.27 V	360	112.7	3.8
2	*5240.00	107.5 AV			1.27 V	360	103.7	3.8
3	5350.00	52.7 PK	74.0	-21.3	1.27 V	360	48.6	4.1
4	5350.00	41.1 AV	54.0	-12.9	1.27 V	360	37.0	4.1
5	#10480.00	62.3 PK	74.0	-11.7	3.56 V	174	49.1	13.2
6	#10480.00	50.3 AV	54.0	-3.7	3.56 V	174	37.1	13.2
7	15720.00	51.5 PK	74.0	-22.5	1.66 V	105	37.9	13.6
8	15720.00	37.5 AV	54.0	-16.5	1.66 V	105	23.9	13.6

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 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	#5628.59	50.5 PK	68.2	-17.7	1.66 H	301	46.1	4.4
2	*5745.00	104.7 PK			1.66 H	301	100.3	4.4
3	*5745.00	94.6 AV			1.66 H	301	90.2	4.4
4	#5959.22	50.7 PK	68.2	-17.5	1.66 H	301	46.0	4.7
5	11490.00	51.1 PK	74.0	-22.9	1.90 H	139	37.6	13.5
6	11490.00	39.2 AV	54.0	-14.8	1.90 H	139	25.7	13.5
7	#17235.00	56.7 PK	74.0	-17.3	1.82 H	162	39.4	17.3
8	#17235.00	46.2 AV	54.0	-7.8	1.82 H	162	28.9	17.3
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	#5648.92	56.2 PK	68.2	-12.0	1.39 V	360	51.8	4.4
2	*5745.00	120.8 PK			1.39 V	360	116.4	4.4
3	*5745.00	110.8 AV			1.39 V	360	106.4	4.4
4	#5987.77	55.7 PK	68.2	-12.5	1.39 V	360	51.0	4.7
5	11490.00	50.8 PK	74.0	-23.2	1.85 V	218	37.3	13.5
6	11490.00	39.1 AV	54.0	-14.9	1.85 V	218	25.6	13.5
7	#17235.00	56.0 PK	74.0	-18.0	1.91 V	172	38.7	17.3
8	#17235.00	45.4 AV	54.0	-8.6	1.91 V	172	28.1	17.3

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	#5633.73	50.6 PK	68.2	-17.6	1.51 H	303	46.2	4.4
2	*5785.00	103.3 PK			1.51 H	303	98.9	4.4
3	*5785.00	93.5 AV			1.51 H	303	89.1	4.4
4	#5997.06	50.5 PK	68.2	-17.7	1.51 H	303	45.8	4.7
5	11570.00	51.3 PK	74.0	-22.7	1.86 H	148	37.8	13.5
6	11570.00	39.6 AV	54.0	-14.4	1.86 H	148	26.1	13.5
7	#17355.00	56.8 PK	74.0	-17.2	1.81 H	156	38.8	18.0
8	#17355.00	46.4 AV	54.0	-7.6	1.81 H	156	28.4	18.0
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	#5602.57	56.1 PK	68.2	-12.1	1.30 V	360	51.7	4.4
2	*5785.00	120.4 PK			1.30 V	360	116.0	4.4
3	*5785.00	110.0 AV			1.30 V	360	105.6	4.4
4	#5926.63	56.1 PK	68.2	-12.1	1.30 V	360	51.4	4.7
5	11570.00	50.8 PK	74.0	-23.2	1.89 V	230	37.3	13.5
6	11570.00	39.2 AV	54.0	-14.8	1.89 V	230	25.7	13.5
7	#17355.00	56.3 PK	74.0	-17.7	1.90 V	164	38.3	18.0
8	#17355.00	45.8 AV	54.0	-8.2	1.90 V	164	27.8	18.0

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	#5588.71	50.8 PK	68.2	-17.4	1.70 H	301	46.6	4.2
2	*5825.00	102.5 PK			1.70 H	301	98.1	4.4
3	*5825.00	91.7 AV			1.70 H	301	87.3	4.4
4	#5995.81	50.3 PK	68.2	-17.9	1.70 H	301	45.6	4.7
5	11650.00	51.3 PK	74.0	-22.7	1.90 H	130	37.6	13.7
6	11650.00	39.1 AV	54.0	-14.9	1.90 H	130	25.4	13.7
7	#17475.00	56.6 PK	74.0	-17.4	1.81 H	175	38.0	18.6
8	#17475.00	46.1 AV	54.0	-7.9	1.81 H	175	27.5	18.6
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	#5613.38	55.2 PK	68.2	-13.0	1.28 V	360	50.8	4.4
2	*5825.00	119.3 PK			1.28 V	360	114.9	4.4
3	*5825.00	109.0 AV			1.28 V	360	104.6	4.4
4	#5927.09	55.9 PK	68.2	-12.3	1.28 V	360	51.2	4.7
5	11650.00	50.7 PK	74.0	-23.3	1.91 V	224	37.0	13.7
6	11650.00	39.0 AV	54.0	-15.0	1.91 V	224	25.3	13.7
7	#17475.00	55.8 PK	74.0	-18.2	1.86 V	154	37.2	18.6
8	#17475.00	45.6 AV	54.0	-8.4	1.86 V	154	27.0	18.6

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.6 PK	74.0	-20.4	1.40 H	236	49.9	3.7
2	5150.00	40.4 AV	54.0	-13.6	1.40 H	236	36.7	3.7
3	*5180.00	98.9 PK			1.40 H	236	95.2	3.7
4	*5180.00	90.3 AV			1.40 H	236	86.6	3.7
5	#10360.00	65.5 PK	74.0	-8.5	1.85 H	144	52.5	13.0
6	#10360.00	52.1 AV	54.0	-1.9	1.85 H	144	39.1	13.0
7	15540.00	58.3 PK	74.0	-15.7	1.83 H	163	45.2	13.1
8	15540.00	46.1 AV	54.0	-7.9	1.83 H	163	33.0	13.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.3 PK	74.0	-5.7	1.03 V	297	64.6	3.7
2	5150.00	53.3 AV	54.0	-0.7	1.03 V	297	49.6	3.7
3	*5180.00	113.6 PK			1.03 V	297	109.9	3.7
4	*5180.00	102.8 AV			1.03 V	297	99.1	3.7
5	#10360.00	58.1 PK	74.0	-15.9	3.77 V	223	45.1	13.0
6	#10360.00	45.4 AV	54.0	-8.6	3.77 V	223	32.4	13.0
7	15540.00	56.3 PK	74.0	-17.7	1.80 V	181	43.2	13.1
8	15540.00	44.7 AV	54.0	-9.3	1.80 V	181	31.6	13.1

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	51.4 PK	74.0	-22.6	1.43 H	235	47.7	3.7
2	5150.00	38.8 AV	54.0	-15.2	1.43 H	235	35.1	3.7
3	*5200.00	99.6 PK			1.43 H	235	95.9	3.7
4	*5200.00	90.3 AV			1.43 H	235	86.6	3.7
5	5350.00	45.7 PK	74.0	-28.3	1.43 H	235	41.6	4.1
6	5350.00	34.4 AV	54.0	-19.6	1.43 H	235	30.3	4.1
7	#10400.00	66.1 PK	74.0	-7.9	1.95 H	144	53.1	13.0
8	#10400.00	53.0 AV	54.0	-1.0	1.95 H	144	40.0	13.0
9	15600.00	57.7 PK	74.0	-16.3	1.77 H	174	44.4	13.3
10	15600.00	45.0 AV	54.0	-9.0	1.77 H	174	31.7	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	56.5 PK	74.0	-17.5	1.50 V	325	52.8	3.7
2	5150.00	43.9 AV	54.0	-10.1	1.50 V	325	40.2	3.7
3	*5200.00	113.8 PK			1.50 V	325	110.1	3.7
4	*5200.00	104.8 AV			1.50 V	325	101.1	3.7
5	5350.00	50.8 PK	74.0	-23.2	1.50 V	325	46.7	4.1
6	5350.00	39.5 AV	54.0	-14.5	1.50 V	325	35.4	4.1
7	#10400.00	60.2 PK	74.0	-13.8	3.58 V	207	47.2	13.0
8	#10400.00	48.1 AV	54.0	-5.9	3.58 V	207	35.1	13.0
9	15600.00	56.9 PK	74.0	-17.1	1.76 V	183	43.6	13.3
10	15600.00	45.2 AV	54.0	-8.8	1.76 V	183	31.9	13.3

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	99.7 PK			1.49 H	219	95.9	3.8
2	*5240.00	90.2 AV			1.49 H	219	86.4	3.8
3	5350.00	48.7 PK	74.0	-25.3	1.49 H	219	44.6	4.1
4	5350.00	36.3 AV	54.0	-17.7	1.49 H	219	32.2	4.1
5	#10480.00	65.1 PK	74.0	-8.9	1.95 H	124	51.9	13.2
6	#10480.00	52.6 AV	54.0	-1.4	1.95 H	124	39.4	13.2
7	15720.00	58.9 PK	74.0	-15.1	1.80 H	167	45.3	13.6
8	15720.00	46.5 AV	54.0	-7.5	1.80 H	167	32.9	13.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	113.9 PK			1.06 V	341	110.1	3.8
2	*5240.00	104.7 AV			1.06 V	341	100.9	3.8
3	5350.00	51.8 PK	74.0	-22.2	1.06 V	341	47.7	4.1
4	5350.00	39.4 AV	54.0	-14.6	1.06 V	341	35.3	4.1
5	#10480.00	60.6 PK	74.0	-13.4	3.56 V	165	47.4	13.2
6	#10480.00	49.3 AV	54.0	-4.7	3.56 V	165	36.1	13.2
7	15720.00	55.8 PK	74.0	-18.2	1.78 V	169	42.2	13.6
8	15720.00	44.3 AV	54.0	-9.7	1.78 V	169	30.7	13.6

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 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	#5644.05	58.3 PK	68.2	-9.9	1.66 H	41	53.9	4.4
2	*5745.00	104.5 PK			1.66 H	41	100.1	4.4
3	*5745.00	95.2 AV			1.66 H	41	90.8	4.4
4	#6007.43	57.8 PK	68.2	-10.4	1.66 H	41	53.0	4.8
5	11490.00	58.6 PK	74.0	-15.4	1.71 H	224	45.1	13.5
6	11490.00	44.9 AV	54.0	-9.1	1.71 H	224	31.4	13.5
7	#17235.00	65.7 PK	74.0	-8.3	1.00 H	147	48.4	17.3
8	#17235.00	53.3 AV	54.0	-0.7	1.00 H	147	36.0	17.3
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	#5644.52	59.2 PK	68.2	-9.0	1.33 V	360	54.8	4.4
2	*5745.00	119.5 PK			1.33 V	360	115.1	4.4
3	*5745.00	109.8 AV			1.33 V	360	105.4	4.4
4	#5996.98	58.6 PK	68.2	-9.6	1.33 V	360	53.9	4.7
5	11490.00	51.4 PK	74.0	-22.6	1.85 V	219	37.9	13.5
6	11490.00	39.7 AV	54.0	-14.3	1.85 V	219	26.2	13.5
7	#17235.00	64.3 PK	74.0	-9.7	1.81 V	204	47.0	17.3
8	#17235.00	52.1 AV	54.0	-1.9	1.81 V	204	34.8	17.3

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	#5564.12	58.3 PK	68.2	-9.9	1.64 H	39	54.1	4.2
2	*5785.00	103.7 PK			1.64 H	39	99.3	4.4
3	*5785.00	93.8 AV			1.64 H	39	89.4	4.4
4	#6020.60	58.1 PK	68.2	-10.1	1.64 H	39	53.2	4.9
5	11570.00	58.6 PK	74.0	-15.4	1.70 H	217	45.1	13.5
6	11570.00	45.2 AV	54.0	-8.8	1.70 H	217	31.7	13.5
7	#17355.00	62.6 PK	74.0	-11.4	1.00 H	140	44.6	18.0
8	#17355.00	52.1 AV	54.0	-1.9	1.00 H	140	34.1	18.0
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	#5612.70	58.6 PK	68.2	-9.6	1.39 V	350	54.2	4.4
2	*5785.00	119.2 PK			1.39 V	350	114.8	4.4
3	*5785.00	109.4 AV			1.39 V	350	105.0	4.4
4	#6024.05	58.9 PK	68.2	-9.3	1.39 V	350	54.1	4.8
5	11570.00	50.9 PK	74.0	-23.1	3.98 V	225	37.4	13.5
6	11570.00	39.1 AV	54.0	-14.9	3.98 V	225	25.6	13.5
7	#17355.00	59.8 PK	74.0	-14.2	1.75 V	206	41.8	18.0
8	#17355.00	50.2 AV	54.0	-3.8	1.75 V	206	32.2	18.0

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	#5604.15	57.1 PK	68.2	-11.1	1.57 H	31	52.7	4.4
2	*5825.00	103.9 PK			1.57 H	31	99.5	4.4
3	*5825.00	94.3 AV			1.57 H	31	89.9	4.4
4	#5991.27	57.8 PK	68.2	-10.4	1.57 H	31	53.1	4.7
5	11650.00	58.7 PK	74.0	-15.3	1.67 H	203	45.0	13.7
6	11650.00	45.1 AV	54.0	-8.9	1.67 H	203	31.4	13.7
7	#17475.00	64.9 PK	74.0	-9.1	1.00 H	132	46.3	18.6
8	#17475.00	52.5 AV	54.0	-1.5	1.00 H	132	33.9	18.6
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	#5570.43	58.1 PK	68.2	-10.1	1.47 V	334	53.9	4.2
2	*5825.00	118.5 PK			1.47 V	334	114.1	4.4
3	*5825.00	108.8 AV			1.47 V	334	104.4	4.4
4	#5978.93	58.0 PK	68.2	-10.2	1.47 V	334	53.3	4.7
5	11650.00	51.5 PK	74.0	-22.5	1.80 V	229	37.8	13.7
6	11650.00	39.6 AV	54.0	-14.4	1.80 V	229	25.9	13.7
7	#17475.00	62.1 PK	74.0	-11.9	1.75 V	204	43.5	18.6
8	#17475.00	51.1 AV	54.0	-2.9	1.75 V	204	32.5	18.6

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	48.8 PK	74.0	-25.2	2.46 H	58	45.1	3.7
2	5150.00	37.5 AV	54.0	-16.5	2.46 H	58	33.8	3.7
3	*5190.00	89.0 PK			2.46 H	58	85.3	3.7
4	*5190.00	81.1 AV			2.46 H	58	77.4	3.7
5	5350.00	48.1 PK	74.0	-25.9	2.46 H	58	44.0	4.1
6	5350.00	36.9 AV	54.0	-17.1	2.46 H	58	32.8	4.1
7	#10380.00	64.8 PK	74.0	-9.2	1.90 H	118	51.7	13.1
8	#10380.00	52.6 AV	54.0	-1.4	1.90 H	118	39.5	13.1
9	15570.00	59.2 PK	74.0	-14.8	1.80 H	156	45.9	13.3
10	15570.00	46.7 AV	54.0	-7.3	1.80 H	156	33.4	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.4 PK	74.0	-11.6	1.53 V	360	58.7	3.7
2	5150.00	53.1 AV	54.0	-0.9	1.53 V	360	49.4	3.7
3	*5190.00	106.0 PK			1.53 V	360	102.3	3.7
4	*5190.00	98.2 AV			1.53 V	360	94.5	3.7
5	5350.00	51.0 PK	74.0	-23.0	1.53 V	360	46.9	4.1
6	5350.00	39.2 AV	54.0	-14.8	1.53 V	360	35.1	4.1
7	#10380.00	60.4 PK	74.0	-13.6	3.53 V	179	47.3	13.1
8	#10380.00	49.2 AV	54.0	-4.8	3.53 V	179	36.1	13.1
9	15570.00	56.1 PK	74.0	-17.9	1.84 V	178	42.8	13.3
10	15570.00	44.5 AV	54.0	-9.5	1.84 V	178	31.2	13.3

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	99.6 PK			2.41 H	50	95.8	3.8
2	*5230.00	90.9 AV			2.41 H	50	87.1	3.8
3	5350.00	52.4 PK	74.0	-21.6	2.41 H	50	48.3	4.1
4	5350.00	44.0 AV	54.0	-10.0	2.41 H	50	39.9	4.1
5	#10460.00	65.0 PK	74.0	-9.0	1.91 H	132	51.9	13.1
6	#10460.00	52.4 AV	54.0	-1.6	1.91 H	132	39.3	13.1
7	15690.00	59.1 PK	74.0	-14.9	1.75 H	172	45.3	13.8
8	15690.00	46.7 AV	54.0	-7.3	1.75 H	172	32.9	13.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	113.8 PK			1.55 V	360	110.0	3.8
2	*5230.00	105.4 AV			1.55 V	360	101.6	3.8
3	5350.00	57.6 PK	74.0	-16.4	1.55 V	360	53.5	4.1
4	5350.00	49.2 AV	54.0	-4.8	1.55 V	360	45.1	4.1
5	#10460.00	60.8 PK	74.0	-13.2	3.54 V	165	47.7	13.1
6	#10460.00	49.4 AV	54.0	-4.6	3.54 V	165	36.3	13.1
7	15690.00	56.3 PK	74.0	-17.7	1.77 V	163	42.5	13.8
8	15690.00	44.7 AV	54.0	-9.3	1.77 V	163	30.9	13.8

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 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	#5620.77	57.8 PK	68.2	-10.4	1.28 H	309	53.4	4.4
2	*5755.00	99.2 PK			1.28 H	309	94.8	4.4
3	*5755.00	89.9 AV			1.28 H	309	85.5	4.4
4	#5992.23	58.0 PK	68.2	-10.2	1.28 H	309	53.3	4.7
5	11510.00	56.1 PK	74.0	-17.9	1.01 H	229	42.5	13.6
6	11510.00	45.6 AV	54.0	-8.4	1.01 H	229	32.0	13.6
7	#17265.00	60.2 PK	74.0	-13.8	1.75 H	149	42.6	17.6
8	#17265.00	49.5 AV	54.0	-4.5	1.75 H	149	31.9	17.6
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	#5650.23	67.5 PK	68.4	-0.9	1.61 V	360	63.2	4.3
2	*5755.00	115.7 PK			1.61 V	360	111.3	4.4
3	*5755.00	106.9 AV			1.61 V	360	102.5	4.4
4	#5984.15	59.0 PK	68.2	-9.2	1.61 V	360	54.3	4.7
5	11510.00	50.3 PK	74.0	-23.7	3.96 V	228	36.7	13.6
6	11510.00	38.7 AV	54.0	-15.3	3.96 V	228	25.1	13.6
7	#17265.00	59.7 PK	74.0	-14.3	1.73 V	198	42.1	17.6
8	#17265.00	50.0 AV	54.0	-4.0	1.73 V	198	32.4	17.6

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	#5558.55	56.7 PK	68.2	-11.5	1.30 H	304	52.5	4.2
2	*5795.00	101.5 PK			1.30 H	304	97.1	4.4
3	*5795.00	92.0 AV			1.30 H	304	87.6	4.4
4	#5987.00	57.4 PK	68.2	-10.8	1.30 H	304	52.7	4.7
5	11590.00	55.8 PK	74.0	-18.2	1.02 H	216	42.3	13.5
6	11590.00	45.4 AV	54.0	-8.6	1.02 H	216	31.9	13.5
7	#17385.00	60.1 PK	74.0	-13.9	1.77 H	147	41.8	18.3
8	#17385.00	49.3 AV	54.0	-4.7	1.77 H	147	31.0	18.3
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	#5644.52	66.5 PK	68.2	-1.7	1.66 V	360	62.1	4.4
2	*5795.00	116.9 PK			1.66 V	360	112.5	4.4
3	*5795.00	107.5 AV			1.66 V	360	103.1	4.4
4	#5932.85	62.7 PK	68.2	-5.5	1.66 V	360	58.0	4.7
5	11590.00	51.3 PK	74.0	-22.7	1.09 V	226	37.8	13.5
6	11590.00	39.0 AV	54.0	-15.0	1.09 V	226	25.5	13.5
7	#17385.00	59.8 PK	74.0	-14.2	1.73 V	206	41.5	18.3
8	#17385.00	49.1 AV	54.0	-4.9	1.73 V	206	30.8	18.3

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	51.2 PK	74.0	-22.8	1.94 H	129	47.5	3.7
2	5150.00	41.0 AV	54.0	-13.0	1.94 H	129	37.3	3.7
3	*5210.00	88.4 PK			1.94 H	129	84.7	3.7
4	*5210.00	80.0 AV			1.94 H	129	76.3	3.7
5	5350.00	50.8 PK	74.0	-23.2	1.94 H	129	46.7	4.1
6	5350.00	37.8 AV	54.0	-16.2	1.94 H	129	33.7	4.1
7	#10420.00	64.2 PK	74.0	-9.8	1.85 H	119	51.1	13.1
8	#10420.00	51.9 AV	54.0	-2.1	1.85 H	119	38.8	13.1
9	15630.00	59.5 PK	74.0	-14.5	1.75 H	187	45.9	13.6
10	15630.00	47.1 AV	54.0	-6.9	1.75 H	187	33.5	13.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.9 PK	74.0	-9.1	1.50 V	40	61.2	3.7
2	5150.00	53.3 AV	54.0	-0.7	1.50 V	40	49.6	3.7
3	*5210.00	103.0 PK			1.50 V	40	99.3	3.7
4	*5210.00	93.7 AV			1.50 V	40	90.0	3.7
5	5350.00	50.8 PK	74.0	-23.2	1.50 V	40	46.7	4.1
6	5350.00	40.3 AV	54.0	-13.7	1.50 V	40	36.2	4.1
7	#10420.00	60.9 PK	74.0	-13.1	3.56 V	170	47.8	13.1
8	#10420.00	49.5 AV	54.0	-4.5	3.56 V	170	36.4	13.1
9	15630.00	56.3 PK	74.0	-17.7	1.78 V	163	42.7	13.6
10	15630.00	44.7 AV	54.0	-9.3	1.78 V	163	31.1	13.6

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 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	#5645.00	57.3 PK	68.2	-10.9	1.76 H	41	52.9	4.4
2	*5775.00	97.4 PK			1.76 H	40	93.0	4.4
3	*5775.00	88.5 AV			1.76 H	40	84.1	4.4
4	#5939.02	57.8 PK	68.2	-10.4	1.76 H	41	53.1	4.7
5	11550.00	56.0 PK	74.0	-18.0	1.05 H	231	42.5	13.5
6	11550.00	45.6 AV	54.0	-8.4	1.05 H	231	32.1	13.5
7	#17325.00	60.3 PK	74.0	-13.7	1.73 H	137	42.5	17.8
8	#17325.00	49.5 AV	54.0	-4.5	1.73 H	137	31.7	17.8
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	#5649.75	67.4 PK	68.2	-0.8	1.59 V	39	63.0	4.4
2	*5775.00	110.8 PK			1.59 V	39	106.4	4.4
3	*5775.00	101.7 AV			1.59 V	39	97.3	4.4
4	#5926.20	60.0 PK	68.2	-8.2	1.59 V	39	55.3	4.7
5	11550.00	51.5 PK	74.0	-22.5	1.07 V	212	38.0	13.5
6	11550.00	39.3 AV	54.0	-14.7	1.07 V	212	25.8	13.5
7	#17325.00	59.7 PK	74.0	-14.3	1.77 V	219	41.9	17.8
8	#17325.00	49.1 AV	54.0	-4.9	1.77 V	219	31.3	17.8

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:

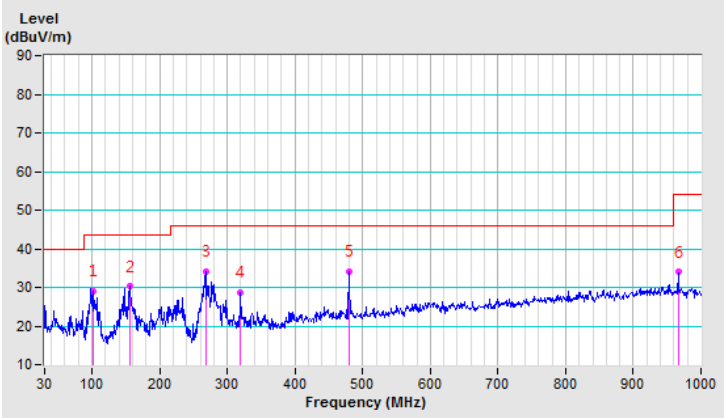
802.11ac (VHT40)

CHANNEL	TX Channel 159	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	101.88	29.0 QP	43.5	-14.5	1.00 H	250	41.2	-12.2
2	155.62	30.2 QP	43.5	-13.3	1.00 H	87	38.6	-8.4
3	268.30	34.2 QP	46.0	-11.8	2.00 H	288	42.9	-8.7
4	320.01	28.7 QP	46.0	-17.3	1.00 H	311	35.3	-6.6
5	480.01	34.0 QP	46.0	-12.0	2.00 H	141	37.1	-3.1
6	966.68	33.9 QP	54.0	-20.1	3.00 H	157	29.0	4.9

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

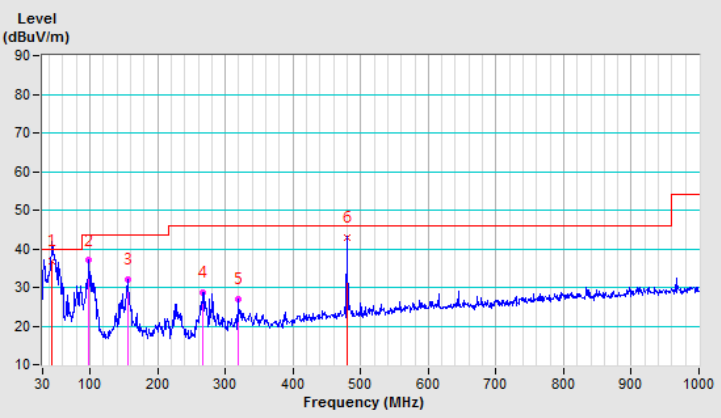


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	43.80	36.9 QP	40.0	-3.1	1.00 V	214	45.3	-8.4
2	98.48	37.0 QP	43.5	-6.5	1.00 V	276	50.0	-13.0
3	155.64	32.0 QP	43.5	-11.5	1.00 V	131	40.4	-8.4
4	266.19	28.6 QP	46.0	-17.4	2.00 V	322	37.4	-8.8
5	319.98	26.9 QP	46.0	-19.1	1.00 V	184	33.5	-6.6
6	480.01	42.8 QP	46.0	-3.2	3.00 V	124	45.9	-3.1

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 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3 Tested Date: May 19, 2017

4.2.3 Test Procedure

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

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

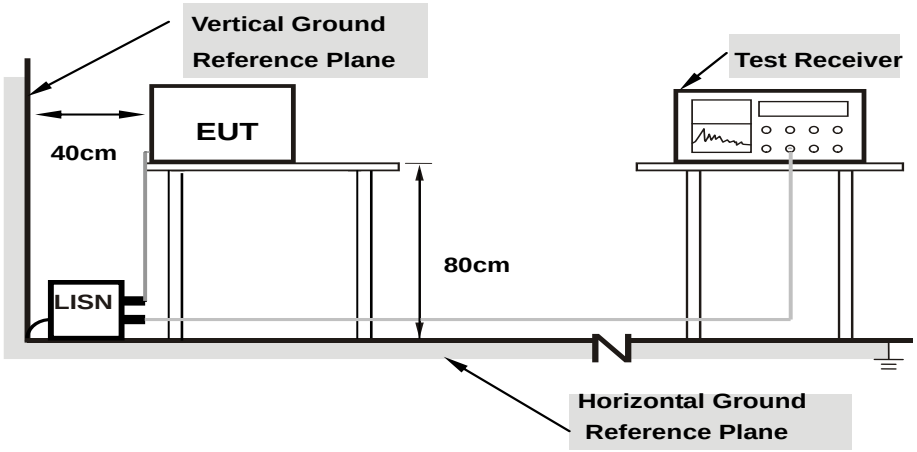
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

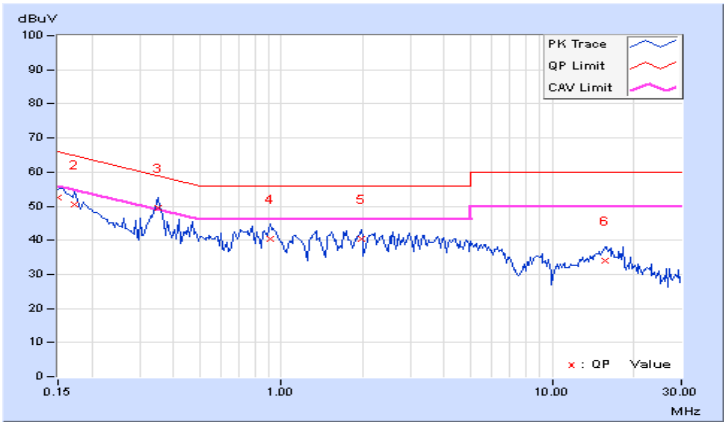
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.20	42.40	31.50	52.60	41.70	66.00	56.00	-13.40	-14.30
2	0.17344	10.20	40.18	29.98	50.38	40.18	64.79	54.79	-14.41	-14.61
3	**0.35322**	**10.23**	**39.41**	**34.19**	**49.64**	**44.42**	**58.89**	**48.89**	**-9.25**	**-4.47**
4	0.90781	10.29	30.23	24.16	40.52	34.45	56.00	46.00	-15.48	-11.55
5	1.97656	10.29	30.18	24.11	40.47	34.40	56.00	46.00	-15.53	-11.60
6	15.71875	11.36	22.66	15.72	34.02	27.08	60.00	50.00	-25.98	-22.92

REMARKS:

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

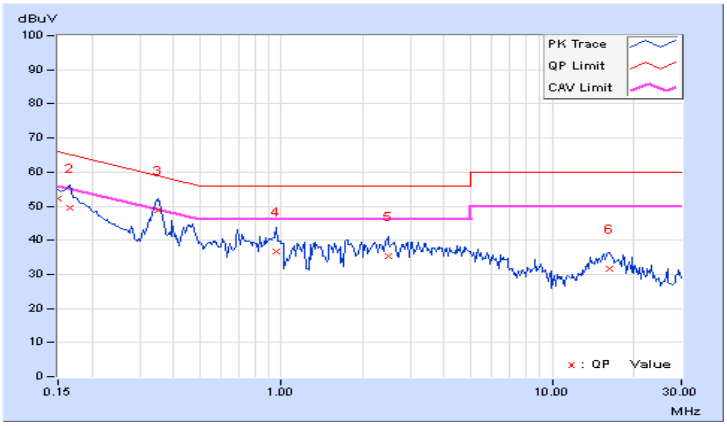


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15050	10.19	41.88	29.34	52.07	39.53	65.97	55.97	-13.90	-16.44
2	0.16562	10.18	39.33	26.97	49.51	37.15	65.18	55.18	-15.67	-18.03
3	0.35109	10.22	38.74	32.93	48.96	43.15	58.94	48.94	-9.98	-5.79
4	0.96250	10.26	26.38	20.11	36.64	30.37	56.00	46.00	-19.36	-15.63
5	2.47656	10.29	25.17	17.87	35.46	28.16	56.00	46.00	-20.54	-17.84
6	16.28516	11.16	20.39	14.11	31.55	25.27	60.00	50.00	-28.45	-24.73

REMARKS:

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



4.3 Transmit Power Measurment

4.3.1 Limits of Transmit Power Measurement

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

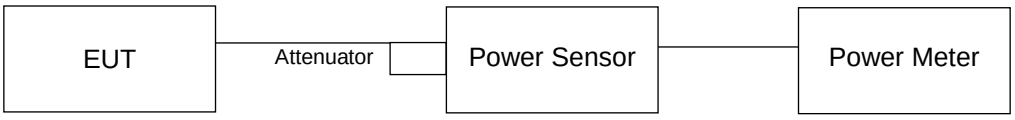
*B is the 26 dB emission bandwidth in megahertz

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

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	18.18	18.84	142.326	21.53	30.00	Pass
40	5200	18.26	18.77	142.324	21.53	30.00	Pass
48	5240	18.08	18.78	139.778	21.45	30.00	Pass
149	5745	22.57	24.40	456.14	26.59	30.00	Pass
157	5785	22.49	24.36	450.317	26.54	30.00	Pass
165	5825	22.58	24.43	458.466	26.61	30.00	Pass

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				
36	5180	17.82	18.18	126.3	21.01	30.00	Pass
40	5200	19.06	19.88	177.813	22.50	30.00	Pass
48	5240	19.08	19.72	174.666	22.42	30.00	Pass
149	5745	22.58	24.45	459.746	26.63	30.00	Pass
157	5785	22.55	24.40	455.31	26.58	30.00	Pass
165	5825	22.53	24.41	455.119	26.58	30.00	Pass

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				
38	5190	11.68	11.15	27.755	14.43	30.00	Pass
46	5230	18.79	19.33	161.387	22.08	30.00	Pass
151	5755	19.61	20.21	196.365	22.93	30.00	Pass
159	5795	22.67	24.54	469.373	26.72	30.00	Pass

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				
42	5210	9.70	8.77	16.867	12.27	30.00	Pass
155	5775	15.36	15.18	67.317	18.28	30.00	Pass

Beamforming Mode

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				
36	5180	17.82	18.18	126.3	21.01	30.00	Pass
40	5200	19.06	19.88	177.813	22.50	30.00	Pass
48	5240	19.08	19.72	174.666	22.42	30.00	Pass
149	5745	22.58	24.45	459.746	26.63	30.00	Pass
157	5785	22.55	24.40	455.31	26.58	30.00	Pass
165	5825	22.53	24.41	455.119	26.58	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi , so the power limit shall not be reduced.

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				
38	5190	11.68	11.15	27.755	14.43	30.00	Pass
46	5230	18.79	19.33	161.387	22.08	30.00	Pass
151	5755	19.61	20.21	196.365	22.93	30.00	Pass
159	5795	22.67	24.54	469.373	26.72	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi , so the power limit shall not be reduced.

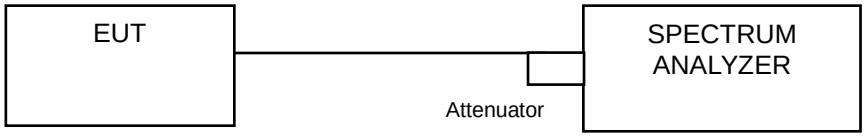
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	9.70	8.77	16.867	12.27	30.00	Pass
155	5775	15.36	15.18	67.317	18.28	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi , so the power limit shall not be reduced.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
36	5180	17.04	17.16
40	5200	16.92	17.04
48	5240	16.56	16.80
149	5745	32.16	30.60
157	5785	31.92	30.24
165	5825	31.80	30.60

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
36	5180	18.00	18.00
40	5200	18.12	18.72
48	5240	18.12	18.00
149	5745	34.44	31.08
157	5785	34.32	31.80
165	5825	33.72	31.80

802.11ac (VHT40)

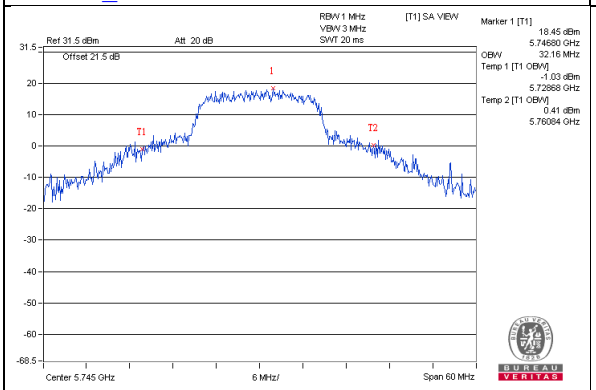
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
38	5190	36.24	36.24
46	5230	36.96	37.20
151	5755	44.88	49.92
159	5795	66.48	64.08

802.11ac (VHT80)

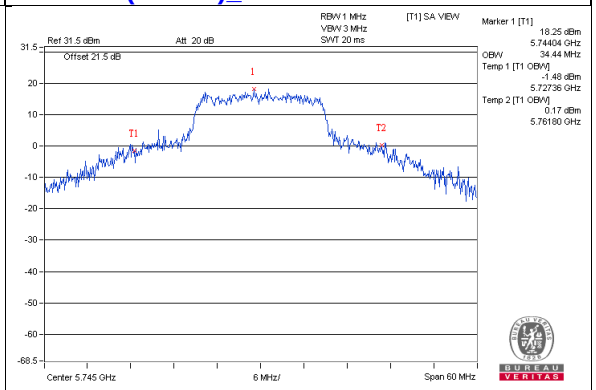
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
42	5210	74.88	75.36
155	5775	75.84	75.36

Spectrum Plot of Worst Value

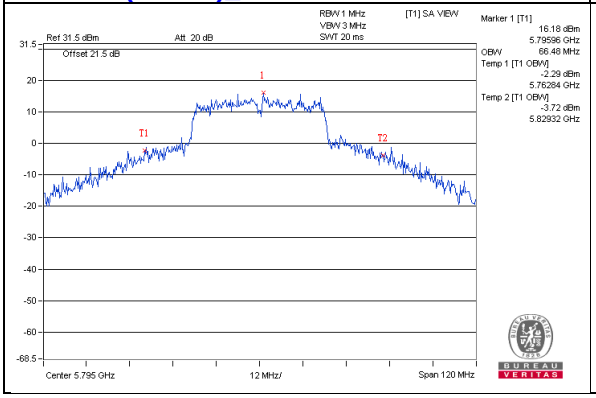
802.11a_Chain0 / CH149



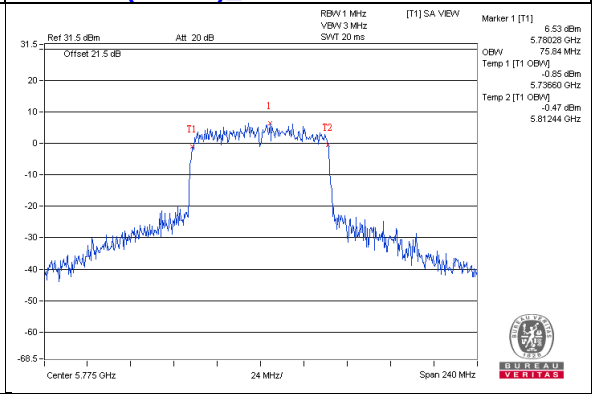
802.11ac (VHT20)_Chain0 / CH149



802.11ac (VHT40)_Chain0 / CH159

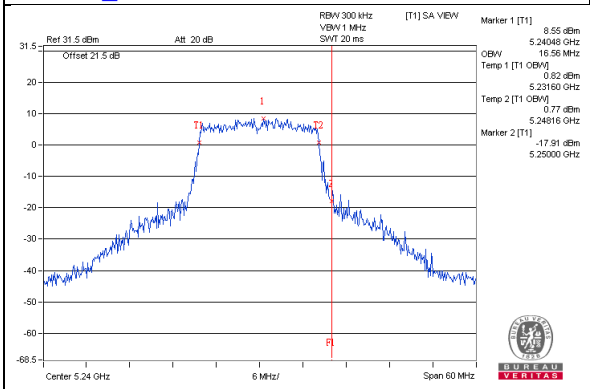


802.11ac (VHT80)_Chain0 / CH155

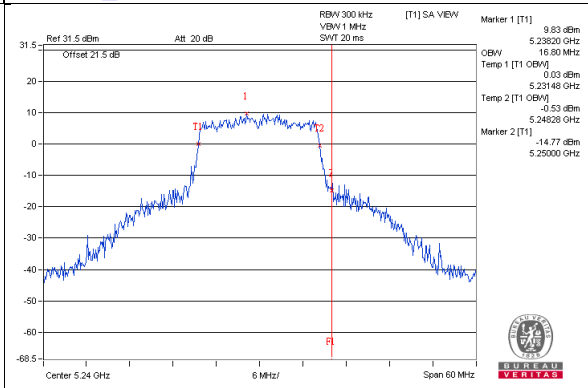


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

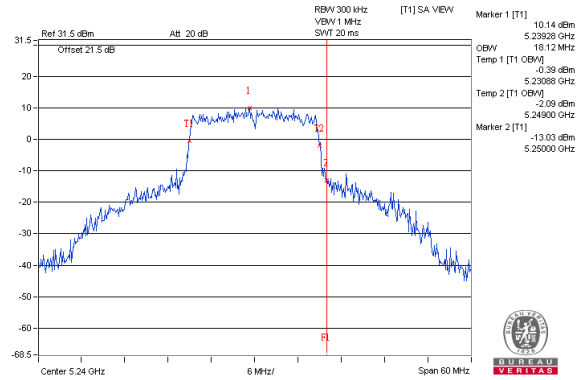
802.11a_Chain0 / CH48



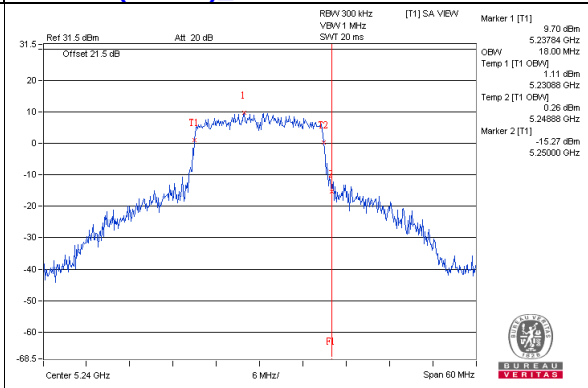
802.11a_Chain1 / CH48



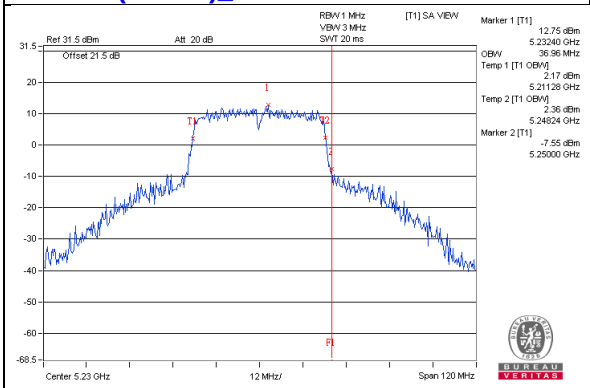
802.11ac(VHT20)_Chain0 / CH48



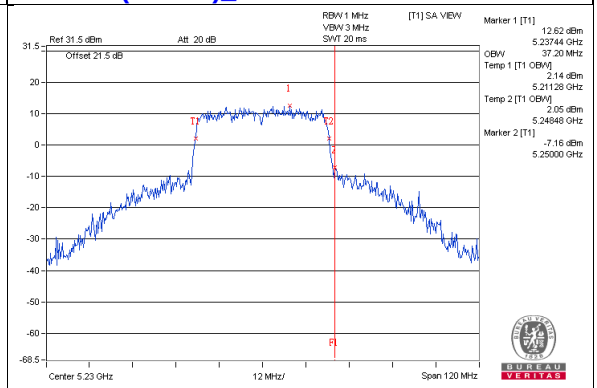
802.11ac(VHT20)_Chain1 / CH48



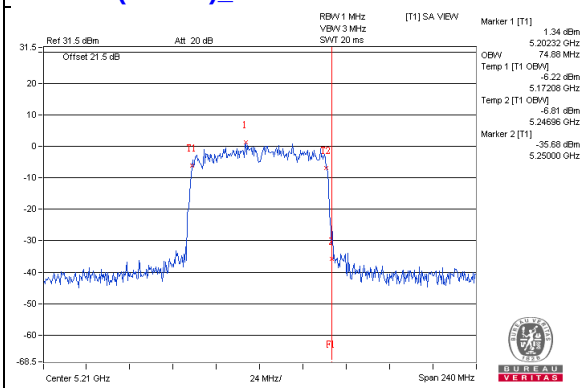
802.11ac(VHT40)_Chain0 / CH46



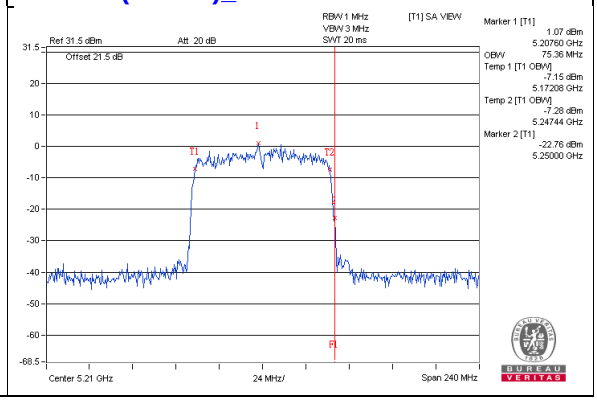
802.11ac(VHT40)_Chain1 / CH46



802.11ac(VHT80)_Chain0 / CH42

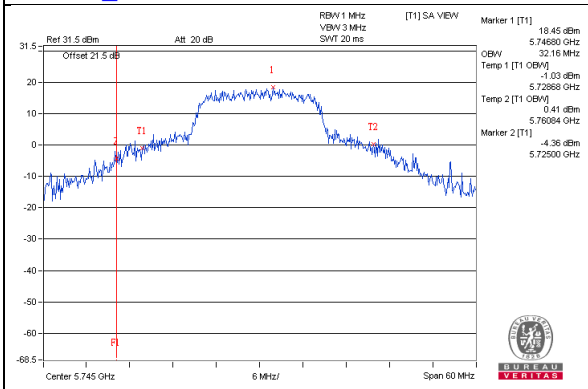


802.11ac(VHT80)_Chain1 / CH42

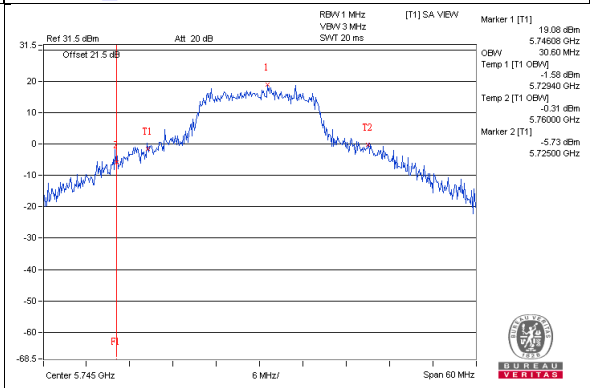


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

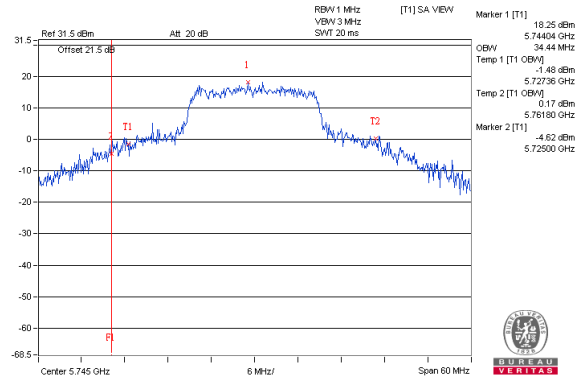
802.11a_Chain0 / CH149



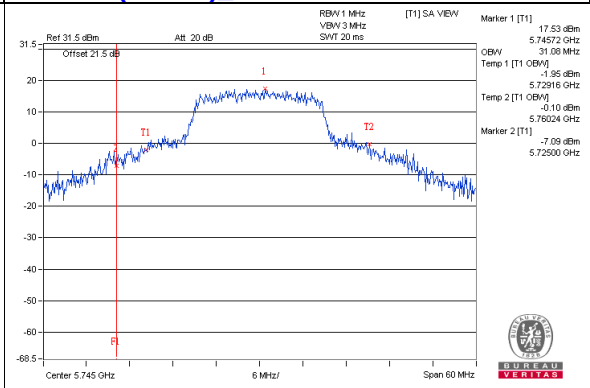
802.11a_Chain1 / CH149



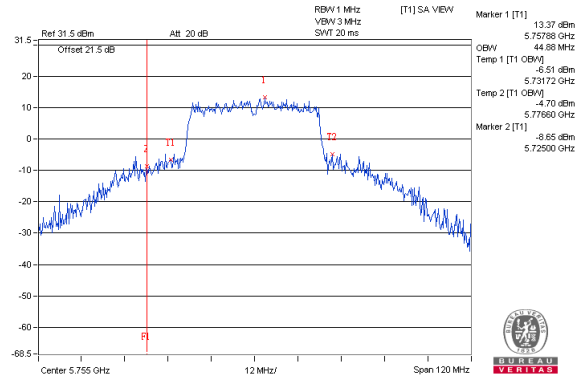
802.11ac(VHT20)_Chain0 / CH149



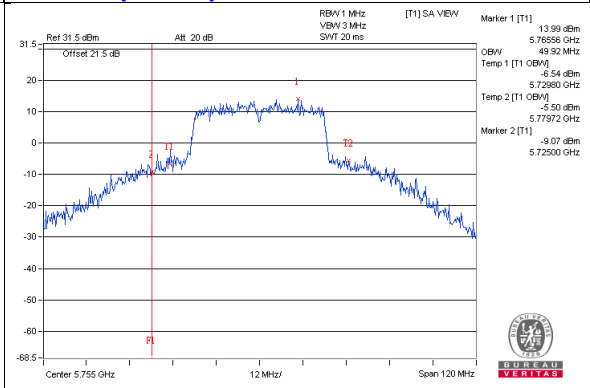
802.11ac(VHT20)_Chain1 / CH149



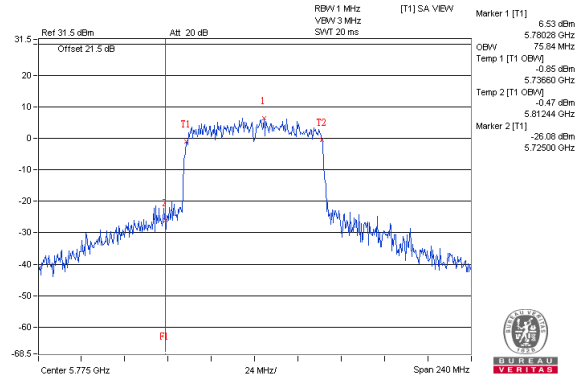
802.11ac(VHT40)_Chain0 / CH151



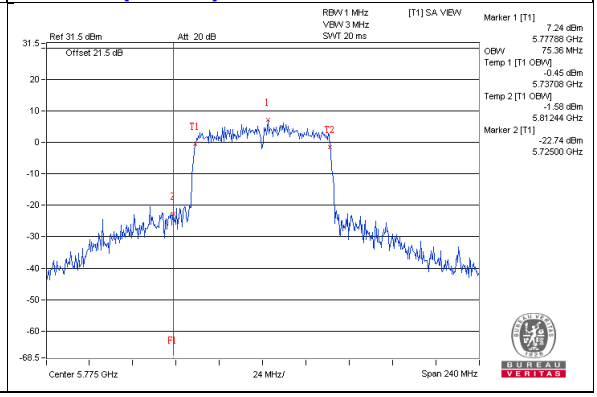
802.11ac(VHT40)_Chain1 / CH151



802.11ac(VHT80)_Chain0 / CH155



802.11ac(VHT80)_Chain1 / CH155

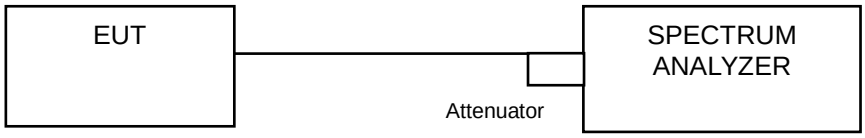


4.5 Peak Power Spectral Density Measurement

4.5.1 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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1:

Using method SA-2

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

For U-NII-3:

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(500 kHz/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)

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

802.11a

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	2.09	5.43	0.24	7.32	17.00	Pass
40	5200	3.52	4.78	0.24	7.44	17.00	Pass
48	5240	3.78	4.71	0.24	7.52	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	3.87	2.72	0.34	6.68	17.00	Pass
40	5200	4.23	6.20	0.34	8.68	17.00	Pass
48	5240	4.29	4.48	0.34	7.74	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT40)

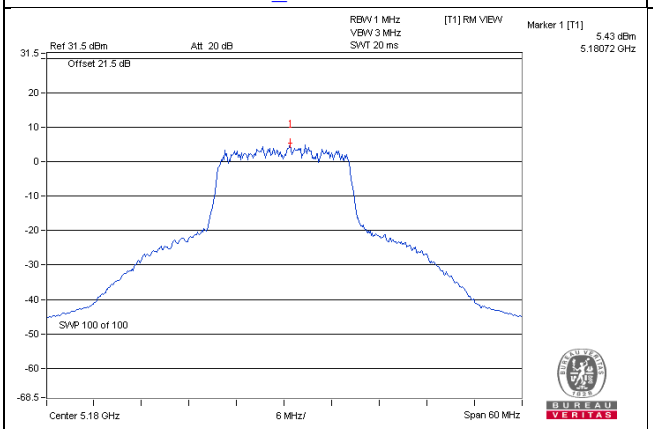
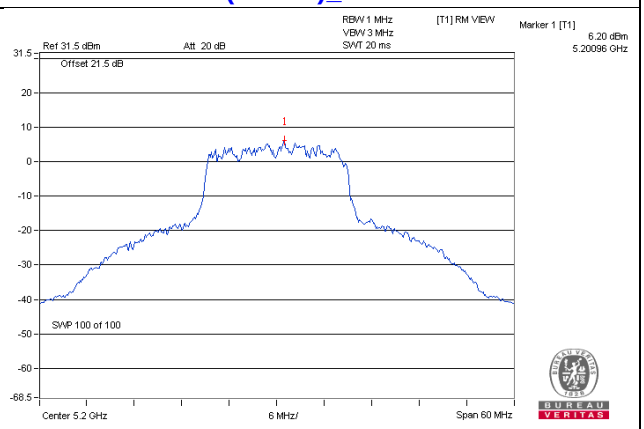
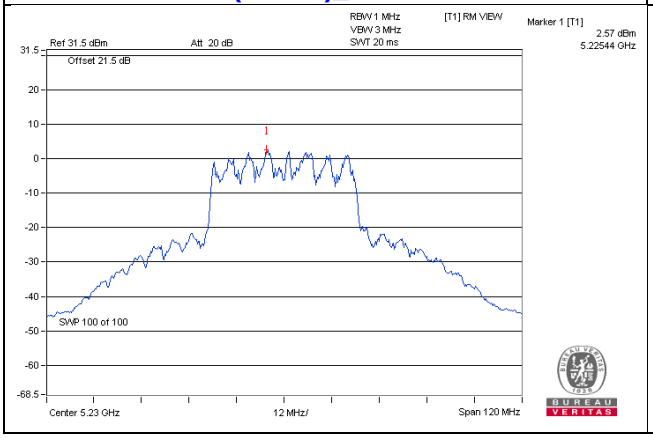
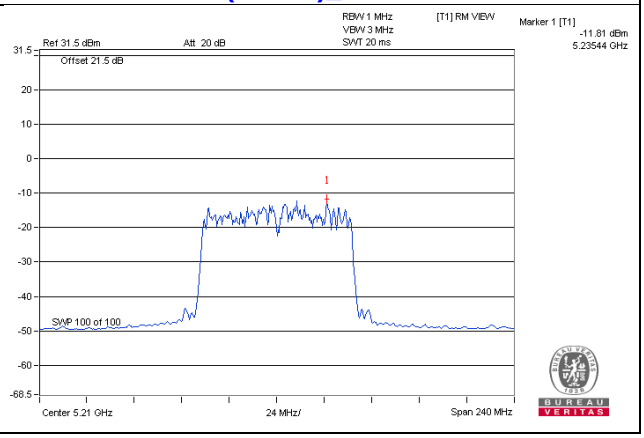
Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-8.02	-6.49	1.04	-3.14	17.00	Pass
46	5230	0.78	1.90	1.04	5.42	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-11.81	-13.76	1.39	-8.28	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH36	**802.11ac (VHT20)_Chain 1 / CH40**
	
802.11ac (VHT40)_Chain 1 / CH46	**802.11ac (VHT80)_Chain 0 / CH42**
	

For U-NII-3:

802.11a

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	0.59	2.81	3.01	0.24	6.06	30.00	Pass
	157	5785	-0.20	2.02	3.01	0.24	5.27	30.00	Pass
	165	5825	0.64	2.86	3.01	0.24	6.11	30.00	Pass
1	149	5745	-1.12	1.10	3.01	0.24	4.35	30.00	Pass
	157	5785	-0.54	1.68	3.01	0.24	4.93	30.00	Pass
	165	5825	0.33	2.55	3.01	0.24	5.80	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.

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

802.11ac (VHT20)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	-0.61	1.61	3.01	0.34	4.96	30.00	Pass
	157	5785	-0.11	2.11	3.01	0.34	5.46	30.00	Pass
	165	5825	0.64	2.86	3.01	0.34	6.21	30.00	Pass
1	149	5745	-0.74	1.48	3.01	0.34	4.83	30.00	Pass
	157	5785	-0.12	2.10	3.01	0.34	5.45	30.00	Pass
	165	5825	0.02	2.24	3.01	0.34	5.59	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.

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

802.11ac (VHT40)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-6.38	-4.16	3.01	1.04	-0.11	30.00	Pass
	159	5795	-4.74	-2.52	3.01	1.04	1.53	30.00	Pass
1	151	5755	-6.57	-4.35	3.01	1.04	-0.30	30.00	Pass
	159	5795	-4.75	-2.53	3.01	1.04	1.52	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.

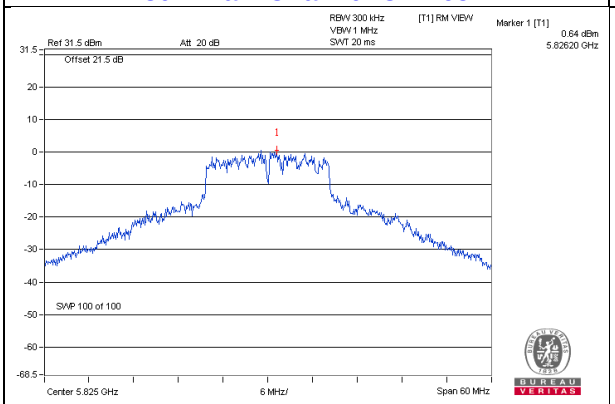
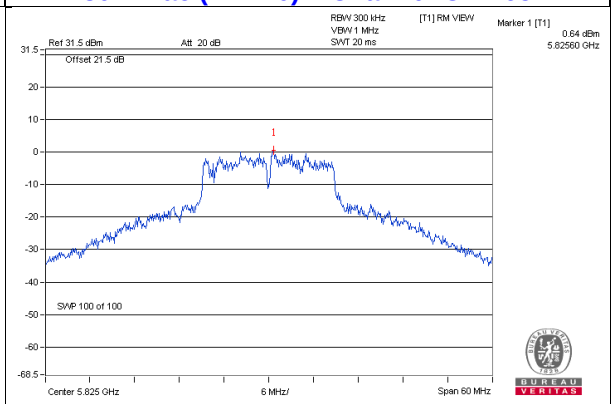
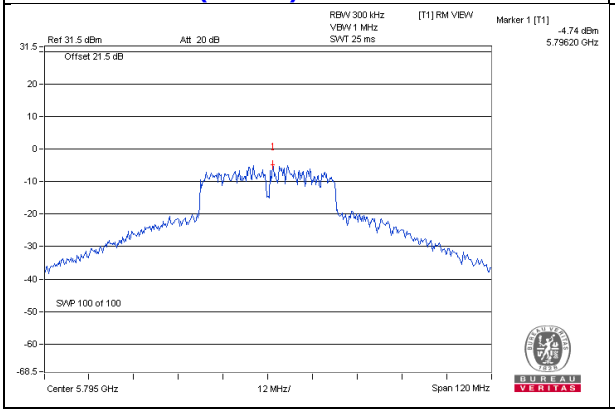
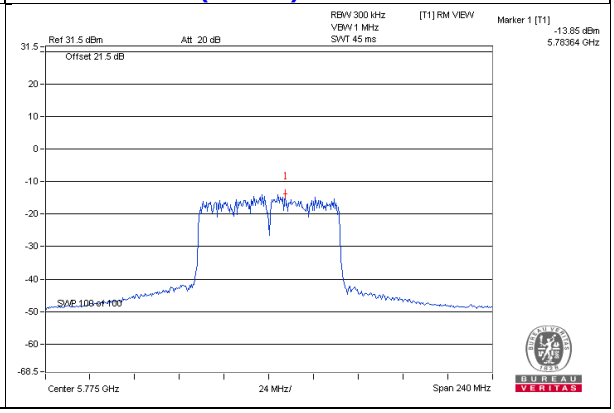
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-13.85	-11.63	3.01	1.39	-7.23	30.00	Pass
1	155	5775	-13.96	-11.74	3.01	1.39	-7.34	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 5.9dBi < 6dBi, so the power density limit shall not be reduced.

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

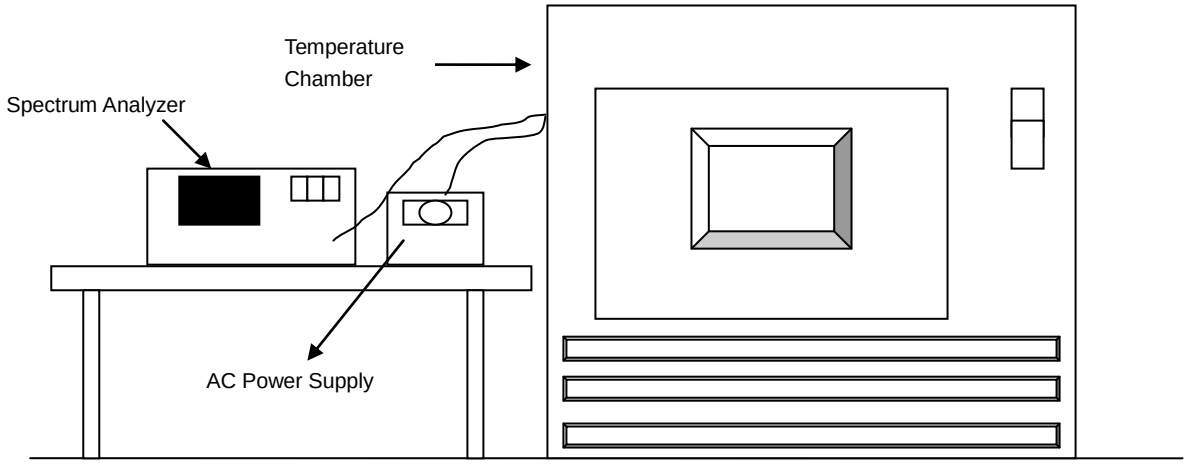
Spectrum Plot of Worst Value	
802.11a – Chain 0: CH 165	**802.11ac (VHT20) – Chain 0: CH 165**
	
802.11ac (VHT40) – Chain 0: CH 159	**802.11ac (VHT80) – Chain 0: CH 155**
	

4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

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.
.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	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	5179.9853	PASS	5179.9837	PASS	5179.9833	PASS	5179.9834	PASS
40	120	5179.9843	PASS	5179.9826	PASS	5179.9821	PASS	5179.9845	PASS
30	120	5179.9817	PASS	5179.9826	PASS	5179.982	PASS	5179.9786	PASS
20	120	5180.0064	PASS	5180.0061	PASS	5180.0075	PASS	5180.0046	PASS
10	120	5180.0267	PASS	5180.0243	PASS	5180.0238	PASS	5180.0259	PASS
0	120	5180.0209	PASS	5180.023	PASS	5180.0237	PASS	5180.0216	PASS
-10	120	5180.0101	PASS	5180.0091	PASS	5180.0112	PASS	5180.0139	PASS
-20	120	5180.0079	PASS	5180.006	PASS	5180.0053	PASS	5180.0084	PASS
-30	120	5179.9741	PASS	5179.9745	PASS	5179.9759	PASS	5179.9778	PASS

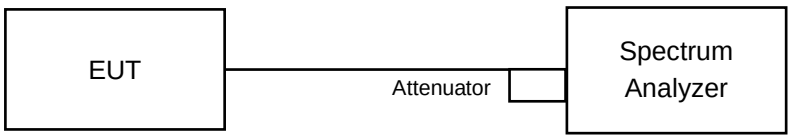
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0074	PASS	5180.0069	PASS	5180.0072	PASS	5180.0039	PASS
	120	5180.0064	PASS	5180.0061	PASS	5180.0075	PASS	5180.0046	PASS
	102	5180.0063	PASS	5180.0067	PASS	5180.0083	PASS	5180.004	PASS

4.7 6dB Bandwidth Measurment

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.39	16.37	0.5	PASS
157	5785	16.38	16.36	0.5	PASS
165	5825	16.37	16.37	0.5	PASS

802.11ac (VHT20)

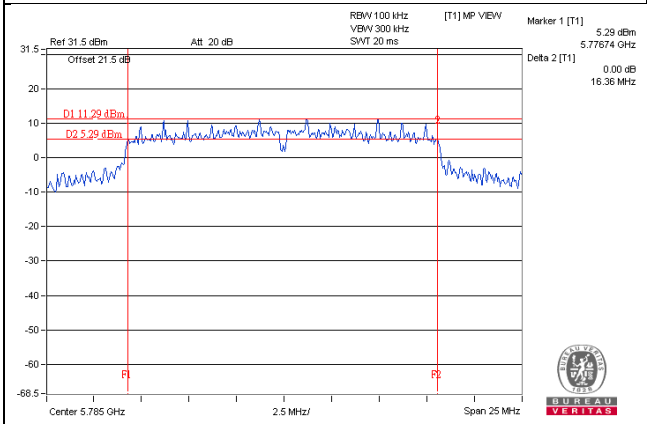
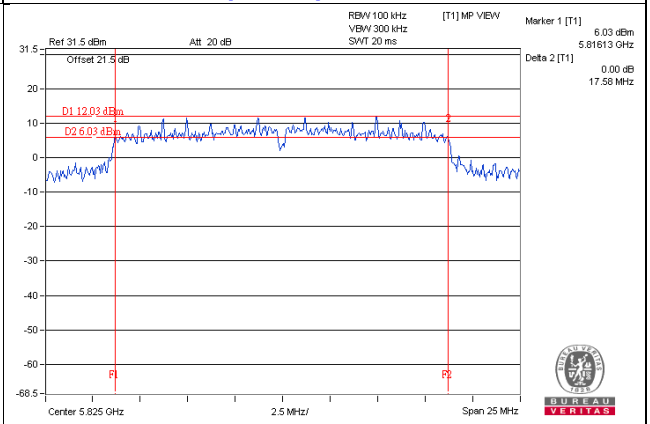
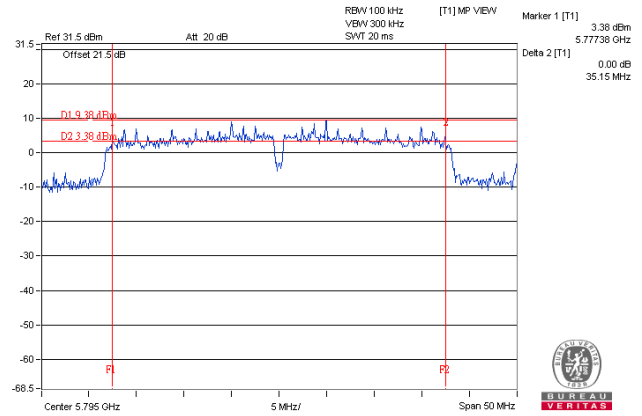
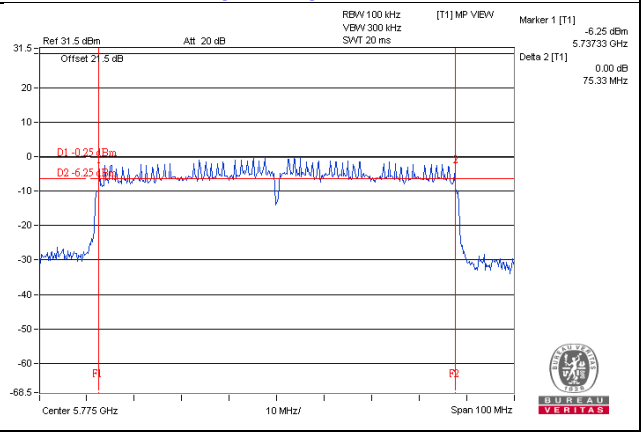
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.61	17.61	0.5	PASS
157	5785	17.60	17.60	0.5	PASS
165	5825	17.58	17.63	0.5	PASS

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.22	35.23	0.5	PASS
159	5795	35.15	35.18	0.5	PASS

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.36	75.33	0.5	PASS

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH157	**802.11ac (VHT20)_Chain 0 / CH165**
	
802.11ac (VHT40)_Chain 0 / CH159	**802.11ac (VHT80)_Chain 1 / CH155**
	

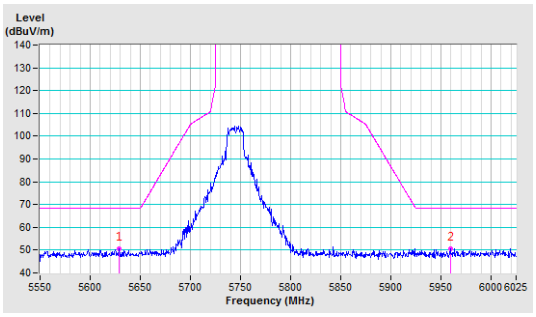
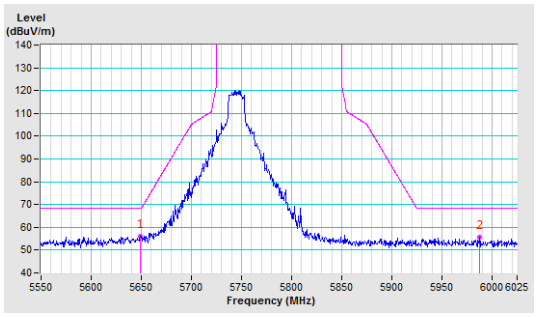
5 Pictures of Test Arrangements

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

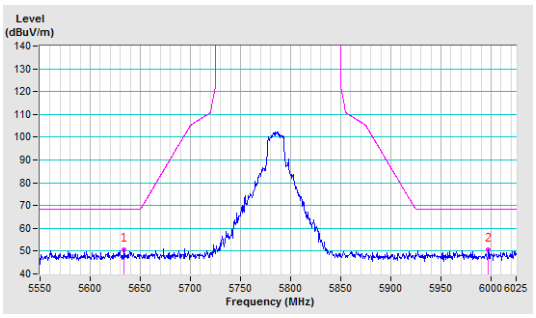
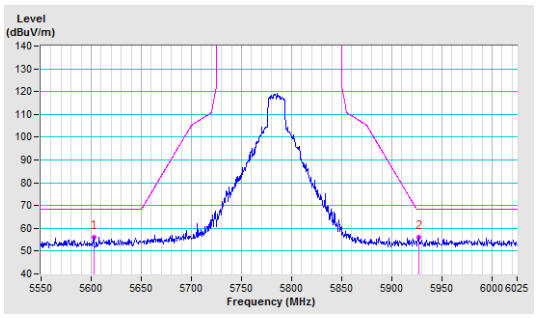
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

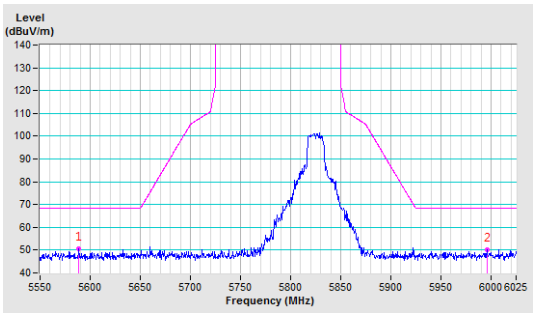
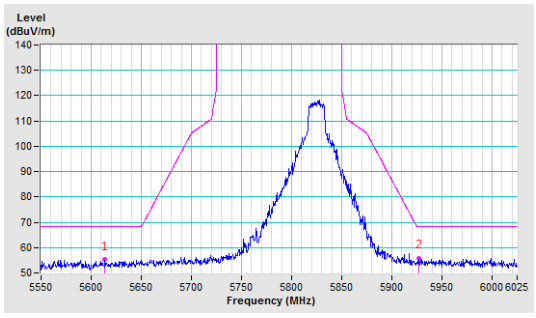
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

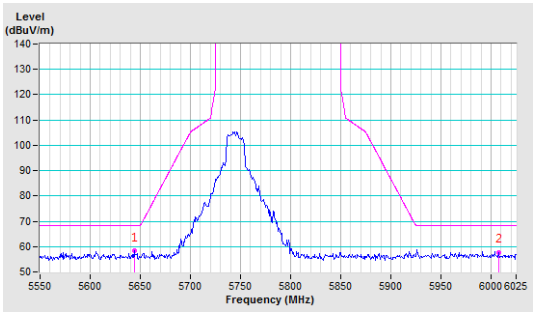
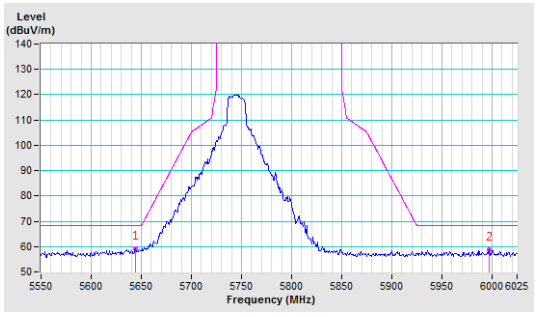
Horizontal	Vertical
	

CH 165 5825 MHz

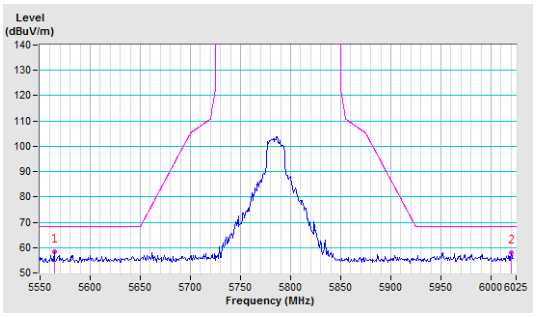
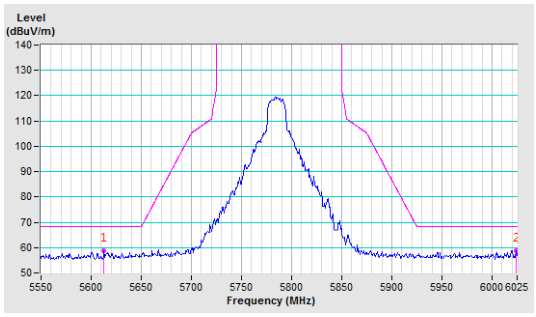
Horizontal	Vertical
	

802.11ac (VHT20)

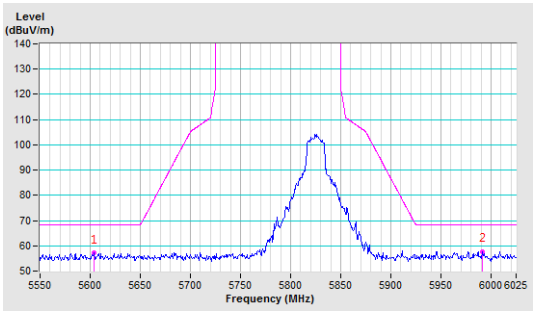
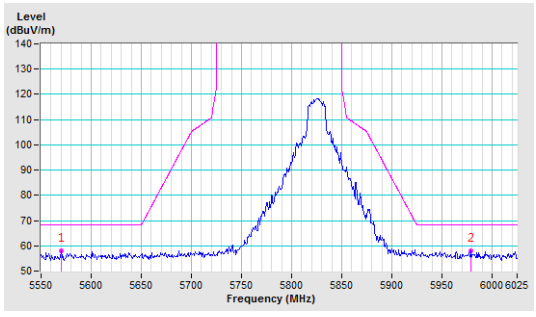
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

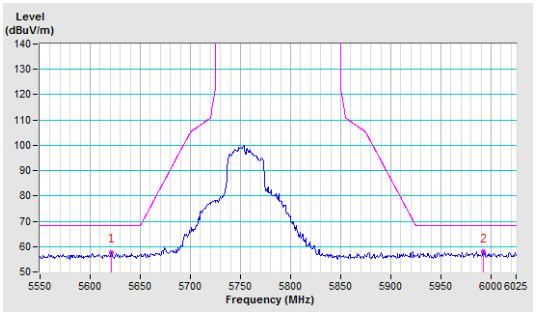
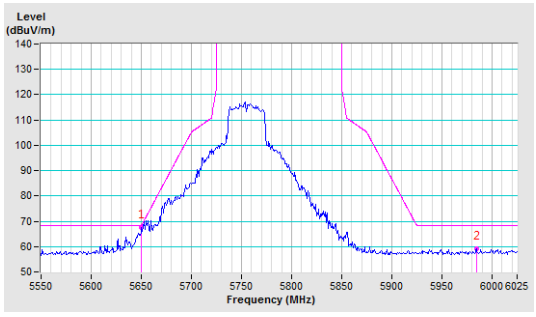
Horizontal	Vertical
	

CH 165 5825 MHz

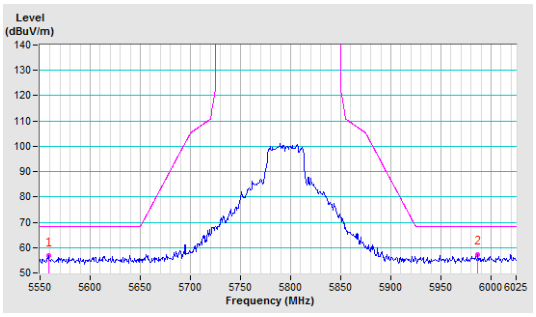
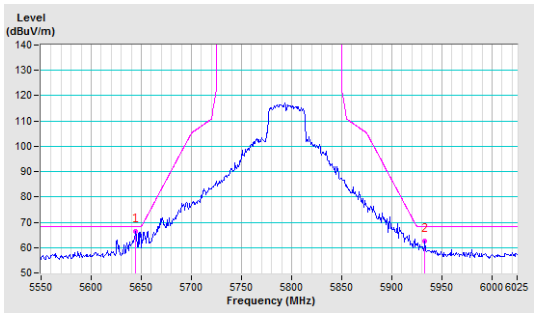
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

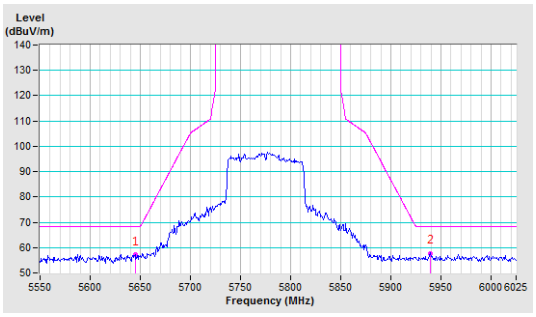
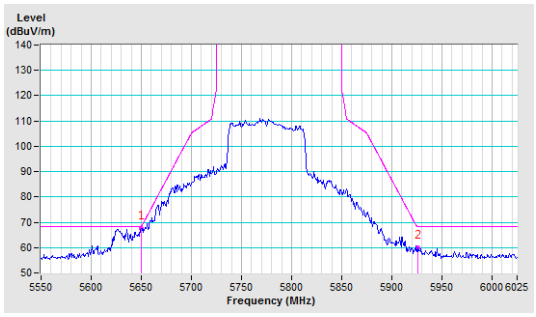
Horizontal	Vertical
	

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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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

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