FCC Test Report

Report No.:	RF160601C24-1
FCC ID:	XCNUBC1301
Test Model:	UBC1301
Received Date:	June 01, 2016
Test Date:	June 22 to July 26, 2016

Applicant:	Ubee Interactive Corp.
Address:	10F-1, No. 5, Taiyuan 1st St. Jhubei City, Hsinchu County 302, Taiwan, R.O.C.

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
RF160601C24-1	Original release.	Aug. 25, 2016

1 Certificate of Conformity

Product:	Wireless eMTA
Brand:	Ubee
Test Model:	UBC1301
Sample Status:	ENGINEERING SAMPLE
Applicant:	Ubee Interactive Corp.
Test Date:	June 22 to July 26, 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. 25, 2016

Midoli Peng / Specialist

Approved by : _____ , **Date:** Aug. 25, 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 -7.40dB at 0.48594MHz.
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 11570.00MHz, 11650.00MHz & 11490.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Meet the requirement.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is I-PEX not a standard connector.

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

1. For WLAN: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25 GHz and 5.725~5.85GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.25GHz and 5.725~5.85GHz RF parameters was recorded in another test report.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	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

Product	Wireless eMTA
Brand	Ubee
Test Model	UBC1301
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	100-120Vac, 1.2A, 60Hz
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 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 802.11a/g: 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), VHT20: 11 802.11n (HT40), VHT40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** **CDD Mode:** 346.172mW **Beamforming Mode:** 312.876mW **5GHz:** **5.18GHz ~ 5.24GHz:** **CDD Mode:** 474.593mW **Beamforming Mode:** 316.252mW **5.745GHz ~ 5.825GHz:** **CDD Mode:** 558.098mW **Beamforming Mode:** 328.25mW
Antenna Type	PCB
Antenna Connector	I-PEX
Accessory Device	Power cord (unshielded, 1.5m)
Data Cable Supplied	NA

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (5GHz)
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:

Frequency (MHz)	Ant 1 2.4GHz (Chain 0) / 5GHz (Chain 3)		Ant 2 2.4GHz (Chain 1) / 5GHz (Chain 2)	
	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)
2400	3.1	69.4	4.0	65.5
2450	3.5	68.0	4.0	65.0
2500	3.9	63.5	3.5	69.9
5050	4.5	73.3	4.9	63.1
5150	4.8	71.7	4.9	64.7
5350	4.4	70.8	4.2	72.5
5725	4.7	67.0	4.6	67.6
5825	4.3	67.1	4.3	69.6

Frequency (MHz)	Ant 3 2.4GHz (Chain 2) / 5GHz (Chain 1)		Ant 4 2.4GHz (Chain 3) / 5GHz (Chain 0)	
	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)
2400	3.9	66.1	3.9	63.0
2450	3.4	66.8	3.8	65.3
2500	3.8	67.0	3.8	65.2
5050	4.8	67.5	4.9	62.4
5150	4.8	69.1	4.7	70.2
5350	4.7	69.4	4.9	63.4
5725	4.9	64.9	4.9	62.1
5825	4.9	63.9	4.9	64.2

3. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	4TX	4RX
802.11g	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS16~23	4TX	4RX
	MCS 24~31	4TX	4RX
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
VHT40	MCS0~9, Nss=1	4TX	4RX
	MCS0~9, Nss=2	4TX	4RX
	MCS0~9, Nss=3	4TX	4RX
	MCS0~9, Nss=4	4TX	4RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS 0~8, Nss=1	4TX	4RX
	MCS 0~8, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~8, Nss=4	4TX	4RX
802.11ac (VHT40)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX
802.11ac (VHT80)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX

Note:
1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. 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)

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

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz:

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥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)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		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

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 (VHT40)	5180-5240	38 to 46	159	OFDM	BPSK	13.5
	5745-5825	151 to 159				

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 (VHT40)	5180-5240	38 to 46	159	OFDM	BPSK	13.5
	5745-5825	151 to 159				

Antenna Port Conducted Measurement:

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

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		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
Beamforming Mode (Output power only)						
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

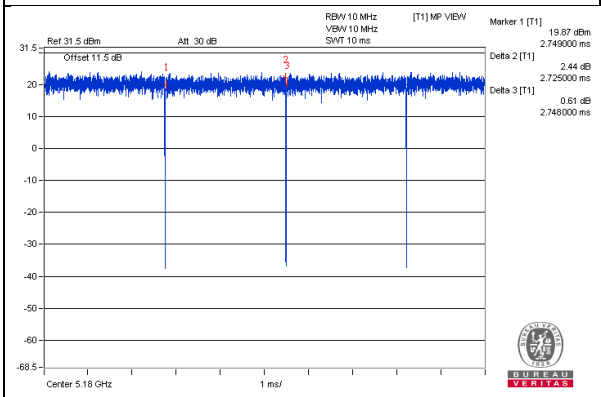
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Robert Cheng
RE<1G	24deg. C, 68%RH	120Vac, 60Hz	Robert Cheng
PLC	24deg. C, 61%RH	120Vac, 60Hz	Jyunchun Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

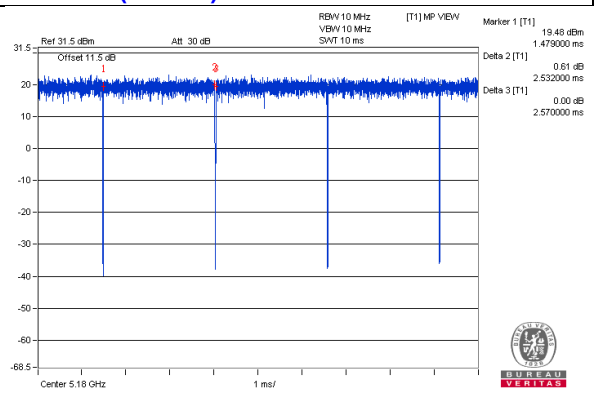
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 2.725 ms/2.748 ms = 0.992
802.11ac (VHT20): Duty cycle = 2.532 ms/2.57 ms = 0.985
802.11ac (VHT40): Duty cycle = 1.24 ms/1.259 ms = 0.985
802.11ac (VHT80): Duty cycle = 0.598 ms/0.628 ms = 0.952, Duty factor = 10 * log(1/0.952) = 0.21

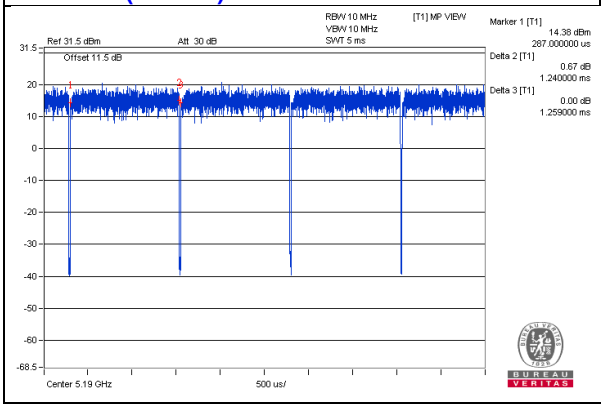
802.11a



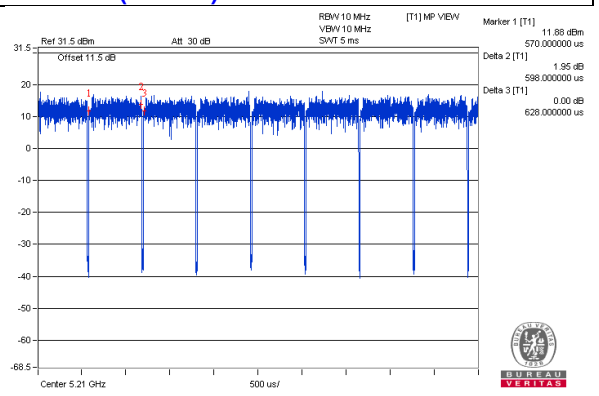
802.11ac (VHT20)



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.

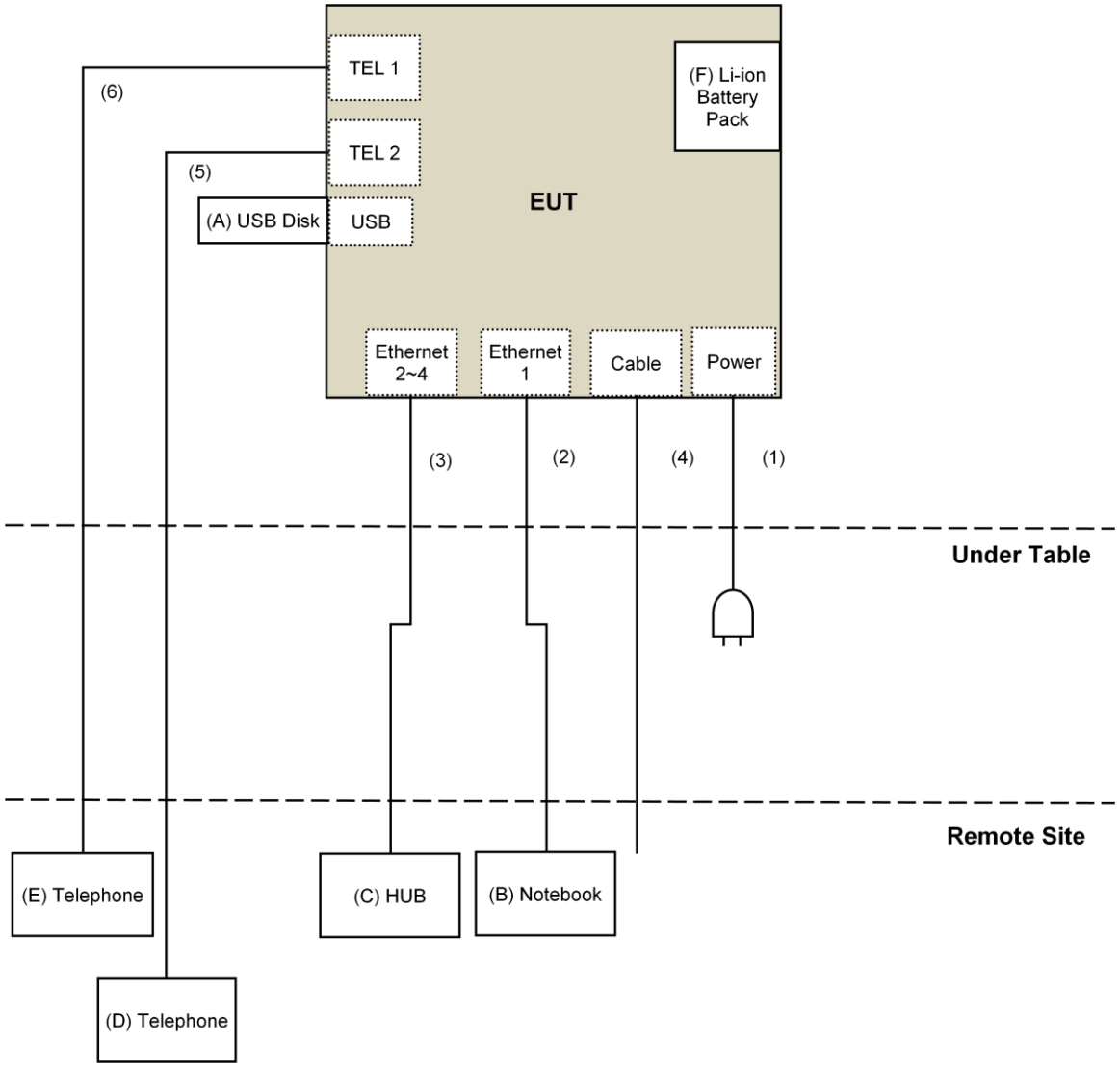
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB Disk	Transcend	USB 3.0 16G	NA	NA	Provided by Lab
B.	HUB	ZyXEL	ES-116P	S060H02000215	FCC Doc	Provided by Lab
C.	TELEPHONE	DAISHO	DS-03	N/A	NA	Provided by Lab
D.	TELEPHONE	Romeo	TE-812	97280903	NA	Provided by Lab
E.	Li-ion Battery Pack	SMP	UBC1301 2S2P LGC-3000D2	NA	NA	Supplied by client

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.	AC Cable	1	1.5	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	3	10	No	0	Provided by Lab
4.	Coaxial Cable	1	10	Yes	0	Provided by Lab
5.	RJ-11 Cable	1	10	No	0	Provided by Lab
6.	RJ-11 Cable	1	10	No	0	Provided by Lab

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r03
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="2">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="2" rowspan="2">789033 D02 General UNII Test Procedure New Rules v01r03</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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 20, 2016	July 19, 2017
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-1000VH2 B	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: July 26, 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:

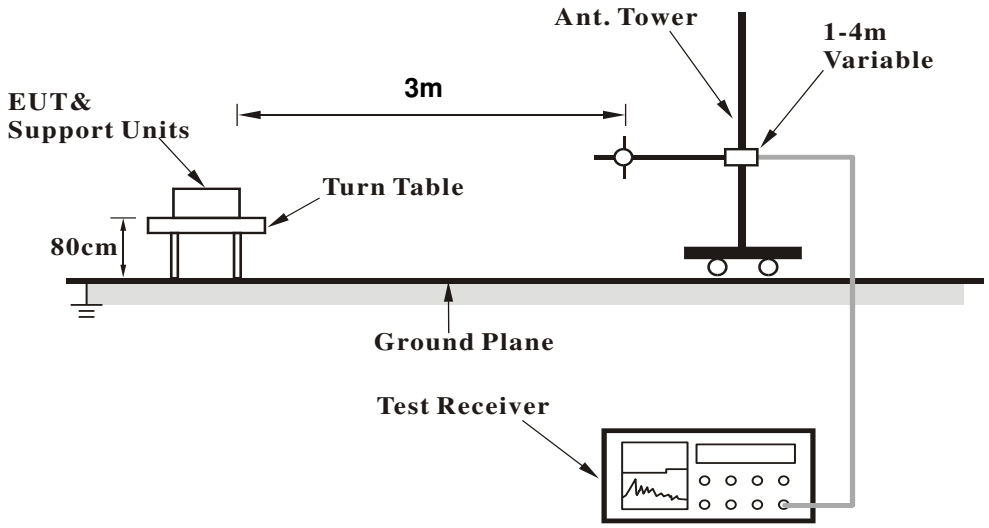
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

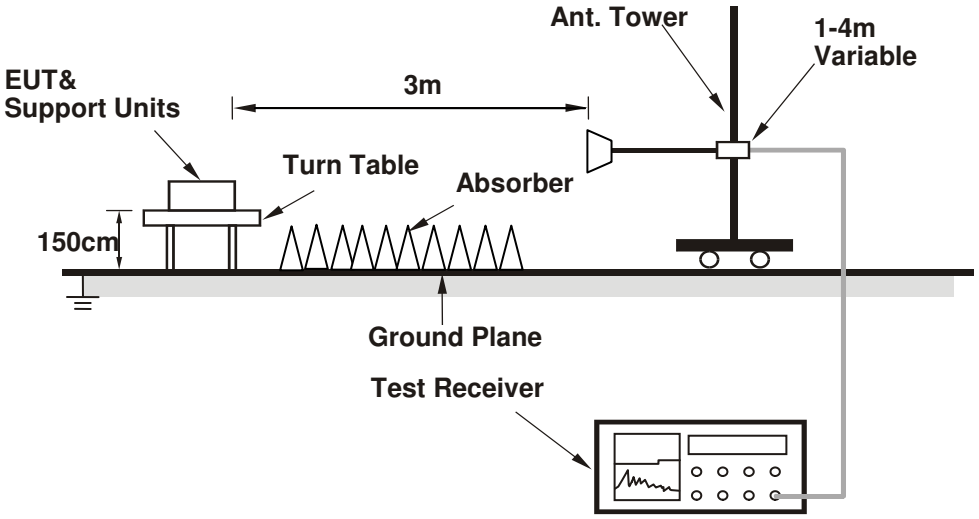
No deviation.

4.1.5 Test Setup

<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

a. Connect the EUT with the support unit B (Notebook Computer) which is placed outside of testing area.
b. The communication partner run test program “Mtool. exe[ver 2.0.3.2]” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data：

802.11a

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	71.6 PK	74.0	-2.4	2.00 H	258	70.0	1.6
2	5150.00	52.4 AV	54.0	-1.6	2.00 H	258	50.8	1.6
3	*5180.00	117.7 PK			2.00 H	258	116.0	1.7
4	*5180.00	108.0 AV			2.00 H	258	106.3	1.7
5	#10360.00	61.6 PK	74.0	-12.4	1.45 H	33	49.9	11.7
6	#10360.00	48.5 AV	54.0	-5.5	1.45 H	33	36.8	11.7
7	15540.00	55.4 PK	74.0	-18.6	2.43 H	88	42.1	13.3
8	15540.00	43.1 AV	54.0	-10.9	2.43 H	88	29.8	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	70.1 PK	74.0	-3.9	2.06 V	249	68.5	1.6
2	5150.00	51.0 AV	54.0	-3.0	2.06 V	249	49.4	1.6
3	*5180.00	116.6 PK			2.06 V	249	114.9	1.7
4	*5180.00	106.9 AV			2.06 V	249	105.2	1.7
5	#10360.00	56.3 PK	74.0	-17.7	2.14 V	116	44.6	11.7
6	#10360.00	43.4 AV	54.0	-10.6	2.14 V	116	31.7	11.7
7	15540.00	55.0 PK	74.0	-19.0	2.36 V	70	41.7	13.3
8	15540.00	42.7 AV	54.0	-11.3	2.36 V	70	29.4	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 40	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	*5200.00	117.4 PK			2.00 H	259	115.6	1.8
2	*5200.00	107.7 AV			2.00 H	259	105.9	1.8
3	#10400.00	61.0 PK	74.0	-13.0	1.42 H	34	49.1	11.9
4	#10400.00	48.1 AV	54.0	-5.9	1.42 H	34	36.2	11.9
5	15600.00	55.5 PK	74.0	-18.5	2.40 H	83	42.2	13.3
6	15600.00	43.3 AV	54.0	-10.7	2.40 H	83	30.0	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	*5200.00	115.8 PK			2.02 V	241	114.0	1.8
2	*5200.00	106.2 AV			2.02 V	241	104.4	1.8
3	#10400.00	56.9 PK	74.0	-17.1	2.16 V	103	45.0	11.9
4	#10400.00	43.8 AV	54.0	-10.2	2.16 V	103	31.9	11.9
5	15600.00	55.0 PK	74.0	-19.0	2.31 V	81	41.7	13.3
6	15600.00	42.5 AV	54.0	-11.5	2.31 V	81	29.2	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 48	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	*5240.00	117.3 PK			2.00 H	259	115.5	1.8
2	*5240.00	107.7 AV			2.00 H	259	105.9	1.8
3	5350.00	53.8 PK	74.0	-20.2	2.00 H	259	51.7	2.1
4	5350.00	41.6 AV	54.0	-12.4	2.00 H	259	39.5	2.1
5	#10480.00	61.2 PK	74.0	-12.8	1.42 H	49	49.0	12.2
6	#10480.00	48.1 AV	54.0	-5.9	1.42 H	49	35.9	12.2
7	15720.00	55.6 PK	74.0	-18.4	2.44 H	68	42.4	13.2
8	15720.00	43.6 AV	54.0	-10.4	2.44 H	68	30.4	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	116.2 PK			1.96 V	253	114.4	1.8
2	*5240.00	106.5 AV			1.96 V	253	104.7	1.8
3	5350.00	52.5 PK	74.0	-21.5	1.96 V	253	50.4	2.1
4	5350.00	40.6 AV	54.0	-13.4	1.96 V	253	38.5	2.1
5	#10480.00	57.3 PK	74.0	-16.7	2.12 V	100	45.1	12.2
6	#10480.00	43.9 AV	54.0	-10.1	2.12 V	100	31.7	12.2
7	15720.00	55.5 PK	74.0	-18.5	2.29 V	95	42.3	13.2
8	15720.00	43.0 AV	54.0	-11.0	2.29 V	95	29.8	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) 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	#5588.95	61.5 PK	68.2	-6.7	1.62 H	128	57.6	3.9
2	*5745.00	120.0 PK			1.62 H	128	117.2	2.8
3	*5745.00	110.4 AV			1.62 H	128	107.6	2.8
4	#5987.48	63.2 PK	68.2	-5.0	1.62 H	128	58.7	4.5
5	11490.00	67.2 PK	74.0	-6.8	3.64 H	141	53.7	13.5
6	11490.00	53.8 AV	54.0	-0.2	3.64 H	141	40.3	13.5
7	#17235.00	64.0 PK	74.0	-10.0	1.97 H	115	45.6	18.4
8	#17235.00	51.4 AV	54.0	-2.6	1.97 H	115	33.0	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	#5586.10	60.3 PK	68.2	-7.9	2.01 V	254	56.4	3.9
2	*5745.00	119.8 PK			2.01 V	254	117.0	2.8
3	*5745.00	109.5 AV			2.01 V	254	106.7	2.8
4	#5990.32	63.9 PK	68.2	-4.3	2.01 V	254	59.4	4.5
5	11490.00	63.2 PK	74.0	-10.8	1.42 V	106	49.7	13.5
6	11490.00	50.4 AV	54.0	-3.6	1.42 V	106	36.9	13.5
7	#17235.00	59.4 PK	74.0	-14.6	2.10 V	65	41.0	18.4
8	#17235.00	46.8 AV	54.0	-7.2	2.10 V	65	28.4	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	#5551.90	64.0 PK	68.2	-4.2	1.69 H	154	60.1	3.9
2	*5785.00	119.9 PK			1.69 H	154	117.0	2.9
3	*5785.00	110.4 AV			1.69 H	154	107.5	2.9
4	#5944.73	64.5 PK	68.2	-3.7	1.69 H	154	60.1	4.4
5	11570.00	67.6 PK	74.0	-6.4	2.89 H	139	54.4	13.2
6	**11570.00**	**53.9 AV**	**54.0**	**-0.1**	**2.89 H**	**139**	**40.7**	**13.2**
7	#17355.00	63.8 PK	74.0	-10.2	1.93 H	116	44.7	19.1
8	#17355.00	51.2 AV	54.0	-2.8	1.93 H	116	32.1	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	#5624.10	61.1 PK	68.2	-7.1	1.99 V	247	57.1	4.0
2	*5785.00	120.3 PK			1.99 V	247	117.4	2.9
3	*5785.00	109.5 AV			1.99 V	247	106.6	2.9
4	#5951.85	64.6 PK	68.2	-3.6	1.99 V	247	60.2	4.4
5	11570.00	63.5 PK	74.0	-10.5	1.49 V	133	50.3	13.2
6	11570.00	50.3 AV	54.0	-3.7	1.49 V	133	37.1	13.2
7	#17355.00	59.5 PK	74.0	-14.5	2.14 V	51	40.4	19.1
8	#17355.00	47.0 AV	54.0	-7.0	2.14 V	51	27.9	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	#5582.30	62.6 PK	68.2	-5.6	1.72 H	151	58.7	3.9
2	*5825.00	119.9 PK			1.72 H	151	117.0	2.9
3	*5825.00	110.0 AV			1.72 H	151	107.1	2.9
4	#5987.48	62.6 PK	68.2	-5.6	1.72 H	151	58.1	4.5
5	11650.00	67.5 PK	74.0	-6.5	3.79 H	136	54.3	13.2
6	**11650.00**	**53.9 AV**	**54.0**	**-0.1**	**3.79 H**	**136**	**40.7**	**13.2**
7	#17475.00	64.2 PK	74.0	-9.8	1.89 H	103	44.8	19.4
8	#17475.00	51.4 AV	54.0	-2.6	1.89 H	103	32.0	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	#5588.95	61.7 PK	68.2	-6.5	1.96 V	258	57.8	3.9
2	*5825.00	119.8 PK			1.96 V	258	116.9	2.9
3	*5825.00	109.3 AV			1.96 V	258	106.4	2.9
4	#5990.32	63.8 PK	68.2	-4.4	1.96 V	258	59.3	4.5
5	11650.00	63.7 PK	74.0	-10.3	1.49 V	106	50.5	13.2
6	11650.00	50.5 AV	54.0	-3.5	1.49 V	106	37.3	13.2
7	#17475.00	60.0 PK	74.0	-14.0	2.09 V	73	40.6	19.4
8	#17475.00	47.7 AV	54.0	-6.3	2.09 V	73	28.3	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 (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	72.2 PK	74.0	-1.8	1.71 H	258	70.6	1.6
2	5150.00	53.8 AV	54.0	-0.2	1.71 H	258	52.2	1.6
3	*5180.00	116.6 PK			1.71 H	258	114.9	1.7
4	*5180.00	106.1 AV			1.71 H	258	104.4	1.7
5	#10360.00	61.6 PK	74.0	-12.4	1.43 H	38	49.9	11.7
6	#10360.00	48.6 AV	54.0	-5.4	1.43 H	38	36.9	11.7
7	15540.00	55.8 PK	74.0	-18.2	2.46 H	83	42.5	13.3
8	15540.00	43.4 AV	54.0	-10.6	2.46 H	83	30.1	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	71.4 PK	74.0	-2.6	2.01 V	262	69.8	1.6
2	5150.00	52.8 AV	54.0	-1.2	2.01 V	262	51.2	1.6
3	*5180.00	114.9 PK			2.01 V	262	113.2	1.7
4	*5180.00	104.4 AV			2.01 V	262	102.7	1.7
5	#10360.00	56.6 PK	74.0	-17.4	2.15 V	106	44.9	11.7
6	#10360.00	43.8 AV	54.0	-10.2	2.15 V	106	32.1	11.7
7	15540.00	55.2 PK	74.0	-18.8	2.34 V	73	41.9	13.3
8	15540.00	42.9 AV	54.0	-11.1	2.34 V	73	29.6	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) 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	66.4 PK	74.0	-7.6	1.61 H	258	64.8	1.6
2	5150.00	48.8 AV	54.0	-5.2	1.61 H	258	47.2	1.6
3	*5200.00	116.4 PK			1.61 H	258	114.6	1.8
4	*5200.00	106.4 AV			1.61 H	258	104.6	1.8
5	#10400.00	61.4 PK	74.0	-12.6	1.45 H	20	49.5	11.9
6	#10400.00	48.3 AV	54.0	-5.7	1.45 H	20	36.4	11.9
7	15600.00	54.9 PK	74.0	-19.1	2.39 H	80	41.6	13.3
8	15600.00	42.6 AV	54.0	-11.4	2.39 H	80	29.3	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	65.2 PK	74.0	-8.8	2.07 V	253	63.6	1.6
2	5150.00	47.4 AV	54.0	-6.6	2.07 V	253	45.8	1.6
3	*5200.00	114.7 PK			2.07 V	253	112.9	1.8
4	*5200.00	104.6 AV			2.07 V	253	102.8	1.8
5	#10400.00	56.0 PK	74.0	-18.0	2.08 V	121	44.1	11.9
6	#10400.00	43.1 AV	54.0	-10.9	2.08 V	121	31.2	11.9
7	15600.00	55.4 PK	74.0	-18.6	2.40 V	59	42.1	13.3
8	15600.00	42.8 AV	54.0	-11.2	2.40 V	59	29.5	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) 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	*5240.00	117.1 PK			1.93 H	261	115.3	1.8
2	*5240.00	105.8 AV			1.93 H	261	104.0	1.8
3	5350.00	54.2 PK	74.0	-19.8	1.93 H	261	52.1	2.1
4	5350.00	42.5 AV	54.0	-11.5	1.93 H	261	40.4	2.1
5	#10480.00	62.2 PK	74.0	-11.8	1.50 H	26	50.0	12.2
6	#10480.00	48.8 AV	54.0	-5.2	1.50 H	26	36.6	12.2
7	15720.00	55.2 PK	74.0	-18.8	2.46 H	75	42.0	13.2
8	15720.00	43.2 AV	54.0	-10.8	2.46 H	75	30.0	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	115.3 PK			1.97 V	248	113.5	1.8
2	*5240.00	104.1 AV			1.97 V	248	102.3	1.8
3	5350.00	53.1 PK	74.0	-20.9	1.97 V	248	51.0	2.1
4	5350.00	41.5 AV	54.0	-12.5	1.97 V	248	39.4	2.1
5	#10480.00	56.8 PK	74.0	-17.2	2.18 V	113	44.6	12.2
6	#10480.00	43.9 AV	54.0	-10.1	2.18 V	113	31.7	12.2
7	15720.00	54.3 PK	74.0	-19.7	2.40 V	80	41.1	13.2
8	15720.00	42.2 AV	54.0	-11.8	2.40 V	80	29.0	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) 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	#5590.85	60.3 PK	68.2	-7.9	1.66 H	138	56.4	3.9
2	*5745.00	119.3 PK			1.66 H	138	116.5	2.8
3	*5745.00	108.6 AV			1.66 H	138	105.8	2.8
4	#5991.75	65.6 PK	68.2	-2.6	1.66 H	138	61.1	4.5
5	11490.00	67.5 PK	74.0	-6.5	3.80 H	127	54.0	13.5
6	**11490.00**	**53.9 AV**	**54.0**	**-0.1**	**3.80 H**	**127**	**40.4**	**13.5**
7	#17235.00	64.2 PK	74.0	-9.8	1.89 H	106	45.8	18.4
8	#17235.00	51.2 AV	54.0	-2.8	1.89 H	106	32.8	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	#5620.77	61.4 PK	68.2	-6.8	1.98 V	246	57.4	4.0
2	*5745.00	118.0 PK			1.98 V	246	115.2	2.8
3	*5745.00	107.8 AV			1.98 V	246	105.0	2.8
4	#5992.70	66.3 PK	68.2	-1.9	1.98 V	246	61.8	4.5
5	11490.00	63.2 PK	74.0	-10.8	1.40 V	109	49.7	13.5
6	11490.00	50.3 AV	54.0	-3.7	1.40 V	109	36.8	13.5
7	#17235.00	59.7 PK	74.0	-14.3	2.08 V	60	41.3	18.4
8	#17235.00	47.0 AV	54.0	-7.0	2.08 V	60	28.6	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	#5552.37	62.3 PK	68.2	-5.9	1.68 H	142	58.4	3.9
2	*5785.00	118.9 PK			1.68 H	142	116.0	2.9
3	*5785.00	109.1 AV			1.68 H	142	106.2	2.9
4	#6018.82	62.2 PK	68.2	-6.0	1.68 H	142	57.7	4.5
5	11570.00	67.6 PK	74.0	-6.4	3.74 H	151	54.4	13.2
6	11570.00	53.7 AV	54.0	-0.3	3.74 H	151	40.5	13.2
7	#17355.00	64.8 PK	74.0	-9.2	1.88 H	116	45.7	19.1
8	#17355.00	51.7 AV	54.0	-2.3	1.88 H	116	32.6	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	#5553.32	61.2 PK	68.2	-7.0	1.98 V	247	57.3	3.9
2	*5785.00	118.4 PK			1.98 V	247	115.5	2.9
3	*5785.00	107.6 AV			1.98 V	247	104.7	2.9
4	#5943.30	62.7 PK	68.2	-5.5	1.98 V	247	58.3	4.4
5	11570.00	63.8 PK	74.0	-10.2	1.38 V	128	50.6	13.2
6	11570.00	50.5 AV	54.0	-3.5	1.38 V	128	37.3	13.2
7	#17355.00	60.2 PK	74.0	-13.8	2.15 V	43	41.1	19.1
8	#17355.00	47.5 AV	54.0	-6.5	2.15 V	43	28.4	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	#5589.90	62.1 PK	68.2	-6.1	1.67 H	139	58.2	3.9
2	*5825.00	118.3 PK			1.67 H	139	115.4	2.9
3	*5825.00	108.6 AV			1.67 H	139	105.7	2.9
4	#5993.18	61.7 PK	68.2	-6.5	1.67 H	139	57.2	4.5
5	11650.00	67.0 PK	74.0	-7.0	3.81 H	128	53.8	13.2
6	11650.00	53.6 AV	54.0	-0.4	3.81 H	128	40.4	13.2
7	#17475.00	64.6 PK	74.0	-9.4	1.84 H	116	45.2	19.4
8	#17475.00	51.9 AV	54.0	-2.1	1.84 H	116	32.5	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	#5587.05	61.0 PK	68.2	-7.2	2.04 V	245	57.1	3.9
2	*5825.00	119.3 PK			2.04 V	245	116.4	2.9
3	*5825.00	107.9 AV			2.04 V	245	105.0	2.9
4	#5978.45	61.6 PK	68.2	-6.6	2.04 V	245	57.1	4.5
5	11650.00	63.1 PK	74.0	-10.9	1.43 V	121	49.9	13.2
6	11650.00	50.1 AV	54.0	-3.9	1.43 V	121	36.9	13.2
7	#17475.00	59.7 PK	74.0	-14.3	2.13 V	57	40.3	19.4
8	#17475.00	47.3 AV	54.0	-6.7	2.13 V	57	27.9	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.

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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	72.5 PK	74.0	-1.5	2.37 H	254	70.9	1.6
2	5150.00	53.2 AV	54.0	-0.8	2.37 H	254	51.6	1.6
3	*5190.00	112.7 PK			2.37 H	254	110.9	1.8
4	*5190.00	101.4 AV			2.37 H	254	99.6	1.8
5	#10380.00	57.2 PK	74.0	-16.8	1.49 H	19	45.4	11.8
6	#10380.00	44.1 AV	54.0	-9.9	1.49 H	19	32.3	11.8
7	15570.00	55.2 PK	74.0	-18.8	2.41 H	98	41.9	13.3
8	15570.00	42.9 AV	54.0	-11.1	2.41 H	98	29.6	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	71.0 PK	74.0	-3.0	1.98 V	239	69.4	1.6
2	5150.00	52.8 AV	54.0	-1.2	1.98 V	239	51.2	1.6
3	*5190.00	112.1 PK			1.98 V	239	110.3	1.8
4	*5190.00	99.5 AV			1.98 V	239	97.7	1.8
5	#10380.00	56.7 PK	74.0	-17.3	2.18 V	108	44.9	11.8
6	#10380.00	43.8 AV	54.0	-10.2	2.18 V	108	32.0	11.8
7	15570.00	54.5 PK	74.0	-19.5	2.41 V	57	41.2	13.3
8	15570.00	42.5 AV	54.0	-11.5	2.41 V	57	29.2	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 46	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	69.2 PK	74.0	-4.8	1.65 H	261	67.6	1.6
2	5150.00	53.2 AV	54.0	-0.8	1.65 H	261	51.6	1.6
3	*5230.00	115.3 PK			1.65 H	261	113.5	1.8
4	*5230.00	104.8 AV			1.65 H	261	103.0	1.8
5	5372.00	63.3 PK	74.0	-10.7	1.65 H	261	61.1	2.2
6	5372.00	52.6 AV	54.0	-1.4	1.65 H	261	50.4	2.2
7	#10460.00	56.7 PK	74.0	-17.3	1.40 H	15	44.6	12.1
8	#10460.00	43.8 AV	54.0	-10.2	1.40 H	15	31.7	12.1
9	15690.00	55.4 PK	74.0	-18.6	2.48 H	93	42.2	13.2
10	15690.00	42.7 AV	54.0	-11.3	2.48 H	93	29.5	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	68.3 PK	74.0	-5.7	1.99 V	238	66.7	1.6
2	5150.00	52.1 AV	54.0	-1.9	1.99 V	238	50.5	1.6
3	*5230.00	113.7 PK			1.99 V	238	111.9	1.8
4	*5230.00	102.9 AV			1.99 V	238	101.1	1.8
5	5372.00	61.7 PK	74.0	-12.3	1.99 V	238	59.5	2.2
6	5372.00	50.8 AV	54.0	-3.2	1.99 V	238	48.6	2.2
7	#10460.00	56.7 PK	74.0	-17.3	2.19 V	115	44.6	12.1
8	#10460.00	43.6 AV	54.0	-10.4	2.19 V	115	31.5	12.1
9	15690.00	55.3 PK	74.0	-18.7	2.35 V	82	42.1	13.2
10	15690.00	43.1 AV	54.0	-10.9	2.35 V	82	29.9	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	#5608.43	65.0 PK	68.2	-3.2	1.56 H	265	61.1	3.9
2	*5755.00	116.2 PK			1.56 H	265	113.3	2.9
3	*5755.00	105.5 AV			1.56 H	265	102.6	2.9
4	#5930.48	66.3 PK	68.2	-1.9	1.56 H	256	61.9	4.4
5	11510.00	56.6 PK	74.0	-17.4	1.46 H	16	43.1	13.5
6	11510.00	43.7 AV	54.0	-10.3	1.46 H	16	30.2	13.5
7	#17265.00	55.5 PK	74.0	-18.5	2.46 H	95	37.0	18.5
8	#17265.00	42.9 AV	54.0	-11.1	2.46 H	95	24.4	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	#5580.40	64.1 PK	68.2	-4.1	2.04 V	242	60.2	3.9
2	*5755.00	115.3 PK			2.04 V	242	112.4	2.9
3	*5755.00	105.0 AV			2.04 V	242	102.1	2.9
4	#5928.10	65.4 PK	68.2	-2.8	2.04 V	242	61.0	4.4
5	11510.00	56.5 PK	74.0	-17.5	2.14 V	128	43.0	13.5
6	11510.00	43.8 AV	54.0	-10.2	2.14 V	128	30.3	13.5
7	#17265.00	55.3 PK	74.0	-18.7	2.39 V	84	36.8	18.5
8	#17265.00	42.7 AV	54.0	-11.3	2.39 V	84	24.2	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	#5650.23	65.8 PK	68.4	-2.6	1.54 H	257	61.8	4.0
2	*5795.00	116.5 PK			1.54 H	257	113.6	2.9
3	*5795.00	105.7 AV			1.54 H	257	102.8	2.9
4	#5960.40	67.1 PK	68.2	-1.1	1.54 H	257	62.6	4.5
5	11590.00	56.4 PK	74.0	-17.6	1.44 H	43	43.3	13.1
6	11590.00	43.7 AV	54.0	-10.3	1.44 H	43	30.6	13.1
7	#17385.00	55.1 PK	74.0	-18.9	2.49 H	92	35.8	19.3
8	#17385.00	42.4 AV	54.0	-11.6	2.49 H	92	23.1	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	#5649.75	64.9 PK	68.2	-3.3	2.01 V	249	60.9	4.0
2	*5795.00	117.2 PK			2.01 V	249	114.3	2.9
3	*5795.00	105.4 AV			2.01 V	249	102.5	2.9
4	#5940.93	66.7 PK	68.2	-1.5	2.01 V	249	62.3	4.4
5	11590.00	56.9 PK	74.0	-17.1	2.15 V	102	43.8	13.1
6	11590.00	43.9 AV	54.0	-10.1	2.15 V	102	30.8	13.1
7	#17385.00	54.9 PK	74.0	-19.1	2.42 V	74	35.6	19.3
8	#17385.00	42.6 AV	54.0	-11.4	2.42 V	74	23.3	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.

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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	66.1 PK	74.0	-7.9	2.43 H	255	64.5	1.6
2	5150.00	53.5 AV	54.0	-0.5	2.43 H	255	51.9	1.6
3	*5210.00	109.8 PK			2.43 H	255	108.0	1.8
4	*5210.00	99.2 AV			2.43 H	255	97.4	1.8
5	5350.00	59.3 PK	74.0	-14.7	2.43 H	255	57.2	2.1
6	5350.00	48.1 AV	54.0	-5.9	2.43 H	255	46.0	2.1
7	#10420.00	56.8 PK	74.0	-17.2	1.41 H	18	44.8	12.0
8	#10420.00	44.0 AV	54.0	-10.0	1.41 H	18	32.0	12.0
9	15630.00	54.8 PK	74.0	-19.2	2.51 H	91	41.5	13.3
10	15630.00	42.5 AV	54.0	-11.5	2.51 H	91	29.2	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	64.6 PK	74.0	-9.4	1.99 V	249	63.0	1.6
2	5150.00	51.9 AV	54.0	-2.1	1.99 V	249	50.3	1.6
3	*5210.00	108.1 PK			1.99 V	249	106.3	1.8
4	*5210.00	97.6 AV			1.99 V	249	95.8	1.8
5	5350.00	57.9 PK	74.0	-16.1	1.99 V	249	55.8	2.1
6	5350.00	46.8 AV	54.0	-7.2	1.99 V	249	44.7	2.1
7	#10420.00	56.9 PK	74.0	-17.1	2.19 V	108	44.9	12.0
8	#10420.00	43.8 AV	54.0	-10.2	2.19 V	108	31.8	12.0
9	15630.00	55.2 PK	74.0	-18.8	2.36 V	63	41.9	13.3
10	15630.00	43.0 AV	54.0	-11.0	2.36 V	63	29.7	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	#5640.73	67.9 PK	68.2	-0.3	1.54 H	256	63.9	4.0
2	*5775.00	110.7 PK			1.54 H	256	107.8	2.9
3	*5775.00	99.1 AV			1.54 H	256	96.2	2.9
4	#5931.43	63.5 PK	68.2	-4.7	1.54 H	256	59.1	4.4
5	11550.00	57.3 PK	74.0	-16.7	1.45 H	16	44.0	13.3
6	11550.00	44.4 AV	54.0	-9.6	1.45 H	16	31.1	13.3
7	#17325.00	55.2 PK	74.0	-18.8	2.50 H	72	36.3	18.9
8	#17325.00	42.7 AV	54.0	-11.3	2.50 H	72	23.8	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	#5629.80	66.6 PK	68.2	-1.6	2.00 V	231	62.6	4.0
2	*5775.00	110.4 PK			2.00 V	231	107.5	2.9
3	*5775.00	97.5 AV			2.00 V	231	94.6	2.9
4	#5933.80	63.8 PK	68.2	-4.4	2.00 V	231	59.4	4.4
5	11550.00	56.1 PK	74.0	-17.9	2.16 V	109	42.8	13.3
6	11550.00	43.5 AV	54.0	-10.5	2.16 V	109	30.2	13.3
7	#17325.00	55.1 PK	74.0	-18.9	2.40 V	71	36.2	18.9
8	#17325.00	42.9 AV	54.0	-11.1	2.40 V	71	24.0	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 Data：

802.11ac (VHT40)

CHANNEL	TX Channel 159	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	179.87	33.05 QP	43.50	-10.45	1.70 H	255	43.34	-10.29
2	299.73	35.06 QP	46.00	-10.94	1.70 H	308	43.06	-8.00
3	419.62	40.99 QP	46.00	-5.01	1.70 H	263	45.82	-4.83
4	539.52	33.65 QP	46.00	-12.35	1.70 H	216	35.89	-2.24
5	659.41	37.37 QP	46.00	-8.63	1.70 H	96	37.22	0.15
6	779.28	35.45 QP	46.00	-10.55	1.70 H	134	33.18	2.27
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	44.45	31.68 QP	40.00	-8.32	1.10 V	286	40.44	-8.76
2	59.95	35.69 QP	40.00	-4.31	1.10 V	17	44.70	-9.01
3	179.82	34.68 QP	43.50	-8.82	1.10 V	206	44.96	-10.28
4	299.71	40.59 QP	46.00	-5.41	1.10 V	360	48.59	-8.00
5	419.67	39.81 QP	46.00	-6.19	1.10 V	354	44.64	-4.83
6	779.33	38.74 QP	46.00	-7.26	1.10 V	128	36.47	2.27

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

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 22, 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.

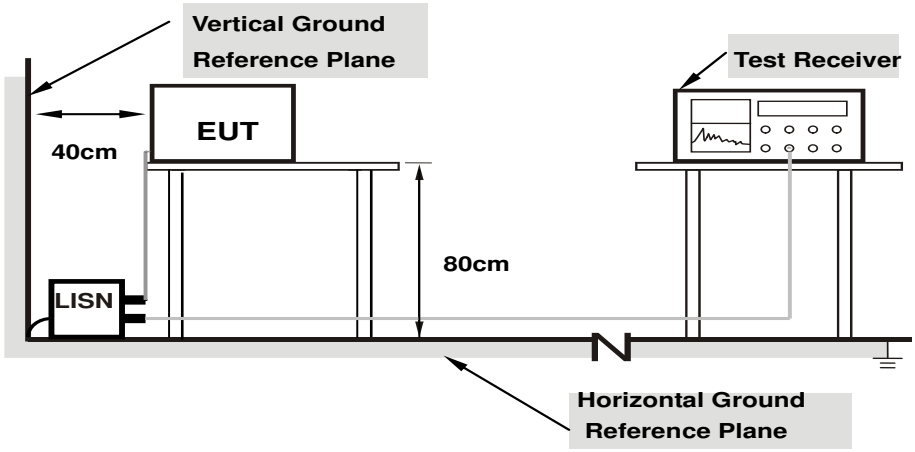
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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.

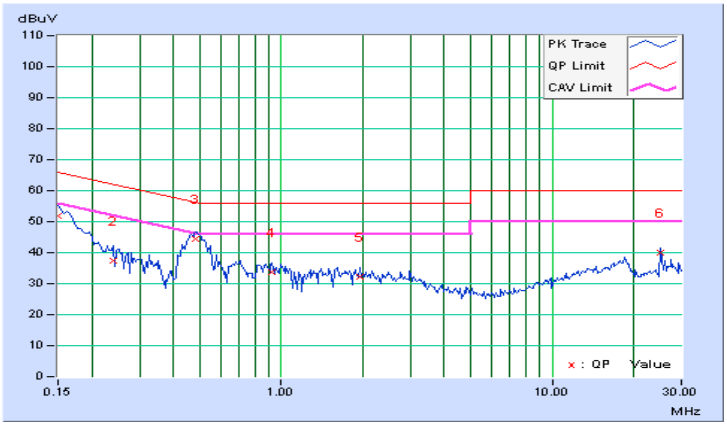
4.2.7 Test Results

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.21	41.70	27.95	51.91	38.16	66.00	56.00	-14.09	-17.84
2	0.23984	10.22	27.30	16.62	37.52	26.84	62.10	52.10	-24.58	-25.26
3	0.48203	10.23	34.33	28.20	44.56	38.43	56.30	46.30	-11.75	-7.88
4	0.92344	10.25	23.39	14.09	33.64	24.34	56.00	46.00	-22.36	-21.66
5	1.94531	10.31	21.84	13.48	32.15	23.79	56.00	46.00	-23.85	-22.21
6	25.23047	11.45	28.42	26.58	39.87	38.03	60.00	50.00	-20.13	-11.97

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

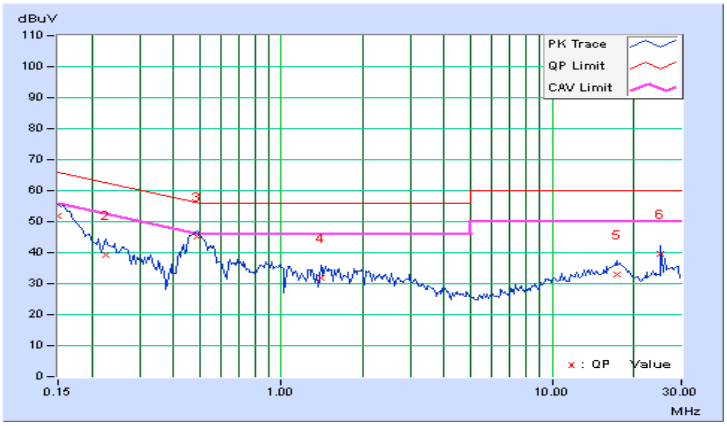


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.19	41.64	28.09	51.83	38.28	66.00	56.00	-14.17	-17.72
2	0.22422	10.21	29.06	16.66	39.27	26.87	62.66	52.66	-23.39	-25.79
3	**0.48594**	**10.21**	**34.81**	**28.63**	**45.02**	**38.84**	**56.24**	**46.24**	**-11.22**	**-7.40**
4	1.39844	10.26	21.75	12.63	32.01	22.89	56.00	46.00	-23.99	-23.11
5	17.37109	11.00	21.88	16.96	32.88	27.96	60.00	50.00	-27.12	-22.04
6	25.23047	11.13	28.60	27.13	39.73	38.26	60.00	50.00	-20.27	-11.74

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)

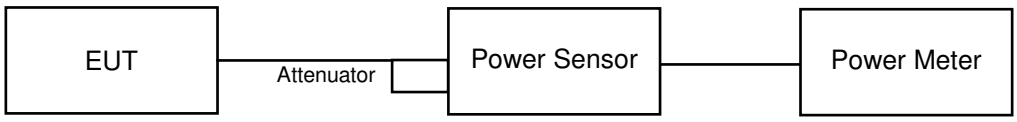
*B is the 26 dB emission bandwidth in megahertz

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	0824006	May 26, 2016	May 25, 2017
Power sensor Anritsu	MA2411B	0738172	May 26, 2016	May 25, 2017

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. Tested Date: July 20, 2016

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

802.11a

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	18.71	18.56	18.41	18.36	283.973	24.53	30.00	Pass
40	5200	18.68	18.67	19.23	18.96	309.869	24.91	30.00	Pass
48	5240	18.82	18.50	19.21	18.91	308.175	24.89	30.00	Pass
149	5745	20.71	20.83	20.87	20.96	485.739	26.86	30.00	Pass
157	5785	20.91	20.93	20.96	20.99	497.531	26.97	30.00	Pass
165	5825	20.89	20.96	20.87	21.01	495.845	26.95	30.00	Pass

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	17.74	17.76	18.47	18.37	258.147	24.12	30.00	Pass
40	5200	18.81	18.69	19.28	19.01	314.333	24.97	30.00	Pass
48	5240	18.87	18.72	19.25	18.89	313.149	24.96	30.00	Pass
149	5745	20.89	20.91	20.84	21.03	494.158	26.94	30.00	Pass
157	5785	20.93	20.96	20.89	21.05	498.712	26.98	30.00	Pass
165	5825	20.95	20.93	20.96	21.04	500.126	26.99	30.00	Pass

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	17.61	17.72	17.93	18.01	242.161	23.84	30.00	Pass
46	5230	20.43	20.71	20.79	21.02	474.593	26.76	30.00	Pass
151	5755	21.43	21.42	21.23	21.36	547.183	27.38	30.00	Pass
159	5795	21.56	21.55	21.29	21.38	558.098	27.47	30.00	Pass

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	17.11	16.49	17.27	17.64	207.379	23.17	30.00	Pass
155	5775	19.05	18.61	18.78	18.87	305.563	24.85	30.00	Pass

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	17.74	17.76	18.47	18.37	258.147	24.12	25.18	Pass
40	5200	18.81	18.69	19.28	19.01	314.333	24.97	25.18	Pass
48	5240	18.87	18.72	19.25	18.89	313.149	24.96	25.18	Pass
149	5745	19.09	18.96	18.79	19.18	318.278	25.03	25.20	Pass
157	5785	19.02	19.03	18.93	19.13	319.791	25.05	25.20	Pass
165	5825	19.08	19.07	19.03	19.30	326.731	25.14	25.20	Pass

Note: 1. For UNII-1: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.82dBi > 6dBi , so the power limit shall be reduced to 30-(10.82-6) = 25.18dBm.
2. For UNII-3: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power limit shall be reduced to 30-(10.8-6) =25.2dBm.

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	17.61	17.72	17.93	18.01	242.161	23.84	25.18	Pass
46	5230	18.76	19.01	18.99	19.15	316.252	25.00	25.18	Pass
151	5755	19.24	19.20	18.95	19.17	328.25	25.16	25.20	Pass
159	5795	19.19	19.25	18.82	19.12	324.991	25.12	25.20	Pass

Note: 1. For UNII-1: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.82dBi > 6dBi , so the power limit shall be reduced to 30-(10.82-6) = 25.18dBm.
2. For UNII-3: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power limit shall be reduced to 30-(10.8-6) =25.2dBm.

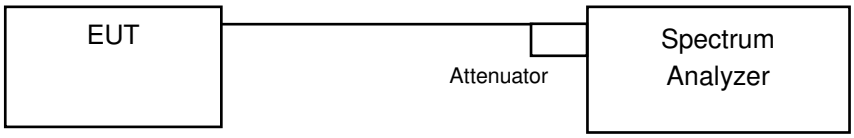
802.11ac (VHT80)

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	17.11	16.49	17.27	17.64	207.379	23.17	25.18	Pass
155	5775	19.05	18.61	18.78	18.87	305.563	24.85	25.20	Pass

Note: 1. For UNII-1: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.82dBi > 6dBi , so the power limit shall be reduced to 30-(10.82-6) = 25.18dBm.
2. For UNII-3: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power limit shall be reduced to 30-(10.8-6) =25.2dBm.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 27, 2016	Jan. 26, 2017

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. Tested Date: July 20, 2016

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.

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	17.04	16.92	17.04	17.04
40	5200	17.04	16.92	17.04	16.92
48	5240	16.80	17.04	16.92	17.16
149	5745	16.92	17.04	16.92	17.28
157	5785	17.04	17.16	17.04	17.16
165	5825	17.16	17.04	16.92	17.28

802.11ac (VHT20)

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

802.11ac (VHT40)

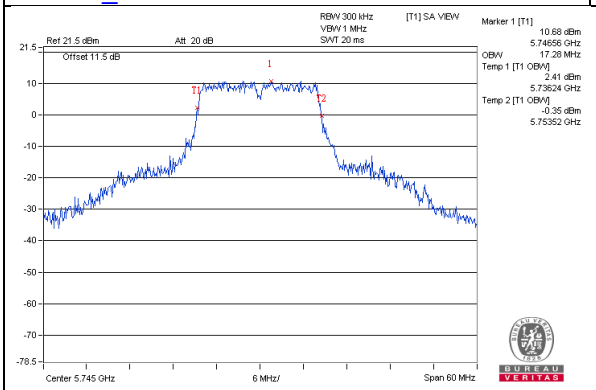
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.72	36.96	36.72	36.96
46	5230	36.72	36.96	36.96	36.96
151	5755	36.72	36.96	36.72	36.96
159	5795	36.72	36.72	36.72	36.96

802.11ac (VHT80)

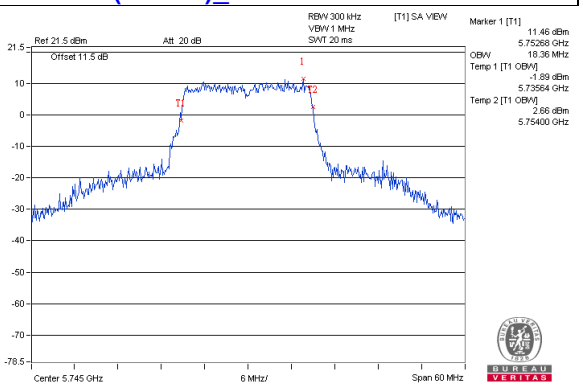
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	75.84	74.88	74.88	74.88
155	5775	76.32	76.32	76.32	76.32

Spectrum Plot of Worst Value

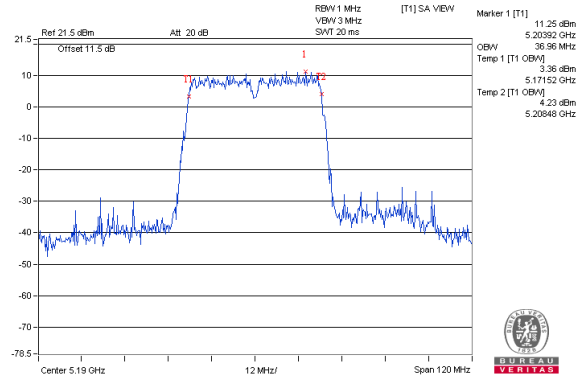
802.11a_Chain3 / CH149



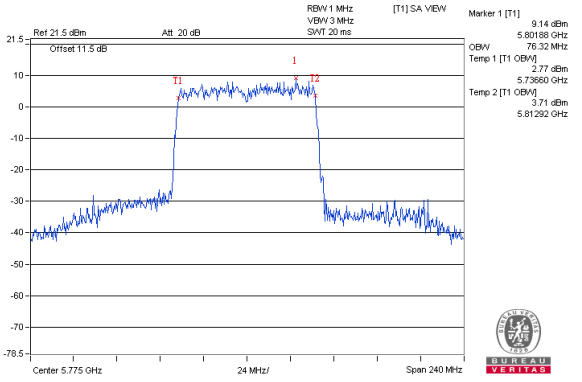
802.11ac (VHT20)_Chain3 / CH149



802.11ac (VHT40)_Chain1 / CH38

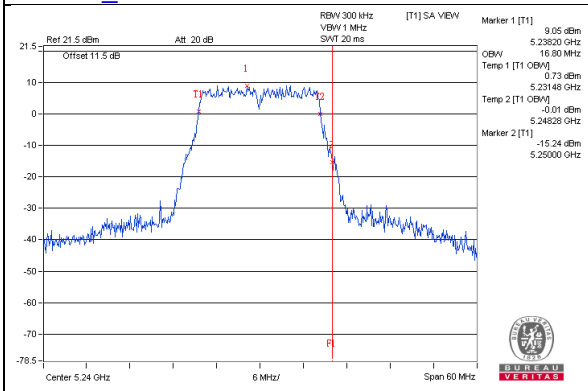


802.11ac (VHT80)_Chain0 / CH155

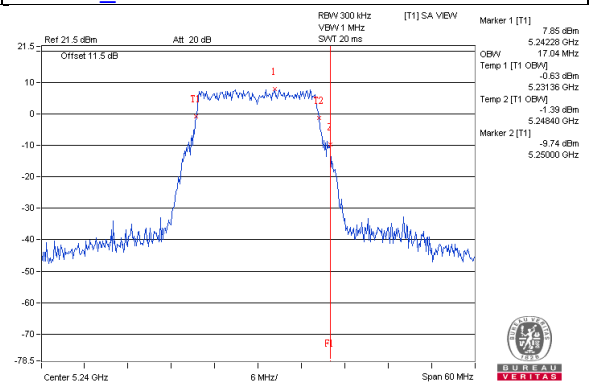


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

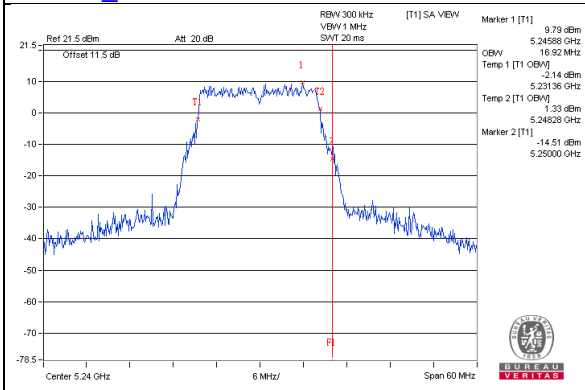
802.11a_Chain0 / CH48



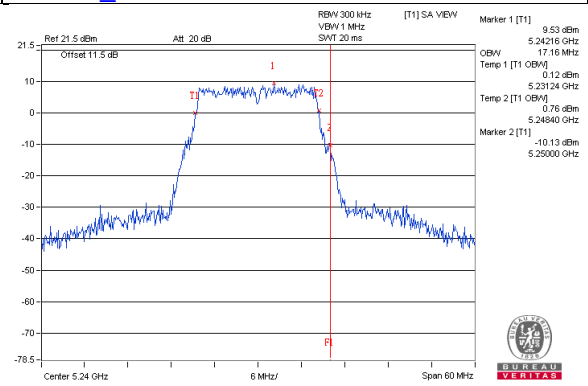
802.11a_Chain1 / CH48



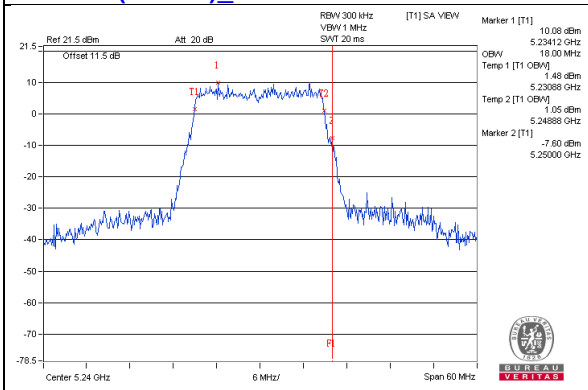
802.11a_Chain2 / CH48



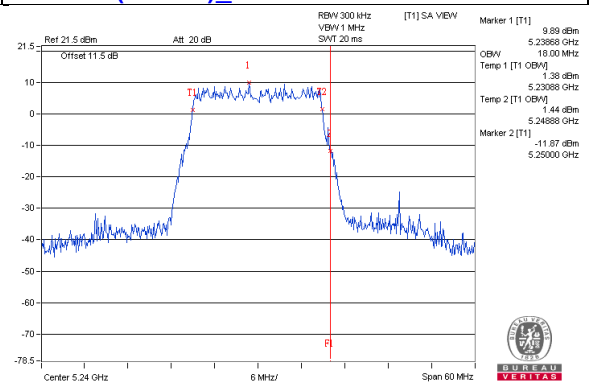
802.11a_Chain3 / CH48



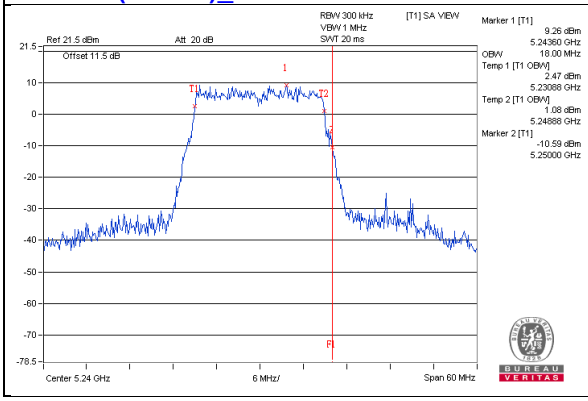
802.11ac(VHT20)_Chain0 / CH48



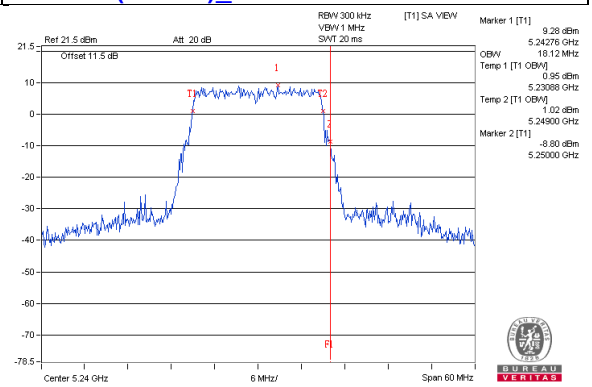
802.11ac(VHT20)_Chain1 / CH48



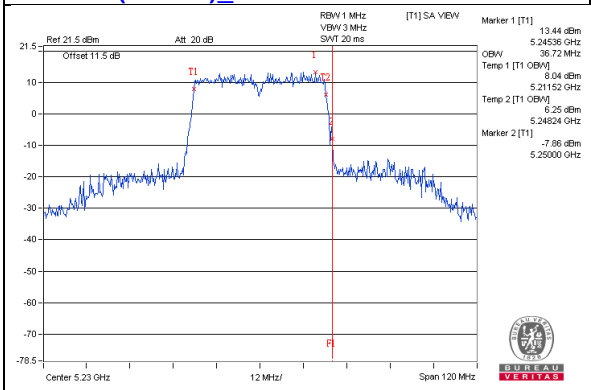
802.11ac(VHT20)_Chain2 / CH48



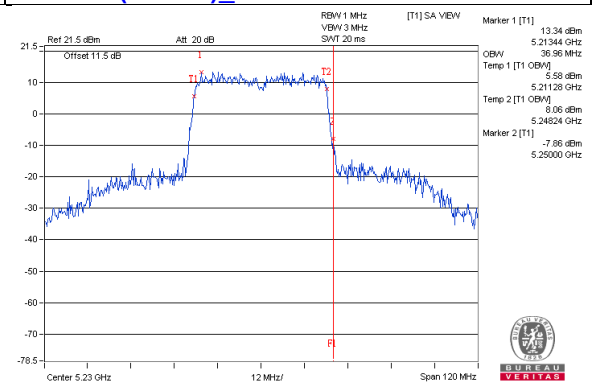
802.11ac(VHT20)_Chain3 / CH48



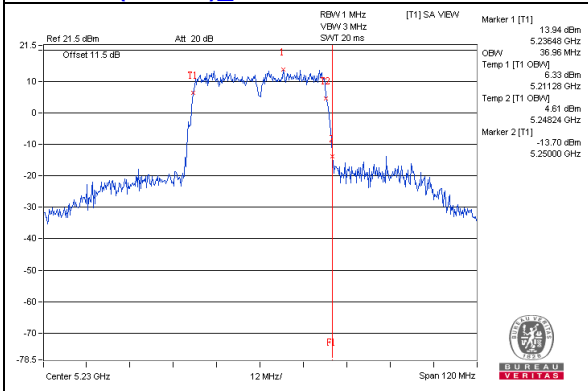
802.11ac(VHT40)_Chain0 / CH46



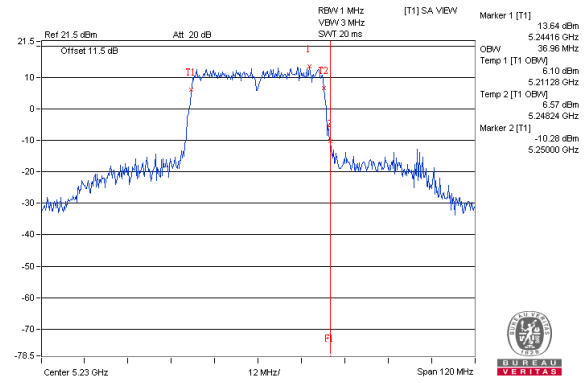
802.11ac(VHT20)_Chain1 / CH46



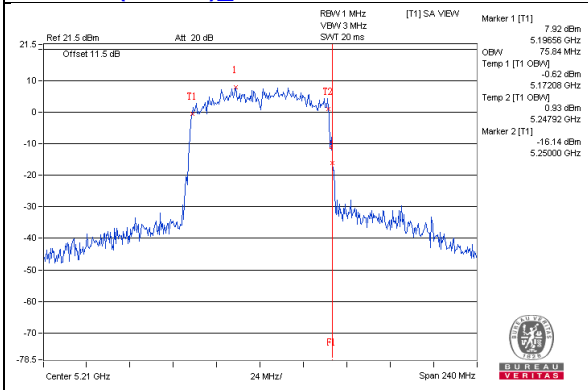
802.11ac(VHT40)_Chain2 / CH46



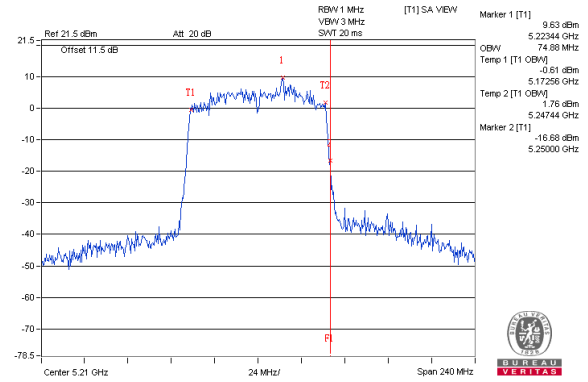
802.11ac(VHT20)_Chain3 / CH46



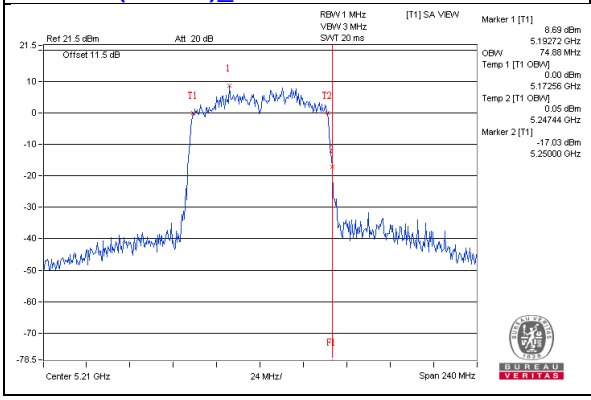
802.11ac(VHT80)_Chain0 / CH42



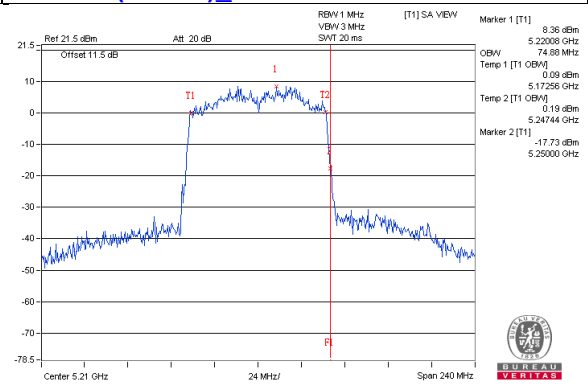
802.11ac(VHT80)_Chain1 / CH42



802.11ac(VHT80)_Chain2 / CH42



802.11ac(VHT80)_Chain3 / CH42

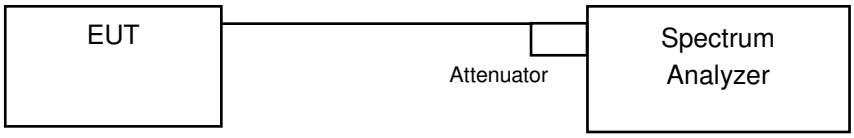


4.5 Peak Power Spectral Density Measurement

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 27, 2016	Jan. 26, 2017

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. Tested Date: July 20, 2016

4.5.4 Test Procedure

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

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

802.11ac (VHT80)

For U-NII-1:

Using method SA-2

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

For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 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 and add 10 log (1/duty cycle)

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

802.11a

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	5.71	5.86	6.24	6.10	12.00	12.18	Pass
40	5200	5.96	5.65	5.97	6.47	12.04	12.18	Pass
48	5240	5.78	5.71	5.85	6.30	11.94	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.

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	4.23	3.35	3.88	4.26	9.97	12.18	Pass
40	5200	6.18	5.51	6.03	6.26	12.03	12.18	Pass
48	5240	5.92	5.36	6.46	6.41	12.08	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.

802.11ac (VHT40)

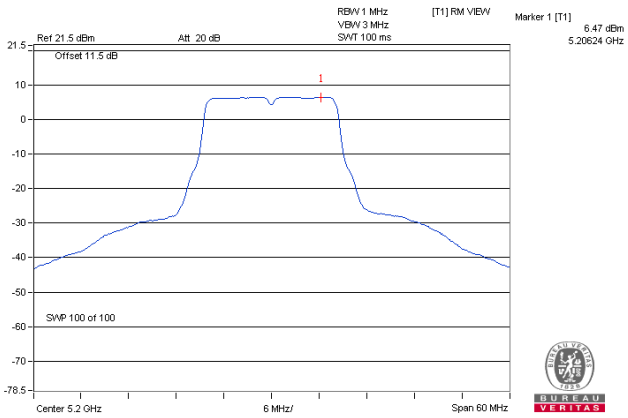
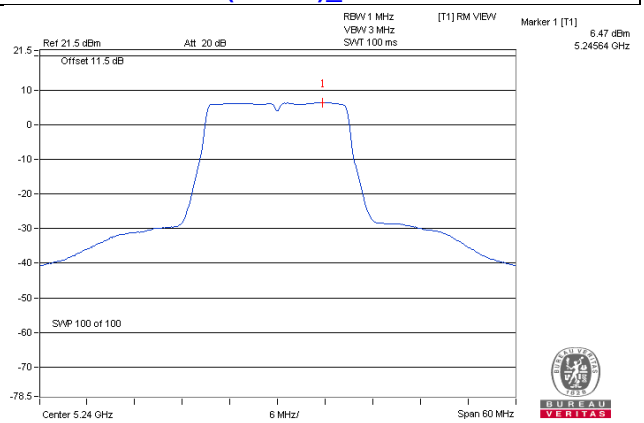
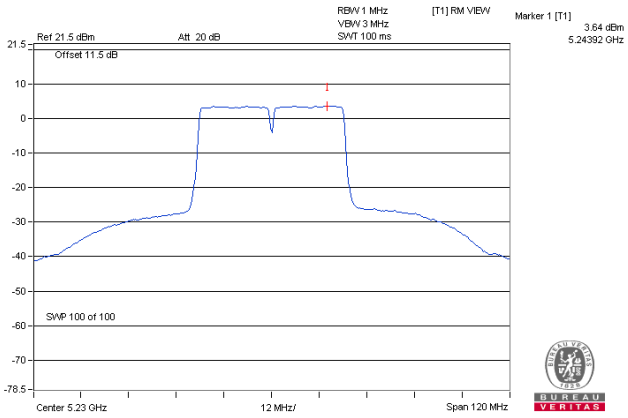
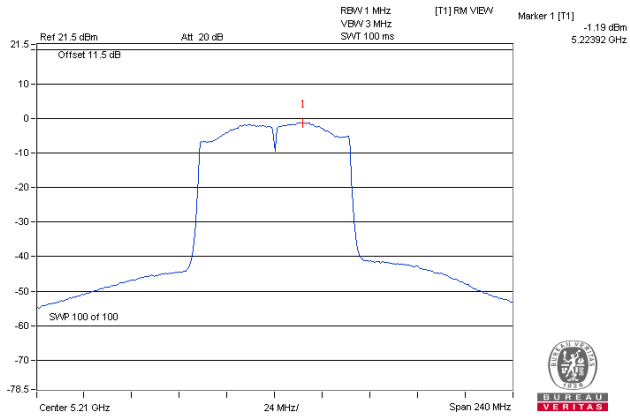
Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
38	5190	1.33	1.16	1.09	1.13	7.20	12.18	Pass
46	5230	3.53	3.41	3.27	3.64	9.49	12.18	Pass

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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.

802.11ac (VHT80):

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)				Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	-1.19	-1.88	-1.99	-1.45	0.21	4.62	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a_Chain 3 / CH40	**802.11ac (VHT20)_Chain 2 / CH48**
	
802.11ac (VHT40)_Chain 3 / CH46	**802.11ac (VHT80)_Chain 0 / CH42**
	

For U-NII-3:

802.11a

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	-1.61	0.61	6.02	6.63	25.20	Pass
	157	5785	-1.16	1.06	6.02	7.08	25.20	Pass
	165	5825	-1.05	1.17	6.02	7.19	25.20	Pass
1	149	5745	-1.42	0.80	6.02	6.82	25.20	Pass
	157	5785	-1.05	1.17	6.02	7.19	25.20	Pass
	165	5825	-0.96	1.26	6.02	7.28	25.20	Pass
2	149	5745	-1.32	0.90	6.02	6.92	25.20	Pass
	157	5785	-1.13	1.09	6.02	7.11	25.20	Pass
	165	5825	-1.18	1.04	6.02	7.06	25.20	Pass
3	149	5745	-0.59	1.63	6.02	7.65	25.20	Pass
	157	5785	-0.65	1.57	6.02	7.59	25.20	Pass
	165	5825	-0.68	1.54	6.02	7.56	25.20	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power density limit shall be reduced to 30-(10.8-6) = 25.20dBm.

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	-1.20	1.02	6.02	7.04	25.20	Pass
	157	5785	-1.02	1.20	6.02	7.22	25.20	Pass
	165	5825	-1.10	1.12	6.02	7.14	25.20	Pass
1	149	5745	-1.64	0.58	6.02	6.60	25.20	Pass
	157	5785	-1.94	0.28	6.02	6.30	25.20	Pass
	165	5825	-1.75	0.47	6.02	6.49	25.20	Pass
2	149	5745	-1.95	0.27	6.02	6.29	25.20	Pass
	157	5785	-1.60	0.62	6.02	6.64	25.20	Pass
	165	5825	-1.53	0.69	6.02	6.71	25.20	Pass
3	149	5745	-0.98	1.24	6.02	7.26	25.20	Pass
	157	5785	-0.60	1.62	6.02	7.64	25.20	Pass
	165	5825	-0.66	1.56	6.02	7.58	25.20	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power density limit shall be reduced to 30-(10.8-6) = 25.20dBm.

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	-4.48	-2.26	6.02	3.76	25.20	Pass
	159	5795	-4.09	-1.87	6.02	4.15	25.20	Pass
1	151	5755	-4.85	-2.63	6.02	3.39	25.20	Pass
	159	5795	-4.63	-2.41	6.02	3.61	25.20	Pass
2	151	5755	-4.78	-2.56	6.02	3.46	25.20	Pass
	159	5795	-4.50	-2.28	6.02	3.74	25.20	Pass
3	149	5745	-5.05	-2.83	6.02	3.19	25.20	Pass
	151	5755	-4.51	-2.29	6.02	3.73	25.20	Pass

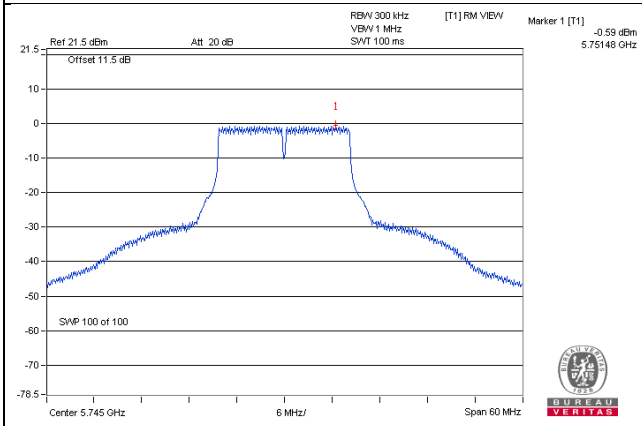
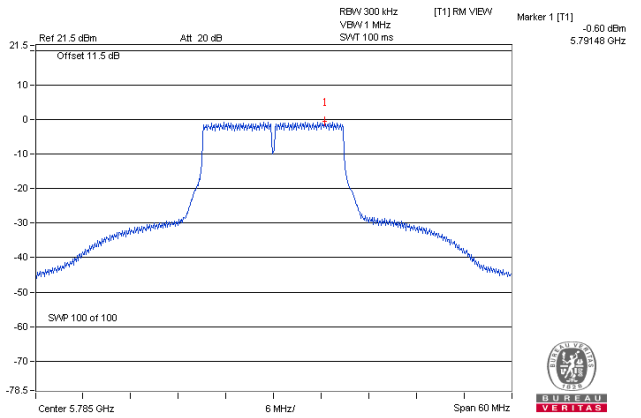
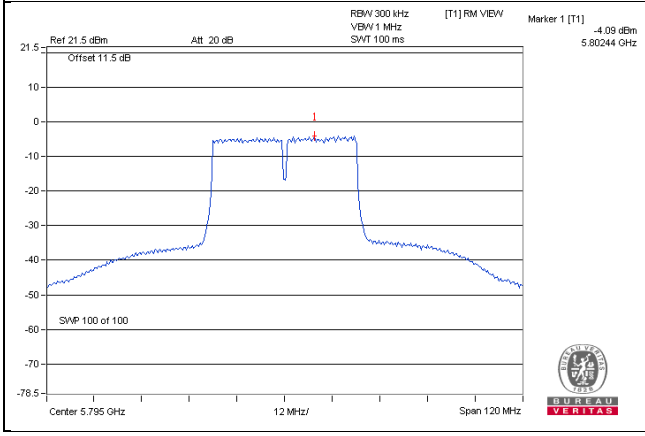
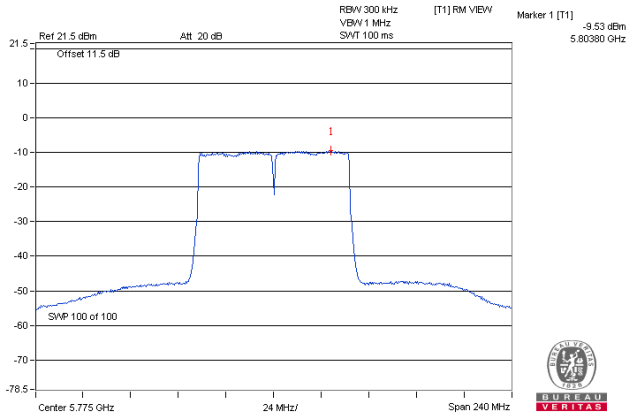
Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power density limit shall be reduced to 30-(10.8-6) = 25.20dBm.

802.11ac (VHT80)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-9.84	-7.62	6.02	0.21	-1.39	25.20	Pass
1	155	5775	-9.72	-7.50	6.02	0.21	-1.27	25.20	Pass
2	155	5775	-9.96	-7.74	6.02	0.21	-1.51	25.20	Pass
3	155	5775	-9.53	-7.31	6.02	0.21	-1.08	25.20	Pass

Note: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 10.8dBi > 6dBi , so the power density limit shall be reduced to 30-(10.8-6) = 25.20dBm.

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

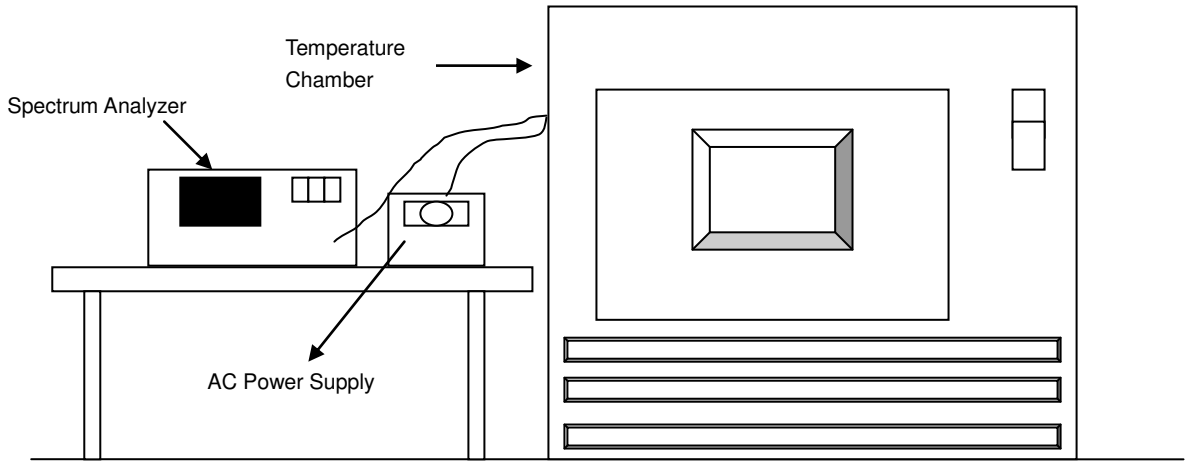
Spectrum Plot of Worst Value	
802.11a_Chain 3 / CH149	**802.11ac (VHT20)_Chain 3 / CH157**
	
802.11ac (VHT40)_Chain 0 / CH159	**802.11ac (VHT80)_Chain 3 / CH155**
	

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 27, 2016	Jan. 26, 2017
AC Power Source Extech Electronics	6502	1140503	NA	NA
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Dec. 03, 2015	Dec. 02, 2016
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. Tested Date: July 20, 2016

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

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	5180.0245	Pass	5180.0239	Pass	5180.0258	Pass	5180.0232	Pass
40	120	5180.0229	Pass	5180.0235	Pass	5180.0253	Pass	5180.024	Pass
30	120	5179.9948	Pass	5179.9925	Pass	5179.994	Pass	5179.9911	Pass
20	120	5179.9917	Pass	5179.9899	Pass	5179.987	Pass	5179.9918	Pass
10	120	5179.9751	Pass	5179.9775	Pass	5179.9786	Pass	5179.9748	Pass
0	120	5179.9981	Pass	5179.9974	Pass	5180.0001	Pass	5179.9998	Pass
-10	120	5179.9876	Pass	5179.9876	Pass	5179.9895	Pass	5179.9893	Pass
-20	120	5180.0139	Pass	5180.0121	Pass	5180.0125	Pass	5180.0126	Pass
-30	120	5180.0246	Pass	5180.0244	Pass	5180.0226	Pass	5180.0228	Pass

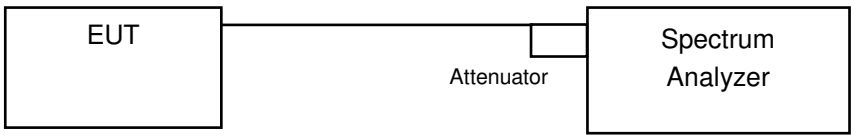
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5179.991	Pass	5179.9903	Pass	5179.9873	Pass	5179.9922	Pass
	120	5179.9917	Pass	5179.9899	Pass	5179.987	Pass	5179.9918	Pass
	102	5179.9914	Pass	5179.9902	Pass	5179.9863	Pass	5179.9921	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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 27, 2016	Jan. 26, 2017

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. Tested Date: July 20, 2016

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

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.40	16.40	16.42	16.40	0.5	Pass
157	5785	16.42	16.42	16.41	16.42	0.5	Pass
165	5825	16.39	16.41	16.42	16.40	0.5	Pass

802.11ac (VHT20)

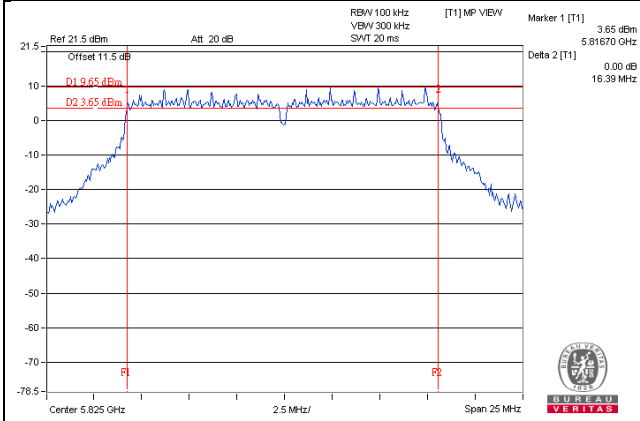
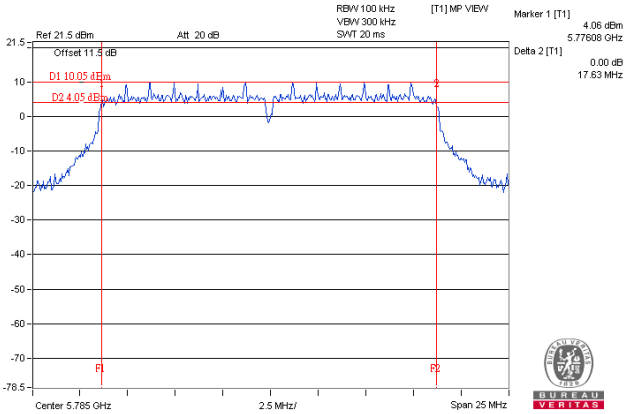
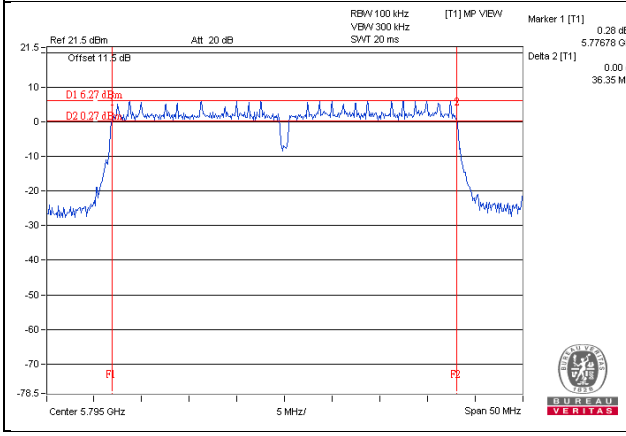
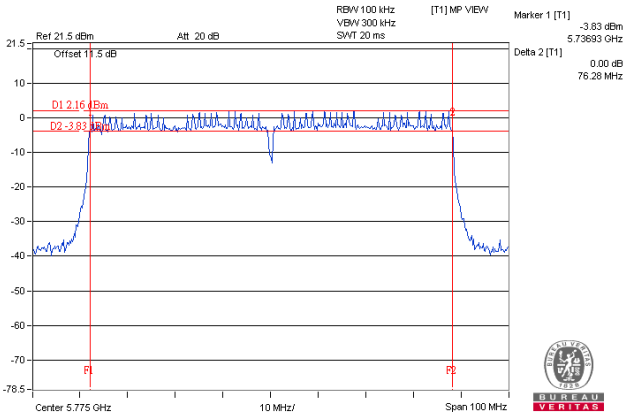
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	17.66	17.66	17.67	17.65	0.5	Pass
157	5785	17.65	17.64	17.67	17.63	0.5	Pass
165	5825	17.65	17.67	17.68	17.65	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	36.48	36.41	36.49	36.41	0.5	Pass
159	5795	36.42	36.40	36.46	36.35	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	76.32	76.45	76.42	76.28	0.5	Pass

Spectrum Plot of Worst Value	
802.11a / Chain 0 : CH165	**802.11ac(VHT20) / Chain 3 : CH157**
	
802.11ac(VHT40) / Chain 3 : CH159	**802.11ac(VHT80) / Chain 3 : CH155**
	

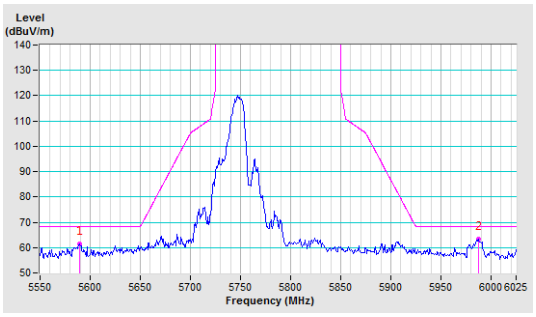
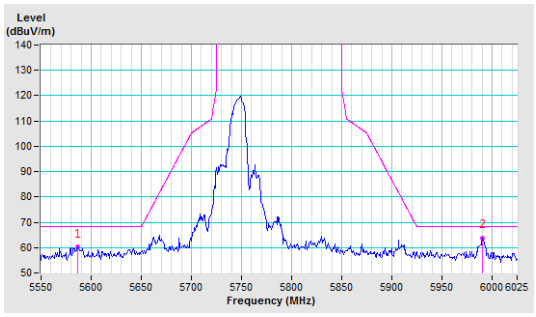
5 Pictures of Test Arrangements

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

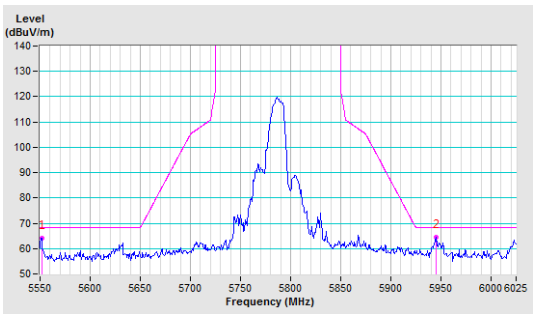
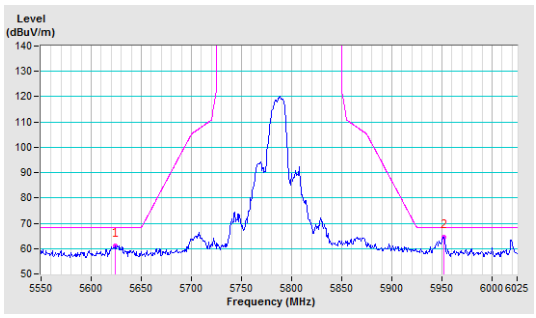
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

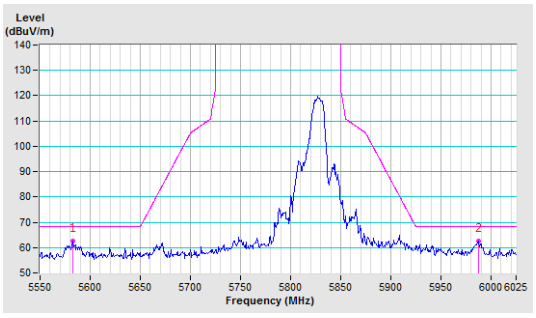
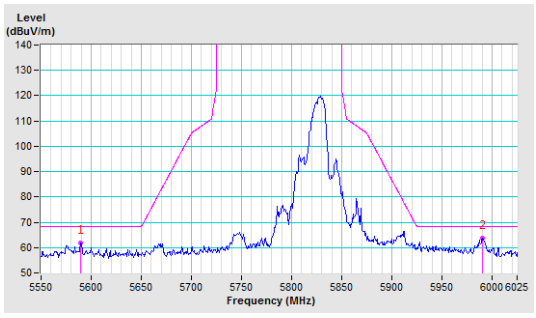
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

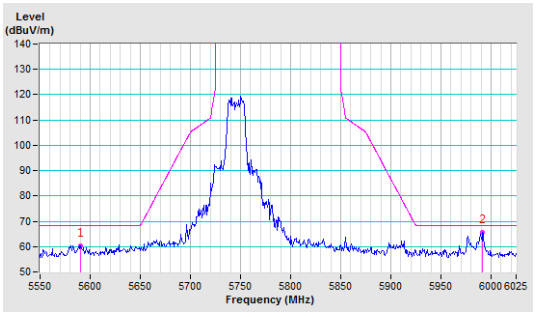
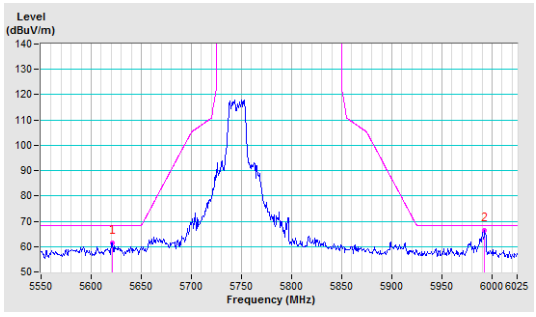
Horizontal	Vertical
	

CH 165 5825 MHz

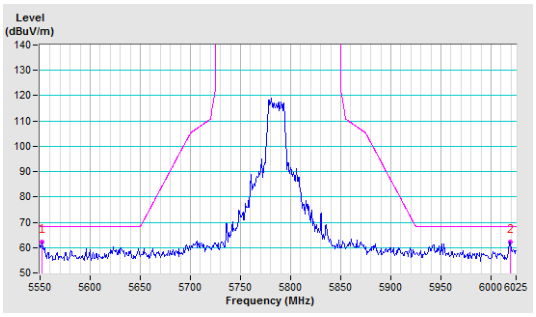
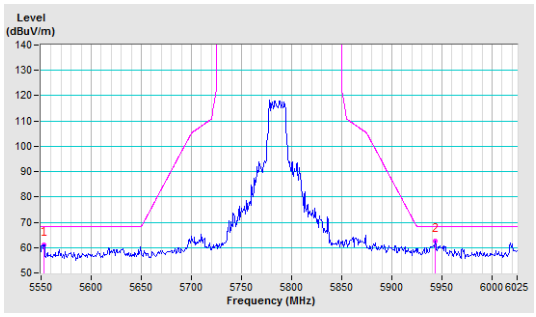
Horizontal	Vertical
	

802.11ac (VHT20)

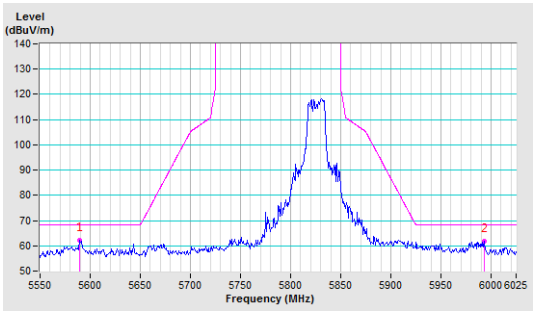
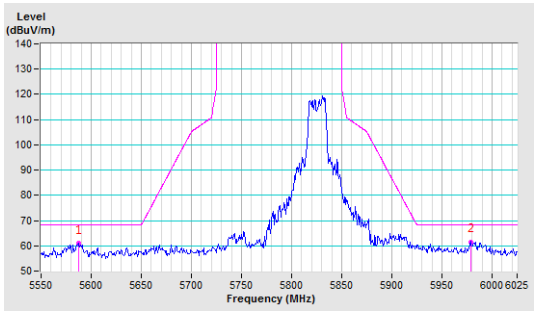
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

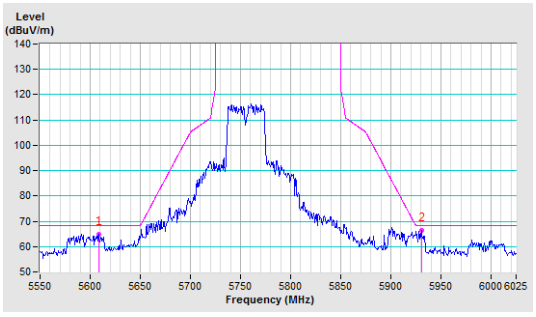
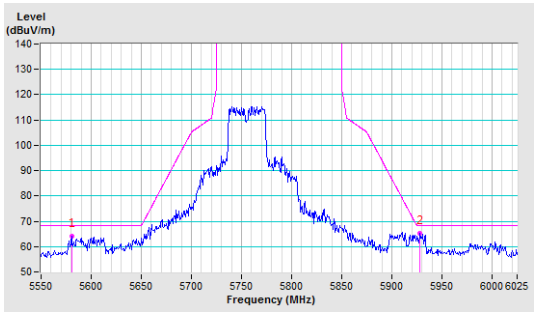
Horizontal	Vertical
	

CH 165 5825 MHz

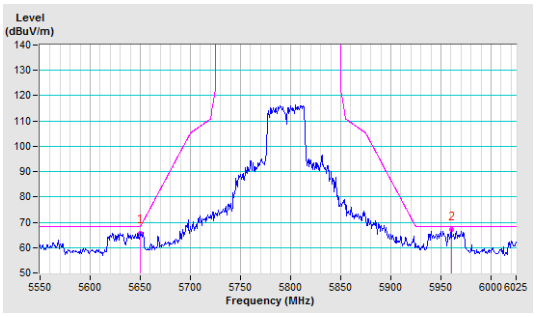
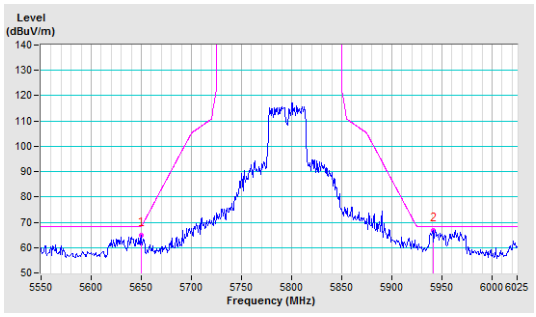
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

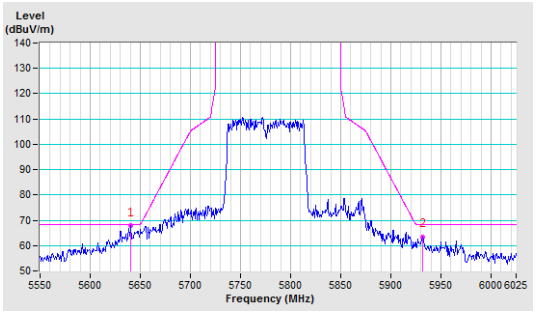
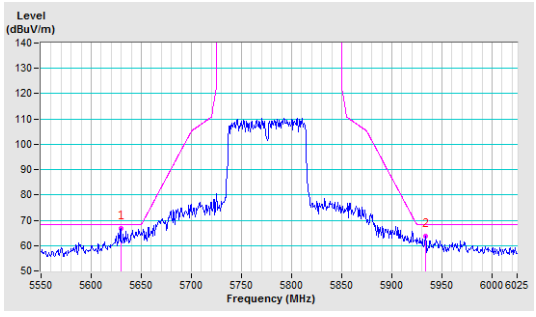
Horizontal	Vertical
	

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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Tel: 886-2-26052180
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Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
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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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