

Test Report



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Applicant:

Suzhou Gongyuan Automation Technology Co.,Ltd.

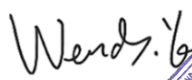
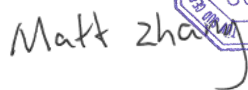
Address: 118 Fuchunjiang Dong Lu, 215506 Changshu City,
Jiangsu Province, People's Republic of China

Product: Insulation monitoring devices for IT systems

Model: GYIM-DAR

COMMERCIAL-IN-CONFIDENCE

Report Number: 64.713.23.31871.01

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Prepared by	Wendy Ye	 	2024-04-22
Approved by	Matt Zhang	 	2024-04-22

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service control rules.

EXECUTIVE SUMMARY This product was tested and found to be in compliance with	EN IEC 61326-1:2021 EN IEC 61326-2-4:2021
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TUV[®]

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2024-04-22

1.2 Introduction

Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details please see testing and certification regulation, chapter A-3.4.

The information contained in this report is intended to show verification of the EMC Qualification Approval Testing of the requirements of the standards for the tests listed in Section 1.3.

Applicant : Suzhou Gongyuan Automation Technology Co.,Ltd.
Address : 118 Fuchunjiang Dong Lu, 215506 Changshu City, Jiangsu Province, People's Republic of China
Manufacturer : Same as the applicant
Address : Same as the applicant
Model Number(s) : GYIM-DAR
Product Type : Insulation monitoring devices for IT systems
Trademark : Gongyuan
Date of Receipt of EUT : 2024-01-15
Start of Test : 2024-01-17
Finish of Test : 2024-04-09
Name of Engineer(s) : Wendy Ye

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with EN IEC 61326-1 and EN IEC 61326-2-4 is shown below.

Specification	Clause	Test Description	Result	Remark
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	7	Conducted disturbance at mains terminals	N/A	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	7	Radiated disturbance	Pass	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	7	Harmonic current emission	N/A	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	7	Flicker	N/A	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Electrostatic discharge immunity test	Pass	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Electrical fast transient /burst immunity test	N/A	Note 1
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Immunity to conducted disturbances, induced by radio-frequency fields	N/A	Note 1
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Radiated, radio-frequency, electromagnetic field immunity test	Pass	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Surge immunity test	N/A	Note 1
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Voltage dips, short interruptions and voltage variations immunity tests	N/A	/
EN IEC 61326-1:2021 EN IEC 61326-2-4:2021	6	Power-frequency magnetic field immunity test	Pass	Note 2

Remark:

Note 1: Not applicable to ports interfacing with cables whose total length less than 3m according to the manufacturer's function specification.

Note 2: Equipment containing no Hall elements or magnetic field sensors is not susceptible to magnetic field. Hence, this equipment is deemed to fulfil the magnetic field test.

1.4 Test Conditions

1.4.1 Environmental Conditions

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

The climatic conditions during the tests were within the following limits:

Temperature	Humidity	Atmospheric pressure
15 °C – 35 °C	30 % - 60 %	860 hPa – 1060 hPa

If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.

1.4.2 Performance Criteria

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. 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. 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 from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. 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. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after 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 from what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

1.5 Product Information and general remarks

1.5.1 Technical Description

Ratings : Us: 10-30VDC, rated power: 1.5W,
Un: 1000VDC, Ran: 1-1000kΩ, DC IMD
Protection class : Class III

1.5.2 Test Configuration

Configuration	Description
DC Powered	DC 12V and DC 24V (supplied by test board of applicant)
DC Powered	DC 100V (supplied by DC source of lab) as detection sample.
AC Powered	230V/50Hz (supplied by lab AC source) for test board

1.5.3 Modes of Operation

Mode	Description
TM1	Continuous operating, measuring mode
Remark: 1) The length of DC input line and all signal & control lines are < 3m. 2) EUT was tested with relevant accessories supplied by manufacturer. 3) This product is for industrial use.	

1.5.4 General remark

Full tests were applied.

1.6 Test Location

Test Site:
TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch

Address:
D1 building, No.63 Chuangqi Road, Shilou Town,
Panyu District, Guangzhou 511447, People's Republic of China

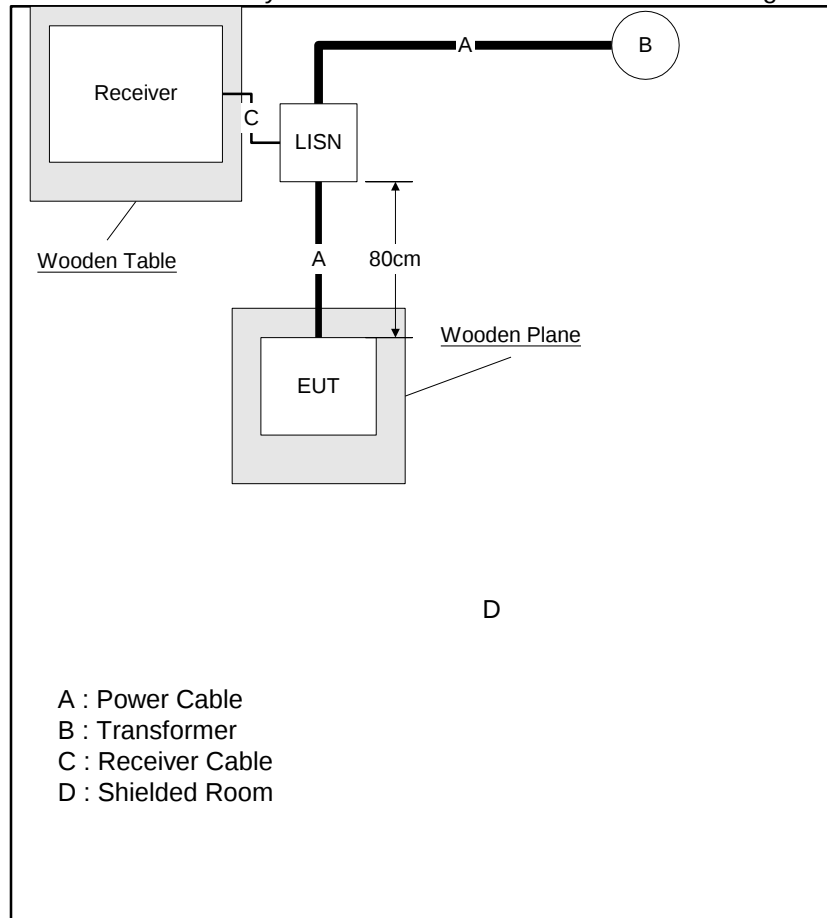
2 Test Details

2.1 Conducted Disturbance

2.1.1 Test Method

The EUT was placed on a 0.8 m non-conductive table for table-top equipment and on a 0.12 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.



2.1.2 Specification Limits

Required Specification Limits (Class A)			
Line Under Test	Frequency Range (MHz)	Quasi-peak (dBμV)	Average (dBμV)
DC Power Port	0.15 to 0.5	97-89	84-76
	0.5 to 30	89	76
Supplementary information: Note 1. EUT powered at one of the Nominal input voltages and frequencies			

Required Specification Limits (Class B)			
Line Under Test	Frequency Range (MHz)	Quasi-peak (dBμV)	Average (dBμV)
DC Power Port	0.15 to 0.5	84-74	74-64
	0.5 to 30	74	64
Supplementary information: Note 1. EUT powered at one of the Nominal input voltages and frequencies			

2.1.3 Test Setup

N/A

2.1.4 Test Location

This test was carried out in shielded room.

2.1.5 Test Results

N/A. length of DC line and signal line <3m.

2.2 Radiated Disturbance (30MHz to 1000MHz)

2.2.1 Test Method

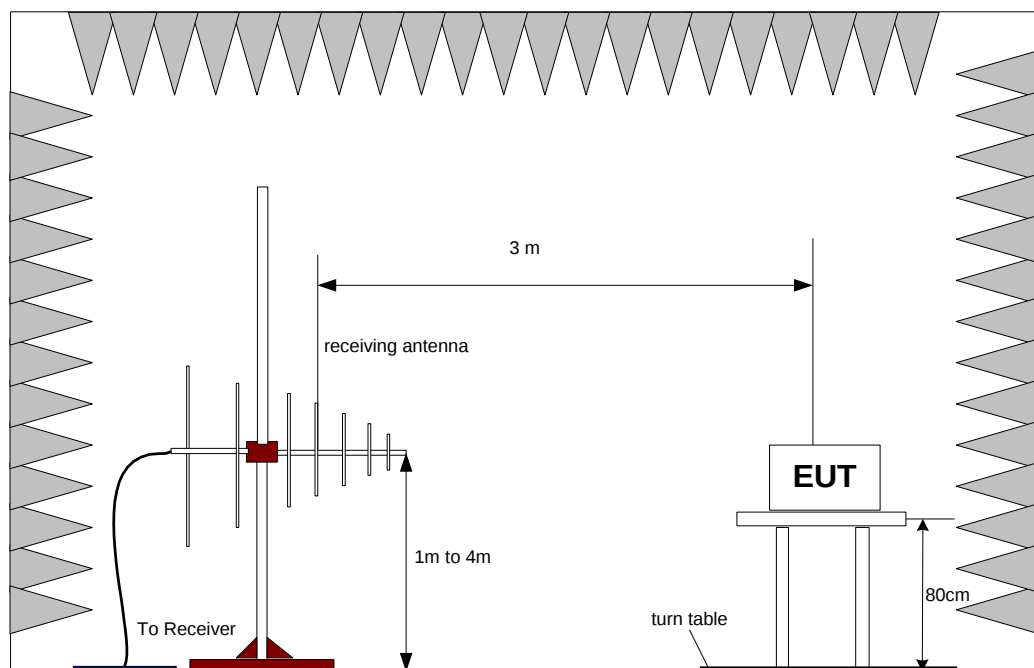
The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive. Guidance on how to arrange the EUT during the measurements can be found in 5.3.4.3.

Table-top EUT shall be placed at $(0,8 \pm 0,05)$ m above the reference plane of the test site selected for measurement.

Floor standing EUT shall be placed at $(0,12 \pm 0,04)$ m above the reference plane of the test site selected for measurement.

Where the EUT comprises multiple parts, these shall be arranged to minimise, as far as it is reasonably practical, the test volume. A minimum distance of 0,1 m shall be maintained between these parts.

A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 3m or 10m distance. Using the prescan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using a Quasi-Peak detector. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification.



2.2.2 Specification Limits

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 3 m for Class B	
Frequency range MHz	Quasi-peak limits dB(μ V/m)
30 to 230	40
230 to 1000	47

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 10 m for Class B	
Frequency range MHz	Quasi-peak limits dB(μ V/m)
30 to 230	30
230 to 1000	37

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 3 m for Class A	
Frequency range MHz	Quasi-peak limits dB(μ V/m)
30 to 230	50
230 to 1000	57

Radiated disturbance limits in the frequency range 30MHz to 1000MHz at a measuring distance of 10 m for Class A	
Frequency range MHz	Quasi-peak limits dB(μ V/m)
30 to 230	40
230 to 1000	47

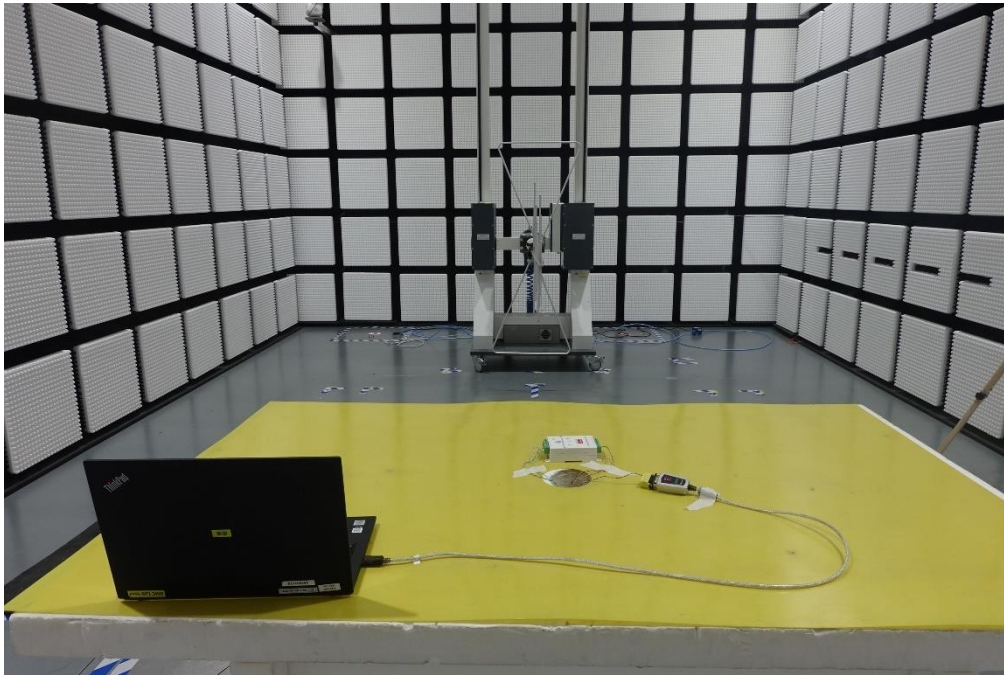
Remark :

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

2.2.3 Test Setup



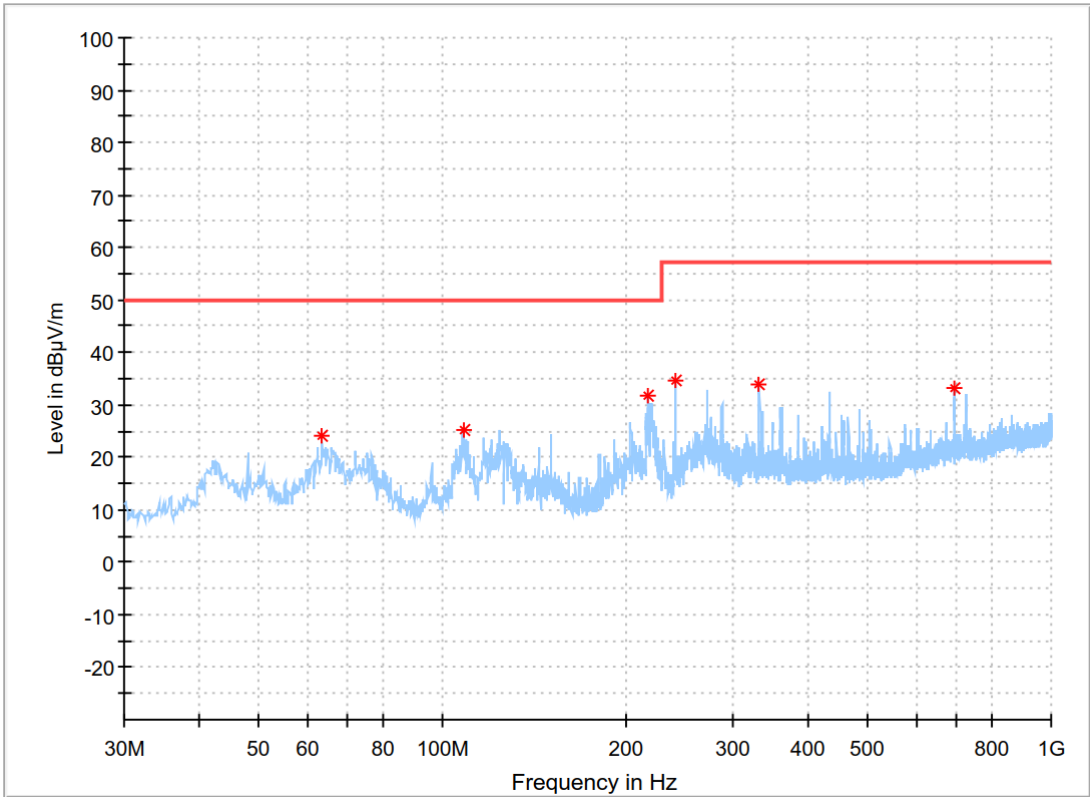
2.2.4 Test Location

This test was carried out in 3m SAC Test Location.



2.2.5 Test Results

Radiated Emission 30MHz-1000MHz



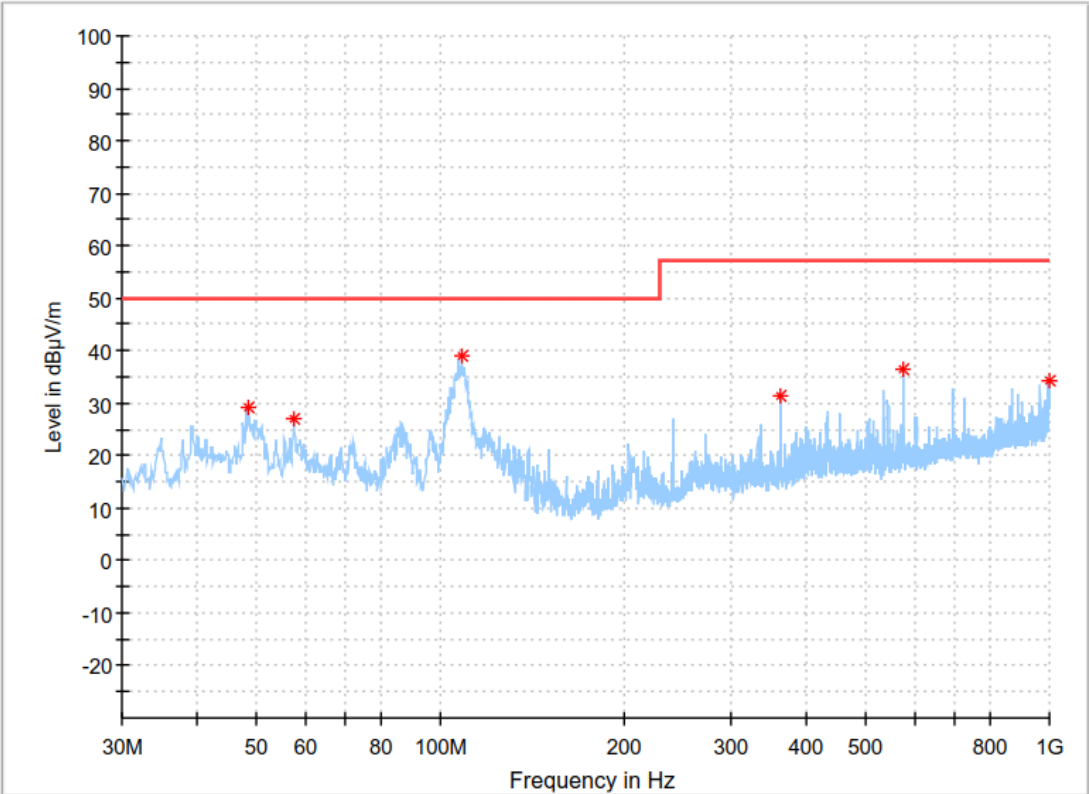
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
63.465000	24.08	50.00	25.92	H	-21.6
108.206250	25.19	50.00	24.81	H	-22.0
218.180000	31.80	50.00	18.20	H	-22.2
241.460000	34.48	57.00	22.52	H	-21.4
331.912500	34.01	57.00	22.99	H	-18.9
694.207500	33.32	57.00	23.68	H	-11.7

Model : GYIM-DAR
Test Mode : TM1. Continuous operating, measuring mode
Test Voltage : DC 12V
Polarity : Horizontal
Test Date : 2024-04-09



Radiated Emission 30MHz-1000MHz



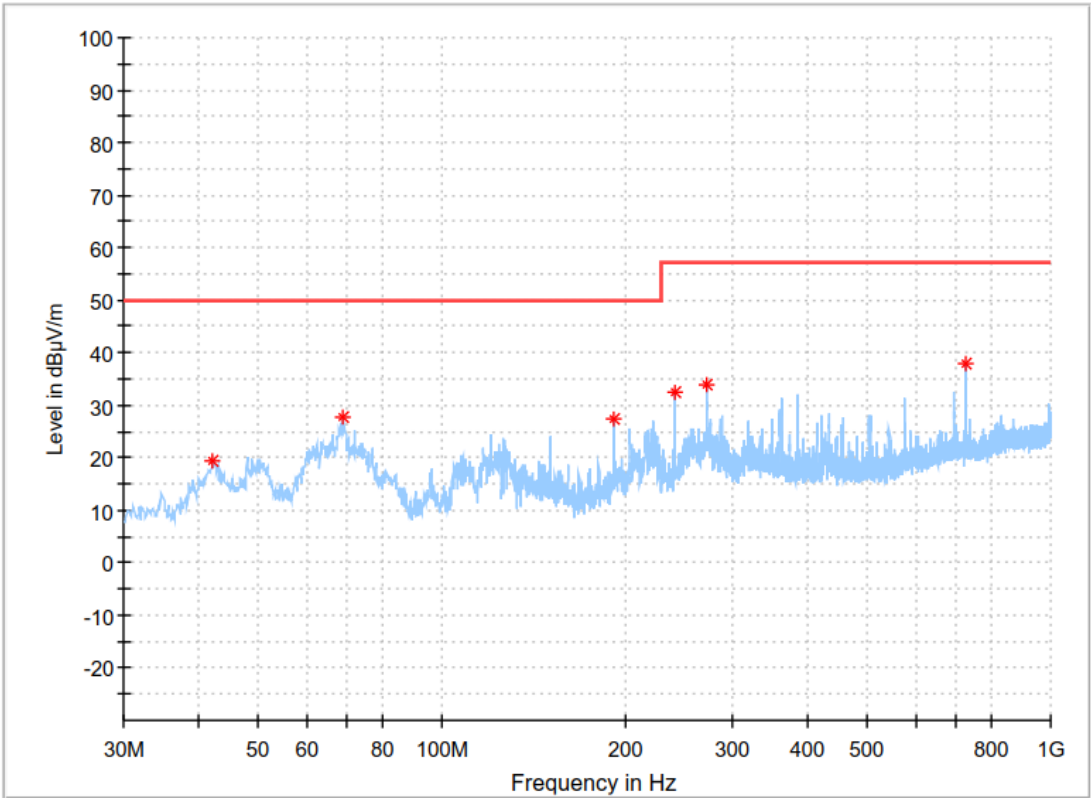
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
48.551250	29.26	50.00	20.74	V	-18.4
57.402500	27.11	50.00	22.89	V	-19.7
108.691250	38.84	50.00	11.16	V	-22.1
362.346250	31.39	57.00	25.61	V	-18.7
573.685000	36.50	57.00	20.50	V	-14.3
997.696250	34.42	57.00	22.58	V	-7.7

Model : GYIM-DAR
Test Mode : TM1. Continuous operating, measuring mode
Test Voltage : DC 12V
Polarity : Vertical
Test Date : 2024-04-09



Radiated Emission 30MHz-1000MHz



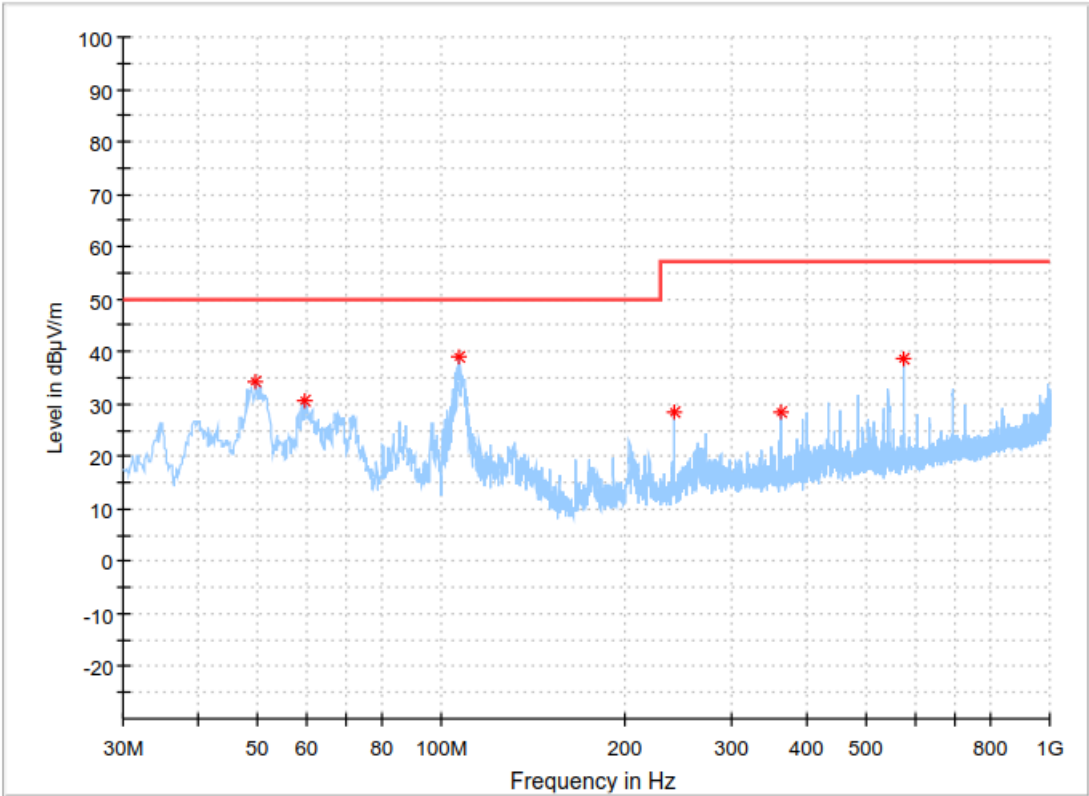
Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
42.125000	19.41	50.00	30.59	H	-19.2
68.921250	27.86	50.00	22.14	H	-23.9
191.990000	27.22	50.00	22.78	H	-22.6
241.460000	32.39	57.00	24.61	H	-21.4
271.772500	33.85	57.00	23.15	H	-20.6
724.762500	37.83	57.00	19.17	H	-11.4

Model : GYIM-DAR
Test Mode : TM1. Continuous operating, measuring mode
Test Voltage : DC 24V
Polarity : Horizontal
Test Date : 2024-04-09



Radiated Emission 30MHz-1000MHz



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
49.642500	34.42	50.00	15.58	V	-18.3
59.827500	30.48	50.00	19.52	V	-20.4
107.236250	38.82	50.00	11.18	V	-21.9
241.581250	28.39	57.00	28.61	V	-21.4
362.225000	28.56	57.00	28.44	V	-18.7
573.927500	38.79	57.00	18.21	V	-14.3

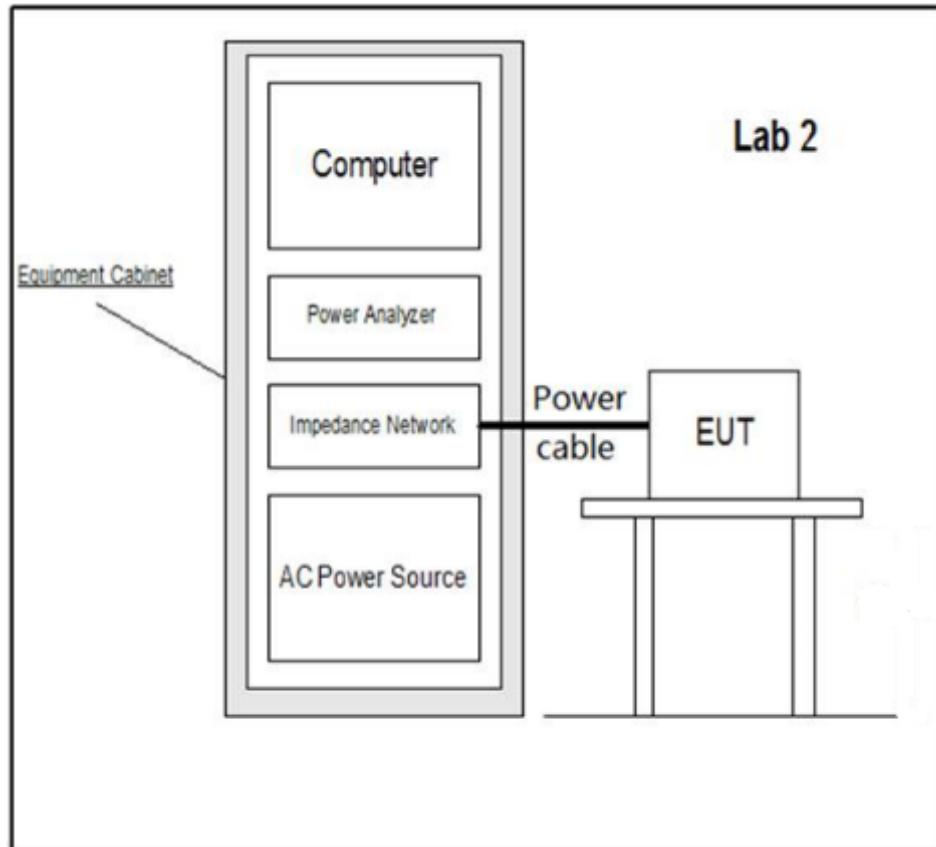
Model : GYIM-DAR
Test Mode : TM1. Continuous operating, measuring mode
Test Voltage : DC 24V
Polarity : Vertical
Test Date : 2024-04-09

2.3 Harmonic current emission

2.3.1 Test Method

Harmonic current test should be conducted with the user's operation control or automatic programs set to the mode expected to produce the maximum total harmonic current under normal operating conditions.

Specific test conditions for the measurement of harmonic currents associated with some types of equipment are given in test equipment list.



2.3.2 Specification Limits

Limits for class A Equipment	
Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15(15/n)$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23(8/n)$

2.3.3 Test Setup

N/A

2.3.4 Test Location

N/A

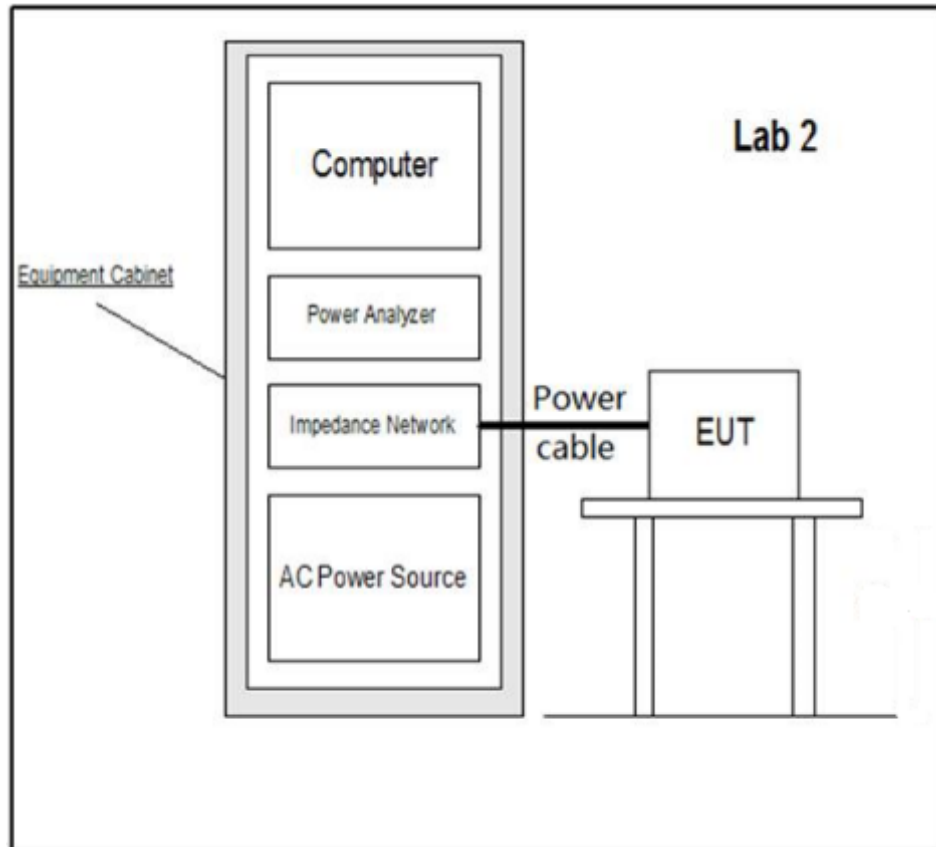
2.3.5 Test Results

N/A

2.4 Flicker

2.4.1 Test Method

Flicker test should be conducted with the user's operation controls or automatic programs set to the mode expected to produce the most unfavourable sequence of voltage change, using only those combinations of controls and programmes which are mentioned by the manufacturer in the instruction manual, or are otherwise likely to be used.



2.4.2 Specification Limits

The value of P_{st} shall not be greater than 1.0

The value of P_{lt} shall not be greater than 0.65

T_{max} , the accumulated time value of $d(t)$ with a deviation exceeding 3.3% during a single voltage change at the EUT terminals, shall not exceed 500ms

The maximum relative steady-state voltage change, dc , shall not exceed 3.3%

The maximum relative voltage change d_{max} , shall not exceed

a) 4% without additional conditions

b) 6% for equipment which is:

- Switched manually, or
- Switched automatically more frequently than twice per day, and also has either a delayed start, or manual restart, after a power supply interruption

c) 7% for equipment which is:

- Attended whilst in use, or
- Switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart or manual restart, after a power supply interruption

2.4.3 Test Setup

N/A

2.4.4 Test Location

N/A

2.4.5 Test Results

N/A

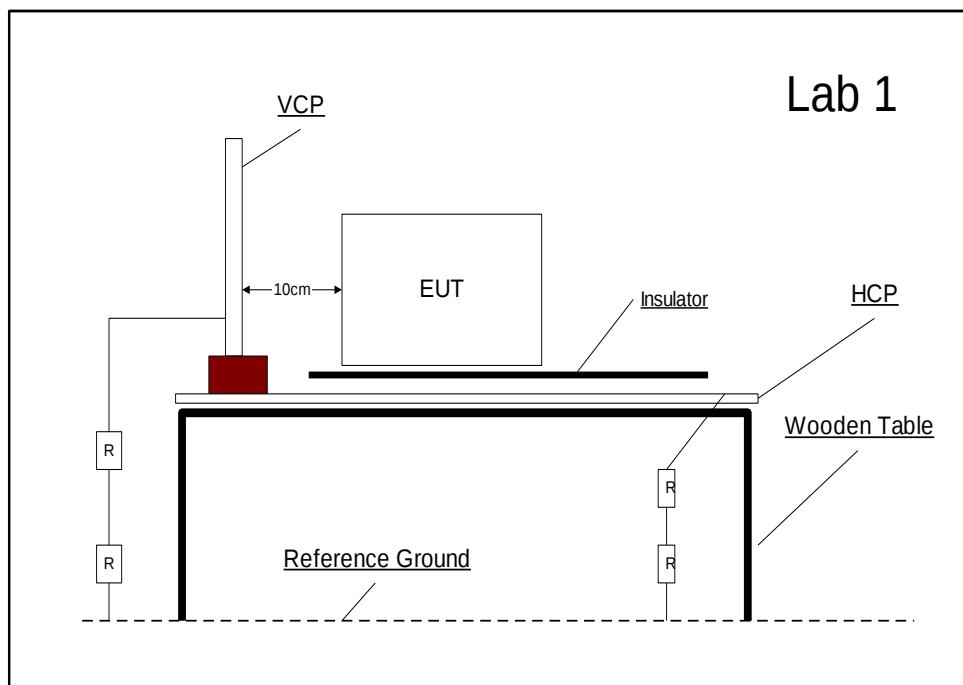
2.5 Electrostatic discharge immunity test

2.5.1 Test Method

The equipment under test including associated cabling was configured on but insulated from, using a 0.5mm isolator, a horizontal coupling plane fitted to the top of a 0.8m non-conductive table for table-top equipment; and on a 0.1m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

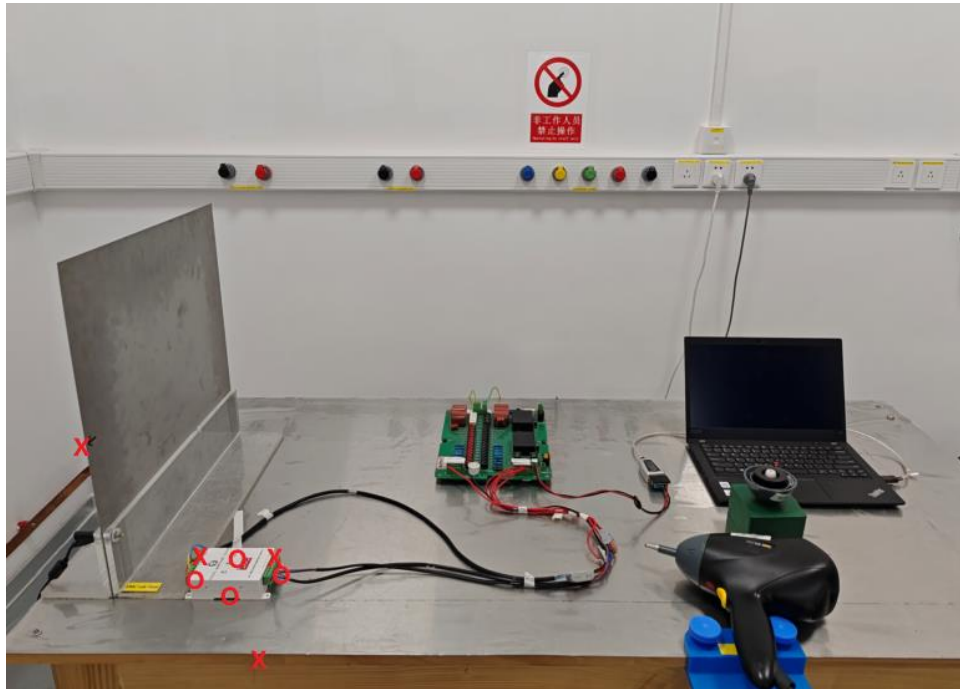
During this testing any anomalies in the equipment under tests performance was recorded.



2.5.2 Specification Limits

Required Test Levels				Performance Criteria
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)	
	Positive	Negative		
Air – Direct	8	8	10	B
Contact – Direct	4	4	10	B
Contact – Indirect	4	4	10	B

2.5.3 Test Setup and Teat point



X: Contact Discharge, O: Air Discharge
Tests were performed to EUT only. Not for auxiliary.

2.5.4 Test Location

This test was carried out in ESD room.

2.5.5 Test Results

Results for Configuration and Mode: 24VDC powered/ Measuring mode
 Performance assessment of the EUT made during this test: Pass
 Environment conduction: Temp: 22.6°C R.H.: 48.1% A.P.: 101.3kPa
 Detailed results are shown below.
 Test date: 2024-03-12

Test Point	Discharge	Results: Met Performance Criteria									
		2kV		4kV		6kV		8kV		15kV	
		+	-	+	-	+	-	+	-	+	-
HCP	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
VCP	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
Each conductive location touchable by hand	Contact	N/A	N/A	A	A	N/A	N/A	N/A	N/A	N/A	N/A
Each nonconductive location touchable by hand	Air	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A
N/A	Not Appliance										

Remark: N/A

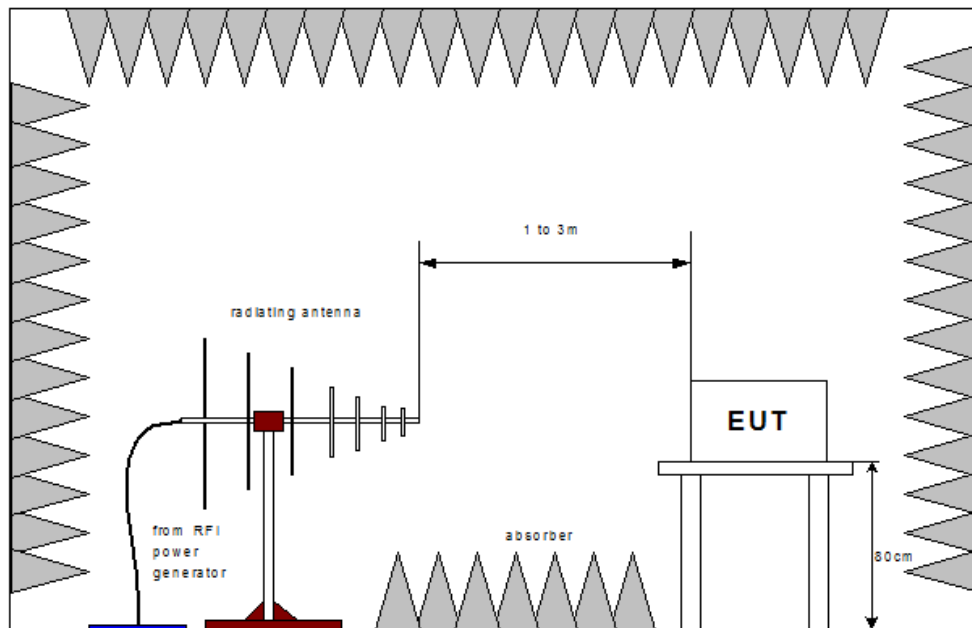
2.6 Radiated, radio-frequency, electromagnetic field immunity test

2.6.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.12 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four side of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this testing any anomalies in the equipment under tests performance was recorded.



2.6.2 Specification Limits

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 1000	10	AM (80 %,1 kHz, sine wave)	1	1	A
1400 to 6000	3	AM (80 %,1 kHz, sine wave)	1	1	A

Note 1. EUT powered at one of the Nominal input voltages and frequencies



2.6.3 Test Setup



2.6.4 Test Location

This test was carried out in RS Test Location.

2.6.5 Test Results

Results for Configuration and Mode: 24VDC, continuous operating
Performance assessment of the EUT made during this test: Pass
Detailed results are shown below.
Test date: 2024-01-18

Tabulated Results for RF Electromagnetic Field 80 - 6000 MHz					
Side of the equipment under test	Antenna polarization	Test Level	Dwell Time	Measuring distance	Results
Front, Left, Right, Back sides	Horizontal	10 V/m for 80 to 1000MHz, 3V for 1400 to 6000MHz;	1 s	3 m	A
Front, Left, Right, Back sides	Vertical	10 V/m for 80 to 1000MHz, 3V for 1400 to 6000MHz;	1 s	3 m	A

Remark: No observable change.

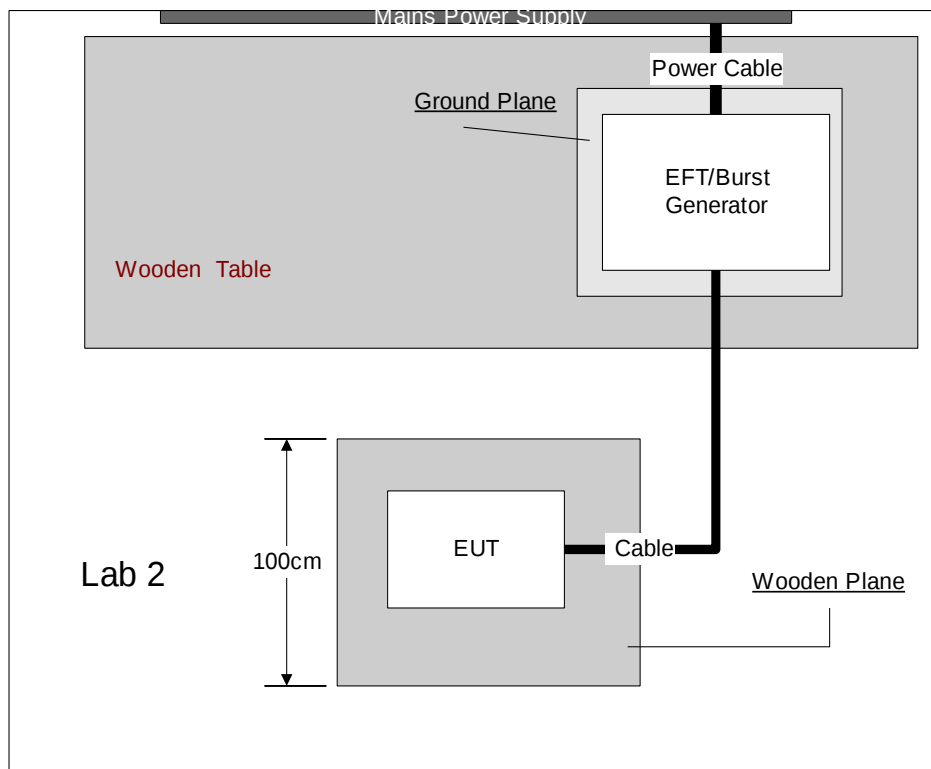
2.7 Electrical fast transient /burst immunity test

2.7.1 Test Method

The equipment under test including associated cabling was configured on but insulated from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using a CDN for power ports, capacitive coupling clamp for signal and control ports and a 33nF coupling capacitor for earth ports, the required fast transient burst voltage levels in both voltage polarities were applied at the detailed pulse repartition rate and duration of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.7.2 Specification Limits

Required Test Levels Input and output a.c. power ports					Performance Criteria
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	
Input and output a.c. power ports	± 2.0	5 kHz	2 min per polarity	Direct	B
For extra low voltage a.c. ports and output a.c. ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.					

Required Test Levels Input and output d.c. power ports					Performance Criteria
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	
Input and output a.c. power ports	± 2.0	5 kHz	2 min per polarity	Clamp	B
For extra low voltage a.c. ports and output a.c. ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.					

Required Test Levels ports for signal and control lines					Performance Criteria
Line Under Test	Level (kV)	Repetition Rate (kHz)	Test Duration	Coupling Method	
Signal and control lines	± 1.0	5 kHz	2 min per polarity	Clamp	B
Applicable only to ports interfacing with cables whose total length can exceed 3m according to the manufacturer's function specification.					

2.7.3 Test Setup

N/A

2.7.4 Test Location

This test was carried out in EMS Test Location.

2.7.5 Test Results

N/A. Length of all DC and signal lines < 3m.

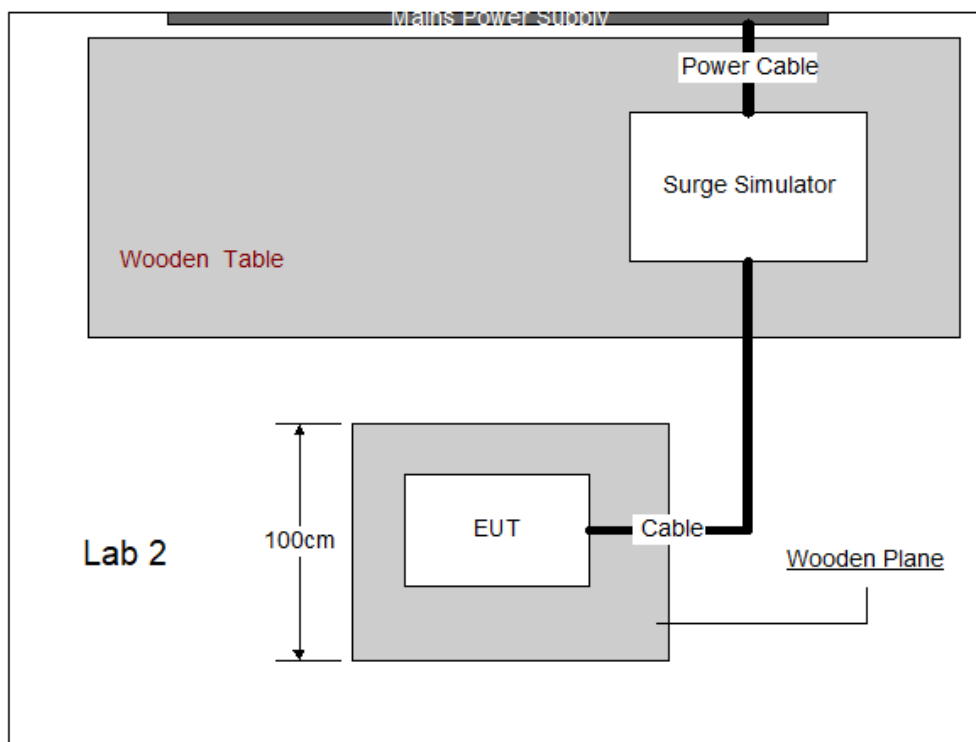
2.8 Surge immunity test

2.8.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using CDNs for power ports and appropriate coupling methods for applicable signal and control ports, the required number of surges was applied for each surge voltage level using both positive and negative surge voltage polarities. Surges were applied at the power line frequency phase angles and repartition rates detailed.

During this testing any anomalies in the equipment under tests performance was recorded.



2.8.2 Specification Limits

For AC Power port

Characteristics	Test Levels	Performance Criteria
Wave-shape data	1.2/50 μ s	B
Test levels line to line with 2 Ω impedance	± 1.0 kV	
line to earth with 12 Ω impedance	± 2.0 kV	
Note in addition to the specified test level, all lower levels as detailed in IEC 61000-4-5 should also be satisfied.		

For DC Power port

Characteristics	Test Levels	Performance Criteria
Wave-shape data	1.2/50 μ s	B
Test levels line to line with 2 Ω impedance	± 1.0 kV	
line to earth with 12 Ω impedance	± 2.0 kV	
Applicable only to ports interfacing with cables whose total length may exceed 3m according to the manufacturer's function specification.		

For Signal and control port

Characteristics	Test Levels	Performance Criteria
Wave-shape data 42 Ω impedance	1.2/50 μ s ± 1.0 kV	B
Applicable only to ports interfacing with cables whose total length may exceed 30m according to the manufacturer's function specification.		

2.8.3 Test Setup

N/A

2.8.4 Test Location

This test was carried out in EMS Test Location.

2.8.5 Test Results

N/A. Length of all DC and signal lines < 3m.

2.9 Immunity to conducted disturbances, induced by radio-frequency fields

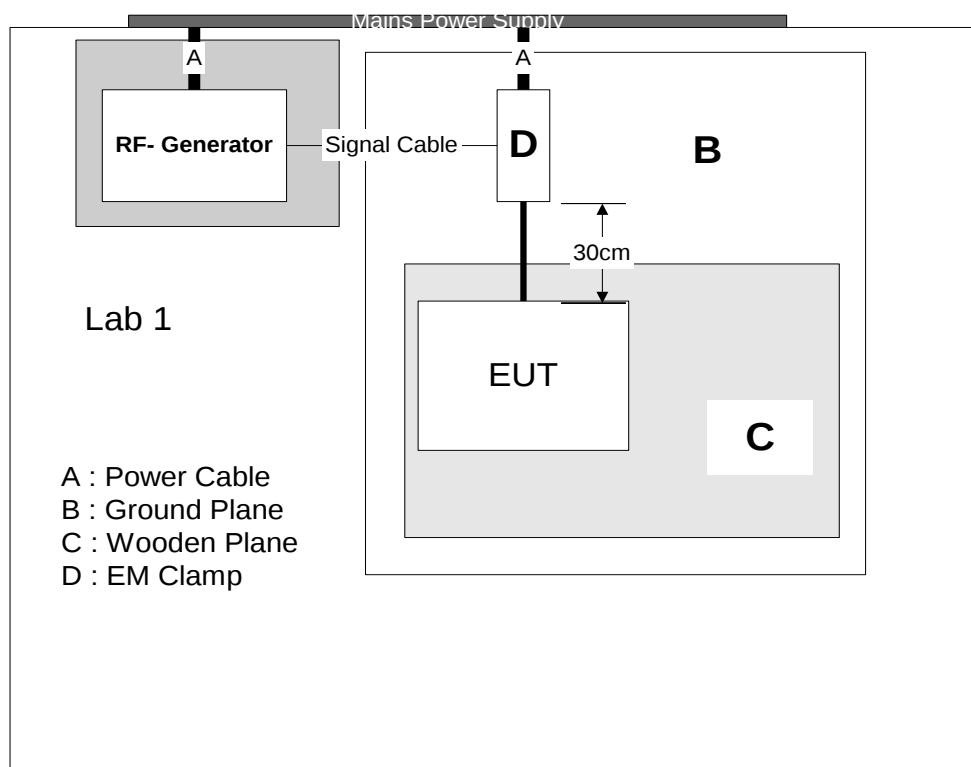
2.9.1 Test Method

The equipment under test was configured, on but insulated from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.1 m non-conductive table for table-top equipment, above a ground reference plane all within a test laboratory.

All associated cabling was configured, on but insulated from, using a 50 mm isolator, the same horizontal coupling plane as the equipment under test.

Using CDNs, EM Clamps or current clamps as appropriate, the power ports and applicable signal and control ports were subjected to the required, pre calibrated RF injected signal strength, modulated as described, swept over the frequency range of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.9.2 Specification Limits

Required Test Levels Input and output a.c. power ports						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
Input and output a.c. power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
For extra low voltage a.c ports and output a.c. ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.						

Required Test Levels Input and output d.c. power ports						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
Input and output d.c. power ports	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
For extra low voltage a.c ports and output a.c. ports, this testing is only applicable to ports interfacing with cables whose total length may exceed 3 m according to the manufacturer's functional specification.						

Required Test Levels Ports for signal lines and control lines						Performance Criteria
Line Under Test	Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
Signal and control port	0.15 to 80	3	AM (80 %,1 kHz, sine wave)	1	1	A
Applicable only to ports interfacing with cables whose total length may exceed 3m according to the manufacturer's function specification.						

2.9.3 Test Setup

N/A

2.9.4 Test Location

This test was carried out in EMS Test Location.

2.9.5 Test Results

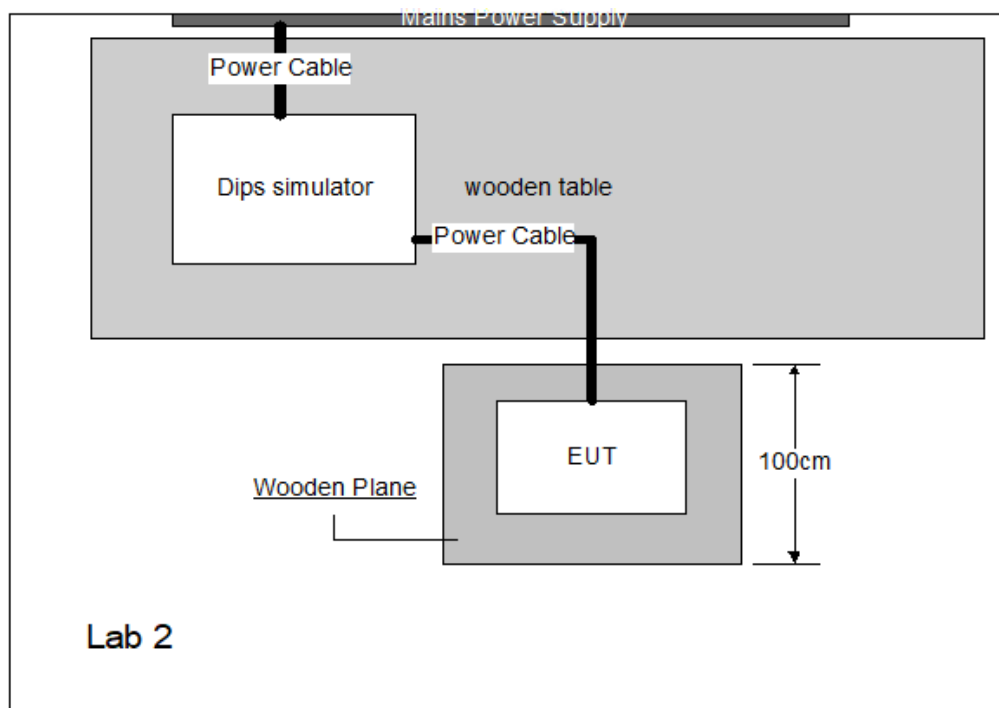
N/A. Length of all DC and signal lines < 3m.

2.10 Voltage dips, short interruptions and voltage variations immunity tests

2.10.1 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using a programmable power supply the equipment under test was subjected to the detailed supply voltage dips and interruptions. The required supply phase synchronization and test repetition rate, detailed, was controlled by the programmable power supply. During this testing any anomalies in the equipment under tests performance was recorded.



2.10.2 Specification Limits

Voltage Dips and short interruptions				
Voltage Dips in % UT	Test level in % UT	Duration		Performance Criteria
		50Hz	60Hz	
100	0	1cycle	1cycle	B
60	40	10 cycles	12 cycles	C
30	70	25 cycles	30 cycles	C
100	0	250cycle	300cycle	C
UT is the rated voltage of the Equipment Under Test				

2.10.3 Test Setup

N/A

2.10.4 Test Location

This test was carried out in EMS Test Location.

2.10.5 Test Results

Results for Configuration and Mode: N/A

Performance assessment of the EUT made during this test: N/A

Detailed results are shown below.

Test date: N/A

Tabulated Results for Voltage Dip and Short Interruption					
Line under test	Vnom	Operating Frequency	Test Level	Duration	Result

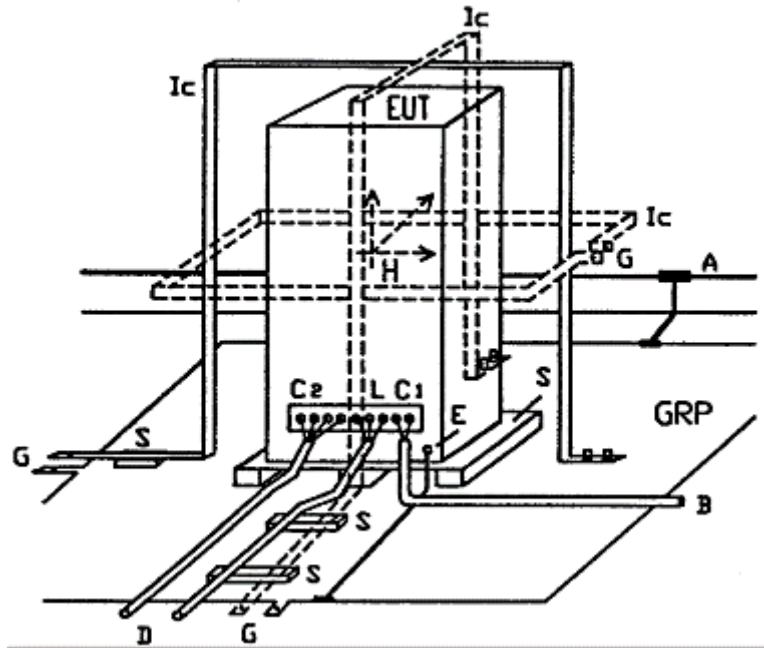
2.11 Power-frequency magnetic field immunity test

2.11.1 Test Method

The equipment under test including associated cabling was configured on a non-conductive support at the volumetric center of the immunity coils. A pre calibrated input level was then applied to magnetic immunity coils at the detailed frequency and level for the required test period.

The EUT was retested with the magnetic field applied in all 3 orthogonal planes of the EUT.

During this testing any anomalies in the equipment under tests performance was recorded.



2.11.2 Specification Limits

Required Test Levels			Performance Criteria
Application	Level (A/m)	Duration	
Continuous Field	30	dependent on EUT operating cycle	A
Supplementary information:			
Note 1. EUT powered at one of the Nominal input voltages and frequencies			

2.11.3 Test Setup



2.11.4 Test Location

This test was carried out in EMS Test Location.

2.11.5 Test Results

Results for Configuration and Mode: 24VDC, continuous operating

Performance assessment of the EUT made during this test: PASS

Detailed results are shown below.

Test date: 2024-01-17

Required Test Levels			Performance Criteria
Operating Frequency (Hz)	Level (A/m)	Dwell (s)	
50	30	300	PASS (A)
60	30	300	PASS (A)

3 Test Equipment Information

Radiated Emission Test (SAC-3 area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	64-2-63-20-003	101702	2024-04-08	2025-04-07
EMI Test Receiver	Rohde & Schwarz	ESR 7	64-2-63-20-001	102241	2023-11-10	2024-11-09
EMI Test Receiver	Rohde & Schwarz	ESR 7	64-2-63-20-002	102240	2023-11-10	2024-11-09
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	64-2-62-20-003	00340	2024-02-23	2025-02-22
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	64-2-62-22-011	00562	2023-10-16	2024-10-15
Horn Antenna	Schwarzbeck	BBHA 9120D	64-2-62-20-004	02152	2023-11-27	2024-11-26
Active Loop Antenna	Schwarzbeck	FMZB 1513-60	64-2-62-21-012	00041	2023-11-22	2024-11-21
Pre-amplifier	Rohde & Schwarz	SCU08F1	64-2-28-20-010	101016	2023-11-07	2024-11-06
Pre-amplifier	Rohde & Schwarz	SCU08F2	64-2-28-20-005	100742	2023-11-07	2024-11-06
Pre-amplifier	Rohde & Schwarz	SCU18F	64-2-28-20-011	100759	2023-11-07	2024-11-06
Pre-amplifier	PHX	BP-01G-18G	64-2-28-22-013	BP230021	2023-11-23	2024-11-22
Circular magnetic loop	Schwarzbeck	FESP 5133-7/41	64-2-62-21-002	412	2024-04-11	2025-04-10
field monitoring coil	Schwarzbeck	FESP 5133-F	64-2-62-23-004	0113	2023-11-13	2024-11-12
Coupling/Decoupling Network	EM TEST	CDNE M310	64-2-60-23-017	65995	2023-06-27	2024-06-26
Coupling/Decoupling Network	EM TEST	CDNE M310	64-2-60-23-018	65996	2023-06-27	2024-06-26
Coupling/Decoupling Network	EM TEST	CDNE M210	64-2-60-23-019	65806	2023-06-27	2024-06-26
Coupling/Decoupling Network	EM TEST	CDNE M210	64-2-60-23-020	65804	2023-06-27	2024-06-26
PV-DC LISN	SCHWARZBECK	8300	64-2-60-22-002	8300-00270	2023-09-28	2024-09-27
LISN	SCHWARZBECK	NSLK8163	64-2-60-20-006	05018	2023-08-29	2024-08-28
Testing Software	R&S	EMC32 (Version: 10.60.20)	64-2-26-20-006	N/A	N/A	N/A
3m Semi-anechoic chamber	TDK	SAC-3	64-2-90-20-004	N/A	2023-09-05	2026-09-04

Electrostatic Discharge Test(ESD area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
ESD Generator	EMTEST	ESD NX30	64-2-75-20-009	23124	2023-08-31	2024-08-30
ESD Generator	EMTEST	ESD NX30	64-2-75-23-002	P23122743 54	2023-06-05	2024-06-04

Radiated Immunity Test (CAC-3 area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100B	64-2-64-20-001	101903	2023-11-07	2024-11-06
Power Amplifier	Rohde & Schwarz	BBA150-BC500	64-2-28-20-002	104061	2023-11-07	2024-11-06
Power Amplifier	Rohde & Schwarz	BBA150-D110E100	64-2-28-20-003	104048	2023-11-07	2024-11-06
Microwave Log-Periodic Antenna	Schwarzbeck	STLP9129 SET	64-2-62-20-002	3074	N/A	N/A
Average Power Sensor	Rohde & Schwarz	NRP6AN	64-2-32-20-001	101424	2023-11-07	2024-11-06
Average Power Sensor	Rohde & Schwarz	NRP6AN	64-2-32-20-002	101425	2023-11-07	2024-11-06
Testing Software	R&S	EMC32 (Version: 10.60.20)	64-2-26-20-003	N/A	N/A	N/A
3m FAC Chamber	TDK	CAC-3	64-2-90-20-003	N/A	2023-09-06	2026-09-05

Power-frequency magnetic field Test(EMS area)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Multifunctional threephase voltage source	EMTEST	NetWave 67.3-400	64-2-09-20-011	P2009239095	2023-11-10	2024-11-09
Helmholtz Coils	Schwarzbeck	HHS 5215-100	64-2-62-20-011	HHS 5215-100 #111	2023-11-10	2024-11-09
Testing Software	EMTEST	Net.Control (Version: 3.2.5)	64-2-09-20-011-A01	N/A	N/A	N/A
magnetic field coil	EMTEST	MS 100N	64-2-62-20-012	P2007238680	2023-11-10	2024-11-09
Current Transformer	EMTEST	MFT 30	64-2-62-20-012-A001	P2142257128	2023-11-10	2024-11-09
Current Transformer	EMTEST	MFT 100-230	64-2-62-20-012-A002	P2236267172	2023-11-10	2024-11-09
Programmable AC power supply	SophPower	SFC-360	64-2-09-22-005	635913	2023-12-13	2024-12-12
Multipurpose power supply	Kikusui	PCR6000LA	64-2-09-08-002	MG002890	2023-11-23	2024-11-22

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: $\pm 4.96\text{dB}$; Vertical: $\pm 6.16\text{dB}$;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	$\pm 5.12\text{dB}$;
Uncertainty for Conducted Emission 9kHz-150KHz	$\pm 3.26\text{dB}$
Uncertainty for Conducted Emission 150kHz-30MHz	$\pm 3.22\text{dB}$
Uncertainty for Radiated Electromagnetic Disturbance 9KHz-30MHz	3.20dB
Uncertainty for Harmonic test	3.16%
Uncertainty for Flicker test	4.69%
Uncertainty for RS test	2.08dB, K=2
Uncertainty for CS test	28.0% (CDN), 45.0% (EM Clamp) K=2
Uncertainty for ESD test	The immunity measurement system uncertainty is within standard requirement and is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
Uncertainty for EFT test	
Uncertainty for Surges test	
Uncertainty for PFMF test	
Uncertainty for Voltage Dips, Voltage Variations and Short Interruptions Test	

Remark:

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.4.3.

5 Photographs

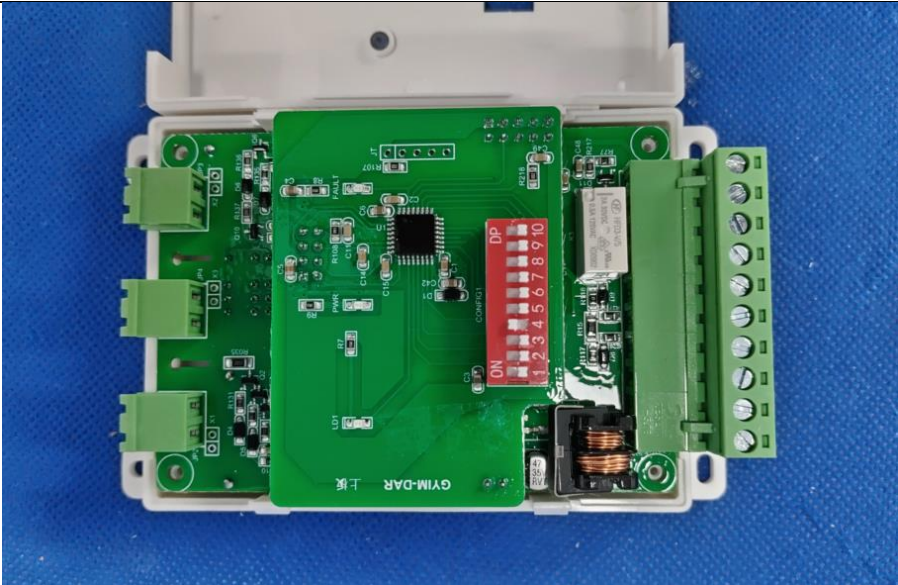
Details of: General view



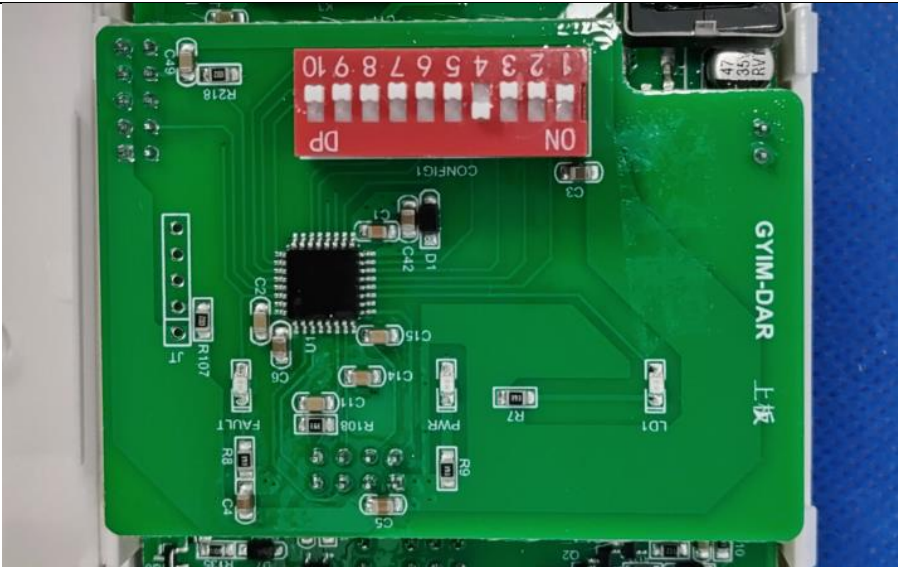
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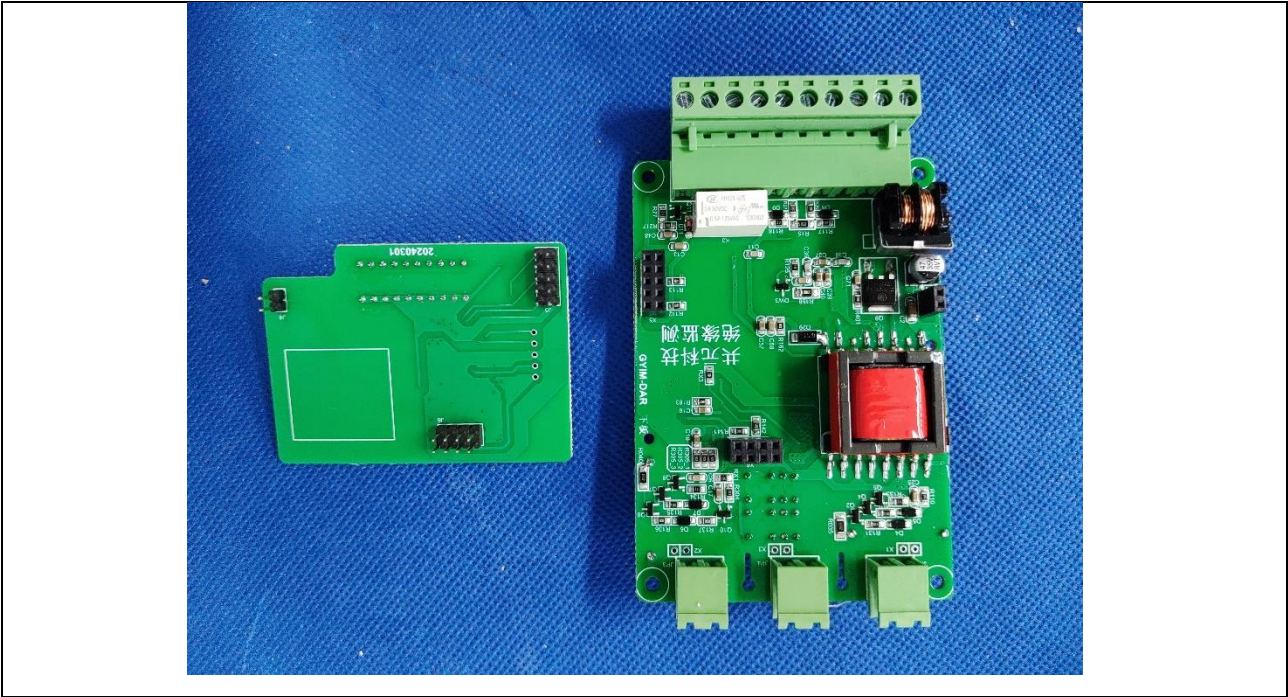
Details of: PCB view



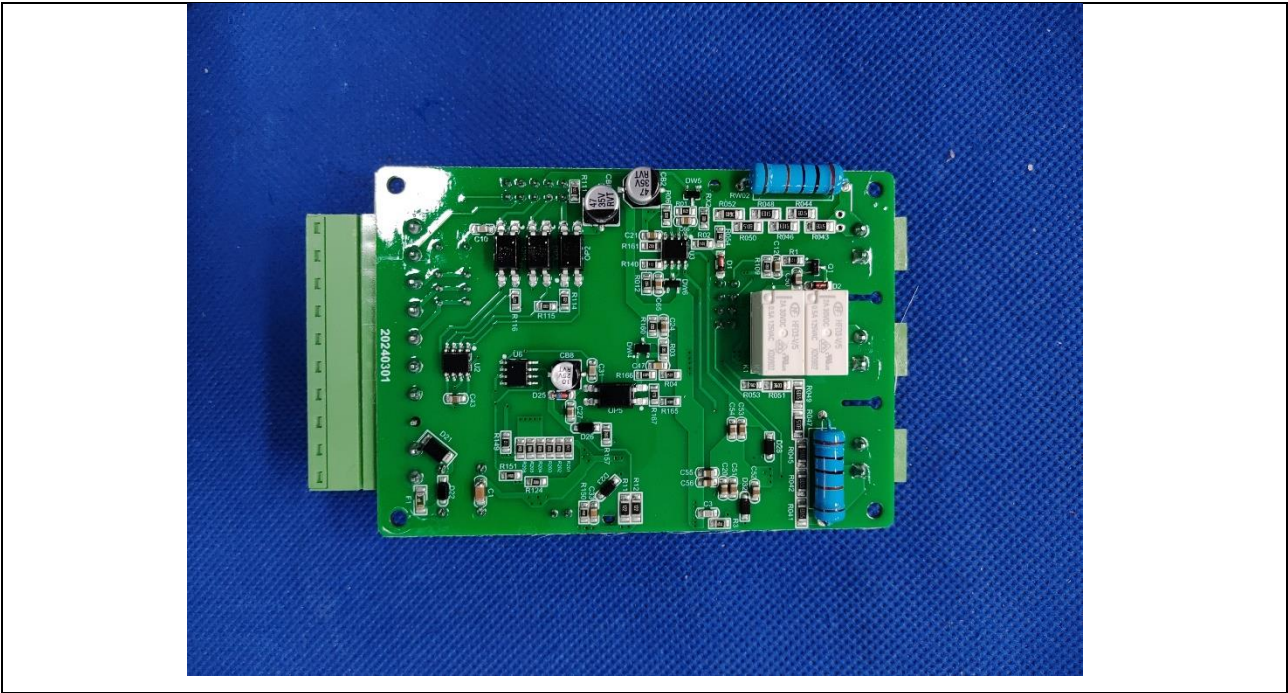
Details of: PCB view



Details of: PCB view



Details of: PCB view



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