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EMC TEST REPORT

Report No: STS1707130E01

Issued for

Product Name:	Multi - USB Charging Station
Brand Name:	Show Wish
Test Model Name:	YM-UD06
Series Model:	YM-UD01, YM-UD02, YM-UD04 YM-UD05, YM-UD07, YM-UD08, YM-UD09, YM-UD10, YM-UD11, YM-UD12, YM-UD13, YM-UD14, YM-UD15, YM-UD16
Test Standard:	EN 55032:2015 EN 61000-3-2:2014 EN 61000-3-3:2013 EN 55024:2010/A1:2015

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Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail: sts@stsapp.com



**TEST REPORT CERTIFICATION**

Applicant's name.....: *****

Address.....: ***

Manufacturer's Name.....: ****

**

Address.....: **

**

Product description

Product name.....: Multi - USB Charging Station

Model and/or type reference .: YM-UD06

Standards: EN 55032:2015
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 55024:2010/A1:2015

This device described above has been tested by STS, and the test results show that the equipment under test (EUT) is in compliance with the EMC Directive 2014/30/EU requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests: 13 July. 2017 ~ 26 July. 2017

Date of Issue: 27 July. 2017

Test Result.....: **Pass**Testing Engineer : 

(Barry Li)

Technical Manager : 

(Chopin Xiao)

Authorized Signatory : 

(Vita Li)





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**Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	27 July. 2017	STS1707130E01	ALL	Initial Issue
Note: Format version of the report -V01				





1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55032:2015	Conducted Emissions From The AC Mains Power Ports	Class B	PASS	
	Conducted Emissions From Asymmetric Mode	Class B	N/A	
	Conducted Differential Voltage Emissions	Class B	N/A	
	Radiated Emissions	Class B	PASS	NOTE (1)
EN61000-3-2:2014	Harmonic Current Emission	-----	N/A	NOTE (2)
EN 61000-3-3:2013	Voltage Fluctuations & Flicker	-----	PASS	
EMC Immunity				
Section EN 55024:2010/A1:2015	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN 61000-4-3:2006+A1: 2008+A2:2010	RF electromagnetic field	A	PASS	
EN 61000-4-4:2012	Fast transients	B	PASS	
EN 61000-4-5:2014	Surges	B	PASS	
EN 61000-4-6:2014/AC:2015	Radio-frequency common mode / conducted susceptibility	A	PASS	
EN 61000-4-8:2010	Power Frequency Magnetic Field	A	N/A	
EN 61000-4-11:2004	Volt. Interruptions Volt. Dips	B / C / C NOTE (3)	PASS	

Note:

(1) If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.

If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.

If the highest frequency of the internal sources of the EUT is between 500 MHz and 1GHz, measurement shall only be made up to 5 GHz.

If the highest frequency of the internal sources of the EUT is above 1 GHz, the Measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

(2) The power consumption of EUT is less than 75W and no Limits apply.

(3) Voltage dip: 100% reduction – Performance Criteria **B**

Voltage dip: 30% reduction – Performance Criteria **C**

Voltage Interruption: 100% Interruption – Performance Criteria **C**

(4) For client's request and manual description, the test will not be executed.

(5) "N/A" denotes test is not applicable in this Test Report



1.1 TEST FACTORY

Company Name:	Shenzhen STS Test Services Co. Ltd.
Address:	1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	+86-755 3688 6288
Fax:	+86-755 3688 6277
Registration No.:	CNAS Registration No.: L7649; IC Registration No.: 12108A

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
STSC01	ANSI	9KHz-150KHz	2.88	
		150 KHz ~ 30MHz	2.67	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
STSC02	ANSI	30MHz ~ 200MHz	3.80	
		200MHz ~ 1000MHz	3.97	
		1GHz ~ 6 GHz	3.03	



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Multi - USB Charging Station
Brand Name	Show Wish
Model Name	YM-UD06
Series Name	YM-UD01, YM-UD02, YM-UD04 YM-UD05, YM-UD07, YM-UD08, YM-UD09, YM-UD10, YM-UD11, YM-UD12, YM-UD13, YM-UD14, YM-UD15, YM-UD16
Model Difference	Appearance is not the same.
Product Description	<p>The EUT is a Multi - USB Charging Station</p> <p>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</p>
Power Source	<p>Power supply and ADP(rating):</p> <p>Input: AC 100-240V</p> <p>Output: 5V 14.4A (6 USB port, each port 2.4A)</p>
Hardware version number	N/A
Software version number	N/A

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	FULL LOAD
Mode 2	HALF LOAD
Mode 3	NO LOAD

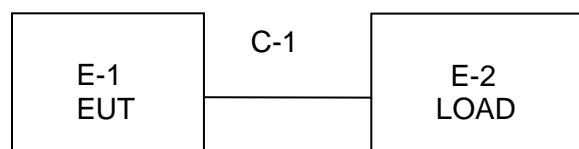
For Conducted Test	
Final Test Mode	Description
Mode 1	FULL LOAD

For Radiated Test	
Final Test Mode	Description
Mode 1	FULL LOAD

For EMS Test	
Final Test Mode	Description
Mode 1	FULL LOAD
Mode 2	HALF LOAD
Mode 3	NO LOAD

Note: The test modes were carried out for all operation modes. Only worst case will be show in this report.

2.3 DESCRIPTION OF TEST SETUP





2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	Multi - USB Charging Station	Show Wish	YM-UD06	EUT
E-2	LOAD	N/A	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
C-1	Unshielded	NO	145cm	/

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.



2.5 MEASUREMENT INSTRUMENTS LIST

2.5.1 CONDUCTED TEST SITE

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESPI	102086	2016.10.23	2017.10.22
LISN	R&S	ENV216	101242	2016.10.26	2017.10.25
LISN	EMCO	3810/2NM	000-23625	2016.10.26	2017.10.25
Absorbing clamp	R&S	MDS-21	100668	2016.10.23	2017.10.22

2.5.2 RADIATED TEST SITE

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	101427	2016.10.23	2017.10.22
Bilog Antenna	TESEQ	CBL6111D	34678	2017.03.24	2018.03.23
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2017.03.06	2018.03.05
Power Amplifier	Agilent	8449B	60538	2016.10.23	2017.10.22
Spectrum Analyzer	Agilent	E4407B	MY50140340	2016.10.25	2017.10.24
Pre-mpifier(0.1M-3GHz)	EM	EM330	60538	2017.03.12	2018.03.11
Spectrum Analyzer	Agilent	N9020A	MY49100060	2017.03.11	2018.03.10
EMI Test Receiver	ESW	R&S	101535	2017.06.01	2018.05.31

2.5.3 HARMONICS AND FLICKER

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Harmonic Voltage & Flicker	LAPLACE	AC 2000A	3112217	2016.10.23	2017.10.22
AC Power Source	MTONI	PHF-5010	631169	2016.10.23	2017.10.22

2.5.4 ESD

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
ESD TEST GENERATOR	HAEFELY	ONYX 16	173835	2016.10.23	2017.10.22

2.5.5 SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Surger Generator	HTEC	HCWG71	143804	2016.10.23	2017.10.22
Surger Generator	HTEC	SCDN161P	143805	2016.10.23	2017.10.22



VOLTAGE DIPS & INTERRUPTIONS Generator	HTEC	HPFS 161P	143803	2016.10.23	2017.10.22
EFT/B Generator	HTEC	HEFT 51	143801	2016.10.23	2017.10.22

2.5.6 RS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
RF Relay matrix tsj	TSJ	RFM-S621	04261	2017.06.28	2018.06.27
Power meter	Agilent	E4419B	MY45102079	2017.06.28	2018.06.27
Power Sensor	Agilent	8481A	MY41496625	2017.06.28	2018.06.27
Power Sensor	Agilent	8481A	MY41496628	2017.06.28	2018.06.27
MXG analog signal generator	Agilent	N5181A	MY46240859	2017.06.28	2018.06.27
Power Amplifier	Schaffner	CBA9429	T4306S	2017.06.28	2018.06.27
Power Amplifier	Schaffner	CBA9433	T435F4	2017.06.28	2018.06.27
Logarithmic-periodic Antenna	Schwarzbeck	VULP9118E	820	2017.06.28	2018.06.27
Microwave Horn Antenna	Schwarzbeck	BBHA 9120LF	F01008	2017.06.28	2018.06.27
Universal Radio Communication Tester	R&S	CMU200	111764	2016.10.23	2017.10.22
Audio Analyzer	R&S	UPV	100419	2017.03.07	2018.03.06

2.5.7 INJECTION CURRENT

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
CS	SCHLODER	CDG-6000-25	126A1280/2014	2016.10.23	2017.10.22
CDN	SCHLODER	CDN-M2+3	A2210275/2014	2016.10.23	2017.10.22
EM Clamp	SCHLODER	EMCL-20	132A1283	2016.09.29	2017.09.28
Attenuator	HTEC	ATT-6DB-100	A100W224	2016.10.23	2017.10.22
Audio Power Amplifier	B&K	2716-C-001	2610976	2017.03.07	2018.03.06
Mouth Simulator	B&K	4227	2630621	2017.03.07	2018.03.06
Sound Calibrator	B&K	4231	2637486	2017.03.07	2018.03.06
1/2" Pressure-field Microphone	B&K	4192	2641678	2017.03.07	2018.03.06
Ear Simulator for Telephonometry	B&K	4185	2553612	2017.03.07	2018.03.06
Telephone Test Head	B&K	4185	2631728	2017.03.07	2018.03.06
Universal Radio Communication Tester	R&S	CMU200	111764	2016.10.25	2017.10.24



Audio Analyzer	R&S	UPV	100419	2017.03.07	2018.03.06
RF Communications	HEWLETT PACKARD	8920A	0.4-1000M	2017.03.07	2018.03.06

2.5.8 PFMF

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
MF Generator	HTEC	HMFG-COMB	143903	2016.10.23	2017.10.22
Magnetic field coil	HTEC	HCOIL 100	143808	2016.10.23	2017.10.22





3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 REQUIREMENTS FOR CONDUCTED EMISSIONS FROM THE AC MAINS POWER

PORTS OF CLASS A EQUIPMENT

FREQUENCY (MHz)	Coupling device	Detector type / bandwidth	Class A limits dB(μ V)
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	79
0.50 - 30			63
0.15 - 0.5	AMN	Average / 9 kHz	66
0.50 - 30			60

3.1.2 REQUIREMENTS FOR CONDUCTED EMISSIONS FROM THE AC MAINS POWER

PORTS OF CLASS B EQUIPMENT

FREQUENCY (MHz)	Coupling device	Detector type / bandwidth	Class B limits dB(μ V)
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66 - 56*
0.50 - 5			56
5 - 30			60
0.15 - 0.5	AMN	Average / 9 kHz	56 - 46*
0.50 - 5			46
5 - 30			50

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

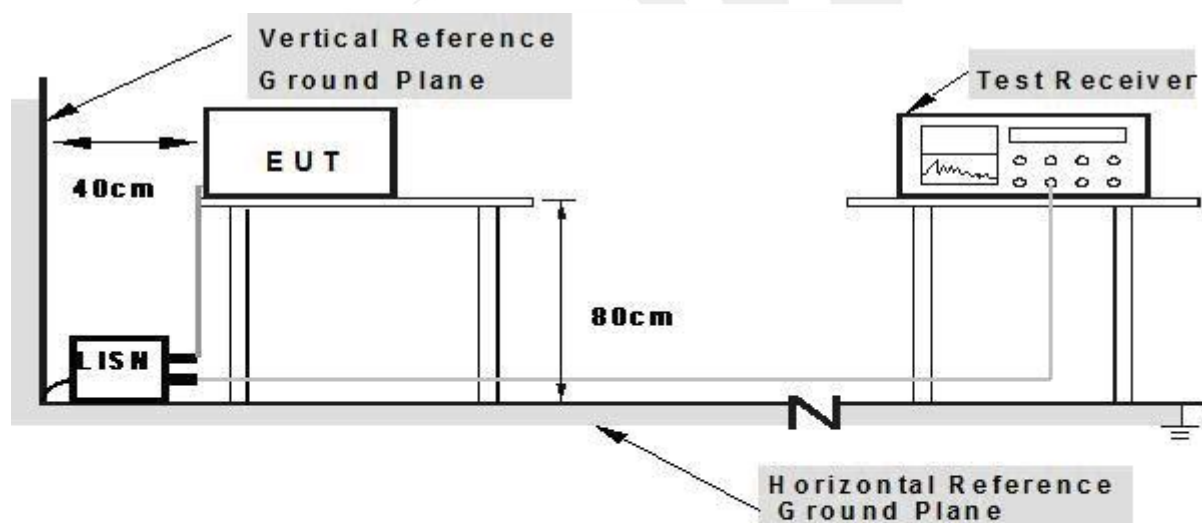
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.3 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISN s (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.1.6 TEST RESULTS

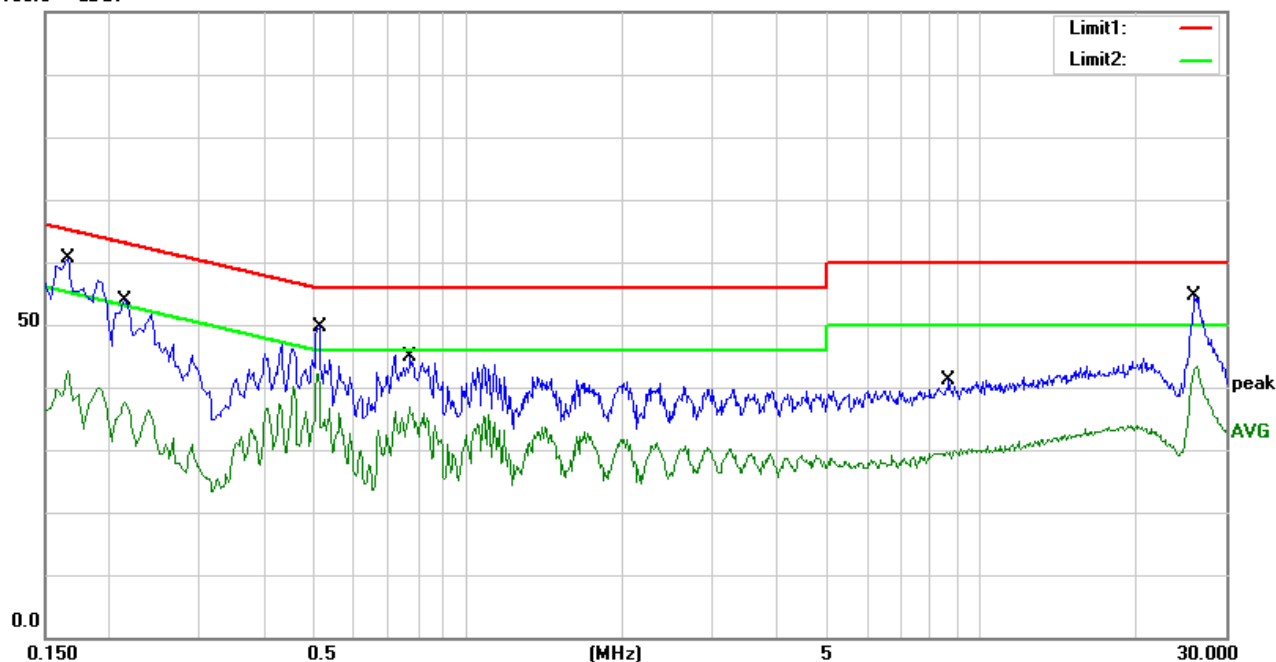
Temperature:	25.4℃	Relative Humidity:	61%
Pressure:	1010hPa	Phase:	L
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1660	50.86	9.79	60.65	65.16	-4.51	QP
2	0.1660	28.18	9.79	37.97	55.16	-17.19	AVG
3	0.2140	44.06	9.84	53.90	63.05	-9.15	QP
4	0.2140	27.32	9.84	37.16	53.05	-15.89	AVG
5	0.5100	39.35	10.02	49.37	56.00	-6.63	QP
6	0.5100	32.23	10.02	42.25	46.00	-3.75	AVG
7	0.7740	35.05	9.83	44.88	56.00	-11.12	QP
8	0.7740	26.00	9.83	35.83	46.00	-10.17	AVG
9	8.6700	31.05	10.06	41.11	60.00	-18.89	QP
10	8.6700	18.68	10.06	28.74	50.00	-21.26	AVG
11	26.1260	44.32	10.18	54.50	60.00	-5.50	QP
12	26.1260	31.90	10.18	42.08	50.00	-7.92	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) - Limit

100.0 dBuV





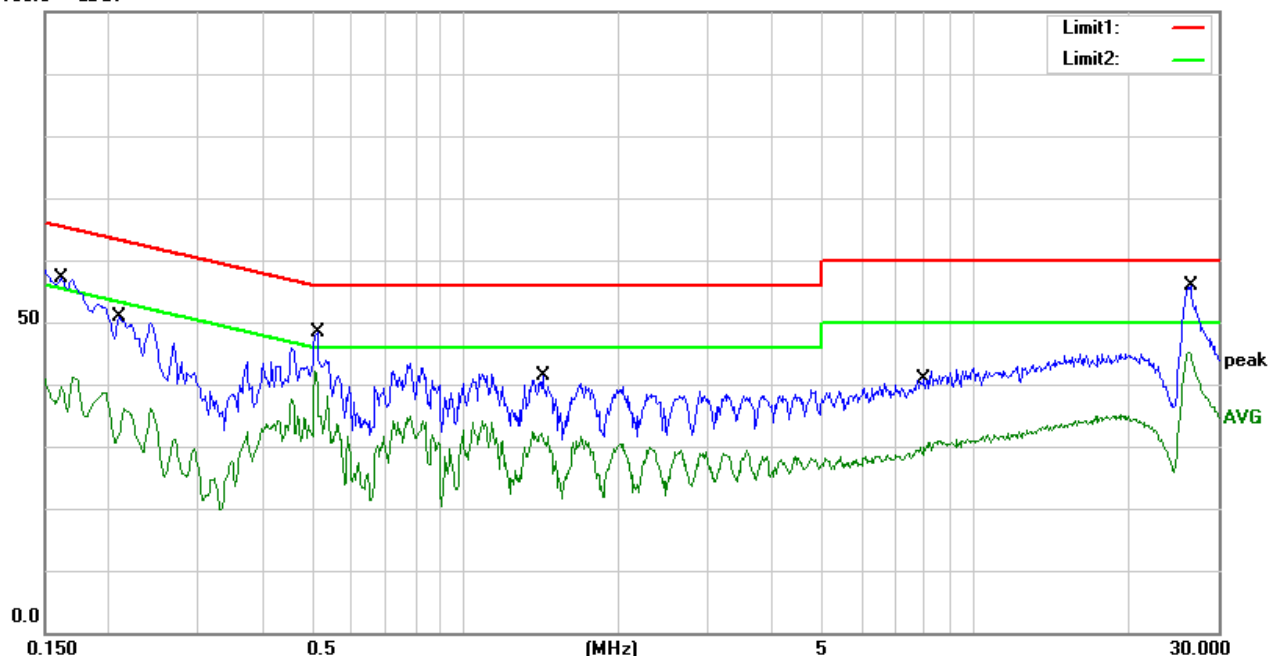
Temperature:	25.4℃	Relative Humidity:	61%
Pressure:	1010hPa	Phase:	N
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1620	47.25	9.78	57.03	65.36	-8.33	QP
2	0.1620	29.44	9.78	39.22	55.36	-16.14	AVG
3	0.2100	40.92	9.91	50.83	63.21	-12.38	QP
4	0.2100	26.14	9.91	36.05	53.21	-17.16	AVG
5	0.5100	38.01	9.97	47.98	56.00	-8.02	QP
6	0.5100	32.00	9.97	41.97	46.00	-4.03	AVG
7	1.4220	31.57	9.83	41.40	56.00	-14.60	QP
8	1.4220	21.67	9.83	31.50	46.00	-14.50	AVG
9	7.9460	30.86	9.90	40.76	60.00	-19.24	QP
10	7.9460	20.67	9.90	30.57	50.00	-19.43	AVG
11	26.4660	45.64	10.35	55.99	60.00	-4.01	QP
12	26.4660	32.36	10.35	42.71	50.00	-7.29	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result = Reading + Factor) - Limit

100.0 dBuV





3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Distance (m)	Detector type/ bandwidth	Class A dBuV/m	Class B
				dBuV/m
30 - 230	3	Quasi peak/ 120 kHz	50	40
230 - 1000	3	Quasi peak/ 120 kHz	57	47
1000 - 3000	3	Peak /1 MHz	76	70
3000 - 6000	3	Peak /1 MHz	80	74
1000 - 3000	3	AV/1 MHz	56	50
3000 - 6000	3	AV/1 MHz	60	54

Notes:

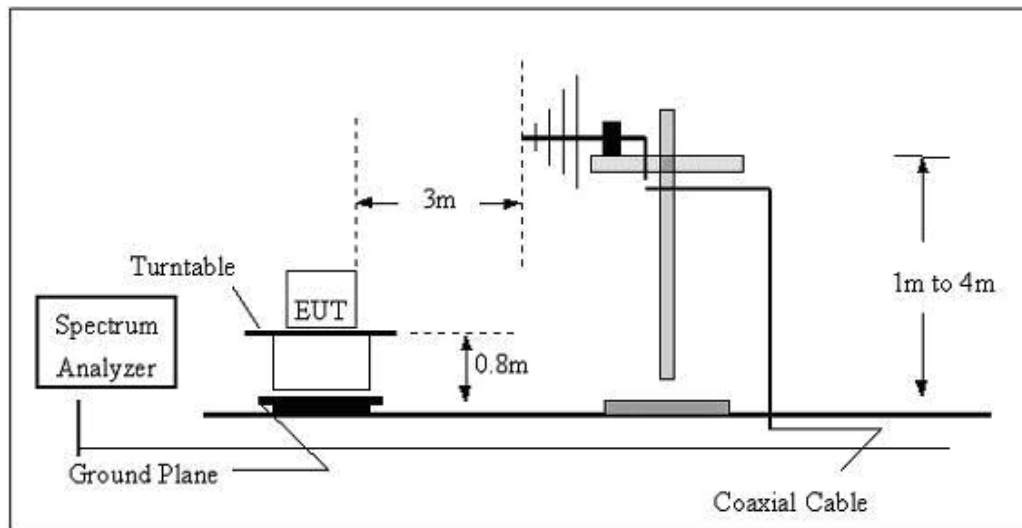
- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

3.2.3 TEST PROCEDURE

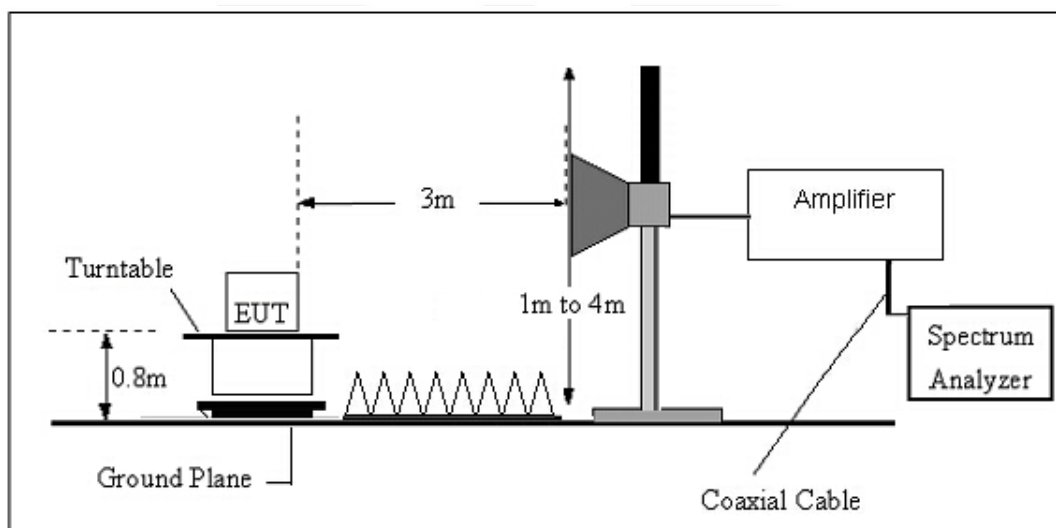
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.2.6 TEST RESULTS

Temperature:	26℃	Relative Humidity:	60%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.4237	38.26	-11.41	26.85	40.00	-13.15	QP
2	84.7018	58.17	-21.52	36.65	40.00	-3.35	QP
3	162.6106	54.42	-18.71	35.71	40.00	-4.29	QP
4	234.1682	50.17	-18.18	31.99	47.00	-15.01	QP
5	295.1470	41.11	-15.11	26.00	47.00	-21.00	QP
6	986.0715	27.24	-0.12	27.12	47.00	-19.88	QP

Remark:

1. All readings are Quasi-Peak.
2. Margin = Result (Result = Reading + Factor) - Limit





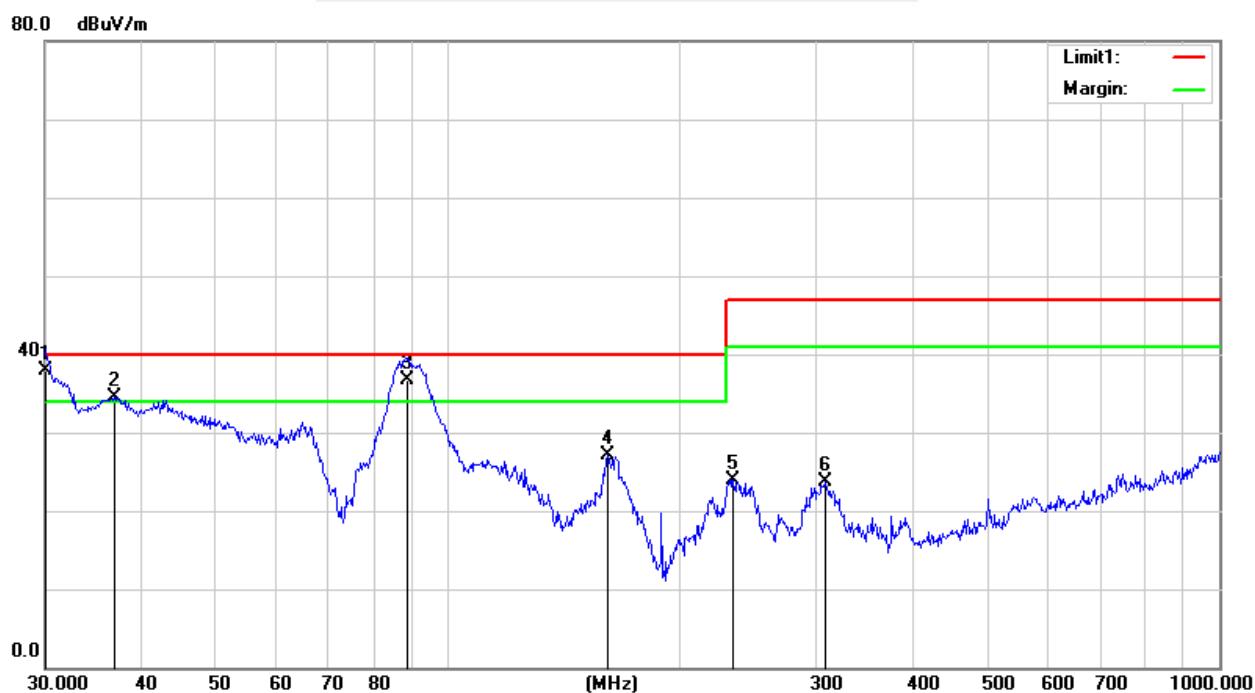
Temperature:	26°C	Relative Humidity:	60%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.0197	49.12	-11.20	37.92	40.00	-2.08	QP
2	36.8952	49.31	-14.73	34.58	40.00	-5.42	QP
3	88.3621	57.24	-20.61	36.63	40.00	-3.37	QP
4	160.9088	45.62	-18.57	27.05	40.00	-12.95	QP
5	234.1682	42.12	-18.18	23.94	47.00	-23.06	QP
6	307.8312	38.29	-14.57	23.72	47.00	-23.28	QP

Remark:

1. All readings are Quasi-Peak.

2. Margin = Result (Result = Reading + Factor) - Limit



3.3 HARMONICS CURRENT

3.3.1 LIMITS OF HARMONICS CURRENT

IEC 555-2					
Table - I			Table - II		
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Amperes)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Amperes)
Non Portable Tools or TV Receivers	Odd Harmonics		TV Receivers	Odd Harmonics	
	3	2.30		3	0.80
	5	1.14		5	0.60
	7	0.77		7	0.45
	9	0.40		9	0.30
	11	0.33		11	0.17
	13	0.21		13	0.12
	15≤n≤39	0.15 · 15/n		15≤n≤39	0.10 · 15/n
	Even Harmonics			Even Harmonics	
	2	1.08		2	0.30
	4	0.43		4	0.15
	8	0.30			
	8≤n≤40	0.23 · 8/n		DC	0.05

EN 61000-3-2/IEC 61000-3-2					
Equipment Category	Max. Permissible Harmonic Current (in Amperes)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in A) (mA/w)	
Class A	Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required	Class D	3	2.30	3.4
			5	1.14	1.9
			7	0.77	1.0
			9	0.40	0.5
			11	0.33	0.35
			13≤n≤39	see Table I	3.85/n
			only odd harmonics required		

3.3.2 TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b. The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Portable tools.; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

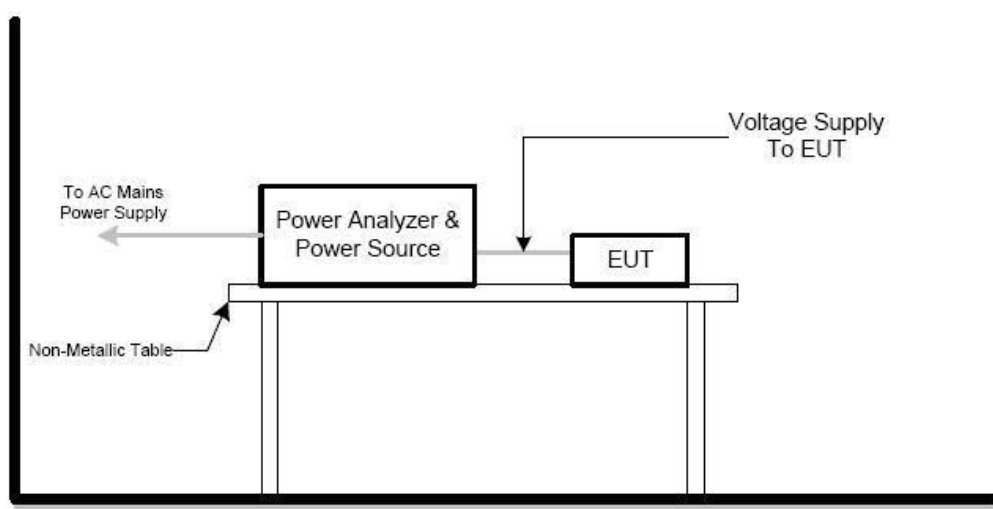
Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

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

3.3.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.4 TEST SETUP





3.3.5 TEST RESULTS

Temperature:	26°C	Relative Humidity:	45%
Pressure:	1010hPa	Test Voltage:	N/A

*Note: The active input power of the EUT is less than **75 W**. No limits apply for equipment with an active input power up to and including 75W.*



3.4 VOLTAGE FLUCTUATION AND FLICKERS

3.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKERS

Tests	Measurement Value	Limit	Descriptions
	IEC555-3	IEC/EN 61000-3-3	
P_{st}	$\leq 1.0, T_p = 10 \text{ min.}$	$\leq 1.0, T_p = 10 \text{ min.}$	Short Term Flicker Indicator
P_{lt}	N/A	$\leq 0.65, T_p = 2 \text{ hr.}$	Long Term Flicker Indicator
$T_{dt(s)}$	$\leq 3\%$	$\leq 3.3\%$	Relative Steady-State V-Chang
$d_{max}(\%)$	$\leq 4\%$	$\leq 4\%$	Maximum Relative V-Chang
$d_c(\%)$	N/A	$\leq 3.3\%$ for $> 500 \text{ ms}$	Relative V-change Characteristic

3.4.2 TEST PROCEDURE

a. Fluctuation and Flickers Test:

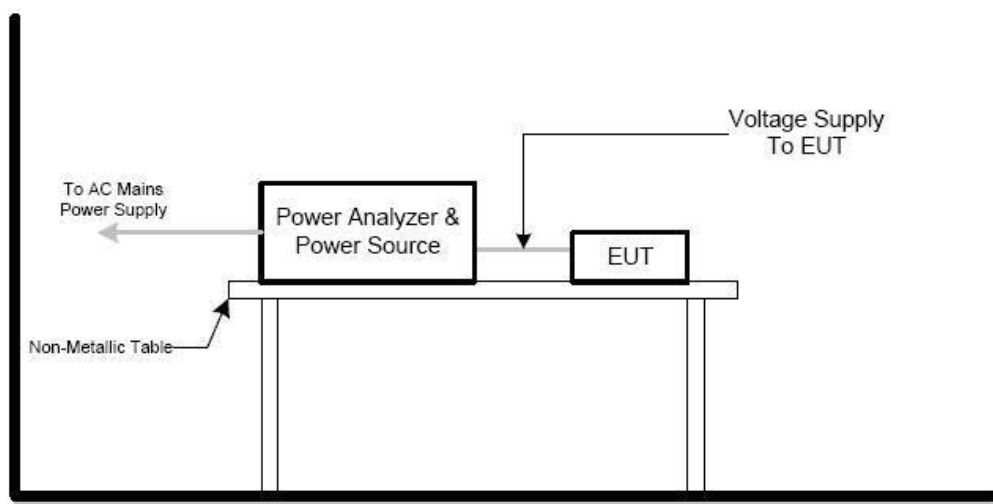
Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

b. All types of voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

3.4.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.4.4 TEST SETUP





3.4.5 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	45%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.00	1.0	Pass
P_{lt}	--	0.65	--
$T_{dt(s)}$	0.00	0.5	Pass
$d_{max}(\%)$	-0.16%	4%	Pass
$d_c(\%)$	+0.06%	3.3%	Pass





4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SERVIRITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform. Criteria
1. ESD IEC/EN 61000-4-2	8KV air discharge 4KV contact discharge	Direct Mode	B
	4KV HCP discharge 4KV VCP discharge	Indirect Mode	B
2. RS IEC/EN 61000-4-3	80 MHz to 1000 MHz, 1000Hz, 80%, AM modulated	Enclosure	A
3. EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5KHz Repetition Freq.	Power Supply Port	B
	5/50ns Tr/Th 5KHz Repetition Freq.	CTL/Signal Data Line Port	B
4. Surges IEC/EN 61000-4-5	1.2/50(8/20) Tr/Th us	L-N	B
	1.2/50(8/20) Tr/Th us	L-PE N-PE	B
5 Injected Current IEC/EN 61000-4-6	0.15 MHz to 80 MHz, 1000Hz 80% , AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz, 1000Hz 80% , AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz, 1000Hz 80% , AM Modulated 150Ω source impedance	DC Power Port	A
6. Power Frequency Magnetic Field IEC/EN 61000-4-8	50 Hz,	Enclosure	A
7. Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 100%	AC Power Port	B
	Voltage dip 30%		C
	Interruption 100%		C



4.2 GENERAL PERFORMANCE CRITERIA

According to **EN 55024** standard, the general performance criteria as following:

Criterion A	The apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the manufacturer does not specify the minimum performance level or the permissible performance loss, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
Criterion B	<p>After test, the apparatus shell continues to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is however allowed. However, no change of operating state if stored data is allowed to persist after the test. If the manufacturer does not specify the minimum performance level or the permissible performance loss, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended. Mackabler.dk</p>
Criterion C	<p>Temporary loss of function is allowed, provided the functions is self-recoverable or can be restored by the operation of controls by the user in accordance with the manufacturer instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

4.2.1 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.



4.3 ESD TESTING

4.3.1 TEST SPECIFICATION

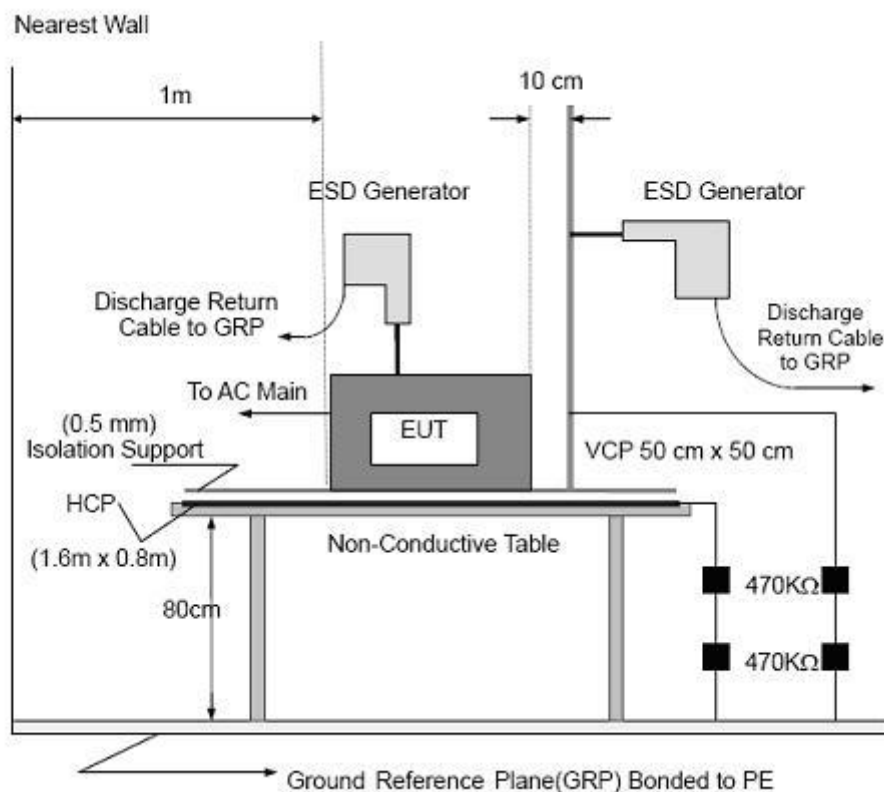
Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance:	B
Discharge Voltage:	Air Discharge : 2KV/4KV/8KV (Direct) Contact Discharge : 2KV/4KV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total 50 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.3.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT.
During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.
If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.
Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.
- b. Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.

4.3.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.



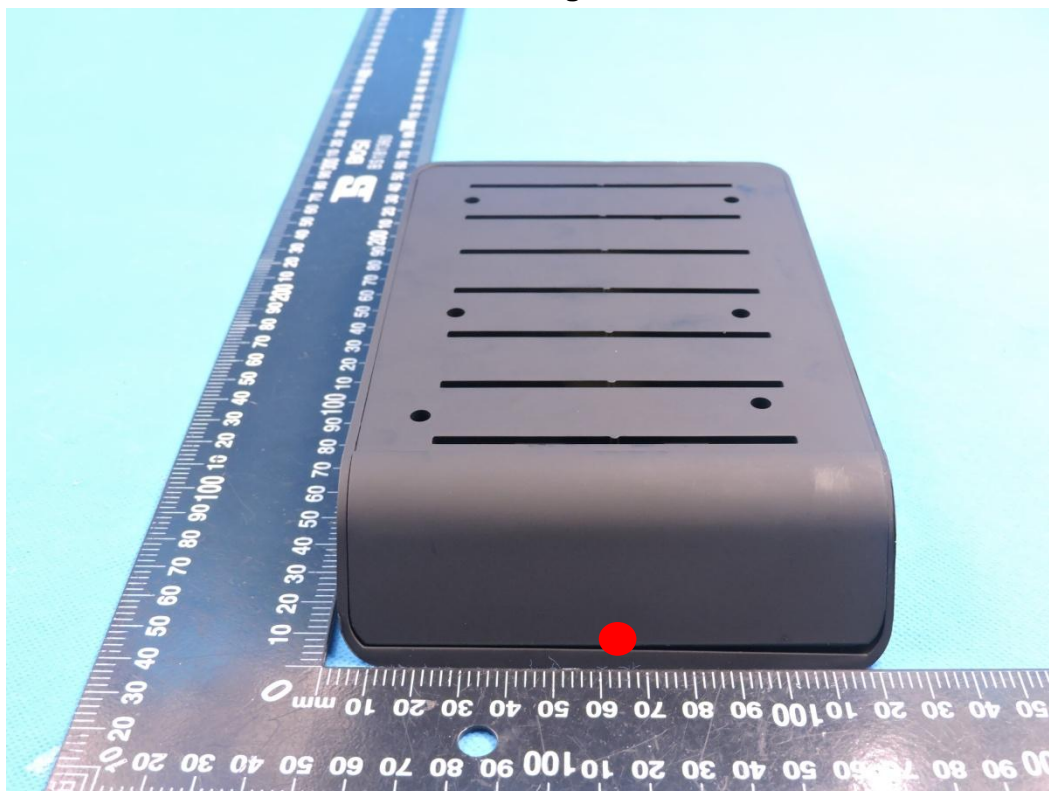
4.3.4 TEST RESULTS

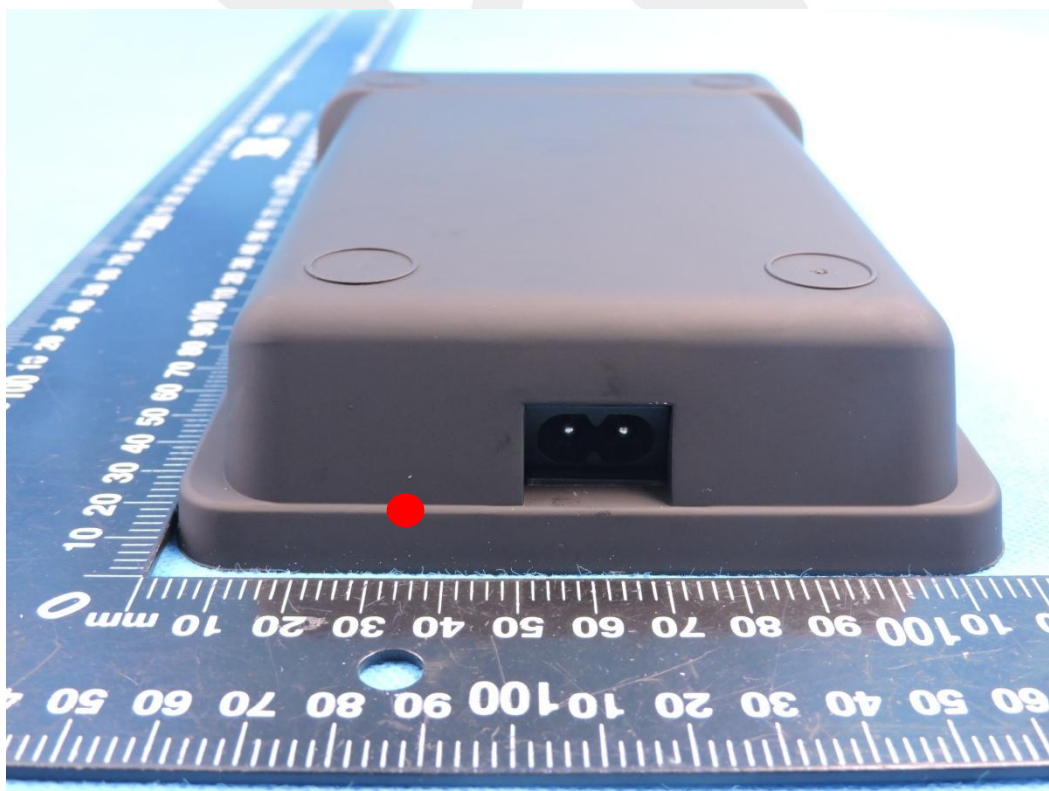
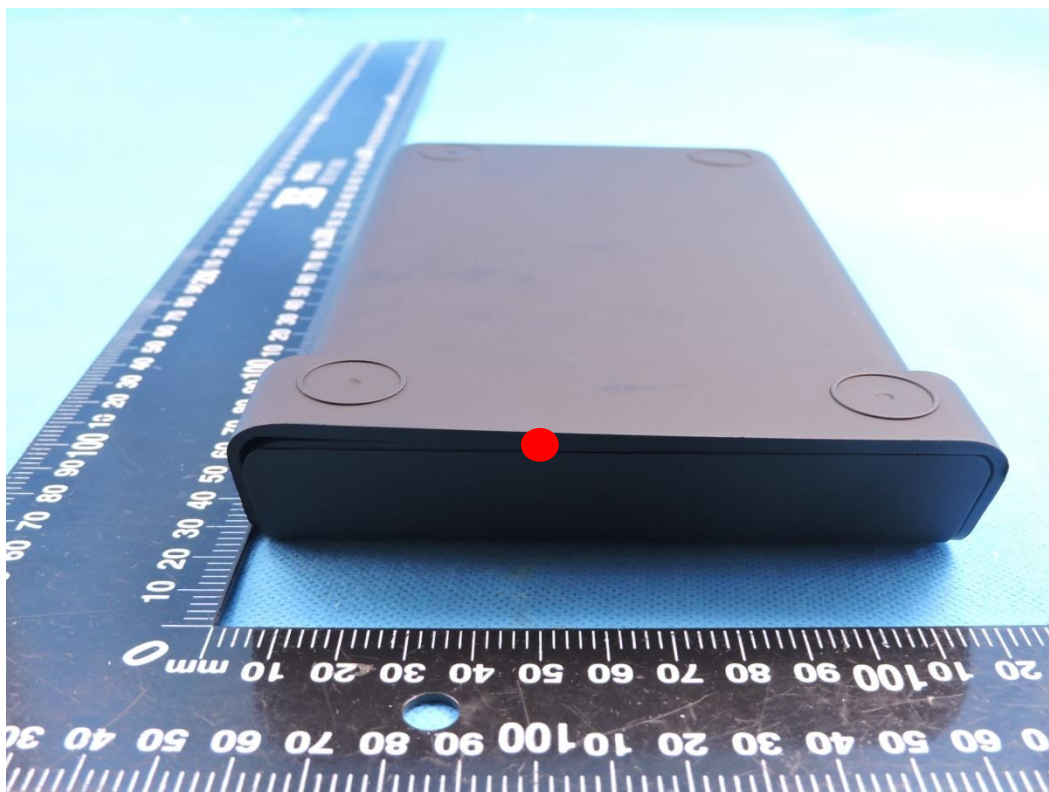
Temperature:	22.9℃	Relative Humidity:	55%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1/2/3		

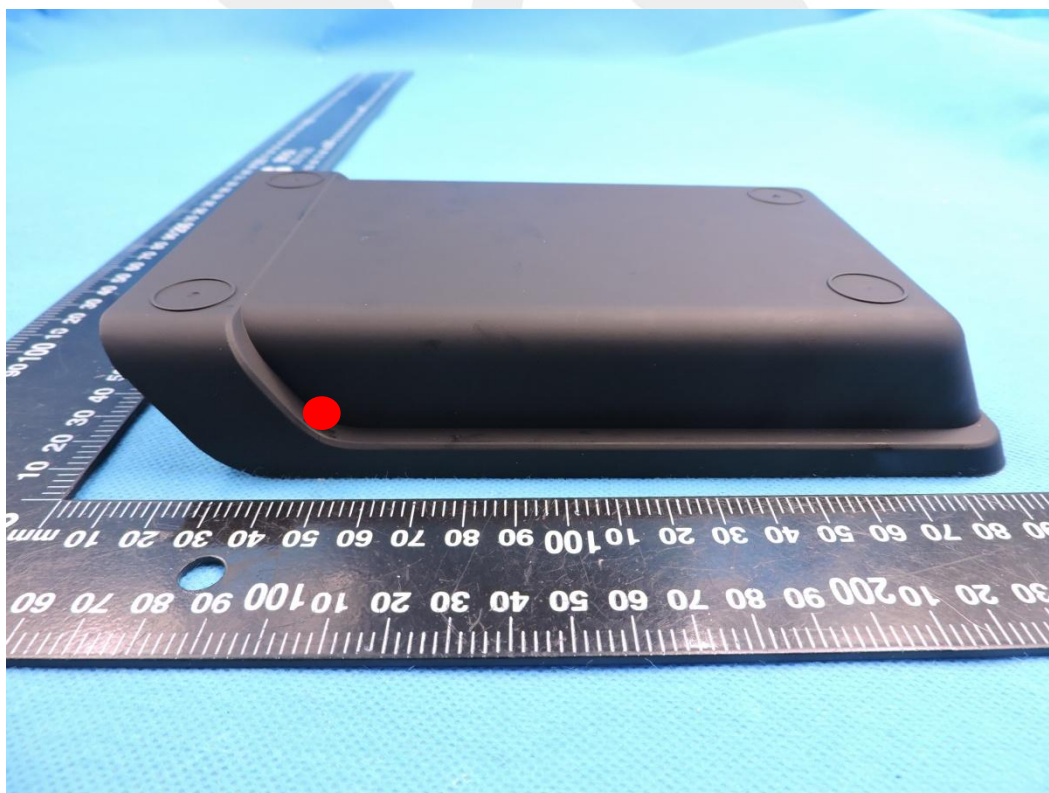
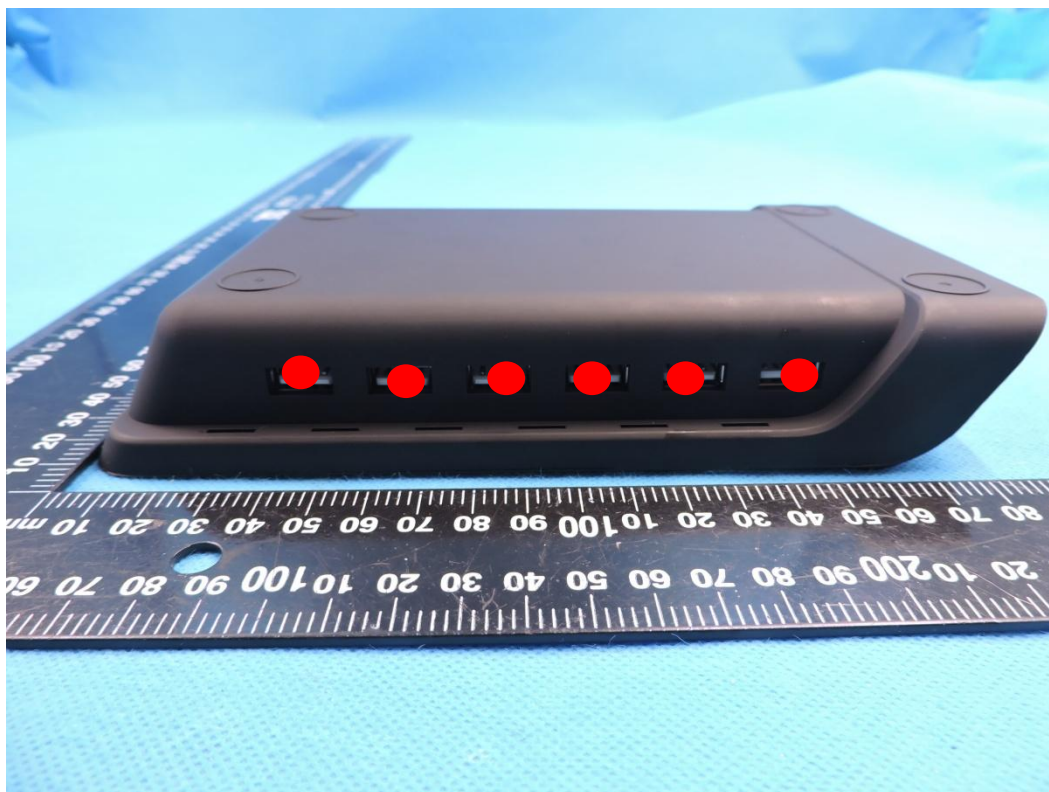
Test Location	Voltage	Criterion	Result (Pass/Fail)
HCP	±2KV; ±4KV	B	Pass
VCP	±2KV; ±4KV	B	Pass
Charge Port	±2KV; ±4KV; ±8KV	B	Pass
Crevice	±2KV; ±4KV; ±8KV	B	Pass



The Photo for Discharge Points of EUT







Red Dot —Air Discharged
Blue Dot —Contact Discharged

4.4 RS TESTING

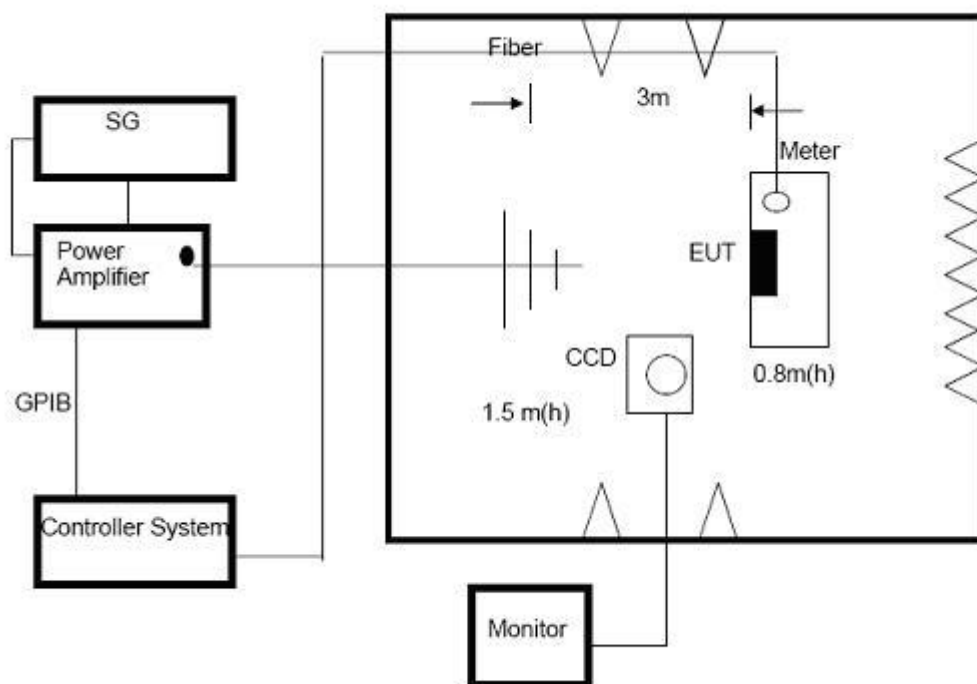
4.4.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance:	A
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 3 seconds

4.4.2 TEST PROCEDURE

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz 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% of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.4.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

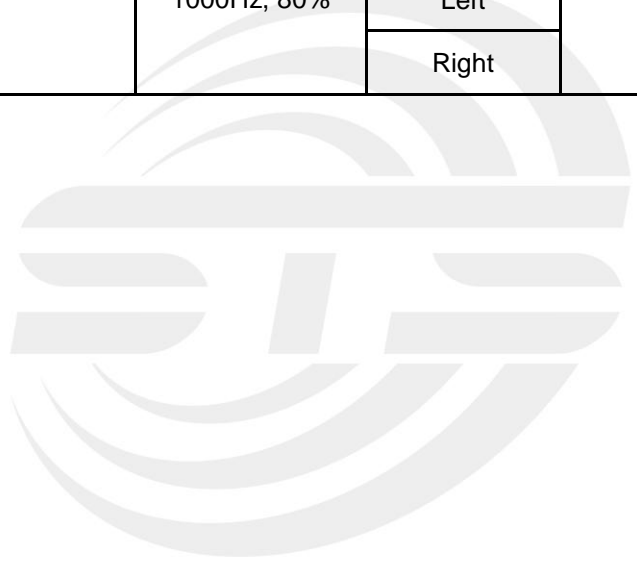
The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.



4.4.4 TEST RESULTS

Temperature:	25.3℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1/2/3		

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results	Judgment
80MHz - 1000MHz	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	PASS
			Rear			
			Left			
			Right			





4.5 EFT/BURST TESTING

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance:	B
Test Voltage:	Power Line : 1 KV Signal/Control Line : 0.5 KV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

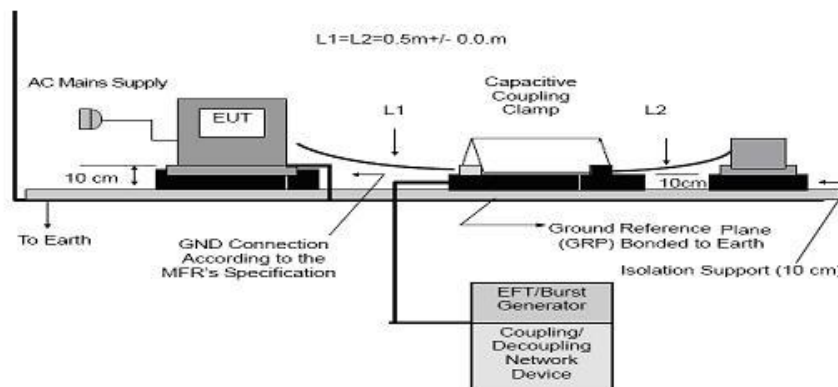
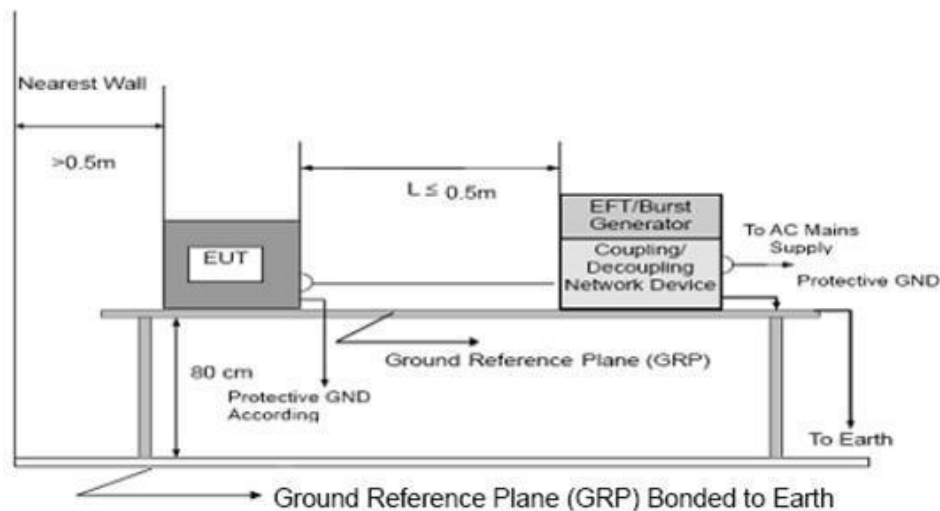
4.5.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

- a. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
- b. Both positive and negative polarity discharges were applied.
- c. The duration time of each test sequential was 1 minute

4.5.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.



4.5.4 TEST RESULTS

Temperature:	25.3℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1/2/3		

Coupling Line		Test level	Perform. Criteria	Results	Judgment
AC line	L	±1KV	B	A	PASS
	N	±1KV		A	PASS
	PE				
	L+N	±1KV		A	PASS
	L+PE				
	N+PE				
	L+N+PE				
DC Line					
Signal Line					

Note: 1) N/A - denotes test is not applicable in this test report.



4.6 SURGE TESTING

4.6.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance:	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power line ~ line to line: 1 KV line to ground: 2KV Telecommunication line: 0.5KV
Surge Input/Output:	L-N, L-PE, N-PE
Generator Source:	(L-N)2 ohm between networks
Impedance:	(L-PE, N-PE)12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

4.6.2 TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on

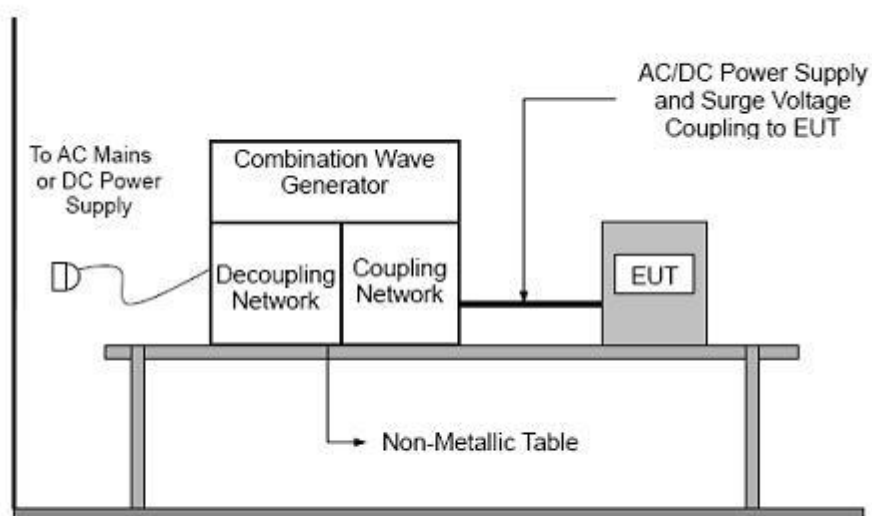
b. equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

c. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The

d. interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

4.6.3 TEST SETUP





4.6.4 TEST RESULTS

Temperature:	22°C	Relative Humidity:	55%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1/2/3		

Coupling Line		Test level	Perform. Criteria	Results	Judgment
AC line	L-N	±1KV	B	A	PASS
	L-PE				
	N-PE				
DC Line					
Signal Line					

Note: 1) N/A - denotes test is not applicable in this test report.



4.7 RADIO-FREQUENCY COMMON MODE / CONDUCTED SUSCEPTIBILITY

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance:	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 Vr.m.s.
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

4.7.2 TEST PROCEDURE

The EUT shall be tested within its intended operating and climatic conditions.

The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5×10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts were made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

The diagram illustrates the experimental setup for EUT testing. On the left, a Control System is connected via GPIB to a Power Amplifier, which is connected to an S.G. (Signal Generator). The Power Amplifier is also connected to an Attenuator (6dB/25W). The EUT (Equipment Under Test) is placed on an Insulation Support inside a Shielding Room. The Insulation Support is 10cm high. The EUT is connected to a CDN (Coaxial Noise Detector) and a ground wire. The Shielding Room has dimensions $0.1\text{m} < L < 0.3\text{m}$ and a distance $D \geq 50\text{cm}$ from the EUT. The Ground Reference Plane (GRP) is Bonded to Earth.

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.



4.7.4 TEST RESULTS

Temperature:	25.3℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1/2/3		

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

Note: 1) N/A - denotes test is not applicable in this test report.



4.8 POWER FREQUENCY MAGNETIC FIELD TESTING

4.8.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-8
Required Performance:	A
Frequency Range:	50Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

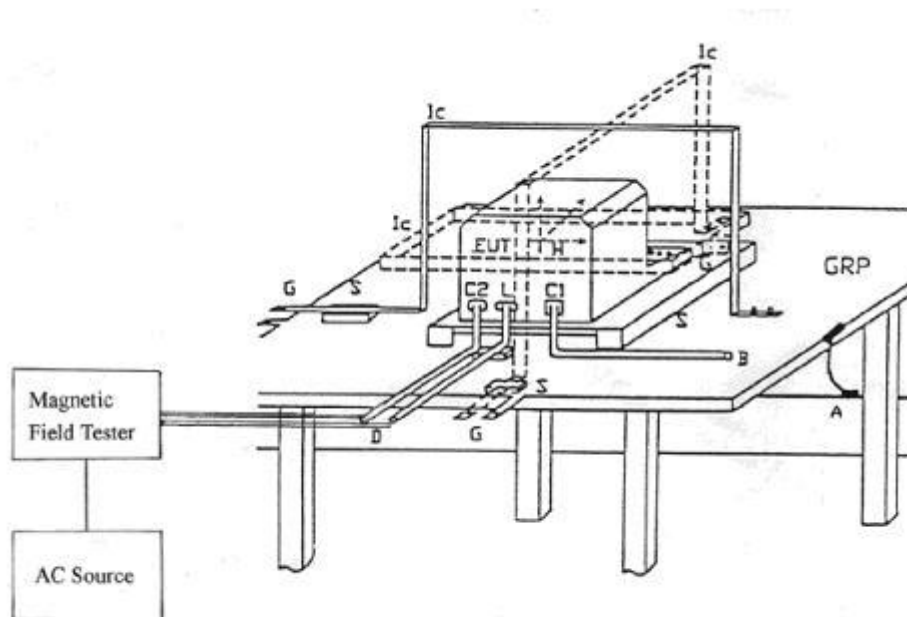
4.8.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

- a. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- b. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

4.8.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.



4.8.4 TEST RESULTS

Temperature:	26°C	Relative Humidity:	45%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	N/A		

Note: denotes test is not applicable in this test report.



4.9 VOLTAGE INTERRUPTION/DIPS TESTING

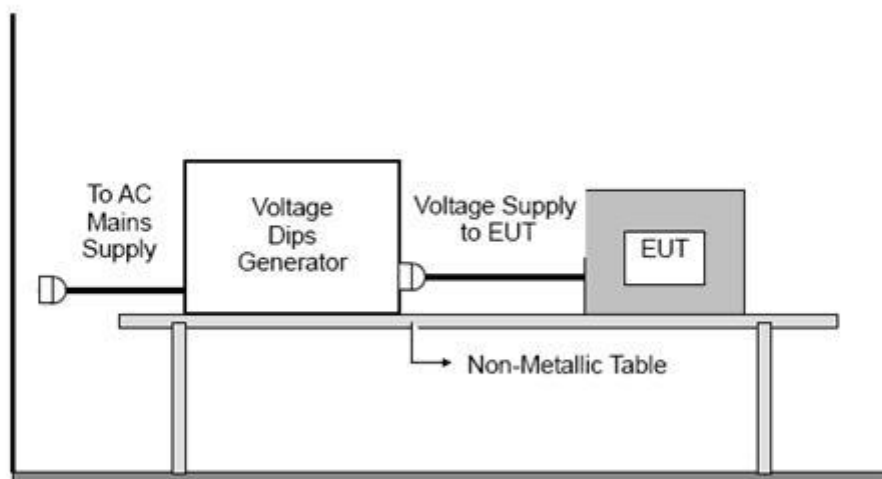
4.9.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance:	B (For 100% Voltage Dips, 0.5 Cycle) B (For 100% Voltage Dips, 1 Cycle) C (For 30% Voltage Dips, 25 Cycles) C (For 100% Voltage Interruptions, 250 Cycles)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

4.9.2 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

4.9.3 TEST SETUP





4.9.4 TEST RESULTS

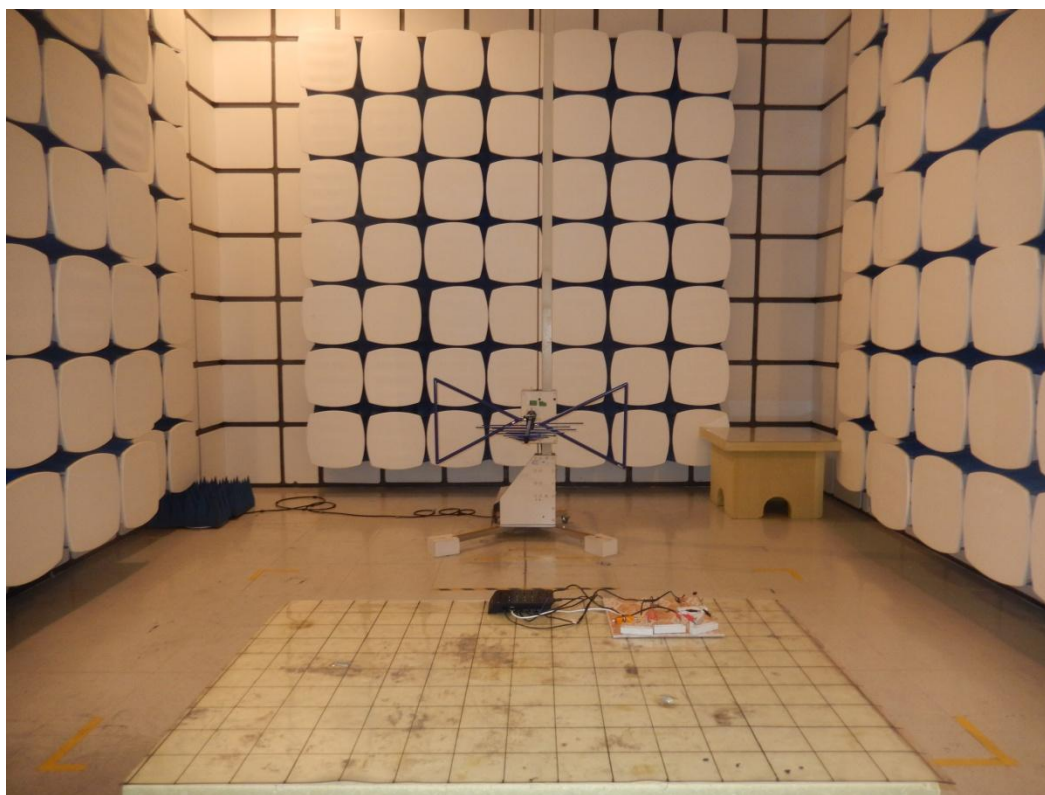
Temperature:	25.3℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1/2/3		

Voltage Reduction	Duration (cycle)	Perform Criteria	Results	Judgment
Voltage dip 100%	0.5	B	B	PASS
Voltage dip 100%	1	B	B	PASS
Voltage dip 30%	25	C	B	PASS
Voltage interruptions	250	C	C	PASS



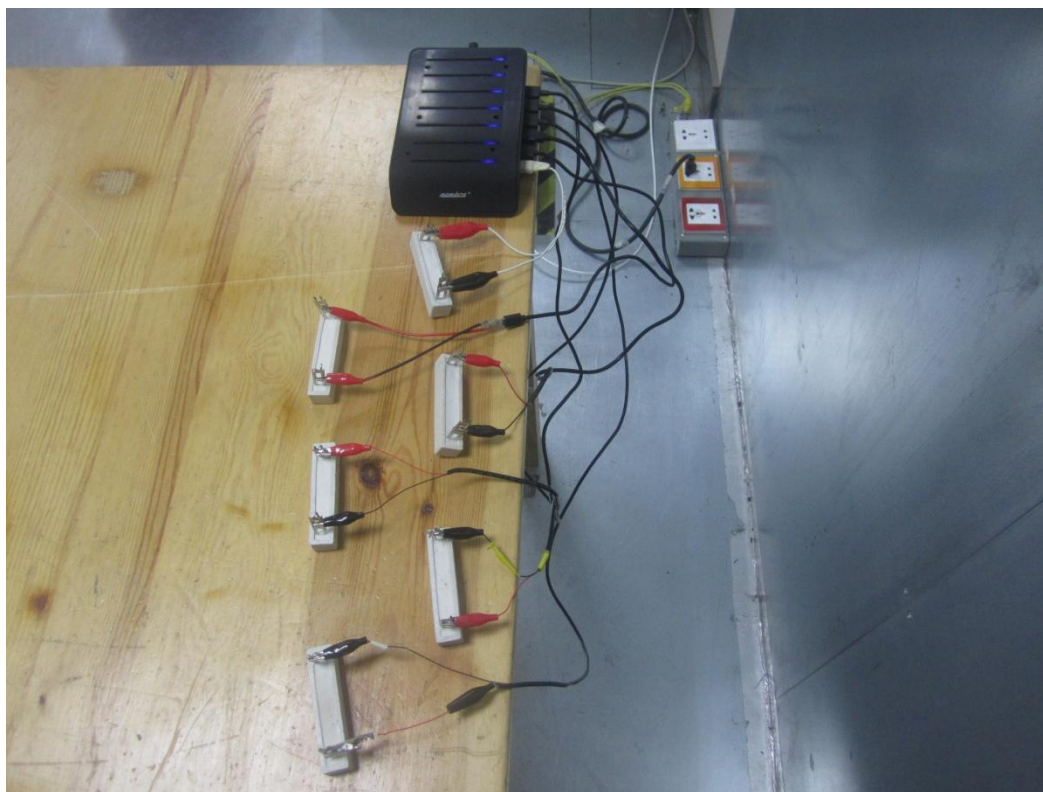
APPENDIX 1-PHOTO TEST OF EUT

RE

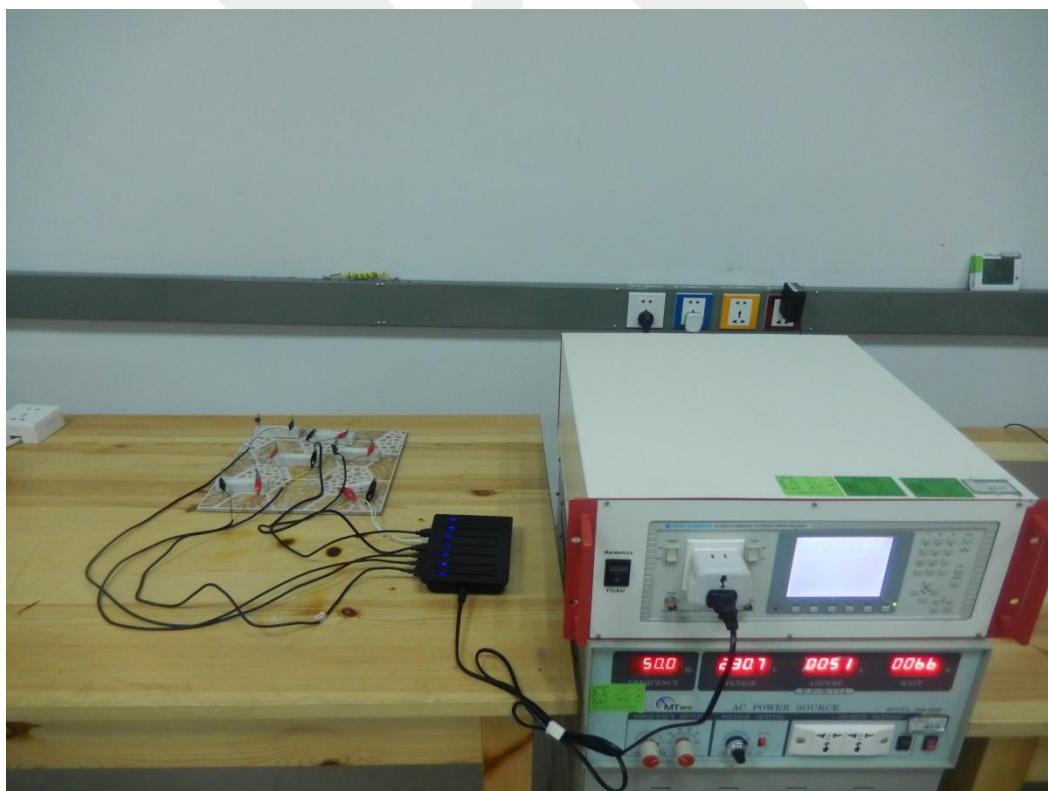


CE

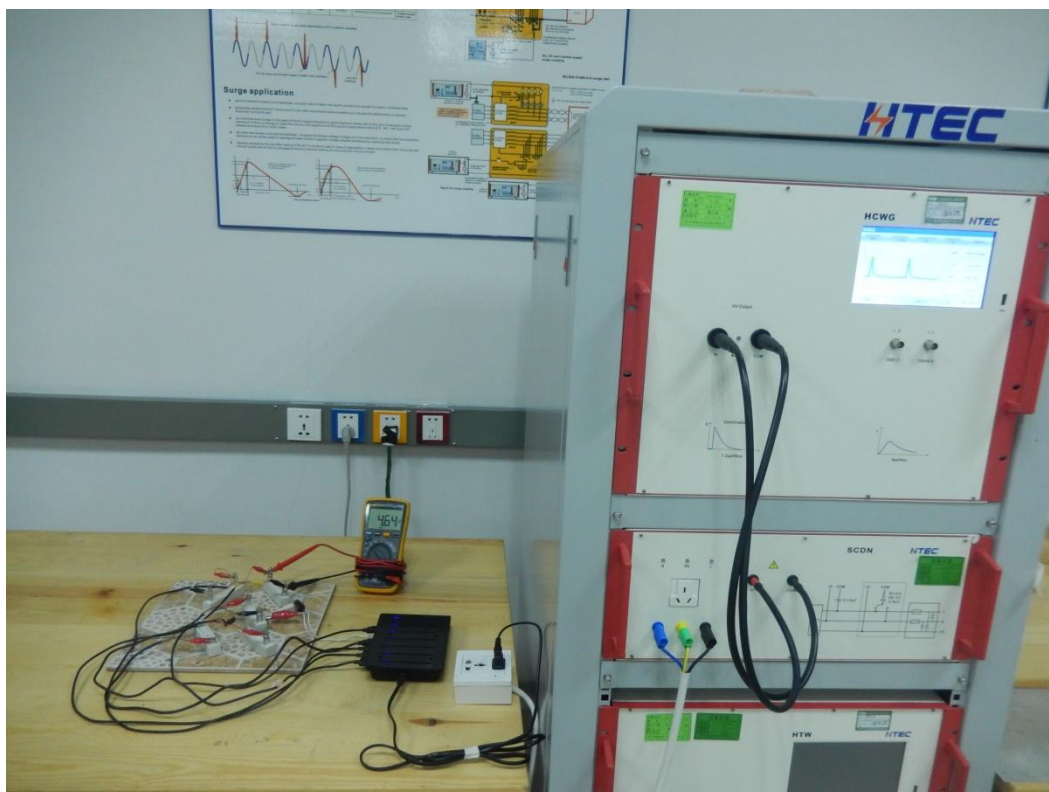




Harmonic&Flick



SURGE



EFT



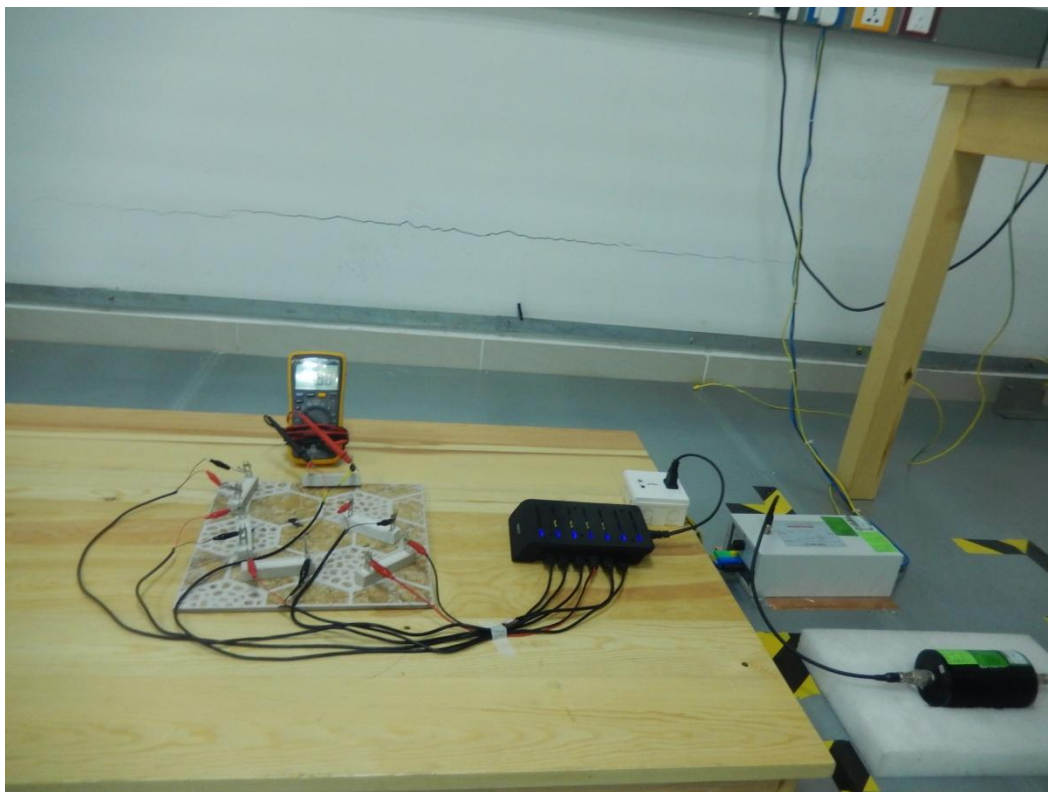
DIPS



ESD



CS



RS



APPENDIX 2-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Photo 1

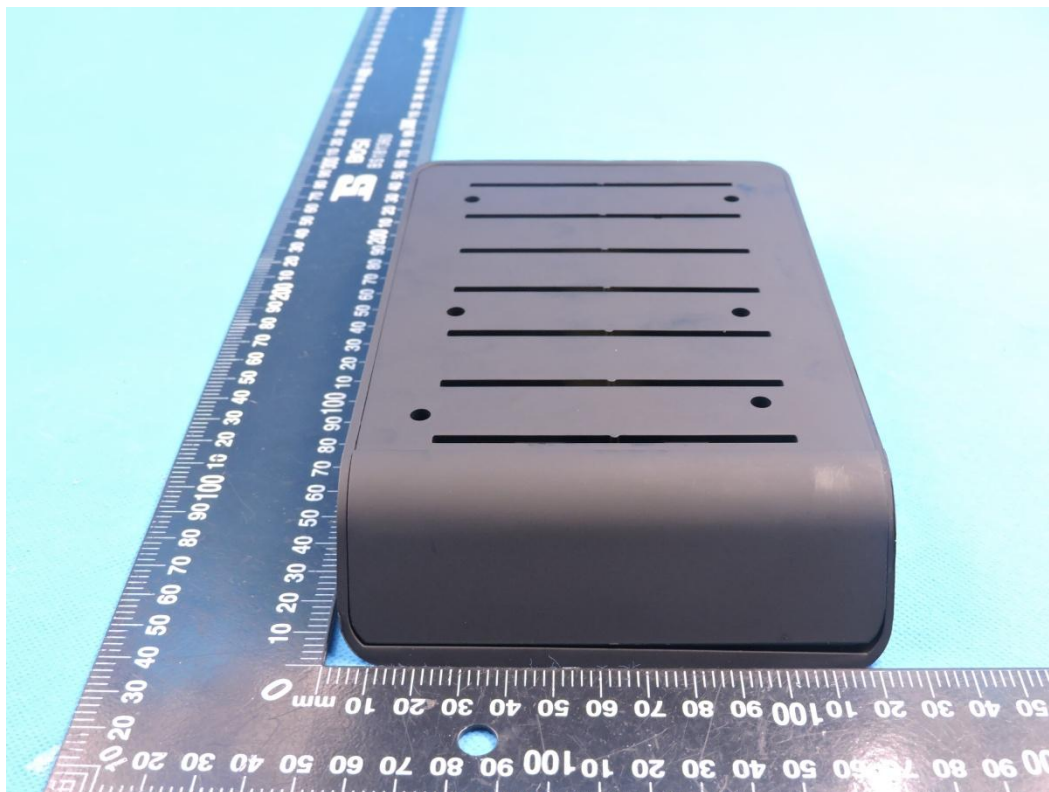


Photo 2



Photo 3

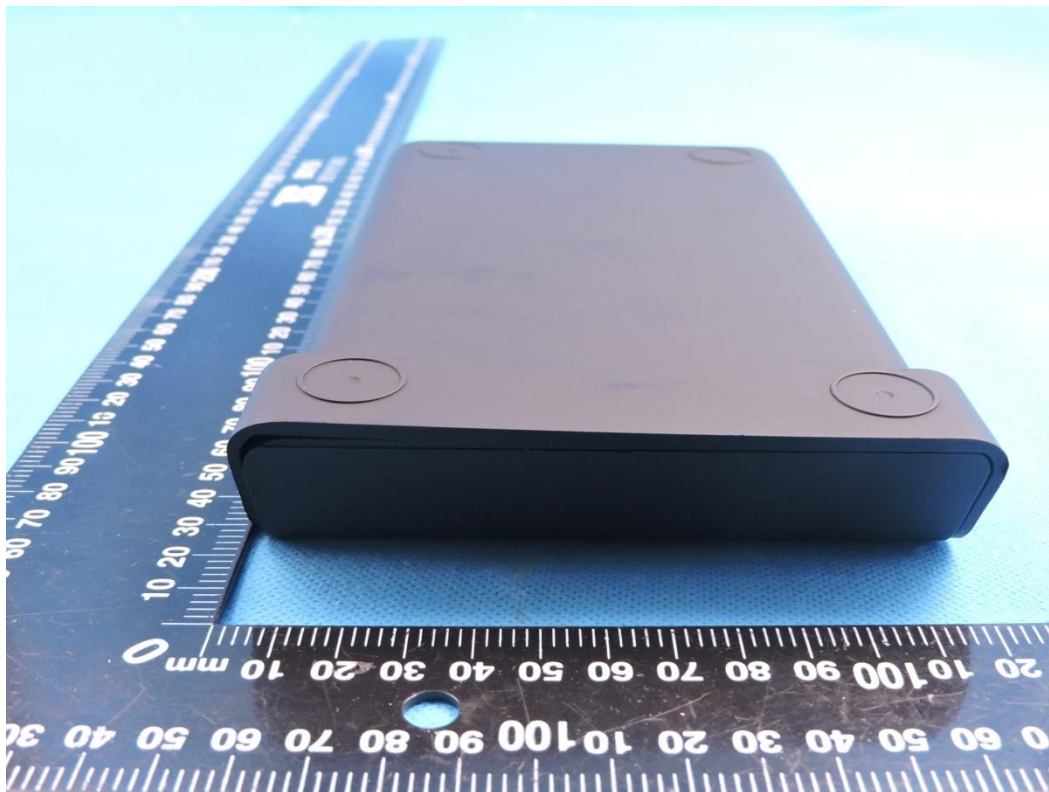


Photo 4



Photo 5



Photo 6

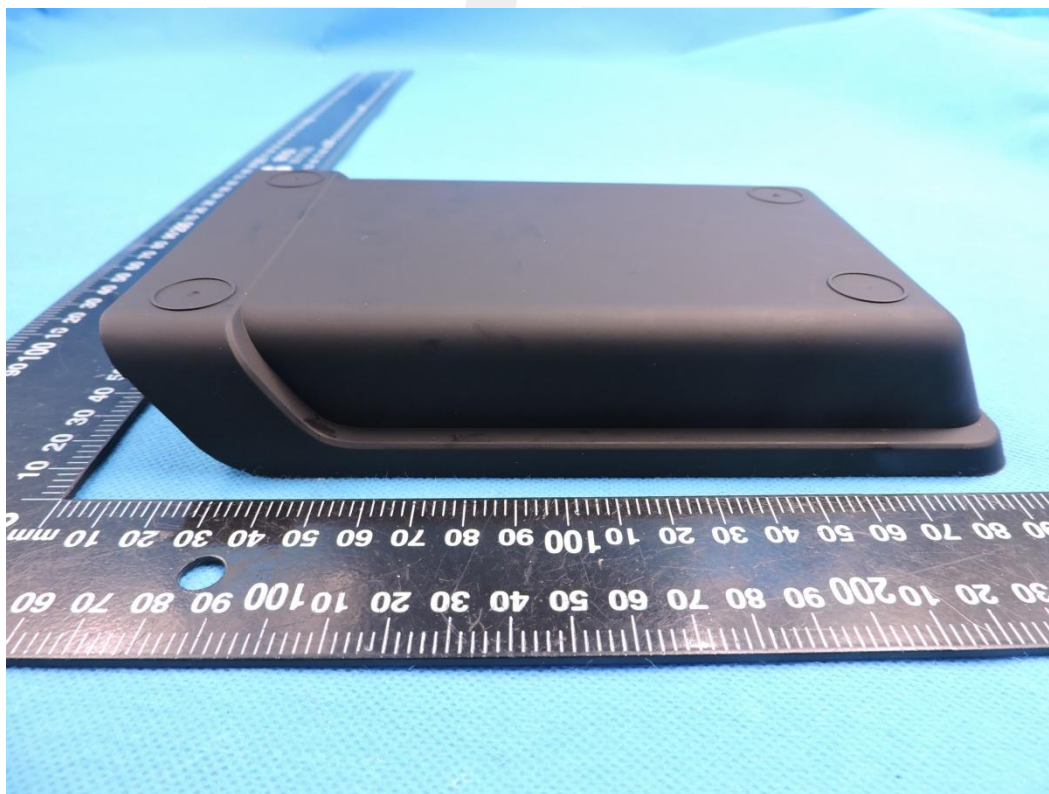


Photo 7

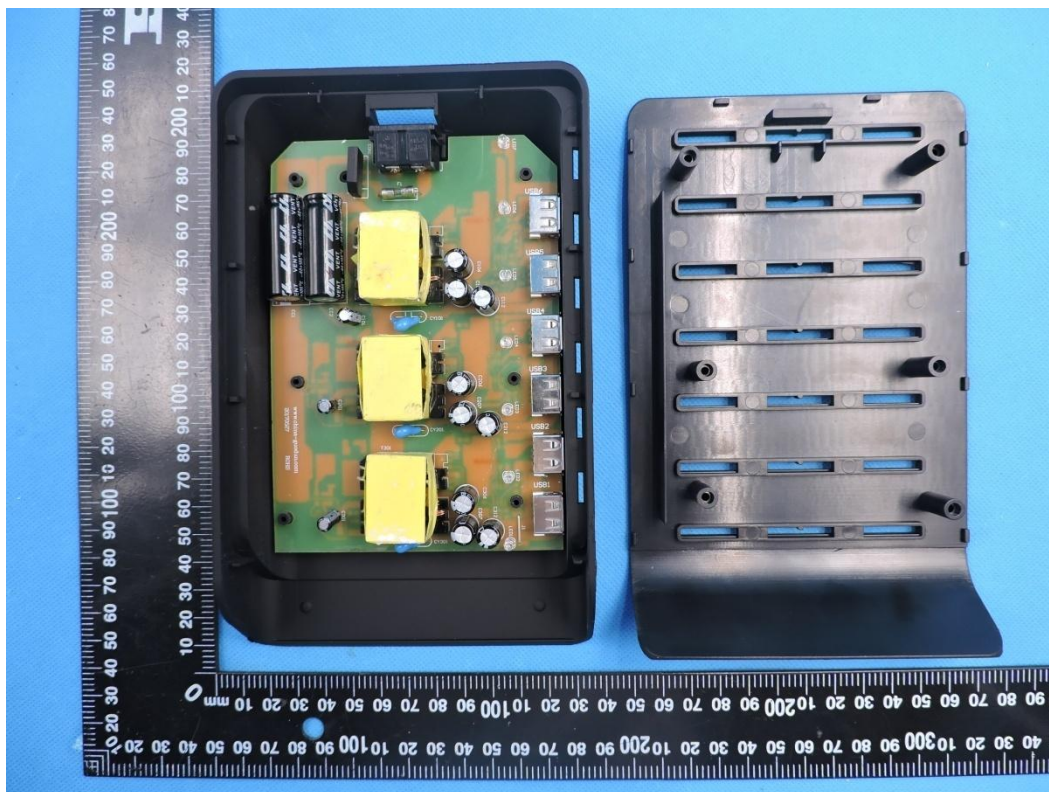


Photo 8

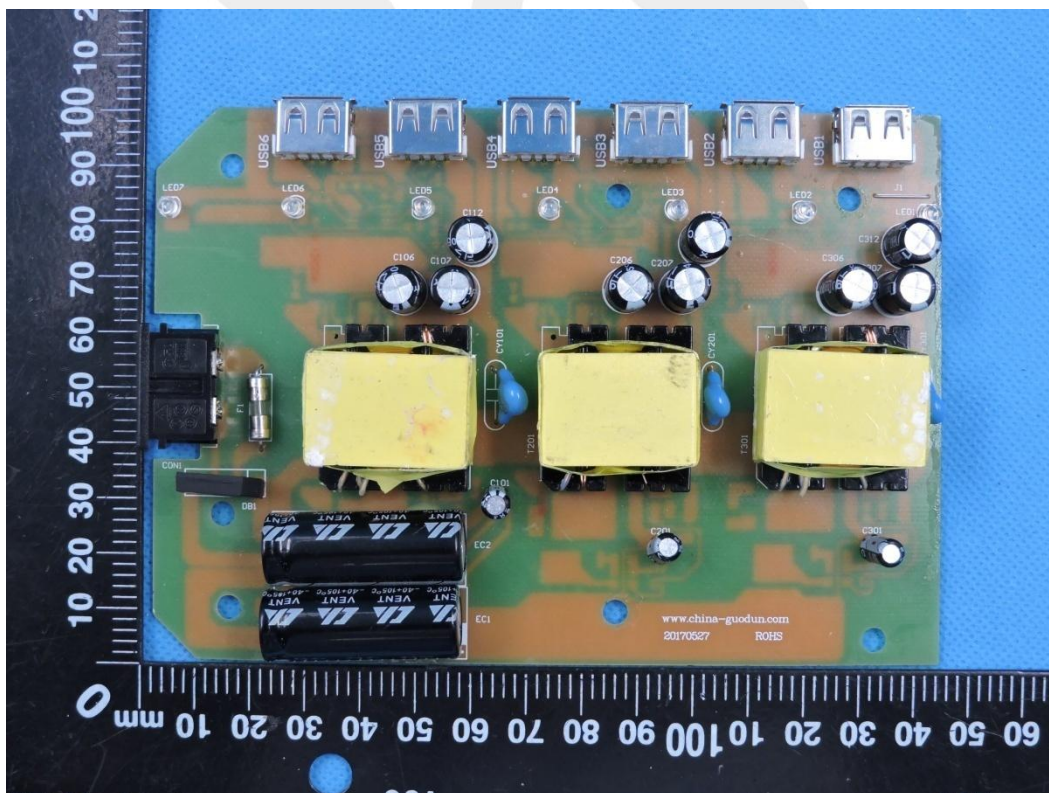
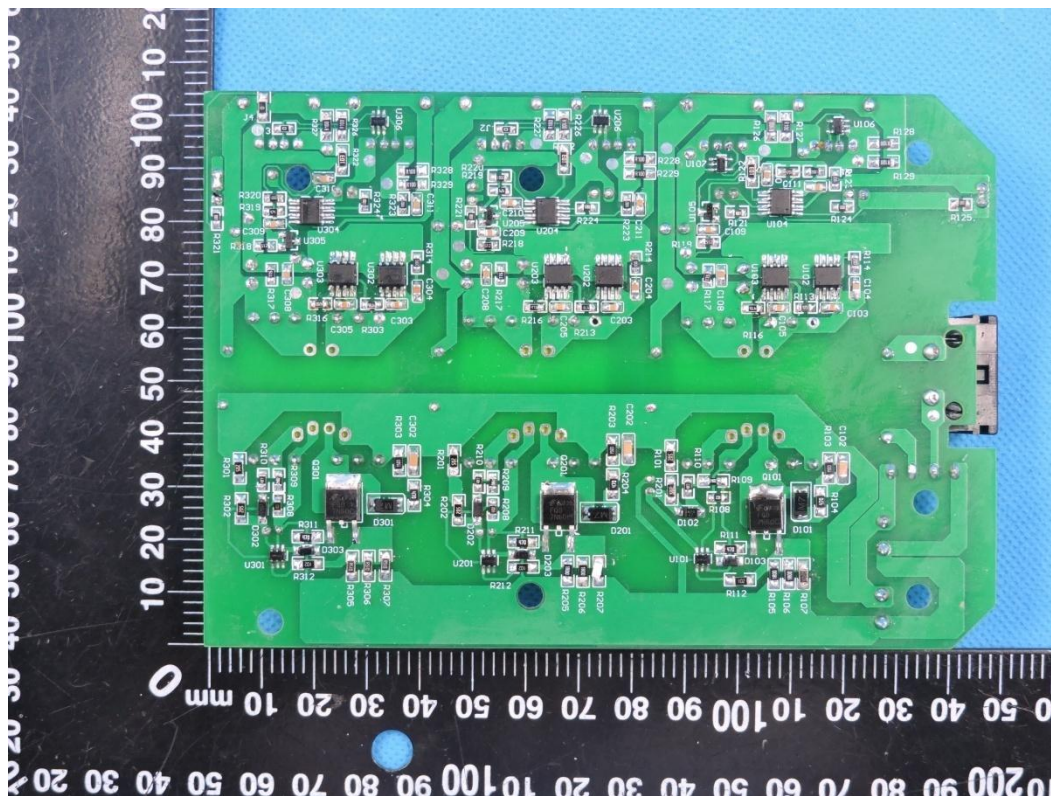


Photo 9



*****END OF THE REPORT*****