


Technical Construction File

TCF No.: ZDE-22001007-8 / 07.October.2022

Certificat Holder	Zhejiang Dabo Electric Co., Ltd
Address	No. 79, Longhui Road, Houxi Village, Beibaixiang Town, Leqing City, Wenzhou City, Zhejiang Province
Manufacturer	Zhejiang Dabo Electric Co., Ltd
Address	No. 79, Longhui Road, Houxi Village, Beibaixiang Town, Leqing City, Wenzhou City, Zhejiang Province
Equipment Name	Surge protective device
Equipment All Model	SEE NEXT PAGE
Major Model	YTTS1-PV1/2、YTTS1-B+C/12.5、YTTS1-C40、YTTS1-PV、ESP-D40
According To	Electromagnetic Compatibility Directive (2014/30/EU)
Reviewed By	<i>Liqian wang</i>
Prepared By	Zhejiang Dabo Electric Co., Ltd
Controlled by	 <p>Beijing United-Standard, Product Testing & Technical Service Co.,Ltd No.2109,Building 401,WangJingYuan,Chaoyang District,Beijing City,China</p>

Equipment All Model:

YTTS1-PV1/2、YTTS1-B+C/12.5、YTTS1-C40、YTTS1-PV、ESP-D40

Catalog Of The TCF

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Part I: Description Of The Product

Equipment Name: Surge protective device

Equipment Major Model: YTTS1-PV1/2、YTTS1-B+C/12.5、YTTS1-C40、YTTS1-PV、ESP-D40

1.1 EUT Photographs



Part II:EMC Measurement & Test Report

EMC MEASUREMENT AND TEST REPORT

Test Report No.: ZDE-22001007-8 / T

Certificat Holder	Zhejiang Dabo Electric Co., Ltd
Address	No. 79, Longhui Road, Houxi Village, Beibaixiang Town, Leqing City, Wenzhou City, Zhejiang Province
Manufacturer	Zhejiang Dabo Electric Co., Ltd
Address	No. 79, Longhui Road, Houxi Village, Beibaixiang Town, Leqing City, Wenzhou City, Zhejiang Province
Equipment Name	Surge protective device
Major Model	YTTS1-PV1/2、YTTS1-B+C/12.5、YTTS1-C40、YTTS1-PV、ESP-D40
According To	Electromagnetic Compatibility Directive (2014/30/EU)
Test Standards	EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A2:2021
Test Engineer	<i>HABIM M?</i>
Verify Engineer	<i>MMXU</i>
Test Date	07.October.2022
Issuance Date	07.October.2022

Test item	
Description:	Surge protective device
Model and/or type reference:	YTTS1-PV1/2、YTTS1-B+C/12. 5、YTTS1-C40、YTTS1-PV、ESP-D40
Manufacturer :	Zhejiang Dabo Electric Co., Ltd

Emission Tests (EN IEC 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A2:2021)			
Test Standard	Test Items	Measured	Result
EN IEC 61000-3-2:2019+A1:2021, Class A	Harmonic Currents	Compliant	Pass
EN 61000-3-3:2013+A2:2021	Voltage Fluctuations and Flickers	Compliant	Pass
N/A means Not Applicable.			

Immunity Tests (EN 60974-10:2014)				
Test Standard	Description of Test	Pass Criterion	Result	
IEC 61000-4-2:2008	Electrostatic Discharge Contact discharge: ± 4 kV, Air discharge: ± 8 kV	B	Pass	
IEC 61000-4-3:2010	Radio Frequency Electromagnetic Field 3 V/m, 1 kHz, AM, 80%, 80 MHz-1000 MHz	A	Pass	
IEC 61000-4-4:2012	Fast Transients ± 0.5 kV, ± 1 kV, 5/50 Tr/Th ns, 5kHz	B	Pass	
IEC 61000-4-5:2014	Surges Line to line: ± 1 kV (peak)	B	Pass	
IEC 61000-4-6:2013	Radio-frequency continuous conducted 3 V (unmodulated, r.m.s), 0,15 MHz-80 MHz 80% AM (1kHz)	A	Pass	
IEC 61000-4-11:2004	Voltage Dips	>95% residual voltage, 0.5 period	B	Pass
		30% residual voltage, 25 periods	C	Pass
IEC 61000-4-11:2004	Voltage Interruptions	>95% residual voltage, 250 periods	C	Pass

Performance Criteria Description

Performance Criteria	
Performance criterion A	During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.
Performance criterion B	After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the EUT if used as intended.
Performance criterion C	During and after testing, a temporary loss of function is allowed, provided the function is selfrecoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.

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1. General Description

1.1 Information

1.1.1 Description of Equipment under Test (EUT)

Description	Surge protective device
Model and/or type reference	YTTS1-PV1/2、YTTS1-B+C/12. 5、YTTS1-C40、YTTS1-PV、ESP-D40

1.1.2 Test Mode

The equipment was tested under normal operating according to the manufacturer's instruction

1.1.3 Accessories used during testing

AC/DC power transformer used. (I/P: 230Va.c./50Hz, O/P: 24Va.c.)

1.2 Test Equipment List

Test Item	Disturbance Voltage				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
EMI Test Receiver	R&S	EPSI	101611	2016-01-10	1 year
L.I.S.N.	Schwarz beck	NSLK8126	8126-224	2016-01-10	1 year
Pulse Limiter	R&S	ESH3-Z2	100911	2016-01-10	1 year
Current Probe	FCC	F-33-4	091684	2016-01-10	1 year

Test Item	Radiated Electromagnetic Disturbance				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
Spectrum Analyzer	R&S	FSP	836079/035	2016-01-10	1 year
EMI Test Receiver	R&S	ESVB	825471/005	2016-01-10	1 year
Pre-amplifier	Agilent	8447F	3113A06717	2016-01-10	1 year
Pre-amplifier	Compliance Direction	PAP-0118	24002	2016-01-10	1 year
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2016-01-10	1 year
Horn Antenna	ETS	3117	00086197	2016-01-10	1 year

Test Item	Harmonic Currents & Flickers				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
Digital Power Analyzer	California Instrument	CTS	72831	2016-01-10	1 year
Power Source	California Instrument	5001IX-CTS-400	60077	2016-01-10	1 year

Test Item	ESD				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
ESD Generator	TESQ AG	NSG 437	161	2016-01-10	1 year

Test Item	Radio Frequency Electromagnetic Field				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
Signal Generator	R&S	SMT03	100059	2016-01-10	1 year
Voltage Probe	R&S	URV5-Z2	100013	2016-01-10	1 year
Power Amplifier	AR	150W1000	300999	2016-01-10	1 year
Power Amplifier	AR	25S1G4AM1	305993	2016-01-10	1 year
Trilog Antenna	SCHWARZBECK	VULB9163	9163-333	2016-01-10	1 year
Anechoic chamber	Albatross Projects	MCDC	---	2016-01-10	1 year

Test Item	Fast Transients				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
Transient 2000	EMC PARTNER	TRA2000	863	2016-01-10	1 year
Coupling Clamp	EMC PARTNER	CN-EFT1000	513	2016-01-10	1 year

Test Item	Surges				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
Transient 2000	EMC PARTNER	TRA2000	863	2016-01-10	1 year

Test Item	Injected Currents				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
CS Immunity Tester	EMTEST	CWS500	0900-03	2016-01-10	1 year
Attenuator	EMTEST	MA-500	1009	2016-01-10	1 year
CDN	Luthi	L-801M2/M3	2665	2016-01-10	1 year

Test Item	Voltage Dips & Short Interruptions				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Interval
Transient 2000	EMC PARTNER	TRA2000	863	2016-01-10	1 year

1.3 Description of Test Facility

All measurement facilities used to collect the measurement data are located at Beijing TIRT Technology Co., Ltd.

2. Emission Tests

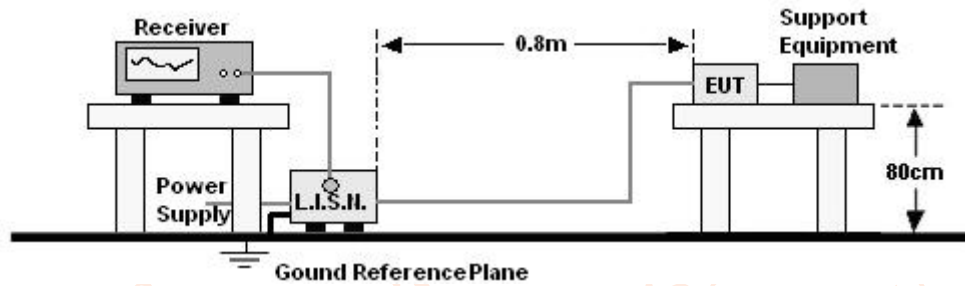
2.1 Conducted Emission

Result: Pass

Test standard : EN 55022:2010/AC:2011

Frequency range : 0.15-30MHz

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 4Vd.c.)

Operation Mode : Running

Earthing : Not pplied

Temperature : 26°C

Humidity : 60%

Test Limit

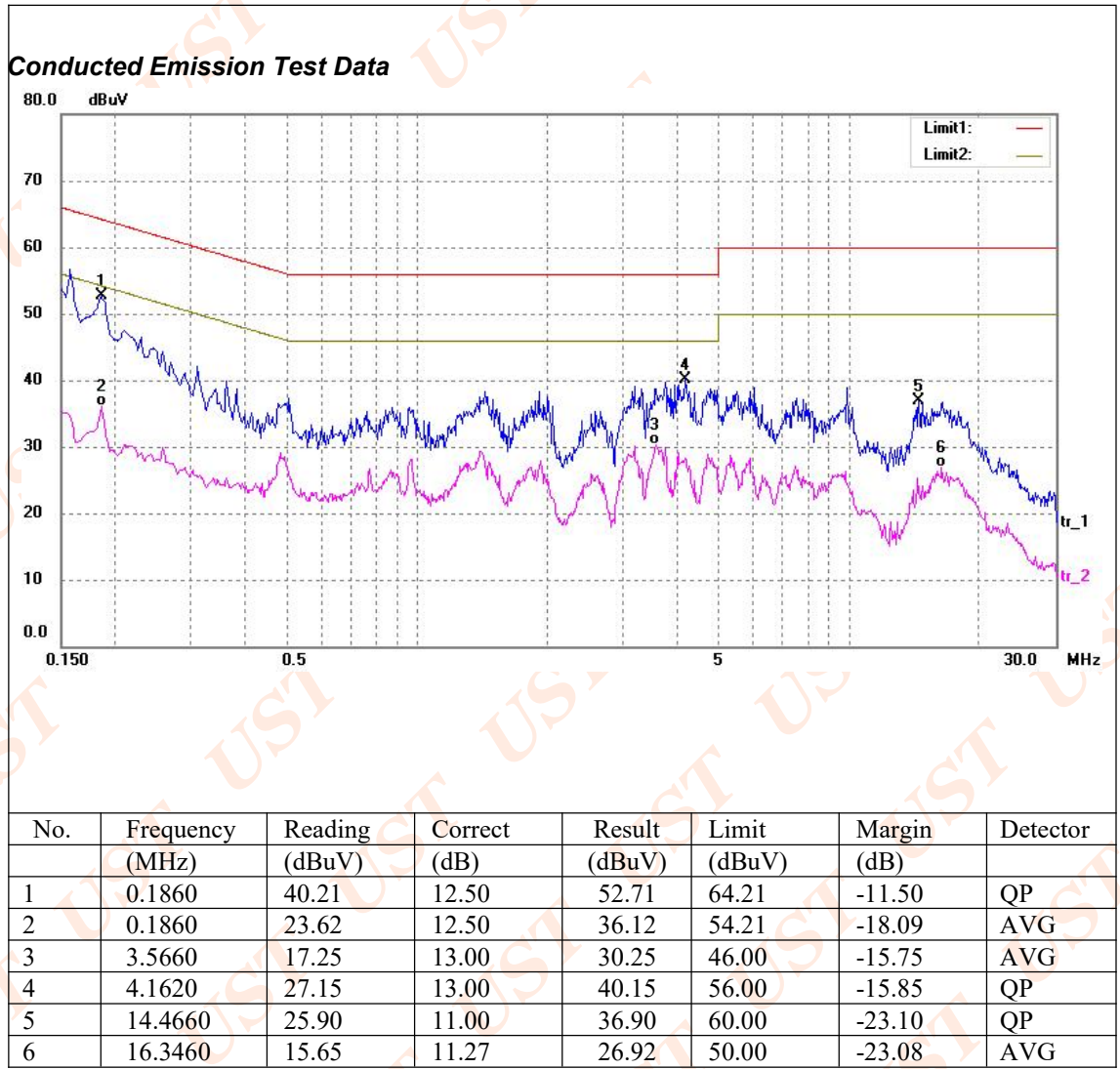
Frequency MHz	Class B Limits (dB μ V/m)	
	Quasi-peak Level	Average Level
0.15 to 0.50	66-56*	56-46*
0.50 to 5.00	56	46
0.50 to 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.

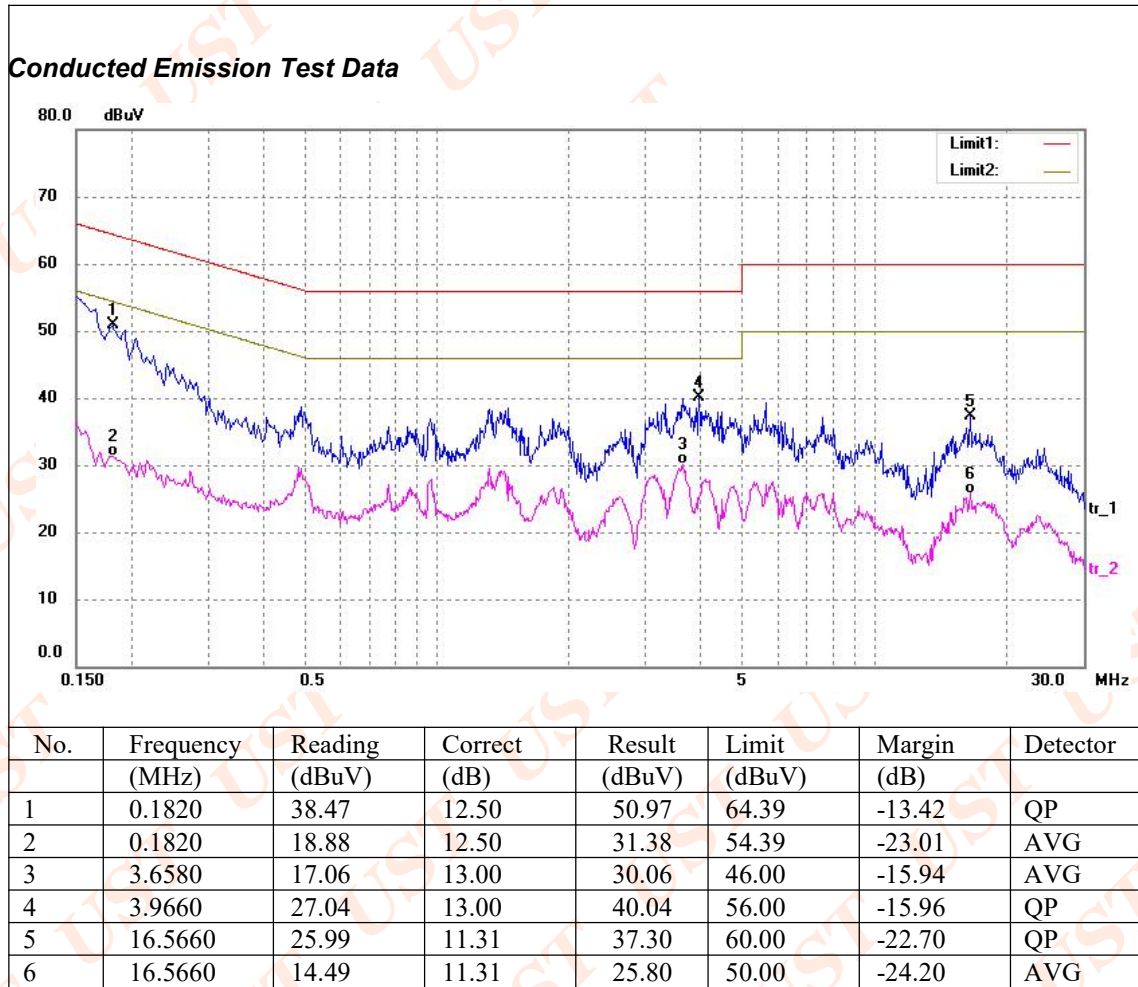
2. The lower limit shall apply at the transition frequencies.

Table: Test Data refer to next pages.

Test Specification: Line



Test Specification: Neutral



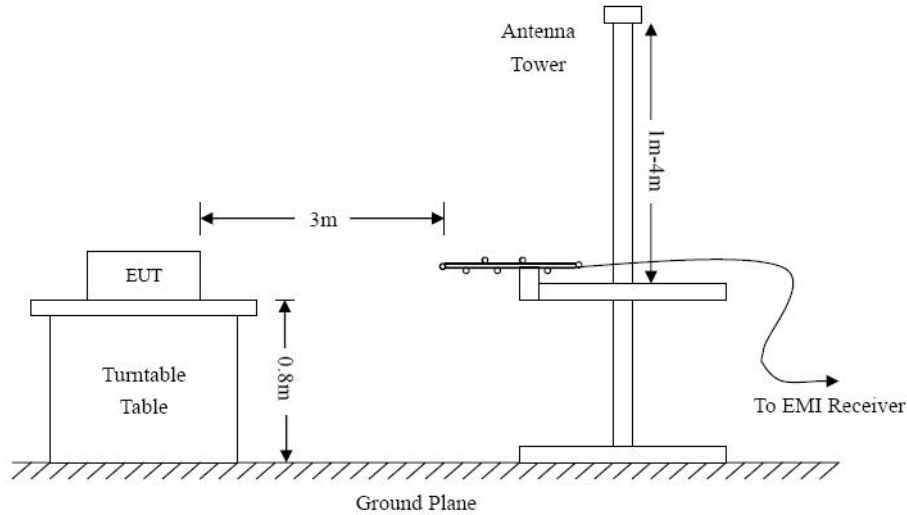
2.2 Radiated Emission

Result: Pass

Test standard : EN 55022:2010/AC:2011

Frequency range : 30-1000MHz

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 24°C

Humidity : 60%

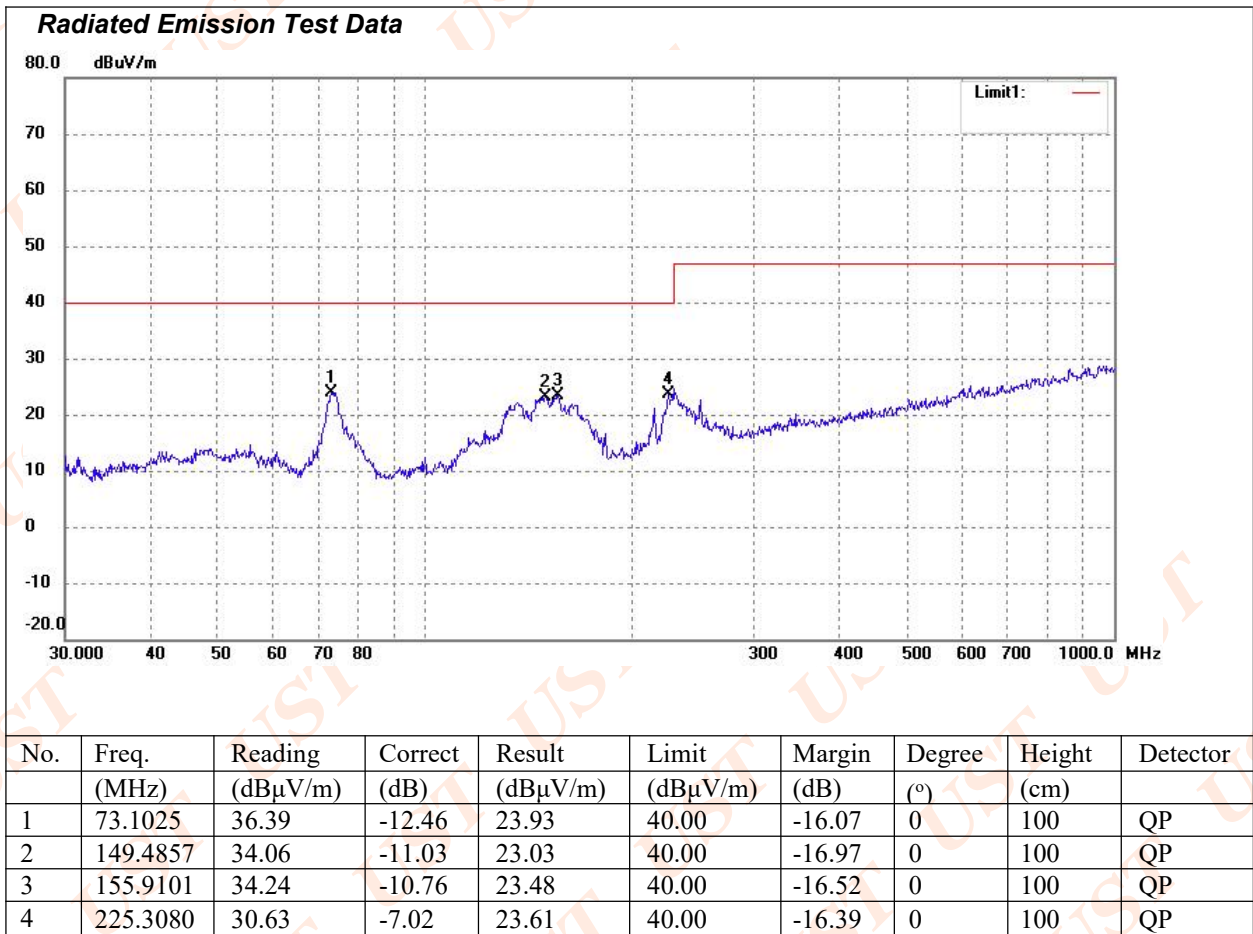
Test Limit

Frequency (MHz)	Distance (Meters) (In SAC*)	Limits (dB μ V/m)
30 - 230	3	40
230 - 1000	3	47

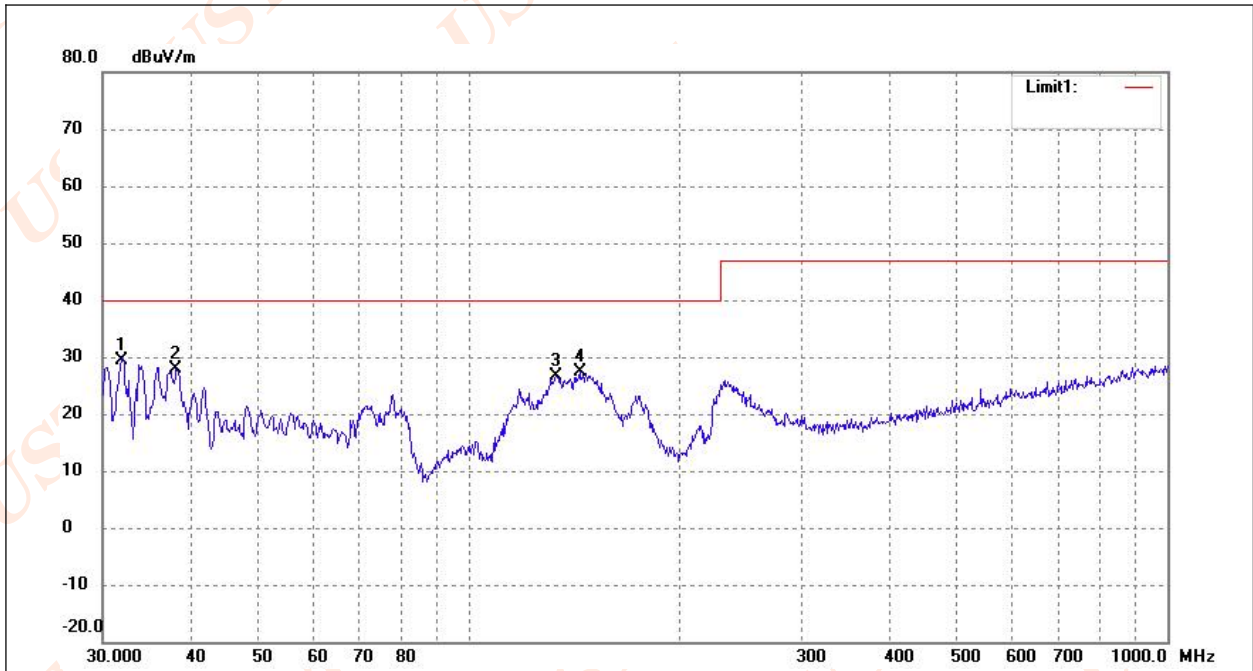
*SAC=Semi-Anechoic Chamber

Table: Test Data refer to next pages.

Test Specification: Horizontal



Test Specification: Vertical



No.	Freq. (MHz)	Reading (dBμV/m)	Correct (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	31.9546	40.53	-11.03	29.50	40.00	-10.50	0	100	QP
2	38.2120	38.01	-10.11	27.90	40.00	-12.10	0	100	QP
3	133.6188	37.43	-10.79	26.64	40.00	-13.36	0	100	QP
4	144.3348	38.31	-10.95	27.36	40.00	-12.64	0	100	QP

2.3 Harmonic Current Emission

Result: n.a.

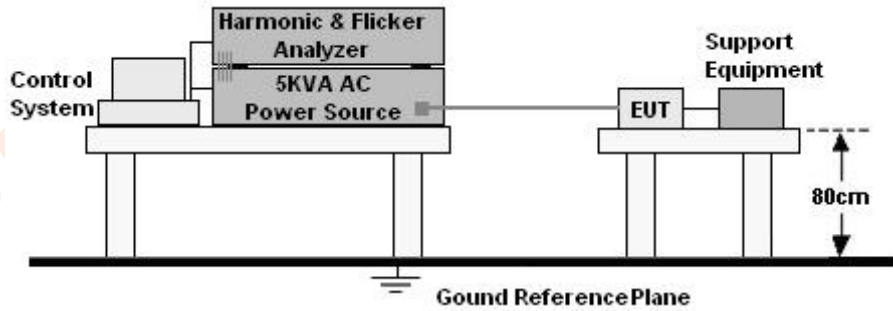
Test standard : EN IEC 61000-3-

2:2019+A1:2021 Measured

harmonics : 2-40

Class : A

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 25°C

Humidity : 60%

Table: Test Data refer to next pages.

Type of Test: Harmonics Test – Worst Case Table

Power Analyzer: Digital Power Analyzer

AC Source: Mains / Manual Source

Limit: Class A

Harmonic Results
Against Chosen Limits

PASS

Notes:

Voltage Crest Factor outside permitted limits

Test Parameter Details

EUT Operating Mode: Running

Measured Power: 94.3W

Test Voltage: I/P 230Va.c. 50Hz O/P 24Vd.c.

Fundamental Current: 0.46A

Test Observation Period: 2.5 mins

Power Factor: 0.863

Hn#	Limit	Reading	Result	Hn#	Limit	Reading	Result
2	1.08A	23.127mA	PASS	3	2.300A	37.658mA	PASS
4	430.0mA	21.103mA	PASS	5	1.140A	33.164mA	PASS
6	300.0mA	19.086mA	PASS	7	770.0mA	31.529mA	PASS
8	230.0mA	18.132mA	PASS	9	400.0mA	23.824mA	PASS
10	184.0mA	16.306mA	PASS	11	330.0mA	21.217mA	PASS
12	153.3mA	15.158mA	PASS	13	210.0mA	17.338mA	PASS
14	131.4mA	11.302mA	PASS	15	150.0mA	15.908mA	PASS
16	115.0mA	9.831mA	PASS	17	132.3mA	11.347mA	PASS
18	102.2mA	6.147mA	PASS	19	118.4mA	9.458mA	PASS
20	92.0mA	6.045mA	PASS	21	107.1mA	8.369mA	PASS
22	83.63mA	4.362mA	PASS	23	97.82mA	6.527mA	PASS
24	76.66mA	3.724mA	PASS	25	90.00mA	5.048mA	PASS
26	70.76mA	1.905mA	PASS	27	83.33mA	3.621mA	PASS
28	65.71mA	1.377mA	PASS	29	77.58mA	3.425mA	PASS
30	61.33mA	1.208mA	PASS	31	72.58mA	2.639mA	PASS
32	57.5mA	1.114mA	PASS	33	68.18mA	2.367mA	PASS
34	54.11mA	1.025mA	PASS	35	64.28mA	2.042mA	PASS
36	51.11mA	1.011mA	PASS	37	60.81mA	1.967mA	PASS
38	48.42mA	0.934mA	PASS	39	57.69mA	1.381mA	PASS
40	46.0mA	0.837mA	PASS	---	---	---	---

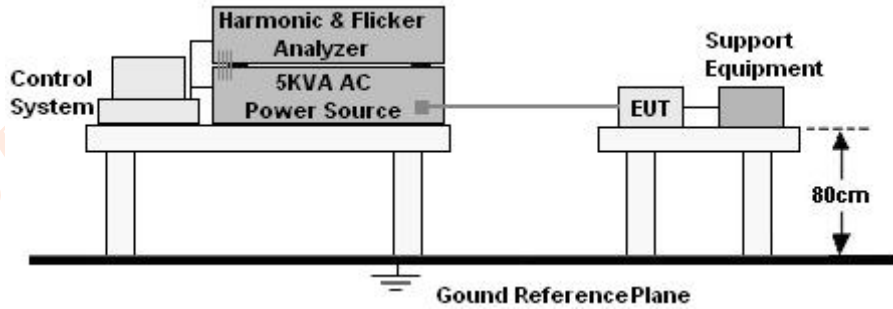
2.4 Voltage Fluctuations and Flickers

Result: Pass

Test Standard : EN 61000-3-3:2013+A2:2021

Limits: EN 61000-3-3:2013+A2:2021 clause 5

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 25°C

Humidity : 60%

Table: Test Data

Test Items	Measured values	Limits	Results
Pst	0.061	1.00	PASS
Plt	0.036	0.65	PASS
dc[%]	0.028	3.30	PASS
dmax[%]	0.135	4.00	PASS
dt[s]	0.000	0.50	PASS

3 Immunity Tests

3.1 Electrostatic Discharges

Result: Pass

Test standard : IEC 61000-4-2:2008, EN 55024:2010

Charge voltage : $\pm 2.0\text{kV}$, $\pm 4.0\text{kV}$ (contact discharge); $\pm 2.0\text{kV}$, $\pm 4.0\text{kV}$, $\pm 6.0\text{kV}$, $\pm 8.0\text{kV}$ (air discharge)

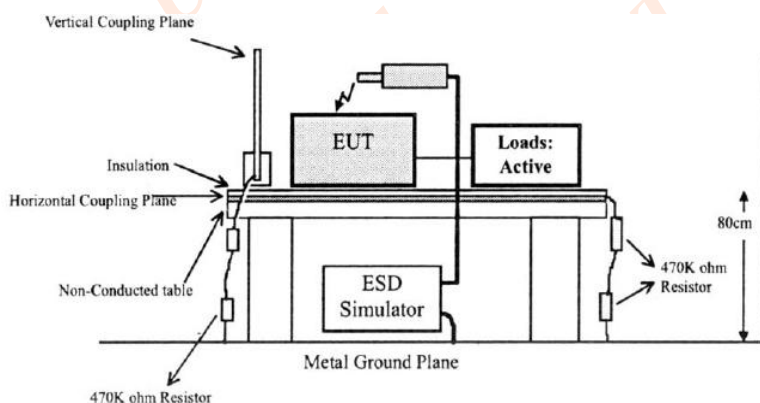
Number of discharge : ≥ 10

Polarity : Positive /

Negative Performance

criterion: B

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied Temperature : 25°C

Humidity : 60%

Table: Electrostatic Discharge, both Polarities

Discharge points	Type of discharge	Criterion	Result	Remarks
All exposed non-metallic enclosure/part	Air	B	Pass	During the test, degradation of performance is allowed. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function.
All exposed metallic enclosure/part	Contact	B	Pass	
HCP	Indirect Contact	B	Pass	
HCP	Indirect Contact	B	Pass	

3.2 Radio Frequency Electromagnetic Field

Result: Pass

Test standard : IEC 61000-4-3:2010, EN 55024:2010

Criterion : A

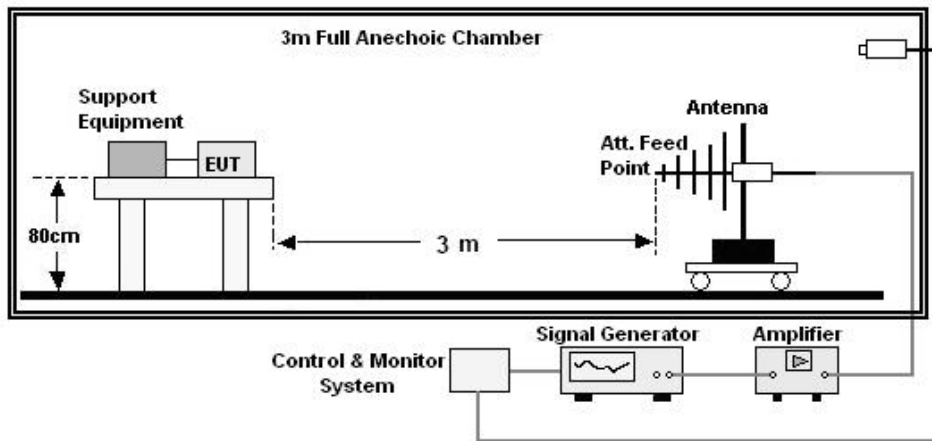
Test level : 3V/m (unmodulated, rms.)

Frequency range : 80-1000MHz

Modulation : 1kHz sine-wave, 80% AM

Sweep step : 1%

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 26°C

Humidity : 60%

Table: Radio Frequency Electromagnetic Field

Coupling port	Coupling method	Strength	Criterion	Result	Remarks
Horizontal Vertical	Left, Right Front, Rear	3V/m (r.m.s)	A	Pass	During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss.

3.3 Fast Transients

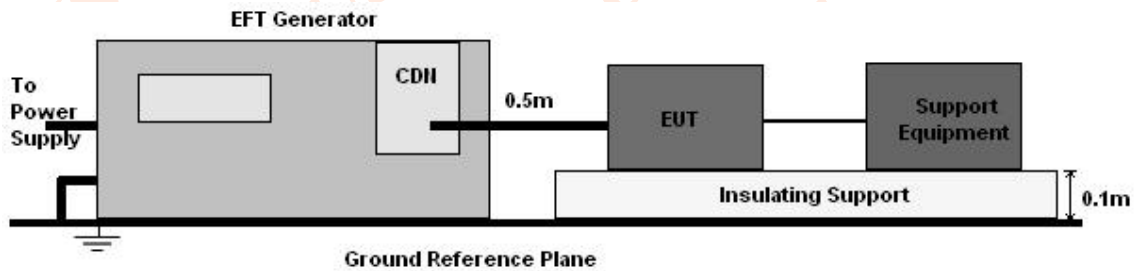
Result: Pass

Test standard : IEC 61000-4-4:2012, EN 55024:2010

Criterion : B

Test level : 0.5 kV(peak), 1 kV(peak), 5/50 Tr/Th ns, 5kHz repetition frequency

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 25°C

Humidity : 60%

Table: Fast Transients

Coupling port	Test Level	Criterion	Result	Remarks
AC mains power port	1 kV(peak)	B	Pass	During the test, degradation of performance is allowed. After the test, the EUT shall continue to operate as
Signal port	0.5 kV(peak)	B	Pass	intended without operator intervention. No degradation of performance or loss of function.

3.4 Surges

Result: Pass

Test standard : IEC 61000-4-5:2014, EN 55024:2010

Pulsform : 1.2/50 μ s

Test voltage : ± 1 kV line to line

Coupling : Coupling Network for AC Mains

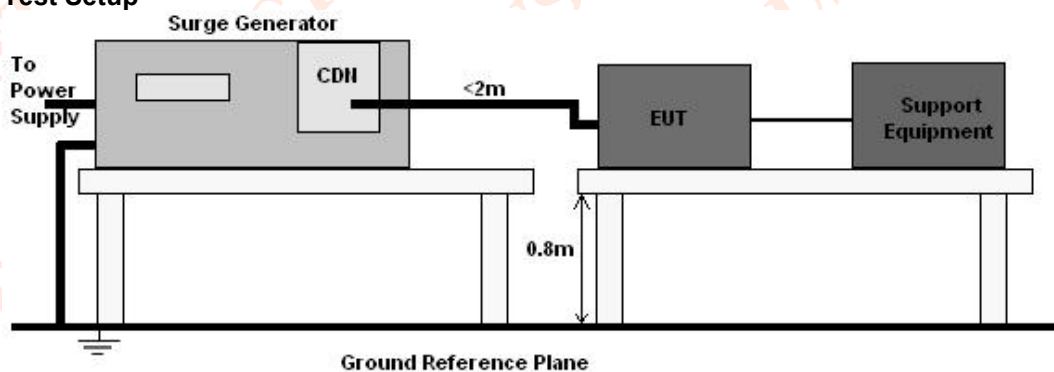
Coupling phase : 0, $\pi/2$, π , $3\pi/2$

Number of surges : 5 (for each combination of parameters)

Repetition rate : max. 1/min

Performance Criterion : B

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 26°C

Humidity : 60%

Table: Surges

Test port	Test voltage	Criterion	Result	Remarks
AC mains power port	± 1 kV	B	Pass	During the test, degradation of performance is allowed. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function.

3.5 Radio-frequency continuous conducted

Result: Pass

Test standard: IEC 61000-4-5:2014, EN 55024:2010

Performance Criterion : A

Test level : 3 V r.m.s

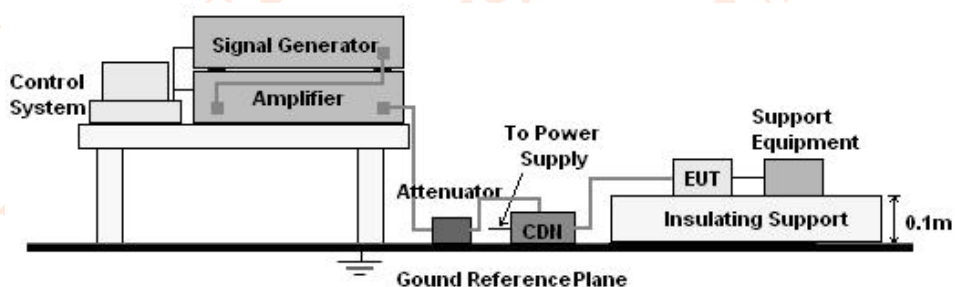
Source Standard : 150Ω

Frequency range : 150kHz-80MHz

Modulation : 1kHz sine-wave, 80% AM

Sweep step : 1%

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 26°C

Humidity : 60%

Table: Radio-frequency continuous conducted

Test port	Test level	Criterion	Result	Remarks
AC mains power port	3 V r.m.s	A	Pass	During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss.
Signal port	3 V r.m.s	A	Pass	

3.6 Voltage Dips & Interruptions

Result: Pass

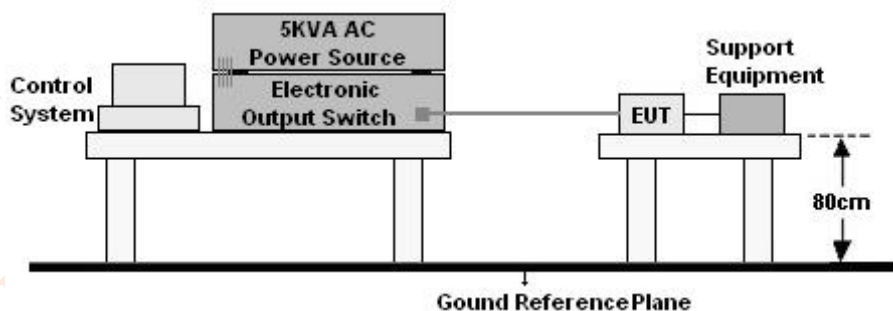
Test standard: IEC 61000-4-11:2004, EN 55024:2010

Voltage Dips: >95% residual voltage, 0.5 period, Performance Criteria: B

30% residual voltage, 25 periods, Performance Criteria: C

Voltage Interruption: >95% residual voltage, 250 periods, Performance Criteria: C

Test Setup



Input Voltage : 230Va.c./50Hz (Output: 24Vd.c.)

Operation Mode : Running

Earthing : Not Applied

Temperature : 26°C

Humidity : 60%

Table: Voltage Dips

Test port	Test level	Criterion	Result	Remarks
AC mains power port	>95% residual voltage, 0.5 period	B	Pass	During the test, degradation of performance is allowed. After the test, the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function.
	30% residual voltage, 25 periods	C	Pass	During and after testing, a temporary loss of function is allowed, provided the function is selfrecoverable.

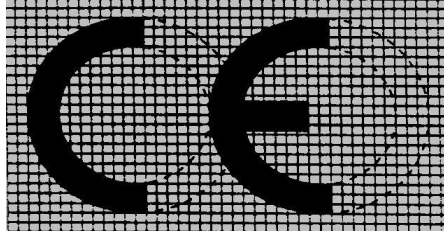
Table: Voltage Interruptions

Test port	Test level	Criterion	Result	Remarks
AC mains power port	>95% residual voltage, 250 periods	C	Pass	During and after testing, a temporary loss of function is allowed, provided the function is selfrecoverable.

4 PRODUCT LABELING

4.1 CE Mark Label Specification

Text is Black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT



4.2 Proposed Label Location on EUT

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

EC DECLARATION OF CONFORMITY

COUNCIL DIRECTIVE 2014/30/EU ON Electromagnetic Compatibility Directive WE,

Zhejiang Dabo Electric Co., Ltd
No. 79, Longhui Road, Houxi Village, Beibaixiang Town, Leqing City,
Wenzhou City, Zhejiang Province

THE PRODUCT DESCRIBED IS IN CONFORMITY WITH THE DIRECTIVE

2014/30/EU

PRODUCT TYPE: Surge protective device

PRODUCT MODEL: YTTS1-PV1/2、YTTS1-B+C/12. 5、YTTS1-C40、
YTTS1-PV、ESP-D40

THE PRODUCT HAS BEEN ASSESSED BY THE APPLICATION OF THE
FOLLOWING STANDARDS:

EN IEC 61000-3-2:2019+A1:2021

EN 61000-3-3:2013+A2:2021

wenzhou 11.11.2022

ISSUE PLACE AND DATE

Honghong Wang

COMPANY STAMP AND SIGNATURE
OF AUTHORIZED PERSONNEL

