FCC Test Report

Report No.:	RF160322E08-1
FCC ID:	2ABTEG2100
Test Model:	Fios-G2100
Received Date:	Mar. 22, 2016
Test Date:	Apr. 23 to July 06, 2016
Issued Date:	Aug. 16, 2016
Applicant:	Verizon Online LLC
Address:	1300 I Street NW, Room 400W, Washington, District of Columbia, 20005 United State
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF160322E08-1	Original release.	Aug. 16, 2016

1 Certificate of Conformity

Product:	Fios-G2100
Brand:	Verizon
Test Model:	Fios-G2100
Sample Status:	R&D SAMPLE
Applicant:	Verizon Online LLC
Test Date:	Apr. 23 to July 06, 2016
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:** Aug. 16, 2016

Claire Kuan / Specialist

Approved by : _____ , **Date:** Aug. 16, 2016

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 -11.16dB at 24.00000MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5150.00MHz and 5399.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	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(MHF) not a standard connector.

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

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	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.19 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.43 dB
	6GHz ~ 18GHz	3.49 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 (WLAN)

Product	Fios-G2100
Brand	Verizon
Test Model	Fios-G2100
Status of EUT	R&D SAMPLE
Power Supply Rating	DC 19V from Adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18 ~ 5.24GHz and 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 **5GHz:** 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** 985.723mW **5GHz:** **CDD Mode:** **5.18GHz ~ 5.24GHz:** 813.01mW **5.745GHz ~ 5.825GHz:** 675.244mW **SDM Mode:** **5.18GHz ~ 5.24GHz:** 813.01mW **5.745GHz ~ 5.825GHz:** 675.244Mw **Beamforming Mode:** **5.18GHz ~ 5.24GHz:** 813.01mW **5.745GHz ~ 5.825GHz:** 675.244mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Cable Supplied	NA

Note:

1. Simultaneously transmission condition.

Condition	Technology				
1	WLAN (2.4GHz)	WLAN (5GHz)	Zigbee	Z-wave	DECT 6.0
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.					

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

WLAN					
5GHz					
Antenna No.	Transmitter Circuit	Antenna Gain(dBi)	Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type
1	Chain (0)	4.37	5150~5250	PCB	i-pex(MHF)
		4.92	5250~5350		
		4.23	5470~5725		
		4.23	5725~5850		
2	Chain (1)	4.13	5150~5250	PCB	i-pex(MHF)
		4.06	5250~5350		
		4.03	5470~5725		
		4.03	5725~5850		
3	Chain (2)	3.01	5150~5250	PCB	i-pex(MHF)
		3.72	5250~5350		
		4.79	5470~5725		
		4.71	5725~5850		
4	Chain (3)	3.87	5150~5250	PCB	i-pex(MHF)
		4.26	5250~5350		
		4.61	5470~5725		
		4.3	5725~5850		
2.4GHz					
Antenna No.	Transmitter Circuit	Antenna Gain(dBi)	Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type
5	Chain (0)	3.9	2400~2483.5	PCB	i-pex(MHF)
6	Chain (1)	5.1			
7	Chain (2)	3.95			
8	Chain (3)	3.51			
DECT					
Antenna No.	Antenna Gain(dBi)		Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type
9	5.46		1920~1930	Embedded	NA
10	5.46		1920~1930	Embedded	NA
Z-wave					
Antenna No.	Antenna Gain(dBi)		Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type
11	1.02		908~916	On Board Printed	NA
Zigbee					
Antenna No.	Antenna Gain(dBi)		Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type
12	4.23		2400~2483.5	On Board Printed	NA
Note 1. For WLAN 2.4GHz will fix transmission on Chain (0), Chain (1) and Chain (2).					

3. The EUT must be supplied with a adapter as following table:

Brand	Model No.	Spec.	Remark
Verizon	ADP-57AR A	Input: 105-125Vac, 1.5A, 60Hz AC input cable: Unshielded, 3ft Output: 19Vdc, 3.0A DC output cable: Unshielded, 1.8m	DELTA

4. The EUT incorporates a MIMO function.

2.4GHz			
Modulation Mode	Data Rate (MCS)	TX & RX Configuration	
802.11b	1 ~ 11Mbps	3TX	4RX
802.11g	6 ~ 54Mbps	3TX	4RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	3TX	4RX
	MCS 8~15	3TX	4RX
	MCS 16~23	3TX	4RX
VHT20	MCS0~8 Nss=1	3TX	4RX
	MCS0~8 Nss=2	3TX	4RX
	MCS0~9 Nss=3	3TX	4RX
VHT40	MCS0~9 Nss=1	3TX	4RX
	MCS0~9 Nss=2	3TX	4RX
	MCS0~9 Nss=3	3TX	4RX
5GHz			
Modulation Mode	Data Rate (MCS)	TX & RX Configuration	
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS0~8 Nss=1	4TX	4RX
	MCS0~8 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~8 Nss=4	4TX	4RX
802.11ac (VHT40) & 802.11ac (VHT80)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX
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 802.11 b/g 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 802.11n (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 802.11n (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≥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

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)
802.11ac (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
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3
SDM 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	OFDM	BPSK	26
802.11ac (VHT40)		38 to 46	38	OFDM	BPSK	54
802.11ac (VHT80)		42	42	OFDM	BPSK	117

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)
802.11ac (VHT20)	5180-5240	36 to 48	48	OFDM	BPSK	6.5
	5745-5825	149 to 165				

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)
802.11ac (VHT20)	5180-5240	36 to 48	48	OFDM	BPSK	6.5
	5745-5825	149 to 165				

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.

Max Average Transmit Power						
CDD 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
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3
SDM 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	26
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	54
802.11ac (VHT80)		42	42	OFDM	BPSK	117
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	26
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	54
802.11ac (VHT80)		155	155	OFDM	BPSK	117
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
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Peak Power Spectral Density						
CDD 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
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3
SDM 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	26
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	54
802.11ac (VHT80)		42	42	OFDM	BPSK	117
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	26
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	54
802.11ac (VHT80)		155	155	OFDM	BPSK	117
6dB bandwidth						
SDM Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

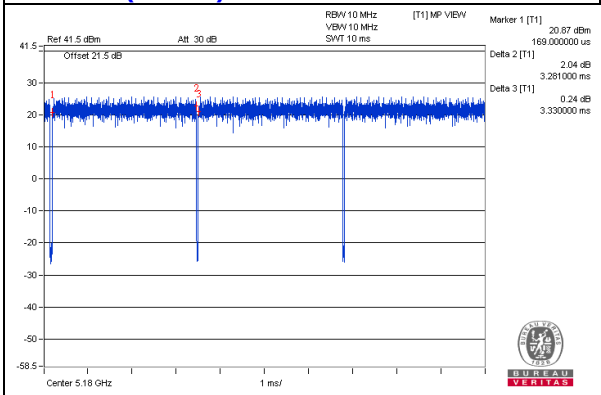
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	20deg. C, 70%RH	120Vac, 60Hz	Russell Yeh
RE<1G	20deg. C, 70%RH	120Vac, 60Hz	Russell Yeh
PLC	24deg. C, 62%RH	120Vac, 60Hz	Jyunchun Lin
APCM	18deg. C, 64%RH	120Vac, 60Hz	Anderson Chen

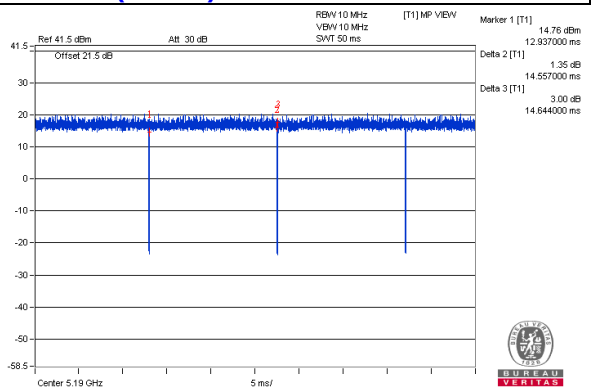
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11ac (VHT20): Duty cycle = 3.281 ms/3.33 ms = 0.985
802.11ac (VHT40): Duty cycle = 14.557 ms/14.644 ms = 0.994
802.11ac (VHT80): Duty cycle = 6.705 ms/6.793 ms = 0.987

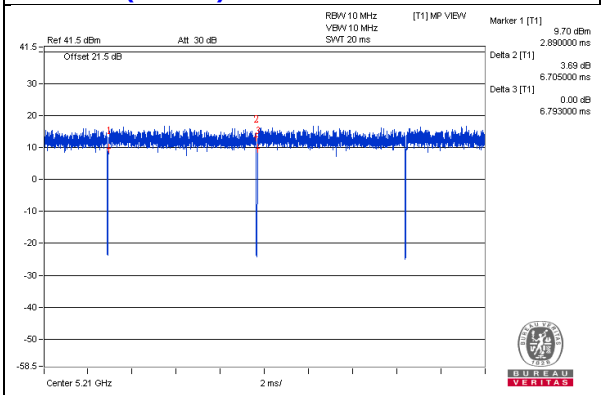
802.11ac (VHT20)



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.

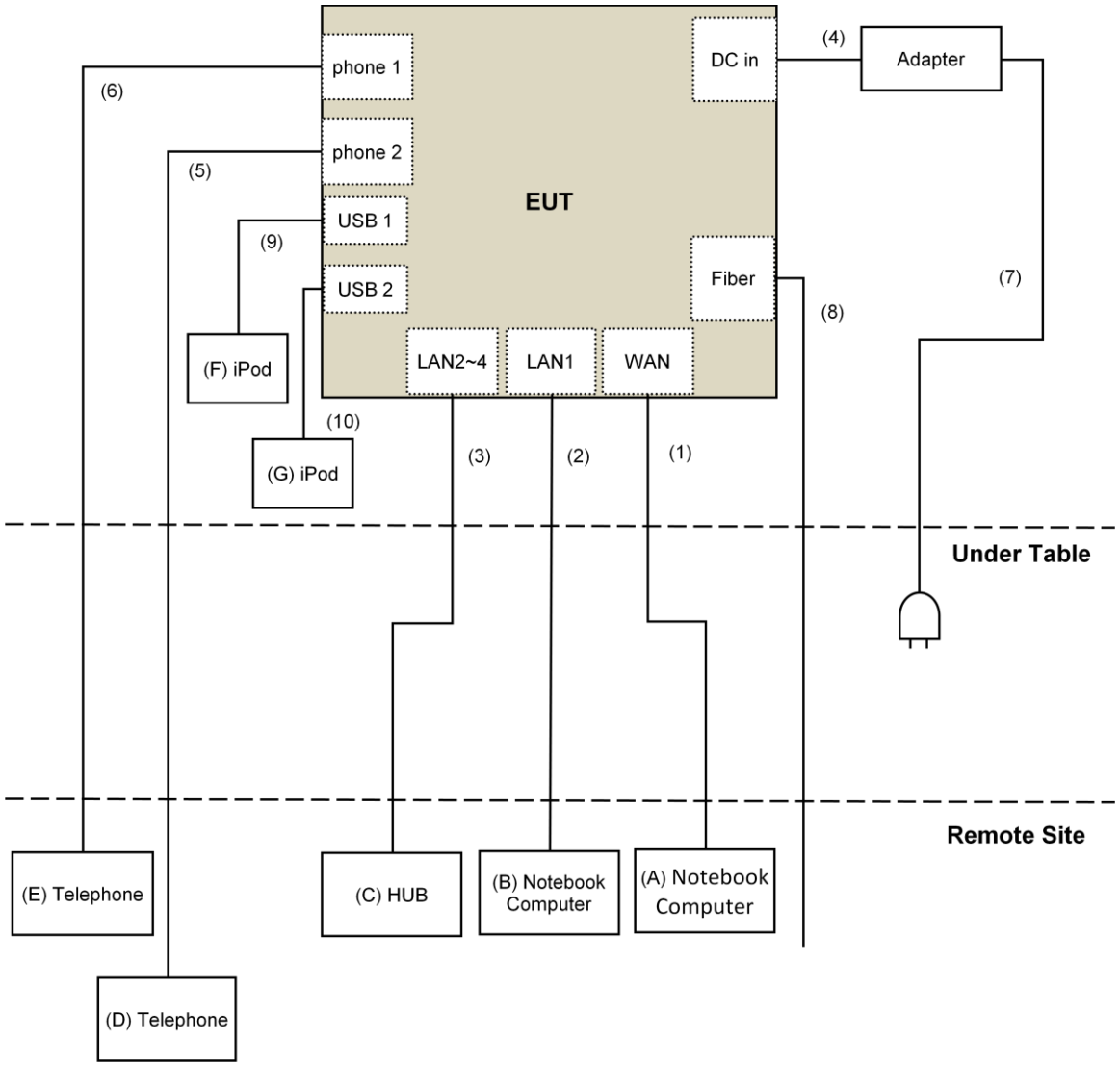
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook Computer	DELL	E5430	4YV4VY1	FCC DoC	Provided by Lab
B.	Notebook Computer	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
C.	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab
D.	Telephone	DAISHO	DS-03	NA	NA	Provided by Lab
E.	Telephone	ROMEO	TE-812	97280903	NA	Provided by Lab
F.	iPod	Apple	MC749TA/A	CC4DMFJUDFDM	NA	Provided by Lab
G.	iPod	Apple	MC749TA/A	CC4DN25WDFDM	NA	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.	RJ-45	1	10	No	0	Provided by Lab
2.	RJ-45	1	10	No	0	Provided by Lab
3.	RJ-45	3	10	No	0	Provided by Lab
4.	DC	1	1.8	No	0	Supplied by client
5.	RJ-11	1	10	No	0	Provided by Lab
6.	RJ-11	1	10	No	0	Provided by Lab
7.	AC	1	3ft	No	0	Provided by Lab
8.	Fiber	1	10	No	0	Provided by Lab
9.	USB	1	0.1	Yes	0	Provided by Lab
10.	USB	1	0.1	Yes	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r02
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedure New Rules v01r02</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK:74 (dBμV/m)</td><td>AV:54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK:-27 (dBm/MHz)</td><td rowspan="3">PK:68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK:-27 (dBm/MHz) *1
PK:10 (dBm/MHz) *2
PK:15.6 (dBm/MHz) *3
PK:27 (dBm/MHz) *4</td><td>PK: 68.2(dBμV/m) *1
PK:105.2 (dBμV/m) *2
PK: 110.8(dBμV/m) *3
PK:122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

Note:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

For Radiated Out of Band Emisison (OOBE) Measurement (For U-NII-3 band):

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY54450088	July 24, 2015	July 23, 2016
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 02, 2016	Apr. 01, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 19, 2015	Sep. 18, 2016
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150318 150323 150324	Mar. 30, 2016	Mar. 29, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Loop antenna was used for all emissions below 30 MHz.
4. The test was performed in 966 Chamber No. 4.
5. The FCC Site Registration No. is 292998
6. The CANADA Site Registration No. is 20331-2
7. Tested Date:Apr. 23, 2016

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY54450088	July 24, 2015	July 23, 2016
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 02, 2016	Apr. 01, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 19, 2015	Sep. 18, 2016
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150318 150323 150324	Mar. 30, 2016	Mar. 29, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSP40	100060	May 11, 2016	May 10, 2017
Power meter Anritsu	ML2495A	1014008	May 05, 2016	May 04, 2017
Power sensor Anritsu	MA2411B	0917122	May 05, 2016	May 04, 2017
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 15, 2016	Jan. 14, 2017
Digital Multimeter FLUKE	87III	73680266	Nov. 10, 2015	Nov. 09, 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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Loop antenna was used for all emissions below 30 MHz.
4. The test was performed in 966 Chamber No. 4.
5. The FCC Site Registration No. is 292998
6. The CANADA Site Registration No. is 20331-2
7. Tested Date: June 02 to July 06, 2016

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:

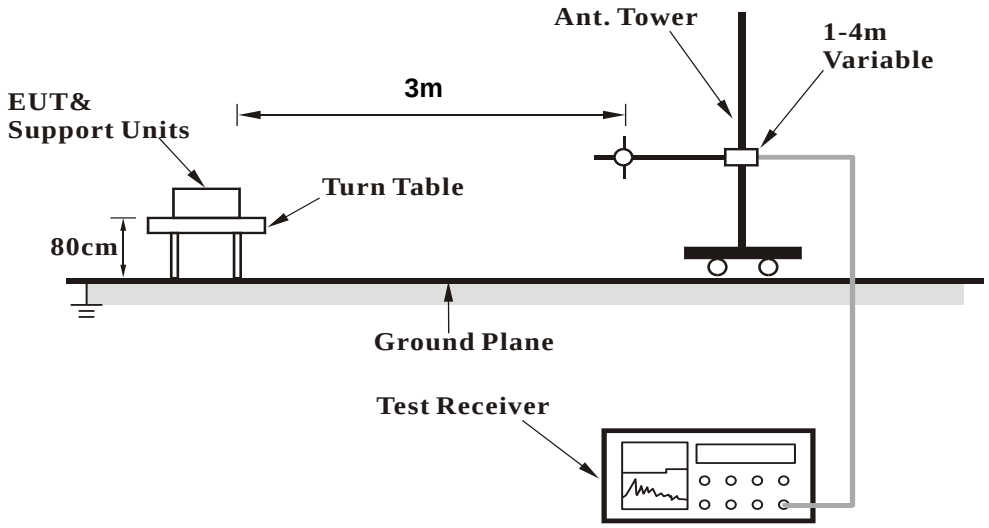
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 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

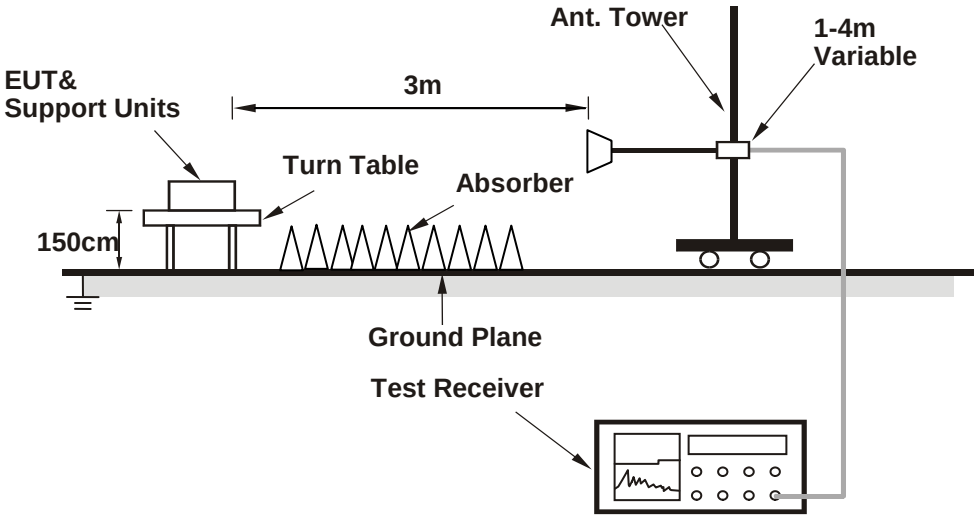
No deviation.

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

1. Connect the EUT with the Notebook Computer which is placed on remote site.
2. Controlling software (Telnet paste 5G.txt command) has been activated to set the EUT on specific status.

4.1.7 Test Results

CDD Mode

Above 1GHz Data:

802.11ac (VHT20)

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	65.2 PK	74.0	-8.8	1.50 H	60	63.6	1.6
2	5150.00	50.0 AV	54.0	-4.0	1.50 H	60	48.4	1.6
3	*5180.00	115.1 PK			1.50 H	60	113.4	1.7
4	*5180.00	105.3 AV			1.50 H	60	103.6	1.7
5	#6906.67	60.5 PK	68.2	-7.7	1.64 H	120	53.7	6.8
6	#10360.00	60.7 PK	74.0	-13.3	1.70 H	184	49.0	11.7
7	#10360.00	47.1 AV	54.0	-6.9	1.70 H	184	35.4	11.7
8	15540.00	58.3 PK	74.0	-15.7	1.58 H	360	45.0	13.3
9	15540.00	43.6 AV	54.0	-10.4	1.58 H	360	30.3	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	68.4 PK	74.0	-5.6	2.12 V	309	66.8	1.6
2	5150.00	53.1 AV	54.0	-0.9	2.12 V	309	51.5	1.6
3	*5180.00	118.6 PK			2.12 V	309	116.9	1.7
4	*5180.00	108.4 AV			2.12 V	309	106.7	1.7
5	#6906.67	61.4 PK	68.2	-6.8	1.41 V	244	54.6	6.8
6	#10360.00	59.4 PK	74.0	-14.6	1.85 V	271	47.7	11.7
7	#10360.00	45.5 AV	54.0	-8.5	1.85 V	271	33.8	11.7
8	15540.00	61.0 PK	74.0	-13.0	1.98 V	294	47.7	13.3
9	15540.00	44.2 AV	54.0	-9.8	1.98 V	294	30.9	13.3

REMARKS:

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

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	5150.00	63.1 PK	74.0	-10.9	1.50 H	156	61.5	1.6
2	5150.00	50.5 AV	54.0	-3.5	1.50 H	156	48.9	1.6
3	*5200.00	121.1 PK			1.50 H	156	119.3	1.8
4	*5200.00	110.5 AV			1.50 H	156	108.7	1.8
5	5360.00	62.1 PK	74.0	-11.9	1.50 H	156	59.9	2.2
6	5360.00	49.8 AV	54.0	-4.2	1.50 H	156	47.6	2.2
7	#6933.33	64.6 PK	68.2	-3.6	1.45 H	357	57.8	6.8
8	#10400.00	61.0 PK	74.0	-13.0	1.66 H	188	49.1	11.9
9	#10400.00	47.4 AV	54.0	-6.6	1.66 H	188	35.5	11.9
10	15600.00	58.8 PK	74.0	-15.2	1.50 H	360	45.5	13.3
11	15600.00	44.0 AV	54.0	-10.0	1.50 H	360	30.7	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.0 PK	74.0	-7.0	1.74 V	120	65.4	1.6
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.74 V**	**120**	**52.3**	**1.6**
3	*5200.00	123.9 PK			1.74 V	120	122.1	1.8
4	*5200.00	113.3 AV			1.74 V	120	111.5	1.8
5	5360.00	65.1 PK	74.0	-8.9	1.74 V	120	62.9	2.2
6	5360.00	52.5 AV	54.0	-1.5	1.74 V	120	50.3	2.2
7	#6933.33	64.8 PK	68.2	-3.4	1.65 V	66	58.0	6.8
8	#10400.00	60.6 PK	74.0	-13.4	1.83 V	269	48.7	11.9
9	#10400.00	46.7 AV	54.0	-7.3	1.83 V	269	34.8	11.9
10	15600.00	61.5 PK	74.0	-12.5	2.02 V	292	48.2	13.3
11	15600.00	44.8 AV	54.0	-9.2	2.02 V	292	31.5	13.3

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	117.4 PK			1.42 H	185	115.6	1.8
2	*5240.00	108.6 AV			1.42 H	185	106.8	1.8
3	5399.00	57.1 PK	74.0	-16.9	1.42 H	185	54.9	2.2
4	5399.00	45.5 AV	54.0	-8.5	1.42 H	185	43.3	2.2
5	#6986.67	56.6 PK	68.2	-11.6	1.46 H	190	49.6	7.0
6	#10480.00	61.5 PK	74.0	-12.5	1.67 H	179	49.3	12.2
7	#10480.00	47.8 AV	54.0	-6.2	1.67 H	179	35.6	12.2
8	15720.00	59.3 PK	74.0	-14.7	1.53 H	355	46.1	13.2
9	15720.00	44.6 AV	54.0	-9.4	1.53 H	355	31.4	13.2
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	122.6 PK			1.78 V	113	120.8	1.8
2	*5240.00	113.5 AV			1.78 V	113	111.7	1.8
3	5399.00	64.3 PK	74.0	-9.7	1.78 V	113	62.1	2.2
4	**5399.00**	**53.9 AV**	**54.0**	**-0.1**	**1.78 V**	**113**	**51.7**	**2.2**
5	#6986.67	62.7 PK	68.2	-5.5	1.36 V	158	55.7	7.0
6	#10480.00	61.5 PK	74.0	-12.5	1.86 V	271	49.3	12.2
7	#10480.00	47.6 AV	54.0	-6.4	1.86 V	271	35.4	12.2
8	15720.00	62.4 PK	74.0	-11.6	1.94 V	299	49.2	13.2
9	15720.00	45.6 AV	54.0	-8.4	1.94 V	299	32.4	13.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	#5641.20	58.3 PK	68.2	-9.9	2.38 H	158	55.7	2.6
2	*5745.00	118.9 PK			2.38 H	158	116.1	2.8
3	*5745.00	108.1 AV			2.38 H	158	105.3	2.8
4	#5992.70	58.4 PK	68.2	-9.8	2.38 H	158	55.0	3.4
5	7660.00	57.0 PK	74.0	-17.0	1.73 H	119	48.6	8.4
6	7660.00	44.9 AV	54.0	-9.1	1.73 H	119	36.5	8.4
7	11490.00	62.0 PK	74.0	-12.0	1.73 H	192	48.5	13.5
8	11490.00	48.9 AV	54.0	-5.1	1.73 H	192	35.4	13.5
9	#17235.00	59.8 PK	74.0	-14.2	1.58 H	349	41.4	18.4
10	#17235.00	45.1 AV	54.0	-8.9	1.58 H	349	26.7	18.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5591.80	59.5 PK	68.2	-8.7	1.62 V	300	57.0	2.5
2	*5745.00	119.2 PK			1.62 V	300	116.4	2.8
3	*5745.00	108.6 AV			1.62 V	300	105.8	2.8
4	#5979.40	59.6 PK	68.2	-8.6	1.62 V	300	56.3	3.3
5	7660.00	57.9 PK	74.0	-16.1	1.56 V	88	49.5	8.4
6	7660.00	45.6 AV	54.0	-8.4	1.56 V	88	37.2	8.4
7	11490.00	62.1 PK	74.0	-11.9	1.70 V	270	48.6	13.5
8	11490.00	47.7 AV	54.0	-6.3	1.70 V	270	34.2	13.5
9	#17235.00	60.7 PK	74.0	-13.3	1.92 V	302	42.3	18.4
10	#17235.00	45.6 AV	54.0	-8.4	1.92 V	302	27.2	18.4

REMARKS:

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

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

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	#5637.40	57.5 PK	68.2	-10.7	2.44 H	145	54.9	2.6
2	*5785.00	117.6 PK			2.44 H	145	114.7	2.9
3	*5785.00	107.4 AV			2.44 H	145	104.5	2.9
4	#5995.55	57.0 PK	68.2	-11.2	2.44 H	145	53.6	3.4
5	7713.33	56.6 PK	74.0	-17.4	1.74 H	127	48.2	8.4
6	7713.33	44.7 AV	54.0	-9.3	1.74 H	127	36.3	8.4
7	11570.00	62.8 PK	74.0	-11.2	1.55 H	183	49.6	13.2
8	11570.00	48.7 AV	54.0	-5.3	1.55 H	183	35.5	13.2
9	#17355.00	60.4 PK	74.0	-13.6	1.62 H	358	41.3	19.1
10	#17355.00	46.2 AV	54.0	-7.8	1.62 H	358	27.1	19.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5622.20	58.3 PK	68.2	-9.9	1.61 V	302	55.7	2.6
2	*5785.00	119.2 PK			1.61 V	302	116.3	2.9
3	*5785.00	108.3 AV			1.61 V	302	105.4	2.9
4	#5940.93	60.2 PK	68.2	-8.0	1.61 V	302	57.1	3.1
5	7713.33	57.5 PK	74.0	-16.5	1.58 V	101	49.1	8.4
6	7713.33	45.3 AV	54.0	-8.7	1.58 V	101	36.9	8.4
7	11570.00	61.9 PK	74.0	-12.1	1.49 V	276	48.7	13.2
8	11570.00	47.5 AV	54.0	-6.5	1.49 V	276	34.3	13.2
9	#17355.00	60.4 PK	74.0	-13.6	1.91 V	296	41.3	19.1
10	#17355.00	45.3 AV	54.0	-8.7	1.91 V	296	26.2	19.1

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5628.37	56.8 PK	68.2	-11.4	2.35 H	146	54.2	2.6
2	*5825.00	117.0 PK			2.35 H	146	114.1	2.9
3	*5825.00	106.9 AV			2.35 H	146	104.0	2.9
4	#5935.70	58.0 PK	68.2	-10.2	2.35 H	146	54.9	3.1
5	#7766.67	56.9 PK	74.0	-17.1	1.79 H	115	48.5	8.4
6	#7766.67	45.1 AV	54.0	-8.9	1.79 H	115	36.7	8.4
7	11650.00	63.3 PK	74.0	-10.7	1.58 H	182	50.1	13.2
8	11650.00	49.2 AV	54.0	-4.8	1.58 H	182	36.0	13.2
9	#17475.00	60.8 PK	74.0	-13.2	1.59 H	355	41.4	19.4
10	#17475.00	46.5 AV	54.0	-7.5	1.59 H	355	27.1	19.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5592.27	58.1 PK	68.2	-10.1	1.58 V	300	55.6	2.5
2	*5825.00	118.2 PK			1.58 V	300	115.3	2.9
3	*5825.00	108.5 AV			1.58 V	300	105.6	2.9
4	#6000.30	59.3 PK	68.2	-8.9	1.58 V	300	55.9	3.4
5	#7766.67	57.5 PK	74.0	-16.5	1.53 V	99	49.1	8.4
6	#7766.67	45.1 AV	54.0	-8.9	1.53 V	99	36.7	8.4
7	11650.00	62.7 PK	74.0	-11.3	1.51 V	280	49.5	13.2
8	11650.00	48.3 AV	54.0	-5.7	1.51 V	280	35.1	13.2
9	#17475.00	60.8 PK	74.0	-13.2	1.82 V	291	41.4	19.4
10	#17475.00	45.9 AV	54.0	-8.1	1.82 V	291	26.5	19.4

REMARKS:

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

802.11ac (VHT40)

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

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	63.7 PK	74.0	-10.3	2.39 H	143	62.1	1.6
2	5150.00	52.8 AV	54.0	-1.2	2.39 H	143	51.2	1.6
3	*5190.00	110.3 PK			2.39 H	143	108.5	1.8
4	*5190.00	100.1 AV			2.39 H	143	98.3	1.8
5	5350.00	54.7 PK	74.0	-19.3	2.39 H	143	52.6	2.1
6	5350.00	42.8 AV	54.0	-11.2	2.39 H	143	40.7	2.1
7	#6920.00	57.2 PK	68.2	-11.0	2.28 H	121	50.3	6.9
8	#10380.00	53.8 PK	74.0	-20.2	1.53 H	178	42.0	11.8
9	#10380.00	40.0 AV	54.0	-14.0	1.53 H	178	28.2	11.8
10	15570.00	52.7 PK	74.0	-21.3	1.60 H	360	39.4	13.3
11	15570.00	41.1 AV	54.0	-12.9	1.60 H	360	27.8	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.2 PK	74.0	-9.8	2.12 V	295	62.6	1.6
2	5150.00	53.2 AV	54.0	-0.8	2.12 V	295	51.6	1.6
3	*5190.00	113.4 PK			2.12 V	295	111.6	1.8
4	*5190.00	103.5 AV			2.12 V	295	101.7	1.8
5	5350.00	55.4 PK	74.0	-18.6	2.12 V	295	53.3	2.1
6	5350.00	43.5 AV	54.0	-10.5	2.12 V	295	41.4	2.1
7	#6920.00	61.0 PK	68.2	-7.2	1.57 V	234	54.1	6.9
8	#10380.00	52.7 PK	74.0	-21.3	1.47 V	286	40.9	11.8
9	#10380.00	40.2 AV	54.0	-13.8	1.47 V	286	28.4	11.8
10	15570.00	52.9 PK	74.0	-21.1	1.80 V	301	39.6	13.3
11	15570.00	41.7 AV	54.0	-12.3	1.80 V	301	28.4	13.3

REMARKS:

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

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	5150.00	59.4 PK	74.0	-14.6	2.44 H	149	57.8	1.6
2	5150.00	46.2 AV	54.0	-7.8	2.44 H	149	44.6	1.6
3	*5230.00	115.4 PK			2.44 H	149	113.6	1.8
4	*5230.00	106.7 AV			2.44 H	149	104.9	1.8
5	5350.00	57.2 PK	74.0	-16.8	2.44 H	149	55.1	2.1
6	5350.00	45.6 AV	54.0	-8.4	2.44 H	149	43.5	2.1
7	#6973.33	57.5 PK	68.2	-10.7	2.37 H	155	50.5	7.0
8	#10460.00	53.8 PK	74.0	-20.2	1.88 H	199	41.7	12.1
9	#10460.00	40.2 AV	54.0	-13.8	1.88 H	199	28.1	12.1
10	15690.00	54.5 PK	74.0	-19.5	1.62 H	360	41.3	13.2
11	15690.00	43.1 AV	54.0	-10.9	1.62 H	360	29.9	13.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.9 PK	74.0	-9.1	1.87 V	114	63.3	1.6
2	5150.00	52.8 AV	54.0	-1.2	1.87 V	114	51.2	1.6
3	*5230.00	121.7 PK			1.87 V	113	119.9	1.8
4	*5230.00	111.1 AV			1.87 V	113	109.3	1.8
5	5350.00	64.5 PK	74.0	-9.5	1.87 V	114	62.4	2.1
6	5350.00	52.6 AV	54.0	-1.4	1.87 V	114	50.5	2.1
7	#6973.33	63.1 PK	68.2	-5.1	2.00 V	47	56.1	7.0
8	#10460.00	53.6 PK	74.0	-20.4	1.51 V	281	41.5	12.1
9	#10460.00	41.6 AV	54.0	-12.4	1.51 V	281	29.5	12.1
10	15690.00	54.5 PK	74.0	-19.5	1.92 V	298	41.3	13.2
11	15690.00	43.9 AV	54.0	-10.1	1.92 V	298	30.7	13.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5633.60	56.8 PK	68.2	-11.4	1.51 H	142	54.2	2.6
2	*5755.00	114.6 PK			1.51 H	142	111.7	2.9
3	*5755.00	103.4 AV			1.51 H	142	100.5	2.9
4	#5953.75	56.9 PK	68.2	-11.3	1.51 H	142	53.7	3.2
5	7673.33	56.3 PK	74.0	-17.7	1.64 H	133	47.9	8.4
6	7673.33	44.5 AV	54.0	-9.5	1.64 H	133	36.1	8.4
7	11510.00	53.7 PK	74.0	-20.3	1.96 H	201	40.2	13.5
8	11510.00	39.8 AV	54.0	-14.2	1.96 H	201	26.3	13.5
9	#17265.00	54.0 PK	74.0	-20.0	2.04 H	202	35.5	18.5
10	#17265.00	42.5 AV	54.0	-11.5	2.04 H	202	24.0	18.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5613.65	59.2 PK	68.2	-9.0	1.55 V	300	56.6	2.6
2	*5755.00	115.2 PK			1.55 V	300	112.3	2.9
3	*5755.00	105.8 AV			1.55 V	300	102.9	2.9
4	#5955.65	59.5 PK	68.2	-8.7	1.55 V	300	56.3	3.2
5	7673.33	56.9 PK	74.0	-17.1	1.54 V	103	48.5	8.4
6	7673.33	44.7 AV	54.0	-9.3	1.54 V	103	36.3	8.4
7	11510.00	53.3 PK	74.0	-20.7	1.96 V	279	39.8	13.5
8	11510.00	41.6 AV	54.0	-12.4	1.96 V	279	28.1	13.5
9	#17265.00	53.9 PK	74.0	-20.1	1.98 V	266	35.4	18.5
10	#17265.00	43.2 AV	54.0	-10.8	1.98 V	266	24.7	18.5

REMARKS:

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

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5605.57	56.6 PK	68.2	-11.6	1.51 H	144	54.0	2.6
2	*5795.00	114.7 PK			1.51 H	144	111.8	2.9
3	*5795.00	103.5 AV			1.51 H	144	100.6	2.9
4	#5930.95	58.0 PK	68.2	-10.2	1.51 H	144	54.9	3.1
5	7726.67	56.5 PK	74.0	-17.5	1.66 H	138	48.1	8.4
6	7726.67	44.8 AV	54.0	-9.2	1.66 H	138	36.4	8.4
7	11590.00	53.4 PK	74.0	-20.6	1.91 H	208	40.3	13.1
8	11590.00	40.2 AV	54.0	-13.8	1.91 H	208	27.1	13.1
9	#17385.00	54.6 PK	74.0	-19.4	2.08 H	201	35.3	19.3
10	#17385.00	42.8 AV	54.0	-11.2	2.08 H	201	23.5	19.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5626.95	57.7 PK	68.2	-10.5	1.57 V	301	55.1	2.6
2	*5795.00	115.3 PK			1.57 V	301	112.4	2.9
3	*5795.00	105.2 AV			1.57 V	301	102.3	2.9
4	#5935.70	59.8 PK	68.2	-8.4	1.57 V	301	56.7	3.1
5	7726.67	57.3 PK	74.0	-16.7	1.56 V	100	48.9	8.4
6	7726.67	45.2 AV	54.0	-8.8	1.56 V	100	36.8	8.4
7	11590.00	54.3 PK	74.0	-19.7	1.97 V	273	41.2	13.1
8	11590.00	42.2 AV	54.0	-11.8	1.97 V	273	29.1	13.1
9	#17385.00	54.2 PK	74.0	-19.8	2.05 V	262	34.9	19.3
10	#17385.00	43.6 AV	54.0	-10.4	2.05 V	262	24.3	19.3

REMARKS:

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

802.11ac (VHT80)

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

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	64.7 PK	74.0	-9.3	2.00 H	192	63.1	1.6
2	5150.00	50.5 AV	54.0	-3.5	2.00 H	192	48.9	1.6
3	*5210.00	106.9 PK			2.00 H	192	105.1	1.8
4	*5210.00	95.1 AV			2.00 H	192	93.3	1.8
5	5350.00	54.2 PK	74.0	-19.8	2.00 H	192	52.1	2.1
6	5350.00	42.1 AV	54.0	-11.9	2.00 H	192	40.0	2.1
7	#6946.67	56.9 PK	68.2	-11.3	1.74 H	139	50.0	6.9
8	#10420.00	53.1 PK	74.0	-20.9	1.88 H	211	41.1	12.0
9	#10420.00	40.0 AV	54.0	-14.0	1.88 H	211	28.0	12.0
10	15630.00	53.6 PK	74.0	-20.4	2.15 H	205	40.3	13.3
11	15630.00	40.3 AV	54.0	-13.7	2.15 H	205	27.0	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.9 PK	74.0	-6.1	2.09 V	299	66.3	1.6
2	5150.00	53.7 AV	54.0	-0.3	2.09 V	299	52.1	1.6
3	*5210.00	110.1 PK			2.09 V	299	108.3	1.8
4	*5210.00	98.3 AV			2.09 V	299	96.5	1.8
5	5350.00	55.9 PK	74.0	-18.1	2.09 V	299	53.8	2.1
6	5350.00	44.3 AV	54.0	-9.7	2.09 V	299	42.2	2.1
7	#6946.67	58.8 PK	68.2	-9.4	1.50 V	278	51.9	6.9
8	#10420.00	50.7 PK	74.0	-23.3	1.94 V	273	38.7	12.0
9	#10420.00	39.8 AV	54.0	-14.2	1.94 V	273	27.8	12.0
10	15630.00	52.4 PK	74.0	-21.6	2.00 V	262	39.1	13.3
11	15630.00	40.5 AV	54.0	-13.5	2.00 V	262	27.2	13.3

REMARKS:

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

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5626.48	60.7 PK	68.2	-7.5	2.60 H	162	58.1	2.6
2	*5775.00	110.5 PK			2.60 H	162	107.6	2.9
3	*5775.00	97.5 AV			2.60 H	162	94.6	2.9
4	#5940.45	57.6 PK	68.2	-10.6	2.60 H	162	54.5	3.1
5	7700.00	56.4 PK	74.0	-17.6	1.69 H	150	48.0	8.4
6	7700.00	44.9 AV	54.0	-9.1	1.69 H	150	36.5	8.4
7	11550.00	54.4 PK	74.0	-19.6	1.98 H	204	41.1	13.3
8	11550.00	42.5 AV	54.0	-11.5	1.98 H	204	29.2	13.3
9	#17325.00	53.2 PK	74.0	-20.8	2.05 H	199	34.3	18.9
10	#17325.00	40.1 AV	54.0	-13.9	2.05 H	199	21.2	18.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5627.90	60.9 PK	68.2	-7.3	1.47 V	302	58.3	2.6
2	*5775.00	112.5 PK			1.47 V	302	109.6	2.9
3	*5775.00	100.3 AV			1.47 V	302	97.4	2.9
4	#5936.18	61.0 PK	68.2	-7.2	1.47 V	302	57.9	3.1
5	7700.00	57.4 PK	74.0	-16.6	1.51 V	94	49.0	8.4
6	7700.00	45.2 AV	54.0	-8.8	1.51 V	94	36.8	8.4
7	11550.00	52.7 PK	74.0	-21.3	1.94 V	284	39.4	13.3
8	11550.00	40.1 AV	54.0	-13.9	1.94 V	284	26.8	13.3
9	#17325.00	53.4 PK	74.0	-20.6	2.02 V	277	34.5	18.9
10	#17325.00	40.3 AV	54.0	-13.7	2.02 V	277	21.4	18.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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 WORST-CASE DATA

802.11ac (VHT20)

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	39.63	34.2 QP	40.0	-5.8	1.00 H	158	43.2	-9.0
2	250.00	41.7 QP	46.0	-4.3	1.00 H	108	51.7	-10.0
3	375.00	38.0 QP	46.0	-8.0	1.00 H	280	44.1	-6.1
4	500.01	34.4 QP	46.0	-11.6	1.00 H	218	37.1	-2.7
5	624.99	41.4 QP	46.0	-4.6	2.17 H	121	41.4	0.0
6	750.01	39.4 QP	46.0	-6.6	1.00 H	352	37.5	1.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	84.85	35.5 QP	40.0	-4.5	1.00 V	171	49.8	-14.3
2	108.86	33.4 QP	43.5	-10.1	1.00 V	31	44.9	-11.5
3	250.00	37.4 QP	46.0	-8.6	1.00 V	286	47.4	-10.0
4	375.00	38.4 QP	46.0	-7.6	1.00 V	298	44.5	-6.1
5	500.01	41.6 QP	46.0	-4.4	1.00 V	263	44.3	-2.7
6	625.00	43.7 QP	46.0	-2.3	1.00 V	199	43.7	0.0

REMARKS:

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

SDM Mode

ABOVE 1GHz DATA

802.11ac (VHT20)

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	65.2 PK	74.0	-8.8	1.51 H	72	63.6	1.6
2	5150.00	49.7 AV	54.0	-4.3	1.51 H	72	48.1	1.6
3	*5180.00	116.3 PK			1.51 H	72	114.6	1.7
4	*5180.00	106.0 AV			1.51 H	72	104.3	1.7
5	#10360.00	60.6 PK	74.0	-13.4	1.75 H	179	48.9	11.7
6	#10360.00	46.8 AV	54.0	-7.2	1.75 H	179	35.1	11.7
7	15540.00	58.5 PK	74.0	-15.5	1.57 H	360	45.2	13.3
8	15540.00	43.8 AV	54.0	-10.2	1.57 H	360	30.5	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	67.2 PK	74.0	-6.8	2.29 V	296	65.6	1.6
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**2.29 V**	**296**	**52.3**	**1.6**
3	*5180.00	119.5 PK			2.11 V	282	117.8	1.7
4	*5180.00	109.1 AV			2.11 V	282	107.4	1.7
5	#10360.00	59.6 PK	74.0	-14.4	1.87 V	281	47.9	11.7
6	#10360.00	45.6 AV	54.0	-8.4	1.87 V	281	33.9	11.7
7	15540.00	61.4 PK	74.0	-12.6	2.01 V	298	48.1	13.3
8	15540.00	44.3 AV	54.0	-9.7	2.01 V	298	31.0	13.3

REMARKS:

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

802.11ac (VHT40)

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

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	63.8 PK	74.0	-10.2	2.37 H	150	62.2	1.6
2	5150.00	53.0 AV	54.0	-1.0	2.37 H	150	51.4	1.6
3	*5190.00	111.2 PK			2.38 H	136	109.4	1.8
4	*5190.00	101.2 AV			2.38 H	136	99.4	1.8
5	5350.00	55.5 PK	74.0	-18.5	2.38 H	136	53.4	2.1
6	5350.00	43.3 AV	54.0	-10.7	2.38 H	136	41.2	2.1
7	#10380.00	53.9 PK	74.0	-20.1	1.49 H	190	42.1	11.8
8	#10380.00	40.4 AV	54.0	-13.6	1.49 H	190	28.6	11.8
9	15570.00	53.3 PK	74.0	-20.7	1.58 H	360	40.0	13.3
10	15570.00	41.5 AV	54.0	-12.5	1.58 H	360	28.2	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.1 PK	74.0	-6.9	2.10 V	287	65.5	1.6
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**2.10 V**	**287**	**52.3**	**1.6**
3	*5190.00	114.4 PK			2.10 V	287	112.6	1.8
4	*5190.00	104.6 AV			2.10 V	287	102.8	1.8
5	5350.00	57.9 PK	74.0	-16.1	2.10 V	287	55.8	2.1
6	5350.00	46.0 AV	54.0	-8.0	2.10 V	287	43.9	2.1
7	#10380.00	52.9 PK	74.0	-21.1	1.45 V	292	41.1	11.8
8	#10380.00	40.7 AV	54.0	-13.3	1.45 V	292	28.9	11.8
9	15570.00	53.4 PK	74.0	-20.6	1.74 V	287	40.1	13.3
10	15570.00	42.1 AV	54.0	-11.9	1.74 V	287	28.8	13.3

REMARKS:

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

802.11ac (VHT80)

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

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	64.4 PK	74.0	-9.6	1.95 H	205	62.8	1.6
2	5150.00	50.3 AV	54.0	-3.7	1.95 H	205	48.7	1.6
3	*5210.00	107.1 PK			2.01 H	179	105.3	1.8
4	*5210.00	97.2 AV			2.01 H	179	95.4	1.8
5	5350.00	54.3 PK	74.0	-19.7	1.99 H	193	52.2	2.1
6	5350.00	42.3 AV	54.0	-11.7	1.99 H	193	40.2	2.1
7	#6946.67	57.4 PK	68.2	-10.8	2.01 H	179	50.5	6.9
8	#10420.00	52.7 PK	74.0	-21.3	1.89 H	200	40.7	12.0
9	#10420.00	39.7 AV	54.0	-14.3	1.89 H	200	27.7	12.0
10	15630.00	53.3 PK	74.0	-20.7	2.19 H	212	40.0	13.3
11	15630.00	40.0 AV	54.0	-14.0	2.19 H	212	26.7	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.6 PK	74.0	-4.4	1.33 V	287	68.0	1.6
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.33 V**	**287**	**52.3**	**1.6**
3	*5210.00	110.3 PK			1.33 V	287	108.5	1.8
4	*5210.00	100.4 AV			1.33 V	287	98.6	1.8
5	5350.00	57.0 PK	74.0	-17.0	1.33 V	287	54.9	2.1
6	5350.00	46.8 AV	54.0	-7.2	1.33 V	287	44.7	2.1
7	#6946.67	58.8 PK	68.2	-9.4	1.50 V	278	51.9	6.9
8	#10420.00	51.0 PK	74.0	-23.0	1.94 V	260	39.0	12.0
9	#10420.00	40.0 AV	54.0	-14.0	1.94 V	260	28.0	12.0
10	15630.00	52.7 PK	74.0	-21.3	2.05 V	250	39.4	13.3
11	15630.00	40.6 AV	54.0	-13.4	2.05 V	250	27.3	13.3

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 23, 2015	Oct. 22, 2016
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 28, 2015	Oct. 27, 2016
RF Cable	5D-FB	COACAB-002	Mar. 04, 2016	Mar. 03, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	Jun. 20, 2016	Jun. 19, 2017
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. 1.
3. Tested Date: June 21, 2016

4.2.3 Test Procedure

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

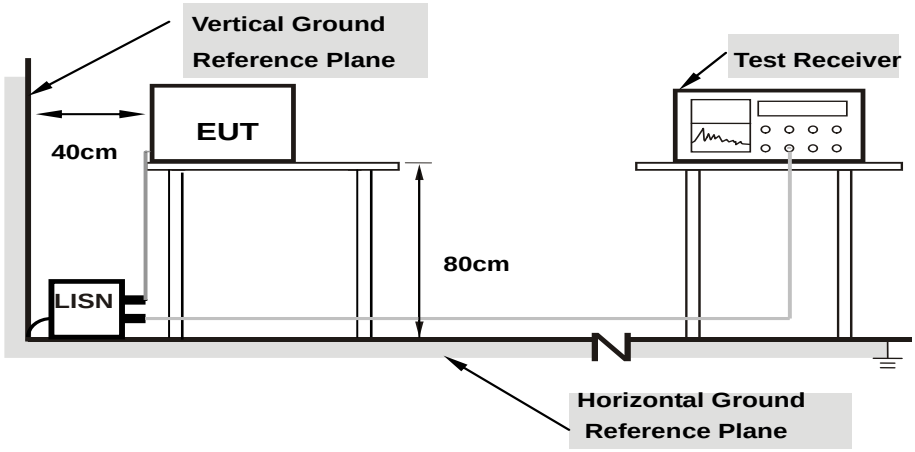
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

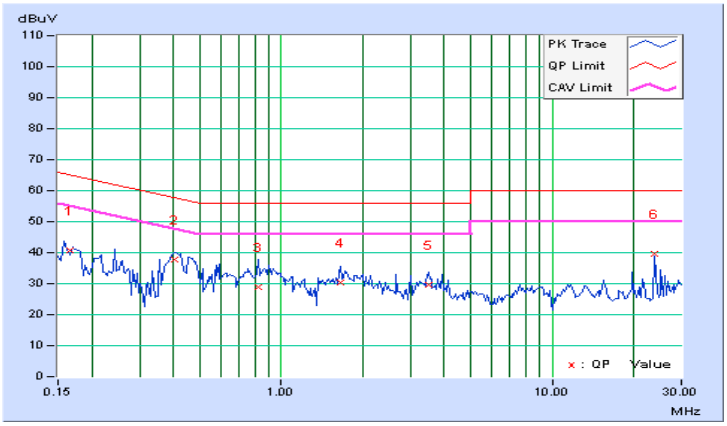
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16506	10.21	30.62	15.56	40.83	25.77	65.21	55.21	-24.37	-29.43
2	0.40391	10.22	27.57	15.03	37.79	25.25	57.77	47.77	-19.98	-22.52
3	0.82188	10.25	18.74	8.81	28.99	19.06	56.00	46.00	-27.01	-26.94
4	1.66406	10.29	20.24	13.74	30.53	24.03	56.00	46.00	-25.47	-21.97
5	3.50000	10.30	19.15	11.89	29.45	22.19	56.00	46.00	-26.55	-23.81
6	**24.00000**	**11.43**	**28.26**	**27.41**	**39.69**	**38.84**	**60.00**	**50.00**	**-20.31**	**-11.16**

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.

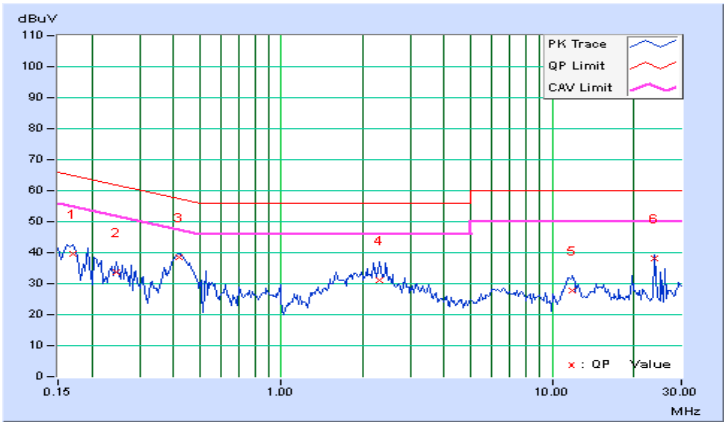


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	10.20	29.48	15.42	39.68	25.62	64.98	54.98	-25.31	-29.37
2	0.24766	10.21	23.53	15.32	33.74	25.53	61.84	51.84	-28.10	-26.31
3	0.41809	10.20	28.25	22.35	38.45	32.55	57.49	47.49	-19.03	-14.93
4	2.31250	10.28	20.66	14.73	30.94	25.01	56.00	46.00	-25.06	-20.99
5	11.93359	10.65	17.23	11.54	27.88	22.19	60.00	50.00	-32.12	-27.81
6	24.00000	11.13	26.98	26.50	38.11	37.63	60.00	50.00	-21.89	-12.37

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 Measurment

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 ≦ 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)

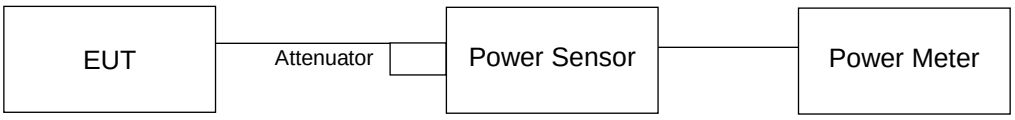
*B is the 26 dB emission bandwidth in megahertz

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

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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 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

CDD MODE

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	21.84	21.65	21.79	21.82	602.038	27.80	30.00	Pass
40	5200	22.42	22.74	22.69	23.39	766.567	28.85	30.00	Pass
48	5240	23.03	23.15	23.02	23.12	813.01	29.10	30.00	Pass
149	5745	22.34	22.21	21.93	22.59	675.244	28.29	30.00	Pass
157	5785	21.91	21.84	21.91	22.43	638.22	28.05	30.00	Pass
165	5825	21.65	21.95	21.89	22.71	644.056	28.09	30.00	Pass

Note: 1. The directional gain is 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	18.46	17.75	17.57	18.38	255.725	24.08	30.00	Pass
46	5230	22.22	22.85	22.79	23.34	765.359	28.84	30.00	Pass
151	5755	21.84	21.89	21.75	22.23	624.015	27.95	30.00	Pass
159	5795	21.84	22.02	21.96	22.22	635.739	28.03	30.00	Pass

Note: 1. The directional gain is 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	17.33	17.36	17.12	17.31	213.875	23.30	30.00	Pass
155	5775	21.71	21.80	21.76	22.36	621.763	27.94	30.00	Pass

Note: 1. The directional gain is 4.61dBi < 6dBi , so the power limit shall not be reduced.

SDM MODE

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	22.92	22.71	22.80	22.91	768.502	28.86	30.00	Pass
40	5200	22.42	22.74	22.69	23.39	766.567	28.85	30.00	Pass
48	5240	23.03	23.15	23.02	23.12	813.01	29.10	30.00	Pass
149	5745	22.34	22.21	21.93	22.59	675.244	28.29	30.00	Pass
157	5785	21.91	21.84	21.91	22.43	638.22	28.05	30.00	Pass
165	5825	21.65	21.95	21.89	22.71	644.056	28.09	30.00	Pass

Note: 1. The directional gain is 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	19.54	18.83	18.64	19.02	319.247	25.04	30.00	Pass
46	5230	22.22	22.85	22.79	23.34	765.359	28.84	30.00	Pass
151	5755	21.84	21.89	21.75	22.23	624.015	27.95	30.00	Pass
159	5795	21.84	22.02	21.96	22.22	635.739	28.03	30.00	Pass

Note: 1. The directional gain is 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	19.11	19.24	19.16	19.28	332.553	25.22	30.00	Pass
155	5775	21.71	21.80	21.76	22.36	621.763	27.94	30.00	Pass

Note: 1. The directional gain is 4.61dBi < 6dBi , so the power limit shall not be reduced.

Beamforming MODE

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	21.84	21.65	21.79	21.82	602.038	27.80	30.00	Pass
40	5200	22.42	22.74	22.69	23.39	766.567	28.85	30.00	Pass
48	5240	23.03	23.15	23.02	23.12	813.01	29.10	30.00	Pass
149	5745	22.34	22.21	21.93	22.59	675.244	28.29	30.00	Pass
157	5785	21.91	21.84	21.91	22.43	638.22	28.05	30.00	Pass
165	5825	21.65	21.95	21.89	22.71	644.056	28.09	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	18.46	17.75	17.57	18.38	255.725	24.08	30.00	Pass
46	5230	22.22	22.85	22.79	23.34	765.359	28.84	30.00	Pass
151	5755	21.84	21.89	21.75	22.23	624.015	27.95	30.00	Pass
159	5795	21.84	22.02	21.96	22.22	635.739	28.03	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

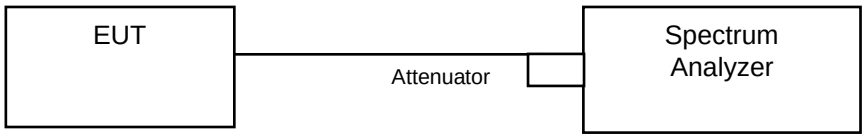
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	17.33	17.36	17.12	17.31	213.875	23.30	30.00	Pass
155	5775	21.71	21.80	21.76	22.36	621.763	27.94	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

SDM MODE

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
36	5180	18.00	18.12	18.36	18.24
40	5200	16.80	18.24	18.24	18.24
48	5240	16.92	18.24	18.12	18.12
149	5745	16.92	18.12	18.12	18.00
157	5785	16.92	18.12	18.12	18.12
165	5825	16.92	18.24	18.00	18.00

802.11ac (VHT40)

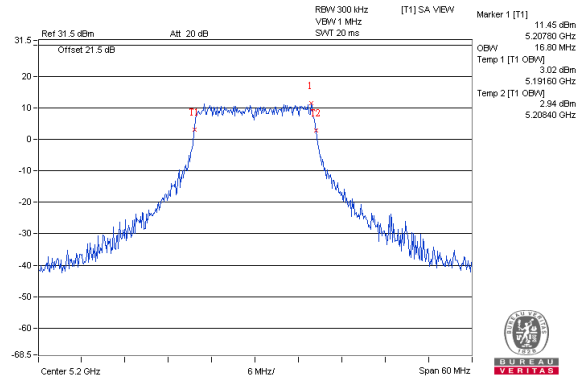
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
38	5190	36.72	36.96	36.72	36.96
46	5230	36.72	36.72	36.72	36.96
151	5755	36.72	36.96	36.96	36.72
159	5795	36.96	36.96	38.00	36.96

802.11ac (VHT80)

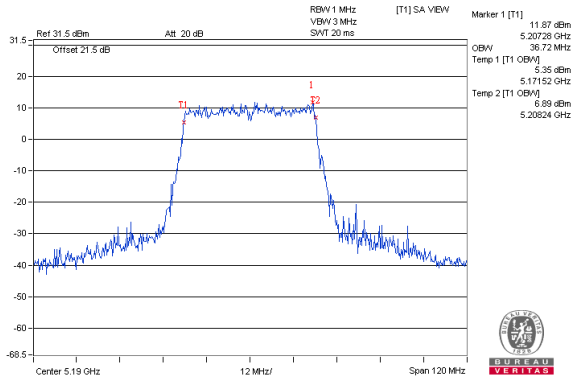
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
42	5210	75.36	75.84	75.36	75.36
155	5775	75.36	75.36	75.36	75.36

Spectrum Plot of Worst Value

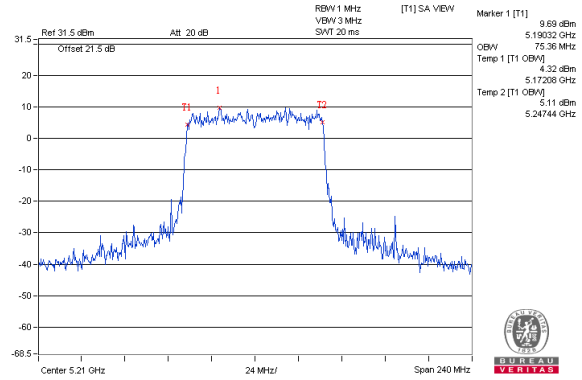
802.11ac (VHT20)_Chain0 / CH40

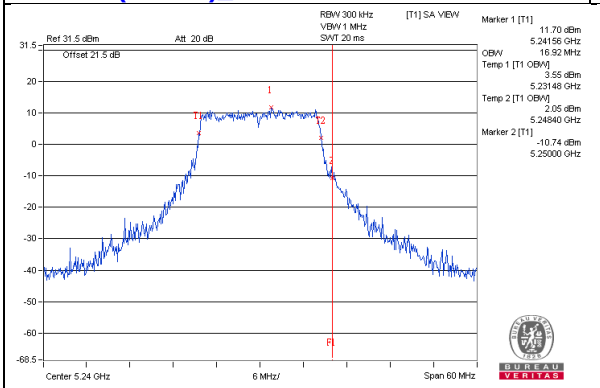
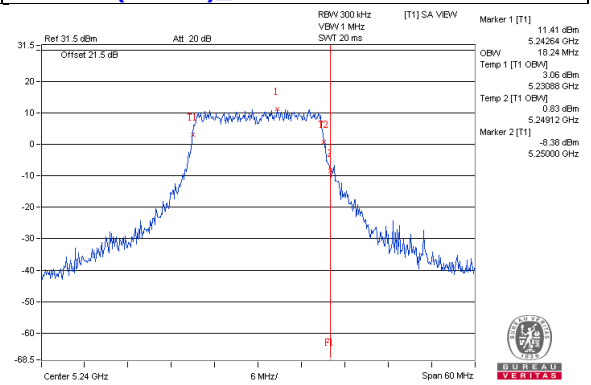
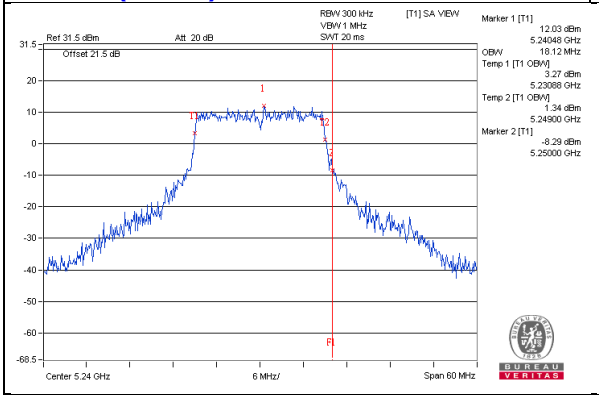
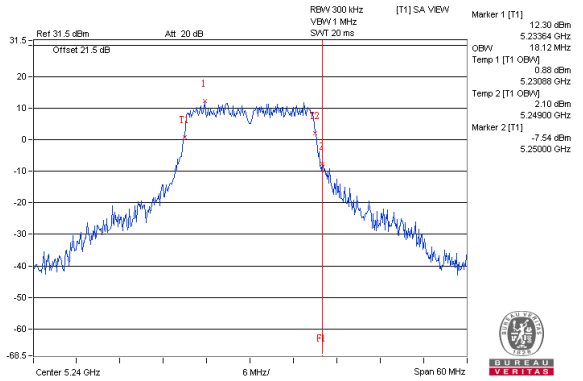


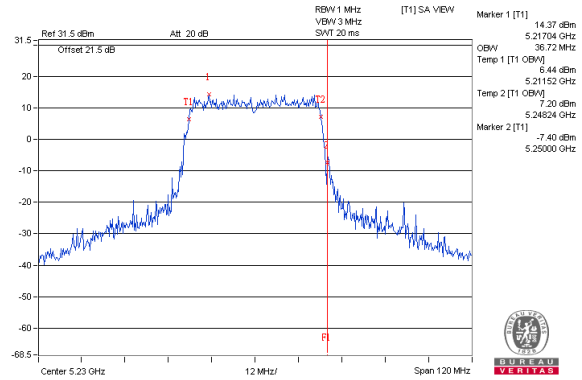
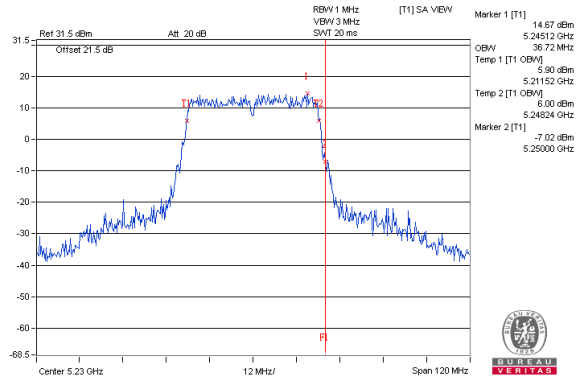
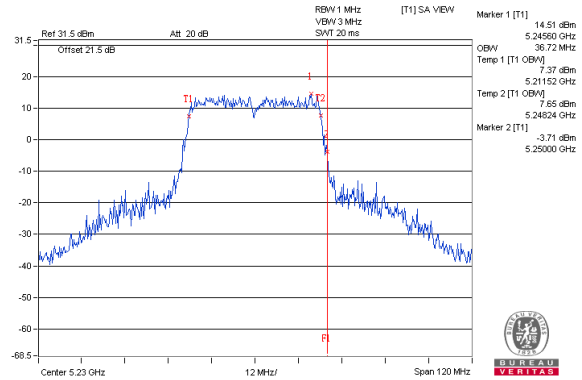
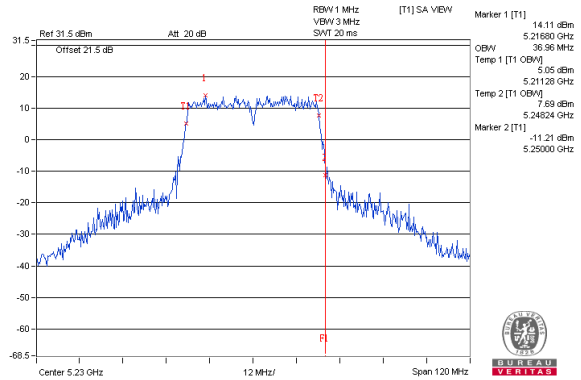
802.11ac (VHT40)_Chain0 / CH38

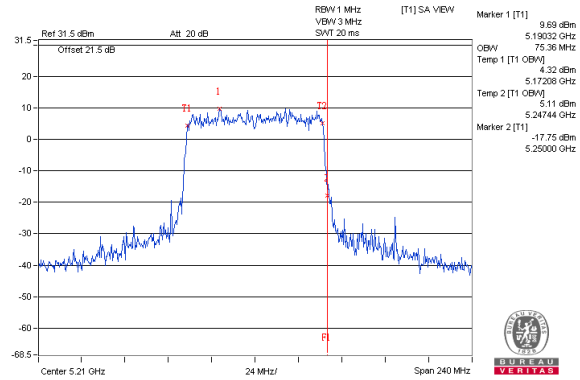
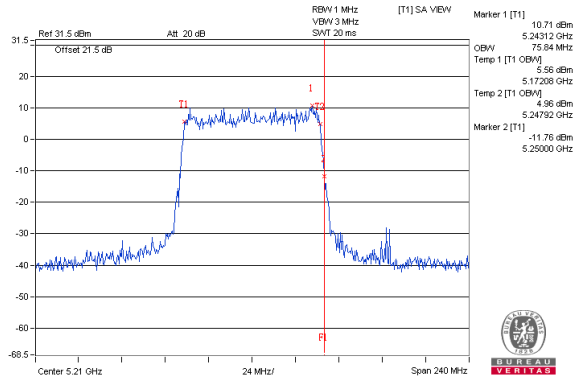
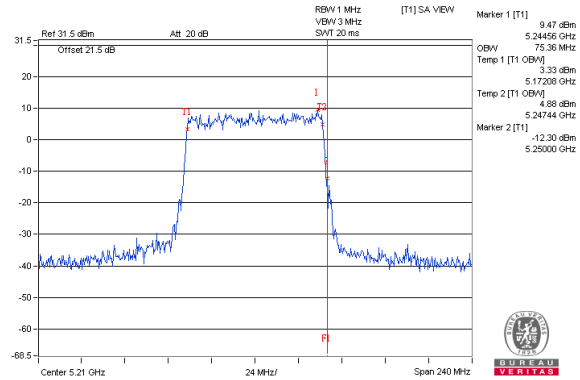
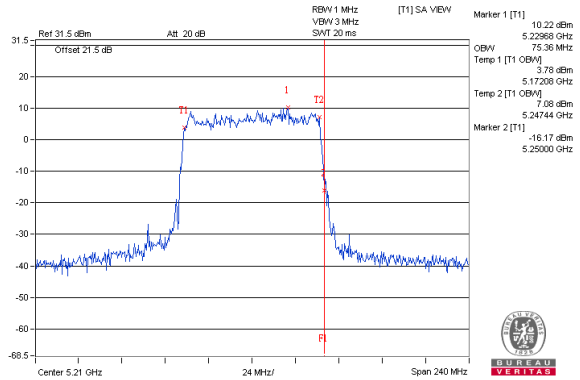


802.11ac (VHT80)_Chain0 / CH42



Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11ac(VHT20)_Chain0 / CH48	802.11ac(VHT20)_Chain1 / CH48
	
802.11ac(VHT20)_Chain2 / CH48	802.11ac(VHT20)_Chain3 / CH48
	

Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11ac(VHT40)_Chain0 / CH46	802.11ac(VHT20)_Chain1 / CH46
	
802.11ac(VHT40)_Chain2 / CH46	802.11ac(VHT20)_Chain3 / CH46
	

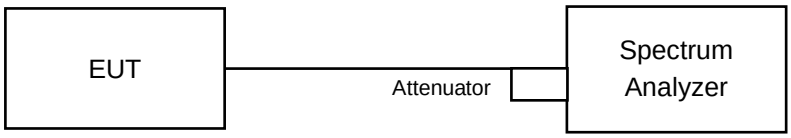
Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)	
802.11ac(VHT80)_Chain0 / CH42	802.11ac(VHT80)_Chain1 / CH42
	
802.11ac(VHT80)_Chain2 / CH42	802.11ac(VHT80)_Chain3 / CH42
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1:

Using method SA-1

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

For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

CDD MODE

For U-NII-1:

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	6.58	6.33	7.19	6.91	12.79	17.00	Pass
40	5200	7.51	8.19	7.99	7.87	13.92	17.00	Pass
48	5240	7.75	7.31	7.37	7.38	13.48	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT40)

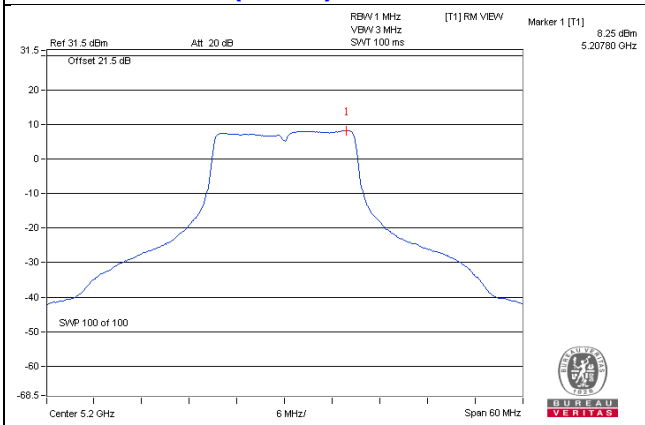
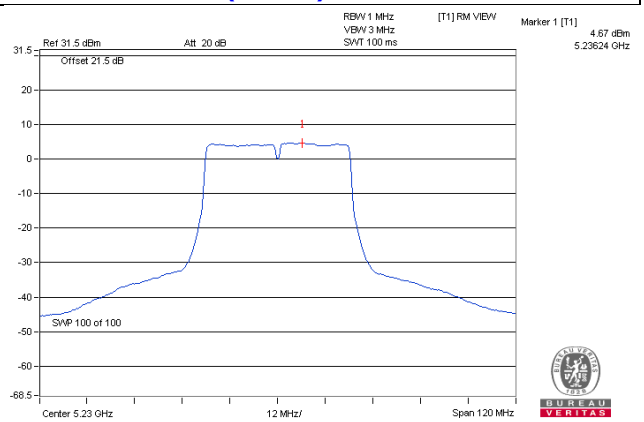
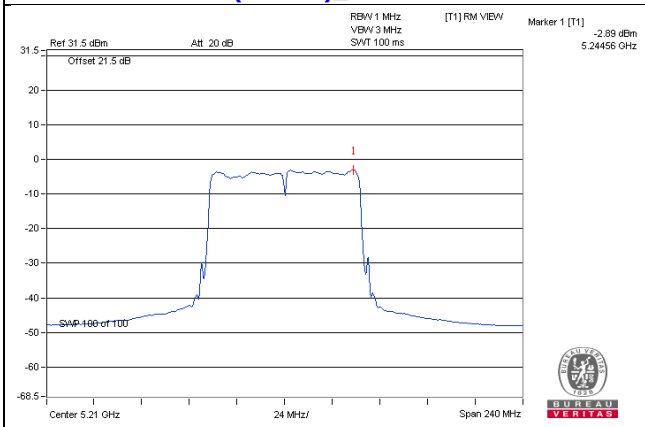
Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
38	5190	-0.08	0.03	-0.27	0.47	6.07	17.00	Pass
46	5230	4.25	4.52	4.42	4.25	10.38	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
42	5210	-3.13	-3.46	-2.91	-2.89	2.93	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

Spectrum Plot of Worst Value	
802.11ac (VHT20)_Chain 1 / CH40	**802.11ac (VHT40)_Chain 1 / CH46**
	
802.11ac (VHT80)_Chain 3 / CH42	
	

For U-NII-3:

802.11ac (VHT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-0.97	1.25	6.02	7.27	30.00	Pass
	157	5785	-1.49	0.73	6.02	6.75	30.00	Pass
	165	5825	-1.26	0.96	6.02	6.98	30.00	Pass
1	149	5745	-1.42	0.80	6.02	6.82	30.00	Pass
	157	5785	-1.31	0.91	6.02	6.93	30.00	Pass
	165	5825	-1.62	0.60	6.02	6.62	30.00	Pass
2	149	5745	-1.72	0.50	6.02	6.52	30.00	Pass
	157	5785	-1.76	0.46	6.02	6.48	30.00	Pass
	165	5825	-2.07	0.15	6.02	6.17	30.00	Pass
3	149	5745	-1.43	0.79	6.02	6.81	30.00	Pass
	157	5785	-2.12	0.10	6.02	6.12	30.00	Pass
	165	5825	-1.96	0.26	6.02	6.28	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT40)

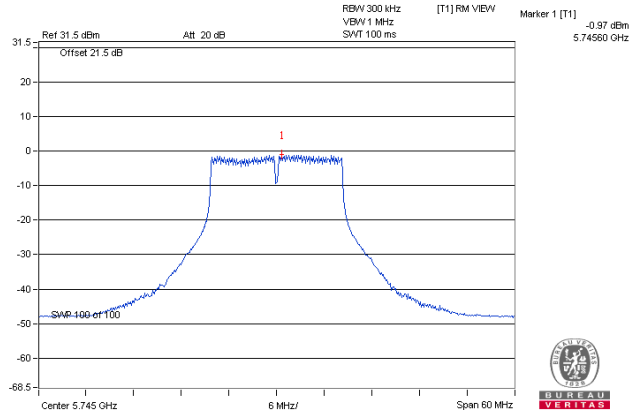
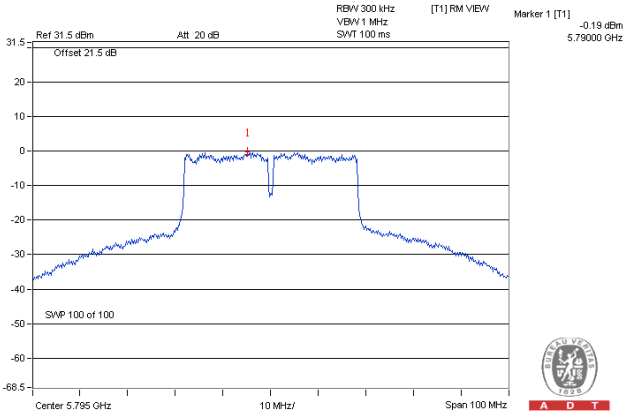
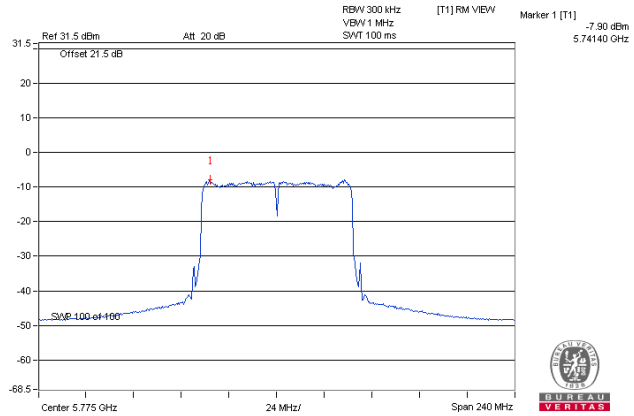
TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-5.03	-2.81	6.02	3.21	30.00	Pass
	159	5795	-5.14	-2.92	6.02	3.10	30.00	Pass
1	151	5755	-5.12	-2.90	6.02	3.12	30.00	Pass
	159	5795	-5.22	-3.00	6.02	3.02	30.00	Pass
2	151	5755	-5.19	-2.97	6.02	3.05	30.00	Pass
	159	5795	-0.19	2.03	6.02	8.05	30.00	Pass
3	151	5755	-5.48	-3.26	6.02	2.76	30.00	Pass
	159	5795	-5.61	-3.39	6.02	2.63	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

802.11ac (VHT80)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-8.12	-5.90	6.02	0.12	30.00	Pass
1	155	5775	-8.11	-5.89	6.02	0.13	30.00	Pass
2	155	5775	-8.29	-6.07	6.02	-0.05	30.00	Pass
3	155	5775	-7.90	-5.68	6.02	0.34	30.00	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 4.61dBi < 6dBi , so the power limit shall not be reduced.

Spectrum Plot of Worst Value	
802.11ac (VHT20)_Chain 0 / CH149	**802.11ac (VHT40)_Chain 2 / CH159**
	
802.11ac (VHT80)_Chain 3 / CH155	
	

SDM MODE

For U-NII-1:

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	8.59	8.76	9.03	9.07	14.89	17.00	Pass
40	5200	7.51	8.19	7.99	7.87	13.92	17.00	Pass
48	5240	7.75	7.31	7.37	7.38	13.48	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

802.11ac (VHT40)

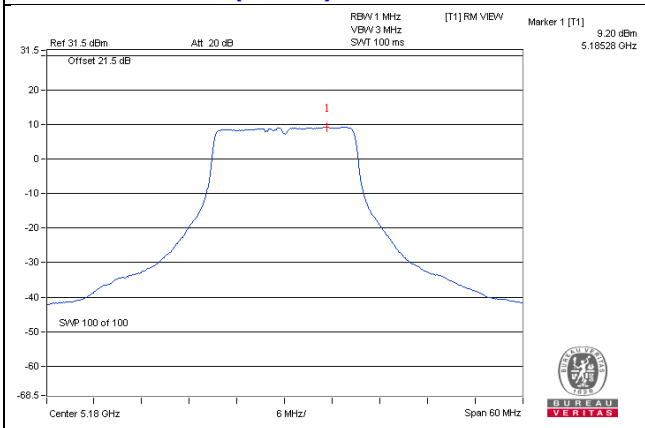
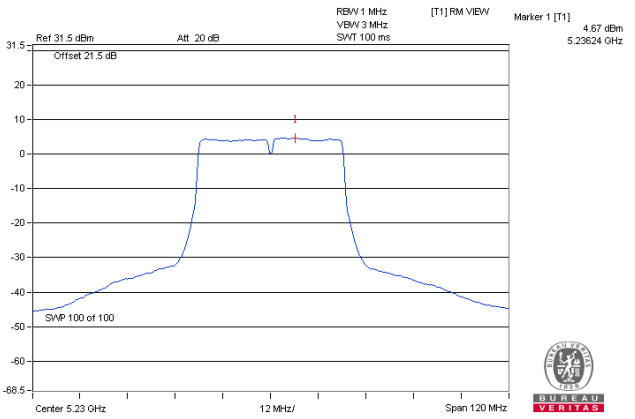
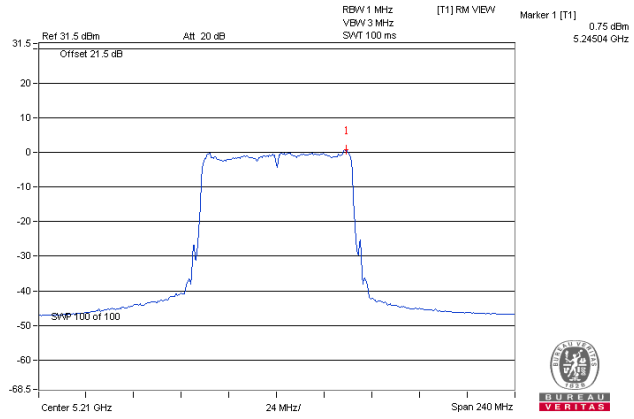
Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
38	5190	2.33	2.35	2.52	2.46	8.44	17.00	Pass
46	5230	4.25	4.52	4.42	4.25	10.38	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
42	5210	-0.04	0.69	0.19	0.75	6.43	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

Spectrum Plot of Worst Value	
802.11ac (VHT20)_Chain 3 / CH36	**802.11ac (VHT40)_Chain 1 / CH46**
	
802.11ac (VHT80)_Chain 3 / CH42	
	

For U-NII-3:

802.11ac (VHT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-0.97	1.25	6.02	7.27	30.00	Pass
	157	5785	-1.49	0.73	6.02	6.75	30.00	Pass
	165	5825	-1.26	0.96	6.02	6.98	30.00	Pass
1	149	5745	-1.42	0.80	6.02	6.82	30.00	Pass
	157	5785	-1.31	0.91	6.02	6.93	30.00	Pass
	165	5825	-1.62	0.60	6.02	6.62	30.00	Pass
2	149	5745	-1.72	0.50	6.02	6.52	30.00	Pass
	157	5785	-1.76	0.46	6.02	6.48	30.00	Pass
	165	5825	-2.07	0.15	6.02	6.17	30.00	Pass
3	149	5745	-1.43	0.79	6.02	6.81	30.00	Pass
	157	5785	-2.12	0.10	6.02	6.12	30.00	Pass
	165	5825	-1.96	0.26	6.02	6.28	30.00	Pass

Note: 1. The directional gain is 4.71dBi < 6dBi, so the power limit shall not be reduced.

802.11ac (VHT40)

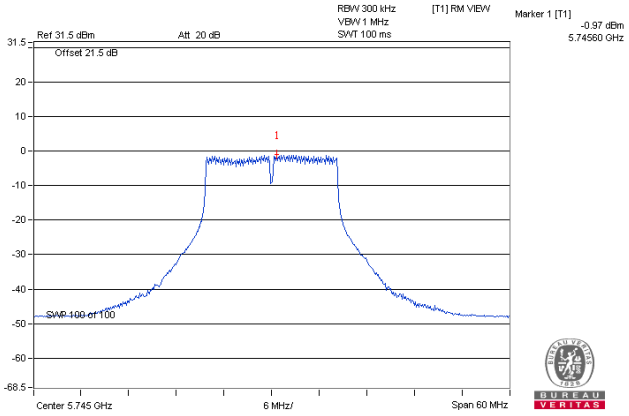
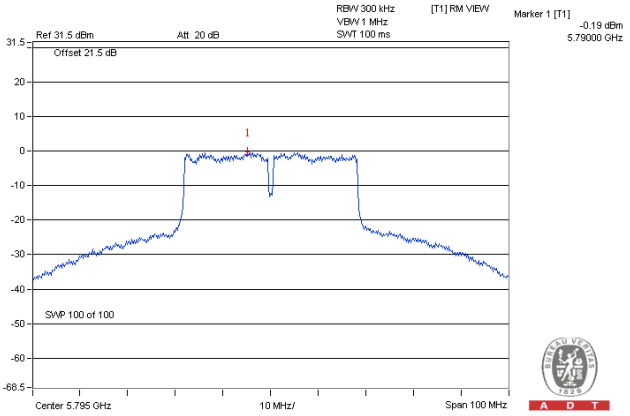
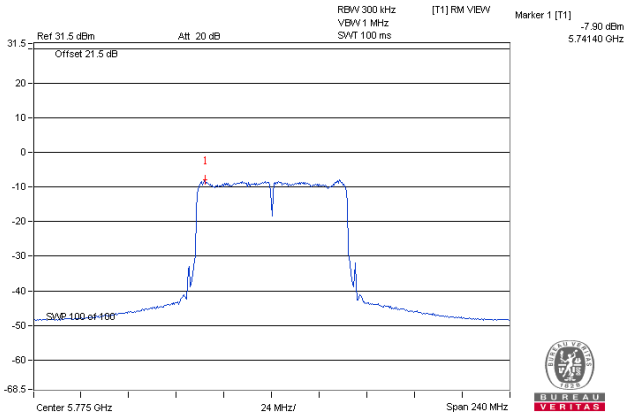
TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-5.03	-2.81	6.02	3.21	30.00	Pass
	159	5795	-5.14	-2.92	6.02	3.10	30.00	Pass
1	151	5755	-5.12	-2.90	6.02	3.12	30.00	Pass
	159	5795	-5.22	-3.00	6.02	3.02	30.00	Pass
2	151	5755	-5.19	-2.97	6.02	3.05	30.00	Pass
	159	5795	-0.19	2.03	6.02	8.05	30.00	Pass
3	151	5755	-5.48	-3.26	6.02	2.76	30.00	Pass
	159	5795	-5.61	-3.39	6.02	2.63	30.00	Pass

Note: 1. The directional gain is 4.71dBi < 6dBi, so the power limit shall not be reduced.

802.11ac (VHT80)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-8.12	-5.90	6.02	0.12	30.00	Pass
1	155	5775	-8.11	-5.89	6.02	0.13	30.00	Pass
2	155	5775	-8.29	-6.07	6.02	-0.05	30.00	Pass
3	155	5775	-7.90	-5.68	6.02	0.34	30.00	Pass

Note: 1. The directional gain is 4.71dBi < 6dBi, so the power limit shall not be reduced.

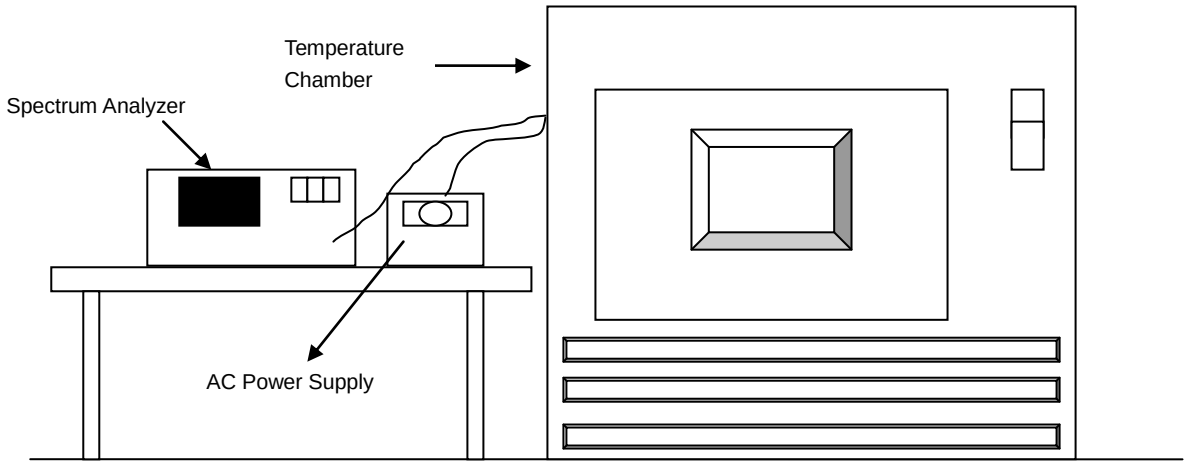
Spectrum Plot of Worst Value	
802.11ac (VHT20)_Chain 0 / CH149	**802.11ac (VHT40)_Chain 2 / CH159**
	
802.11ac (VHT80)_Chain 3 / CH155	
	

4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. 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.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

SDM MODE

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5179.997	Pass	5179.9989	Pass	5179.9983	Pass	5179.9988	Pass
40	120	5179.9767	Pass	5179.9751	Pass	5179.9795	Pass	5179.9777	Pass
30	120	5179.9869	Pass	5179.9854	Pass	5179.9868	Pass	5179.9879	Pass
20	120	5180.0109	Pass	5180.0121	Pass	5180.0088	Pass	5180.0094	Pass
10	120	5179.9788	Pass	5179.9769	Pass	5179.9801	Pass	5179.9763	Pass
0	120	5179.9742	Pass	5179.9737	Pass	5179.9768	Pass	5179.9777	Pass
-10	120	5179.9989	Pass	5180.0022	Pass	5180.0017	Pass	5180.002	Pass
-20	120	5180.0119	Pass	5180.0108	Pass	5180.0129	Pass	5180.0129	Pass
-30	120	5180.0243	Pass	5180.026	Pass	5180.0233	Pass	5180.0222	Pass

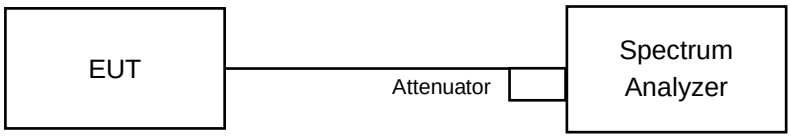
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0101	Pass	5180.0121	Pass	5180.0086	Pass	5180.0089	Pass
	120	5180.0109	Pass	5180.0121	Pass	5180.0088	Pass	5180.0094	Pass
	102	5180.0105	Pass	5180.0115	Pass	5180.0097	Pass	5180.0087	Pass

4.7 6dB Bandwidth Measurment

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

SDM MODE

802.11ac (VHT20)

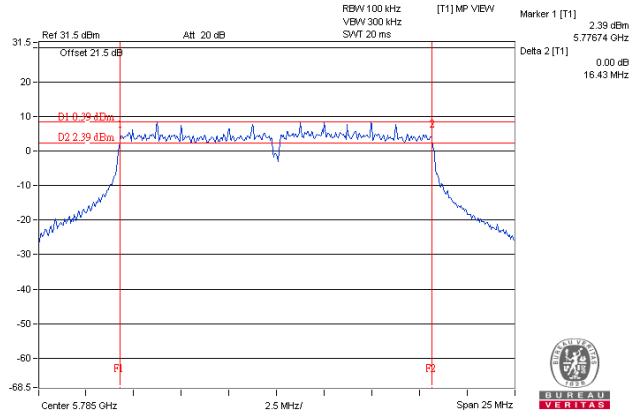
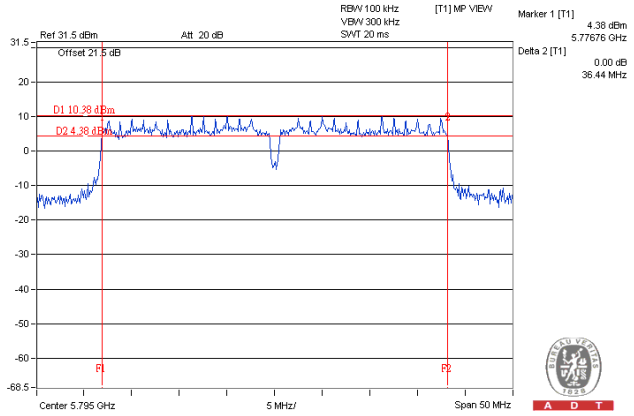
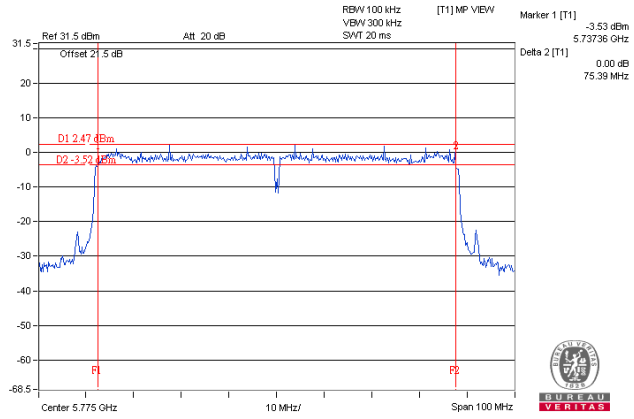
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.43	17.66	17.71	17.73	0.5	Pass
157	5785	16.43	17.66	17.71	17.70	0.5	Pass
165	5825	16.43	17.65	17.72	17.71	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	36.50	36.47	36.54	36.48	0.5	Pass
159	5795	36.48	36.46	36.44	36.49	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	75.43	75.52	75.83	75.39	0.5	Pass

Spectrum Plot of Worst Value	
802.11ac(VHT20) / Chain 0 : CH157	**802.11ac(VHT40) / Chain 2 : CH159**
	
802.11ac(VHT80) / Chain 3 : CH155	
	

5 Pictures of Test Arrangements

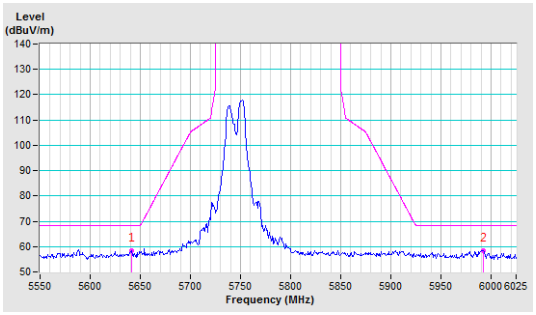
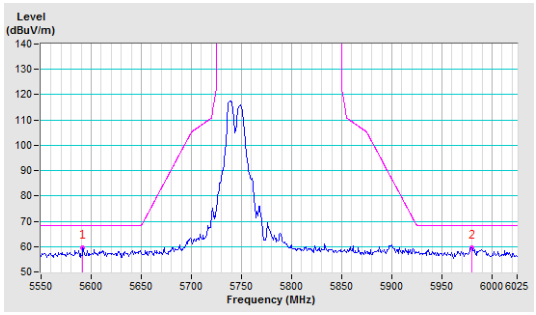
Please refer to the attached file (Test Setup Photo).

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

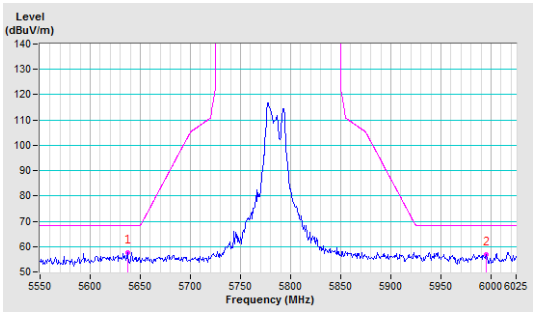
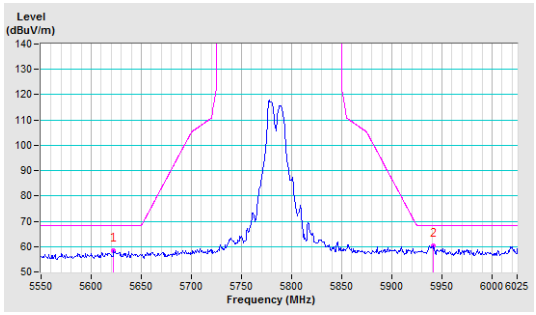
CDD MODE

802.11ac (VHT20)

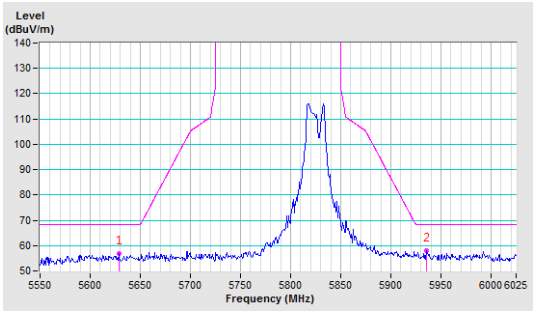
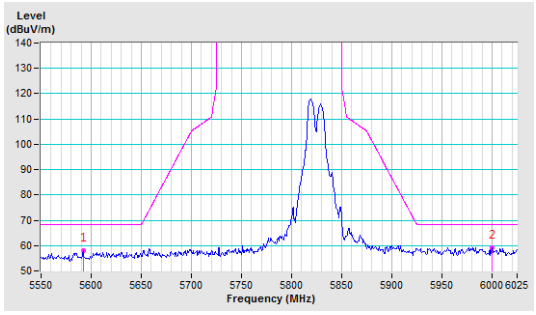
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

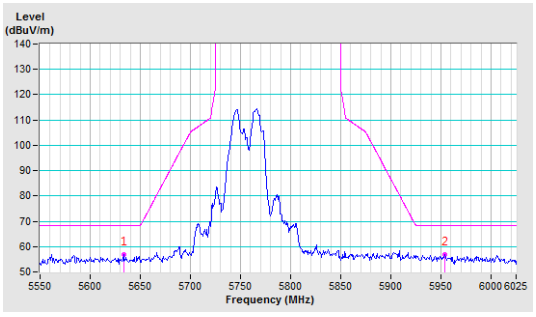
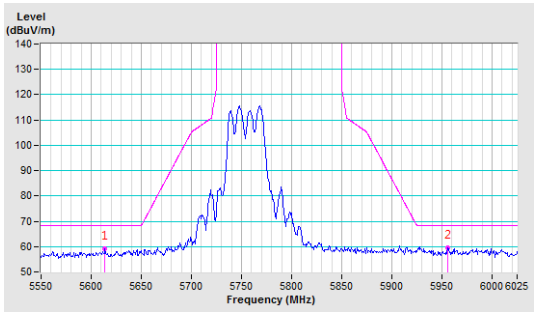
Horizontal	Vertical
	

CH 165 5825 MHz

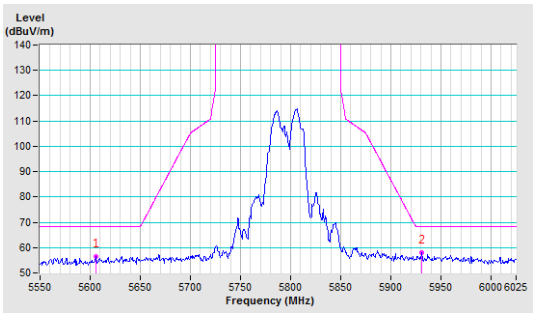
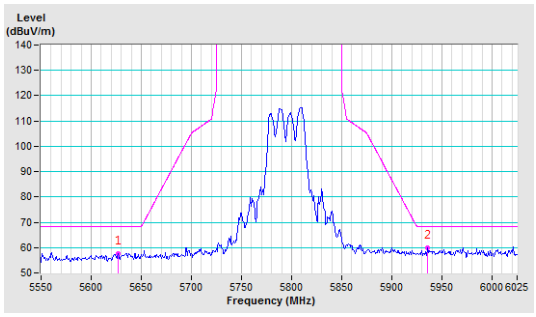
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

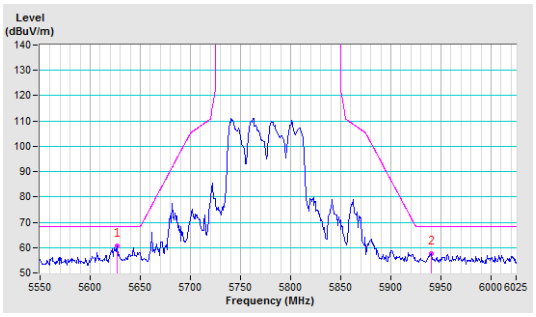
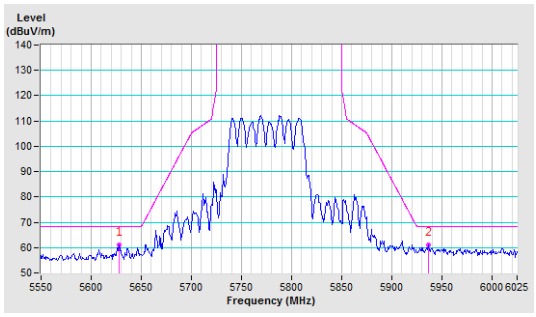
Horizontal	Vertical
	

CH 159 5795 MHz

Horizontal	Vertical
	

802.11ac (VHT80)

CH 155 5775 MHz

Horizontal	Vertical
	

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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