



EMC Test Report

For

Applicant name: SHENZHEN TENDA TECHNOLOGY CO., LTD.
Address: 6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
EUT name: BE5010 Dual-band Wi-Fi 7 Ceiling Access Point
Brand name: Tenda
Model number: i36
Series model number: N/A

Issued By

Company name: BTF Testing Lab (Shenzhen) Co., Ltd.
Address: 101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

Report number: BTF250603R01101
Test standards: ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-3 V2.3.2 (2023-01)
ETSI EN 301 489-17 V3.3.1 (2024-09)
Test conclusion: Pass

Date of sample receipt: 2025-06-03

Test date: 2025-06-04 to 2025-08-15

Date of issue: 2025-08-27

Prepared by:

Chris Liu / Project engineer



Ryan.CJ / EMC Manager

Note: All the test results in this report only related to the testing samples. Which can be duplicated completely for the legal use with approval of applicant; it shall not be reproduced except in full without the written approval of BTF Testing Lab (Shenzhen) Co., Ltd., All the objections should be raised within thirty days from the date of issue. To validate the report, you can contact us.

Revision History		
Version	Issue Date	Revisions Content
R_V0	2025-08-27	Original
<i>Note:</i> <i>Once the revision has been made, then previous versions reports are invalid.</i>		

Table of Contents

1 Introduction.....	4
1.1 Laboratory Location.....	4
1.2 Laboratory Facility.....	4
1.3 Announcement.....	4
2 Product Information.....	5
2.1 Application Information.....	5
2.2 Manufacturer Information.....	5
2.3 Factory Information.....	5
2.4 General Description of Equipment under Test (EUT).....	5
3 Summary of Test Results.....	6
3.1 Test Standards.....	6
3.2 Uncertainty of Test.....	6
3.3 Summary of Test Result.....	6
3.4 Additions to, deviations, or exclusions from the method.....	7
4 Test Configuration.....	8
4.1 Test Equipment List.....	8
4.2 Test Auxiliary Equipment.....	9
4.3 Test Modes.....	9
5 Evaluation Results (Evaluation).....	10
5.1 Harmonic current emissions.....	10
5.1.1 Conclusion.....	10
6 Emission Test Results (EMI).....	11
6.1 Conducted emissions (AC power port).....	11
6.1.1 Test Data.....	12
6.2 Radiated emissions (30MHz-1GHz).....	14
6.2.1 Test Data.....	15
6.3 Radiated emissions (above 1GHz).....	17
6.3.1 Test Data.....	18
6.4 Voltage fluctuations and flicker.....	19
6.4.1 Test Data.....	19
7 Immunity Test Results (EMS).....	20
7.1 Electrostatic discharge.....	23
7.1.1 Test Data.....	23
7.1.2 Test Data.....	24
7.2 Radio frequency electromagnetic field (80 MHz to 6 000 MHz).....	25
7.2.1 Test Data.....	25
7.3 Fast transients, common mode (AC power port).....	26
7.3.1 Test Data.....	26
7.4 Surges (AC power port).....	27
7.4.1 Test Data.....	27
7.5 Radio frequency, common mode 0,15 MHz to 80 MHz (AC power port).....	28
7.5.1 Test Data.....	28
7.6 Voltage dips and interruptions.....	29
7.6.1 Test Data.....	29
8 Test Setup Photos.....	30
9 EUT Constructional Details (EUT Photos).....	35

1 Introduction

1.1 Laboratory Location

Test location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Phone number:	+86-0755-23146130
Fax number:	+86-0755-23146130

1.2 Laboratory Facility

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

- **FCC - Designation No.: CN1409**
BTF Testing Lab (Shenzhen) Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The test firm Registration No. is 695374.
- **CNAS - Registration No.: CNAS L17568**
BTF Testing Lab (Shenzhen) Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L17568.
- **A2LA - Registration No.: 6660.01**
BTF Testing Lab (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.

1.3 Announcement

- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.
- (7) All entrusted information in this report is provided by the client and has been confirmed through consultation with the client; The testing items for this report have been discussed and confirmed with the client, and our company is only responsible for the content reflected in the report.

2 Product Information

2.1 Application Information

Company name:	SHENZHEN TENDA TECHNOLOGY CO., LTD.
Address:	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

2.2 Manufacturer Information

Company name:	SHENZHEN TENDA TECHNOLOGY CO., LTD.
Address:	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

2.3 General Description of Equipment under Test (EUT)

EUT name:	BE5010 Dual-band Wi-Fi 7 Ceiling Access Point
Under test model name:	i36
Series model name:	N/A
Description of model name differentiation:	N/A
Hardware version:	N/A
Software version:	N/A
Ratings:	Power:48V 800mA from adapter Adapter: MODLE:BN017-A38048E INPUT:100-240V~ 50/60Hz 1.0A OUTPUT:48V 800mA

3 Summary of Test Results

3.1 Test Standards

The tests were performed according to following standards:

ETSI EN 301 489-1 V2.2.3 (2019-11): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility

ETSI EN 301 489-3 V2.3.2 (2023-01): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

ETSI EN 301 489-17 V3.3.1 (2024-09) : ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

3.2 Uncertainty of Test

Measurement	Value
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.45 dB
Radiated Emission (30MHz ~ 1000MHz)	±4.80 dB
Radiated Emission (1GHz ~ 18GHz)	±4.82 dB
Voltage Flicker	±5.88%

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.3 Summary of Test Result

Item	Standard	Requirement	Result
Conducted emissions (AC power port)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 8.4 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1	Pass
Radiated emissions (30MHz-1GHz)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 8.2 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1	Pass
Radiated emissions (above 1GHz)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 8.2 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1	Pass
Harmonic current emissions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	Class B	Pass
Voltage fluctuations and flicker	ETSI EN 301 489-1 V2.2.3	EN 301 489-1, clause 8.6	Pass

	(2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1	
Electrostatic discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 9.3 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2	Pass
Radio frequency electromagnetic field (80 MHz to 6 000 MHz)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 9.2 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2	Pass
Fast transients, common mode (AC power port)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 9.4 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2	Pass
Surges (AC power port)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 9.8 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2	Pass
Radio frequency, common mode 0,15 MHz to 80 MHz (AC power port)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 9.5 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2	Pass
Voltage dips and interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01) ETSI EN 301 489-17 V3.3.1 (2024-09)	EN 301 489-1, clause 9.7 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2	Pass
Remark: 1. Pass: Meet the requirements. 2. N/A: not applicable.			

3.4 Additions to, deviations, or exclusions from the method

None

4 Test Configuration

4.1 Test Equipment List

Conducted emissions (AC power port)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Pulse Limiter	Schwarzbeck	VTSD 9561-F	953	/	/
Coaxial Switcher	Schwarzbeck	CX210	CX210	/	/
V-LISN	Schwarzbeck	NSLK 8127	1073	2024-10-25	2025-10-24
EMI Receiver	Rohde & Schwarz	ESCI3	101422	2024-10-25	2025-10-24
Test Software	Frad	EZ_EMCC	Version: EMC-CON 3A1.1+	/	/

Radiated emissions (above 1GHz) Radiated emissions (30MHz-1GHz)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	Rohde & Schwarz	ESCI7	101032	2024-10-25	2025-10-24
Signal Analyzer	Rohde & Schwarz	FSQ40	100010	2024-10-25	2025-10-24
Horn Antenna	Schwarzbeck	BBHA9120D	2597	2024-10-30	2025-10-29
Log periodic antenna	Schwarzbeck	VULB 9168	1328	2024-10-28	2025-10-27
Preamplifier(30MHz ~ 1GHz)	Schwarzbeck	BBV9744	246	2024-09-24	2025-09-23
Preamplifier(1GHz ~ 18GHz)	Schwarzbeck	BBV9718D	8	2024-09-24	2025-09-23
Test Software	Frad	EZ_EMCC	Version: FA-03A2 RE+	/	/

Voltage fluctuations and flicker					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Harmonic and Flicker system	ZES ZIMMER	HAF5000S	930670	2024-10-25	2025-10-24

Electrostatic discharge					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
ESD Generator	Prima	PESD6030	PR210823683	2024-10-28	2025-10-27

Radio frequency electromagnetic field (80 MHz to 6 000 MHz)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Antenna	SKET	STLP9129_Plus	/	/	/
USB Power Sensor	Agilent	U2001A	MZ54330012	2025-01-21	2026-01-20
USB Power sensor	Agilent	U2000A	MY53410013	2025-01-21	2026-01-20
Signal Generator	Agilent	N5181A	MY50141997	2025-01-21	2026-01-20

Fast transients, common mode (AC power port)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EFT Generator	Prima	PEFT6030-3816	PR210343256	2024-10-25	2025-10-24

Surges (AC power port)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Isolation transformer	Prima	JMB-2KVA	LL-PLM2125	2024-10-25	2025-10-24
Surge Generator	Prima	PSUG6010-2216	PR210955342	2024-10-25	2025-10-24

Radio frequency, common mode 0,15 MHz to 80 MHz (AC power port)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
CDN coupling	Prima	CRF-CDN-M316	PR210881049	2024-10-25	2025-10-24
CDN coupling	Prima	CRF-CDN-M216	PR210881044	2024-10-25	2025-10-24
6DB ATTENUATOR	Prima	50W DC-3GHZ	T2A-50-6-3-N	2024-10-25	2025-10-24
Rf conduction immunity test system	Prima	CRF61006A	PR210681042	2024-10-25	2025-10-24

Voltage dips and interruptions					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Dips Generator	Prima	PDIP6010	PR20076499	2024-10-25	2025-10-24

4.2 Test Auxiliary Equipment

The EUT has been tested as an independent unit.

4.3 Test Modes

No.	Test Modes
TM1	Working
TM2	Power on+2.4gWIFI
TM3	Power on+5gWIFI

5 Evaluation Results (Evaluation)

5.1 Harmonic current emissions

Test Requirement:	Class B
Test Limit:	Not specified
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

5.1.1 Conclusion

Refer to EN IEC 61000-3-2 clause 7.1:

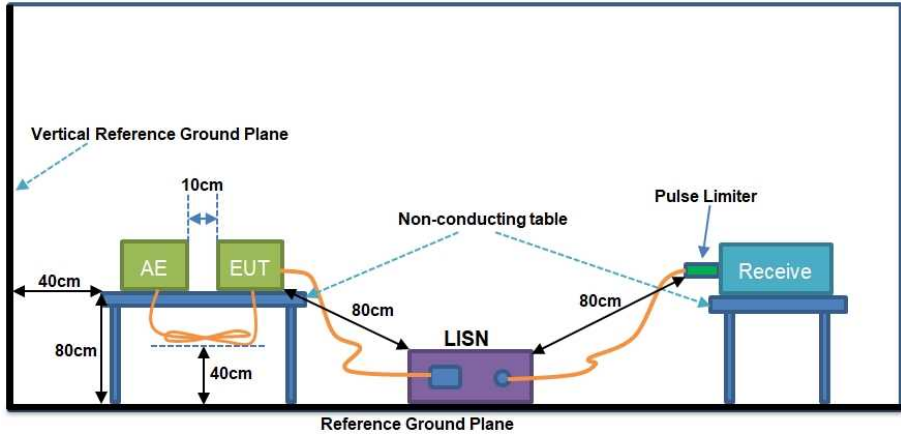
"For the following categories of equipment, limits are not specified in this document:

- lighting equipment with a rated power less than but not equal to 5 W;
- equipment with a rated power of 75 W or less, other than lighting equipment;"

Since the rated power of the EUT is less than above described, it is deemed to comply with the requirement.

6 Emission Test Results (EMI)

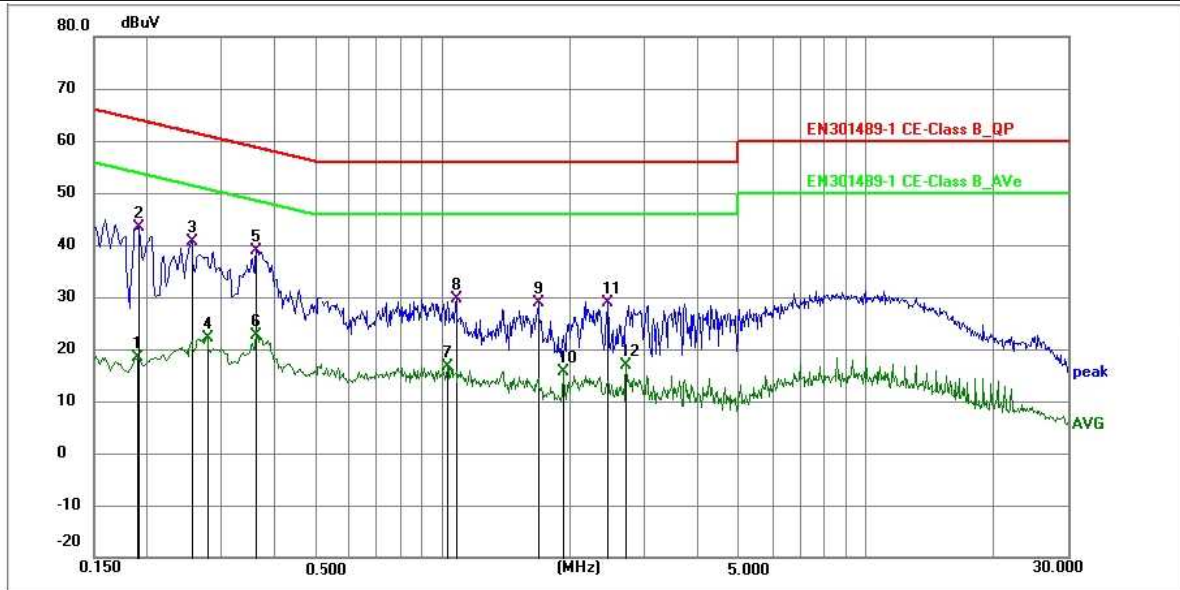
6.1 Conducted emissions (AC power port)

Test Requirement:	EN 301 489-1, clause 8.4 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1		
Test Method:	EN 55032, annex A.3		
Test Limit:	Frequency Range (MHz)	Detector Type / Bandwidth	Limit (dBuV)
	0.15 to 0.5	Quasi Peak / 9 kHz	66 to 56
	0.5 to 5	Quasi Peak / 9 kHz	56
	5 to 30	Quasi Peak / 9 kHz	60
	0.15 to 0.5	Average / 9 kHz	56 to 46
	0.5 to 5	Average / 9 kHz	46
	5 to 30	Average / 9 kHz	50
Procedure:	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. Remark: Level= Read Level+ Cable Loss+ LISN Factor		
Test Setup:			
Operating Environment:			
Temperature:	25.2 °C		
Humidity:	52.3 %		
Atmospheric Pressure:	1010 mbar		
Test voltage:	AC 230V 50Hz		

6.1.1 Test Data

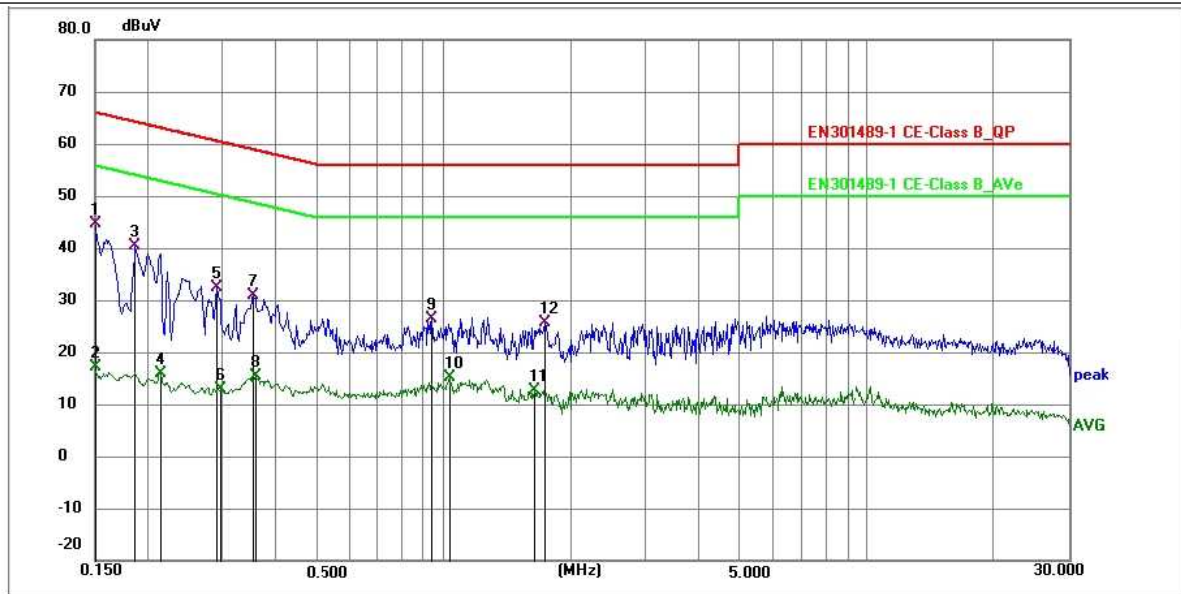
Remark: The report only reflects the test data of worst mode.

TM1 / Line: Line



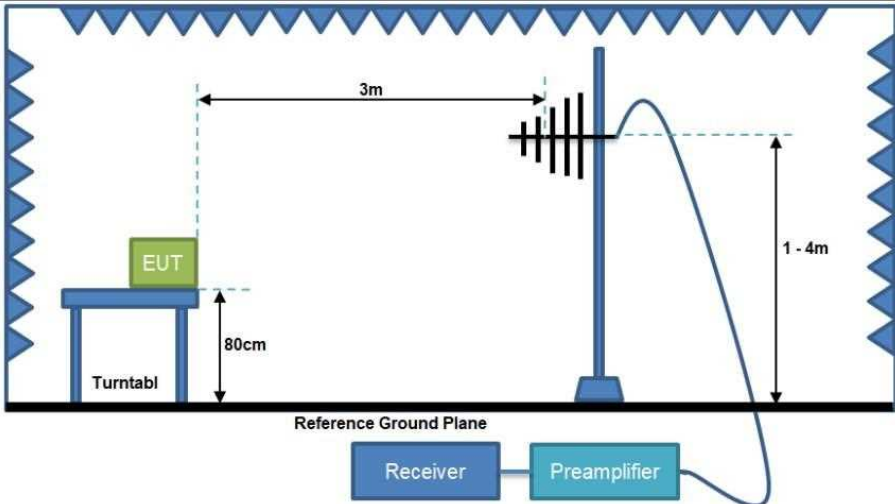
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1901	7.76	10.64	18.40	54.03	-35.63	AVG	P	
2	0.1905	32.71	10.64	43.35	64.01	-20.66	QP	P	
3	0.2535	30.00	10.66	40.66	61.64	-20.98	QP	P	
4	0.2760	11.38	10.66	22.04	50.94	-28.90	AVG	P	
5 *	0.3613	28.24	10.67	38.91	58.70	-19.79	QP	P	
6	0.3613	11.90	10.67	22.57	48.70	-26.13	AVG	P	
7	1.0275	5.89	10.85	16.74	46.00	-29.26	AVG	P	
8	1.0770	18.68	10.84	29.52	56.00	-26.48	QP	P	
9	1.6845	18.15	10.73	28.88	56.00	-27.12	QP	P	
10	1.9365	4.87	10.69	15.56	46.00	-30.44	AVG	P	
11	2.4495	18.17	10.69	28.86	56.00	-27.14	QP	P	
12	2.7105	6.24	10.71	16.95	46.00	-29.05	AVG	P	

TM1 / Line: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1 *	0.1500	34.19	10.55	44.74	66.00	-21.26	QP	P	
2	0.1500	6.58	10.55	17.13	56.00	-38.87	AVG	P	
3	0.1860	29.74	10.56	40.30	64.21	-23.91	QP	P	
4	0.2130	5.36	10.57	15.93	53.09	-37.16	AVG	P	
5	0.2893	21.66	10.62	32.28	60.54	-28.26	QP	P	
6	0.2970	2.16	10.62	12.78	50.33	-37.55	AVG	P	
7	0.3523	20.23	10.67	30.90	58.91	-28.01	QP	P	
8	0.3570	4.81	10.67	15.48	48.80	-33.32	AVG	P	
9	0.9420	15.63	10.87	26.50	56.00	-29.50	QP	P	
10	1.0320	4.27	10.86	15.13	46.00	-30.87	AVG	P	
11	1.6392	1.78	10.93	12.71	46.00	-33.29	AVG	P	
12	1.7382	14.68	10.94	25.62	56.00	-30.38	QP	P	

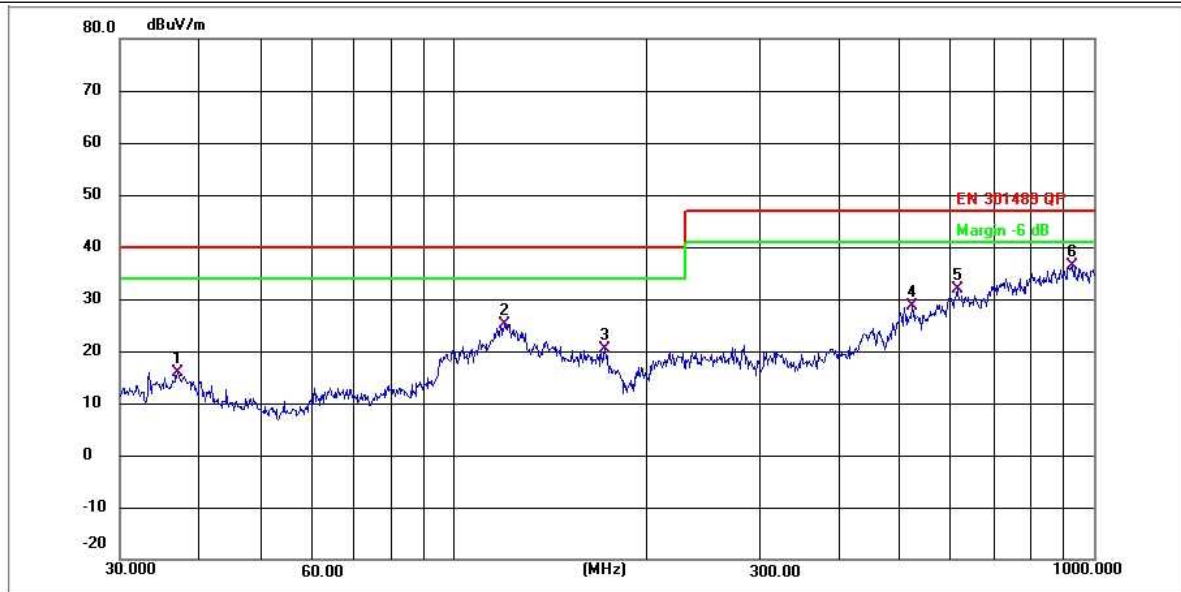
6.2 Radiated emissions (30MHz-1GHz)

Test Requirement:	EN 301 489-1, clause 8.2 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1		
Test Method:	EN 55032, annex A.2		
Test Limit:	FREQUENCY (MHz)	dB(μV/m) At 10m	dB(μV/m) At 3m
	30MHz-230MHz	30	40
	230MHz-1GHz	37	47
	Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz		
Procedure:	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. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor		
Test Setup:			
Operating Environment:			
Temperature:	25.2 °C		
Humidity:	52.3 %		
Atmospheric Pressure:	1010 mbar		
Test voltage:	AC 230V 50Hz		

6.2.1 Test Data

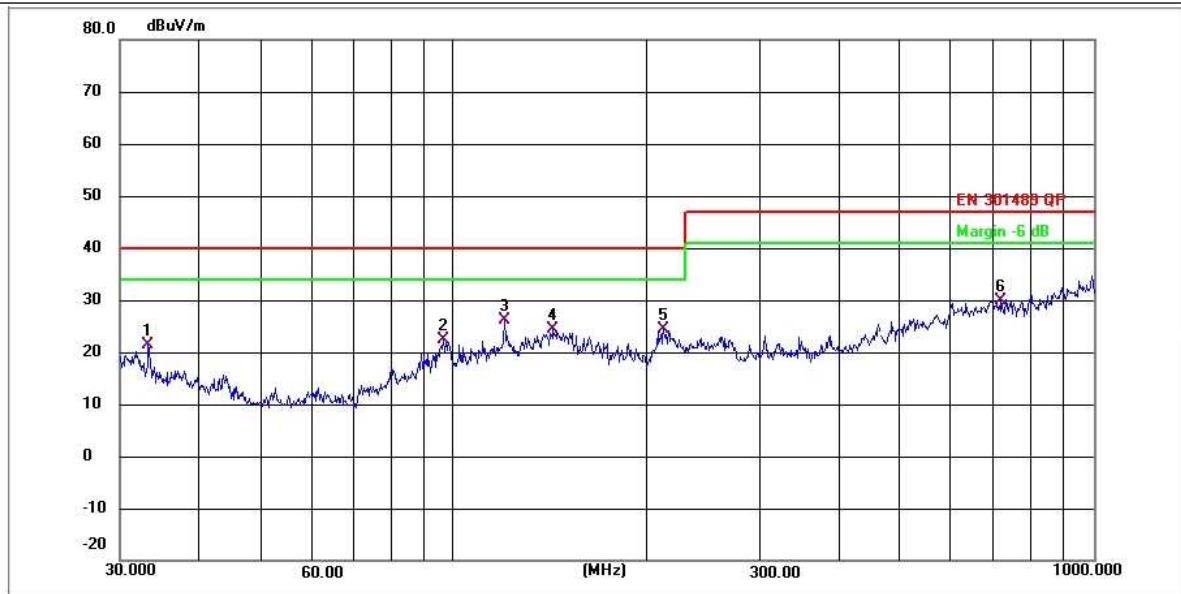
Remark: The report only reflects the test data of worst mode.

TM2 / Polarization: Horizontal



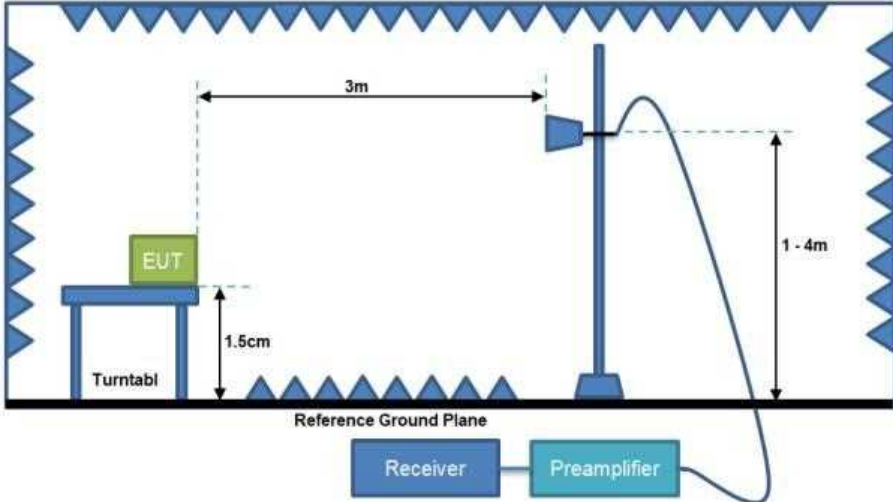
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	36.8952	25.54	-9.66	15.88	40.00	-24.12	QP	P
2	119.8555	47.48	-22.29	25.19	40.00	-14.81	QP	P
3	172.2964	42.07	-21.80	20.27	40.00	-19.73	QP	P
4	520.8881	47.55	-18.85	28.70	47.00	-18.30	QP	P
5	614.2142	50.12	-18.24	31.88	47.00	-15.12	QP	P
6 *	927.3808	52.54	-16.04	36.50	47.00	-10.50	QP	P

TM2 / Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	33.2693	31.04	-9.68	21.36	40.00	-18.64	QP	P
2	96.0985	44.98	-22.53	22.45	40.00	-17.55	QP	P
3 *	120.0660	48.52	-22.29	26.23	40.00	-13.77	QP	P
4	142.8241	46.46	-22.07	24.39	40.00	-15.61	QP	P
5	212.6420	45.68	-21.41	24.27	40.00	-15.73	QP	P
6	717.9396	47.66	-17.66	30.00	47.00	-17.00	QP	P

6.3 Radiated emissions (above 1GHz)

Test Requirement:	EN 301 489-1, clause 8.2 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1		
Test Method:	EN 55032, annex A.2		
Test Limit:	Frequency range (MHz)	Radiated emissions limit (dBuV/m)	
		Peak	Average
	1000 to 3000	70	50
	3000 to 6000	74	54
	Detector: Peak for pre-scan (1000kHz resolution bandwidth) 1000MHz to 6000MHz		
Procedure:	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. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor		
Test Setup:			
Operating Environment:			
Temperature:	25.2 °C		
Humidity:	52.3 %		
Atmospheric Pressure:	1010 mbar		
Test voltage:	AC 230V 50Hz		

6.3.1 Test Data

Remark: The report only reflects the test data of worst mode.

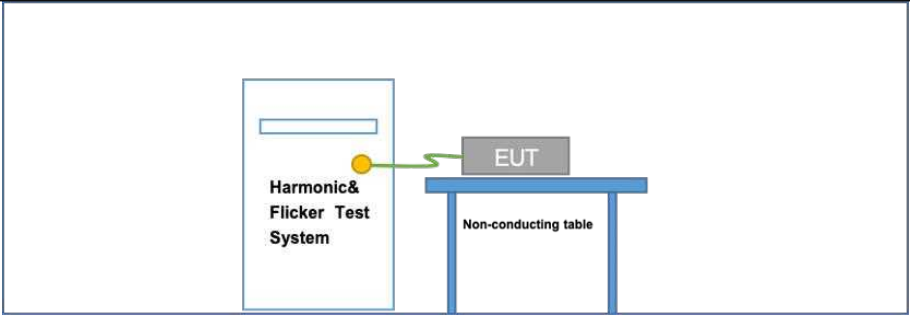
TM2 / Polarization: Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	1308.203	59.76	-49.99	9.76	74.00	-64.24	peak	P
2	1308.203	50.18	-49.99	0.19	54.00	-53.81	AVG	P
3	2071.272	60.61	-49.75	10.87	74.00	-63.13	peak	P
4	2071.272	50.02	-49.75	0.28	54.00	-53.72	AVG	P
5	3210.922	58.17	-49.23	8.94	74.00	-65.06	peak	P
6	3210.922	47.66	-49.23	-1.57	54.00	-55.57	AVG	P
7	4244.963	66.71	-49.24	17.47	74.00	-56.53	peak	P
8	4244.963	56.00	-49.24	6.76	54.00	-47.24	AVG	P
9	4841.678	69.28	-48.86	20.42	74.00	-53.58	peak	P
10	4841.678	58.40	-48.86	9.54	54.00	-44.46	AVG	P
11 *	5784.792	71.83	-48.42	23.41	74.00	-50.59	peak	P
12	5784.792	62.32	-48.42	13.89	54.00	-40.11	AVG	P

TM2 / Polarization: Vertical

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	1222.197	59.38	-50.02	9.36	74.00	-64.64	peak	P
2	1222.197	48.80	-50.02	-1.22	54.00	-55.22	AVG	P
3	2097.895	61.31	-49.73	11.58	74.00	-62.42	peak	P
4	2097.895	51.43	-49.73	1.70	54.00	-52.30	AVG	P
5	3437.549	59.20	-49.28	9.92	74.00	-64.08	peak	P
6	3437.549	48.94	-49.28	-0.35	54.00	-54.35	AVG	P
7	3920.143	66.96	-49.38	17.58	74.00	-56.42	peak	P
8	3920.143	57.33	-49.38	7.95	54.00	-46.05	AVG	P
9	4912.220	69.44	-48.82	20.63	74.00	-53.37	peak	P
10	4912.220	58.87	-48.82	10.06	54.00	-43.94	AVG	P
11 *	5554.016	71.32	-48.52	22.79	74.00	-51.21	peak	P
12	5554.016	61.11	-48.52	12.59	54.00	-41.41	AVG	P

6.4 Voltage fluctuations and flicker

Test Requirement:	EN 301 489-1, clause 8.6 EN 301 489-3, clause 7.1 EN 301 489-17, clause 7.1
Test Method:	EN 61000-3-3, clause 6
Test Limit:	EN 61000-3-3, clause 5
Test Setup:	
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

6.4.1 Test Data

Please Refer to Appendix for Details.

7 Immunity Test Results (EMS)

Performance Criteria for ETSI EN 301 489-1 V2.2.3 (2019-11)

Continuous phenomena:

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

Continuous and non-continuous operation

Latency is the time delay between the initiation and the completion of operation of the EUT.

Correct functioning requires completing the relevant operation within the maximum latency time.

Where the maximum latency is specified in the applicable harmonised radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall be used.

Where this is not the case, then the maximum latency is that required by the intended use of the EUT.

Operating modes

Where the EUT has more than one mode of operation (see clause 4.4.1), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in all modes to confirm there are no such unintentional responses.

Transient phenomena:

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Continuous and non-continuous operation

Latency is the time delay between the initiation and the completion of operation of the EUT.

Correct functioning requires completing the relevant operation within the maximum latency time.

Where the maximum latency is specified in the applicable harmonised radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall be used.

Where this is not the case, then the maximum latency is that required by the intended use of the EUT.

Operating modes

Where the EUT has more than one mode of operation (see clause 4.4.1), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in all modes to confirm there are no such unintentional responses.

Performance Criteria for ETSI EN 301 489-3 V2.3.2 (2023-01)

Performance Criteria

In the table below:

- performance criterion A applies for immunity tests with phenomena of a continuous nature;
- performance criterion B applies for immunity tests with phenomena of a transient nature.

NOTE: Whether a phenomenon is considered transient, continuous or otherwise is indicated in the test procedures for the phenomenon in ETSI EN 301 489-1 [1], clause 9.

Table 2: Performance Requirements

Criterion	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions

B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
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Where "operate as intended" or "no loss of function" is specified, the EUT shall demonstrate correct functioning as described in clause 5.

Where the EUT has more than one mode of operation (see clause 4.5.2), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in sufficient modes to confirm there are no such unintentional responses.

Performance Criteria for ETSI EN 301 489-17 V3.3.1 (2024-09)

Performance criteria

General performance criteria

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Performance table

Performance criteria overview

Table 2: Performance criteria

Criteria	During test	After test (i.e. as a result of the application of the test)
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

Minimum performance level

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

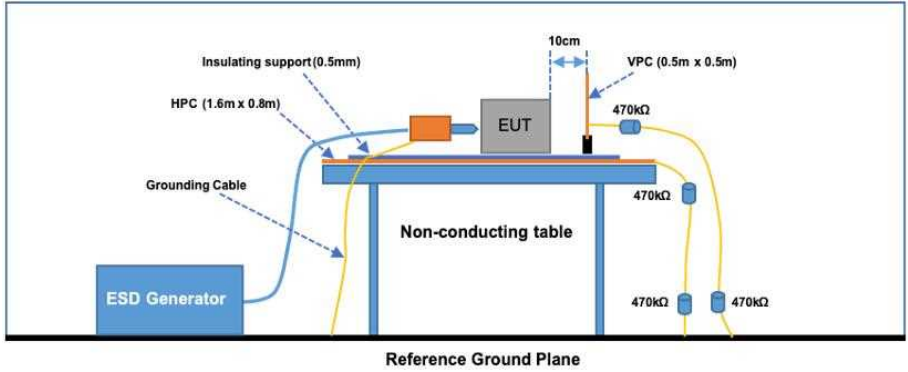
Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

7.1 Electrostatic discharge

Test Requirement:	EN 301 489-1, clause 9.3 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2
Test Method:	EN 61000-4-2, clauses 6, 7 and 8
Procedure:	Discharge Impedance: 330Ω/150pF Number of Discharge: Minimum 10 times at each test point Discharge Mode: Single Discharge Discharge Period: 1 second minimum
Performance Criteria:	TT(B), TR(B)
Test Setup:	
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

7.1.1 Test Data

Discharge type	Volt (kV)	Polarity	Test Point	Result/ Observations
Air discharge	2,4,8	+	1	
Air discharge	2,4,8	-	1	
Contact discharge	4	+	2	
Contact discharge	4	-	2	
Horizontal Coupling	4	+	3	
Horizontal Coupling	4	-	3	
Vertical Coupling	4	+	3	
Vertical Coupling	4	-	3	

Note1:

Test Points:

Air discharge: Red Arrow

Contact discharge: Yellow Arrow

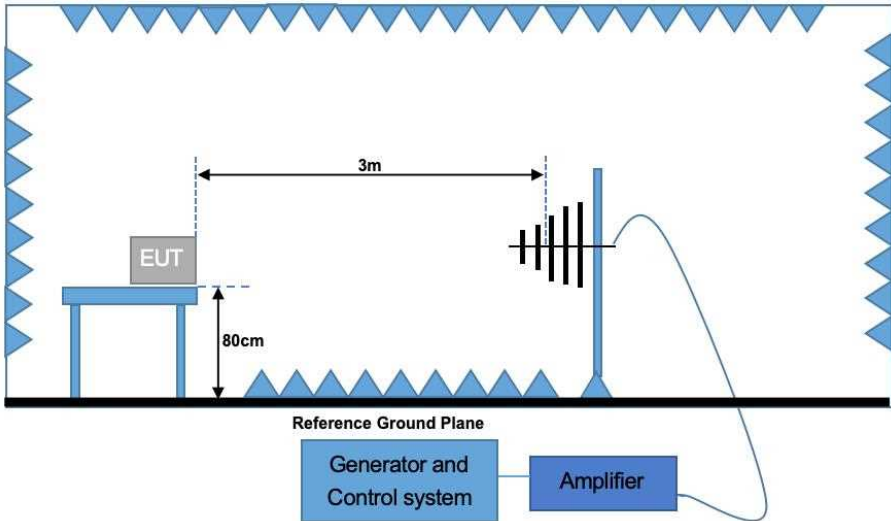
Horizontal / Vertical Coupling: All sides

A: No degradation in the performance of the EUT was observed.

7.1.2 Test Data



7.2 Radio frequency electromagnetic field (80 MHz to 6 000 MHz)

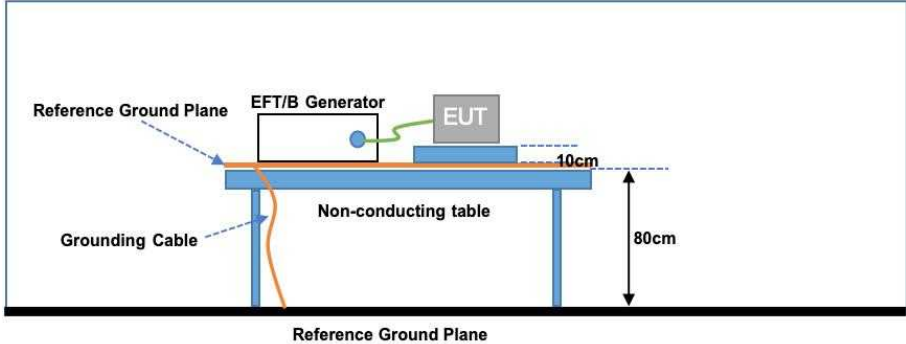
Test Requirement:	EN 301 489-1, clause 9.2 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2
Test Method:	EN 61000-4-3, clauses 6, 7 and 8
Procedure:	Frequency Range: 80MHz to 6GHz Antenna Polarisation: Vertical and Horizontal Modulation: 1kHz,80% Amp. Mod,1% increment
Performance Criteria:	CT(A), CR(A)
Test Setup:	 The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a table at a height of 80cm. A reference ground plane is positioned below the table. An antenna is placed at a distance of 3m from the EUT. The antenna is connected to a Generator and Control system and an Amplifier. The entire setup is enclosed in a shielded room, indicated by the blue zigzag lines representing the walls.
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

7.2.1 Test Data

Frequency	Field Strength (V/m)	EUT face	Dwell time	Result/ Observations
80MHz-6GHz	3	Front	3s	A
80MHz-6GHz	3	Back	3s	A
80MHz-6GHz	3	Left	3s	A
80MHz-6GHz	3	Right	3s	A
80MHz-6GHz	3	Top	3s	A
80MHz-6GHz	3	Bottom	3s	A

A: No degradation in the performance of the EUT was observed.

7.3 Fast transients, common mode (AC power port)

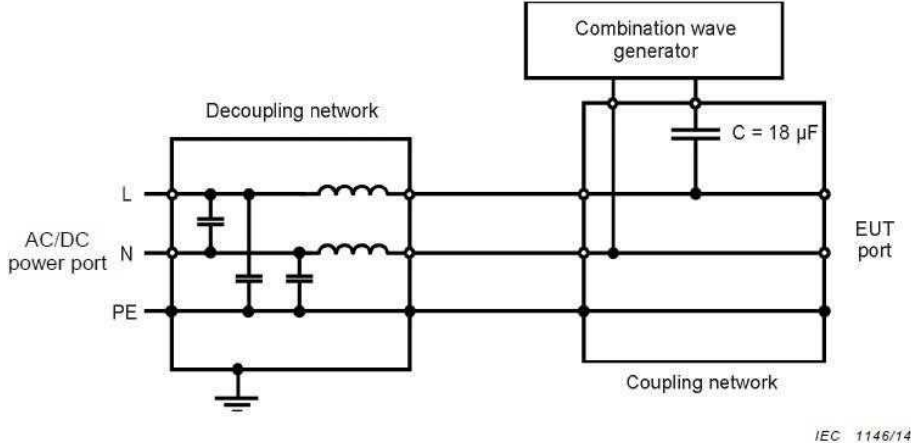
Test Requirement:	EN 301 489-1, clause 9.4 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2
Test Method:	EN 61000-4-4, clauses 5
Procedure:	Repetition Frequency: 5kHz Burst Period: 300ms
Performance Criteria:	TT(B), TR(B)
Test Setup:	
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

7.3.1 Test Data

Port	Volt (kV)	Polarity	CDN/ Clamp	Result/ Observations
AC power port	1	+	CDN	A
AC power port	1	-	CDN	A

A: No degradation in the performance of the EUT was observed.

7.4 Surges (AC power port)

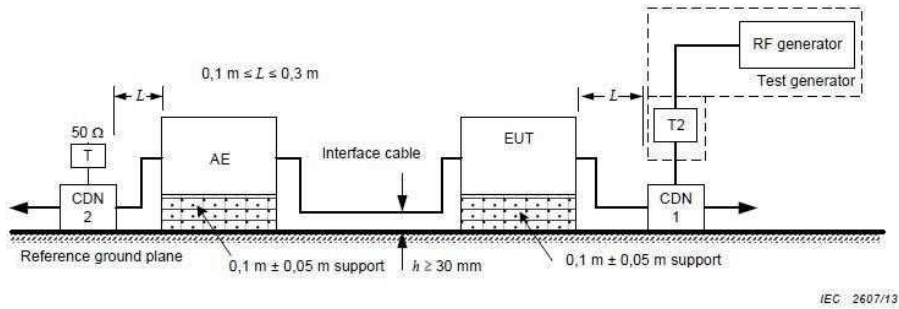
Test Requirement:	EN 301 489-1, clause 9.8 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2
Test Method:	EN 61000-4-5, clauses 7 and 8
Performance Criteria:	TT(B), TR(B)
Test Setup:	
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

7.4.1 Test Data

Port	Volt (kV)	Polarity	Phase(degree)	Result/ Observations
L-N	1	+	0°	A
L-N	1	-	0°	A
L-N	1	-	90°	A
L-N	1	+	90°	A
L-N	1	-	180°	A
L-N	1	+	180°	A
L-N	1	+	270°	A
L-N	1	-	270°	A

A: No degradation in the performance of the EUT was observed.

7.5 Radio frequency, common mode 0,15 MHz to 80 MHz (AC power port)

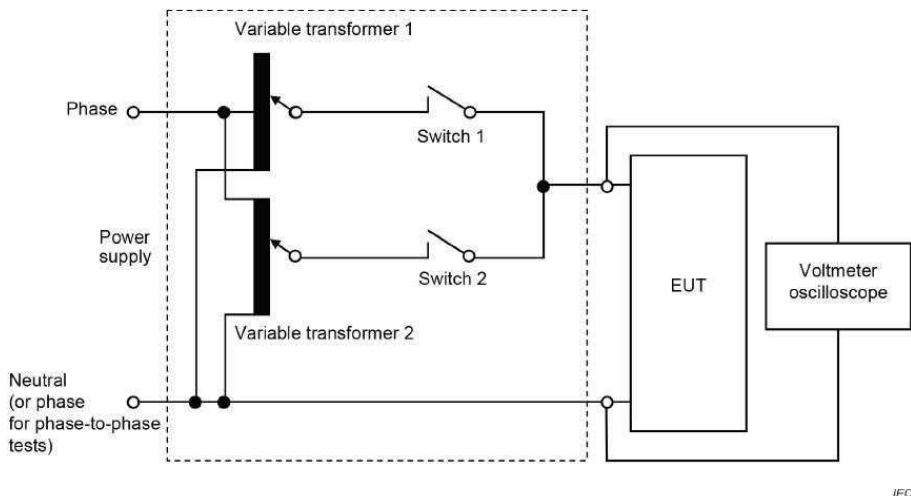
Test Requirement:	EN 301 489-1, clause 9.5 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2
Test Method:	EN 61000-4-6, clauses 6 and 8
Performance Criteria:	CT(A), CR(A)
Test Setup:	
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

7.5.1 Test Data

Port	Strength (Vrms)	CDN/Clamp	Dwell time	Result/ Observations
AC power port	3	CDN	3s	A

A: No degradation in the performance of the EUT was observed.

7.6 Voltage dips and interruptions

Test Requirement:	EN 301 489-1, clause 9.7 EN 301 489-3, clause 7.2 EN 301 489-17, clause 7.2
Test Method:	EN 61000-4-11, clause 8 The test levels shall be: - voltage dip: 0 % residual voltage for 0,5 cycle; - voltage dip: 0 % residual voltage for 1 cycle; - voltage dip: 70 % residual voltage for 25 cycles (at 50 Hz); - voltage interruption: 0 % residual voltage for 250 cycles (at 50 Hz).
Performance Criteria:	Voltage dips: TT(B), TR(B) Voltage interruptions: TT(C), TR(C)
Test Setup:	
Operating Environment:	
Temperature:	25.2 °C
Humidity:	52.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 230V 50Hz

7.6.1 Test Data

Level %UT	Phase (degree)	Duration	No. of Dips/ Interruptions	Result/ Observations
0	0°	0.5 Cycles	3	B
0	180°	0.5 Cycles	3	B
0	0°	1 Cycles	3	B
0	180°	1 Cycles	3	B
0	0°	250 Cycles	3	C
0	180°	250 Cycles	3	C
70	0°	25 Cycles	3	B
70	180°	25 Cycles	3	B

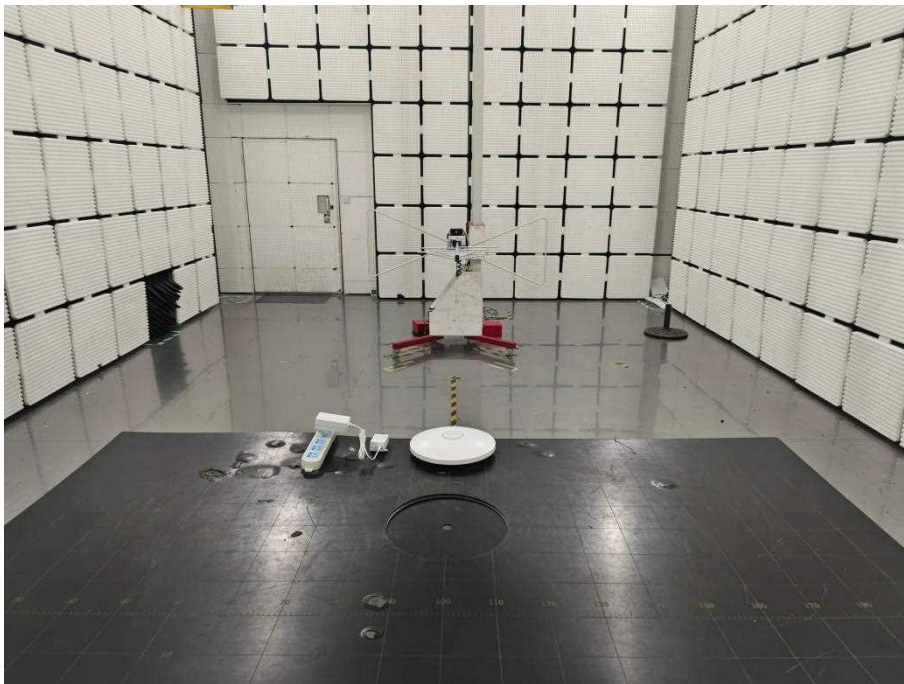
A: No degradation in the performance of the EUT was observed.

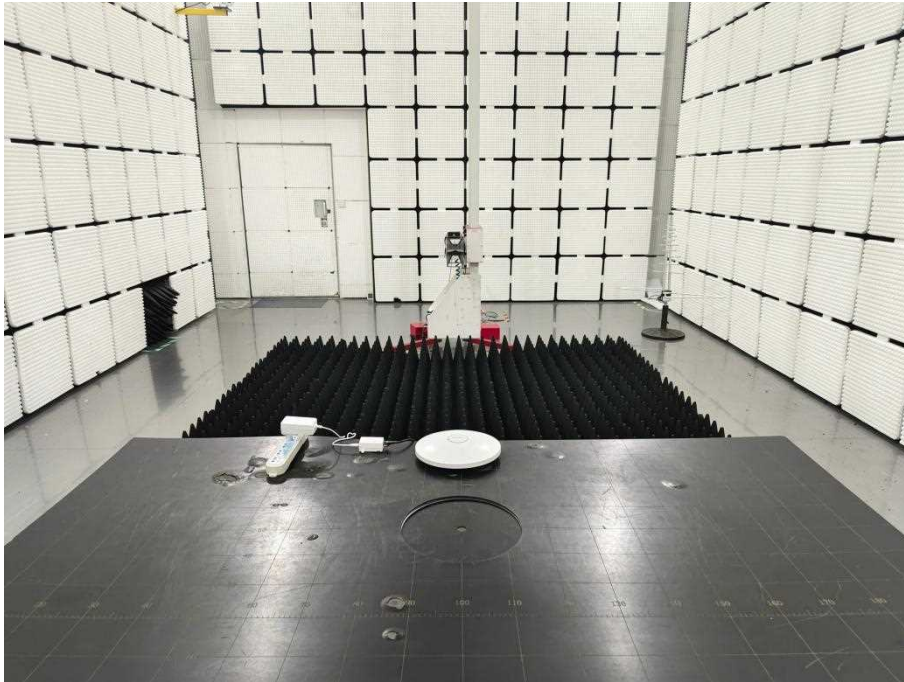
8 Test Setup Photos

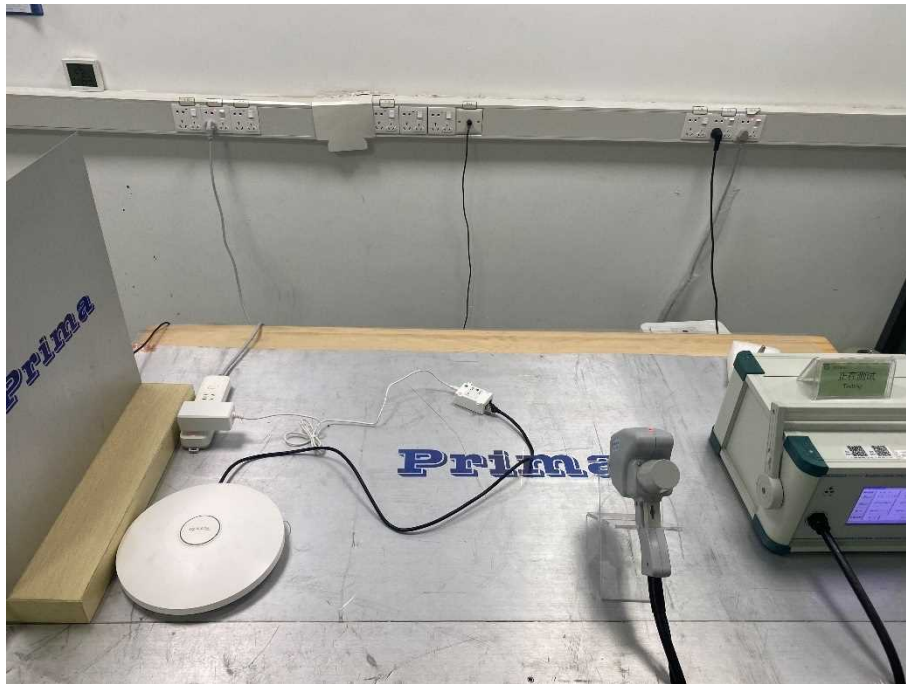
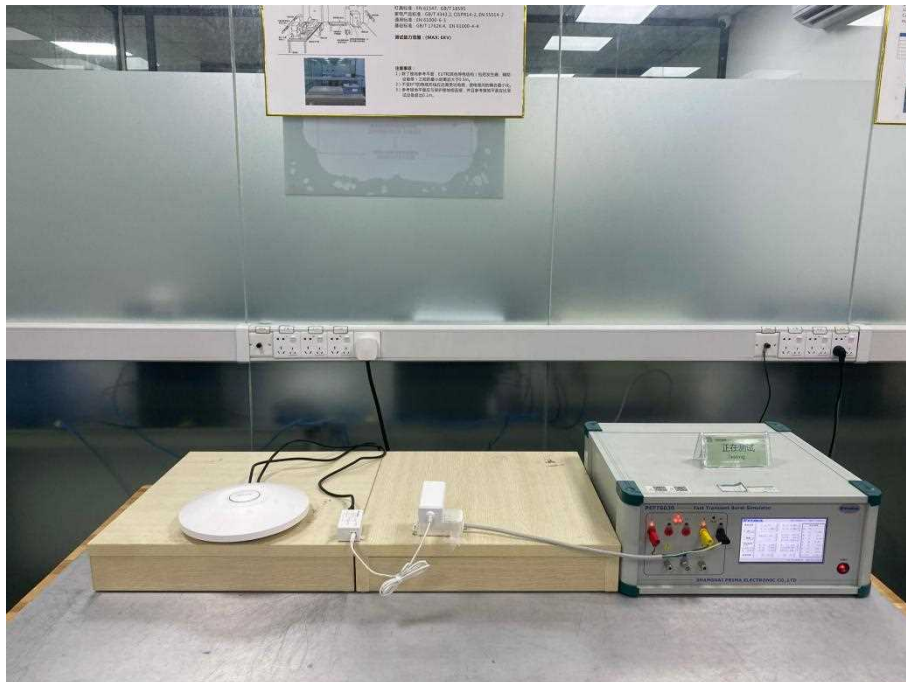
Conducted emissions (AC power port)



Radiated emissions (30MHz-1GHz)



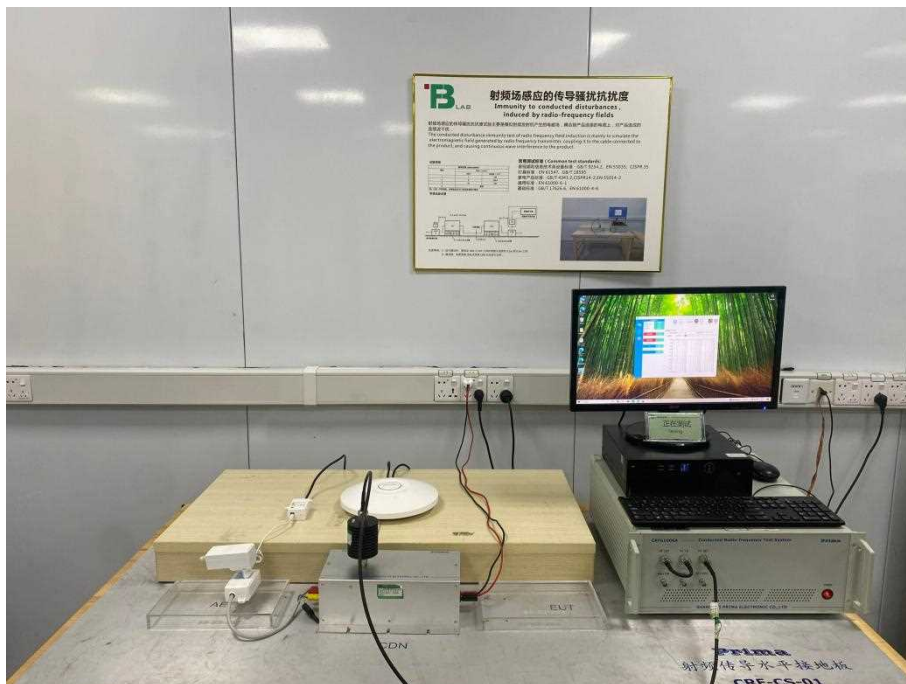
Radiated emissions (above 1GHz)**Voltage fluctuations and flicker**

Electrostatic discharge**Fast transients, common mode (AC power port)**

Surges (AC power port)



Radio frequency, common mode 0,15 MHz to 80 MHz (AC power port)



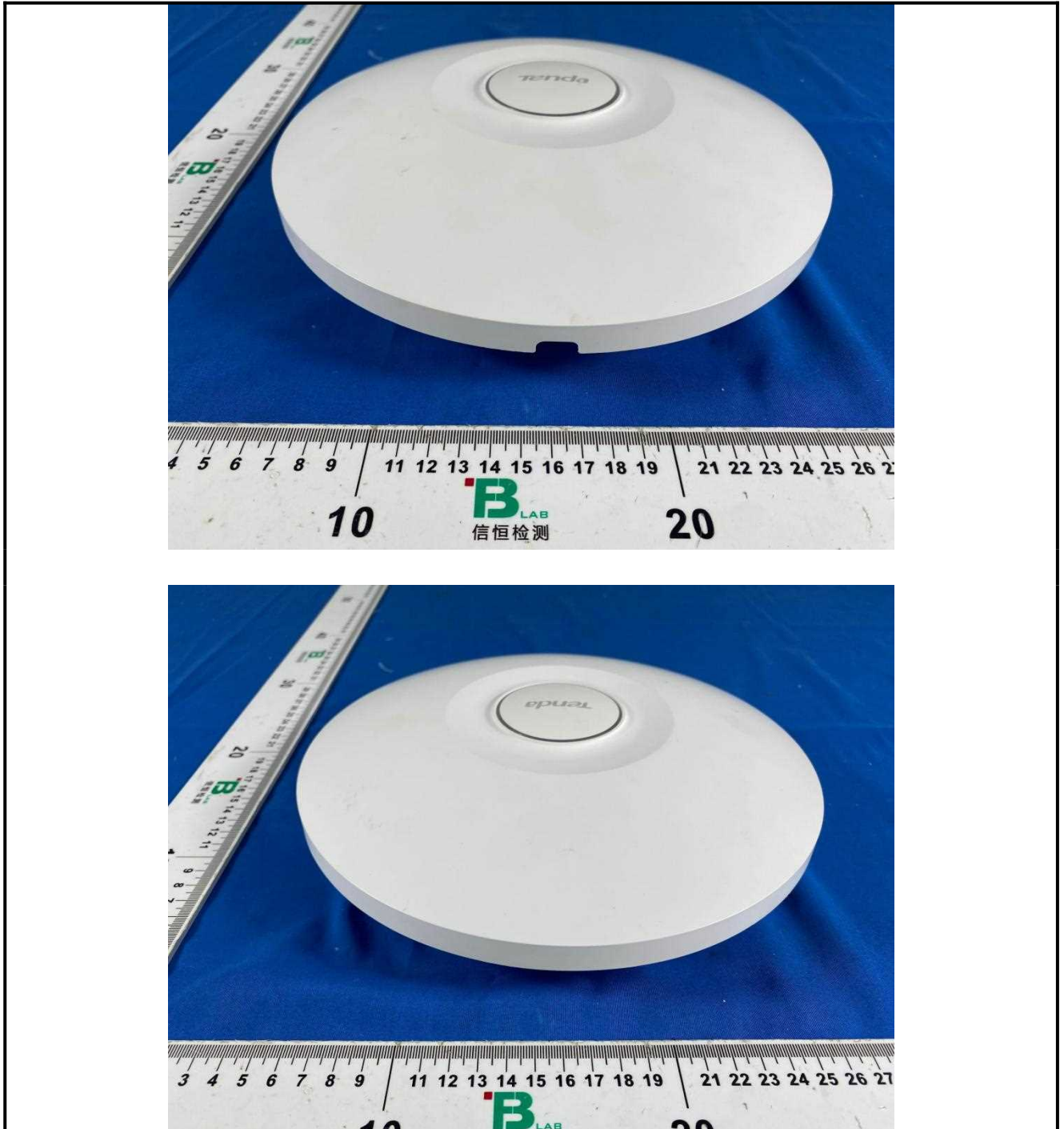
Voltage dips and interruptions

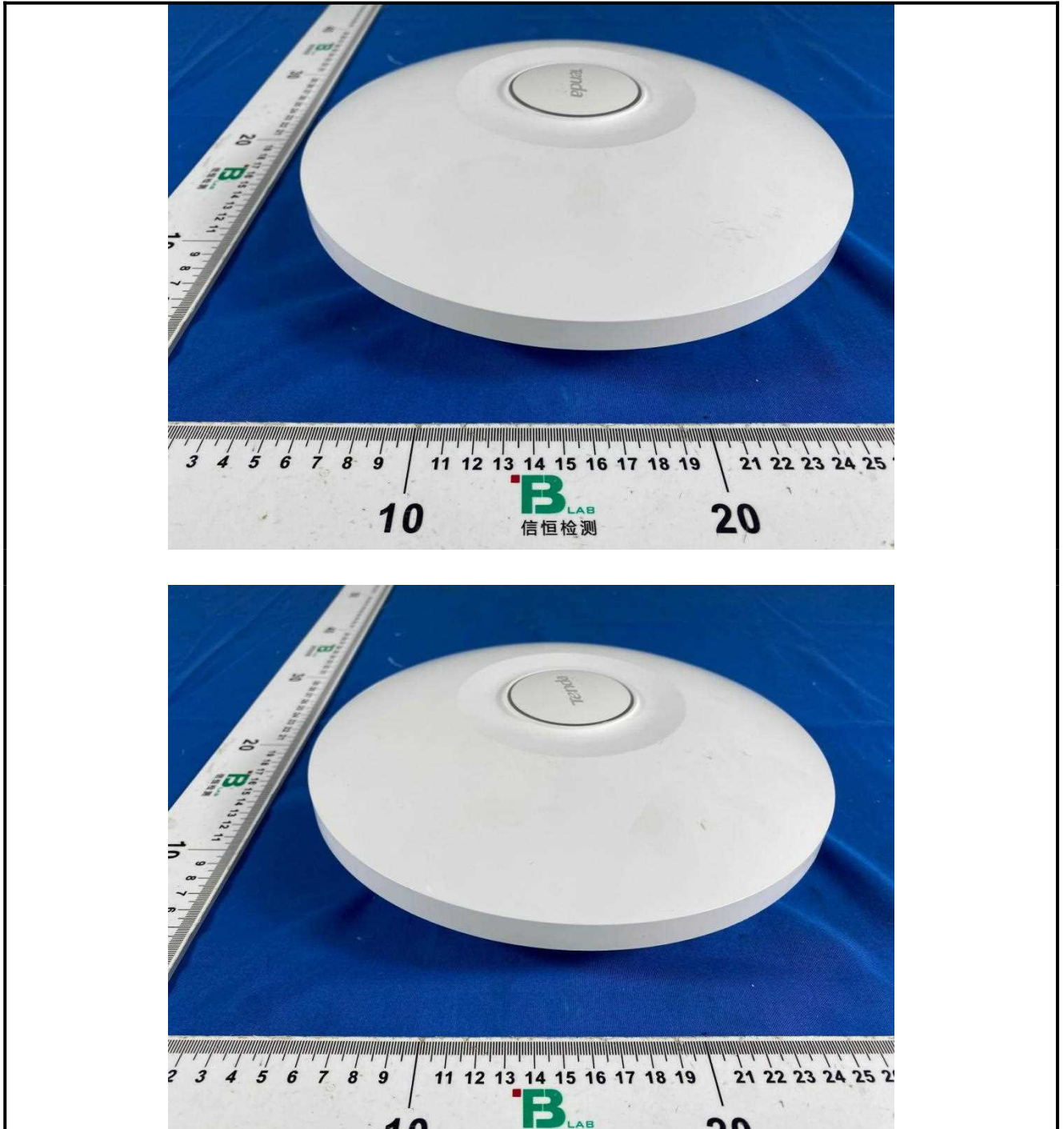


9 EUT Constructional Details (EUT Photos)

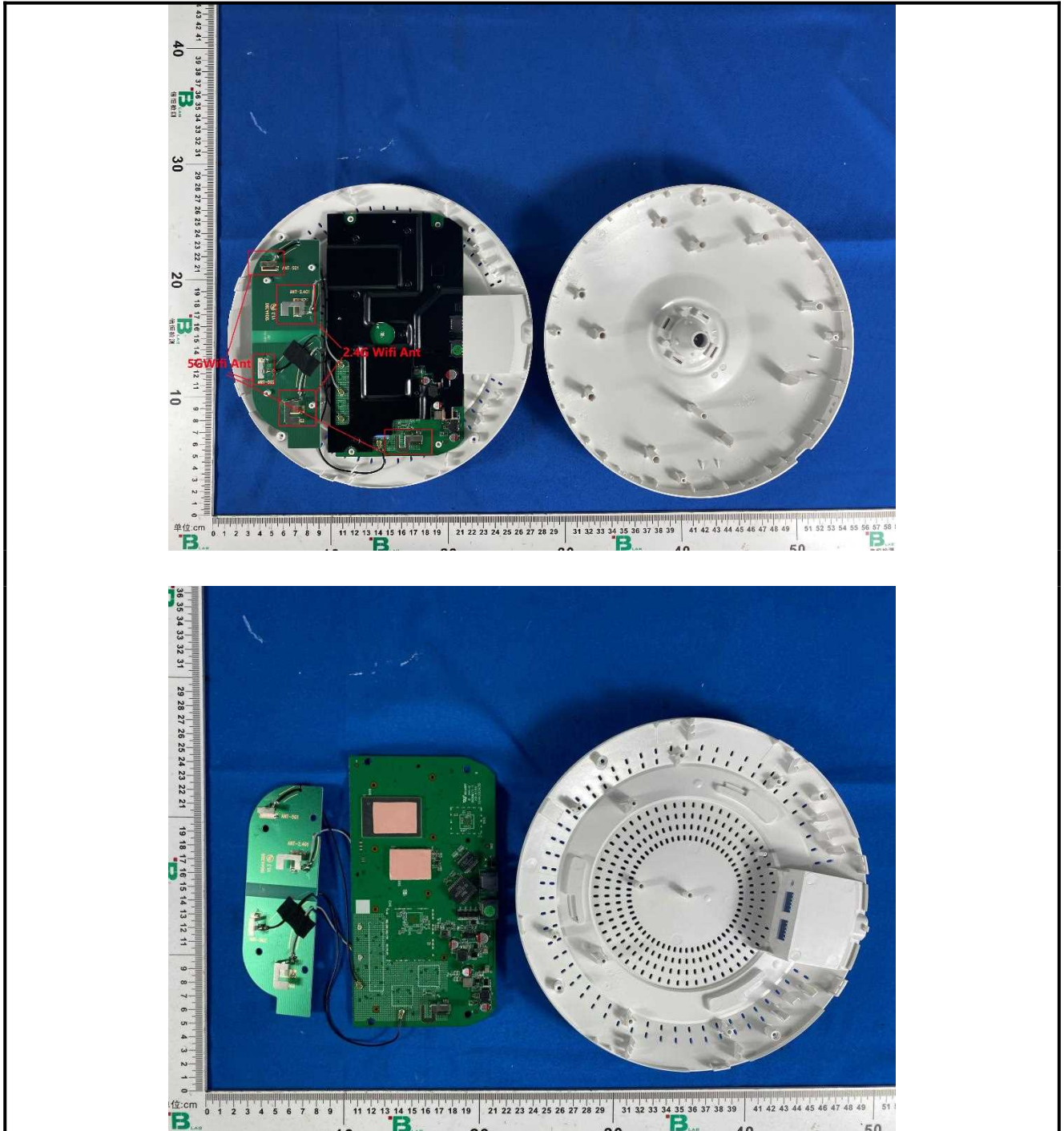


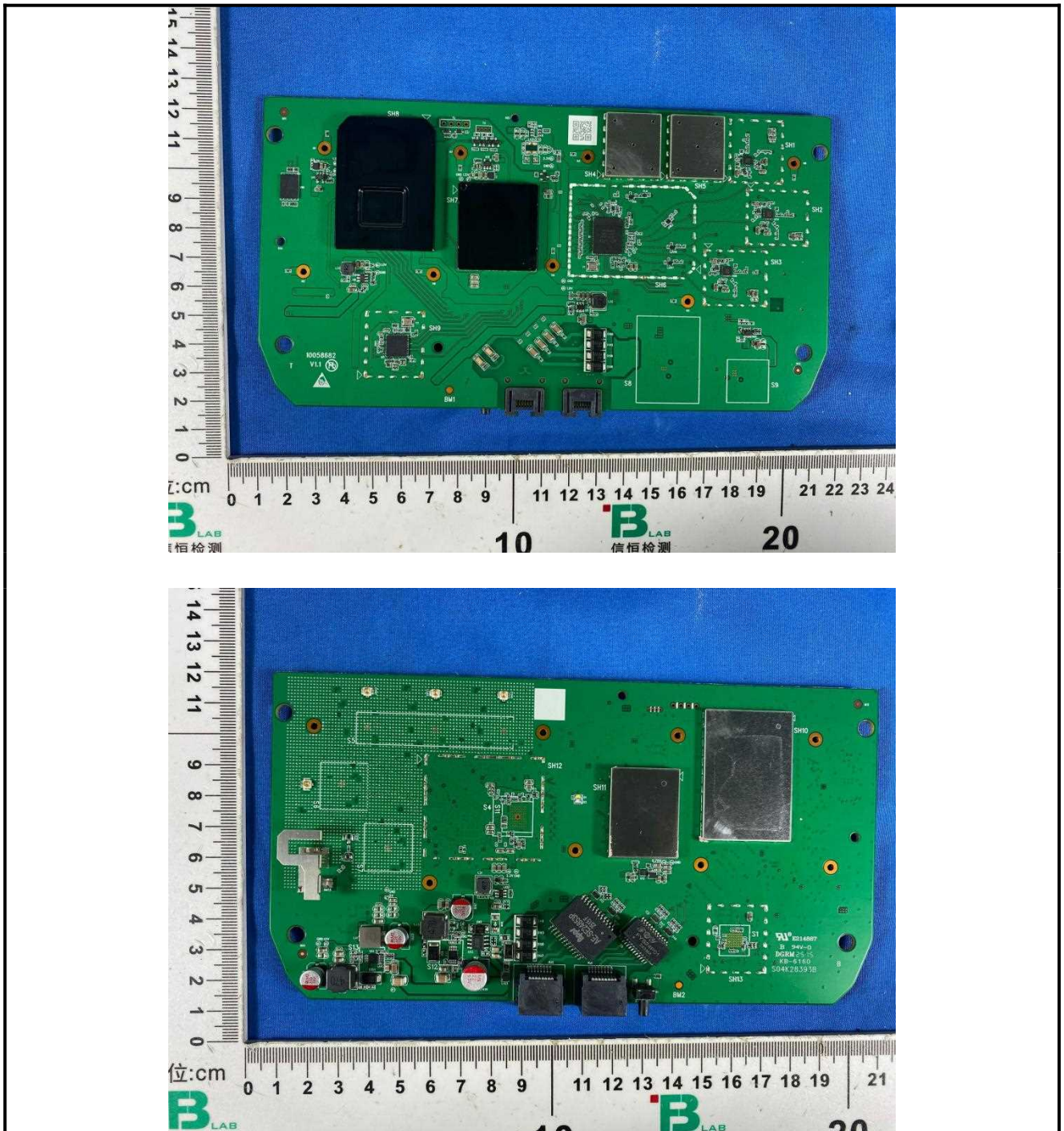


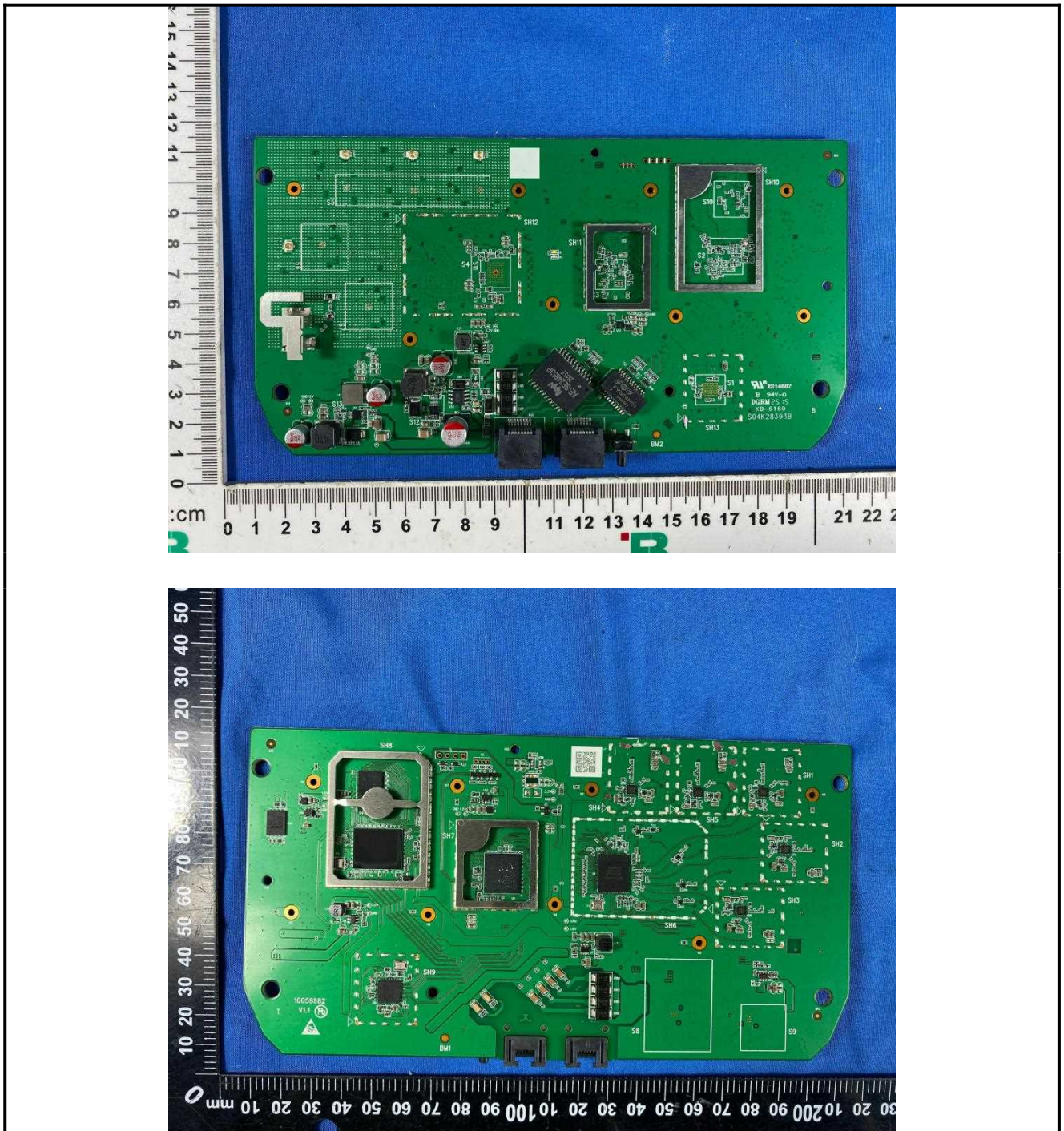


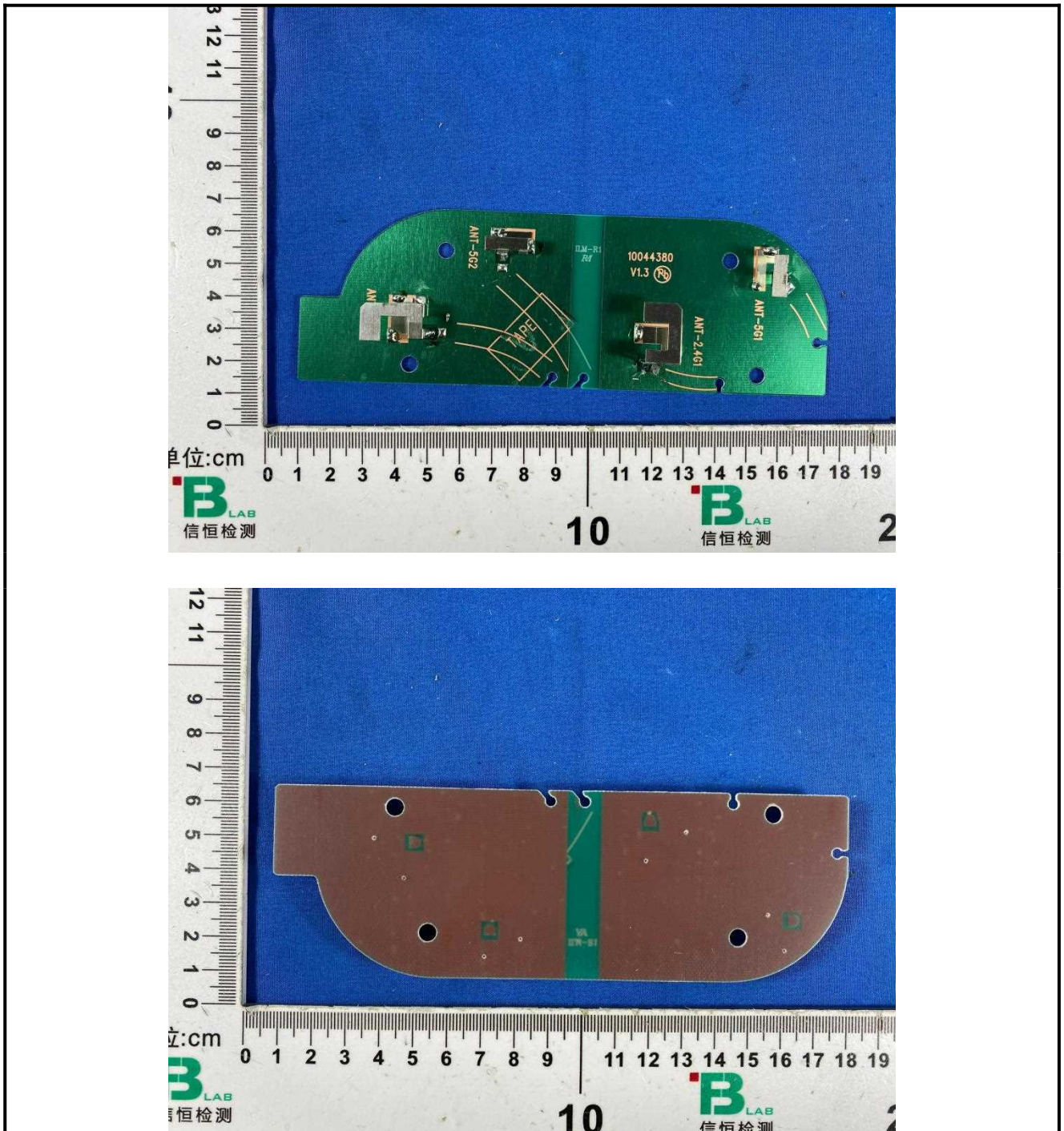














BTF Testing Lab (Shenzhen) Co., Ltd.

101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

www.btf-lab.com

-- END OF REPORT --