



EMC TEST REPORT

For

Zhuhai Telehof Electrics Co.,Ltd

Surge Protection Device for Information Technology System

Model No. : See model list and difference

Prepared for : Zhuhai Telehof Electrics Co.,Ltd

Address : 3/F ,Phase I , No.6 Jinhua Road, Xiaolin ,Hongqi
Township,Jinwan District,Zhuhai City,China

Prepared by : DONGGUAN JUN' AN TESTING AND CERTIFICATION
CO., LTD.

Address : Room 303, Building 1, No.316, Renzhou Road, Shatian
Town, Dongguan City, Guangdong Province

Report Number : JAT23081702137ER-2

Date of Test : 2023-08-12 to 2023-08-21

Date of Report : 2023-08-21



TEST REPORT DESCRIPTION

Applicant : Zhuhai Telehof Electrics Co.,Ltd
Manufacturer : Zhuhai Telehof Electrics Co.,Ltd
Brand Name : Telebahn
EUT : Surge Protection Device for Information Technology System
Model No. : BS LC 24
Power Supply: 24VDC

Measurement Procedure Used:

EN 55014-1:2017+A11:2020
EN IEC 55014-2:2021
EN 61000-4-2:2009
EN IEC 61000-4-3:2020

The device described above is tested by DONGGUAN JUN' AN TESTING AND CERTIFICATION CO., LTD.. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and DONGGUAN JUN' AN TESTING AND CERTIFICATION CO., LTD. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the EN 55014-1, EN IEC 55014-2, EN 61000-3-2, and EN 61000-3-3 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of DONGGUAN JUN' AN TESTING AND CERTIFICATION CO., LTD.

Date of Test : 2023-08-12 to 2023-08-21

Prepared by : Hunter Tian
Hunter Tian/Editor

Reviewer : Eddy Tian/Supervisor

Approved & Authorized Signer : Amy Zhang
Amy Zhang/Manager





Modified History

Rev.	Summary	Date of Rev.	Report No.
V1.0	Original Report	2023-08-21	JAT23081702137ER-2

Model list: and difference:

Model	Rating
BS LC../BS SC.. BS LD../BS SD.. /BS L CD../BS SHFD../BS HFD..	Un:5-110V U _c :7V-180VDC I _L :0.5-1A I _{imp} :2.5kA-5kA(total) I _n :10kA-20kA t _a :1ns R:1-2.2Ω
BS LC..4M/BS SC..4M BS LD..4M/BS SD..4M /BS L CD..4M/BS SHFD..4M/BS HFD..4M/BS RS	Un:5-110V U _c :7V-180VDC I _L :0.5-1A I _{imp} :2.5kA-5kA(total) I _n :10kA-20kA t _a :1ns R:1-2.2Ω
BS RK SD../BS RK SC.. BS RK C..	Un:5-110V U _c :7V-180VDC I _L :0.5-1A I _{imp} :0.5kA-1kA(total) I _n :5kA-10kA t _a :1ns R:1-2.2Ω
BS RK 5../BS RK 24.. BS 4RK..	Un:5-110V U _c :7V-180VDC I _L :0.5-1A I _{imp} :1kA-2kA(total) I _n :10kA-20kA t _a :1ns R:1-5.1Ω
BS LSA../BS LSA X..	Un:5-110V U _c :7V-180VDC I _L :0.5-1A I _{imp} :1kA-2kA(total) I _n :5kA-10kA t _a :1ns R:1-22Ω
BS TTY../BS AD../BS RS485..	Un:5-110V U _c :7V-180VDC I _L :0.5-10A I _{imp} :1kA-2kA(total) I _n :5kA-10kA t _a :1ns R:1-4Ω



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<p>BS NP 4TP../BS NP 4TP..1X /BS NP 4TP..2X/BS NP 4TP..3X</p>	<p>UN:5-60V Uc:7V-70VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns Vs:1000Mbit/s</p>
<p>BS RJ45../BS POE.. /BS RJ11../BS RJ12../BS RMT../</p>	<p>UN:5-60V Uc:7V-70VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns Vs:1000Mbit/s</p>
<p>BS G.../BS GF../BS N..</p>	<p>UN:90-230V Uc:90V-250VDC IL:0.5-10A Iimp:1kA In:5kA-10kA ta:100ns F:0-6GHz</p>
<p>BS RS...P</p>	<p>UN:5-48V Uc:8V-55VDC IL:0.5-3A In:3kA ta:1ns F:40MHz</p>
<p>BS PI SCD..M</p>	<p>UN:5-48V Uc:8V-55VDC IL:0.55A In:10kA ta:1ns fg:67MHz</p>
<p>BS V..IN../BS RJ45..IN../BS VS...</p>	<p>UN:5-60V Uc:7V-70VDC IL:0.5-1A Iimp:1kA-2kA(total) In:5kA-10kA ta:1ns Vs:1000Mbit/s Power:UN:230/400V Uc:255-380V In:3-5kA Imax:6-10kA</p>

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MODEL LIST

BS..HFD../2M Series	BS 4RK S 110	BS RK 48 RS-II	BS LSA 10G 110
BS SHFD 5/2M	BS 4RK S 180	BS RK 48 RS-ID	BS LSA 10G 110S
BS HFD 5/2M	BS RK 5...Series	BS RK 48 ST-II	BS LSA 1G 110
BS SHFD 24/2M	BS RK 5 TR-II	BS RK 48 ST-ID	BS TVSS...Series
BS HFD 24/2M	BS RK 5 TR-ID	BS RK 60...Series	BS TVSS 10/G48
BS 4RK SC...Series	BS RK 5 TR-DI	BS RK 60 ST-II	BS TVSS 10/G5
BS 4RK SC 5	BS RK 5 TR-DD	BS RK 60 ST-ID	BS TVSS 20/G48
BS 4RK SC 12	BS RK 5 TC-II	BS RK 60 ST-DI	BS TVSS 20/G5
BS 4RK SC 24	BS RK 5 TC-ID	BS RK 60 ST-DD	BS RJ45...(4P) Series
BS 4RK SC 48	BS RK 5 TC-DI	BS RK 60 ST-II F	BS RJ45 5V (4P)
BS 4RK SC 60	BS RK 5 TC-DD	BS RK 60 ST-ID F	BS RJ45 24V (4P)
BS 4RK SC 180	BS RK 5 RS-II	BS RK 60 ST-DI F	BS RJ45 48V (4P)
BS 4RK SD...Series	BS RK 5 RS-ID	BS RK 60 ST-DD F	BS RJ45G 5 (4P)
BS 4RK SD 5	BS RK 5 RS-II F	BS SCD 6A-38 DI	BS RJ45G 24 (4P)
BS 4RK SD 12	BS RK 12...Series	BS SCD 6A-38 DD	BS RJ45G 48 (4P)
BS 4RK SD 24	BS RK 12 ST-3	BS TTY...Series	BS NP 4TP...Series
BS 4RK SD 48	BS RK 12 ST-3 DI	BS TTY 5	BS NP 4TP 5V
BS 4RK SD 60	BS RK 12 ST-3-DD	BS TTY 12	BS NP 4TP 24V
BS 4RK SD 110	BS RK 24...Series	BS TTY 24	BS NP 4TP 48V
BS 4RK SD 180	BS RK 24 ST-II	BS TTY 32	BS NP 4TP G5
BS 4RK SCD...Series	BS RK 24 ST-ID	BS TTY 110	BS NP 4TP G24
BS 4RK SCD 5	BS RK 24 ST-DI	BS AD...Series	BS NP 4TP G48
BS 4RK SCD 12	BS RK 24 ST-DD	BS AD 24	BS NP 4TP E1000 5V
BS 4RK SCD 24	BS RK 24 ST-II F	BS AD 24 S	BS NP 4TP E1000 5V M
BS 4RK SCD 48	BS RK 24 ST-ID F	BS RS485...Series	BS NP 4TP 1X...Series
BS 4RK SCD 60	BS RK 24 ST-DI F	BS RS485 5	BS NP 4TP 1X 5V
BS 4RK SCD 110	BS RK 24 ST-DD F	BS ALD 36	BS NP 4TP 1X 24V
BS 4RK SDD...Series	BS RK 24 TR-II	BS ALD 60	BS NP 4TP 1X 48V
BS 4RK SDD 5	BS RK 24 TR-ID	BS LSC...Series	BS NP 4TP 1X E1000 5V
BS 4RK SDD 24	BS RK 24 TR-DI	BS LSA C5L	BS NP 4TP 1X E1000 12V
BS 4RK SDD 48	BS RK 24 TR-DD	BS LSA C12L	BS NP 4TP 1X E1000 24V
BS 4RK SHFD...Series	BS RK 24 ST-3	BS LSA C24L	BS NP 4TP 1X E1000 5V M
BS 4RK SHFD 5	BS RK 24 ST-3 DD	BS LSA C48L	BS NP 4TP 1X G5
BS 4RK SHFD 12	BS RK 24 ST-3 DI	BS LSA C60L	BS NP 4TP 1X G24
BS 4RK SHFD 24	BS RK 24 ST-II LT	BS LSA C110L	BS NP 4TP 1X G48
BS 4RK SHFD 48	BS RK 24 PA-II	BS LSA C5R	BS NP 4TP 2X...Series
BS 4RK HFD...Series	BS RK 24 PA-ID	BS LSA C12R	BS NP 4TP 2X 5V
BS 4RK HFD 5	BS RK 24 RS-II	BS LSA C24R	BS NP 4TP 2X 24V
BS 4RK HFD 12	BS RK 24 RS-ID	BS LSA D110R	BS NP 4TP 2X 48V
BS 4RK HFD 24	BS RK 24 TR-DI F	BS LSA D250R	BS NP 4TP 2X E1000 5V
BS 4RK HFD 48	BS RK 32...Series	BS LSA D24R	BS NP 4TP 2X E1000 12V
BS 4RK S...Series	BS RK 32 TR-DD	BS LSA C110L S	BS NP 4TP 2X E1000 24V
BS 4RK S 5	BS RK 32 TR-DI	BS LSA X...Series	BS NP 4TP 2X E1000 5V M
BS 4RK S 12	BS RK 48...Series	BS LSA X C110	BS NP 4TP 2X G5
BS 4RK S 24	BS RK 48 ST-3	BS LSA X D250R	BS NP 4TP 2X G24
BS 4RK S 48	BS RK 48 ST-3 DI	BS LSA X C110S	BS NP 4TP 2X G48

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BS 4RK S 60	BS RK 48 ST-3 DD	BS LSA X C280S	BS NP 4TP 3X...Series
Base with GDT	BS SD 110	BS RK SC 24	BS LD 48/4M
Base without GDT	BS SD 180	BS RK SC 36	BS LD 60/4M
BS LC..Series	BS SD 250	BS RK SC 48	BS LD 180/4M
BS LC 5	BS SCD 24	BS RK SC 110	BS LDD 5/4M
BS LC 12	BS L CD..Series	BS RK SC 180	BS LDD 12/4M
BS LC 24	BS L CD(limp 2.5kA)	BS RK SD..Series	BS LDD 24/4M
BS LC 30	BS L CD(limp 1.5kA)	BS RK SD 5	BS LDD 48/4M
BS LC 36	BS L CD/5V	BS RK SD 12	BS ..HFD../4M Series
BS LC 48	BS L CD/12V	BS RK SD 24	BS SHFD 5/4M
BS LC 60	BS L CD/19V	BS RK SD 36	BS SHFD 12/4M
BS LC 110	BS L CD/24V	BS RK SD 48	BS SHFD 24/4M
BS LC 250	BS L CD/48V	BS RK SD 110	BS SHFD 48/4M
BS LC 280	BS L CD/60V	BS RK SD 180	BS HFD 5/4M
BS LC 500	BS L CD/110V	BS RK SD 5-M	BS HFD 12/4M
BS LD..Series	BS L CD F(24V)	BS RK SD 12-M	BS HFD 24/4M
BS LD 5	BS TC-ID..	BS RK SD 24-M	BS HFD 48/4M
BS LD 12	BS TC-ID 5	BS RK SD 48-M	BS SC 24-4M
BS LD 24	BS TC-ID 12	BS RK SD 110-M	BS LS CD 24/4M
BS LD 30	BS TC-ID 24	BS RK SD 48/0	BS LCD.../4M Series
BS LD 36	BS SHFD..Series	BS RKW...Series	BS LCD 5/4M
BS LD 48	BS SHFD 5	BS RKW SHFD 5-2	BS LCD 12/4M
BS LD 60	BS SHFD 12	BS RKW SHFD 12-2	BS LCD 24/4M
BS LD 110	BS SHFD 24	BS RKW SHFD 24-2	BS LCD 48/4M
BS LD 250	BS SHFD 36	BS RK SHFD 5	BS LCD 60/4M
BS LD 280	BS SHFD 48	BS RKW SHFD 12	BS LCD 180/4M
BS LD 500	BS SHFD 60	BS RKW SHFD 24	BS RS485.../4M Series
BS SC..Series	BS SHFD 110	BS RKW HFD 5	BS RS485 5/4M
BS SC 5	BS SHFD 180	BS RKW HFD 12	BS L B 4M
BS SC 12	BS HFD..Series	BS RKW HFD 24	BS SCY 110/4M
BS SC 15	BS HFD 5	BS RK C...Series	BS SCY 250/4M
BS SC 24	BS HFD 12	BS RK C 5	BS LC.../2M Series
BS SC 30	BS HFD 24	BS RK C 12	BS LC 5/2M
BS SC 48	BS HFD 48	BS RK C 24	BS LC 12/2M
BS SC 60	BS HFD 60	BS RK C 48	BS LC 24/2M
BS SC 110	BS HFD 110	BS RK C 60	BS LC 48/2M
BS SC 180	BS HFD 180	BS LC.../4M Series	BS LC 60/2M
BS SC 250	BS S..Series	BS LC 5/4M	BS LC 180/2M
BS SC 110/11	BS S 12	BS LC 12/4M	BS LD.../2M Series
BS SD..Series	BS S 24	BS LC 24/4M	BS LD 5/2M
BS SD 5	BS S 48	BS LC 48/4M	BS LD 12/2M
BS SD 12	BS S 60	BS LC 60/4M	BS LD 24/2M
BS SD 15	BS S 110	BS LC 180/4M	BS LD 48/2M
BS SD 24	BS S 180	BS LD.../4M Series	BS LD 60/2M
BS SD 30	BS RK SC..Series	BS LD 5/4M	BS LD 180/2M
BS SD 48	BS RK SC 5	BS LD 12/4M	BS LDD 5/2M
BS SD 60	BS RK SC 12	BS LD 24/4M	BS LDD 24/2M
BS NP 4TP 3X 5V	BS RJ45 NI(A)	BS GC N	BS V 2IN1/12V

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BS NP 4TP 3X 24V	BS RJ45 NI(B)	BS BNC G	BS V 2IN1/48V
BS NP 4TP 3X 48V	BS POE...Series	BS G UHF	BS V 3IN1/24V
BS NP 4TP 3X G5	BS POE 5V	BS L4J N	BS V 3IN1/220V
BS NP 4TP 3X G24	BS POE 7.5V	BS L4JY N	BS V 3IN1/12V
BS NP 4TP 3X G48	BS POE 7.5V(A)	BS GC NS	BS V 3IN1/48V
BS NP 4TP 3X E1000 5V	BS POE 7.5V(B)	BS G TNC	BS VS 3IN1/24V(A)
BS NP 4TP 3X E1000 12V	BS POE 5V/16	BS G SMA	BS VS 3IN1/12V(A)
BS NP 4TP 3X E1000 24V	BS POE 48V(A)	BS N GC	BS VS 3IN1/48V(A)
BS NP 4TP 3X E1000 5V M	BS POE 5V-K(A)	BS N GC(F/F)	BS VS 3IN1/24V(B)
BS RJ45G 48(A)-15	BS POE 48V-K(A)	BS BNC GA	BS VS 3IN1/12V(B)
BS RJ45G 48(A)-8	BS MJ8 POE	BS G NG	BS VS 3IN1/48V(B)
BS NP 15	BS MJ8 5V	BS BNC GF	BS RJ45 V 2 IN 1 S(12V)
BS RJ11 110 3X	BS MJ8 24V	BS G NA	BS RJ45 V 2 IN 1/12V
BS BNC 5V/8	BS RJ45E WP	BS GH BNC	BS RJ45 V 2 IN 1/24V
BS 8BNC 5V	BS ELP...WP Series	BS GH N	BS RJ45 V 2 IN 1 S(24V)
BS 16BNC 5V	BS ELP 48 WP	BS L4 NA	BS RJ45 V 2 IN 1/48V
BS 24BNC 5V	BS LCD/24 WP	BS GF CTV	BS RJ45 V 2 IN 1 S(48V)
BS RJ45G...Series	BS TC TN/JP	BS GF CTV S	BS RJ45 V 2 IN 1/220V
BS RJ45G 5(A)	BS RMT...Series	BS L47/16 A	BS RJ45 V 2 IN 1 S(220V)
BS RJ45G 5(B)	BS RMT 24V(A)	BS L47/16 B	BS RJ45 V 2 IN 1/K
BS RJ45G 12(A)	BS RMT 24V(B)	BS G SMA (F/F)	BS RJ45 V 2 IN 1/DIN
BS RJ45G 12(B)	BS RMT 12V(A)	BS N GB	BS SD TC1
BS RJ45G 24(A)	BS RMT 12V(B)	BS RS..Series	E-3
BS RJ45G 24(B)	BS RJ11...Series	BS RS 9P	E-5
BS RJ45G 48(A)	BS RJ11 110(A)	BS RS 9PA	E-10
BS RJ45G 48(B)	BS RJ11 110(B)	BS RS 15P	E-3a
BS RJ45G 48(A1)	BS RJ11 110 D(A)	BS RS 25P	E-5a
BS RJ45G 48 D(A)	BS RJ11 111 D(B)	BS RS 37P	E-10a
BS RJ45G 48(E)	BS RJ11 110(A)+LED	BS RS 37P A	C-10
BS RJ45G 60(A)	BS RJ11 110(B)+LED	BS PI...Series	L-10
BS RJ45G 60(B)	BS RJ12 110(A)	BS PI SCD 24 M	T-1
BS RJ45G 48-90W(A)	BS RJ12 110(B)	BS PI SCD 35 M	T-2
BS RJ45...Series	BS BNC....Series	BS PI SCD 48 M	T-3
BS RJ45 5V(A)	BS CAB-V	BS PI SCD 24 M-2	T-4
BS RJ45 5V(B)	BS BNC 5V(AB)	BS PI SCD 35 M-2	R-10a
BS RJ45 5V M(A)	BS BNC 5V(A)	BS PI SCD 48 M-2	R-10b
BS RJ45 5V M(B)	BS BNC 5V(B)	BS PI SCD 24 M-S	PET-16
BS RJ45 E1000 5V(A)	BS V BNC(A)	BS PI SCD 35 M-S	R-...series
BS RJ45 E1000 5V(B)	BS V BNC(B)	BS PI SCD 48 M-S	BS L4 7/16
BS RJ45 24V(A)	BS BNC 12V(A)	BS CLE RJ45G 48 WP	BS F 1.6/5.6
BS RJ45 24V(B)	BS CTV 24(A)	BS LC 24/4M-PG-IP67	CAMCAR Series
BS RJ45 24V-K(A)	BS CTV 24(B)	BS 3LP-IP67-...	DVR Series
BS RJ45 24V-K(B)	BS G...Series	BS 5LP-IP67-...	BS..Ex
BS RJ45 IN...Series	BS G BNC	BS V 2IN1/24V	BS PI SCD 230/24 M
BS RJ45 NI 48	BS G N	BS V 2IN1/220V	

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1. SUMMARY OF TEST RESULT

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted Disturbance at Mains Terminals	EN 55014	Table 2a	Pass
Magnetic Emission	EN 55014	Table 3	Pass
IMMUNITY			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic Discharge (ESD)	EN 61000-4-2	B	Pass
EFT/B Immunity	EN 61000-4-4	B	Pass
Surge Immunity	EN 61000-4-5	B	Pass

Note: N/A is an abbreviation for Not Applicable.



2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : Surge Protection Device for Information Technology System

Model Number : BS LC 24

Test Voltage : 24VDC

Applicant : Zhuhai Telehof Electrics Co.,Ltd

Address : 3/F ,Phase I , No.6 Jinhua Road, Xiaolin ,Hongqi Township,Jinwan District,Zhuhai City,China

Manufacturer : Zhuhai Telehof Electrics Co.,Ltd

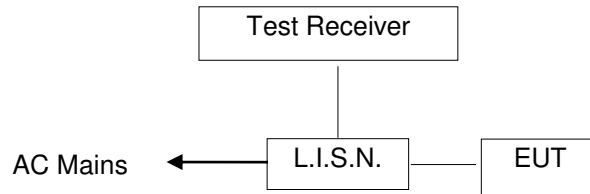
Address : 3/F ,Phase I , No.6 Jinhua Road, Xiaolin ,Hongqi Township,Jinwan District,Zhuhai City,China

Date of Received : 2023-08-12

Date of Test : 2023-08-12 to 2023-08-21

3. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1. Block Diagram of Test Setup



(EUT: Surge Protection Device for Information Technology System)

3.2. Measuring Standard and Limits

3.2.1. Standard: EN 55014

3.2.2. Limits

Frequency	At mains terminals (dB μ V)	
	Quasi-peak Level	Average Level
9kHz ~ 50kHz	110	--
50kHz ~ 150kHz	90 ~ 80*	--
150kHz ~ 0.5MHz	66 ~ 56*	56 ~ 46*
0.5MHz ~ 2.51MHz	56	46
2.51MHz ~ 3.0MHz	73	63
3.0MHz ~ 5.0MHz	56	46
5.0MHz ~ 30MHz	60	50

1. At the transition frequency the lower limit applies.
2. * Decreasing linearly with logarithm of the frequency.

3.3. Operating Condition of EUT

3.3.1. Setup the EUT as shown on Section 4.1.

3.3.2. Turn on the power of all equipments.

3.3.3. Let the EUT work in measuring mode (ON) and measure it.



3.4. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground and connected to the AC mains through a Line Impedance Stabilization Network (L.I.S.N.). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission according to the EN 55014 regulations during conducted emission measurement. And the voltage probe had been used for the load terminals measurement according to the EN 55015 standard.

The bandwidth of the test receiver (R&S ESCS30) is set at 200Hz in 9k~150kHz range and 9kHz in 150k~30MHz range.

The frequency range from 9kHz to 30MHz is checked.

All the test results are listed in Section 4.5. The scanning waveform is put in the following pages.

3.5. Measuring Results

PASS.

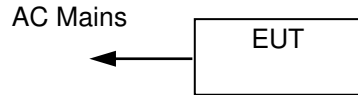
The frequency range from 9kHz to 30MHz is investigated.

Please refer to the following pages.

4. MAGNETIC FIELD EMISSION MEASUREMENT

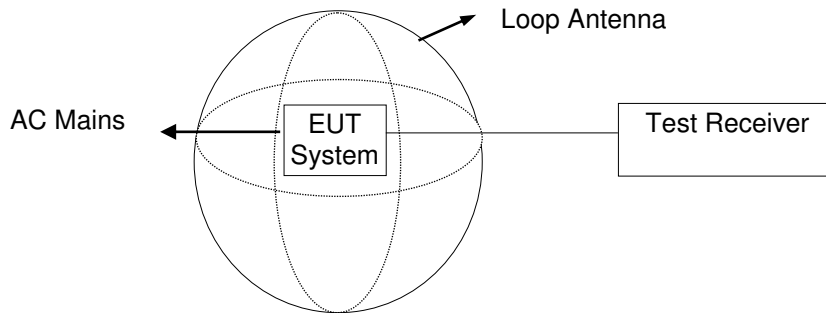
4.1. Block Diagram of Test Setup

4.1.1. Block Diagram of EUT System



(EUT: Surge Protection Device for Information Technology System)

4.1.2. Block Diagram of Test Setup



(EUT: Surge Protection Device for Information Technology System)

4.2. Measuring Standard and Limits

4.2.1. Test Standard

EN 55014

4.2.2. Test Limits

Frequency	Limits for loop diameter (dB μ A)	
	2m	
9kHz ~ 70kHz	88	
70kHz ~ 150kHz	88 ~ 58*	
150kHz ~ 2.2MHz	58 ~ 26*	
2.2MHz ~ 3.0MHz	58	
3.0MHz ~ 30MHz	22	

1. At the transition frequency the lower limit applies.
2. * Decreasing linearly with logarithm of the frequency.

4.3. Operating Condition of EUT

4.3.1. Setup the EUT as shown on Section 5.1.

4.3.2. Turn on the power of all equipments.

4.3.3. Let the EUT work in measuring mode (ON) and measure it.

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4.4. Test Procedure

The EUT is placed on a wood table in the center of a loop antenna. The induced current in the loop antenna is measured by means of a current probe and the test receiver. Three field components are checked by means of a coaxial switch.

The frequency range from 9kHz to 30MHz is investigated. The receiver is measured with the quasi-peak detector. For frequency band 9kHz to 150kHz, the bandwidth of the field strength meter (R&S test receiver ESCS30) is set at 200Hz. For frequency band 150kHz to 30MHz, the bandwidth is set at 9kHz.

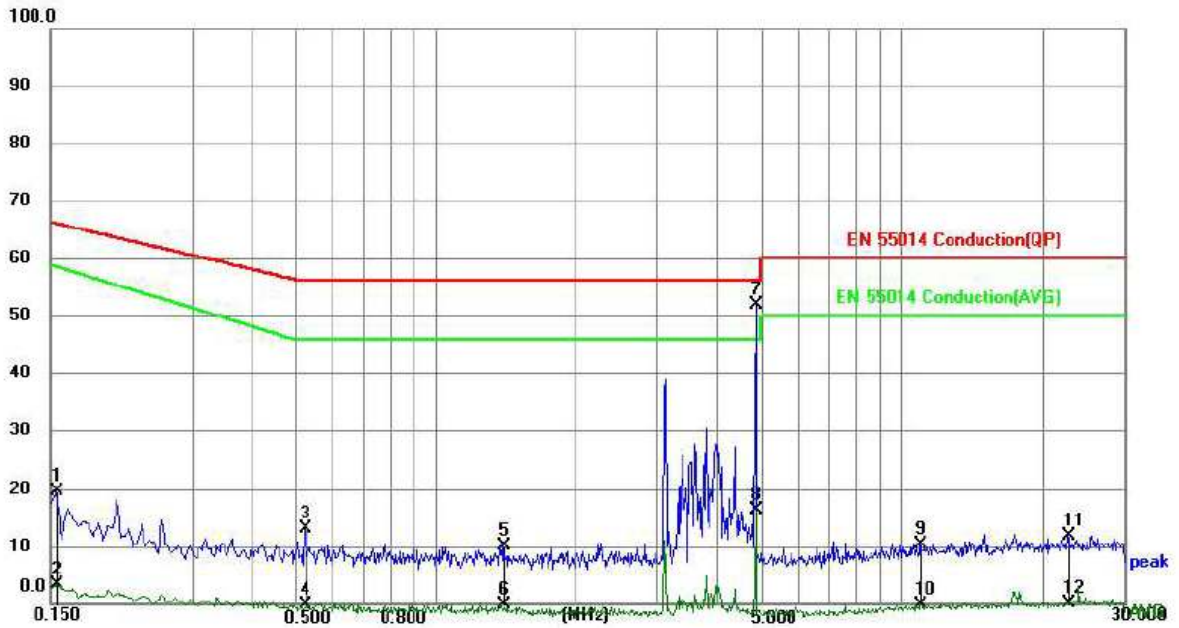
All the test results are listed in Section 5.5, and all the scanning waveform is put in the following pages.

4.5. Measuring Results

PASS.

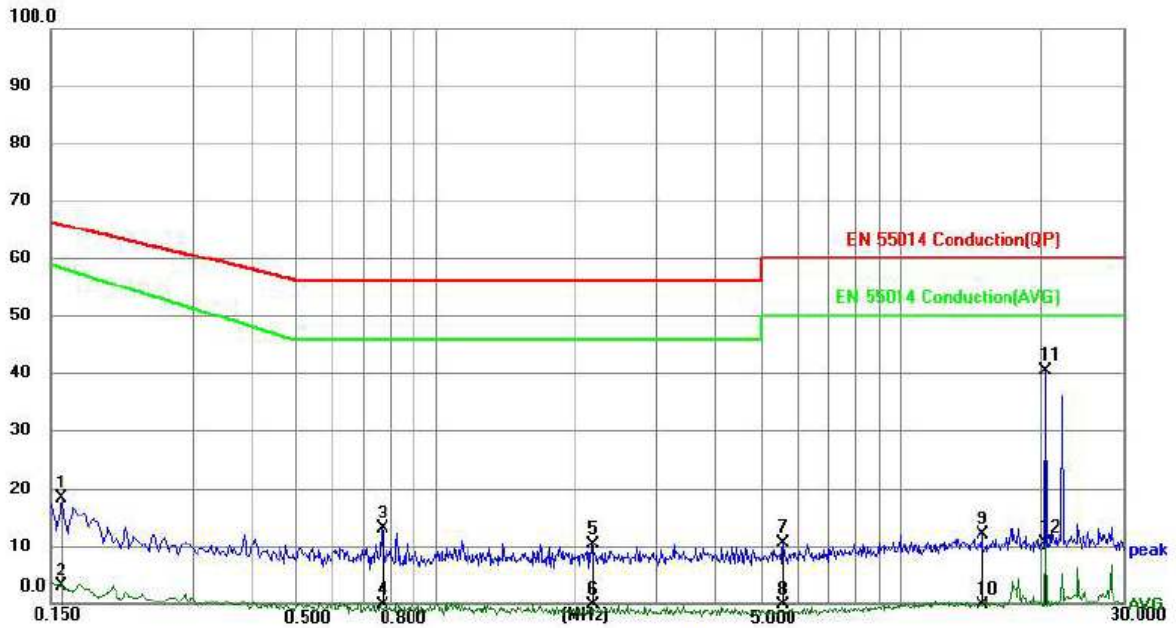
The frequency range from 9kHz to 30MHz is investigated.

Please refer to the following pages.



Site LAB Phase: **L1** Temperature: (C)
 Limit: EN 55014 Conduction(QP) Power: Humidity: %RH

No.	Mk.	Freq. MHz	Reading Level dB	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1545	10.00	9.52	19.52	65.75	46.23	peak	
2		0.1545	-6.25	9.52	3.27	58.68	55.41	AVG	
3		0.5235	3.49	9.56	13.05	56.00	42.95	peak	
4		0.5235	-10.13	9.56	-0.57	46.00	46.57	AVG	
5		1.4010	0.47	9.57	10.04	56.00	45.96	peak	
6		1.4010	-10.25	9.57	-0.68	46.00	46.68	AVG	
7	*	4.8615	42.28	9.59	51.87	56.00	4.13	peak	
8		4.8615	6.77	9.59	16.36	46.00	29.64	AVG	
9		10.9095	0.83	9.64	10.47	60.00	49.53	peak	
10		10.9095	-9.85	9.64	-0.21	50.00	50.21	AVG	
11		22.7670	2.16	9.77	11.93	60.00	48.07	peak	
12		22.7670	-9.61	9.77	0.16	50.00	49.84	AVG	



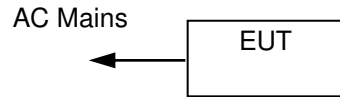
Site LAB
 Limit: EN 55014 Conduction(QP)
 Phase: **N**
 Power:
 Temperature: (C)
 Humidity: %RH

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz		dB	dBuV	dBuV	dB		
1		0.1590	8.83	9.51	18.34	65.52	47.18	peak	
2		0.1590	-6.45	9.51	3.06	58.37	55.31	AVG	
3		0.7665	3.62	9.56	13.18	56.00	42.82	peak	
4		0.7665	-10.61	9.56	-1.05	46.00	47.05	AVG	
5		2.1660	0.92	9.58	10.50	56.00	45.50	peak	
6		2.1660	-11.52	9.58	-1.94	46.00	47.94	AVG	
7		5.5815	0.84	9.68	10.52	60.00	49.48	peak	
8		5.5815	-11.19	9.68	-1.51	50.00	51.51	AVG	
9		14.9325	2.39	9.79	12.18	60.00	47.82	peak	
10		14.9325	-10.15	9.79	-0.36	50.00	50.36	AVG	
11	*	20.4720	30.64	9.84	40.48	60.00	19.52	peak	
12		20.4720	0.75	9.84	10.59	50.00	39.41	AVG	

5. RADIATED EMISSION MEASUREMENT

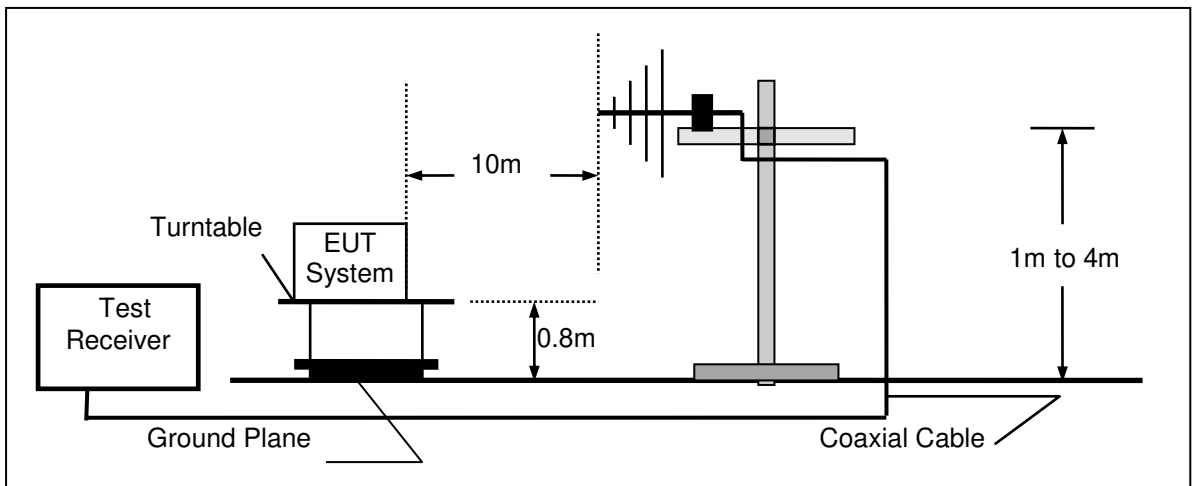
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of EUT System



(EUT: Surge Protection Device for Information Technology System)

5.1.2. Block diagram of test setup (In chamber)



(EUT: Surge Protection Device for Information Technology System)

5.2. Measuring Standard and Limits

5.2.1. Test Standard

EN 55014

5.2.2. Test Limits

All emanations from a device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	10	30
230 ~ 300	10	37

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

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5.3. Operating Condition of EUT

- 5.3.1. Setup the EUT as shown on Section 6.1.
- 5.3.2. Turn on the power of all equipments.
- 5.3.3. Let the EUT work in measuring mode (ON) and measure it.

5.4. Test Procedure

The EUT is placed on a turntable which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna that is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

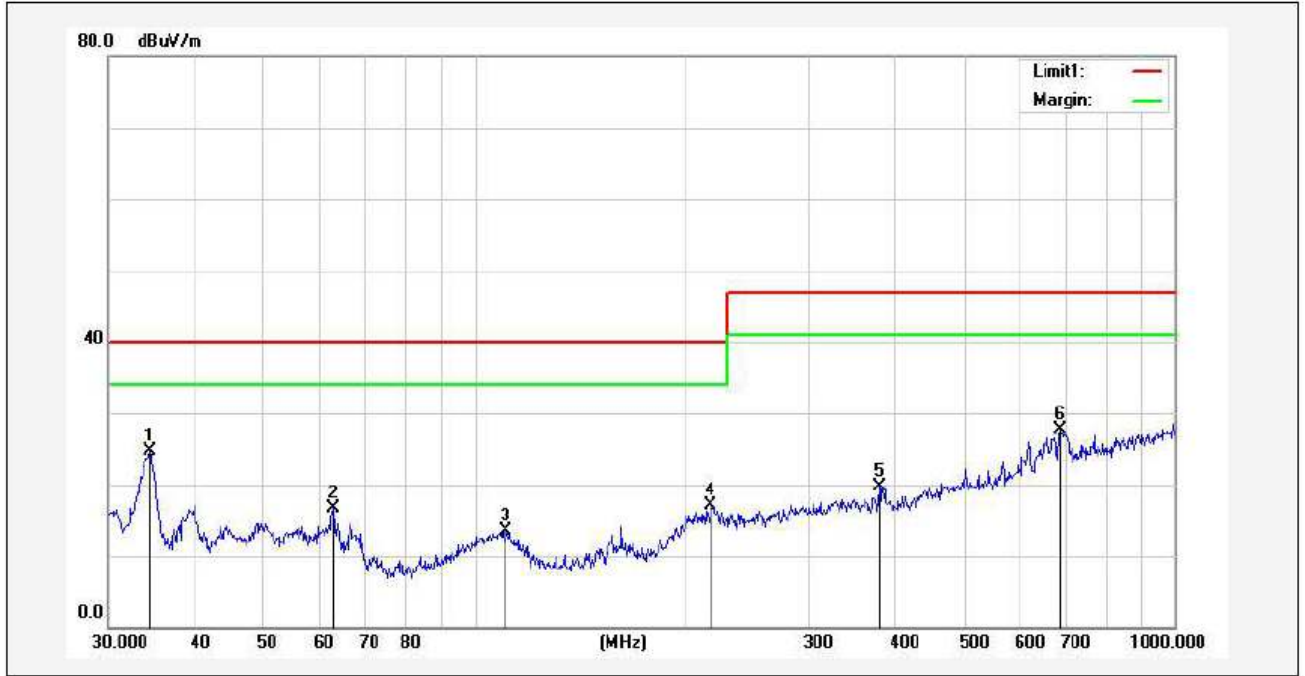
The bandwidth of the Receiver (ESU26) is set at 120kHz.
All the scanning curves are attached in the following pages.

5.5. Measuring Results

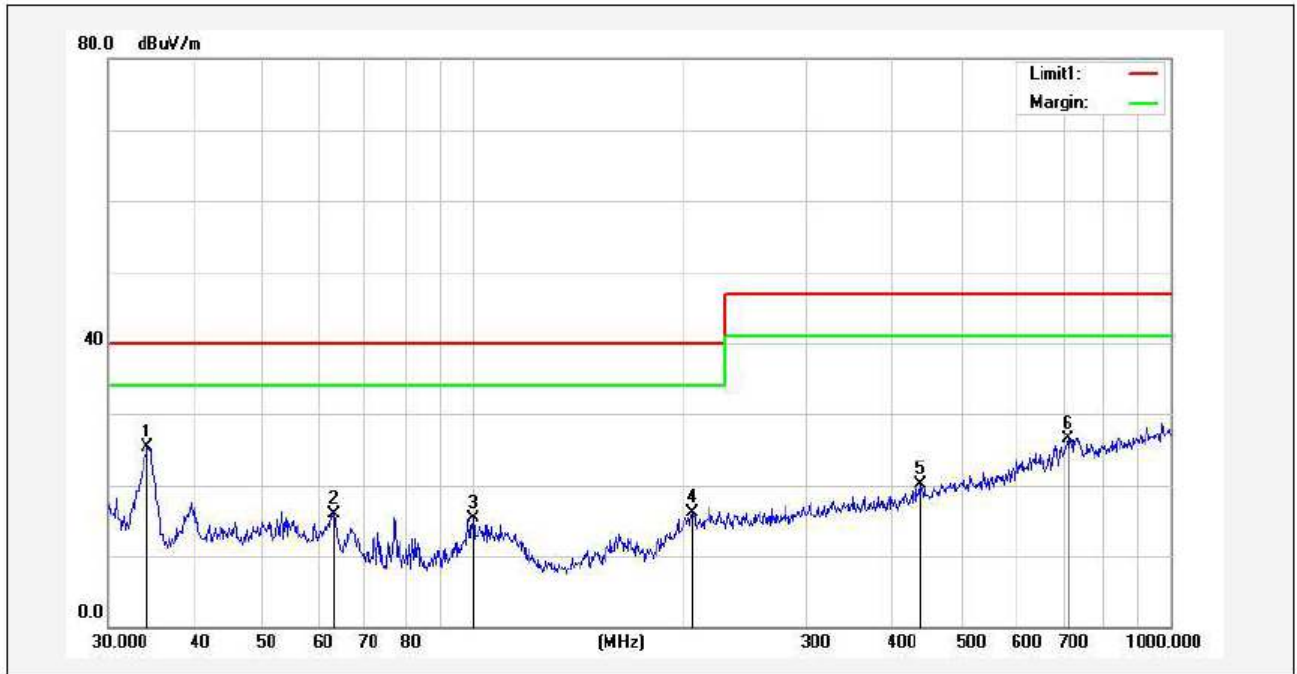
PASS.

The frequency range from 30MHz to 300MHz is investigated.

Please refer to the following pages.



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	34.3963	40.49	-15.86	24.63	40.00	-15.37			peak
2	62.8708	35.04	-18.33	16.71	40.00	-23.29			peak
3	110.9570	30.65	-17.18	13.47	40.00	-26.53			peak
4	217.5442	32.52	-15.41	17.11	40.00	-22.89			peak
5	378.5842	32.46	-12.76	19.70	47.00	-27.30			peak
6	684.7454	34.18	-6.57	27.61	47.00	-19.39			peak



No.	Frequency (MHz)	Reading (dBuV)	Correction (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	34.1561	41.06	-15.71	25.35	40.00	-14.65			peak
2	63.0915	34.30	-18.43	15.87	40.00	-24.13			peak
3	99.8777	33.14	-17.92	15.22	40.00	-24.78			peak
4	206.3976	31.63	-15.45	16.18	40.00	-23.82			peak
5	437.1198	31.58	-11.46	20.12	47.00	-26.88			peak
6	711.6734	32.55	-6.09	26.46	47.00	-20.54			peak



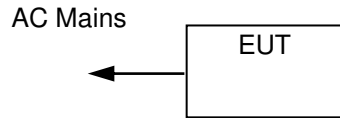
Electrical Fast Transient/Burst Test Results

Standard: <input checked="" type="checkbox"/> IEC 61000-4-4		Result: <input checked="" type="checkbox"/> PASS / <input type="checkbox"/> FAIL	
Applicant : Zhuhai Telehof Electrics Co.,Ltd			
EUT : Surge Protection Device for Information Technology System			
M/N : BS LC 24			
Input Voltage: <u>24VDC</u>			
Criterion : <u>B</u>			
Ambient Condition : <u>22 °C</u>		<u>50% RH</u>	
Operation Mode: ON			
Line : <input checked="" type="checkbox"/> AC Mains		Line : <input type="checkbox"/> DC Line <input type="checkbox"/> I/O Cable	
Coupling : <input checked="" type="checkbox"/> Direct		Coupling : <input type="checkbox"/> Capacitive	
Test Time : 120s			
Line	Test Voltage	Result(+)	Result(-)
L	1kV	PASS	PASS
N	1kV	PASS	PASS
PE			
L、N	1kV	PASS	PASS
L、PE			
N、PE			
L、N、PE			
Signal Line			
DC Line			
Note:			

6. SURGE IMMUNITY TEST

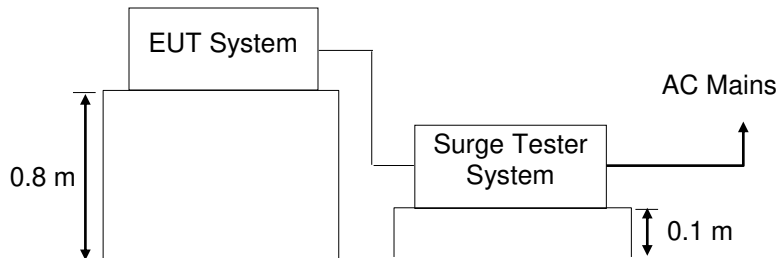
6.1. Block Diagram of Test Setup

6.1.1. Block Diagram of EUT System



(EUT: Surge Protection Device for Information Technology System)

6.1.2. Surge Test Setup



(EUT: Surge Protection Device for Information Technology System)

6.2. Test Standard

(EN 61000-4-5: Severity Level: Line to Line: 0.5kV)

6.3. Severity Levels and Performance Criterion

6.3.1. Severity level

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

6.3.2. Performance criterion: B



6.4. Operating Condition of EUT

- 6.4.1. Setup the EUT as shown on Section 12.1.
- 6.4.2. Turn on the power of all equipments.
- 6.4.3. Let the EUT work in test mode (ON) and test it.

6.5. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 12.1.2.
- 2) For line to line coupling mode, provide a 0.5kV 1.2/50us voltage surge (At open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

6.6. Test Results

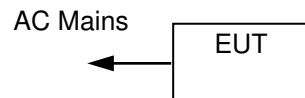
PASS.

Please refer to the following page.

7. VOLTAGE DIPS AND INTERRUPTIONS TEST

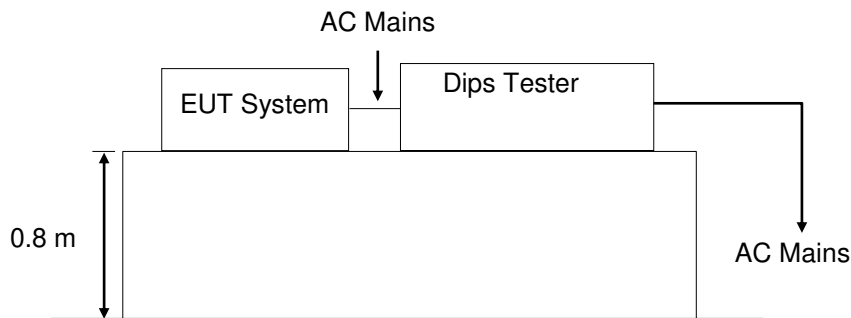
7.1. Block Diagram of Test Setup

7.1.1. Block Diagram of EUT System



(EUT: Surge Protection Device for Information Technology System)

7.1.2. Dips Test Setup



(EUT: Surge Protection Device for Information Technology System)

7.2. Test Standard

7.3. Severity Levels and Performance Criterion

7.3.1. Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5
70	30	10

7.3.2. Performance criterion: B&C



7.4. Operating Condition of EUT

- 7.4.1. Setup the EUT as shown on Section 15.1.
- 7.4.2. Turn on the power of all equipments.
- 7.4.3. Let the EUT work in test mode (ON) and test it.

7.5. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 15.1.2.
- 2) The interruption is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

7.6. Test Results

PASS.

Please refer to the following page.

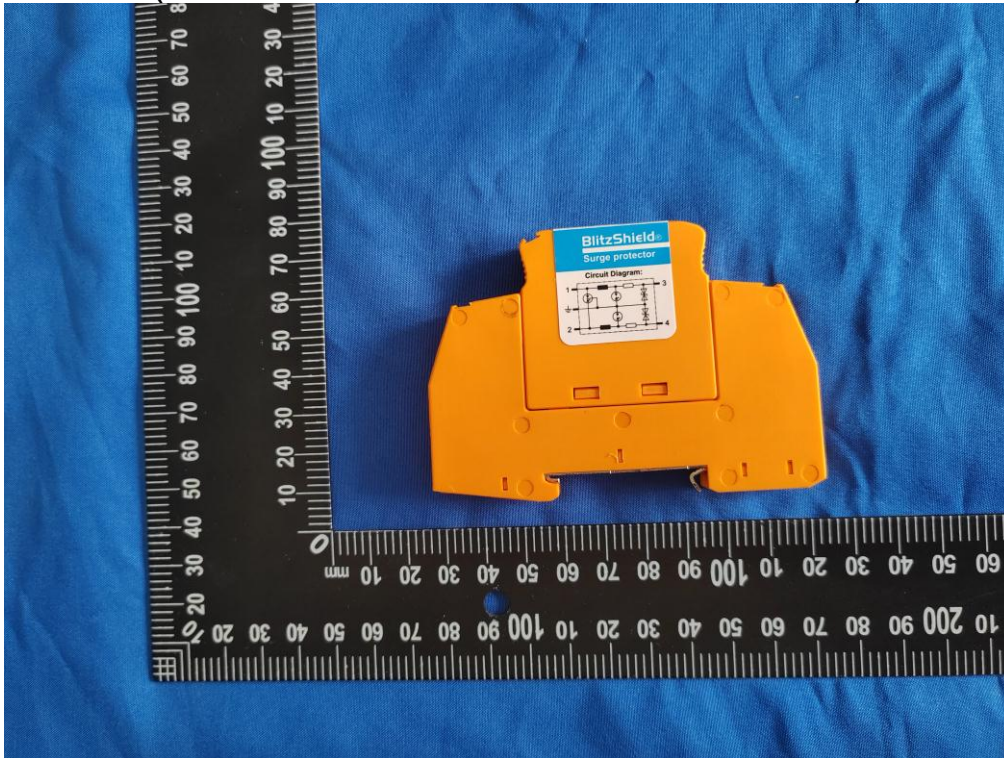


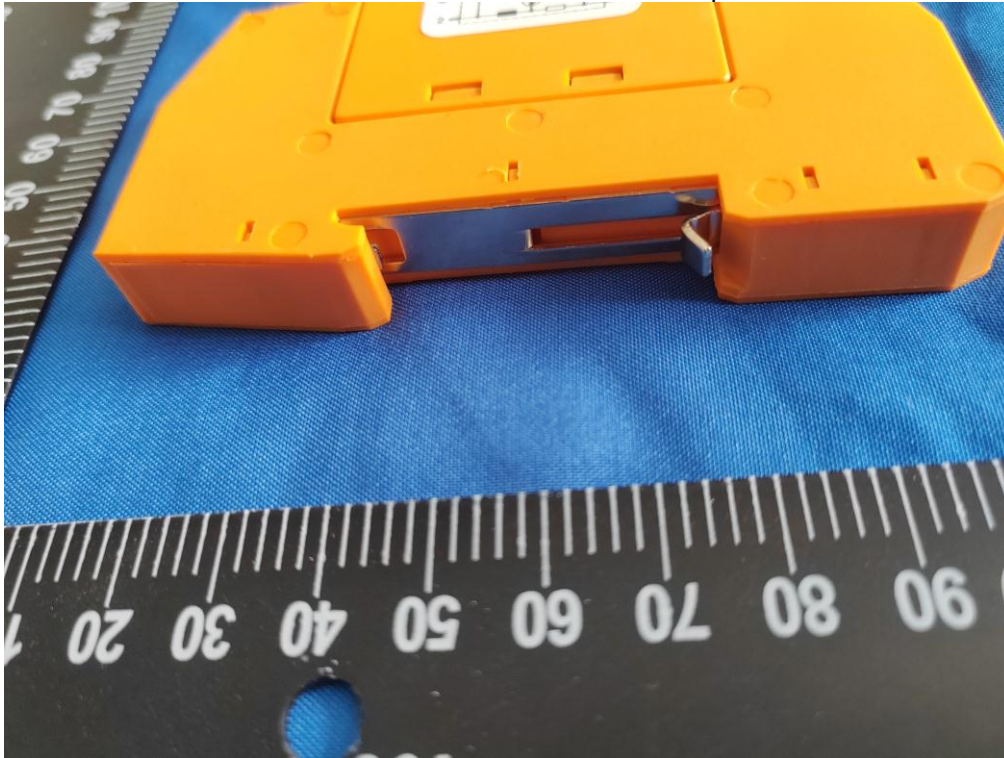
Voltage Dips and Interruptions Test Results

SHENZHEN EMTEK CO., LTD.

Applicant : Zhuhai Telehof Electrics Co.,Ltd EUT : Surge Protection Device for Information Technology Test Date : <u>2023-08-12</u> System M/N : BS LC 24 Temperature : <u>22°C</u> Power Supply : <u>24VDC</u> Humidity : <u>50%</u>				
Test Mode: <u>ON</u>				
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration 6 (in periods)	Criterion <input type="checkbox"/> A <input checked="" type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> D	Result P=PASS F=FAIL
0	100	0.5P	B	PASS
70	30	10P	C	PASS
Test Mode : <u>N/A</u>				
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D	Result P=PASS F=FAIL
Note:				

APPENDIX (Photos of EUT Model: BS LC 24)





-----End of report-----