FCC Test Report

Report No.: RF160201E01-1

FCC ID: W59XAP1410

Test Model: XAP-1410

Received Date: Feb. 01, 2016

Test Date: Feb. 02 to 04, 2016

Issued Date: Feb. 24, 2016

Applicant: Luxul Wireless

Address: 14203 Minuteman Dr Suite 201 Draper UT 84020 USA

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 14
3.5 General Description of Applied Standard 15

4 Test Types and Results **16**

4.1 Radiated Emission and Bandedge Measurement 16
4.1.1 Limits of Radiated Emission and Bandedge Measurement 16
4.1.2 Test Instruments 17
4.1.3 Test Procedure 18
4.1.4 Deviation from Test Standard 18
4.1.5 Test Setup 19
4.1.6 EUT Operating Condition 19
4.1.7 Test Results 20
4.2 Conducted Emission Measurement 39
4.2.1 Limits of Conducted Emission Measurement 39
4.2.2 Test Instruments 39
4.2.3 Test Procedure 40
4.2.4 Deviation from Test Standard 40
4.2.5 Test Setup 40
4.2.6 EUT Operating Condition 40
4.2.7 Test Results 41
4.3 Transmit Power Measurment 43
4.3.1 Limits of Transmit Power Measurement 43
4.3.2 Test Setup 44
4.3.3 Test Instruments 44
4.3.4 Test Procedure 44
4.3.5 Deviation from Test Standard 44
4.3.6 EUT Operating Condition 44
4.3.7 Test Result 45
4.4 Peak Power Spectral Density Measurement 47
4.4.1 Limits of Peak Power Spectral Density Measurement 47
4.4.2 Test Setup 47
4.4.3 Test Instruments 47
4.4.4 Test Procedure 48
4.4.5 Deviation from Test Standard 48
4.4.6 EUT Operating Condition 48
4.4.7 Test Results 49
4.5 Frequency Stability Measurement 55
4.5.1 Limits of Frequency Stability Measurement 55
4.5.2 Test Setup 55
4.5.3 Test Instruments 55
4.5.4 Test Procedure 55
4.5.5 Deviation from Test Standard 55
4.5.6 EUT Operating Condition 55

4.5.7 Test Results 56
4.6 6dB Bandwidth Measurment 57
4.6.1 Limits of 6dB Bandwidth Measurement 57
4.6.2 Test Setup 57
4.6.3 Test Instruments 57
4.6.4 Test Procedure 57
4.6.5 Deviation from Test Standard 57
4.6.6 EUT Operating Condition 57
4.6.7 Test Results 58

5 Pictures of Test Arrangements 60

Appendix – Information on the Testing Laboratories 61

Release Control Record

Issue No.	Description	Date Issued
RF160201E01-1	Original release.	

1 Certificate of Conformity

Product: High Power AC1200 Dual-Band Wireless AP

Brand: Luxul

Test Model: XAP-1410

Sample Status: ENGINEERING SAMPLE

Applicant: Luxul Wireless

Test Date: Feb. 02 to 04, 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:** Feb. 24, 2016
Claire Kuan / Specialist

Approved by : _____ , **Date:** Feb. 24, 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 -6.10dB at 0.38438MHz.
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 5860.00MHz and 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 IPEX not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.19 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.43 dB
	6GHz ~ 18GHz	3.49 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	High Power AC1200 Dual-Band Wireless AP
Brand	Luxul
Test Model	XAP-1410
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 56V from POE
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 802.11g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
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: 289.975mW **Beamforming Mode** 802.11ac (VHT20): 396.725mW 802.11ac (VHT40): 273.598mW 802.11ac (VHT80): 91.018mW **5.745 ~ 5.825GHz** **CDD Mode** 802.11a: 361.162mW **Beamforming Mode** 802.11ac (VHT20): 355.055mW 802.11ac (VHT40): 191.485mW 802.11ac (VHT80): 88.011mW
	For 15.247 802.11b: 368.978mW **CDD Mode** 802.11g: 860.191mW 802.11n (HT20): 834.727mW 802.11n (HT40): 616.565mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	POE x1
Data Cable Supplied	RJ45 cable (Unshielded, 1m) x1

Note:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. 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 (GHz to GHz)	Antenna Type	Connecter Type	Cable Loss(dB)	Cable Length
Chain (0)	HL	290-20261	4	2.4~2.4835	PIFA	IPEX	NA	43mm
Chain (1)	HL	290-20262	4	2.4~2.4835	PIFA	IPEX	NA	83mm
5GHz								
Transmitter Circuit	Brand	Model No.	Ant. Gain (dBi) Including cable loss	Frequency range (GHz to GHz)	Antenna Type	Connecter Type	Cable Loss(dB)	Cable Length
Chain (0)	HL	290-20263	4.5	5.15~5.85	PIFA	IPEX	NA	142mm
Chain (1)	HL	290-20264	4.5	5.15~5.85	PIFA	IPEX	NA	207mm

3. The EUT power needs to be supplied from one POE, the information is as below table:

Brand	Model No.	Spec.
PHIHONG	POE29U-560	Input: 100-240Vac, 0.8A, 50-60Hz Output: 56V, 0.536A

4. The EUT incorporates a MIMO function with beamforming.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	1TX (Fixed Chain 0)	2RX
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	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
802.11ac (VHT20)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX

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 & 802.11a modulation mode.

5. The emission of the simultaneous operation (2.4GHz & 5GHz) has been evaluated and no

non-compliance was found.

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

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane** (for below 1GHz) and **Z-plane** (for above 1GHz)..

Radiated Emission Test (Above 1GHz):

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

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

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1GHz):

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

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

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 64	48	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

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

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

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 64	48	OFDM	BPSK	13.5

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

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

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

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
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

Test Condition:

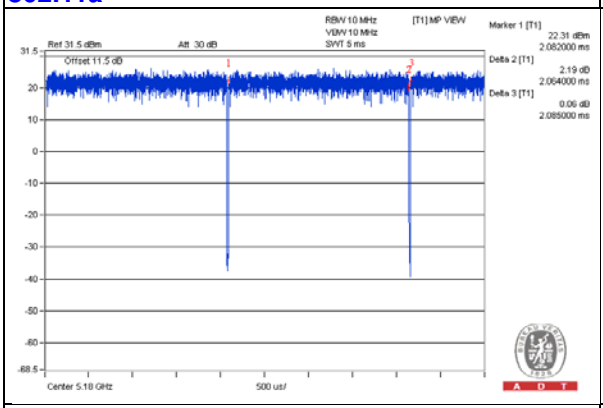
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	JyunChun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	JyunChun Lin
PLC	25deg. C, 68%RH	120Vac, 60Hz	Eagle Chen
APCM	21deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 Duty Cycle of Test Signal

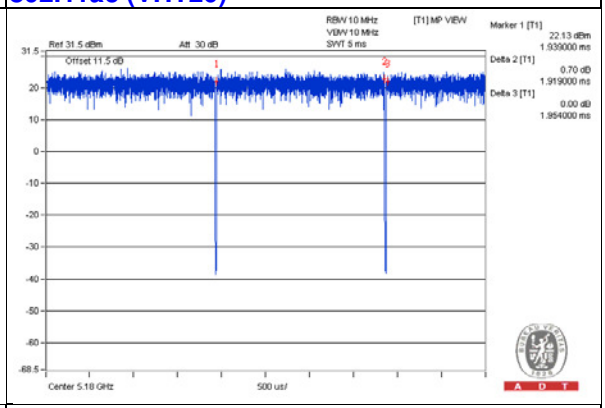
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 2.064 ms/2.085 ms = 0.99
802.11ac (VHT20): Duty cycle = 1.919 ms/1.954 ms = 0.982
802.11ac (VHT40): Duty cycle = 0.945 ms/0.964 ms = 0.98
802.11ac (VHT80): Duty cycle = 0.458 ms/0.477 ms = 0.96, Duty factor = 10 * log(1/0.96) = 0.18

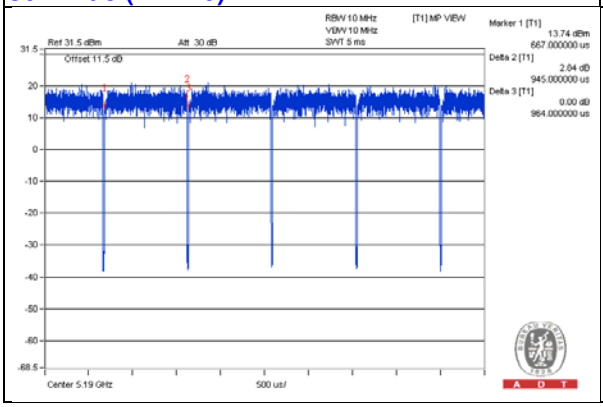
802.11a



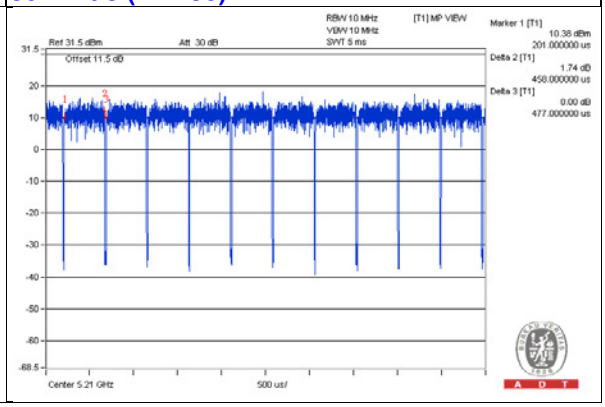
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.4 Description of Support Units

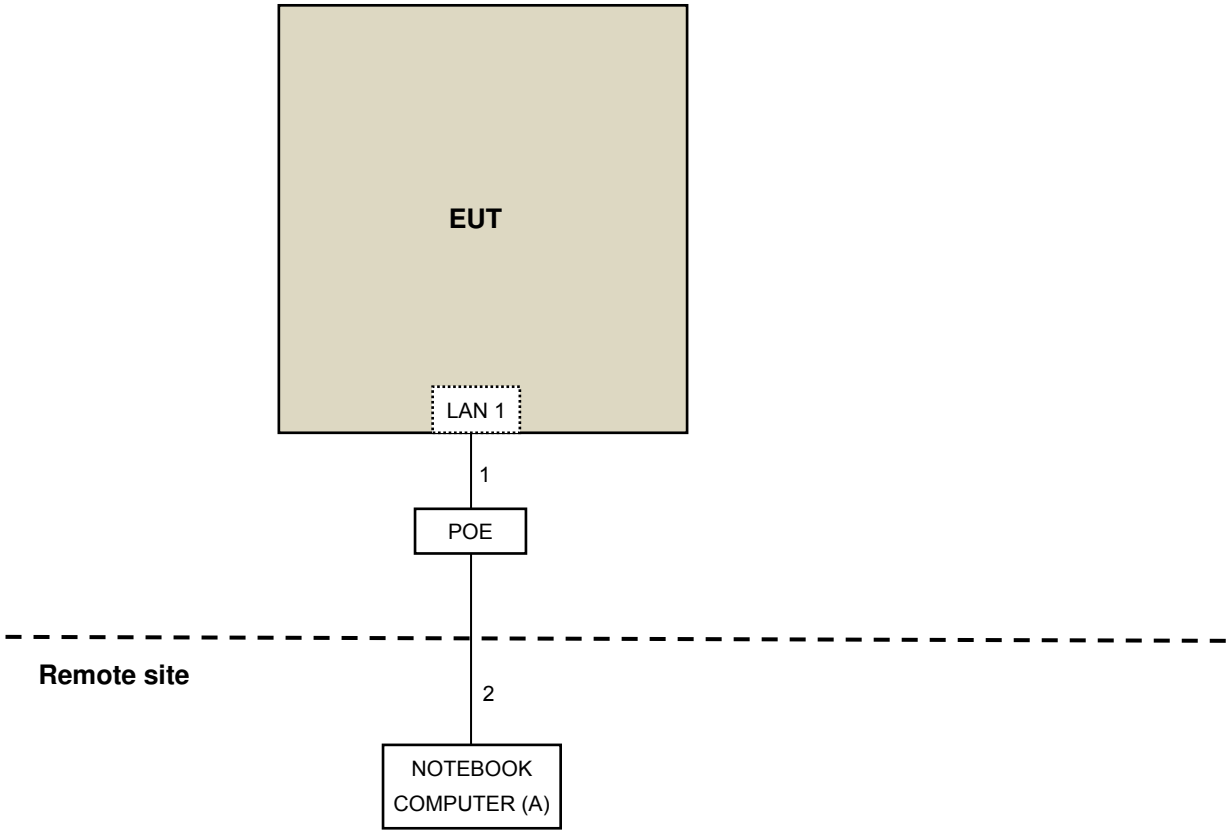
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	NOTEBOOK COMPUTER	DELL	E5430	4YV4VY1	FCC DoC	Provided by Lab

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45	1	1	No	0	Provided by Lab
2.	RJ45	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 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.

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	**LIMIT**	
789033 D02 General UNII Test Procedure New Rules v01r01	FIELD STRENGTH AT 3m	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	**EIRP LIMIT**	**EQUIVALENT FIELD STRENGTH AT 3m**
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/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(dBμV/m) *1 PK:78.2 (dBμV/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:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY54450088	July 24, 2015	July 23, 2016
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 03, 2015	Apr. 02, 2016
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 19, 2015	Sep. 18, 2016
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150318 150323 150324	Mar. 31, 2015	Mar. 30, 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
Spectrum Analyzer R&S	FSP 40	100060	May 08, 2015	May 07, 2016
Power meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 15, 2016	Jan. 14, 2017

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3 Loop antenna was used for all emissions below 30 MHz.
4. The test was performed in 966 Chamber No. 4.
5. The FCC Site Registration No. is 292998
6. The CANADA Site Registration No. is 20331-2
7. Tested Date: Feb. 02 to 04, 2016

4.1.3 Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

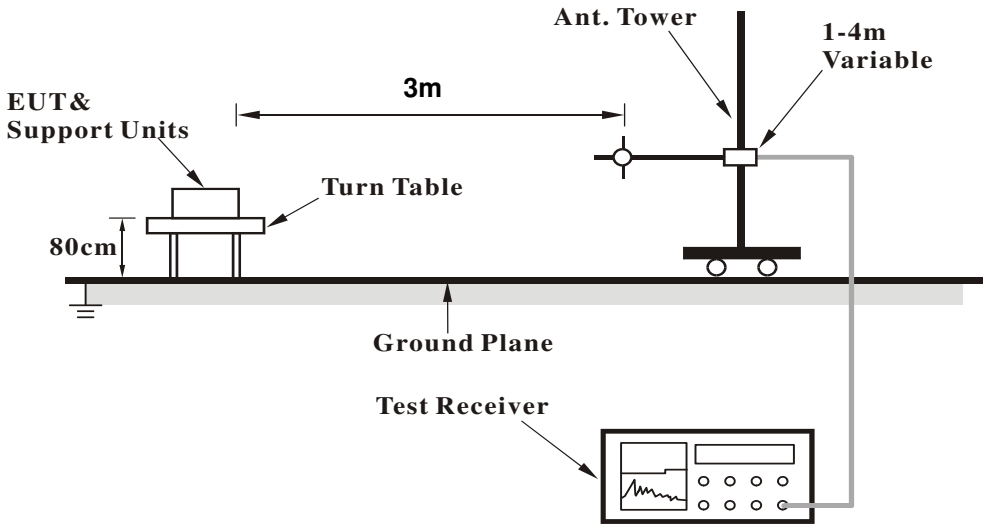
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

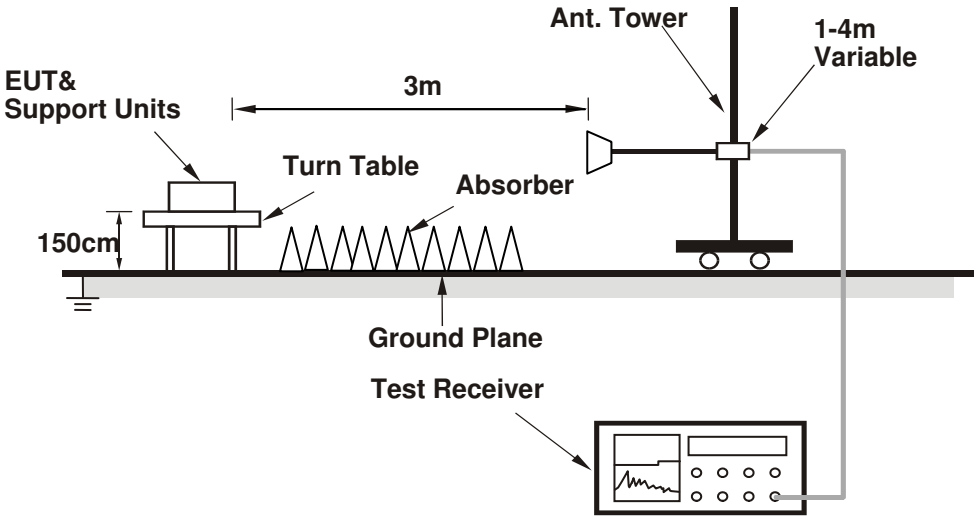
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Condition

a. Connected the EUT with the support unit A (Notebook Computer) which is placed on remote site.
b. Contorlling software (MTool REL_ 2_0_2_1) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data:

CDD Mode

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5000.00	53.4 PK	74.0	-20.6	2.01 H	92	53.16	0.24
2	5000.00	47.4 AV	54.0	-6.6	2.01 H	92	47.16	0.24
3	5098.00	60.9 PK	74.0	-13.1	1.91 H	252	60.41	0.49
4	5098.00	51.4 AV	54.0	-2.6	1.91 H	252	50.91	0.49
5	5150.00	67.7 PK	74.0	-6.3	1.91 H	121	67.06	0.64
6	5150.00	53.4 AV	54.0	-0.6	1.91 H	121	52.76	0.64
7	*5180.00	113.5 PK			1.91 H	252	112.77	0.73
8	*5180.00	104.0 AV			1.91 H	252	103.27	0.73
9	#6906.00	60.7 PK	68.2	-7.5	1.76 H	135	55.61	5.09
10	#10360.00	50.7 PK	68.2	-17.5	1.79 H	166	39.95	10.75
11	15540.00	62.9 PK	74.0	-11.1	2.33 H	146	49.75	13.15
12	15540.00	50.5 AV	54.0	-3.5	2.33 H	146	37.35	13.15
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	51.8 PK	74.0	-22.2	3.98 V	168	51.56	0.24
2	5000.00	45.9 AV	54.0	-8.1	3.98 V	168	45.66	0.24
3	5098.00	59.2 PK	74.0	-14.8	3.98 V	168	58.71	0.49
4	5098.00	47.8 AV	54.0	-6.2	3.98 V	168	47.31	0.49
5	5150.00	66.1 PK	74.0	-7.9	3.98 V	168	65.46	0.64
6	5150.00	49.6 AV	54.0	-4.4	3.98 V	168	48.96	0.64
7	*5180.00	112.9 PK			3.98 V	168	112.17	0.73
8	*5180.00	103.4 AV			3.98 V	168	102.67	0.73
9	#6906.00	59.0 PK	68.2	-9.2	3.98 V	168	53.91	5.09
10	#10360.00	50.2 PK	68.2	-18.0	1.51 V	147	39.45	10.75
11	15540.00	60.3 PK	74.0	-13.7	3.99 V	163	47.15	13.15
12	15540.00	48.1 AV	54.0	-5.9	3.99 V	163	34.95	13.15

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5116.90	63.1 PK	74.0	-10.9	1.85 H	124	62.56	0.54
2	5116.90	51.6 AV	54.0	-2.4	1.85 H	124	51.06	0.54
3	*5200.00	115.1 PK			1.88 H	255	114.31	0.79
4	*5200.00	105.8 AV			1.88 H	255	105.01	0.79
5	5358.40	62.5 PK	74.0	-11.5	1.88 H	113	61.33	1.17
6	5358.40	53.5 AV	54.0	-0.5	1.88 H	113	52.33	1.17
7	#10400.00	50.9 PK	74.0	-23.1	1.79 H	170	39.80	11.10
8	#10400.00	38.6 AV	54.0	-15.4	1.79 H	170	27.50	11.10
9	15600.00	62.9 PK	74.0	-11.1	2.33 H	145	49.68	13.22
10	15600.00	50.5 AV	54.0	-3.5	2.33 H	145	37.28	13.22
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	5116.90	61.5 PK	74.0	-12.5	3.95 V	181	60.96	0.54
2	5116.90	49.8 AV	54.0	-4.2	3.95 V	181	49.26	0.54
3	*5200.00	114.5 PK			3.95 V	181	113.71	0.79
4	*5200.00	105.1 AV			3.95 V	181	104.31	0.79
5	5358.40	61.0 PK	74.0	-13.0	3.95 V	181	59.83	1.17
6	5358.40	52.1 AV	54.0	-1.9	3.95 V	181	50.93	1.17
7	#10400.00	50.5 PK	74.0	-23.5	1.52 V	159	39.40	11.10
8	#10400.00	40.4 AV	54.0	-13.6	1.52 V	159	29.30	11.10
9	15600.00	60.8 PK	74.0	-13.2	3.97 V	160	47.58	13.22
10	15600.00	48.6 AV	54.0	-5.4	3.97 V	160	35.38	13.22

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.3 PK			1.77 H	249	115.38	0.92
2	*5240.00	106.9 AV			1.77 H	249	105.98	0.92
3	5400.90	63.1 PK	74.0	-10.9	1.82 H	116	61.89	1.21
4	5400.90	53.6 AV	54.0	-0.4	1.82 H	116	52.39	1.21
5	#10480.00	51.5 PK	74.0	-22.5	1.75 H	164	40.56	10.94
6	#10480.00	39.1 AV	54.0	-14.9	1.75 H	164	28.16	10.94
7	15720.00	62.4 PK	74.0	-11.6	2.38 H	133	49.87	12.53
8	15720.00	50.2 AV	54.0	-3.8	2.38 H	133	37.67	12.53
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	115.7 PK			3.97 V	188	114.78	0.92
2	*5240.00	106.2 AV			3.97 V	188	105.28	0.92
3	5400.90	61.4 PK	74.0	-12.6	3.97 V	188	60.19	1.21
4	5400.90	51.9 AV	54.0	-2.1	3.97 V	188	50.69	1.21
5	#10480.00	50.9 PK	74.0	-23.1	1.57 V	149	39.96	10.94
6	#10480.00	40.7 AV	54.0	-13.3	1.57 V	149	29.76	10.94
7	15720.00	60.4 PK	74.0	-13.6	3.92 V	171	47.87	12.53
8	15720.00	48.3 AV	54.0	-5.7	3.92 V	171	35.77	12.53

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5664.10	61.2 PK	74.0	-12.8	1.88 H	249	59.58	1.62
2	#5664.10	50.8 AV	54.0	-3.2	1.88 H	249	49.18	1.62
3	#5725.00	77.6 PK	78.2	-0.6	1.94 H	249	75.92	1.68
4	*5745.00	111.6 PK			1.94 H	249	109.89	1.71
5	*5745.00	102.3 AV			1.94 H	249	100.59	1.71
6	11490.00	50.7 PK	74.0	-23.3	1.81 H	183	38.10	12.60
7	11490.00	38.2 AV	54.0	-15.8	1.81 H	183	25.60	12.60
8	#17235.00	63.4 PK	74.0	-10.6	2.32 H	149	45.85	17.55
9	#17235.00	50.9 AV	54.0	-3.1	2.32 H	149	33.35	17.55
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	#5664.10	59.5 PK	74.0	-14.5	4.00 V	184	57.88	1.62
2	#5664.10	49.1 AV	54.0	-4.9	4.00 V	184	47.48	1.62
3	#5725.00	75.8 PK	78.2	-2.4	4.00 V	184	74.12	1.68
4	*5745.00	111.1 PK			4.00 V	184	109.39	1.71
5	*5745.00	101.6 AV			4.00 V	184	99.89	1.71
6	11490.00	50.7 PK	74.0	-23.3	1.54 V	160	38.10	12.60
7	11490.00	40.6 AV	54.0	-13.4	1.54 V	160	28.00	12.60
8	#17235.00	60.2 PK	74.0	-13.8	3.97 V	146	42.65	17.55
9	#17235.00	48.3 AV	54.0	-5.7	3.97 V	146	30.75	17.55

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5704.10	67.5 PK	68.2	-0.7	1.88 H	247	65.84	1.66
2	#5725.00	65.9 PK	78.2	-12.3	1.93 H	251	64.22	1.68
3	*5785.00	117.1 PK			1.93 H	251	115.34	1.76
4	*5785.00	107.7 AV			1.93 H	251	105.94	1.76
5	#5850.00	66.4 PK	78.2	-11.8	1.93 H	251	64.63	1.77
6	#5864.00	66.1 PK	68.2	-2.1	1.76 H	247	64.33	1.77
7	11570.00	50.9 PK	74.0	-23.1	1.78 H	183	38.56	12.34
8	11570.00	38.6 AV	54.0	-15.4	1.78 H	183	26.26	12.34
9	#17355.00	63.6 PK	68.2	-4.6	2.32 H	135	45.43	18.17
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	#5704.10	65.8 PK	68.2	-2.4	3.95 V	187	64.14	1.66
2	#5725.00	63.9 PK	78.2	-14.3	3.95 V	187	62.22	1.68
3	*5785.00	116.6 PK			3.95 V	187	114.84	1.76
4	*5785.00	107.1 AV			3.95 V	187	105.34	1.76
5	#5850.00	64.6 PK	78.2	-13.6	3.95 V	187	62.83	1.77
6	#5864.00	64.3 PK	68.2	-3.9	3.95 V	187	62.53	1.77
7	11570.00	51.2 PK	74.0	-22.8	1.58 V	169	38.86	12.34
8	11570.00	41.0 AV	54.0	-13.0	1.58 V	169	28.66	12.34
9	#17355.00	60.6 PK	68.2	-7.6	3.98 V	142	42.43	18.17

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	114.9 PK			1.93 H	248	113.12	1.78
2	*5825.00	105.5 AV			1.93 H	248	103.72	1.78
3	#5850.00	75.5 PK	78.2	-2.7	1.93 H	248	73.73	1.77
4	#5860.00	68.0 PK	68.2	-0.2	1.93 H	248	66.23	1.77
5	#5904.20	65.7 PK	68.2	-2.5	1.84 H	246	63.93	1.77
6	11650.00	51.3 PK	74.0	-22.7	1.83 H	186	39.14	12.16
7	11650.00	38.5 AV	54.0	-15.5	1.83 H	186	26.34	12.16
8	#17475.00	62.7 PK	68.2	-5.5	2.30 H	140	43.96	18.74
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	114.4 PK			3.93 V	201	112.62	1.78
2	*5825.00	104.9 AV			3.93 V	201	103.12	1.78
3	#5850.00	73.8 PK	78.2	-4.4	3.93 V	201	72.03	1.77
4	#5860.00	66.2 PK	68.2	-2.0	3.93 V	201	64.43	1.77
5	#5904.20	63.9 PK	68.2	-4.3	3.93 V	201	62.13	1.77
6	11650.00	50.2 PK	74.0	-23.8	1.52 V	144	38.04	12.16
7	11650.00	40.4 AV	54.0	-13.6	1.52 V	144	28.24	12.16
8	#17475.00	60.6 PK	68.2	-7.6	4.00 V	142	41.86	18.74

REMARKS:

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

802.11ac (VHT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5098.00	60.6 PK	74.0	-13.4	4.00 H	252	60.11	0.49
2	5098.00	49.9 AV	54.0	-4.1	4.00 H	252	49.41	0.49
3	5150.00	68.6 PK	74.0	-5.4	1.95 H	112	67.96	0.64
4	5150.00	53.5 AV	54.0	-0.5	1.95 H	112	52.86	0.64
5	*5180.00	112.8 PK			1.81 H	252	112.07	0.73
6	*5180.00	103.4 AV			1.81 H	252	102.67	0.73
7	#10360.00	50.9 PK	74.0	-23.1	1.83 H	183	40.15	10.75
8	#10360.00	38.6 AV	54.0	-15.4	1.83 H	183	27.85	10.75
9	15540.00	63.4 PK	74.0	-10.6	2.37 H	141	50.25	13.15
10	15540.00	51.1 AV	54.0	-2.9	2.37 H	141	37.95	13.15
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	5098.00	58.7 PK	74.0	-15.3	3.97 V	196	58.21	0.49
2	5098.00	48.1 AV	54.0	-5.9	3.97 V	196	47.61	0.49
3	5150.00	66.9 PK	74.0	-7.1	3.97 V	196	66.26	0.64
4	5150.00	51.8 AV	54.0	-2.2	3.97 V	196	51.16	0.64
5	*5180.00	112.3 PK			3.97 V	196	111.57	0.73
6	*5180.00	102.8 AV			3.97 V	196	102.07	0.73
7	#10360.00	50.8 PK	74.0	-23.2	1.53 V	132	40.05	10.75
8	#10360.00	40.9 AV	54.0	-13.1	1.53 V	132	30.15	10.75
9	15540.00	60.3 PK	74.0	-13.7	4.00 V	146	47.15	13.15
10	15540.00	48.0 AV	54.0	-6.0	4.00 V	146	34.85	13.15

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5119.20	62.7 PK	74.0	-11.3	1.93 H	124	62.16	0.54
2	5119.20	52.4 AV	54.0	-1.6	1.93 H	124	51.86	0.54
3	*5200.00	115.5 PK			1.79 H	249	114.71	0.79
4	*5200.00	106.0 AV			1.79 H	249	105.21	0.79
5	5358.40	63.6 PK	74.0	-10.4	1.96 H	122	62.43	1.17
6	5358.40	53.5 AV	54.0	-0.5	1.96 H	122	52.33	1.17
7	#10400.00	50.8 PK	74.0	-23.2	1.81 H	168	39.70	11.10
8	#10400.00	38.5 AV	54.0	-15.5	1.81 H	168	27.40	11.10
9	15600.00	63.9 PK	74.0	-10.1	2.26 H	149	50.68	13.22
10	15600.00	51.2 AV	54.0	-2.8	2.26 H	149	37.98	13.22
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	5119.20	60.9 PK	74.0	-13.1	3.97 V	208	60.36	0.54
2	5119.20	50.6 AV	54.0	-3.4	3.97 V	208	50.06	0.54
3	*5200.00	115.0 PK			3.97 V	208	114.21	0.79
4	*5200.00	105.2 AV			3.97 V	208	104.41	0.79
5	5358.40	61.8 PK	74.0	-12.2	3.97 V	208	60.63	1.17
6	5358.40	51.9 AV	54.0	-2.1	3.97 V	208	50.73	1.17
7	#10400.00	50.4 PK	74.0	-23.6	1.51 V	137	39.30	11.10
8	#10400.00	40.5 AV	54.0	-13.5	1.51 V	137	29.40	11.10
9	15600.00	60.8 PK	74.0	-13.2	4.00 V	147	47.58	13.22
10	15600.00	48.8 AV	54.0	-5.2	4.00 V	147	35.58	13.22

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.5 PK			1.77 H	250	115.58	0.92
2	*5240.00	107.1 AV			1.77 H	250	106.18	0.92
3	5399.10	62.6 PK	74.0	-11.4	1.90 H	117	61.39	1.21
4	5399.10	53.5 AV	54.0	-0.5	1.90 H	117	52.29	1.21
5	#10480.00	51.3 PK	74.0	-22.7	1.79 H	179	40.36	10.94
6	#10480.00	38.5 AV	54.0	-15.5	1.79 H	179	27.56	10.94
7	15720.00	63.7 PK	74.0	-10.3	2.37 H	139	51.17	12.53
8	15720.00	51.3 AV	54.0	-2.7	2.37 H	139	38.77	12.53
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	116.0 PK			3.91 V	220	115.08	0.92
2	*5240.00	106.3 AV			3.91 V	220	105.38	0.92
3	5399.10	60.9 PK	74.0	-13.1	3.91 V	220	59.69	1.21
4	5399.10	51.8 AV	54.0	-2.2	3.91 V	220	50.59	1.21
5	#10480.00	50.4 PK	74.0	-23.6	1.56 V	131	39.46	10.94
6	#10480.00	40.5 AV	54.0	-13.5	1.56 V	131	29.56	10.94
7	15720.00	61.0 PK	74.0	-13.0	4.00 V	154	48.47	12.53
8	15720.00	48.8 AV	54.0	-5.2	4.00 V	154	36.27	12.53

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5662.00	58.3 PK	74.0	-15.7	2.38 H	245	56.70	1.60
2	#5662.00	50.6 AV	54.0	-3.4	2.38 H	245	49.00	1.60
3	#5715.00	68.1 PK	74.0	-5.9	1.91 H	253	66.43	1.67
4	#5715.00	47.5 AV	54.0	-6.5	1.91 H	253	45.83	1.67
5	**#5725.00**	**78.1 PK**	**78.2**	**-0.1**	**1.91 H**	**253**	**76.42**	**1.68**
6	*5745.00	111.6 PK			1.91 H	253	109.89	1.71
7	*5745.00	101.8 AV			1.91 H	253	100.09	1.71
8	11490.00	50.6 PK	74.0	-23.4	1.81 H	176	38.00	12.60
9	11490.00	38.3 AV	54.0	-15.7	1.81 H	176	25.70	12.60
10	#17235.00	63.8 PK	74.0	-10.2	2.32 H	138	46.25	17.55
11	#17235.00	51.2 AV	54.0	-2.8	2.32 H	138	33.65	17.55

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	#5662.00	56.6 PK	74.0	-17.4	3.99 V	223	55.00	1.60
2	#5662.00	48.9 AV	54.0	-5.1	3.99 V	223	47.30	1.60
3	#5715.00	66.3 PK	74.0	-7.7	3.99 V	223	64.63	1.67
4	#5715.00	45.7 AV	54.0	-8.3	3.99 V	223	44.03	1.67
5	#5725.00	76.3 PK	78.2	-1.9	3.99 V	223	74.62	1.68
6	*5745.00	111.1 PK			3.99 V	223	109.39	1.71
7	*5745.00	101.1 AV			3.99 V	223	99.39	1.71
8	11490.00	50.0 PK	74.0	-24.0	1.51 V	150	37.40	12.60
9	11490.00	40.3 AV	54.0	-13.7	1.51 V	150	27.70	12.60
10	#17235.00	60.8 PK	74.0	-13.2	4.00 V	153	43.25	17.55
11	#17235.00	48.5 AV	54.0	-5.5	4.00 V	153	30.95	17.55

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5707.10	67.4 PK	68.2	-0.8	1.88 H	247	65.74	1.66
2	#5725.00	65.4 PK	78.2	-12.8	1.89 H	256	63.72	1.68
3	*5785.00	117.3 PK			1.89 H	256	115.54	1.76
4	*5785.00	108.2 AV			1.89 H	256	106.44	1.76
5	#5850.00	66.3 PK	78.2	-11.9	1.89 H	256	64.53	1.77
6	#5864.30	65.7 PK	68.2	-2.5	1.90 H	247	63.93	1.77
7	11570.00	50.8 PK	74.0	-23.2	1.81 H	197	38.46	12.34
8	11570.00	38.5 AV	54.0	-15.5	1.81 H	197	26.16	12.34
9	#17355.00	63.5 PK	68.2	-4.7	2.27 H	151	45.33	18.17
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	#5707.10	65.8 PK	68.2	-2.4	3.95 V	195	64.14	1.66
2	#5725.00	63.7 PK	78.2	-14.5	3.95 V	195	62.02	1.68
3	*5785.00	116.8 PK			3.95 V	195	115.04	1.76
4	*5785.00	107.5 AV			3.95 V	195	105.74	1.76
5	#5850.00	64.6 PK	78.2	-13.6	3.95 V	195	62.83	1.77
6	#5864.30	64.0 PK	68.2	-4.2	3.95 V	195	62.23	1.77
7	11570.00	50.1 PK	74.0	-23.9	1.54 V	146	37.76	12.34
8	11570.00	40.3 AV	54.0	-13.7	1.54 V	146	27.96	12.34
9	#17355.00	60.2 PK	68.2	-8.0	4.00 V	139	42.03	18.17

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	113.3 PK			1.80 H	256	111.52	1.78
2	*5825.00	103.4 AV			1.80 H	256	101.62	1.78
3	#5850.00	75.2 PK	78.2	-3.0	1.80 H	256	73.43	1.77
4	#5860.00	67.6 PK	74.0	-6.4	1.80 H	256	65.83	1.77
5	#5860.00	53.6 AV	54.0	-0.4	1.80 H	256	51.83	1.77
6	#5906.70	63.6 PK	74.0	-10.4	1.91 H	243	61.82	1.78
7	#5906.70	53.5 AV	54.0	-0.5	1.91 H	243	51.72	1.78
8	11650.00	50.1 PK	74.0	-23.9	1.78 H	185	37.94	12.16
9	11650.00	38.1 AV	54.0	-15.9	1.78 H	185	25.94	12.16
10	#17475.00	63.6 PK	74.0	-10.4	2.28 H	158	44.86	18.74
11	#17475.00	51.1 AV	54.0	-2.9	2.28 H	158	32.36	18.74
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	112.8 PK			3.97 V	216	111.02	1.78
2	*5825.00	102.7 AV			3.97 V	216	100.92	1.78
3	#5850.00	73.5 PK	78.2	-4.7	3.97 V	216	71.73	1.77
4	#5860.00	65.9 PK	74.0	-8.1	3.97 V	216	64.13	1.77
5	#5860.00	51.9 AV	54.0	-2.1	3.97 V	216	50.13	1.77
6	#5906.70	61.9 PK	74.0	-12.1	3.97 V	216	60.12	1.78
7	#5906.70	51.7 AV	54.0	-2.3	3.97 V	216	49.92	1.78
8	11650.00	49.8 PK	74.0	-24.2	1.59 V	140	37.64	12.16
9	11650.00	40.3 AV	54.0	-13.7	1.59 V	140	28.14	12.16
10	#17475.00	60.9 PK	74.0	-13.1	4.00 V	136	42.16	18.74
11	#17475.00	48.8 AV	54.0	-5.2	4.00 V	136	30.06	18.74

REMARKS:

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

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.2 PK	74.0	-6.8	1.80 H	251	66.56	0.64
2	5150.00	53.2 AV	54.0	-0.8	1.80 H	251	52.56	0.64
3	*5190.00	107.4 PK			1.80 H	251	106.65	0.75
4	*5190.00	97.0 AV			1.80 H	251	96.25	0.75
5	5355.00	57.3 PK	74.0	-16.7	1.80 H	251	56.12	1.18
6	5355.00	46.3 AV	54.0	-7.7	1.80 H	251	45.12	1.18
7	#6919.00	58.7 PK	74.0	-15.3	1.78 H	135	53.52	5.18
8	#6919.00	53.6 AV	54.0	-0.4	1.78 H	135	48.42	5.18
9	#10380.00	50.4 PK	74.0	-23.6	1.83 H	187	39.47	10.93
10	#10380.00	38.3 AV	54.0	-15.7	1.83 H	187	27.37	10.93
11	15570.00	63.3 PK	74.0	-10.7	2.33 H	148	50.11	13.19
12	15570.00	50.6 AV	54.0	-3.4	2.33 H	148	37.41	13.19
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	65.4 PK	74.0	-8.6	3.93 V	200	64.76	0.64
2	5150.00	51.5 AV	54.0	-2.5	3.93 V	200	50.86	0.64
3	*5190.00	106.9 PK			3.93 V	200	106.15	0.75
4	*5190.00	96.3 AV			3.93 V	200	95.55	0.75
5	5355.00	65.5 PK	74.0	-8.5	3.93 V	200	64.32	1.18
6	5355.00	44.7 AV	54.0	-9.3	3.93 V	200	43.52	1.18
7	#6919.00	57.0 PK	74.0	-17.0	3.93 V	200	51.82	5.18
8	#6919.00	51.8 AV	54.0	-2.2	3.93 V	200	46.62	5.18
9	#10380.00	50.2 PK	74.0	-23.8	1.58 V	148	39.27	10.93
10	#10380.00	40.6 AV	54.0	-13.4	1.58 V	148	29.67	10.93
11	15570.00	60.5 PK	74.0	-13.5	4.00 V	141	47.31	13.19
12	15570.00	48.8 AV	54.0	-5.2	4.00 V	141	35.61	13.19

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.3 PK	74.0	-5.7	1.80 H	250	67.66	0.64
2	5150.00	53.2 AV	54.0	-0.8	1.80 H	250	52.56	0.64
3	*5230.00	112.1 PK			1.80 H	250	111.20	0.90
4	*5230.00	102.2 AV			1.80 H	250	101.30	0.90
5	5350.00	59.5 PK	74.0	-14.5	1.80 H	250	58.32	1.18
6	5350.00	49.6 AV	54.0	-4.4	1.80 H	250	48.42	1.18
7	#10460.00	51.1 PK	74.0	-22.9	1.85 H	198	40.13	10.97
8	#10460.00	38.9 AV	54.0	-15.1	1.85 H	198	27.93	10.97
9	15690.00	62.8 PK	74.0	-11.2	2.32 H	159	50.16	12.64
10	15690.00	50.5 AV	54.0	-3.5	2.32 H	159	37.86	12.64
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	3.92 V	200	65.86	0.64
2	5150.00	51.4 AV	54.0	-2.6	3.92 V	200	50.76	0.64
3	*5230.00	111.6 PK			3.92 V	200	110.70	0.90
4	*5230.00	101.5 AV			3.92 V	200	100.60	0.90
5	5350.00	57.7 PK	74.0	-16.3	3.92 V	200	56.52	1.18
6	5350.00	47.8 AV	54.0	-6.2	3.92 V	200	46.62	1.18
7	#10460.00	50.1 PK	74.0	-23.9	1.53 V	135	39.13	10.97
8	#10460.00	40.5 AV	54.0	-13.5	1.53 V	135	29.53	10.97
9	15690.00	59.9 PK	74.0	-14.1	4.00 V	145	47.26	12.64
10	15690.00	48.1 AV	54.0	-5.9	4.00 V	145	35.46	12.64

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	67.5 PK	74.0	-6.5	2.34 H	247	65.83	1.67
2	#5715.00	53.1 AV	54.0	-0.9	2.34 H	247	51.43	1.67
3	#5725.00	77.9 PK	78.2	-0.3	2.34 H	247	76.22	1.68
4	*5755.00	107.8 PK			2.34 H	246	106.08	1.72
5	*5755.00	97.8 AV			2.34 H	246	96.08	1.72
6	#6234.00	53.4 PK	74.0	-20.6	1.74 H	242	50.73	2.67
7	#6234.00	45.7 AV	54.0	-8.3	1.74 H	242	43.03	2.67
8	11510.00	51.2 PK	74.0	-22.8	1.82 H	189	38.64	12.56
9	11510.00	38.8 AV	54.0	-15.2	1.82 H	189	26.24	12.56
10	#17265.00	63.6 PK	74.0	-10.4	2.29 H	142	45.96	17.64
11	#17265.00	50.8 AV	54.0	-3.2	2.29 H	142	33.16	17.64
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	65.7 PK	74.0	-8.3	3.94 V	192	64.03	1.67
2	#5715.00	51.3 AV	54.0	-2.7	3.94 V	192	49.63	1.67
3	#5725.00	76.1 PK	78.2	-2.1	3.94 V	192	74.42	1.68
4	*5755.00	107.3 PK			3.94 V	192	105.58	1.72
5	*5755.00	97.1 AV			3.94 V	192	95.38	1.72
6	#6234.00	51.7 PK	74.0	-22.3	3.94 V	192	49.03	2.67
7	#6234.00	44.0 AV	54.0	-10.0	3.94 V	192	41.33	2.67
8	11510.00	50.0 PK	74.0	-24.0	1.52 V	139	37.44	12.56
9	11510.00	40.5 AV	54.0	-13.5	1.52 V	139	27.94	12.56
10	#17265.00	60.0 PK	74.0	-14.0	4.00 V	130	42.36	17.64
11	#17265.00	48.0 AV	54.0	-6.0	4.00 V	130	30.36	17.64

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	111.1 PK			1.79 H	246	109.33	1.77
2	*5795.00	100.5 AV			1.79 H	246	98.73	1.77
3	#5850.00	71.6 PK	78.2	-6.6	1.79 H	246	69.83	1.77
4	#5860.00	68.1 PK	74.0	-5.9	1.79 H	250	66.33	1.77
5	**#5860.00**	**53.9 AV**	**54.0**	**-0.1**	**1.79 H**	**250**	**52.13**	**1.77**
6	#6277.00	52.9 PK	74.0	-21.1	1.67 H	118	50.06	2.84
7	#6277.00	43.9 AV	54.0	-10.1	1.67 H	118	41.06	2.84
8	11590.00	51.1 PK	74.0	-22.9	1.85 H	213	38.84	12.26
9	11590.00	38.6 AV	54.0	-15.4	1.85 H	213	26.34	12.26
10	#17385.00	64.0 PK	74.0	-10.0	2.27 H	137	45.62	18.38
11	#17385.00	51.2 AV	54.0	-2.8	2.27 H	137	32.82	18.38

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	*5795.00	110.6 PK			3.93 V	202	108.83	1.77
2	*5795.00	99.8 AV			3.93 V	202	98.03	1.77
3	#5850.00	69.9 PK	78.2	-8.3	3.93 V	202	68.13	1.77
4	#5860.00	66.3 PK	74.0	-7.7	3.93 V	202	64.53	1.77
5	#5860.00	52.2 AV	54.0	-1.8	3.93 V	202	50.43	1.77
6	#6277.00	52.1 PK	74.0	-21.9	3.93 V	202	49.26	2.84
7	#6277.00	42.3 AV	54.0	-11.7	3.93 V	202	39.46	2.84
8	11590.00	50.0 PK	74.0	-24.0	1.56 V	145	37.74	12.26
9	11590.00	40.3 AV	54.0	-13.7	1.56 V	145	28.04	12.26
10	#17385.00	60.0 PK	74.0	-14.0	4.00 V	132	41.62	18.38
11	#17385.00	48.2 AV	54.0	-5.8	4.00 V	132	29.82	18.38

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.

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.8 PK	74.0	-8.2	2.02 H	248	65.16	0.64
2	5150.00	53.7 AV	54.0	-0.3	2.02 H	248	53.06	0.64
3	*5210.00	102.8 PK			2.02 H	248	101.97	0.83
4	*5210.00	92.2 AV			2.02 H	248	91.37	0.83
5	5350.00	56.1 PK	74.0	-17.9	2.02 H	248	54.92	1.18
6	5350.00	44.8 AV	54.0	-9.2	2.02 H	248	43.62	1.18
7	#6946.00	57.4 PK	74.0	-16.6	1.71 H	134	52.03	5.37
8	#6946.00	50.9 AV	54.0	-3.1	1.71 H	134	45.53	5.37
9	#10420.00	50.4 PK	74.0	-23.6	1.86 H	182	39.34	11.06
10	#10420.00	38.2 AV	54.0	-15.8	1.86 H	182	27.14	11.06
11	15630.00	63.2 PK	74.0	-10.8	2.22 H	149	50.17	13.03
12	15630.00	50.5 AV	54.0	-3.5	2.22 H	149	37.47	13.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.1 PK	74.0	-9.9	3.93 V	189	63.46	0.64
2	5150.00	52.0 AV	54.0	-2.0	3.93 V	189	51.36	0.64
3	*5210.00	102.3 PK			3.93 V	189	101.47	0.83
4	*5210.00	91.5 AV			3.93 V	189	90.67	0.83
5	5350.00	54.5 PK	74.0	-19.5	3.93 V	189	53.32	1.18
6	5350.00	43.1 AV	54.0	-10.9	3.93 V	189	41.92	1.18
7	#6946.00	55.6 PK	74.0	-18.4	3.93 V	189	50.23	5.37
8	#6946.00	49.1 AV	54.0	-4.9	3.93 V	189	43.73	5.37
9	#10420.00	50.4 PK	74.0	-23.6	1.57 V	146	39.34	11.06
10	#10420.00	40.4 AV	54.0	-13.6	1.57 V	146	29.34	11.06
11	15630.00	59.7 PK	74.0	-14.3	4.00 V	127	46.67	13.03
12	15630.00	48.0 AV	54.0	-6.0	4.00 V	127	34.97	13.03

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	72.0 PK	74.0	-2.0	1.76 H	248	70.33	1.67
2	#5715.00	53.6 AV	54.0	-0.4	1.76 H	248	51.93	1.67
3	#5725.00	76.4 PK	78.2	-1.8	1.76 H	248	74.72	1.68
4	*5775.00	103.7 PK			1.76 H	248	101.95	1.75
5	*5775.00	92.1 AV			1.76 H	248	90.35	1.75
6	#5850.00	70.2 PK	78.2	-8.0	1.76 H	248	68.43	1.77
7	#5860.00	68.9 PK	74.0	-5.1	1.76 H	248	67.13	1.77
8	#5860.00	51.2 AV	54.0	-2.8	1.76 H	248	49.43	1.77
9	#6416.00	54.9 PK	74.0	-19.1	1.73 H	230	51.65	3.25
10	#6416.00	46.2 AV	54.0	-7.8	1.73 H	230	42.95	3.25
11	11550.00	50.9 PK	74.0	-23.1	1.83 H	186	38.49	12.41
12	11550.00	38.8 AV	54.0	-15.2	1.83 H	186	26.39	12.41
13	#17325.00	63.3 PK	74.0	-10.7	2.23 H	163	45.37	17.93
14	#17325.00	50.6 AV	54.0	-3.4	2.23 H	163	32.67	17.93
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	#5715.00	70.5 PK	74.0	-3.5	3.97 V	206	68.83	1.67
2	#5715.00	51.9 AV	54.0	-2.1	3.97 V	206	50.23	1.67
3	#5725.00	74.7 PK	78.2	-3.5	3.97 V	206	73.02	1.68
4	*5775.00	103.2 PK			3.97 V	206	101.45	1.75
5	*5775.00	92.4 AV			3.97 V	206	90.65	1.75
6	#5850.00	68.5 PK	78.2	-9.7	3.97 V	206	66.73	1.77
7	#5860.00	67.1 PK	74.0	-6.9	3.97 V	206	65.33	1.77
8	#5860.00	49.6 AV	54.0	-4.4	3.97 V	206	47.83	1.77
9	#6416.00	53.4 PK	74.0	-20.6	3.97 V	206	50.15	3.25
10	#6416.00	44.6 AV	54.0	-9.4	3.97 V	206	41.35	3.25
11	11550.00	49.8 PK	74.0	-24.2	1.59 V	155	37.39	12.41
12	11550.00	40.2 AV	54.0	-13.8	1.59 V	155	27.79	12.41
13	#17325.00	60.2 PK	74.0	-13.8	4.00 V	147	42.27	17.93
14	#17325.00	48.5 AV	54.0	-5.5	4.00 V	147	30.57	17.93

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.

Below 1GHz Data:

CDD Mode

802.11ac (VHT20)

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	72.60	32.1 QP	40.0	-7.9	2.00 H	264	43.78	-11.67
2	**86.70**	**33.2 QP**	**40.0**	**-6.8**	**1.50 H**	**48**	**47.81**	**-14.57**
3	116.57	31.9 QP	43.5	-11.7	1.50 H	95	42.72	-10.87
4	156.04	33.1 QP	43.5	-10.4	2.00 H	98	41.69	-8.58
5	212.25	32.3 QP	43.5	-11.2	1.00 H	277	44.16	-11.88
6	500.00	28.3 QP	46.0	-17.7	2.00 H	281	31.25	-2.91
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	37.50	32.8 QP	40.0	-7.2	1.00 V	130	42.24	-9.41
2	74.58	30.5 QP	40.0	-9.5	1.00 V	59	42.52	-12.01
3	146.55	31.2 QP	43.5	-12.3	1.00 V	292	39.89	-8.65
4	214.55	27.5 QP	43.5	-16.0	1.50 V	56	39.39	-11.91
5	740.01	28.0 QP	46.0	-18.0	1.50 V	186	26.10	1.86
6	902.11	29.6 QP	46.0	-16.4	2.00 V	221	25.83	3.77

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

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	100287	Apr. 17, 2015	Apr. 16, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Oct. 02, 2015	Oct. 01, 2016
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100071	Nov. 11, 2015	Nov. 10, 2016
RF Cable	5D-FB	COACAB-001	May 25, 2015	May 24, 2016
50 ohms Terminator	50	3	Oct. 21, 2015	Oct. 20, 2016
50 ohms Terminator	N/A	EMC-04	Oct. 28, 2015	Oct. 27, 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. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Feb. 04, 2016

4.2.3 Test Procedure

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

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

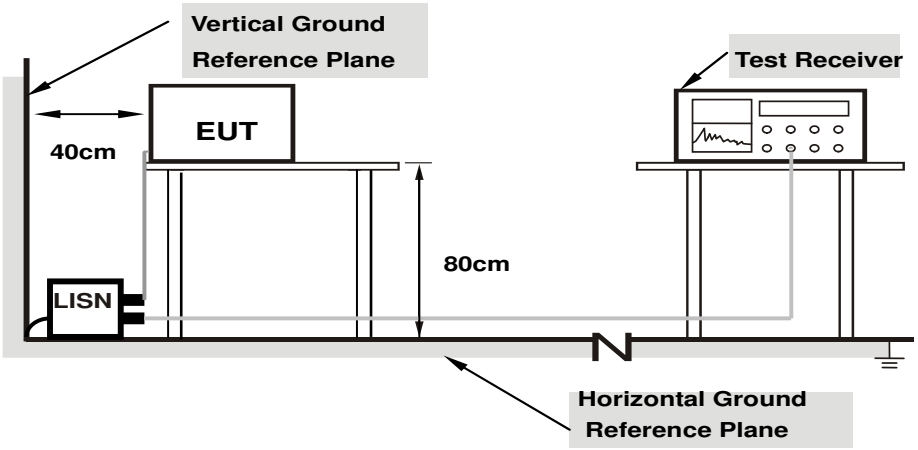
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

4.2.7 Test Results

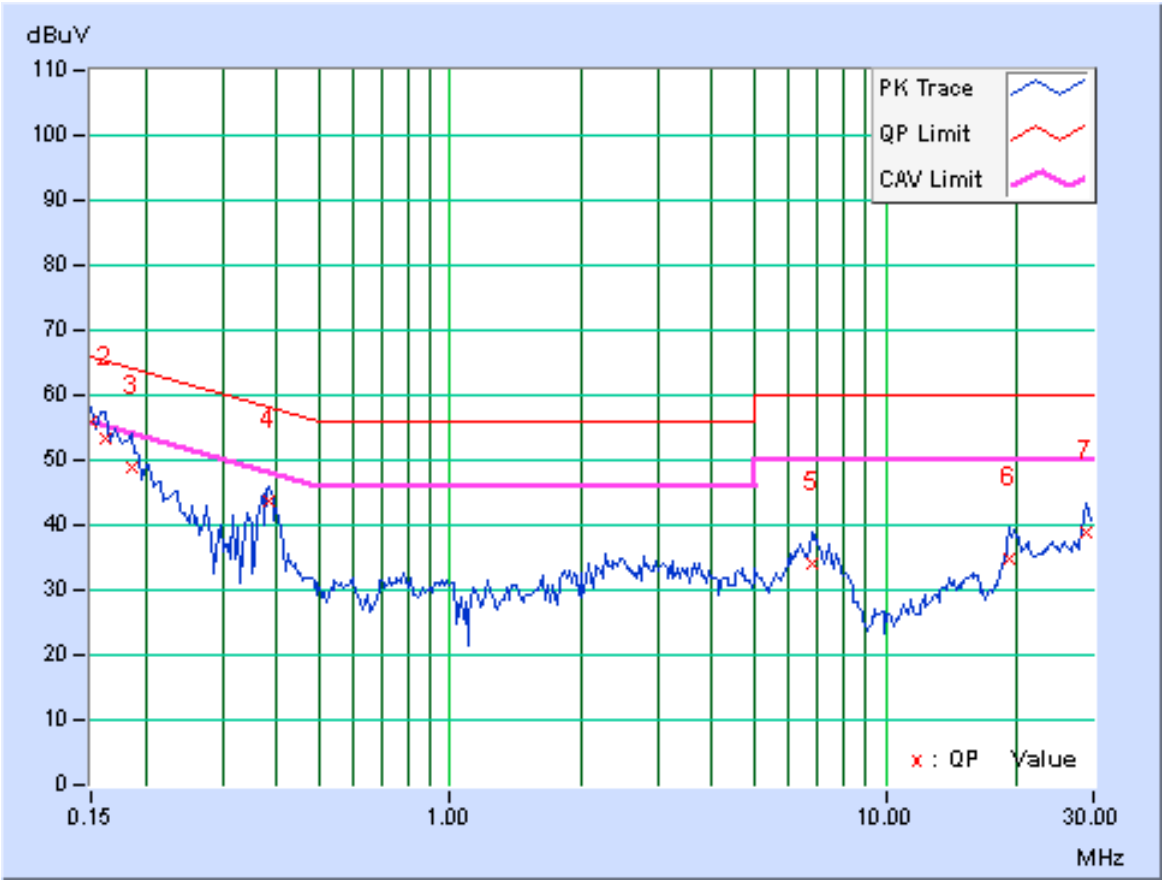
CDD Mode

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.21	45.56	29.34	55.77	39.55	66.00	56.00	-10.23	-16.45
2	0.16172	10.22	43.09	26.07	53.31	36.29	65.38	55.38	-12.07	-19.09
3	0.18516	10.23	38.67	23.33	48.90	33.56	64.25	54.25	-15.36	-20.70
4	**0.38438**	**10.28**	**33.53**	**31.81**	**43.81**	**42.09**	**58.18**	**48.18**	**-14.38**	**-6.10**
5	6.76172	10.55	23.53	18.95	34.08	29.50	60.00	50.00	-25.92	-20.50
6	19.24219	11.00	23.63	18.39	34.63	29.39	60.00	50.00	-25.37	-20.61
7	28.98438	11.25	27.80	22.53	39.05	33.78	60.00	50.00	-20.95	-16.22

REMARKS:

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

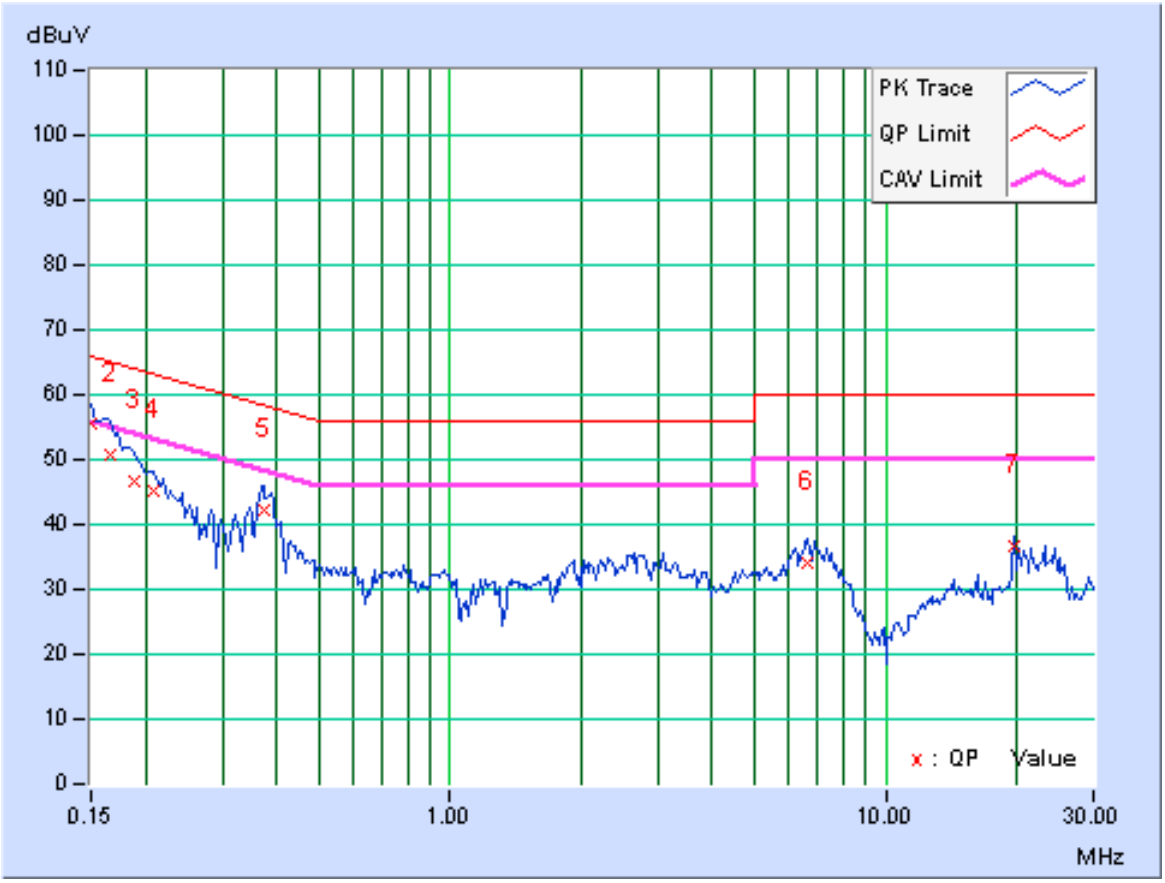


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.28	45.15	28.44	55.43	38.72	66.00	56.00	-10.57	-17.28
2	0.16562	10.29	40.57	26.28	50.86	36.57	65.18	55.18	-14.31	-18.60
3	0.18906	10.30	36.40	23.47	46.70	33.77	64.08	54.08	-17.37	-20.30
4	0.20859	10.31	34.70	21.24	45.01	31.55	63.26	53.26	-18.25	-21.71
5	0.37266	10.36	31.73	27.52	42.09	37.88	58.44	48.44	-16.35	-10.56
6	6.65234	10.59	23.30	18.47	33.89	29.06	60.00	50.00	-26.11	-20.94
7	19.70703	10.98	25.56	24.19	36.54	35.17	60.00	50.00	-23.46	-14.83

REMARKS:

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



4.3 Transmit Power Measurment

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

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

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

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

4.3.2 Test Setup

4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

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				
36	5180	20.94	20.26	230.335	23.62	30	Pass
40	5200	21.79	21.25	284.36	24.54	30	Pass
48	5240	21.94	21.26	289.975	24.62	30	Pass
149	5745	17.40	17.48	110.93	20.45	30	Pass
157	5785	21.55	23.39	361.162	25.58	30	Pass
165	5825	20.07	20.94	225.79	23.54	30	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.41	20.14	213.177	23.29	28.49	Pass
40	5200	22.53	21.85	332.17	25.21	28.49	Pass
48	5240	23.75	22.03	396.725	25.98	28.49	Pass
149	5745	17.42	17.49	111.313	20.47	28.49	Pass
157	5785	21.56	23.26	355.055	25.50	28.49	Pass
165	5825	19.85	20.47	208.034	23.18	28.49	Pass

Note: Directional gain = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	17.56	17.24	109.982	20.41	28.49	Pass
46	5230	21.58	21.13	273.598	24.37	28.49	Pass
151	5755	16.52	16.75	92.19	19.65	28.49	Pass
159	5795	19.49	20.11	191.485	22.82	28.49	Pass

Note: Directional gain = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	16.67	16.49	91.018	19.59	28.49	Pass
155	5775	16.46	16.41	88.011	19.45	28.49	Pass

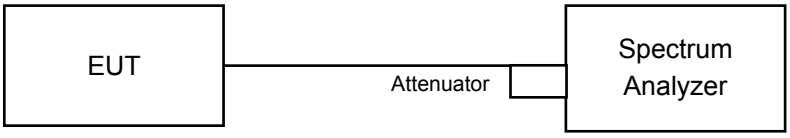
Note: Directional gain = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.

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 ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value

For U-NII-3:

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

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 ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

For U-NII-3:

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

4.4.5 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			
36	5180	7.21	6.96	10.10	15.49	Pass
40	5200	8.22	7.73	10.99	15.49	Pass
48	5240	8.20	7.77	11.00	15.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 17-(7.51-6) = 15.49dBm.

Beamforming Mode

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			
36	5180	6.90	6.23	9.59	15.49	Pass
40	5200	8.87	8.07	11.50	15.49	Pass
48	5240	9.47	8.37	11.97	15.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 17-(7.51-6) = 15.49dBm.

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			
38	5190	1.12	0.95	4.05	15.49	Pass
46	5230	5.04	4.52	7.80	15.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 17-(7.51-6) = 15.49dBm.

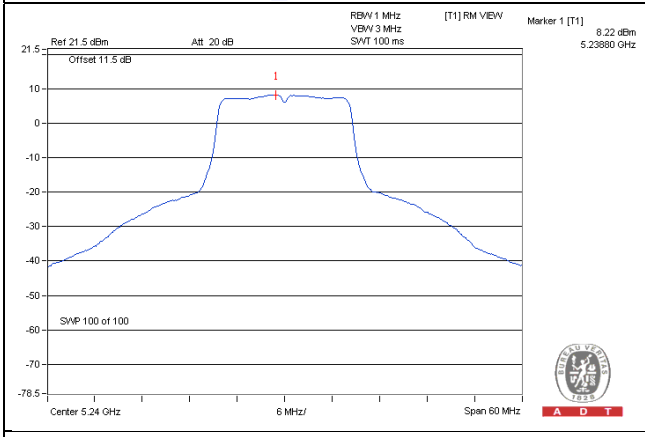
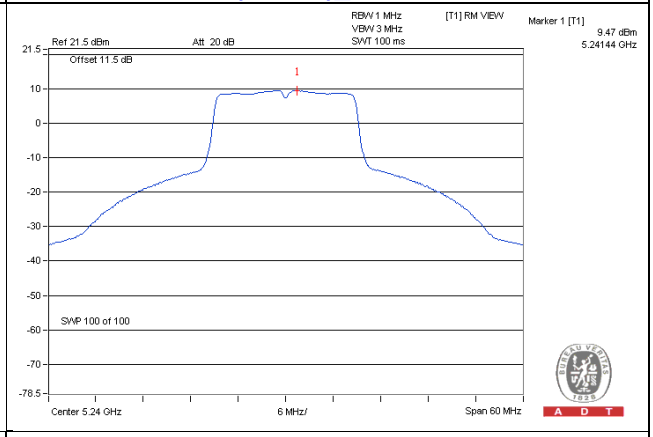
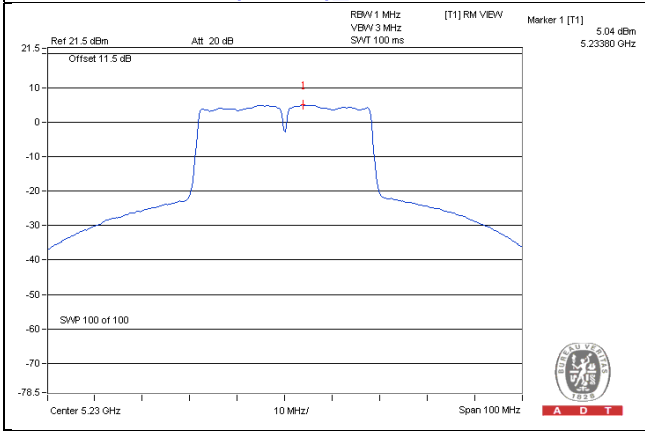
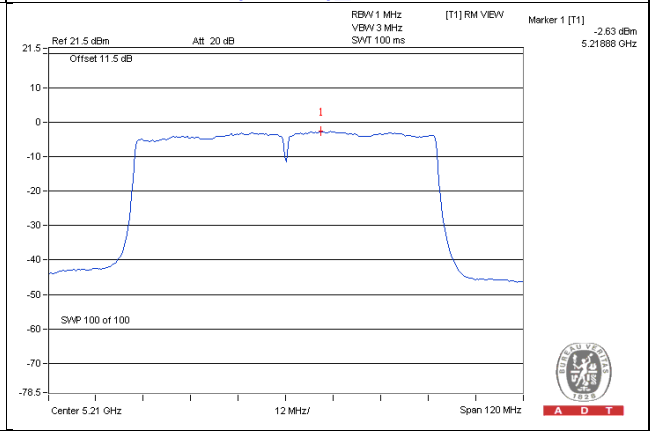
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. EIRP Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-2.63	-2.87	0.18	0.44	15.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 17-(7.51-6) = 15.49dBm.

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

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

For U-NII-3:

CDD Mode

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-3.19	-0.97	3.01	2.04	28.49	Pass
	157	5785	0.70	2.92	3.01	5.93	28.49	Pass
	165	5825	-0.32	1.90	3.01	4.91	28.49	Pass
1	149	5745	-3.06	-0.84	3.01	2.17	28.49	Pass
	157	5785	1.87	4.09	3.01	7.10	28.49	Pass
	165	5825	-0.01	2.21	3.01	5.22	28.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.

Beamforming Mode

802.11ac (VHT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-3.52	-1.30	3.01	1.71	28.49	Pass
	157	5785	0.31	2.53	3.01	5.54	28.49	Pass
	165	5825	-1.82	0.40	3.01	3.41	28.49	Pass
1	149	5745	-3.15	-0.93	3.01	2.08	28.49	Pass
	157	5785	1.72	3.94	3.01	6.95	28.49	Pass
	165	5825	-1.03	1.19	3.01	4.20	28.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.

802.11ac (VHT40)

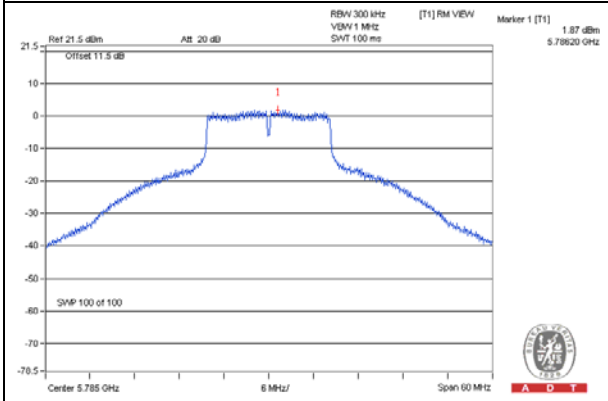
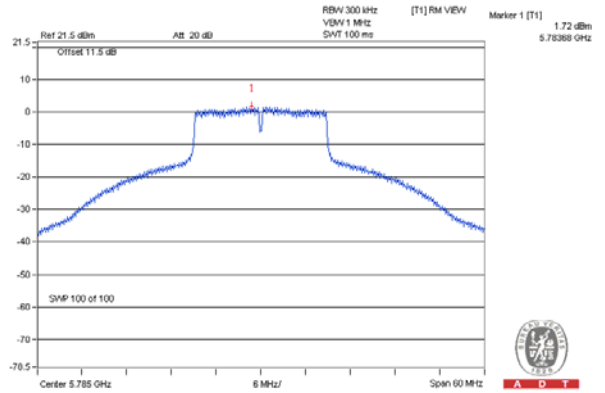
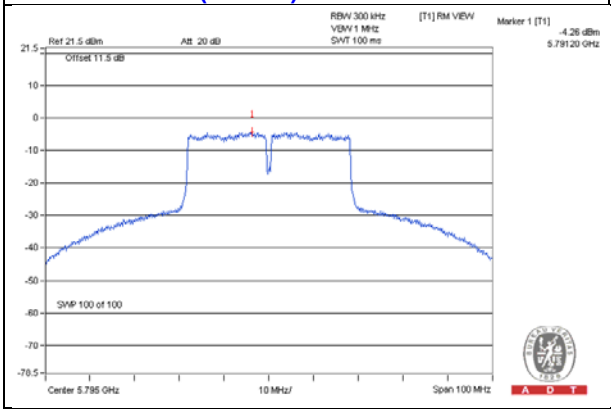
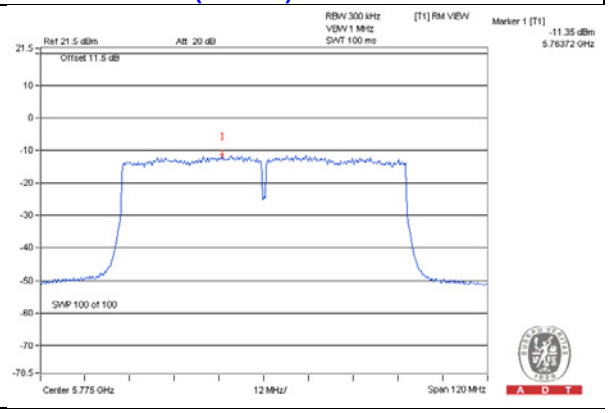
TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-7.54	-5.32	3.01	-2.31	28.49	Pass
	159	5795	-5.17	-2.95	3.01	0.06	28.49	Pass
1	151	5755	-7.89	-5.67	3.01	-2.66	28.49	Pass
	159	5795	-4.26	-2.04	3.01	0.97	28.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.

802.11ac (VHT80)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-11.51	-9.29	3.01	0.18	-6.10	28.49	Pass
1	155	5775	-11.35	-9.13	3.01	0.18	-5.94	28.49	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 = 4.5dBi + 10log(2) = 7.51dBi > 6dBi , so the power limit shall be reduced to 30-(7.51-6) = 28.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

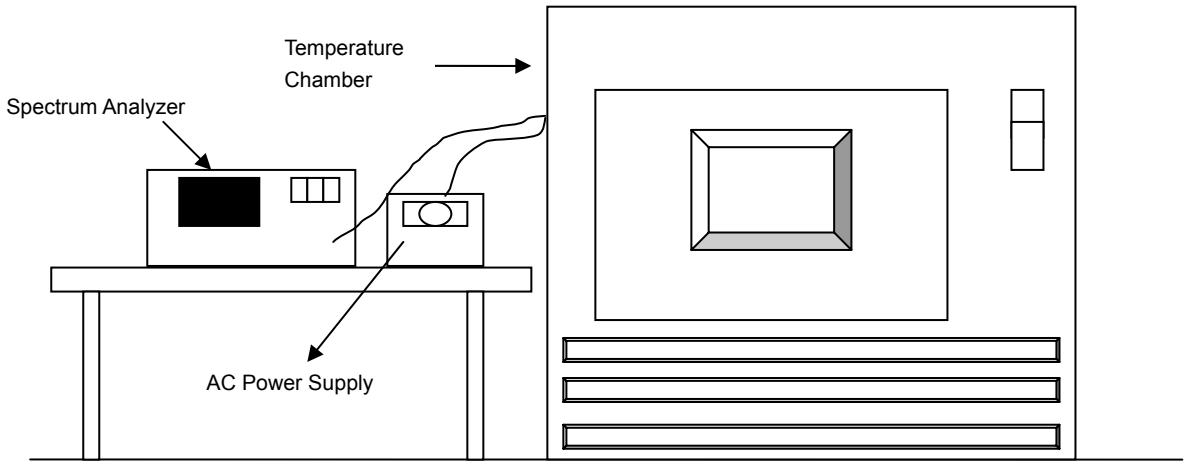
Spectrum Plot of Worst Value	
802.11a – Chain 1: CH 157	**802.11ac (VHT20) – Chain 1: CH 157**
	
802.11ac (VHT40) – Chain 1: CH 159	**802.11ac (VHT80) – Chain 1: CH 155**
	

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

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

4.5.5 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

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (℃)	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	5180.0205	0.00040	5180.0198	0.00038	5180.0196	0.00038	5180.0205	0.00040
40	120	5179.9952	-0.00009	5179.9967	-0.00006	5179.9985	-0.00003	5179.9996	-0.00001
30	120	5180.012	0.00023	5180.0108	0.00021	5180.0114	0.00022	5180.0139	0.00027
20	120	5179.9855	-0.00028	5179.9866	-0.00026	5179.9879	-0.00023	5179.9879	-0.00023
10	120	5179.9779	-0.00043	5179.9774	-0.00044	5179.974	-0.00050	5179.976	-0.00046
0	120	5179.9767	-0.00045	5179.9738	-0.00051	5179.9756	-0.00047	5179.9755	-0.00047
-10	120	5180.0074	0.00014	5180.0043	0.00008	5180.0077	0.00015	5180.0057	0.00011
-20	120	5179.9936	-0.00012	5179.9913	-0.00017	5179.9907	-0.00018	5179.9913	-0.00017
-30	120	5179.9918	-0.00016	5179.9959	-0.00008	5179.9943	-0.00011	5179.9966	-0.00007

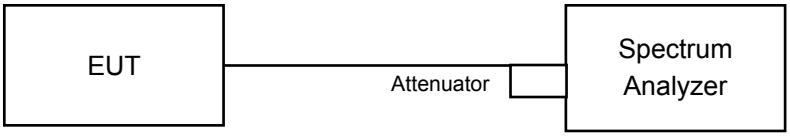
FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5179.9845	-0.00030	5179.9868	-0.00025	5179.987	-0.00025	5179.9881	-0.00023
	120	5179.9855	-0.00028	5179.9866	-0.00026	5179.9879	-0.00023	5179.9879	-0.00023
	102	5179.9864	-0.00026	5179.9857	-0.00028	5179.987	-0.00025	5179.9869	-0.00025

4.6 6dB Bandwidth Measurment

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

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

4.6.5 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

CDD Mode

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.40	16.44	0.5	PASS
157	5785	16.38	16.37	0.5	PASS
165	5825	16.37	16.40	0.5	PASS

Beamforming Mode

802.11ac (VHT20)

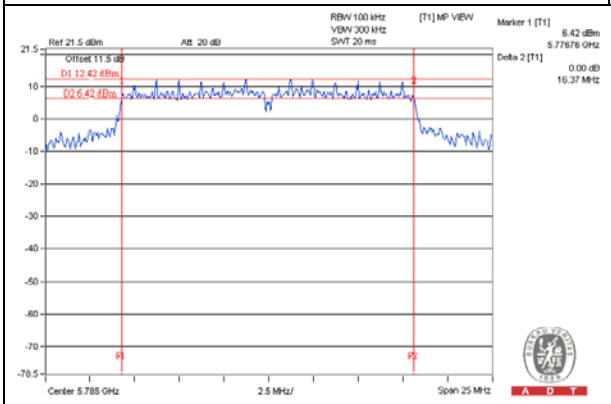
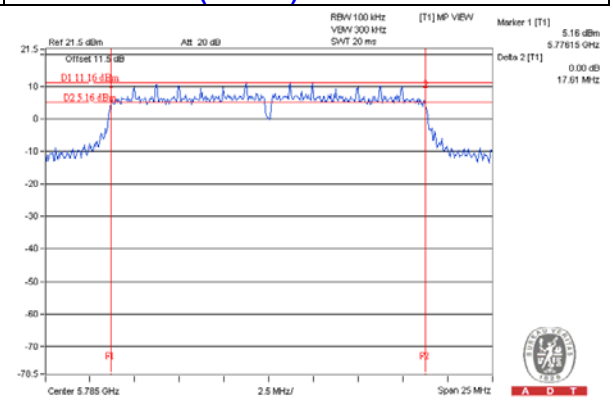
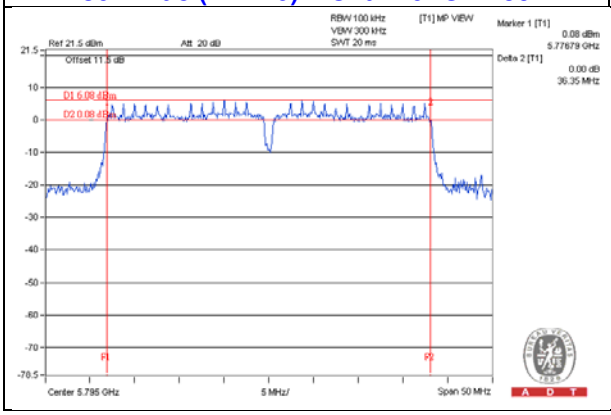
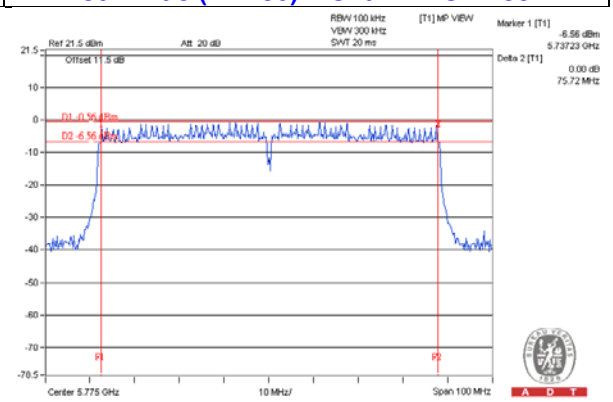
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.62	17.65	0.5	PASS
157	5785	17.61	17.63	0.5	PASS
165	5825	17.62	17.65	0.5	PASS

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	36.43	36.41	0.5	PASS
159	5795	36.35	36.47	0.5	PASS

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.78	75.72	0.5	PASS

Spectrum Plot of Worst Value	
802.11a – Chain 1: CH 157	**802.11ac (VHT20) – Chain 0: CH 157**
	
802.11ac (VHT40) – Chain 0: CH 159	**802.11ac (VHT80) – Chain 1: 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.

--- END ---