



华检测试
CTL TESTING TECHNICAL



中国认可
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TESTING
CNAS L14175

Shenzhen CTL Testing Technical Services Co., Ltd.
Tel: 0755-21380337 Web: www.sz-ctl.com

Test Report

EN IEC 62040-2 Uninterruptible power systems (UPS) - part 2: Electromagnetic compatibility (EMC) requirements

Report Reference No. : GM2401128012-E

Compiled by

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Date of issue : February 01, 2024

Testing Laboratory Name : Shenzhen CTL Testing Technical Services Co., Ltd.

Address : No. 101, Building 1, Phase 1, Longbang Industrial Park, No. 8 Tianyuan Road, Shutianpu Community, Matian Street, Guangming District, Shenzhen, China.

Testing location/ procedure : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing methods ☐

Applicant's name : GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

Address : No. 1, Shijielang Road, Lianhe Industrial West 2 Zone, Luocun, Shishan Town, Nanhai District, Foshan, Guangdong, China

Test specification:

Standard : EN IEC 62040-2: 2018

Non-standard test method : /

Test Report Form No. :

TRF Originator : Shenzhen CTL Testing Technical Services Co., Ltd

Shenzhen CTL Testing Technical Services Co., Ltd.

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Test item description : UPS

Trade Mark : Prostar

Result : Pass



EMC -- Test Report

Test Report No. : GM2401128012-E	February 01, 2024
	Date of issue

Equipment under Test : UPS

Type / Model : PET1103B

Listed Models : PER1103B, PET1101, PET1102, PET1103, PET1101B, PET1102B,
PER1101, PER1102, PER1103, PER1101B, PER1102B

Applicant : GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

Address : No. 1, Shijielang Road, Lianhe Industrial West 2 Zone, Luocun, Shishan
Town, Nanhai District, Foshan, Guangdong, China

Manufacturer : GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

Address : No. 1, Shijielang Road, Lianhe Industrial West 2 Zone, Luocun, Shishan
Town, Nanhai District, Foshan, Guangdong, China

Test Result	Pass
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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.

History of this test report

Report No.	Version	Description	Issued Date
GM2401128012-E	V1.0	Initial Issued Report	February 01, 2024

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1. TEST STANDARDS

The tests were performed according to following standards:

[EN IEC 62040-2: 2018](#) Uninterruptible power systems (UPS) - part 2: Electromagnetic compatibility (EMC) requirements

2. SUMMARY

2.1. General Remarks:

Date of receipt of test sample : January 15, 2024

Sampling and Testing commenced on : January 15, 2024

Testing concluded on : January 19, 2024

2.2. Equipment Under Test

Power Rating

Input Power : AC 220V-240V, 50/60Hz
Output Power : AC 208V/220V/230V/240V, 50/60Hz
Adaptor information : N/A

2.3. Description of test modes

The EUT were tested under the following modes, the final worst mode was marked in bold face and recorded in this report.

EMISSION TEST:

Description of Test Mode	Test Voltage
Charging	AC 230V/50Hz
Discharging	AC 230V/50Hz

IMMUNITY TESTS:

Description of Test Mode	Test Voltage
Charging	AC 230V/50Hz
Discharging	AC 230V/50Hz

Emissions tests.....: According to EN IEC 62040-2, searching for the highest disturbance.

Immunity tests: According to EN IEC 62040-2, searching for the highest susceptibility.

Note:

For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.

The tests are carried out with surge protective devices disconnected

2.4. Short description of the Equipment under Test (EUT)

The EUT is a UPS

2.5. Description of Support units

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

■ - supplied by the manufacturer

o - supplied by the lab

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.

2.6. Performance Criteria

Definition related to the performance level:

- based on the used product standard
- o based on the declaration of the manufacturer, requestor or purchaser

Criterion A:

Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) 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.

Criterion B:

Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

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 (or permissible loss of performance) 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. 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.

Criterion C:

Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Testing Technical Services Co., Ltd.

No. 101, Building 1, Phase 1, Longbang Industrial Park, No. 8 Tianyuan Road, Shutianpu Community, Matian Street, Guangming District, Shenzhen, China.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Certificated by CNAS

Registration No.: CNAS L14175

Date of issue: Jan. 06, 2021

Valid until: Jan. 05, 2027

3.3. Test Description

Emission Measurement			
Test Item	Standard	Limit	Conclusion
Radiated Emission	EN IEC 62040-2: 2018	C2	PASS
Conduction Emission	EN IEC 62040-2: 2018	C2	PASS
Immunity Measurement			
Test Item	Standard	Test Result	Conclusion
Electrostatic Discharge	EN IEC 62040-2: 2018 IEC 61000-4-2: 2008	Criterion B	PASS
RF Field Strength Susceptibility	EN IEC 62040-2: 2018 IEC 61000-4-3: 2020	Criterion A	PASS
Electrical Fast Transient/Burst Test	EN IEC 62040-2: 2018 IEC 61000-4-4: 2012	Criterion B	PASS
Surge Test	EN IEC 62040-2: 2018 IEC 61000-4-5: 2017	Criterion B	PASS
Conducted Susceptibility Test	EN IEC 62040-2: 2018 IEC 61000-4-6: 2013	Criterion A	PASS
Power Frequency Magnetic Field Susceptibility Test	EN IEC 62040-2: 2018 IEC 61000-4-8: 2009	Criterion A	PASS

Remark:

1. The test result PASS and /or FAIL has no relationship with the measurement uncertainty.

3.4. 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 Shenzhen CTL Testing Technical Services Co., Ltd 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.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission(chamber 2)	30~1000MHz	$\pm 3.64\text{dB}$	(1)
Conducted Emission	0.15~30MHz	$\pm 2.86\text{dB}$	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

3.5. Equipments Used during the Test

Radiated Emission (966 Chamber 2)						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	ULTRA-BROADBAND ANTENNA	SCHWARZBECK	VULB 9162	00342	2023/08/19	2024/08/18
2.	EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101131	2023/08/08	2024/08/07
3.	RF Pre-amplifier	EMtrace	RP01A	02717	2023/08/07	2024/08/06
Software						
Name of Software		Manufacture		Version		
EZ-EMC		Farad Technology Co.,Ltd		1.1.4.2		

Conducted Emission (EMC 4#)						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	EMI Test Receiver	ROHDE & SCHWARZ	ESU	100485	2023/08/10	2024/08/09
2.	LISN	SCHWARZBECK	NNLK 8129 RC	5019	2023/08/07	2024/08/06
3.	Limitator	ROHDE & SCHWARZ	ESH3-Z2	100028	2023/08/10	2024/08/09
Software						
Name of Software		Manufacturer		Version		
EZ-EMC		Farad Technology Co.,Ltd		1.1.4.2		

Electrostatic Discharge						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	ESD Simulator	AMETEK CTS	esd NX30.1	11905	2023/09/06	2024/09/05

Electrical Fast Transient/Surge						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Ultra Compact Simulator	HAEFELY	AXOS8	186722	2023/08/07	2024/08/06
2.	Three-phase coupling network	HAEFELY	FP-COMB32	188210	2023/08/07	2024/08/06

Conducted Susceptibility (CS) :						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Signal Generator	ROHDE & SCHWARZ	SML01	103218	2023/08/07	2024/08/06
2.	Attenuator	FiberHome	6dB 200W	N/A	2023/08/08	2024/08/07
3.	Amplifier	Micotop	MPA-0.01-400-200	MPA2007233	2023/08/07	2024/08/06
4.	Power meter	Agilent	E4419B	GB43312263	2023/08/07	2024/08/06
5.	Power Sensor	KEYSIGHT	E9304A	MR56020034	2023/08/07	2024/08/06
6.	Power Sensor	KEYSIGHT	E9304A	MR5400087	2023/08/07	2024/08/06
7.	CDN	Dr.Hubert GmbH	CDN-M5-32A	20902542-0201	2023/08/08	2024/08/07
Software						
Name of Software		Manufactor		Version		
EM6		Emtrace test technologies(Shenzhen) co.,ltd		1.0.0.0		

Power Frequency Magnetic Field Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Magnetic field generator	PMI	MAG100	/	2023/08/08	2024/08/07

RF Field Strength Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	SIGNAL GENERATOR	Agilent	N5181A	MY47420649	2023/08/10	2024/08/09
2.	Power Amplifier	Micotop	MPA-80-1000-1000-A	MPA2007228	2023/08/08	2024/08/07
3.	Power Amplifier	Micotop	MPA-80-1000-1000-B	MPA2007229	2023/08/08	2024/08/07
4.	Power Amplifier	Micotop	MPA-80-1000-1000	MPA2007227	2023/08/08	2024/08/07
5.	Power Amplifier	Micotop	MPA-80-1000-1000-C	MPA2007230	2023/08/08	2024/08/07
6.	Power Amplifier	Micotop	MPA-80-1000-1000-D	MPA2007231	2023/08/08	2024/08/07
7.	Power Amplifier	Micotop	MPA-80-1000-1000-E	MPA2007232	2023/08/08	2024/08/07
8.	Power Meter	Agilent	E4419B	GB43312510	2023/08/10	2024/08/09
9.	Test Antenna-Bi-Log	Schwarzbeck	STLP 9128 E special	3142	2023/08/19	2024/08/18
10.	Power transmitter	KEYSIGHT	E9301A	MY41069009	2023/08/10	2024/08/09
11.	Power transmitter	KEYSIGHT	E9301A	MY41069011	2023/08/10	2024/08/09
Software						
Name of Software		Manufactor		Version		
EM3		Emtrace test technologies(ShenZhen) co.,ltd		1.1.9.0		

Remark:

1. The test result PASS and /or FAIL has no relationship with the measurement uncertainty.

4. TEST CONDITIONS AND RESULTS

4.1. Radiated Emission

For test instruments and accessories used see section 3.5.

4.1.1. Description of the test location

Test location: 966 Chamber 2

4.1.2. Limits of disturbance

For frequency below 1000MHz

Frequency (MHz)	C2(at 3m)	C3(at 3m)
	Quasi-Peak dB μ V/m	Quasi-Peak dB μ V/m
30 ~ 230	50	60
230 ~ 1000	57	70

NOTE: 1.The tighter limit shall apply at the edge between two frequency bands.

2.Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

Frequency range of radiated measurement

Highest internal frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes(MHz)	Range(MHz)
Below 108	1000
108-500	2000
500-1000	5000
Above 1000	Up to 5 times of the highest frequency or 6GHz, whichever is less

For frequency above 1000MHz

Frequency (GHz)	Class A(dB μ V/m)(at 3m)		Class B(dB μ V/m)(at 3m)	
	Peak	Average	Peak	Average
1.0-3.0	76	56	70	50
3.0-6.0	80	60	74	54

NOTE: 1.The lower limit shall apply at transition frequencies.

2.Emission level(dB μ V/m) = 20 log Emission level(μ V/m)

3.All emanation from a class A/B digital device or system, including any net work of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

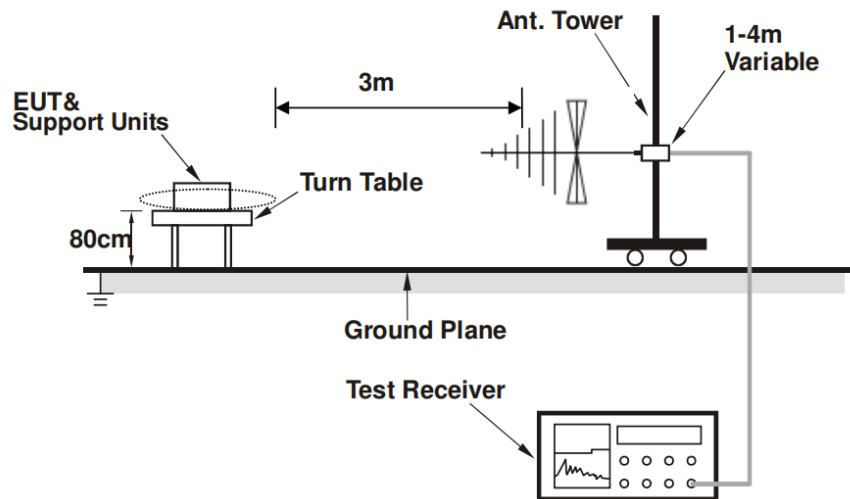
4.1.3. Description of the test set-up

4.1.3.1. Operating Condition

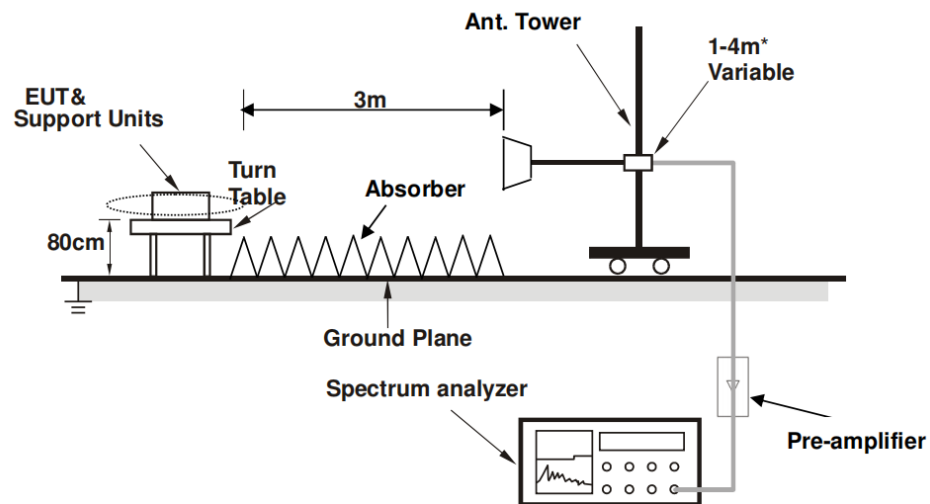
The EUT is set to work shall be carried out with full load mode during the test, and the maximum emanating results are recorded.

4.1.3.2. Test setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



4.1.4. Test procedure

<Frequency range 30MHz-1000MHz>

- a. The EUT was placed on the top of a rotating table 0.8meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is 30MHz-1000MHz.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection(QP) at frequency 30MHz-1000MHz.
2. Emission level(dBμV/m) = Raw Value(dBμV) + Correction Factor(dB/m).
3. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)(if the raw value not contains the amplifier).
4. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Amplifier Gain(dB)(if the raw value contains the amplifier)
5. Margin value = Limit value - Emission level.

4.1.5. Test result

Frequency range	30-1000MHz	Environmental conditions	Temperature	26°C
Detector function& Resolution bandwidth	Quasi-Peak, 120kHz			
Frequency range	1GHz-6GHz		Humidity	60.0%RH
Detector function& Resolution bandwidth	Peak,Average 1MHz			

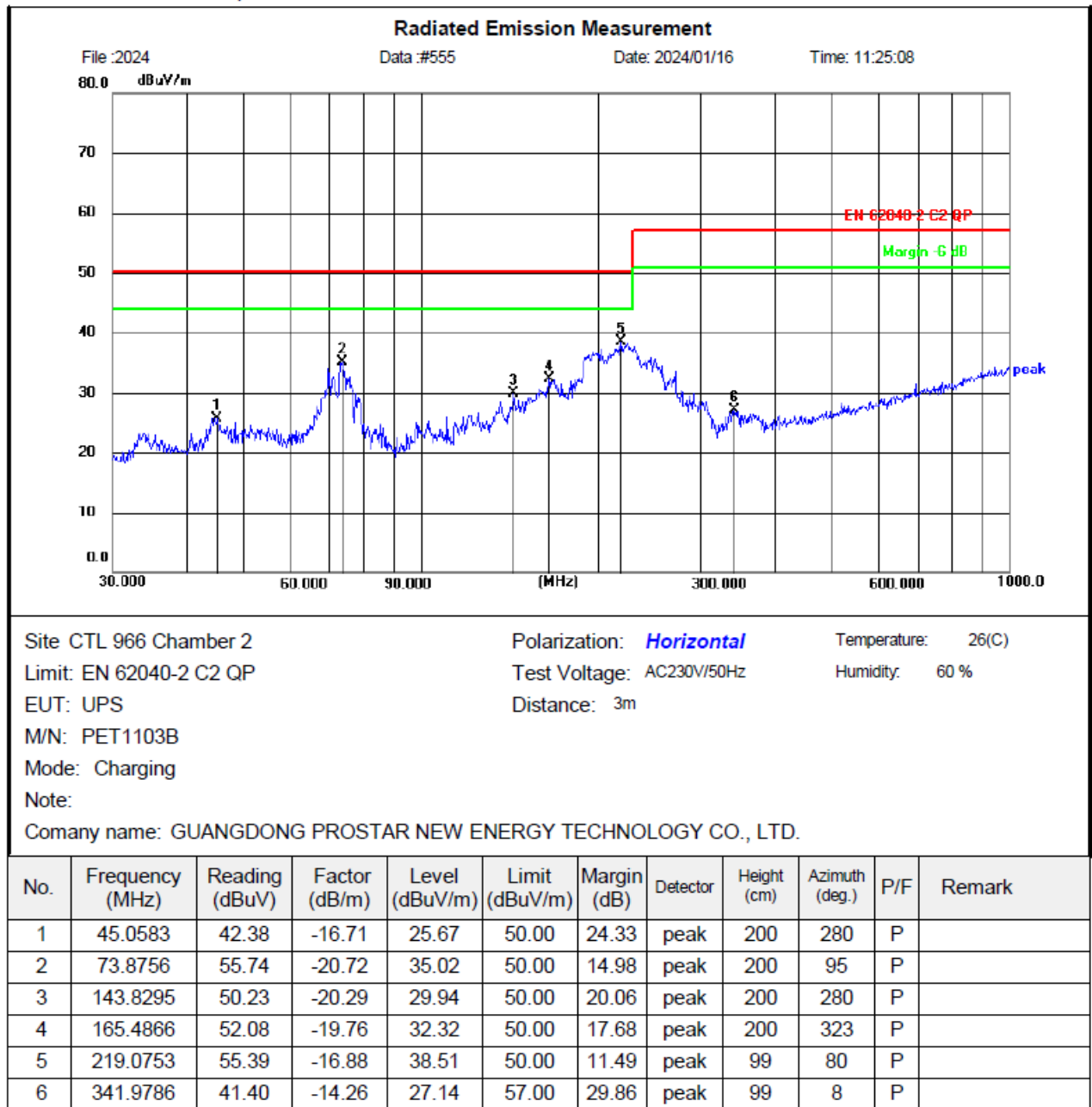
The requirements are **Fulfilled**

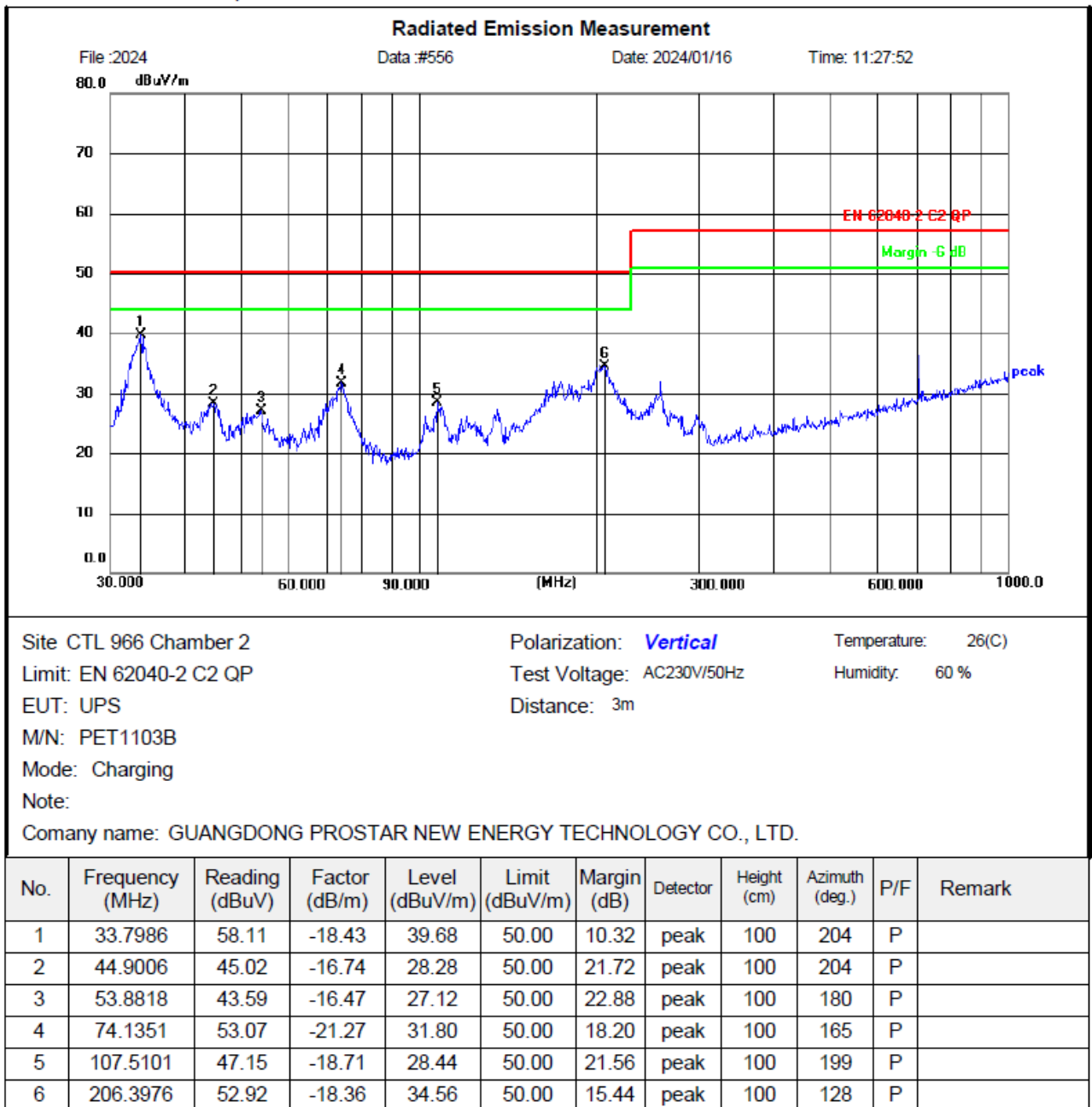
Remarks: The limits are kept. For detailed results, please see the following page(s).



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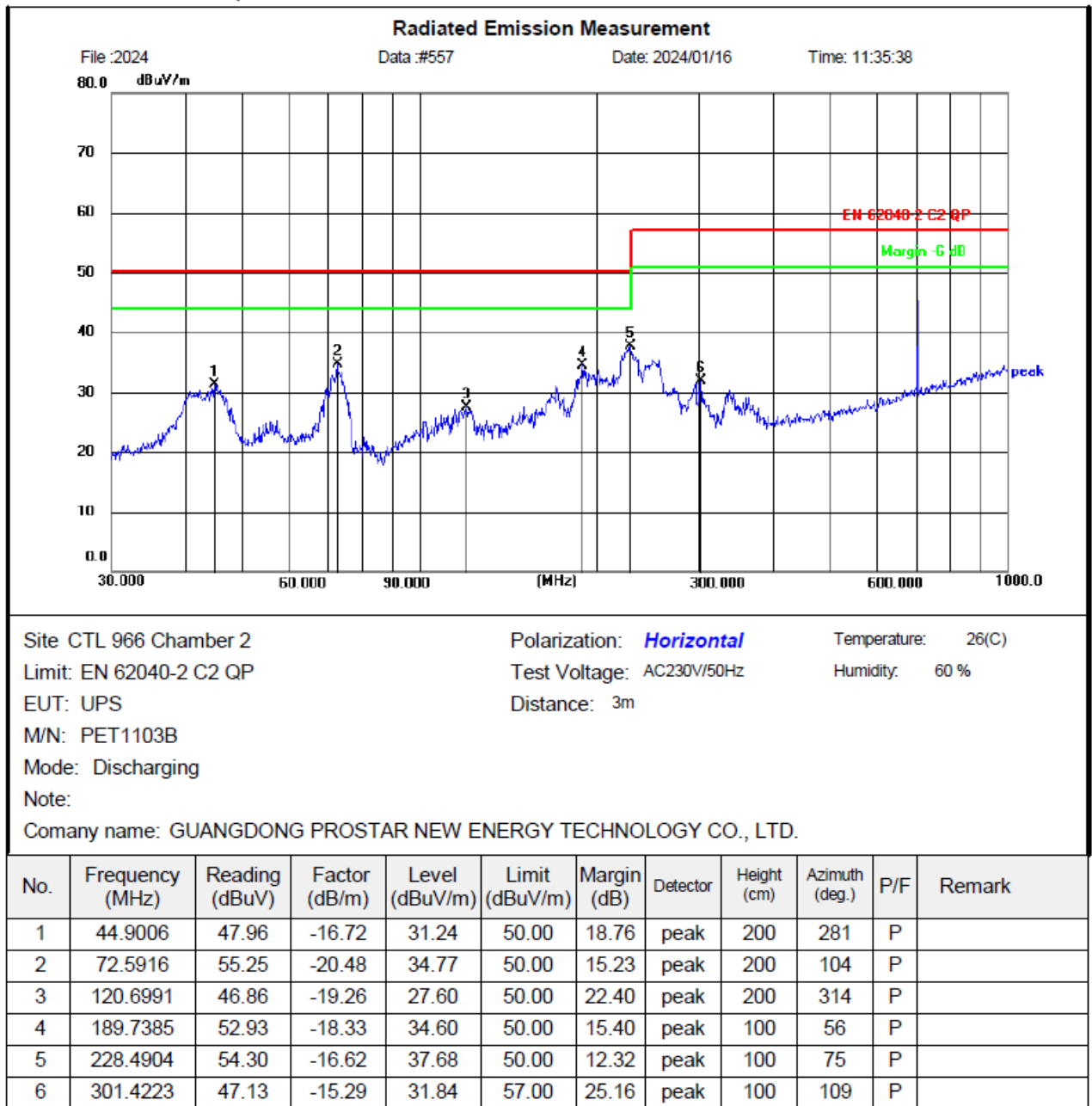
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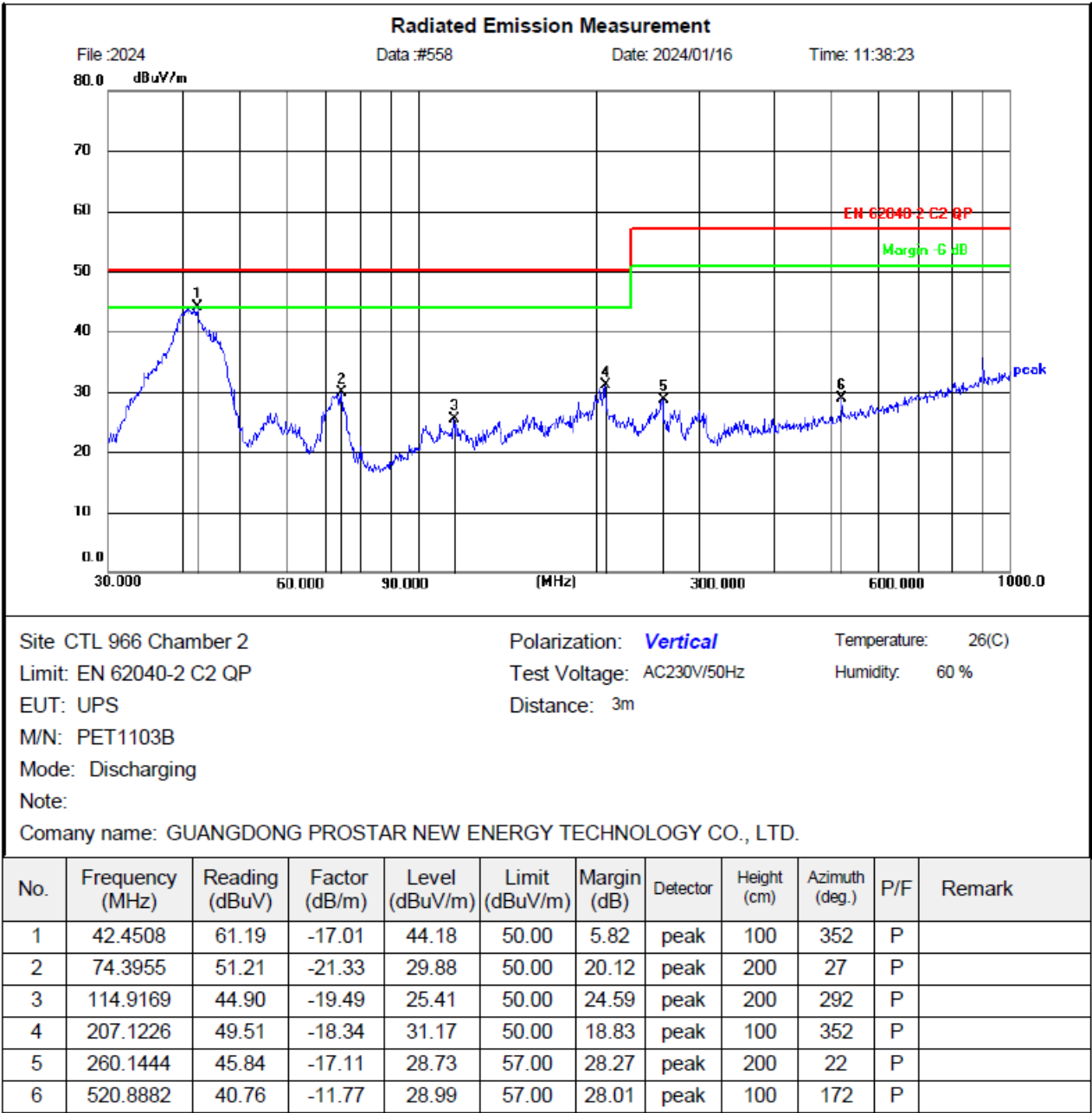
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4.2. Conducted disturbance

For test instruments and accessories used see section 3.5.

4.2.1. Description of the test location

Test location: EMC Test Room 4#

4.2.2. Limits of disturbance

Limit of disturbance voltage at the mains terminals

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	79	66
0.500~5.000	73	60
5.000~30.00	73	60

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

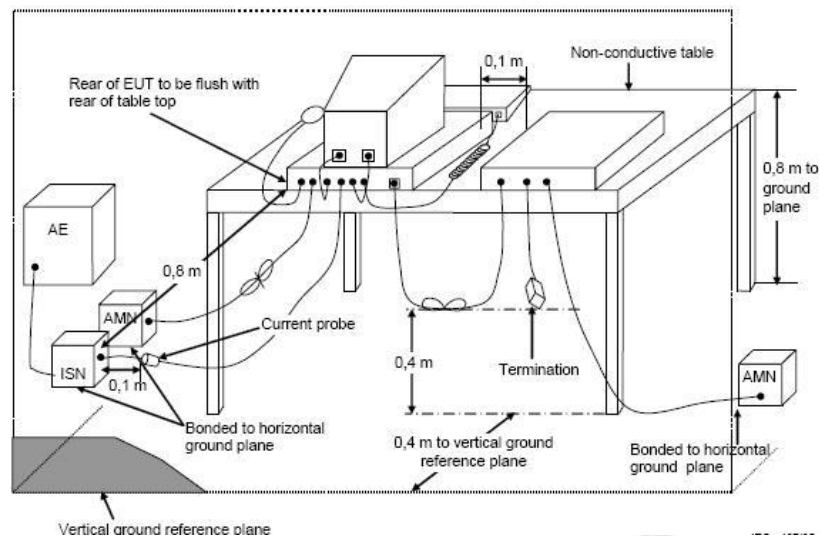
4.2.3. Description of the test set-up

4.2.3.1. Operating Condition

The EUT is set to work shall be carried out full load mode during the test, and the maximum emanating results are recorded.

4.2.3.2. Configuration of test setup

Mains terminals:



4.2.4. Test result

Frequency range	0.15-30MHz	Environmental conditions	Temperature	26℃
Resolution bandwidth	9kHz		Humidity	60.0%RH

The requirements are **Fulfilled**

Remarks: The limits are kept. For detailed results, please see the following page(s).



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Conducted Emission Measurement

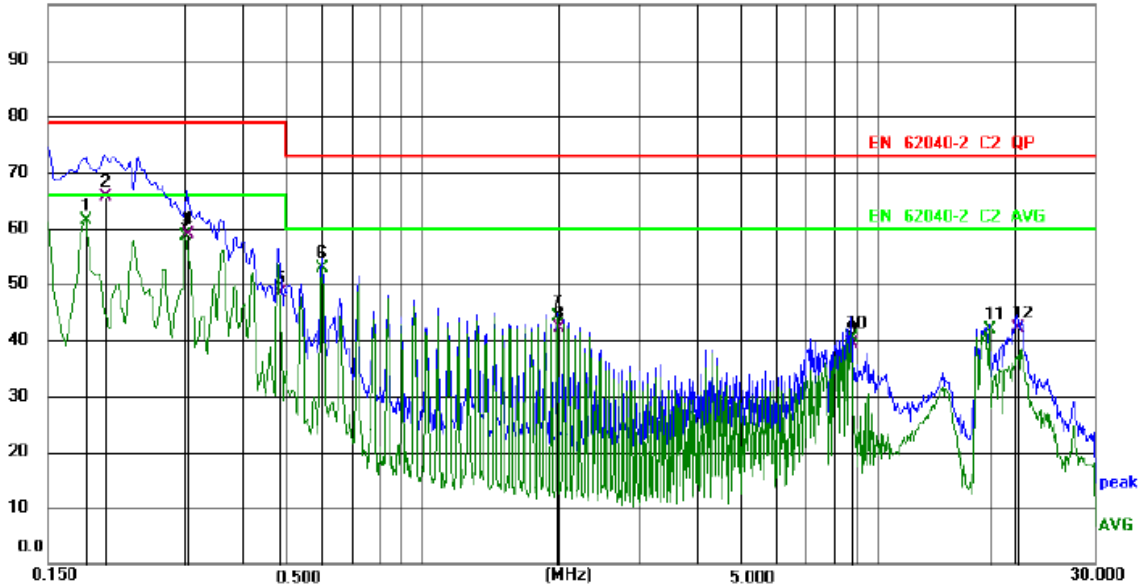
File :2024 CE

Data :#251

Date: 2024/1/16

Time: 10:18:08

100.0 dBuV



Site LAB

Phase: L1

Temperature: 26(C)

Limit: EN 62040-2 C2 QP

Power: AC230V/50Hz

Humidity: 60 %RH

EUT: UPS

M/N: PET1103B

Mode: Charging

Note:

Company name: GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1815	51.24	10.20	61.44	66.00	4.56	AVG	P	
2	0.2000	55.45	10.19	65.64	79.00	13.36	QP	P	
3	0.2985	48.46	10.20	58.66	66.00	7.34	AVG	P	
4	0.3030	48.72	10.20	58.92	79.00	20.08	QP	P	
5	0.4830	38.17	10.20	48.37	79.00	30.63	QP	P	
6	0.6000	42.74	10.21	52.95	60.00	7.05	AVG	P	
7	1.9815	33.88	10.22	44.10	60.00	15.90	AVG	P	
8	1.9820	31.93	10.22	42.15	73.00	30.85	QP	P	
9	8.7630	28.86	10.51	39.37	73.00	33.63	QP	P	
10	8.7630	29.79	10.51	40.30	60.00	19.70	AVG	P	
11	17.5875	31.26	10.59	41.85	60.00	18.15	AVG	P	
12	20.3510	31.54	10.61	42.15	73.00	30.85	QP	P	



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Conducted Emission Measurement

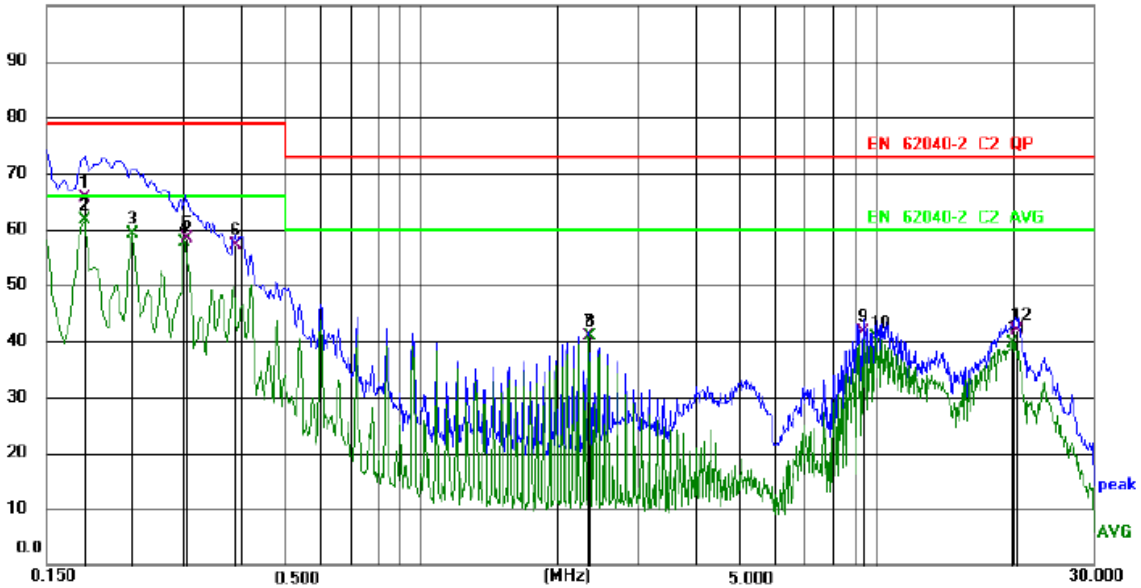
File :2024 CE

Data :#252

Date: 2024/1/16

Time: 10:23:15

100.0 dBuV



Site LAB

Phase: N

Temperature: 26(C)

Limit: EN 62040-2 C2 QP

Power: AC230V/50Hz

Humidity: 60 %RH

EUT: UPS

M/N: PET1103B

Mode: Charging

Note:

Company name: GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1810	55.43	10.16	65.59	79.00	13.41	QP	P	
2	0.1815	51.54	10.16	61.70	66.00	4.30	AVG	P	
3	0.2310	48.94	10.15	59.09	66.00	6.91	AVG	P	
4	0.2985	47.57	10.16	57.73	66.00	8.27	AVG	P	
5	0.3030	48.25	10.16	58.41	79.00	20.59	QP	P	
6	0.3890	47.05	10.16	57.21	79.00	21.79	QP	P	
7	2.3410	30.72	10.19	40.91	73.00	32.09	QP	P	
8	2.3415	30.60	10.19	40.79	60.00	19.21	AVG	P	
9	9.3660	31.26	10.47	41.73	73.00	31.27	QP	P	
10	9.9645	30.11	10.48	40.59	60.00	19.41	AVG	P	
11	19.9905	29.09	10.61	39.70	60.00	20.30	AVG	P	
12	20.3510	31.15	10.61	41.76	73.00	31.24	QP	P	



华检测试
CTL TESTING TECHNICAL

SHENZHEN CTL TESTING TECHNICAL SERVICES CO., LTD.

Longbang Industrial Park, No. 8 Tianyuan Road, Guangming District, Shenzhen.

<http://www.sz-ctl.com>

Tel: 0755-21380337

Conducted Emission Measurement

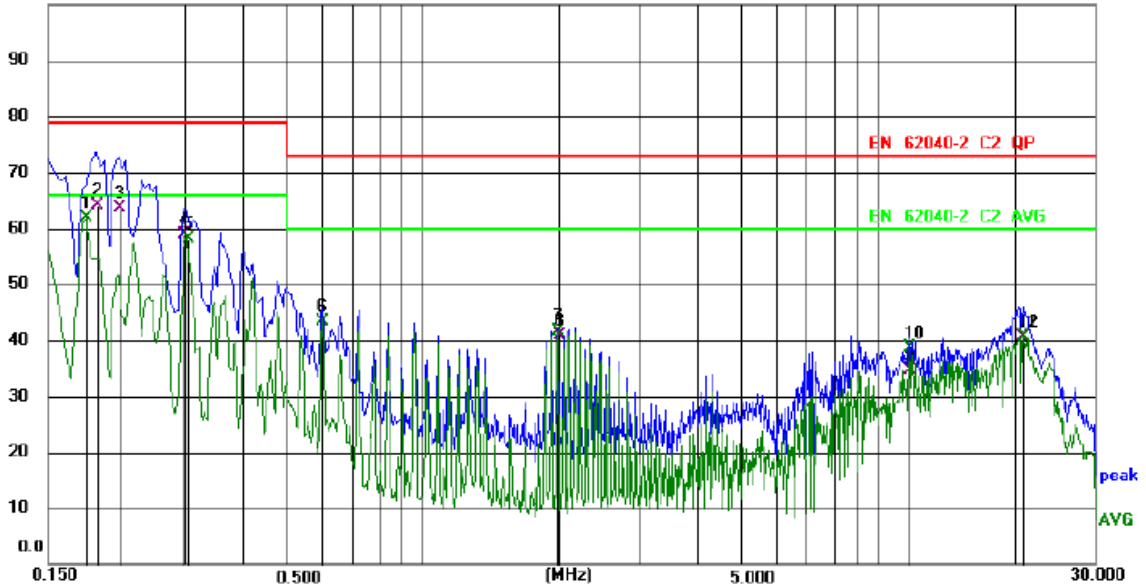
File :2024 CE

Data :#245

Date: 2024/1/15

Time: 16:10:14

100.0 dBuV



Site LAB

Limit: EN 62040-2 C2 QP

EUT: UPS

M/N: PET1103B

Mode: Discharging

Note:

Company name: GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

Phase: L1

Temperature: 26(C)

Power: AC230V/50Hz

Humidity: 60 %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1815	51.75	10.20	61.95	66.00	4.05	AVG	P	
2	0.1910	53.95	10.19	64.14	79.00	14.86	QP	P	
3	0.2130	53.46	10.19	63.65	79.00	15.35	QP	P	
4	0.2980	48.79	10.20	58.99	79.00	20.01	QP	P	
5	0.3030	48.01	10.20	58.21	66.00	7.79	AVG	P	
6	0.6000	33.10	10.21	43.31	60.00	16.69	AVG	P	
7	1.9815	31.35	10.22	41.57	60.00	18.43	AVG	P	
8	1.9820	30.74	10.22	40.96	73.00	32.04	QP	P	
9	11.7060	24.03	10.57	34.60	73.00	38.40	QP	P	
10	11.7060	28.01	10.57	38.58	60.00	21.42	AVG	P	
11	20.8320	30.12	10.60	40.72	73.00	32.28	QP	P	
12	20.9490	29.99	10.60	40.59	60.00	19.41	AVG	P	



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Tel: 0755-21380337

Conducted Emission Measurement

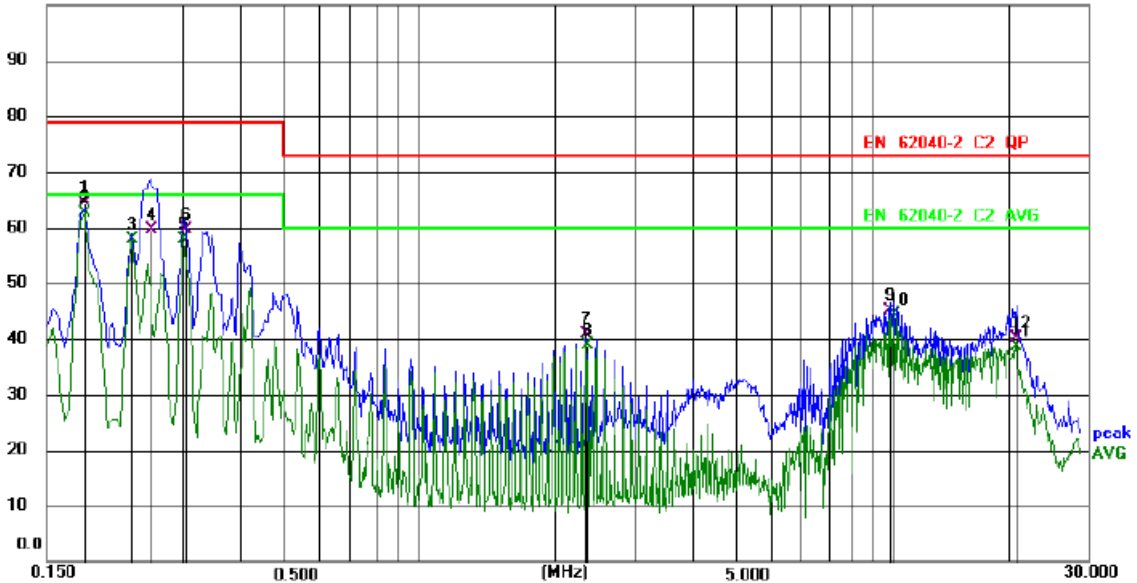
File :2024 CE

Data :#246

Date: 2024/1/15

Time: 16:14:22

100.0 dBuV



Site LAB

Phase: N

Temperature: 26(C)

Limit: EN 62040-2 C2 QP

Power: AC230V/50Hz

Humidity: 60 %RH

EUT: UPS

M/N: PET1103B

Mode: Discharging

Note:

Company name: GUANGDONG PROSTAR NEW ENERGY TECHNOLOGY CO., LTD.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1810	54.24	10.16	64.40	79.00	14.60	QP	P	
2	0.1815	52.39	10.16	62.55	66.00	3.45	AVG	P	
3	0.2310	47.66	10.15	57.81	66.00	8.19	AVG	P	
4	0.2540	49.37	10.16	59.53	79.00	19.47	QP	P	
5	0.2985	47.68	10.16	57.84	66.00	8.16	AVG	P	
6	0.3030	49.49	10.16	59.65	79.00	19.35	QP	P	
7	2.3410	30.58	10.19	40.77	73.00	32.23	QP	P	
8	2.3415	28.81	10.19	39.00	60.00	21.00	AVG	P	
9	10.9860	34.71	10.50	45.21	73.00	27.79	QP	P	
10	11.2245	33.83	10.50	44.33	60.00	15.67	AVG	P	
11	20.7105	28.00	10.60	38.60	60.00	21.40	AVG	P	
12	20.8320	29.63	10.60	40.23	73.00	32.77	QP	P	

4.3. Electrostatic discharge

For test instruments and accessories used see section 3.5.

4.3.1. Description of the test location and date

Test location: EMC Test Room 1#

Date of test: January 18, 2024

Operator: Bill

4.3.2. Severity levels of electrostatic discharge

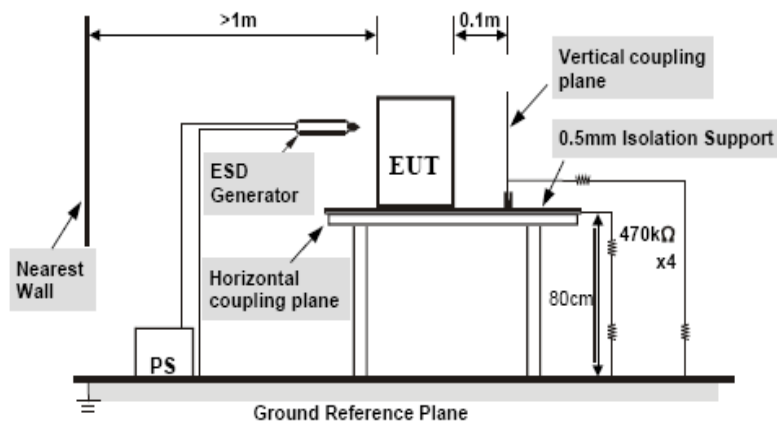
Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	2	2
2	4	4
3	6	8
4	8	15
X	Special	Special

4.3.3. Description of the test set-up

4.3.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the results of the maximum susceptible results are recorded.

4.3.3.2. Test setup



4.3.4. Test specification:

<u>Contact discharge voltage:</u>	☒ 2 kV	☒ 4 kV	
<u>Air discharge voltage:</u>	☒ 2 kV	☒ 4 kV	☒ 8 kV
<u>Number of discharges:</u>	☒ ≥ 10	☐ ≥ 25	
<u>Type of discharge:</u>	Direct discharge	☒ Air discharge	
		☒ Contact discharge	
	Indirect discharge	☒ Contact discharge	
<u>Polarity:</u>	☒ Positive	☒ Negative	
<u>Discharge location:</u>	☒ see photo documentation of the test set-up ☒ all external locations accessible by hand ☒ horizontal plate (HCP) ☒ vertical coupling plate (VCP)		

4.3.5. Test procedure

The basis test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The discharge return cable of the generator shall be kept at a distance of at least 0.2m from the EUT whilst the discharge is being applied and should not be held by the operator.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1meters from the EUT with the discharge electrode touching the HCP.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m *0.5m) was placed vertically to and 0.1 meters from the EUT.

4.3.6. Discharge position



ESD discharge locations



– Contact Discharge



– Air Discharge

4.3.7. Test result

Environmental conditions	Temperature	25°C
	Humidity	55.0%RH

The requirements are **Fulfilled**

Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

4.4. Radiated, radio-frequency, electromagnetic field

For test instruments and accessories used see section 3.5.

4.4.1. Description of the test location and date

Test location: Chamber 964

Date of test: January 18, 2024

Operator: Bill

4.4.2. Severity levels of radiated, radio-frequency, electromagnetic field

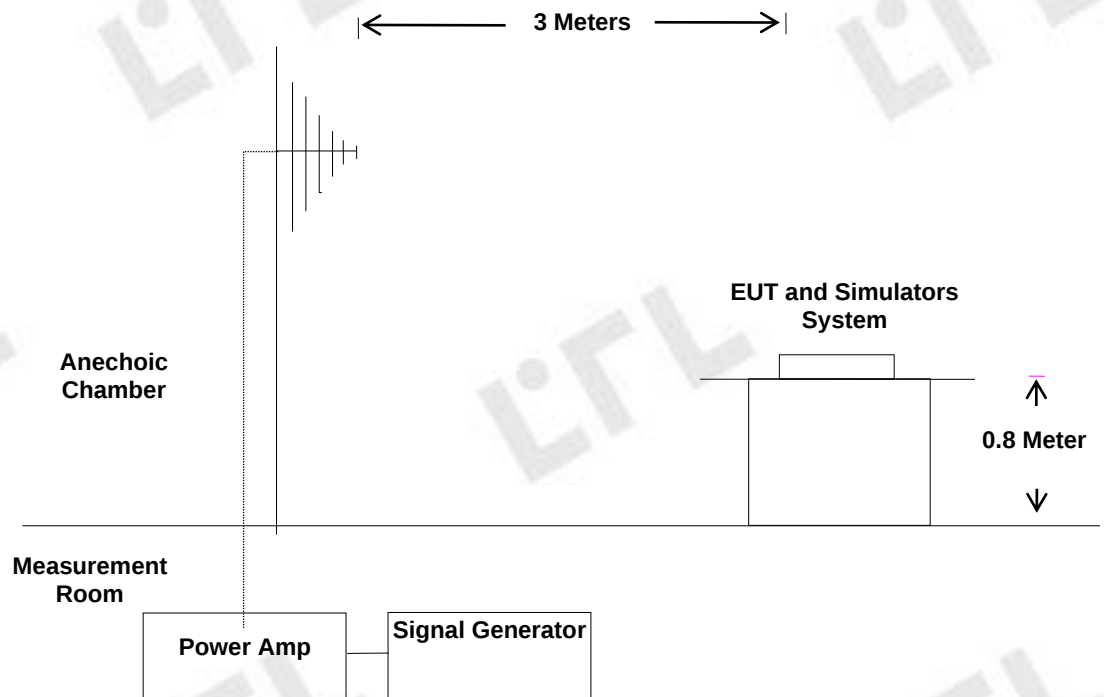
Level	Field Strength (V/m)
1.	1
2.	3
3.	10
X	Special

4.4.3. Description of the test set-up

4.4.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the results of the maximum susceptible results are recorded.

4.4.3.2. Test setup



4.4.4. Test specification:

<u>Frequency range:</u>	■ 80 MHz to 1000 MHz
<u>Field strength:</u>	■ 10 V/m
<u>EUT - antenna separation:</u>	■ 3 m
<u>Modulation:</u>	■ AM: 80 % ■ sinusoidal 1000Hz
<u>Frequency step:</u>	■ 1 % with 3 s dwell time
<u>Antenna polarisation:</u>	■ horizontal ■ vertical

4.4.5. Test procedure

The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a fully-anechoic chamber.
- The frequency range is swept from 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5s.
- The field strength levels were 10V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.4.6. Test result

Environmental conditions	Temperature	25°C
	Humidity	55.0%RH

The requirements are **Fulfilled**

Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

4.5. Electrical fast transients / Burst

For test instruments and accessories used see section 3.5.

4.5.1. Description of the test location

Test location: EMC Test Room 3#

Date of test: January 17, 2024

Operator: Bill

4.5.2. Severity levels of electrical fast transients / Burst

Severity level: $\pm 2000V$ for AC power supply lines

Open Circuit Output Test Voltage $\pm 10\%$				
Level	For Power Supply Lines		For I / O (Input / Output) Signal Data and Control Lines	
	V peak(KV)	Repetition Frequency (KHz)	V peak(KV)	Repetition Frequency (KHz)
1	0.5	5 or 100	0.25	5 or 100
2	1	5 or 100	0.5	5 or 100
3	2	5 or 100	1	5 or 100
4	4	5 or 100	2	5 or 100
X	Special	Special	Special	Special

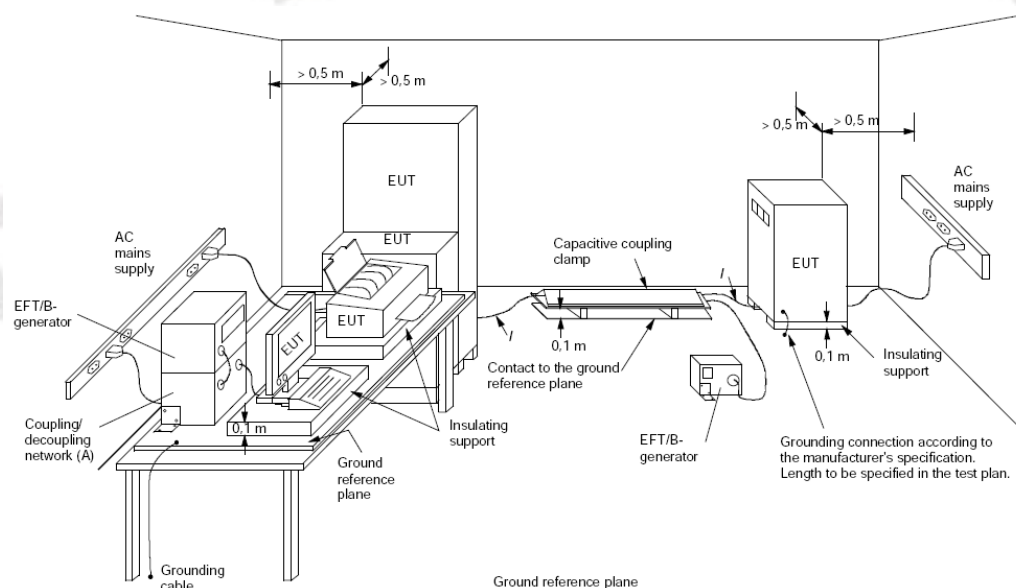
Performance criterion: B

4.5.3. Description of the test set-up

4.5.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the results of the maximum susceptible results are recorded.

4.5.3.2. Configuration of test setup



4.5.4. Test specification:Coupling network:☒ 0.5 kV ☒ 1 kV ☒ 2 kVCoupling clamp:☐ 0.5 kV ☐ 1 kV ☐ 2 kVBurst frequency:☒ 5.0 kHzCoupling duration:☒ ≥ 60 sPolarity:☒ positive ☒ negative**4.5.5. Coupling points**

Cable description:

AC power line : L, N, PE, L+N, L+PE, N+PE, L+N+PE

Screening:

☐ screened ☒ unscreened

Status:

☐ passive ☒ active

Signal transmission:

☒ analogue ☐ digital

Length:

☒ 1.5 m**4.5.6. Test result**

Environmental conditions	Temperature	25°C
	Humidity	55.0%RH

The requirements are **Fulfilled**Performance Criterion: **B****Remarks:** During the test no deviation was detected to the selected operation mode(s).

4.6. Surge

For test instruments and accessories used see section 3.5.

4.6.1. Description of the test location

Test location: EMC Test Room 3#

Date of test: January 17, 2024

Operator: Bill

4.6.2. Severity levels of surge

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

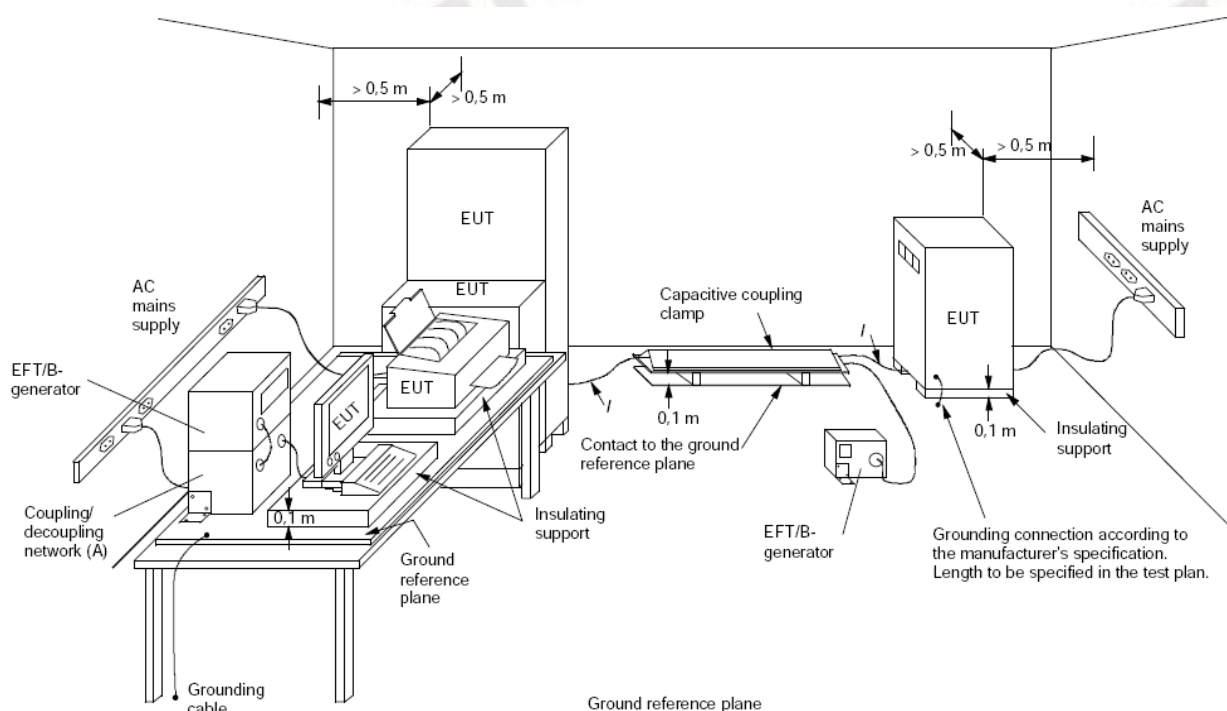
Performance criterion: **B**

4.6.3. Description of the test set-up

4.6.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the results of the maximum susceptible results are recorded.

4.6.3.2. Configuration of test setup



4.6.4. Test specification:Pulse amplitude-Power line sym.:
☒ 0.5 kV ☒ 1 kV ☐ 2 kV ☐ 4 kV
Source impedance: 2 Ω Pulse amplitude-Power line un sym:
☒ 0.5 kV ☒ 1 kV ☒ 2 kV ☐ 4 kV
Source impedance: 12 Ω

Signal line:

☐ 0.5 kV ☐ 1 kV ☐ 2 kV ☐ 4 kV
Number of surges:☒ 5 Surges/Phase anglePhase angle:
☒ 0 ° ☒ 90 ° ☒ 180 ° ☒ 270 °
Repetition rate:☒ 60 sPolarity:
☒ positive ☒ negative
4.6.5. Coupling points

Cable description:

AC power line: L+N, L+PE, N+PE

Screening:

☐ screened☒ unscreened

Status:

☐ passive☒ active

Signal transmission:

☒ analogue☐ digital

Length:

☒ 1.5 m**4.6.6. Test result**

Environmental conditions	Temperature	25°C
	Humidity	55.0%RH

The requirements are **Fulfilled**Performance Criterion: **B**
Remarks: During the test no deviation was detected to the selected operation mode(s).

4.7. Conducted disturbances induced by radio-frequency fields

For test instruments and accessories used see section 3.5.

4.7.1. Description of the test location

Test location: EMC Test Room 5#

Date of test: January 16, 2024

Operator: Bill

4.7.2. Severity levels of conducted Susceptibility

Severity Level: 10V

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

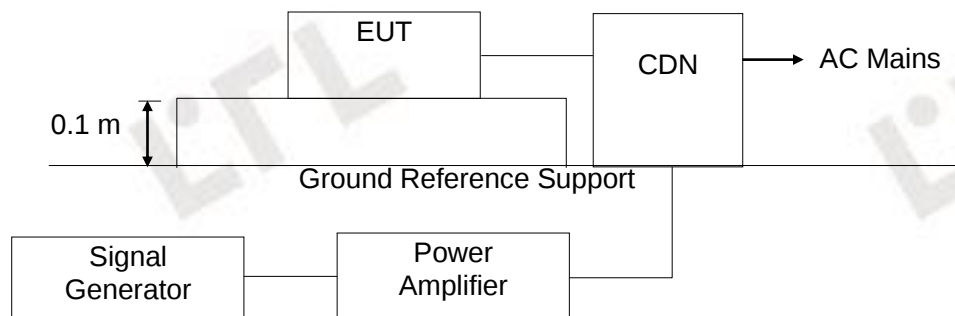
Performance criterion: A

4.7.3. Description of the test set-up

4.7.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the results of the maximum susceptible results are recorded.

4.7.3.2. Configuration of test setup



4.7.4. Test specification:

Frequency range:

■ 0.15 MHz to 80 MHz

Test voltage:

■ 10 V

Modulation:

■ AM: 80 %
■ sinusoidal 1000Hz

Frequency step:

■ 1 % with 3 s dwell time

4.7.5. Coupling points

Cable description

AC power line

Screening:

☐ screened

☒ unscreened

Status:

☐ passive

☒ active

Signal transmission:

☒ analogue

☐ digital

Length:

☒ 1.5 m

4.7.6. Test result

Environmental conditions	Temperature	25°C
	Humidity	55.0%RH

The requirements are **Fulfilled**

Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

4.8. Magnetic Field Immunity

For test instruments and accessories used see section 3.5.

4.8.1. Description of the test location

Test location: EMC Test Room 3#

Date of test: January 16, 2024

Operator: Bill

4.8.2. Severity levels of magnetic field immunity

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

4.8.3. Description of the test set-up

4.8.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the results of the maximum susceptible results are recorded.

4.8.4. Test specification:

Test frequency: ☒ 50 Hz

Continuous field: ☒ 30 A/m

Test duration: ☒ 5 m

Antenna factor: 0.917 A/m

Axis: ☒ x-axis ☒ y-axis ☒ z-axis

4.8.5. Test procedure

- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

4.8.6. Test result

Environmental conditions	Temperature	25°C
	Humidity	55.0%RH

The requirements are **Fulfilled**

Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

5. Test Setup Photos



RADIATED EMISSION TEST(30MHz-1GHz)



CONDUCTION EMISSION TEST(0.15MHz-30MHz)



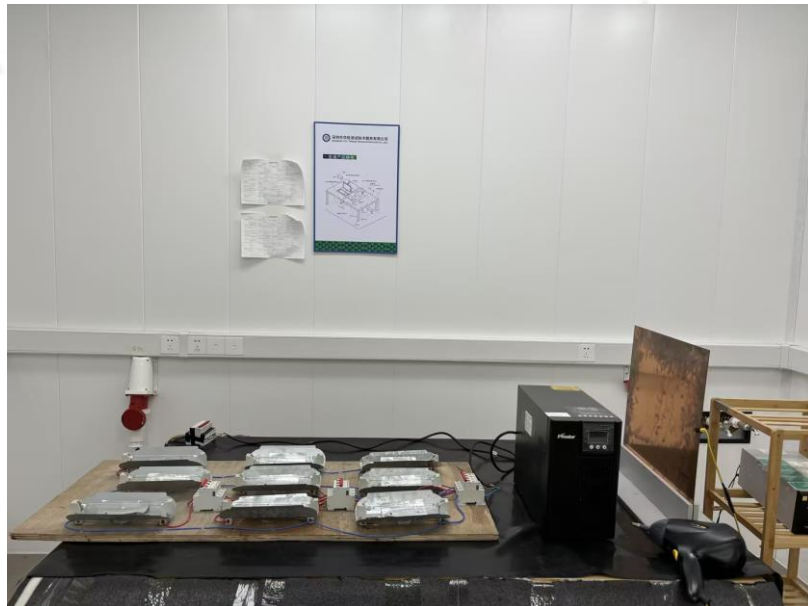
CONDUCTED SUSCEPTIBILITY TEST



EFT/B TEST



SURGE TEST



ESD TEST



RS TEST

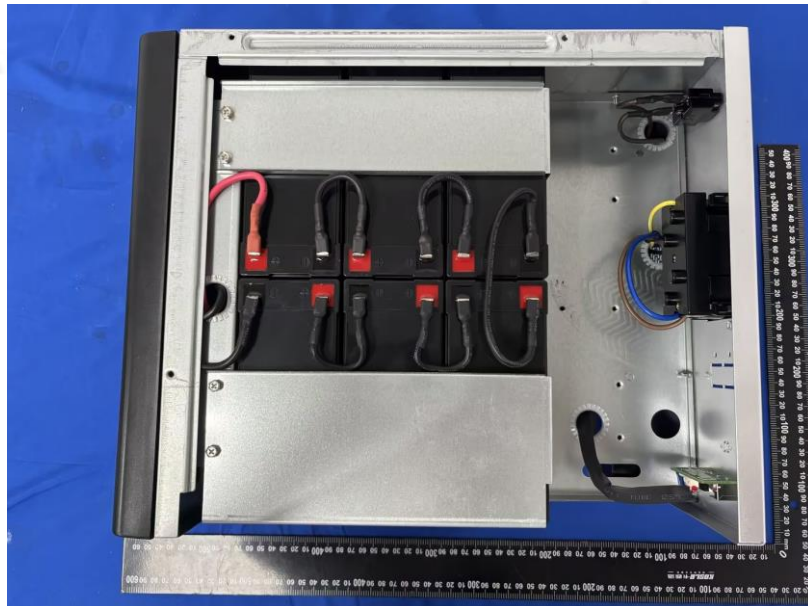


POWER-FREQUENCY MAGNETIC FIELDS TEST

6. External and Internal Photos of the EUT









(Listed Models:PER1103B)

..... **End Of Report.**.....