

FCC Test Report

Report No.: RF160219E04-1

FCC ID: RSL-AP500

Test Model: AT-AP500

Received Date: Feb. 19, 2016

Test Date: Mar. 14 to 22, 2016

Issued Date: Apr. 14, 2016

Applicant: Allied Telesis K.K.

Address: 2nd TOC Bldg. 7-21-11 Nishi-Gotanda, Shinagawa-ku, Tokyo 141-0031, Japan

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.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	10
3.2.1 Test Mode Applicability and Tested Channel Detail	11
3.3 Duty Cycle of Test Signal	13
3.4 Description of Support Units	14
3.4.1 Configuration of System under Test	15
3.5 General Description of Applied Standard	17
4 Test Types and Results	18
4.1 Radiated Emission and Bandedge Measurement	18
4.1.1 Limits of Radiated Emission and Bandedge Measurement	18
4.1.2 Test Instruments	19
4.1.3 Test Procedure	21
4.1.4 Deviation from Test Standard	21
4.1.5 Test Setup	22
4.1.6 EUT Operating Condition	23
4.1.7 Test Results	24
4.2 Conducted Emission Measurement	43
4.2.1 Limits of Conducted Emission Measurement	43
4.2.2 Test Instruments	43
4.2.3 Test Procedure	44
4.2.4 Deviation from Test Standard	44
4.2.5 Test Setup	44
4.2.6 EUT Operating Condition	44
4.2.7 Test Results (Mode 1)	45
4.2.8 Test Results (Mode 2)	47
4.3 Transmit Power Measurement	49
4.3.1 Limits of Transmit Power Measurement	49
4.3.2 Test Setup	49
4.3.3 Test Instruments	49
4.3.4 Test Procedure	49
4.3.5 Deviation from Test Standard	49
4.3.6 EUT Operating Condition	50
4.3.7 Test Result	51
4.4 Peak Power Spectral Density Measurement	52
4.4.1 Limits of Peak Power Spectral Density Measurement	52
4.4.2 Test Setup	52
4.4.3 Test Instruments	52
4.4.4 Test Procedure	53
4.4.5 Deviation from Test Standard	53
4.4.6 EUT Operating Condition	53
4.4.7 Test Results	54
4.5 Frequency Stability Measurement	59
4.5.1 Limits of Frequency Stability Measurement	59
4.5.2 Test Setup	59
4.5.3 Test Instruments	59
4.5.4 Test Procedure	59
4.5.5 Deviation from Test Standard	59

4.5.6 EUT Operating Condition	59
4.5.7 Test Results	60
4.6 6dB Bandwidth Measurement.....	61
4.6.1 Limits of 6dB Bandwidth Measurement.....	61
4.6.2 Test Setup.....	61
4.6.3 Test Instruments	61
4.6.4 Test Procedure	61
4.6.5 Deviation from Test Standard	61
4.6.6 EUT Operating Condition	61
4.6.7 Test Results	62
5 Pictures of Test Arrangements.....	64
Appendix – Information on the Testing Laboratories	65



A D T

Release Control Record

Issue No.	Description	Date Issued
RF160219E04-1	Original release.	Apr. 14, 2016



A D T

1 Certificate of Conformity

Product: Cloud-Managed Enterprise-class Wireless Access Point with IEEE802.11a/b/g/n/ac Dual Radio

Brand:  Allied Telesis™

Test Model: AT-AP500

Sample Status: ENGINEERING SAMPLE

Applicant: Allied Telesis K.K.

Test Date: Mar. 14 to 22, 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:** Apr. 14, 2016
Claire Kuan / Specialist

Approved by :  , **Date:** Apr. 14, 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 -3.52dB at 0.33359MHz.
15.407(b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 5147.00MHz & 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) ($\pm$)
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	Cloud-Managed Enterprise-class Wireless Access Point with IEEE802.11a/b/g/n/ac Dual Radio
Brand	 Allied Telesis™
Test Model	AT-AP500
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 12V from Power Adapter or DC 48V from POE Adapter
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 450Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	2.4GHz: 2.412GHz ~ 2.472GHz 5GHz: 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Number of Channel	2.4GHz: 11 for 802.11b, 802.11g, 802.11n (HT20), VHT20 7 for 802.11n (HT40), VHT40 5GHz: 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
Output Power	2.4GHz: 802.11b: 126.474mW 802.11g: 362.092mW 802.11n (HT20): 275.13mW 802.11n (HT40): 118.624mW 5GHz (5.18 ~ 5.24GHz): 802.11a: 374.366mW 802.11ac (VHT20): 354.405mW 802.11ac (VHT40): 287.629mW 802.11ac (VHT80): 84.17mW 5GHz (5.745 ~ 5.825GHz): 802.11a: 374.284mW 802.11ac (VHT20): 348.113mW 802.11ac (VHT40): 269.741mW 802.11ac (VHT80): 50.927mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter (Option) x 1
Data Cable Supplied	NA

Note:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. The EUT could be supplied with a power adapter (Option) or POE adapter (only for test,not for sale) as following table:

Item	Brand	Model No.	Spec.
Power adapter	Elementech	A124-11202050	Input: 100-240V, 0.6A, 50/60Hz Output: 12.0V, 2A DC output cable(1.8m, unshielded)
POE adapter	RUCKUS	GRT-480125A (740-64216-001)	Input: 100-240V, 1.0A, 50/60Hz Output: 48V, 1250mA

From the above adapters, the radiated emission worse case was found in **POE adapter**. Therefore only the test data of the mode was recorded in this report.

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

2.4GHz					
Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain(dBi) Including cable loss	Connector type
Chain (0)	Aristotle	RFA-02-G133-70B-110R	PIFA	3.1	i-pex(MHF)
Chain (1)		RFA-52-G181-58-90		2.47	
Chain (2)		RFA-02-G133-70B-180		1.75	
5 GHz					
Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain(dBi) Including cable loss	Connector type
Chain (0)	Aristotle	RFA-05-G134-70-230C	PIFA	2.65	i-pex(MHF)
Chain (1)		RFA-52-G181-58-90		5.55	
Chain (2)		RFA-05-G134-70-105C		4.15	
Chain (3)		RFA-05-G134-70-75C		4.04	

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1Tx Fixed Chan 0	3Rx
802.11g	6 ~ 54Mbps	3Tx/2Tx/1Tx diversity	3Rx
802.11n (HT20)	MCS 0~7	3Tx/2Tx/1Tx diversity	3Rx
	MCS 8~15	3Tx/2Tx	3Rx
	MCS 16~23	3Tx	3Rx
802.11n (HT40)	MCS 0~7	3Tx/2Tx/1Tx diversity	3Rx
	MCS 8~15	3Tx/2Tx	3Rx
	MCS 16~23	3Tx	3Rx
VHT20	MCS0~8 Nss=1	3Tx/2Tx/1Tx diversity	3Rx
	MCS0~8 Nss=2	3Tx/2Tx	3Rx
	MCS0~9 Nss=3	3Tx	3Rx
VHT40	MCS0~9 Nss=1	3Tx/2Tx/1Tx diversity	3Rx
	MCS0~9 Nss=2	3Tx/2Tx	3Rx
	MCS0~9 Nss=3	3Tx	3Rx
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	4Tx/3Tx/2Tx/1Tx diversity	4Rx
802.11n (HT20)	MCS 0~7	4Tx/3Tx/2Tx/1Tx diversity	4Rx
	MCS 8~15	4Tx/3Tx/2Tx	4Rx
	MCS 16~23	4Tx/3Tx	4Rx
	MCS 24~31	4Tx	4Rx
802.11n (HT40)	MCS 0~7	4Tx/3Tx/2Tx/1Tx diversity	4Rx
	MCS 8~15	4Tx/3Tx/2Tx	4Rx
	MCS 16~23	4Tx/3Tx	4Rx
	MCS 24~31	4Tx	4Rx
802.11ac (VHT20)	MCS0~8 Nss=1	4Tx/3Tx/2Tx/1Tx diversity	4Rx
	MCS0~8 Nss=2	4Tx/3Tx/2Tx	4Rx
	MCS0~9 Nss=3	4Tx/3Tx	4Rx
	MCS0~8 Nss=4	4Tx	4Rx
802.11ac (VHT40)	MCS0~9 Nss=1	4Tx/3Tx/2Tx/1Tx diversity	4Rx
	MCS0~9 Nss=2	4Tx/3Tx/2Tx	4Rx
	MCS0~9 Nss=3	4Tx/3Tx	4Rx
	MCS0~9 Nss=4	4Tx	4Rx
802.11ac (VHT80)	MCS0~9 Nss=1	4Tx/3Tx/2Tx/1Tx diversity	4Rx
	MCS0~9 Nss=2	4Tx/3Tx/2Tx	4Rx
	MCS0~9 Nss=3	4Tx/3Tx	4Rx
	MCS0~9 Nss=4	4Tx	4Rx

Note:
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)

5. Spurious emission of the simultaneous operation (2.4GHz and 5GHz) has been evaluated and no non-compliance was found. 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 PoE
2	-	-	√	-	With adapter

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane**

Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

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
802.11n (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (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
802.11n (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5320	36 to 64	48	OFDM	BPSK	6
802.11a	5745-5825	149 to 165		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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5320	36 to 64	48	OFDM	BPSK	6
802.11a	5745-5825	149 to 165		OFDM	BPSK	6

Antenna Port Conducted Measurement:

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

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
802.11n (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (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
802.11n (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (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 $\geq$ 1G	20deg. C, 52%RH	120Vac, 60Hz	Tim Ho
RE<1G	20deg. C, 52%RH	120Vac, 60Hz	Tim Ho
PLC	24deg. C, 61%RH	120Vac, 60Hz	Eagle Chen
APCM	19deg. C, 64%RH	120Vac, 60Hz	Anderson Chen

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 = $2.062 \text{ ms} / 2.082 \text{ ms} = 0.99$

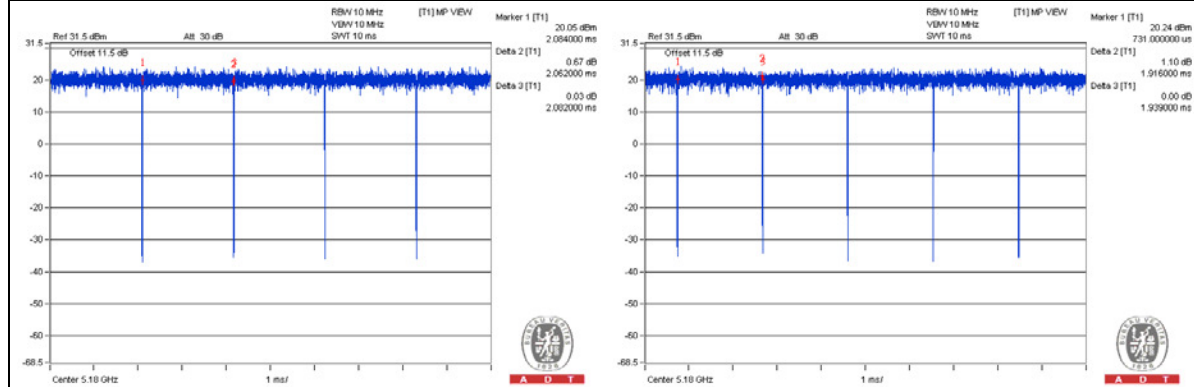
802.11ac (VHT20): Duty cycle = $1.916 \text{ ms} / 1.939 \text{ ms} = 0.988$

802.11ac (VHT40): Duty cycle = $0.946 \text{ ms} / 0.963 \text{ ms} = 0.982$

802.11ac (VHT80): Duty cycle = $0.459 \text{ ms} / 0.48 \text{ ms} = 0.956$, Duty factor = $10 * \log(1/0.956) = 0.19$

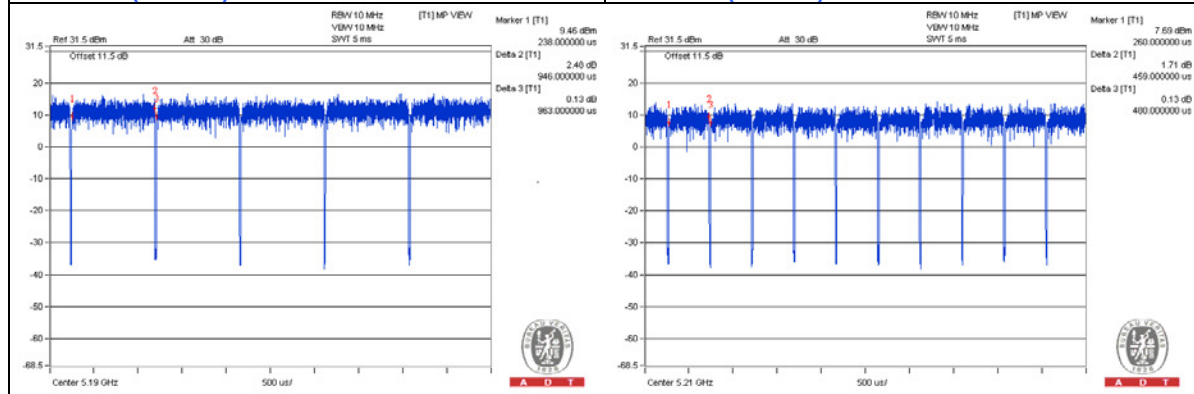
802.11a

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.	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
B.	POE	RUCKUS	GRT-480125A (740-64216-001)	NA	NA	Supplied by client

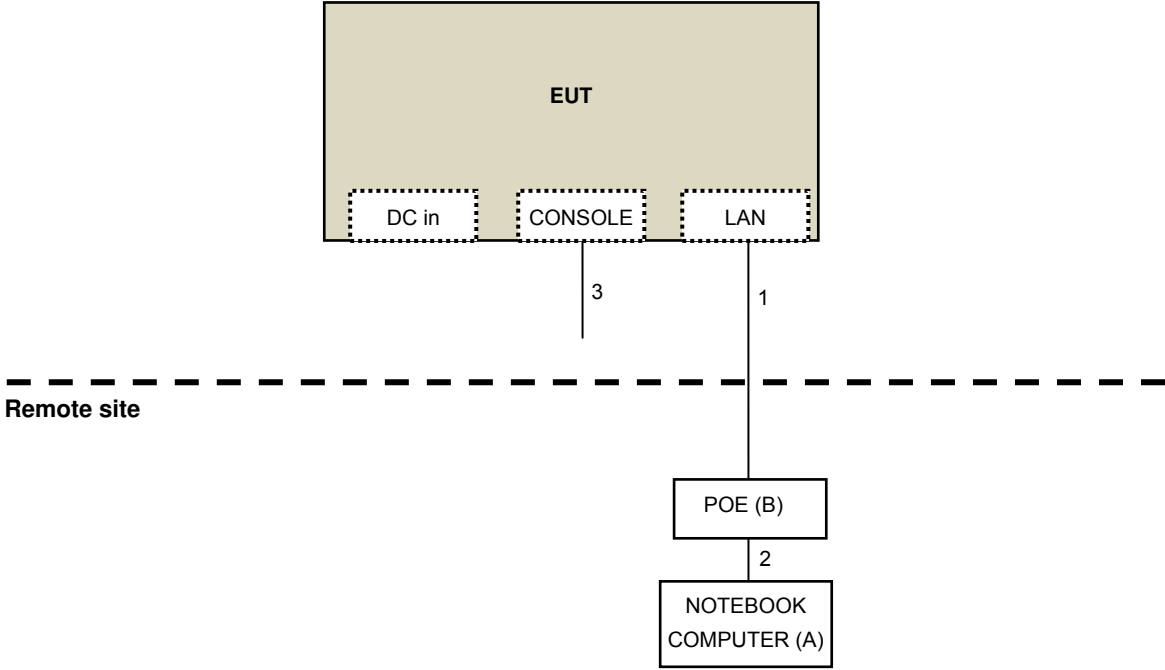
Note:

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

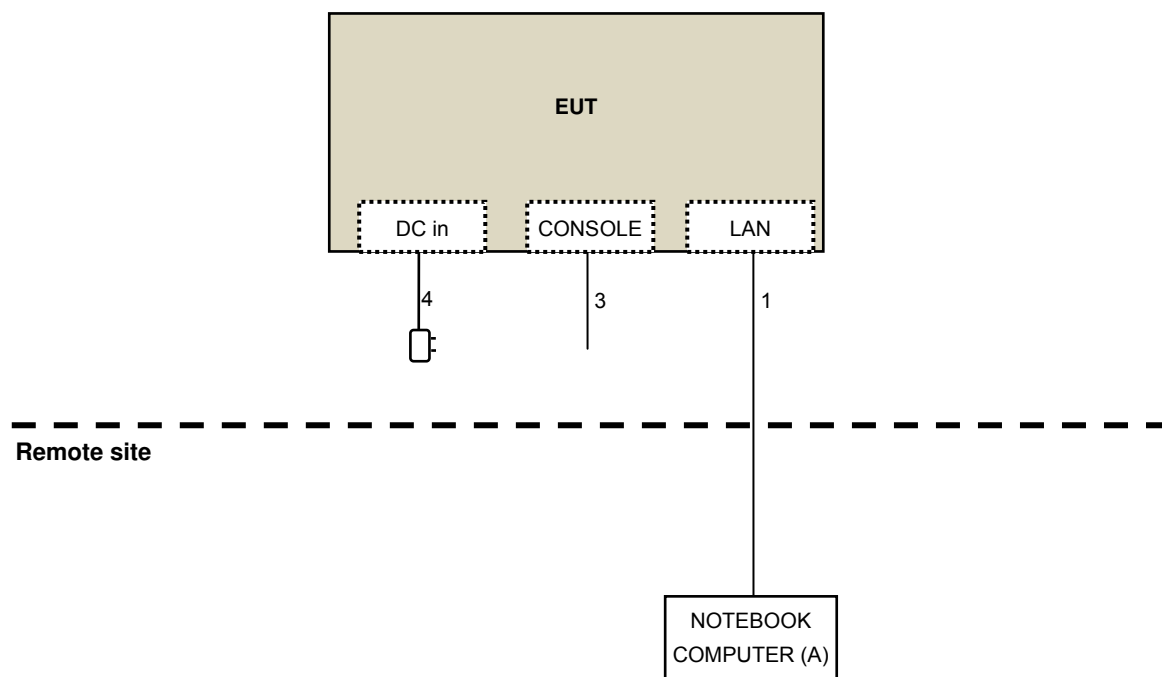
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45	1	10	No	0	Provided by Lab
2.	RJ-45	1	3	No	0	Provided by Lab
3.	Console	1	1.8	No	0	Provided by Lab
4.	DC	1	1.8	No	0	Supplied by client

3.4.1 Configuration of System under Test

For PoE Mode:



For Adapter Mode:



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 v01r01

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 v01r01	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
Boresight Antenna Fixture	NA	NA	NA	NA
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Dec. 03, 2015	Dec. 02, 2016
Power Meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. The FCC Site Registration No. is 147459
4. The CANADA Site Registration No. is 20331-1
5. Tested Date: Mar. 14 to 17, 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:

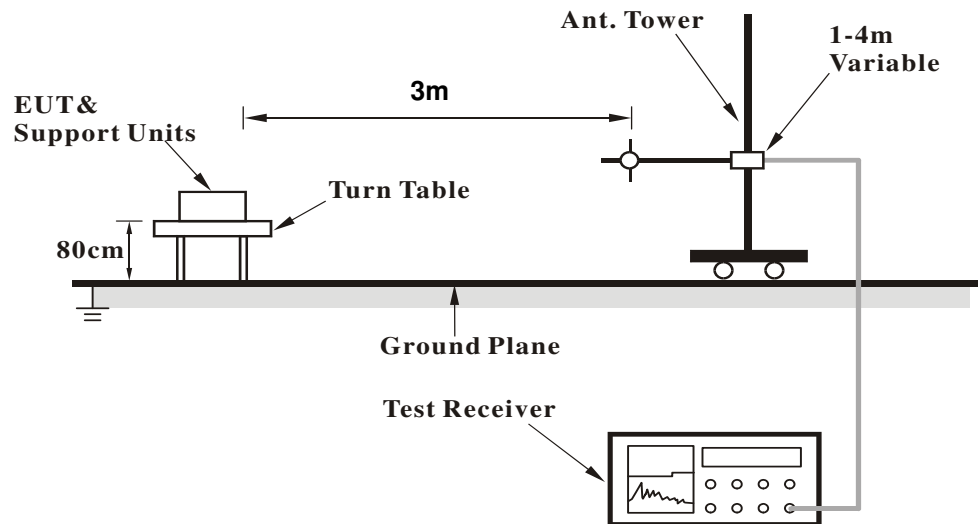
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

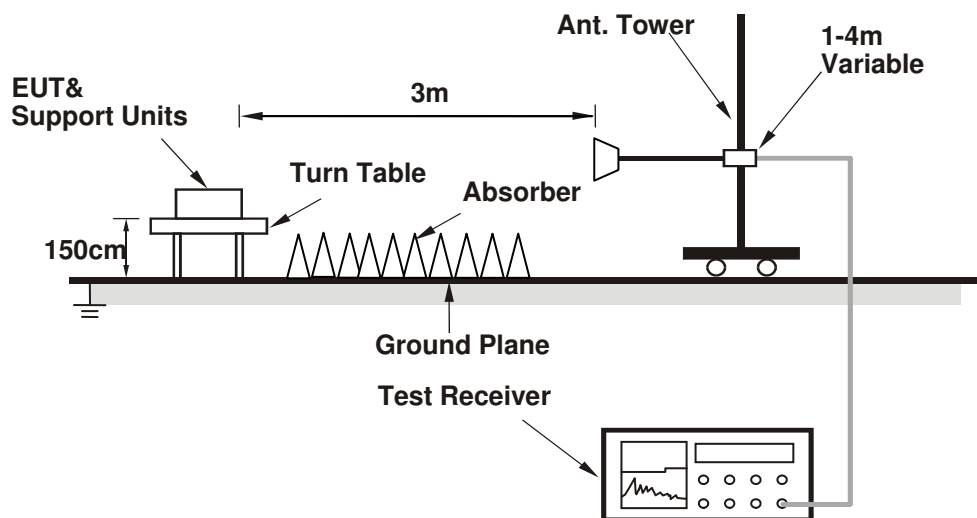
No deviation.

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

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on remote site.
2. Controlling software (Mtool.exe [V2.0.2.7]) 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	69.3 PK	74.0	-4.7	3.34 H	276	66.74	2.56
2	5150.00	50.6 AV	54.0	-3.4	3.34 H	276	48.04	2.56
3	*5180.00	114.1 PK			3.34 H	276	111.45	2.65
4	*5180.00	104.3 AV			3.34 H	276	101.65	2.65
5	#10360.00	53.4 PK	74.0	-20.6	1.07 H	253	40.18	13.22
6	#10360.00	40.3 AV	54.0	-13.7	1.07 H	253	27.08	13.22
7	15540.00	52.5 PK	74.0	-21.5	1.55 H	154	37.02	15.48
8	15540.00	37.5 AV	54.0	-16.5	1.55 H	154	22.02	15.48
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	72.5 PK	74.0	-1.5	2.91 V	191	69.94	2.56
2	5150.00	52.6 AV	54.0	-1.4	2.91 V	191	50.04	2.56
3	*5180.00	117.9 PK			2.69 V	172	115.25	2.65
4	*5180.00	106.4 AV			2.69 V	172	103.75	2.65
5	#10360.00	54.3 PK	74.0	-19.7	1.19 V	184	41.08	13.22
6	#10360.00	42.4 AV	54.0	-11.6	1.19 V	184	29.18	13.22
7	15540.00	50.4 PK	74.0	-23.6	1.49 V	102	34.92	15.48
8	15540.00	36.5 AV	54.0	-17.5	1.49 V	102	21.02	15.48

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.4 PK	74.0	-10.6	3.33 H	271	60.84	2.56
2	5150.00	44.3 AV	54.0	-9.7	3.33 H	271	41.74	2.56
3	*5200.00	116.4 PK			3.33 H	271	113.69	2.71
4	*5200.00	105.4 AV			3.33 H	271	102.69	2.71
5	5363.00	53.6 PK	74.0	-20.4	3.33 H	271	50.47	3.13
6	5363.00	42.2 AV	54.0	-11.8	3.33 H	271	39.07	3.13
7	#10400.00	53.6 PK	74.0	-20.4	1.05 H	244	40.13	13.47
8	#10400.00	40.7 AV	54.0	-13.3	1.05 H	244	27.23	13.47
9	15600.00	52.1 PK	74.0	-21.9	1.53 H	144	36.67	15.43
10	15600.00	37.2 AV	54.0	-16.8	1.53 H	144	21.77	15.43

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.3 PK	74.0	-8.7	2.58 V	187	62.74	2.56
2	5150.00	46.4 AV	54.0	-7.6	2.58 V	187	43.84	2.56
3	*5200.00	118.5 PK			2.58 V	187	115.79	2.71
4	*5200.00	107.4 AV			2.58 V	187	104.69	2.71
5	5363.00	55.7 PK	74.0	-18.3	2.58 V	64	52.57	3.13
6	5363.00	44.1 AV	54.0	-9.9	2.58 V	64	40.97	3.13
7	#10400.00	55.1 PK	74.0	-18.9	1.18 V	173	41.63	13.47
8	#10400.00	43.3 AV	54.0	-10.7	1.18 V	173	29.83	13.47
9	15600.00	51.8 PK	74.0	-22.2	1.49 V	105	36.37	15.43
10	15600.00	37.6 AV	54.0	-16.4	1.49 V	105	22.17	15.43

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	5000.00	51.4 PK	74.0	-22.6	2.21 H	234	49.17	2.23
2	5000.00	43.6 AV	54.0	-10.4	2.21 H	234	41.37	2.23
3	5150.00	55.4 PK	74.0	-18.6	3.30 H	281	52.84	2.56
4	5150.00	42.2 AV	54.0	-11.8	3.30 H	281	39.64	2.56
5	*5240.00	116.1 PK			3.30 H	281	113.29	2.81
6	*5240.00	106.4 AV			3.30 H	281	103.59	2.81
7	5400.00	54.3 PK	74.0	-19.7	3.30 H	281	51.07	3.23
8	5400.00	43.6 AV	54.0	-10.4	3.30 H	281	40.37	3.23
9	#10480.00	53.4 PK	74.0	-20.6	1.01 H	232	40.00	13.40
10	#10480.00	40.3 AV	54.0	-13.7	1.01 H	232	26.90	13.40
11	15720.00	52.3 PK	74.0	-21.7	1.49 H	159	37.29	15.01
12	15720.00	37.2 AV	54.0	-16.8	1.49 H	159	22.19	15.01

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	5000.00	53.4 PK	74.0	-20.6	2.64 V	120	51.17	2.23
2	5000.00	45.7 AV	54.0	-8.3	2.64 V	120	43.47	2.23
3	5150.00	57.2 PK	74.0	-16.8	2.87 V	275	54.64	2.56
4	5150.00	44.4 AV	54.0	-9.6	2.87 V	275	41.84	2.56
5	*5240.00	118.4 PK			2.87 V	275	115.59	2.81
6	*5240.00	108.1 AV			2.87 V	275	105.29	2.81
7	5400.00	56.3 PK	74.0	-17.7	2.87 V	275	53.07	3.23
8	5400.00	45.2 AV	54.0	-8.8	2.87 V	275	41.97	3.23
9	#10480.00	55.3 PK	74.0	-18.7	1.12 V	186	41.90	13.40
10	#10480.00	43.5 AV	54.0	-10.5	1.12 V	186	30.10	13.40
11	15720.00	52.1 PK	74.0	-21.9	1.48 V	120	37.09	15.01
12	15720.00	37.7 AV	54.0	-16.3	1.48 V	120	22.69	15.01

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	69.8 PK	74.0	-4.2	1.00 H	102	66.01	3.79
2	#5715.00	49.9 AV	54.0	-4.1	1.00 H	102	46.11	3.79
3	#5725.00	75.4 PK	78.2	-2.8	1.00 H	102	71.60	3.80
4	*5745.00	110.4 PK			1.00 H	102	106.60	3.80
5	*5745.00	100.8 AV			1.00 H	102	97.00	3.80
6	#5984.00	55.3 PK	74.0	-18.7	1.00 H	126	51.21	4.09
7	#5984.00	46.5 AV	54.0	-7.5	1.00 H	126	42.41	4.09
8	11490.00	52.1 PK	74.0	-21.9	1.00 H	204	37.07	15.03
9	11490.00	39.9 AV	54.0	-14.1	1.00 H	204	24.87	15.03
10	#17235.00	49.8 PK	74.0	-24.2	1.50 H	157	30.20	19.60
11	#17235.00	34.4 AV	54.0	-19.6	1.50 H	157	14.80	19.60

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	71.0 PK	74.0	-3.0	2.54 V	82	67.21	3.79
2	#5715.00	51.4 AV	54.0	-2.6	2.54 V	82	47.61	3.79
3	#5725.00	77.1 PK	78.2	-1.1	2.54 V	82	73.30	3.80
4	*5745.00	112.6 PK			2.54 V	82	108.80	3.80
5	*5745.00	104.1 AV			2.54 V	82	100.30	3.80
6	#5984.00	57.1 PK	74.0	-16.9	2.54 V	360	53.01	4.09
7	#5984.00	48.8 AV	54.0	-5.2	2.54 V	360	44.71	4.09
8	11490.00	52.8 PK	74.0	-21.2	1.13 V	172	37.77	15.03
9	11490.00	40.3 AV	54.0	-13.7	1.13 V	172	25.27	15.03
10	#17235.00	50.9 PK	74.0	-23.1	1.46 V	115	31.30	19.60
11	#17235.00	35.5 AV	54.0	-18.5	1.46 V	115	15.90	19.60

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	58.5 PK	74.0	-15.5	1.04 H	101	54.71	3.79
2	#5715.00	45.6 AV	54.0	-8.4	1.04 H	101	41.81	3.79
3	#5725.00	64.4 PK	78.2	-13.8	1.04 H	101	60.60	3.80
4	*5785.00	117.4 PK			1.04 H	101	113.57	3.83
5	*5785.00	106.5 AV			1.04 H	101	102.67	3.83
6	#5850.00	59.5 PK	78.2	-18.7	1.04 H	101	55.67	3.83
7	#5870.00	55.5 PK	74.0	-18.5	1.04 H	101	51.65	3.85
8	#5870.00	44.4 AV	54.0	-9.6	1.04 H	101	40.55	3.85
9	11570.00	53.5 PK	74.0	-20.5	1.06 H	216	38.66	14.84
10	11570.00	40.4 AV	54.0	-13.6	1.06 H	216	25.56	14.84
11	#17355.00	51.8 PK	74.0	-22.2	1.54 H	168	31.56	20.24
12	#17355.00	36.7 AV	54.0	-17.3	1.54 H	168	16.46	20.24

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	60.4 PK	74.0	-13.6	2.54 V	82	56.61	3.79
2	#5715.00	47.9 AV	54.0	-6.1	2.54 V	82	44.11	3.79
3	#5725.00	66.9 PK	78.2	-11.3	2.54 V	82	63.10	3.80
4	*5785.00	119.9 PK			2.54 V	82	116.07	3.83
5	*5785.00	108.7 AV			2.54 V	82	104.87	3.83
6	#5850.00	61.5 PK	78.2	-16.7	2.54 V	82	57.67	3.83
7	#5870.00	57.6 PK	74.0	-16.4	2.54 V	82	53.75	3.85
8	#5870.00	46.0 AV	54.0	-8.0	2.54 V	82	42.15	3.85
9	11570.00	56.0 PK	74.0	-18.0	1.16 V	170	41.16	14.84
10	11570.00	44.0 AV	54.0	-10.0	1.16 V	170	29.16	14.84
11	#17355.00	52.1 PK	74.0	-21.9	1.51 V	110	31.86	20.24
12	#17355.00	37.7 AV	54.0	-16.3	1.51 V	110	17.46	20.24

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	113.3 PK			1.04 H	116	109.47	3.83
2	*5825.00	103.3 AV			1.04 H	116	99.47	3.83
3	#5850.00	74.2 PK	78.2	-4.0	1.04 H	116	70.37	3.83
4	#5860.00	59.6 PK	74.0	-14.4	1.04 H	116	55.76	3.84
5	#5860.00	44.3 AV	54.0	-9.7	1.04 H	116	40.46	3.84
6	11650.00	51.4 PK	74.0	-22.6	1.00 H	217	36.73	14.67
7	11650.00	39.5 AV	54.0	-14.5	1.00 H	217	24.83	14.67
8	#17475.00	50.2 PK	74.0	-23.8	1.48 H	158	29.37	20.83
9	#17475.00	34.6 AV	54.0	-19.4	1.48 H	158	13.77	20.83

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	115.1 PK			2.56 V	74	111.27	3.83
2	*5825.00	105.4 AV			2.56 V	74	101.57	3.83
3	#5850.00	76.8 PK	78.2	-1.4	2.56 V	74	72.97	3.83
4	#5860.00	61.1 PK	74.0	-12.9	2.56 V	74	57.26	3.84
5	#5860.00	46.6 AV	54.0	-7.4	2.56 V	74	42.76	3.84
6	11650.00	53.2 PK	74.0	-20.8	1.15 V	183	38.53	14.67
7	11650.00	40.4 AV	54.0	-13.6	1.15 V	183	25.73	14.67
8	#17475.00	50.9 PK	74.0	-23.1	1.51 V	123	30.07	20.83
9	#17475.00	35.4 AV	54.0	-18.6	1.51 V	123	14.57	20.83

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	70.4 PK	74.0	-3.6	3.28 H	271	67.84	2.56
2	5150.00	50.6 AV	54.0	-3.4	3.28 H	271	48.04	2.56
3	*5180.00	114.3 PK			3.28 H	271	111.65	2.65
4	*5180.00	102.2 AV			3.28 H	271	99.55	2.65
5	#10360.00	53.7 PK	74.0	-20.3	1.07 H	252	40.48	13.22
6	#10360.00	40.4 AV	54.0	-13.6	1.07 H	252	27.18	13.22
7	15540.00	53.0 PK	74.0	-21.0	1.53 H	148	37.52	15.48
8	15540.00	38.0 AV	54.0	-16.0	1.53 H	148	22.52	15.48
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	72.8 PK	74.0	-1.2	2.59 V	180	70.24	2.56
2	5150.00	52.1 AV	54.0	-1.9	2.59 V	180	49.54	2.56
3	*5180.00	116.0 PK			2.69 V	172	113.35	2.65
4	*5180.00	104.0 AV			2.69 V	172	101.35	2.65
5	#10360.00	54.8 PK	74.0	-19.2	1.23 V	183	41.58	13.22
6	#10360.00	42.8 AV	54.0	-11.2	1.23 V	183	29.58	13.22
7	15540.00	50.3 PK	74.0	-23.7	1.55 V	87	34.82	15.48
8	15540.00	36.5 AV	54.0	-17.5	1.55 V	87	21.02	15.48

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	5150.00	67.4 PK	74.0	-6.6	3.38 H	291	64.84	2.56
2	5150.00	43.3 AV	54.0	-10.7	3.38 H	291	40.74	2.56
3	*5200.00	115.4 PK			3.38 H	291	112.69	2.71
4	*5200.00	103.3 AV			3.38 H	291	100.59	2.71
5	#10400.00	53.1 PK	74.0	-20.9	1.05 H	258	39.63	13.47
6	#10400.00	40.3 AV	54.0	-13.7	1.05 H	258	26.83	13.47
7	15600.00	52.4 PK	74.0	-21.6	1.54 H	129	36.97	15.43
8	15600.00	37.2 AV	54.0	-16.8	1.54 H	129	21.77	15.43
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.8 PK	74.0	-4.2	2.43 V	82	67.24	2.56
2	5150.00	45.5 AV	54.0	-8.5	2.43 V	82	42.94	2.56
3	*5200.00	117.9 PK			2.43 V	82	115.19	2.71
4	*5200.00	105.4 AV			2.43 V	82	102.69	2.71
5	#10400.00	55.8 PK	74.0	-18.2	1.23 V	167	42.33	13.47
6	#10400.00	43.8 AV	54.0	-10.2	1.23 V	167	30.33	13.47
7	15600.00	52.4 PK	74.0	-21.6	1.44 V	94	36.97	15.43
8	15600.00	37.9 AV	54.0	-16.1	1.44 V	94	22.47	15.43

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	114.4 PK			3.31 H	279	111.59	2.81
2	*5240.00	103.4 AV			3.31 H	279	100.59	2.81
3	5397.00	51.6 PK	74.0	-22.4	3.00 H	244	48.37	3.23
4	5397.00	40.4 AV	54.0	-13.6	3.00 H	244	37.17	3.23
5	#10480.00	53.5 PK	74.0	-20.5	1.13 H	249	40.10	13.40
6	#10480.00	39.9 AV	54.0	-14.1	1.13 H	249	26.50	13.40
7	15720.00	52.6 PK	74.0	-21.4	1.54 H	138	37.59	15.01
8	15720.00	37.6 AV	54.0	-16.4	1.54 H	138	22.59	15.01
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	116.8 PK			2.39 V	81	113.99	2.81
2	*5240.00	105.5 AV			2.39 V	81	102.69	2.81
3	5397.00	53.8 PK	74.0	-20.2	2.43 V	81	50.57	3.23
4	5397.00	42.5 AV	54.0	-11.5	2.43 V	81	39.27	3.23
5	#10480.00	54.5 PK	74.0	-19.5	1.25 V	188	41.10	13.40
6	#10480.00	42.5 AV	54.0	-11.5	1.25 V	188	29.10	13.40
7	15720.00	49.9 PK	74.0	-24.1	1.60 V	100	34.89	15.01
8	15720.00	36.1 AV	54.0	-17.9	1.60 V	100	21.09	15.01

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	66.4 PK	74.0	-7.6	1.05 H	88	62.61	3.79
2	#5715.00	46.4 AV	54.0	-7.6	1.05 H	88	42.61	3.79
3	#5725.00	75.4 PK	78.2	-2.8	1.05 H	88	71.60	3.80
4	*5745.00	110.4 PK			1.05 H	88	106.60	3.80
5	*5745.00	99.3 AV			1.05 H	88	95.50	3.80
6	11490.00	50.3 PK	74.0	-23.7	1.02 H	189	35.27	15.03
7	11490.00	37.4 AV	54.0	-16.6	1.02 H	189	22.37	15.03
8	#17235.00	48.6 PK	74.0	-25.4	1.47 H	145	29.00	19.60
9	#17235.00	32.2 AV	54.0	-21.8	1.47 H	145	12.60	19.60

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	68.5 PK	74.0	-5.5	2.70 V	80	64.71	3.79
2	#5715.00	48.1 AV	54.0	-5.9	2.70 V	80	44.31	3.79
3	#5725.00	77.1 PK	78.2	-1.1	2.70 V	80	73.30	3.80
4	*5745.00	112.8 PK			2.70 V	80	109.00	3.80
5	*5745.00	101.3 AV			2.70 V	80	97.50	3.80
6	11490.00	51.4 PK	74.0	-22.6	1.18 V	163	36.37	15.03
7	11490.00	38.5 AV	54.0	-15.5	1.18 V	163	23.47	15.03
8	#17235.00	49.5 PK	74.0	-24.5	1.49 V	106	29.90	19.60
9	#17235.00	33.6 AV	54.0	-20.4	1.49 V	106	14.00	19.60

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	59.4 PK	74.0	-14.6	1.00 H	111	55.61	3.79
2	#5715.00	46.6 AV	54.0	-7.4	1.00 H	111	42.81	3.79
3	#5725.00	65.4 PK	78.2	-12.8	1.00 H	111	61.60	3.80
4	*5785.00	115.4 PK			1.00 H	111	111.57	3.83
5	*5785.00	104.4 AV			1.00 H	111	100.57	3.83
6	#5850.00	64.5 PK	78.2	-13.7	1.00 H	111	60.67	3.83
7	#5860.00	55.4 PK	74.0	-18.6	1.00 H	111	51.56	3.84
8	#5860.00	43.5 AV	54.0	-10.5	1.00 H	111	39.66	3.84
9	11570.00	53.5 PK	74.0	-20.5	1.01 H	225	38.66	14.84
10	11570.00	40.7 AV	54.0	-13.3	1.01 H	225	25.86	14.84
11	#17355.00	52.2 PK	74.0	-21.8	1.50 H	183	31.96	20.24
12	#17355.00	37.1 AV	54.0	-16.9	1.50 H	183	16.86	20.24

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	2.56 V	77	57.41	3.79
2	#5715.00	48.2 AV	54.0	-5.8	2.56 V	77	44.41	3.79
3	#5725.00	67.3 PK	78.2	-10.9	2.56 V	77	63.50	3.80
4	*5785.00	117.6 PK			2.56 V	77	113.77	3.83
5	*5785.00	106.3 AV			2.56 V	77	102.47	3.83
6	#5850.00	66.5 PK	78.2	-11.7	2.56 V	77	62.67	3.83
7	#5860.00	57.6 PK	74.0	-16.4	2.56 V	77	53.76	3.84
8	#5860.00	45.8 AV	54.0	-8.2	2.56 V	77	41.96	3.84
9	11570.00	55.5 PK	74.0	-18.5	1.19 V	180	40.66	14.84
10	11570.00	43.7 AV	54.0	-10.3	1.19 V	180	28.86	14.84
11	#17355.00	52.4 PK	74.0	-21.6	1.57 V	118	32.16	20.24
12	#17355.00	37.9 AV	54.0	-16.1	1.57 V	118	17.66	20.24

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	113.2 PK			1.02 H	86	109.37	3.83
2	*5825.00	102.2 AV			1.02 H	86	98.37	3.83
3	#5850.00	75.2 PK	78.2	-3.0	1.02 H	86	71.37	3.83
4	#5860.00	63.3 PK	74.0	-10.7	1.02 H	86	59.46	3.84
5	#5860.00	45.5 AV	54.0	-8.5	1.02 H	86	41.66	3.84
6	11650.00	51.8 PK	74.0	-22.2	1.02 H	211	37.13	14.67
7	11650.00	39.9 AV	54.0	-14.1	1.02 H	211	25.23	14.67
8	#17475.00	50.8 PK	74.0	-23.2	1.49 H	154	29.97	20.83
9	#17475.00	34.9 AV	54.0	-19.1	1.49 H	154	14.07	20.83

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	115.2 PK			2.70 V	74	111.37	3.83
2	*5825.00	104.2 AV			2.70 V	74	100.37	3.83
3	#5850.00	77.0 PK	78.2	-1.2	2.70 V	74	73.17	3.83
4	#5860.00	65.2 PK	74.0	-8.8	2.70 V	74	61.36	3.84
5	#5860.00	47.5 AV	54.0	-6.5	2.70 V	74	43.66	3.84
6	11650.00	53.4 PK	74.0	-20.6	1.13 V	198	38.73	14.67
7	11650.00	40.7 AV	54.0	-13.3	1.13 V	198	26.03	14.67
8	#17475.00	50.7 PK	74.0	-23.3	1.53 V	127	29.87	20.83
9	#17475.00	35.3 AV	54.0	-18.7	1.53 V	127	14.47	20.83

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	70.4 PK	74.0	-3.6	3.29 H	283	67.84	2.56
2	5150.00	50.1 AV	54.0	-3.9	3.29 H	283	47.54	2.56
3	*5190.00	106.4 PK			3.29 H	283	103.72	2.68
4	*5190.00	94.4 AV			3.29 H	283	91.72	2.68
5	5350.00	55.2 PK	74.0	-18.8	3.29 H	283	52.11	3.09
6	5350.00	44.4 AV	54.0	-9.6	3.29 H	283	41.31	3.09
7	#10380.00	49.9 PK	74.0	-24.1	1.00 H	212	36.56	13.34
8	#10380.00	34.3 AV	54.0	-19.7	1.00 H	212	20.96	13.34
9	15570.00	48.2 PK	74.0	-25.8	1.50 H	151	32.75	15.45
10	15570.00	33.2 AV	54.0	-20.8	1.50 H	151	17.75	15.45
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	72.7 PK	74.0	-1.3	2.91 V	276	70.14	2.56
2	5150.00	52.5 AV	54.0	-1.5	2.91 V	276	49.94	2.56
3	*5190.00	108.9 PK			2.91 V	276	106.22	2.68
4	*5190.00	96.6 AV			2.91 V	276	93.92	2.68
5	5350.00	57.9 PK	74.0	-16.1	2.91 V	276	54.81	3.09
6	5350.00	46.4 AV	54.0	-7.6	2.91 V	276	43.31	3.09
7	#10380.00	51.2 PK	74.0	-22.8	1.14 V	202	37.86	13.34
8	#10380.00	35.4 AV	54.0	-18.6	1.14 V	202	22.06	13.34
9	15570.00	49.2 PK	74.0	-24.8	1.45 V	110	33.75	15.45
10	15570.00	34.4 AV	54.0	-19.6	1.45 V	110	18.95	15.45

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.4 PK	74.0	-4.6	3.30 H	281	66.84	2.56
2	5150.00	48.6 AV	54.0	-5.4	3.30 H	281	46.04	2.56
3	*5230.00	110.4 PK			3.30 H	281	107.63	2.77
4	*5230.00	99.4 AV			3.30 H	281	96.63	2.77
5	5384.00	56.4 PK	74.0	-17.6	3.30 H	281	53.21	3.19
6	5384.00	43.2 AV	54.0	-10.8	3.30 H	281	40.01	3.19
7	#10460.00	52.1 PK	74.0	-21.9	1.06 H	200	38.68	13.42
8	#10460.00	40.1 AV	54.0	-13.9	1.06 H	200	26.68	13.42
9	15690.00	50.6 PK	74.0	-23.4	1.45 H	162	35.46	15.14
10	15690.00	34.7 AV	54.0	-19.3	1.45 H	162	19.56	15.14

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	71.1 PK	74.0	-2.9	2.94 V	86	68.54	2.56
2	5150.00	50.9 AV	54.0	-3.1	2.94 V	86	48.34	2.56
3	*5230.00	112.8 PK			2.94 V	86	110.03	2.77
4	*5230.00	101.4 AV			2.94 V	86	98.63	2.77
5	5384.00	58.3 PK	74.0	-15.7	2.94 V	86	55.11	3.19
6	5384.00	45.2 AV	54.0	-8.8	2.94 V	86	42.01	3.19
7	#10460.00	53.2 PK	74.0	-20.8	1.13 V	207	39.78	13.42
8	#10460.00	40.3 AV	54.0	-13.7	1.13 V	207	26.88	13.42
9	15690.00	51.0 PK	74.0	-23.0	1.51 V	122	35.86	15.14
10	15690.00	35.4 AV	54.0	-18.6	1.51 V	122	20.26	15.14

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	65.4 PK	74.0	-8.6	1.00 H	109	61.61	3.79
2	#5715.00	50.4 AV	54.0	-3.6	1.00 H	109	46.61	3.79
3	#5725.00	75.4 PK	78.2	-2.8	1.00 H	109	71.60	3.80
4	*5755.00	106.4 PK			1.00 H	109	102.59	3.81
5	*5755.00	94.4 AV			1.00 H	109	90.59	3.81
6	#5908.00	54.4 PK	74.0	-19.6	1.00 H	109	50.52	3.88
7	#5908.00	43.4 AV	54.0	-10.6	1.00 H	109	39.52	3.88
8	11510.00	49.7 PK	74.0	-24.3	1.00 H	208	34.71	14.99
9	11510.00	33.9 AV	54.0	-20.1	1.00 H	208	18.91	14.99
10	#17265.00	48.3 PK	74.0	-25.7	1.47 H	135	28.53	19.77
11	#17265.00	33.1 AV	54.0	-20.9	1.47 H	135	13.33	19.77
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	67.9 PK	74.0	-6.1	2.80 V	81	64.11	3.79
2	#5715.00	52.8 AV	54.0	-1.2	2.80 V	81	49.01	3.79
3	#5725.00	77.1 PK	78.2	-1.1	2.80 V	81	73.30	3.80
4	*5755.00	108.7 PK			2.80 V	81	104.89	3.81
5	*5755.00	96.7 AV			2.80 V	81	92.89	3.81
6	#5908.00	56.4 PK	74.0	-17.6	2.80 V	81	52.52	3.88
7	#5908.00	45.4 AV	54.0	-8.6	2.80 V	81	41.52	3.88
8	11510.00	50.9 PK	74.0	-23.1	1.17 V	199	35.91	14.99
9	11510.00	35.0 AV	54.0	-19.0	1.17 V	199	20.01	14.99
10	#17265.00	49.8 PK	74.0	-24.2	1.50 V	116	30.03	19.77
11	#17265.00	34.8 AV	54.0	-19.2	1.50 V	116	15.03	19.77

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	#5715.00	62.5 PK	74.0	-11.5	1.03 H	95	58.71	3.79
2	#5715.00	49.9 AV	54.0	-4.1	1.03 H	95	46.11	3.79
3	#5725.00	66.5 PK	78.2	-11.7	1.03 H	95	62.70	3.80
4	*5795.00	111.3 PK			1.03 H	95	107.46	3.84
5	*5795.00	100.4 AV			1.03 H	95	96.56	3.84
6	#5850.00	74.8 PK	78.2	-3.4	1.03 H	95	70.97	3.83
7	#5860.00	65.5 PK	74.0	-8.5	1.03 H	95	61.66	3.84
8	#5860.00	49.5 AV	54.0	-4.5	1.03 H	95	45.66	3.84
9	11590.00	52.0 PK	74.0	-22.0	1.09 H	209	37.21	14.79
10	11590.00	39.7 AV	54.0	-14.3	1.09 H	209	24.91	14.79
11	#17385.00	51.0 PK	74.0	-23.0	1.40 H	171	30.60	20.40
12	#17385.00	35.1 AV	54.0	-18.9	1.40 H	171	14.70	20.40

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	64.6 PK	74.0	-9.4	2.80 V	77	60.81	3.79
2	#5715.00	51.4 AV	54.0	-2.6	2.80 V	77	47.61	3.79
3	#5725.00	68.8 PK	78.2	-9.4	2.80 V	77	65.00	3.80
4	*5795.00	113.7 PK			2.80 V	77	109.86	3.84
5	*5795.00	102.7 AV			2.80 V	77	98.86	3.84
6	#5850.00	76.2 PK	78.2	-2.0	2.80 V	77	72.37	3.83
7	#5860.00	67.9 PK	74.0	-6.1	2.80 V	77	64.06	3.84
8	#5860.00	51.2 AV	54.0	-2.8	2.80 V	77	47.36	3.84
9	11590.00	52.1 PK	74.0	-21.9	1.11 V	202	37.31	14.79
10	11590.00	39.5 AV	54.0	-14.5	1.11 V	202	24.71	14.79
11	#17385.00	49.5 PK	74.0	-24.5	1.55 V	119	29.10	20.40
12	#17385.00	33.6 AV	54.0	-20.4	1.55 V	119	13.20	20.40

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	5147.00	67.2 PK	74.0	-6.8	3.33 H	266	64.65	2.55
2	5147.00	50.4 AV	54.0	-3.6	3.33 H	266	47.85	2.55
3	*5210.00	104.4 PK			3.33 H	266	101.67	2.73
4	*5210.00	91.4 AV			3.33 H	266	88.67	2.73
5	#10420.00	49.8 PK	74.0	-24.2	1.00 H	199	36.34	13.46
6	#10420.00	34.1 AV	54.0	-19.9	1.00 H	199	20.64	13.46
7	15630.00	48.1 PK	74.0	-25.9	1.48 H	130	32.77	15.33
8	15630.00	32.7 AV	54.0	-21.3	1.48 H	130	17.37	15.33
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	5147.00	69.0 PK	74.0	-5.0	3.03 V	282	66.45	2.55
2	5147.00	52.9 AV	54.0	-1.1	3.03 V	282	50.35	2.55
3	*5210.00	106.1 PK			3.03 V	282	103.37	2.73
4	*5210.00	93.4 AV			3.03 V	282	90.67	2.73
5	#10420.00	50.8 PK	74.0	-23.2	1.18 V	212	37.34	13.46
6	#10420.00	35.0 AV	54.0	-19.0	1.18 V	212	21.54	13.46
7	15630.00	50.0 PK	74.0	-24.0	1.51 V	117	34.67	15.33
8	15630.00	35.2 AV	54.0	-18.8	1.51 V	117	19.87	15.33

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	65.4 PK	74.0	-8.6	1.04 H	89	61.61	3.79
2	#5715.00	50.4 AV	54.0	-3.6	1.04 H	89	46.61	3.79
3	#5725.00	67.4 PK	78.2	-10.8	1.04 H	89	63.60	3.80
4	*5775.00	101.4 PK			1.04 H	89	97.59	3.81
5	*5775.00	89.5 AV			1.04 H	89	85.69	3.81
6	#5850.00	60.1 PK	78.2	-18.1	1.04 H	89	56.27	3.83
7	#5860.00	58.2 PK	74.0	-15.8	1.04 H	89	54.36	3.84
8	#5860.00	45.4 AV	54.0	-8.6	1.04 H	89	41.56	3.84
9	11550.00	49.8 PK	74.0	-24.2	1.02 H	217	34.91	14.89
10	11550.00	34.2 AV	54.0	-19.8	1.02 H	217	19.31	14.89
11	#17325.00	48.6 PK	74.0	-25.4	1.42 H	132	28.52	20.08
12	#17325.00	33.2 AV	54.0	-20.8	1.42 H	132	13.12	20.08

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	67.8 PK	74.0	-6.2	2.85 V	81	64.01	3.79
2	#5715.00	52.8 AV	54.0	-1.2	2.85 V	81	49.01	3.79
3	#5725.00	69.6 PK	78.2	-8.6	2.85 V	81	65.80	3.80
4	*5775.00	103.3 PK			2.85 V	81	99.49	3.81
5	*5775.00	91.3 AV			2.85 V	81	87.49	3.81
6	#5850.00	62.2 PK	78.2	-16.0	2.85 V	81	58.37	3.83
7	#5860.00	60.0 PK	74.0	-14.0	2.85 V	81	56.16	3.84
8	#5860.00	47.3 AV	54.0	-6.7	2.85 V	81	43.46	3.84
9	11550.00	50.9 PK	74.0	-23.1	1.19 V	192	36.01	14.89
10	11550.00	34.9 AV	54.0	-19.1	1.19 V	192	20.01	14.89
11	#17325.00	49.3 PK	74.0	-24.7	1.51 V	113	29.22	20.08
12	#17325.00	34.4 AV	54.0	-19.6	1.51 V	113	14.32	20.08

REMARKS:

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

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 48	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	30.08	25.9 QP	40.0	-14.1	1.00 H	219	35.12	-9.26
2	57.32	31.5 QP	40.0	-8.5	2.00 H	273	39.92	-8.45
3	68.68	28.2 QP	40.0	-11.8	1.50 H	24	37.76	-9.57
4	178.03	23.8 QP	43.5	-19.7	1.50 H	262	32.95	-9.19
5	225.02	25.4 QP	46.0	-20.6	1.50 H	316	36.31	-10.93
6	637.65	27.6 QP	46.0	-18.4	1.50 H	43	27.14	0.43
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	41.88	33.7 QP	40.0	-6.4	1.00 V	295	42.24	-8.59
2	79.68	35.6 QP	40.0	-4.4	1.50 V	142	47.69	-12.10
3	117.44	30.1 QP	43.5	-13.4	1.00 V	351	40.91	-10.83
4	221.14	23.5 QP	46.0	-22.5	1.50 V	53	34.60	-11.08
5	274.07	22.1 QP	46.0	-23.9	1.00 V	63	30.29	-8.23
6	800.12	30.2 QP	46.0	-15.8	1.50 V	197	27.11	3.05

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. 08, 2016	Mar. 07, 2017
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
50 ohms Terminator	E1-011315	13	Dec. 11 2015	Dec. 10 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. 22, 2016

4.2.3 Test Procedure

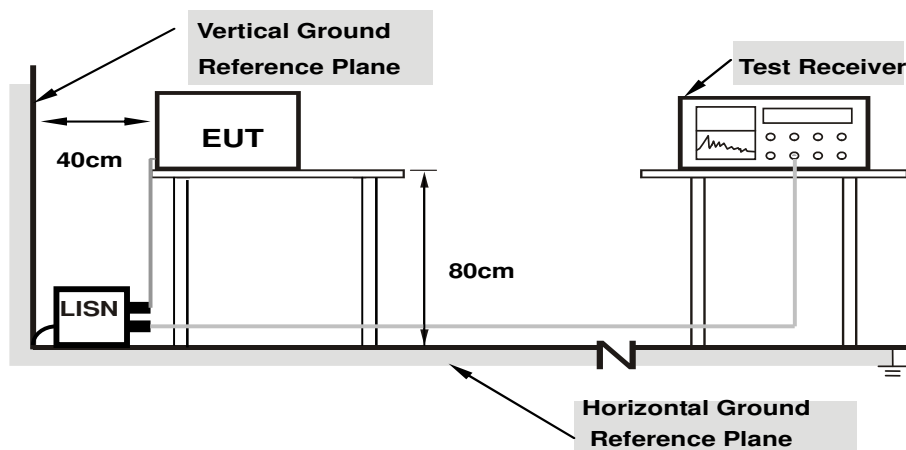
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

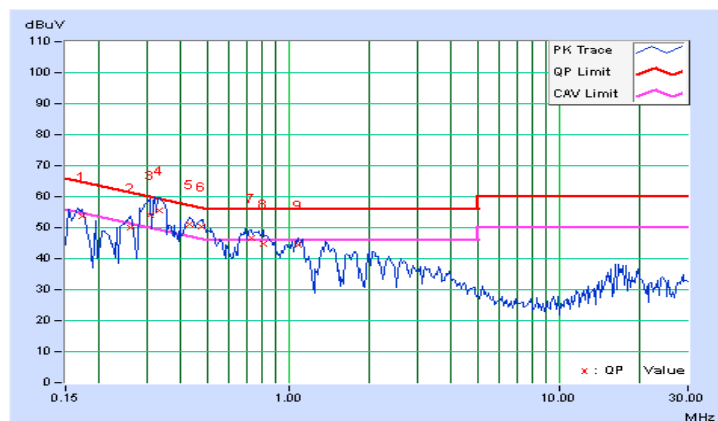
4.2.7 Test Results (Mode 1)

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

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.
		(dB)								
1	0.17344	10.30	43.24	36.06	53.54	46.36	64.79	54.79	-11.25	-8.43
2	0.25938	10.29	39.79	33.49	50.08	43.78	61.45	51.45	-11.38	-7.68
3	0.31016	10.29	43.68	26.95	53.97	37.24	59.97	49.97	-6.00	-12.73
4	0.33359	10.29	45.45	35.55	55.74	45.84	59.36	49.36	-3.62	-3.52
5	0.43125	10.30	40.70	32.82	51.00	43.12	57.23	47.23	-6.23	-4.11
6	0.47422	10.29	40.07	30.50	50.36	40.79	56.44	46.44	-6.08	-5.65
7	0.73203	10.26	36.36	27.50	46.62	37.76	56.00	46.00	-9.38	-8.24
8	0.80625	10.25	34.73	26.97	44.98	37.22	56.00	46.00	-11.02	-8.78
9	1.08203	10.23	34.07	25.48	44.30	35.71	56.00	46.00	-11.70	-10.29

REMARKS:

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

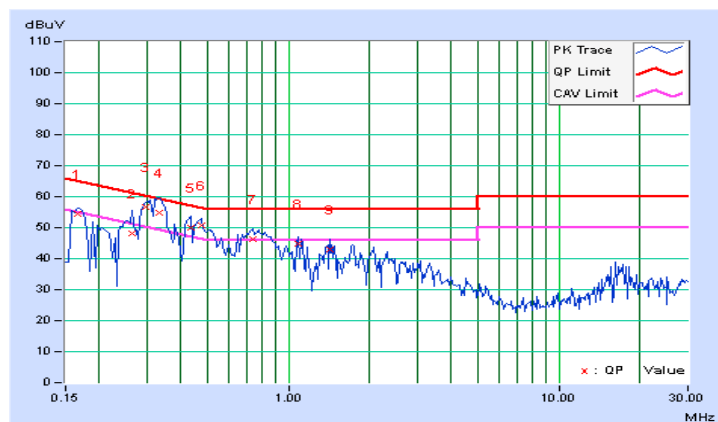


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [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	0.16562	10.29	44.11	38.92	54.40	49.21	65.18	55.18	-10.78	-5.97
2	0.26328	10.27	38.05	24.20	48.32	34.47	61.33	51.33	-13.01	-16.86
3	0.29844	10.27	46.37	36.49	56.64	46.76	60.29	50.29	-3.65	-3.53
4	0.33359	10.27	44.57	35.24	54.84	45.51	59.36	49.36	-4.52	-3.85
5	0.43516	10.28	39.85	27.12	50.13	37.40	57.15	47.15	-7.03	-9.76
6	0.47422	10.27	40.48	31.29	50.75	41.56	56.44	46.44	-5.69	-4.88
7	0.73594	10.25	36.05	26.01	46.30	36.26	56.00	46.00	-9.70	-9.74
8	1.08594	10.22	34.51	25.81	44.73	36.03	56.00	46.00	-11.27	-9.97
9	1.42969	10.24	32.67	25.20	42.91	35.44	56.00	46.00	-13.09	-10.56

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.



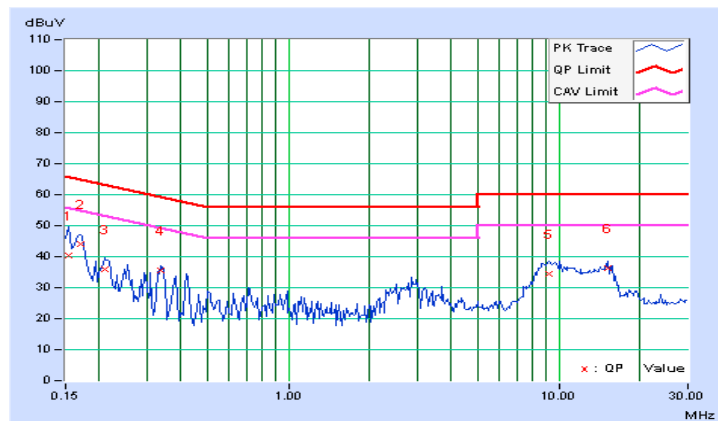
4.2.8 Test Results (Mode 2)

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

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	0.15391	10.32	29.97	10.23	40.29	20.55	65.79	55.79	-25.49	-35.23
2	0.16953	10.31	33.92	24.38	44.23	34.69	64.98	54.98	-20.76	-20.30
3	0.20859	10.28	25.83	17.06	36.11	27.34	63.26	53.26	-27.15	-25.92
4	0.33750	10.29	25.17	21.69	35.46	31.98	59.26	49.26	-23.80	-17.28
5	9.21875	10.53	23.81	14.04	34.34	24.57	60.00	50.00	-25.66	-25.43
6	15.08203	10.79	25.34	19.14	36.13	29.93	60.00	50.00	-23.87	-20.07

REMARKS:

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

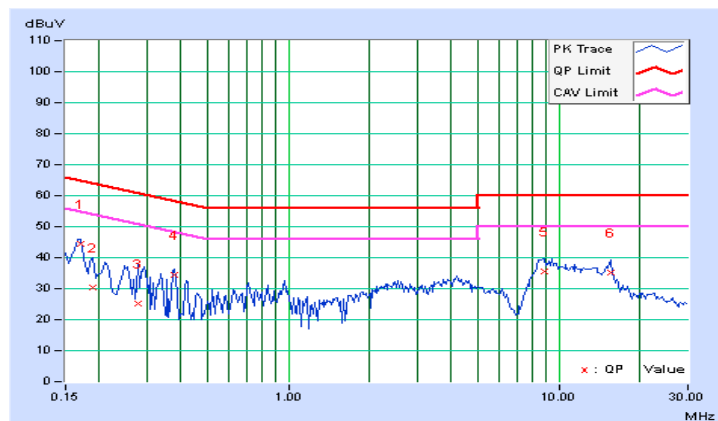


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [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	0.16953	10.29	34.29	24.08	44.58	34.37	64.98	54.98	-20.41	-20.62
2	0.18906	10.27	20.06	2.03	30.33	12.30	64.08	54.08	-33.75	-41.78
3	0.27891	10.27	14.99	1.86	25.26	12.13	60.85	50.85	-35.59	-38.72
4	0.37656	10.28	24.29	24.08	34.57	34.36	58.35	48.35	-23.79	-14.00
5	8.86719	10.53	24.89	16.27	35.42	26.80	60.00	50.00	-24.58	-23.20
6	15.50000	10.83	24.53	16.98	35.36	27.81	60.00	50.00	-24.64	-22.19

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

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

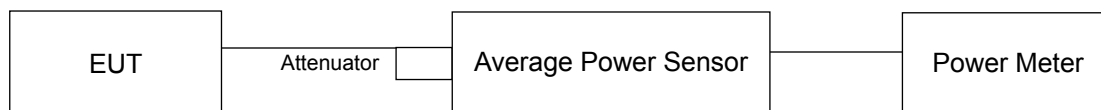
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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 and set the detector to AVERAGE. 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: 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	18.77	18.75	18.23	18.31	284.616	24.54	30	Pass
40	5200	19.86	19.75	19.52	19.56	371.135	25.70	30	Pass
48	5240	19.82	19.88	19.54	19.60	374.366	25.73	30	Pass
149	5745	17.54	17.08	16.93	16.88	205.874	23.14	30	Pass
157	5785	19.98	19.77	19.52	19.56	374.284	25.73	30	Pass
165	5825	18.09	17.89	17.48	17.74	241.34	23.83	30	Pass

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	18.94	18.35	18.08	18.23	277.53	24.43	30	Pass
40	5200	19.87	19.65	19.03	19.30	354.405	25.49	30	Pass
48	5240	18.56	18.62	18.07	18.12	273.541	24.37	30	Pass
149	5745	14.86	14.01	14.10	13.94	106.275	20.26	30	Pass
157	5785	19.84	19.52	19.11	19.07	348.113	25.42	30	Pass
165	5825	17.45	16.99	16.80	16.85	201.873	23.05	30	Pass

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	14.20	13.65	13.52	13.22	92.957	19.68	30	Pass
46	5230	18.98	18.84	18.13	18.26	287.629	24.59	30	Pass
151	5755	13.19	12.60	12.98	12.43	76.401	18.83	30	Pass
159	5795	18.65	18.30	18.02	18.16	269.741	24.31	30	Pass

802.11ac (VHT80)

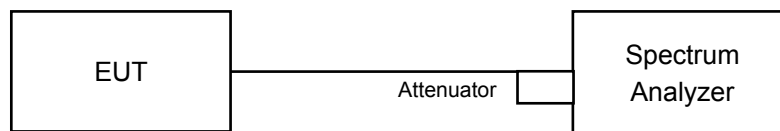
Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	13.68	13.01	13.12	13.08	84.17	19.25	30	Pass
155	5775	11.28	11.02	11.11	10.77	50.927	17.07	30	Pass

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

802.11a, 802.11ac (VH20) & 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 band:

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

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 band:

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 Band

802.11a

Channel	Frequency (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	4.91	4.96	3.83	4.14	10.51	12.82	PASS
40	5200	5.92	5.63	4.45	4.99	11.31	12.82	PASS
48	5240	5.95	5.85	4.64	4.65	11.34	12.82	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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (10.18 - 6) = 12.82\text{dBm}$.

802.11ac (VHT20)

Channel	Frequency (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	5.12	4.56	3.70	4.17	10.44	12.82	PASS
40	5200	5.93	5.48	4.57	4.98	11.29	12.82	PASS
48	5240	4.70	4.38	4.50	4.31	10.50	12.82	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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (10.18 - 6) = 12.82\text{dBm}$.

802.11ac (VHT40)

Channel	Frequency (MHz)	PSD (dBm/ MHz)				Total Power Density (dBm/ MHz)	MAX. Limit (dBm/ MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
38	5190	-2.26	-2.66	-3.53	-2.95	3.20	12.82	PASS
46	5230	1.84	1.99	1.10	1.37	7.61	12.82	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 = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (10.18 - 6) = 12.82\text{dBm}$.

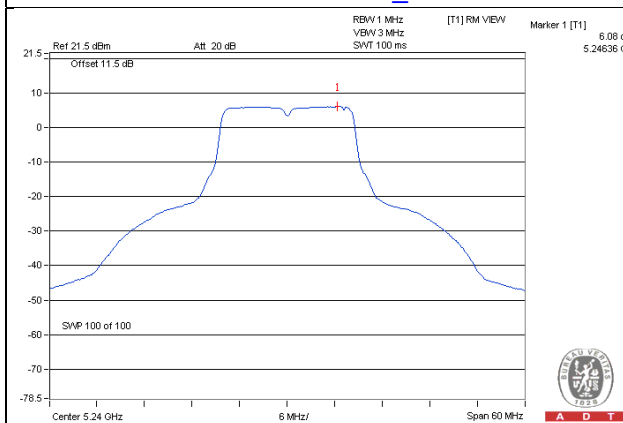
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)				Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. EIRP Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	-4.50	-5.44	-5.43	-5.28	0.19	1.07	12.82	Pass

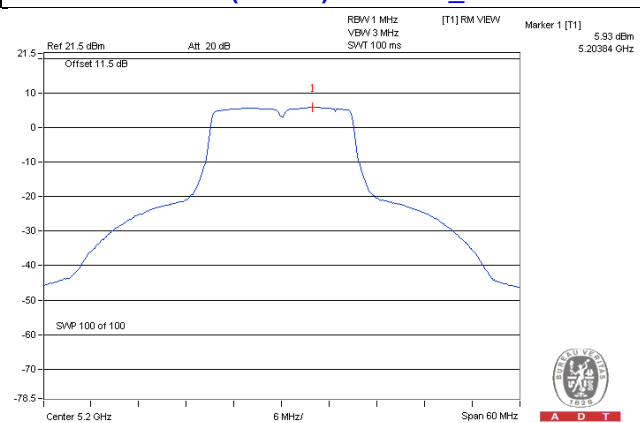
- Note:**
- Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 - Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (10.18 - 6) = 12.82\text{dBm}$.
 - Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

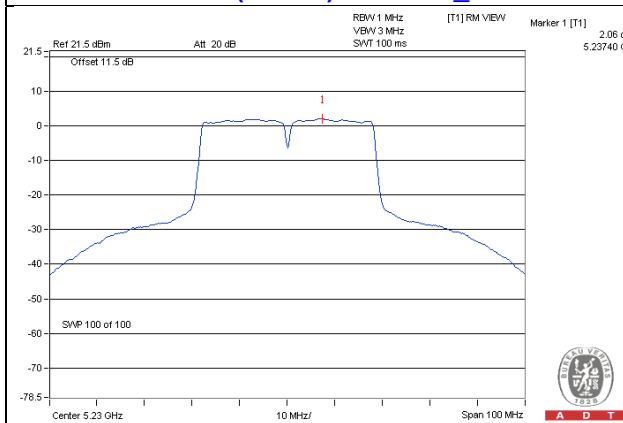
802.11a / Chain 0_CH48



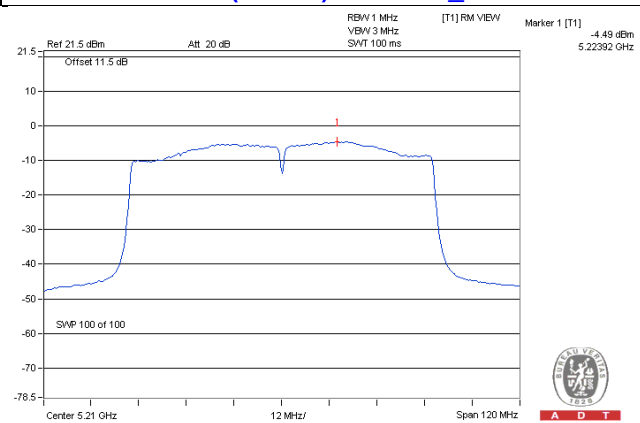
802.11ac (VHT20) / Chain 0_CH40



802.11ac (VHT40) / Chain 1_CH46



802.11ac (VHT80) / Chain 0_CH42



For U-NII-3 Band

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	-2.94	-0.72	6.02	5.30	25.82	Pass
	157	5785	-1.04	1.18	6.02	7.20	25.82	Pass
	165	5825	-2.07	0.15	6.02	6.17	25.82	Pass
1	149	5745	-3.77	-1.55	6.02	4.47	25.82	Pass
	157	5785	-1.94	0.28	6.02	6.30	25.82	Pass
	165	5825	-2.97	-0.75	6.02	5.27	25.82	Pass
2	149	5745	-5.28	-3.06	6.02	2.96	25.82	Pass
	157	5785	-3.30	-1.08	6.02	4.94	25.82	Pass
	165	5825	-3.42	-1.20	6.02	4.82	25.82	Pass
3	149	5745	-4.88	-2.66	6.02	3.36	25.82	Pass
	157	5785	-2.96	-0.74	6.02	5.28	25.82	Pass
	165	5825	-3.78	-1.56	6.02	4.46	25.82	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(10.18-6) = 25.82\text{dBm}$.

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	-6.26	-4.04	6.02	1.98	25.82	Pass
	157	5785	-1.36	0.86	6.02	6.88	25.82	Pass
	165	5825	-3.38	-1.16	6.02	4.86	25.82	Pass
1	149	5745	-7.06	-4.84	6.02	1.18	25.82	Pass
	157	5785	-2.17	0.05	6.02	6.07	25.82	Pass
	165	5825	-5.03	-2.81	6.02	3.21	25.82	Pass
2	149	5745	-7.46	-5.24	6.02	0.78	25.82	Pass
	157	5785	-3.18	-0.96	6.02	5.06	25.82	Pass
	165	5825	-5.17	-2.95	6.02	3.07	25.82	Pass
3	149	5745	-8.21	-5.99	6.02	0.03	25.82	Pass
	157	5785	-2.82	-0.60	6.02	5.42	25.82	Pass
	165	5825	-4.60	-2.38	6.02	3.64	25.82	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(10.18-6) = 25.82\text{dBm}$.

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	-10.91	-8.69	6.02	-2.67	25.82	Pass
	159	5795	-6.05	-3.83	6.02	2.19	25.82	Pass
1	151	5755	-11.28	-9.06	6.02	-3.04	25.82	Pass
	159	5795	-6.95	-4.73	6.02	1.29	25.82	Pass
2	151	5755	-12.52	-10.30	6.02	-4.28	25.82	Pass
	159	5795	-6.84	-4.62	6.02	1.40	25.82	Pass
3	151	5755	-12.64	-10.42	6.02	-4.40	25.82	Pass
	159	5795	-6.86	-4.64	6.02	1.38	25.82	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(10.18-6) = 25.82\text{dBm}$.

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	-15.51	-13.29	6.02	0.19	-7.08	25.82	Pass
1	155	5775	-16.31	-14.09	6.02	0.19	-7.88	25.82	Pass
2	155	5775	-16.52	-14.30	6.02	0.19	-8.09	25.82	Pass
3	155	5775	-17.43	-15.21	6.02	0.19	-9.00	25.82	Pass

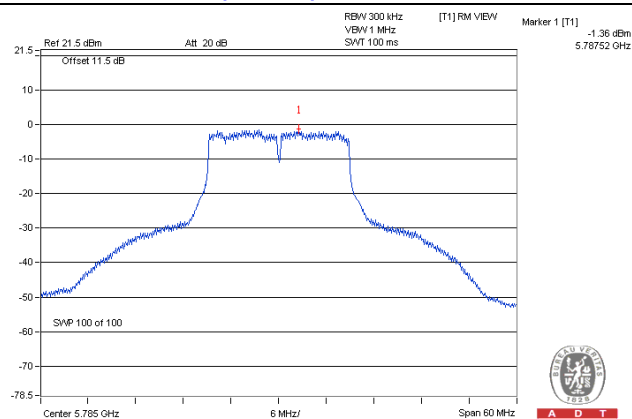
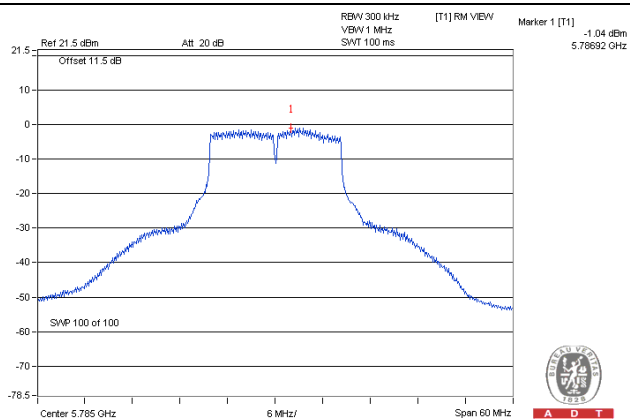
Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / 4] = 10.18\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(10.18-6) = 25.82\text{dBm}$.

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

Spectrum Plot of Worst Value

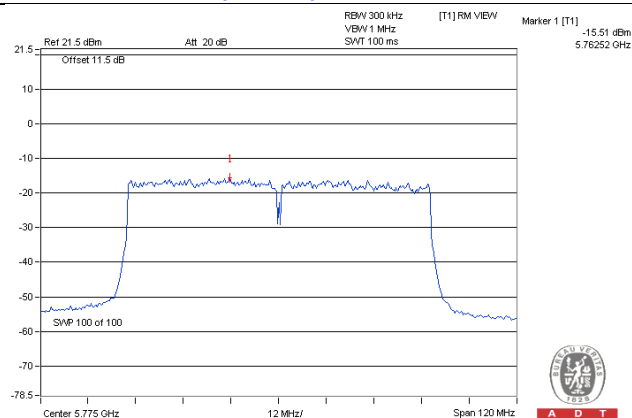
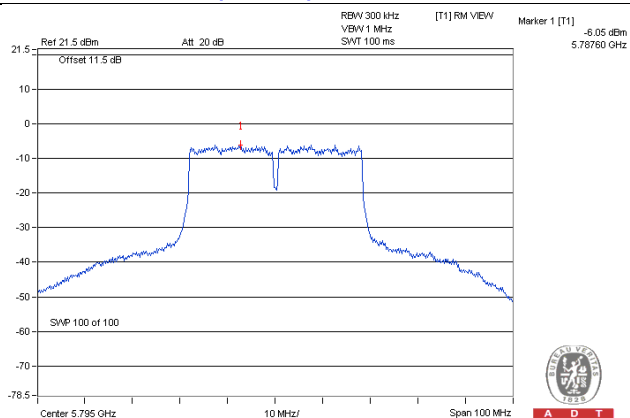
802.11a / Chain 0: CH157

802.11ac (VHT20) / Chain 0: CH157



802.11ac (VHT40) / Chain 0: CH159

802.11ac (VHT80) / Chain 1: CH155

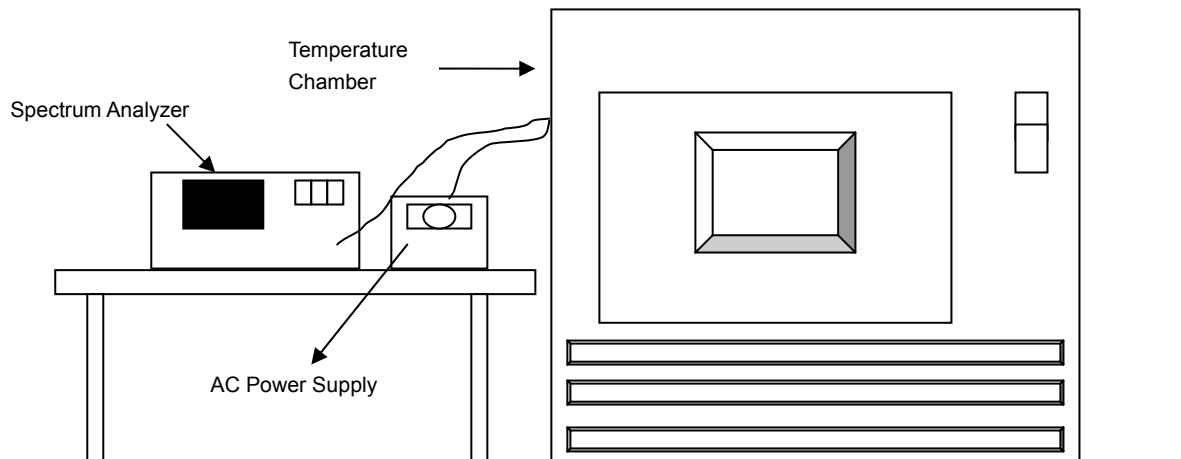


4.5 Frequency Stability Measurement

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	5180.0088	0.00017	5180.0088	0.00017	5180.0066	0.00013	5180.0074	0.00014
40	120	5179.9762	-0.00046	5179.9737	-0.00051	5179.9762	-0.00046	5179.9729	-0.00052
30	120	5180.0192	0.00037	5180.0224	0.00043	5180.0235	0.00045	5180.0207	0.00040
20	120	5179.9811	-0.00036	5179.9809	-0.00037	5179.9824	-0.00034	5179.9825	-0.00034
10	120	5180.0145	0.00028	5180.01	0.00019	5180.0141	0.00027	5180.0133	0.00026
0	120	5179.9962	-0.00007	5179.9917	-0.00016	5179.992	-0.00015	5179.9942	-0.00011
-10	120	5180.0078	0.00015	5180.0085	0.00016	5180.0087	0.00017	5180.0073	0.00014
-20	120	5179.9903	-0.00019	5179.9896	-0.00020	5179.991	-0.00017	5179.9912	-0.00017
-30	120	5180.0152	0.00029	5180.0143	0.00028	5180.0126	0.00024	5180.0142	0.00027

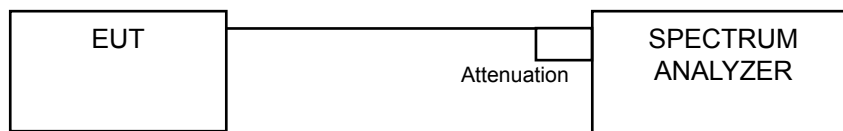
FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5179.9815	-0.00036	5179.9813	-0.00036	5179.9832	-0.00032	5179.9825	-0.00034
	120	5179.9811	-0.00036	5179.9809	-0.00037	5179.9824	-0.00034	5179.9825	-0.00034
	102	5179.9819	-0.00035	5179.9811	-0.00036	5179.9821	-0.00035	5179.9834	-0.00032

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	16.13	16.38	16.42	16.40	0.5	Pass
157	5785	16.14	16.13	16.39	16.40	0.5	Pass
165	5825	16.12	16.04	16.36	16.38	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	17.62	17.67	17.65	17.68	0.5	Pass
157	5785	17.65	17.65	17.64	17.67	0.5	Pass
165	5825	17.36	17.63	17.66	17.66	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	36.39	36.40	36.49	36.45	0.5	Pass
159	5795	36.38	36.48	36.55	36.51	0.5	Pass

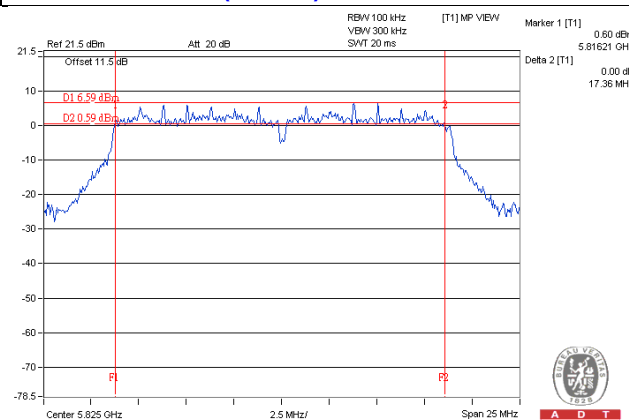
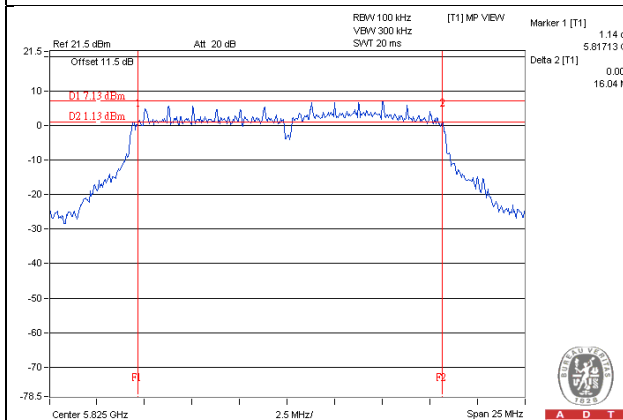
802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	76.23	76.62	76.61	76.56	0.5	Pass

Spectrum Plot of Worst Value

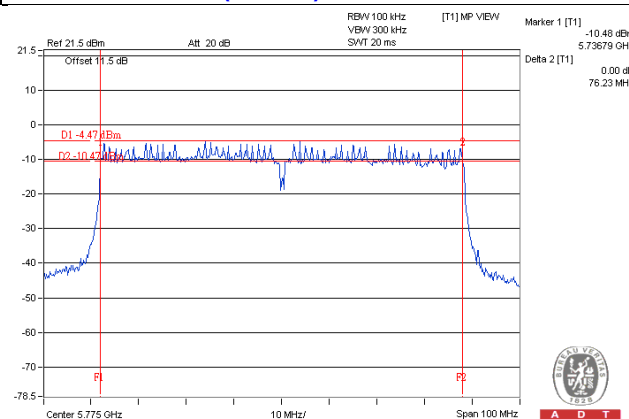
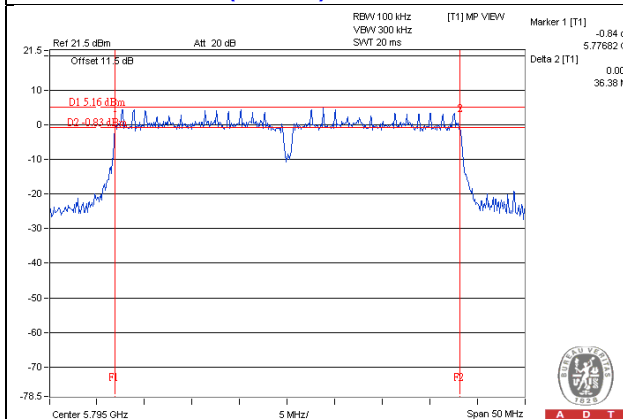
802.11a / Chain 1: CH165

802.11ac (VHT20) / Chain 0: CH165



802.11ac (VHT40) / Chain 0: CH159

802.11ac (VHT80) / Chain 0: CH155



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.

--- END ---