# TEST REPORT

| | |
|---|---|
| Applicant: | Nemo Power Tools Limited |
| Address: | 21st Floor, CMA Building 64 Connaught Road Central Hong Kong |
| Manufacturer: | Nemo Power Tools(Huizhou) Co., Ltd |
| Address: | 2/F, 4th Industrial Area, Luokeng Village, Xiaotie Zone, Xiaojinkou Town, Huicheng District, Huizhou City, Guangdong Province, China |
| EUT: | GRABO High Flow |
| Trade Mark: | GRABO |
| Model Number: | GHF-V1 |
| Date of Receipt: | Jul. 05, 2024 |
| Test Date: | Jul. 05, 2024 - Jul. 12, 2024 |
| Date of Report: | Jul. 12, 2024 |
| Prepared By: | Shenzhen DL Testing Technology Co., Ltd. |
| Address: | 101-201, Comprehensive Building, Tongzhou Electronics Longgang Factory Area, No.1 Baolong Fifth Road, Baolong Community, Baolong Street, Longgang District, Shenzhen, China |
| Applicable Standards: | EN IEC 55014-1:2021<br>EN IEC 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A1:2019+A2:2021<br>EN IEC 55014-2:2021<br>EN 61000-4-2:2009, EN IEC 61000-4-3:2020, EN 61000-4-4:2012,<br>EN 61000-4-5:2014+A1:2017, EN IEC 61000-4-6:2023, EN IEC 61000-4-11:2020 |
| Test Result: | Pass |
| Report Number: | DL-240705006ER |

| | |
|---|---|
| Prepared (Engineer): | HuiLian Xu |
| Reviewer (Supervisor): | Jack Bu |
| Approved (Manager): | Jade Yang |

*This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.*

**TABLE OF CONTENT**

## 1. VERSION

| Version No. | Date | Description |
|---|---|---|
| 00 | Jul. 12, 2024 | Original |
| | | |
| | | |

## 2. TEST SUMMARY

| EMC Emission | | | | |
|---|---|---|---|---|
| Standard | Test Item | Limit | Result | Remark |
| EN 55014-1 | Conducted Emission at power ports | ------ | PASS | |
| | Conducted Emission at load terminals | ------ | N/A | |
| | Disturbance power Emission | ------ | PASS | |
| | Radiated Emission below 1GHz | ------ | PASS | |
| EN 61000-3-2 | Harmonic Current Emission | Class B | PASS | |
| EN 61000-3-3 | Voltage Fluctuations & Flicker | ------ | PASS | |
| **EMC Immunity** | | | | |
| Section EN 55014-2 | Test Item | Performance Criteria | Result | Remark |
| EN 61000-4-2 | Electrostatic Discharge | B | PASS | |
| EN 61000-4-3 | RF electromagnetic field | A | PASS | |
| EN 61000-4-4 | Fast transients | B | PASS | |
| EN 61000-4-5 | Surges | B | PASS | |
| EN 61000-4-6 | Injected Current | A | PASS | |
| EN 61000-4-11 | Volt. Interruptions Volt. Dips | C / C / C[NOTE (3)] | PASS | |

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) The power consumption of EUT is less than 75W and no Limits apply.

(3) Voltage dip: 70% reduction – Performance Criteria B

Voltage Interruptions: 30% reduction – Performance Criteria C

(4) Test Facility: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Comprehensive Building, Tongzhou Electronics Longgang Factory Area, No.1 Baolong Fifth Road, Baolong Community, Baolong Street, Longgang District, Shenzhen, China

## 3. GENERAL INFORMATION

### 3.1 Description of Device (EUT)

| | |
|---|---|
| EUT: | GRABO High Flow |
| Trade Mark: | GRABO |
| Model Number: | GHF-V1 |
| Test Model: | GHF-V1 |
| Model difference: | N/A |
| Power Supply: | Charging Input: 100-240V~ 50/60Hz 2A max 84W<br>Charging Output: 21V⎓3.6-4.4A under load 4.5A max<br>Battery: DC 20V |
| Work Frequency: | Below 15MHz |

NOTE:
(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
(2) The EUT's all information provided by client.

### 3.2 Tested System Details

None.

### 3.3 Block Diagram of Test Set-up


### 3.4 Test Mode Description

Mode1. Charging Mode Mode2. On Mode

### 3.5 Test Auxiliary Equipment

None.

### 3.6 Test Uncertainty

Conducted Emission Uncertainty : ±2.56dB

Radiated Emission Uncertainty : ±3.24dB

## 4. TEST INSTRUMENT USED

**For Conducted Emission Test (843 Shielded Room)**

| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| 843 Shielded Room | YIHENG | 843 Room | 843 | Nov. 05, 2023 | Nov. 04, 2026 |
| EMI Receiver | R&S | ESR | 101421 | Nov. 04, 2023 | Nov. 03, 2024 |
| LISN | R&S | ENV216 | 102417 | Nov. 04, 2023 | Nov. 03, 2024 |
| Clamp | COM-POWER | CLA-050 | 431072 | Nov. 04, 2023 | Nov. 03, 2024 |
| 3-Loop Antenna | DAZE | ZN30401 | 13021 | Nov. 04, 2023 | Nov. 03, 2024 |
| ISN T8 | Schwarzbeck | NTFM 8158 | 101135 | Nov. 04, 2023 | Nov. 03, 2024 |
| ISN T5 | Schwarzbeck | NTFM 8158 | 101136 | Nov. 04, 2023 | Nov. 03, 2024 |
| 843 Cable 1# | ChengYu | CE Cable | 001 | Nov. 04, 2023 | Nov. 03, 2024 |
| 843 Cable 1# | ChengYu | CE Cable | 002 | Nov. 04, 2023 | Nov. 03, 2024 |

**For Radiated Emission Test (966 chamber)**

| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| 966 chamber | YIHENG | 966 Room | 966 | Nov. 06, 2023 | Nov. 05, 2026 |
| Spectrum Analyzer | Agilent | E4408B | MY50140780 | Nov. 04, 2023 | Nov. 03, 2024 |
| EMI Receiver | R&S | ESRP7 | 101393 | Nov. 04, 2023 | Nov. 03, 2024 |
| Amplifier | Schwarzbeck | BBV9743B | 00153 | Nov. 04, 2023 | Nov. 03, 2024 |
| Amplifier | EMEC | EM01G8GA | 00270 | Nov. 04, 2023 | Nov. 03, 2024 |
| Broadband Trilog Antenna | Schwarzbeck | VULB9162 | 00306 | Nov. 04, 2023 | Nov. 03, 2024 |
| Horn Antenna | Schwarzbeck | BBHA9120D | 02139 | Nov. 04, 2023 | Nov. 03, 2024 |
| 966 Cable 1# | ChengYu | 966 | 004 | Nov. 04, 2023 | Nov. 03, 2024 |
| 966 Cable 2# | ChengYu | 966 | 003 | Nov. 04, 2023 | Nov. 03, 2024 |

**For Harmonic & Flicker Test (EMS --- site )**

| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Harmonics, Flicker & power Analyser | LAPLACE INSTRUMENTS | AC2000A | 311370 | Nov. 04, 2023 | Nov. 03, 2024 |
| AC Power Supply | MToni | HPF5010 | 633659 | Nov. 04, 2023 | Nov. 03, 2024 |

**For Electrostatic Discharge Immunity Test ( EMS --- site )**

| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| ESD Tester | SCHLODER | SESD 230 | 17352 | Nov. 04, 2023 | Nov. 03, 2024 |

**For RF Field Strength Susceptibility Test (Keyway --- site)**

| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Signal Generator | HP | 8648A | 3625U00573 | Apr. 11, 2024 | Apr. 11, 2025 |
| Amplifier | A&R | 500A100 | 17034 | Apr. 11, 2024 | Apr. 11, 2025 |
| Amplifier | A&R | 100W/1000M1 | 17028 | Apr. 11, 2024 | Apr. 11, 2025 |
| Audio Analyzer (20Hz~1GHz) | Panasonic | 2023B | 202301/428 | Apr. 11, 2024 | Apr. 11, 2025 |
| Isotropic Field Probe | A&R | FP2000 | 16755 | Apr. 11, 2024 | Apr. 11, 2025 |
| Antenna | EMCO | 3108 | 9507-2534 | Apr. 11, 2024 | Apr. 11, 2025 |
| Log-periodic Antenna | A&R | AT1080 | 16812 | Apr. 11, 2024 | Apr. 11, 2025 |

**For EFT /B, Surge, Voltage Dips Interruptions Test (EMS --- site )**

| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Transient Comprehensive Immunity Test System | Graphtec | HVIP16T+HCO MPACT 5 | 192501+192202 | Nov. 04, 2023 | Nov. 03, 2024 |
| Coupling Clamp | HTEC | 001 | 0001 | Nov. 04, 2023 | Nov. 03, 2024 |

**For Injected Currents Susceptibility Test (EMS --- site )**

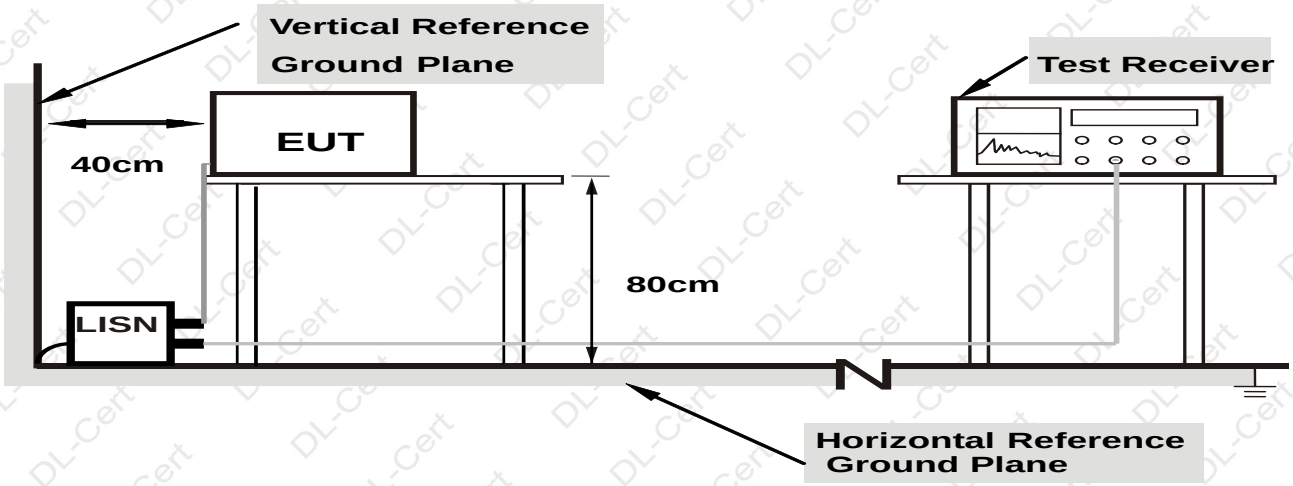
| Equipment | Manufacturer | Model | Serial | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| C/S Test System | LIONCEL | RIS-6091-85 | 0191101 | Nov. 04, 2023 | Nov. 03, 2024 |
| CDN | LIONCEL | CDN-M2-16 | 0191001 | Nov. 04, 2023 | Nov. 03, 2024 |
| CDN | LIONCEL | CDN-M3-16 | 0191002 | Nov. 04, 2023 | Nov. 03, 2024 |
| Injection Clamp | Frankonia | EMCL-20 | 18101728-0108 | Nov. 04, 2023 | Nov. 03, 2024 |

**Other**

| Item | Name | Manufacturer | Model | Software version |
|---|---|---|---|---|
| 1 | EMC Conduction Test System | FALA | EZ_EMC | EMC-CON 3A1.1 |
| 2 | EMC radiation test system | FALA | EZ_EMC | FA-03A2 |
| 3 | RF test system | MAIWEI | MTS8310 | 2.0.0.0 |
| 4 | RF communication test system | MAIWEI | MTS8200 | 2.0.0.0 |

## 5. CONDUCTED EMISSION AT THE MAINS TERMINALS TEST

5.1 Block Diagram of Test Setup




**Note: 1.Support units were connected to second LISN.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes**

5.2 Test Standard and Limit

EN 55014-1

| Frequency MHz | Limits dB(μV) | | | |
|---|---|---|---|---|
| | At mains terminals | | At load terminals and additional terminals | |
| | Quasi-peak Level | Average Level | Quasi-peak Level | Average Level |
| 0.15~0.50 | 66 ~ 56* | 59 ~ 46* | 80 | 70 |
| 0.50~5.00 | 56 | 46 | 74 | 64 |
| 5.00~30.00 | 60 | 50 | 74 | 64 |

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

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

5.3 EUT Configuration on Test

The following equipment's are installed on conducted emission test to meet EN 55014-1 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

5.4 Operating Condition of EUT

5.4.1 Setup the EUT and simulators as shown in Section 5.1.

5.4.2 Turn on the power of all equipment.

5.4.3 Let the EUT work in test modes and test it.

5.5 Test Procedure

The EUT is put on the ground and connected to the AC mains through a Artificial Mains Network (AMN). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the **EN 55014-1** regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESR) is set at 10KHz.

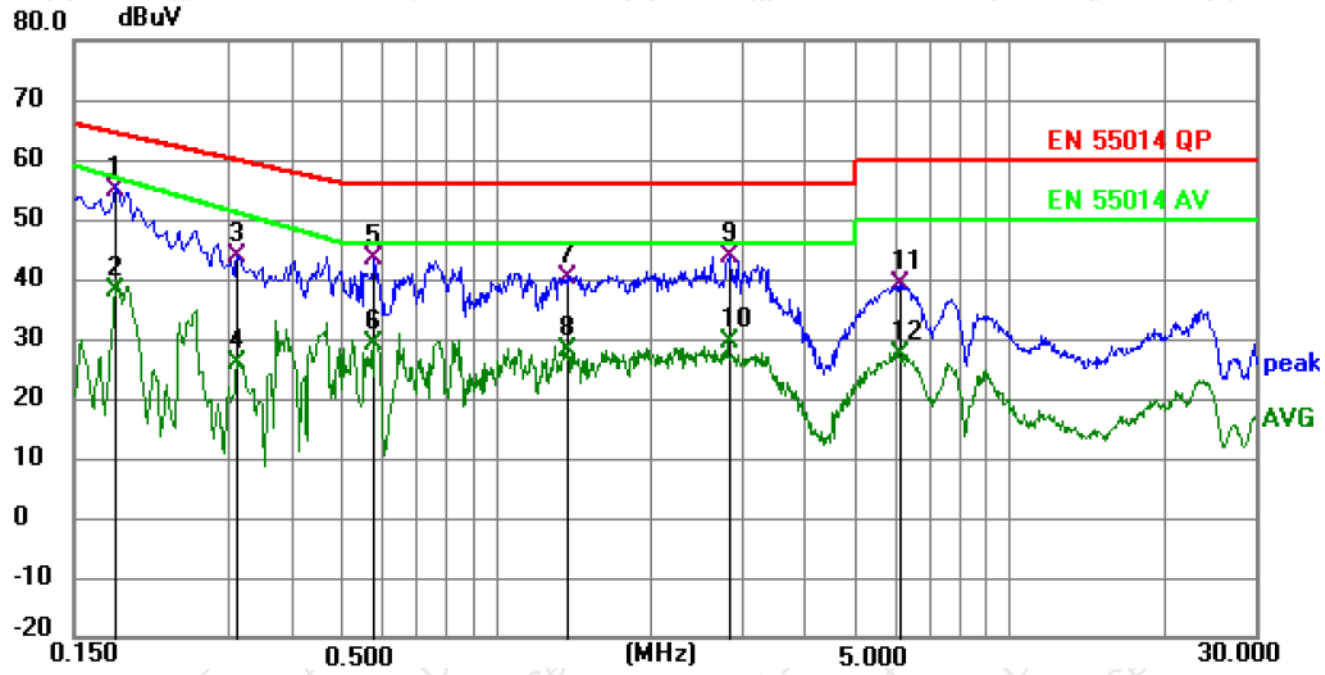
The frequency ranges from 150kHz to 30MHz is investigated.

5.6 Test Result

PASS

Please refer to the following page.

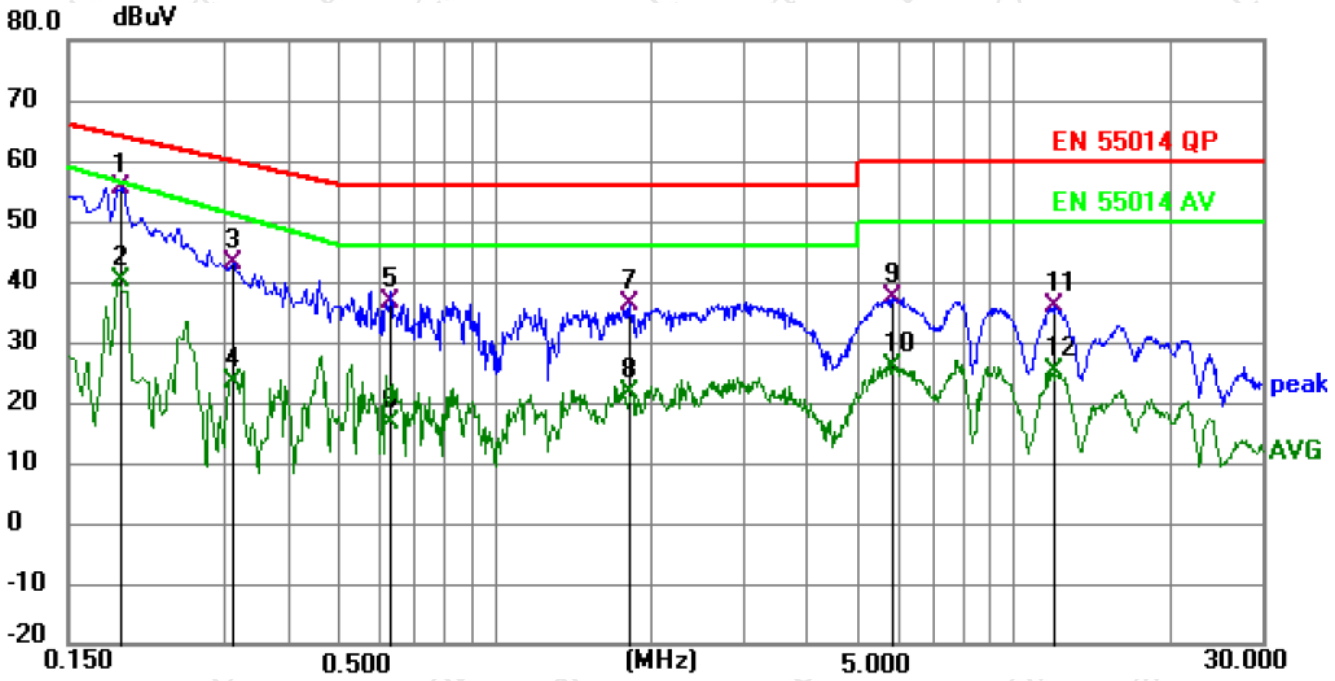
| Conducted Emission Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Phase: | Line |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 * | 0.1815 | 45.27 | 9.67 | 54.94 | 64.42 | -9.48 | QP | P | |
| 2 | 0.1815 | 28.20 | 9.67 | 37.87 | 56.94 | -19.07 | AVG | P | |
| 3 | 0.3120 | 33.72 | 9.92 | 43.64 | 59.92 | -16.28 | QP | P | |
| 4 | 0.3120 | 15.84 | 9.92 | 25.76 | 51.09 | -25.33 | AVG | P | |
| 5 | 0.5775 | 33.59 | 9.77 | 43.36 | 56.00 | -12.64 | QP | P | |
| 6 | 0.5775 | 19.50 | 9.77 | 29.27 | 46.00 | -16.73 | AVG | P | |
| 7 | 1.3740 | 30.27 | 9.98 | 40.25 | 56.00 | -15.75 | QP | P | |
| 8 | 1.3740 | 17.88 | 9.98 | 27.86 | 46.00 | -18.14 | AVG | P | |
| 9 | 2.8410 | 33.65 | 9.95 | 43.60 | 56.00 | -12.40 | QP | P | |
| 10 | 2.8410 | 19.46 | 9.95 | 29.41 | 46.00 | -16.59 | AVG | P | |
| 11 | 6.1035 | 29.10 | 9.98 | 39.08 | 60.00 | -20.92 | QP | P | |
| 12 | 6.1035 | 17.48 | 9.98 | 27.46 | 50.00 | -22.54 | AVG | P | |

Remark:Correct Factor = Cable lose + LISN insertion loss;
Level = Reading + Correct factor;Margin = Level – Limit;

| Conducted Emission Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Phase: | Neutral |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |

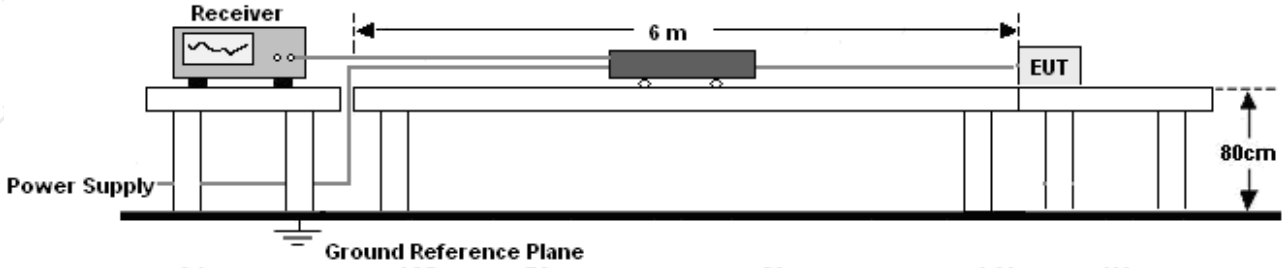



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 * | 0.1905 | 45.49 | 9.88 | 55.37 | 64.01 | -8.64 | QP | P | |
| 2 | 0.1905 | 30.31 | 9.88 | 40.19 | 56.42 | -16.23 | AVG | P | |
| 3 | 0.3120 | 33.05 | 9.90 | 42.95 | 59.92 | -16.97 | QP | P | |
| 4 | 0.3120 | 13.65 | 9.90 | 23.55 | 51.09 | -27.54 | AVG | P | |
| 5 | 0.6270 | 26.75 | 9.95 | 36.70 | 56.00 | -19.30 | QP | P | |
| 6 | 0.6270 | 6.70 | 9.95 | 16.65 | 46.00 | -29.35 | AVG | P | |
| 7 | 1.8285 | 26.12 | 9.96 | 36.08 | 56.00 | -19.92 | QP | P | |
| 8 | 1.8285 | 11.53 | 9.96 | 21.49 | 46.00 | -24.51 | AVG | P | |
| 9 | 5.8605 | 27.37 | 9.92 | 37.29 | 60.00 | -22.71 | QP | P | |
| 10 | 5.8605 | 15.82 | 9.92 | 25.74 | 50.00 | -24.26 | AVG | P | |
| 11 | 11.9490 | 25.75 | 10.03 | 35.78 | 60.00 | -24.22 | QP | P | |
| 12 | 11.9490 | 15.20 | 10.03 | 25.23 | 50.00 | -24.77 | AVG | P | |

Remark:Correct Factor = Cable lose + LISN insertion loss;
Level = Reading + Correct factor;Margin = Level – Limit;

## 6. DISTURBANCE POWER EMISSION TEST

6.1 Block Diagram of Test Setup




6.2 Test Standard and Limit

EN 55014-1

| Frequency MHz | Limits dB(pW) | |
|---|---|---|
| | Quasi-peak Level | Average Level |
| 30-300 | 45-55 | 35-45 |

Notes: The limit Increasing linearly with the frequency from 30 to 300MHz.

**Margin when performing disturbance power Measurement in the frequency range 30 MHz to 300 MHz**

| Frequency MHz | Margin Quasi-peak dB(pW) |
|---|---|
| | Household and similar appliances / Tools |
| 200 to 300 | 0 to 10 |

Note: The limit Increasing linearly with the frequency from 200 to 300MHz.

6.3 EUT Configuration on Test

The following equipment's are installed on conducted emission test to meet EN 55014-1 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

6.4 Operating Condition of EUT

6.4.1 Setup the EUT and simulators as shown in Section 6.1.

6.4.2 Turn on the power of all equipment.

6.4.3 Let the EUT work in test modes and test it.

6.5 Test Procedure

a. The absorbing clamp was placed around the lead to be measured, with its current transformer towards the equipment under test.

b. All connectors having a connected lead shall be terminated in a manner representative of use.

c. The absorbing clamp was applied successively to all leads whose length is 25cm or longer, unscreened or screened, which may be connected to the individual units of the equipment under test.

d. The Product was placed on a nonconductive table of 0.8 m of height above the floor and at least 0.8m from other metallic objects and from any person. The lead to be measured shall be stretched in a straight horizontal line for length sufficient to accommodate the absorbing clamp.

e. Pre-scans were performed with a quasi-peak detector and an average detector.

f. At each test frequency the absorbing clamp shall be moved along the lead until the maximum value is found between a position adjacent to the equipment under test and a distance of about a half wavelength from it.

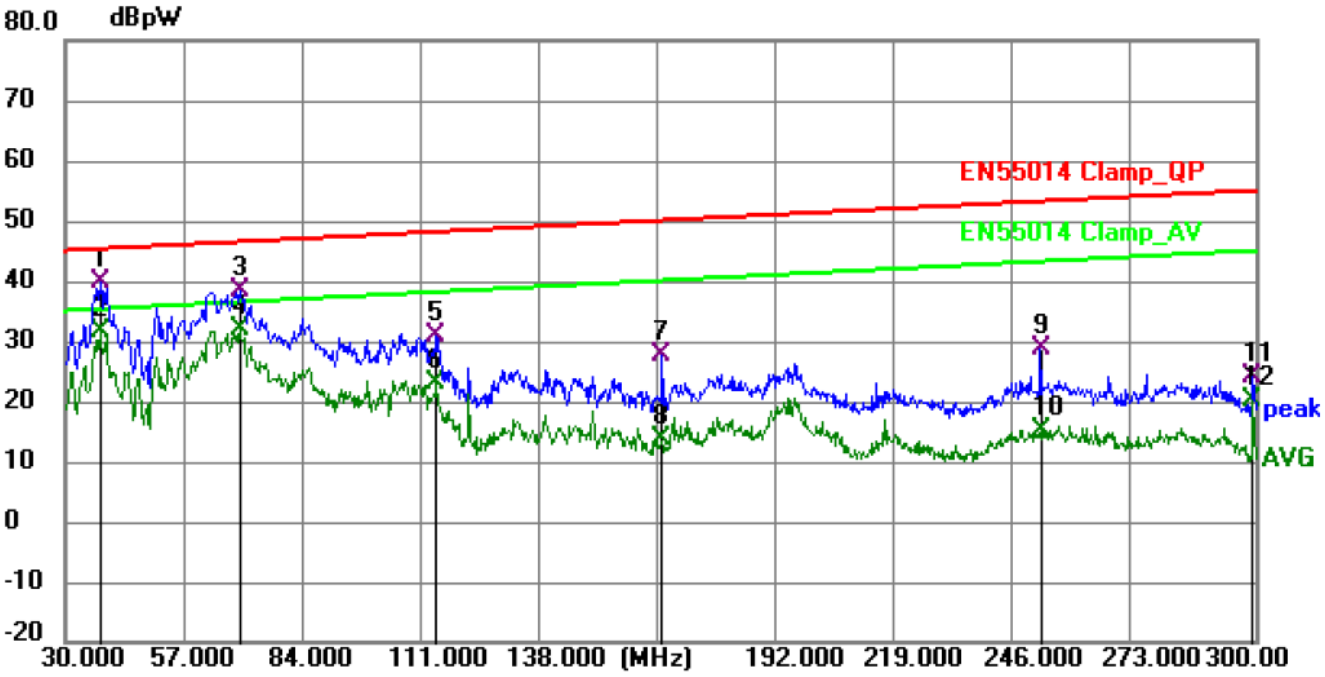
The bandwidth of the test receiver (R&S Test Receiver ESR) is set at 10KHz.

6.6 Test Result

PASS

Please refer to the following page.

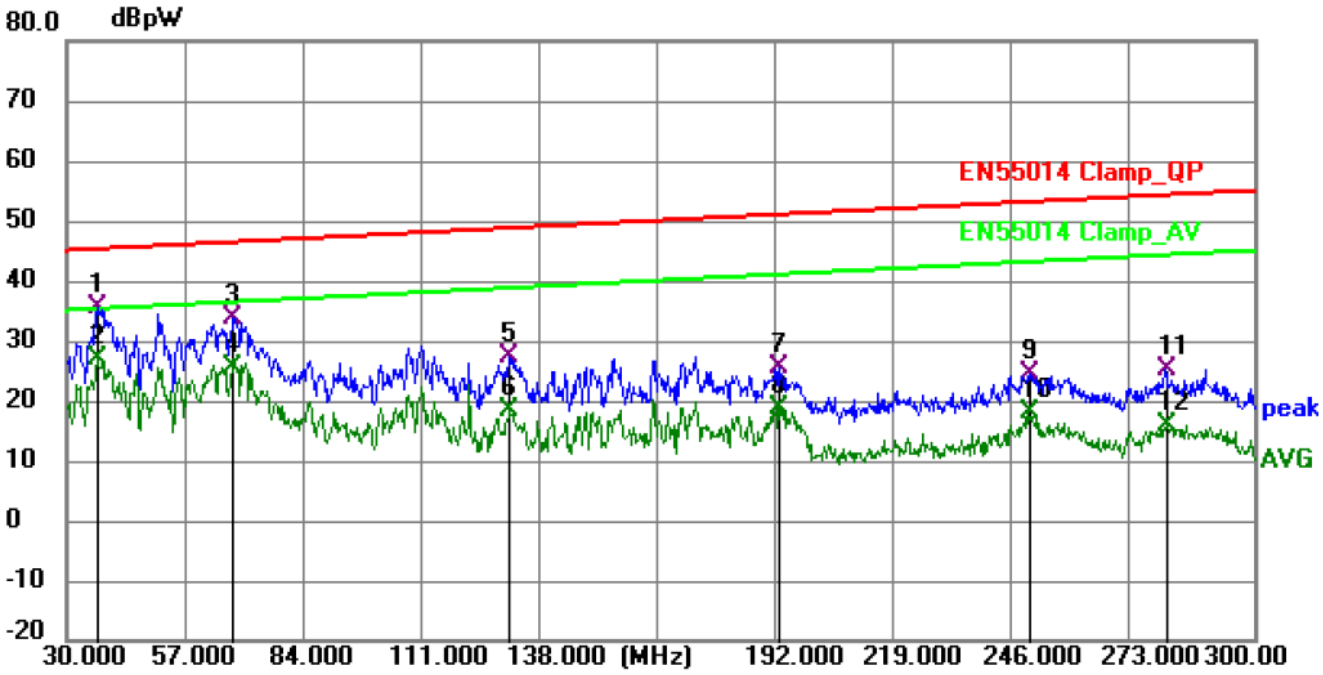
| Disturbance Power Test Data | | | |
|---|---|---|---|
| Temperature: | 26℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Test Line: | AC Line |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |




| No. | Frequency (MHz) | Reading (dBpW) | Factor (dB) | Level (dBpW) | Limit (dBpW) | Margin (dB) | Detector | Position (cm) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 37.9800 | 22.43 | 17.48 | 39.91 | 45.30 | -5.39 | QP | | P | |
| 2 * | 37.9800 | 14.23 | 17.48 | 31.71 | 35.30 | -3.59 | AVG | | P | |
| 3 | 69.9000 | 20.53 | 17.82 | 38.35 | 46.48 | -8.13 | QP | | P | |
| 4 | 69.9000 | 14.07 | 17.82 | 31.89 | 36.48 | -4.59 | AVG | | P | |
| 5 | 114.3600 | 13.91 | 16.86 | 30.77 | 48.12 | -17.35 | QP | | P | |
| 6 | 114.3600 | 6.05 | 16.86 | 22.91 | 38.12 | -15.21 | AVG | | P | |
| 7 | 165.4200 | 13.41 | 14.27 | 27.68 | 50.02 | -22.34 | QP | | P | |
| 8 | 165.4200 | -0.60 | 14.27 | 13.67 | 40.02 | -26.35 | AVG | | P | |
| 9 | 251.5200 | 10.13 | 18.59 | 28.72 | 53.20 | -24.48 | QP | | P | |
| 10 | 251.5200 | -3.28 | 18.59 | 15.31 | 43.20 | -27.89 | AVG | | P | |
| 11 | 299.7000 | 6.84 | 17.16 | 24.00 | 54.99 | -30.99 | QP | | P | |
| 12 | 299.7000 | 2.98 | 17.16 | 20.14 | 44.99 | -24.85 | AVG | | P | |

Remark:Correct Factor = Cable lose + LISN insertion loss;
Level = Reading + Correct factor;Margin = Level – Limit;

| Disturbance Power Test Data | | | |
|---|---|---|---|
| Temperature: | 26℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Test Line: | DC Line |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |

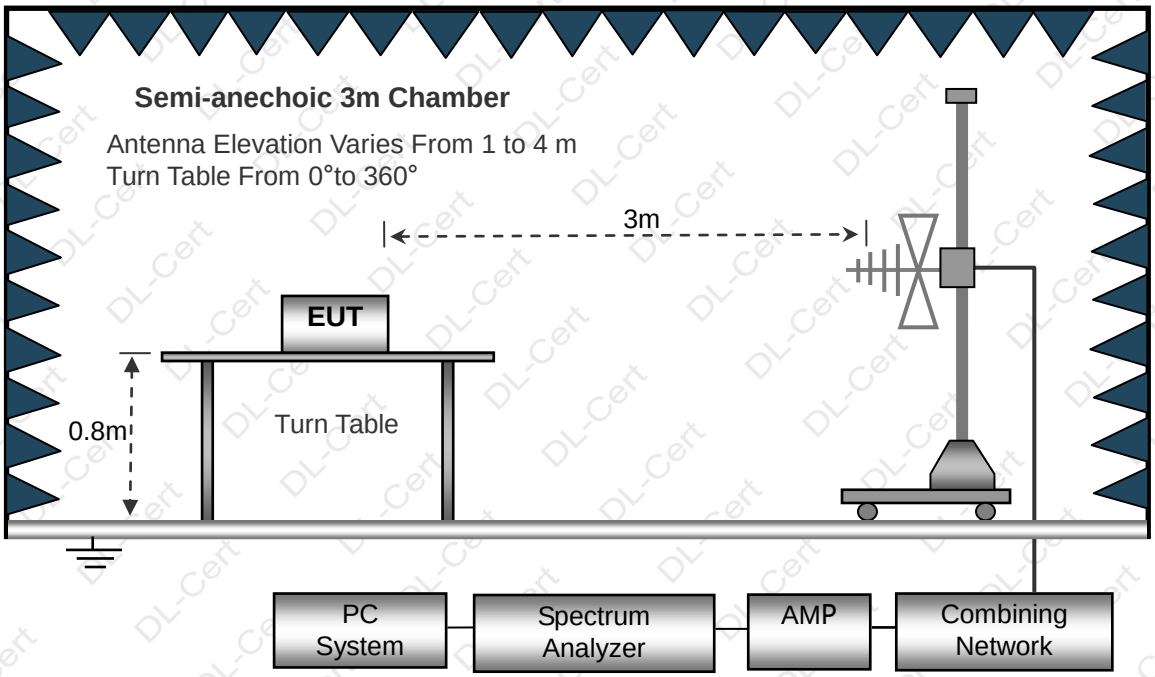



| No. | Frequency (MHz) | Reading (dBpW) | Factor (dB) | Level (dBpW) | Limit (dBpW) | Margin (dB) | Detector | Position (cm) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 37.0200 | 18.01 | 17.46 | 35.47 | 45.26 | -9.79 | QP | | P | |
| 2 * | 37.0200 | 9.63 | 17.46 | 27.09 | 35.26 | -8.17 | AVG | | P | |
| 3 | 68.0400 | 15.89 | 17.89 | 33.78 | 46.41 | -12.63 | QP | | P | |
| 4 | 68.0400 | 7.72 | 17.89 | 25.61 | 36.41 | -10.80 | AVG | | P | |
| 5 | 130.8000 | 11.52 | 15.82 | 27.34 | 48.73 | -21.39 | QP | | P | |
| 6 | 130.8000 | 2.54 | 15.82 | 18.36 | 38.73 | -20.37 | AVG | | P | |
| 7 | 192.0600 | 9.75 | 15.64 | 25.39 | 51.00 | -25.61 | QP | | P | |
| 8 | 192.0600 | 3.11 | 15.64 | 18.75 | 41.00 | -22.25 | AVG | | P | |
| 9 | 249.0000 | 5.93 | 18.55 | 24.48 | 53.11 | -28.63 | QP | | P | |
| 10 | 249.0000 | -0.41 | 18.55 | 18.14 | 43.11 | -24.97 | AVG | | P | |
| 11 | 280.0200 | 6.52 | 18.49 | 25.01 | 54.26 | -29.25 | QP | | P | |
| 12 | 280.0200 | -2.46 | 18.49 | 16.03 | 44.26 | -28.23 | AVG | | P | |

Remark:Correct Factor = Cable lose + LISN insertion loss;
Level = Reading + Correct factor;Margin = Level – Limit;

## 7. RADIATION EMISSION TEST

7.1 Block Diagram of Test Setup




7.2 Test Standard and Limit

EN 55014-1

| Frequency MHz | Distance (Meters) | Field Strengths Limits dB(μV)/m |
|---|---|---|
| 30~230 | 3 | 40.0 |
| 230～1000 | 3 | 47.0 |

Remark:

(1) The smaller limit shall apply at the cross 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 device or system.

7.3 EUT Configuration on Test

The EN 55014-1 regulations test method must be used to find the maximum emission during radiated emission test.

The configuration of EUT is the same as used in conducted emission test.

Please refer to Section 2.2.

7.4 Operating Condition of EUT

Same as conducted emission test, which is listed in Section 2.2 except the test set up replaced as Section 4.1.

7.5 Test Procedure

1) The radiated emissions test was conducted in a semi-anechoic chamber.

2) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

3) Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.

4) The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

5) The bandwidth setting on the field strength meter (R&S Test Receiver ESCI) is set at 120KHz.

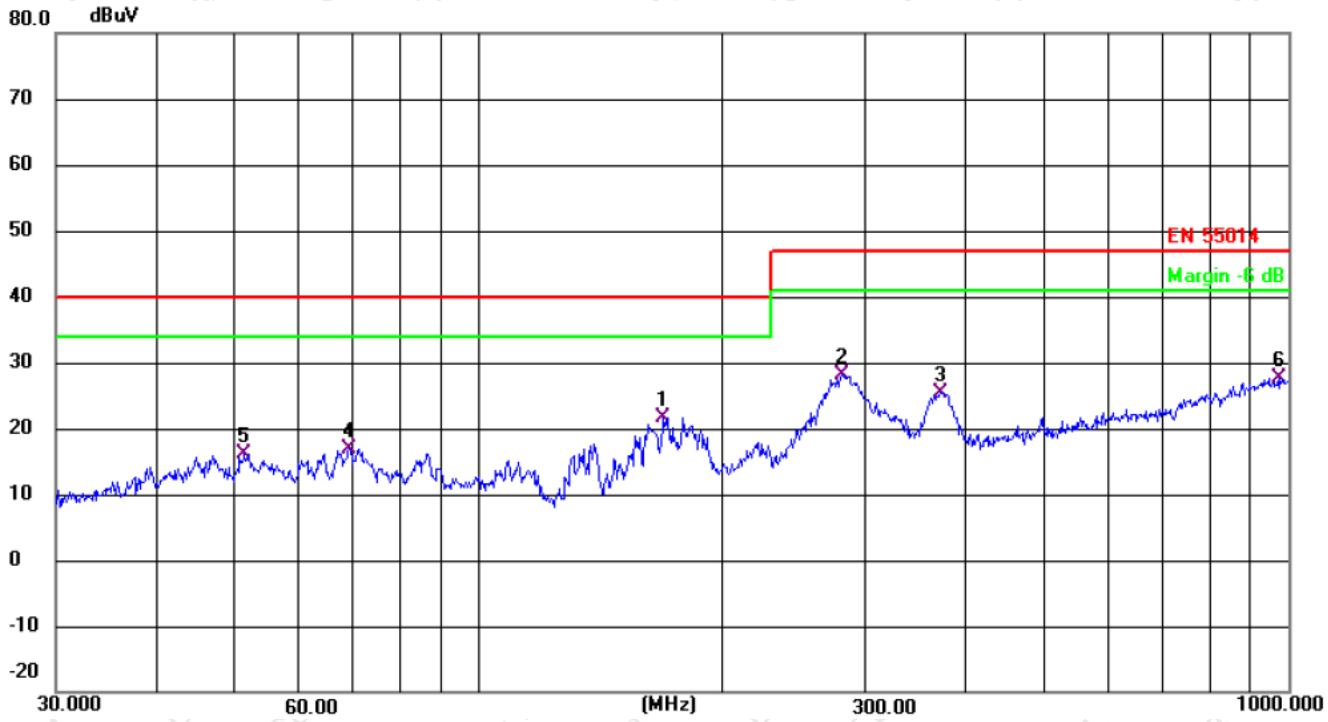
6) The frequency range from 30MHz to 1000MHz is checked.

7.6 Test Result

PASS

Please refer to the following page.

| Radiation Emission Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Polarization: | Horizontal |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |



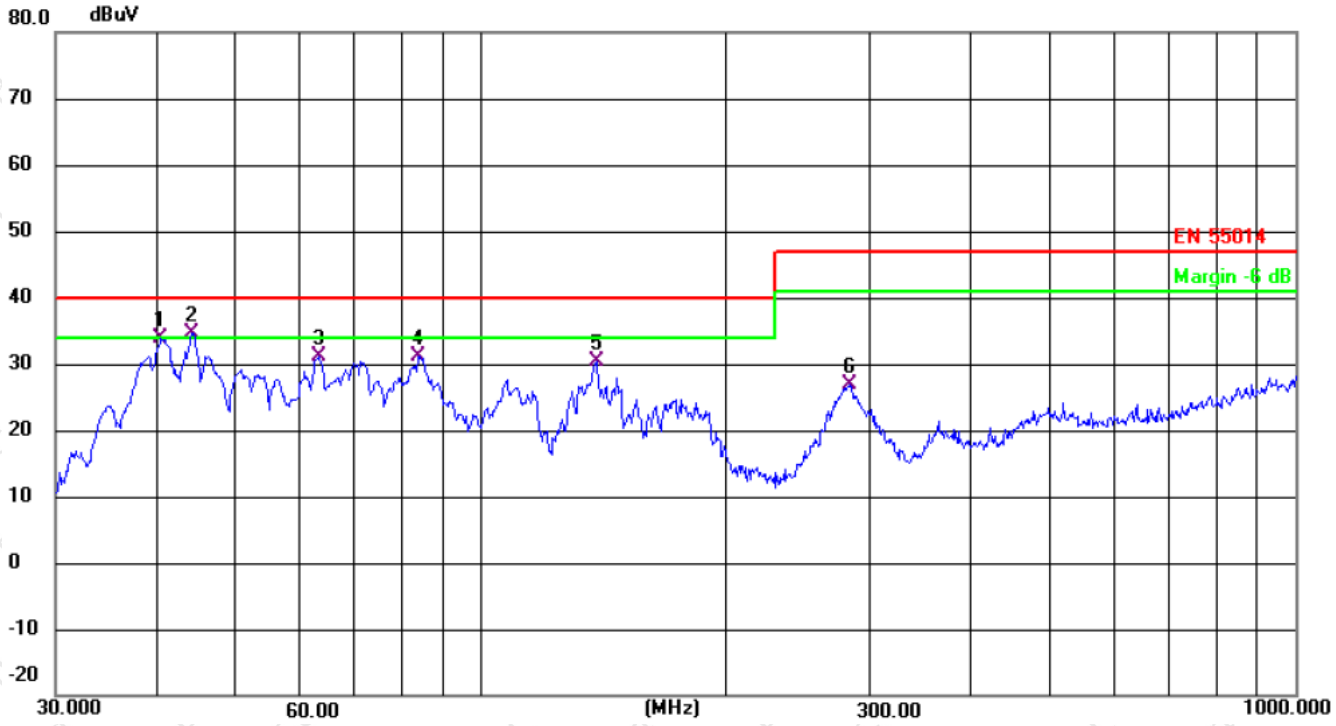

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dB | dB | Detector |
| 1 | * | 169.0053 | 38.69 | -17.04 | 21.65 | 40.00 | -18.35 | QP |
| 2 | | 281.0074 | 40.51 | -12.29 | 28.22 | 47.00 | -18.78 | QP |
| 3 | | 372.0045 | 35.77 | -10.36 | 25.41 | 47.00 | -21.59 | QP |
| 4 | | 69.1140 | 33.53 | -16.65 | 16.88 | 40.00 | -23.12 | QP |
| 5 | | 51.3004 | 29.14 | -13.01 | 16.13 | 40.00 | -23.87 | QP |
| 6 | | 972.3373 | 27.63 | -0.05 | 27.58 | 47.00 | -19.42 | QP |

Remark:

Correct Factor=Cable loss+Antenna factor-Preamplifier

Measurement Level = Reading Level + Correct Factor; Margin = Measurement Level- Limit;

| Radiation Emission Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Polarization: | Vertical |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |



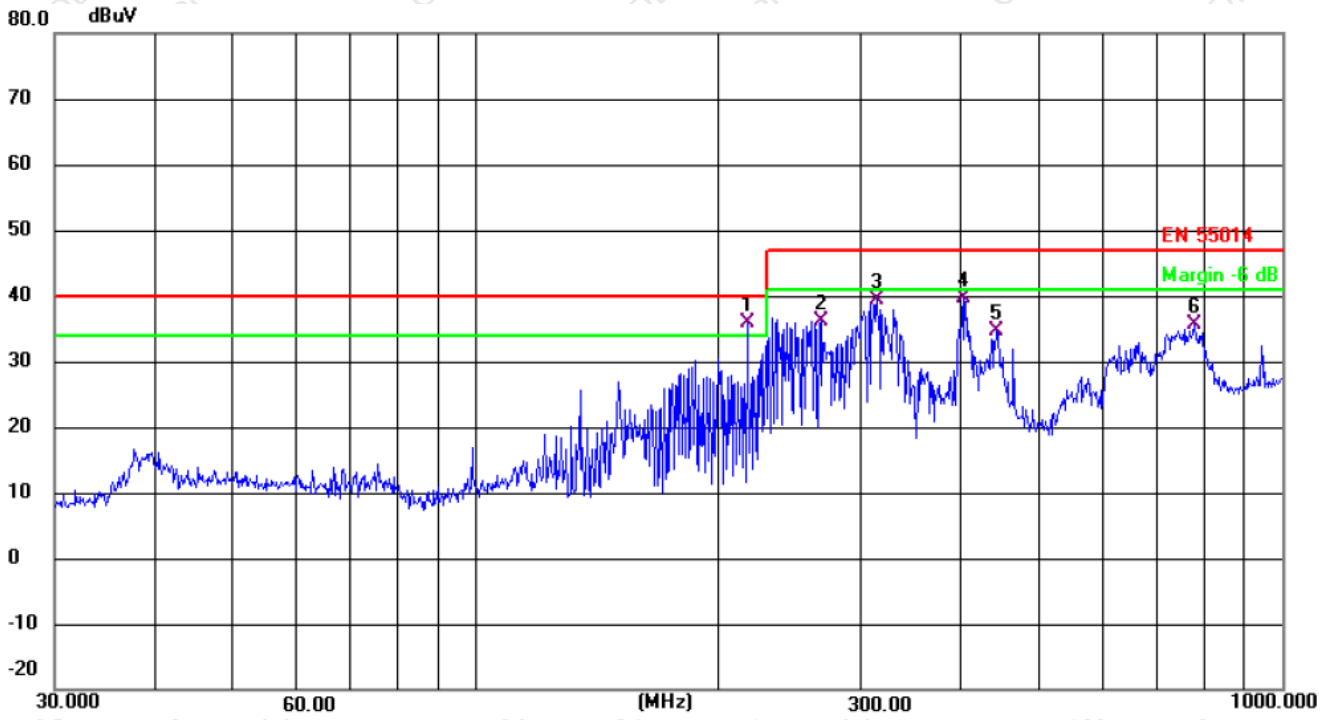

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dB | dB | Detector |
| 1 | | 40.4170 | 47.84 | -14.00 | 33.84 | 40.00 | -6.16 | QP |
| 2 | * | 44.1202 | 47.81 | -13.18 | 34.63 | 40.00 | -5.37 | QP |
| 3 | | 63.0916 | 45.52 | -14.51 | 31.01 | 40.00 | -8.99 | QP |
| 4 | | 83.8155 | 49.50 | -18.31 | 31.19 | 40.00 | -8.81 | QP |
| 5 | | 138.3873 | 48.77 | -18.37 | 30.40 | 40.00 | -9.60 | QP |
| 6 | | 282.9851 | 39.19 | -12.40 | 26.79 | 47.00 | -20.21 | QP |

Remark:

Correct Factor=Cable loss+Antenna factor-Preamplifier

Measurement Level = Reading Level + Correct Factor; Margin = Measurement Level- Limit;

| Radiation Emission Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Polarization: | Horizontal |
| Test Voltage: | DC 20V | Test Mode: | Mode 2 |



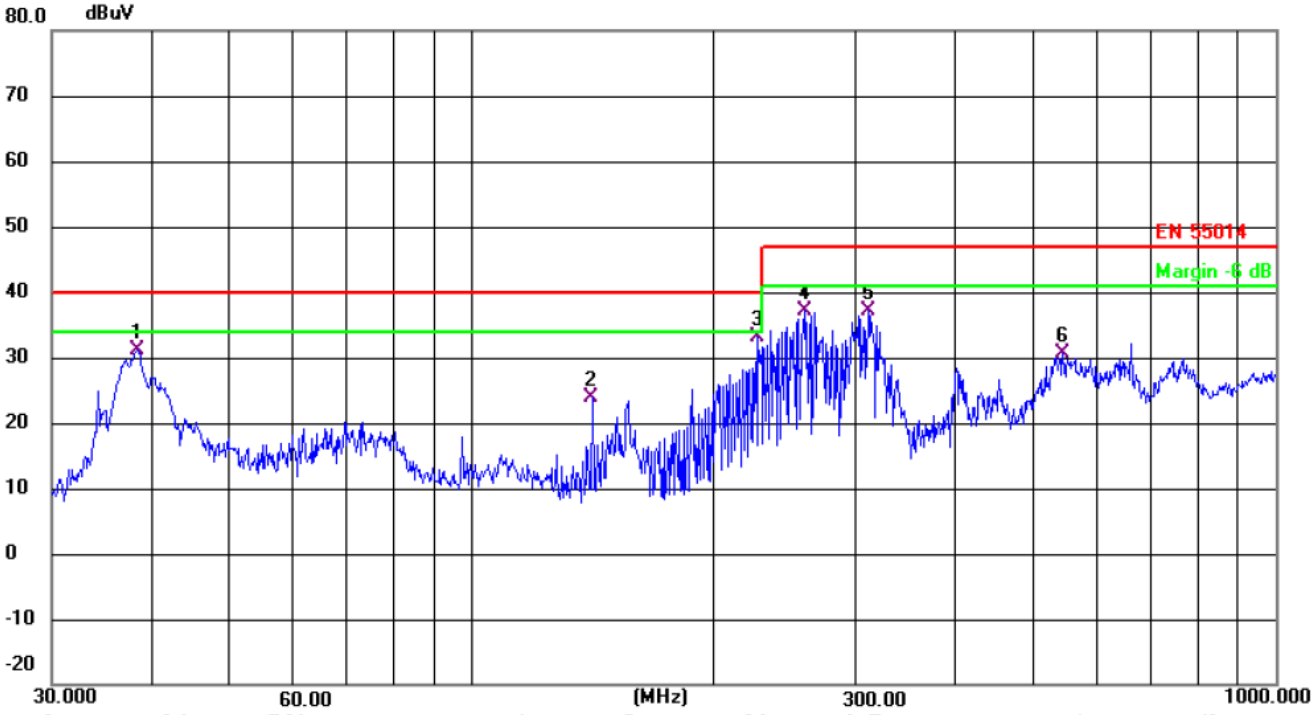

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dB | dB | Detector |
| 1 | * | 216.7828 | 50.23 | -14.25 | 35.98 | 40.00 | -4.02 | QP |
| 2 | | 268.4852 | 48.74 | -12.59 | 36.15 | 47.00 | -10.85 | QP |
| 3 | | 314.3764 | 50.76 | -11.44 | 39.32 | 47.00 | -7.68 | QP |
| 4 | | 401.8384 | 49.09 | -9.50 | 39.59 | 47.00 | -7.41 | QP |
| 5 | | 441.7425 | 43.26 | -8.59 | 34.67 | 47.00 | -12.33 | QP |
| 6 | | 776.8778 | 37.97 | -2.46 | 35.51 | 47.00 | -11.49 | QP |

Remark:

Correct Factor=Cable loss+Antenna factor-Preamplifier

Measurement Level = Reading Level + Correct Factor; Margin = Measurement Level- Limit;

| Radiation Emission Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Pressure: | 1009hPa | Polarization: | Vertical |
| Test Voltage: | DC 20V | Test Mode: | Mode 2 |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dB | dB | Detector |
| 1 | | 38.3462 | 45.59 | -14.53 | 31.06 | 40.00 | -8.94 | QP |
| 2 | | 141.3296 | 42.40 | -18.42 | 23.98 | 40.00 | -16.02 | QP |
| 3 | * | 226.8936 | 47.11 | -13.98 | 33.13 | 40.00 | -6.87 | QP |
| 4 | | 259.2338 | 50.42 | -13.23 | 37.19 | 47.00 | -9.81 | QP |
| 5 | | 311.0866 | 48.87 | -11.78 | 37.09 | 47.00 | -9.91 | QP |
| 6 | | 543.2742 | 36.85 | -6.34 | 30.51 | 47.00 | -16.49 | QP |

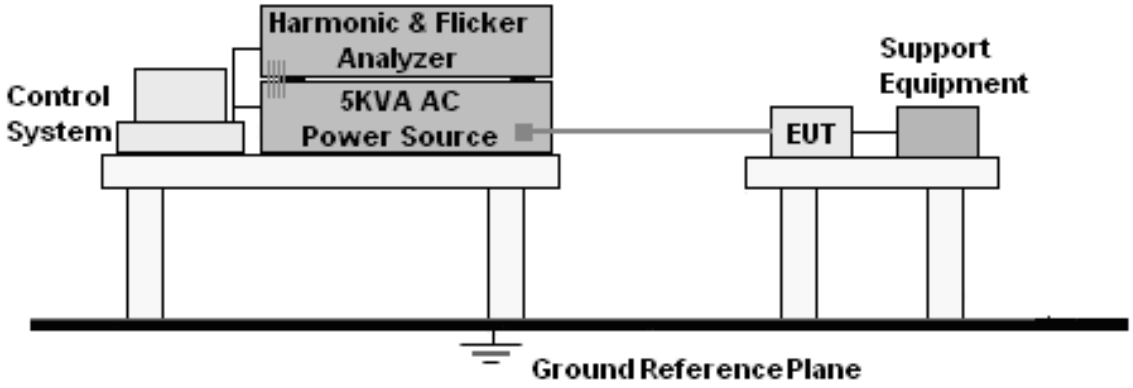
Remark:

Correct Factor=Cable loss+Antenna factor-Preamplifier

Measurement Level = Reading Level + Correct Factor; Margin = Measurement Level- Limit;

## 8. HARMONIC CURRENT EMISSION TEST

8.1 Block Diagram of Test Setup




8.2 Test Standard

EN 61000-3-2

8.3 Operating Condition of EUT

Setup the EUT as shown in Section 8.1.

Turn on the power of all equipment.

Let the EUT work in test mode and test it.

8.4 Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

8.5 Test Results

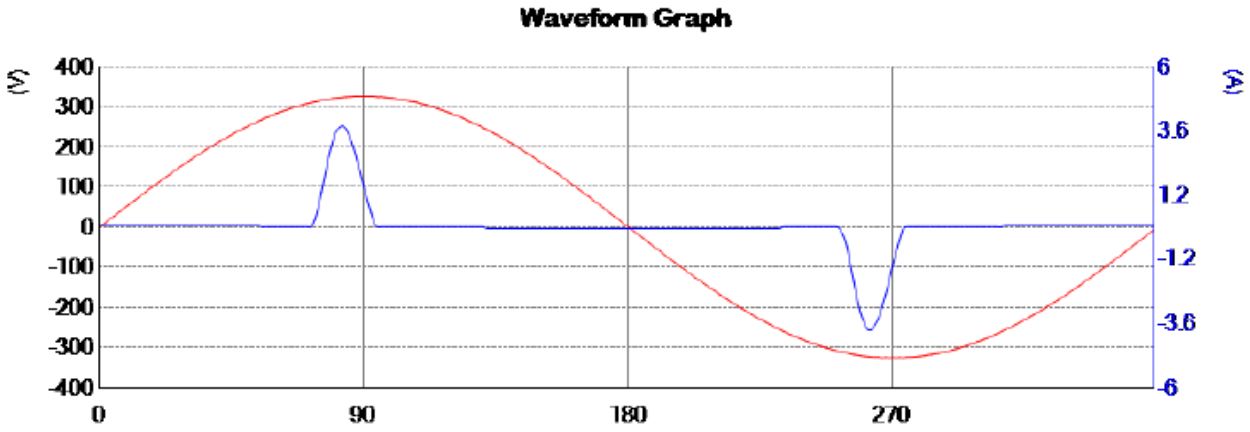
PASS

Please refer to the following page.

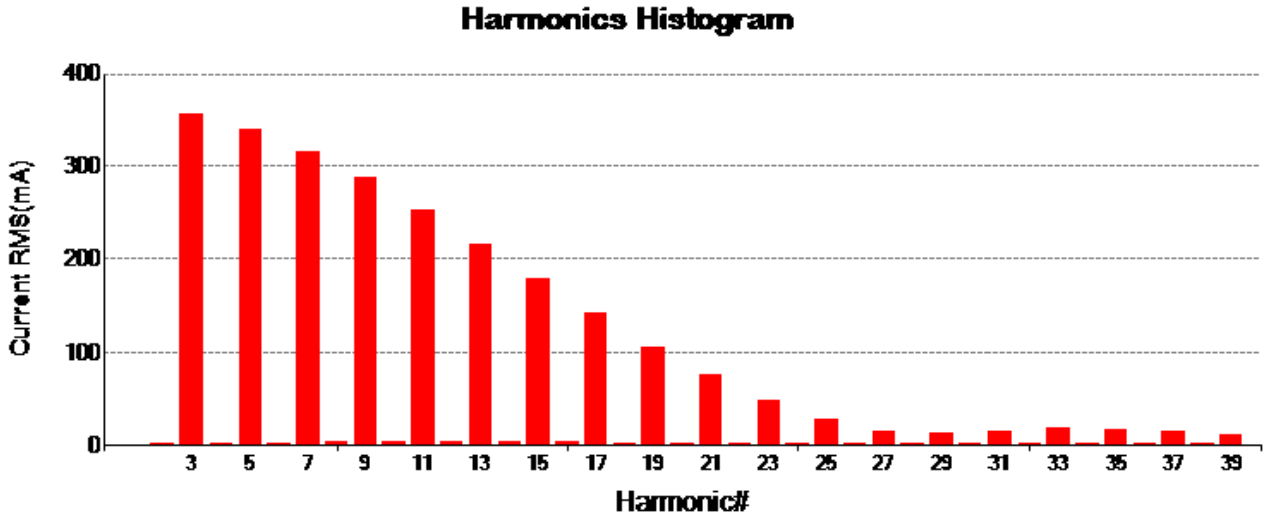
**EUT: GRABO High Flow** **Operator:**
**Test category: EN IEC 61000-3-2:2019+A1:2021 Class B** **Model/Type:GHF-V1**
**Measurement standard: IEC 61000-4-7 Ed2:1:2009** **Serial number:**
**Test date:2024-07-11** **Start time: 14:32:03** **End time: 14:34:43**
**Test duration (sec):150**
**Describe:**

**Test Result: Pass** **Source qualification(Power Off Load): Idle - Pass**

**Current & voltage waveforms**




**Harmonics and Class B**



**EUT: GRABO High Flow** **Operator:**

**Test category: EN IEC 61000-3-2:2019+A1:2021 Class B** **Model/Type:GHF-V1**

**Measurement standard: IEC 61000-4-7 Ed2:1:2009** **Serial number:**

**Test date:2024-07-11** **Start time: 14:32:03** **End time: 14:34:43**

**Test duration (sec):150**

**Describe:**

**Test Result: Pass** **Source qualification(Power Off Load): Idle - Pass**

**THC(mA): 781.300** **I - THD(%): 90.2** **POHC(mA):105.000** **POHC Limit(mA):377.030**

**Parameter values during test:**

**V_RMS (Volts): 230.0** **Frequency(Hz): 50.0**
**I_RMS( A): 0.9** **Crest Factor: 4.041**
**Power (Watts): 83.7** **Power Factor: 0.419**

| Harm# | Harms(filtered) (mA) | Limit (mA) | Harms(avg) (mA) | 100%Limit | Harms(max) (mA) | 150%Limit | Status |
|---|---|---|---|---|---|---|---|
| I_Fund | 371.700 | | | | | | |
| 2 | 1.700 | 1620.000 | 2.400 | 0.148 | 6.400 | 0.263 | Pass |
| 3 | 356.900 | 3450.000 | 356.500 | 10.333 | 357.100 | 6.900 | Pass |
| 4 | 2.100 | 645.000 | 2.700 | 0.419 | 6.100 | 0.630 | Pass |
| 5 | 340.200 | 1710.000 | 339.800 | 19.871 | 340.400 | 13.271 | Pass |
| 6 | 2.600 | 450.000 | 3.000 | 0.667 | 5.900 | 0.874 | Pass |
| 7 | 316.600 | 1155.000 | 316.200 | 27.377 | 317.200 | 18.309 | Pass |
| 8 | 3.000 | 345.000 | 3.200 | 0.928 | 5.500 | 1.063 | Pass |
| 9 | 287.000 | 600.000 | 286.400 | 47.733 | 287.700 | 31.967 | Pass |
| 10 | 3.200 | 276.000 | 3.300 | 1.196 | 5.300 | 1.280 | Pass |
| 11 | 253.000 | 495.000 | 252.400 | 50.990 | 254.000 | 34.209 | Pass |
| 12 | 3.400 | 229.950 | 3.300 | 1.435 | 5.200 | 1.508 | Pass |
| 13 | 216.300 | 315.000 | 215.700 | 68.476 | 217.700 | 46.074 | Pass |
| 14 | 3.400 | 197.100 | 3.200 | 1.624 | 4.800 | 1.624 | Pass |
| 15 | 178.500 | 225.000 | 177.900 | 79.067 | 180.100 | 53.363 | Pass |
| 16 | 3.000 | 172.500 | 3.100 | 1.797 | 4.400 | 1.700 | Pass |
| 17 | 141.700 | 198.600 | 141.000 | 70.997 | 143.500 | 48.171 | Pass |
| 18 | 2.800 | 153.300 | 2.800 | 1.826 | 4.100 | 1.783 | Pass |
| 19 | 106.800 | 177.600 | 106.200 | 59.797 | 108.600 | 40.766 | Pass |
| 20 | 2.500 | 138.000 | 2.500 | 1.812 | 3.500 | 1.691 | Pass |
| 21 | 75.700 | 160.650 | 75.000 | 46.685 | 77.500 | 32.161 | Pass |
| 22 | 1.900 | 125.400 | 2.200 | 1.754 | 3.000 | 1.595 | Pass |
| 23 | 49.000 | 146.700 | 48.500 | 33.061 | 50.700 | 23.040 | Pass |
| 24 | 1.600 | 115.050 | 1.700 | 1.478 | 2.600 | 1.507 | Pass |
| 25 | 28.000 | 135.000 | 27.700 | 20.519 | 29.300 | 14.469 | Pass |
| 26 | 1.000 | 106.200 | 1.300 | 1.224 | 2.300 | 1.444 | Pass |
| 27 | 14.500 | 124.950 | 14.700 | 11.765 | 15.100 | 8.057 | Pass |
| 28 | 0.500 | 98.550 | 0.900 | 0.913 | 1.700 | 1.150 | Pass |
| 29 | 12.200 | 116.400 | 12.800 | 10.997 | 14.500 | 8.305 | Pass |
| 30 | 0.300 | 91.950 | 0.600 | 0.653 | 1.600 | 1.160 | Pass |
| 31 | 15.800 | 108.900 | 16.300 | 14.968 | 17.800 | 10.897 | Pass |
| 32 | 0.100 | 86.250 | 0.500 | 0.580 | 1.400 | 1.082 | Pass |
| 33 | 17.900 | 102.300 | 18.400 | 17.986 | 19.600 | 12.773 | Pass |
| 34 | 0.300 | 81.150 | 0.500 | 0.616 | 1.200 | 0.986 | Pass |
| 35 | 17.600 | 96.450 | 17.900 | 18.559 | 18.800 | 12.995 | Pass |
| 36 | 0.300 | 76.650 | 0.600 | 0.783 | 1.200 | 1.044 | Pass |
| 37 | 15.200 | 91.200 | 15.500 | 16.996 | 16.300 | 11.915 | Pass |
| 38 | 0.300 | 72.600 | 0.600 | 0.826 | 1.000 | 0.918 | Pass |
| 39 | 11.500 | 86.550 | 11.600 | 13.403 | 12.400 | 9.551 | Pass |
| 40 | 0.500 | 69.000 | 0.700 | 1.014 | 1.000 | 0.966 | Pass |

**Note: All harmonics are below the minimum limits and are ignored.**

## 9. VOLTAGE FLUCTUATIONS & FLICKER TEST

9.1 Block Diagram of Test Setup

Same as Section 8.1.

9.2 Test Standard

EN 61000-3-3

9.3 Operating Condition of EUT

Same as Section 8.3. The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

Flicker Test Limit

| Test items | Limits |
|---|---|
| Pst | 1.0 |
| dc | 3.3% |
| Tmax | 4.0% |
| dt | Not exceed 3.3% for 500ms |

9.4 Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

9.5 Test Results

| Flicker Test Data | | | |
|---|---|---|---|
| Temperature: | 24.5℃ | Relative Humidity: | 54% |
| Test Voltage: | AC 230V/50Hz | Test Mode: | Mode 1 |

| Voltage Fluctuation | Limit | Value |
|---|---|---|
| Relative Voltage Change Characteristic Tmax ( dc > 3% ) | 500 ms | 0 ms |
| Maximum Relative Voltage Change dmax | 4% | 0.00 |
| | 6% | / |
| | 7% | / |
| Relative Steady-state Voltage Change dc | 3.3% | 0.00 |

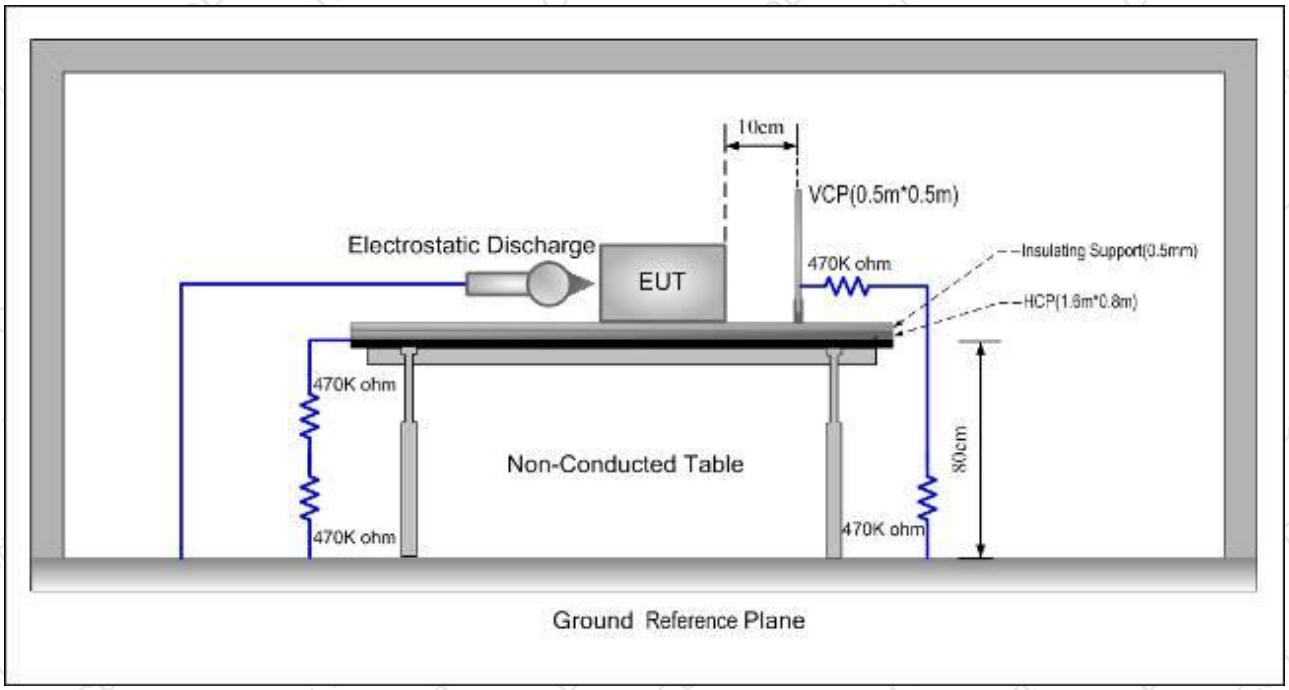
| Flicker | Limit | Value |
|---|---|---|
| Short-term Flicker Indicator Pst | 1.0 | 0.063 |
| Long-term Flicker Indicator Plt | 0.65 | / |

## 10.IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA

| Product Standard | EN 55014-2 |
|---|---|
| **CRITERION A** | 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 resonably expect from the apparatus if used as intended |
| **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 (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** | 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. |

## 11.ELECTROSTATIC DISCHARGE IMMUNITY TEST

11.1 Block Diagram of Test Setup




11.2 Test Standard

EN 55014-2, EN 61000-4-2

11.3 Severity Levels and Performance Criterion

Severity Level: 3 / Air Discharge: ±8KV

Level: 2 / Contact Discharge: ±4KV

Performance criterion: B

11.4 Test Procedure

a. Electrostatic discharges were applied only to those points and surfaces of the Product 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 ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the Product.

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 Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product 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 Product. The ESD generator was positioned vertically at a distance of 0.1 meters from the Product 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 the four faces of the Product were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the Product.

11.5 Test Results

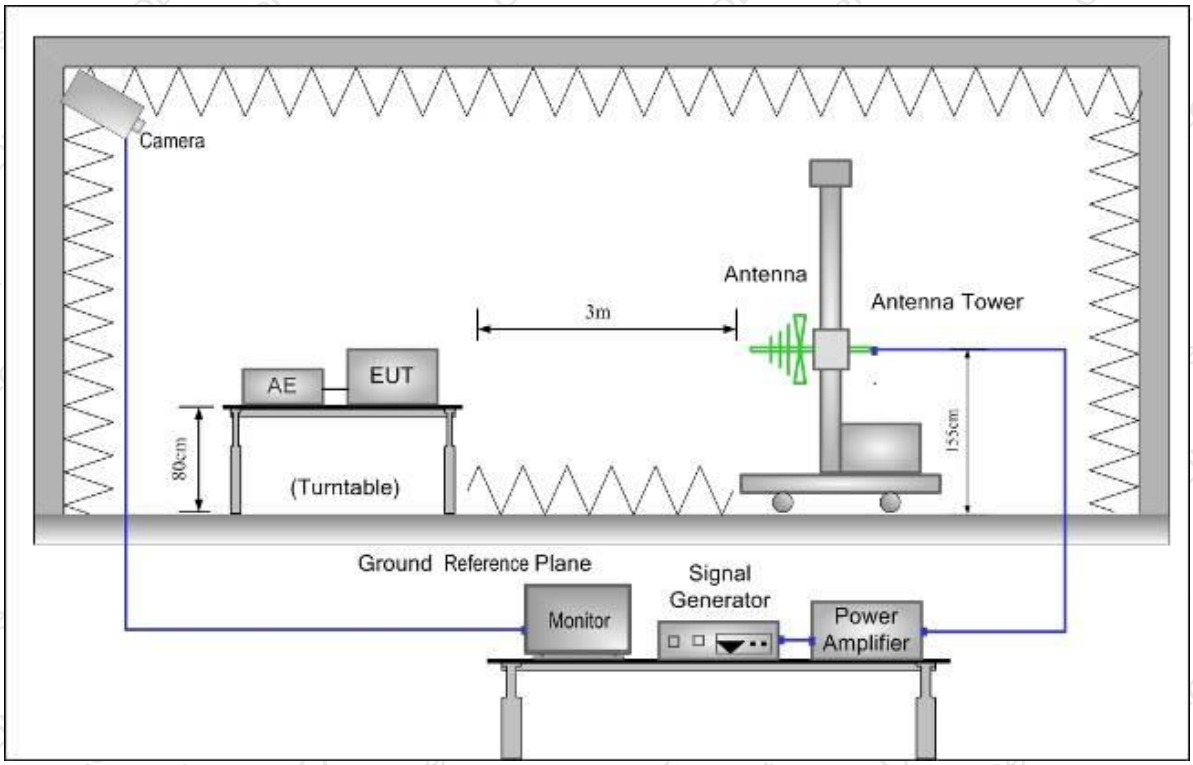
PASS

Please refer to the following page.

| Electrostatic Discharge Test Data | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25.1℃ | | Humidity: | 55% | |
| Power Supply: | AC 230V/50Hz<br>DC 20V | | Test Mode: | Mode 1/2 | |
| Discharge Method | Discharge Position | Voltage (±kV) | Min. No. of Discharge per polarity (Each Point) | Required Level | Result |
| Contact Discharge | Conductive Surfaces | 4 | 10 | B | Pass |
| | Indirect Discharge HCP | 4 | 10 | B | Pass |
| | Indirect Discharge VCP | 4 | 10 | B | Pass |
| Air Discharge | Slots, Apertures, and Insulating Surfaces | 8 | 10 | B | Pass |
| Note: N/A | | | | | |

## 12.RF FIELD STRENGTH SUSCEPTIBILITY TEST

12.1 Block Diagram of Test Setup




12.2 Test Standard

EN 55014-2, EN 61000-4-3

12.3 Severity Levels and Performance Criterion

Severity Level 2, 3V / m

Performance criterion: A

12.4 Test Procedure

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

All the scanning conditions are as follows:

| Condition of Test | Remarks |
|---|---|
| Fielded Strength | 3 V/m (Severity Level 2) |
| Radiated Signal | Modulated |
| Scanning Frequency | 80 – 1000 MHz |
| Dwell time of radiated | 0.0015 decade/s |
| Waiting Time | 1 Sec. |

12.5 Test Results

PASS

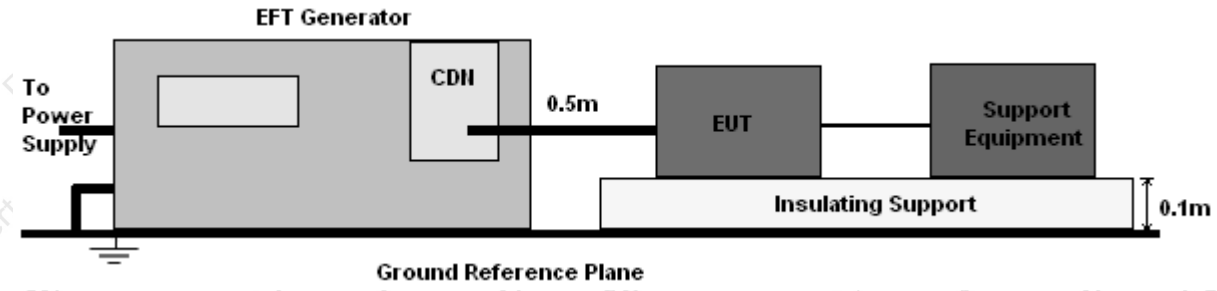
Please refer to the following page.

| R/S Test Data | | | | |
|---|---|---|---|---|
| Temperature: | 25.1℃ | Humidity: | 55% | |
| Power Supply : | AC 230V/50Hz<br>DC 20V | Test Mode: | Mode 1/2 | |
| Criterion: | A | Steps | 1 % | |
| Frequency (MHz) | Position | Field Strength (V/m) | Required Level | Result |
| 80 – 1000 | Front, Right, Back, Left | 3 | A | Pass |
| Note: N/A | | | | |

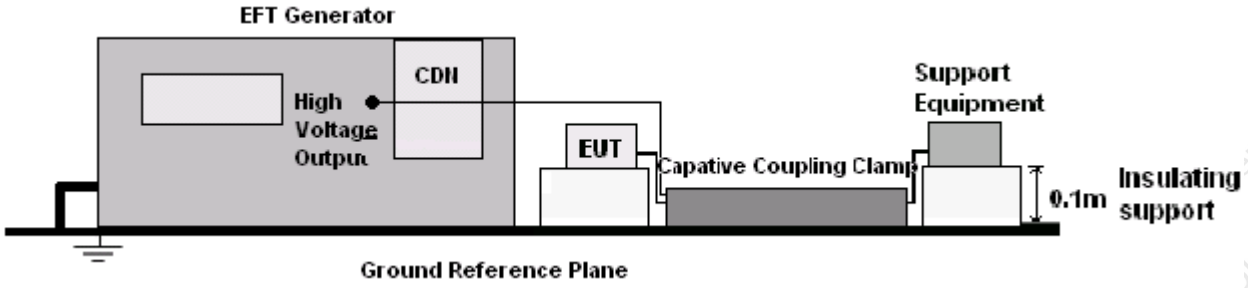
## 13.ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

13.1 Block Diagram of EUT Test Setup

For input a.c. / d.c. power port:




For signal lines and control lines:




13.2 Test Standard

EN 55014-2, EN 61000-4-4

13.3 Severity Levels and Performance Criterion

Severity Level 2 at 1KV, Pulse Rise time & Duration: 5 nS / 50 nS

Performance criterion: B

13.4 Test Procedure

EUT shall be placed 0.8m high above the ground reference plane which is a min.1m*1m metallic sheet with 0.65mm minimum thickness. 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

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 2 minutes.

13.5 Test Results

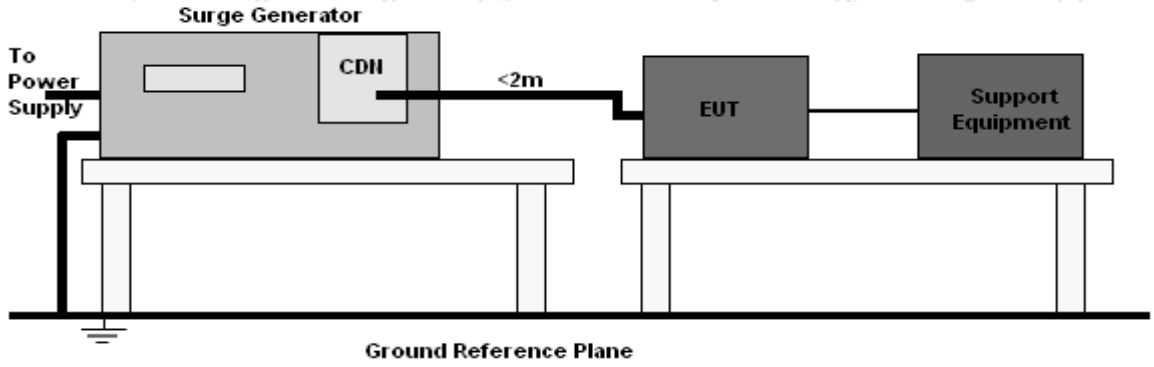
PASS

Please refer to the following page.

| EFT Test Data | | | | |
|---|---|---|---|---|
| Temperature: | 24.5℃ | Humidity: | 53% | |
| Power Supply : | AC 230V/50Hz | Test Mode: | Mode 1 | |
| Coupling Line | Test Voltage (kV) | Performance Criterion | Result | |
| L | ±0.5, 1 | B | PASS | |
| N | ±0.5, 1 | B | PASS | |
| L-N | ±0.5, 1 | B | PASS | |

## 14.SURGE TEST

14.1 Block Diagram of EUT Test Setup




14.2 Test Standard

EN 55014-2, EN61000-4-5

14.3 Severity Levels and Performance Criterion

Severity Level: Line to Line, Level 2 at 1KV;

Severity Level: Line to Earth, Level 3 at 2KV.

Performance criterion: B

14.4 Test Procedure

1) Set up the EUT and test generator as shown on section 11.1

2) For line-to-line coupling mode, provide a 1KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

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

4) Different phase angles are done individually.

5) Repeat procedure 2) to 4) except the open-circuit test voltage change from 1KV to 2KV for line to earth coupling mode test.

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

14.5 Test Result

PASS

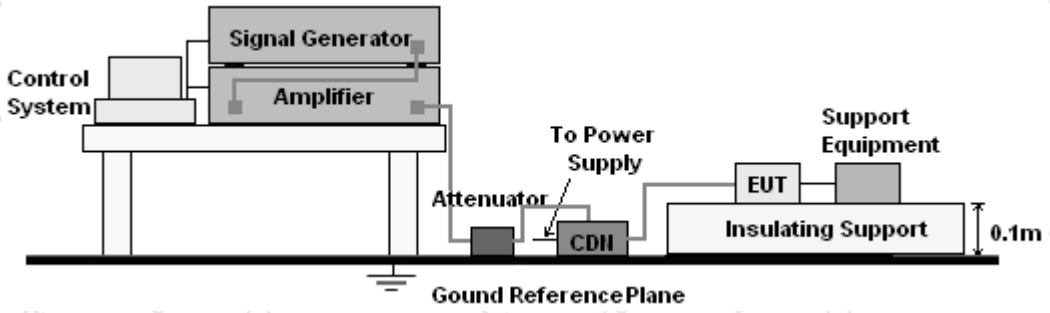
Please refer to the following page.

| Surge Test Data | | | | | | |
|---|---|---|---|---|---|---|
| Temperature: | 24.5℃ | | Humidity: | 53% | | |
| Power Supply : | AC 230V/50Hz | | Test Mode: | Mode 1 | | |
| Location | Polarity | Phase Angle | No of Pulse | Pulse Voltage (KV) | Performance Criterion | Result |
| L-N | + | 90 | 5 | 0.5,1 | B | Pass |
| L-N | - | 270 | 5 | 0.5,1 | B | Pass |
| Note: N/A | | | | | | |

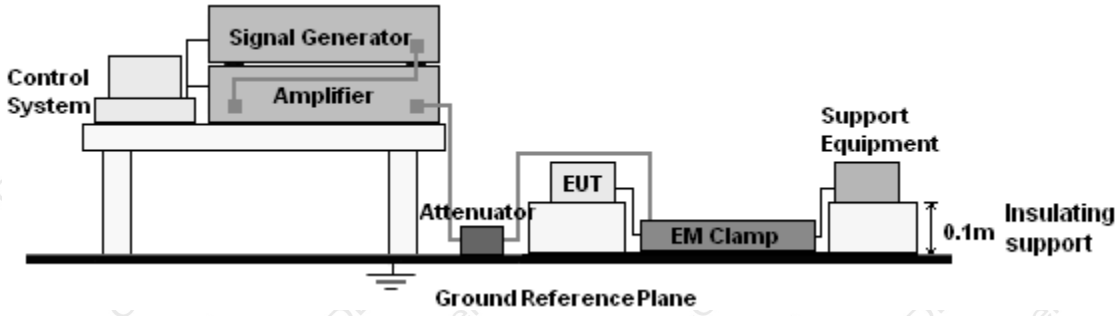
## 15.INJECTED CURRENTS SUSCEPTIBILITY TEST

15.1 Block Diagram of EUT Test Setup

For input a.c. / d.c. power port:




For signal lines and control lines:




15.2 Test Standard

EN 55014-2, EN61000-4-6

15.3 Severity Levels and Performance Criterion

Severity Level 2: 3V( rms ), 150KHz ～ 80MHz

Performance criterion: A

15.4 Test Procedure

1) Set up the EUT, CDN and test generator as shown on section 12.1

2) Let EUT work in test mode and measure.

3) The EUT and supporting equipments 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 at above 0.1-0.3m 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) The disturbance signal described below is injected to EUT through CDN.

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

6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave

7) The rate of sweep shall not exceed $1.5\times10^{-3}$ decades/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.

8) Recording the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

15.5 Test Result

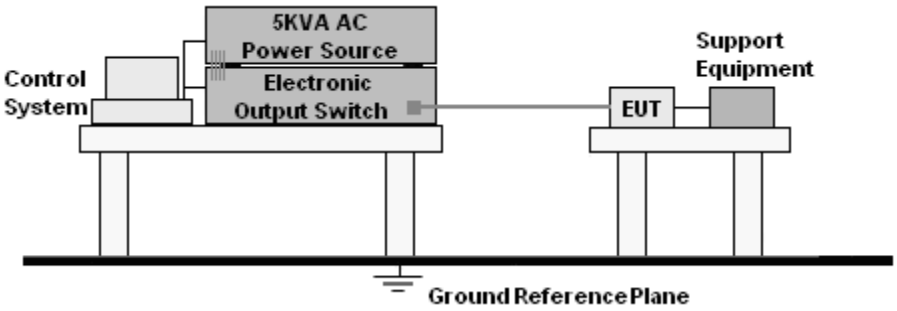
PASS

Please refer to the following page.

| CS Test Data | | | | | | |
|---|---|---|---|---|---|---|
| Temperature: | | 24.5℃ | | Humidity: | 53% | |
| Power Supply : | | AC 230V/50Hz | | Test Mode: | Mode 1 | |
| Frequency Range(MHz) | Injected Position | Strength | Modulation Signal | Freq. Step | Performance Criterion | Result |
| 0.15～80 | AC Line | 3V(rms), Unmodulated | AM 80%, 1kHz sine wave | 1% | A | Pass |
| 0.15～80 | DC Line, Signal Line | 3V(rms), Unmodulated | AM 80%, 1kHz sine wave | 1% | / | / |
| Note: N/A | | | | | | |

## 16.VOLTAGE DIPS AND INTERRUPTIONS TEST

16.1 Block Diagram of EUT Test Setup




16.2 Test Standard

EN 55014-2, EN61000-4-11

16.3 Severity Levels and Performance Criterion

Input and Output AC Power Ports.

☑ Voltage Dips.

☑ Voltage Interruptions.

| Environmental Phenomena | Test Specification | Units | Performance Criterion |
|---|---|---|---|
| Voltage Dips | 100<br>0.5 | % Reduction<br>period | C |
| | 60<br>10 | % Reduction<br>period | C |
| | 30<br>25 | % Reduction<br>period | C |

16.4 Test Procedure

1) Set up the EUT and test generator as shown on section 14.1

2) The interruption is introduced at selected phase angles with specified duration. There is a 3mins minimum interval between each test event.

3) After each test a full functional check is performed before the next test.

4) Repeat procedures 2 & 3 for voltage dips, only the level and duration is changed.

5) Record any degradation of performance.

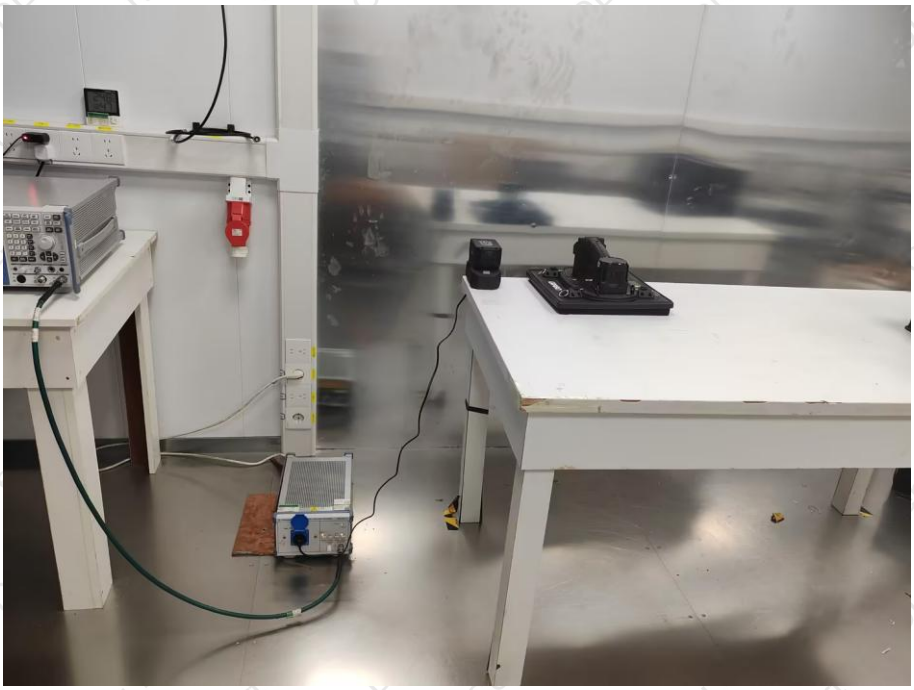
16.5 Test Result

PASS

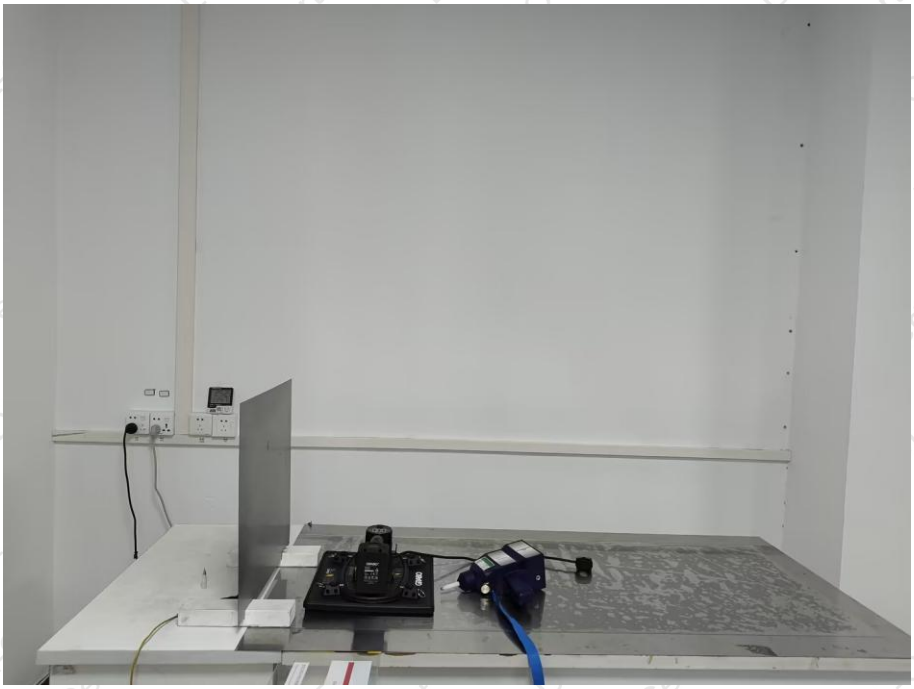
Please refer to the following page.

| DIPS Test Data | | | | |
|---|---|---|---|---|
| Temperature: | 24.5℃ | Humidity: | 53% | |
| Power Supply : | AC 230V/50Hz | Test Mode: | Mode 1 | |
| Environmental Phenomena | Test Specification | Units | Performance Criterion | Result |
| Voltage Dips | 100<br>0.5 | % Reduction<br>period | C | Pass |
| | 60<br>10 | % Reduction<br>period | C | Pass |
| | 30<br>25 | % Reduction<br>period | C | Pass |

## 17.SETUP PHOTOGRAPHS



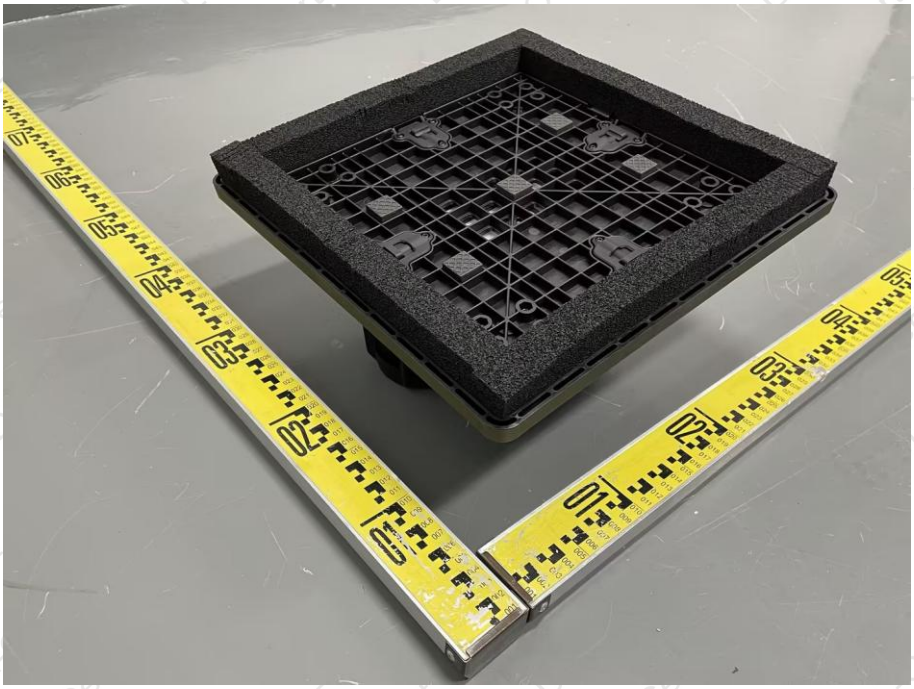

LAPLACE INSTRUMENTS LTD
230.4
0.76



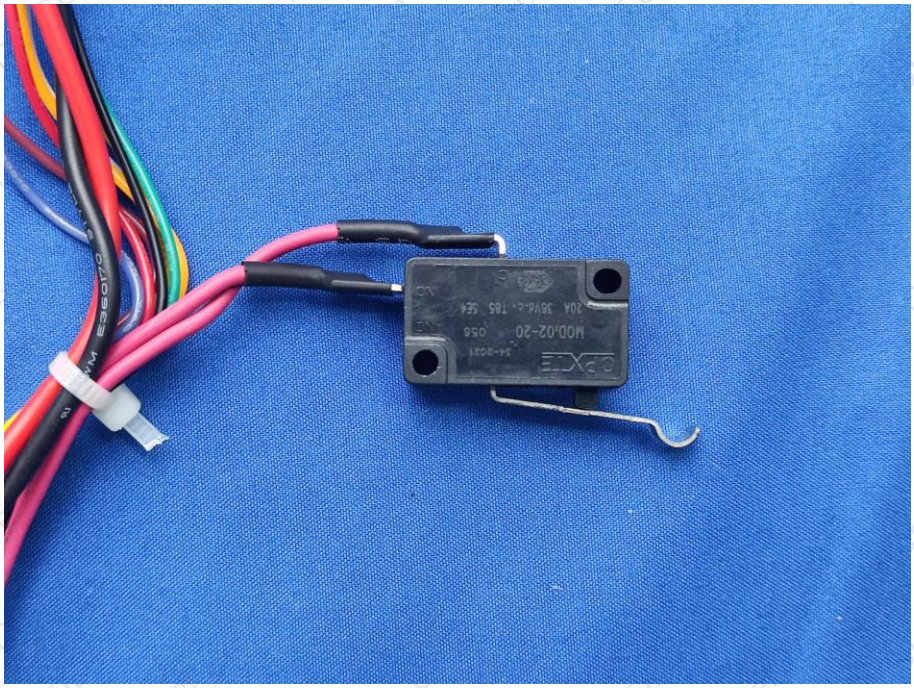
## 18.EUT PHOTOGRAPHS

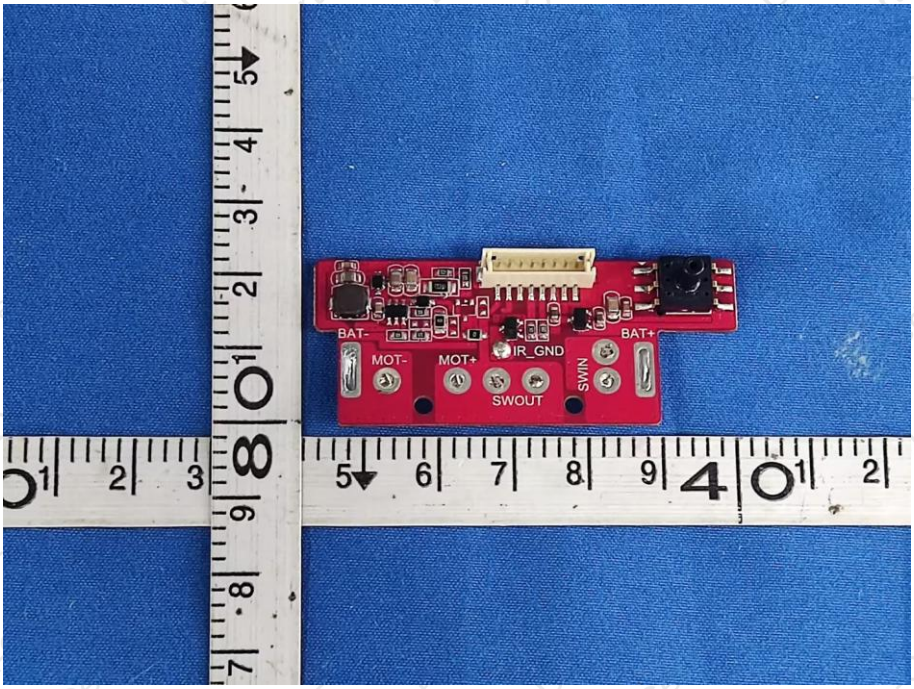


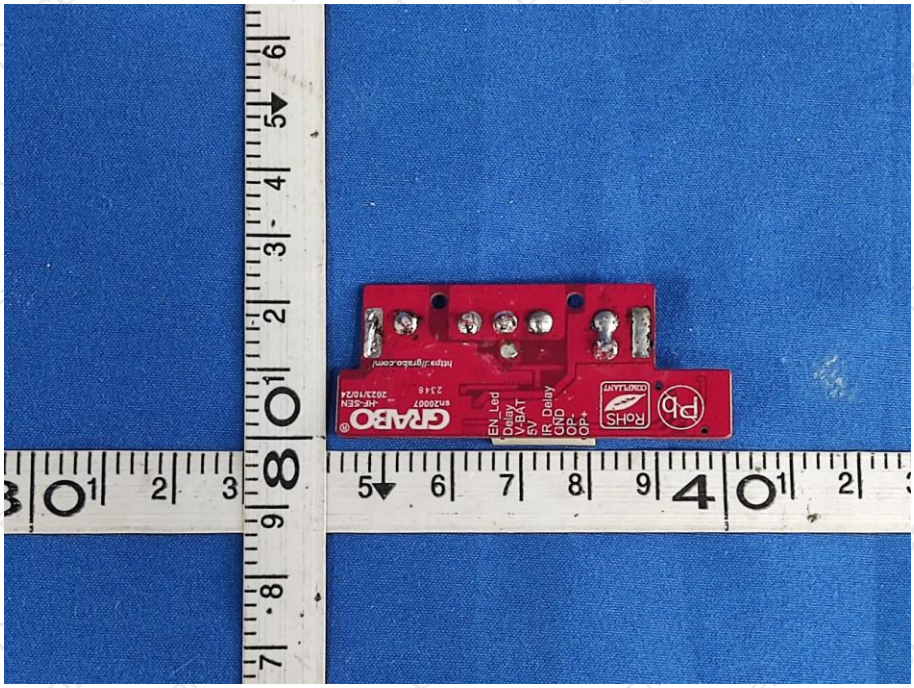
GRABO

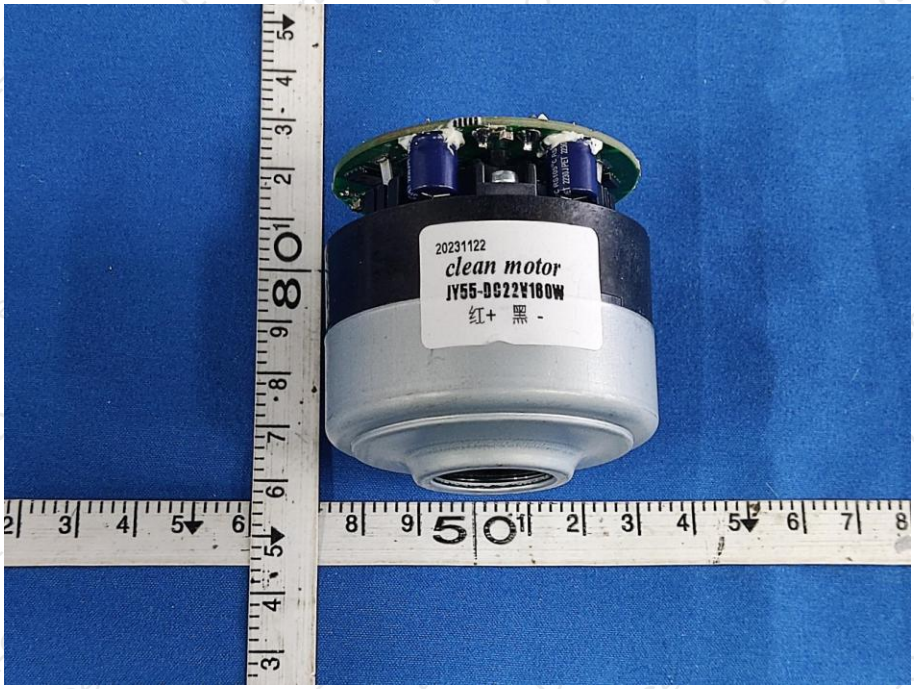


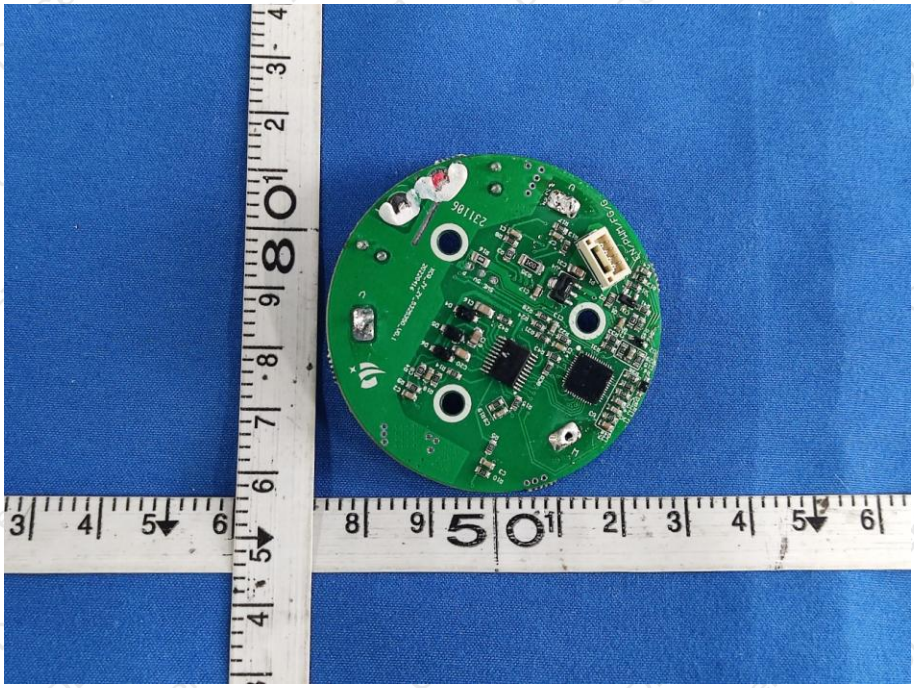

GRABO

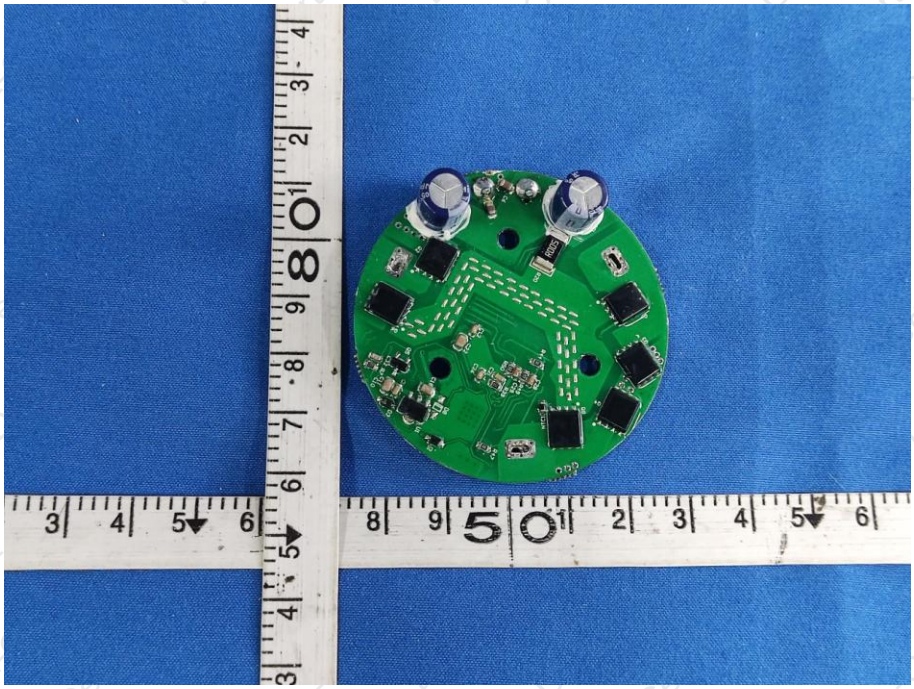


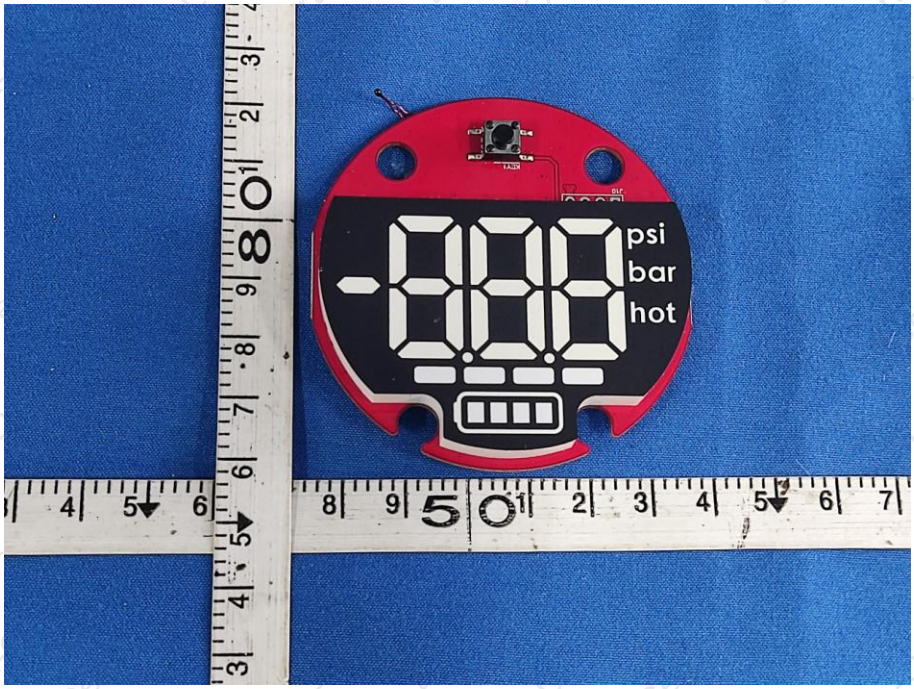

BAT-
BAT+
MOT-
MOT+
IR_GND
SWOUT
SWIN

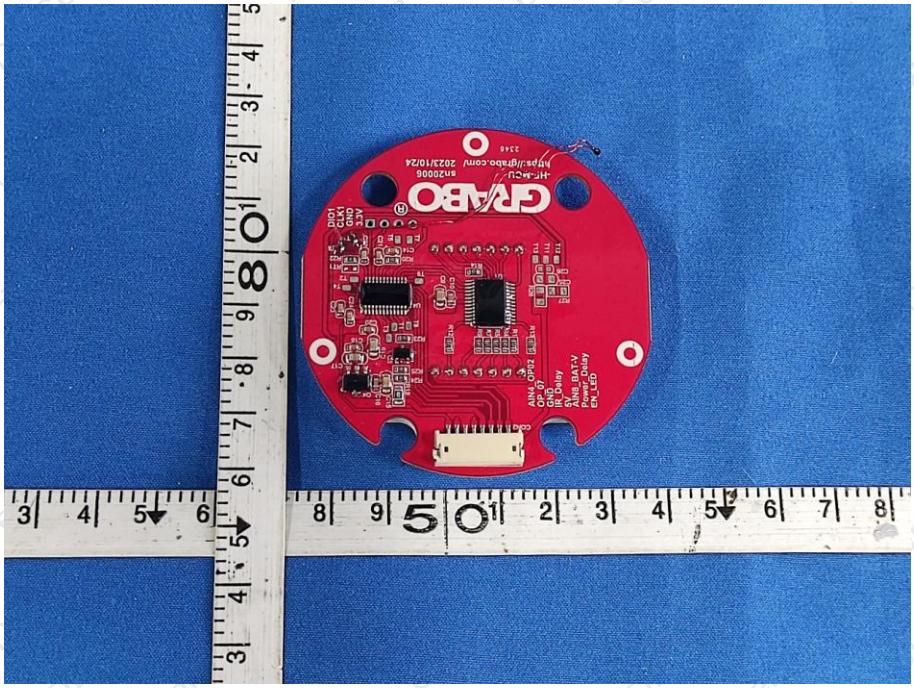

EN_Led
Delay
V_BAT
IR
Delay
GND
OP-
OP+


20231122
clean motor
JY55-DC22V180W
红+ 黑 -






psi
bar
hot

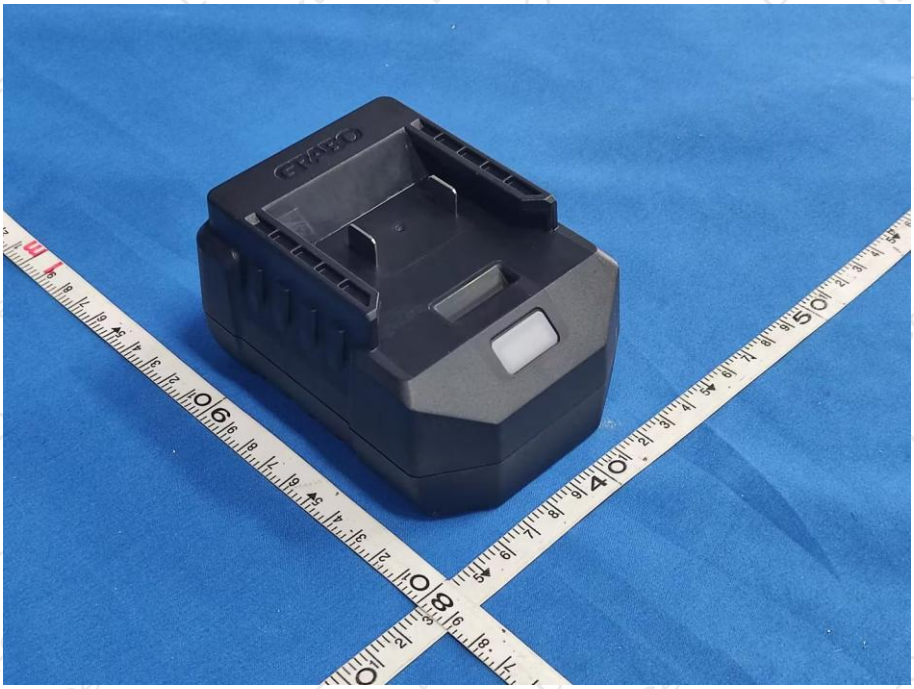

GRABO


GRABO


GRABO
LITHIUM ION
20 V
5.0 AH


GRABO
MODEL
20V
5.0 AH
100 WH
LITHIUM ION
20 V
5.0 AH


GRABO


GRABO

**※※※※※ END OF REPORT ※※※※※**