FCC Test Report

Report No.:	RF160923E02E-1
FCC ID:	U8G-P1811ACPRO
Test Model:	Balance 30 Pro
Series Model:	Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro
Received Date:	Mar. 20, 2019
Test Date:	Apr. 25 to May 15, 2019
Issued Date:	May 21, 2019
Applicant:	PISMO LABS TECHNOLOGY LIMITED
Address:	A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF160923E02E-1	Original release.	May 21, 2019

1 Certificate of Conformity

Product:	PEPWAVE / peplink Wireless Product
Brand:	PEPWAVE / peplink
Test Model:	Balance 30 Pro
Series Model:	Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro
Sample Status:	PROTOTYPE
Applicant:	PISMO LABS TECHNOLOGY LIMITED
Test Date:	Apr. 25 to May 15, 2019
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10: 2013

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

Prepared by : Phoenix Huang , **Date:** May 21, 2019

Phoenix Huang / Specialist

Approved by : , **Date:** May 21, 2019

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -10.86dB at 0.15000MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is R-SMA not a standard connector.

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

Note:

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.8 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.0 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	PEPWAVE / peplink Wireless Product
Brand	PEPWAVE / peplink
Test Model	Balance 30 Pro
Series Model	Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro
Status of EUT	PROTOTYPE
Power Supply Rating	10 - 56Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18~ 5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** 997.839mW **5GHz:** **5.18 ~ 5.24GHz:** 511.334mW **5.745 ~ 5.825GHz:** 410.933mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. There are WLAN, WWAN(LTE) technology used for the EUT.
2. EUT contains two WiFi chip as same model, this chip model support dual band operation, but it will be locked to single band operation by firmware. One chip is supported 2.4GHz, other is supported 5GHz.
3. EUT could be applied with a plug in USB cellular device.
4. EUT inside has one WWAN(LTE) module which FCC ID: N7NMC7455.
5. Simultaneously transmission condition.

Condition	Technology			
1	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7455)	-
2	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7455)	3G/LTE (USB cellular device)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.				

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

Brand	Model	Difference
PEPWAVE / peplink	Balance 30 Pro	For marketing requirement
	Peplink Balance 30 Pro	
	BPL-031-LTEA-W-T	
	Pismo 811AC	
	B30 Pro	
From the above models, model: **Balance 30 Pro** was selected as representative model for the test and its data are recorded in this report.		

7. The EUT must be supplied with a power adapter as following table:

Adapter 1		
Brand	Model No.	Spec.
DVE	DSA-36PFH-12 FUS 120300AN	Input: 100-240Vac, 50/60Hz, 1A Output: 12Vdc, 3A DC output cable (Unshielded, 1.5m)
Adapter 2 (Only for test not for sale)		
Model No.		Spec.
STD-26021		Input: 100-240Vac, 47-63Hz, 1.6A AC input cable (Unshielded, 1.5m with one core) Output: 56Vdc, 2.15A DC output cable (Unshielded, 1.5m)

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

For WLAN

Antenna No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (MHz)	Antenna Type	Connector Type
2.4GHz	Master Wave Technology Co., Ltd	98614PRSX000	2.44	2400 ~ 2500	Dipole	R-SMA
5GHz			4.10	5150 ~ 5350	Dipole	R-SMA
			4.73	5725 ~ 5850		

For WWAN(LTE)

Brand	Model	Antenna Net Gain(dBi)	Frequency Range (MHz)	Antenna Type	Connector Type
Master Wave Technology Co., Ltd	98642ZSAX001	2.5	1920~1980	Dipole	SMA
		1.82	880~915		
		1.48	1710~1785		
		3.42	2500~2570		
		2	832~862		
		3.52	2570~2620		
		3.02	2300~2400		
		2.39	1850~1910		
		1.69	699~716		
		2.12	777~787		
		2.39	1850~1915		
		3.52	2496~2690		

9. 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
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: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)		

10. 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	
1	√	√	√	√	With Adapter 1
2	-	√	√	-	With Adapter 2 (for support 802.3af POE function)

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

Note:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. "-"means no effect.

Radiated Emission Test (Above 1GHz):

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

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	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.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240, 5745-5825	36 to 48, 149 to 165	40	OFDM	BPSK	6

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.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240, 5745-5825	36 to 48, 149 to 165	40	OFDM	BPSK	6

Antenna Port Conducted Measurement:

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

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

Test Condition:

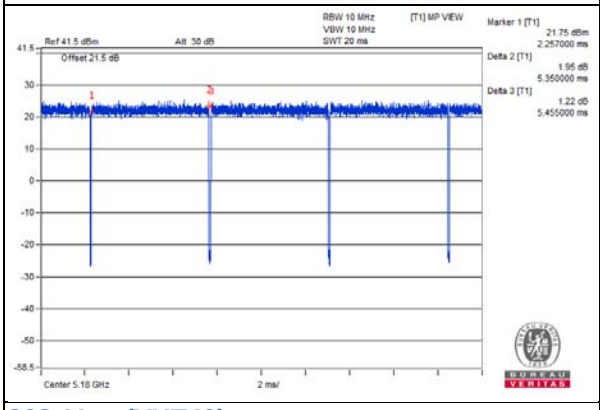
Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Robert Cheng
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Nelson Teng
	23deg. C, 69%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
	25deg. C, 68%RH	120Vac, 60Hz	Weiwei Lo
APCM	21deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

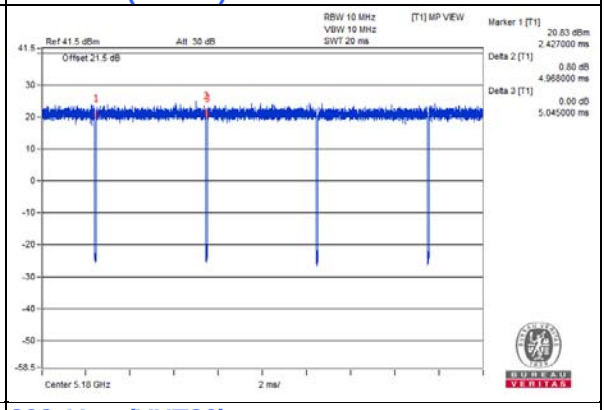
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 5.35 ms/5.455 ms = 0.981
802.11ac (VHT20): Duty cycle = 4.968 ms/5.045 ms = 0.985
802.11ac (VHT40): Duty cycle = 2.415 ms/2.498 ms = 0.967, Duty factor = 10 * log (1/Duty cycle) = 0.15
802.11ac (VHT80): Duty cycle = 1.134 ms/1.214 ms = 0.934, Duty factor = 10 * log (1/Duty cycle) = 0.3

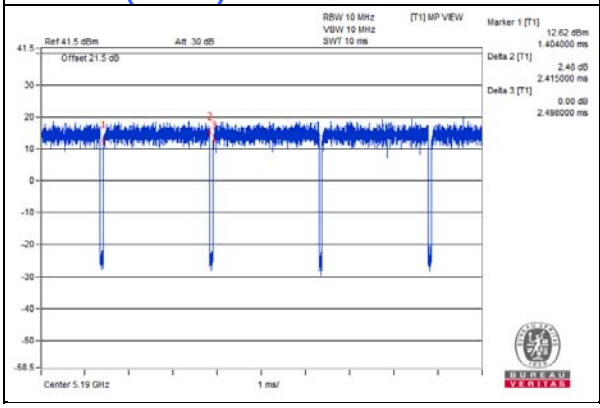
802.11a



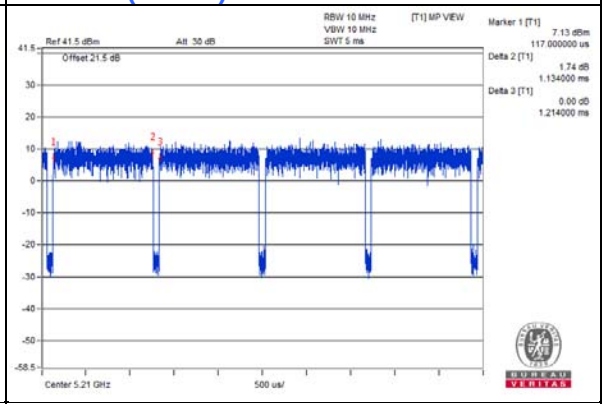
802.11ac (VHT20)



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.	3G Donle	D-Link	DWM-156	Q2011A4000812	NA	Provided by Lab
B.	Laptop	DELL	PP32LA	GSLB32S	FCC DoC	Provided by Lab
C.	Laptop	Lenovo	80WG	YD025N5Q	PD93165NGU	Provided by Lab
D.	SIM Card	KeysSight	E7515-10910	NA	NA	Provided by Lab
E.	PoE Load	NA	NA	NA	NA	Provided by Lab
F.	Adapter	NA	STD-26021	NA	NA	Supplied by client

Note:

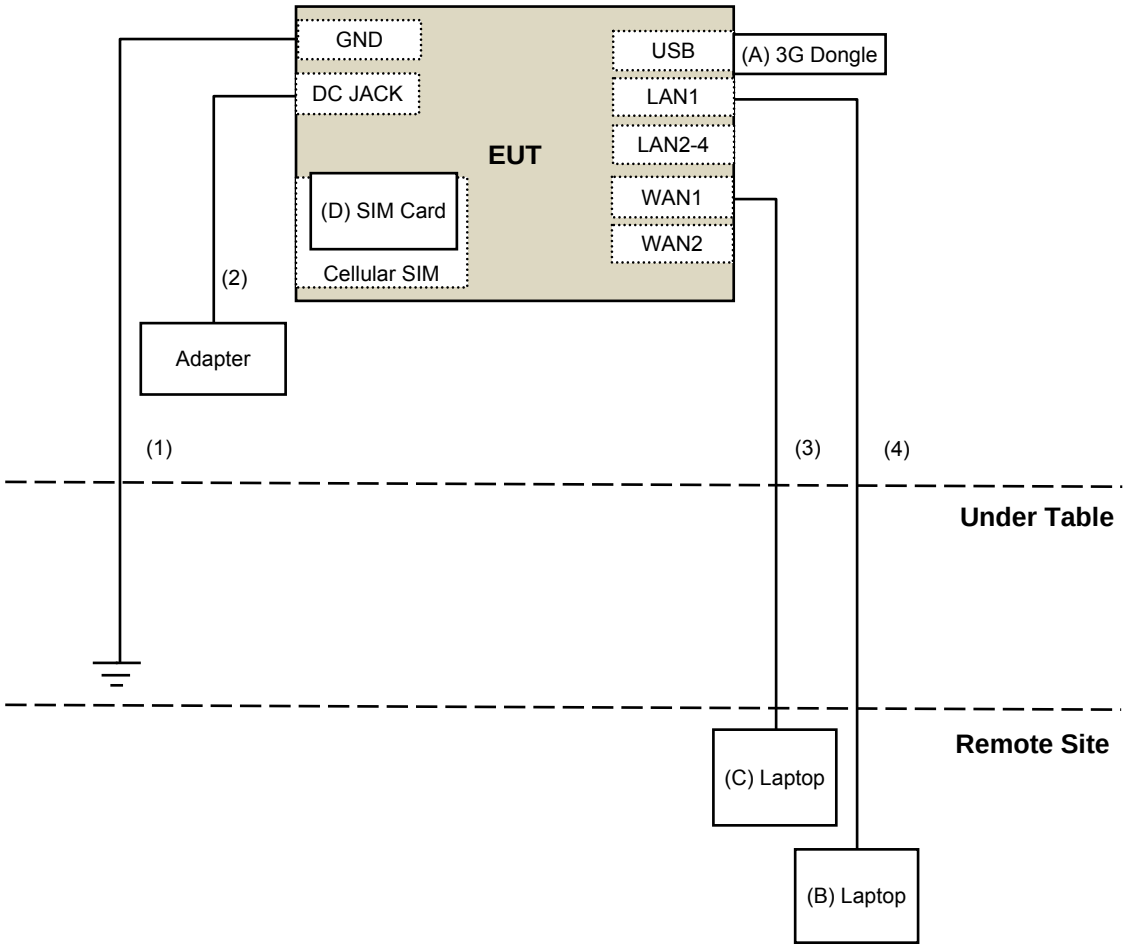
1. All power cords of the above support units are non-shielded (1.8m).

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

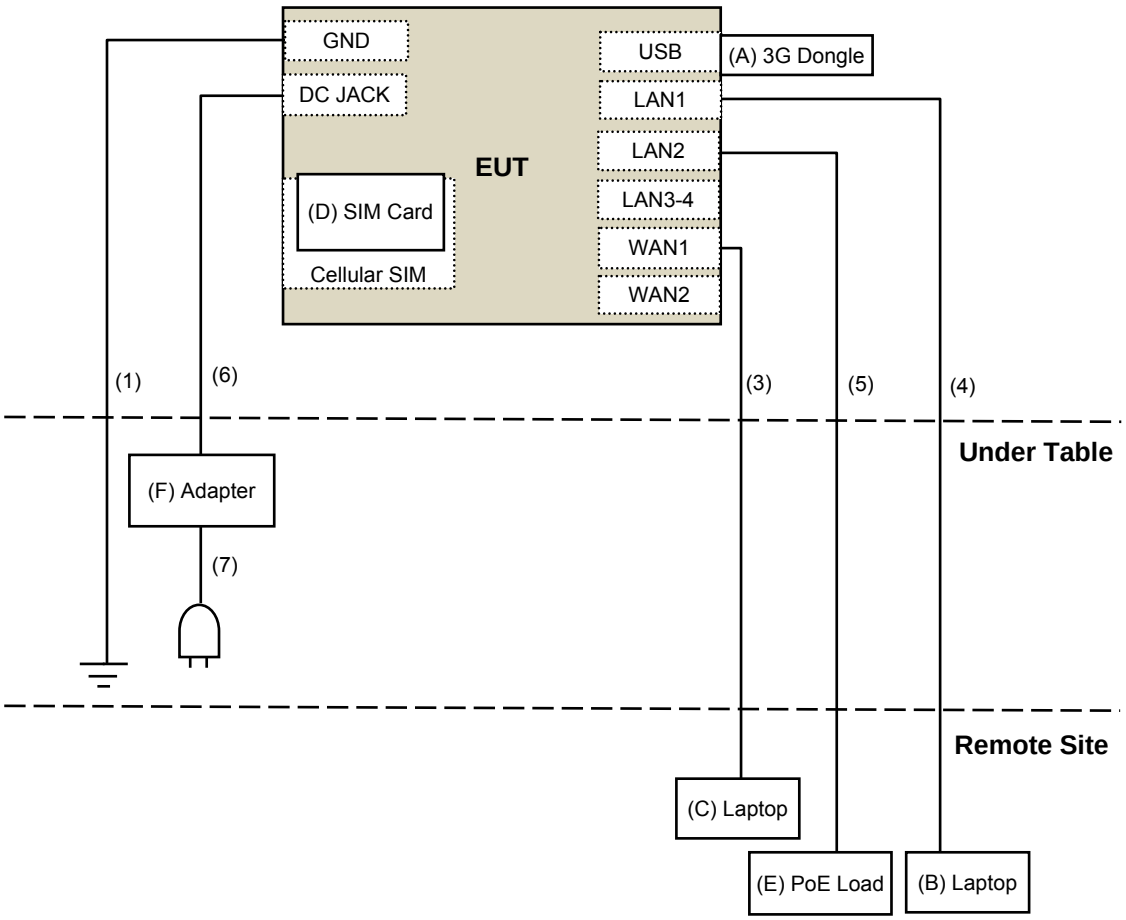
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

For Mode 1



For Mode 2


GND
DC JACK
EUT
(D) SIM Card
Cellular SIM
USB
LAN1
LAN2
LAN3-4
WAN1
WAN2
(A) 3G Dongle
(1)
(6)
(3)
(5)
(4)
Under Table
(F) Adapter
(7)
Remote Site
(C) Laptop
(E) PoE Load
(B) Laptop

3.5 General Description of Applied Standard

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

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits of unwanted emission out of the restricted bands

<table>
<tr><td colspan="2">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="2" rowspan="2">789033 D02 General UNII Test Procedure New Rules v02r01</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK:74 (dBμV/m)</td><td>AV:54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK:-27 (dBm/MHz)</td><td rowspan="3">PK:68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK:-27 (dBm/MHz) *1
PK:10 (dBm/MHz) *2
PK:15.6 (dBm/MHz) *3
PK:27 (dBm/MHz) *4</td><td>PK: 68.2(dBμV/m) *1
PK:105.2 (dBμV/m) *2
PK: 110.8(dBμV/m) *3
PK:122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

Note:

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

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

4.1.2 Test Instruments

For Mode 1:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	June 01, 2018	May 31, 2019
Pre-Amplifier EMCI	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier EMCI	EMC330N	980538	May 07, 2018	May 06, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB9168	AMP-ZFL-05	May 07, 2018	May 06, 2019
RF Cable	8D	966-5-1	May 07, 2018	May 06, 2019
RF Cable	8D	966-5-2	May 07, 2018	May 06, 2019
RF Cable	8D	966-5-3	May 07, 2018	May 06, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-1819	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980509	May 07, 2018	May 06, 2019
RF Cable EMCI	EMC104-SM-SM-1500	180503	May 07, 2018	May 06, 2019
RF Cable EMCI	EMC104-SM-SM-2000	180501	May 07, 2018	May 06, 2019
RF Cable EMCI	EMC104-SM-SM-6000	180505	May 07, 2018	May 06, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 28, 2019	Jan. 27, 2020
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 25, 2018	Nov. 24, 2019
RF Cable	EMC102-KM-KM-1200	160924	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC102-KM-KM-1200	160925	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 09, 2019	Jan. 08, 2020
True RMS Clamp Meter FLUKE	325	31130711WS	May 22, 2018	May 21, 2019

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: Apr. 25 to 30, 2019

For Mode 2

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ESR7 R&S	ESR7	102026	Apr. 24, 2019	Apr. 23, 2020
Spectrum Analyzer Keysight	N9030B	MY57141948	June 01, 2018	May 31, 2019
Pre-Amplifier EMCI	EMC001340	980142	Jan. 25, 2019	Jan. 24, 2020
Loop Antenna Electro-Metrics	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
RF Cable	NA	LOOPCAB-001	Jan. 14, 2019	Jan. 13, 2020
RF Cable	NA	LOOPCAB-002	Jan. 14, 2019	Jan. 13, 2020
Pre-Amplifier EMCI	EMC330N	980538	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB9168	9168-0842	Nov. 21, 2018	Nov. 20, 2019
RF Cable	8D	966-5-1	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-2	May 03, 2019	May 02, 2020
RF Cable	8D	966-5-3	May 03, 2019	May 02, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-02	Jan. 28, 2019	Jan. 27, 2020
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 5.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: May 15, 2019

4.1.3 Test Procedure

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

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

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

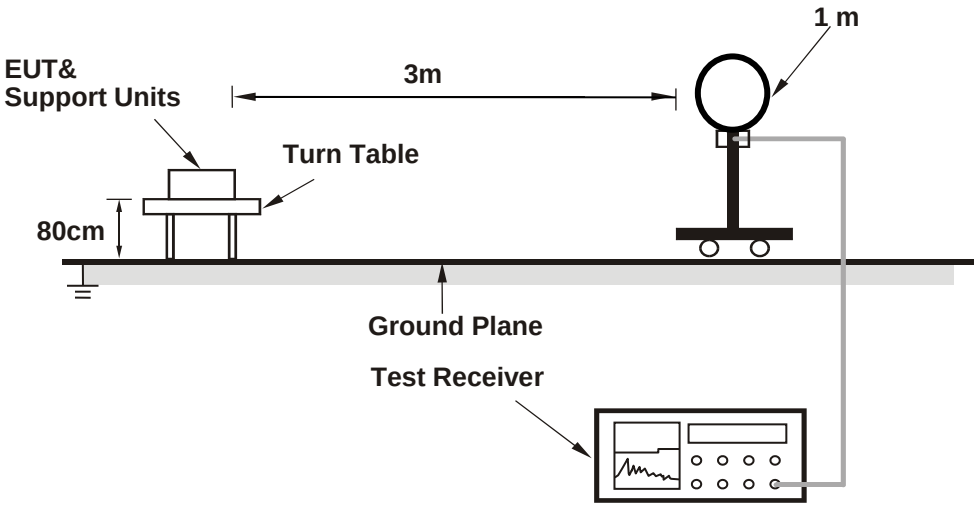
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

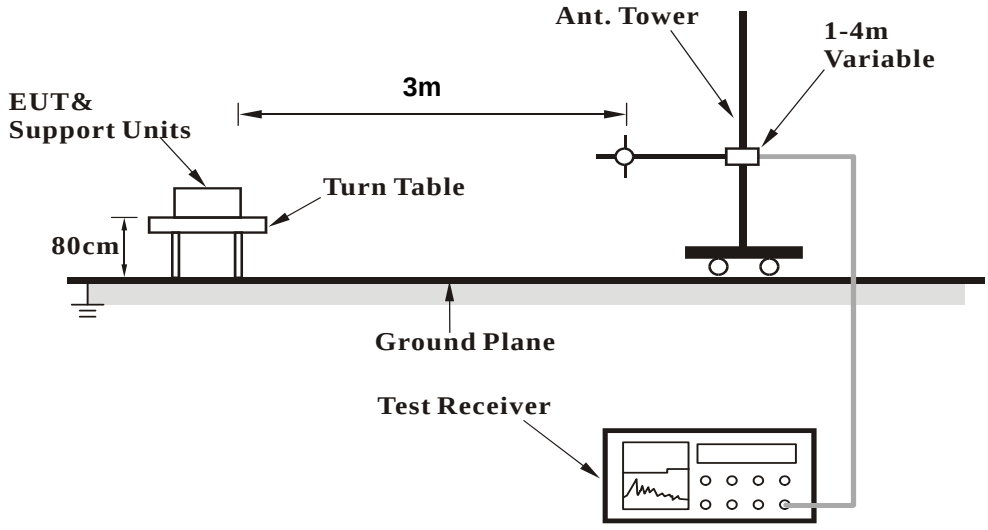
No deviation.

4.1.5 Test Setup

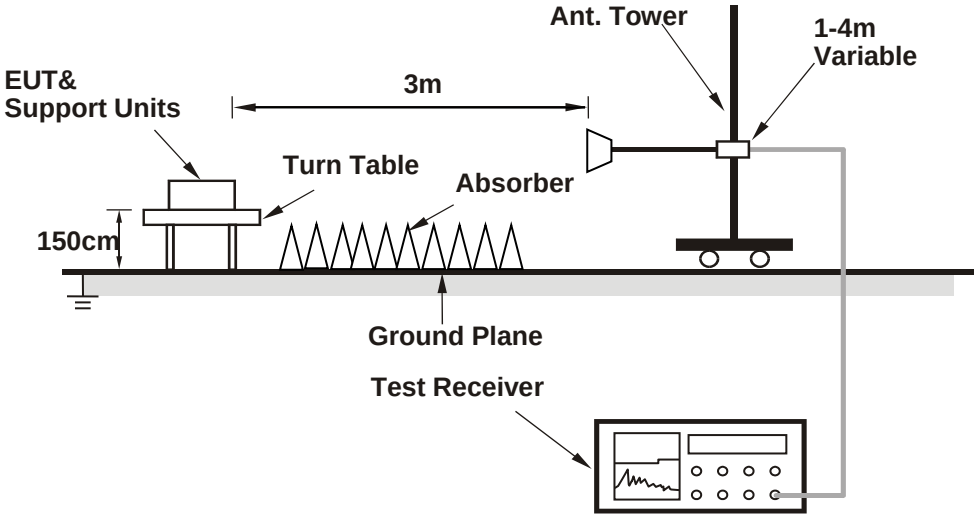
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Condition

a. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (Atheros Radio Test 2(ART2-GUI) Version:2.3) has been activated to set the EUT under transmission condition continuously.

4.1.7 Test Results (Mode 1)

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	63.2 PK	74.0	-10.8	1.78 H	354	61.4	1.8
2	5150.00	47.8 AV	54.0	-6.2	1.78 H	354	46.0	1.8
3	*5180.00	110.1 PK			1.78 H	354	108.4	1.7
4	*5180.00	100.0 AV			1.78 H	354	98.3	1.7
5	#10360.00	59.9 PK	68.2	-8.3	1.66 H	353	48.9	11.0
6	15540.00	51.6 PK	74.0	-22.4	1.51 H	304	40.7	10.9
7	15540.00	39.5 AV	54.0	-14.5	1.51 H	304	28.6	10.9
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	68.9 PK	74.0	-5.1	1.87 V	360	67.1	1.8
2	5150.00	53.8 AV	54.0	-0.2	1.87 V	360	52.0	1.8
3	*5180.00	116.0 PK			1.87 V	360	114.3	1.7
4	*5180.00	106.3 AV			1.87 V	360	104.6	1.7
5	#10360.00	63.3 PK	68.2	-4.9	1.62 V	354	52.3	11.0
6	15540.00	53.2 PK	74.0	-20.8	2.15 V	39	42.3	10.9
7	15540.00	40.7 AV	54.0	-13.3	2.15 V	39	29.8	10.9

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 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	63.1 PK	74.0	-10.9	1.82 H	347	61.3	1.8
2	5150.00	47.9 AV	54.0	-6.1	1.82 H	347	46.1	1.8
3	*5200.00	112.3 PK			1.82 H	347	110.6	1.7
4	*5200.00	102.2 AV			1.82 H	347	100.5	1.7
5	#10400.00	59.5 PK	68.2	-8.7	1.69 H	357	48.2	11.3
6	15600.00	51.4 PK	74.0	-22.6	1.50 H	291	40.2	11.2
7	15600.00	39.0 AV	54.0	-15.0	1.50 H	291	27.8	11.2
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	5150.00	68.1 PK	74.0	-5.9	1.87 V	360	66.3	1.8
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.87 V**	**360**	**52.1**	**1.8**
3	*5200.00	120.1 PK			1.87 V	360	118.4	1.7
4	*5200.00	109.8 AV			1.87 V	360	108.1	1.7
5	#10400.00	63.5 PK	68.2	-4.7	1.67 V	352	52.2	11.3
6	15600.00	53.5 PK	74.0	-20.5	2.10 V	25	42.3	11.2
7	15600.00	41.0 AV	54.0	-13.0	2.10 V	25	29.8	11.2

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 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			1.83 H	358	110.6	1.4
2	*5240.00	101.8 AV			1.83 H	358	100.4	1.4
3	5350.00	62.6 PK	74.0	-11.4	1.83 H	358	61.1	1.5
4	5350.00	47.7 AV	54.0	-6.3	1.83 H	358	46.2	1.5
5	#10480.00	59.0 PK	68.2	-9.2	1.67 H	360	47.6	11.4
6	15720.00	50.9 PK	74.0	-23.1	1.50 H	291	40.4	10.5
7	15720.00	38.8 AV	54.0	-15.2	1.50 H	291	28.3	10.5
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	*5240.00	119.0 PK			1.86 V	360	117.6	1.4
2	*5240.00	108.7 AV			1.86 V	360	107.3	1.4
3	5350.00	56.5 PK	74.0	-17.5	1.86 V	360	55.0	1.5
4	5350.00	44.8 AV	54.0	-9.2	1.86 V	360	43.3	1.5
5	#10480.00	63.4 PK	68.2	-4.8	1.68 V	360	52.0	11.4
6	15720.00	53.2 PK	74.0	-20.8	2.12 V	41	42.7	10.5
7	15720.00	40.7 AV	54.0	-13.3	2.12 V	41	30.2	10.5

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.

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	#5563.17	51.2 PK	68.2	-17.0	1.78 H	354	49.5	1.7
2	*5745.00	99.9 PK			1.78 H	354	97.9	2.0
3	*5745.00	90.6 AV			1.78 H	354	88.6	2.0
4	#6012.34	52.1 PK	68.2	-16.1	1.78 H	354	49.6	2.5
5	11490.00	58.7 PK	74.0	-15.3	1.67 H	347	47.0	11.7
6	11490.00	45.2 AV	54.0	-8.8	1.67 H	347	33.5	11.7
7	#17235.00	49.8 PK	68.2	-18.4	1.51 H	291	33.0	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	#5648.65	57.2 PK	68.2	-11.0	1.86 V	4	55.5	1.7
2	*5745.00	118.5 PK			1.86 V	4	116.5	2.0
3	*5745.00	109.1 AV			1.86 V	4	107.1	2.0
4	#6007.16	52.7 PK	68.2	-15.5	1.86 V	4	50.2	2.5
5	11490.00	61.9 PK	74.0	-12.1	1.66 V	99	50.2	11.7
6	11490.00	48.6 AV	54.0	-5.4	1.66 V	99	36.9	11.7
7	#17235.00	50.5 PK	68.2	-17.7	1.63 V	60	33.7	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	#5619.93	51.7 PK	68.2	-16.5	1.80 H	346	48.7	3.0
2	*5785.00	100.1 PK			1.80 H	346	98.0	2.1
3	*5785.00	90.7 AV			1.80 H	346	88.6	2.1
4	#6005.90	51.5 PK	68.2	-16.7	1.80 H	346	47.9	3.6
5	11570.00	58.2 PK	74.0	-15.8	1.69 H	360	46.7	11.5
6	11570.00	44.9 AV	54.0	-9.1	1.69 H	360	33.4	11.5
7	#17355.00	50.1 PK	68.2	-18.1	1.57 H	285	33.2	16.9
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	#5578.22	58.3 PK	68.2	-9.9	1.85 V	2	56.6	1.7
2	*5785.00	117.9 PK			1.85 V	2	115.8	2.1
3	*5785.00	108.6 AV			1.85 V	2	106.5	2.1
4	#5992.45	53.5 PK	68.2	-14.7	1.85 V	2	51.0	2.5
5	11570.00	61.5 PK	74.0	-12.5	1.62 V	103	50.0	11.5
6	11570.00	48.4 AV	54.0	-5.6	1.62 V	103	36.9	11.5
7	#17355.00	50.6 PK	68.2	-17.6	1.62 V	59	33.7	16.9

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 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	#5593.15	51.3 PK	68.2	-16.9	1.79 H	344	49.6	1.7
2	*5825.00	100.2 PK			1.79 H	344	98.0	2.2
3	*5825.00	90.8 AV			1.79 H	344	88.6	2.2
4	#5990.80	51.3 PK	68.2	-16.9	1.79 H	344	48.8	2.5
5	11650.00	58.6 PK	74.0	-15.4	1.66 H	342	47.5	11.1
6	11650.00	45.4 AV	54.0	-8.6	1.66 H	342	34.3	11.1
7	#17475.00	49.9 PK	68.2	-18.3	1.53 H	296	31.6	18.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5596.63	59.1 PK	68.2	-9.1	1.80 V	6	57.4	1.7
2	*5825.00	118.2 PK			1.80 V	6	116.0	2.2
3	*5825.00	108.7 AV			1.80 V	6	106.5	2.2
4	#5935.53	53.5 PK	68.2	-14.7	1.80 V	6	51.1	2.4
5	11650.00	62.3 PK	74.0	-11.7	1.59 V	101	51.2	11.1
6	11650.00	48.9 AV	54.0	-5.1	1.59 V	101	37.8	11.1
7	#17475.00	51.0 PK	68.2	-17.2	1.65 V	44	32.7	18.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	63.4 PK	74.0	-10.6	1.73 H	355	61.6	1.8
2	5150.00	48.1 AV	54.0	-5.9	1.73 H	355	46.3	1.8
3	*5180.00	110.5 PK			1.73 H	355	108.8	1.7
4	*5180.00	100.3 AV			1.73 H	355	98.6	1.7
5	#10360.00	59.4 PK	68.2	-8.8	1.66 H	360	48.4	11.0
6	15540.00	51.8 PK	74.0	-22.2	1.51 H	301	40.9	10.9
7	15540.00	39.7 AV	54.0	-14.3	1.51 H	301	28.8	10.9
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	68.5 PK	74.0	-5.5	1.84 V	360	66.7	1.8
2	5150.00	53.6 AV	54.0	-0.4	1.84 V	360	51.8	1.8
3	*5180.00	115.4 PK			1.84 V	360	113.7	1.7
4	*5180.00	105.4 AV			1.84 V	360	103.7	1.7
5	#10360.00	62.8 PK	68.2	-5.4	1.58 V	343	51.8	11.0
6	15540.00	53.1 PK	74.0	-20.9	2.12 V	34	42.2	10.9
7	15540.00	40.8 AV	54.0	-13.2	2.12 V	34	29.9	10.9

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 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	63.6 PK	74.0	-10.4	1.77 H	342	61.8	1.8
2	5150.00	48.2 AV	54.0	-5.8	1.77 H	342	46.4	1.8
3	*5200.00	112.4 PK			1.77 H	342	110.7	1.7
4	*5200.00	102.4 AV			1.77 H	342	100.7	1.7
5	#10400.00	59.7 PK	68.2	-8.5	1.71 H	343	48.4	11.3
6	15600.00	52.1 PK	74.0	-21.9	1.54 H	286	40.9	11.2
7	15600.00	39.5 AV	54.0	-14.5	1.54 H	286	28.3	11.2
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	5150.00	69.1 PK	74.0	-4.9	1.78 V	360	67.3	1.8
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.78 V**	**360**	**52.1**	**1.8**
3	*5200.00	119.2 PK			1.78 V	360	117.5	1.7
4	*5200.00	109.3 AV			1.78 V	360	107.6	1.7
5	#10400.00	62.7 PK	68.2	-5.5	1.57 V	360	51.4	11.3
6	15600.00	53.3 PK	74.0	-20.7	2.20 V	32	42.1	11.2
7	15600.00	41.0 AV	54.0	-13.0	2.20 V	32	29.8	11.2

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 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	111.6 PK			1.83 H	349	110.2	1.4
2	*5240.00	101.3 AV			1.83 H	349	99.9	1.4
3	5350.00	62.4 PK	74.0	-11.6	1.83 H	349	60.9	1.5
4	5350.00	47.3 AV	54.0	-6.7	1.83 H	349	45.8	1.5
5	#10480.00	59.2 PK	68.2	-9.0	1.64 H	360	47.8	11.4
6	15720.00	50.5 PK	74.0	-23.5	1.46 H	296	40.0	10.5
7	15720.00	38.5 AV	54.0	-15.5	1.46 H	296	28.0	10.5
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	*5240.00	119.1 PK			1.79 V	360	117.7	1.4
2	*5240.00	108.3 AV			1.79 V	360	106.9	1.4
3	5350.00	58.1 PK	74.0	-15.9	1.79 V	360	56.6	1.5
4	5350.00	45.8 AV	54.0	-8.2	1.79 V	360	44.3	1.5
5	#10480.00	63.5 PK	68.2	-4.7	1.57 V	360	52.1	11.4
6	15720.00	52.9 PK	74.0	-21.1	2.14 V	44	42.4	10.5
7	15720.00	40.2 AV	54.0	-13.8	2.14 V	44	29.7	10.5

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.

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	#5565.89	52.4 PK	68.2	-15.8	2.23 H	181	50.7	1.7
2	*5745.00	101.8 PK			2.23 H	181	99.8	2.0
3	*5745.00	91.0 AV			2.23 H	181	89.0	2.0
4	#6017.93	51.5 PK	68.2	-16.7	2.23 H	181	49.0	2.5
5	11490.00	58.6 PK	74.0	-15.4	1.68 H	358	46.9	11.7
6	11490.00	45.3 AV	54.0	-8.7	1.68 H	358	33.6	11.7
7	#17235.00	49.7 PK	68.2	-18.5	1.54 H	275	32.9	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	#5627.71	57.9 PK	68.2	-10.3	1.80 V	3	56.1	1.8
2	*5745.00	118.9 PK			1.80 V	3	116.9	2.0
3	*5745.00	108.7 AV			1.80 V	3	106.7	2.0
4	#5960.22	53.3 PK	68.2	-14.9	1.80 V	3	50.9	2.4
5	11490.00	62.5 PK	74.0	-11.5	1.57 V	101	50.8	11.7
6	11490.00	49.4 AV	54.0	-4.6	1.57 V	101	37.7	11.7
7	#17235.00	50.9 PK	68.2	-17.3	1.71 V	31	34.1	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	#5555.30	51.5 PK	68.2	-16.7	2.26 H	183	49.8	1.7
2	*5785.00	100.1 PK			2.26 H	183	98.0	2.1
3	*5785.00	89.6 AV			2.26 H	183	87.5	2.1
4	#6005.31	51.9 PK	68.2	-16.3	2.26 H	183	49.4	2.5
5	11570.00	58.5 PK	74.0	-15.5	1.74 H	360	47.0	11.5
6	11570.00	45.1 AV	54.0	-8.9	1.74 H	360	33.6	11.5
7	#17355.00	50.3 PK	68.2	-17.9	1.52 H	274	33.4	16.9
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	#5592.99	58.1 PK	68.2	-10.1	1.84 V	3	56.4	1.7
2	*5785.00	117.5 PK			1.84 V	3	115.4	2.1
3	*5785.00	108.0 AV			1.84 V	3	105.9	2.1
4	#5943.00	52.8 PK	68.2	-15.4	1.84 V	3	50.4	2.4
5	11570.00	62.2 PK	74.0	-11.8	1.53 V	95	50.7	11.5
6	11570.00	49.0 AV	54.0	-5.0	1.53 V	95	37.5	11.5
7	#17355.00	50.8 PK	68.2	-17.4	1.59 V	35	33.9	16.9

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 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	#5574.81	52.3 PK	68.2	-15.9	2.25 H	197	50.6	1.7
2	*5825.00	99.8 PK			2.25 H	197	97.6	2.2
3	*5825.00	90.7 AV			2.25 H	197	88.5	2.2
4	#5958.89	51.1 PK	68.2	-17.1	2.25 H	197	48.7	2.4
5	11650.00	58.9 PK	74.0	-15.1	1.65 H	356	47.8	11.1
6	11650.00	45.5 AV	54.0	-8.5	1.65 H	356	34.4	11.1
7	#17475.00	50.0 PK	68.2	-18.2	1.53 H	287	31.7	18.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5553.63	58.6 PK	68.2	-9.6	1.85 V	6	56.9	1.7
2	*5825.00	117.6 PK			1.85 V	6	115.4	2.2
3	*5825.00	108.2 AV			1.85 V	6	106.0	2.2
4	#5927.22	54.2 PK	68.2	-14.0	1.85 V	6	51.9	2.3
5	11650.00	62.3 PK	74.0	-11.7	1.59 V	100	51.2	11.1
6	11650.00	49.1 AV	54.0	-4.9	1.59 V	100	38.0	11.1
7	#17475.00	51.4 PK	68.2	-16.8	1.64 V	42	33.1	18.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	65.7 PK	74.0	-8.3	2.27 H	188	63.9	1.8
2	5150.00	51.2 AV	54.0	-2.8	2.27 H	188	49.4	1.8
3	*5190.00	99.2 PK			2.27 H	188	97.5	1.7
4	*5190.00	90.1 AV			2.27 H	188	88.4	1.7
5	5350.00	56.2 PK	74.0	-17.8	2.27 H	188	54.7	1.5
6	5350.00	43.5 AV	54.0	-10.5	2.27 H	188	42.0	1.5
7	#10380.00	56.0 PK	68.2	-12.2	1.66 H	360	44.8	11.2
8	15570.00	50.5 PK	74.0	-23.5	1.42 H	292	39.4	11.1
9	15570.00	38.6 AV	54.0	-15.4	1.42 H	292	27.5	11.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.2 PK	74.0	-5.8	1.80 V	343	66.4	1.8
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.80 V**	**343**	**52.1**	**1.8**
3	*5190.00	109.5 PK			1.80 V	343	107.8	1.7
4	*5190.00	99.3 AV			1.80 V	343	97.6	1.7
5	5350.00	57.5 PK	74.0	-16.5	1.80 V	343	56.0	1.5
6	5350.00	44.8 AV	54.0	-9.2	1.80 V	343	43.3	1.5
7	#10380.00	59.9 PK	68.2	-8.3	1.68 V	231	48.7	11.2
8	15570.00	53.3 PK	74.0	-20.7	2.10 V	28	42.2	11.1
9	15570.00	40.7 AV	54.0	-13.3	2.10 V	28	29.6	11.1

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	*5230.00	105.1 PK			2.28 H	190	103.6	1.5
2	*5230.00	95.0 AV			2.28 H	190	93.5	1.5
3	5350.00	53.9 PK	74.0	-20.1	2.28 H	190	52.4	1.5
4	5350.00	41.2 AV	54.0	-12.8	2.28 H	190	39.7	1.5
5	#10460.00	55.4 PK	68.2	-12.8	1.61 H	316	44.1	11.3
6	15690.00	50.9 PK	74.0	-23.1	1.41 H	292	40.4	10.5
7	15690.00	0.1 AV	54.0	-53.9	1.41 H	292	-10.4	10.5
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	*5230.00	114.6 PK			1.87 V	6	113.1	1.5
2	*5230.00	104.2 AV			1.87 V	6	102.7	1.5
3	5350.00	57.1 PK	74.0	-16.9	1.87 V	6	55.6	1.5
4	5350.00	44.5 AV	54.0	-9.5	1.87 V	6	43.0	1.5
5	#10460.00	60.1 PK	68.2	-8.1	1.64 V	225	48.8	11.3
6	15690.00	53.5 PK	74.0	-20.5	2.14 V	20	43.0	10.5
7	15690.00	40.9 AV	54.0	-13.1	2.14 V	20	30.4	10.5

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.

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	#5645.84	52.1 PK	68.2	-16.1	2.23 H	197	50.4	1.7
2	*5755.00	97.8 PK			2.23 H	197	95.8	2.0
3	*5755.00	87.2 AV			2.23 H	197	85.2	2.0
4	#5936.21	51.3 PK	68.2	-16.9	2.23 H	197	48.9	2.4
5	11510.00	55.8 PK	74.0	-18.2	1.55 H	321	44.0	11.8
6	11510.00	42.5 AV	54.0	-11.5	1.55 H	321	30.7	11.8
7	#17265.00	50.9 PK	68.2	-17.3	1.43 H	298	34.1	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	#5642.40	66.3 PK	68.2	-1.9	1.84 V	3	64.6	1.7
2	*5755.00	115.4 PK			1.84 V	3	113.4	2.0
3	*5755.00	104.8 AV			1.84 V	3	102.8	2.0
4	#5927.72	55.8 PK	68.2	-12.4	1.84 V	3	53.5	2.3
5	11510.00	59.1 PK	74.0	-14.9	1.68 V	104	47.3	11.8
6	11510.00	45.7 AV	54.0	-8.3	1.68 V	104	33.9	11.8
7	#17265.00	50.6 PK	68.2	-17.6	1.67 V	57	33.8	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 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	#5581.97	50.8 PK	68.2	-17.4	2.23 H	196	49.1	1.7
2	*5795.00	97.3 PK			2.23 H	196	95.1	2.2
3	*5795.00	86.9 AV			2.23 H	196	84.7	2.2
4	#5942.17	52.7 PK	68.2	-15.5	2.23 H	196	50.3	2.4
5	11590.00	55.8 PK	74.0	-18.2	1.57 H	325	44.4	11.4
6	11590.00	42.6 AV	54.0	-11.4	1.57 H	325	31.2	11.4
7	#17385.00	51.2 PK	68.2	-17.0	1.46 H	284	34.2	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	#5642.68	59.1 PK	68.2	-9.1	1.83 V	5	57.4	1.7
2	*5795.00	115.2 PK			1.83 V	5	113.0	2.2
3	*5795.00	104.6 AV			1.83 V	5	102.4	2.2
4	#5929.60	58.2 PK	68.2	-10.0	1.83 V	5	55.9	2.3
5	11590.00	59.6 PK	74.0	-14.4	1.72 V	113	48.2	11.4
6	11590.00	46.2 AV	54.0	-7.8	1.72 V	113	34.8	11.4
7	#17385.00	50.3 PK	68.2	-17.9	1.73 V	56	33.3	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 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	65.8 PK	74.0	-8.2	2.24 H	181	64.0	1.8
2	5150.00	51.5 AV	54.0	-2.5	2.24 H	181	49.7	1.8
3	*5210.00	95.8 PK			2.24 H	181	94.1	1.7
4	*5210.00	86.1 AV			2.24 H	181	84.4	1.7
5	5350.00	55.9 PK	74.0	-18.1	2.24 H	181	54.4	1.5
6	5350.00	43.1 AV	54.0	-10.9	2.24 H	181	41.6	1.5
7	#10420.00	63.3 PK	68.2	-4.9	1.71 H	360	52.1	11.2
8	15630.00	52.8 PK	74.0	-21.2	1.37 H	303	41.9	10.9
9	15630.00	40.6 AV	54.0	-13.4	1.37 H	303	29.7	10.9
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	66.5 PK	74.0	-7.5	1.90 V	360	64.7	1.8
2	5150.00	53.8 AV	54.0	-0.2	1.90 V	360	52.0	1.8
3	*5210.00	105.2 PK			1.90 V	360	103.5	1.7
4	*5210.00	95.5 AV			1.90 V	360	93.8	1.7
5	5350.00	57.5 PK	74.0	-16.5	1.90 V	360	56.0	1.5
6	5350.00	44.8 AV	54.0	-9.2	1.90 V	360	43.3	1.5
7	#10420.00	63.1 PK	68.2	-5.1	1.60 V	345	51.9	11.2
8	15630.00	53.5 PK	74.0	-20.5	2.21 V	46	42.6	10.9
9	15630.00	41.0 AV	54.0	-13.0	2.21 V	46	30.1	10.9

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5645.18	51.4 PK	68.2	-16.8	2.22 H	194	49.7	1.7
2	*5775.00	91.1 PK			2.22 H	194	89.0	2.1
3	*5775.00	82.3 AV			2.22 H	194	80.2	2.1
4	#5947.59	52.3 PK	68.2	-15.9	2.22 H	194	49.9	2.4
5	11550.00	52.9 PK	74.0	-21.1	1.53 H	317	41.3	11.6
6	11550.00	39.7 AV	54.0	-14.3	1.53 H	317	28.1	11.6
7	#17325.00	51.5 PK	68.2	-16.7	1.46 H	280	34.7	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	#5647.71	66.7 PK	68.2	-1.5	1.83 V	3	65.0	1.7
2	*5775.00	109.0 PK			1.83 V	3	106.9	2.1
3	*5775.00	100.0 AV			1.83 V	3	97.9	2.1
4	#5927.46	60.1 PK	68.2	-8.1	1.83 V	3	57.8	2.3
5	11550.00	52.7 PK	74.0	-21.3	1.65 V	91	41.1	11.6
6	11550.00	39.3 AV	54.0	-14.7	1.65 V	91	27.7	11.6
7	#17325.00	50.5 PK	68.2	-17.7	1.72 V	57	33.7	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.

Below 1GHz Data:

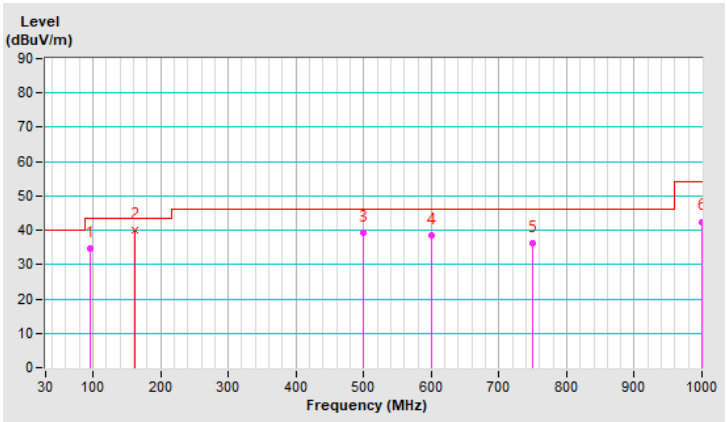
802.11a

CHANNEL	TX Channel 40	**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	96.48	34.8 QP	43.5	-8.7	2.00 H	244	52.8	-18.0
2	162.55	39.9 QP	43.5	-3.6	1.55 H	150	52.9	-13.0
3	500.02	39.4 QP	46.0	-6.6	2.00 H	150	47.1	-7.7
4	599.98	38.5 QP	46.0	-7.5	1.00 H	310	43.8	-5.3
5	750.04	36.2 QP	46.0	-9.8	2.00 H	0	39.0	-2.8
6	1000.00	42.5 QP	54.0	-11.5	1.00 H	250	42.9	-0.4

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 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.

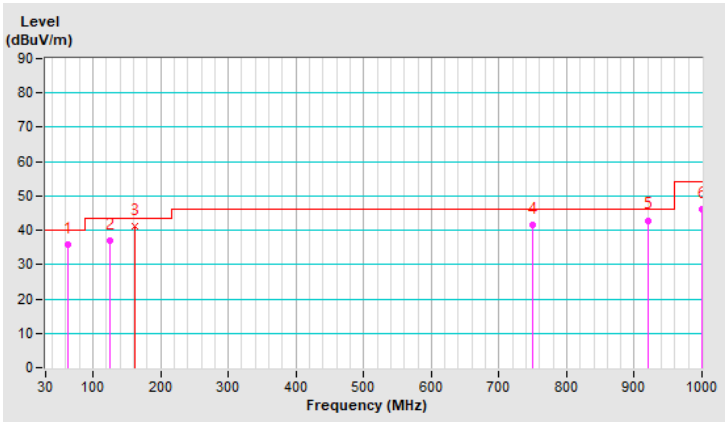


CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	62.83	35.8 QP	40.0	-4.2	1.05 V	55	49.8	-14.0
2	124.99	37.1 QP	43.5	-6.4	1.00 V	245	51.9	-14.8
3	162.49	41.0 QP	43.5	-2.5	1.00 V	177	54.0	-13.0
4	750.05	41.5 QP	46.0	-4.5	2.00 V	0	44.3	-2.8
5	920.05	42.9 QP	46.0	-3.1	1.24 V	200	43.8	-0.9
6	1000.00	46.2 QP	54.0	-7.8	1.25 V	180	46.6	-0.4

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 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.



4.1.8 Test Results (Mode 2)

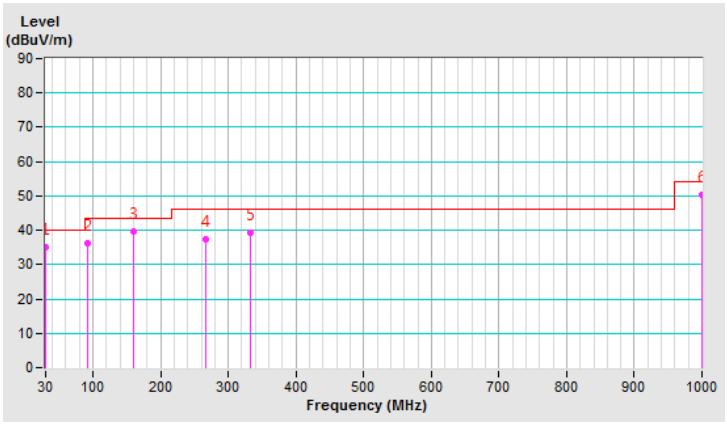
802.11a

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.63	35.1 QP	40.0	-4.9	1.50 H	143	49.8	-14.7
2	92.30	36.3 QP	43.5	-7.2	2.00 H	264	54.6	-18.3
3	160.00	39.7 QP	43.5	-3.8	2.00 H	206	52.7	-13.0
4	266.68	37.2 QP	46.0	-8.8	1.00 H	117	50.7	-13.5
5	333.00	39.1 QP	46.0	-6.9	1.00 H	157	50.5	-11.4
6	1000.00	50.2 QP	54.0	-3.8	1.00 H	203	50.6	-0.4

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 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.

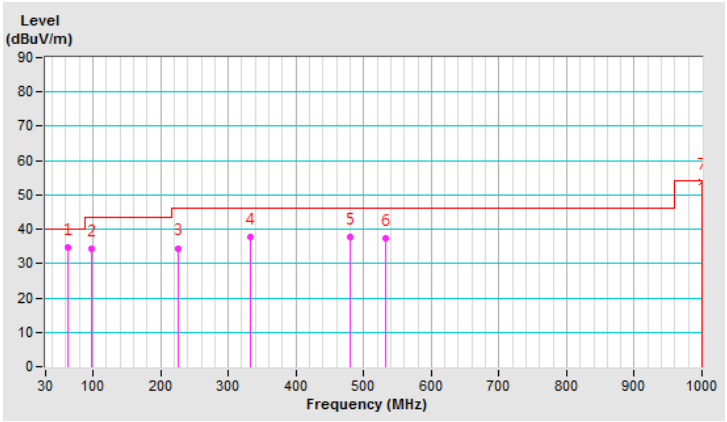


CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	62.85	34.7 QP	40.0	-5.3	2.00 V	360	48.7	-14.0
2	97.17	34.2 QP	43.5	-9.3	1.00 V	302	52.2	-18.0
3	225.02	34.5 QP	46.0	-11.5	1.00 V	187	49.9	-15.4
4	333.32	37.8 QP	46.0	-8.2	1.50 V	247	49.2	-11.4
5	479.96	37.9 QP	46.0	-8.1	1.00 V	265	45.9	-8.0
6	533.33	37.2 QP	46.0	-8.8	1.00 V	145	44.3	-7.1
7	999.98	53.6 QP	54.0	-0.4	1.41 V	265	54.0	-0.4

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 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. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 17, 2019	Mar. 16, 2020
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 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: May 02 to 15, 2019

4.2.3 Test Procedure

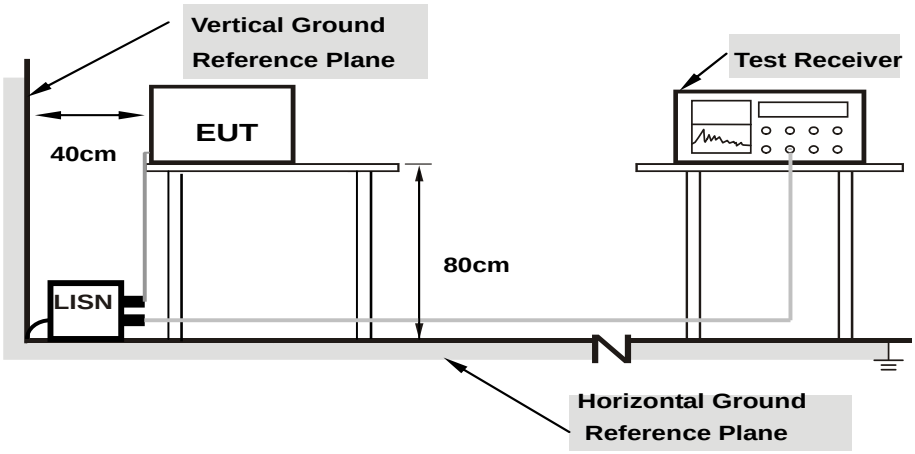
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

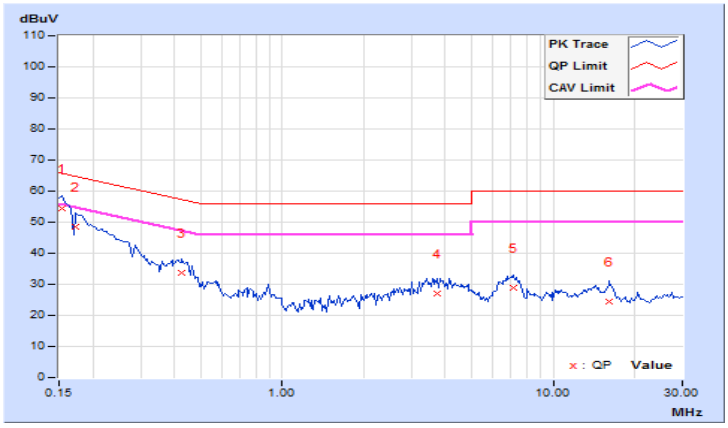
4.2.7 Test Results (Mode 1)

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	0.15391	10.03	44.57	25.13	54.60	35.16	65.79	55.79	-11.19	-20.63
2	0.17344	10.04	38.33	16.70	48.37	26.74	64.79	54.79	-16.42	-28.05
3	0.42734	10.08	23.60	13.86	33.68	23.94	57.30	47.30	-23.62	-23.36
4	3.73828	10.30	16.83	9.55	27.13	19.85	56.00	46.00	-28.87	-26.15
5	7.16016	10.52	18.30	12.80	28.82	23.32	60.00	50.00	-31.18	-26.68
6	16.17578	11.11	13.41	7.60	24.52	18.71	60.00	50.00	-35.48	-31.29

Remarks:

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

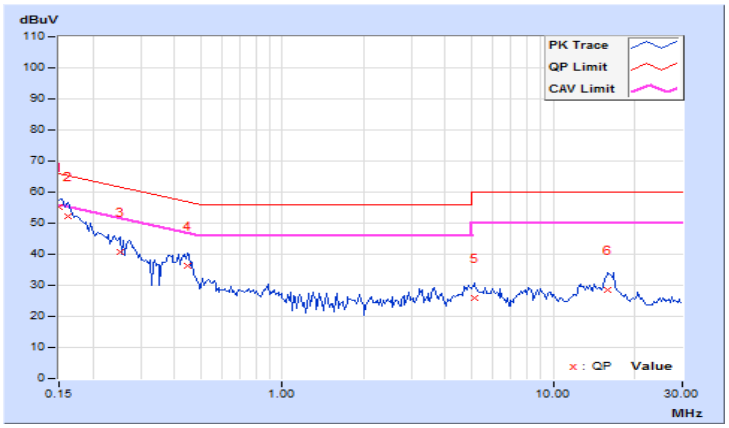


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**9.94**	**45.20**	**26.84**	**55.14**	**36.78**	**66.00**	**56.00**	**-10.86**	**-19.22**
2	0.16172	9.94	42.37	23.26	52.31	33.20	65.38	55.38	-13.07	-22.18
3	0.25156	9.96	30.96	13.71	40.92	23.67	61.71	51.71	-20.79	-28.04
4	0.44688	9.98	26.18	16.32	36.16	26.30	56.93	46.93	-20.77	-20.63
5	5.11328	10.24	15.82	8.39	26.06	18.63	60.00	50.00	-33.94	-31.37
6	15.95313	10.89	17.56	10.74	28.45	21.63	60.00	50.00	-31.55	-28.37

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



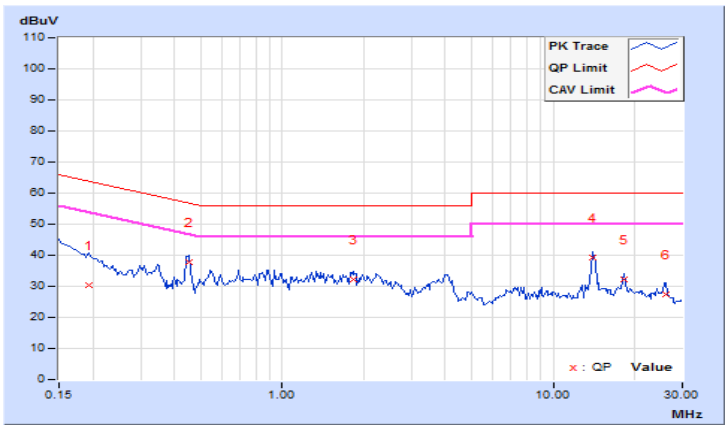
4.2.8 Test Results (Mode 2)

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	0.19297	10.04	20.37	10.33	30.41	20.37	63.91	53.91	-33.50	-33.54
2	0.45078	10.07	27.74	22.39	37.81	32.46	56.86	46.86	-19.05	-14.40
3	1.82422	10.15	22.18	13.49	32.33	23.64	56.00	46.00	-23.67	-22.36
4	14.03516	10.75	28.41	28.24	39.16	38.99	60.00	50.00	-20.84	-11.01
5	18.32031	10.98	21.32	20.00	32.30	30.98	60.00	50.00	-27.70	-19.02
6	25.93359	11.16	16.11	11.32	27.27	22.48	60.00	50.00	-32.73	-27.52

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

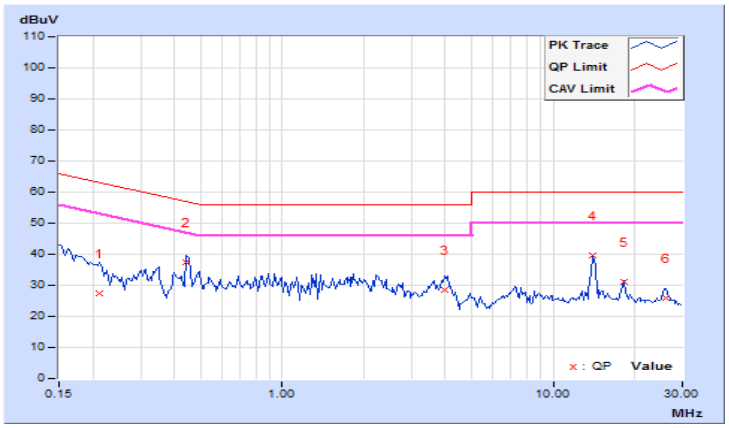


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.21250	9.94	17.32	10.11	27.26	20.05	63.11	53.11	-35.85	-33.06
2	0.44297	9.96	27.51	20.19	37.47	30.15	57.01	47.01	-19.54	-16.86
3	4.00000	10.12	18.38	7.98	28.50	18.10	56.00	46.00	-27.50	-27.90
4	14.03906	10.58	29.14	28.01	39.72	38.59	60.00	50.00	-20.28	-11.41
5	18.32031	10.79	20.46	19.62	31.25	30.41	60.00	50.00	-28.75	-19.59
6	25.93359	10.93	15.11	10.82	26.04	21.75	60.00	50.00	-33.96	-28.25

Remarks:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

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

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

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

4.3.2 Test Setup

4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Results

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.07	20.91	224.935	23.52	30	Pass
40	5200	23.62	24.49	511.334	27.09	30	Pass
48	5240	21.63	23.14	351.609	25.46	30	Pass
149	5745	22.98	23.27	410.933	26.14	30	Pass
157	5785	22.41	22.89	368.717	25.67	30	Pass
165	5825	21.88	22.02	313.391	24.96	30	Pass

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	19.03	20.25	185.908	22.69	30	Pass
40	5200	22.99	24.10	456.107	26.59	30	Pass
48	5240	20.66	21.95	273.088	24.36	30	Pass
149	5745	22.83	23.22	401.761	26.04	30	Pass
157	5785	22.54	22.85	372.225	25.71	30	Pass
165	5825	21.94	22.01	315.17	24.99	30	Pass

802.11ac (VHT40)

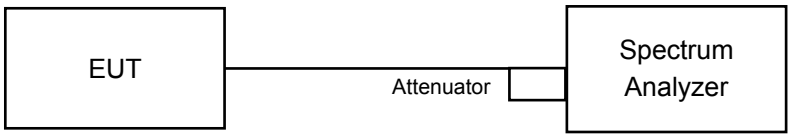
Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.48	16.70	82.092	19.14	30	Pass
46	5230	21.05	22.03	286.938	24.58	30	Pass
151	5755	22.53	23.06	381.363	25.81	30	Pass
159	5795	22.19	22.68	350.93	25.45	30	Pass

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	13.03	13.93	44.808	16.51	30	Pass
155	5775	20.51	20.73	230.764	23.63	30	Pass

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.16	17.76
40	5200	30.72	33.44
48	5240	18.36	18.24
149	5745	30.88	35.20
157	5785	31.04	33.12
165	5825	31.68	31.36

802.11ac (VHT20)

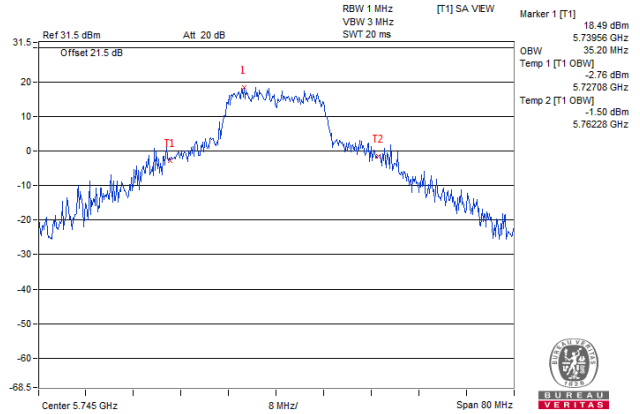
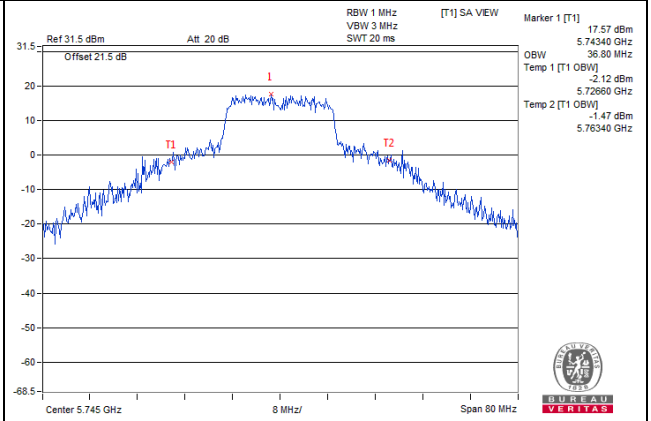
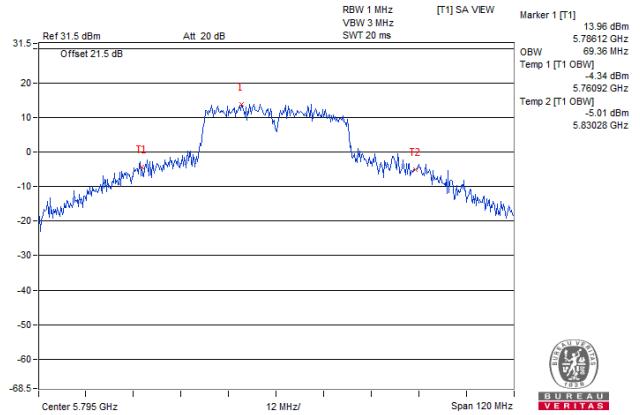
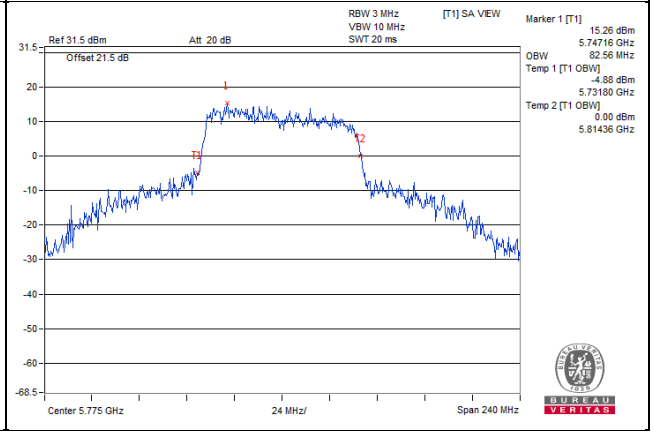
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	18.56	18.88
40	5200	26.56	32.80
48	5240	16.92	19.20
149	5745	31.04	36.80
157	5785	31.84	30.72
165	5825	31.84	34.08

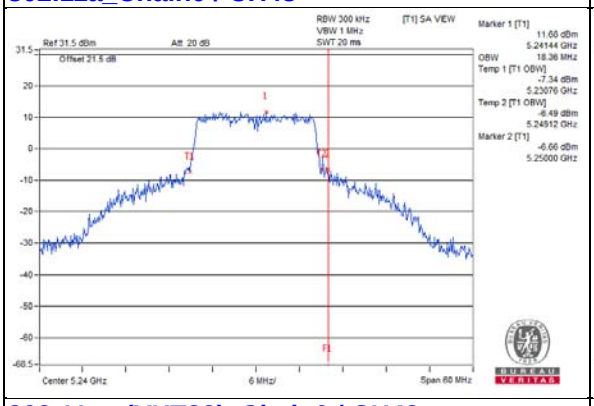
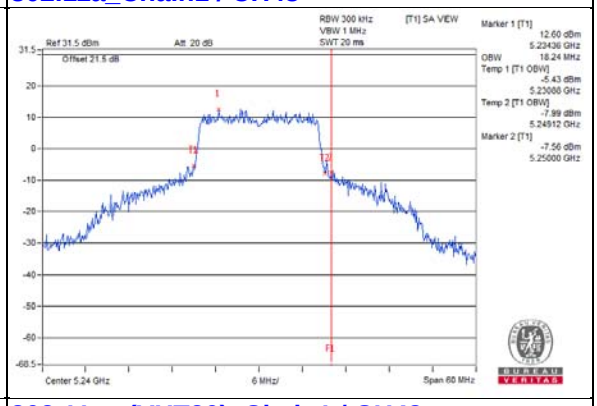
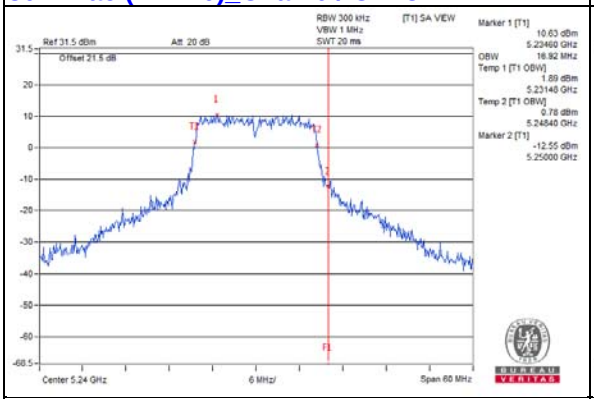
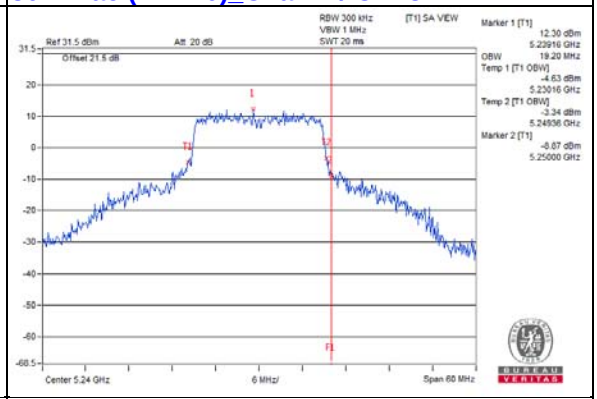
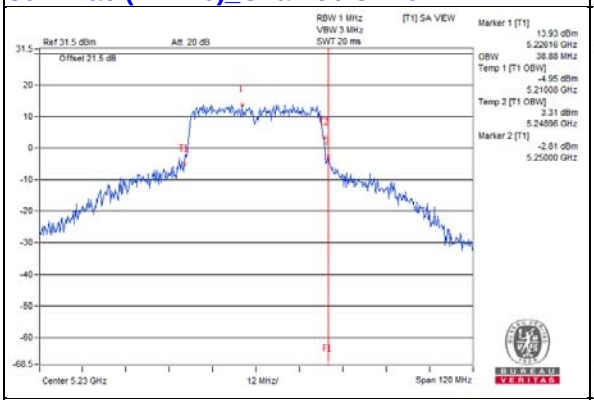
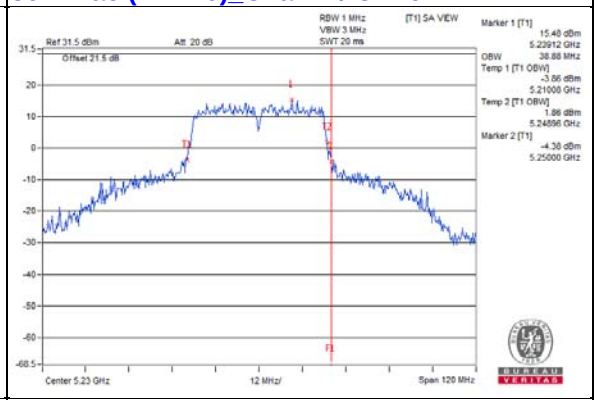
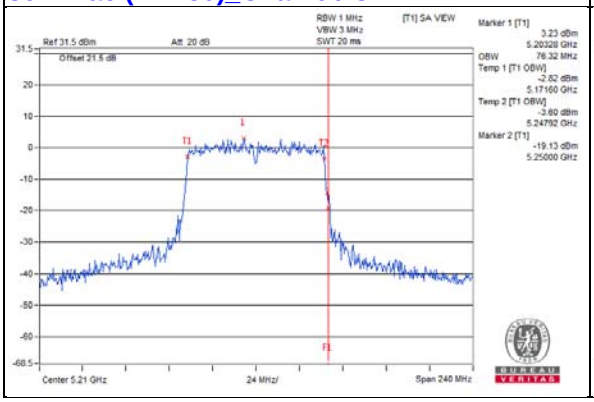
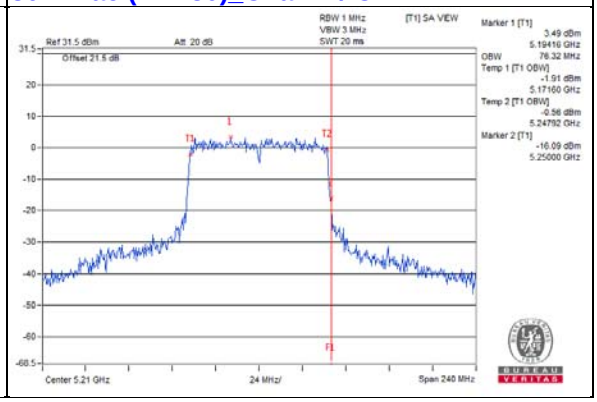
802.11ac (VHT40)

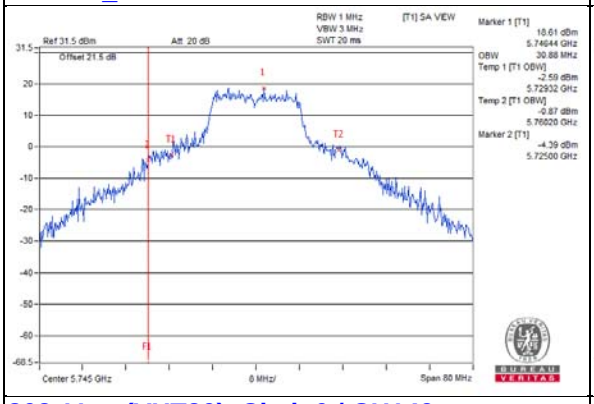
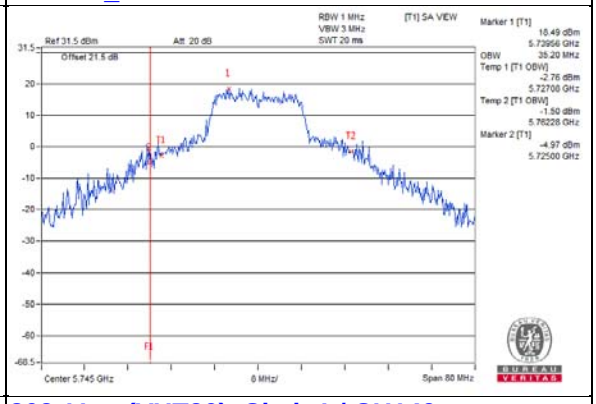
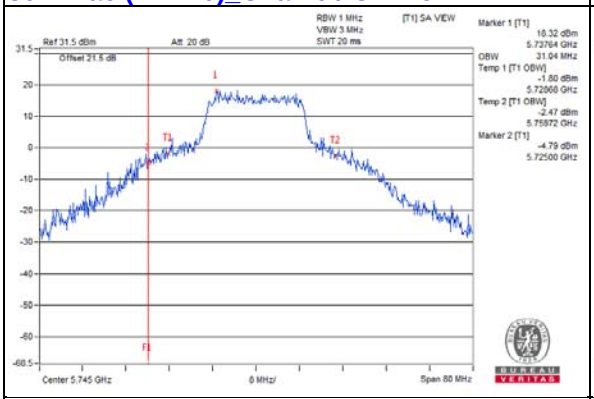
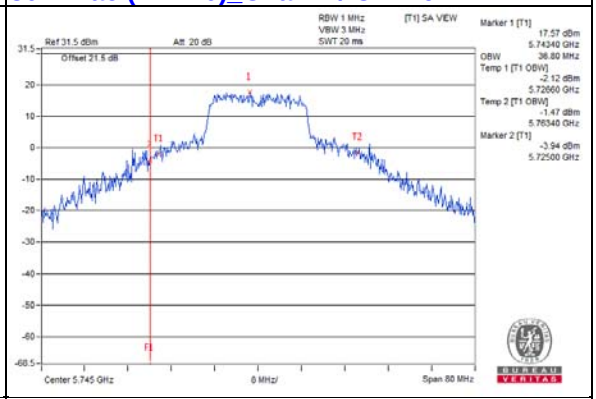
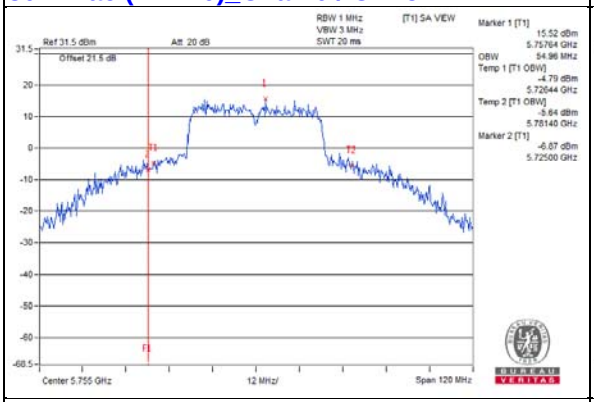
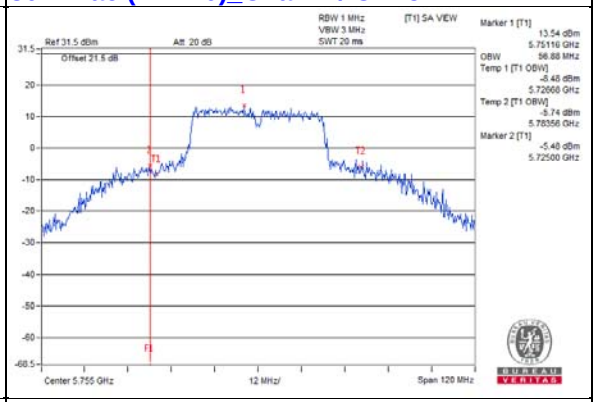
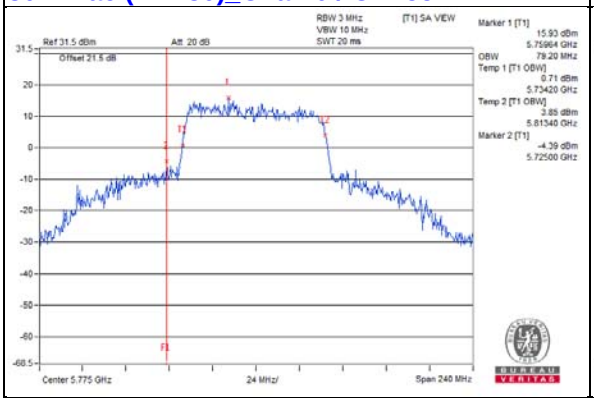
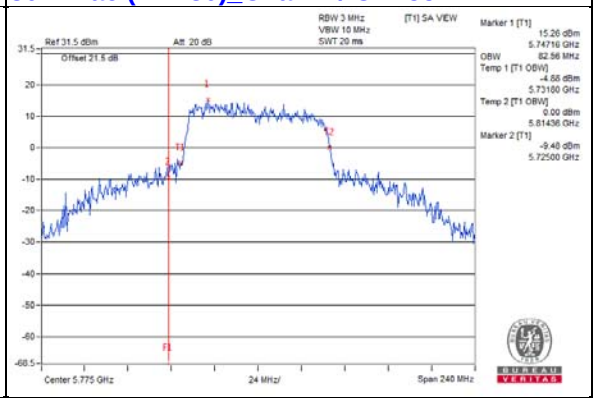
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.72	36.72
46	5230	38.88	38.88
151	5755	54.96	56.88
159	5795	63.12	69.36

802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.32	76.32
155	5775	79.20	82.56

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

Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11a_Chain0 / CH48	**802.11a_Chain1 / CH48**
	
802.11ac (VHT20)_Chain0 / CH48	**802.11ac (VHT20)_Chain1 / CH48**
	
802.11ac (VHT40)_Chain0 / CH46	**802.11ac (VHT40)_Chain1 / CH46**
	
802.11ac (VHT80)_Chain0 / CH42	**802.11ac (VHT80)_Chain1 / CH42**
	

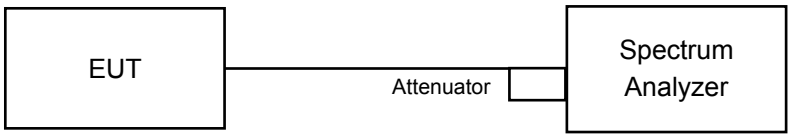
Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2C band)	
802.11a_Chain0 / CH149	**802.11a_Chain1 / CH149**
	
802.11ac (VHT20)_Chain0 / CH149	**802.11ac (VHT20)_Chain1 / CH149**
	
802.11ac (VHT40)_Chain0 / CH151	**802.11ac (VHT40)_Chain1 / CH151**
	
802.11ac (VHT80)_Chain0 / CH155	**802.11ac (VHT80)_Chain1 / CH155**
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
	√	Indoor Access Point	
		Client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1 band:

For 802.11a, 802.11ac (VHT20)

Using method SA-1

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

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

Using method SA-2

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

For U-NII-3 band:

For 802.11a, 802.11ac (VHT20)

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

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1 band:

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	5.25	6.37	8.86	15.89	Pass
40	5200	9.54	9.74	12.65	15.89	Pass
48	5240	8.11	7.74	10.94	15.89	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 4.1dBi + 10log(2) = 7.11dBi > 6dBi, so the power density limit shall be reduced to 17-(7.11-6) = 15.89dBm.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	4.86	5.71	8.32	15.89	Pass
40	5200	8.58	9.18	11.90	15.89	Pass
48	5240	6.68	7.45	10.09	15.89	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 4.1dBi + 10log(2) = 7.11dBi > 6dBi, so the power density limit shall be reduced to 17-(7.11-6) = 15.89dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-2.22	-0.13	0.15	2.11	15.89	Pass
46	5230	2.34	4.29	0.15	6.58	15.89	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 4.1dBi + 10log(2) = 7.11dBi > 6dBi, so the power density limit shall be reduced to 17-(7.11-6) = 15.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

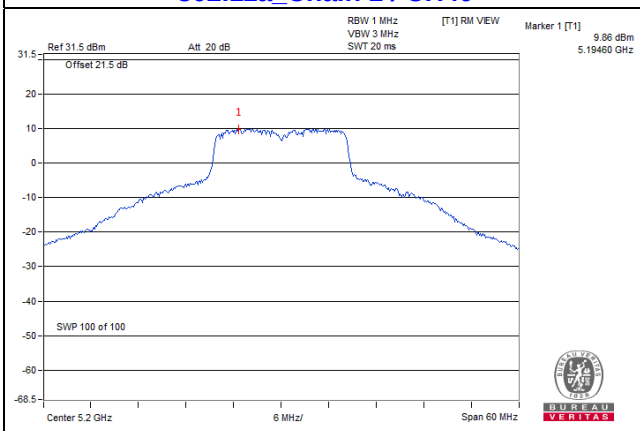
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-8.94	-6.29	0.3	-4.11	15.89	Pass

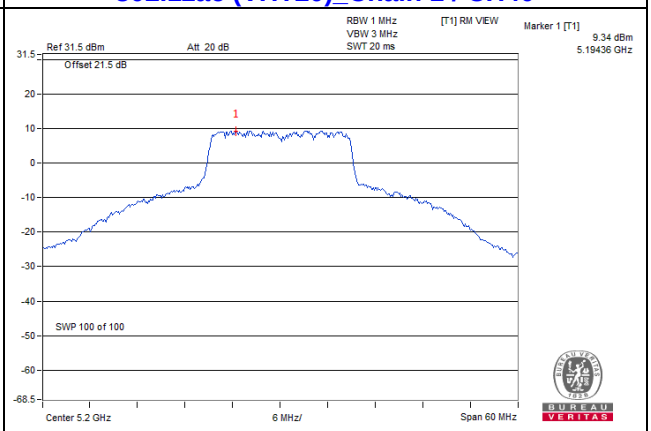
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 4.1dBi + 10log(2) = 7.11dBi > 6dBi, so the power density limit shall be reduced to 17-(7.11-6) = 15.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

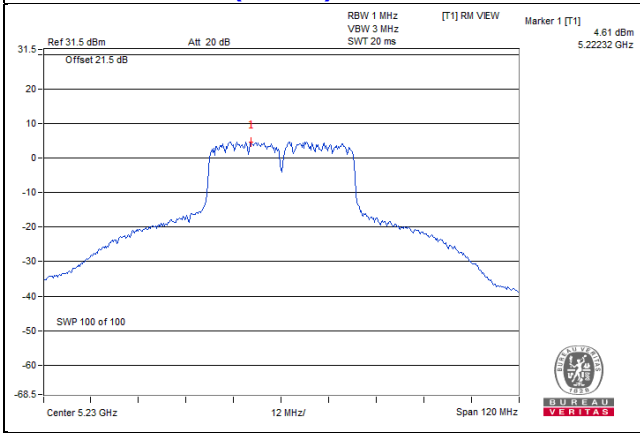
802.11a_Chain 1 / CH40



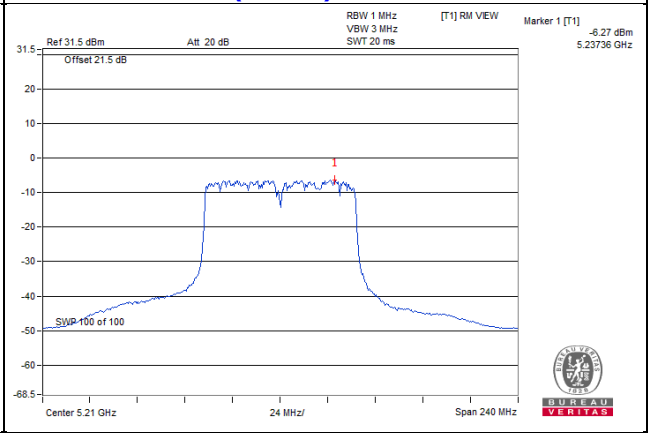
802.11ac (VHT20)_Chain 1 / CH40



802.11ac (VHT40)_Chain 1 / CH46



802.11ac (VHT80)_Chain 1 / CH42



For U-NII-3 band:

802.11a

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	dBm/300kHz	dBm/500kHz		
149	5745	0.01	0.30	3.17	5.39	28.26	Pass
157	5785	0.27	0.12	3.21	5.43	28.26	Pass
165	5825	0.13	-0.48	2.85	5.07	28.26	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 4.73dBi + 10log(2) = 7.74dBi > 6dBi, so the power density limit shall be reduced to 30-(7.74-6) = 28.26dBm.

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD (dBm/300kHz)		Total PSD		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1	dBm/300kHz	dBm/500kHz		
149	5745	0.30	-10.50	0.65	2.87	28.26	Pass
157	5785	-0.22	-0.82	2.50	4.72	28.26	Pass
165	5825	-0.38	-0.41	2.62	4.84	28.26	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 4.73dBi + 10log(2) = 7.74dBi > 6dBi, so the power density limit shall be reduced to 30-(7.74-6) = 28.26dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD With Duty Factor		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1		dBm/300kHz	dBm/500kHz		
151	5755	-3.25	-3.95	0.15	-0.43	1.79	28.26	Pass
159	5795	-3.27	-3.80	0.15	-0.37	1.85	28.26	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 4.73dBi + 10log(2) = 7.74dBi > 6dBi, so the power density limit shall be reduced to 30-(7.74-6) = 28.26dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

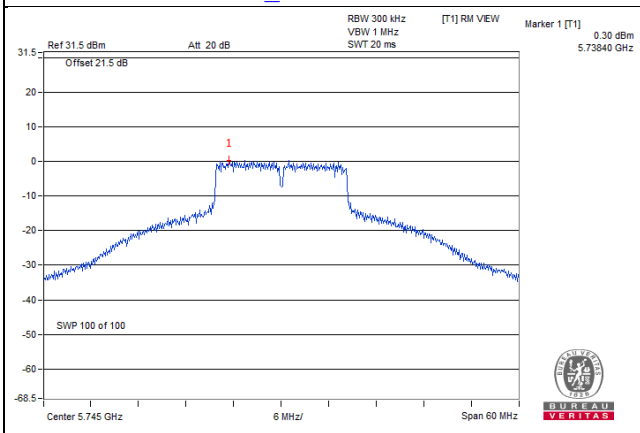
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD With Duty Factor		Limit (dBm/500kHz)	Pass /Fail
		Chain 0	Chain 1		dBm/300kHz	dBm/500kHz		
155	5775	-8.06	-8.25	0.3	-4.85	-2.63	28.89	Pass

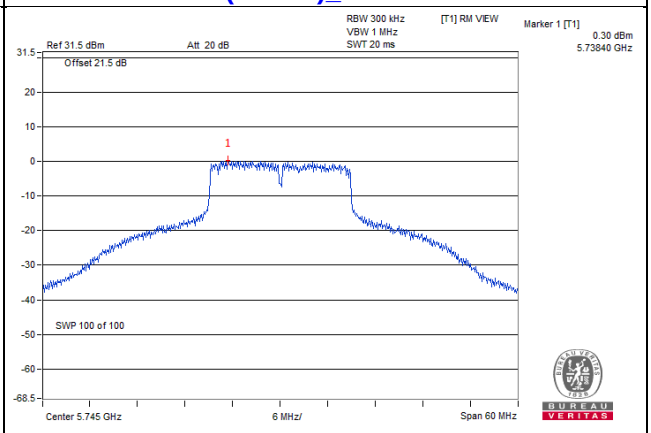
Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 4.73dBi + 10log(2) = 7.74dBi > 6dBi, so the power density limit shall be reduced to 30-(7.74-6) = 28.26dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

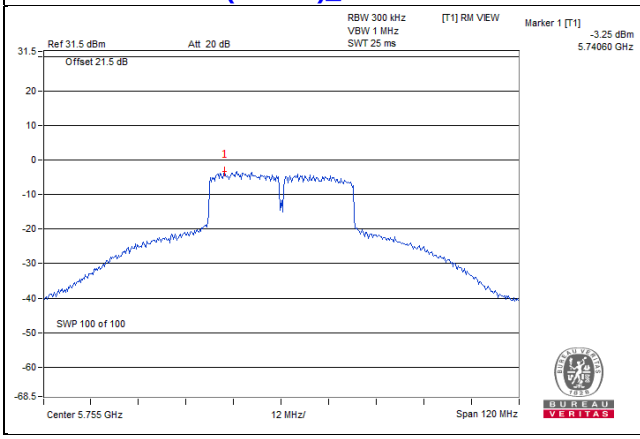
802.11a_Chain 1 / CH149



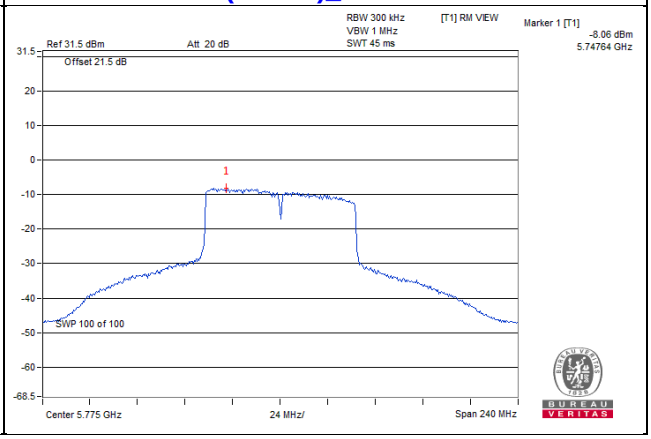
802.11ac (VHT20)_Chain 0 / CH149



802.11ac (VHT40)_Chain 0 / CH151



802.11ac (VHT80)_Chain 0 / CH155

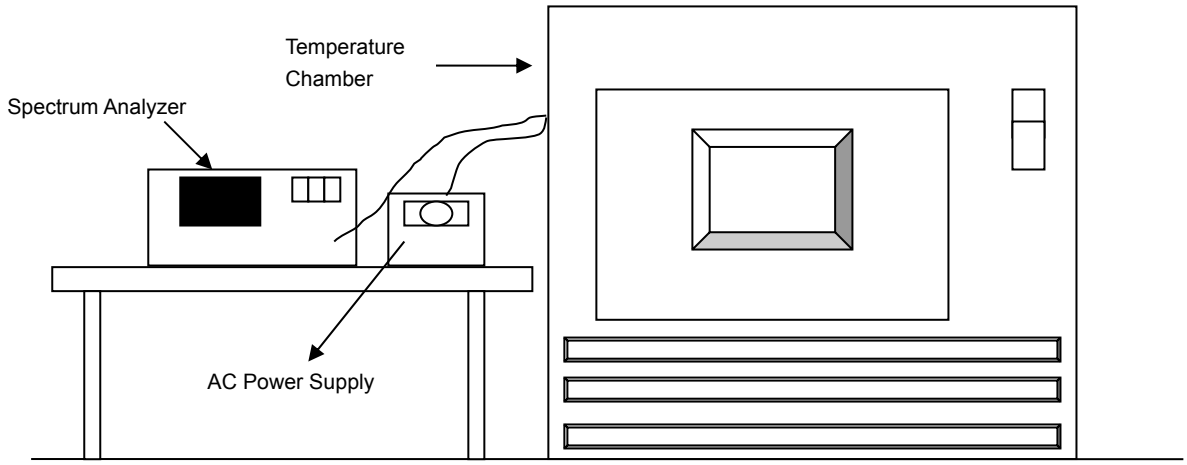


4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal 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
50	120	5179.9758	Pass	5179.9775	Pass	5179.98	Pass	5179.9791	Pass
40	120	5179.9979	Pass	5179.9974	Pass	5180.0011	Pass	5179.9989	Pass
30	120	5180.0173	Pass	5180.0153	Pass	5180.0158	Pass	5180.0168	Pass
20	120	5180.0147	Pass	5180.0167	Pass	5180.0138	Pass	5180.0159	Pass
10	120	5179.9751	Pass	5179.9733	Pass	5179.9735	Pass	5179.976	Pass
0	120	5179.9915	Pass	5179.9906	Pass	5179.9924	Pass	5179.9948	Pass
-10	120	5179.9864	Pass	5179.9852	Pass	5179.9852	Pass	5179.9864	Pass
-20	120	5180.0049	Pass	5180.0053	Pass	5180.0054	Pass	5180.0087	Pass
-30	120	5179.997	Pass	5179.9933	Pass	5179.9939	Pass	5179.9958	Pass

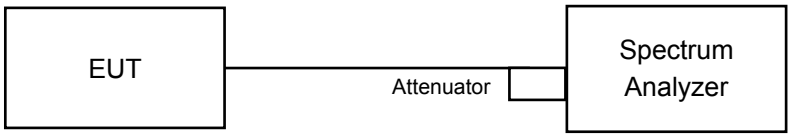
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0144	Pass	5180.0175	Pass	5180.0135	Pass	5180.0153	Pass
	120	5180.0147	Pass	5180.0167	Pass	5180.0138	Pass	5180.0159	Pass
	102	5180.0152	Pass	5180.0158	Pass	5180.0131	Pass	5180.0157	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	16.39	16.43	0.5	Pass
157	5785	16.38	16.39	0.5	Pass
165	5825	16.31	16.37	0.5	Pass

802.11ac (VHT20)

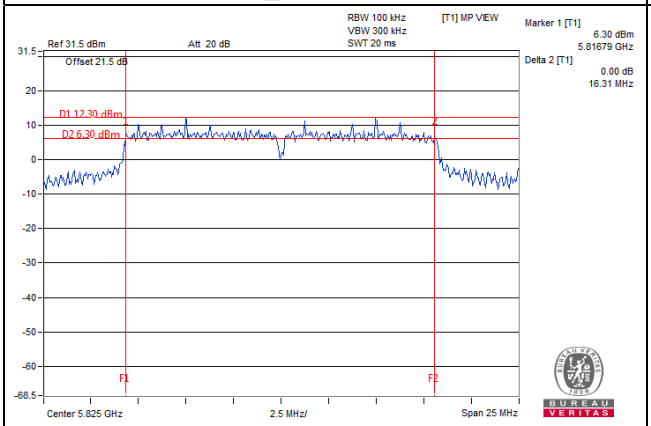
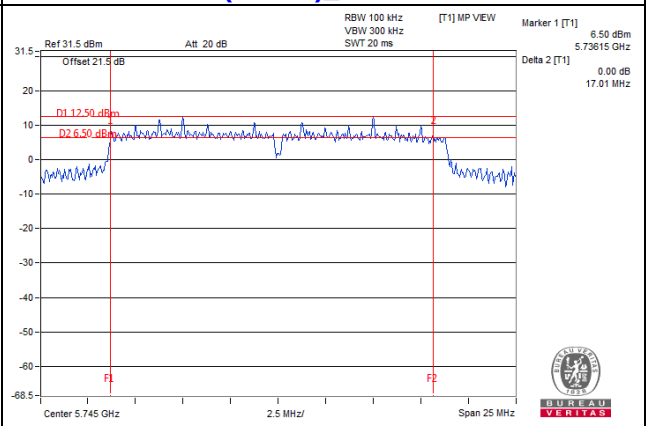
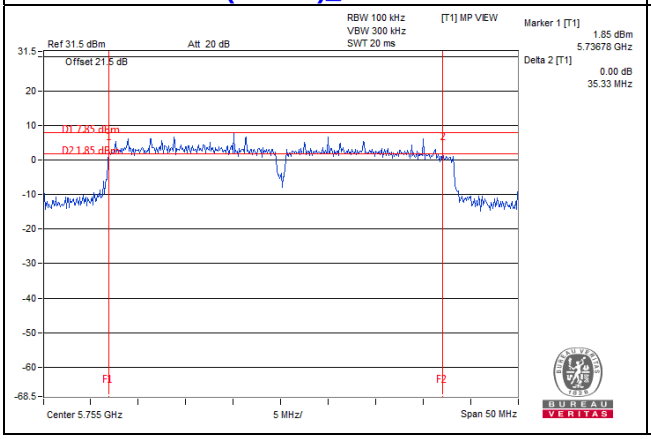
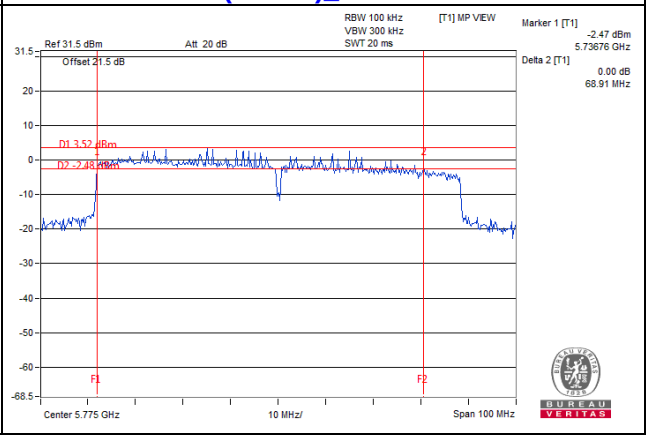
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.63	17.01	0.5	Pass
157	5785	17.59	17.65	0.5	Pass
165	5825	17.57	17.60	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.75	35.33	0.5	Pass
159	5795	35.90	35.76	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	70.96	68.91	0.5	Pass

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

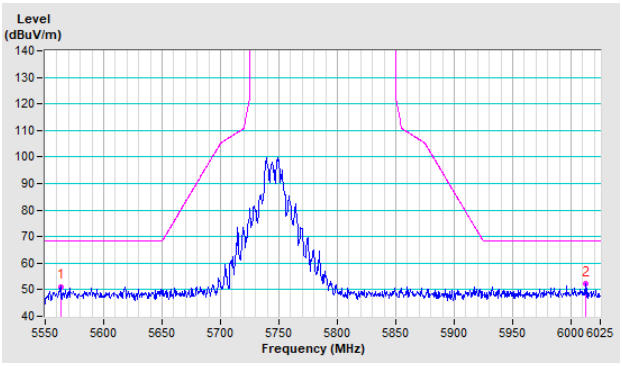
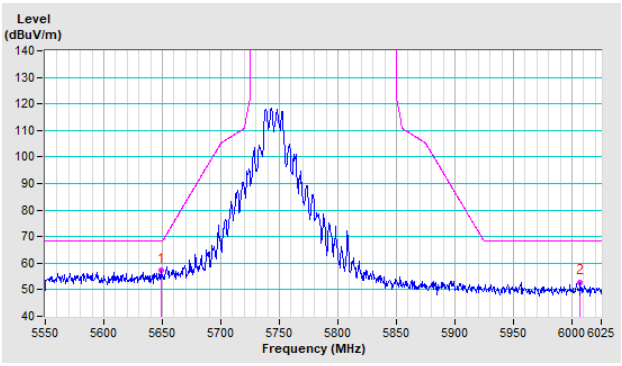
5 Pictures of Test Arrangements

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

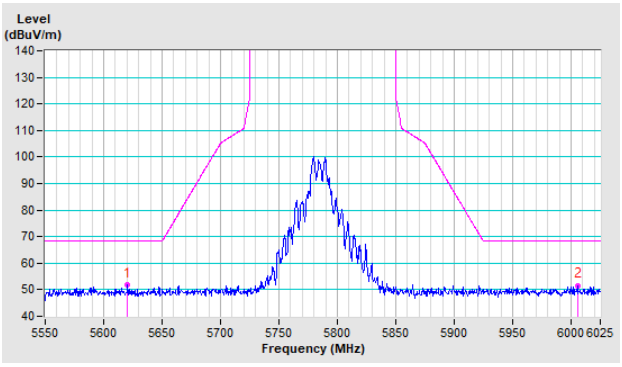
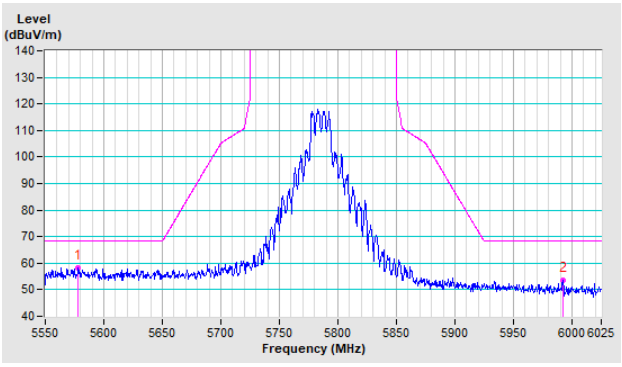
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

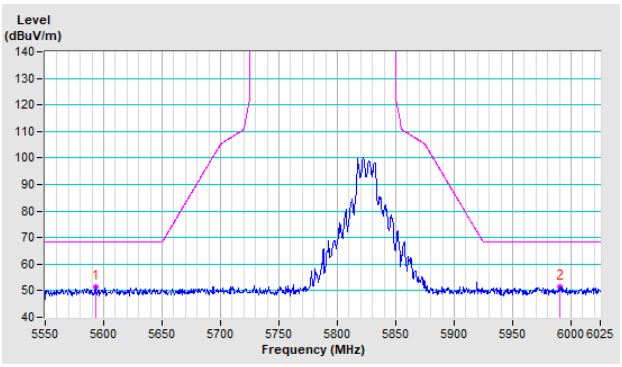
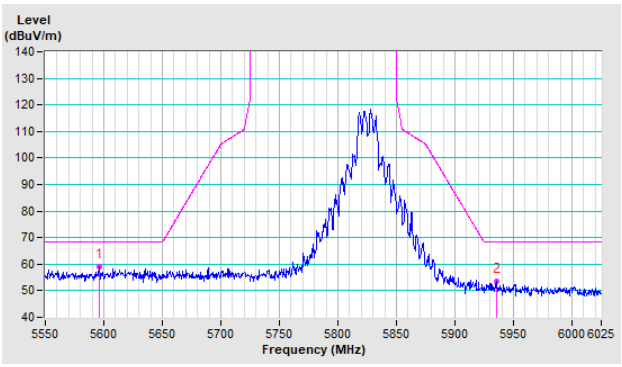
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

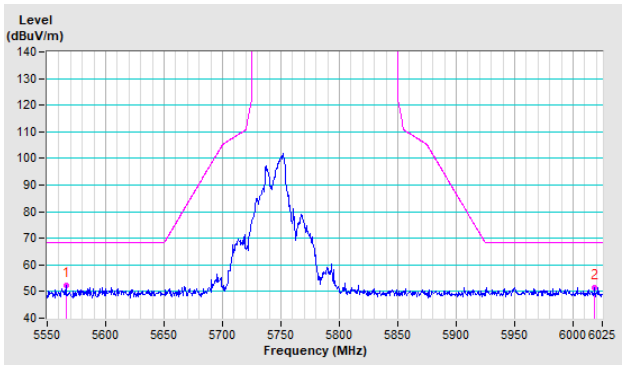
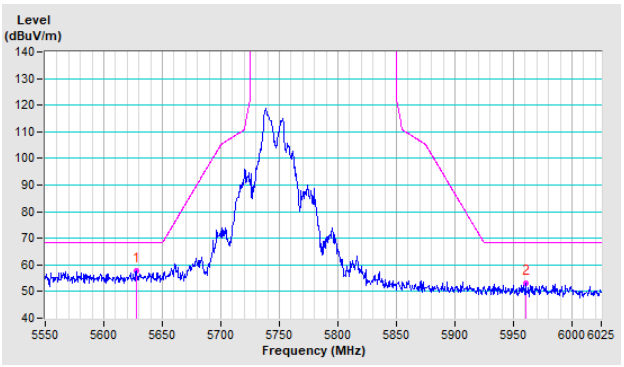
Horizontal	Vertical
	

CH 165 5825 MHz

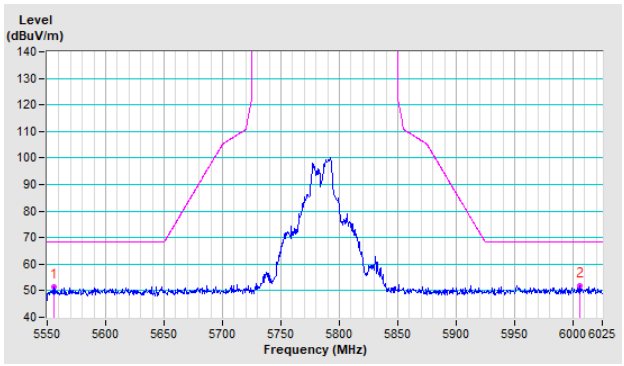
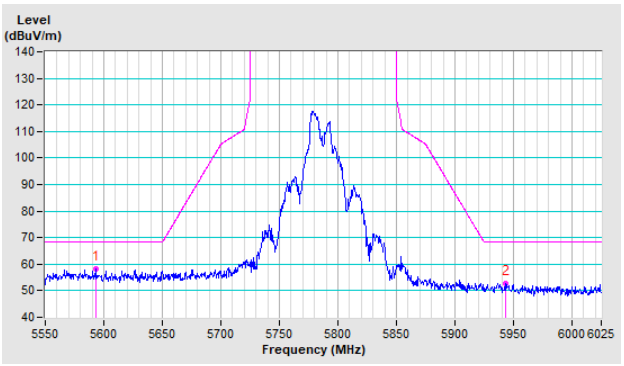
Horizontal	Vertical
	

802.11ac (VHT20)

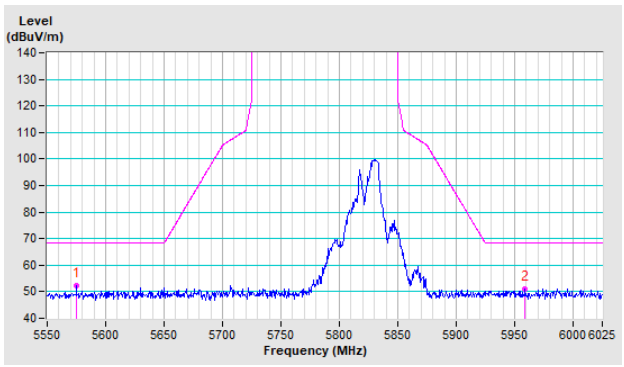
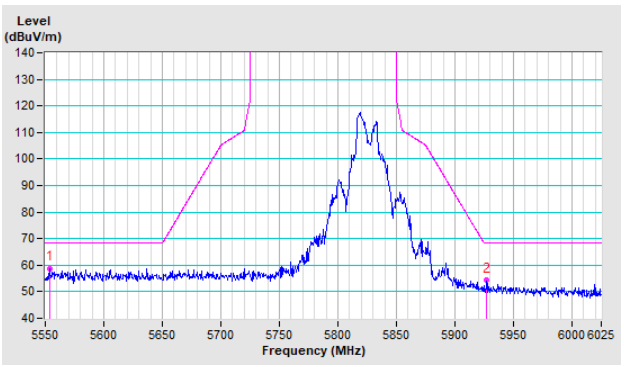
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

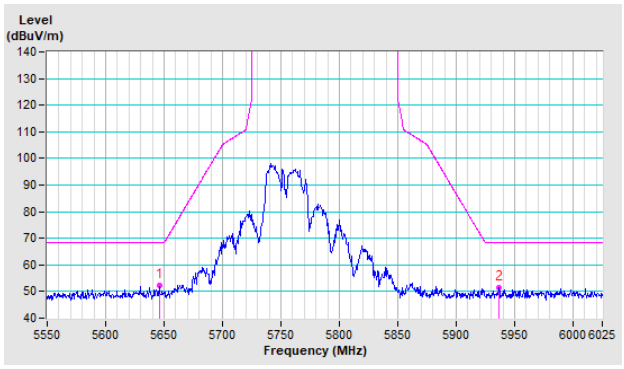
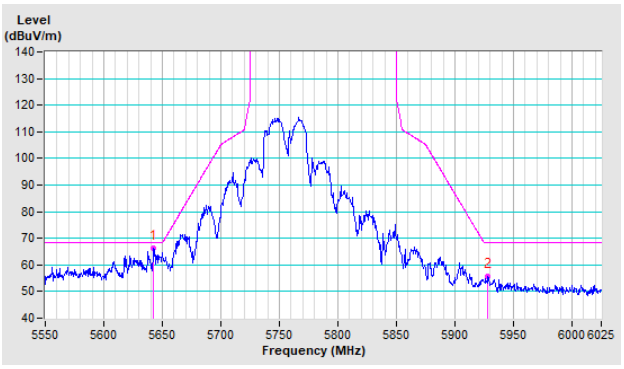
Horizontal	Vertical
	

CH 165 5825 MHz

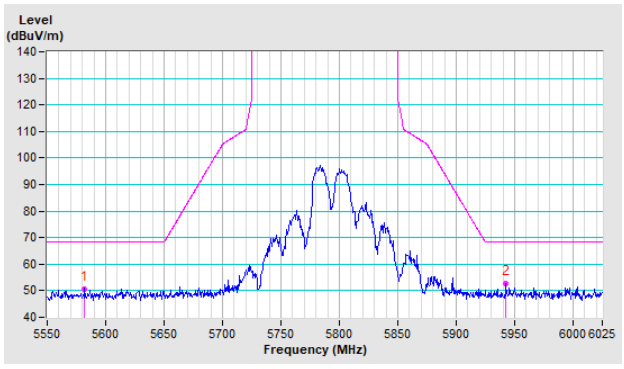
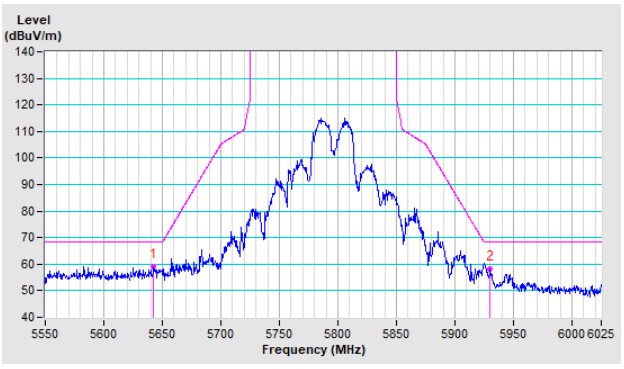
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

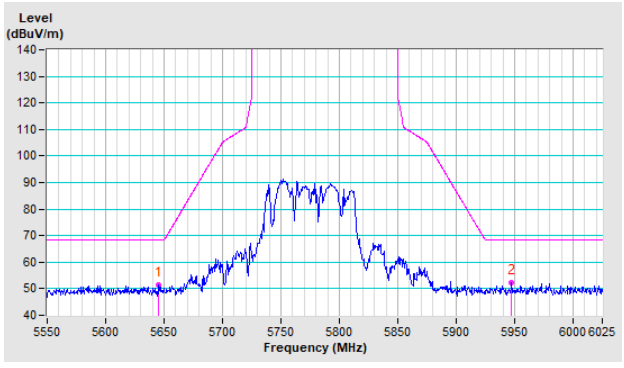
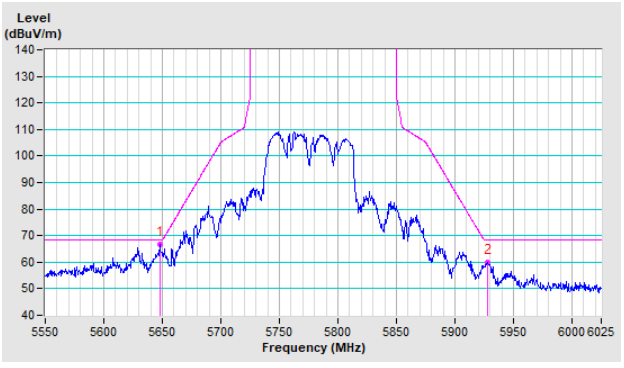
Horizontal	Vertical
	

CH 159 5795 MHz

Horizontal	Vertical
	

802.11ac (VHT80)

CH 155 5775 MHz

Horizontal	Vertical
	

Appendix – Information 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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