

FCC Test Report

Report No.: RF180911E19A-1

FCC ID: 2APLE18300392

Test Model: VMC5040

Received Date: Nov. 12, 2018

Test Date: Nov. 17 to 22, 2018

Issued Date: Dec. 03, 2018

Applicant: Arlo Technologies, Inc.

Address: 2200 Faraday Ave. Suite 150, Carlsbad, CA 92008, Unites States

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

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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
RF180911E19A-1	Original release.	Dec. 03, 2018

1 Certificate of Conformity

Product: arlo ULTRA

Brand: Arlo

Test Model: VMC5040

Sample Status: ENGINEERING SAMPLE

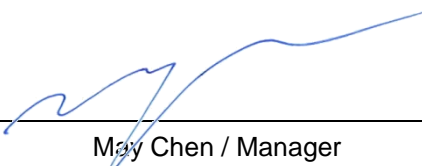
Applicant: Arlo Technologies, Inc.

Test Date: Nov. 17 to 22, 2018

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

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

Prepared by :  _____, **Date:** _____ Dec. 03, 2018
Claire Kuan / Specialist

Approved by :  _____, **Date:** _____ Dec. 03, 2018
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.53dB at 0.47423MHz.
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 5350.00MHz, 5470.00MHz, 5725.00MHz.
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(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

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	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.33 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	arlo ULTRA
Brand	Arlo
Test Model	VMC5040
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 5V from USB interface or DC 3.85V from battery
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
Modulation Technology	OFDM
Transfer Rate	802.11a: up to 54Mbps 802.11n: up to 72.2Mbps 802.11ac: up to 86.7Mbps
Operating Frequency	5.26 ~ 5.32GHz, 5.50 ~ 5.72GHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20): 16
Output Power	5.26GHz ~ 5.32GHz: 78.705mW 5.50 ~ 5.72GHz: 72.277mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Battery x 1
Data Cable Supplied	USB cable x 1 (Unshielded, 0.8m)

Note:

- This report is prepared for FCC class II change. The difference compared with the Report No.: RF180911E19-1 as the following information:
 - ◆ Add DFS band <5.26~ 5.32GHz, 5.50 ~ 5.72GHz>.
- According to above condition, all test items need to be performed. And all data were verified to meet the requirements.
- 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.

- The EUT could be supplied from a battery as following table:

Brand	Model No.	Spec.
Arlo	A-4a	3.85Vdc, 18.48Wh, 4800mAh

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

Antenna No	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type
Left	1.3	2.4~2.4835	Monopole	NA
	3.4	5.15~5.85	Monopole	NA
Right	1.5	2.4~2.4835	Monopole	NA
	3.5	5.15~5.85	Monopole	NA

- In the original report, the EUT was pre-tested under following test modes:

Pre-test Mode	Power
Mode A	Power from USB adapter
Mode B	Power from battery

From the above modes, the worst radiated emission was found in **Mode A**. Therefore only the test data of the modes were recorded in this report.

7. In the original report, the EUT was pre-tested under following test modes:

Pre-test Mode	Power
Mode A	Power from Laptop
Mode B	Power from USB adapter

From the above modes, the worst conducted emission was found in **Mode A**. Therefore only the test data of the modes were recorded in this report.

8. The EUT incorporates a SISO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX diversity	1RX
802.11g	6 ~ 54Mbps	1TX diversity	1RX
802.11n (HT20)	MCS 0~7	1TX diversity	1RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX diversity	1RX
802.11n (HT20)	MCS 0~7	1TX diversity	1RX
802.11ac (VHT20)	MCS0~8 Nss=1	1TX diversity	1RX

9. 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 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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE \geq 1G	RE $<$ 1G	PLC	APCM	
-	√	√	√	√	PLC: Power from Laptop other: Power from USB adapter

Where **RE \geq 1G**: Radiated Emission above 1GHz

RE $<$ 1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: In the original report, the EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6
802.11ac (VHT20)		52 to 64	52, 60, 64	OFDMA	BPSK	6.5
802.11a	5500-5720	100 to 144	100, 116, 140, 144	OFDM	BPSK	6
802.11ac (VHT20)		100 to 144	100, 116, 140, 144	OFDMA	BPSK	6.5

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)
802.11ac (VHT20)	5260-5320	52 to 64	60	OFDMA	BPSK	6.5
	5500-5720	100 to 144				

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)
802.11ac (VHT20)	5260-5320	52 to 64	60	OFDMA	BPSK	6.5
	5500-5720	100 to 144				

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	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6
802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	BPSK	6.5
802.11a	5500-5720	100 to 144	100, 116, 140, 144	OFDM	BPSK	6
802.11ac (VHT20)		100 to 144	100, 116, 140, 144	OFDM	BPSK	6.5

Test Condition:

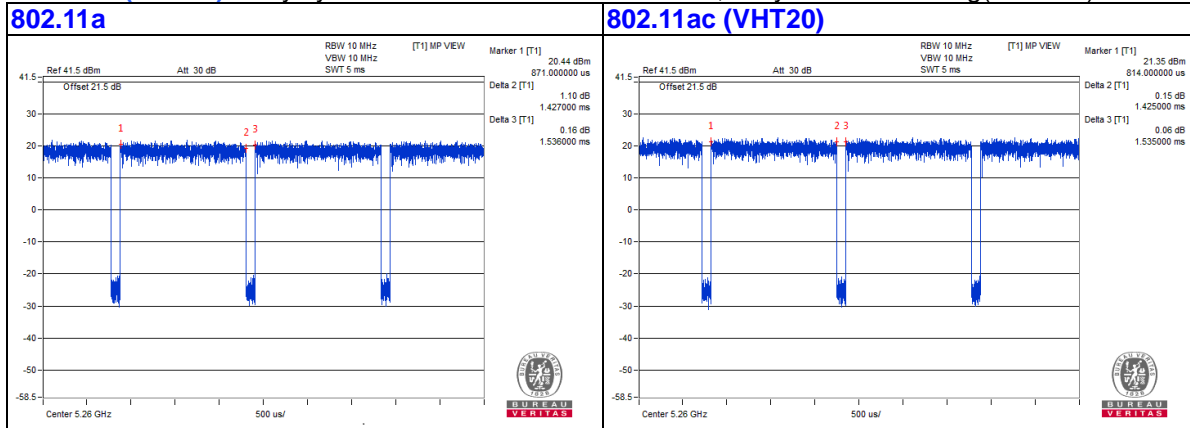
Applicable To	Environmental Conditions	Input Power (system)	Tested By
RE \geq 1G	23deg. C, 68%RH	120Vac, 60Hz	Steven Chiang
RE $<$ 1G	22deg. C, 64%RH	120Vac, 60Hz	Steven Chiang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 1.427 ms/1.536 ms = 0.929, Duty factor = $10 * \log(1/0.929) = 0.32$

802.11ac (VHT20): Duty cycle = 1.425 ms/1.535 ms = 0.928, Duty factor = $10 * \log(1/0.928) = 0.32$



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.	USB Adapter	ASUS	EXA1205UA	NA	NA	Provided by Lab
B.	Laptop	HP	TPN-Q186	5CD8212YYG	FCC DoC	Provided by Lab

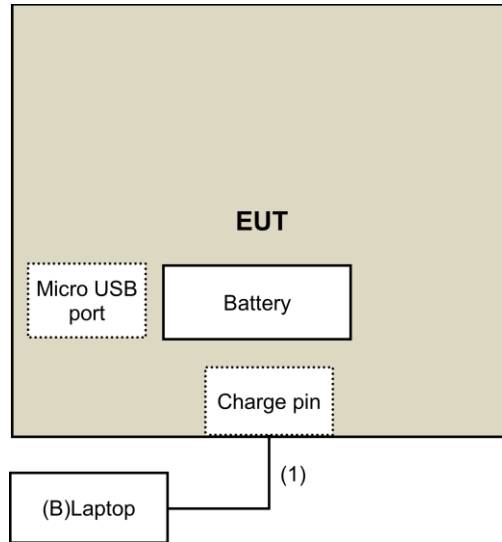
Note:

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

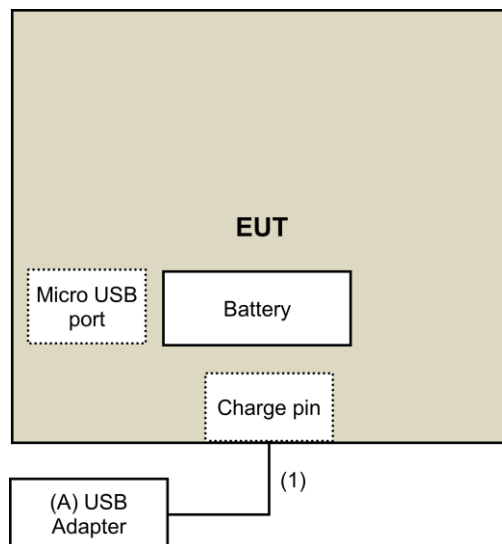
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	0.8	No	0	Supplied by client

3.4.1 Configuration of System under Test

For conducted emission test:



For radiated emission 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
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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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 Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001	Jan. 15, 2018	Jan. 14, 2019
RF Cable	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 30, 2018	Oct. 29, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-4-1	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-2	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-3	Mar. 21, 2018	Mar. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier Mini-Circuits	ZVA-183-S+	AMP-ZVA-03	May 10, 2018	May 09, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150318	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 10, 2018	Jan. 09, 2019
True RMS Clamp Meter FLUKE	325	31130711WS	May 22, 2018	May 21, 2019

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Nov. 17 to 22, 2018

4.1.3 Test Procedure

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

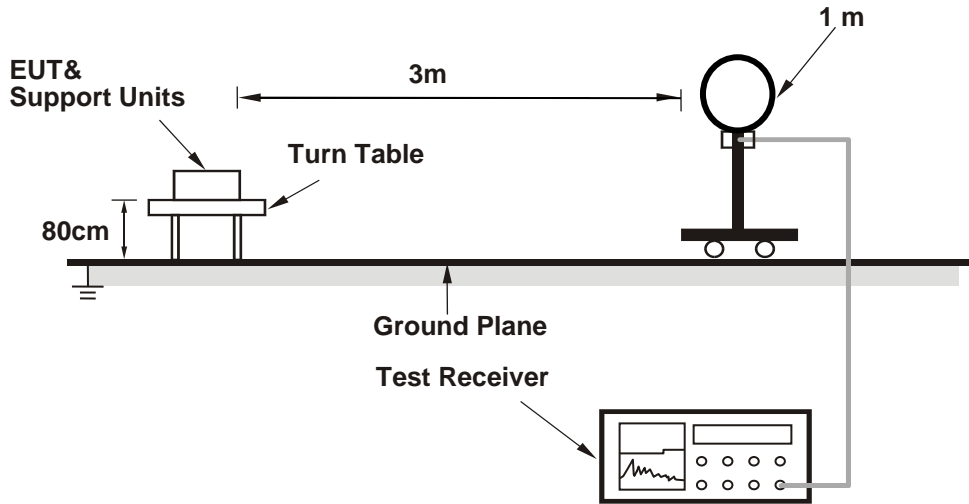
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

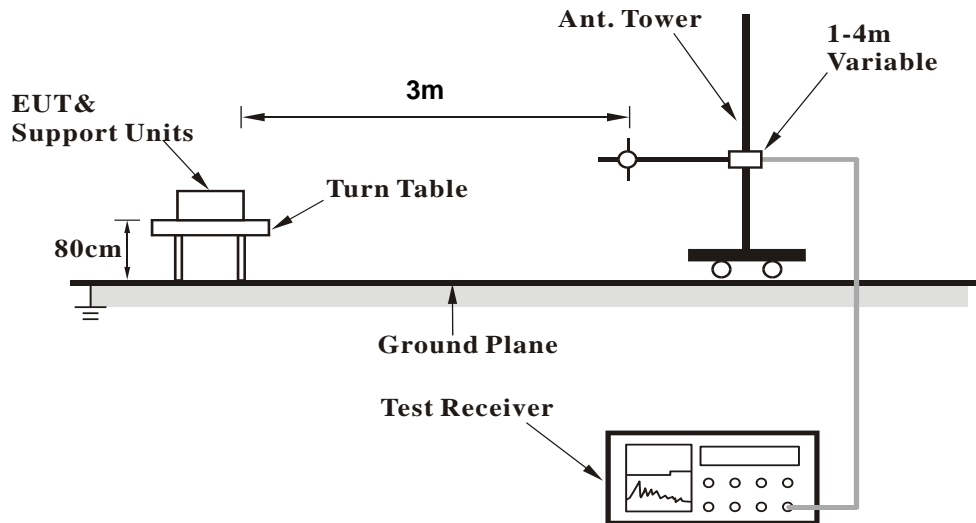
No deviation.

4.1.5 Test Setup

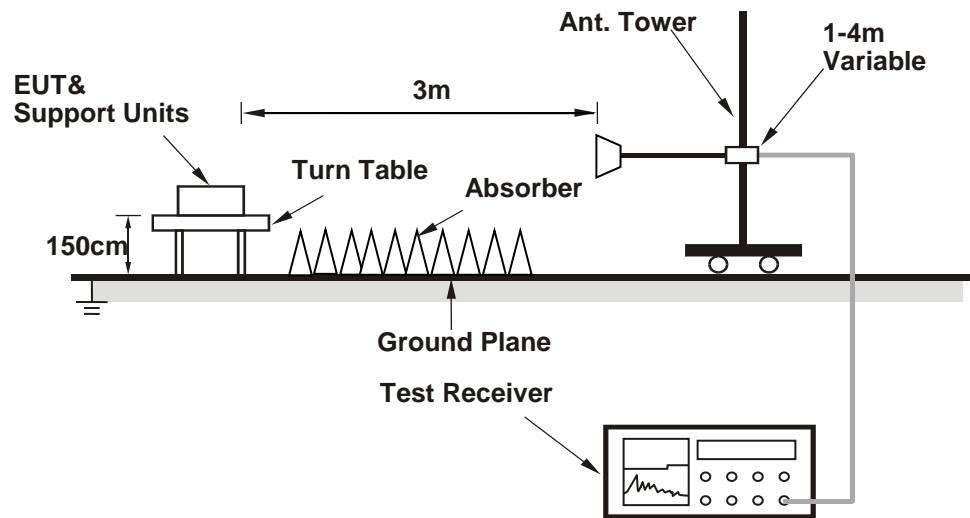
For Radiated emission below 30MHz



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 Arlo Gen RF Commands.txt command) has been activated to set the EUT on specific status.

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	49.1 PK	74.0	-24.9	1.07 H	62	46.1	3.0
2	5150.00	36.2 AV	54.0	-17.8	1.07 H	62	33.2	3.0
3	*5260.00	109.1 PK			1.07 H	62	106.7	2.4
4	*5260.00	99.9 AV			1.07 H	62	97.5	2.4
5	#10520.00	46.5 PK	68.2	-21.7	1.12 H	327	33.6	12.9
6	15780.00	47.9 PK	74.0	-26.1	1.35 H	254	35.4	12.5
7	15780.00	35.1 AV	54.0	-18.9	1.35 H	254	22.6	12.5

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	49.0 PK	74.0	-25.0	1.11 V	291	46.0	3.0
2	5150.00	36.0 AV	54.0	-18.0	1.11 V	291	33.0	3.0
3	*5260.00	104.3 PK			1.11 V	291	101.9	2.4
4	*5260.00	95.2 AV			1.11 V	291	92.8	2.4
5	#10520.00	47.1 PK	68.2	-21.1	1.37 V	172	34.2	12.9
6	15780.00	48.1 PK	74.0	-25.9	1.24 V	181	35.6	12.5
7	15780.00	35.8 AV	54.0	-18.2	1.24 V	181	23.3	12.5

REMARKS:

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

CHANNEL	TX Channel 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	109.4 PK			1.06 H	66	106.9	2.5
2	*5300.00	100.0 AV			1.06 H	66	97.5	2.5
3	10600.00	47.0 PK	74.0	-27.0	1.16 H	334	34.6	12.4
4	10600.00	34.5 AV	54.0	-19.5	1.16 H	334	22.1	12.4
5	15900.00	47.8 PK	74.0	-26.2	1.30 H	268	35.5	12.3
6	15900.00	35.1 AV	54.0	-18.9	1.30 H	268	22.8	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	104.9 PK			1.14 V	289	102.4	2.5
2	*5300.00	95.6 AV			1.14 V	289	93.1	2.5
3	10600.00	47.3 PK	74.0	-26.7	1.34 V	172	34.9	12.4
4	10600.00	35.1 AV	54.0	-18.9	1.34 V	172	22.7	12.4
5	15900.00	48.4 PK	74.0	-25.6	1.24 V	175	36.1	12.3
6	15900.00	36.0 AV	54.0	-18.0	1.24 V	175	23.7	12.3

REMARKS:

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

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	109.5 PK			1.05 H	66	107.0	2.5
2	*5320.00	100.1 AV			1.05 H	66	97.6	2.5
3	5350.00	73.0 PK	74.0	-1.0	1.05 H	66	70.4	2.6
4	5350.00	50.9 AV	54.0	-3.1	1.05 H	66	48.3	2.6
5	10640.00	46.7 PK	74.0	-27.3	1.11 H	322	34.1	12.6
6	10640.00	34.2 AV	54.0	-19.8	1.11 H	322	21.6	12.6
7	15960.00	48.1 PK	74.0	-25.9	1.26 H	263	35.6	12.5
8	15960.00	35.5 AV	54.0	-18.5	1.26 H	263	23.0	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	*5320.00	104.7 PK			1.13 V	279	102.2	2.5
2	*5320.00	95.4 AV			1.13 V	279	92.9	2.5
3	5350.00	69.5 PK	74.0	-4.5	1.13 V	279	66.9	2.6
4	5350.00	47.3 AV	54.0	-6.7	1.13 V	279	44.7	2.6
5	10640.00	46.8 PK	74.0	-27.2	1.41 V	165	34.2	12.6
6	10640.00	34.4 AV	54.0	-19.6	1.41 V	165	21.8	12.6
7	15960.00	48.4 PK	74.0	-25.6	1.27 V	181	35.9	12.5
8	15960.00	36.0 AV	54.0	-18.0	1.27 V	181	23.5	12.5

REMARKS:

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

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	60.3 PK	74.0	-13.7	1.02 H	88	57.4	2.9
2	5460.00	44.9 AV	54.0	-9.1	1.02 H	88	42.0	2.9
3	#5470.00	68.1 PK	68.2	-0.1	1.02 H	88	65.2	2.9
4	*5500.00	107.1 PK			1.02 H	88	104.2	2.9
5	*5500.00	98.2 AV			1.02 H	88	95.3	2.9
6	11000.00	46.7 PK	74.0	-27.3	1.16 H	332	33.5	13.2
7	11000.00	34.2 AV	54.0	-19.8	1.16 H	332	21.0	13.2
8	#16500.00	48.5 PK	68.2	-19.7	1.28 H	243	33.5	15.0

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	5460.00	55.7 PK	74.0	-18.3	1.17 V	283	52.8	2.9
2	5460.00	43.1 AV	54.0	-10.9	1.17 V	283	40.2	2.9
3	#5470.00	63.1 PK	68.2	-5.1	1.17 V	283	60.2	2.9
4	*5500.00	102.7 PK			1.17 V	283	99.8	2.9
5	*5500.00	93.4 AV			1.17 V	283	90.5	2.9
6	11000.00	46.4 PK	74.0	-27.6	1.39 V	164	33.2	13.2
7	11000.00	34.2 AV	54.0	-19.8	1.39 V	164	21.0	13.2
8	#16500.00	48.2 PK	68.2	-20.0	1.21 V	187	33.2	15.0

REMARKS:

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

CHANNEL	TX Channel 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	109.3 PK			1.02 H	94	106.1	3.2
2	*5580.00	100.0 AV			1.02 H	94	96.8	3.2
3	11160.00	46.9 PK	74.0	-27.1	1.06 H	335	33.8	13.1
4	11160.00	34.6 AV	54.0	-19.4	1.06 H	335	21.5	13.1
5	#16740.00	47.7 PK	68.2	-20.5	1.32 H	264	31.3	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	*5580.00	104.6 PK			1.20 V	274	101.4	3.2
2	*5580.00	95.3 AV			1.20 V	274	92.1	3.2
3	11160.00	47.7 PK	74.0	-26.3	1.38 V	177	34.6	13.1
4	11160.00	35.0 AV	54.0	-19.0	1.38 V	177	21.9	13.1
5	#16740.00	47.9 PK	68.2	-20.3	1.21 V	179	31.5	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 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	108.1 PK			1.02 H	88	104.7	3.4
2	*5700.00	99.2 AV			1.02 H	88	95.8	3.4
3	#5725.00	68.1 PK	68.2	-0.1	1.02 H	88	64.8	3.3
4	11400.00	46.6 PK	74.0	-27.4	1.22 H	344	33.1	13.5
5	11400.00	33.9 AV	54.0	-20.1	1.22 H	344	20.4	13.5
6	#17100.00	50.6 PK	68.2	-17.6	1.27 H	242	34.5	16.1

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	*5700.00	103.6 PK			1.15 V	298	100.2	3.4
2	*5700.00	94.8 AV			1.15 V	298	91.4	3.4
3	#5725.00	64.6 PK	68.2	-3.6	1.15 V	298	61.3	3.3
4	11400.00	47.3 PK	74.0	-26.7	1.52 V	171	33.8	13.5
5	11400.00	34.4 AV	54.0	-19.6	1.52 V	171	20.9	13.5
6	#17100.00	50.6 PK	68.2	-17.6	1.20 V	173	34.5	16.1

REMARKS:

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

CHANNEL	TX Channel 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	5460.00	49.5 PK	74.0	-24.5	1.01 H	89	46.6	2.9
2	5460.00	36.9 AV	54.0	-17.1	1.01 H	89	34.0	2.9
3	#5470.00	50.2 PK	68.2	-18.0	1.01 H	89	47.3	2.9
4	*5720.00	108.4 PK			1.01 H	89	105.1	3.3
5	*5720.00	99.5 AV			1.01 H	89	96.2	3.3
6	#5850.00	50.4 PK	68.2	-17.8	1.01 H	89	46.8	3.6
7	11440.00	47.0 PK	74.0	-27.0	1.18 H	360	33.6	13.4
8	11440.00	34.3 AV	54.0	-19.7	1.18 H	360	20.9	13.4
9	#17160.00	50.8 PK	68.2	-17.4	1.36 H	240	34.5	16.3

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	48.2 PK	74.0	-25.8	1.18 V	268	45.3	2.9
2	5460.00	35.4 AV	54.0	-18.6	1.18 V	268	32.5	2.9
3	#5470.00	47.6 PK	68.2	-20.6	1.18 V	268	44.7	2.9
4	*5720.00	103.8 PK			1.18 V	268	100.5	3.3
5	*5720.00	94.7 AV			1.18 V	268	91.4	3.3
6	#5850.00	47.3 PK	68.2	-20.9	1.18 V	268	43.7	3.6
7	11440.00	47.0 PK	74.0	-27.0	1.49 V	184	33.6	13.4
8	11440.00	34.4 AV	54.0	-19.6	1.49 V	184	21.0	13.4
9	#17160.00	50.6 PK	68.2	-17.6	1.18 V	179	34.3	16.3

REMARKS:

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

802.11ac (VHT20)

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	48.6 PK	74.0	-25.4	1.05 H	86	45.6	3.0
2	5150.00	36.6 AV	54.0	-17.4	1.05 H	86	33.6	3.0
3	*5260.00	109.5 PK			1.05 H	86	107.1	2.4
4	*5260.00	99.8 AV			1.05 H	86	97.4	2.4
5	#10520.00	46.7 PK	68.2	-21.5	1.05 H	333	33.8	12.9
6	15780.00	47.8 PK	74.0	-26.2	1.33 H	244	35.3	12.5
7	15780.00	35.1 AV	54.0	-18.9	1.33 H	244	22.6	12.5

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	47.5 PK	74.0	-26.5	1.20 V	293	44.5	3.0
2	5150.00	35.1 AV	54.0	-18.9	1.20 V	293	32.1	3.0
3	*5260.00	104.3 PK			1.20 V	293	101.9	2.4
4	*5260.00	95.0 AV			1.20 V	293	92.6	2.4
5	#10520.00	47.2 PK	68.2	-21.0	1.34 V	180	34.3	12.9
6	15780.00	48.4 PK	74.0	-25.6	1.21 V	193	35.9	12.5
7	15780.00	36.3 AV	54.0	-17.7	1.21 V	193	23.8	12.5

REMARKS:

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

CHANNEL	TX Channel 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	110.6 PK			1.00 H	84	108.1	2.5
2	*5300.00	100.4 AV			1.00 H	84	97.9	2.5
3	10600.00	46.0 PK	74.0	-28.0	1.16 H	350	33.6	12.4
4	10600.00	33.9 AV	54.0	-20.1	1.16 H	350	21.5	12.4
5	15900.00	48.3 PK	74.0	-25.7	1.30 H	241	36.0	12.3
6	15900.00	35.6 AV	54.0	-18.4	1.30 H	241	23.3	12.3

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	105.1 PK			1.17 V	296	102.6	2.5
2	*5300.00	95.8 AV			1.17 V	296	93.3	2.5
3	10600.00	47.4 PK	74.0	-26.6	1.40 V	177	35.0	12.4
4	10600.00	35.0 AV	54.0	-19.0	1.40 V	177	22.6	12.4
5	15900.00	48.4 PK	74.0	-25.6	1.29 V	190	36.1	12.3
6	15900.00	36.2 AV	54.0	-17.8	1.29 V	190	23.9	12.3

REMARKS:

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

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	108.8 PK			1.01 H	85	106.3	2.5
2	*5320.00	99.0 AV			1.01 H	85	96.5	2.5
3	5350.00	73.9 PK	74.0	-0.1	1.01 H	85	71.3	2.6
4	5350.00	51.0 AV	54.0	-3.0	1.01 H	85	48.4	2.6
5	10640.00	46.6 PK	74.0	-27.4	1.09 H	331	34.0	12.6
6	10640.00	34.2 AV	54.0	-19.8	1.09 H	331	21.6	12.6
7	15960.00	48.5 PK	74.0	-25.5	1.35 H	246	36.0	12.5
8	15960.00	35.5 AV	54.0	-18.5	1.35 H	246	23.0	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	*5320.00	104.7 PK			1.16 V	275	102.2	2.5
2	*5320.00	94.3 AV			1.16 V	275	91.8	2.5
3	5350.00	68.6 PK	74.0	-5.4	1.16 V	275	66.0	2.6
4	5350.00	47.3 AV	54.0	-6.7	1.16 V	275	44.7	2.6
5	10640.00	47.7 PK	74.0	-26.3	1.40 V	180	35.1	12.6
6	10640.00	35.1 AV	54.0	-18.9	1.40 V	180	22.5	12.6
7	15960.00	47.9 PK	74.0	-26.1	1.26 V	188	35.4	12.5
8	15960.00	35.8 AV	54.0	-18.2	1.26 V	188	23.3	12.5

REMARKS:

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

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	61.8 PK	74.0	-12.2	1.02 H	88	58.9	2.9
2	5460.00	44.5 AV	54.0	-9.5	1.02 H	88	41.6	2.9
3	#5470.00	68.1 PK	68.2	-0.1	1.02 H	88	65.2	2.9
4	*5500.00	107.4 PK			1.02 H	88	104.5	2.9
5	*5500.00	97.4 AV			1.02 H	88	94.5	2.9
6	11000.00	46.9 PK	74.0	-27.1	1.15 H	345	33.7	13.2
7	11000.00	34.2 AV	54.0	-19.8	1.15 H	345	21.0	13.2
8	#16500.00	50.5 PK	68.2	-17.7	1.36 H	236	35.5	15.0

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	5460.00	56.2 PK	74.0	-17.8	1.16 V	289	53.3	2.9
2	5460.00	39.6 AV	54.0	-14.4	1.16 V	289	36.7	2.9
3	#5470.00	65.3 PK	68.2	-2.9	1.16 V	289	62.4	2.9
4	*5500.00	105.6 PK			1.16 V	289	102.7	2.9
5	*5500.00	92.6 AV			1.16 V	289	89.7	2.9
6	11000.00	47.2 PK	74.0	-26.8	1.40 V	176	34.0	13.2
7	11000.00	34.7 AV	54.0	-19.3	1.40 V	176	21.5	13.2
8	#16500.00	48.5 PK	68.2	-19.7	1.30 V	173	33.5	15.0

REMARKS:

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

CHANNEL	TX Channel 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	109.7 PK			1.02 H	84	106.5	3.2
2	*5580.00	99.9 AV			1.02 H	84	96.7	3.2
3	11160.00	46.7 PK	74.0	-27.3	1.18 H	359	33.6	13.1
4	11160.00	34.0 AV	54.0	-20.0	1.18 H	359	20.9	13.1
5	#16740.00	51.1 PK	68.2	-17.1	1.33 H	247	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	*5580.00	105.2 PK			1.16 V	271	102.0	3.2
2	*5580.00	95.4 AV			1.16 V	271	92.2	3.2
3	11160.00	46.6 PK	74.0	-27.4	1.40 V	176	33.5	13.1
4	11160.00	34.4 AV	54.0	-19.6	1.40 V	176	21.3	13.1
5	#16740.00	48.0 PK	68.2	-20.2	1.27 V	186	31.6	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 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	107.2 PK			1.04 H	89	103.8	3.4
2	*5700.00	97.1 AV			1.04 H	89	93.7	3.4
3	#5725.00	67.9 PK	68.2	-0.3	1.04 H	89	64.6	3.3
4	11400.00	46.6 PK	74.0	-27.4	1.12 H	356	33.1	13.5
5	11400.00	34.4 AV	54.0	-19.6	1.12 H	356	20.9	13.5
6	#17100.00	50.2 PK	68.2	-18.0	1.29 H	238	34.1	16.1

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	*5700.00	102.3 PK			1.13 V	290	98.9	3.4
2	*5700.00	92.2 AV			1.13 V	290	88.8	3.4
3	#5725.00	63.1 PK	68.2	-5.1	1.13 V	290	59.8	3.3
4	11400.00	46.5 PK	74.0	-27.5	1.51 V	181	33.0	13.5
5	11400.00	33.7 AV	54.0	-20.3	1.51 V	181	20.2	13.5
6	#17100.00	51.2 PK	68.2	-17.0	1.17 V	169	35.1	16.1

REMARKS:

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

CHANNEL	TX Channel 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	5460.00	49.2 PK	74.0	-24.8	1.01 H	87	46.3	2.9
2	5460.00	37.0 AV	54.0	-17.0	1.01 H	87	34.1	2.9
3	#5470.00	50.9 PK	68.2	-17.3	1.01 H	87	48.0	2.9
4	*5720.00	108.8 PK			1.01 H	87	105.5	3.3
5	*5720.00	99.4 AV			1.01 H	87	96.1	3.3
6	#5850.00	49.2 PK	68.2	-19.0	1.01 H	87	45.6	3.6
7	11440.00	46.2 PK	74.0	-27.8	1.21 H	340	32.8	13.4
8	11440.00	33.8 AV	54.0	-20.2	1.21 H	340	20.4	13.4
9	#17160.00	51.1 PK	68.2	-17.1	1.31 H	251	34.8	16.3

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	48.1 PK	74.0	-25.9	1.13 V	269	45.2	2.9
2	5460.00	35.2 AV	54.0	-18.8	1.13 V	269	32.3	2.9
3	#5470.00	49.0 PK	68.2	-19.2	1.13 V	269	46.1	2.9
4	*5720.00	104.2 PK			1.13 V	269	100.9	3.3
5	*5720.00	94.8 AV			1.13 V	269	91.5	3.3
6	#5850.00	48.7 PK	68.2	-19.5	1.13 V	269	45.1	3.6
7	11440.00	46.7 PK	74.0	-27.3	1.49 V	173	33.3	13.4
8	11440.00	33.9 AV	54.0	-20.1	1.49 V	173	20.5	13.4
9	#17160.00	50.9 PK	68.2	-17.3	1.16 V	192	34.6	16.3

REMARKS:

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

Below 1GHz Data:

802.11ac (VHT20)

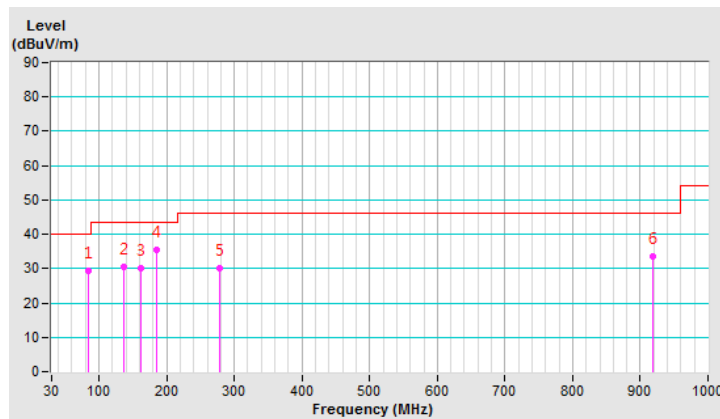
CHANNEL	TX Channel 60	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	84.32	29.3 QP	40.0	-10.7	1.50 H	1	42.7	-13.4
2	137.11	30.6 QP	43.5	-12.9	2.00 H	94	39.0	-8.4
3	161.44	30.1 QP	43.5	-13.4	2.00 H	285	37.9	-7.8
4	185.69	35.6 QP	43.5	-7.9	1.50 H	300	45.7	-10.1
5	278.47	30.0 QP	46.0	-16.0	1.00 H	187	37.7	-7.7
6	917.99	33.6 QP	46.0	-12.4	1.50 H	277	27.6	6.0

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 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.



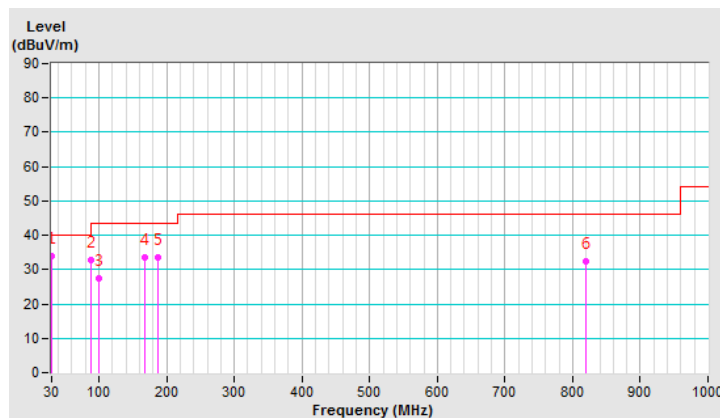
CHANNEL	TX Channel 60	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	30.51	33.8 QP	40.0	-6.2	1.00 V	311	42.8	-9.0
2	87.96	32.9 QP	40.0	-7.1	1.50 V	261	46.5	-13.6
3	100.30	27.6 QP	43.5	-15.9	1.00 V	134	39.8	-12.2
4	167.57	33.7 QP	43.5	-9.8	1.00 V	360	41.8	-8.1
5	186.22	33.7 QP	43.5	-9.8	1.00 V	30	43.9	-10.2
6	820.43	32.3 QP	46.0	-13.7	2.00 V	64	28.2	4.1

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 22, 2018	Oct. 21, 2019
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 04, 2018	June 03, 2019
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: Nov. 20, 2018

4.2.3 Test Procedure

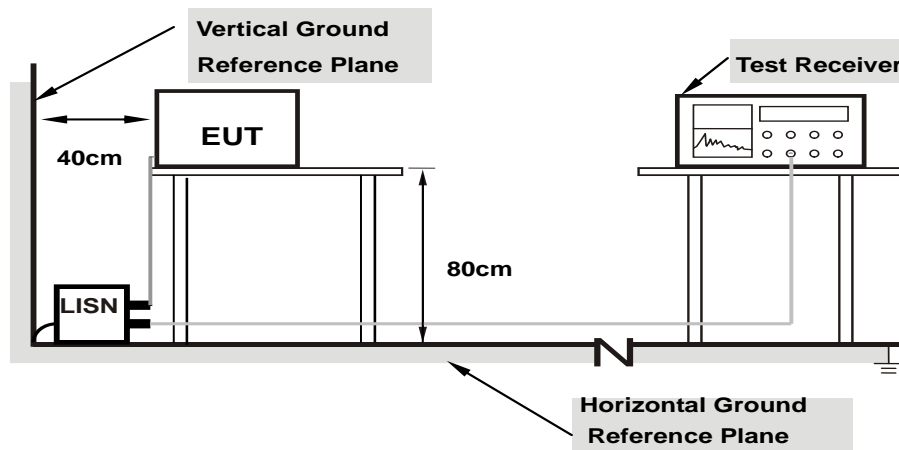
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

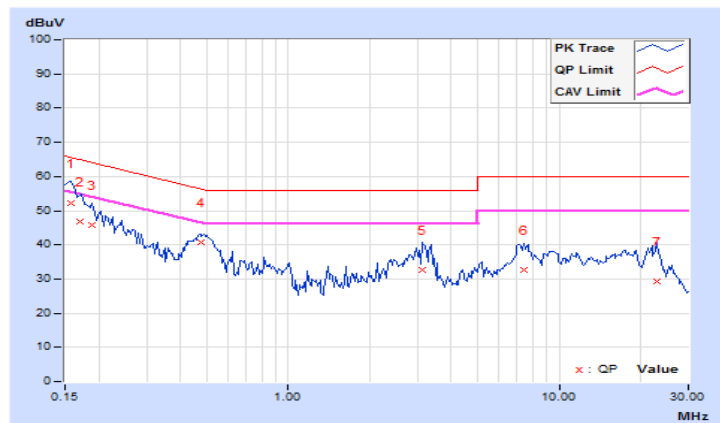
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15780	10.02	42.13	24.33	52.15	34.35	65.58	55.58	-13.43	-21.23
2	0.16953	10.03	36.84	18.13	46.87	28.16	64.98	54.98	-18.11	-26.82
3	0.18905	10.04	35.71	22.15	45.75	32.19	64.08	54.08	-18.33	-21.89
4	0.47423	10.07	30.73	23.84	40.80	33.91	56.44	46.44	-15.64	-12.53
5	3.12500	10.21	22.52	12.41	32.73	22.62	56.00	46.00	-23.27	-23.38
6	7.37890	10.41	22.12	16.49	32.53	26.90	60.00	50.00	-27.47	-23.10
7	22.89060	11.11	18.26	12.72	29.37	23.83	60.00	50.00	-30.63	-26.17

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.

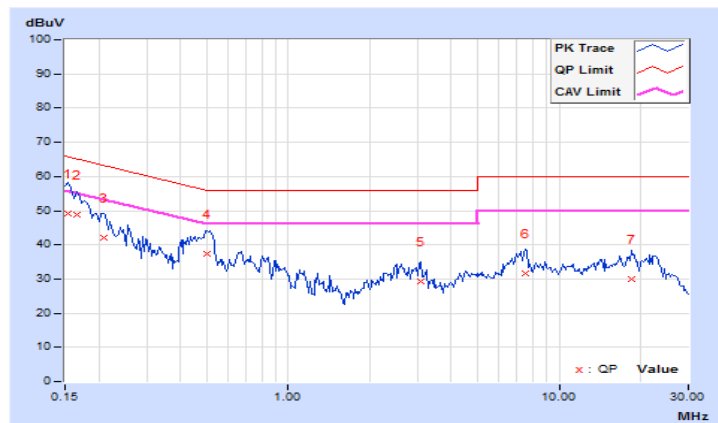


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.15390	9.93	39.12	15.43	49.05	25.36	65.79	55.79	-16.74
2	0.16561	9.93	38.83	25.69	48.76	35.62	65.18	55.18	-16.42	-19.56
3	0.20856	9.94	32.11	18.16	42.05	28.10	63.26	53.26	-21.21	-25.16
4	0.50000	9.97	27.42	18.28	37.39	28.25	56.00	46.00	-18.61	-17.75
5	3.07422	10.08	19.31	12.15	29.39	22.23	56.00	46.00	-26.61	-23.77
6	7.53123	10.27	21.23	15.23	31.50	25.50	60.00	50.00	-28.50	-24.50
7	18.50780	10.80	19.02	13.16	29.82	23.96	60.00	50.00	-30.18	-26.04

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

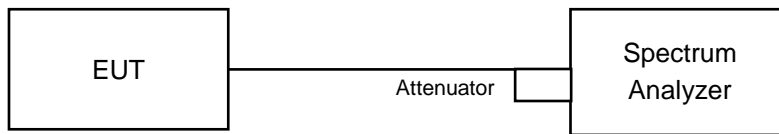
Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p \leq 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
		Client device	250mW (24 dBm)
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

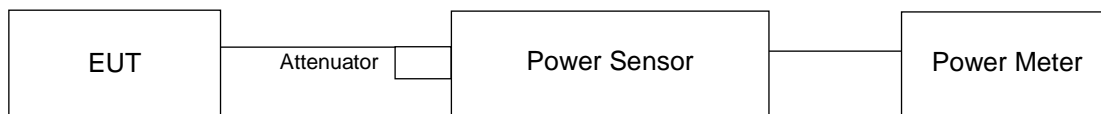
4.3.2 Test Setup

FOR POWER OUTPUT MEASUREMENT

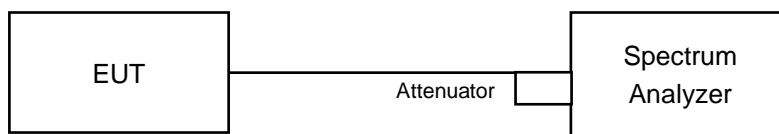
For channel straddling 5725MHz:



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 Average Power Measurement

For channel straddling 5725MHz:

Method SA-2

1. Set span to encompass the 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. Detector = RMS.
7. Trace average at least 100 traces in power averaging mode
8. Compute power by integrating the spectrum across the 26 dB EBW of the signal.
9. Duty factor need added to measured value (duty cycle < 98 percent).

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 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 Result

802.11a

Power Output:

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Limit (dBm)	Pass / Fail
52	5260	77.09	18.87	24.00	Pass
60	5300	78.343	18.94	24.00	Pass
64	5320	77.983	18.92	24.00	Pass
100	5500	42.073	16.24	24.00	Pass
116	5580	70.146	18.46	24.00	Pass
140	5700	48.084	16.82	24.00	Pass
*144 (UNII-2C Band)	5720	16.179	12.09	24.00	Pass
*144 (UNII-3 Band)	5720	4.655	6.68	30.00	Pass

Note: * Test was performed in accordance with Measurement follow FCC KDB 789033 UNII test procedure Method SA-2 and use spectrum analyzer test.

The Total Power for the straddle channel:

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
144	5720	20.834	13.19

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

26dB BANDWIDTH:

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)
52	5260	43.50
60	5300	42.85
64	5320	43.44
100	5500	21.87
116	5580	42.11
140	5700	35.32
144 (UNII-2C Band)	5720	23.37

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	43.50	27.38 > 24
60	5300	42.85	27.31 > 24
64	5320	43.44	27.37 > 24
100	5500	21.87	24.39 > 24
116	5580	42.11	27.24 > 24
140	5700	35.32	26.48 > 24
144 (UNII-2C Band)	5720	23.37	24.68 > 24

802.11ac (VHT20)

Power Output:

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Limit (dBm)	Pass / Fail
52	5260	77.983	18.92	24.00	Pass
60	5300	78.705	18.96	24.00	Pass
64	5320	57.677	17.61	24.00	Pass
100	5500	32.509	15.12	24.00	Pass
116	5580	72.277	18.59	24.00	Pass
140	5700	31.842	15.03	24.00	Pass
*144 (UNII-2C Band)	5720	16.8	12.25	24.00	Pass
*144 (UNII-3 Band)	5720	5.167	7.13	30.00	Pass

Note: * Test was performed in accordance with Measurement follow FCC KDB 789033 UNII test procedure Method SA-2 and use spectrum analyzer test.

The Total Power for the straddle channel:

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
144	5720	21.967	13.42

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

26dB BANDWIDTH:

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)
52	5260	43.88
60	5300	43.53
64	5320	30.15
100	5500	21.99
116	5580	43.37
140	5700	21.86
144 (UNII-2C Band)	5720	23.39

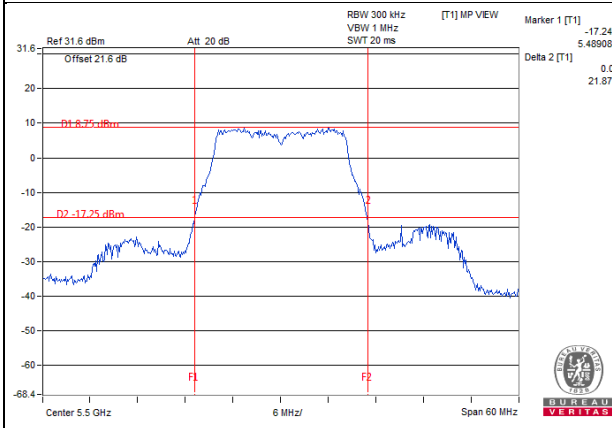
Note: For U_NII-2A, U_NII-2C Band output power limitation is determined based on 26dBc bandwidth.

Power Limit = 11dBm + 10logB < U_NII-2A, U_NII-2C >

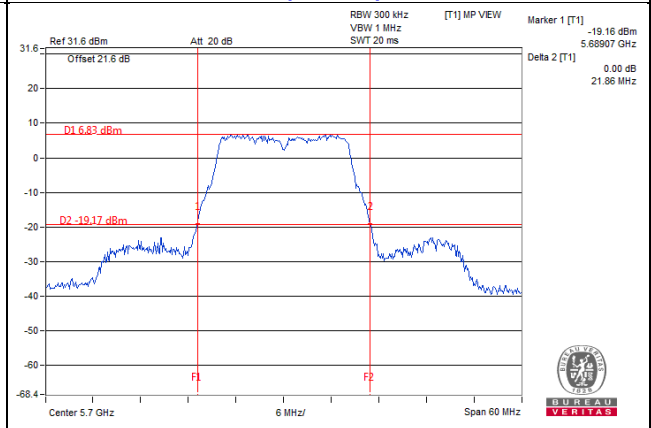
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
52	5260	43.88	27.42 > 24
60	5300	43.53	27.38 > 24
64	5320	30.15	25.79 > 24
100	5500	21.99	24.42 > 24
116	5580	43.37	27.37 > 24
140	5700	21.86	24.39 > 24
144 (UNII-2C Band)	5720	23.39	24.69 > 24

Spectrum Plot of Worst Value

802.11a / CH100



802.11ac (VHT20) / CH140



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

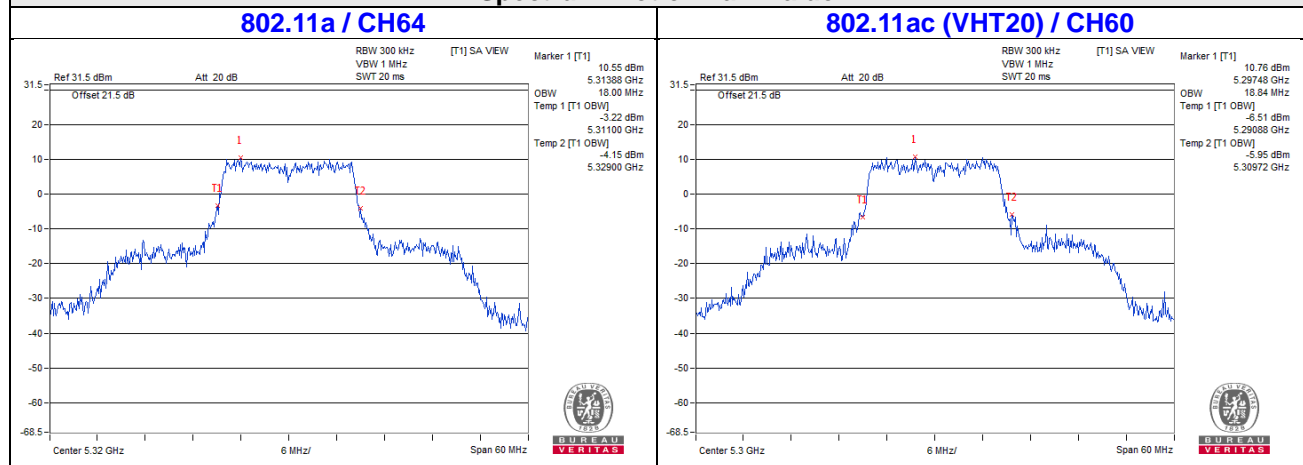
802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
52	5260	17.76
60	5300	17.76
64	5320	18.00
100	5500	17.04
116	5580	17.76
140	5700	17.40
144 (UNII-2C Band)	5720	13.76
144 (UNII-3 Band)	5720	3.76

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
52	5260	18.00
60	5300	18.84
64	5320	17.16
100	5500	17.16
116	5580	18.12
140	5700	17.28
144 (UNII-2C Band)	5720	13.76
144 (UNII-3 Band)	5720	3.64

Spectrum Plot of Max. Value

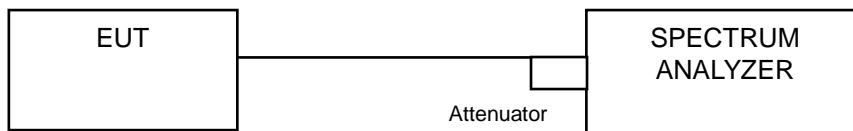


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

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

For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500\text{ kHz}/300\text{kHz})$
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-2A, UNII-2C:

802.11a

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)	Duty Factor (dB)	PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
52	5260	4.81	0.32	3.0269	11.00	Pass
60	5300	5.71	0.32	3.7239	11.00	Pass
64	5320	5.27	0.32	3.3651	11.00	Pass
100	5500	2.98	0.32	1.9861	11.00	Pass
116	5580	5.58	0.32	3.6141	11.00	Pass
140	5700	3.12	0.32	2.0512	11.00	Pass
144 (UNII-2C Band)	5720	4.22	0.32	2.6424	11.00	Pass

Note: 1. Refer to section 3.3 for duty cycle spectrum plot.

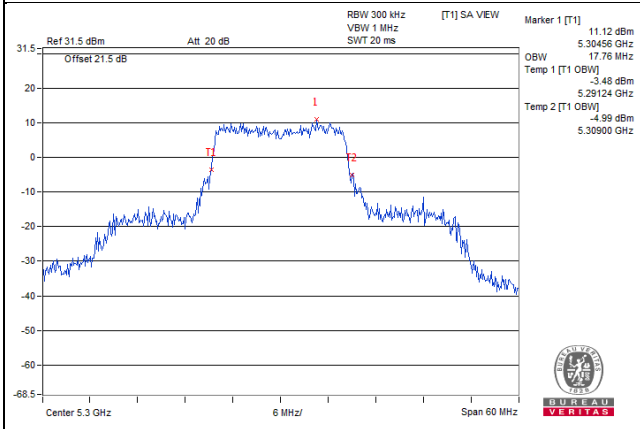
802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)	Duty Factor (dB)	PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
52	5260	5.37	0.32	3.4435	11.00	Pass
60	5300	5.79	0.32	3.7931	11.00	Pass
64	5320	4.03	0.32	2.5293	11.00	Pass
100	5500	2.06	0.32	1.6069	11.00	Pass
116	5580	5.17	0.32	3.2885	11.00	Pass
140	5700	1.93	0.32	1.5596	11.00	Pass
144 (UNII-2C Band)	5720	3.85	0.32	2.4266	11.00	Pass

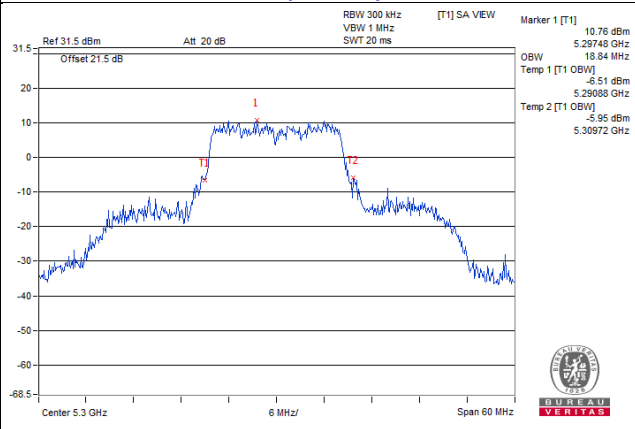
Note: 1. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

802.11a / CH60



802.11ac (VHT20) / CH60



For U-NII-3:

802.11a

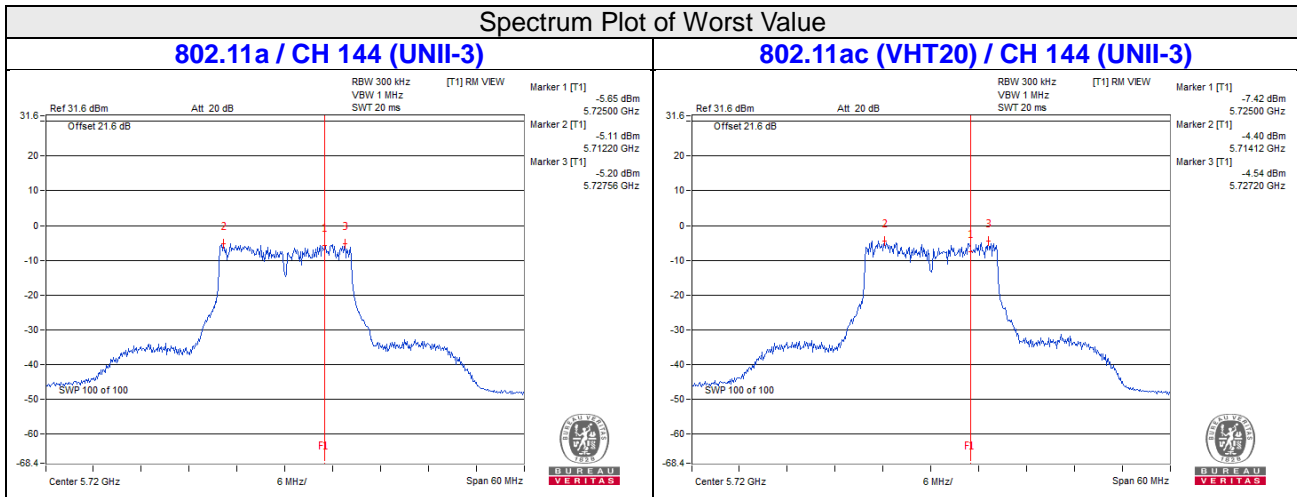
Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)	Duty Factor (dB)	Total PSD With Duty Factor		Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
				mW/300kHz	dBm/300kHz			
144 (U-NII-3 Band)	5720	-5.20	0.32	0.3251	-4.88	-2.66	30.00	Pass

Note: 1. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/300kHz)	Duty Factor (dB)	Total PSD With Duty Factor		Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
				mW/300kHz	dBm/300kHz			
144 (U-NII-3 Band)	5720	-4.54	0.32	0.3787	-4.22	-2.00	30.00	Pass

Note: 1. Refer to section 3.3 for duty cycle spectrum plot.

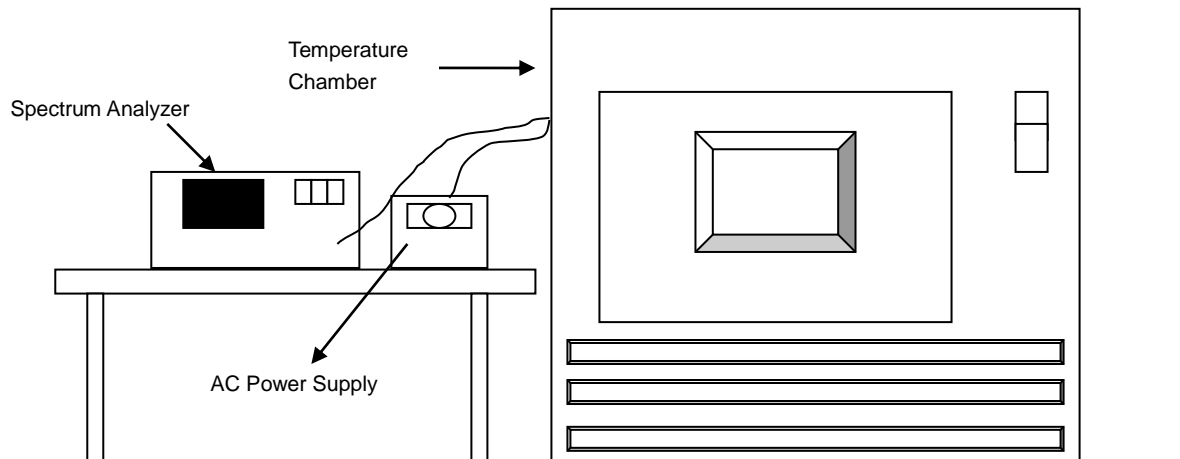


4.6 Frequency Stability Measurement

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

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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: 5260 MHz									
TEMP. (°C)	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	5259.9817	PASS	5259.9833	PASS	5259.9843	PASS	5259.9833	PASS
40	120	5260.0259	PASS	5260.0246	PASS	5260.026	PASS	5260.0236	PASS
30	120	5259.9822	PASS	5259.9801	PASS	5259.9786	PASS	5259.9812	PASS
20	120	5260.0139	PASS	5260.016	PASS	5260.0133	PASS	5260.0128	PASS
10	120	5259.9767	PASS	5259.9799	PASS	5259.979	PASS	5259.9752	PASS
0	120	5260.0189	PASS	5260.0184	PASS	5260.0196	PASS	5260.0219	PASS
-10	120	5259.9974	PASS	5259.9982	PASS	5259.9956	PASS	5259.9947	PASS
-20	120	5259.974	PASS	5259.9761	PASS	5259.977	PASS	5259.9761	PASS
-30	120	5260.0135	PASS	5260.0168	PASS	5260.0154	PASS	5260.0134	PASS

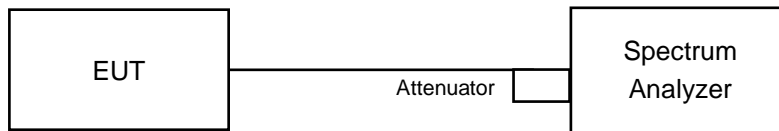
Frequency Stability Versus Voltage									
Operating Frequency: 5260 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5260.0143	PASS	5260.016	PASS	5260.014	PASS	5260.0137	PASS
	120	5260.0139	PASS	5260.016	PASS	5260.0133	PASS	5260.0128	PASS
	102	5260.0144	PASS	5260.0151	PASS	5260.013	PASS	5260.0129	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) $\geq 3 \times$ 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

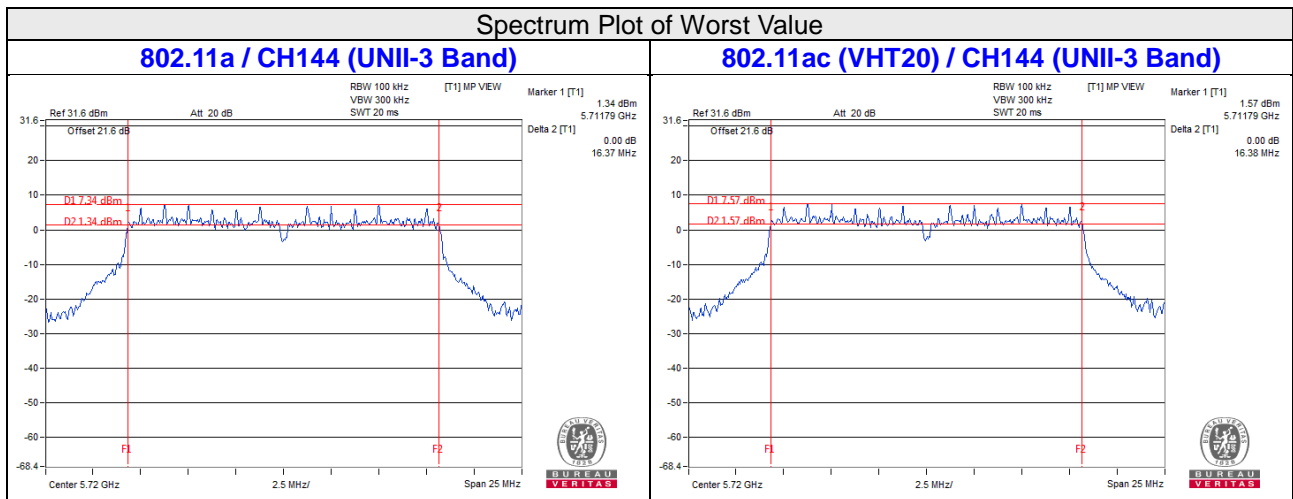
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
144 (UNII-3 Band)	5720	3.16	0.5	Pass

Note: The 6dB bandwidth above 5725MHz = Marker 1 + Delta 2 - 5725MHz

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
144 (UNII-3 Band)	5720	3.17	0.5	Pass

Note: The 6dB bandwidth above 5725MHz = Marker 1 + Delta 2 - 5725MHz



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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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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