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检测
TESTING
CNAS L4595

EMC TEST REPORT

For

Shanghai Panelmate Electronics Co., Ltd.

Firewall ES4000

Test Model: Firewall ES4000

Prepared for	:	Shanghai Panelmate Electronics Co., Ltd.
Address	:	Building 18th, No.177 Fulian 2nd Rd. Baoshan District, Shanghai, 201906
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	March 29, 2023
Number of tested samples	:	1
Sample No.	:	A032923008
Date of Test	:	March 29, 2023 ~ April 03, 2023
Date of Report	:	April 11, 2023

LCS TESTING APPR

EMC TEST REPORT
EN IEC 61000-6-4:2019
Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN IEC 61000-6-2:2019
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

Report Reference No. .....:	**LCSA032923008E001**
Date Of Issue ..... :	April 11, 2023
Testing Laboratory Name....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address..... :	101, 201 Building A and 301 Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, Guangdong, China
Testing Location/ Procedure .. :	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....:	**Shanghai Panelmate Electronics Co., Ltd.**
Address..... :	Building 18th, No.177 Fulian 2nd Rd. Baoshan District, Shanghai, 201906
Test specification:	
Standard ..... :	EN IEC 61000-6-4:2019 EN IEC 61000-6-2:2019
Test Report Form No..... :	LCSEMC-1.0
TRF Originator ..... :	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF..... :	Dated 2011-03

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Test Item Description.....:	**Firewall ES4000**
Trade Mark..... :	Panelmate
Test Model ..... :	Firewall ES4000
Ratings..... :	Please Refer To Page 9
Result .....:	**Positive**

Compiled by:	Supervised by:	Approved by:
Cindy Nie	Baron Wen	Gavin Liang
Cindy Nie/ File administrators	Baron Wen/Technique principal	Gavin Liang/ Manager

EMC -- TEST REPORT

Test Report No. : LCSA032923008E001	April 11, 2023 Date of issue

Test Model.....	: Firewall ES4000
EUT.....	: Firewall ES4000
Applicant.....	: **Shanghai Panelmate Electronics Co., Ltd.**
Address.....	: Building 18th, No.177 Fulian 2nd Rd. Baoshan District, Shanghai, 201906
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: **Shanghai Panelmate Electronics Co., Ltd.**
Address.....	: Building 18th, No.177 Fulian 2nd Rd. Baoshan District, Shanghai, 201906
Telephone.....	: /
Fax.....	: /
Factory.....	: **Shanghai Panelmate Electronics Co., Ltd.**
Address.....	: Building 18th, No.177 Fulian 2nd Rd. Baoshan District, Shanghai, 201906
Telephone.....	: /
Fax.....	: /

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions Content	Revised By
000	April 04, 2023	Initial Issue	--
001	April 11, 2023	Revised	Cindy Nie

Remark：

Declared by applicant, the model has been changed in this report，and original test report become invalid.

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1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION (EN IEC 61000-6-4:2019)			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN IEC 61000-6-4:2019	Class A	N/A
Conducted disturbance at telecommunication port	EN IEC 61000-6-4:2019	Class A	N/A
Radiated disturbance	EN IEC 61000-6-4:2019	Class A	PASS
Harmonic current emissions	EN IEC 61000-3-2:2019+A1: 2021	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3: 2013+A1:2019	--------	N/A

IMMUNITY (EN IEC 61000-6-2:2019)			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2: 2009	B	PASS
Radio-frequency, Continuous radiated disturbance	EN IEC 61000-4-3:2020	A	PASS
Electrical fast transient (EFT)	EN 61000-4-4: 2012	B	PASS
Surge (Input d.c. power ports)	EN 61000-4-5: 2014+A1: 2017	B	N/A
Surge (Telecommunication ports)		B	PASS
Radio-frequency, Continuous conducted disturbance	EN61000-4-6:2014/A1:2015	A	PASS
Power frequency magnetic field	EN 61000-4-8: 2010	A	PASS
Voltage dips, >95% reduction	EN IEC 61000-4-11:2020+AC: 2020	B	N/A
Voltage dips, 30% reduction		C	N/A
Voltage interruptions		C	N/A
N/A is an abbreviation for Not Applicable.			

Test mode:		
Mode	Working	Record

1.2.Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:
— essential operational modes and states;
— tests of all peripheral access (hard disks, floppy disks, printers, keyboard, mouse, etc.);
— quality of software execution;
— quality of data display and transmission;
— quality of speech transmission.

1.2.1.Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment 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 deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.2.Performance criterion B

After the test, the equipment 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 manufacture, when the equipment 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 operation 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 deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3.Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

EUT	: Firewall ES4000
Trade Mark	: Panelmate
Test Model	: Firewall ES4000
Power Supply	: DC24V 0.5A
EUT Clock Frequency	: ≤108MHz

2.2.Description of Test Facility

Site Description

EMC Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

2.3.Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.4.Measurement Uncertainty

Test	Parameters	Expanded uncertainty (Ulab)	Expanded uncertainty (Ucispr)
Coucted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Power Disturbance	Level accuracynd (30MHz to 300MHz)	± 2.90dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 3.3 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB
Voltage Fluctuations & Flicker	Voltage	± 0.510%	N/A
EMF		± 21.59%	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. MEASURING DEVICES AND TEST EQUIPMENT

RADIATED DISTURBANCE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	E3	E3-EMC	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
4	EMI Test Receiver	R&S	ESR3	102311	2022-08-17	2023-08-16
5	Broadband Preamplifier	/	BP-01M18G	P190501	2021-06-21	2022-06-20

ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD 230	604035	2022-07-18	2023-07-17

RF ELECTROMAGNETIC FIELD)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXG Vector Signal Generator	Agilent	E4438C	MY42081396(6G)	2022-06-16	2023-06-15
2	RF POWER AMPLIFIER	SKET	HAP_0306G-50W	/	2022-06-16	2023-06-15
3	RF POWER AMPLIFIER	OPHIR	5225R	1052	2022-06-16	2023-06-15
4	RF POWER AMPLIFIER	OPHIR	5273F	1019	2022-06-16	2023-06-15
5	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	NCR	NCR
6	Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	NCR	NCR
7	RS Electric field probe	narda	EP601	611WX80208	2022-06-16	2023-06-15
Note: NCR means no calibration requirement						

ELECTRICAL FAST TRANSIENT IMMUNITY

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2022-08-17	2023-08-16
2	Electric fast pulse group generator	3ctest	EFT-4001G	EC0461044	2022-10-31	2023-10-30
3	Capacitive coupling clamp	3CTEST	EFTC	EC0441098	2022-06-16	2023-06-15

SURGES, LINE TO LINE AND LINE TO GROUND

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2022-08-17	2023-08-16
2	Communication wave lightning generator	HTEC	HTSG 70	181701	2022-10-31	2023-10-30
3	Symmetrical data line coupling network	HTEC	HCN 8	182701	2022-10-31	2023-10-30
4	Data line decoupling network	HTEC	HDEC 8	182702	2022-10-31	2023-10-30

RF COMMON MODE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Simulator	FRANKONIA	CIT-10/75	A126A1195	2022-08-17	2023-08-16
2	CDN	FRANKONIA	CDN-M2+M3	A2210177	2022-06-16	2023-06-15
3	6dB Attenuator	FRANKONIA	DAM25W	1172040	2022-06-16	2023-06-15
4	Electromagnetic coupling injection clamp	ZHINAN	ZN23203	14017	2022-06-16	2023-06-15

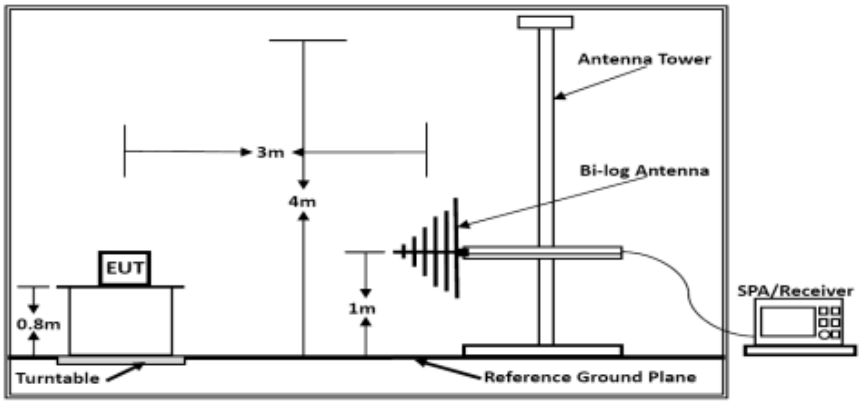
MAGNETIC FIELD SUSCEPTIBILITY TEST

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power frequency mag-field generator System	EVERFINE	EMS61000-8K	906003	2022-06-16	2023-06-15

NCR --- No calibration requirement.

4.1. Radiated Emission Measurement

4.1.1.Block Diagram of Test Setup



Below 1GHz

4.1.2.Measuring Standard

EN IEC 61000-6-4:2019

4.1.3.Radiated Emission Limits

All emanations from a class 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 (dBμV/m)
30 ~ 230	3	50
230 ~ 1000	3	57

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.

4.1.4.EUT Configuration on Test

The EN IEC 61000-6-4 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.1.5.Operating Condition of EUT

4.1.5.1.Turn on the power.

4.1.5.2.Let the EUT work in test mode (Working) and measure it.

4.1.6.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, which 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. By-log 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 EMI test receiver is set at RBW/VBW=120kHz/300kHz.
The frequency range from 30MHz to 1000MHz is checked.
The bandwidth of the Spectrum analyzer is set at RBW/VBW=1MHz/3MHz.

All the scanning waveform is in next page.

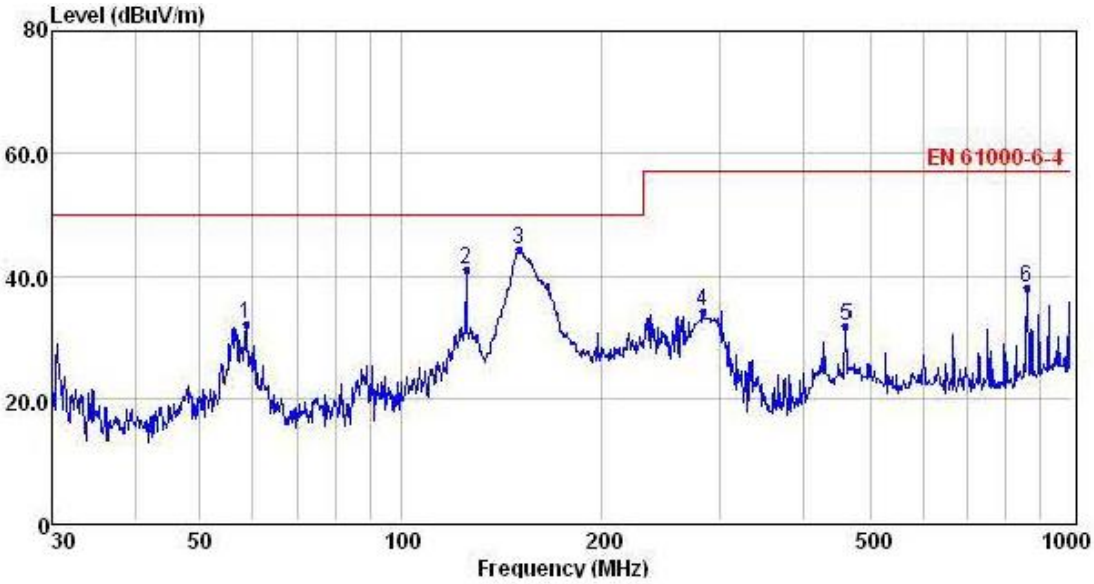
4.1.7.Test Results

PASS.

The frequency range from 30MHz to 1000MHz is investigated.

The scanning waveforms is in the next page.

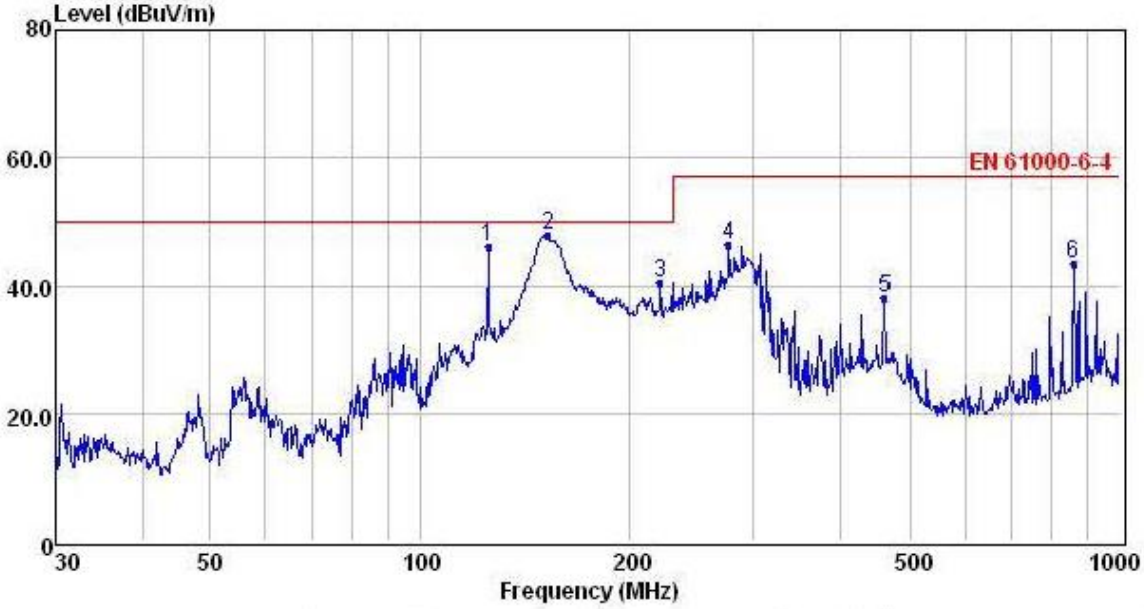
Test Model	Firewall ES4000	**Test Mode**	Working
Environmental Conditions	22.3℃, 53% RH	**Detector Function**	Quasi-peak
Pol	Vertical	**Distance**	3m
Test Engineer	XF Peng	**Test Voltage**	DC 24V



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	58.61	18.87	0.65	12.51	32.03	50.00	-17.97	QP
2	125.01	30.02	0.93	9.99	40.94	50.00	-9.06	QP
3	150.01	34.61	1.03	8.70	44.34	50.00	-5.66	QP
4	282.99	19.53	1.30	13.36	34.19	57.00	-22.81	QP
5	462.35	14.27	1.46	15.98	31.71	57.00	-25.29	QP
6	860.04	14.75	2.06	21.14	37.95	57.00	-19.05	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

Test Model	Firewall ES4000	**Test Mode**	Working
Environmental Conditions	22.3℃, 53% RH	**Detector Function**	Quasi-peak
Pol	Horizontal	**Distance**	3m
Test Engineer	XF Peng	**Test Voltage**	DC 24V

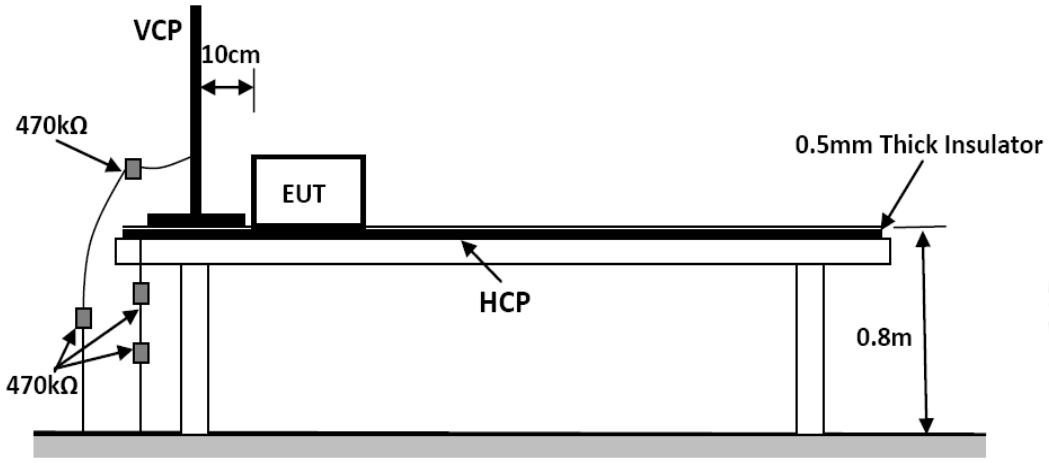


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	125.01	35.04	0.93	9.99	45.96	50.00	-4.04	QP
2	152.66	38.03	1.04	8.84	47.91	50.00	-2.09	QP
3	220.62	27.62	1.23	11.72	40.57	50.00	-9.43	QP
4	277.09	31.94	1.29	13.24	46.47	57.00	-10.53	QP
5	462.35	20.53	1.46	15.98	37.97	57.00	-19.03	QP
6	860.04	20.36	2.06	21.14	43.56	57.00	-13.44	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

4.2. ElectrostaTic Discharge Immunity Test

4.2.1.Block Diagram of Test Setup



4.2.2.Test Standard

EN IEC 61000-6-2:2019 (EN 61000-4-2: 2009,
Severity Level: 3 / Air Discharge: ±8KV, Level: 2 / Contact Discharge: ±4KV)

4.2.3.Severity Levels and Performance Criterion

4.2.3.1.Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	±2	±2
2.	±4	±4
3.	±6	±8
4.	±8	±15
X	Special	Special

4.2.3.2.Performance Criterion: **B**

4.2.4.EUT Configuration on Test

The configuration of EUT is listed in Section 4.2.1.

4.2.5.Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 4.1.5.
Except the test set up replaced by Section 4.2.1.

4.2.6.Test Procedure

4.2.6.1.Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

4.2.6.2.Contact Discharge

All the procedure shall be same as Section 4.2.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

4.2.6.3.Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

4.2.6.4.Indirect Discharge For Vertical Coupling Plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

4.2.7.Test Results

PASS.

Please refer to the following pages

Electrostatic Discharge Test Results

Standard	☐ IEC 61000-4-2 ☑ EN 61000-4-2		
Applicant	Shanghai Panelmate Electronics Co., Ltd.		
EUT	Firewall ES4000	**Temperature**	23.5℃
M/N	Firewall ES4000	**Humidity**	53.8%
Criterion	B	**Pressure**	1021mbar
Test Mode	Working	**Test Engineer**	Hy Luo

Air Discharge

Test Points	Test Levels			Results		
	± 2KV	± 4KV	± 8KV	assed	Fail	Performance Criterion
Fron	☒	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☒	☐	☐A ☒B

Contact Discharge

Test Points	Test Levels		Results		
	± 2 KV	±4 KV	Passed		Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B
Top	☒	☒	☒	☐	☐A ☒B
Bottom	☒	☒	☒	☐	☐A ☒B

Discharge To Horizontal Coupling Plane

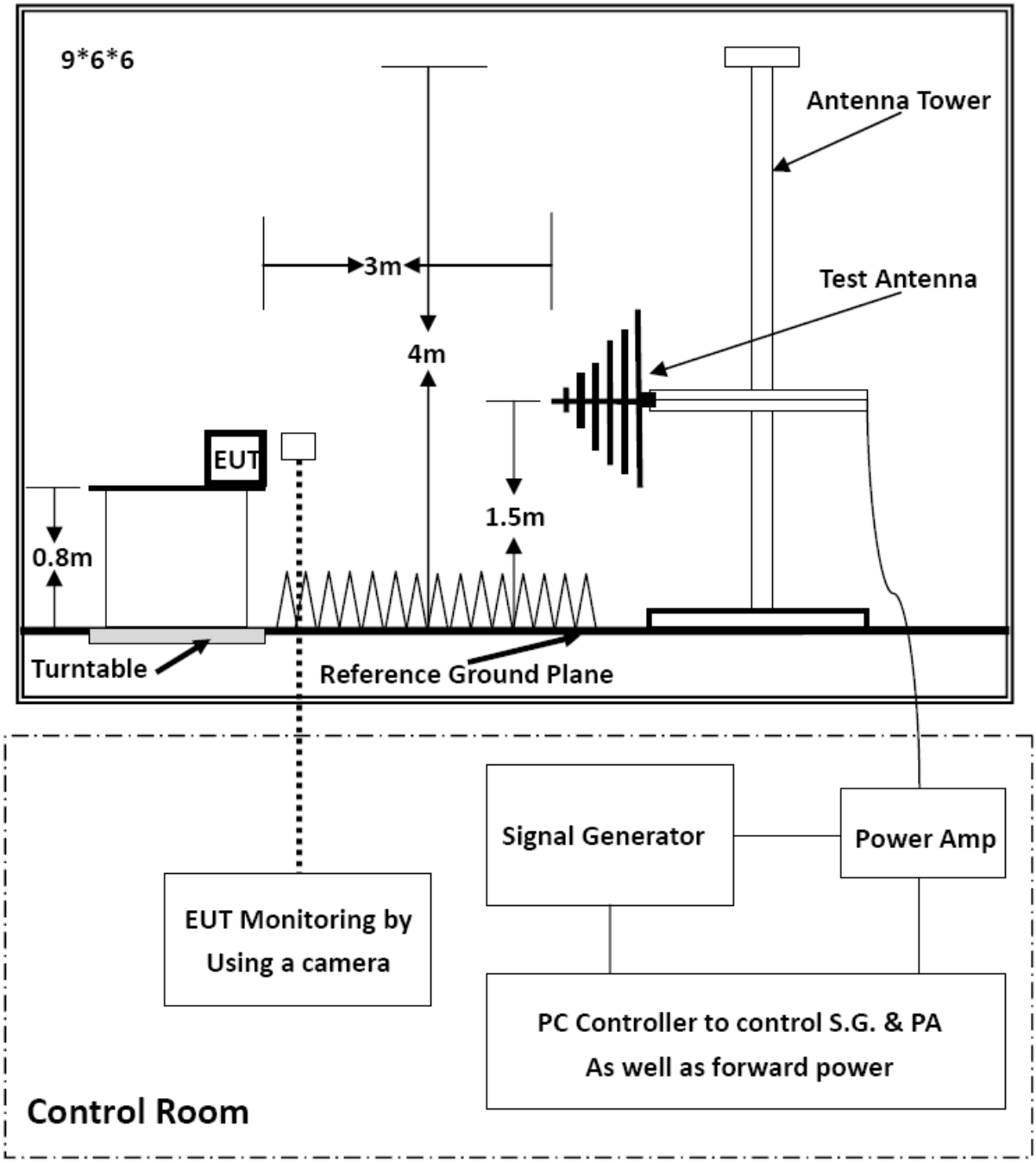
Side of EUT	Test Levels		Results		
	± 2 KV	± 4 KV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

Discharge To Vertical Coupling Plane

Side of EUT	Test Levels		Results		
	± 2 KV	± 4 kV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☐	☐A ☒B
Back	☒	☒	☒	☐	☐A ☒B
Left	☒	☒	☒	☐	☐A ☒B
Right	☒	☒	☒	☐	☐A ☒B

4.3. RF Field Strength Susceptibility Test

4.3.1.Block Diagram of Test



4.3.2.Test Standard

EN IEC 61000-6-2:2019
(EN IEC 61000-4-3:2020 Severity Level 3: 10V / m)

4.3.3.Severity Levels and Performance Criterion

4.3.3.1.Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
4.	30
X.	Special

4.3.3.2.Performance Criterion: **A**

4.3.4.EUT Configuration on Test

The configuration of the EUT is same as Section 4.3.1.

4.3.5.Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 4.2.4, except the test setup replaced as Section 4.3.1.

4.3.6.Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a CCD Recording is used to monitor its screen.

All the scanning conditions are as following:

	Condition of Test	Remark
1.	Fielded Strength	10V/m (Severity Level 3)
2.	Radiated Signal	Unmodulated
3.	Scanning Frequency	80-1GHz
4.	Sweep time of radiated	0.0015 Decade/s
5.	Dwell Time	3 Sec.

4.3.7.Test Results

PASS.

Please refer to the following page

RF Field Strength Susceptibility Test Results

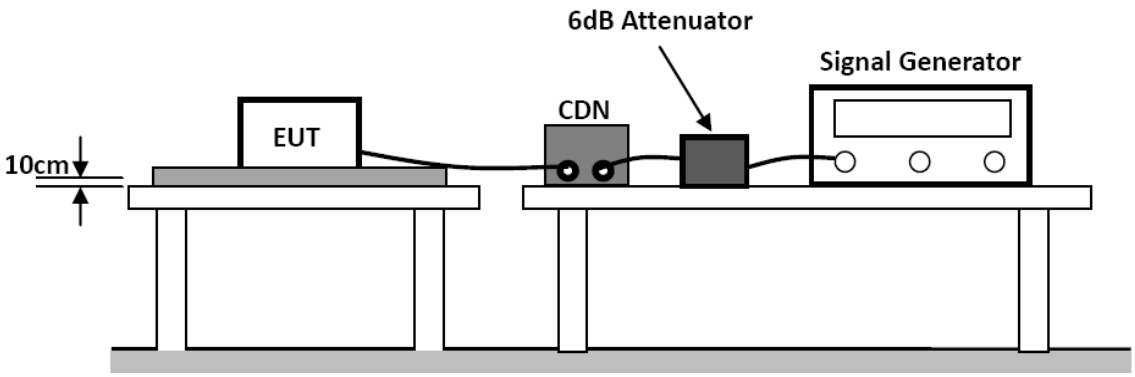
Standard	☐ IEC 61000-4-3 ☑ EN 61000-4-3		
Applicant	Shanghai Panelmate Electronics Co., Ltd.		
EUT	Firewall ES4000	**Temperature**	23.2℃
M/N	Firewall ES4000	**Humidity**	53.3%
Test Mode	Working	**Criterion**	A
Field Strength	10V/m	**Field Strength**	80 MHz to 1.0 GHz
Test Engineer	Hy Luo		
Modulation	☐None ☐ Pulse ☑AM 1KHz 80%		
Steps	1%		

	Horizontal	Vertical
Front	PASS	PASS
Right	PASS	PASS
Rear	PASS	PASS
Left	PASS	PASS

Note:

4.4. Injected Currents Susceptibility Test

4.4.1.Block Diagram of Test Setup



4.4.2.Test Standard

EN 61000-6-2: 2007 (EN61000-4-6:2014/A1:2015, Severity Level: Level 2, (0.15MHz ~ 80MHz)

4.4.3.Severity Levels and Performance Criterion

4.4.3.1.Severity level

Level	Field Strength (V)
1	1
2	3
3	10
4	30
X	Special

4.4.3.2.Performance Criterion: **A**

4.4.4.EUT Configuration on Test

The configuration of EUT is listed in Section 3

4.4.5.Operating Condition of EUT

4.4.5.1.Setup the EUT as shown in Section 4.4.1.

4.4.5.2.Turn on the power of all equipments.

4.4.5.3.Let the EUT work in test Mode and measure it.

4.4.6.Test Procedure

4.4.6.1.Set up the EUT, CDN and test generators as shown on Section 4.4.1.

4.4.6.2.Let the EUT work in test mode and measure it.

4.4.6.3.The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

4.4.6.4.The disturbance signal described below is injected to EUT through CDN.

4.4.6.5.The EUT operates within its operational mode(s) under intended climatic conditions after power on.

4.4.6.6.The frequency range is swept from 150kHz to80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

4.4.6.7.The rate of sweep shall not exceed 1.5*10-3decades/s. where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

4.4.6.8.Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

4.4.7.Test Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

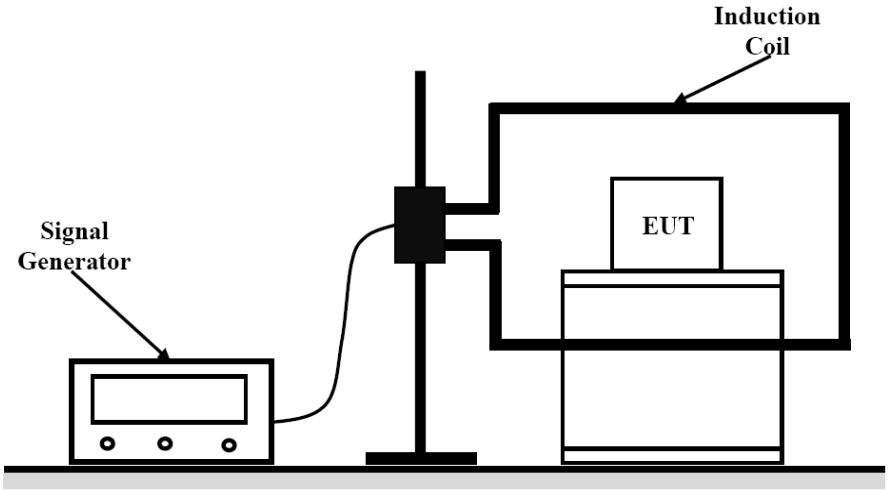
Standard	☐ IEC 61000-4-6 ☑ EN 61000-4-6		
Applicant	Shanghai Panelmate Electronics Co., Ltd.		
EUT	Firewall ES4000	**Temperature**	24.4℃
M/N	Firewall ES4000	**Humidity**	52.6%
Test Mode	Working	**Criterion**	A
Test Engineer	Hy Luo	**Test Voltage**	DC 24V

Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Result
0.15 ~ 80	Singal Line	3V	A	PASS

Note:

4.5. Magnetic Field Susceptibility Test

4.5.1.Block Diagram of Test Setup



4.5.2.Test Standard

EN IEC 61000-6-2:2019
(EN 61000-4-8: 2010, Severity Level: Level 4, 30A / m)

4.5.3.Severity Levels and Performance Criterion

4.5.3.1.Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

4.5.3.2.Performance Criterion: **A**

4.5.4.EUT Configuration on Test

The configuration of the EUT is same as Section 4.5.1

4.5.5.Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil is set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

4.5.6.Test Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Result

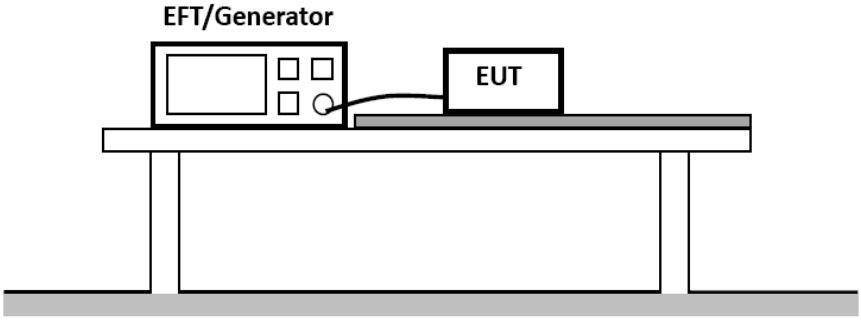
Standard	☐ IEC 61000-4-8 ☑ EN 61000-4-8		
Applicant	Shanghai Panelmate Electronics Co., Ltd.		
EUT	Firewall ES4000	**Temperature**	24.8℃
M/N	Firewall ES4000	**Humidity**	53.7％
Test Mode	Working	**Criterion**	A
Test Engineer	Hy Luo	**Test Voltage**	DC 24V

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result
30	5 mins	X	A	PASS
30	5 mins	Y	A	PASS
30	5 mins	Z	A	PASS

Note:

4.6. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

4.6.1. Block Diagram of Test Setup



4.6.2. Test Standard

EN IEC 61000-6-2:2019 (EN 61000-4-4: 2012, Level 3: 1KV)

4.6.3. Severity Levels and Performance Criterion

4.6.3.1. Severity level

Open Circuit Output Test Voltage ±10%		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 KV	0.25 KV
2	1 KV	0.5 KV
3	2 KV	1 KV
4	4 KV	2 KV
X	Special	Special

4.6.3.2. Performance Criterion

Performance Criterion: B

4.6.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4.6.1.

4.6.5. Operating Condition of EUT

4.6.5.1. Setup the EUT as shown in Section 4.6.1.
4.6.5.2. Turn on the power of all equipments.
4.6.5.3. Let the EUT work in test mode(1) and measure it.

4.6.6. Test Procedure

The EUT is put on the table, which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

4.6.6.1. For input and output AC power ports:
The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 mins.

4.6.6.2. For signal lines and control lines ports:
The EUT is connected to the power mains by using a coupling device, which Couples the EFT interference signal to I/O Cable. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 mins.

4.6.6.3. For DC output line ports:
It's unnecessary to test.

4.6.7. Test Results

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

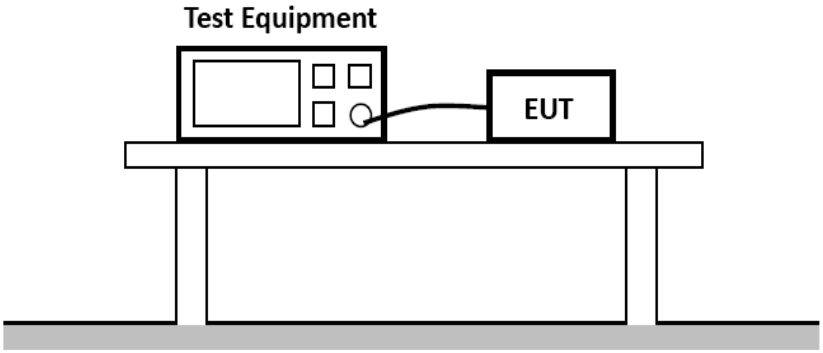
Standard	☐ IEC 61000-4-4 ☑ EN 61000-4-4		
Applicant	Shanghai Panelmate Electronics Co., Ltd.		
EUT	Firewall ES4000	**Temperature**	24.2℃
M/N	Firewall ES4000	**Humidity**	53.6%
Test Mode	Working	**Criterion**	B
Test Engineer	Hy Luo	**Test Voltage**	DC 24V

Line	Test Voltage	Result (+)	Result (-)
P			
N			
PE			
P,N			
P,PE			
N,PE			
P,N,PE			
Signal Line	1KV	PASS	PASS
I/O Cable			

Note: a: P indicates the positive polarity of the power port, N indicates the negative polarity of the power port.

4.7. SURGE IMMUNITY TEST

4.7.1. Block Diagram of Test Setup



4.7.2. Test Standard

EN IEC 61000-6-2:2019 (EN 61000-4-5: 2014+A1: 2017+A1: 2017, Severity Level: Singal Line: Level 3, 1.0KV,)

4.7.3. Severity Levels and Performance Criterion

4.7.3.1. Severity level

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

4.7.3.2. Performance Criterion

Performance Criterion: B

4.7.4. EUT Configuration on Test

The configuration of EUT is listed in Section 4.7.1.

4.7.5. Operating Condition of EUT

4.7.5.1.Setup the EUT as shown in Section 4.7.1.
4.7.5.1.Turn on the power of all equipments.
4.7.5.1.Let the EUT work in test mode (1) and measure it.

4.7.6. Test Procedure

4.7.6.1. Set up the EUT and test generator as shown on Section 4.7.1.

4.7.6.2. For line to line coupling mode, provide a 2.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

4.7.6.3.For I/O ports coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

4.7.6.4. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

4.7.6.5. Different phase angles are done individually.

4.7.6.6. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

4.7.7. Test Results

PASS.

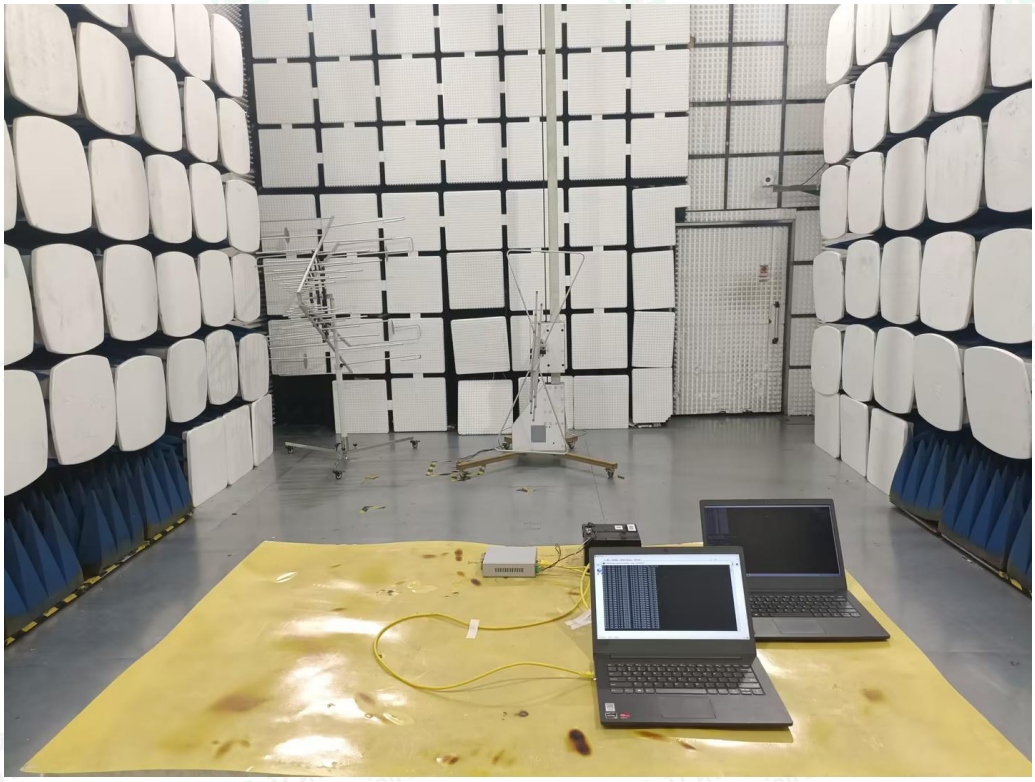
Please refer to the following page.

Surge Immunity Test Result

Standard	☐ IEC 61000-4-5 ☑ EN 61000-4-5		
Applicant	Shanghai Panelmate Electronics Co., Ltd.		
EUT	Firewall ES4000	**Temperature**	24.4℃
M/N	Firewall ES4000	**Humidity**	53.5%
Test Mode	Working	**Criterion**	B
Test Engineer	Hy Luo	**Test Voltage**	DC 24V

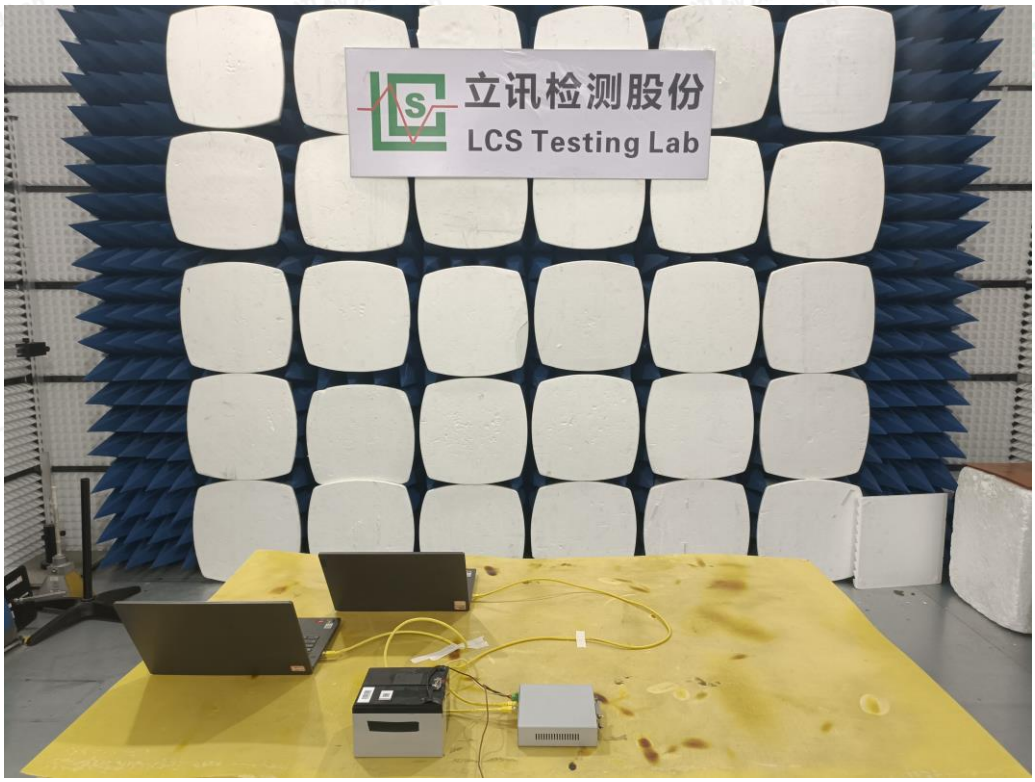
Location	Polarity	Number of Pulse	Pulse Voltage (KV)	Result
P-N				
P-PE				
N-PE				
Signal Line	+	/	1.0	PASS
	-	/	1.0	PASS
I/O Cable				
Note	a: P indicates the positive polarity of the power port, N indicates the negative polarity of the power port.			

5. PHOTOGRAPHS OF TEST SETUP



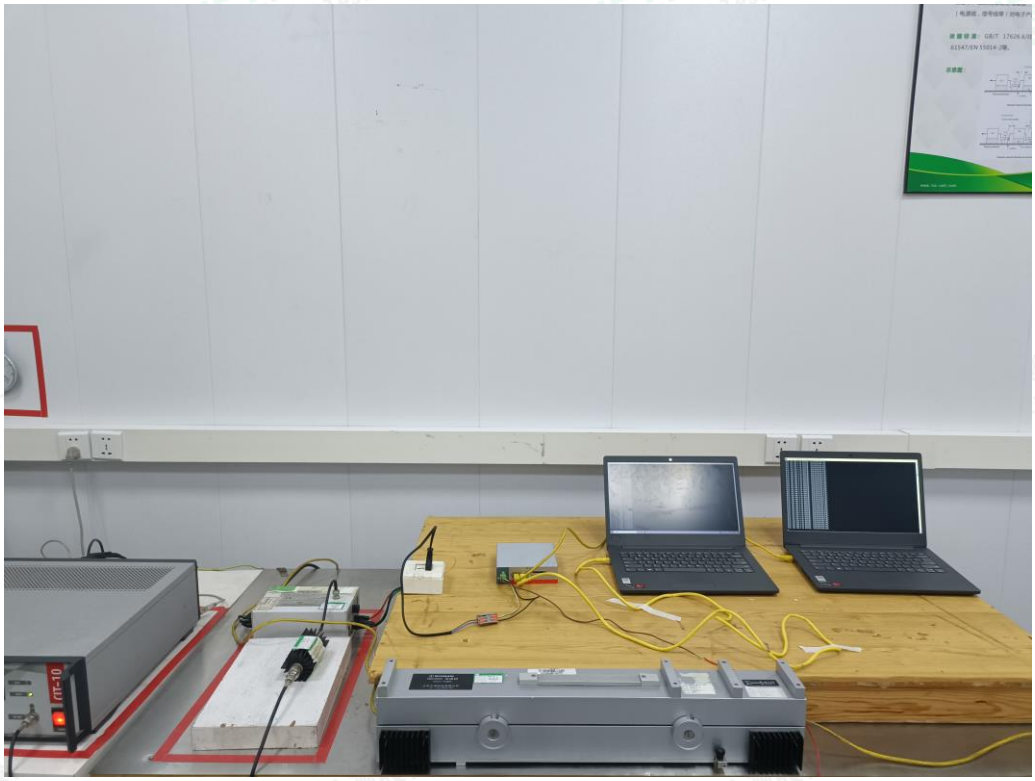
Test Setup Photo of Radiated Measurement (30MHz~1GHz)

Test Setup Photo of Electrostatic Discharge Test



Test Setup Photo of RF Field Strength Susceptibility Test

Photo of Electrical Fast Transient/Burst Test & Surge Immunity Test



Test Setup Photo of Injected Currents Susceptibility Test(I/O Cable)

Test Setup Photo of Magnetic Field Immunity Test

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

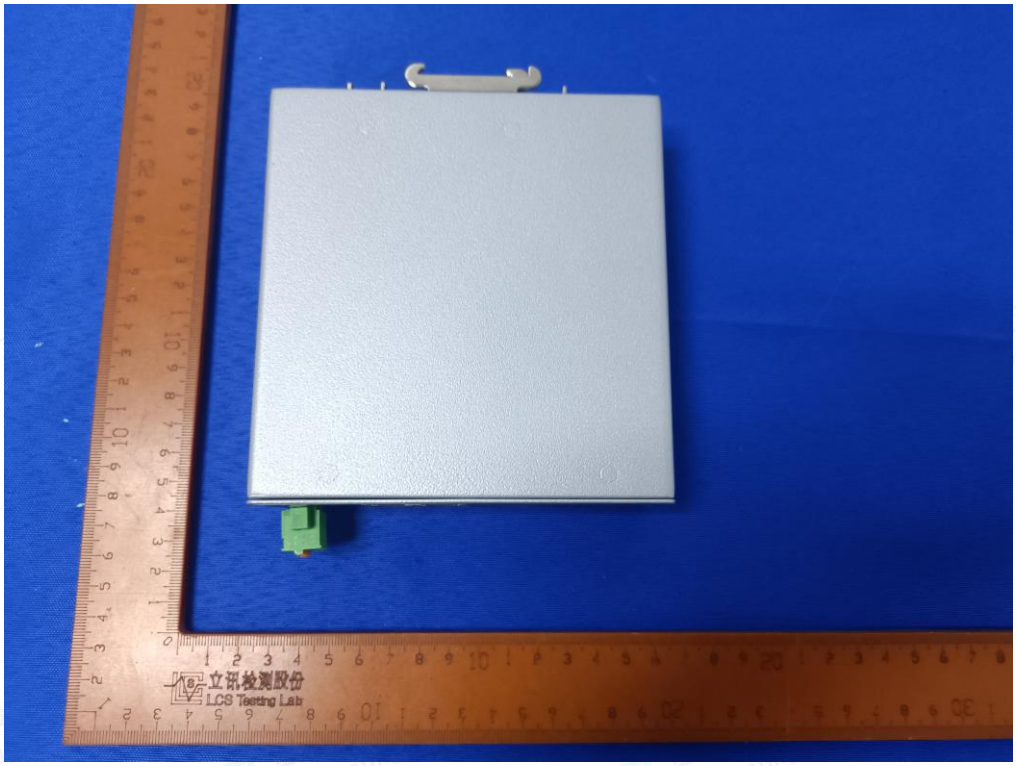


Fig. 1

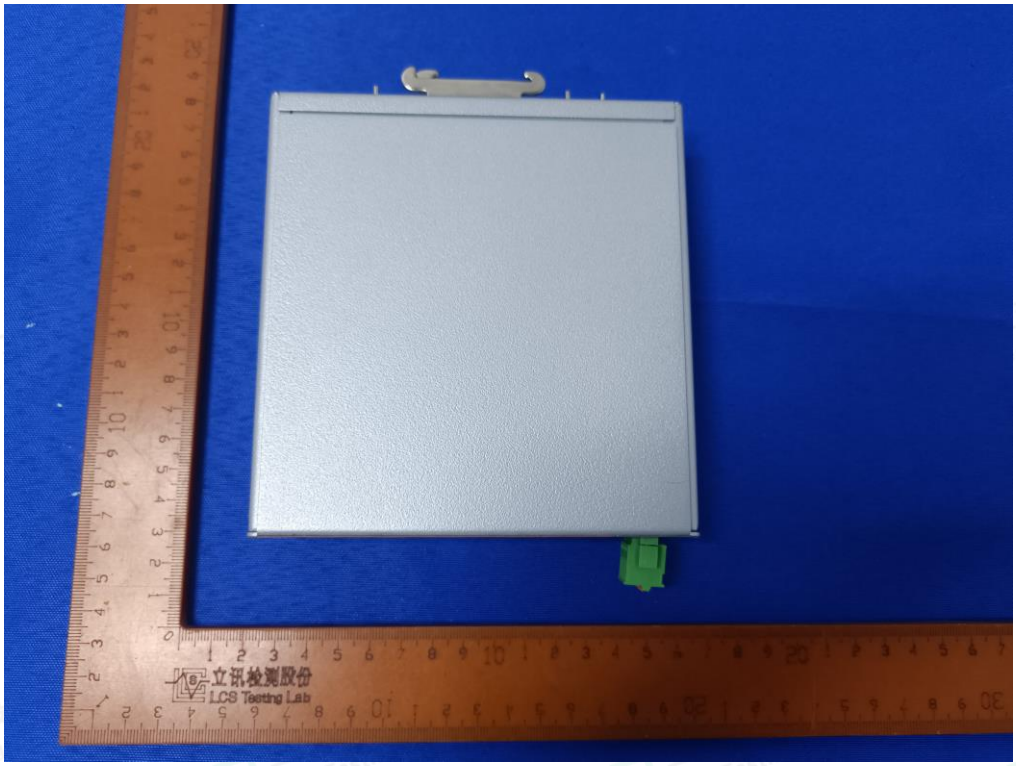


Fig. 2

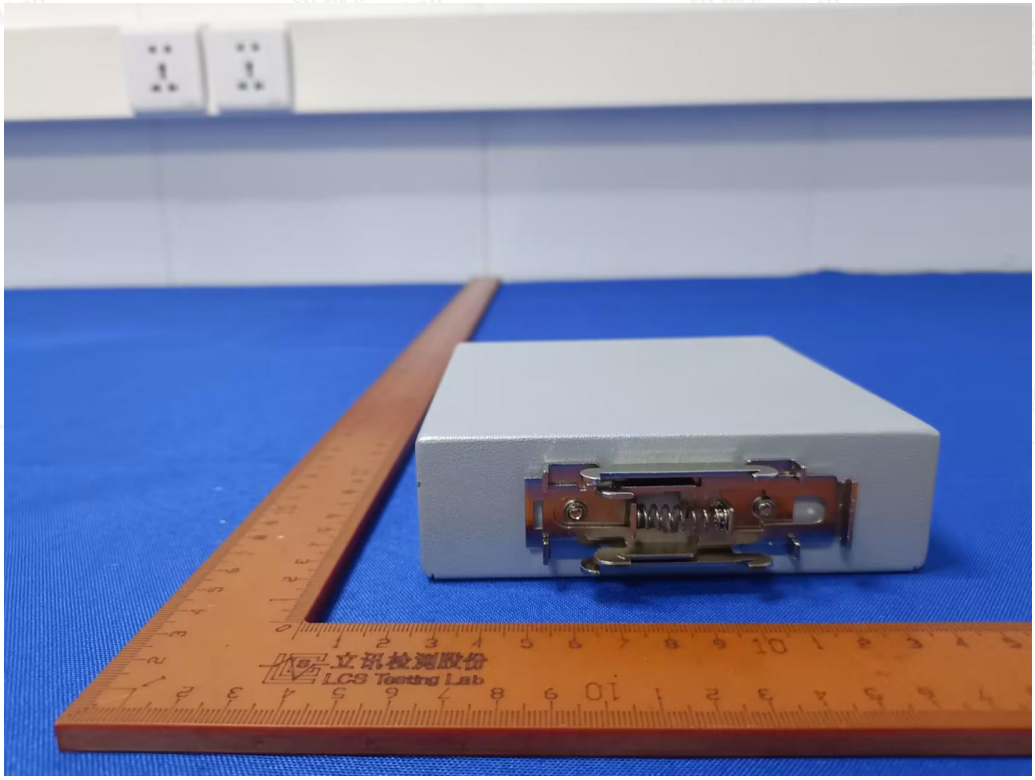

立讯检测股份
LCS Testing Lab

Fig. 3

WAN1
LAN1
STAT
CONF
立讯检测股份
LCS Testing Lab

Fig. 4

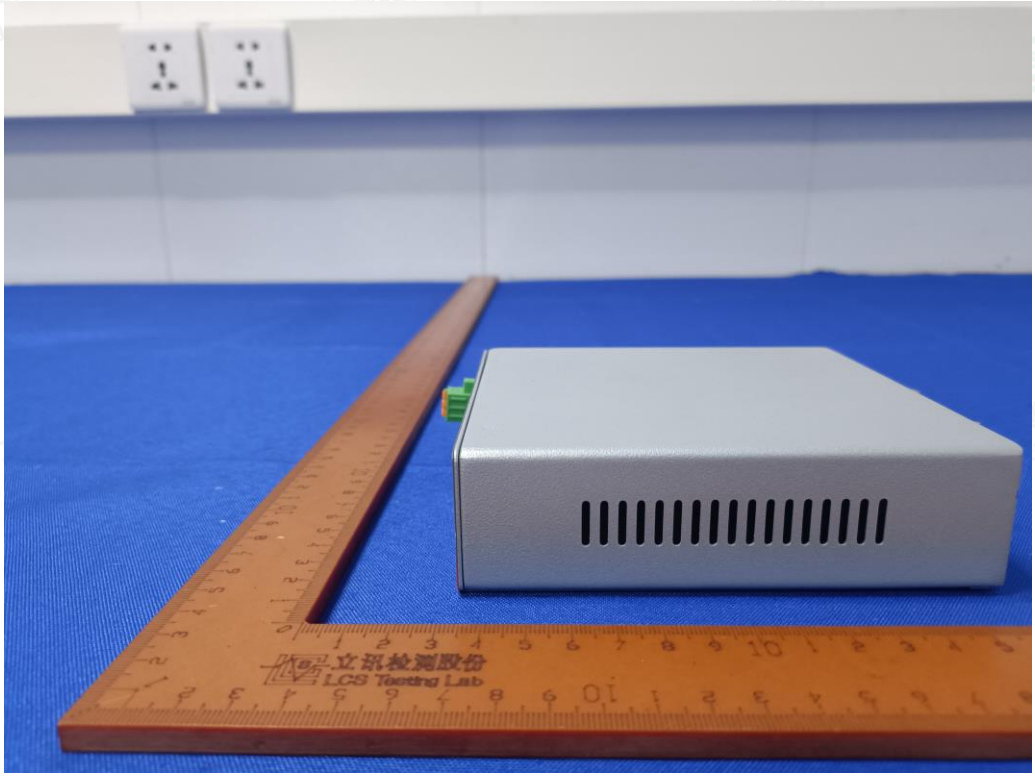


Fig. 5

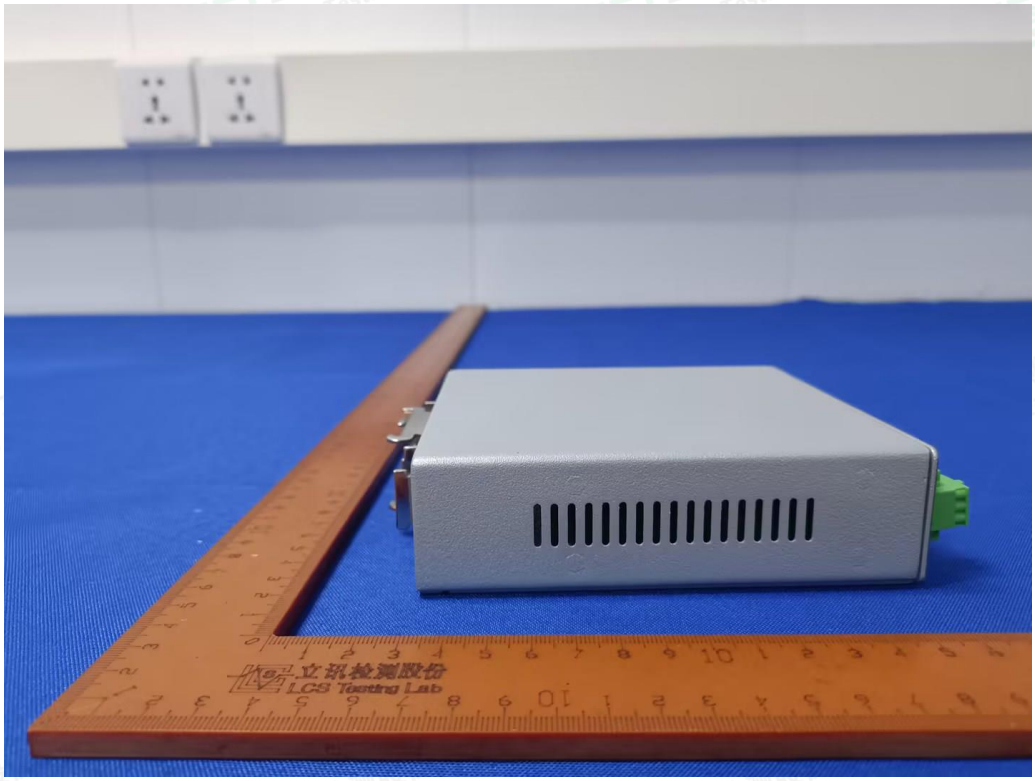


Fig. 6

----------THE END OF TEST REPORT----------