FCC Test Report

Report No.:	RF181015E02-1
FCC ID:	PY318300420
Test Model:	R7000
Received Date:	Oct. 15, 2018
Test Date:	Oct. 20 to Dec. 05, 2018
Issued Date:	Dec. 12, 2018
Applicant:	NETGEAR, Inc.
Address:	350 East Plumeria Drive San Jose, CA 95134
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF181015E02-1	Original release.	Dec. 12, 2018

1 Certificate of Conformity

Product:	AC1900 Smart WiFi Router
Brand:	NETGEAR
Test Model:	R7000
Sample Status:	ENGINEERING SAMPLE
Applicant:	NETGEAR, Inc.
Test Date:	Oct. 20 to Dec. 05, 2018
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 : Phoenix Huang / Specialist , **Date:** Dec. 12, 2018

Approved by : May Chen / Manager , **Date:** Dec. 12, 2018

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 -12.34dB at 0.34531MHz.
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 -0.1dB at 5150.00MHz, 5649.47MHz, 11490.00MHz, 11510.00MHz and 11590.00MHz.
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 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	5.53 dB
Radiated Emissions above 1 GHz (for 966 Chamber No. 3)	1GHz ~ 6GHz	5.08 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB
Radiated Emissions above 1 GHz (for 966 Chamber No. 4)	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1900 Smart WiFi Router
Brand	NETGEAR
Test Model	R7000
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 and VHT (20/40) mode in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18~ 5.24GHz, 5.745 ~ 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	**2.412 ~ 2.462GHz** **CDD Mode:** 950.585mW **Beamforming Mode:** 550.262mW **5.18 ~ 5.24GHz** **CDD Mode:** 861.408mW **Beamforming Mode:** 539.752mW **5.745 ~ 5.825GHz** **CDD Mode:** 876.145mW **Beamforming Mode:** 532.959mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	RJ45 Cable x1 (unshielded, 1.4m)

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. The EUT must be supplied power adapter and following different models could be chosen as following table:

No.	Brand	Model No.	P/N	Spec.
1	NETGEAR	AD2080F20	332-10876-01	Input: 100-240Vac, 1.0A, 50/60Hz Output: 12V, 3.5A DC Output cable: Unshielded, 1.8m
2	NETGEAR	2ABN042F NA	332-10761-01	Input: 100-240Vac, 1.5A, 50/60Hz Output: 12V, 3.5A DC Output cable: Unshielded, 1.8m

Note:
1. The EUT was pre-tested with above adapters, for radiated emission test the worse case was found in **Adapter 1**. Therefore only the test data of the adapter was recorded in this report.
2. The EUT was pre-tested with above adapters, for AC power conducted emission test the worse case was found in **Adapter 2**. Therefore only the test data of the adapter was recorded in this report.

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

Antenna No.	Ant. Gain (dBi) (include cable loss)	Frequency range (GHz)	Antenna Type	Connector Type
1	3.52	2.4~2.4835	Dipole	i-pex
	3.89	5.15~5.85		
2	3.39	2.4~2.4835	Dipole	i-pex
	3.86	5.15~5.85		
3	3.16	2.4~2.4835	Dipole	i-pex
	3.86	5.15~5.85		

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	3TX	3RX
802.11g	6 ~ 54Mbps	3TX	3RX
802.11n (HT20)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
VHT20	MCS0~8 Nss=1	3TX	3RX
	MCS0~8 Nss=2	3TX	3RX
	MCS0~9 Nss=3	3TX	3RX
VHT40	MCS0~9 Nss=1	3TX	3RX
	MCS0~9 Nss=2	3TX	3RX
	MCS0~9 Nss=3	3TX	3RX

5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	3TX	3RX
802.11n (HT20)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11ac (VHT20)	MCS0~8 Nss=1	3TX	3RX
	MCS0~8 Nss=2	3TX	3RX
	MCS0~9 Nss=3	3TX	3RX
802.11ac (VHT40)	MCS0~9 Nss=1	3TX	3RX
	MCS0~9 Nss=2	3TX	3RX
	MCS0~9 Nss=3	3TX	3RX
802.11ac (VHT80)	MCS0~9 Nss=1	3TX	3RX
	MCS0~9 Nss=2	3TX	3RX
	MCS0~9 Nss=3	3TX	3RX

Note:
1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. 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.
3. 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)

5. The above EUT information is declared by manufacturer and for more detailed features description, please refers 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	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210 MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775 MHz

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

Radiated Emission Test (Above 1GHz):

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

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)	5180-5240, 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)	5180-5240, 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 / Beamforming Mode (output power only)						
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

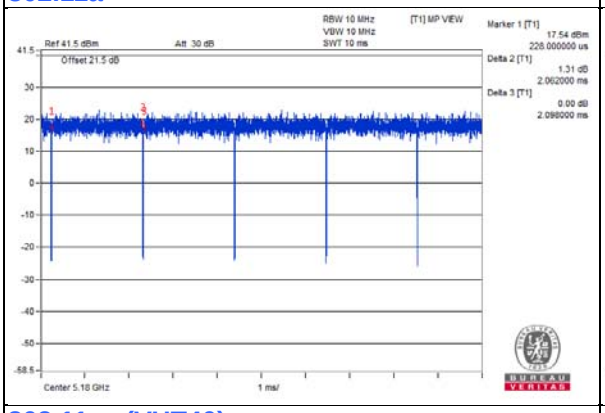
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	23deg. C, 68%RH	120Vac, 60Hz	Steven Chiang
	21deg. C, 67%RH	120Vac, 60Hz	Steven Chiang
RE<1G	23deg. C, 69%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

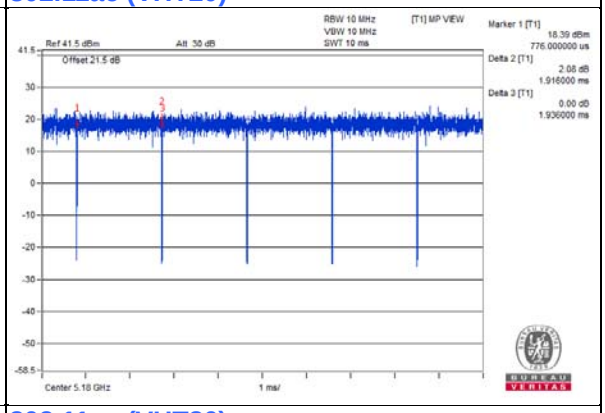
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 2.062 ms/2.098 ms = 0.983
802.11ac (VHT20): Duty cycle = 1.916 ms/1.936 ms = 0.99
802.11ac (VHT40): Duty cycle = 0.941 ms/0.961 ms = 0.979, Duty factor = 10 * log (1/Duty cycle) = 0.09
802.11ac (VHT80): Duty cycle = 0.459 ms/0.478 ms = 0.96, Duty factor = 10 * log (1/Duty cycle) = 0.18

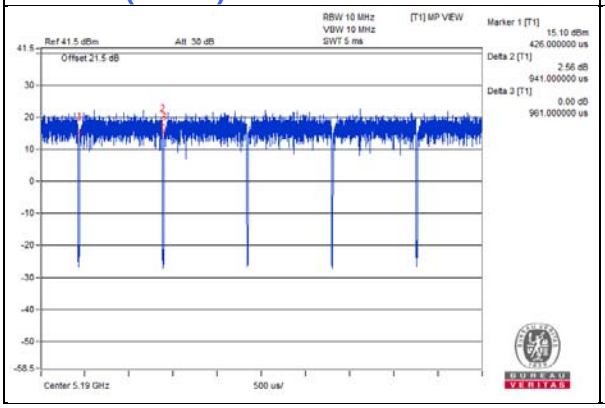
802.11a



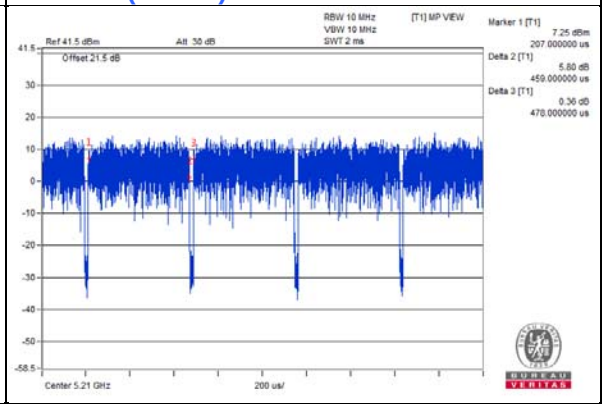
802.11ac (VHT20)



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.

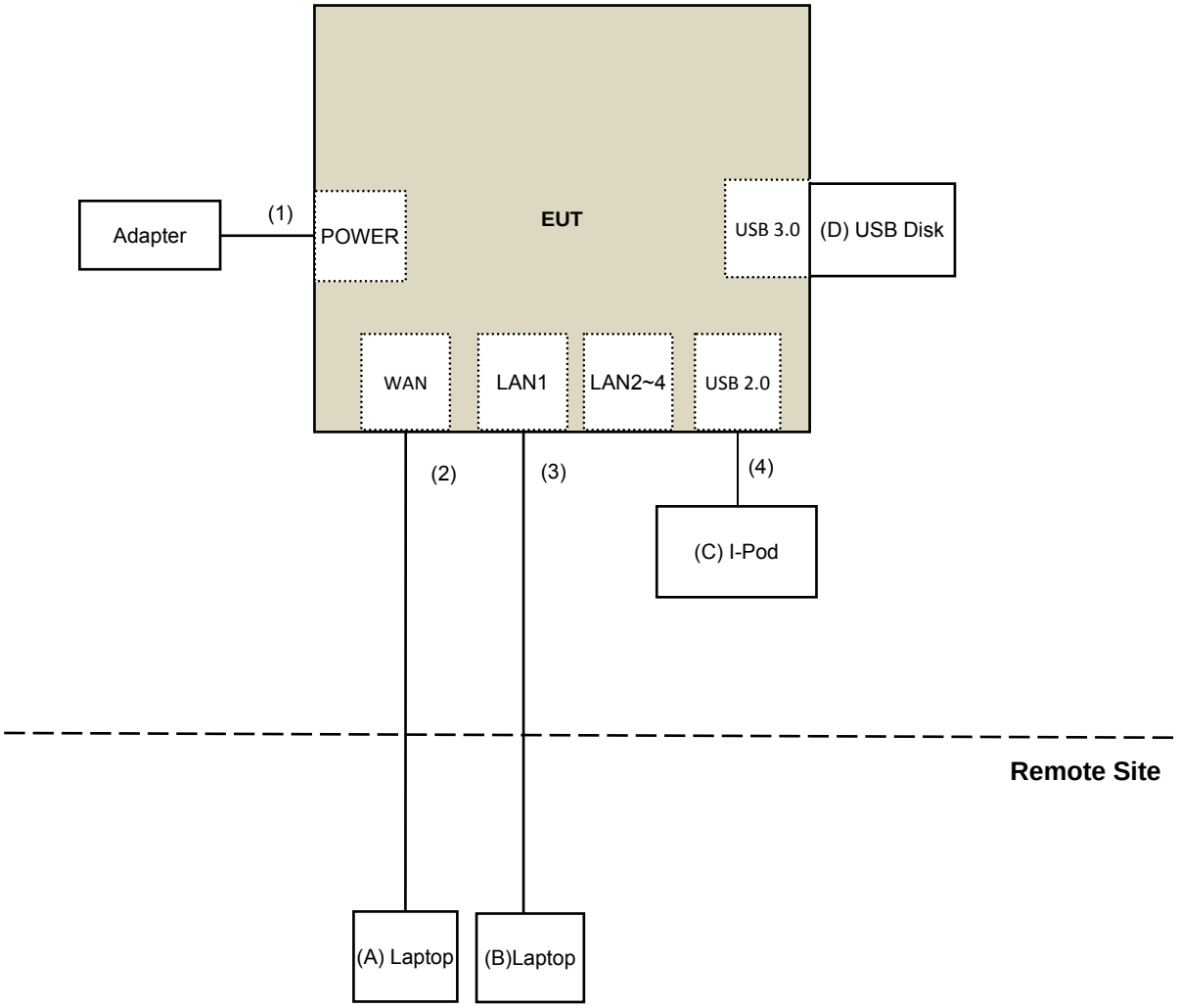
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Laptop	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
C.	iPod	Apple	MC749TA/A	CC4DMFJUDFDM	NA	Provided by Lab
D.	USB Disk	Transcend	16GB	NA	NA	Provided by Lab

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	1.8	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	USB Cable	1	0.1	Yes	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits of unwanted emission out of the restricted bands

<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 v02r01</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="5">*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 OOBE test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier Mini-Circuits	ZVA-183-S+	AMP-ZVA-03	May 10, 2018	May 09, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150318	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. The CANADA Site Registration No. is 20331-2
4. Tested Date: Oct. 20, 2018

For U-NII Band 1 test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200	160922	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150317	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
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 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 10, 2018	Jan. 09, 2019
True RMS Clamp Meter FLUKE	325	31130711WS	May 22, 2018	May 21, 2019

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: Dec. 05, 2018

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001	Jan. 15, 2018	Jan. 14, 2019
RF Cable	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200	160922	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150317	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
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 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019

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: Nov. 16 to 20, 2018

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. Parallel, perpendicular, and ground-parallel orientations 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 detects 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:

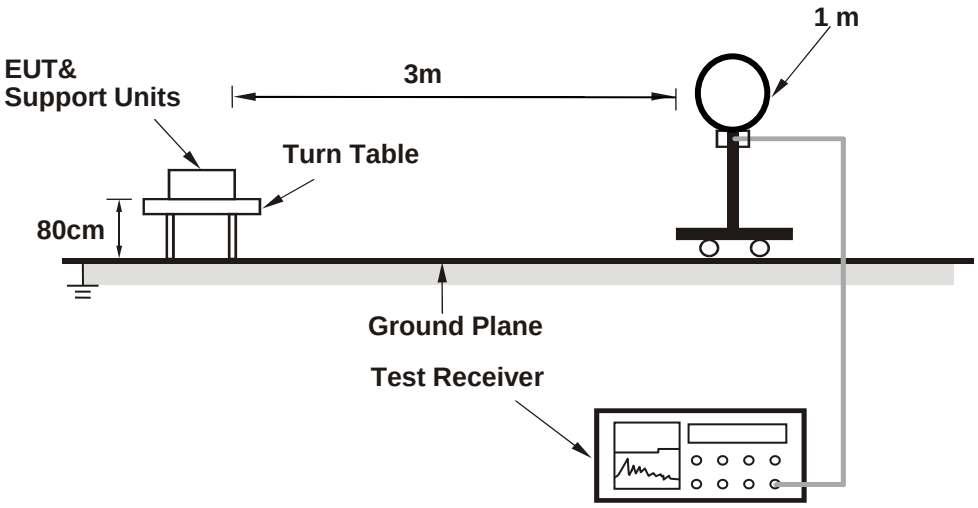
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

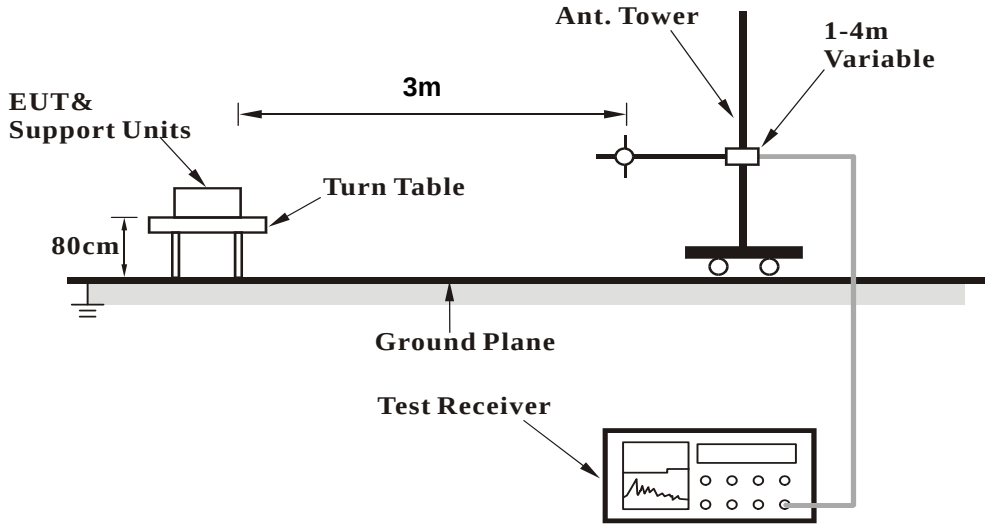
No deviation.

4.1.5 Test Setup

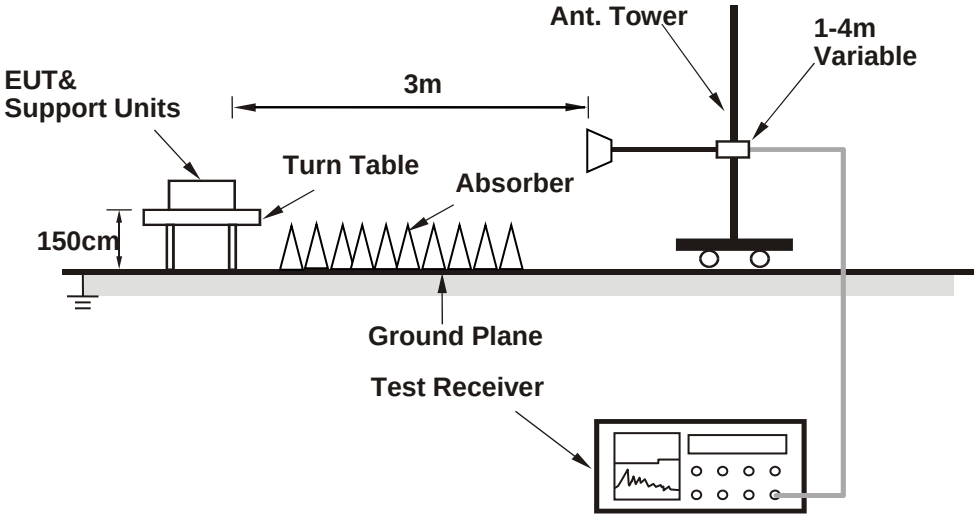
For Radiated emission below 30MHz



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. Controlling software (Mtool 2.0.1.1) 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	53.3 PK	74.0	-20.7	2.75 H	130	50.4	2.9
2	5150.00	41.1 AV	54.0	-12.9	2.75 H	130	38.2	2.9
3	*5180.00	113.5 PK			2.75 H	130	110.6	2.9
4	*5180.00	103.9 AV			2.75 H	130	101.0	2.9
5	#10360.00	51.0 PK	68.2	-17.2	1.28 H	133	38.7	12.3
6	15540.00	60.1 PK	74.0	-13.9	3.97 H	60	47.3	12.8
7	15540.00	44.3 AV	54.0	-9.7	3.97 H	60	31.5	12.8
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	5150.00	63.5 PK	74.0	-10.5	1.46 V	329	60.6	2.9
2	5150.00	51.9 AV	54.0	-2.1	1.46 V	329	49.0	2.9
3	*5180.00	119.2 PK			1.46 V	329	116.3	2.9
4	*5180.00	110.0 AV			1.46 V	329	107.1	2.9
5	#10360.00	52.2 PK	68.2	-16.0	1.13 V	151	39.9	12.3
6	15540.00	61.3 PK	74.0	-12.7	1.91 V	51	48.5	12.8
7	15540.00	46.1 AV	54.0	-7.9	1.91 V	51	33.3	12.8

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 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	50.2 PK	74.0	-23.8	2.71 H	123	47.3	2.9
2	5150.00	39.7 AV	54.0	-14.3	2.71 H	123	36.8	2.9
3	*5200.00	113.7 PK			2.71 H	123	110.9	2.8
4	*5200.00	104.1 AV			2.71 H	123	101.3	2.8
5	#10400.00	51.5 PK	68.2	-16.7	1.26 H	118	38.7	12.8
6	15600.00	60.3 PK	74.0	-13.7	4.00 H	59	47.0	13.3
7	15600.00	44.2 AV	54.0	-9.8	4.00 H	59	30.9	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	61.6 PK	74.0	-12.4	1.44 V	328	58.7	2.9
2	5150.00	49.3 AV	54.0	-4.7	1.44 V	328	46.4	2.9
3	*5200.00	119.3 PK			1.44 V	328	116.5	2.8
4	*5200.00	110.1 AV			1.44 V	328	107.3	2.8
5	#10400.00	52.2 PK	68.2	-16.0	1.04 V	148	39.4	12.8
6	15600.00	61.4 PK	74.0	-12.6	1.87 V	58	48.1	13.3
7	15600.00	46.2 AV	54.0	-7.8	1.87 V	58	32.9	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	5079.10	48.4 PK	74.0	-25.6	2.71 H	109	45.9	2.5
2	5079.10	37.9 AV	54.0	-16.1	2.71 H	109	35.4	2.5
3	*5240.00	115.1 PK			2.71 H	109	112.9	2.2
4	*5240.00	104.6 AV			2.71 H	109	102.4	2.2
5	5350.00	47.8 PK	74.0	-26.2	2.71 H	109	45.5	2.3
6	5350.00	37.1 AV	54.0	-16.9	2.71 H	109	34.8	2.3
7	5399.30	49.6 PK	74.0	-24.4	2.71 H	109	47.1	2.5
8	5399.30	39.4 AV	54.0	-14.6	2.71 H	109	36.9	2.5
9	#10480.00	53.5 PK	68.2	-14.7	1.23 H	121	41.1	12.4
10	15720.00	64.2 PK	74.0	-9.8	3.97 H	63	52.2	12.0
11	15720.00	47.7 AV	54.0	-6.3	3.97 H	63	35.7	12.0
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	5079.10	56.1 PK	74.0	-17.9	1.40 V	329	53.6	2.5
2	5079.10	46.2 AV	54.0	-7.8	1.40 V	329	43.7	2.5
3	*5240.00	118.9 PK			1.40 V	329	116.7	2.2
4	*5240.00	109.3 AV			1.40 V	329	107.1	2.2
5	5350.00	59.2 PK	74.0	-14.8	1.40 V	329	56.9	2.3
6	5350.00	47.4 AV	54.0	-6.6	1.40 V	329	45.1	2.3
7	5399.30	59.6 PK	74.0	-14.4	1.40 V	329	57.1	2.5
8	5399.30	48.7 AV	54.0	-5.3	1.40 V	329	46.2	2.5
9	#10480.00	57.5 PK	68.2	-10.7	1.07 V	162	45.1	12.4
10	15720.00	66.2 PK	74.0	-7.8	1.86 V	54	54.2	12.0
11	15720.00	50.1 AV	54.0	-3.9	1.86 V	54	38.1	12.0

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 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	#5587.49	59.6 PK	68.2	-8.6	3.42 H	207	56.4	3.2
2	*5745.00	115.0 PK			3.42 H	207	112.1	2.9
3	*5745.00	104.7 AV			3.42 H	207	101.8	2.9
4	#5997.39	55.4 PK	68.2	-12.8	3.42 H	207	51.7	3.7
5	11490.00	64.0 PK	74.0	-10.0	1.30 H	112	51.7	12.3
6	11490.00	49.7 AV	54.0	-4.3	1.30 H	112	37.4	12.3
7	#17235.00	52.8 PK	68.2	-15.4	3.90 H	89	37.5	15.3
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	#5583.80	62.1 PK	68.2	-6.1	2.32 V	327	58.9	3.2
2	*5745.00	118.5 PK			2.32 V	327	115.6	2.9
3	*5745.00	109.0 AV			2.32 V	327	106.1	2.9
4	#5989.11	56.5 PK	68.2	-11.7	2.32 V	327	52.8	3.7
5	11490.00	67.2 PK	74.0	-6.8	1.02 V	139	54.9	12.3
6	11490.00	53.7 AV	54.0	-0.3	1.02 V	139	41.4	12.3
7	#17235.00	56.4 PK	68.2	-11.8	3.22 V	258	41.1	15.3

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	#5626.78	59.7 PK	68.2	-8.5	3.38 H	208	56.4	3.3
2	*5785.00	114.7 PK			3.38 H	208	111.6	3.1
3	*5785.00	104.6 AV			3.38 H	208	101.5	3.1
4	#5937.85	58.7 PK	68.2	-9.5	3.38 H	208	55.1	3.6
5	11570.00	63.9 PK	74.0	-10.1	1.29 H	125	51.5	12.4
6	11570.00	49.5 AV	54.0	-4.5	1.29 H	125	37.1	12.4
7	#17355.00	52.3 PK	68.2	-15.9	4.00 H	79	36.3	16.0
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	#5626.01	62.5 PK	68.2	-5.7	2.36 V	329	59.2	3.3
2	*5785.00	118.4 PK			2.36 V	329	115.3	3.1
3	*5785.00	108.9 AV			2.36 V	329	105.8	3.1
4	#5945.78	62.3 PK	68.2	-5.9	2.36 V	329	58.8	3.5
5	11570.00	66.9 PK	74.0	-7.1	1.04 V	137	54.5	12.4
6	11570.00	53.5 AV	54.0	-0.5	1.04 V	137	41.1	12.4
7	#17355.00	56.7 PK	68.2	-11.5	3.24 V	247	40.7	16.0

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	#5585.26	55.3 PK	68.2	-12.9	3.58 H	210	52.1	3.2
2	*5825.00	114.5 PK			3.58 H	210	111.3	3.2
3	*5825.00	104.4 AV			3.58 H	210	101.2	3.2
4	#5987.31	57.8 PK	68.2	-10.4	3.58 H	210	54.1	3.7
5	11650.00	63.6 PK	74.0	-10.4	1.30 H	109	51.2	12.4
6	11650.00	49.2 AV	54.0	-4.8	1.30 H	109	36.8	12.4
7	#17475.00	52.7 PK	68.2	-15.5	3.94 H	84	35.3	17.4
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	#5597.44	56.8 PK	68.2	-11.4	2.32 V	326	53.6	3.2
2	*5825.00	118.3 PK			2.32 V	326	115.1	3.2
3	*5825.00	108.9 AV			2.32 V	326	105.7	3.2
4	#5984.04	62.9 PK	68.2	-5.3	2.32 V	326	59.2	3.7
5	11650.00	66.6 PK	74.0	-7.4	1.01 V	137	54.2	12.4
6	11650.00	53.8 AV	54.0	-0.2	1.01 V	137	41.4	12.4
7	#17475.00	56.5 PK	68.2	-11.7	3.24 V	245	39.1	17.4

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	54.1 PK	74.0	-19.9	2.79 H	119	51.2	2.9
2	5150.00	42.5 AV	54.0	-11.5	2.79 H	119	39.6	2.9
3	*5180.00	114.2 PK			2.79 H	119	111.3	2.9
4	*5180.00	104.8 AV			2.79 H	119	101.9	2.9
5	#10360.00	51.4 PK	68.2	-16.8	1.18 H	134	39.1	12.3
6	15540.00	59.8 PK	74.0	-14.2	3.92 H	57	47.0	12.8
7	15540.00	43.7 AV	54.0	-10.3	3.92 H	57	30.9	12.8
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	5150.00	66.1 PK	74.0	-7.9	1.62 V	33	63.2	2.9
2	5150.00	51.0 AV	54.0	-3.0	1.62 V	33	48.1	2.9
3	*5180.00	119.1 PK			1.62 V	33	116.2	2.9
4	*5180.00	109.5 AV			1.62 V	33	106.6	2.9
5	#10360.00	52.8 PK	68.2	-15.4	1.12 V	140	40.5	12.3
6	15540.00	61.4 PK	74.0	-12.6	1.96 V	40	48.6	12.8
7	15540.00	46.0 AV	54.0	-8.0	1.96 V	40	33.2	12.8

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 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	52.6 PK	74.0	-21.4	2.72 H	114	49.7	2.9
2	5150.00	40.3 AV	54.0	-13.7	2.72 H	114	37.4	2.9
3	*5200.00	114.5 PK			2.72 H	114	111.7	2.8
4	*5200.00	104.7 AV			2.72 H	114	101.9	2.8
5	#10400.00	51.6 PK	68.2	-16.6	1.19 H	136	38.8	12.8
6	15600.00	60.6 PK	74.0	-13.4	3.98 H	53	47.3	13.3
7	15600.00	44.6 AV	54.0	-9.4	3.98 H	53	31.3	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	60.7 PK	74.0	-13.3	1.84 V	35	57.8	2.9
2	5150.00	49.3 AV	54.0	-4.7	1.84 V	35	46.4	2.9
3	*5200.00	119.6 PK			1.84 V	35	116.8	2.8
4	*5200.00	109.6 AV			1.84 V	35	106.8	2.8
5	#10400.00	52.4 PK	68.2	-15.8	1.08 V	155	39.6	12.8
6	15600.00	61.9 PK	74.0	-12.1	1.85 V	48	48.6	13.3
7	15600.00	46.4 AV	54.0	-7.6	1.85 V	48	33.1	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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	47.7 PK	74.0	-26.3	2.70 H	118	45.1	2.6
2	5150.00	37.3 AV	54.0	-16.7	2.70 H	118	34.7	2.6
3	*5240.00	114.4 PK			2.70 H	118	112.2	2.2
4	*5240.00	104.3 AV			2.70 H	118	102.1	2.2
5	5350.00	51.1 PK	74.0	-22.9	2.70 H	118	48.8	2.3
6	5350.00	39.8 AV	54.0	-14.2	2.70 H	118	37.5	2.3
7	5401.30	51.0 PK	74.0	-23.0	2.70 H	118	48.5	2.5
8	5401.30	40.0 AV	54.0	-14.0	2.70 H	118	37.5	2.5
9	#10480.00	53.9 PK	68.2	-14.3	1.28 H	120	41.5	12.4
10	15720.00	64.3 PK	74.0	-9.7	4.00 H	69	52.3	12.0
11	15720.00	47.8 AV	54.0	-6.2	4.00 H	69	35.8	12.0
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	5150.00	55.4 PK	74.0	-18.6	1.57 V	32	52.8	2.6
2	5150.00	45.7 AV	54.0	-8.3	1.57 V	32	43.1	2.6
3	*5240.00	119.4 PK			1.57 V	32	117.2	2.2
4	*5240.00	109.3 AV			1.57 V	32	107.1	2.2
5	5350.00	59.1 PK	74.0	-14.9	1.57 V	32	56.8	2.3
6	5350.00	47.5 AV	54.0	-6.5	1.57 V	32	45.2	2.3
7	5401.30	59.0 PK	74.0	-15.0	1.57 V	32	56.5	2.5
8	5401.30	48.3 AV	54.0	-5.7	1.57 V	32	45.8	2.5
9	#10480.00	57.8 PK	68.2	-10.4	1.07 V	150	45.4	12.4
10	15720.00	66.0 PK	74.0	-8.0	1.91 V	58	54.0	12.0
11	15720.00	49.7 AV	54.0	-4.3	1.91 V	58	37.7	12.0

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 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	#5585.65	59.9 PK	68.2	-8.3	3.49 H	129	56.7	3.2
2	*5745.00	114.4 PK			3.49 H	129	111.5	2.9
3	*5745.00	103.7 AV			3.49 H	129	100.8	2.9
4	#5992.38	56.3 PK	68.2	-11.9	3.49 H	129	52.6	3.7
5	11490.00	63.9 PK	74.0	-10.1	1.24 H	115	51.6	12.3
6	11490.00	49.2 AV	54.0	-4.8	1.24 H	115	36.9	12.3
7	#17235.00	52.9 PK	68.2	-15.3	3.98 H	72	37.6	15.3
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	#5584.60	62.6 PK	68.2	-5.6	2.31 V	327	59.4	3.2
2	*5745.00	118.6 PK			2.31 V	327	115.7	2.9
3	*5745.00	108.9 AV			2.31 V	327	106.0	2.9
4	#5979.86	56.9 PK	68.2	-11.3	2.31 V	327	53.3	3.6
5	11490.00	68.5 PK	74.0	-5.5	1.06 V	138	56.2	12.3
6	**11490.00**	**53.9 AV**	**54.0**	**-0.1**	**1.06 V**	**138**	**41.6**	**12.3**
7	#17235.00	56.2 PK	68.2	-12.0	3.18 V	249	40.9	15.3

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	#5624.29	59.2 PK	68.2	-9.0	3.53 H	127	55.9	3.3
2	*5785.00	114.2 PK			3.53 H	127	111.1	3.1
3	*5785.00	103.5 AV			3.53 H	127	100.4	3.1
4	#5944.07	58.8 PK	68.2	-9.4	3.53 H	127	55.3	3.5
5	11570.00	63.8 PK	74.0	-10.2	1.23 H	116	51.4	12.4
6	11570.00	49.2 AV	54.0	-4.8	1.23 H	116	36.8	12.4
7	#17355.00	52.7 PK	68.2	-15.5	3.89 H	76	36.7	16.0
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	#5619.75	62.3 PK	68.2	-5.9	2.33 V	326	59.0	3.3
2	*5785.00	118.5 PK			2.33 V	326	115.4	3.1
3	*5785.00	108.6 AV			2.33 V	326	105.5	3.1
4	#5944.45	63.5 PK	68.2	-4.7	2.33 V	326	60.0	3.5
5	11570.00	67.9 PK	74.0	-6.1	1.09 V	137	55.5	12.4
6	11570.00	53.7 AV	54.0	-0.3	1.09 V	137	41.3	12.4
7	#17355.00	57.1 PK	68.2	-11.1	3.24 V	251	41.1	16.0

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	#5590.94	55.3 PK	68.2	-12.9	3.48 H	128	52.1	3.2
2	*5825.00	114.3 PK			3.48 H	128	111.1	3.2
3	*5825.00	103.8 AV			3.48 H	128	100.6	3.2
4	#5978.35	57.7 PK	68.2	-10.5	3.48 H	128	54.1	3.6
5	11650.00	64.2 PK	74.0	-9.8	1.24 H	125	51.8	12.4
6	11650.00	49.7 AV	54.0	-4.3	1.24 H	125	37.3	12.4
7	#17475.00	53.1 PK	68.2	-15.1	3.94 H	82	35.7	17.4
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	#5579.83	57.2 PK	68.2	-11.0	2.32 V	326	54.0	3.2
2	*5825.00	118.7 PK			2.32 V	326	115.5	3.2
3	*5825.00	108.8 AV			2.32 V	326	105.6	3.2
4	#5979.55	63.1 PK	68.2	-5.1	2.32 V	326	59.5	3.6
5	11650.00	68.0 PK	74.0	-6.0	1.02 V	137	55.6	12.4
6	11650.00	53.6 AV	54.0	-0.4	1.02 V	137	41.2	12.4
7	#17475.00	56.0 PK	68.2	-12.2	3.28 V	237	38.6	17.4

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	57.9 PK	74.0	-16.1	3.57 H	112	55.3	2.6
2	5150.00	47.5 AV	54.0	-6.5	3.57 H	112	44.9	2.6
3	*5190.00	108.1 PK			3.57 H	112	105.6	2.5
4	*5190.00	97.2 AV			3.57 H	112	94.7	2.5
5	5350.00	51.2 PK	74.0	-22.8	3.57 H	112	48.9	2.3
6	5350.00	40.1 AV	54.0	-13.9	3.57 H	112	37.8	2.3
7	#10380.00	51.2 PK	68.2	-17.0	1.31 H	115	39.2	12.0
8	15570.00	53.5 PK	74.0	-20.5	3.98 H	62	40.9	12.6
9	15570.00	39.8 AV	54.0	-14.2	3.98 H	62	27.2	12.6
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	72.7 PK	74.0	-1.3	1.70 V	34	70.1	2.6
2	5150.00	53.6 AV	54.0	-0.4	1.70 V	34	51.0	2.6
3	*5190.00	113.3 PK			1.70 V	34	110.8	2.5
4	*5190.00	102.8 AV			1.70 V	34	100.3	2.5
5	5350.00	56.7 PK	74.0	-17.3	1.70 V	34	54.4	2.3
6	5350.00	46.0 AV	54.0	-8.0	1.70 V	34	43.7	2.3
7	#10380.00	52.3 PK	68.2	-15.9	1.13 V	136	40.3	12.0
8	15570.00	56.8 PK	74.0	-17.2	1.95 V	51	44.2	12.6
9	15570.00	42.4 AV	54.0	-11.6	1.95 V	51	29.8	12.6

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.6 PK	74.0	-15.4	3.50 H	133	55.7	2.9
2	5150.00	48.2 AV	54.0	-5.8	3.50 H	133	45.3	2.9
3	*5230.00	113.8 PK			3.50 H	133	111.2	2.6
4	*5230.00	103.4 AV			3.50 H	133	100.8	2.6
5	5350.00	53.2 PK	74.0	-20.8	3.50 H	133	50.5	2.7
6	5350.00	42.1 AV	54.0	-11.9	3.50 H	133	39.4	2.7
7	#10460.00	51.2 PK	68.2	-17.0	1.24 H	136	38.7	12.5
8	15690.00	53.1 PK	74.0	-20.9	3.98 H	77	40.6	12.5
9	15690.00	39.4 AV	54.0	-14.6	3.98 H	77	26.9	12.5
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	63.7 PK	74.0	-10.3	1.67 V	33	60.8	2.9
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.67 V**	**33**	**51.0**	**2.9**
3	*5230.00	118.8 PK			1.67 V	33	116.2	2.6
4	*5230.00	108.3 AV			1.67 V	33	105.7	2.6
5	5350.00	58.2 PK	74.0	-15.8	1.67 V	33	55.5	2.7
6	5350.00	47.2 AV	54.0	-6.8	1.67 V	33	44.5	2.7
7	#10460.00	52.7 PK	68.2	-15.5	1.10 V	137	40.2	12.5
8	15690.00	56.6 PK	74.0	-17.4	1.90 V	40	44.1	12.5
9	15690.00	42.0 AV	54.0	-12.0	1.90 V	40	29.5	12.5

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	#5605.65	58.3 PK	68.2	-9.9	3.55 H	135	55.0	3.3
2	*5755.00	112.6 PK			3.55 H	135	109.6	3.0
3	*5755.00	101.5 AV			3.55 H	135	98.5	3.0
4	#5936.27	55.6 PK	68.2	-12.6	3.55 H	135	52.0	3.6
5	11510.00	64.0 PK	74.0	-10.0	1.27 H	110	51.7	12.3
6	11510.00	49.6 AV	54.0	-4.4	1.27 H	110	37.3	12.3
7	#17265.00	52.6 PK	68.2	-15.6	3.94 H	76	37.2	15.4
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	#5567.53	65.6 PK	68.2	-2.6	2.31 V	1	62.4	3.2
2	*5755.00	117.8 PK			2.31 V	1	114.8	3.0
3	*5755.00	106.3 AV			2.31 V	1	103.3	3.0
4	#5968.28	64.6 PK	68.2	-3.6	2.31 V	1	61.0	3.6
5	11510.00	67.8 PK	74.0	-6.2	1.00 V	135	55.5	12.3
6	**11510.00**	**53.9 AV**	**54.0**	**-0.1**	**1.00 V**	**135**	**41.6**	**12.3**
7	#17265.00	56.7 PK	68.2	-11.5	3.23 V	234	41.3	15.4

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	#5639.31	57.4 PK	68.2	-10.8	3.59 H	131	54.2	3.2
2	*5795.00	113.0 PK			3.59 H	131	110.0	3.0
3	*5795.00	101.9 AV			3.59 H	131	98.9	3.0
4	#5944.07	57.9 PK	68.2	-10.3	3.59 H	131	54.4	3.5
5	11590.00	64.2 PK	74.0	-9.8	1.18 H	115	51.8	12.4
6	11590.00	49.8 AV	54.0	-4.2	1.18 H	115	37.4	12.4
7	#17385.00	54.1 PK	68.2	-14.1	4.00 H	48	37.9	16.2
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	#5639.41	62.5 PK	68.2	-5.7	1.87 V	3	59.3	3.2
2	*5795.00	118.0 PK			1.87 V	3	115.0	3.0
3	*5795.00	106.7 AV			1.87 V	3	103.7	3.0
4	#5949.62	62.0 PK	68.2	-6.2	1.87 V	3	58.5	3.5
5	11590.00	68.0 PK	74.0	-6.0	1.03 V	137	55.6	12.4
6	**11590.00**	**53.9 AV**	**54.0**	**-0.1**	**1.03 V**	**137**	**41.5**	**12.4**
7	#17385.00	56.2 PK	68.2	-12.0	3.29 V	229	40.0	16.2

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	57.6 PK	74.0	-16.4	3.56 H	141	54.7	2.9
2	5150.00	47.6 AV	54.0	-6.4	3.56 H	141	44.7	2.9
3	*5210.00	104.3 PK			3.56 H	141	101.6	2.7
4	*5210.00	95.7 AV			3.56 H	141	93.0	2.7
5	5350.00	48.1 PK	74.0	-25.9	3.56 H	141	45.4	2.7
6	5350.00	37.5 AV	54.0	-16.5	3.56 H	141	34.8	2.7
7	#10420.00	51.1 PK	68.2	-17.1	1.19 H	135	38.5	12.6
8	15630.00	53.8 PK	74.0	-20.2	3.96 H	62	40.7	13.1
9	15630.00	39.9 AV	54.0	-14.1	3.96 H	62	26.8	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	65.9 PK	74.0	-8.1	2.59 V	7	63.0	2.9
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**2.59 V**	**7**	**51.0**	**2.9**
3	*5210.00	109.4 PK			2.59 V	7	106.7	2.7
4	*5210.00	100.9 AV			2.59 V	7	98.2	2.7
5	5350.00	54.2 PK	74.0	-19.8	2.59 V	7	51.5	2.7
6	5350.00	44.1 AV	54.0	-9.9	2.59 V	7	41.4	2.7
7	#10420.00	52.1 PK	68.2	-16.1	1.10 V	141	39.5	12.6
8	15630.00	56.4 PK	74.0	-17.6	1.95 V	55	43.3	13.1
9	15630.00	42.2 AV	54.0	-11.8	1.95 V	55	29.1	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 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	#5648.93	63.2 PK	68.2	-5.0	3.52 H	128	60.0	3.2
2	*5775.00	108.9 PK			3.52 H	128	105.9	3.0
3	*5775.00	99.5 AV			3.52 H	128	96.5	3.0
4	#5932.41	57.5 PK	68.2	-10.7	3.52 H	128	53.9	3.6
5	11550.00	52.2 PK	74.0	-21.8	1.22 H	117	39.8	12.4
6	11550.00	39.8 AV	54.0	-14.2	1.22 H	117	27.4	12.4
7	#17325.00	54.1 PK	68.2	-14.1	4.00 H	57	38.4	15.7
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	**#5649.47**	**68.1 PK**	**68.2**	**-0.1**	**2.47 V**	**324**	**64.9**	**3.2**
2	*5775.00	113.8 PK			2.47 V	324	110.8	3.0
3	*5775.00	104.6 AV			2.47 V	324	101.6	3.0
4	#5963.59	65.3 PK	68.2	-2.9	2.47 V	324	61.8	3.5
5	11550.00	52.0 PK	74.0	-22.0	1.12 V	133	39.6	12.4
6	11550.00	39.6 AV	54.0	-14.4	1.12 V	133	27.2	12.4
7	#17325.00	56.8 PK	68.2	-11.4	1.90 V	56	41.1	15.7

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:

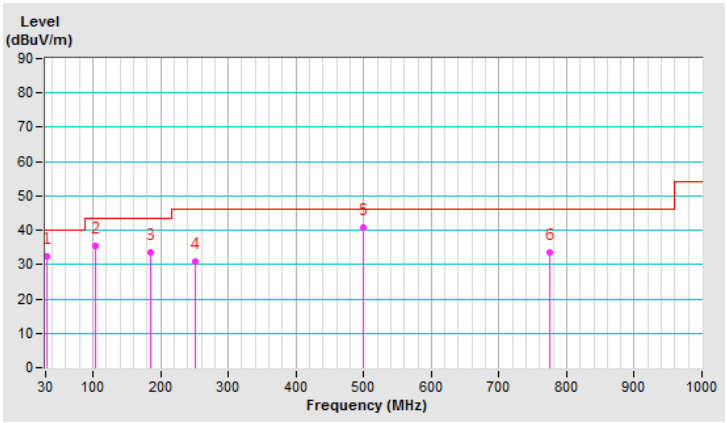
802.11ac (VHT40)

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	30.97	32.5 QP	40.0	-7.5	3.00 H	243	41.5	-9.0
2	102.75	35.6 QP	43.5	-7.9	2.50 H	269	47.4	-11.8
3	185.20	33.6 QP	43.5	-9.9	2.50 H	231	43.5	-9.9
4	250.19	30.9 QP	46.0	-15.1	2.00 H	238	39.8	-8.9
5	500.45	40.8 QP	46.0	-5.2	2.00 H	226	42.8	-2.0
6	773.99	33.4 QP	46.0	-12.6	1.50 H	279	29.8	3.6

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

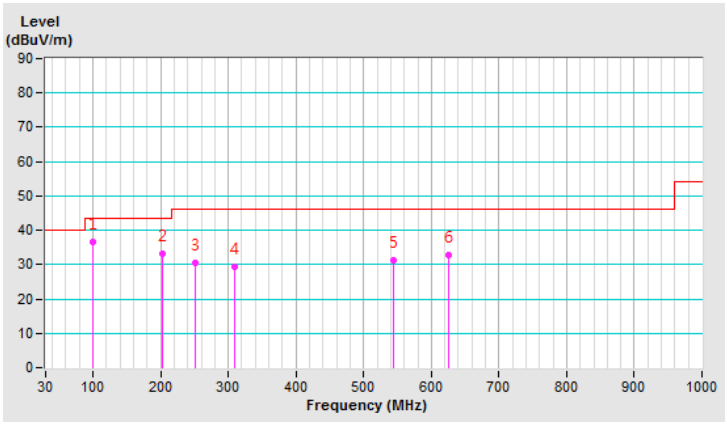


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	98.87	36.7 QP	43.5	-6.8	1.00 V	269	49.3	-12.6
2	201.69	33.3 QP	43.5	-10.2	1.00 V	118	44.2	-10.9
3	250.19	30.6 QP	46.0	-15.4	1.50 V	308	39.5	-8.9
4	308.39	29.4 QP	46.0	-16.6	1.50 V	217	36.0	-6.6
5	544.10	31.3 QP	46.0	-14.7	1.00 V	265	32.7	-1.4
6	624.61	32.8 QP	46.0	-13.2	3.00 V	115	31.9	0.9

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 04, 2018	June 03, 2019
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
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 Conduction 1.
3 Tested Date: Nov. 16, 2018

4.2.3 Test Procedure

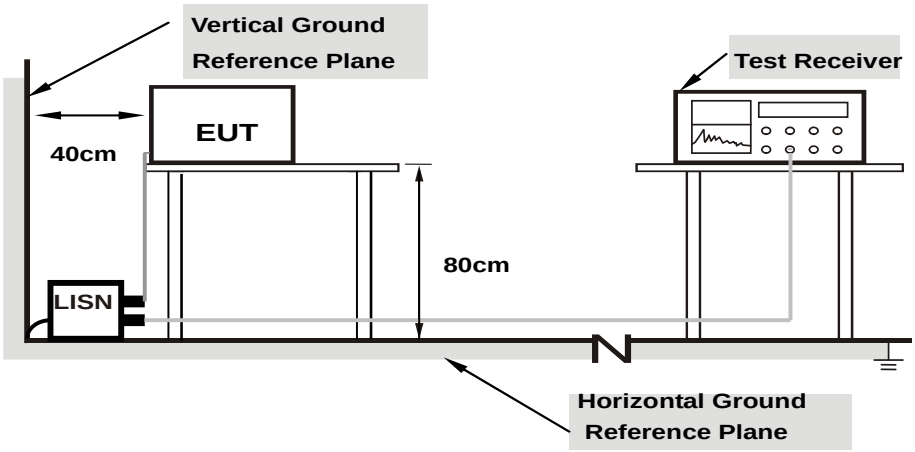
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

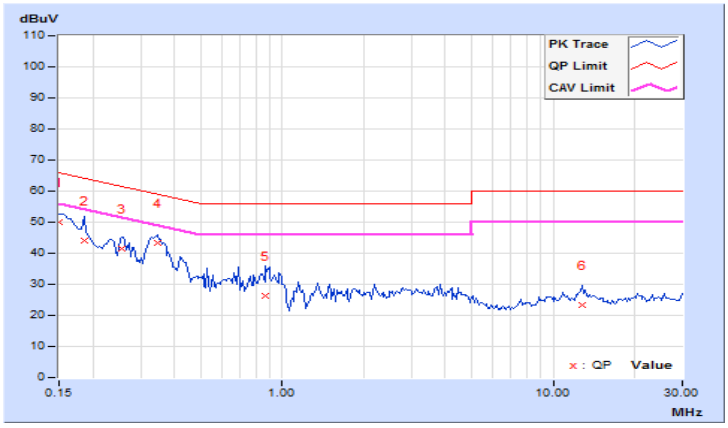
4.2.7 Test Results

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	10.03	40.00	26.52	50.03	36.55	66.00	56.00	-15.97	-19.45
2	0.18516	10.04	33.97	18.68	44.01	28.72	64.25	54.25	-20.24	-25.53
3	0.25547	10.06	31.55	23.61	41.61	33.67	61.58	51.58	-19.97	-17.91
4	**0.34531**	**10.07**	**33.20**	**26.66**	**43.27**	**36.73**	**59.07**	**49.07**	**-15.80**	**-12.34**
5	0.86484	10.12	16.33	4.96	26.45	15.08	56.00	46.00	-29.55	-30.92
6	12.74609	10.88	12.44	6.83	23.32	17.71	60.00	50.00	-36.68	-32.29

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

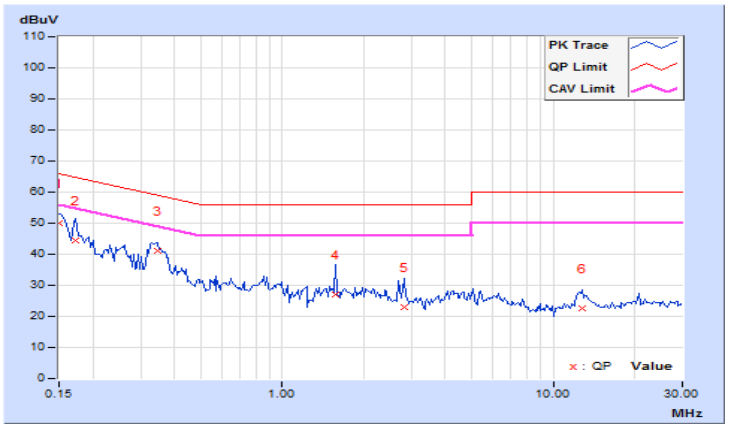


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.15000	9.94	40.07	27.35	50.01	37.29	66.00	56.00	-15.99	-18.71
2	0.17344	9.94	34.64	18.77	44.58	28.71	64.79	54.79	-20.21	-26.08
3	0.34531	9.97	31.26	24.60	41.23	34.57	59.07	49.07	-17.84	-14.50
4	1.57422	10.04	16.91	9.48	26.95	19.52	56.00	46.00	-29.05	-26.48
5	2.81250	10.11	12.82	5.72	22.93	15.83	56.00	46.00	-33.07	-30.17
6	12.83203	10.70	11.99	6.64	22.69	17.34	60.00	50.00	-37.31	-32.66

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 Measurement

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)
		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 Results

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	22.59	21.71	23.22	539.698	27.32	30	Pass
40	5200	22.30	22.44	22.86	538.409	27.31	30	Pass
48	5240	22.94	21.94	22.65	537.181	27.30	30	Pass
149	5745	24.87	24.39	24.54	866.96	29.38	30	Pass
157	5785	25.01	24.31	24.27	853.10	29.31	30	Pass
165	5825	24.80	24.03	24.10	812.83	29.10	30	Pass

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	22.24	22.53	22.86	539.752	27.32	30	Pass
40	5200	22.51	22.31	22.77	537.688	27.31	30	Pass
48	5240	22.82	22.25	21.53	501.539	27.00	30	Pass
149	5745	25.16	24.09	24.60	872.97	29.41	30	Pass
157	5785	24.95	24.11	24.63	860.99	29.35	30	Pass
165	5825	25.07	23.85	24.14	824.14	29.16	30	Pass

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
38	5190	19.85	19.20	20.20	284.494	24.54	30	Pass
46	5230	24.78	24.21	24.73	861.408	29.35	30	Pass
151	5755	25.24	24.22	24.39	872.97	29.41	30	Pass
159	5795	25.19	24.15	24.56	876.145	29.43	30	Pass

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
42	5210	18.99	19.54	19.75	263.606	24.21	30	Pass
155	5775	24.22	23.69	23.66	730.399	28.64	30	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	22.24	22.53	22.86	539.752	27.32	27.36	Pass
40	5200	22.51	22.31	22.77	537.688	27.31	27.36	Pass
48	5240	22.82	22.25	21.53	501.539	27.00	27.36	Pass
149	5745	22.96	21.87	22.38	524.494	27.20	27.36	Pass
157	5785	22.69	21.88	22.37	512.534	27.10	27.36	Pass
165	5825	22.96	21.78	22.10	510.539	27.08	27.36	Pass

Note: The directional gain = 10 log[(10$^{Chain1/20}$ + 10$^{Chain2/20}$ + 10$^{Chain3/20}$)^2 / 3] = 8.64dBi > 6dBi, so the power limit shall be reduced to 30-(8.64-6) = 27.36dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
38	5190	19.85	19.20	20.20	284.494	24.54	27.36	Pass
46	5230	22.46	22.16	22.79	530.743	27.25	27.36	Pass
151	5755	22.94	21.89	22.12	514.244	27.11	27.36	Pass
159	5795	23.02	22.05	22.36	532.959	27.27	27.36	Pass

Note: The directional gain = 10 log[(10$^{Chain1/20}$ + 10$^{Chain2/20}$ + 10$^{Chain3/20}$)^2 / 3] = 8.64dBi > 6dBi, so the power limit shall be reduced to 30-(8.64-6) = 27.36dBm.

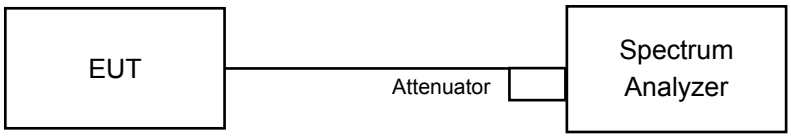
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
42	5210	18.99	19.54	19.75	263.606	24.21	27.36	Pass
155	5775	22.69	22.13	22.15	513.144	27.10	27.36	Pass

Note: The directional gain = 10 log[(10$^{Chain1/20}$ + 10$^{Chain2/20}$ + 10$^{Chain3/20}$)^2 / 3] = 8.64dBi > 6dBi, so the power limit shall be reduced to 30-(8.64-6) = 27.36dBm.

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

CDD Mode

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
36	5180	17.04	17.04	17.04
40	5200	17.04	17.16	17.04
48	5240	17.04	17.22	17.22
149	5745	17.04	16.92	16.80
157	5785	17.16	16.80	16.68
165	5825	17.16	16.92	16.92

802.11ac (VHT20)

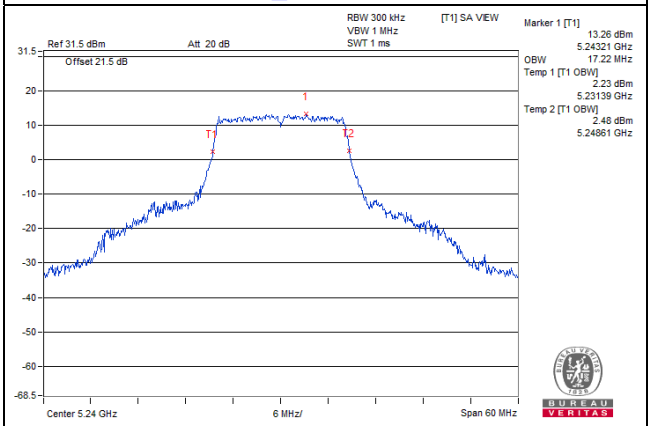
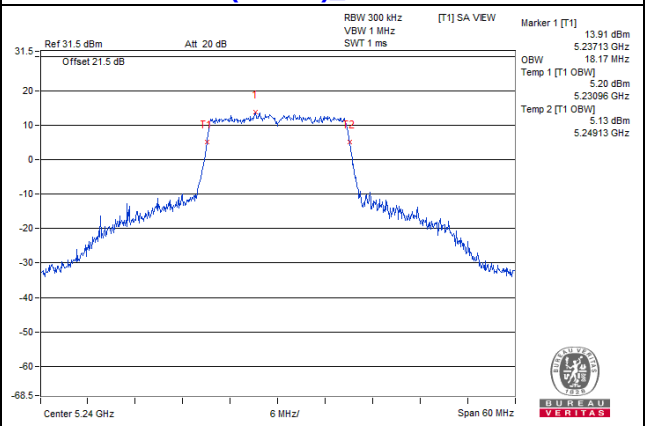
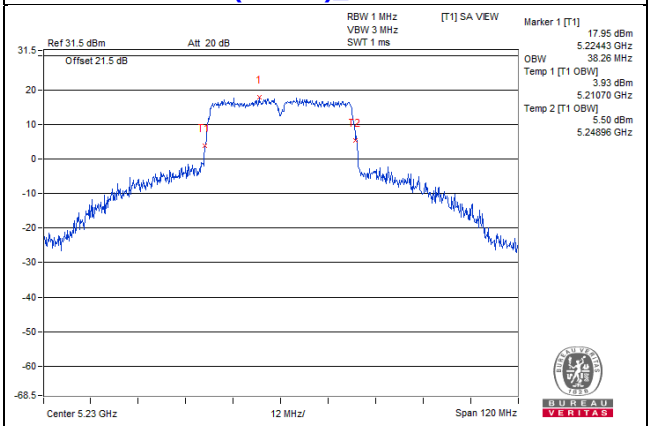
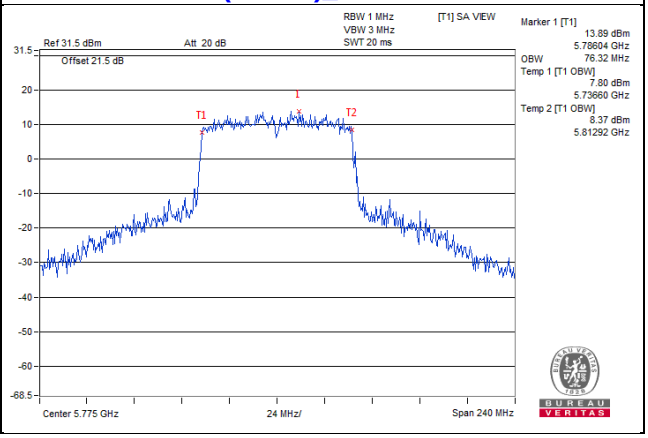
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
36	5180	18.00	18.12	18.12
40	5200	18.00	18.12	18.12
48	5240	18.17	18.08	18.17
149	5745	18.12	18.12	18.00
157	5785	18.12	17.88	18.00
165	5825	18.12	17.88	18.12

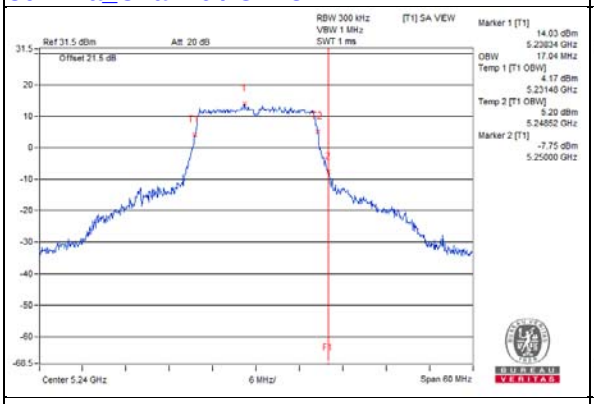
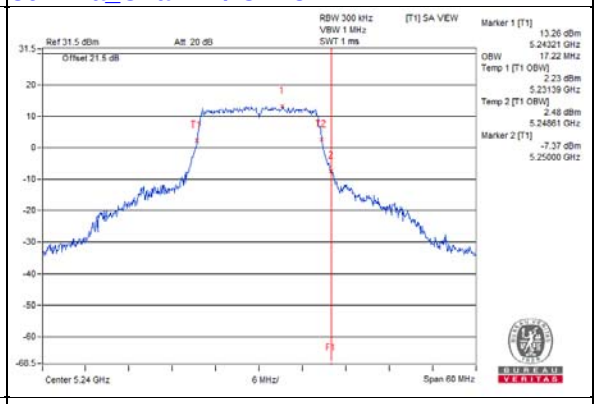
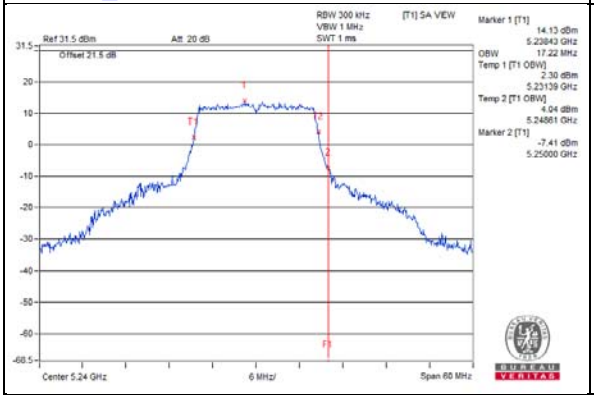
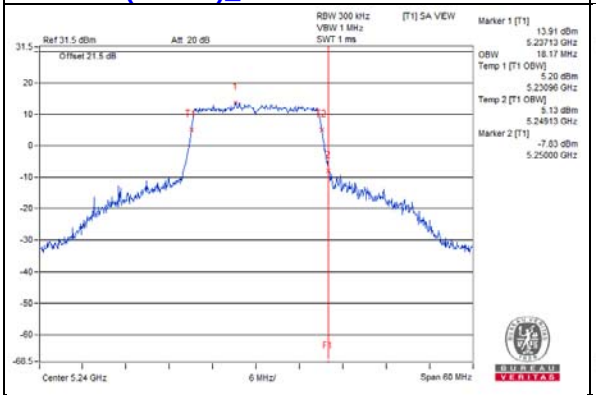
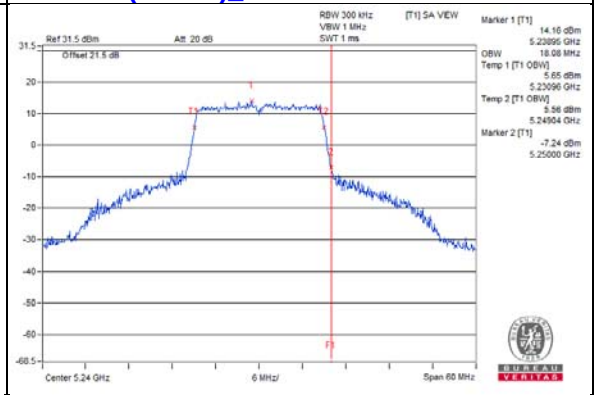
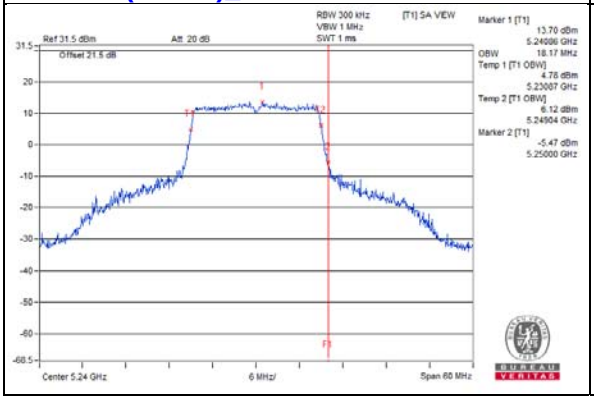
802.11ac (VHT40)

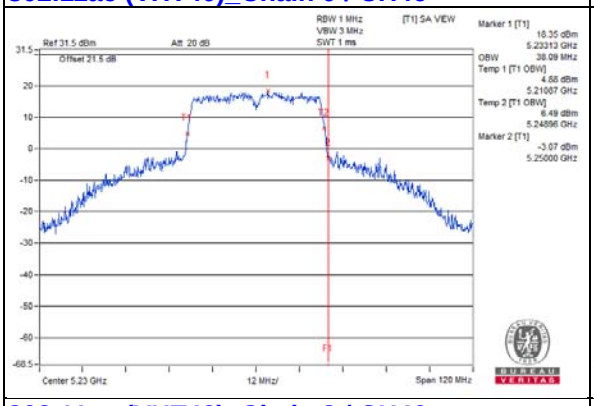
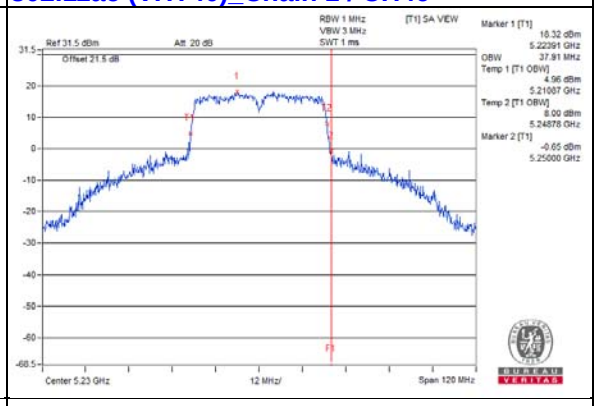
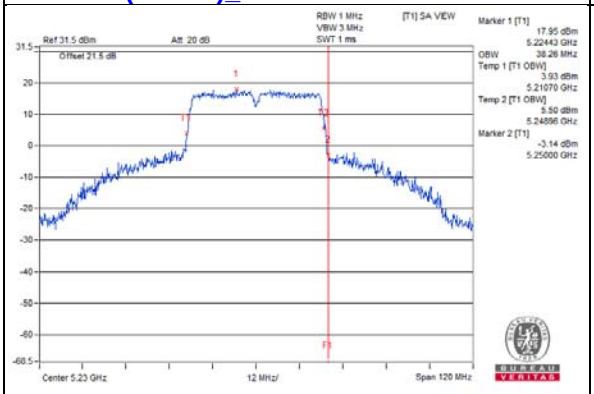
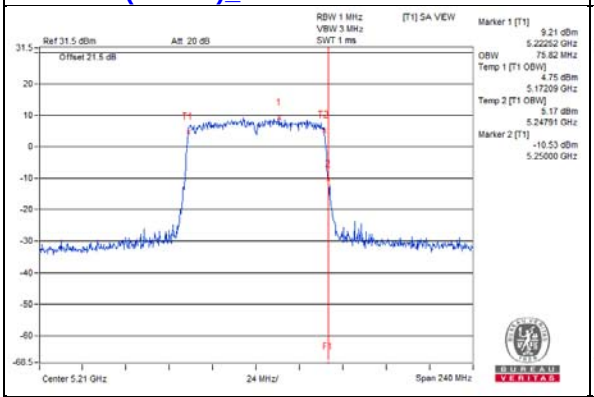
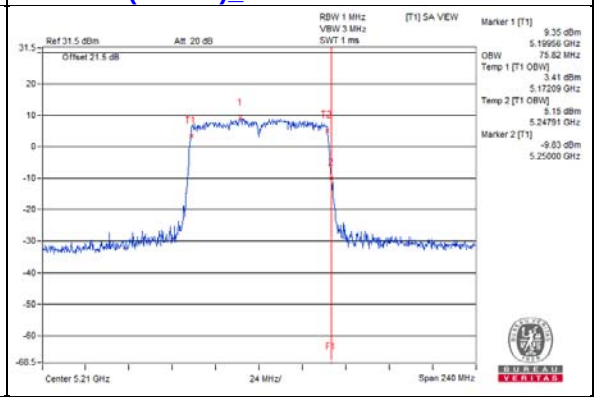
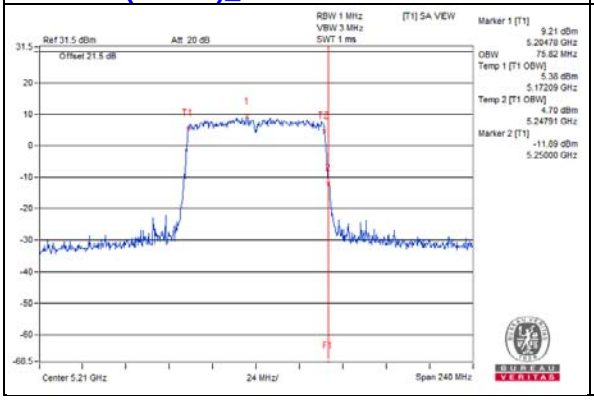
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
38	5190	36.48	36.72	36.48
46	5230	38.09	37.91	38.26
151	5755	37.68	36.72	36.72
159	5795	38.16	37.20	37.20

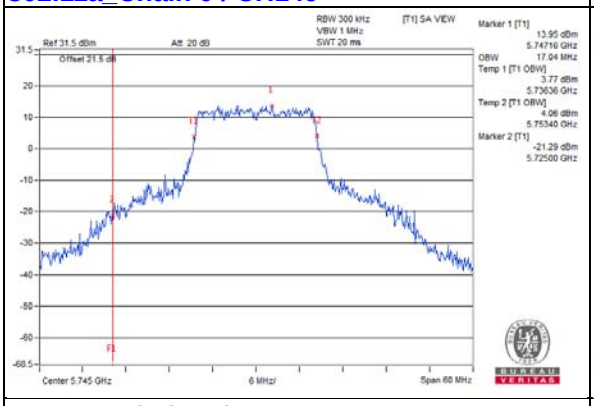
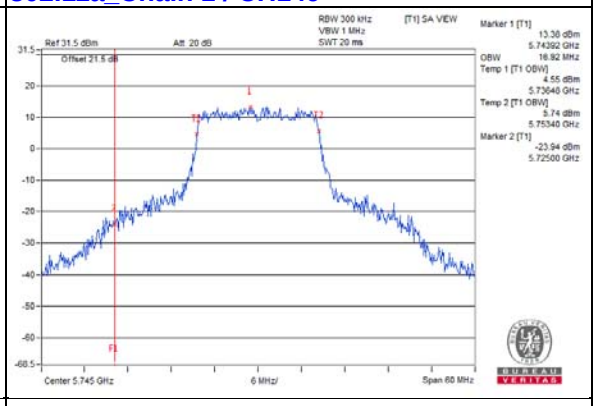
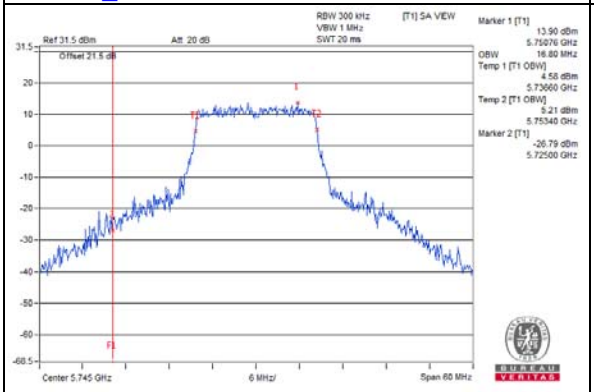
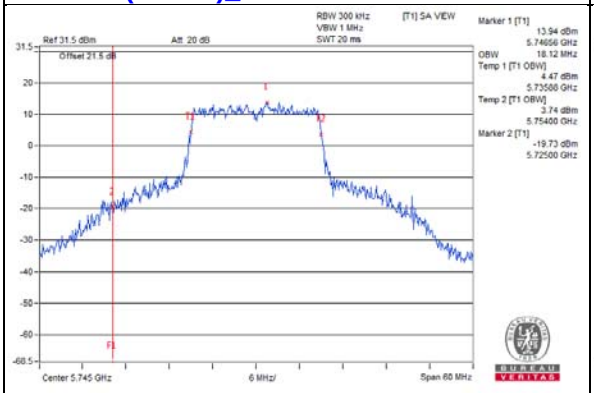
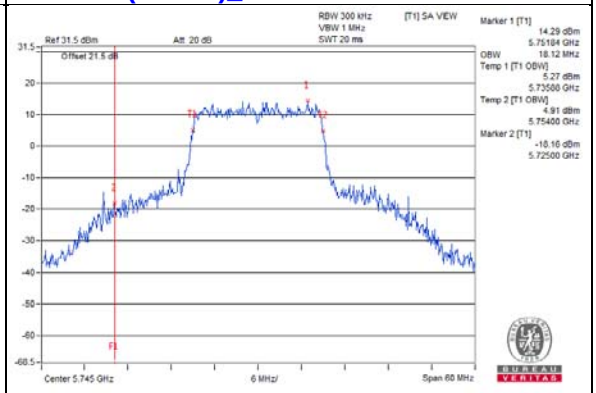
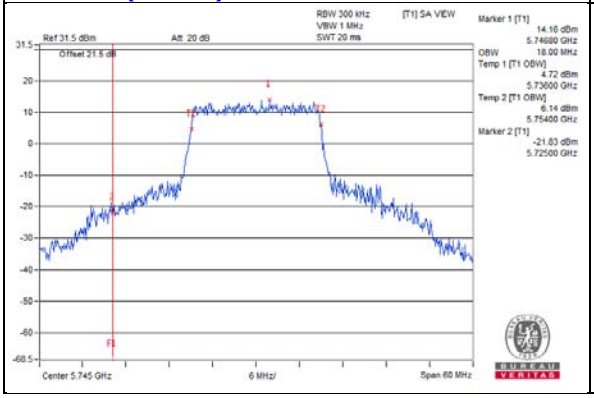
802.11ac (VHT80)

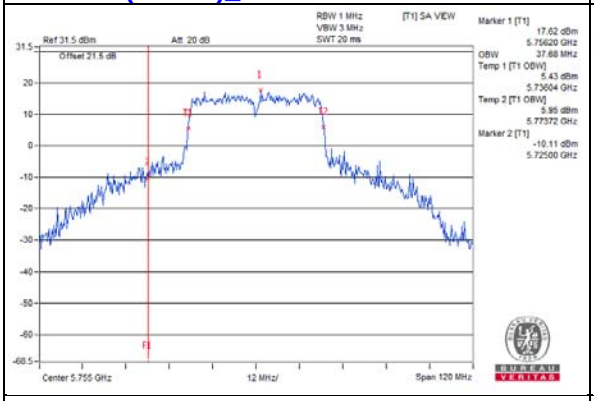
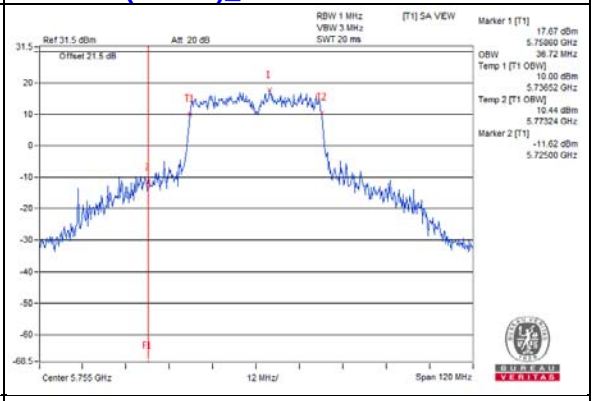
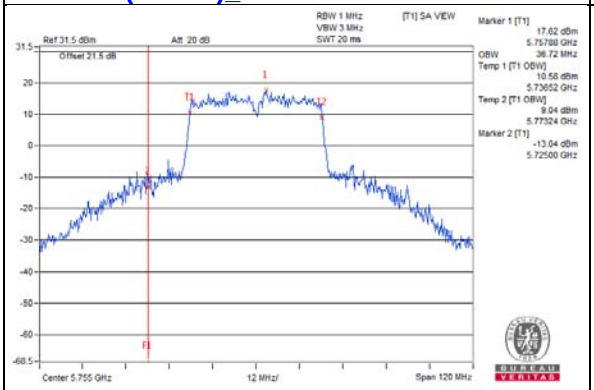
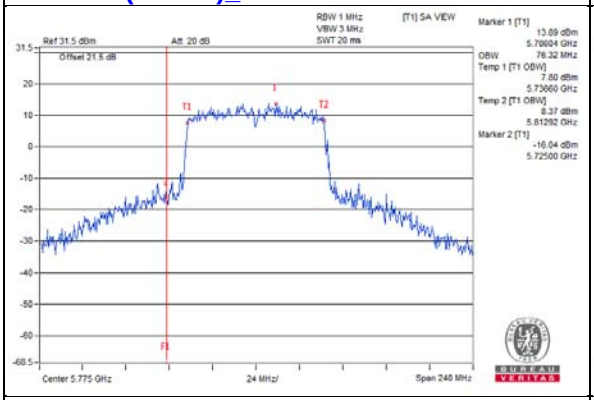
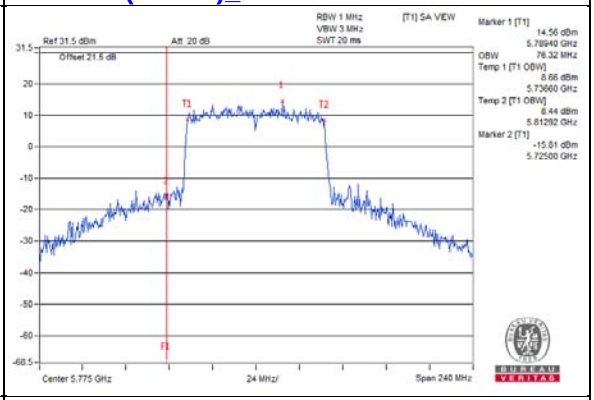
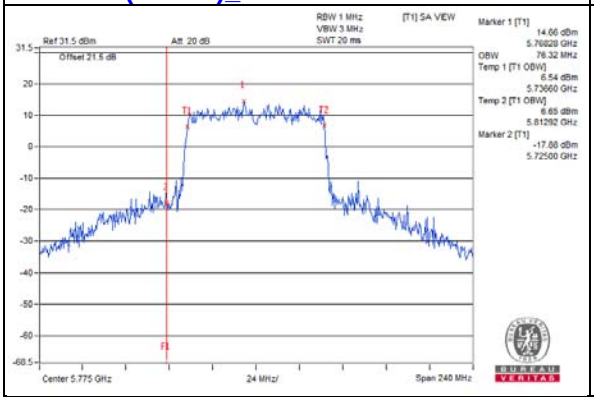
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
42	5210	75.82	75.82	75.82
155	5775	76.32	76.32	76.32

Spectrum Plot of Max. Value	
802.11a_Chain 1 / CH48	**802.11ac (VHT20)_Chain 0 / CH48**
	
802.11ac (VHT40)_Chain 2 / CH46	**802.11ac (VHT80)_Chain 0 / CH155**
	

Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11a_Chain 0 / CH48	**802.11a_Chain 1 / CH48**
	
802.11a_Chain 2 / CH48	
	
802.11ac (VHT20)_Chain 0 / CH48	**802.11ac (VHT20)_Chain 1 / CH48**
	
802.11ac (VHT20)_Chain 2 / CH48	
	

Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11ac (VHT40)_Chain 0 / CH46	**802.11ac (VHT40)_Chain 1 / CH46**
	
802.11ac (VHT40)_Chain 2 / CH46	
	
802.11ac (VHT80)_Chain 0 / CH42	**802.11ac (VHT80)_Chain 1 / CH42**
	
802.11ac (VHT80)_Chain 2 / CH42	
	

Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2C band)	
802.11a_Chain 0 / CH149	**802.11a_Chain 1 / CH149**
	
802.11a_Chain 2 / CH149	
	
802.11ac (VHT20)_Chain 0 / CH149	**802.11ac (VHT20)_Chain 1 / CH149**
	
802.11ac (VHT20)_Chain 2 / CH149	
	

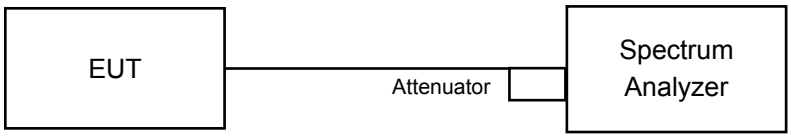
Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2C band)	
802.11ac (VHT40)_Chain 0 / CH151	**802.11ac (VHT40)_Chain 1 / CH151**
	
802.11ac (VHT40)_Chain 2 / CH151	
	
802.11ac (VHT80)_Chain 0 / CH155	**802.11ac (VHT80)_Chain 1 / CH155**
	
802.11ac (VHT80)_Chain 2 / 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	
		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, U-NII-2A, U-NII-2C band:

For 802.11a, 802.11ac (VHT20)

Using method SA-1

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

For 802.11ac (VHT40), 802.11ac (VHT80)

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:

For 802.11a, 802.11ac (VHT20)

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

For 802.11ac (VHT40), 802.11ac (VHT80)

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

CDD Mode

For U-NII-1:

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)			Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
36	5180	9.07	8.87	9.53	13.94	14.36	Pass
40	5200	9.12	9.22	9.04	13.90	14.36	Pass
48	5240	9.50	8.99	9.14	13.99	14.36	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. The directional gain = 10 log[(10$^{Chain0/20}$ + 10$^{Chain1/20}$ + 10^{Chain2}/20)^2 / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 17-(8.64-6) = 14.36dBm.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)			Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
36	5180	8.80	9.08	9.44	13.89	14.36	Pass
40	5200	8.94	9.06	9.11	13.81	14.36	Pass
48	5240	9.58	8.80	9.45	14.06	14.36	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. The directional gain = 10 log[(10$^{Chain0/20}$ + 10$^{Chain1/20}$ + 10^{Chain2}/20)^2 / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 17-(8.64-6) = 14.36dBm.

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	Chain 2				
38	5190	3.09	2.67	3.19	0.09	7.85	14.36	Pass
46	5230	7.96	7.43	7.92	0.09	12.64	14.36	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. The directional gain = 10 log[(10$^{Chain0/20}$ + 10$^{Chain1/20}$ + 10^{Chain2}/20)^2 / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 17-(8.64-6) = 14.36dBm.
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	Chain 2				
42	5210	-1.08	-0.41	-0.39	0.18	4.34	14.36	Pass

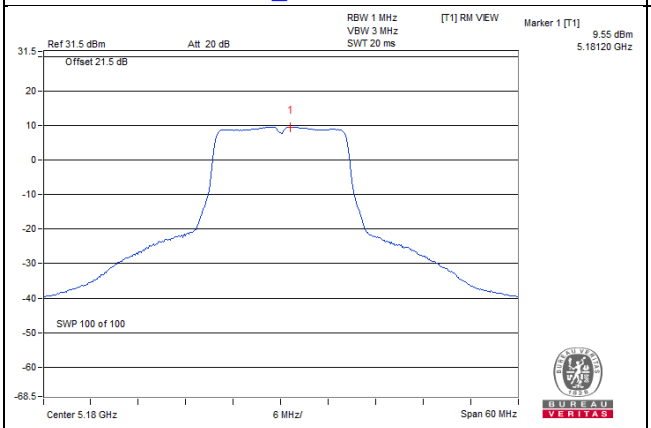
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. The directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$ + 10^{Chain2}/20)^2 / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 17-(8.64-6) = 14.36dBm.

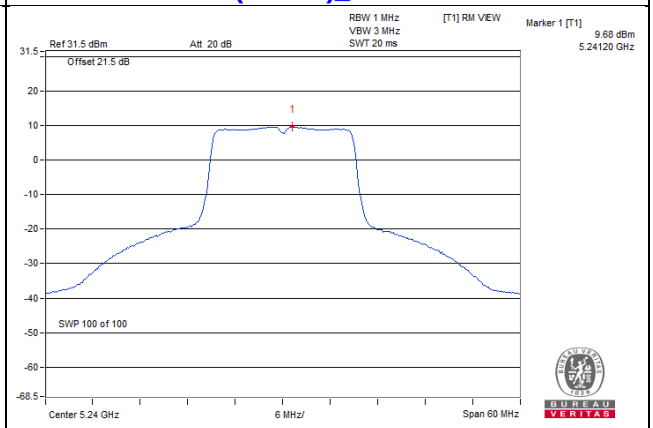
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

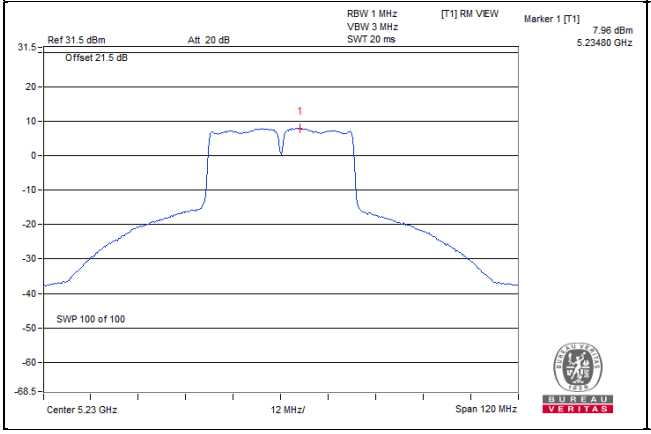
802.11a_Chain 2 / CH36



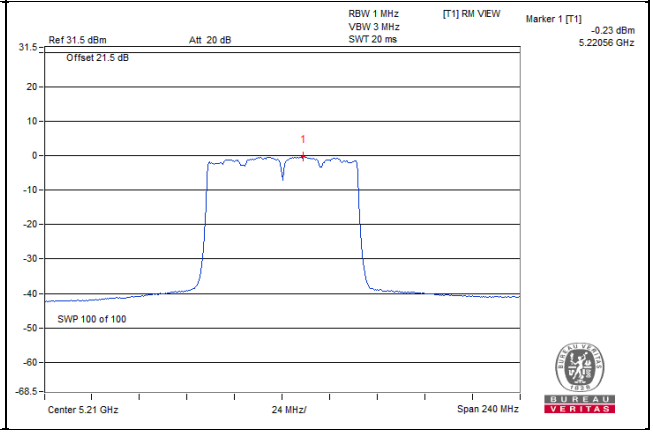
802.11ac (VHT20)_Chain 0 / CH48



802.11ac (VHT40)_Chain 0 / CH46



802.11ac (VHT80)_Chain 2 / CH42



CDD Mode

For U-NII-3:

802.11a

Chan.	Freq. (MHz)	PSD (dBm/300kHz)			Total PSD		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	Chain 2	dBm/300kHz	dBm/500kHz		
149	5745	2.14	1.61	1.37	6.49	8.71	27.36	Pass
157	5785	1.86	1.39	1.24	6.28	8.50	27.36	Pass
165	5825	1.44	0.98	0.84	5.87	8.09	27.36	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$ + $10^{Chain2}/20)^2$ / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 30-(8.64-6) = 27.36dBm.

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)			Total PSD		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	Chain 2	dBm/300kHz	dBm/500kHz		
149	5745	1.68	1.39	1.32	6.24	8.46	27.36	Pass
157	5785	1.53	0.88	1.35	6.03	8.25	27.36	Pass
165	5825	1.12	0.64	0.66	5.58	7.80	27.36	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$ + $10^{Chain2}/20)^2$ / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 30-(8.64-6) = 27.36dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)			Duty Factor (dB)	Total PSD With Duty Factor		Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	Chain 2		mW/300kHz	dBm/300kHz			
151	5755	-0.42	-0.94	-0.98	0.09	2.5646	4.09	6.31	27.36	Pass
159	5795	-0.41	-1.30	-1.56	0.09	2.3994	3.80	6.02	27.36	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$ + $10^{Chain2}/20)^2$ / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 30-(8.64-6) = 27.36dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)			Duty Factor (dB)	Total PSD With Duty Factor		Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	Chain 2		mW/300kHz	dBm/300kHz			
155	5775	-4.81	-5.27	-5.45	0.18	0.9504	-0.22	2.00	27.36	Pass

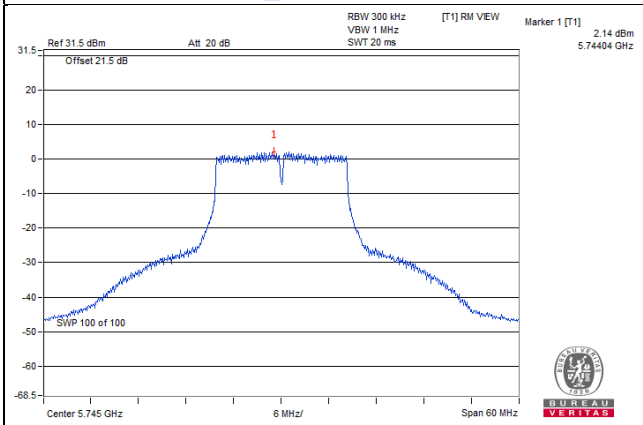
Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.

2. The directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$ + 10^{Chain2}/20)^2 / 3] = 8.64dBi > 6dBi , so the power density limit shall be reduced to 30-(8.64-6) = 27.36dBm.

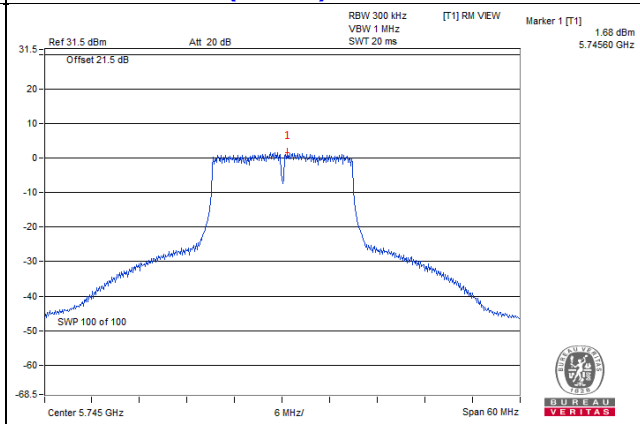
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

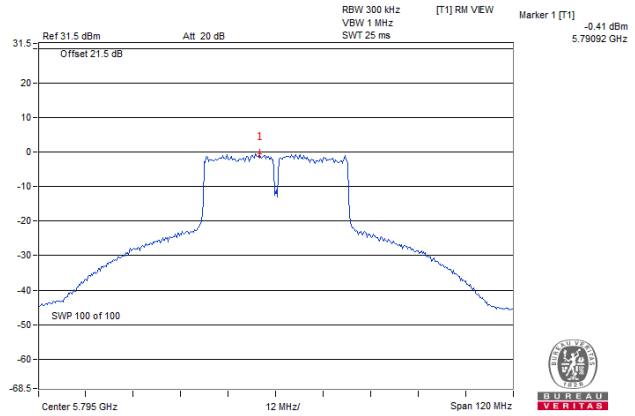
802.11a_Chain 0 / CH149



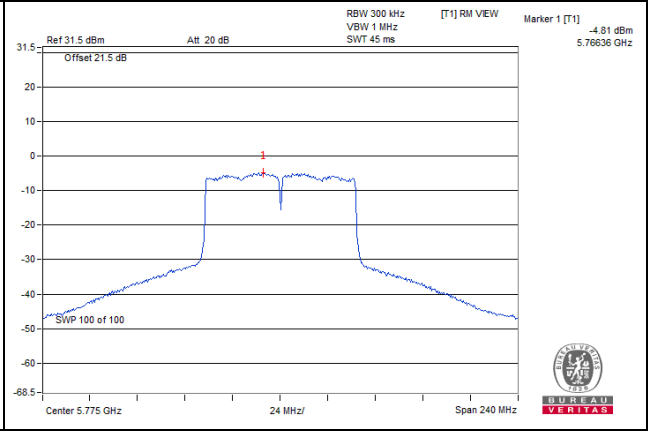
802.11ac (VHT20)_Chain 0 / CH149



802.11ac (VHT40)_Chain 0 / CH159



802.11ac (VHT80)_Chain 0 / CH155

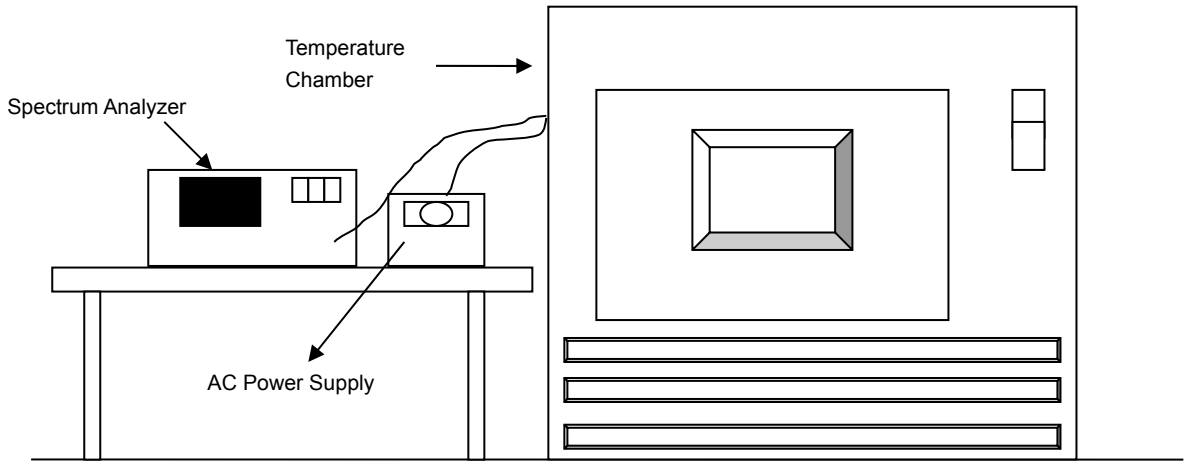


4.6 Frequency Stability Measurement

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 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5180.0253	Pass	5180.0264	Pass	5180.0249	Pass	5180.0224	Pass
40	120	5179.9984	Pass	5179.9973	Pass	5179.9995	Pass	5180.0008	Pass
30	120	5179.9957	Pass	5179.9974	Pass	5179.9962	Pass	5179.9992	Pass
20	120	5180.0168	Pass	5180.0148	Pass	5180.0153	Pass	5180.017	Pass
10	120	5180.0085	Pass	5180.01	Pass	5180.01	Pass	5180.0102	Pass
0	120	5179.9861	Pass	5179.9868	Pass	5179.9909	Pass	5179.9909	Pass
-10	120	5179.9803	Pass	5179.9781	Pass	5179.9754	Pass	5179.9762	Pass
-20	120	5179.9916	Pass	5179.9896	Pass	5179.9886	Pass	5179.9893	Pass
-30	120	5180.0209	Pass	5180.0218	Pass	5180.0237	Pass	5180.0185	Pass

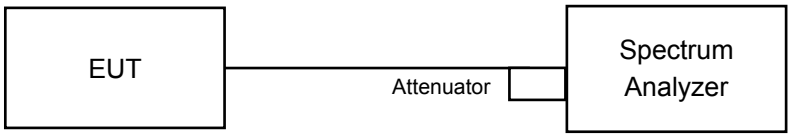
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0172	Pass	5180.0153	Pass	5180.0149	Pass	5180.0173	Pass
	120	5180.0168	Pass	5180.0148	Pass	5180.0153	Pass	5180.017	Pass
	102	5180.0173	Pass	5180.0155	Pass	5180.016	Pass	5180.0178	Pass

4.7 6dB Bandwidth Measurement

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	Chain 2		
149	5745	16.39	16.40	16.44	0.5	Pass
157	5785	16.42	16.43	16.45	0.5	Pass
165	5825	16.43	16.42	16.45	0.5	Pass

802.11ac (VHT20)

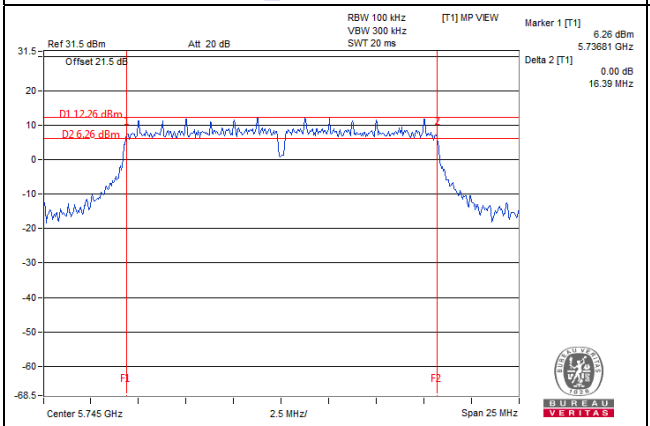
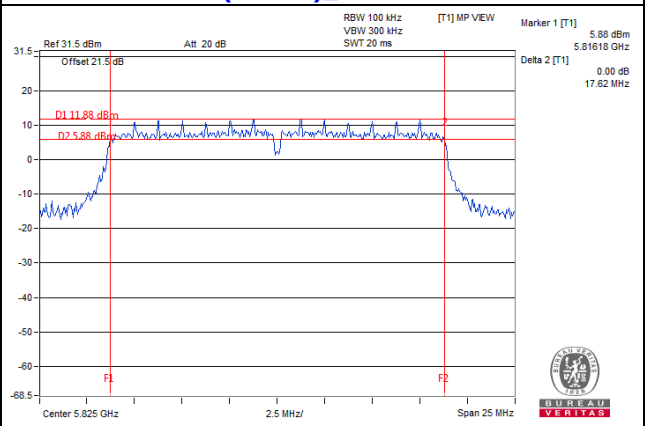
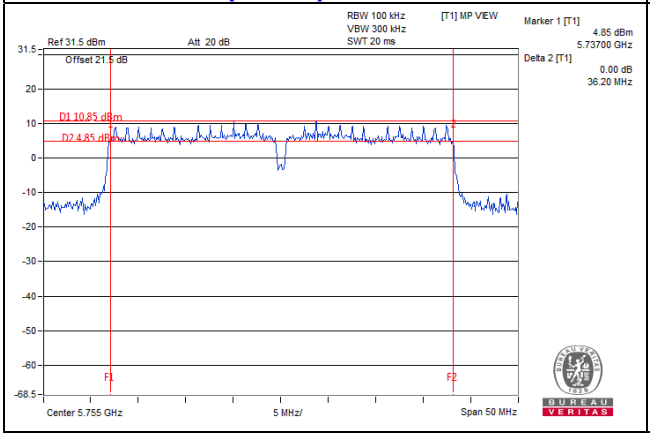
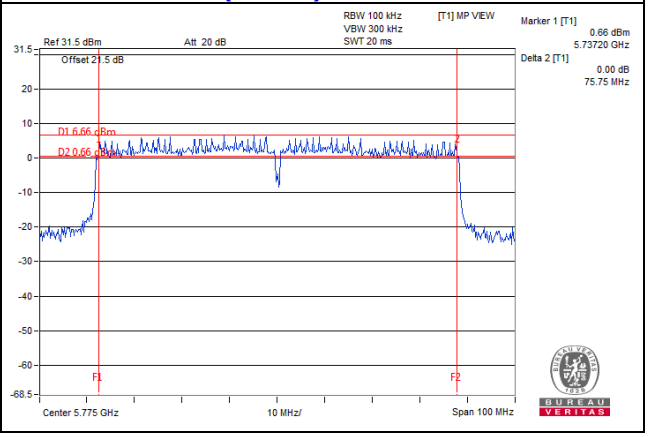
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
149	5745	17.64	17.65	17.68	0.5	Pass
157	5785	17.63	17.67	17.66	0.5	Pass
165	5825	17.62	17.67	17.65	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
151	5755	36.20	36.45	36.46	0.5	Pass
159	5795	36.28	36.47	36.44	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
155	5775	75.80	75.75	75.98	0.5	Pass

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH149	**802.11ac (VHT20)_Chain 0 / CH165**
	
802.11ac (VHT40)_Chain 0 / CH151	**802.11ac (VHT80)_Chain 1 / CH155**
	

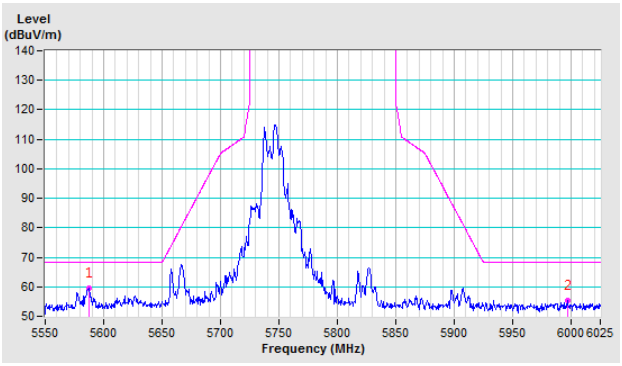
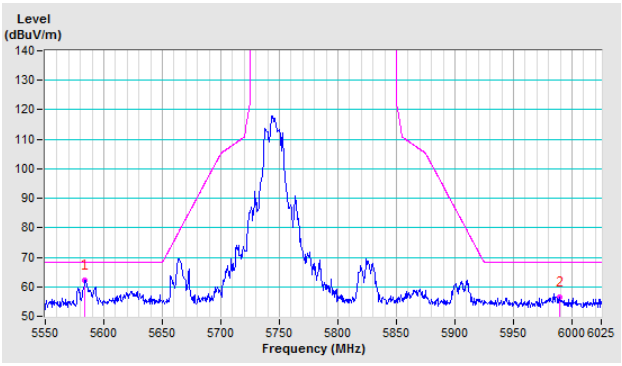
5 Pictures of Test Arrangements

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

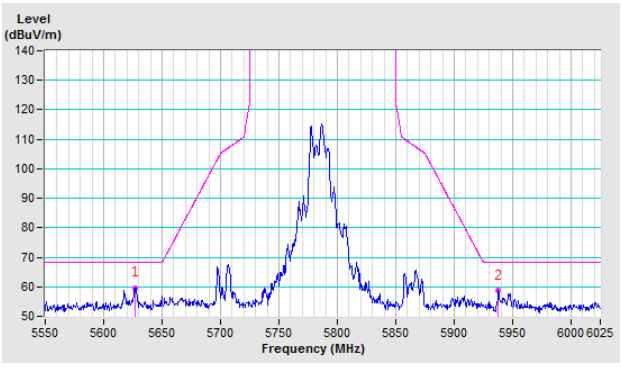
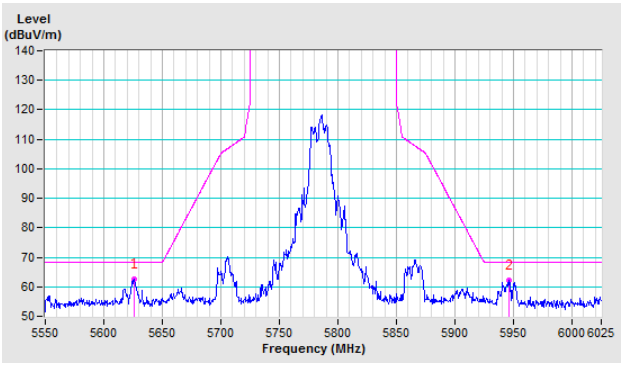
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

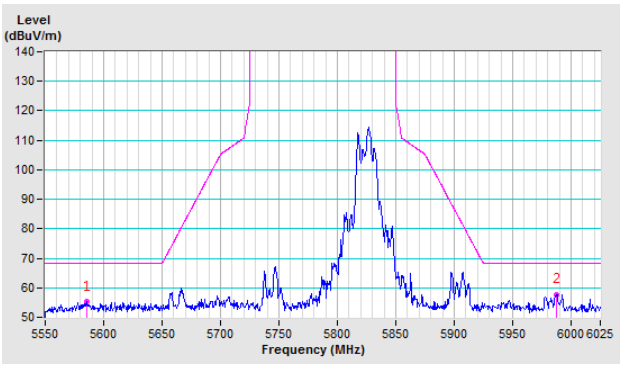
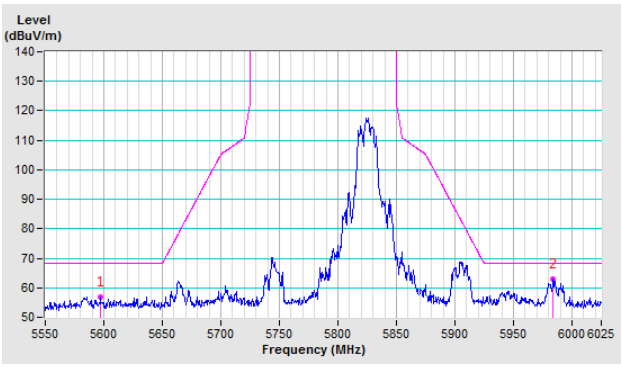
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

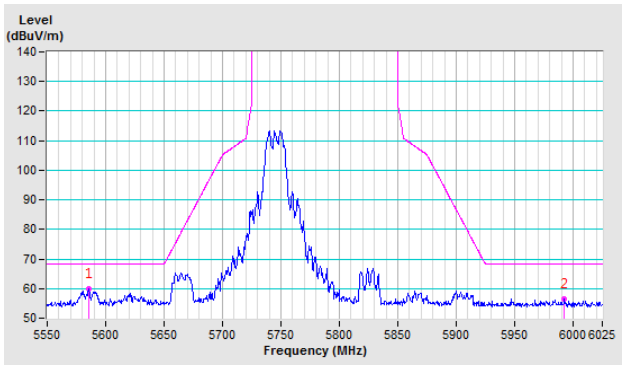
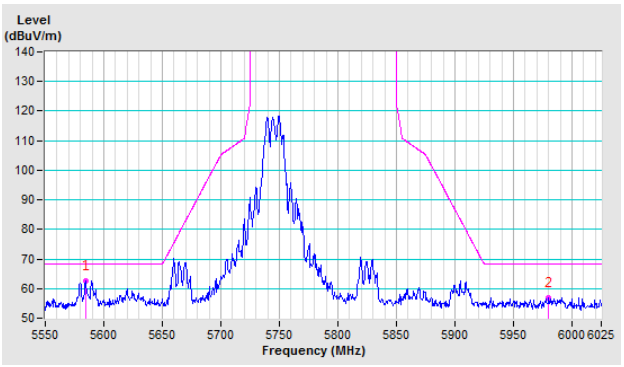
Horizontal	Vertical
	

CH 165 5825 MHz

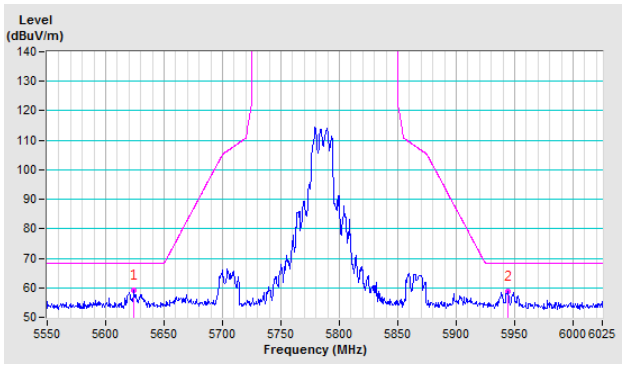
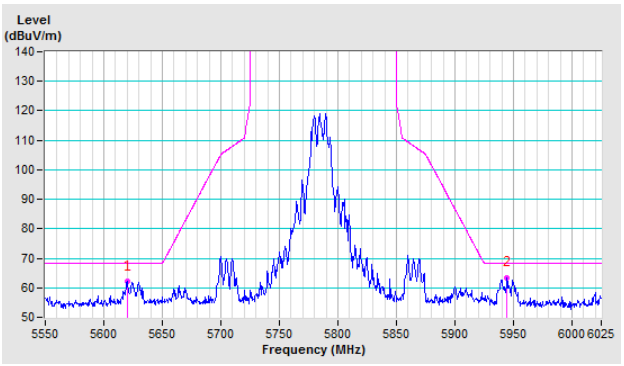
Horizontal	Vertical
	

802.11ac (VHT20)

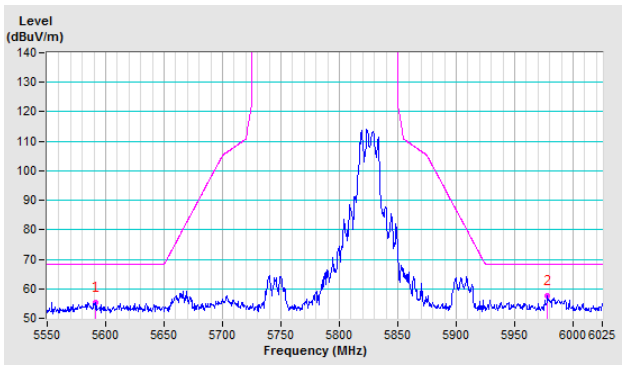
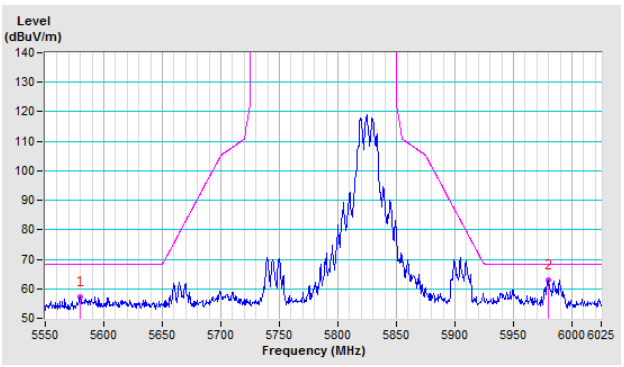
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

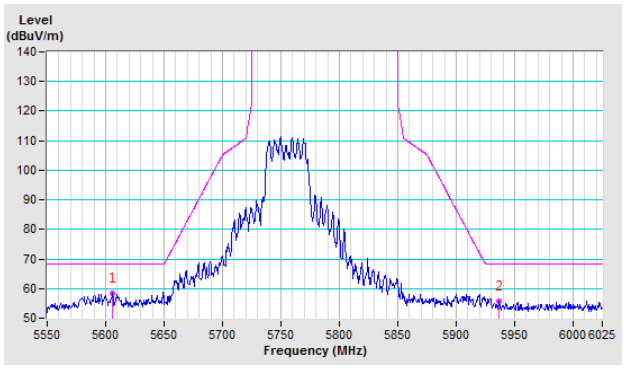
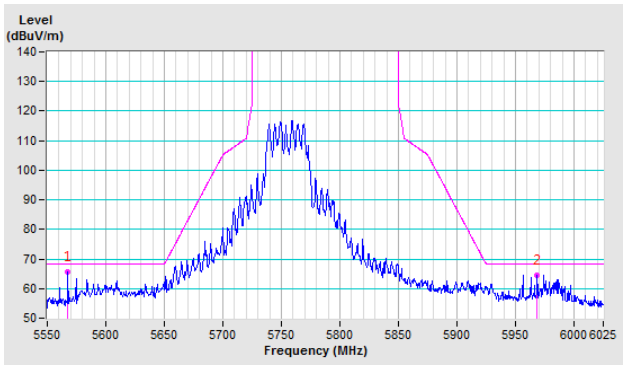
Horizontal	Vertical
	

CH 165 5825 MHz

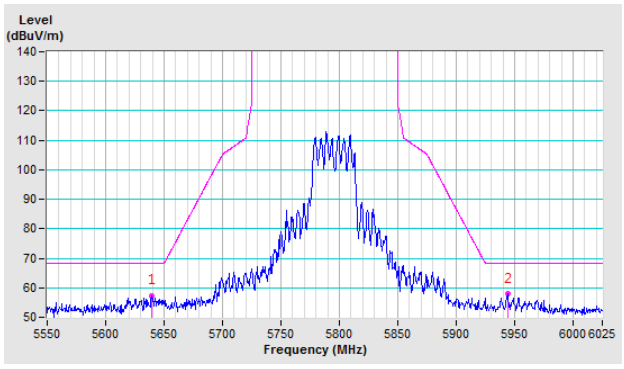
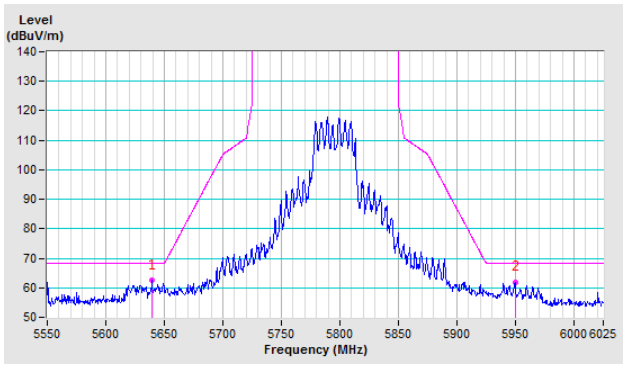
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

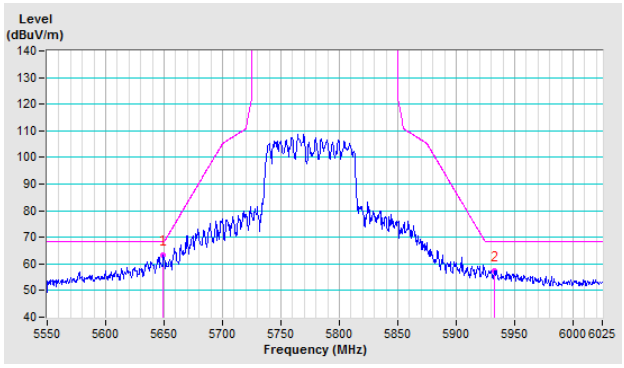
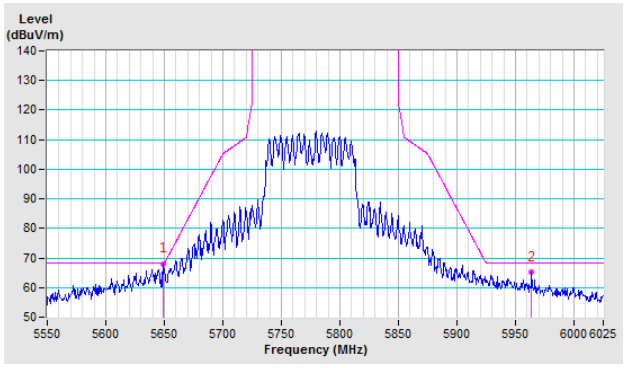
Horizontal	Vertical
	

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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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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