FCC Test Report

Report No.:	RF181106C33-1
FCC ID:	A8J-EWS357AP
Test Model:	EWS357AP
Series Model:	ECW220
Received Date:	Nov. 06, 2018
Test Date:	Dec. 03, 2018 ~ Jan. 23, 2019
Issued Date:	Jan. 30, 2019
Applicant:	EnGenius Technologies
Address:	1580 Scenic Avenue, Costa Mesa, CA92626
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

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Release Control Record

Issue No.	Description	Date Issued
RF181106C33-1	Original release	Jan. 30, 2019

1 Certificate of Conformity

Product:	802.11AX Indoor Ceiling Mount Access Point
Brand:	EnGenius
Test Model:	EWS357AP
Series Model:	ECW220
Sample Status:	Engineering sample
Applicant:	EnGenius Technologies
Test Date:	Dec. 03, 2018 ~ Jan. 23, 2019
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 : Celine Chou , **Date:** Jan. 30, 2019

Celine Chou / Senior Specialist

Approved by : Bruce Chen , **Date:** Jan. 30, 2019

Bruce Chen / 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 -5.79dB at 0.47422MHz.
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 -1.0dB at 15600.00MHz.
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 IPEX not a standard connector.

Note:
1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.

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	3.86 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	802.11AX Indoor Ceiling Mount Access Point
Brand	EnGenius
Test Model	EWS357AP
Series Model	ECW220
Model Difference	Refer to note for more details
Sample Status	Engineering sample
Power Supply Rating	12Vdc from adapter 54Vdc from PoE
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM for OFDMA
Modulation Technology	OFDM, OFDMA
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 867Mbps 802.11ax: up to 1200Mbps
Operating Frequency	5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	5180~5240MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 4 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 2 802.11ac (VHT80), 802.11ax (HE80): 1 5745~5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 5 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 2 802.11ac (VHT80), 802.11ax (HE80): 1
Output Power	CDD Mode: 5180 ~ 5240MHz: 164.565mW 5745 ~ 5825MHz: 195.489mW Beamforming Mode: 5180 ~ 5240MHz: 75.598mW 5745 ~ 5825MHz: 87.012mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	NA

Note:

1. All models are listed as below. Model EWS357AP is the representative for final test.

Brand	Model	Difference
EnGenius	EWS357AP	For marketing purpose.
	ECW220	

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	2TX
802.11n (HT40)	Support	2TX
802.11ac (VHT20)	Support	2TX
802.11ac (VHT40)	Support	2TX
802.11ac (VHT80)	Support	2TX
802.11ax (HE20)	Support	2TX
802.11ax (HE40)	Support	2TX
802.11ax (HE80)	Support	2TX

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40 on 802.11ac mode and HE20/HE40 on 802.11ax mode. The bandwidth and modulation are similar for VHT80 on 802.11ac mode and HE80 on 802.11ax mode. Therefore the investigated worst case is the 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.

* 802.11ax mode only support full Resource Unit size.

3. The EUT consumes power from the following adapter and PoE.

Adapter (for support unit only)	
Brand	JG
Model	ZZU1588-150120-2A
Input	100-240Vac, ~1.5A Max, 50-60Hz
Output	12Vdc, 1.5A
Power Line	1.5m DC cable without core attached on adapter

PoE (for support unit only)	
Brand	EnGenius
Model	EPA5006GP
Input	100-240Vac, ~0.8A, 50-60Hz
Output	54Vdc, 0.6A PIN 4,5:54V PIN 7,8:RETURN
Power Line	0.55m non-shielding AC cable without core

4. The following antennas were provided to the EUT.

Ant. No.	1	2	3	4
Ant. Type	PIFA	PIFA	PIFA	PIFA
Ant. Connector	IPEX	IPEX	IPEX	IPEX
Frequency (MHz)	2400-2500		5150-5850	
Peak Gain (dBi)	3.5	3.5	4.6	4.5

5. 2.4GHz & 5GHz technology can transmit at same time.

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

3.2 Description of Test Modes

For 5180 ~ 5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

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), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency
42	5210MHz

For 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

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), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

Where RE≥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 **Y-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	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11ax (HE20)		36 to 48	36, 40, 48	OFDMA	MCS0
	802.11ax (HE40)		38 to 46	38, 46	OFDMA	MCS0
	802.11ax (HE80)		42	42	OFDMA	MCS0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11ax (HE20)		149 to 165	149, 157, 165	OFDMA	MCS0
	802.11ax (HE40)		151 to 159	151, 159	OFDMA	MCS0
	802.11ax (HE80)		155	155	OFDMA	MCS0

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	5180-5240	36 to 48	157	OFDM	6.0
	802.11a	5745-5825	149 to 165		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	5180-5240	36 to 48	157	OFDM	6.0
	802.11a	5745-5825	149 to 165		OFDM	6.0

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	MCS0
	802.11n (HT40)		38 to 46	38, 46	OFDM	MCS0
	802.11ac (VHT80)		42	42	OFDM	MCS0
	802.11ax (HE20)		36 to 48	36, 40, 48	OFDMA	MCS0
	802.11ax (HE40)		38 to 46	38, 46	OFDMA	MCS0
	802.11ax (HE80)		42	42	OFDMA	MCS0
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	MCS0
	802.11n (HT40)		151 to 159	151, 159	OFDM	MCS0
	802.11ac (VHT80)		155	155	OFDM	MCS0
	802.11ax (HE20)		149 to 165	149, 157, 165	OFDMA	MCS0
	802.11ax (HE40)		151 to 159	151, 159	OFDMA	MCS0
	802.11ax (HE80)		155	155	OFDMA	MCS0

Test Condition:

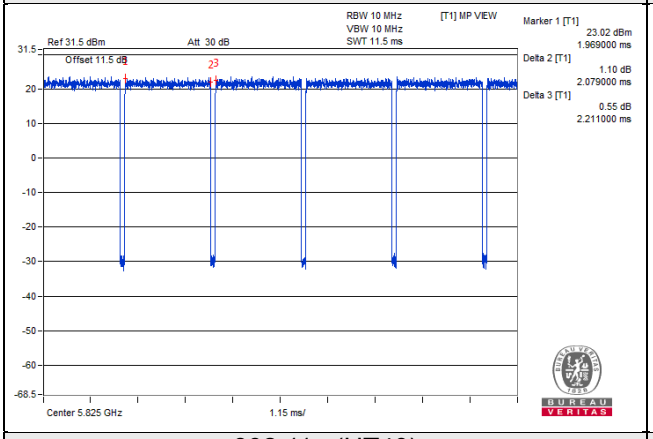
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	24 deg. C, 67% RH 24 deg. C, 68% RH 25 deg. C, 68% RH	120Vac, 60Hz	Willy Cheng
RE<1G	24 deg. C, 66% RH	120Vac, 60Hz 54Vdc	Adair Peng
PLC	25 deg. C, 75% RH	120Vac, 60Hz 54Vdc	Willy Cheng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chris Lin

3.3 Duty Cycle of Test Signal

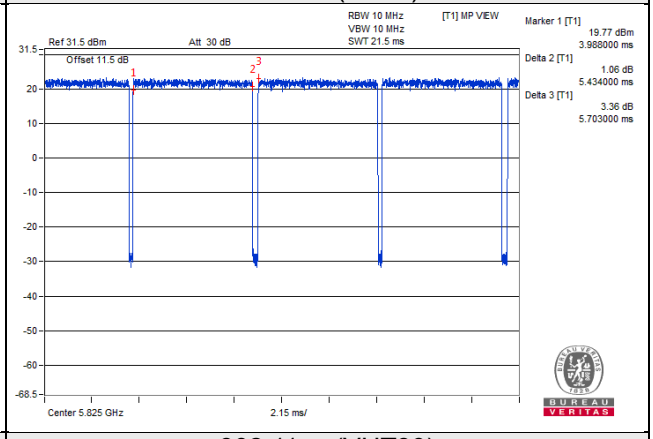
Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.079/2.211 = 0.940, Duty factor = 10 * log (1/0.940) = 0.27
802.11n (HT20): Duty cycle = 5.434/5.703 = 0.953, Duty factor = 10 * log (1/0.953) = 0.21
802.11n (HT40): Duty cycle = 5.429/5.678 = 0.956, Duty factor = 10 * log (1/0.956) = 0.19
802.11ac (VHT80): Duty cycle = 5.422/5.699 = 0.951, Duty factor = 10 * log (1/0.951) = 0.22
802.11ax (HT20): Duty cycle = 5.391/5.627 = 0.958, Duty factor = 11 * log (1/0.958) = 0.19
802.11ax (HT40): Duty cycle = 5.374/5.633 = 0.954, Duty factor = 12 * log (1/0.954) = 0.20
802.11ax (HT80): Duty cycle = 5.378/5.684 = 0.946, Duty factor = 13 * log (1/0.946) = 0.24

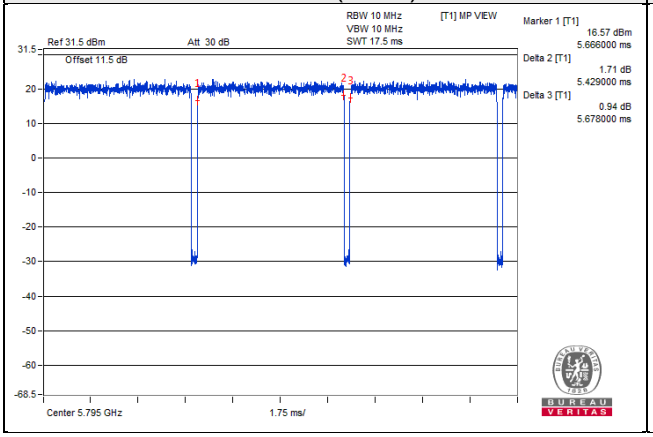
802.11a



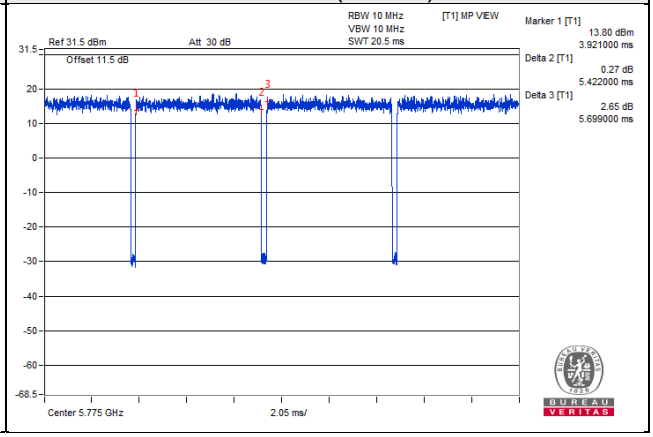
802.11n (HT20)

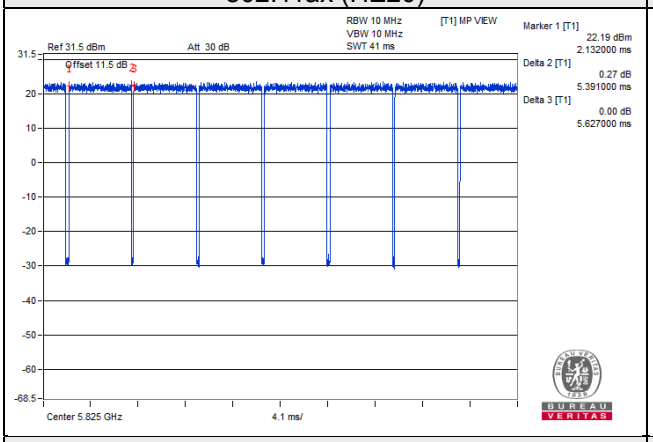
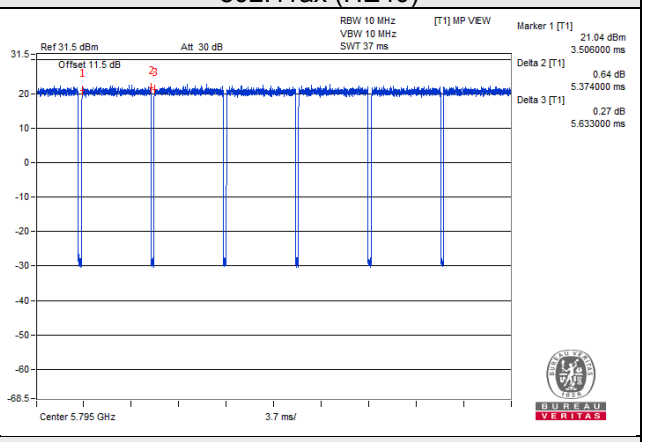
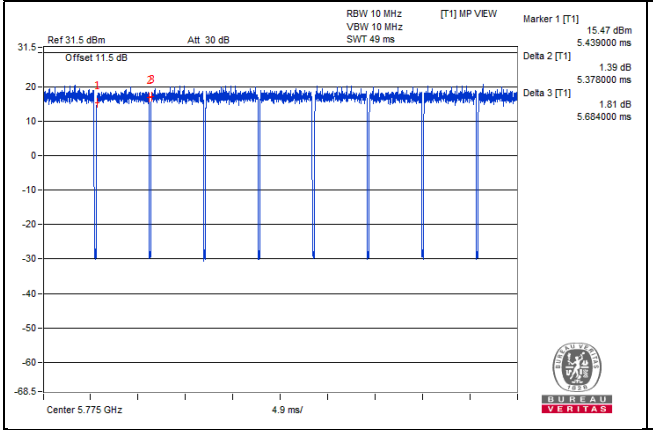


802.11n (HT40)



802.11ac (VHT80)



802.11ax (HE20)	802.11ax (HE40)
	
802.11ax (HE80)	
	

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	1HC2XM1	FCC DoC Approved	-
B.	Adapter	JG	ZZU1588-150120-2A	NA	NA	Provided by manufacturer
C.	POE	EnGenius	EPA5006GP	NA	NA	Provided by manufacturer

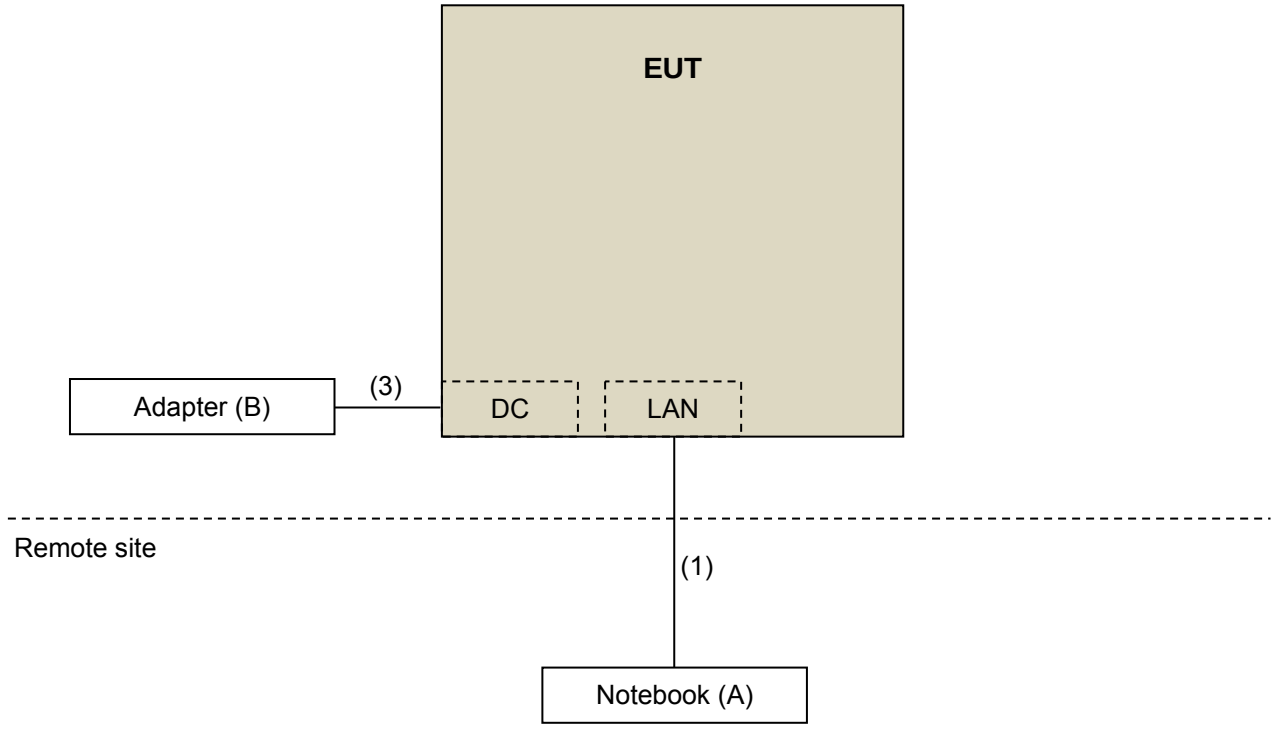
Note:

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.

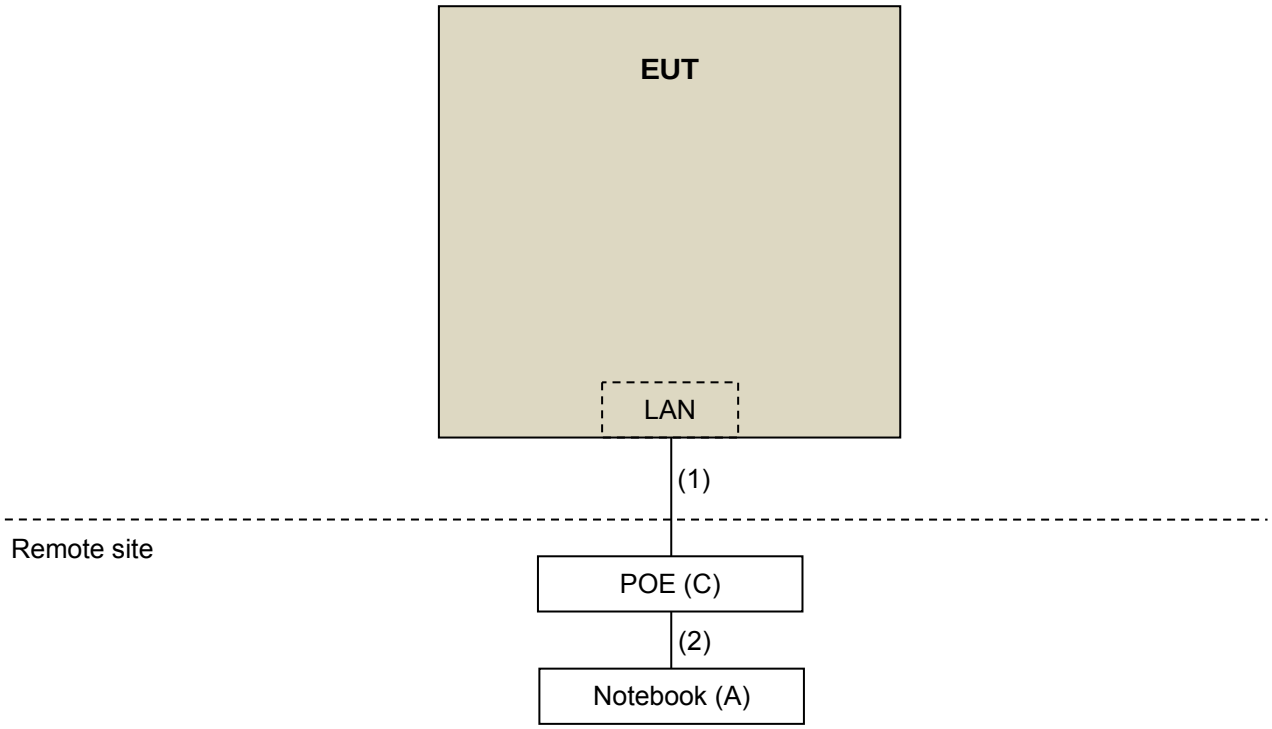
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 cable	1	6	N	0	Cat5e
2.	RJ45 cable	1	1.5	N	0	Cat5e
3.	DC cable	1	1.5	-	0	Provided by manufacturer

3.4.1 Configuration of System under Test

Test Mode A



Test Mode B



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

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></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><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></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

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 29, 2018	May 28, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna TESEQ	HLA 6121	45745	Jun. 14, 2018	Jun. 13, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-S M-8000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
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
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2018	Nov. 13, 2019
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 17, 2018	Jul. 16, 2019

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.
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 7450F-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.

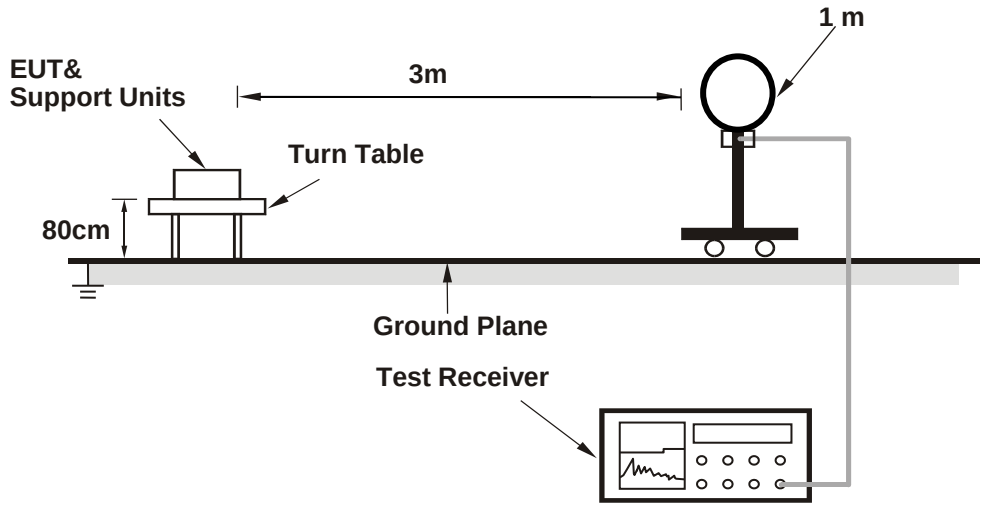
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

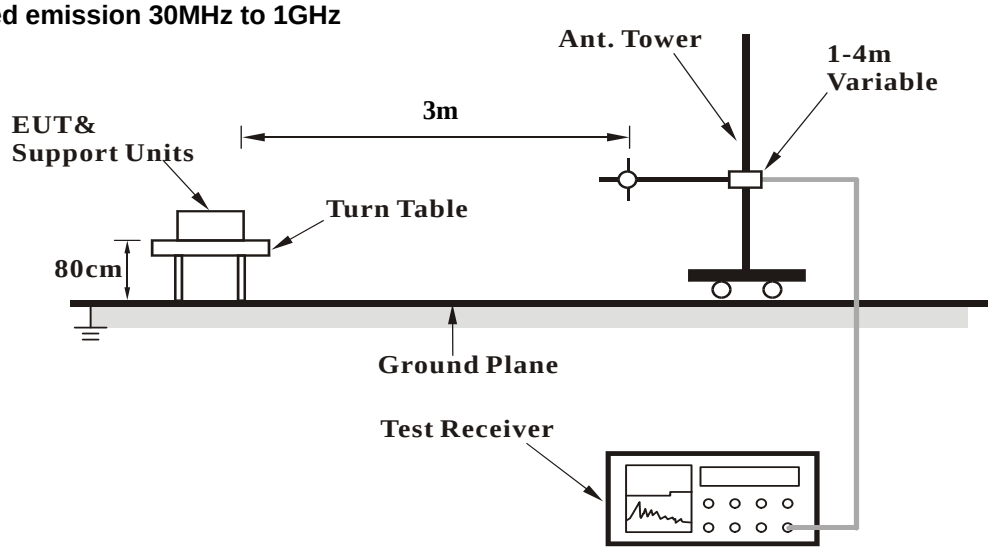
No deviation.

4.1.5 Test Setup

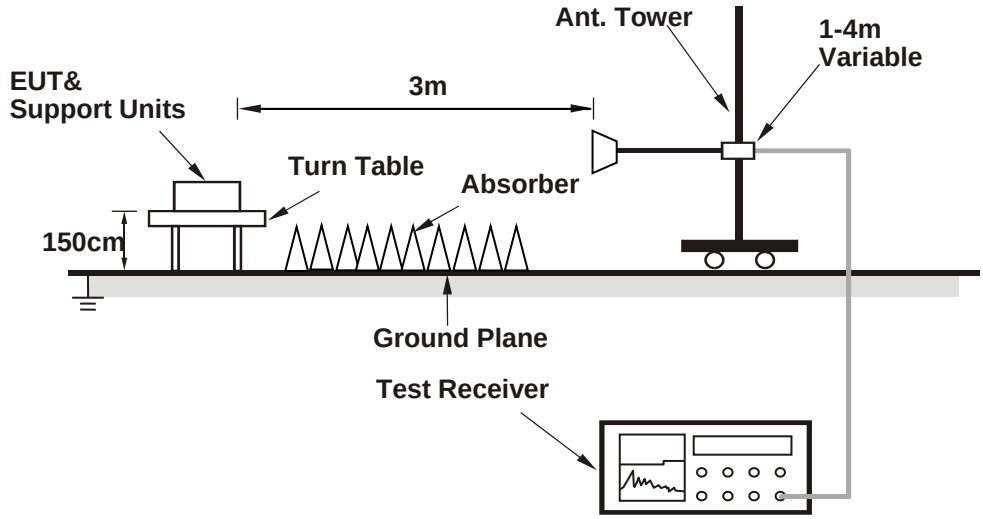
For Radiated emission below 30MHz



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

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. 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.
d. The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz data:

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	70.4 PK	74.0	-3.6	1.26 H	61	66.5	3.9
2	5150.00	52.4 AV	54.0	-1.6	1.26 H	61	48.5	3.9
3	*5180.00	111.6 PK			2.19 H	57	72.1	39.5
4	*5180.00	101.7 AV			2.19 H	57	62.2	39.5
5	#10360.00	59.0 PK	68.2	-9.2	2.18 H	303	43.2	15.8
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	5150.00	65.9 PK	74.0	-8.1	1.19 V	20	62.0	3.9
2	5150.00	49.8 AV	54.0	-4.2	1.19 V	20	45.9	3.9
3	*5180.00	110.3 PK			1.30 V	14	70.8	39.5
4	*5180.00	100.8 AV			1.30 V	14	61.3	39.5
5	#10360.00	58.8 PK	68.2	-9.4	2.19 V	334	43.0	15.8

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	113.0 PK			1.77 H	51	73.5	39.5
2	*5200.00	103.0 AV			1.77 H	51	63.5	39.5
3	#10400.00	58.9 PK	68.2	-9.3	1.46 H	55	43.0	15.9
4	15600.00	67.7 PK	74.0	-6.3	1.36 H	340	51.0	16.7
5	15600.00	52.9 AV	54.0	-1.1	1.36 H	340	36.2	16.7
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	*5200.00	111.8 PK			2.55 V	343	72.3	39.5
2	*5200.00	102.1 AV			2.55 V	343	62.6	39.5
3	#10400.00	59.1 PK	68.2	-9.1	2.22 V	328	43.2	15.9
4	15600.00	66.5 PK	74.0	-7.5	1.07 V	335	49.8	16.7
5	**15600.00**	**53.0 AV**	**54.0**	**-1.0**	**1.07 V**	**335**	**36.3**	**16.7**

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	113.0 PK			1.20 H	59	73.7	39.3
2	*5240.00	102.7 AV			1.20 H	59	63.4	39.3
3	5350.00	56.1 PK	74.0	-17.9	1.46 H	121	52.2	3.9
4	5350.00	43.4 AV	54.0	-10.6	1.46 H	121	39.5	3.9
5	#10480.00	60.0 PK	68.2	-8.2	1.25 H	21	43.2	16.8
6	15720.00	66.8 PK	74.0	-7.2	1.25 H	342	50.8	16.0
7	15720.00	52.6 AV	54.0	-1.4	1.25 H	342	36.6	16.0
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	*5240.00	111.5 PK			1.21 V	25	72.2	39.3
2	*5240.00	101.8 AV			1.21 V	25	62.5	39.3
3	5350.00	59.5 PK	74.0	-14.5	1.56 V	49	55.6	3.9
4	5350.00	43.1 AV	54.0	-10.9	1.56 V	49	39.2	3.9
5	#10480.00	59.3 PK	68.2	-8.9	1.11 V	311	42.5	16.8
6	15720.00	66.3 PK	74.0	-7.7	1.12 V	336	50.3	16.0
7	15720.00	52.6 AV	54.0	-1.4	1.12 V	336	36.6	16.0

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5625.00	54.5 PK	68.2	-13.7	1.21 H	274	50.3	4.2
2	*5745.00	111.2 PK			1.21 H	274	71.1	40.1
3	*5745.00	101.1 AV			1.21 H	274	61.0	40.1
4	#5935.26	56.4 PK	68.2	-11.8	1.21 H	274	51.5	4.9
5	11490.00	59.9 PK	74.0	-14.1	1.37 H	30	42.3	17.6
6	11490.00	50.3 AV	54.0	-3.7	1.37 H	30	32.7	17.6
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	#5628.85	57.7 PK	68.2	-10.5	3.29 V	338	53.5	4.2
2	*5745.00	112.2 PK			3.29 V	338	72.1	40.1
3	*5745.00	102.1 AV			3.29 V	338	62.0	40.1
4	#5980.77	58.8 PK	68.2	-9.4	3.29 V	338	53.7	5.1
5	11490.00	59.6 PK	74.0	-14.4	3.53 V	176	42.0	17.6
6	11490.00	49.4 AV	54.0	-4.6	3.53 V	176	31.8	17.6

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 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	#5619.23	54.3 PK	68.2	-13.9	1.15 H	280	50.0	4.3
2	*5785.00	111.7 PK			1.15 H	280	71.4	40.3
3	*5785.00	101.7 AV			1.15 H	280	61.4	40.3
4	#5979.49	57.8 PK	68.2	-10.4	1.15 H	280	52.7	5.1
5	11570.00	61.0 PK	74.0	-13.0	1.24 H	30	43.5	17.5
6	11570.00	52.4 AV	54.0	-1.6	1.24 H	30	34.9	17.5
7	#17355.00	66.4 PK	68.2	-1.8	1.40 H	335	44.8	21.6
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	#5646.79	56.6 PK	68.2	-11.6	3.43 V	338	52.4	4.2
2	*5785.00	111.5 PK			3.43 V	338	71.2	40.3
3	*5785.00	101.3 AV			3.43 V	338	61.0	40.3
4	#5928.85	57.4 PK	68.2	-10.8	3.43 V	338	52.5	4.9
5	11570.00	60.6 PK	74.0	-13.4	2.32 V	158	43.1	17.5
6	11570.00	50.7 AV	54.0	-3.3	2.32 V	158	33.2	17.5
7	#17335.00	66.7 PK	68.2	-1.5	1.93 V	345	45.5	21.2

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
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency
6. " # ": The radiated frequency is out of the restricted band

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5614.74	54.3 PK	68.2	-13.9	1.08 H	275	50.0	4.3
2	*5825.00	113.0 PK			1.08 H	275	72.6	40.4
3	*5825.00	102.9 AV			1.08 H	275	62.5	40.4
4	#5980.77	56.7 PK	68.2	-11.5	1.08 H	275	51.6	5.1
5	11650.00	61.6 PK	74.0	-12.4	1.79 H	42	44.5	17.1
6	11650.00	52.5 AV	54.0	-1.5	1.79 H	42	35.4	17.1
7	#17475.00	67.1 PK	68.2	-1.1	1.07 H	324	44.0	23.1
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	#5625.64	56.0 PK	68.2	-12.2	2.30 V	186	51.8	4.2
2	*5825.00	113.4 PK			2.30 V	186	73.0	40.4
3	*5825.00	102.4 AV			2.30 V	186	62.0	40.4
4	#5985.90	57.6 PK	68.2	-10.6	2.30 V	186	52.5	5.1
5	11650.00	61.6 PK	74.0	-12.4	3.47 V	48	44.5	17.1
6	11650.00	52.3 AV	54.0	-1.7	3.47 V	48	35.2	17.1
7	#17475.00	67.0 PK	68.2	-1.2	1.66 V	170	43.9	23.1

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

802.11ax (HE20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.5 PK	74.0	-4.5	2.29 H	58	66.0	3.5
2	5150.00	52.8 AV	54.0	-1.2	2.29 H	58	49.3	3.5
3	*5180.00	115.9 PK			2.03 H	64	76.7	39.2
4	*5180.00	102.2 AV			2.03 H	64	63.0	39.2
5	#10360.00	59.2 PK	68.2	-9.0	1.46 H	55	43.8	15.4
6	15540.00	70.8 PK	74.0	-3.2	1.60 H	58	54.6	16.2
7	15540.00	51.5 AV	54.0	-2.5	1.60 H	58	35.3	16.2
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	67.2 PK	74.0	-6.8	1.27 V	17	63.7	3.5
2	5150.00	49.0 AV	54.0	-5.0	1.27 V	17	45.5	3.5
3	*5180.00	114.4 PK			1.14 V	32	75.2	39.2
4	*5180.00	100.8 AV			1.14 V	32	61.6	39.2
5	#10360.00	58.2 PK	68.2	-10.0	2.15 V	329	42.8	15.4
6	15540.00	63.7 PK	74.0	-10.3	1.00 V	336	47.5	16.2
7	15540.00	47.0 AV	54.0	-7.0	1.00 V	336	30.8	16.2

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
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency
6. " # ": The radiated frequency is out of the restricted band

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	116.2 PK			1.26 H	62	76.7	39.5
2	*5200.00	102.7 AV			1.26 H	62	63.2	39.5
3	#10400.00	58.7 PK	68.2	-9.5	1.04 H	256	42.8	15.9
4	15600.00	66.9 PK	74.0	-7.1	1.04 H	21	50.2	16.7
5	15600.00	50.5 AV	54.0	-3.5	1.04 H	21	33.8	16.7
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	*5200.00	114.8 PK			2.52 V	346	75.3	39.5
2	*5200.00	101.3 AV			2.52 V	346	61.8	39.5
3	#10400.00	58.9 PK	68.2	-9.3	2.13 V	333	43.0	15.9
4	15600.00	65.3 PK	74.0	-8.7	1.39 V	52	48.6	16.7
5	15600.00	49.4 AV	54.0	-4.6	1.39 V	52	32.7	16.7

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.0 PK			1.86 H	48	76.7	39.3
2	*5240.00	102.4 AV			1.86 H	48	63.1	39.3
3	5350.00	56.0 PK	74.0	-18.0	2.05 H	3	52.1	3.9
4	5350.00	43.3 AV	54.0	-10.7	2.05 H	3	39.4	3.9
5	#10480.00	60.6 PK	68.2	-7.6	1.14 H	20	43.8	16.8
6	15720.00	68.2 PK	74.0	-5.8	1.24 H	324	52.2	16.0
7	15720.00	52.3 AV	54.0	-1.7	1.24 H	324	36.3	16.0
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	*5240.00	114.7 PK			1.08 V	26	75.4	39.3
2	*5240.00	101.1 AV			1.08 V	26	61.8	39.3
3	5350.00	56.7 PK	74.0	-17.3	1.55 V	93	52.8	3.9
4	5350.00	42.9 AV	54.0	-11.1	1.55 V	93	39.0	3.9
5	#10480.00	59.2 PK	68.2	-9.0	1.09 V	311	42.4	16.8
6	15720.00	68.0 PK	74.0	-6.0	1.11 V	337	52.0	16.0
7	15720.00	51.6 AV	54.0	-2.4	1.11 V	337	35.6	16.0

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5624.36	54.8 PK	68.2	-13.4	2.06 H	266	50.6	4.2
2	*5745.00	115.2 PK			2.06 H	266	75.4	39.8
3	*5745.00	101.2 AV			2.06 H	266	61.4	39.8
4	#5958.97	57.4 PK	68.2	-10.8	2.06 H	266	52.6	4.8
5	11490.00	58.5 PK	74.0	-15.5	1.40 H	28	41.7	16.8
6	11490.00	48.7 AV	54.0	-5.3	1.40 H	28	31.9	16.8
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	#5625.64	58.7 PK	68.2	-9.5	3.30 V	333	54.5	4.2
2	*5745.00	114.6 PK			3.30 V	333	74.5	40.1
3	*5745.00	101.1 AV			3.30 V	333	61.0	40.1
4	#5977.56	58.3 PK	68.2	-9.9	3.30 V	333	53.2	5.1
5	11490.00	59.7 PK	74.0	-14.3	3.54 V	173	42.1	17.6
6	11490.00	50.6 AV	54.0	-3.4	3.54 V	173	33.0	17.6

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 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	#5638.46	54.6 PK	68.2	-13.6	2.05 H	269	50.4	4.2
2	*5785.00	114.3 PK			2.05 H	269	74.0	40.3
3	*5785.00	100.4 AV			2.05 H	269	60.1	40.3
4	#5980.13	56.8 PK	68.2	-11.4	2.05 H	269	51.7	5.1
5	11570.00	59.2 PK	74.0	-14.8	1.29 H	31	41.7	17.5
6	11570.00	50.7 AV	54.0	-3.3	1.29 H	31	33.2	17.5
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	#5629.49	55.4 PK	68.2	-12.8	3.37 V	330	51.2	4.2
2	*5785.00	115.6 PK			3.37 V	330	75.3	40.3
3	*5785.00	101.7 AV			3.37 V	330	61.4	40.3
4	#5971.15	57.8 PK	68.2	-10.4	3.37 V	330	52.8	5.0
5	11570.00	60.5 PK	74.0	-13.5	3.66 V	174	43.0	17.5
6	11570.00	52.1 AV	54.0	-1.9	3.66 V	174	34.6	17.5

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5607.69	54.3 PK	68.2	-13.9	1.91 H	60	50.0	4.3
2	*5825.00	113.8 PK			1.91 H	60	73.4	40.4
3	*5825.00	99.9 AV			1.91 H	60	59.5	40.4
4	#5945.51	56.4 PK	68.2	-11.8	1.91 H	60	51.5	4.9
5	11650.00	62.9 PK	74.0	-11.1	1.00 H	53	45.8	17.1
6	11650.00	52.4 AV	54.0	-1.6	1.00 H	53	35.3	17.1
7	#17475.00	66.9 PK	68.2	-1.3	1.01 H	324	43.8	23.1
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	#5632.05	56.5 PK	68.2	-11.7	3.83 V	335	52.3	4.2
2	*5825.00	114.9 PK			3.83 V	335	74.5	40.4
3	*5825.00	101.6 AV			3.83 V	335	61.2	40.4
4	#5997.44	58.5 PK	68.2	-9.7	3.83 V	335	53.4	5.1
5	11650.00	61.2 PK	74.0	-12.8	3.43 V	161	44.1	17.1
6	11650.00	52.8 AV	54.0	-1.2	3.43 V	161	35.7	17.1
7	#17475.00	67.1 PK	68.2	-1.1	2.27 V	357	44.0	23.1

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

802.11ax (HE40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.1 PK	74.0	-5.9	2.17 H	359	64.6	3.5
2	5150.00	52.2 AV	54.0	-1.8	2.17 H	359	48.7	3.5
3	*5190.00	108.8 PK			2.24 H	354	69.5	39.3
4	*5190.00	95.2 AV			2.24 H	354	55.9	39.3
5	#10380.00	58.3 PK	68.2	-9.9	1.46 H	74	42.8	15.5
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	61.7 PK	74.0	-12.3	1.59 V	42	58.2	3.5
2	5150.00	47.1 AV	54.0	-6.9	1.59 V	42	43.6	3.5
3	*5190.00	104.7 PK			1.49 V	23	65.4	39.3
4	*5190.00	92.1 AV			1.49 V	23	52.8	39.3
5	#10380.00	57.8 PK	68.2	-10.4	1.21 V	306	42.3	15.5

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.5 PK	74.0	-7.5	1.00 H	56	62.6	3.9
2	5150.00	52.3 AV	54.0	-1.7	1.00 H	56	48.4	3.9
3	*5230.00	112.7 PK			1.86 H	51	73.4	39.3
4	*5230.00	99.9 AV			1.86 H	51	60.6	39.3
5	5350.00	61.4 PK	74.0	-12.6	1.60 H	61	57.5	3.9
6	5350.00	47.7 AV	54.0	-6.3	1.60 H	61	43.8	3.9
7	#10460.00	59.5 PK	68.2	-8.7	1.26 H	56	42.9	16.6
8	15690.00	67.5 PK	74.0	-6.5	1.66 H	340	51.4	16.1
9	15690.00	51.8 AV	54.0	-2.2	1.66 H	340	35.7	16.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.1 PK	74.0	-8.9	2.85 V	332	61.2	3.9
2	5150.00	50.4 AV	54.0	-3.6	2.85 V	332	46.5	3.9
3	*5230.00	109.5 PK			1.46 V	37	70.2	39.3
4	*5230.00	96.6 AV			1.46 V	37	57.3	39.3
5	5350.00	59.7 PK	74.0	-14.3	3.04 V	119	55.8	3.9
6	5350.00	45.5 AV	54.0	-8.5	3.04 V	119	41.6	3.9
7	#10460.00	59.0 PK	68.2	-9.2	1.41 V	277	42.4	16.6
8	15690.00	63.4 PK	74.0	-10.6	1.32 V	51	47.3	16.1
9	15690.00	48.6 AV	54.0	-5.4	1.32 V	51	32.5	16.1

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5633.97	62.4 PK	68.2	-5.8	1.21 H	271	58.2	4.2
2	#5635.00	66.1 PK	68.2	-2.1	1.27 H	273	61.9	4.2
3	*5755.00	112.4 PK			1.21 H	271	72.6	39.8
4	*5755.00	97.7 AV			1.21 H	271	57.9	39.8
5	#5995.51	59.0 PK	68.2	-9.2	1.21 H	271	54.0	5.0
6	11510.00	59.2 PK	74.0	-14.8	1.14 H	45	42.3	16.9
7	11510.00	49.5 AV	54.0	-4.5	1.14 H	45	32.6	16.9
8	#17265.00	64.0 PK	68.2	-4.2	1.32 H	333	43.2	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	#5630.00	66.7 PK	68.2	-1.5	2.98 V	338	62.5	4.2
2	#5634.62	62.0 PK	68.2	-6.2	3.00 V	340	57.8	4.2
3	*5755.00	111.0 PK			3.00 V	340	71.2	39.8
4	*5755.00	97.4 AV			3.00 V	340	57.6	39.8
5	#5975.64	58.0 PK	68.2	-10.2	3.00 V	340	53.0	5.0
6	11510.00	59.3 PK	74.0	-14.7	3.24 V	154	42.4	16.9
7	11510.00	50.1 AV	54.0	-3.9	3.24 V	154	33.2	16.9
8	#17265.00	63.0 PK	68.2	-5.2	2.61 V	281	42.2	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 159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5602.56	55.9 PK	68.2	-12.3	2.89 H	289	51.6	4.3
2	*5795.00	113.4 PK			2.89 H	289	73.0	40.4
3	*5795.00	100.6 AV			2.89 H	289	60.2	40.4
4	#5925.00	65.9 PK	68.2	-2.3	3.09 H	311	61.0	4.9
5	#5937.18	60.0 PK	68.2	-8.2	2.89 H	289	55.1	4.9
6	11590.00	60.6 PK	74.0	-13.4	1.87 H	43	43.1	17.5
7	11590.00	52.1 AV	54.0	-1.9	1.87 H	43	34.6	17.5
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	#5600.64	55.5 PK	68.2	-12.7	3.87 V	332	51.2	4.3
2	*5795.00	110.0 PK			3.87 V	332	69.6	40.4
3	*5795.00	96.1 AV			3.87 V	332	55.7	40.4
4	#5925.00	64.1 PK	68.2	-4.1	3.57 V	322	59.2	4.9
5	#5932.05	58.4 PK	68.2	-9.8	3.87 V	332	53.5	4.9
6	11590.00	61.5 PK	74.0	-12.5	1.32 V	151	44.0	17.5
7	11590.00	52.3 AV	54.0	-1.7	1.32 V	151	34.8	17.5

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

802.11ax (HE80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.7 PK	74.0	-5.3	2.14 H	359	65.2	3.5
2	5150.00	52.9 AV	54.0	-1.1	2.14 H	359	49.4	3.5
3	*5210.00	106.0 PK			2.24 H	355	66.8	39.2
4	*5210.00	92.6 AV			2.24 H	355	53.4	39.2
5	5350.00	56.9 PK	74.0	-17.1	2.05 H	342	53.2	3.7
6	5350.00	43.1 AV	54.0	-10.9	2.05 H	342	39.4	3.7
7	#10420.00	58.0 PK	68.2	-10.2	1.83 H	39	42.3	15.7
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	5150.00	64.2 PK	74.0	-9.8	1.70 V	48	60.7	3.5
2	5150.00	49.6 AV	54.0	-4.4	1.70 V	48	46.1	3.5
3	*5210.00	103.4 PK			1.49 V	17	64.2	39.2
4	*5210.00	90.1 AV			1.49 V	17	50.9	39.2
5	5350.00	56.9 PK	74.0	-17.1	1.96 V	58	53.2	3.7
6	5350.00	43.2 AV	54.0	-10.8	1.96 V	58	39.5	3.7
7	#10420.00	57.7 PK	68.2	-10.5	1.05 V	352	42.0	15.7

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5650.00	64.6 PK	68.2	-3.6	1.27 H	277	60.3	4.3
2	#5650.00	61.0 PK	68.2	-7.2	1.04 H	279	56.7	4.3
3	*5775.00	108.5 PK			1.04 H	279	68.5	40.0
4	*5775.00	95.0 AV			1.04 H	279	55.0	40.0
5	#5925.00	66.6 PK	68.2	-1.6	1.00 H	275	61.7	4.9
6	#5928.85	62.4 PK	68.2	-5.8	1.04 H	279	57.5	4.9
7	11550.00	60.0 PK	74.0	-14.0	1.19 H	52	43.0	17.0
8	11550.00	49.8 AV	54.0	-4.2	1.19 H	52	32.8	17.0
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	#5621.15	59.9 PK	68.2	-8.3	2.72 V	332	55.7	4.2
2	#5650.00	65.2 PK	68.2	-3.0	2.98 V	340	60.9	4.3
3	*5775.00	108.6 PK			2.72 V	332	68.6	40.0
4	*5775.00	95.3 AV			2.72 V	332	55.3	40.0
5	#5925.00	59.0 PK	68.2	-9.2	3.01 V	345	54.1	4.9
6	#5965.38	61.1 PK	68.2	-7.1	2.72 V	332	56.3	4.8
7	11550.00	59.9 PK	74.0	-14.1	3.53 V	158	42.9	17.0
8	11550.00	51.6 AV	54.0	-2.4	3.53 V	158	34.6	17.0

Remarks:

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

Below 1GHz Worst-Case Data:

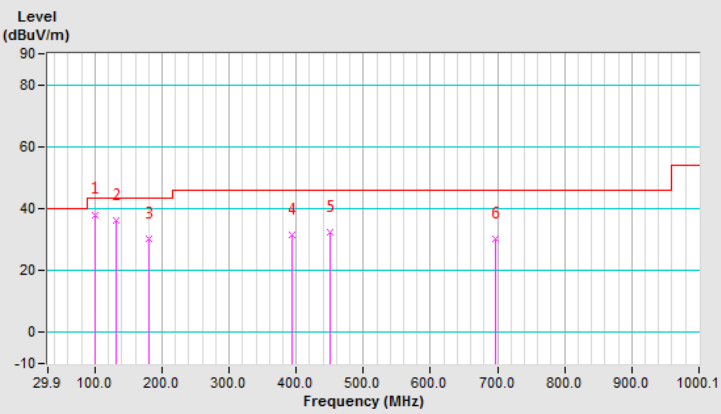
802.11a

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	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	99.89	38.1 QP	43.5	-5.4	1.99 H	109	51.7	-13.6
2	131.00	36.3 QP	43.5	-7.2	1.99 H	253	46.8	-10.5
3	179.61	30.3 QP	43.5	-13.2	1.50 H	238	40.5	-10.2
4	393.48	31.6 QP	46.0	-14.4	1.99 H	143	37.4	-5.8
5	449.87	32.2 QP	46.0	-13.8	1.99 H	199	36.5	-4.3
6	696.79	30.1 QP	46.0	-15.9	1.50 H	213	29.9	0.2

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

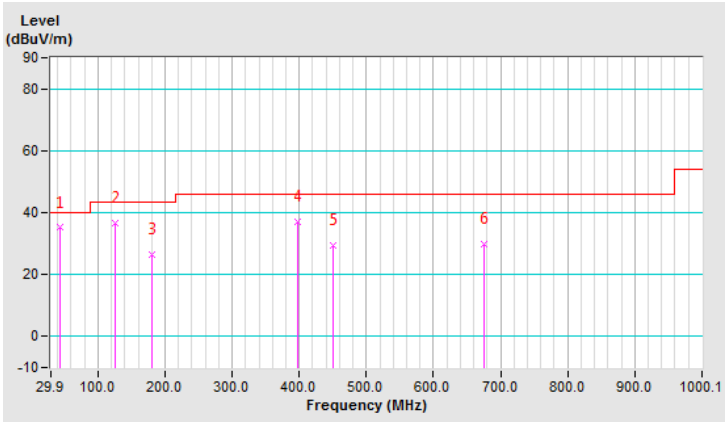


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

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	43.51	35.1 QP	40.0	-4.9	1.01 V	328	45.1	-10.0
2	125.17	36.6 QP	43.5	-6.9	1.01 V	354	47.6	-11.0
3	179.61	26.5 QP	43.5	-17.0	1.01 V	94	36.7	-10.2
4	397.37	36.9 QP	46.0	-9.1	1.51 V	198	42.5	-5.6
5	449.87	29.5 QP	46.0	-16.5	1.51 V	11	33.8	-4.3
6	675.40	29.9 QP	46.0	-16.1	1.51 V	221	30.1	-0.2

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

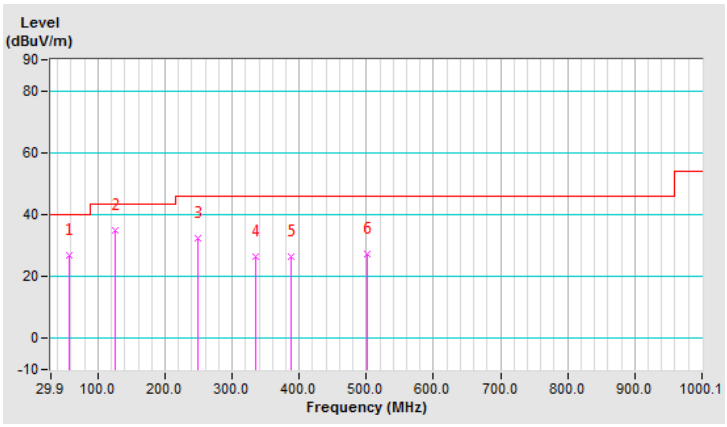


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	57.12	26.7 QP	40.0	-13.3	1.99 H	159	36.8	-10.1
2	125.17	35.0 QP	43.5	-8.5	1.50 H	97	46.0	-11.0
3	249.60	32.3 QP	46.0	-13.7	1.00 H	126	41.4	-9.1
4	335.15	26.3 QP	46.0	-19.7	1.00 H	6	33.0	-6.7
5	387.65	26.5 QP	46.0	-19.5	1.00 H	330	32.3	-5.8
6	500.42	27.3 QP	46.0	-18.7	1.50 H	102	30.9	-3.6

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 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

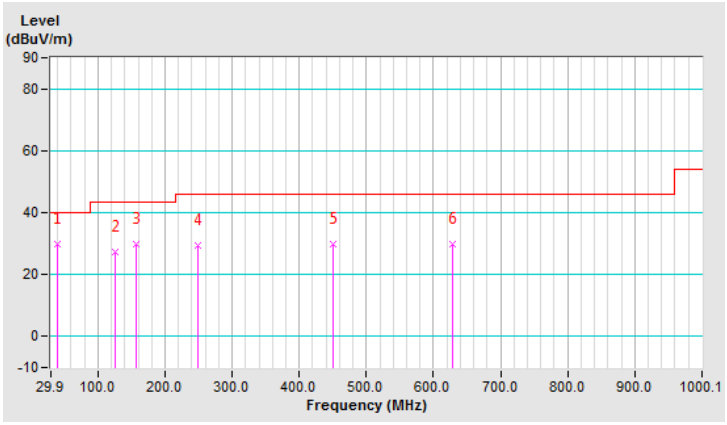


CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	39.62	29.9 QP	40.0	-10.1	1.01 V	150	40.3	-10.4
2	125.17	27.3 QP	43.5	-16.2	2.00 V	198	38.3	-11.0
3	156.28	29.9 QP	43.5	-13.6	1.01 V	263	39.0	-9.1
4	249.60	29.4 QP	46.0	-16.6	1.01 V	59	38.5	-9.1
5	449.87	29.8 QP	46.0	-16.2	1.01 V	332	34.1	-4.3
6	628.74	29.8 QP	46.0	-16.2	1.51 V	160	30.4	-0.6

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 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

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 08, 2018	Feb. 07, 2019
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 26, 2018	Feb. 25, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 2019
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 1.
3. The VCCI Site Registration No. is C-2040.

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.

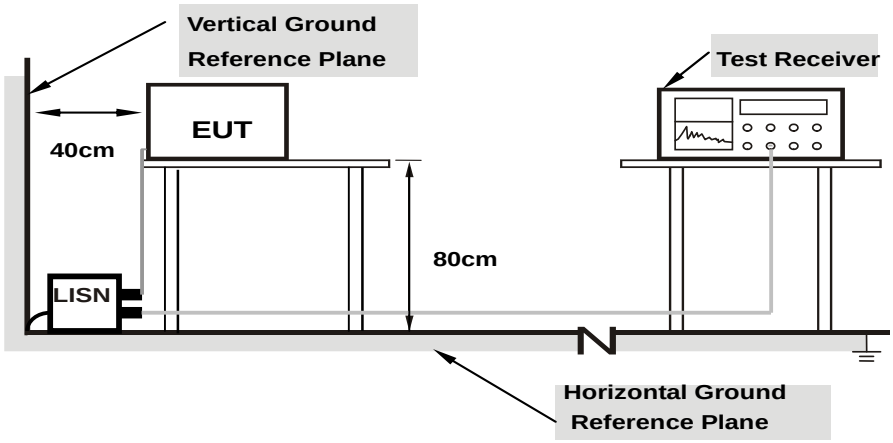
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

Worst-case data:

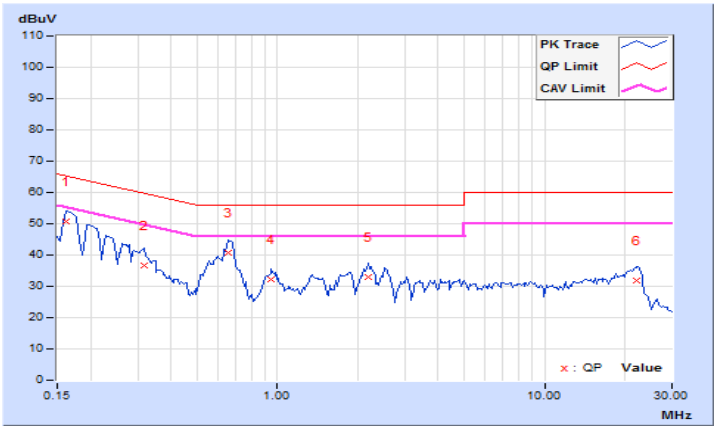
802.11a

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.73	41.03	25.01	50.76	34.74	65.38	55.38	-14.62	-20.64
2	0.31797	9.74	26.83	22.60	36.57	32.34	59.76	49.76	-23.19	-17.42
3	0.65781	9.72	31.06	24.86	40.78	34.58	56.00	46.00	-15.22	-11.42
4	0.94688	9.69	22.38	16.74	32.07	26.43	56.00	46.00	-23.93	-19.57
5	2.20313	9.75	23.36	16.51	33.11	26.26	56.00	46.00	-22.89	-19.74
6	22.14063	9.95	21.82	16.30	31.77	26.25	60.00	50.00	-28.23	-23.75

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.

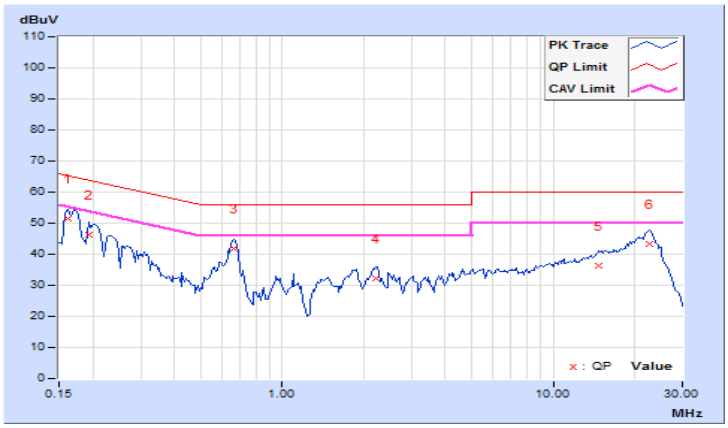


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

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	0.16172	9.72	41.60	25.47	51.32	35.19	65.38	55.38	-14.06	-20.19
2	0.19297	9.73	36.43	18.41	46.16	28.14	63.91	53.91	-17.75	-25.77
3	0.66172	9.74	32.02	25.88	41.76	35.62	56.00	46.00	-14.24	-10.38
4	2.21094	9.74	22.38	16.25	32.12	25.99	56.00	46.00	-23.88	-20.01
5	14.73047	10.00	26.36	21.33	36.36	31.33	60.00	50.00	-23.64	-18.67
6	22.55078	10.10	33.15	27.88	43.25	37.98	60.00	50.00	-16.75	-12.02

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.

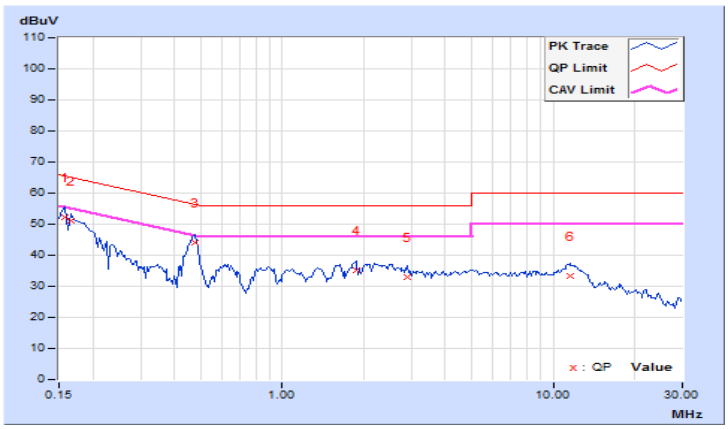


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

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	0.15781	9.67	42.61	28.29	52.28	37.96	65.58	55.58	-13.30	-17.62
2	0.16562	9.67	41.28	25.84	50.95	35.51	65.18	55.18	-14.23	-19.67
3	0.47422	9.66	34.50	30.53	44.16	40.19	56.44	46.44	-12.28	-6.25
4	1.87109	9.68	25.37	21.38	35.05	31.06	56.00	46.00	-20.95	-14.94
5	2.88672	9.70	23.27	18.43	32.97	28.13	56.00	46.00	-23.03	-17.87
6	11.53125	9.86	23.46	18.46	33.32	28.32	60.00	50.00	-26.68	-21.68

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.

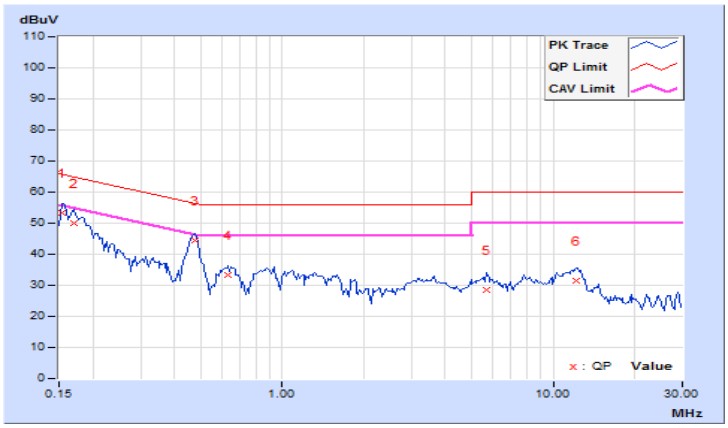


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

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	0.15391	9.68	43.62	29.00	53.30	38.68	65.79	55.79	-12.49	-17.11
2	0.16953	9.68	40.35	25.68	50.03	35.36	64.98	54.98	-14.95	-19.62
3	**0.47422**	**9.67**	**34.87**	**30.98**	**44.54**	**40.65**	**56.44**	**46.44**	**-11.90**	**-5.79**
4	0.63047	9.66	23.65	19.11	33.31	28.77	56.00	46.00	-22.69	-17.23
5	5.70313	9.77	18.79	12.71	28.56	22.48	60.00	50.00	-31.44	-27.52
6	12.17969	9.89	21.66	16.60	31.55	26.49	60.00	50.00	-28.45	-23.51

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)

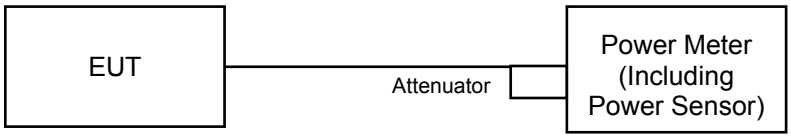
*B is the 26 dB emission bandwidth in megahertz

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



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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating 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				
36	5180	18.11	18.65	137.996	21.40	30.00	Pass
40	5200	18.88	19.41	**164.565**	22.16	30.00	Pass
48	5240	18.53	19.11	152.755	21.84	30.00	Pass
149	5745	19.99	19.81	**195.489**	22.91	30.00	Pass
157	5785	19.83	19.34	182.062	22.60	30.00	Pass
165	5825	18.71	18.91	152.106	21.82	30.00	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	17.42	18.11	119.922	20.79	30.00	Pass
40	5200	18.55	19.00	151.047	21.79	30.00	Pass
48	5240	18.18	18.83	142.150	21.53	30.00	Pass
149	5745	19.28	19.34	170.624	22.32	30.00	Pass
157	5785	19.08	19.22	164.470	22.16	30.00	Pass
165	5825	17.96	18.46	132.663	21.23	30.00	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.42	16.27	77.198	18.88	30.00	Pass
46	5230	18.13	18.94	143.356	21.56	30.00	Pass
151	5755	18.04	18.38	132.545	21.22	30.00	Pass
159	5795	19.40	19.36	173.394	22.39	30.00	Pass

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				
42	5210	15.29	15.93	72.980	18.63	30.00	Pass
155	5775	17.89	18.09	125.935	21.00	30.00	Pass

802.11ax (HE20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	17.71	18.13	124.033	20.94	30.00	Pass
40	5200	18.35	19.18	151.185	21.80	30.00	Pass
48	5240	18.30	18.91	145.412	21.63	30.00	Pass
149	5745	19.33	19.45	173.809	22.40	30.00	Pass
157	5785	19.11	19.33	167.174	22.23	30.00	Pass
165	5825	18.11	18.71	139.016	21.43	30.00	Pass

802.11ax (HE40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	15.61	16.17	77.792	18.91	30.00	Pass
46	5230	18.22	18.91	144.178	21.59	30.00	Pass
151	5755	18.02	18.42	132.889	21.23	30.00	Pass
159	5795	19.46	19.33	174.012	22.41	30.00	Pass

802.11ax (HE80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	15.50	15.91	74.475	18.72	30.00	Pass
155	5775	17.92	18.21	128.166	21.08	30.00	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.41	15.10	59.965	17.78	28.39	Pass
40	5200	15.54	15.99	75.529	18.78	28.39	Pass
48	5240	15.17	15.82	71.079	18.52	28.39	Pass
149	5745	16.27	16.33	85.318	19.31	28.39	Pass
157	5785	16.07	16.21	82.241	19.15	28.39	Pass
165	5825	14.95	15.45	66.336	18.22	28.39	Pass

Note: Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power limit shall be reduced to 30-(7.61-6) = 28.39dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	12.41	13.26	38.602	15.87	28.39	Pass
46	5230	15.12	15.93	71.683	18.55	28.39	Pass
151	5755	15.03	15.37	66.277	18.21	28.39	Pass
159	5795	16.39	16.35	86.703	19.38	28.39	Pass

Note: Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power limit shall be reduced to 30-(7.61-6) = 28.39dBm.

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				
42	5210	12.28	12.92	36.492	15.62	28.39	Pass
155	5775	14.88	15.08	62.972	17.99	28.39	Pass

Note: Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power limit shall be reduced to 30-(7.61-6) = 28.39dBm.

802.11ax (HE20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.70	15.12	62.021	17.93	28.39	Pass
40	5200	15.34	16.17	**75.598**	18.79	28.39	Pass
48	5240	15.29	15.90	72.711	18.62	28.39	Pass
149	5745	16.32	16.44	86.910	19.39	28.39	Pass
157	5785	16.10	16.32	83.593	19.22	28.39	Pass
165	5825	15.10	15.70	69.513	18.42	28.39	Pass

Note: Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power limit shall be reduced to 30-(7.61-6) = 28.39dBm.

802.11ax (HE40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	12.60	13.16	38.898	15.90	28.39	Pass
46	5230	15.21	15.90	72.094	18.58	28.39	Pass
151	5755	15.01	15.41	66.450	18.22	28.39	Pass
159	5795	16.45	16.32	**87.012**	19.40	28.39	Pass

Note: Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power limit shall be reduced to 30-(7.61-6) = 28.39dBm.

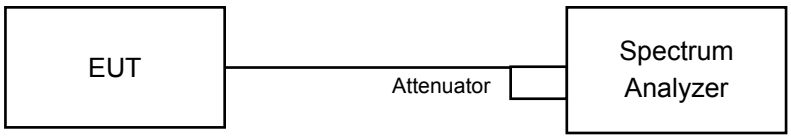
802.11ax (HE80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	12.49	12.90	37.240	15.71	28.39	Pass
155	5775	14.91	15.20	64.087	18.07	28.39	Pass

Note: Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power limit shall be reduced to 30-(7.61-6) = 28.39dBm.

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
36	5180	17.28	17.76
40	5200	18.72	19.92
48	5240	19.08	19.56
149	5745	18.00	18.00
157	5785	17.76	17.76
165	5825	21.96	17.28

802.11n (HT20)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.08	19.08
40	5200	19.08	19.32
48	5240	19.08	19.20
149	5745	19.08	19.08
157	5785	19.08	19.08
165	5825	19.04	19.08

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	37.92	38.04
46	5230	38.16	38.40
151	5755	38.04	38.16
159	5795	38.16	38.16

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	77.28	77.28
155	5775	77.52	77.52

802.11ax (HE20)

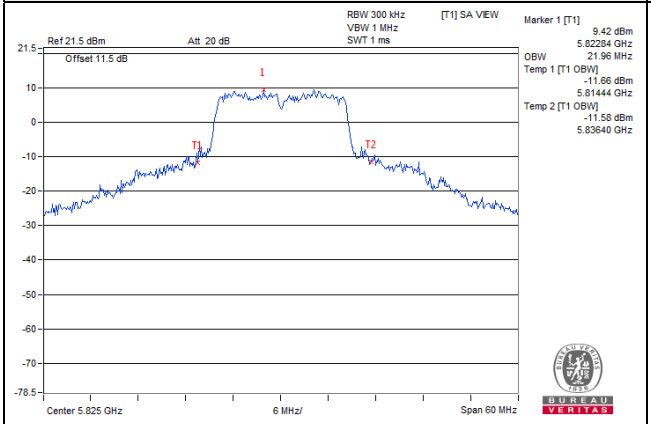
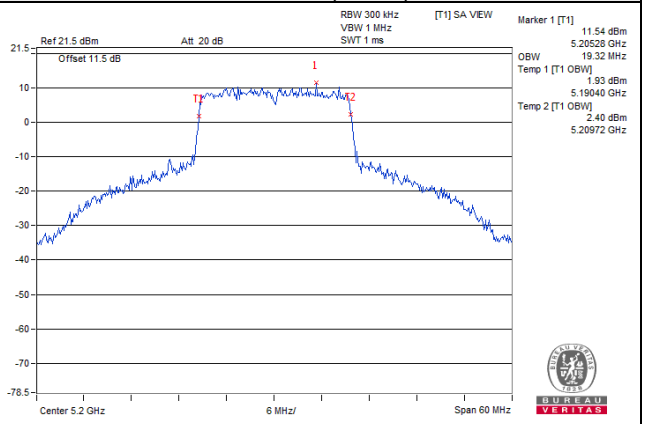
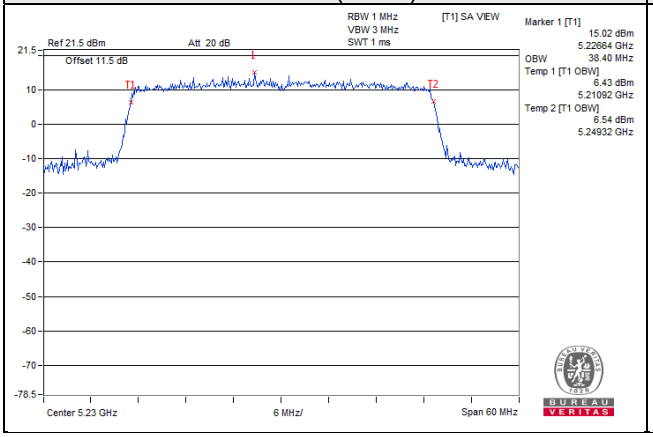
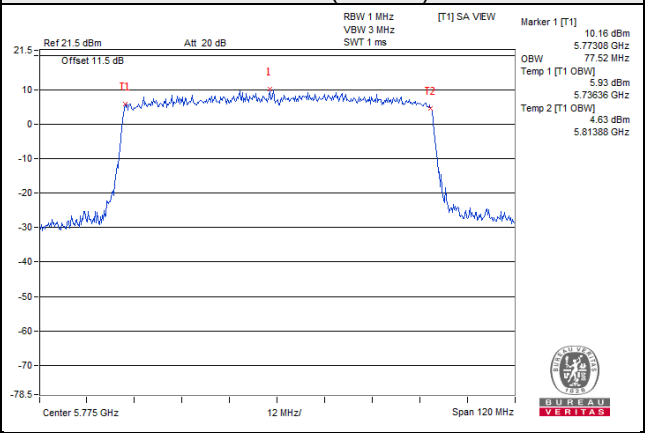
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	17.76	18.12
48	5240	17.88	18.00
149	5745	17.76	17.64
157	5785	17.76	17.64
165	5825	17.64	17.64

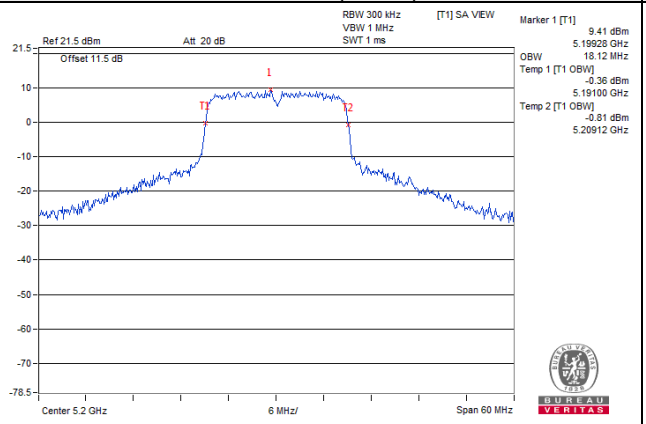
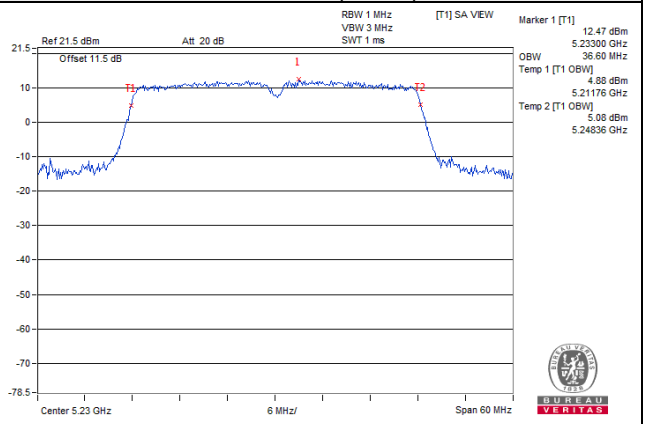
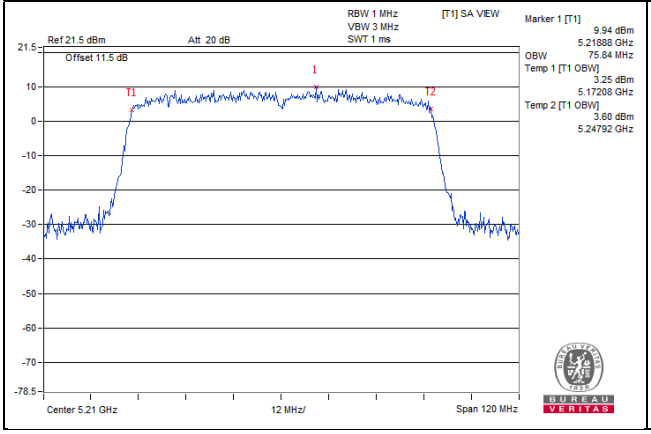
802.11ax (HE40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.36	36.36
46	5230	36.36	36.60
151	5755	36.24	36.36
159	5795	36.48	36.48

802.11ax (HE80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.84	75.60
155	5775	75.60	75.60

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

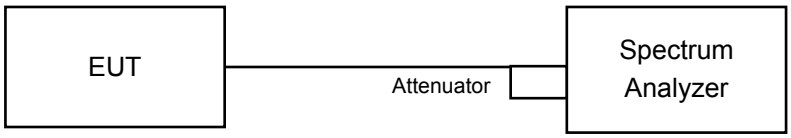
Spectrum Plot of Worst Value	
802.11ax (HE20)	802.11ax (HE40)
	
802.11ax (HE80)	
	

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

For U-NII-1 band:

Using method SA-2

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.

b. Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS

c. Set Channel power measure = 1MHz

d. Sweep time = auto, trigger set to “free run”.

e. Trace average at least 100 traces in power averaging mode.

f. Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.

b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS

c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.

d. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz / 300 kHz)

e. Sweep time = auto, trigger set to “free run”.

f. Trace average at least 100 traces in power averaging mode.

g. 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

For U-NII-1 band:

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				
36	5180	3.45	4.04	0.27	7.04	15.39	Pass
40	5200	4.33	5.09	0.27	8.01	15.39	Pass
48	5240	3.91	4.92	0.27	7.72	15.39	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. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

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				
36	5180	2.51	3.22	0.21	6.10	15.39	Pass
40	5200	3.56	4.51	0.21	7.28	15.39	Pass
48	5240	3.55	4.06	0.21	7.03	15.39	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. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

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				
38	5190	-2.64	-1.54	0.19	1.15	15.39	Pass
46	5230	0.63	1.68	0.19	4.39	15.39	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. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
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				
42	5210	-5.25	-4.62	0.22	-1.69	15.39	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. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

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				
36	5180	3.07	3.85	0.19	6.68	15.39	Pass
40	5200	4.16	5.02	0.19	7.81	15.39	Pass
48	5240	3.55	4.36	0.19	7.17	15.39	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. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

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				
38	5190	-2.15	-0.96	0.20	1.70	15.39	Pass
46	5230	1.01	1.89	0.20	4.68	15.39	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. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

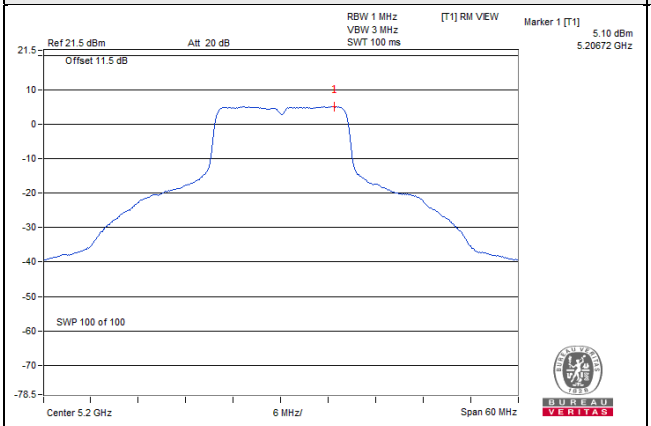
802.11ax (HE80)

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				
42	5210	-5.05	-4.23	0.24	-1.37	15.39	Pass

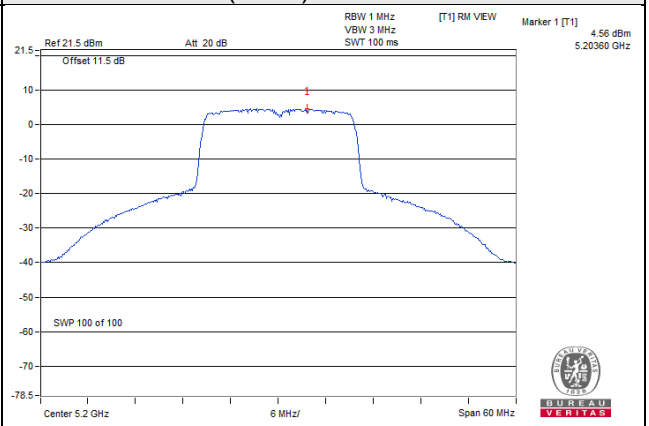
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 17-(7.61-6) = 15.39dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

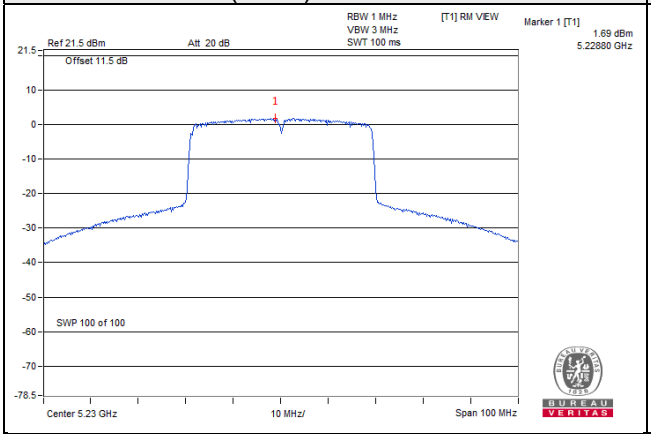
802.11a / Chain 1 / CH 40



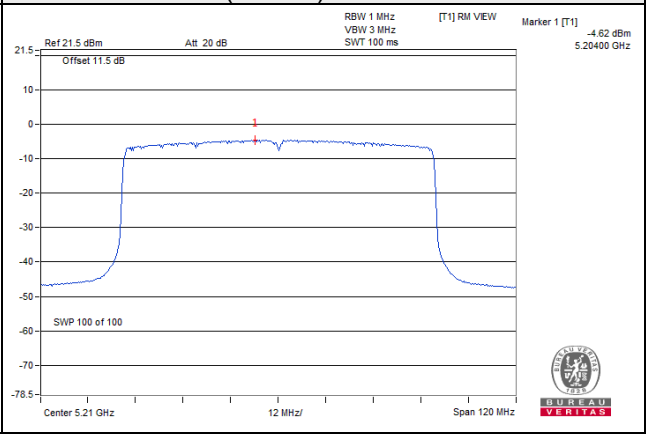
802.11n (HT20) / Chain 1 / CH 40

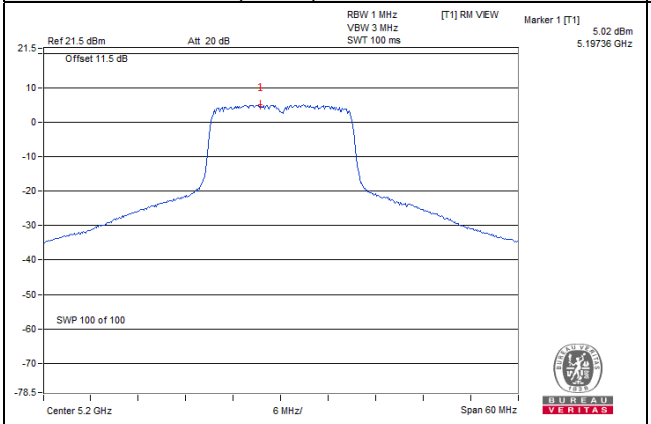
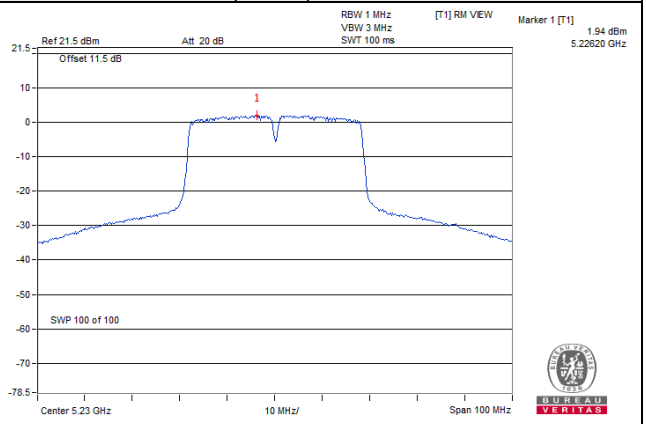
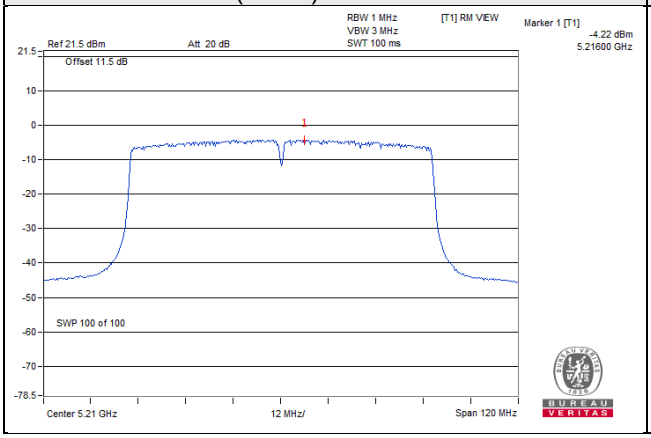


802.11n (HT40) / Chain 1 / CH 46



802.11ac (VHT80) / Chain 1 / CH 42



Spectrum Plot of Worst Value	
802.11ax (HE20) / Chain 1 / CH 40	802.11ax (HE40) / Chain 1 / CH 46
	
802.11ax (HE80) / Chain 1 / CH 42	
	

For U-NII-3 band:

802.11a

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	-2.33	-0.11	3.01	0.27	3.17	28.39	Pass
	157	5785	-2.31	-0.09	3.01	0.27	3.19	28.39	Pass
	165	5825	-3.02	-0.80	3.01	0.27	2.48	28.39	Pass
1	149	5745	-2.82	-0.60	3.01	0.27	2.68	28.39	Pass
	157	5785	-3.06	-0.84	3.01	0.27	2.44	28.39	Pass
	165	5825	-3.66	-1.44	3.01	0.27	1.84	28.39	Pass

Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	-3.77	-1.55	3.01	0.21	1.67	28.39	Pass
	157	5785	-3.91	-1.69	3.01	0.21	1.53	28.39	Pass
	165	5825	-4.64	-2.42	3.01	0.21	0.80	28.39	Pass
1	149	5745	-4.17	-1.95	3.01	0.21	1.27	28.39	Pass
	157	5785	-4.77	-2.55	3.01	0.21	0.67	28.39	Pass
	165	5825	-5.51	-3.29	3.01	0.21	-0.07	28.39	Pass

Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-8.58	-6.36	3.01	0.19	-3.16	28.39	Pass
	159	5795	-6.56	-4.34	3.01	0.19	-1.14	28.39	Pass
1	151	5755	-8.40	-6.18	3.01	0.19	-2.98	28.39	Pass
	159	5795	-7.18	-4.96	3.01	0.19	-1.76	28.39	Pass

Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-11.69	-9.47	3.01	0.22	-6.24	28.39	Pass
1	155	5775	-11.44	-9.22	3.01	0.22	-5.99	28.39	Pass

Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	-2.35	-0.13	3.01	0.19	3.07	28.39	Pass
	157	5785	-2.56	-0.34	3.01	0.19	2.86	28.39	Pass
	165	5825	-4.25	-2.03	3.01	0.19	1.17	28.39	Pass
1	149	5745	-2.99	-0.77	3.01	0.19	2.43	28.39	Pass
	157	5785	-3.67	-1.45	3.01	0.19	1.75	28.39	Pass
	165	5825	-3.61	-1.39	3.01	0.19	1.81	28.39	Pass

Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-7.51	-5.29	3.01	0.20	-2.08	28.39	Pass
	159	5795	-5.60	-3.38	3.01	0.20	-0.17	28.39	Pass
1	151	5755	-7.86	-5.64	3.01	0.20	-2.43	28.39	Pass
	159	5795	-6.43	-4.21	3.01	0.20	-1.00	28.39	Pass

Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

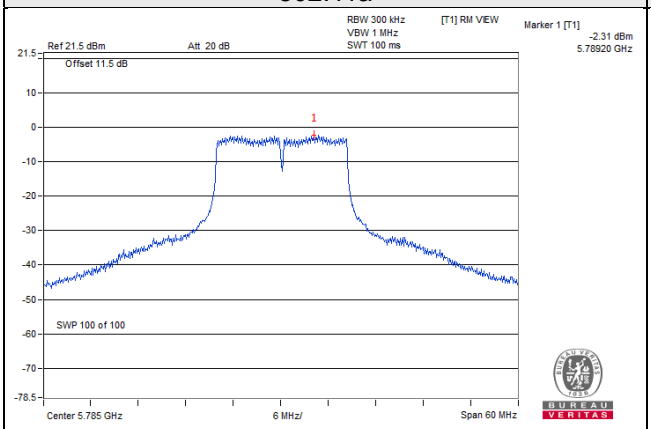
802.11ax (HE80)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-10.73	-8.51	3.01	0.24	-5.26	28.39	Pass
1	155	5775	-11.39	-9.17	3.01	0.24	-5.92	28.39	Pass

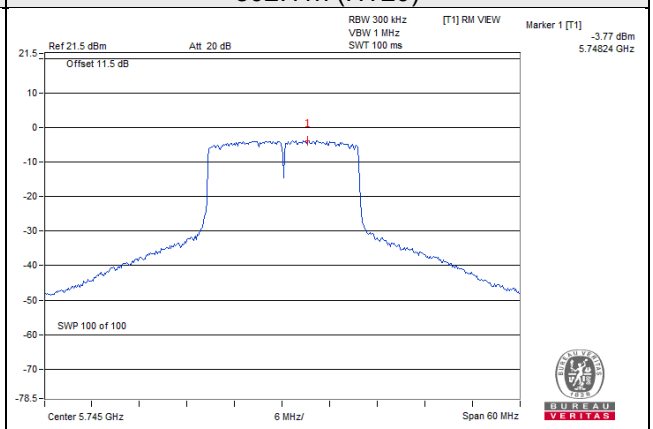
Note:
1. Directional gain = 4.60dBi + 10log(2) = 7.61dBi > 6dBi, so the power density limit shall be reduced to 30-(7.61-6) = 28.39dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

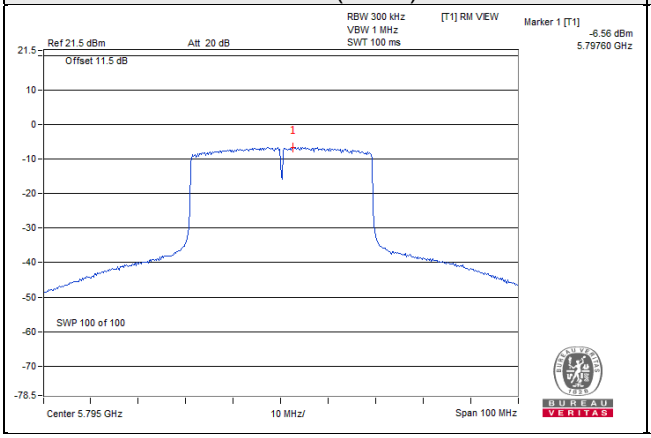
802.11a



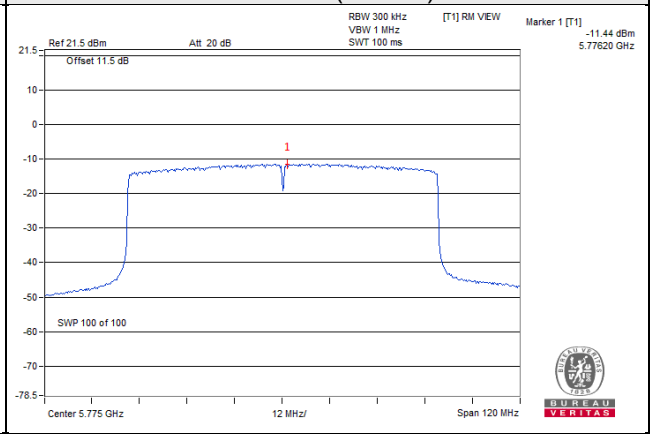
802.11n (HT20)

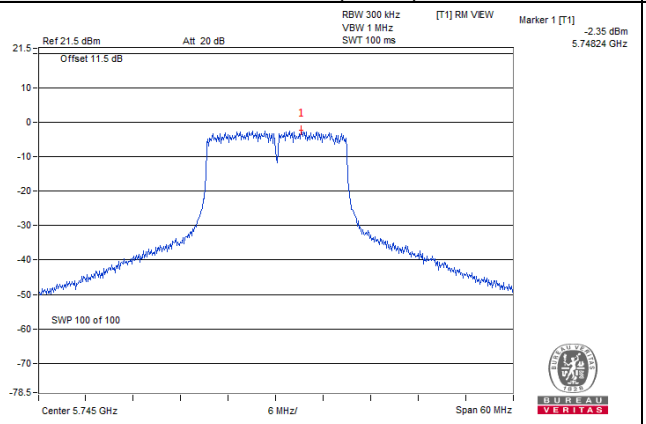
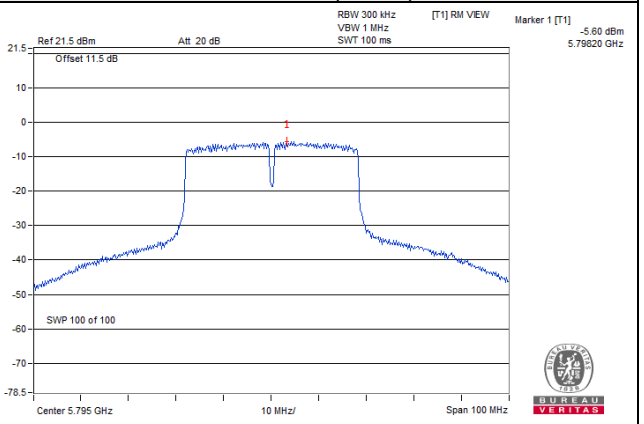
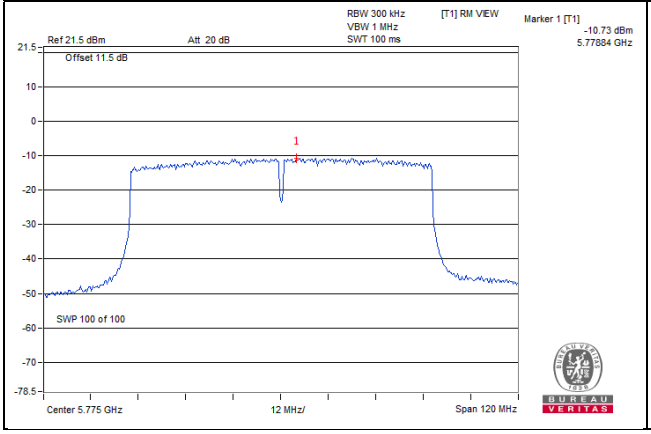


802.11n (HT40)



802.11ac (VHT80)



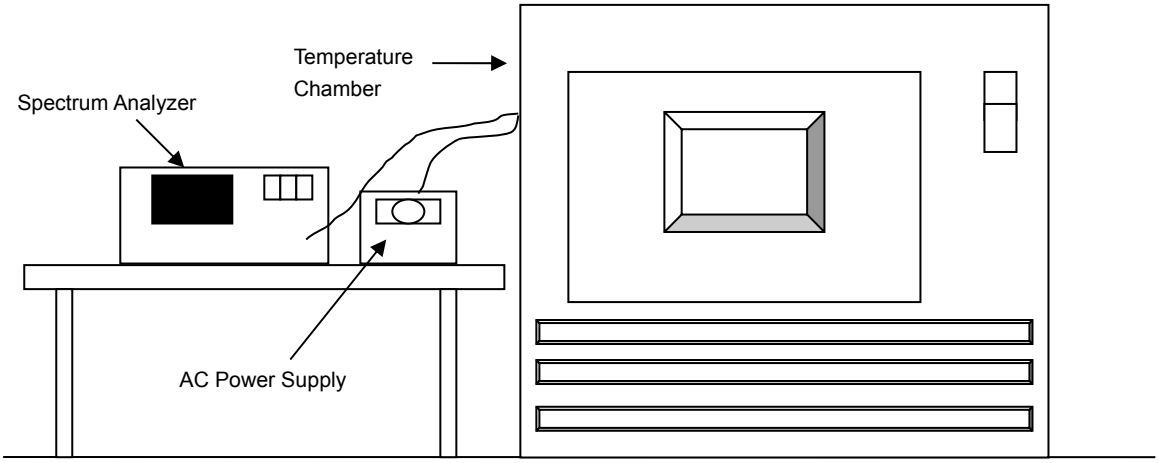
Spectrum Plot of Worst Value	
802.11ax (HE20)	802.11ax (HE40)
	
802.11ax (HE80)	
	

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	100039	Jun. 11, 2018	Jun. 10, 2019
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 04, 2018	Jun. 03, 2019
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019
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

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.

b. Turn the EUT on and couple its output to a spectrum analyzer.

c. Turn the EUT off and set the chamber to the highest temperature specified.

d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.

e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 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: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5180.0012	Pass	5179.9985	Pass	5179.9985	Pass	5179.9999	Pass
40	120	5180.0081	Pass	5180.0068	Pass	5180.0077	Pass	5180.0086	Pass
30	120	5179.9815	Pass	5179.9832	Pass	5179.9827	Pass	5179.9816	Pass
20	120	5180.0231	Pass	5180.0213	Pass	5180.0195	Pass	5180.0234	Pass
10	120	5179.9861	Pass	5179.9849	Pass	5179.9834	Pass	5179.986	Pass
0	120	5179.9857	Pass	5179.986	Pass	5179.9841	Pass	5179.9872	Pass
-10	120	5180.0056	Pass	5180.0086	Pass	5180.0064	Pass	5180.0091	Pass
-20	120	5180.0246	Pass	5180.0212	Pass	5180.0222	Pass	5180.0229	Pass
-30	120	5180.0147	Pass	5180.0126	Pass	5180.0135	Pass	5180.0146	Pass

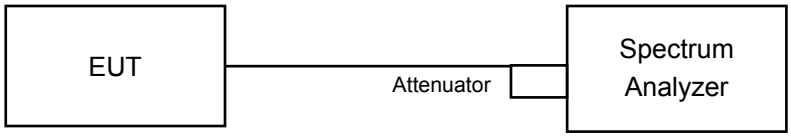
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5180.0233	Pass	5180.0218	Pass	5180.0194	Pass	5180.0236	Pass
	120	5180.0231	Pass	5180.0213	Pass	5180.0195	Pass	5180.0234	Pass
	102	5180.0235	Pass	5180.0209	Pass	5180.0198	Pass	5180.0243	Pass

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.41	16.40	0.5	Pass
157	5785	16.39	16.42	0.5	Pass
165	5825	16.39	16.42	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	18.91	18.89	0.5	Pass
157	5785	18.94	18.74	0.5	Pass
165	5825	18.83	18.88	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	37.74	37.65	0.5	Pass
159	5795	37.96	38.03	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.58	77.42	0.5	Pass

802.11ax (HE20)

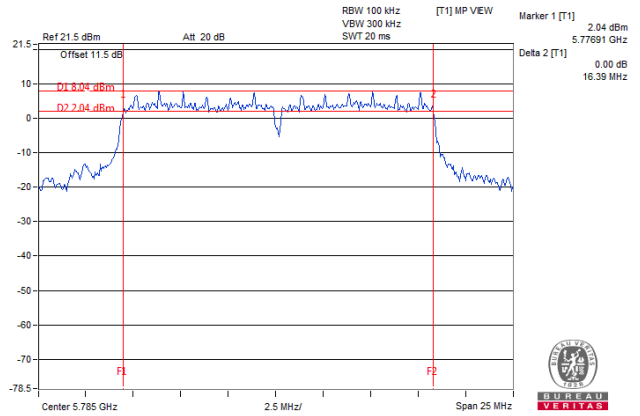
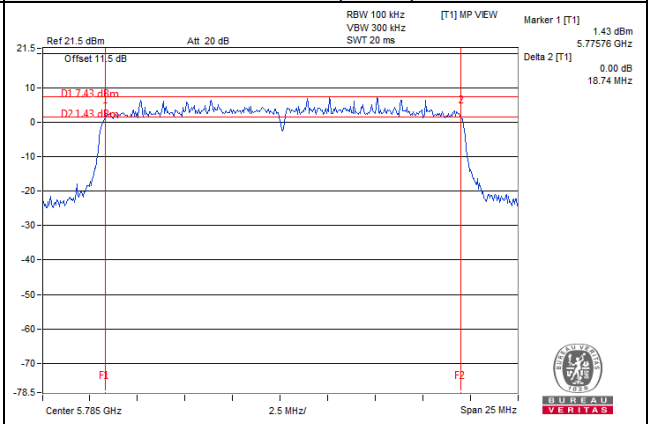
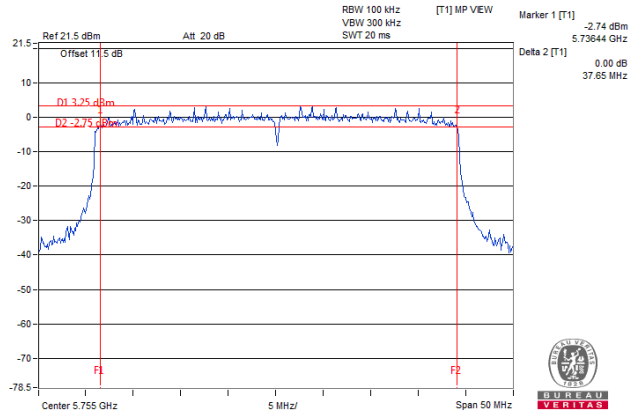
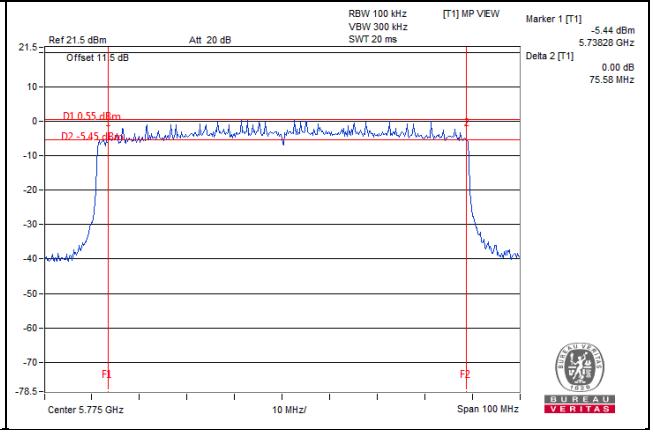
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.61	17.57	0.5	Pass
157	5785	17.61	17.60	0.5	Pass
165	5825	16.87	17.10	0.5	Pass

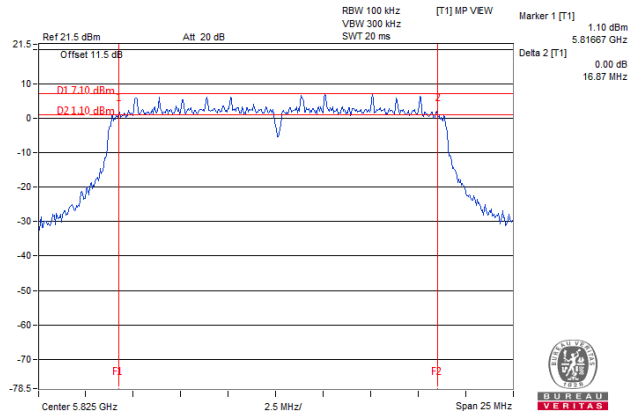
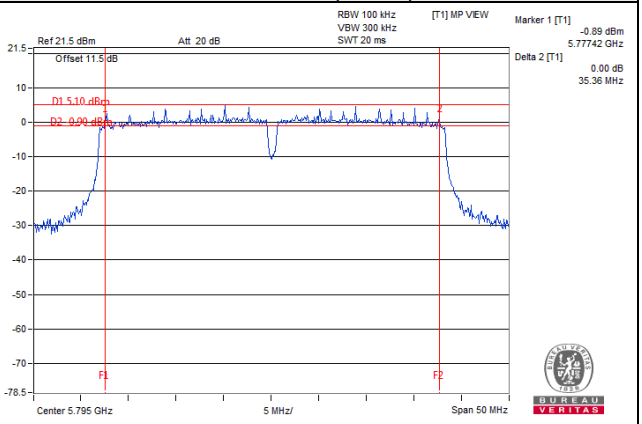
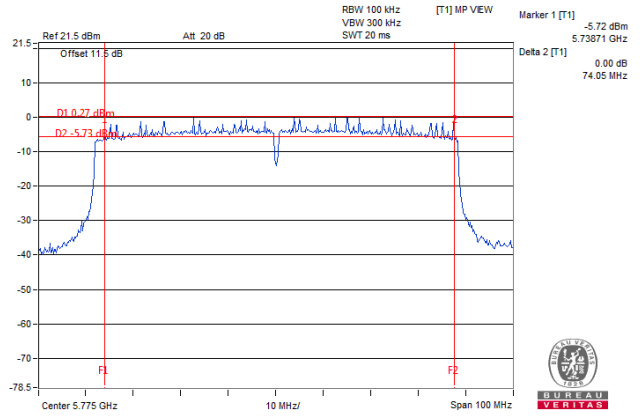
802.11ax (HE40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.65	35.75	0.5	Pass
159	5795	35.56	35.36	0.5	Pass

802.11ax (HE80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.54	74.05	0.5	Pass

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

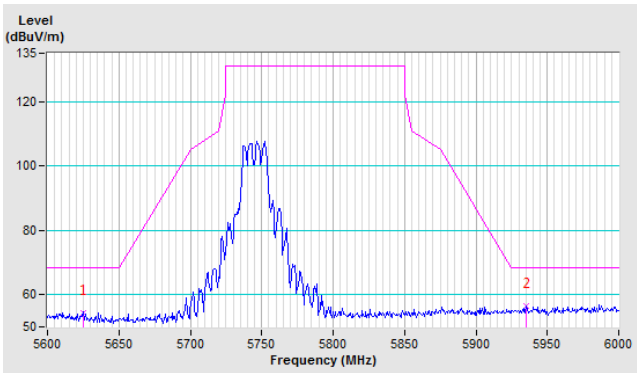
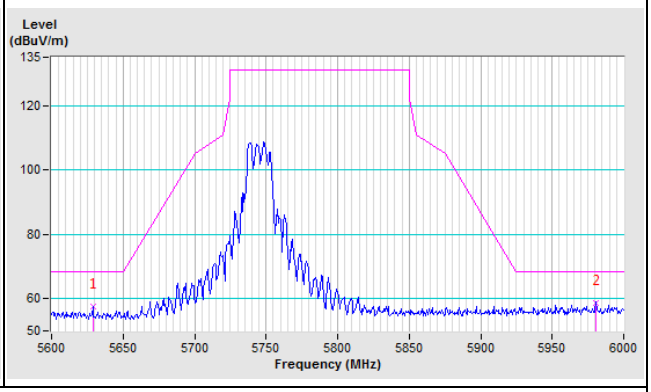
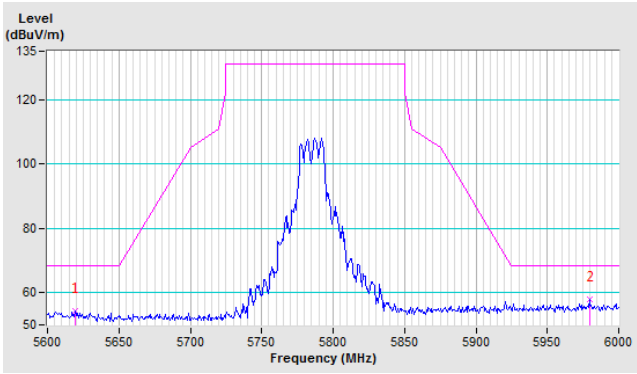
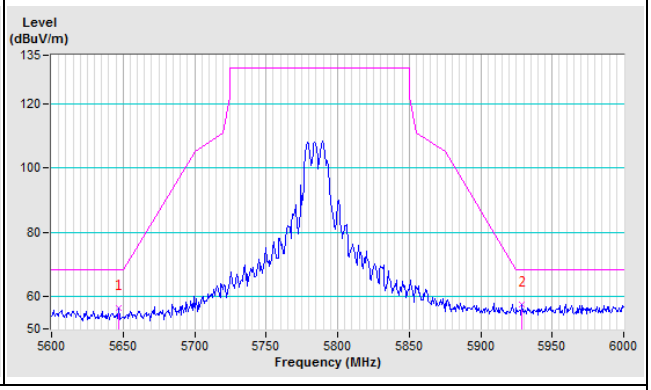
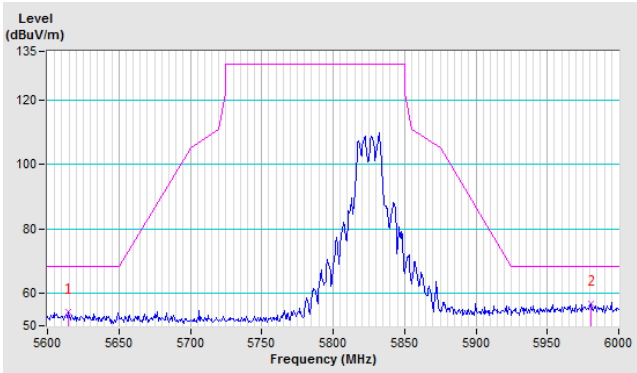
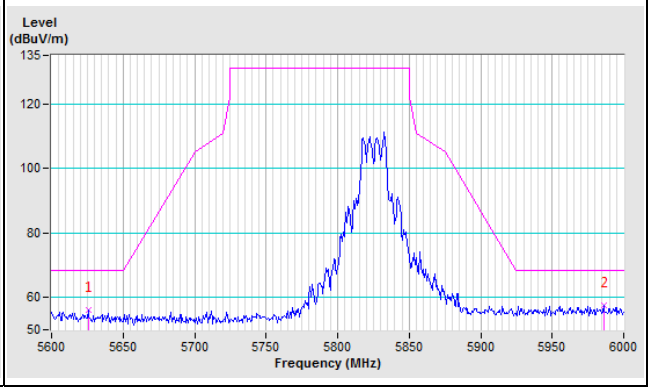
Spectrum Plot of Worst Value	
802.11ax (HE20)	802.11ax (HE40)
	
802.11ax (HE80)	
	

5 Pictures of Test Arrangements

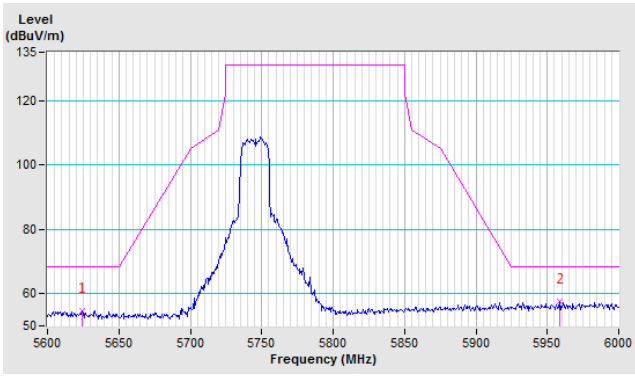
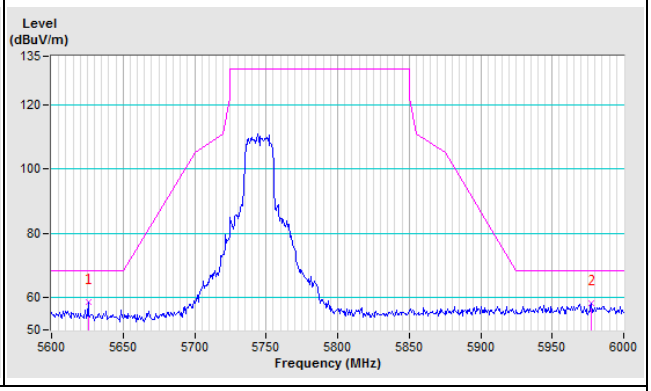
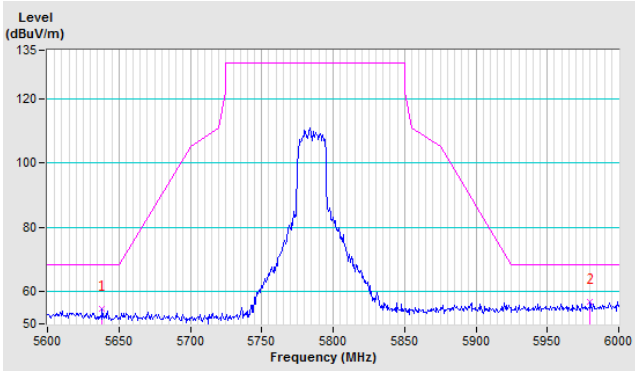
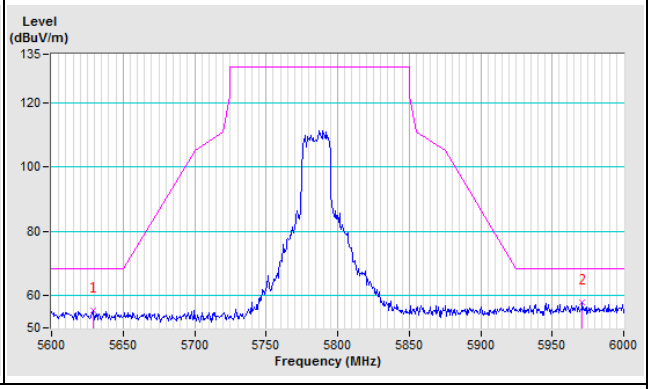
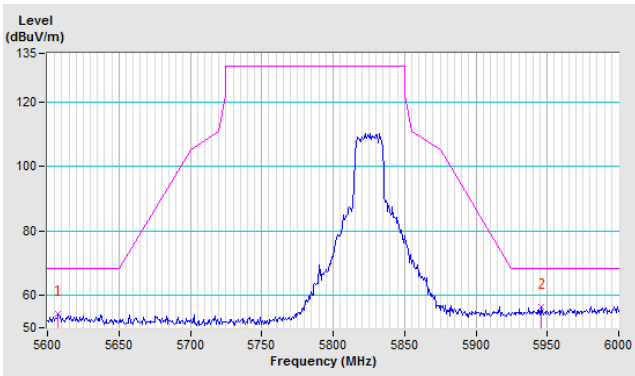
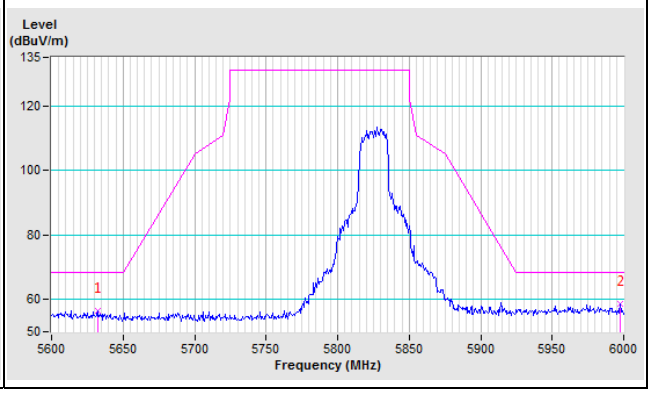
Please refer to the attached file (Test Setup Photo).

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

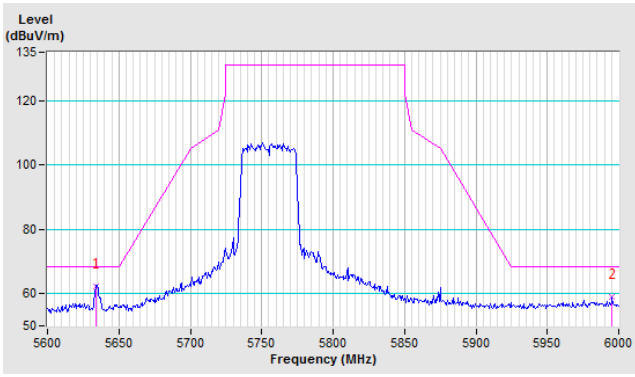
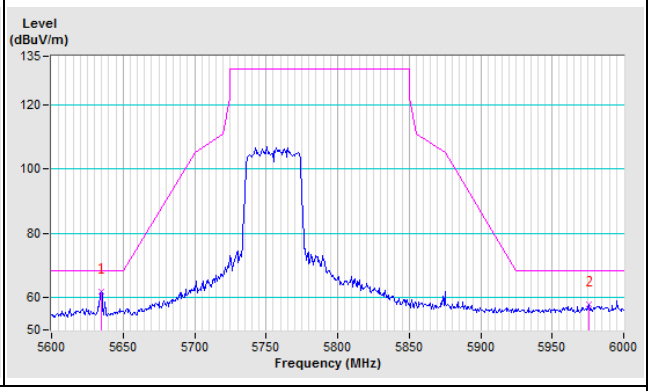
802.11a

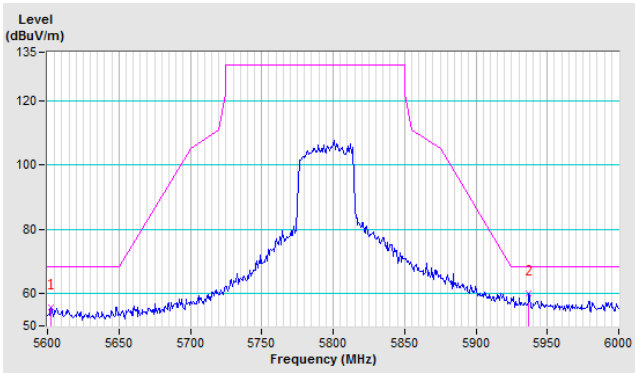
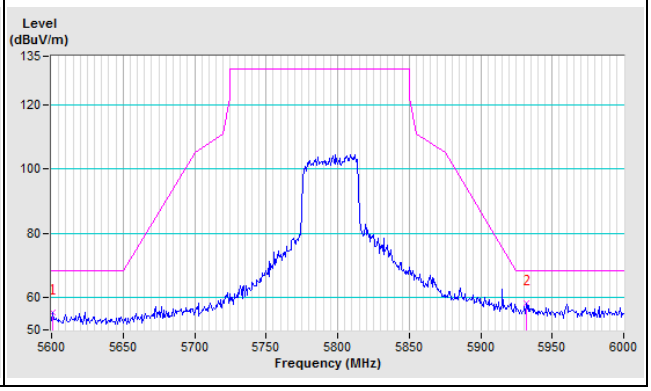
CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

802.11ax (HE20)

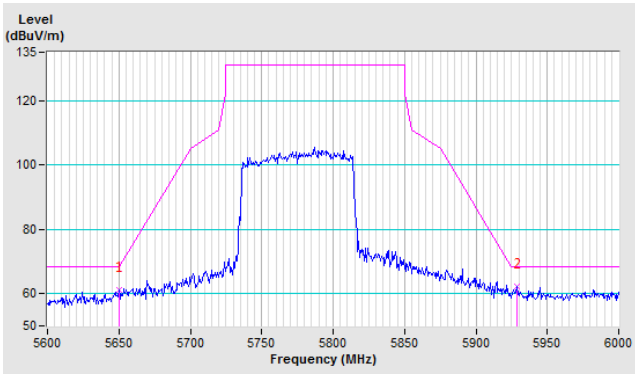
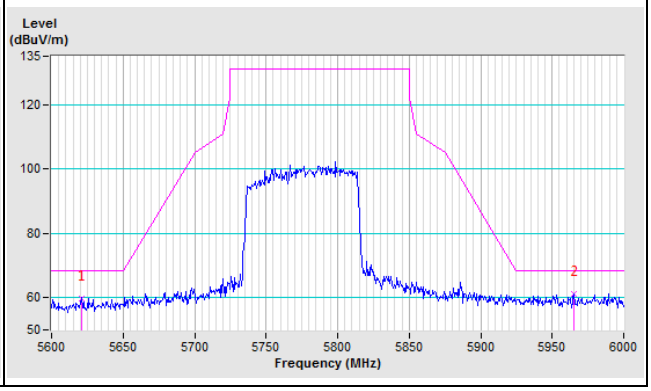
CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

802.11ax (HE40)

CH151	
Horizontal	Vertical
	

CH159	
Horizontal	Vertical
	

802.11ax (HE80)

CH155	
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:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
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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 ---