

FCC Test Report

Report No.: RF160119C37-1

FCC ID: GZ5NVG3XXX

Test Model: NVG348BQR2

Series Model: NVG343QR2, NVG343BQR2, NVG348QR2, NVG363Q, NVG368Q

Received Date: Jan. 19, 2016

Test Date: Feb. 26 to Mar. 08, 2016

Issued Date: Apr. 21, 2016

Applicant: ARRIS GROUP, INC.

Address: 2500 Walsh Ave. Santa Clara, CA 95051, United States

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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A D T

Release Control Record

Issue No.	Description	Date Issued
RF160119C37-1	Original release.	Apr. 21, 2016



A D T

1 Certificate of Conformity

Product: VDSL Gateway

Brand: **ARRIS**

Test Model: NVG348BQR2

Series Model: NVG343QR2, NVG343BQR2, NVG348QR2, NVG363Q, NVG368Q

Sample Status: ENGINEERING SAMPLE

Applicant: ARRIS GROUP, INC.

Test Date: Feb. 26 to Mar. 08, 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 : C. C., **Date:** Apr. 21, 2016
Claire Kuan / Specialist

Approved by : May Chen, **Date:** Apr. 21, 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 -7.36dB at 1.33203MHz.
15.407(b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5725.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF) not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.40 dB
	6GHz ~ 18GHz	3.73 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	VDSL Gateway
Brand	ARRIS
Test Model	NVG348BQR2
Series Model	NVG343QR2, NVG343BQR2, NVG348QR2, NVG363Q, NVG368Q
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 12V from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
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	For 15.407 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	For 15.407 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	For 15.407 5.18 ~ 5.24GHz CDD Mode 802.11a: 264.883mW 802.11ac (VHT20): 237.118mW 802.11ac (VHT40): 235.906mW 802.11ac (VHT80): 176.292mW Beamforming Mode 802.11ac (VHT20): 237.118mW 802.11ac (VHT40): 235.906mW 802.11ac (VHT80): 176.292mW 5.745 ~ 5.825GHz CDD Mode 802.11a: 599.069mW 802.11ac (VHT20): 584.116mW 802.11ac (VHT40): 237.02mW 802.11ac (VHT80): 97.223mW Beamforming Mode 802.11ac (VHT20): 262.978mW 802.11ac (VHT40): 237.02mW 802.11ac (VHT80): 97.223mW
	For 15.247 802.11b: 78.705mW CDD Mode 802.11g: 514.08mW 802.11n (HT20): 455.328mW 802.11n (HT40): 344.789mW

Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1 Stand x1 (Brand : FOXCONN / Model: 447.00105.005)
Data Cable Supplied	Refer to Note

Note:

- 2.4GHz and 5GHz technology can transmit at same time.
- All models are listed as below.

Model	NVG343QR2	NVG343BQR2	NVG348QR2	NVG348BQR2	NVG363Q	NVG368Q
xDSL	V	V	V	V	X	X
Bonding	X	V	X	V	X	X
VoIP	X	X	V	V	X	V
2.4G Wi-Fi	V	V	V	V	V	V
5G Wi-Fi	V	V	V	V	V	V

From the above models, model: **NVG348BQR2** was selected as representative model for the test and its data was recorded in this report.

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

2.4GHz								
Transmitter Circuit	Brand	Model No.	Ant. Gain (dBi) Including cable loss	Frequency Range (MHz to MHz)	Antenna Type	Connector Type	Cable Loss(dB)	Cable Length (mm)
Chain (0)	FIT	CZZ04-EF_X3	2.3	2400 to 2500	Dipole	i-pex(MHF)	NA	45
Chain (1)	FIT	CZZ05-EF_X3	2.71	2400 to 2500	Dipole	i-pex(MHF)	NA	120
5GHz								
Transmitter Circuit	Brand	Model No.	Ant. Gain (dBi) Including cable loss	Frequency Range (MHz to MHz)	Antenna Type	Connector Type	Cable Loss(dB)	Cable Length (mm)
Chain (0)	FIT	CZZ03-EF_X3	6.36	5150 to 5850	Dipole	i-pex(MHF)	NA	200
Chain (1)	FIT	CZZ02-EF_X3	5.01	5150 to 5850	Dipole	i-pex(MHF)	NA	230
Chain (2)	FIT	CZZ01-EF_X3	4.38	5150 to 5850	Dipole	i-pex(MHF)	NA	275
Chain (3)	FIT	CZZ00-EF_X3	6.97	5150 to 5850	Dipole	i-pex(MHF)	NA	305

- The data cables of EUT information are as below:

Data cable	Brand	Model No.	Description
Ethernet Cable	NIEN-YI	NYS1097	2m, unshielded
RJ14 Cable	WHA YU	C107-421195-A	4.5m, unshielded
RJ14 Cable	NIEN-YI	NYS1131	4.5m, unshielded
RJ11 Cable	NIEN-YI	NYS0833	2m, unshielded
RJ14 Y Cable	FOXCONN	CT64A01T62-001-EF	0.3m, unshielded

5. The EUT power needs to be supplied from power adapters, the information is as below table:

No.	Brand	Model No.	Spec.
1	Ktec	KSASB0241200200VU	Input: 100-120Vac, 0.6A, 50/60Hz Output: 12V, 2.0A DC cable: 2.0m, unshielded
2	HOIOTO	ADS-25FSG-12 12024EPCU-L	Input: 100-120Vac, 0.6A, 50/60Hz Output: 12V, 2.0A DC cable: 2.0m, unshielded

For radiated test, the EUT was pre-tested with adapter 1 & 2, the worst case was found in adapter 1. Therefore only the test data of the adapter 1 was recorded in this report.

6. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX (Fixed Chain 0)	1RX (Fixed Chain 0)
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
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
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS0~8 Nss=1	4TX	4RX
	MCS0~8 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~8 Nss=4	4TX	4RX
802.11ac (VHT40)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX
802.11ac (VHT80)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX

Note. : 1. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. All of modulation mode support beamforming function except 2.4GHz and 802.11a modulation mode.

7. The emission of the simultaneous operation (2.4GHz & 5GHz) has been evaluated and no non-compliance was found.

8. 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 $\geq$ 1G	RE<1G	PLC	APCM	
1	√	√	√	√	With Adapter 1
2	-	-	√	-	With Adapter 2

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz
APCM: Antenna Port Conducted Measurement

NOTE: "-" means no effect.

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)
802.11a	5745-5825	149 to 165	157	OFDM	BPSK	6

Power Line Conducted Emission Test:

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

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	157	OFDM	BPSK	6

Transmit Power 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						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Peak Power Spectral Density, 6dB Bandwidth 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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY	TEST LOCATION
RE $\geq$ 1G	21deg. C, 70%RH	120Vac, 60Hz	Gary Cheng	2
RE<1G	21deg. C, 68%RH	120Vac, 60Hz	Gary Cheng	2
PLC	20deg. C, 63%RH	120Vac, 60Hz	Timmy Hu	2
APCM	17deg. C, 64%RH	120Vac, 60Hz	Anderson Chen	1

3.3 Duty Cycle of Test Signal

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

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

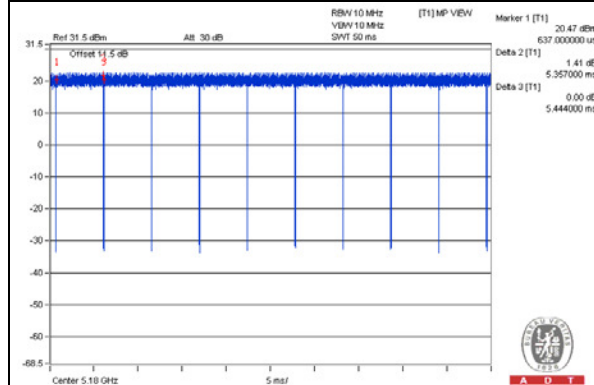
802.11a: Duty cycle = $5.357 \text{ ms} / 5.444 \text{ ms} = 0.984$

802.11ac (VHT20): Duty cycle = $4.964 \text{ ms} / 5.052 \text{ ms} = 0.983$

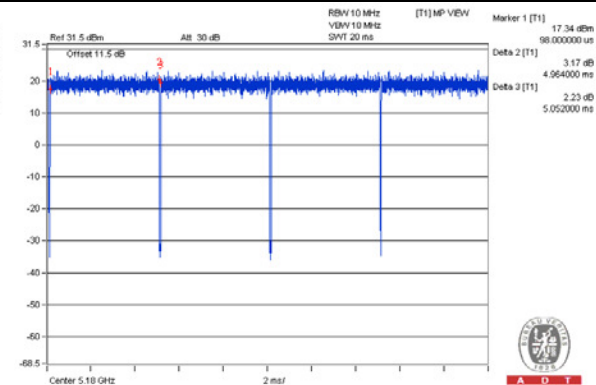
802.11ac (VHT40): Duty cycle = $2.42 \text{ ms} / 2.469 \text{ ms} = 0.98$

802.11ac (VHT80): Duty cycle = $1.139 \text{ ms} / 1.208 \text{ ms} = 0.943$, Duty factor = $10 * \log(1/0.943) = 0.26$

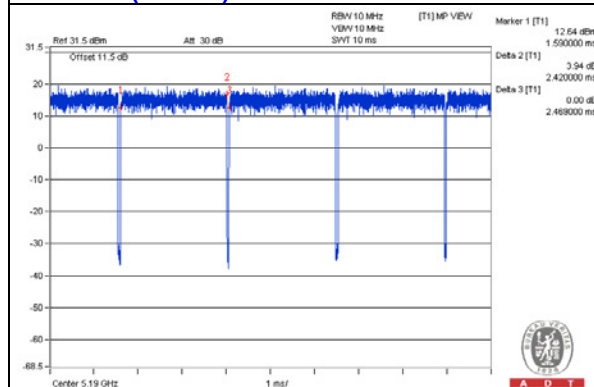
802.11a



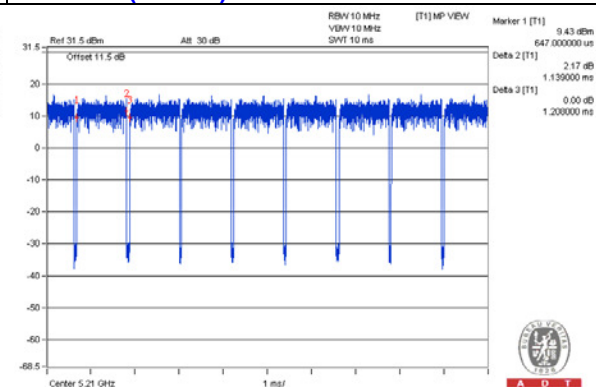
802.11ac (VHT20)



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.

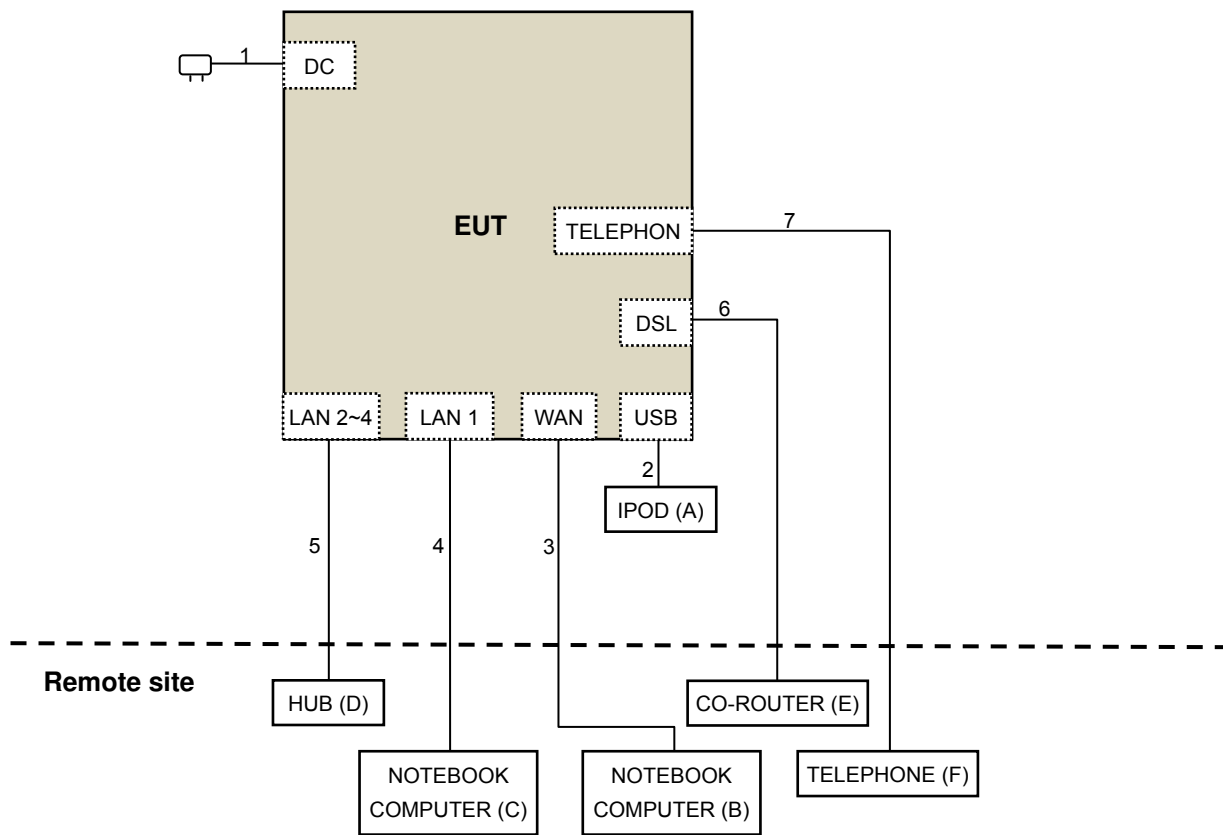
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	IPOD	Apple	MD778TA/A	CC4JG680F4T1	NA	Provided by Lab
B.	NOTEBOOK COMPUTER	DELL	E5430	4YV4VY1	FCC DoC	Provided by Lab
C.	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
D.	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab
E.	CO-ROUTER	ZyXEL	IES-1000	S08024701597	FCC DoC	Provided by Lab
F.	TELEPHONE	WONDER	WD-303	7C17KA 06072	N/A	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC	1	2	No	0	Supplied by client
2.	USB	1	0.1	Yes	0	Provided by Lab
3.	RJ-45	1	10	No	0	Provided by Lab
4.	RJ-45	1	10	No	0	Provided by Lab
5.	RJ-45	3	10	No	0	Provided by Lab
6.	RJ-11	1	10	No	0	Provided by Lab
7.	RJ-11	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 v01r02

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedure New Rules v01r02	FIELD STRENGTH AT 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) ^{*1} PK:-17 (dBm/MHz) ^{*2}	PK: 68.2(dBuV/m) ^{*1} PK:78.2 (dBuV/m) ^{*2}

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

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 12, 2015	Aug. 11, 2016
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-07	May 08, 2015	May 07, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	138	Jan. 18, 2016	Jan. 17, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 03, 2015	Apr. 02, 2016
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Jan. 20, 2016	Jan. 19, 2017
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 06, 2015	Apr. 05, 2016
RF Cable	EMC104-SM- SM-2000 EMC104-SM- SM-5000 EMC104-SM- SM-5000	150317 150321 150322	Mar. 31, 2015	Mar. 30, 2016
Spectrum Analyzer Keysight	N9030A	MY54490520	July 26, 2015	July 25, 2016
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 CT	NA	NA	NA	NA
Power Meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
Spectrum Analyzer R&S	FSP40	100060	May 08, 2015	May 07, 2016
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Dec. 03, 2015	Dec. 02, 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.
*The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. The FCC Site Registration No. is 147459
4. The CANADA Site Registration No. is 20331-1
5. Tested Date: Feb. 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:

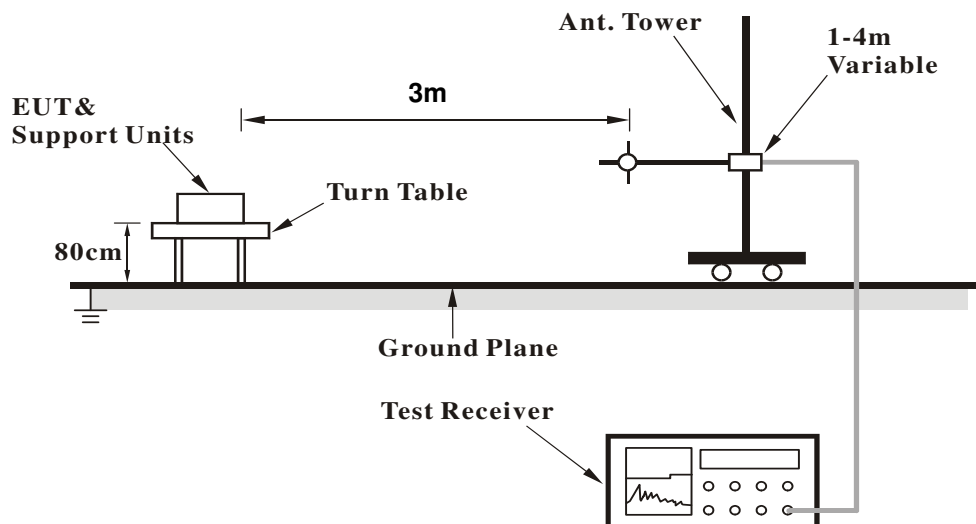
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

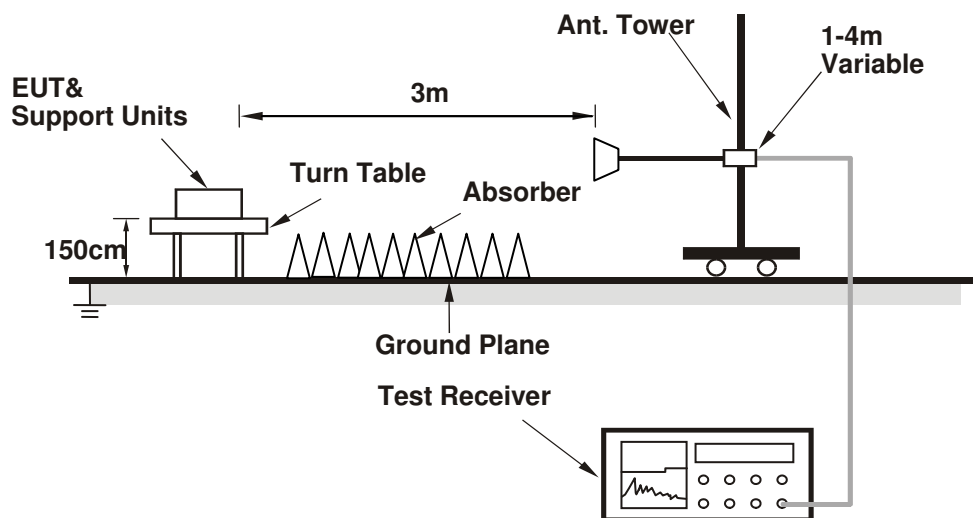
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Condition

- Connected the EUT with the support unit B-C (Notebook Computer) which is placed on remote site.
- Contorlling software (Mtool.exe [V2.0.1.8]) has been activated to set the EUT on specific status.

4.1.7 Test Results

ABOVE 1GHz DATA :

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.4 PK	74.0	-10.6	2.58 H	176	55.07	8.33
2	5150.00	47.8 AV	54.0	-6.2	2.58 H	176	39.47	8.33
3	*5180.00	114.6 PK			2.58 H	176	106.13	8.47
4	*5180.00	104.3 AV			2.58 H	176	95.83	8.47
5	#10360.00	54.6 PK	74.0	-19.4	1.04 H	15	40.10	14.50
6	#10360.00	43.2 AV	54.0	-10.8	1.04 H	15	28.70	14.50
7	15540.00	50.3 PK	74.0	-23.7	2.46 H	254	31.62	18.68
8	15540.00	39.6 AV	54.0	-14.4	2.46 H	254	20.92	18.68
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.1 PK	74.0	-11.9	3.53 V	237	53.77	8.33
2	5150.00	46.3 AV	54.0	-7.7	3.53 V	237	37.97	8.33
3	*5180.00	111.6 PK			3.53 V	237	103.13	8.47
4	*5180.00	101.3 AV			3.53 V	237	92.83	8.47
5	#10360.00	51.7 PK	74.0	-22.3	2.74 V	16	37.20	14.50
6	#10360.00	41.9 AV	54.0	-12.1	2.74 V	16	27.40	14.50
7	15540.00	49.9 PK	74.0	-24.1	2.54 V	166	31.22	18.68
8	15540.00	39.1 AV	54.0	-14.9	2.54 V	166	20.42	18.68

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	115.1 PK			2.54 H	160	106.56	8.54
2	*5200.00	104.5 AV			2.54 H	160	95.96	8.54
3	#10400.00	54.1 PK	74.0	-19.9	1.07 H	17	39.50	14.60
4	#10400.00	42.8 AV	54.0	-11.2	1.07 H	17	28.20	14.60
5	15600.00	50.2 PK	74.0	-23.8	2.43 H	249	31.30	18.90
6	15600.00	39.3 AV	54.0	-14.7	2.43 H	249	20.40	18.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	111.8 PK			3.52 V	237	103.26	8.54
2	*5200.00	101.2 AV			3.52 V	237	92.66	8.54
3	#10400.00	51.7 PK	74.0	-22.3	2.73 V	22	37.10	14.60
4	#10400.00	41.7 AV	54.0	-12.3	2.73 V	22	27.10	14.60
5	15600.00	50.0 PK	74.0	-24.0	2.56 V	164	31.10	18.90
6	15600.00	39.5 AV	54.0	-14.5	2.56 V	164	20.60	18.90

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	113.2 PK			2.61 H	156	104.60	8.60
2	*5240.00	104.1 AV			2.61 H	156	95.50	8.60
3	5403.50	58.3 PK	74.0	-15.7	2.61 H	156	49.37	8.93
4	5403.50	48.1 AV	54.0	-5.9	2.61 H	156	39.17	8.93
5	#10480.00	54.2 PK	74.0	-19.8	1.09 H	20	39.73	14.47
6	#10480.00	42.9 AV	54.0	-11.1	1.09 H	20	28.43	14.47
7	15720.00	49.7 PK	74.0	-24.3	2.48 H	249	30.66	19.04
8	15720.00	39.1 AV	54.0	-14.9	2.48 H	249	20.06	19.04
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	111.2 PK			3.58 V	224	102.60	8.60
2	*5240.00	101.0 AV			3.58 V	224	92.40	8.60
3	5403.50	55.5 PK	74.0	-18.5	3.58 V	224	46.57	8.93
4	5403.50	45.4 AV	54.0	-8.6	3.58 V	224	36.47	8.93
5	#10480.00	52.0 PK	74.0	-22.0	2.79 V	4	37.53	14.47
6	#10480.00	42.1 AV	54.0	-11.9	2.79 V	4	27.63	14.47
7	15720.00	49.9 PK	74.0	-24.1	2.57 V	153	30.86	19.04
8	15720.00	39.1 AV	54.0	-14.9	2.57 V	153	20.06	19.04

REMARKS:

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

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	66.5 PK	74.0	-7.5	2.11 H	172	56.82	9.68
2	#5715.00	48.6 AV	54.0	-5.4	2.11 H	172	38.92	9.68
3	#5725.00	78.0 PK	78.2	-0.2	2.11 H	172	68.30	9.70
4	*5745.00	114.1 PK			2.11 H	172	104.34	9.76
5	*5745.00	104.0 AV			2.11 H	172	94.24	9.76
6	11490.00	54.2 PK	74.0	-19.8	1.04 H	4	39.34	14.86
7	11490.00	43.0 AV	54.0	-11.0	1.04 H	4	28.14	14.86
8	#17235.00	49.7 PK	74.0	-24.3	2.46 H	241	26.47	23.23
9	#17235.00	38.9 AV	54.0	-15.1	2.46 H	241	15.67	23.23

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	#5715.00	64.2 PK	74.0	-9.8	3.59 V	236	54.52	9.68
2	#5715.00	46.1 AV	54.0	-7.9	3.59 V	236	36.42	9.68
3	#5725.00	75.6 PK	78.2	-2.6	3.59 V	236	65.90	9.70
4	*5745.00	111.7 PK			3.59 V	236	101.94	9.76
5	*5745.00	101.5 AV			3.59 V	236	91.74	9.76
6	11490.00	52.5 PK	74.0	-21.5	2.82 V	0	37.64	14.86
7	11490.00	42.3 AV	54.0	-11.7	2.82 V	0	27.44	14.86
8	#17235.00	50.1 PK	74.0	-23.9	2.55 V	164	26.87	23.23
9	#17235.00	39.5 AV	54.0	-14.5	2.55 V	164	16.27	23.23

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	64.0 PK	74.0	-10.0	2.01 H	172	54.32	9.68
2	#5715.00	48.9 AV	54.0	-5.1	2.01 H	172	39.22	9.68
3	#5725.00	67.0 PK	78.2	-11.2	2.01 H	172	57.30	9.70
4	*5785.00	118.8 PK			2.01 H	172	108.95	9.85
5	*5785.00	109.0 AV			2.01 H	172	99.15	9.85
6	#5850.00	66.0 PK	78.2	-12.2	2.01 H	172	56.08	9.92
7	#5944.80	60.2 PK	74.0	-13.8	2.01 H	172	50.05	10.15
8	#5944.80	48.8 AV	54.0	-5.2	2.01 H	172	38.65	10.15
9	11570.00	60.3 PK	74.0	-13.7	1.08 H	18	45.10	15.20
10	11570.00	50.4 AV	54.0	-3.6	1.08 H	18	35.20	15.20
11	#17355.00	55.8 PK	74.0	-18.2	2.43 H	254	32.24	23.56
12	#17355.00	44.4 AV	54.0	-9.6	2.43 H	254	20.84	23.56

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	#5715.00	61.2 PK	74.0	-12.8	3.62 V	239	51.52	9.68
2	#5715.00	46.5 AV	54.0	-7.5	3.62 V	239	36.82	9.68
3	#5725.00	64.7 PK	78.2	-13.5	3.62 V	239	55.00	9.70
4	*5785.00	116.5 PK			3.62 V	239	106.65	9.85
5	*5785.00	106.4 AV			3.62 V	239	96.55	9.85
6	#5850.00	63.3 PK	78.2	-14.9	3.62 V	239	53.38	9.92
7	#5944.80	57.7 PK	74.0	-16.3	3.62 V	239	47.55	10.15
8	#5944.80	46.8 AV	54.0	-7.2	3.62 V	239	36.65	10.15
9	11570.00	59.3 PK	74.0	-14.7	2.87 V	14	44.10	15.20
10	11570.00	48.6 AV	54.0	-5.4	2.87 V	14	33.40	15.20
11	#17355.00	56.2 PK	74.0	-17.8	2.60 V	155	32.64	23.56
12	#17355.00	44.5 AV	54.0	-9.5	2.60 V	155	20.94	23.56

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	115.1 PK			2.05 H	173	105.19	9.91
2	*5825.00	105.8 AV			2.05 H	173	95.89	9.91
3	#5850.00	77.7 PK	78.2	-0.5	2.05 H	173	67.78	9.92
4	#5860.00	68.0 PK	74.0	-6.0	2.05 H	173	58.07	9.93
5	#5860.00	53.8 AV	54.0	-0.2	2.05 H	173	43.87	9.93
6	11650.00	56.3 PK	74.0	-17.7	1.05 H	9	40.90	15.40
7	11650.00	45.4 AV	54.0	-8.6	1.05 H	9	30.00	15.40
8	#17475.00	51.4 PK	74.0	-22.6	2.45 H	256	27.31	24.09
9	#17475.00	40.4 AV	54.0	-13.6	2.45 H	256	16.31	24.09

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	112.5 PK			3.65 V	230	102.59	9.91
2	*5825.00	103.2 AV			3.65 V	230	93.29	9.91
3	#5850.00	75.1 PK	78.2	-3.1	3.65 V	230	65.18	9.92
4	#5860.00	64.6 PK	74.0	-9.4	3.65 V	230	54.67	9.93
5	#5860.00	51.3 AV	54.0	-2.7	3.65 V	230	41.37	9.93
6	11650.00	54.6 PK	74.0	-19.4	2.90 V	17	39.20	15.40
7	11650.00	44.4 AV	54.0	-9.6	2.90 V	17	29.00	15.40
8	#17475.00	52.4 PK	74.0	-21.6	2.65 V	140	28.31	24.09
9	#17475.00	41.5 AV	54.0	-12.5	2.65 V	140	17.41	24.09

REMARKS:

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

802.11ac (VHT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.3 PK	74.0	-13.7	2.35 H	168	51.97	8.33
2	5150.00	46.8 AV	54.0	-7.2	2.35 H	168	38.47	8.33
3	*5180.00	113.5 PK			2.35 H	168	105.03	8.47
4	*5180.00	102.8 AV			2.35 H	168	94.33	8.47
5	#10360.00	55.2 PK	74.0	-18.8	1.02 H	18	40.70	14.50
6	#10360.00	43.5 AV	54.0	-10.5	1.02 H	18	29.00	14.50
7	15540.00	50.0 PK	74.0	-24.0	2.48 H	247	31.32	18.68
8	15540.00	39.4 AV	54.0	-14.6	2.48 H	247	20.72	18.68
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	52.6 PK	74.0	-21.4	1.73 V	241	44.27	8.33
2	5150.00	39.7 AV	54.0	-14.3	1.73 V	241	31.37	8.33
3	*5180.00	110.8 PK			1.73 V	241	102.33	8.47
4	*5180.00	99.7 AV			1.73 V	241	91.23	8.47
5	#10360.00	52.2 PK	74.0	-21.8	2.75 V	9	37.70	14.50
6	#10360.00	42.3 AV	54.0	-11.7	2.75 V	9	27.80	14.50
7	15540.00	50.5 PK	74.0	-23.5	2.53 V	166	31.82	18.68
8	15540.00	39.5 AV	54.0	-14.5	2.53 V	166	20.82	18.68

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	113.5 PK			2.34 H	155	104.96	8.54
2	*5200.00	102.9 AV			2.34 H	155	94.36	8.54
3	#10400.00	53.8 PK	74.0	-20.2	1.11 H	5	39.20	14.60
4	#10400.00	42.6 AV	54.0	-11.4	1.11 H	5	28.00	14.60
5	15600.00	50.5 PK	74.0	-23.5	2.37 H	233	31.60	18.90
6	15600.00	39.5 AV	54.0	-14.5	2.37 H	233	20.60	18.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	110.7 PK			1.72 V	232	102.16	8.54
2	*5200.00	99.4 AV			1.72 V	232	90.86	8.54
3	#10400.00	51.3 PK	74.0	-22.7	2.72 V	2	36.70	14.60
4	#10400.00	41.7 AV	54.0	-12.3	2.72 V	2	27.10	14.60
5	15600.00	49.9 PK	74.0	-24.1	2.56 V	164	31.00	18.90
6	15600.00	39.4 AV	54.0	-14.6	2.56 V	164	20.50	18.90

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	113.9 PK			2.55 H	161	105.30	8.60
2	*5240.00	103.2 AV			2.55 H	161	94.60	8.60
3	5350.00	57.7 PK	74.0	-16.3	2.55 H	161	48.90	8.80
4	5350.00	47.2 AV	54.0	-6.8	2.55 H	161	38.40	8.80
5	#10480.00	55.0 PK	74.0	-19.0	1.06 H	30	40.53	14.47
6	#10480.00	43.4 AV	54.0	-10.6	1.06 H	30	28.93	14.47
7	15720.00	50.7 PK	74.0	-23.3	2.46 H	242	31.66	19.04
8	15720.00	39.9 AV	54.0	-14.1	2.46 H	242	20.86	19.04
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.7 PK			1.79 V	248	102.10	8.60
2	*5240.00	99.6 AV			1.79 V	248	91.00	8.60
3	5350.00	54.5 PK	74.0	-19.5	1.79 V	248	45.70	8.80
4	5350.00	44.6 AV	54.0	-9.4	1.79 V	248	35.80	8.80
5	#10480.00	51.8 PK	74.0	-22.2	2.71 V	12	37.33	14.47
6	#10480.00	42.0 AV	54.0	-12.0	2.71 V	12	27.53	14.47
7	15720.00	50.0 PK	74.0	-24.0	2.58 V	175	30.96	19.04
8	15720.00	39.3 AV	54.0	-14.7	2.58 V	175	20.26	19.04

REMARKS:

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

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	70.5 PK	74.0	-3.5	1.10 H	8	60.82	9.68
2	#5715.00	52.0 AV	54.0	-2.0	1.10 H	8	42.32	9.68
3	#5725.00	78.1 PK	78.2	-0.1	1.10 H	8	68.40	9.70
4	*5745.00	114.7 PK			1.10 H	8	104.94	9.76
5	*5745.00	104.1 AV			1.10 H	8	94.34	9.76
6	11490.00	55.1 PK	74.0	-18.9	1.02 H	14	40.24	14.86
7	11490.00	43.7 AV	54.0	-10.3	1.02 H	14	28.84	14.86
8	#17235.00	50.8 PK	74.0	-23.2	2.49 H	244	27.57	23.23
9	#17235.00	39.8 AV	54.0	-14.2	2.49 H	244	16.57	23.23

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	#5715.00	67.4 PK	74.0	-6.6	1.78 V	235	57.72	9.68
2	#5715.00	49.1 AV	54.0	-4.9	1.78 V	235	39.42	9.68
3	#5725.00	74.6 PK	78.2	-3.6	1.78 V	235	64.90	9.70
4	*5745.00	111.4 PK			1.78 V	235	101.64	9.76
5	*5745.00	100.5 AV			1.78 V	235	90.74	9.76
6	11490.00	51.4 PK	74.0	-22.6	2.69 V	3	36.54	14.86
7	11490.00	41.7 AV	54.0	-12.3	2.69 V	3	26.84	14.86
8	#17235.00	49.4 PK	74.0	-24.6	2.58 V	152	26.17	23.23
9	#17235.00	38.7 AV	54.0	-15.3	2.58 V	152	15.47	23.23

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	70.3 PK	74.0	-3.7	1.20 H	9	60.62	9.68
2	#5715.00	50.7 AV	54.0	-3.3	1.20 H	9	41.02	9.68
3	#5725.00	71.0 PK	78.2	-7.2	1.20 H	9	61.30	9.70
4	*5785.00	119.1 PK			1.20 H	9	109.25	9.85
5	*5785.00	108.5 AV			1.20 H	9	98.65	9.85
6	#5850.00	66.8 PK	78.2	-11.4	1.20 H	9	56.88	9.92
7	#5944.80	60.6 PK	74.0	-13.4	1.20 H	9	50.45	10.15
8	#5944.80	51.0 AV	54.0	-3.0	1.20 H	9	40.85	10.15
9	11570.00	59.9 PK	74.0	-14.1	1.13 H	15	44.70	15.20
10	11570.00	50.1 AV	54.0	-3.9	1.13 H	15	34.90	15.20
11	#17355.00	55.6 PK	74.0	-18.4	2.44 H	256	32.04	23.56
12	#17355.00	44.4 AV	54.0	-9.6	2.44 H	256	20.84	23.56

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	#5715.00	67.4 PK	74.0	-6.6	3.63 V	252	57.72	9.68
2	#5715.00	47.6 AV	54.0	-6.4	3.63 V	252	37.92	9.68
3	#5725.00	68.2 PK	78.2	-10.0	3.63 V	252	58.50	9.70
4	*5785.00	115.6 PK			3.63 V	252	105.75	9.85
5	*5785.00	106.2 AV			3.63 V	252	96.35	9.85
6	#5850.00	64.2 PK	78.2	-14.0	3.63 V	252	54.28	9.92
7	#5944.80	57.4 PK	74.0	-16.6	3.63 V	252	47.25	10.15
8	#5944.80	48.4 AV	54.0	-5.6	3.63 V	252	38.25	10.15
9	11570.00	59.2 PK	74.0	-14.8	2.89 V	9	44.00	15.20
10	11570.00	48.7 AV	54.0	-5.3	2.89 V	9	33.50	15.20
11	#17355.00	56.3 PK	74.0	-17.7	2.55 V	168	32.74	23.56
12	#17355.00	44.7 AV	54.0	-9.3	2.55 V	168	21.14	23.56

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	114.8 PK			1.19 H	10	104.89	9.91
2	*5825.00	104.5 AV			1.19 H	10	94.59	9.91
3	#5850.00	74.6 PK	78.2	-3.6	1.19 H	10	64.68	9.92
4	#5860.00	69.3 PK	74.0	-4.7	1.19 H	10	59.37	9.93
5	#5860.00	53.2 AV	54.0	-0.8	1.19 H	10	43.27	9.93
6	11650.00	54.8 PK	74.0	-19.2	1.06 H	42	39.40	15.40
7	11650.00	43.5 AV	54.0	-10.5	1.06 H	42	28.10	15.40
8	#17475.00	50.8 PK	74.0	-23.2	2.45 H	229	26.71	24.09
9	#17475.00	40.1 AV	54.0	-13.9	2.45 H	229	16.01	24.09

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	111.7 PK			3.61 V	242	101.79	9.91
2	*5825.00	101.4 AV			3.61 V	242	91.49	9.91
3	#5850.00	71.4 PK	78.2	-6.8	3.61 V	242	61.48	9.92
4	#5860.00	66.1 PK	74.0	-7.9	3.61 V	242	56.17	9.93
5	#5860.00	50.4 AV	54.0	-3.6	3.61 V	242	40.47	9.93
6	11650.00	51.6 PK	74.0	-22.4	2.75 V	12	36.20	15.40
7	11650.00	41.7 AV	54.0	-12.3	2.75 V	12	26.30	15.40
8	#17475.00	50.5 PK	74.0	-23.5	2.52 V	177	26.41	24.09
9	#17475.00	39.5 AV	54.0	-14.5	2.52 V	177	15.41	24.09

REMARKS:

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

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.3 PK	74.0	-4.7	2.71 H	168	60.97	8.33
2	5150.00	53.5 AV	54.0	-0.5	2.71 H	168	45.17	8.33
3	*5190.00	110.1 PK			2.71 H	168	101.60	8.50
4	*5190.00	99.6 AV			2.71 H	168	91.10	8.50
5	5350.00	57.1 PK	74.0	-16.9	2.71 H	168	48.30	8.80
6	5350.00	51.1 AV	54.0	-2.9	2.71 H	168	42.30	8.80
7	#10380.00	52.4 PK	74.0	-21.6	1.10 H	27	37.85	14.55
8	#10380.00	41.4 AV	54.0	-12.6	1.10 H	27	26.85	14.55
9	15570.00	50.5 PK	74.0	-23.5	2.43 H	222	31.71	18.79
10	15570.00	39.7 AV	54.0	-14.3	2.43 H	222	20.91	18.79
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.5 PK	74.0	-7.5	3.66 V	230	58.17	8.33
2	5150.00	50.2 AV	54.0	-3.8	3.66 V	230	41.87	8.33
3	*5190.00	107.1 PK			3.66 V	230	98.60	8.50
4	*5190.00	96.4 AV			3.66 V	230	87.90	8.50
5	5350.00	54.4 PK	74.0	-19.6	3.66 V	230	45.60	8.80
6	5350.00	48.1 AV	54.0	-5.9	3.66 V	230	39.30	8.80
7	#10380.00	49.4 PK	74.0	-24.6	2.76 V	16	34.85	14.55
8	#10380.00	39.6 AV	54.0	-14.4	2.76 V	16	25.05	14.55
9	15570.00	50.3 PK	74.0	-23.7	2.47 V	164	31.51	18.79
10	15570.00	39.2 AV	54.0	-14.8	2.47 V	164	20.41	18.79

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	109.7 PK			2.74 H	161	101.11	8.59
2	*5230.00	99.8 AV			2.74 H	161	91.21	8.59
3	5392.00	56.0 PK	74.0	-18.0	2.74 H	161	47.10	8.90
4	5392.00	45.7 AV	54.0	-8.3	2.74 H	161	36.80	8.90
5	#10460.00	52.5 PK	74.0	-21.5	1.16 H	22	37.99	14.51
6	#10460.00	41.7 AV	54.0	-12.3	1.16 H	22	27.19	14.51
7	15690.00	50.6 PK	74.0	-23.4	2.38 H	227	31.63	18.97
8	15690.00	40.0 AV	54.0	-14.0	2.38 H	227	21.03	18.97
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	107.3 PK			3.62 V	228	98.71	8.59
2	*5230.00	96.4 AV			3.62 V	228	87.81	8.59
3	5392.00	53.4 PK	74.0	-20.6	3.62 V	228	44.50	8.90
4	5392.00	41.5 AV	54.0	-12.5	3.62 V	228	32.60	8.90
5	#10460.00	49.2 PK	74.0	-24.8	2.70 V	9	34.69	14.51
6	#10460.00	39.7 AV	54.0	-14.3	2.70 V	9	25.19	14.51
7	15690.00	49.8 PK	74.0	-24.2	2.44 V	177	30.83	18.97
8	15690.00	38.8 AV	54.0	-15.2	2.44 V	177	19.83	18.97

REMARKS:

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

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	72.3 PK	74.0	-1.7	2.07 H	45	62.62	9.68
2	#5715.00	53.2 AV	54.0	-0.8	2.07 H	45	43.52	9.68
3	#5725.00	72.6 PK	78.2	-5.6	2.07 H	45	62.90	9.70
4	*5755.00	109.4 PK			2.07 H	45	99.63	9.77
5	*5755.00	99.0 AV			2.07 H	45	89.23	9.77
6	11510.00	51.3 PK	74.0	-22.7	1.13 H	12	36.45	14.85
7	11510.00	40.2 AV	54.0	-13.8	1.13 H	12	25.35	14.85
8	#17265.00	50.0 PK	74.0	-24.0	2.45 H	214	26.77	23.23
9	#17265.00	39.4 AV	54.0	-14.6	2.45 H	214	16.17	23.23

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	#5715.00	69.4 PK	74.0	-4.6	3.58 V	239	59.72	9.68
2	#5715.00	50.1 AV	54.0	-3.9	3.58 V	239	40.42	9.68
3	#5725.00	69.9 PK	78.2	-8.3	3.58 V	239	60.20	9.70
4	*5755.00	106.3 PK			3.58 V	239	96.53	9.77
5	*5755.00	95.8 AV			3.58 V	239	86.03	9.77
6	11510.00	48.2 PK	74.0	-25.8	2.75 V	18	33.35	14.85
7	11510.00	38.5 AV	54.0	-15.5	2.75 V	18	23.65	14.85
8	#17265.00	48.5 PK	74.0	-25.5	2.43 V	163	25.27	23.23
9	#17265.00	37.6 AV	54.0	-16.4	2.43 V	163	14.37	23.23

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	111.6 PK			2.12 H	178	101.72	9.88
2	*5795.00	101.3 AV			2.12 H	178	91.42	9.88
3	#5850.00	68.3 PK	78.2	-9.9	2.12 H	178	58.38	9.92
4	#5860.00	67.4 PK	74.0	-6.6	2.12 H	178	57.47	9.93
5	#5860.00	53.2 AV	54.0	-0.8	2.12 H	178	43.27	9.93
6	11590.00	52.5 PK	74.0	-21.5	1.15 H	32	37.19	15.31
7	11590.00	41.4 AV	54.0	-12.6	1.15 H	32	26.09	15.31
8	#17385.00	50.3 PK	74.0	-23.7	2.35 H	238	26.54	23.76
9	#17385.00	39.5 AV	54.0	-14.5	2.35 H	238	15.74	23.76

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	107.5 PK			3.63 V	229	97.62	9.88
2	*5795.00	97.4 AV			3.63 V	229	87.52	9.88
3	#5850.00	65.4 PK	78.2	-12.8	3.63 V	229	55.48	9.92
4	#5860.00	64.2 PK	74.0	-9.8	3.63 V	229	54.27	9.93
5	#5860.00	50.2 AV	54.0	-3.8	3.63 V	229	40.27	9.93
6	11590.00	48.9 PK	74.0	-25.1	2.65 V	7	33.59	15.31
7	11590.00	39.2 AV	54.0	-14.8	2.65 V	7	23.89	15.31
8	#17385.00	49.4 PK	74.0	-24.6	2.43 V	187	25.64	23.76
9	#17385.00	38.6 AV	54.0	-15.4	2.43 V	187	14.84	23.76

REMARKS:

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

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5133.20	67.2 PK	74.0	-6.8	2.56 H	168	58.94	8.26
2	5133.20	53.1 AV	54.0	-0.9	2.56 H	168	44.84	8.26
3	*5210.00	105.5 PK			2.56 H	168	96.95	8.55
4	*5210.00	94.3 AV			2.56 H	168	85.75	8.55
5	5350.00	58.4 PK	74.0	-15.6	2.56 H	168	49.60	8.80
6	5350.00	46.0 AV	54.0	-8.0	2.56 H	168	37.20	8.80
7	#10420.00	51.3 PK	74.0	-22.7	1.15 H	42	36.73	14.57
8	#10420.00	40.2 AV	54.0	-13.8	1.15 H	42	25.63	14.57
9	15630.00	49.6 PK	74.0	-24.4	2.35 H	247	30.67	18.93
10	15630.00	38.4 AV	54.0	-15.6	2.35 H	247	19.47	18.93
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5133.20	58.2 PK	74.0	-15.8	1.19 V	38	49.94	8.26
2	5133.20	44.5 AV	54.0	-9.5	1.19 V	38	36.24	8.26
3	*5210.00	103.1 PK			1.19 V	38	94.55	8.55
4	*5210.00	91.5 AV			1.19 V	38	82.95	8.55
5	5350.00	56.9 PK	74.0	-17.1	1.19 V	38	48.10	8.80
6	5350.00	44.2 AV	54.0	-9.8	1.19 V	38	35.40	8.80
7	#10420.00	48.2 PK	74.0	-25.8	2.61 V	0	33.63	14.57
8	#10420.00	38.4 AV	54.0	-15.6	2.61 V	0	23.83	14.57
9	15630.00	47.5 PK	74.0	-26.5	2.47 V	201	28.57	18.93
10	15630.00	37.3 AV	54.0	-16.7	2.47 V	201	18.37	18.93

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	73.2 PK	74.0	-0.8	2.08 H	176	63.52	9.68
2	#5715.00	48.0 AV	54.0	-6.0	2.08 H	176	38.32	9.68
3	#5725.00	76.2 PK	78.2	-2.0	2.08 H	176	66.50	9.70
4	*5775.00	106.8 PK			2.08 H	176	96.97	9.83
5	*5775.00	94.0 AV			2.08 H	176	84.17	9.83
6	#5850.00	72.4 PK	78.2	-5.8	2.08 H	176	62.48	9.92
7	#5860.00	71.8 PK	74.0	-2.2	2.08 H	176	61.87	9.93
8	#5860.00	46.7 AV	54.0	-7.3	2.08 H	176	36.77	9.93
9	11550.00	50.9 PK	74.0	-23.1	1.17 H	45	35.81	15.09
10	11550.00	39.8 AV	54.0	-14.2	1.17 H	45	24.71	15.09
11	#17325.00	48.2 PK	74.0	-25.8	2.39 H	226	24.82	23.38
12	#17325.00	37.5 AV	54.0	-16.5	2.39 H	226	14.12	23.38

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	70.4 PK	74.0	-3.6	1.19 V	54	60.72	9.68
2	#5715.00	45.4 AV	54.0	-8.6	1.19 V	54	35.72	9.68
3	#5725.00	73.3 PK	78.2	-4.9	1.19 V	54	63.60	9.70
4	*5775.00	102.8 PK			1.19 V	54	92.97	9.83
5	*5775.00	91.2 AV			1.19 V	54	81.37	9.83
6	#5850.00	69.5 PK	78.2	-8.7	1.19 V	54	59.58	9.92
7	#5860.00	68.5 PK	74.0	-5.5	1.19 V	54	58.57	9.93
8	#5860.00	43.4 AV	54.0	-10.6	1.19 V	54	33.47	9.93
9	11550.00	48.4 PK	74.0	-25.6	2.57 V	0	33.31	15.09
10	11550.00	38.8 AV	54.0	-15.2	2.57 V	0	23.71	15.09
11	#17325.00	47.7 PK	74.0	-26.3	2.43 V	186	24.32	23.38
12	#17325.00	37.7 AV	54.0	-16.3	2.43 V	186	14.32	23.38

REMARKS:

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

Below 1GHz Worst-Case Data

802.11a

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	38.94	36.4 QP	40.0	-3.6	1.62 H	254	45.65	-9.21
2	72.72	34.4 QP	40.0	-5.6	1.90 H	101	46.06	-11.68
3	209.90	34.3 QP	43.5	-9.2	1.10 H	226	46.14	-11.85
4	320.01	37.9 QP	46.0	-8.1	1.20 H	54	45.07	-7.21
5	350.26	38.3 QP	46.0	-7.7	1.20 H	65	45.02	-6.74
6	624.90	37.4 QP	46.0	-8.6	1.40 H	100	37.49	-0.11
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	84.68	35.7 QP	40.0	-4.3	3.80 V	18	50.09	-14.39
2	350.24	36.9 QP	46.0	-9.1	1.00 V	310	43.60	-6.74
3	439.90	36.6 QP	46.0	-9.4	1.20 V	310	40.49	-3.89
4	559.90	37.4 QP	46.0	-8.6	1.20 V	262	39.19	-1.81
5	625.16	37.9 QP	46.0	-8.1	1.20 V	330	37.94	-0.08
6	874.90	38.8 QP	46.0	-7.2	1.10 V	102	35.38	3.38

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	100375	May 06, 2015	May 05, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 01, 2015	Aug. 31, 2016
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 11, 2015	June 10, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 23, 2015	Sep. 22, 2016
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2015	Sep. 30, 2016
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Mar. 08, 2016

4.2.3 Test Procedure

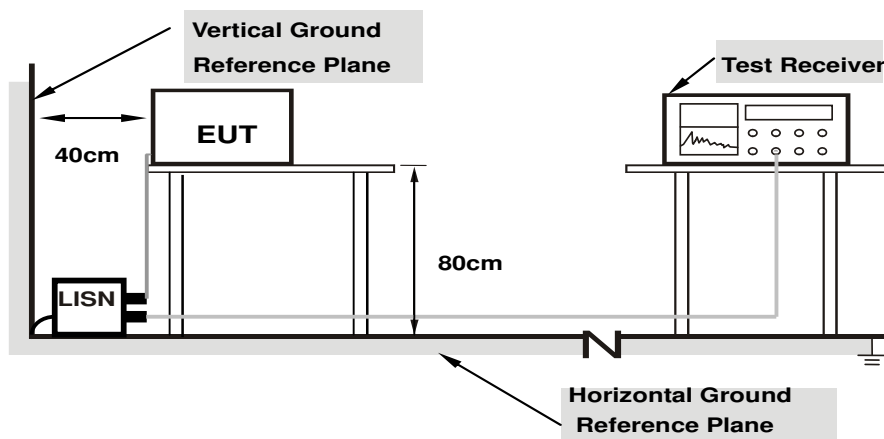
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

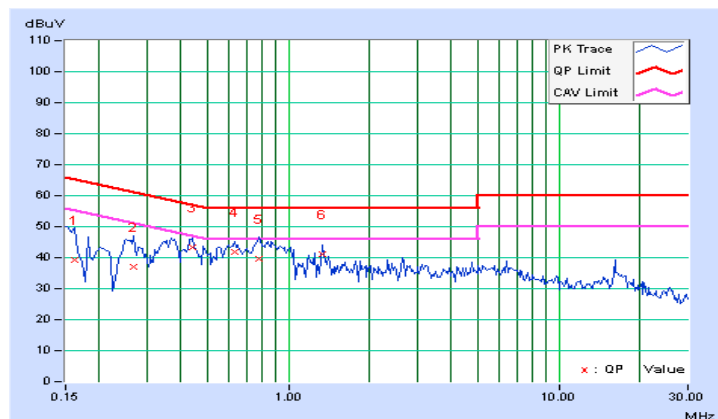
4.2.7 Test Results (Mode 1)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	10.25	28.85	12.61	39.10	22.86	65.38	55.38	-26.27	-32.51
2	0.26719	10.23	26.77	14.77	37.00	25.00	61.20	51.20	-24.21	-26.21
3	0.43906	10.24	32.91	26.00	43.15	36.24	57.08	47.08	-13.93	-10.84
4	0.63047	10.21	31.71	22.62	41.92	32.83	56.00	46.00	-14.08	-13.17
5	0.77891	10.20	29.61	21.01	39.81	31.21	56.00	46.00	-16.19	-14.79
6	1.33203	10.18	31.03	28.46	41.21	38.64	56.00	46.00	-14.79	-7.36

REMARKS:

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

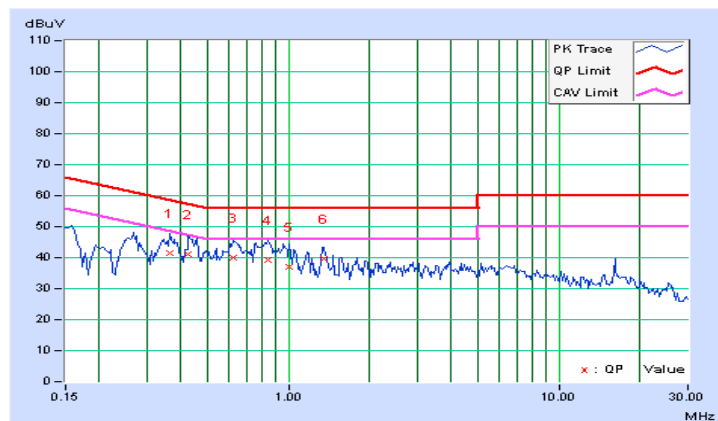


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.36484	10.22	31.24	13.70	41.46	23.92	58.62	48.62	-17.16	-24.70
2	0.42734	10.22	30.81	25.56	41.03	35.78	57.30	47.30	-16.28	-11.53
3	0.62656	10.20	29.65	23.25	39.85	33.45	56.00	46.00	-16.15	-12.55
4	0.84531	10.18	29.14	19.84	39.32	30.02	56.00	46.00	-16.68	-15.98
5	1.00391	10.16	26.70	20.51	36.86	30.67	56.00	46.00	-19.14	-15.33
6	1.35156	10.18	29.49	25.05	39.67	35.23	56.00	46.00	-16.33	-10.77

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.



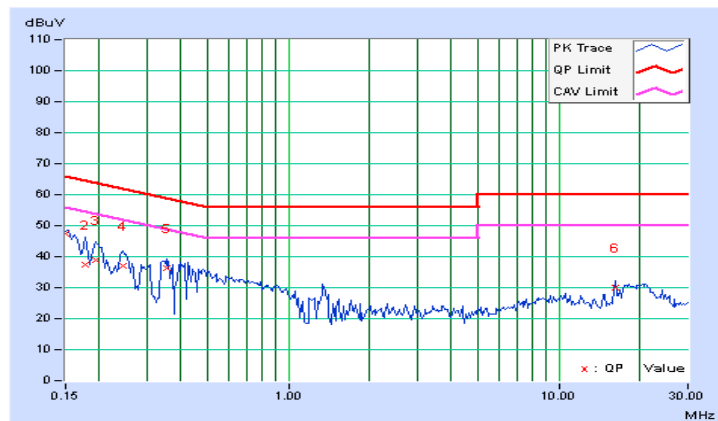
4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.26	37.06	23.10	47.32	33.36	66.00	56.00	-18.68	-22.64
2	0.17734	10.24	27.10	12.46	37.34	22.70	64.61	54.61	-27.27	-31.91
3	0.19297	10.23	28.55	21.98	38.78	32.21	63.91	53.91	-25.13	-21.70
4	0.24375	10.22	26.90	13.84	37.12	24.06	61.97	51.97	-24.84	-27.90
5	0.35703	10.24	26.24	18.69	36.48	28.93	58.80	48.80	-22.32	-19.87
6	16.10547	10.80	19.35	18.57	30.15	29.37	60.00	50.00	-29.85	-20.63

REMARKS:

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

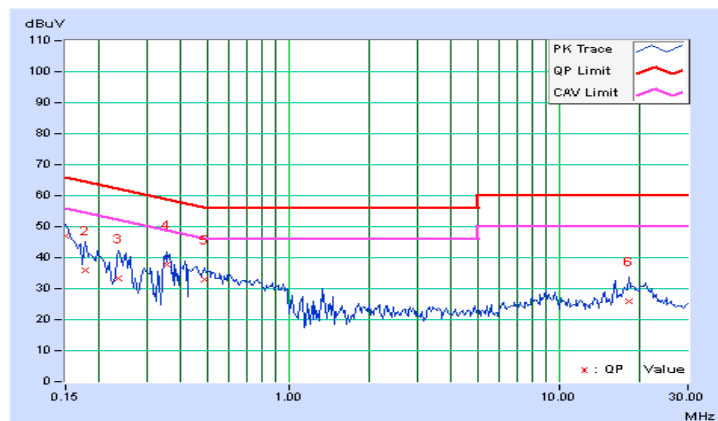


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.24	36.90	21.10	47.14	31.34	66.00	56.00	-18.86	-24.66
2	0.17734	10.22	25.68	13.45	35.90	23.67	64.61	54.61	-28.71	-30.94
3	0.23594	10.20	23.09	14.94	33.29	25.14	62.24	52.24	-28.94	-27.09
4	0.35703	10.22	27.46	21.11	37.68	31.33	58.80	48.80	-21.12	-17.47
5	0.48984	10.21	22.80	13.63	33.01	23.84	56.17	46.17	-23.16	-22.33
6	18.19141	10.89	15.01	10.11	25.90	21.00	60.00	50.00	-34.10	-29.00

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

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

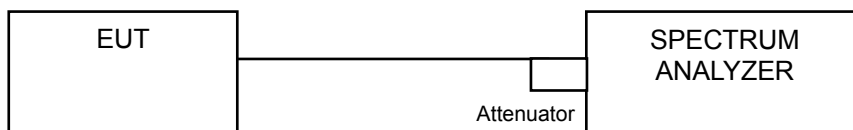
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

POWER OUTPUT:

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	18.03	18.79	18.30	17.63	264.767	24.23	29.03	Pass
40	5200	18.03	19.00	18.14	17.54	264.883	24.23	29.03	Pass
48	5240	17.94	18.71	18.33	17.73	263.902	24.21	29.03	Pass
149	5745	16.49	16.27	17.33	17.73	200.298	23.02	29.03	Pass
157	5785	21.36	20.90	22.33	22.26	599.069	27.77	29.03	Pass
165	5825	18.65	18.58	19.60	19.77	331.436	25.20	29.03	Pass

Note: The directional gain is 6.97dBi > 6dBi , so the power limit shall be reduced to $30-(6.97-6) = 29.03\text{dBm}$.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	17.65	18.41	17.69	17.06	237.118	23.75	29.03	Pass
40	5200	17.56	18.32	17.32	17.10	230.173	23.62	29.03	Pass
48	5240	17.26	18.21	17.31	17.11	224.664	23.52	29.03	Pass
149	5745	16.62	16.27	17.30	17.86	203.081	23.08	29.03	Pass
157	5785	21.34	20.80	22.17	22.12	584.116	27.66	29.03	Pass
165	5825	17.48	17.54	18.91	18.60	262.978	24.20	29.03	Pass

Note: The directional gain is 6.97dBi > 6dBi , so the power limit shall be reduced to $30-(6.97-6) = 29.03\text{dBm}$.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	17.76	18.33	17.51	17.14	235.906	23.73	29.03	Pass
46	5230	17.74	18.21	17.46	17.10	232.656	23.67	29.03	Pass
151	5755	14.55	14.30	15.40	15.91	129.093	21.11	29.03	Pass
159	5795	17.31	16.82	18.18	18.41	237.02	23.75	29.03	Pass

Note: The directional gain is 6.97dBi > 6dBi , so the power limit shall be reduced to $30-(6.97-6) = 29.03\text{dBm}$.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	16.02	17.35	16.43	15.80	176.292	22.46	29.03	Pass
155	5775	13.34	13.16	14.20	14.57	97.223	19.88	29.03	Pass

Note: The directional gain is 6.97dBi > 6dBi , so the power limit shall be reduced to $30-(6.97-6) = 29.03\text{dBm}$.

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	17.65	18.41	17.69	17.06	237.118	23.75	24.24	Pass
40	5200	17.56	18.32	17.32	17.10	230.173	23.62	24.24	Pass
48	5240	17.26	18.21	17.31	17.11	224.664	23.52	24.24	Pass
149	5745	16.62	16.27	17.30	17.86	203.081	23.08	24.24	Pass
157	5785	17.52	17.56	18.86	18.54	261.873	24.18	24.24	Pass
165	5825	17.48	17.54	18.91	18.60	262.978	24.20	24.24	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (11.76 - 6) = 24.24\text{dBm}$.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	17.76	18.33	17.51	17.14	235.906	23.73	24.24	Pass
46	5230	17.74	18.21	17.46	17.10	232.656	23.67	24.24	Pass
151	5755	14.55	14.30	15.40	15.91	129.093	21.11	24.24	Pass
159	5795	17.31	16.82	18.18	18.41	237.02	23.75	24.24	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (11.76 - 6) = 24.24\text{dBm}$.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	16.02	17.35	16.43	15.80	176.292	22.46	24.24	Pass
155	5775	13.34	13.16	14.20	14.57	97.223	19.88	24.24	Pass

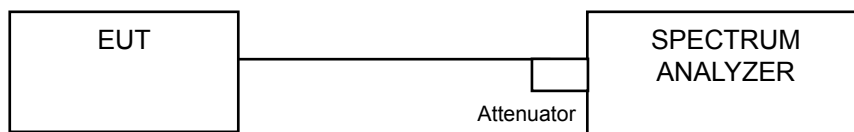
Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (11.76 - 6) = 24.24\text{dBm}$.

4.4 Peak Power Spectral Density Measurement

4.4.1 Limits of Peak Power Spectral Density Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

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

For U-NII-1 band:

Using method SA-1

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

For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW $\geq$ 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 $BWCF = 10\log(500 \text{ kHz}/300\text{kHz})$
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

For 802.11ac (VHT80):

For U-NII-1 band:

Using method SA-2

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

For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW $\geq$ 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 $BWCF = 10\log(500 \text{ kHz}/300\text{kHz})$
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 $10 \log (1/\text{duty cycle})$

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-1:

CDD Mode

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	3.81	4.31	4.90	4.68	10.46	11.24	Pass
40	5200	4.06	4.29	5.34	4.66	10.64	11.24	Pass
48	5240	3.88	3.81	5.61	4.86	10.63	11.24	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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(11.76-6) = 11.24\text{dBm}$.

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	2.87	3.29	3.69	3.44	9.35	11.24	Pass
40	5200	2.73	3.45	3.99	3.48	9.46	11.24	Pass
48	5240	3.15	3.56	3.99	3.36	9.55	11.24	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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(11.76-6) = 11.24\text{dBm}$.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
38	5190	-0.19	0.61	0.59	0.71	6.47	11.24	Pass
46	5230	-0.02	0.76	1.26	0.79	6.74	11.24	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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17-(11.76-6) = 11.24\text{dBm}$.

802.11ac (VHT80)

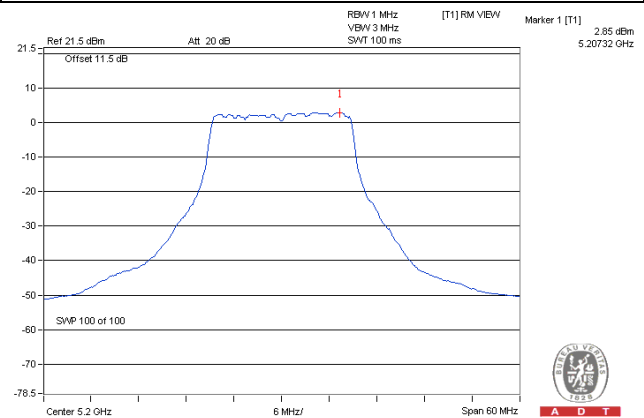
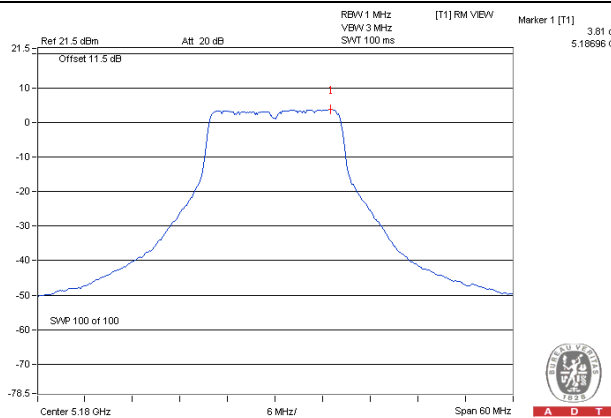
Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Duty Factor (dBm/MHz)	Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	-3.78	-4.24	-2.02	-3.16	0.26	3.06	11.24	Pass

- 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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (11.76 - 6) = 11.24\text{dBm}$.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

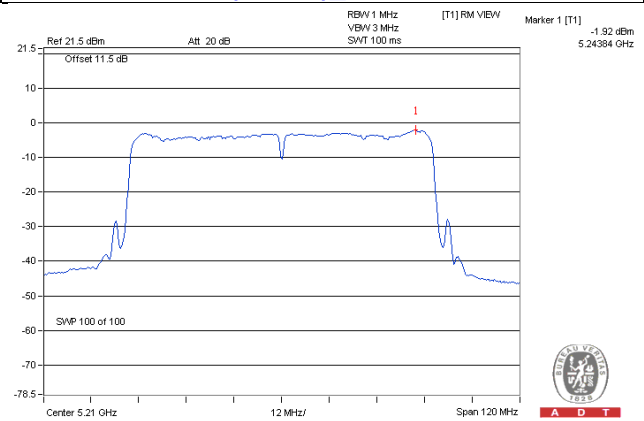
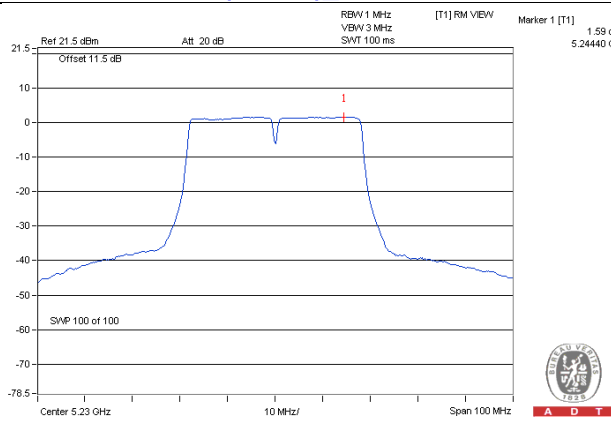
802.11a_Chain 0 / CH36

802.11ac (VHT20)_Chain 0 / CH40



802.11ac (VHT40)_Chain 2 / CH46

802.11ac (VHT80)_Chain 2 / CH42



For U-NII-3:

CDD Mode

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	-4.00	-1.78	6.02	4.24	24.24	Pass
	157	5785	0.76	2.98	6.02	9.00	24.24	Pass
	165	5825	-1.97	0.25	6.02	6.27	24.24	Pass
1	149	5745	-3.72	-1.50	6.02	4.52	24.24	Pass
	157	5785	1.02	3.24	6.02	9.26	24.24	Pass
	165	5825	-1.62	0.60	6.02	6.62	24.24	Pass
2	149	5745	-4.85	-2.63	6.02	3.39	24.24	Pass
	157	5785	0.04	2.26	6.02	8.28	24.24	Pass
	165	5825	-2.57	-0.35	6.02	5.67	24.24	Pass
3	149	5745	-4.77	-2.55	6.02	3.47	24.24	Pass
	157	5785	-0.50	1.72	6.02	7.74	24.24	Pass
	165	5825	-3.26	-1.04	6.02	4.98	24.24	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (11.76 - 6) = 24.24\text{dBm}$.

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	-3.90	-1.68	6.02	4.34	24.24	Pass
	157	5785	0.33	2.55	6.02	8.57	24.24	Pass
	165	5825	-2.86	-0.64	6.02	5.38	24.24	Pass
1	149	5745	-4.25	-2.03	6.02	3.99	24.24	Pass
	157	5785	0.44	2.66	6.02	8.68	24.24	Pass
	165	5825	-1.96	0.26	6.02	6.28	24.24	Pass
2	149	5745	-5.11	-2.89	6.02	3.13	24.24	Pass
	157	5785	-0.14	2.08	6.02	8.10	24.24	Pass
	165	5825	-3.62	-1.40	6.02	4.62	24.24	Pass
3	149	5745	-5.32	-3.10	6.02	2.92	24.24	Pass
	157	5785	-0.79	1.43	6.02	7.45	24.24	Pass
	165	5825	-4.23	-2.01	6.02	4.01	24.24	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (11.76 - 6) = 24.24\text{dBm}$.

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	-9.38	-7.16	6.02	-1.14	24.24	Pass
	159	5795	-7.04	-4.82	6.02	1.20	24.24	Pass
1	151	5755	-9.56	-7.34	6.02	-1.32	24.24	Pass
	159	5795	-6.67	-4.45	6.02	1.57	24.24	Pass
2	151	5755	-10.40	-8.18	6.02	-2.16	24.24	Pass
	159	5795	-7.87	-5.65	6.02	0.37	24.24	Pass
3	151	5755	-10.34	-8.12	6.02	-2.10	24.24	Pass
	159	5795	-7.95	-5.73	6.02	0.29	24.24	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(11.76-6) = 24.24\text{dBm}$.

802.11ac (VHT80)

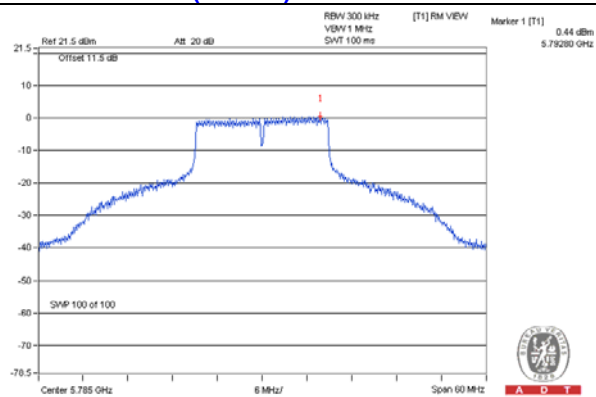
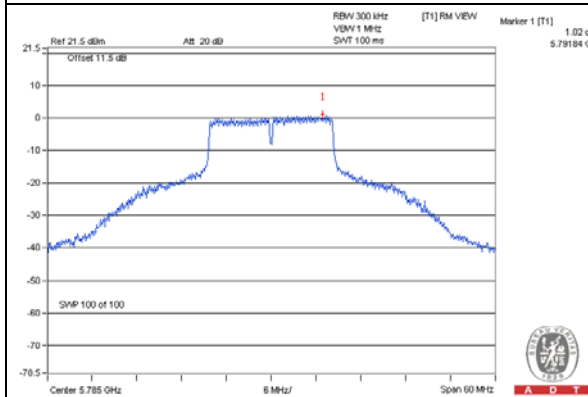
TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Duty Factor (dB)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-14.08	-11.86	6.02	0.26	-5.58	24.24	Pass
1	155	5775	-14.39	-12.17	6.02	0.26	-5.89	24.24	Pass
2	155	5775	-14.90	-12.68	6.02	0.26	-6.40	24.24	Pass
3	155	5775	-14.26	-12.04	6.02	0.26	-5.76	24.24	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 11.76\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(11.76-6) = 24.24\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

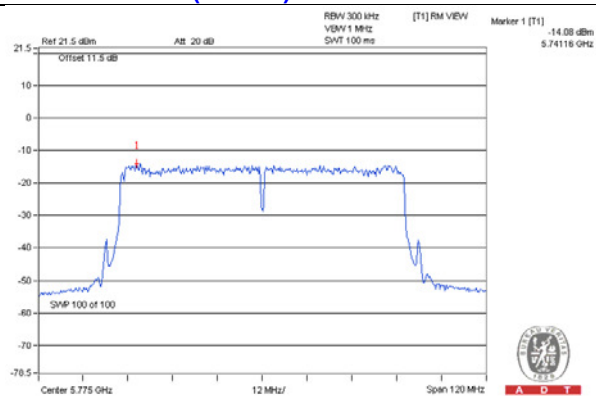
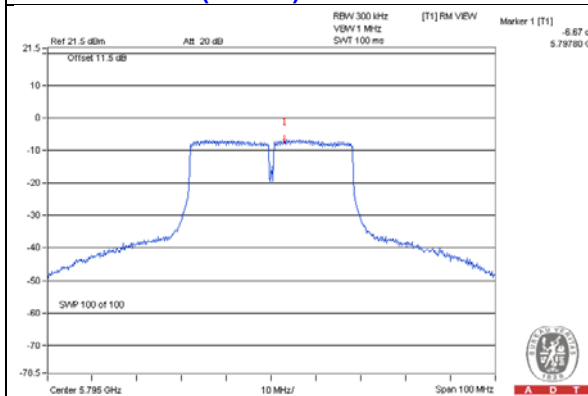
802.11a – Chain 1: CH 157

802.11ac (VHT20) – Chain 1: CH 157



802.11ac (VHT40) – Chain 1: CH 159

802.11ac (VHT80) – Chain 0: CH 155

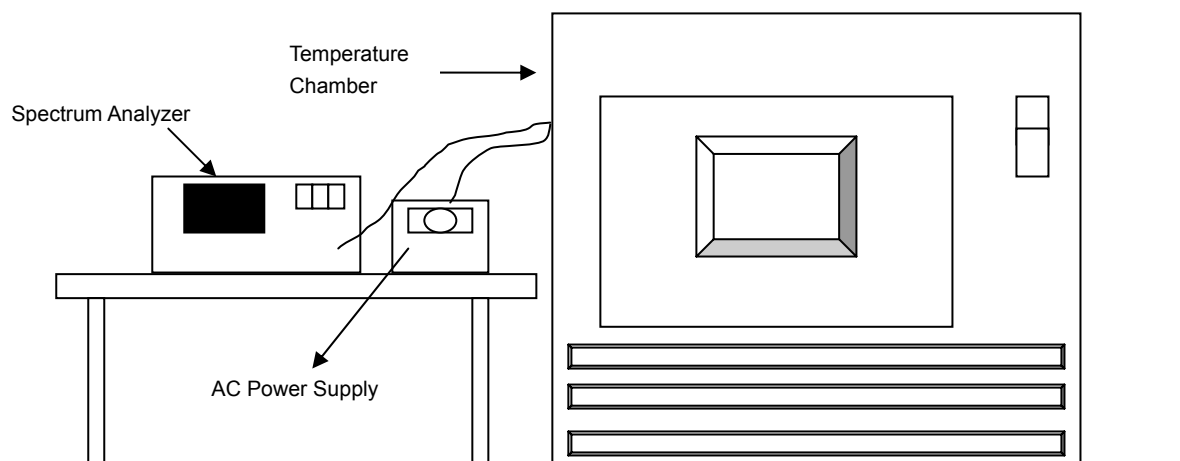


4.5 Frequency Stability Measurement

4.5.1 Limits of Frequency Stability Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5179.9992	-0.00002	5180.0003	0.00001	5180.001	0.00002	5180.0004	0.00001
40	120	5180.0102	0.00020	5180.0107	0.00021	5180.0115	0.00022	5180.0116	0.00022
30	120	5179.9793	-0.00040	5179.9782	-0.00042	5179.9802	-0.00038	5179.9797	-0.00039
20	120	5179.9755	-0.00047	5179.9743	-0.00050	5179.9785	-0.00042	5179.9763	-0.00046
10	120	5179.9907	-0.00018	5179.9917	-0.00016	5179.9906	-0.00018	5179.9869	-0.00025
0	120	5179.98	-0.00039	5179.9804	-0.00038	5179.9787	-0.00041	5179.9802	-0.00038
-10	120	5180.0178	0.00034	5180.019	0.00037	5180.0214	0.00041	5180.0182	0.00035
-20	120	5179.9823	-0.00034	5179.981	-0.00037	5179.9789	-0.00041	5179.98	-0.00039
-30	120	5179.9985	-0.00003	5179.9986	-0.00003	5179.9998	0.00000	5180.0003	0.00001

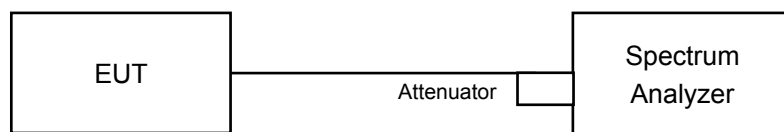
FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5179.9748	-0.00049	5179.974	-0.00050	5179.9781	-0.00042	5179.9756	-0.00047
	120	5179.9755	-0.00047	5179.9743	-0.00050	5179.9785	-0.00042	5179.9763	-0.00046
	102	5179.9753	-0.00048	5179.9737	-0.00051	5179.978	-0.00042	5179.9769	-0.00045

4.6 6dB Bandwidth Measurement

4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.45	16.43	16.46	16.43	0.5	PASS
157	5785	16.09	16.08	16.40	16.32	0.5	PASS
165	5825	16.39	16.44	16.41	16.43	0.5	PASS

802.11n (VHT20)

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

802.11n (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	36.44	36.43	36.41	36.40	0.5	PASS
159	5795	36.38	36.36	36.08	36.34	0.5	PASS

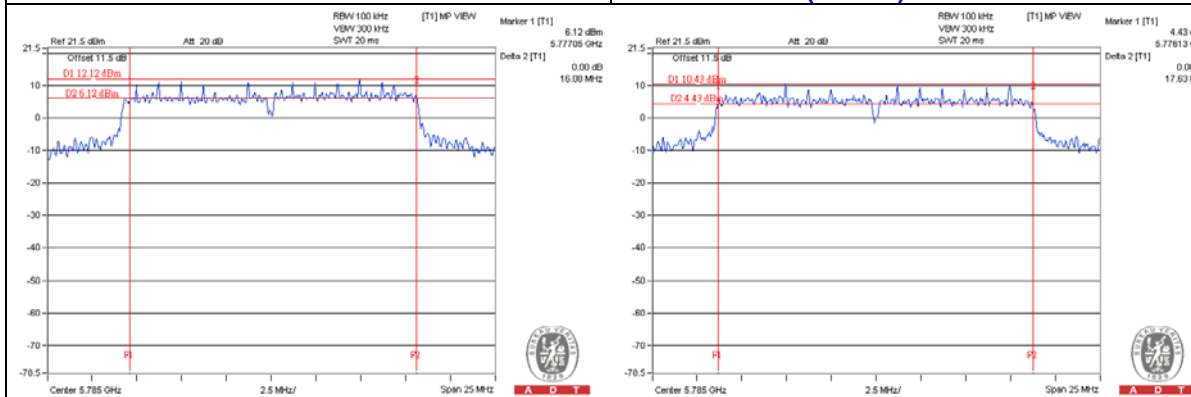
802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	75.41	75.50	75.45	75.36	0.5	PASS

Spectrum Plot of Worst Value

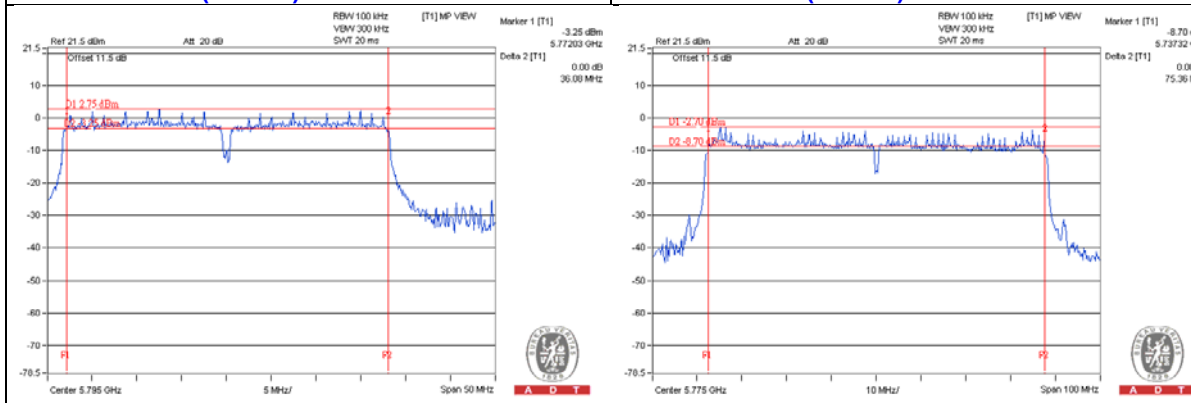
802.11a – Chain 1: CH 157

802.11ac (VHT20) – Chain 3: CH 157



802.11ac (VHT40) – Chain 2: CH 159

802.11ac (VHT80) – Chain 3: CH 155



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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