

FCC Test Report

Report No.: RF150408C04A-1

FCC ID: TE7AP500

Test Model: AP500

Received Date: Apr. 08, 2015

Test Date: Aug. 18 to Sep. 25, 2015

Issued Date: Nov. 02, 2015

Applicant: TP-LINK TECHNOLOGIES CO., LTD.

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A D T

Release Control Record

Issue No.	Description	Date Issued
RF150408C04A-1	Original release.	Nov. 02, 2015



A D T

1 Certificate of Conformity

Product: AC1900 Wireless Gigabit Access Point

Brand: TP-LINK

Test Model: AP500

Sample Status: PROTOTYPE

Applicant: TP-LINK TECHNOLOGIES CO., LTD.

Test Date: Aug. 18 to Sep. 25, 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 : *Elsie Hsu* , **Date:** Nov. 02, 2015
Elsie Hsu / Specialist

Approved by : *May Chen* , **Date:** Nov. 02, 2015
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -6.62dB at 0.15000MHz.
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 5117.00MHz, 5150.00MHz, 5399.00MHz.
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(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is RP-SMA-F not a standard connector.

NOTE: 1. For WLAN: The EUT was operating in 2.4 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.85GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2.4 ~ 2.4835GHz and 5.725~5.85GHz RF parameters was recorded in another test report.

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	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.37 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.65 dB
	6GHz ~ 18GHz	3.88 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1900 Wireless Gigabit Access Point
Brand	TP-LINK
Test Model	AP500
Status of EUT	PROTOTYPE
Power Supply Rating	12Vdc from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac/11n mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g/a: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1300Mbps
Operating Frequency	For 15.407 5.18 ~ 5.24GHz
	For 15.247 (2.4GHz) 2.412 ~ 2.462GHz
	For 15.247 (5GHz) 5.745 ~ 5.825GHz
Number of Channel	For 15.407 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
	For 15.247 (5GHz) 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)

Output Power	For 15.407 CDD Mode: 802.11a: 129.773mW 802.11ac (VHT20): 97.538mW 802.11ac (VHT40): 79.62mW 802.11ac (VHT80): 50.159mW Beamforming Mode: 802.11ac (VHT20): 91.869mW 802.11ac (VHT40): 78.347mW 802.11ac (VHT80): 48.68mW
	For 15.247 (2.4GHz) CDD Mode: 802.11b: 944.994mW 802.11g: 905.754mW 802.11n (HT20): 985.832mW 802.11n (HT40): 183.341mW For 15.247 (5GHz) CDD Mode: 802.11a: 941.704mW 802.11ac (VHT20): 929.132mW 802.11ac (VHT40): 939.727mW 802.11ac (VHT80): 325.598mW Beamforming Mode: 802.11ac (VHT20): 922.803mW 802.11ac (VHT40): 918.936mW 802.11ac (VHT80): 326.978mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

- 2.4GHz and 5GHz technology can transmit at same time.
- The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Antenna Gain (dBi)	Frequency range (GHz to GHz)	Antenna Type	Connector Type
Chain (0)	NA	NA	1.59	2.4-2.4835	Dipole	RP-SMA-F
			1.03	5.15-5.25		
			1.43	5.725-5.850		
Chain (1)	NA	NA	1.59	2.4-2.4835	Dipole	RP-SMA-F
			1.03	5.15-5.25		
			1.43	5.725-5.850		
Chain (2)	NA	NA	1.59	2.4-2.4835	Dipole	RP-SMA-F
			1.03	5.15-5.25		
			1.43	5.725-5.850		

- The EUT must be supplied with a power adapter as following table:

Brand Name	Model No.	Spec.
Ten Pao International Inc.	S040EU1200250	Input: 100-240V~, 1.2A Max., 50/60Hz Output: 12V, 2500mA DC output cable: 1.5m, unshielded

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	3TX	3RX
802.11g	6 ~ 54Mbps	3TX	3RX
802.11n (HT20)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	3TX	3RX
802.11n (HT20)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11ac (VHT20)	MCS 0~8, Nss=1	3TX	3RX
	MCS 0~8, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX
802.11ac (VHT40)	MCS 0~9, Nss=1	3TX	3RX
	MCS 0~9, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX
802.11ac (VHT80)	MCS 0~9, Nss=1	3TX	3RX
	MCS 0~9, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX

Note:

1. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)
2. All of modulation mode support beamforming function except 2.4GHz band and 5GHz band (802.11a) modulation mode.

5. 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

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 **Y-plane** (for below 1GHz) and **X-plane** (for above 1GHz).

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.

CDD 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 (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
Beamforming Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	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.

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5240	36 to 48	48	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.

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5240	36 to 48	48	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.

CDD 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 (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
Beamforming Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo
RE<1G	22deg. C, 67%RH	120Vac, 60Hz	Weiwei Lo
PLC	25deg. C, 60%RH	120Vac, 60Hz	Timmy Hu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Gary Cheng

3.3 Duty Cycle of Test Signal

CDD Mode:

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

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

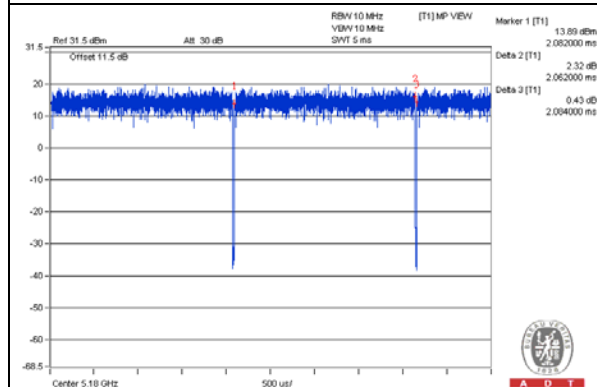
802.11a: Duty cycle = $2.062 \text{ ms} / 2.084 \text{ ms} = 0.989$

802.11ac (VHT20): Duty cycle = $1.927 \text{ ms} / 1.947 \text{ ms} = 0.99$

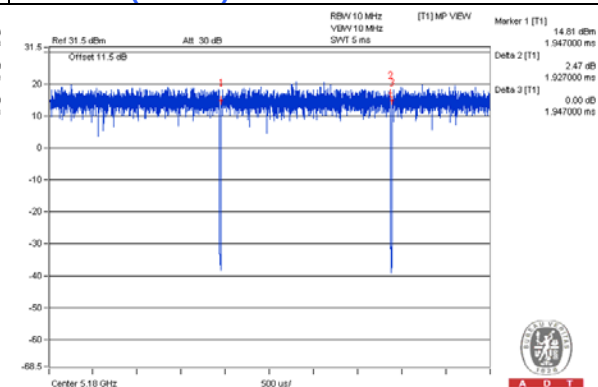
802.11ac (VHT40): Duty cycle = $0.952 \text{ ms} / 0.971 \text{ ms} = 0.98$

802.11ac (VHT80): Duty cycle = $0.46 \text{ ms} / 0.479 \text{ ms} = 0.96$, Duty factor = $10 * \log(1/0.96) = 0.18$

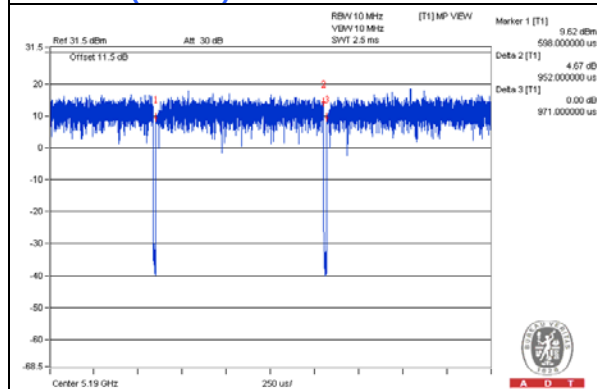
802.11a



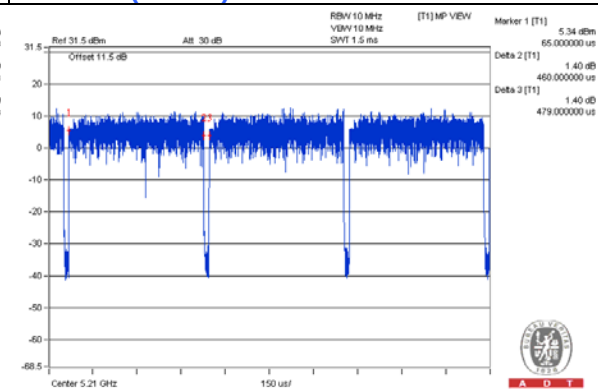
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



Beamforming Mode:

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

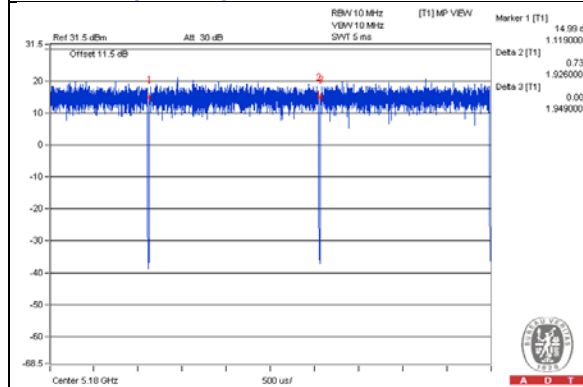
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11ac (VHT20): Duty cycle = $1.926 \text{ ms} / 1.949 \text{ ms} = 0.988$

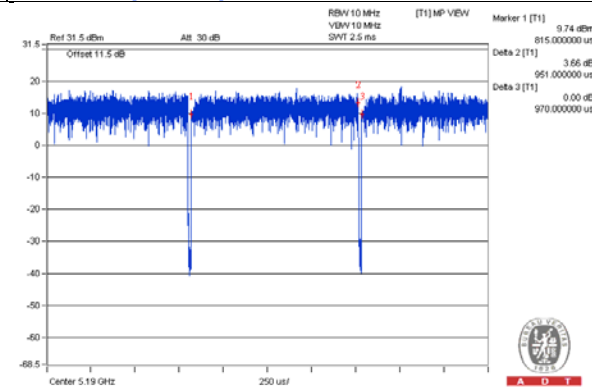
802.11ac (VHT40): Duty cycle = $0.951 \text{ ms} / 0.97 \text{ ms} = 0.98$

802.11ac (VHT80): Duty cycle = $0.459 \text{ ms} / 0.478 \text{ ms} = 0.96$, Duty factor = $10 * \log(1/0.96) = 0.18$

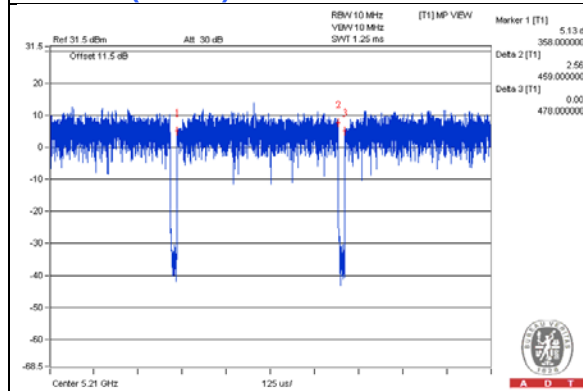
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



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.

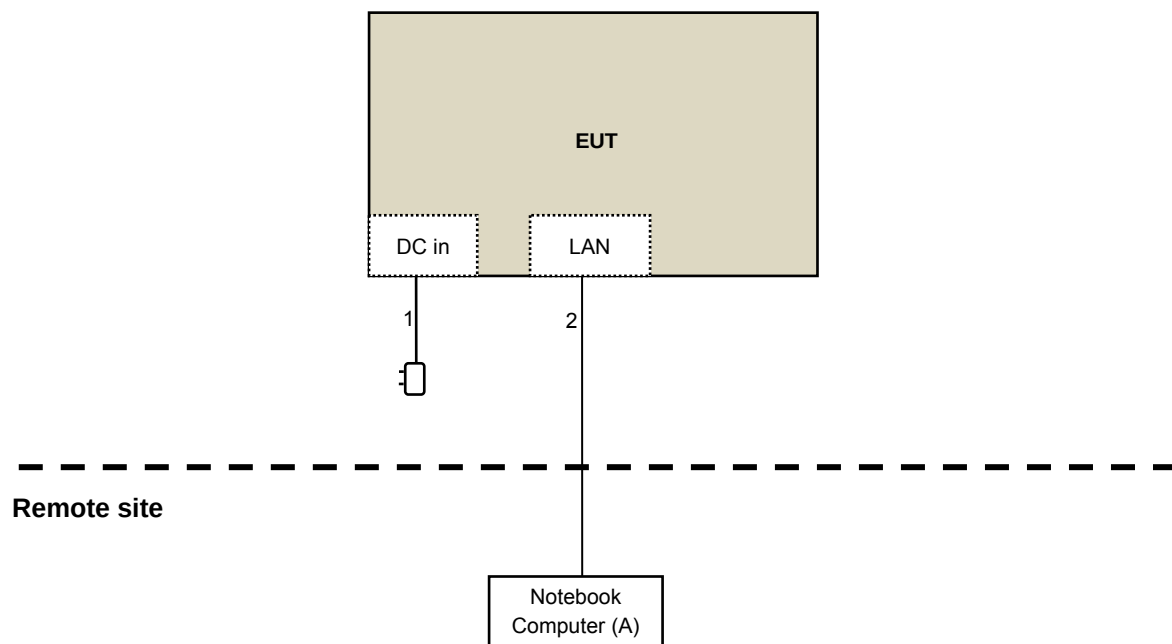
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook Computer	DELL	PP32LA	GSLB32S	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC	1	1.5	No	0	Supplied by Client
2.	RJ-45	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

FCC Part 15, Subpart E (15.407)

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:

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

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedure New Rules 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

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
Horn_Antenna AISI	AIH.8018	000032009111 0	Feb. 09, 2015	Feb. 08, 2016
Pre-Amplifier Agilent	8449B	3008A02578	June 23, 2015	June 22, 2016
RF Cable	NA	131205 131216 131217 SNMY23684/ 4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	June 26, 2015	June 25, 2016
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Spectrum Analyzer R&S	FSP 40	100060	May 08, 2015	May 07, 2016
Power meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-S P-AR	MAA0812-00 8	Jan. 12, 2015	Jan. 11, 2016

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The VCCI Site Registration No. is G-137.
5. The CANADA Site Registration No. is IC 7450H-2.
6. Tested Date: Aug. 18 to 20, 2015

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 06, 2015	Feb. 05, 2016
RF Cable	8D-FB	CHGCAB-001 -1 CHGCAB-001 -2	Oct. 04, 2014	Oct. 03, 2015
	RF-141	CHGCAB-004	Oct. 04, 2014	Oct. 03, 2015
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The CANADA Site Registration No. is IC 7450H-2.
5. Tested Date: Sep. 21, 2015

4.1.3 Test Procedures

- 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:

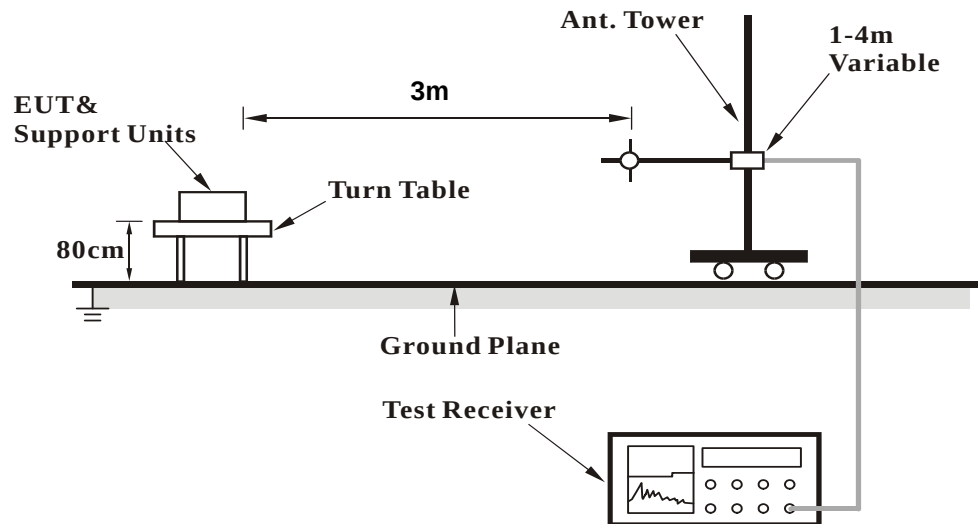
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

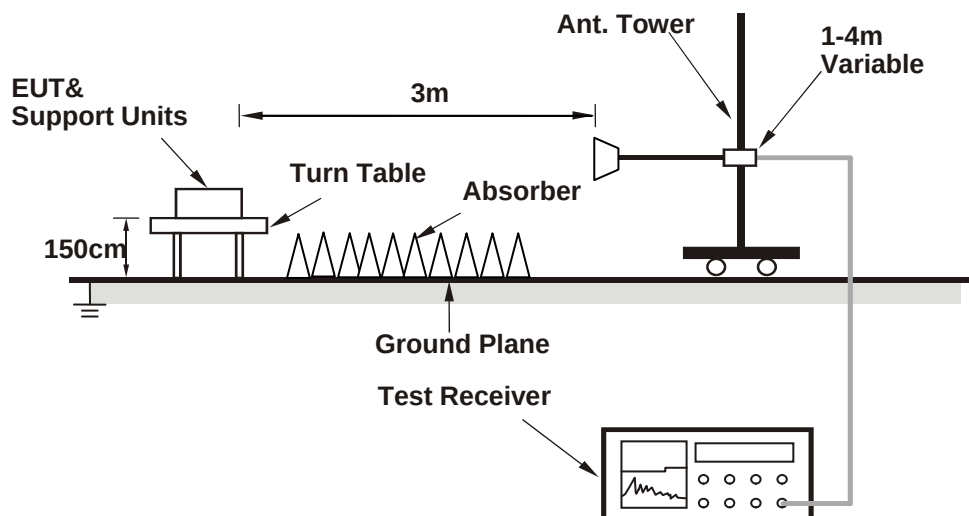
No deviation.

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 Conditions

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on remote site.
2. Controlling software (MTool_2.0.1.1.exe) has been activated to set the EUT on specific status.

4.1.7 Test Results

CDD Mode

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	5096.70	54.7 PK	74.0	-19.3	1.50 H	170	45.03	9.67
2	5096.70	44.9 AV	54.0	-9.1	1.50 H	170	35.23	9.67
3	*5180.00	99.3 PK			1.72 H	163	89.14	10.16
4	*5180.00	90.3 AV			1.72 H	163	80.14	10.16
5	#10360.00	52.6 PK	74.0	-21.4	1.46 H	244	35.62	16.98
6	#10360.00	38.8 AV	54.0	-15.2	1.46 H	244	21.82	16.98
7	15540.00	52.6 PK	74.0	-21.4	1.73 H	151	30.67	21.93
8	15540.00	40.8 AV	54.0	-13.2	1.73 H	151	18.87	21.93
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	5096.70	63.1 PK	74.0	-10.9	2.06 V	336	53.43	9.67
2	5096.70	52.8 AV	54.0	-1.2	2.06 V	336	43.13	9.67
3	*5180.00	111.5 PK			2.05 V	306	101.34	10.16
4	*5180.00	101.1 AV			2.05 V	306	90.94	10.16
5	#10360.00	50.5 PK	74.0	-23.5	1.35 V	187	33.52	16.98
6	#10360.00	37.8 AV	54.0	-16.2	1.35 V	187	20.82	16.98
7	15540.00	52.9 PK	74.0	-21.1	1.59 V	225	30.97	21.93
8	15540.00	39.6 AV	54.0	-14.4	1.59 V	225	17.67	21.93

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 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	5121.00	54.4 PK	74.0	-19.6	1.55 H	178	44.61	9.79
2	5121.00	44.8 AV	54.0	-9.2	1.55 H	178	35.01	9.79
3	*5200.00	100.1 PK			1.78 H	171	89.84	10.26
4	*5200.00	89.9 AV			1.78 H	171	79.64	10.26
5	5359.00	50.8 PK	74.0	-23.2	1.49 H	221	40.21	10.59
6	5359.00	41.5 AV	54.0	-12.5	1.49 H	221	30.91	10.59
7	#10400.00	51.9 PK	74.0	-22.1	1.51 H	232	34.84	17.06
8	#10400.00	38.3 AV	54.0	-15.7	1.51 H	232	21.24	17.06
9	15600.00	52.4 PK	74.0	-21.6	1.77 H	145	30.12	22.28
10	15600.00	40.3 AV	54.0	-13.7	1.77 H	145	18.02	22.28

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	5121.00	62.5 PK	74.0	-11.5	2.03 V	321	52.71	9.79
2	5121.00	52.7 AV	54.0	-1.3	2.03 V	321	42.91	9.79
3	*5200.00	110.6 PK			2.03 V	306	100.34	10.26
4	*5200.00	100.3 AV			2.03 V	306	90.04	10.26
5	5359.00	59.0 PK	74.0	-15.0	1.76 V	33	48.41	10.59
6	5359.00	48.9 AV	54.0	-5.1	1.76 V	33	38.31	10.59
7	#10400.00	50.4 PK	74.0	-23.6	1.40 V	175	33.34	17.06
8	#10400.00	38.0 AV	54.0	-16.0	1.40 V	175	20.94	17.06
9	15600.00	52.9 PK	74.0	-21.1	1.55 V	213	30.62	22.28
10	15600.00	39.6 AV	54.0	-14.4	1.55 V	213	17.32	22.28

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	5081.90	53.4 PK	74.0	-20.6	1.50 H	229	43.76	9.64
2	5081.90	43.0 AV	54.0	-11.0	1.50 H	229	33.36	9.64
3	*5240.00	105.4 PK			1.82 H	185	95.07	10.33
4	*5240.00	95.1 AV			1.82 H	185	84.77	10.33
5	5399.00	56.2 PK	74.0	-17.8	1.52 H	170	45.50	10.70
6	5399.00	45.5 AV	54.0	-8.5	1.52 H	170	34.80	10.70
7	#10480.00	51.8 PK	74.0	-22.2	1.55 H	247	35.07	16.73
8	#10480.00	38.4 AV	54.0	-15.6	1.55 H	247	21.67	16.73
9	15720.00	52.4 PK	74.0	-21.6	1.72 H	138	29.77	22.63
10	15720.00	40.2 AV	54.0	-13.8	1.72 H	138	17.57	22.63

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	5081.90	60.6 PK	74.0	-13.4	2.18 V	320	50.96	9.64
2	5081.90	50.1 AV	54.0	-3.9	2.18 V	320	40.46	9.64
3	*5240.00	115.9 PK			2.02 V	309	105.57	10.33
4	*5240.00	105.2 AV			2.02 V	309	94.87	10.33
5	5399.00	63.5 PK	74.0	-10.5	1.96 V	357	52.80	10.70
6	5399.00	53.0 AV	54.0	-1.0	1.96 V	357	42.30	10.70
7	#10480.00	50.7 PK	74.0	-23.3	1.38 V	169	33.97	16.73
8	#10480.00	38.4 AV	54.0	-15.6	1.38 V	169	21.67	16.73
9	15720.00	53.3 PK	74.0	-20.7	1.56 V	219	30.67	22.63
10	15720.00	40.1 AV	54.0	-13.9	1.56 V	219	17.47	22.63

REMARKS:

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

802.11ac (VHT20)

CHANNEL	TX Channel 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	5100.00	55.8 PK	74.0	-18.2	1.56 H	157	46.13	9.67
2	5100.00	46.3 AV	54.0	-7.7	1.56 H	157	36.63	9.67
3	*5180.00	101.1 PK			1.86 H	172	90.94	10.16
4	*5180.00	90.8 AV			1.86 H	172	80.64	10.16
5	#10360.00	52.5 PK	74.0	-21.5	1.60 H	261	35.52	16.98
6	#10360.00	38.8 AV	54.0	-15.2	1.60 H	261	21.82	16.98
7	15540.00	52.4 PK	74.0	-21.6	1.67 H	122	30.47	21.93
8	15540.00	40.2 AV	54.0	-13.8	1.67 H	122	18.27	21.93
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	5100.00	62.9 PK	74.0	-11.1	1.75 V	314	53.23	9.67
2	5100.00	52.8 AV	54.0	-1.2	1.75 V	314	43.13	9.67
3	*5180.00	111.9 PK			2.04 V	311	101.74	10.16
4	*5180.00	101.0 AV			2.04 V	311	90.84	10.16
5	#10360.00	50.2 PK	74.0	-23.8	1.43 V	154	33.22	16.98
6	#10360.00	38.2 AV	54.0	-15.8	1.43 V	154	21.22	16.98
7	15540.00	54.1 PK	74.0	-19.9	1.56 V	224	32.17	21.93
8	15540.00	40.6 AV	54.0	-13.4	1.56 V	224	18.67	21.93

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	5117.00	64.3 PK	74.0	-9.7	1.55 H	143	54.53	9.77
2	5117.00	46.5 AV	54.0	-7.5	1.55 H	143	36.73	9.77
3	*5200.00	101.7 PK			1.91 H	161	91.44	10.26
4	*5200.00	90.4 AV			1.91 H	161	80.14	10.26
5	5359.00	58.4 PK	74.0	-15.6	1.49 H	182	47.81	10.59
6	5359.00	44.0 AV	54.0	-10.0	1.49 H	182	33.41	10.59
7	#10400.00	52.4 PK	74.0	-21.6	1.57 H	260	35.34	17.06
8	#10400.00	38.8 AV	54.0	-15.2	1.57 H	260	21.74	17.06
9	15600.00	52.4 PK	74.0	-21.6	1.64 H	127	30.12	22.28
10	15600.00	40.2 AV	54.0	-13.8	1.64 H	127	17.92	22.28

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	5117.00	63.5 PK	74.0	-10.5	2.01 V	314	53.73	9.77
2	5117.00	53.0 AV	54.0	-1.0	2.01 V	314	43.23	9.77
3	*5200.00	111.7 PK			1.97 V	308	101.44	10.26
4	*5200.00	100.6 AV			1.97 V	308	90.34	10.26
5	5359.00	60.0 PK	74.0	-14.0	2.01 V	54	49.41	10.59
6	5359.00	49.5 AV	54.0	-4.5	2.01 V	54	38.91	10.59
7	#10400.00	49.9 PK	74.0	-24.1	1.45 V	138	32.84	17.06
8	#10400.00	38.0 AV	54.0	-16.0	1.45 V	138	20.94	17.06
9	15600.00	54.2 PK	74.0	-19.8	1.62 V	222	31.92	22.28
10	15600.00	40.9 AV	54.0	-13.1	1.62 V	222	18.62	22.28

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	5077.00	56.1 PK	74.0	-17.9	1.44 H	184	46.47	9.63
2	5077.00	41.8 AV	54.0	-12.2	1.44 H	184	32.17	9.63
3	*5240.00	104.0 PK			1.89 H	168	93.67	10.33
4	*5240.00	92.8 AV			1.89 H	168	82.47	10.33
5	5399.00	60.5 PK	74.0	-13.5	1.58 H	150	49.80	10.70
6	5399.00	47.1 AV	54.0	-6.9	1.58 H	150	36.40	10.70
7	#10480.00	52.5 PK	74.0	-21.5	1.56 H	265	35.77	16.73
8	#10480.00	38.6 AV	54.0	-15.4	1.56 H	265	21.87	16.73
9	15720.00	52.0 PK	74.0	-22.0	1.66 H	127	29.37	22.63
10	15720.00	39.7 AV	54.0	-14.3	1.66 H	127	17.07	22.63

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	5077.00	58.3 PK	74.0	-15.7	1.94 V	314	48.67	9.63
2	5077.00	48.0 AV	54.0	-6.0	1.94 V	314	38.37	9.63
3	*5240.00	114.4 PK			1.95 V	278	104.07	10.33
4	*5240.00	103.1 AV			1.95 V	278	92.77	10.33
5	5399.00	63.4 PK	74.0	-10.6	1.94 V	40	52.70	10.70
6	5399.00	52.7 AV	54.0	-1.3	1.94 V	40	42.00	10.70
7	#10480.00	49.6 PK	74.0	-24.4	1.43 V	143	32.87	16.73
8	#10480.00	37.5 AV	54.0	-16.5	1.43 V	143	20.77	16.73
9	15720.00	54.8 PK	74.0	-19.2	1.61 V	229	32.17	22.63
10	15720.00	41.4 AV	54.0	-12.6	1.61 V	229	18.77	22.63

REMARKS:

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

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5115.00	58.9 PK	74.0	-15.1	1.49 H	191	49.15	9.75
2	5115.00	47.8 AV	54.0	-6.2	1.49 H	191	38.05	9.75
3	5150.00	68.6 PK	74.0	-5.4	1.54 H	151	58.63	9.97
4	5150.00	49.4 AV	54.0	-4.6	1.54 H	151	39.43	9.97
5	*5190.00	98.8 PK			1.84 H	161	88.60	10.20
6	*5190.00	88.6 AV			1.84 H	161	78.40	10.20
7	#10380.00	52.3 PK	74.0	-21.7	1.61 H	254	35.28	17.02
8	#10380.00	38.1 AV	54.0	-15.9	1.61 H	254	21.08	17.02
9	15570.00	51.9 PK	74.0	-22.1	1.62 H	113	29.80	22.10
10	15570.00	39.7 AV	54.0	-14.3	1.62 H	113	17.60	22.10
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	5115.00	63.0 PK	74.0	-11.0	2.16 V	327	53.25	9.75
2	5115.00	52.0 AV	54.0	-2.0	2.16 V	327	42.25	9.75
3	5150.00	70.9 PK	74.0	-3.1	1.98 V	321	60.93	9.97
4	5150.00	52.9 AV	54.0	-1.1	1.98 V	321	42.93	9.97
5	*5190.00	110.5 PK			1.98 V	321	100.30	10.20
6	*5190.00	98.7 AV			1.98 V	321	88.50	10.20
7	#10380.00	50.2 PK	74.0	-23.8	1.47 V	153	33.18	17.02
8	#10380.00	37.9 AV	54.0	-16.1	1.47 V	153	20.88	17.02
9	15570.00	54.5 PK	74.0	-19.5	1.58 V	226	32.40	22.10
10	15570.00	41.1 AV	54.0	-12.9	1.58 V	226	19.00	22.10

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 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	5145.00	60.5 PK	74.0	-13.5	1.44 H	201	50.56	9.94
2	5145.00	48.7 AV	54.0	-5.3	1.44 H	201	38.76	9.94
3	*5230.00	100.7 PK			1.88 H	154	90.38	10.32
4	*5230.00	89.6 AV			1.88 H	154	79.28	10.32
5	5384.00	58.1 PK	74.0	-15.9	1.51 H	157	47.44	10.66
6	5384.00	47.5 AV	54.0	-6.5	1.51 H	157	36.84	10.66
7	#10460.00	52.3 PK	74.0	-21.7	1.59 H	252	35.48	16.82
8	#10460.00	38.1 AV	54.0	-15.9	1.59 H	252	21.28	16.82
9	15690.00	52.0 PK	74.0	-22.0	1.61 H	105	29.48	22.52
10	15690.00	40.1 AV	54.0	-13.9	1.61 H	105	17.58	22.52

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	5145.00	63.8 PK	74.0	-10.2	1.45 V	321	53.86	9.94
2	5145.00	52.9 AV	54.0	-1.1	1.45 V	321	42.96	9.94
3	*5230.00	115.6 PK			1.94 V	319	105.28	10.32
4	*5230.00	99.7 AV			1.94 V	319	89.38	10.32
5	5384.00	60.4 PK	74.0	-13.6	2.14 V	37	49.74	10.66
6	5384.00	49.9 AV	54.0	-4.1	2.14 V	37	39.24	10.66
7	#10460.00	50.8 PK	74.0	-23.2	1.51 V	146	33.98	16.82
8	#10460.00	38.4 AV	54.0	-15.6	1.51 V	146	21.58	16.82
9	15690.00	54.9 PK	74.0	-19.1	1.53 V	213	32.38	22.52
10	15690.00	41.4 AV	54.0	-12.6	1.53 V	213	18.88	22.52

REMARKS:

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

802.11ac (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	65.6 PK	74.0	-8.4	1.57 H	165	55.63	9.97
2	5150.00	49.5 AV	54.0	-4.5	1.57 H	165	39.53	9.97
3	*5210.00	95.3 PK			1.83 H	159	85.03	10.27
4	*5210.00	84.0 AV			1.83 H	159	73.73	10.27
5	5350.00	53.8 PK	74.0	-20.2	1.39 H	194	43.25	10.55
6	5350.00	40.2 AV	54.0	-13.8	1.39 H	194	29.65	10.55
7	#10420.00	52.2 PK	74.0	-21.8	1.64 H	258	35.22	16.98
8	#10420.00	38.0 AV	54.0	-16.0	1.64 H	258	21.02	16.98
9	15630.00	51.9 PK	74.0	-22.1	1.57 H	101	29.53	22.37
10	15630.00	40.2 AV	54.0	-13.8	1.57 H	101	17.83	22.37
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	68.1 PK	74.0	-5.9	1.99 V	316	58.13	9.97
2	5150.00	53.0 AV	54.0	-1.0	1.99 V	316	43.03	9.97
3	*5210.00	106.5 PK			1.99 V	316	96.23	10.27
4	*5210.00	94.2 AV			1.99 V	316	83.93	10.27
5	5350.00	57.9 PK	74.0	-16.1	1.99 V	316	47.35	10.55
6	5350.00	45.4 AV	54.0	-8.6	1.99 V	316	34.89	10.55
7	#10420.00	50.6 PK	74.0	-23.4	1.45 V	156	33.62	16.98
8	#10420.00	38.3 AV	54.0	-15.7	1.45 V	156	21.32	16.98
9	15630.00	54.5 PK	74.0	-19.5	1.56 V	213	32.13	22.37
10	15630.00	40.9 AV	54.0	-13.1	1.56 V	213	18.53	22.37

REMARKS:

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

Below 1GHz Data

802.11a

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	84.71	26.8 QP	40.0	-13.2	1.50 H	82	45.29	-18.50
2	104.84	24.7 QP	43.5	-18.8	1.50 H	82	41.34	-16.62
3	145.96	30.7 QP	43.5	-12.8	1.50 H	263	43.81	-13.10
4	211.68	36.7 QP	43.5	-6.9	1.00 H	341	52.65	-16.00
5	267.65	35.6 QP	46.0	-10.4	1.00 H	159	48.87	-13.26
6	290.88	36.1 QP	46.0	-9.9	1.00 H	280	48.44	-12.36
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	36.55	34.6 QP	40.0	-5.4	1.00 V	356	48.62	-13.98
2	54.11	34.6 QP	40.0	-5.4	1.00 V	142	47.63	-13.02
3	194.56	30.3 QP	43.5	-13.3	1.00 V	272	46.10	-15.85
4	280.94	32.6 QP	46.0	-13.4	1.00 V	99	45.19	-12.60
5	463.98	30.5 QP	46.0	-15.5	1.00 V	316	38.06	-7.57
6	594.01	27.1 QP	46.0	-18.9	1.50 V	155	31.59	-4.51

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

Beamforming Mode

Above 1GHz Data

802.11ac (VHT20)

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	5100.00	55.8 PK	74.0	-18.2	1.51 H	145	47.69	8.11
2	5100.00	46.5 AV	54.0	-7.5	1.51 H	145	38.39	8.11
3	*5180.00	101.0 PK			1.80 H	158	92.53	8.47
4	*5180.00	90.7 AV			1.80 H	158	82.23	8.47
5	#10360.00	52.2 PK	74.0	-21.8	1.54 H	251	37.70	14.50
6	#10360.00	38.8 AV	54.0	-15.2	1.54 H	251	24.30	14.50
7	15540.00	52.6 PK	74.0	-21.4	1.72 H	114	33.92	18.68
8	15540.00	40.2 AV	54.0	-13.8	1.72 H	114	21.52	18.68
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	5100.00	63.3 PK	74.0	-10.7	1.72 V	310	55.19	8.11
2	5100.00	52.9 AV	54.0	-1.1	1.72 V	310	44.79	8.11
3	*5180.00	111.7 PK			2.04 V	315	103.23	8.47
4	*5180.00	100.6 AV			2.04 V	315	92.13	8.47
5	#10360.00	50.2 PK	74.0	-23.8	1.48 V	145	35.70	14.50
6	#10360.00	38.0 AV	54.0	-16.0	1.48 V	145	23.50	14.50
7	15540.00	54.3 PK	74.0	-19.7	1.55 V	216	35.62	18.68
8	15540.00	40.6 AV	54.0	-13.4	1.55 V	216	21.92	18.68

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	5117.00	64.2 PK	74.0	-9.8	1.54 H	136	56.02	8.18
2	5117.00	46.2 AV	54.0	-7.8	1.54 H	136	38.02	8.18
3	*5200.00	102.3 PK			1.86 H	154	93.76	8.54
4	*5200.00	90.8 AV			1.86 H	154	82.26	8.54
5	5359.00	58.4 PK	74.0	-15.6	1.46 H	177	49.57	8.83
6	5359.00	43.8 AV	54.0	-10.2	1.46 H	177	34.97	8.83
7	#10400.00	52.5 PK	74.0	-21.5	1.62 H	265	37.90	14.60
8	#10400.00	38.9 AV	54.0	-15.1	1.62 H	265	24.30	14.60
9	15600.00	52.0 PK	74.0	-22.0	1.63 H	123	33.10	18.90
10	15600.00	39.9 AV	54.0	-14.1	1.63 H	123	21.00	18.90

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	5117.00	64.0 PK	74.0	-10.0	2.04 V	310	55.82	8.18
2	5117.00	53.0 AV	54.0	-1.0	2.04 V	310	44.82	8.18
3	*5200.00	111.2 PK			2.01 V	323	102.66	8.54
4	*5200.00	100.2 AV			2.01 V	323	91.66	8.54
5	5359.00	60.5 PK	74.0	-13.5	2.01 V	64	51.67	8.83
6	5359.00	49.7 AV	54.0	-4.3	2.01 V	64	40.87	8.83
7	#10400.00	49.9 PK	74.0	-24.1	1.47 V	133	35.30	14.60
8	#10400.00	37.9 AV	54.0	-16.1	1.47 V	133	23.30	14.60
9	15600.00	53.8 PK	74.0	-20.2	1.56 V	230	34.90	18.90
10	15600.00	40.6 AV	54.0	-13.4	1.56 V	230	21.70	18.90

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	5077.00	56.3 PK	74.0	-17.7	1.40 H	170	48.24	8.06
2	5077.00	42.0 AV	54.0	-12.0	1.40 H	170	33.94	8.06
3	*5240.00	103.7 PK			1.93 H	179	95.10	8.60
4	*5240.00	92.5 AV			1.93 H	179	83.90	8.60
5	5399.00	60.8 PK	74.0	-13.2	1.53 H	160	51.87	8.93
6	5399.00	47.6 AV	54.0	-6.4	1.53 H	160	38.67	8.93
7	#10480.00	52.2 PK	74.0	-21.8	1.61 H	267	37.73	14.47
8	#10480.00	38.2 AV	54.0	-15.8	1.61 H	267	23.73	14.47
9	15720.00	51.8 PK	74.0	-22.2	1.68 H	119	32.76	19.04
10	15720.00	39.3 AV	54.0	-14.7	1.68 H	119	20.26	19.04

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	5077.00	58.6 PK	74.0	-15.4	1.92 V	313	50.54	8.06
2	5077.00	48.5 AV	54.0	-5.5	1.92 V	313	40.44	8.06
3	*5240.00	114.5 PK			1.90 V	275	105.90	8.60
4	*5240.00	102.9 AV			1.90 V	275	94.30	8.60
5	5399.00	63.2 PK	74.0	-10.8	1.92 V	43	54.27	8.93
6	5399.00	52.4 AV	54.0	-1.6	1.92 V	43	43.47	8.93
7	#10480.00	49.5 PK	74.0	-24.5	1.44 V	143	35.03	14.47
8	#10480.00	37.3 AV	54.0	-16.7	1.44 V	143	22.83	14.47
9	15720.00	54.5 PK	74.0	-19.5	1.63 V	226	35.46	19.04
10	15720.00	41.3 AV	54.0	-12.7	1.63 V	226	22.26	19.04

REMARKS:

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

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5115.00	59.1 PK	74.0	-14.9	1.47 H	182	50.93	8.17
2	5115.00	47.7 AV	54.0	-6.3	1.47 H	182	39.53	8.17
3	5150.00	68.2 PK	74.0	-5.8	1.54 H	149	59.87	8.33
4	5150.00	49.3 AV	54.0	-4.7	1.54 H	149	40.97	8.33
5	*5190.00	98.1 PK			1.82 H	162	89.60	8.50
6	*5190.00	88.2 AV			1.82 H	162	79.70	8.50
7	#10380.00	52.4 PK	74.0	-21.6	1.63 H	262	37.85	14.55
8	#10380.00	38.2 AV	54.0	-15.8	1.63 H	262	23.65	14.55
9	15570.00	52.3 PK	74.0	-21.7	1.67 H	98	33.51	18.79
10	15570.00	40.1 AV	54.0	-13.9	1.67 H	98	21.31	18.79
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	5115.00	63.4 PK	74.0	-10.6	2.15 V	340	55.23	8.17
2	5115.00	52.2 AV	54.0	-1.8	2.15 V	340	44.03	8.17
3	5150.00	71.0 PK	74.0	-3.0	1.98 V	328	62.67	8.33
4	5150.00	53.0 AV	54.0	-1.0	1.98 V	328	44.67	8.33
5	*5190.00	111.0 PK			1.96 V	316	102.50	8.50
6	*5190.00	99.1 AV			1.96 V	316	90.60	8.50
7	#10380.00	50.8 PK	74.0	-23.2	1.52 V	137	36.25	14.55
8	#10380.00	38.3 AV	54.0	-15.7	1.52 V	137	23.75	14.55
9	15570.00	54.1 PK	74.0	-19.9	1.60 V	236	35.31	18.79
10	15570.00	40.9 AV	54.0	-13.1	1.60 V	236	22.11	18.79

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	5145.00	60.0 PK	74.0	-14.0	1.45 H	194	51.69	8.31
2	5145.00	48.5 AV	54.0	-5.5	1.45 H	194	40.19	8.31
3	*5230.00	100.8 PK			1.92 H	153	92.21	8.59
4	*5230.00	89.5 AV			1.92 H	153	80.91	8.59
5	5384.00	58.1 PK	74.0	-15.9	1.57 H	150	49.21	8.89
6	5384.00	47.8 AV	54.0	-6.2	1.57 H	150	38.91	8.89
7	#10460.00	51.9 PK	74.0	-22.1	1.61 H	263	37.39	14.51
8	#10460.00	37.9 AV	54.0	-16.1	1.61 H	263	23.39	14.51
9	15690.00	52.4 PK	74.0	-21.6	1.57 H	108	33.43	18.97
10	15690.00	40.3 AV	54.0	-13.7	1.57 H	108	21.33	18.97

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	5145.00	63.6 PK	74.0	-10.4	1.43 V	331	55.29	8.31
2	5145.00	52.9 AV	54.0	-1.1	1.43 V	331	44.59	8.31
3	*5230.00	115.9 PK			1.90 V	315	107.31	8.59
4	*5230.00	100.2 AV			1.90 V	315	91.61	8.59
5	5384.00	60.7 PK	74.0	-13.3	2.11 V	45	51.81	8.89
6	5384.00	49.9 AV	54.0	-4.1	2.11 V	45	41.01	8.89
7	#10460.00	51.1 PK	74.0	-22.9	1.48 V	137	36.59	14.51
8	#10460.00	38.5 AV	54.0	-15.5	1.48 V	137	23.99	14.51
9	15690.00	54.8 PK	74.0	-19.2	1.52 V	218	35.83	18.97
10	15690.00	41.2 AV	54.0	-12.8	1.52 V	218	22.23	18.97

REMARKS:

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

802.11ac (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	65.1 PK	74.0	-8.9	1.51 H	174	56.77	8.33
2	5150.00	49.1 AV	54.0	-4.9	1.51 H	174	40.77	8.33
3	*5210.00	95.3 PK			1.78 H	157	86.75	8.55
4	*5210.00	83.8 AV			1.78 H	157	75.25	8.55
5	5350.00	53.4 PK	74.0	-20.6	1.38 H	202	44.60	8.80
6	5350.00	40.1 AV	54.0	-13.9	1.38 H	202	31.30	8.80
7	#10420.00	52.4 PK	74.0	-21.6	1.69 H	249	37.83	14.57
8	#10420.00	38.0 AV	54.0	-16.0	1.69 H	249	23.43	14.57
9	15630.00	52.2 PK	74.0	-21.8	1.63 H	105	33.27	18.93
10	15630.00	40.3 AV	54.0	-13.7	1.63 H	105	21.37	18.93
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	5150.00	67.6 PK	74.0	-6.4	1.98 V	313	59.27	8.33
2	5150.00	52.7 AV	54.0	-1.3	1.98 V	313	44.37	8.33
3	*5210.00	105.9 PK			2.03 V	311	97.35	8.55
4	*5210.00	93.8 AV			2.03 V	311	85.25	8.55
5	5350.00	57.7 PK	74.0	-16.3	2.02 V	327	48.90	8.80
6	5350.00	45.0 AV	54.0	-9.0	2.02 V	327	36.20	8.80
7	#10420.00	50.5 PK	74.0	-23.5	1.42 V	163	35.93	14.57
8	#10420.00	38.2 AV	54.0	-15.8	1.42 V	163	23.63	14.57
9	15630.00	54.8 PK	74.0	-19.2	1.56 V	217	35.87	18.93
10	15630.00	41.0 AV	54.0	-13.0	1.56 V	217	22.07	18.93

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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100375	May 06, 2015	May 05, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 01, 2015	Aug. 31, 2016
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 11, 2015	June 10, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 23, 2015	Sep. 22, 2016
50 ohms Terminator	E1-011315	13	Dec. 12 2014	Dec. 11 2015
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
- 3 The VCCI Con C Registration No. is C-3611.
- 4 Tested Date: Sep. 25, 2015

4.2.3 Test Procedures

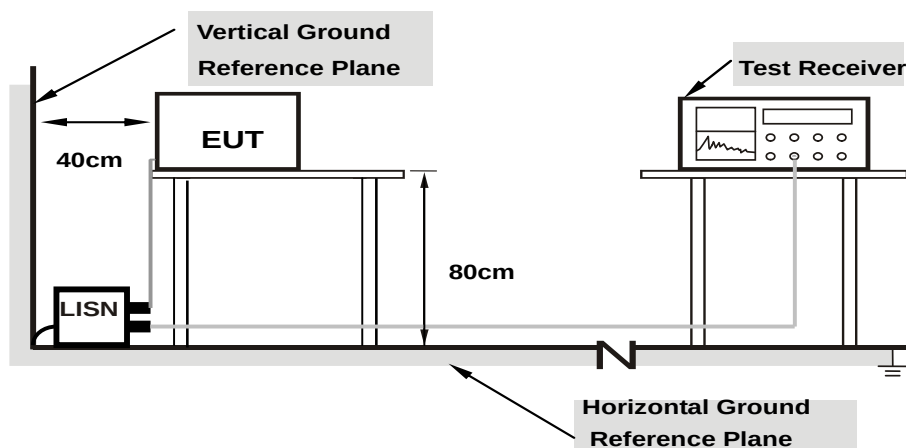
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

Same as 4.1.6.

4.2.7 Test Results

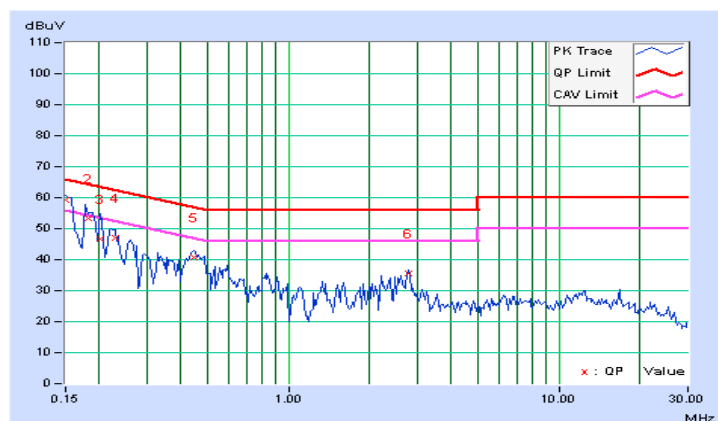
CDD Mode

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	0.15000	0.11	59.12	48.95	59.23	49.06	66.00	56.00	-6.77	-6.94
2	0.18259	0.12	53.31	40.70	53.43	40.82	64.37	54.37	-10.94	-13.55
3	0.20078	0.12	46.58	24.51	46.70	24.63	63.58	53.58	-16.88	-28.95
4	0.22812	0.12	46.79	36.44	46.91	36.56	62.52	52.52	-15.61	-15.96
5	0.44688	0.14	40.52	35.67	40.66	35.81	56.93	46.93	-16.27	-11.12
6	2.79688	0.24	35.46	26.62	35.70	26.86	56.00	46.00	-20.30	-19.14

Remarks:

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

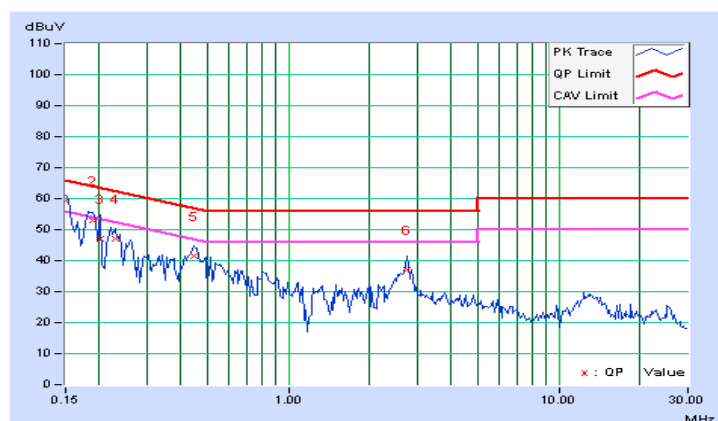


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	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	0.15000	0.09	59.29	48.69	59.38	48.78	66.00	56.00	-6.62	-7.22
2	0.18906	0.10	52.97	42.04	53.07	42.14	64.08	54.08	-11.01	-11.94
3	0.20078	0.10	47.02	33.45	47.12	33.55	63.58	53.58	-16.46	-20.03
4	0.22812	0.10	46.95	35.24	47.05	35.34	62.52	52.52	-15.47	-17.18
5	0.44688	0.12	41.35	36.62	41.47	36.74	56.93	46.93	-15.46	-10.19
6	2.75781	0.24	36.94	29.57	37.18	29.81	56.00	46.00	-18.82	-16.19

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-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 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

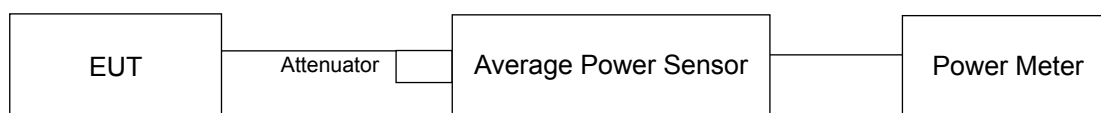
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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 Procedures

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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	12.79	13.01	12.05	55.042	17.41	30	Pass
40	5200	11.77	11.94	10.79	42.657	16.30	30	Pass
48	5240	16.58	16.48	16.00	129.773	21.13	30	Pass

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	13.47	13.42	12.60	62.409	17.95	30	Pass
40	5200	12.83	12.85	11.84	53.738	17.30	30	Pass
48	5240	15.40	15.24	14.69	97.538	19.89	30	Pass

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
38	5190	13.91	13.86	13.07	69.203	18.40	30	Pass
46	5230	14.20	14.64	13.84	79.62	19.01	30	Pass

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
42	5210	12.35	12.59	11.71	50.159	17.00	30	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	13.36	13.31	12.49	60.848	17.84	30	Pass
40	5200	12.71	12.73	11.72	52.273	17.18	30	Pass
48	5240	15.14	14.98	14.43	91.869	19.63	30	Pass

Note: Directional gain = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
38	5190	13.79	13.74	12.95	67.316	18.28	30	Pass
46	5230	14.13	14.57	13.77	78.347	18.94	30	Pass

Note: Directional gain = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
42	5210	12.22	12.46	11.58	48.68	16.87	30	Pass

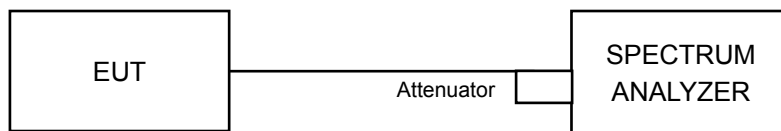
Note: Directional gain = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

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-2A			11dBm/ MHz
U-NII-2C			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 Procedures

For 802.11a, 802.11ac (VHT20), 802.11ac (VHT40):

Using method SA-1

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 MHz, Detector = RMS
- Sweep time = auto, trigger set to "free run".
- Trace average at least 100 traces in power averaging mode.
- Record the max value

For 802.11ac (VHT80):

Using method SA-2

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm)			Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
36	5180	0.10	0.29	0.01	4.91	17	Pass
40	5200	-1.19	-0.74	-1.46	3.65	17	Pass
48	5240	3.73	4.36	3.54	8.66	17	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 = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm)			Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
36	5180	0.27	0.53	0.09	5.07	17	Pass
40	5200	-0.51	0.08	-0.79	4.38	17	Pass
48	5240	2.39	2.60	1.96	7.10	17	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 = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD (dBm)			Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
38	5190	-1.97	-2.02	-2.38	2.65	17	Pass
46	5230	-1.05	-0.81	-1.68	3.61	17	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 = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

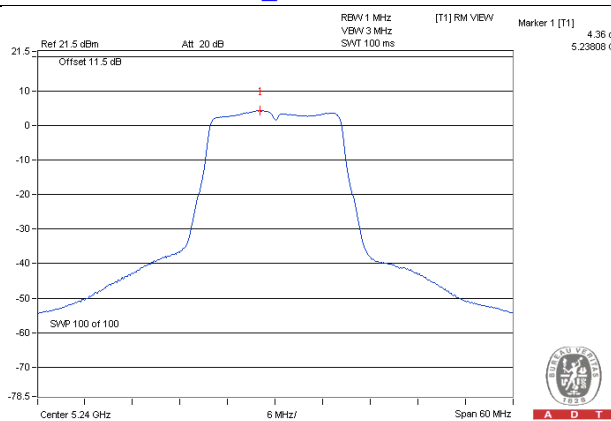
802.11ac (VHT80)

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	Chain 2				
42	5210	-6.40	-5.88	-6.94	0.18	-1.44	17	Pass

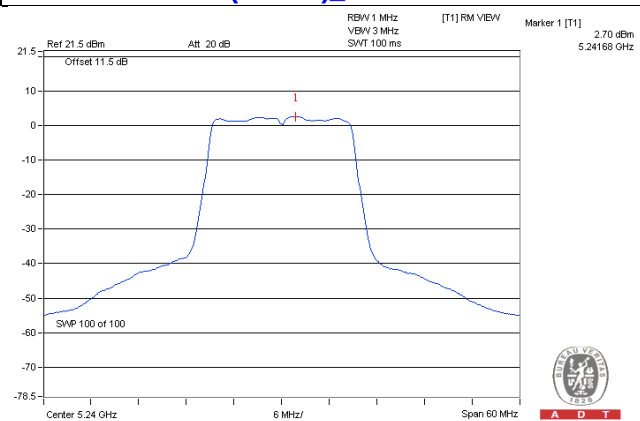
- Note:**
- Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 - Directional gain = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
 - Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

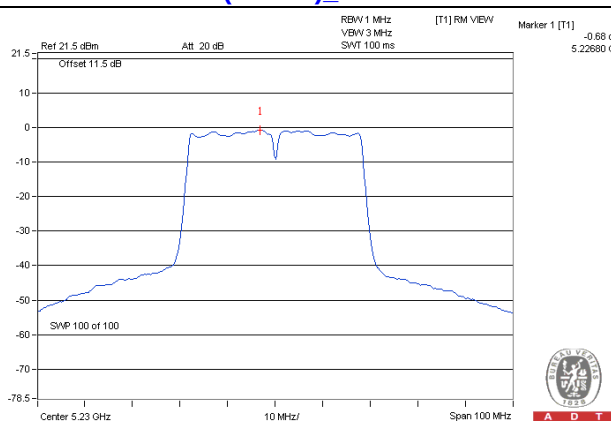
802.11a_Chain 1 / CH48



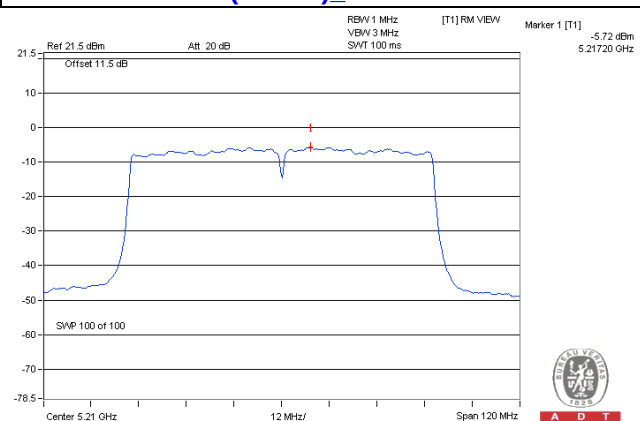
802.11ac (VHT20)_Chain 1 / CH48



802.11ac (VHT40)_Chain 1 / CH46



802.11ac (VHT80)_Chain 1 / CH42



Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm)			Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
36	5180	0.35	0.64	0.06	5.13	17	Pass
40	5200	-0.38	0.02	-0.64	4.45	17	Pass
48	5240	2.39	2.67	1.93	7.11	17	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 = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD (dBm)			Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2			
38	5190	-1.92	-1.93	-2.28	2.73	17	Pass
46	5230	-1.11	-0.88	-1.76	3.54	17	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 = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11ac (VHT80)

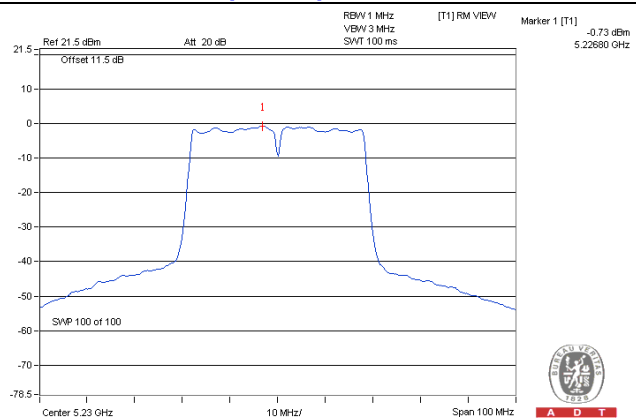
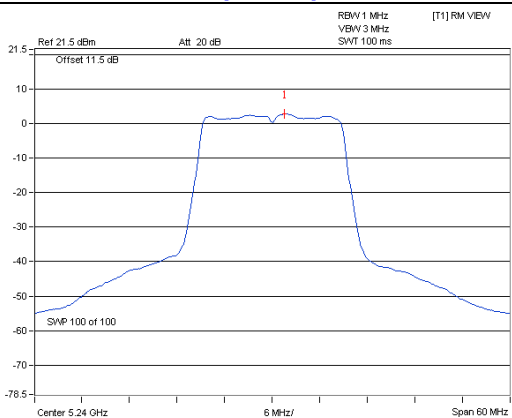
Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)			Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
42	5210	-6.42	-5.92	-6.98	0.18	-1.47	17	Pass

- 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 = $1.03\text{dBi} + 10\log(3) = 5.8\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

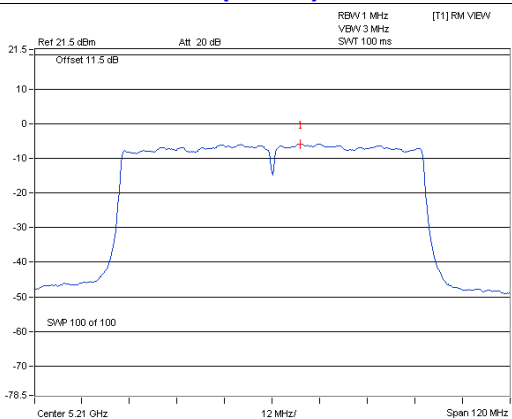
Spectrum Plot of Worst Value

802.11ac (VHT20) Chain 1 / CH48

802.11ac (VHT40) Chain 1 / CH46



802.11ac (VHT80) Chain 1 / CH42

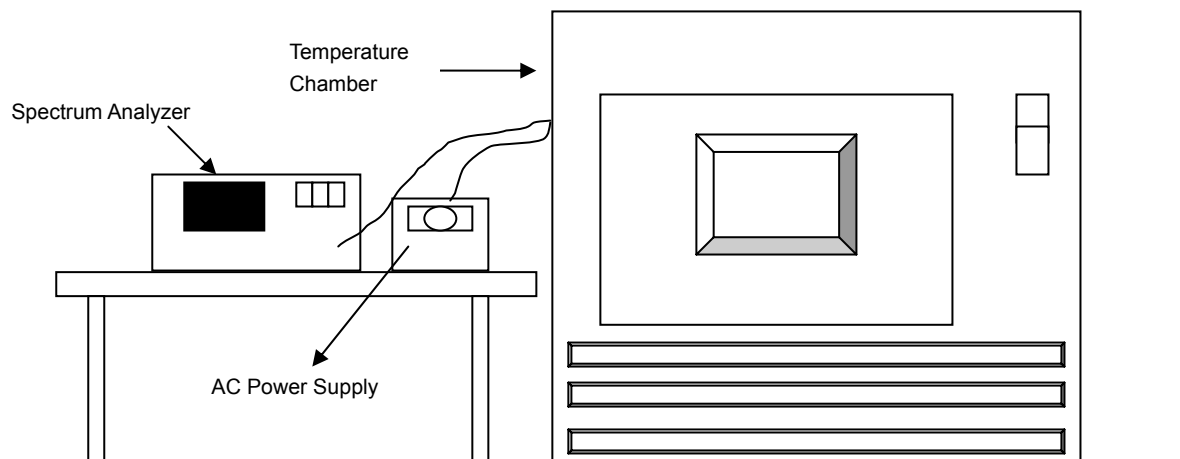


4.5 Frequency Stability Measurement

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 Procedures

- 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 Conditions

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 (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5179.9835	-0.00032	5179.988	-0.00023	5179.9879	-0.00023	5179.9874	-0.00024
40	120	5179.9902	-0.00019	5179.9901	-0.00019	5179.9906	-0.00018	5179.9933	-0.00013
30	120	5180.0205	0.00040	5180.0196	0.00038	5180.0223	0.00043	5180.0198	0.00038
20	120	5180.0169	0.00033	5180.018	0.00035	5180.0157	0.00030	5180.0164	0.00032
10	120	5179.9904	-0.00019	5179.9925	-0.00014	5179.9922	-0.00015	5179.9891	-0.00021
0	120	5179.9854	-0.00028	5179.9858	-0.00027	5179.9818	-0.00035	5179.9865	-0.00026
-10	120	5180.0017	0.00003	5180.0051	0.00010	5180.0024	0.00005	5180.0048	0.00009
-20	120	5179.9829	-0.00033	5179.9827	-0.00033	5179.9878	-0.00024	5179.9872	-0.00025
-30	120	5179.9947	-0.00010	5179.9961	-0.00008	5179.9977	-0.00004	5179.9946	-0.00010

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 (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5180.0174	0.00034	5180.0188	0.00036	5180.015	0.00029	5180.0163	0.00031
	120	5180.0169	0.00033	5180.018	0.00035	5180.0157	0.00030	5180.0164	0.00032
	102	5180.0178	0.00034	5180.0175	0.00034	5180.0163	0.00031	5180.0163	0.00031

5 Pictures of Test Arrangements

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

Appendix A– 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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab/Telecom Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

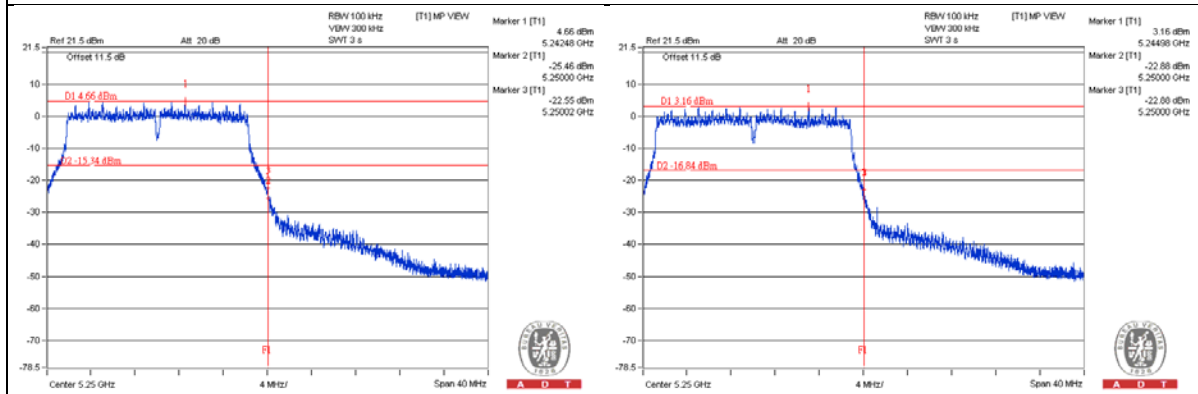
The address and road map of all our labs can be found in our web site also.

Appendix B

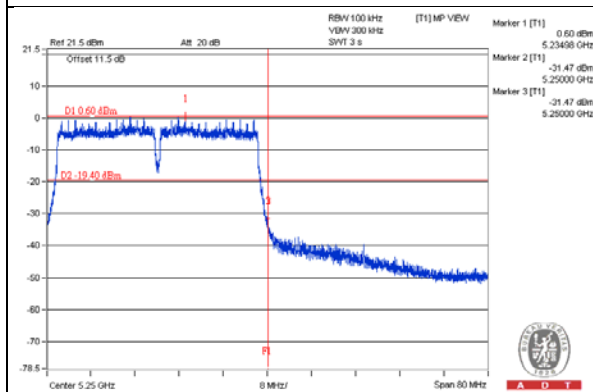
Band Edge At Nearby DFS Band

CDD Mode

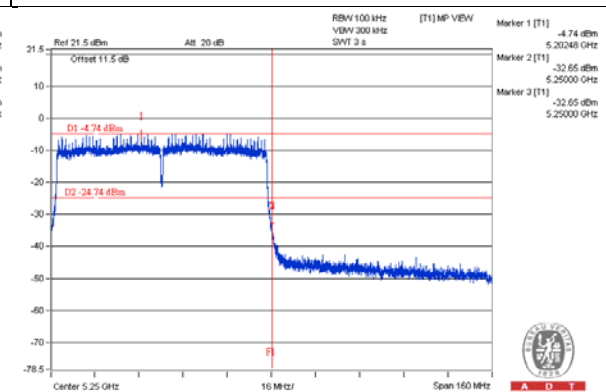
1) Test results demonstrating last channel (20dB BW) shall not exceed the band edge on 5150~5250MHz.



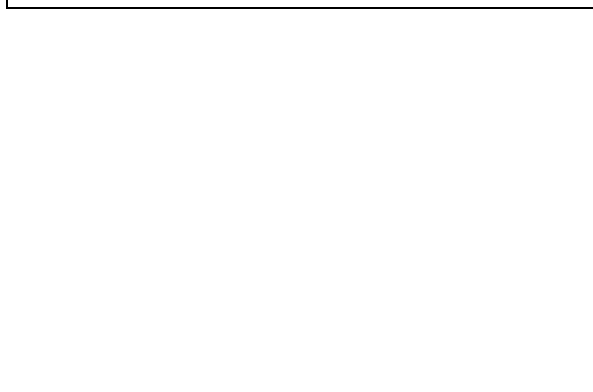
802.11a mode



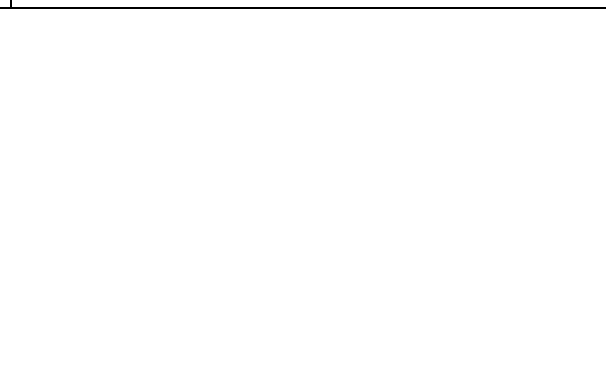
802.11ac (VHT20) mode



802.11ac (VHT40) mode

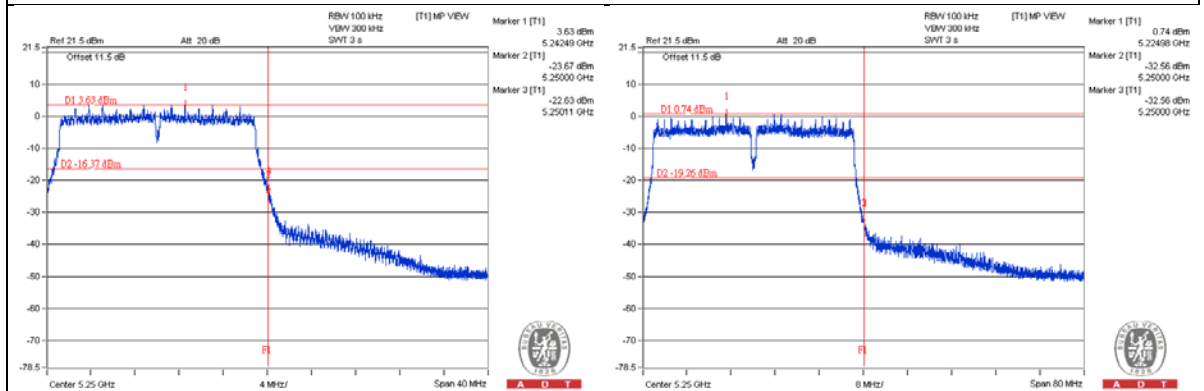


802.11ac (VHT80) mode



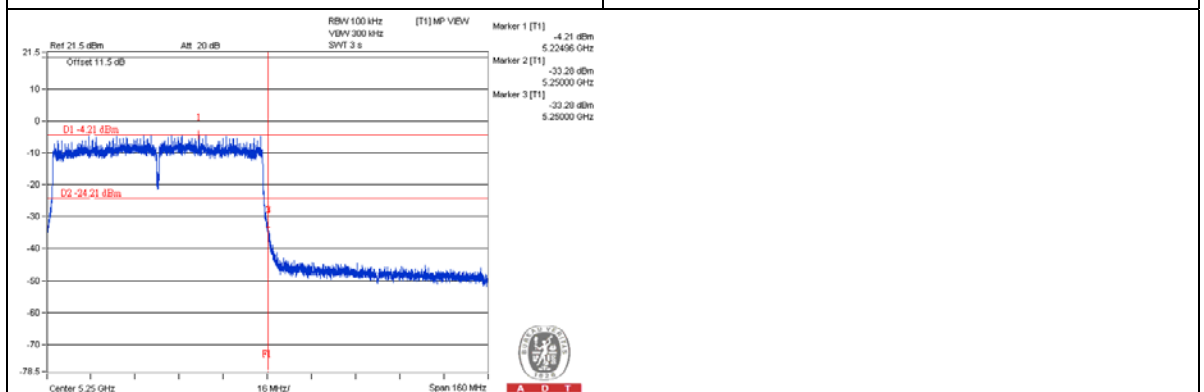
Beamforming Mode

1) Test results demonstrating last channel (20dB BW) shall not exceed the band edge on 5150~5250MHz.



802.11ac (VHT20) mode

802.11ac (VHT40) mode



802.11ac (VHT80) mode

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