FCC Test Report

Report No.:	RF191227E09-1
FCC ID:	2AF5PMH7021
Test Model:	MH7021
Series Model:	MH702XY (where X can be 0, 1, 2, 3, or 4, and Y can be A, B, C, D or blank)
Received Date:	Dec. 27, 2019
Test Date:	Jan. 11 to Feb. 17, 2020
Issued Date:	Mar. 11, 2020
Applicant:	MTRLC LLC
Address:	225 Franklin St. 26th Floor Boston, MA 02110
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
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF191227E09-1	Original release.	Mar. 11, 2020

1 Certificate of Conformity

Product: AC2200 Tri-band Mesh WiFi

Brand: Motorola

Test Model: MH7021

Series Model: MH702XY (where X can be 0, 1, 2, 3, or 4, and Y can be A, B, C, D or blank)

Sample Status: ENGINEERING SAMPLE

Applicant: MTRLC LLC

Test Date: Jan. 11 to Feb. 17, 2020

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 : Vivian Huang , **Date:** Mar. 11, 2020

Vivian Huang / Specialist

Approved by : , **Date:** Mar. 11, 2020

Clark Lin / Technical 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 -29.54dB at 0.37266MHz.
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 -0.3dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is I-pex not a standard connector.

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

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	1.8 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.0 dB
	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC2200 Tri-band Mesh WiFi
Brand	Motorola
Test Model	MH7021
Series Model	MH702XY (where X can be 0, 1, 2, 3, or 4, and Y can be A, B, C, D or blank)
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only and VHT20/40 in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 400Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462 GHz **5GHz:** 5.18~ 5.24 GHz, 5.745 ~ 5.825 GHz
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	**CDD Mode:** **2.412 ~ 2.462GHz:** 897.105 mW **5.18 ~ 5.24GHz:** 526.285 mW **5.745 ~ 5.825GHz:** 855.18 mW **Beamforming Mode:** **2.412 ~ 2.462GHz:** 768.617 mW **5.18 ~ 5.24GHz:** 526.285 mW **5.745 ~ 5.825GHz:** 588.273 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. The EUT has below radios as following table:

Radio 1	Radio 2
WLAN (2.4GHz) +WLAN (5GHz LB)	WLAN (5GHz HB)

2. Simultaneously transmission condition.

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

3. The EUT has following model names, which are identical to each other in all aspects except for the following information:

Brand Name	Model Name	Difference
Motorola	MH7021	MH7021 x 1, black and white
	MH702XY (where X can be 0, 1, 2, 3, or 4, and Y can be A, B, C, D or blank)	for identical hardware for marketing purposes
From the above models, model: MH7021 was selected as representative model for the test and its data are recorded in this report.		

4. The EUT power needs to be supplied from a power adapters, the information is as below table:

No.	Brand	Model No.	Spec.
1	Shenzhen Gongjin Electronics Co., Ltd	S24B72-120A200-0K	Input: 100-240Vac, 0.8A, 50/60Hz Output: 12Vdc, 2A DC Output cable: Unshielded, 1.5m

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

Antenna No	Brand	Antenna Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type	±Cable Length (mm)	Cable Loss (dB)
ANT 1 (2.4GHz/5GHz)	WALSIN TECHNOLOGY CORPORATION	2.88	2.4~2.5	PCB	I-pex	85±3	0.23
		4.31	5.15~5.85				0.36
ANT 2 (2.4GHz/5GHz)		3	2.4~2.5	PCB	I-pex	125±3	0.31
		5.27	5.15~5.85				0.5
ANT 3(5GHz)		5.19	5.15~5.85	METAL TUBE	I-pex	110±3	0.47
ANT 4(5GHz)		5.37	5.15~5.85	METAL TUBE	I-pex	110±3	0.47

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 the manufacturer will control the power for 802.11n mode is the same as the 802.11ac or more lower than it and investigated worst case to representative mode in test report. (Final test mode refer to 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

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 (VHT20)	5180-5240	36 to 48	48	OFDM	BPSK	6.5
802.11ac (VHT40)	5745-5825	151 to 159	159	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

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

CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5180-5240	36 to 48	48	OFDM	BPSK	6.5
802.11ac (VHT40)	5745-5825	151 to 159	159	OFDM	BPSK	13.5

Antenna Port Conducted Measurement:

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

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

Test Condition:

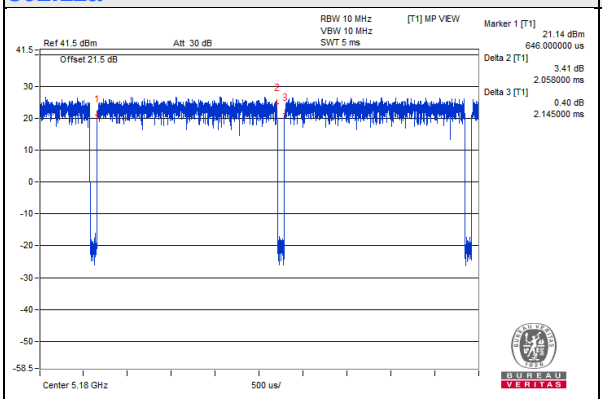
Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25deg. C, 75%RH	120Vac, 60Hz	Nelson Teng
RE<1G	23deg. C, 67%RH	120Vac, 60Hz	Kevin Ko
PLC	25deg. C, 75%RH	120Vac, 60Hz	Kevin Ko
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

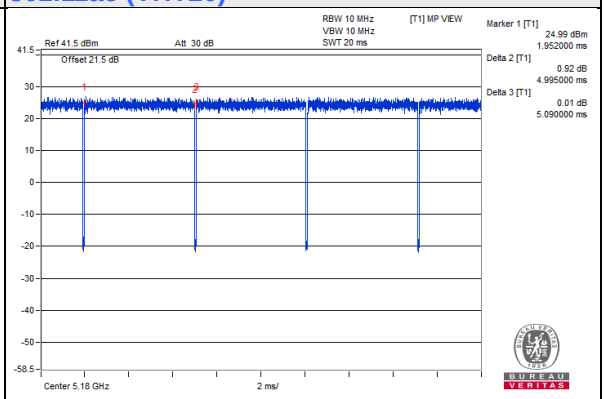
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 2.058/2.145 = 0.959, Duty factor = 10 * log(1/ Duty cycle) = 0.18
802.11ac (VHT20): Duty cycle = 4.995/5.09 = 0.981
802.11ac (VHT40): Duty cycle = 2.433/2.523 = 0.964, Duty factor = 10 * log(1/ Duty cycle) = 0.16
802.11ac (VHT80): Duty cycle = 1.147/1.226 = 0.936, Duty factor = 10 * log(1/ Duty cycle) = 0.29

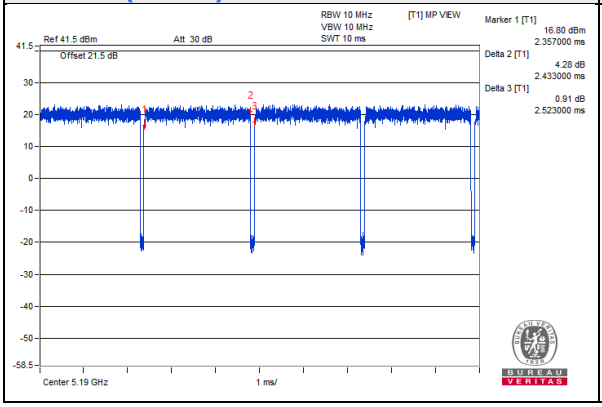
802.11a



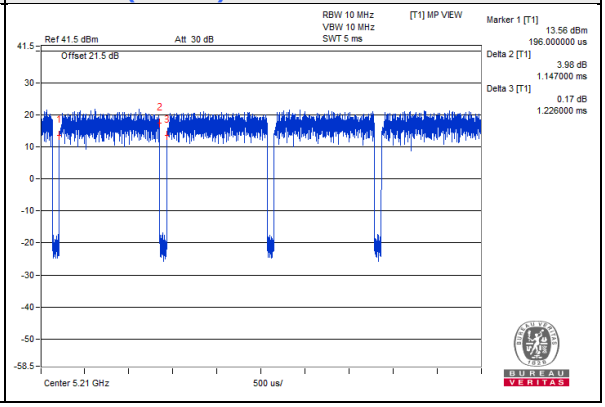
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.4 Description of Support Units

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

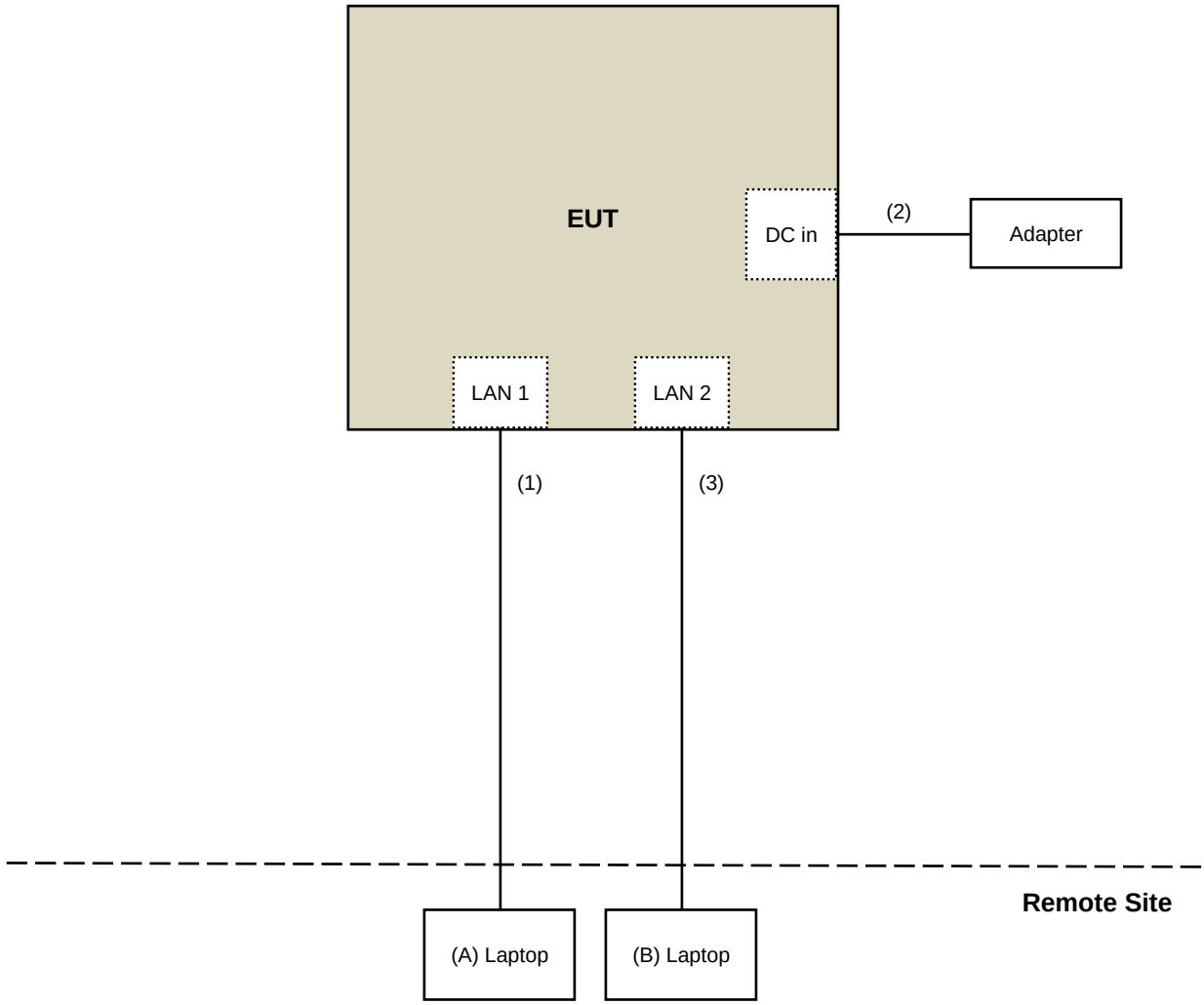
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
B.	Laptop	DELL	E5430	4N1SKV1	FCC DoC	Provided by Lab

Note:

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

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard and References

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

Test Standard:

FCC Part 15, Subpart E (15.407)
ANSI C63.10-2013

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

References Test Guidance:

KDB 789033 D02 General UNII Test Procedure New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01

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

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

*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

For OOBE test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-1200	160922	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-2000	180601	June 10, 2019	June 09, 2020
RF Cable	EMC104-SM-SM-6000	180602	June 10, 2019	June 09, 2020
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-4500	181205	Aug. 26, 2019	Aug. 25, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Jan. 11, 2020

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 03, 2019	July 02, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 30, 2019	May 29, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 11, 2019	Nov. 10, 2020
RF Cable	8D	966-3-1	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-2	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-3	Mar. 18, 2019	Mar. 17, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 26, 2019	Sep. 25, 2020
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-1200	160922	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-2000	180601	June 10, 2019	June 09, 2020
RF Cable	EMC104-SM-SM-6000	180602	June 10, 2019	June 09, 2020
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC102-KM-KM-4500	181205	Aug. 26, 2019	Aug. 25, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 16, 2020	Jan. 15, 2021
True RMS Clamp Meter FLUKE	325	31130711WS	May 21, 2019	May 20, 2020
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Feb. 12 to 17, 2020

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:

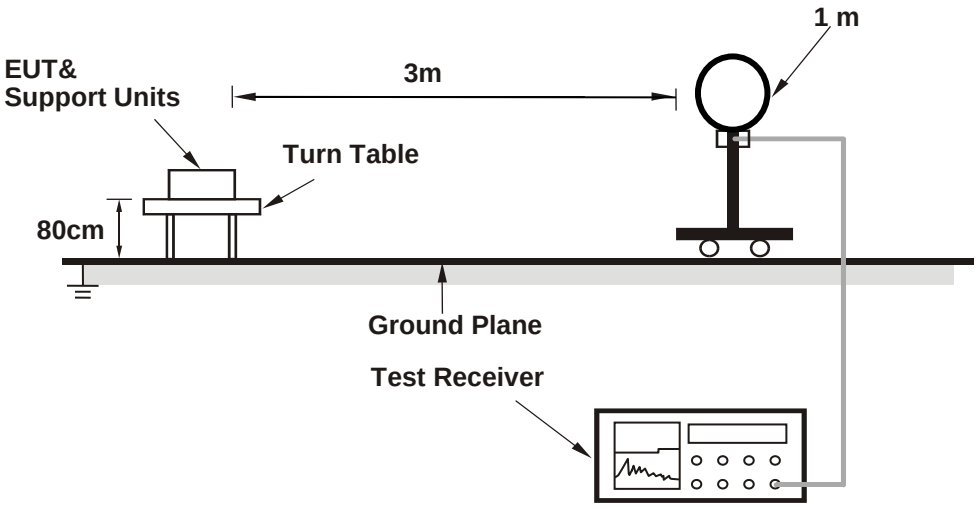
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

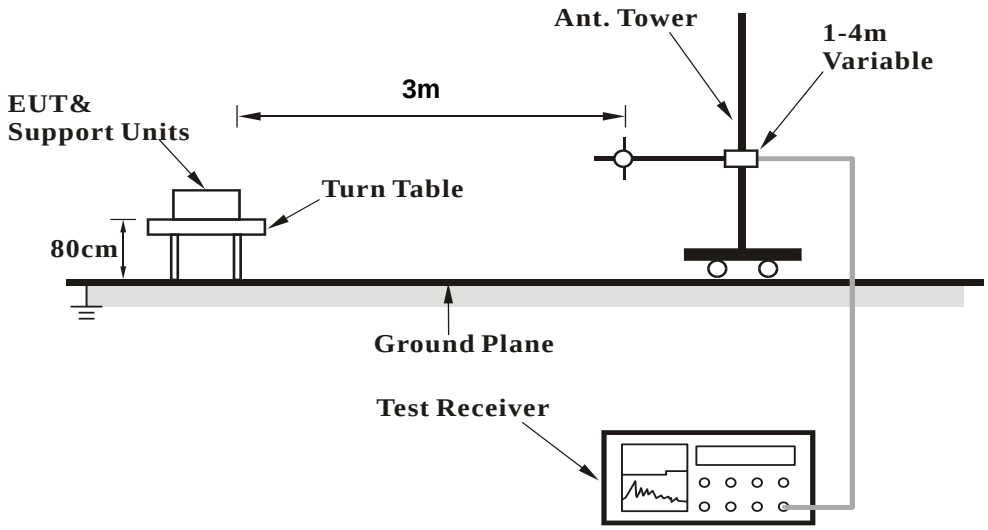
No deviation.

4.1.5 Test Setup

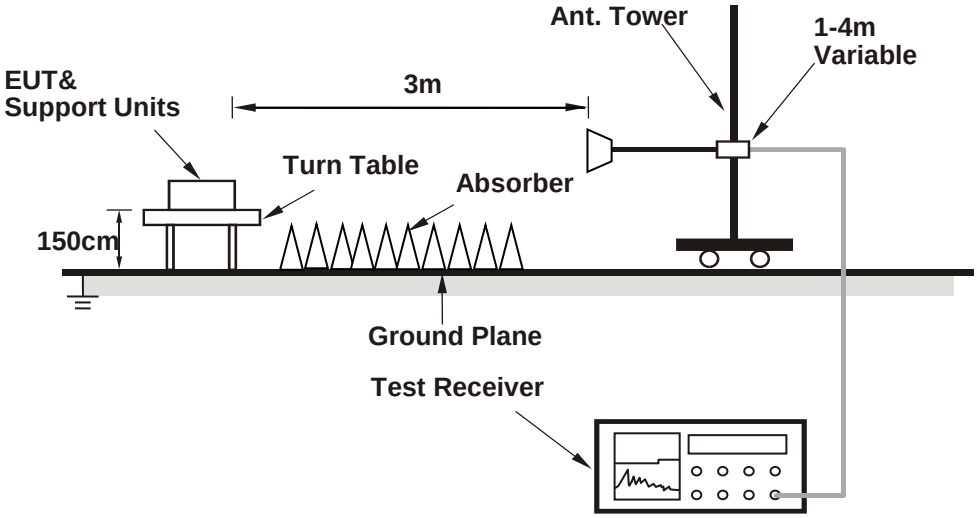
For Radiated emission below 30MHz



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 (QRCT_V 3.0-00264) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

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	71.5 PK	74.0	-2.5	1.32 H	14	68.5	3.0
2	5150.00	51.9 AV	54.0	-2.1	1.32 H	14	48.9	3.0
3	*5180.00	111.3 PK			1.32 H	14	108.4	2.9
4	*5180.00	101.1 AV			1.32 H	14	98.2	2.9
5	#10360.00	48.8 PK	68.2	-19.4	1.69 H	98	36.8	12.0
6	15540.00	49.3 PK	74.0	-24.7	3.13 H	277	36.3	13.0
7	15540.00	37.1 AV	54.0	-16.9	3.13 H	277	24.1	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**	**73.7 PK**	**74.0**	**-0.3**	**1.40 V**	**18**	**70.7**	**3.0**
2	5150.00	53.6 AV	54.0	-0.4	1.40 V	18	50.6	3.0
3	*5180.00	116.4 PK			1.40 V	18	113.5	2.9
4	*5180.00	106.4 AV			1.40 V	18	103.5	2.9
5	#10360.00	46.3 PK	68.2	-21.9	3.59 V	241	34.3	12.0
6	15540.00	48.3 PK	74.0	-25.7	2.66 V	174	35.3	13.0
7	15540.00	36.7 AV	54.0	-17.3	2.66 V	174	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	71.0 PK	74.0	-3.0	1.26 H	6	68.0	3.0
2	5150.00	52.1 AV	54.0	-1.9	1.26 H	6	49.1	3.0
3	*5200.00	111.9 PK			1.26 H	6	109.1	2.8
4	*5200.00	102.3 AV			1.26 H	6	99.5	2.8
5	#10400.00	49.9 PK	68.2	-18.3	1.75 H	87	37.8	12.1
6	15600.00	49.8 PK	74.0	-24.2	3.08 H	284	36.9	12.9
7	15600.00	38.0 AV	54.0	-16.0	3.08 H	284	25.1	12.9
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	5150.00	68.2 PK	74.0	-5.8	1.58 V	17	65.2	3.0
2	5150.00	53.2 AV	54.0	-0.8	1.58 V	17	50.2	3.0
3	*5200.00	118.7 PK			1.58 V	17	115.9	2.8
4	*5200.00	107.8 AV			1.58 V	17	105.0	2.8
5	#10400.00	47.4 PK	68.2	-20.8	3.61 V	243	35.3	12.1
6	15600.00	49.7 PK	74.0	-24.3	2.69 V	162	36.8	12.9
7	15600.00	38.0 AV	54.0	-16.0	2.69 V	162	25.1	12.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	112.2 PK			1.28 H	13	109.6	2.6
2	*5240.00	102.3 AV			1.28 H	13	99.7	2.6
3	5350.00	47.6 PK	74.0	-26.4	1.28 H	13	45.0	2.6
4	5350.00	34.3 AV	54.0	-19.7	1.28 H	13	31.7	2.6
5	#10480.00	50.1 PK	68.2	-18.1	1.73 H	101	37.6	12.5
6	15720.00	50.2 PK	74.0	-23.8	3.13 H	271	38.0	12.2
7	15720.00	38.2 AV	54.0	-15.8	3.13 H	271	26.0	12.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	117.6 PK			1.46 V	18	115.0	2.6
2	*5240.00	107.4 AV			1.46 V	18	104.8	2.6
3	5350.00	49.5 PK	74.0	-24.5	1.46 V	18	46.9	2.6
4	5350.00	36.9 AV	54.0	-17.1	1.46 V	18	34.3	2.6
5	#10480.00	47.6 PK	68.2	-20.6	3.65 V	232	35.1	12.5
6	15720.00	49.9 PK	74.0	-24.1	2.66 V	160	37.7	12.2
7	15720.00	38.3 AV	54.0	-15.7	2.66 V	160	26.1	12.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5598.65	61.1 PK	68.2	-7.1	2.69 H	310	58.1	3.0
2	*5745.00	115.3 PK			2.69 H	310	112.0	3.3
3	*5745.00	106.5 AV			2.69 H	310	103.2	3.3
4	#5935.38	61.0 PK	68.2	-7.2	2.69 H	310	57.1	3.9
5	11490.00	50.7 PK	74.0	-23.3	1.71 H	106	38.1	12.6
6	11490.00	39.9 AV	54.0	-14.1	1.71 H	106	27.3	12.6
7	#17235.00	50.2 PK	68.2	-18.0	3.13 H	269	33.4	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5623.04	63.2 PK	68.2	-5.0	2.17 V	84	60.1	3.1
2	*5745.00	121.4 PK			2.17 V	94	118.1	3.3
3	*5745.00	111.7 AV			2.17 V	94	108.4	3.3
4	#5984.86	61.0 PK	68.2	-7.2	2.17 V	84	57.2	3.8
5	11490.00	48.3 PK	74.0	-25.7	3.63 V	239	35.7	12.6
6	11490.00	39.1 AV	54.0	-14.9	3.63 V	239	26.5	12.6
7	#17235.00	49.6 PK	68.2	-18.6	2.69 V	145	32.8	16.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5636.32	61.4 PK	68.2	-6.8	2.69 H	307	58.3	3.1
2	*5785.00	115.2 PK			2.69 H	307	111.8	3.4
3	*5785.00	106.1 AV			2.69 H	307	102.7	3.4
4	#5946.85	62.6 PK	68.2	-5.6	2.69 H	307	58.8	3.8
5	11570.00	50.7 PK	74.0	-23.3	1.77 H	113	38.5	12.2
6	11570.00	39.9 AV	54.0	-14.1	1.77 H	113	27.7	12.2
7	#17355.00	50.0 PK	68.2	-18.2	3.16 H	270	33.4	16.6
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	#5596.07	63.1 PK	68.2	-5.1	2.21 V	101	60.1	3.0
2	*5785.00	121.9 PK			2.21 V	101	118.5	3.4
3	*5785.00	111.9 AV			2.21 V	101	108.5	3.4
4	#5968.90	61.1 PK	68.2	-7.1	2.21 V	101	57.3	3.8
5	11570.00	48.3 PK	74.0	-25.7	3.58 V	247	36.1	12.2
6	11570.00	39.1 AV	54.0	-14.9	3.58 V	247	26.9	12.2
7	#17355.00	49.8 PK	68.2	-18.4	2.74 V	157	33.2	16.6

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5556.79	61.5 PK	68.2	-6.7	2.71 H	306	58.5	3.0
2	*5825.00	115.0 PK			2.71 H	306	111.4	3.6
3	*5825.00	106.3 AV			2.71 H	306	102.7	3.6
4	#5974.22	61.1 PK	68.2	-7.1	2.71 H	306	57.4	3.7
5	11650.00	50.2 PK	74.0	-23.8	1.70 H	98	37.8	12.4
6	11650.00	39.7 AV	54.0	-14.3	1.70 H	98	27.3	12.4
7	#17475.00	50.0 PK	68.2	-18.2	3.18 H	261	33.0	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5626.42	62.4 PK	68.2	-5.8	2.12 V	95	59.3	3.1
2	*5825.00	122.3 PK			2.12 V	95	118.7	3.6
3	*5825.00	112.4 AV			2.12 V	95	108.8	3.6
4	#5933.98	61.5 PK	68.2	-6.7	2.12 V	95	57.6	3.9
5	11650.00	47.9 PK	74.0	-26.1	3.64 V	219	35.5	12.4
6	11650.00	38.9 AV	54.0	-15.1	3.64 V	219	26.5	12.4
7	#17475.00	49.9 PK	68.2	-18.3	2.71 V	162	32.9	17.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	71.7 PK	74.0	-2.3	1.34 H	16	68.7	3.0
2	5150.00	52.3 AV	54.0	-1.7	1.34 H	16	49.3	3.0
3	*5180.00	110.9 PK			1.34 H	16	108.0	2.9
4	*5180.00	100.8 AV			1.34 H	16	97.9	2.9
5	#10360.00	48.4 PK	68.2	-19.8	1.67 H	108	36.4	12.0
6	15540.00	48.9 PK	74.0	-25.1	3.18 H	289	35.9	13.0
7	15540.00	37.0 AV	54.0	-17.0	3.18 H	289	24.0	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	70.5 PK	74.0	-3.5	1.34 V	22	67.5	3.0
2	5150.00	53.2 AV	54.0	-0.8	1.34 V	22	50.2	3.0
3	*5180.00	115.4 PK			1.34 V	22	112.5	2.9
4	*5180.00	105.3 AV			1.34 V	22	102.4	2.9
5	#10360.00	46.4 PK	68.2	-21.8	3.59 V	230	34.4	12.0
6	15540.00	48.4 PK	74.0	-25.6	2.70 V	174	35.4	13.0
7	15540.00	36.8 AV	54.0	-17.2	2.70 V	174	23.8	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	71.1 PK	74.0	-2.9	1.23 H	3	68.1	3.0
2	5150.00	51.9 AV	54.0	-2.1	1.23 H	3	48.9	3.0
3	*5200.00	111.2 PK			1.23 H	3	108.4	2.8
4	*5200.00	101.9 AV			1.23 H	3	99.1	2.8
5	#10400.00	49.7 PK	68.2	-18.5	1.73 H	73	37.6	12.1
6	15600.00	49.7 PK	74.0	-24.3	3.12 H	289	36.8	12.9
7	15600.00	37.8 AV	54.0	-16.2	3.12 H	289	24.9	12.9
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	5150.00	68.6 PK	74.0	-5.4	1.62 V	20	65.6	3.0
2	5150.00	53.4 AV	54.0	-0.6	1.62 V	20	50.4	3.0
3	*5200.00	117.7 PK			1.62 V	20	114.9	2.8
4	*5200.00	106.9 AV			1.62 V	20	104.1	2.8
5	#10400.00	47.4 PK	68.2	-20.8	3.57 V	246	35.3	12.1
6	15600.00	49.5 PK	74.0	-24.5	2.69 V	151	36.6	12.9
7	15600.00	38.0 AV	54.0	-16.0	2.69 V	151	25.1	12.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	112.0 PK			1.23 H	18	109.4	2.6
2	*5240.00	102.2 AV			1.23 H	18	99.6	2.6
3	5350.00	47.6 PK	74.0	-26.4	1.23 H	18	45.0	2.6
4	5350.00	34.5 AV	54.0	-19.5	1.23 H	18	31.9	2.6
5	#10480.00	49.9 PK	68.2	-18.3	1.77 H	110	37.4	12.5
6	15720.00	50.3 PK	74.0	-23.7	3.13 H	284	38.1	12.2
7	15720.00	38.0 AV	54.0	-16.0	3.13 H	284	25.8	12.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.4 PK			1.46 V	18	113.8	2.6
2	*5240.00	106.5 AV			1.46 V	18	103.9	2.6
3	5350.00	49.6 PK	74.0	-24.4	1.46 V	18	47.0	2.6
4	5350.00	36.8 AV	54.0	-17.2	1.46 V	18	34.2	2.6
5	#10480.00	47.9 PK	68.2	-20.3	3.64 V	220	35.4	12.5
6	15720.00	50.5 PK	74.0	-23.5	2.65 V	175	38.3	12.2
7	15720.00	38.1 AV	54.0	-15.9	2.65 V	175	25.9	12.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5617.09	62.2 PK	68.2	-6.0	2.68 H	309	59.1	3.1
2	*5745.00	114.1 PK			2.68 H	309	110.8	3.3
3	*5745.00	105.7 AV			2.68 H	309	102.4	3.3
4	#5981.50	61.8 PK	68.2	-6.4	2.68 H	309	58.1	3.7
5	11490.00	50.6 PK	74.0	-23.4	1.70 H	108	38.0	12.6
6	11490.00	40.0 AV	54.0	-14.0	1.70 H	108	27.4	12.6
7	#17235.00	50.2 PK	68.2	-18.0	3.13 H	264	33.4	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5556.89	61.1 PK	68.2	-7.1	1.77 V	88	58.1	3.0
2	*5745.00	119.6 PK			1.77 V	88	116.3	3.3
3	*5745.00	110.6 AV			1.77 V	88	107.3	3.3
4	#5968.75	60.7 PK	68.2	-7.5	1.77 V	88	56.9	3.8
5	11490.00	48.4 PK	74.0	-25.6	3.66 V	246	35.8	12.6
6	11490.00	39.5 AV	54.0	-14.5	3.66 V	246	26.9	12.6
7	#17235.00	49.7 PK	68.2	-18.5	2.68 V	137	32.9	16.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5597.46	62.6 PK	68.2	-5.6	2.62 H	310	59.6	3.0
2	*5785.00	114.5 PK			2.62 H	310	111.1	3.4
3	*5785.00	105.9 AV			2.62 H	310	102.5	3.4
4	#5930.36	61.6 PK	68.2	-6.6	2.62 H	310	57.7	3.9
5	11570.00	50.7 PK	74.0	-23.3	1.66 H	107	38.5	12.2
6	11570.00	39.6 AV	54.0	-14.4	1.66 H	107	27.4	12.2
7	#17355.00	50.0 PK	68.2	-18.2	3.14 H	252	33.4	16.6
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	#5594.23	61.4 PK	68.2	-6.8	1.76 V	82	58.4	3.0
2	*5785.00	119.8 PK			1.76 V	82	116.4	3.4
3	*5785.00	110.6 AV			1.76 V	82	107.2	3.4
4	#5968.06	61.2 PK	68.2	-7.0	1.76 V	82	57.4	3.8
5	11570.00	48.5 PK	74.0	-25.5	3.63 V	250	36.3	12.2
6	11570.00	39.6 AV	54.0	-14.4	3.63 V	250	27.4	12.2
7	#17355.00	49.4 PK	68.2	-18.8	2.68 V	138	32.8	16.6

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5640.88	61.5 PK	68.2	-6.7	2.70 H	312	58.4	3.1
2	*5825.00	113.7 PK			2.70 H	312	110.1	3.6
3	*5825.00	105.4 AV			2.70 H	312	101.8	3.6
4	#5928.24	60.8 PK	68.2	-7.4	2.70 H	312	56.9	3.9
5	11650.00	50.6 PK	74.0	-23.4	1.71 H	95	38.2	12.4
6	11650.00	39.5 AV	54.0	-14.5	1.71 H	95	27.1	12.4
7	#17475.00	49.7 PK	68.2	-18.5	3.10 H	259	32.7	17.0
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	#5623.26	61.9 PK	68.2	-6.3	1.81 V	84	58.8	3.1
2	*5825.00	119.2 PK			1.81 V	84	115.6	3.6
3	*5825.00	110.4 AV			1.81 V	84	106.8	3.6
4	#5976.62	61.1 PK	68.2	-7.1	1.81 V	84	57.4	3.7
5	11650.00	47.9 PK	74.0	-26.1	3.64 V	260	35.5	12.4
6	11650.00	39.2 AV	54.0	-14.8	3.64 V	260	26.8	12.4
7	#17475.00	49.7 PK	68.2	-18.5	2.66 V	149	32.7	17.0

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

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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	70.1 PK	74.0	-3.9	1.29 H	30	67.1	3.0
2	5150.00	51.4 AV	54.0	-2.6	1.29 H	30	48.4	3.0
3	*5190.00	105.4 PK			1.29 H	30	102.5	2.9
4	*5190.00	97.1 AV			1.29 H	30	94.2	2.9
5	#10380.00	46.3 PK	68.2	-21.9	1.68 H	105	34.1	12.2
6	15570.00	46.5 PK	74.0	-27.5	3.17 H	287	33.5	13.0
7	15570.00	34.3 AV	54.0	-19.7	3.17 H	287	21.3	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	71.6 PK	74.0	-2.4	1.50 V	24	68.6	3.0
2	5150.00	53.2 AV	54.0	-0.8	1.50 V	24	50.2	3.0
3	*5190.00	110.9 PK			1.50 V	24	108.0	2.9
4	*5190.00	101.3 AV			1.50 V	24	98.4	2.9
5	#10380.00	44.3 PK	68.2	-23.9	3.60 V	260	32.1	12.2
6	15570.00	47.3 PK	74.0	-26.7	2.71 V	151	34.3	13.0
7	15570.00	35.4 AV	54.0	-18.6	2.71 V	151	22.4	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.5 PK	74.0	-7.5	1.26 H	19	63.5	3.0
2	5150.00	51.4 AV	54.0	-2.6	1.26 H	19	48.4	3.0
3	*5230.00	106.9 PK			1.26 H	19	104.3	2.6
4	*5230.00	99.4 AV			1.26 H	19	96.8	2.6
5	5350.00	49.0 PK	74.0	-25.0	1.26 H	19	46.4	2.6
6	5350.00	36.1 AV	54.0	-17.9	1.26 H	19	33.5	2.6
7	#10460.00	47.4 PK	68.2	-20.8	1.71 H	96	35.0	12.4
8	15690.00	49.6 PK	74.0	-24.4	3.23 H	279	37.2	12.4
9	15690.00	37.7 AV	54.0	-16.3	3.23 H	279	25.3	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	5150.00	68.8 PK	74.0	-5.2	1.46 V	21	65.8	3.0
2	5150.00	53.1 AV	54.0	-0.9	1.46 V	21	50.1	3.0
3	*5230.00	113.3 PK			1.46 V	21	110.7	2.6
4	*5230.00	103.1 AV			1.46 V	21	100.5	2.6
5	5350.00	49.9 PK	74.0	-24.1	1.46 V	21	47.3	2.6
6	5350.00	37.5 AV	54.0	-16.5	1.46 V	21	34.9	2.6
7	#10460.00	45.4 PK	68.2	-22.8	3.64 V	238	33.0	12.4
8	15690.00	48.1 PK	74.0	-25.9	2.69 V	134	35.7	12.4
9	15690.00	36.4 AV	54.0	-17.6	2.69 V	134	24.0	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5575.09	62.2 PK	68.2	-6.0	2.67 H	305	59.2	3.0
2	*5755.00	111.8 PK			2.67 H	305	108.5	3.3
3	*5755.00	103.6 AV			2.67 H	305	100.3	3.3
4	#5960.97	60.8 PK	68.2	-7.4	2.67 H	305	57.0	3.8
5	11510.00	49.3 PK	74.0	-24.7	1.70 H	115	36.8	12.5
6	11510.00	38.4 AV	54.0	-15.6	1.70 H	115	25.9	12.5
7	#17265.00	49.0 PK	68.2	-19.2	3.23 H	292	32.4	16.6
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	#5643.05	64.4 PK	68.2	-3.8	1.82 V	79	61.3	3.1
2	*5755.00	118.6 PK			1.82 V	79	115.3	3.3
3	*5755.00	110.2 AV			1.82 V	79	106.9	3.3
4	#5942.90	61.6 PK	68.2	-6.6	1.82 V	79	57.8	3.8
5	11510.00	46.4 PK	74.0	-27.6	3.65 V	258	33.9	12.5
6	11510.00	38.6 AV	54.0	-15.4	3.65 V	258	26.1	12.5
7	#17265.00	48.5 PK	68.2	-19.7	2.62 V	142	31.9	16.6

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	#5642.98	61.2 PK	68.2	-7.0	2.65 H	308	58.1	3.1
2	*5795.00	112.6 PK			2.65 H	308	109.1	3.5
3	*5795.00	104.1 AV			2.65 H	308	100.6	3.5
4	#6014.24	61.0 PK	68.2	-7.2	2.65 H	308	57.2	3.8
5	11590.00	49.5 PK	74.0	-24.5	1.72 H	97	37.2	12.3
6	11590.00	38.4 AV	54.0	-15.6	1.72 H	97	26.1	12.3
7	#17385.00	49.0 PK	68.2	-19.2	3.20 H	275	32.5	16.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5646.57	62.4 PK	68.2	-5.8	1.86 V	77	59.3	3.1
2	*5795.00	118.1 PK			1.86 V	77	114.6	3.5
3	*5795.00	110.5 AV			1.86 V	77	107.0	3.5
4	#5929.47	61.5 PK	68.2	-6.7	1.86 V	77	57.6	3.9
5	11590.00	46.2 PK	74.0	-27.8	3.62 V	242	33.9	12.3
6	11590.00	38.5 AV	54.0	-15.5	3.62 V	242	26.2	12.3
7	#17385.00	48.8 PK	68.2	-19.4	2.63 V	142	32.3	16.5

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 other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.6 PK	74.0	-4.4	1.26 H	24	66.6	3.0
2	5150.00	51.0 AV	54.0	-3.0	1.26 H	24	48.0	3.0
3	*5210.00	104.7 PK			1.26 H	24	102.0	2.7
4	*5210.00	95.0 AV			1.26 H	24	92.3	2.7
5	5350.00	55.9 PK	74.0	-18.1	1.26 H	24	53.3	2.6
6	5350.00	45.0 AV	54.0	-9.0	1.26 H	24	42.4	2.6
7	#10420.00	45.3 PK	68.2	-22.9	1.72 H	92	33.0	12.3
8	15630.00	46.0 PK	74.0	-28.0	3.23 H	274	33.3	12.7
9	15630.00	34.6 AV	54.0	-19.4	3.23 H	274	21.9	12.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.0 PK	74.0	-9.0	1.55 V	14	62.0	3.0
2	5150.00	52.7 AV	54.0	-1.3	1.55 V	14	49.7	3.0
3	*5210.00	108.1 PK			1.55 V	14	105.4	2.7
4	*5210.00	100.0 AV			1.55 V	14	97.3	2.7
5	5350.00	56.7 PK	74.0	-17.3	1.55 V	14	54.1	2.6
6	5350.00	45.5 AV	54.0	-8.5	1.55 V	14	42.9	2.6
7	#10420.00	43.2 PK	68.2	-25.0	3.64 V	249	30.9	12.3
8	15630.00	46.2 PK	74.0	-27.8	2.73 V	143	33.5	12.7
9	15630.00	34.3 AV	54.0	-19.7	2.73 V	143	21.6	12.7

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 other emission levels were very low against the limit.
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	#5642.29	62.6 PK	68.2	-5.6	2.68 H	309	59.5	3.1
2	*5775.00	105.8 PK			2.68 H	309	102.4	3.4
3	*5775.00	97.1 AV			2.68 H	309	93.7	3.4
4	#5999.17	60.9 PK	68.2	-7.3	2.68 H	309	57.1	3.8
5	11550.00	42.8 PK	74.0	-31.2	1.77 H	102	30.4	12.4
6	11550.00	34.4 AV	54.0	-19.6	1.77 H	102	22.0	12.4
7	#17325.00	46.1 PK	68.2	-22.1	3.18 H	271	29.4	16.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5648.86	65.8 PK	68.2	-2.4	1.80 V	75	62.6	3.2
2	*5775.00	111.7 PK			1.80 V	75	108.3	3.4
3	*5775.00	103.9 AV			1.80 V	75	100.5	3.4
4	#5926.27	63.5 PK	68.2	-4.7	1.80 V	75	59.6	3.9
5	11550.00	43.3 PK	74.0	-30.7	3.64 V	247	30.9	12.4
6	11550.00	35.3 AV	54.0	-18.7	3.64 V	247	22.9	12.4
7	#17325.00	45.6 PK	68.2	-22.6	2.74 V	147	28.9	16.7

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 other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz Data:

U-NII-1

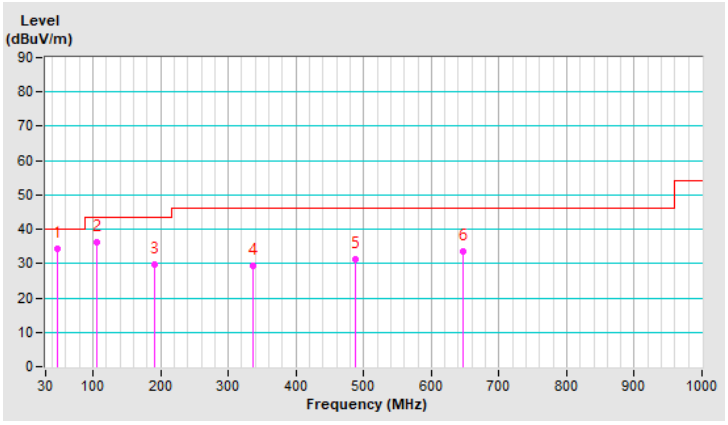
802.11ac (VHT20)

CHANNEL	TX Channel 48	**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	48.39	34.2 QP	40.0	-5.8	1.00 H	108	41.9	-7.7
2	106.11	36.1 QP	43.5	-7.4	1.70 H	209	47.0	-10.9
3	190.37	29.6 QP	43.5	-13.9	1.22 H	32	39.4	-9.8
4	336.44	29.4 QP	46.0	-16.6	1.20 H	307	34.7	-5.3
5	488.78	31.4 QP	46.0	-14.6	1.22 H	348	33.1	-1.7
6	647.35	33.4 QP	46.0	-12.6	1.20 H	5	31.6	1.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. 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.

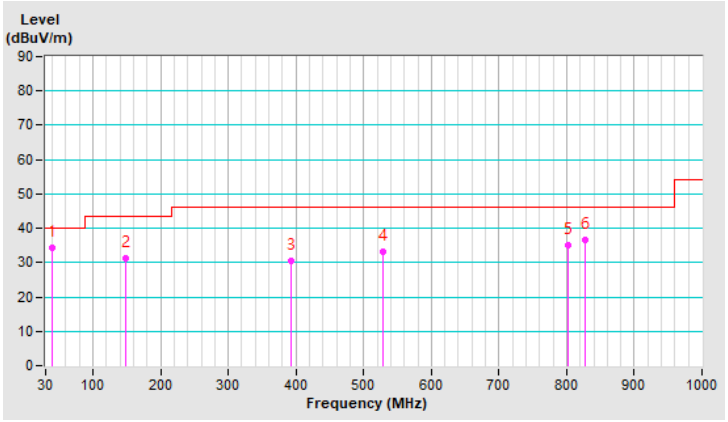


CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	39.40	34.2 QP	40.0	-5.8	1.30 V	66	42.5	-8.3
2	149.12	31.2 QP	43.5	-12.3	1.30 V	320	38.3	-7.1
3	392.68	30.6 QP	46.0	-15.4	1.06 V	160	34.8	-4.2
4	529.25	33.3 QP	46.0	-12.7	1.30 V	233	34.2	-0.9
5	801.22	35.2 QP	46.0	-10.8	1.48 V	194	30.8	4.4
6	827.43	36.6 QP	46.0	-9.4	2.20 V	168	31.6	5.0

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. 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.



U-NII-3

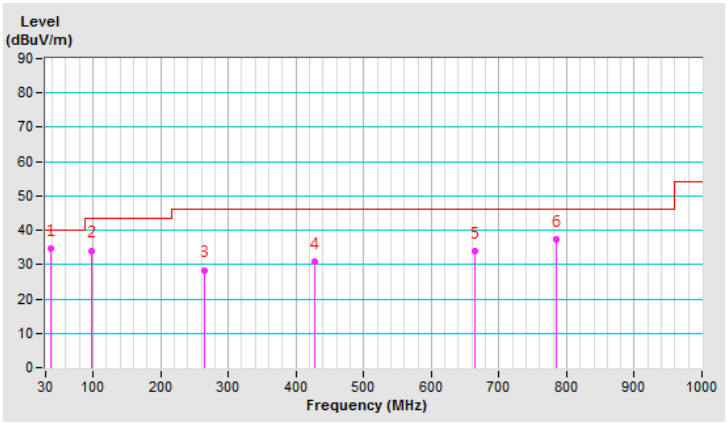
802.11ac (VHT40)

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	37.98	34.5 QP	40.0	-5.5	2.00 H	136	42.7	-8.2
2	97.29	34.1 QP	43.5	-9.4	1.00 H	360	46.3	-12.2
3	265.64	28.4 QP	46.0	-17.6	1.50 H	240	36.0	-7.6
4	428.50	31.0 QP	46.0	-15.0	1.50 H	58	34.1	-3.1
5	664.09	34.0 QP	46.0	-12.0	1.00 H	18	32.1	1.9
6	783.98	37.2 QP	46.0	-8.8	1.50 H	354	32.7	4.5

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 other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. 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.

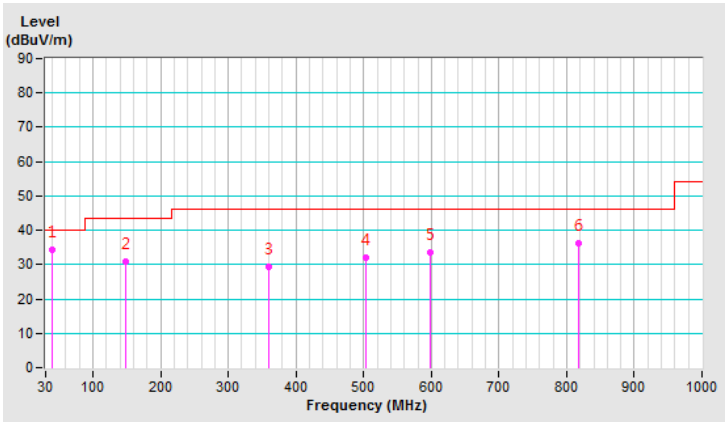


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	38.73	34.4 QP	40.0	-5.6	2.00 V	110	42.7	-8.3
2	149.24	30.8 QP	43.5	-12.7	1.50 V	360	37.9	-7.1
3	358.90	29.5 QP	46.0	-16.5	2.00 V	324	34.2	-4.7
4	502.87	32.0 QP	46.0	-14.0	1.00 V	338	33.4	-1.4
5	598.10	33.6 QP	46.0	-12.4	2.00 V	62	32.6	1.0
6	817.88	36.3 QP	46.0	-9.7	1.00 V	336	31.5	4.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. 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. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 23, 2019	Oct. 22, 2020
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	50	3	Oct. 23, 2019	Oct. 22, 2020
RF Cable	5D-FB	COCCAB-001	Sep. 27, 2019	Sep. 26, 2020
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 14, 2019	Mar. 13, 2020
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: Feb. 11 to 17, 2020

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.

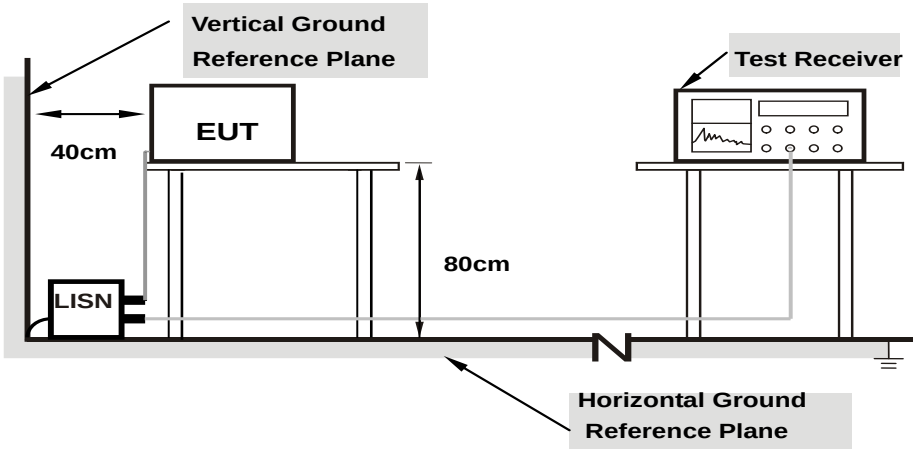
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

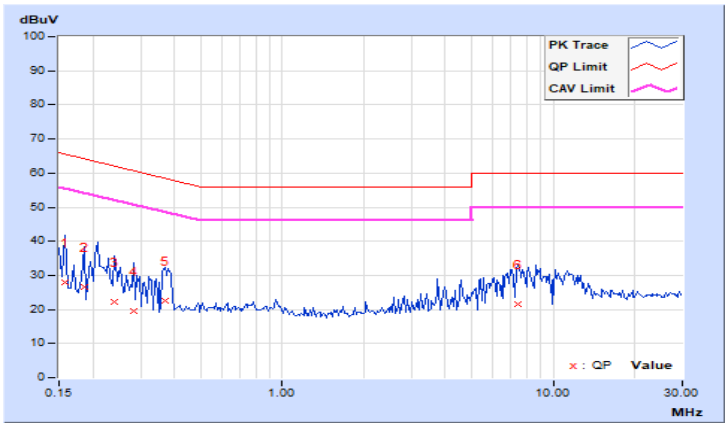
U-NII-1

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	0.15780	9.99	17.89	-1.92	27.88	8.07	65.58	55.58	-37.70	-47.51
2	0.18513	9.99	16.60	-10.43	26.59	-0.44	64.25	54.25	-37.66	-54.69
3	0.23982	9.99	12.15	-9.82	22.14	0.17	62.10	52.10	-39.96	-51.93
4	0.28280	9.99	9.42	-10.90	19.41	-0.91	60.73	50.73	-41.32	-51.64
5	0.36878	10.00	12.62	-11.11	22.62	-1.11	58.53	48.53	-35.91	-49.64
6	7.40233	10.48	11.13	-10.25	21.61	0.23	60.00	50.00	-38.39	-49.77

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.

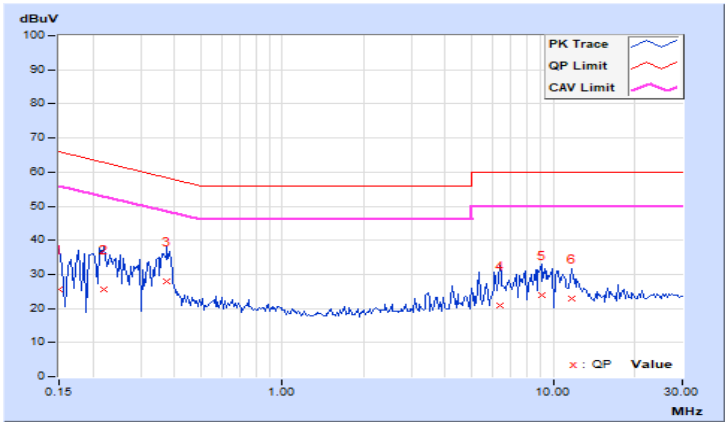


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.15002	9.99	15.70	-3.72	25.69	6.27	66.00	56.00	-40.31	-49.73
2	0.22033	9.99	15.72	-8.88	25.71	1.11	62.81	52.81	-37.10	-51.70
3	0.37651	10.01	18.01	-8.43	28.02	1.58	58.36	48.36	-30.34	-46.78
4	6.33980	10.36	10.63	-10.75	20.99	-0.39	60.00	50.00	-39.01	-50.39
5	9.03903	10.52	13.49	-10.13	24.01	0.39	60.00	50.00	-35.99	-49.61
6	11.69535	10.67	12.12	-10.32	22.79	0.35	60.00	50.00	-37.21	-49.65

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.



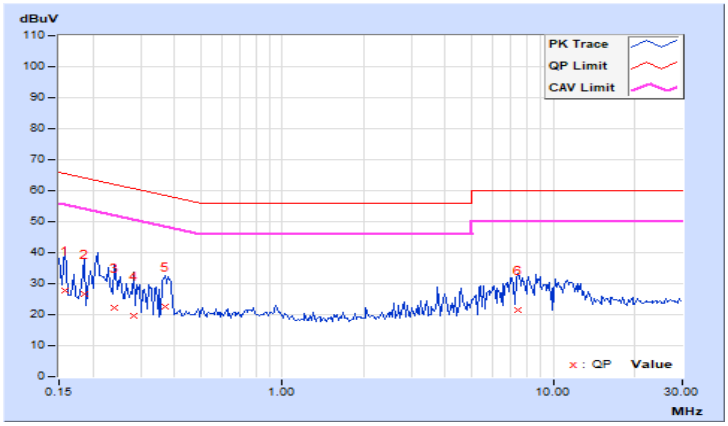
U-NII-3

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	0.15781	9.99	17.88	-1.93	27.87	8.06	65.58	55.58	-37.71	-47.52
2	0.18516	9.99	16.61	-10.46	26.60	-0.47	64.25	54.25	-37.65	-54.72
3	0.23984	9.99	12.11	-9.85	22.10	0.14	62.10	52.10	-40.00	-51.96
4	0.28281	9.99	9.46	-10.95	19.45	-0.96	60.73	50.73	-41.28	-51.69
5	0.36875	10.00	12.63	-11.15	22.63	-1.15	58.53	48.53	-35.90	-49.68
6	7.40234	10.48	11.10	-10.23	21.58	0.25	60.00	50.00	-38.42	-49.75

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.

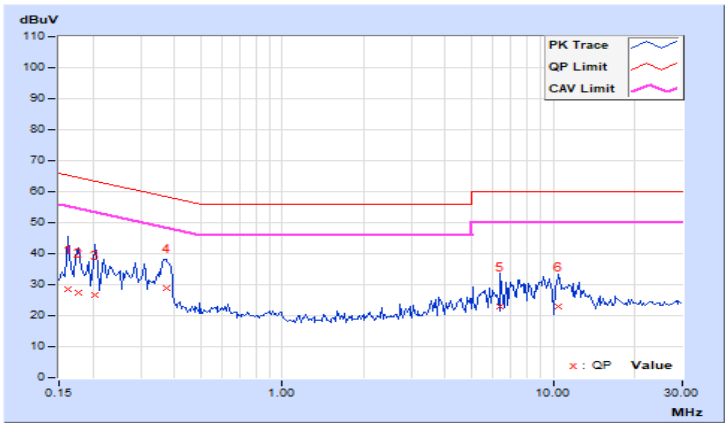


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.16172	9.99	18.38	-6.93	28.37	3.06	65.38	55.38	-37.01	-52.32
2	0.17734	9.99	17.42	-9.44	27.41	0.55	64.61	54.61	-37.20	-54.06
3	0.20469	9.99	16.55	-6.98	26.54	3.01	63.42	53.42	-36.88	-50.41
4	**0.37266**	**10.01**	**18.89**	**-7.95**	**28.90**	**2.06**	**58.44**	**48.44**	**-29.54**	**-46.38**
5	6.39453	10.36	12.70	-10.25	23.06	0.11	60.00	50.00	-36.94	-49.89
6	10.46875	10.61	12.43	-10.09	23.04	0.52	60.00	50.00	-36.96	-49.48

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 Result

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.91	20.94	247.476	23.94	30	Pass
40	5200	23.47	23.11	426.975	26.30	30	Pass
48	5240	23.07	23.29	416.073	26.19	30	Pass
149	5745	25.84	25.32	724.115	28.60	30	Pass
157	5785	25.92	25.44	740.786	28.70	30	Pass
165	5825	26.08	25.48	758.692	28.80	30	Pass

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.83	20.88	243.521	23.87	30	Pass
40	5200	23.33	22.96	412.975	26.16	30	Pass
48	5240	23.95	24.44	526.285	27.21	30	Pass
149	5745	25.62	24.93	675.926	28.30	30	Pass
157	5785	25.77	24.99	693.073	28.41	30	Pass
165	5825	25.86	25.07	706.844	28.49	30	Pass

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	20.22	20.12	207.998	23.18	30	Pass
46	5230	21.89	21.76	304.494	24.84	30	Pass
151	5755	26.44	25.82	822.499	29.15	30	Pass
159	5795	26.71	25.87	855.18	29.32	30	Pass

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	20.52	20.51	225.18	23.53	30	Pass
155	5775	22.97	22.44	373.541	25.72	30	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.83	20.88	243.521	23.87	28.19	Pass
40	5200	23.33	22.96	412.975	26.16	28.19	Pass
48	5240	23.95	24.44	526.285	27.21	28.19	Pass
149	5745	24.53	24.78	584.4	27.67	27.71	Pass
157	5785	24.62	24.75	588.273	27.70	27.71	Pass
165	5825	24.65	24.71	587.544	27.69	27.71	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 30-(7.81-6) = 28.19dBm.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	20.22	20.12	207.998	23.18	28.19	Pass
46	5230	21.89	21.76	304.494	24.84	28.19	Pass
151	5755	24.94	24.32	582.285	27.65	27.71	Pass
159	5795	24.92	24.43	587.788	27.69	27.71	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 30-(7.81-6) = 28.19dBm.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

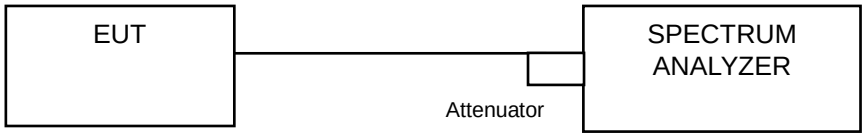
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	20.52	20.51	225.18	23.53	28.19	Pass
155	5775	22.97	22.44	373.541	25.72	27.71	Pass

Note: 1. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 30-(7.81-6) = 28.19dBm.
2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$)^2 / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.44	16.44
40	5200	16.68	16.68
48	5240	17.28	16.68
149	5745	16.61	16.61
157	5785	16.8	16.56
165	5825	24.36	16.68

802.11ac (VHT20)

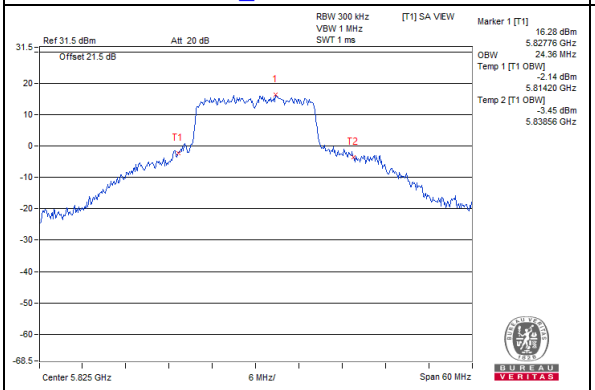
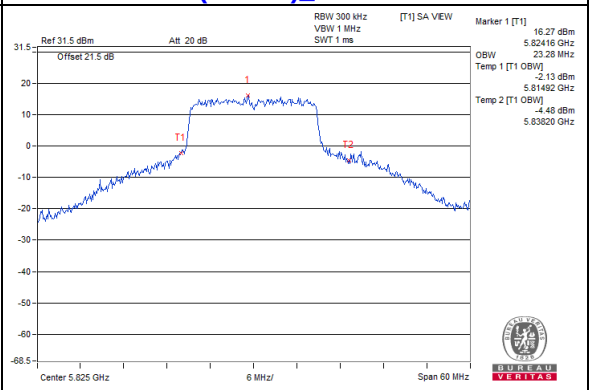
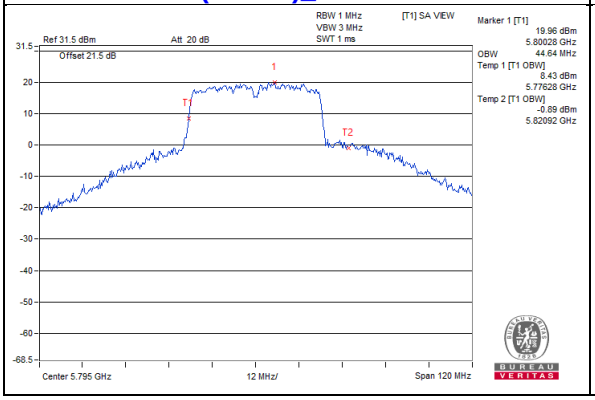
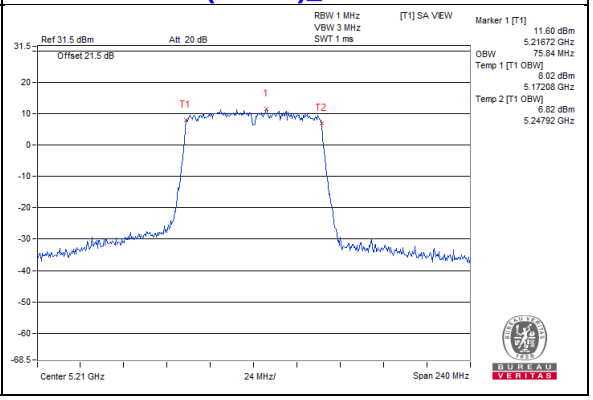
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	17.76	17.64
48	5240	18	17.76
149	5745	17.64	17.64
157	5785	17.76	17.64
165	5825	23.28	17.64

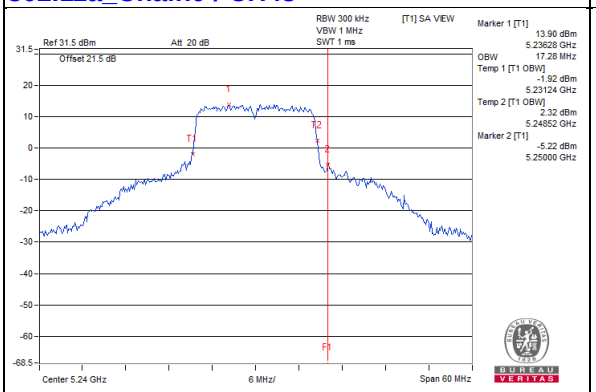
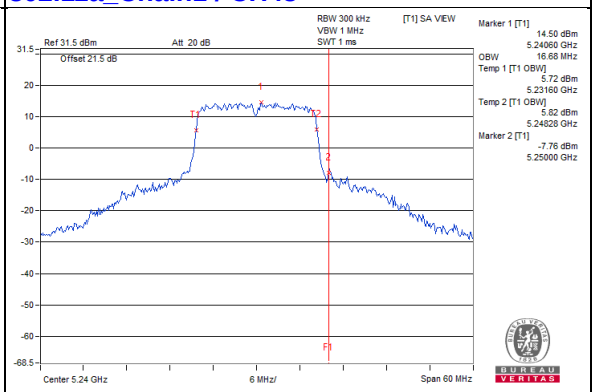
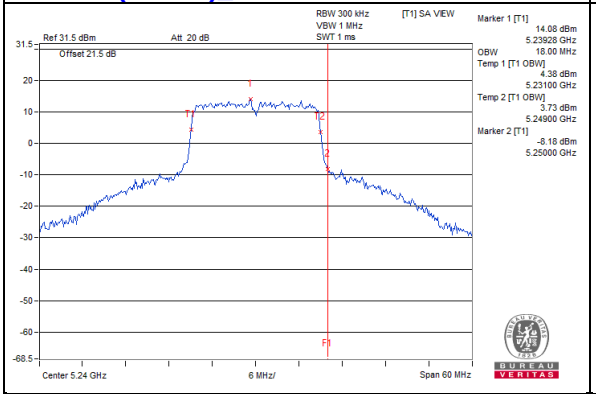
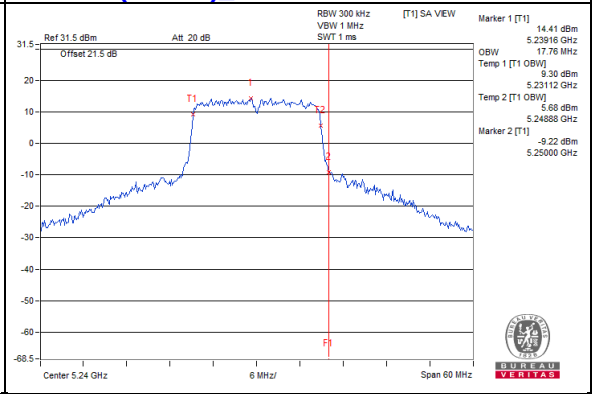
802.11ac (VHT40)

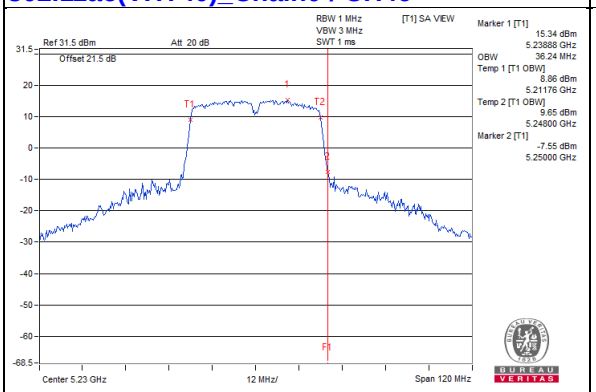
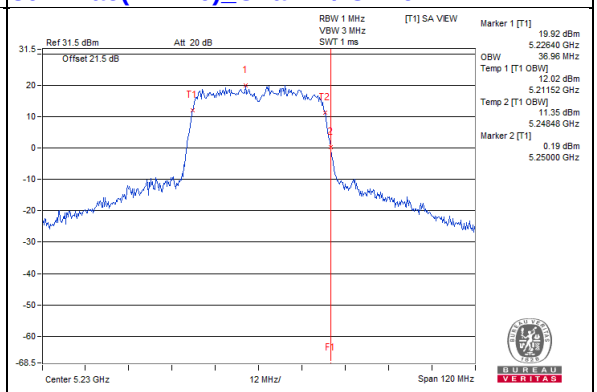
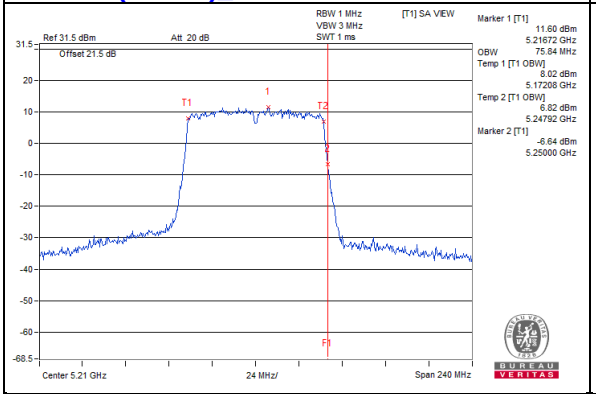
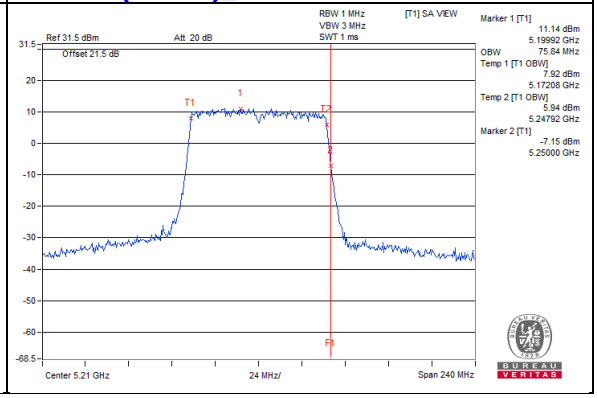
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36	36
46	5230	36.24	36.96
151	5755	36.48	36.24
159	5795	44.64	36.24

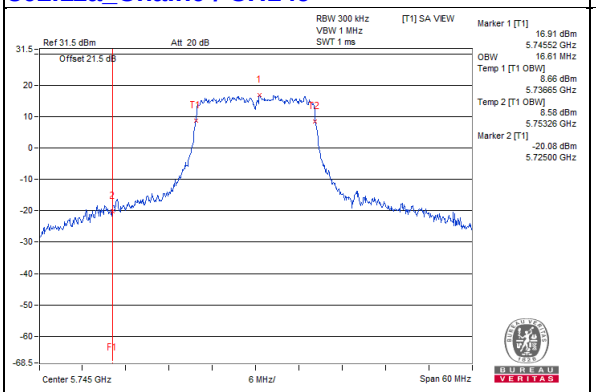
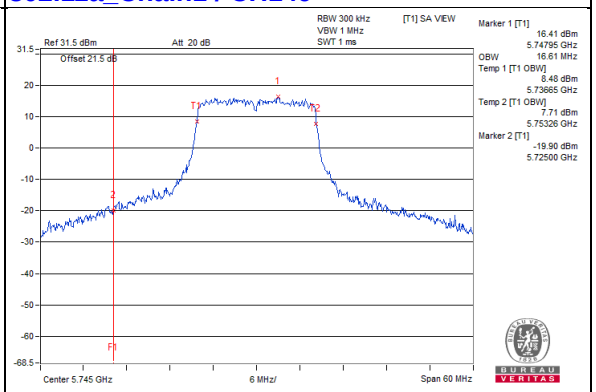
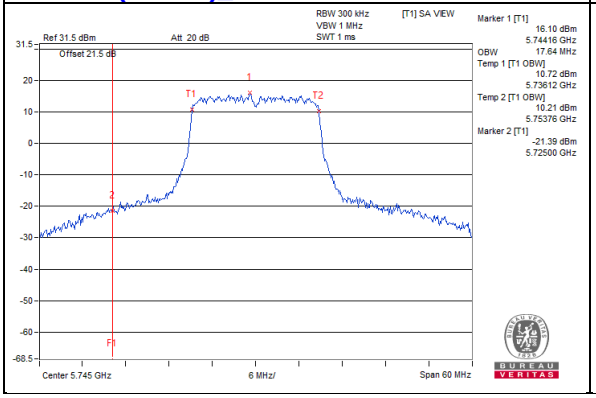
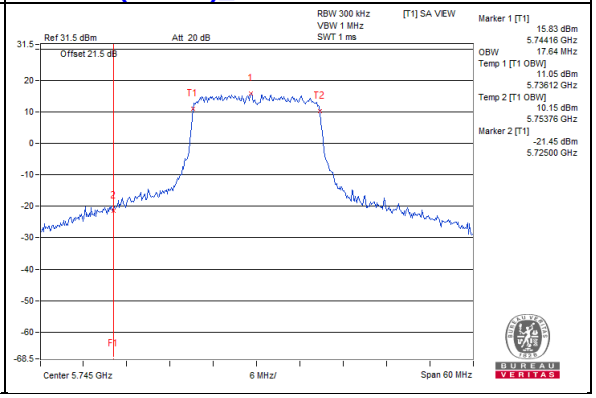
802.11ac (VHT80)

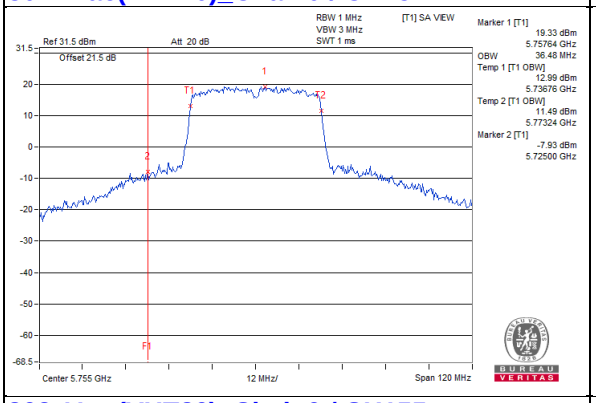
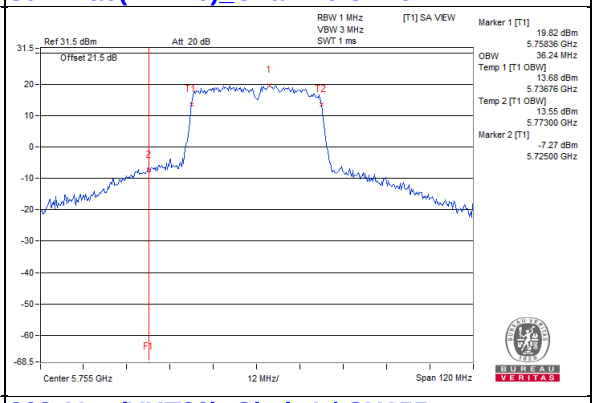
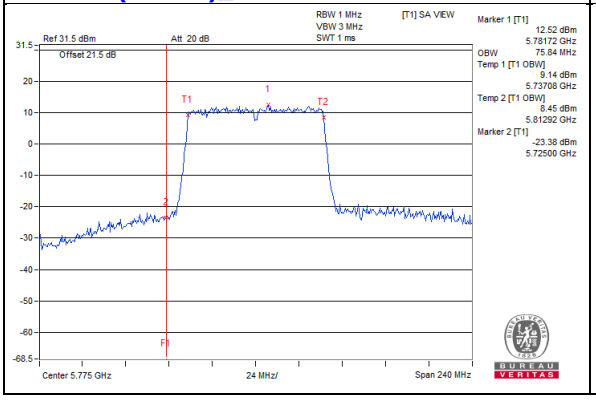
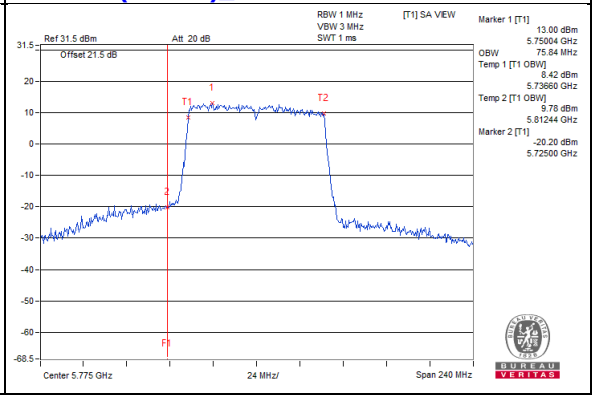
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.84	75.84
155	5775	75.84	75.84

Spectrum Plot of Max Value	
802.11a_Chain0 / CH165	802.11ac (VHT20)_Chain0 / CH165
	
802.11ac (VHT40)_Chain0 / CH159	802.11ac (VHT80)_Chain0 / CH42
	

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
	

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

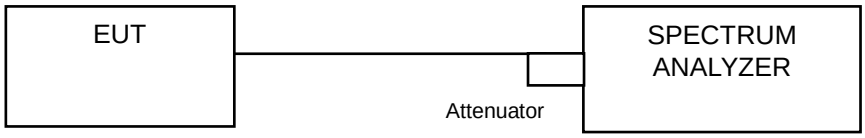
Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2C band)	
802.11ac(VHT40)_Chain0 / CH151	802.11ac(VHT40)_Chain1 / CH151
	
802.11ac(VHT80)_Chain0 / CH155	802.11ac(VHT80)_Chain1 / CH155
	

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 802.11ac (VHT20):

For U-NII-1:

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 U-NII-3:

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

For 802.11a, 802.11ac (VHT40), 802.11ac (VHT80):
For U-NII-1:
Using method SA-2

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

For U-NII-3:

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

802.11a

Chan.	Freq. (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	7.16	7.88	0.18	10.55	15.19	Pass
40	5200	9.44	9.75	0.18	12.61	15.19	Pass
48	5240	9.66	9.49	0.18	12.59	15.19	Pass

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

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 17-(7.81-6) = 15.19dBm.

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

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm/MHz)		Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	7.61	7.68	10.66	15.19	Pass
40	5200	9.89	9.68	12.80	15.19	Pass
48	5240	9.30	9.88	12.61	15.19	Pass

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

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 17-(7.81-6) = 15.19dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	3.88	4.00	0.16	6.95	15.19	Pass
46	5230	5.48	5.91	0.16	8.71	15.19	Pass

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

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 17-(7.81-6) = 15.19dBm.

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

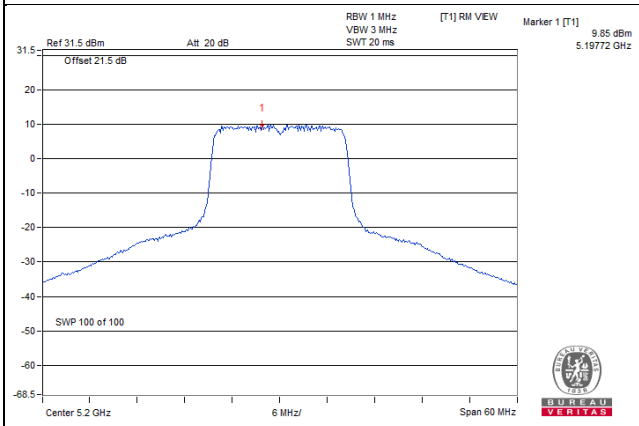
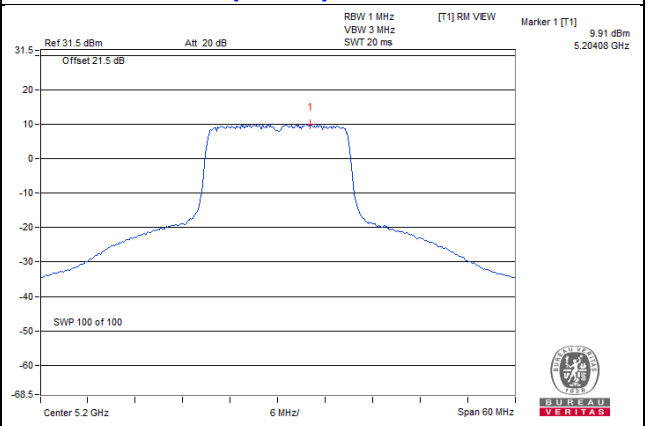
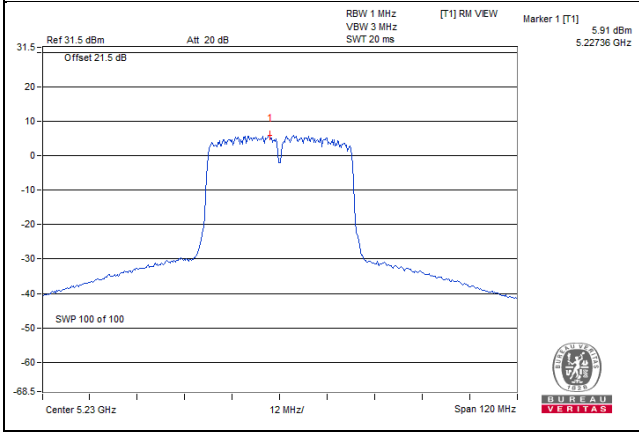
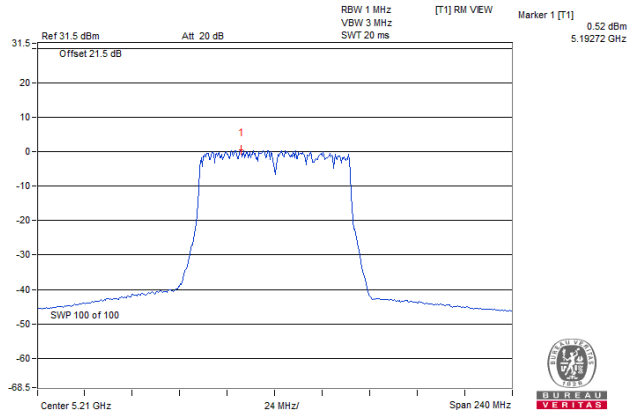
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	0.46	0.52	0.29	3.50	15.19	Pass

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

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 7.81dBi > 6dBi , so the power density limit shall be reduced to 17-(7.81-6) = 15.19dBm.

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

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

For U-NII-3:

802.11a

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Duty Factor (dB)	Total PSD (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/ 300kHz	dBm/ 300kHz				
149	5745	3.67	3.21	4.609	6.64	0.18	8.86	27.71	Pass
157	5785	3.13	3.66	4.564	6.59	0.18	8.81	27.71	Pass
165	5825	3.35	3.42	4.545	6.58	0.18	8.80	27.71	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[(10$^{G0/20}$ + 10$^{G1/20}$)^2 / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Total PSD (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/ 300kHz	dBm/ 300kHz			
149	5745	2.66	2.70	3.707	5.69	7.91	27.71	Pass
157	5785	3.15	3.15	4.131	6.16	8.38	27.71	Pass
165	5825	2.81	3.24	4.018	6.04	8.26	27.71	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[(10$^{G0/20}$ + 10$^{G1/20}$)^2 / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Duty Factor (dB)	Total PSD (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/ 300kHz	dBm/ 300kHz				
151	5755	-0.16	0.40	2.1365	3.30	0.16	5.52	27.71	Pass
159	5795	0.35	0.73	2.351	3.71	0.16	5.93	27.71	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. Directional gain = 10 log[(10$^{G0/20}$ + 10$^{G1/20}$)^2 / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

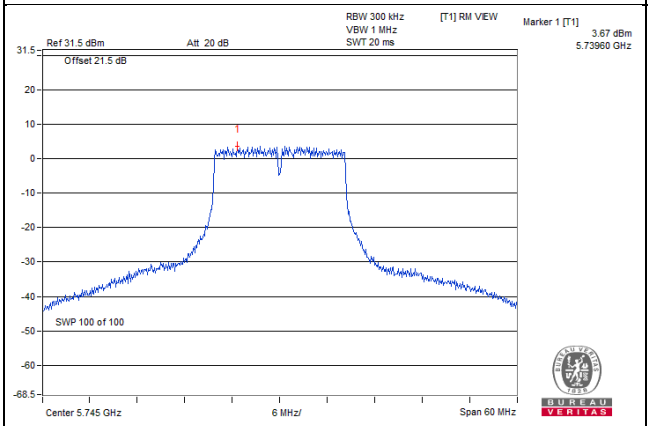
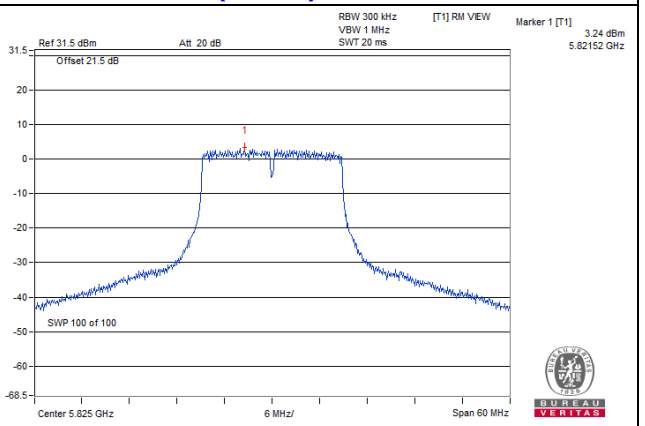
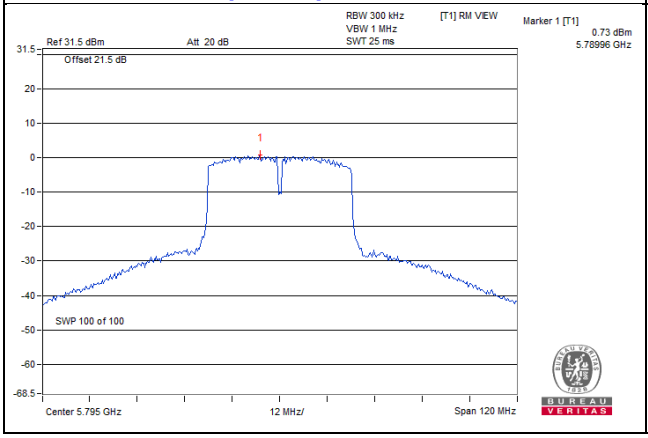
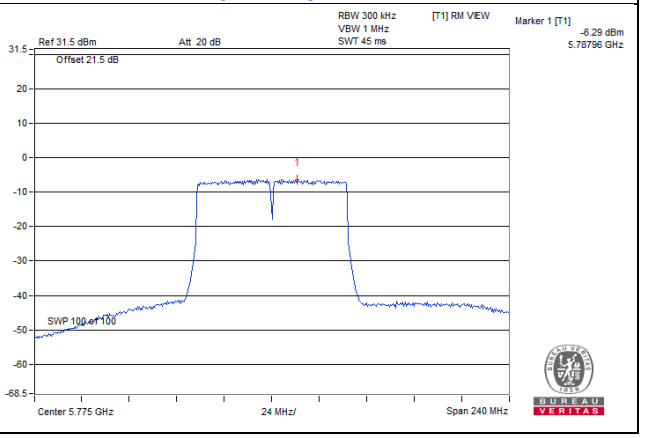
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Duty Factor (dB)	Total PSD (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass /Fail
		Chain 0	Chain 1	mW/ 300kHz	dBm/ 300kHz				
155	5775	-6.29	-6.42	0.4949	-3.05	0.29	-0.83	27.71	Pass

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

2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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

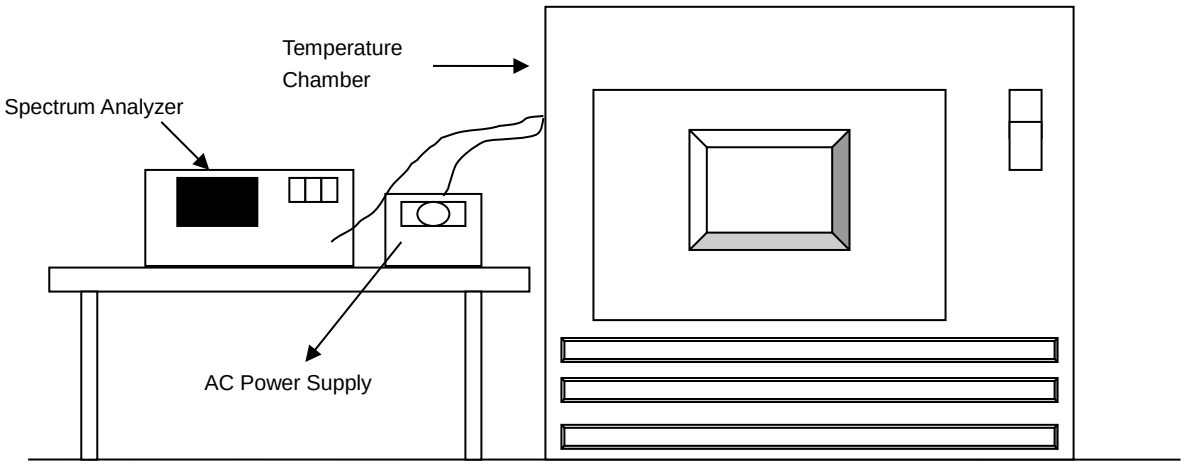
Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH149	**802.11ac (VHT20)_Chain 1 / CH165**
	
802.11ac (VHT40)_Chain 1 / CH159	**802.11ac (VHT80)_Chain 0 / CH155**
	

4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step (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 (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
40	120	5179.9845	PASS	5179.9867	PASS	5179.9845	PASS	5179.9866	PASS
30	120	5179.9855	PASS	5179.9863	PASS	5179.9855	PASS	5179.9881	PASS
20	120	5179.9792	PASS	5179.9748	PASS	5179.979	PASS	5179.9786	PASS
10	120	5179.9892	PASS	5179.9884	PASS	5179.9879	PASS	5179.99	PASS
0	120	5180.0102	PASS	5180.0073	PASS	5180.0077	PASS	5180.0092	PASS

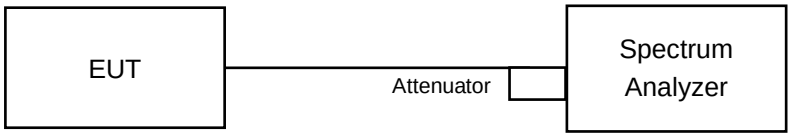
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5179.9786	PASS	5179.9757	PASS	5179.9799	PASS	5179.9786	PASS
	120	5179.9792	PASS	5179.9748	PASS	5179.979	PASS	5179.9786	PASS
	102	5179.9789	PASS	5179.9756	PASS	5179.9789	PASS	5179.9776	PASS

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

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

802.11ac (VHT20)

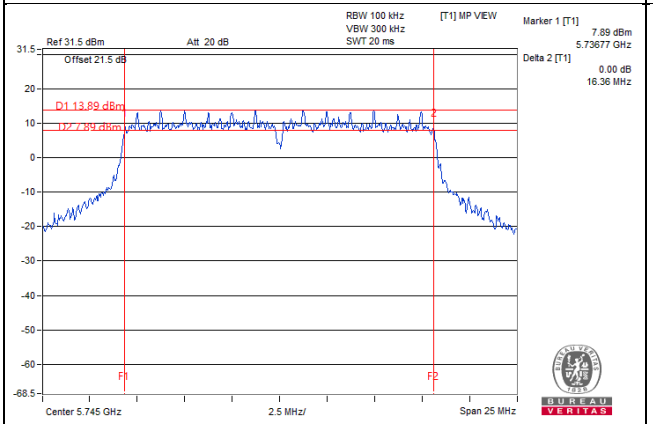
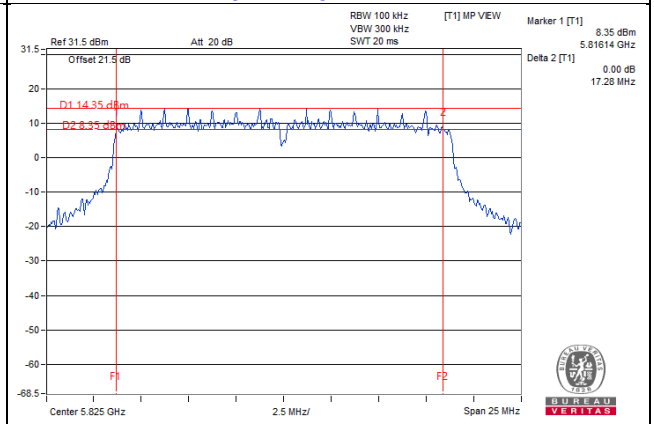
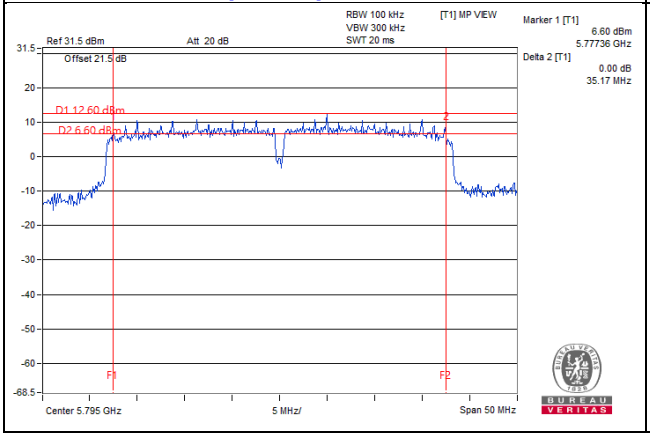
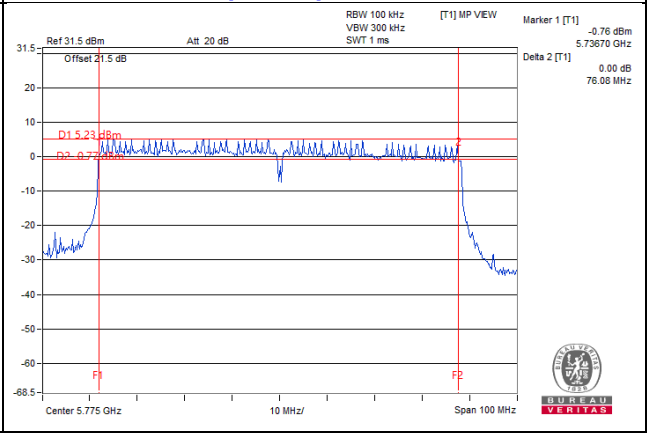
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.32	17.59	0.5	PASS
157	5785	17.62	17.35	0.5	PASS
165	5825	17.64	17.28	0.5	PASS

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.24	35.22	0.5	PASS
159	5795	35.17	35.2	0.5	PASS

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.47	76.08	0.5	PASS

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH149	**802.11ac (VHT20)_Chain 1 / CH165**
	
802.11ac (VHT40)_Chain 0 / CH159	**802.11ac (VHT80)_Chain 1 / CH155**
	

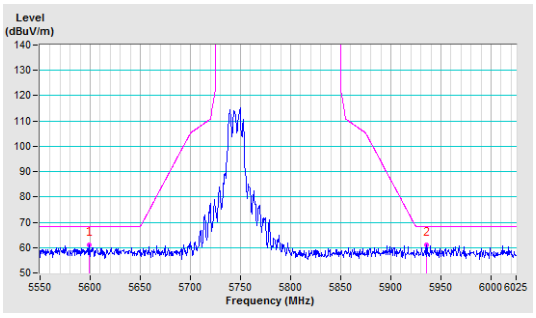
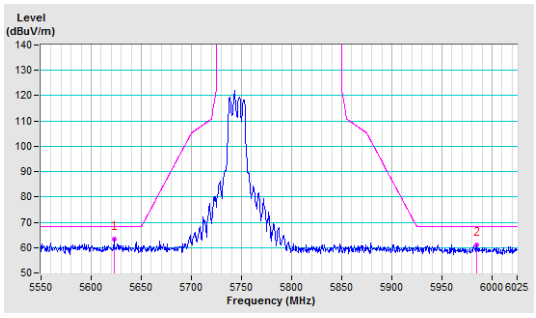
5 Pictures of Test Arrangements

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

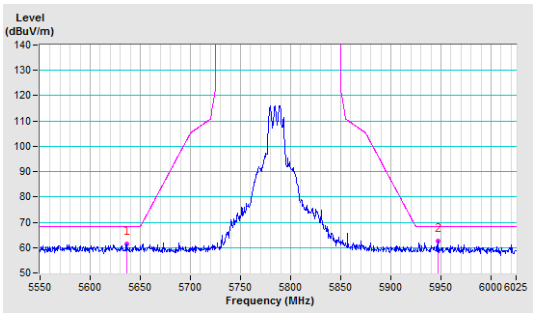
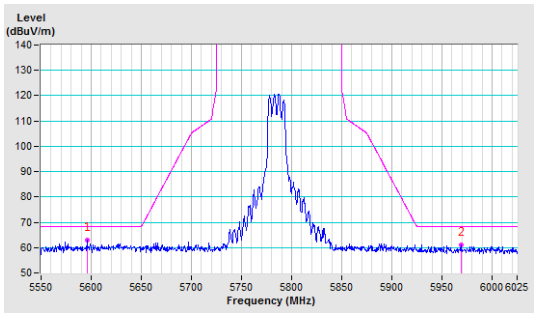
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

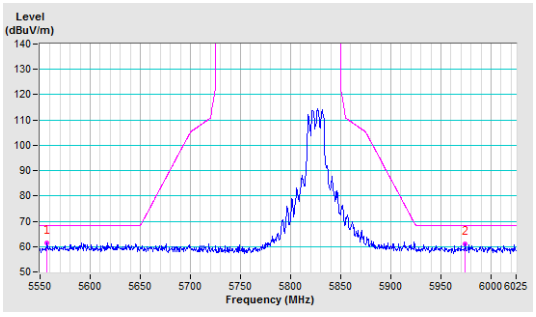
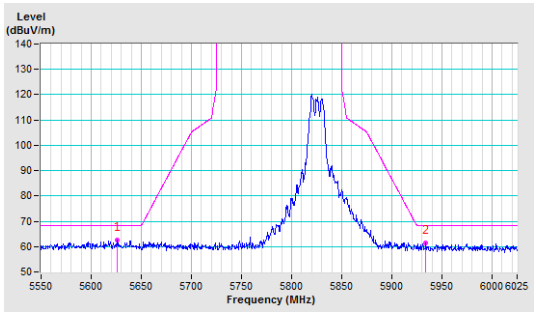
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

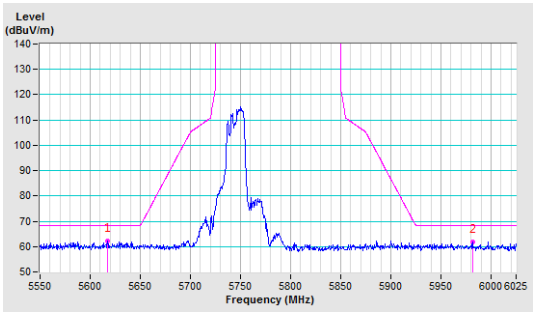
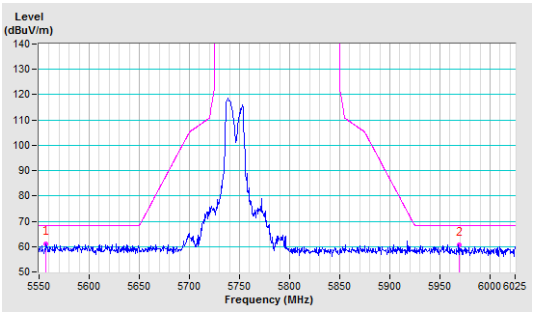
Horizontal	Vertical
	

CH 165 5825 MHz

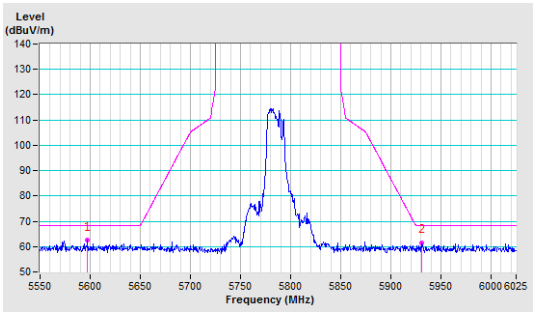
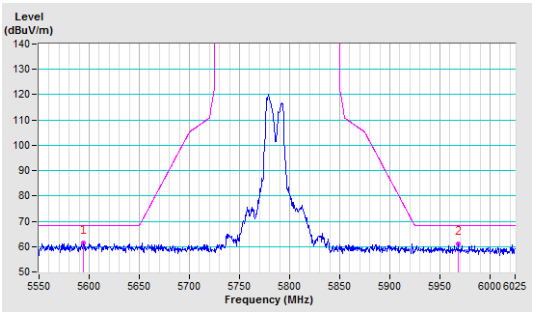
Horizontal	Vertical
	

802.11ac (VHT20)

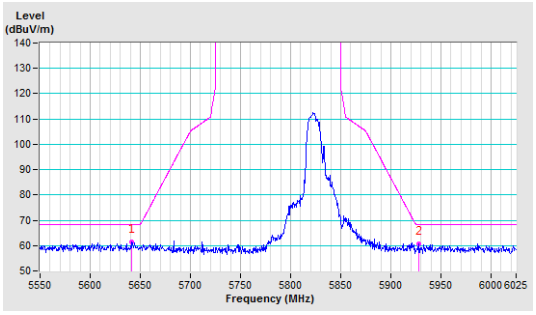
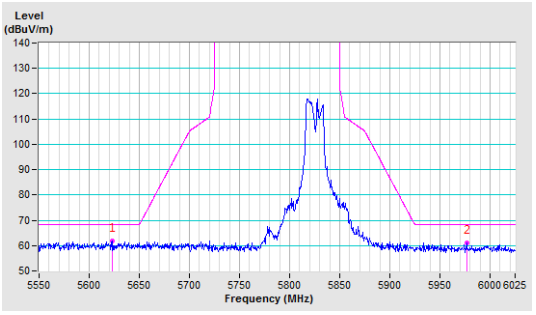
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

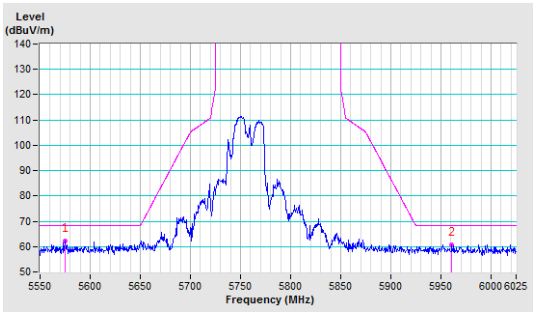
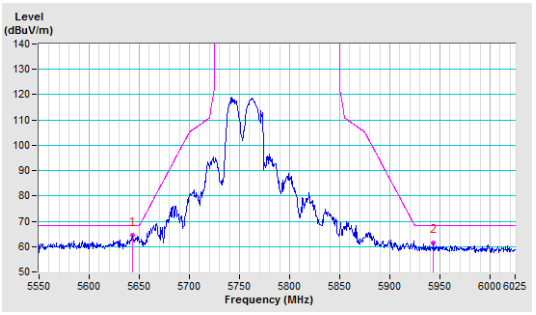
Horizontal	Vertical
	

CH 165 5825 MHz

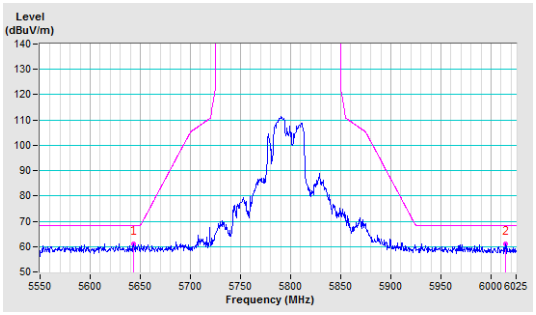
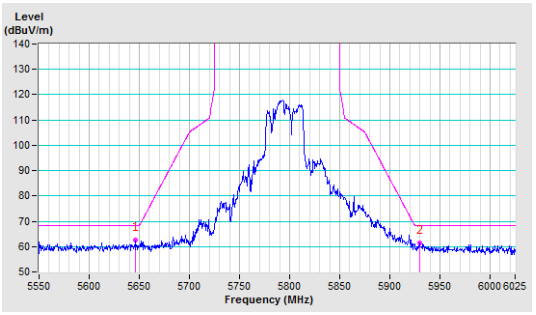
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

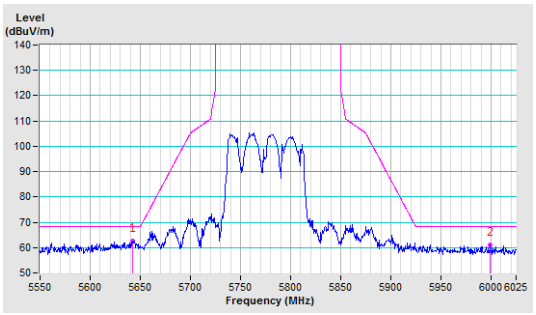
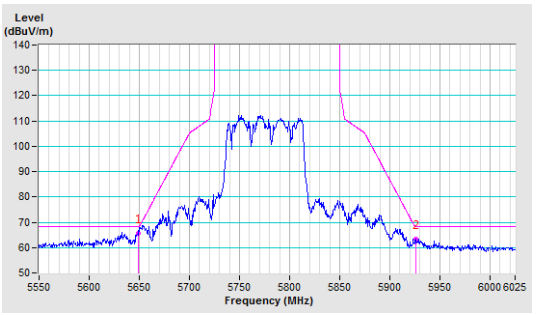
Horizontal	Vertical
	

CH 159 5795 MHz

Horizontal	Vertical
	

802.11ac (VHT80)

CH 155 5775 MHz

Horizontal	Vertical
	

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

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