



# EMC Measurement and Test Report For

**Meteca SA  
MBC-LR**

**Applicant** : Meteca SA  
**Address** : Via Alla Torre, 2 6850 Mendrisio (CH)  
**Product Name** : MBC-LR  
**Brand Name** : MBC-LR01  
**Model No** : MBC-LR01, MBC-LR01-001  
**Standards** : ETSI EN 301 489-1 V2.2.3 (2019-11)  
: ETSI EN 301 489-3 V2.3.2 (2023-01)  
**Report No** : MTL23110100303E01  
**Date of Receiptsample** : 2023-11-01  
**Date of Test** : 2023-11-01 to 2023-11-30  
**Date of Issue** : 2023-12-04  
**Test Result** : PASS

**Remarks:**

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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**Report version**

Version No.	Date of issue	Description
Rev.00	/	/
/	/	/



## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

## TEST REPORT DECLARATION

**Applicant** : Meteca SA  
**Address** : Via Alla Torre, 2 6850 Mendrisio (CH)  
**Manufacturer** : Meteca SA  
**Address** : Via Alla Torre, 2 6850 Mendrisio (CH)  
**EUT Description** : MBC-LR

(A) Model No. : MBC-LR01  
(B) Serial No. : MBC-LR01-0001  
(C) Power Supply : DC 3.3V

### Test Procedure Used:

**ETSI EN 301 489-1 V2.2.3 (2019-11)**

**ETSI EN 301 489-3 V2.3.2 (2023-01)**

The devices described above have been tested by **ShenzhenMTL Testing Technology Co., Ltd** to determine the maximum emission levels emanating from the device, the severe levels that the device can endure and EUT'S performance criterion. The test results are contained in this test report. **Shenzhen MTL Testing Technology Co., Ltd.** is assumed of full responsibility for the accuracy and completeness of these tests.

This report applies to above tested sample only and shall not be reproduced in part without written approval of **Shenzhen MTL Testing Technology Co., Ltd.**

Prepared by:

## Project Engineer

Reviewed by:

**Project Manager**

Approved by:

## Technical Director





## 1.2 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.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product may be which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with the standard ETSI EN 301489-1, Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements.



#### 1.4EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
Mode 1	MBC-LR	Working

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adapter	/	/	/



## 1.5 Performance Criteria for EMS

### ➤ EN 301 489-3, The performance criteria are:

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

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.





## 1.6 Measurement Uncertainty

Measurement uncertainty	
Parameter	Uncertainty
Uncertainty for Radiated Emission in 3m chamber	@30-200MHz $\pm 4.52\text{dB}$ @0.2-1GHz $\pm 5.56\text{dB}$ @1-6GHz $\pm 3.84\text{dB}$ @6-18GHz $\pm 3.92\text{dB}$
Uncertainty for Conducted Emission	@9-150kHz $\pm 3.74\text{dB}$ @0.15-30MHz $\pm 3.34\text{dB}$
Uncertainty for Harmonic test	3.26%
Uncertainty for Flicker test	4.76%
Uncertainty for RS test	21%, k=2
Uncertainty for CS test	29%, k=2
Uncertainty for ESD test	The immunity measurement system uncertainty is within standard requirement and is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
Uncertainty for EFT test	
Uncertainty for Surges test	
Uncertainty for Voltage Dips, Voltage Variations and Short Interruptions Test	
Uncertainty for PFMF test	

**1.7 Test Equipment List and Details**

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2022-12-28	2023-12-27
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2022-12-28	2023-12-27
Amplifier	Agilent	8447F	3113A06717	2022-12-28	2023-12-27
Amplifier	C&D	PAP-1G18	2002	2022-12-28	2023-12-27
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2022-12-28	2023-12-27
Horn Antenna	ETS	3117	00086197	2022-12-28	2023-12-27
Loop Antenna	Schwarz beck	FMZB 1516	9773	2022-12-28	2023-12-27
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2022-12-28	2023-12-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2022-12-28	2023-12-27
AC LISN	Schwarz beck	NSLK8126	8126-224	2022-12-28	2023-12-27
DC LISN	Schwarz beck	NNBM8126D	279	2022-12-28	2023-12-27
8-WIRE LISN	Schwarz beck	8158	CAT3-8158-0059	2022-12-28	2023-12-27
8-WIRE LISN	Schwarz beck	8158	CAT5-8158-0117	2022-12-28	2023-12-27
Digital Power Analyzer	California Instrument	PACS-1	72831	2022-12-28	2023-12-27
Power Source	California Instrument	5001iX	25965	2022-12-28	2023-12-27
ESD Generator	LIOGCEL	ESD-203B	0170901	2022-12-28	2023-12-27
Signal Generator	Rohde & Schwarz	SMT03	100059	2022-12-28	2023-12-27
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2022-12-28	2023-12-27
Power Amplifier	AR	150W1000	300999	2022-12-28	2023-12-27
Power Amplifier	AR	25S1G4AM1	305993	2022-12-28	2023-12-27
Transient 2000	EMC PARTNER	TRA2000	863	2022-12-28	2023-12-27
CW Simulator	EM Test	CWS 500C	0900-03	2022-12-28	2023-12-27
CDN	Luthi	L-801M2/M3	2665	2022-12-28	2023-12-27
EMC PRO	KEYTEK	EMCPro	0509124	2022-12-28	2023-12-27
Coil	KEYTEK	F-1000-4-8	0533	2022-12-28	2023-12-27
CS Generator	MARCONI	2024	112260/042	2022-12-28	2023-12-27
Attenuator	FRANKONIA	75-A-FFN-06	1001698	2022-12-28	2023-12-27
CDN	FRANKONIA	CDN M2+M3	A3027019	2022-12-28	2023-12-27
Signal Generator	HP	8688B	3438A00604	2022-12-28	2023-12-27
Power Meter	KEITHLEY	3500	1162591	2022-12-28	2023-12-27
Power Meter	KEITHLEY	3500	1121428	2022-12-28	2023-12-27
RF Power Amplifier	MicoTop	MPA-80-1000-250	MPA1906239	2022-12-28	2023-12-27
RF Power Amplifier	MicoTop	MPA-80-1000-100	MPA1906238	2022-12-28	2023-12-27
Antenna	SCHWARZBECK	STLP 9129	9129 114	N/A	N/A



Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

\*Remark: indicates software version used in the compliance certification testing





## 2. SUMMARY OF TEST RESULTS

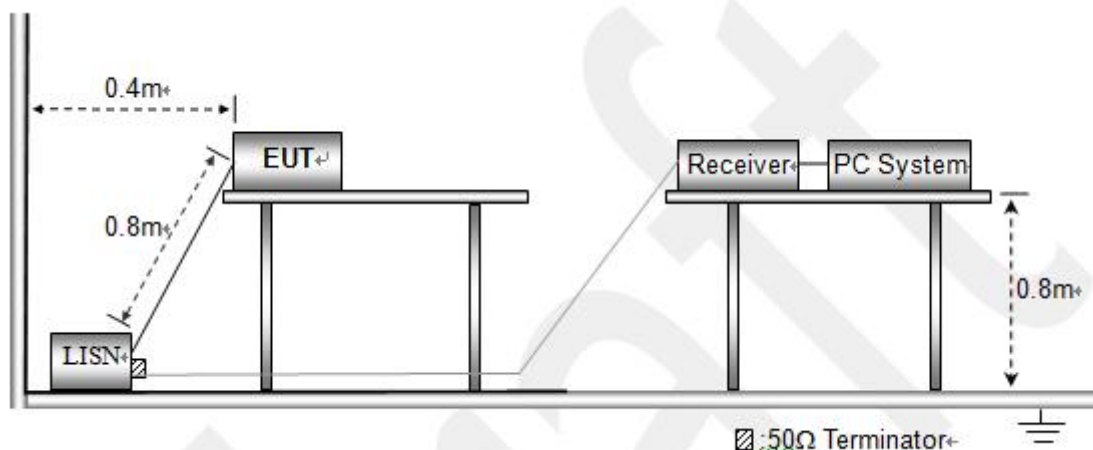
Standards	Reference	Description of Test Item	Result
ETSI EN 301489-1	8.2	Radiated Emissions	Pass
	8.3	Conducted Emissions for DC Power Port	N/A
	8.4	Conducted Emissions for AC Power Port	N/A
	8.5	Harmonic Current Emissions	N/A
	8.6	Voltage Fluctuations and Flicker	N/A
	8.7	Telecommunication Ports	N/A
	9.2	Radio Frequency Electromagnetic Field	Pass
	9.3	Electrostatic Discharge	Pass
	9.4	Fast Transients, Common Mode	N/A
	9.5	Radio Frequency, Common Mode	N/A
	9.6	Transient and Surges in the Vehicular Environment	N/A
	9.7	Voltage Dips and Interruptions	N/A
	9.8	Surges	N/A
<p>Pass: The EUT complies with the essential requirements in the standard. Fail: The EUT does not comply with the essential requirements in the standard. N/A: Not applicable.</p>			

### 3. Conducted Emissions

#### 3.1 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

#### 3.2 Basic Test Setup Block Diagram



#### 3.3 Environmental Conditions

Temperature:	22.5 °C
Relative Humidity:	54 %
ATM Pressure:	1015 mbar

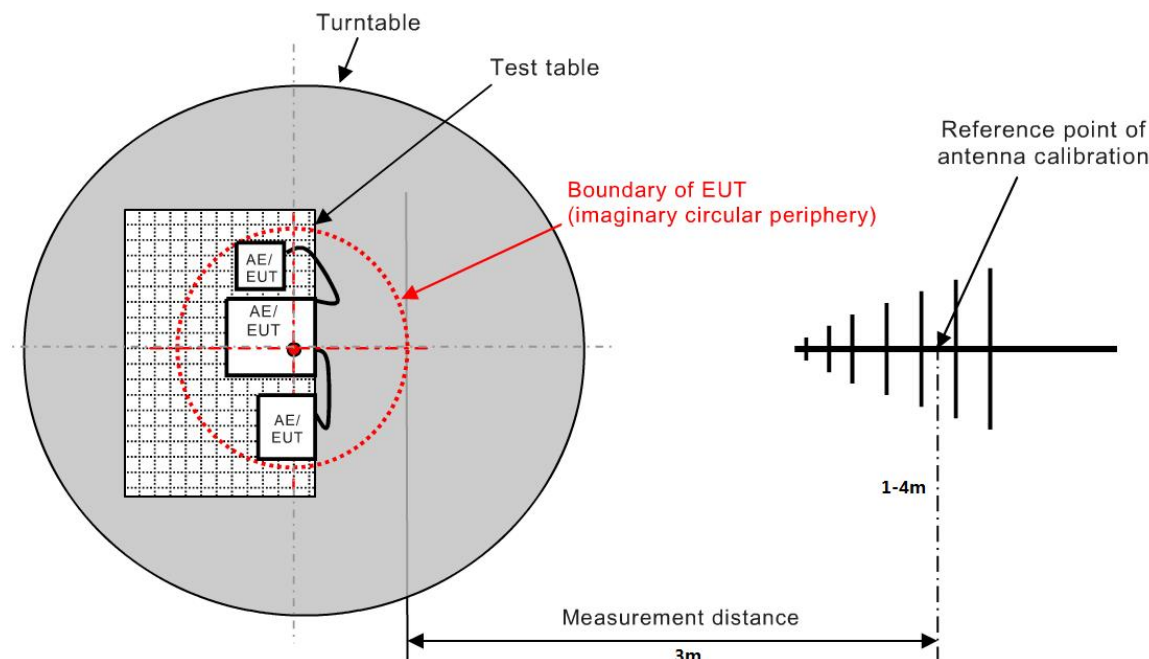
#### 3.4 Conducted Emissions Test Data

EUT is test by DC Power supply, so this test report is not applicable.

## 4. Radiated Emissions

### 4.2 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.



### 4.2 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{EN 301489 Class B Limit}$$





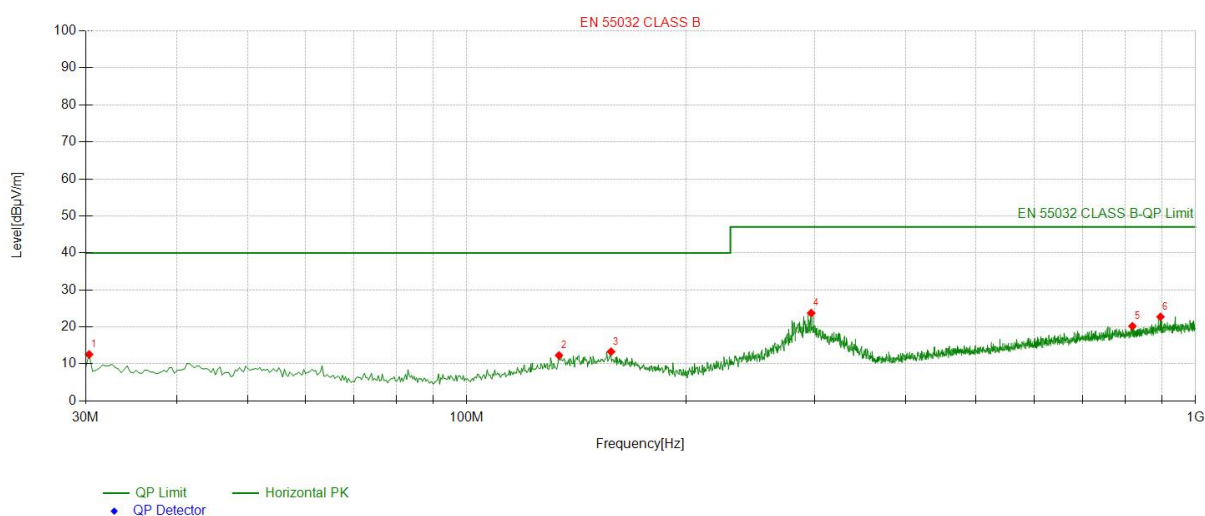
### 4.3 Environmental Conditions

Temperature:	22.5° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

### 4.4 Summary of Test Results/Plots

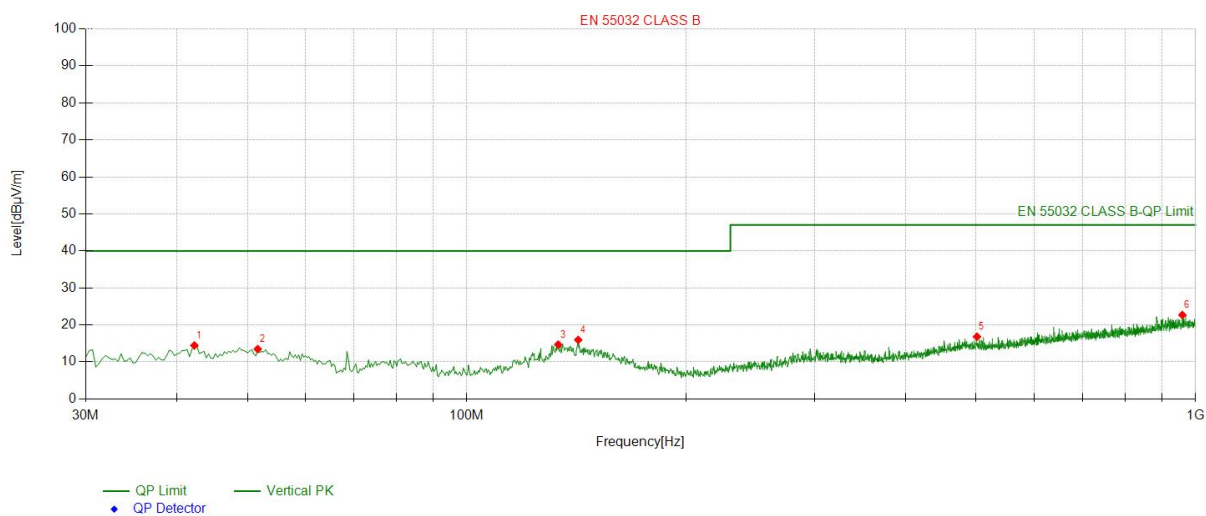
Note: Only show the worst case in the test report

#### ➤ 30MHz to 1GHz



#### Suspected List

NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	30.323441	-17.34	29.89	12.55	40.00	27.45	100	351	Horizontal
2	133.82460	-17.11	29.41	12.30	40.00	27.70	100	217	Horizontal
3	157.75925	-16.02	29.32	13.30	40.00	26.70	100	182	Horizontal
4	296.83894	-17.46	41.20	23.74	47.00	23.26	100	264	Horizontal
5	819.19639	-9.32	29.51	20.19	47.00	26.81	100	137	Horizontal
6	895.20506	-8.40	31.12	22.72	47.00	24.28	100	101	Horizontal

**Suspected List**

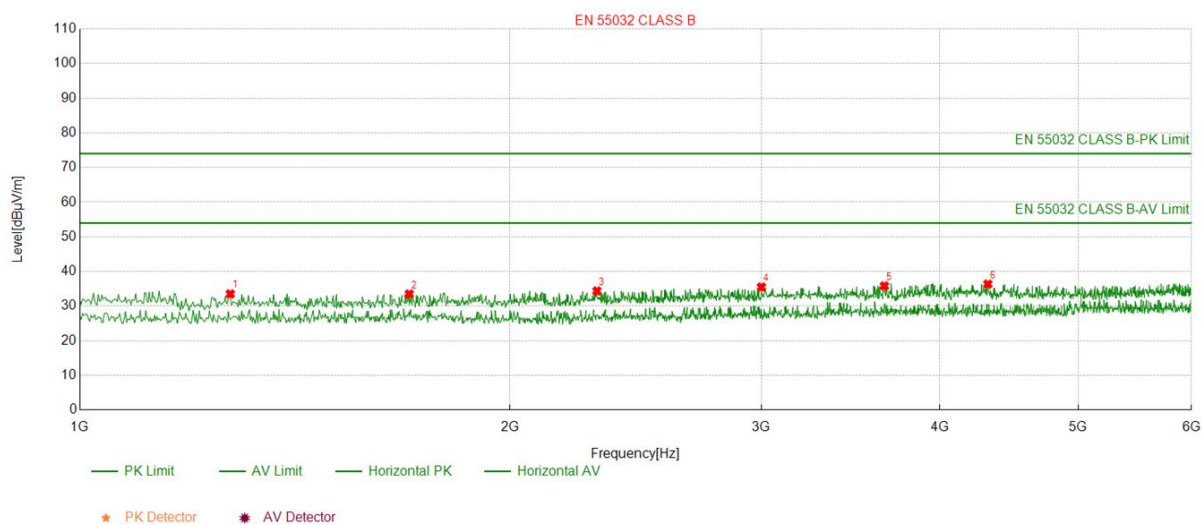
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	42.290764	-16.57	31.02	14.45	40.00	25.55	100	86	Vertical
2	51.670557	-16.95	30.41	13.46	40.00	26.54	100	45	Vertical
3	133.50116	-17.14	31.82	14.68	40.00	25.32	100	332	Vertical
4	142.23407	-16.67	32.61	15.94	40.00	24.06	100	287	Vertical
5	501.25375	-13.83	30.64	16.81	47.00	30.19	100	190	Vertical
6	959.24641	-7.85	30.53	22.68	47.00	24.32	100	320	Vertical

**Remark:**

Factor = Cable loss + Antenna factor – Preamplifier; Level = Reading + Factor; Margin = Limit – Level;

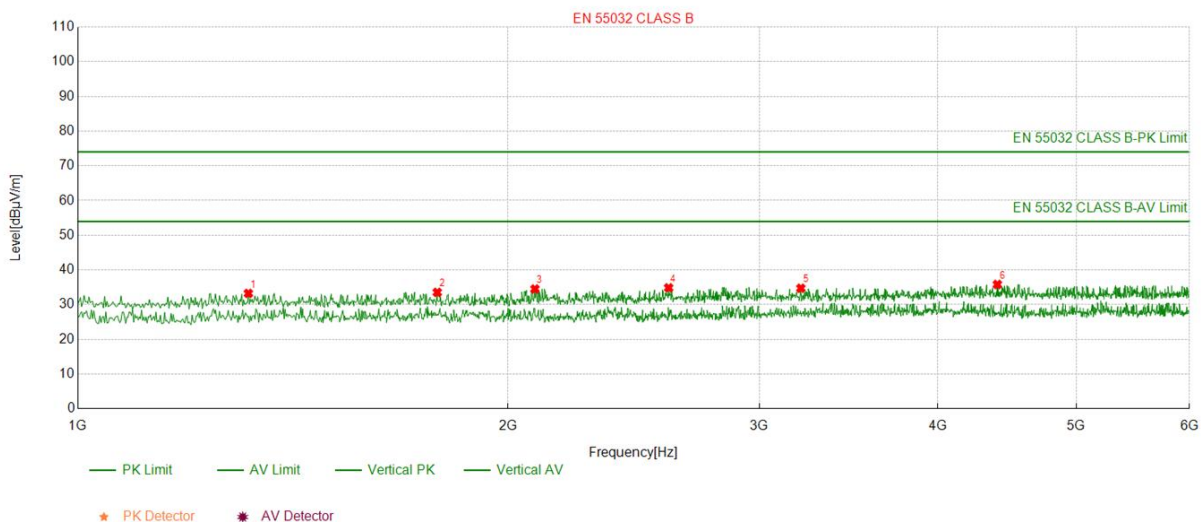


## ➤ Above 1GHz



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1274.2742	-19.85	53.36	33.51	74.00	40.49	100	227	Horizontal
2	1700.7007	-18.59	52.08	33.49	74.00	40.51	100	130	Horizontal
3	2301.3013	-15.76	50.12	34.36	74.00	39.64	100	328	Horizontal
4	3000	-14.47	49.98	35.51	74.00	38.49	100	25	Horizontal
5	3657.6576	-12.99	48.81	35.82	74.00	38.18	100	359	Horizontal
6	4321.3213	-11.45	47.79	36.34	74.00	37.66	100	148	Horizontal



**Suspected List**

NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1316.3163	-19.66	52.90	33.24	74.00	40.76	100	6	Vertical
2	1784.7847	-18.46	52.00	33.54	74.00	40.46	100	176	Vertical
3	2089.0890	-16.99	51.50	34.51	74.00	39.49	100	48	Vertical
4	2591.5915	-14.46	49.32	34.86	74.00	39.14	100	2	Vertical
5	3207.2072	-14.38	49.10	34.72	74.00	39.28	100	31	Vertical
6	4402.4024	-11.22	47.04	35.82	74.00	38.18	100	247	Vertical

Remark:

Factor = Cable loss + Antenna factor – Preamplifier; Level = Reading + Factor; Margin = Limit – Level;

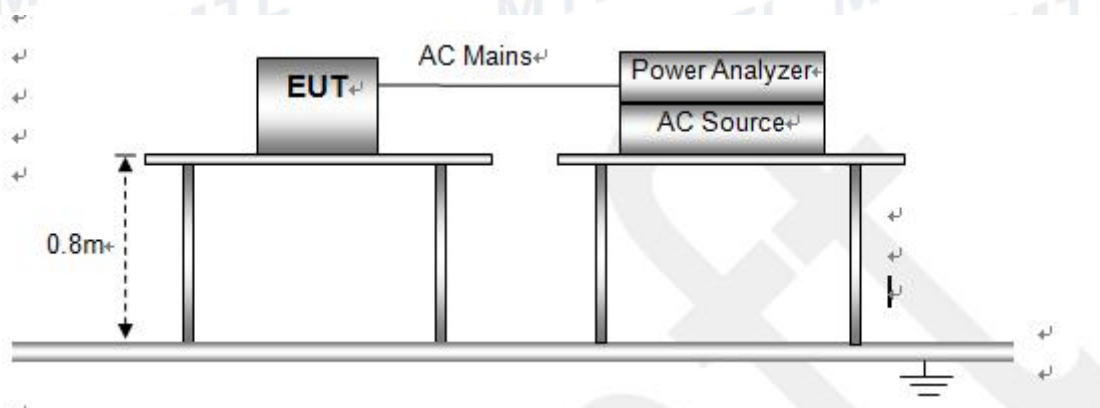


## 5. Harmonic Current Emissions

### 5.1 Test Procedure

Test is conducting under the description of EN 61000-3-2.

### 5.2 Test Setup Block Diagram



### 5.3 Test Standards

EN61000-3-2, Clause 7.1 Limits for Class A equipment.

### 5.4 Environmental Conditions

Temperature:	26°C
Relative Humidity:	55%
ATM Pressure:	1022 mbar

### 5.5 Result:

EUT is test by DC Power supply, so this test report is not applicable.

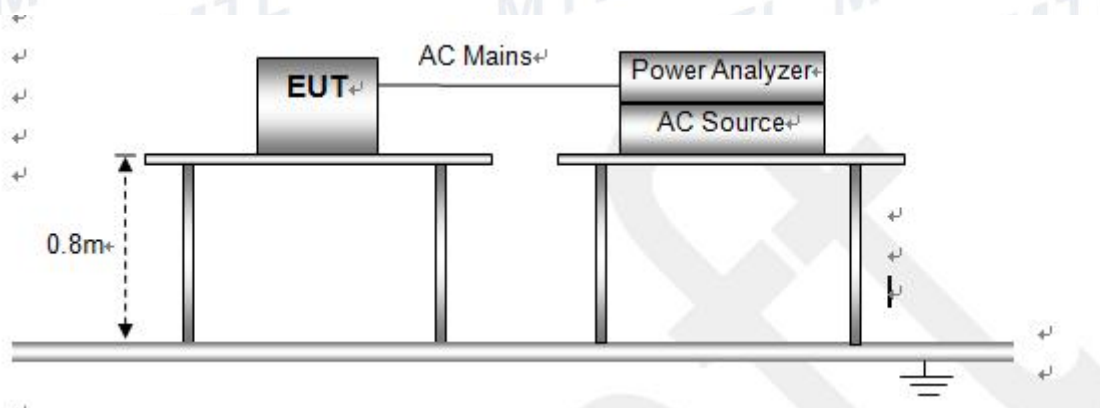


## 6. Voltage Fluctuation and Flicker

### 6.1 Test Procedure

Test is conducting under the description of EN 61000-3-3.

### 6.2 Test Setup Block Diagram



### 6.3 Test Standards

EN61000-3-3, Limit: Clause 5.

### 6.4 Environmental Conditions

Temperature:	26°C
Relative Humidity:	55%
ATM Pressure:	1022 mbar

### 6.5 Result:

EUT is test by DC Power supply, so this test report is not applicable.

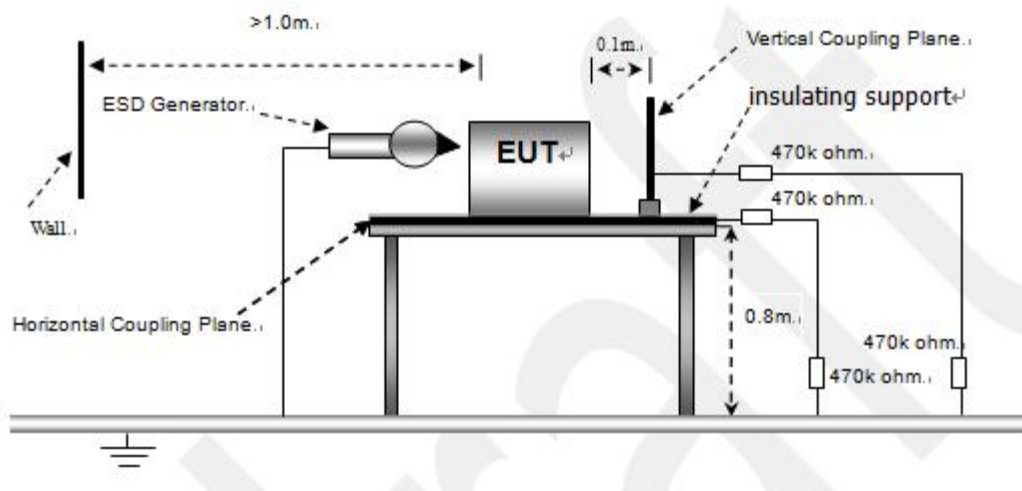


## 7. Electrostatic Discharge (ESD)

### 7.1 Test Procedure

Test is conducting under the description of EN 61000-4-2.

### 7.2 Test Setup Block Diagram



### 7.3 Test Performance

Performance Criterion:	Mode	Verdict
	Mode 1	B
Note:		

### 7.4 Environmental Conditions

Temperature:	26°C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

**7.5 Electrostatic Discharge Immunity Test Data**

Test mode	Mode 1							
EN 61000-4-2	Test Levels (kV)							
Test Points	-2	+2	-4	+4	-6	+6	-8	+8
Air Discharge								
Charging Port	/	/	/	/	/	/	/	/
Enclosure	/	/	/	/	/	/	/	/
Direct Contact Discharge								
/	/	/	/	/	/	/	/	/
Indirect Contact Discharge								
HCP(6 Sides)	A	A	A	A	/	/	/	/
VCP(4 Sides)	A	A	A	A	/	/	/	/

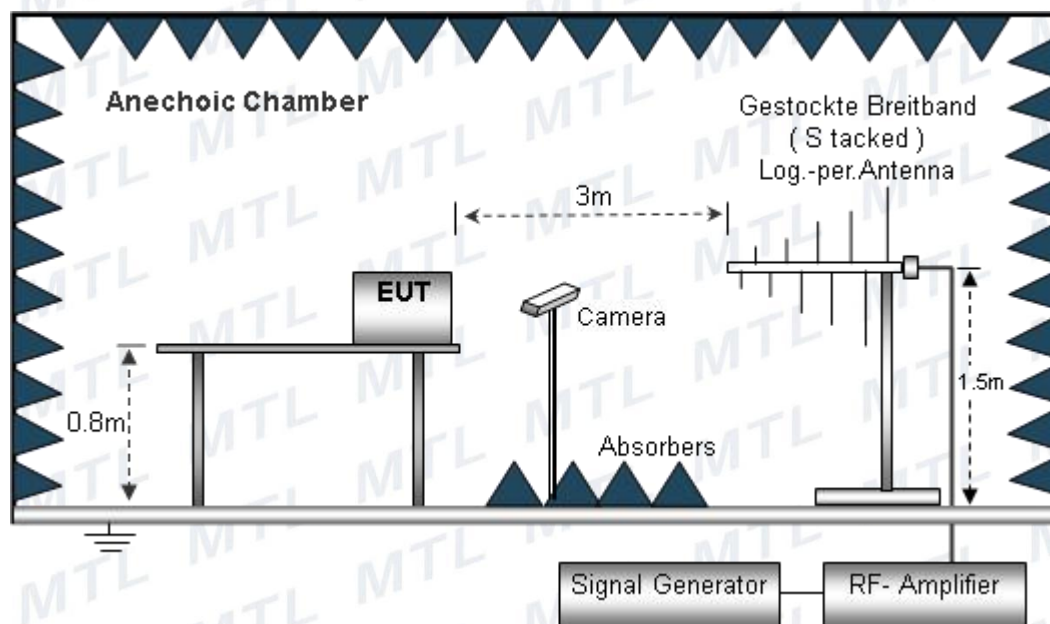
Test Result: Pass

## 8. Radio Frequency Electromagnetic Field (R/S)

### 8.1 Test Procedure

Test is conducting under the description of EN 61000-4-3.

### 8.2 Test Setup Block Diagram



### 8.3 Test Performance

Performance Criterion:	Mode	Verdict
	Mode 1	A
Note:		

### 8.4 Environmental Conditions

Temperature:	25°C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

### 8.5 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental

Dwell time: 1 second

Modulation: AM by 1kHz sine wave with 80% modulation depth





Test mode		Mode 1							
Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-6000	3	A	A	A	A	A	A	A	A
1800(±1%), 2600(±1%), 3500(±1%), 5000(±1%)	3	A	A	A	A	A	A	A	A

Test Result: Pass



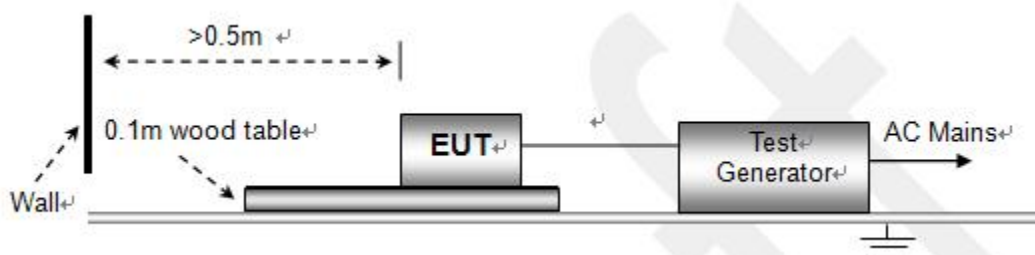
## 9. Fast Transients, Common Mode (EFT)

### 9.1 Test Procedure

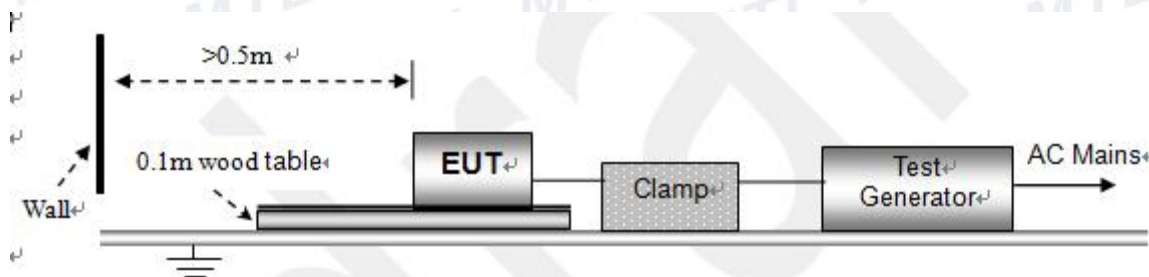
Test is conducting under the description of EN 61000-4-4.

### 9.2 Test Setup Block Diagram

For AC Mains or DC Ports:



For Signal or Telecommunication Ports:



### 9.3 Test Performance

Performance Criterion:	Mode	Verdict
	Mode 1	B
Note:		

### 9.4 Environmental Conditions

Temperature:	22°C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

### 9.5 Result:

EUT is test by DC Power supply, so this test report is not applicable.



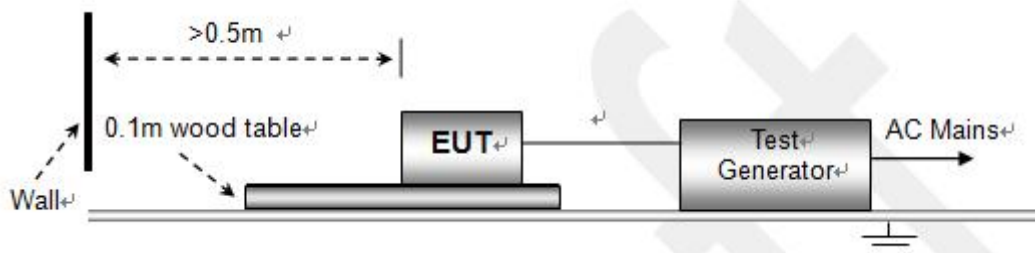
## 10. Surges

### 10.1 Test Procedure

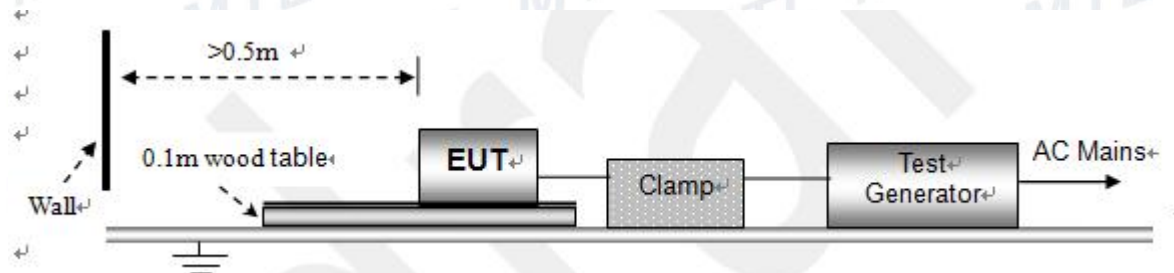
Test is conducting under the description of EN 61000-4-5.

### 10.2 Test Setup Block Diagram

For AC Mains or DC Ports:



For Signal or Telecommunication Ports:



### 10.3 Test Performance

Performance Criterion:	Mode	Verdict
	Mode 1	
Note:		B

### 10.4 Environmental Conditions

Temperature:	25°C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

### 10.5 Result:

EUT is test by DC Power supply, so this test report is not applicable.





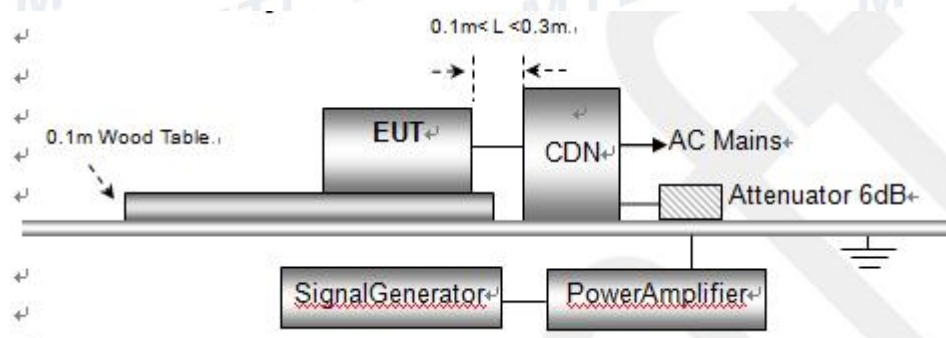
## 11. Radio Frequency, Common Mode (C/S)

### 11.1 Test Procedure

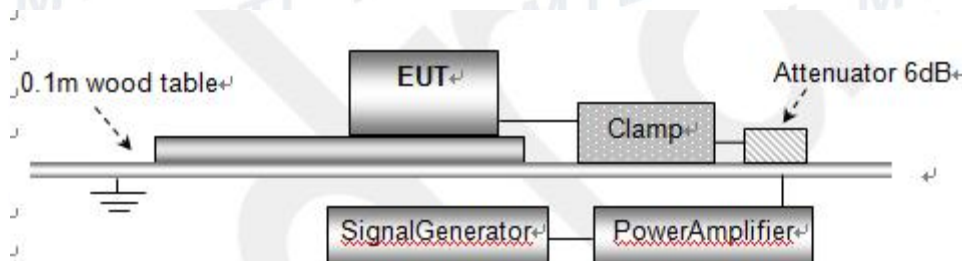
Test is conducting under the description of EN 61000-4-6.

### 11.2 Test Setup Block Diagram

For AC Mains or DC Input:



For Signal or Telecommunication Ports:



### 11.3 Test Performance

Performance Criterion:	Mode	Verdict
	Mode 1	
Note:		A

### 11.4 Environmental Conditions

Temperature:	25°C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

### 11.5 Result:

EUT is test by DC Power supply, so this test report is not applicable.

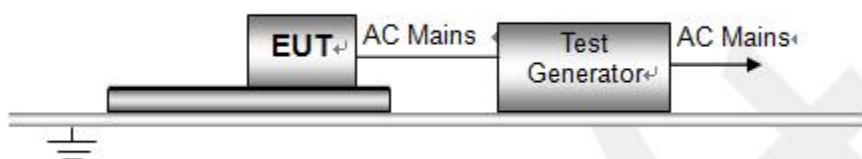


## 12. Voltage Dips and Interruptions

### 12.1 Test Procedure

Test is conducting under the description of EN 61000-4-11.

### 12.2 Test Setup Block Diagram



### 12.3 Test Performance

Performance Criterion:	Mode	Verdict
	Mode 1	B for voltage dip/ C for voltage interruption
Note:		

### 12.4 Environmental Conditions

Temperature:	25°C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

### 12.5 Result:

EUT is test by DC Power supply, so this test report is not applicable.



### 13. Test Set-up Photos of the EUT

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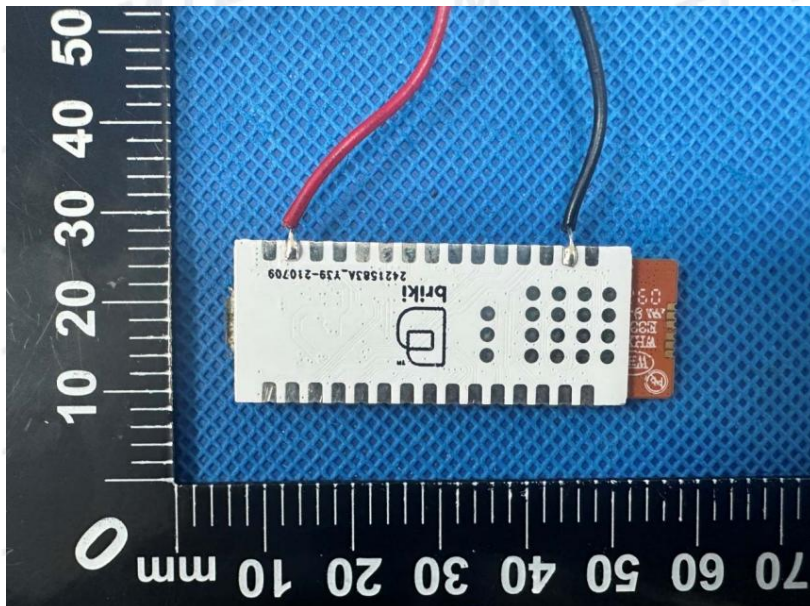
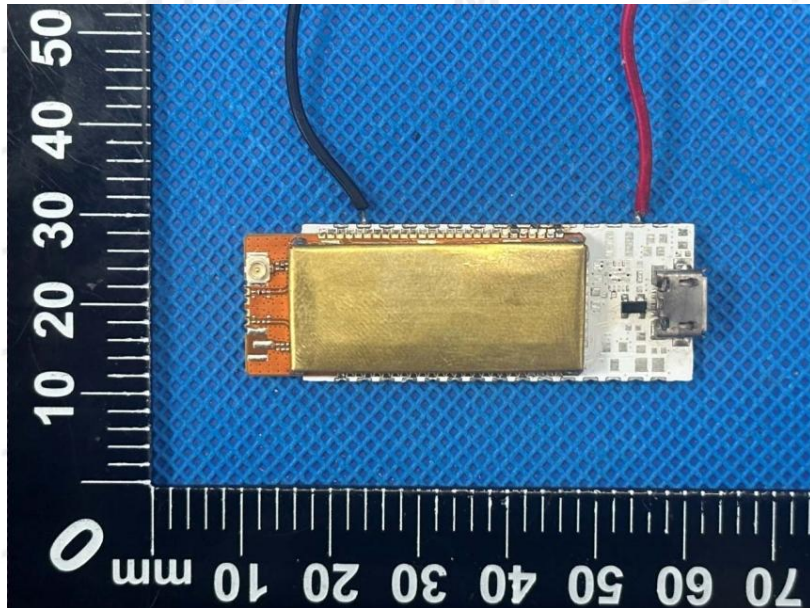






## 14. PHOTOS OF THE EUT

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\*\*\*End of Report\*