Report No.:	RF190122E02-1
FCC ID:	PKRNVWSKR5MD8800
Test Model:	SKR5MD8800
Received Date:	Jan. 15, 2019
Test Date:	Jan. 15 to 23, 2019
Issued Date:	Mar. 06, 2019
Applicant:	Inseego Corp.
Address:	9605 Scranton Road Suite 300, San Diego, CA 92121 United States
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

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Release Control Record

Issue No.	Description	Date Issued
RF190122E02-1	Original release.	Mar. 06, 2019

1 Certificate of Conformity

Product: 4G LTE Wireless Router

Brand: Inseego

Test Model: SKR5MD8800

Sample Status: ENGINEERING SAMPLE

Applicant: Inseego Corp.

Test Date: Jan. 15 to 23, 2019

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Mar. 06, 2019
Phoenix Huang / Specialist

Approved by : _____ , **Date:** Mar. 06, 2019
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.45dB at 0.42734MHz.
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 and 5140.80MHz.
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 R-SMA 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.

Note:
Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	4.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.12 dB
	6GHz ~ 18GHz	4.86 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 (WLAN)

Product	4G LTE Wireless Router
Brand	Inseego
Test Model	SKR5MD8800
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc ~ 24Vdc
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 300Mbps 802.11ac: up to 866.7Mbps
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:** 855.093mW **Beamforming Mode:** 770.217mW **5.18 ~ 5.24GHz** **CDD Mode:** 570.326mW **Beamforming Mode:** 482.677mW **5.745 ~ 5.825GHz** **CDD Mode:** 804.638mW **Beamforming Mode:** 473.195mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT has below radios as following table:

Radio 1	Radio 2	Radio 3
WLAN (2.4GHz + 5GHz)	Bluetooth + GPS	WWAN

2. Simultaneously transmission condition.

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

3. The EUT inside has one WWAN module which FCC ID: PKRNVWMD8800.

4. The antennas and antenna RF cables (option) provided to the EUT, please refer to the following table:

Antenna No.	Brand Name	Model Name	Antenna Gain (dBi)	Frequency Range	Antenna Type	Antenna Connector Type
WLAN_1	RF link	RF21S00506AX1	4.11	2.4~2.4835 GHz	Dipole	R-SMA
			6.12	5.15~5.85 GHz		
WLAN_2	M.gear	C037-511343-A	4.11	2.4~2.4835 GHz	Dipole	R-SMA
			6.12	5.15~5.85 GHz		
BT_ANT	RF link	RF21S00506AX1	4.11	2,402~2,480 GHz	Dipole	R-SMA
WWAN_1_1	-	SWX-614XRSXX-999	2.1	1850 MHz to 1910 MHz	Dipole	SMA
			1.8	1710 MHz to 1755 MHz		
			1.8	824 MHz to 849 MHz		
			2.7	2500 MHz to 2570 MHz		
			0.4	777 MHz to 787 MHz		
			0.4	788 MHz to 798 MHz		
			1.8	1710 MHz to 1780 MHz		
WWAN_1_2	-	SWX-614XRSXX-999	2.1	1850 MHz to 1910 MHz	Dipole	SMA
			1.8	1710 MHz to 1755 MHz		
			1.8	824 MHz to 849 MHz		
			2.7	2500 MHz to 2570 MHz		
			0.4	777 MHz to 787 MHz		
			0.4	788 MHz to 798 MHz		
			1.8	1710 MHz to 1780 MHz		
WWAN_2_1	-	SWX-6141SAXX-508	3.56	3550 MHz to 3700 MHz	Dipole	SMA
WWAN_2_2	-	SWX-6141SAXX-508	3.56	3550 MHz to 3700 MHz	Dipole	SMA
WWAN_3_1 (Rx only)	-	RF21S00773A	3.5	5.15~5.85 GHz	Dipole	SMA
WWAN_3_2 (Rx only)	-	RF21S00773A	3.5	5.15~5.85 GHz	Dipole	SMA
GPS_ANT	-	-	2.4	1575.4	Dipole	SMA

Antenna RF Cable (Option)			
For WLAN & BT	Cable Loss (dB)	Frequency Range	Cable Connector Type
	3.5	1850 MHz to 1910 MHz	R-SMA
	3.5	1710 MHz to 1755 MHz	
	2.5	824 MHz to 849 MHz	
	4.5	2.4~2.4835 GHz	
	4.5	2500 MHz to 2570 MHz	
	2.5	777 MHz to 787 MHz	
	2.5	788 MHz to 798 MHz	
	3.5	1710 MHz to 1780 MHz	
	4.5	3550 MHz to 3700 MHz	
	6.93	5.15~5.85GHz	
For WWAN & GPS	Cable Loss (dB)	Frequency Range	Cable Connector Type
	3.5	1850 MHz to 1910 MHz	SMA
	3.5	1710 MHz to 1755 MHz	
	2.5	824 MHz to 849 MHz	
	4.5	2.4~2.4835 GHz	
	4.5	2500 MHz to 2570 MHz	
	2.5	777 MHz to 787 MHz	
	2.5	788 MHz to 798 MHz	
	3.5	1710 MHz to 1780 MHz	
	4.5	3550 MHz to 3700 MHz	
	6.93	5.15~5.85GHz	

5. The EUT was pre-tested under the following modes:

For Radiated Emission test	
Pre-test Mode	Description
Mode A	**EUT (Y plane) without antenna cable: 12Vdc power from adapter**
Mode B	EUT (X plane) without antenna cable: 12Vdc power from adapter
Mode C	EUT (X plane) without antenna cable: 12Vdc power from power supply
Mode D	EUT (X plane) without antenna cable: 24Vdc power from power supply
Mode E	EUT (Y plane) with antenna cable: 12Vdc power from adapter
From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.	
For AC Power Conducted Emission test	
Pre-test Mode	Description
Mode F	**12Vdc power from adapter**
Mode G	12Vdc power from power supply
Mode H	24Vdc power from power supply
From the above modes, the worst case was found in **Mode F**. Therefore only the test data of the mode was recorded in this report.	

6. The EUT incorporates a MIMO function.

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	2TX	2RX
802.11g	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
VHT20	2TX	2RX
VHT40	2TX	2RX
5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX

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)

7. 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 **Y-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5180-5240, 5745-5825	36 to 48, 149 to 165	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	36 to 48, 149 to 165	159	OFDM	BPSK	13.5

Antenna Port Conducted Measurement:

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

CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3
Beamforming Mode (output power only)						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Test Condition:

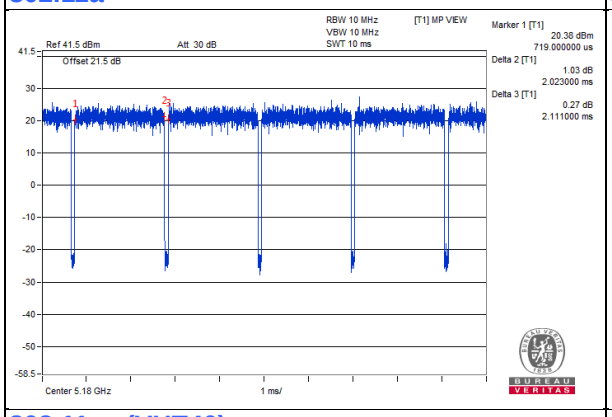
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	22deg. C, 67%RH	120Vac, 60Hz	Rey Chen
	24deg. C, 67%RH	120Vac, 60Hz	Rey Chen
RE<1G	22deg. C, 69%RH	120Vac, 60Hz	Steven Chiang
PLC	23deg. C, 74%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

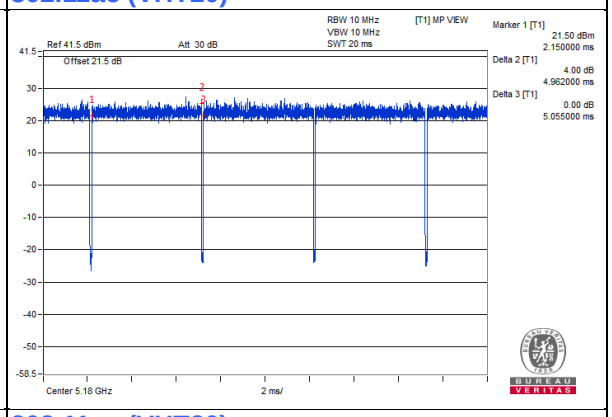
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 2.023 ms/2.111 ms = 0.958, Duty factor = 10 * log (1/Duty cycle) = 0.18
802.11ac (VHT20): Duty cycle = 4.962 ms/5.055 ms = 0.982
802.11ac (VHT40): Duty cycle = 2.408 ms/2.509 ms = 0.96, Duty factor = 10 * log (1/Duty cycle) = 0.18
802.11ac (VHT80): Duty cycle = 1.133 ms/1.217 ms = 0.931, Duty factor = 10 * log (1/Duty cycle) = 0.31

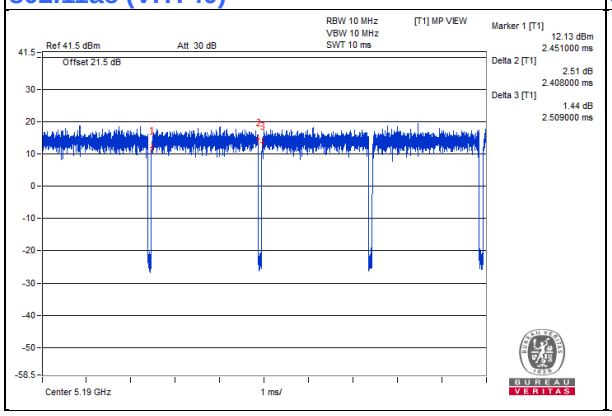
802.11a



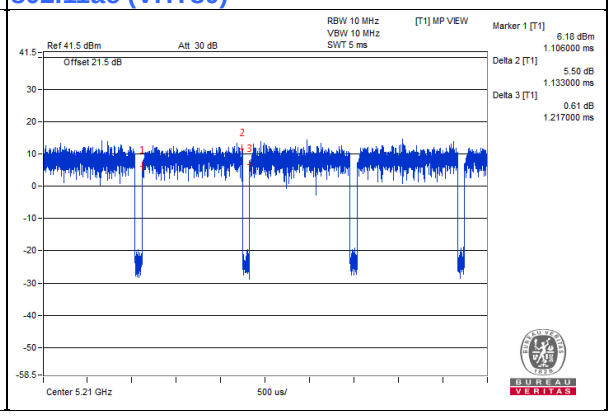
802.11ac (VHT20)



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.	Adapter	CWT	2ABF060F	NA	NA	Supplied by client
B.	PoE Load	Luxul	XAP-1440	NA	NA	Supplied by client
C.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
D.	iPod	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
E.	SIM Card	R&S	CRT-Z3	NA	NA	Provided by Lab

Note:

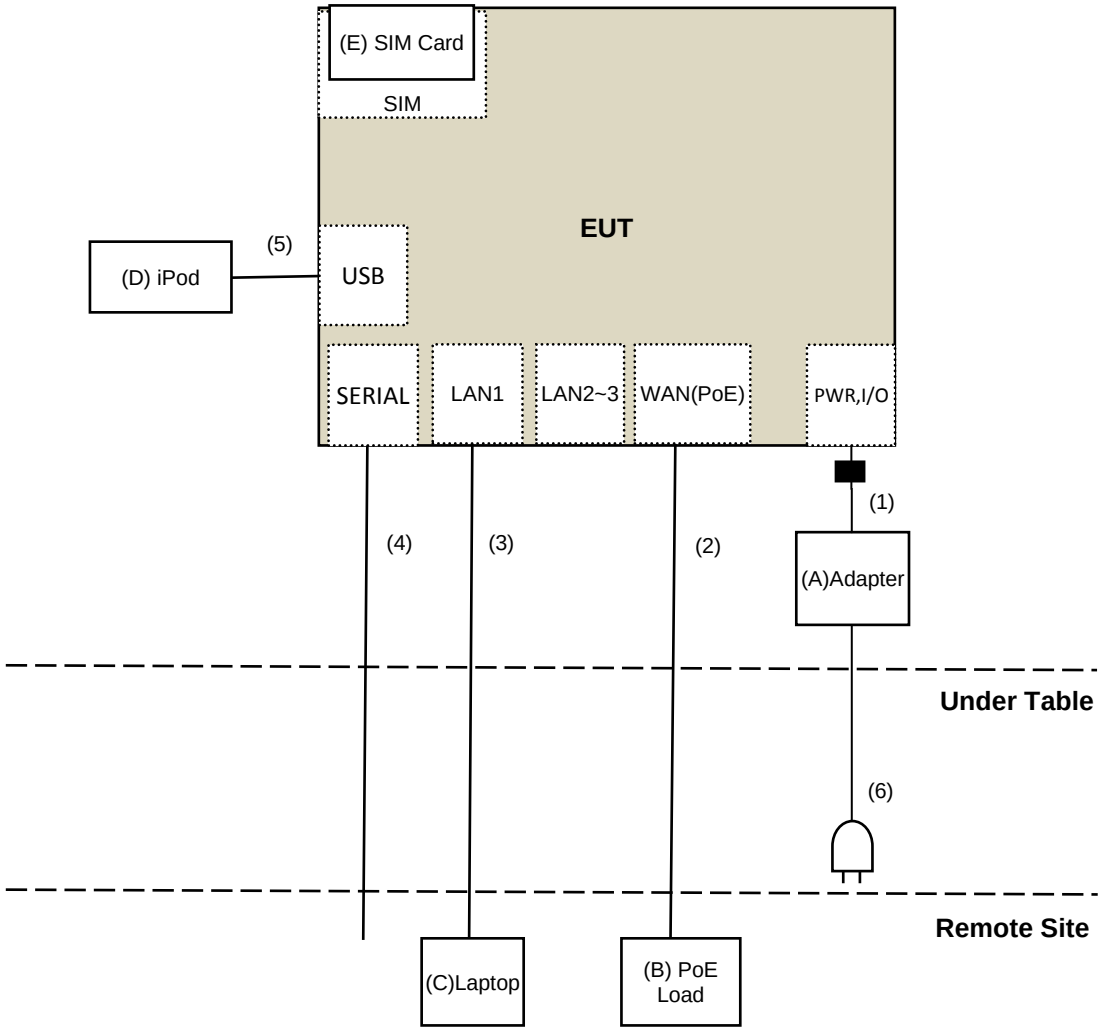
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.2	No	1	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.	RJ-45 Cable	1	10	No	0	Provided by Lab
5.	USB Cable	1	0.1	Yes	0	Provided by Lab
6.	AC Cable	1	0.8	No	0	Supplied by client

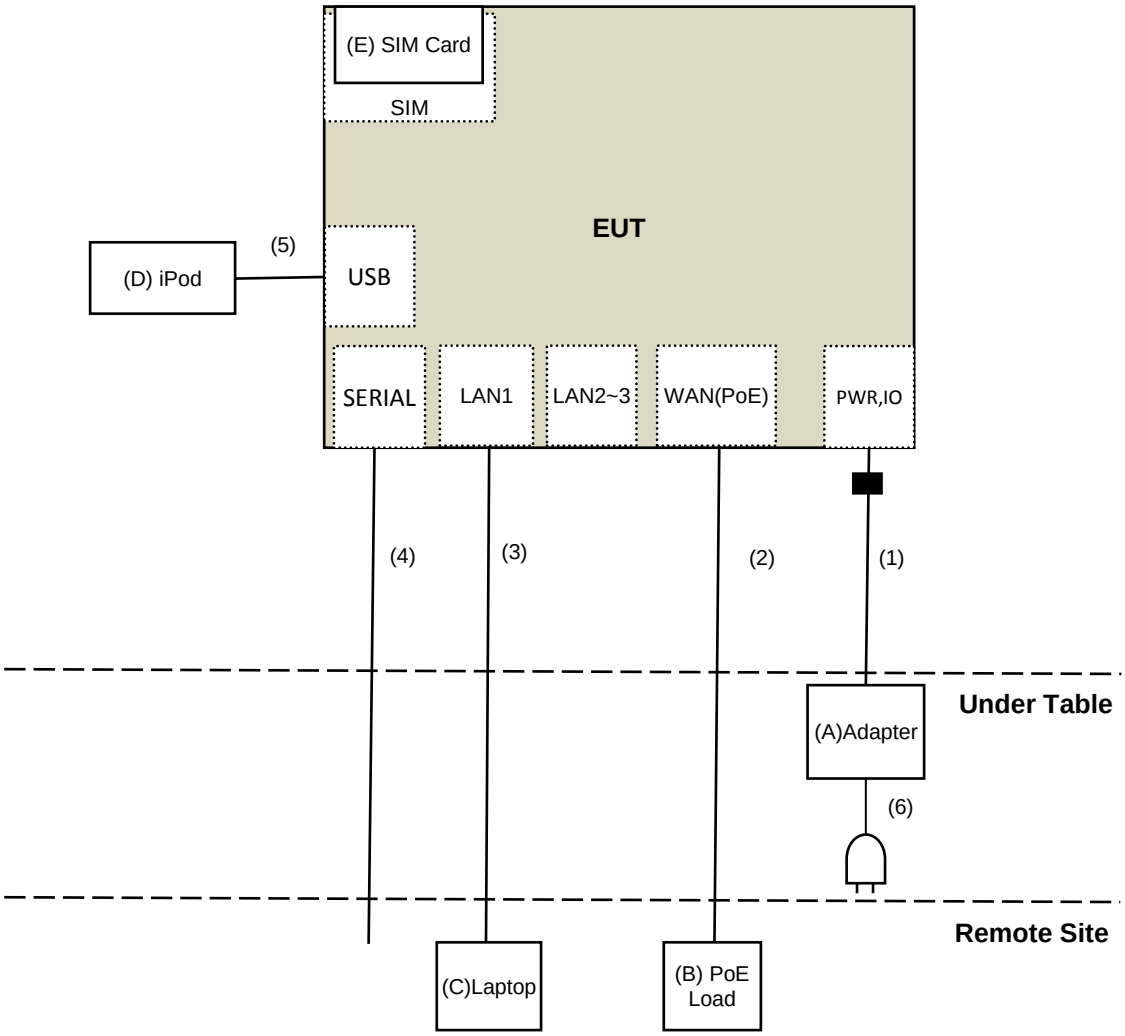
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

For Power Line Conducted Emission test:



For other 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

Applicable To			Limit	
789033 D02 General UNII Test Procedure New Rules v02r01			Field Strength at 3m	
			PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 30, 2018	Oct. 29, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-4-1	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-2	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-3	Mar. 21, 2018	Mar. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 25, 2018	Nov. 24, 2019
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	Nov. 25, 2018	Nov. 24, 2019
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
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
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
DC Power Supply Topward	6603D	795558	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 09, 2019	Jan. 08, 2020
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. 4.
3. The CANADA Site Registration No. is 20331-2
4. Tested Date: Jan. 15 to 23, 2019

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:

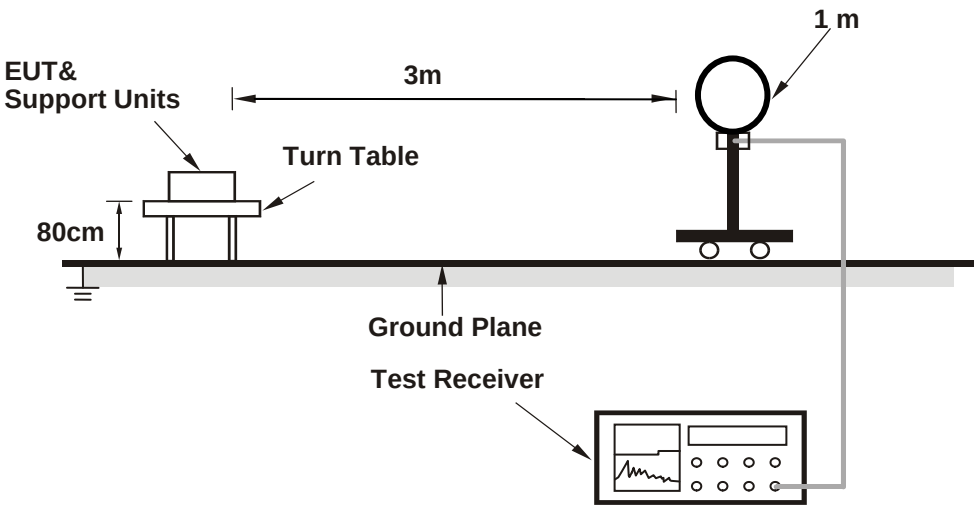
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

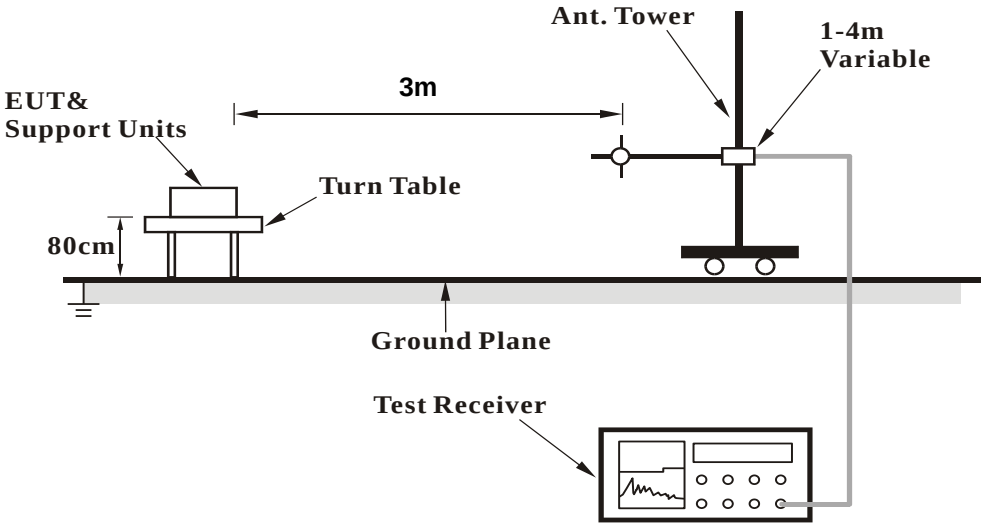
No deviation.

4.1.5 Test Setup

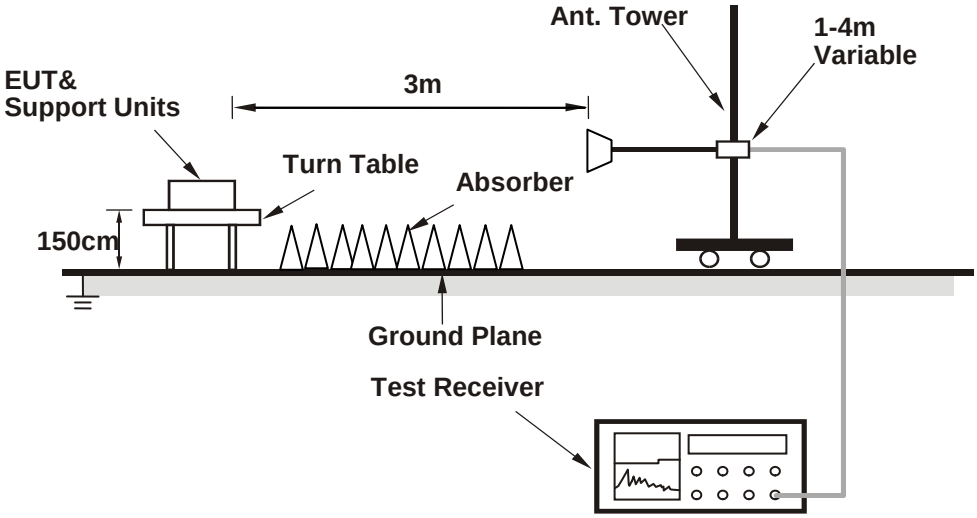
For Radiated emission below 30MHz



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 (QDART-Connectivity (1.0.38)) 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	43.3 PK	74.0	-30.7	1.43 H	330	40.3	3.0
2	5150.00	36.5 AV	54.0	-17.5	1.43 H	330	33.5	3.0
3	*5180.00	101.5 PK			1.43 H	330	98.6	2.9
4	*5180.00	92.4 AV			1.43 H	330	89.5	2.9
5	#10360.00	43.0 PK	68.2	-25.2	2.31 H	228	30.0	13.0
6	15540.00	43.7 PK	74.0	-30.3	2.56 H	328	30.6	13.1
7	15540.00	31.2 AV	54.0	-22.8	2.56 H	328	18.1	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	64.3 PK	74.0	-9.7	1.58 V	182	61.3	3.0
2	5150.00	53.5 AV	54.0	-0.5	1.58 V	182	50.5	3.0
3	*5180.00	119.5 PK			1.58 V	182	116.6	2.9
4	*5180.00	109.9 AV			1.58 V	182	107.0	2.9
5	#10360.00	43.7 PK	68.2	-24.5	1.77 V	106	30.7	13.0
6	15540.00	44.6 PK	74.0	-29.4	1.46 V	240	31.5	13.1
7	15540.00	31.8 AV	54.0	-22.2	1.46 V	240	18.7	13.1

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	44.4 PK	74.0	-29.6	1.39 H	332	41.4	3.0
2	5150.00	35.8 AV	54.0	-18.2	1.39 H	332	32.8	3.0
3	*5200.00	105.1 PK			1.39 H	332	102.2	2.9
4	*5200.00	96.1 AV			1.39 H	332	93.2	2.9
5	5423.90	42.3 PK	74.0	-31.7	1.39 H	332	39.3	3.0
6	5423.90	33.3 AV	54.0	-20.7	1.39 H	332	30.3	3.0
7	#10400.00	46.5 PK	68.2	-21.7	2.21 H	247	33.4	13.1
8	15600.00	47.8 PK	74.0	-26.2	2.54 H	354	34.8	13.0
9	15600.00	35.3 AV	54.0	-18.7	2.54 H	354	22.3	13.0
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	65.4 PK	74.0	-8.6	1.94 V	186	62.4	3.0
2	5150.00	52.8 AV	54.0	-1.2	1.94 V	186	49.8	3.0
3	*5200.00	123.1 PK			1.94 V	186	120.2	2.9
4	*5200.00	113.6 AV			1.94 V	186	110.7	2.9
5	5423.90	53.3 PK	74.0	-20.7	1.94 V	186	50.3	3.0
6	5423.90	42.3 AV	54.0	-11.7	1.94 V	186	39.3	3.0
7	#10400.00	47.2 PK	68.2	-21.0	1.84 V	111	34.1	13.1
8	15600.00	48.9 PK	74.0	-25.1	1.40 V	257	35.9	13.0
9	15600.00	36.4 AV	54.0	-17.6	1.40 V	257	23.4	13.0

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	105.1 PK			1.48 H	318	102.6	2.5
2	*5240.00	95.9 AV			1.48 H	318	93.4	2.5
3	5423.90	41.9 PK	74.0	-32.1	1.48 H	318	38.9	3.0
4	5423.90	32.3 AV	54.0	-21.7	1.48 H	318	29.3	3.0
5	#10480.00	45.9 PK	68.2	-22.3	2.24 H	244	32.7	13.2
6	15720.00	47.3 PK	74.0	-26.7	2.55 H	339	34.9	12.4
7	15720.00	34.8 AV	54.0	-19.2	2.55 H	339	22.4	12.4
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	*5240.00	123.1 PK			1.82 V	190	120.6	2.5
2	*5240.00	113.4 AV			1.82 V	190	110.9	2.5
3	5423.90	52.9 PK	74.0	-21.1	1.82 V	190	49.9	3.0
4	5423.90	41.3 AV	54.0	-12.7	1.82 V	190	38.3	3.0
5	#10480.00	47.7 PK	68.2	-20.5	1.89 V	98	34.5	13.2
6	15720.00	49.0 PK	74.0	-25.0	1.45 V	264	36.6	12.4
7	15720.00	36.6 AV	54.0	-17.4	1.45 V	264	24.2	12.4

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 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	#5595.12	56.5 PK	68.2	-11.7	2.61 H	323	53.2	3.3
2	*5745.00	109.8 PK			2.61 H	323	106.2	3.6
3	*5745.00	100.0 AV			2.61 H	323	96.4	3.6
4	#6023.77	56.8 PK	68.2	-11.4	2.61 H	323	52.8	4.0
5	11490.00	46.7 PK	74.0	-27.3	2.20 H	259	32.9	13.8
6	11490.00	34.9 AV	54.0	-19.1	2.20 H	259	21.1	13.8
7	#17235.00	47.5 PK	68.2	-20.7	2.56 H	352	30.4	17.1
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	#5645.12	59.8 PK	68.2	-8.4	1.89 V	176	56.6	3.2
2	*5745.00	126.1 PK			1.89 V	176	122.5	3.6
3	*5745.00	116.6 AV			1.89 V	176	113.0	3.6
4	#5948.50	57.6 PK	68.2	-10.6	1.89 V	176	53.7	3.9
5	11490.00	46.8 PK	74.0	-27.2	1.84 V	125	33.0	13.8
6	11490.00	35.4 AV	54.0	-18.6	1.84 V	125	21.6	13.8
7	#17235.00	48.5 PK	68.2	-19.7	1.41 V	246	31.4	17.1

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 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	#5621.77	56.6 PK	68.2	-11.6	2.62 H	335	53.2	3.4
2	*5785.00	109.7 PK			2.62 H	335	106.1	3.6
3	*5785.00	99.9 AV			2.62 H	335	96.3	3.6
4	#6019.47	57.1 PK	68.2	-11.1	2.62 H	335	53.1	4.0
5	11570.00	46.8 PK	74.0	-27.2	2.25 H	250	33.1	13.7
6	11570.00	34.7 AV	54.0	-19.3	2.25 H	250	21.0	13.7
7	#17355.00	47.7 PK	68.2	-20.5	2.59 H	360	30.1	17.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5589.92	56.4 PK	68.2	-11.8	1.95 V	174	53.1	3.3
2	*5785.00	126.1 PK			1.95 V	174	122.5	3.6
3	*5785.00	116.4 AV			1.95 V	174	112.8	3.6
4	#5952.74	56.4 PK	68.2	-11.8	1.95 V	174	52.5	3.9
5	11570.00	47.5 PK	74.0	-26.5	1.88 V	102	33.8	13.7
6	11570.00	35.8 AV	54.0	-18.2	1.88 V	102	22.1	13.7
7	#17355.00	48.8 PK	68.2	-19.4	1.42 V	260	31.2	17.6

REMARKS:

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

CHANNEL	TX Channel 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	#5619.75	56.8 PK	68.2	-11.4	2.62 H	330	53.4	3.4
2	*5825.00	109.8 PK			2.62 H	330	106.0	3.8
3	*5825.00	99.9 AV			2.62 H	330	96.1	3.8
4	#6008.51	57.4 PK	68.2	-10.8	2.62 H	330	53.4	4.0
5	11650.00	46.6 PK	74.0	-27.4	2.23 H	243	33.0	13.6
6	11650.00	34.4 AV	54.0	-19.6	2.23 H	243	20.8	13.6
7	#17475.00	48.4 PK	68.2	-19.8	2.59 H	351	29.8	18.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5571.13	56.7 PK	68.2	-11.5	1.83 V	182	53.4	3.3
2	*5825.00	126.5 PK			1.83 V	182	122.7	3.8
3	*5825.00	116.9 AV			1.83 V	182	113.1	3.8
4	#5944.21	56.9 PK	68.2	-11.3	1.83 V	182	53.0	3.9
5	11650.00	47.8 PK	74.0	-26.2	1.89 V	118	34.2	13.6
6	11650.00	36.1 AV	54.0	-17.9	1.89 V	118	22.5	13.6
7	#17475.00	49.1 PK	68.2	-19.1	1.45 V	255	30.5	18.6

REMARKS:

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

802.11ac (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	43.7 PK	74.0	-30.3	1.41 H	320	40.7	3.0
2	5150.00	36.9 AV	54.0	-17.1	1.41 H	320	33.9	3.0
3	*5180.00	101.4 PK			1.41 H	320	98.5	2.9
4	*5180.00	92.4 AV			1.41 H	320	89.5	2.9
5	#10360.00	46.5 PK	68.2	-21.7	2.19 H	251	33.5	13.0
6	15540.00	47.9 PK	74.0	-26.1	2.49 H	360	34.8	13.1
7	15540.00	35.4 AV	54.0	-18.6	2.49 H	360	22.3	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	64.7 PK	74.0	-9.3	2.12 V	188	61.7	3.0
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**2.12 V**	**188**	**50.9**	**3.0**
3	*5180.00	119.4 PK			2.12 V	188	116.5	2.9
4	*5180.00	109.9 AV			2.12 V	188	107.0	2.9
5	#10360.00	47.9 PK	68.2	-20.3	1.83 V	124	34.9	13.0
6	15540.00	48.8 PK	74.0	-25.2	1.42 V	258	35.7	13.1
7	15540.00	36.1 AV	54.0	-17.9	1.42 V	258	23.0	13.1

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4823.10	39.7 PK	74.0	-34.3	1.43 H	322	37.7	2.0
2	4823.10	35.2 AV	54.0	-18.8	1.43 H	322	33.2	2.0
3	5150.00	44.0 PK	74.0	-30.0	1.43 H	322	41.0	3.0
4	5150.00	35.8 AV	54.0	-18.2	1.43 H	322	32.8	3.0
5	*5200.00	104.1 PK			1.43 H	322	101.2	2.9
6	*5200.00	94.5 AV			1.43 H	322	91.6	2.9
7	#10400.00	46.5 PK	68.2	-21.7	2.17 H	241	33.4	13.1
8	15600.00	47.9 PK	74.0	-26.1	2.52 H	351	34.9	13.0
9	15600.00	35.6 AV	54.0	-18.4	2.52 H	351	22.6	13.0
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	4823.10	50.7 PK	74.0	-23.3	1.75 V	177	48.7	2.0
2	4823.10	44.2 AV	54.0	-9.8	1.75 V	177	42.2	2.0
3	5150.00	65.0 PK	74.0	-9.0	1.99 V	173	62.0	3.0
4	5150.00	52.8 AV	54.0	-1.2	1.99 V	173	49.8	3.0
5	*5200.00	122.1 PK			1.99 V	173	119.2	2.9
6	*5200.00	112.0 AV			1.99 V	173	109.1	2.9
7	#10400.00	47.2 PK	68.2	-21.0	1.86 V	112	34.1	13.1
8	15600.00	49.5 PK	74.0	-24.5	1.34 V	248	36.5	13.0
9	15600.00	36.7 AV	54.0	-17.3	1.34 V	248	23.7	13.0

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	105.6 PK			1.48 H	317	103.1	2.5
2	*5240.00	96.1 AV			1.48 H	317	93.6	2.5
3	5423.90	43.2 PK	74.0	-30.8	1.48 H	317	40.2	3.0
4	5423.90	33.1 AV	54.0	-20.9	1.48 H	317	30.1	3.0
5	#10480.00	46.2 PK	68.2	-22.0	2.26 H	240	33.0	13.2
6	15720.00	48.0 PK	74.0	-26.0	2.55 H	343	35.6	12.4
7	15720.00	35.7 AV	54.0	-18.3	2.55 H	343	23.3	12.4
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	*5240.00	123.6 PK			1.81 V	179	121.1	2.5
2	*5240.00	113.6 AV			1.81 V	179	111.1	2.5
3	5423.90	54.2 PK	74.0	-19.8	1.81 V	179	51.2	3.0
4	5423.90	42.1 AV	54.0	-11.9	1.81 V	179	39.1	3.0
5	#10480.00	46.9 PK	68.2	-21.3	1.88 V	123	33.7	13.2
6	15720.00	49.6 PK	74.0	-24.4	1.45 V	258	37.2	12.4
7	15720.00	36.8 AV	54.0	-17.2	1.45 V	258	24.4	12.4

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 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	#5601.51	56.3 PK	68.2	-11.9	2.59 H	321	52.9	3.4
2	*5745.00	109.9 PK			2.59 H	321	106.3	3.6
3	*5745.00	99.6 AV			2.59 H	321	96.0	3.6
4	#5978.94	56.9 PK	68.2	-11.3	2.59 H	321	52.9	4.0
5	11490.00	46.1 PK	74.0	-27.9	2.17 H	248	32.3	13.8
6	11490.00	34.3 AV	54.0	-19.7	2.17 H	248	20.5	13.8
7	#17235.00	47.6 PK	68.2	-20.6	2.55 H	356	30.5	17.1
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	#5646.14	60.2 PK	68.2	-8.0	1.96 V	200	57.0	3.2
2	*5745.00	126.7 PK			1.96 V	200	123.1	3.6
3	*5745.00	116.5 AV			1.96 V	200	112.9	3.6
4	#5970.68	57.0 PK	68.2	-11.2	1.96 V	200	53.0	4.0
5	11490.00	47.4 PK	74.0	-26.6	1.89 V	108	33.6	13.8
6	11490.00	36.0 AV	54.0	-18.0	1.89 V	108	22.2	13.8
7	#17235.00	48.8 PK	68.2	-19.4	1.43 V	266	31.7	17.1

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 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	#5644.88	55.3 PK	68.2	-12.9	2.65 H	335	52.1	3.2
2	*5785.00	109.6 PK			2.65 H	335	106.0	3.6
3	*5785.00	99.2 AV			2.65 H	335	95.6	3.6
4	#5945.79	57.5 PK	68.2	-10.7	2.65 H	335	53.6	3.9
5	11570.00	46.8 PK	74.0	-27.2	2.20 H	238	33.1	13.7
6	11570.00	34.5 AV	54.0	-19.5	2.20 H	238	20.8	13.7
7	#17355.00	47.5 PK	68.2	-20.7	2.52 H	359	29.9	17.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5621.97	56.2 PK	68.2	-12.0	1.90 V	186	52.8	3.4
2	*5785.00	126.7 PK			1.90 V	186	123.1	3.6
3	*5785.00	116.7 AV			1.90 V	186	113.1	3.6
4	#5936.56	56.6 PK	68.2	-11.6	1.90 V	186	52.7	3.9
5	11570.00	47.4 PK	74.0	-26.6	1.79 V	102	33.7	13.7
6	11570.00	36.0 AV	54.0	-18.0	1.79 V	102	22.3	13.7
7	#17355.00	48.9 PK	68.2	-19.3	1.38 V	251	31.3	17.6

REMARKS:

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

CHANNEL	TX Channel 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	#5634.60	56.1 PK	68.2	-12.1	2.58 H	310	52.9	3.2
2	*5825.00	109.9 PK			2.58 H	310	106.1	3.8
3	*5825.00	99.7 AV			2.58 H	310	95.9	3.8
4	#6019.10	57.3 PK	68.2	-10.9	2.58 H	310	53.3	4.0
5	11650.00	46.5 PK	74.0	-27.5	2.17 H	237	32.9	13.6
6	11650.00	34.2 AV	54.0	-19.8	2.17 H	237	20.6	13.6
7	#17475.00	47.8 PK	68.2	-20.4	2.50 H	360	29.2	18.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.14	57.4 PK	68.2	-10.8	2.01 V	201	54.2	3.2
2	*5825.00	126.3 PK			2.01 V	201	122.5	3.8
3	*5825.00	116.0 AV			2.01 V	201	112.2	3.8
4	#5932.09	59.9 PK	68.2	-8.3	2.01 V	201	56.0	3.9
5	11650.00	47.7 PK	74.0	-26.3	1.88 V	113	34.1	13.6
6	11650.00	36.0 AV	54.0	-18.0	1.88 V	113	22.4	13.6
7	#17475.00	48.7 PK	68.2	-19.5	1.41 V	250	30.1	18.6

REMARKS:

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

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	43.7 PK	74.0	-30.3	1.43 H	332	40.7	3.0
2	5150.00	36.8 AV	54.0	-17.2	1.43 H	332	33.8	3.0
3	*5190.00	94.7 PK			1.43 H	332	91.8	2.9
4	*5190.00	85.4 AV			1.43 H	332	82.5	2.9
5	5424.00	43.0 PK	74.0	-31.0	1.43 H	332	40.0	3.0
6	5424.00	33.9 AV	54.0	-20.1	1.43 H	332	30.9	3.0
7	#10380.00	42.6 PK	68.2	-25.6	2.32 H	227	29.6	13.0
8	15570.00	43.8 PK	74.0	-30.2	2.52 H	343	30.8	13.0
9	15570.00	31.2 AV	54.0	-22.8	2.52 H	343	18.2	13.0
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	64.7 PK	74.0	-9.3	1.82 V	187	61.7	3.0
2	5150.00	53.8 AV	54.0	-0.2	1.82 V	187	50.8	3.0
3	*5190.00	112.7 PK			1.82 V	187	109.8	2.9
4	*5190.00	102.9 AV			1.82 V	187	100.0	2.9
5	5424.00	54.0 PK	74.0	-20.0	1.82 V	187	51.0	3.0
6	5424.00	42.9 AV	54.0	-11.1	1.82 V	187	39.9	3.0
7	#10380.00	44.0 PK	68.2	-24.2	1.82 V	123	31.0	13.0
8	15570.00	44.9 PK	74.0	-29.1	1.47 V	249	31.9	13.0
9	15570.00	32.3 AV	54.0	-21.7	1.47 V	249	19.3	13.0

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 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	5141.10	43.6 PK	74.0	-30.4	1.46 H	343	40.6	3.0
2	5141.10	36.6 AV	54.0	-17.4	1.46 H	343	33.6	3.0
3	*5230.00	103.1 PK			1.46 H	343	100.5	2.6
4	*5230.00	94.7 AV			1.46 H	343	92.1	2.6
5	5357.40	48.7 PK	74.0	-25.3	1.46 H	343	45.8	2.9
6	5357.40	37.6 AV	54.0	-16.4	1.46 H	343	34.7	2.9
7	#10460.00	47.1 PK	68.2	-21.1	2.17 H	239	33.9	13.2
8	15690.00	48.3 PK	74.0	-25.7	2.53 H	342	36.0	12.3
9	15690.00	35.6 AV	54.0	-18.4	2.53 H	342	23.3	12.3
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	5141.10	64.6 PK	74.0	-9.4	1.86 V	181	61.6	3.0
2	5141.10	53.6 AV	54.0	-0.4	1.86 V	181	50.6	3.0
3	*5230.00	121.1 PK			1.86 V	181	118.5	2.6
4	*5230.00	112.2 AV			1.86 V	181	109.6	2.6
5	5357.40	59.7 PK	74.0	-14.3	1.86 V	181	56.8	2.9
6	5357.40	46.6 AV	54.0	-7.4	1.86 V	181	43.7	2.9
7	#10460.00	47.2 PK	68.2	-21.0	1.79 V	99	34.0	13.2
8	15690.00	49.1 PK	74.0	-24.9	1.44 V	258	36.8	12.3
9	15690.00	36.5 AV	54.0	-17.5	1.44 V	258	24.2	12.3

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 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	#5612.65	55.7 PK	68.2	-12.5	2.61 H	323	52.3	3.4
2	*5755.00	106.9 PK			2.61 H	323	103.3	3.6
3	*5755.00	97.1 AV			2.61 H	323	93.5	3.6
4	#5997.30	56.7 PK	68.2	-11.5	2.61 H	323	52.7	4.0
5	11510.00	46.8 PK	74.0	-27.2	2.16 H	255	33.0	13.8
6	11510.00	34.5 AV	54.0	-19.5	2.16 H	255	20.7	13.8
7	#17265.00	47.9 PK	68.2	-20.3	2.56 H	342	30.8	17.1
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	#5637.55	65.6 PK	68.2	-2.6	2.05 V	175	62.4	3.2
2	*5755.00	123.1 PK			2.05 V	175	119.5	3.6
3	*5755.00	113.7 AV			2.05 V	175	110.1	3.6
4	#5933.74	57.4 PK	68.2	-10.8	2.05 V	175	53.5	3.9
5	11510.00	47.5 PK	74.0	-26.5	1.89 V	107	33.7	13.8
6	11510.00	35.8 AV	54.0	-18.2	1.89 V	107	22.0	13.8
7	#17265.00	48.6 PK	68.2	-19.6	1.35 V	266	31.5	17.1

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 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	#5617.64	57.4 PK	68.2	-10.8	2.64 H	334	54.0	3.4
2	*5795.00	106.7 PK			2.64 H	334	103.1	3.6
3	*5795.00	96.8 AV			2.64 H	334	93.2	3.6
4	#5927.71	57.1 PK	68.2	-11.1	2.64 H	334	53.2	3.9
5	11590.00	46.4 PK	74.0	-27.6	2.22 H	257	32.8	13.6
6	11590.00	34.5 AV	54.0	-19.5	2.22 H	257	20.9	13.6
7	#17385.00	47.3 PK	68.2	-20.9	2.57 H	347	29.4	17.9
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	#5637.36	59.5 PK	68.2	-8.7	2.01 V	169	56.3	3.2
2	*5795.00	106.7 PK			2.64 V	334	103.1	3.6
3	*5795.00	96.8 AV			2.64 V	334	93.2	3.6
4	#5935.33	59.6 PK	68.2	-8.6	2.01 V	169	55.7	3.9
5	11590.00	46.7 PK	74.0	-27.3	1.81 V	114	33.1	13.6
6	11590.00	35.4 AV	54.0	-18.6	1.89 V	107	21.8	13.6
7	#17385.00	48.4 PK	68.2	-19.8	1.44 V	247	30.5	17.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
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	5140.80	41.8 PK	74.0	-32.2	1.37 H	347	38.8	3.0
2	5140.80	36.9 AV	54.0	-17.1	1.37 H	347	33.9	3.0
3	*5210.00	90.3 PK			1.37 H	347	87.5	2.8
4	*5210.00	81.7 AV			1.37 H	347	78.9	2.8
5	5350.00	44.8 PK	74.0	-29.2	1.37 H	347	42.0	2.8
6	5350.00	35.8 AV	54.0	-18.2	1.37 H	347	33.0	2.8
7	#5630.00	44.0 PK	68.2	-24.2	2.59 H	357	40.7	3.3
8	#5630.00	31.4 AV	54.0	-22.6	2.59 H	357	28.1	3.3
9	#10420.00	42.5 PK	68.2	-25.7	2.32 H	238	29.4	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	5140.80	62.8 PK	74.0	-11.2	1.84 V	185	59.8	3.0
2	**5140.80**	**53.9 AV**	**54.0**	**-0.1**	**1.84 V**	**185**	**50.9**	**3.0**
3	*5210.00	108.3 PK			1.84 V	185	105.5	2.8
4	*5210.00	99.2 AV			1.84 V	185	96.4	2.8
5	5350.00	55.8 PK	74.0	-18.2	1.84 V	185	53.0	2.8
6	5350.00	44.8 AV	54.0	-9.2	1.84 V	185	42.0	2.8
7	#10420.00	44.0 PK	68.2	-24.2	1.76 V	112	30.9	13.1
8	15630.00	44.1 PK	74.0	-29.9	1.47 V	247	31.3	12.8
9	15630.00	31.8 AV	54.0	-22.2	1.47 V	247	19.0	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 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	#5625.11	56.5 PK	68.2	-11.7	2.05 H	322	53.2	3.3
2	*5775.00	98.2 PK			2.05 H	322	94.6	3.6
3	*5775.00	88.7 AV			2.05 H	322	85.1	3.6
4	#6011.01	57.3 PK	68.2	-10.9	2.05 H	322	53.3	4.0
5	11550.00	46.7 PK	74.0	-27.3	2.27 H	258	33.1	13.6
6	11550.00	34.5 AV	54.0	-19.5	2.27 H	258	20.9	13.6
7	#17325.00	47.6 PK	68.2	-20.6	2.50 H	343	30.2	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	#5640.81	66.6 PK	68.2	-1.6	1.96 V	181	63.4	3.2
2	*5775.00	114.9 PK			1.96 V	181	111.3	3.6
3	*5775.00	105.5 AV			1.96 V	181	101.9	3.6
4	#5925.88	60.8 PK	68.2	-7.4	1.96 V	181	56.9	3.9
5	11550.00	47.0 PK	74.0	-27.0	1.84 V	106	33.4	13.6
6	11550.00	35.4 AV	54.0	-18.6	1.84 V	106	21.8	13.6
7	#17325.00	49.1 PK	68.2	-19.1	1.42 V	253	31.7	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.

Below 1GHz Data:

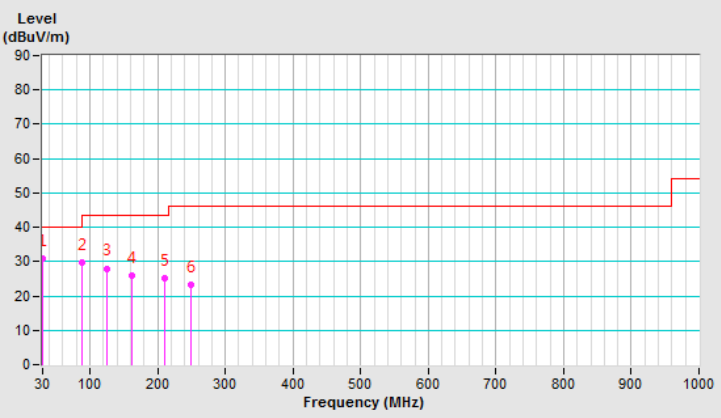
802.11ac (VHT40)

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	30.70	30.9 QP	40.0	-9.1	1.00 H	77	40.6	-9.7
2	88.37	29.8 QP	43.5	-13.7	2.00 H	85	43.2	-13.4
3	125.01	28.0 QP	43.5	-15.5	1.50 H	45	37.4	-9.4
4	161.02	25.9 QP	43.5	-17.6	1.50 H	267	33.8	-7.9
5	209.81	25.0 QP	43.5	-18.5	1.00 H	80	35.4	-10.4
6	250.02	23.2 QP	46.0	-22.8	1.00 H	71	31.9	-8.7

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. 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.

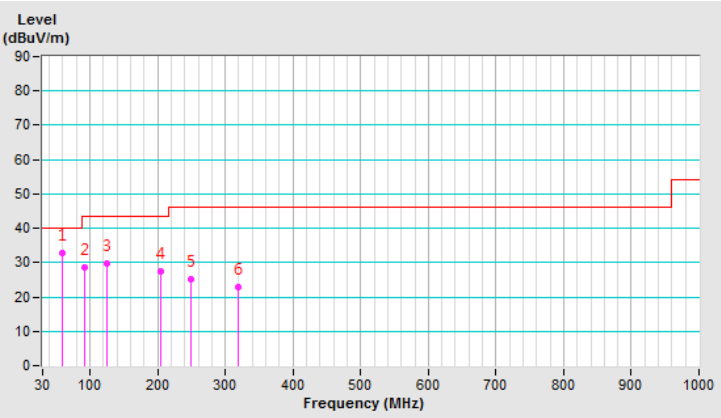


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	59.71	32.7 QP	40.0	-7.3	1.50 V	174	41.4	-8.7
2	91.91	28.7 QP	43.5	-14.8	1.50 V	295	41.8	-13.1
3	125.01	29.8 QP	43.5	-13.7	1.00 V	1	39.2	-9.4
4	204.72	27.3 QP	43.5	-16.2	1.00 V	360	37.7	-10.4
5	249.97	25.0 QP	46.0	-21.0	1.50 V	351	33.7	-8.7
6	318.53	22.9 QP	46.0	-23.1	1.00 V	12	29.4	-6.5

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. 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: Jan. 23, 2019

4.2.3 Test Procedure

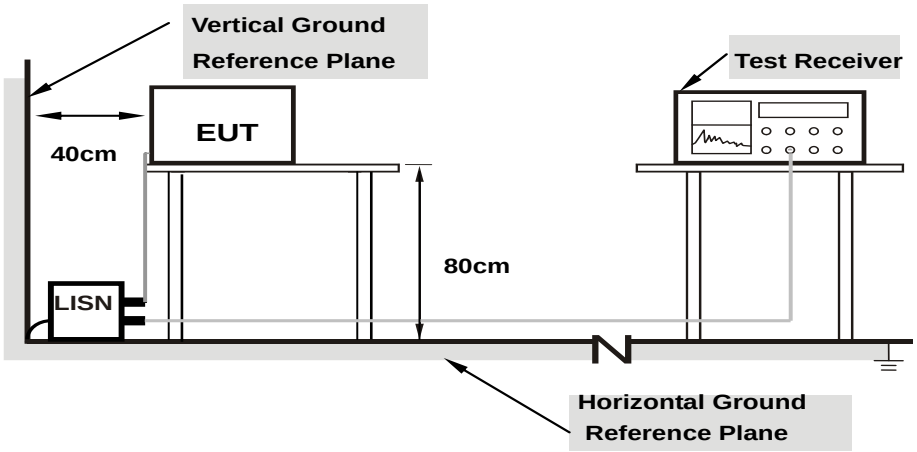
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

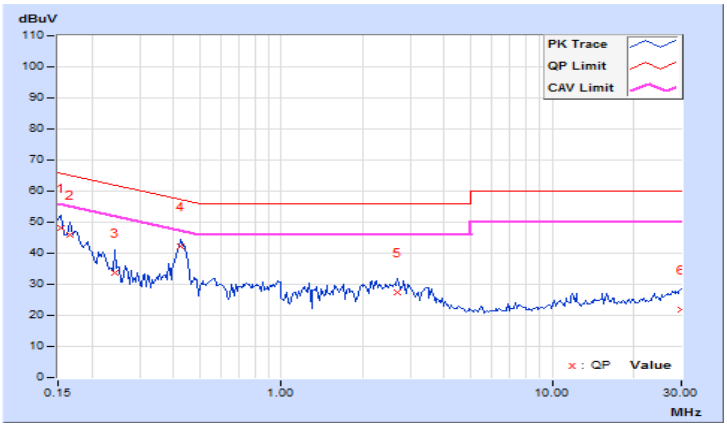
4.2.7 Test Results

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	0.15391	10.02	37.98	23.22	48.00	33.24	65.79	55.79	-17.79	-22.55
2	0.16562	10.03	36.02	23.24	46.05	33.27	65.18	55.18	-19.13	-21.91
3	0.24375	10.05	23.82	11.94	33.87	21.99	61.97	51.97	-28.10	-29.98
4	**0.42734**	**10.07**	**32.01**	**24.78**	**42.08**	**34.85**	**57.30**	**47.30**	**-15.22**	**-12.45**
5	2.69531	10.19	17.19	10.62	27.38	20.81	56.00	46.00	-28.62	-25.19
6	29.93359	11.23	10.70	5.30	21.93	16.53	60.00	50.00	-38.07	-33.47

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

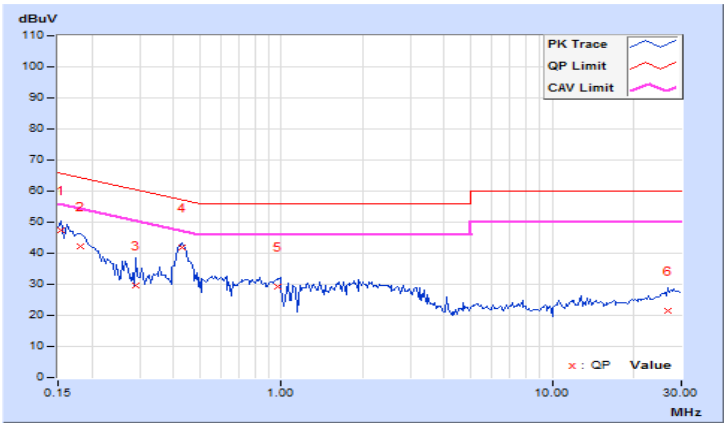


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.15391	9.93	37.57	23.42	47.50	33.35	65.79	55.79	-18.29	-22.44
2	0.18125	9.94	32.44	18.60	42.38	28.54	64.43	54.43	-22.05	-25.89
3	0.29063	9.95	19.66	6.46	29.61	16.41	60.51	50.51	-30.90	-34.10
4	0.43125	9.96	31.93	24.34	41.89	34.30	57.23	47.23	-15.34	-12.93
5	0.97422	9.99	19.23	11.92	29.22	21.91	56.00	46.00	-26.78	-24.09
6	26.67578	10.94	10.39	4.95	21.33	15.89	60.00	50.00	-38.67	-34.11

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				
36	5180	19.08	19.22	164.47	22.16	29.88	Pass
40	5200	23.74	23.94	484.334	26.85	29.88	Pass
48	5240	23.78	23.92	485.385	26.86	29.88	Pass
149	5745	25.61	25.41	711.451	28.52	29.88	Pass
157	5785	25.59	25.44	712.188	28.53	29.88	Pass
165	5825	25.78	25.86	763.921	28.83	29.88	Pass

Note: The max. gain is 6.12dBi > 6dBi, so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.63	20.78	235.285	23.72	29.88	Pass
40	5200	23.76	23.82	478.675	26.80	29.88	Pass
48	5240	23.72	23.93	482.677	26.84	29.88	Pass
149	5745	25.58	25.46	712.97	28.53	29.88	Pass
157	5785	25.61	25.44	713.86	28.54	29.88	Pass
165	5825	25.79	25.72	752.565	28.77	29.88	Pass

Note: The max. gain is 6.12dBi > 6dBi, so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.96	15.79	77.377	18.89	29.88	Pass
46	5230	24.46	24.64	570.326	27.56	29.88	Pass
151	5755	25.89	25.87	774.517	28.89	29.88	Pass
159	5795	25.73	26.34	804.638	29.06	29.88	Pass

Note: The max. gain is 6.12dBi > 6dBi, so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	14.27	14.33	53.832	17.31	29.88	Pass
155	5775	19.62	19.84	188.005	22.74	29.88	Pass

Note: The max. gain is 6.12dBi > 6dBi, so the power limit shall be reduced to 30-(6.12-6) = 29.88dBm.

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				
36	5180	20.63	20.78	235.285	23.72	26.87	Pass
40	5200	23.76	23.82	478.675	26.80	26.87	Pass
48	5240	23.72	23.93	482.677	26.84	26.87	Pass
149	5745	23.57	23.58	455.544	26.59	26.87	Pass
157	5785	23.59	23.51	452.948	26.56	26.87	Pass
165	5825	23.77	23.71	473.195	26.75	26.87	Pass

Note: The directional gain = 6.12dBi + 10log(2) = 9.13dBi > 6dBi, so the power limit shall be reduced to 30-(9.13-6) = 26.87dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.96	15.79	77.377	18.89	26.87	Pass
46	5230	23.45	23.63	451.984	26.55	26.87	Pass
151	5755	23.55	23.68	459.81	26.63	26.87	Pass
159	5795	23.54	23.61	455.559	26.59	26.87	Pass

Note: The directional gain = 6.12dBi + 10log(2) = 9.13dBi > 6dBi, so the power limit shall be reduced to 30-(9.13-6) = 26.87dBm.

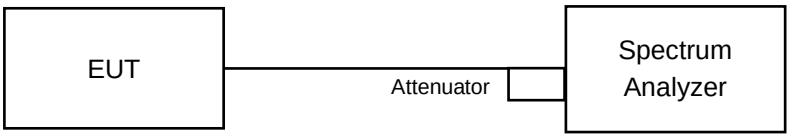
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	14.27	14.33	53.832	17.31	26.87	Pass
155	5775	19.62	19.84	188.005	22.74	26.87	Pass

Note: The directional gain = 6.12dBi + 10log(2) = 9.13dBi > 6dBi, so the power limit shall be reduced to 30-(9.13-6) = 26.87dBm.

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
36	5180	16.56	16.44
40	5200	16.68	16.56
48	5240	16.68	16.56
149	5745	19.08	18.48
157	5785	18.48	19.92
165	5825	19.68	19.08

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.76
40	5200	17.76	17.76
48	5240	17.88	17.64
149	5745	19.20	18.96
157	5785	19.68	19.56
165	5825	20.16	19.80

802.11ac (VHT40)

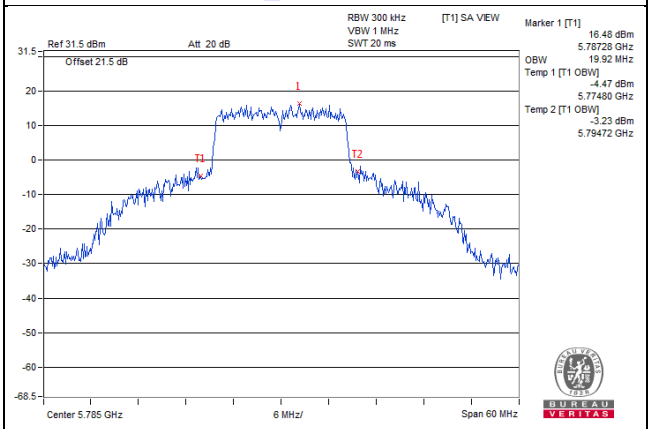
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.24
46	5230	36.48	36.72
151	5755	38.40	43.44
159	5795	40.56	49.20

802.11ac (VHT80)

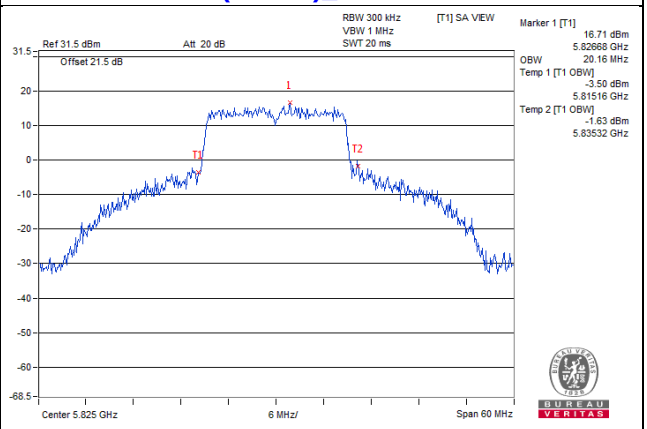
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.32	75.84
155	5775	75.36	76.32

Spectrum Plot of Max. Value

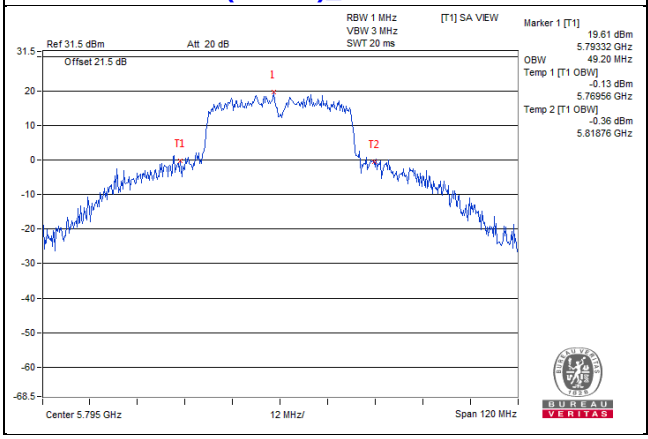
802.11a_Chain 1 / CH157



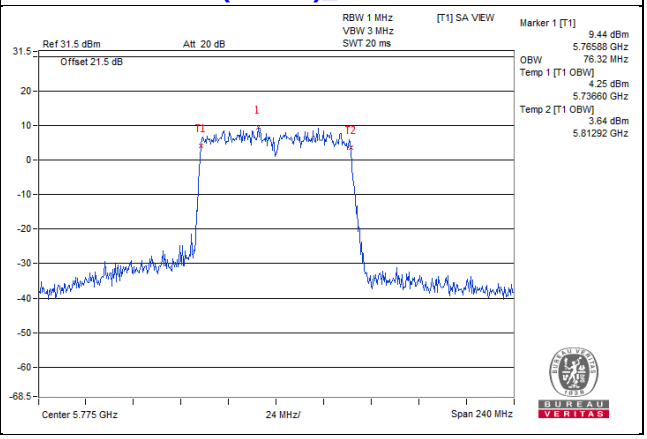
802.11ac (VHT20)_Chain 0 / CH165



802.11ac (VHT40)_Chain 1 / CH159

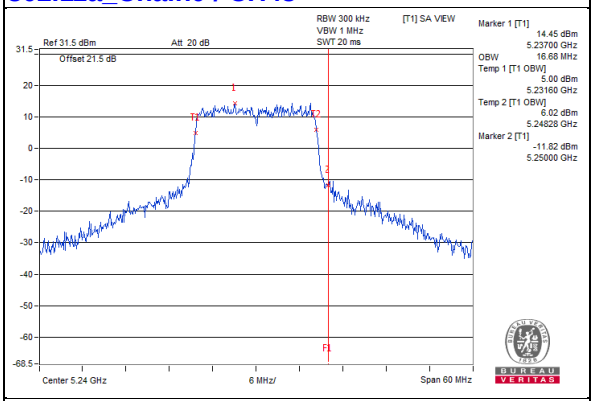


802.11ac (VHT80)_Chain 1 / CH155

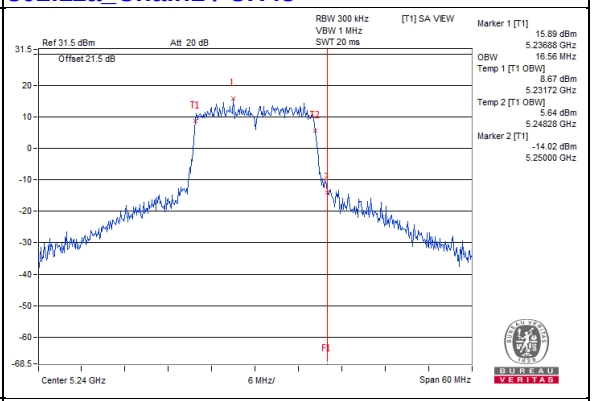


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

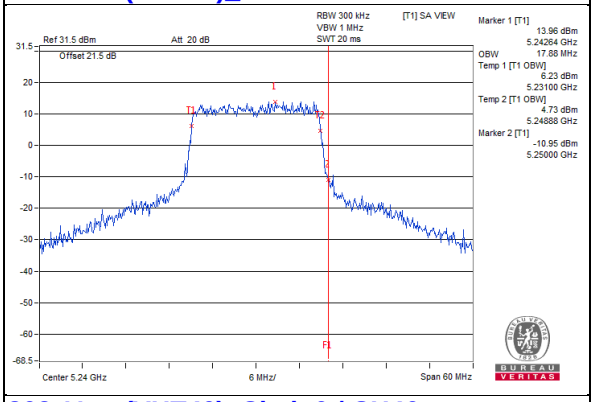
802.11a_Chain0 / CH48



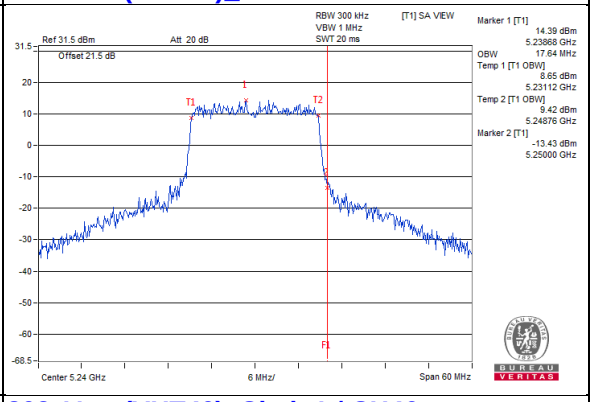
802.11a_Chain1 / CH48



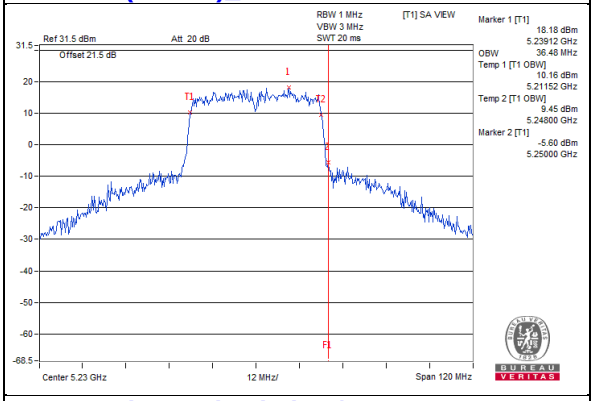
802.11ac (VHT20)_Chain0 / CH48



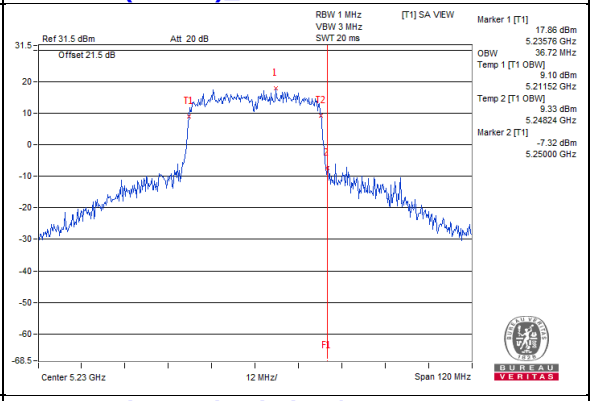
802.11ac (VHT20)_Chain1 / CH48



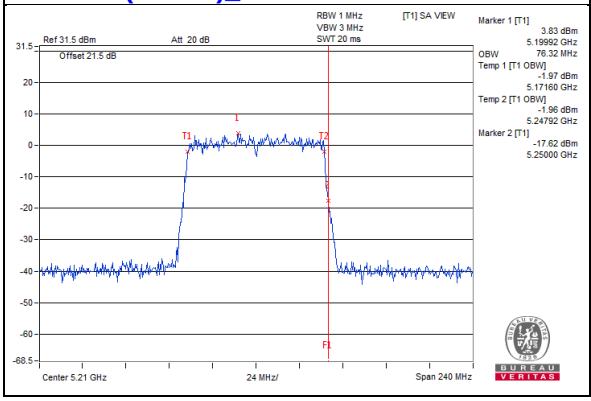
802.11ac (VHT40)_Chain0 / CH46



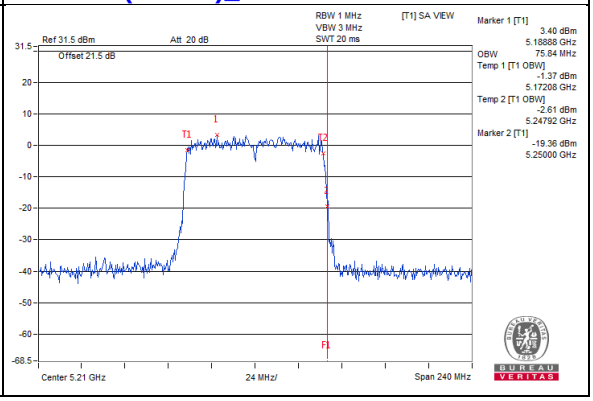
802.11ac (VHT40)_Chain1 / CH46



802.11ac (VHT80)_Chain0 / CH42

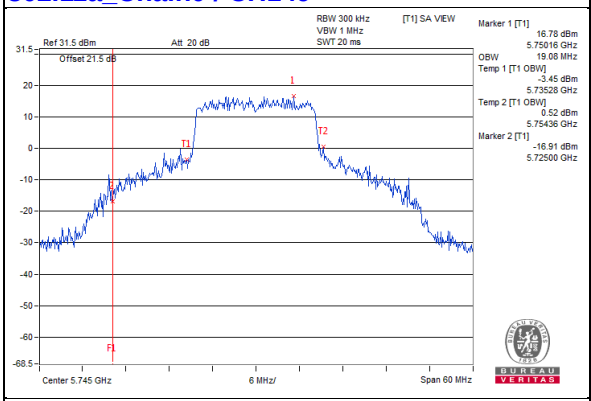


802.11ac (VHT80)_Chain1 / CH42

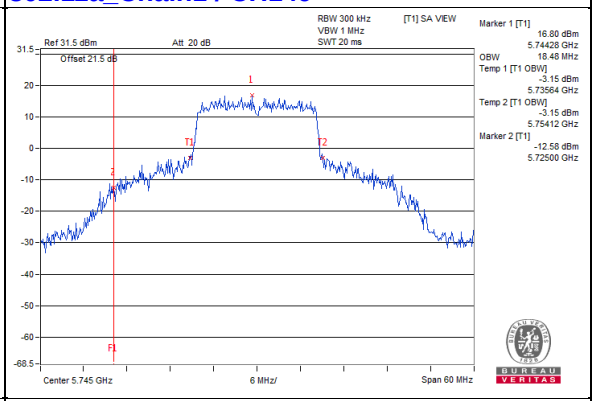


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

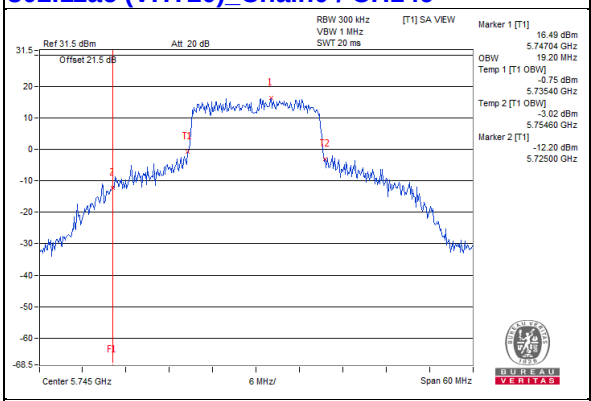
802.11a_Chain0 / CH149



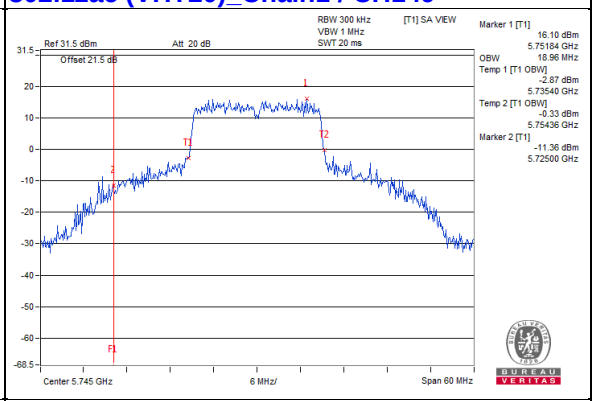
802.11a_Chain1 / CH149



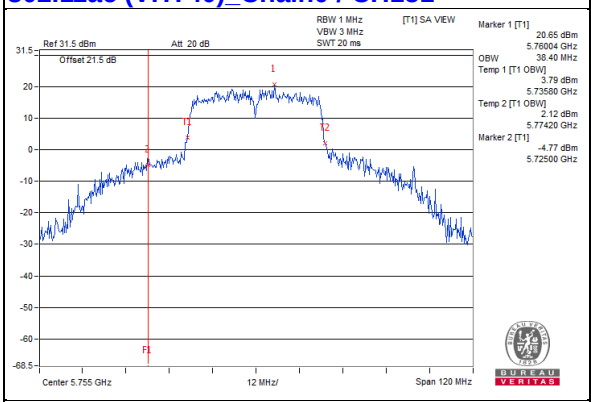
802.11ac (VHT20)_Chain0 / CH149



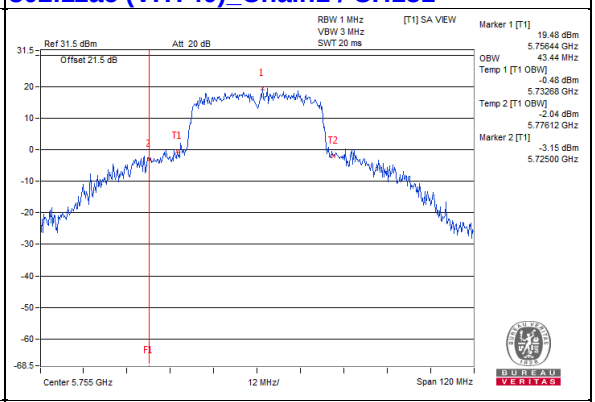
802.11ac (VHT20)_Chain1 / CH149



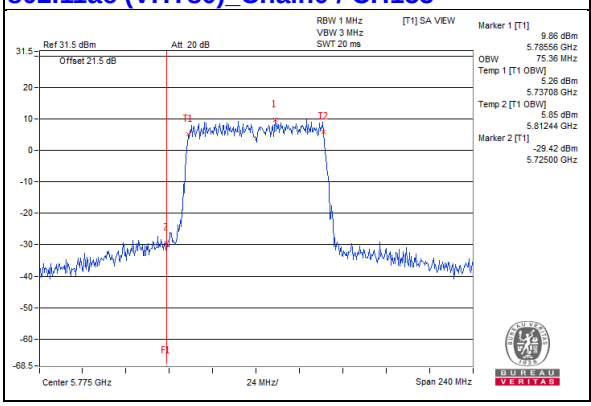
802.11ac (VHT40)_Chain0 / CH151



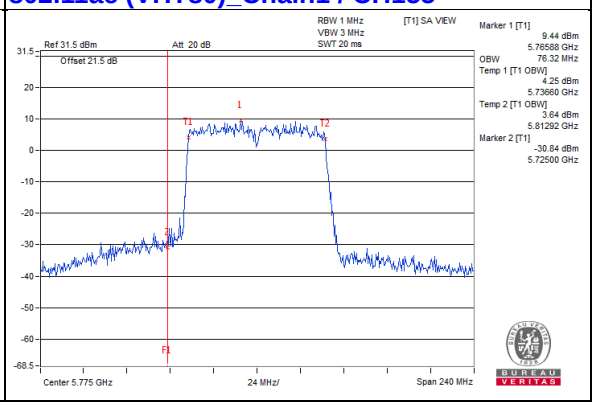
802.11ac (VHT40)_Chain1 / CH151



802.11ac (VHT80)_Chain0 / CH155



802.11ac (VHT80)_Chain1 / CH155

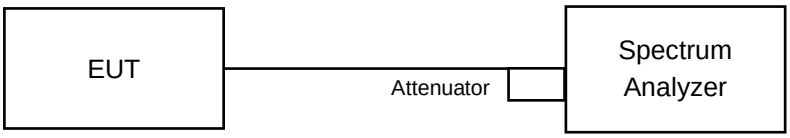


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
	√	Indoor Access Point	
		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 band:

For 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 other modulation mode

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 802.11ac (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 other modulation mode

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 W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	5.64	5.75	0.18	8.89	13.87	Pass
40	5200	9.78	9.26	0.18	12.72	13.87	Pass
48	5240	9.89	9.68	0.18	12.98	13.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 17-(9.13-6) = 13.87dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

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			
36	5180	6.14	6.18	9.17	13.87	Pass
40	5200	9.49	9.25	12.38	13.87	Pass
48	5240	9.89	9.43	12.68	13.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 17-(9.13-6) = 13.87dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-1.34	-1.67	0.18	1.69	13.87	Pass
46	5230	7.64	7.24	0.18	10.63	13.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 17-(9.13-6) = 13.87dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

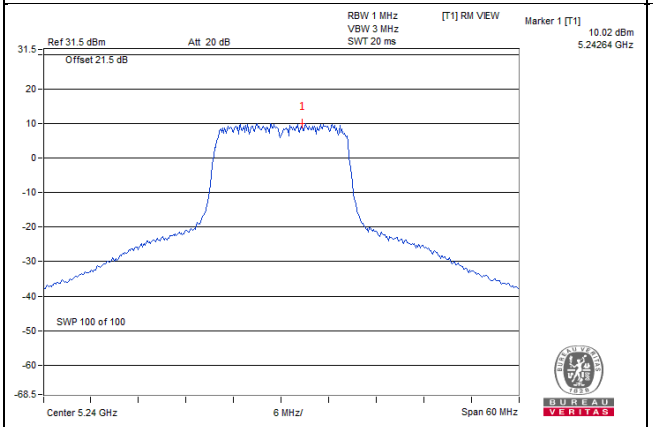
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-6.38	-7.18	0.31	-3.44	13.87	Pass

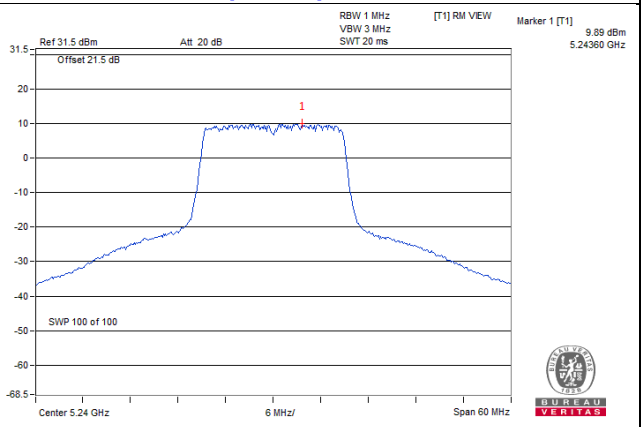
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 17-(9.13-6) = 13.87dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

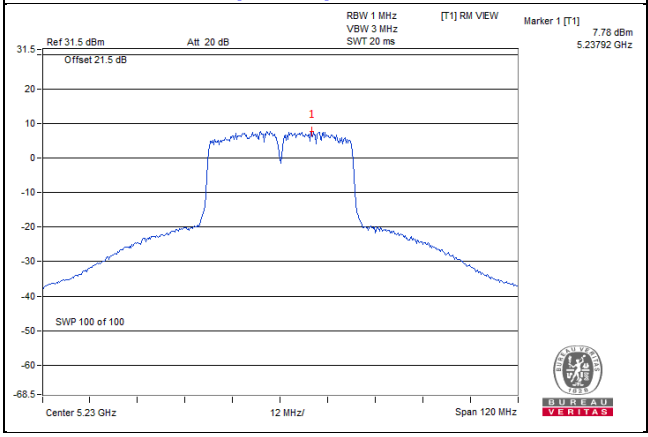
802.11a_Chain 0 / CH48



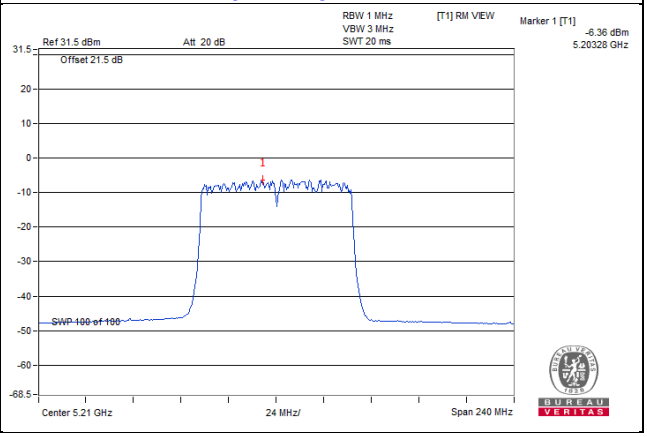
802.11ac (VHT20)_Chain 0 / CH48



802.11ac (VHT40)_Chain 0 / CH46



802.11ac (VHT80)_Chain 0 / CH42



CDD Mode

For U-NII-3:

802.11a

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		mW/300kHz	dBm/300kHz			
149	5745	3.83	3.25	0.18	4.726	6.74	8.96	26.87	Pass
157	5785	3.74	3.47	0.18	4.7889	6.80	9.02	26.87	Pass
165	5825	4.14	3.26	0.18	4.9175	6.92	9.14	26.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 30-(9.13-6) = 26.87dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	dBm/300kHz	dBm/500kHz		
149	5745	3.82	3.62	6.73	8.95	26.87	Pass
157	5785	3.86	3.18	6.54	8.76	26.87	Pass
165	5825	3.85	3.14	6.52	8.74	26.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 30-(9.13-6) = 26.87dBm.

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		mW/300kHz	dBm/300kHz			
151	5755	1.06	0.77	0.18	2.574	4.11	6.33	26.87	Pass
159	5795	0.58	0.47	0.18	2.3518	3.71	5.93	26.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 30-(9.13-6) = 26.87dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

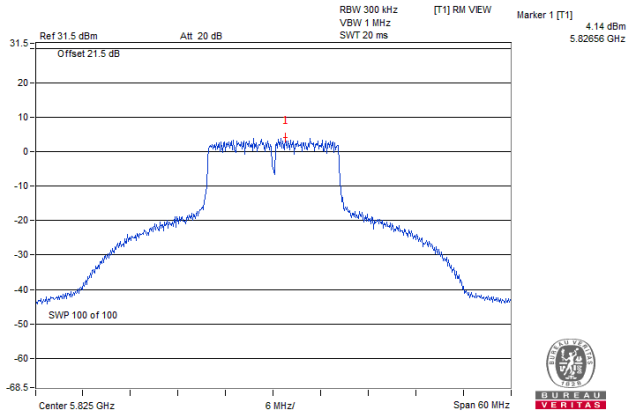
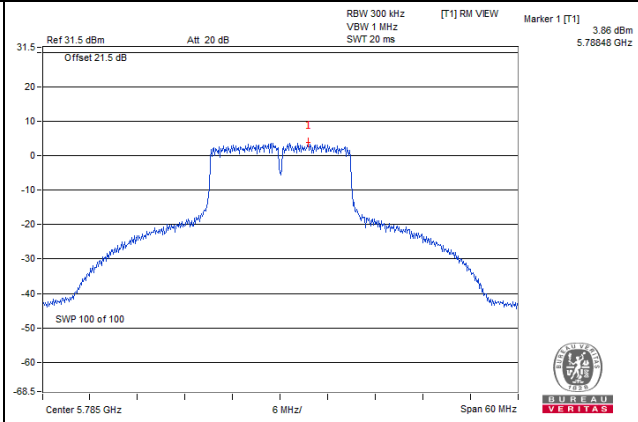
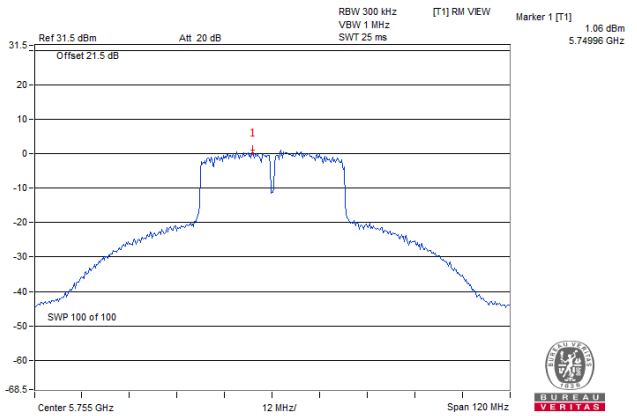
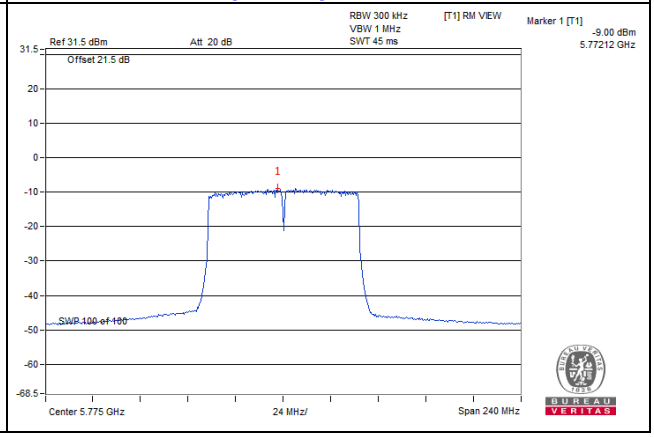
802.11ac (VHT80)

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		mW/300kHz	dBm/300kHz			
155	5775	-9.00	-9.64	0.31	0.2519	-5.99	-3.77	26.87	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 = 6.12dBi + 10log(2) = 9.13dBi > 6dBi , so the power density limit shall be reduced to 30-(9.13-6) = 26.87dBm.

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

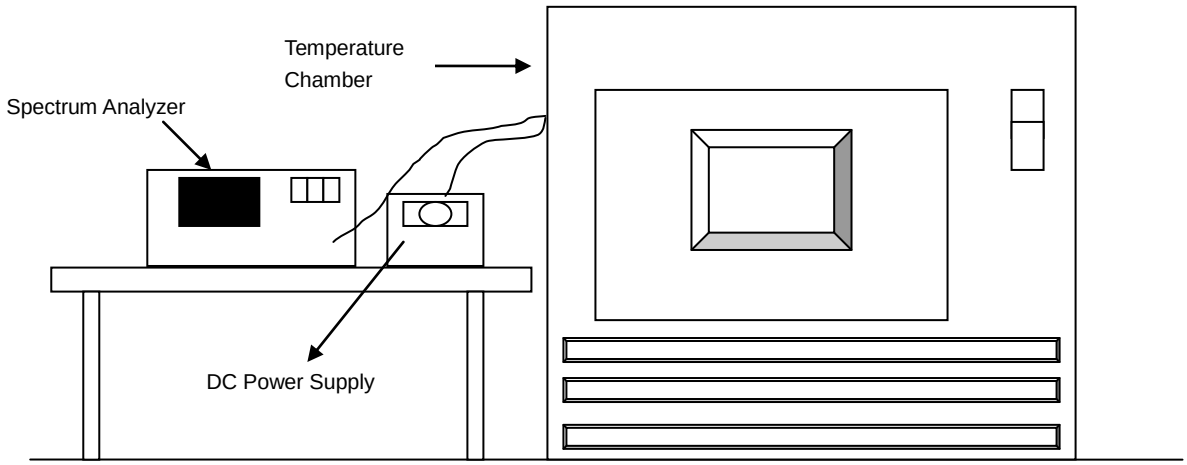
Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH165	**802.11ac (VHT20)_Chain 0 / CH157**
	
802.11ac (VHT40)_Chain 0 / CH151	**802.11ac (VHT80)_Chain 0 / CH155**
	

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 DC 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 (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.

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 (Vdc)	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	12	5179.994	Pass	5179.9906	Pass	5179.9893	Pass	5179.9897	Pass
40	12	5180.0218	Pass	5180.017	Pass	5180.0184	Pass	5180.0168	Pass
30	12	5180.0056	Pass	5180.0084	Pass	5180.0087	Pass	5180.0083	Pass
20	12	5179.9772	Pass	5179.978	Pass	5179.9762	Pass	5179.9768	Pass
10	12	5180.0044	Pass	5180.0072	Pass	5180.0057	Pass	5180.0086	Pass
0	12	5179.9775	Pass	5179.9728	Pass	5179.9761	Pass	5179.9729	Pass
-10	12	5179.985	Pass	5179.9881	Pass	5179.9845	Pass	5179.9839	Pass
-20	12	5180.0041	Pass	5180.0043	Pass	5180.0026	Pass	5180.0028	Pass
-30	12	5179.9829	Pass	5179.9796	Pass	5179.9805	Pass	5179.9818	Pass

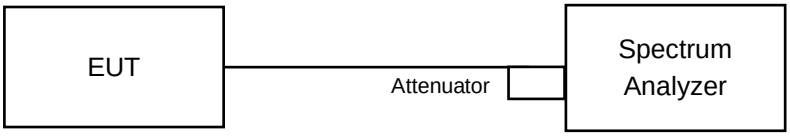
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	13.8	5179.977	Pass	5179.9786	Pass	5179.9764	Pass	5179.9759	Pass
	12	5179.9772	Pass	5179.978	Pass	5179.9762	Pass	5179.9768	Pass
	10.2	5179.9762	Pass	5179.9774	Pass	5179.9767	Pass	5179.9766	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

CDD Mode

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.39	16.40	0.5	Pass
157	5785	16.39	16.39	0.5	Pass
165	5825	16.38	16.38	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.66	17.66	0.5	Pass
157	5785	17.63	17.65	0.5	Pass
165	5825	17.61	17.61	0.5	Pass

802.11ac (VHT40)

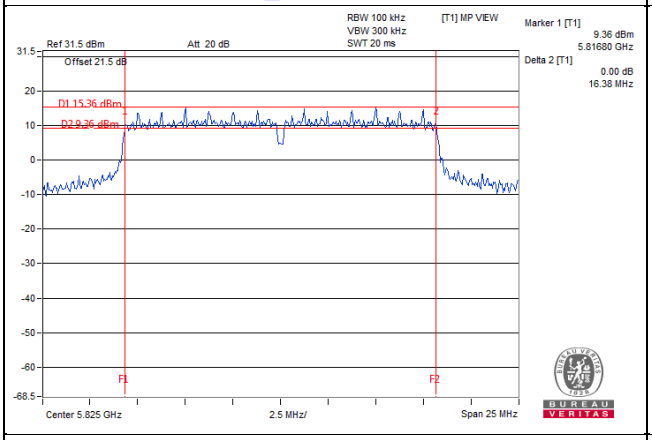
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.27	35.25	0.5	Pass
159	5795	34.76	35.37	0.5	Pass

802.11ac (VHT80)

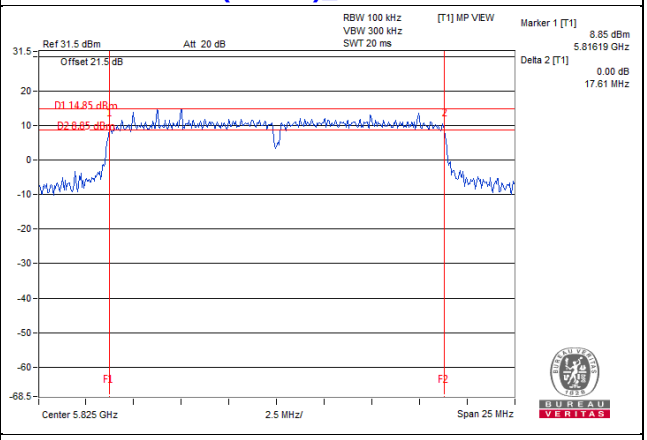
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.41	76.49	0.5	Pass

Spectrum Plot of Worst Value

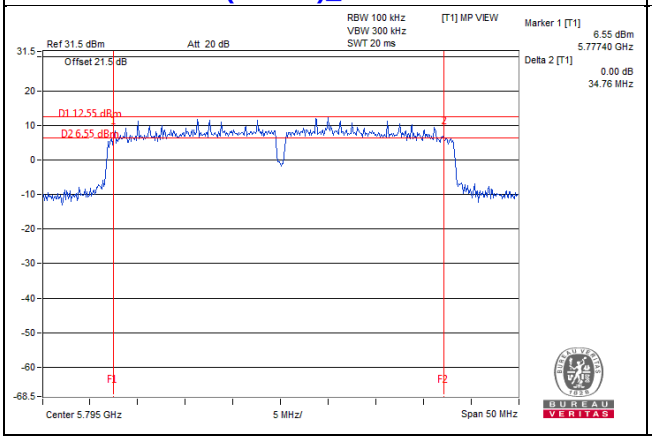
802.11a_Chain 0 / CH165



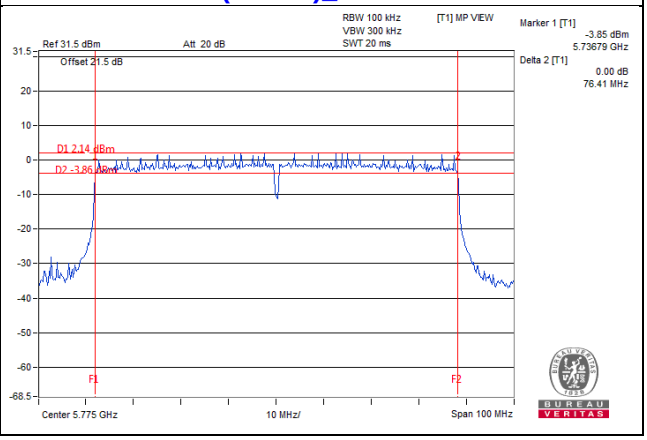
802.11ac (VHT20)_Chain 0 / CH165



802.11ac (VHT40)_Chain 0 / CH159



802.11ac (VHT80)_Chain 0 / CH155



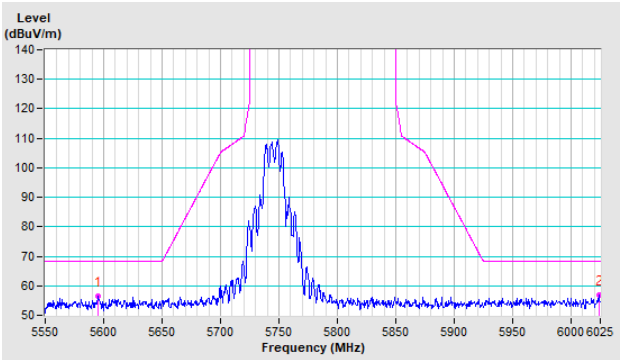
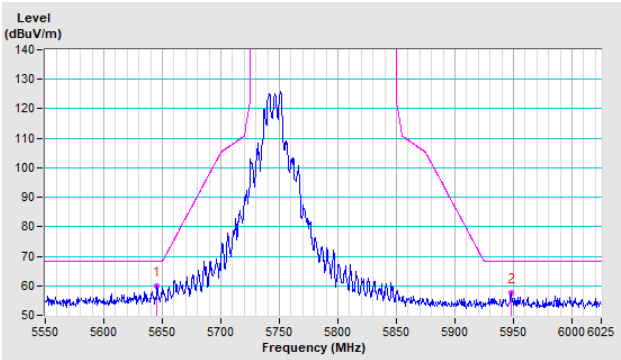
5 Pictures of Test Arrangements

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

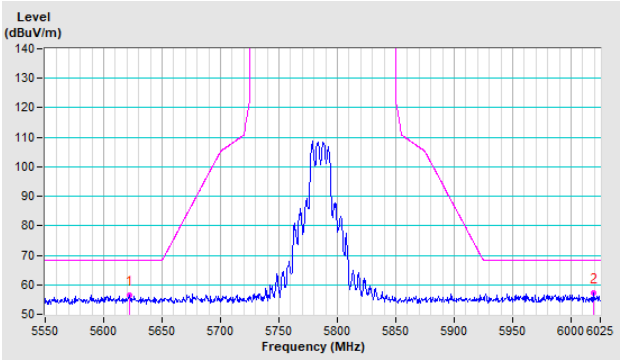
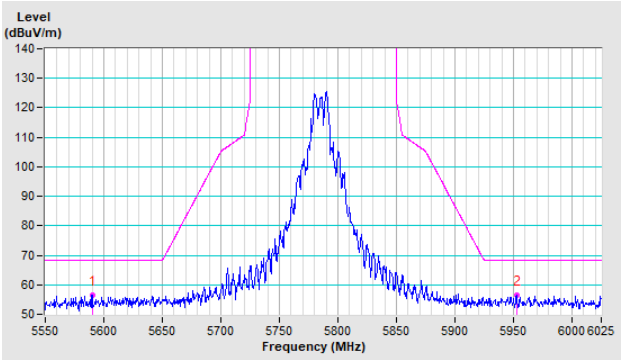
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

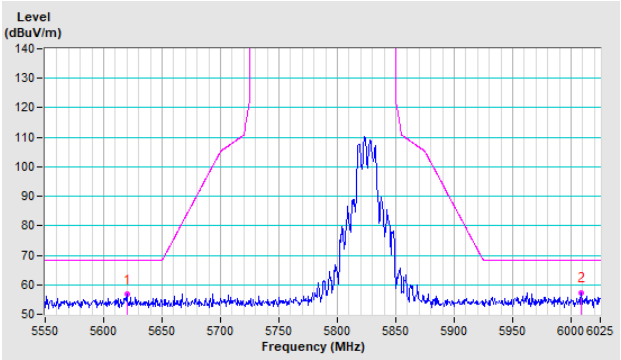
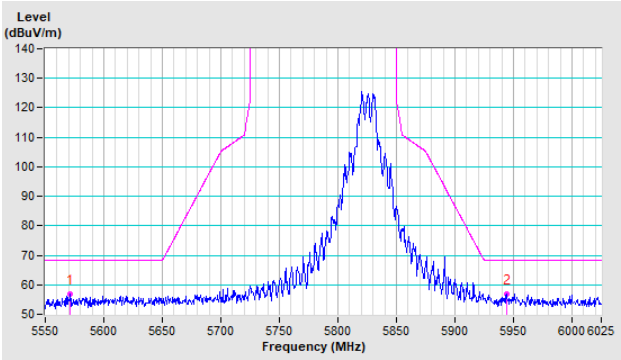
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

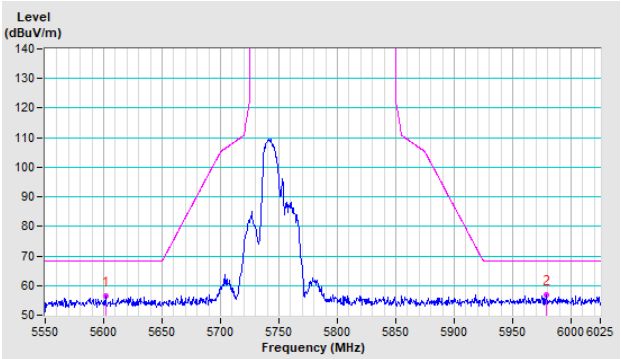
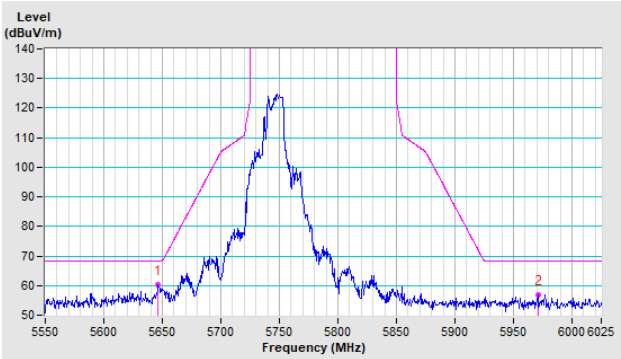
Horizontal	Vertical
	

CH 165 5825 MHz

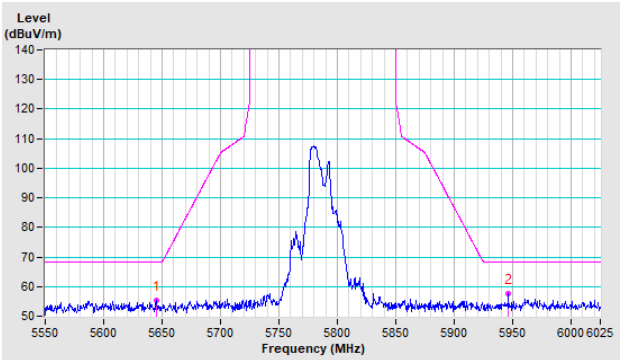
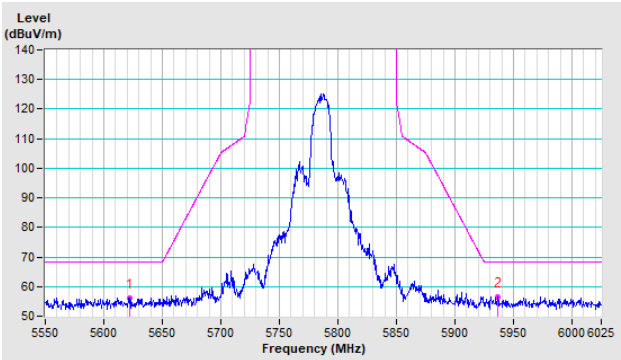
Horizontal	Vertical
	

802.11ac (VHT20)

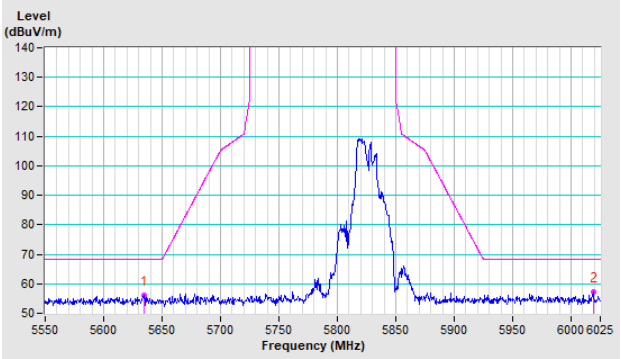
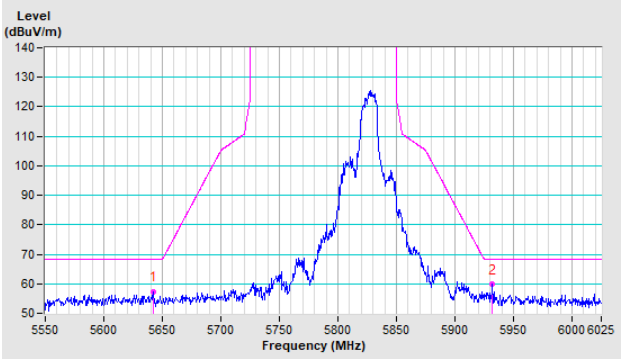
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

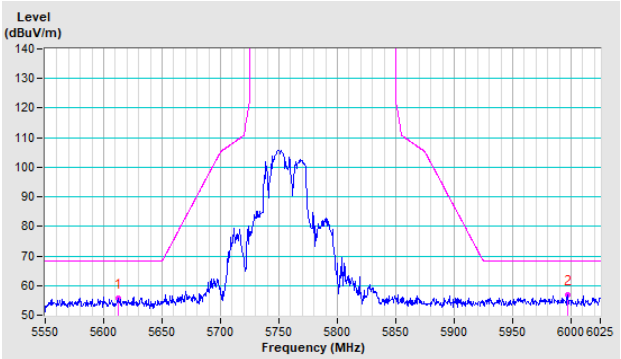
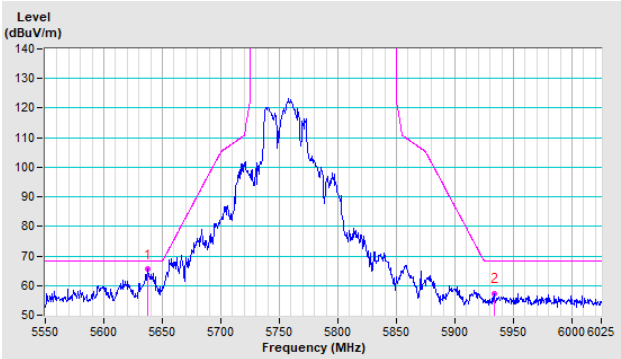
Horizontal	Vertical
	

CH 165 5825 MHz

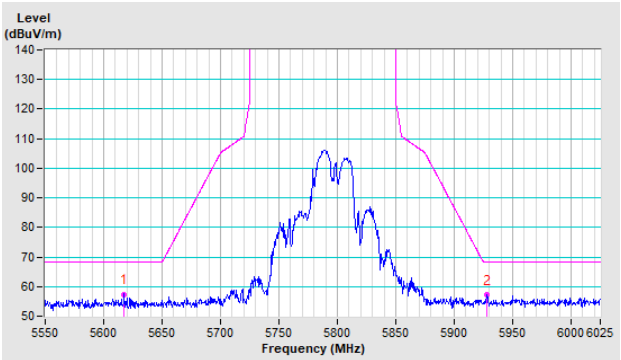
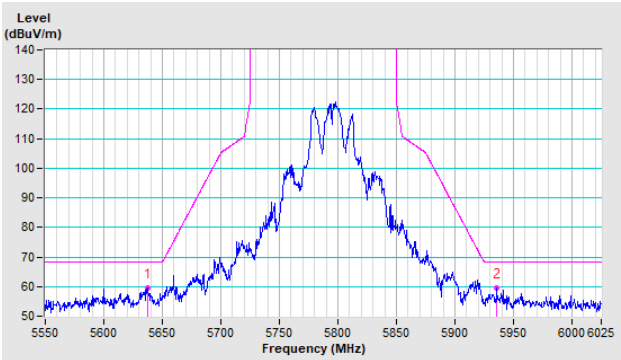
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

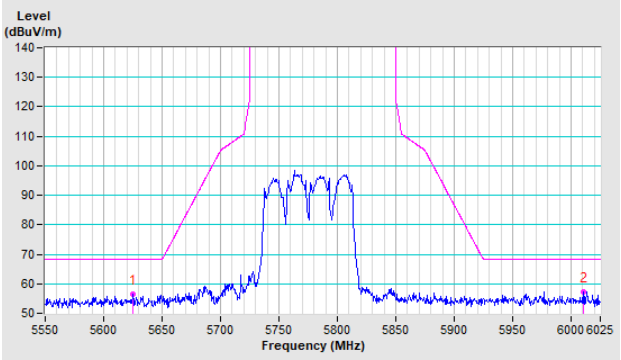
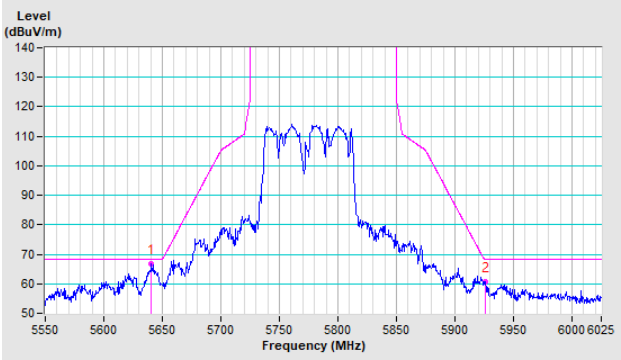
Horizontal	Vertical
	

CH 159 5795 MHz

Horizontal	Vertical
	

802.11ac (VHT80)

CH 155 5775 MHz

Horizontal	Vertical
	

Appendix – Information of 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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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

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

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

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