FCC Test Report

Report No.:	RF191025E02-1
FCC ID:	UXX-S5A946A
Test Model:	S5A947A
Series Model:	S5A946A
Received Date:	Oct. 25, 2019
Test Date:	Nov. 06, 2019 ~ Nov. 21, 2019
Issued Date:	Dec. 04, 2019
Applicant:	Cradlepoint, Inc
Address:	1111 W. Jefferson Street Suite 400 Boise, ID 83702 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF191025E02-1	Original Release	Dec. 04, 2019

1 Certificate of Conformity

Product:	Advanced Edge Router
Brand:	cradlepoint
Test Model:	S5A947A
Series Model:	S5A946A
Sample Status:	Engineering Sample
Applicant:	Cradlepoint, Inc
Test Date:	Nov. 06, 2019 ~ Nov. 21, 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 : Rona Chen , **Date:** Dec. 04, 2019

Rona Chen / Specialist

Approved by : , **Date:** Dec. 04, 2019

Dylan Chiou / 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 -7.16 dB at 0.34124 MHz.
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 -0.4 dB at 5105.00 MHz & 5125.00 MHz.
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)	6 dB Bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is i-pex (MHF) not a standard connector.

Note:

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	3.86 dB
	200 MHz ~ 1000 MHz	3.87 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Advanced Edge Router		
Brand	cradlepoint		
Test Model	S5A947A		
Series Model	S5A946A		
Status of EUT	Engineering Sample		
Power Supply Rating	12.0 Vdc (Adapter)		
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM for OFDMA		
Modulation Technology	OFDM, OFDMA		
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 300.0 Mbps 802.11ac: up to 866.7 Mbps 802.11ax: up to 1201.0 Mbps		
Operating Frequency	5180 ~ 5240 MHz, 5745 ~ 5825 MHz		
Number of Channel	5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20) 2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40) 1 for 802.11ac (VHT80), 802.11ax (HE80) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20) 2 for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40) 1 for 802.11ac (VHT80), 802.11ax (HE80)		
Output Power	Frequency Range	CDD Mode	Beamforming Mode
	5180 ~ 5240 MHz	476.181 mW	476.181 mW
	5745 ~ 5825 MHz	462.242 mW	462.242 mW
Antenna Type	Refer to Note as below		
Antenna Connector	Refer to Note as below		
Accessory Device	Refer to Note as below		
Data Cable Supplied	N/A		

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx Function
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX
802.11ax (HE20)	2TX
802.11ax (HE40)	2TX
802.11ax (HE80)	2TX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40, 802.11ac mode for VHT20 / VHT40 / VHT80, and 802.11ax mode for HE20 / HE40 / HE80, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* For 802.11n, 802.11ac and 802.11ax, 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.

2. All models are listed as below.

Brand	Product Marketing Name (PMN)	Model	Wi-Fi Function	Embedded Radio (WWAN Module)	Number of WWAN Antenna Port
cradlepoint	E300-C18B	S5A946A	Yes	Telit, LM960A18 Contains FCC ID: RI7LM960 Contains IC : 5131A-LM960	4
	E300-C4D	S5A947A	Yes	Quectel, EC25-AF Contains FCC ID: XMR201808EC25AF Contains IC : 10224A-2018EC25AF	2
* The differences compared with different models are embedded WWAN module and number of WWAN antenna port. Above samples had been pre-tested and the worst case was found on model: S5A947A. Therefore, only this S5A947A was as a representative for the final test and recorded in this report.					

3. The WLAN antenna information of EUT is listed as below.

Antenna No.	RF Chain No.	Brand	Model	Antenna Gain (dBi)		Antenna Type	Connecter Type
				2.4G	5G		
Radio 1	WiFi Chain0	Cradlepoint	02102140-06997-1	1.7	3	PCB	i-pex (MHF)
Radio 2	WiFi Chain1		02102140-06997-2	2.5	3.3		

4. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	APD	WA-36N12R	I/P: 100 – 240 Vac, 0.9 A, 50-60 Hz, O/P: 12 Vdc, 3 A 1.5 m non-shielded cable w/o ferrite core
Adapter 2	APD	WA-36A12R	I/P: 100 – 240 Vac, 0.9 A, 50-60 Hz, O/P: 12 Vdc, 3 A 1.5 m non-shielded cable w/o ferrite core
Adapter 3	Ktec	KSA-36W-120300D5	I/P: 100 – 240 Vac, 1 A, 50/60 Hz, O/P: 12 Vdc, 3 A 1.5 m non-shielded cable w/o ferrite core

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

3.2 Description of Test Modes

For 5180 ~ 5240 MHz

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

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

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

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

Channel	Frequency (MHz)
42	5210

For 5745 ~ 5825 MHz:

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

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

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

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

Channel	Frequency (MHz)
155	5775

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	EUT + Adapter 1
B	-	√	√	-	EUT + Adapter 2
C	-	√	√	-	EUT + Adapter 3

Where **RE≥1G:** Radiated Emission above 1 GHz **RE<1G:** Radiated Emission below 1 GHz
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 **X-plane**.
2. "-" means no effect.

Radiated Emission Test (Above 1 GHz):

☒ 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	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-		802.11ax (HE20)	36 to 48	36, 40, 48	OFDMA	BPSK	8.6
-		802.11ax (HE40)	38 to 46	38, 46	OFDMA	BPSK	17.2
-		802.11ax (HE80)	42	42	OFDMA	BPSK	36.0
-	5745-5825	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-		802.11ax (HE20)	149 to 165	149, 157, 165	OFDMA	BPSK	8.6
-		802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	17.2
-		802.11ax (HE80)	155	155	OFDMA	BPSK	36.0

Radiated Emission Test (Below 1 GHz):

☒ 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	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11ax (HE20)	36 to 48	36	OFDMA	BPSK	8.6

Power Line Conducted Emission Test:

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

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

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11ax (HE20)	36 to 48	36	OFDMA	BPSK	8.6

Antenna Port Conducted Measurement:

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

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

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

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-		802.11ax (HE20)	36 to 48	36, 40, 48	OFDMA	BPSK	8.6
-		802.11ax (HE40)	38 to 46	38, 46	OFDMA	BPSK	17.2
-		802.11ax (HE80)	42	42	OFDMA	BPSK	36.0
-	5745-5825	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-		802.11ax (HE20)	149 to 165	149, 157, 165	OFDMA	BPSK	8.6
-		802.11ax (HE40)	151 to 159	151, 159	OFDMA	BPSK	17.2
-		802.11ax (HE80)	155	155	OFDMA	BPSK	36.0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Adair Peng
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Titan Hsu
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Adair Peng
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Ivan Tseng

3.3 Duty Cycle of Test Signal

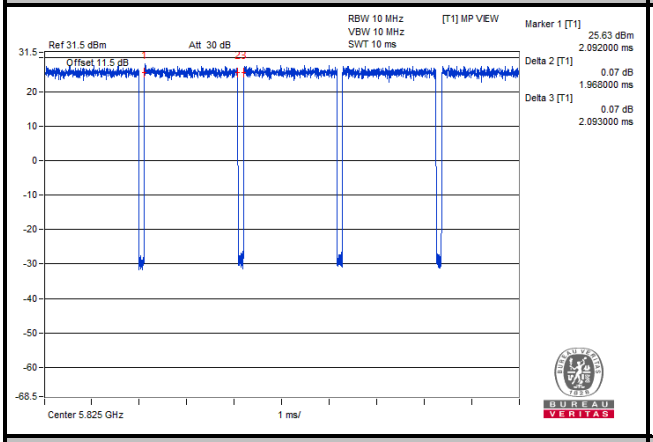
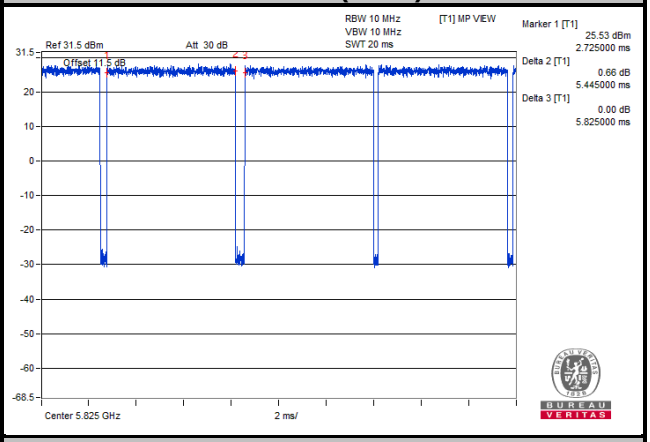
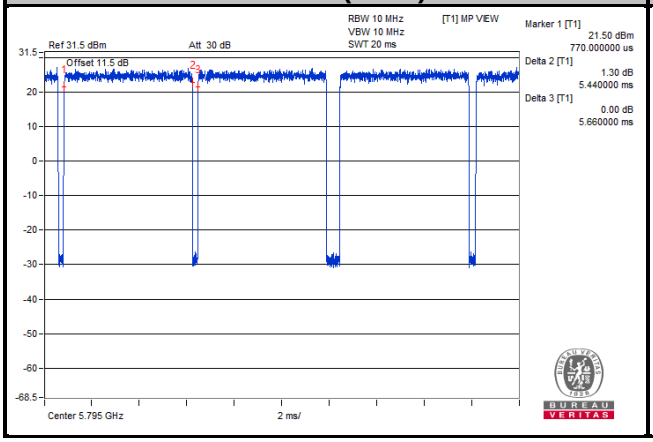
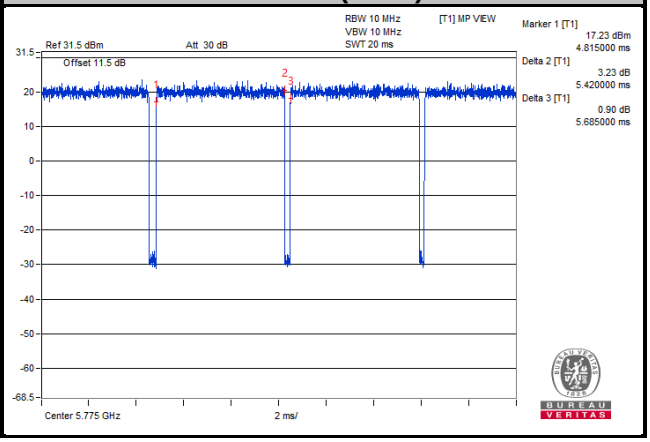
MODULATION TYPE: BPSK

802.11a: Duty cycle = 1.968/2.093 = 0.940, Duty factor = 10 * log(1/0.940) = 0.27

802.11ax (HE20): Duty cycle = 5.445/5.825 = 0.935, Duty factor = 10 * log(1/0.935) = 0.29

802.11ax (HE40): Duty cycle = 5.440/5.660 = 0.961, Duty factor = 10 * log(1/0.961) = 0.17

802.11ax (HE80): Duty cycle = 5.420/5.685 = 0.953, Duty factor = 10 * log(1/0.953) = 0.21

802.11a	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.

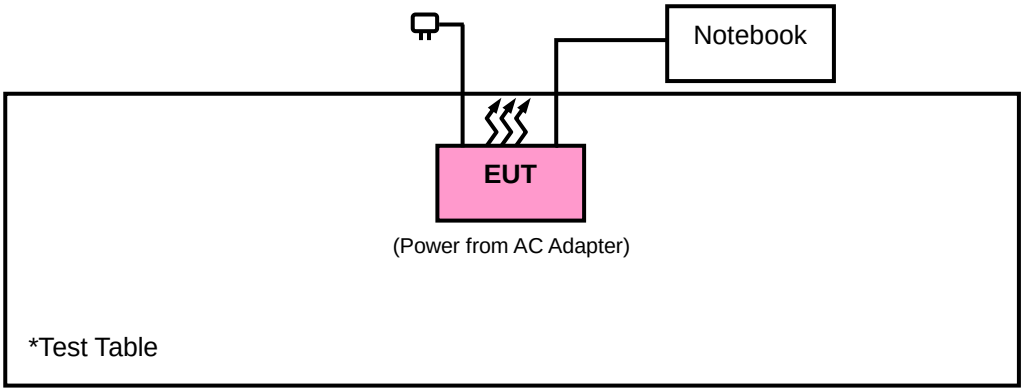
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook	DELL	E5410	1HC2XM1	N/A
2.	Adapter 1	APD	WA-36N12R	N/A	N/A
3.	Adapter 2	APD	WA-36A12R	N/A	N/A
4.	Adapter 3	Ktec	KSA-36W-120300D5	N/A	N/A

No.	Signal Cable Description of The Above Support Units
1.	6 m LAN cable
2.	1.5 m non-shielded cable w/o ferrite core
3.	1.5 m non-shielded cable w/o ferrite core
4.	1 m non-shielded cable w/o ferrite core

Note:

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart E (15.407)
ANSI C63.10-2013

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

References Test Guidance:

KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, 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 20 dB under any condition of modulation.

4.1.2 Limits of Unwanted Emission Out of the Restricted Bands

Applicable To			Limit	
789033 D02 General UNII Test Procedures New Rules v02r01			Field Strength at 3 m	
			PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Frequency Band	**Applicable To**		**EIRP Limit**	**Equivalent Field Strength at 3 m**
5150~5250 MHz	15.407(b)(1)		PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2 (dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8 (dBμV/m) *3 PK:122.2 (dBμV/m) *4
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

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

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

4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
			Nov. 11, 2019	Nov. 10, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Sep. 05, 2019	Sep. 04, 2020
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55 190004/MY551900 07/MY55210005	Jul. 15, 2019	Jul. 14, 2020
Digital Multimeter Fluke	87-III	70360742	Jun. 27, 2019	Jun. 26, 2020
Temperature & Humidity Chamber	GTH-120-40-CP-A R	MAA1306-019	Sep. 10, 2019	Sep. 09, 2020

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.

4.1.4 Test Procedures

For Radiated Emission below 30 MHz

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 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

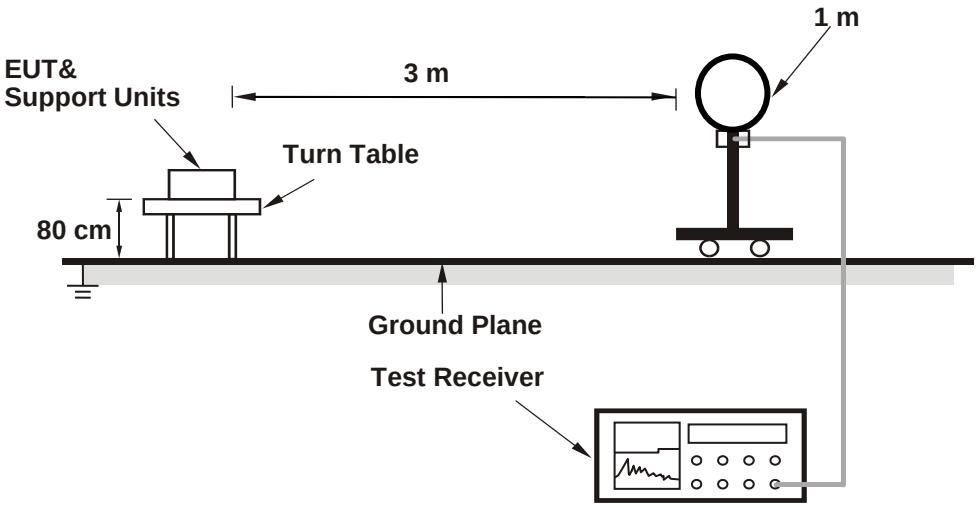
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
   (11a: RBW = 1 MHz, VBW = 1 kHz ; 11ax (HE20): RBW = 1 MHz, VBW = 1 kHz ;
   11ax (HE40): RBW = 1 MHz, VBW = 1 kHz ; 11ax (HE80): RBW = 1 MHz, VBW = 1 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 Deviation from Test Standard

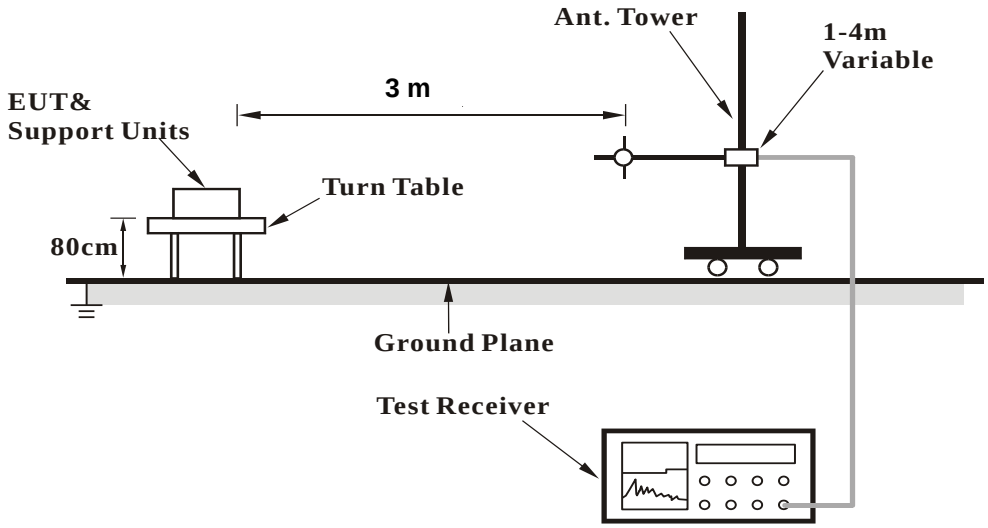
No deviation.

4.1.6 Test Setup

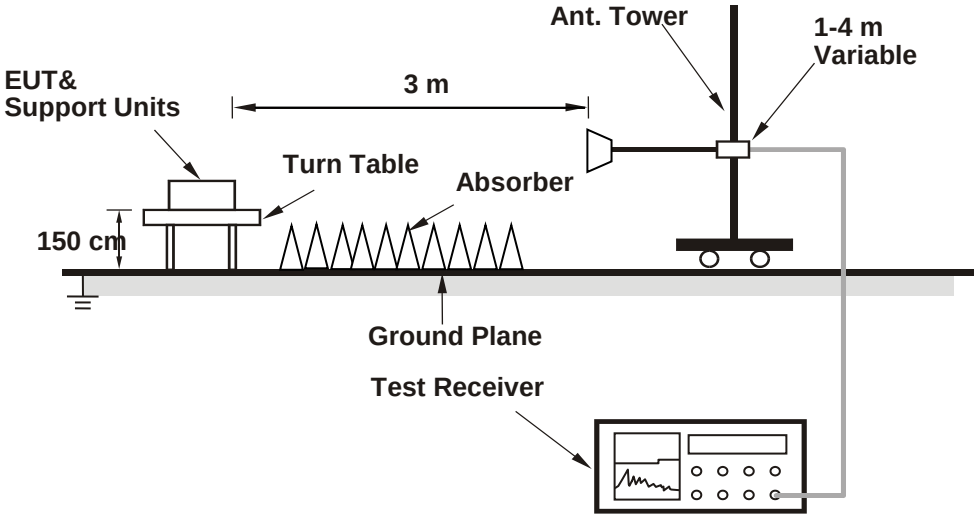
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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

4.1.7 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.8 Test Results

Above 1 GHz Data：

Mode A

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	5105.00	58.9 PK	74.0	-15.1	1.19 H	123	54.8	4.1
2	5105.00	48.4 AV	54.0	-5.6	1.19 H	123	44.3	4.1
3	5150.00	55.2 PK	74.0	-18.8	3.13 H	205	51.0	4.2
4	5150.00	42.7 AV	54.0	-11.3	3.13 H	205	38.5	4.2
5	*5180.00	111.1 PK			3.20 H	194	71.7	39.4
6	*5180.00	101.4 AV			3.20 H	194	62.0	39.4
7	#10360.00	60.4 PK	68.2	-7.8	3.92 H	319	42.9	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	5105.00	59.6 PK	74.0	-14.4	1.14 V	357	55.5	4.1
2	5105.00	51.6 AV	54.0	-2.4	1.14 V	357	47.5	4.1
3	5150.00	59.9 PK	74.0	-14.1	1.43 V	341	55.7	4.2
4	5150.00	44.9 AV	54.0	-9.1	1.43 V	341	40.7	4.2
5	*5180.00	116.1 PK			1.32 V	354	76.7	39.4
6	*5180.00	106.4 AV			1.32 V	354	67.0	39.4
7	#10360.00	62.0 PK	68.2	-6.2	3.66 V	64	44.5	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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	5125.00	57.6 PK	74.0	-16.4	1.27 H	130	53.5	4.1
2	5125.00	48.4 AV	54.0	-5.6	1.27 H	130	44.3	4.1
3	*5200.00	111.1 PK			3.23 H	201	71.8	39.3
4	*5200.00	101.6 AV			3.23 H	201	62.3	39.3
5	#10400.00	60.6 PK	68.2	-7.6	3.84 H	311	43.0	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	5125.00	59.1 PK	74.0	-14.9	1.13 V	357	55.0	4.1
2	5125.00	51.6 AV	54.0	-2.4	1.13 V	357	47.5	4.1
3	*5200.00	116.1 PK			1.42 V	355	76.8	39.3
4	*5200.00	106.7 AV			1.42 V	355	67.4	39.3
5	#10400.00	62.2 PK	68.2	-6.0	3.56 V	61	44.6	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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	114.2 PK			3.20 H	205	75.1	39.1
2	*5240.00	104.3 AV			3.20 H	205	65.2	39.1
3	5350.00	56.6 PK	74.0	-17.4	2.97 H	191	52.5	4.1
4	5350.00	43.8 AV	54.0	-10.2	2.97 H	191	39.7	4.1
5	#10480.00	61.9 PK	68.2	-6.3	3.81 H	318	43.5	18.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	119.3 PK			1.45 V	352	80.2	39.1
2	*5240.00	109.4 AV			1.45 V	352	70.3	39.1
3	5350.00	58.2 PK	74.0	-15.8	1.39 V	359	54.1	4.1
4	5350.00	44.6 AV	54.0	-9.4	1.39 V	359	40.5	4.1
5	#10480.00	63.5 PK	68.2	-4.7	3.61 V	65	45.1	18.4

REMARKS:

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

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	#5625.60	58.2 PK	68.2	-10.0	2.37 H	201	53.8	4.4
2	*5745.00	116.4 PK			2.37 H	201	76.3	40.1
3	*5745.00	106.5 AV			2.37 H	201	66.4	40.1
4	#5973.60	58.1 PK	68.2	-10.1	2.37 H	201	52.7	5.4
5	11490.00	61.9 PK	74.0	-12.1	3.70 H	70	42.6	19.3
6	11490.00	49.0 AV	54.0	-5.0	3.70 H	70	29.7	19.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5626.40	60.2 PK	68.2	-8.0	2.29 V	359	55.8	4.4
2	*5745.00	121.4 PK			2.29 V	359	81.3	40.1
3	*5745.00	110.7 AV			2.29 V	359	70.6	40.1
4	#5935.20	58.4 PK	68.2	-9.8	2.29 V	359	53.0	5.4
5	11490.00	62.5 PK	74.0	-11.5	2.86 V	335	43.2	19.3
6	11490.00	50.5 AV	54.0	-3.5	2.86 V	335	31.2	19.3

REMARKS:

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

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	#5628.00	57.4 PK	68.2	-10.8	2.55 H	200	53.0	4.4
2	*5785.00	116.5 PK			2.55 H	200	76.2	40.3
3	*5785.00	106.6 AV			2.55 H	200	66.3	40.3
4	#5951.20	58.5 PK	68.2	-9.7	2.55 H	200	53.1	5.4
5	11570.00	62.0 PK	74.0	-12.0	2.83 H	64	43.0	19.0
6	11570.00	48.6 AV	54.0	-5.4	2.83 H	64	29.6	19.0
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	#5609.60	59.2 PK	68.2	-9.0	2.43 V	358	54.7	4.5
2	*5785.00	120.9 PK			2.43 V	358	80.6	40.3
3	*5785.00	110.4 AV			2.43 V	358	70.1	40.3
4	#5984.80	58.2 PK	68.2	-10.0	2.43 V	358	52.7	5.5
5	11570.00	62.5 PK	74.0	-11.5	2.91 V	340	43.5	19.0
6	11570.00	50.3 AV	54.0	-3.7	2.91 V	340	31.3	19.0

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

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	#5609.60	58.1 PK	68.2	-10.1	2.28 H	200	53.6	4.5
2	*5825.00	118.1 PK			2.28 H	200	77.7	40.4
3	*5825.00	107.9 AV			2.28 H	200	67.5	40.4
4	#5946.40	58.1 PK	68.2	-10.1	2.28 H	200	52.7	5.4
5	11650.00	61.3 PK	74.0	-12.7	3.69 H	67	42.4	18.9
6	11650.00	48.5 AV	54.0	-5.5	3.69 H	67	29.6	18.9
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	#5627.20	59.1 PK	68.2	-9.1	2.28 V	0	54.7	4.4
2	*5825.00	120.4 PK			2.28 V	0	80.0	40.4
3	*5825.00	110.4 AV			2.28 V	0	70.0	40.4
4	#5927.20	58.6 PK	68.2	-9.6	2.28 V	0	53.2	5.4
5	11650.00	61.9 PK	74.0	-12.1	2.90 V	331	43.0	18.9
6	11650.00	50.2 AV	54.0	-3.8	2.90 V	331	31.3	18.9

REMARKS:

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

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	5105.00	58.8 PK	74.0	-15.2	1.41 H	130	54.7	4.1
2	5105.00	50.4 AV	54.0	-3.6	1.41 H	130	46.3	4.1
3	5150.00	57.9 PK	74.0	-16.1	2.97 H	209	53.7	4.2
4	5150.00	45.1 AV	54.0	-8.9	2.97 H	209	40.9	4.2
5	*5180.00	115.2 PK			3.11 H	213	75.8	39.4
6	*5180.00	101.5 AV			3.11 H	213	62.1	39.4
7	#10360.00	61.2 PK	68.2	-7.0	3.93 H	333	43.7	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	5105.00	60.2 PK	74.0	-13.8	1.17 V	357	56.1	4.1
2	**5105.00**	**53.6 AV**	**54.0**	**-0.4**	**1.17 V**	**357**	**49.5**	**4.1**
3	5150.00	59.6 PK	74.0	-14.4	1.58 V	355	55.4	4.2
4	5150.00	46.3 AV	54.0	-7.7	1.58 V	355	42.1	4.2
5	*5180.00	120.4 PK			1.47 V	352	81.0	39.4
6	*5180.00	106.7 AV			1.47 V	352	67.3	39.4
7	#10360.00	62.7 PK	68.2	-5.5	3.59 V	66	45.2	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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	5125.00	58.8 PK	74.0	-15.2	1.24 H	120	54.7	4.1
2	5125.00	50.3 AV	54.0	-3.7	1.24 H	120	46.2	4.1
3	*5200.00	114.6 PK			3.03 H	205	75.3	39.3
4	*5200.00	101.3 AV			3.03 H	205	62.0	39.3
5	#10400.00	61.6 PK	68.2	-6.6	3.85 H	327	44.0	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	5125.00	60.4 PK	74.0	-13.6	1.11 V	356	56.3	4.1
2	**5125.00**	**53.6 AV**	**54.0**	**-0.4**	**1.11 V**	**356**	**49.5**	**4.1**
3	*5200.00	119.7 PK			1.55 V	353	80.4	39.3
4	*5200.00	106.3 AV			1.55 V	353	67.0	39.3
5	#10400.00	62.8 PK	68.2	-5.4	3.63 V	63	45.2	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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	116.8 PK			2.97 H	199	77.7	39.1
2	*5240.00	104.0 AV			2.97 H	199	64.9	39.1
3	5350.00	56.2 PK	74.0	-17.8	3.09 H	209	52.1	4.1
4	5350.00	44.2 AV	54.0	-9.8	3.09 H	209	40.1	4.1
5	#10480.00	62.2 PK	68.2	-6.0	3.76 H	331	43.8	18.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	122.8 PK			1.40 V	349	83.7	39.1
2	*5240.00	109.1 AV			1.40 V	349	70.0	39.1
3	5350.00	57.8 PK	74.0	-16.2	1.37 V	339	53.7	4.1
4	5350.00	45.4 AV	54.0	-8.6	1.37 V	339	41.3	4.1
5	#10480.00	63.8 PK	68.2	-4.4	3.67 V	69	45.4	18.4

REMARKS:

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

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	#5630.40	58.4 PK	68.2	-9.8	2.29 H	200	54.0	4.4
2	*5745.00	119.1 PK			2.29 H	200	79.0	40.1
3	*5745.00	105.8 AV			2.29 H	200	65.7	40.1
4	#5947.20	58.5 PK	68.2	-9.7	2.29 H	200	53.1	5.4
5	11490.00	62.2 PK	74.0	-11.8	3.77 H	71	42.9	19.3
6	11490.00	48.8 AV	54.0	-5.2	3.77 H	71	29.5	19.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5604.00	59.0 PK	68.2	-9.2	2.33 V	358	54.5	4.5
2	*5745.00	123.6 PK			2.33 V	358	83.5	40.1
3	*5745.00	110.4 AV			2.33 V	358	70.3	40.1
4	#5935.20	58.4 PK	68.2	-9.8	2.33 V	358	53.0	5.4
5	11490.00	62.8 PK	74.0	-11.2	2.81 V	339	43.5	19.3
6	11490.00	50.7 AV	54.0	-3.3	2.81 V	339	31.4	19.3

REMARKS:

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

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	#5607.20	57.7 PK	68.2	-10.5	2.29 H	199	53.2	4.5
2	*5785.00	119.7 PK			2.99 H	199	79.4	40.3
3	*5785.00	106.7 AV			2.99 H	199	66.4	40.3
4	#5932.00	58.2 PK	68.2	-10.0	2.29 H	199	52.8	5.4
5	11570.00	62.1 PK	74.0	-11.9	3.64 H	65	43.1	19.0
6	11570.00	49.0 AV	54.0	-5.0	3.64 H	65	30.0	19.0
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	#5611.20	59.0 PK	68.2	-9.2	2.30 V	0	54.5	4.5
2	*5785.00	123.6 PK			2.30 V	0	83.3	40.3
3	*5785.00	110.1 AV			2.30 V	0	69.8	40.3
4	#5926.40	58.2 PK	68.2	-10.0	2.30 V	0	52.8	5.4
5	11570.00	62.7 PK	74.0	-11.3	2.85 V	331	43.7	19.0
6	11570.00	50.5 AV	54.0	-3.5	2.85 V	331	31.5	19.0

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

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	#5610.40	57.9 PK	68.2	-10.3	2.27 H	199	53.4	4.5
2	*5825.00	120.8 PK			2.27 H	199	80.4	40.4
3	*5825.00	107.7 AV			2.27 H	199	67.3	40.4
4	#5996.80	59.0 PK	68.2	-9.2	2.27 H	199	53.5	5.5
5	11650.00	61.5 PK	74.0	-12.5	2.80 H	73	42.6	18.9
6	11650.00	48.7 AV	54.0	-5.3	2.80 H	73	29.8	18.9
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	#5629.60	58.8 PK	68.2	-9.4	2.32 V	1	54.4	4.4
2	*5825.00	123.1 PK			2.32 V	1	82.7	40.4
3	*5825.00	110.3 AV			2.32 V	1	69.9	40.4
4	#5952.80	58.3 PK	68.2	-9.9	2.32 V	1	52.9	5.4
5	11650.00	62.1 PK	74.0	-11.9	2.84 V	323	43.2	18.9
6	11650.00	50.4 AV	54.0	-3.6	2.84 V	323	31.5	18.9

REMARKS:

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

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	5115.00	58.4 PK	74.0	-15.6	1.40 H	135	54.3	4.1
2	5115.00	49.8 AV	54.0	-4.2	1.40 H	135	45.7	4.1
3	5150.00	59.7 PK	74.0	-14.3	3.17 H	213	55.5	4.2
4	5150.00	46.7 AV	54.0	-7.3	3.17 H	213	42.5	4.2
5	*5190.00	111.3 PK			3.05 H	202	72.0	39.3
6	*5190.00	98.3 AV			3.05 H	202	59.0	39.3
7	#10380.00	60.2 PK	68.2	-8.0	3.98 H	315	42.5	17.7
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	5115.00	60.1 PK	74.0	-13.9	1.08 V	355	56.0	4.1
2	5115.00	53.1 AV	54.0	-0.9	1.08 V	355	49.0	4.1
3	5150.00	62.0 PK	74.0	-12.0	1.42 V	354	57.8	4.2
4	5150.00	48.7 AV	54.0	-5.3	1.42 V	354	44.5	4.2
5	*5190.00	116.3 PK			1.56 V	354	77.0	39.3
6	*5190.00	103.3 AV			1.56 V	354	64.0	39.3
7	#10380.00	61.9 PK	68.2	-6.3	3.82 V	62	44.2	17.7

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

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	5105.00	58.2 PK	74.0	-15.8	1.23 H	129	54.1	4.1
2	5105.00	46.6 AV	54.0	-7.4	1.23 H	129	42.5	4.1
3	*5230.00	115.4 PK			3.18 H	204	76.3	39.1
4	*5230.00	101.7 AV			3.18 H	204	62.6	39.1
5	5350.00	58.4 PK	74.0	-15.6	3.09 H	199	54.3	4.1
6	5350.00	43.8 AV	54.0	-10.2	3.09 H	199	39.7	4.1
7	#10460.00	61.3 PK	68.2	-6.9	3.79 H	331	43.1	18.2
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	5105.00	59.6 PK	74.0	-14.4	1.22 V	357	55.5	4.1
2	5105.00	49.6 AV	54.0	-4.4	1.22 V	357	45.5	4.1
3	*5230.00	120.5 PK			1.30 V	352	81.4	39.1
4	*5230.00	106.9 AV			1.30 V	352	67.8	39.1
5	5350.00	60.8 PK	74.0	-13.2	1.43 V	350	56.7	4.1
6	5350.00	45.1 AV	54.0	-8.9	1.43 V	350	41.0	4.1
7	#10460.00	62.7 PK	68.2	-5.5	3.70 V	64	44.5	18.2

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

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	#5640.00	58.0 PK	68.2	-10.2	2.37 H	199	53.6	4.4
2	*5755.00	117.4 PK			2.37 H	199	77.3	40.1
3	*5755.00	104.3 AV			2.37 H	199	64.2	40.1
4	#5952.00	59.0 PK	68.2	-9.2	2.37 H	199	53.6	5.4
5	11510.00	61.9 PK	74.0	-12.1	3.68 H	66	42.5	19.4
6	11510.00	49.0 AV	54.0	-5.0	3.68 H	66	29.6	19.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5629.60	58.7 PK	68.2	-9.5	2.33 V	1	54.3	4.4
2	*5755.00	120.8 PK			2.33 V	1	80.7	40.1
3	*5755.00	108.1 AV			2.33 V	1	68.0	40.1
4	#5964.00	58.4 PK	68.2	-9.8	2.33 V	1	53.0	5.4
5	11510.00	62.7 PK	74.0	-11.3	2.89 V	329	43.3	19.4
6	11510.00	50.7 AV	54.0	-3.3	2.89 V	329	31.3	19.4

REMARKS:

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

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	#5606.40	58.1 PK	68.2	-10.1	2.46 H	202	53.6	4.5
2	*5795.00	118.0 PK			2.46 H	202	77.6	40.4
3	*5795.00	104.7 AV			2.46 H	202	64.3	40.4
4	#5943.20	58.8 PK	68.2	-9.4	2.46 H	202	53.4	5.4
5	11590.00	61.4 PK	74.0	-12.6	3.73 H	69	42.5	18.9
6	11590.00	48.3 AV	54.0	-5.7	3.73 H	69	29.4	18.9
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	#5616.00	59.3 PK	68.2	-8.9	2.24 V	2	54.8	4.5
2	*5795.00	120.8 PK			2.24 V	2	80.4	40.4
3	*5795.00	108.0 AV			2.24 V	2	67.6	40.4
4	#5983.20	58.9 PK	68.2	-9.3	2.24 V	2	53.4	5.5
5	11590.00	62.1 PK	74.0	-11.9	2.94 V	330	43.2	18.9
6	11590.00	50.0 AV	54.0	-4.0	2.94 V	330	31.1	18.9

REMARKS:

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

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	5135.00	60.6 PK	74.0	-13.4	1.40 H	139	56.5	4.1
2	5135.00	48.7 AV	54.0	-5.3	1.40 H	139	44.6	4.1
3	5150.00	59.7 PK	74.0	-14.3	2.97 H	209	55.5	4.2
4	5150.00	43.9 AV	54.0	-10.1	2.97 H	209	39.7	4.2
5	*5210.00	103.4 PK			3.13 H	200	64.2	39.2
6	*5210.00	90.9 AV			3.13 H	200	51.7	39.2
7	5350.00	55.0 PK	74.0	-19.0	3.01 H	211	50.9	4.1
8	5350.00	42.8 AV	54.0	-11.2	3.01 H	211	38.7	4.1
9	#10420.00	60.4 PK	68.2	-7.8	3.88 H	313	42.5	17.9
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	5135.00	62.6 PK	74.0	-11.4	1.15 V	355	58.5	4.1
2	5135.00	52.1 AV	54.0	-1.9	1.15 V	355	48.0	4.1
3	5150.00	62.7 PK	74.0	-11.3	1.43 V	349	58.5	4.2
4	5150.00	45.2 AV	54.0	-8.8	1.43 V	349	41.0	4.2
5	*5210.00	108.5 PK			1.44 V	345	69.3	39.2
6	*5210.00	95.9 AV			1.44 V	345	56.7	39.2
7	5350.00	56.7 PK	74.0	-17.3	1.39 V	351	52.6	4.1
8	5350.00	43.3 AV	54.0	-10.7	1.39 V	351	39.2	4.1
9	#10420.00	61.9 PK	68.2	-6.3	3.77 V	63	44.0	17.9

REMARKS:

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

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	#5649.60	60.1 PK	68.2	-8.1	1.83 H	185	55.7	4.4
2	#5650.00	61.4 PK	68.2	-6.8	2.16 H	174	57.0	4.4
3	*5775.00	111.4 PK			1.83 H	185	71.2	40.2
4	*5775.00	98.8 AV			1.83 H	185	58.6	40.2
5	#5925.00	57.9 PK	68.2	-10.3	2.03 H	180	52.5	5.4
6	#5928.00	58.5 PK	68.2	-9.7	1.83 H	185	53.1	5.4
7	11550.00	61.6 PK	74.0	-12.4	3.72 H	69	42.4	19.2
8	11550.00	47.7 AV	54.0	-6.3	3.72 H	69	28.5	19.2
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	#5649.60	62.2 PK	68.2	-6.0	2.21 V	0	57.8	4.4
2	#5650.00	67.6 PK	68.2	-0.6	2.23 V	0	63.2	4.4
3	*5775.00	116.4 PK			2.21 V	0	76.2	40.2
4	*5775.00	103.3 AV			2.21 V	0	63.1	40.2
5	#5925.00	60.5 PK	68.2	-7.7	2.40 V	2	55.1	5.4
6	#5928.00	59.2 PK	68.2	-9.0	2.21 V	0	53.8	5.4
7	11550.00	62.2 PK	74.0	-11.8	2.97 V	339	43.0	19.2
8	11550.00	50.1 AV	54.0	-3.9	2.97 V	339	30.9	19.2

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

Below 1 GHz Worst-Case Data:

Mode A

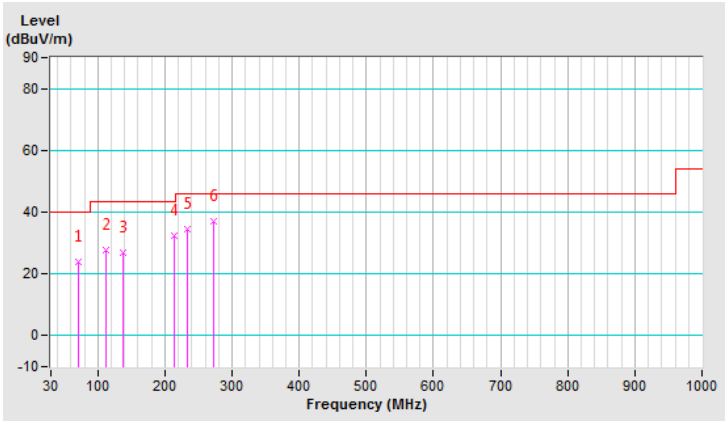
802.11ax (HE20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	70.77	23.8 QP	40.0	-16.2	2.00 H	5	35.0	-11.2
2	111.54	27.9 QP	43.5	-15.6	1.00 H	86	39.7	-11.8
3	138.25	27.0 QP	43.5	-16.5	1.50 H	101	36.2	-9.2
4	214.16	32.2 QP	43.5	-11.3	1.00 H	97	42.9	-10.7
5	233.84	34.3 QP	46.0	-11.7	1.00 H	110	44.4	-10.1
6	271.80	37.0 QP	46.0	-9.0	1.50 H	293	45.2	-8.2

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

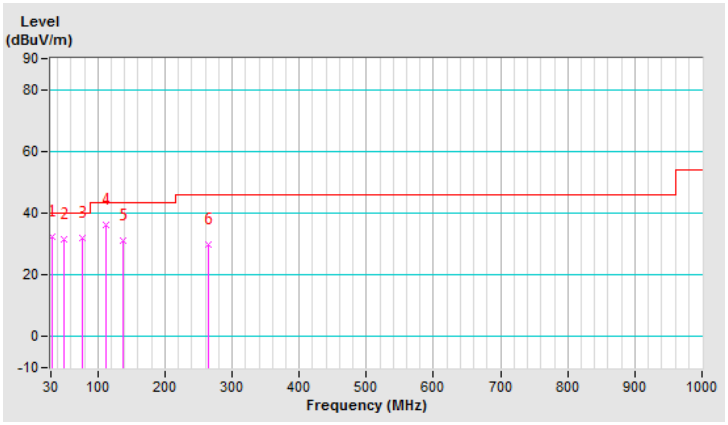


CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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	32.81	32.2 QP	40.0	-7.8	1.00 V	307	43.0	-10.8
2	49.68	31.6 QP	40.0	-8.4	1.00 V	103	40.6	-9.0
3	76.39	32.0 QP	40.0	-8.0	1.00 V	311	44.5	-12.5
4	111.54	36.3 QP	43.5	-7.2	1.00 V	115	48.1	-11.8
5	138.25	31.3 QP	43.5	-12.2	1.00 V	75	40.5	-9.2
6	264.77	29.8 QP	46.0	-16.2	1.00 V	145	38.5	-8.7

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.



Mode B

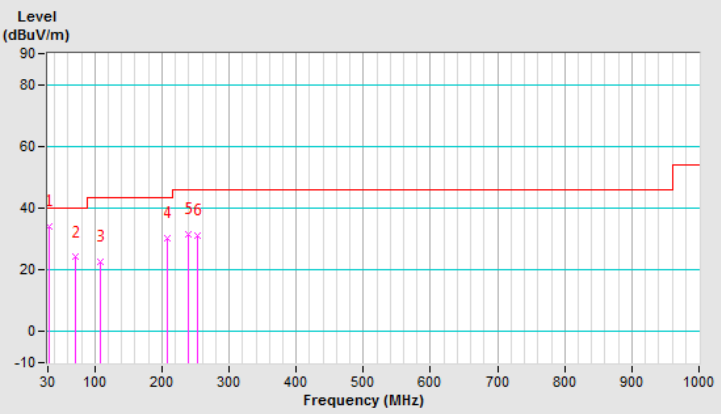
802.11ax (HE20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	31.41	33.9 QP	40.0	-6.1	1.50 H	343	44.8	-10.9
2	70.77	24.1 QP	40.0	-15.9	1.00 H	237	35.3	-11.2
3	107.32	22.5 QP	43.5	-21.0	2.00 H	218	34.6	-12.1
4	207.13	30.1 QP	43.5	-13.4	1.00 H	99	41.0	-10.9
5	239.46	31.4 QP	46.0	-14.6	1.50 H	37	41.0	-9.6
6	252.12	30.9 QP	46.0	-15.1	1.00 H	302	40.1	-9.2

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

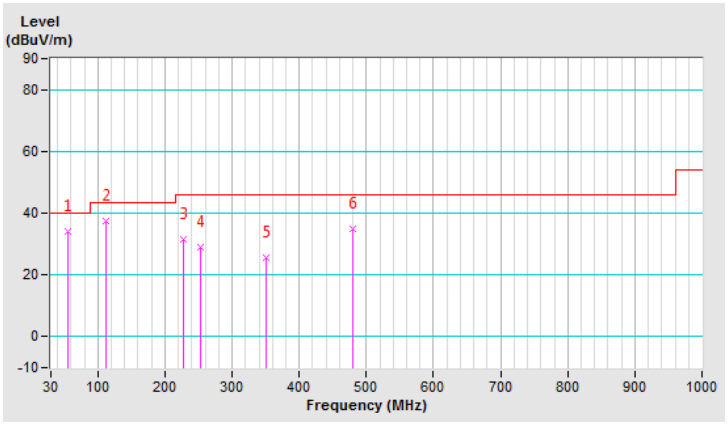


CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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	55.30	34.1 QP	40.0	-5.9	1.50 V	300	43.1	-9.0
2	111.54	37.4 QP	43.5	-6.1	1.00 V	87	49.2	-11.8
3	226.81	31.5 QP	46.0	-14.5	2.00 V	191	41.9	-10.4
4	252.12	29.0 QP	46.0	-17.0	1.00 V	201	38.2	-9.2
5	350.52	25.6 QP	46.0	-20.4	1.50 V	177	31.9	-6.3
6	479.86	35.1 QP	46.0	-10.9	1.00 V	88	37.2	-2.1

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.



Mode C

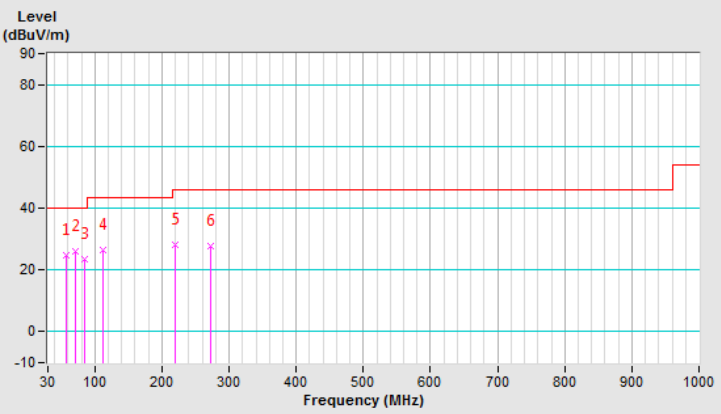
802.11ax (HE20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	56.71	24.7 QP	40.0	-15.3	2.00 H	83	34.0	-9.3
2	70.77	25.9 QP	40.0	-14.1	1.50 H	24	37.1	-11.2
3	84.83	23.6 QP	40.0	-16.4	1.50 H	7	37.4	-13.8
4	111.54	26.3 QP	43.5	-17.2	2.00 H	182	38.1	-11.8
5	219.78	28.1 QP	46.0	-17.9	1.50 H	127	38.7	-10.6
6	271.80	27.8 QP	46.0	-18.2	1.00 H	318	36.0	-8.2

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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.

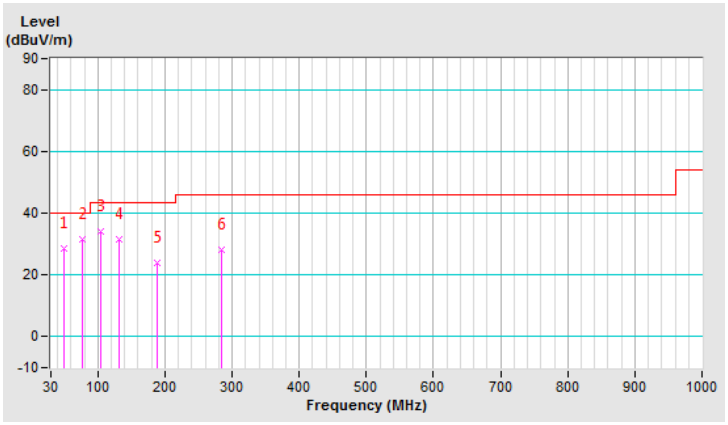


CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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	49.68	28.6 QP	40.0	-11.4	1.00 V	258	37.6	-9.0
2	76.39	31.6 QP	40.0	-8.4	1.50 V	261	44.1	-12.5
3	104.51	34.0 QP	43.5	-9.5	1.50 V	273	46.4	-12.4
4	131.22	31.5 QP	43.5	-12.0	1.50 V	3	41.5	-10.0
5	188.86	23.8 QP	43.5	-19.7	2.00 V	327	34.4	-10.6
6	284.45	28.2 QP	46.0	-17.8	1.50 V	104	36.1	-7.9

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
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 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 10, 2018	Dec. 09, 2019
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

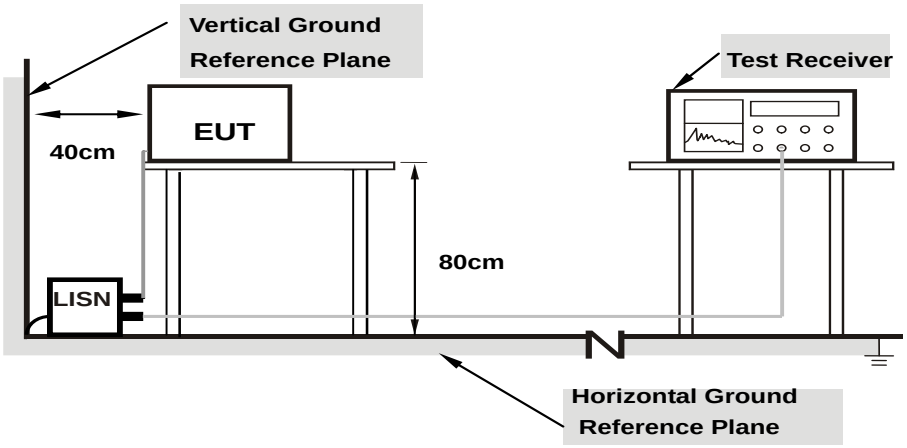
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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 150 kHz to 30 MHz was searched. Emission levels under (Limit -20 dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT Operating Conditions

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

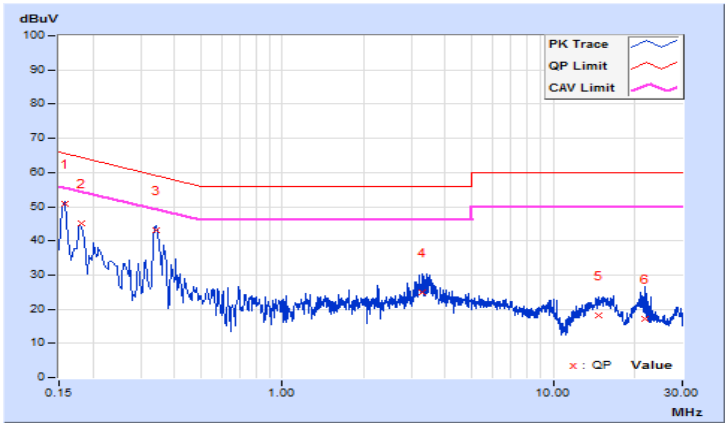
Mode A

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 67%RH
Tested by	Adair Peng	Test Date	2019/11/16

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15770	9.67	41.24	30.11	50.91	39.78	65.58	55.58	-14.67	-15.80
2	0.18200	9.66	35.40	25.70	45.06	35.36	64.39	54.39	-19.33	-19.03
3	**0.34124**	**9.68**	**33.25**	**32.33**	**42.93**	**42.01**	**59.17**	**49.17**	**-16.24**	**-7.16**
4	3.27000	9.82	15.26	4.92	25.08	14.74	56.00	46.00	-30.92	-31.26
5	14.75000	9.96	8.22	2.89	18.18	12.85	60.00	50.00	-41.82	-37.15
6	21.77000	9.99	7.17	1.35	17.16	11.34	60.00	50.00	-42.84	-38.66

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

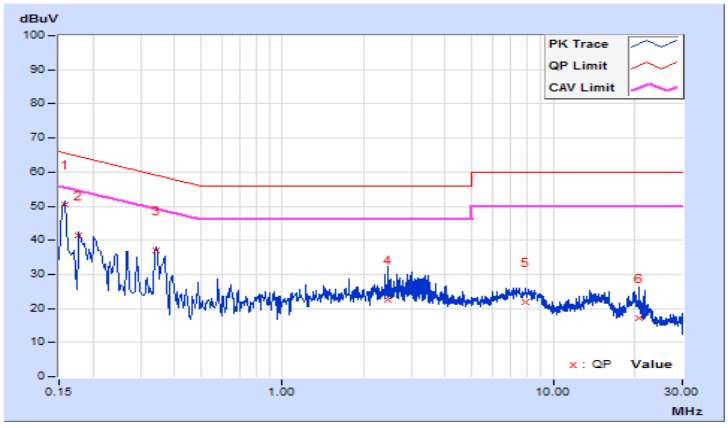


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 67%RH
Tested by	Adair Peng	Test Date	2019/11/16

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15770	9.64	40.88	29.42	50.52	39.06	65.58	55.58	-15.06	-16.52
2	0.17800	9.64	31.73	18.18	41.37	27.82	64.58	54.58	-23.21	-26.76
3	0.34200	9.65	27.34	24.66	36.99	34.31	59.15	49.15	-22.16	-14.84
4	2.47000	9.76	12.66	3.57	22.42	13.33	56.00	46.00	-33.58	-32.67
5	7.87400	9.87	12.13	6.21	22.00	16.08	60.00	50.00	-38.00	-33.92
6	20.87400	10.06	6.96	1.23	17.02	11.29	60.00	50.00	-42.98	-38.71

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



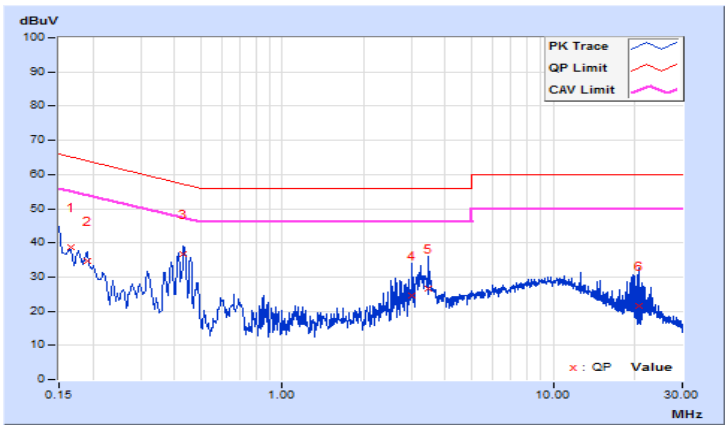
Mode B

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 67%RH
Tested by	Adair Peng	Test Date	2019/11/16

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16535	9.67	29.17	20.32	38.84	29.99	65.19	55.19	-26.35	-25.20
2	0.19000	9.66	25.07	17.06	34.73	26.72	64.04	54.04	-29.31	-27.32
3	0.43000	9.69	27.12	23.75	36.81	33.44	57.25	47.25	-20.44	-13.81
4	2.99800	9.81	14.70	4.03	24.51	13.84	56.00	46.00	-31.49	-32.16
5	3.46600	9.82	16.90	7.85	26.72	17.67	56.00	46.00	-29.28	-28.33
6	20.72200	9.98	11.62	2.36	21.60	12.34	60.00	50.00	-38.40	-37.66

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

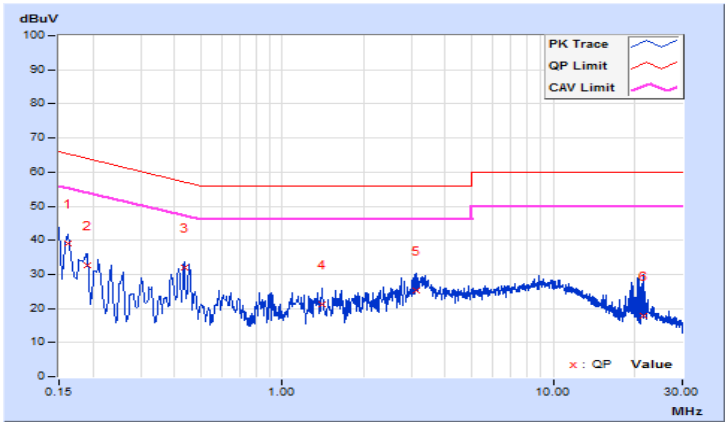


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 67%RH
Tested by	Adair Peng	Test Date	2019/11/16

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	9.64	29.45	16.05	39.09	25.69	65.37	55.37	-26.28	-29.68
2	0.19000	9.64	22.97	12.19	32.61	21.83	64.04	54.04	-31.43	-32.21
3	0.43370	9.66	22.35	20.97	32.01	30.63	57.18	47.18	-25.17	-16.55
4	1.40600	9.72	11.59	5.21	21.31	14.93	56.00	46.00	-34.69	-31.07
5	3.10600	9.78	15.35	6.38	25.13	16.16	56.00	46.00	-30.87	-29.84
6	21.48200	10.06	7.91	2.12	17.97	12.18	60.00	50.00	-42.03	-37.82

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



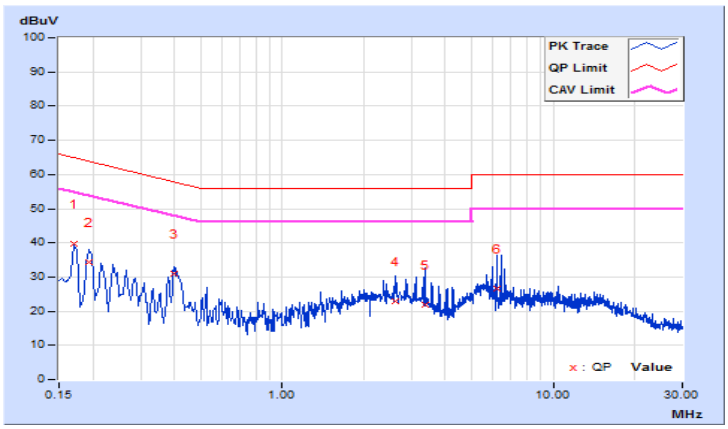
Mode C

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 67%RH
Tested by	Adair Peng	Test Date	2019/11/16

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17000	9.67	29.92	15.77	39.59	25.44	64.96	54.96	-25.37	-29.52
2	0.19400	9.66	24.56	11.24	34.22	20.90	63.86	53.86	-29.64	-32.96
3	0.39758	9.69	21.37	16.34	31.06	26.03	57.90	47.90	-26.84	-21.87
4	2.60600	9.80	13.18	6.14	22.98	15.94	56.00	46.00	-33.02	-30.06
5	3.36200	9.82	12.09	4.72	21.91	14.54	56.00	46.00	-34.09	-31.46
6	6.17400	9.87	16.81	4.42	26.68	14.29	60.00	50.00	-33.32	-35.71

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

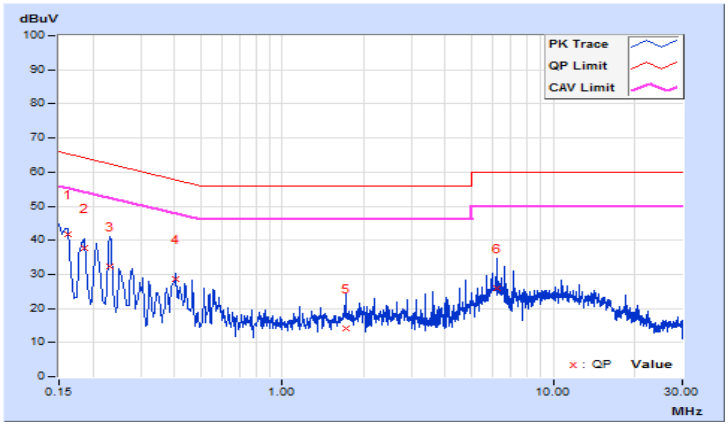


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 67%RH
Tested by	Adair Peng	Test Date	2019/11/16

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16105	9.64	32.18	17.15	41.82	26.79	65.41	55.41	-23.59	-28.62
2	0.18600	9.64	28.00	13.13	37.64	22.77	64.21	54.21	-26.57	-31.44
3	0.22985	9.64	22.83	9.23	32.47	18.87	62.46	52.46	-29.99	-33.59
4	0.40600	9.66	18.99	11.96	28.65	21.62	57.73	47.73	-29.08	-26.11
5	1.71400	9.74	4.55	1.78	14.29	11.52	56.00	46.00	-41.71	-34.48
6	6.17800	9.85	16.10	8.36	25.95	18.21	60.00	50.00	-34.05	-31.79

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 ≦ 125 mW (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	250 mW (24 dBm)
U-NII-2A	-		250 mW (24 dBm) or 11 dBm + 10 log B*
U-NII-2C	-		250 mW (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 $N_{ANT} \leq 4$;

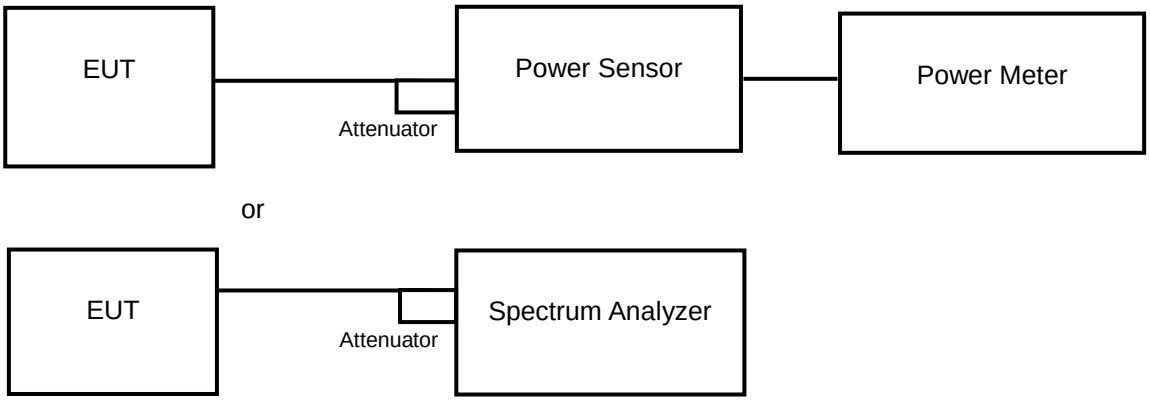
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};

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

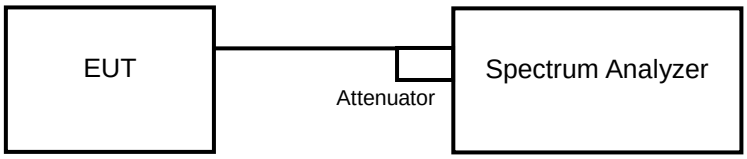
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

<Power Output Measurement>



<26 dB Bandwidth>



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Average Power Measurement

<802.11a, 802.11ax (HE20), 802.11ax (HE40)>

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

<802.11ac (VHT80)>

a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99 % occupied bandwidth) of the signal.
b. Set sweep trigger to “free run”.
c. Set RBW = 1 MHz.
d. Set VBW ≥ 3 MHz
e. Number of points in sweep ≥ 2 Span / RBW.
f. Sweep time ≤ (number of points in sweep) * T
g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
h. Detector = RMS.
i. Trace mode = max hold.
j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

26 dB Bandwidth

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

Power Output:

CDD Mode:

802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	19.66	20.01	192.701	22.85	30	Pass
40	5200	20.27	20.39	215.81	23.34	30	Pass
48	5240	23.41	23.15	425.818	26.29	30	Pass
149	5745	23.11	22.51	382.882	25.83	30	Pass
157	5785	22.33	22.53	350.063	25.44	30	Pass
165	5825	23.31	23.11	418.933	26.22	30	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.81	21.09	249.033	23.96	30	Pass
40	5200	20.83	20.71	238.821	23.78	30	Pass
48	5240	23.91	23.62	476.181	26.78	30	Pass
149	5745	23.50	22.71	410.51	26.13	30	Pass
157	5785	23.22	22.81	400.879	26.03	30	Pass
165	5825	23.51	23.32	439.171	26.43	30	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	19.98	19.92	197.716	22.96	30	Pass
46	5230	20.19	19.87	201.523	23.04	30	Pass
151	5755	24.11	23.04	459.004	26.62	30	Pass
159	5795	24.02	23.22	462.242	26.65	30	Pass

802.11ax (HE80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	16.15	15.86	79.758	19.02	30	Pass
155	5775	21.67	20.95	271.344	24.34	30	Pass

Beamforming Mode:

802.11ax (HE20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.81	21.09	249.033	23.96	29.84	Pass
40	5200	20.83	20.71	238.821	23.78	29.84	Pass
48	5240	23.91	23.62	476.181	26.78	29.84	Pass
149	5745	23.50	22.71	410.51	26.13	29.84	Pass
157	5785	23.22	22.81	400.879	26.03	29.84	Pass
165	5825	23.51	23.32	439.171	26.43	29.84	Pass

Note:

Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 6.16 dBi >6 dBi, so the output power limit shall be reduced to 30-(6.16-6) = 29.84 dBm.

802.11ax (HE40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	19.98	19.92	197.716	22.96	29.84	Pass
46	5230	20.19	19.87	201.523	23.04	29.84	Pass
151	5755	24.11	23.04	459.004	26.62	29.84	Pass
159	5795	24.02	23.22	462.242	26.65	29.84	Pass

Note:

Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 6.16 dBi >6 dBi, so the output power limit shall be reduced to 30-(6.16-6) = 29.84 dBm.

802.11ax (HE80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	16.15	15.86	79.758	19.02	29.84	Pass
58	5290	16.55	16.78	92.829	19.68	23.84	Pass
155	5775	21.67	20.95	271.344	24.34	29.84	Pass

Note:

Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16$ dBi >6 dBi, so the output power limit shall be reduced to 30-(6.16-6) = 29.84 dBm.

26 dB Bandwidth:

802.11a

Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.84	19.43
40	5200	19.71	19.58
48	5240	20.18	19.56

802.11ax (HE20)

Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	21.93	21.30
40	5200	21.62	21.53
48	5240	21.41	21.66

802.11ax (HE40)

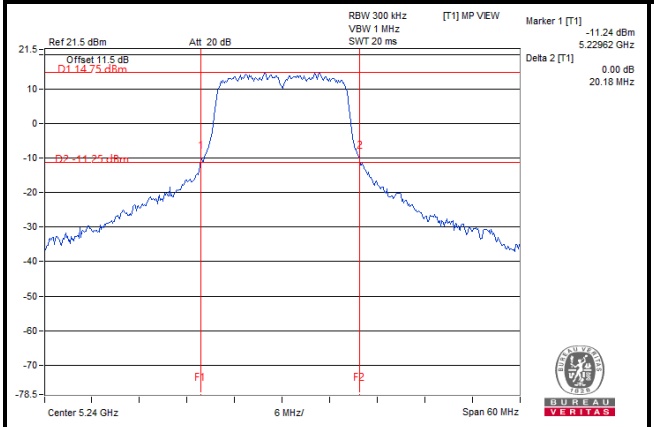
Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	42.40	42.20
46	5230	42.05	42.48

802.11ax (HE80)

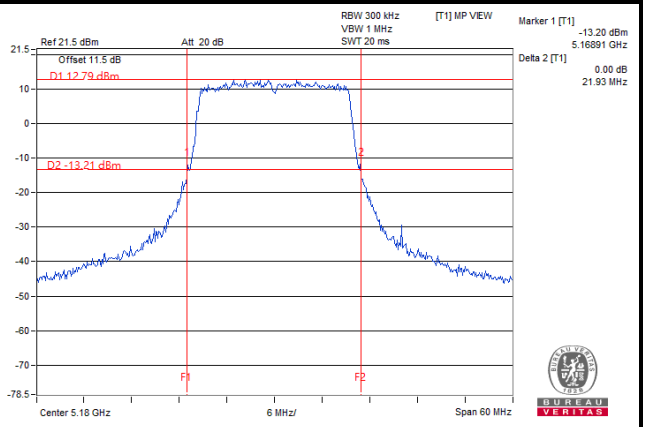
Channel	Frequency (MHz)	26 dBc Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	83.02	83.21

Spectrum Plot of Worst Value

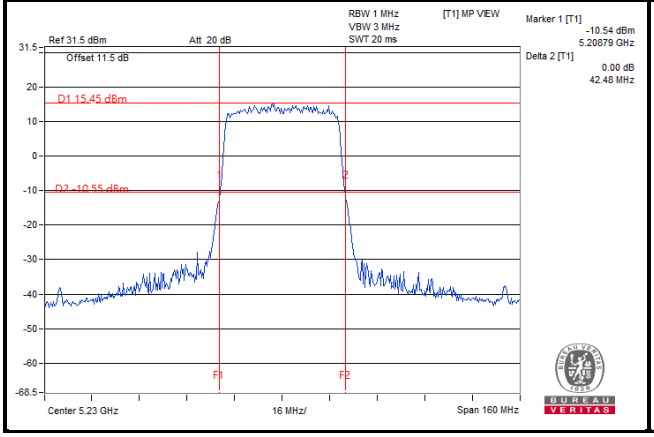
802.11a



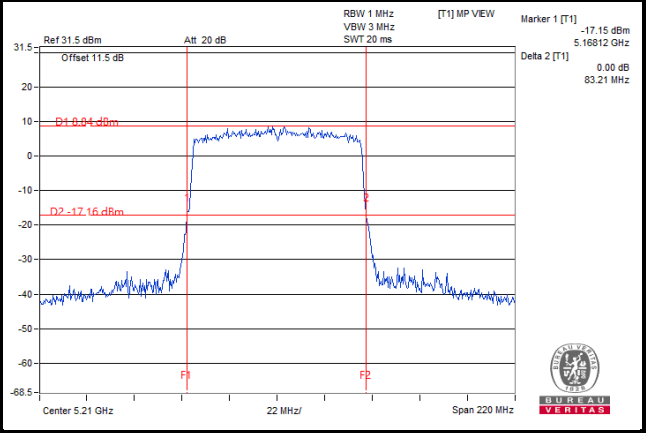
802.11ax (HE20)



802.11ax (HE40)

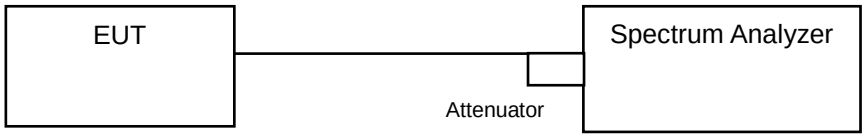


802.11ax (HE80)



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 SAMPLE. 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 Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.44	16.44
40	5200	16.44	16.44
48	5240	16.44	16.44
149	5745	16.44	16.44
157	5785	16.56	16.44
165	5825	16.56	16.44

802.11ax (HE20)

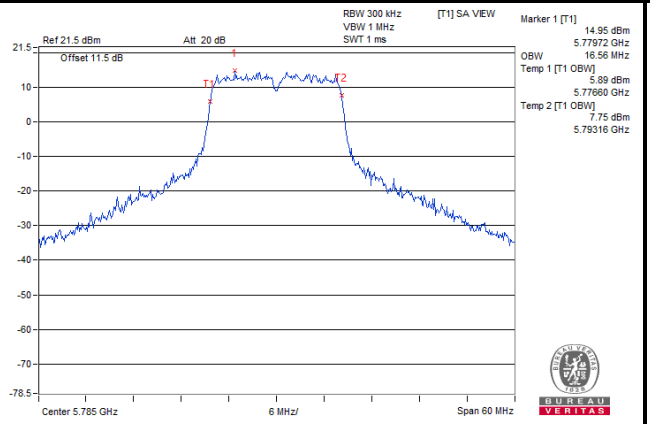
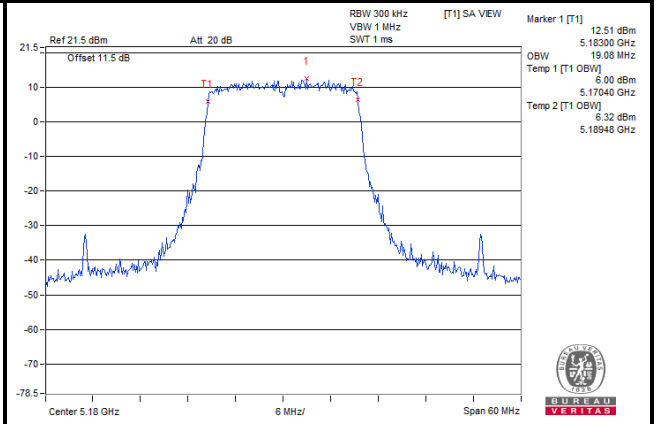
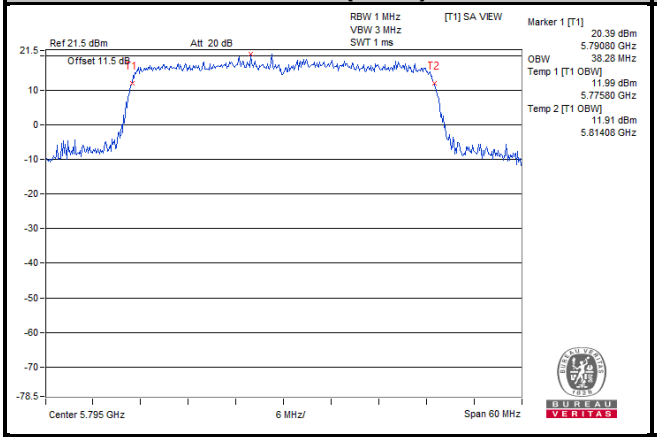
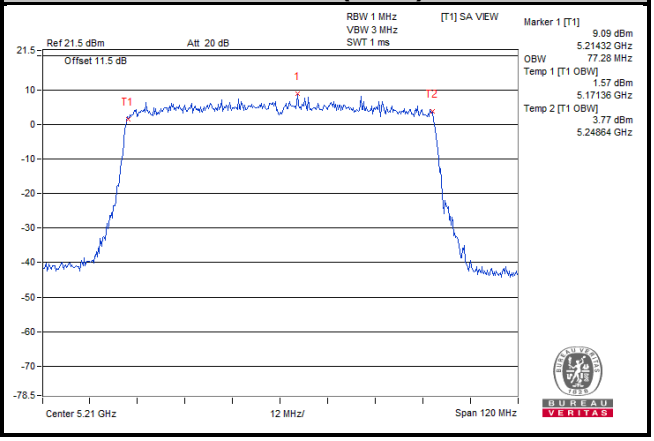
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	18.96	19.08
40	5200	18.96	19.08
48	5240	19.08	19.08
149	5745	19.08	19.08
157	5785	19.08	19.08
165	5825	19.08	19.08

802.11ax (HE40)

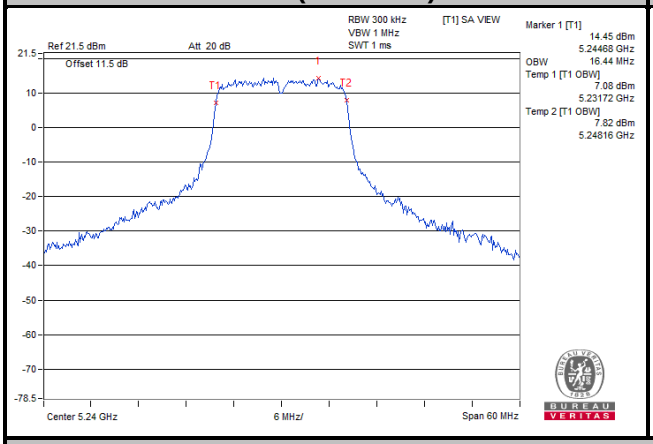
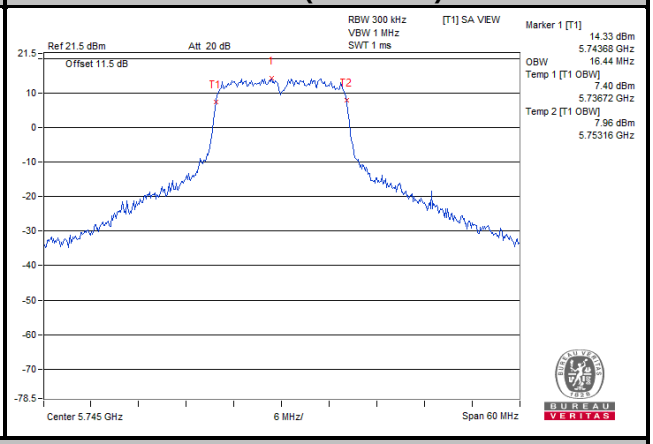
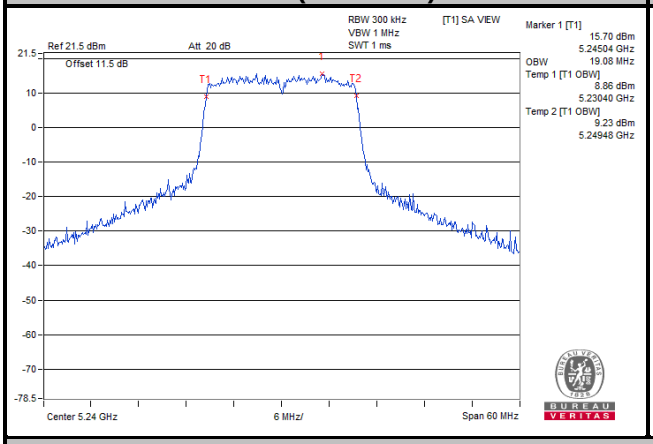
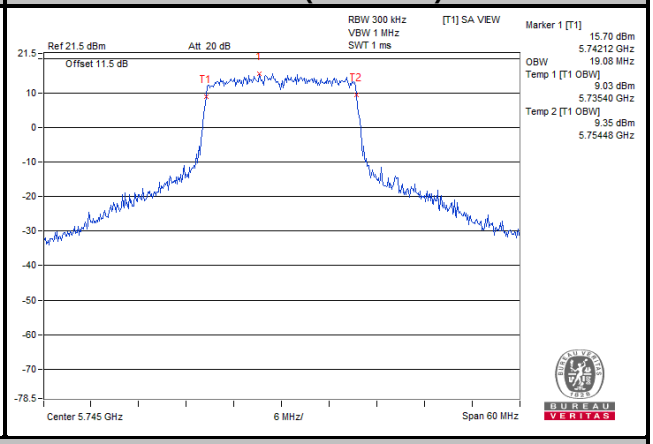
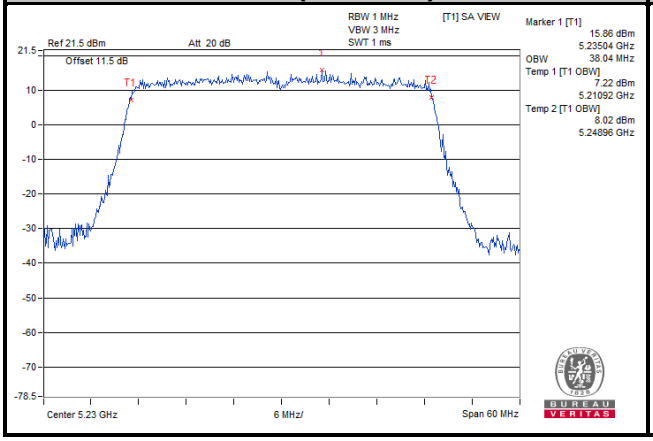
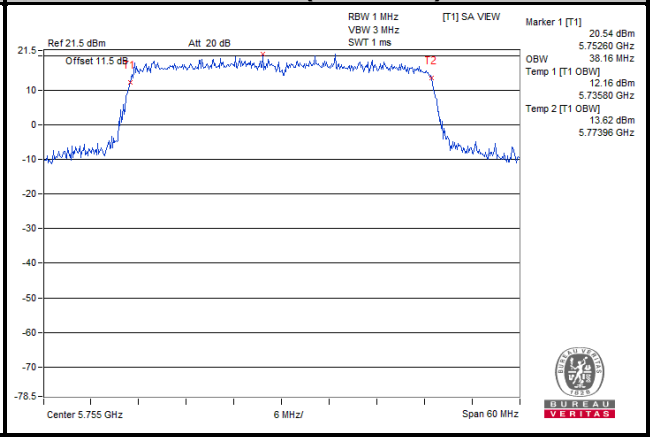
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	38.04	38.04
46	5230	38.04	38.04
151	5755	38.16	38.16
159	5795	38.28	38.28

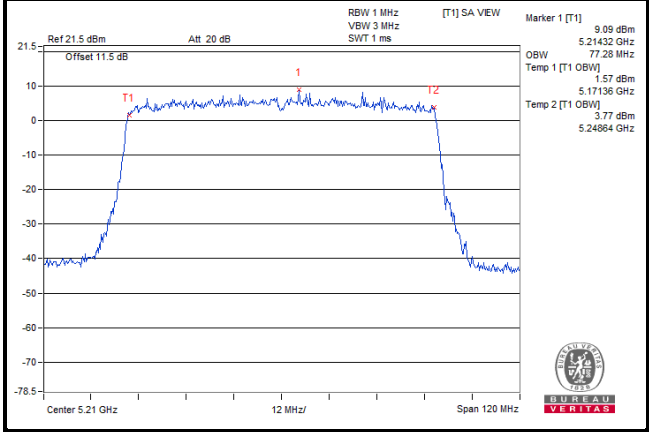
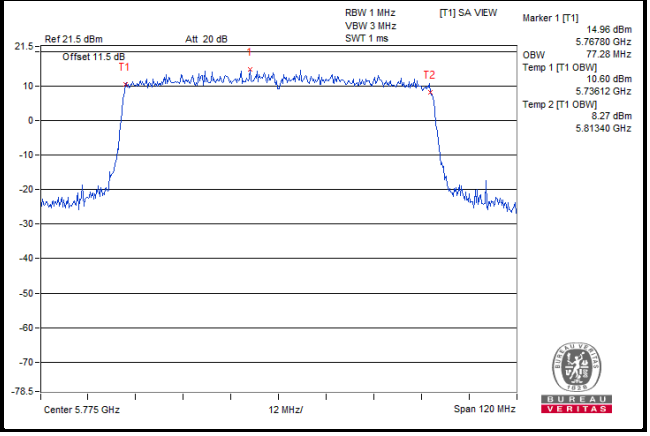
802.11ax (HE80)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	77.28	77.28
155	5775	77.28	77.28

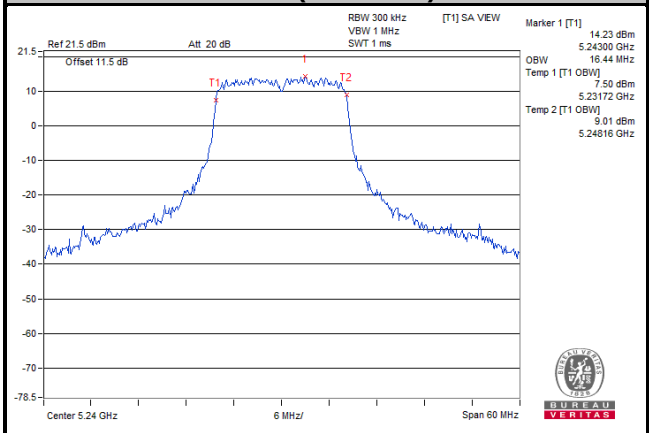
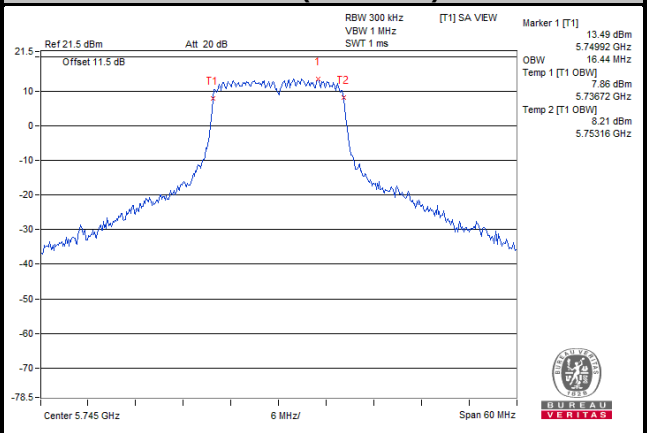
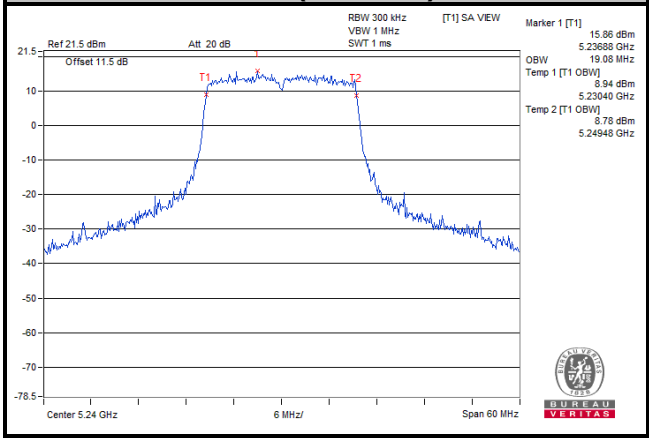
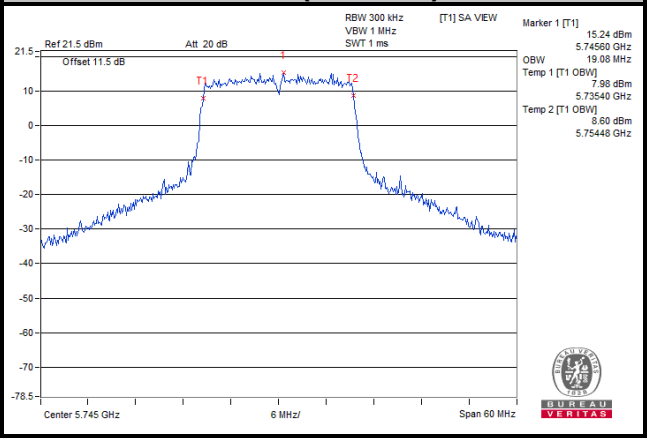
Spectrum Plot of Worst Value	
802.11a	802.11ax (HE20)
	
802.11ax (HE40)	802.11ax (HE80)
	

Chain 0

Spectrum Plot for Nearby DFS Band	
802.11a	
Ch 48 (5240 MHz)	Ch 149 (5745 MHz)
	
802.11ax (HE20)	
Ch 48 (5240 MHz)	Ch 149 (5745 MHz)
	
802.11ax (HE40)	
Ch 46 (5230 MHz)	Ch 151 (5755 MHz)
	

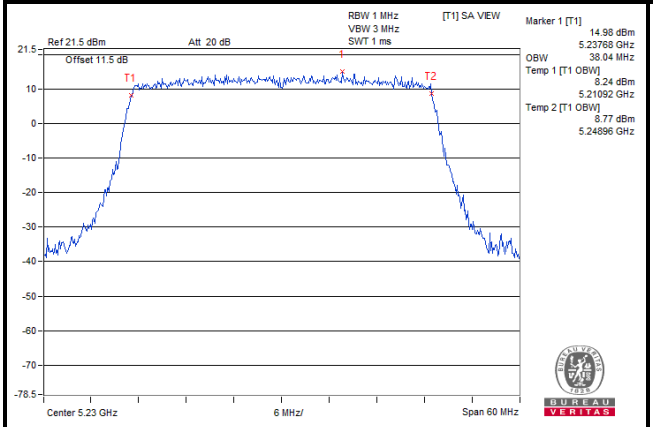
802.11ax (HE80)	
Ch 42 (5210 MHz)	Ch 155 (5775 MHz)
	

Chain 1

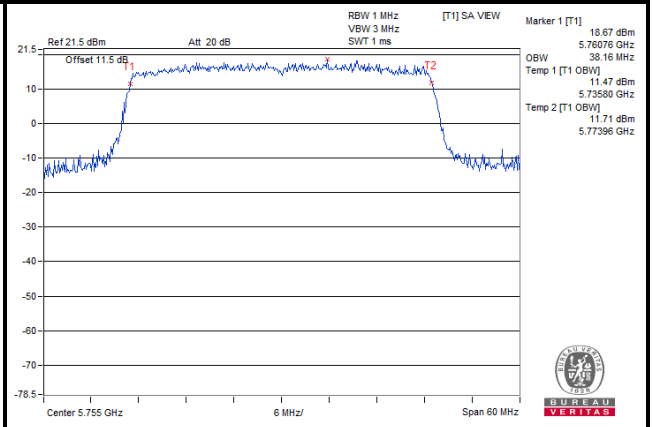
Spectrum Plot for Nearby DFS Band	
802.11a	
Ch 48 (5240 MHz)	Ch 149 (5745 MHz)
	
802.11ax (HE20)	
Ch 48 (5240 MHz)	Ch 149 (5745 MHz)
	

802.11ax (HE40)

Ch 46 (5230 MHz)

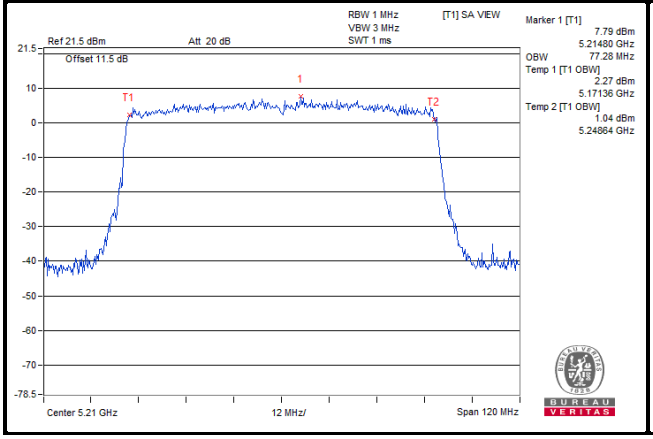


Ch 151 (5755 MHz)

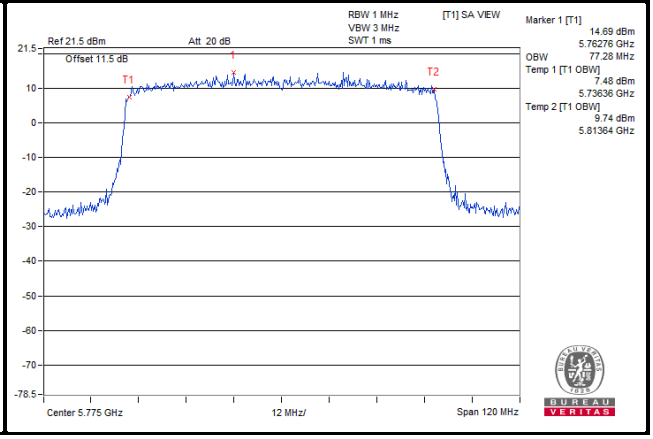


802.11ax (HE80)

Ch 42 (5210 MHz)



Ch 155 (5775 MHz)

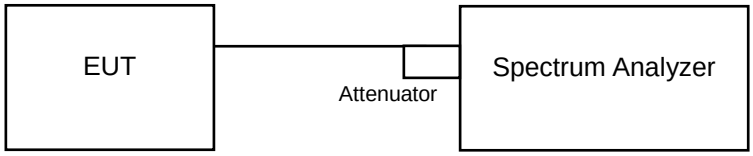


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1 band:

Using method SA-2

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

※For U-NII-3:

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

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

4.5.7 Test Results

For U-NII-1 Band

802.11a

Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	5.92	6.35	0.27	9.42	16.84	Pass
40	5200	6.62	6.58	0.27	9.88	16.84	Pass
48	5240	9.44	9.55	0.27	12.78	16.84	Pass

Note:

1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16$ dBi > 6 dBi , so the power density limit shall be reduced to 17-(6.16-6) = 16.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	6.22	6.18	0.29	9.50	16.84	Pass
40	5200	5.73	5.70	0.29	9.02	16.84	Pass
48	5240	8.48	9.09	0.29	12.10	16.84	Pass

Note:

1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16$ dBi > 6 dBi , so the power density limit shall be reduced to 17-(6.16-6) = 16.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	2.33	2.09	0.17	5.39	16.84	Pass
46	5230	2.73	2.16	0.17	5.63	16.84	Pass

Note:

1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16$ dBi > 6 dBi , so the power density limit shall be reduced to 17-(6.16-6) = 16.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE80)

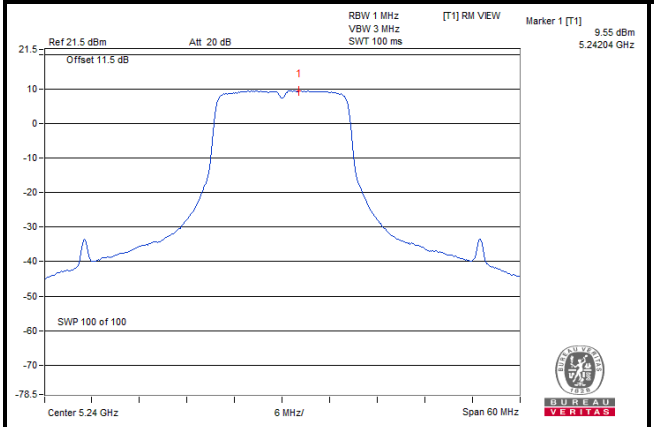
Channel	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-4.55	-4.83	0.21	-1.47	16.84	Pass

Note:

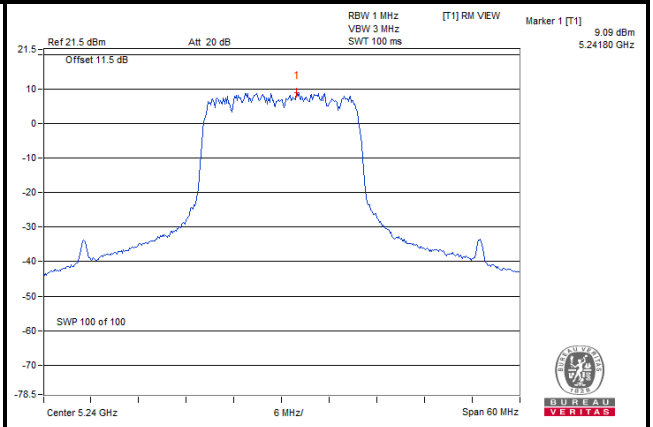
1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16$ dBi > 6 dBi , so the power density limit shall be reduced to 17-(6.16-6) = 16.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

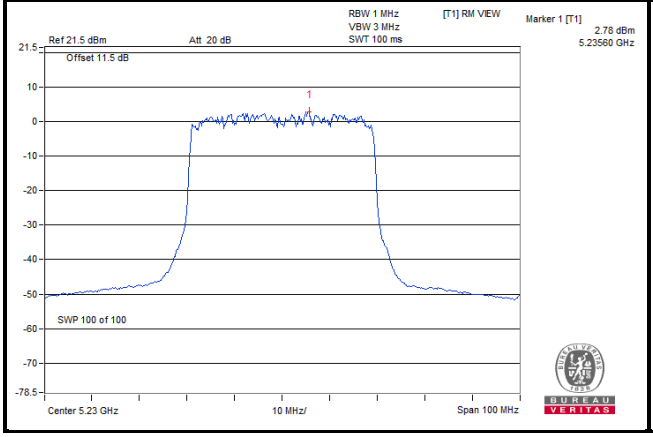
802.11a



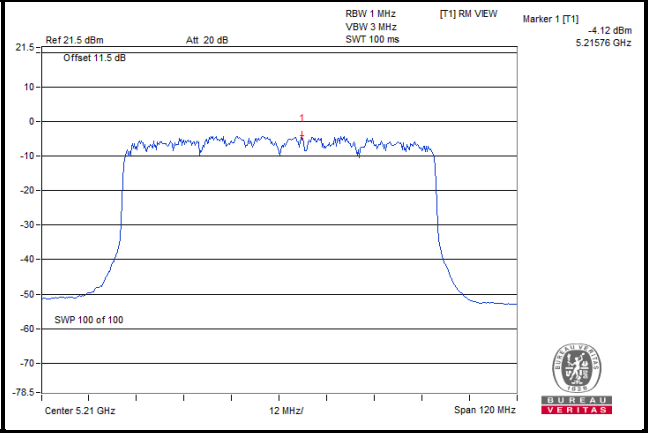
802.11ax (HE20)



802.11ax (HE40)



802.11ax (HE80)



For U-NII-3 Band

802.11a

TX Chain	Channel	Frequency (MHz)	PSD w/o Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	149	5745	1.56	3.78	3.01	0.27	7.06	29.84	Pass
	157	5785	1.24	3.46	3.01	0.27	6.74	29.84	Pass
	165	5825	1.17	3.39	3.01	0.27	6.67	29.84	Pass
1	149	5745	0.73	2.95	3.01	0.27	6.23	29.84	Pass
	157	5785	0.95	3.17	3.01	0.27	6.45	29.84	Pass
	165	5825	1.37	3.59	3.01	0.27	6.87	29.84	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16 > 6$ dBi , so the power density limit shall be reduced to 30-(6.16-6) = 29.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

TX Chain	Channel	Frequency (MHz)	PSD		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	149	5745	-0.26	1.96	3.01	0.29	5.26	30	Pass
	157	5785	-0.26	1.96	3.01	0.29	5.26	30	Pass
	165	5825	-0.33	1.89	3.01	0.29	5.19	30	Pass
1	149	5745	-0.73	1.49	3.01	0.29	4.79	30	Pass
	157	5785	-0.38	1.84	3.01	0.29	5.14	30	Pass
	165	5825	0.06	2.28	3.01	0.29	5.58	30	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16 > 6$ dBi , so the power density limit shall be reduced to 30-(6.16-6) = 29.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

TX Chain	Channel	Frequency (MHz)	PSD		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	151	5755	-1.76	0.46	3.01	0.17	3.64	30	Pass
	159	5795	-1.75	0.47	3.01	0.17	3.65	30	Pass
1	151	5755	-3.13	-0.91	3.01	0.17	2.27	30	Pass
	159	5795	-2.85	-0.63	3.01	0.17	2.55	30	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16 > 6$ dBi , so the power density limit shall be reduced to 30-(6.16-6) = 29.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

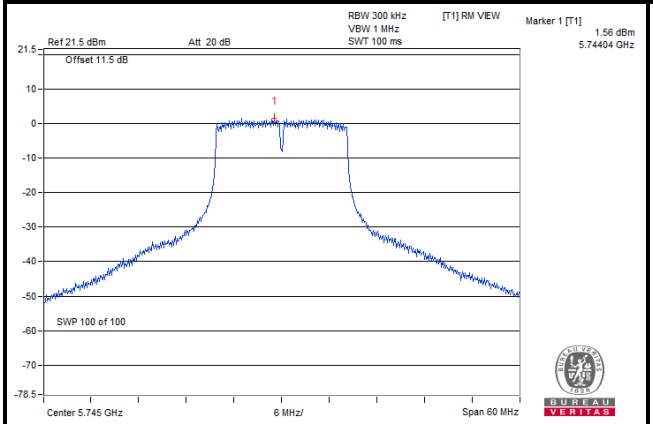
802.11ax (HE80)

TX Chain	Channel	Frequency (MHz)	PSD		10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
			(dBm/300 kHz)	(dBm/500 kHz)					
0	155	5775	-7.10	-4.88	3.01	0.21	-1.66	30	Pass
1	155	5775	-7.75	-5.53	3.01	0.21	-2.31	30	Pass

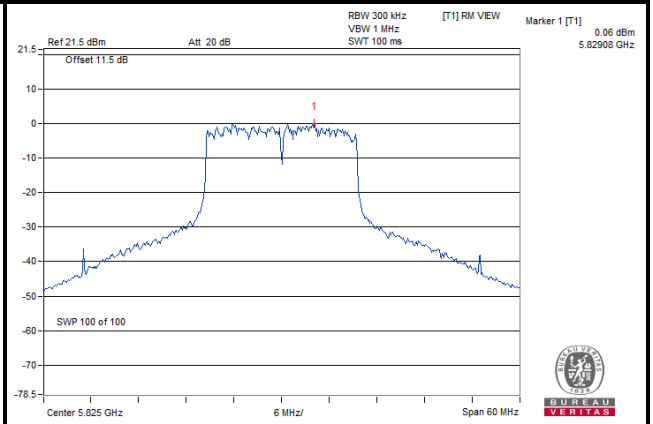
Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 6.16 > 6$ dBi , so the power density limit shall be reduced to 30-(6.16-6) = 29.84 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

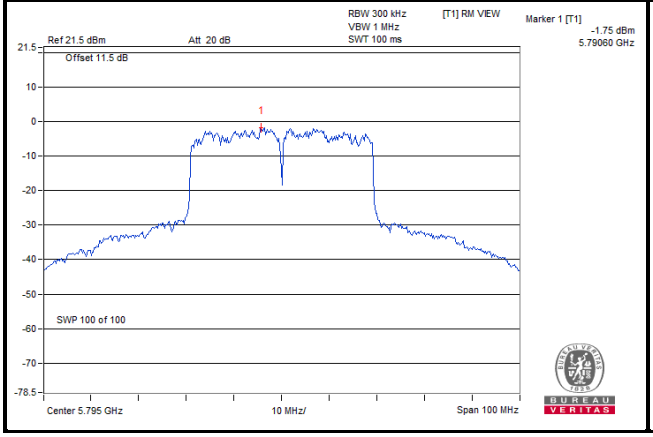
802.11a



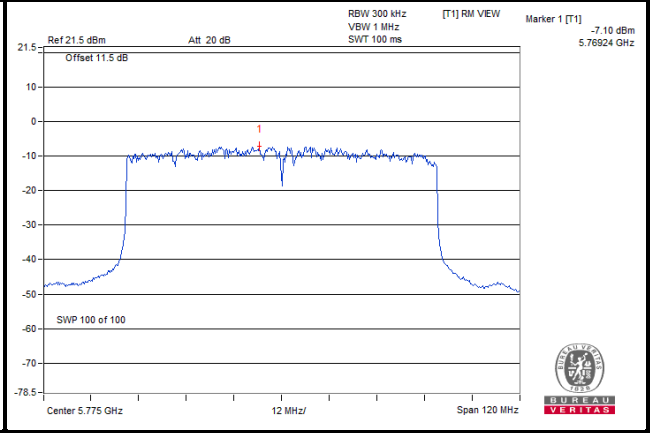
802.11ax (HE20)



802.11ax (HE40)



802.11ax (HE80)

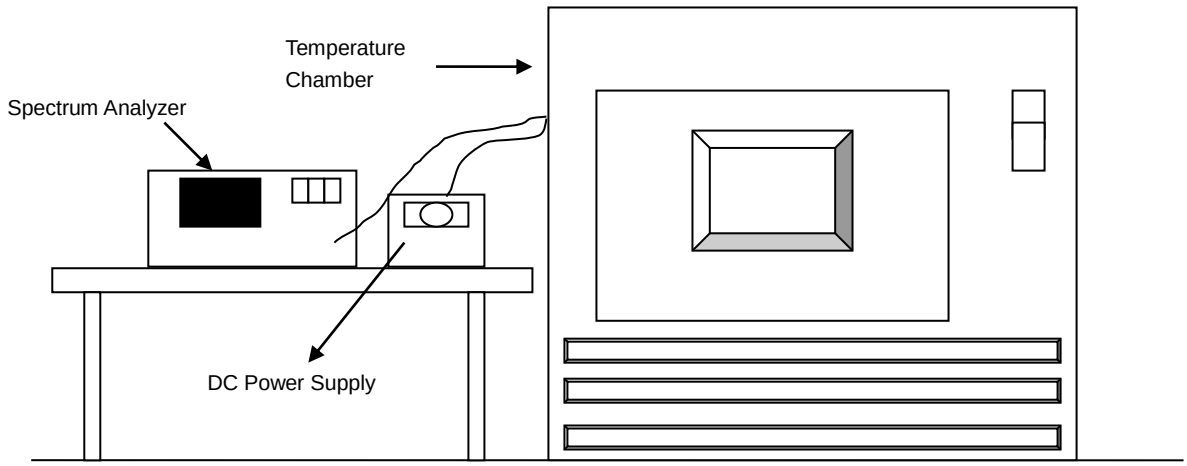


4.6 Frequency Stability

4.6.1 Limit 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

Refer to section 4.1.3 to get information of above instrument.

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC 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 (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
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: 5180 MHz									
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
60	120	5180.0056	PASS	5180.0103	PASS	5180.0074	PASS	5180.0067	PASS
50	120	5180.0231	PASS	5180.0264	PASS	5180.0234	PASS	5180.0265	PASS
40	120	5180.0012	PASS	5179.9995	PASS	5180	PASS	5179.9981	PASS
30	120	5180.0227	PASS	5180.0232	PASS	5180.0219	PASS	5180.0226	PASS
20	120	5180.0029	PASS	5179.9998	PASS	5180.0024	PASS	5180.0028	PASS
10	120	5180.0187	PASS	5180.0192	PASS	5180.0217	PASS	5180.0176	PASS
0	120	5180.0085	PASS	5180.0079	PASS	5180.0073	PASS	5180.0075	PASS
-10	120	5179.9753	PASS	5179.9731	PASS	5179.9728	PASS	5179.9756	PASS
-20	120	5180.0047	PASS	5180.0028	PASS	5180.0068	PASS	5180.0034	PASS

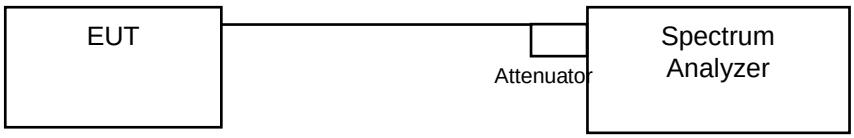
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
Temp. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5180.0021	PASS	5180.0003	PASS	5180.0016	PASS	5180.0029	PASS
	120	5180.0029	PASS	5179.9998	PASS	5180.0024	PASS	5180.0028	PASS
	102	5180.0025	PASS	5179.9989	PASS	5180.0034	PASS	5180.0021	PASS

4.7 6 dB Bandwidth Measurement

4.7.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set resolution bandwidth (RBW) = 100 kHz
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)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.39	16.02	0.5	Pass
157	5785	15.40	15.79	0.5	Pass
165	5825	15.39	15.98	0.5	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	18.51	18.36	0.5	Pass
157	5785	18.70	18.51	0.5	Pass
165	5825	18.18	18.56	0.5	Pass

802.11ax (HE40)

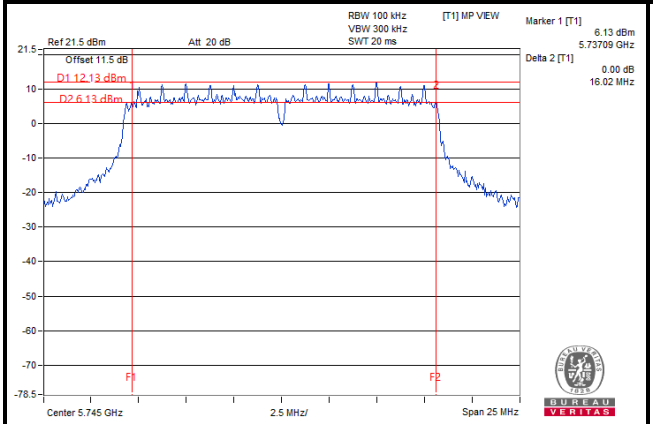
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	37.52	37.36	0.5	Pass
159	5795	36.89	37.52	0.5	Pass

802.11ax (HE80)

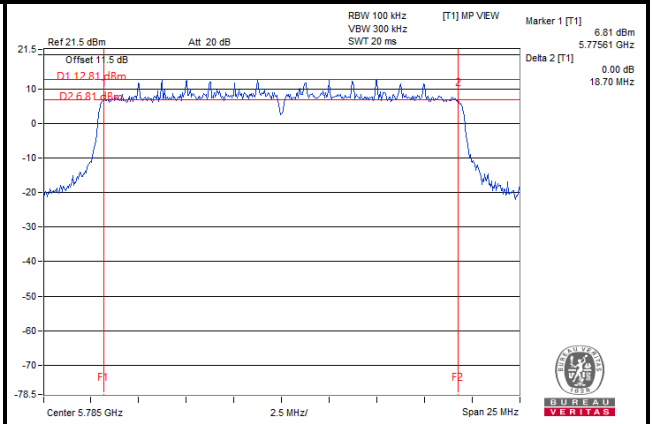
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	74.55	76.18	0.5	Pass

Spectrum Plot of Worst Value

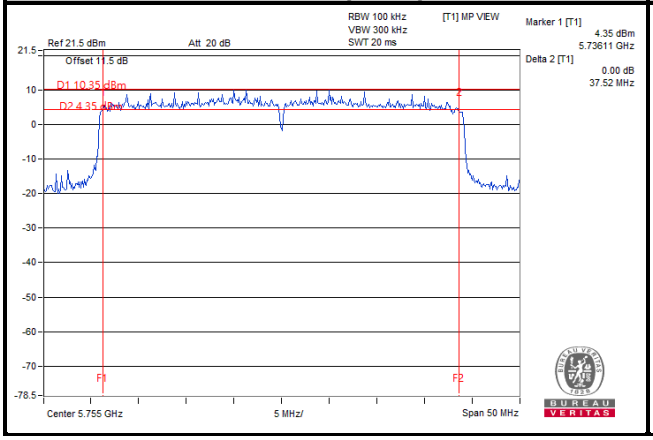
802.11a



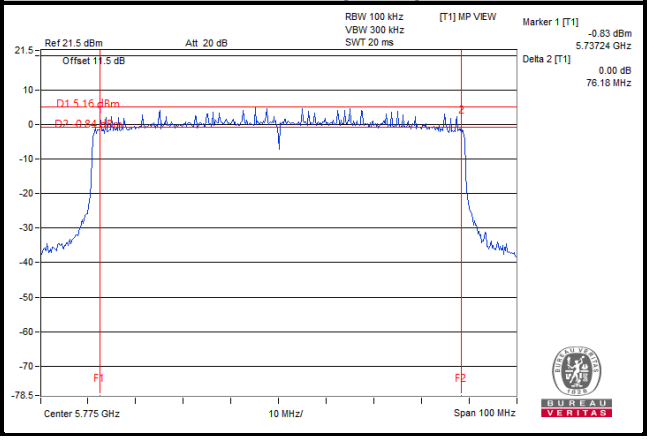
802.11ax (HE20)



802.11ax (HE40)



802.11ax (HE80)

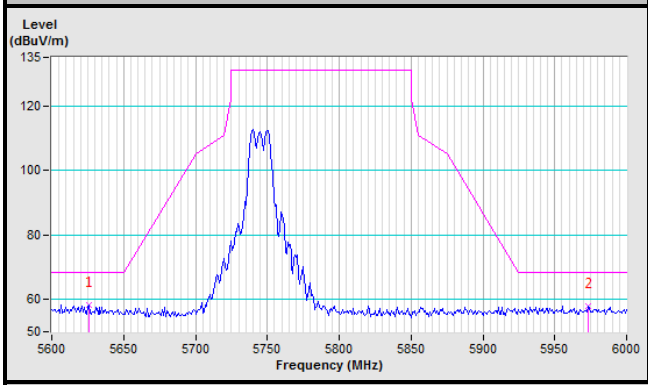
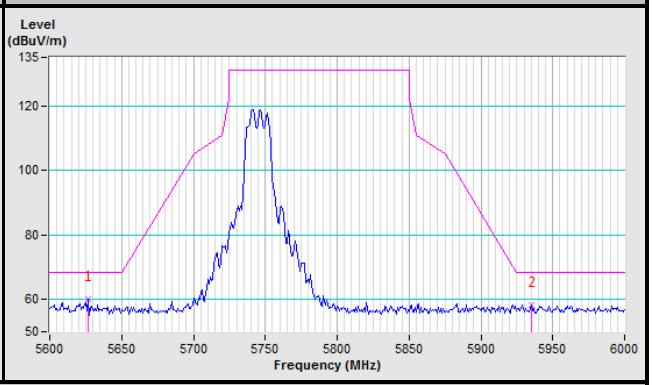
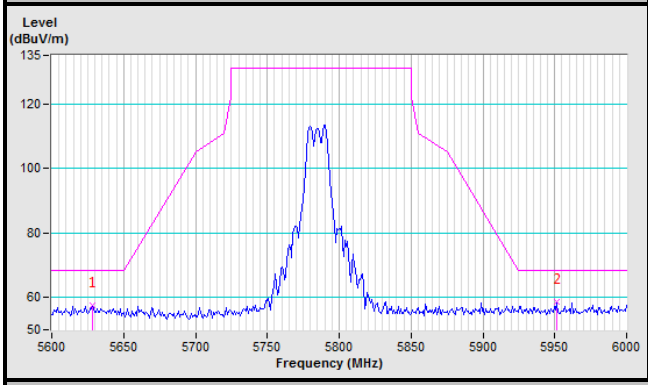
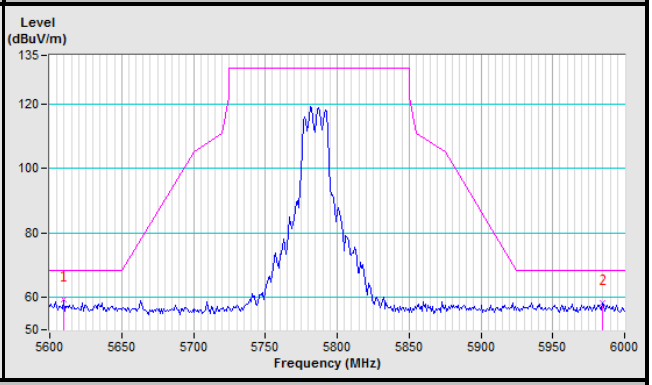
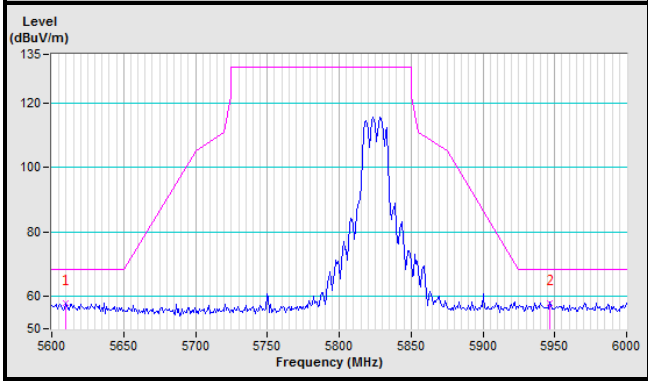
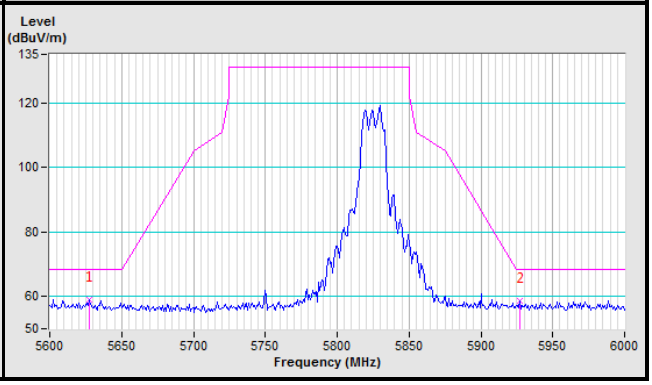


5 Pictures of Test Arrangements

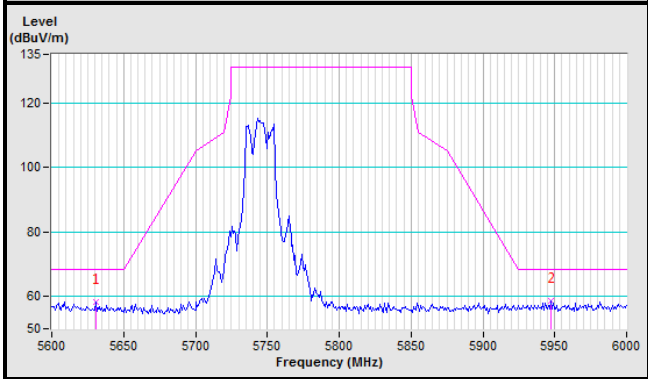
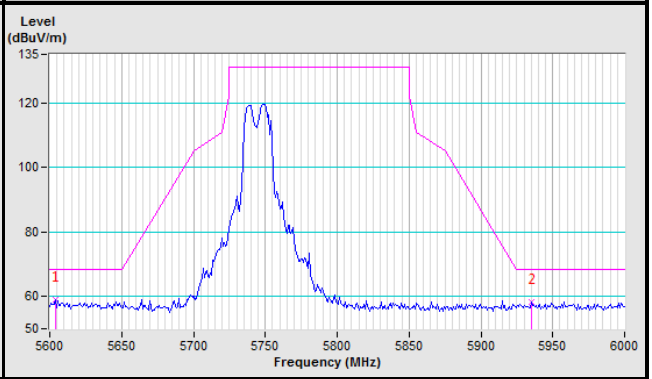
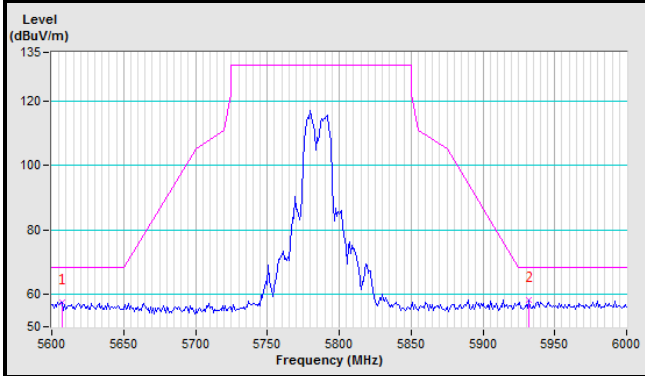
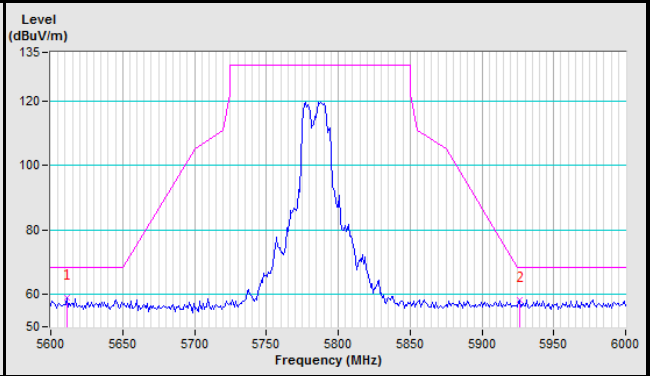
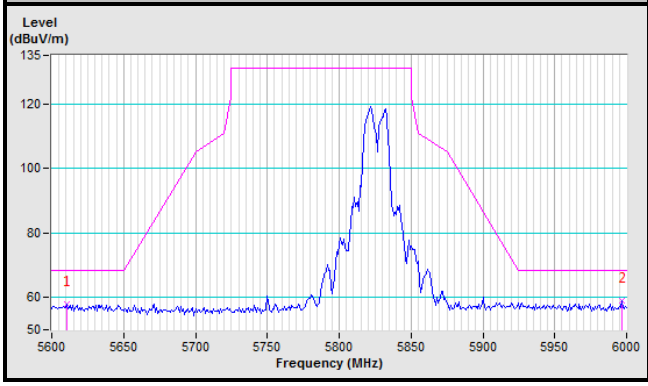
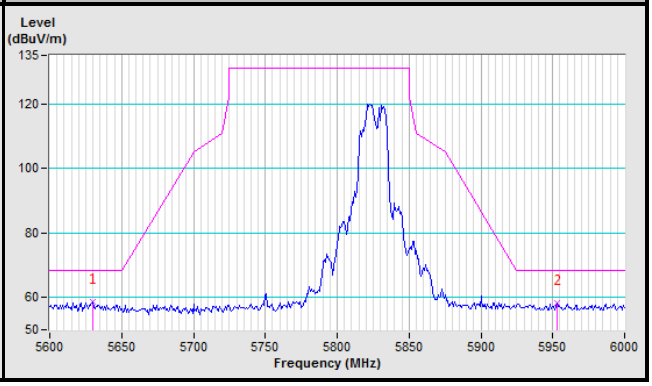
Please refer to the attached file (Test Setup Photo).

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

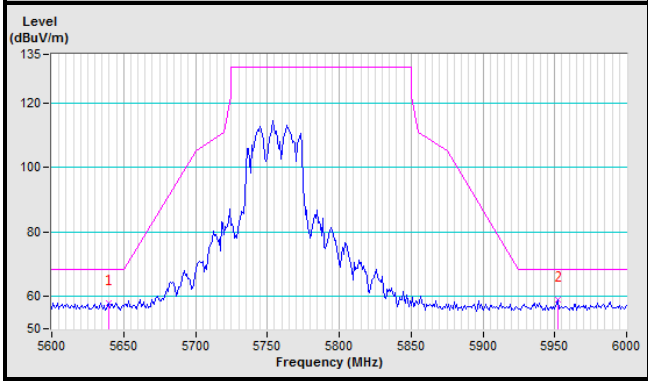
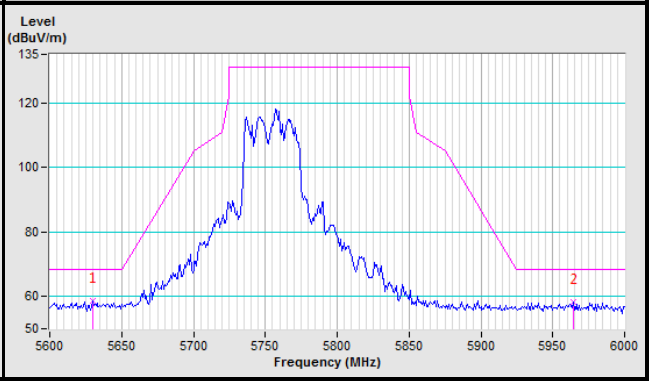
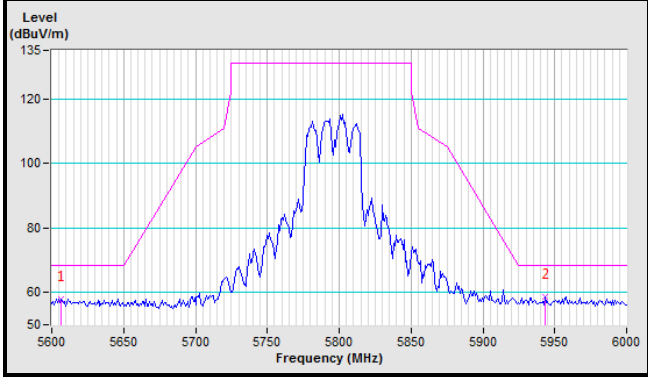
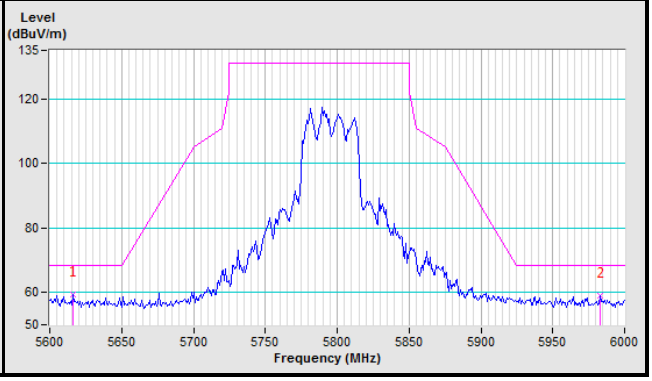
802.11a

Ch 149	
Horizontal	Vertical
	
Ch 157	
Horizontal	Vertical
	
Ch 165	
Horizontal	Vertical
	

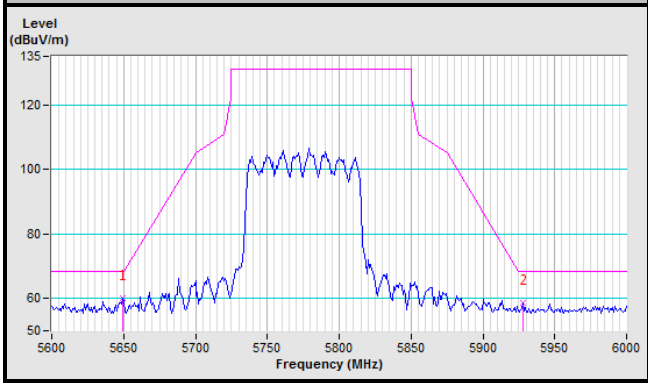
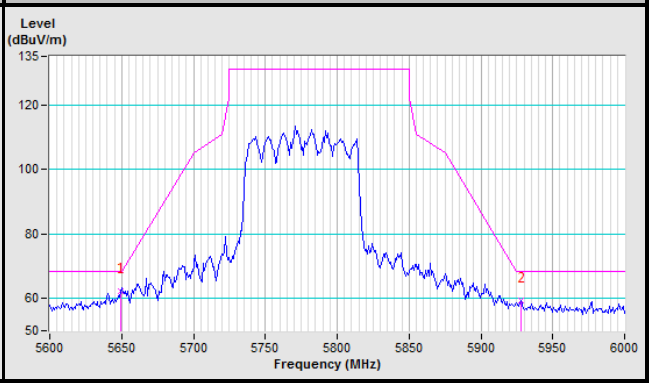
802.11ax (HE20)

Ch 149	
Horizontal	Vertical
	
Ch 157	
Horizontal	Vertical
	
Ch 165	
Horizontal	Vertical
	

802.11ax (HE40)

Ch 151	
Horizontal	Vertical
	
Ch 159	
Horizontal	Vertical
	

802.11ax (HE80)

Ch 155	
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 according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
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Hwa Ya EMC/RF/Safety Lab
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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.

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