

FCC Test Report

Report No.: RF170906C12A

FCC ID: PY317400402

Test Model: RBR20

Series Model: RBS20 (Refer to item 3.1 for more details)

Received Date: Aug. 25, 2017

Test Date: Aug. 25 ~ Sep. 05, 2017

Issued Date: Dec. 06, 2017

Applicant: NETGEAR, INC.

Address: 350 East Plumeria Drive San Jose, CA 95134

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

FCC Registration / Designation Number: 788550 / TW0003



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 Standards	14
4 Test Types and Results	15
4.1 Radiated Emission and Bandedge Measurement	15
4.1.1 Limits of Radiated Emission and Bandedge Measurement	15
4.1.2 Test Instruments	16
4.1.3 Test Procedures	17
4.1.4 Deviation from Test Standard	17
4.1.5 Test Setup	18
4.1.6 EUT Operating Conditions	19
4.1.7 Test Results	20
4.2 Conducted Emission Measurement	42
4.2.1 Limits of Conducted Emission Measurement	42
4.2.2 Test Instruments	42
4.2.3 Test Procedures	43
4.2.4 Deviation from Test Standard	43
4.2.5 Test Setup	43
4.2.6 EUT Operating Conditions	43
4.2.7 Test Results	44
4.3 Transmit Power Measurement	48
4.3.1 Limits of Transmit Power Measurement	48
4.3.2 Test Setup	48
4.3.3 Test Instruments	48
4.3.4 Test Procedure	49
4.3.5 Deviation from Test Standard	49
4.3.6 EUT Operating Conditions	49
4.3.7 Test Result	50
4.4 Occupied Bandwidth Measurement	59
4.4.1 Test Setup	59
4.4.2 Test Instruments	59
4.4.3 Test Procedure	59
4.4.4 Test Result	60
4.5 Peak Power Spectral Density Measurement	62
4.5.1 Limits of Peak Power Spectral Density Measurement	62
4.5.2 Test Setup	62
4.5.3 Test Instruments	62
4.5.4 Test Procedures	62
4.5.5 Deviation from Test Standard	62
4.5.6 EUT Operating Conditions	62
4.5.7 Test Results	63
4.6 Frequency Stability	66
4.6.1 Limits of Frequency Stability Measurement	66

4.6.2	Test Setup	66
4.6.3	Test Instruments	66
4.6.4	Test Procedure	66
4.6.5	Deviation from Test Standard	67
4.6.6	EUT Operating Condition	67
4.6.7	Test Results	67
5	Pictures of Test Arrangements.....	68
	Appendix – Information on the Testing Laboratories	69

Release Control Record

Issue No.	Description	Date Issued
RF170906C12A	Original release.	Dec. 06, 2017

1 Certificate of Conformity

Product: Orbi Router, Orbi Satellite (Refer to item 3.1 for more details)

Brand: NETGEAR

Test Model: RBR20

Series Model: RBS20 (Refer to item 3.1 for more details)

Sample Status: Engineering sample

Applicant: NETGEAR, INC.

Test Date: Aug. 25 ~ Sep. 05, 2017

Standards: 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 : Celine Chou , **Date:** Dec. 06, 2017
Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Dec. 06, 2017
Ken Liu / Senior 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 -5.83dB at 0.16096MHz.
15.407(b)(1/2/3/4(ii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5350.00MHz, 5727.00MHz, 5725.00MHz and 5735.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is I-PEX not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Orbi Router, Orbi Satellite (Refer to note for more details)
Brand	NETGEAR
Test Model	RBR20
Series Model	RBS20
Model Difference	Refer to note for more details
Sample Status	Engineering sample
Power Supply Rating	12Vdc from adapter
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 867Mbps
Operating Frequency	5260 ~ 5320MHz, 5500 ~ 5700MHz
Number of Channel	5260 ~ 5320MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5500 ~ 5700MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 11 802.11n (HT40), 802.11ac (VHT40): 5 802.11ac (VHT80): 2
Output Power	CDD Mode: 5260 ~ 5320MHz: 217.617mW 5500 ~ 5700MHz: 246.258mW Beamforming Mode: 5260 ~ 5320MHz: 217.617mW 5500 ~ 5700MHz: 246.258mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. The differences compared with the original report (BV CPS report no.: RF170906C12D-1) is adding 5.26GHz to 5.32GHz & 5.50GHz to 5.70GHz by software.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	Beamforming Mode	TX Function
802.11a	Not Support	2TX
802.11n (HT20)	Support (CDD / NSS=1)	2TX
802.11n (HT40)	Support (CDD / NSS=1)	2TX
802.11ac (VHT20)	Support (CDD / NSS=1)	2TX
802.11ac (VHT40)	Support (CDD / NSS=1)	2TX
802.11ac (VHT80)	Support (CDD / NSS=1)	2TX

* 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)

* For 802.11n and 802.11ac, CDD mode and Beamforming mode are presented in power output test item. For other test items, CDD mode is the worst case for final tests after pretesting.

3. All models are electrically identical except software firmware. Model: RBR20 is the representative for final test.

Brand	Model	Function	Band	RF Module	Difference
NETGEAR	RBR20	Router	2.4G/UNII-2C/UNII-3	Module 1	Master mode only
			UNII-1/UNII-2A	Module 2	
	RBS20	Satellite	2.4G/UNII-2C/UNII-3	Module 1	Master mode and Client mode for 2.4GHz
			UNII-1/UNII-2A	Module 2	Client mode for UNII-2C/UNII-3 Master mode only for U-NII-1/UNII-2A

The following RF Modules are for the EUT.

RF Module	Band	Antenna No.
Module 1	2.4G	1/2
	UNII-2C/UNII-3	1/2
Module 2	UNII-1/UNII-2A	3/4

4. The following filters are provided to this EUT.

RF Module Brand / Model	Filter	Position	Filter Model Name	Remark
Module 1	1st	TFL1 ,TFL2	Filter 1	passive filter (pin to pin & Same design)
	2nd	TFL1 ,TFL2	Filter 2	passive filter (pin to pin & Same design)
Module 2	1st	BFL2, BFL3	Filter 3	passive filter (pin to pin & Same design)
	2nd	BFL2, BFL3	Filter 4	passive filter (pin to pin & Same design)

5. The EUT uses following antennas.

Ant. Type	Dipole				
Connector Type	I-PEX				
Directional Antenna Gain (dBi)					
Item	2.4G	5G Band 1	5G Band 2	5G Band 3	5G Band 4
-	5.71	5.01	5.63	5.71	4.65

6. The EUT consumes power from the following adapters.

Adapter 1	
Brand	NETGEAR
Model	ML18-F120150-A1
P/N	332-11014-01
Input Power	100-120Vac, 50/60Hz, 0.5A
Output Power	12Vdc, 1.5A
Power Line	1.8m power cable without core attached on adapter

Adapter 2	
Brand	NETGEAR
Model	MU18A2120150-A1
P/N	332-11015-01
Input Power	100-240Vac, 50/60Hz, 0.5A
Output Power	12Vdc, 1.5A
Power Line	1.8m power cable without core attached on adapter

Adapter 3	
Brand	NETGEAR
Model	2ABB018F 1 NJ
P/N	332-11008-01
Input Power	100-120Vac, 50/60Hz, 0.6A
Output Power	12Vdc, 1.5A
Power Line	1.8m power cable without core attached on adapter

Adapter 4	
Brand	NETGEAR
Model	2ABB018F NA
P/N	332-11009-01
Input Power	100-240Vac, 50/60Hz, 0.6A
Output Power	12Vdc, 1.5A
Power Line	1.85m power cable without core attached on adapter

* Adapter 1 and 2 are electrically identical, different model names are for marketing purpose. Therefore adapter 1 was chosen for final test and presented in the test report.

* Adapter 3 and 4 are electrically identical, different model names are for marketing purpose. Therefore adapter 3 was chosen for final test and presented in the test report.

7. Spurious emission of the simultaneous operation mode as below and the test data please refer to report no.: RF170906C12A-1.

No	Mode
1	WLAN 2.4GHz + WLAN 5GHz B1 + WLAN 5GHz B3
2	WLAN 2.4GHz + WLAN 5GHz B2 + WLAN 5GHz B3
3	WLAN 2.4GHz + WLAN 5GHz B2 + WLAN 5GHz B4

3.2 Description of Test Modes

For 5260 ~ 5320MHz

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

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

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

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290 MHz

For 5500 ~ 5700MHz

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

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz		

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

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz		

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530MHz	122	5610 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Power from adapter 1
B	-	√	√	-	Power from adapter 3

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission
 APCM: Antenna Port Conducted Measurement

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. "-" means no effect.

Radiated Emission Test (Above 1GHz):

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11ac (VHT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A, B	802.11a	5260-5320	52 to 64	52	OFDM	6.0
	802.11a	5500-5700	100 to 140		OFDM	6.0

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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A, B	802.11a	5260-5320	52 to 64	52	OFDM	6.0
	802.11a	5500-5700	100 to 140		OFDM	6.0

Transmit Power Measurement:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
CDD Mode						
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11ac (VHT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3
Beamforming Mode						
A	802.11ac (VHT20)	5260-5320	52 to 64	52, 60, 64	OFDM	6.5
	802.11ac (VHT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
A	802.11ac (VHT20)	5500-5700	100 to 140	100, 116, 140	OFDM	6.5
	802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3

Peak Power Spectral Density, Bandwidth and Frequency Stability 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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11ac (VHT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 70% RH	120Vac, 60Hz	Matthew Yang
RE<1G	25 deg. C, 70% RH	120Vac, 60Hz	Luis Lee
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Luis Lee
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Cedric Wu

3.3 Duty Cycle of Test Signal

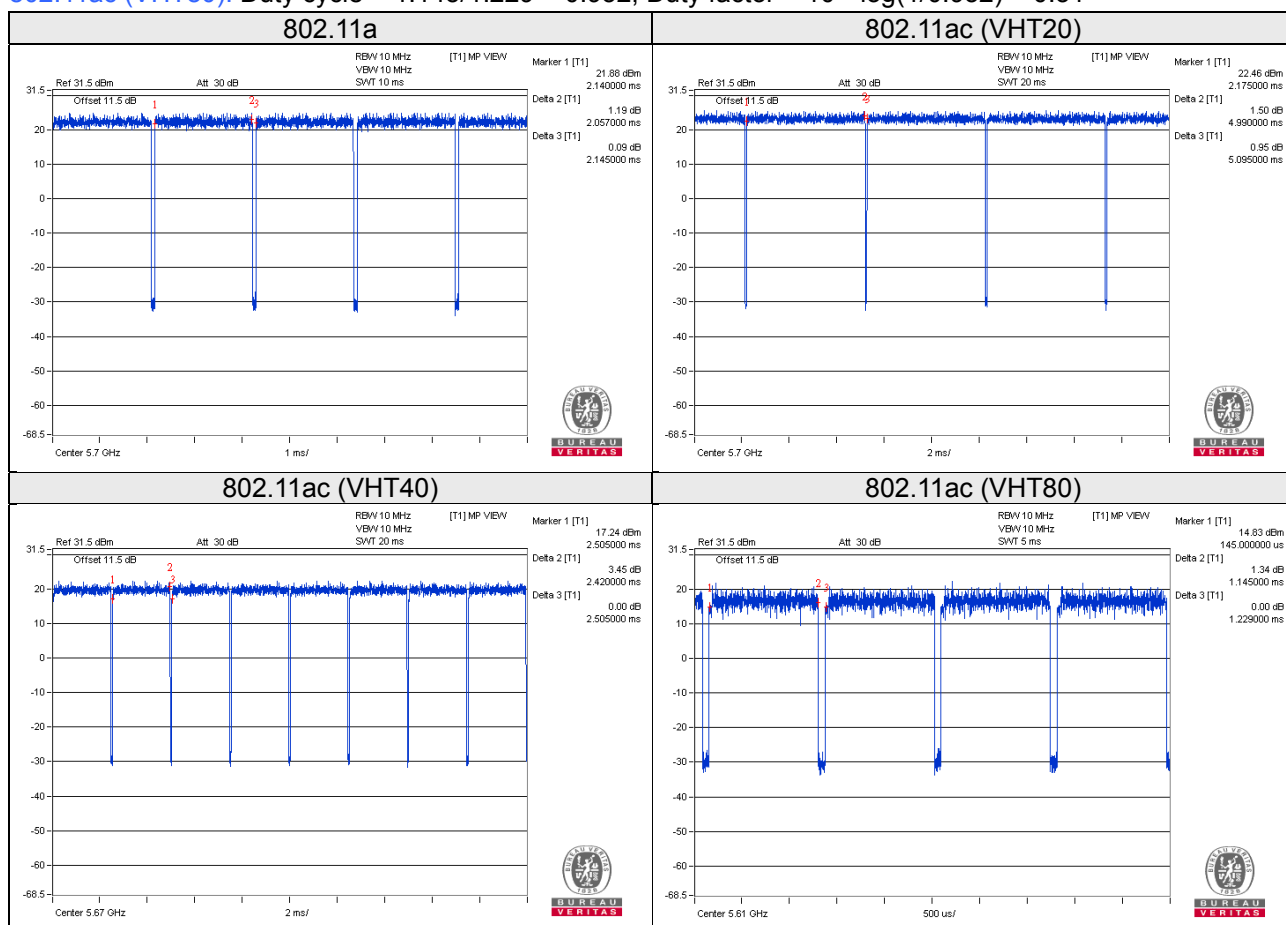
Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.057/2.145 = 0.959, Duty factor = $10 * \log(1/0.959) = 0.18$

802.11ac (VHT20): Duty cycle = 4.990/5.095 = 0.979, Duty factor = $10 * \log(1/0.979) = 0.09$

802.11ac (VHT40): Duty cycle = 2.420/2.505 = 0.966, Duty factor = $10 * \log(1/0.966) = 0.15$

802.11ac (VHT80): Duty cycle = 1.145/1.229 = 0.932, Duty factor = $10 * \log(1/0.932) = 0.31$



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.

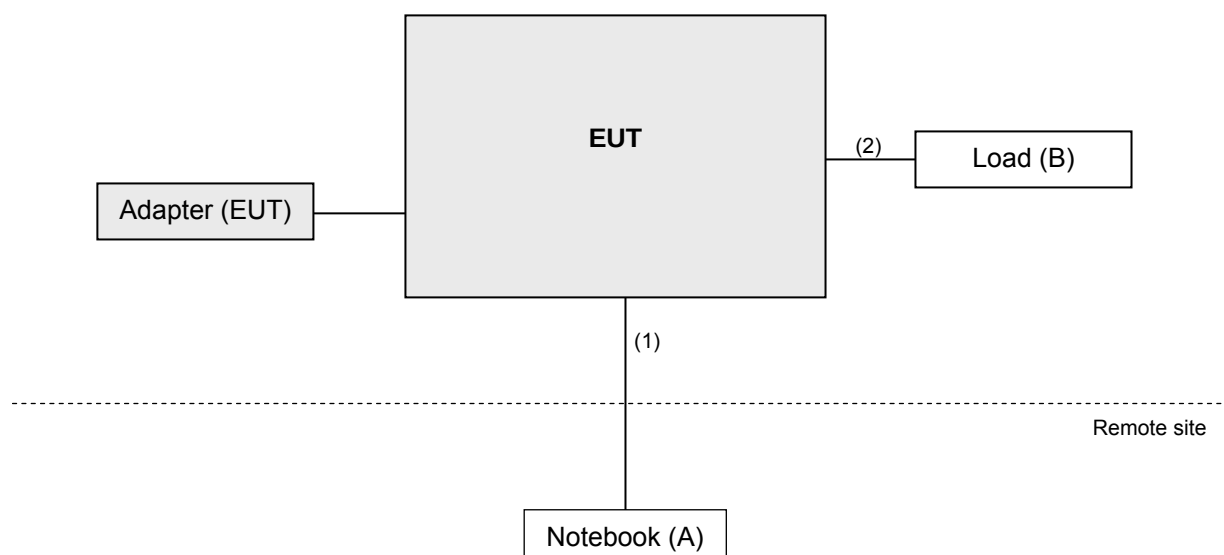
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	6RP2YM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	3	N	0	-
2.	RJ45, Cat5e	1	1.8	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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 v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

Note:

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

Limits of unwanted emission out of the restricted bands

Applicable To			Limit	
789033 D02 General UNII Test Procedure New Rules v02r01			Field Strength at 3m	
			PK: 74 (dBµV/m)	AV: 54 (dBµV/m)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK: -27 (dBm/MHz)	PK: 68.2(dBµV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK: -27 (dBm/MHz) ^{*1} PK: 10 (dBm/MHz) ^{*2} PK: 15.6 (dBm/MHz) ^{*3} PK: 27 (dBm/MHz) ^{*4}	PK: 68.2(dBµV/m) ^{*1} PK: 105.2 (dBµV/m) ^{*2} PK: 110.8(dBµV/m) ^{*3} PK: 122.2 (dBµV/m) ^{*4}
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	
^{*1} beyond 75 MHz or more above of the band edge.			^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.	
^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.			^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	

Note: 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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 24, 2016	Oct. 23, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Dec. 15, 2016	Dec. 14, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent	8449B	3008A01960	Aug. 08, 2017	Aug. 07, 2018
Preamplifier Agilent	8447D	2944A10631	Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Aug. 08, 2017	Aug. 07, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 17, 2016	Oct. 16, 2017
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 08, 2017	Jun. 07, 2018

- 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 HwaYa Chamber 4.
 3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
 5. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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:

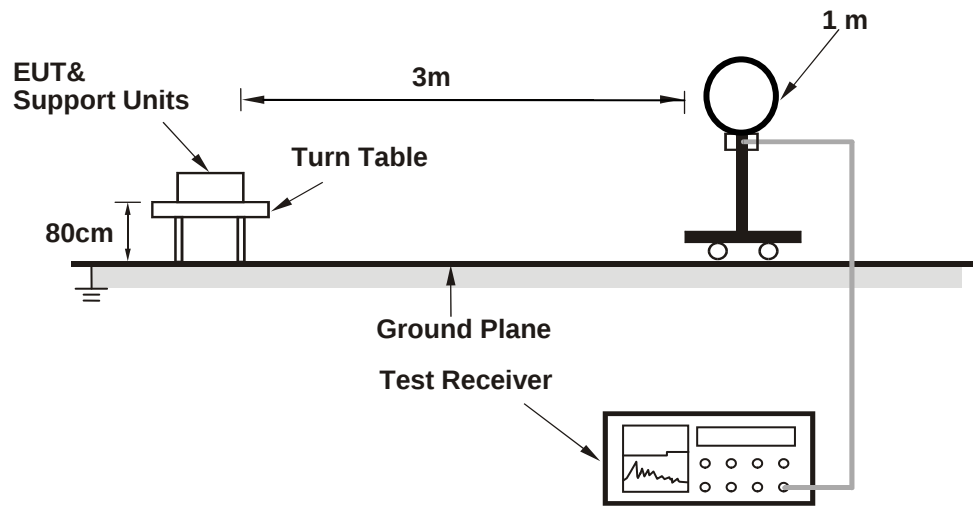
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

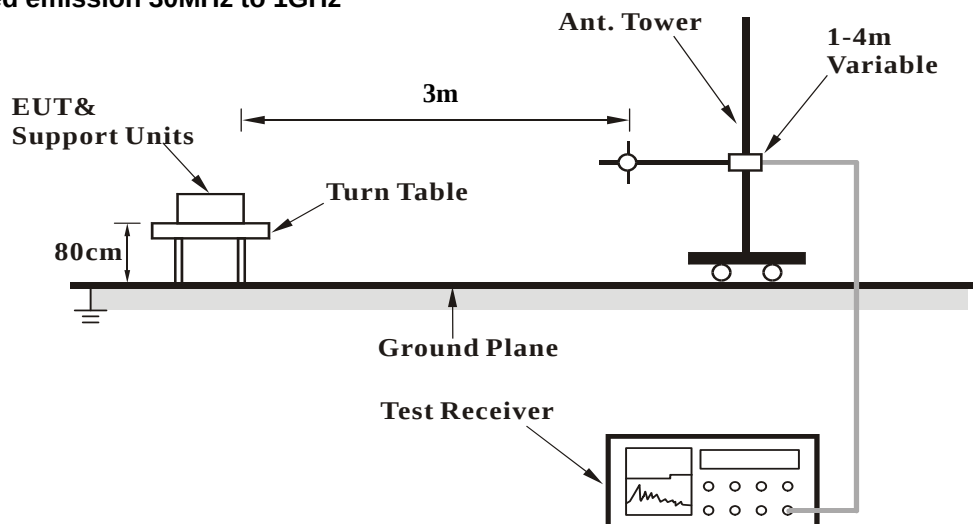
No deviation.

4.1.5 Test Setup

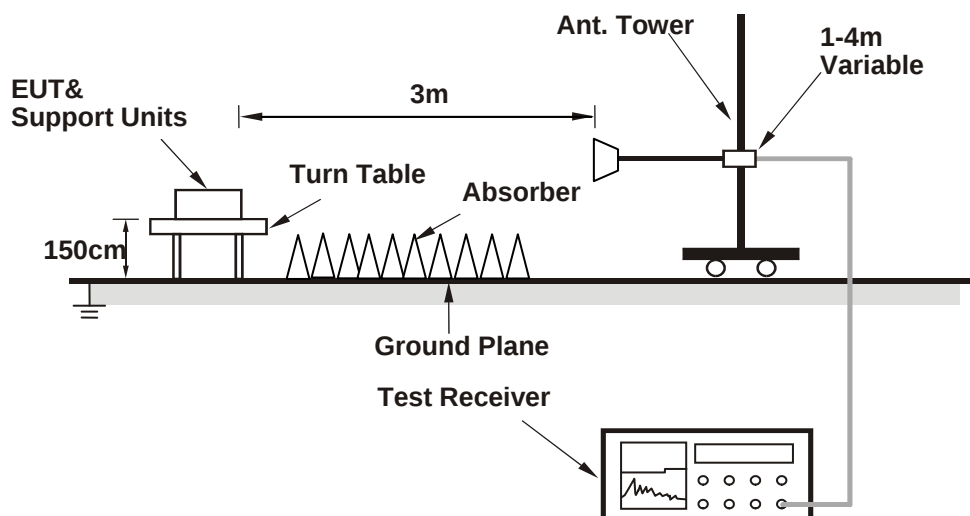
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Prepared a notebook to act as a communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz data:

802.11a

CHANNEL	TX Channel 52	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	58.7 PK	74.0	-15.3	3.66 H	312	51.3	7.4
2	5150.00	45.9 AV	54.0	-8.1	3.66 H	312	38.5	7.4
3	*5260.00	109.3 PK			3.66 H	312	67.8	41.5
4	*5260.00	98.7 AV			3.66 H	312	57.2	41.5
5	#10520.00	62.0 PK	74.0	-12.0	2.88 H	269	41.7	20.3
6	#10520.00	48.9 AV	54.0	-5.1	2.88 H	269	28.6	20.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.1 PK	74.0	-14.9	2.37 V	179	51.7	7.4
2	5150.00	46.5 AV	54.0	-7.5	2.37 V	179	39.1	7.4
3	*5260.00	119.6 PK			2.37 V	179	78.1	41.5
4	*5260.00	108.6 AV			2.37 V	179	67.1	41.5
5	#10520.00	62.2 PK	74.0	-11.8	2.44 V	110	41.9	20.3
6	#10520.00	49.2 AV	54.0	-4.8	2.44 V	110	28.9	20.3

Remarks:

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

CHANNEL	TX Channel 60	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5300.00	110.0 PK			3.67 H	311	68.4	41.6
2	*5300.00	99.2 AV			3.67 H	311	57.6	41.6
3	10600.00	62.7 PK	74.0	-11.3	3.07 H	274	41.9	20.8
4	10600.00	49.5 AV	54.0	-4.5	3.07 H	274	28.7	20.8
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	*5300.00	119.8 PK			2.33 V	201	78.2	41.6
2	*5300.00	108.9 AV			2.33 V	201	67.3	41.6
3	10600.00	62.9 PK	74.0	-11.1	2.58 V	104	42.1	20.8
4	10600.00	49.8 AV	54.0	-4.2	2.58 V	104	29.0	20.8

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 64	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5320.00	109.4 PK			3.63 H	309	67.8	41.6
2	*5320.00	98.4 AV			3.63 H	309	56.8	41.6
3	5350.00	59.4 PK	74.0	-14.6	3.63 H	309	51.4	8.0
4	5350.00	48.0 AV	54.0	-6.0	3.63 H	309	40.0	8.0
5	10640.00	62.6 PK	74.0	-11.4	3.01 H	275	41.8	20.8
6	10640.00	49.6 AV	54.0	-4.4	3.01 H	275	28.8	20.8
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	*5320.00	119.7 PK			2.40 V	199	78.1	41.6
2	*5320.00	108.6 AV			2.40 V	199	67.0	41.6
3	5350.00	72.5 PK	74.0	-1.5	2.40 V	199	64.5	8.0
4	5350.00	53.9 AV	54.0	-0.1	2.40 V	199	45.9	8.0
5	10640.00	62.9 PK	74.0	-11.1	2.68 V	97	42.1	20.8
6	10640.00	49.8 AV	54.0	-4.2	2.68 V	97	29.0	20.8

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 100	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	5460.00	59.9 PK	74.0	-14.1	1.07 H	111	51.7	8.2
2	5460.00	47.3 AV	54.0	-6.7	1.07 H	111	39.1	8.2
3	#5470.00	61.5 PK	74.0	-12.5	1.07 H	111	53.3	8.2
4	#5470.00	48.0 AV	54.0	-6.0	1.07 H	111	39.8	8.2
5	*5500.00	109.1 PK			1.07 H	111	67.1	42.0
6	*5500.00	99.1 AV			1.07 H	111	57.1	42.0
7	11000.00	62.9 PK	74.0	-11.1	1.34 H	185	41.5	21.4
8	11000.00	49.8 AV	54.0	-4.2	1.34 H	185	28.4	21.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	61.2 PK	74.0	-12.8	2.46 V	96	53.0	8.2
2	5460.00	49.2 AV	54.0	-4.8	2.46 V	96	41.0	8.2
3	#5470.00	69.7 PK	74.0	-4.3	2.46 V	96	61.5	8.2
4	#5470.00	53.7 AV	54.0	-0.3	2.46 V	96	45.5	8.2
5	*5500.00	120.9 PK			2.46 V	96	78.9	42.0
6	*5500.00	110.1 AV			2.46 V	96	68.1	42.0
7	11000.00	63.2 PK	74.0	-10.8	1.78 V	266	41.8	21.4
8	11000.00	49.9 AV	54.0	-4.1	1.78 V	266	28.5	21.4

Remarks:

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

CHANNEL	TX Channel 116	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5580.00	109.1 PK			1.04 H	110	66.9	42.2
2	*5580.00	99.8 AV			1.04 H	110	57.6	42.2
3	11160.00	63.5 PK	74.0	-10.5	1.29 H	188	42.0	21.5
4	11160.00	50.7 AV	54.0	-3.3	1.29 H	188	29.2	21.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	121.4 PK			2.37 V	96	79.2	42.2
2	*5580.00	110.7 AV			2.37 V	96	68.5	42.2
3	11160.00	64.0 PK	74.0	-10.0	1.85 V	273	42.5	21.5
4	11160.00	51.1 AV	54.0	-2.9	1.85 V	273	29.6	21.5

Remarks:

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

CHANNEL	TX Channel 140	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	*5700.00	107.4 PK			1.08 H	112	64.9	42.5
2	*5700.00	97.7 AV			1.08 H	112	55.2	42.5
3	#5727.00	60.7 PK	74.0	-13.3	1.08 H	112	52.0	8.7
4	#5727.00	47.1 AV	54.0	-6.9	1.08 H	112	38.4	8.7
5	11400.00	63.2 PK	74.0	-10.8	1.32 H	177	41.7	21.5
6	11400.00	50.0 AV	54.0	-4.0	1.32 H	177	28.5	21.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	119.1 PK			2.52 V	100	76.6	42.5
2	*5700.00	108.5 AV			2.52 V	100	66.0	42.5
3	#5727.00	71.7 PK	74.0	-2.3	2.52 V	100	63.0	8.7
4	#5727.00	53.9 AV	54.0	-0.1	2.52 V	100	45.2	8.7
5	11400.00	63.1 PK	74.0	-10.9	1.89 V	280	41.6	21.5
6	11400.00	50.1 AV	54.0	-3.9	1.89 V	280	28.6	21.5

Remarks:

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

802.11ac (VHT20)

CHANNEL	TX Channel 52	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	58.6 PK	74.0	-15.4	3.57 H	314	51.2	7.4
2	5150.00	46.3 AV	54.0	-7.7	3.57 H	314	38.9	7.4
3	*5260.00	109.7 PK			3.57 H	314	68.2	41.5
4	*5260.00	98.7 AV			3.57 H	314	57.2	41.5
5	#10520.00	61.8 PK	74.0	-12.2	3.32 H	235	41.5	20.3
6	#10520.00	48.9 AV	54.0	-5.1	3.32 H	235	28.6	20.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.4 PK	74.0	-14.6	2.33 V	180	52.0	7.4
2	5150.00	46.7 AV	54.0	-7.3	2.33 V	180	39.3	7.4
3	*5260.00	119.7 PK			2.33 V	180	78.2	41.5
4	*5260.00	108.9 AV			2.33 V	180	67.4	41.5
5	#10520.00	62.1 PK	74.0	-11.9	1.74 V	46	41.8	20.3
6	#10520.00	49.3 AV	54.0	-4.7	1.74 V	46	29.0	20.3

Remarks:

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

CHANNEL	TX Channel 60	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5300.00	110.4 PK			3.71 H	310	68.8	41.6
2	*5300.00	99.3 AV			3.71 H	310	57.7	41.6
3	10600.00	62.5 PK	74.0	-11.5	3.42 H	244	41.7	20.8
4	10600.00	49.7 AV	54.0	-4.3	3.42 H	244	28.9	20.8
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	*5300.00	120.0 PK			2.37 V	209	78.4	41.6
2	*5300.00	109.1 AV			2.37 V	209	67.5	41.6
3	10600.00	62.8 PK	74.0	-11.2	1.85 V	61	42.0	20.8
4	10600.00	50.0 AV	54.0	-4.0	1.85 V	61	29.2	20.8

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 64	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5320.00	108.7 PK			3.44 H	310	67.1	41.6
2	*5320.00	97.8 AV			3.44 H	310	56.2	41.6
3	5350.00	60.8 PK	74.0	-13.2	3.44 H	310	52.8	8.0
4	5350.00	48.2 AV	54.0	-5.8	3.44 H	310	40.2	8.0
5	10640.00	62.5 PK	74.0	-11.5	2.98 H	250	41.7	20.8
6	10640.00	49.2 AV	54.0	-4.8	2.98 H	250	28.4	20.8
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	*5320.00	119.4 PK			2.08 V	198	77.8	41.6
2	*5320.00	108.2 AV			2.08 V	198	66.6	41.6
3	5350.00	67.2 PK	74.0	-6.8	2.08 V	198	59.2	8.0
4	5350.00	53.8 AV	54.0	-0.2	2.08 V	198	45.8	8.0
5	10640.00	62.7 PK	74.0	-11.3	1.65 V	37	41.9	20.8
6	10640.00	49.6 AV	54.0	-4.4	1.65 V	37	28.8	20.8

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 100	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	5460.00	60.4 PK	74.0	-13.6	1.18 H	114	52.2	8.2
2	5460.00	47.8 AV	54.0	-6.2	1.18 H	114	39.6	8.2
3	#5470.00	61.7 PK	74.0	-12.3	1.18 H	114	53.5	8.2
4	#5470.00	48.4 AV	54.0	-5.6	1.18 H	114	40.2	8.2
5	*5500.00	109.1 PK			1.18 H	114	67.1	42.0
6	*5500.00	98.5 AV			1.18 H	114	56.5	42.0
7	11000.00	63.0 PK	74.0	-11.0	1.30 H	196	41.6	21.4
8	11000.00	49.8 AV	54.0	-4.2	1.30 H	196	28.4	21.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	61.4 PK	74.0	-12.6	2.71 V	89	53.2	8.2
2	5460.00	49.3 AV	54.0	-4.7	2.71 V	89	41.1	8.2
3	#5470.00	71.1 PK	74.0	-2.9	2.71 V	89	62.9	8.2
4	#5470.00	53.7 AV	54.0	-0.3	2.71 V	89	45.5	8.2
5	*5500.00	120.8 PK			2.71 V	89	78.8	42.0
6	*5500.00	109.9 AV			2.71 V	89	67.9	42.0
7	11000.00	62.8 PK	74.0	-11.2	1.82 V	233	41.4	21.4
8	11000.00	49.9 AV	54.0	-4.1	1.82 V	233	28.5	21.4

Remarks:

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

CHANNEL	TX Channel 116	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5580.00	109.6 PK			1.15 H	109	67.4	42.2
2	*5580.00	99.0 AV			1.15 H	109	56.8	42.2
3	11160.00	63.0 PK	74.0	-11.0	1.42 H	202	41.5	21.5
4	11160.00	49.8 AV	54.0	-4.2	1.42 H	202	28.3	21.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	120.5 PK			2.58 V	84	78.3	42.2
2	*5580.00	109.6 AV			2.58 V	84	67.4	42.2
3	11160.00	63.1 PK	74.0	-10.9	1.85 V	225	41.6	21.5
4	11160.00	50.1 AV	54.0	-3.9	1.85 V	225	28.6	21.5

Remarks:

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

CHANNEL	TX Channel 140	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5700.00	109.2 PK			2.18 H	125	66.7	42.5
2	*5700.00	98.4 AV			2.18 H	125	55.9	42.5
3	#5725.00	61.8 PK	74.0	-12.2	2.18 H	125	53.1	8.7
4	#5725.00	48.8 AV	54.0	-5.2	2.18 H	125	40.1	8.7
5	11400.00	63.1 PK	74.0	-10.9	1.29 H	200	41.6	21.5
6	11400.00	50.2 AV	54.0	-3.8	1.29 H	200	28.7	21.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	119.8 PK			2.51 V	284	77.3	42.5
2	*5700.00	109.0 AV			2.51 V	284	66.5	42.5
3	#5725.00	68.0 PK	74.0	-6.0	2.51 V	284	59.3	8.7
4	#5725.00	53.9 AV	54.0	-0.1	2.51 V	284	45.2	8.7
5	11400.00	63.4 PK	74.0	-10.6	1.93 V	206	41.9	21.5
6	11400.00	50.4 AV	54.0	-3.6	1.93 V	206	28.9	21.5

Remarks:

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

802.11ac (VHT40)

CHANNEL	TX Channel 54	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5270.00	106.5 PK			3.65 H	313	65.0	41.5
2	*5270.00	96.4 AV			3.65 H	313	54.9	41.5
3	5350.00	60.1 PK	74.0	-13.9	3.65 H	313	52.1	8.0
4	5350.00	47.8 AV	54.0	-6.2	3.65 H	313	39.8	8.0
5	#10540.00	62.5 PK	74.0	-11.5	3.20 H	264	42.0	20.5
6	#10540.00	49.5 AV	54.0	-4.5	3.20 H	264	29.0	20.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5270.00	117.3 PK			2.15 V	201	75.8	41.5
2	*5270.00	106.7 AV			2.15 V	201	65.2	41.5
3	5350.00	62.7 PK	74.0	-11.3	2.15 V	201	54.7	8.0
4	5350.00	49.1 AV	54.0	-4.9	2.15 V	201	41.1	8.0
5	#10540.00	62.8 PK	74.0	-11.2	1.64 V	142	42.3	20.5
6	#10540.00	49.9 AV	54.0	-4.1	1.64 V	142	29.4	20.5

Remarks:

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

CHANNEL	TX Channel 62	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5310.00	102.7 PK			3.69 H	311	61.1	41.6
2	*5310.00	92.4 AV			3.69 H	311	50.8	41.6
3	5356.00	61.5 PK	74.0	-12.5	3.69 H	311	53.5	8.0
4	5356.00	49.8 AV	54.0	-4.2	3.69 H	311	41.8	8.0
5	10620.00	62.4 PK	74.0	-11.6	3.23 H	299	41.6	20.8
6	10620.00	49.3 AV	54.0	-4.7	3.23 H	299	28.5	20.8
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	*5310.00	111.2 PK			2.21 V	199	69.6	41.6
2	*5310.00	100.8 AV			2.21 V	199	59.2	41.6
3	5356.00	67.6 PK	74.0	-6.4	2.21 V	199	59.6	8.0
4	5356.00	53.7 AV	54.0	-0.3	2.21 V	199	45.7	8.0
5	10620.00	62.8 PK	74.0	-11.2	1.59 V	113	42.0	20.8
6	10620.00	49.7 AV	54.0	-4.3	1.59 V	113	28.9	20.8

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 102	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	5460.00	58.0 PK	74.0	-16.0	2.41 H	134	49.8	8.2
2	5460.00	47.4 AV	54.0	-6.6	2.41 H	134	39.2	8.2
3	#5470.00	61.1 PK	74.0	-12.9	2.41 H	134	52.9	8.2
4	#5470.00	48.0 AV	54.0	-6.0	2.41 H	134	39.8	8.2
5	*5510.00	104.8 PK			2.41 H	134	62.8	42.0
6	*5510.00	94.2 AV			2.41 H	134	52.2	42.0
7	11020.00	63.1 PK	74.0	-10.9	1.55 H	213	41.8	21.3
8	11020.00	49.8 AV	54.0	-4.2	1.55 H	213	28.5	21.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	61.8 PK	74.0	-12.2	2.42 V	88	53.6	8.2
2	5460.00	49.8 AV	54.0	-4.2	2.42 V	88	41.6	8.2
3	#5470.00	67.4 PK	74.0	-6.6	2.42 V	88	59.2	8.2
4	#5470.00	53.9 AV	54.0	-0.1	2.42 V	88	45.7	8.2
5	*5510.00	115.9 PK			2.42 V	88	73.9	42.0
6	*5510.00	105.1 AV			2.42 V	88	63.1	42.0
7	11020.00	63.4 PK	74.0	-10.6	2.11 V	169	42.1	21.3
8	11020.00	50.0 AV	54.0	-4.0	2.11 V	169	28.7	21.3

Remarks:

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

CHANNEL	TX Channel 110	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	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	*5550.00	107.1 PK			2.44 H	138	64.9	42.2
2	*5550.00	96.6 AV			2.44 H	138	54.4	42.2
3	11100.00	62.7 PK	74.0	-11.3	1.40 H	224	41.4	21.3
4	11100.00	49.6 AV	54.0	-4.4	1.40 H	224	28.3	21.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5550.00	117.9 PK			2.42 V	92	75.7	42.2
2	*5550.00	107.5 AV			2.42 V	92	65.3	42.2
3	11100.00	63.0 PK	74.0	-11.0	1.95 V	163	41.7	21.3
4	11100.00	49.8 AV	54.0	-4.2	1.95 V	163	28.5	21.3

Remarks:

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

CHANNEL	TX Channel 134	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	*5670.00	105.7 PK			2.33 H	126	63.3	42.4
2	*5670.00	95.2 AV			2.33 H	126	52.8	42.4
3	#5735.00	62.9 PK	74.0	-11.1	2.33 H	126	54.1	8.8
4	#5735.00	47.8 AV	54.0	-6.2	2.33 H	126	39.0	8.8
5	11340.00	63.1 PK	74.0	-10.9	1.66 H	218	41.6	21.5
6	11340.00	50.1 AV	54.0	-3.9	1.66 H	218	28.6	21.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5670.00	116.0 PK			2.34 V	80	73.6	42.4
2	*5670.00	105.7 AV			2.34 V	80	63.3	42.4
3	#5735.00	68.4 PK	74.0	-5.6	2.34 V	80	59.6	8.8
4	#5735.00	53.9 AV	54.0	-0.1	2.34 V	80	45.1	8.8
5	11340.00	63.4 PK	74.0	-10.6	1.91 V	155	41.9	21.5
6	11340.00	50.3 AV	54.0	-3.7	1.91 V	155	28.8	21.5

Remarks:

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

802.11ac (VHT80)

CHANNEL	TX Channel 58	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	58.5 PK	74.0	-15.5	3.46 H	312	51.1	7.4
2	5150.00	45.6 AV	54.0	-8.4	3.46 H	312	38.2	7.4
3	*5290.00	98.1 PK			3.46 H	312	56.6	41.5
4	*5290.00	87.9 AV			3.46 H	312	46.4	41.5
5	5350.00	61.0 PK	74.0	-13.0	3.46 H	312	53.0	8.0
6	5350.00	49.5 AV	54.0	-4.5	3.46 H	312	41.5	8.0
7	#10580.00	62.1 PK	74.0	-11.9	3.33 H	282	41.5	20.6
8	#10580.00	49.1 AV	54.0	-4.9	3.33 H	282	28.5	20.6
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	59.2 PK	74.0	-14.8	2.18 V	200	51.8	7.4
2	5150.00	46.5 AV	54.0	-7.5	2.18 V	200	39.1	7.4
3	*5290.00	108.1 PK			2.18 V	200	66.6	41.5
4	*5290.00	97.7 AV			2.18 V	200	56.2	41.5
5	5350.00	65.9 PK	74.0	-8.1	2.18 V	200	57.9	8.0
6	5350.00	53.8 AV	54.0	-0.2	2.18 V	200	45.8	8.0
7	#10580.00	62.3 PK	74.0	-11.7	1.63 V	100	41.7	20.6
8	#10580.00	49.2 AV	54.0	-4.8	1.63 V	100	28.6	20.6

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 106	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	5460.00	60.4 PK	74.0	-13.6	2.54 H	133	52.2	8.2
2	5460.00	46.7 AV	54.0	-7.3	2.54 H	133	38.5	8.2
3	#5470.00	57.6 PK	74.0	-16.4	2.54 H	133	49.4	8.2
4	#5470.00	47.5 AV	54.0	-6.5	2.54 H	133	39.3	8.2
5	*5530.00	100.3 PK			2.54 H	133	58.2	42.1
6	*5530.00	90.7 AV			2.54 H	133	48.6	42.1
7	#5725.00	60.8 PK	74.0	-13.2	2.54 H	133	52.1	8.7
8	#5725.00	46.7 AV	54.0	-7.3	2.54 H	133	38.0	8.7
9	11060.00	62.8 PK	74.0	-11.2	1.39 H	225	41.5	21.3
10	11060.00	49.7 AV	54.0	-4.3	1.39 H	225	28.4	21.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	61.3 PK	74.0	-12.7	2.41 V	87	53.1	8.2
2	5460.00	50.4 AV	54.0	-3.6	2.41 V	87	42.2	8.2
3	#5470.00	64.8 PK	74.0	-9.2	2.41 V	87	56.6	8.2
4	#5470.00	53.5 AV	54.0	-0.5	2.41 V	87	45.3	8.2
5	*5530.00	111.5 PK			2.41 V	87	69.4	42.1
6	*5530.00	101.6 AV			2.41 V	87	59.5	42.1
7	#5725.00	59.9 PK	74.0	-14.1	2.41 V	87	51.2	8.7
8	#5725.00	47.6 AV	54.0	-6.4	2.41 V	87	38.9	8.7
9	11060.00	63.1 PK	74.0	-10.9	1.81 V	138	41.8	21.3
10	11060.00	49.8 AV	54.0	-4.2	1.81 V	138	28.5	21.3

Remarks:

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

CHANNEL	TX Channel 122	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	5460.00	59.1 PK	74.0	-14.9	2.49 H	135	50.9	8.2
2	5460.00	47.1 AV	54.0	-6.9	2.49 H	135	38.9	8.2
3	#5470.00	60.1 PK	74.0	-13.9	2.49 H	135	51.9	8.2
4	#5470.00	47.4 AV	54.0	-6.6	2.49 H	135	39.2	8.2
5	*5610.00	103.6 PK			2.49 H	135	61.3	42.3
6	*5610.00	92.5 AV			2.49 H	135	50.2	42.3
7	#5725.00	61.0 PK	74.0	-13.0	2.49 H	135	52.3	8.7
8	#5725.00	48.3 AV	54.0	-5.7	2.49 H	135	39.6	8.7
9	11220.00	63.4 PK	74.0	-10.6	1.61 H	209	41.7	21.7
10	11220.00	50.3 AV	54.0	-3.7	1.61 H	209	28.6	21.7
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	5460.00	61.0 PK	74.0	-13.0	2.19 V	93	52.8	8.2
2	5460.00	50.5 AV	54.0	-3.5	2.19 V	93	42.3	8.2
3	#5470.00	61.2 PK	74.0	-12.8	2.19 V	93	53.0	8.2
4	#5470.00	50.8 AV	54.0	-3.2	2.19 V	93	42.6	8.2
5	*5610.00	114.3 PK			2.19 V	93	72.0	42.3
6	*5610.00	104.2 AV			2.19 V	93	61.9	42.3
7	#5725.00	65.5 PK	74.0	-8.5	2.19 V	93	56.8	8.7
8	#5725.00	52.5 AV	54.0	-1.5	2.19 V	93	43.8	8.7
9	11220.00	63.7 PK	74.0	-10.3	1.73 V	133	42.0	21.7
10	11220.00	50.5 AV	54.0	-3.5	1.73 V	133	28.8	21.7

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 52	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

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	74.53	27.1 QP	40.0	-12.9	1.00 H	254	43.7	-16.6
2	212.30	28.5 QP	43.5	-15.0	1.24 H	274	44.6	-16.1
3	551.87	41.2 QP	46.0	-4.8	1.24 H	231	48.7	-7.5
4	633.36	43.0 QP	46.0	-3.0	1.24 H	175	48.2	-5.2
5	800.24	39.3 QP	46.0	-6.7	1.00 H	172	41.1	-1.8
6	945.77	40.4 QP	46.0	-5.6	1.50 H	230	39.8	0.6
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	74.53	34.4 QP	40.0	-5.6	1.00 V	282	51.0	-16.6
2	561.57	39.1 QP	46.0	-6.9	1.50 V	214	46.4	-7.3
3	606.20	39.6 QP	46.0	-6.4	2.58 V	281	45.3	-5.7
4	710.98	41.1 QP	46.0	-4.9	1.26 V	201	45.2	-4.1
5	860.39	43.0 QP	46.0	-3.0	1.50 V	196	44.1	-1.1
6	938.01	41.8 QP	46.0	-4.2	2.58 V	7	41.3	0.5

Remarks:

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

CHANNEL	TX Channel 52	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	126.92	25.2 QP	43.5	-18.3	1.50 H	58	40.7	-15.5
2	249.17	26.1 QP	46.0	-19.9	1.00 H	129	40.2	-14.1
3	637.25	30.7 QP	46.0	-15.3	1.50 H	217	35.8	-5.1
4	703.22	38.3 QP	46.0	-7.7	1.00 H	159	42.5	-4.2
5	815.76	38.4 QP	46.0	-7.6	1.00 H	156	40.1	-1.7
6	885.62	40.3 QP	46.0	-5.7	1.50 H	215	41.3	-1.0
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	57.07	26.9 QP	40.0	-13.1	1.00 V	30	41.5	-14.6
2	128.86	23.2 QP	43.5	-20.3	1.00 V	334	38.6	-15.4
3	495.60	28.0 QP	46.0	-18.0	1.00 V	144	36.4	-8.4
4	707.10	34.4 QP	46.0	-11.6	1.00 V	314	38.5	-4.1
5	839.05	34.7 QP	46.0	-11.3	1.00 V	146	36.1	-1.4
6	901.14	38.2 QP	46.0	-7.8	1.00 V	180	38.7	-0.5

Remarks:

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

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

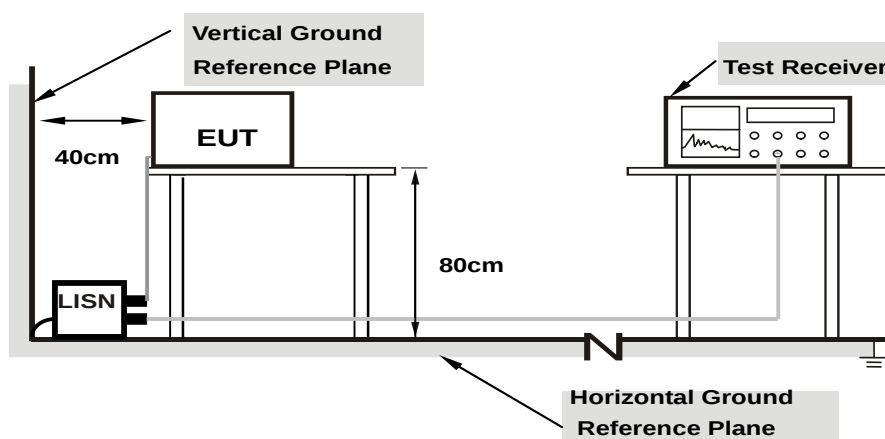
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

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 Conditions

Same as 4.1.6.

4.2.7 Test Results

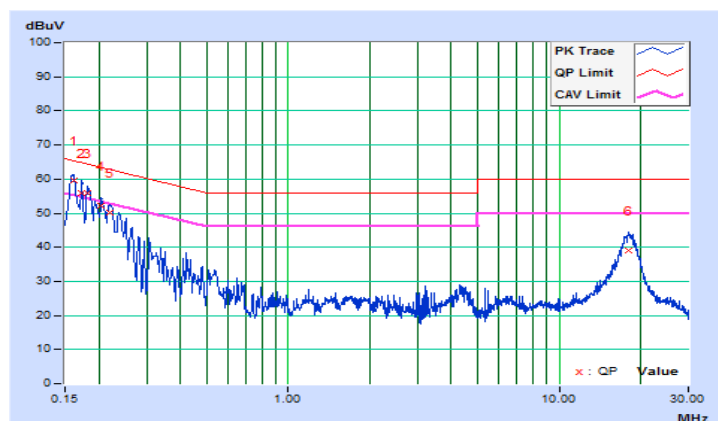
Worst-case data: 802.11a

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16096	10.45	49.13	32.05	59.58	42.50	65.41	55.41	-5.83	-12.91
2	0.17346	10.45	45.54	26.86	55.99	37.31	64.79	54.79	-8.80	-17.48
3	0.18128	10.45	45.48	27.89	55.93	38.34	64.43	54.43	-8.50	-16.09
4	0.20474	10.46	41.87	24.18	52.33	34.64	63.42	53.42	-11.09	-18.78
5	0.22024	10.46	39.62	22.55	50.08	33.01	62.81	52.81	-12.73	-19.80
6	18.01088	11.32	27.70	20.43	39.02	31.75	60.00	50.00	-20.98	-18.25

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.

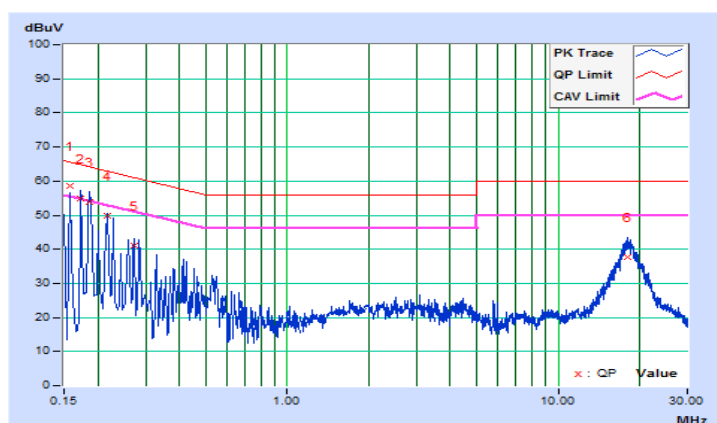


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	10.21	48.31	31.24	58.52	41.45	65.58	55.58	-7.06	-14.13
2	0.17346	10.21	44.53	25.68	54.74	35.89	64.79	54.79	-10.05	-18.90
3	0.18519	10.22	43.68	26.67	53.90	36.89	64.25	54.25	-10.35	-17.36
4	0.21647	10.22	39.51	22.20	49.73	32.42	62.95	52.95	-13.22	-20.53
5	0.27120	10.23	30.70	14.70	40.93	24.93	61.08	51.08	-20.15	-26.15
6	18.04607	10.98	26.63	18.17	37.61	29.15	60.00	50.00	-22.39	-20.85

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.

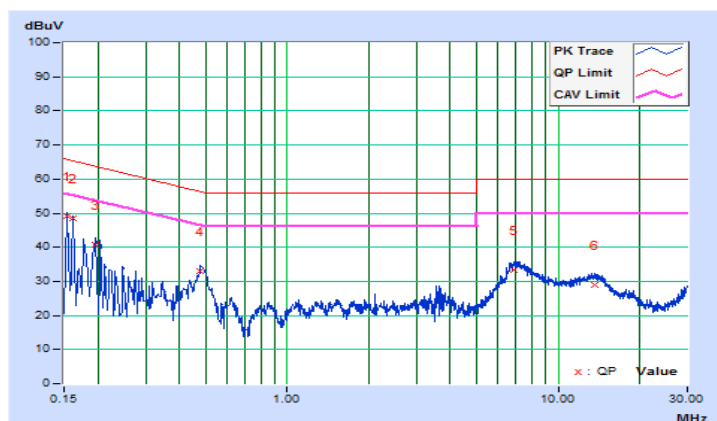


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.45	38.67	20.65	49.12	31.10	65.79	55.79	-16.67	-24.69
2	0.16173	10.45	37.91	22.74	48.36	33.19	65.37	55.37	-17.01	-22.18
3	0.19692	10.45	30.34	12.16	40.79	22.61	63.74	53.74	-22.95	-31.13
4	0.47915	10.51	22.61	17.82	33.12	28.33	56.35	46.35	-23.23	-18.02
5	6.84783	10.78	22.51	17.96	33.29	28.74	60.00	50.00	-26.71	-21.26
6	13.67078	11.11	17.93	11.50	29.04	22.61	60.00	50.00	-30.96	-27.39

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.

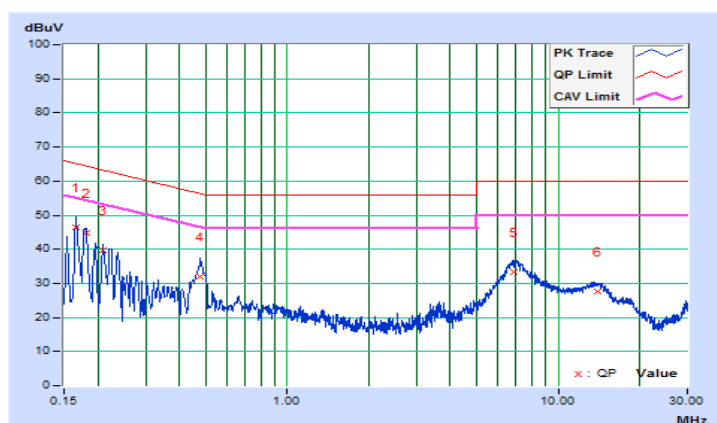


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16569	10.21	36.41	19.43	46.62	29.64	65.17	55.17	-18.55	-25.53
2	0.18075	10.22	34.55	20.68	44.77	30.90	64.45	54.45	-19.68	-23.55
3	0.20865	10.22	29.39	14.34	39.61	24.56	63.26	53.26	-23.65	-28.70
4	0.47844	10.24	21.70	16.60	31.94	26.84	56.37	46.37	-24.43	-19.53
5	6.85956	10.53	22.76	17.28	33.29	27.81	60.00	50.00	-26.71	-22.19
6	14.06960	10.83	16.82	10.42	27.65	21.25	60.00	50.00	-32.35	-28.75

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	$\sqrt{\quad}$		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	$\sqrt{\quad}$		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} ;

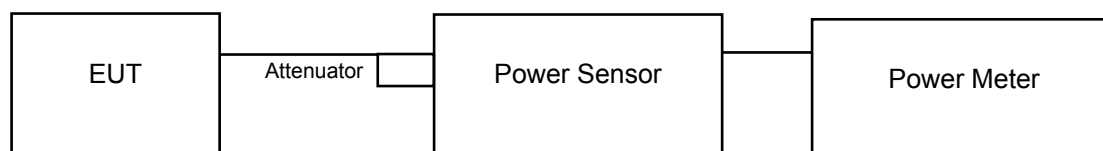
Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

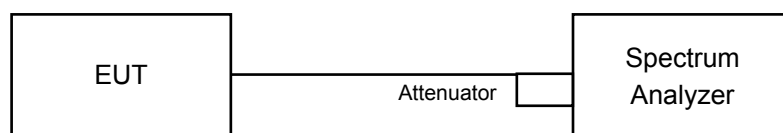
4.3.2 Test Setup

For Power Output

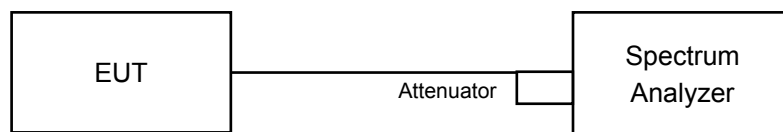
802.11a, 802.11ac (VHT20), 802.11ac (VHT40)



802.11ac (VHT80)



For 26dB Bandwidth



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

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

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.

For 802.11ac (VHT80)

- a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- b. Set sweep trigger to “free run”.
- c. Set RBW = 1 MHz.
- d. Set VBW $\geq$ 3 MHz.
- e. Number of points in sweep $\geq$ 2 Span / RBW.
- f. Sweep time $\leq$ (number of points in sweep) * T
- g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
- h. Detector = RMS.
- i. Trace mode = max hold.
- j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
- k. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

For 26dB Bandwidth

- a. Set RBW = approximately 1% of the emission bandwidth.
- b. Set the VBW > RBW.
- c. Detector = Peak.
- d. Trace mode = max hold.
- e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.18	20.22	209.428	23.21	24.00	Pass
60	5300	20.20	20.16	208.466	23.19	24.00	Pass
64	5320	19.65	19.88	189.532	22.78	24.00	Pass
100	5500	19.66	20.60	207.285	23.17	23.94	Pass
116	5580	19.95	20.22	204.051	23.10	24.00	Pass
140	5700	19.88	20.37	206.168	23.14	24.00	Pass

Note:

Chain 0

1. $11\text{dBm} + 10\log (42.26) = 27.26 > 24\text{dBm}$
2. $11\text{dBm} + 10\log (42.75) = 27.31 > 24\text{dBm}$
3. $11\text{dBm} + 10\log (40.60) = 27.09 > 24\text{dBm}$
4. $11\text{dBm} + 10\log (20.91) = 24.20 > 24\text{dBm}$
5. $11\text{dBm} + 10\log (21.05) = 24.23 > 24\text{dBm}$
6. $11\text{dBm} + 10\log (27.61) = 25.41 > 24\text{dBm}$

Chain 1

1. $11\text{dBm} + 10\log (37.88) = 26.78 > 24\text{dBm}$
2. $11\text{dBm} + 10\log (39.03) = 26.91 > 24\text{dBm}$
3. $11\text{dBm} + 10\log (37.14) = 26.70 > 24\text{dBm}$
4. $11\text{dBm} + 10\log (19.68) = 23.94 < 24\text{dBm}$
5. $11\text{dBm} + 10\log (20.98) = 24.22 > 24\text{dBm}$
6. $11\text{dBm} + 10\log (20.78) = 24.18 > 24\text{dBm}$

802.11ac (VHT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.12	20.60	217.617	23.38	24.00	Pass
60	5300	20.07	20.16	205.378	23.13	24.00	Pass
64	5320	19.23	19.42	171.251	22.34	24.00	Pass
100	5500	19.95	20.43	209.263	23.21	24.00	Pass
116	5580	19.92	20.41	208.076	23.18	24.00	Pass
140	5700	20.04	20.26	207.095	23.16	24.00	Pass

Note:

Chain 0

1. 11dBm + 10log (45.38) = 27.57 > 24dBm
2. 11dBm + 10log (45.97) = 27.62 > 24dBm
3. 11dBm + 10log (42.10) = 27.24 > 24dBm
4. 11dBm + 10log (21.06) = 24.23 > 24dBm
5. 11dBm + 10log (22.32) = 24.49 > 24dBm
6. 11dBm + 10log (30.17) = 25.80 > 24dBm

Chain 1

1. 11dBm + 10log (39.44) = 26.96 > 24dBm
2. 11dBm + 10log (44.04) = 27.44 > 24dBm
3. 11dBm + 10log (36.93) = 26.67 > 24dBm
4. 11dBm + 10log (20.91) = 24.20 > 24dBm
5. 11dBm + 10log (22.46) = 24.51 > 24dBm
6. 11dBm + 10log (22.44) = 24.51 > 24dBm

802.11ac (VHT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
54	5270	19.99	20.13	202.809	23.07	24.00	Pass
62	5310	18.36	18.65	141.831	21.52	24.00	Pass
102	5510	20.13	21.56	246.258	23.91	24.00	Pass
110	5550	20.19	20.67	221.153	23.45	24.00	Pass
134	5670	20.13	20.34	211.182	23.25	24.00	Pass

Note:

Chain 0

1. 11dBm + 10log (86.68) = 30.38 > 24dBm
2. 11dBm + 10log (74.66) = 29.73 > 24dBm
3. 11dBm + 10log (41.14) = 27.14 > 24dBm
4. 11dBm + 10log (44.95) = 27.53 > 24dBm
5. 11dBm + 10log (55.83) = 28.47 > 24dBm

Chain 1

1. 11dBm + 10log (80.60) = 30.06 > 24dBm
2. 11dBm + 10log (49.03) = 27.90 > 24dBm
3. 11dBm + 10log (41.00) = 27.13 > 24dBm
4. 11dBm + 10log (41.50) = 27.18 > 24dBm
5. 11dBm + 10log (41.46) = 27.18 > 24dBm

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
58	5290	15.77	15.59	73.981	18.69	24.00	Pass
106	5530	19.02	20.48	191.485	22.82	24.00	Pass
122	5610	20.47	20.79	231.379	23.64	24.00	Pass

Note:

Chain 0

1. $11\text{dBm} + 10\log (139.70) = 32.45 > 24\text{dBm}$
2. $11\text{dBm} + 10\log (83.99) = 30.24 > 24\text{dBm}$
3. $11\text{dBm} + 10\log (88.85) = 30.49 > 24\text{dBm}$

Chain 1

1. $11\text{dBm} + 10\log (84.05) = 30.25 > 24\text{dBm}$
2. $11\text{dBm} + 10\log (83.51) = 30.22 > 24\text{dBm}$
3. $11\text{dBm} + 10\log (84.13) = 30.25 > 24\text{dBm}$

Beamforming Mode

802.11ac (VHT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.12	20.60	217.617	23.38	24.00	Pass
60	5300	20.07	20.16	205.378	23.13	24.00	Pass
64	5320	19.23	19.42	171.251	22.34	24.00	Pass
100	5500	19.95	20.43	209.263	23.21	24.00	Pass
116	5580	19.92	20.41	208.076	23.18	24.00	Pass
140	5700	20.04	20.26	207.095	23.16	24.00	Pass

Note:

1. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
2. U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.

Chain 0

1. 11dBm + 10log (45.38) = 27.57 > 24dBm
2. 11dBm + 10log (45.97) = 27.62 > 24dBm
3. 11dBm + 10log (42.10) = 27.24 > 24dBm
4. 11dBm + 10log (21.06) = 24.23 > 24dBm
5. 11dBm + 10log (22.32) = 24.49 > 24dBm
6. 11dBm + 10log (30.17) = 25.80 > 24dBm

Chain 1

1. 11dBm + 10log (39.44) = 26.96 > 24dBm
2. 11dBm + 10log (44.04) = 27.44 > 24dBm
3. 11dBm + 10log (36.93) = 26.67 > 24dBm
4. 11dBm + 10log (20.91) = 24.20 > 24dBm
5. 11dBm + 10log (22.46) = 24.51 > 24dBm
6. 11dBm + 10log (22.44) = 24.51 > 24dBm

802.11ac (VHT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
54	5270	19.99	20.13	202.809	23.07	24.00	Pass
62	5310	18.36	18.65	141.831	21.52	24.00	Pass
102	5510	20.13	21.56	246.258	23.91	24.00	Pass
110	5550	20.19	20.67	221.153	23.45	24.00	Pass
134	5670	20.13	20.34	211.182	23.25	24.00	Pass

Note:

1. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
2. U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.

Chain 0

1. 11dBm + 10log (86.68) = 30.38 > 24dBm
2. 11dBm + 10log (74.66) = 29.73 > 24dBm
3. 11dBm + 10log (41.14) = 27.14 > 24dBm
4. 11dBm + 10log (44.95) = 27.53 > 24dBm
5. 11dBm + 10log (55.83) = 28.47 > 24dBm

Chain 1

1. 11dBm + 10log (80.60) = 30.06 > 24dBm
2. 11dBm + 10log (49.03) = 27.90 > 24dBm
3. 11dBm + 10log (41.00) = 27.13 > 24dBm
4. 11dBm + 10log (41.50) = 27.18 > 24dBm
5. 11dBm + 10log (41.46) = 27.18 > 24dBm

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
58	5290	15.77	15.59	73.981	18.69	24.00	Pass
106	5530	19.02	20.48	191.485	22.82	24.00	Pass
122	5610	20.47	20.79	231.379	23.64	24.00	Pass

Note:

1. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
2. U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.

Chain 0

1. 11dBm + 10log (139.70) = 32.45 > 24dBm
2. 11dBm + 10log (83.99) = 30.24 > 24dBm
3. 11dBm + 10log (88.85) = 30.49 > 24dBm

Chain 1

1. 11dBm + 10log (84.05) = 30.25 > 24dBm
2. 11dBm + 10log (83.51) = 30.22 > 24dBm
3. 11dBm + 10log (84.13) = 30.25 > 24dBm

26dB Bandwidth:

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	42.26	37.88
60	5300	42.75	39.03
64	5320	40.60	37.14
100	5500	20.91	19.68
116	5580	21.05	20.98
140	5700	27.61	20.78

802.11n (HT20)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	45.38	39.44
60	5300	45.97	44.04
64	5320	42.10	36.93
100	5500	21.06	20.91
116	5580	22.32	22.46
140	5700	30.17	22.44

802.11n (HT40)

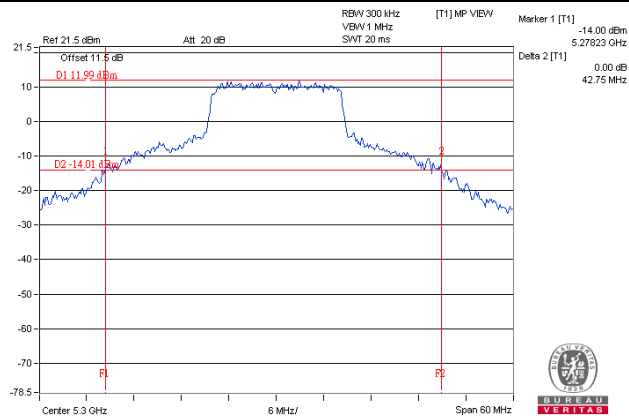
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	86.68	80.60
62	5310	74.66	49.03
102	5510	41.14	41.00
110	5550	44.95	41.50
134	5670	55.83	41.46

802.11ac (VHT80)

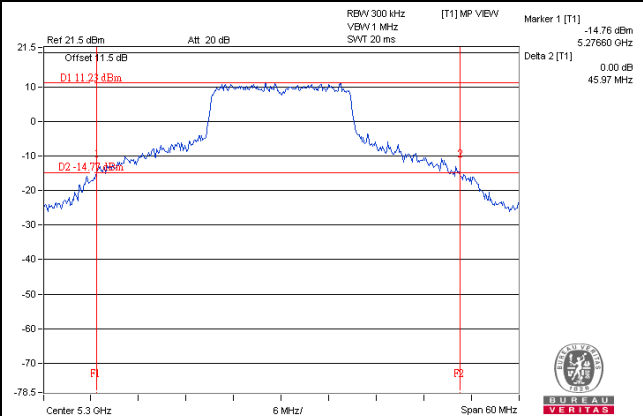
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
58	5290	139.70	84.05
106	5530	83.99	83.51
122	5610	88.85	84.13

Spectrum Plot of Worst Value

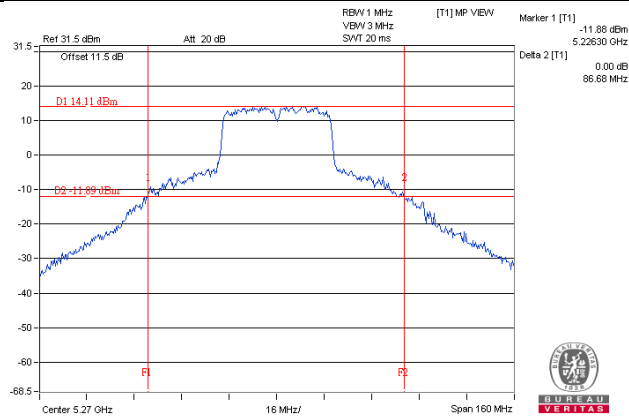
802.11a



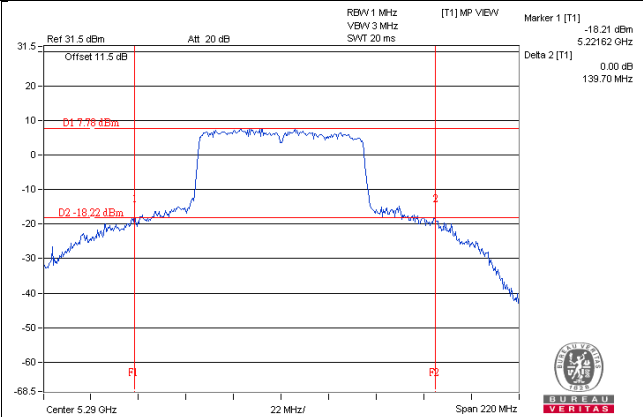
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



EUT Maximum Conducted Power

CDD Mode

802.11a

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	209.428	23.21
5470~5725	207.285	23.17

802.11ac (VHT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	217.617	23.38
5470~5725	209.263	23.21

802.11ac (VHT40)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	202.809	23.07
5470~5725	246.258	23.91

802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	73.981	18.69
5470~5725	231.379	23.64

Beamforming Mode

802.11ac (VHT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	217.617	23.38
5470~5725	209.263	23.21

802.11ac (VHT40)

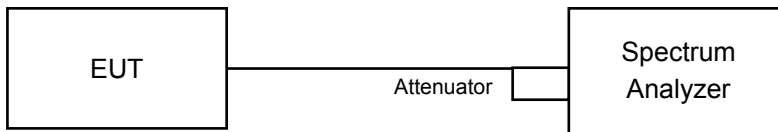
Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	202.809	23.07
5470~5725	246.258	23.91

802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	73.981	18.69
5470~5725	231.379	23.64

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Result

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	24.60	19.80
60	5300	26.16	22.56
64	5320	23.04	19.56
100	5500	16.56	16.56
116	5580	16.44	16.56
140	5700	16.68	16.56

802.11ac (VHT20)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	23.88	19.56
60	5300	25.80	22.08
64	5320	21.60	18.48
100	5500	17.76	17.76
116	5580	17.76	17.76
140	5700	17.88	17.76

802.11ac (VHT40)

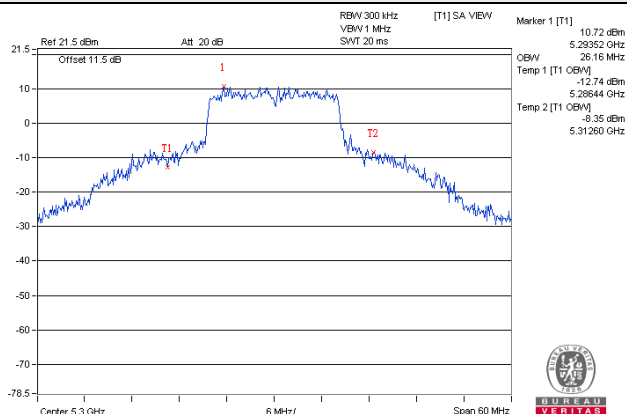
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	38.04	37.20
62	5310	36.84	36.48
102	5510	36.36	36.24
110	5550	36.48	36.36
134	5670	36.48	36.24

802.11ac (VHT80)

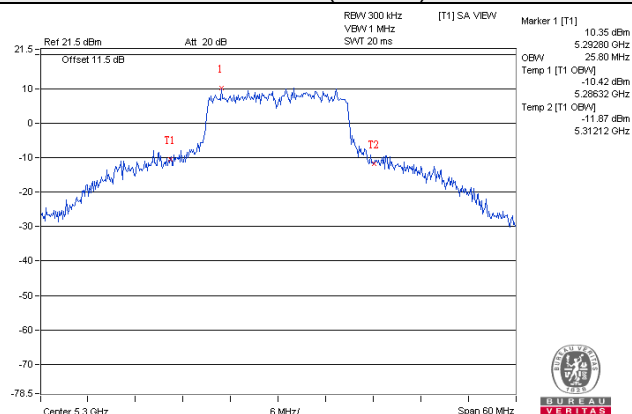
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
58	5290	76.32	75.84
106	5530	75.84	75.84
122	5610	76.08	76.08

Spectrum Plot of Worst Value

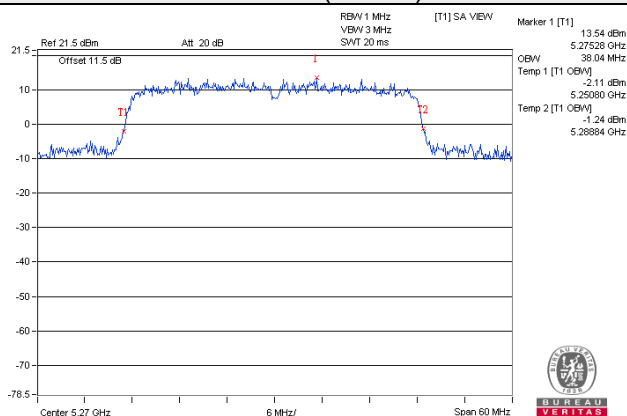
802.11a



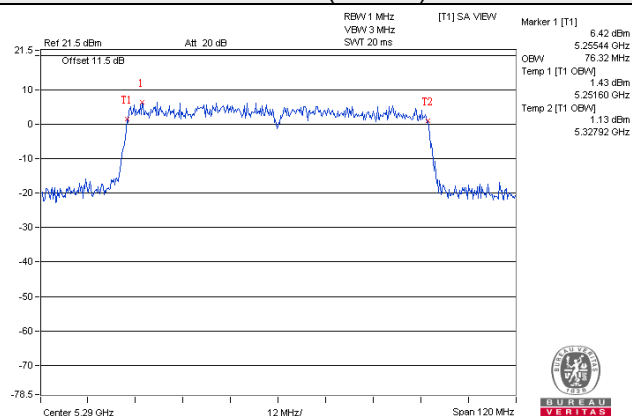
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)

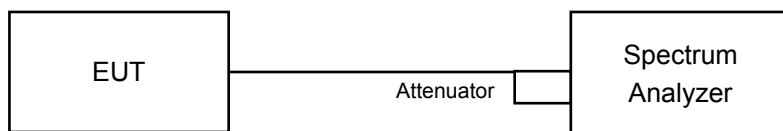


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

Using method SA-2

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

802.11a

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
52	5260	6.34	5.87	0.18	9.30	11.00	Pass
60	5300	5.95	5.79	0.18	9.06	11.00	Pass
64	5320	5.93	5.35	0.18	8.84	11.00	Pass
100	5500	7.31	8.18	0.18	10.96	11.00	Pass
116	5580	7.31	8.21	0.18	10.98	11.00	Pass
140	5700	6.48	7.29	0.18	10.10	11.00	Pass

Note:

1. Method 1 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. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
52	5260	5.65	5.44	0.09	8.65	11.00	Pass
60	5300	5.08	5.44	0.09	8.37	11.00	Pass
64	5320	5.21	4.82	0.09	8.12	11.00	Pass
100	5500	6.89	7.78	0.09	10.46	11.00	Pass
116	5580	7.66	7.96	0.09	10.92	11.00	Pass
140	5700	6.82	7.45	0.09	10.25	11.00	Pass

Note:

1. Method 1 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. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT40)

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
54	5270	2.97	3.04	0.15	6.17	11.00	Pass
62	5310	3.60	3.75	0.15	6.84	11.00	Pass
102	5510	4.94	6.36	0.15	8.87	11.00	Pass
110	5550	5.15	5.06	0.15	8.27	11.00	Pass
134	5670	3.43	3.82	0.15	6.79	11.00	Pass

Note:

1. Method 1 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. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

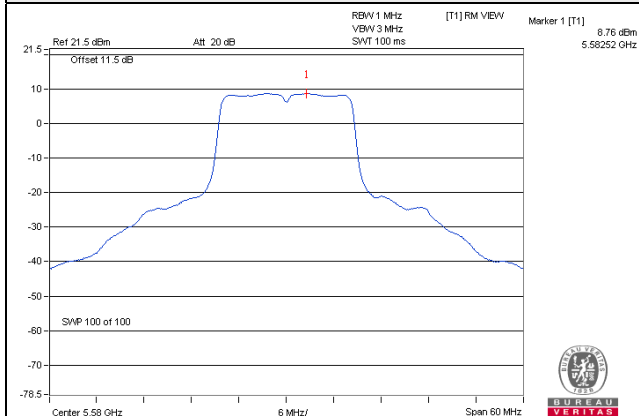
Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
58	5290	-1.24	-2.19	0.31	1.63	11.00	Pass
106	5530	0.85	1.47	0.31	4.49	11.00	Pass
122	5610	1.10	1.53	0.31	4.64	11.00	Pass

Note:

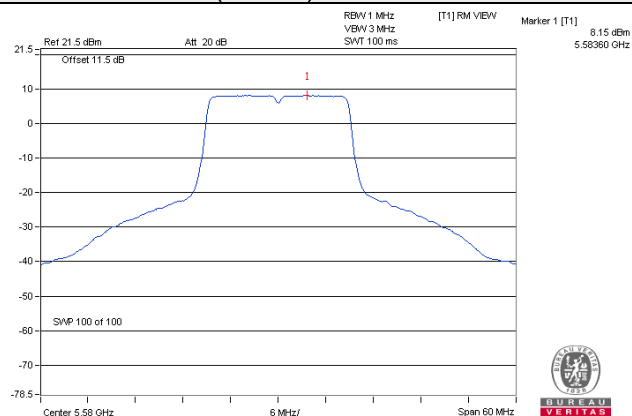
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. U-NII-2A Directional gain = 5.63dBi < 6dBi, so the limit no need to be reduced.
U-NII-2C Directional gain = 5.71dBi < 6dBi, so the limit no need to be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

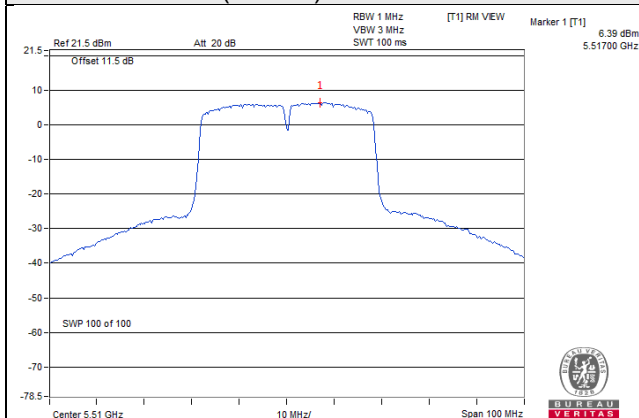
802.11a / Chain 1 / CH 116



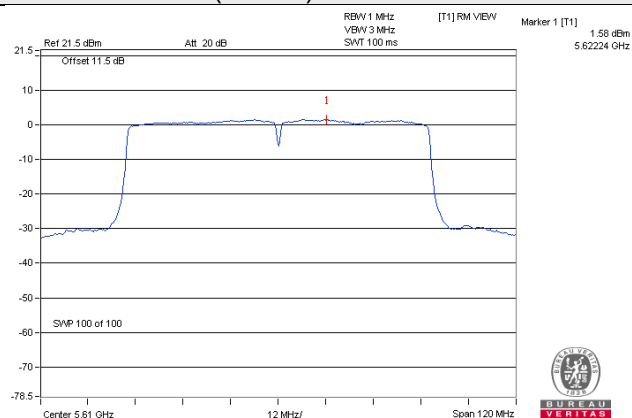
802.11ac (VHT20) / Chain 1 / CH 116



802.11ac (VHT40) / Chain 1 / CH 102



802.11ac (VHT80) / Chain 1 / CH 122

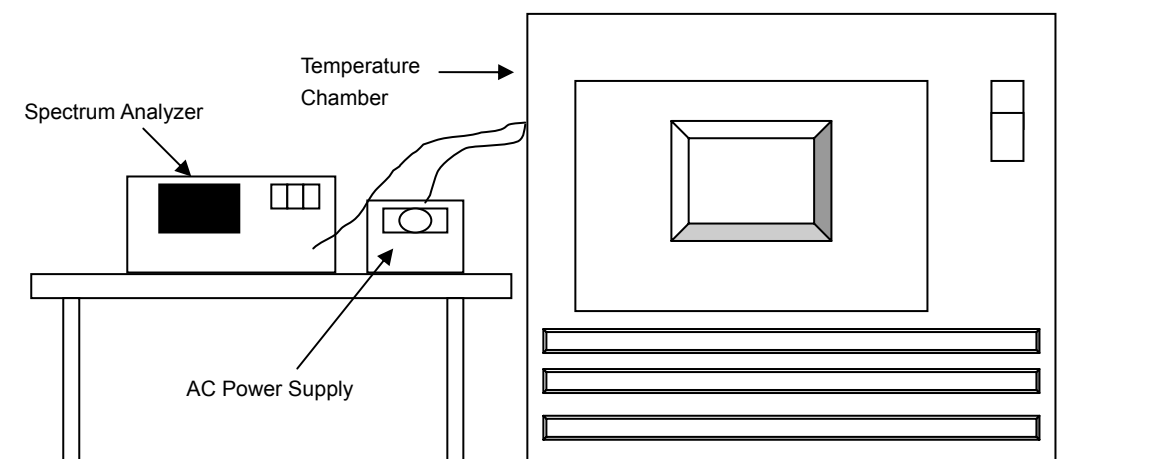


4.6 Frequency Stability

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 08, 2017	Jun. 07, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 30, 2017	Jun. 29, 2018
AC Power Supply Extech	CFW-105	E000603	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.4 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.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5260MHz									
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	5259.9761	-0.00045	5259.9744	-0.00049	5259.9749	-0.00048	5259.9754	-0.00047
40	120	5260.0123	0.00023	5260.0136	0.00026	5260.0125	0.00024	5260.0121	0.00023
30	120	5260.0139	0.00026	5260.0121	0.00023	5260.0149	0.00028	5260.0098	0.00019
20	120	5260.0026	0.00005	5260.0022	0.00004	5260.0017	0.00003	5259.9998	0.00000
10	120	5259.9832	-0.00032	5259.9789	-0.00040	5259.9795	-0.00039	5259.9815	-0.00035
0	120	5259.9775	-0.00043	5259.9777	-0.00042	5259.9769	-0.00044	5259.9799	-0.00038
-10	120	5259.9774	-0.00043	5259.9749	-0.00048	5259.9767	-0.00044	5259.9785	-0.00041
-20	120	5259.9811	-0.00036	5259.9821	-0.00034	5259.981	-0.00036	5259.9807	-0.00037
-30	120	5260.0008	0.00002	5259.9989	-0.00002	5259.9972	-0.00005	5260.0015	0.00003

Frequency Stability Versus Voltage									
Operating Frequency: 5260MHz									
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	5260.0036	0.00007	5260.0021	0.00004	5260.0025	0.00005	5260.0006	0.00001
	120	5260.0026	0.00005	5260.0022	0.00004	5260.0017	0.00003	5259.9998	0.00000
	102	5260.003	0.00006	5260.0032	0.00006	5260.0026	0.00005	5259.9997	-0.00001

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 FCC recognized accredited test firms and 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

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 ---