

TEST REPORT

Product Name : DMX512APP

Model Number : GFC007

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APPENDIX (Photos of the EUT) (8 pages)

TEST REPORT DESCRIPTION

Applicant : Shenzhen Greatfavian Electronic CO., LTD
5F, Tongfuyu Industrial Park, Lezhujiao, Zhoushi Road, Baoan District,
Shenzhen, China 518126

Manufacturer : Shenzhen Greatfavian Electronic CO., LTD
5F, Tongfuyu Industrial Park, Lezhujiao, Zhoushi Road, Baoan District,
Shenzhen, China 518126

Factory : Shenzhen Greatfavian Electronic CO., LTD
5F, Tongfuyu Industrial Park, Lezhujiao, Zhoushi Road, Baoan District,
Shenzhen, China 518126

Trade Mark : GFLAI

EUT : DMX512APP

Model Number : GFC007

Rating : DC 6V from adapter
Adapter: Model: ZF-0601000
INPUT: 100-240V~50/60Hz 0.65A Max
OUTPUT: 6V/1000mA

Measurement Procedure Used:

BS EN 55032:2015+A1:2020

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

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

BS EN 55035:2017+A11:2020


The device described above is tested by EMTEK (DONGGUAN) CO., LTD. and EMTEK (SHENZHEN) CO., LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and EMTEK (DONGGUAN) CO., LTD. is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the BS EN 55032, BS EN IEC 61000-3-2, BS EN 61000-3-3, BS EN 55035 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of EMTEK (DONGGUAN) CO., LTD.

Date of Test :

Jul 04, 2024 to Oct 08, 2024

Prepared by :


Jessica Zhang /Editor

Reviewer :


Warren Deng /Supervisor

Approve & Authorized Signer :

Sam Lv / Manager

Modified Information

| Version | Report No. | Revision Date | Summary |
|---------|----------------------|---------------|-----------------|
| | EDG2408190171E00601R | / | Original Report |



1. DESCRIPTION OF STANDARDS AND RESULTS (EUT)

| EMISSION | | | | |
|---|-----------------------------------|-------------------------------|----------------------|---------|
| Description of Test Item | | Standard | Limits | Results |
| Conducted Emissions From the AC Mains Power Ports | | BS EN 55032 | Class B | Pass |
| Asymmetric mode conducted emissions | Wired network ports | | Class B | N/A |
| | Optical fibre ports | | Class B | N/A |
| | Broadcast receiver tuner ports | | Class B | N/A |
| | Antenna ports | | Class B | N/A |
| Conducted differential voltage emissions | TV broadcast receiver tuner ports | | Class B | N/A |
| | RF modulator output ports | | Class B | N/A |
| | FM broadcast receiver tuner ports | | Class B | N/A |
| Radiated emissions at frequencies up to 1 GHz | | | Class B | Pass |
| Radiated emissions at frequencies above 1 GHz | | | Class B | Pass |
| Radiated emissions from FM receivers | | | Table A.6 | N/A |
| Outdoor units of home satellite receiving systems | | | Table A.7 | N/A |
| Harmonic Current Emissions | | BS EN IEC 61000-3-2 | Class A | N/A |
| Voltage Fluctuation and Flicker | | BS EN 61000-3-3 | Section 5 | Pass |
| IMMUNITY | | | | |
| Description of Test Item | | Basic Standard | Performance Criteria | Results |
| Electrostatic Discharge | Enclosure ports | IEC 61000-4-2:2008 | B | Pass |
| Continuous RF electromagnetic field disturbances | Enclosure ports | IEC 61000-4-3: 2020 | A | Pass |
| Electrical fast transients/burst | AC mains power ports | IEC61000-4-4:2012 | B | Pass |
| | Analogue/digital data ports | | B | N/A |
| | DC network power ports | | B | N/A |
| Surges | AC mains power ports | IEC 61000-4-5: 2014+AMD1:2017 | B | Pass |
| | Analogue/digital data ports | | B,C | N/A |
| | DC network power ports | | B | N/A |
| Continuous induced RF disturbances | AC mains power ports | IEC 61000-4-6:2013/COR 1:2015 | A | Pass |
| | Analogue/digital data ports | | A | N/A |
| | DC network power ports | | A | N/A |
| Power frequency magnetic field | Enclosure ports | IEC 61000-4-8:2009 | A | N/A |
| Voltage dips and interruptions | AC mains power ports | IEC 61000-4-11: 2020 | B,C | Pass |
| Broadband impulsive conducted disturbances | Analogue/digital data ports | \ | N/A | N/A |
| Note: N/A is an abbreviation for Not Applicable. | | | | |

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : DMX512APP

Model Number : GFC007

Hardware Version : N/A

Test Voltage : AC 230V 50Hz, AC 120V 60Hz

Date of Received : Aug 19, 2024

Date of Test : Aug 19, 2024 to Oct 11, 2024

2.2. Independent Operation Modes

- A. BT
- B. 433

2.3. Test Manner

| Test Items | Test Voltage | Operation Modes | Worst case |
|--|------------------------------|-----------------|------------|
| Conducted disturbance at mains Terminals | AC 230V 50Hz AC 120V 60Hz | Mode A&B | Mode A |
| Radiated emissions at frequencies up to 1 GHz | AC 230V 50Hz AC 120V 60Hz | Mode A&B | Mode A |
| Radiated emissions at frequencies above to 1 GHz | AC 230V 50Hz AC 120V 60Hz | Mode A&B | Mode A |
| Voltage Fluctuation and Flicker | AC 230V 50Hz | Mode A&B | Mode A |
| Electrostatic Discharge | AC 230V 50Hz AC 120V 60Hz | Mode A&B | / |
| Continuous RF electromagnetic field disturbances | AC 230V 50Hz AC 120V 60Hz | Mode A&B | / |
| Electrical fast transients/burst | AC 230V 50Hz AC 120V 60Hz | Mode A&B | / |
| Surges | AC 230V 50Hz AC 120V 60Hz | Mode A&B | / |
| Continuous induced RF disturbances | AC 230V 50Hz AC 120V 60Hz | Mode A&B | / |
| Voltage dips and interruptions | AC 230V 50Hz AC 120V 60Hz | Mode A&B | / |

2.4. Description of Support Device

| Kind of Equipment | Manufacturer | Type | SN |
|-------------------|--------------|------|----|
| / | / | / | / |
| / | / | / | / |
| / | / | / | / |

2.5. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2024.07.06
The certificate is valid until 2030.07.05
The Laboratory has been assessed and proved to be in compliance with
CNAS/CL01:2018
The Certificate Registration Number is L3150

Recognized by FCC
Designation Number: CN1300
Test Firm Registration Number: 945551

Accredited by A2LA, April 05, 2021
The Certificate Registration Number is 4321.02

Recognized by Industry Canada
The Certificate Registration Number is CN0113

Name of Firm : EMTEK (DONGGUAN) Co., Ltd.
Site Location : Room 111&112, Building 8, -1&2/F., Office Building2, Zone A, Zhongda Marine
Biotechnology Research and Development Base, No.9, Xincheng Avenue,
Songshan Lake High-Tech Industrial Development Zone, Dongguan,
Guangdong, China

2.6. Measurement Uncertainty

| Test Item | Uncertainty |
|---|---|
| Conducted Emission Uncertainty | : 2.08dB(9k~150kHz Conduction 1#) 2.42dB(150k-30MHz Conduction 1#) |
| Radiated Emission Uncertainty (3m Chamber) | : 3.32dB (30M~1GHz Polarize: H) 3.34dB (30M~1GHz Polarize: V) 4.98dB (1~6GHz) 5.20dB (6~18GHz) |
| Uncertainty for Flicker test | : 0.07% |
| Uncertainty for Harmonic test | : 1.8% |
| Uncertainty for C/S Test | : 1.45(Using CDN Test) |
| Uncertainty for R/S Test | : 2.10dB(80MHz-200MHz) 1.76dB(200MHz-1000MHz) |
| Uncertainty for test site temperature and humidity | : 0.6°C 4% |

3. MEASURING DEVICE AND TEST EQUIPMENT

3.1. For Conducted Disturbances at the AC mains port

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|-------------------|---------------|---------------|------------|-----------|---------------|
| 1. | EMI Test Receiver | Rohde&Schwarz | ESCI | 100137 | 2024/4/29 | 1 Year |
| 2. | AMN | Rohde&Schwarz | ENV216 | 101209 | 2024/4/28 | 1 Year |
| 3. | Test Software | Farad | Ver. CON-03A1 | -- | N/A | N/A |

3.2. For Radiated Emission

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|-----------------------|---------------|--------------|------------------|-----------|---------------|
| 1. | EMI Test Receiver | Rohde&Schwarz | ESCI | 101415 | 2024/4/28 | 1 Year |
| 2. | Bi-log Hybrid Antenna | Schwarzbeck | VULB9163 | 141 | 2024/5/5 | 1 Year |
| 3. | Pre-Amplifier | HP | 8447F | OPH64 | 2024/4/28 | 1 Year |
| 4. | Signal Analyzer | R&S | FSV30 | 103039 | 2024/4/28 | 1 Year |
| 5. | Horn Antenna | Schwarzbeck | BBHA9120D | 1272 | 2024/5/5 | 1 Year |
| 6. | Pre-Amplifier | LUNAR EM | PM1-18-40 | J1010000008 1 | 2024/4/28 | 1 Year |
| 7. | Test Software | Farad | Ver. RA-03A1 | -- | N/A | N/A |

3.3. For Harmonic / Flicker Measurement

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|---|--------------|--------------------|------------|-----------|---------------|
| 1. | AC variable frequency power supply | Teseq | 100-CTS-230-TESQ | 1804A03259 | 2024/4/29 | 1 Year |
| 2. | Harmonic current and voltage fluctuation analyzer | Teseq | 50011X-CTS-400-SCH | 1805A03008 | 2024/4/29 | 1 Year |

3.4. For Electrostatic Discharge Test

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|------------|--------------|-----------|------------|-----------|---------------|
| 1. | ESD Tester | TESEQ | NSG 437 | 409 | 2024/5/7 | 1 Year |

3.5. For Continuous RF Electromagnetic Field Disturbances Immunity

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|--------------------------|--------------|-----------|------------|-----------|---------------|
| 1. | Power Amplifier | MILMEGA | AS0102-55 | 1018770 | 2024/5/10 | 1 Year |
| 2. | 50ohm Diode Power Sensor | BOONTON | 51011EMC | 34236 | 2024/5/10 | 1 Year |
| 3. | RF Power Meter. Dual | BOONTON | 4232A | 10539 | 2024/5/10 | 1 Year |

| | Channel | | | | | |
|-----|---------------------------------|-----------------|------------------|-------------------|------------|--------|
| 4. | Log.-Per. Antenna | SCHWARZBECK | STLP 9129-7/16 | 3050 | N/A | N/A |
| 5. | Signal Generator | Agilent | N5181A | MY50145187 | 2024/5/10 | 1 Year |
| 6. | Broad-Band Horn Antenna | SCHWARZBECK | STLP 9149 | 9149-227 | N/A | N/A |
| 7. | Field Strength Meter | DARE | RSS1006A | 10I00037SN02 2 | 2024/5/10 | 1 Year |
| 8. | Multi-function interface system | DARE | CTR1009B | 12I00250SN07 2 | N/A | N/A |
| 9. | Automatic switch group | DARE | RSW1004A | N/A | N/A | N/A |
| 10. | Power Amplifier | MILMEGA | AS1860-50 | 1059346 | 2024/5/10 | 1 Year |
| 11. | Power Amplifier | Vectawave | VBA 1000-600C | 133627 | 2023/10/23 | 1 Year |
| 12. | Directional Coupler | BONN | BDC 0810-50/1500 | 2229689 | 2023/10/23 | 1 Year |
| 13. | Audio Analyzer | R&S | UPV | 101473 | 2024/5/10 | 1 Year |
| 14. | Audio Test System | AUDIO PRECISION | ATS-1 | 41100 | 2024/5/10 | 1 Year |

3.6. For Fast Transients Test

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|---------------------------|--------------|-----------|------------|-----------|---------------|
| 1. | EMS comprehensive tester | HTEC | HCOMPACT7 | 190305 | 2024/4/29 | 1 Year |
| 2. | Capacitive Coupling Clamp | RMTEST | HFK | 0605-10 | 2024/4/29 | 1 Year |

3.7. For Surge Test

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|-------------------------------------|--------------|-----------|------------|-----------|---------------|
| 1. | EMS comprehensive tester | HTEC | HCOMPACT7 | 190305 | 2024/4/29 | 1 Year |
| 2 | Communication waves surge generator | HTEC | HTSG 70 | 223001 | 2024/1/17 | 1 Year |
| 3 | Coupling Module | HTEC | HCN 8 | 232403 | 2024/1/17 | 1 Year |
| 4 | Coupling Module | HTEC | HDEC 8 | 224705 | 2024/1/17 | 1 Year |

3.8. For Injected Currents Test

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|----------------------------|-----------------|------------------|------------|-----------|---------------|
| 1. | Signal generator | Rohde& Schwarz | SMB100A | 103042 | 2024/4/28 | 1 Year |
| 2. | Single channel power meter | Rohde& Schwarz | NRVS | 101761 | 2024/4/28 | 1 Year |
| 3. | 6 db attenuator | AR-WORLDWIDE | 6dB/50FH-006-100 | 324011 | 2024/4/28 | 1 Year |
| 4. | CDN | SKET | CDN M2+M3 | 204303 | 2024/4/28 | 1 Year |
| 5. | Power amplifier | BONN Elektronik | BSA 1515-25 | 97483 | 2024/4/28 | 1 Year |
| 6. | CDN | SKET | CDN 150K80M-T8 | 212309 | 2024/4/28 | 1 Year |
| 7. | CDN | SKET | CDN 150K80M-T8 | 212310 | 2024/4/28 | 1 Year |

3.9. For Power Frequency Magnetic Field Test

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|-----------------------|--------------|-----------|------------|-----------|---------------|
| 1. | Magnetic Field Tester | HAEFELY | MAG100 | 250040.1 | 2024/1/17 | 1 Year |

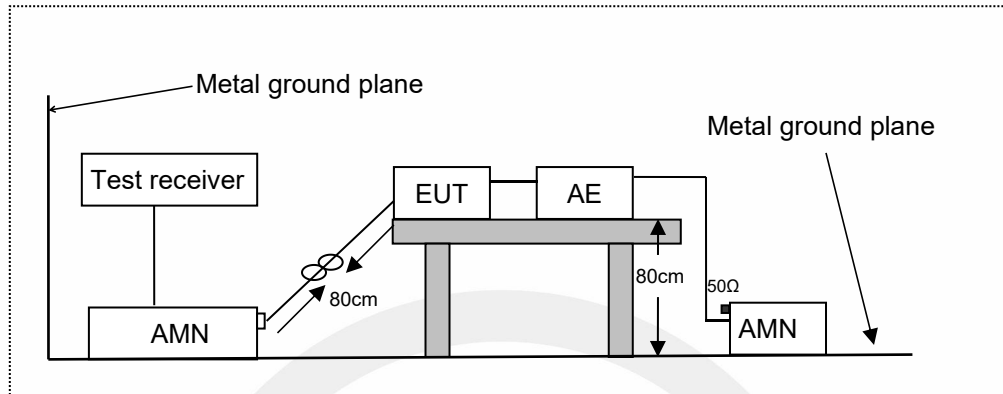
3.10. For Voltage Dips and Interruptions Test

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Cal. Interval |
|------|--------------------------|--------------|-----------|------------|-----------|---------------|
| 1. | EMS comprehensive tester | HTEC | HCOMPACT7 | 190305 | 2024/4/29 | 1 Year |
| 2. | Dips module | HTEC | HV1P16T | 190302 | 2024/4/29 | 1 Year |



4. CONDUCTED EMISSIONS FROM THE AC MAINS POWER PORTS

4.1. Block Diagram of Test Setup



AMN: Artificial Mains Network
AE: Associated equipment
EUT: Equipment under test

4.2. Limits

BS EN 55032, Class B, Table A.10

| Frequency range MHz | Coupling device (see Table A.10) | Detector type / bandwidth | Class B limits dB(μV) |
|------------------------|-------------------------------------|------------------------------|--------------------------|
| 0.15 to 0.5 | AMN | Quasi Peak / 9 kHz | 66 to 56 |
| 0.5 to 5 | | | 56 |
| 5 to 30 | | | 60 |
| 0.15 to 0.5 | AMN | Average / 9 kHz | 56 to 46 |
| 0.5 to 5 | | | 46 |
| 5 to 30 | | | 50 |

4.3. Test Procedure

The EUT was placed on a desk 0.8 m height from the metal ground plane and 0.4 m from the conducting wall of the shielding room and it was kept at least 0.8 m from any other grounded conducting surface. The size of the table will nominally be 1.5 m x1.0 m.

The rear of the arrangement shall be flush with the back of the supporting tabletop unless that would not be possible or typical of normal use.

All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units.

Connect EUT to the power mains through a artificial mains network (AMN). Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle

no longer than 0.4 m, so that its length is shortened to 1 m.

All the support units are connecting to the other AMN.

The AMN provides 50 ohm coupling impedance for the measuring instrument.

The CISPR states that the AMN with 50 ohm and 50 microhenry should be used.

Both sides of AC line were checked for maximum conducted interference.

The frequency range from 150 kHz to 30 MHz was sweep.

Set the test-receiver system to quasi peak detect function and average detect function, and to measure the conducted emissions values.

Test results were obtained from the following equation:

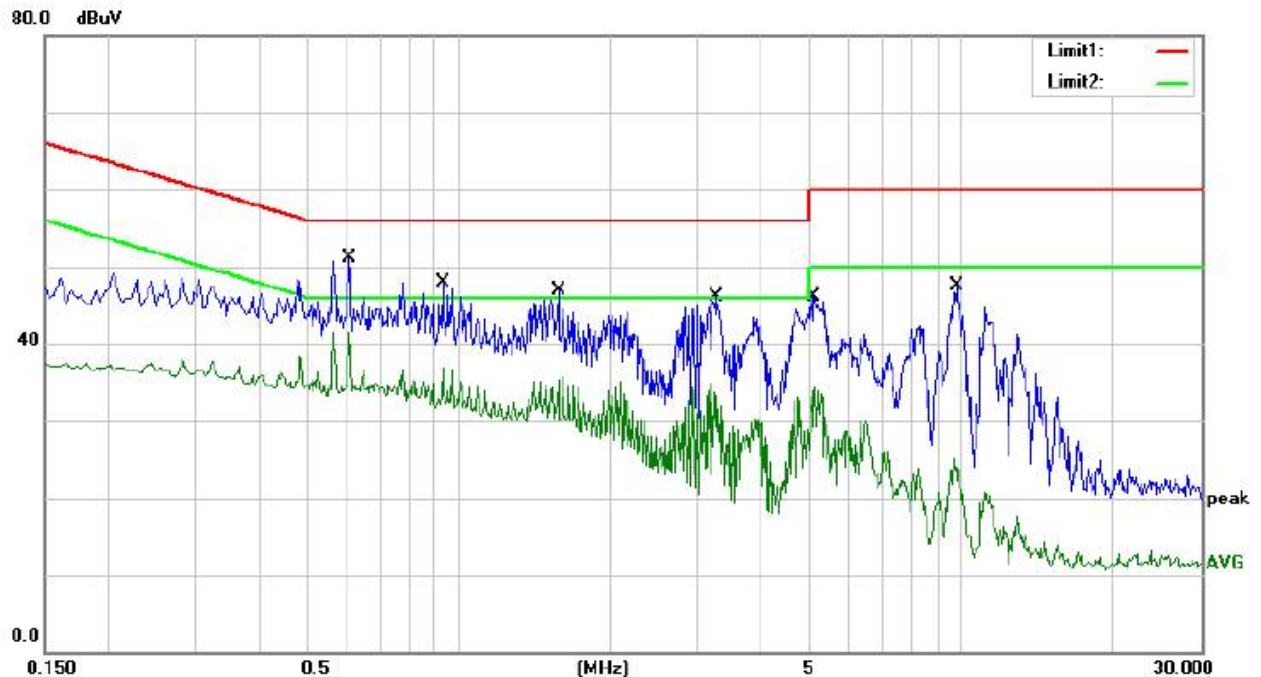
Emission Level (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)

Margin (dB) = Emission Level (dBμV) - Limit (dBμV)

4.4. Measuring Results

PASS.

All the modes were tested and the worst data are attached the following pages.

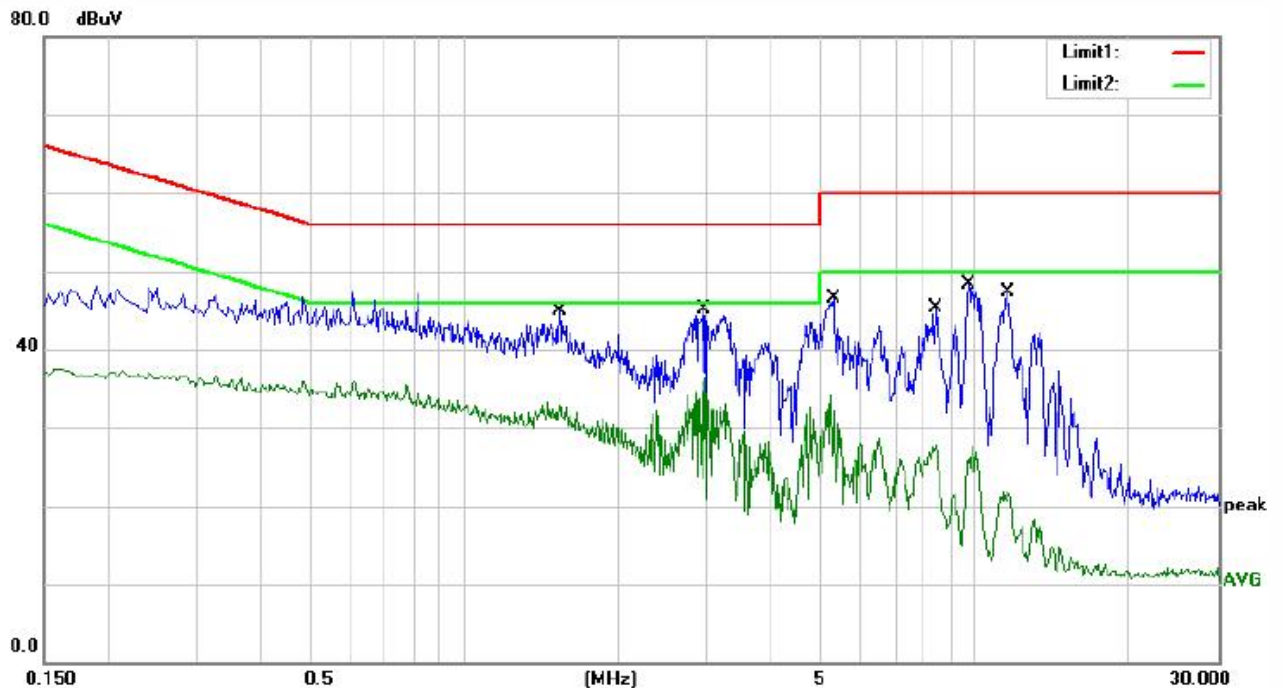


| Site site #1 | | | Phase: L1 | | | | Temperature: 22.5 | | |
|--------------|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|-------------------|----------|---------|
| No. | Mk. | Freq. MHz | Reading Level dBμV | Correct Factor dB | Measure- ment dBμV | Limit dBμV | Over dB | Detector | Comment |
| 1 | | 0.6060 | 34.01 | 17.06 | 51.07 | 56.00 | -4.93 | QP | |
| 2 | * | 0.6060 | 24.53 | 17.06 | 41.59 | 46.00 | -4.41 | AVG | |
| 3 | | 0.9300 | 30.97 | 17.03 | 48.00 | 56.00 | -8.00 | QP | |
| 4 | | 0.9300 | 19.84 | 17.03 | 36.87 | 46.00 | -9.13 | AVG | |
| 5 | | 1.5780 | 29.78 | 17.08 | 46.86 | 56.00 | -9.14 | QP | |
| 6 | | 1.5780 | 18.64 | 17.08 | 35.72 | 46.00 | -10.28 | AVG | |
| 7 | | 3.2540 | 29.19 | 17.01 | 46.20 | 56.00 | -9.80 | QP | |
| 8 | | 3.2540 | 17.83 | 17.01 | 34.84 | 46.00 | -11.16 | AVG | |
| 9 | | 5.0980 | 29.07 | 16.96 | 46.03 | 60.00 | -13.97 | QP | |
| 10 | | 5.0980 | 17.27 | 16.96 | 34.23 | 50.00 | -15.77 | AVG | |
| 11 | | 9.7940 | 30.50 | 16.99 | 47.49 | 60.00 | -12.51 | QP | |
| 12 | | 9.7940 | 8.17 | 16.99 | 25.16 | 50.00 | -24.84 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Jian

Remark:

1. Measurement (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
2. Over (dB) = Measurement (dBμV) - Limit (dBμV)



Site site #1

Phase:

N

Temperature: 22.5

| No. | Mk. | Freq. | Reading | Correct | Measure- | Limit | Over | | |
|-----|-----|---------|---------|---------|----------|-------|--------|----------|---------|
| | | MHz | Level | Factor | ment | | | Detector | Comment |
| | | | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | | 1.5420 | 27.73 | 17.07 | 44.80 | 56.00 | -11.20 | QP | |
| 2 | | 1.5420 | 16.17 | 17.07 | 33.24 | 46.00 | -12.76 | AVG | |
| 3 | | 2.9580 | 28.01 | 17.02 | 45.03 | 56.00 | -10.97 | QP | |
| 4 | * | 2.9580 | 19.19 | 17.02 | 36.21 | 46.00 | -9.79 | AVG | |
| 5 | | 5.2780 | 29.59 | 16.97 | 46.56 | 60.00 | -13.44 | QP | |
| 6 | | 5.2780 | 17.21 | 16.97 | 34.18 | 50.00 | -15.82 | AVG | |
| 7 | | 8.3740 | 28.21 | 17.02 | 45.23 | 60.00 | -14.77 | QP | |
| 8 | | 8.3740 | 10.68 | 17.02 | 27.70 | 50.00 | -22.30 | AVG | |
| 9 | | 9.7500 | 31.32 | 16.99 | 48.31 | 60.00 | -11.69 | QP | |
| 10 | | 9.7500 | 10.58 | 16.99 | 27.57 | 50.00 | -22.43 | AVG | |
| 11 | | 11.6460 | 30.39 | 16.95 | 47.34 | 60.00 | -12.66 | QP | |
| 12 | | 11.6460 | 5.03 | 16.95 | 21.98 | 50.00 | -28.02 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Jian

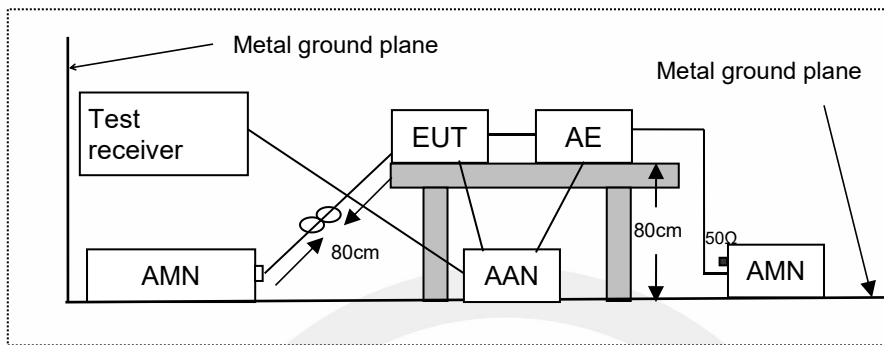
Remark:

1. Measurement (dBμV) = AMN Factor (dB) + Cable Loss (dB) + Reading (dBμV)

2. Over (dB) = Measurement (dBμV) - Limit (dBμV)

5. ASYMMETRIC MODE CONDUCTED EMISSIONS AT WIRED NETWORK PORTS

5.1. Block Diagram of Test Setup



AMN: Artificial mains network
AE: Associated equipment
EUT: Equipment under test
AAN: Asymmetric artificial network

5.2. Limits

BS EN 55032, Class B, Table A.12

| Frequency range (MHz) | Coupling device (see Table A.12) | Detector type / bandwidth | Class B voltage limits dB(μV) | Class B current limits dB(μA) |
|-----------------------|----------------------------------|---------------------------|-------------------------------|-------------------------------|
| 0.15 to 0.5 | AAN | Quasi Peak / 9 kHz | 84 to 74 | N/A |
| 0.5 to 30 | | | 74 | |
| 0.15 to 0.5 | AAN | Average / 9 kHz | 74 to 64 | |
| 0.5 to 30 | | | 64 | |
| 0.15 to 0.5 | CVP and current probe | Quasi Peak / 9 kHz | 84 to 74 | 40 to 30 |
| 0.5 to 30 | | | 74 | 30 |
| 0.15 to 0.5 | CVP and current probe | Average / 9 kHz | 74 to 64 | 30 to 20 |
| 0.5 to 30 | | | 64 | 20 |
| 0.15 to 0.5 | Current Probe | Quasi Peak / 9 kHz | N/A | 40 to 30 |
| 0.5 to 30 | | | | 30 |
| 0.15 to 0.5 | Current Probe | Average / 9 kHz | | 30 to 20 |
| 0.5 to 30 | | | | 20 |

5.3. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through artificial mains network(AMN) or connected to the wired network port through an asymmetric artificial network(ANN). AMN provided a 50ohm coupling impedance for the tested equipment AC mains port, ANN provided a common mode (asymmetric mode) impedance of 150 Ω to

the wired network port under test. Both sides of AC line and the wired network line are investigated to find out the maximum conducted emission according to the BS EN 55032 regulations during conducted emission measurement.

The bandwidth of the receiver is set at 9kHz in 150kHz~30MHz. The frequency range from 150kHz to 30MHz is investigated.

Test results were obtained from the following equation:

Emission Level (dBμV) = ANN Factor (dB) + Cable Loss (dB) + Reading (dBμV)

Margin (dB) = Emission Level (dBμV) - Limit (dBμV)

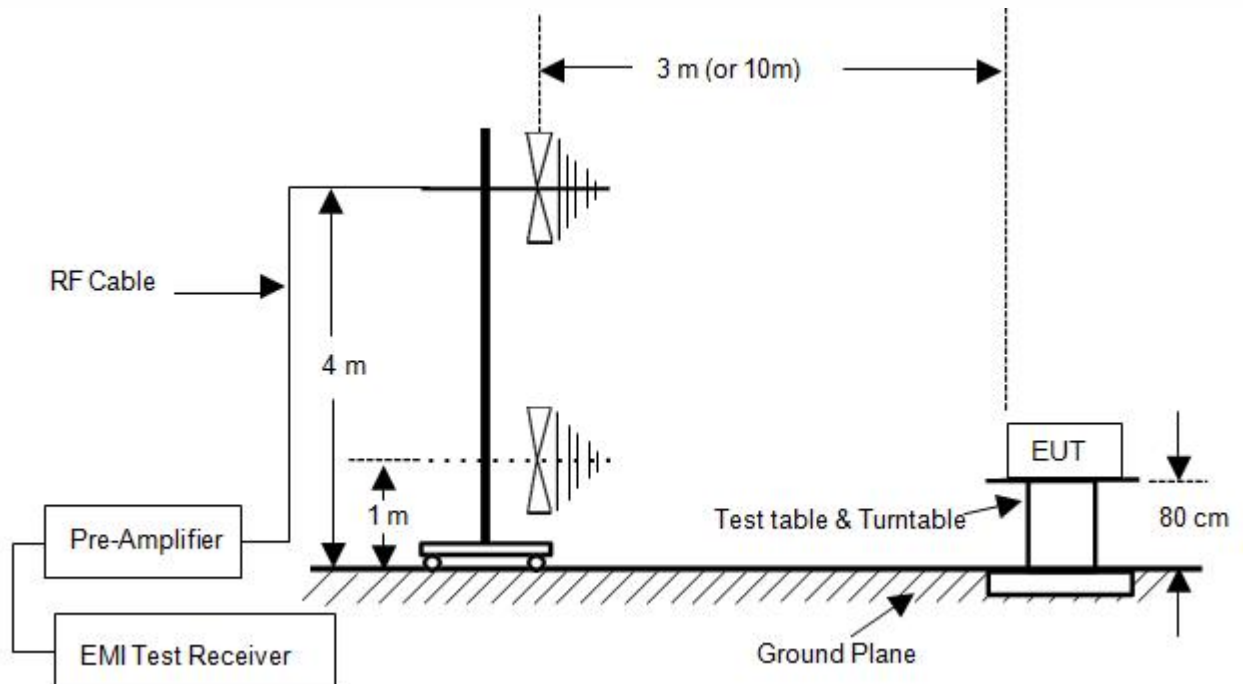
5.4. Measuring Results

Not Applicable



6. RADIATED EMISSION MEASUREMENT (UP TO 1GHz)

6.1. Block Diagram of Test Setup



6.2. Radiated Limit

BS EN 55032, Class B, Table A.4

| Frequency range MHz | Measurement | | | Class B limits dB(μV/m) |
|------------------------|-------------|--------------|---------------------------|----------------------------|
| | Facility | Distance (m) | Detector type / bandwidth | |
| 30 to 230 | OATS/SAC | 10 | Quasi Peak / 120 kHz | 30 |
| 230 to 1 000 | | | | 37 |
| 30 to 230 | OATS/SAC | 3 | | 40 |
| 230 to 1 000 | | | | 47 |

6.3. Test Procedure

The EUT was placed on a non-conductive table whose total height equaled 80cm. All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units. Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, so that its length is shortened to 1 m.

The EUT was set 3 meters (or 10 meters) away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level.

The turntable can rotate 360 degree to determine the position of the maximum emission level.

The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

The bandwidth of the Receiver is set at 120 kHz.

Test results were obtained from the following equation:

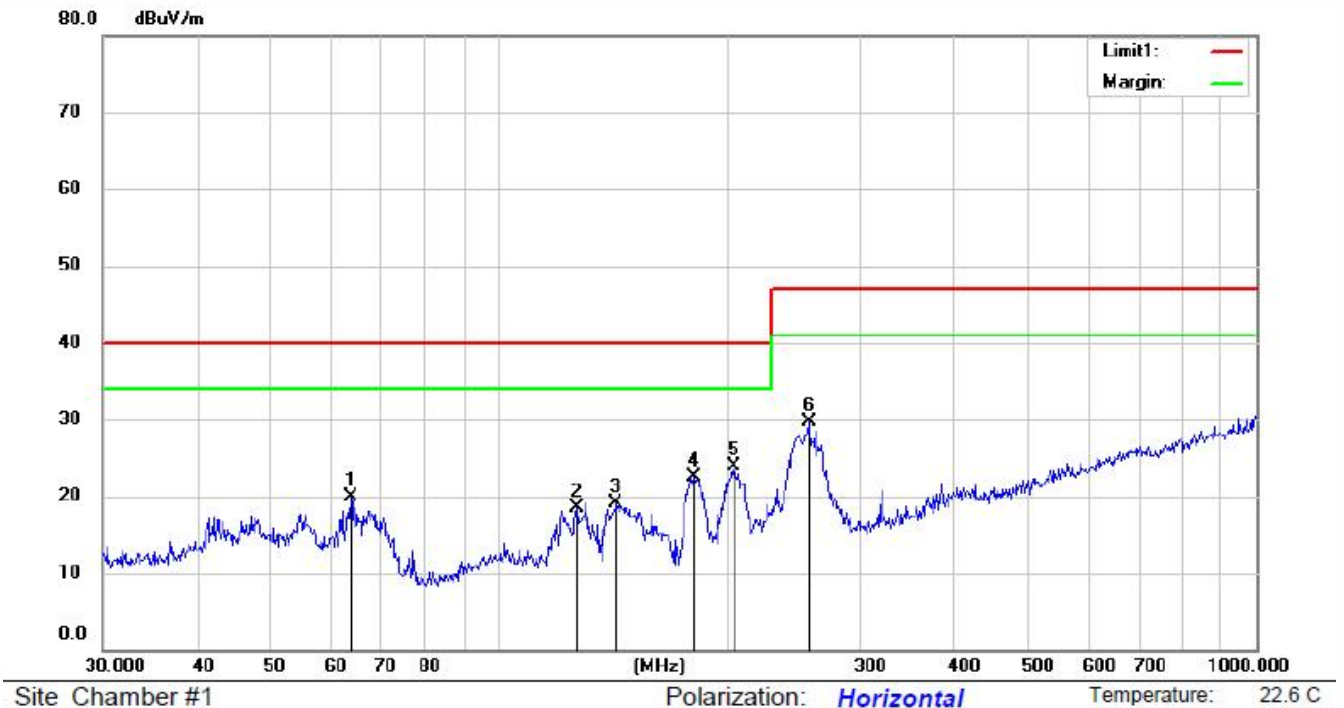
Emission level (dB μ V/m) = Antenna Factor - Amp Factor + Cable Loss + Reading

Margin (dB) = Emission Level (dB μ V/m) - Limit (dB μ V/m)

6.4. Measuring Results

PASS.

All the modes were tested and the worst data are attached the following pages.



| No. | Mk. | Freq. MHz | Reading Level dBuV | Ant. Factor dB/m | Pre Amp Gain dB | Cable loss dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Detector | HI cm | Degree deg. | Comment |
|-----|-----|--------------|--------------------------|------------------------|-----------------------|---------------------|----------------------------|-----------------|------------|----------|----------|----------------|---------|
| 1 | | 63.7588 | 38.16 | 11.25 | 30.53 | 1.07 | 19.95 | 40.00 | -20.05 | QP | | | |
| 2 | | 126.7723 | 39.13 | 8.85 | 30.75 | 1.27 | 18.50 | 40.00 | -21.50 | QP | | | |
| 3 | | 142.8243 | 40.13 | 8.27 | 30.66 | 1.39 | 19.13 | 40.00 | -20.87 | QP | | | |
| 4 | | 180.6488 | 41.67 | 9.78 | 30.46 | 1.6 | 22.59 | 40.00 | -17.41 | QP | | | |
| 5 | * | 204.2377 | 40.83 | 11.72 | 30.34 | 1.74 | 23.95 | 40.00 | -16.05 | QP | | | |
| 6 | | 256.5211 | 44.45 | 13.12 | 30.06 | 2.13 | 29.64 | 47.00 | -17.36 | QP | | | |

*:Maximum data x:Over limit !:over margin

Operator: Ccyf

Remark:

1. Measurement (dB μ V/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dB μ V/m)
2. Over (dB) = Measurement (dB μ V/m) - Limit (dB μ V/m)



| Site Chamber #1 | | | | | | Polarization: <i>Vertical</i> | | | | Temperature: 22.6 C | | | |
|-----------------|-----|----------|---------------|-------------|--------------|-------------------------------|--------------|--------|--------|---------------------|--------|------|---------|
| No. | Mk. | Freq. | Reading Level | Ant. Factor | Pre Amp Gain | Cable loss | Measure-ment | Limit | Over | HI | Degree | | |
| | | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | Detector | cm | deg. | Comment |
| 1 | | 42.1542 | 43.99 | 13.29 | 30.52 | 0.65 | 27.41 | 40.00 | -12.59 | QP | | | |
| 2 | | 46.8303 | 44.63 | 13.87 | 30.49 | 0.73 | 28.74 | 40.00 | -11.26 | QP | | | |
| 3 | * | 63.9828 | 49.95 | 11.18 | 30.53 | 1.07 | 31.67 | 40.00 | -8.33 | QP | | | |
| 4 | | 147.4036 | 44.85 | 8.45 | 30.64 | 1.42 | 24.08 | 40.00 | -15.92 | QP | | | |
| 5 | | 180.0165 | 43.86 | 9.7 | 30.47 | 1.6 | 24.69 | 40.00 | -15.31 | QP | | | |
| 6 | | 248.5520 | 43.40 | 12.96 | 30.1 | 2.12 | 28.38 | 47.00 | -18.62 | QP | | | |

*:Maximum data x:Over limit !:over margin

Operator: Ccyf

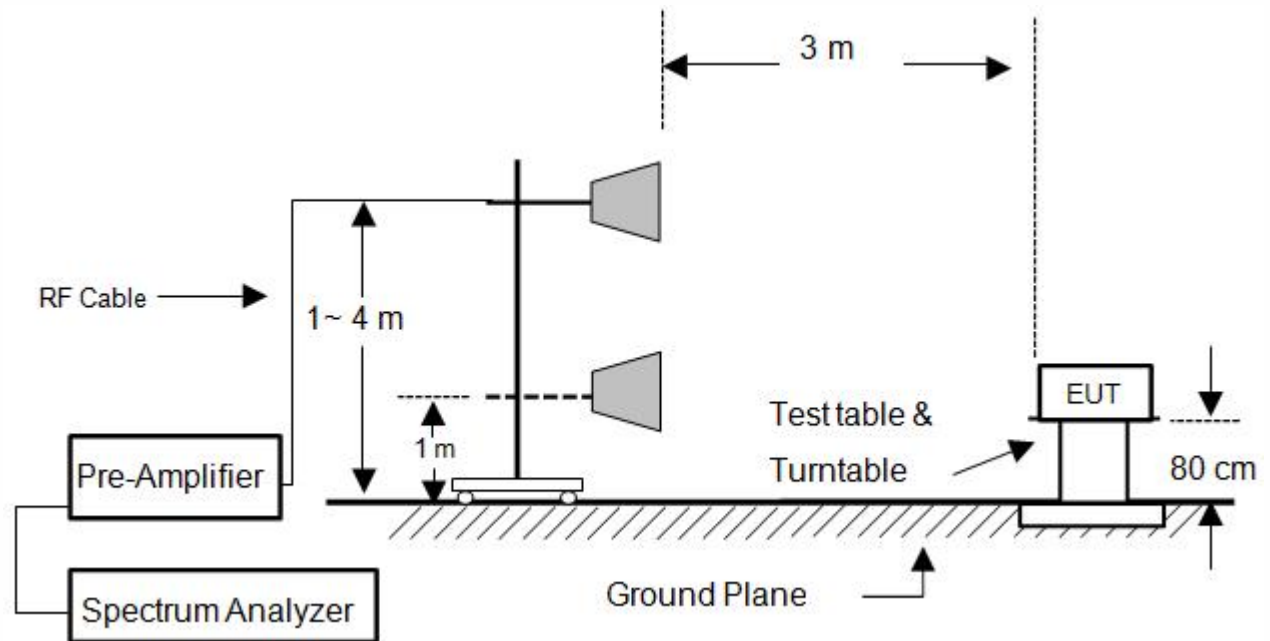
Remark:

1. Measurement (dBμV/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dBμV/m)

2. Over (dB) = Measurement (dBμV/m) - Limit (dBμV/m)

7. RADIATED EMISSION MEASUREMENT (ABOVE 1GHz)

7.1. Block Diagram of Test Setup



7.2. Radiated Limit

BS EN 55032, Class B, Table A.5

| Frequency range (MHz) | Measurement | | | Class B limits dB(μ V/m) |
|-----------------------|-------------|--------------|--------------------------|-------------------------------|
| | Facility | Distance (m) | Detector type/ bandwidth | |
| 1000 to 6000 | FSOATS | 3 | Average / 1 MHz | 54 |
| 1000 to 6000 | | | Peak / 1 MHz | 74 |

Note: The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes. If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

7.3. Test Procedure

The EUT was placed on a non-conductive table whose total height equaled 80cm. All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units. Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, so that its length is shortened to 1 m.

The EUT was set 3 meters away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level.

The turntable can rotate 360 degree to determine the position of the maximum emission level.

The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

The frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz.

Test results were obtained from the following equation:

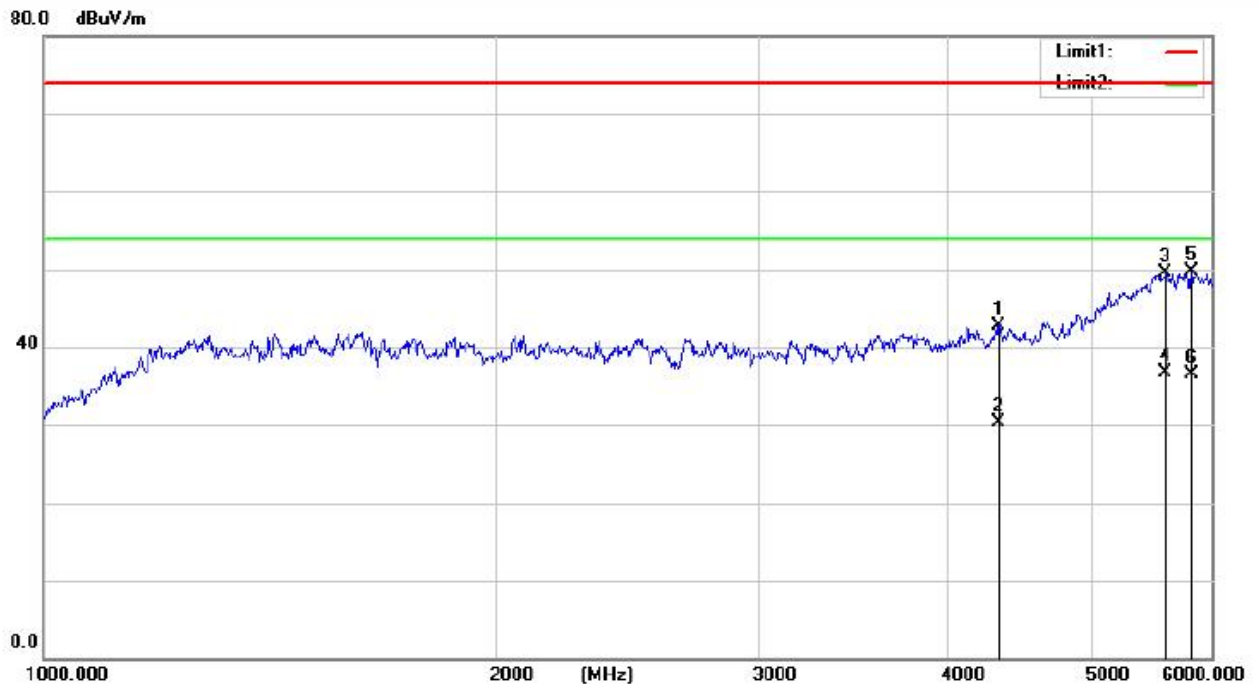
Emission level (dB μ V/m) = Antenna Factor -Amp Factor +Cable Loss + Reading

Margin (dB) = Emission Level (dB μ V/m) - Limit (dB μ V/m)

7.4. Measuring Results

PASS.

All the modes were tested and the worst data are attached the following pages.



Site site #1 Polarization: **Horizontal** Temperature: 23.4

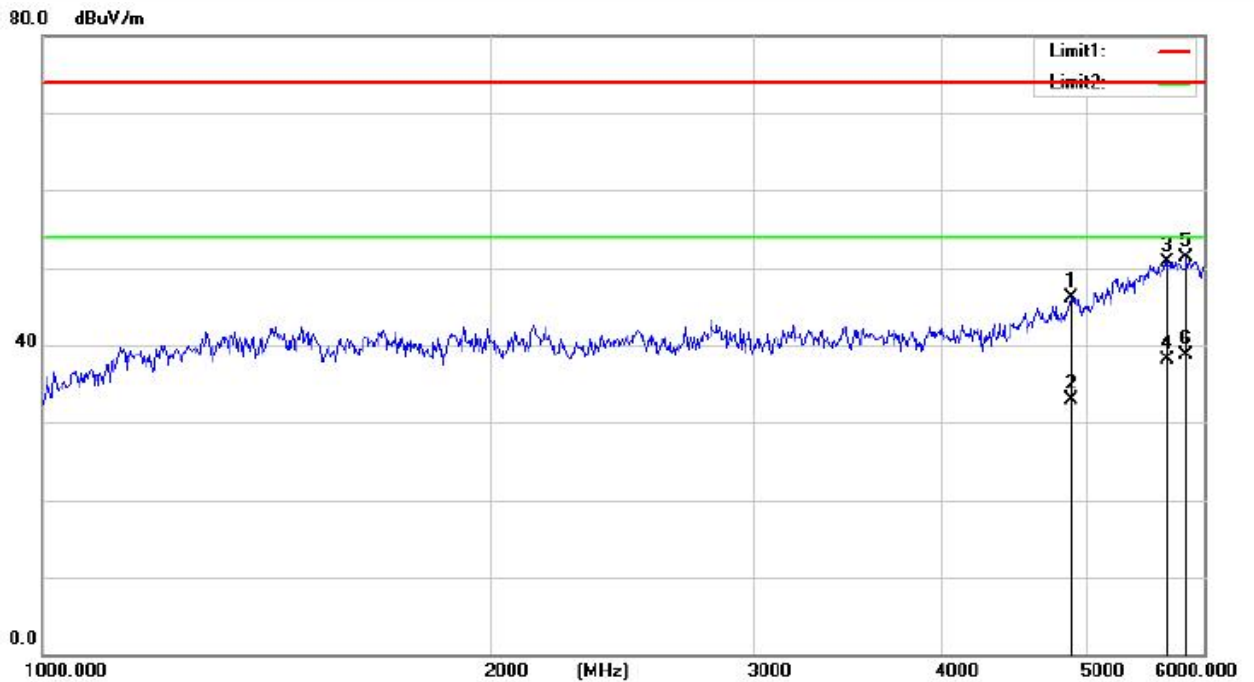
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree degree | Comment |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| 1 | | 4330.397 | 47.16 | -4.36 | 42.80 | 74.00 | -31.20 | peak | | |
| 2 | | 4330.397 | 34.68 | -4.36 | 30.32 | 54.00 | -23.68 | AVG | | |
| 3 | | 5595.042 | 48.80 | 0.78 | 49.58 | 74.00 | -24.42 | peak | | |
| 4 | * | 5595.042 | 35.93 | 0.78 | 36.71 | 54.00 | -17.29 | AVG | | |
| 5 | | 5819.996 | 47.67 | 2.01 | 49.68 | 74.00 | -24.32 | peak | | |
| 6 | | 5819.996 | 34.58 | 2.01 | 36.59 | 54.00 | -17.41 | AVG | | |

*:Maximum data x:Over limit !:over margin

Operator: Ccyf

Remark:

1. Measurement (dB μ V/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dB μ V/m)
2. Over (dB) = Measurement (dB μ V/m) - Limit (dB μ V/m)



| Site site #1 | | Polarization: Vertical | | | | | | Temperature: 23.4 | | |
|--------------|-----|-------------------------------|--------------------------|-------------------------|----------------------------|-----------------|------------|-------------------------|---------------------------|---------|
| No. | Mk. | Freq. MHz | Reading Level dBuV | Correct Factor dB | Measure- ment dBuV/m | Limit dBuV/m | Over dB | Antenna Height cm | Table Degree degree | Comment |
| 1 | | 4891.499 | 47.95 | -1.82 | 46.13 | 74.00 | -27.87 | peak | | |
| 2 | | 4891.499 | 34.74 | -1.82 | 32.92 | 54.00 | -21.08 | AVG | | |
| 3 | | 5675.819 | 49.56 | 1.22 | 50.78 | 74.00 | -23.22 | peak | | |
| 4 | | 5675.819 | 36.90 | 1.22 | 38.12 | 54.00 | -15.88 | AVG | | |
| 5 | | 5840.889 | 49.23 | 2.05 | 51.28 | 74.00 | -22.72 | peak | | |
| 6 | * | 5840.889 | 36.57 | 2.05 | 38.62 | 54.00 | -15.38 | AVG | | |

*:Maximum data x:Over limit !:over margin

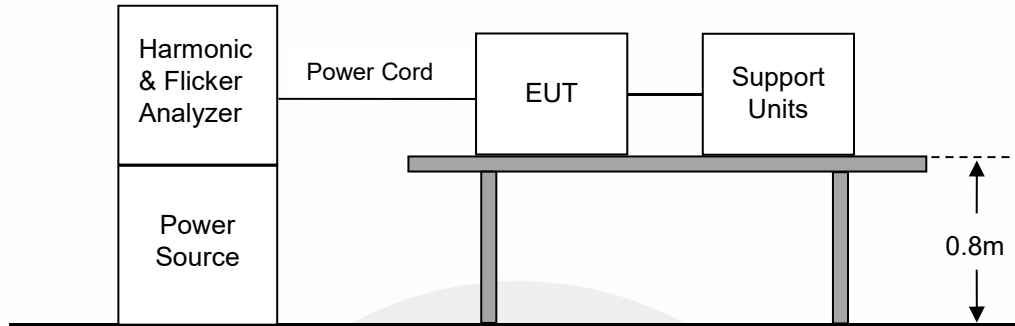
Operator: Ccyf

Remark:

1. Measurement (dB μ V/m) = Antenna Factor(dB) -Amp Factor(dB) +Cable Loss(dB) + Reading(dB μ V/m)
2. Over (dB) = Measurement (dB μ V/m) - Limit (dB μ V/m)

8. HARMONIC CURRENT EMISSION MEASUREMENT

8.1. Block Diagram of Test Setup



8.2. Standard Limits

BS EN IEC 61000-3-2, CLASS A

Harmonic current emissions evaluate the potential for the EUT to cause distortion on the AC power lines. It is applicable to electrical and electronic equipment having an input current ≤ 16 A per phase, and intended to be connected to public low-voltage distribution systems

Table 1 - Limits for Class A equipment

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

8.3. Test Procedure

The measurement of harmonic currents shall be performed as follows: i. For each harmonic order, measure the 1.5 s smoothed r.m.s. harmonic current in each DFT time window as defined in EN / IEC 61000-4-7:2009. ii. Calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period Short cyclic ($T_{\text{cycle}} \leq 2.5 \text{ min}$). Because of synchronisation to meet the requirements for repeatability in 5%.

8.4. Test Results

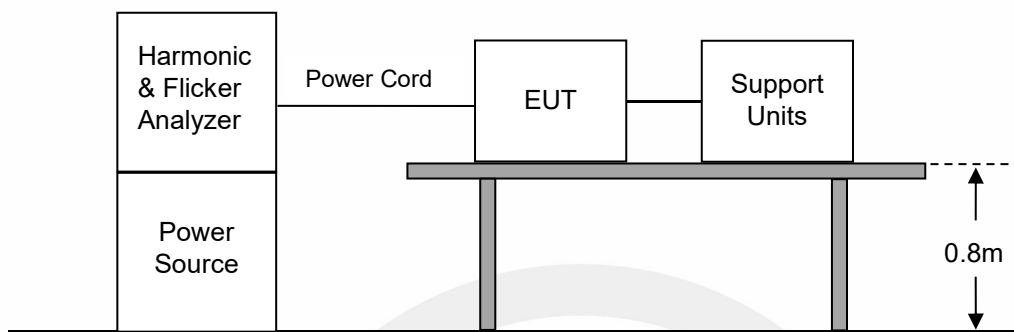
N/A.

As specified on section 7 and above figure of BS EN IEC 61000-3-2, the limits are not specified for equipment with a rated power of 75W or less. The EUT meets the above condition, so it conforms to BS EN IEC 61000-3-2.



9. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

9.1. Block Diagram of Test Setup



9.2. Standard Limits

BS EN 61000-3-3 Limits

The objective of voltage changes, voltage fluctuations and flicker in public low voltage supply systems during equipment with rated current ≤ 16 A per phase, ensures that home appliances and certain other electrical equipment do not adversely affect lighting equipment when connected to the same power system.

Voltage Fluctuation and Flicker Limits:

- the value of P_{st} shall not be greater than 1.0;
- the value of P_{lt} shall not be greater than 0.65;
- the value of $d(t)$ during a voltage change shall not exceed 3.3 % for more than 500 ms;
- the relative steady-state voltage change, d_c , shall not exceed 3.3 %;
- the maximum relative voltage change, d_{max} , shall not exceed 4.0 %;

9.3. Test Procedure

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of 8% is achieved during the whole assessment procedure.

9.4. Test Results

PASS.

Please see the attached page.

Flicker Test Summary per IEC61000-3-3:2013/AMD1:2017 (Run time)

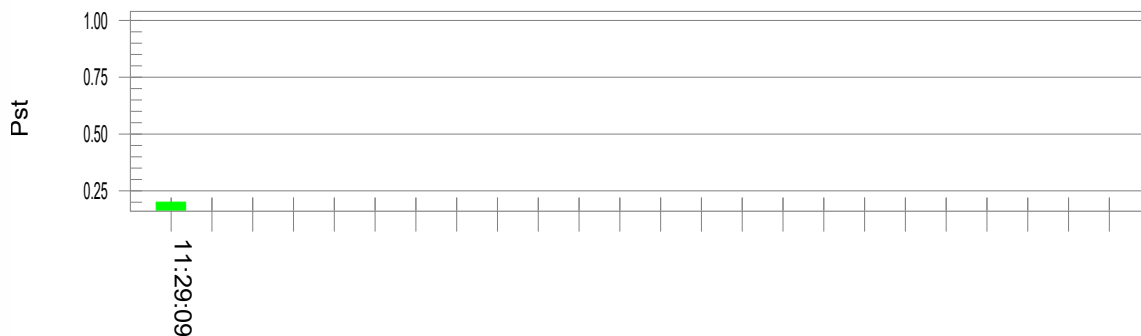
EUT: GFC007
 Test category: All parameters (European limits)
 Test date: 2024/9/2
 Test duration (min): 10
 Comment: ON
 Customer: Customer

Tested by: CHENLI
 Test Margin: 100
 End time: 11:29:15
 Data file name: F-000803.cts_data

Test Result: Pass Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

| | | | |
|---------------------------------|--------|------------------|------------|
| Vrms at the end of test (Volt): | 229.90 | | |
| Highest dt (%): | | Test limit (%): | |
| T-max (mS): | 0 | Test limit (mS): | 500.0 Pass |
| Highest dc (%): | 0.00 | Test limit (%): | 3.30 Pass |
| Highest dmax (%): | 0.00 | Test limit (%): | 4.00 Pass |
| Highest Pst (10 min. period): | 0.200 | Test limit: | 1.000 Pass |

Immunity General performance criteria Description

General performance criteria are defined in BS EN 55035 clause 8.2, 8.3 and 8.4. These criteria shall be used during the testing of primary functions where no relevant annex is applicable.

When assessing the impact of a disturbance on a function, the assessment should take into consideration the function's performance prior to the application of the disturbance and only identify as failures those changes in performance that are a result of the disturbance.

BS EN 55035:

Performance criterion A

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

Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, 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 manufacturer, 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), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

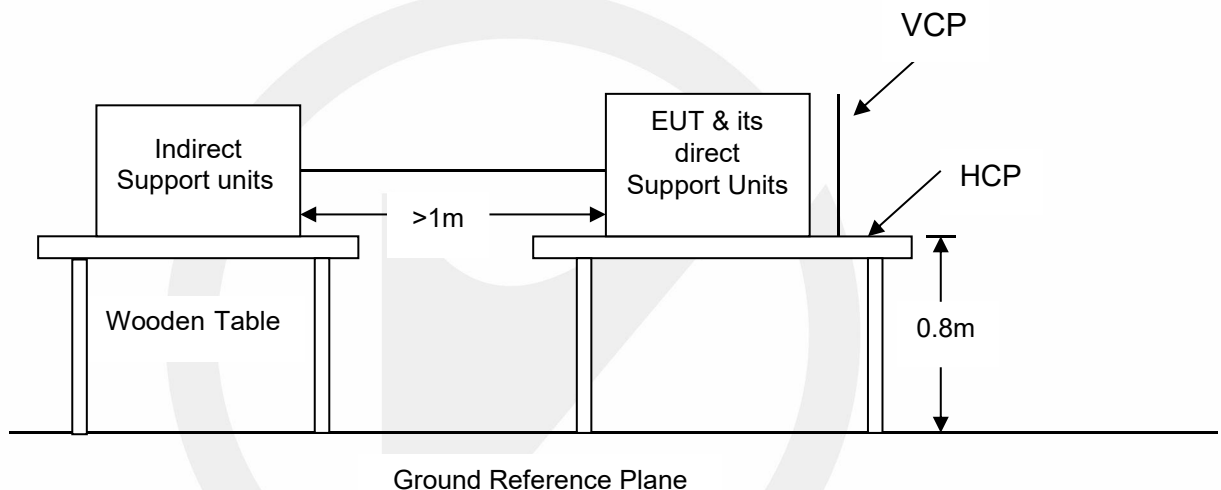
Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

10. ELECTROSTATIC DISCHARGE

10.1. Test Specification

| | |
|-----------------------|--|
| Test standard | : BS EN 55035 |
| Basic standard | : IEC 61000-4-2 |
| Performance criterion | : B |
| Test level | : $\pm 8.0\text{kV}$ (Air discharge) $\pm 4.0\text{kV}$ (Contact discharge) |

10.2. Block Diagram of Test Setup



10.3. Test Procedure

- In the case of air discharge testing, the climatic conditions shall be within the following ranges:
 - ambient temperature: 15°C to 35°C ;
 - relative humidity : 30% to 60%;
 - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar)
- Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :
 - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
 - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
 - The contact discharge test shall not be applied to such surfaces.
- In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

- f. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final test level should not exceed the product specification value in order to avoid damage to the equipment.
- g. The test shall be performed with both air discharge and contact discharge. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied. For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
- h. Ensure that the applied charge on the EUT has been dis-charged before next ESD pulse.

10.4. Test Results

PASS

Temperature : 25.6° C
Humidity : 56.3%
Atmospheric Pressure : 101kpa
Test Engineer : Chenli
Test Date : 2024-10-08

Air Discharge:

| Test Voltage | Location | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--------------|----------------|------------------|--------------------------------|--------------------|
| ±2; 4; 8 kV | Gap | B | B | Pass |
| ±2; 4; 8 kV | Non-Metal part | B | B | Pass |

Contact Discharge

| Test Voltage | Location | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--------------|------------|------------------|--------------------------------|--------------------|
| ±2; 4kV | Metal part | B | B | Pass |

Indirect Discharge

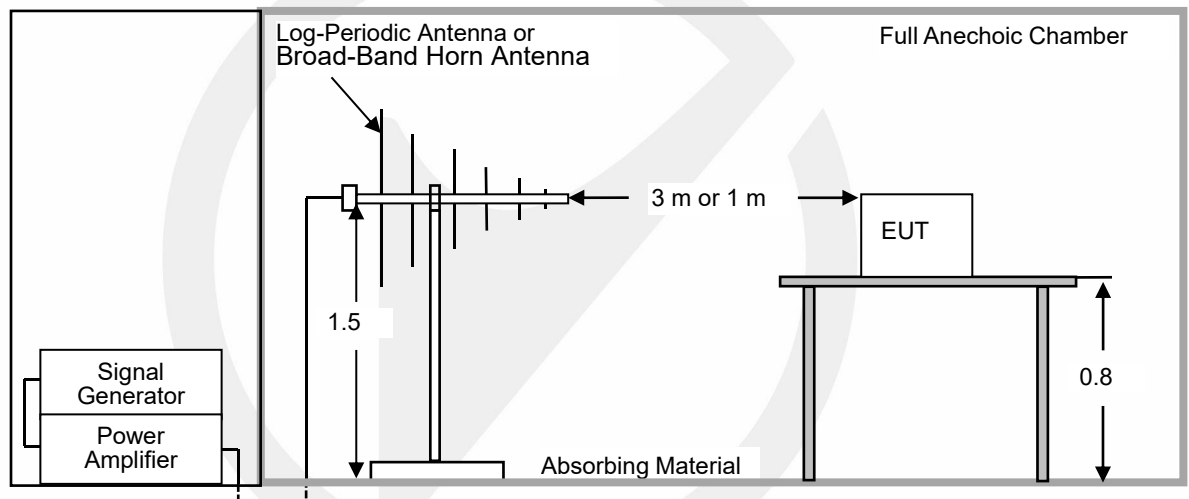
| Test Voltage | Location | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--------------|----------|------------------|--------------------------------|--------------------|
| ±2; 4 kV | HCP | A | B | Pass |
| ±2; 4kV | VCP | A | B | Pass |

11. CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES

11.1. Test Specification

| | | |
|-----------------------|--|------|
| Test standard | : BS EN 55035 | |
| Basic standard | : IEC 61000-4-3 | |
| Performance criterion | : A | |
| Frequency range & | : <input checked="" type="checkbox"/> 80M-1000MHz | 3V/m |
| Test level | : <input checked="" type="checkbox"/> Spot frequency | 3V/m |
| | : <input type="checkbox"/> Additional spot frequency | 3V/m |
| Modulation | : AM, 80%, 1kHz sine-wave | |

11.2. Block Diagram of Test Setup



11.3. Test procedure

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semi-anechoic chamber.

- The antenna which is enabling the complete frequency range of 80-1000 MHz is placed 3m (or 1m) away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the antenna.
- The test is performed with the antenna facing the front and back sides of the EUT with. Both vertical and horizontal polarizations from antenna are tested.

11.4. Test results

These test result outsourced to EMTEK(SHENZHEN) CO., LTD.

PASS

Temperature : 24.8° C
Humidity : 58.4%
Atmospheric Pressure : 101kpa
Test Engineer : CSL
Test Date : 2024-09-20

☒ 80M-1000MHz:

| Freq. Range (MHz) | Field | Modulation | Polarity | Position (°) | Actual criterion | Required performance criterion | Result |
|-------------------|-------|------------|----------|-----------------|------------------|--------------------------------|--------|
| 80-1000 | 3V/m | AM, 80% | H / V | 0, 90, 180, 270 | A | A | Pass |

☒ Spot frequency:

| Freq (MHz) | Field | Modulation | Polarity | Position (°) | Actual criterion | Required performance criterion | Result |
|------------------------|-------|------------|----------|-----------------|------------------|--------------------------------|--------|
| 1800, 2600, 3500, 5000 | 3V/m | AM, 80% | H / V | 0, 90, 180, 270 | A | A | Pass |

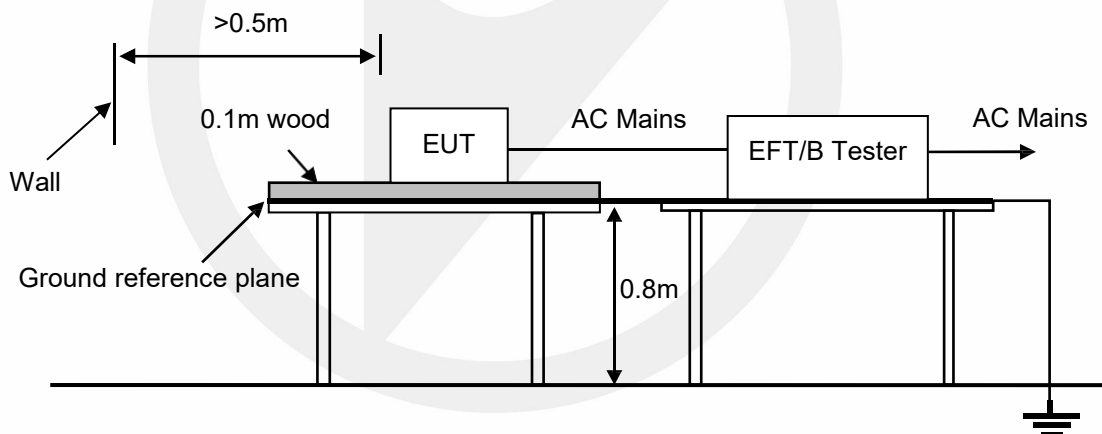
12. ELECTRICAL FAST TRANSIENTS/BURST

12.1. Test Specification

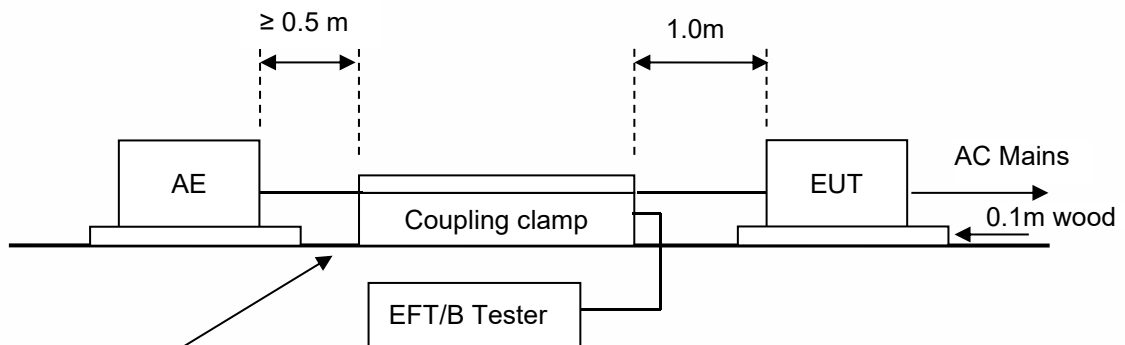
| | |
|-----------------------|---|
| Test standard | : BS EN 55035 |
| Basic standard | : IEC 61000-4-4 |
| Performance criterion | : B |
| Test level | : <input checked="" type="checkbox"/> 1kV, AC mains power ports <input type="checkbox"/> 0.5kV, DC network power ports <input checked="" type="checkbox"/> 0.5kV, Analogue/digital data ports |
| Repetition frequency | : <input checked="" type="checkbox"/> 5kHz, <input type="checkbox"/> 100kHz(Only xDSL ports) |
| Tr/Th: | : 5/50ns |
| Burst period | : 300ms |
| Test time | : 120s |

12.2. Block Diagram of Test Setup

AC Lines:



Signal lines:



Ground reference Surge Immunity Tester plan

12.3.Test Procedure

The EUT is put on the table that 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.

12.4.Test Results

PASS

Temperature : 26.2° C
Humidity : 58.4%
Atmospheric Pressure : 101kpa
Test Engineer : Chen Li
Test Date : 2024-09-02

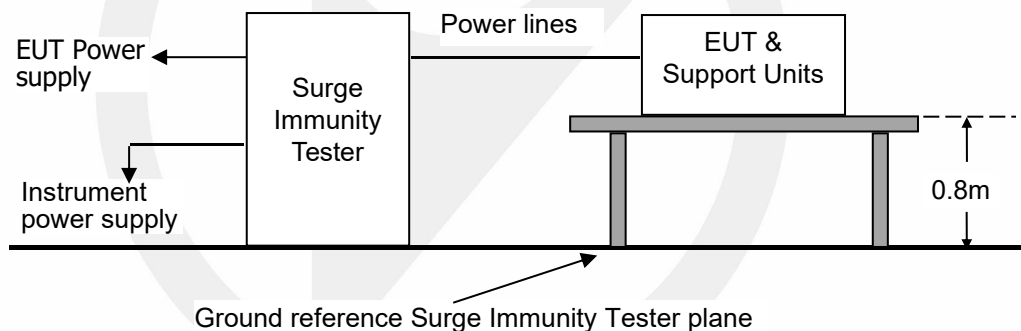
| Injection Line | Voltage (kV) | Injected Method | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--|--------------|--|------------------|--------------------------------|--------------------|
| <input checked="" type="checkbox"/> AC mains power ports | ± 1 | <input checked="" type="checkbox"/> CDN <input type="checkbox"/> Direct injection <input type="checkbox"/> Capacitive coupling clamp | A | B | Pass |
| <input type="checkbox"/> DC network power ports | ± 0.5 | <input type="checkbox"/> CDN <input type="checkbox"/> Direct injection <input type="checkbox"/> Capacitive coupling clamp | N/A | N/A | N/A |
| <input type="checkbox"/> Analogue/digital data ports (Wired network port) | ± 0.5 | <input type="checkbox"/> CDN <input type="checkbox"/> Direct injection <input type="checkbox"/> Capacitive coupling clamp | N/A | N/A | N/A |
| <input type="checkbox"/> Analogue/digital data ports (Broadcast receiver tuner port) | ± 0.5 | <input type="checkbox"/> CDN <input type="checkbox"/> Direct injection <input type="checkbox"/> Capacitive coupling clamp | N/A | N/A | N/A |

13. SURGES

13.1. Test Specification

| | |
|------------------|---|
| Test standard | : BS EN 55035 |
| Basic standard | : IEC 61000-4-5 |
| Test level | : <input checked="" type="checkbox"/> 1kV, Line to Line, AC mains power ports, Criterion B <input type="checkbox"/> 2kV, Line to Earth, AC mains power ports, Criterion B <input type="checkbox"/> 0.5kV, Line to Reference ground, DC network power ports, Criterion B <input checked="" type="checkbox"/> 1.0kV, Lines to Ground, Unshielded symmetrical, Criterion C <input type="checkbox"/> 4.0kV, Lines to Ground, Unshielded symmetrical, Criterion C <input type="checkbox"/> 0.5kV, Shield to ground, Coaxial or shielded port, Criterion B |
| Number of surges | : 5 (for each combination of parameters) |
| Repetition rate | : 1 minute / time |
| Polarity: | : Positive / Negative |
| Phase angle: | : 90°, 270° (Only AC mains power ports) |

13.2. Block Diagram of Test Setup



13.3. Test Procedure

This test simulates a lightning event by inducing transients onto the AC/DC power supply lines in common mode (Line to Ground) and differential mode (Line to Line). Each device was tested in a total of two surge configurations: Line to Ground (L-G): Combination Wave, Line to Protective Earth with 9uF and 10Ohm and Neutral to Protective Earth with 9uF and 10Ohm, common mode, generator earthed.

Line to Line (L-L): Combination Wave,

Line to Neutral with 18uF, differential mode, generator floated.

2 ohm : the source impedance of the low-voltage power supply network.

12 ohm : the source impedance of the low-voltage power supply network and ground.

- If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the a.c. voltage wave (positive and negative).
- The surges have to be applied line to line and line to earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.
- The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan. All lower levels including the selected test level shall be satisfied.
- For testing the secondary protection, the output voltage of the generator shall be increased up to the

- worst-case voltage breakdown level (let-through level) of the primary protection.
e. Testing shall be performed according to a Test Plan, which shall be included in the test report.
f. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied.

13.4. Test results

PASS

Temperature : 26.2° C
Humidity : 58.4%
Atmospheric Pressure : 101kpa
Test Engineer : Chen Li
Test Date : 2024-09-02

☒ AC mains power ports:

| Coupling Line | Voltage (kV) | Waveform (μs) | Polarity | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--|--------------|---------------|------------|------------------|--------------------------------|--------------------|
| <input checked="" type="checkbox"/> Line to line | 0.5, 1 | 1.2/50 (8/20) | Pos./ Neg. | A | B | Pass |
| <input type="checkbox"/> Line to earth | 0.5, 1, 2 | 1.2/50 (8/20) | Pos./ Neg. | N/A | B | N/A |

☐ DC network power ports:

| Coupling Line | Voltage (kV) | Waveform (μs) | Polarity | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--------------------------|--------------|---------------|------------|------------------|--------------------------------|--------------------|
| Line to Reference ground | 0.5 | 1.2/50 (8/20) | Pos./ Neg. | N/A | B | N/A |

☐ Analogue/digital data ports:

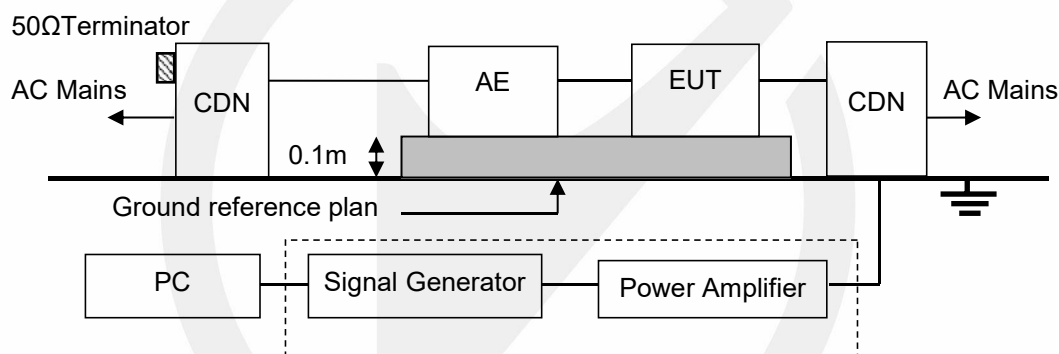
| Port type | Coupling Line | Voltage (kV) | Waveform (μs) | Polarity | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|--|-----------------|--------------|----------------|------------|------------------|--------------------------------|--------------------|
| <input type="checkbox"/> Unshielded symmetrical (Wired network port) | Lines to ground | 0.5, 1.0 | 10/700 (5/320) | Pos./ Neg. | N/A | C | N/A |

14. CONTINUOUS INDUCED RF DISTURBANCES

14.1. Test Specification

| | |
|-----------------------|--|
| Test standard | : BS EN 55035 |
| Basic standard | : IEC 61000-4-6 |
| Performance criterion | : A |
| Frequency range & | : 0.15M to 10MHz, 3V |
| Test level | : 10M to 30MHz, 3V to 1V 30M to 80MHz, 1V |
| Modulation | : AM 80%, 1kHz sine-wave |
| Frequency Step | : 1% of fundamental |

14.2. Block Diagram of Test Setup



14.3. Test Procedure

- The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.
- The EUT is placed on a 0.1m high test table, and a well grounded cable is connected to metallic plane above the test table.
- All cables/wires must be laid out on test plate (3cm in thickness), and the EUT is set up on test plate (10 cm in thickness) as shown in test setup photo, and the cables/wires must not be in mid-air, they should be touching the surface of test plate. Ensure that the EUT is properly connected to the accessory equipment.
- The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF-input ports of the coupling devices are terminated by a 50 ohm load resistor.
- The frequency range is swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency (ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
- Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise

modes selected for susceptibility

h. Testing shall be performed according to a Test Plan, which shall be included in the test report.

14.4. Test results

PASS

Temperature : 26.2° C
 Humidity : 58.4%
 Atmospheric Pressure : 101kpa
 Test Engineer : Chen Li
 Test Date : 2024-09-02

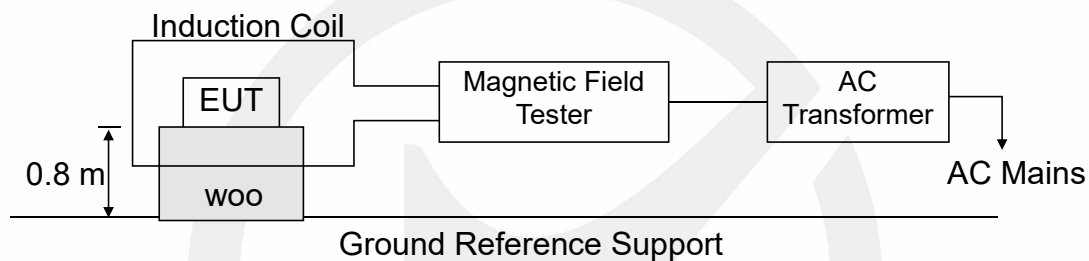
| Range (MHz) | Level (V) | Injection port | Coupling type | Actual criterion | Required performance criterion | Result (Pass/Fail) |
|-------------|-----------|--|---|------------------|--------------------------------|--------------------|
| 0.15-10 | 3 | <input checked="" type="checkbox"/> AC mains power ports | <input checked="" type="checkbox"/> CDN <input type="checkbox"/> EM Clamp <input type="checkbox"/> Current Clamp <input type="checkbox"/> Direct injection | A | A | Pass |
| 10-30 | 3-1 | | | | | |
| 30-80 | 1 | | | | | |
| 0.15-10 | 3 | <input type="checkbox"/> DC network power ports | <input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp <input type="checkbox"/> Current Clamp <input type="checkbox"/> Direct injection | N/A | N/A | N/A |
| 10-30 | 3-1 | | | | | |
| 30-80 | 1 | | | | | |
| 0.15-10 | 3 | <input type="checkbox"/> Analogue/digital data ports (Wired network port) | <input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp <input type="checkbox"/> Current Clamp <input type="checkbox"/> Direct injection | N/A | N/A | N/A |
| 10-30 | 3-1 | | | | | |
| 30-80 | 1 | | | | | |
| 0.15-10 | 3 | <input type="checkbox"/> Analogue/digital data ports (Broadcast receiver tuner port) | <input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp <input type="checkbox"/> Current Clamp <input type="checkbox"/> Direct injection | N/A | N/A | N/A |
| 10-30 | 3-1 | | | | | |
| 30-80 | 1 | | | | | |
| 0.15-10 | 3 | <input type="checkbox"/> Analogue/digital data ports (.....) | <input type="checkbox"/> CDN <input type="checkbox"/> EM Clamp <input type="checkbox"/> Current Clamp <input type="checkbox"/> Direct injection | N/A | N/A | N/A |
| 10-30 | 3-1 | | | | | |
| 30-80 | 1 | | | | | |

15. POWER FREQUENCY MAGNETIC FIELD

15.1. Test Specification

| | |
|-----------------------|---|
| Test standard | : BS EN 55035 |
| Basic standard | : IEC 61000-4-8 |
| Performance criterion | : A |
| Field strength | : <input checked="" type="checkbox"/> 1A/m <input type="checkbox"/> _A/m |
| Frequency | : 50Hz or 60Hz |

15.2. Block Diagram of Test Setup



15.3. Test Procedure

The EUT is placed in the middle of an 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. X, Y and Z 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.

15.4. Test Results

N/A.

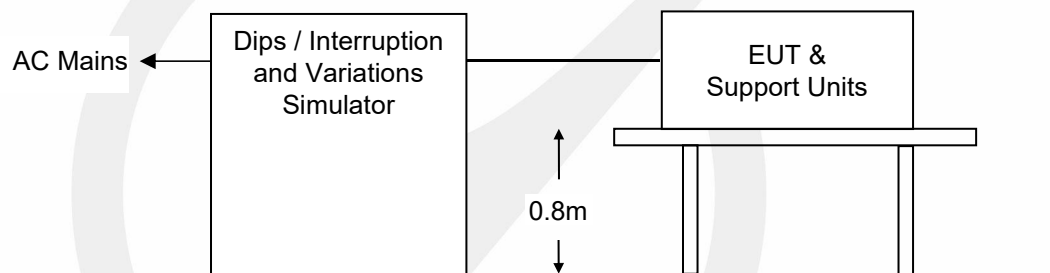
Applicable only to equipment containing devices intrinsically susceptible to magnetic fields.

16. VOLTAGE DIPS AND INTERRUPTIONS

16.1. Test Specification

| | |
|----------------|---|
| Test standard | : BS EN 55035 |
| Basic standard | : IEC 61000-4-11 |
| Test level | : 0%, 0.5 period, Criterion B |
| | <input checked="" type="checkbox"/> 70%, 25 periods for 50Hz, Criterion C |
| | <input checked="" type="checkbox"/> 70%, 30 periods for 60Hz, Criterion C |
| | <input checked="" type="checkbox"/> 0%, 250 periods for 50Hz, Criterion C |
| | <input checked="" type="checkbox"/> 0%, 300 periods for 60Hz, Criterion C |

16.2. Block Diagram of Test Setup



16.3. Test Procedure

- a. Where the equipment has a rated voltage the following shall apply - If the voltage range does not exceed 20% of the lower voltage specified for the rated voltage range, a single voltage within that range may be specified as a basis for test level specification.
 - In all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.
- b. Test Conditions
 - Select operated voltage and frequency of EUT - Test of interval : 10 sec.
 - Level and duration : Sequence of 3 dips/interrupts.
 - Voltage rise (and fall) time : 1.5 μ s.

16.4. Test results

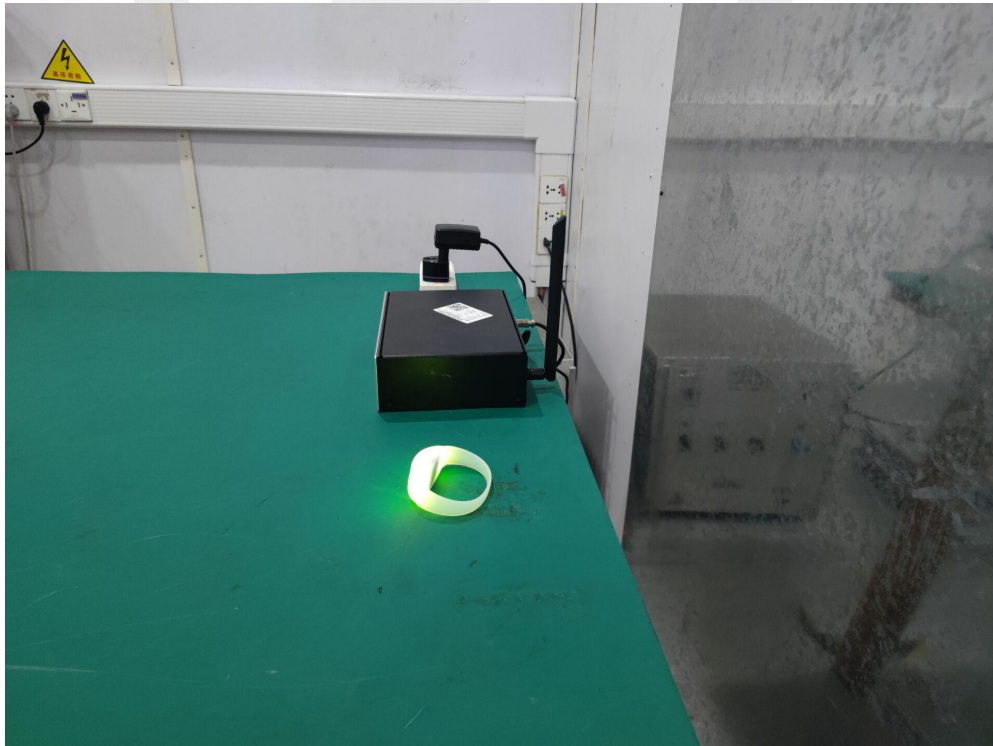
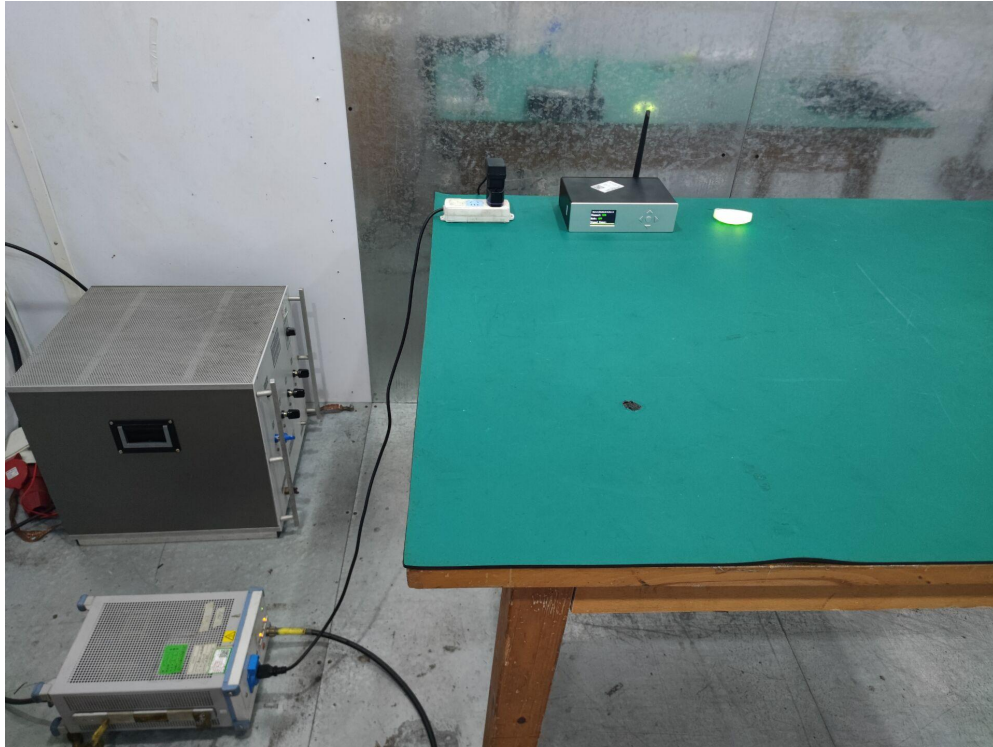
PASS

Temperature : 26.2° C
Humidity : 58.8%
Atmospheric Pressure : 101kpa
Test Engineer : Chen Li
Test Date : 2024-09-02

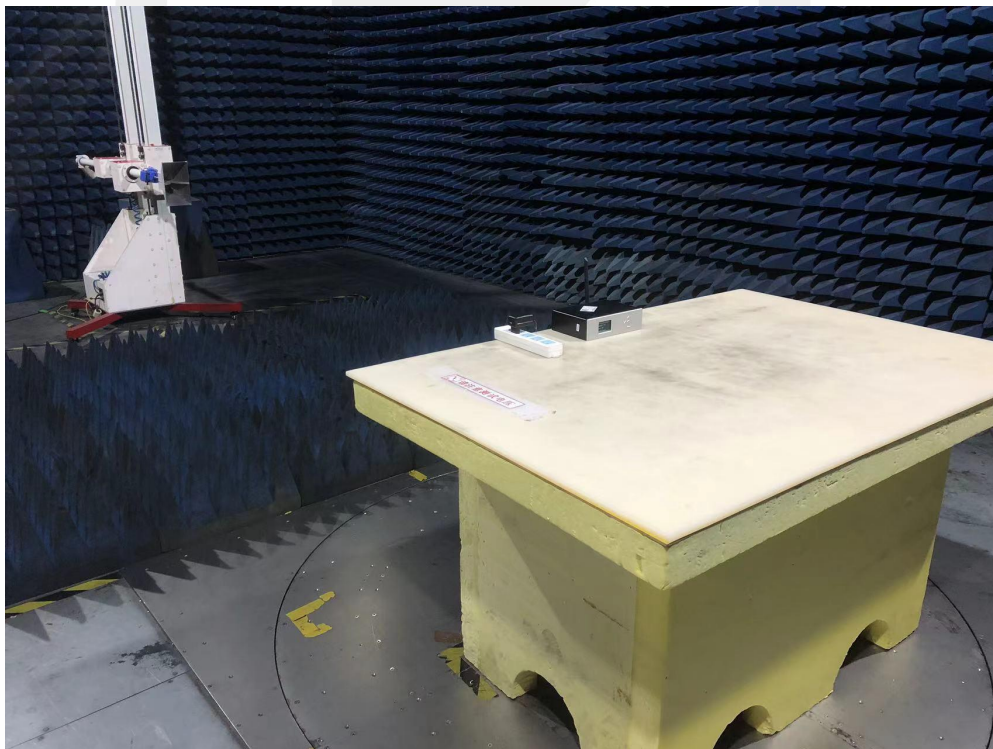
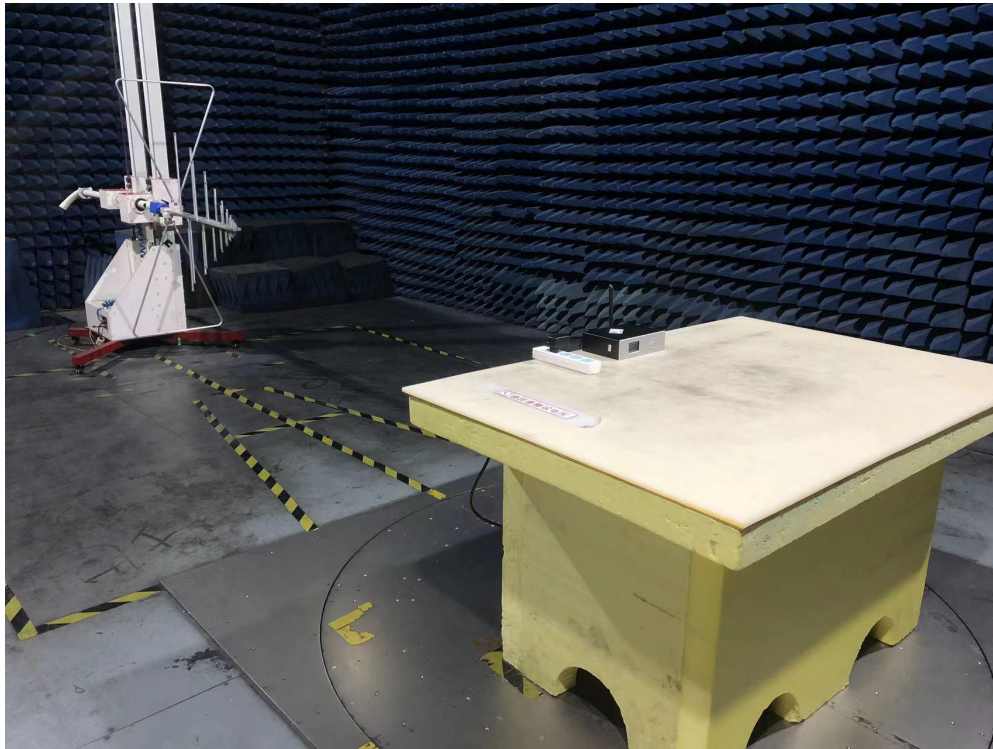
| | Test Level (% UT) | Phase angle (°) | Input Voltage (V) | Freq (Hz) | Duration (periods) | Actual criterion | Required performance criterion | Result (Pass /Fail) |
|---|-------------------|-----------------|-------------------|-----------|--------------------|------------------|--------------------------------|---------------------|
| <input checked="" type="checkbox"/> Voltage dips | 0% | 0°, 180° | AC 100V | 50 | 0.5 | A | B | Pass |
| <input checked="" type="checkbox"/> Voltage dips | 0% | 0°, 180° | AC 240V | 50 | 0.5 | A | B | Pass |
| <input checked="" type="checkbox"/> Voltage dips | 70% | 0°, 180° | AC 100V | 50 | 25 | A | C | Pass |
| <input checked="" type="checkbox"/> Voltage dips | 70% | 0°, 180° | AC 240V | 50 | 25 | A | C | Pass |
| <input checked="" type="checkbox"/> Voltage dips | 70% | 0°, 180° | AC 100V | 60 | 30 | A | C | Pass |
| <input checked="" type="checkbox"/> Voltage dips | 70% | 0°, 180° | AC 240V | 60 | 30 | A | C | Pass |
| <input checked="" type="checkbox"/> Voltage interruptions | 0% | 0°, 180° | AC 100V | 50 | 250 | B | C | Pass |
| <input checked="" type="checkbox"/> Voltage interruptions | 0% | 0°, 180° | AC 240V | 50 | 250 | B | C | Pass |
| <input checked="" type="checkbox"/> Voltage interruptions | 0% | 0°, 180° | AC 100V | 60 | 300 | B | C | Pass |
| <input checked="" type="checkbox"/> Voltage interruptions | 0% | 0°, 180° | AC 240V | 60 | 300 | B | C | Pass |

17. PHOTOGRAPHS

17.1. Photos of Conducted Emissions Measurement



17.2.Photos of Radiation Emission Measurement





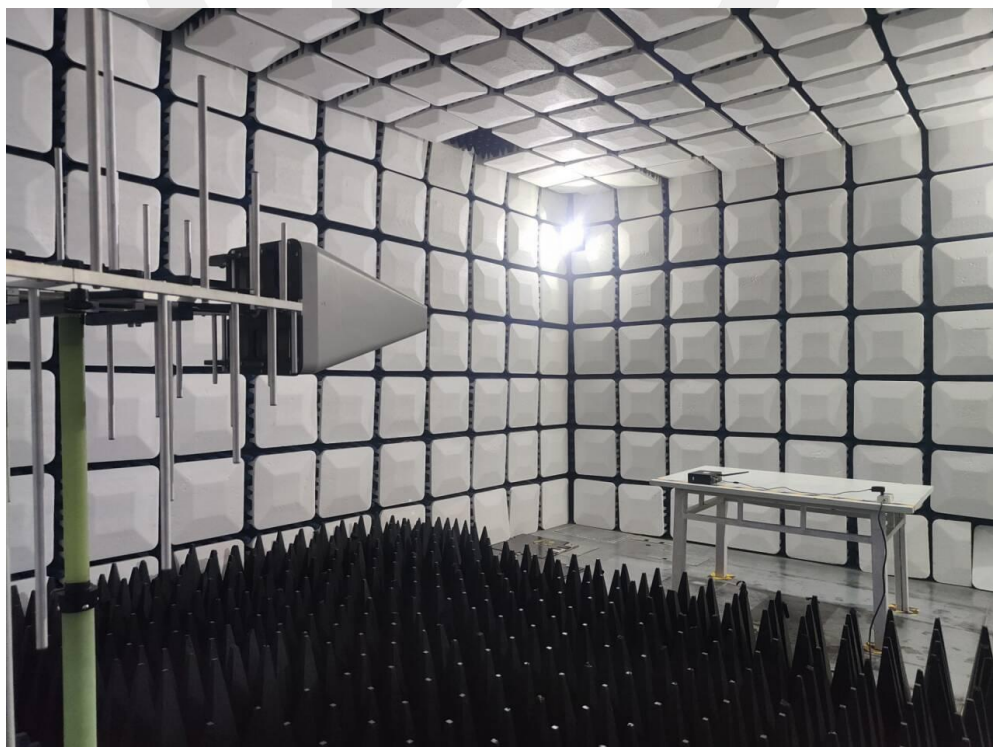
17.3.Photo of Harmonic / Flicker Measurement



17.4.Photo of Electrostatic Discharges



17.5.Photo of Continuous RF Electromagnetic Field Disturbances



17.6.Photo of Electrical Fast Transients/Burst



17.7.Photo of Surges




17.8.Photo of Continuous Induced RF Disturbances



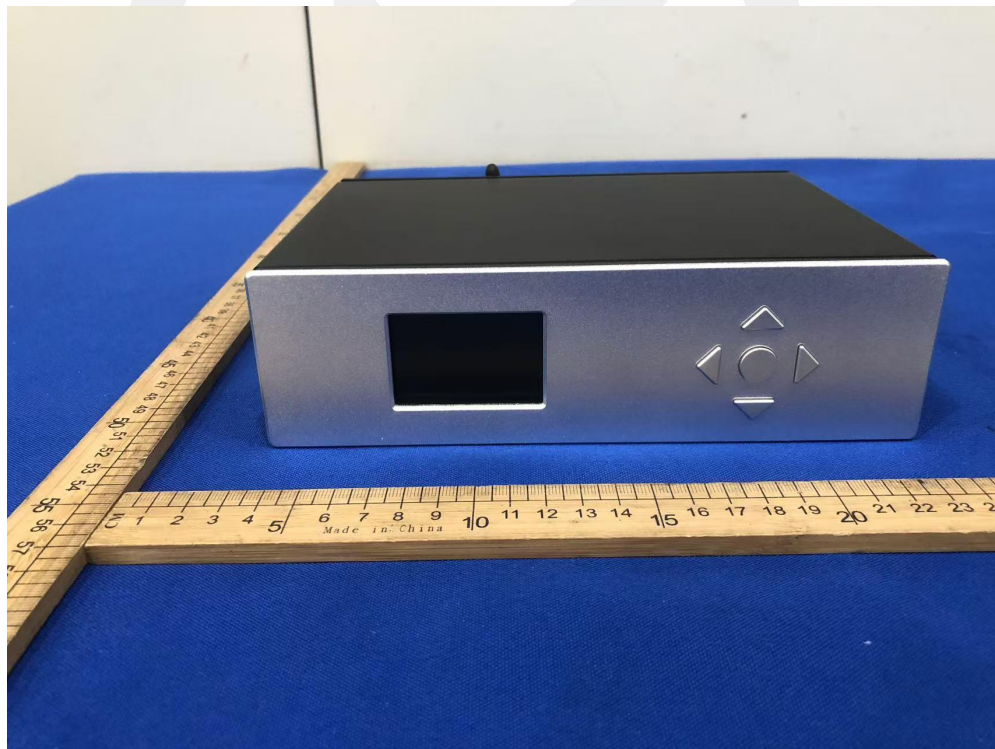
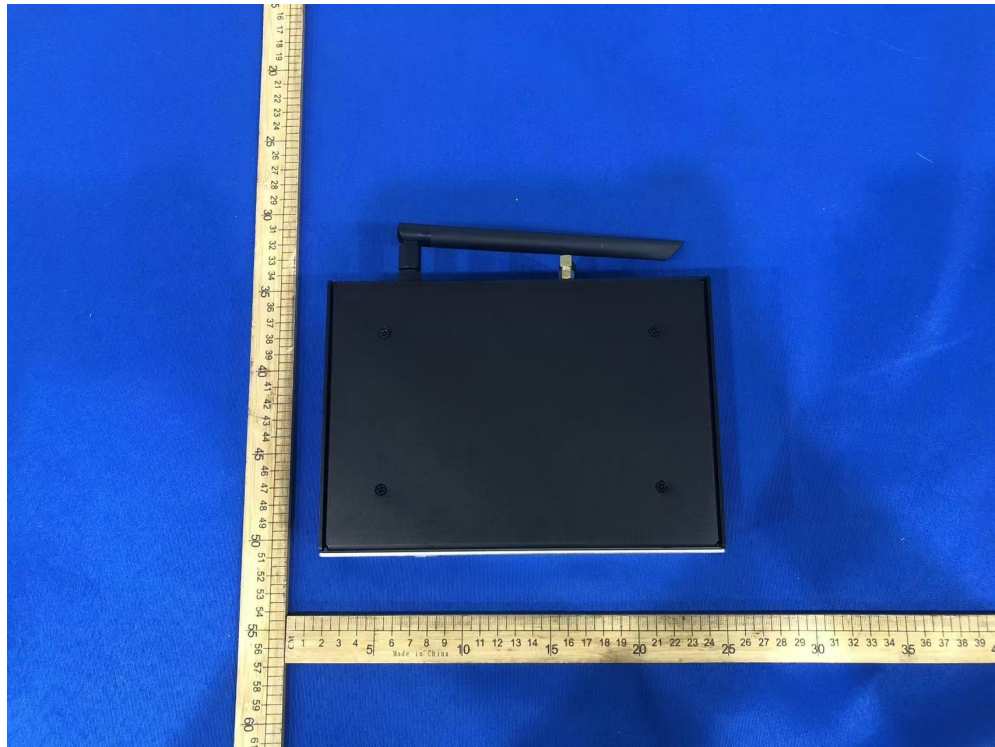
17.9.Photo of Voltage dips and interruptions

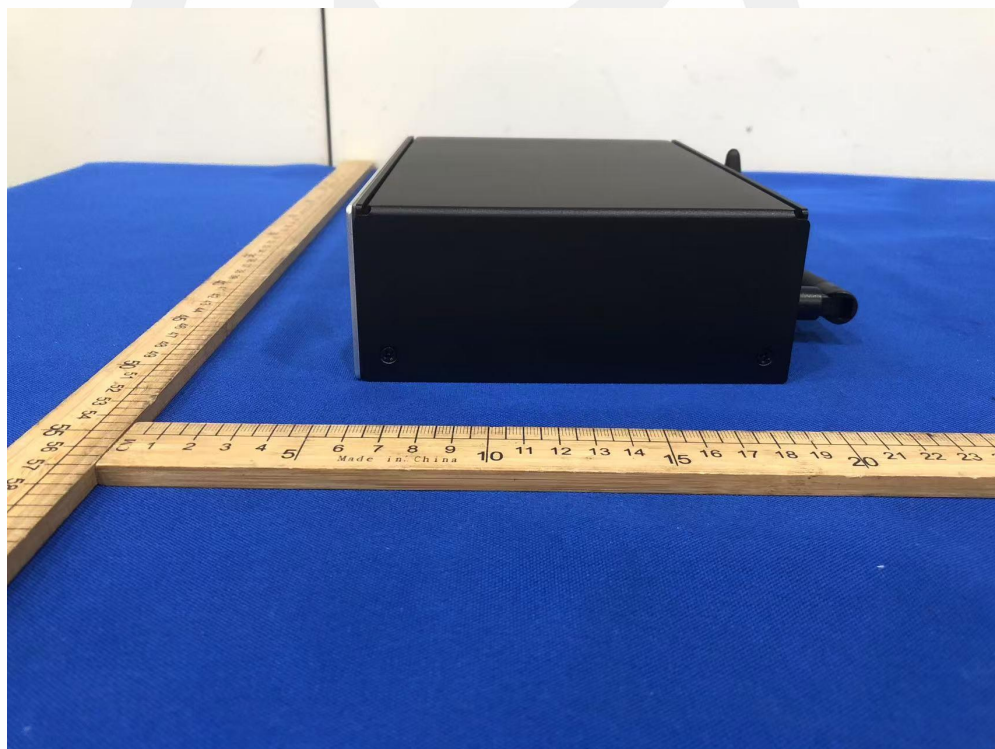




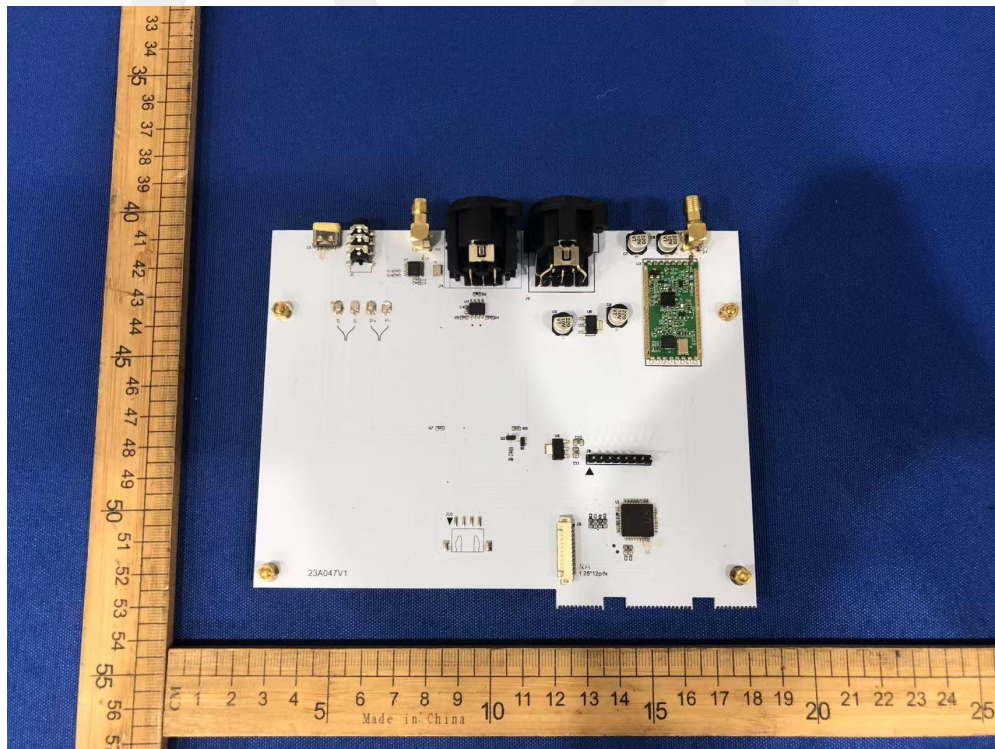
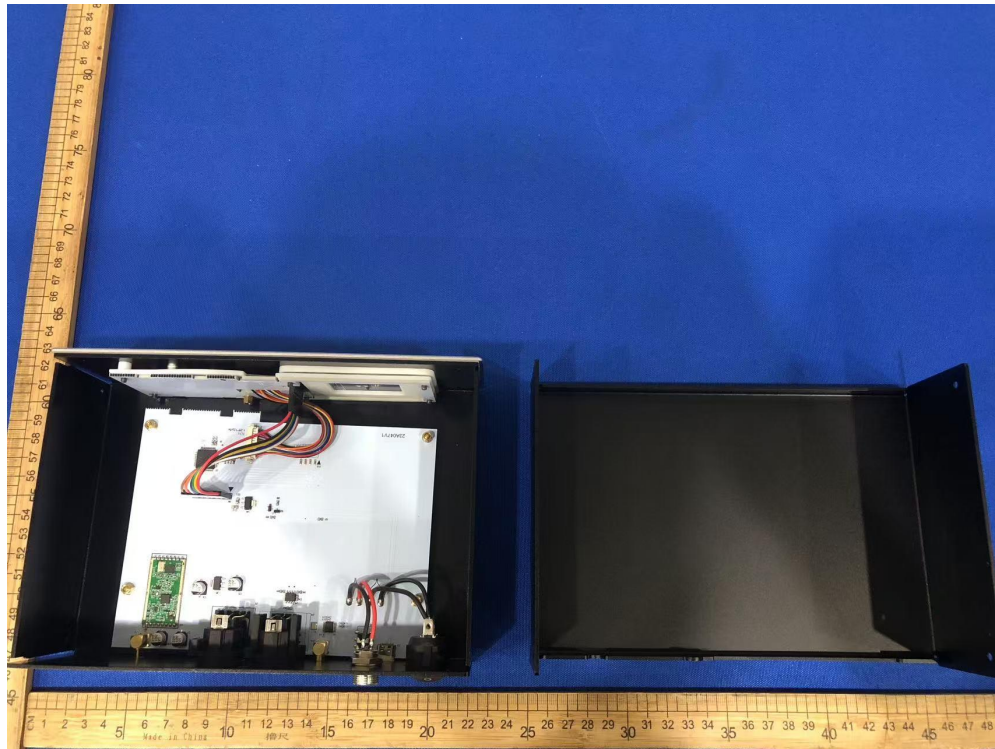
APPENDIX (PHOTOS OF EUT)

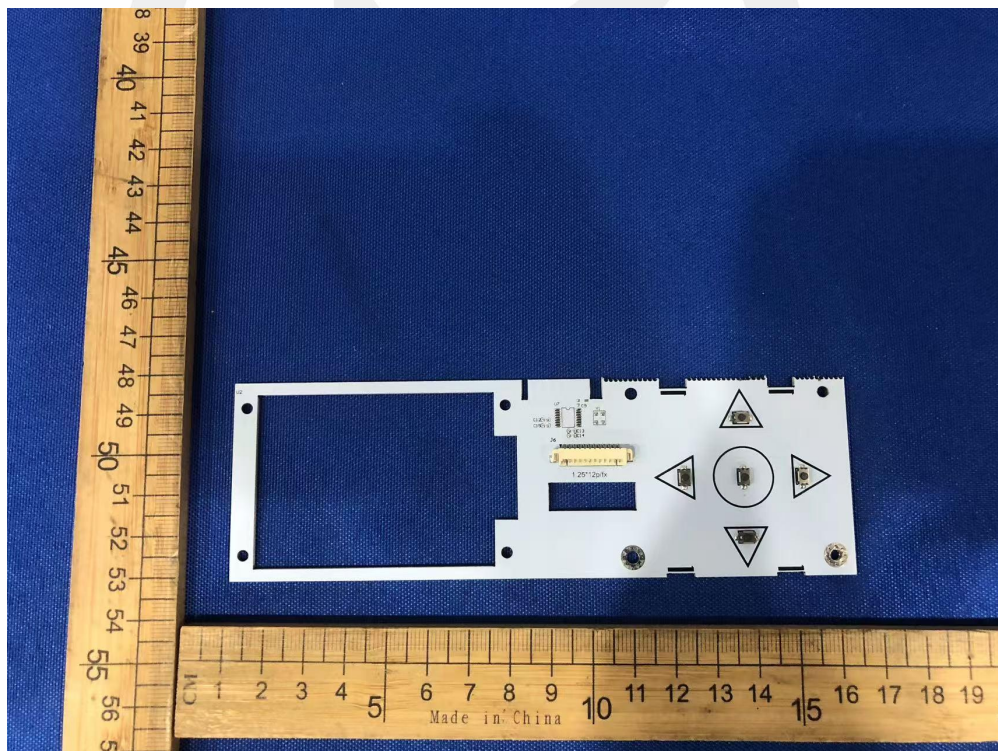
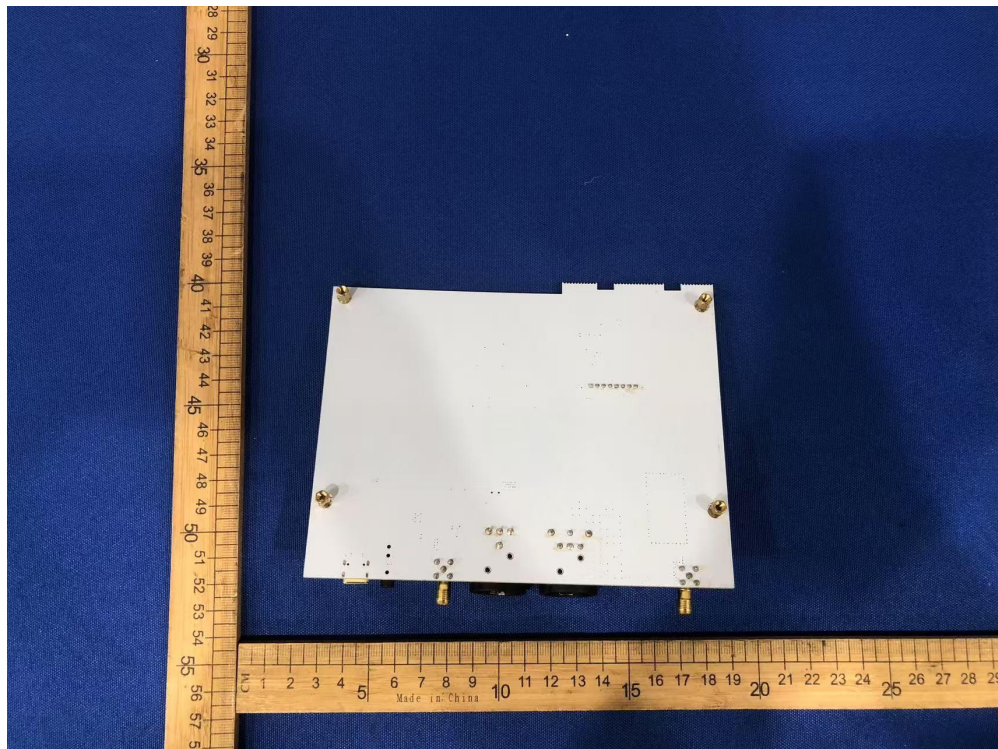


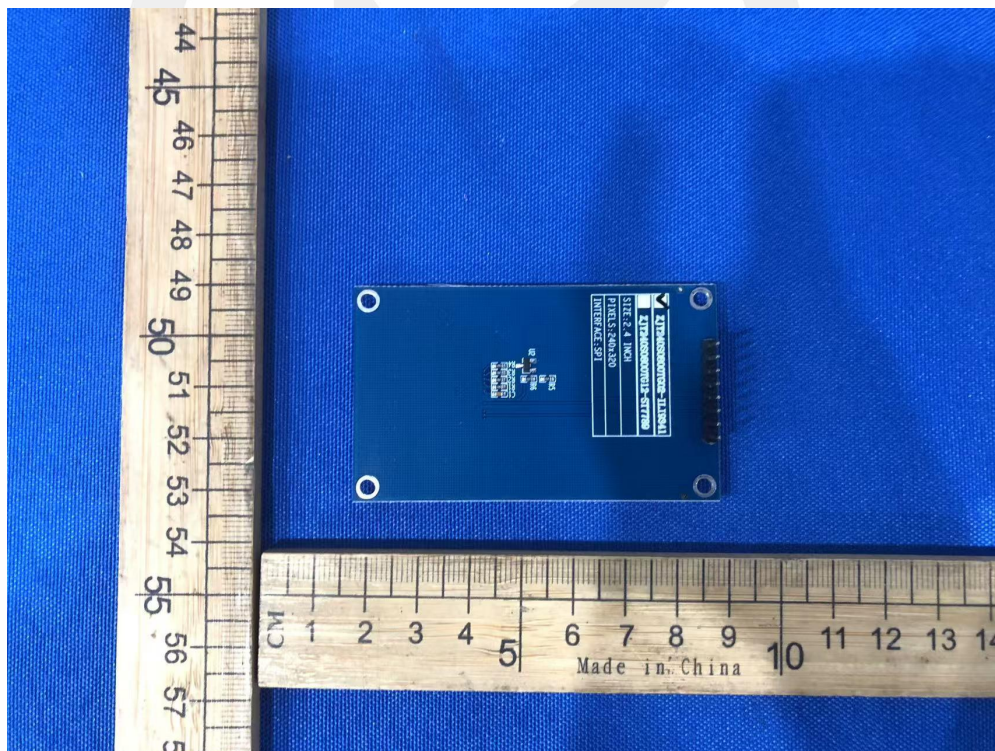
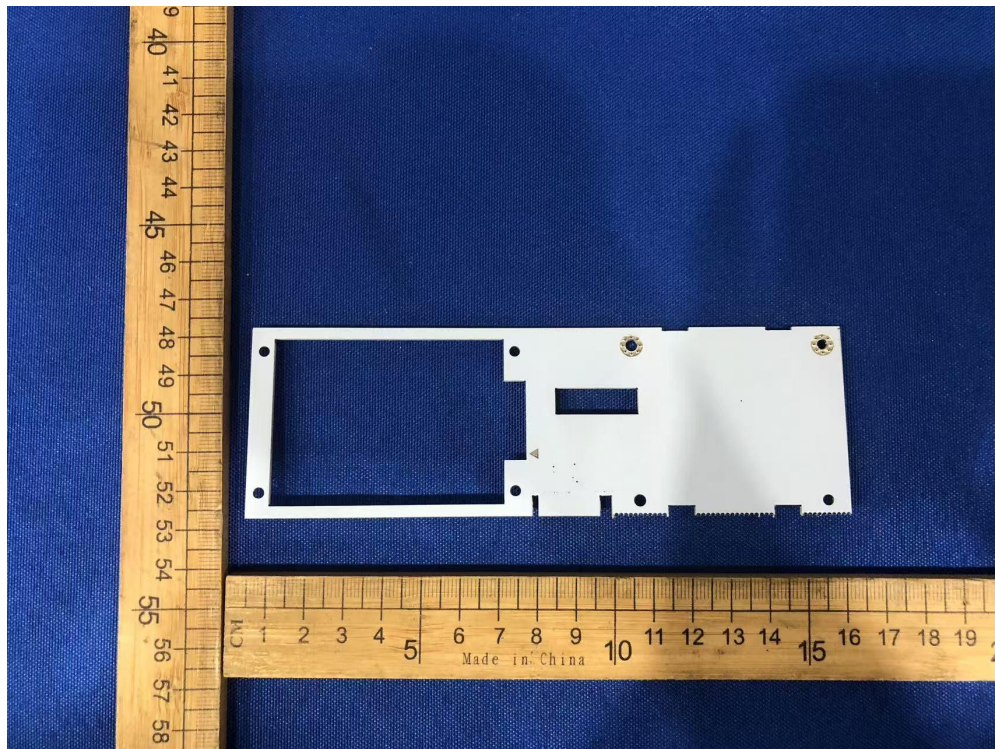


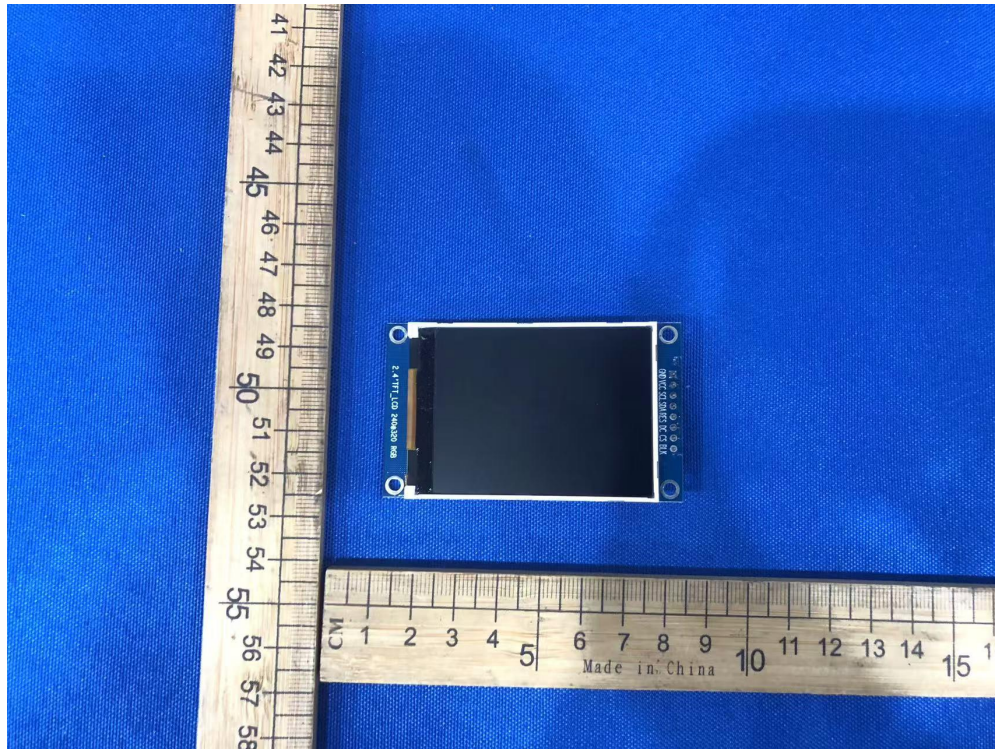












*** End of Report ***

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