



Prüfbericht-Nr.: <i>Test report no.:</i>	CN22VVN0(P15E-WiFi) 001	Auftrags-Nr.: <i>Order no.:</i>	238519748	Seite 1 von 137 Page 1 of 137	
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-09-06		
Auftraggeber: <i>Client:</i>	EnGenius Technologies 1580 Scenic Avenue, Costa Mesa, CA 92626				
Prüfgegenstand: <i>Test item:</i>	11ax Cloud Managed AP				
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	ECW230S				
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15E Test report (WiFi 5GHz)				
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart E Section 15.407				
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-09-06				
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003123611-011, 012 A003123611-014, 016				
Prüfzeitraum: <i>Testing period:</i>	2022-01-21 - 2022-06-16				
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site				
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories				
Prüfergebnis*: <i>Test result*:</i>	Pass				
zusammengestellt von: <i>compiled by:</i>	genehmigt von: <i>authorized by:</i>				
Datum: <i>Date:</i> 2022-06-16	 Ethan Shao	Ausstellungsdatum: <i>Issue date:</i> 2022-06-16	 Ryan Chen		
Stellung / Position:	Assistant Project Engineer	Stellung / Position:	Senior Project Manager		
Sonstiges / Other:					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet	5 = mangelhaft
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested	5 = poor
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.407(a) & 15.203	Antenna Requirement	Pass
5.1.2	15.407(a)	Maximum Conducted Output Power	Pass
5.1.3	15.407(h)(1)	Transmit Power Control (TPC)	Pass
5.1.4	15.407(a)	26 dB Bandwidth	Pass
5.1.4	2.1049	99% Occupied Bandwidth	Pass
5.1.5	15.407(e)	6 dB Bandwidth (U-NII-3 Band only)	Pass
5.1.6	15.407(g)	Frequency Stability	Pass
5.1.7	15.407(a)	Power Spectral Density	Pass
5.1.8	15.407(b) & 15.205 & 15.209	Radiated Spurious Emissions and Band Edges	Pass
5.1.9	15.407(h) & KDB 905462 D02	Dynamic Frequency Selection	Pass
5.2.1	15.207	Mains Conducted Emission	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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Appendix A - Test Result of Conducted_1T1R

Appendix B - Test Result of Conducted_4T4R

**Appendix C - Test Result of Radiated Emissions & Mains Conducted
Emission_Adapter 1T1R**

**Appendix D - Test Result of Radiated Emissions & Mains Conducted
Emission_Adapter 4T4R**

**Appendix E - Test Result of Radiated Emissions & Mains Conducted
Emission_POE 1T1R**

**Appendix F - Test Result of Radiated Emissions & Mains Conducted
Emission_POE 4T4R**

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN22VVN0(P15E-WiFi) 001	Original Release	2022-06-16

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Conducted_1T1R

Appendix B - Test Result of Conducted_4T4R

Appendix C - Test Result of Radiated Emissions & Mains Conducted Emission_Adapter 1T1R

Appendix D - Test Result of Radiated Emissions & Mains Conducted Emission_Adapter 4T4R

Appendix E - Test Result of Radiated Emissions & Mains Conducted Emission_POE 1T1R

Appendix F - Test Result of Radiated Emissions & Mains Conducted Emission_POE 4T4R

Appendix SP - Photographs of Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart E Section 15.407
FCC 47CFR Part 2: Subpart J Section 2.1049
ANSI C63.10:2013
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB 662911 D01 Multiple Transmitter Output v02r01

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.30 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.30 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.54 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.52 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a 11ax Cloud Managed AP. It contains a WLAN compatible module enabling the user to communicate data through a Wireless interface.

This equipment has two radio modules, one module is 2.4GHz + 5GHz with 4T4R and the other one is scanning radio; the scanning radio has two configurations of 1T1R and RX only. For the scanning radio in this application we just apply the RX only mode for FCC ID: A8J-ECW230S; and we also put the 1T1R test data in the report for reference only.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	11ax Cloud Managed AP
Type Identification	ECW230S
FCC ID	A8J-ECW230S

Technical Specification of EUT

Item	EUT information	
Operating Frequency	Band 1: 5180 MHz ~ 5240 MHz Band 2: 5260 MHz ~ 5320 MHz Band 3: 5500 MHz ~ 5700 MHz Band 4: 5745 MHz ~ 5825 MHz	
Channel Number	Band 1: 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 Band 2: 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 Band 3: 11 for 802.11a, 802.11n HT20, 802.11ac VHT20, 802.11ax HE20 5 for 802.11n HT40, 802.11ac VHT40, 802.11ax HE40 2 for 802.11ac VHT80, 802.11ax HE80 Band 4: 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	
Data Rate	802.11a: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7 802.11ac: up to MCS9 802.11ax: up to MCS11	
Operation Voltage	Adapter: Input: 100~240Vac; Output: 12 Vdc POE: Input: 100~240Vac; Output: 44~57 Vdc	
Modulation	802.11a, 802.11n HT20, 802.11n HT40: OFDM-BPSK, QPSK, 16QAM, 64QAM 802.11ac VHT20, 802.11ac VHT40, 802.11ac VHT80: OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM 802.11ax HE20, 802.11ax HE40, 802.11ax HE80 OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM	
Maximum Output Power (mW)	Scanning Mode (CDD)	5180 ~ 5240 MHz: 28.91 5260 ~ 5320 MHz: 29.11 5500 ~ 5700 MHz: 29.11 5745 ~ 5825 MHz: 27.67
	Traffic Mode (CDD)	5180 ~ 5240 MHz: 332.80 5260 ~ 5320 MHz: 173.82 5500 ~ 5700 MHz: 84.74 5745 ~ 5825 MHz: 339.26
	Beamforming Mode	5180 ~ 5240 MHz: 83.21 5260 ~ 5320 MHz: 79.66 5500 ~ 5700 MHz: 21.19 5745 ~ 5825 MHz: 84.83
TPC Function	Supported	
Antenna Information	Refer to 5.1.1	
Accessory Device	Refer to 4.4	

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

Traffic Mode (4T4R)									
802.11a		802.11n HT20		802.11n HT40		802.11ac VHT20		802.11ac VHT40	
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting	Channel	Power Setting	Channel	Power Setting
36	17	36	16	38	13.5	36	16	38	14
40	18.5	40	16	46	18	40	16	46	18
48	18.5	48	18.5	54	12.5	48	18.5	54	12.5
52	11.5	52	11.5	62	12.5	52	11	62	12.5
60	11.5	60	11.5	102	12.5	60	11	102	12.5
64	11.5	64	12	110	12.5	64	11.5	110	12.5
100	11.5	100	12	134	12.5	100	11.5	134	12.5
116	11.5	116	11.5	151	18.5	116	11.5	151	18.5
140	11.5	140	12	159	18	140	11	159	18
149	19.5	149	19			149	19		
157	19	157	18.5			157	18.5		
165	19	165	18.5			165	18.5		
802.11ac VHT80		802.11ax HE20		802.11ax HE40		802.11ax HE80			
Channel	Power Setting	Channel	Power Setting	Channel	Power Setting	Channel	Power Setting		
42	15.5	36	16.5	38	15	42	15		
58	15.5	40	17.5	46	18	58	15		
106	13	48	18.5	54	12.5	106	13		
122	13	52	11.5	62	12.5	122	12.5		
155	18.5	60	11.5	102	13	155	18.5		
		64	12	110	12.5				
		100	12	134	12.5				
		116	11.5	151	18.5				
		140	11	159	18.5				
		149	19						
		157	18.5						
		165	18.5						

4.2 Carrier Frequency and Channel

Band	Channel	Frequency (MHz)	802.11a 802.11n HT20 802.11ac VHT20 802.11ax HE20	802.11n HT40 802.11ac VHT40 802.11ax HE40	802.11ac VHT80 802.11ax HE80
U-NII-1 (Band 1)	36	5180	V		
	38	5190		V	
	40	5200	V		
	42	5210			V
	44	5220	V		
	46	5230		V	
	48	5240	V		
U-NII-2A (Band 2)	52	5260	V		
	54	5270		V	
	56	5280	V		
	58	5290			V
	60	5300	V		
	62	5310		V	
	64	5320	V		
U-NII-2C (Band 3)	100	5500	V		
	102	5510		V	
	104	5520	V		
	106	5530			V
	108	5540	V		
	110	5550		V	
	112	5560	V		
	116	5580	V		
	118	5590		V	
	120	5600	V		
	122	5610			V
	124	5620	V		
	126	5630		V	
	128	5640	V		
	132	5660	V		
134	5670		V		
136	5680	V			
140	5700	V			
U-NII-3 (Band 4)	149	5745	V		
	151	5755		V	
	153	5765	V		
	155	5775			V
	157	5785	V		
	159	5795		V	
	161	5805	V		
165	5825	V			

4.3 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	QSPR
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The samples were used as follows:

A003123611-011, 012 for conducted test

A003123611-014, 016 for radiated test

Full test was applied on all test modes, but only worst case was shown.

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

Modulation Mode	Tx Function
802.11a	4TX (MIMO)
802.11n HT20	4TX (MIMO)
802.11n HT40	4TX (MIMO)
802.11ac VHT20	4TX (MIMO)
802.11ac VHT40	4TX (MIMO)
802.11ac VHT80	4TX (MIMO)
802.11ax HE20	4TX (MIMO)
802.11ax HE40	4TX (MIMO)
802.11ax HE80	4TX (MIMO)

* The modulation and bandwidth are similar for 802.11n mode HT20/HT40, 802.11ac mode VHT20/40/80 and 802.11ax mode HE20/40/80, therefore investigated worse case as representative mode in test report.

** For Beamforming mode, only output power is evaluated and presented in this report.

EUT Configure Mode	Applicable To				Description
	Antenna Port Conducted Measurement	Radiated Spurious Emissions above 1 GHz	Radiated Spurious Emissions below 1 GHz	Mains Conducted Emission	
-	√	√	√	√	-

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on X-plane.
2. "-" means no effect.
3. POE Mode had been verified the worst case of Radiated Spurious Emissions and Mains Conducted Emission tests.

Antenna Port Conducted Measurement

- Pre-Scan full test was applied on all test modes, but only worst case was shown.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
CDD	802.11a	5180-5240	36 to 48	36, 40, 48	6.0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT20	5180-5240	36 to 48	36, 40, 48	MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT40	5180-5240	38 to 46	38, 46	MCS0
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
	802.11ac VHT20	5180-5240	36 to 48	36, 40, 48	NSS1 MCS0
		5260-5320	52 to 64	52, 60, 64	
		5745-5825	149 to 165	149, 157, 165	
	802.11ac VHT40	5180-5240	38 to 46	38, 46	NSS1 MCS0
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
	802.11ac VHT80	5180-5240	36 to 48	42	NSS1 MCS0
		5260-5320	52 to 64	58	
		5500-5700	100 to 140	106, 122	
		5745-5825	149 to 165	155	
	802.11ax HE20	5180-5240	36 to 48	36, 40, 48	NSS1 MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11ax HE40	5180-5240	38 to 46	38, 46	NSS1 MCS0
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
	802.11ax HE80	5180-5240	36 to 48	42	NSS1 MCS0
5260-5320		52 to 64	58		
5500-5700		100 to 140	106, 122		
5745-5825		149 to 165	155		

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
BFM	802.11n HT20	5180-5240	36 to 48	36, 40, 48	MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11n HT40	5180-5240	38 to 46	38, 46	
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
	802.11ac VHT20	5180-5240	36 to 48	36, 40, 48	NSS1 MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11ac VHT40	5180-5240	38 to 46	38, 46	
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
	802.11ac VHT80	5180-5240	36 to 48	42	
		5260-5320	52 to 64	58	
		5500-5700	100 to 140	106, 122	
		5745-5825	149 to 165	155	
802.11ax HE20	5180-5240	36 to 48	36, 40, 48		
	5260-5230	52 to 64	52, 60, 64		
	5500-5700	100 to 140	100, 116, 140		
	5745-5825	149 to 165	149, 157, 165		
802.11ax HE40	5180-5240	38 to 46	38, 46		
	5260-5320	54 to 62	54, 62		
	5500-5700	102 to 134	102, 110, 134		
	5745-5825	151 to 159	151, 159		
802.11ax HE80	5180-5240	36 to 48	42		
	5260-5320	52 to 64	58		
	5500-5700	100 to 140	106, 122		
	5745-5825	149 to 165	155		

Radiated Spurious Emissions (Above 1 GHz)

- Pre-Scan full test was applied on all test modes, but only worst case was shown.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
Adapter	802.11a	5180-5240	36 to 48	36, 40, 48	6.0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11ac VHT20	5180-5240	36 to 48	36, 40, 48	NSS1 MCS0
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11ac VHT40	5180-5240	38 to 46	38, 46	
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
	802.11ac VHT80	5180-5240	36 to 48	42	
		5260-5320	52 to 64	58	
		5500-5700	100 to 140	106, 122	
		5745-5825	149 to 165	155	
	802.11ax HE20	5180-5240	36 to 48	36, 40, 48	
		5260-5320	52 to 64	52, 60, 64	
		5500-5700	100 to 140	100, 116, 140	
		5745-5825	149 to 165	149, 157, 165	
	802.11ax HE40	5180-5240	38 to 46	38, 46	
		5260-5320	54 to 62	54, 62	
		5500-5700	102 to 134	102, 110, 134	
		5745-5825	151 to 159	151, 159	
802.11ax HE80	5180-5240	42	42		
	5260-5320	58	58		
	5500-5700	106 to 140	106, 122		
	5745-5825	155	155		
POE	802.11a	5180-5240	36 to 48	40	6.0
		5745-5825	149 to 165	165	
	802.11ax HE40	5500-5700	102 to 134	102	NSS1 MCS0
	802.11ax HE80	5260-5320	58	58	

Radiated Spurious Emissions (Below 1 GHz)

- Pre-Scan full test was applied on all test modes, but only worst case was shown.
 Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
Adapter	802.11a	5180-5240	36 to 48	40	6.0
		5260-5320	52 to 64	52	
		5745-5825	149 to 165	165	
	802.11ac VHT40	5180-5240	38 to 46	46	NSS1 MCS0
	802.11ac VHT80	5500-5700	100 to 140	122	
		5745-5825	149 to 165	155	
	802.11ax HE40	5500-5700	102 to 134	102	
802.11ax HE80	5260-5320	58	58		
POE	802.11a	5180-5240	36 to 48	40	6.0
		5260-5320	52 to 64	52	
		5745-5825	149 to 165	165	
	802.11ac VHT40	5180-5240	38 to 46	46	NSS1 MCS0
	802.11ac VHT80	5500-5700	100 to 140	122	
		5745-5825	149 to 165	155	
	802.11ax HE40	5500-5700	102 to 134	102	
802.11ax HE80	5260-5320	58	58		

Mains Conducted Emission Test

- Pre-Scan full test was applied on all test modes, but only worst case was shown.
 Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency (MHz)	Available Channel	Tested Channel	Date Rate (Mbps)
Adapter	802.11ac VHT40	5180-5240	38 to 46	46	NSS1 MCS0
	802.11ax HE40	5180-5240	38 to 46	46	NSS1 MCS0
POE	802.11ac VHT40	5180-5240	38 to 46	46	NSS1 MCS0
	802.11ax HE40	5180-5240	38 to 46	46	NSS1 MCS0

Test Condition

Test Item		Ambient Temperature	Relative Humidity	Tested by
Conducted Measurement	Scanning Mode	18-23 °C	59-68 %	Andy Chen
	Traffic Mode	21-21.3 °C	69 %	Andy Chen
Radiated Spurious Emissions above 1 GHz	Scanning Mode	23.1-25.1 °C	50-60 %	Nick Guan
	Traffic Mode			Hunter Wang
Radiated Spurious Emissions below 1 GHz	Scanning Mode	23.1-25.1 °C	50-60 %	Nick Guan
	Traffic Mode			Hunter Wang
Mains Conducted Emission	Scanning Mode	24.6-25.8 °C	52-54 %	Hunter Wang
	Traffic Mode			

4.4 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

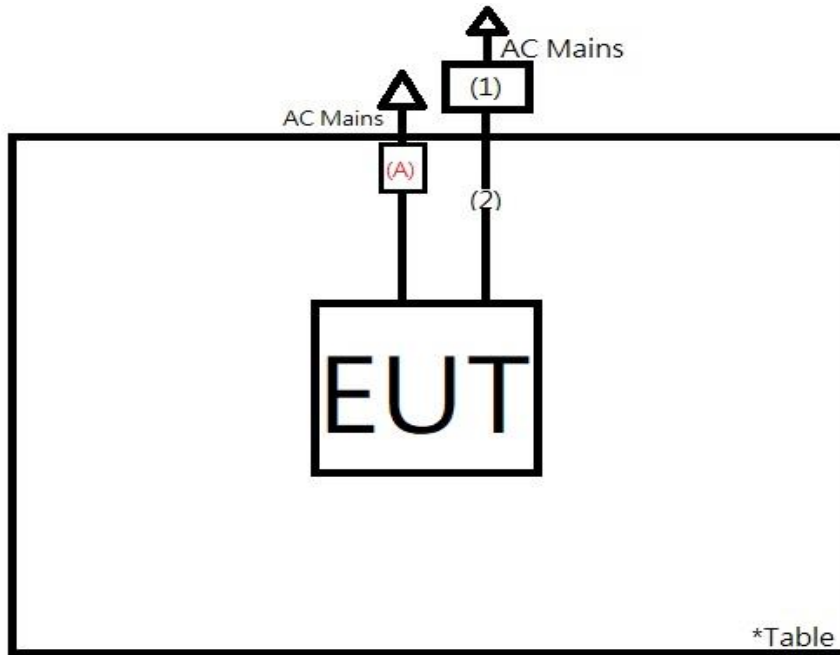
None.

Support Unit

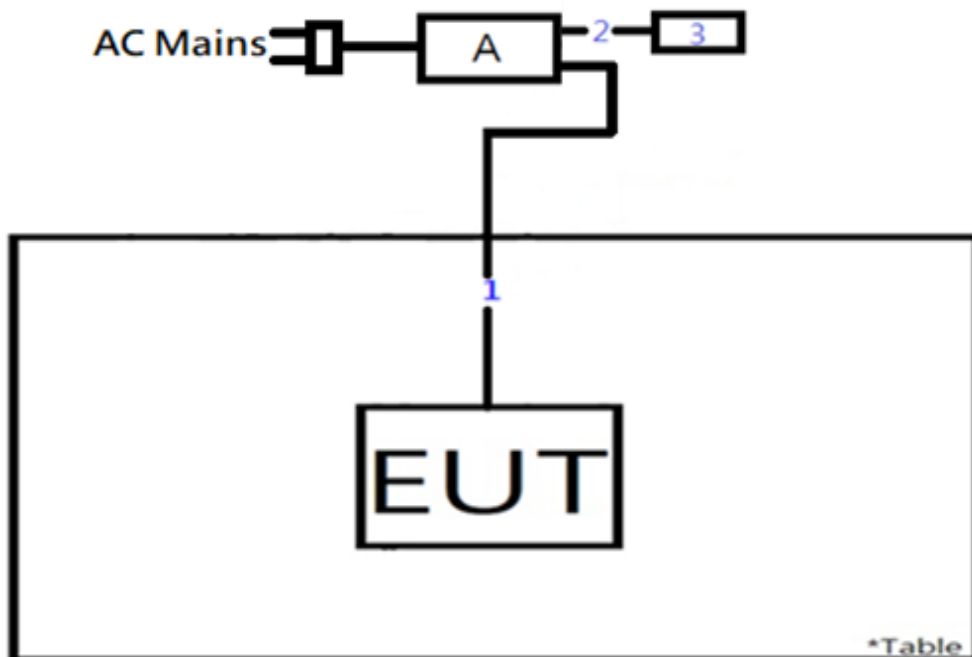
No.	Description	Brand	Model	S/N	Remark
Radiated Test for Adapter Mode					
A	Adapter	Powertron Electronics Corp	PA1024-120HEB200	--	150 cm non-shielded cable with core
1	Notebook	HP	15s-du0007TX	CND93662VF	--
2	LAN Cable	TUV	TUV-010	--	300 cm non-shielded cable w/o core
Radiated Test for POE Mode					
A	PoE Adapter	SENAO	EPA5006GPR	--	173 cm non-shielded cable w/o core
1	LAN Cable	TUV-JP	TUV-JP-001	--	1000 cm non-shielded cable w/o core
2	LAN Cable	TUV-JP	TUV-JP-001	--	300 cm non-shielded cable w/o core
3	Notebook	HP	15s-du0007TX	CND93662VF	--
Mains Conducted Test for Adapter Mode					
A	Adapter	Powertron Electronics Corp	PA1024-120HEB200	--	150 cm non-shielded cable with core
1	LAN Cable	TUV-JP	TUV-JP-001	--	95 m non-shielded cable w/o core
2	Notebook	HP	15s-du0007TX	CND93662VF	-
Mains Conducted Test for Poe Mode					
A	PoE Adapter	EPA	EPA5006GAT	--	173 cm non-shielded cable w/o core
1	LAN Cable	TUV-JP	TUV-JP-001	--	95 cm non-shielded cable w/o core
2	LAN Cable	TUV-JP	TUV-JP-001	--	120 cm non-shielded cable w/o core
3	Notebook	HP	15s-du0007TX	CND93662VF	--
Conducted Test					
-	Notebook	HP	TPN-C139	CND93662VF	--

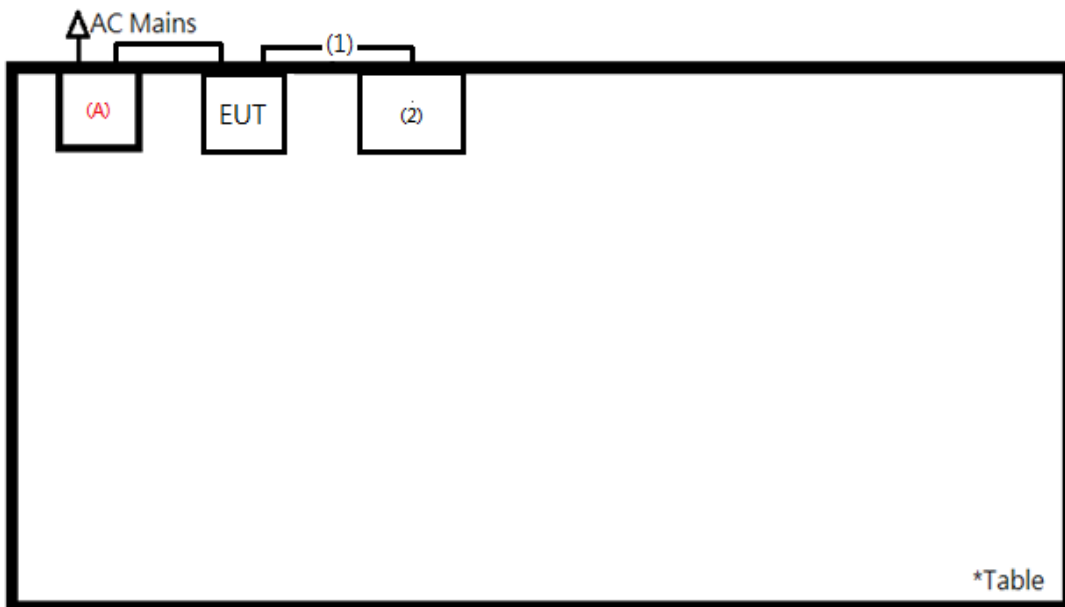
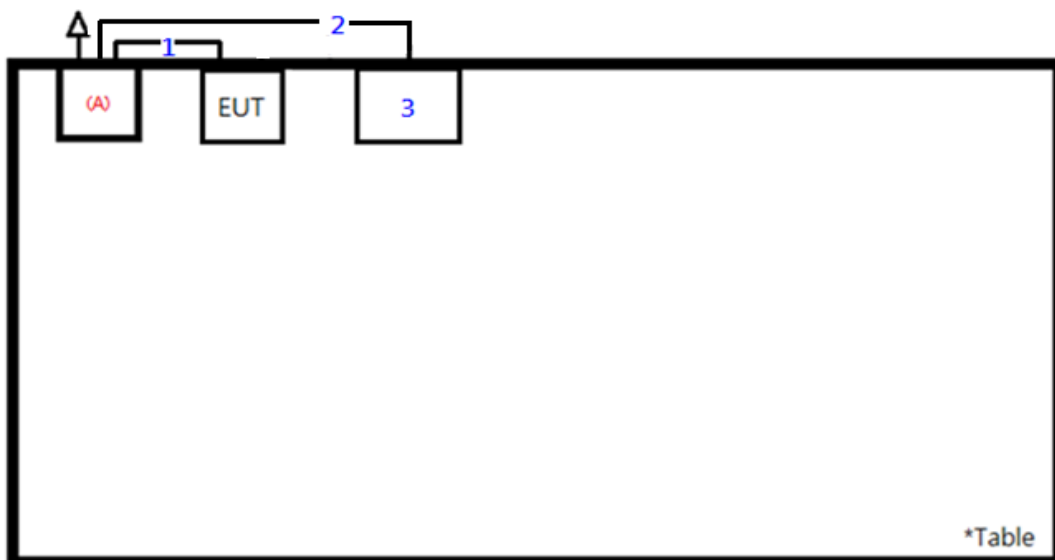
4.5 Test Setup Diagram

<Radiated Spurious Emissions, Adapter Mode>



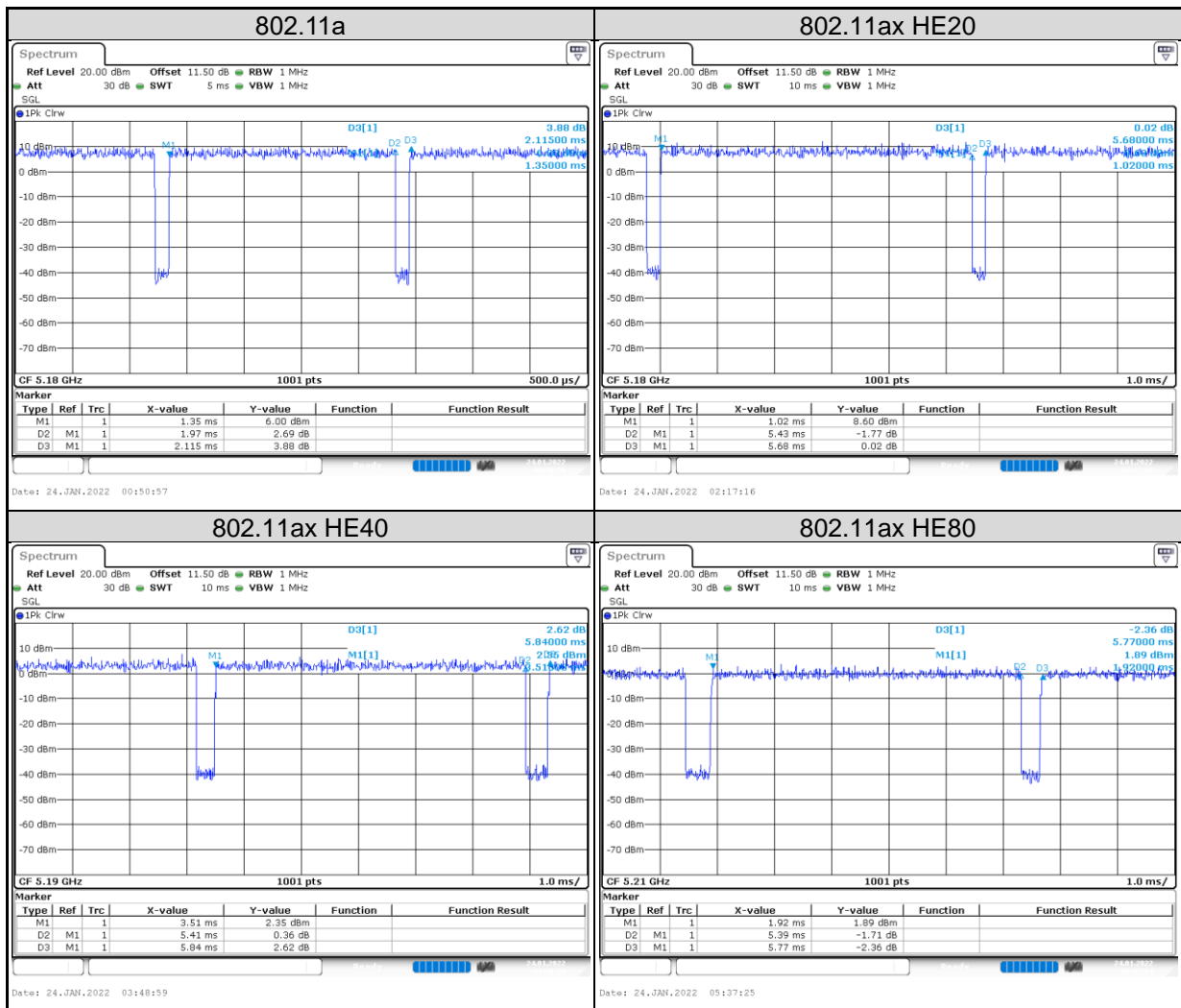
<Radiated Spurious Emissions, POE Mode>



<Mains Conducted Emission, Adapter Mode>

<Mains Conducted Emission, POE Mode>


4.6 Duty Cycle of Test Signal

Mode	On + Off Time (ms)	On Time (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	2.12	1.97	93.14	0.31
802.11ax HE20	5.68	5.43	95.60	0.20
802.11ax HE40	5.84	5.41	92.64	0.33
802.11ax HE80	5.77	5.39	93.41	0.30



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

Requirement Use of approved antennas only

According to the manufacturer declaration, the EUT's antenna specifications are described as below. The antenna is used with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

ANT	Antenna Type	Gain (dBi)			
		Traffic Mode			
		5180~5240 MHz	5260~5320 MHz	5500~5700 MHz	5745~5825 MHz
1	PIFA	5.13	5.13	5.19	5.19
2	PIFA	4.26	4.26	4.26	3.81
3	PIFA	4.03	4.03	4.56	4.56
4	PIFA	5.04	5.04	5.04	5.04
Max Peak Gain		5.13	5.13	5.19	5.19
CDD Mode	Power Directional Gain =	5.13	5.13	5.19	5.19
	PSD Directional Gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] =$	10.65	10.65	10.79	10.69
Beamforming Mode	Power Directional Gain =	10.65	10.65	10.79	10.69
	PSD Directional Gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] =$	10.65	10.65	10.79	10.69
-	-	Scanning Mode			
-	PIFA	6.17	6.17	5.72	6.17

Refer to EUT photo for details.

5.1.2 Maximum Conducted Output Power

Limit

Operation Band	EUT Category	Limit
U-NII-1	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p \leq 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)

Note: 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.

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Power Meter	Anritsu	ML2495A	1901008	2021/03/24	2022/03/23	2022/01/21	2022/01/25
Power Sensor	Anritsu	MA2411B	1725269	2021/03/24	2022/03/23	2022/01/21	2022/01/25

Test Procedures

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

Test Result, Scanning Mode (1T1R)
<802.11a>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	14.56	28.58	29.83
40	5200	14.61	28.91	29.83
48	5240	14.51	28.25	29.83
52	5260	14.64	29.11	23.83
60	5300	13.46	22.18	23.83
64	5320	12.93	19.63	23.83
100	5500	10.32	10.76	24.00
116	5580	12.51	17.82	24.00
140	5700	14.64	29.11	24.00
149	5745	10.18	10.42	29.83
157	5785	13.74	23.66	29.83
165	5825	11.55	14.29	29.83

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

1. $11 \text{ dBm} + 10\log(36.28) = 26.60 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(33.33) = 26.23 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(31.05) = 25.92 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(34.17) = 26.34 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(34.13) = 26.33 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(31.05) = 25.92 \text{ dBm} > 24 \text{ dBm}$.

<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	14.44	27.80	29.83
40	5200	14.36	27.29	29.83
48	5240	14.24	26.55	29.83
52	5260	14.17	26.12	24.00
60	5300	13.70	23.44	24.00
64	5320	12.85	19.28	24.00
100	5500	10.24	10.57	24.00
116	5580	14.14	25.94	24.00
140	5700	14.37	27.35	24.00
149	5745	14.21	26.36	29.83
157	5785	13.29	21.33	29.83
165	5825	12.80	19.05	29.83

<802.11n HT40>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
38	5190	13.04	20.14	29.83
46	5230	13.53	22.54	29.83
54	5270	13.04	20.14	24.00
62	5310	10.01	10.02	24.00
102	5510	12.48	17.70	24.00
110	5550	12.79	19.01	24.00
134	5670	13.94	24.77	24.00
151	5755	14.17	26.12	29.83
159	5795	13.91	24.60	29.83

<802.11ac VHT20>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
36	5180	14.51	28.25	29.83
40	5200	14.43	27.73	29.83
48	5240	14.35	27.23	29.83
52	5260	14.26	26.67	23.83
60	5300	13.78	23.88	23.83
64	5320	12.93	19.63	23.83
100	5500	10.32	10.76	24.00
116	5580	14.42	27.67	24.00
140	5700	14.46	27.93	24.00
149	5745	14.29	26.85	29.83
157	5785	13.37	21.73	29.83
165	5825	12.87	19.36	29.83

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

1. $11 \text{ dBm} + 10\log(35.20) = 26.47 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(33.41) = 26.24 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(31.89) = 26.04 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(34.49) = 26.38 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(30.65) = 25.86 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(30.85) = 25.89 \text{ dBm} > 24 \text{ dBm}$.

<802.11ac VHT40>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
38	5190	13.11	20.46	29.83
46	5230	13.59	22.86	29.83
54	5270	13.12	20.51	23.83
62	5310	10.07	10.16	23.83
102	5510	12.56	18.03	24.00
110	5550	12.85	19.28	24.00
134	5670	14.03	25.29	24.00
151	5755	14.26	26.67	29.83
159	5795	13.99	25.06	29.83

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

1. $11 \text{ dBm} + 10\log(70.57) = 29.49 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(50.83) = 28.06 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(71.37) = 29.54 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(71.37) = 29.54 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(72.97) = 29.63 \text{ dBm} > 24 \text{ dBm}$.

<802.11ac VHT80>

Channel	Channel Frequency (MHz)	Average Output Power		Limit (dBm)
		(dBm)	(mW)	
42	5210	9.47	8.85	29.83
58	5290	7.43	5.53	23.83
106	5530	12.92	19.59	24.00
122	5610	13.73	23.60	24.00
155	5775	14.42	27.67	29.83

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

1. $11 \text{ dBm} + 10\log(104.54) = 31.19 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(140.34) = 32.47 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(128.51) = 32.09 \text{ dBm} > 24 \text{ dBm}$.

Test Result, Traffic Mode with CDD
<802.11a>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	16.55	16.81	16.51	16.51	22.62	182.70	30.00
40	5200	18.89	19.10	18.85	18.93	24.96	313.63	30.00
48	5240	18.84	18.80	18.98	18.64	24.84	304.60	30.00
52	5260	11.04	11.32	11.44	10.89	17.20	52.46	23.83
60	5300	10.75	11.21	11.01	10.87	16.98	49.93	23.77
64	5320	10.58	11.05	10.80	10.74	16.82	48.04	23.79
100	5500	10.50	10.85	10.81	10.46	16.68	46.55	23.83
116	5580	11.06	11.15	11.03	10.82	17.04	50.55	23.84
140	5700	10.84	11.24	10.95	10.80	16.98	49.91	23.86
149	5745	18.92	19.20	19.12	18.95	25.07	321.34	30.00
157	5785	18.93	19.18	19.11	18.94	25.06	320.77	30.00
165	5825	18.94	19.36	18.88	18.95	25.06	320.43	30.00

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

1. $11 \text{ dBm} + 10\log(19.18) = 23.83 \text{ dBm} < 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(18.94) = 23.77 \text{ dBm} < 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(19.02) = 23.79 \text{ dBm} < 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(19.18) = 23.83 \text{ dBm} < 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(19.22) = 23.84 \text{ dBm} < 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(19.30) = 23.86 \text{ dBm} < 24 \text{ dBm}$.

<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	15.63	16.26	15.83	15.73	21.89	154.52	30.00
40	5200	18.62	17.26	17.95	17.39	23.86	243.19	30.00
48	5240	18.71	19.03	19.17	18.75	24.94	311.88	30.00
52	5260	10.87	11.37	11.24	11.19	17.19	52.38	24.00
60	5300	10.69	11.12	11.20	11.97	17.29	53.59	24.00
64	5320	11.40	11.66	11.30	11.21	17.42	55.16	24.00
100	5500	11.43	11.44	11.28	11.29	17.38	54.72	24.00
116	5580	11.15	11.08	11.05	10.97	17.08	51.09	24.00
140	5700	11.29	11.64	11.41	11.34	17.44	55.50	24.00
149	5745	18.70	18.90	18.70	18.83	24.80	302.27	30.00
157	5785	18.74	19.00	18.92	18.82	24.89	308.44	30.00
165	5825	18.91	19.13	18.54	18.91	24.90	308.90	30.00

<802.11n HT40>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
38	5190	14.30	14.67	14.11	13.61	20.21	104.95	30.00
46	5230	18.82	19.11	19.14	18.97	25.03	318.60	30.00
54	5270	12.90	13.26	13.22	13.20	19.17	82.56	24.00
62	5310	12.93	13.27	13.02	13.20	19.13	81.80	24.00
102	5510	12.95	12.72	12.72	12.77	18.81	76.06	24.00
110	5550	13.01	13.08	13.06	12.86	19.02	79.87	24.00
134	5670	13.13	13.23	13.15	13.12	19.18	82.76	24.00
151	5755	18.75	18.96	19.03	18.75	24.89	308.67	30.00
159	5795	18.70	18.99	18.84	18.57	24.80	301.89	30.00

<802.11ac VHT20>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	16.03	16.34	16.21	16.01	22.17	164.82	30.00
40	5200	17.84	17.76	18.30	18.57	24.15	260.07	30.00
48	5240	18.59	18.92	19.09	18.62	24.83	304.13	30.00
52	5260	10.78	12.66	11.04	10.78	17.41	55.09	24.00
60	5300	10.64	11.12	10.68	10.80	16.83	48.25	24.00
64	5320	10.90	11.31	11.01	11.17	17.12	51.53	24.00
100	5500	11.03	11.45	11.08	10.87	17.13	51.68	24.00
116	5580	11.14	11.34	11.36	11.16	17.27	53.36	24.00
140	5700	10.60	11.07	10.78	10.49	16.76	47.44	24.00
149	5745	18.57	18.76	18.55	18.74	24.68	293.54	30.00
157	5785	18.61	18.89	18.79	18.68	24.76	299.53	30.00
165	5825	18.79	19.01	18.37	18.75	24.76	299.00	30.00

<802.11ac VHT40>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
38	5190	13.98	14.42	14.22	14.11	20.21	104.86	30.00
46	5230	18.67	18.95	18.97	18.84	24.88	307.59	30.00
54	5270	12.76	13.05	13.01	12.98	18.97	78.92	24.00
62	5310	12.87	13.22	12.86	13.01	19.01	79.67	24.00
102	5510	12.78	12.59	12.57	12.61	18.66	73.43	24.00
110	5550	12.84	12.96	12.91	12.73	18.88	77.29	24.00
134	5670	12.98	13.05	13.00	12.95	19.02	79.72	24.00
151	5755	18.62	18.77	19.75	18.54	24.97	313.97	30.00
159	5795	18.56	18.73	18.61	18.37	24.59	287.74	30.00

<802.11ac VHT80>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
42	5210	16.67	17.22	17.81	17.70	23.39	218.45	30.00
58	5290	16.36	16.51	15.84	16.70	22.38	173.17	24.00
106	5530	13.06	13.27	13.23	12.98	19.16	82.36	24.00
122	5610	12.60	14.16	12.64	12.37	19.02	79.88	24.00
155	5775	18.79	19.16	19.04	18.91	25.00	316.07	30.00

<802.11ax HE20>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	16.51	16.87	16.64	16.56	22.67	184.83	30.00
40	5200	18.95	18.28	18.66	18.40	24.60	288.46	30.00
48	5240	19.27	19.18	19.31	19.04	25.22	332.80	30.00
52	5260	11.35	11.63	11.69	11.22	17.50	56.20	24.00
60	5300	10.98	11.71	11.43	11.15	17.35	54.29	24.00
64	5320	11.57	11.71	11.73	11.51	17.65	58.23	24.00
100	5500	11.69	11.53	11.60	11.48	17.60	57.50	24.00
116	5580	11.17	11.47	11.31	11.26	17.32	54.01	24.00
140	5700	11.78	12.61	10.61	10.98	17.58	57.34	24.00
149	5745	18.95	18.97	19.11	18.88	25.00	316.15	30.00
157	5785	18.99	19.15	19.22	18.81	25.06	320.99	30.00
165	5825	18.85	18.93	19.20	18.79	24.97	313.76	30.00

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

1. $11 \text{ dBm} + 10\log(20.90) = 24.20 \text{ dBm} > 24 \text{ dBm}$.
2. $11 \text{ dBm} + 10\log(20.78) = 24.18 \text{ dBm} > 24 \text{ dBm}$.
3. $11 \text{ dBm} + 10\log(20.90) = 24.20 \text{ dBm} > 24 \text{ dBm}$.
4. $11 \text{ dBm} + 10\log(20.66) = 24.15 \text{ dBm} > 24 \text{ dBm}$.
5. $11 \text{ dBm} + 10\log(20.98) = 24.22 \text{ dBm} > 24 \text{ dBm}$.
6. $11 \text{ dBm} + 10\log(21.06) = 24.23 \text{ dBm} > 24 \text{ dBm}$.

<802.11ax HE40>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
38	5190	15.27	15.46	15.42	15.33	21.39	137.76	30.00
46	5230	18.97	19.17	19.28	18.91	25.11	324.02	30.00
54	5270	13.28	13.31	13.37	13.02	19.27	84.48	24.00
62	5310	13.02	13.19	13.46	12.82	19.15	82.21	24.00
102	5510	13.19	13.37	13.44	13.03	19.28	84.74	24.00
110	5550	12.97	13.07	13.16	12.86	19.04	80.11	24.00
134	5670	13.19	13.26	13.31	13.15	19.25	84.11	24.00
151	5755	18.92	18.99	19.14	18.81	24.99	315.30	30.00
159	5795	19.20	19.35	19.47	19.11	25.31	339.26	30.00

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

- 11 dBm + 10log (41.80) = 27.21 dBm > 24 dBm.
- 11 dBm + 10log (41.80) = 27.21 dBm > 24 dBm.
- 11 dBm + 10log (41.64) = 27.19 dBm > 24 dBm.
- 11 dBm + 10log (41.72) = 27.20 dBm > 24 dBm.
- 11 dBm + 10log (41.72) = 27.20 dBm > 24 dBm.

<802.11ax HE80>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
42	5210	17.17	17.14	18.05	17.77	23.57	227.55	30.00
58	5290	16.22	16.40	15.92	16.92	22.40	173.82	24.00
106	5530	13.13	13.33	13.39	13.05	19.25	84.10	24.00
122	5610	13.02	13.05	13.16	12.89	19.05	80.38	24.00
155	5775	19.09	19.23	19.27	19.02	25.17	329.18	30.00

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

- 11 dBm + 10log (82.32) = 30.15 dBm > 24 dBm.
- 11 dBm + 10log (81.84) = 30.13 dBm > 24 dBm.
- 11 dBm + 10log (82.00) = 30.14 dBm > 24 dBm.

Test Result, Beamforming Mode
<802.11n HT20>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	9.61	10.24	9.81	9.71	15.87	38.64	25.35
40	5200	12.60	11.24	11.93	11.37	17.84	60.81	25.35
48	5240	12.69	13.01	13.15	12.73	18.92	77.98	25.35
52	5260	4.85	5.35	5.22	5.17	11.17	13.10	19.35
60	5300	4.67	5.10	5.18	5.95	11.27	13.40	19.35
64	5320	5.38	5.64	5.28	5.19	11.40	13.79	19.35
100	5500	5.41	5.42	5.26	5.27	11.36	13.68	19.21
116	5580	5.13	5.06	5.03	4.95	11.06	12.77	19.21
140	5700	5.27	5.62	5.39	5.32	11.42	13.88	19.21
149	5745	12.68	12.88	12.68	12.81	18.78	75.58	25.31
157	5785	12.72	12.98	12.90	12.80	18.87	77.12	25.31
165	5825	12.89	13.11	12.52	12.89	18.88	77.24	25.31

<802.11n HT40>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
38	5190	8.28	8.65	8.09	7.59	14.19	26.24	25.35
46	5230	12.80	13.09	13.12	12.95	19.01	79.66	25.35
54	5270	6.88	7.24	7.20	7.18	13.15	20.64	19.35
62	5310	6.91	7.25	7.00	7.18	13.11	20.45	19.35
102	5510	6.93	6.70	6.70	6.75	12.79	19.02	19.21
110	5550	6.99	7.06	7.04	6.84	13.00	19.97	19.21
134	5670	7.11	7.21	7.13	7.10	13.16	20.69	19.21
151	5755	12.73	12.94	13.01	12.73	18.87	77.18	25.31
159	5795	12.68	12.97	12.82	12.55	18.78	75.48	25.31

<802.11ac VHT20>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	10.01	10.32	10.19	9.99	16.15	41.21	25.35
40	5200	11.82	11.74	12.28	12.55	18.13	65.03	25.35
48	5240	12.57	12.90	13.07	12.60	18.81	76.04	25.35
52	5260	4.76	6.64	5.02	4.76	11.39	13.77	19.35
60	5300	4.62	5.10	4.66	4.78	10.81	12.06	19.35
64	5320	4.88	5.29	4.99	5.15	11.10	12.89	19.35
100	5500	5.01	5.43	5.06	4.85	11.11	12.92	19.21
116	5580	5.12	5.32	5.34	5.14	11.25	13.34	19.21
140	5700	4.58	5.05	4.76	4.47	10.74	11.86	19.21
149	5745	12.55	12.74	12.53	12.72	18.66	73.39	25.31
157	5785	12.59	12.87	12.77	12.66	18.74	74.89	25.31
165	5825	12.77	12.99	12.35	12.73	18.74	74.76	25.31

<802.11ac VHT40>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
38	5190	7.96	8.40	8.20	8.09	14.19	26.22	25.35
46	5230	12.65	12.93	12.95	12.82	18.86	76.91	25.35
54	5270	6.74	7.03	6.99	6.96	12.95	19.73	19.35
62	5310	6.85	7.20	6.84	6.99	12.99	19.92	19.35
102	5510	6.76	6.57	6.55	6.59	12.64	18.36	19.21
110	5550	6.82	6.94	6.89	6.71	12.86	19.33	19.21
134	5670	6.96	7.03	6.98	6.93	13.00	19.93	19.21
151	5755	12.60	12.75	13.73	12.52	18.95	78.50	25.31
159	5795	12.54	12.71	12.59	12.35	18.57	71.95	25.31

<802.11ac VHT80>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
42	5210	10.65	11.20	11.79	11.68	17.37	54.62	25.35
58	5290	10.34	10.49	9.82	10.68	16.36	43.30	19.35
106	5530	7.04	7.25	7.21	6.96	13.14	20.59	19.21
122	5610	6.58	8.14	6.62	6.35	13.00	19.97	19.21
155	5775	12.77	13.14	13.02	12.89	18.98	79.03	25.31

<802.11ax HE20>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
36	5180	10.49	10.85	10.62	10.54	16.65	46.21	25.35
40	5200	12.93	12.26	12.64	12.38	18.58	72.12	25.35
48	5240	13.25	13.16	13.29	13.02	19.20	83.21	25.35
52	5260	5.33	5.61	5.67	5.20	11.48	14.05	19.35
60	5300	4.96	5.69	5.41	5.13	11.33	13.57	19.35
64	5320	5.55	5.69	5.71	5.49	11.63	14.56	19.35
100	5500	5.67	5.51	5.58	5.46	11.58	14.38	19.21
116	5580	5.15	5.45	5.29	5.24	11.30	13.50	19.21
140	5700	5.76	6.59	4.59	4.96	11.56	14.34	19.21
149	5745	12.93	12.95	13.09	12.86	18.98	79.05	25.31
157	5785	12.97	13.13	13.20	12.79	19.04	80.26	25.31
165	5825	12.83	12.91	13.18	12.77	18.95	78.45	25.31

<802.11ax HE40>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
38	5190	9.25	9.44	9.40	9.31	15.37	34.44	25.35
46	5230	12.95	13.15	13.26	12.89	19.09	81.02	25.35
54	5270	7.26	7.29	7.35	7.00	13.25	21.12	19.35
62	5310	7.00	7.17	7.44	6.80	13.13	20.56	19.35
102	5510	7.17	7.35	7.42	7.01	13.26	21.19	19.21
110	5550	6.95	7.05	7.14	6.84	13.02	20.03	19.21
134	5670	7.17	7.24	7.29	7.13	13.23	21.03	19.21
151	5755	12.90	12.97	13.12	12.79	18.97	78.84	25.31
159	5795	13.18	13.33	13.45	13.09	19.29	84.83	25.31

<802.11ax HE80>

Channel	Channel Frequency (MHz)	Average Output Power (dBm)				Total Power		Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3	(dBm)	(mW)	
42	5210	11.15	11.12	12.03	11.75	17.55	56.89	25.35
58	5290	10.20	10.38	9.90	10.90	16.38	43.46	19.35
106	5530	7.11	7.31	7.37	7.03	13.23	21.03	19.21
122	5610	7.00	7.03	7.14	6.87	13.03	20.10	19.21
155	5775	13.07	13.21	13.25	13.00	19.15	82.31	25.31

5.1.3 Transmit Power Control (TPC)

Requirement U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p of less than 500 mW.

Maximum EIRP of this device is 566.24 mW which greater than 500mW.

Scanning Mode:

Band 2: $14.64+6.17= 20.81$ dBm->159.22 mW

Band 3: $14.64+5.72= 20.36$ dBm-> 108.64 mW

Traffic Mode:

Band 2: $22.40+5.13= 27.53$ dBm-> **566.24** mW

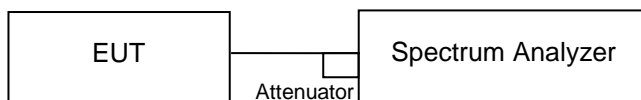
Band 3: $19.28+5.19= 24.47$ dBm-> 279.90 mW

TPC	E.I.R.P	15.407(h)(1)
V	> 500mW	The TPC mechanism is required for system with an E.I.R.P. of above 500mW
	< 500mW	-

5.1.4 26 dB Bandwidth and 99% Occupied Bandwidth

Kind of Test Site Shielded room

Test Setup



Test Instruments

<Scanning Mode>

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101513	2022/05/11	2023/05/09	2022/03/15	2022/06/15
Spectrum Analyzer	R&S	FSV40	100921	2021/05/10	2022/05/09	2022/03/15	2022/03/16

<Traffic Mode>

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101513	2022/05/11	2023/05/09	2022/03/15	2022/06/15
Spectrum Analyzer	R&S	FSV40	100921	2021/05/10	2022/05/09	2022/03/15	2022/03/16

Test Procedure

- 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%.
- f. For 99% Bandwidth Measurement, 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 PEAK. 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.

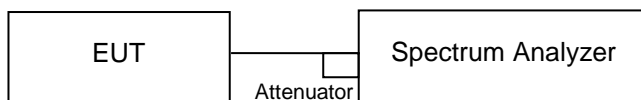
Test Results

Please refer to Appendix A for 1T1R, Appendix B for 4T4R.

5.1.5 6 dB Bandwidth (5725-5850MHz)

Kind of Test Site Shielded room

Test Setup



Test Instruments

<Scanning Mode>

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	100921	2021/05/10	2022/05/09	2022/03/15	2022/03/16

<Traffic Mode>

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101512	2021/01/29	2022/01/28	2022/01/24	2022/01/28

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.

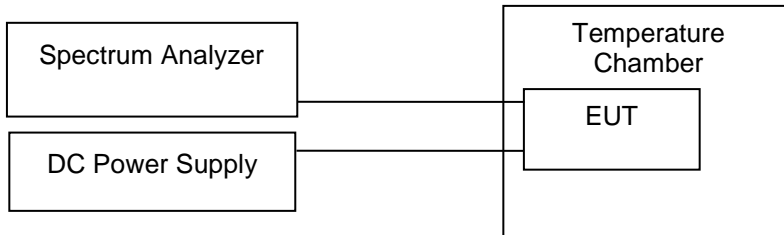
Test Results

Please refer to Appendix A for 1T1R, Appendix B for 4T4R.

5.1.6 Frequency Stability Measurement

Kind of Test Site Shielded room

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	100921	2021/05/10	2022/05/09	2022/01/24	2022/01/28

Test Procedure

- a. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
- b. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10 dB lower than the measured peak value.
- c. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

Test Results for Scanning Mode
<Chain 0, U-NII-1>

Frequency (MHz)	5200			
Voltage (V)	Measurement Frequency (MHz)			Deviation (ppm)
132	5200.01534			2.950
120	5200.01534			2.950
108	5200.01534			2.950
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5199.97656	5199.97656	5199.97656	5199.97656
40	5199.98611	5199.98524	5199.9835	5199.98466
30	5199.99913	5199.99855	5199.99855	5199.99855
20	5200.01534	5200.01592	5200.01505	5200.01534
10	5200.03184	5200.03155	5200.03126	5200.03126
0	5200.04255	5200.04313	5200.04342	5200.04342
-10	5200.04834	5200.04834	5200.04863	5200.04863
-20	5200.04515	5200.04486	5200.04457	5200.04457
Max. Deviation (ppm)	9.296	9.296	9.352	9.352

<Chain 0, U-NII-2>

Frequency (MHz)	5300			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5300.01534			2.894
120	5300.01534			2.894
108	5300.01534			2.894
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5299.97569	5299.97569	5299.97598	5299.97569
40	5299.98466	5299.9835	5299.98437	5299.98379
30	5299.99971	5299.99826	5299.99855	5299.99826
20	5300.01621	5300.01534	5300.01534	5300.01534
10	5300.03155	5300.03184	5300.03213	5300.03213
0	5300.04486	5300.04428	5300.04428	5300.04428
-10	5300.04978	5300.04978	5300.04949	5300.04978
-20	5300.04515	5300.04544	5300.04544	5300.04544
Max. Deviation (ppm)	9.392	9.392	9.338	9.392

<Chain 0, U-NII-2C>

Frequency (MHz)	5580			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5580.01679			3.009
120	5580.01679			3.009
108	5580.01679			3.009
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5579.97453	5579.97424	5579.97424	5579.97424
40	5579.98292	5579.9835	5579.98379	5579.9835
30	5580.00029	5579.99884	5579.99855	5579.99884
20	5580.01766	5580.01679	5580.01679	5580.01679
10	5580.03502	5580.03415	5580.03415	5580.03415
0	5580.04747	5580.04689	5580.04689	5580.04689
-10	5580.0521	5580.0521	5580.0521	5580.0521
-20	5580.0466	5580.04689	5580.04689	5580.04689
Max. Deviation (ppm)	10.019	10.019	10.019	10.019

<Chain 0, U-NII-3>

Frequency (MHz)	5785			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5785.01737			3.003
120	5785.01737			3.003
108	5785.01737			3.003
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5784.97424	5784.97424	5784.97308	5784.97366
40	5784.98321	5784.98292	5784.98321	5784.98321
30	5785	5785.00058	5784.99884	5784.99913
20	5785.01852	5785.01737	5785.01737	5785.01737
10	5785.03444	5785.03473	5785.03531	5785.03531
0	5785.0492	5785.04863	5785.04863	5785.04863
-10	5785.05412	5785.05412	5785.05412	5785.05412
-20	5785.04805	5785.04834	5785.04834	5785.04863
Max. Deviation (ppm)	10.211	10.211	10.211	10.211

Test Results for Traffic Mode
<Chain 0, U-NII-1>

Frequency (MHz)	5200			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5199.95861			7.960
120	5199.95861			7.960
108	5199.95861			7.960
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5199.9314	5199.92504	5199.92272	5199.92272
40	5199.92764	5199.92764	5199.92764	5199.92764
30	5199.94096	5199.94096	5199.94096	5199.94096
20	5199.95861	5199.95861	5199.95861	5199.95861
10	5199.97742	5199.97742	5199.97742	5199.97742
0	5199.99768	5199.99768	5199.99768	5199.99768
-10	5200.01158	5200.01158	5200.01158	5200.01158
-20	5200.0136	5200.01447	5200.01505	5200.01563
Max. Deviation (ppm)	13.915	14.415	14.862	14.862

<Chain 0, U-NII-2>

Frequency (MHz)	5300			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5299.95774			7.974
120	5299.95774			7.974
108	5299.95774			7.974
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5299.92098	5299.92098	5299.92098	5299.92098
40	5299.92619	5299.92619	5299.92619	5299.92619
30	5299.9398	5299.9398	5299.9398	5299.9398
20	5299.95774	5299.95774	5299.95774	5299.95774
10	5299.97685	5299.97685	5299.97685	5299.97685
0	5299.99768	5299.9974	5299.9974	5299.9974
-10	5300.01158	5300.01158	5300.01158	5300.01158
-20	5300.0165	5300.01679	5300.0165	5300.01679
Max. Deviation (ppm)	14.909	14.909	14.909	14.909

<Chain 0, U-NII-2C>

Frequency (MHz)	5580			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5579.95543			7.987
120	5579.95543			7.987
108	5579.95543			7.987
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5579.91722	5579.91722	5579.91722	5579.91722
40	5579.92243	5579.92243	5579.92243	5579.92243
30	5579.93661	5579.93661	5579.93661	5579.93661
20	5579.95543	5579.95543	5579.95543	5579.95543
10	5579.9754	5579.9754	5579.9754	5579.9754
0	5579.99711	5579.99711	5579.99711	5579.99711
-10	5580.01216	5580.01216	5580.01216	5580.01216
-20	5580.01766	5580.01766	5580.01766	5580.01766
Max. Deviation (ppm)	15.919	15.919	15.919	15.919

<Chain 0, U-NII-3>

Frequency (MHz)	5785			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5784.95369			8.005
120	5784.9644			6.154
108	5784.95369			8.005
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5784.91433	5784.91433	5784.91433	5784.91433
40	5784.91954	5784.91954	5784.91954	5784.91954
30	5784.9343	5784.9343	5784.93401	5784.9343
20	5784.9644	5784.96237	5784.95861	5784.9563
10	5784.97424	5784.97424	5784.97453	5784.97453
0	5784.99711	5784.99682	5784.99711	5784.99682
-10	5785.01245	5785.01245	5785.01245	5785.01245
-20	5785.01852	5785.01852	5785.01823	5785.01852
Max. Deviation (ppm)	16.164	16.164	16.164	16.164

<Chain 1, U-NII-1>

Frequency (MHz)	5200			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5199.95861			7.960
120	5199.95861			7.960
108	5199.95861			7.960
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5199.92272	5199.92272	5199.92272	5199.92272
40	5199.92764	5199.92764	5199.92764	5199.92764
30	5199.94124	5199.94096	5199.94124	5199.94096
20	5199.95861	5199.95861	5199.95861	5199.95861
10	5199.97742	5199.97742	5199.97742	5199.97742
0	5199.99768	5199.99768	5199.99768	5199.99768
-10	5200.01158	5200.01158	5200.01158	5200.01158
-20	5200.01563	5200.01563	5200.01592	5200.01592
Max. Deviation (ppm)	14.862	14.862	14.862	14.862

<Chain 1, U-NII-2>

Frequency (MHz)	5300			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5299.95774			7.974
120	5299.95774			7.974
108	5299.95774			7.974
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5299.92098	5299.92127	5299.92127	5299.92127
40	5299.92619	5299.92619	5299.92619	5299.92619
30	5299.9398	5299.9398	5299.9398	5299.9398
20	5299.95774	5299.95774	5299.95774	5299.95774
10	5299.97685	5299.97685	5299.97685	5299.97685
0	5299.9974	5299.9974	5299.9974	5299.9974
-10	5300.01158	5300.01158	5300.01158	5300.01158
-20	5300.0165	5300.0165	5300.0165	5300.0165
Max. Deviation (ppm)	14.909	14.855	14.855	14.855

<Chain 1, U-NII-2C>

Frequency (MHz)	5580			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5579.95543			7.987
120	5579.95543			7.987
108	5579.95543			7.987
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5579.91722	5579.91722	5579.91722	5579.91722
40	5579.92359	5579.92301	5579.92301	5579.92214
30	5579.93661	5579.93661	5579.93661	5579.93661
20	5579.95543	5579.95543	5579.95543	5579.95543
10	5579.9754	5579.9754	5579.9754	5579.9754
0	5579.99711	5579.99711	5579.99711	5579.99711
-10	5580.01216	5580.01216	5580.01216	5580.01216
-20	5580.01766	5580.01766	5580.01766	5580.01766
Max. Deviation (ppm)	15.919	15.919	15.919	15.919

<Chain 1, U-NII-3>

Frequency (MHz)	5785			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5784.95369			8.005
120	5784.95601			7.604
108	5784.95369			8.005
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5784.91433	5784.91433	5784.91433	5784.91433
40	5784.91954	5784.91954	5784.91954	5784.91954
30	5784.9343	5784.93401	5784.93401	5784.93401
20	5784.95601	5784.95514	5784.95456	5784.95398
10	5784.97424	5784.97424	5784.97424	5784.97424
0	5784.99682	5784.99682	5784.99711	5784.99682
-10	5785.01216	5785.01216	5785.01216	5785.01245
-20	5785.01823	5785.01852	5785.01823	5785.01823
Max. Deviation (ppm)	16.164	16.164	16.164	16.164

<Chain 2, U-NII-1>

Frequency (MHz)	5200			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5199.96411			6.902
120	5199.97221			5.344
108	5199.96816			6.123
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5199.92301	5199.92272	5199.92272	5199.92272
40	5199.92764	5199.92764	5199.92764	5199.92764
30	5199.94182	5199.94153	5199.94124	5199.94124
20	5199.97221	5199.96151	5199.95977	5199.95919
10	5199.97742	5199.97742	5199.97742	5199.97742
0	5199.99768	5199.99768	5199.99768	5199.99768
-10	5200.01158	5200.01158	5200.01158	5200.01158
-20	5200.01592	5200.01592	5200.01592	5200.01592
Max. Deviation (ppm)	14.806	14.862	14.862	14.862

<Chain 2, U-NII-2>

Frequency (MHz)	5300			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5299.95774			7.974
120	5299.95774			7.974
108	5299.95774			7.974
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5299.92127	5299.92127	5299.92127	5299.92127
40	5299.9259	5299.92619	5299.92619	5299.92619
30	5299.9398	5299.9398	5299.9398	5299.9398
20	5299.95774	5299.95774	5299.95774	5299.95774
10	5299.97685	5299.97685	5299.97685	5299.97685
0	5299.9974	5299.9974	5299.9974	5299.9974
-10	5300.01158	5300.01158	5300.01158	5300.01158
-20	5300.0165	5300.0165	5300.0165	5300.0165
Max. Deviation (ppm)	14.855	14.855	14.855	14.855

<Chain 2, U-NII-2C>

Frequency (MHz)	5580			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5579.95543			7.987
120	5579.95543			7.987
108	5579.95543			7.987
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5579.91722	5579.91722	5579.91722	5579.91722
40	5579.92214	5579.92243	5579.92214	5579.92214
30	5579.93661	5579.93661	5579.93661	5579.93661
20	5579.95543	5579.95543	5579.95543	5579.95543
10	5579.9754	5579.9754	5579.9754	5579.9754
0	5579.99711	5579.99711	5579.99711	5579.99711
-10	5580.01216	5580.01216	5580.01216	5580.01216
-20	5580.01766	5580.01766	5580.01766	5580.01766
Max. Deviation (ppm)	15.919	15.919	15.919	15.919

<Chain 2, U-NII-3>

Frequency (MHz)	5785			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5784.95369			8.005
120	5784.95398			6.154
108	5784.95369			8.005
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5784.91433	5784.91433	5784.91433	5784.91433
40	5784.92012	5784.91983	5784.91954	5784.91954
30	5784.93401	5784.9343	5784.93401	5784.93401
20	5784.95398	5784.95398	5784.95398	5784.95369
10	5784.97482	5784.97482	5784.97453	5784.97453
0	5784.99219	5784.99305	5784.99363	5784.9945
-10	5785.011	5785.011	5785.01187	5785.01216
-20	5785.01823	5785.01823	5785.01823	5785.01823
Max. Deviation (ppm)	16.164	16.164	16.164	16.164

<Chain 3, U-NII-1>

Frequency (MHz)	5200			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5199.95919			7.848
120	5199.95919			7.848
108	5199.95919			7.848
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5199.92562	5199.92475	5199.9233	5199.92301
40	5199.92764	5199.92764	5199.92764	5199.92764
30	5199.94385	5199.94327	5199.94269	5199.94182
20	5199.95919	5199.9589	5199.95861	5199.95861
10	5199.97742	5199.97742	5199.97742	5199.97742
0	5199.99768	5199.99797	5199.99797	5199.99768
-10	5200.01158	5200.01158	5200.01158	5200.01158
-20	5200.01621	5200.01621	5200.01621	5200.01621
Max. Deviation (ppm)	14.304	14.471	14.750	14.806

<Chain 3, U-NII-2>

Frequency (MHz)	5300			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5299.95774			7.974
120	5299.95774			7.974
108	5299.95774			7.974
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5299.92127	5299.92127	5299.92127	5299.92127
40	5299.9259	5299.9259	5299.92619	5299.92619
30	5299.9398	5299.9398	5299.9398	5299.9398
20	5299.95774	5299.95774	5299.95774	5299.95774
10	5299.97685	5299.97685	5299.97685	5299.97685
0	5299.9974	5299.9974	5299.9974	5299.9974
-10	5300.01158	5300.01158	5300.01158	5300.01158
-20	5300.0165	5300.0165	5300.0165	5300.0165
Max. Deviation (ppm)	14.855	14.855	14.855	14.855

<Chain 3, U-NII-2C>

Frequency (MHz)	5580			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5579.95543			7.987
120	5579.95543			7.987
108	5579.95543			7.987
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5579.91722	5579.91722	5579.91722	5579.91722
40	5579.92214	5579.92214	5579.92214	5579.92214
30	5579.93661	5579.93661	5579.93661	5579.93661
20	5579.95543	5579.95543	5579.95543	5579.95543
10	5579.9754	5579.97569	5579.97569	5579.9754
0	5579.9974	5579.9974	5579.99711	5579.99711
-10	5580.01216	5580.01216	5580.01216	5580.01216
-20	5580.01766	5580.01766	5580.01766	5580.01766
Max. Deviation (ppm)	15.919	15.919	15.919	15.919

<Chain 3, U-NII-3>

Frequency (MHz)	5785			
Voltage (V)	Measurement Frequency (MHz)			Max. Deviation (ppm)
132	5784.95369			8.005
120	5784.95369			6.154
108	5784.95369			8.005
Temperature (°C)	Measurement Frequency (MHz)			
	0 Minute	2 Minute	5 Minute	10 Minute
50	5784.91433	5784.91433	5784.91433	5784.91433
40	5784.92069	5784.92069	5784.92012	5784.92012
30	5784.93401	5784.93401	5784.93401	5784.93401
20	5784.95369	5784.95369	5784.95369	5784.95369
10	5784.97627	5784.97598	5784.97569	5784.97482
0	5784.9945	5784.9945	5784.99479	5784.99508
-10	5785.00405	5785.00637	5785.00839	5785.011
-20	5785.01823	5785.01823	5785.01823	5785.01823
Max. Deviation (ppm)	16.164	16.164	16.164	16.164

5.1.7 Power Spectral Density

Limit

For the 5.15~5.25GHz Bands:

For mobile and portable client devices in the 5.15~5.25GHz band, the Maximum Power spectral density shall not exceed 11dBm/MHz. For an indoor access point operating in the band 5.15~5.25GHz, the maximum power spectral density shall not exceed 17dBm/MHz.

For the 5.25~5.35GHz Bands:

- a) The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- b) All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device, except devices installed in vehicles, shall be labelled or include in the user manual the following text "for indoor use only."

For the 5.47~5.725GHz Bands:

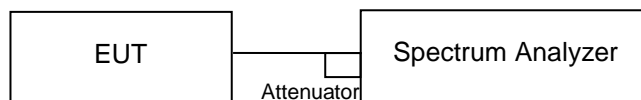
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

For the 5.745~5.85GHz Bands:

The maximum power spectral density shall not exceed 30dBm/500kHz.

Kind of Test Site Shielded room

Test Setup



Test Instruments

<Scanning Mode>

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101512	2021/01/29	2022/01/28	2022/01/24	2022/01/28

<Traffic Mode>

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date	Test Date	
						From	Until
Spectrum Analyzer	R&S	FSV40	101512	2021/01/29	2022/01/28	2022/01/24	2022/01/28

Test Procedure**For U-NII-1, U-NII-2A, U-NII-2C 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 \geq 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

※For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 500 kHz, Set VBW \geq 3 RBW, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
4. Sweep time = auto, trigger set to "free run".
5. Trace average at least 100 traces in power averaging mode.
6. Record the max value and add 10 log (1/duty cycle)

For MIMO mode, calculation method follows FCC KDB 662911 Method 2) a) of power density measurement using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

Test Results

Please refer to Appendix A for 1T1R, Appendix B for 4T4R.

5.1.8 Radiated Spurious Emissions

Limit

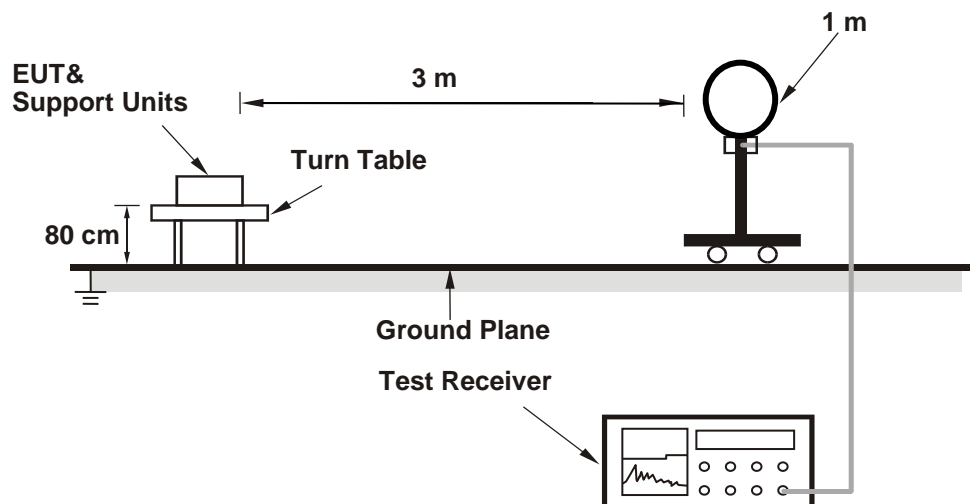
Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Emissions radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in §15.407(b).

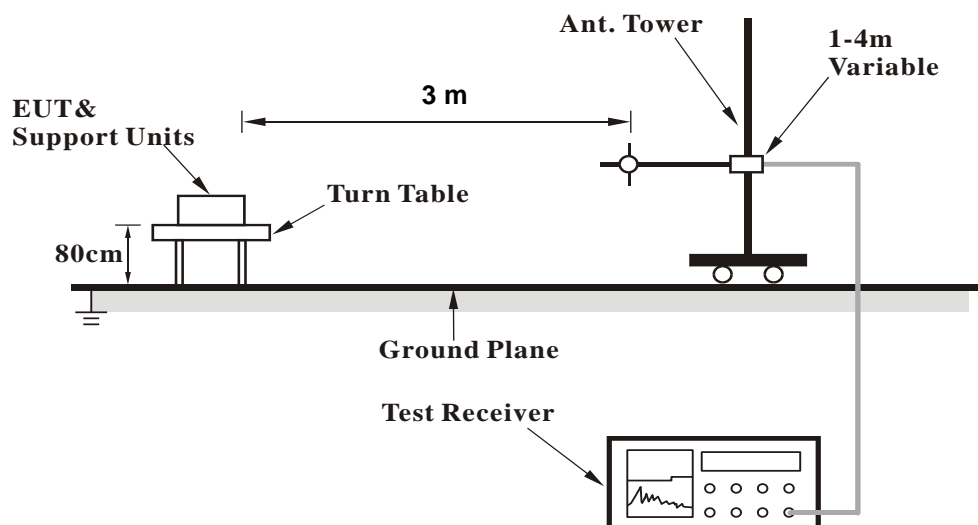
Kind of Test Site 3m Semi-Anechoic Chamber

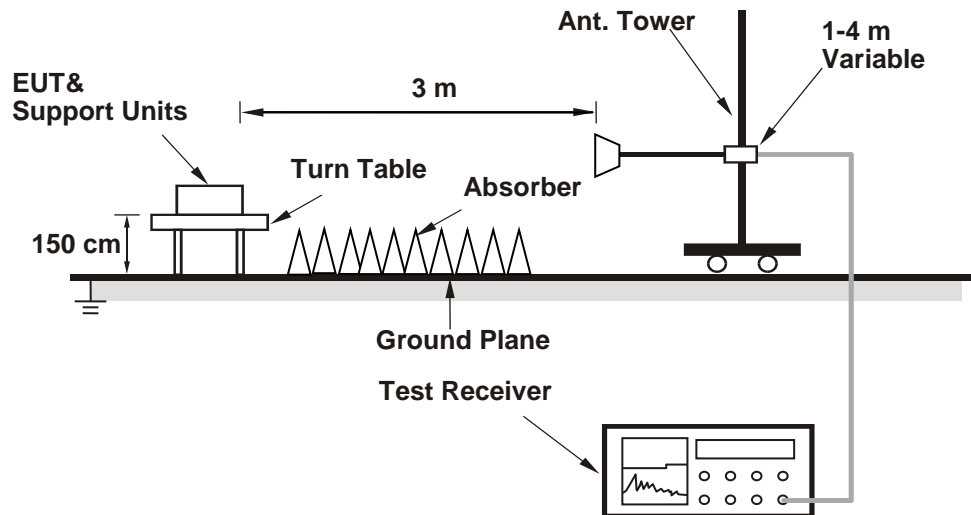
Test Setup

<Radiated Emissions below 30 MHz>



<Radiated Emissions 30 MHz to 1 GHz>



<Radiated Emissions above 1 GHz>


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

Test Instruments
<POE with Scanning Mode>

Above 1GHz: 2022/1/30-2022/3/2

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101513	2021/5/28	2022/5/27
Horn Antenna	ETS-Lindgren	3117	00218930	2021/12/20	2022/12/19
HF-AMP + AC source	EMCI	EMC051845SE	980635	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC051845SE	980633	2022/2/16	2023/2/15
HF-AMP + AC source	EMCI	EMC184045SE	980656	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2022/2/16	2023/2/15
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15

30MHz-1GHz: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2022/2/25	2023/2/24
Bilog Antenna	SCHWARZBECK	VULB-9168	00949	2021/5/30	2022/5/29
LF-AMP	Agilent	8447D	2727A05146	2022/2/16	2023/2/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/11	2022/3/10

9kHz-30MHz: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2022/2/25	2023/2/24
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/11	2022/3/10
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2021/12/8	2022/12/7

<POE with Traffic Mode>

Above 1GHz: 2021/9/25 – 2022/1/28

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101513	2021/5/28	2022/5/27
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
HF-AMP + AC source	EMCI	EMC051845SE	980635	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC184045SE	980656	2021/2/9	2022/2/8
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15

30MHz-1GHz: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00949	2021/5/30	2022/5/29
LF-AMP	Agilent	8447D	2727A05146	2022/2/16	2023/2/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/11	2022/3/10

9kHz-30MHz: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2021/12/8	2022/12/7

<Adapter with Scanning Mode>

Above 1GHz: 2022/1/30 – 2022/3/2

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101513	2021/5/28	2022/5/27
Horn Antenna	ETS-Lindgren	3117	00218930	2021/12/20	2022/12/19
HF-AMP + AC source	EMCI	EMC051845SE	980635	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC051845SE	980633	2022/2/16	2023/2/15
HF-AMP + AC source	EMCI	EMC184045SE	980656	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2022/2/16	2023/2/15
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15

30MHz-1GHz: 2022/3/2 – 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00949	2021/5/30	2022/5/29
LF-AMP	Agilent	8447D	2727A05146	2022/2/16	2023/2/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/11	2022/3/10

9k-30M: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2021/12/8	2022/12/7

<Adapter with Traffic Mode>

Above 1GHz: 2021/9/25 – 2022/1/28

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101513	2021/5/28	2022/5/27
HF-AMP + AC source	EMCI	EMC051845SE	980635	2021/2/1	2022/1/31
HF-AMP + AC source	EMCI	EMC184045SE	980656	2021/2/9	2022/2/8
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15

30MHz-1G: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00949	2021/5/30	2022/5/29
LF-AMP	Agilent	8447D	2727A05146	2022/2/16	2023/2/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/11	2022/3/10
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/11	2022/3/10

9kHz-30MHz: 2022/3/3

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Loop Antenna	SCHWARZBECK	FMZB 1519B	00215	2021/12/8	2022/12/7

Test Procedures**For Radiated Emissions 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 (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) 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.
2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated Emissions 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 $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

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Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix C,D for Adapter and Appendix E, F for POE.