Report No. : FR1N0529-07AC





RADIO TEST REPORT

FCC ID	: MSQ-RTAX5D00
Equipment	: ROG Rapture Quad-band Gaming Router
Brand Name	: ASUS
Model Name	: GT-AXE16000
Applicant	: ASUSTeK COMPUTER INC.
	1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Standard	: 47 CFR FCC Part 15.407

The product was received on Aug. 16, 2023, and testing was started from Aug. 18, 2023 and completed on Apr. 16, 2024. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

an

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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- **Appendix F. Test Photos**

Photographs of EUT v01





History of this test report

Report No.	Version	Description	Issued Date
FR1N0529-07AC	01	Initial issue of report	Apr. 01, 2024
FR1N0529-07AC	02	Add the Contention-Based Protocol test.	Apr. 18, 2024



Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark		
1.1.2	15.203	Antenna Requirement	PASS	-		
3.1	15.407(a)	Emission Bandwidth	PASS	-		
3.2	15.407(a)	Maximum Equivalent Isotopically Radiated Power (E.I.R.P.)	PASS	-		
3.3	15.407(a)	Peak Power Spectral Density (E.I.R.P.)	PASS	-		
3.4	15.407(b)	Unwanted Emissions	PASS	-		
3.5	15.407(d)	Contention-Based Protocol	PASS	-		
Note: Reference to Sporton Project No.: 1N0529-05						

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Wendy Pan



1 General Description

1.1 Information

1.1.1 **RF General Information**

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5925-7125	ax (HEW20)	5955-6995	1-209 [53]
5925-7125	ax (HEW40)	5965-7005	3-211 [27]
5925-7125	ax (HEW80)	5985-7025	7-215 [14]
5925-7125	ax (HEW160)	6025-6985	15-207 [7]

Band	Mode	BWch (MHz)	Nant
UNII 5~8	802.11ax HEW20	20	4TX
UNII 5~8	802.11ax HEW20-BF	20	4TX
UNII 5~8	802.11ax HEW40	40	4TX
UNII 5~8	802.11ax HEW40-BF	40	4TX
UNII 5~8	802.11ax HEW80	80	4TX
UNII 5~8	802.11ax HEW80-BF	80	4TX
UNII 5~8	802.11ax HEW160	160	4TX
UNII 5~8	802.11ax HEW160-BF	160	4TX

Note:

• HEW20, HEW40, HEW80 and HEW160 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.

- BWch is the nominal channel bandwidth.
- The channel defined in the IEEE Standard P802.11ax[™]/D6.1.



1.1.2 Antenna Information

For EUT 5

	Port								
Ant.	WLAN 2.4GHz	WLAN 5GHz UNII 1& UNII 2A	WLAN 5GHz UNII 2C& UNII 3	WLAN 6GHz	Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
1	2	2	-	-	WALSIN	RFPCA311406IMLB901	PCB	I-PEX	
2	1	1	-	-	WALSIN	RFDPA181121IMLB901	Dipole	I-PEX	
3	4	4	-	-	WALSIN	RFDPA181121IMLB902	Dipole	I-PEX	
4	3	3	-	-	WALSIN	RFDPA181105IMLB901	Dipole	I-PEX	
5	-	-	4	-	WALSIN	RFPCA191412IM5B901	PCB	I-PEX	
6	-	-	3	-	WALSIN	RFDPA181108IM5B901	Dipole	I-PEX	Noto?
7	-	-	2	-	WALSIN	RFDPA181119IM5B901	Dipole	I-PEX	NULEZ
8	-	-	1	-	WALSIN	RFDPA181125IM5B901	Dipole	I-PEX	
9	-	-	-	4	WALSIN	RFPCA170920IM6B901	PCB	I-PEX	
10	-	-	-	3	WALSIN	RFPCA222024IMLB901	PCB	I-PEX	
11	-	-	-	2	WALSIN	RFDPA181119IM6B901	Dipole	I-PEX	
12	-	-	-	1	WALSIN	RFDPA181110IM6B901	Dipole	I-PEX	

Note1: The above information was declared by manufacturer. Note2:

Mode 1: 2G5GL-external antenna Vertical

Band (MHz)	2400-2483.5	5150-5250	5250-5350
Frequency (Hz)	2.45G	5.2G	5.3G
Ant. 1 Max Gain (dBi)	2.46	3.34	3.41
Ant. 2 Max Gain (dBi)	2.3	4.72	3.84
Ant. 3 Max Gain (dBi)	3.43	3.61	3.43
Ant. 4 Max Gain (dBi)	2.12	4.5	4.7
DG [1SS] (dBi)	4.53	6.17	6.32
DG [2SS] (dBi)	3.43	4.72	4.7
DG [4SS] (dBi)	3.43	4.72	4.7

Mode 2: 2G5GL-external antenna Horizontal

Band (MHz)	2400-2483.5	5150-5250	5250-5350
Frequency (Hz)	2.45G	5.2G	5.3G
Ant. 1 Max Gain (dBi)	2.46	3.34	3.41
Ant. 2 Max Gain (dBi)	3.54	4.16	4.71
Ant. 3 Max Gain (dBi)	4.36	3.44	3.32
Ant. 4 Max Gain (dBi)	3.47	4.31	4.69
DG [1SS] (dBi)	5	4.76	4.75
DG [2SS] (dBi)	4.36	4.31	4.71
DG [4SS] (dBi)	4.36	4.31	4.71

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Mode 3: 5GH-external antenna Vertical

Band (MHz)	5470-5725	5725-5850
Frequency (Hz)	5.6G	5.785G
Ant. 5 Max Gain (dBi)	2.56	1.18
Ant. 6 Max Gain (dBi)	4.83	4.59
Ant. 7 Max Gain (dBi)	4.4	4.62
Ant. 8 Max Gain (dBi)	3.82	3.91
DG [1SS] (dBi)	6.97	6.48
DG [2SS] (dBi)	4.83	4.62
DG [4SS] (dBi)	4.83	4.62

Mode 4: 5GH-external antenna Horizontal

Band (MHz)	5470-5725		5725-5850	
Frequency (Hz)	5.	6G	5.785G	
Ant. 5 Max Gain (dBi)	2.	56	1.18	
Ant. 6 Max Gain (dBi)	4.	.84	4.	77
Ant. 7 Max Gain (dBi)	3.	62	4.	56
Ant. 8 Max Gain (dBi)	4.	15	4.	12
DG [1SS] (dBi)	5.	.83	5.	27
DG [2SS] (dBi)	4.	.84	4.	77
DG [4SS] (dBi)	4.	.84	4.	77
Mode 5: 6G-external antenna	Vertical			
Band (MHz)	6175	6475	6695	6995
Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 9 Max Gain (dBi)	3.1	3.04	2.87	2.01
Ant. 10 Max Gain (dBi)	2.8	2.63	3.57	4.12
Ant. 11 Max Gain (dBi)	4.49	3.97	4.38	4.34
Ant. 12 Max Gain (dBi)	4.65	3.76	4.1	4.29
DG [1SS] (dBi)	5.66	5.2	5.58	5.35
DG [2SS] (dBi)	4.65	3.97	4.38	4.34
DG [4SS] (dBi)	4.65	3.97	4.38	4.34
Mode 6: 6G-external antenna	Horizontal			
Band (MHz)	6175	6475	6695	6995
Frequency (Hz)	6.175G	6.475G	6.695G	6.995G
Ant. 9 Max Gain (dBi)	3.1	3.04	2.87	2.01
Ant. 10 Max Gain (dBi)	2.8	2.63	3.57	4.12
Ant. 11 Max Gain (dBi)	4.88	4.49	4.92	4.59
Ant. 12 Max Gain (dBi)	4.53	4.43	4.26	4.31
DG [1SS] (dBi)	4.99	4.63	4.64	4.41
DG [2SS] (dBi)	4.88	4.49	-	-
DG [4SS] (dBi)	4.88	4.49	-	-



Note3: The directional gain is measured which follows the procedure of KDB 662911 D03.

Only the highest gain antenna was selected from each different antenna mode of antenna to test and record in this report.

For 2.4GHz function:

For IEEE 802.11b/g/n/VHT/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11a/n/ac/ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For 6GHz function:

For IEEE 802.11ax (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.



1.1.3 EUT Operational Condition

EUT Power Type	From Power Adapter					
	\boxtimes	With beamforming		Without beamforming		
Beamforming Function		The product has beamforming function for n/VHT/ax in 2.4GHz, n/ac/ax in 5GHz and ax in 6GHz.				
	\boxtimes	Indoor Access Point		Subordinate		
		Indoor Client		Standard Power Access Point		
Device Type		Dual Client		Standard Client		
		Fixed Client		Very Low Power		
Condition of EUT	Indoor 🗌 Outdoor			Outdoor		
Channel Puncturing Function	n 🗌 Supported 🖾 Unsupported		Unsupported			
Support RU		Full RU		Partial RU		
Test Software Version	Mtool 3.2.1.4					
Software / Firmware Version for CBP	9.0.0.4.386_47110-g9eae327					

Note: The above information was declared by manufacturer.

1.1.4 Table for Components Source Information

Component	Main Source	Second Source
5G pre filter	Brand: Qorvo Model: QPQ1904	-
DDR4	Brand: SAMSUNG Density: 512MB	Brand: SAMSUNG Density: 1GB
Transformer of 1Gbps LAN	Brand: NETSWAP Model: NS777202	Brand: MINGTEK Model: HN8001VG
MLCC on the path of the CPU (Location: C124, C126, C127, C128)	Brand: WALSIN Model: 0201X104K160CT	Brand: TAIYO YUDEN Model: EMK063BJ104KP-F

Note: The above information was declared by manufacturer.

1.1.5 Table for EUT Information

5G pre filter	DDR4	Transformer of 1Gbps LAN	MLCC on the path of the CPU (Location: C124, C126, C127, C128)
Second Source	Main Source	Main Source	Main Source
Main Source	Main Source	Main Source	Main Source
Second Source	Second Source	Main Source	Main Source
Second Source	Second Source	Second Source	Main Source
Main Source	Second Source	Main Source	Second Source
	5G pre filter Second Source Main Source Second Source Second Source Main Source	5G pre filterDDR4Second SourceMain SourceMain SourceMain SourceSecond SourceSecond SourceSecond SourceSecond SourceMain SourceSecond Source	5G pre filterDDR4Transformer of 1Gbps LANSecond SourceMain SourceMain SourceMain SourceMain SourceMain SourceSecond SourceSecond SourceMain SourceSecond SourceSecond SourceSecond SourceMain SourceSecond SourceSecond SourceMain SourceSecond SourceMain Source

Note 1: From the above EUTs, EUT 5 was selected to test all items, EUT 4 was selected to test Unwanted

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Emissions below 1GHz test and their data were recorded in this report. Note2: The above information was declared by manufacturer.

1.1.6 Table for EUT Supports Function

Function	Support Type	Remark
AP Router	Master	Support 2.4GHz/5GHz/6GHz
Bridge	Slave without radar detection	Support 2.4GHz/5GHz
Repeater	Master	Support 2.4GHz/5GHz
Mesh	Master	Support 2.4GHz/5GHz/6GHz

Note: The above information was declared by manufacturer.

1.1.7 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR1N0529AC

Below is the table for the change of the product with respect to the original one.

	Modifications		Performance Checking	
1.	Adding a second transformer source of 1Gbps LAN and combination as EUT 4.	Unw	Unwanted Emissions below 1GHz test.	
	(Brand name: MINGTEK / Model name: HN8001VG)			
		1.	Emission Bandwidth	
2.	 Adding EUT 5, the difference with EUT 3 is the following: a. With 5G pre filter. 		Maximum Equivalent Isotopically Radiated	
			Power (E.I.R.P.)	
 b. Add the second source for MLCC on the path of the CPU (Location: C124, C126, C127, C128). c. Updating the measurement method of antenna 		3.	Peak Power Spectral Density (E.I.R.P.)	
		4.	Unwanted Emissions	
	gain for EUT 5.		Contention-Based Protocol	
		Eva	luating the affected frequencies only.	
3. 4.	Removing Manufacturer name and address. Updating the Components Source information of main source (512MB) and Second source (1GB) for DDR4.	Afte	r evaluating, it does not affect the test.	



1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR FCC Part 15.407
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01
- The following reference test guidance is not within the scope of accreditation of TAF.
- FCC KDB 987594 D02 v01r01
- FCC KDB 662911 D03 v01
- FCC KDB 412172 D01 v01r01
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information		
Test Lab. : Sporton International Inc. Hsinchu Laboratory		
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)	
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085	
	Test site Designation No. TW3787 with FCC.	
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.	

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated	03CH05-CB	laakaan Bang	21.8~23.3 / 59~60	Aug. 18, 2023
(Below 1GHz)	03CH06-CB	Jackson Peng	21.9-22.4 / 55-58	Mar. 04, 2024
Radiated	03CH05-CB	laska a Dava	21.9-22.4 / 55-58	Jan. 08, 2024~ Jan. 22, 2024
(Above 1GHz)	03CH06-CB	Jackson Peng	21.9-22.4 / 55-58	
RF Conducted (For other tests)	TH03-CB	Nyle Chang	24.5-24.8 / 52-62	Jan. 27, 2024~ Jan. 31, 2024
RF Conducted (Contention-Based Protocol test)	DF02-CB	Kevin Huang	22.7~24 / 64~67	Apr. 04, 2024~ Apr. 16, 2024



1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Radiated Emission (9kHz ~ 30MHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.1 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.2 dB	Confidence levels of 95%
Conducted Emission	3.1 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.1 dB	Confidence levels of 95%
Bandwidth Measurement	2.2%	Confidence levels of 95%



2 Test Configuration of EUT

2.1 Test Channel Mode

For 4T1S and 4T2S mode:

Mode
802.11ax HEW40-BF_Nss1,(MCS0)_4TX
6445MHz
802.11ax HEW80-BF_Nss1,(MCS0)_4TX
6465MHz
6625MHz
6705MHz
6785MHz
802.11ax HEW160-BF_Nss1,(MCS0)_4TX
6505MHz Straddle 6.425-6.525GHz
6665MHz
802.11ax HEW80-BF_Nss2,(MCS0)_4TX
6465MHz
6625MHz
6705MHz
6785MHz
802.11ax HEW160-BF_Nss2,(MCS0)_4TX
6345MHz
6505MHz Straddle 6.425-6.525GHz
6665MHz

Note:

The EUT supports non-beamforming and beamforming modes, after evaluating, beamforming mode has been evaluated to be the worst case, so it was selected to test and record in this test report.



2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests		
Tests Item	Emission Bandwidth Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) Peak Power Spectral Density (E.I.R.P.) Contention Based Protocol	
Test Condition	Conducted measurement at transmit chains	
Test Mode	EUT 5	

The Worst Case Mode for Following Conformance Tests			
Tests Item	Unwanted Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
	СТХ		
Operating Mode < 1GHz	 After evaluating, the worst case was found at Z axis. So the measurement will follow this same test configuration. The EUT has two types for setting the antenna. One is antenna in horizontal and the other is antenna in vertical, The EUT was performed at 2.4GHz, UNII 1+UNII 2A, UNII 2C+UNII 3, 6GHz, the worst case was found at 2.4GHz. Thus, the measurement will follow this same test configuration. The EUT was performed at Adapter 1, Adapter 3 and Adapter 4, the worst case was found at Adapter 1. Thus, the measurement will follow this same test configuration. 		
1	EUT 4 in Z axis + antenna in horizontal + Adapter 1 + WLAN 2.4GHz		
2	EUT 5 in Z axis + antenna in horizontal + Adapter 1 + WLAN 2.4GHz		
For operating mode	e 2 is the worst case and it was record in this test report.		
	СТХ		
Operating Mode > 1GHz	 The EUT was performed at X axis, Y axis and Z axis position, and the worst case was found at Z axis. So the measurement will follow this same test configuration. The EUT has two types for setting the antenna. One is antenna in horizontal and the other is antenna in vertical, and the worst case was found at antenna in vertical. So the measurement will follow this same test configuration. 		
1	EUT 5 in Z axis + antenna in vertical for WLAN 6GHz		



The Worst Case Mode for Following Conformance Tests		
Tests Item	Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation	
Operating Mode		
1	EUT 5 + WLAN 2.4GHz + WLAN 5GHz (UNII 2C/ UNII 3) + WLAN 6GHz	
2	EUT 5 + WLAN 5GHz (UNII 1/ UNII 2A) + WLAN 5GHz (UNII 2C/ UNII 3) + WLAN 6GHz	
Refer to Sporton Test Report No.: FA1N0529-07 for Co-location RF Exposure Evaluation.		

2.3 EUT Operation during Test

For CTX Mode:

non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

beamforming mode:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

During the test, the following programs under WIN 7 were executed.

The program was executed as follows:

- 1. During the test, the EUT operation to normal function.
- 2. Executed command fixed test channel under DOS[10.0.19043.1320] LanTest20(version 2.0.0.2).
- 3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by Router and transmit duty cycle no less than 98%.



2.4 Accessories

Accessories					
Equipment Name	Brand Name	Model Name	Rating	Remark	
Adapter 1	AcBel	ADD011	INPUT: 100-240V~ 1.7A, 50-60Hz OUTPUT: +19.5V, 3.33A, 65.0W MAX.	With the DC cable: Non-shielded, 1.5m	
Adapter 2	AcBel	ADD011	INPUT: 100-240V~ 1.7A, 50-60Hz OUTPUT: +19.5V, 3.33A, 65.0W MAX.	With the DC cable: Non-shielded, 1.5m	
Adapter 3	DELTA	ADP-65GD	INPUT: AC100-240V ~ 50-60Hz, 1.5A OUTPUT: +19V, 3.42A.	With the DC cable: Non-shielded, 1.8m	
Adapter 4	DELTA	ADP-65DE B	INPUT: 100-240V~1.5A, 50-60Hz OUTPUT: 19.0V, 3.42A, 65.0W	With the DC cable: Non-shielded, 1.5m	
Adapter 5	DELTA	ADP-65DE B	INPUT: 100-240V ~ 1.5A, 50-60Hz OUTPUT: 19.0V, 3.42A, 65.0W	With the DC cable: Non-shielded, 1.5m	
Others					
RJ-45 cable*1: Shielded, 1.5m					
Power cord*1: Non-shielded, 0.9m					

Note1: Adapter 1 & Adapter 2 and Adapter 4 & Adapter 5 are identical except for the S/N; Therefore, Adapter 1 and Adapter 4 were selected to test and recorded in this report.

Note2: Refer to photographs of EUT for the detail information of difference between Adapter 1 & Adapter 2 and Adapter 4 & Adapter 5.



2.5 Support Equipment

For Radiated (below 1GHz)

Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID	
А	Notebook	DELL	E4300	N/A	

For Radiated (above 1GHz):

Support Equipment					
No.	Equipment	Brand Name	Model Name	FCC ID	
А	Notebook	DELL	E4300	N/A	
В	Notebook	DELL	E4300	N/A	
С	Router	ASUS	GT-AXE16000	MSQ-RTAX5D00	

For RF Conducted:

Support Equipment						
No.	No. Equipment Brand Name Model Name FCC ID					
А	Notebook	DELL	E4300	N/A		

For RF Conducted (Contention Based Protocol test):

Support Equipment					
No. Equipment Brand Name Model Name FCC ID					
А	Notebook	DELL	E4300	N/A	
В	Notebook	DELL	E6230	N/A	
С	WLAN module	Intel	BE200NGW	PD9BE200NG	



2.6 Test Setup Diagram









3 Transmitter Test Result

3.1 Emission Bandwidth

3.1.1 Emission Bandwidth Limit

	Emission Bandwidth Limit			
UNI	I Devices			
\boxtimes	For the 5925-6425 GHz band, N/A			
\boxtimes	For the 6425-6525 GHz band, N/A			
\boxtimes	For the 6525-6875 GHz band, N/A			
\boxtimes	For the 6875-7125 GHz band, N/A			
RLA	AN Devices			
	For the 5925-6425 GHz band, N/A			
	For the 6425-6525 GHz band, N/A			
	For the 6525-6875 GHz band, N/A			
	For the 6875-7125 GHz band, N/A			

3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

	Test Method				
•	For the emission bandwidth shall be measured using one of the options below:				
	\boxtimes	According to FCC KDB 987594 D02 clause II.C, measurement procedure shall refer to FCC KDB 789033 D02, clause C for EBW and clause D for OBW measurement.			
Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.					
		Refer as IC RSS-Gen, clause 4.6 for bandwidth testing.			

3.1.4 Test Setup



3.1.5 Test Result of Emission Bandwidth

Refer as Appendix A



3.2 Maximum Equivalent Isotopically Radiated Power (E.I.R.P.)

3.2.1 Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) Limit

	Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) Limit					
UNI	UNII Devices					
\boxtimes	For the 5.925 ~ 6.425 GHz band:					
	 For standard power access point and fixed client device : e.i.r.p < 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees not exceed 125 mW (21 dBm). 					
	 For indoor access point : e.i.r.p < 30 dBm. 					
	 For subordinate device control of an indoor access point : e.i.r.p < 30 dBm. 					
	 For client device control of a standard power access point : e.i.r.p < 30 dBm. 					
	 For client device control of an indoor access point : e.i.r.p < 24 dBm. 					
	 For very low power device : e.i.r.p < 14 dBm. 					
\square	For the 6.425 ~ 6.525 GHz band:					
	 For indoor access point : e.i.r.p < 30 dBm. 					
	 For client device control of an indoor access point : e.i.r.p < 24 dBm. 					
\boxtimes	For the 6.525 ~ 6.875 GHz band:					
	 For standard power access point and fixed client device : e.i.r.p < 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees not exceed 125 mW (21 dBm). 					
	 For indoor access point : e.i.r.p < 30 dBm. 					
	 For subordinate device control of an indoor access point : e.i.r.p < 30 dBm. 					
	 For client device control of a standard power access point : e.i.r.p < 30 dBm. 					
	 For client device control of an indoor access point : e.i.r.p < 24 dBm. 					
	 For very low power device : e.i.r.p < 14 dBm. 					
\square	For the 6.875 ~ 7.125 GHz band:					
	 For indoor access point : e.i.r.p < 30 dBm. 					
	 For client device control of an indoor access point : e.i.r.p < 24 dBm. 					
RL	AN Devices					
	For the 5.925 ~ 7.125 GHz band:					
	 For low-power indoor access-points & indoor subordinate devices < 30 dBm. 					
	 For low-power client devices < 24 dBm. 					
	For the 5.925 ~ 6.875 GHz band:					
	 For standard-power access points & fixed client devices < 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees not exceed 125 mW (21 dBm). 					
	 For standard client devices < 30 dBm. 					



3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

	Test Method				
	Acco 7890	ording to FCC KDB 987594 D02 clause II.E, the test measurement procedure shall refer to KDB 033.			
	Aver	age over on/off periods with duty factor			
	\boxtimes	Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging). Spectrum analyzer setting: RBW/VBW : 1/3MHz ; Detector : RMS ; Trace mode : Average ; Sweep Count 100.			
		Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)			
	Wide	eband RF power meter and average over on/off periods with duty factor			
		Refer as FCC KDB 789033 D02, clause E Method PM-G (using an RF average power meter).			
	For o	conducted measurement.			
	•	If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.			
	•	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP _{total} = P _{total} + DG			
\boxtimes	For	radiated measurement.			
	•	Refer as FCC KDB 789033 D02 clause II A.1.F "Antenna-port Conducted versus Radiated Testing"			
	•	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.			
	•	Refer as FCC KDB 412172 D01 clause 2.2 for EIRP calculation.			



3.2.4 Test Setup



3.2.5 Test Result of Maximum Equivalent Isotopically Radiated Power (E.I.R.P)

Refer as Appendix B



3.3 Peak Power Spectral Density (E.I.R.P.)

3.3.1 Peak Power Spectral Density (E.I.R.P.) Limit

	Peak Power Spectral Density (E.I.R.P.) Limit					
UNI	UNII Devices					
\boxtimes	For	the 5.925 ~ 6.425 GHz band:				
	•	For standard power access point and fixed client device : e.i.r.p PSD < 23 dBm/MHz.				
	•	For indoor access point : e.i.r.p PSD < 5 dBm/MHz.				
	•	For subordinate device control of an indoor access point : e.i.r.p PSD < 5 dBm/MHz.				
	•	For client device control of a standard power access point : e.i.r.p PSD < 17 dBm/MHz.				
	•	For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz.				
	•	For very low power device : e.i.r.p PSD < -5 dBm/MHz.				
\boxtimes	For	the 6.425 ~ 6.525 GHz band:				
	•	For indoor access point : e.i.r.p PSD < 5 dBm/MHz.				
	•	For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz.				
\boxtimes	For	the 6.525 ~ 6.875 GHz band:				
	•	For standard power access point and fixed client device : e.i.r.p PSD < 23 dBm/MHz.				
	•	For indoor access point : e.i.r.p PSD < 5 dBm/MHz.				
	•	For subordinate device control of an indoor access point : e.i.r.p PSD < 5 dBm/MHz.				
	•	For client device control of a standard power access point : e.i.r.p PSD < 17 dBm/MHz.				
	•	For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz.				
	•	For very low power device : e.i.r.p PSD < -5 dBm/MHz.				
\boxtimes	For	the 6.875 ~ 7.125 GHz band:				
	•	For indoor access point : e.i.r.p PSD < 5 dBm/MHz.				
	•	For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz.				
RL	AN D	evices				
	For	the 5.925 ~ 7.125 GHz band:				
	-	For low-power indoor access-points & indoor subordinate devices < 5 dBm / MHz.				
	•	For low-power client devices < -1 dBm / MHz.				
	For	the 5.925 ~ 6.875 GHz band:				
	•	For standard-power access points & fixed client devices < 23 dBm / MHz.				
	•	For standard client devices < 17 dBm / MHz.				

3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.



3.3.3 Test Procedures

	Test Method				
•	According to FCC KDB 987594 D02 clause II.F, the measurement procedure shall refer to KDB 789033. Peak power spectral density procedures that the same method as used to determine the conducted output power shall be used to determine the peak power spectral density and use the peak search function on the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density shall be measured using below options:				
	Refer as FCC KDB 789033 D02, F)5) power spectral density can be measured using resolution bandwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth				
	[duty cycle ≥ 98% or external video / power trigger]				
	Refer as FCC KDB 789033 D02, clause E Method SA-1 (spectral trace averaging).				
	Refer as FCC KDB 789033 D02, clause E Method SA-1 Alt. (RMS detection with slow sweep speed)				
	duty cycle < 98% and average over on/off periods with duty factor				
	Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging).				
	Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep speed)				
	For conducted measurement.				
	 If the EUT supports multiple transmit chains using options given below: 				
	☐ Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.				
	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,				
	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.				
	 If multiple transmit chains, EIRP PPSD calculation could be following as methods: PPSD_{total} = PPSD₁ + PPSD₂ + + PPSD_n (calculated in linear unit [mW] and transfer to log unit [dBm]) EIRP_{total} = PPSD_{total} + DG 				
\boxtimes	For radiated measurement.				
	 Refer as FCC KDB 789033 D02 clause II A.1.F "Antenna-port Conducted versus Radiated Testing" 				



Test Method

• Refer as FCC KDB 412172 D01 clause 2.2 for EIRP calculation.

3.3.4 Test Setup



3.3.5 Test Result of Peak Power Spectral Density (E.I.R.P.)

Refer as Appendix C



3.4 Unwanted Emissions

3.4.1 Transmitter Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit					
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)		
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300		
0.490~1.705	24000/F(kHz)	33.8 - 23	30		
1.705~30.0	30	29	30		
30~88	100	40	3		
88~216	150	43.5	3		
216~960	200	46	3		
Above 960	500	54	3		

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m(20 x log (standard distance/ test distance) = 20log(3/1) = 9.54dB. EX. Above 18GHz emission limit calculation (3m to 1m) = 54dBuV/m at 3m + 9.54dB = 63.54 dBuV/m at 1m.



Un-restricted band emissions above 1GHz Limit						
Frequency	Limit					
Any outside the 5.945 -	e.i.r.p27 dBm [68.2 dBuV/m@3m]					
7.125 GHz emission	 Note 1: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m(20 x log (standard distance/test distance) = 20log(3/1) = 9.54dB. EX. Above 18GHz emission limit calculation (3m to 1m) = 68.2dBuV/m at 3m + 9.54dB = 77.74 dBuV/m at 1m. Note 2:-27 dBm EIRP OOBE is measured RMS which is a deviation from the current 15E rules for 5 GHz bands. In addition, 15.35(b) applies where the peak emissions must be limited to no more than 20 dB above the average limit. 					
Frequency	Emission MASK Limit					
5.945 – 7.125 GHz	Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.					



3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

	Test Method							
•	Acco 7893 Mea perfo equi abov are i be e dista mea	ording to KDB 987594 D02 II.G. the unwanted emission measurement procedure shall refer to KDB 300(except emission MASK). Issurements may be performed at a distance other than the limit distance provided they are not ormed in the near field and the emissions to be measured can be detected by the measurement ipment. Measurements shall not be performed at a distance greater than 30 m for frequencies ve 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less impractical. When performing measurements at a distance other than that specified, the results shall extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear ance for field-strength measurements, inverse of linear distance-squared for power-density asurements).						
•	The	average emission levels shall be measured in [duty cycle \geq 98 or duty factor].						
•	For	the transmitter unwanted emissions shall be measured using following options below:						
	•	Refer as FCC KDB 789033 D02, clause G)2) for unwanted emissions into non-restricted bands.						
	•	Refer as FCC KDB 789033 D02, clause G)1) for unwanted emissions into restricted bands.						
		 Refer as FCC KDB 789033 D02, G)6) Method AD (Trace Averaging). (For unrestricted band measurement) 						
		Refer as FCC KDB 789033 D02, G)6) Method VB (Reduced VBW).						
		Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.(For restricted band average measurement)						
		Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.						
		Refer as FCC KDB 789033 D02, clause G)5) measurement procedure peak limit.						
		Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.						
•	For	emission MASK shall be measured using following options below:						
		Refer as FCC draft KDB 987594 D02, J) In-Band Emissions						
•	For	radiated measurement.						
	•	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.						
	•	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.						
	-	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.						
•	The	any unwanted emissions level shall not exceed the fundamental emission level.						
•	All a has	implitude of spurious emissions that are attenuated by more than 20 dB below the permissible value no need to be reported.						



3.4.4 Test Setup







3.4.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable)

= Level

3.4.6 Transmitter Unwanted Emissions (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

3.4.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix D

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3.5 Contention Based Protocol

3.5.1 Contention Based Protocol Limit

EUT can detect an AWGN signal with 90% (or better) level of certainty.

3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

	Test Method
•	For Contention Based Protocol shall be measured using following options below:
\boxtimes	Refer as FCC KDB 987594 D02, I) Contention Based Protocol.

3.5.4 Test Setup



3.5.5 Test Result of Contention Based Protocol

Refer as Appendix E



3.6 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	9kHz - 30 MHz Mar. 23, 2023 Mar. 22, 2024		Radiation (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 02, 2023	Aug. 01, 2024	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	ТDК	SAC-3M	03CH05-CB	1GHz ~18GHz 3m	Sep. 29, 2023	Sep. 28, 2024	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 24, 2023	Mar. 23, 2024	Radiation (03CH05-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	BBHA 9120 D-1291	1GHz~18GHz	Jun. 08, 2023	Jun. 07, 2024	Radiation (03CH05-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Sep. 04, 2023	Sep. 03, 2024	Radiation (03CH05-CB)
Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	May 03, 2023	May 02, 2024	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC12630SE	980287	1GHz – 26.5GHz	Jun. 30, 2023	Jun. 29, 2024	Radiation (03CH05-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 24, 2023	Nov. 23, 2024	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Apr. 18, 2023	Apr. 17, 2024	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Aug. 16, 2023	Aug. 15, 2024	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH05-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH05-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 06, 2023	Dec. 05, 2024	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
Loop Antenna	Teseq	HLA 6120	31244	9kHz - 30 MHz	Mar. 23, 2023	Mar. 22, 2024	Radiation (03CH06-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH06-CB	30 MHz ~ 1 GHz	Aug. 03, 2023	Aug. 02, 2024	Radiation (03CH06-CB)
3m Semi Anechoic Chamber VSWR	ТDК	SAC-3M	03CH06-CB	1GHz ~18GHz 3m	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH06-CB)

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Instrument Brand Model No.		Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark	
Bilog Antenna with 6 dB attenuator	TESEQ & EMCI	CBL6112D & N-6-06	37878 & AT-N0606	20MHz ~ 2GHz	Jul. 30, 2023	Jul. 29, 2024	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBE CK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Jul. 31, 2023	Jul. 30, 2024	Radiation (03CH06-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Sep. 04, 2023	Sep. 03, 2024	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	Nov. 03, 2023	Nov. 02, 2024	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	Aug. 01, 2023	Jul. 31, 2024	Radiation (03CH06-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 24, 2023	Nov. 23, 2024	Radiation (03CH06-CB)
Signal Analyzer	R&S	FSV40	101904	9kHz ~ 40GHz	Apr. 21, 2023	Apr. 20, 2024	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 13, 2023	Jun. 12, 2024	Radiation (03CH06-CB)
RF Cable-low	Woken	RG402	Low Cable-24+68	30MHz~1GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05+68	1GHz~18GHz	Oct. 02, 2023	Oct. 01, 2024	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 06, 2023	Dec. 05, 2024	Radiation (03CH06-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz	Dec. 22, 2023	Dec. 21, 2024	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1726195	300MHz~40GHz	Sep. 04, 2023	Sep. 03, 2024	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 04, 2023	Sep. 03, 2024	Conducted (TH03-CB)
RF Cable	Woken	RG402	High Cable-11	30MHz –18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH03-CB)
RF Cable	Woken	RG402	High Cable-12	30MHz –18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH03-CB)
RF Cable	Woken	RG402	High Cable-13	30MHz –18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz –18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz –18 GHz	Oct. 02, 2023	Oct. 01, 2024	Conducted (TH03-CB)
Band Rejector	MTJ	6G Band Rejector	BRJ-01	1 ~ 8GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (TH03-CB)
Band Rejector	MTJ	6G Band Rejector	BRJ-02	1 ~ 8GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (TH03-CB)
Switch	SPTCB	SP-SWI	SWI-03	1 ~26.5 GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (TH03-CB)



Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)
Spectrum Analyzer	R&S	FSV40	101025	9kHz ~ 40GHz	Nov. 07, 2023	Nov. 06, 2024	Conducted (DF02-CB)
Signal generator	R&S	SMB100A	181239	1MHz-40GHz	Jan. 08, 2024	Jan. 07, 2025	Conducted (DF02-CB)
Vector Signal generator	R&S	SMW200A	109426	100kHz- 7.5GHz	Dec. 29, 2022	Dec. 28, 2023	Conducted (DF02-CB)
RF Power Divider	STI	2 Way	DV-8G -05	1 ~ 8GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Power Divider	STI	2 Way	DV-8G -06	1 ~ 8GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Power Divider	STI	2 Way	DV-8G -07	1 ~ 8GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Power Divider	STI	2 Way	DV-8G -08	1 ~ 8GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Power Divider	Woken	4 Way	DF02-DV02	1 ~ 6GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Power Divider	Woken	4 Way	DF02-DV04	1 ~ 6GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Power Divider	Woken	4 Way	DF02-DV05	1 ~ 6GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Cable-high	Woken	RG402	Cable-60	1~18 GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Cable-high	Woken	RG402	Cable-61	1~18 GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)
RF Cable-high	Woken	RG402	Cable-63	1~18 GHz	Oct. 03, 2023	Oct. 02, 2024	Conducted (DF02-CB)

Note: Calibration Interval of instruments listed above is one year. NCR means Non-Calibration required.



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Appendix A

Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
5.925-6.425GHz	-	-	-	-	-
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	164.56M	156.684M	157MD1D	162.36M	156.371M
6.425-6.525GHz	-	-	-	-	-
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	42.13M	37.811M	37M8D1D	40.15M	37.742M
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	83.6M	77.375M	77M4D1D	81.4M	77.262M
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	82.94M	77.396M	77M4D1D	80.74M	77.275M
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	164.88M	156.428M	156MD1D	162.96M	155.872M
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	163.68M	156.224M	156MD1D	162.96M	155.957M
6.525-6.875GHz	-	-	-	-	-
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	92.62M	77.478M	77M5D1D	81.4M	77.242M
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	86.46M	77.469M	77M5D1D	80.52M	77.209M
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	163.68M	156.323M	156MD1D	162.36M	156.075M
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	164.56M	156.278M	156MD1D	163.24M	156.086M

Max-N dB = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band; Max-OBW = Maximum 99% occupied bandwidth; Min-N dB = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band; Min-OBW = Minimum 99% occupied bandwidth


EBW_EUT 5

Appendix A

Result

Mode	Result	Limit	Port 1-N dB	Port 1-OBW	Port 2-N dB	Port 2-OBW	Port 3-N dB	Port 3-OBW	Port 4-N dB	Port 4-OBW
		(Hz)	(Hz)	(Hz) (Hz) (Hz)		(Hz)	(Hz)	(Hz)	(Hz)	
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
6445MHz	Pass	Inf	40.15M	37.774M	42.13M	37.742M	41.14M	37.805M	41.47M	37.811M
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
6465MHz	Pass	Inf	82.72M	77.375M	83.6M	77.296M	81.4M	77.262M	82.28M	77.347M
6625MHz	Pass	Inf	82.06M	77.322M	83.16M	77.444M	81.4M	77.409M	82.28M	77.242M
6705MHz	Pass	Inf	82.72M	77.462M	82.94M	77.413M	82.5M	77.407M	82.28M	77.374M
6785MHz	Pass	Inf	92.62M	77.394M	81.4M	77.478M	81.84M	77.348M	81.84M	77.304M
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
6505MHz Straddle 6.425-6.525GHz	Pass	Inf	162.96M	156.05M	164.88M	156.094M	164.4M	155.872M	163.44M	156.428M
6665MHz	Pass	Inf	163.68M	156.323M	162.36M	156.075M	162.36M	156.15M	162.8M	156.267M
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
6465MHz	Pass	Inf	81.4M	77.32M	80.96M	77.275M	80.74M	77.275M	82.94M	77.396M
6625MHz	Pass	Inf	80.52M	77.209M	85.8M	77.407M	81.84M	77.371M	82.28M	77.303M
6705MHz	Pass	Inf	85.36M	77.292M	81.4M	77.339M	81.84M	77.372M	81.4M	77.315M
6785MHz	Pass	Inf	82.94M	77.377M	81.18M	77.469M	82.72M	77.238M	86.46M	77.284M
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	-	-	-	-	-	-	-	-	-	-
6345MHz	Pass	Inf	162.36M	156.48M	164.56M	156.684M	164.56M	156.371M	163.68M	156.477M
6505MHz Straddle 6.425-6.525GHz	Pass	Inf	163.68M	156.173M	162.96M	155.957M	163.2M	156.126M	163.44M	156.224M
6665MHz	Pass	Inf	163.24M	156.139M	164.12M	156.086M	163.68M	156.278M	164.56M	156.256M

Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth



6.425-6.525GHz_802.11ax HEW40-BF_Nss1,(MCS0)_4TX



6.425-6.525GHz_802.11ax HEW80-BF_Nss1,(MCS0)_4TX



EBW



6.525-6.875GHz_802.11ax HEW80-BF_Nss1,(MCS0)_4TX



6.525-6.875GHz_802.11ax HEW80-BF_Nss1,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW80-BF_Nss1,(MCS0)_4TX



6.425-6.525GHz_802.11ax HEW160-BF_Nss1,(MCS0)_4TX



EBW



6.525-6.875GHz_802.11ax HEW160-BF_Nss1,(MCS0)_4TX



6.425-6.525GHz_802.11ax HEW80-BF_Nss2,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW80-BF_Nss2,(MCS0)_4TX



6.525-6.875GHz_802.11ax HEW80-BF_Nss2,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW80-BF_Nss2,(MCS0)_4TX



5.925-6.425GHz_802.11ax HEW160-BF_Nss2,(MCS0)_4TX





6.425-6.525GHz_802.11ax HEW160-BF_Nss2,(MCS0)_4TX



6.525-6.875GHz_802.11ax HEW160-BF_Nss2,(MCS0)_4TX





Summary

Mode	EIRP	EIRP
	(dBm)	(W)
5.925-6.425GHz	-	-
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	21.99	0.15812
6.425-6.525GHz	-	-
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	15.83	0.03828
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	21.76	0.14997
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	22.09	0.16181
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	22.65	0.18408
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	23.63	0.23067
6.525-6.875GHz	-	-
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	22.25	0.16788
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	21.98	0.15776
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	16.44	0.04406
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	22.51	0.17824



Result

Mode	Result	EIRP	EIRP Limit
		(dBm)	(dBm)
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-
6445MHz	Pass	15.83	30.00
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	-	-
6465MHz	Pass	21.76	30.00
6625MHz	Pass	18.99	30.00
6705MHz	Pass	15.42	30.00
6785MHz	Pass	22.25	30.00
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	-	-	-
6505MHz Straddle 6.425-6.525GHz	Pass	22.65	30.00
6665MHz	Pass	16.44	30.00
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	-	-	-
6465MHz	Pass	22.09	30.00
6625MHz	Pass	21.87	30.00
6705MHz	Pass	21.98	30.00
6785MHz	Pass	21.57	30.00
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	-	-	-
6345MHz	Pass	21.99	30.00
6505MHz Straddle 6.425-6.525GHz	Pass	23.63	30.00
6665MHz	Pass	22.51	30.00

DG = Directional Gain; Port X = Port X output power































Summary

Mode	EIRP PD
	(dBm/RBW)
5.925-6.425GHz	-
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	4.51
6.425-6.525GHz	-
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	4.96
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	4.94
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	4.97
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	4.93
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	4.93
6.525-6.875GHz	-
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	4.97
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	4.98
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	4.82
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	4.95

RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;



Result

Mode	Result	EIRP PD	EIRP PD Limit
		(dBm/RBW)	(dBm/RBW)
802.11ax HEW40-BF_Nss1,(MCS0)_4TX	-	-	-
6445MHz	Pass	4.96	5.00
802.11ax HEW80-BF_Nss1,(MCS0)_4TX	-	=	-
6465MHz	Pass	4.94	5.00
6625MHz	Pass	4.97	5.00
6705MHz	Pass	4.93	5.00
6785MHz	Pass	4.85	5.00
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	-	-	-
6505MHz Straddle 6.425-6.525GHz	Pass	4.93	5.00
6665MHz	Pass	4.82	5.00
802.11ax HEW80-BF_Nss2,(MCS0)_4TX	-	-	-
6465MHz	Pass	4.97	5.00
6625MHz	Pass	4.98	5.00
6705MHz	Pass	4.86	5.00
6785MHz	Pass	4.89	5.00
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	-	-	-
6345MHz	Pass	4.51	5.00
6505MHz Straddle 6.425-6.525GHz	Pass	4.93	5.00
6665MHz	Pass	4.95	5.00

DG = Directional Gain: RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band: PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;































Radiated Emissions below 1GHz

Summary							
Mode	Result	Туре	Freq	Level	Limit	Margin	Condition
			(Hz)	(dBuV/m)	(dBuV/m)	(dB)	
Mode 2	Pass	QP	52.31M	35.87	40.00	-4.13	Vertical











RSE TX above 1GHz

Appendix D.2

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth	Height (m)	Comments
6.525-6.875GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ax HEW160-BF_Nss2,(MCS0)_4TX	Pass	AV	13.33948G	45.54	54.00	-8.46	3	Horizontal	355	1.43	-






















































































	Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA		
ľ		(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)		
Ľ	РК	13.0166G	56.22	88.20	-31.98	39.50	3	Vertical	244	2.04	-	39.83	10.48	33.59		
	RMS	13.00244G	45.06	68.20	-23.14	28.29	3	Vertical	244	2.04	-	39.89	10.48	33.60		
5																



Lim.PK PK





Туре	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA		
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB)	(dB)	(dB)		
PK	13.00804G	57.26	88.20	-30.94	40.51	3	Horizontal	264	2.79	-	39.87	10.48	33.60		
RMS	13.00556G	44.96	68.20	-23.24	28.20	3	Horizontal	264	2.79	-	39.88	10.48	33.60		
/															






















































































































































6.425-6.525GHz_802.11ax HEW40-BF_Nss1,(MCS0)_4TX



0.2030 0.2	0.50	0.520 0	0.540 0.500	0.560	0.40 0.420	0.440
Ref(Hz)	Ref(dBm)	Freq(Hz)	Level(dBm)	Limit(dBm)	Margin(dB)	Port
6.4509G	-2.60	6.5076G	-29.88	-22.65	-7.23	1
6.4575G	-2.29	6.5079G	-30.48	-22.31	-8.17	2
6.4574G	-2.92	6.5067G	-29.21	-22.92	-6.29	3
6.4531G	-2.77	6.5073G	-29.88	-22.80	-7.08	4

Appendix D.3



6.525-6.875GHz_802.11ax HEW80-BF_Nss1,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW80-BF_Nss1,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW160-BF_Nss1,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW80-BF_Nss2,(MCS0)_4TX





6.525-6.875GHz_802.11ax HEW80-BF_Nss2,(MCS0)_4TX





6.425-6.525GHz_802.11ax HEW160-BF_Nss2,(MCS0)_4TX



6.525-6.875GHz_802.11ax HEW160-BF_Nss2,(MCS0)_4TX

MASK





Contention Based Protocol Threshold Level 802.11ax HEW20												
UNII Band	Channel	Bandwidth (MHz)	Frequency (MHz)	Interfe frequ (MI	erence ency Hz)	EUT Status	Injected AWGN Power (dBm)	Ant Gain (dBi)	Detection Power(dBm)	Detection Limit (dBm)		
						OFF	-61.99	2.01	-64.02	≤ -62		
5	53	20	6215	Center	6215	Minimal	-62.99	2.01	-65.00	≤ -62		
						ON	-79.99	2.01	-82.00	≤ -62		
		20	6455	Center	6455	OFF	-60.99	2.01	-63.03	≤ -62		
6	101					Minimal	-61.99	2.01	-64.00	≤ -62		
						ON	-79.99	2.01	-82.00	≤ -62		
				Center	6695	OFF	-61.99	2.01	-64.07	≤ -62		
7	149	20	6695			Minimal	-62.99	2.01	-65.00	≤ -62		
						ON	-79.99	2.01	-82.00	≤ -62		
			7015	Center	7015	OFF	-61.99	2.01	-64.05	≤ -62		
8	213	20				Minimal	-62.99	2.01	-65.00	≤ -62		
								ON	-79.99	2.01	-82.00	≤ -62



	Contention Based Protocol Threshold Level 802.11ax HEW160										
UNII Band	Channel	Bandwidth (MHz)	Frequency (MHz)	Interfe frequ (MI	erence ency Hz)	EUT Status	Injected AWGN Power (dBm)	Ant Gain (dBi)	Detection Power(dBm)	Detection Limit (dBm)	
				1		OFF	-59.99	2.01	-62.01	≤ -62	
				LOW	6110	Minimal	-60.99	2.01	-63.00	≤ -62	
				euge		ON	-79.99	2.01	-82.00	≤ - 62	
						OFF	-59.99	2.01	-62.02	≤ - 62	
5	47	160	6185	Center	6185	Minimal	-60.99	2.01	-63.00	≤ -62	
						ON	-79.99	2.01	-82.00	≤ - 62	
				LP als		OFF	-60.99	2.01	-63.01	≤ -62	
				Hign	6260	Minimal	-61.99	2.01	-64.00	≤ -62	
				euge		ON	-79.99	2.01	-82.00	≤ -62	
					6430	OFF	-59.99	2.01	-62.01	≤ - 62	
6				LOW		Minimal	-60.99	2.01	-63.00	≤ -62	
				edge ON	ON	-79.99	2.01	-82.00	≤ - 62		
	111	160	6505			OFF	-59.99	2.01	-62.06	≤ -62	
				Center	6505	Minimal	-60.99	2.01	-63.00	≤ -62	
						ON	-79.99	2.01	-82.00	≤ - 62	
						OFF	-60.99	2.01	-63.05	≤ -62	
				High	6580	Minimal	-61.99	2.01	-64.00	≤ -62	
				euge		ON	-79.99	2.01	-82.00	≤ -62	
	143	160	6665	Low edge	6590	OFF	-59.99	2.01	-62.02	≤ - 62	
						Minimal	-60.99	2.01	-63.00	≤ -62	
						ON	-79.99	2.01	-82.00	≤ -62	
				Center	6665	OFF	-60.99	2.01	-63.07	≤ -62	
7						Minimal	-61.99	2.01	-64.00	≤ -62	
						ON	-79.99	2.01	-82.00	≤ -62	
				High	6740	OFF	-59.99	2.01	-62.01	≤ -62	
						Minimal	-60.99	2.01	-63.00	≤ -62	
				euge		ON	-79.99	2.01	-82.00	≤ -62	
				1		OFF	-59.99	2.01	-62.08	≤ - 62	
				LOW	6910	Minimal	-60.99	2.01	-63.00	≤ - 62	
	207			euge		ON	-79.99	2.01	-82.00	≤ -62	
		160		Center	6985	OFF	-59.99	2.01	-62.02	≤ -62	
8			6985			Minimal	-60.99	2.01	-63.00	≤ -62	
						ON	-79.99	2.01	-82.00	≤ -62	
						OFF	-60.99	2.01	-63.02	≤ -62	
				Hign	7060	Minimal	-61.99	2.01	-64.00	≤ - 62	
				euge		ON	-79.99	2.01	-82.00	≤ - 62	



Contention Based protocol 802.11ax HEW20												
UNII Band	Channel	Bandwidth (MHz)	Frequency (MHz)	Interference frequency (MHz)		AWGN Threshold Level (dBm)	EUT Status	Number of Detected (out of 10 times)	Detection Probability (%)	Limit (%)	Test Result	
5	53	20	6215	Center	6215	-64.02	OFF	9	90	90	PASS	
6	101	20	6455	Center	6455	-63.03	OFF	9	90	90	PASS	
7	149	20	6695	Center	6695	-64.07	OFF	10	100	90	PASS	
8	213	20	7015	Center	7015	-64.05	OFF	10	100	90	PASS	



Contention Based protocol 802.11ax HEW160														
UNII Band	Channel	Bandwidth (MHz)	Frequency (MHz)	Interference frequency (MHz)		AWGN Threshold Level (dBm)	EUT Status	Number of Detected (out of 10 times)	Detection Probability (%)	Limit (%)	Test Result			
				Low edge	6110	-62.01	OFF	10	100	90	PASS			
5	47	160	6185	Center	6185	-62.02	OFF	9	90	90	PASS			
				High edge	6260	-63.01	OFF	10	100	90	PASS			
6 11			6505	Low edge	6430	-62.01	OFF	9	90	90	PASS			
	111	160		Center	6505	-62.06	OFF	9	90	90	PASS			
				High edge	6580	-63.05	OFF	10	100	90	PASS			
				Low edge	6590	-62.02	OFF	9	90	90	PASS			
7	143 160	143	160	143 160	160	6665	Center	6665	-63.07	OFF	10	100	90	PASS
				High edge	6740	-62.01	OFF	10	100	90	PASS			
8	207	160	60 6985	Low edge	6910	-62.08	OFF	10	100	90	PASS			
				Center	6985	-62.02	OFF	10	100	90	PASS			
						High edge	7060	-63.02	OFF	9	90	90	PASS	







































Appendix E








Appendix E





Appendix E





Appendix E





Appendix E





Appendix E

