

TEST REPORT

Application No.: SHEM2111011824MI
Applicant: Acrel Co.,Ltd
Address of Applicant: No.253, Yulv Road, Jiading, Shanghai, China
Manufacturer: Acrel Co.,Ltd
Address of Manufacturer: No.253, Yulv Road, Jiading, Shanghai, China
Factory: Jiangsu Acrel Electrical Manufacturing Co.,Ltd.
Address of Factory: No.5, Dongmeng Road, Nanzha, Jiangyin, Jiangsu, China
Equipment Under Test (EUT):
EUT Name: Conversion module
Model No.: AWT100-Lora, AWT100, AWT100-LRHW, AWT100-lorawan,
 AWT100-LWHW, AWT100-LW868, AWT100-LW923 □
 □ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark: Acrel
Standard(s) : 47 CFR Part 15, Subpart B
Date of Receipt: 2021-11-08
Date of Test: 2021-11-10 to 2021-11-11
Date of Issue: 2021-11-12

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlan Zhan


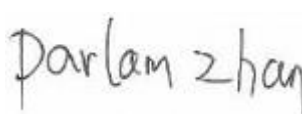
Parlan Zhan
Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Revision Record			
Version	Description	Date	Remark
00	Original	2021-11-12	/

Authorized for issue by:			
			
		Bruce Tang / Project Engineer	
			
		Parlam Zhan / Reviewer	



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2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at Mains Terminals (150kHz-30MHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (above 1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass

InternalSource	UpperFrequency
Below 1.705MHz	30MHz
1.705MHz to 108MHz	1GHz
108MHz to 500MHz	2GHz
500MHz to 1GHz	5GHz
Above 1GHz	5th harmonic of the highest frequency or 40GHz, whichever is lower

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model AWT100-Lora was tested since their differences were the model number and product name.



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4 General Information

4.1 Details of E.U.T.

Power supply: AC85-265V,50/60Hz

Test voltage: AC120V60Hz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	LENOVO	R400	/

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Emission at mains port using AMN	2.6dB (9kHz to 150kHz)
		2.4dB (150kHz to 30MHz)
2	Conducted Emission at mains port using VP	1.8 dB (9kHz to 30MHz)
3	Conducted Emission at telecommunication port using AAN	4.2 dB (150kHz to 30MHz)
4	Radiated Power	3.2dB
5	Radiated Emission	4.5dB (30MHz-1GHz)
		5.1dB (1GHz-6GHz)
		5.4dB (6GHz-18GHz)
6	Radiated Disturbance (disturbance current in a LLAS)	2.4dB (9kHz to 30MHz)

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 8617A

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2020-12-20	2021-12-19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2020-12-20	2021-12-19
Line impedance stabilization network	EMCO	3816/2	SHEM019-1	2020-12-20	2021-12-19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2020-12-20	2021-12-19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020-12-20	2023-12-19
CE test Cable	/	/	CE01	2020-12-20	2021-12-19

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2020-12-20	2021-12-19
CONTROLLER	INNCO	CO200	SHEM047-1	N/A	N/A
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	N/A	N/A
TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	N/A	N/A
Broadband UHF-VHF ANTENNA	SCHWARZBECK	VULB9168	SHEM048-1	2021-09-11	2023-09-10
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
Pre-Amplifier	HP	8447D	SHEM236-1	2021-05-27	2022-05-26

Radiated Emissions (above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2020-12-20	2021-12-19
CONTROLLER	INNCO	CO200	SHEM047-1	N/A	N/A
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	N/A	N/A
TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	N/A	N/A
Double ridged broadband horn ANTENNA	SCHWARZBECK	BBHA9120D	SHEM050-1	2021-09-18	2023-09-17
High-amplifier	SCHWARZBECK	SCU-F0118-G40-BZ4-CS	SHEM050-2	2020-12-20	2021-12-19
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Digital pressure meter	YONGZHI	DYM3-01	SHEM082-1	2021-01-22	2024-01-21
Temperature&humidity recorder	ShangHai weather meter work	ZJ 1-2B	SHEM042-1~6	2021-09-07	2022-09-06
Digital Multimeter	FLUKE	17B	SHEM043-3	2021-09-04	2022-09-03
Autoformer regulator	Guangzhou bao de	TDGC2-5KVA	SHEM150-1	N/A	N/A
Multi-purpose tong tester	FLUKE	316	SHEM001-1	2020-12-20	2021-12-19



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6 Emission Test Results

6.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement:	47 CFR Part 15, Subpart B
Test Method:	ANSI C63.4:2014
Frequency Range:	150kHz to 30MHz
Limit:	
0.15M-0.5MHz	66dB(μV)-56dB(μV) quasi-peak, 56dB(μV)-46dB(μV) average
0.5M-5MHz	56dB(μV) quasi-peak, 46dB(μV) average
5M-30MHz	60dB(μV) quasi-peak, 50dB(μV) average
Detector:	Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

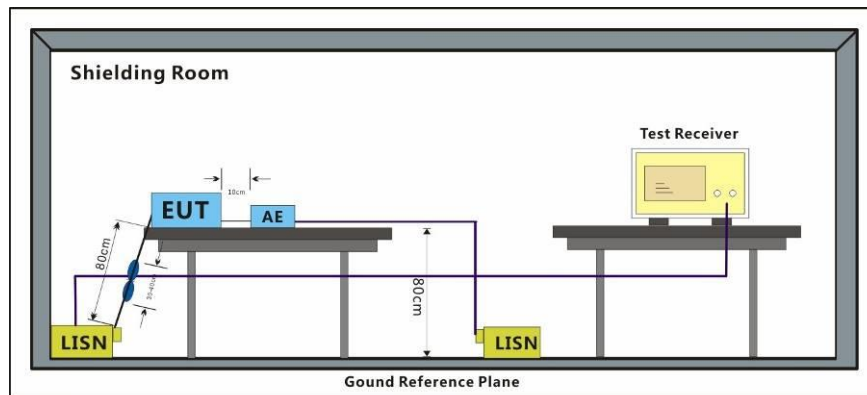
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a: Keep EUT running continual.

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

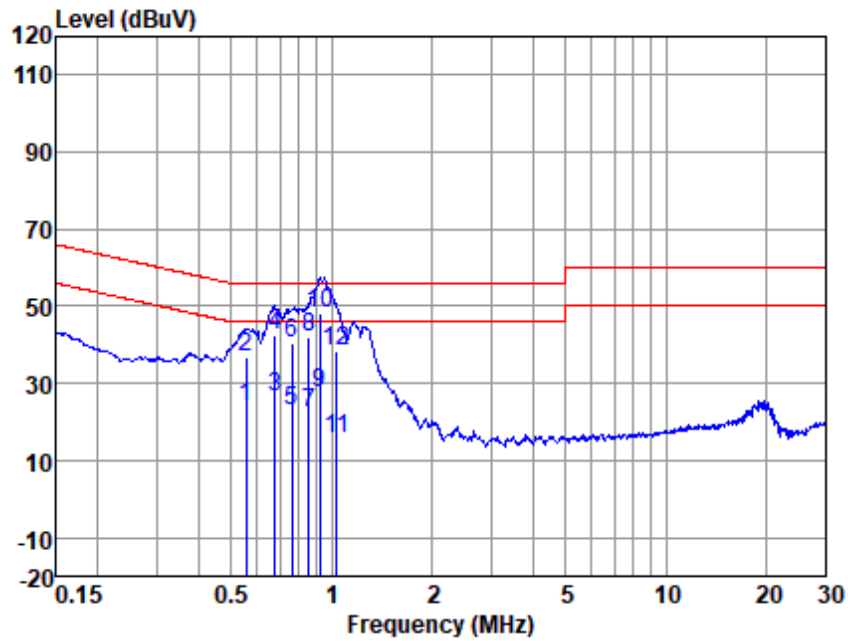


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Mode:a; Line:Live Line



LISN : LINE
 EUT/Project No : 11824MI
 Test Mode : a

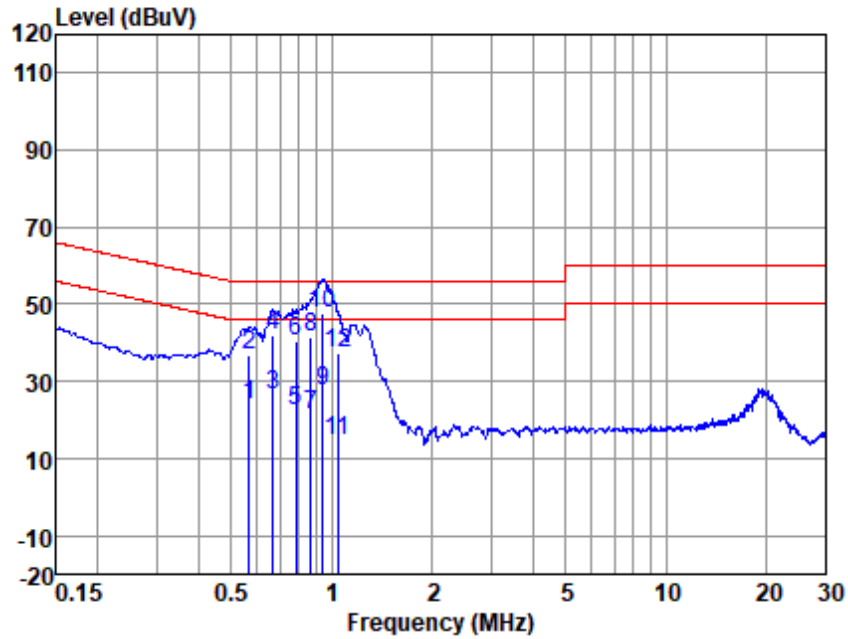
Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark	
1	0.56	13.56	0.20	9.92	23.68	46.00	-22.32	Average
2	0.56	26.90	0.20	9.92	37.02	56.00	-18.98	QP
3	0.68	16.50	0.20	9.91	26.61	46.00	-19.39	Average
4	0.68	32.64	0.20	9.91	42.75	56.00	-13.25	QP
5	0.76	12.69	0.20	9.90	22.79	46.00	-23.21	Average
6	0.76	30.22	0.20	9.90	40.32	56.00	-15.68	QP
7	0.85	12.16	0.20	9.90	22.26	46.00	-23.74	Average
8	0.85	31.68	0.20	9.90	41.78	56.00	-14.22	QP
9	0.92	17.57	0.20	9.90	27.67	46.00	-18.33	Average
10	0.92	38.08	0.20	9.90	48.18	56.00	-7.82	QP
11	1.04	5.57	0.20	9.91	15.68	46.00	-30.32	Average
12	1.04	28.21	0.20	9.91	38.32	56.00	-17.68	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss



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Mode:a; Line:Neutral Line



LISN : NEUTRAL
 EUT/Project No : 11824MI
 Test Mode : a

Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark	
1	0.57	13.82	0.20	9.92	23.94	46.00	-22.06	Average
2	0.57	26.86	0.20	9.92	36.98	56.00	-19.02	QP
3	0.67	16.36	0.20	9.91	26.47	46.00	-19.53	Average
4	0.67	31.73	0.20	9.91	41.84	56.00	-14.16	QP
5	0.78	12.27	0.20	9.90	22.37	46.00	-23.63	Average
6	0.78	30.38	0.20	9.90	40.48	56.00	-15.52	QP
7	0.87	11.12	0.20	9.90	21.22	46.00	-24.78	Average
8	0.87	31.42	0.20	9.90	41.52	56.00	-14.48	QP
9	0.94	17.41	0.20	9.90	27.51	46.00	-18.49	Average
10	0.94	37.40	0.20	9.90	47.50	56.00	-8.50	QP
11	1.04	4.52	0.20	9.91	14.63	46.00	-31.37	Average
12	1.04	26.98	0.20	9.91	37.09	56.00	-18.91	QP

Notes: Emission Level = Read Level + LISN Factor + Cable loss



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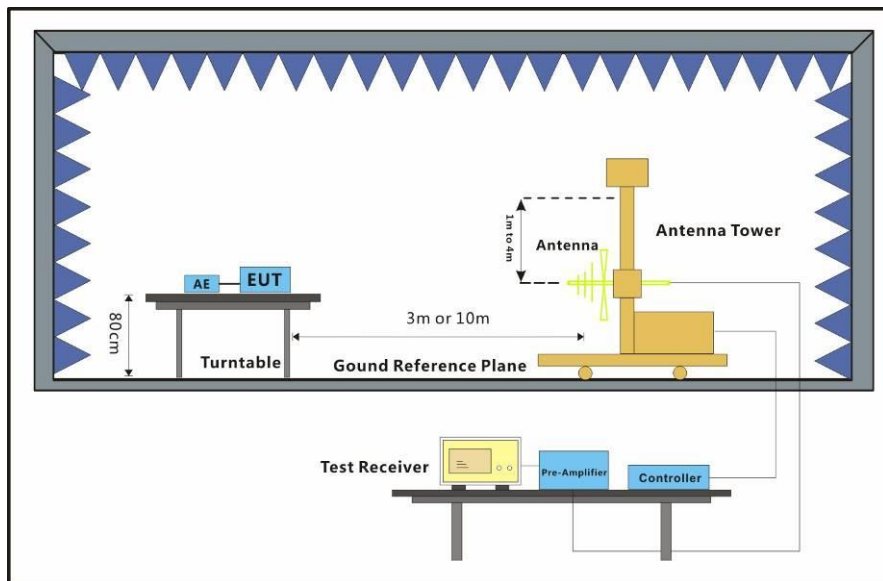
6.2 Radiated Emissions (30MHz-1GHz)

Test Requirement: 47 CFR Part 15, Subpart B
 Test Method: ANSI C63.4:2014
 Frequency Range: 30MHz to 1GHz
 Measurement Distance: 3m
 Limit:
 30MHz -88MHz 40.0(dBμV/m) quasi-peak
 88MHz-216MHz 43.5(dBμV/m) quasi-peak
 216MHz-960MHz 46.0(dBμV/m) quasi-peak
 960MHz-1000MHz 54.0(dBμV/m) quasi-peak
 Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to1000MHz

6.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
 Test mode a: Keep EUT running continual.

6.2.2 Test Setup Diagram



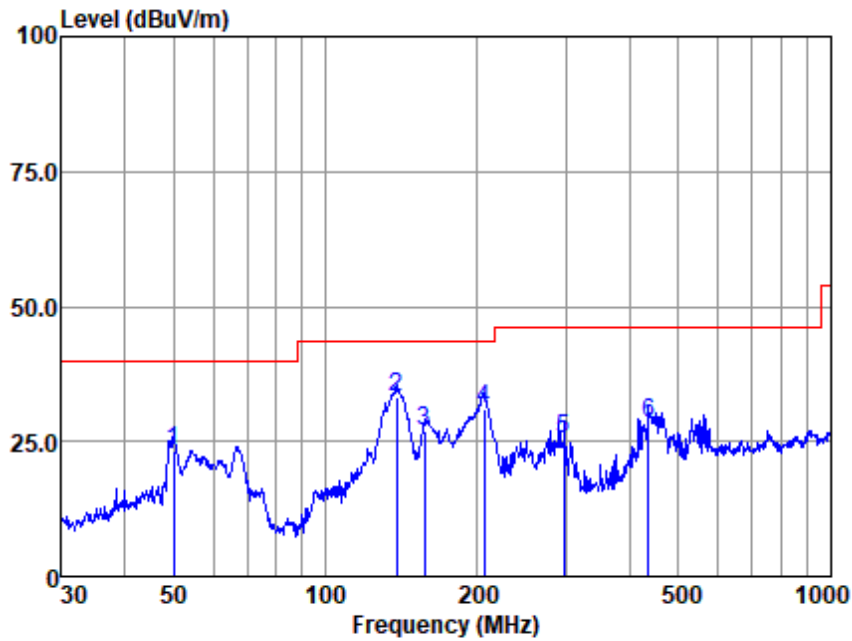
6.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.



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Mode:a; Polarization:Horizontal



Antenna Polarity :HORIZONTAL
 EUT/Project :11824MI
 Test mode :a

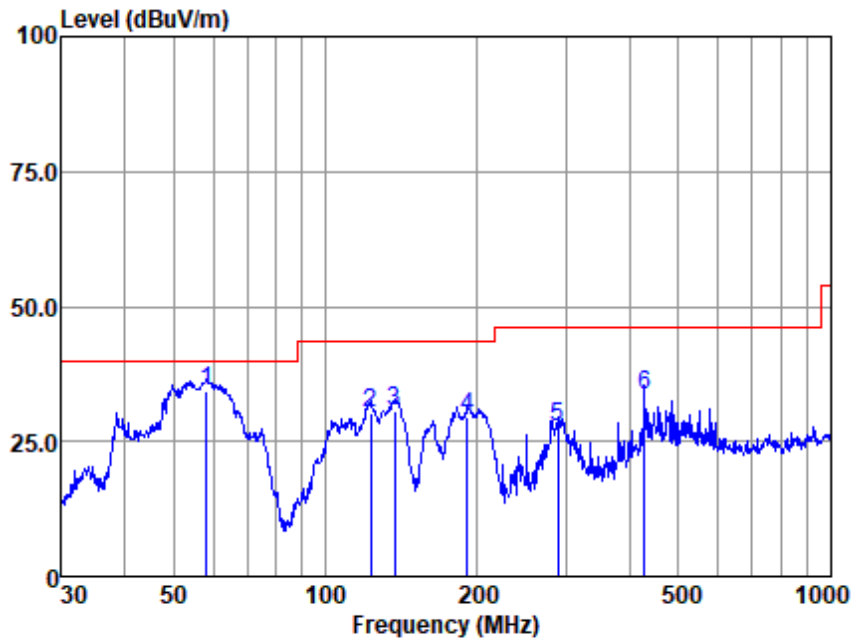
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	50.057	40.57	13.84	1.00	32.05	23.36	40.00	-16.64 QP
2	138.387	50.71	12.60	1.77	31.72	33.36	43.50	-10.14 QP
3	157.007	43.07	13.30	1.90	31.26	27.01	43.50	-16.49 QP
4	206.398	50.25	9.88	2.29	31.45	30.97	43.50	-12.53 QP
5	297.224	40.43	13.40	2.81	31.10	25.54	46.00	-20.46 QP
6	437.120	39.00	16.85	3.28	30.88	28.25	46.00	-17.75 QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Mode:a; Polarization:Vertical



Antenna Polarity :VERTICAL
 EUT/Project :11824MI
 Test mode :a

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	58.203	51.66	13.42	1.10	31.69	34.49	40.00	-5.51 QP
2	122.834	48.89	11.48	1.66	31.62	30.41	43.50	-13.09 QP
3	136.939	48.20	12.48	1.77	31.71	30.74	43.50	-12.76 QP
4	191.074	48.47	10.60	2.18	31.75	29.50	43.50	-14.00 QP
5	289.002	42.76	13.32	2.78	31.30	27.56	46.00	-18.44 QP
6	428.019	44.02	16.59	3.22	30.35	33.48	46.00	-12.52 QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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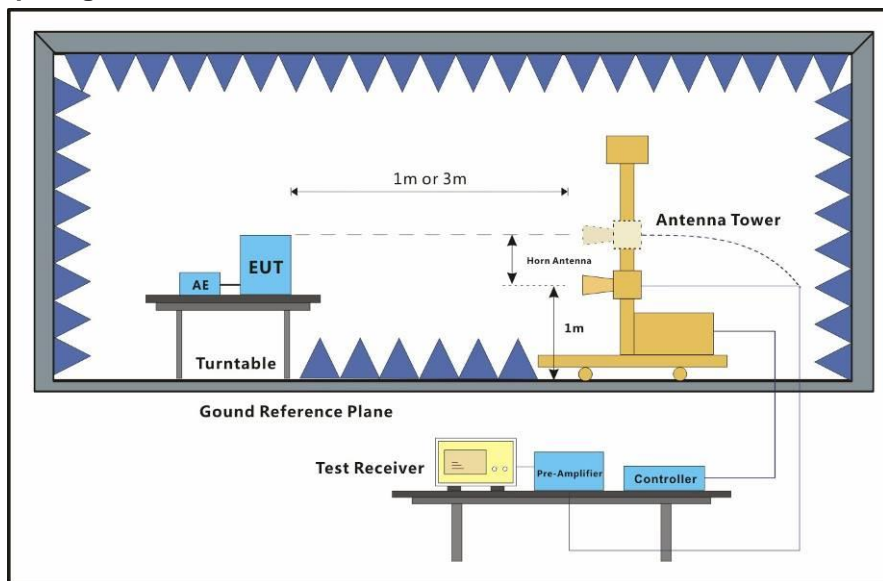
6.3 Radiated Emissions (above 1GHz)

Test Requirement: 47 CFR Part 15, Subpart B
 Test Method: ANSI C63.4:2014
 Frequency Range: Above 1GHz
 Measurement Distance: 3m
 Limit:
 Above 1GHz 74(dBµV/m) peak, 54(dBµV/m) average
 Detector: Peak for pre-scan (1000kHz resolution bandwidth) 1000M to18000MHz

6.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
 Test mode a: Keep EUT running continual.

6.3.2 Test Setup Diagram

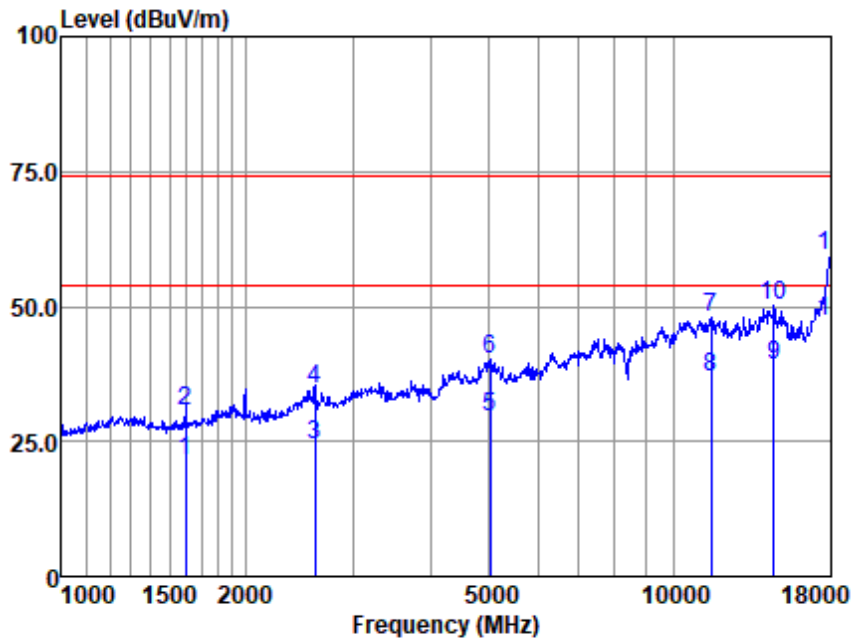


6.3.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.



Mode:a; Polarization:Horizontal



Antenna Polarity :HORIZONTAL
 EUT/Project :11824MI
 Test mode :a

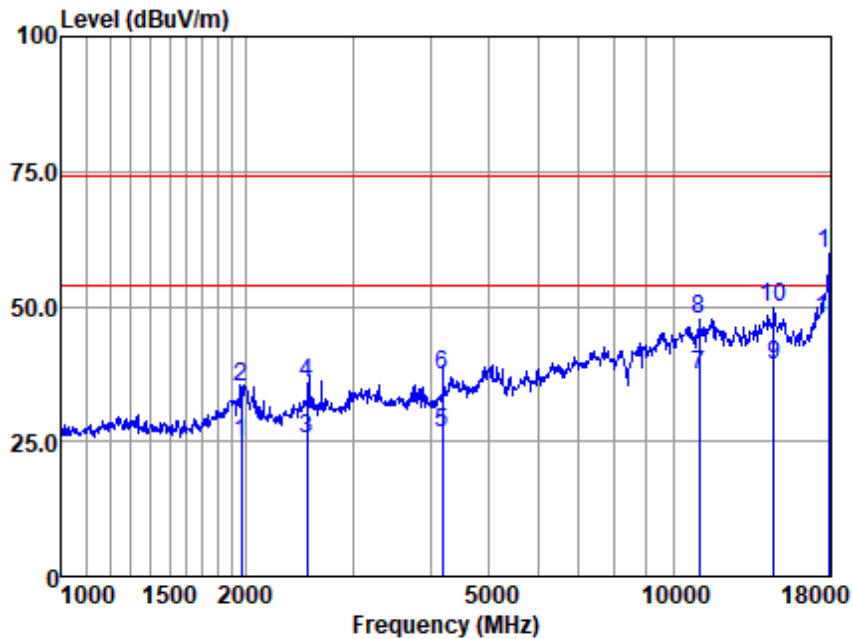
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1597.181	19.48	0.00	1.90	0.00	21.38	54.00	-32.62 Average
2	1597.181	28.76	0.00	1.90	0.00	30.66	74.00	-43.34 Peak
3	2595.613	21.88	0.00	2.45	0.00	24.33	54.00	-29.67 Average
4	2595.613	32.15	0.00	2.45	0.00	34.60	74.00	-39.40 Peak
5	5002.497	25.18	0.00	4.35	0.00	29.53	54.00	-24.47 Average
6	5002.497	35.96	0.00	4.35	0.00	40.31	74.00	-33.69 Peak
7	11500.200	41.38	0.00	6.47	0.00	47.85	74.00	-26.15 Peak
8	11500.200	30.59	0.00	6.47	0.00	37.06	54.00	-16.94 Average
9	14575.970	31.59	0.00	7.50	0.00	39.09	54.00	-14.91 Average
10	14575.970	42.75	0.00	7.50	0.00	50.25	74.00	-23.75 Peak
11	18000.000	35.83	0.00	11.29	0.00	47.12	54.00	-6.88 Average
12	18000.000	48.08	0.00	11.29	0.00	59.37	74.00	-14.63 Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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Mode:a; Polarization:Vertical



Antenna Polarity :VERTICAL
 EUT/Project :11824MI
 Test mode :a

	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1966.680	22.83	0.00	1.98	0.00	24.81	54.00	-29.19 Average
2	1966.680	33.26	0.00	1.98	0.00	35.24	74.00	-38.76 Peak
3	2521.664	23.10	0.00	2.42	0.00	25.52	54.00	-28.48 Average
4	2521.664	33.50	0.00	2.42	0.00	35.92	74.00	-38.08 Peak
5	4193.872	23.37	0.00	3.36	0.00	26.73	54.00	-27.27 Average
6	4193.872	33.84	0.00	3.36	0.00	37.20	74.00	-36.80 Peak
7	10980.470	30.75	0.00	6.58	0.00	37.33	54.00	-16.67 Average
8	10980.470	40.93	0.00	6.58	0.00	47.51	74.00	-26.49 Peak
9	14575.970	31.75	0.00	7.50	0.00	39.25	54.00	-14.75 Average
10	14575.970	42.24	0.00	7.50	0.00	49.74	74.00	-24.26 Peak
11	17948.050	48.53	0.00	11.21	0.00	59.74	74.00	-14.26 Peak
12	17948.050	36.51	0.00	11.21	0.00	47.72	54.00	-6.28 Average

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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7 Photographs

7.1 Conducted Emissions at Mains Terminals (150kHz-30MHz) Test Setup



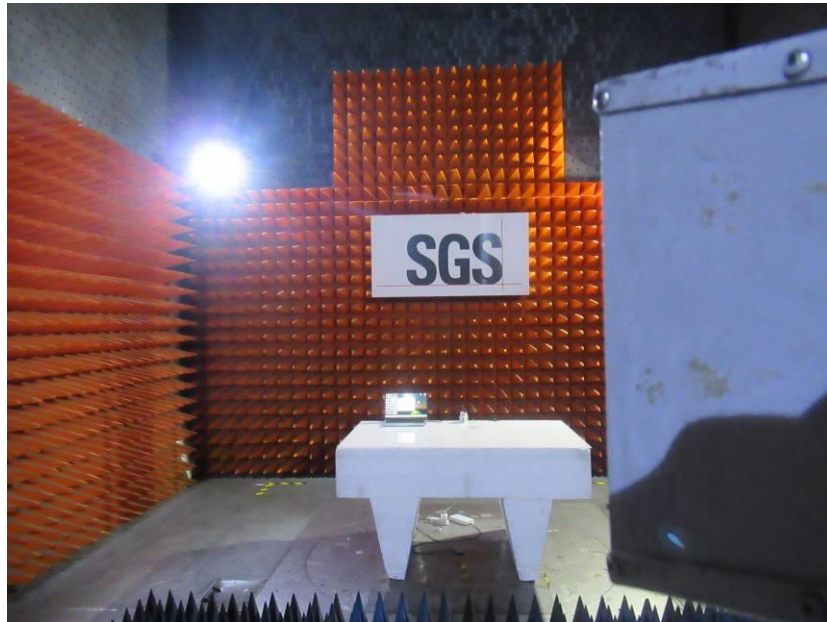
7.2 Radiated Emissions (30MHz-1GHz) Test Setup



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7.3 Radiated Emissions (above 1GHz) Test Setup



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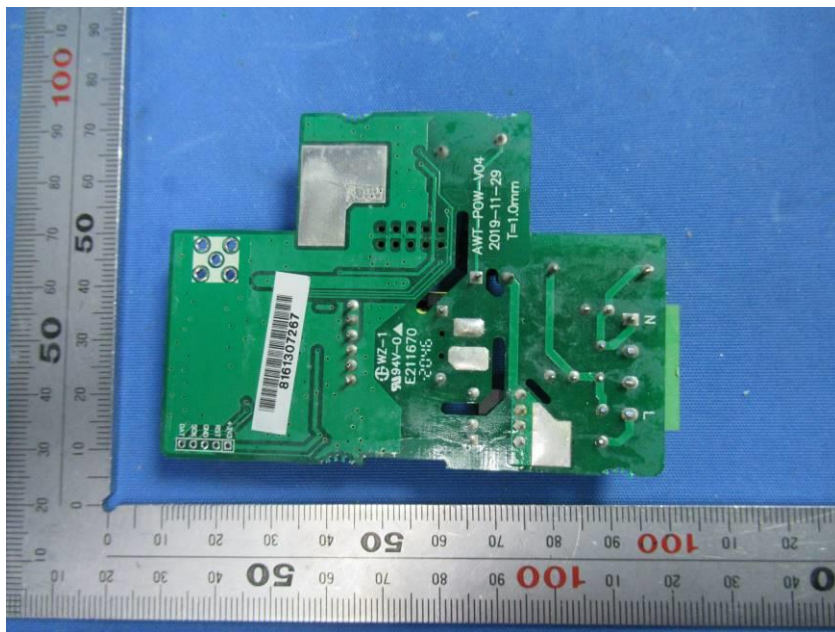
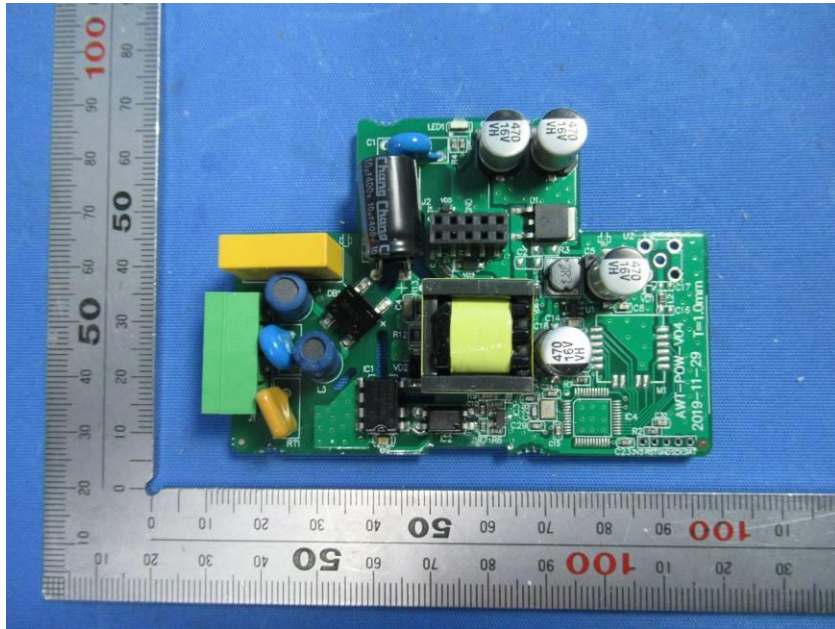
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7.4 EUT Constructional Details (EUT Photos)



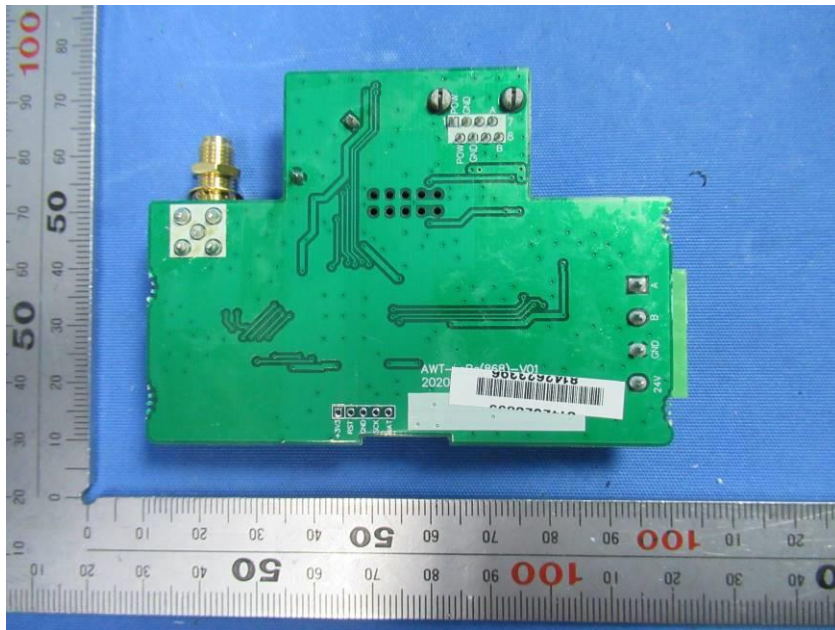
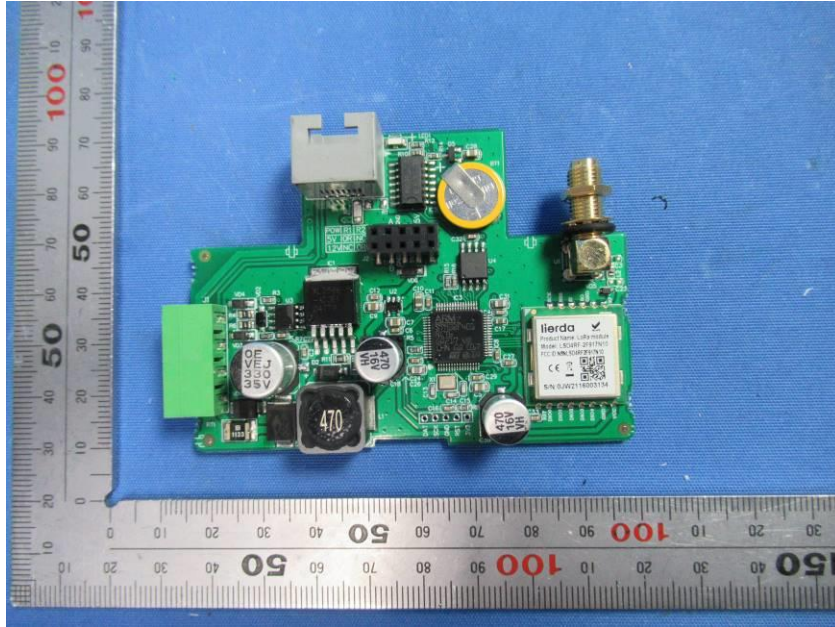
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