

# User Manual

When displaying the TARIFF 1 , press and hold the [Set] button for 3 seconds to enter the rate setting.

Press [+] or [-] to select between TARIFF1 and Dual Tariff.

Press the [OK] key to confirm your choice and enter the next setting menu.

### **If your choice is single rate/tariff,**

Press [+] or [-] to select the setting data.

Press the [History] key to switch between digit positions.

Press the [OK] key to confirm the current setting.

### **If your choice is dual rate/tariff,**

Press [+] or [-] to select the setting data.

Press the [History] key to switch between digit positions.

Press the [OK] key to confirm the current setting and please refer to following example

#### **{Example: Setting Double Rate}**

Rate 1: 1.00 \$/KWh starting from 8:00;

Rate 2: 0.50 \$/KWh Starting from 23:00, then:

During 8: 00~23:00 at a unit price of \$1/Kwh.

During 23:00~8:00, at a unit price of \$0.5/Kwh.



Default value: 0.86 KgCO<sub>2</sub>/KWh.

When the carbon emission unit is displayed, press and hold the [Set] button for 3 seconds to enter the carbon emission setting.

Press [+] or [-] to select the setting value.

Press the [History] key to switch between digit positions.

Press the [OK] key to save the current settings and exit.



#### **4.Data Reset:**

Press the [+] and [-] keys simultaneously for 3 seconds, and the display will flash,

Press the [Set] button again for 3 seconds to reset for factory setting and clear the data.

#### **5.Technical parameters:**

##### 5.1 Display Range

Total power consumption time display range: 0 minutes, 0 seconds -9999 days

- Power display range: 0.000-9999W
- Voltage display range: 0.000-9999V
- Current display range: 0.000-9999A
- Power data display range: 0.000-9999KWh

##### 5.2 Working conditions:

- Working voltage: 230VAC/50HZ
- Max current: 16A
- Max power: 3680W

##### 5.3 Warning:

For indoor use only and keep out of water!

Do not exceed the max power!

#### **General Description:**

Plug the power meter into a household 230 VAC wall-outlet, and connect with appliances such as refrigerators, televisions, air conditioners, etc. or connect with microinverter Schuko plug into the power meter. The power meter displays parameters such as power (watts), electricity consumption (kilowatt hours), and electricity bill , and can visually display the electricity consumption/generation for the past 7 days, 7 weeks, and 7 months.

#### **1.Real-Time Display**

Press the [Energy] button repeatedly to display in sequence as following:



Power (W): Display real-time power.



AC Voltage(V)



Frequency(Hz)



Current(A)



Power factor: 1.00 means resistive load, < 1 means inductive load.



Maximum power: The maximum instantaneous power of overall connection.



Maximum current: The maximum instantaneous current of overall connection.



Overload alarm wattage: Defaults to 3680W. When the actual power exceeds this value, "Overload" flashes.

#### ●How to DIY set the Overload alarm wattage?

When the overload alarm wattage is displayed, press and hold the [Energy] button for 3 seconds to set the overload alarm value.

Press the [+] or [-] keys to adjust the number.

Press the [History] key to switch between digit positions.

Press the [OK] key to confirm and exit the settings.

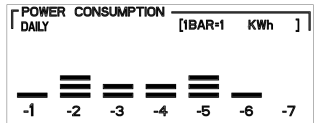
- Warning: For the purpose of safety, the Pre-set overload alarm wattage should be less than 3680W.

## 2. Historical display

Press the [History] button repeatedly to display the electricity chart for the past 7 days, past 7 weeks, and past 7 months.

- Chart is only giving a brief and rough data; For precise-data Please take further view
- When home applicant is connected to the Energy Meter, the data is showing the consumption data; When the output of microinverter connected to the energy meter, the data is showing the generation data

### # Chart View



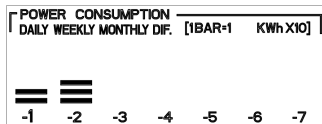
Power Data in the past 7 days

When in Daily Data Chart, 1BAR=1KWh indicates that 1<sup>st</sup> horizontal line represents 0.1~1.0KWh, and 2<sup>nd</sup> horizontal line represents 1.1~2.0KWh, etc...



Power Data in the past 7 weeks

When in Weekly Data Chart, 1BAR=3KWh represents 1<sup>st</sup> horizontal line representing 0.1~3KWh, and 2<sup>nd</sup> horizontal line represents 3.1-6.0KWh displays two horizontal lines, etc...



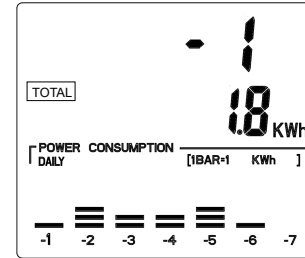
Power Data in the past 7 months

When in Monthly Data Chart, 1BAR=10KWh represents 1<sup>st</sup> horizontal line representing 0.1~10KWh, and 2<sup>nd</sup> horizontal line represents 10.1-20.0KWh displays two horizontal lines, etc...

### #Precise View

Long press and hold the [History] button for 3 seconds to display the precise value

- Before Holding the [History] button for 3 seconds, check the display for Daily or Weekly or Monthly, When enter precise view, accordingly the data will be for Daily or Weekly or Monthly.



Press the [+] or [-] keys to view the precise value of total electricity consumption in the past 1-7 days/week/month.

## 3. Cost and time display

Press the [Cost] button repeatedly to display in sequence:

- Please refer to the second row on the display;



Clock: display the current time.

Press the [Set] button for 3 seconds to enter the clock setting.

Press the [+] or [-] keys to adjust the number.

Press the [History] key to switch between digit positions.

Press the [OK] key to complete the settings and exit.

Press the [History] and [Energy] buttons simultaneously for 3 seconds, and select the 12/24 hour display.



Total power time

Display the total operating time when the power of the connected electrical appliance is greater than 1W.

**Note:** In the first hour, the second row displays: first 2 numbers to be minutes and second 2 numbers to be seconds.

Afterwards, the second row displays: first 2 numbers to be hours and second 2 numbers to be minutes.

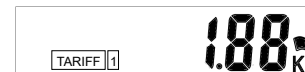


Total power data



Total cost/Income

**Note:** When the rate is equal to 0 or pending for preset, the data will not be included.



Rate display and settings

- This machine has two modes: single rate/tariff and double rate/tariff.

# ATTESTATION OF CONFORMITY

**Name and Address of Attestation Holder:**

Ningbo Cowell Electronics & Technology Co., Ltd.  
Building 1, No. 59, Changxing Road, Jiangbei District,  
Ningbo, Zhejiang Province, China

**Document Number**

CE-777-01-190122

**Date of Issue:**

01.05.2023

**Name and Address of Manufacturer:**

Ningbo Cowell Electronics & Technology Co., Ltd.  
Building 1, No. 59, Changxing Road, Jiangbei District,  
Ningbo, Zhejiang Province, China

**Expiration Date:**

01.05.2028

**Brand:**

N/A

**Test Report Number:**

TR22011701

TR22011702

TR22011703

**Product Name:**

POWER METER

**Test Required:**

EN 61010-1:2010+A1:2019

IEC 60884-1:2022

IEC 60884-2-5:2017

EN IEC 61326-1:2021

**Product Model:**

See Annex I

The product meets the technical requirement of the above standards as mentioned in the reference test reports and hence fulfils the technical requirements of the following directives

## **2014/35/EU Low Voltage Directive** **2014/30/EU Electromagnetic Compatibility Directive**

This document is only valid for the equipment and configuration described, in conjunction with the test data detailed above reference test reports. Document was issued on voluntary basis and does not imply meeting Notified Body conformity assessment procedure for the product.

The CE Mark, under the responsibility of the manufacturer or the importer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

**SIGNATURE**



# ATTESTATION OF CONFORMITY

## Annex I

**Product Model:**

PMB01  
PMB01B  
PMB03  
PMB02  
PMB02B  
PMB05  
PMB05B  
PMB06  
PMB09

**Document Number**

CE-777-01-190122

**Date of Issue:**

01.05.2023

**Expiration Date:**

01.05.2028

**Test Report Number:**

TR22011701  
TR22011702  
TR22011703

**Test Required:**

EN 61010-1:2010+A1:2019  
IEC 60884-1:2022  
IEC 60884-2-5:2017  
EN IEC 61326-1:2021

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The CE Mark, under the responsibility of the manufacturer or the importer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives.

SIGNATURE



**TEST REPORT****EN 61010-1****Part of the electricity machine of the safety**

Report the reference have no. ....: TR22011701

Test by (+ signature) .....: Jime liu

Jime liu

Approved by (+ signature).....:

Kenny

Kenny



The date of the Issued .....: 2022 -01-17(updated 2023-04-26)

**The test laboratory** .....: Kind Product Technical Service Co., Ltd

Address .....: No.48, Tofine Zone, Huanggusuan Rd., Hangzhou P.R. of China

Test the position.....: Kind Product Technical Service Co., Ltd

Adress.....: No.48, Tofine Zone, Huanggusuan Rd., Hangzhou P.R. of China

**Applicant name** .....: Ningbo Cowell Electronics & Technology Co., Ltd.

Address.....: Building 1, No. 59, Changxing Road, Jiangbei District, Ningbo, Zhejiang Province, China

**Test the specification:** POWER METER

Standard.....: EN 61010-1:2010+A1:2019

Test the procedure: CE-LVD

**The test reports that the shape have no.:**.....**Copyright 2001 System of IEC for the sake of consistent test and the attestation (IECEE) of the material of the electricity, Geneva city, Switzerland. Very in reserve.**

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**Test the item depiction** .....: POWER METER

The trade symbolize.....:

The model/ type reference .....: PMB01, PMB01B, PMB03, PMB02, PMB02B, PMB05, PMB05B, PMB06, PMB09

Difference of models .....: All are same, except the overall shape

Name plate Copy

**Product name:** POWER METER

**Model:** PMB01

**Rating:** 230V/50Hz, 3680W

**Manufacturer:** Ningbo Cowell Electronics & Technology Co., Ltd.

**Address:** Building 1, No. 59, Changxing Road, Jiangbei District, Ningbo, Zhejiang Province, China

**Caution:** To prevent risk electric shock, don not open the enclosure  
Please disconnect the power supply before change heat element.



The summary of the test: The model of PMB01 was tested all item,

<p><b>Test the item detail</b> ..... : All safety test and construction review</p> <p>The type of the tools and implements ..... :</p> <p>Appliance..... : Portable</p> <p>Protect the stroke of the contrary electricity ..... : Class I</p> <p>Protect the index..... : IP2X</p> <p>Other characteristic..... :</p> <p>The temperature of the surroundings of the list price( C) ..... : 15°C --30 °C</p>
<p><b>The solid example of possible test decide:</b></p> <p>Test the solid example shouldn't used for testing the object..... : N/A</p> <p>Test the item does the meeting need ..... : P( Pass)</p> <p>Test the item can't need ..... : F( failure)</p>
<p><b>Test</b> ..... :</p> <p>The date of the test item of receipt ..... : 2023-04-07</p>
<p>The test that date( s) ..... : 2023-04-26</p>
<p><b>Common remarks</b></p> <p><b>This test report is not valid likewise the test report unless sign at was test by the Laboratory.</b></p> <p>Test result the donation reports the description but object test at this.  This report won't be a replication, the expect is ample, did not write of approve the test laboratory of lassoing.</p> <p>"(See surround#)" check another circular affixture to the report.  "(See the additional table)" check the table affixture to the report.</p> <p>Spread over this reports that the comma (order) is a usage similarly ten enter to make to box off the sign.</p>

EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
4	General test condition Should check the requirements according to test result.		P
4.1	Two test condition: Basic Fault condition	Basic Fault condition	P
4.2	Test schedule If the test maybe damaged the unit, can test at the final		P
4.3	Basic test condition		P
4.3.1	The test condition should as following except other specified  Temperature: 15°C-35°C Humidity: less than 75% Aerosphere pressure value: 75Kpa-106Kpa		P
4.3.2	The test unit should be test at the unfavourably condition except other specified		P
4.3.3	Under free ventilation		P
4.3.7	Test under every unfavourably input voltage marked in label		P
4.3.8	Protect earth terminal should connect to earth	Connect earth	P
4.3.9	Control button		P
4.3.10	Connection		P
4.3.11	Motor load		P
4.3.12	Output	Not output	N/A
4.3.13	Operation weeks		P
4.3.14	Load and fill		P
4.3.15	Heating equipment		P
	Test according to clause 9.2.1		P
4.4	Single fault condition		P
4.4.1	Following		P
4.4.2	Infliction fault condition		P
4.4.2.1	Protect impedance		P
4.4.2.2	Protect conductor should cut		P
4.4.2.4	Motor complete power should stop or prevent start		P
4.4.2.5	Capacitor should short circuit		P
4.4.2.6	Transformer	Switch power approved	P
4.4.2.7	Equipment output should short		P



EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
4.4.2.9	Cooling Limit to: -----Close vent of filter -----stop cooling electric fan with motor -----stop cooling for circle water or other refrigerant		N/A
4.4.2.10	Heating set		P
4.4.2.11	Insulation circuit and parts pass item 9.1 check should not short		P
4.4.3	Times condition continue		P
4.4.3.1	Per item testing limit to in one hour		P
4.4.3.2	Equipment which use blackout or limit circuit should test reach maximal temperature		P
4.4.3.3	Leakage circuit during use thermal cut-out stop fault		P
4.4.4	Check out		P
4.4.4.1	Protect electric shock according to: -----test 6.3.2 item -----Use double or strengthen insulation according to 6.8.4 item		P
4.4.4.2	Temperature requirement: Test temperature of surface or accessible parts Should not exceed 105C	See test data	P
4.4.4.3	Spread fire: equipment cover gauze should placed softwood cover cotton paper		P
4.4.4.4	Prevent 1.2 item describe other danger according to check clause 7~clause 15		P
5	Marking and document		P
5.1.1	Equipment should mark according to item 5.1.2~5.2,and see .Should not mark parts take down without tool		P
5.1.2	Marking -----manufacture name or registered trade mark -----model 、 designation or recognise equipment other method	See above marking information	P
5.1.3	Power supply a) Character: -----AC: rated frequency or frequency range -----DC: _____ b) Rated voltage or rated voltage range	AC input	P

EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
5.1.4	Thermal cut-out Can instead should mark rated circuit and model; can not instead should shower relative information in documentation		P
5.1.5	Circuit terminal Voltage less than 50V(a.c.) or 120V(d.c.) should mark near to terminal or nameplate or on terminal.		P
5.1.6	Terminal and operate device a) Function earth terminal: see item 5.1.2 table 1 sign 5 b) Protect conductor terminal: see item 5.1.2table sign 6 c) Terminal for with power plug or circuitthermal cut-out should mark "on" or "off" clear. d) Dry cabinet or similar instruments doorshould mark with "open"		P
5.1.7	Equipment for double or strengthen insulation should mark item 5.1.2 table 1 sign 11...		N/A
5.1.8	Battery electrified should mark		N/A
5.2	Notice mark		P
5.3	Mark endurance According to item 5.1.2~5.2		P
5.4	Documentation		P
5.4.1	Provide documentation be accompanying with equipment: ----- Technical procedure -----Use instructions manual -----For technical helping manufacturer or vendor name and address -----Item 5.4.2~5.4.5 regulated information	See instruction manual	P
5.4.2	Equipment operate condition		P
5.4.3 5.4.3.101	Setting If instrument may not comply with this standard after moisture condition, manufacturer should specified in instruction manual	Comply with standard after moisture condition	P
5.4.4	Operation If the accessible parts are dangerous, it should add specified protect method		P
5.4.5	Maintain If main power supply is high temperature or other special cable, instruction manual should give clear indication of only use equivalent cable instead	Less than cable rating	P

EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
6	Protect electric shock	Pass for protect electric shock	P
6.1	According to measure clause 6.2 and 6.3, test clause 6.4~6.12		P
6.1.1	Especial		P
6.2	The definition of accessible parts according to clause 6.2.1~6.2.3		P
6.2.1	Basic check Rigid testing paper brings to bear 10N for all surface, include bottom.	Pass	P
6.2.2	Vent up of danger live part should insert with long 100mm and diameter 4mm metal test pin.		P
6.2.3	Vent of adjust control key should insert with diameter 3mm metal test pin		P
6.3	Limit value of touchable parts Voltage 、 current 、 electricity or energy between every two touchable should not exceed value of clause 6.3.21 in normal and clause 6.3.2 in single fault.	Pass	P
6.3.1	Normal value should not exceed clause 6.3.1.1~6.3.1.3 limit value....	24V DC power output	P
6.3.1.1	Voltage: 30V virtual and 42.4V Peak or 60V D.C		
6.3.1.2	Current: 0.5mA virtual and 0.7mA Peak or 2mA D.C		P
6.3.1.3	Capacitor limit for voltage exceed clause 6.3.1.1 value: -----Voltage amount or less than 15Kv Peak or D.C, 45 electricity -----Voltage exceed 15Kv Peak or D.C, 350mJ energy		P
6.3.2	Single fault value		P
6.3.2.1	Voltage should be 50V virtual and 70V Peak or 120V D.C		P
6.3.2.2	Current for voltage exceed clause 6.3.2.1 should be 3.5mA virtual and 5mA Peak and 15mA D.C.		P
6.3.2.3	Capacitor value see clause 6.3.2.3 chart 1 and 2 厖.....		P
6.4	Protection in normal use		P
	Basic insulation	Clearance distance comply with 6.7	P
	Enclosure or barrier	Comply with Clause 8.1	P
	Protect resistance		N/A
	Check as following:		P
	According to clause 6.2		P

EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
	According to 6.8 testing		P
6.5	Protection for single fault condition		P
6.5.1	Earth		P
6.5.1.2	The resistance of earth connect device	<0.1ohm	P
6.5.1.4	Connect of measure instrument accessible parts		P
6.5.2	Double insulation or reinforce insulation Check the clearance distance and voltage withstand test		P
6.5.3	Resistance of protect circuit		P
6.5.4	Internal set If the instrument intend to install into cabinet, there is no any live parts, do not need comply with relevant requirement		P
6.6.1	Internal circuit insulation If internal circuit may be change to live parts in fault condition, it should be insulated from other accessible		P
6.6.2	External accessible should not be live parts		P
6.7	Creepage distance and Clearance distance Should less than value in appendix D		P
6.8	Electric strength test Check with withstand test		P
6.8.1	Refer test point		P
	Test unit cover with metal sheet area not less than 20cm		P
6.8.2	Before test, the test unit place in ambient with humidity 92.5%±2.5, temperature 40°C±2°C, 48H, place in 4.3.1 clause condition 2h before voltage withstand test		P
6.8.4	Test with voltage value specified in appendix D, should not break down		P
6.9	Construction requirements for protect electric shock		
	Should not connect only with soldering method for withstanding electric strength		P
	The wire or screw loose or fall off should reduce the creepage distance and clearance distance		P
6.10	Power cord		P
	Power cord size and type should be applicable		P
	Yellow/ green cover wire only use in earth circuit		P
6.10.2	Permanently power cord connecting		N/A



EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
6.10.2.1	Cord entry		N/A
	Should protect damage		N/A
6.10.2.2	Strain relief should comply with following		N/A
	Should secure cord directly with screw		N/A
	Should have a knot		N/A
	Should permit cord is push into instruments		N/A
	After strain relief test, the displace should not more than 2mm, the test force according to table 2		N/A
6.10.3	Plug and connector should have applicable rating		P
6.11	Accessible terminal		N/A
6.11.1	Accessible terminals should have any protection, Check with below methods: Throw of f insulate layer 8mm of wire, the wire thread should not be near to accessible terminal		N/A
6.11.2	Protect earth terminal		P
	The capacity of protect terminal should less than conduct terminal		P
	When power cord connect power supply, the protect terminal should be connected at first		P
6.12	Disconnect the power supply		P
	The instrument should have any disconnect all pole of power supply device such as switch,		P
7	Protect mechanism hazard		P
	Moving parts		P
	Stability Should not overturn when place in 10° incline		P
7.4	Transit handle should withstand 4 times weight of instruments		P
8	Impact, vibration		P
	General requirements After the test, check below item Live parts should become accessible Should any crack risk Reduce creepage distance or clearance distance Moving parts become accessible Fire of risk	After the test, check below item No this found Live parts should become accessible Should any crack risk Reduce creepage distance or clearance distance Moving parts become accessible Fire of risk	P
8.1	Rigidity test: with diameter 12mm stick apply 30N force		P

EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
8.2	Impact test: test 0.5j energy three times for every parts		P
8.3	Vibration test		P
8.4	Drop test		P
9	Heating or risk of fire		P
9.1	Heating should lead to risk of fire under normal or single fault condition		P
9.2	Temperature test		P
	The temperature rise should not exceed values specified in table three		P
10	Heat-resistant		P
10.1	The instruments operate at 40C, no reduce creepage distance		P
10.2	The no-metallic enclosure should withstand hi-temperature		P
10.3	Heat-resistant of insulate material		P
11	Resistant moisture or liquid		N/A
	If clean method is specified by manufacturer, there is no risk of electric shock after clean procedure		N/A
	If liquid fall off in equipment during normal operation, there is no risk of electric shock		N/A
	Pour liquid from vessel no lead to danger in normal use		N/A
11.5	Liquid leakage		N/A
11.5.1	Equipment design for Liquid leakage should not from vessel、tube、airproof 柜et etc. Lead to danger		N/A
11.5.2	Batteries design for electrolyte leakage should not shock		N/A
11.6	Special protect set		N/A
12	radiation protection 、 sound pressure		N/A
12.1	Ionisation radiation		N/A
12.3	Ultraviolet radiation		N/A
12.4	Microwave radiation		N/A
12.6	Laser radiation		N/A
13	Gas emit, exposed danger		P
13.1	The instruments should emit hazard gas during normal use or single fault condition		P
13.2	Risk of exposed		P
	Components overheating should exploded		P

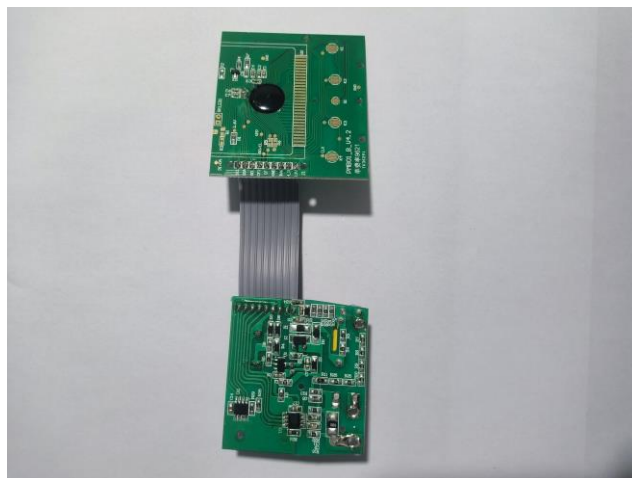
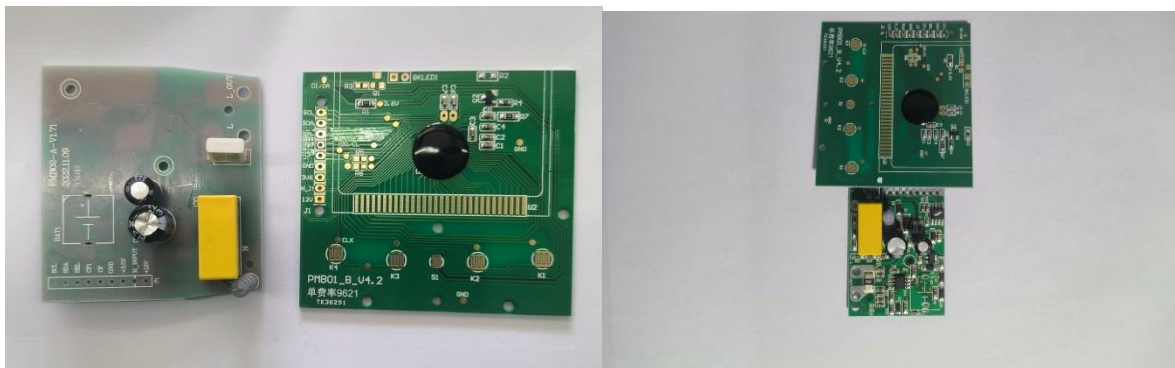
EN 61010-1			
Clause	The need – test	Result- remarks	Verdict
13.2.2	Cell set		P
	Cell set fault condition should lead to risk of fire		P
14	Components power cord, plug, AC socket, switch, fuse, PCB, plastic, internal wire, transformer, should approved separately		P
	Motor winding temperature		P
	When lock the rotator, winding temperature should not exceed the values specified in table 4		P
14.7	Transformer		P
	Short circuit test		P
	Over load test		P
15	Inter-lock protector		N/A

Product photos:









--The end of report--

# TEST REPORT

**Report Number** ..... TR22011703

Date of Test..... Jan.07, 2022~ Jan.17, 2022

Date of issue.....: Jan.17, 2022(updated Apr.26,2023)

Total number of pages ..... 24

Test Result..... PASS

Tested by (name + signature).....: *Jime Liu*

Approved (name + signature).....: *Jime Liu*



**Testing Laboratory**..... Kind Product Technical (Hangzhou) Service co., ltd.

**Address** .....No.48, Tofine Zone, Huanggusuan Rd., Hangzhou P.R. of China

**Applicant's name**..... Ningbo Cowell Electronics & Technology Co., Ltd.

Address ..... Building 1, No. 59, Changxing Road, Jiangbei District, Ningbo, Zhejiang Province, China

**Manufacturer's name** ..... Ningbo Cowell Electronics & Technology Co., Ltd.

Address ..... Building 1, No. 59, Changxing Road, Jiangbei District, Ningbo, Zhejiang Province, China

**Product name** .....POWER METER

Trademark .....

Model/Type reference ..... PMB01, PMB01B, PMB03, PMB02, PMB02B, PMB05, PMB05B  
PMB06,PMB09

Ratings ..... 230V/50Hz, 3680W

**Test specification:**

Standard.....: EN IEC 61326-1:2021

Test procedure .....IEC test report

Non-standard test method..... N/A

**Test Report Form No** ..... TRF

**Test Report Form(s) Originator** ..... KIND Testing

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## 1. GENERAL INFORMATION

### 1.1 Description of Device (EUT)

EUT : POWER METER  
Trademark : N/A  
Model Number : PMB01

Model Difference : All models have the same structure and function and different appearance

Power Supply : AC 230V

### 1.2 Tested System Details None.

### 1.3 Test Facility

Kind Product Technical (Hangzhou) Service co., Ltd.  
Add. : No.48, Tofine Zone, Huanggusuan Rd., Hangzhou P.R. of China

### 1.4 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product 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  $k=2$ .

Test item	Value (dB)
Conducted Emission (150K-30MHZ)	3.20
Radiated disturbance30MHz-1000MHz	4.80
Radiated disturbance1000MHz-6000MHz	5.10

## 1.5 Test Instrument Used Conducted

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Sep. 22, 2021	Sep. 21, 2022
2	LISN	CYBERTEK	EM5040A	E18504001 49	Sep. 22, 2021	Sep. 21, 2022
3	Test Cable	N/A	C01	N/A	Sep. 22, 2021	Sep. 21, 2022
4	Test Cable	N/A	C02	N/A	Sep. 22, 2021	Sep. 21, 2022
5	EMI Test Receiver	R&S	ESRP3	101946	Sep. 22, 2021	Sep. 21, 2022
6	Absorbing Clamp	DZ	ZN23201	N/A	Sep. 22, 2021	Sep. 21, 2022

## Radiated emissions Test (966chamber)

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Bilog Antenna	Schwarzbeck	VULB9168	00877	Sep. 22, 2021	Sep. 21, 2022
2	Loop Antenna	SCHWARZBECK	FMZB1519B	014	Sep. 22, 2021	Sep. 21, 2022
3	Test Cable	N/A	R-01	N/A	Sep. 22, 2021	Sep. 21, 2022
4	Test Cable	N/A	R-02	N/A	Sep. 22, 2021	Sep. 21, 2022
5	EMI Test Receiver	R&S	ESCI7	101169	Sep. 22, 2021	Sep. 21, 2022
6	Antenna Mast	EM	SC100_1	N/A	N/A	N/A
7	Turn Table	EM	SC100	N/A	N/A	N/A
8	Spectrum Analyzer	KEYSIGHT	9020A	MY5537083 5	Sep. 22, 2021	Sep. 21, 2022
9	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	1541	Sep. 22, 2021	Sep. 21, 2022
10	Horn Antenna (18GHz-40GHz)	A.H. System	SAS-574	588	Sep. 22, 2021	Sep. 21, 2022
11	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	N/A	Sep. 22, 2021	Sep. 21, 2022
12	Amplifier (1GHz-40GHz)	Quanjuda	DLE-161	097	Sep. 22, 2021	Sep. 21, 2022

## Harmonic / Flicker Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Harmonic & Flicker	LAPLACE INSTRUMENTS	C2000A	311370	Sep. 22, 2021	Sep. 21, 2022
2	AC Power Source	LAPLACE INSTRUMENTS	C2000A	311370	Sep. 22, 2021	Sep. 21, 2022

## Electrostatic discharge Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	ESD TEST GENERATOR	HTEC	HESD16	N/A	Sep. 22, 2021	Sep. 21, 2022

## Continuous RF electromagnetic field disturbances Test (SMQ --- site )

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Signal Generator	R&S	SMT 06	832080/007	Sep. 22, 2021	Sep. 21, 2022
2	Log-Bicon Antenna	Schwarzbeck	VULB9161	4022	Sep. 22, 2021	Sep. 21, 2022
3	Power Amplifier	AR	150W1000M 1	320946	Sep. 22, 2021	Sep. 21, 2022
4	Microwave Horn Antenna	AR	AT4002A	321467	Sep. 22, 2021	Sep. 21, 2022
5	Power Amplifier	AR	25S1G4A	308598	Sep. 22, 2021	Sep. 21, 2022

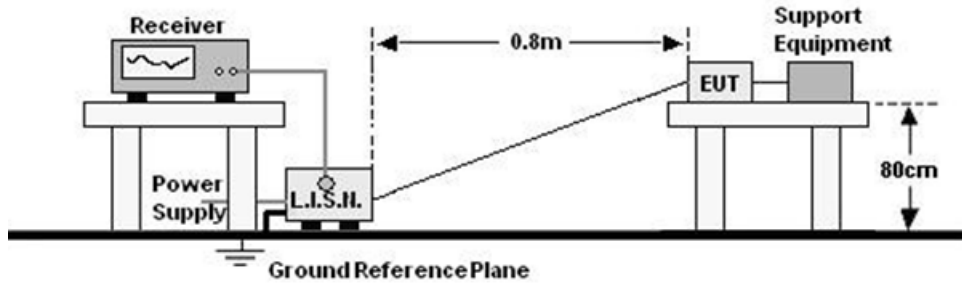
## EFT and Surge and Voltage dips and interruptions Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Surge Generator	HTEC	HCOMPACT 5	202501	Sep. 22, 2021	Sep. 21, 2022
2	DIPS Generator	HTEC	HV1P16T	202101	Sep. 22, 2021	Sep. 21, 2022
3	EFT/B Generator	HTEC	HCOMPACT 5	202501	Sep. 22, 2021	Sep. 21, 2022
4	EFT/B Clamp	HTEC	H3C	N/A	Sep. 22, 2021	Sep. 21, 2022

## 2. CONDUCTED EMISSIONS

### 2.1 Block Diagram Of Test

Setup For mains ports:



### 2.2 Limit

Limits for Conducted emissions at the mains ports of Class B MME

Frequency range (MHz)	Limits dB( $\mu$ V)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56*	56 to 46*
0,50 to 5	56	46
5 to 30	60	50

- Notes: 1. \*Decreasing linearly with logarithm of frequency.  
2. The lower limit shall apply at the transition frequencies.

### 2.3 Test

procedure

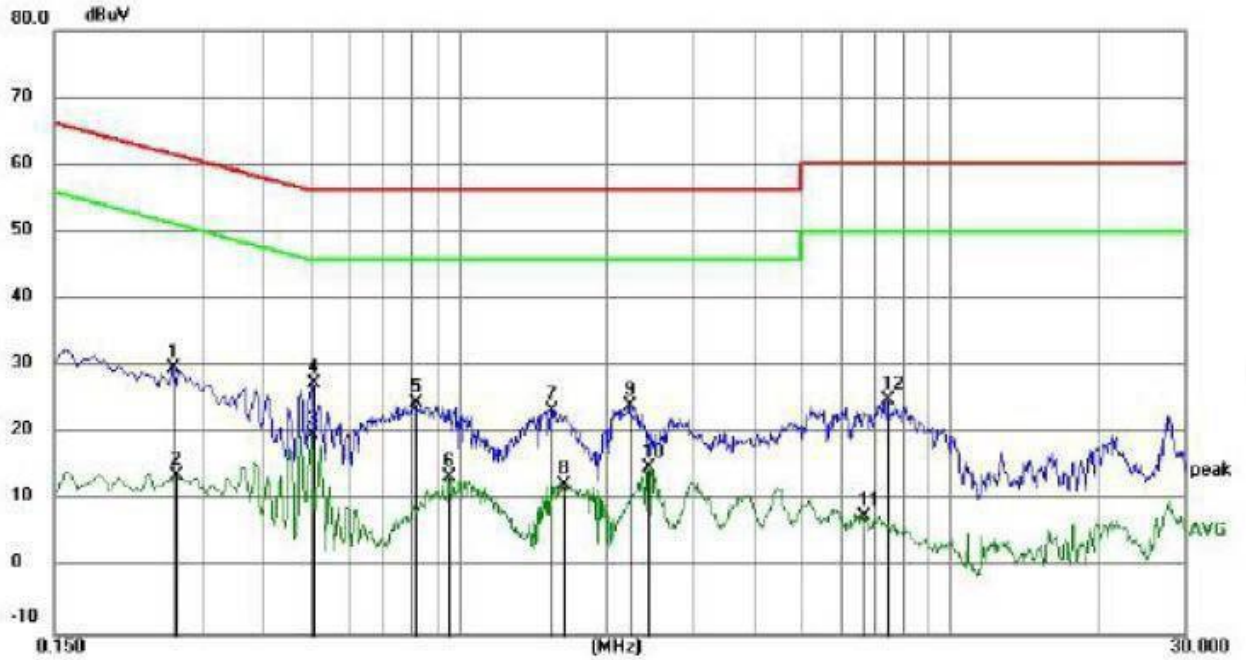
For mains

ports:

- The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- For each frequency whose maximum record was higher or close to limit, measure its QPand AVG values and record.

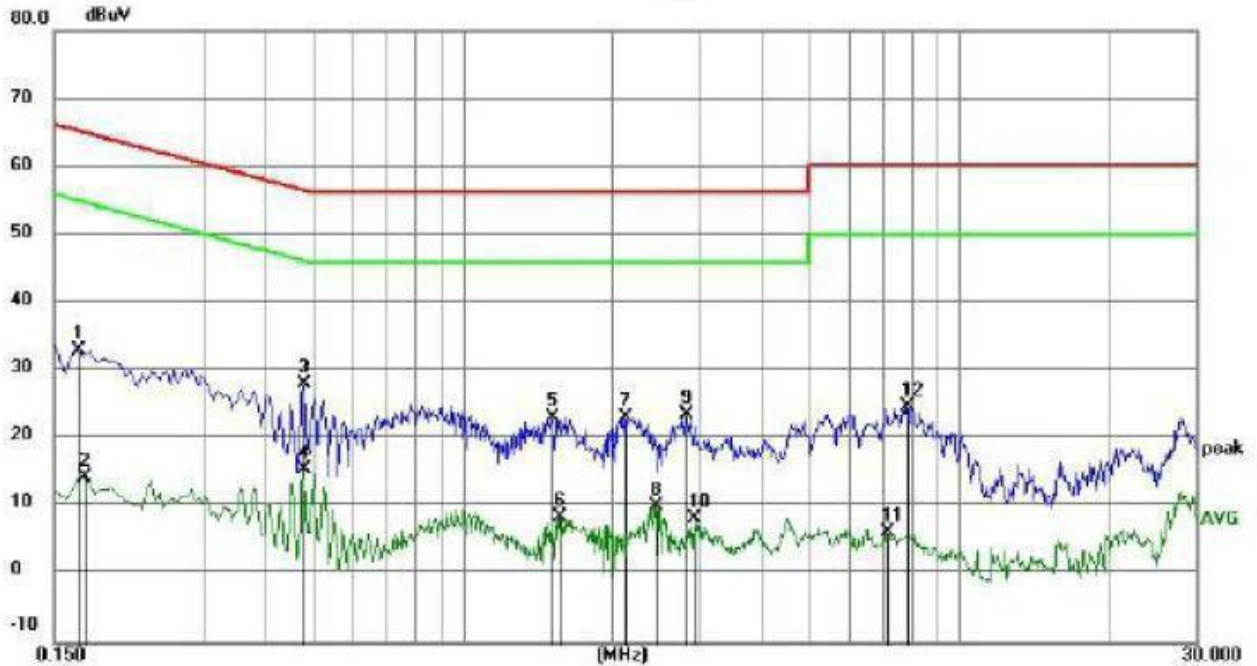
2.4 Test Result

Conducted Emission Test Data			
Temperature:	25.6°C	Relative Humidity:	55%
Pressure:	1011hPa	Phase :	Live
Test Voltage :	AC 230V/50Hz	Test Mode:	Working mode



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2625	29.71	0.00	29.71	61.35	-31.64	peak	P	
2	0.2670	13.77	0.00	13.77	51.21	-37.44	AVG	P	
3	0.5010	19.80	0.00	19.80	46.00	-26.20	AVG	P	
4	0.5055	27.38	0.00	27.38	56.00	-28.62	peak	P	
5	0.8160	24.50	0.00	24.50	56.00	-31.50	peak	P	
6	0.9555	13.58	0.00	13.58	46.00	-32.42	AVG	P	
7	1.5360	23.51	0.00	23.51	56.00	-32.49	peak	P	
8	1.6305	12.37	0.00	12.37	46.00	-33.63	AVG	P	
9	2.2335	24.11	0.00	24.11	56.00	-31.89	peak	P	
10	2.4224	14.81	0.00	14.81	46.00	-31.19	AVG	P	
11	6.6525	7.66	0.00	7.66	50.00	-42.34	AVG	P	
12	7.4715	24.95	0.00	24.95	60.00	-35.05	peak	P	

Conducted Emission Test Data			
Temperature:	25.6°C	Relative Humidity:	55%
Pressure:	1011hPa	Phase :	Neutral
Test Voltage :	AC 230V/50Hz	Test Mode:	Working mode



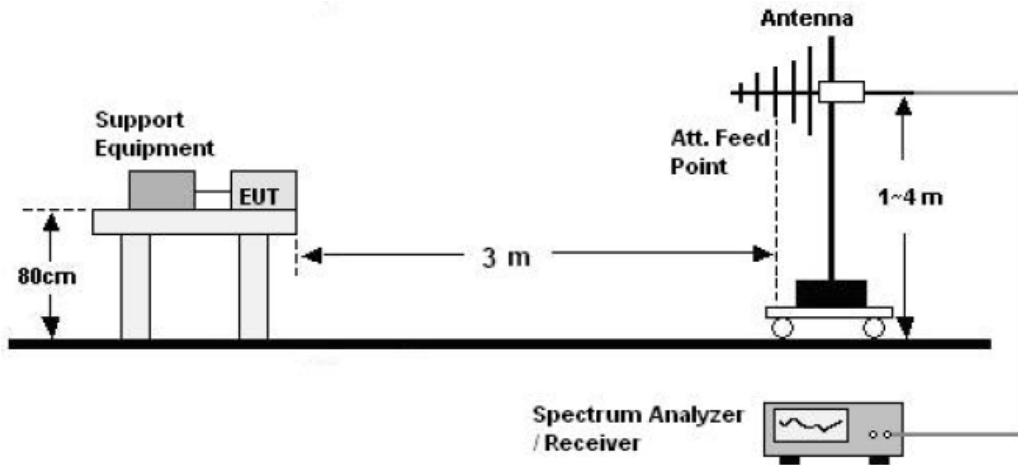
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1680	33.17	0.00	33.17	65.06	-31.89	peak	P	
2	0.1725	14.48	0.00	14.48	54.84	-40.36	AVG	P	
3	0.4785	28.09	0.00	28.09	56.37	-28.28	peak	P	
4	0.4785	15.44	0.00	15.44	46.37	-30.93	AVG	P	
5	1.5090	23.17	0.00	23.17	56.00	-32.83	peak	P	
6	1.5630	8.52	0.00	8.52	46.00	-37.48	AVG	P	
7	2.1165	23.29	0.00	23.29	56.00	-32.71	peak	P	
8	2.4450	10.06	0.00	10.06	46.00	-35.94	AVG	P	
9	2.8230	23.54	0.00	23.54	56.00	-32.46	peak	P	
10	2.9219	8.25	0.00	8.25	46.00	-37.75	AVG	P	
11	7.1430	6.36	0.00	6.36	50.00	-43.64	AVG	P	
12	7.8315	24.74	0.00	24.74	60.00	-35.26	peak	P	



### 3. RADIATED DISTURBANCE TEST

#### 3.1 Block Diagram Of Test

Setup 30MHz ~ 1GHz:



#### 3.2 Limits

Frequency (MHz)	Quasi-peak limits at 3m dB( $\mu$ V/m)
30-230	40
230-1000	47

Note: The lower limit shall apply at the transition frequencies.

#### 3.3 Test

##### Procedure

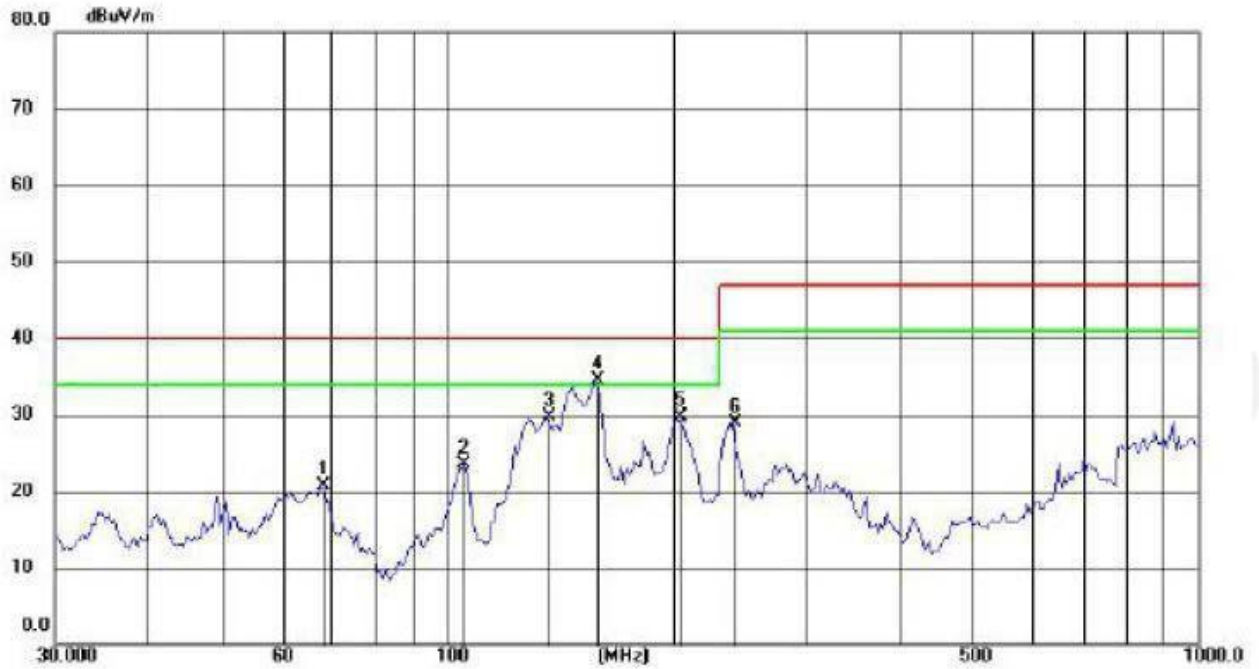
30MHz ~

1GHz:

- The Product was placed on the nonconductive turntable 0.8 m above the ground in a semi anechoic chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

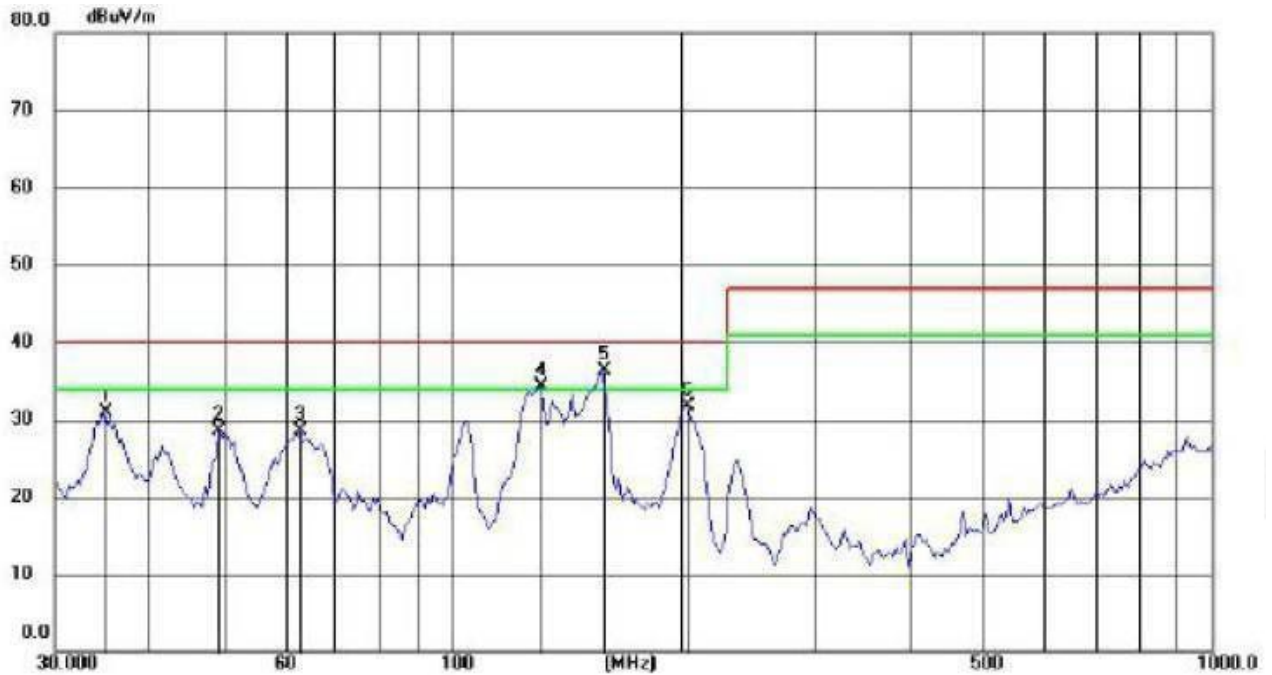
## 3.4 Test Results

Radiated disturbances Test Data			
Temperature:	25.8°C	Relative Humidity:	55%
Pressure:	1011hPa	Phase :	Horizontal
Test Voltage :	AC 230V/50Hz	Test Mode:	Working mode



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	67.7939	37.01	-16.31	20.70	40.00	-19.30	peak				
2	105.0873	43.15	-19.55	23.60	40.00	-16.40	peak				
3	135.5062	47.42	-17.66	29.76	40.00	-10.24	peak				
4	157.2829	51.30	-16.86	34.44	40.00	-5.56	peak				
5	202.8104	49.36	-19.68	29.68	40.00	-10.32	peak				
6	239.5670	46.64	-17.70	28.94	47.00	-18.06	peak				

Radiated disturbances Test Data			
Temperature:	25.8°C	Relative Humidity:	55%
Pressure:	1011hPa	Phase :	Vertical
Test Voltage :	AC 230V/50Hz	Test Mode:	Working mode



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	34.8212	48.46	-17.63	30.83	40.00	-9.17	peak				
2	49.4460	45.83	-17.27	28.56	40.00	-11.44	peak				
3	62.6507	47.06	-18.59	28.47	40.00	-11.53	peak				
4	130.8369	55.75	-21.44	34.31	40.00	-5.69	peak				
5	157.2829	57.26	-20.86	36.40	40.00	-3.60	peak				
6	202.8104	53.44	-21.68	31.76	40.00	-8.24	peak				

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

#### **4. HARMONIC CURRENT EMISSION TEST**

##### 4.1 Block Diagram of Test Setup

##### 4.2 Test Standard

IEC 61000-3-2

##### 4.3 Operating Condition of EUT

4.3.1 Setup the EUT as shown in Section 6.1.

4.3.2 Turn on the power of all equipment.

4.3.3 Let the EUT work in test mode and test it.

##### 4.4 Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

##### 4.5 Test Results

Pass

## 5. VOLTAGE FLUCTUATIONS & FLICKER TEST

### 5.1 Block Diagram of Test

Setup Same as  
Section 6.1.

### 5.2 Test Standard

IEC 61000-3-3

### 5.3 Operating Condition of EUT

Same as Section 5.3.. The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

#### Flicker Test Limit

Test items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

### 5.4 Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

### 5.5 Test Results

Pass

**6. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA**

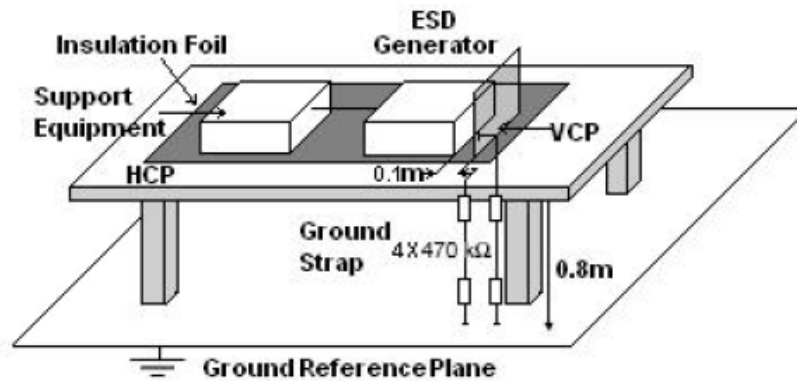
Product Standard	IEC 61326-1, IEC 61326-2-6
CRITERION A	During testing, normal performance within the specification limits.
CRITERION B	During testing, temporary degradation, or loss of function or performance which is self-recovering.
CRITERION C	During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

## 7. ELECTROSTATIC DISCHARGE (ESD)

### 7.1 Test Specification

Test Port	:	Enclosure port
Discharge Impedance	:	330 ohm / 150 pF
Discharge Mode	:	Single Discharge
Discharge Period	:	one second between each discharge

### 7.2 Block Diagram of Test Setup



### 7.3 Test Procedure

- Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the Product.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product and re-triggered for a new single discharge. The test was repeated until all discharges were complete.



g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the Product. The ESD generator was positioned vertically at a distance of 0.1 meters from the Product with the discharge electrode touching the HCP.

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the Product were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the Product.

#### 7.4 Test Results

Discharge Method	Discharge Position	Voltage ( $\pm$ kV)	Min. No. of Discharge per polarity (Each Point)	Required Level	Performance Criterion
Contact Discharge	Conductive Surfaces	4 <sup>a</sup> , 6 <sup>b</sup>	10	B	A
	Indirect Discharge HCP	4 <sup>a</sup> , 6 <sup>b</sup>	10	B	A
	Indirect Discharge VCP	4 <sup>a</sup> , 6 <sup>b</sup>	10	B	A
Air Discharge	Slots, Apertures, and Insulating Surfaces	2 <sup>b</sup> , 4 <sup>b</sup> , 8 <sup>a, b</sup>	10	B	A

Note: 'a' meas the frequency refer to IEC 61326-1, 'b' meas the frequency refer to IEC 61326-2-6.

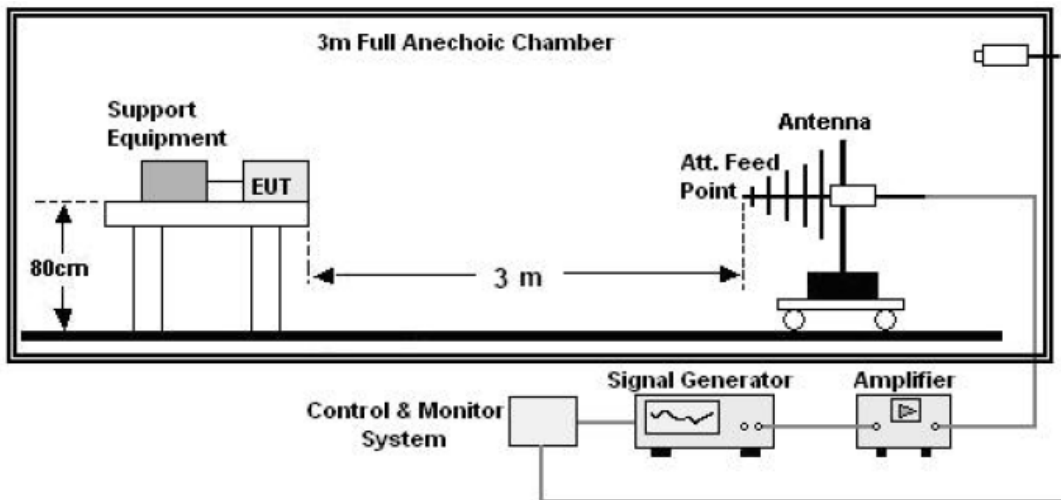
## 8. ELECTROMAGNETIC FIELD (RS)

### 8.1 Test Specification

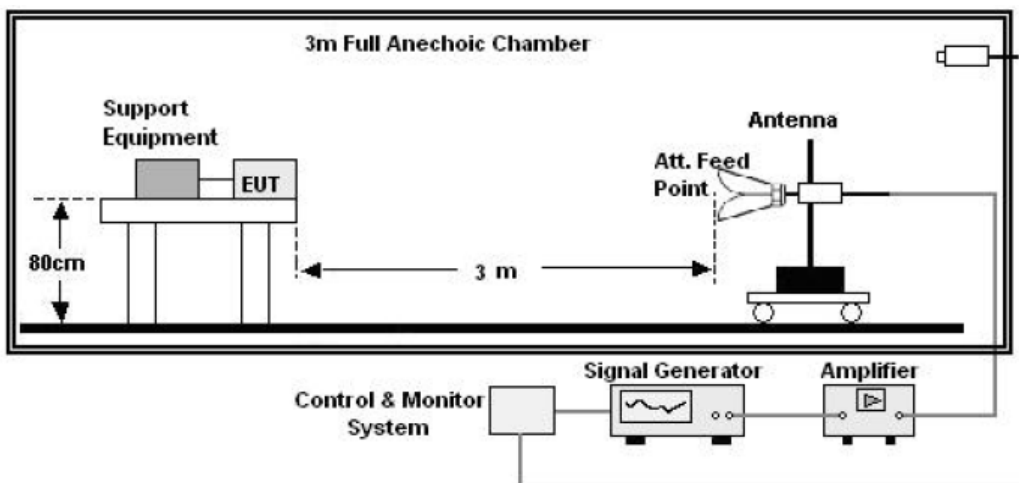
Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second
Polarization	:	Horizontal & Vertical

### 8.2 Block Diagram of Test

Setup Below 1GHz:



Above 1GHz:



### 8.3 Test Procedure

- a. The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3m or 1m from the Product.
- b. The frequency range is swept from 80MHz to 1000MHz and 1400MHz to 2700MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s. Where the frequency range is swept incrementally, the step size was 1%.
- c. The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.

### 8.4 Test Results

Frequency	Position	Field Strength (V/m)	Required Level	Performance Criterion
80 - 1000 <sup>a, b</sup>	Front, Right, Back, Left	10	A	A
1000-6000 <sup>b</sup>	Front, Right, Back, Left	3	A	A
1400 - 2000 <sup>a</sup>	Front, Right, Back, Left	3	A	A
2000 - 2700 <sup>a</sup>	Front, Right, Back, Left	1	A	A
Note: 'a' meas the frequency refer to IEC 61326-1, 'b' meas the frequency refer to IEC 61326-2-6.				

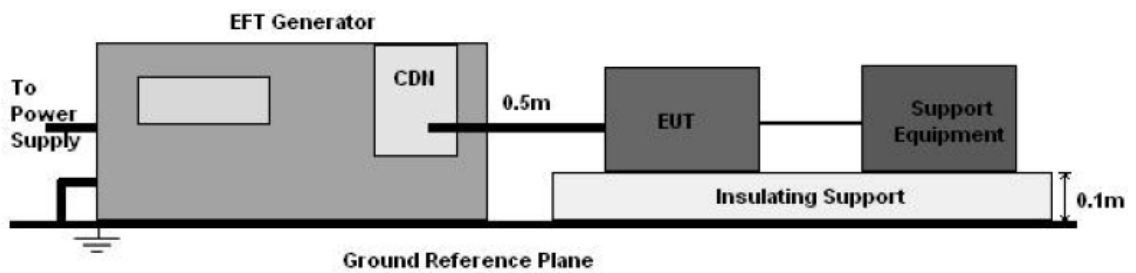
## 9. ELECTRICAL FAST TRANSIENTS/BURST (EFT)

### 9.1 Test Specification

Test Port	:	input a.c. power port
Impulse Frequency	:	5 kHz
Impulse Wave-shape	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	2 minutes per polarity

### 9.2 Block Diagram of EUT Test

Setup For input a.c. power port:



### 9.3 Test Procedure

- The Product and support units were located on a non-conductive table above ground reference plane.
- A 0.5m-long power cord was attached to Product during the test.

### 9.4 Test Results

Coupling	Voltage (kV)	Polarity	Required Level	Performance Criterion
AC Mains L-N	1 <sup>a</sup> , 2 <sup>b</sup>	±	B	A

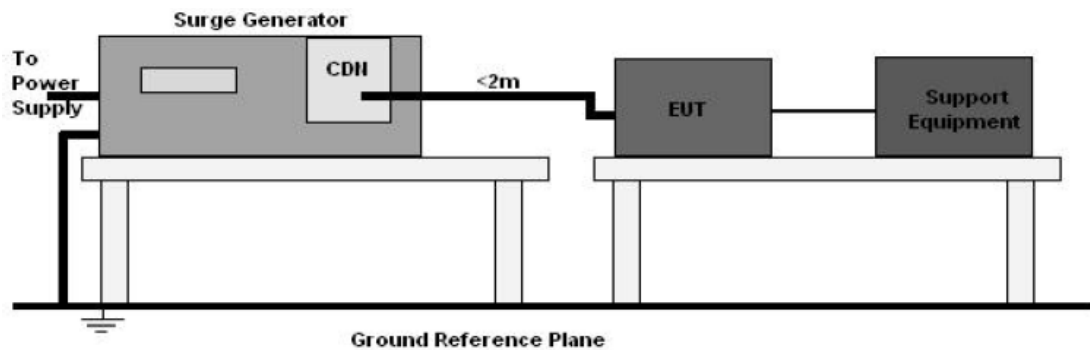
Note: 'a' meas the frequency refer to IEC 61326-1, 'b' meas the frequency refer to IEC 61326-2-6.

## 10. SURGES IMMUNITY TEST

### 10.1 Test Specification

Test Port	:	input a.c. power port
Wave-Shape	:	Open Circuit Voltage - 1.2 / 50 us Short Circuit Current - 8 / 20 us
Pulse Repetition Rate	:	1 pulse / min.
Phase Angle	:	0° / 90° / 180° / 270°
Test Events	:	5 pulses (positive & negative) for each polarity

### 10.2 Block Diagram of EUT Test Setup



### 10.3 Test Procedure

- The surge is to be applied to the Product power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave.
- The power cord between the Product and the coupling/decoupling networks shall be 2 meters in length (or shorter). Interconnection line between the Product and the coupling/decoupling networks shall be 2 meters in length (or shorter).

### 10.4 Test Result

Coupling Line	Voltage (kV)	Phase Angle	Required Level	Performance Criterion
L - N	+0.5 <sup>a, b</sup> , +1 <sup>a, b</sup>	90°	B	A
	-0.5 <sup>a, b</sup> , -1 <sup>a, b</sup>	270°	B	A
L-PE, N-PE	+0.5 <sup>a, b</sup> , +1 <sup>a, b</sup> , +2 <sup>b</sup>	90°	B	A
	-0.5 <sup>a, b</sup> , -1 <sup>a, b</sup> , -2 <sup>b</sup>	270°	B	A

Note: 'a' meas the frequency refer to IEC 61326-1, 'b' meas the frequency refer to IEC 61326-2-6.

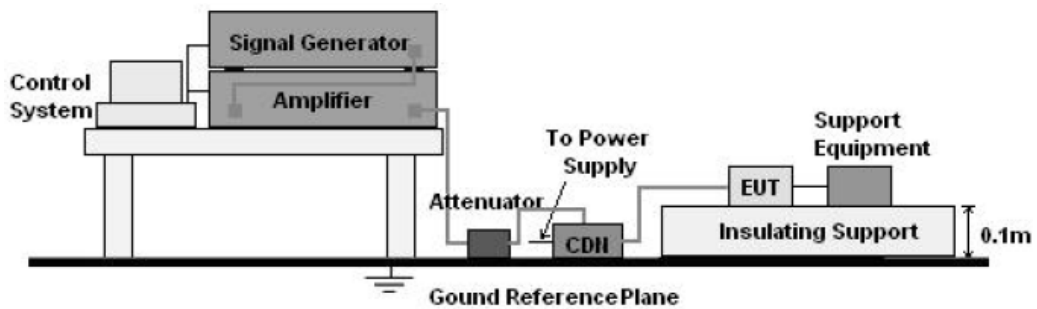
## 11. CONTINUOUS INDUCED RF DISTURBANCES (CS)

### 11.1 Test Specification

Test Port	:	input a.c. power port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second

### 11.2 Block Diagram of EUT Test

Setup For input a.c. power port:



### 11.3 Test Procedure

For input a.c. power port:

- The Product and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
- The frequency range is swept from 150 kHz to 10MHz, 10MHz to 30MHz, 30MHz to 80MHz with the signal 80% amplitude modulated with a 1 kHz sine wave, and the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the Product to be able to respond.

### 11.4 Test Result

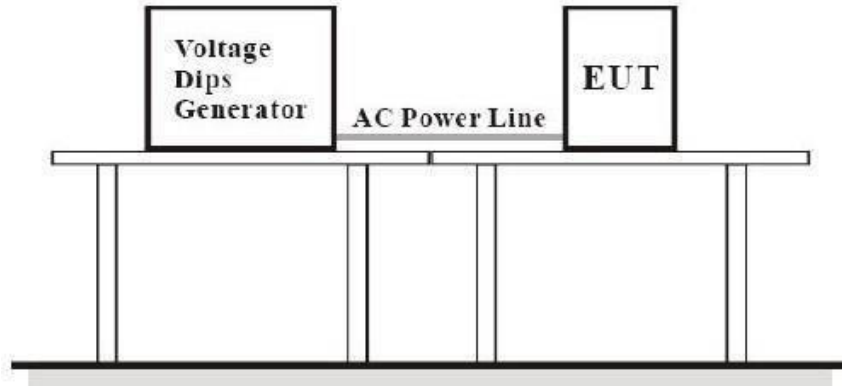
Inject Line	Frequency (MHz)	Voltage Level (V r.m.s.)	Required Level	Performance Criterion
a.c. port	0.15 - 80	3	A	A
Note: N/A				

## 12. VOLTAGE DIPS AND INTERRUPTIONS (DIPS)

### 12.1 Test Specification

Test Port	:	input a.c. power port
Phase Angle	:	0°, 180°
Test cycle	:	3 times

### 12.2 Block Diagram of EUT Test Setup



### 12.3 Test Procedure

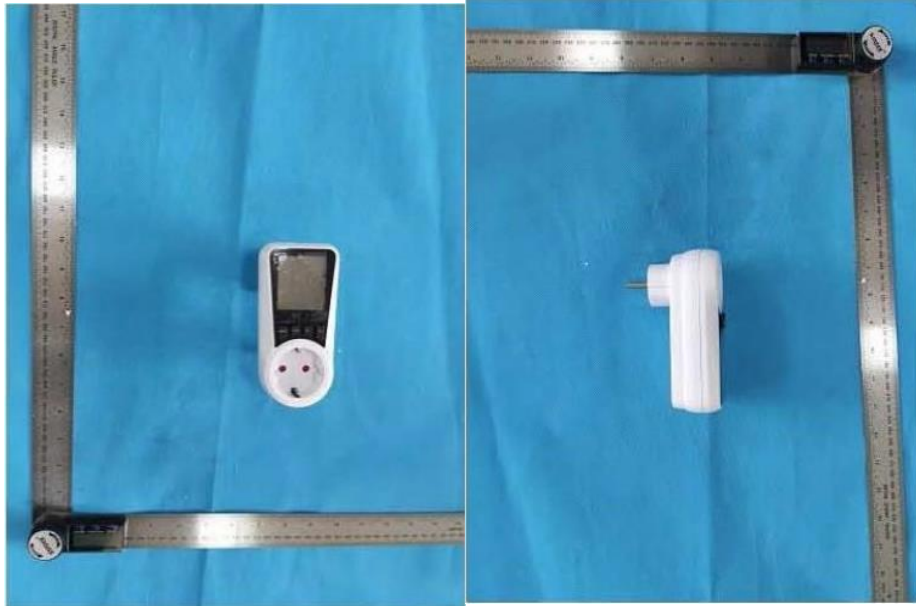
- The Product and support units were located on a non-conductive table above ground floor.
- Set the parameter of tests and then perform the test software of test simulator.
- Conditions changes to occur at 0 degree crossover point of the voltage waveform.

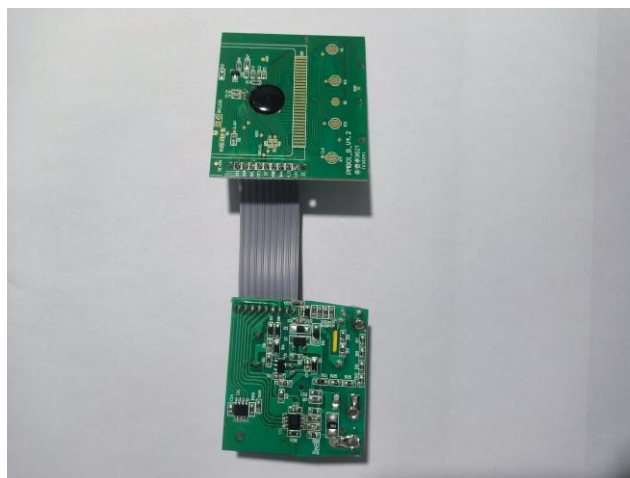
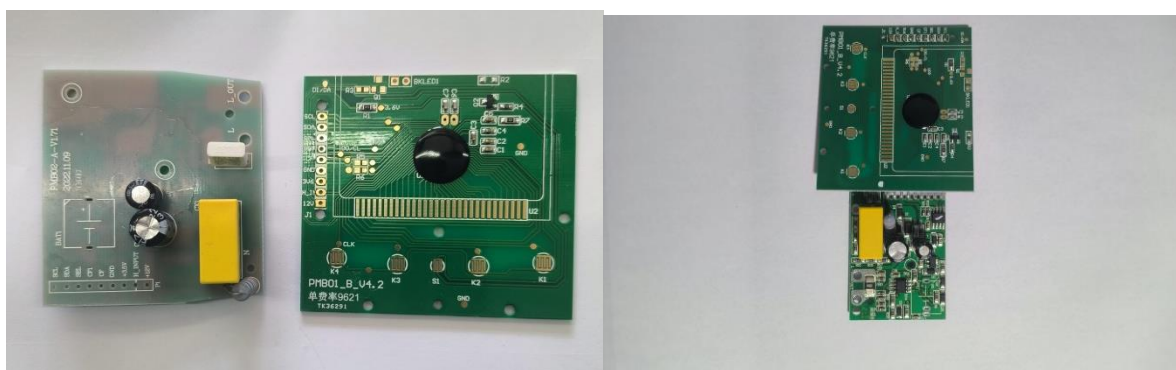
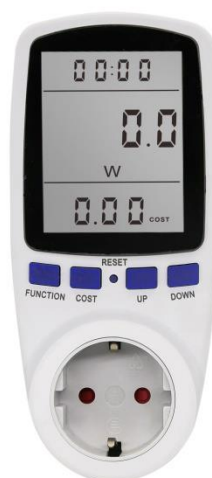
### 12.4 Test Result

Test Level % $U_T$	Voltage dips in % $U_T$	Duration in cycles	Required Level	Performance Criterion
0	100	0.5	B	B
0	100	1	B	B
70	30	25/30	C	C
Voltage Interruptions:				
0	100	250/300	C	C
Note: N/A				









The end of report