FCC Test Report

FCC ID	:	**SQG-SONAIF513**
Equipment	:	**Sona IF513 802.11ax Wi-Fi 6E Module with Bluetooth 5.4**
Model No.	:	**Sona IF513**
Brand Name	:	**Ezurio**
Applicant	:	**Ezurio LLC**
Address	:	**W66N220 Commerce Court, Cedarburg, WI 53012 United States Of America**
Standard	:	**47 CFR FCC Part 15.407**
Received Date	:	**Jun. 06, 2024**
Tested Date	:	**Oct. 04 ~ Oct. 25, 2024**

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:	**Approved by:**
Along Chen / Assistant Manager	**Gary Chang / Manager**

Table of Contents

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Local Support Equipment List 13
1.3 Test Setup Chart 13
1.4 The Equipment List 17
1.5 Test Standards 18
1.6 Reference Guidance 18
1.7 Deviation from Test Standard and Measurement Procedure 18
1.8 Measurement Uncertainty 19

2 TEST CONFIGURATION 20

2.1 Testing Facility 20
2.2 The Worst Test Modes and Channel Details 21

3 TRANSMITTER TEST RESULTS 23

3.1 Emission Bandwidth 23
3.2 Conducted Output Power 24
3.3 Power Spectral Density 26
3.4 Unwanted Emissions 28
3.5 AC Power Line Conducted Emissions 31

4 TEST LABORATORY INFORMATION 32

Appendix A. Emission Bandwidth

Appendix B. Conducted Output Power

Appendix C. Power Spectral Density

Appendix D. Unwanted Emissions

Appendix E. AC Power Line Conducted Emissions

Release Record

Report No.	Version	Description	Issued Date
FR460601-1AN	Rev. 01	Initial issue	Nov. 25, 2024
FR460601-1AN	Rev. 02	Modified antenna gain	Dec. 17, 2024
FR460601-1AN	Rev. 03	Modified antenna gain	Dec. 24, 2024

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.410MHz 25.67 (Margin -21.97dB) - AV	Pass
15.407(b) 15.209	Unwanted Emissions	[dBuV/m at 3m]: 450.01MHz 42.75 (Margin -3.25dB) - QP	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(e)	6dB bandwidth	Meet the requirement of limit	Pass
15.407(a)	Conducted Output Power	Max Power [dBm]: 5150~5250MHz: 19.43 5250~5350MHz: 17.51 5470~5725MHz: 18.21 5725~5850MHz: 20.16	Pass
15.407(a)	Power Spectral Density	Meet the requirement of limit	Pass
15.407(g)	Frequency Stability	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

1.1.1 Product Details

The four configurations of the EUT are shown on the following:

Model Name	Part No.	Description
Sona IF513	453-00184	Module, Sona IF513, MHF4L
	453-00185	Module, Sona IF513, Trace Pin
	453-00193	Module, Sona IF513, Antenna Diversity, MHF4L
	453-00194	Module, Sona IF513, Antenna Diversity, Trace Pin
	453-00186	Module, Sona IF513, M.2, Key E, SDIO, UART
	453-00195	Module, Sona IF513, Antenna Diversity, M.2, Key E, SDIO, UART
	453-00213	Module, Sona IF513, M.2, Key E, SDIO, UART, Ext. OSC
	453-00214	Module, Sona IF513, Antenna Diversity, M.2, Key E, SDIO, UART, Ext. OSC

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11**	**Ch. Freq. (MHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**Data Rate / MCS**
5150-5250 5250-5350 5470-5725 5725-5850	a	5180-5240 5260-5320 5500-5720 5745-5825	36-48 [4] 52-64 [4] 100-144 [12] 149-165 [5]	1	6-54 Mbps
5150-5250 5250-5350 5470-5725	n (HT20) ac (VHT20) ax (HE20)	5180-5240 5260-5320 5500-5720	36-48 [4] 52-64 [4] 100-144 [12]	1	MCS 0-7 MCS 0-9 MCS 0-11
Note 1: OFDM/OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulation. Note 2: TPC function is supported. Note 3: 802.11ax supports full RU and partial RU configuration. Test results of partial RU configuration are recorded in this report. Refers to report no.: FR460601AN for test results of full RU configuration.					

1.1.3 Antenna Details

Ant. No.	Manufacturer	Model	Part Number	Type	Connector	Operating Frequencies / Gain (dBi)		
						2.4GHz	5GHz	6GHz
1	Joymax Inc.	TWX-100B RS3B	NA	Dipole	RP-SMA	2	4	4
2	Ezurio	FlexMIMO 6E	EFD2471A3 S-10MH4L	PIFA	MHF4L	2.2	3.8	3.3
3	Ezurio	Mini NanoBlade Flex 6 GHz	EMF2471A 3S-10MH4L	PCB Dipole	MHF4L	2.4	4.4	5.2
4	Ezurio	FlexPIFA 6E	EFB2471A3 S-10MH4L	PIFA	MHF4L	2.2	3.9	3.8

1.1.4 Configuration of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host	
TPC	☒ Support	☐ Not support
Beamforming	☐ Support	☒ Not support
RU Configuration	☐ Full RU	☒ Partial RU
Channel Puncturing	☐ Support	☒ Not support

1.1.5 Channel List

802.11a / n HT20 / ac VHT20 / ax HE20	
Channel	**Frequency(MHz)**
36	5180
40	5200
44	5220
48	5240
52	5260
56	5280
60	5300
64	5320
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720
149	5745
153	5765
157	5785
161	5805
165	5825

1.1.6 Test Tool and Duty Cycle

Test Tool	Tera Term, v4.74		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	ax HE20 RU26	99.23%	0.03
	ax HE20 RU52	98.70%	0.06
	ax HE20 RU106	99.37%	0.03

1.1.7 Power Index of Test Tool

Part No. 453-00184

Modulation Mode	Test Frequency (MHz)	Power Index
ax HE20 RU26	5180	54
ax HE20 RU26	5200	54
ax HE20 RU26	5240	54
ax HE20 RU26	5260	54
ax HE20 RU26	5300	54
ax HE20 RU26	5320	54
ax HE20 RU26	5500	54
ax HE20 RU26	5580	54
ax HE20 RU26	5700	30
ax HE20 RU26	5720	54
ax HE20 RU26	5745	68
ax HE20 RU26	5785	78
ax HE20 RU26	5825	78
ax HE20 RU52	5180	56
ax HE20 RU52	5200	62
ax HE20 RU52	5240	64
ax HE20 RU52	5260	66
ax HE20 RU52	5300	66
ax HE20 RU52	5320	60
ax HE20 RU52	5500	54
ax HE20 RU52	5580	66
ax HE20 RU52	5700	30
ax HE20 RU52	5720	65
ax HE20 RU52	5745	78
ax HE20 RU52	5785	78

ax HE20 RU52	5825	78
ax HE20 RU106	5180	58
ax HE20 RU106	5200	64
ax HE20 RU106	5240	82
ax HE20 RU106	5260	71
ax HE20 RU106	5300	71
ax HE20 RU106	5320	62
ax HE20 RU106	5500	56
ax HE20 RU106	5580	75
ax HE20 RU106	5700	32
ax HE20 RU106	5720	67
ax HE20 RU106	5745	80
ax HE20 RU106	5785	80
ax HE20 RU106	5825	80

Part No. 453-00193

Modulation Mode	Test Frequency (MHz)	Power Index
ax HE20 RU26	5180	52
ax HE20 RU26	5200	52
ax HE20 RU26	5240	52
ax HE20 RU26	5260	50
ax HE20 RU26	5300	50
ax HE20 RU26	5320	50
ax HE20 RU26	5500	51
ax HE20 RU26	5580	51
ax HE20 RU26	5700	32
ax HE20 RU26	5720	55
ax HE20 RU26	5745	70
ax HE20 RU26	5785	80
ax HE20 RU26	5825	80
ax HE20 RU52	5180	55
ax HE20 RU52	5200	60
ax HE20 RU52	5240	61
ax HE20 RU52	5260	63
ax HE20 RU52	5300	62
ax HE20 RU52	5320	58
ax HE20 RU52	5500	51

ax HE20 RU52	5580	63
ax HE20 RU52	5700	30
ax HE20 RU52	5720	66
ax HE20 RU52	5745	80
ax HE20 RU52	5785	80
ax HE20 RU52	5825	80
ax HE20 RU106	5180	58
ax HE20 RU106	5200	61
ax HE20 RU106	5240	77
ax HE20 RU106	5260	67
ax HE20 RU106	5300	67
ax HE20 RU106	5320	59
ax HE20 RU106	5500	52
ax HE20 RU106	5580	71
ax HE20 RU106	5700	30
ax HE20 RU106	5720	68
ax HE20 RU106	5745	82
ax HE20 RU106	5785	82
ax HE20 RU106	5825	82

Part No. 453-00213

Modulation Mode	Test Frequency (MHz)	Power Index
ax HE20 RU26	5180	52
ax HE20 RU26	5200	52
ax HE20 RU26	5240	52
ax HE20 RU26	5260	52
ax HE20 RU26	5300	52
ax HE20 RU26	5320	52
ax HE20 RU26	5500	52
ax HE20 RU26	5580	52
ax HE20 RU26	5700	30
ax HE20 RU26	5720	52
ax HE20 RU26	5745	68
ax HE20 RU26	5785	80
ax HE20 RU26	5825	80
ax HE20 RU52	5180	53
ax HE20 RU52	5200	59

ax HE20 RU52	5240	60
ax HE20 RU52	5260	61
ax HE20 RU52	5300	61
ax HE20 RU52	5320	56
ax HE20 RU52	5500	50
ax HE20 RU52	5580	61
ax HE20 RU52	5700	30
ax HE20 RU52	5720	64
ax HE20 RU52	5745	80
ax HE20 RU52	5785	80
ax HE20 RU52	5825	80
ax HE20 RU106	5180	55
ax HE20 RU106	5200	60
ax HE20 RU106	5240	75
ax HE20 RU106	5260	66
ax HE20 RU106	5300	66
ax HE20 RU106	5320	58
ax HE20 RU106	5500	52
ax HE20 RU106	5580	69
ax HE20 RU106	5700	30
ax HE20 RU106	5720	65
ax HE20 RU106	5745	80
ax HE20 RU106	5785	80
ax HE20 RU106	5825	80

Part No. 453-00214

Modulation Mode	Test Frequency (MHz)	Power Index
ax HE20 RU26	5180	54
ax HE20 RU26	5200	54
ax HE20 RU26	5240	54
ax HE20 RU26	5260	54
ax HE20 RU26	5300	54
ax HE20 RU26	5320	54
ax HE20 RU26	5500	54
ax HE20 RU26	5580	54
ax HE20 RU26	5700	32
ax HE20 RU26	5720	56

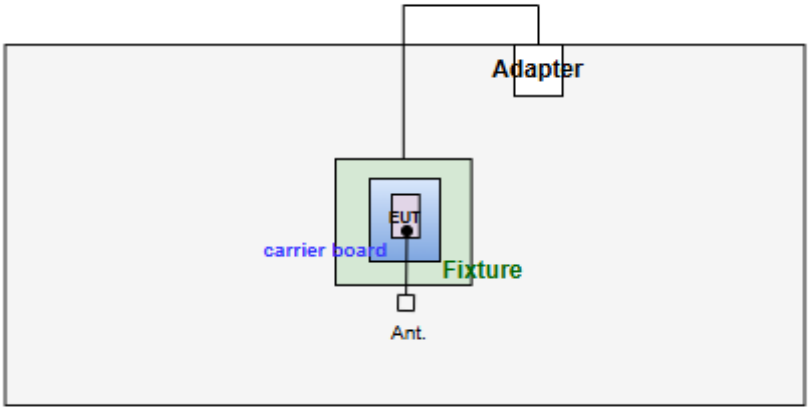
ax HE20 RU26	5745	70
ax HE20 RU26	5785	80
ax HE20 RU26	5825	80
ax HE20 RU52	5180	56
ax HE20 RU52	5200	62
ax HE20 RU52	5240	64
ax HE20 RU52	5260	66
ax HE20 RU52	5300	66
ax HE20 RU52	5320	62
ax HE20 RU52	5500	54
ax HE20 RU52	5580	66
ax HE20 RU52	5700	32
ax HE20 RU52	5720	66
ax HE20 RU52	5745	80
ax HE20 RU52	5785	80
ax HE20 RU52	5825	80
ax HE20 RU106	5180	59
ax HE20 RU106	5200	64
ax HE20 RU106	5240	80
ax HE20 RU106	5260	71
ax HE20 RU106	5300	71
ax HE20 RU106	5320	62
ax HE20 RU106	5500	56
ax HE20 RU106	5580	75
ax HE20 RU106	5700	30
ax HE20 RU106	5720	68
ax HE20 RU106	5745	82
ax HE20 RU106	5785	82
ax HE20 RU106	5825	82

1.2 Local Support Equipment List

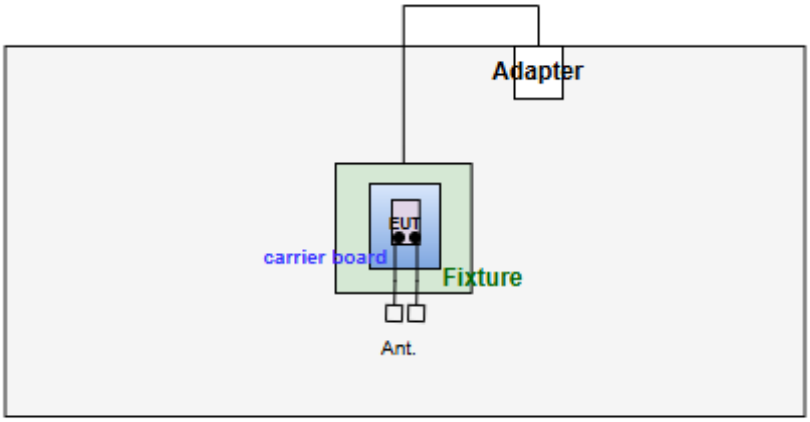
Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Laptop	DELL	Latitude 5400	DoC	---
2	Fixture	Ezurio	750-00001-2-0	---	Provided by applicant.
3	Fixture's adapter	Chenzhou Frecom Electronics Co.	F36L7-120300S PACP	---	Provided by applicant.
4	50Ω terminator	Woken	WTER-18S2	---	---

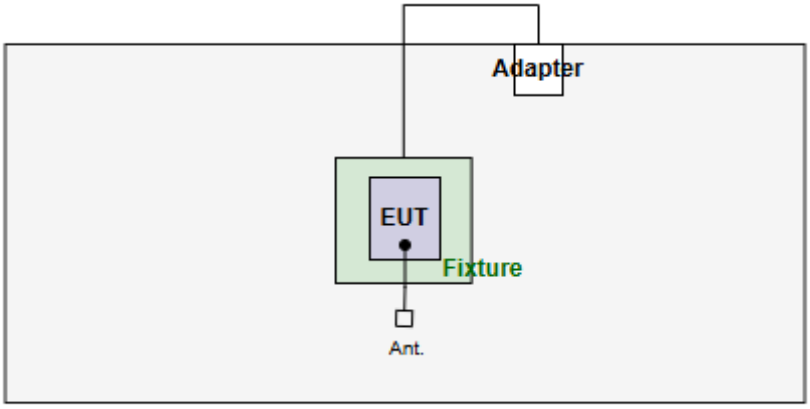
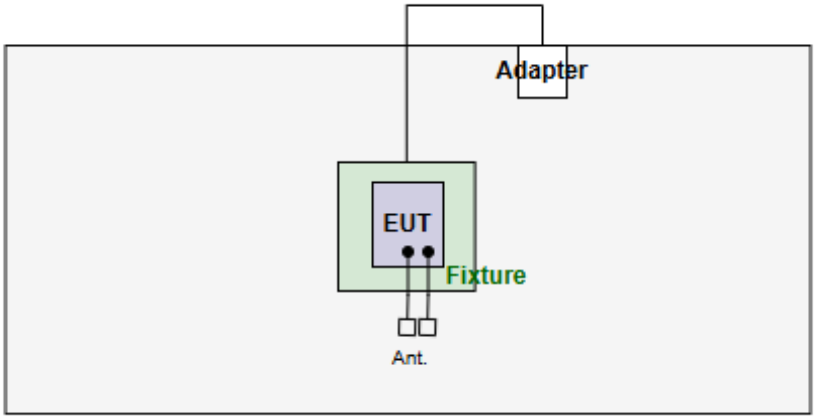
1.3 Test Setup Chart

Test Setup Diagram (Conducted Emission –Laird part number: 453-00184)

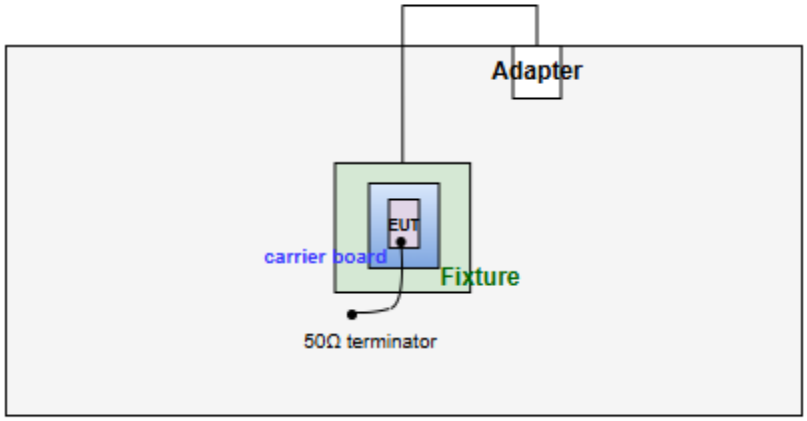


Test Setup Diagram (Conducted Emission –Laird part number: 453-00193)

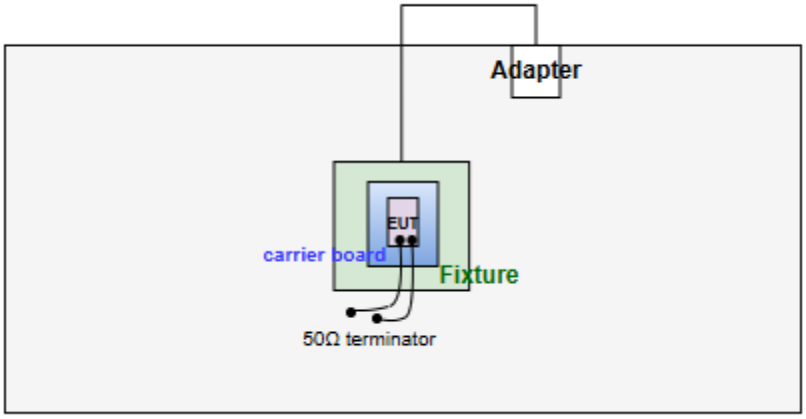


Test Setup Diagram (Conducted Emission –Laird part number: 453-00213)

Test Setup Diagram (Conducted Emission – Laird part number: 453-00214)


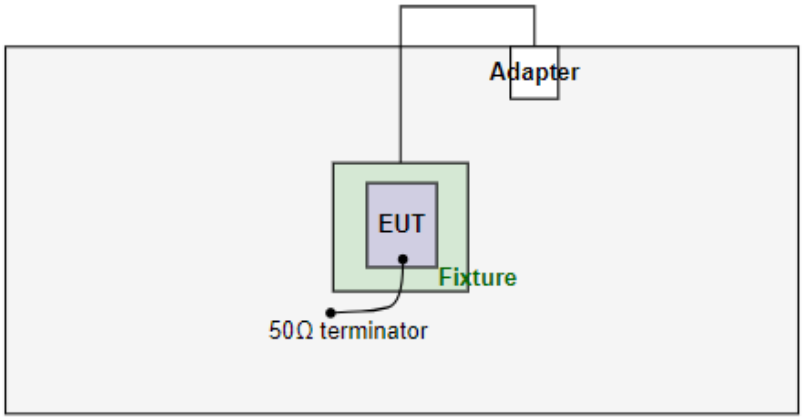
Test Setup Diagram (Radiated Emission – Laird part number: 453-00184)



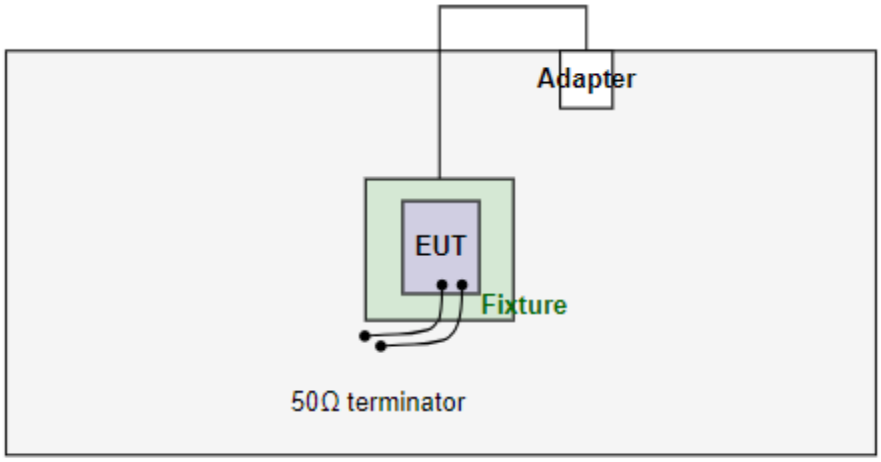
Test Setup Diagram (Radiated Emission –Laird part number: 453-00193)



Test Setup Diagram (Radiated Emission – Laird part number: 453-00213)



Test Setup Diagram (Radiated Emission –Laird part number: 453-00214)



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Oct. 21, 2024				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101658	Feb. 23, 2024	Feb. 22, 2025
LISN	R&S	ENV216	101579	May 09, 2024	May 08, 2025
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127667	Jan. 10, 2024	Jan. 09, 2025
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 07, 2024	Oct. 08, 2025
50 ohm terminal	NA	50	01	Jun. 19, 2024	Jun. 18, 2025
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Oct. 04 ~ Oct. 25, 2024				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101910	Apr. 18, 2024	Apr. 17, 2025
Power Meter	Anritsu	ML2495A	1241002	Nov. 21, 2023	Nov. 20, 2024
Power Sensor	Anritsu	MA2411B	1207366	Nov. 21, 2023	Nov. 20, 2024
Attenuator	Pasternack	PE7005-10	10-2	Oct. 04, 2024	Oct. 03, 2025
HIGHPASS FILTER 3.1-18G	WHK	WHK3.1/18G-10SS	39	Oct. 02, 2024	Oct. 01, 2025
LOWPASS FILTER	WI	WLKS1100-12SS	2	Oct. 02, 2024	Oct. 01, 2025
Measurement Software	Sporton	SENSE-15247_DTS	V5.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Oct. 09 ~ Oct. 14, 2024				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Mar. 05, 2024	Mar. 04, 2025
Spectrum Analyzer	R&S	FSV40	101498	Nov. 23, 2023	Nov. 22, 2024
Loop Antenna	R&S	HFH2-Z2	100330	Oct. 31, 2023	Oct. 30, 2024
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 09, 2024	Aug. 08, 2025
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Nov. 27, 2023	Nov. 26, 2024
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 30, 2023	Oct. 29, 2024
Preamplifier	EMC	EMC02325	980225	Jun. 17, 2024	Jun. 16, 2025
Preamplifier	EMC	EMC118A45SE	980898	Jul. 05, 2024	Jul. 04, 2025
Preamplifier	EMC	EMC184045SE	980903	Jul. 30, 2024	Jul. 29, 2025
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 02, 2024	Oct. 01, 2025
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 02, 2024	Oct. 01, 2025
LF cable 11M	EMC	EMCCFD400-NW-NW-11000	200801	Oct. 02, 2024	Oct. 01, 2025
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 02, 2024	Oct. 01, 2025
RF Cable	EMC	EMC104-35M-35M-8000	210920	Oct. 02, 2024	Oct. 01, 2025
RF Cable	EMC	EMC104-35M-35M-3000	210922	Oct. 02, 2024	Oct. 01, 2025
Attenuator	Pasternack	PE7005-10	10-1	Oct. 02, 2024	Oct. 01, 2025
HIGHPASS FILTER 3.1-18G	WHK	WHK3.1/18G-10SS	39	Oct. 02, 2024	Oct. 01, 2025
Measurement Software	Sporton	SENSE-15247_DTS	V5.11	NA	NA
Measurement Software	Sporton	SENSE-EMI	V5.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

47 CFR FCC Part 15.407
ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 412172 D01 Determining ERP and EIRP v01r01
FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.130 Hz
Conducted power	±0.808 dB
Frequency error	$\pm 1 \times 10^{-9}$
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Unwanted Emission ≤ 1GHz	±3.41 dB
Unwanted Emission > 1GHz	±4.59 dB
Time	±0.1%
Temperature	±0.4 °C

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS, TH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Frequency band 5150~5350 MHz / 5470~5725 MHz							
Test item	**Modulation Mode**	**Test Frequency (MHz)**	**Data Rate**	**Test method**	**Mode**	**Test Configuration**	**Note**
AC Power Line Conducted Emissions	ax HE20 RU106	5240	MCS 0	Conducted	TX	1	---
Unwanted Emissions ≤1GHz	ax HE20 RU106	5240	MCS 0	Radiated	TX	1, 2, 3, 4	Note 2
Unwanted Emissions >1GHz	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5180 / 5200 / 5240 / 5260 / 5300 / 5320 / 5500 / 5580 / 5700 / 5720	MCS 0	Radiated	TX	1	Note 2
	ax HE20 RU26	5580	MCS 0	Radiated	TX	2, 3, 4	Note 2
	ax HE20 RU106	5240 / 5320					
Unwanted Emissions ≤1GHz	ax HE20 RU106	5240	MCS 0	Conducted	TX	1, 2, 3, 4	---
Unwanted Emissions >1GHz	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5180 / 5200 / 5240 / 5260 / 5300 / 5320 / 5500 / 5580 / 5700 / 5720	MCS 0	Conducted	TX	1	---
	ax HE20 RU26	5180	MCS 0	Conducted	TX	2, 3, 4	---
	ax HE20 RU52	5320 / 5700					
Conducted Output Power	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5180 / 5200 / 5240 / 5260 / 5300 / 5320 / 5500 / 5580 / 5700 / 5720	6 Mbps MCS 0	Conducted	TX	1, 2, 3, 4	---
Emission Bandwidth Power Spectral Density	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5180 / 5200 / 5240 / 5260 / 5300 / 5320 / 5500 / 5580 / 5700 / 5720	MCS 0	Conducted	TX	1	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** result was found as the worst case and was shown in this report.
2. The 50Ω terminator is connected to antenna port of EUT for radiated emission measurement.
3. Test configurations are listed as below:

   Configuration 1: Laird part number: 453-00184

   Configuration 2: Laird part number: 453-00193

   Configuration 3: Laird part number: 453-00213

   Configuration 4: Laird part number: 453-00214

Frequency band 5725-5850 MHz							
Test item	**Modulation Mode**	**Test Frequency (MHz)**	**Data Rate**	**Test method**	**Mode**	**Test Configuration**	**Note**
AC Power Line Conducted Emissions	ax HE20 RU26	5825	MCS 0	Conducted	TX	1	---
Unwanted Emissions ≤1GHz	ax HE20 RU26	5825	MCS 0	Radiated	TX	1, 2, 3, 4	Note 2
Unwanted Emissions >1GHz	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5745 / 5785 / 5825	MCS 0	Radiated	TX	1	Note 2
	ax HE20 RU26	5785	MCS 0	Radiated	TX	2, 3, 4	Note 2
Unwanted Emissions ≤1GHz	ax HE20 RU26	5825	MCS 0	Conducted	TX	1, 2, 3, 4	---
Unwanted Emissions >1GHz	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5745 / 5785 / 5825	MCS 0	Conducted	TX	1	---
	ax HE20 RU26	5745	MCS 0	Conducted	TX	2, 3, 4	---
Conducted Output Power	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5745 / 5785 / 5825	MCS 0	Conducted	TX	1, 2, 3, 4	---
Emission Bandwidth 6dB bandwidth Power Spectral Density	ax HE20 RU26 ax HE20 RU52 ax HE20 RU106	5745 / 5785 / 5825	MCS 0	Conducted	TX	1	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** result was found as the worst case and was shown in this report.
2. The 50Ω terminator is connected to antenna port of EUT for radiated emission measurement.
3. Test configurations are listed as below:

   Configuration 1: Laird part number: 453-00184

   Configuration 2: Laird part number: 453-00193

   Configuration 3: Laird part number: 453-00213

   Configuration 4: Laird part number: 453-00214

3 Transmitter Test Results

3.1 Emission Bandwidth

3.1.1 Limit of Emission Bandwidth

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.1.2 Test Procedures

26dB Bandwidth

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW, Detector = Peak.
3. Trace mode = max hold.
4. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

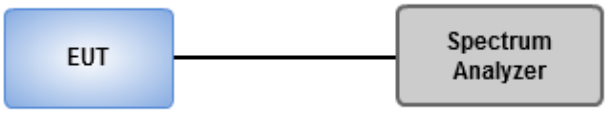
Occupied Bandwidth

1. Set RBW = 1 % to 5 % of the OBW.
2. Set VBW ≥ 3 RBW.
3. Sample detection and single sweep mode shall be used.
4. Use the 99 % power bandwidth function of the instrument.

6dB Bandwidth

1. Set RBW = 100kHz, VBW = 300kHz.
2. Detector = Peak,Trace mode = max hold.
3. Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.1.3 Test Setup



3.1.4 Test Results

Ambient Condition	24-25°C / 61-62%	**Tested By**	Roger Lu

Refer to Appendix A.

3.2 Conducted Output Power

3.2.1 Limit of Conducted Output Power

Frequency band 5150-5250 MHz		
Operating Mode		**Limit**
☐	Outdoor access point	Conducted Power: 1 W The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm)
☐	Indoor access point	Conducted Power: 1 W
☐	Fixed point-to-point access points	Conducted Power: 1 W
☒	Client devices	Conducted Power: 250 mW

Frequency Band (MHz)		**Limit**
☒	5250 ~ 5350	Conducted Power: 250mW or 11dBm+10 log B
☒	5470 ~ 5725	Conducted Power: 250mW or 11dBm+10 log B
☒	5725 ~ 5850	Conducted Power: 1 W
Note: “B” is the 26dB emission bandwidth in MHz.		

3.2.2 Test Procedures

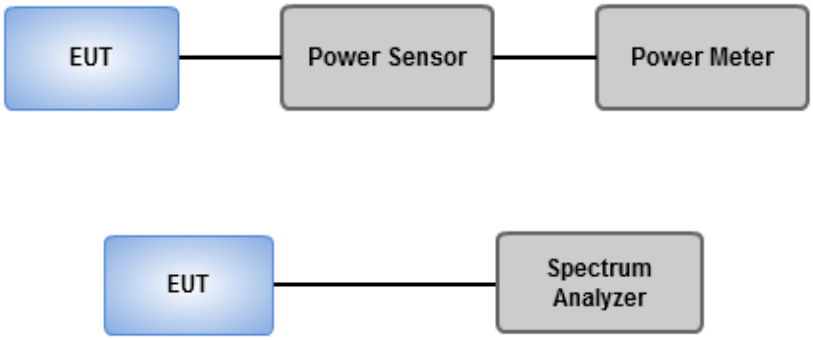
Method PM-G (Measurement using a gated RF average power meter)

Measurements is performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Spectrum analyzer (For channel that extends across the 5.725 GHz boundary)

1. Set RBW = 1MHz, VBW = 3MHz, Sweep time = Auto, Detector = RMS.
2. Trace average at least 100 traces in power averaging mode.
3. Compute power by integrating the spectrum across the 26 dB EBW.
4. Add 10 log(1/X, X:duty cycle) if duty cycle is <98%).

3.2.3 Test Setup



3.2.4 Test Results

Ambient Condition	24-25°C / 61-62%	Tested By	Roger Lu

Refer to Appendix B.

3.3 Power Spectral Density

3.3.1 Limit of Power Spectral Density

Frequency band 5150-5250 MHz		
Operating Mode		**Limit**
☐	Outdoor access point	17 dBm / MHz
☐	Indoor access point	17 dBm / MHz
☐	Fixed point-to-point access points	17 dBm / MHz
☒	Client devices	11 dBm / MHz

Frequency Band (MHz)		**Limit**
☒	5250 ~ 5350	11 dBm / MHz
☒	5470 ~ 5725	11 dBm / MHz
☒	5725 ~ 5850	30 dBm /500 kHz

3.3.2 Test Procedures

For 5150 ~ 5250 MHz / 5250 ~ 5350 MHz / 5470 ~ 5725 MHz

Duty cycle ≥ 98 %

1. Set RBW = 1 MHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
2. Trace average 100 traces.
3. Use the peak marker function to determine the maximum amplitude level.

Duty cycle < 98 %

1. Set RBW = 1 MHz, VBW = 3 MHz, Detector = RMS.
2. Set sweep time ≥ 10 * (number of points in sweep) * (total on/off period of the transmitted signal).
3. Perform a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.
5. Add 10 log(1/x), where x is the duty cycle.

For 5725 ~ 5850 MHz

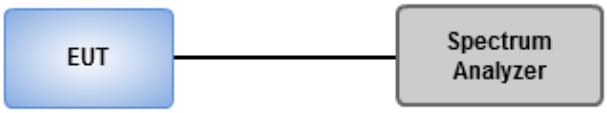
Duty cycle ≥ 98 %

1. Set RBW = 500 kHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
2. Trace average 100 traces.
3. Use the peak marker function to determine the maximum amplitude level.

Duty cycle < 98 %

1. Set RBW = 500 kHz, VBW = 3 MHz, Detector = RMS.
2. Set sweep time ≥ 10 * (number of points in sweep) * (total on/off period of the transmitted signal).
3. Perform a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.
5. Add 10 log(1/x), where x is the duty cycle.

3.3.3 Test Setup



3.3.4 Test Results

Ambient Condition	24-25°C / 61-62%	Tested By	Roger Lu

Refer to Appendix C.

3.4 Unwanted Emissions

3.4.1 Limit of Unwanted Emissions

Restricted Band Emissions 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:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

Un-restricted band emissions above 1GHz Limit	
Operating Band	**Limit**
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.850 GHz	All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Note 1: 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).	

3.4.2 Test Procedures

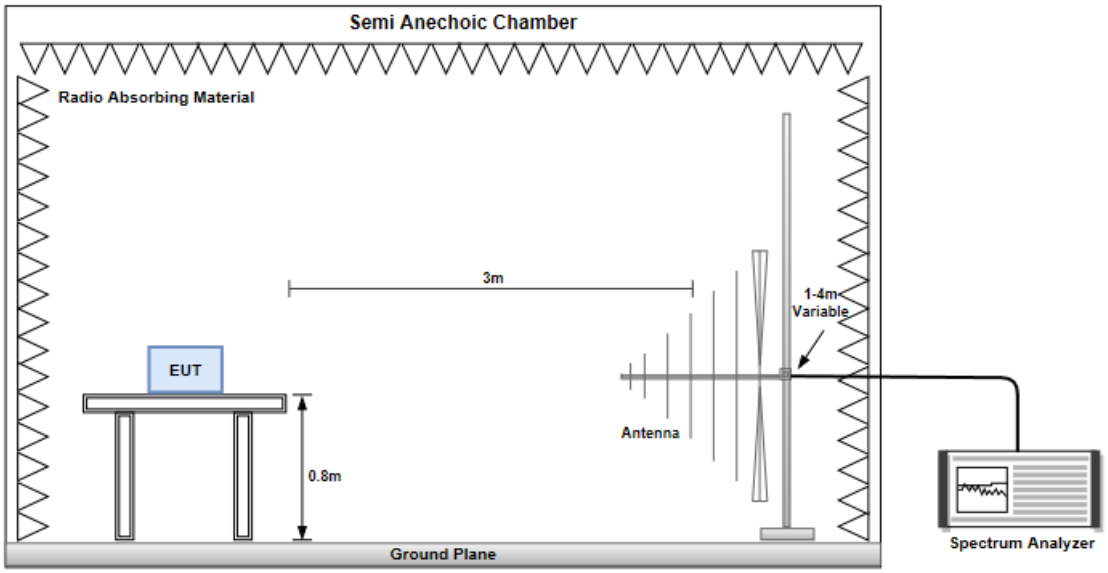
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

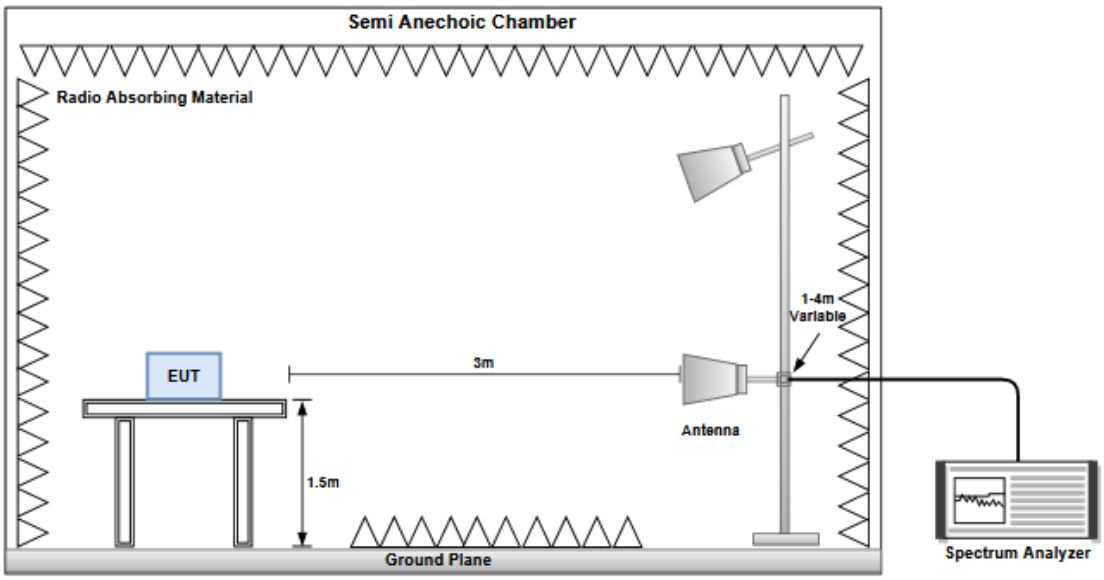
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.4.3 Test Setup

Unwanted Emissions below 1 GHz



Unwanted Emissions above 1 GHz



3.4.4 Test Results

Refer to Appendix D.

3.5 AC Power Line Conducted Emissions

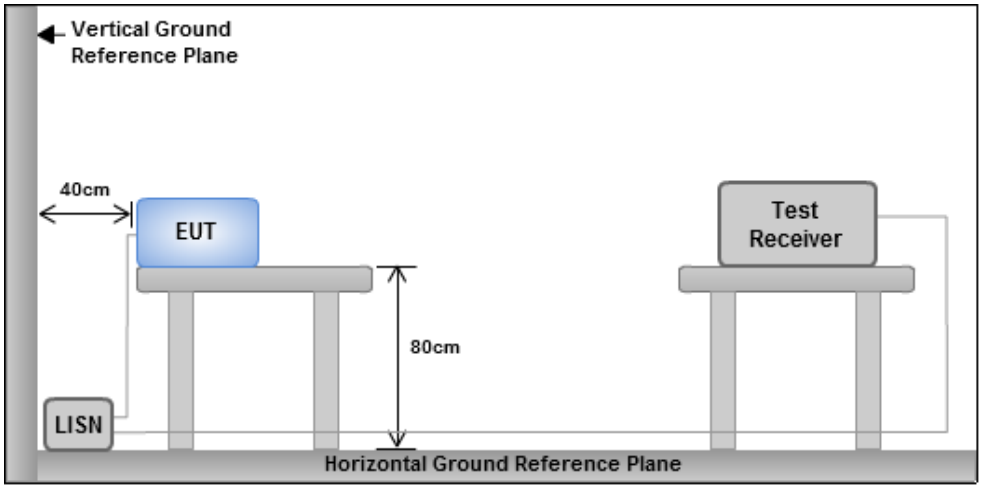
3.5.1 Limit of AC Power Line Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.5.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

3.5.3 Test Setup



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.5.4 Test Results

Refer to Appendix E.

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan (R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

No.2-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
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Email: ICC_Service@icertifi.com.tw

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