

FCC Test Report

Report No.: RF190225D05-1

FCC ID: P27RC8335PRO

Test Model: RC8335PRO

Received Date: Feb. 25, 2019

Test Date: Mar. 6 to 18, 2019

Issued Date: Mar. 22, 2019

Applicant: Sercomm Corp.

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

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**FCC Registration /
Designation Number:** 198487 / TW2021



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Release Control Record

Issue No.	Description	Date Issued
RF190225D05-1	Original release.	Mar. 22, 2019

1 Certificate of Conformity

Product: SmartThings Smart Camera, SmartThings Cam

Brand: SmartThings, Sercomm

Test Model: RC8335PRO

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Mar. 6 to 18, 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 RF characteristics under the conditions specified in this report.

Prepared by :

Annie Chang

Date: Mar. 22, 2019

Annie Chang / Senior Specialist

Approved by :

Rex Lai

Date: Mar. 22, 2019

Rex Lai / Associate Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.25dB at 0.16172MHz.
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 -1.04dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is I-PEX not a standard connector.

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

Note:

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.77 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.48 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	SmartThings Smart Camera, SmartThings Cam
Brand	SmartThings, Sercomm
Test Model	RC8335PRO
Status of EUT	Engineering sample
Power Supply Rating	DC 12V from Adapter
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only.
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz 4 for 802.11a, 802.11n (20MHz), 802.11ac (20MHz) 2 for 802.11n (40MHz), 802.11ac (40MHz) 1 for 802.11ac (80MHz) 5745 ~ 5825MHz 5 for 802.11a, 802.11n (20MHz) 802.11ac (20MHz) 2 for 802.11n (40MHz) 802.11ac (40MHz) 1 for 802.11ac (80MHz)
Output Power	5180 ~ 5240MHz: 129.730mW 5745 ~ 5825MHz: 130.780mW
Antenna Type	5180 ~ 5240MHz: Ant.1: PCB dipole antenna with 2.85dBi gain Ant.2: PCB dipole antenna with 2.76dBi gain 5745 ~ 5825MHz: Ant.1: PCB dipole antenna with 4.44dBi gain Ant.2: PCB dipole antenna with 3.71dBi gain
Antenna Connector	I-PEX
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. The EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX FUNCTION
802.11a	1TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX
802.11ac (20MHz)	2TX
802.11ac (40MHz)	2TX
802.11ac (80MHz)	2TX

* 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)

2. The EUT uses following adapter.

Brand	APD
Model	WB-12G12FU
Input Power	100-240V, 50-60Hz, 0.3A
Output Power	12V, 1A
Power Line	AC 2 Pin, Non-shielded DC cable (3.0m)

3. 2.4GHz & 5GHz technologies cannot transmit at same time.

4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (20MHz), 802.11ac (20MHz):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (40MHz), 802.11ac (40MHz):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (80MHz):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (20MHz), 802.11ac (20MHz):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (40MHz), 802.11ac (40MHz):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (80MHz):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 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.

EUT Configure Mode	Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
-	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11ac (40MHz)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (80MHz)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
-	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11ac (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (80MHz)		155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

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

Power Line Conducted Emission Test:

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

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

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
-	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11ac (40MHz)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (80MHz)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
-	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11ac (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (80MHz)		155	155	OFDM	BPSK	29.3

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE $\geq$ 1G	24deg. C, 71%RH	120Vac, 60Hz	Ian Chang
RE<1G	24deg. C, 71%RH	120Vac, 60Hz	Ian Chang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Dalen Dai
APCM	25deg. C, 76%RH	120Vac, 60Hz	Saxon Lee

3.3 Duty Cycle of Test Signal

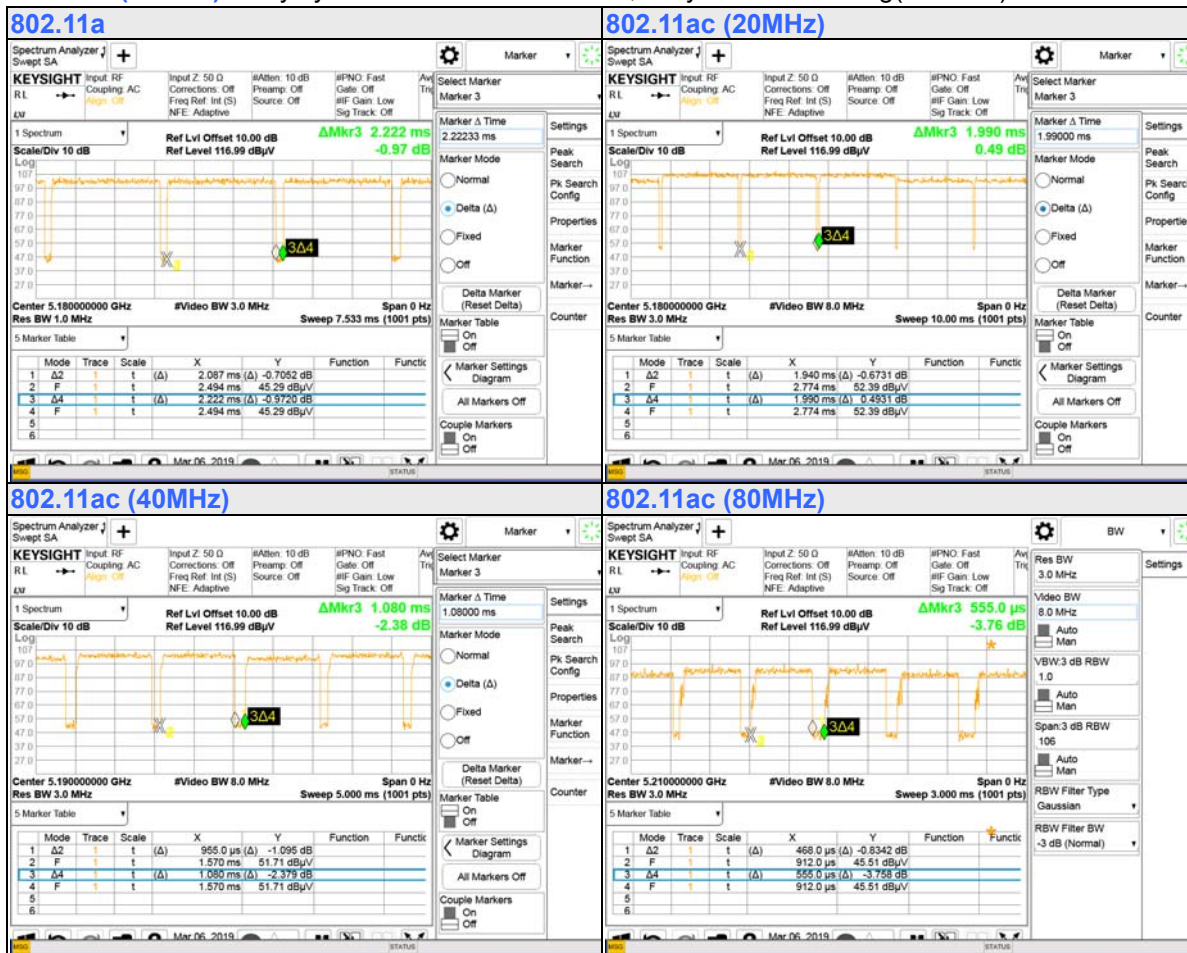
Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = $2.087/2.222 = 0.939$, Duty factor = $10 * \log(1/0.939) = 0.27$

802.11ac (20MHz): Duty cycle = $1.94/1.99 = 0.975$, Duty factor = $10 * \log(1/0.975) = 0.11$

802.11ac (40MHz): Duty cycle = $0.955/1.080 = 0.884$, Duty factor = $10 * \log(1/0.884) = 0.53$

802.11ac (80MHz): Duty cycle = $0.468/0.555 = 0.843$, Duty factor = $10 * \log(1/0.843) = 0.74$



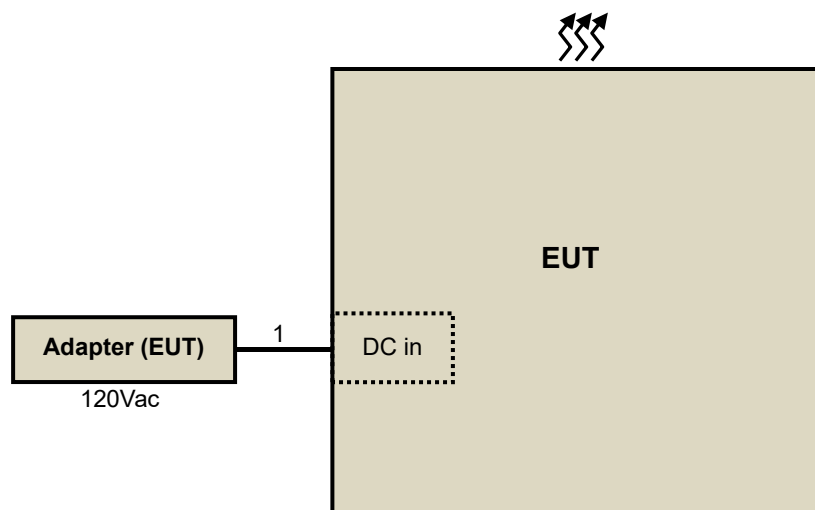
3.4 Description of Support Units

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	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	3	N	0	Supplied by client

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

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
HP Preamplifier	8447D	2432A03504	Feb. 20, 2019	Feb. 19, 2020
HP Preamplifier	8449B	3008A01201	Feb. 21, 2019	Feb. 20, 2020
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2019	Feb. 19, 2020
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 05, 2019	Mar. 04, 2020
Schwarzbeck Antenna	VULB 9168	139	Nov. 26, 2018	Nov. 25, 2019
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 25, 2018	Nov. 24, 2019
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 25, 2018	Nov. 24, 2019
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Aug. 13, 2018	Aug. 12, 2019
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Aug. 13, 2018	Aug. 12, 2019
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 4, 2018	Jun. 3, 2019
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 25, 2018	Nov. 24, 2019
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 27, 2018	Sep. 26, 2019
Anritsu Power Sensor	MA2411B	0738404	Apr. 26, 2018	Apr. 25, 2019
Anritsu Power Meter	ML2495A	0842014	Apr. 26, 2018	Apr. 25, 2019

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.

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:

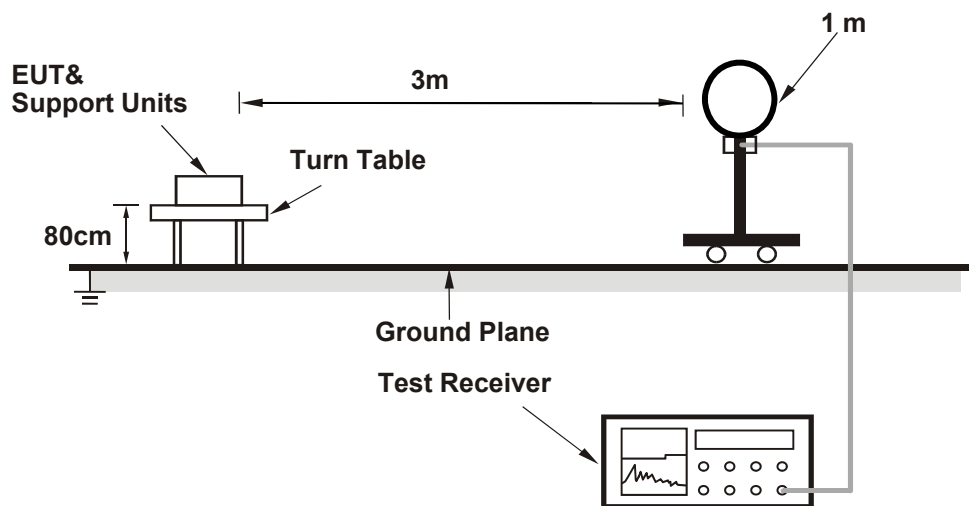
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

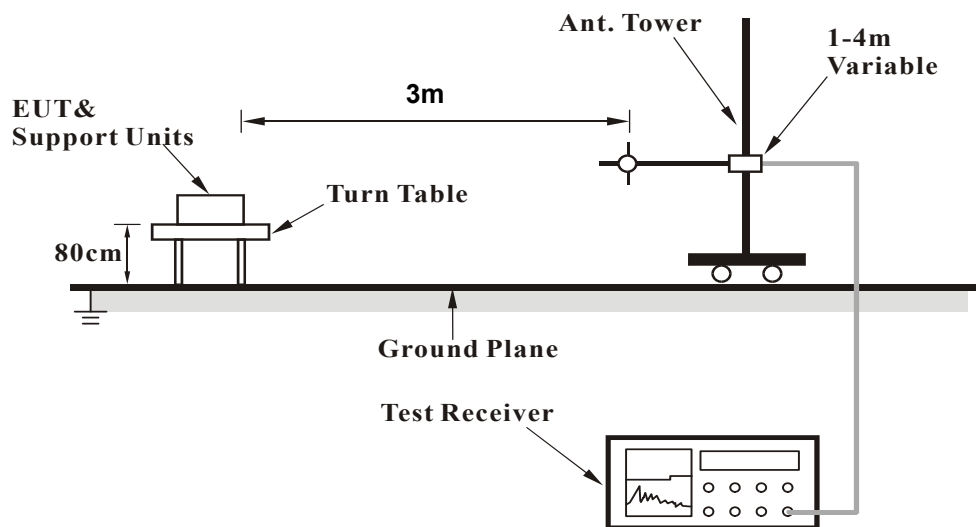
No deviation.

4.1.5 Test Setup

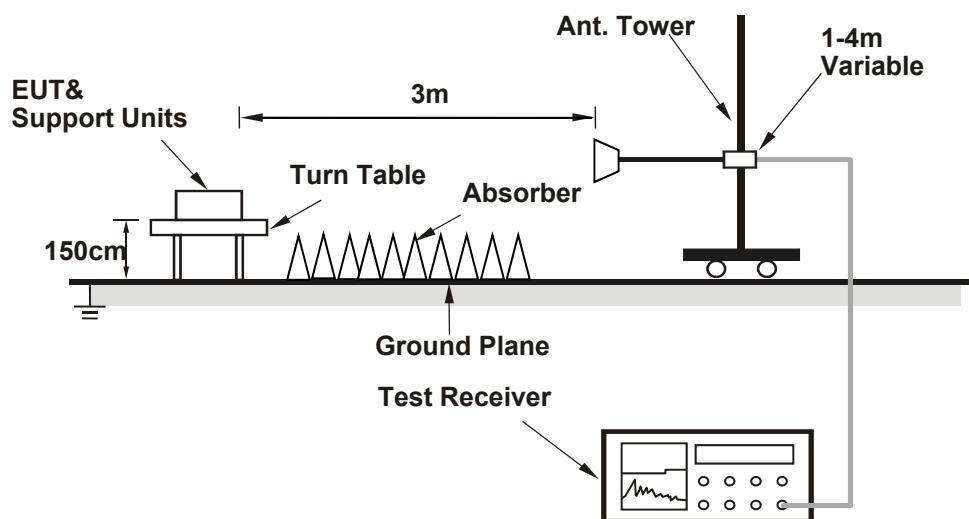
For Radiated emission below 30MHz



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

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
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	70.97 PK	74.00	-3.03	3.01 H	101	63.76	7.21
2	5150.00	52.93 AV	54.00	-1.07	3.01 H	101	45.72	7.21
3	*5180.00	114.30 PK			3.01 H	101	107.05	7.25
4	*5180.00	104.33 AV			3.01 H	101	97.08	7.25
5	#10360.00	60.27 PK	68.20	-7.93	1.79 H	20	43.13	17.14
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	67.78 PK	74.00	-6.22	2.18 V	96	60.57	7.21
2	5150.00	51.17 AV	54.00	-2.83	2.18 V	96	43.96	7.21
3	*5180.00	112.56 PK			2.18 V	96	105.31	7.25
4	*5180.00	102.18 AV			2.18 V	96	94.93	7.25
5	#10360.00	59.30 PK	68.20	-8.90	1.62 V	220	42.16	17.14

REMARKS:

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

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
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	*5200.00	118.20 PK			2.63 H	103	110.94	7.26
2	*5200.00	107.51 AV			2.63 H	103	100.25	7.26
3	#10400.00	61.00 PK	68.20	-7.20	1.64 H	127	43.66	17.34

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	*5200.00	116.14 PK			2.20 V	91	108.88	7.26
2	*5200.00	105.89 AV			2.20 V	91	98.63	7.26
3	#10400.00	60.00 PK	68.20	-8.20	1.89 V	169	42.66	17.34

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
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	*5240.00	117.25 PK			2.98 H	107	110.29	6.96
2	*5240.00	106.85 AV			2.98 H	107	99.89	6.96
3	5350.00	61.77 PK	74.00	-12.23	2.98 H	107	54.40	7.37
4	5350.00	47.88 AV	54.00	-6.12	2.98 H	107	40.51	7.37
5	#10480.00	61.31 PK	68.20	-6.89	1.63 H	128	43.61	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	115.71 PK			2.19 V	106	108.75	6.96
2	*5240.00	105.24 AV			2.19 V	106	98.28	6.96
3	5350.00	61.24 PK	74.00	-12.76	2.19 V	106	53.87	7.37
4	5350.00	47.40 AV	54.00	-6.60	2.19 V	106	40.03	7.37
5	#10480.00	60.58 PK	68.20	-7.62	1.98 V	261	42.88	17.70

REMARKS:

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

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
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	#5650.19	62.90 PK	68.34	-5.44	3.05 H	103	55.47	7.43
2	*5745.00	110.18 PK			3.05 H	103	102.59	7.59
3	*5745.00	100.16 AV			3.05 H	103	92.57	7.59
4	#5951.14	61.10 PK	68.20	-7.10	3.05 H	103	53.00	8.10
5	11490.00	61.63 PK	74.00	-12.37	1.69 H	236	43.56	18.07
6	11490.00	45.51 AV	54.00	-8.49	1.69 H	236	27.44	18.07
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	#5655.88	61.45 PK	72.55	-11.10	2.20 V	100	54.02	7.43
2	*5745.00	107.75 PK			2.20 V	100	100.16	7.59
3	*5745.00	97.68 AV			2.20 V	100	90.09	7.59
4	#5932.14	60.32 PK	68.20	-7.88	2.20 V	100	52.16	8.16
5	11490.00	60.58 PK	74.00	-13.42	1.82 V	87	42.51	18.07
6	11490.00	44.42 AV	54.00	-9.58	1.82 V	87	26.35	18.07

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
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	#5636.65	60.02 PK	68.20	-8.18	3.02 H	110	52.52	7.50
2	*5785.00	110.98 PK			3.02 H	110	103.24	7.74
3	*5785.00	101.31 AV			3.02 H	110	93.57	7.74
4	#5948.30	61.23 PK	68.20	-6.97	3.02 H	110	53.12	8.11
5	11570.00	61.64 PK	74.00	-12.36	1.68 H	19	43.66	17.98
6	11570.00	45.89 AV	54.00	-8.11	1.68 H	19	27.91	17.98
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	#5618.83	61.11 PK	68.20	-7.09	2.19 V	95	53.53	7.58
2	*5785.00	108.99 PK			2.19 V	95	101.25	7.74
3	*5785.00	98.90 AV			2.19 V	95	91.16	7.74
4	#5940.05	59.68 PK	68.20	-8.52	2.19 V	95	51.55	8.13
5	11570.00	60.64 PK	74.00	-13.36	1.45 V	68	42.66	17.98
6	11570.00	44.67 AV	54.00	-9.33	1.45 V	68	26.69	17.98

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
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	#5624.36	60.27 PK	68.20	-7.93	3.07 H	108	52.72	7.55
2	*5825.00	111.63 PK			3.07 H	108	103.71	7.92
3	*5825.00	101.54 AV			3.07 H	108	93.62	7.92
4	#5967.30	60.69 PK	68.20	-7.51	3.07 H	108	52.60	8.09
5	11650.00	61.21 PK	74.00	-12.79	1.72 H	155	43.49	17.72
6	11650.00	44.91 AV	54.00	-9.09	1.72 H	155	27.19	17.72
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	#5625.63	60.47 PK	68.20	-7.73	2.01 V	93	52.92	7.55
2	*5825.00	109.34 PK			2.01 V	93	101.42	7.92
3	*5825.00	99.58 AV			2.01 V	93	91.66	7.92
4	#5931.03	62.65 PK	68.20	-5.55	2.01 V	93	54.50	8.15
5	11650.00	59.94 PK	74.00	-14.06	1.27 V	88	42.22	17.72
6	11650.00	44.15 AV	54.00	-9.85	1.27 V	88	26.43	17.72

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 (20MHz)

CHANNEL	TX Channel 36	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	69.24 PK	74.00	-4.76	1.99 H	269	62.03	7.21
2	5150.00	50.69 AV	54.00	-3.31	1.99 H	269	43.48	7.21
3	*5180.00	112.71 PK			1.99 H	269	105.46	7.25
4	*5180.00	102.96 AV			1.99 H	269	95.71	7.25
5	#10360.00	60.79 PK	68.20	-7.41	1.66 H	139	43.65	17.14

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	64.56 PK	74.00	-9.44	3.08 V	53	57.35	7.21
2	5150.00	48.67 AV	54.00	-5.33	3.08 V	53	41.46	7.21
3	*5180.00	111.80 PK			3.08 V	53	104.55	7.25
4	*5180.00	101.21 AV			3.08 V	53	93.96	7.25
5	#10360.00	59.32 PK	68.20	-8.88	1.90 V	208	42.18	17.14

REMARKS:

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

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
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	*5200.00	113.04 PK			1.98 H	261	105.78	7.26
2	*5200.00	102.83 AV			1.98 H	261	95.57	7.26
3	#10400.00	60.82 PK	68.20	-7.38	1.67 H	128	43.48	17.34

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	*5200.00	111.97 PK			3.10 V	60	104.71	7.26
2	*5200.00	101.49 AV			3.10 V	60	94.23	7.26
3	#10400.00	59.85 PK	68.20	-8.35	1.89 V	251	42.51	17.34

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
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	*5240.00	112.65 PK			1.97 H	268	105.69	6.96
2	*5240.00	102.52 AV			1.97 H	268	95.56	6.96
3	5350.00	61.00 PK	74.00	-13.00	1.97 H	268	53.63	7.37
4	5350.00	47.72 AV	54.00	-6.28	1.97 H	268	40.35	7.37
5	#10480.00	60.97 PK	68.20	-7.23	1.66 H	171	43.27	17.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	111.21 PK			3.12 V	58	104.25	6.96
2	*5240.00	100.71 AV			3.12 V	58	93.75	6.96
3	5350.00	60.58 PK	74.00	-13.42	3.12 V	58	53.21	7.37
4	5350.00	47.19 AV	54.00	-6.81	3.12 V	58	39.82	7.37
5	#10480.00	60.31 PK	68.20	-7.89	1.96 V	188	42.61	17.70

REMARKS:

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

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
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	#5649.09	59.03 PK	68.20	-9.17	2.91 H	102	51.59	7.44
2	*5745.00	110.93 PK			2.91 H	102	103.34	7.59
3	*5745.00	101.04 AV			2.91 H	102	93.45	7.59
4	#5934.13	60.29 PK	68.20	-7.91	2.91 H	102	52.14	8.15
5	11490.00	61.29 PK	74.00	-12.71	1.91 H	258	43.22	18.07
6	11490.00	45.63 AV	54.00	-8.37	1.91 H	258	27.56	18.07
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5627.40	59.49 PK	68.20	-8.71	1.98 V	89	51.94	7.55
2	*5745.00	108.59 PK			1.98 V	89	101.00	7.59
3	*5745.00	99.03 AV			1.98 V	89	91.44	7.59
4	#5938.31	60.54 PK	68.20	-7.66	1.98 V	89	52.40	8.14
5	11490.00	60.28 PK	74.00	-13.72	1.39 V	39	42.21	18.07
6	11490.00	44.62 AV	54.00	-9.38	1.39 V	39	26.55	18.07

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
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	#5622.12	60.34 PK	68.20	-7.86	2.94 H	105	52.77	7.57
2	*5785.00	111.36 PK			2.94 H	105	103.62	7.74
3	*5785.00	101.03 AV			2.94 H	105	93.29	7.74
4	#5961.68	60.62 PK	68.20	-7.58	2.94 H	105	52.52	8.10
5	11570.00	61.57 PK	74.00	-12.43	1.62 H	186	43.59	17.98
6	11570.00	45.29 AV	54.00	-8.71	1.62 H	186	27.31	17.98
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	#5651.67	59.71 PK	69.44	-9.73	1.96 V	96	52.28	7.43
2	*5785.00	108.98 PK			1.96 V	96	101.24	7.74
3	*5785.00	99.08 AV			1.96 V	96	91.34	7.74
4	#5941.07	60.35 PK	68.20	-7.85	1.96 V	96	52.22	8.13
5	11570.00	60.17 PK	74.00	-13.83	1.42 V	55	42.19	17.98
6	11570.00	44.64 AV	54.00	-9.36	1.42 V	55	26.66	17.98

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
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	#5623.13	59.44 PK	68.20	-8.76	2.97 H	101	51.88	7.56
2	*5825.00	111.37 PK			2.97 H	101	103.45	7.92
3	*5825.00	101.58 AV			2.97 H	101	93.66	7.92
4	#5947.80	60.72 PK	68.20	-7.48	2.97 H	101	52.60	8.12
5	11650.00	61.57 PK	74.00	-12.43	1.57 H	148	43.85	17.72
6	11650.00	45.21 AV	54.00	-8.79	1.57 H	148	27.49	17.72
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	#5621.50	59.67 PK	68.20	-8.53	2.06 V	102	52.10	7.57
2	*5825.00	109.60 PK			2.06 V	102	101.68	7.92
3	*5825.00	99.46 AV			2.06 V	102	91.54	7.92
4	#5934.70	60.65 PK	68.20	-7.55	2.06 V	102	52.50	8.15
5	11650.00	60.56 PK	74.00	-13.44	1.55 V	88	42.84	17.72
6	11650.00	44.66 AV	54.00	-9.34	1.55 V	88	26.94	17.72

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 (40MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.25 PK	74.00	-5.75	1.98 H	266	61.04	7.21
2	5150.00	52.79 AV	54.00	-1.21	1.98 H	266	45.58	7.21
3	*5190.00	105.68 PK			1.98 H	266	98.43	7.25
4	*5190.00	96.16 AV			1.98 H	266	88.91	7.25
5	#10380.00	59.79 PK	68.20	-8.41	1.57 H	184	42.55	17.24

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.61 PK	74.00	-11.39	2.94 V	63	55.40	7.21
2	5150.00	48.88 AV	54.00	-5.12	2.94 V	63	41.67	7.21
3	*5190.00	103.65 PK			2.94 V	63	96.40	7.25
4	*5190.00	93.53 AV			2.94 V	63	86.28	7.25
5	#10380.00	58.53 PK	68.20	-9.67	1.72 V	193	41.29	17.24

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	110.52 PK			2.13 H	265	103.48	7.04
2	*5230.00	100.24 AV			2.13 H	265	93.20	7.04
3	5350.00	62.40 PK	74.00	-11.60	2.13 H	265	55.03	7.37
4	5350.00	47.78 AV	54.00	-6.22	2.13 H	265	40.41	7.37
5	#10460.00	61.13 PK	68.20	-7.07	1.66 H	139	43.52	17.61
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	108.41 PK			3.01 V	59	101.37	7.04
2	*5230.00	97.97 AV			3.01 V	59	90.93	7.04
3	5350.00	62.01 PK	74.00	-11.99	3.01 V	59	54.64	7.37
4	5350.00	47.40 AV	54.00	-6.60	3.01 V	59	40.03	7.37
5	#10460.00	59.83 PK	68.20	-8.37	1.82 V	159	42.22	17.61

REMARKS:

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

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
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	#5631.83	59.63 PK	68.20	-8.57	2.54 H	288	52.11	7.52
2	*5755.00	107.50 PK			2.54 H	288	99.89	7.61
3	*5755.00	97.49 AV			2.54 H	288	89.88	7.61
4	#5941.34	60.87 PK	68.20	-7.33	2.54 H	288	52.75	8.12
5	11510.00	61.45 PK	74.00	-12.55	1.84 H	154	43.36	18.09
6	11510.00	45.33 AV	54.00	-8.67	1.84 H	154	27.24	18.09
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	#5635.62	59.38 PK	68.20	-8.82	2.89 V	90	51.88	7.50
2	*5755.00	105.49 PK			2.89 V	90	97.88	7.61
3	*5755.00	95.30 AV			2.89 V	90	87.69	7.61
4	#5966.88	59.86 PK	68.20	-8.34	2.89 V	90	51.77	8.09
5	11510.00	60.35 PK	74.00	-13.65	1.45 V	99	42.26	18.09
6	11510.00	44.28 AV	54.00	-9.72	1.45 V	99	26.19	18.09

REMARKS:

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

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
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	#5620.67	59.63 PK	68.20	-8.57	2.58 H	290	52.05	7.58
2	*5795.00	107.78 PK			2.58 H	290	99.99	7.79
3	*5795.00	97.63 AV			2.58 H	290	89.84	7.79
4	#5935.45	61.05 PK	68.20	-7.15	2.58 H	290	52.90	8.15
5	11590.00	61.62 PK	74.00	-12.38	1.68 H	159	43.68	17.94
6	11590.00	45.52 AV	54.00	-8.48	1.68 H	159	27.58	17.94
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	#5633.93	60.26 PK	68.20	-7.94	2.94 V	96	52.76	7.50
2	*5795.00	105.47 PK			2.94 V	96	97.68	7.79
3	*5795.00	95.32 AV			2.94 V	96	87.53	7.79
4	#5937.99	60.98 PK	68.20	-7.22	2.94 V	96	52.84	8.14
5	11590.00	60.82 PK	74.00	-13.18	1.55 V	45	42.88	17.94
6	11590.00	44.63 AV	54.00	-9.37	1.55 V	45	26.69	17.94

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 (80MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.00 PK	74.00	-8.00	2.01 H	265	58.79	7.21
2	5150.00	52.96 AV	54.00	-1.04	2.01 H	265	45.75	7.21
3	*5210.00	104.02 PK			2.01 H	265	96.84	7.18
4	*5210.00	93.90 AV			2.01 H	265	86.72	7.18
5	5350.00	61.25 PK	74.00	-12.75	2.01 H	265	53.88	7.37
6	5350.00	48.19 AV	54.00	-5.81	2.01 H	265	40.82	7.37
7	#10420.00	60.06 PK	68.20	-8.14	1.69 H	108	42.63	17.43
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.84 PK	74.00	-11.16	1.99 V	190	55.63	7.21
2	5150.00	50.54 AV	54.00	-3.46	1.99 V	190	43.33	7.21
3	*5210.00	102.40 PK			1.99 V	190	95.22	7.18
4	*5210.00	92.94 AV			1.99 V	190	85.76	7.18
5	5350.00	60.91 PK	74.00	-13.09	1.99 V	190	53.54	7.37
6	5350.00	48.31 AV	54.00	-5.69	1.99 V	190	40.94	7.37
7	#10420.00	58.65 PK	68.20	-9.55	1.78 V	199	41.22	17.43

REMARKS:

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

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK)
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	#5648.06	63.51 PK	68.20	-4.69	2.60 H	280	56.07	7.44
2	*5775.00	106.23 PK			2.60 H	280	98.53	7.70
3	*5775.00	96.16 AV			2.60 H	280	88.46	7.70
4	#5927.32	62.16 PK	68.20	-6.04	2.60 H	280	53.99	8.17
5	11550.00	61.44 PK	74.00	-12.56	1.66 H	117	43.42	18.02
6	11550.00	45.90 AV	54.00	-8.10	1.66 H	117	27.88	18.02
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	#5634.27	61.36 PK	68.20	-6.84	2.98 V	91	53.86	7.50
2	*5775.00	104.46 PK			2.98 V	91	96.76	7.70
3	*5775.00	94.22 AV			2.98 V	91	86.52	7.70
4	#5925.77	61.86 PK	68.20	-6.34	2.98 V	91	53.68	8.18
5	11550.00	60.54 PK	74.00	-13.46	1.48 V	69	42.52	18.02
6	11550.00	44.20 AV	54.00	-9.80	1.48 V	69	26.18	18.02

REMARKS:

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

Below 1GHz Data:

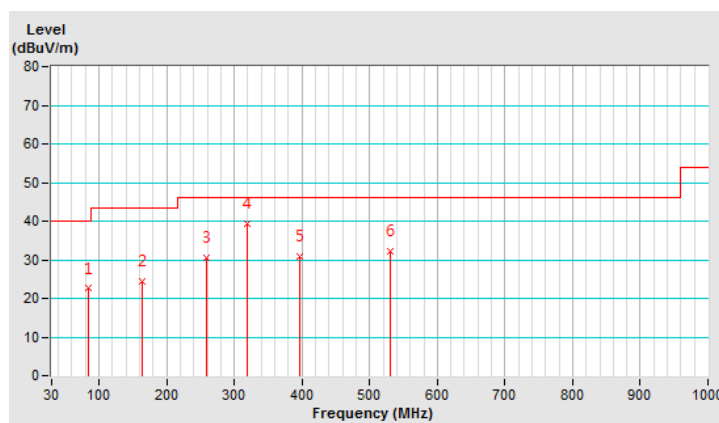
802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	83.74	22.61 QP	40.00	-17.39	2.15 H	283	34.74	-12.13
2	163.91	24.46 QP	43.50	-19.04	2.61 H	250	31.32	-6.86
3	258.05	30.46 QP	46.00	-15.54	1.83 H	151	37.12	-6.66
4	319.50	39.35 QP	46.00	-6.65	2.01 H	273	43.86	-4.51
5	396.18	30.88 QP	46.00	-15.12	1.21 H	255	34.20	-3.32
6	530.91	32.29 QP	46.00	-13.71	1.09 H	222	33.09	-0.80

REMARKS:

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

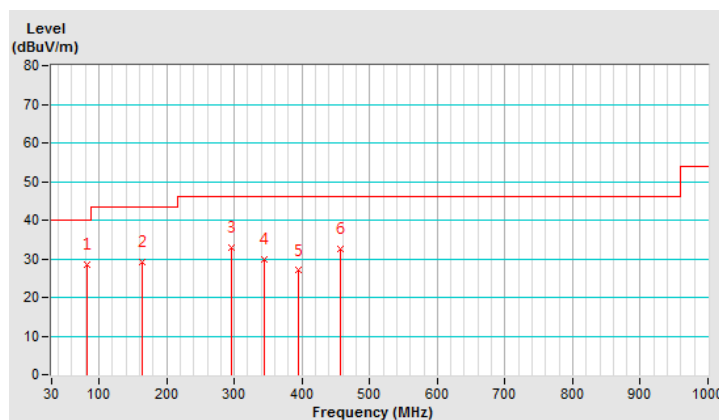


CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	81.65	28.61 QP	40.00	-11.39	1.06 V	360	40.53	-11.92
2	164.01	29.18 QP	43.50	-14.32	1.34 V	67	36.04	-6.86
3	294.96	32.89 QP	46.00	-13.11	1.18 V	65	38.09	-5.20
4	344.09	29.76 QP	46.00	-16.24	1.54 V	111	34.14	-4.38
5	395.16	26.98 QP	46.00	-19.02	1.41 V	7	30.30	-3.32
6	456.02	32.54 QP	46.00	-13.46	1.15 V	274	34.46	-1.92

REMARKS:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	838251/021	Nov. 1, 2018	Oct. 31, 2019
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ENV216	101195	May 2, 2018	May 1, 2019
LISN With Adapter (for EUT)	AD10	C03Ada-002	May 2, 2018	May 1, 2019
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 26, 2018	Jul. 25, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 3, 2018	May 2, 2019
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C03.01	Sep. 18, 2018	Sep. 17, 2019
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 25, 2019	Jan. 24, 2020
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Jan. 25, 2019	Jan. 24, 2020
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 21, 2018	Nov. 20, 2019
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 21, 2018	Nov. 20, 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 Shielded Room No. 3.

4.2.3 Test Procedure

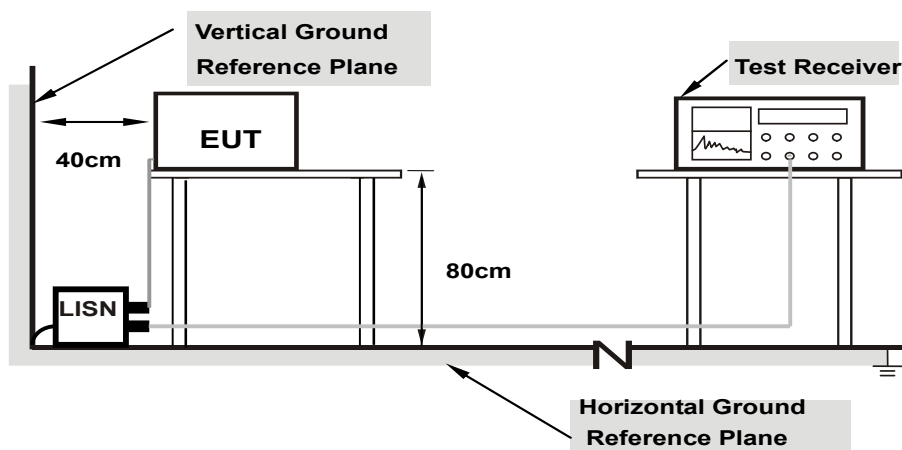
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

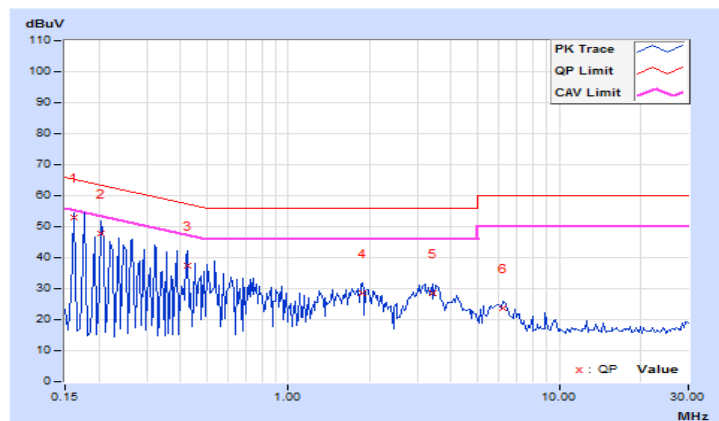
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. 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	0.16172	9.71	43.42	28.58	53.13	38.29	65.38	55.38	-12.25	-17.09
2	0.20469	9.71	38.18	23.48	47.89	33.19	63.42	53.42	-15.53	-20.23
3	0.42344	9.75	27.58	13.46	37.33	23.21	57.38	47.38	-20.05	-24.17
4	1.87109	9.92	18.74	6.28	28.66	16.20	56.00	46.00	-27.34	-29.80
5	3.39844	9.99	18.68	5.52	28.67	15.51	56.00	46.00	-27.33	-30.49
6	6.21875	10.08	13.64	2.04	23.72	12.12	60.00	50.00	-36.28	-37.88

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.

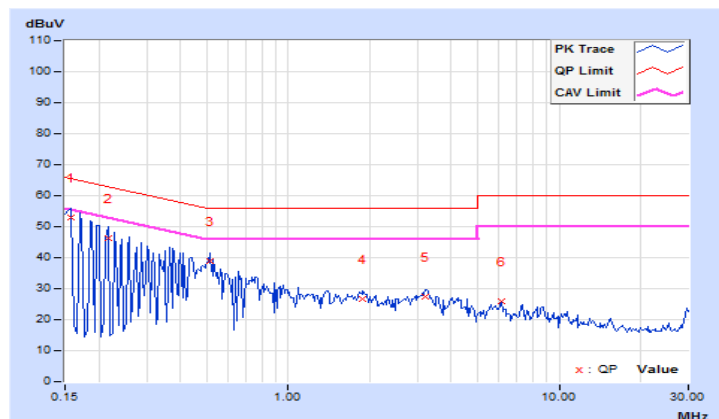


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.72	43.28	28.38	53.00	38.10	65.58	55.58	-12.58	-17.48
2	0.21641	9.72	36.48	20.84	46.20	30.56	62.96	52.96	-16.76	-22.40
3	0.51328	9.78	29.06	20.58	38.84	30.36	56.00	46.00	-17.16	-15.64
4	1.88672	9.91	16.62	9.68	26.53	19.59	56.00	46.00	-29.47	-26.41
5	3.22266	9.98	17.26	9.18	27.24	19.16	56.00	46.00	-28.76	-26.84
6	6.08984	10.07	15.70	9.04	25.77	19.11	60.00	50.00	-34.23	-30.89

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

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

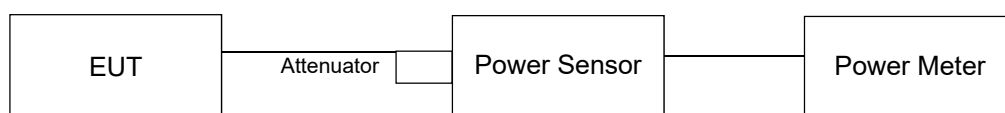
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.3.2 Test Setup



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 802.11a, 802.11n (20MHz), 802.11n (40MHz), 802.11ac (20MHz), 802.11ac (40MHz)

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 and set the detector to AVERAGE. Duty factor is not added to measured value.

For 802.11ac (80MHz)

- 1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- 2) Set sweep trigger to "free run".
- 3) Set RBW = 1 MHz.
- 4) Set VBW $\geq$ 3 MHz
- 5) Number of points in sweep $\geq$ 2 Span / RBW.
- 6) Sweep time $\leq$ (number of points in sweep) * T
- 7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
- 8) Detector = RMS.
- 9) Trace mode = max hold.
- 10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

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

Power Output:

802.11a

Channel	Channel Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
36	5180	66.988	18.26	24	Pass
40	5200	66.681	18.24	24	Pass
48	5240	65.766	18.18	24	Pass
149	5745	63.68	18.04	30	Pass
157	5785	63.387	18.02	30	Pass
165	5825	63.533	18.03	30	Pass

802.11ac (20MHz)

CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	18.11	18.04	128.394	21.09	24	Pass
40	5200	18.15	18.09	129.730	21.13	24	Pass
48	5240	18.12	18.07	128.984	21.11	24	Pass
149	5745	18.13	18.06	128.986	21.11	30	Pass
157	5785	18.14	18.10	129.728	21.13	30	Pass
165	5825	18.19	18.12	130.780	21.17	30	Pass

802.11ac (40MHz)

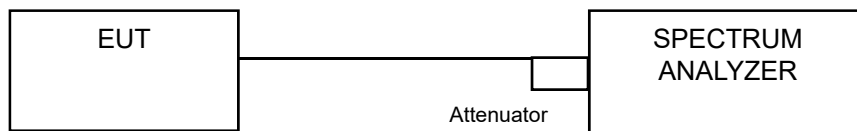
CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
38	5190	17.16	17.09	103.168	20.14	24	Pass
46	5230	18.02	18.00	126.483	21.02	24	Pass
151	5755	18.09	18.06	128.390	21.09	30	Pass
159	5795	18.06	18.02	127.360	21.05	30	Pass

802.11ac (80MHz)

CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
42	5210	15.23	15.18	66.304	18.22	24	Pass
155	5775	18.14	18.11	129.877	21.14	30	Pass

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
36	5180	17.04
40	5200	17.04
48	5240	16.92
149	5745	18.52
157	5785	17.90
165	5825	17.60

802.11ac (20MHz)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
36	5180	18.00	18.00
40	5200	17.88	18.00
48	5240	18.00	18.00
149	5745	19.13	18.80
157	5785	18.70	18.60
165	5825	18.30	18.20

802.11ac (40MHz)

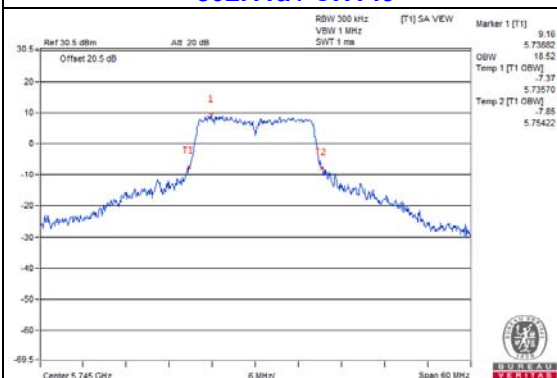
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
38	5190	36.60	36.60
46	5230	37.00	37.00
151	5755	37.11	37.00
159	5795	36.83	36.66

802.11ac (80MHz)

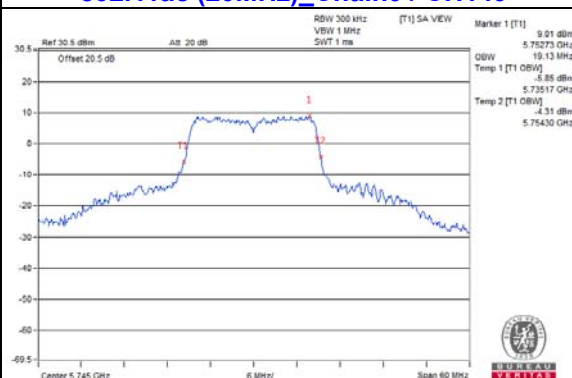
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		CHAIN 0	CHAIN 1
42	5210	75.12	75.12
155	5775	75.48	75.60

Spectrum Plot of Worst Value

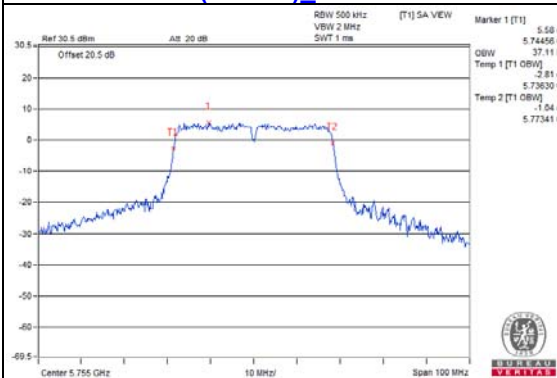
802.11a / CH149



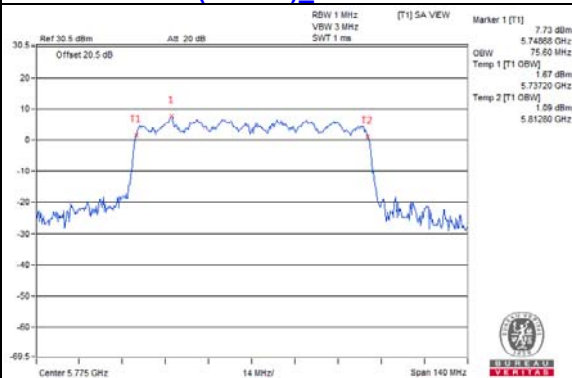
802.11ac (20MHz)_Chain0 / CH149



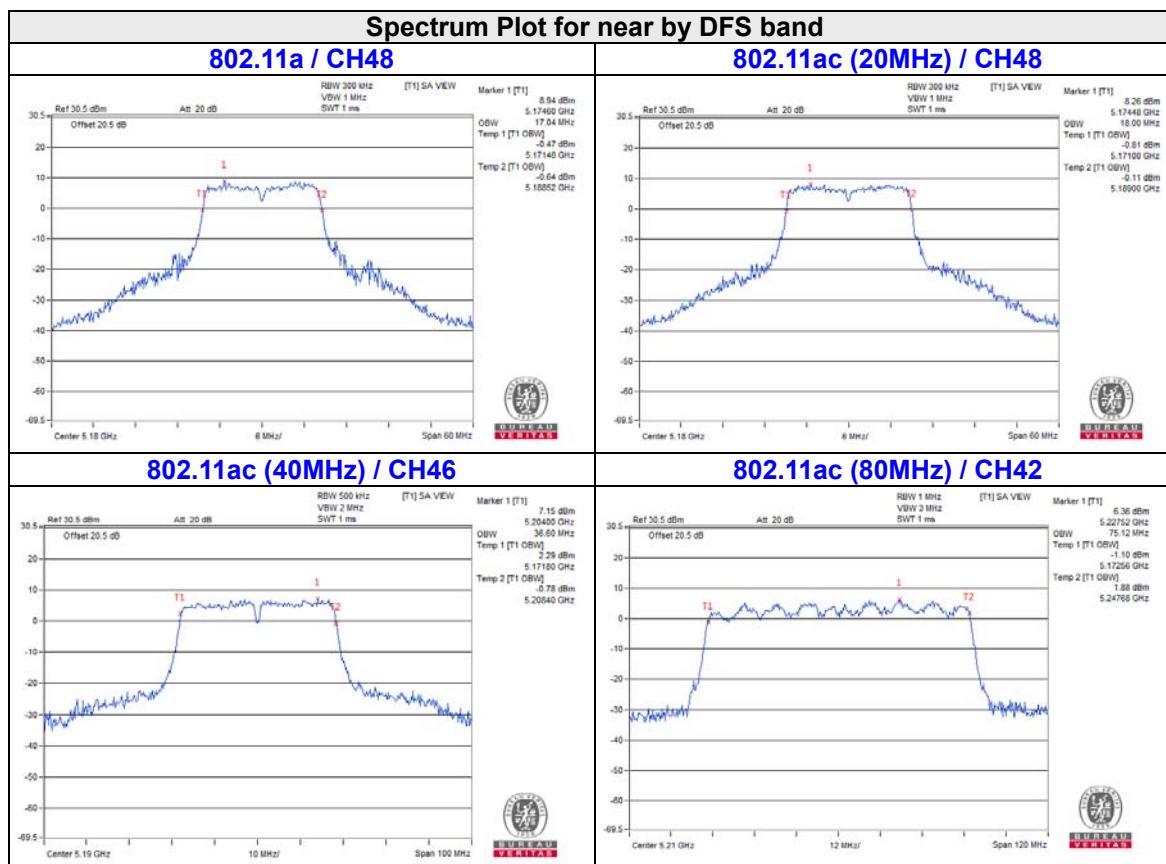
802.11ac (40MHz)_Chain0 / CH151



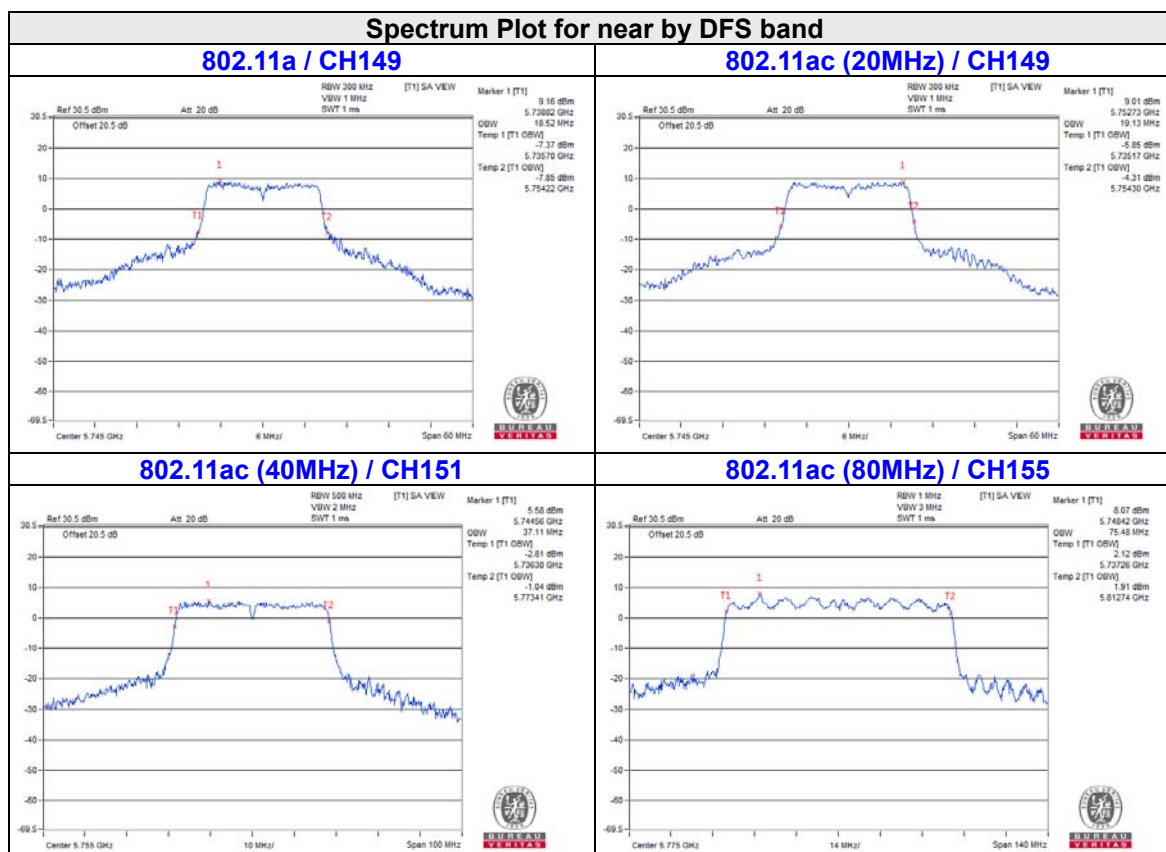
802.11ac (80MHz)_Chain1 / CH155



For U-NII-1 Band:



For U-NII-3 Band:



4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1 band:

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 = 500 kHz, Set VBW ≥ 3 RBW, 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)	PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
36	5180	4.65	0.27	4.92	11	Pass
40	5200	4.17	0.27	4.44	11	Pass
48	5240	4.93	0.27	5.20	11	Pass

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

802.11ac (20MHz)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	4.11	4.46	0.11	7.41	11	Pass
40	5200	4.29	4.23	0.11	7.38	11	Pass
48	5240	4.58	4.60	0.11	7.71	11	Pass

- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (40MHz)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	0.22	0.59	0.53	3.95	11	Pass
46	5230	2.11	2.13	0.53	5.66	11	Pass

- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

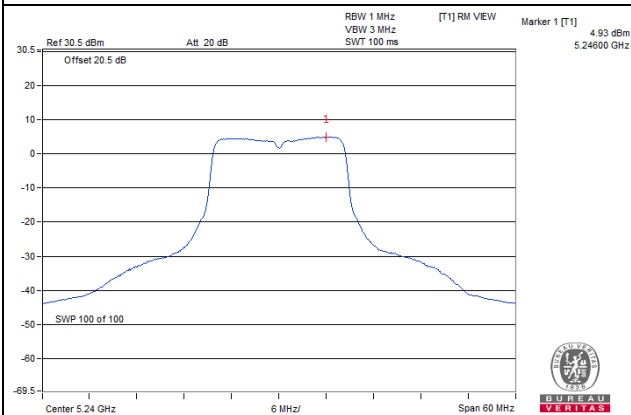
802.11ac (80MHz)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-4.25	-4.14	0.74	-0.44	11	Pass

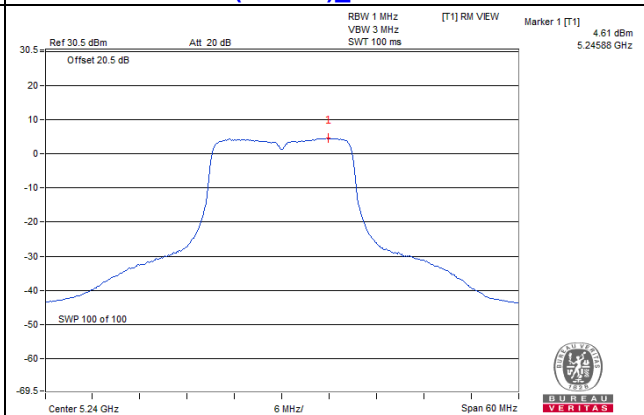
- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

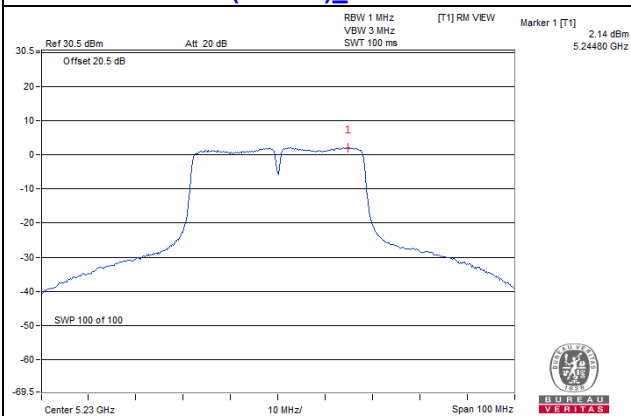
802.11a / CH48



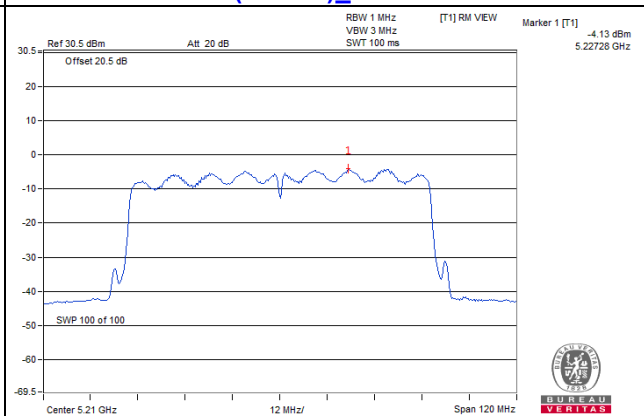
802.11ac (20MHz)_Chain 1 / CH48



802.11ac (40MHz)_Chain 1 / CH46



802.11ac (80MHz)_Chain 1 / CH42



For U-NII-3:

802.11a

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
149	5745	-3.76	0.27	-3.49	30	Pass
157	5785	-3.77	0.27	-3.50	30	Pass
165	5825	-3.56	0.27	-3.29	30	Pass

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

802.11ac (20MHz)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-4.13	3.01	0.11	-1.01	28.91	Pass
	157	5785	-3.94	3.01	0.11	-0.82	28.91	Pass
	165	5825	-4.08	3.01	0.11	-0.96	28.91	Pass
1	149	5745	-4.23	3.01	0.11	-1.11	28.91	Pass
	157	5785	-3.89	3.01	0.11	-0.77	28.91	Pass
	165	5825	-4.02	3.01	0.11	-0.90	28.91	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.09 - 6) = 28.91\text{dBm}$.

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

802.11ac (40MHz)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-9.55	3.01	0.53	-6.01	28.91	Pass
	159	5795	-9.82	3.01	0.53	-6.28	28.91	Pass
1	151	5755	-9.71	3.01	0.53	-6.17	28.91	Pass
	159	5795	-9.84	3.01	0.53	-6.30	28.91	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.09 - 6) = 28.91\text{dBm}$.

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

802.11ac (80MHz)

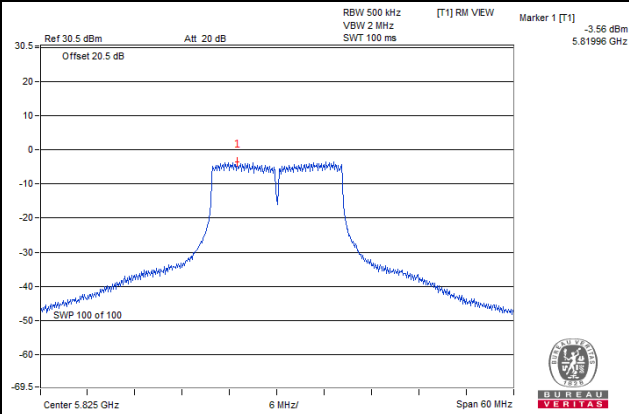
TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-12.37	3.01	0.74	-8.62	28.91	Pass
1	155	5775	-12.49	3.01	0.74	-8.74	28.91	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.09 - 6) = 28.91\text{dBm}$.

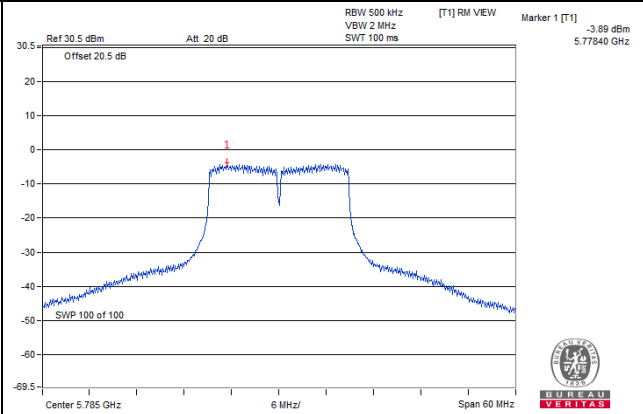
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

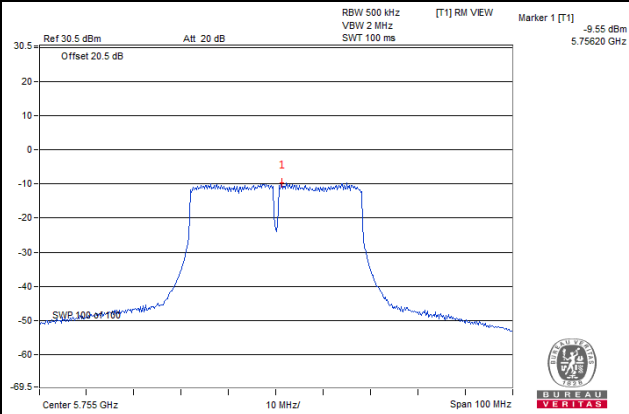
802.11a / CH165



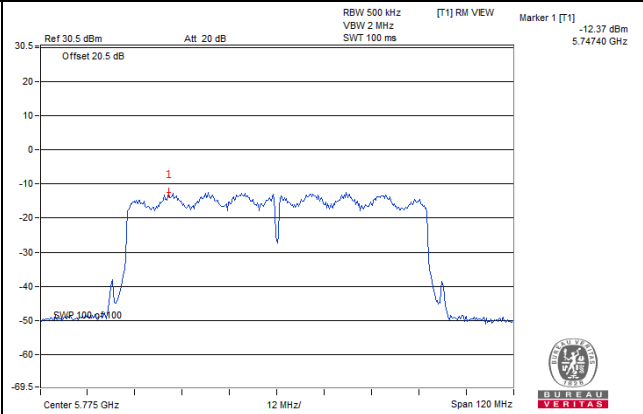
802.11ac (20MHz)_Chain 1 / CH157



802.11ac (40MHz)_Chain 0 / CH151



802.11ac (80MHz)_Chain 0 / CH155

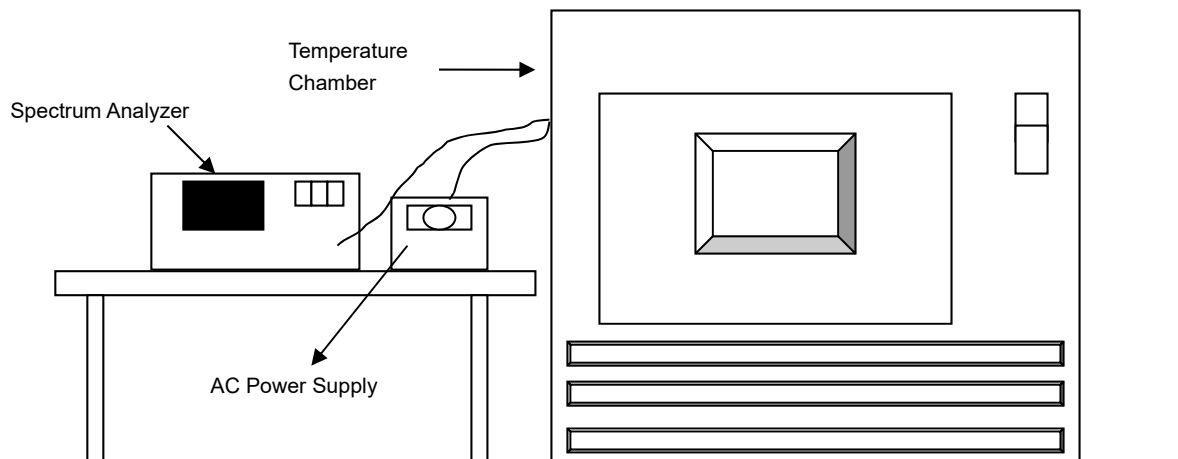


4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

- 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: 5180 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5179.9798	Pass	5179.9827	Pass	5179.9823	Pass	5179.9831	Pass
40	120	5179.9986	Pass	5180.0008	Pass	5180.001	Pass	5180.0002	Pass
30	120	5180.0065	Pass	5180.0073	Pass	5180.0048	Pass	5180.0079	Pass
20	120	5180.0266	Pass	5180.0262	Pass	5180.0243	Pass	5180.0261	Pass
10	120	5179.9985	Pass	5179.9968	Pass	5179.9959	Pass	5179.9996	Pass
0	120	5180.0205	Pass	5180.0166	Pass	5180.0204	Pass	5180.0172	Pass
-10	120	5180.0066	Pass	5180.0086	Pass	5180.0076	Pass	5180.0067	Pass
-20	120	5180.0019	Pass	5180.0011	Pass	5180.0043	Pass	5180.0049	Pass
-30	120	5179.9968	Pass	5179.9989	Pass	5179.9987	Pass	5179.9996	Pass

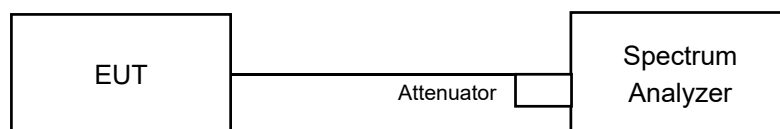
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0259	Pass	5180.0266	Pass	5180.0238	Pass	5180.0255	Pass
	120	5180.0266	Pass	5180.0262	Pass	5180.0243	Pass	5180.0261	Pass
	102	5180.0257	Pass	5180.0265	Pass	5180.0237	Pass	5180.0255	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

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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
149	5745	16.37	0.5	PASS
157	5785	16.39	0.5	PASS
165	5825	16.39	0.5	PASS

802.11ac (20MHz)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.59	17.58	0.5	PASS
157	5785	17.62	17.60	0.5	PASS
165	5825	17.58	17.60	0.5	PASS

802.11ac (40MHz)

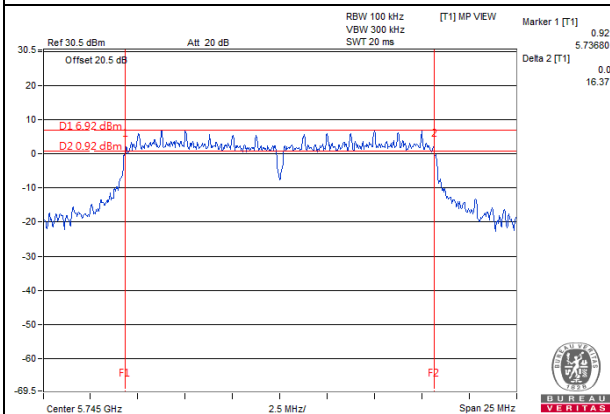
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	36.37	36.35	0.5	PASS
159	5795	36.14	36.15	0.5	PASS

802.11ac (80MHz)

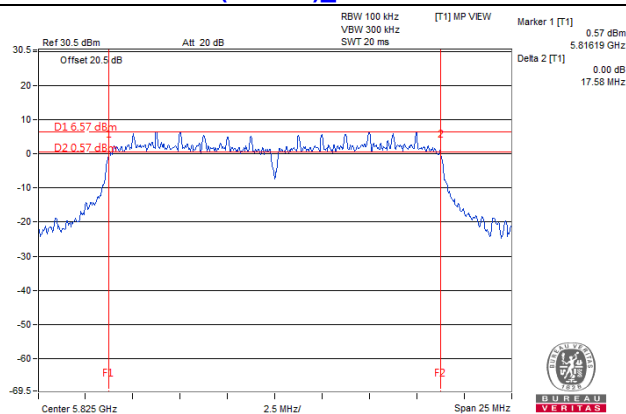
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.35	75.40	0.5	PASS

Spectrum Plot of Worst Value

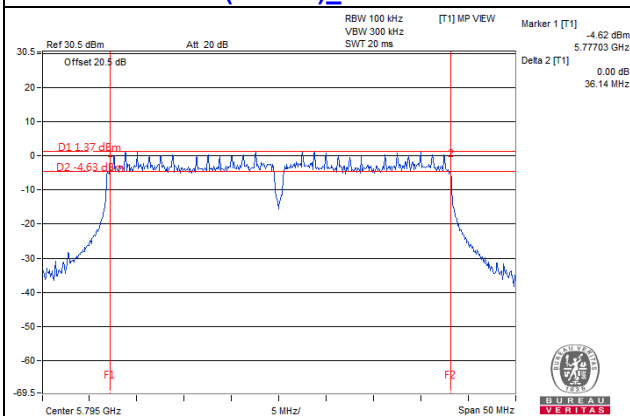
802.11a / CH149



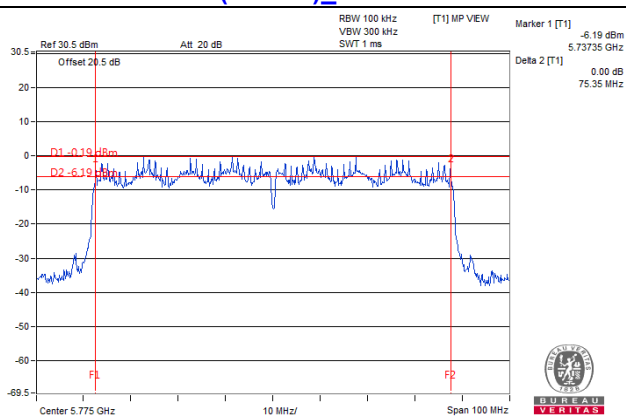
802.11ac (20MHz)_Chain 0 / CH165



802.11ac (40MHz)_Chain 0 / CH159



802.11ac (80MHz)_Chain 0 / CH155



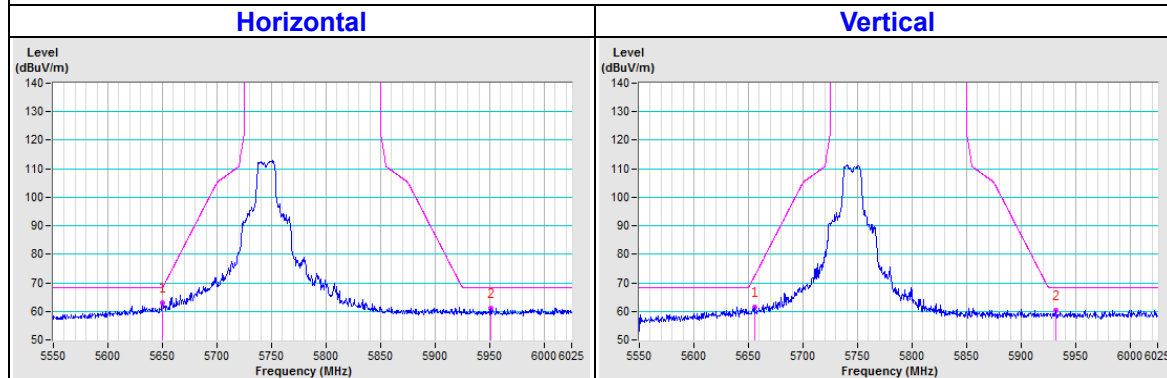
5 Pictures of Test Arrangements

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

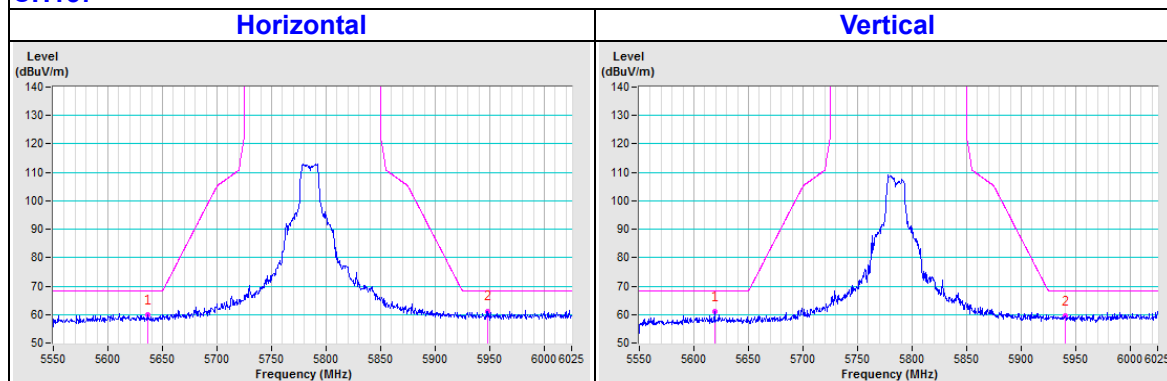
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

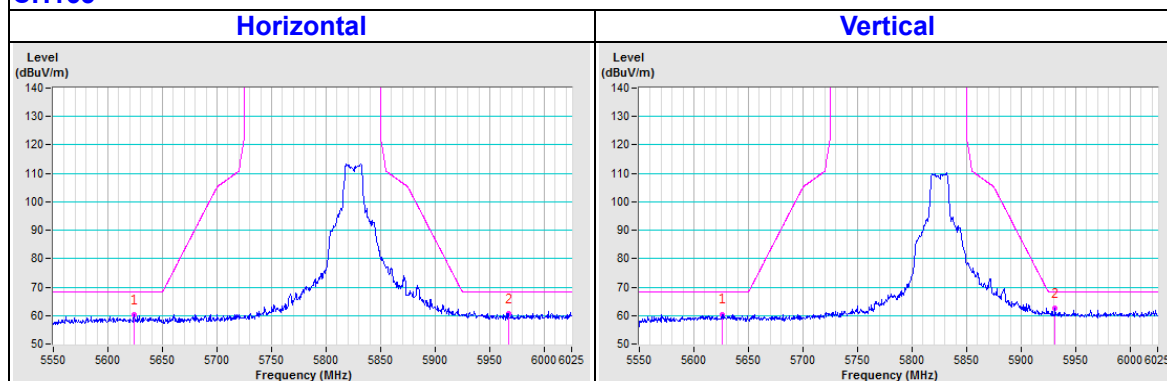
CH149



CH157

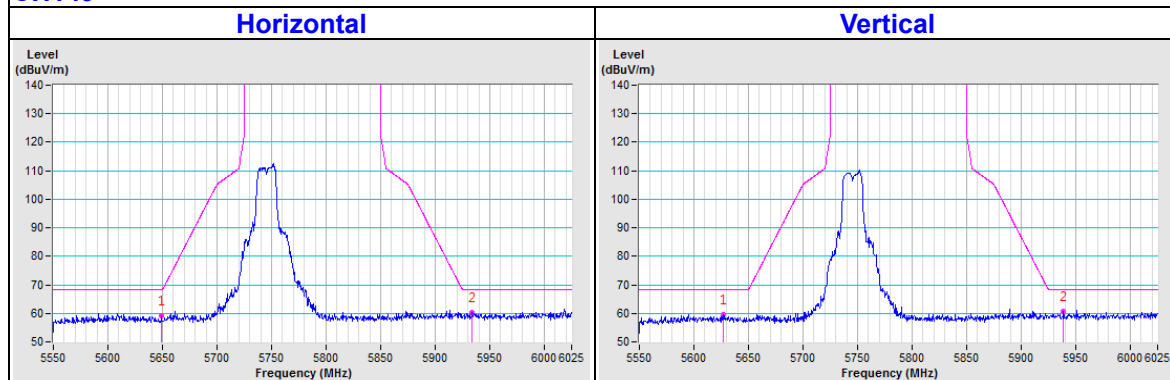


CH165

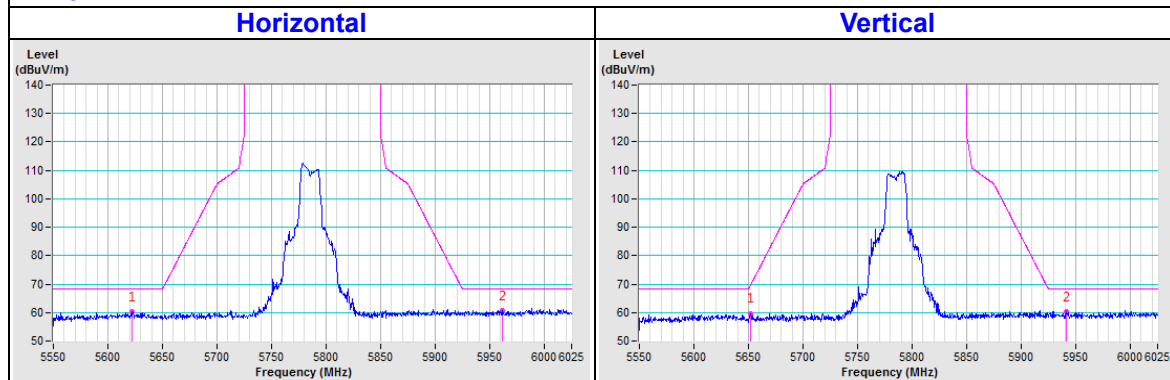


802.11ac (20MHz)

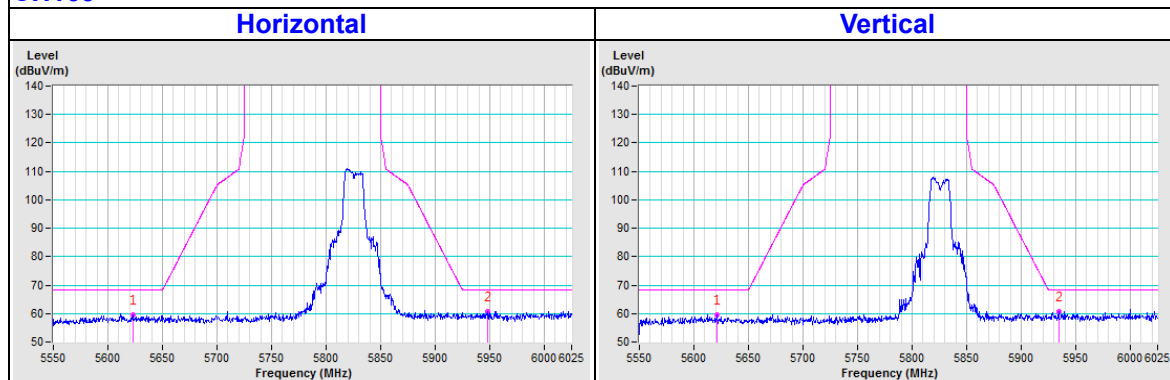
CH149



CH157

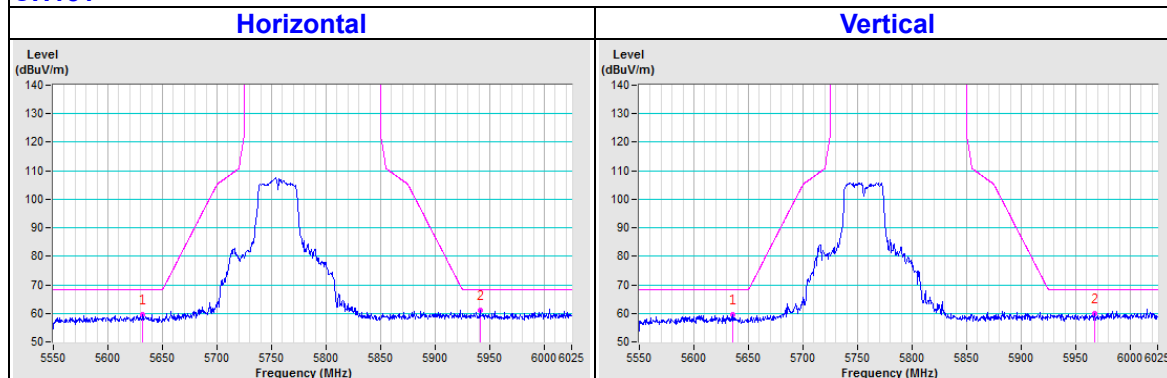


CH165

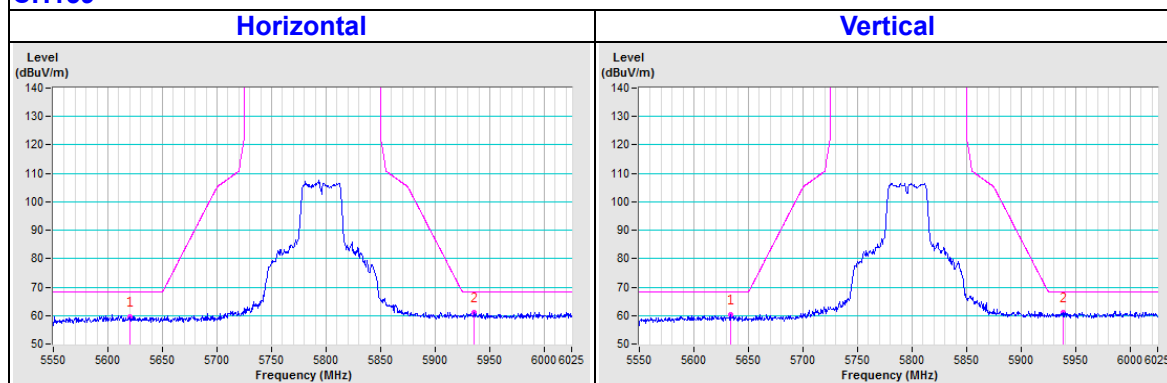


802.11ac (40MHz)

CH151

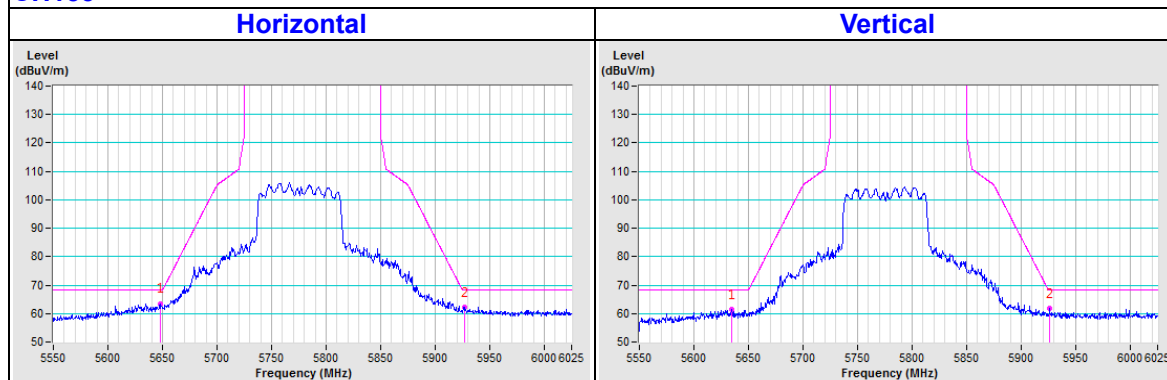


CH159



802.11ac (80MHz)

CH155



Appendix – Information of the Testing Laboratories

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

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

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Web Site: www.bureauveritas-adt.com

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

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