

FCC Test Report

Report No.: RF151112D02-1

FCC ID: P27RP151

Test Model: RP151

Series Model: RP151xxxxxxx (The "x" in model name can be 0 to 9, A to Z, blank or "- " , for marking purpose)

Received Date: Nov. 12, 2015

Test Date: Nov. 18 ~ 27, 2015

Issued Date: Dec. 3, 2015

Applicant: Sercomm Corp.

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

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Release Control Record

Issue No.	Description	Date Issued
RF151112D02-1	Original release.	Dec. 3, 2015

1 Certificate of Conformity

Product: Selectable Dual Band WiFi Adapter

Brand: Sercomm

Test Model: RP151

Series Model: RP151xxxxxxxx (The "x" in model name can be 0 to 9, A to Z, blank or "-", for marking purpose)

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Nov. 18 ~ 27, 2015

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

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

Prepared by :



Date:

Dec. 3, 2015

Celia Chen / Supervisor

Approved by :



Date:

Dec. 3, 2015

Rex Lai / Assistant 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 -7.07dB at 0.47031MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5860.01MHz.
15.407(a)(1/2 /3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
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.

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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.78 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	4.00 dB
Radiated Emissions above 1 GHz	1GHz ~ 40GHz	3.36 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Selectable Dual Band WiFi Adapter
Brand	Sercomm
Test Model	RP151
Series Model	RP151xxxxxxxx (The “x” in model name can be 0 to 9, A to Z, blank or “- “ , for marking purpose)
Model Difference	For marking purpose
Status of EUT	Engineering sample
Power Supply Rating	AC I/P: 100-240Vac, 200mA, 50/60Hz DC O/P: 12Vdc, 350mA
Modulation Type	64QAM, 16QAM, QPSK, BPSK 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 433Mbps
Operating Frequency	5180 ~ 5240MHz 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80) 5745 ~ 5825MHz 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80)
Output Power	5180 ~ 5240MHz 65.622 mW 5745 ~ 5825MHz 117.634mW
Antenna Type	PCB antenna with 4.11dBi gain
Antenna Connector	I-PEX connector
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX FUNCTION
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX

Note: The modulation and bandwidth are similar for 802.11n mode for HT20 (HT40) and 802.11ac mode for VHT20 (VHT40), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

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

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE ³ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE³1G**: 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 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

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	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1GHz):

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (HT40)	5745-5825	151 to 159	159	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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (HT40)	5745-5825	151 to 159	159	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.

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	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE ³ 1G	23deg. C, 65%RH	120Vac, 60Hz	Aaron You
RE<1G	23deg. C, 65%RH	120Vac, 60Hz	Aaron You
PLC	21deg. C, 70%RH	120Vac, 60Hz	Aaron You
APCM	25deg. C, 60%RH	120Vac, 60Hz	Saxon Lee

3.3 Duty Cycle of Test Signal

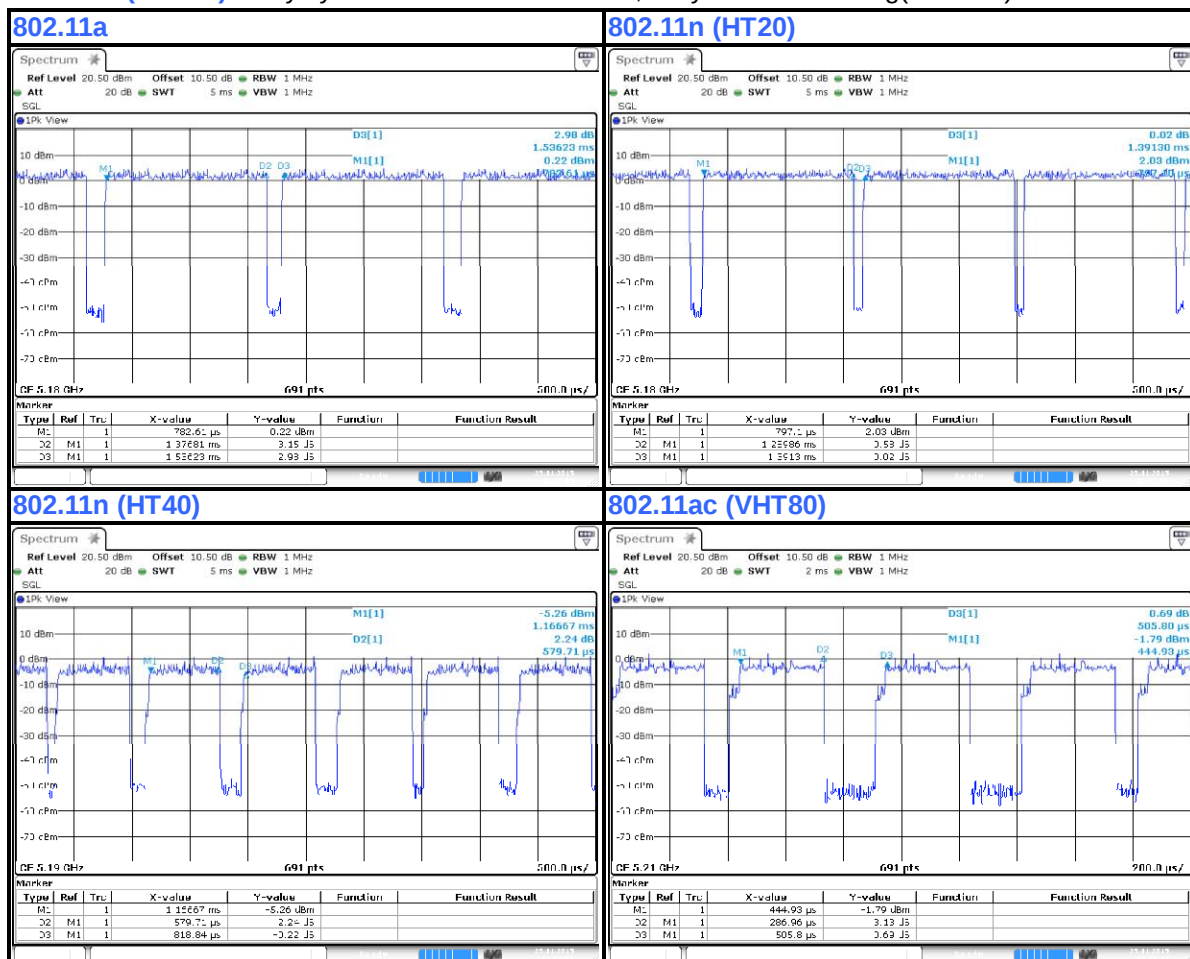
Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = $1.376/1.536 = 0.896$, Duty factor = $10 * \log(1/0.896) = 0.48$

802.11n (HT20): Duty cycle = $1.289/1.391 = 0.927$, Duty factor = $10 * \log(1/0.927) = 0.33$

802.11n (HT40): Duty cycle = $0.579/0.818 = 0.708$, Duty factor = $10 * \log(1/0.708) = 1.50$

802.11ac (VHT80): Duty cycle = $0.286/0.505 = 0.566$, Duty factor = $10 * \log(1/0.566) = 2.47$



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.	Notebook PC	DELL	PP27L	8SNZ12S	FCC DoC Approved	Provided by Lab

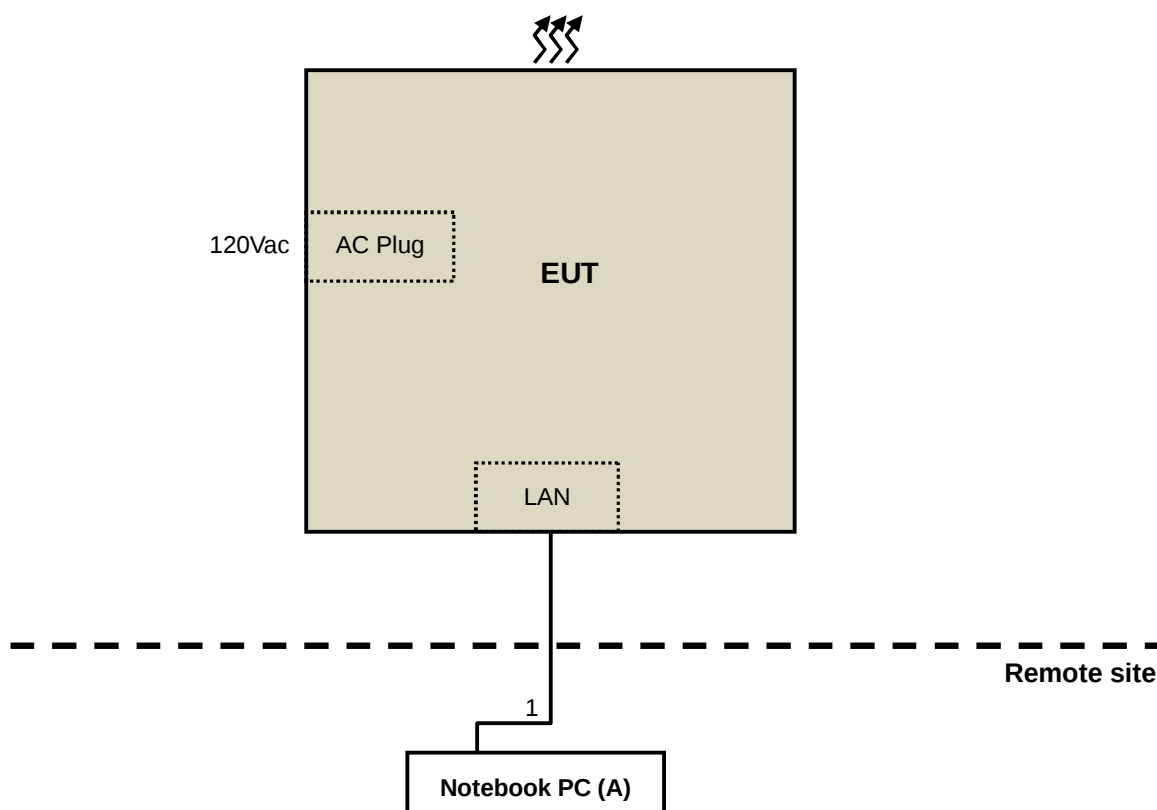
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable	1	10	N	0	Provided by Lab

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)

789033 D02 General UNII Test Procedure New Rules v01

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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 v01	FIELD STRENGTH AT 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) ^{*1} PK:-17 (dBm/MHz) ^{*2}	PK: 68.2(dBuV/m) ^{*1} PK:78.2 (dBuV/m) ^{*2}

NOTE: ^{*1} beyond 10MHz of the band edge ^{*2} within 10 MHz of band edge

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. 26, 2015	Feb. 25, 2016
HP Preamplifier	8449B	3008A01201	Feb. 26, 2015	Feb. 25, 2016
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 01, 2015	Feb. 28, 2016
Agilent TEST RECEIVER	N9038A	MY51210129	Jan. 20, 2015	Jan. 19, 2016
Schwarzbeck Antenna	VULB 9168	139	Feb. 04, 2015	Feb. 03, 2016
Schwarzbeck Antenna	VHBA 9123	480	May 29, 2015	May 28, 2017
Schwarzbeck Horn Antenna	BBHA-9170	212	Feb. 09, 2015	Feb. 08, 2016
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Feb. 10, 2015	Feb. 09, 2016
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.4	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF104	CABLE-CH6	Aug. 15, 2015	Aug. 14, 2016
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 15, 2015	Aug. 14, 2016
EMCO Horn Antenna	3115	00028257	Feb. 05, 2015	Feb. 04, 2016
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2015	Sep. 22, 2016
Anritsu Power Sensor	MA2411B	0738404	Apr. 21, 2015	Apr. 20, 2016
Anritsu Power Meter	ML2495A	0842014	Apr. 21, 2015	Apr. 20, 2016

- 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.
5. The FCC Site Registration No. is 447212.

4.1.3 Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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 detect 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:

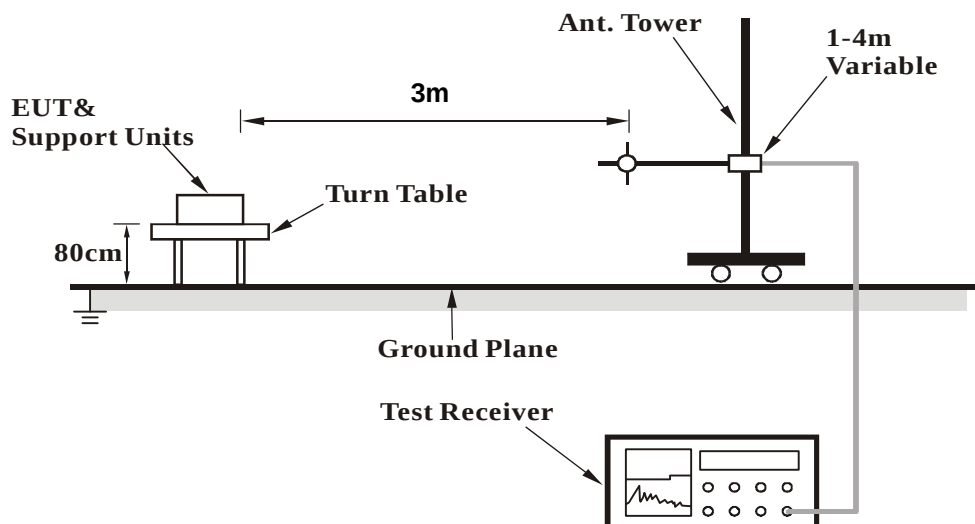
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

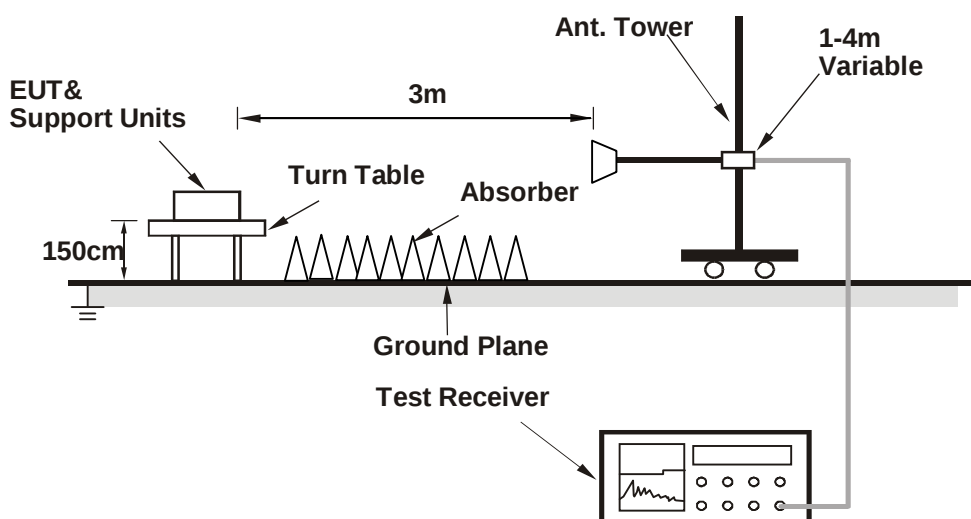
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Condition

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

BELOW 1GHz WORST-CASE DATA

802.11n (HT40)

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	81.22	23.1 QP	40.0	-16.9	4.00 H	224	41.44	-18.37
2	108.81	23.7 QP	43.5	-19.8	3.54 H	124	40.95	-17.21
3	143.37	28.8 QP	43.5	-14.7	3.08 H	247	42.68	-13.90
4	625.05	25.7 QP	46.0	-20.3	1.63 H	78	30.72	-4.99
5	731.79	26.9 QP	46.0	-19.1	1.17 H	359	30.36	-3.46
6	903.49	30.7 QP	46.0	-15.3	1.00 H	278	31.40	-0.74
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	45.28	32.2 QP	40.0	-7.8	1.22 V	188	46.20	-14.02
2	81.22	30.3 QP	40.0	-9.8	1.08 V	154	48.62	-18.37
3	108.81	30.6 QP	43.5	-12.9	1.00 V	183	47.83	-17.21
4	553.72	23.8 QP	46.0	-22.2	2.38 V	289	30.42	-6.61
5	835.23	27.9 QP	46.0	-18.1	2.69 V	46	29.71	-1.81
6	933.55	29.4 QP	46.0	-16.7	1.95 V	226	29.27	0.08

REMARKS:

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

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	62.7 PK	74.0	-11.3	2.44 H	74	54.28	8.43
2	5150.00	48.2 AV	54.0	-5.8	2.44 H	74	39.74	8.43
3	*5180.00	101.9 PK			2.44 H	74	93.37	8.54
4	*5180.00	93.2 AV			2.44 H	74	84.61	8.54
5	#10360.00	60.1 PK	74.0	-13.9	1.70 H	297	40.26	19.88
6	#10360.00	48.3 AV	54.0	-5.7	1.70 H	297	28.41	19.88
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	61.9 PK	74.0	-12.1	2.52 V	86	53.50	8.43
2	5150.00	47.8 AV	54.0	-6.2	2.52 V	86	39.33	8.43
3	*5180.00	101.5 PK			2.52 V	86	92.99	8.54
4	*5180.00	92.7 AV			2.52 V	86	84.13	8.54
5	#10360.00	66.9 PK	74.0	-7.2	2.19 V	326	46.97	19.88
6	#10360.00	52.8 AV	54.0	-1.3	2.19 V	326	32.87	19.88

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	102.6 PK			3.23 H	75	93.98	8.60
2	*5200.00	93.8 AV			3.23 H	75	85.20	8.60
3	#10400.00	60.5 PK	74.0	-13.5	1.82 H	300	40.53	19.93
4	#10400.00	49.1 AV	54.0	-4.9	1.82 H	300	29.21	19.93
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	102.0 PK			2.49 V	87	93.43	8.60
2	*5200.00	93.1 AV			2.49 V	87	84.47	8.60
3	#10400.00	66.9 PK	74.0	-7.1	2.09 V	326	46.93	19.93
4	#10400.00	52.8 AV	54.0	-1.3	2.09 V	326	32.82	19.93

REMARKS:

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

CHANNEL	TX Channel 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	103.6 PK			3.18 H	91	94.87	8.70
2	*5240.00	94.4 AV			3.18 H	91	85.69	8.70
3	5350.00	62.6 PK	74.0	-11.4	3.18 H	91	53.62	8.96
4	5350.00	48.5 AV	54.0	-5.5	3.18 H	91	39.50	8.96
5	#10480.00	60.3 PK	74.0	-13.7	1.66 H	293	40.15	20.13
6	#10480.00	48.2 AV	54.0	-5.8	1.66 H	293	28.07	20.13
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	101.9 PK			2.70 V	82	93.20	8.70
2	*5240.00	92.9 AV			2.70 V	82	84.22	8.70
3	5350.00	61.6 PK	74.0	-12.4	2.70 V	82	52.62	8.96
4	5350.00	47.5 AV	54.0	-6.5	2.70 V	82	38.57	8.96
5	#10480.00	67.0 PK	74.0	-7.0	2.06 V	326	46.87	20.13
6	#10480.00	52.9 AV	54.0	-1.1	2.06 V	326	32.79	20.13

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	#5714.99	66.9 PK	68.2	-1.3	3.63 H	122	57.14	9.79
2	#5725.00	73.2 PK	78.2	-5.0	3.63 H	122	63.40	9.80
3	*5745.00	106.5 PK			3.63 H	122	96.60	9.85
4	*5745.00	97.2 AV			3.63 H	122	87.37	9.85
5	11490.00	61.4 PK	74.0	-12.6	1.59 H	288	40.02	21.38
6	11490.00	49.5 AV	54.0	-4.5	1.59 H	288	28.11	21.38
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	#5714.99	65.6 PK	68.2	-2.6	2.09 V	86	55.81	9.79
2	#5725.00	72.5 PK	78.2	-5.7	2.09 V	86	62.73	9.80
3	*5745.00	104.4 PK			2.09 V	86	94.58	9.85
4	*5745.00	95.5 AV			2.09 V	86	85.62	9.85
5	11490.00	63.4 PK	74.0	-10.6	1.78 V	306	41.99	21.38
6	11490.00	50.9 AV	54.0	-3.2	1.78 V	306	29.47	21.38

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	107.5 PK			3.31 H	76	97.59	9.94
2	*5785.00	98.4 AV			3.31 H	76	88.41	9.94
3	11570.00	64.2 PK	74.0	-9.8	3.69 H	112	42.77	21.44
4	11570.00	50.0 AV	54.0	-4.0	3.69 H	112	28.55	21.44
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	*5785.00	105.2 PK			2.08 V	87	95.24	9.94
2	*5785.00	96.1 AV			2.08 V	87	86.17	9.94
3	11570.00	66.9 PK	74.0	-7.1	3.62 V	324	45.49	21.44
4	11570.00	52.8 AV	54.0	-1.3	3.62 V	324	31.31	21.44

REMARKS:

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

CHANNEL	TX Channel 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	*5825.00	108.7 PK			3.29 H	72	98.64	10.04
2	*5825.00	99.3 AV			3.29 H	72	89.21	10.04
3	#5850.00	74.0 PK	78.2	-4.2	3.29 H	72	63.91	10.07
4	#5860.01	67.1 PK	68.2	-1.1	3.29 H	72	56.96	10.09
5	11650.00	63.7 PK	74.0	-10.3	3.58 H	110	42.82	20.90
6	11650.00	49.6 AV	54.0	-4.4	3.58 H	110	28.71	20.90
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	*5825.00	106.2 PK			2.14 V	79	96.12	10.04
2	*5825.00	96.7 AV			2.14 V	79	86.66	10.04
3	#5850.00	73.1 PK	78.2	-5.1	2.14 V	79	63.07	10.07
4	#5860.01	66.0 PK	68.2	-2.2	2.14 V	79	55.88	10.09
5	11650.00	64.9 PK	74.0	-9.1	3.73 V	352	44.03	20.90
6	11650.00	52.0 AV	54.0	-2.0	3.73 V	352	31.07	20.90

REMARKS:

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

802.11n (HT20)

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	62.4 PK	74.0	-11.7	3.92 H	100	53.92	8.43
2	5150.00	47.7 AV	54.0	-6.3	3.92 H	100	39.29	8.43
3	*5180.00	103.7 PK			3.92 H	100	95.18	8.54
4	*5180.00	94.2 AV			3.92 H	100	85.67	8.54
5	#10360.00	61.5 PK	74.0	-12.5	1.58 H	287	41.63	19.88
6	#10360.00	48.4 AV	54.0	-5.6	1.58 H	287	28.55	19.88
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	60.6 PK	74.0	-13.4	2.43 V	71	52.19	8.43
2	5150.00	46.7 AV	54.0	-7.3	2.43 V	71	38.31	8.43
3	*5180.00	103.0 PK			2.43 V	71	94.45	8.54
4	*5180.00	93.6 AV			2.43 V	71	85.02	8.54
5	#10360.00	67.0 PK	74.0	-7.0	2.19 V	335	47.09	19.88
6	#10360.00	52.8 AV	54.0	-1.2	2.19 V	335	32.96	19.88

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	105.5 PK			3.54 H	100	96.88	8.60
2	*5200.00	95.4 AV			3.54 H	100	86.77	8.60
3	#10400.00	61.8 PK	74.0	-12.3	1.62 H	300	41.82	19.93
4	#10400.00	48.5 AV	54.0	-5.5	1.62 H	300	28.60	19.93
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	103.7 PK			2.39 V	74	95.11	8.60
2	*5200.00	94.4 AV			2.39 V	74	85.78	8.60
3	#10400.00	66.9 PK	74.0	-7.1	2.14 V	336	46.93	19.93
4	#10400.00	52.8 AV	54.0	-1.2	2.14 V	336	32.91	19.93

REMARKS:

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

CHANNEL	TX Channel 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	104.6 PK			3.49 H	91	95.94	8.70
2	*5240.00	94.7 AV			3.49 H	91	86.01	8.70
3	5350.00	61.8 PK	74.0	-12.2	3.49 H	91	52.88	8.96
4	5350.00	48.5 AV	54.0	-5.5	3.49 H	91	39.57	8.96
5	#10480.00	60.8 PK	74.0	-13.2	1.62 H	296	40.63	20.13
6	#10480.00	48.2 AV	54.0	-5.8	1.62 H	296	28.10	20.13
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	103.2 PK			2.48 V	74	94.46	8.70
2	*5240.00	94.0 AV			2.48 V	74	85.25	8.70
3	5350.00	60.3 PK	74.0	-13.7	2.48 V	74	51.34	8.96
4	5350.00	47.5 AV	54.0	-6.5	2.48 V	74	38.54	8.96
5	#10480.00	67.0 PK	74.0	-7.0	2.21 V	335	46.86	20.13
6	#10480.00	52.9 AV	54.0	-1.1	2.21 V	335	32.79	20.13

REMARKS:

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

CHANNEL	TX Channel 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	#5714.99	66.9 PK	68.2	-1.3	3.21 H	74	57.13	9.79
2	#5725.00	74.3 PK	78.2	-3.9	3.21 H	74	64.47	9.80
3	*5745.00	105.7 PK			3.21 H	74	95.88	9.85
4	*5745.00	96.4 AV			3.21 H	74	86.56	9.85
5	11490.00	63.4 PK	74.0	-10.6	3.49 H	113	42.05	21.38
6	11490.00	49.5 AV	54.0	-4.5	3.49 H	113	28.16	21.38
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	#5714.99	65.7 PK	68.2	-2.5	2.02 V	76	55.86	9.79
2	#5725.00	73.8 PK	78.2	-4.4	2.02 V	76	63.97	9.80
3	*5745.00	104.5 PK			2.02 V	76	94.69	9.85
4	*5745.00	95.1 AV			2.02 V	76	85.24	9.85
5	11490.00	65.2 PK	74.0	-8.8	1.89 V	305	43.82	21.38
6	11490.00	50.6 AV	54.0	-3.4	1.89 V	305	29.25	21.38

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	107.5 PK			3.32 H	77	97.59	9.94
2	*5785.00	97.2 AV			3.32 H	77	87.25	9.94
3	11570.00	63.6 PK	74.0	-10.5	3.55 H	108	42.11	21.44
4	11570.00	49.7 AV	54.0	-4.3	3.55 H	108	28.29	21.44
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	*5785.00	104.3 PK			2.15 V	83	94.34	9.94
2	*5785.00	95.0 AV			2.15 V	83	85.05	9.94
3	11570.00	67.1 PK	74.0	-6.9	3.67 V	323	45.67	21.44
4	11570.00	52.9 AV	54.0	-1.1	3.67 V	323	31.49	21.44

REMARKS:

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

CHANNEL	TX Channel 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	*5825.00	107.0 PK			3.28 H	77	96.96	10.04
2	*5825.00	97.6 AV			3.28 H	77	87.56	10.04
3	#5850.00	73.5 PK	78.2	-4.7	3.28 H	77	63.47	10.07
4	#5860.01	67.2 PK	68.2	-1.0	4.00 H	77	57.10	10.09
5	11650.00	63.2 PK	74.0	-10.8	3.63 H	114	42.30	20.90
6	11650.00	49.4 AV	54.0	-4.6	3.63 H	114	28.47	20.90
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	*5825.00	104.8 PK			2.05 V	78	94.74	10.04
2	*5825.00	95.4 AV			2.05 V	78	85.32	10.04
3	#5850.00	70.8 PK	78.2	-7.4	2.05 V	78	60.71	10.07
4	#5860.01	66.1 PK	68.2	-2.1	2.05 V	78	56.04	10.09
5	11650.00	63.7 PK	74.0	-10.3	1.53 V	302	42.83	20.90
6	11650.00	52.0 AV	54.0	-2.0	1.53 V	302	31.09	20.90

REMARKS:

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

802.11n (HT40)

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	68.3 PK	74.0	-5.8	3.91 H	99	59.82	8.43
2	5150.00	49.9 AV	54.0	-4.1	3.91 H	99	41.43	8.43
3	*5190.00	104.5 PK			3.91 H	99	95.92	8.57
4	*5190.00	94.6 AV			3.91 H	99	86.02	8.57
5	#10380.00	61.8 PK	74.0	-12.2	1.72 H	279	41.93	19.90
6	#10380.00	48.4 AV	54.0	-5.6	1.72 H	279	28.50	19.90
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	65.2 PK	74.0	-8.8	2.30 V	79	56.74	8.43
2	5150.00	49.1 AV	54.0	-4.9	2.30 V	79	40.65	8.43
3	*5190.00	103.8 PK			2.30 V	79	95.21	8.57
4	*5190.00	93.9 AV			2.30 V	79	85.37	8.57
5	#10380.00	66.8 PK	74.0	-7.2	2.05 V	323	46.90	19.90
6	#10380.00	52.9 AV	54.0	-1.1	2.05 V	323	32.99	19.90

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	104.2 PK			3.62 H	94	95.49	8.67
2	*5230.00	95.0 AV			3.62 H	94	86.29	8.67
3	5350.00	62.6 PK	74.0	-11.4	3.62 H	94	53.65	8.96
4	5350.00	47.5 AV	54.0	-6.5	3.62 H	94	38.57	8.96
5	#10460.00	60.9 PK	74.0	-13.1	1.55 H	268	40.82	20.08
6	#10460.00	48.3 AV	54.0	-5.8	1.55 H	268	28.17	20.08
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	103.5 PK			2.59 V	81	94.84	8.67
2	*5230.00	93.9 AV			2.59 V	81	85.24	8.67
3	5350.00	61.0 PK	74.0	-13.0	2.59 V	81	52.05	8.96
4	5350.00	46.8 AV	54.0	-7.2	2.59 V	81	37.80	8.96
5	#10460.00	67.1 PK	74.0	-6.9	2.03 V	324	47.05	20.08
6	#10460.00	52.9 AV	54.0	-1.1	2.03 V	324	32.86	20.08

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	#5714.99	67.0 PK	68.2	-1.2	3.33 H	77	57.25	9.79
2	#5725.00	73.1 PK	78.2	-5.1	3.33 H	77	63.28	9.80
3	*5755.00	104.4 PK			3.33 H	77	94.53	9.88
4	*5755.00	94.1 AV			3.33 H	77	84.23	9.88
5	11510.00	61.3 PK	74.0	-12.7	3.20 H	129	39.88	21.42
6	11510.00	49.4 AV	54.0	-4.7	3.20 H	129	27.93	21.42
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	#5714.99	66.4 PK	68.2	-1.8	2.08 V	84	56.63	9.79
2	#5725.00	71.6 PK	78.2	-6.6	2.08 V	81	61.84	9.80
3	*5755.00	102.5 PK			2.08 V	81	92.63	9.88
4	*5755.00	92.7 AV			2.08 V	81	82.78	9.88
5	11510.00	63.0 PK	74.0	-11.0	2.16 V	330	41.55	21.42
6	11510.00	51.2 AV	54.0	-2.8	2.16 V	330	29.76	21.42

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	*5795.00	107.1 PK			3.30 H	78	97.11	9.96
2	*5795.00	96.8 AV			3.30 H	78	86.81	9.96
3	#5850.00	69.7 PK	78.2	-8.5	3.30 H	78	59.65	10.07
4	#5860.01	66.8 PK	68.2	-1.4	3.30 H	78	56.71	10.09
5	11590.00	63.8 PK	74.0	-10.3	3.27 H	124	42.30	21.45
6	11590.00	49.9 AV	54.0	-4.1	3.27 H	124	28.41	21.45
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	*5795.00	103.9 PK			2.07 V	84	93.98	9.96
2	*5795.00	93.5 AV			2.07 V	84	83.55	9.96
3	#5850.00	67.6 PK	78.2	-10.6	2.07 V	84	57.54	10.07
4	#5860.01	65.4 PK	68.2	-2.8	2.07 V	84	55.34	10.09
5	11590.00	67.1 PK	74.0	-6.9	3.69 V	320	45.63	21.45
6	11590.00	52.7 AV	54.0	-1.3	3.69 V	320	31.27	21.45

REMARKS:

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

802.11ac (VHT80)

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	67.9 PK	74.0	-6.1	3.51 H	102	59.49	8.43
2	5150.00	50.6 AV	54.0	-3.4	3.51 H	102	42.17	8.43
3	*5210.00	104.9 PK			3.51 H	102	96.25	8.62
4	*5210.00	94.5 AV			3.51 H	102	85.92	8.62
5	5350.00	65.6 PK	74.0	-8.4	3.51 H	102	56.66	8.96
6	5350.00	47.9 AV	54.0	-6.1	3.51 H	102	38.90	8.96
7	#10420.00	61.3 PK	74.0	-12.8	1.81 H	295	41.27	19.98
8	#10420.00	48.5 AV	54.0	-5.5	1.81 H	295	28.53	19.98
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	5150.00	66.1 PK	74.0	-7.9	2.50 V	78	57.70	8.43
2	5150.00	49.7 AV	54.0	-4.3	2.50 V	78	41.27	8.43
3	*5210.00	104.1 PK			2.50 V	78	95.45	8.62
4	*5210.00	93.7 AV			2.50 V	78	85.09	8.62
5	5350.00	63.6 PK	74.0	-10.4	2.50 V	78	54.62	8.96
6	5350.00	46.7 AV	54.0	-7.3	2.50 V	78	37.75	8.96
7	#10420.00	67.1 PK	74.0	-6.9	2.23 V	324	47.10	19.98
8	#10420.00	52.9 AV	54.0	-1.1	2.23 V	324	32.92	19.98

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	#5714.99	67.1 PK	68.2	-1.1	3.30 H	77	57.27	9.79
2	#5725.00	68.4 PK	78.2	-9.8	3.30 H	77	58.63	9.80
3	*5775.00	102.0 PK			3.30 H	77	92.03	9.93
4	*5775.00	91.9 AV			3.30 H	77	81.99	9.93
5	#5850.00	64.3 PK	78.2	-13.9	3.30 H	77	54.20	10.07
6	#5860.01	63.9 PK	68.2	-4.3	3.30 H	77	53.80	10.09
7	11550.00	61.7 PK	74.0	-12.3	3.26 H	125	40.23	21.43
8	11550.00	48.8 AV	54.0	-5.3	3.26 H	125	27.32	21.43
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	#5714.99	66.0 PK	68.2	-2.2	2.15 V	81	56.19	9.79
2	#5725.00	66.4 PK	78.2	-11.8	2.15 V	81	56.58	9.80
3	*5775.00	99.1 PK			2.15 V	81	89.13	9.93
4	*5775.00	89.2 AV			2.15 V	81	79.25	9.93
5	#5850.00	63.3 PK	78.2	-14.9	2.15 V	81	53.27	10.07
6	#5860.01	62.3 PK	68.2	-5.9	2.15 V	81	52.19	10.09
7	11550.00	65.7 PK	74.0	-8.3	3.63 V	324	44.28	21.43
8	11550.00	51.5 AV	54.0	-2.5	3.63 V	324	30.07	21.43

REMARKS:

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

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	100276	Apr. 01, 2015	Mar. 31, 2016
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	Apr. 27, 2015	Apr. 26, 2016
LISN With Adapter (for EUT)	AD10	C10Ada-002	Apr. 27, 2015	Apr. 26, 2016
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 25, 2015	Nov. 24, 2016
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 06, 2015	May 05, 2016
Software	Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 17, 2015	Feb. 16, 2016
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 19, 2015	May 18, 2016
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 13, 2015	Nov. 12, 2016
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 13, 2015	Nov. 12, 2016

Notes: 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. 10.

3. The VCCI Site Registration No. C-1852.

4. Tested Date: Nov. 27, 2015.

4.2.3 Test Procedure

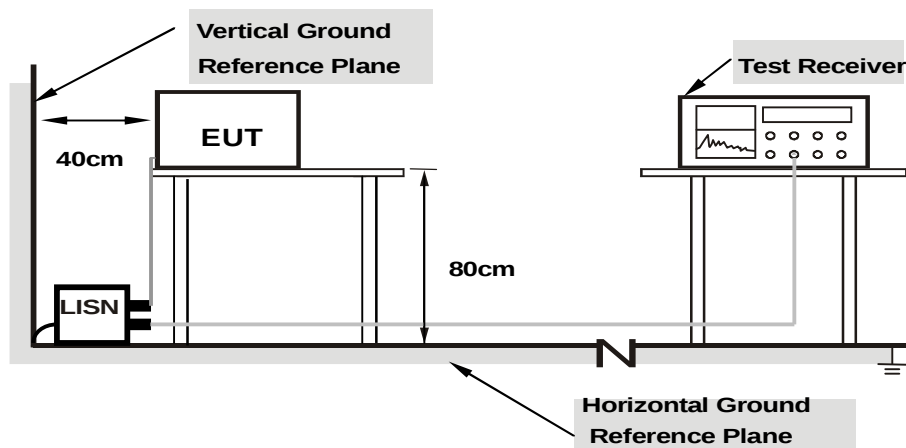
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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: 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 item 4.1.6.

4.2.7 Test Results

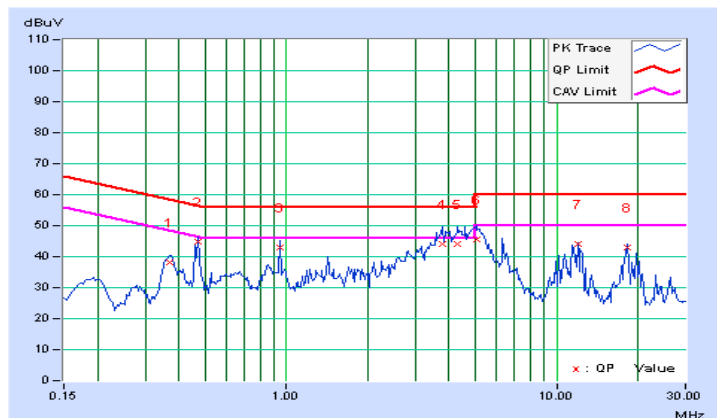
802.11n (HT40): CH 159

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.36875	9.69	28.43	22.29	38.12	31.98	58.53	48.53	-20.41	-16.55
2	0.47031	9.70	34.94	29.74	44.64	39.44	56.51	46.51	-11.87	-7.07
3	0.94297	9.76	33.38	27.28	43.14	37.04	56.00	46.00	-12.86	-8.96
4	3.75781	9.94	34.29	25.94	44.23	35.88	56.00	46.00	-11.77	-10.12
5	4.29297	9.96	34.08	24.00	44.04	33.96	56.00	46.00	-11.96	-12.04
6	5.07031	9.97	35.53	23.87	45.50	33.84	60.00	50.00	-14.50	-16.16
7	11.95313	10.09	34.12	26.23	44.21	36.32	60.00	50.00	-15.79	-13.68
8	18.30469	10.15	32.98	25.06	43.13	35.21	60.00	50.00	-16.87	-14.79

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

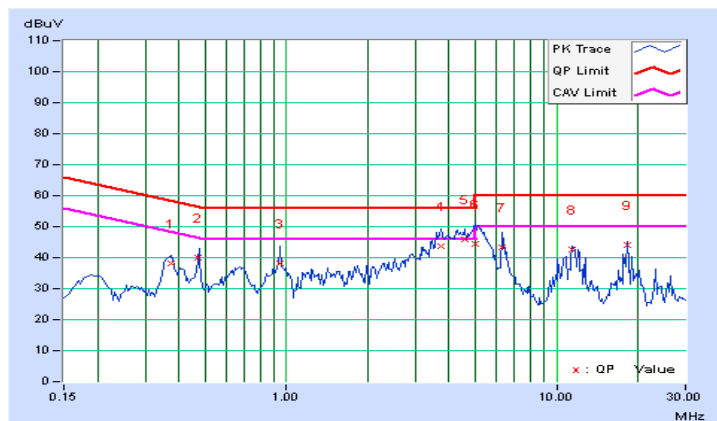


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.37266	9.74	28.57	22.77	38.31	32.51	58.44	48.44	-20.13	-15.93
2	0.47294	9.75	30.32	22.84	40.07	32.59	56.46	46.46	-16.40	-13.88
3	0.94688	9.79	28.22	23.18	38.01	32.97	56.00	46.00	-17.99	-13.03
4	3.72656	9.96	33.78	22.81	43.74	32.77	56.00	46.00	-12.26	-13.23
5	4.60156	9.99	36.09	25.27	46.08	35.26	56.00	46.00	-9.92	-10.74
6	4.99219	10.00	34.28	22.27	44.28	32.27	56.00	46.00	-11.72	-13.73
7	6.31641	10.03	33.46	25.35	43.49	35.38	60.00	50.00	-16.51	-14.62
8	11.46484	10.13	32.45	25.42	42.58	35.55	60.00	50.00	-17.42	-14.45
9	18.24219	10.24	33.89	26.06	44.13	36.30	60.00	50.00	-15.87	-13.70

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)
		Mobile and Portable client device	250mW (24 dBm)
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 $N_{ANT} \leq 4$;

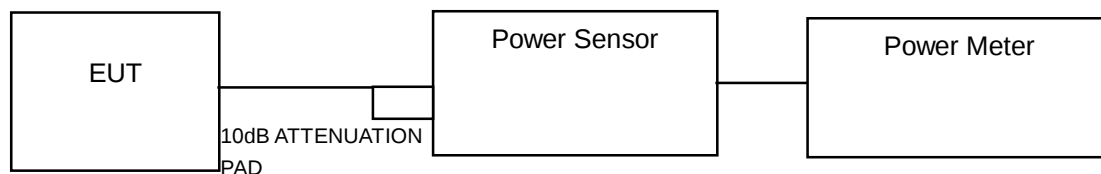
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

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

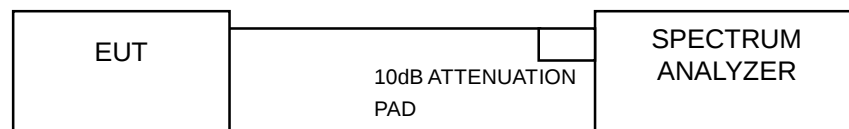
For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

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

For 802.11a, 802.11n (HT20), 802.11n (HT40)

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 802.11ac (VHT80)

- 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.

FOR 26 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%.

FOR OCCUPIED BANDWIDTH

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 AVERAGE. 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.

4.3.5 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

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	11.00	11.55	26.878	14.29	30	PASS
40	5200	11.02	11.47	26.675	14.26	30	PASS
48	5240	11.00	11.52	26.78	14.28	30	PASS
149	5745	15.10	15.26	65.933	18.19	30	PASS
157	5785	15.48	15.61	71.71	18.56	30	PASS
165	5825	15.68	15.68	73.966	18.69	30	PASS

802.11n (HT20)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	11.42	11.62	28.389	14.53	30	PASS
40	5200	12.52	12.35	35.044	15.45	30	PASS
48	5240	12.37	12.41	34.676	15.40	30	PASS
149	5745	15.46	15.42	69.99	18.45	30	PASS
157	5785	15.61	15.64	73.036	18.64	30	PASS
165	5825	16.02	16.07	80.452	19.06	30	PASS

802.11n (HT40)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	14.40	14.43	55.275	17.43	30	PASS
46	5230	14.39	14.42	55.148	17.42	30	PASS
151	5755	16.46	16.52	89.134	19.50	30	PASS
159	5795	17.68	17.71	117.634	20.71	30	PASS

802.11ac (VHT80)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
42	5210	15.20	15.12	65.622	18.17	30	PASS
155	5775	14.21	14.26	53.032	17.25	30	PASS

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
36	5180	21.92	21.92	PASS
40	5200	21.93	21.98	PASS
48	5240	22.06	22.02	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
36	5180	22.22	22.02	PASS
40	5200	22.34	22.55	PASS
48	5240	22.52	22.31	PASS

802.11n (HT40)

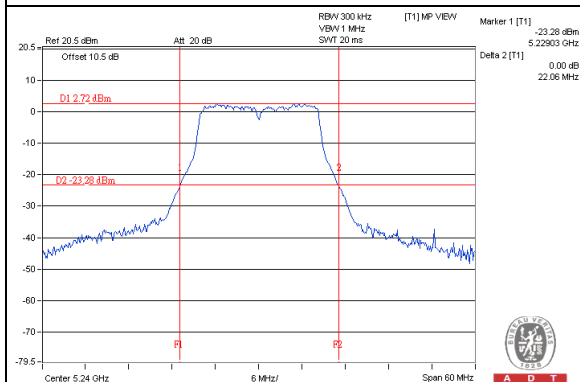
CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
38	5190	54.28	48.64	PASS
46	5230	51.28	46.86	PASS

802.11ac (VHT80)

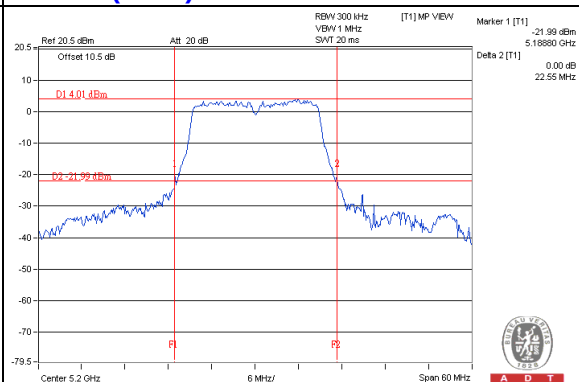
CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
42	5210	101.78	97.23	PASS

SPECTRUM PLOT OF WORST VALUE

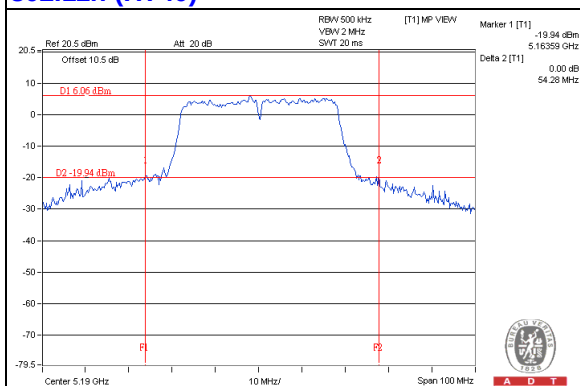
802.11a



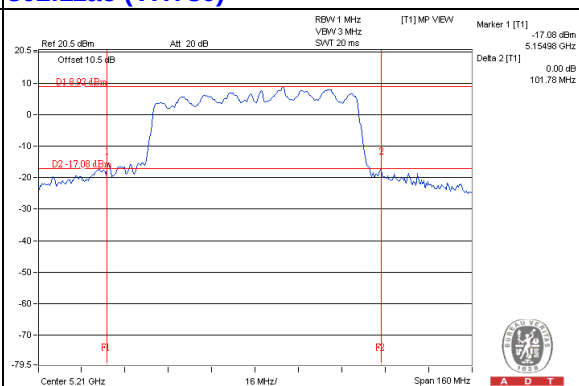
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



OCCUPIED BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
36	5180	16.92	16.80	PASS
40	5200	16.80	16.92	PASS
48	5240	16.92	16.92	PASS
149	5745	16.96	16.90	PASS
157	5785	17.00	17.00	PASS
165	5825	17.10	17.10	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
36	5180	17.88	17.88	PASS
40	5200	17.88	17.88	PASS
48	5240	17.88	17.88	PASS
149	5745	18.09	18.10	PASS
157	5785	18.09	18.10	PASS
165	5825	18.30	18.10	PASS

802.11n (HT40)

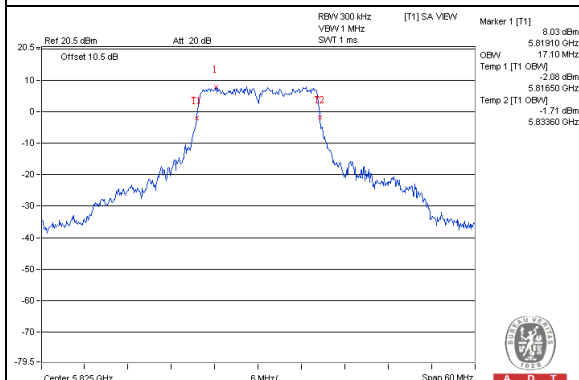
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
38	5190	37.60	37.60	PASS
46	5230	37.60	37.20	PASS
151	5755	37.68	37.67	PASS
159	5795	42.00	39.67	PASS

802.11ac (VHT80)

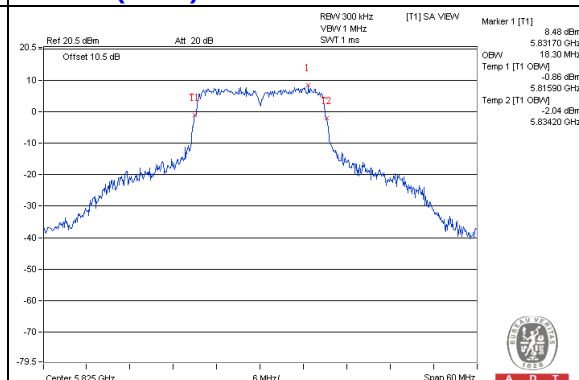
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
42	5210	75.60	75.60	PASS
155	5775	75.68	75.32	PASS

SPECTRUM PLOT OF WORST VALUE

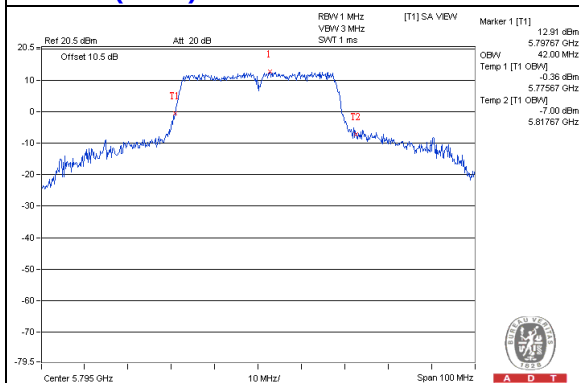
802.11a



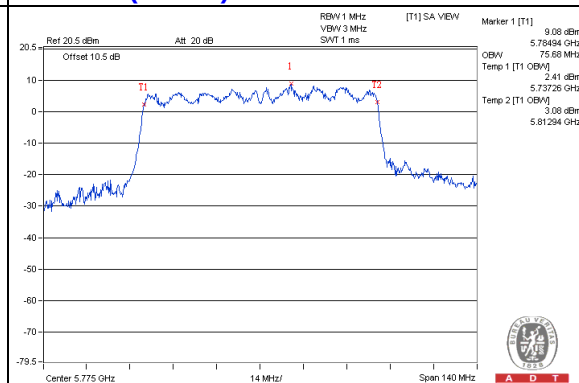
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

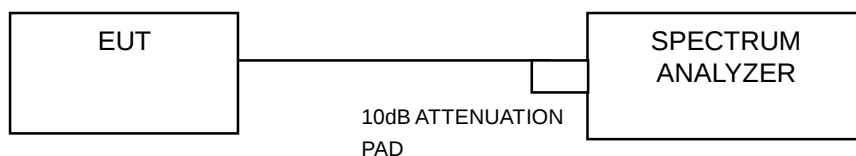


4.4 Peak Power Spectral Density Measurement

4.4.1 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	
		Mobile and Portable client device	11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 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 $\geq$ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 500 kHz, Set VBW $\geq$ 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)
6. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz}/300\text{kHz})$

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-1 Band

802.11a

CHAN.	FREQ. (MHz)	PSD (dBm)		TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
36	5180	-2.18	-2.04	0.90	0.48	1.38	15.88	PASS
40	5200	-1.91	-1.94	1.08	0.48	1.56	15.88	PASS
48	5240	-0.93	-1.33	1.88	0.48	2.36	15.88	PASS

NOTE:

- Method 1 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.
- For U-NII-1 Band:**
Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(7.12-6) = 15.88\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

CHAN.	FREQ. (MHz)	PSD (dBm)		TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
36	5180	-0.83	-0.78	2.20	0.33	2.53	15.88	PASS
40	5200	-0.64	-0.31	2.54	0.33	2.87	15.88	PASS
48	5240	-0.02	-0.34	2.83	0.33	3.16	15.88	PASS

NOTE:

- Method 1 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.
- For U-NII-1 Band:**
Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(7.12-6) = 15.88\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

CHAN.	FREQ. (MHz)	PSD (dBm)		TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
38	5190	-1.18	-1.79	1.54	1.50	3.04	15.88	PASS
46	5230	-1.42	-1.13	1.74	1.50	3.24	15.88	PASS

NOTE:

- Method 1 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.
- For U-NII-1 Band:**
Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(7.12-6) = 15.88\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

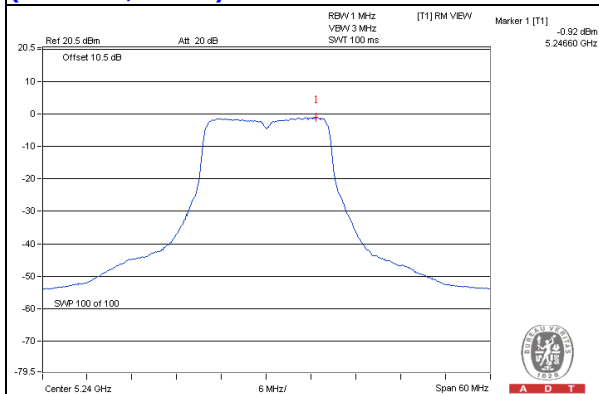
CHAN.	FREQ. (MHz)	PSD (dBm)		TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
42	5210	-2.82	-3.05	0.08	2.47	2.55	15.88	PASS

NOTE:

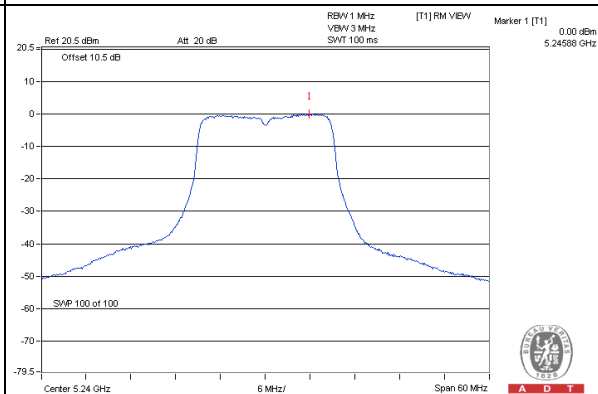
- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- For U-NII-1 Band:**
Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(7.12-6) = 15.88\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

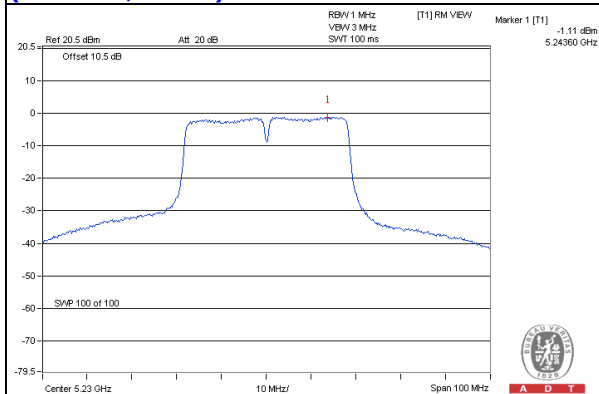
802.11a
(CHAIN 0, CH 48)



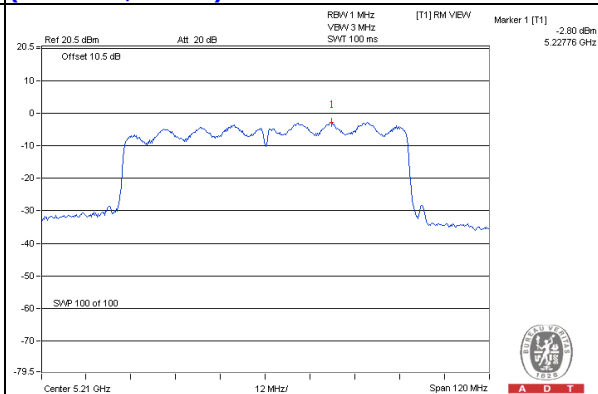
802.11n (HT20)
(CHAIN 0, CH 48)



802.11n (HT40)
(CHAIN 1, CH 46)



802.11ac (VHT80)
(CHAIN 0, CH 42)



For U-NII-3 Band

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	10.82	3.01	0.48	14.31	28.88	PASS
	157	5785	11.01	3.01	0.48	14.50	28.88	PASS
	165	5825	10.78	3.01	0.48	14.27	28.88	PASS
1	149	5745	10.90	3.01	0.48	14.39	28.88	PASS
	157	5785	10.97	3.01	0.48	14.46	28.88	PASS
	165	5825	10.56	3.01	0.48	14.05	28.88	PASS

NOTE:

- Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12 > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.12 - 6) = 28.88\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	10.01	3.01	0.33	13.35	28.88	PASS
	157	5785	9.83	3.01	0.33	13.17	28.88	PASS
	165	5825	10.54	3.01	0.33	13.88	28.88	PASS
1	149	5745	9.80	3.01	0.33	13.14	28.88	PASS
	157	5785	9.82	3.01	0.33	13.16	28.88	PASS
	165	5825	10.74	3.01	0.33	14.08	28.88	PASS

NOTE:

- Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12 > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.12 - 6) = 28.88\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	151	5755	7.78	3.01	1.50	12.29	28.88	PASS
	159	5795	9.59	3.01	1.50	14.10	28.88	PASS
1	151	5755	7.83	3.01	1.50	12.34	28.88	PASS
	159	5795	9.42	3.01	1.50	13.93	28.88	PASS

NOTE:

1. Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12 > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.12 - 6) = 28.88\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

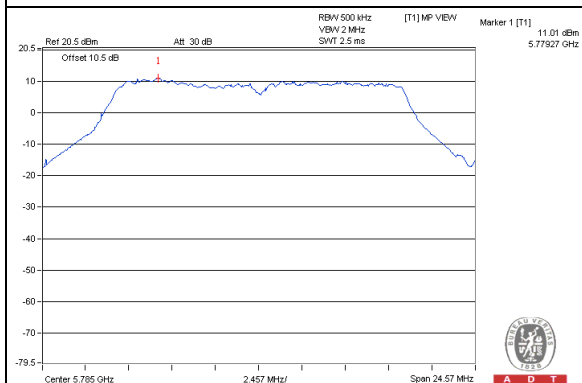
TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	155	5775	5.42	3.01	2.47	10.90	28.88	PASS
1	155	5775	5.24	3.01	2.47	10.72	28.88	PASS

NOTE:

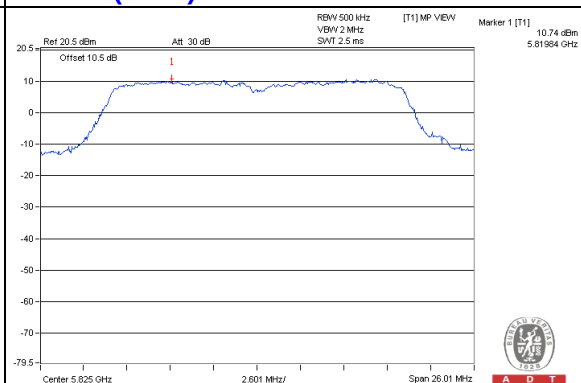
1. Directional gain = $4.11\text{dBi} + 10\log(2) = 7.12 > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (7.12 - 6) = 28.88\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

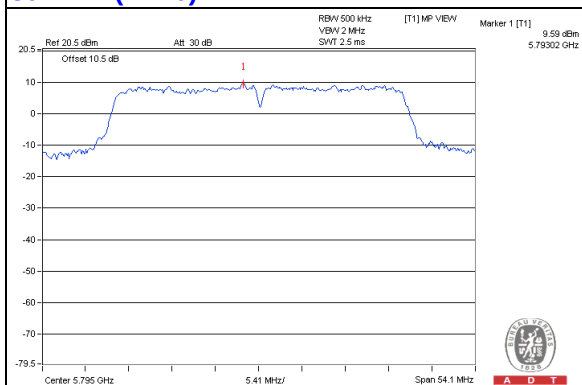
802.11a



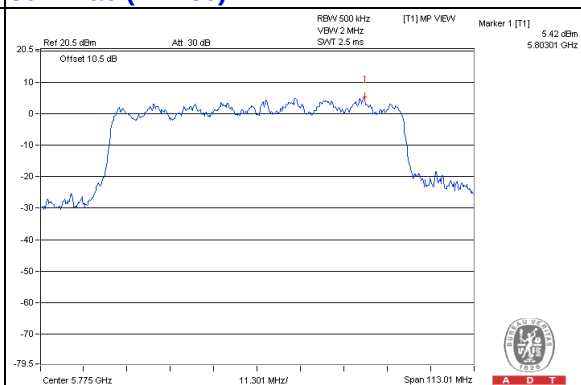
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

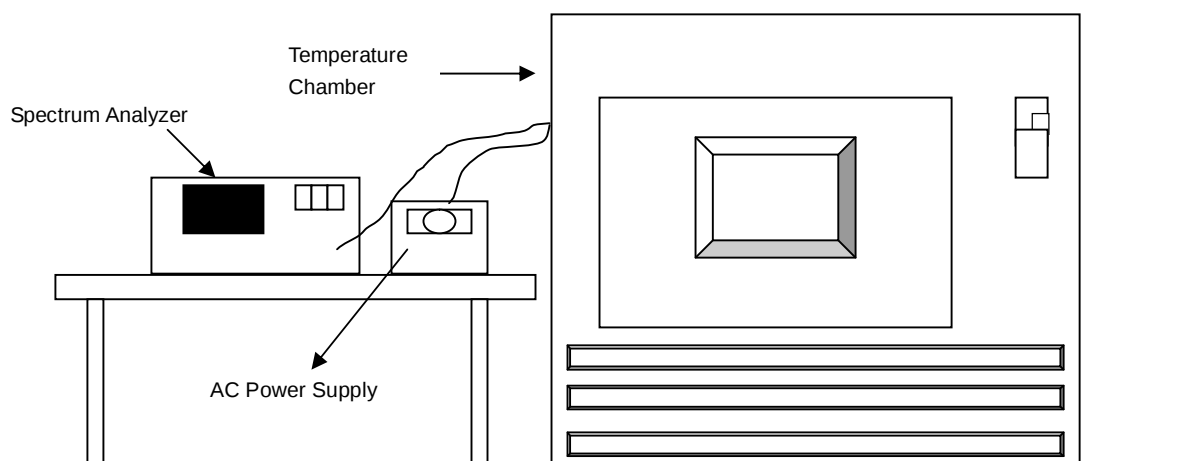


4.5 Frequency Stability Measurement

4.5.1 Limits of Frequency Stability Measurement

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

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

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.5.7 Test Results

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
50	120	5180.04269	8.2413127	5180.042599	8.2237452	5180.042598	8.2235521	5180.042937	8.2889961
40	120	5180.043297	8.3584942	5180.043129	8.3260618	5180.043403	8.3789575	5180.043533	8.4040541
30	120	5180.043104	8.3212355	5180.042817	8.2658301	5180.042737	8.2503861	5180.042886	8.2791506
20	120	5180.042355	8.1766409	5180.04224	8.1544402	5180.042237	8.1538610	5180.042543	8.2129344
10	120	5180.043017	8.3044402	5180.043195	8.3388031	5180.043104	8.3212355	5180.042802	8.2629344
0	120	5180.043242	8.3478764	5180.043195	8.3388031	5180.042927	8.2870656	5180.04309	8.3185328
-10	120	5180.043048	8.3104247	5180.042721	8.2472973	5180.042705	8.2442085	5180.04286	8.2741313
-20	120	5180.042778	8.2583012	5180.042861	8.2743243	5180.043082	8.3169884	5180.04289	8.2799228

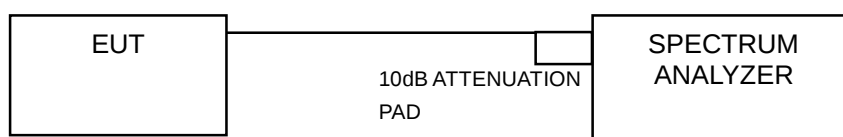
FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	138	5180.042799	8.2623552	5180.042961	8.2936293	5180.043196	8.3389961	5180.043185	8.3368726
	120	5180.042355	8.1766409	5180.04224	8.1544402	5180.042237	8.1538610	5180.042543	8.2129344
	102	5180.042173	8.1415058	5180.042226	8.1517375	5180.042345	8.1747104	5180.042284	8.1629344

4.6 6dB Bandwidth Measurement

4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

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

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.36	16.36	0.5	PASS
157	5785	16.38	16.36	0.5	PASS
165	5825	16.40	16.41	0.5	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.78	17.06	0.5	PASS
157	5785	17.36	17.36	0.5	PASS
165	5825	17.37	17.34	0.5	PASS

802.11n (HT40)

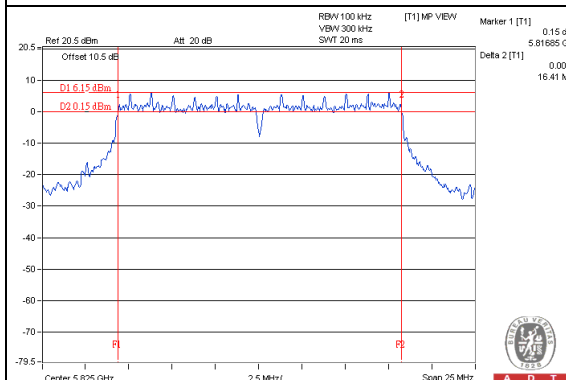
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.34	36.01	0.5	PASS
159	5795	36.07	35.69	0.5	PASS

802.11ac (VHT80)

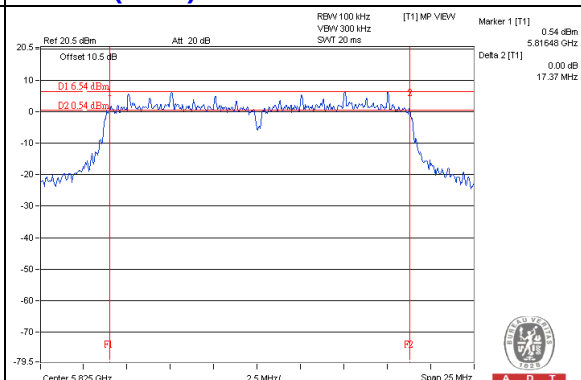
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
155	5775	75.35	75.43	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

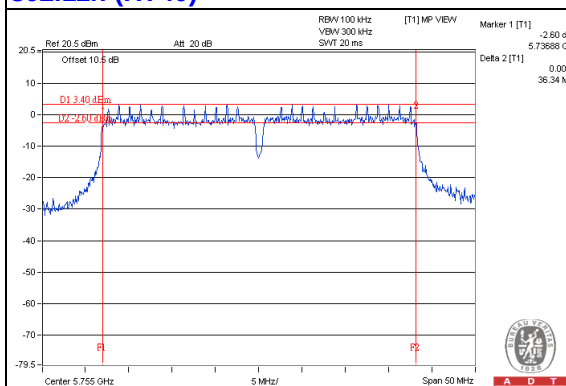
802.11a



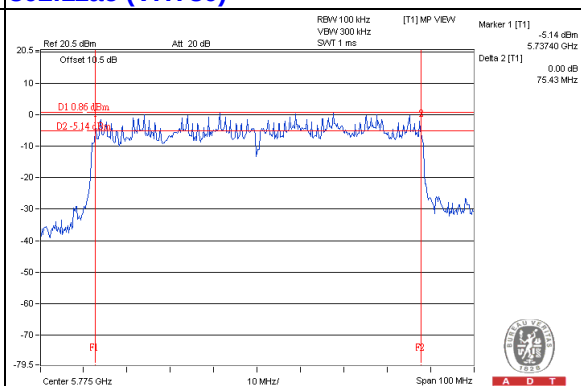
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



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 accredited and approved 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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