TEST REPORT

Product Name:	4 channel with rf control intelligent switch
Trademark:	SONOFF
Model Number:	Sonoff 4CH Pro R2
Serial Model:	Sonoff 4CH R2
Prepared For:	Shenzhen Sonoff Technologies Co., Ltd.
Address:	301, 3F, BLDG 52, The Third Industrial Park, Bantian, Longgang Dist Shenzhen, GD, 518055 China.
Manufacturer:	Shenzhen Sonoff Technologies Co., Ltd.
Address:	301, 3F, BLDG 52, The Third Industrial Park, Bantian, Longgang Dist Shenzhen, GD, 518055 China.
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Sample Received Date:	Apr. 02, 2018
Sample tested Date:	Apr. 03, 2018 to Apr. 10, 2018
Issue Date:	Apr. 10, 2018
Report No.:	BCTC-FY180301676-2E
Test Standards	Draft ETSI EN 301 489-1 V2.2.0 (2017-03) Final draft ETSI EN 301 489-3 V2.1.1 (2017-03) Draft ETSI EN 301 489-17 V3.2.0 (2017-03)
Test Results	PASS
Remark:	This is RED EMC test report.

Compiled by:	Reviewed by:	Approved by:
Willen Wang	Rita Xiao	Carson.Zhang
Willen Wang	Rita Xiao	Carson Zhang/Manager

The test report is effective only with both signature and specialized stamp.This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full.The tested sample(s) and the sample information are provided by the client.

TABLE OF CONTENT

(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
BCTC-FY180301676-2E	Apr. 10, 2018	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

EMISSION		
Standard	**Test Item**	**Test result**
EN 55032	Conducted emissions from the AC mains power ports	Pass
EN 55032	Asymmetric mode conducted emissions	N/A[1]
EN 55032	Conducted differential voltage emissions	N/A[2]
EN 55032	Radiated emissions	Pass
EN 61000-3-2	Harmonic current emission(H)	Pass
EN 61000-3-3	Voltage fluctuations & flicker(F)	Pass

IMMUNITY		
Standard	**Test Item**	**Test result**
IEC 61000-4-2	Electrostatic discharge (ESD)	Pass
IEC 61000-4-3	Continuous RF electromagnetic field disturbances(RS)	Pass[#]
IEC 61000-4-4	Electrical fast transients/burst (EFT)	Pass
IEC 61000-4-5	Surges	Pass
IEC 61000-4-6	Radio frequency, common mode	Pass
IEC 61000-4-11	Voltage dips and interruptions (DIPS)	Pass

Remark:
"#"indicates the testing item(s) was (were) fulfilled by subcontracted lab.
1. Applicable to ports listed above and intended to connect to cables longer than 3 m.
2. The Product has no antenna port.
3. The Product belongs to Class A, and its power is less than 75W, so it deems to fulfil this standard without testing.

3. 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 (150kHz-30MHz)	1.82
Radiated Emission(30MHz~1GHz)	2.51
Radiated Emission(1GHz~6GHz)	2.51

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	Sonoff 4CH Pro R2
Serial Model:	Sonoff 4CH R2
Model Description:	The product is different for model number and outlook color.
Wi-Fi Specification:	IEEE 802.11b/g/n
SRD	433.92MHz
Hardware Version:	N/A
Software Version:	N/A

Operation Frequency:	WiFi: IEEE 802.11b/g/n 20: 2412-2472MHz SRD: RX 433.92MHz
Max. RF output power:	WiFi (2.4G) : 9.58dBm
Type of Modulation:	WiFi: DSSS, OFDM SRD: ASK
Antenna installation:	WiFi: Internal antenna
Antenna Gain:	WiFi (2.4G) : 1dBi
Ratings:	Input: AC 90-264V 50/60Hz DC 5-24V
Adapter:	N/A

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Specification	Note
1	--	--	Applicant	---	Shielded	With a ferrite ring in mid
2	--	--	BCTC	--	Unshielded	--

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No	Device	Brand	Model	Series No.	Data Cable	Power
1.	---	---	---	---	---	---

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Test Mode

Test item	Test Mode	Test Voltage
Conducted emissions from the AC mains power ports (150KHz-30MHz) Class B	Wifi linking	AC 230V/50Hz*
Radiated emissions(30MHz-6GHz) Class B	Wifi linking	AC 230V/50Hz*
Harmonic current emission(H) Class __A___	Wifi linking	AC 230V/50Hz*
Voltage fluctuations & flicker(F)	Wifi linking	AC 230V/50Hz*
Electrostatic discharge (ESD) ☒Air Discharge: ±2,4,8kV ☒Contact Discharge: ±2,4kV ☒HCP & VCP: ±2,4kV	Wifi linking	AC 230V/50Hz
Continuous RF electromagnetic field disturbances(RS) ☒80MHz-6000MHz , 3V/m,80%	Wifi linking	AC 230V/50Hz
Electrical fast transients/burst (EFT) ☒1kV AC(Input) ☐0.5kV DC(Input)	Wifi linking	AC 230V/50Hz

☐0.5kV signal,Telec,control		
Surges ☒1kV Line-Line, ☐2kV Line-PE, N-PE ☐0.5kVDC(Input) ☐1KV,☐4KV signal,Telec, control Line-Line:90°+1kV,270°-1kV Line-PE:90°+2kV,270°-2kV N-PE:90°-2kV,270°+2kV	Wifi linking	AC 230V/50Hz
Continuous induced RF disturbances (CS) 0.15MHz to 10MHz 3V,10MHz-30MHz 3 to 1V,30MHz-80MHz 1V ☒ AC(Input) ☐ DC(Input) ☐ signal,control	Wifi linking	AC 230V/50Hz
Voltage dips and interruptions (DIPS) ☒Less 5% 0.5P ☒70% 500ms Voltage Interruptions ☒less5% 5000ms	Wifi linking	AC230V/50Hz
All test mode were tested and passed, only Conducted Emissions, Radiated Emissions Harmonic Current Emissions and Voltage Fluctuations and Flicker shows (*) is the worst case mode which were recorded in this report.		

4.5 Test Environment

Temperature:	25℃
Humidity:	60%
Atmospheric Pressure:	1012 hPa

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Conducted emissions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR	102075	Aug. 14, 2017	Aug. 13, 2018
LISN	R&S	ENV216	101375	Aug. 14, 2017	Aug. 13, 2018
ISN	HPX	ISN T800	S1509001	Aug. 14, 2017	Aug. 13, 2018

Radiated emissions Test (966 chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	Aug. 25, 2017	Aug. 24, 2018
Receiver	R&S	ESRP	101154	Aug. 14, 2017	Aug. 13, 2018
Amplifier	Schwarzbeck	BBV9718	9718-309	Aug. 14, 2017	Aug. 13, 2018
Amplifier	Schwarzbeck	BBV9744	9744-0037	Aug. 14, 2017	Aug. 13, 2018
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Aug. 13, 2017	Aug. 12, 2018
Horn Antenna	SCHWARZBECK	BBHA9120D	1201	Aug. 16, 2017	Aug. 15, 2018

Harmonic / Flicker Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Harmonic & Flicker Tester	LAPLAEC	AC2000A	439263	Aug. 14, 2017	Aug. 13, 2018
AC Power Supply	LAPLAEC	PCR4000M	631589	Aug. 14, 2017	Aug. 13, 2018

Electrostatic discharge Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
ESD Tester	3C TEST	EDS 30V	ES0121614	Aug. 16, 2017	Aug. 15, 2018
ESD Tester	KIKISUI	KES4201A	UH002321	Aug. 15, 2017	Aug. 14, 2018

Continuous RF electromagnetic field disturbances Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Signal Generator	HP	8648A	3625U00573	Sep. 26, 2017	Sep. 25, 2018
Amplifier	A&R	500A100	17034	Sep. 26, 2017	Sep. 25, 2018
Amplifier	A&R	100W/1000M1	17028	Sep. 26, 2017	Sep. 25, 2018
Audio Analyzer (20Hz~1GHz)	Panasonic	2023B	202301/428	Sep. 26, 2017	Sep. 25, 2018
Isotropic Field Probe	A&R	FP2000	16755	Sep. 26, 2017	Sep. 25, 2018
Antenna	EMCO	3108	9507-2534	Sep. 26, 2017	Sep. 25, 2018
Log-periodic Antenna	A&R	AT1080	16812	Sep. 26, 2017	Sep. 25, 2018

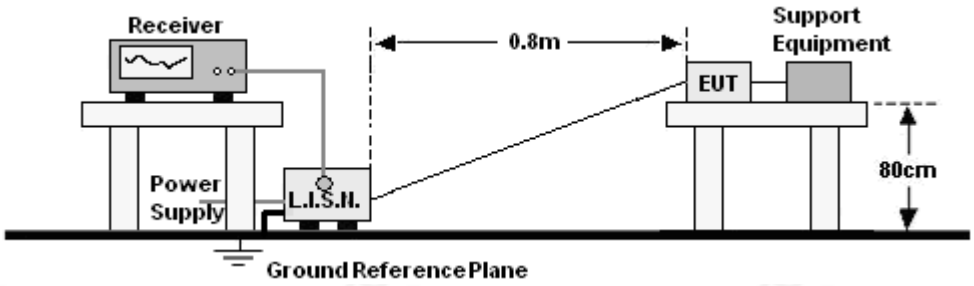
EFT and Surge and Voltage dips and interruptions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Compact Generator	TRANSIENT	TRA2000	646	Aug. 14, 2017	Aug. 13, 2018
Coupling Clamp	PARTNER	CN-EFT1000	CN-EFT1000-1624	Aug. 14, 2017	Aug. 13, 2018

Continuous induced RF disturbances Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
C/S Test System	SCHLODER	CDG-6000-75	126B1405/2016	Aug. 14, 2017	Aug. 13, 2018
Attenuator	SCHLODER	6DB DC-1G	HA1630	Aug. 14, 2017	Aug. 13, 2018
CDN	SCHLODER	CDN M2/M3	A2210389/2016	Aug. 14, 2017	Aug. 13, 2018
Injection Clamp	SCHLOBER	EMCL-20	132A1272/2016	Aug. 14, 2017	Aug. 13, 2018

6. CONDUCTED EMISSIONS

6.1 Block Diagram Of Test Setup

For mains ports:



6.2 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.

6.3 Test procedure

For mains ports:

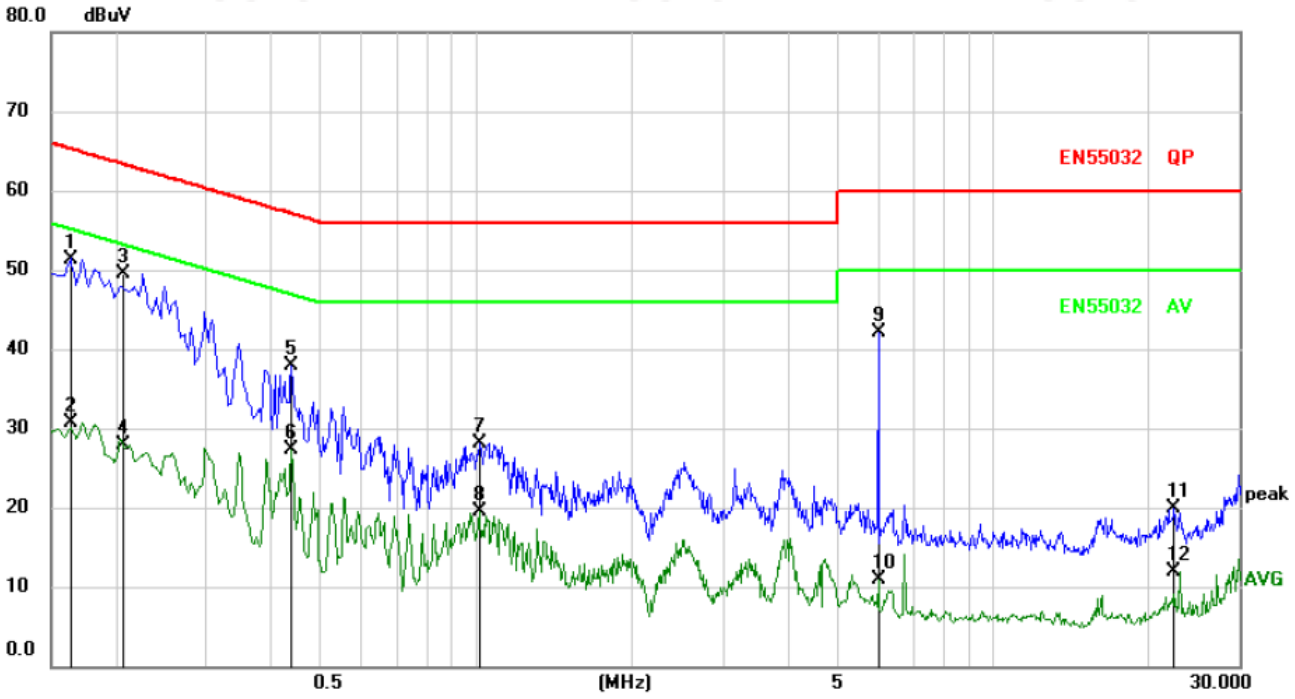
a. The Product was placed on a nonconductive table 0.8/0.1 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).

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 QP and AVG values and record.

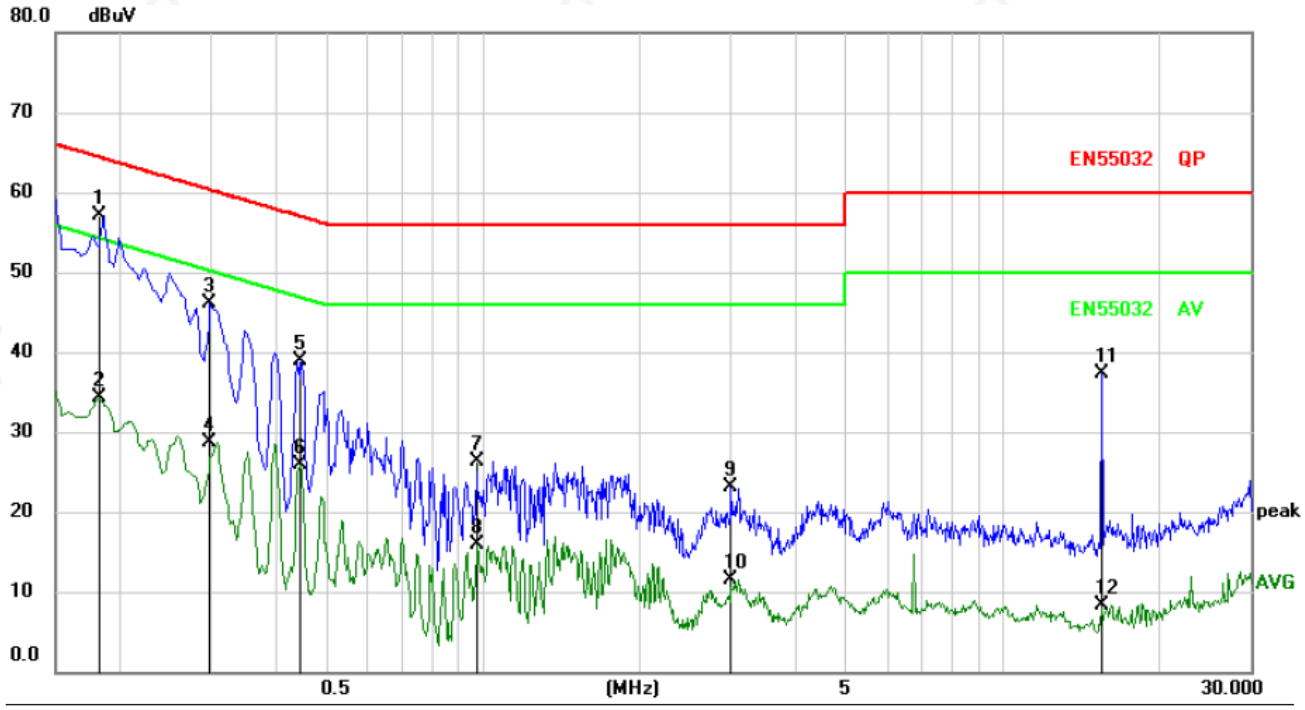
6.4 Test Result

Temperature:	25℃	Relative Humidity:	60%
Pressure:	1012hPa	Phase :	L
Test Mode	Wifi linking	Remark:	n/a



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1635	41.69	9.71	51.40	65.28	-13.88	QP	
2		0.1635	20.95	9.71	30.66	55.28	-24.62	AVG	
3		0.2072	39.79	9.63	49.42	63.32	-13.90	QP	
4		0.2072	18.26	9.63	27.89	53.32	-25.43	AVG	
5		0.4380	28.16	9.67	37.83	57.10	-19.27	QP	
6		0.4380	17.58	9.67	27.25	47.10	-19.85	AVG	
7		1.0140	18.41	9.71	28.12	56.00	-27.88	QP	
8		1.0140	9.73	9.71	19.44	46.00	-26.56	AVG	
9		6.0090	32.24	9.78	42.02	60.00	-17.98	QP	
10		6.0090	1.19	9.78	10.97	50.00	-39.03	AVG	
11		22.4565	9.87	10.00	19.87	60.00	-40.13	QP	
12		22.4565	1.82	10.00	11.82	50.00	-38.18	AVG	

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012hPa	Phase :	N
Test Mode	Wifi linking	Remark:	n/a

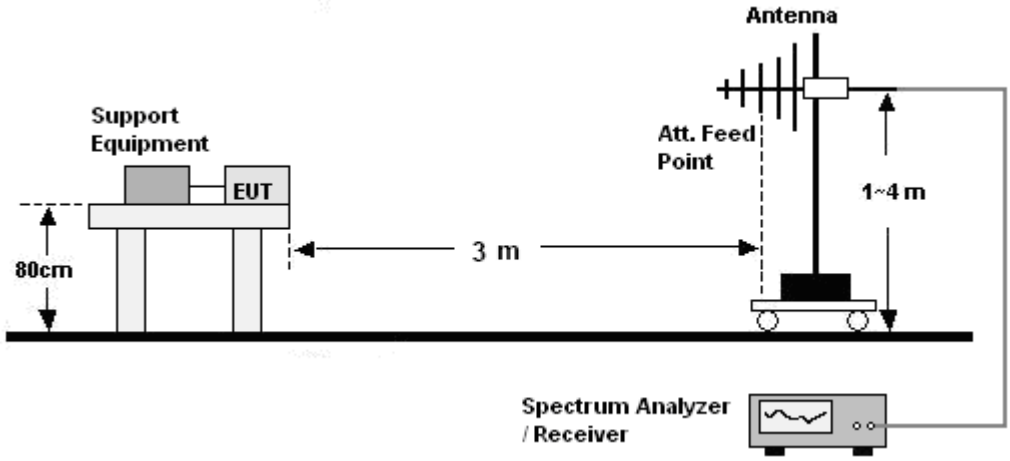


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1815	47.45	9.67	57.12	64.42	-7.30	QP	
2		0.1815	24.64	9.67	34.31	54.42	-20.11	AVG	
3		0.2985	36.41	9.65	46.06	60.28	-14.22	QP	
4		0.2985	19.05	9.65	28.70	50.28	-21.58	AVG	
5		0.4425	29.29	9.67	38.96	57.01	-18.05	QP	
6		0.4425	16.31	9.67	25.98	47.01	-21.03	AVG	
7		0.9780	16.53	9.71	26.24	56.00	-29.76	QP	
8		0.9780	6.18	9.71	15.89	46.00	-30.11	AVG	
9		3.0075	13.30	9.72	23.02	56.00	-32.98	QP	
10		3.0075	1.82	9.72	11.54	46.00	-34.46	AVG	
11		15.4905	27.43	9.93	37.36	60.00	-22.64	QP	
12		15.4905	-1.66	9.93	8.27	50.00	-41.73	AVG	

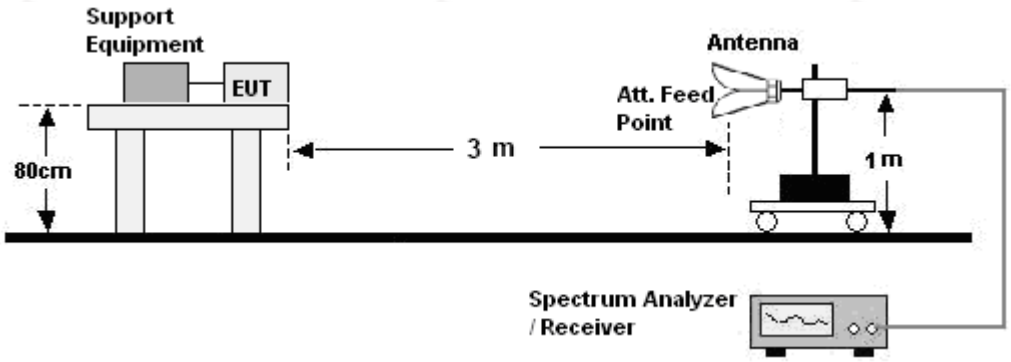
7. RADIATED EMISSIONS TEST

7.1 Block Diagram Of Test Setup

30MHz ~ 1GHz:



Above 1GHz:



7.2 Limits

Limits for radiated disturbance of Class B MME

Frequency (MHz)	Quasi-peak limits at 3m dB(μV/m)
30-230	40
230-1000	47

Frequency (GHz)	limit above 1G at 3m dB(μV/m)	
	Average	peak
1-3	50	70
3-6	54	74

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

7.3 Test Procedure

30MHz ~ 1GHz:

a. The Product was placed on the nonconductive turntable 0.8/0.1 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 maximum value.

Above 1GHz:

a. The Product was placed on the non-conductive turntable 0.8/0.1 m above the ground in a full anechoic chamber..

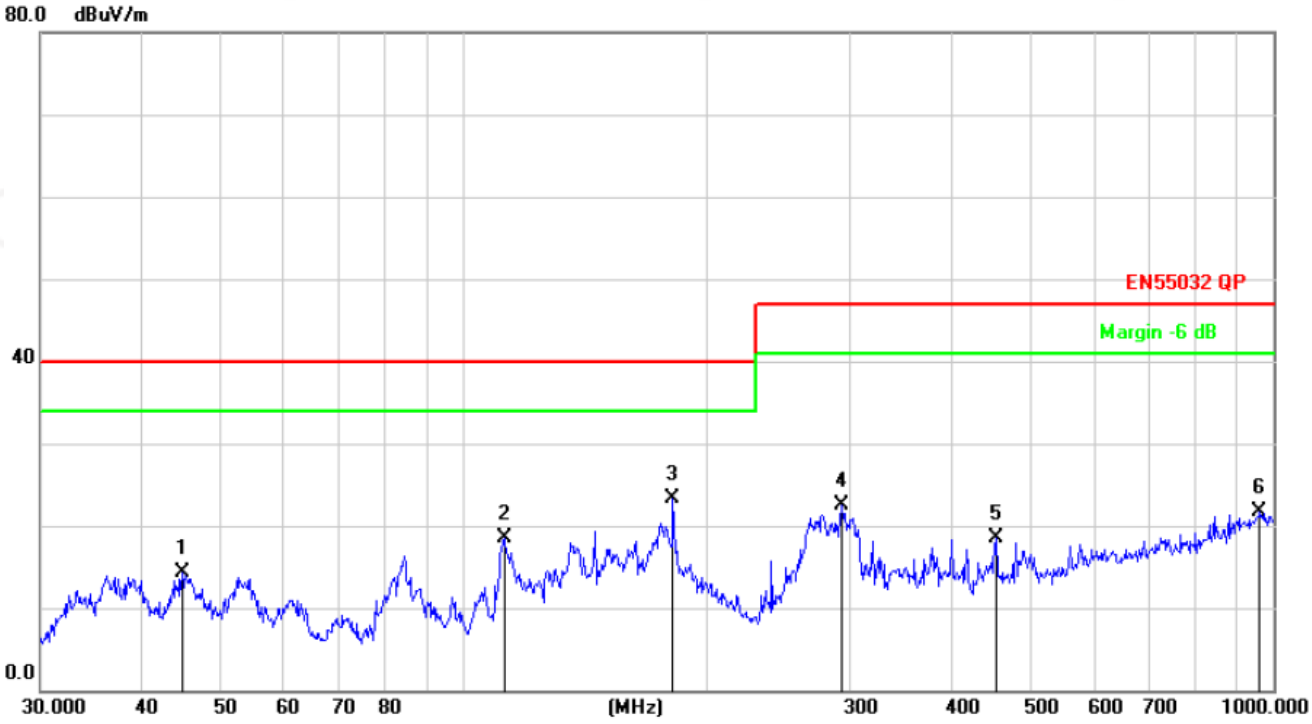
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

7.4 Test Results

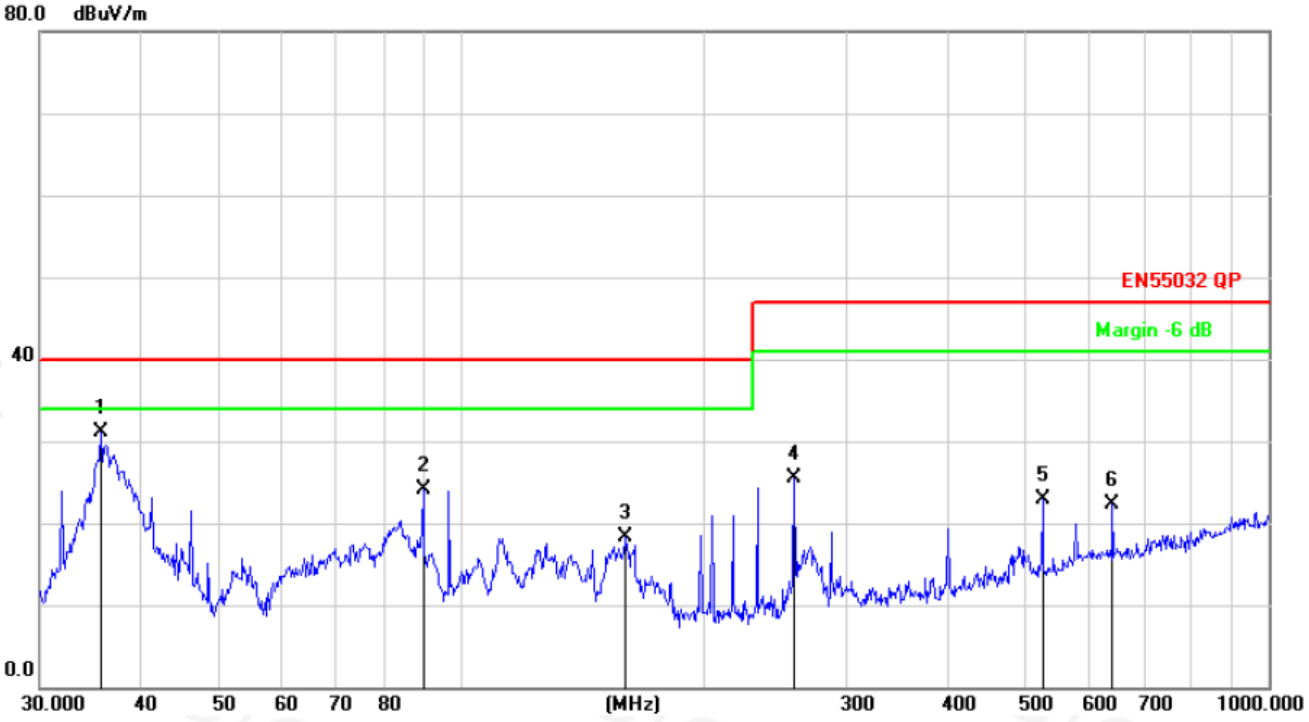
Below 1GHz

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012hPa	Polarization :	Horizontal
Test Mode	Wifi linking	Remark:	n/a



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		44.9006	28.32	-14.05	14.27	40.00	-25.73	QP
2		112.1305	34.64	-16.10	18.54	40.00	-21.46	QP
3	*	181.2834	41.25	-17.95	23.30	40.00	-16.70	QP
4		293.0842	36.35	-13.84	22.51	47.00	-24.49	QP
5		454.3100	29.08	-10.59	18.49	47.00	-28.51	QP
6		962.1623	23.66	-1.96	21.70	47.00	-25.30	QP

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012hPa	Polarization :	Vertical
Test Mode	Wifi linking	Remark:	n/a



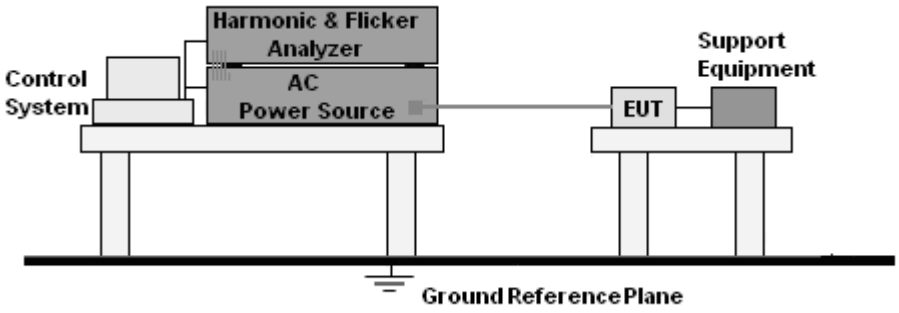
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	35.7490	47.29	-16.22	31.07	40.00	-8.93	QP
2		89.5899	41.66	-17.53	24.13	40.00	-15.87	QP
3		159.7844	37.33	-19.08	18.25	40.00	-21.75	QP
4		258.3264	40.51	-15.03	25.48	47.00	-21.52	QP
5		524.5541	31.79	-8.96	22.83	47.00	-24.17	QP
6		640.6110	28.76	-6.53	22.23	47.00	-24.77	QP

Above 1G

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8. HARMONIC CURRENT EMISSION(H)

8.1 Block Diagram of Test Setup



8.2 Limit

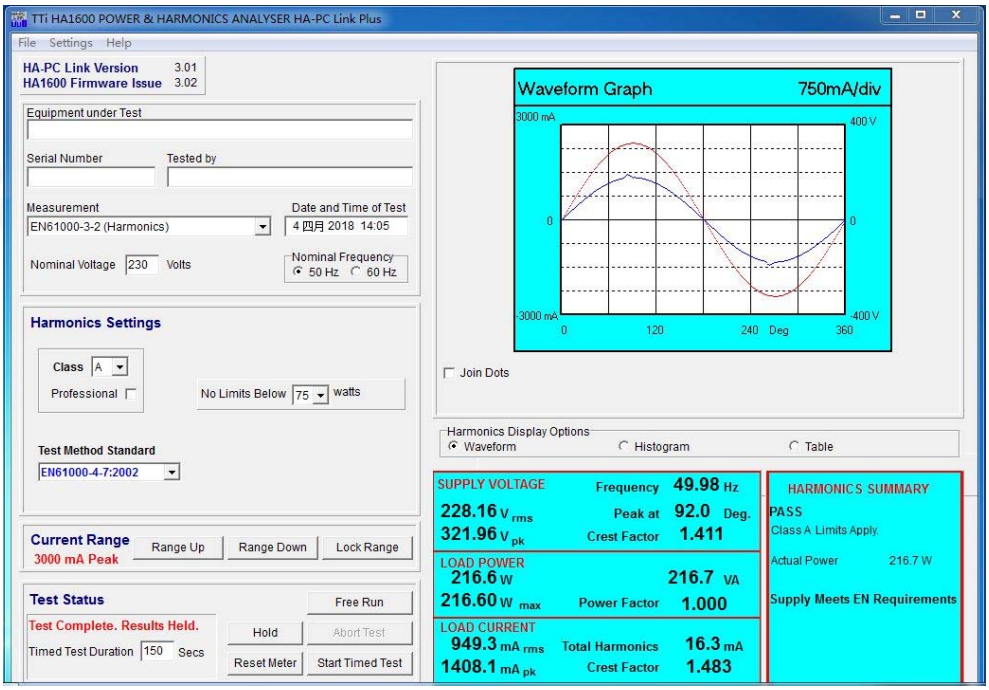
EN 61000-3-2:2014 Clause 7.

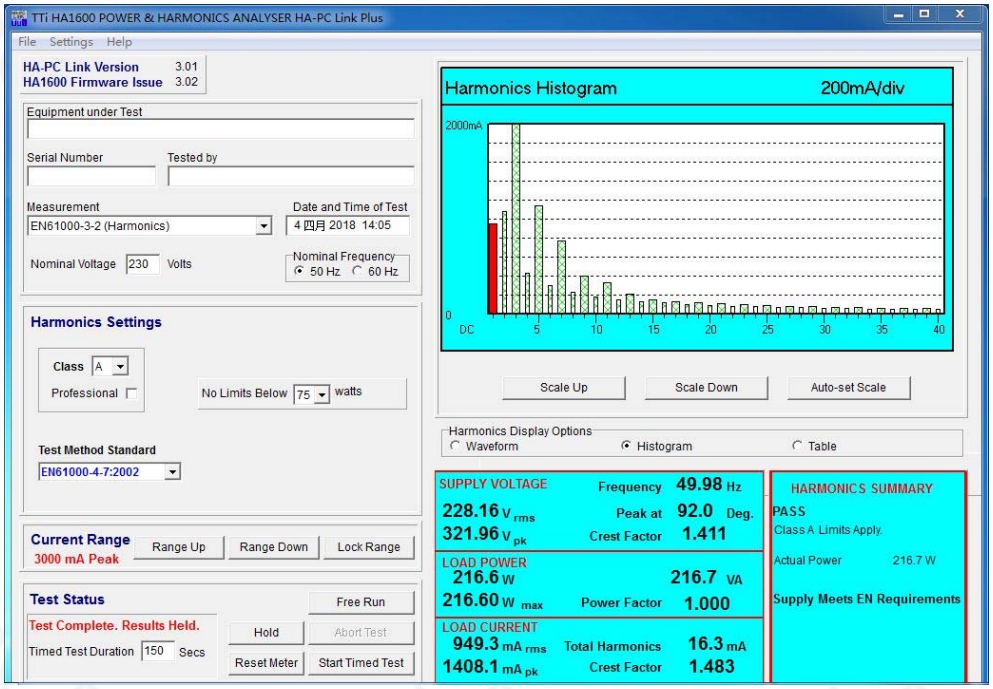
8.3 Test Procedure

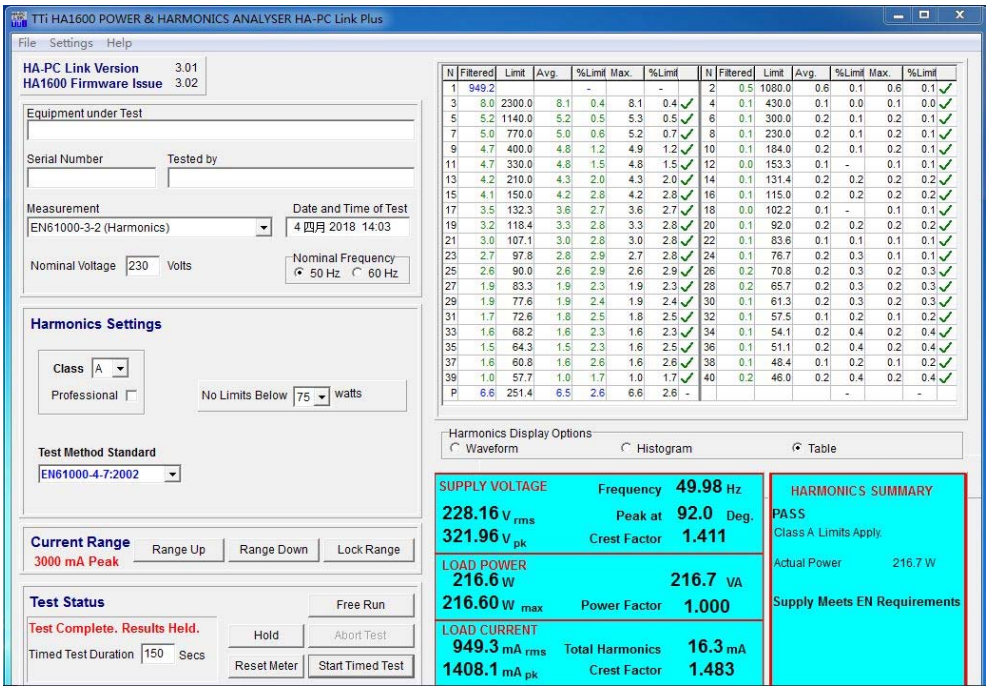
a. The Product was placed on the top of a non-conductive table above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

b. The correspondent test program of test instrument to measure the current harmonics emanated from Product was chosen. The measure time shall be not less than the time necessary for the Product to be exercised.

8.4 Test Results

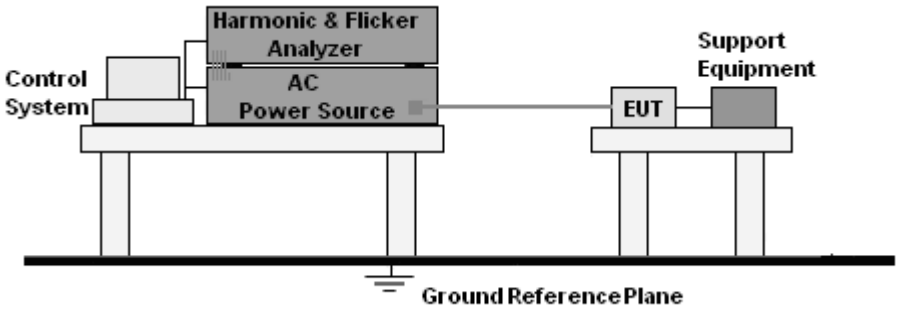

TTi HA1600 POWER & HARMONICS ANALYSER HA-PC Link Plus
File Settings Help
HA-PC Link Version 3.01
HA1600 Firmware Issue 3.02
Equipment under Test
Serial Number
Tested by
Measurement
EN61000-3-2 (Harmonics)
Date and Time of Test
4 四月 2018 14:05
Nominal Voltage 230 Volts
Nominal Frequency
50 Hz 60 Hz
Harmonics Settings
Class A
Professional
No Limits Below 75 watts
Test Method Standard
EN61000-4-7:2002
Current Range
3000 mA Peak
Range Up
Range Down
Lock Range
Test Status
Test Complete. Results Held.
Timed Test Duration 150 Secs
Free Run
Hold
Abort Test
Reset Meter
Start Timed Test
Waveform Graph 750mA/div
3000 mA
400 V
0
-3000 mA
-400 V
0 120 240 Deg 360
Join Dots
Harmonics Display Options
Waveform Histogram Table
SUPPLY VOLTAGE
228.16 V rms
321.96 V pk
Frequency 49.98 Hz
Peak at 92.0 Deg.
Crest Factor 1.411
LOAD POWER
216.6 W
216.60 W max
216.7 VA
Power Factor 1.000
LOAD CURRENT
949.3 mA rms
1408.1 mA pk
Total Harmonics 16.3 mA
Crest Factor 1.483
HARMONICS SUMMARY
PASS
Class A Limits Apply.
Actual Power 216.7 W
Supply Meets EN Requirements


TTi HA1600 POWER & HARMONICS ANALYSER HA-PC Link Plus
File Settings Help
HA-PC Link Version 3.01
HA1600 Firmware Issue 3.02
Equipment under Test
Serial Number
Tested by
Measurement
EN61000-3-2 (Harmonics)
Date and Time of Test
4 四月 2018 14:05
Nominal Voltage 230 Volts
Nominal Frequency
50 Hz 60 Hz
Harmonics Settings
Class A
Professional
No Limits Below 75 watts
Test Method Standard
EN61000-4-7:2002
Current Range
3000 mA Peak
Range Up
Range Down
Lock Range
Test Status
Test Complete. Results Held.
Timed Test Duration 150 Secs
Free Run
Hold
Abort Test
Reset Meter
Start Timed Test
Harmonics Histogram 200mA/div
2000mA
0
DC 5 10 15 20 25 30 35 40
Scale Up
Scale Down
Auto-set Scale
Harmonics Display Options
Waveform Histogram Table
SUPPLY VOLTAGE
228.16 V rms
321.96 V pk
Frequency 49.98 Hz
Peak at 92.0 Deg.
Crest Factor 1.411
LOAD POWER
216.6 W
216.60 W max
216.7 VA
Power Factor 1.000
LOAD CURRENT
949.3 mA rms
1408.1 mA pk
Total Harmonics 16.3 mA
Crest Factor 1.483
HARMONICS SUMMARY
PASS
Class A Limits Apply.
Actual Power 216.7 W
Supply Meets EN Requirements


TTi HA1600 POWER & HARMONICS ANALYSER HA-PC Link Plus
File Settings Help
HA-PC Link Version 3.01
HA1600 Firmware Issue 3.02
Equipment under Test
Serial Number
Tested by
Measurement
EN61000-3-2 (Harmonics)
Date and Time of Test
4 四月 2018 14:03
Nominal Voltage 230 Volts
Nominal Frequency
50 Hz 60 Hz
Harmonics Settings
Class A
Professional
No Limits Below 75 watts
Test Method Standard
EN61000-4-7:2002
Current Range
3000 mA Peak
Range Up
Range Down
Lock Range
Test Status
Test Complete. Results Held.
Timed Test Duration 150 Secs
Free Run
Hold
Abort Test
Reset Meter
Start Timed Test
Harmonics Display Options
Waveform
Histogram
Table
SUPPLY VOLTAGE
228.16 V rms
321.96 V pk
Frequency 49.98 Hz
Peak at 92.0 Deg.
Crest Factor 1.411
LOAD POWER
216.6 W
216.60 W max
216.7 VA
Power Factor 1.000
LOAD CURRENT
949.3 mA rms
1408.1 mA pk
Total Harmonics 16.3 mA
Crest Factor 1.483
HARMONICS SUMMARY
PASS
Class A Limits Apply.
Actual Power 216.7 W
Supply Meets EN Requirements

9. VOLTAGE FLUCTUATIONS & FLICKER(F)

9.1 Block Diagram of Test Setup



9.2 Limit

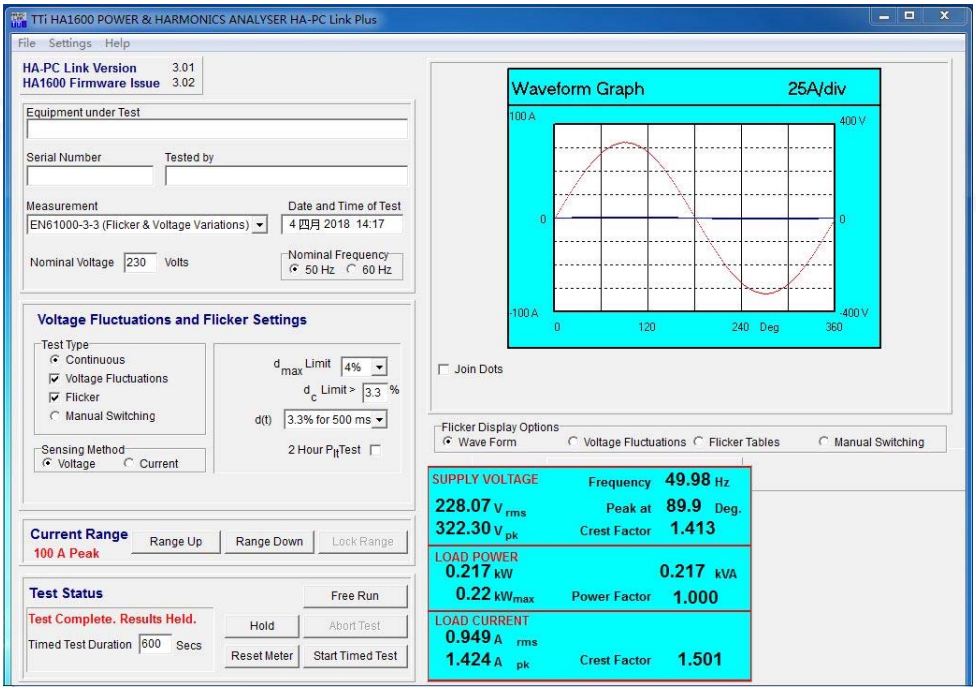
EN 61000-3-3:2013 Clause 5.

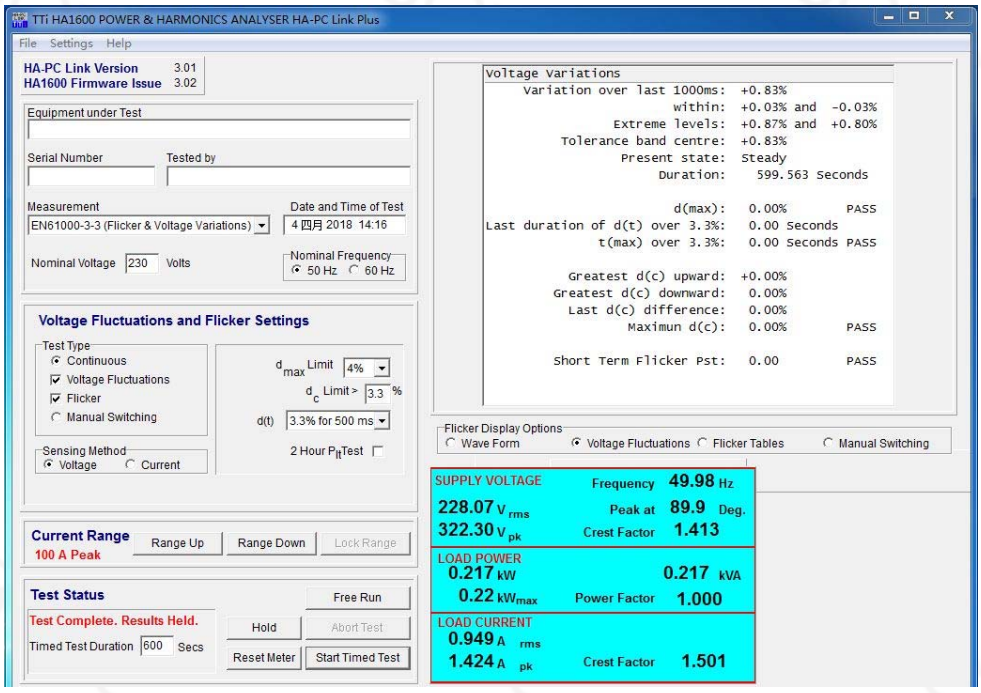
9.3 Test Procedure

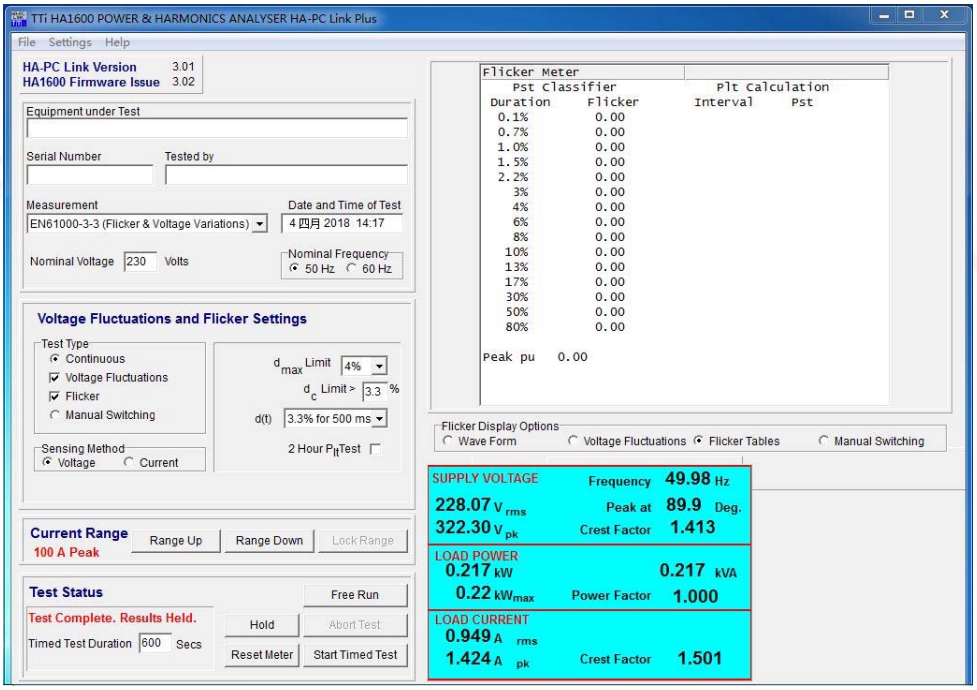
a. The Product was placed on the top of a non-conductive table above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

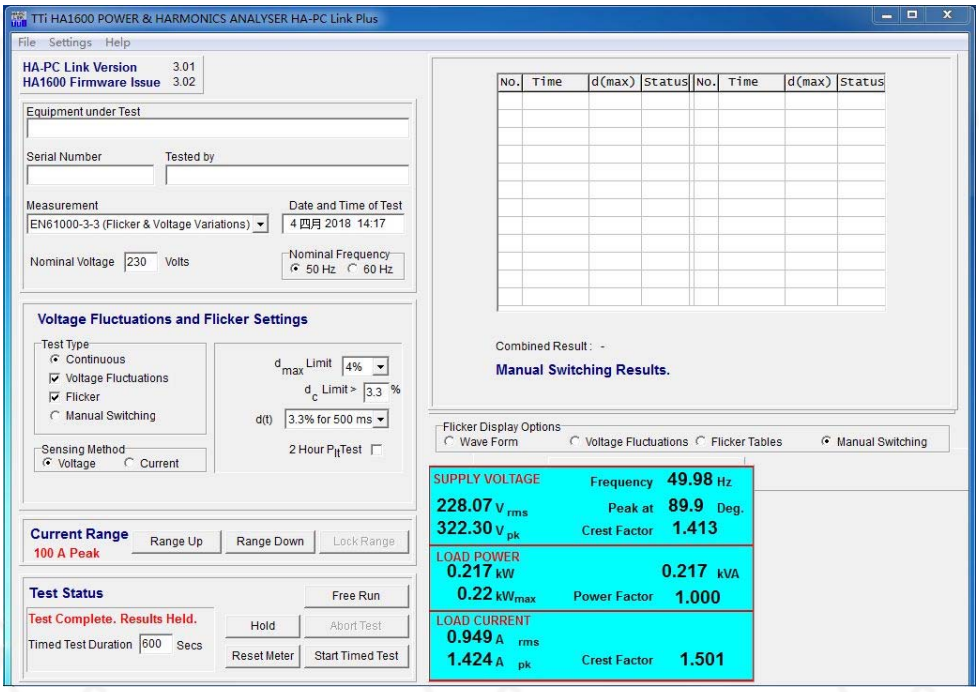
b. During the flick test, the measure time shall include that part of whole operation cycle in which the Product produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

9.4 Test Results






TTi HA1600 POWER & HARMONICS ANALYSER HA-PC Link Plus
File Settings Help
HA-PC Link Version 3.01
HA1600 Firmware Issue 3.02
Equipment under Test
Serial Number
Tested by
Measurement
EN61000-3-3 (Flicker & Voltage Variations)
Date and Time of Test
4 四月 2018 14:17
Nominal Voltage 230 Volts
Nominal Frequency
50 Hz 60 Hz
Voltage Fluctuations and Flicker Settings
Test Type
Continuous
Voltage Fluctuations
Flicker
Manual Switching
Sensing Method
Voltage Current
d max Limit 4%
dc Limit > 3.3 %
d(t) 3.3% for 500 ms
2 Hour Plt Test
Current Range
100 A Peak
Range Up
Range Down
Lock Range
Test Status
Test Complete. Results Held.
Timed Test Duration 600 Secs
Free Run
Hold
Abort Test
Reset Meter
Start Timed Test
Flicker Meter
Pst Classifier
Plt Calculation
Duration Flicker Interval Pst
0.1% 0.00
0.7% 0.00
1.0% 0.00
1.5% 0.00
2.2% 0.00
3% 0.00
4% 0.00
6% 0.00
8% 0.00
10% 0.00
13% 0.00
17% 0.00
30% 0.00
50% 0.00
80% 0.00
Peak pu 0.00
Flicker Display Options
Wave Form
Voltage Fluctuations
Flicker Tables
Manual Switching
SUPPLY VOLTAGE
Frequency 49.98 Hz
228.07 V rms
Peak at 89.9 Deg.
322.30 V pk
Crest Factor 1.413
LOAD POWER
0.217 kW
0.217 kVA
0.22 kWmax
Power Factor 1.000
LOAD CURRENT
0.949 A rms
1.424 A pk
Crest Factor 1.501


TTi HA1600 POWER & HARMONICS ANALYSER HA-PC Link Plus
File Settings Help
HA-PC Link Version 3.01
HA1600 Firmware Issue 3.02
Equipment under Test
Serial Number
Tested by
Measurement
EN61000-3-3 (Flicker & Voltage Variations)
Date and Time of Test
4 四月 2018 14:17
Nominal Voltage 230 Volts
Nominal Frequency
50 Hz 60 Hz
Voltage Fluctuations and Flicker Settings
Test Type
Continuous
Voltage Fluctuations
Flicker
Manual Switching
Sensing Method
Voltage Current
d max Limit 4%
dc Limit > 3.3 %
d(t) 3.3% for 500 ms
2 Hour Plt Test
Current Range
100 A Peak
Range Up
Range Down
Lock Range
Test Status
Test Complete. Results Held.
Timed Test Duration 600 Secs
Free Run
Hold
Abort Test
Reset Meter
Start Timed Test
No. Time d(max) Status No. Time d(max) Status
Combined Result: -
Manual Switching Results.
Flicker Display Options
Wave Form
Voltage Fluctuations
Flicker Tables
Manual Switching
SUPPLY VOLTAGE
Frequency 49.98 Hz
228.07 V rms
Peak at 89.9 Deg.
322.30 V pk
Crest Factor 1.413
LOAD POWER
0.217 kW
0.217 kVA
0.22 kWmax
Power Factor 1.000
LOAD CURRENT
0.949 A rms
1.424 A pk
Crest Factor 1.501

10. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA

According To EN 301489 -17standard, The General Performance Criteria As Following:

Criteria	During the test	After the test
A	Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions
B	May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions	Functions shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions
C	May be loss of function (one or more)	Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance (see note 2)

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: no degradation of performance after the test is understood as any degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

PERFORMANCE FOR TT

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

PERFORMANCE FOR TR

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

PERFORMANCE FOR CT

The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an Acknowledgement (ACK) or Not Acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

PERFORMANCE FOR CR

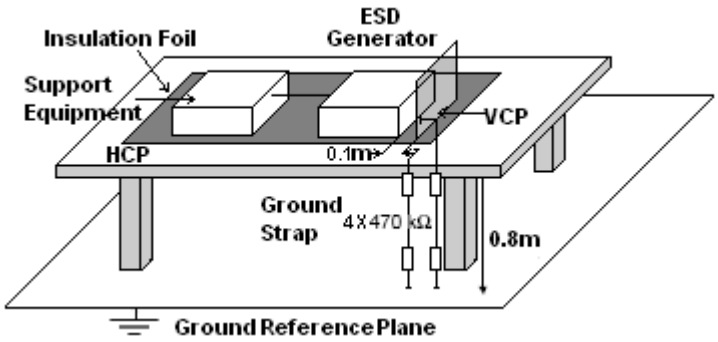
The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

11. ELECTROSTATIC DISCHARGE (ESD)

11.1 Test Specification

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

11.2 Block Diagram of Test Setup



11.3 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.

.

11.4 Test Results

Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Mode：	Mode1

Mode	Air Discharge (Test result)								Contact Discharge (Test result)								Observation	Perform Criteria	Judgment
Test level (kV)	2		4		8		15		2		4		6		8				
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-			
HCP									A	A	A	A					**CT,CR**	**B**	**PASS**
VCP									A	A	A	A					**CT,CR**	**B**	**PASS**
enclosure	A	A	A	A	A	A											**CT,CR**	**B**	**PASS**

Note:

1) P/N denotes the Positive/Negative polarity of the output voltage.
2) Test condition:
Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point. Air discharges: Minimum 10 times (Positive/Negative) at each point.
3) N/A - denotes test is not applicable in this test report
4)There was not any unintentional transmission in standby mode

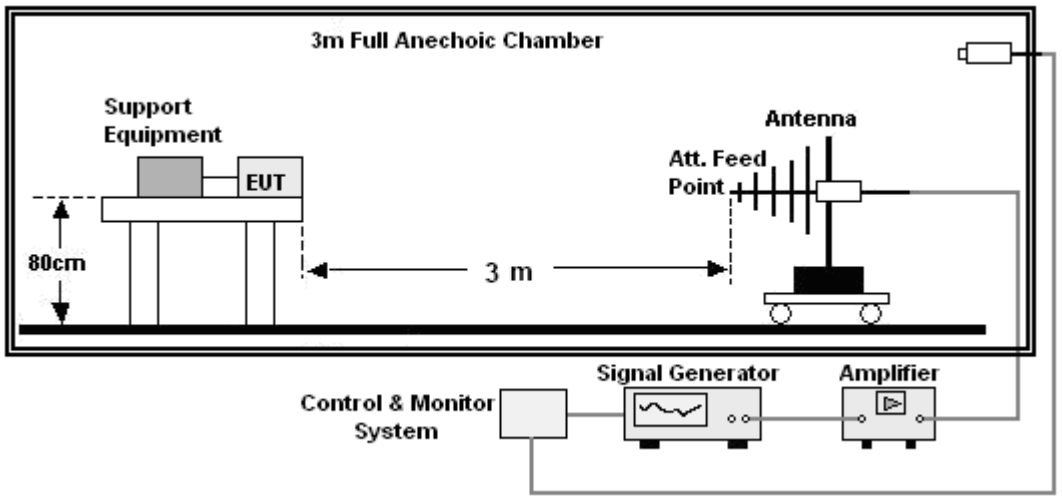
12. CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES(RS)

12.1 Test Specification

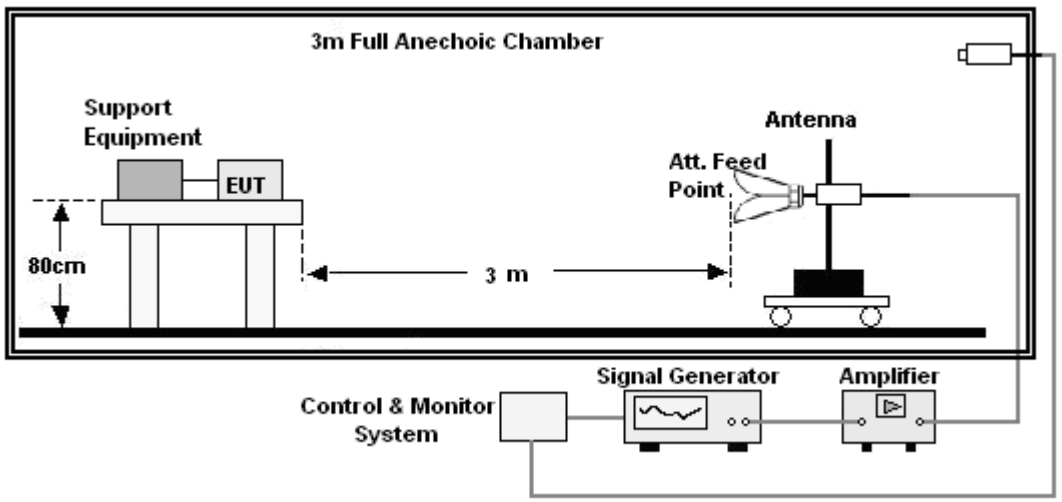
Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second
Polarization	:	Horizontal & Vertical

12.2 Block Diagram of Test Setup

Below 1GHz:



Above 1GHz:



12.3 Test Procedure

a. The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3 meters from the Product.

b. The frequency range is swept from 80MHz to 6000MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave,and the step size was 1%.

c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond, but should not exceed 5 s at each of the frequencies during the scan.

d. The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.

e. For Broadcast reception function:Group 2 not apply in this test.

12.4 Test Results

Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Mode：	Mode1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform Criteria	Test Result	Judgment
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	**CT,CR**	**A**	**A**	**PASS**
			Rear				
			Left				
			Right				

Note:

1) P/N denotes the Positive/Negative polarity of the output voltage.
2) N/A - denotes test is not applicable in this test report.
3) There was no change operated with initial operating during the test.
4) There was not any unintentional transmission in standby mode

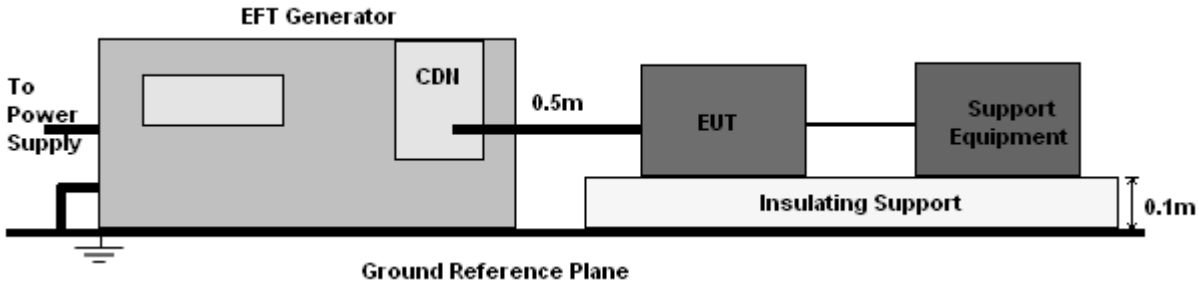
13. ELECTRICAL FAST TRANSIENTS/BURST (EFT)

13.1 Test Specification

Test Port	:	input a.c. . power port analogue/digital data port
Impulse Frequency	:	5 kHz 100 kHz only for single ports of CPE xDSL equipment
Impulse Wave-shape	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	2 minutes per polarity

13.2 Block Diagram of EUT Test Setup

For input a.c. power port:



13.3 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.

13.4 Test Results

Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Mode：	Mode1

Coupling Line		Test level (KV)l								Observation	Perform Criteria	Test Result	Judgment
		0.5		1		2		4					
		+	-	+	-	+	-	+	-				
AC Line	L	A	A	A	A					CT,CR	B	A	PASS
	N	A	A	A	A							A	PASS
	L+N	A	A	A	A							A	PASS
	PE												
	L+PE												
	N+PE												
	L+N+PE												
DC Line													
Signal Line													

Note:

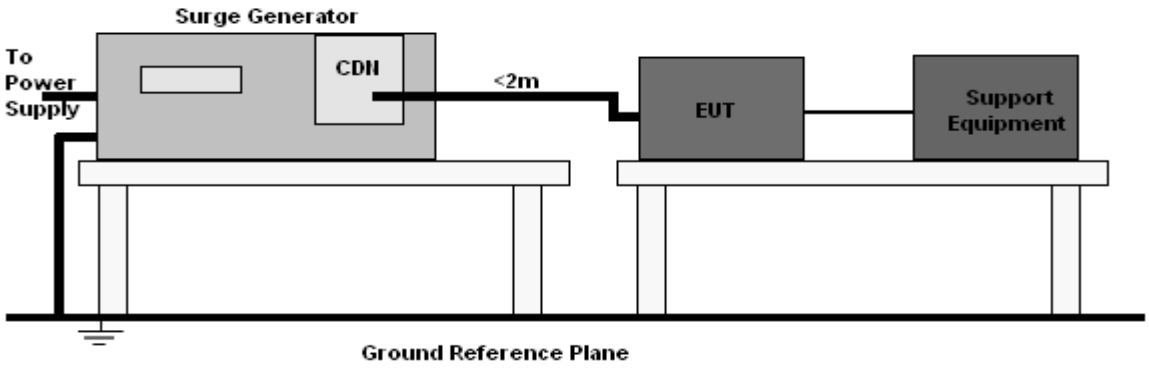
1) P/N denotes the Positive/Negative polarity of the output voltage.
2) N/A - denotes test is not applicable in this test report.
3) There was not any unintentional transmission in standby mode

14. SURGES IMMUNITY TEST

14.1 Test Specification

Test Port	:	input a.c. power port analogue/digital data 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

14.2 Block Diagram of EUT Test Setup



14.3 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).

14.4 Test Result

Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Mode：	Mode1

Coupling Line			Test level (KV) Test Result								Observation	Perform Criteria	Judgment
			0.5		1		2		4				
			+	-	+	-	+	-	+	-			
AC Line	L-N	0°	A	A	B	B					CT,CR	B	PASS
		90°	A	A	B	B							
		180°	A	A	B	B							
		270°	A	A	B	B							
	L-PE	0°											
		90°											
		180°											
		270°											
	N-PE	0°											
		90°											
		180°											
		270°											
DC Line													
Signal Line													

Note:

1) Polarity and Numbers of Impulses：5 Pst / Ngt at each tested mode
2) N/A - denotes test is not applicable in this Test Report
3) There was not any unintentional transmission in standby mode

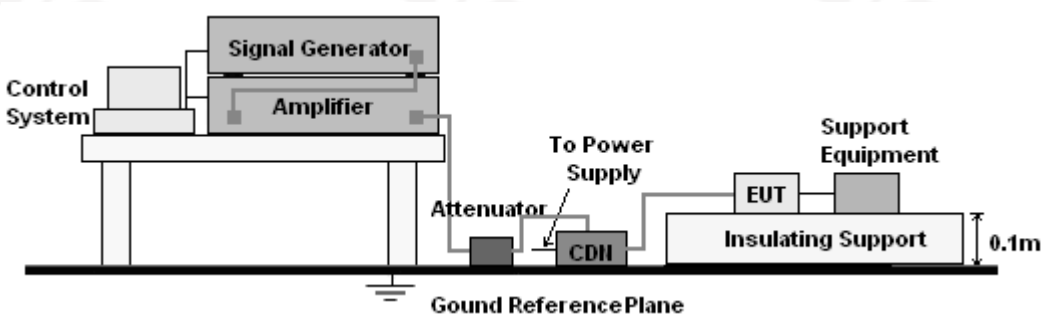
15. CONTINUOUS INDUCED RF DISTURBANCES (CS)

15.1 Test Specification

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

15.2 Block Diagram of EUT Test Setup

For input a.c. power port:



15.3 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 GRP directly.

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 kHz sine 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.

For analogue/digital data 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 telecommunication port under test was connected to support units through the current clamp.

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 kHz sine 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.

15.4 Test Result

Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Mode：	Mode1

Test Ports (Mode)	Freq. Range (MHz)	Field Strength Azimuth	Observation	Perform Criteria	Test Result	Judgment
Input/ Output AC. Power Port	0.15-80	3 V/m (rms) AM Modulated 1000Hz, 80%	**CT,CR**	A	A	PASS
Input/ Output DC. Power Port	0.15-80		N/A	N/A	N/A	N/A
Signal Line	0.15-80		N/A	N/A	N/A	N/A

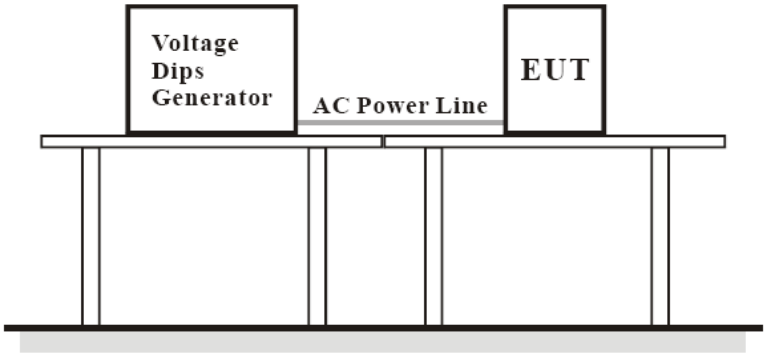
Note: “A” stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

16. VOLTAGE DIPS AND INTERRUPTIONS (DIPS)

17.1 Test Specification

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

17.2 Block Diagram of EUT Test Setup



17.3 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.

17.4 Test Result

Temperature：	25 ℃	Relative Humidity：	45%
Pressure：	1010 hPa	Test Mode：	Mode1

Voltage Reduction	Duration (ms)	Observation	Perform Criteria	Test Result	Judgment
Voltage dip 0%	10	**TT, TR**	**B**	**A**	**PASS**
Voltage dip 0%	20	**TT, TR**	**B**	**A**	**PASS**
Voltage dip 70%	500	**TT, TR**	**B**	**A**	**PASS**
Voltage interruptions	5000	**TT, TR**	**C**	**B**	**PASS**

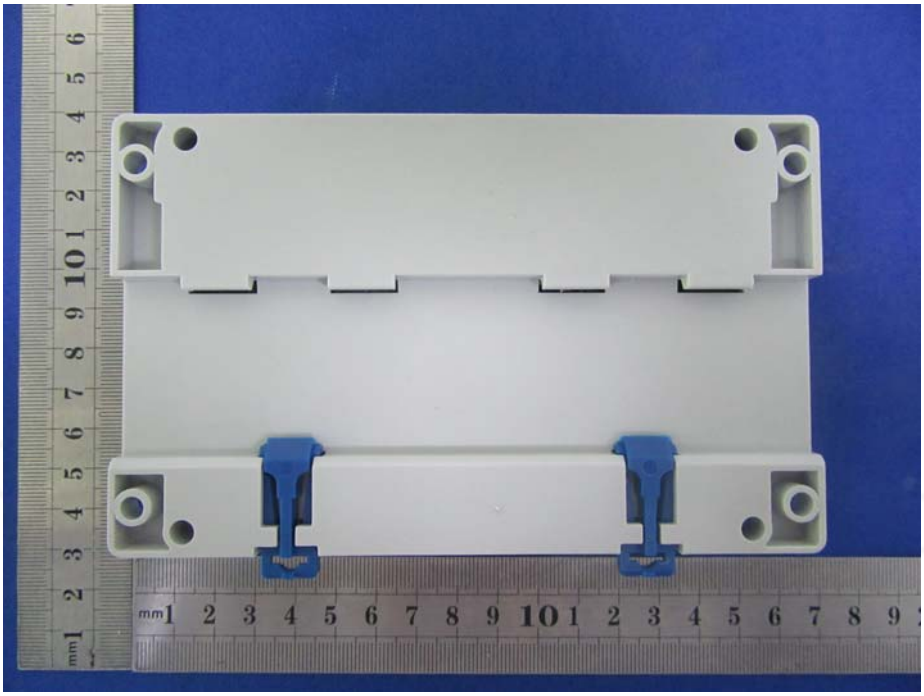
Note:

1) There was not any unintentional transmission in standby mode

17. EUT PHOTOGRAPHS

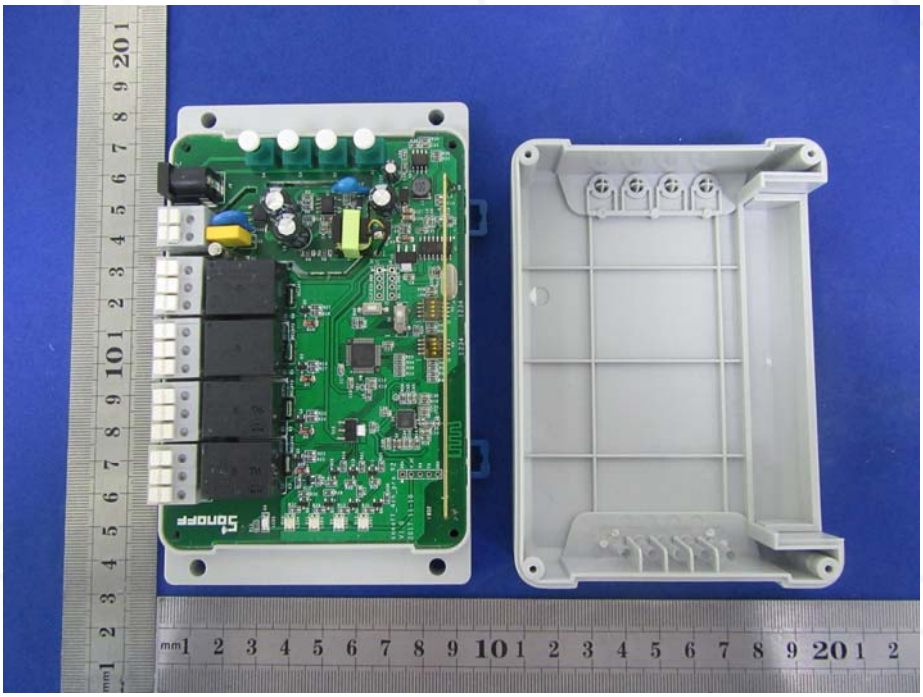
EUT Photo 1

EUT Photo 2

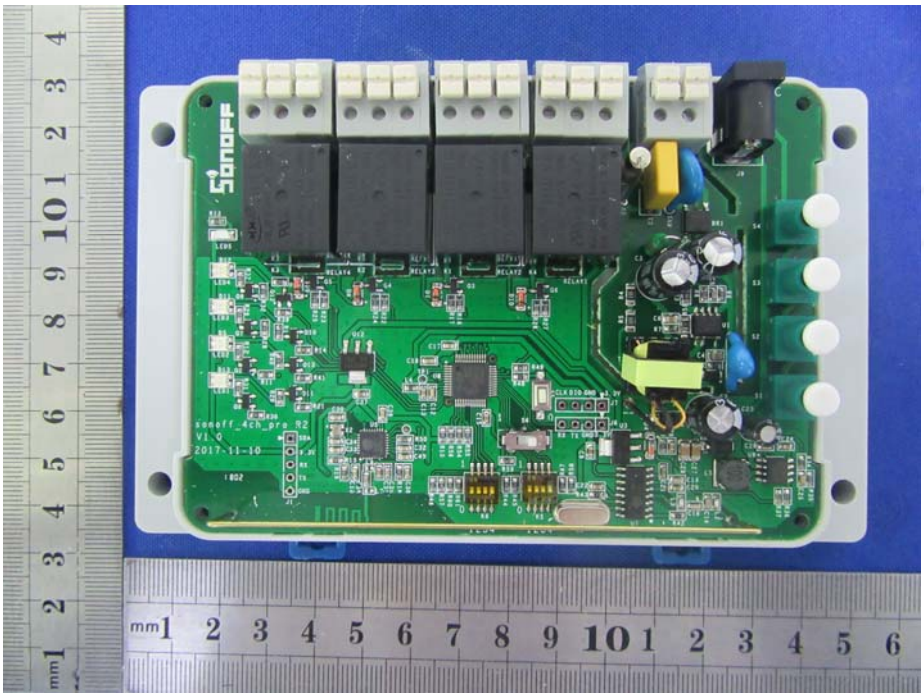


EUT Photo 3

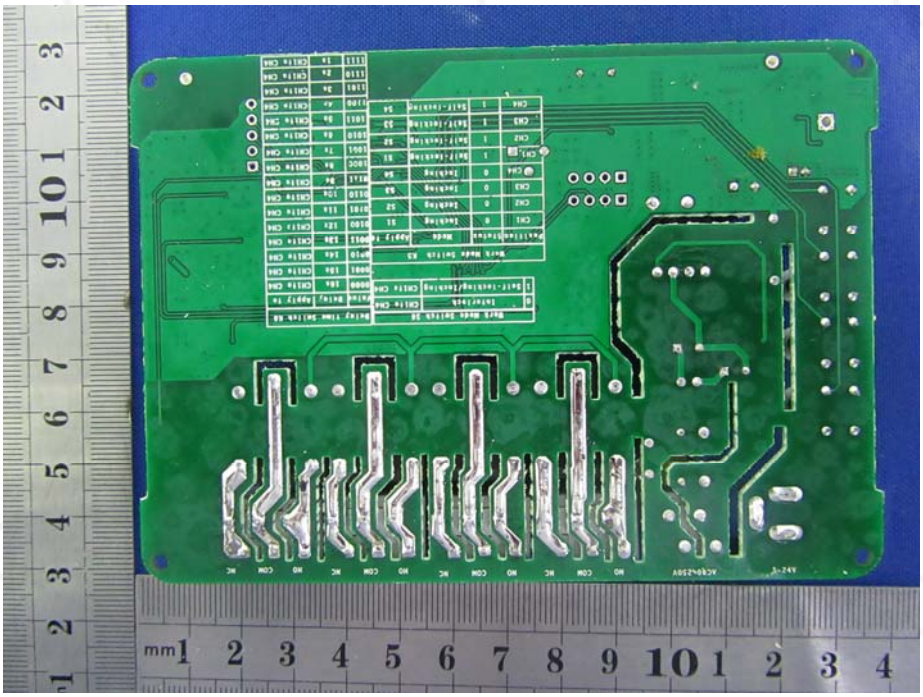
EUT Photo 4



EUT Photo 5

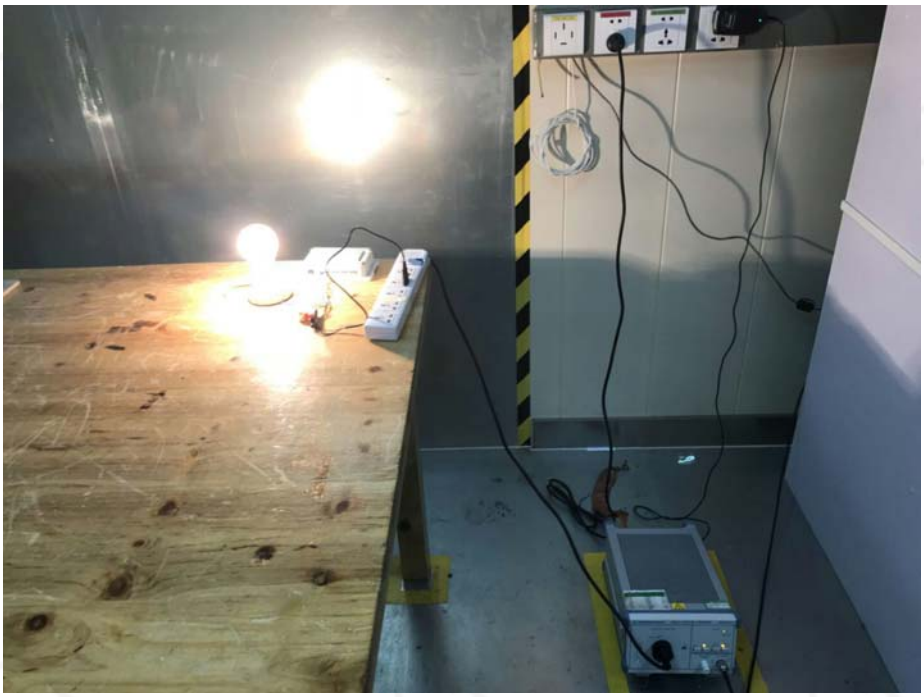


EUT Photo 6



18. EUT TEST SETUP PHOTOGRAPHS

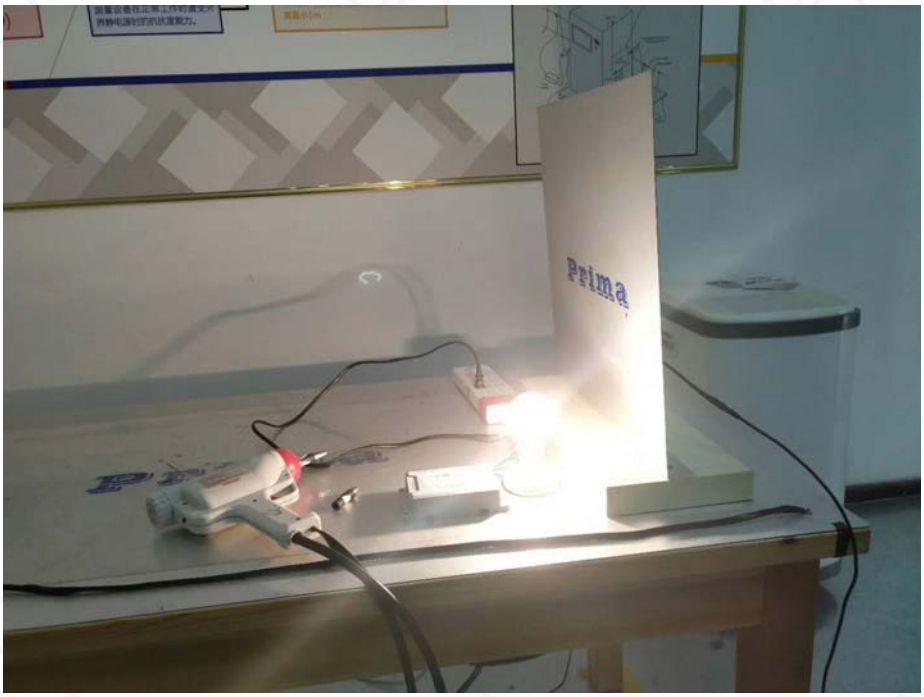
Conducted emissions



Radiated emissions

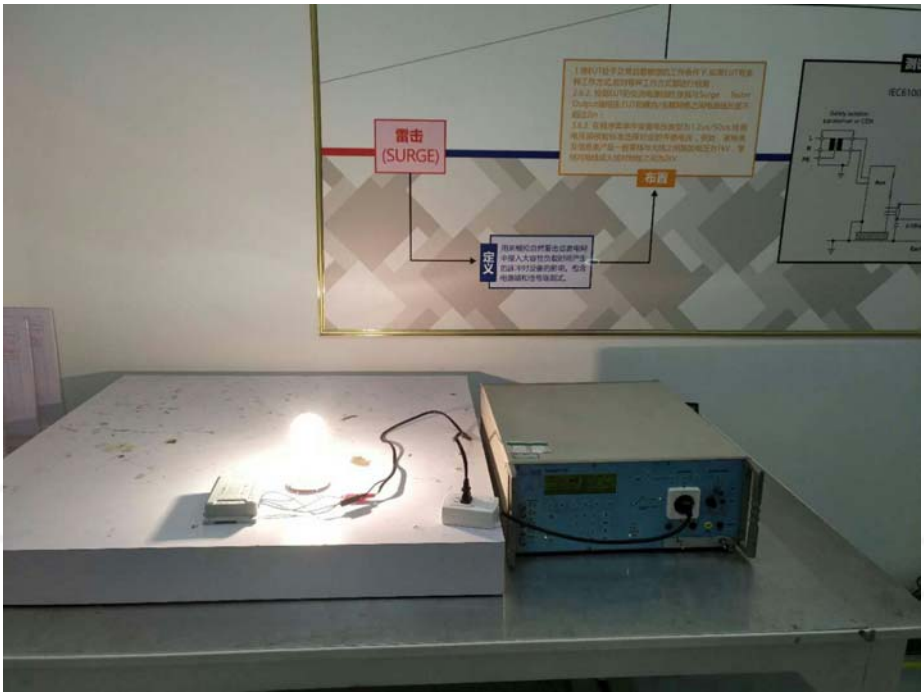
H/F

ESD

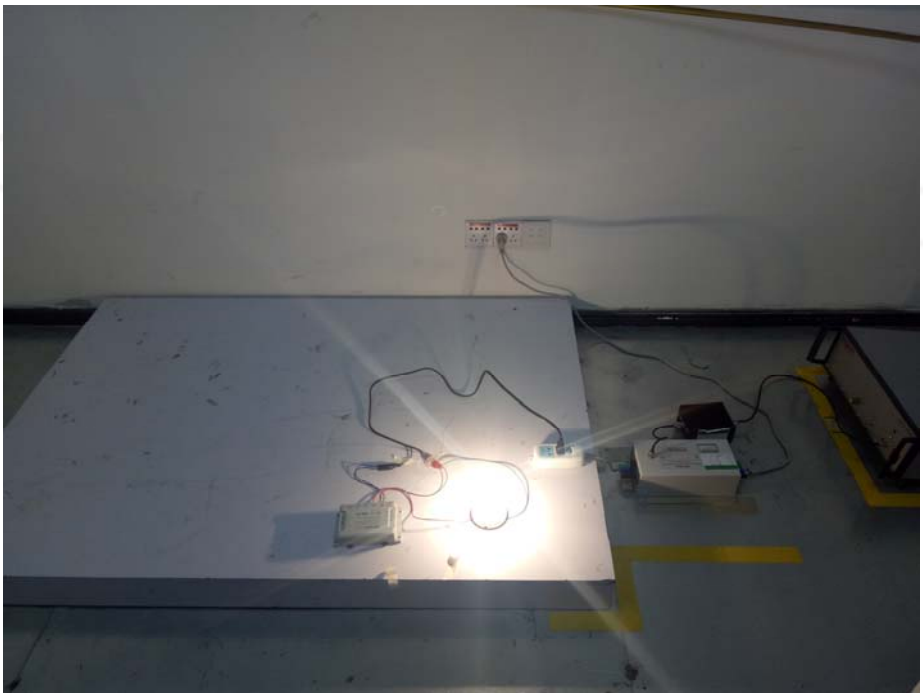


RS

EFT/SURGE/DIPS



CS



※※※※※ END OF REPORT ※※※※※