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).....:

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

TABLE OF CONTENT

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	MY55370835	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	150W1000M1	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

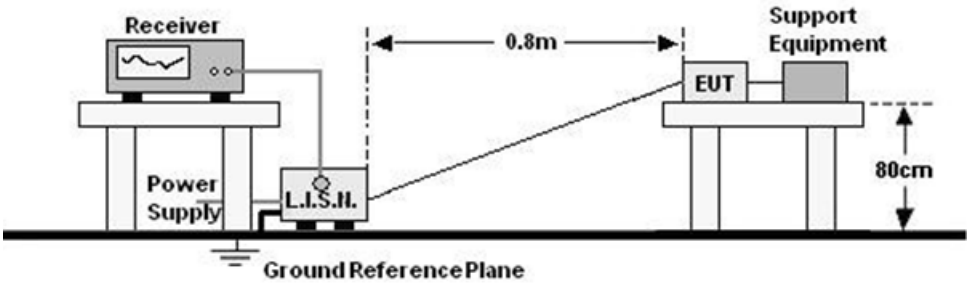
EFT and Surge and Voltage dips and interruptions Test

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Surge Generator	HTEC	HCOMPACT5	202501	Sep. 22, 2021	Sep. 21, 2022
2	DIPS Generator	HTEC	HV1P16T	202101	Sep. 22, 2021	Sep. 21, 2022
3	EFT/B Generator	HTEC	HCOMPACT5	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(μV)	
	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:

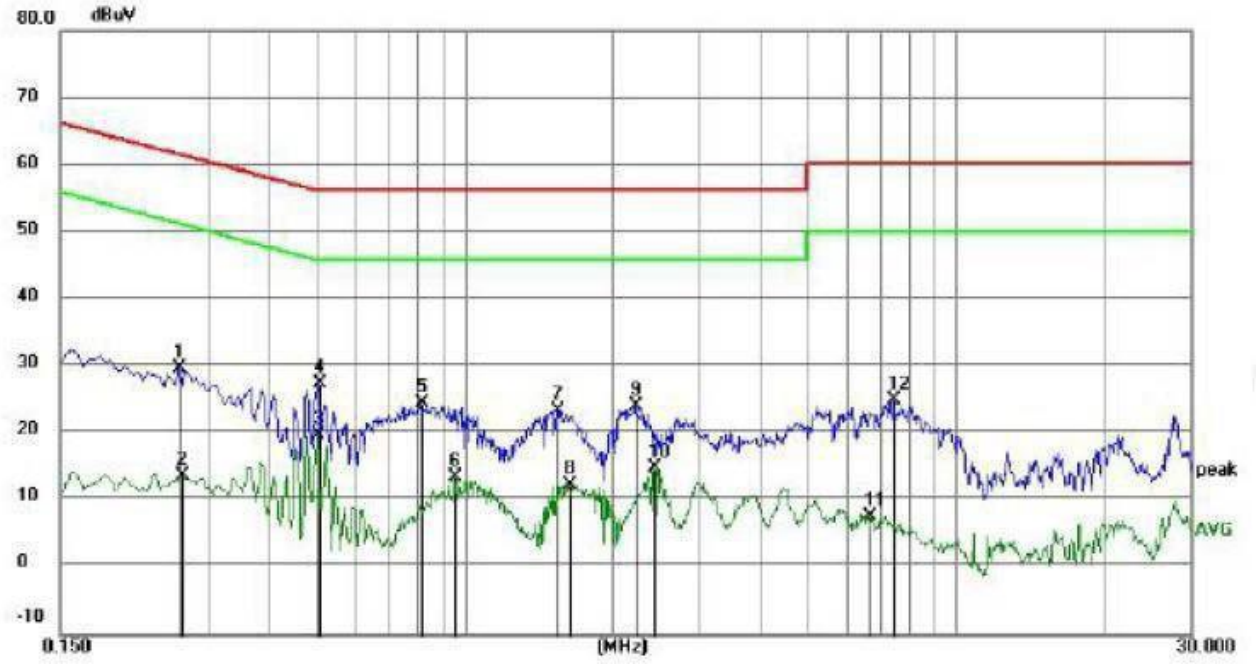
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).

b. 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.

c. For each frequency whose maximum record was higher or close to limit, measure its QPand AVG values and record.

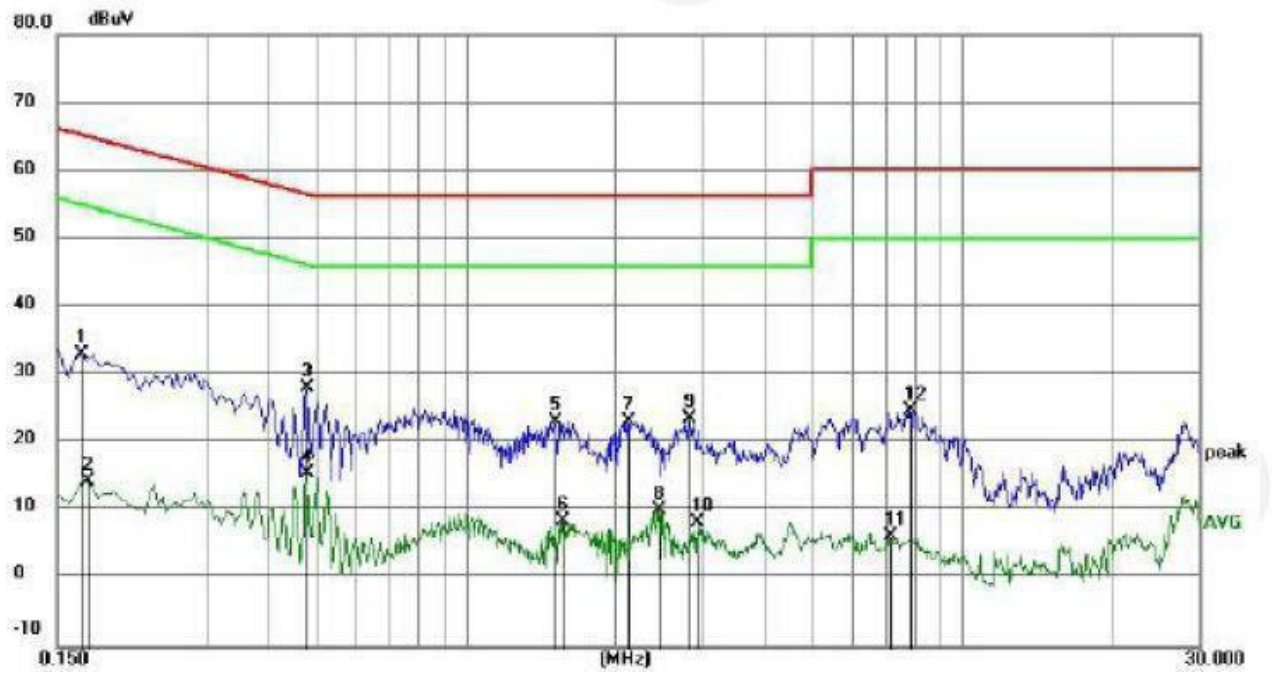
2.4 Test Result

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

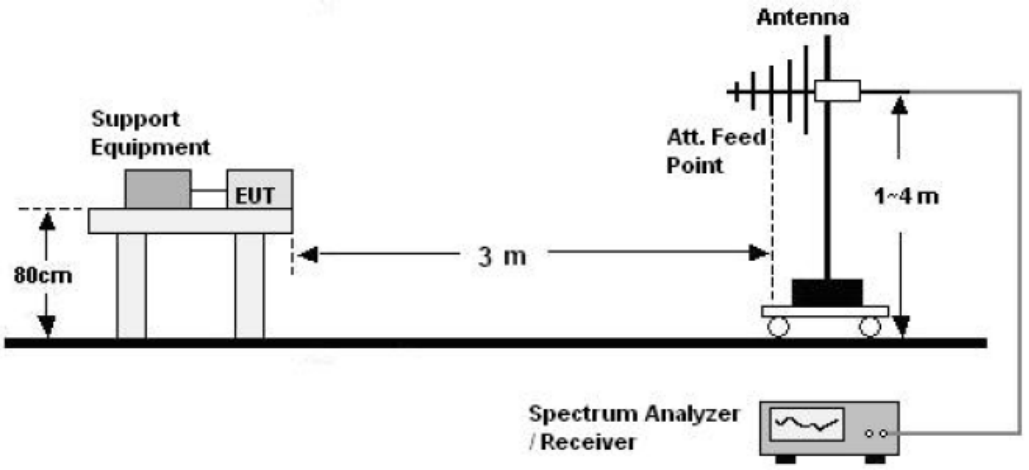


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1680	33.17	0.00	33.17	65.06	-31.89	peak	P	
2	0.1725	14.48	0.00	14.48	54.84	-40.36	AVG	P	
3	0.4785	28.09	0.00	28.09	56.37	-28.28	peak	P	
4	0.4785	15.44	0.00	15.44	46.37	-30.93	AVG	P	
5	1.5090	23.17	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(μV/m)
30-230	40
230-1000	47

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

3.3 Test

Procedure

30MHz ~

1GHz:

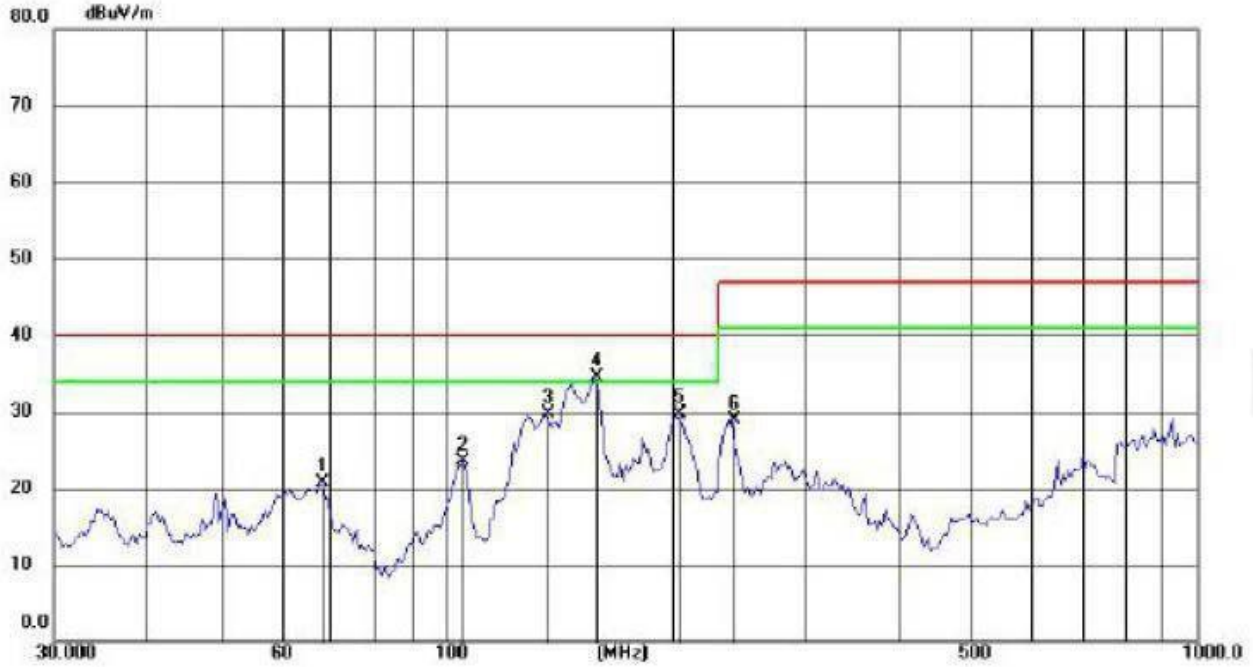
a. The Product was placed on the nonconductive turntable 0.8 m above the ground in a semi anechoic chamber.

b. 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.

c. 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 maximumvalue.

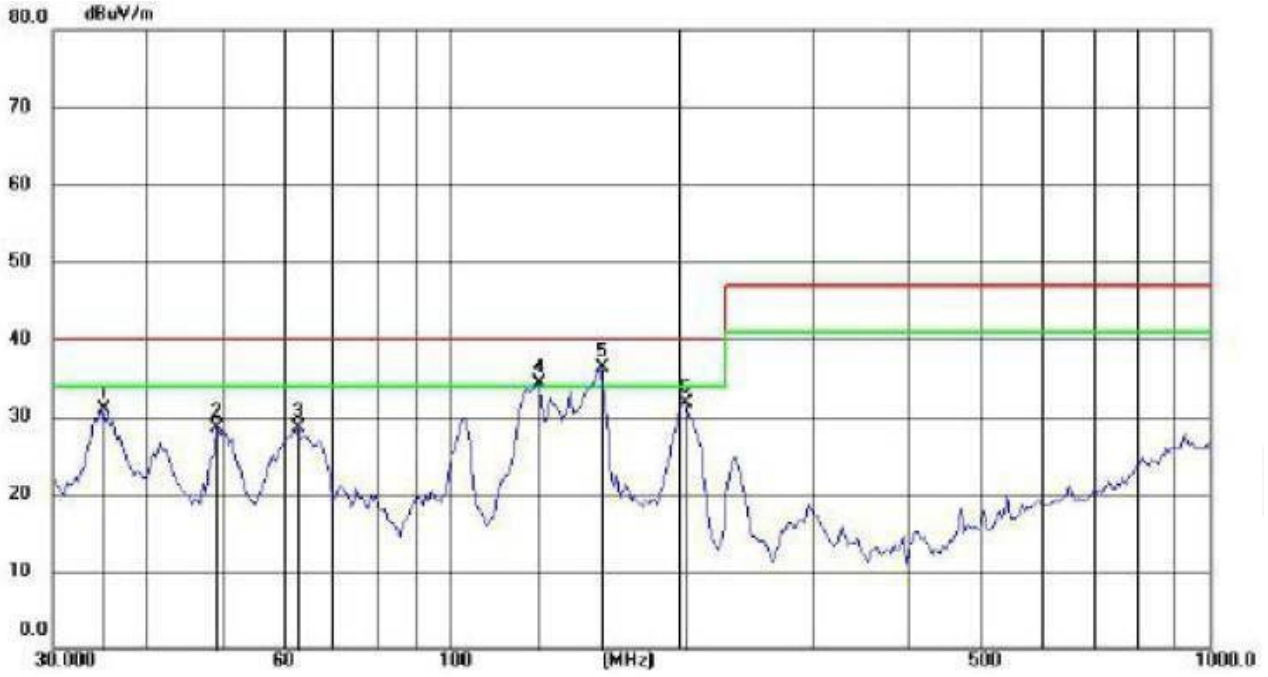
3.4 Test Results

Radiated disturbances Test Data			
Temperature:	25.8℃	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℃	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

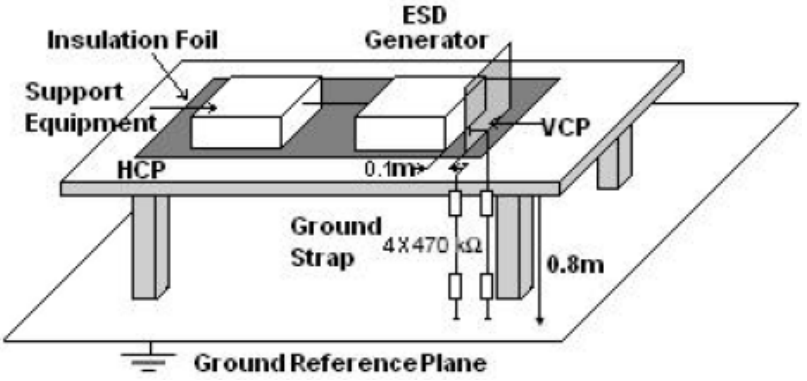
Product Standard	IEC 61326-1, IEC 61326-2-6
CRITERION A	During testing, normal performance within the specification limits.
CRITERION B	During testing, temporary degradation, or loss of function or performance which is self-recovering.
CRITERION C	During testing, temporary degradation, or loss of function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

a. Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. 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.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. 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 (±kV)	Min. No. of Discharge per polarity (Each Point)	Required Level	Performance Criterion
Contact Discharge	Conductive Surfaces	4[a], 6[b]	10	B	A
	Indirect Discharge HCP	4[a], 6[b]	10	B	A
	Indirect Discharge VCP	4[a], 6[b]	10	B	A
Air Discharge	Slots, Apertures, and Insulating Surfaces	2[b], 4[b], 8[a, b]	10	B	A
Note: ‘a’ meas the frequency refer to IEC 61326-1, ‘b’ meas the frequency refer to IEC 61326-2-6.					

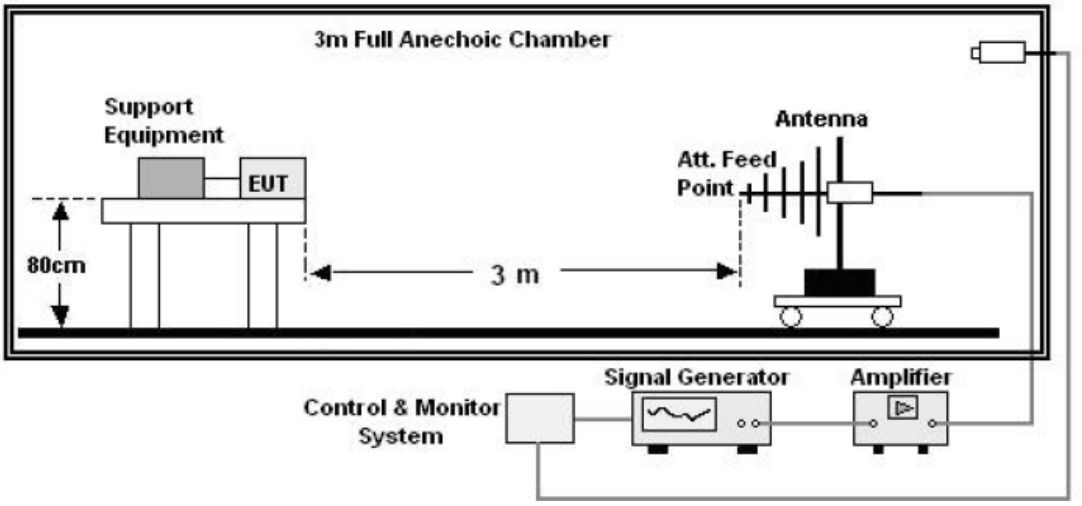
8. ELECTROMAGNETIC FIELD (RS)

8.1 Test Specification

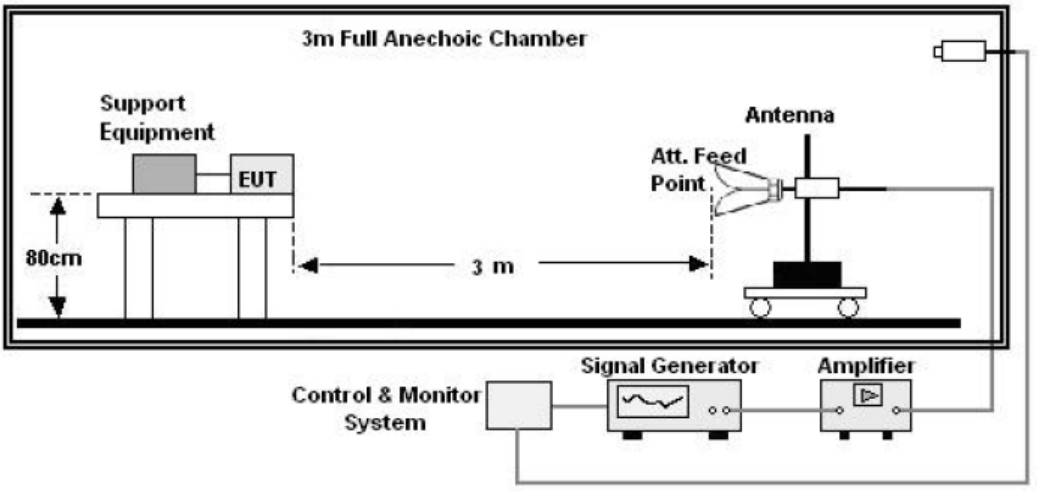
Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second
Polarization	:	Horizontal & Vertical

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 1.5×10^{-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[a, b]	Front, Right, Back, Left	10	A	A
1000-6000[b]	Front, Right, Back, Left	3	A	A
1400 - 2000[a]	Front, Right, Back, Left	3	A	A
2000 - 2700[a]	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.				

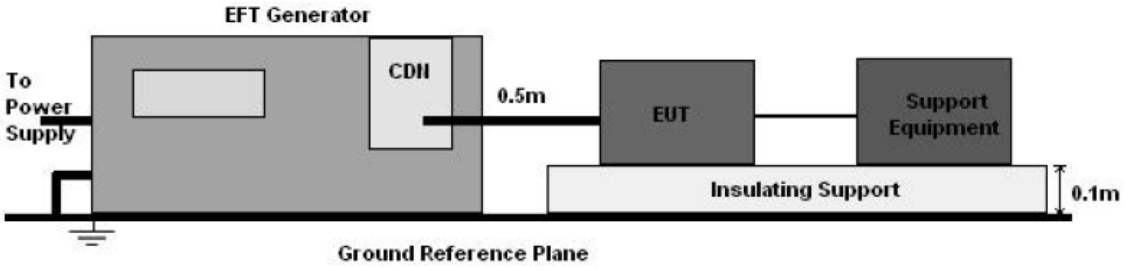
9. ELECTRICAL FAST TRANSIENTS/BURST (EFT)

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

a. The Product and support units were located on a non-conductive table above ground reference plane.

b. A 0.5m-long power cord was attached to Product during the test.

9.4 Test Results

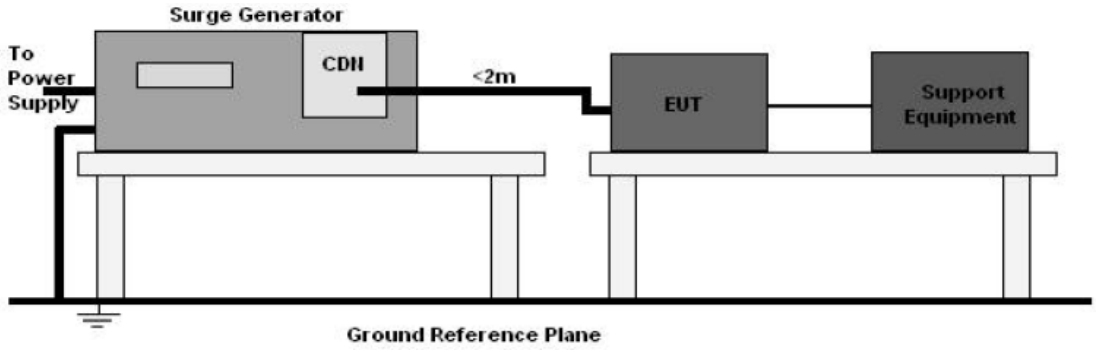
Coupling	Voltage (kV)	Polarity	Required Level	Performance Criterion
AC Mains L-N	1[a], 2[b]	±	B	A
Note: 'a' meas the frequency refer to IEC 61326-1, 'b' meas the frequency refer to IEC 61326-2-6.				

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

a. 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.

b. 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[a, b], +1[a, b]	90°	B	A
	-0.5[a, b], -1[a, b]	270°	B	A
L-PE, N-PE	+0.5[a, b], +1[a, b], +2[b]	90°	B	A
	-0.5[a, b], -1[a, b], -2[b]	270°	B	A
Note: 'a' meas the frequency refer to IEC 61326-1, 'b' meas the frequency refer to IEC 61326-2-6.				

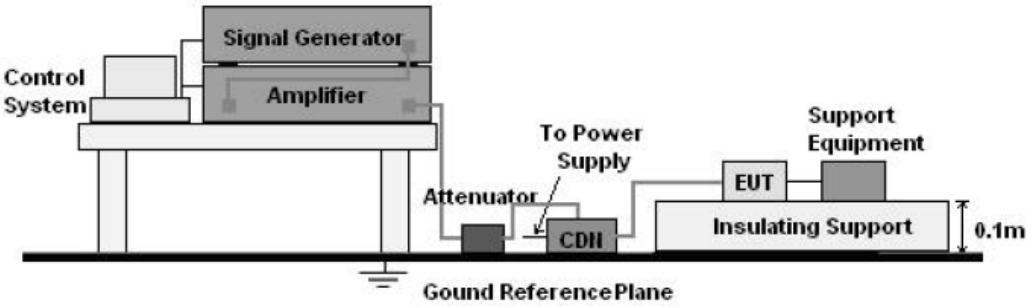
11. CONTINUOUS INDUCED RF DISTURBANCES (CS)

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:

a. 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 GRPdirectly.

b. 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 kHzsine wave, and the step size was 1% of fundamental.

c. 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

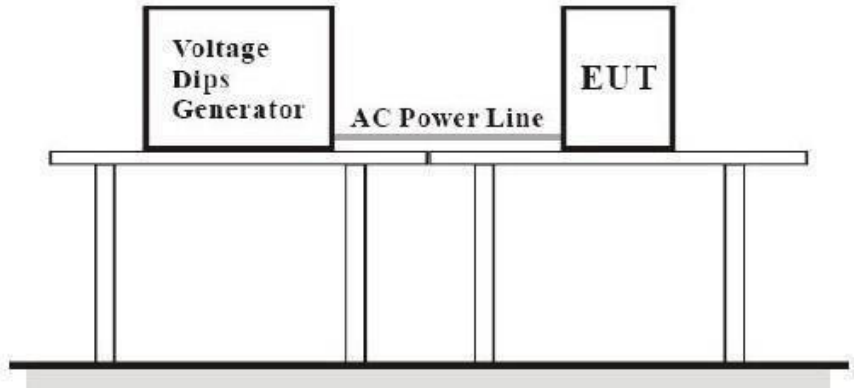
Inject Line	Frequency (MHz)	Voltage Level (V r.m.s.)	Required Level	Performance Criterion
a.c. port	0.15 - 80	3	A	A
Note: N/A				

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

a. The Product and support units were located on a non-conductive table above ground floor.

b. Set the parameter of tests and then perform the test software of test simulator.

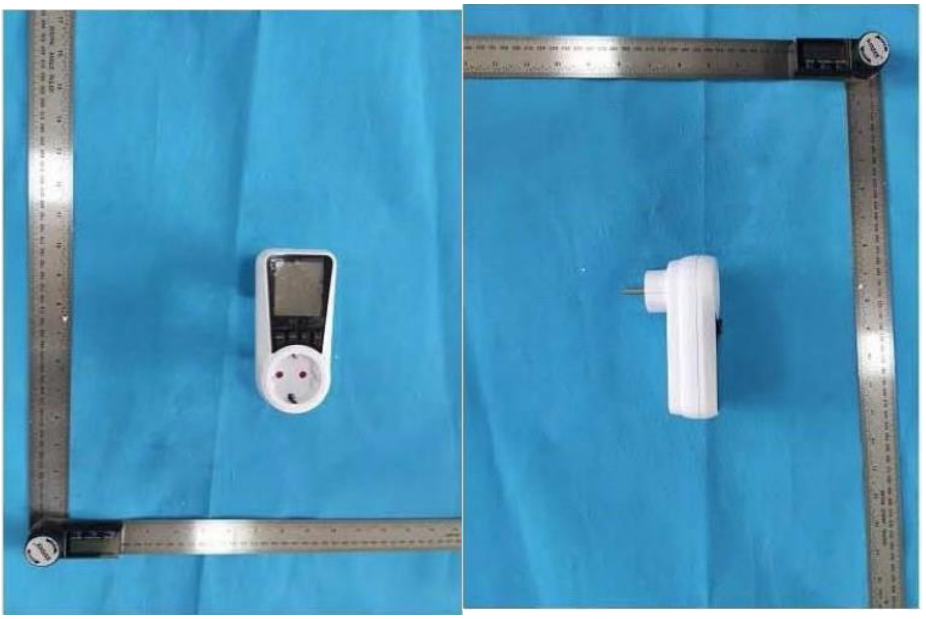
c. Conditions changes to occur at 0 degree crossover point of the voltage waveform.

12.4 Test Result

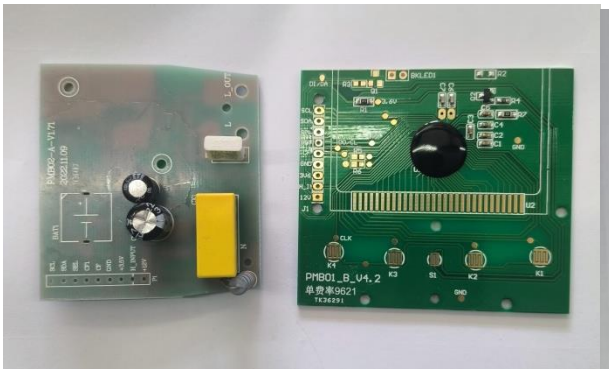
Test Level % U_T	Voltage dips in % U_T	Duration in cycles	Required Level	Performance Criterion
0	100	0.5	B	B
0	100	1	B	B
70	30	25/30	C	C
Voltage Interruptions:				
0	100	250/300	C	C
Note: N/A				

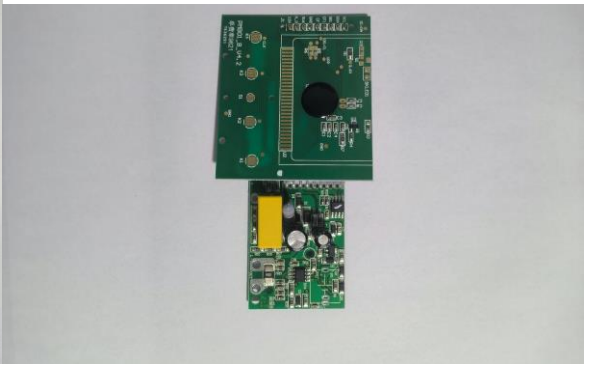

0.0:00
0.000
KWh
0
DAY
RESET
FUNCTION
COST
UP
DOWN

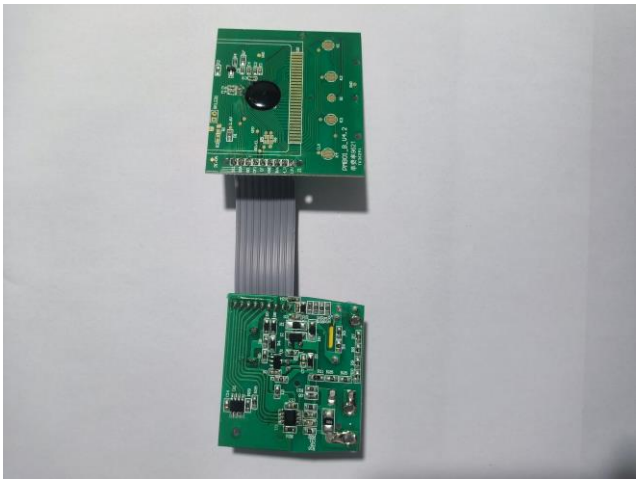

0.0:00
0.000
KWh
SET
MODE
UP




DAY
PF
MAX
WV
Hz
AMIN
KWh
COST
/KWh
FUNCTION
COST
RESET
UP
DOWN







The end of report