

FCC Test Report (DFS Band)

Report No.: RF180830E03C-1

FCC ID: 2APLE18300398

Test Model: VMB5000

Revision: Rev 5

Received Date: Feb. 13, 2019

Test Date: Mar. 05, 2019

Issued Date: June 12, 2019

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**FCC Registration /
Designation Number:** 723255 / TW2022



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Table of Contents

Release Control Record	4
1 Certificate of Conformity.....	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information.....	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	10
3.2.1 Test Mode Applicability and Tested Channel Detail	11
3.3 Duty Cycle of Test Signal	13
3.4 Description of Support Units	14
3.4.1 Configuration of System under Test	14
3.5 General Description of Applied Standard	15
4 Test Types and Results	16
4.1 Radiated Emission and Bandedge Measurement.....	16
4.1.1 Limits of Radiated Emission and Bandedge Measurement	16
4.1.2 Test Instruments	17
4.1.3 Test Procedure	19
4.1.4 Deviation from Test Standard	20
4.1.5 Test Setup.....	20
4.1.6 EUT Operating Condition	21
4.1.7 Test Results	22
4.2 Conducted Emission Measurement	41
4.2.1 Limits of Conducted Emission Measurement	41
4.2.2 Test Instruments	41
4.2.3 Test Procedure	42
4.2.4 Deviation from Test Standard	42
4.2.5 Test Setup.....	42
4.2.6 EUT Operating Condition	42
4.2.7 Test Results	43
4.3 Transmit Power Measurement	45
4.3.1 Limits of Transmit Power Measurement	45
4.3.2 Test Setup.....	45
4.3.3 Test Instruments	45
4.3.4 Test Procedure	46
4.3.5 Deviation from Test Standard	46
4.3.6 EUT Operating Condition	46
4.3.7 Test Result.....	47
4.4 Occupied Bandwidth Measurement	51
4.4.1 Test Setup.....	51
4.4.2 Test Instruments	51
4.4.3 Test Procedure	51
4.4.4 Test Results	52
4.5 Peak Power Spectral Density Measurement	54
4.5.1 Limits of Peak Power Spectral Density Measurement	54
4.5.2 Test Setup.....	54
4.5.3 Test Instruments	54
4.5.4 Test Procedure	54
4.5.5 Deviation from Test Standard	54
4.5.6 EUT Operating Condition	54
4.5.7 Test Results	55
4.6 Frequency Stability Measurement.....	58
4.6.1 Limits of Frequency Stability Measurement	58

4.6.2	Test Setup.....	58
4.6.3	Test Instruments	58
4.6.4	Test Procedure	58
4.6.5	Deviation from Test Standard	58
4.6.6	EUT Operating Condition	58
4.6.7	Test Results	59
5	Pictures of Test Arrangements.....	60
	Appendix – Information on the Testing Laboratories	61

Release Control Record

Issue No.	Description	Date Issued
RF180830E03C-1	Original release.	June 12, 2019

1 Certificate of Conformity

Product: Alro Gen5 Entry Hub

Brand: Arlo

Test Model: VMB5000

Revision: Rev 5

Sample Status: Pre Production Unit

Applicant: Arlo Technologies, Inc.

Test Date: Mar. 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:** June 12, 2019
Wendy Wu / Specialist

Approved by : May Chen , **Date:** June 12, 2019
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.28dB at 0.47031MHz.
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, 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	Antenna connector is i-pex not a standard connector.

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	Alro Gen5 Entry Hub
Brand	Arlo
Test Model	VMB5000
Status of EUT	Pre Production Unit
Revision	Rev 5
S/N	5GP1897VA0006
Power Supply Rating	12Vdc from power adapter
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 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	5.26~ 5.32GHz, 5.50 ~ 5.70GHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20): 15 802.11n (HT40), 802.11ac (VHT40): 7
Output Power	5.26~ 5.32GHz: 249.483mW 5.50 ~ 5.70GHz: 249.543mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

- There are WLAN, Z-Wave, Zigbee and Sub-GHz technology used for the EUT. The EUT has below radios as following table:

Radio 1	Radio 2	Radio 3	Radio 4
WLAN (2.4GHz+5GHz band)	Z-Wave	Zigbee	Sub-GHz

- Simultaneously transmission condition.

Condition	Technology				
1	WLAN 2.4GHz	WLAN 5GHz	Z-Wave	Zigbee	Sub-GHz

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

3. The EUT must be supplied with a power adapter and following different models could be chosen as following table:

No.	Brand	Model No.	Spec.
1	Arlo	AD2076F10	Input: 100-120Vac, 0.56A, 50/60Hz Output: 12Vdc, 1.5A DC output cable (Unshielded, 1.8m)
2	Arlo	AD2067M20	Input: 100-240Vac, 1.0A, 50/60Hz Output: 12Vdc, 2.5A DC output cable (Unshielded, 1.8m)
3	Arlo	2ABB018F 1 NJ	Input: 100-120Vac, 0.6A, 50/60Hz Output: 12Vdc, 1.5A DC output cable (Unshielded, 1.8m)
4	Arlo	P030WM1251	Input: 100-240Vac, 1.0A, 50/60Hz Output: 12Vdc, 2.5A DC output cable (Unshielded, 1.8m)

Note: From the above models, the worst radiated emission and AC power conducted emission test was found in **Adapter 2**. Therefore only the test data of the modes were recorded in this report.

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

Sub-GHz							
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (MHz)	Antenna type	Connector type	
1	NA	902P00214N0	1.5	860~930	PIFA	NA	
Z-Wave							
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (MHz)	Antenna type	Connector type	
1	NA	902P00213N0	2.5	860~930	PIFA	NA	
Zigbee							
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type	
1	INPAQ TECHNOLOGY CO., LTD.	ACA-5036-A2-CC-S	3.5	2.4~2.4835	CHIP	NA	
WLAN							
Ant No.	Brand	Model	Antenna Net Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type	Cable Length (mm)
1	NA	9 07X01052X0	2.5	2.4~2.4835	Dipole	i-plex	75
			1.8	5.15~5.25			
			2	5.25~5.35			
			2.2	5.47~5.725			
			1.6	5.725~5.85			
2	NA	9 07X00747X19	2.5	2.4~2.4835	Dipole	i-plex	90
			2.2	5.15~5.25			
			1.2	5.25~5.35			
			3.2	5.47~5.725			
			3.5	5.725~5.85			

5. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS 0~8 Nss=1	2TX	2RX
	MCS 0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS 0~9 Nss=1	2TX	2RX
	MCS 0~9 Nss=2	2TX	2RX

Note:

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

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 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

FOR 5500 ~ 5700MHz

11 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		

5 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		

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)
802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6
802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	BPSK	6.5
802.11ac (VHT40)		54 to 62	54, 62	OFDM	BPSK	13.5
802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	BPSK	6
802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	BPSK	6.5
802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	BPSK	13.5

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 (VHT40)	5260-5320 5500-5700	54 to 62 102 to 134	110	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

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

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5260-5320 5500-5700	54 to 62 102 to 134	110	OFDM	BPSK	13.5

Antenna Port Conducted Measurement:

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

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
802.11ac (VHT40)		54 to 62	54, 62	OFDM	BPSK	13.5
802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	BPSK	6
802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	BPSK	6.5
802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	BPSK	13.5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE $\geq$ 1G	20deg. C, 61%RH	120Vac, 60Hz	Frank Chuang
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Robert Cheng
PLC	25deg. C, 75%RH	120Vac, 60Hz	Frank Chuang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

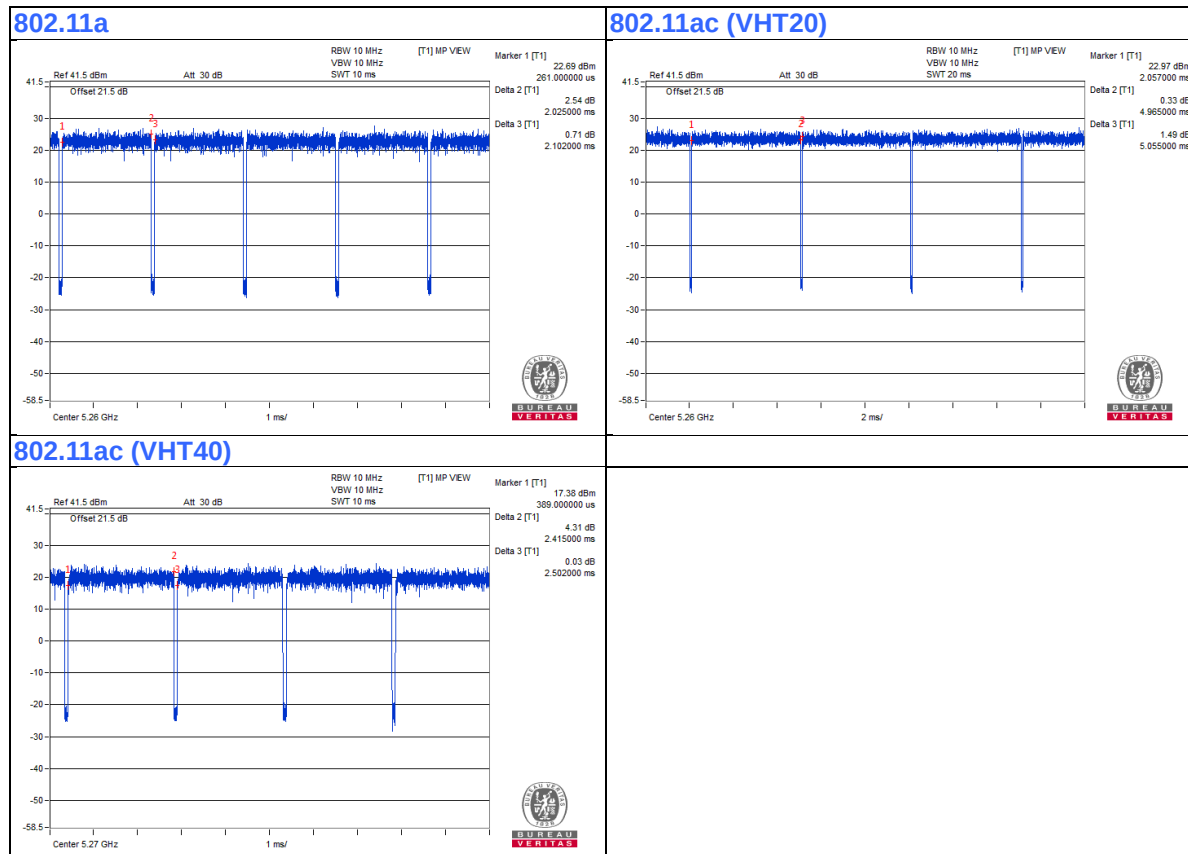
If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

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

802.11a: Duty cycle = Duty cycle = $2.025 \text{ ms} / 2.102 \text{ ms} = 0.963$, Duty factor = $10 * \log (1/\text{Duty cycle}) = 0.16$

802.11ac (VHT20): Duty cycle = $4.965 \text{ ms} / 5.055 \text{ ms} = 0.982$

802.11ac (VHT40): Duty cycle = $2.415 \text{ ms} / 2.502 \text{ ms} = 0.965$, Duty factor = $10 * \log (1/\text{Duty cycle}) = 0.15$



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.

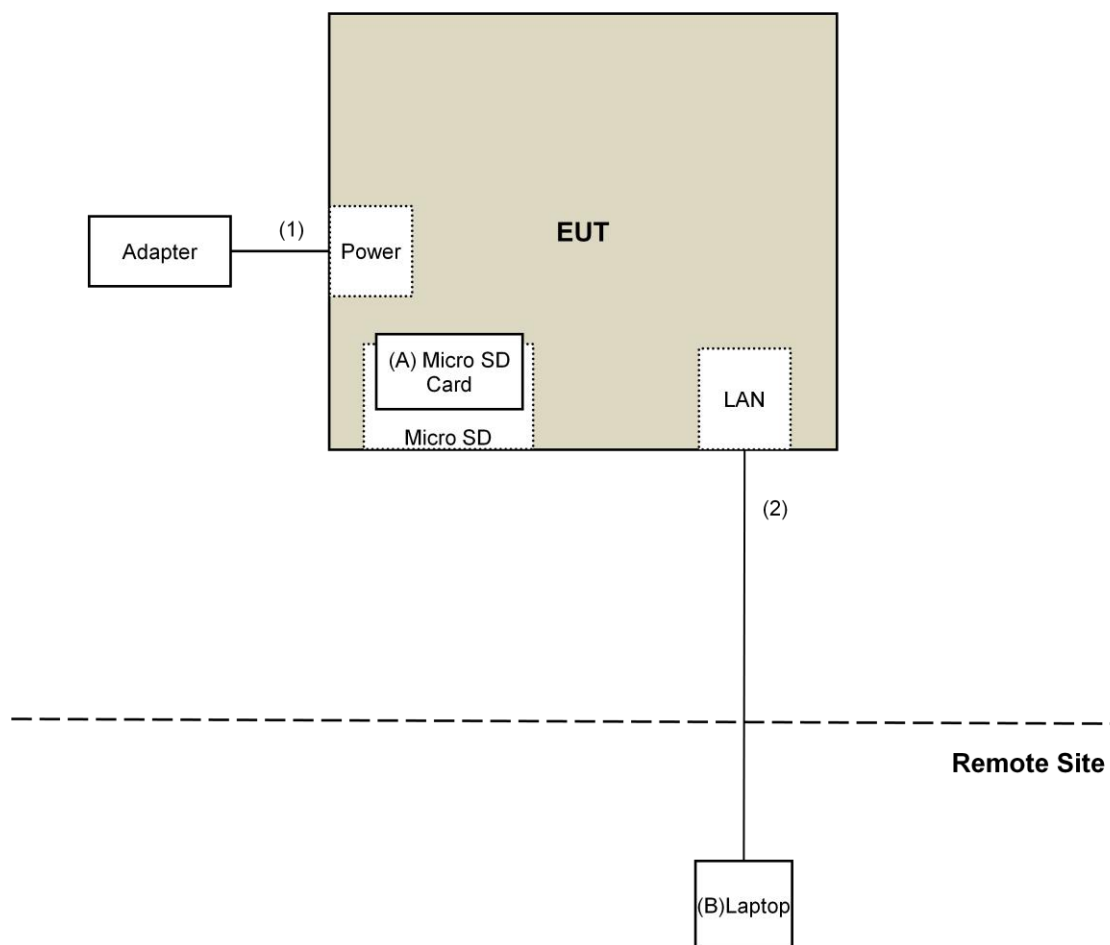
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	MicroSD Card	SanDisk	8GB	NA	NA	Provided by Lab
B.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

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.	DC Cable	1	1.8	No	0	Supplied by client
2.	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:

- 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	☐ 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}
	☐ 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	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 22, 2018	Nov. 21, 2019
RF Cable	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
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 12, 2018	June 11, 2019
RF Cable	EMC104-SM-SM-6000	180602	June 12, 2018	June 11, 2019
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 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 09, 2019	Jan. 08, 2020
True RMS Clamp Meter FLUKE	325	31130711WS	May 22, 2018	May 21, 2019

Note:

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

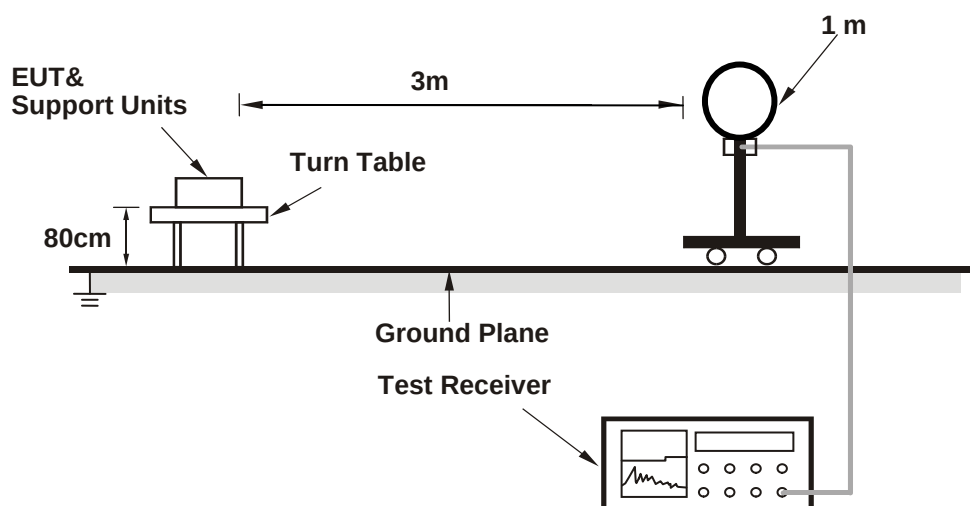
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

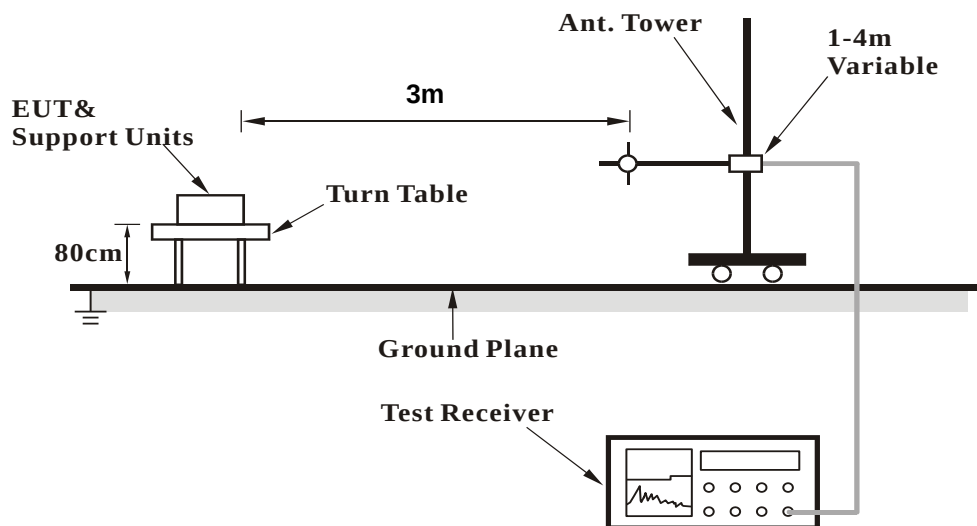
No deviation.

4.1.5 Test Setup

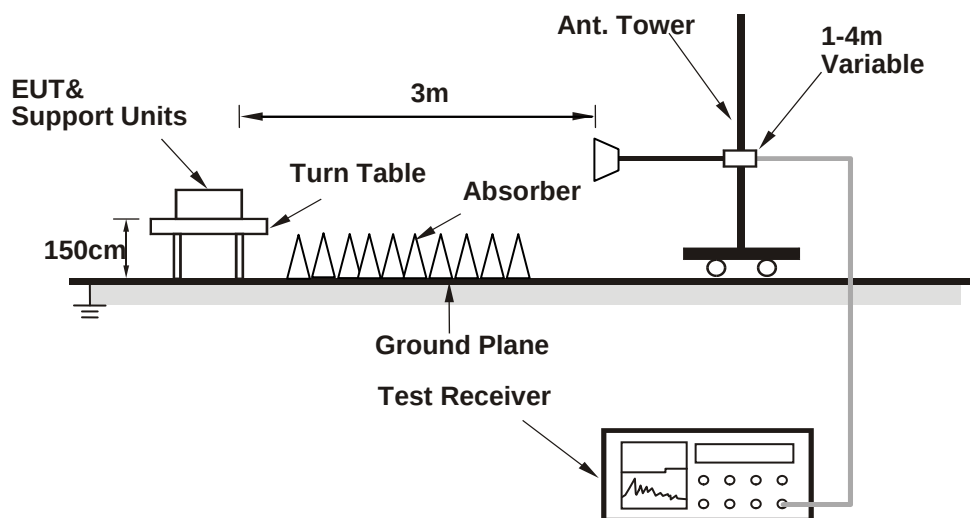
For Radiated emission below 30MHz



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

- Connected the EUT with the Laptop which is placed on remote site.
- Controlling software (QDART-connectivity (1.0.40)) 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	46.7 PK	74.0	-27.3	1.52 H	344	43.6	3.1
2	5150.00	36.3 AV	54.0	-17.7	1.52 H	344	33.2	3.1
3	*5260.00	107.9 PK			1.52 H	344	105.3	2.6
4	*5260.00	98.2 AV			1.52 H	344	95.6	2.6
5	#10520.00	46.2 PK	68.2	-22.0	1.57 H	121	33.8	12.4
6	15780.00	48.5 PK	74.0	-25.5	1.32 H	52	36.4	12.1
7	15780.00	35.6 AV	54.0	-18.4	1.32 H	52	23.5	12.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	47.4 PK	74.0	-26.6	1.87 V	277	44.3	3.1
2	5150.00	39.8 AV	54.0	-14.2	1.87 V	277	36.7	3.1
3	*5260.00	116.5 PK			1.87 V	277	113.9	2.6
4	*5260.00	106.3 AV			1.87 V	277	103.7	2.6
5	#10520.00	45.9 PK	68.2	-22.3	1.61 V	228	33.5	12.4
6	15780.00	47.8 PK	74.0	-26.2	2.02 V	332	35.7	12.1
7	15780.00	35.3 AV	54.0	-18.7	2.02 V	332	23.2	12.1

REMARKS:

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

CHANNEL	TX Channel 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	107.3 PK			1.56 H	357	104.6	2.7
2	*5300.00	97.8 AV			1.56 H	357	95.1	2.7
3	10600.00	46.0 PK	74.0	-28.0	1.54 H	114	33.7	12.3
4	10600.00	34.0 AV	54.0	-20.0	1.54 H	114	21.7	12.3
5	15900.00	48.1 PK	74.0	-25.9	1.33 H	58	36.1	12.0
6	15900.00	35.5 AV	54.0	-18.5	1.33 H	58	23.5	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	*5300.00	116.6 PK			1.88 V	274	113.9	2.7
2	*5300.00	106.4 AV			1.88 V	274	103.7	2.7
3	10600.00	45.5 PK	74.0	-28.5	1.55 V	215	33.2	12.3
4	10600.00	33.6 AV	54.0	-20.4	1.55 V	215	21.3	12.3
5	15900.00	48.3 PK	74.0	-25.7	2.02 V	328	36.3	12.0
6	15900.00	35.6 AV	54.0	-18.4	2.02 V	328	23.6	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.

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	107.4 PK			1.57 H	329	104.7	2.7
2	*5320.00	98.0 AV			1.57 H	329	95.3	2.7
3	5350.00	64.5 PK	74.0	-9.5	1.57 H	329	61.6	2.9
4	5350.00	47.5 AV	54.0	-6.5	1.57 H	329	44.6	2.9
5	10640.00	45.7 PK	74.0	-28.3	1.54 H	106	33.5	12.2
6	10640.00	33.8 AV	54.0	-20.2	1.54 H	106	21.6	12.2
7	15960.00	48.4 PK	74.0	-25.6	1.36 H	53	36.1	12.3
8	15960.00	35.8 AV	54.0	-18.2	1.36 H	53	23.5	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	*5320.00	116.2 PK			1.88 V	275	113.5	2.7
2	*5320.00	105.9 AV			1.88 V	275	103.2	2.7
3	5350.00	71.6 PK	74.0	-2.4	1.88 V	275	68.7	2.9
4	5350.00	53.9 AV	54.0	-0.1	1.88 V	275	51.0	2.9
5	10640.00	45.3 PK	74.0	-28.7	1.60 V	230	33.1	12.2
6	10640.00	33.3 AV	54.0	-20.7	1.60 V	230	21.1	12.2
7	15960.00	48.3 PK	74.0	-25.7	2.04 V	341	36.0	12.3
8	15960.00	35.7 AV	54.0	-18.3	2.04 V	341	23.4	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 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	55.2 PK	74.0	-18.8	1.50 H	328	52.0	3.2
2	5460.00	39.2 AV	54.0	-14.8	1.50 H	328	36.0	3.2
3	#5470.00	64.2 PK	68.2	-4.0	1.50 H	328	61.0	3.2
4	*5500.00	105.2 PK			1.50 H	328	102.1	3.1
5	*5500.00	96.1 AV			1.50 H	328	93.0	3.1
6	11000.00	46.0 PK	74.0	-28.0	1.50 H	116	33.0	13.0
7	11000.00	34.0 AV	54.0	-20.0	1.50 H	116	21.0	13.0
8	#16500.00	48.2 PK	68.2	-20.0	1.32 H	59	33.9	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	57.7 PK	74.0	-16.3	1.87 V	270	54.5	3.2
2	5460.00	41.2 AV	54.0	-12.8	1.87 V	270	38.0	3.2
3	#5470.00	68.1 PK	68.2	-0.1	1.87 V	270	64.9	3.2
4	*5500.00	114.6 PK			1.87 V	270	111.5	3.1
5	*5500.00	104.7 AV			1.87 V	270	101.6	3.1
6	11000.00	45.8 PK	74.0	-28.2	1.55 V	211	32.8	13.0
7	11000.00	34.0 AV	54.0	-20.0	1.55 V	211	21.0	13.0
8	#16500.00	48.1 PK	68.2	-20.1	2.07 V	321	33.8	14.3

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 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	107.5 PK			1.50 H	331	104.3	3.2
2	*5580.00	98.1 AV			1.50 H	331	94.9	3.2
3	11160.00	45.4 PK	74.0	-28.6	1.58 H	127	32.9	12.5
4	11160.00	33.6 AV	54.0	-20.4	1.58 H	127	21.1	12.5
5	#16740.00	48.2 PK	68.2	-20.0	1.36 H	46	33.3	14.9
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	*5580.00	116.6 PK			1.85 V	271	113.4	3.2
2	*5580.00	106.7 AV			1.85 V	271	103.5	3.2
3	11160.00	45.3 PK	74.0	-28.7	1.54 V	227	32.8	12.5
4	11160.00	33.6 AV	54.0	-20.4	1.54 V	227	21.1	12.5
5	#16740.00	47.7 PK	68.2	-20.5	1.97 V	315	32.8	14.9

REMARKS:

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

CHANNEL	TX Channel 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	105.8 PK			1.50 H	344	102.4	3.4
2	*5700.00	96.4 AV			1.50 H	344	93.0	3.4
3	#5725.00	63.5 PK	68.2	-4.7	1.50 H	344	60.1	3.4
4	11400.00	45.4 PK	74.0	-28.6	1.52 H	110	32.3	13.1
5	11400.00	33.5 AV	54.0	-20.5	1.52 H	110	20.4	13.1
6	#17100.00	47.8 PK	68.2	-20.4	1.30 H	47	31.1	16.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	114.6 PK			1.86 V	278	111.2	3.4
2	*5700.00	104.5 AV			1.86 V	278	101.1	3.4
3	#5725.00	68.1 PK	68.2	-0.1	1.86 V	278	64.7	3.4
4	11400.00	45.5 PK	74.0	-28.5	1.50 V	225	32.4	13.1
5	11400.00	33.6 AV	54.0	-20.4	1.50 V	225	20.5	13.1
6	#17100.00	48.1 PK	68.2	-20.1	1.96 V	337	31.4	16.7

REMARKS:

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

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	46.0 PK	74.0	-28.0	1.52 H	340	42.9	3.1
2	5150.00	35.8 AV	54.0	-18.2	1.52 H	340	32.7	3.1
3	*5260.00	107.6 PK			1.52 H	340	105.0	2.6
4	*5260.00	97.9 AV			1.52 H	340	95.3	2.6
5	#10520.00	45.5 PK	68.2	-22.7	1.57 H	128	33.1	12.4
6	15780.00	48.1 PK	74.0	-25.9	1.37 H	63	36.0	12.1
7	15780.00	35.2 AV	54.0	-18.8	1.37 H	63	23.1	12.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	49.8 PK	74.0	-24.2	1.81 V	277	46.7	3.1
2	5150.00	39.5 AV	54.0	-14.5	1.81 V	277	36.4	3.1
3	*5260.00	116.6 PK			1.81 V	277	114.0	2.6
4	*5260.00	105.6 AV			1.81 V	277	103.0	2.6
5	#10520.00	45.5 PK	68.2	-22.7	1.59 V	218	33.1	12.4
6	15780.00	48.7 PK	74.0	-25.3	1.98 V	315	36.6	12.1
7	15780.00	36.1 AV	54.0	-17.9	1.98 V	315	24.0	12.1

REMARKS:

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

CHANNEL	TX Channel 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	107.9 PK			1.49 H	356	105.2	2.7
2	*5300.00	98.3 AV			1.49 H	356	95.6	2.7
3	10600.00	46.5 PK	74.0	-27.5	1.54 H	99	34.2	12.3
4	10600.00	34.5 AV	54.0	-19.5	1.54 H	99	22.2	12.3
5	15900.00	48.5 PK	74.0	-25.5	1.28 H	46	36.5	12.0
6	15900.00	35.8 AV	54.0	-18.2	1.28 H	46	23.8	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	*5300.00	116.5 PK			1.81 V	274	113.8	2.7
2	*5300.00	105.5 AV			1.81 V	274	102.8	2.7
3	10600.00	45.1 PK	74.0	-28.9	1.56 V	206	32.8	12.3
4	10600.00	33.3 AV	54.0	-20.7	1.56 V	206	21.0	12.3
5	15900.00	48.6 PK	74.0	-25.4	2.03 V	323	36.6	12.0
6	15900.00	35.7 AV	54.0	-18.3	2.03 V	323	23.7	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.

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	107.4 PK			1.57 H	328	104.7	2.7
2	*5320.00	97.9 AV			1.57 H	328	95.2	2.7
3	5350.00	64.0 PK	74.0	-10.0	1.57 H	328	61.1	2.9
4	5350.00	47.1 AV	54.0	-6.9	1.57 H	328	44.2	2.9
5	10640.00	45.4 PK	74.0	-28.6	1.56 H	128	33.2	12.2
6	10640.00	33.6 AV	54.0	-20.4	1.56 H	128	21.4	12.2
7	15960.00	48.1 PK	74.0	-25.9	1.30 H	62	35.8	12.3
8	15960.00	35.5 AV	54.0	-18.5	1.30 H	62	23.2	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	*5320.00	116.9 PK			1.82 V	276	114.2	2.7
2	*5320.00	105.7 AV			1.82 V	276	103.0	2.7
3	5350.00	67.8 PK	74.0	-6.2	1.82 V	276	64.9	2.9
4	5350.00	52.5 AV	54.0	-1.5	1.82 V	276	49.6	2.9
5	10640.00	45.1 PK	74.0	-28.9	1.54 V	220	32.9	12.2
6	10640.00	33.5 AV	54.0	-20.5	1.54 V	220	21.3	12.2
7	15960.00	49.0 PK	74.0	-25.0	2.08 V	336	36.7	12.3
8	15960.00	36.0 AV	54.0	-18.0	2.08 V	336	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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	55.1 PK	74.0	-18.9	1.56 H	339	51.9	3.2
2	5460.00	38.9 AV	54.0	-15.1	1.56 H	339	35.7	3.2
3	#5470.00	63.8 PK	68.2	-4.4	1.56 H	339	60.6	3.2
4	*5500.00	105.6 PK			1.56 H	339	102.5	3.1
5	*5500.00	95.6 AV			1.56 H	339	92.5	3.1
6	11000.00	45.6 PK	74.0	-28.4	1.58 H	107	32.6	13.0
7	11000.00	33.9 AV	54.0	-20.1	1.58 H	107	20.9	13.0
8	#16500.00	47.6 PK	68.2	-20.6	1.34 H	69	33.3	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	61.8 PK	74.0	-12.2	1.73 V	230	58.6	3.2
2	5460.00	44.2 AV	54.0	-9.8	1.73 V	230	41.0	3.2
3	#5470.00	67.6 PK	68.2	-0.6	1.73 V	230	64.4	3.2
4	*5500.00	113.9 PK			1.73 V	230	110.8	3.1
5	*5500.00	103.3 AV			1.73 V	230	100.2	3.1
6	11000.00	45.4 PK	74.0	-28.6	1.61 V	226	32.4	13.0
7	11000.00	33.2 AV	54.0	-20.8	1.61 V	226	20.2	13.0
8	#16500.00	47.7 PK	68.2	-20.5	2.02 V	324	33.4	14.3

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 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	108.0 PK			1.52 H	356	104.8	3.2
2	*5580.00	98.4 AV			1.52 H	356	95.2	3.2
3	11160.00	46.0 PK	74.0	-28.0	1.51 H	124	33.5	12.5
4	11160.00	33.7 AV	54.0	-20.3	1.51 H	124	21.2	12.5
5	#16740.00	48.4 PK	68.2	-19.8	1.39 H	47	33.5	14.9
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	*5580.00	116.9 PK			1.83 V	272	113.7	3.2
2	*5580.00	105.4 AV			1.83 V	272	102.2	3.2
3	11160.00	45.1 PK	74.0	-28.9	1.53 V	218	32.6	12.5
4	11160.00	33.1 AV	54.0	-20.9	1.53 V	218	20.6	12.5
5	#16740.00	48.1 PK	68.2	-20.1	2.03 V	335	33.2	14.9

REMARKS:

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

CHANNEL	TX Channel 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	105.6 PK			1.57 H	358	102.2	3.4
2	*5700.00	95.5 AV			1.57 H	358	92.1	3.4
3	#5725.00	63.1 PK	68.2	-5.1	1.57 H	358	59.7	3.4
4	11400.00	46.1 PK	74.0	-27.9	1.53 H	134	33.0	13.1
5	11400.00	34.0 AV	54.0	-20.0	1.53 H	134	20.9	13.1
6	#17100.00	48.5 PK	68.2	-19.7	1.44 H	35	31.8	16.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	114.6 PK			1.73 V	276	111.2	3.4
2	*5700.00	103.4 AV			1.73 V	276	100.0	3.4
3	#5725.00	67.7 PK	68.2	-0.5	1.73 V	276	64.3	3.4
4	11400.00	45.5 PK	74.0	-28.5	1.50 V	209	32.4	13.1
5	11400.00	33.9 AV	54.0	-20.1	1.50 V	209	20.8	13.1
6	#17100.00	48.2 PK	68.2	-20.0	2.03 V	318	31.5	16.7

REMARKS:

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

802.11ac (VHT40)

CHANNEL	TX Channel 54	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	48.9 PK	74.0	-25.1	1.55 H	346	45.8	3.1
2	5150.00	39.8 AV	54.0	-14.2	1.55 H	346	36.7	3.1
3	*5270.00	105.2 PK			1.55 H	346	102.6	2.6
4	*5270.00	95.2 AV			1.55 H	346	92.6	2.6
5	#10540.00	45.6 PK	68.2	-22.6	1.46 H	121	33.2	12.4
6	15810.00	48.9 PK	74.0	-25.1	1.36 H	40	36.9	12.0
7	15810.00	36.0 AV	54.0	-18.0	1.36 H	40	24.0	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	49.3 PK	74.0	-24.7	1.84 V	275	46.2	3.1
2	5150.00	40.1 AV	54.0	-13.9	1.84 V	275	37.0	3.1
3	*5270.00	113.6 PK			1.84 V	275	111.0	2.6
4	*5270.00	104.0 AV			1.84 V	275	101.4	2.6
5	#10540.00	45.6 PK	68.2	-22.6	1.50 V	217	33.2	12.4
6	15810.00	48.8 PK	74.0	-25.2	1.98 V	325	36.8	12.0
7	15810.00	36.0 AV	54.0	-18.0	1.98 V	325	24.0	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 62	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	*5310.00	101.5 PK			1.53 H	338	98.8	2.7
2	*5310.00	92.0 AV			1.53 H	338	89.3	2.7
3	5350.00	60.6 PK	74.0	-13.4	1.53 H	338	57.7	2.9
4	5350.00	46.4 AV	54.0	-7.6	1.53 H	338	43.5	2.9
5	10620.00	46.3 PK	74.0	-27.7	1.49 H	114	34.1	12.2
6	10620.00	34.1 AV	54.0	-19.9	1.49 H	114	21.9	12.2
7	15930.00	48.7 PK	74.0	-25.3	1.45 H	46	36.7	12.0
8	15930.00	35.9 AV	54.0	-18.1	1.45 H	46	23.9	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	*5310.00	110.4 PK			1.83 V	277	107.7	2.7
2	*5310.00	100.9 AV			1.83 V	277	98.2	2.7
3	5350.00	68.8 PK	74.0	-5.2	1.83 V	277	65.9	2.9
4	5350.00	53.9 AV	54.0	-0.1	1.83 V	277	51.0	2.9
5	10620.00	44.9 PK	74.0	-29.1	1.61 V	222	32.7	12.2
6	10620.00	33.2 AV	54.0	-20.8	1.61 V	222	21.0	12.2
7	15930.00	48.6 PK	74.0	-25.4	2.00 V	324	36.6	12.0
8	15930.00	36.0 AV	54.0	-18.0	2.00 V	324	24.0	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.

CHANNEL	TX Channel 102	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	54.7 PK	74.0	-19.3	1.47 H	342	51.5	3.2
2	5460.00	38.8 AV	54.0	-15.2	1.47 H	342	35.6	3.2
3	#5470.00	64.2 PK	68.2	-4.0	1.47 H	342	61.0	3.2
4	*5510.00	100.4 PK			1.47 H	342	97.3	3.1
5	*5510.00	90.8 AV			1.47 H	342	87.7	3.1
6	11020.00	46.3 PK	74.0	-27.7	1.51 H	127	33.4	12.9
7	11020.00	34.0 AV	54.0	-20.0	1.51 H	127	21.1	12.9
8	#16530.00	48.3 PK	68.2	-19.9	1.35 H	61	33.7	14.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	62.5 PK	74.0	-11.5	1.94 V	270	59.3	3.2
2	5460.00	45.7 AV	54.0	-8.3	1.94 V	270	42.5	3.2
3	#5470.00	67.7 PK	68.2	-0.5	1.94 V	270	64.5	3.2
4	*5510.00	109.6 PK			1.94 V	270	106.5	3.1
5	*5510.00	99.9 AV			1.94 V	270	96.8	3.1
6	11020.00	45.5 PK	74.0	-28.5	1.56 V	216	32.6	12.9
7	11020.00	33.7 AV	54.0	-20.3	1.56 V	216	20.8	12.9
8	#16530.00	48.6 PK	68.2	-19.6	2.01 V	322	34.0	14.6

REMARKS:

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

CHANNEL	TX Channel 110	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	*5550.00	104.9 PK			1.47 H	333	101.7	3.2
2	*5550.00	94.8 AV			1.47 H	333	91.6	3.2
3	11100.00	46.3 PK	74.0	-27.7	1.54 H	125	33.8	12.5
4	11100.00	33.8 AV	54.0	-20.2	1.54 H	125	21.3	12.5
5	#16650.00	48.5 PK	68.2	-19.7	1.42 H	63	33.7	14.8
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	*5550.00	112.8 PK			1.92 V	271	109.6	3.2
2	*5550.00	103.4 AV			1.92 V	271	100.2	3.2
3	11100.00	45.7 PK	74.0	-28.3	1.54 V	203	33.2	12.5
4	11100.00	33.8 AV	54.0	-20.2	1.54 V	203	21.3	12.5
5	#16650.00	47.8 PK	68.2	-20.4	1.97 V	323	33.0	14.8

REMARKS:

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

CHANNEL	TX Channel 134	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	*5670.00	102.6 PK			1.52 H	336	99.3	3.3
2	*5670.00	93.1 AV			1.52 H	336	89.8	3.3
3	#5725.00	62.5 PK	68.2	-5.7	1.52 H	336	59.1	3.4
4	11340.00	46.8 PK	74.0	-27.2	1.49 H	112	33.6	13.2
5	11340.00	34.2 AV	54.0	-19.8	1.49 H	112	21.0	13.2
6	#17010.00	49.0 PK	68.2	-19.2	1.43 H	36	32.4	16.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5670.00	112.0 PK			1.90 V	273	108.7	3.3
2	*5670.00	102.1 AV			1.90 V	273	98.8	3.3
3	#5725.00	68.0 PK	68.2	-0.2	1.90 V	273	64.6	3.4
4	11340.00	45.0 PK	74.0	-29.0	1.59 V	222	31.8	13.2
5	11340.00	33.1 AV	54.0	-20.9	1.59 V	222	19.9	13.2
6	#17010.00	48.1 PK	68.2	-20.1	2.08 V	332	31.5	16.6

REMARKS:

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

Below 1GHz Data:

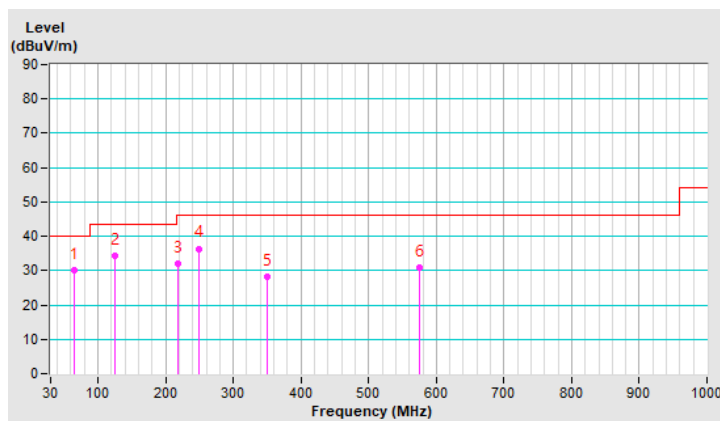
802.11ac (VHT40)

CHANNEL	TX Channel 110	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	64.42	30.0 QP	40.0	-10.0	2.11 H	120	39.2	-9.2
2	125.03	34.2 QP	43.5	-9.3	1.23 H	100	43.5	-9.3
3	217.75	32.1 QP	46.0	-13.9	1.42 H	100	42.9	-10.8
4	249.65	36.4 QP	46.0	-9.6	1.44 H	55	45.3	-8.9
5	349.23	28.1 QP	46.0	-17.9	1.65 H	300	33.8	-5.7
6	574.65	31.0 QP	46.0	-15.0	1.96 H	86	31.5	-0.5

REMARKS:

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

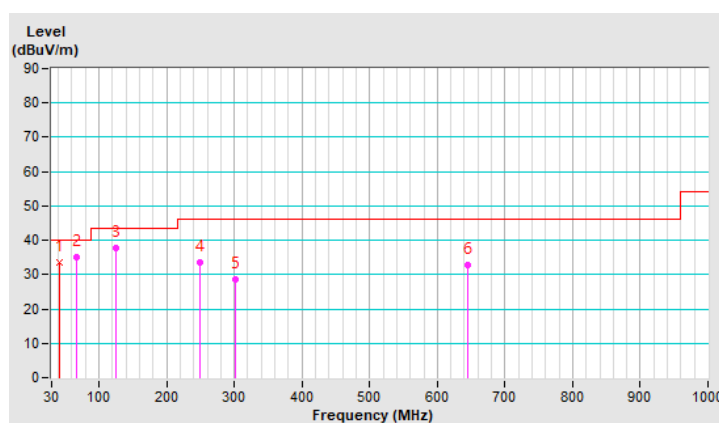


CHANNEL	TX Channel 110	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	42.11	33.6 QP	40.0	-6.4	1.05 V	120	41.7	-8.1
2	66.21	35.1 QP	40.0	-4.9	1.20 V	100	44.5	-9.4
3	125.02	37.7 QP	43.5	-5.8	1.42 V	100	47.0	-9.3
4	250.02	33.5 QP	46.0	-12.5	1.42 V	100	42.4	-8.9
5	302.26	28.5 QP	46.0	-17.5	1.11 V	245	35.3	-6.8
6	644.32	32.6 QP	46.0	-13.4	1.20 V	100	31.4	1.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The 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: Mar. 05, 2019

4.2.3 Test Procedure

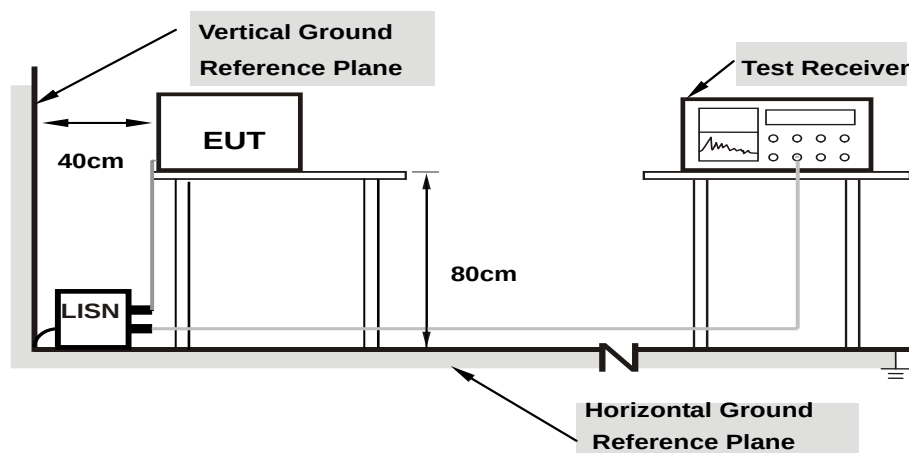
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

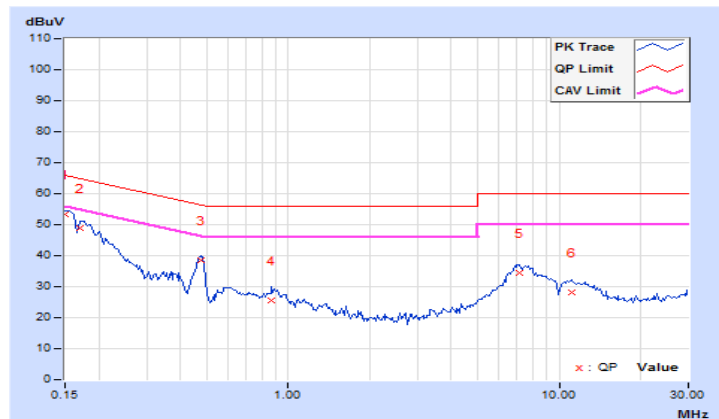
4.2.7 Test Results

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

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.03	43.14	26.41	53.17	36.44	66.00	56.00	-12.83	-19.56
2	0.16953	10.04	38.92	21.11	48.96	31.15	64.98	54.98	-16.02	-23.83
3	0.47422	10.09	28.58	20.75	38.67	30.84	56.44	46.44	-17.77	-15.60
4	0.86875	10.12	15.29	11.54	25.41	21.66	56.00	46.00	-30.59	-24.34
5	7.09766	10.52	23.86	17.55	34.38	28.07	60.00	50.00	-25.62	-21.93
6	11.20313	10.78	17.24	10.78	28.02	21.56	60.00	50.00	-31.98	-28.44

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.

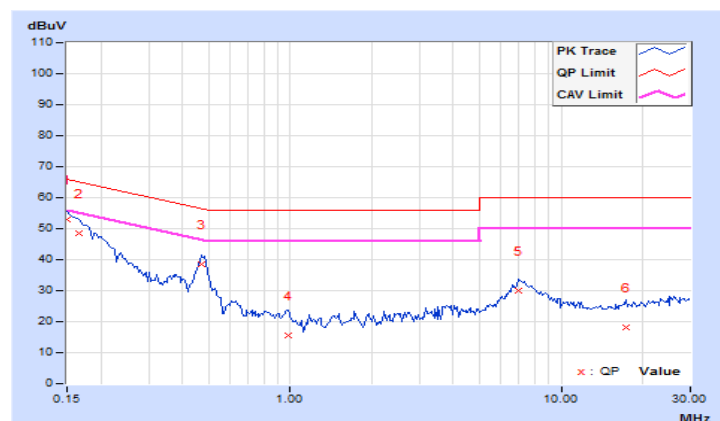


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.94	43.11	25.45	53.05	35.39	66.00	56.00	-12.95	-20.61
2	0.16562	9.94	38.67	20.28	48.61	30.22	65.18	55.18	-16.57	-24.96
3	0.47031	9.98	28.55	24.25	38.53	34.23	56.51	46.51	-17.98	-12.28
4	0.97813	10.00	5.39	1.59	15.39	11.59	56.00	46.00	-40.61	-34.41
5	6.95703	10.35	19.82	14.27	30.17	24.62	60.00	50.00	-29.83	-25.38
6	17.32422	10.98	7.35	1.97	18.33	12.95	60.00	50.00	-41.67	-37.05

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	$\sqrt{\quad}$		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	$\sqrt{\quad}$		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 $N_{ANT} \leq 4$;

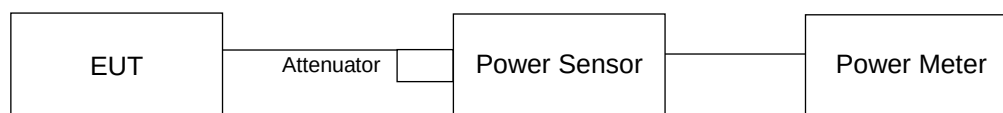
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

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

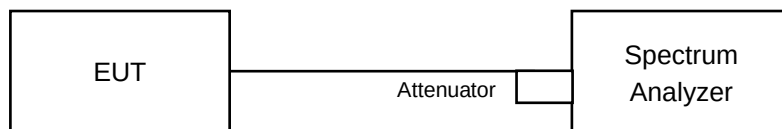
For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.3.2 Test Setup

FOR POWER OUTPUT MEASUREMENT



FOR 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

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 (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.99	20.69	242.823	23.85	24.00	Pass
60	5300	20.96	20.82	245.519	23.90	24.00	Pass
64	5320	20.72	20.52	230.752	23.63	24.00	Pass
100	5500	18.80	18.57	147.803	21.70	23.83	Pass
116	5580	20.61	20.75	233.93	23.69	23.95	Pass
140	5700	18.47	18.01	133.548	21.26	23.89	Pass

26dB BANDWIDTH:

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	20.00	21.89
60	5300	20.03	20.62
64	5320	19.97	21.81
100	5500	19.67	19.22
116	5580	19.74	20.75
140	5700	20.05	19.46

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	20.00	24.01 > 24
60	5300	20.03	24.01 > 24
64	5320	19.97	24 = 24
100	5500	19.22	23.83 < 24
116	5580	19.74	23.95 < 24
140	5700	19.46	23.89 < 24

802.11ac (VHT20)

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	20.99	20.73	243.907	23.87	24.00	Pass
60	5300	21.08	20.73	246.537	23.92	24.00	Pass
64	5320	20.99	20.93	249.483	23.97	24.00	Pass
100	5500	18.77	18.58	147.447	21.69	24.00	Pass
116	5580	20.59	20.83	235.611	23.72	24.00	Pass
140	5700	18.36	18.07	132.67	21.23	24.00	Pass

26dB BANDWIDTH:

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	20.95	21.51
60	5300	20.93	21.24
64	5320	20.76	22.48
100	5500	20.66	20.60
116	5580	20.59	21.53
140	5700	20.48	20.49

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	20.95	24.21 > 24
60	5300	20.93	24.2 > 24
64	5320	20.76	24.17 > 24
100	5500	20.60	24.13 > 24
116	5580	20.59	24.13 > 24
140	5700	20.48	24.11 > 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				
54	5270	20.77	20.64	235.277	23.72	24.00	Pass
62	5310	17.93	17.73	121.38	20.84	24.00	Pass
102	5510	17.47	17.35	110.172	20.42	24.00	Pass
110	5550	20.86	21.06	249.543	23.97	24.00	Pass
134	5670	19.03	19.10	161.266	22.08	24.00	Pass

26dB BANDWIDTH:

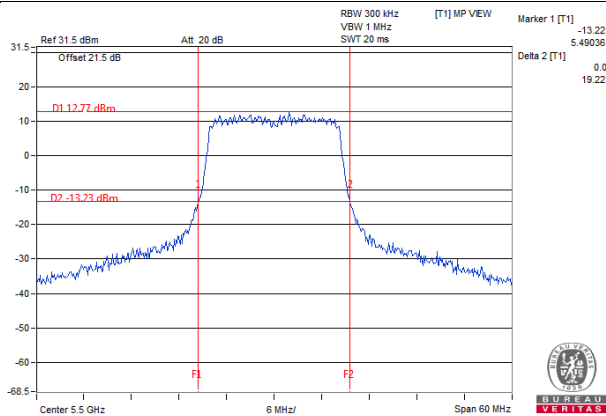
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	41.04	43.44
62	5310	40.93	40.80
102	5510	40.92	40.87
110	5550	40.96	41.96
134	5670	41.02	40.81

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

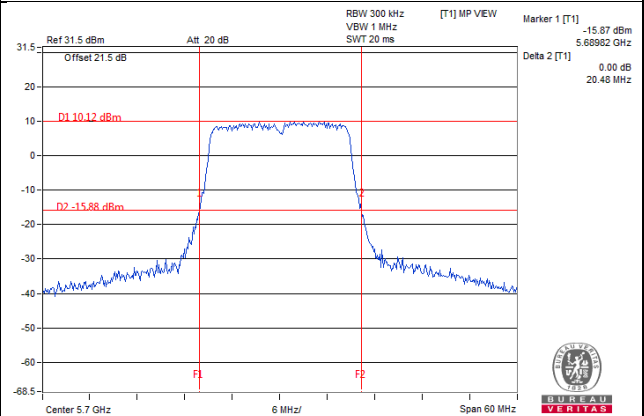
Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
54	5270	41.04	27.13 > 24
62	5310	40.80	27.1 > 24
102	5510	40.87	27.11 > 24
110	5550	40.96	27.12 > 24
134	5670	40.81	27.1 > 24

Spectrum Plot of Worst Value

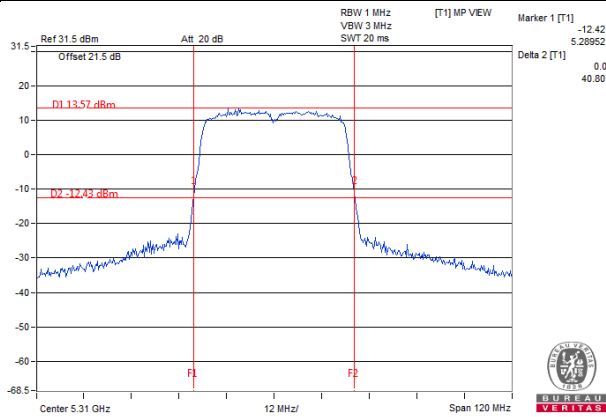
802.11a / Chain 1 –CH100



802.11ac (VHT20) / Chain 0 – CH140

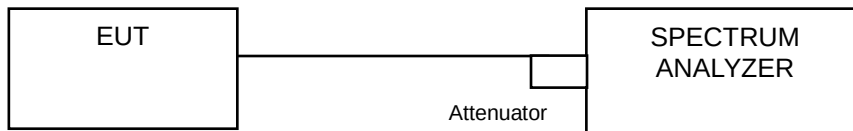


802.11ac (VHT40) / Chain 1 –CH62



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	16.44	16.56
60	5300	16.56	16.44
64	5320	16.56	16.68
100	5500	16.56	16.44
116	5580	16.56	16.56
140	5700	16.56	16.44

802.11ac (VHT20)

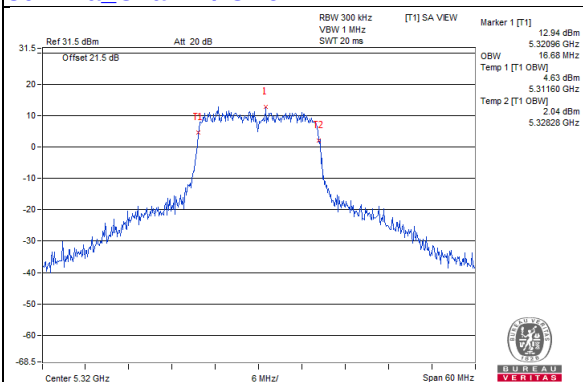
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	17.64	17.76
60	5300	17.88	17.76
64	5320	17.64	17.76
100	5500	17.76	17.64
116	5580	17.64	17.88
140	5700	17.76	17.64

802.11ac (VHT40)

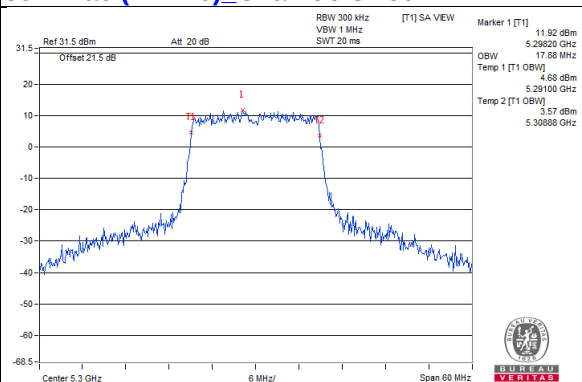
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	36.24	36.24
62	5310	36.24	36.24
102	5510	36.24	36.24
110	5550	36.24	36.24
134	5670	36.24	36.24

Spectrum Plot of Worst Value

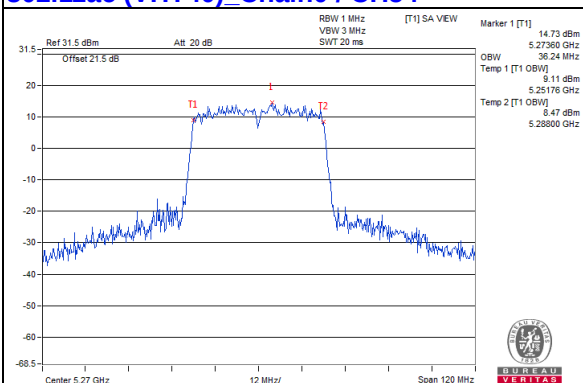
802.11a_Chain1 / CH64



802.11ac (VHT20)_Chain0 / CH60



802.11ac (VHT40)_Chain0 / CH54

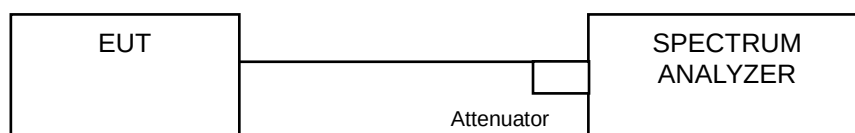


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For 802.11ac (VHT20)

Using method SA-1

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

For 802.11a, 802.11ac (VHT40)

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)

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

802.11a

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
52	5260	7.32	7.28	0.16	10.47	11.00	Pass
60	5300	7.30	7.06	0.16	10.35	11.00	Pass
64	5320	7.63	7.77	0.16	10.87	11.00	Pass
100	5500	5.97	6.01	0.16	9.16	11.00	Pass
116	5580	7.94	7.51	0.16	10.90	11.00	Pass
140	5700	4.51	4.54	0.16	7.70	11.00	Pass

- Note:** 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. For U-NII-2A: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 4.62\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
3. For U-NII-2C: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 5.72\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
4. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
52	5260	7.49	7.15	10.33	11.00	Pass
60	5300	7.51	7.16	10.35	11.00	Pass
64	5320	7.73	7.42	10.59	11.00	Pass
100	5500	5.81	5.67	8.75	11.00	Pass
116	5580	7.60	7.83	10.73	11.00	Pass
140	5700	4.65	4.36	7.52	11.00	Pass

- Note:** 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. For U-NII-2A: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 4.62\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
3. For U-NII-2C: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 5.72\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

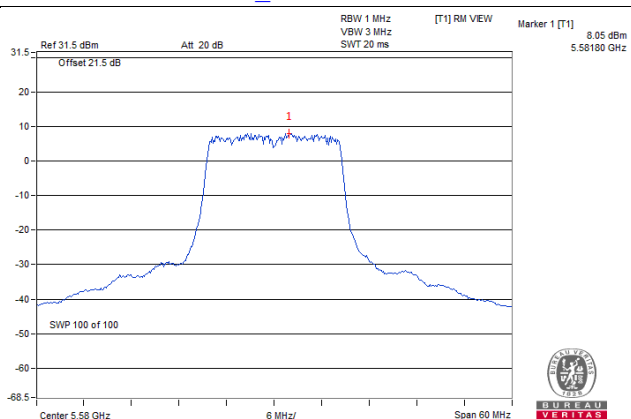
802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
54	5270	4.20	4.15	0.15	7.34	11.00	Pass
62	5310	1.69	1.53	0.15	4.77	11.00	Pass
102	5510	1.93	1.59	0.15	4.92	11.00	Pass
110	5550	5.34	5.43	0.15	8.55	11.00	Pass
134	5670	2.50	2.47	0.15	5.65	11.00	Pass

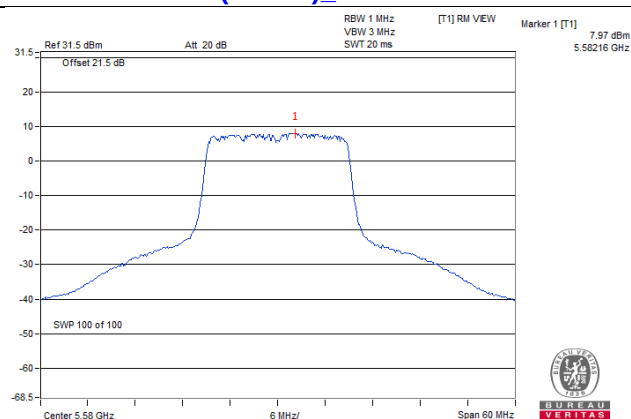
- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. For U-NII-2A: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 4.62\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
 3. For U-NII-2C: Directional gain = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 5.72\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
 4. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

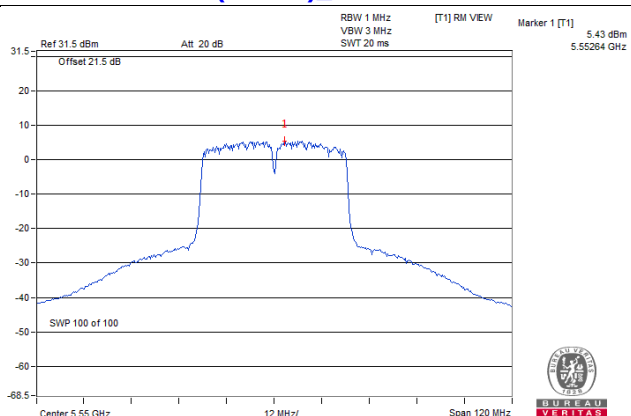
802.11a_Chain 0 / CH116



802.11ac (VHT20)_Chain 1 / CH116



802.11ac (VHT40)_Chain 1 / CH110

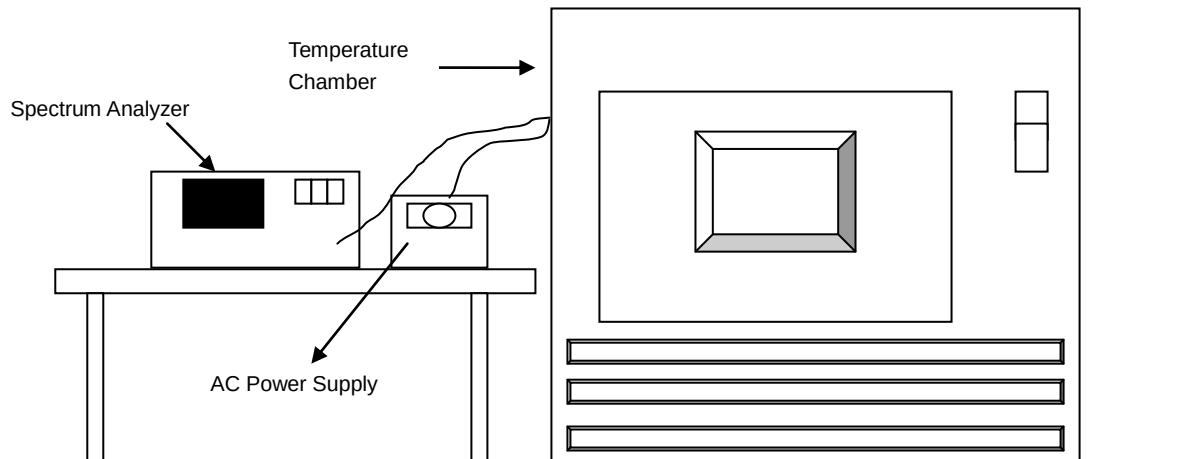


4.6 Frequency Stability Measurement

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 (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed..
- 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	5260.0144	PASS	5260.0107	PASS	5260.0153	PASS	5260.0137	PASS
40	120	5259.9977	PASS	5260.0004	PASS	5260.0001	PASS	5259.9983	PASS
30	120	5260.0224	PASS	5260.0239	PASS	5260.023	PASS	5260.026	PASS
20	120	5259.9931	PASS	5259.9919	PASS	5259.9911	PASS	5259.9936	PASS
10	120	5260.0152	PASS	5260.0169	PASS	5260.0137	PASS	5260.0163	PASS
0	120	5259.9834	PASS	5259.9838	PASS	5259.9818	PASS	5259.984	PASS
-10	120	5260.0056	PASS	5260.009	PASS	5260.0098	PASS	5260.0063	PASS
-20	120	5259.9886	PASS	5259.9871	PASS	5259.9854	PASS	5259.9853	PASS
-30	120	5260.0163	PASS	5260.0161	PASS	5260.0131	PASS	5260.0157	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	5259.9938	PASS	5259.9929	PASS	5259.9904	PASS	5259.993	PASS
	120	5259.9931	PASS	5259.9919	PASS	5259.9911	PASS	5259.9936	PASS
	102	5259.9933	PASS	5259.9923	PASS	5259.9901	PASS	5259.9945	PASS

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

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