Partial FCC Test Report
(Spot Check)

Report No.:	RF200513C33-1
FCC ID:	2ARXKVHH10-L
Test Model:	VHH10-L
Series Model:	VHH10XXXXX (X=A-Z, 0-9, blank or "-")
Received Date:	May 13, 2020
Test Date:	Jun. 04 ~ Jul. 01, 2020
Issued Date:	Jul. 07, 2020
Applicant:	Veea Inc
Address:	164 E 83rd Street, New York NY, 10028, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF200513C33-1	Original release.	Jul. 07, 2020

1 Certificate of Conformity

Product:	veeaHub
Brand:	veeaHub
Test Model:	VHH10-L
Series Model:	VHH10XXXXX (X=A-Z, 0-9, blank or "-")
Sample Status:	Engineering sample
Applicant:	Veea Inc
Test Date:	Jun. 04 ~ Jul. 01, 2020
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 RF characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Jul. 07, 2020
Polly Chien / Specialist

Approved by : _____ , **Date:** Jul. 07, 2020
Bruce Chen / Senior Project Engineer

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 -1.46dB at 0.52109MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.4dB at 17355.00MHz.
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	N/A	Refer to note 1
15.407(g)	Frequency Stability	N/A	Refer to note 1
15.203	Antenna Requirement	Pass	No antenna connector is used.

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

Note:

1. This report is a partial report. Therefore, only Output Power, AC Power Conducted Emission and Radiated Emissions were verified and recorded in this report. Other testing data please refer to the original BV CPS report no.: RF190918C14-4 & RF190918C14A.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 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	veeaHub
Brand	veeaHub
Test Model	VHH10-L
Series Model	VHH10XXXXX (X=A-Z, 0-9, blank or “-”)
Model Difference	Marketing purposes
Sample Status	Engineering sample
Power Supply Rating	48Vdc (Adapter and PoE)
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 600Mbps 802.11ac: up to 3466.7Mbps
Operating Frequency	5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz
Number of Channel	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5260~5320MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5500~5720MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 12 802.11n (HT40), 802.11ac (VHT40): 6 802.11ac (VHT80): 3 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Output Power	CDD Mode: 5180~5240MHz: 74.943mW 5260~5320MHz: 230.018mW 5500~5720MHz: 228.726mW 5745~5825MHz: 401.129mW Beamforming Mode: 5180~5240MHz: 18.738mW 5260~5320MHz: 57.513mW 5500~5720MHz: 57.190mW 5745~5825MHz: 90.196mW
Antenna Type	Chip antenna with 2.1dBi gain
Antenna Connector	NA
Accessory Device	NA
Cable Supplied	NA

Note:

1. This report is a supplementary report to the original BV CPS report no.: RF190918C14-4 & RF190918C14A. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot-check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit. Therefore, only Output Power, AC Power Conducted Emission and Radiated Emissions were verified and recorded in this report. AC Power Conducted Emission and Radiated Emission tests according to original report radiated emission worst channel.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitter and 4 receivers.

Band	Modulation Mode	CDD Mode	Beamforming Mode	TX Function
5GHz	802.11a	Support	Not Support	4TX
	802.11n (HT20)	Support	Support	4TX
	802.11n (HT40)	Support	Support	4TX
	802.11ac (VHT20)	Support	Support	4TX
	802.11ac (VHT40)	Support	Support	4TX
	802.11ac (VHT80)	Support	Support	4TX

* The modulation and bandwidth are similar for 802.11n mode for HT20/HT40 and 802.11ac mode for VHT20/VHT40. After pre-testing, 802.11ac (VHT20/VHT40) power is lower than 802.11n (HT20/HT40), therefore 802.11n (HT20/HT40) is the worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* For 802.11n, 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. The following RF Modules are for the EUT.

RF Module	Band
Module 1	5180 ~ 5320MHz
Module 2	5500 ~ 5825MHz
Module 3	2412 ~ 2462MHz

4. The EUT uses following adapter and PoE.

Adapter (Support unit)	
Brand	EDACPOWER ELEC.
Model	EA1062SGR-480
Input Power	100-240Vac, 50-60Hz, 2.5A
Output Power	48Vdc, 1.35A
Power Line	1.2m DC cable with one core

POE (Support unit)	
Model	APOE02-WM
Output Power	48Vdc

5. WLAN, zigbee, Bluetooth and LoRa technology can transmit at same time.
6. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Description of Test Modes

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

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

5500~5720MHz:

12 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	144	5720 MHz

6 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	142	5710 MHz

3 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	138	5690 MHz
122	5610 MHz		

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	P	
A	√	√	√	√	Power from adapter
B	-	√	√	-	Power from PoE

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

P: Conducted Output Power Measurement PLC: Power Line Conducted Emission

Note:

1. The antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-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	802.11n (HT40)	5180-5240	38 to 46	54	OFDM	6.0
		5260-5320	54 to 62			
A	802.11a	5500-5720	100 to 144	157	OFDM	13.5
		5745-5825	149 to 165			

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	802.11n (HT40)	5180-5240	38 to 46	54	OFDM	6.0
		5260-5320	54 to 62			
A, B	802.11a	5500-5720	100 to 144	157	OFDM	13.5
		5745-5825	149 to 165			

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	802.11n (HT40)	5180-5240	38 to 46	54	OFDM	6.0
		5260-5320	54 to 62			
A, B	802.11a	5500-5720	100 to 144	157	OFDM	13.5
		5745-5825	149 to 165			

Conducted Output 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	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5
	802.11ac (VHT80)		42	42	OFDM	29.3
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
A	802.11a	5500-5720	100 to 144	100, 116, 140, 144	OFDM	6.0
	802.11n (HT20)		100 to 144	100, 116, 140, 144	OFDM	6.5
	802.11n (HT40)		102 to 142	102, 110, 134, 142	OFDM	13.5
	802.11ac (VHT80)		106 to 138	106, 122, 138	OFDM	29.3
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	6.5
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5
	802.11ac (VHT80)		155	155	OFDM	29.3
Beamforming Mode						
A	802.11n (HT20)	5180-5240	36 to 48	36, 40, 48	OFDM	6.5
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5
	802.11ac (VHT80)		42	42	OFDM	29.3
A	802.11n (HT20)	5260-5320	52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
A	802.11n (HT20)	5500-5720	100 to 144	100, 116, 140, 144	OFDM	6.5
	802.11n (HT40)		102 to 142	102, 110, 134, 142	OFDM	13.5
	802.11ac (VHT80)		106 to 138	106, 122, 138	OFDM	29.3
A	802.11n (HT20)	5745-5825	149 to 165	149, 157, 165	OFDM	6.5
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5
	802.11ac (VHT80)		155	155	OFDM	29.3

Test Condition:

Applicable to	Environmental Conditions	Input Power (system)	Tested by
RE≥1G	23 deg. C, 67% RH	120Vac, 60Hz	Adair Peng
RE<1G	23 deg. C, 66% RH	120Vac, 60Hz 48Vdc	Titan Hsu
PLC	25 deg. C, 70% RH	120Vac, 60Hz 48Vdc	Jones Chang
P	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang

3.3 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	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	PoE	NA	APOE02-WM	NA	NA	Provided by manufacturer
D.	Adapter	EDACPOWER ELEC.	EA1062SGR-480	NA	NA	Provided by manufacturer

Note:

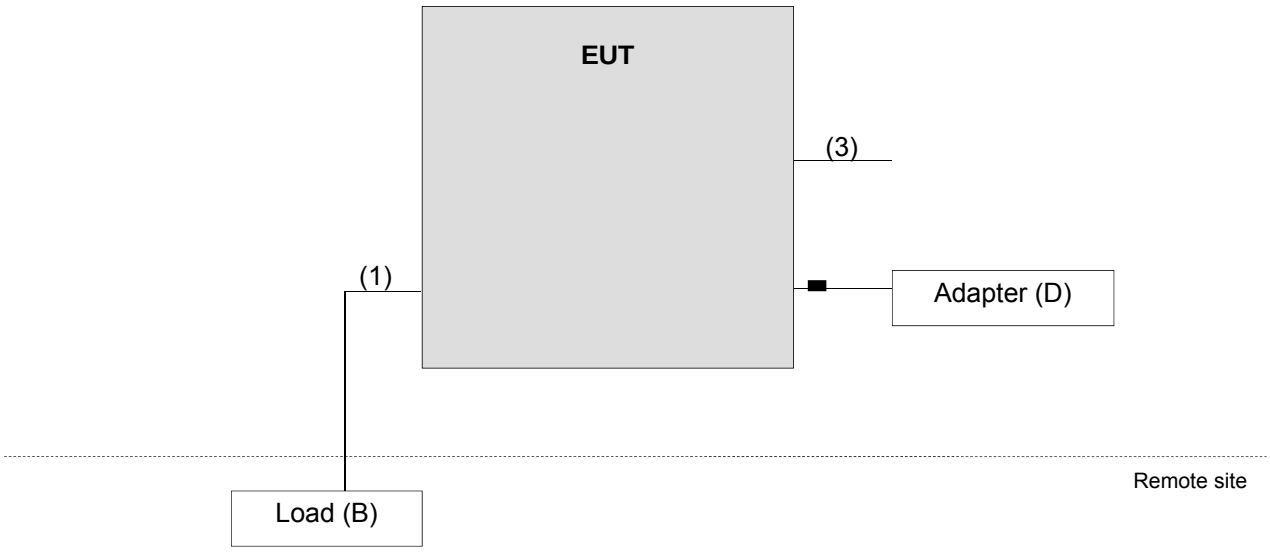
1. All power cords of the above support units are non shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable	2	1.5	N	0	RJ45, Cat5e
2.	LAN cable	1	1.5	N	0	RJ45, Cat5e
3.	Console cable	1	2	N	0	-
4.	LAN cable	1	1.5	N	0	RJ45, Cat5e
5.	LAN cable	1	5	N	0	RJ45, Cat5e
6.	Power cable	1	1.2	N	1	Provided by manufacturer

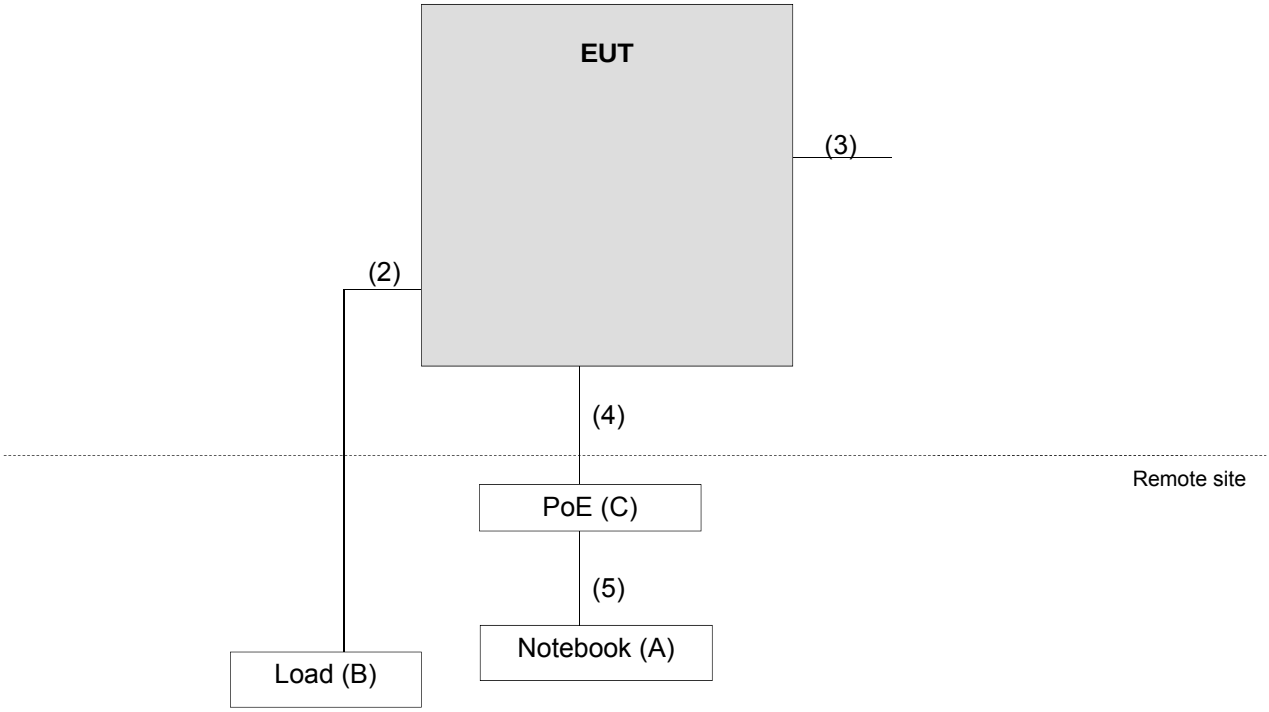
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

Test Mode A



Test Mode B



3.4 General Description of Applied Standards and References

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

Test standard:

FCC Part 15, Subpart E (15.407)

ANSI C63.10:2013

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

References Test Guidance:

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits of unwanted emission out of the restricted bands

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

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

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

4.1.2 Test Instruments

Tested date: Jun. 04 ~ Jun. 24, 2020

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 31, 2019	Dec. 30, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
			Jun. 12, 2020	Jun. 11, 2021
HORN Antenna SCHWARZBECK	9120D	209	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
Preamplifier KEYSIGHT (Above 1GHz)	8449B	3008A01976	Aug. 20, 2019	Aug. 19, 2020
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 15, 2019	Jul. 14, 2020
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Sep. 05, 2019	Sep. 04, 2020

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 3.

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:

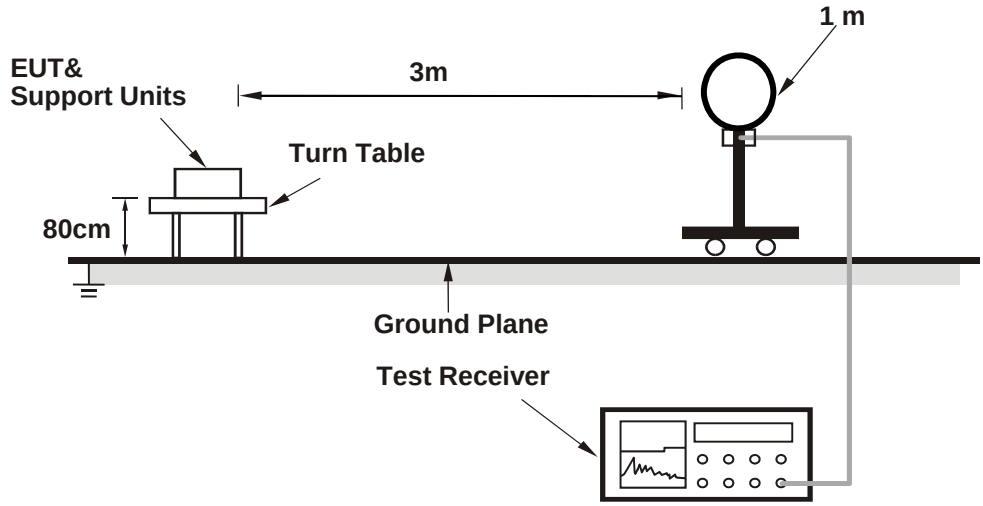
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

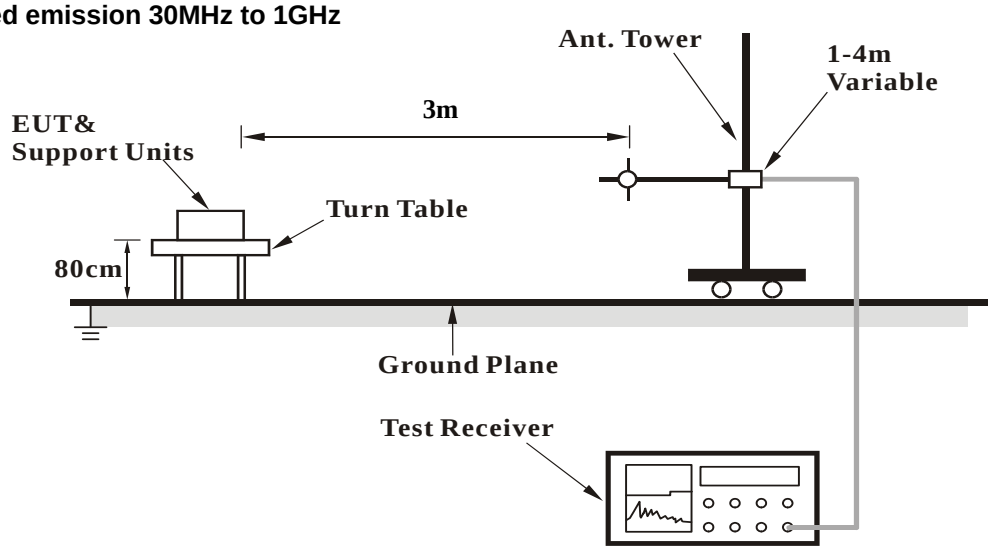
No deviation.

4.1.5 Test Set Up

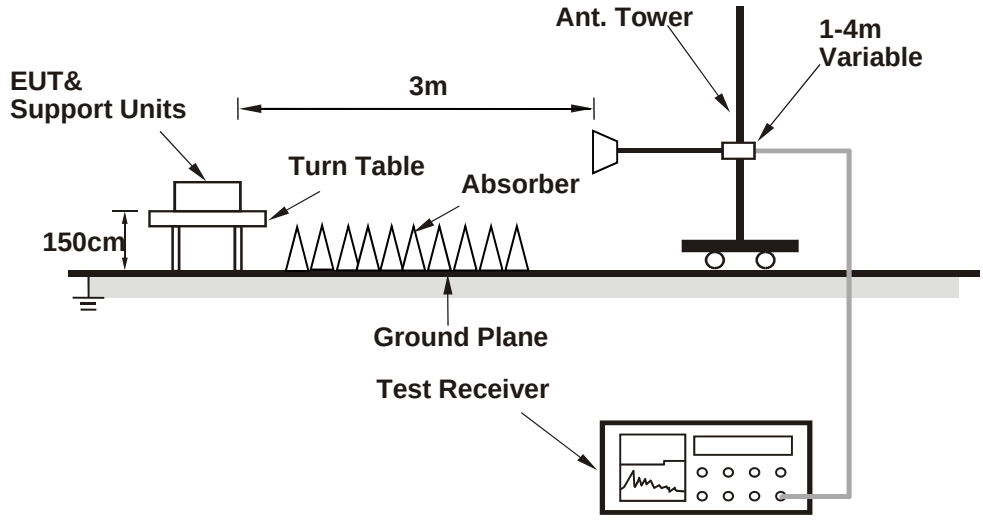
For Radiated emission below 30MHz



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

Adapter mode:

a. Set the EUT under transmission condition continuously at specific channel frequency.

PoE mode:

a. Prepared a notebook to act as a communication partner and placed it outside of testing area.
b. The communication partner connected with EUT via a RJ45 cable and ran a test program (QRCT V3.0.303.0) to enable EUT under transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz data:

For U-NII-1 & U-NII-2A

802.11n (HT40)

CHANNEL	TX Channel 54	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	57.4 PK	74.0	-16.6	1.40 H	359	53.3	4.1
2	5150.00	43.1 AV	54.0	-10.9	1.40 H	359	39.0	4.1
3	*5270.00	112.8 PK			1.40 H	359	73.7	39.1
4	*5270.00	102.5 AV			1.40 H	359	63.4	39.1
5	#10540.00	61.5 PK	68.2	-6.7	1.95 H	189	43.0	18.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.5 PK	74.0	-18.5	3.73 V	310	51.4	4.1
2	5150.00	42.6 AV	54.0	-11.4	3.73 V	310	38.5	4.1
3	*5270.00	110.0 PK			3.73 V	310	70.9	39.1
4	*5270.00	100.1 AV			3.73 V	310	61.0	39.1
5	#10540.00	61.7 PK	68.2	-6.5	1.75 V	303	43.2	18.5

Remarks:

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

For U-NII-2C & U-NII-3

802.11a

802.11n (HT40)

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	#5608.97	58.6 PK	68.2	-9.6	1.45 H	168	54.1	4.5
2	*5785.00	118.2 PK			1.45 H	168	78.0	40.2
3	*5785.00	107.1 AV			1.45 H	168	66.9	40.2
4	#5951.28	60.9 PK	68.2	-7.3	1.45 H	168	55.6	5.3
5	11570.00	61.2 PK	74.0	-12.8	2.53 H	101	42.7	18.5
6	11570.00	47.1 AV	54.0	-6.9	2.53 H	101	28.6	18.5
7	**#17355.00**	**66.8 PK**	**68.2**	**-1.4**	**1.37 H**	**316**	**42.0**	**24.8**
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	#5637.82	55.8 PK	68.2	-12.4	2.47 V	239	51.3	4.5
2	*5785.00	115.5 PK			2.47 V	239	75.3	40.2
3	*5785.00	104.8 AV			2.47 V	239	64.6	40.2
4	#5949.36	56.4 PK	68.2	-11.8	2.47 V	239	51.1	5.3
5	11570.00	60.5 PK	74.0	-13.5	2.03 V	193	42.0	18.5
6	11570.00	46.9 AV	54.0	-7.1	2.03 V	193	28.4	18.5
7	#17355.00	66.6 PK	68.2	-1.6	1.51 V	203	41.8	24.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz worst-case data:

For U-NII-1 & U-NII-2A

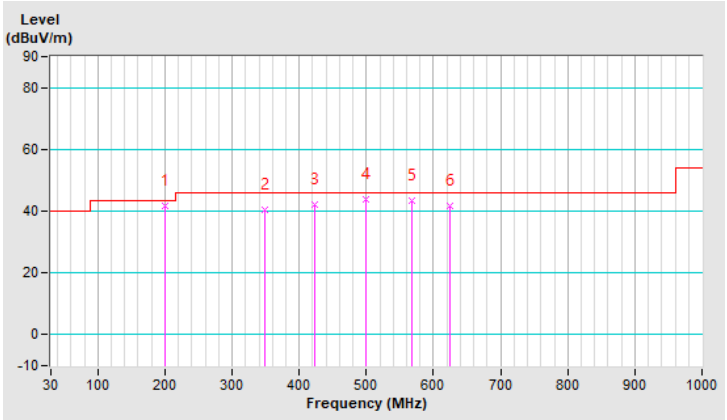
802.11n (HT40)

CHANNEL	TX Channel 54	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	200.10	41.7 QP	43.5	-1.8	1.00 H	268	53.4	-11.7
2	349.12	40.4 QP	46.0	-5.6	1.50 H	44	46.7	-6.3
3	422.22	42.0 QP	46.0	-4.0	1.50 H	348	45.5	-3.5
4	499.54	43.7 QP	46.0	-2.3	1.50 H	286	45.2	-1.5
5	567.01	43.2 QP	46.0	-2.8	1.50 H	313	43.1	0.1
6	624.65	41.5 QP	46.0	-4.5	1.00 H	306	40.1	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

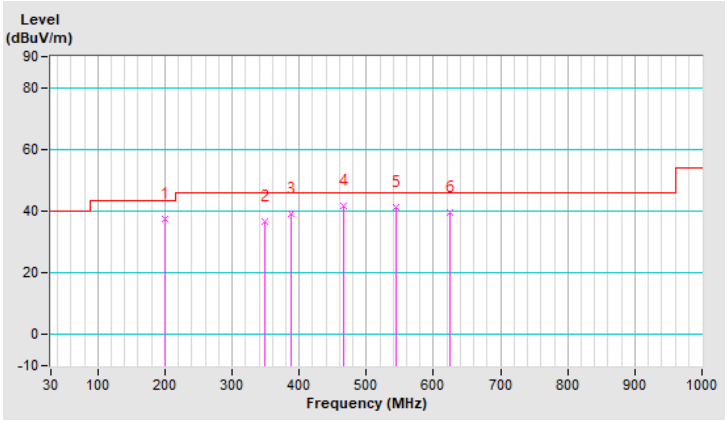


CHANNEL	TX Channel 54	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	200.10	37.5 QP	43.5	-6.0	1.00 V	3	49.2	-11.7
2	349.12	36.6 QP	46.0	-9.4	1.50 V	140	42.9	-6.3
3	388.48	39.0 QP	46.0	-7.0	1.50 V	125	43.8	-4.8
4	465.80	41.7 QP	46.0	-4.3	1.50 V	16	43.9	-2.2
5	544.52	41.3 QP	46.0	-4.7	1.00 V	16	41.9	-0.6
6	624.65	39.5 QP	46.0	-6.5	1.50 V	337	38.1	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

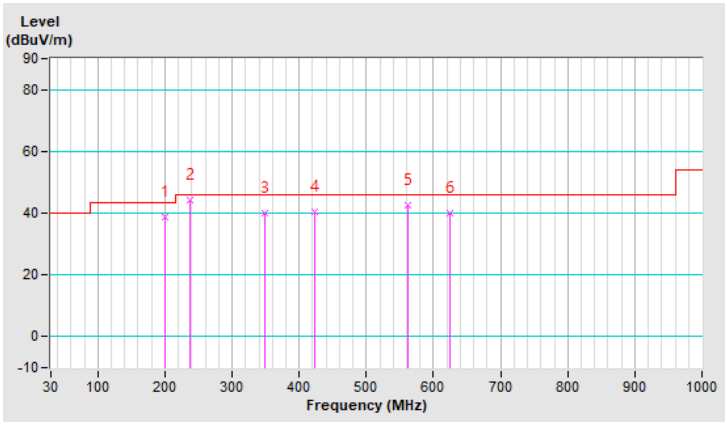


CHANNEL	TX Channel 54	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	200.10	38.9 QP	43.5	-4.6	1.00 H	257	50.6	-11.7
2	236.65	44.1 QP	46.0	-1.9	1.50 H	110	54.4	-10.3
3	349.12	40.0 QP	46.0	-6.0	1.50 H	5	46.3	-6.3
4	422.22	40.3 QP	46.0	-5.7	1.50 H	180	43.8	-3.5
5	562.80	42.4 QP	46.0	-3.6	1.00 H	292	42.5	-0.1
6	624.65	40.2 QP	46.0	-5.8	1.50 H	43	38.8	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

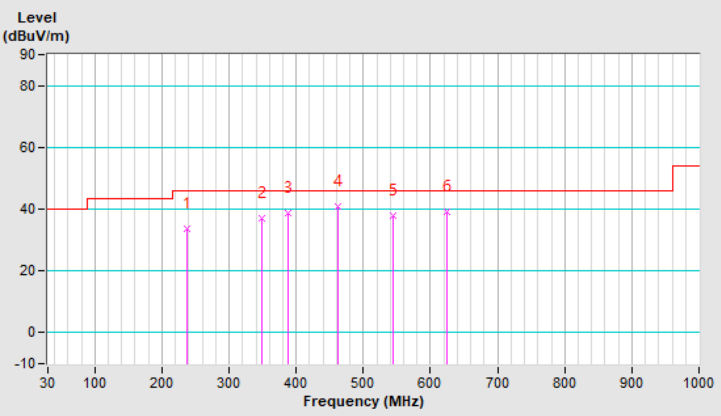


CHANNEL	TX Channel 54	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	236.65	33.5 QP	46.0	-12.5	1.00 V	331	43.8	-10.3
2	349.12	37.1 QP	46.0	-8.9	1.50 V	94	43.4	-6.3
3	388.48	38.7 QP	46.0	-7.3	1.50 V	341	43.5	-4.8
4	461.58	40.9 QP	46.0	-5.1	1.50 V	30	43.3	-2.4
5	544.52	37.7 QP	46.0	-8.3	1.50 V	341	38.3	-0.6
6	624.65	39.2 QP	46.0	-6.8	1.00 V	336	37.8	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



For U-NII-2C & U-NII-3

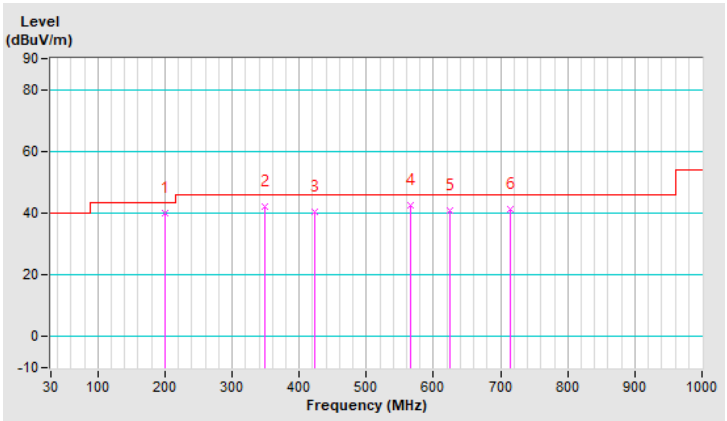
802.11a

CHANNEL	TX Channel 157	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	200.10	40.1 QP	43.5	-3.4	2.00 H	250	51.8	-11.7
2	349.12	42.1 QP	46.0	-3.9	1.50 H	211	48.4	-6.3
3	423.62	40.4 QP	46.0	-5.6	1.50 H	328	43.9	-3.5
4	565.61	42.7 QP	46.0	-3.3	1.00 H	311	42.6	0.1
5	624.65	40.9 QP	46.0	-5.1	1.50 H	16	39.5	1.4
6	714.62	41.3 QP	46.0	-4.7	1.50 H	282	39.1	2.2

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

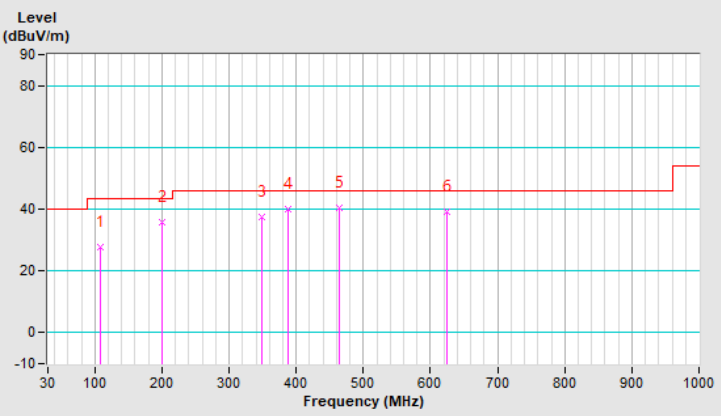


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	107.32	27.9 QP	43.5	-15.6	1.00 V	199	40.0	-12.1
2	200.10	35.7 QP	43.5	-7.8	1.50 V	18	47.4	-11.7
3	349.12	37.5 QP	46.0	-8.5	1.50 V	286	43.8	-6.3
4	388.48	39.9 QP	46.0	-6.1	1.50 V	211	44.7	-4.8
5	464.39	40.6 QP	46.0	-5.4	1.00 V	33	42.8	-2.2
6	624.65	39.2 QP	46.0	-6.8	1.50 V	348	37.8	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

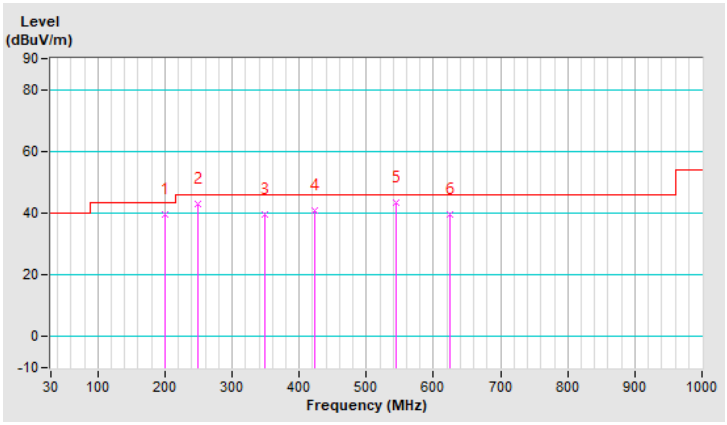


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	200.10	39.4 QP	43.5	-4.1	1.00 H	249	51.1	-11.7
2	249.30	42.8 QP	46.0	-3.2	1.50 H	91	52.3	-9.5
3	349.12	39.5 QP	46.0	-6.5	1.50 H	211	45.8	-6.3
4	422.22	41.0 QP	46.0	-5.0	2.00 H	347	44.5	-3.5
5	544.52	43.4 QP	46.0	-2.6	1.50 H	349	44.0	-0.6
6	624.65	39.7 QP	46.0	-6.3	1.50 H	27	38.3	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

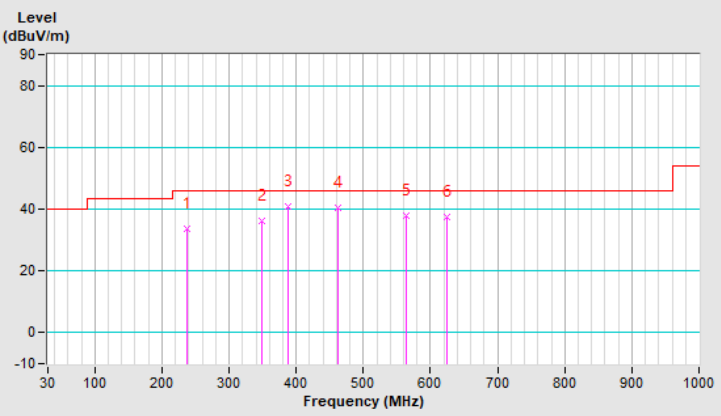


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	238.06	33.6 QP	46.0	-12.4	1.00 V	326	43.7	-10.1
2	349.12	36.2 QP	46.0	-9.8	1.50 V	103	42.5	-6.3
3	388.48	41.0 QP	46.0	-5.0	1.50 V	182	45.8	-4.8
4	461.58	40.5 QP	46.0	-5.5	1.50 V	36	42.9	-2.4
5	564.20	37.8 QP	46.0	-8.2	1.50 V	359	37.9	-0.1
6	624.65	37.6 QP	46.0	-8.4	2.00 V	332	36.2	1.4

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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

Tested date: Jul. 01, 2020

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 17, 2020	Feb. 16, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 20, 2020	Jan. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2019	Aug. 12, 2020
Software ADT	BV ADT_Cond_ V7.3.7.4	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 2 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

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.

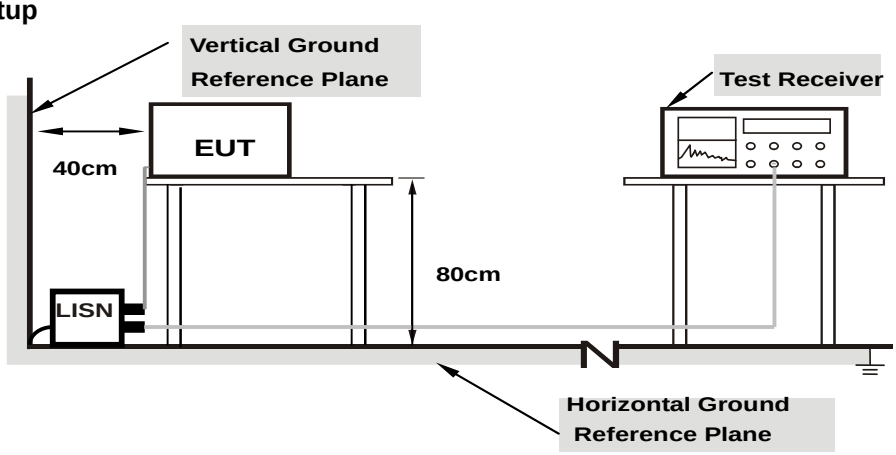
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: 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

For U-NII-1 & U-NII-2A

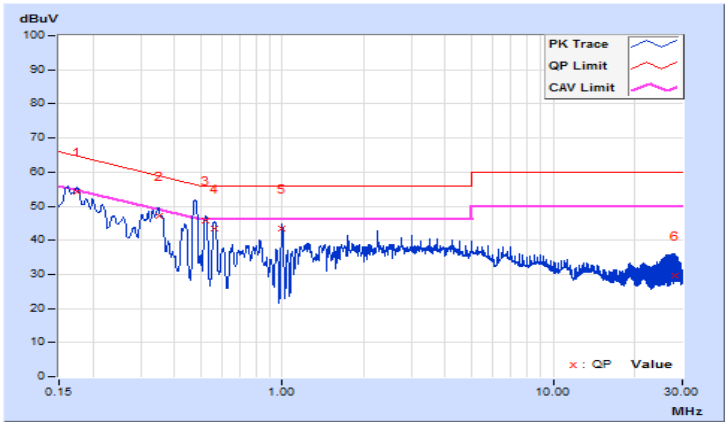
802.11n (HT40)

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

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	0.17420	10.25	44.00	36.00	54.25	46.25	64.76	54.76	-10.51	-8.51
2	0.34975	10.31	36.70	32.73	47.01	43.04	58.97	48.97	-11.96	-5.93
3	**0.52109**	**10.34**	**35.30**	**34.20**	**45.64**	**44.54**	**56.00**	**46.00**	**-10.36**	**-1.46**
4	0.55959	10.35	33.20	29.01	43.55	39.36	56.00	46.00	-12.45	-6.64
5	1.00032	10.42	32.99	29.00	43.41	39.42	56.00	46.00	-12.59	-6.58
6	28.00143	10.78	18.86	16.62	29.64	27.40	60.00	50.00	-30.36	-22.60

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.

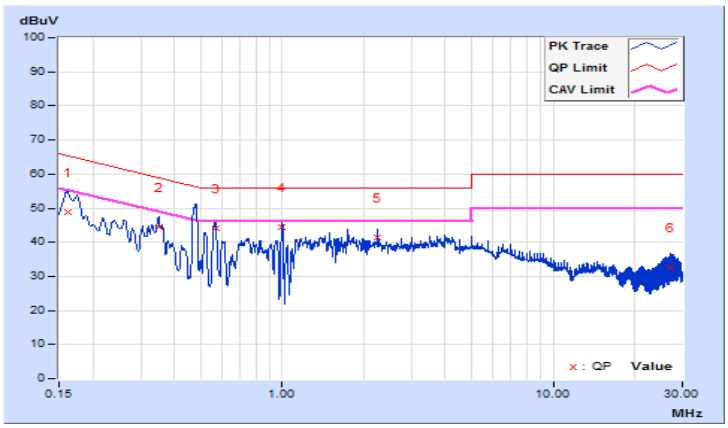


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16093	10.23	38.70	14.10	48.93	24.33	65.42	55.42	-16.49	-31.09
2	0.34975	10.29	34.29	30.26	44.58	40.55	58.97	48.97	-14.39	-8.42
3	0.56625	10.33	33.76	31.48	44.09	41.81	56.00	46.00	-11.91	-4.19
4	1.00032	10.42	33.94	29.74	44.36	40.16	56.00	46.00	-11.64	-5.84
5	2.24925	10.49	30.76	25.95	41.25	36.44	56.00	46.00	-14.75	-9.56
6	27.24675	10.99	21.68	20.36	32.67	31.35	60.00	50.00	-27.33	-18.65

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.

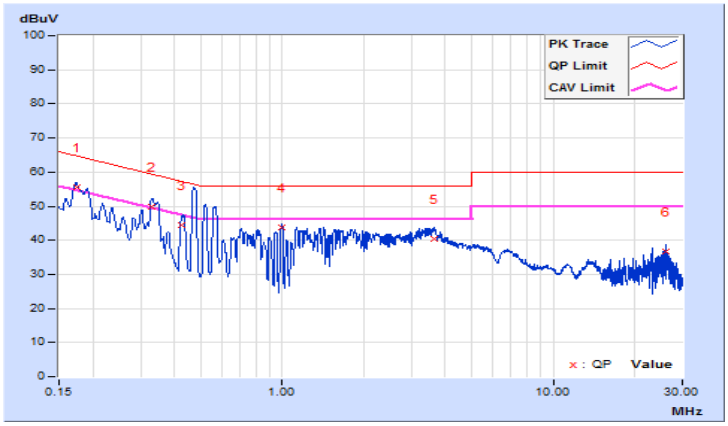


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17374	10.25	45.19	34.72	55.44	44.97	64.78	54.78	-9.34	-9.81
2	0.33002	10.30	39.58	33.02	49.88	43.32	59.45	49.45	-9.57	-6.13
3	0.42635	10.32	34.13	30.40	44.45	40.72	57.32	47.32	-12.87	-6.60
4	0.99769	10.42	33.19	28.08	43.61	38.50	56.00	46.00	-12.39	-7.50
5	3.62400	10.58	29.97	18.10	40.55	28.68	56.00	46.00	-15.45	-17.32
6	25.99800	10.81	25.92	22.60	36.73	33.41	60.00	50.00	-23.27	-16.59

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.

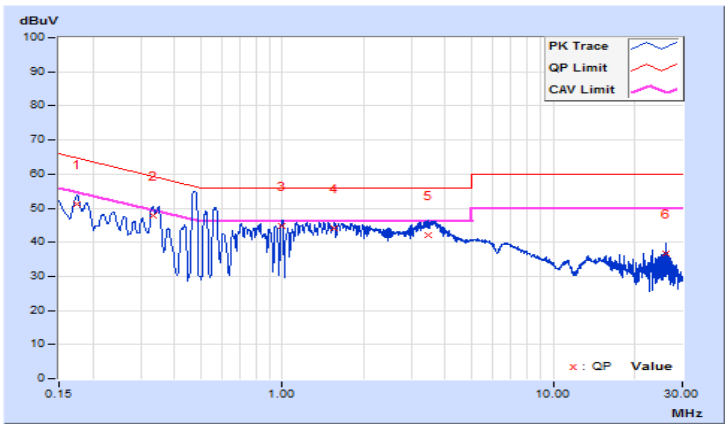


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17466	10.23	41.09	31.03	51.32	41.26	64.74	54.74	-13.42	-13.48
2	0.33225	10.28	37.69	31.90	47.97	42.18	59.39	49.39	-11.42	-7.21
3	1.00032	10.42	34.38	25.02	44.80	35.44	56.00	46.00	-11.20	-10.56
4	1.55400	10.45	33.63	27.99	44.08	38.44	56.00	46.00	-11.92	-7.56
5	3.45075	10.58	31.48	19.59	42.06	30.17	56.00	46.00	-13.94	-15.83
6	25.99800	11.02	25.62	22.15	36.64	33.17	60.00	50.00	-23.36	-16.83

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.



For U-NII-2C & U-NII-3

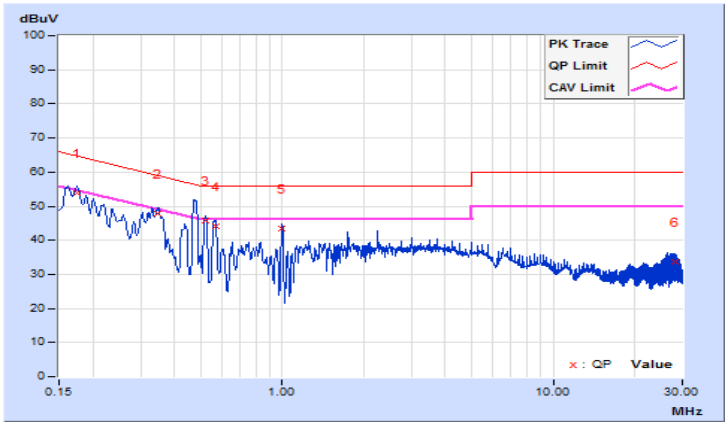
802.11a

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17466	10.25	43.78	35.64	54.03	45.89	64.74	54.74	-10.71	-8.85
2	0.34883	10.31	37.42	33.49	47.73	43.80	58.99	48.99	-11.26	-5.19
3	0.52350	10.34	35.52	33.15	45.86	43.49	56.00	46.00	-10.14	-2.51
4	0.56625	10.35	33.70	32.10	44.05	42.45	56.00	46.00	-11.95	-3.55
5	1.00032	10.42	33.04	29.01	43.46	39.43	56.00	46.00	-12.54	-6.57
6	27.99600	10.78	22.73	21.89	33.51	32.67	60.00	50.00	-26.49	-17.33

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.

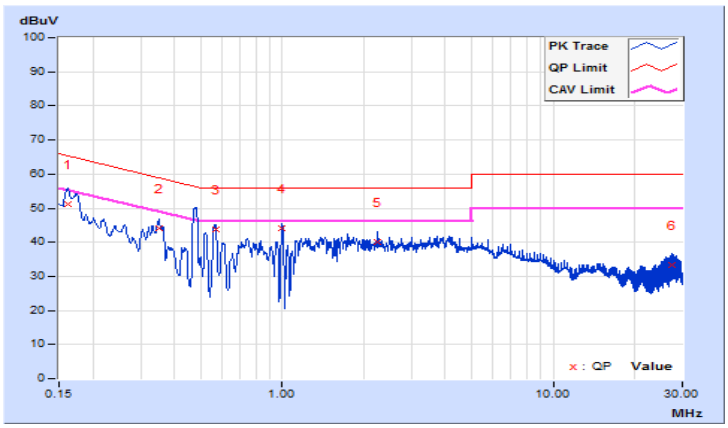


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16125	10.23	40.96	22.62	51.19	32.85	65.40	55.40	-14.21	-22.55
2	0.35025	10.29	33.68	30.31	43.97	40.60	58.96	48.96	-14.99	-8.36
3	0.56703	10.33	33.44	31.47	43.77	41.80	56.00	46.00	-12.23	-4.20
4	1.00032	10.42	33.82	29.72	44.24	40.14	56.00	46.00	-11.76	-5.86
5	2.24925	10.49	29.66	25.58	40.15	36.07	56.00	46.00	-15.85	-9.93
6	27.49328	10.99	22.45	21.54	33.44	32.53	60.00	50.00	-26.56	-17.47

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.

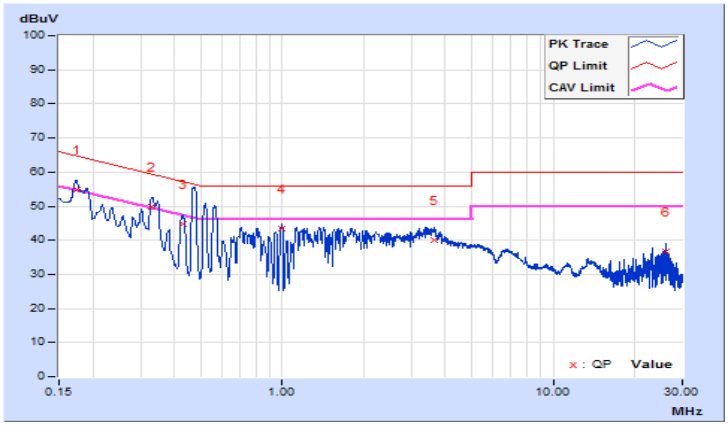


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17475	10.25	44.68	34.53	54.93	44.78	64.73	54.73	-9.80	-9.95
2	0.33089	10.30	39.49	33.43	49.79	43.73	59.43	49.43	-9.64	-5.70
3	0.42860	10.32	34.37	31.38	44.69	41.70	57.28	47.28	-12.59	-5.58
4	0.99769	10.42	33.03	26.44	43.45	36.86	56.00	46.00	-12.55	-9.14
5	3.62175	10.58	29.41	18.44	39.99	29.02	56.00	46.00	-16.01	-16.98
6	26.00025	10.81	25.85	23.04	36.66	33.85	60.00	50.00	-23.34	-16.15

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.

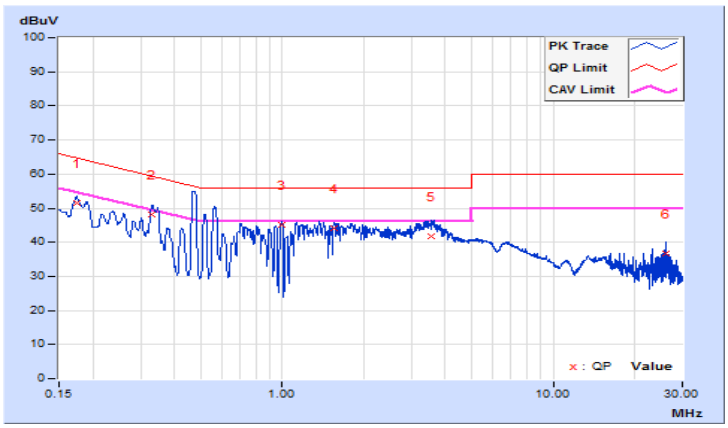


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17420	10.23	41.23	31.25	51.46	41.48	64.76	54.76	-13.30	-13.28
2	0.33176	10.28	37.88	32.05	48.16	42.33	59.41	49.41	-11.25	-7.08
3	0.99506	10.42	34.68	30.72	45.10	41.14	56.00	46.00	-10.90	-4.86
4	1.55400	10.45	33.49	28.39	43.94	38.84	56.00	46.00	-12.06	-7.16
5	3.56775	10.59	31.17	19.31	41.76	29.90	56.00	46.00	-14.24	-16.10
6	26.00025	11.02	25.73	22.83	36.75	33.85	60.00	50.00	-23.25	-16.15

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 ≦ 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

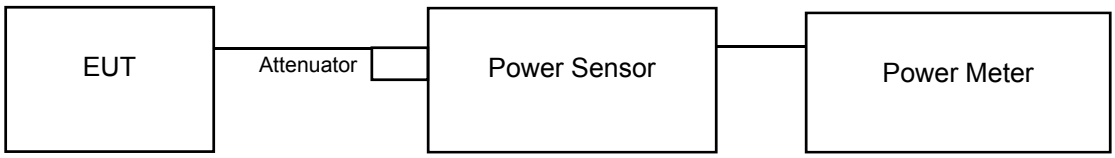
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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 $N_{ANT} \geq 5$.

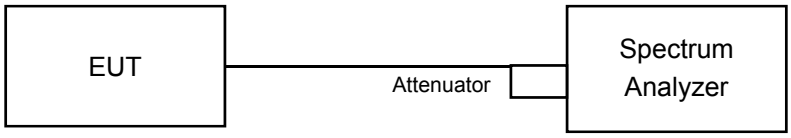
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

For Power Output
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



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, 802.11n (HT20), 802.11n (HT40)

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 ≥ 3 MHz
e. Number of points in sweep ≥ 2 Span / RBW
f. Sweep time ≤ (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.

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

For U-NII-1 Band (Outdoor Access Point)

CDD Mode

802.11a

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
36	5180	12.35	12.57	11.63	12.99	69.713	18.43	30.00	2.10	20.53	21.00	Pass
40	5200	12.36	12.72	11.79	13.25	72.162	18.58	30.00	2.10	20.68	21.00	Pass
48	5240	12.31	12.53	11.35	12.81	67.673	18.30	30.00	2.10	20.40	21.00	Pass

Note: EIRP = conducted power + ant. gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
36	5180	11.77	12.45	11.63	13.02	67.210	18.27	30.00	2.10	20.37	21.00	Pass
40	5200	12.15	12.61	11.71	13.24	70.556	18.49	30.00	2.10	20.59	21.00	Pass
48	5240	12.56	12.95	11.85	13.40	**74.943**	18.75	30.00	2.10	20.85	21.00	Pass

Note: EIRP = conducted power + ant. gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
38	5190	12.25	12.70	11.56	13.15	70.385	18.47	30.00	2.10	20.57	21.00	Pass
46	5230	12.20	12.66	11.55	13.16	70.036	18.45	30.00	2.10	20.55	21.00	Pass

Note: EIRP = conducted power + ant. gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
42	5210	12.21	12.71	11.72	13.02	70.202	18.46	30.00	2.10	20.56	21.00	Pass

Note: EIRP = conducted power + ant. gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

Beamforming Mode

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
36	5180	5.75	6.43	5.61	7.00	16.804	12.25	27.88	8.12	20.37	21.00	Pass
40	5200	6.13	6.59	5.69	7.22	17.641	12.47	27.88	8.12	20.59	21.00	Pass
48	5240	6.54	6.93	5.83	7.38	**18.738**	12.73	27.88	8.12	20.85	21.00	Pass

Note:
1. Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 30-(8.12-6) = 27.88dBm.
2. EIRP = conducted power + directional gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
38	5190	6.23	6.68	5.54	7.13	17.599	12.45	27.88	8.12	20.57	21.00	Pass
46	5230	6.18	6.64	5.53	7.14	17.512	12.43	27.88	8.12	20.55	21.00	Pass

Note:
1. Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 30-(8.12-6) = 27.88dBm.
2. EIRP = conducted power + directional gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3							
42	5210	6.19	6.69	5.70	7.00	17.553	12.44	27.88	8.12	20.56	21.00	Pass

Note:
1. Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 30-(8.12-6) = 27.88dBm.
2. EIRP = conducted power + directional gain + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

For U-NII-2A, U-NII-2C, U-NII-3 band

Power Output:

CDD Mode

802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	15.23	16.02	14.56	16.25	144.083	21.59	23.97	Pass
60	5300	15.25	15.55	14.33	16.53	141.469	21.51	23.97	Pass
64	5320	14.88	14.90	14.43	16.10	130.135	21.14	23.97	Pass
100	5500	14.44	14.38	13.10	15.21	108.819	20.37	23.91	Pass
116	5580	14.02	13.82	12.76	14.39	95.693	19.81	23.89	Pass
140	5700	15.91	14.71	13.55	15.15	123.954	20.93	23.96	Pass
144	5720 For 5500~5720MHz	12.95	13.75	12.14	12.32	80.237	19.04	22.70	Pass
144	5720 For 5745~5825MHz	7.48	6.80	6.05	6.99	20.262	13.07	30.00	Pass
149	5745	20.48	19.18	17.70	19.46	341.672	25.34	30.00	Pass
157	5785	21.22	19.88	18.51	20.02	**401.129**	26.03	30.00	Pass
165	5825	20.56	19.09	18.09	19.46	347.584	25.41	30.00	Pass

Note: Gain = 2.1dBi < 6dBi, so the limit no need to be reduced.

For 5260~5320MHz, 5500~5720MHz
Note:
For U-NII-2A, U-NII-2C Band:
Chain 0
1. 11dBm + 10log (19.95) = 23.99 < 24dBm
2. 11dBm + 10log (20.06) = 24.02 > 24dBm
3. 11dBm + 10log (20.01) = 24.01 > 24dBm
4. 11dBm + 10log (19.99) = 24.00 < 24dBm
5. 11dBm + 10log (20.08) = 24.02 > 24dBm
6. 11dBm + 10log (20.43) = 24.10 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.76) = 22.82 < 24dBm
Chain 1
1. 11dBm + 10log (19.97) = 24.00 < 24dBm
2. 11dBm + 10log (19.85) = 23.97 < 24dBm
3. 11dBm + 10log (19.83) = 23.97 < 24dBm
4. 11dBm + 10log (19.55) = 23.91 < 24dBm
5. 11dBm + 10log (19.47) = 23.89 < 24dBm
6. 11dBm + 10log (19.81) = 23.96 < 24dBm
7. 11dBm + 10log (5725.00 - 5709.90) = 22.78 < 24dBm
Chain 2
1. 11dBm + 10log (19.95) = 23.99 < 24dBm
2. 11dBm + 10log (20.04) = 24.01 > 24dBm
3. 11dBm + 10log (19.93) = 23.99 < 24dBm
4. 11dBm + 10log (19.83) = 23.97 < 24dBm
5. 11dBm + 10log (19.47) = 23.89 < 24dBm
6. 11dBm + 10log (19.78) = 23.96 < 24dBm
7. 11dBm + 10log (5725.00 - 5710.20) = 22.70 < 24dBm
Chain 3
1. 11dBm + 10log (19.82) = 23.97 < 24dBm
2. 11dBm + 10log (20.02) = 24.01 > 24dBm
3. 11dBm + 10log (19.95) = 23.99 < 24dBm
4. 11dBm + 10log (19.69) = 23.94 < 24dBm
5. 11dBm + 10log (20.03) = 24.01 > 24dBm
6. 11dBm + 10log (20.25) = 24.06 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.95) = 22.77 < 24dBm

802.11n (HT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	15.93	16.71	15.22	17.10	170.607	22.32	24.00	Pass
60	5300	15.80	15.93	14.59	17.03	156.433	21.94	24.00	Pass
64	5320	15.37	15.58	15.22	16.98	153.73	21.87	24.00	Pass
100	5500	15.11	15.03	13.81	15.76	125.990	21.00	24.00	Pass
116	5580	14.22	14.11	13.13	14.73	102.463	20.11	24.00	Pass
140	5700	14.98	13.75	12.55	14.57	101.822	20.08	24.00	Pass
144	5720 For 5500~5720MHz	14.03	12.68	11.13	12.90	76.298	18.83	22.81	Pass
144	5720 For 5745~5825MHz	9.03	8.28	6.63	8.39	26.233	14.19	30.00	Pass
149	5745	20.22	18.88	17.23	19.02	315.108	24.98	30.00	Pass
157	5785	20.55	19.05	17.77	19.35	339.794	25.31	30.00	Pass
165	5825	20.41	18.81	17.83	19.03	326.591	25.14	30.00	Pass

Note: Gain = 2.1dBi < 6dBi, so the limit no need to be reduced.

For 5260~5320MHz, 5500~5720MHz

Chain 0

1. 11dBm + 10log (20.67) = 24.15 > 24dBm
2. 11dBm + 10log (20.66) = 24.15 > 24dBm
3. 11dBm + 10log (20.55) = 24.12 > 24dBm
4. 11dBm + 10log (20.59) = 24.13 > 24dBm
5. 11dBm + 10log (20.68) = 24.15 > 24dBm
6. 11dBm + 10log (20.97) = 24.21 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.55) = 22.88 < 24dBm

Chain 1

1. 11dBm + 10log (20.72) = 24.16 > 24dBm
2. 11dBm + 10log (20.90) = 24.20 > 24dBm
3. 11dBm + 10log (20.66) = 24.15 > 24dBm
4. 11dBm + 10log (20.60) = 24.13 > 24dBm
5. 11dBm + 10log (20.38) = 24.09 > 24dBm
6. 11dBm + 10log (20.56) = 24.13 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.72) = 22.84 < 24dBm

Chain 2

1. 11dBm + 10log (20.85) = 24.19 > 24dBm
2. 11dBm + 10log (20.82) = 24.18 > 24dBm
3. 11dBm + 10log (20.73) = 24.16 > 24dBm
4. 11dBm + 10log (20.60) = 24.13 > 24dBm
5. 11dBm + 10log (20.60) = 24.13 > 24dBm
6. 11dBm + 10log (20.60) = 24.13 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.80) = 22.81 < 24dBm

Chain 3

1. 11dBm + 10log (20.65) = 24.14 > 24dBm
2. 11dBm + 10log (20.51) = 24.11 > 24dBm
3. 11dBm + 10log (20.57) = 24.13 > 24dBm
4. 11dBm + 10log (20.43) = 24.10 > 24dBm
5. 11dBm + 10log (20.59) = 24.13 > 24dBm
6. 11dBm + 10log (20.74) = 24.16 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.65) = 22.86 < 24dBm

802.11n (HT40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
54	5270	17.33	18.11	16.35	18.33	**230.018**	23.62	24.00	Pass
62	5310	17.29	17.50	16.22	18.54	223.143	23.49	24.00	Pass
102	5510	17.45	17.49	16.98	18.27	**228.726**	23.59	24.00	Pass
110	5550	17.19	17.03	15.77	17.75	200.149	23.01	24.00	Pass
134	5670	17.13	16.50	15.02	16.55	173.265	22.39	24.00	Pass
142	5710 For 5500~5720MHz	17.75	16.59	15.14	16.56	189.180	22.77	24.00	Pass
142	5710 For 5745~5825MHz	9.37	8.82	6.91	8.49	29.178	14.65	30.00	Pass
151	5755	20.83	19.50	17.81	19.55	360.737	25.57	30.00	Pass
159	5795	20.45	19.15	17.77	19.21	336.350	25.27	30.00	Pass

Note: Gain = 2.1dBi < 6dBi, so the limit no need to be reduced.

For 5260~5320MHz, 5500~5720MHz

Chain 0

1. 11dBm + 10log (40.77) = 27.10 > 24dBm
2. 11dBm + 10log (40.77) = 27.10 > 24dBm
3. 11dBm + 10log (40.73) = 27.09 > 24dBm
4. 11dBm + 10log (40.78) = 27.10 > 24dBm
5. 11dBm + 10log (40.63) = 27.08 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.80) = 26.46 > 24dBm

Chain 1

1. 11dBm + 10log (40.67) = 27.09 > 24dBm
2. 11dBm + 10log (41.00) = 27.12 > 24dBm
3. 11dBm + 10log (40.94) = 27.12 > 24dBm
4. 11dBm + 10log (40.84) = 27.11 > 24dBm
5. 11dBm + 10log (40.97) = 27.12 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.56) = 26.49 > 24dBm

Chain 2

1. 11dBm + 10log (40.33) = 27.05 > 24dBm
2. 11dBm + 10log (40.49) = 27.07 > 24dBm
3. 11dBm + 10log (40.75) = 27.10 > 24dBm
4. 11dBm + 10log (40.83) = 27.10 > 24dBm
5. 11dBm + 10log (40.97) = 27.12 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.73) = 26.47 > 24dBm

Chain 3

1. 11dBm + 10log (40.59) = 27.08 > 24dBm
2. 11dBm + 10log (40.84) = 27.11 > 24dBm
3. 11dBm + 10log (41.21) = 27.15 > 24dBm
4. 11dBm + 10log (40.80) = 27.10 > 24dBm
5. 11dBm + 10log (40.51) = 27.07 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.86) = 26.45 > 24dBm

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
58	5290	17.20	17.61	16.23	18.22	218.508	23.39	24.00	Pass
106	5530	16.55	16.61	15.35	17.33	179.352	22.54	24.00	Pass
122	5610	17.77	17.51	16.09	17.52	213.343	23.29	24.00	Pass
138	5690 For 5500~5720MHz	18.21	17.23	15.73	17.39	224.986	23.52	24.00	Pass
138	5690 For 5745~5825MHz	7.85	6.61	5.25	7.14	20.445	13.11	30.00	Pass
155	5775	18.05	16.85	15.51	16.95	197.351	22.95	30.00	Pass

Note: Gain = 2.1dBi < 6dBi, so the limit no need to be reduced.

For 5260~5320MHz, 5500~5720MHz

Chain 0

1. 11dBm + 10log (84.03) = 30.24 > 24dBm
2. 11dBm + 10log (83.86) = 30.23 > 24dBm
3. 11dBm + 10log (83.84) = 30.23 > 24dBm
4. 11dBm + 10log (5725.00 - 5647.97) = 29.87 > 24dBm

Chain 1

1. 11dBm + 10log (83.75) = 30.22 > 24dBm
2. 11dBm + 10log (84.39) = 30.26 > 24dBm
3. 11dBm + 10log (83.79) = 30.23 > 24dBm
4. 11dBm + 10log (5725.00 - 5648.15) = 29.86 > 24dBm

Chain 2

1. 11dBm + 10log (83.44) = 30.21 > 24dBm
2. 11dBm + 10log (84.83) = 30.28 > 24dBm
3. 11dBm + 10log (84.25) = 30.25 > 24dBm
4. 11dBm + 10log (5725.00 - 5647.97) = 29.87 > 24dBm

Chain 3

1. 11dBm + 10log (83.58) = 30.22 > 24dBm
2. 11dBm + 10log (83.74) = 30.22 > 24dBm
3. 11dBm + 10log (83.20) = 30.20 > 24dBm
4. 11dBm + 10log (5725.00 - 5648.51) = 29.84 > 24dBm

Beamforming Mode

802.11n (HT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	9.91	10.69	9.20	11.08	42.658	16.30	21.88	Pass
60	5300	9.78	9.91	8.57	11.01	39.113	15.92	21.88	Pass
64	5320	9.35	9.56	9.20	10.96	38.438	15.85	21.88	Pass
100	5500	9.09	9.01	7.79	9.74	31.503	14.98	21.88	Pass
116	5580	8.20	8.09	7.11	8.71	25.619	14.09	21.88	Pass
140	5700	8.96	7.73	6.53	8.55	25.458	14.06	21.88	Pass
144	5720 For 5500~5720MHz	8.01	6.66	5.11	6.88	19.076	12.80	20.69	Pass
144	5720 For 5745~5825MHz	3.01	2.26	0.61	2.37	6.560	8.17	27.88	Pass
149	5745	14.20	12.86	11.21	13.00	78.789	18.96	27.88	Pass
157	5785	14.53	13.03	11.75	13.33	84.960	19.29	27.88	Pass
165	5825	14.39	12.79	11.81	13.01	81.660	19.12	27.88	Pass

Note:

1. 5260~5320MHz Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
2. 5500~5700MHz Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
3. 5720MHz (For U-NII-2C) Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 22.81-(8.12-6) = 20.69dBm.
4. 5720MHz & 5745 ~ 5825MHz (For U-NII-3) Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 30-(8.12-6) = 27.88dBm.

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (20.67) = 24.15 > 24dBm
2. 11dBm + 10log (20.66) = 24.15 > 24dBm
3. 11dBm + 10log (20.55) = 24.12 > 24dBm
4. 11dBm + 10log (20.59) = 24.13 > 24dBm
5. 11dBm + 10log (20.68) = 24.15 > 24dBm
6. 11dBm + 10log (20.97) = 24.21 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.55) = 22.88 < 24dBm

Chain 1

1. 11dBm + 10log (20.72) = 24.16 > 24dBm
2. 11dBm + 10log (20.90) = 24.20 > 24dBm
3. 11dBm + 10log (20.66) = 24.15 > 24dBm
4. 11dBm + 10log (20.60) = 24.13 > 24dBm
5. 11dBm + 10log (20.38) = 24.09 > 24dBm
6. 11dBm + 10log (20.56) = 24.13 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.72) = 22.84 < 24dBm

Chain 2

1. 11dBm + 10log (20.85) = 24.19 > 24dBm
2. 11dBm + 10log (20.82) = 24.18 > 24dBm
3. 11dBm + 10log (20.73) = 24.16 > 24dBm
4. 11dBm + 10log (20.60) = 24.13 > 24dBm
5. 11dBm + 10log (20.60) = 24.13 > 24dBm
6. 11dBm + 10log (20.60) = 24.13 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.80) = 22.81 < 24dBm

Chain 3

1. 11dBm + 10log (20.65) = 24.14 > 24dBm
2. 11dBm + 10log (20.51) = 24.11 > 24dBm
3. 11dBm + 10log (20.57) = 24.13 > 24dBm
4. 11dBm + 10log (20.43) = 24.10 > 24dBm
5. 11dBm + 10log (20.59) = 24.13 > 24dBm
6. 11dBm + 10log (20.74) = 24.16 > 24dBm
7. 11dBm + 10log (5725.00 - 5709.65) = 22.86 < 24dBm

802.11n (HT40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
54	5270	11.31	12.09	10.33	12.31	**57.513**	17.60	21.88	Pass
62	5310	11.27	11.48	10.20	12.52	55.793	17.47	21.88	Pass
102	5510	11.43	11.47	10.96	12.25	**57.190**	17.57	21.88	Pass
110	5550	11.17	11.01	9.75	11.73	50.045	16.99	21.88	Pass
134	5670	11.11	10.48	9.00	10.53	43.322	16.37	21.88	Pass
142	5710 For 5500~5720MHz	11.73	10.57	9.12	6.88	40.639	16.09	21.88	Pass
142	5710 For 5745~5825MHz	3.35	2.80	0.89	2.37	7.253	8.61	27.88	Pass
151	5755	14.81	13.48	11.79	13.53	**90.196**	19.55	27.88	Pass
159	5795	14.43	13.13	11.75	13.19	84.099	19.25	27.88	Pass

Note:

1. 5260~5320MHz Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
2. 5500~5700MHz Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
3. 5710MHz (For U-NII-2C) Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
4. 5720MHz & 5745 ~ 5825MHz (For U-NII-3) Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 30-(8.12-6) = 27.88dBm.

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (40.77) = 27.10 > 24dBm
2. 11dBm + 10log (40.77) = 27.10 > 24dBm
3. 11dBm + 10log (40.73) = 27.09 > 24dBm
4. 11dBm + 10log (40.78) = 27.10 > 24dBm
5. 11dBm + 10log (40.63) = 27.08 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.80) = 26.46 > 24dBm

Chain 1

1. 11dBm + 10log (40.67) = 27.09 > 24dBm
2. 11dBm + 10log (41.00) = 27.12 > 24dBm
3. 11dBm + 10log (40.94) = 27.12 > 24dBm
4. 11dBm + 10log (40.84) = 27.11 > 24dBm
5. 11dBm + 10log (40.97) = 27.12 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.56) = 26.49 > 24dBm

Chain 2

1. 11dBm + 10log (40.33) = 27.05 > 24dBm
2. 11dBm + 10log (40.49) = 27.07 > 24dBm
3. 11dBm + 10log (40.75) = 27.10 > 24dBm
4. 11dBm + 10log (40.83) = 27.10 > 24dBm
5. 11dBm + 10log (40.97) = 27.12 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.73) = 26.47 > 24dBm

Chain 3

1. 11dBm + 10log (40.59) = 27.08 > 24dBm
2. 11dBm + 10log (40.84) = 27.11 > 24dBm
3. 11dBm + 10log (41.21) = 27.15 > 24dBm
4. 11dBm + 10log (40.80) = 27.10 > 24dBm
5. 11dBm + 10log (40.51) = 27.07 > 24dBm
6. 11dBm + 10log (5725.00 - 5689.86) = 26.45 > 24dBm

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
58	5290	11.18	11.59	10.21	12.20	54.634	17.37	21.88	Pass
106	5530	10.53	10.59	9.33	11.31	44.844	16.52	21.88	Pass
122	5610	11.75	11.49	10.07	11.50	53.342	17.27	21.88	Pass
138	5690 For 5500~5720MHz	12.19	11.21	9.71	11.37	56.255	17.50	21.88	Pass
138	5690 For 5745~5825MHz	1.83	0.59	-0.77	1.12	5.1121	7.09	27.88	Pass
155	5775	12.03	10.83	9.49	10.93	49.345	16.93	27.88	Pass

Note:
1. 5260~5320MHz Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
2. 5500~5700MHz Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
3. 5690MHz (For U-NII-2C) Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 24-(8.12-6) = 21.88dBm.
4. 5720MHz & 5745 ~ 5825MHz (For U-NII-3) Directional Gain = 2.1dBi + 10log(4) = 8.12dBi > 6dBi, so the limit shall be reduced to 30-(8.12-6) = 27.88dBm.

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (84.03) = 30.24 > 24dBm
2. 11dBm + 10log (83.86) = 30.23 > 24dBm
3. 11dBm + 10log (83.84) = 30.23 > 24dBm
4. 11dBm + 10log (5725.00 - 5647.97) = 29.87 > 24dBm

Chain 1

1. 11dBm + 10log (83.75) = 30.22 > 24dBm
2. 11dBm + 10log (84.39) = 30.26 > 24dBm
3. 11dBm + 10log (83.79) = 30.23 > 24dBm
4. 11dBm + 10log (5725.00 - 5648.15) = 29.86 > 24dBm

Chain 2

1. 11dBm + 10log (83.44) = 30.21 > 24dBm
2. 11dBm + 10log (84.83) = 30.28 > 24dBm
3. 11dBm + 10log (84.25) = 30.25 > 24dBm
4. 11dBm + 10log (5725.00 - 5647.97) = 29.87 > 24dBm

Chain 3

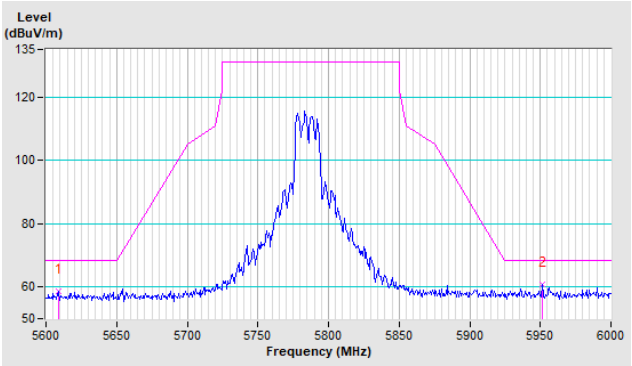
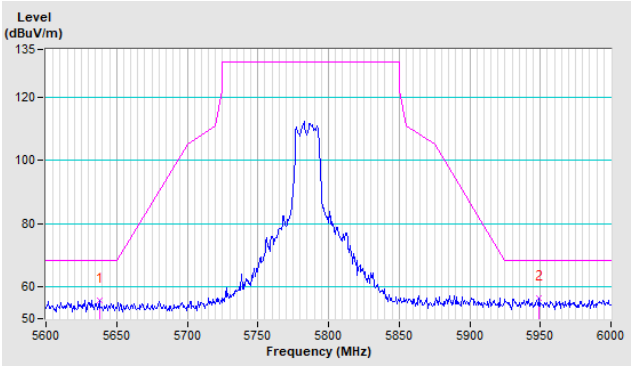
1. 11dBm + 10log (83.58) = 30.22 > 24dBm
2. 11dBm + 10log (83.74) = 30.22 > 24dBm
3. 11dBm + 10log (83.20) = 30.20 > 24dBm
4. 11dBm + 10log (5725.00 - 5648.51) = 29.84 > 24dBm

5 Pictures of Test Arrangements

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

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

802.11a

CH157	
Horizontal	Vertical
	

Appendix – Information of 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:

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

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