

FCC Test Report (WLAN) (Spot Check)

Report No.: RF190603E08-1

FCC ID: NKR-WNCJS8T

Original FCC ID: NKR-VZJS8V

Test Model: JS8T

Received Date: June 03, 2019

Test Date: June 28 to July 05, 2019

Issued Date: Aug. 20, 2019

Applicant: Wistron NeWeb Corp.

Address: 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
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**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF190603E08-1	Original release.	Aug. 20, 2019

1 Certificate of Conformity

Product: OTT BOX

Brand: WNC

Test Model: JS8T

Sample Status: ENGINEERING SAMPLE

Applicant: Wistron NeWeb Corp.

Test Date: June 28 to July 05, 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 : Wendy Wu , **Date:** Aug. 20, 2019
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Aug. 20, 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 -5.9dB at 444.62MHz.
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 -0.5dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOB 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) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.8 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.1 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.1 dB
	6GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.2 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	OTT BOX
Brand	WNC
Test Model	JS8T
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.18~ 5.24GHz, 5.26GHz ~ 5.32GHz, 5.50GHz ~ 5.72GHz, 5.745 ~ 5.825GHz
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 5GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 25 802.11n (HT40), 802.11ac (VHT40): 12 802.11ac (VHT80): 6
Output Power	2.4GHz: 641.636 mW 5.18 ~ 5.24GHz: 247.256 mW 5.26 ~ 5.32GHz: 211.137 mW 5.5 ~ 5.72GHz: 205.4 mW 5.745 ~ 5.825GHz: 402.91 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1 Remote controller x 1 (Brand: NA, Model: RC3441530/01BR)
Cable Supplied	HDMI cable x 1 (Shielded, 1.2m)

Note:

1. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot-check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit.
2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	Bluetooth
2	WLAN 5GHz	Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

3. The EUT needs to be supplied from power adapter, the information is as below table:

Brand	Model No.	Spec.
Frecom	F12L33-120100SPAU	Input: 100-240Vac, 0.3A, 50/60Hz Output: 12V, 1A DC Output cable: Unshielded, 1.5m

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

WLAN				
Chain No.	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna type	Connector type
Chain 0	3.62	2.4~2.4835	On board printed antenna	none
	3.57	5.15~5.25		
	3.63	5.25~5.35		
	2.50	5.47~5.725		
	2.88	5.725~5.85		
Chain 1	5.36	2.4~2.4835	On board printed antenna	none
	3.26	5.15~5.25		
	3.26	5.25~5.35		
	3.75	5.47~5.725		
	4.22	5.725~5.85		
Bluetooth				
Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna type	Connector type	
2.39	2.4~2.4835	On board printed antenna	none	

5. The EUT incorporates a MIMO function.

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

Note: 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.

6. 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 5260 ~ 5320MHz

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

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

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

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290 MHz

FOR 5500 ~ 5720MHz

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

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

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

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	138	5690 MHz
122	5610 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 \geq 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

Radiated Emission Test (Above 1GHz):

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

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5180-5240	38 to 46	38, 46	OFDM	BPSK	13.5
802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6
802.11ac (VHT20)	5500-5720	100 to 144	100, 116, 140, 144	OFDM	BPSK	6.5
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6

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	5180-5320, 5500-5720, 5745-5825	36 to 64, 100 to 144, 149 to 165	149	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	5180-5320, 5500-5720, 5745-5825	36 to 64, 100 to 144, 149 to 165	149	OFDM	BPSK	6

Antenna Port Conducted Measurement:

- 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.

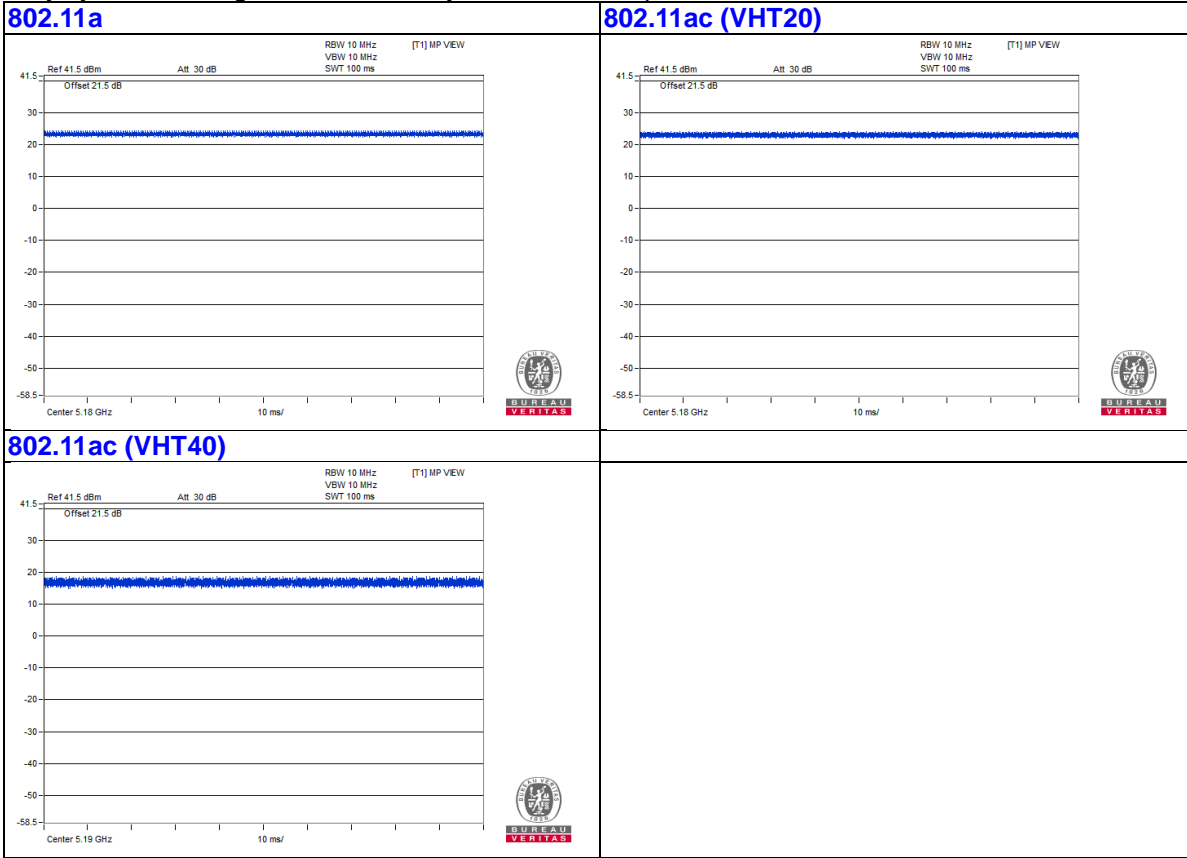
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5180-5240	38 to 46	38, 46	OFDM	BPSK	13.5
802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6
802.11ac (VHT20)	5500-5720	100 to 144	100, 116, 140, 144	OFDM	BPSK	6.5
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE \geq 1G	22deg. C, 66%RH	120Vac, 60Hz	Robert Cheng
RE<1G	22deg. C, 66%RH	120Vac, 60Hz	Robert Cheng
PLC	24deg. C, 74%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.



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.

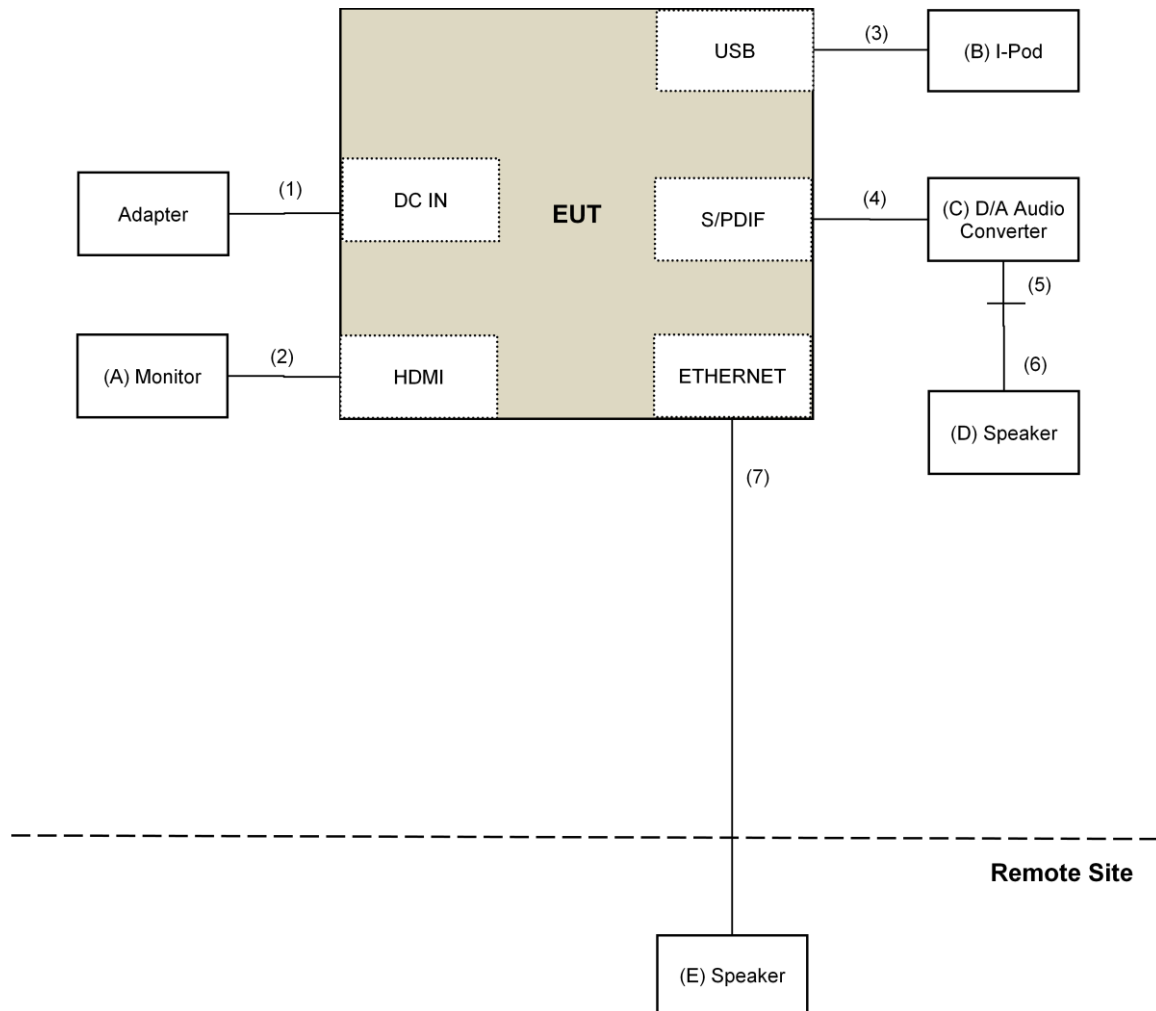
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Monitor	ASUS	VN248	NA	NA	Provided by Lab
B.	iPod	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
C.	D/A Audio Converter	LINDY	NA	NA	NA	Provided by Lab
D.	Speaker	Lenovo	41A5330	NA	NA	Provided by Lab
E.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.5	No	0	Supplied by client
2.	HDMI Cable	1	1.2	Yes	0	Supplied by client
3.	USB Cable	1	0.1	Yes	0	Provided by Lab
4.	Fiber Cable	1	1.5	No	0	Provided by Lab
5.	Audio Cable	1	0.2	No	0	Provided by Lab
6.	Audio Cable	1	1.5	No	0	Provided by Lab
7.	RJ-45 Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

FCC Part 15, Subpart E (15.407)

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits of unwanted emission out of the restricted bands

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

Note:

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI	EMC001340	980142	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 Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	Apr. 30, 2019	Apr. 29, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-2	Mar. 18, 2019	Mar. 17, 2020
RF Cable	8D	966-3-3	Mar. 18, 2019	Mar. 17, 2020
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 25, 2018	Nov. 24, 2019
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-1200	160922	Jan. 28, 2019	Jan. 27, 2020
RF Cable	EMC104-SM-SM-2000	180601	June 10, 2019	June 09, 2020
RF Cable	EMC104-SM-SM-6000	180602	June 10, 2019	June 09, 2020
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 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
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Loop antenna was used for all emissions below 30 MHz.
4. Tested Date: June 28 to July 05, 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:

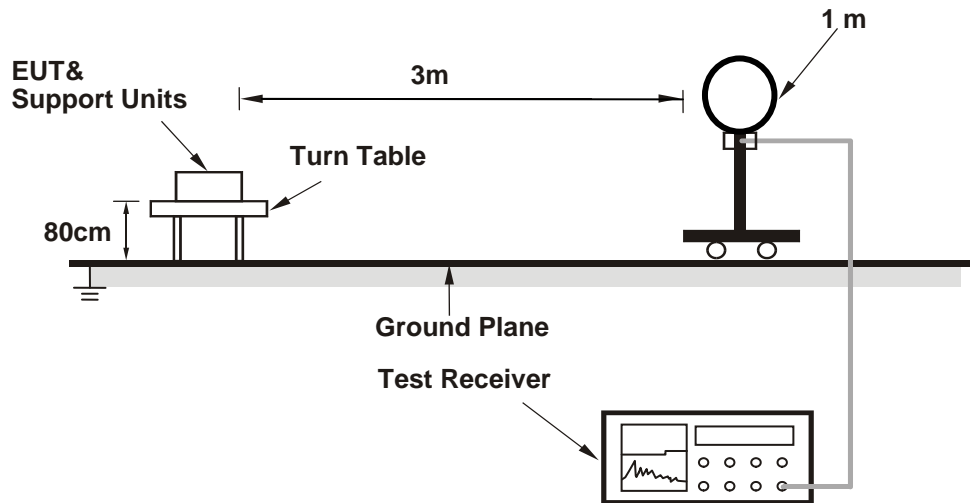
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) 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

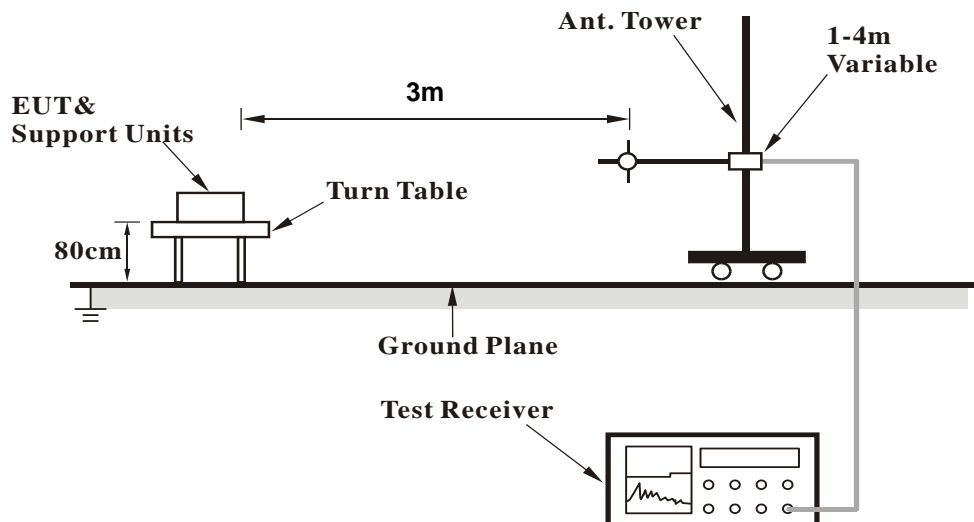
No deviation.

4.1.5 Test Setup

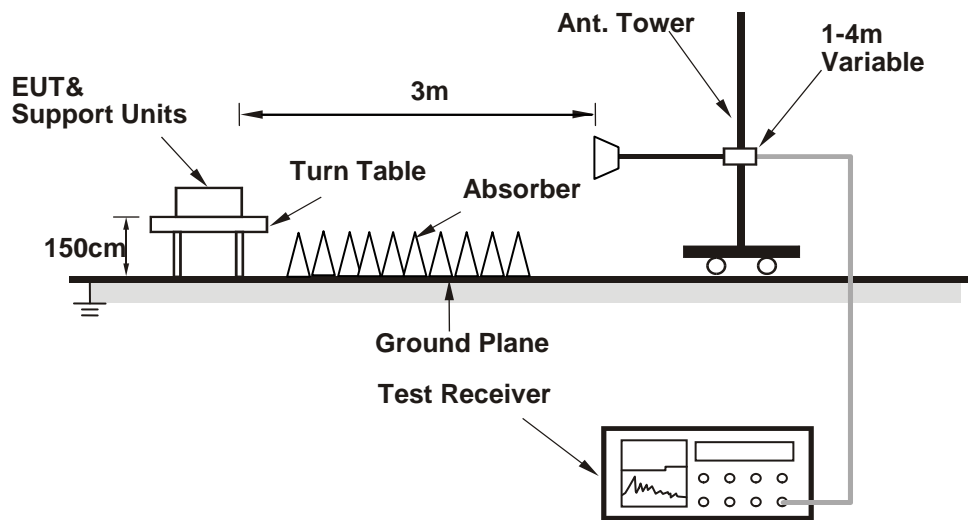
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
- b. Controlling software (HyperTerminal paste command) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

802.11a

CHANNEL	TX Channel 52	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	50.4 PK	74.0	-23.6	1.52 H	11	47.1	3.3
2	5150.00	40.4 AV	54.0	-13.6	1.52 H	11	37.1	3.3
3	*5260.00	113.1 PK			1.52 H	11	110.4	2.7
4	*5260.00	104.2 AV			1.52 H	11	101.5	2.7
5	#10520.00	48.8 PK	68.2	-19.4	1.41 H	215	36.2	12.6
6	15780.00	50.4 PK	74.0	-23.6	1.60 H	299	38.4	12.0
7	15780.00	40.6 AV	54.0	-13.4	1.60 H	299	28.6	12.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	50.4 PK	74.0	-23.6	2.94 V	77	47.1	3.3
2	5150.00	39.4 AV	54.0	-14.6	2.94 V	77	36.1	3.3
3	*5260.00	108.4 PK			2.94 V	77	105.7	2.7
4	*5260.00	99.8 AV			2.94 V	77	97.1	2.7
5	#10520.00	47.7 PK	68.2	-20.5	2.30 V	91	35.1	12.6
6	15780.00	50.4 PK	74.0	-23.6	1.84 V	287	38.4	12.0
7	15780.00	40.0 AV	54.0	-14.0	1.84 V	287	28.0	12.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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 60	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	113.2 PK			1.70 H	2	110.4	2.8
2	*5300.00	104.3 AV			1.70 H	2	101.5	2.8
3	10600.00	47.8 PK	74.0	-26.2	1.71 H	344	35.3	12.5
4	10600.00	38.9 AV	54.0	-15.1	1.71 H	344	26.4	12.5
5	15900.00	50.6 PK	74.0	-23.4	1.50 H	324	38.3	12.3
6	15900.00	40.2 AV	54.0	-13.8	1.50 H	324	27.9	12.3

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	108.2 PK			2.95 V	97	105.4	2.8
2	*5300.00	99.6 AV			2.95 V	97	96.8	2.8
3	10600.00	46.8 PK	74.0	-27.2	2.19 V	109	34.3	12.5
4	10600.00	38.4 AV	54.0	-15.6	2.19 V	109	25.9	12.5
5	15900.00	51.0 PK	74.0	-23.0	1.80 V	336	38.7	12.3
6	15900.00	40.9 AV	54.0	-13.1	1.80 V	336	28.6	12.3

REMARKS:

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

CHANNEL	TX Channel 64	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	112.8 PK			1.68 H	33	110.0	2.8
2	*5320.00	104.2 AV			1.68 H	33	101.4	2.8
3	5350.00	65.9 PK	74.0	-8.1	1.68 H	33	62.9	3.0
4	5350.00	51.3 AV	54.0	-2.7	1.68 H	33	48.3	3.0
5	10640.00	47.5 PK	74.0	-26.5	1.39 H	226	35.0	12.5
6	10640.00	39.1 AV	54.0	-14.9	1.39 H	226	26.6	12.5
7	15960.00	50.4 PK	74.0	-23.6	1.58 H	179	37.7	12.7
8	15960.00	40.2 AV	54.0	-13.8	1.58 H	179	27.5	12.7

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	108.2 PK			2.83 V	113	105.4	2.8
2	*5320.00	99.8 AV			2.83 V	113	97.0	2.8
3	5350.00	62.7 PK	74.0	-11.3	2.83 V	113	59.7	3.0
4	5350.00	48.6 AV	54.0	-5.4	2.83 V	113	45.6	3.0
5	10640.00	47.4 PK	74.0	-26.6	2.25 V	98	34.9	12.5
6	10640.00	39.0 AV	54.0	-15.0	2.25 V	98	26.5	12.5
7	15960.00	50.2 PK	74.0	-23.8	1.77 V	337	37.5	12.7
8	15960.00	40.3 AV	54.0	-13.7	1.77 V	337	27.6	12.7

REMARKS:

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

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5639.42	55.6 PK	68.2	-12.6	1.22 H	345	52.3	3.3
2	*5745.00	115.2 PK			1.39 H	335	111.6	3.6
3	*5745.00	108.2 AV			1.39 H	335	104.6	3.6
4	#5969.35	51.9 PK	68.2	-16.3	1.22 H	345	47.7	4.2
5	11490.00	47.7 PK	74.0	-26.3	1.61 H	294	34.6	13.1
6	11490.00	39.3 AV	54.0	-14.7	1.61 H	294	26.2	13.1
7	#17235.00	50.8 PK	68.2	-17.4	1.41 H	325	33.8	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	#5610.60	51.0 PK	68.2	-17.2	1.64 V	210	47.7	3.3
2	*5745.00	107.6 PK			2.82 V	84	104.0	3.6
3	*5745.00	102.0 AV			2.82 V	84	98.4	3.6
4	#5947.59	51.3 PK	68.2	-16.9	1.64 V	210	47.1	4.2
5	11490.00	47.0 PK	74.0	-27.0	2.20 V	95	33.9	13.1
6	11490.00	38.4 AV	54.0	-15.6	2.20 V	95	25.3	13.1
7	#17235.00	50.9 PK	68.2	-17.3	1.80 V	323	33.9	17.0

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5591.54	52.4 PK	68.2	-15.8	1.48 H	342	49.1	3.3
2	*5785.00	114.8 PK			1.38 H	325	111.0	3.8
3	*5785.00	108.3 AV			1.38 H	325	104.5	3.8
4	#5941.03	52.3 PK	68.2	-15.9	1.48 H	342	48.1	4.2
5	11570.00	47.6 PK	74.0	-26.4	1.65 H	309	34.9	12.7
6	11570.00	39.5 AV	54.0	-14.5	1.65 H	309	26.8	12.7
7	#17355.00	50.6 PK	68.2	-17.6	1.45 H	337	33.7	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	#5586.46	50.1 PK	68.2	-18.1	1.65 V	207	46.8	3.3
2	*5785.00	107.2 PK			2.86 V	98	103.4	3.8
3	*5785.00	101.7 AV			2.86 V	98	97.9	3.8
4	#5966.28	50.4 PK	68.2	-17.8	1.65 V	207	46.2	4.2
5	11570.00	47.2 PK	74.0	-26.8	2.25 V	98	34.5	12.7
6	11570.00	38.8 AV	54.0	-15.2	2.25 V	98	26.1	12.7
7	#17355.00	50.5 PK	68.2	-17.7	1.75 V	311	33.6	16.9

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5629.86	52.1 PK	68.2	-16.1	1.24 H	346	48.8	3.3
2	*5825.00	116.2 PK			1.40 H	346	112.3	3.9
3	*5825.00	107.2 AV			1.40 H	346	103.3	3.9
4	#5932.97	54.3 PK	68.2	-13.9	1.24 H	346	50.2	4.1
5	11650.00	47.8 PK	74.0	-26.2	1.64 H	308	35.0	12.8
6	11650.00	39.1 AV	54.0	-14.9	1.64 H	308	26.3	12.8
7	#17475.00	51.2 PK	68.2	-17.0	1.41 H	321	33.7	17.5

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	#5589.00	50.7 PK	68.2	-17.5	1.66 V	200	47.4	3.3
2	*5825.00	110.2 PK			2.85 V	98	106.3	3.9
3	*5825.00	102.1 AV			2.85 V	98	98.2	3.9
4	#5959.69	50.7 PK	68.2	-17.5	1.66 V	200	46.5	4.2
5	11650.00	46.7 PK	74.0	-27.3	2.22 V	82	33.9	12.8
6	11650.00	37.9 AV	54.0	-16.1	2.22 V	82	25.1	12.8
7	#17475.00	51.4 PK	68.2	-16.8	1.79 V	319	33.9	17.5

REMARKS:

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

802.11ac (VHT20)

CHANNEL	TX Channel 100	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	64.5 PK	74.0	-9.5	1.15 H	34	61.2	3.3
2	5460.00	51.5 AV	54.0	-2.5	1.15 H	34	48.2	3.3
3	#5470.00	67.2 PK	68.2	-1.0	1.06 H	57	63.9	3.3
4	*5500.00	112.0 PK			1.15 H	34	108.7	3.3
5	*5500.00	103.4 AV			1.15 H	34	100.1	3.3
6	11000.00	47.6 PK	74.0	-26.4	1.32 H	206	34.5	13.1
7	11000.00	38.6 AV	54.0	-15.4	1.32 H	206	25.5	13.1
8	#16500.00	50.2 PK	68.2	-18.0	1.99 H	179	35.9	14.3

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	5460.00	61.0 PK	74.0	-13.0	2.83 V	111	57.7	3.3
2	5460.00	48.0 AV	54.0	-6.0	2.83 V	111	44.7	3.3
3	#5470.00	63.9 PK	68.2	-4.3	2.81 V	106	60.6	3.3
4	*5500.00	108.7 PK			2.87 V	103	105.4	3.3
5	*5500.00	99.6 AV			2.87 V	103	96.3	3.3
6	11000.00	47.7 PK	74.0	-26.3	2.22 V	99	34.6	13.1
7	11000.00	39.0 AV	54.0	-15.0	2.22 V	99	25.9	13.1
8	#16500.00	51.4 PK	68.2	-16.8	1.81 V	321	37.1	14.3

REMARKS:

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

CHANNEL	TX Channel 116	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	111.6 PK			1.20 H	48	108.3	3.3
2	*5580.00	103.2 AV			1.20 H	48	99.9	3.3
3	11160.00	48.0 PK	74.0	-26.0	1.38 H	232	35.1	12.9
4	11160.00	39.1 AV	54.0	-14.9	1.38 H	232	26.2	12.9
5	#16740.00	50.0 PK	68.2	-18.2	2.04 H	180	34.6	15.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	108.2 PK			2.88 V	104	104.9	3.3
2	*5580.00	99.4 AV			2.88 V	104	96.1	3.3
3	11160.00	47.6 PK	74.0	-26.4	2.31 V	83	34.7	12.9
4	11160.00	38.7 AV	54.0	-15.3	2.31 V	83	25.8	12.9
5	#16740.00	50.5 PK	68.2	-17.7	1.77 V	309	35.1	15.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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 140	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	112.8 PK			1.10 H	50	109.4	3.4
2	*5700.00	103.7 AV			1.10 H	50	100.3	3.4
3	#5725.00	67.0 PK	68.2	-1.2	1.10 H	50	63.5	3.5
4	11400.00	48.1 PK	74.0	-25.9	1.24 H	205	34.8	13.3
5	11400.00	39.8 AV	54.0	-14.2	1.24 H	205	26.5	13.3
6	#17100.00	51.1 PK	68.2	-17.1	1.44 H	227	34.7	16.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	107.7 PK			2.87 V	98	104.3	3.4
2	*5700.00	98.7 AV			2.87 V	98	95.3	3.4
3	#5725.00	62.8 PK	68.2	-5.4	2.87 V	98	59.3	3.5
4	11400.00	46.7 PK	74.0	-27.3	2.17 V	104	33.4	13.3
5	11400.00	38.5 AV	54.0	-15.5	2.17 V	104	25.2	13.3
6	#17100.00	52.1 PK	68.2	-16.1	1.74 V	345	35.7	16.4

REMARKS:

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

CHANNEL	TX Channel 144	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5720.00	110.9 PK			1.20 H	37	107.4	3.5
2	*5720.00	102.8 AV			1.20 H	37	99.3	3.5
3	#5850.00	52.1 PK	68.2	-16.1	1.20 H	37	48.1	4.0
4	11440.00	48.5 PK	74.0	-25.5	1.39 H	327	35.3	13.2
5	11440.00	39.8 AV	54.0	-14.2	1.39 H	327	26.6	13.2
6	#17160.00	51.0 PK	68.2	-17.2	1.19 H	326	34.2	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	*5720.00	107.6 PK			2.92 V	92	104.1	3.5
2	*5720.00	98.8 AV			2.92 V	92	95.3	3.5
3	#5850.00	48.0 PK	68.2	-20.2	2.92 V	92	44.0	4.0
4	11440.00	47.6 PK	74.0	-26.4	2.11 V	101	34.4	13.2
5	11440.00	39.3 AV	54.0	-14.7	2.11 V	101	26.1	13.2
6	#17160.00	50.8 PK	68.2	-17.4	1.87 V	358	34.0	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.

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.7 PK	74.0	-7.3	1.69 H	40	63.4	3.3
2	5150.00	53.5 AV	54.0	-0.5	1.69 H	40	50.2	3.3
3	*5190.00	106.0 PK			1.66 H	33	102.8	3.2
4	*5190.00	96.3 AV			1.66 H	33	93.1	3.2
5	#10380.00	48.1 PK	68.2	-20.1	1.32 H	225	35.7	12.4
6	15570.00	50.0 PK	74.0	-24.0	1.54 H	249	36.7	13.3
7	15570.00	40.4 AV	54.0	-13.6	1.54 H	249	27.1	13.3

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.3 PK	74.0	-11.7	2.91 V	97	59.0	3.3
2	5150.00	49.5 AV	54.0	-4.5	2.91 V	97	46.2	3.3
3	*5190.00	101.8 PK			2.90 V	100	98.6	3.2
4	*5190.00	91.7 AV			2.90 V	100	88.5	3.2
5	#10380.00	47.5 PK	68.2	-20.7	2.20 V	129	35.1	12.4
6	15570.00	51.7 PK	74.0	-22.3	1.79 V	301	38.4	13.3
7	15570.00	40.9 AV	54.0	-13.1	1.79 V	301	27.6	13.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	112.7 PK			1.37 H	9	109.8	2.9
2	*5230.00	102.5 AV			1.37 H	9	99.6	2.9
3	5350.00	65.2 PK	74.0	-8.8	1.37 H	9	62.2	3.0
4	5350.00	46.0 AV	54.0	-8.0	1.37 H	9	43.0	3.0
5	#10460.00	49.2 PK	68.2	-19.0	1.51 H	294	36.7	12.5
6	15690.00	50.1 PK	74.0	-23.9	1.33 H	250	37.6	12.5
7	15690.00	40.5 AV	54.0	-13.5	1.33 H	250	28.0	12.5

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	108.6 PK			2.89 V	77	105.7	2.9
2	*5230.00	98.8 AV			2.89 V	77	95.9	2.9
3	5350.00	61.5 PK	74.0	-12.5	2.89 V	77	58.5	3.0
4	5350.00	42.4 AV	54.0	-11.6	2.89 V	77	39.4	3.0
5	#10460.00	48.3 PK	68.2	-19.9	2.21 V	117	35.8	12.5
6	15690.00	52.1 PK	74.0	-21.9	1.76 V	306	39.6	12.5
7	15690.00	41.7 AV	54.0	-12.3	1.76 V	306	29.2	12.5

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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:

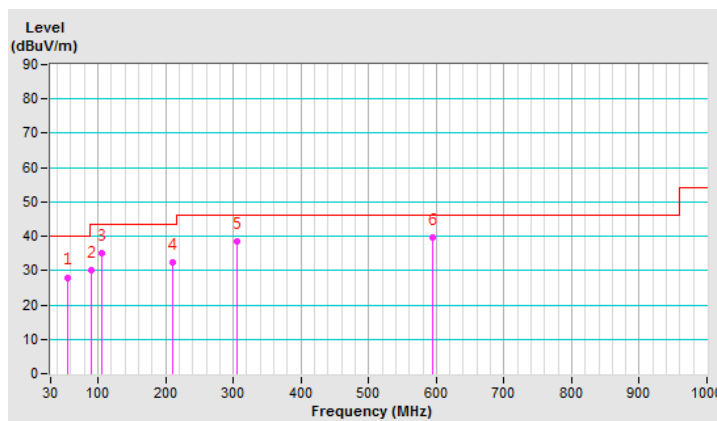
802.11a

CHANNEL	TX Channel 149	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	56.10	28.0 QP	40.0	-12.0	1.32 H	99	41.6	-13.6
2	90.52	30.2 QP	43.5	-13.3	1.47 H	100	48.5	-18.3
3	104.75	35.1 QP	43.5	-8.4	1.92 H	35	51.5	-16.4
4	210.21	32.3 QP	43.5	-11.2	1.65 H	100	47.3	-15.0
5	304.95	38.4 QP	46.0	-7.6	1.21 H	344	49.9	-11.5
6	594.10	39.6 QP	46.0	-6.4	1.32 H	285	44.2	-4.6

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit 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.



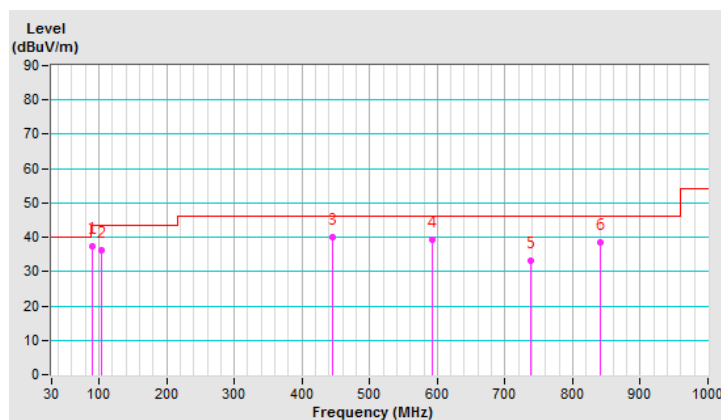
CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	89.77	37.2 QP	43.5	-6.3	1.43 V	71	55.5	-18.3
2	104.21	36.2 QP	43.5	-7.3	1.65 V	302	52.6	-16.4
3	444.62	40.1 QP	46.0	-5.9	1.49 V	88	48.1	-8.0
4	593.10	39.2 QP	46.0	-6.8	1.65 V	177	43.8	-4.6
5	738.50	33.1 QP	46.0	-12.9	1.98 V	311	34.9	-1.8
6	840.10	38.5 QP	46.0	-7.5	1.71 V	285	38.5	0.0

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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: July 04, 2019

4.2.3 Test Procedure

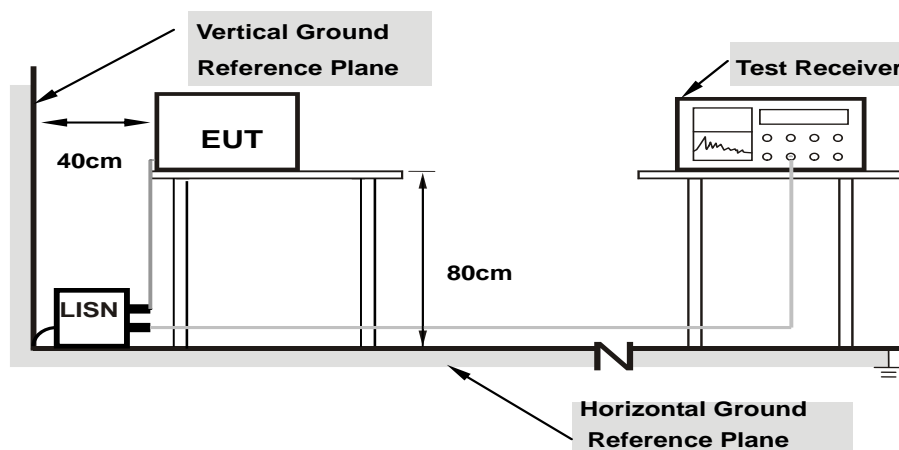
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

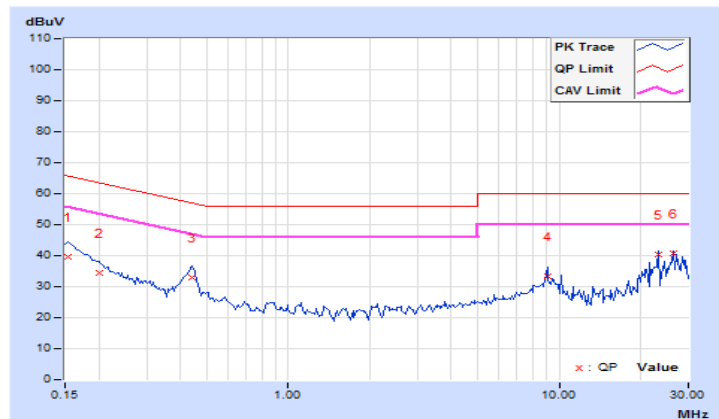
4.2.7 Test Results

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

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.03	29.55	16.02	39.58	26.05	65.79	55.79	-26.21	-29.74
2	0.20078	10.05	24.32	11.01	34.37	21.06	63.58	53.58	-29.21	-32.52
3	0.43906	10.08	22.92	18.79	33.00	28.87	57.08	47.08	-24.08	-18.21
4	9.09766	10.64	22.83	16.02	33.47	26.66	60.00	50.00	-26.53	-23.34
5	23.12891	11.43	29.01	24.84	40.44	36.27	60.00	50.00	-19.56	-13.73
6	26.48828	11.51	29.11	25.03	40.62	36.54	60.00	50.00	-19.38	-13.46

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.

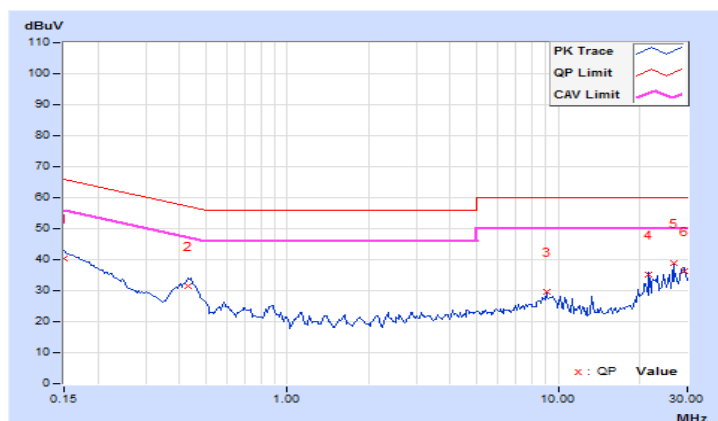


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15000	9.94	30.61	16.37	40.55	26.31	66.00	56.00	-25.45
2	0.43125	9.98	21.66	18.41	31.64	28.39	57.23	47.23	-25.59	-18.84
3	9.08984	10.48	19.19	11.93	29.67	22.41	60.00	50.00	-30.33	-27.59
4	21.66406	11.17	24.18	19.86	35.35	31.03	60.00	50.00	-24.65	-18.97
5	26.60938	11.25	27.47	22.68	38.72	33.93	60.00	50.00	-21.28	-16.07
6	29.11328	11.29	25.15	19.62	36.44	30.91	60.00	50.00	-23.56	-19.09

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 \leq 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} ;

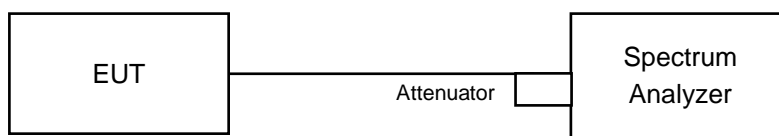
Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

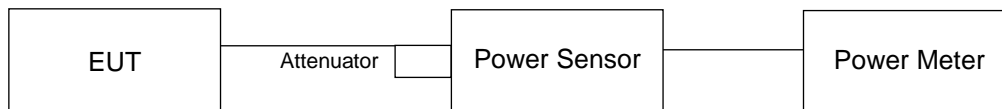
4.3.2 Test Setup

FOR POWER OUTPUT MEASUREMENT

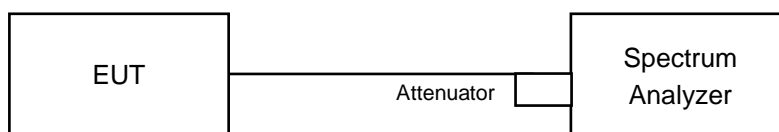
For channel straddling 5725MHz:



For other channels:



FOR 26dB OCCUPIED BANDWIDTH



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

FOR POWER OUTPUT MEASUREMENT

For other channels:

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.

For channel straddling 5725MHz:

Follow FCC KDB 789033 UNII test procedure:

Method SA-1

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1MHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Number of points in sweep ≥ 2 Span / RBW.
5. Sweep time = auto.
6. Set trigger to free run (duty cycle ≥ 98 percent)
7. Detector = RMS.
8. Trace average at least 100 traces in power averaging mode
9. Compute power by integrating the spectrum across the 26 dB EBW of the signal.

FOR 26dB OCCUPIED BANDWIDTH

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW $>$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

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

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POWER OUTPUT

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.23	20.16	209.192	23.21	24.00	Pass
60	5300	20.29	20.18	211.137	23.25	24.00	Pass
64	5320	20.21	20.06	206.345	23.15	24.00	Pass
149	5745	22.57	23.30	394.513	25.96	30.00	Pass
157	5785	22.71	23.35	402.91	26.05	30.00	Pass
165	5825	22.62	23.25	394.159	25.96	30.00	Pass

26dB OCCUPIED BANDWIDTH

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	39.63	38.76
60	5300	38.40	39.12
64	5320	38.85	38.37

Note: For U-NII-2A, U-NII-2C Band output power limitation is determined based on 26dBc bandwidth

Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
52	5260	38.76	26.88 > 24
60	5300	38.40	26.84 > 24
64	5320	38.37	26.83 > 24

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POWER OUTPUT

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
100	5500	20.16	19.72	197.509	22.96	24.00	Pass
116	5580	20.41	19.80	205.4	23.13	24.00	Pass
140	5700	20.39	19.60	200.597	23.02	24.00	Pass
*144 (U-NII-2C Band)	5720	18.50	17.94	133.025	21.24	24.00	Pass
*144 (U-NII-3 Band)	5720	12.97	12.34	36.955	15.68	30.00	Pass

Note: * Test was performed in accordance with Measurement follow FCC KDB 789033 UNII test procedure Method SA-1 and use spectrum analyzer test.

The Total Power for the straddle channel:

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
144	5720	169.98	22.3

Note: The total power was calculated through formula and record the value for reference only.

26dB OCCUPIED BANDWIDTH

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
100	5500	45.24	45.43
116	5580	45.58	44.20
140	5700	45.08	44.21
144 (U-NII-2C Band)	5720	27.25	23.28

Note: For U-NII-2A, U-NII-2C Band output power limitation is determined based on 26dBc bandwidth

Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
100	5500	45.24	27.55 > 24
116	5580	44.20	27.45 > 24
140	5700	44.21	27.45 > 24
144 (U-NII-2C Band)	5720	23.28	24.66 > 24

802.11ac (VHT40)
POWER OUTPUT

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.43	13.81	58.958	17.71	24.00	Pass
46	5230	21.28	20.53	247.256	23.93	24.00	Pass

5 Pictures of Test Arrangements

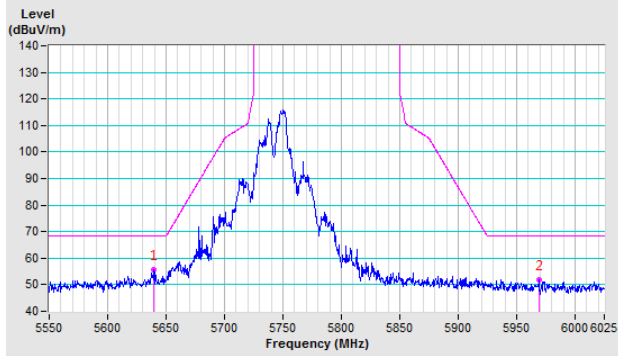
Please refer to the attached file (Test Setup Photo).

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

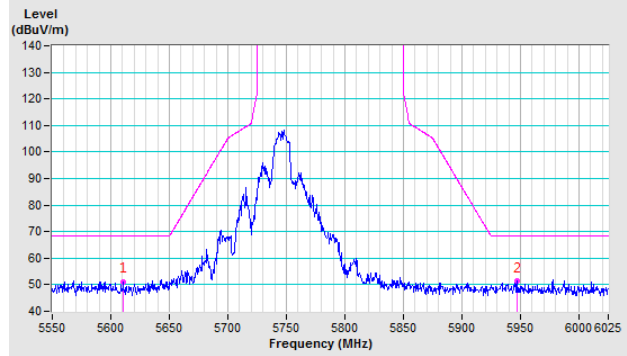
802.11a

CH 149 5745 MHz

Horizontal

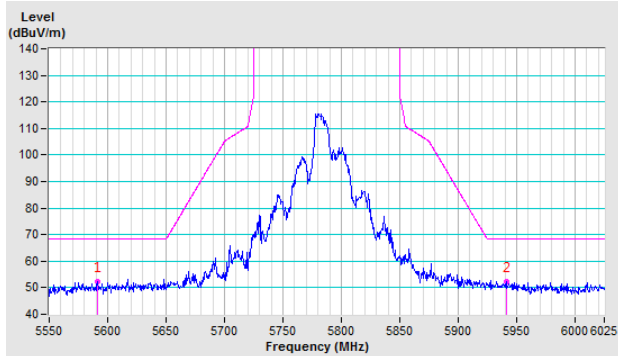


Vertical

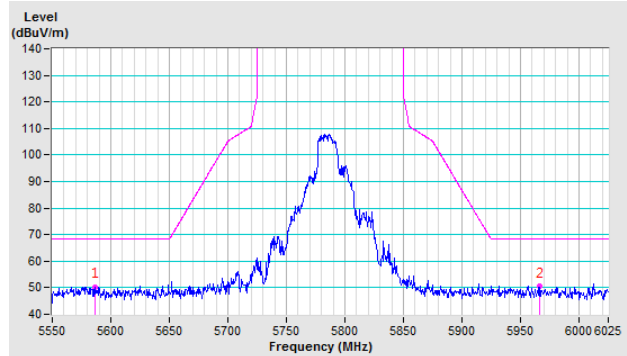


CH 157 5785 MHz

Horizontal

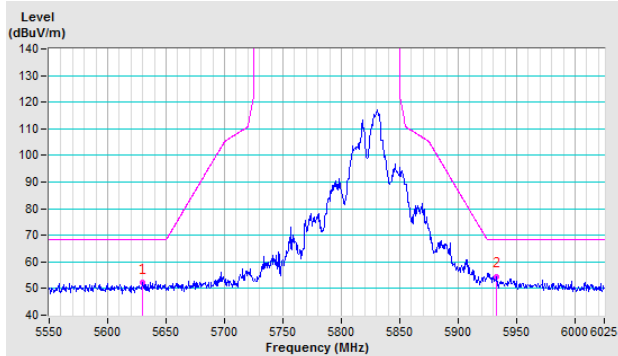


Vertical

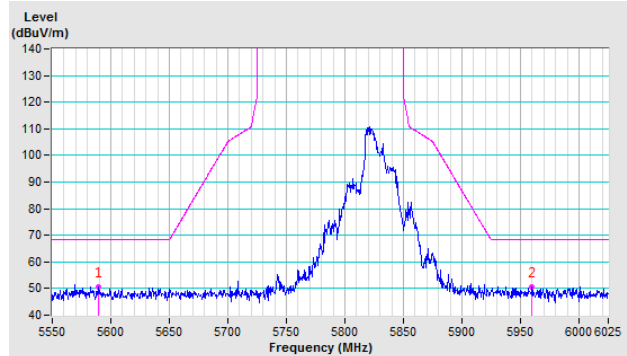


CH 165 5825 MHz

Horizontal



Vertical



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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Web Site: www.bureauveritas-adt.com

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

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