



Project No.: TM-2112000356P
Report No.: TMXD2112001942DE

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Rev.: 00

CE EMC TEST REPORT

for

UP Squared 6000; UP Squared 6000 Edge; AI Core X module
MODEL: xUPNxEHLx; xUPNxEDGExEHLx; xPERxTAIXx (x - Where x
may be any combination of alphanumeric characters or “-” or blank.)

Issued to:

AAEON Technology Inc.

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New Taipei City, Taiwan, R.O.C.**

Issued by:

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Issued Date: January 25, 2022

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Revision History

| Rev. | Issue Date | Revisions | Effect Page | Revised By |
|------|------------------|---------------|-------------|------------|
| 00 | January 25, 2022 | Initial Issue | ALL | Linda Wu |
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1 TEST CERTIFICATION

Product: UP Squared 6000; UP Squared 6000 Edge; AI Core X module

Model: xUPNxEHLx; xUPNxEDGExEHLx; xPERxTAIXx (x - Where x may be any combination of alphanumeric characters or "-" or blank.)

Brand: AAEON

Applicant: AAEON Technology Inc.

5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist.,
New Taipei City, Taiwan, R.O.C.

Manufacturer: AAEON Technology Inc.

5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist.,
New Taipei City, Taiwan, R.O.C.

Tested: December 24, 2021 ~ December 25, 2021

Applicable Standards: ETSI EN 301 489-17 V3.2.4 (2020-09)

ETSI EN 301 489-1 V2.2.3 (2019-11)

EN 55032: 2015 / A11: 2020

CISPR 32: 2015 (Ed 2.0) / C1: 2016

EN IEC 61000-3-2: 2019

EN 61000-3-3: 2013

EN 61000-4-2: 2009

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010

EN 61000-4-4: 2012

EN 61000-4-5: 2014 + A1: 2017

EN 61000-4-6: 2014 + AC: 2015

EN 61000-4-11: 2004 + A1: 2017

Note

This test report can be used for CE and UKCA marking application which is based on equivalent requirements between UK and EU. It is appropriate using designated standards to provide presumption of conformity with GB law.

Statements of Conformity

Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:



Jason Lee
Section Manager

Reviewed by:



Eva Fan
Supervisor of report document dept.

2 TEST RESULT SUMMARY

| EMISSION | | | |
|--|---------------------------------|--------|------------------------|
| Standard | Item | Result | Remarks |
| EN 55032: 2015 / A11: 2020 CISPR 32: 2015 (Ed 2.0) / C1: 2016 | Conducted (Power Port) | PASS | Meet Class A limit |
| | Conducted (Wired Network Ports) | PASS | Meet Class A limit |
| | Radiated | PASS | Meet Class A limit |
| EN IEC 61000-3-2: 2019 | Harmonic current emissions | PASS | Meet Class A limit |
| EN 61000-3-3: 2013 | Voltage fluctuations & flicker | PASS | Meets the requirements |

| IMMUNITY [ETSI EN 301 489-1 V2.2.3 (2019-11)] | | | |
|---|-----------------------------------|--------|--|
| Standard | Item | Result | Remarks |
| EN 61000-4-2: 2009 | ESD | PASS | Meets the requirements of Performance Criterion CT&CR |
| EN 61000-4-3: 2006 + A1: 2008 + A2: 2010 | RS | PASS | Meets the requirements of Performance Criterion CT&CR |
| EN 61000-4-4: 2012 | EFT | PASS | Meets the requirements of Performance Criterion CT&CR |
| EN 61000-4-5: 2014 + A1: 2017 | Surge | PASS | Meets the requirements of Performance Criterion TT&TR |
| EN 61000-4-6: 2014 + AC: 2015 | CS | PASS | Meets the requirements of Performance Criterion CT&CR |
| EN 61000-4-11: 2004 + A1: 2017 | Voltage dips & voltage variations | PASS | Meets the requirements of Voltage Dips: 1) 0% residual 0.5 periods Performance CT&CR 2) 0% residual 1 periods Performance CT&CR 3) 70% residual 25 periods Performance CT&CR 4) 0% residual 250 periods Performance TT or TR |

3 EUT DESCRIPTION

| | |
|--------------------------------|--|
| Product | UP Squared 6000; UP Squared 6000 Edge; AI Core X module |
| Brand Name | AAEON |
| Model | xUPNxEHLx; xUPNxEDGExEHLx; xPERxTAIXx (x - Where x may be any combination of alphanumeric characters or "-" or blank.) |
| Applicant | AAEON Technology Inc. |
| Housing material | Metal case |
| Identify Number | TMXD2112001942DE |
| Received Date | December 17, 2021 |
| EUT Power Rating | 12VDC from Adaptor |
| AC Power During Test | 100VAC / 50Hz & 230VAC / 50Hz to Adaptor |
| AC Adaptor Manufacturer | EDAC |
| AC Adaptor Model Number | EA10681U-120 |
| AC Adaptor Power Rating | I/P: 100-240VAC, 2.0A, 50-60Hz O/P: 12.0VDC, 6.0A 72.0W |
| DC Power Cable Type | Unshielded, 1.2m (Non-detachable, with a core) |

Model Differences

| Model | Difference | Tested (Checked) |
|---|--|-------------------------------------|
| UPN-EHL01 | Devices difference | <input checked="" type="checkbox"/> |
| UPN-EDGE-EHL01 | | <input checked="" type="checkbox"/> |
| PER-TAIX2-A20-2280 | AI Core X module | <input checked="" type="checkbox"/> |
| xUPNxEHLx; xUPNxEDGExEHLx; xPERxTAIXx | 1. x - Where x may be any combination of alphanumeric characters or "-" or blank. 2. For marketing purpose only | <input type="checkbox"/> |



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I/O PORT

Model: UPN-EDGE-EHL01

| I/O PORT TYPES | Q'TY | TESTED WITH |
|--------------------|------|-------------|
| 1. COM Port | 2 | 2 |
| 2. HDMI Port | 1 | 1 |
| 3. Display Port | 1 | 1 |
| 4. Earphone Port | 1 | 1 |
| 5. Microphone Port | 1 | 1 |
| 6. USB 3.0 Port | 2 | 2 |
| 7. USB Type-C Port | 1 | 1 |
| 8. Micro USB Port | 1 | 1 |
| 9. LAN Port | 4 | 4 |
| 10. Antenna Port | 2 | 2 |

Note: None.

4 TEST METHODOLOGY

4.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the below additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration modes are as the following:

Conduction Modes (Power port):

| No. | Model | Operate State | |
|-----|---------------------------------------|-------------------------|--------------|
| 1 | UPN-EDGE-EHL01; PER-TAIX2-A20-2280 | HDMI+DP 3840*2160, 30Hz | 100VAC, 50Hz |
| 2 | | | 230VAC, 50Hz |
| 3 | | Standby Mode | 230VAC, 50Hz |

Conduction Modes (Wired network ports):

| | | |
|---|-------|---------|
| 1 | LAN 1 | 10Mbps |
| 2 | | 100Mbps |
| 3 | | 1Gbps |
| 4 | LAN 2 | 10Mbps |
| 5 | | 100Mbps |
| 6 | | 1Gbps |
| 7 | | 2.5Gbps |
| 8 | LAN 3 | 1Gbps |
| 9 | LAN 4 | 1Gbps |

Radiation Modes:

| No. | Model | Operate State | |
|-----|---------------------------------------|----------------------------------|--------------|
| 1 | UPN-EDGE-EHL01; PER-TAIX2-A20-2280 | HDMI+DP 3840*2160, 30Hz | 100VAC, 50Hz |
| 2 | | HDMI+DP 3840*2160, 30Hz | 230VAC, 50Hz |
| | | HDMI+DP 3840*2160, 30Hz / 1-6GHz | |
| 3 | | Standby Mode | 230VAC, 50Hz |

Worst:

Conduction (Power port): Mode 2

Conduction (Wired network ports): Mode 7

Radiation: Mode 2

4.2. EUT SYSTEM OPERATION

1. Windows 10 boots system.
2. Run colorbarmove.mp4 to activate all peripherals for test EUT.
3. Run Winemc.exe and choose media player to play music.
4. Run Winemc.exe and choose "F:/" to test EUT.
5. Run Lantest20.exe to ping 192.168.1.1 -t (EUT), ping 192.168.1.2 -t (EUT), ping 192.168.1.3 -t (EUT), ping 192.168.1.4 -t (EUT), ping 192.168.1.10 -t (Server PC).

Note: Test program is self-repeating throughout the test.

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

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

EUT Devices:

Model: UPN-EDGE-EHL01

| No. | Equipment | Model No. | Brand Name |
|-----|----------------------------|-----------------------|------------|
| 1 | CPU (3.0GHz) | Atom X6425E Processor | Intel |
| 2 | Memory (SDRAM.LPDDR4.32GB) | MT53E2G32D4DT-046 | Micron |
| 3 | Storage (eMMC 64GB) | SDINBDA4-64G-V | Sandisk |
| 4 | Power Adapter | EA10681U-120 | EDAC |
| 5 | RF Module | INTEL 9260 802.11ac | Intel |

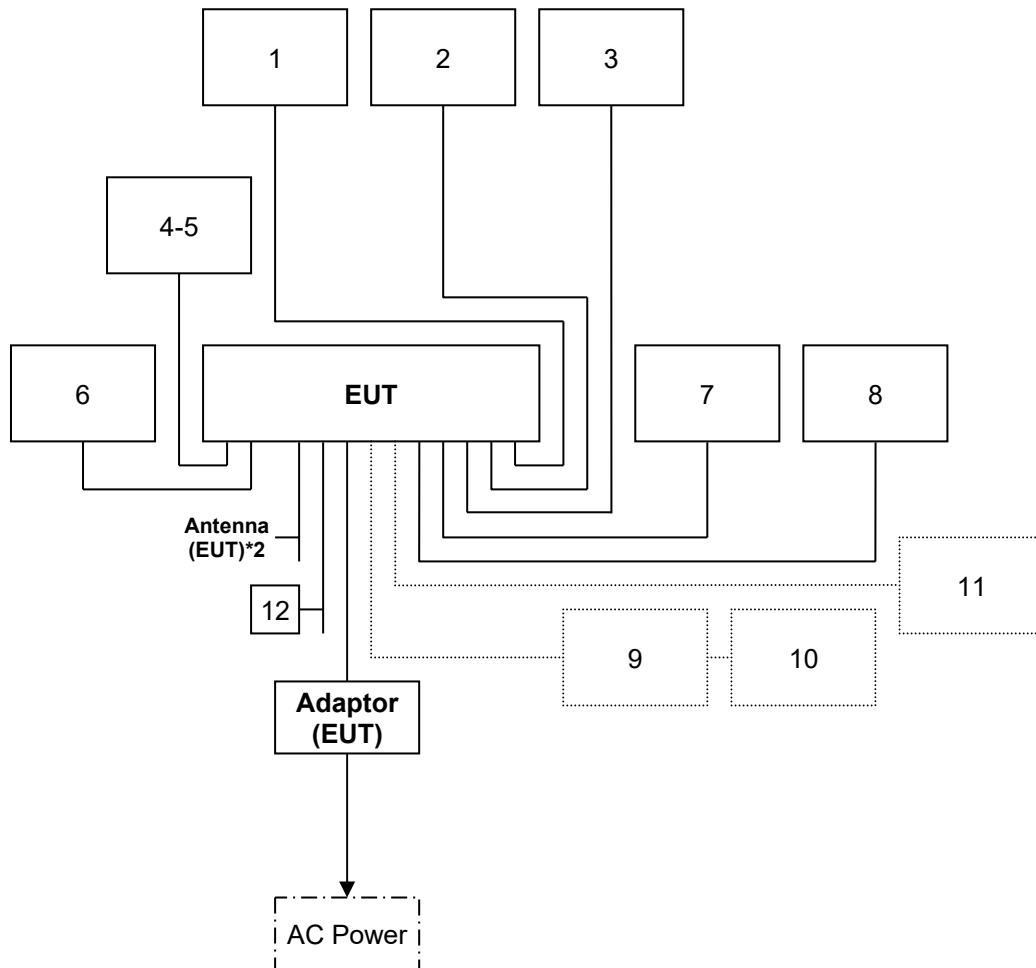
Peripherals Devices:

| No. | Equipment | Model No. | Serial No. | FCC ID / BSMI ID | Brand Name | Data Cable | Power Cord |
|-----|-----------------------|------------|-------------------------------|------------------|------------|-------------------|------------------------------|
| 1 | Earphone & Microphone | X710 | N/A | N/A | HAWK | Unshielded, 1.8m | N/A |
| 2 | USB Mouse | M-U0026 | N/A | BSMI: T41126 | LOGITECT | Shielded, 1.8m | N/A |
| 3 | USB Keyboard | Y-U0011 | 1804SY04FP48 | BSMI: D51160 | LOGITECH | Shielded, 1.8m | N/A |
| 4-5 | Modem | AL-56ERM | 0MERM04A0212 | N/A | GALILEO | Shielded, 1.5m | Unshielded, 1.8m with a core |
| 6 | Monitor | VP28U | KCLMTF168414 | BSMI: R31018 | ASUS | Shielded, 1.8m | Unshielded, 1.8m |
| 7 | USB HDD | TS1TSJ25MC | E57223-0003 | BSMI: D33193 | Transcend | Shielded, 0.5m | N/A |
| 8 | Monitor | U2718Qb | CN-0M5R5F-QD C00-9CL-0CVL-A10 | BSMI: R43002 | DELL | Shielded, 1.8m | Unshielded, 1.8m |
| 9 | Hub | GS-108B v3 | S184305016657 | BSMI: D41163 | ZYXEL | Unshielded, 20m*3 | Unshielded, 1.8m |
| 10 | Server PC | T5810 | 2H6YZG2 | BSMI: R33002 | DELL | Unshielded, 3.0m | Unshielded, 1.8m |
| 11 | Server PC | T5810 | 2H720H2 | BSMI: R33002 | DELL | Unshielded, 20m | Unshielded, 1.8m |
| 12 | Micro USB Cable | N/A | N/A | N/A | N/A | Shielded, 1.8m | N/A |

Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5.2. CONFIGURATION OF SYSTEM UNDER TEST



6 FACILITIES AND ACCREDITATIONS

6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at CCSrf Taiwan Xindian Lab. at No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

Taiwan TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

| | |
|---------------|-----------------|
| Canada | Industry Canada |
| Japan | VCCI |
| Taiwan | BSMI |
| USA | FCC |

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement | Frequency | Uncertainty |
|---|-------------------|-------------|
| Conducted emissions (Power port) | 0.15MHz ~ 30MHz | ± 2.8 |
| Conducted emissions (Wired network ports) | 0.15MHz ~ 30MHz | ± 3.2 |
| Radiated emissions | 30MHz ~ 1000MHz | ± 5.2 |
| | 1000MHz ~ 6000MHz | ± 4.6 |

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

Consistent with industry standard (e.g. CISPR 22: 2005, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than UCISPR which is 3.8dB(AMN); 5.0dB(AAN); 5.2dB(OATS) and 5.5dB(1-6GHz) respectively. CCS values (called ULab in CISPR 16-4-2) is less than UCISPR as shown in the table above. Therefore, MU need not be considered for compliance.

7 EMISSION TEST

7.1. CONDUCTED EMISSION MEASUREMENT

7.1.1. LIMITS

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|-----------------|----------------|---------|----------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 79 | 66 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 73 | 60 | 56 | 46 |
| 5.0 - 30.0 | 73 | 60 | 60 | 50 |

NOTE:

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

7.1.2. TEST INSTRUMENTS

| Conducted Emission room # B | | | | |
|-----------------------------|--------------|-----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Attenuator | MCL | HAT-10 | SD-C012 | 03/23/2022 |
| BNC Cable | EMCI | CFD300-NL | BNC#B5 | 01/04/2022 |
| EMI Test Receiver | R&S | ESR3 | 102166 | 04/12/2022 |
| LISN | Schwarzbeck | NSLK 8127 | 8127382 | 04/13/2022 |
| LISN(EUT) | Schwarzbeck | NSLK 8127 | 8127526 | 04/13/2022 |
| Thermo-Hygro Meter | Wisewind | N/A | SD-S017 | 09/01/2022 |
| Test S/W | EZ-EMC | | | |

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

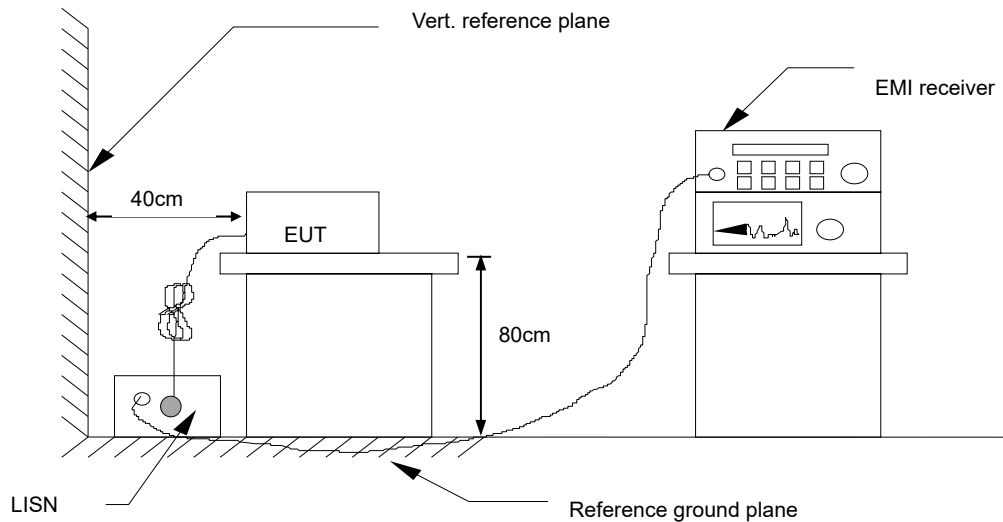
7.1.3. TEST PROCEDURES

Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55032 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per EN 55032.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

7.1.4. TEST SETUP

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.5. DATA SAMPLE

| Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector (P/Q/A) | Line (L1/L2) |
|----------------|-------------------|----------------|------------------|-----------------|----------------|---------------------|-----------------|
| x.xx | 42.95 | 0.55 | 43.50 | 73 | -29.50 | Q | L1 |

| | |
|---------|---|
| Freq. | = Emission frequency in MHz |
| Reading | = Uncorrected Analyzer/Receiver reading |
| Factor | = Insertion loss of LISN + Cable Loss + Pulse Limit |
| Result | = Reading + Factor |
| Limit | = Limit stated in standard |
| Margin | = Reading in reference to limit |
| P | = Peak Reading |
| Q | = Quasi-peak Reading |
| A | = Average Reading |
| L1 | = Hot side |
| L2 | = Neutral side |

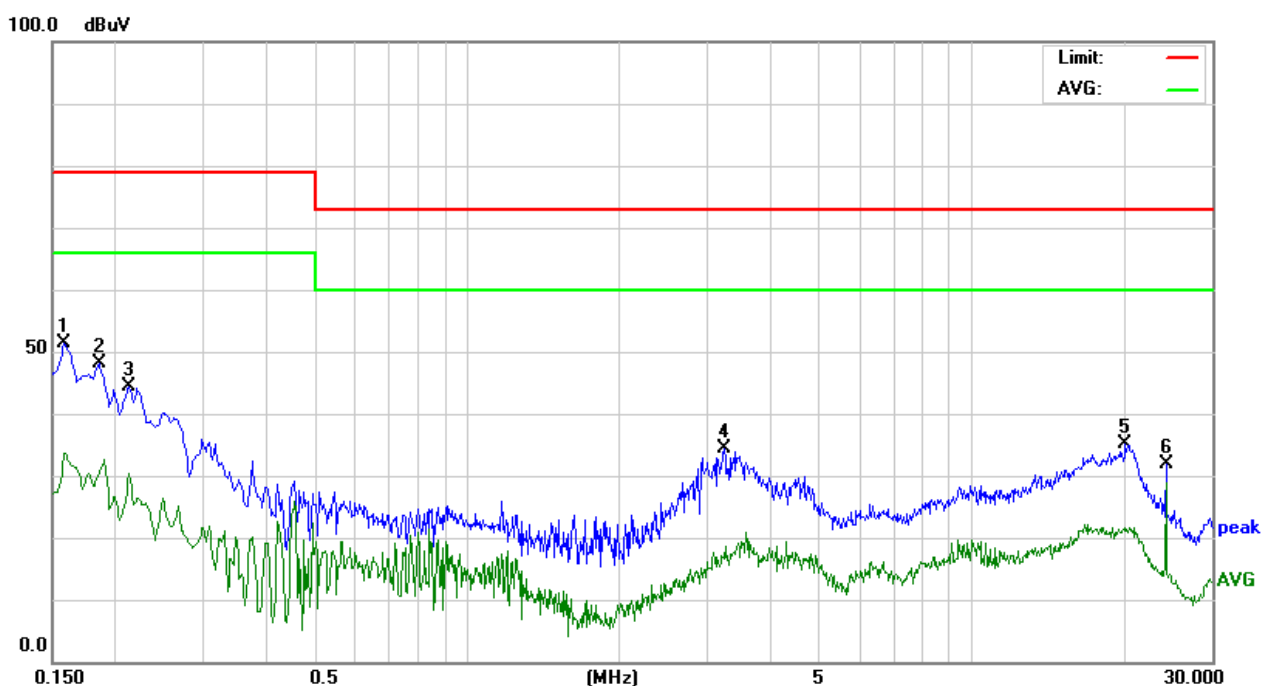
Calculation Formula

$$\text{Margin (dB)} = \text{Result (dBuV)} - \text{Limit (dBuV)}$$

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7.1.6. TEST RESULTS

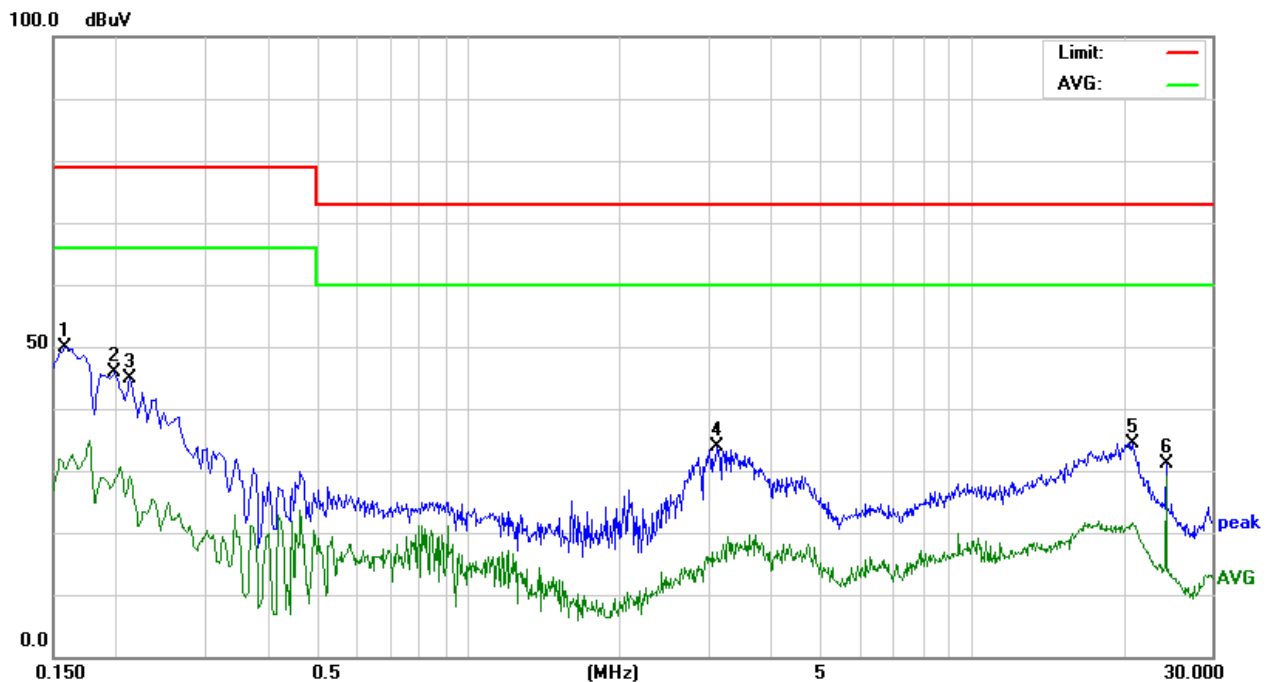
| | | | |
|--------------------------|------------------|---------------|--------|
| Model No. | UPN-EDGE-EHL01 | 6dB Bandwidth | 9 kHz |
| Environmental Conditions | 23.9°C, 59% RH | Test Mode | Mode 2 |
| Tested by | David Cheng | Phase | L1 |
| Standard | EN 55032 CLASS A | | |



| Conducted Emission Readings | | | | | | | |
|------------------------------|----------------|-------------|---------------|-------------------|-------------|------------------|--------------|
| Frequency Range Investigated | | | | 150 kHz to 30 MHz | | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector (P/Q/A) | Line (L1/L2) |
| 0.1590 | 41.25 | 10.08 | 51.33 | 79.00 | -27.67 | P | L1 |
| 0.1860 | 38.01 | 10.09 | 48.10 | 79.00 | -30.90 | P | L1 |
| 0.2130 | 34.33 | 10.10 | 44.43 | 79.00 | -34.57 | P | L1 |
| 3.2370 | 23.96 | 10.39 | 34.35 | 73.00 | -38.65 | P | L1 |
| 20.1795 | 24.09 | 10.92 | 35.01 | 73.00 | -37.99 | P | L1 |
| 24.3060 | 20.94 | 10.95 | 31.89 | 73.00 | -41.11 | P | L1 |

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

| | | | |
|--------------------------|------------------|---------------|--------|
| Model No. | UPN-EDGE-EHL01 | 6dB Bandwidth | 9 kHz |
| Environmental Conditions | 23.9°C, 59% RH | Test Mode | Mode 2 |
| Tested by | David Cheng | Phase | L2 |
| Standard | EN 55032 CLASS A | | |



| Conducted Emission Readings | | | | | | | |
|------------------------------|----------------|-------------|---------------|-------------------|-------------|------------------|--------------|
| Frequency Range Investigated | | | | 150 kHz to 30 MHz | | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector (P/Q/A) | Line (L1/L2) |
| 0.1590 | 39.72 | 10.09 | 49.81 | 79.00 | -29.19 | P | L2 |
| 0.1995 | 35.70 | 10.10 | 45.80 | 79.00 | -33.20 | P | L2 |
| 0.2130 | 34.71 | 10.10 | 44.81 | 79.00 | -34.19 | P | L2 |
| 3.1245 | 23.54 | 10.34 | 33.88 | 73.00 | -39.12 | P | L2 |
| 20.9220 | 23.64 | 10.86 | 34.50 | 73.00 | -38.50 | P | L2 |
| 24.3060 | 20.13 | 10.88 | 31.01 | 73.00 | -41.99 | P | L2 |

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

7.2. REQUIREMENTS FOR ASYMMETRIC MODE CONDUCTED EMISSIONS

7.2.1. LIMITS

For Class A Equipment

| FREQUENCY (MHz) | Voltage Limit (dBuV) | | Current Limit (dBuA) | |
|-----------------|----------------------|---------|----------------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 ~ 0.5 | 97 ~ 87 | 84 ~ 74 | 53 ~ 43 | 40 ~ 30 |
| 0.5 ~ 30.0 | 87 | 74 | 43 | 30 |

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

For Class B Equipment

| FREQUENCY (MHz) | Voltage Limit (dBuV) | | Current Limit (dBuA) | |
|-----------------|----------------------|---------|----------------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 84 ~ 74 | 74 ~ 64 | 40 ~ 30 | 30 ~ 20 |
| 0.5 - 30.0 | 74 | 64 | 30 | 20 |

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

7.2.2. TEST INSTRUMENTS

| Conducted Emission room # B | | | | |
|-----------------------------|--------------|-----------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Attenuator | MCL | HAT-10 | SD-C012 | 03/23/2022 |
| BNC Cable | EMCI | CFD300-NL | BNC#B5 | 01/04/2022 |
| EMI Test Receiver | R&S | ESR3 | 102166 | 04/12/2022 |
| ISN | Teseq | ISN T800 | 30847 | 04/13/2022 |
| LISN | Schwarzbeck | NSLK 8127 | 8127382 | 04/13/2022 |
| LISN(EUT) | Schwarzbeck | NSLK 8127 | 8127526 | 04/13/2022 |
| Thermo-Hygro Meter | Wisewind | N/A | SD-S017 | 09/01/2022 |
| Current Sensor Probe | Teseq | CSP 9160A | 76115 | 09/12/2022 |
| Test S/W | EZ-EMC | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

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7.2.3. TEST PROCEDURE

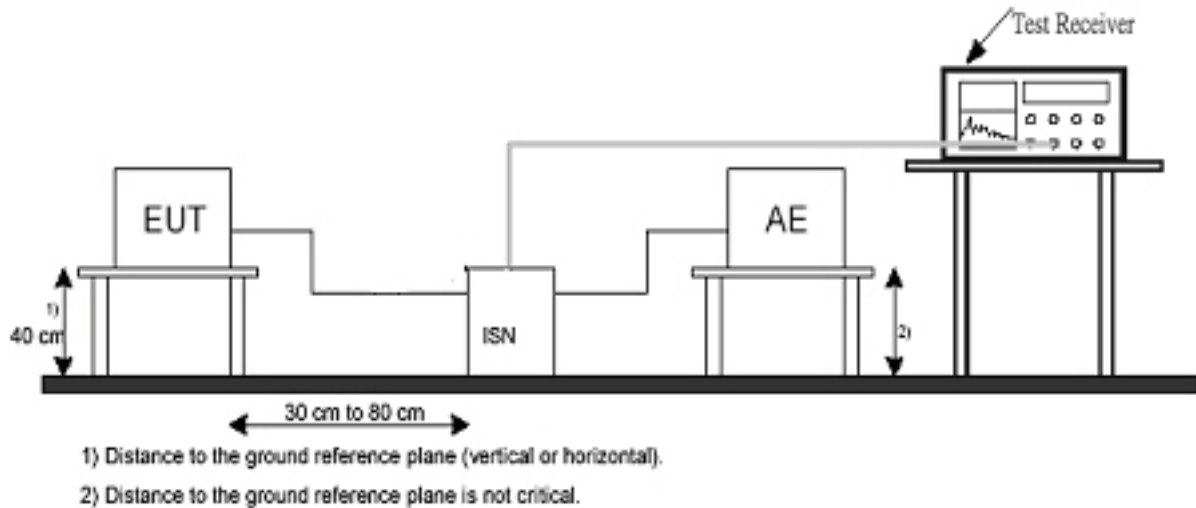
- Selecting AAN for unscreened cable or a current probe for screened cable to take measurement.
- The port of the EUT was connected to the remote side support equipment through the AAN/Current Probe and communication in normal condition.
- Making a overall range scan by using the test receiver controlled by controller and record at least six highest emissions for showing in the test report.
- Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- In case of measuring on the screened cable, the current limit shall be applied; otherwise the voltage limit should be applied.
- The following test modes was scanned during the preliminary test:

Modes:

| | | |
|---|-------|---------|
| 1 | LAN 1 | 10Mbps |
| 2 | | 100Mbps |
| 3 | | 1Gbps |
| 4 | LAN 2 | 10Mbps |
| 5 | | 100Mbps |
| 6 | | 1Gbps |
| 7 | | 2.5Gbps |
| 8 | LAN 3 | 1Gbps |
| 9 | LAN 4 | 1Gbps |

- After the preliminary scan, we found the following test mode(s) producing the highest emission level and test data of the worst case was recorded.

Mode: 7

7.2.4. TEST SETUP

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.5. DATA SAMPLE

| Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector (P/Q/A) |
|----------------|-------------------|----------------|------------------|-----------------|----------------|---------------------|
| x.xx | 62.95 | 0.55 | 63.50 | 87 | -23.50 | Q |

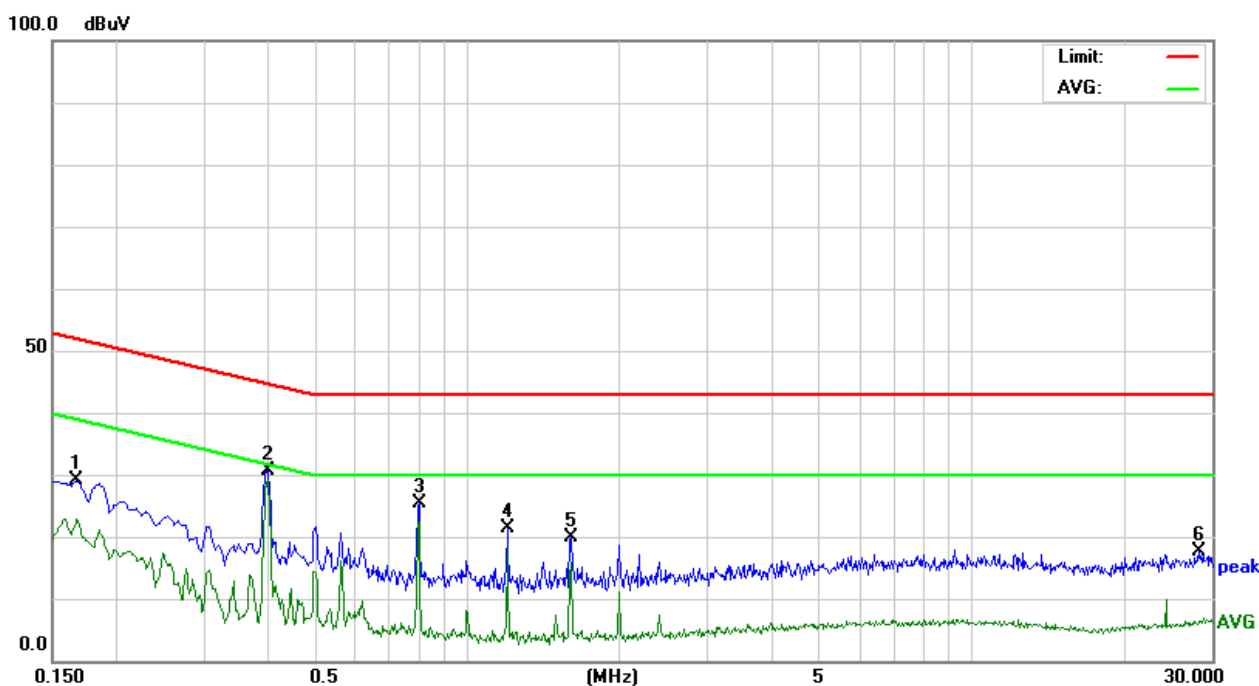
Freq. = Emission frequency in MHz
 Reading = Uncorrected Analyzer/Receiver reading
 Factor = Insertion loss of LISN + Cable Loss + Pulse Limit
 Result = Reading + Factor
 Limit = Limit stated in standard
 Margin = Reading in reference to limit
 P = Peak Reading
 Q = Quasi-peak Reading
 A = Average Reading

Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

7.2.6. TEST RESULTS

| | | | |
|--------------------------|----------------|---------------|------------------|
| Model No. | UPN-EDGE-EHL01 | 6dB Bandwidth | 9 kHz |
| Environmental Conditions | 23.9°C, 59% RH | Test Mode | Mode 7 |
| Tested by | David Cheng | Standard | EN 55032 CLASS A |



| Conducted Emission Readings | | | | | | |
|------------------------------|----------------|-------------|---------------|-------------------|-------------|------------------|
| Frequency Range Investigated | | | | 150 kHz to 30 MHz | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Detector (P/Q/A) |
| 0.1680 | 18.64 | 10.56 | 29.20 | 52.05 | -22.85 | P |
| 0.4020 | 20.28 | 10.31 | 30.59 | 44.81 | -14.22 | P |
| 0.8024 | 14.99 | 10.36 | 25.35 | 43.00 | -17.65 | P |
| 1.2028 | 10.95 | 10.40 | 21.35 | 43.00 | -21.65 | P |
| 1.6034 | 9.33 | 10.44 | 19.77 | 43.00 | -23.23 | P |
| 28.2255 | 7.08 | 10.64 | 17.72 | 43.00 | -25.28 | P |

7.3. RADIATED EMISSION MEASUREMENT

7.3.1. LIMITS

Below 1GHz

| FREQUENCY (MHz) | dBuV/m (At 10m) | | dBuV/m (At 3m) | |
|-----------------|-----------------|---------|----------------|---------|
| | Class A | Class B | Class A | Class B |
| 30 ~ 230 | 40 | 30 | 50 | 40 |
| 230 ~ 1000 | 47 | 37 | 57 | 47 |

Above 1GHz

| Frequency (MHz) | Class A (dBuV/m) (At 3m) | | Class B (dBuV/m) (At 3m) | |
|-----------------|--------------------------|------|--------------------------|------|
| | Average | Peak | Average | Peak |
| 1000 ~ 3000 | 56 | 76 | 50 | 70 |
| 3000 ~ 6000 | 60 | 80 | 54 | 74 |

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

According to EN 55032: 2015 / A11: 2020 Table 1 the measurement frequency range shown in the following table:

Table 1 – Required highest frequency for radiated measurement

| Highest internal frequency (F_X) | Highest internal frequency |
|--|--|
| $F_X \leq 108 \text{ MHz}$ $108 \text{ MHz} < F_X \leq 500 \text{ MHz}$ $500 \text{ MHz} < F_X \leq 1 \text{ GHz}$ $F_X > 1 \text{ GHz}$ | 1 GHz 2 GHz 5 GHz $5 \times F_X$ up to a maximum of 6 GHz |
| NOTE 1 For FM and TV broadcast receivers, F_X is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. | |
| NOTE 2 F_X is defined in 3.1.19. | |

Where F_X is unknown, the radiated emission measurements shall be performed up to 6 GHz.

7.3.2. TEST INSTRUMENTS

| Open Area Test Site # H | | | | |
|-------------------------------|--------------|--------------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Bilog Antenna | Teseq | CBL 6112D | 40529 | 09/22/2022 |
| Cable | EMEC | CFD400E-LW | SD-R074 | 08/11/2022 |
| EMI Test Receiver | R&S | ESCI | 101340 | 02/25/2022 |
| Pre-Amplifier | HP | 8447D | 1937A01554 | 09/23/2022 |
| Thermo-Hygro Meter | Wisewind | 201A | No. 03 | 05/19/2022 |
| Test S/W | EZ-EMC | | | |
| Chamber # E (Above 1GHz Used) | | | | |
| Horn Antenna | ETS | 3117 | 00139062 | 07/13/2022 |
| Microflex Cable x 7m | EMCI | EMC107-NM-NM-7000 | SD-R072 | 07/27/2022 |
| K-Type Cable x 1m | EMCI | EMC101G-KM-KM-1000 | 200702 | 07/04/2022 |
| Pre-Amplifier | Com-Power | PAM-118A | 551041 | 07/06/2022 |
| Signal Analyzer | R&S | FSV40 | 101269 | 07/05/2022 |
| Thermo-Hygro Meter | Wisewind | 201A | SD-R046 | 08/09/2022 |
| Test S/W | EZ-EMC | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

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7.3.3. TEST PROCEDURE

Procedure of Preliminary Test

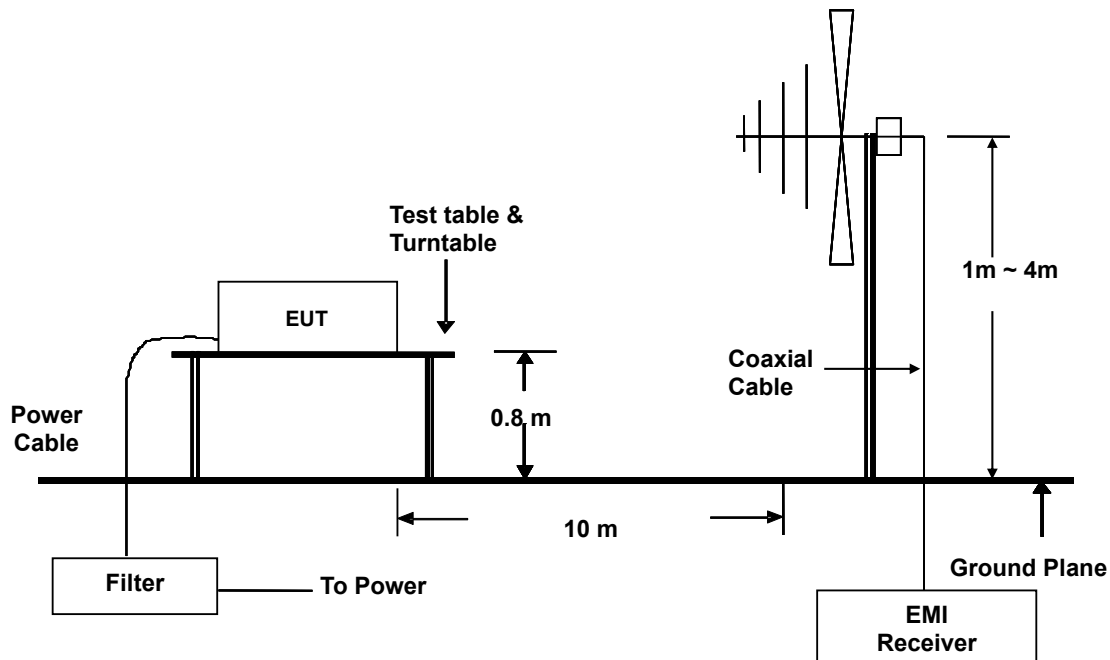
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per EN 55032.
- All I/O cables were positioned to simulate typical usage as per EN 55032.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 or 10 meter away from the EUT as stated in EN 55032. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

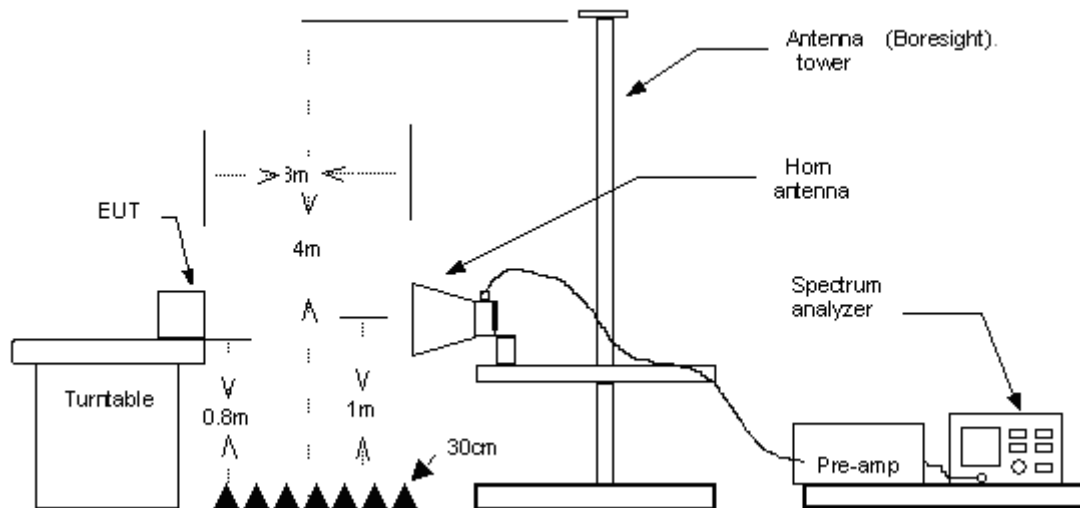
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. Below 1GHz the Q.P. reading and above 1GHz the Peak and Average reading are presented.
- The test data of the worst-case condition(s) was recorded.

7.3.4. TEST SETUP

Below 1GHz



Above 1GHz



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.3.5. DATA SAMPLE

Below 1GHz

| Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector (P/Q) | Pol. (H/V) |
|----------------|-------------------|------------------|--------------------|-------------------|----------------|-------------------|---------------|
| x.xx | 14.0 | 12.2 | 26.2 | 40 | -13.8 | Q | H |

Above 1GHz

| Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector (P/A) | Pol. (H/V) |
|----------------|-------------------|------------------|--------------------|-------------------|----------------|-------------------|---------------|
| x.xx | 42.95 | 0.55 | 43.50 | 60 | -16.50 | A | H |

Freq. = Emission frequency in MHz
 Reading = Uncorrected Analyzer/Receiver reading
 Factor = Antenna Factor + Cable Loss - Amplifier Gain
 Result = Reading + Factor
 Limit = Limit stated in standard
 Margin = Reading in reference to limit
 P = Peak Reading
 Q = Quasi-peak Reading
 A = Average Reading
 H = Antenna Polarization: Horizontal
 V = Antenna Polarization: Vertical

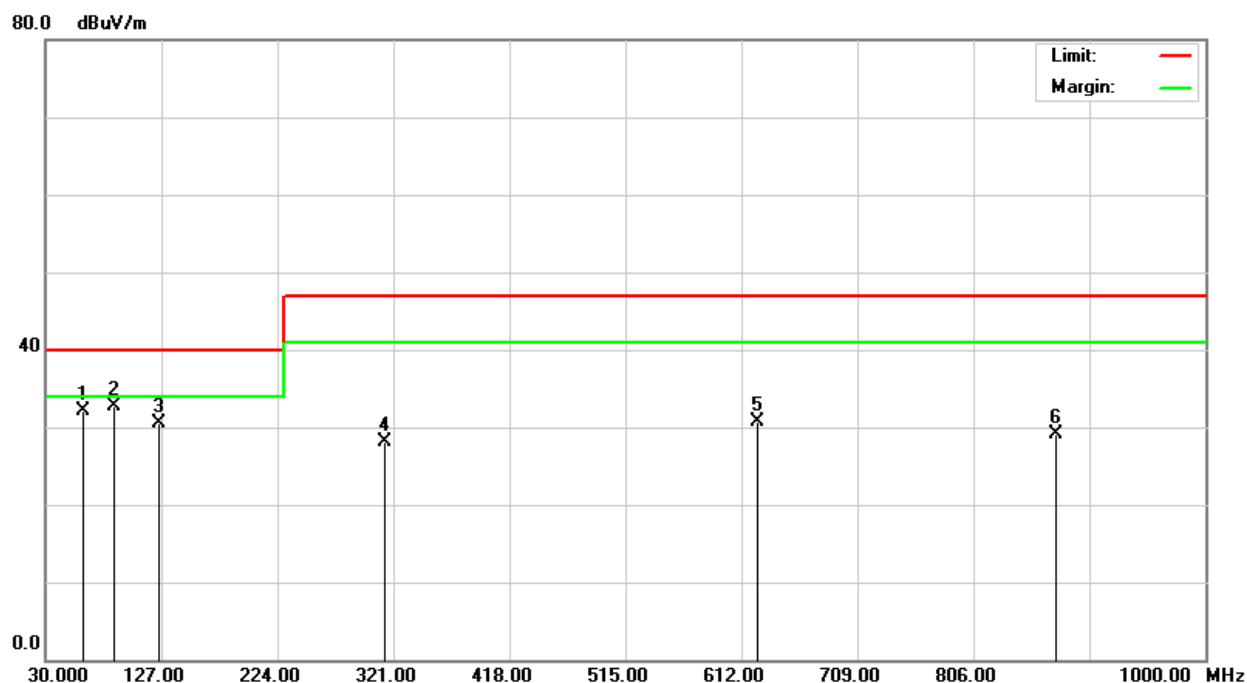
Calculation Formula

Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)

7.3.6. TEST RESULTS

Below 1GHz

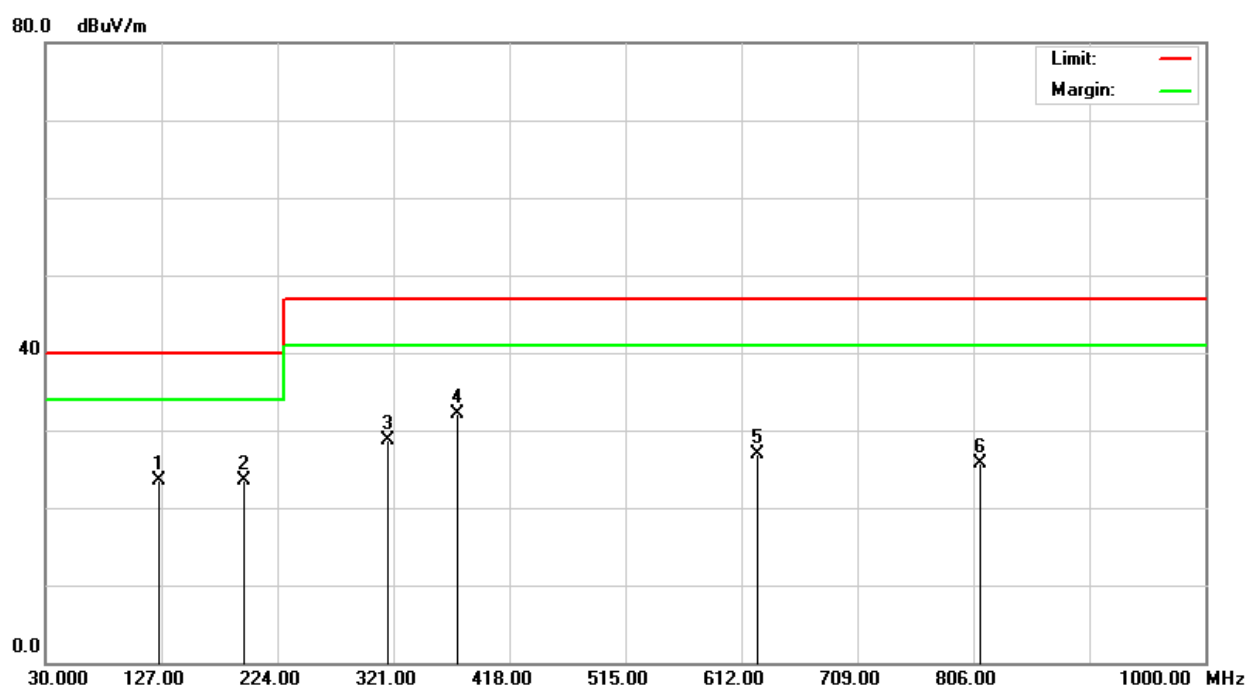
| | | | |
|--------------------------|------------------|------------------|-------------|
| Model No. | UPN-EDGE-EHL01 | Test Mode | Mode 2 |
| Environmental Conditions | 20.3°C, 81% RH | 6dB Bandwidth | 120 kHz |
| Antenna Pole | Vertical | Antenna Distance | 10m |
| Detector Function | Quasi-peak. | Tested by | David Cheng |
| Standard | EN 55032 CLASS A | | |



| Radiated Emission Readings | | | | | | | | | |
|------------------------------|----------------|---------------|-----------------|----------------|---------------------------|-------------|------------|----------------|------------|
| Frequency Range Investigated | | | | | 30 MHz to 1000 MHz at 10m | | | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Detector (P/Q) | Pol. (H/V) |
| 62.0800 | 46.80 | -14.78 | 32.02 | 40.00 | -7.98 | 100 | 210 | Q | V |
| 87.0500 | 44.61 | -11.97 | 32.64 | 40.00 | -7.36 | 100 | 328 | Q | V |
| 125.0200 | 38.90 | -8.34 | 30.56 | 40.00 | -9.44 | 100 | 17 | Q | V |
| 314.1900 | 33.70 | -5.60 | 28.10 | 47.00 | -18.90 | 100 | 115 | Q | V |
| 625.0100 | 29.50 | 1.19 | 30.69 | 47.00 | -16.31 | 400 | 265 | Q | V |
| 875.0300 | 25.30 | 3.90 | 29.20 | 47.00 | -17.80 | 400 | 131 | Q | V |

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

| | | | |
|--------------------------|------------------|------------------|-------------|
| Model No. | UPN-EDGE-EHL01 | Test Mode | Mode 2 |
| Environmental Conditions | 20.3°C, 81% RH | 6dB Bandwidth | 120 kHz |
| Antenna Pole | Horizontal | Antenna Distance | 10m |
| Detector Function | Quasi-peak. | Tested by | David Cheng |
| Standard | EN 55032 CLASS A | | |



| Radiated Emission Readings | | | | | | | | | |
|------------------------------|----------------|---------------|-----------------|----------------|---------------------------|-------------|------------|----------------|------------|
| Frequency Range Investigated | | | | | 30 MHz to 1000 MHz at 10m | | | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (°) | Detector (P/Q) | Pol. (H/V) |
| 125.0100 | 31.80 | -8.34 | 23.46 | 40.00 | -16.54 | 400 | 136 | Q | H |
| 196.7700 | 34.20 | -10.69 | 23.51 | 40.00 | -16.49 | 400 | 87 | Q | H |
| 316.0500 | 34.30 | -5.55 | 28.75 | 47.00 | -18.25 | 400 | 115 | Q | H |
| 375.0200 | 36.10 | -3.99 | 32.11 | 47.00 | -14.89 | 400 | 248 | Q | H |
| 625.0100 | 25.80 | 1.19 | 26.99 | 47.00 | -20.01 | 100 | 166 | Q | H |
| 812.3600 | 22.70 | 2.98 | 25.68 | 47.00 | -21.32 | 100 | 301 | Q | H |

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

Above 1GHz

| | | | |
|--|-----------------------|-------------------------|-------------|
| Model No. | UPN-EDGE-EHL01 | Test Mode | Mode 2 |
| Environmental Conditions | 23.9°C, 61% RH | 6dB Bandwidth | 1 MHz |
| Antenna Pole | Vertical / Horizontal | Antenna Distance | 3m |
| Highest frequency generated or used | 3000MHz | Upper frequency | 6000MHz |
| Detector Function | Peak and average. | Tested by | David Cheng |
| Standard | EN 55032 CLASS A | | |

| Radiated Emission Readings | | | | | | | |
|------------------------------|----------------|---------------|-----------------|------------------|-------------|----------------|------------|
| Frequency Range Investigated | | | | Above 1GHz at 3m | | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector (P/A) | Pol. (H/V) |
| 1395.000 | 53.56 | -8.71 | 44.85 | 76.00 | -31.15 | P | V |
| 1930.000 | 53.75 | -5.88 | 47.87 | 76.00 | -28.13 | P | V |
| 2945.000 | 55.52 | -4.43 | 51.09 | 76.00 | -24.91 | P | V |
| 2995.000 | 54.38 | -4.51 | 49.87 | 76.00 | -26.13 | P | V |
| 4995.000 | 55.18 | -2.51 | 52.67 | 80.00 | -27.33 | P | V |
| 5890.000 | 54.38 | -0.88 | 53.50 | 80.00 | -26.50 | P | V |

| Radiated Emission Readings | | | | | | | |
|------------------------------|----------------|---------------|-----------------|------------------|-------------|----------------|------------|
| Frequency Range Investigated | | | | Above 1GHz at 3m | | | |
| Freq. (MHz) | Reading (dBuV) | Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector (P/A) | Pol. (H/V) |
| 1385.000 | 53.04 | -8.65 | 44.39 | 76.00 | -31.61 | P | H |
| 1950.000 | 54.96 | -5.75 | 49.21 | 76.00 | -26.79 | P | H |
| 2940.000 | 56.13 | -4.44 | 51.69 | 76.00 | -24.31 | P | H |
| 3000.000 | 53.98 | -4.52 | 49.46 | 76.00 | -26.54 | P | H |
| 4995.000 | 56.36 | -2.51 | 53.85 | 80.00 | -26.15 | P | H |
| 5940.000 | 50.59 | -0.68 | 49.91 | 80.00 | -30.09 | P | H |

Note: 1. P= Peak Reading; A= Average Reading.

7.4. HARMONICS CURRENT MEASUREMENT

7.4.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

| Limits for Class A equipment | | Limits for Class D equipment | | |
|------------------------------|--------------------------------------|------------------------------|--|--------------------------------------|
| Harmonics Order n | Max. permissible harmonics current A | Harmonics Order n | Max. permissible harmonics current per watt mA/W | Max. permissible harmonics current A |
| Odd harmonics | | Odd Harmonics only | | |
| 3 | 2.30 | 3 | 3.4 | 2.30 |
| 5 | 1.14 | 5 | 1.9 | 1.14 |
| 7 | 0.77 | 7 | 1.0 | 0.77 |
| 9 | 0.40 | 9 | 0.5 | 0.40 |
| 11 | 0.33 | 11 | 0.35 | 0.33 |
| 13 | 0.21 | 13 | 0.30 | 0.21 |
| 15≤n≤39 | 0.15x15/n | 15≤n≤39 | 3.85/n | 0.15x15/n |
| Even harmonics | | | | |
| 2 | 1.08 | | | |
| 4 | 0.43 | | | |
| 6 | 0.30 | | | |
| 8≤n≤40 | 0.23x8/n | | | |

NOTE: 1. Class A and Class D are classified according to item 7.4.3.
2. According to section 7 of EN IEC 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.4.2. TEST INSTRUMENTS

| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|--------------------------|---------------------|------------|---------------|-----------------|
| 5kVA Power Source | Teseq | NSG 1007-5 | 1537A01296 | 03/09/2022 |
| Signal Conditioning Unit | Teseq | NSG 1000-1 | 1846A01831 | 03/09/2022 |
| Software | WIN2100V4 Ver. 4.22 | | | |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

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7.4.3. TEST PROCEDURE

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The classification of EUT is according to section 5 of EN IEC 61000-3-2.
- The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

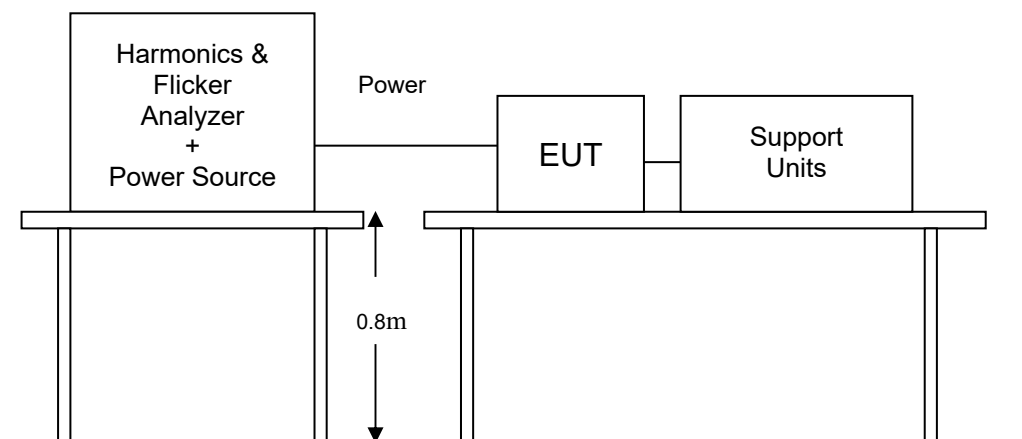
Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; television receivers and refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

7.4.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.4.5. TEST RESULTS

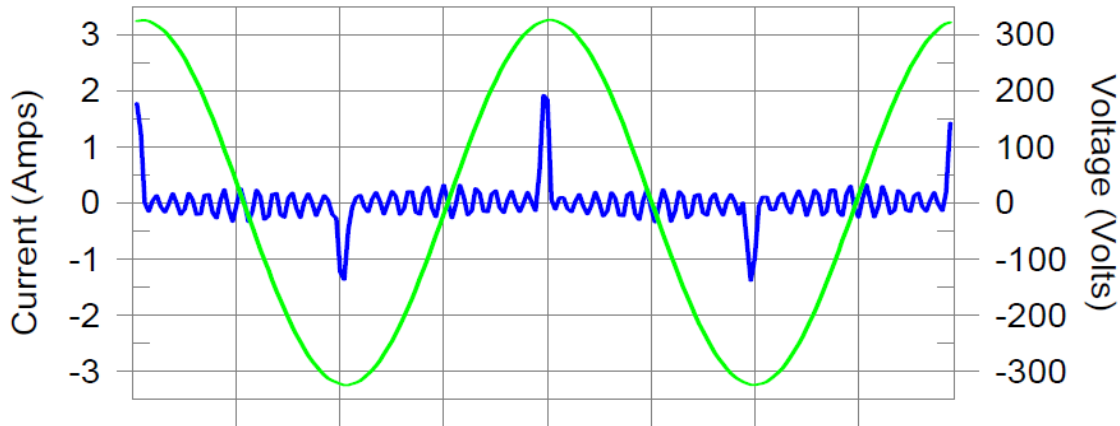
| | | | |
|--------------------------|--------------------------|--------------|--|
| Power Consumption | 24.8W | Test Results | PASS |
| Environmental Conditions | 22.5°C, 51% RH, 1009mbar | Limits | Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D |
| Test Mode | Operating | Tested by | David Cheng |

NOTE: Limits classified according to item 7.4.1.

Test result of EN IEC 61000-3-2

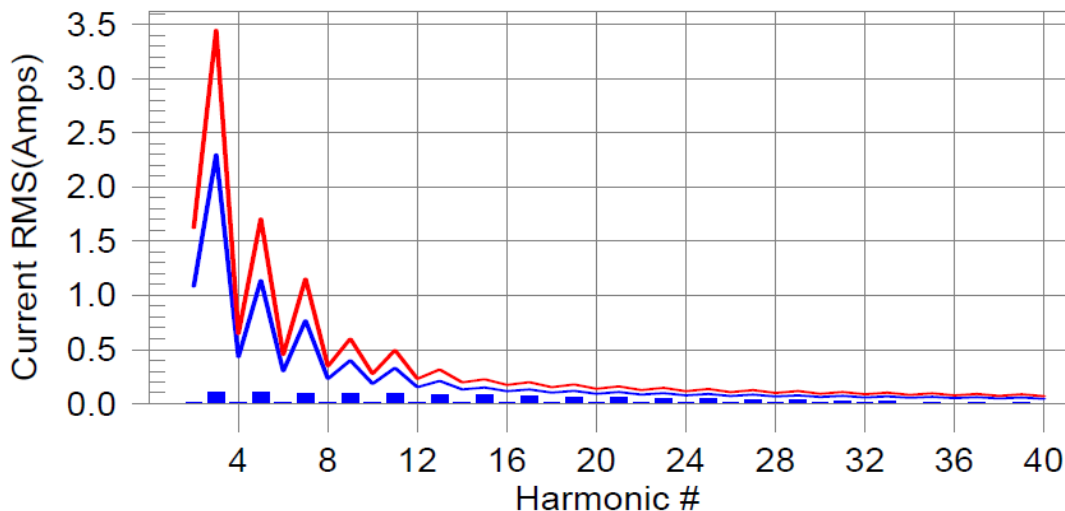
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonics H19-37.6% of 150% limit, H19-54.1% of 100% limit

Test Result: Pass Source qualification: Normal
 THC(A): 0.288 I-THD(%): 255.2 POHC(A): 0.106 POHC Limit(A): 0.251

Highest parameter values during test:

| | | | |
|----------------|--------|----------------|-------|
| V_RMS (Volts): | 229.81 | Frequency(Hz): | 49.99 |
| I_Peak (Amps): | 2.292 | I_RMS (Amps): | 0.365 |
| I_Fund (Amps): | 0.113 | Crest Factor: | 6.597 |
| Power (Watts): | 24.8 | Power Factor: | 0.303 |

| Harm# | Harms(avg) | 100%Limit | %of Limit | Harms(max) | 150%Limit | %of Limit | Status |
|-------|------------|-----------|-----------|------------|-----------|-----------|--------|
| 2 | 0.013 | 1.080 | 1.2 | 0.014 | 1.620 | 0.9 | Pass |
| 3 | 0.103 | 2.300 | 4.5 | 0.107 | 3.450 | 3.1 | Pass |
| 4 | 0.013 | 0.430 | 3.0 | 0.014 | 0.645 | 2.2 | Pass |
| 5 | 0.101 | 1.140 | 8.9 | 0.105 | 1.710 | 6.1 | Pass |
| 6 | 0.013 | 0.300 | 4.4 | 0.014 | 0.450 | 3.2 | Pass |
| 7 | 0.098 | 0.770 | 12.7 | 0.102 | 1.155 | 8.8 | Pass |
| 8 | 0.013 | 0.230 | 5.8 | 0.015 | 0.345 | 4.2 | Pass |
| 9 | 0.094 | 0.400 | 23.5 | 0.098 | 0.600 | 16.3 | Pass |
| 10 | 0.014 | 0.184 | 7.3 | 0.015 | 0.276 | 5.3 | Pass |
| 11 | 0.089 | 0.330 | 27.0 | 0.093 | 0.495 | 18.7 | Pass |
| 12 | 0.014 | 0.153 | 8.9 | 0.015 | 0.230 | 6.5 | Pass |
| 13 | 0.084 | 0.210 | 39.8 | 0.087 | 0.315 | 27.6 | Pass |
| 14 | 0.014 | 0.131 | 10.4 | 0.015 | 0.197 | 7.5 | Pass |
| 15 | 0.077 | 0.150 | 51.6 | 0.081 | 0.225 | 35.8 | Pass |
| 16 | 0.014 | 0.115 | 11.8 | 0.015 | 0.173 | 8.6 | Pass |
| 17 | 0.071 | 0.132 | 53.7 | 0.074 | 0.198 | 37.3 | Pass |
| 18 | 0.013 | 0.102 | 13.0 | 0.015 | 0.153 | 9.5 | Pass |
| 19 | 0.064 | 0.118 | 54.1 | 0.067 | 0.178 | 37.6 | Pass |
| 20 | 0.013 | 0.092 | 13.9 | 0.014 | 0.138 | 10.2 | Pass |
| 21 | 0.057 | 0.107 | 53.3 | 0.059 | 0.161 | 37.0 | Pass |
| 22 | 0.012 | 0.084 | 14.5 | 0.013 | 0.125 | 10.7 | Pass |
| 23 | 0.050 | 0.098 | 51.3 | 0.052 | 0.147 | 35.6 | Pass |
| 24 | 0.011 | 0.077 | 14.9 | 0.013 | 0.115 | 11.1 | Pass |
| 25 | 0.043 | 0.090 | 48.1 | 0.045 | 0.135 | 33.5 | Pass |
| 26 | 0.010 | 0.071 | 14.8 | 0.012 | 0.107 | 11.1 | Pass |
| 27 | 0.037 | 0.083 | 44.1 | 0.038 | 0.125 | 30.7 | Pass |
| 28 | 0.010 | 0.066 | 14.4 | 0.011 | 0.099 | 10.9 | Pass |
| 29 | 0.031 | 0.078 | 39.4 | 0.032 | 0.116 | 27.4 | Pass |
| 30 | 0.008 | 0.061 | 13.7 | 0.010 | 0.092 | 10.6 | Pass |
| 31 | 0.025 | 0.073 | 34.1 | 0.026 | 0.109 | 23.8 | Pass |
| 32 | 0.007 | 0.058 | 12.7 | 0.008 | 0.086 | 9.8 | Pass |
| 33 | 0.019 | 0.068 | 28.5 | 0.021 | 0.102 | 20.1 | Pass |
| 34 | 0.006 | 0.054 | 11.3 | 0.007 | 0.081 | 8.8 | Pass |
| 35 | 0.015 | 0.064 | 22.9 | 0.016 | 0.096 | 16.3 | Pass |
| 36 | 0.005 | 0.051 | N/A | 0.006 | 0.077 | N/A | Pass |
| 37 | 0.011 | 0.061 | 17.4 | 0.012 | 0.091 | 12.7 | Pass |
| 38 | 0.004 | 0.048 | N/A | 0.005 | 0.073 | N/A | Pass |
| 39 | 0.007 | 0.058 | 12.3 | 0.008 | 0.087 | 9.3 | Pass |
| 40 | 0.003 | 0.046 | N/A | 0.003 | 0.069 | N/A | Pass |

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

| | | | |
|-----------------|--------|----------------|-------|
| Voltage (Vrms): | 229.81 | Frequency(Hz): | 49.99 |
| I_Peak (Amps): | 2.292 | I_RMS (Amps): | 0.365 |
| I_Fund (Amps): | 0.113 | Crest Factor: | 6.597 |
| Power (Watts): | 24.8 | Power Factor: | 0.303 |

| Harm# | Harmonics V-rms | Limit V-rms | % of Limit | Status |
|-------|-----------------|-------------|------------|--------|
| 2 | 0.046 | 0.459 | 9.99 | OK |
| 3 | 0.304 | 2.067 | 14.72 | OK |
| 4 | 0.019 | 0.460 | 4.06 | OK |
| 5 | 0.085 | 0.919 | 9.29 | OK |
| 6 | 0.024 | 0.459 | 5.15 | OK |
| 7 | 0.046 | 0.689 | 6.73 | OK |
| 8 | 0.007 | 0.460 | 1.56 | OK |
| 9 | 0.055 | 0.459 | 11.99 | OK |
| 10 | 0.013 | 0.460 | 2.77 | OK |
| 11 | 0.042 | 0.230 | 18.21 | OK |
| 12 | 0.018 | 0.230 | 7.62 | OK |
| 13 | 0.054 | 0.230 | 23.56 | OK |
| 14 | 0.010 | 0.230 | 4.36 | OK |
| 15 | 0.041 | 0.230 | 17.94 | OK |
| 16 | 0.009 | 0.230 | 3.86 | OK |
| 17 | 0.048 | 0.230 | 21.07 | OK |
| 18 | 0.017 | 0.230 | 7.61 | OK |
| 19 | 0.053 | 0.230 | 23.19 | OK |
| 20 | 0.030 | 0.230 | 12.94 | OK |
| 21 | 0.052 | 0.230 | 22.71 | OK |
| 22 | 0.013 | 0.230 | 5.56 | OK |
| 23 | 0.050 | 0.230 | 21.70 | OK |
| 24 | 0.016 | 0.230 | 6.79 | OK |
| 25 | 0.046 | 0.230 | 19.85 | OK |
| 26 | 0.013 | 0.230 | 5.65 | OK |
| 27 | 0.036 | 0.230 | 15.78 | OK |
| 28 | 0.012 | 0.230 | 5.31 | OK |
| 29 | 0.040 | 0.230 | 17.46 | OK |
| 30 | 0.013 | 0.230 | 5.72 | OK |
| 31 | 0.032 | 0.230 | 14.14 | OK |
| 32 | 0.012 | 0.230 | 5.19 | OK |
| 33 | 0.029 | 0.230 | 12.82 | OK |
| 34 | 0.010 | 0.230 | 4.55 | OK |
| 35 | 0.025 | 0.230 | 10.69 | OK |
| 36 | 0.009 | 0.230 | 3.96 | OK |
| 37 | 0.020 | 0.230 | 8.80 | OK |
| 38 | 0.008 | 0.230 | 3.52 | OK |
| 39 | 0.016 | 0.230 | 7.02 | OK |
| 40 | 0.017 | 0.230 | 7.59 | OK |

7.5. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.5.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

| TEST ITEM | LIMIT | REMARK |
|---------------|-------|--|
| P_{st} | 1.0 | P_{st} means short-term flicker indicator. |
| P_{lt} | 0.65 | P_{lt} means long-term flicker indicator. |
| T_{dt} (ms) | 500 | T_{dt} means maximum time that dt exceeds 3 %. |
| d_{max} (%) | 4% | d_{max} means maximum relative voltage change. |
| dc (%) | 3.3% | dc means relative steady-state voltage change |

7.5.2. TEST INSTRUMENTS

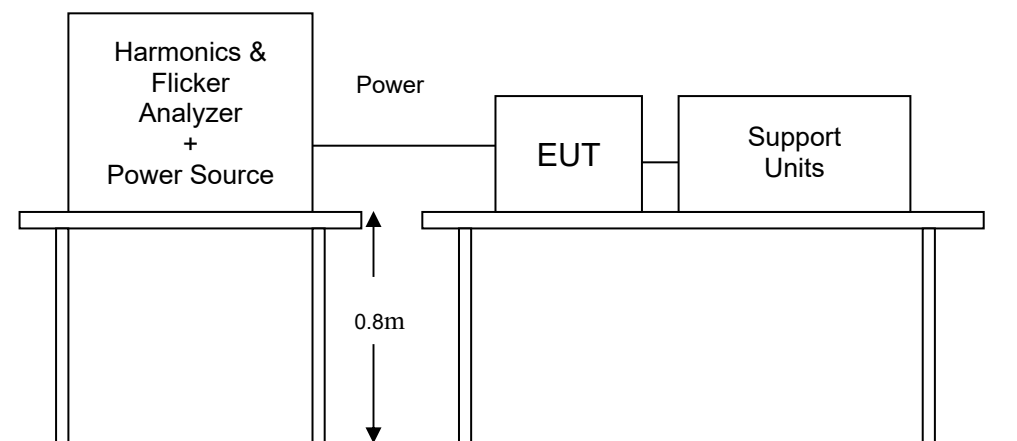
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
|--------------------------|---------------------|------------|---------------|-----------------|
| 5kVA Power Source | Teseq | NSG 1007-5 | 1537A01296 | 03/09/2022 |
| Signal Conditioning Unit | Teseq | NSG 1000-1 | 1846A01831 | 03/09/2022 |
| Software | WIN2100V4 Ver. 4.22 | | | |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.5.3. TEST PROCEDURE

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.5.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5.5. TEST RESULTS

| | | | |
|--------------------------|--------------------------|-----------|-------------|
| Observation Period (Tp) | 10mins | Test Mode | Operating |
| Environmental Conditions | 22.5°C, 51% RH, 1009mbar | Tested by | David Cheng |

| TEST PARAMETER | MEASUREMENT VALUE | LIMIT | REMARK |
|----------------|-------------------|-------|--------|
| P_{st} | 0.064 | 1.0 | PASS |
| P_{lt} | 0.028 | 0.65 | PASS |
| T_{dt} (ms) | 0 | 500 | PASS |
| d_{max} (%) | 0 | 4% | PASS |
| dc (%) | 0 | 3.3% | PASS |

Note: None.

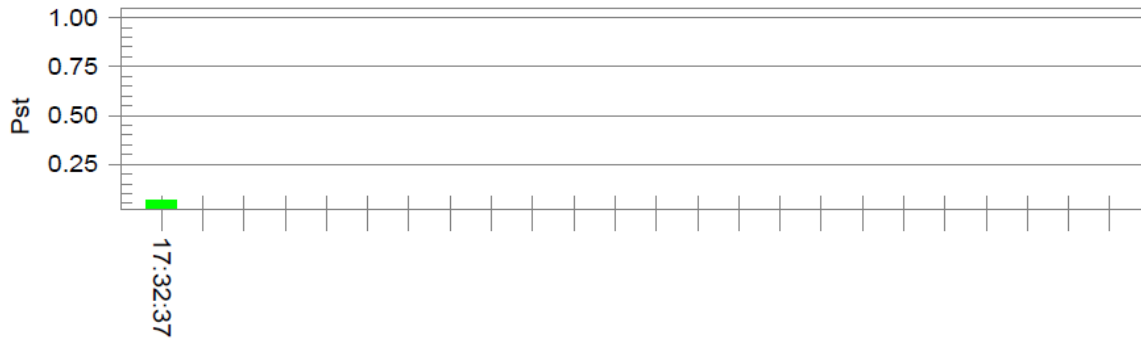
Test result of EN 61000-3-3

Test Result: Pass

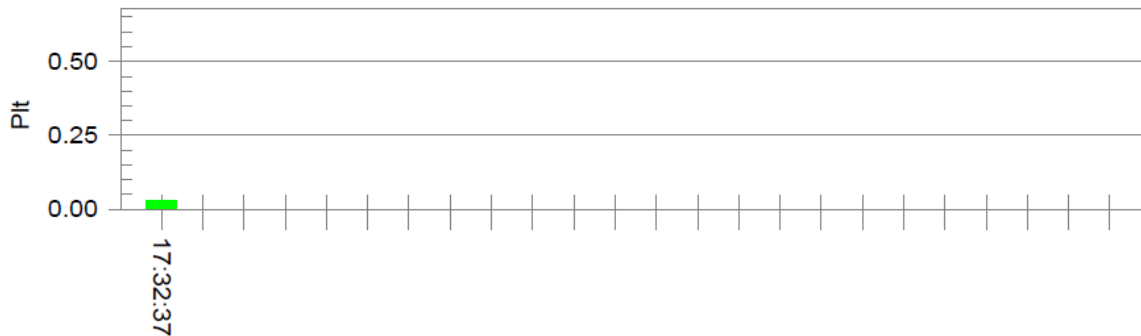
Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.73

Highest dt (%):

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.064

Highest Plt (2 hr. period): 0.028

Test limit (%):

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

Test limit: 0.650 Pass

8 IMMUNITY TEST

8.1. GENERAL DESCRIPTION

| Product Standard | ETSI EN 301 489-1 V2.2.3 (2019-11) | |
|--|------------------------------------|---|
| | Test Type | Minimum Requirement |
| Basic Standard, Specification, and Performance Criterion required | EN 61000-4-2 | Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion TT&TR |
| | EN 61000-4-3 | Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 6000MHz, 3V/m, 80% AM(1kHz) Performance Criterion CT&CR |
| | EN 61000-4-4 | Electrical Fast Transient/Burst - EFT, AC Power Port: 1kV, DC Power Port: 0.5kV, Signal Port: 0.5kV Performance Criterion TT&TR |
| | EN 61000-4-5 | Surge Immunity Test: 1.2/50 μ s Open Circuit Voltage, 8 /20 μ s Short Circuit Current, 10/700 μ s Open Circuit Voltage AC Power Port ~ line to line: 1kV, line to earth: 2kV Signal Port ~ line to line: 0.5kV, line to earth: 1kV (Outdoor Cable) Signal Port ~ line to earth: 0.5kV (Indoor Cable) Performance Criterion TT&TR |
| | EN 61000-4-6 | Conducted Radio Frequency Disturbances Test –CS: AC Power Port; DC Power Port; Signal Port: 0.15 ~ 80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion CT&CR |
| | EN 61000-4-11 | Voltage Dips: 1) 0% residual 0.5 cycle Performance TT or TR 2) 0% residual 1 cycle Performance TT or TR 3) 70% residual 25 cycles Performance TT or TR 4) 0% residual 250 cycles Performance TT or TR |

8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

General performance criteria

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Performance table

Table 1: Performance criteria

| Criteria | During test | After test |
|----------|--|---|
| A | Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions. | Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions. |
| B | May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions. | Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions |
| C | May be loss of function (one or more). | Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). |

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

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Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Transmitters (TT)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement.

(NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

8.3. ELECTROSTATIC DISCHARGE (ESD)

8.3.1. TEST SPECIFICATION

| | |
|-----------------------------|---|
| Basic Standard: | EN 61000-4-2 |
| Discharge Impedance: | 330 ohm / 150 pF |
| Discharge Voltage: | Air Discharge: 2 ; 4 ; 8 kV (Direct) Contact Discharge: 2 ; 4 kV (Direct/Indirect) |
| Polarity: | Positive & Negative |
| Number of Discharge: | Minimum 10 times at each test point |
| Discharge Mode: | Single Discharge 1 second minimum |

8.3.2. TEST INSTRUMENT

| IMMUNITY SHIELDED ROOM | | | | |
|------------------------|--------------|---------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Aneroid Barometer | SATO | 7610-20 | 89090 | 08/12/2022 |
| ESD Simulator | Teseq | NSG 437 | 1189 | 04/18/2022 |
| Thermo-Hygro Meter | Wisewind | 201A | SD-S039 | 01/05/2022 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

8.3.3. TEST PROCEDURE

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 20 discharges, 10 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 10 indirect discharges to the center of the front edge of the Horizontal Coupling Plane (HCP). The remaining three test points shall each receive at least 10 direct contact discharges. If no direct contact test points are available, then at least 20 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

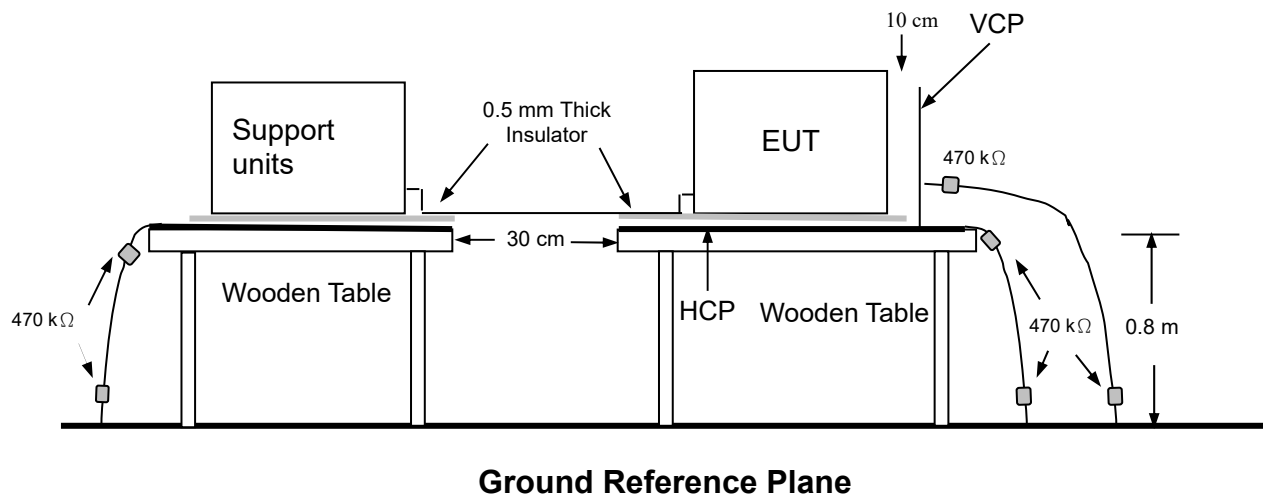
b) Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

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

- a) The EUT was located 0.1 m minimum from all side of the **HCP** (dimensions 1.6m x 0.8m).
- b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
- c) The time interval between two successive single discharges was at least 1 second.
- d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each **HCP** opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the **HCP** and perpendicular to its front edge during the discharge.
- g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane (VCP)** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

8.3.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k ohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

8.3.5. TEST RESULTS

Normal Mode

| | | | |
|------------------------------|----------|-----------------|-------------|
| Temperature | 19.3°C | Humidity | 52% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | | Criterion TT&TR | |

| Air Discharge | | | | | | | |
|---------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|---|---|
| Test Points | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

| Contact Discharge | | | | | | | |
|-------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|---|---|
| Test Points | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Front | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Left | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Right | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Top | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Bottom | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

| Discharge To Horizontal Coupling Plane | | | | | | | |
|--|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|---|---|
| Side of EUT | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Front | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Left | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Right | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

| Discharge To Vertical Coupling Plane | | | | | | | |
|--------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|---|---|
| Side of EUT | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Front | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Left | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
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NOTE: 1. There was no change compared with initial operation during the test.

Standby Mode

| | | | |
|------------------------------|----------|-----------------|-------------|
| Temperature | 19.3°C | Humidity | 52% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | | Criterion TT&TR | |

| Air Discharge | | | | | | | |
|---------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|---|---|
| Test Points | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

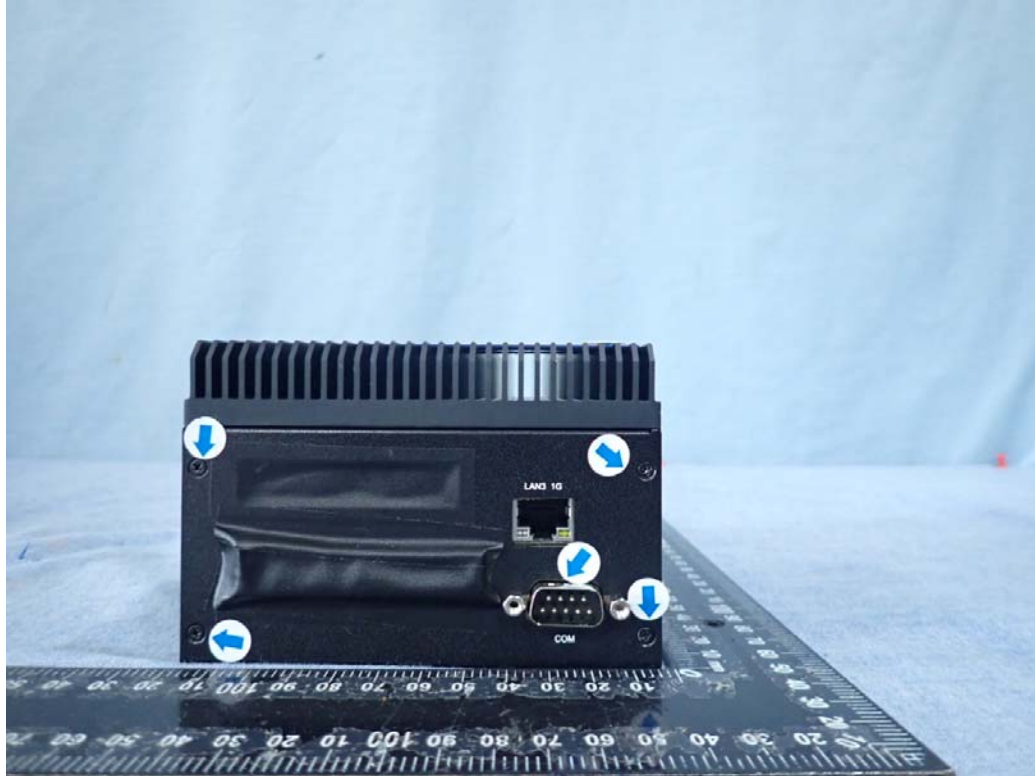
| Contact Discharge | | | | | | | |
|-------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|---|---|
| Test Points | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Front | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Left | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Right | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Top | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Bottom | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

| Discharge To Horizontal Coupling Plane | | | | | | | |
|--|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|---|---|
| Side of EUT | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Front | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Left | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Right | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

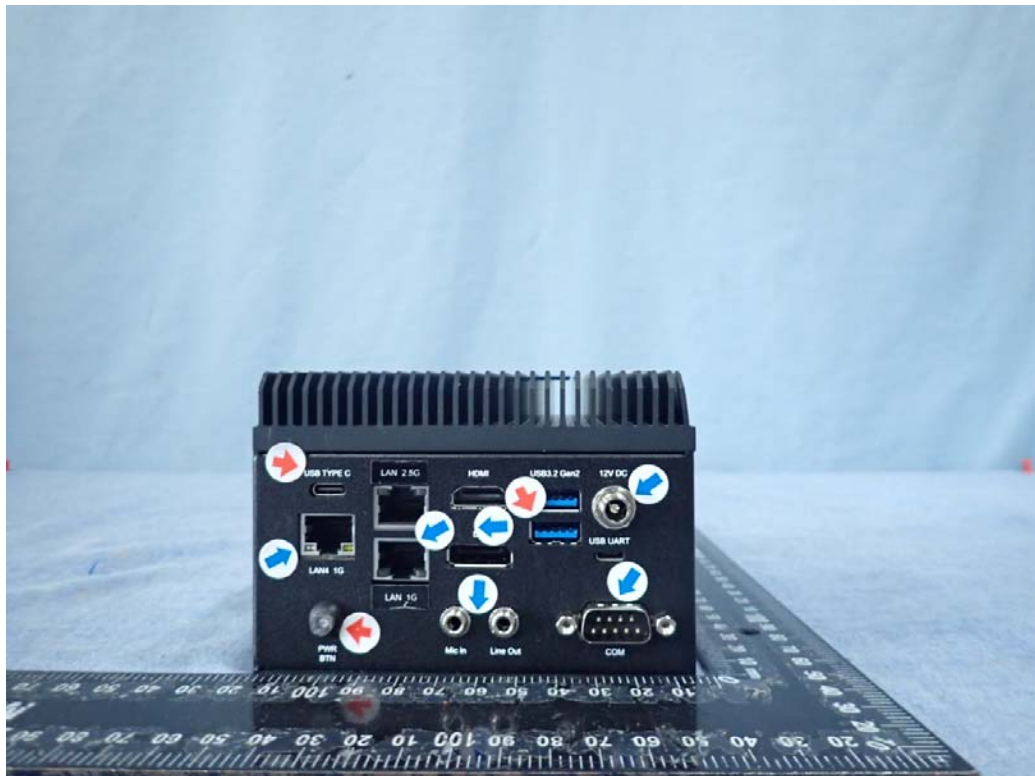
| Discharge To Vertical Coupling Plane | | | | | | | |
|--------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|---|---|
| Side of EUT | Test Levels | | | Results | | | |
| | ± 2 kV | ± 4 kV | ± 8 kV | Pass | Fail | Performance Criterion | Observation |
| Front | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Back | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Left | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |
| Right | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 |

NOTE: 1. There was no change compared with initial operation during the test.

The Photo for Discharge Points of EUT Front



Back



Red Dot —Air Discharged
Blue Dot —Contact Discharged

Left



Right

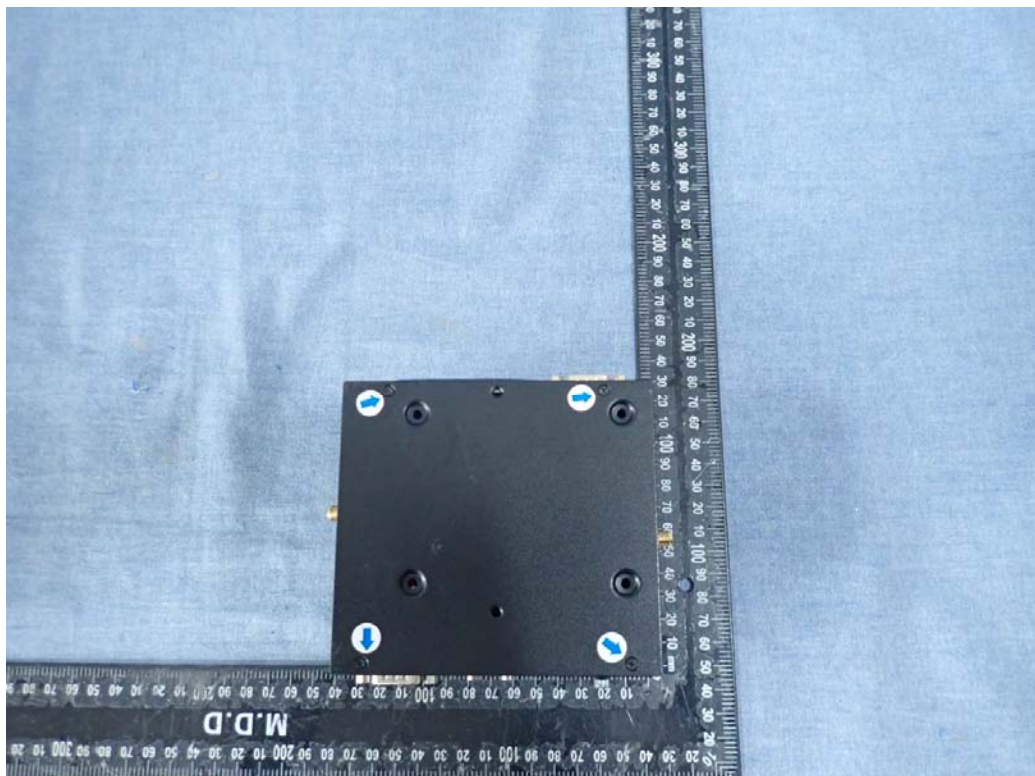


Red Dot —Air Discharged
Blue Dot —Contact Discharged

Top



Bottom



Red Dot —Air Discharged
Blue Dot —Contact Discharged

8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)**8.4.1. TEST SPECIFICATION**

| | |
|-----------------------------|------------------------------------|
| Basic Standard: | EN 61000-4-3 |
| Frequency Range: | 80 MHz ~ 6000 MHz |
| Field Strength: | 3 V/m |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of preceding frequency value |
| Polarity of Antenna: | Horizontal and Vertical |
| Test Distance: | 3 m |
| Antenna Height: | 1.5m |

8.4.2. TEST INSTRUMENT

| 844 RS Chamber | | | | |
|----------------------|----------------------|--------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Electric Field Probe | AR | FL7006 | 0356656 | 10/15/2022 |
| Field of Calibration | CCS | Chamber#RS | 80-1000MHz | 02/25/2022 |
| RF Power Meter | Boonton | 4242 | 17419 | 03/16/2022 |
| Power Sensor | Boonton | 51011A-EMC | 36833 | 03/16/2022 |
| Power Sensor | Boonton | 51011A-EMC | 36834 | 03/16/2022 |
| Thermo-Hygro Meter | Wisewind | N/A | SD-S019 | 10/04/2022 |
| Broadband Antenna | Schwarzbeck | VUSLP 9111E | D-69250 | N.C.R |
| Power Amplifier | Milmega | 80RF1000-600 | 1079361 | N.C.R |
| Signal Generator | Agilent | N5181A | MY47421336 | 09/13/2022 |
| Field of Calibration | CCS | Chamber#RS | 1000-6000M | 02/24/2022 |
| Direction Coupler | AR | DC7144A | 306217 | N.C.R |
| Microwave Antenna | Schwarzbeck | STLP 9149 | 767 | N.C.R |
| Power Amplifier | AR | 60S1G3 | 302728 | N.C.R |
| Power Amplifier | Milmega | AS1860-100 | 1075832 | N.C.R |
| Power Amplifier | Teseq | CBA6G-100D | 1087370 | N.C.R |
| Software | EmcwareVer. 2.6.0.16 | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

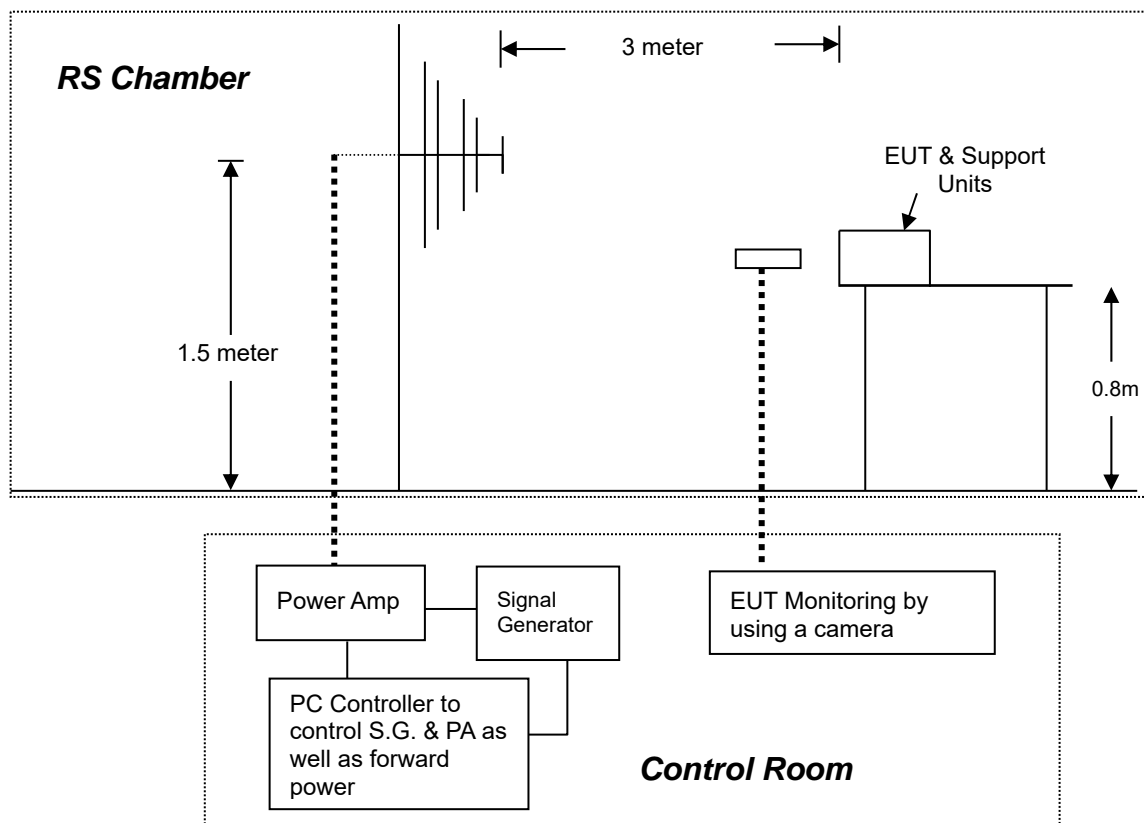
2. N.C.R.= No Calibration required.

8.4.3. TEST PROCEDURE

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

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 6000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

8.4.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

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NOTE:**TABLETOP EQUIPMENT**

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

8.4.5. TEST RESULTS**Normal Mode**

| | | | |
|--------------------|-------------|-------------------------------------|----------------------------|
| Temperature | 21.5°C | Humidity | 52% RH |
| Pressure | 1009mbar | Dwell Time | 3 sec. |
| Tested By | David Cheng | Required Passing Performance | Criterion CT&CR |

| Frequency (MHz) | Polarity | Azimuth | Field Strength (V/m) | Performance Criterion | Observation | Result |
|-----------------|----------|---------|----------------------|---|---|--------|
| 80 ~ 6000 | V&H | 0 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 80 ~ 6000 | V&H | 90 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 80 ~ 6000 | V&H | 180 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 80 ~ 6000 | V&H | 270 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with the initial operation during the test.

Standby Mode

| | | | |
|--------------------|-------------|-------------------------------------|----------------------------|
| Temperature | 21.5°C | Humidity | 52% RH |
| Pressure | 1009mbar | Dwell Time | 3 sec. |
| Tested By | David Cheng | Required Passing Performance | Criterion CT&CR |

| Frequency (MHz) | Polarity | Azimuth | Field Strength (V/m) | Performance Criterion | Observation | Result |
|-----------------|----------|---------|----------------------|---|---|--------|
| 80 ~ 6000 | V&H | 0 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 80 ~ 6000 | V&H | 90 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 80 ~ 6000 | V&H | 180 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 80 ~ 6000 | V&H | 270 | 3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with the initial operation during the test.

8.5. ELECTRICAL FAST TRANSIENT (EFT)

8.5.1. TEST SPECIFICATION

| | |
|----------------------------|--|
| Basic Standard: | EN 61000-4-4 |
| Test Voltage: | AC Power Port: 1kV Signal Port: 0.5kV |
| Polarity: | Positive & Negative |
| Impulse Frequency: | 5 kHz |
| Impulse Wave-shape: | 5/50 ns |
| Burst Duration: | 15 ms |
| Burst Period: | 300 ms |
| Test Duration: | Not less than 1 min. |

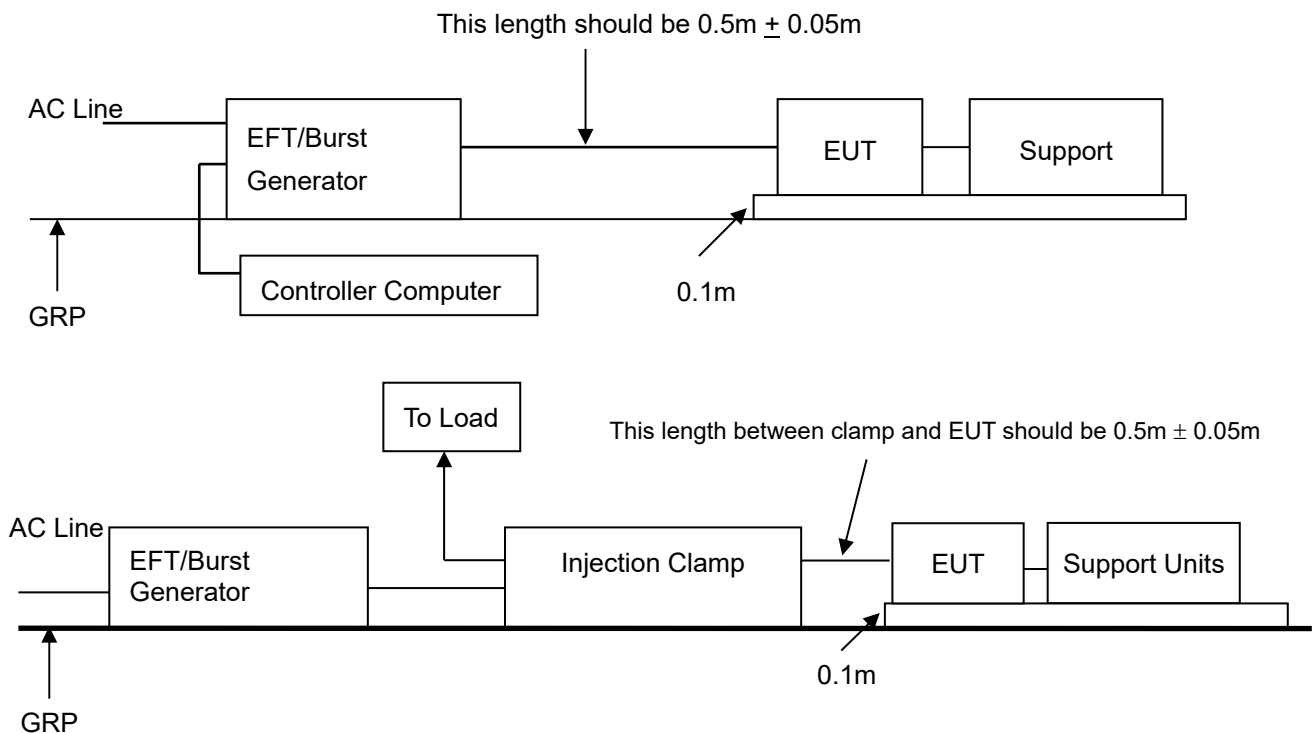
8.5.2. TEST INSTRUMENT

| Immunity Shield Room | | | | |
|----------------------|-----------------|---------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Capacitive Clamp | EMC-Partner | CN-EFT1000 | 589 | 06/06/2022 |
| EMC Immunity Tester | EMC Partner | TRANSINT 2000 | 1117 | 02/25/2022 |
| Software | GenecsVer. 3.27 | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R.= No Calibration required.

8.5.3. TEST PROCEDURE

- All types of cables, including their length, and the interface port of the EUT to which they were connected.
- Both positive and negative polarity discharges were applied.
- The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.

8.5.4. TEST SETUP

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:**TABLETOP EQUIPMENT**

The configuration consisted of a wooden table (0.1m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

8.5.5. TEST RESULTS

Normal Mode

| | | | |
|------------------------------|----------|-----------------|-------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | | Criterion TT&TR | |

| Test Point | Polarity | Test Level (kV) | Performance Criterion | Observation | Result |
|------------|----------|-----------------|---|---|--------|
| L | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| N | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - N | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| N - PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - N - PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| RJ45 | +/- | 0.5 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| RJ45(2.5G) | +/- | 0.5 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during the test.

Standby Mode

| | | | |
|------------------------------|----------|-----------------|-------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | | Criterion TT&TR | |

| Test Point | Polarity | Test Level (kV) | Performance Criterion | Observation | Result |
|------------|----------|-----------------|---|---|--------|
| L | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| N | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - N | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| N - PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - N - PE | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| RJ45 | +/- | 0.5 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| RJ45(2.5G) | +/- | 0.5 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during the test.

8.6. SURGE IMMUNITY TEST

8.6.1. TEST SPECIFICATION

Basic Standard: EN 61000-4-5

Wave-Shape: Combination Wave
1.2/50 μ s Open Circuit Voltage
8/20 μ s Short Circuit Current
10/700 μ s Open Circuit Voltage

Test Voltage: AC Power Port ~ line to line: 1kV, line to earth: 2kV
Signal Port ~ line to line: 0.5kV, line to earth: 1kV

Surge Input/Output: AC Power Line: L-N / L-PE / N-PE
Signal Line: L-L / L-G

Generator Source Impedance: 2 ohm between networks
12 ohm between network and ground
42 ohm between network and ground

Polarity: Positive/Negative

Phase Angle: 0° / 90° / 180° / 270°

Pulse Repetition Rate: 1 time / min. (maximum)

Number of Tests: 5 positive and 5 negative at selected points

8.6.2. TEST INSTRUMENT

| Immunity Shield Room | | | | |
|----------------------|-----------------|---------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| CDN | EMC-Partner | CDN-UTP8 | 1505 | 12/08/2022 |
| EMC Immunity Tester | EMC Partner | TRANSINT 2000 | 1117 | 02/25/2022 |
| Software | GenecsVer. 3.27 | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R.= No Calibration required.

8.6.3. TEST PROCEDURE

a) For EUT power supply:

The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

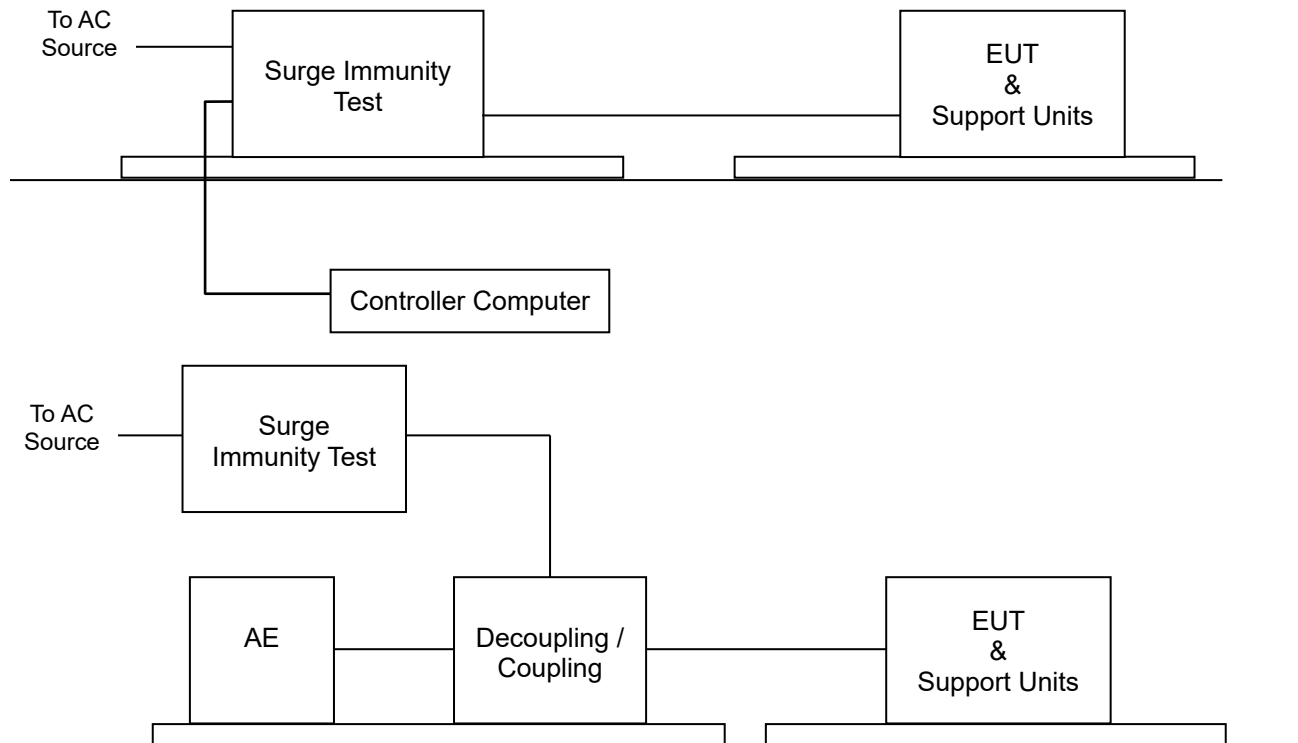
b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

c) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge was applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor were not specified. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

8.6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.6.5. TEST RESULTS

Normal Mode

| | | | |
|------------------------------|----------|-----------------|-------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | | Criterion TT&TR | |

| Test Point | Polarity | Test Level (kV) | Performance Criterion | Observation | Result |
|------------|----------|-----------------|---|---|--------|
| L - N | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - PE | +/- | 2 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| N - PE | +/- | 2 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| RJ45 | +/- | 0.5; 1 | <input type="checkbox"/> CT / <input type="checkbox"/> CR <input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 | PASS |
| RJ45(2.5G) | +/- | 0.5; 1 | <input type="checkbox"/> CT / <input type="checkbox"/> CR <input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during the test.

2. As ± 1 kV applied on RJ45 port, the transmitting was interrupted during test. It could become normal after test stop.

Standby Mode

| | | | |
|------------------------------|----------|-----------------|-------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | | Criterion TT&TR | |

| Test Point | Polarity | Test Level (kV) | Performance Criterion | Observation | Result |
|------------|----------|-----------------|---|---|--------|
| L - N | +/- | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| L - PE | +/- | 2 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| N - PE | +/- | 2 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| RJ45 | +/- | 0.5; 1 | <input type="checkbox"/> CT / <input type="checkbox"/> CR <input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 | PASS |
| RJ45(2.5G) | +/- | 0.5; 1 | <input type="checkbox"/> CT / <input type="checkbox"/> CR <input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during the test.

2. As ± 1 kV applied on RJ45 port, the transmitting was interrupted during test. It could become normal after test stop.

8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)**8.7.1. TEST SPECIFICATION**

| | |
|-------------------------|--|
| Basic Standard: | EN 61000-4-6 |
| Frequency Range: | 0.15 MHz ~ 80 MHz |
| Field Strength: | 3 Vrms |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of preceding frequency value |
| Coupled cable: | Power Mains, Unshielded; RJ45 Line, Unshielded |
| Coupling device: | CDN-M3 (3 wires); CDN-T8; EM-Clamp |

8.7.2. TEST INSTRUMENT

| CS Room | | | | |
|---------------------------|-----------------------|-------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Attenuator | EMCI | SA3NL | 10006F | N.C.R |
| CDN | Teseq | CDN M116 | 35362 | 12/13/2022 |
| CDN | Teseq | CDN ST08A | 36269 | 08/16/2022 |
| CDN | Teseq | CDN M016 | 35820 | 12/13/2022 |
| CDN | Teseq | CDN T400A | 25674 | 12/13/2022 |
| CDN | SCHAFFNER | CDN M325 | 17457 | 12/13/2022 |
| CDN | Teseq | CDN T8A-10 | 57182 | 05/25/2022 |
| Continuous Wave Simulator | EM Test | CWS 500N1.4 | P1446143188 | 12/11/2022 |
| EM Clamp | Schaffner | KEMZ 801 | 19227 | 12/13/2022 |
| CDN | TESEQ | CDN T800A | 34381 | N.C.R |
| Software | icd.controlVer. 5.3.5 | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R.= No Calibration required.

8.7.3. TEST PROCEDURE

The EUT shall be tested within its intended operating and climatic conditions.

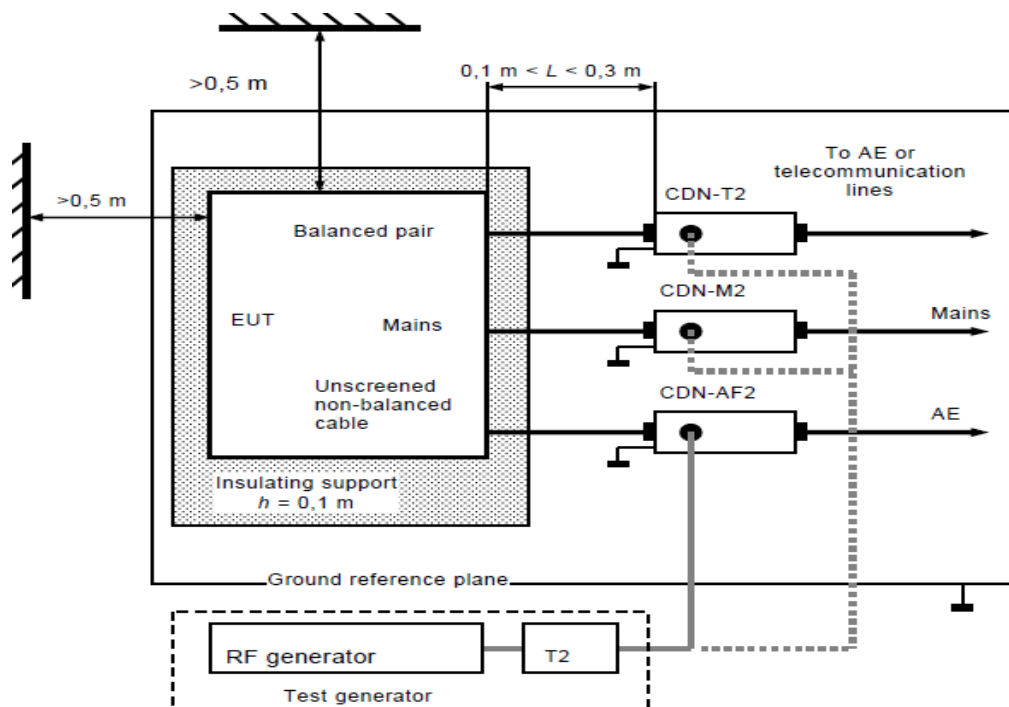
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5×10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts was made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

8.7.4. TEST SETUP



Note: 1. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.
2. The EUT clearance from any metallic obstacles shall be at least 0.5m

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:**TABLE-TOP AND FLOOR-STANDING EQUIPMENT**

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

8.7.5. TEST RESULTS**Normal Mode**

| | | | |
|--------------------|-------------|-------------------------------------|----------------------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Dwell Time | 3 sec. |
| Tested By | David Cheng | Required Passing Performance | Criterion CT&CR |

| Frequency Band (MHz) | Field Strength (Vrms) | Cable | Injection Method | Performance Criterion | Observation | Result |
|----------------------|-----------------------|------------------------|------------------|---|---|--------|
| 0.15 ~ 80 | 3 | AC Power Line (0.3m) | CDN-M3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0.15 ~ 80 | 3 | RJ45 Line (0.3m) | CDN-T8 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0.15 ~ 80 | 3 | RJ45(2.5G) Line (0.3m) | EM-Clamp | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during the test.

Standby Mode

| | | | |
|--------------------|-------------|-------------------------------------|----------------------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Dwell Time | 3 sec. |
| Tested By | David Cheng | Required Passing Performance | Criterion CT&CR |

| Frequency Band (MHz) | Field Strength (Vrms) | Cable | Injection Method | Performance Criterion | Observation | Result |
|----------------------|-----------------------|------------------------|------------------|---|---|--------|
| 0.15 ~ 80 | 3 | AC Power Line (0.3m) | CDN-M3 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0.15 ~ 80 | 3 | RJ45 Line (0.3m) | CDN-T8 | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0.15 ~ 80 | 3 | RJ45(2.5G) Line (0.3m) | EM-Clamp | <input checked="" type="checkbox"/> CT <input checked="" type="checkbox"/> CR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during the test.

8.8. VOLTAGE DIPS & VOLTAGE INTERRUPTIONS

8.8.1. TEST SPECIFICATION

Basic Standard: EN 61000-4-11

Test duration time: Minimum three test events in sequence

Interval between event: Minimum 10 seconds

Angle: 0~360 degree

Step: 45 degree

8.8.2. TEST INSTRUMENT

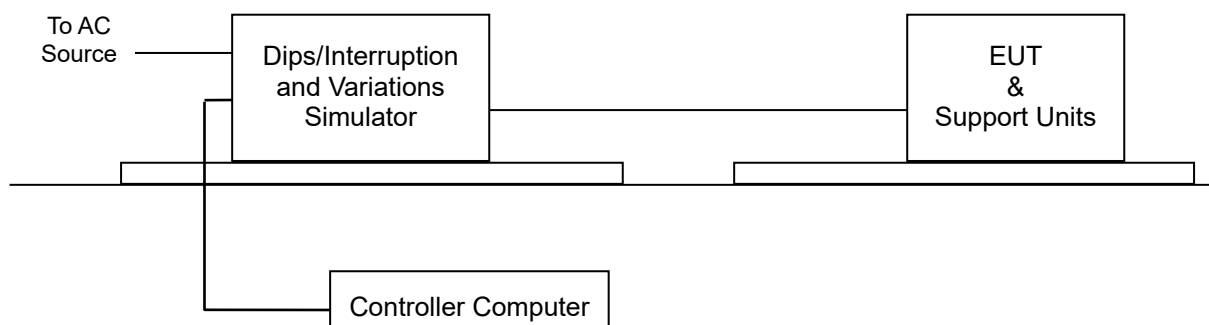
| Immunity shielded room | | | | |
|------------------------|-----------------|---------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| AC/DC Clamp Meter | Lutron | CM-9930R | I.200121 | 05/01/2022 |
| EMC Immunity Tester | EMC Partner | TRANSINT 2000 | 1117 | 02/25/2022 |
| Software | GenecsVer. 3.27 | | | |

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R.= No Calibration required.

8.8.3. TEST PROCEDURE

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

8.8.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.8.5. TEST RESULTS

Normal Mode

| | | | |
|------------------------------|--|-----------|-------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | TT or TR: 0% residual 0.5 cycle 0% residual 1 cycle 70% residual 25 cycles TT or TR: 0% residual 250 cycles | | |

| Test Power: 230Vac, 50Hz | | | | |
|--------------------------|------------------|---|---|-------------|
| Voltage (% Residual) | Duration (Cycle) | Performance Criterion | Observation | Test Result |
| 0 | 0.5 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0 | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 70 | 25 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0 | 250 | <input type="checkbox"/> CT / <input type="checkbox"/> CR <input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during and after the test. No unintentional response was found during the test.
2. EUT shut down, it could not become normal except reinstalled by operator.

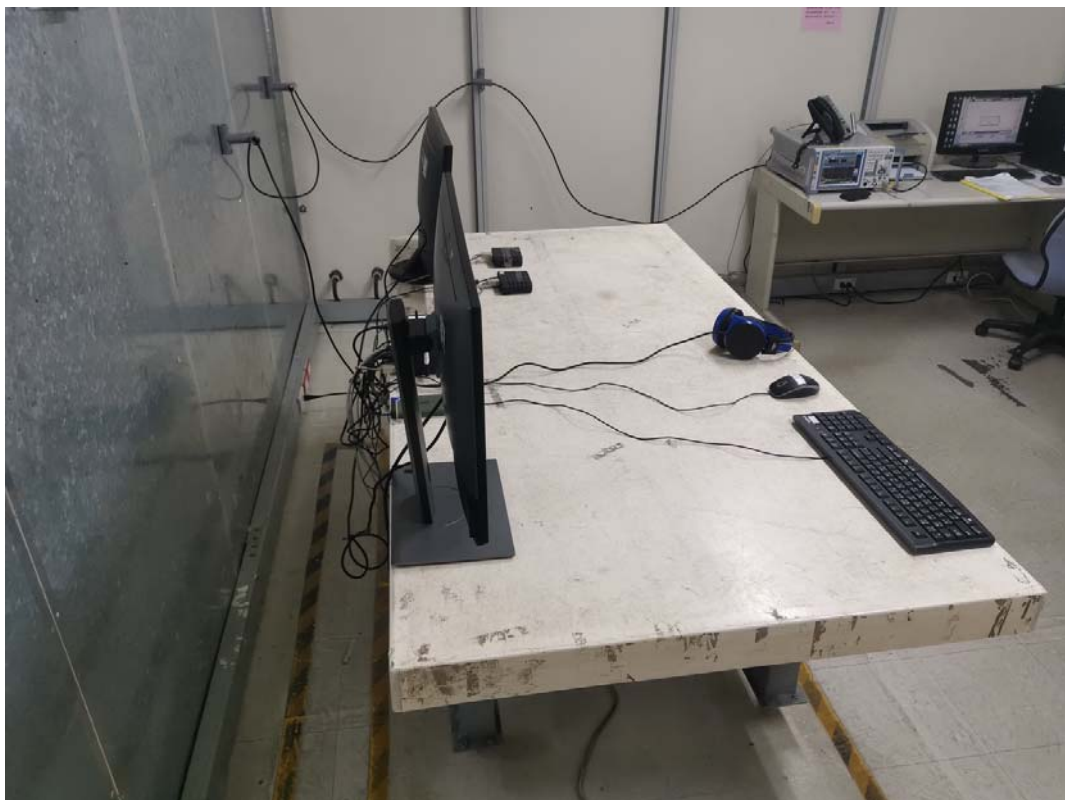
Standby Mode

| | | | |
|------------------------------|--|-----------|-------------|
| Temperature | 22.5°C | Humidity | 51% RH |
| Pressure | 1009mbar | Tested By | David Cheng |
| Required Passing Performance | TT or TR: 0% residual 0.5 cycle 0% residual 1 cycle 70% residual 25 cycles TT or TR: 0% residual 250 cycles | | |

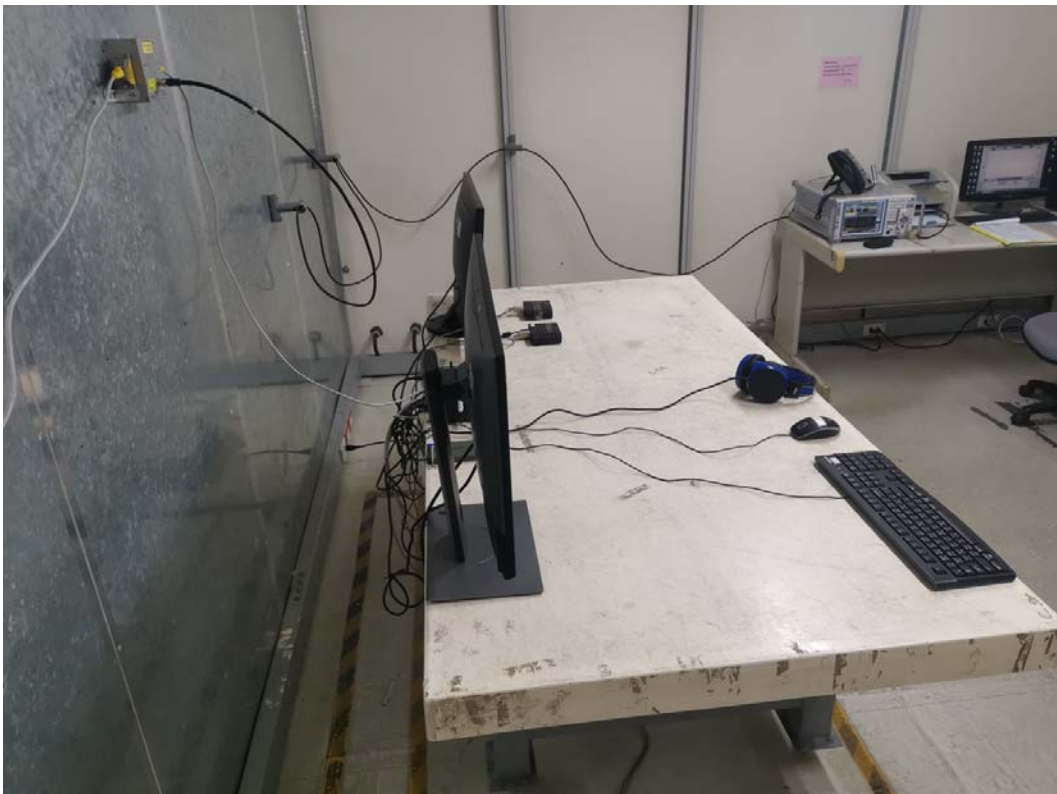
| Test Power: 230Vac, 50Hz | | | | |
|--------------------------|------------------|---|---|-------------|
| Voltage (% Residual) | Duration (Cycle) | Performance Criterion | Observation | Test Result |
| 0 | 0.5 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0 | 1 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 70 | 25 | <input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR <input type="checkbox"/> TT / <input type="checkbox"/> TR | Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 | PASS |
| 0 | 250 | <input type="checkbox"/> CT / <input type="checkbox"/> CR <input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR | Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 | PASS |

NOTE: 1. There was no change compared with initial operation during and after the test. No unintentional response was found during the test.
2. EUT shut down, it could not become normal except reinstalled by operator.

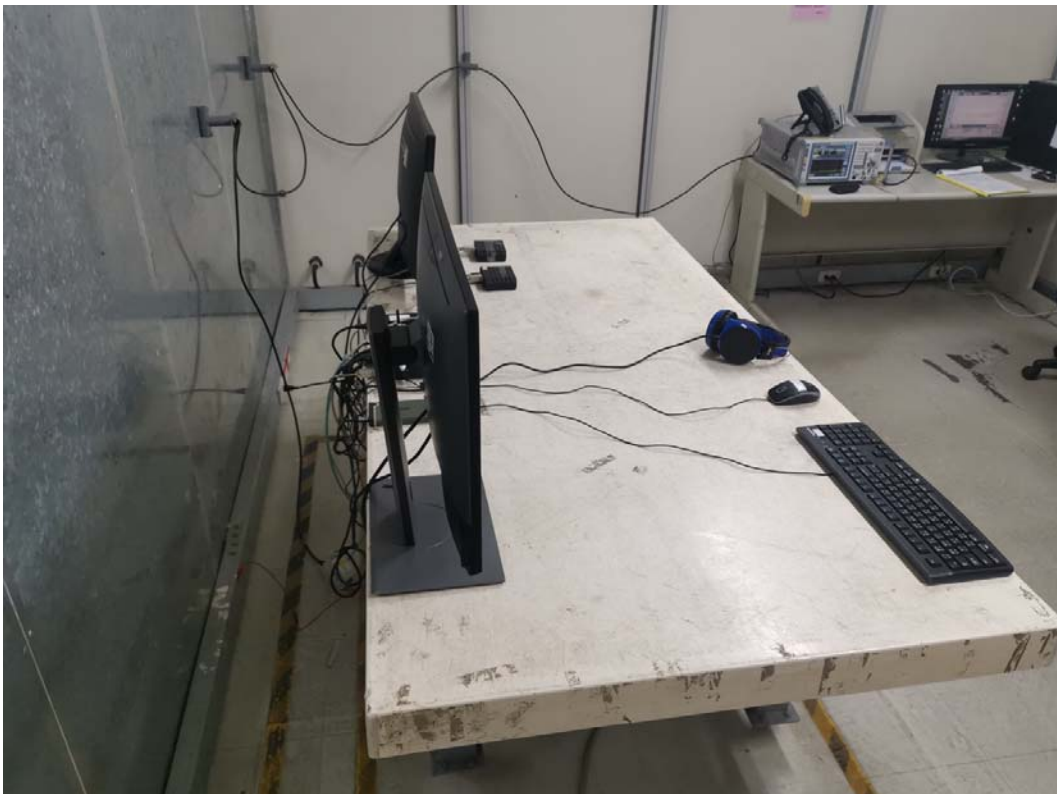
9 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



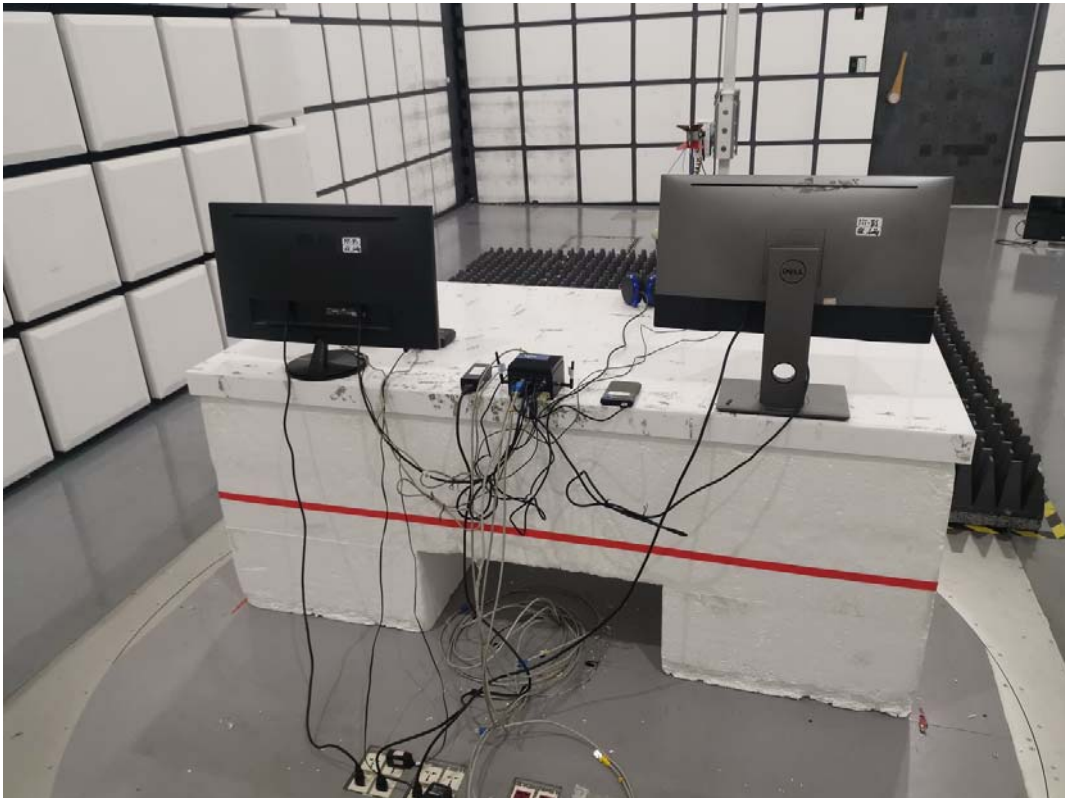
CONDUCTED EMISSION TEST FOR WIRED NETWORK PORTS with ISN (10Mbps & 100Mbps & 1Gbps)



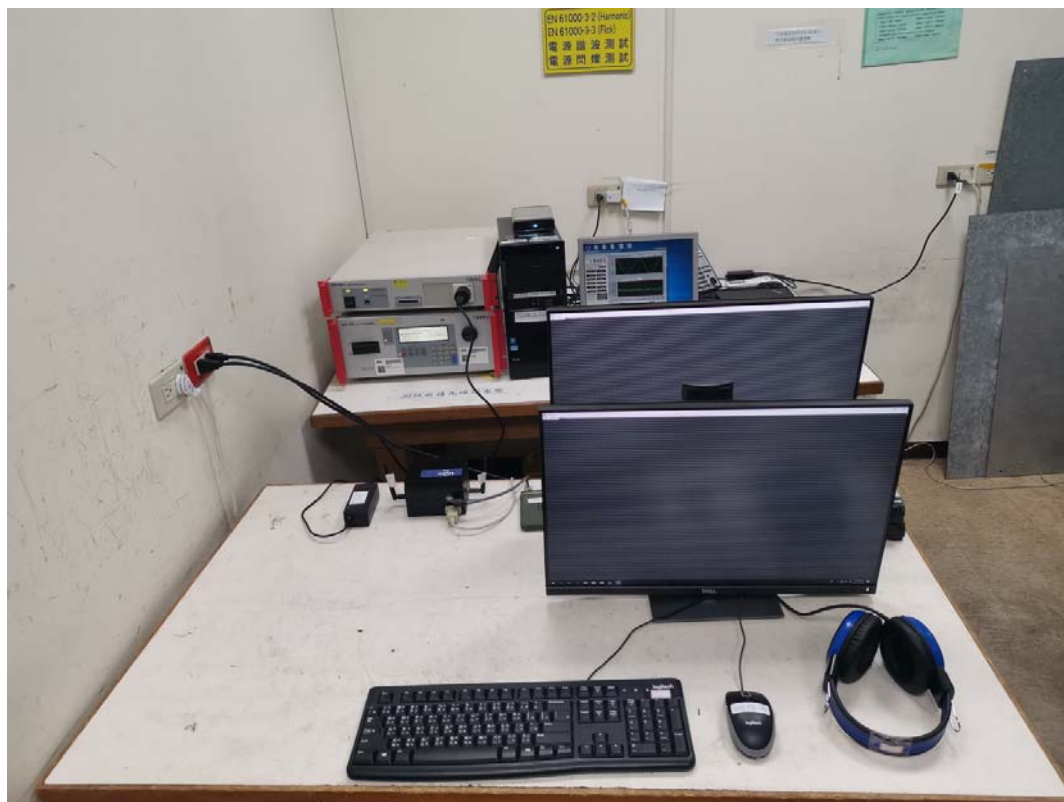
CONDUCTED EMISSION TEST FOR WIRED NETWORK PORTS with ISN (2.5Gbps)



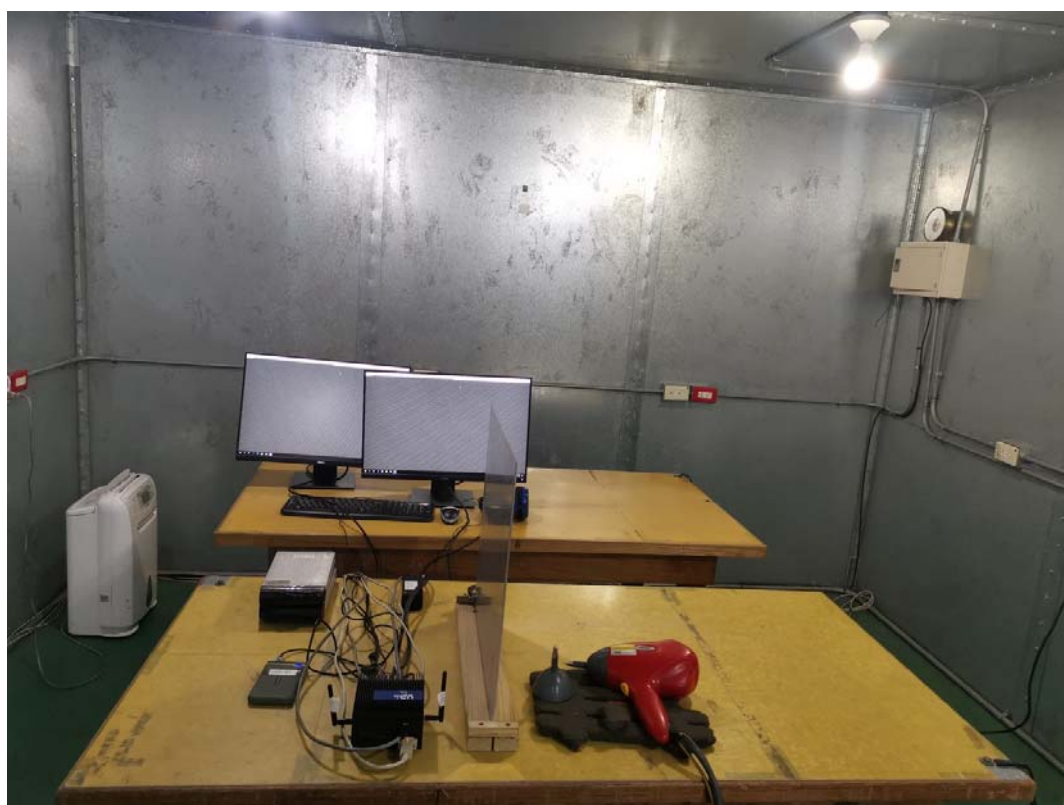
RADIATED EMISSION TEST (Below 1GHz)

RADIATED EMISSION TEST (Above 1GHz)

Harmonic & Flicker Test



ESD Test



RS Test



EFT Test



EFT For RJ45 Test**EFT For RJ45(2.5G) Test**

Surge Test



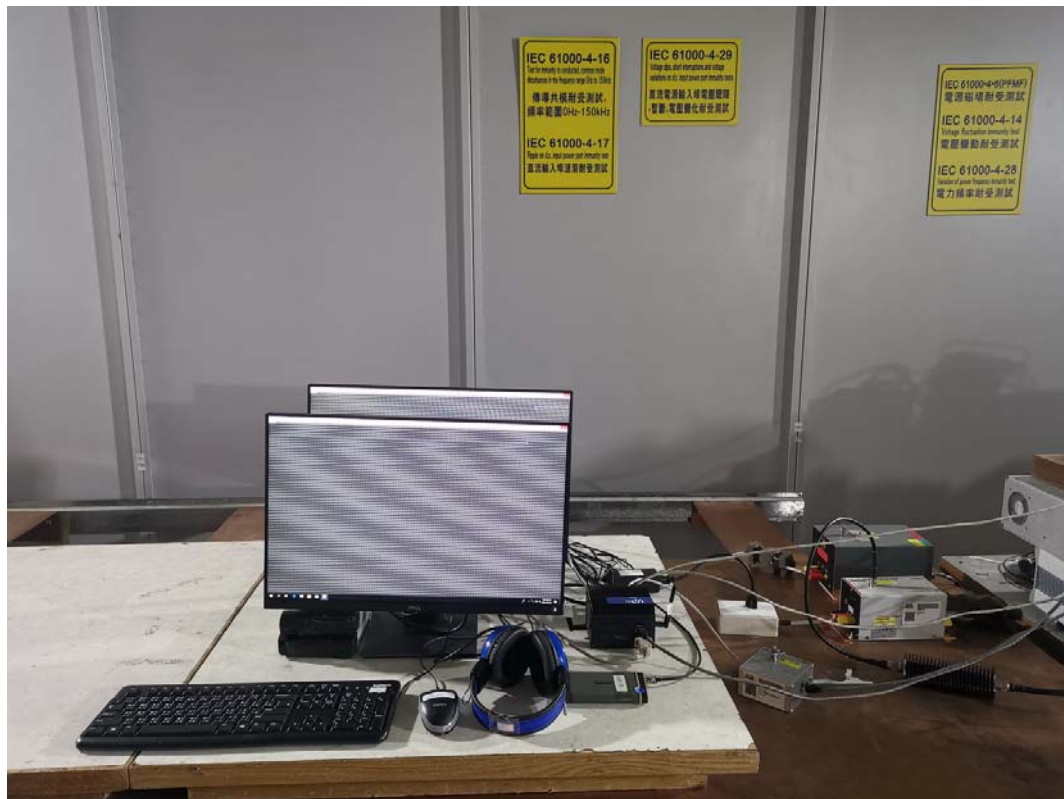
Surge For RJ45 Test



Surge For RJ45(2.5G) Test



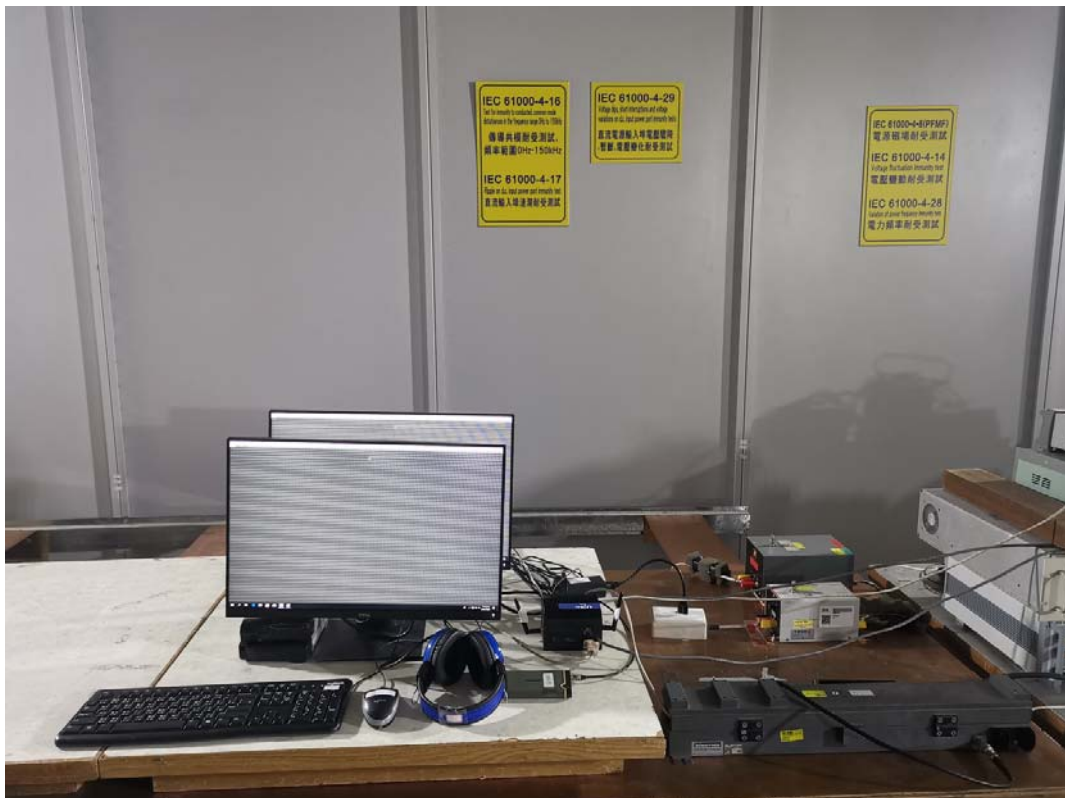
CS Test



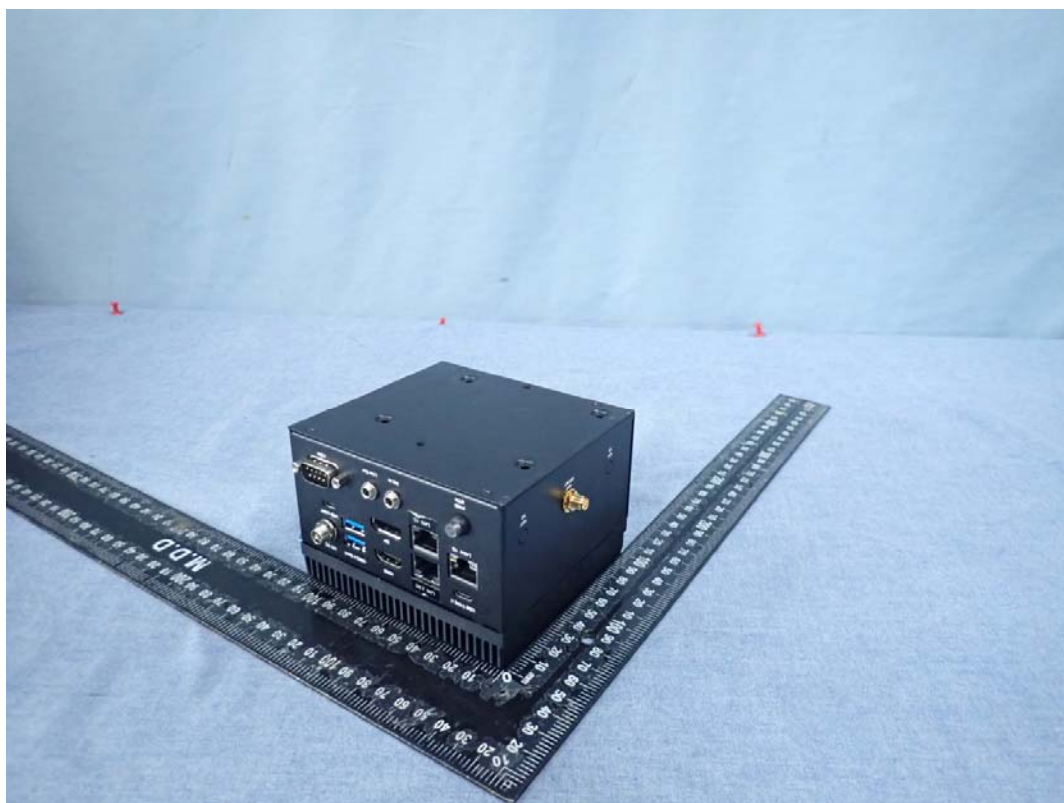
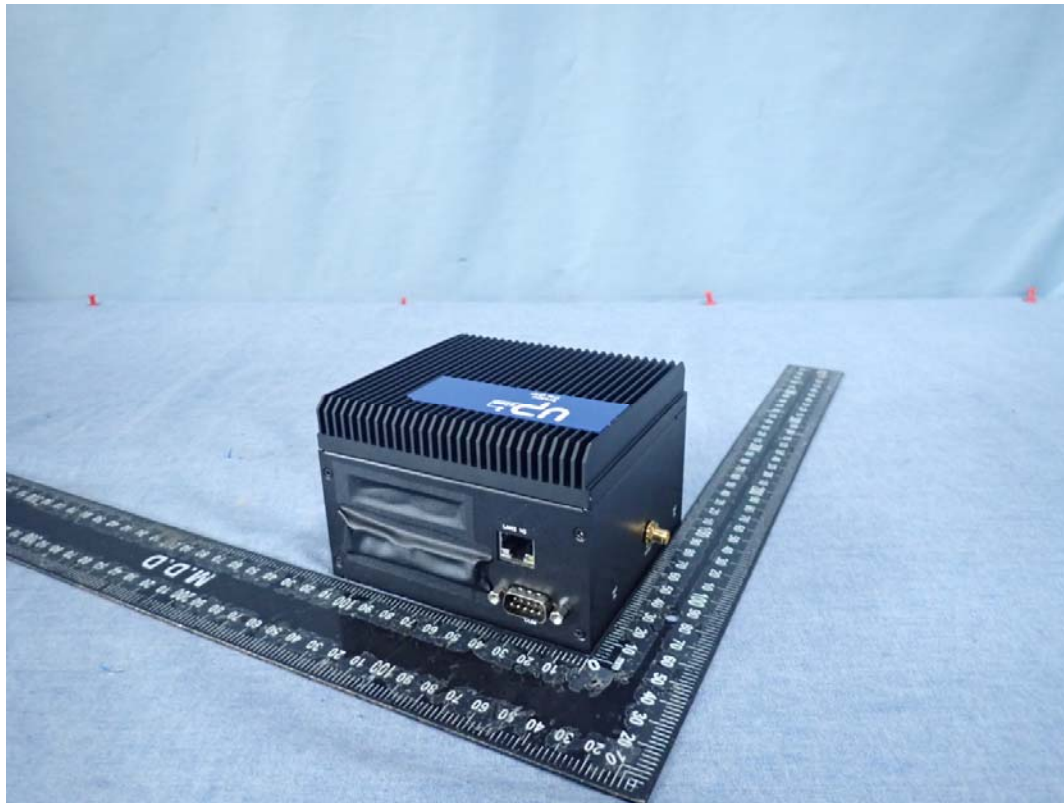
CS For RJ45 Test

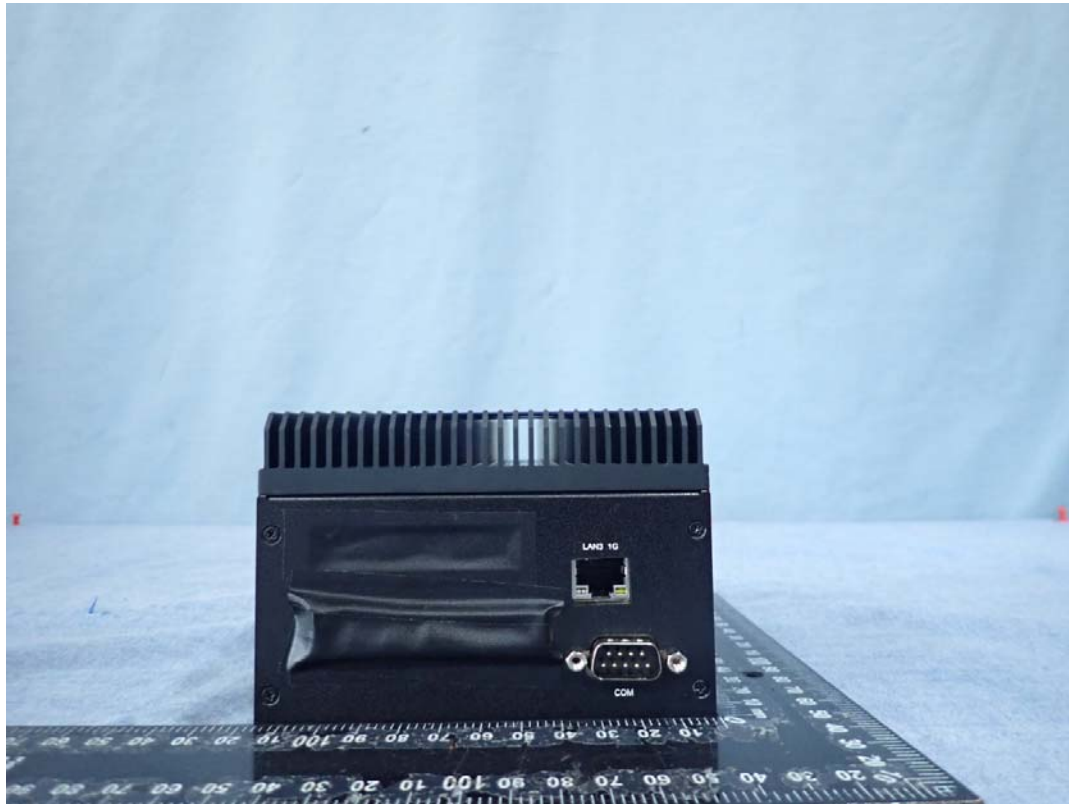


CS For RJ45(2.5G) Test

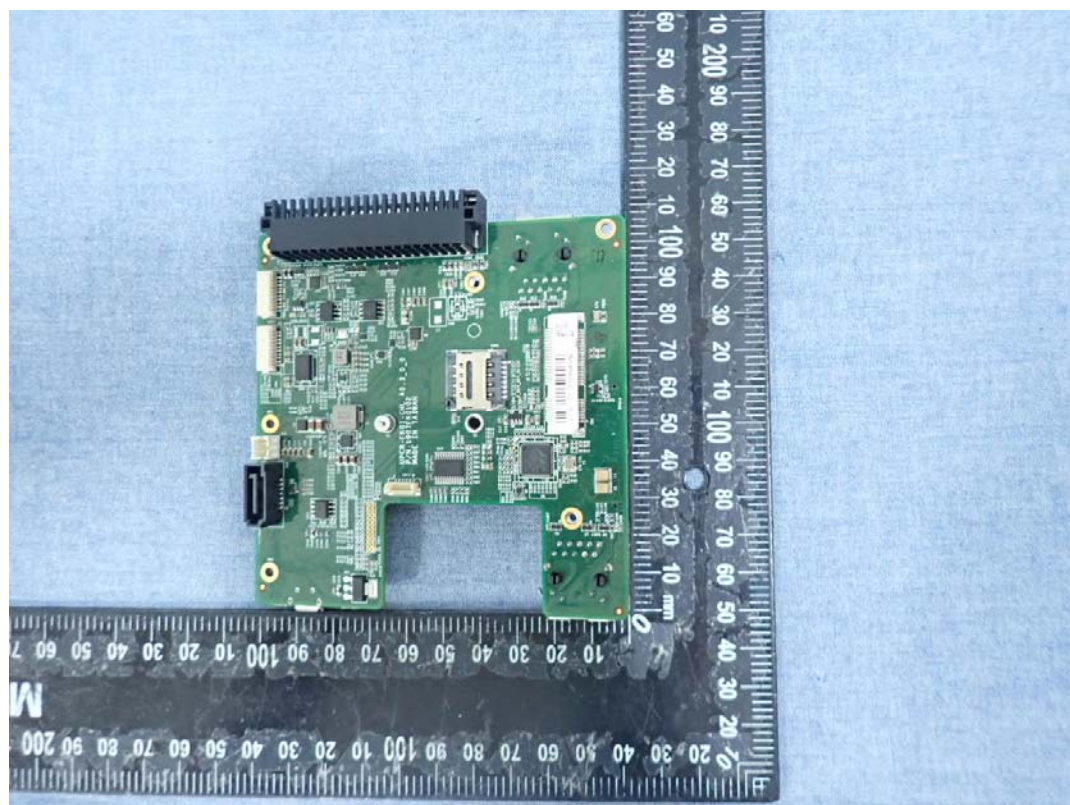
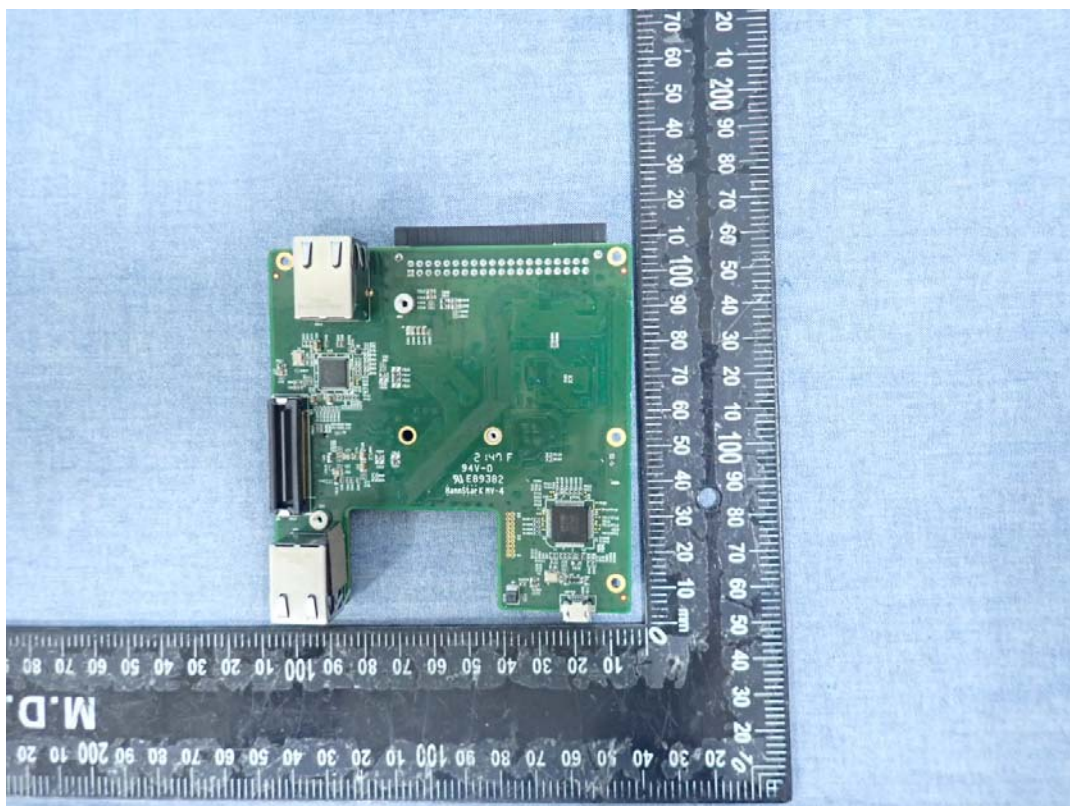


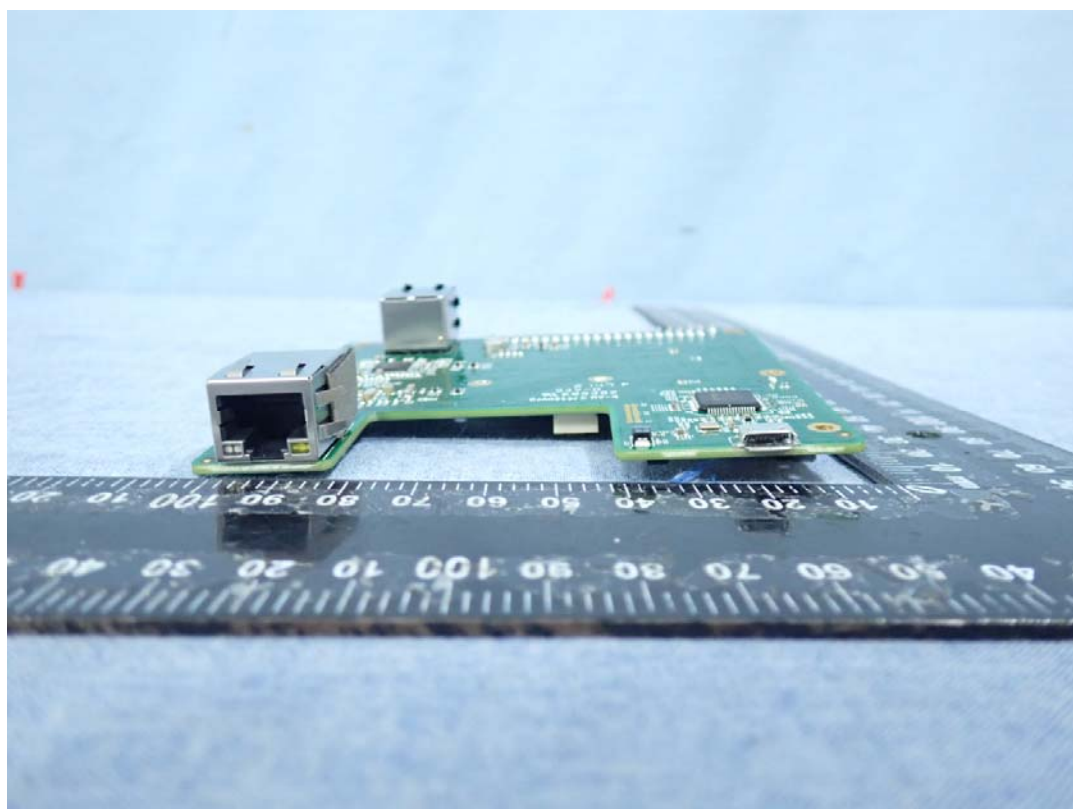
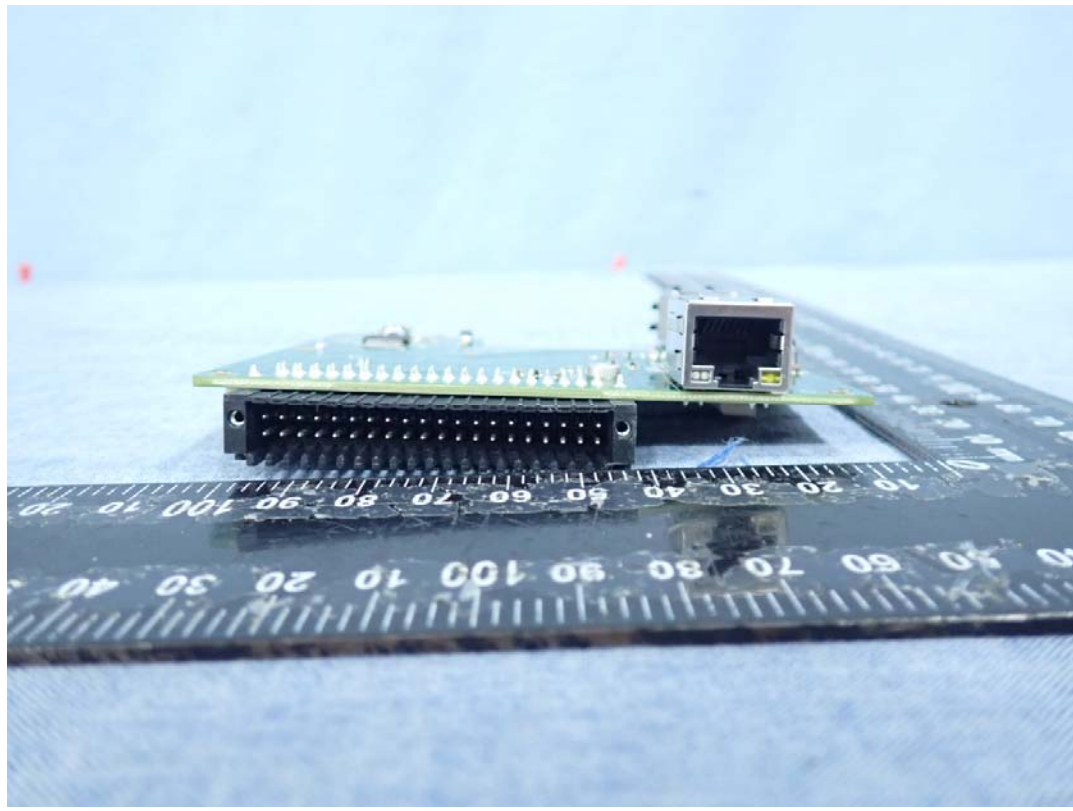
Voltage Dips / Interruptions Test

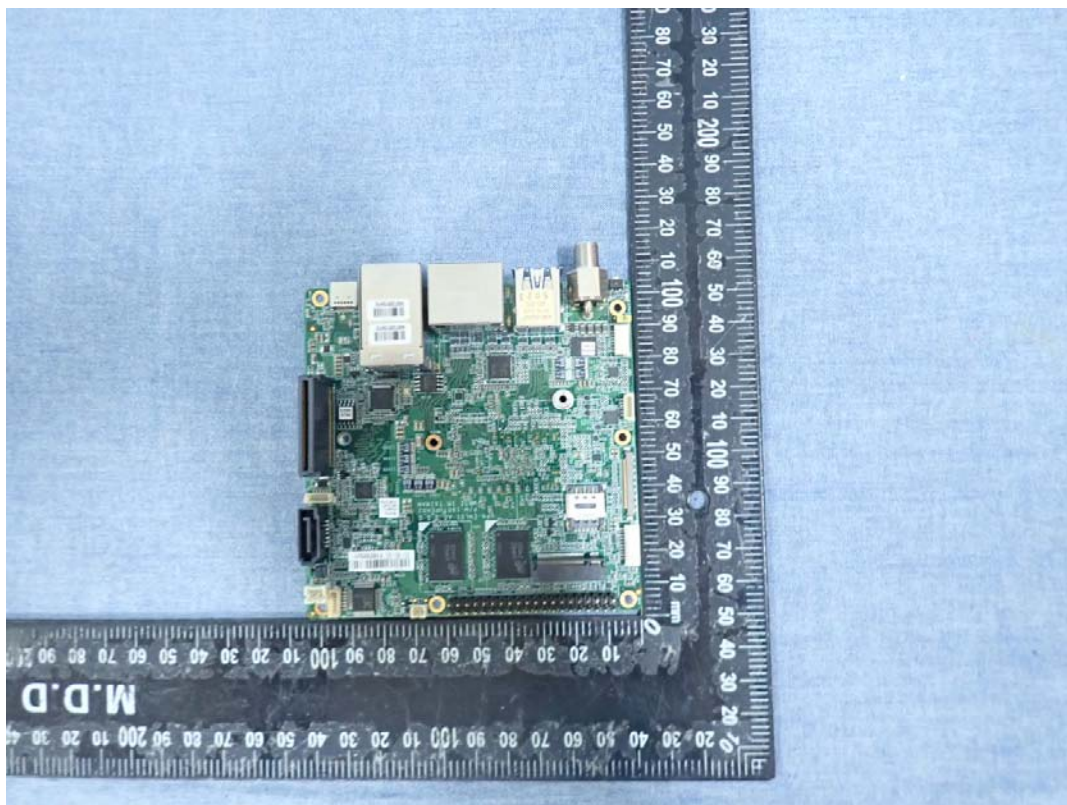
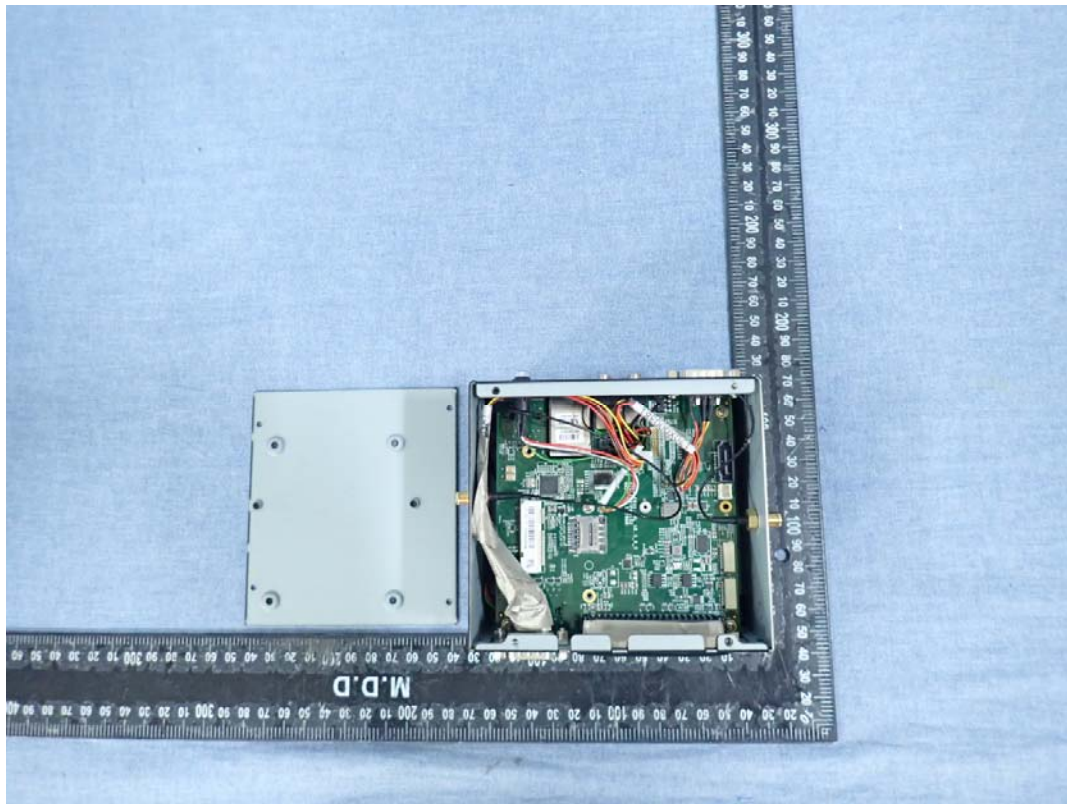
APPENDIX 1 - PHOTOGRAPHS OF EUT**Model: UPN-EDGE-EHL01**

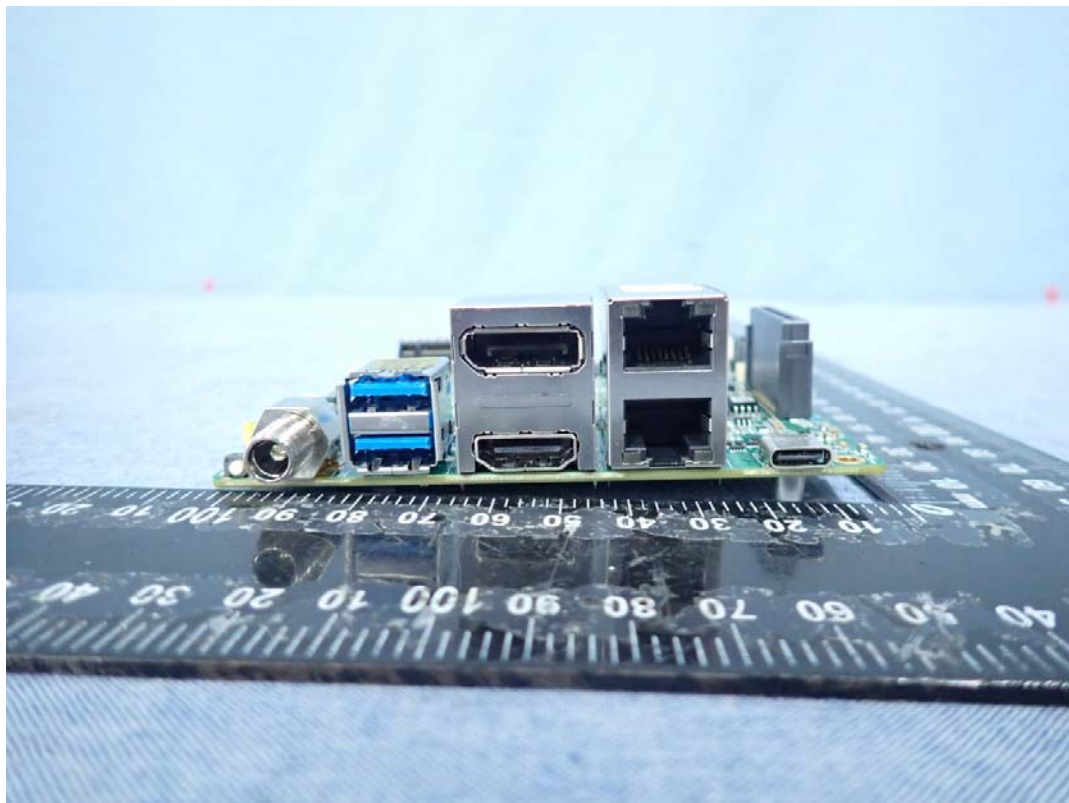
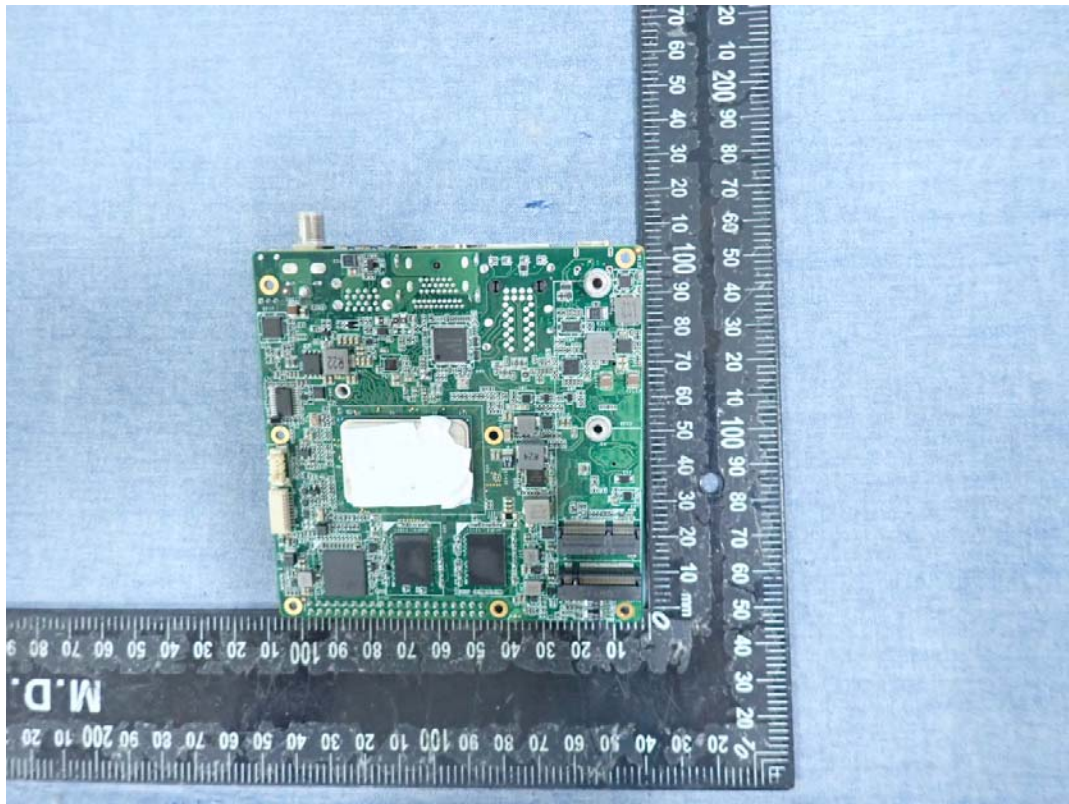










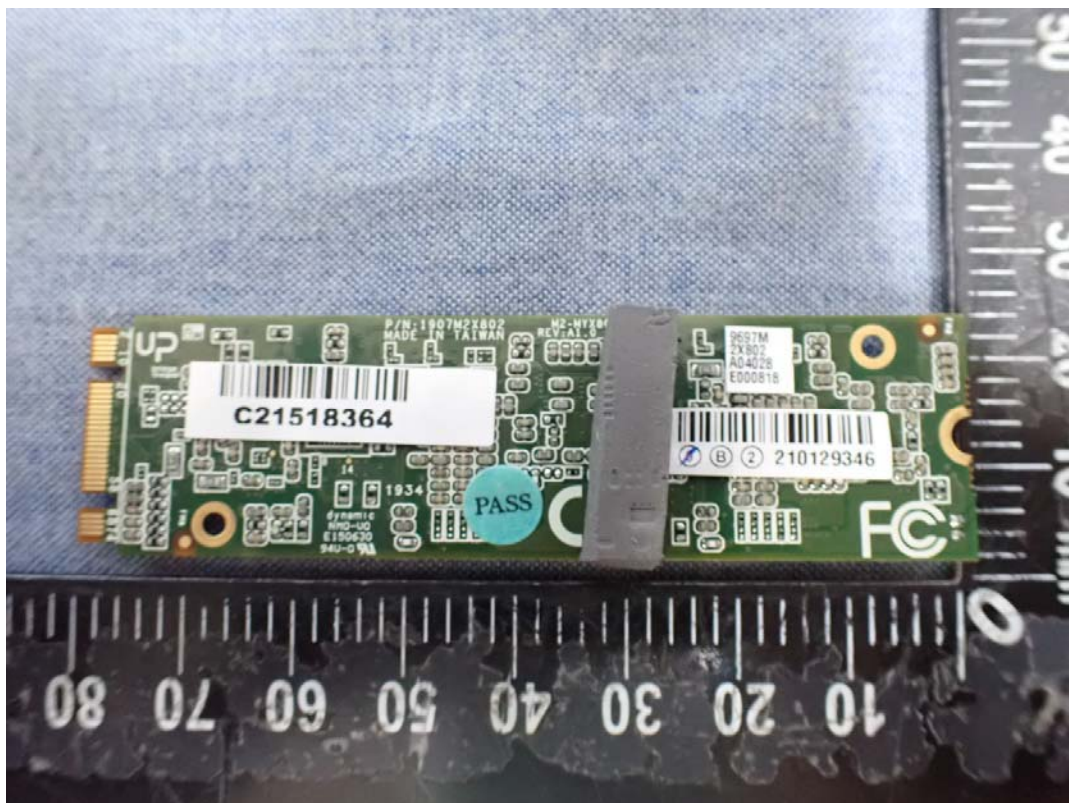
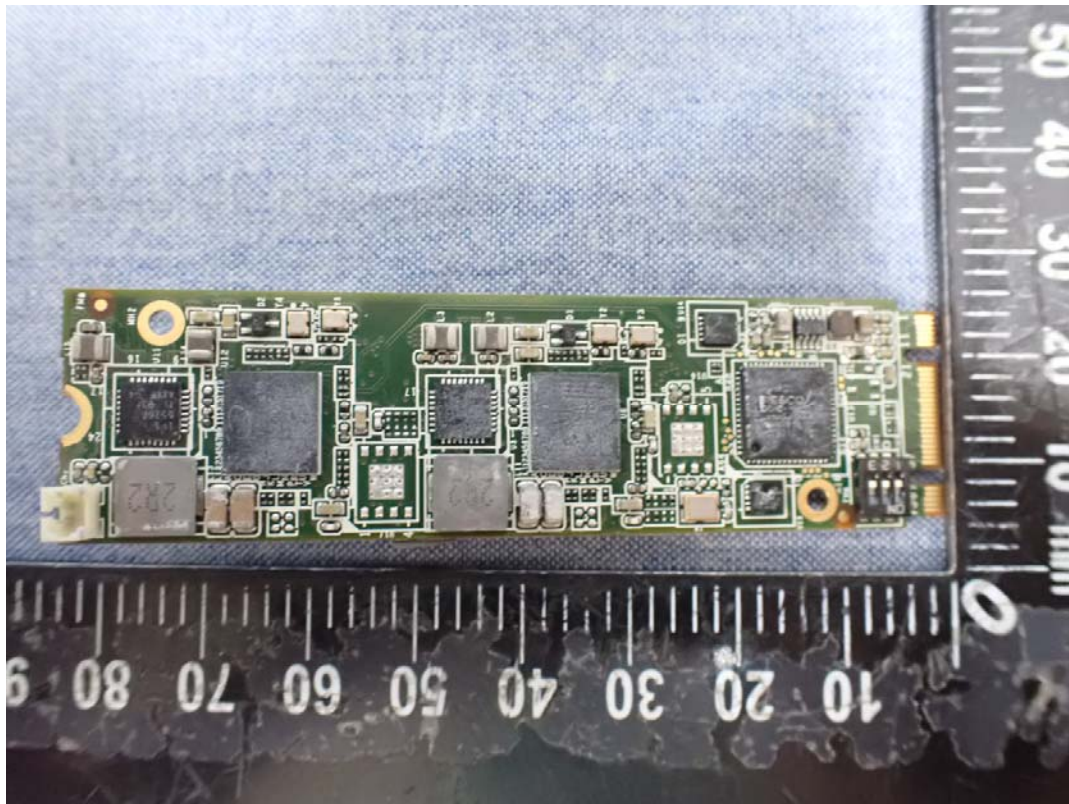


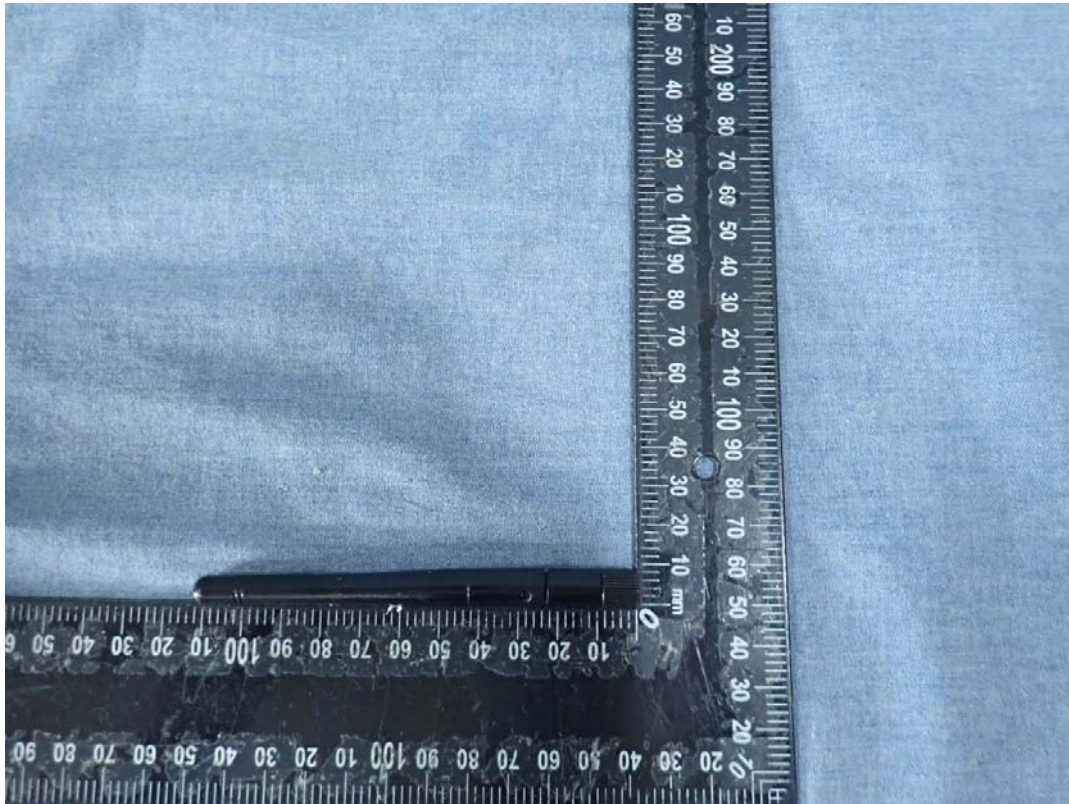


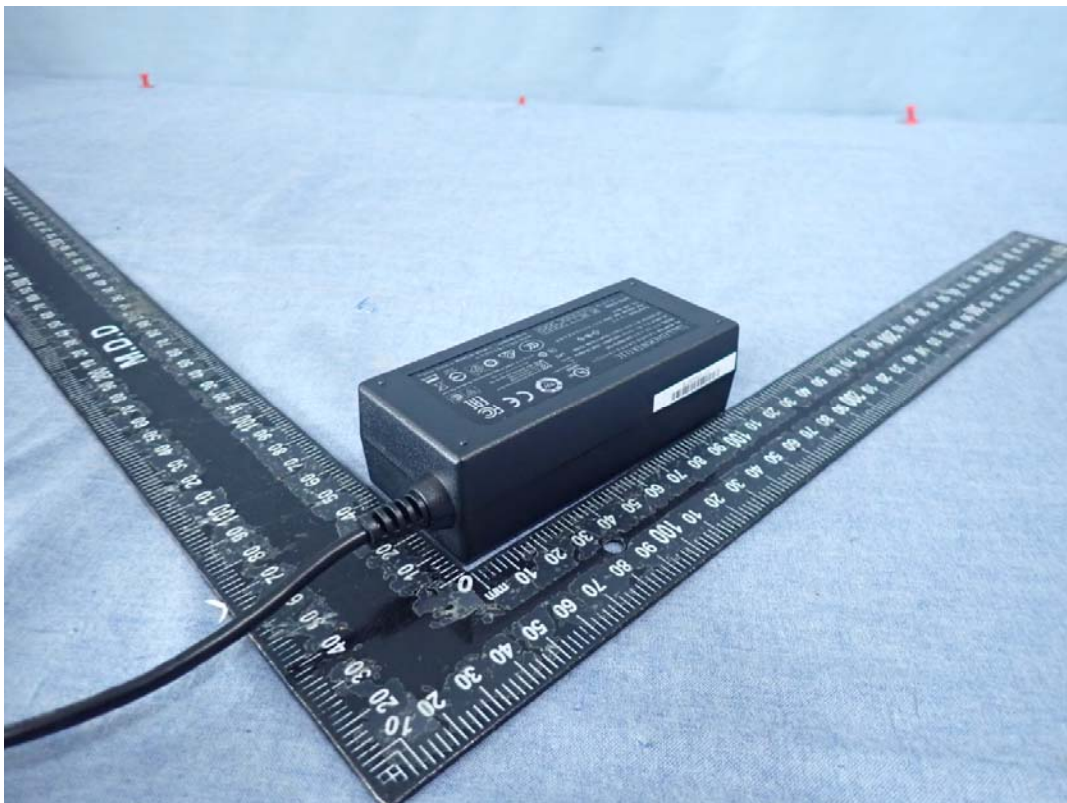
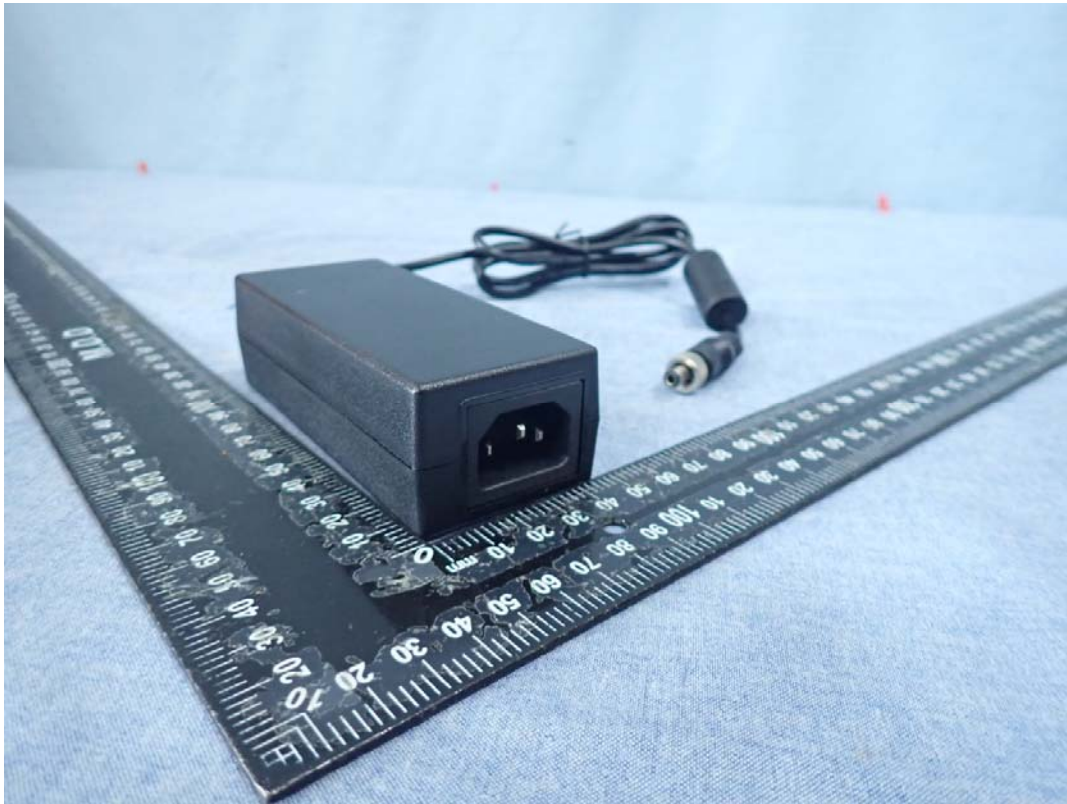
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Model: PER-TAIX2-A20-2280







Report No.: TMXD2112001942DE

