



# TEST REPORT

Applicant: Nebra Ltd

Address: Unit 4 Bells Yew Green Business Court, Bells Yew Green, East Sussex, United Kingdom

Manufacturer: Shenzhen Eastech Company Limited.

Address: 2nd floor, 3rd building, Baishixia Development Area, Fuyong Street, Bao'an District, Shenzhen City, Guangdong Province, China.

EUT: 150Mbps 2 in 1 Bluetooth wifi adapter

Trade Mark: N/A

Model Number: FX-8723B

Date of Receipt: Jun. 17, 2021

Test Date: Jun. 17, 2021 - Jun. 24, 2021

Date of Report: Jun. 24, 2021

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

Applicable Standards: ETSI EN 301 489-1 V2.2.3 (2019-11),  
ETSI EN 301 489-17 V3.2.4 (2020-09)  
BS EN 55032:2015+A11:2020, BS EN 55035:2017/A11:2020

Test Result: Pass

Report Number: DL-20210624011-2E

Prepared (Engineer): Randy Xie

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



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

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## 1. VERSION

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | Jun. 24, 2021 | Original    |
|             |               |             |
|             |               |             |

## 2. TEST SUMMARY

| EMC Emission                            |                                   |                               |                         |        |
|---|-----------------------------------|-------------------------------|-------------------------|--------|
| Standard                                | Test Item                         | Limit                         | Result                  | Remark |
| ETSI EN 301 489-1,<br>BS EN 55032       | Conducted Emission at power ports | Class B                       | N/A                     |        |
|   | Conducted Emission at LAN port    | Class B                       | N/A                     |        |
|   | Radiated Emission below 1GHz      | Class B                       | PASS                    |        |
|   | Radiated Emission above 1GHz      | Class B                       | PASS                    |        |
| BS EN IEC 61000-3-2                     | Harmonic Current Emission         | Class A or D                  | N/A <sup>NOTE (2)</sup> |        |
| BS EN 61000-3-3                         | Voltage Fluctuations & Flicker    | -----                         | N/A                     |        |
| EMC Immunity                            |                                   |                               |                         |        |
| Section ETSI EN 301 489-17, BS EN 55035 | Test Item                         | Performance Criteria          | Result                  | Remark |
| BS EN 61000-4-2                         | Electrostatic Discharge           | B                             | PASS                    |        |
| BS EN IEC 61000-4-3                     | RF electromagnetic field          | A                             | PASS                    |        |
| BS EN 61000-4-4                         | Fast transients                   | B                             | N/A                     |        |
| BS EN 61000-4-5                         | Surges                            | B                             | N/A                     |        |
| BS EN 61000-4-6                         | Injected Current                  | A                             | N/A                     |        |
| BS EN 61000-4-11                        | Volt. Interruptions Volt. Dips    | B / C / C <sup>NOTE (3)</sup> | N/A                     |        |

## NOTE:

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

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

(3) Voltage dip: 100% reduction – Performance Criteria B

Voltage dip: 100% reduction – Performance Criteria B

Voltage dip: 70% reduction – Performance Criteria C

Voltage Interruption: 100% Interruption – Performance Criteria C

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

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China



### 3. GENERAL INFORMATION

#### 3.1 Description of Device (EUT)

EUT: 150Mbps 2 in 1 Bluetooth wifi adapter

Trade Mark: N/A

Model Number: FX-8723B

Test Model: FX-8723B

Model difference: N/A

Power Supply: DC 5V from USB

Work Frequency: 2.4GHz

#### 3.2 Tested System Details

None.

#### 3.3 Block Diagram of Test Set-up



#### 3.4 Test Mode Description

Mode1: On Mode

#### 3.5 Test Auxiliary Equipment

Notebook (Provide by test lab):

Manufacturer: LENOVO

Model: 310S-14AST

I/P: AC 100-240V 50/60Hz

#### 3.6 Test Uncertainty

Conducted Emission Uncertainty :  $\pm 2.56\text{dB}$

Radiated Emission Uncertainty :  $\pm 3.24\text{dB}$



**4. TEST INSTRUMENT USED****For Conducted Emission Test (843 Shielded Room)**

| Equipment         | Manufacturer | Model     | Serial | Last Cal.     | Next Cal.     |
|-------------------|--------------|-----------|--------|---------------|---------------|
| 843 Shielded Room | ChengYu      | 843 Room  | 843    | Nov. 25, 2019 | Nov. 24, 2022 |
| EMI Receiver      | R&S          | ESR       | 101421 | Dec. 07, 2020 | Dec. 06, 2021 |
| LISN              | R&S          | ENV216    | 102417 | Dec. 07, 2020 | Dec. 06, 2021 |
| Clamp             | COM-POWER    | CLA-050   | 431071 | Dec. 05, 2020 | Dec. 04, 2021 |
| 3-Loop Antenna    | DAZE         | ZN30401   | 13021  | Dec. 07, 2020 | Dec. 06, 2021 |
| ISN T8            | Schwarzbeck  | NTFM 8158 | 101135 | Dec. 07, 2020 | Dec. 06, 2021 |
| ISN T5            | Schwarzbeck  | NTFM 8158 | 101136 | Dec. 07, 2020 | Dec. 06, 2021 |
| 843 Cable 1#      | ChengYu      | CE Cable  | 001    | Dec. 07, 2020 | Dec. 06, 2021 |
| 843 Cable 1#      | ChengYu      | CE Cable  | 002    | Dec. 07, 2020 | Dec. 06, 2021 |

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

| Equipment                | Manufacturer | Model     | Serial     | Last Cal.     | Next Cal.     |
|--------------------------|--------------|-----------|------------|---------------|---------------|
| 966 Chamber              | ChengYu      | 966 Room  | 966        | Nov. 25, 2019 | Nov. 24, 2022 |
| Spectrum Analyzer        | Agilent      | E4408B    | MY50140780 | Dec. 07, 2020 | Dec. 06, 2021 |
| EMI Receiver             | R&S          | ESRP7     | 101393     | Dec. 07, 2020 | Dec. 06, 2021 |
| Amplifier                | Schwarzbeck  | BBV9743B  | 00153      | Dec. 07, 2020 | Dec. 06, 2021 |
| Amplifier                | EMEC         | EM01G8GA  | 00270      | Dec. 07, 2020 | Dec. 06, 2021 |
| Broadband Trilog Antenna | Schwarzbeck  | VULB9162  | 00306      | Nov. 28, 2020 | Nov. 27, 2021 |
| Horn Antenna             | Schwarzbeck  | BBHA9120D | 02139      | Nov. 28, 2020 | Nov. 27, 2021 |
| 966 Cable 1#             | ChengYu      | 966       | 004        | Dec. 07, 2020 | Dec. 06, 2021 |
| 966 Cable 2#             | ChengYu      | 966       | 003        | Dec. 07, 2020 | Dec. 06, 2021 |

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

| Equipment                           | Manufacturer        | Model   | Serial | Last Cal.     | Next Cal.     |
|-------------------------------------|---------------------|---------|--------|---------------|---------------|
| Harmonics, Flicker & power Analyser | LAPLACE INSTRUMENTS | AC2000A | 311370 | Dec. 07, 2020 | Dec. 06, 2021 |
| AC Power Supply                     | MToni               | HPF5010 | 633659 | Dec. 07, 2020 | Dec. 06, 2021 |

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

| Equipment  | Manufacturer | Model    | Serial | Last Cal.     | Next Cal.     |
|------------|--------------|----------|--------|---------------|---------------|
| ESD Tester | SCHLODER     | SESD 230 | 17352  | Dec. 05, 2020 | Dec. 04, 2021 |

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

| Equipment                     | Manufacturer | Model       | Serial     | Last Cal.     | Next Cal.     |
|-------------------------------|--------------|-------------|------------|---------------|---------------|
| Signal Generator              | HP           | 8648A       | 3625U00573 | Sep. 26, 2020 | Sep. 26, 2021 |
| Amplifier                     | A&R          | 500A100     | 17034      | Sep. 26, 2020 | Sep. 26, 2021 |
| Amplifier                     | A&R          | 100W/1000M1 | 17028      | Sep. 26, 2020 | Sep. 26, 2021 |
| Audio Analyzer<br>(20Hz~1GHz) | Panasonic    | 2023B       | 202301/428 | Sep. 26, 2020 | Sep. 26, 2021 |
| Isotropic Field<br>Probe      | A&R          | FP2000      | 16755      | Sep. 26, 2020 | Sep. 26, 2021 |
| Antenna                       | EMCO         | 3108        | 9507-2534  | Sep. 26, 2020 | Sep. 26, 2021 |
| Log-periodic<br>Antenna       | A&R          | AT1080      | 16812      | Sep. 26, 2020 | Sep. 26, 2021 |

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

| Equipment   | Manufacturer | Model                  | Serial        | Last Cal.     | Next Cal.     |
|---|--------------|------------------------|---------------|---------------|---------------|
| Transient<br>Comprehensive<br>Immunity Test<br>System | Graphtec     | HVIP16T+HCO<br>MPACT 5 | 192501+192202 | Dec. 07, 2020 | Dec. 06, 2021 |
| Coupling Clamp  | HTEC         | 001                    | 0001          | Dec. 07, 2020 | Dec. 06, 2021 |

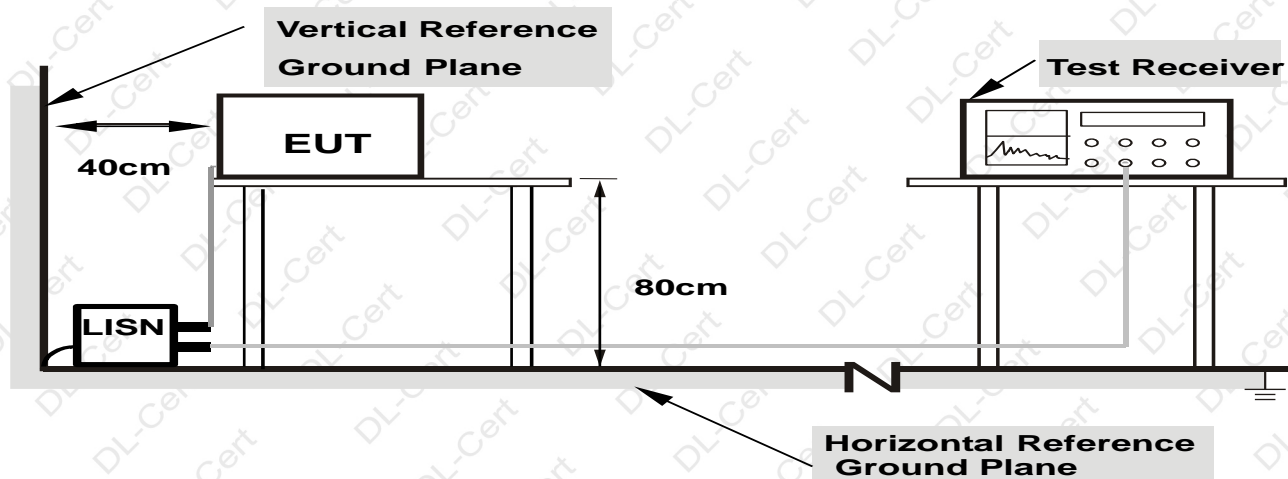
**For Injected Currents Susceptibility Test (EMS --- site)**

| Equipment       | Manufacturer | Model       | Serial        | Last Cal.     | Next Cal.     |
|-----------------|--------------|-------------|---------------|---------------|---------------|
| C/S Test System | LIONCEL      | RIS-6091-85 | 0191101       | Dec. 07, 2020 | Dec. 06, 2021 |
| CDN             | LIONCEL      | CDN-M2-16   | 0191001       | Dec. 07, 2020 | Dec. 06, 2021 |
| CDN             | LIONCEL      | CDN-M3-16   | 0191002       | Dec. 07, 2020 | Dec. 06, 2021 |
| Injection Clamp | Frankonia    | EMCL-20     | 18101728-0108 | Dec. 05, 2020 | Dec. 04, 2021 |

## 5. CONDUCTED EMISSION TEST

### 5.1 Block Diagram of Test Setup

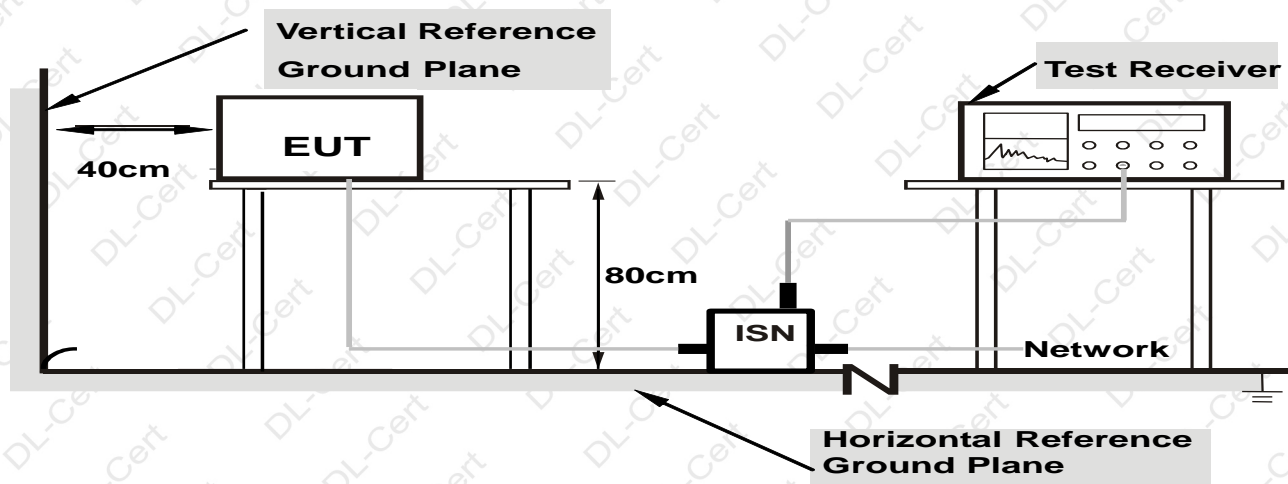
#### For Mains Terminals Test



**Note: 1.**Support units were connected to second LISN.

**2.**Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

#### For Telecom Port Test



**Note: 1.**Support units were connected to second LISN.

**2.**Both of ISNs are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 5.2 Test Standard and Limit

BS EN 55032



| For Mains Terminals Test |                     |               | For Telecom Port Test |                     |               |
|--------------------------|---------------------|---------------|-----------------------|---------------------|---------------|
| Frequency<br>MHz         | Limits dB( $\mu$ V) |               | Frequency<br>MHz      | Limits dB( $\mu$ V) |               |
|                          | Quasi-peak Level    | Average Level |                       | Quasi-peak Level    | Average Level |
| 0.15~0.50                | 66 ~ 56*            | 55 ~ 46*      | 0.15~0.50             | 84 ~ 74*            | 74 ~ 64*      |
| 0.50~5.00                | 56                  | 46            | 0.50~30.00            | 74                  | 64            |
| 5.00~30.00               | 60                  | 50            | /                     | /                   | /             |

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

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

### 5.3 EUT Configuration on Test

The following equipment's are installed on conducted emission test to meet BS EN 55032 requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

### 5.4 Operating Condition of EUT

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

5.4.2 Turn on the power of all equipment.

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

### 5.5 Test Procedure

The EUT is put on the table and connected to the AC mains through a Artificial Mains Network (AMN) or ISN. This provided a 50ohm coupling impedance for the tested equipment's. Both sides of AC line are checked to find out the maximum conducted emission levels according to the **BS EN 55032** regulations during conducted emission test.

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

The frequency range from 150 KHz to 30 MHz is investigated.

We pretest all mode, the result only show the worst mode's data.

### 5.6 Test Result

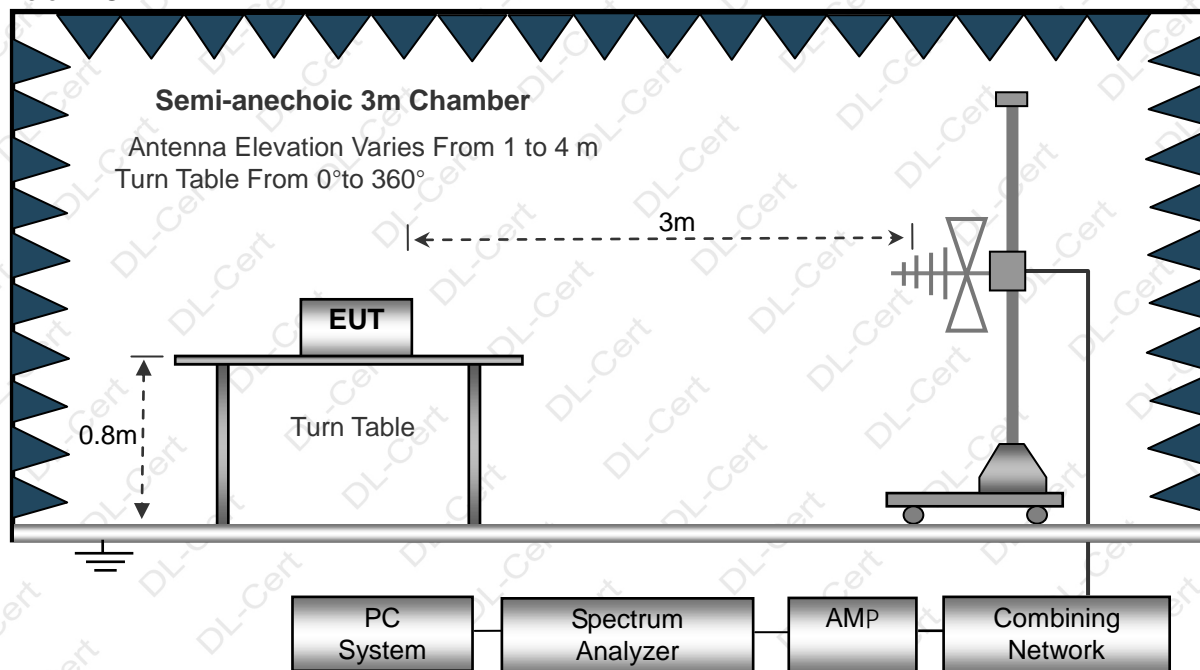
The EUT is powered by DC, no requirements for this item.



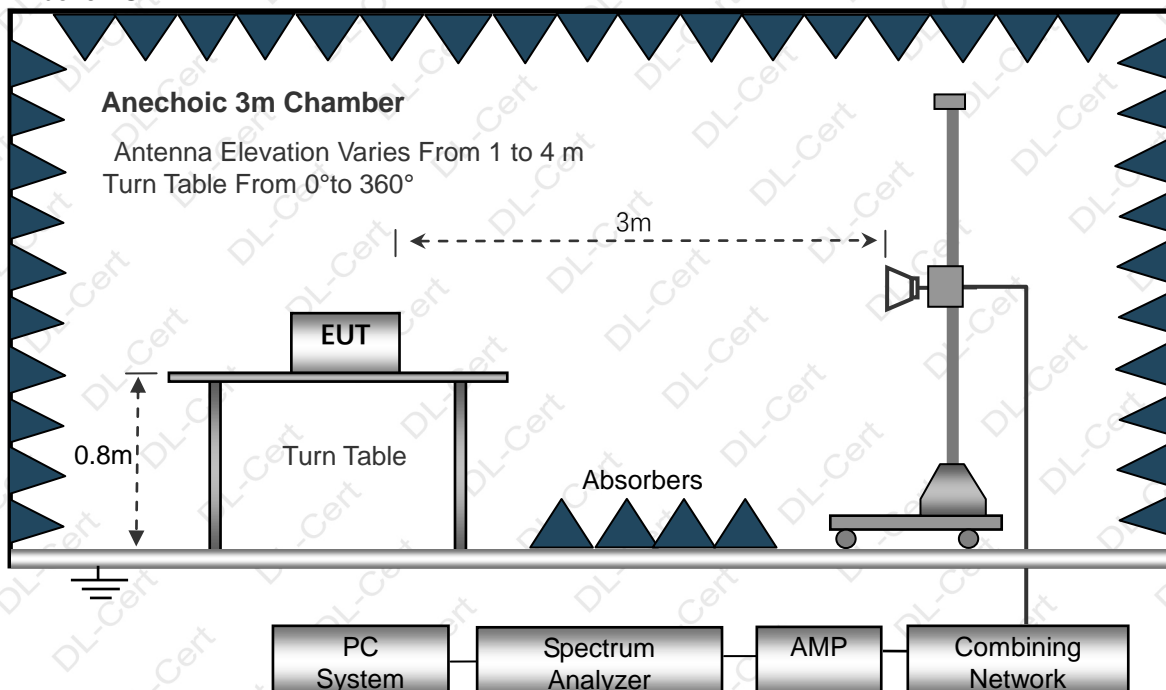
## 6. RADIATION EMISSION TEST

### 6.1 Block Diagram of Test Setup

Below 1GHz



Above 1GHz



### 6.2 Test Standard and Limit

BS EN 55032

Below 1GHz



| Equipment Type | Distance (Meters) | Frequency MHz | Limit values dB( $\mu$ V/m) Quasi-peak |
|----------------|-------------------|---------------|--|
| FM receivers   | 3                 | $\leq 1\ 000$ | Fundamental 60                         |
|                |                   | 30 to 230     | Harmonics 52                           |
|                |                   | 230 to 300    | Harmonics 52                           |
|                |                   | 300 to 1000   | Harmonics 56                           |
| Other          | 3                 | 30 to 230     | 40                                     |
|                |                   | 230 to 1000   | 47                                     |

Above 1GHz

| Frequency MHz | Distance (Meters) | Field Strengths Limits dB( $\mu$ V)/m | Detector |
|---------------|-------------------|---------------------------------------|----------|
| 1000~3000     | 3                 | 76.0                                  | PEAK     |
| 1000~3000     | 3                 | 56.0                                  | AVERAGE  |
| 3000~6000     | 3                 | 80.0                                  | PEAK     |
| 3000~6000     | 3                 | 60.0                                  | AVERAGE  |

Remark:

- (1) The smaller limit shall apply at the cross point between two frequency bands.
- (2) Distance refers to the distance in meters between the measuring instrument, antenna and the closed point of any part of the device or system.

### 6.3 EUT Configuration on Test

The BS EN 55032 regulations test method must be used to find the maximum emission during radiated emission test.

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

Please refer to Section 5.3.

### 6.4 Operating Condition of EUT

Same as conducted emission test, which is listed in Section 5.4 except the test set up replaced as Section 6.2.

### 6.5 Test Procedure

- 1) The radiated emissions test was conducted in a semi-anechoic chamber.
- 2) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
- 3) Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.
- 4) The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.
- 5) The bandwidth setting on the receiver (R&S Test Receiver ESR) is set at 120KHz. (above 1GHz set at 1MHz)
- 6) The frequency range from 30MHz to 6000MHz is checked.
- 7) We pretest all mode, the result only shows the worst mode's data.
- 8) The peak emission below the average's limit, so the average's result no recoring.

### 6.6 Test Result

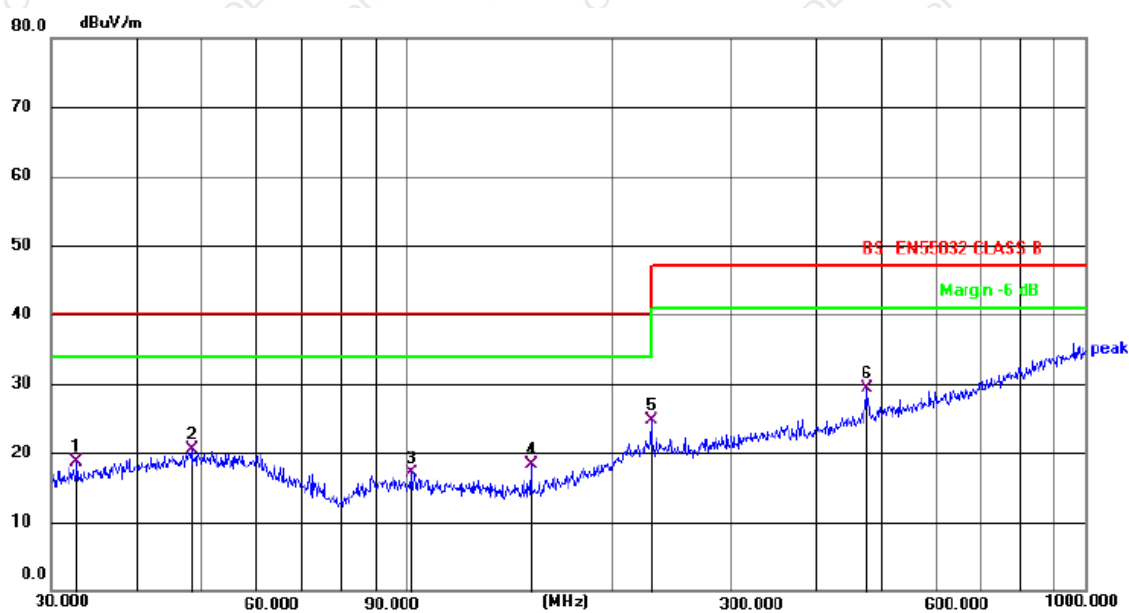
PASS

Please refer to the following page.



## Radiation Emission Test Data (Below 1GHz)

|               |         |                    |            |
|---------------|---------|--------------------|------------|
| Temperature:  | 24.5 °C | Relative Humidity: | 54%        |
| Pressure:     | 1009hPa | Polarization:      | Horizontal |
| Test Voltage: | DC 5V   | Test Mode:         | Mode 1     |

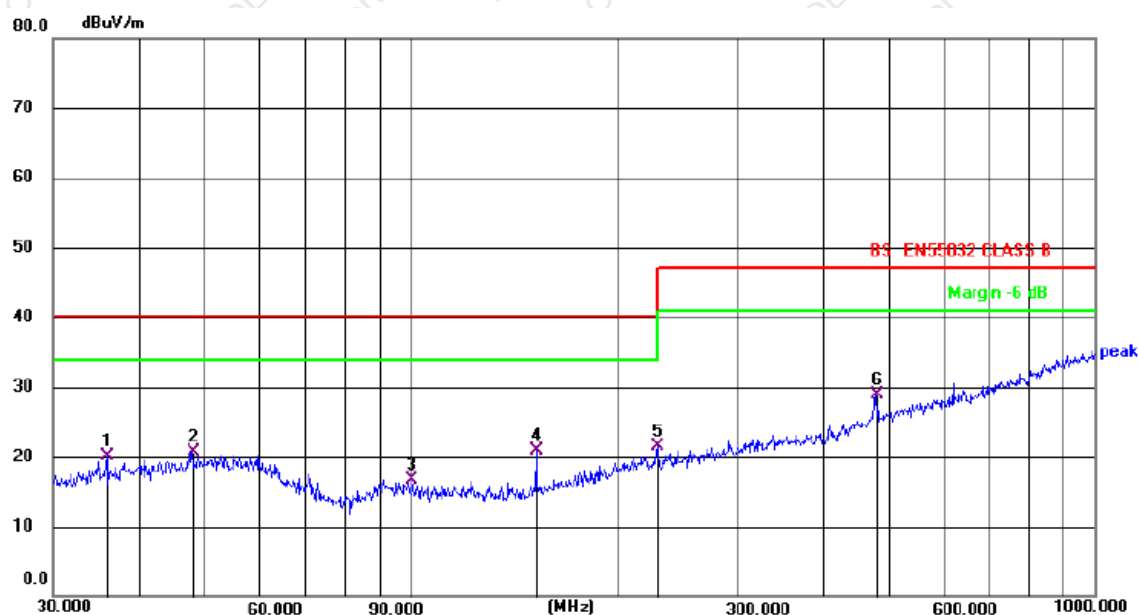


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|---------------|------------|----------|
| 1   |     | 32.7486      | 34.30                    | -15.53                  | 18.77                      | 40.00         | 21.23      | QP       |
| 2   |     | 48.3318      | 33.99                    | -13.47                  | 20.52                      | 40.00         | 19.48      | QP       |
| 3   |     | 101.6443     | 34.73                    | -17.63                  | 17.10                      | 40.00         | 22.90      | QP       |
| 4   |     | 152.6641     | 37.33                    | -18.99                  | 18.34                      | 40.00         | 21.66      | QP       |
| 5   | *   | 229.2931     | 39.44                    | -14.77                  | 24.67                      | 40.00         | 15.33      | QP       |
| 6   |     | 475.4991     | 37.95                    | -8.74                   | 29.21                      | 47.00         | 17.79      | QP       |



## Radiation Emission Test Data (Below 1GHz)

|               |         |                    |          |
|---------------|---------|--------------------|----------|
| Temperature:  | 24.5 °C | Relative Humidity: | 54%      |
| Pressure:     | 1009hPa | Polarization:      | Vertical |
| Test Voltage: | DC 5V   | Test Mode:         | Mode 1   |



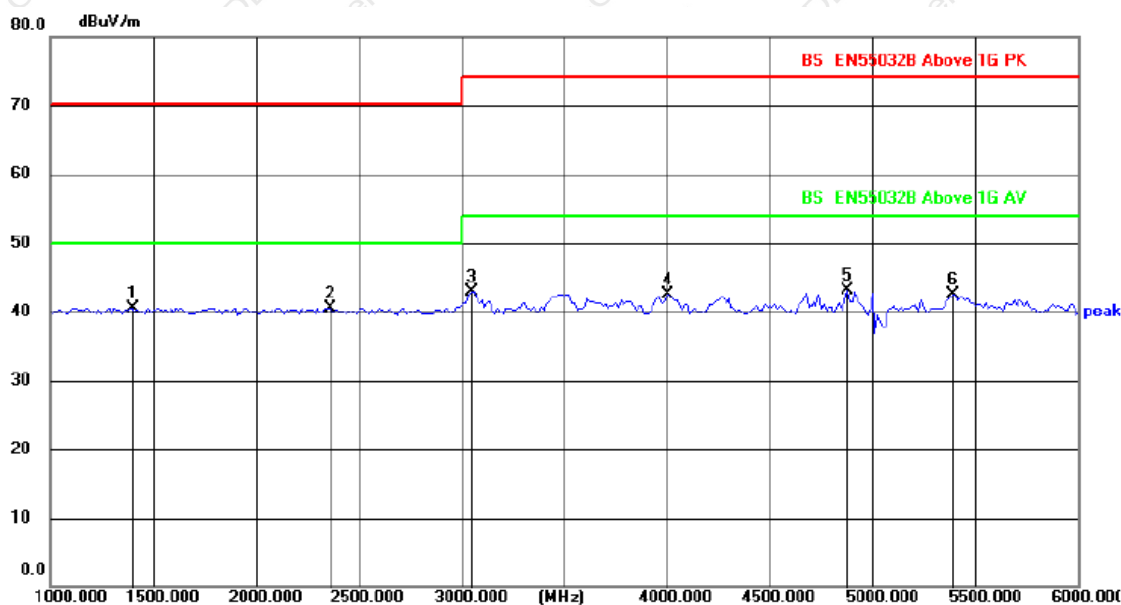
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|---------------|------------|----------|
| 1   |     | 36.0007      | 34.99                    | -14.98                  | 20.01                      | 40.00         | 19.99      | QP       |
| 2   |     | 47.9940      | 34.22                    | -13.50                  | 20.72                      | 40.00         | 19.28      | QP       |
| 3   |     | 100.5806     | 34.23                    | -17.61                  | 16.62                      | 40.00         | 23.38      | QP       |
| 4   |     | 152.6641     | 39.93                    | -18.99                  | 20.94                      | 40.00         | 19.06      | QP       |
| 5   |     | 229.2930     | 36.35                    | -14.77                  | 21.58                      | 40.00         | 18.42      | QP       |
| 6   | *   | 478.8456     | 37.52                    | -8.65                   | 28.87                      | 47.00         | 18.13      | QP       |





## Radiation Emission Test Data (Above 1GHz)

|               |         |                    |            |
|---------------|---------|--------------------|------------|
| Temperature:  | 24.5 °C | Relative Humidity: | 54%        |
| Pressure:     | 1009hPa | Polarization:      | Horizontal |
| Test Voltage: | DC 5V   | Test Mode:         | Mode 1     |

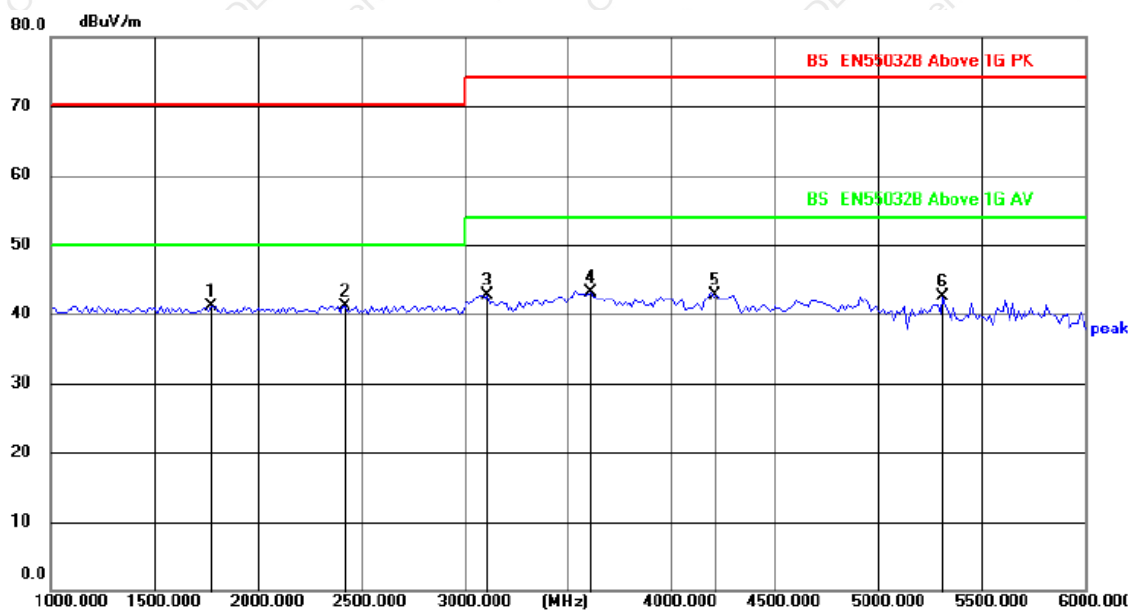


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|---------------|------------|----------|
| 1   |     | 1400.000     | 81.56                    | -41.02                  | 40.54                      | 70.00         | 29.46      | peak     |
| 2   | *   | 2362.500     | 78.42                    | -37.83                  | 40.59                      | 70.00         | 29.41      | peak     |
| 3   |     | 3050.000     | 80.08                    | -37.13                  | 42.95                      | 74.00         | 31.05      | peak     |
| 4   |     | 4000.000     | 78.18                    | -35.67                  | 42.51                      | 74.00         | 31.49      | peak     |
| 5   |     | 4875.000     | 78.01                    | -35.00                  | 43.01                      | 74.00         | 30.99      | peak     |
| 6   |     | 5387.500     | 76.36                    | -33.80                  | 42.56                      | 74.00         | 31.44      | peak     |



## Radiation Emission Test Data (Above 1GHz)

|               |         |                    |          |
|---------------|---------|--------------------|----------|
| Temperature:  | 24.5 °C | Relative Humidity: | 54%      |
| Pressure:     | 1009hPa | Polarization:      | Vertical |
| Test Voltage: | DC 5V   | Test Mode:         | Mode 1   |

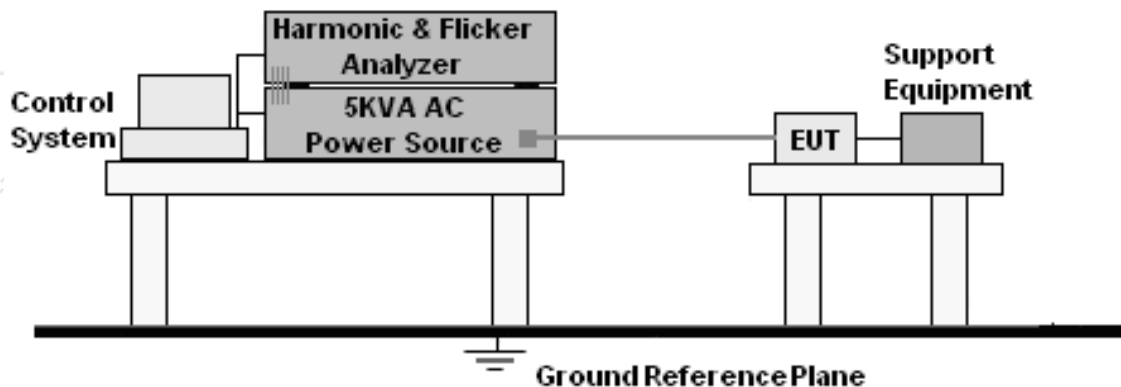


| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dB/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|---------------|------------|----------|
| 1   |     | 1775.000     | 79.32                    | -38.20                  | 41.12                      | 70.00         | 28.88      | peak     |
| 2   | *   | 2425.000     | 78.99                    | -37.84                  | 41.15                      | 70.00         | 28.85      | peak     |
| 3   |     | 3112.500     | 79.73                    | -36.95                  | 42.78                      | 74.00         | 31.22      | peak     |
| 4   |     | 3612.500     | 78.96                    | -35.86                  | 43.10                      | 74.00         | 30.90      | peak     |
| 5   |     | 4212.500     | 78.26                    | -35.49                  | 42.77                      | 74.00         | 31.23      | peak     |
| 6   |     | 5312.500     | 76.54                    | -34.02                  | 42.52                      | 74.00         | 31.48      | peak     |



## 7. HARMONIC CURRENT EMISSION TEST

### 7.1 Block Diagram of Test Setup



### 7.2 Test Standard

BS EN 61000-3-2

### 7.3 Operating Condition of EUT

Setup the EUT as shown in Section 5.1.

Turn on the power of all equipment.

Let the EUT work in test mode and test it.

### 7.4 Test Procedure

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

### 7.5 Test Results

The EUT is powered by DC, no requirements for this item.



## 8. VOLTAGE FLUCTUATIONS & FLICKER TEST

### 8.1 Block Diagram of Test Setup

Same as Section 7.1.

### 8.2 Test Standard

BS EN 61000-3-3

### 8.3 Operating Condition of EUT

Same as Section 7.3. The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

#### Flicker Test Limit

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

### 8.4 Test Procedure

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

### 8.5 Test Results

The EUT is powered by DC, no requirements for this item.



**9. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA**

| Product Standard  | BS EN 55035, ETSI EN 301 489-17  |   |
|---|--|---|
| Criteria  | During the test  | After the test  |
| <b>A</b>  | Shall operate as intended.<br>(see note).<br>Shall be no loss of function.<br>Shall be no unintentional transmissions. | Shall operate as intended.<br>Shall be no degradation of performance.<br>Shall be no loss of function.<br>Shall be no loss of critical stored data. |
| <b>B</b>  | May be loss of function.   | Functions shall be self-recoverable.<br>Shall operate as intended after recovering.<br>Shall be no loss of critical stored data.                    |
| <b>C</b>  | May be loss of function.   | Functions shall be recoverable by the operator.<br>Shall operate as intended after recovering.<br>Shall be no loss of critical stored data.         |
| <p>NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.</p> <p>6.2.2 Minimum performance level</p> <p>For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.</p> <p>For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.</p> |  |   |

**PERFORMANCE FOR 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 FOR TR**

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

**PERFORMANCE FOR 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.

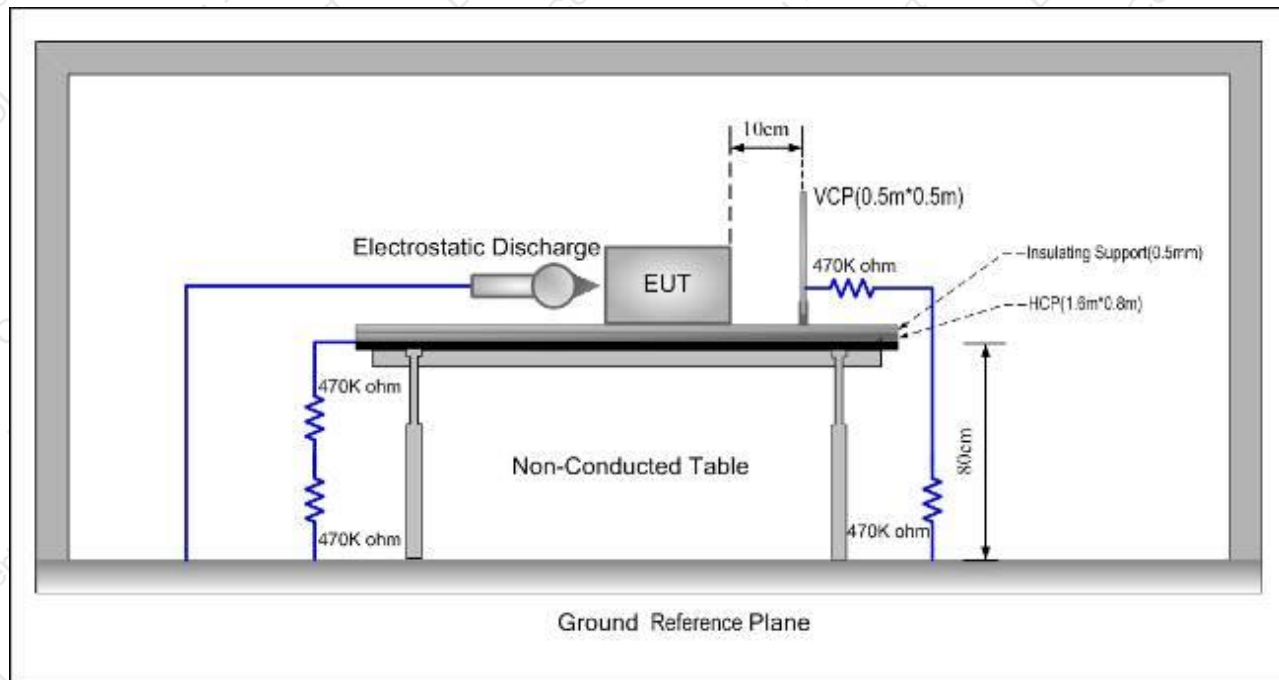
**PERFORMANCE FOR CR**

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.

## 10. ELECTROSTATIC DISCHARGE IMMUNITY TEST

### 10.1 Block Diagram of Test Setup



### 10.2 Test Standard

ETSI EN 301 489-17, BS EN 55035, BS EN 61000-4-2

### 10.3 Severity Levels and Performance Criterion

Severity Level: 3 / Air Discharge:  $\pm 8\text{KV}$

Level: 2 / Contact Discharge:  $\pm 4\text{KV}$

Performance criterion: B

### 10.4 Test Procedure

- Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the Product.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the Product. The ESD generator was positioned vertically at a distance of 0.1 meters from the Product with the discharge electrode touching the HCP.
- At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical



edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the Product were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the Product.

#### 10.5 Test Results

PASS

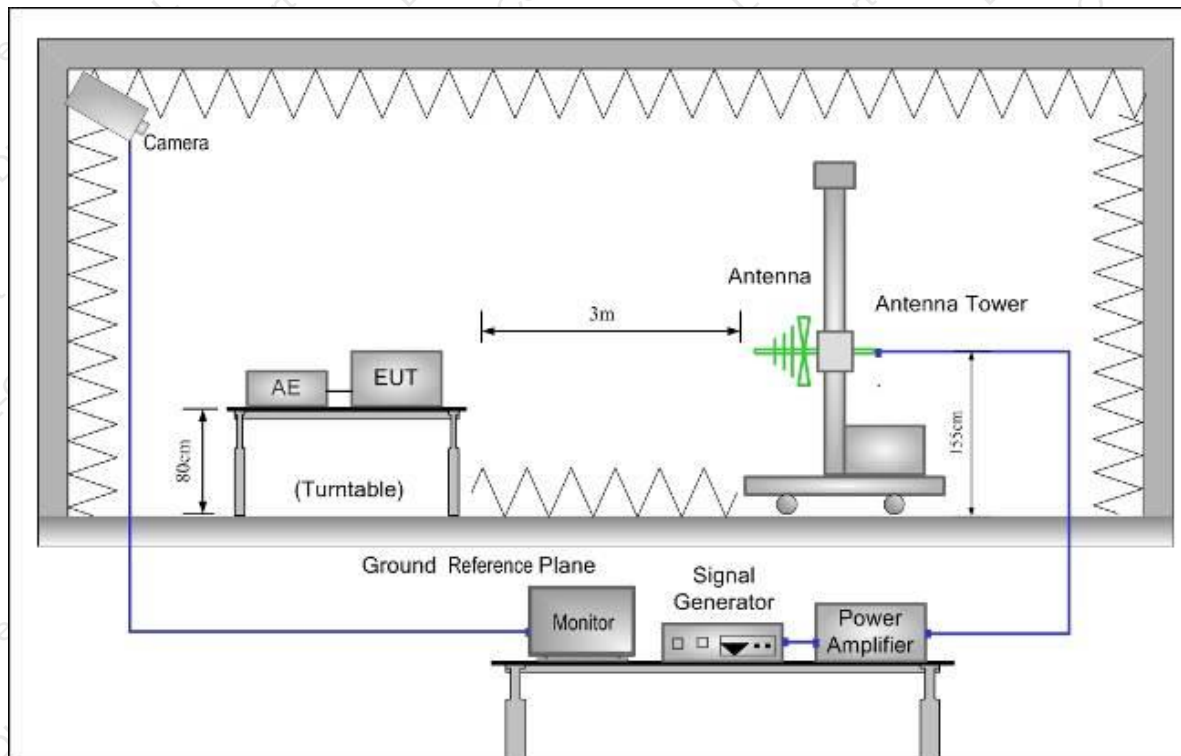
Please refer to the following page.

| Electrostatic Discharge Test Data |   |               |   |                |        |
|-----------------------------------|---|---------------|---|----------------|--------|
| Temperature:                      | 25.1 °C                                   |               | Humidity:                                       | 55%            |        |
| Power Supply:                     | DC 5V                                     |               | Test Mode:                                      | Mode 1         |        |
| Discharge Method                  | Discharge Position                        | Voltage (±kV) | Min. No. of Discharge per polarity (Each Point) | Required Level | Result |
| Contact Discharge                 | Conductive Surfaces                       | 4             | 10  | B              | Pass   |
|                                   | Indirect Discharge HCP                    | 4             | 10  | B              | Pass   |
|                                   | Indirect Discharge VCP                    | 4             | 10  | B              | Pass   |
| Air Discharge                     | Slots, Apertures, and Insulating Surfaces | 8             | 10  | B              | Pass   |
| Note: N/A                         |   |               |   |                |        |



## 11. RF FIELD STRENGTH SUSCEPTIBILITY TEST

### 11.1 Block Diagram of Test Setup



### 11.2 Test Standard

ETSI EN 301 489-17, BS EN 55035, BS EN 61000-4-3

### 11.3 Severity Levels and Performance Criterion

Severity Level 2, 3V / m

Performance criterion: A

### 11.4 Test Procedure

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

All the scanning conditions are as follows:

| Condition of Test      | Remarks                  |
|------------------------|--------------------------|
| Fielded Strength       | 3 V/m (Severity Level 2) |
| Radiated Signal        | Modulated                |
| Scanning Frequency     | 80 – 6000 MHz            |
| Dwell time of radiated | 0.0015 decade/s          |
| Waiting Time           | 1 Sec.                   |



## 11.5 Test Results

PASS

Please refer to the following page.

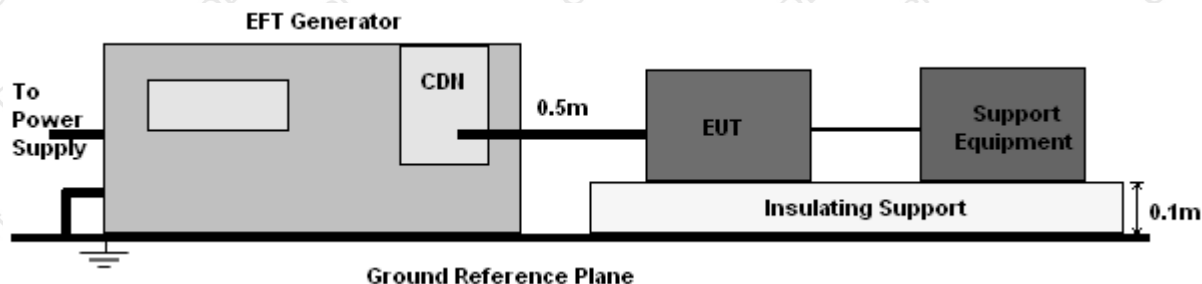
| R/S Test Data      |                             |                         |                |        |
|--------------------|-----------------------------|-------------------------|----------------|--------|
| Temperature:       | 25.1℃                       |                         | Humidity:      | 55%    |
| Power Supply :     | DC 5V                       |                         | Test Mode:     | Mode 1 |
| Criterion:         | A                           |                         | Steps          | 1 %    |
| Frequency<br>(MHz) | Position                    | Field Strength<br>(V/m) | Required Level | Result |
| 80 – 6000          | Front, Right,<br>Back, Left | 3                       | A              | Pass   |
| Note: N/A          |                             |                         |                |        |



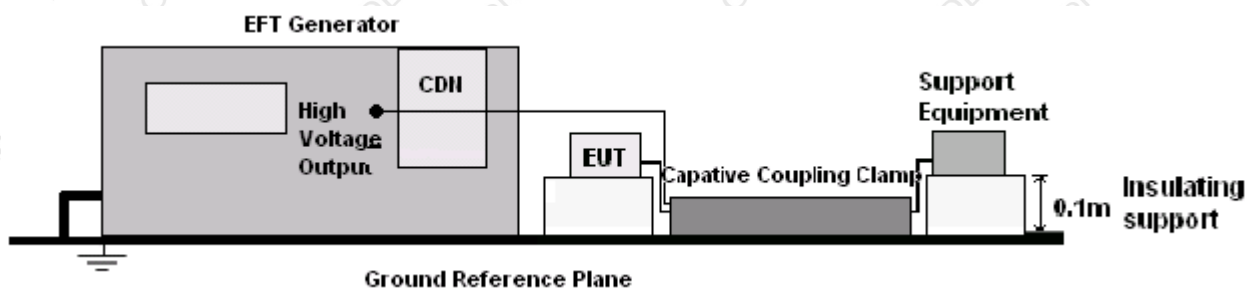
## 12. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

### 12.1 Block Diagram of EUT Test Setup

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



For signal lines and control lines:



### 12.2 Test Standard

ETSI EN 301 489-17, BS EN 55035, BS EN 61000-4-4

### 12.3 Severity Levels and Performance Criterion

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

Performance criterion: B

### 12.4 Test Procedure

EUT shall be placed 0.8m high above the ground reference plane which is a min.1m\*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m

For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

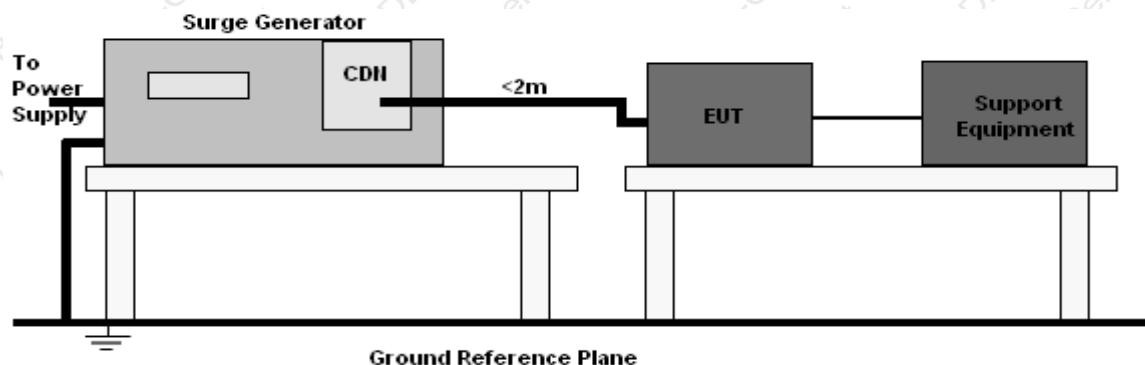
### 12.5 Test Results

The EUT is powered by DC, no requirements for this item.



### 13. SURGE TEST

#### 13.1 Block Diagram of EUT Test Setup



#### 13.2 Test Standard

ETSI EN 301 489-17, BS EN 55035, BS EN61000-4-5

#### 13.3 Severity Levels and Performance Criterion

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

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

Performance criterion: B

#### 13.4 Test Procedure

- 1) Set up the EUT and test generator as shown on section 11.1
- 2) For line to line coupling mode, provide a 1KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Repeat procedure 2) to 4) except the open-circuit test voltage change from 1KV to 2KV for line to earth coupling mode test.
- 6) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

#### 13.5 Test Result

The EUT is powered by DC, no requirements for this item.

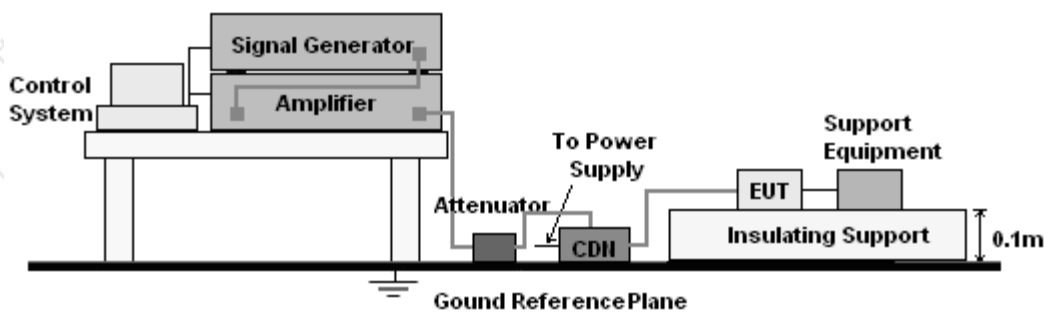




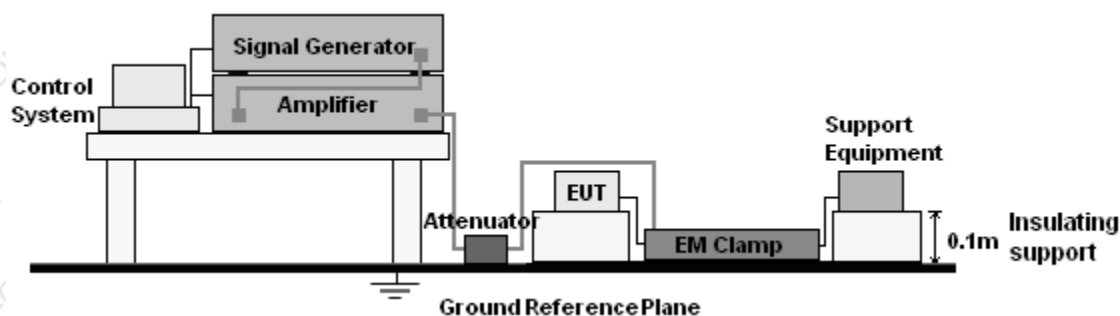
## 14. INJECTED CURRENTS SUSCEPTIBILITY TEST

### 14.1 Block Diagram of EUT Test Setup

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



For signal lines and control lines:



### 14.2 Test Standard

ETSI EN 301 489-17, BS EN 55035, BS EN61000-4-6

### 14.3 Severity Levels and Performance Criterion

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

Performance criterion: A

### 14.4 Test Procedure

- 1) Set up the EUT, CDN and test generator as shown on section 12.1
- 2) Let EUT work in test mode and measure.
- 3) The EUT and supporting equipments are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane at above 0.1-0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave
- 7) The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

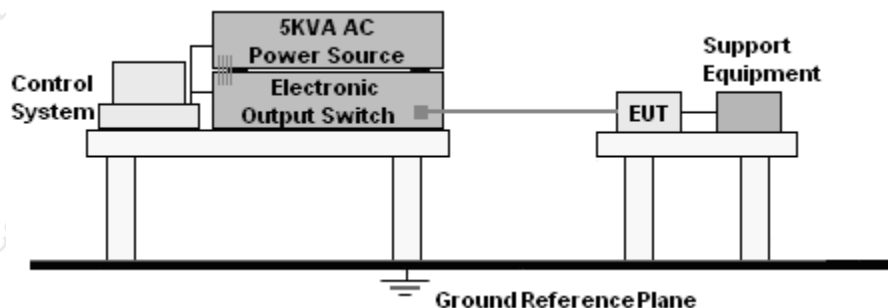
### 14.5 Test Result

The EUT is powered by DC, no requirements for this item.



## 15. VOLTAGE DIPS AND INTERRUPTIONS TEST

### 15.1 Block Diagram of EUT Test Setup



### 15.2 Test Standard

ETSI EN 301 489-17, BS EN 55035, BS EN61000-4-11

### 15.3 Severity Levels and Performance Criterion

Input and Output AC Power Ports.

- ☒ Voltage Dips.
- ☒ Voltage Interruptions.

| Environmental Phenomena | Test Specification | Units                 | Performance Criterion |
|-------------------------|--------------------|-----------------------|-----------------------|
| Voltage Dips            | 100<br>0.5         | % Reduction<br>period | B                     |
|                         | 100<br>1           | % Reduction<br>period | B                     |
|                         | 30<br>25           | % Reduction<br>period | C                     |
| Voltage Interruptions   | 100<br>250         | % Reduction<br>period | C                     |

### 15.4 Test Procedure

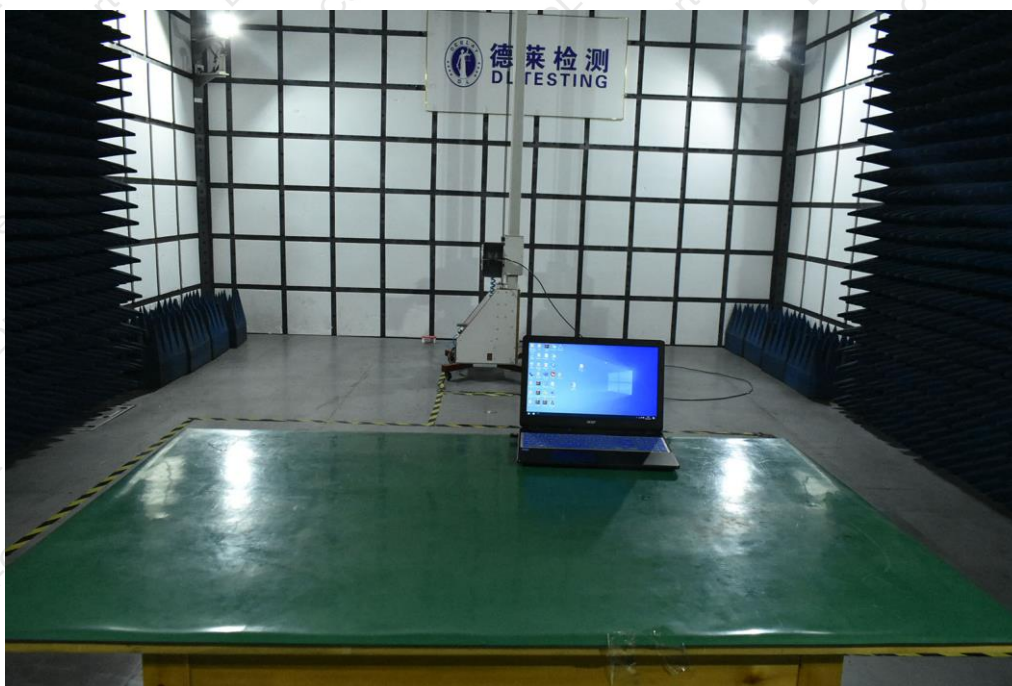
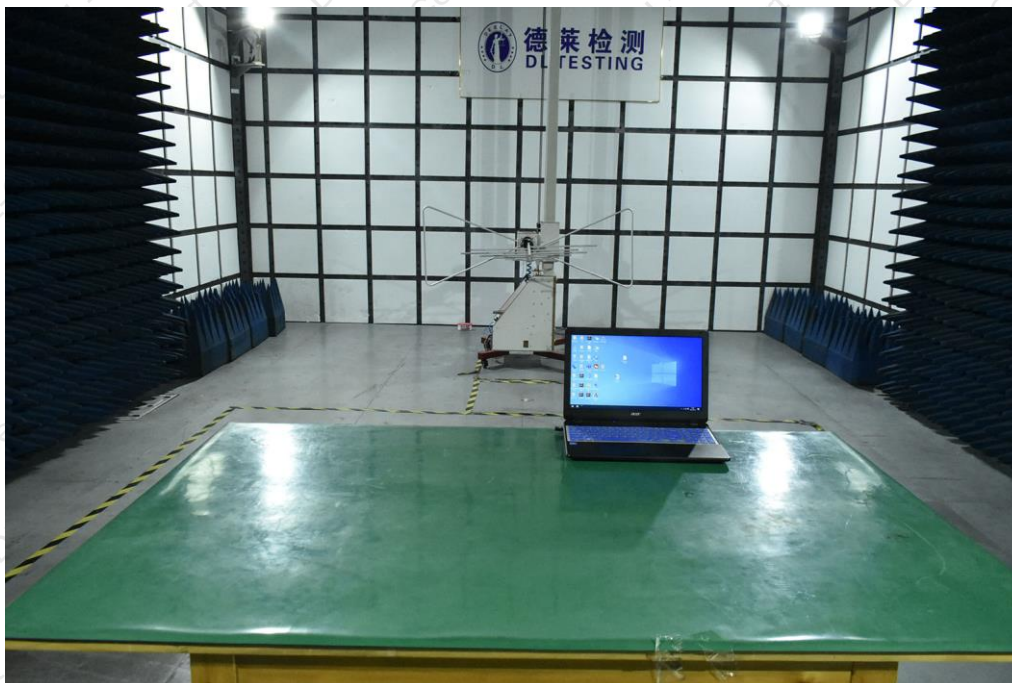
- 1) Set up the EUT and test generator as shown on section 14.1
- 2) The interruption is introduced at selected phase angles with specified duration. There is a 3mins minimum interval between each test event.
- 3) After each test a full functional check is performed before the next test.
- 4) Repeat procedures 2 & 3 for voltage dips, only the level and duration is changed.
- 5) Record any degradation of performance.

### 15.5 Test Result

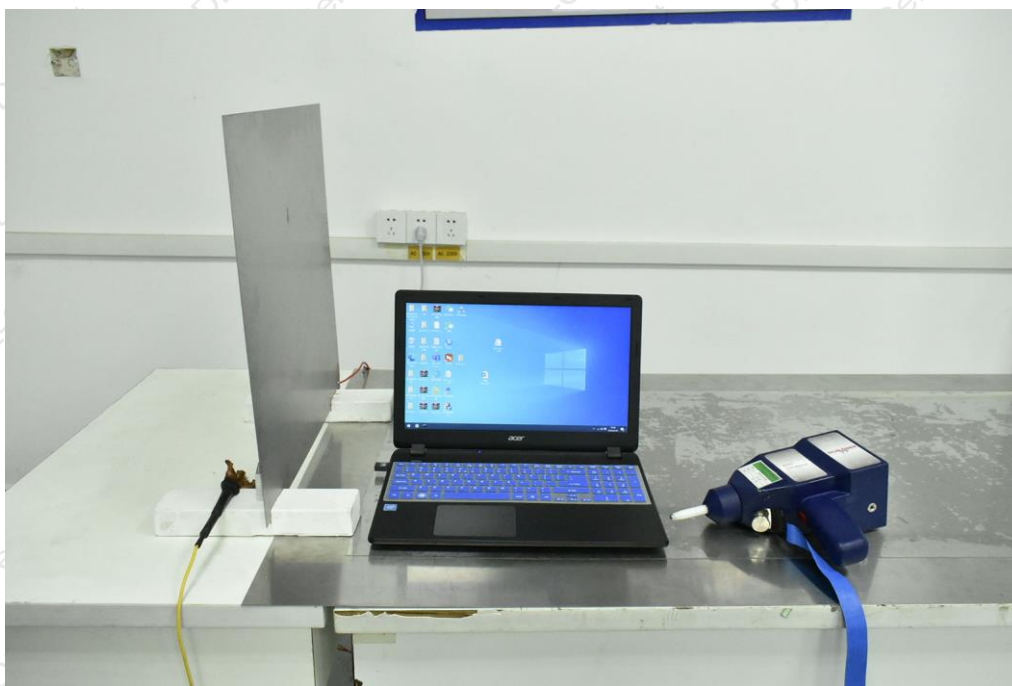
The EUT is powered by DC, no requirements for this item.



## 16. SETUP PHOTOGRAPHS



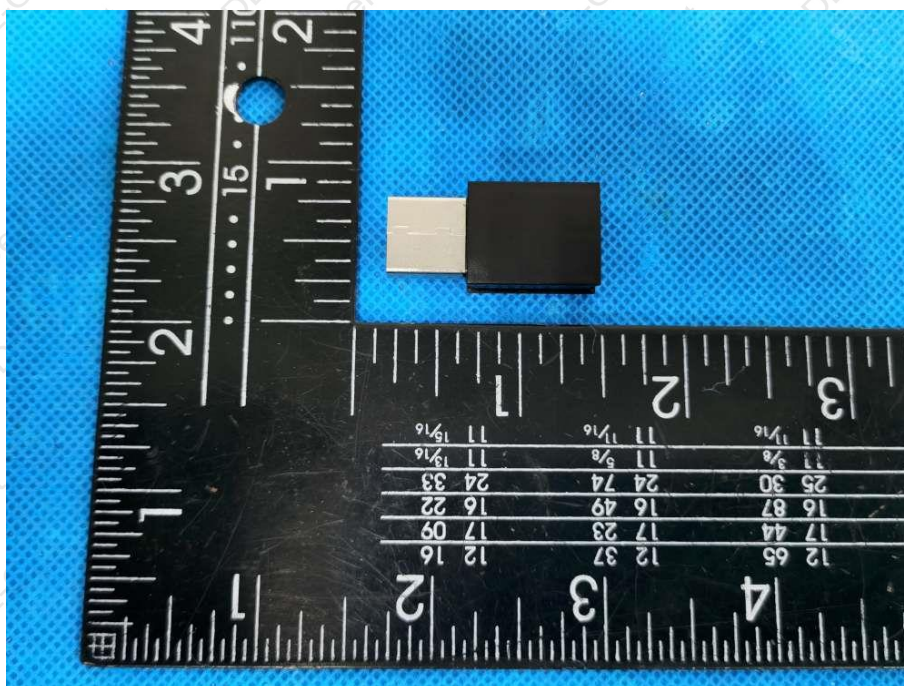
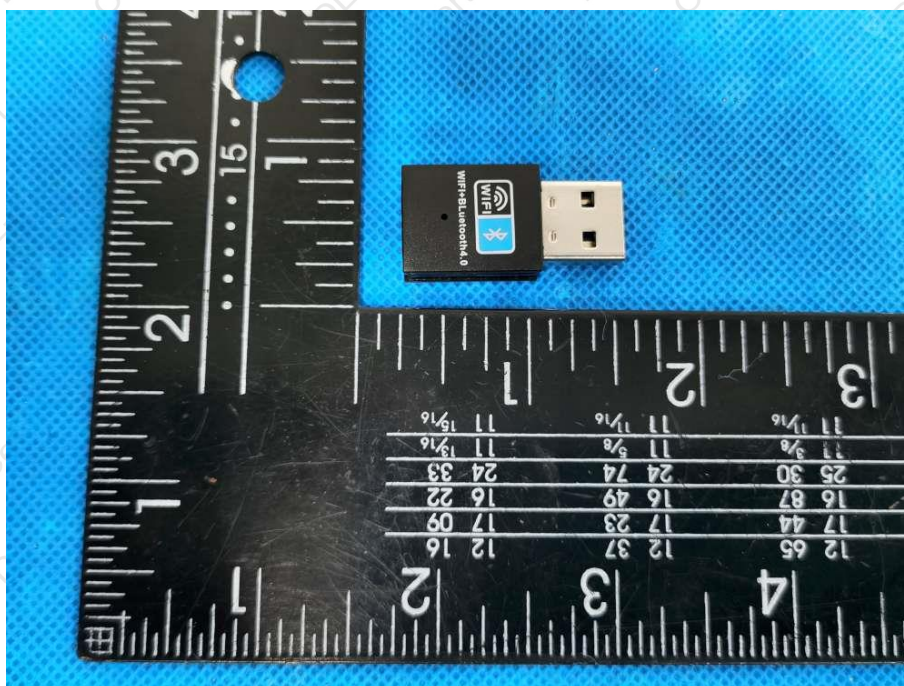


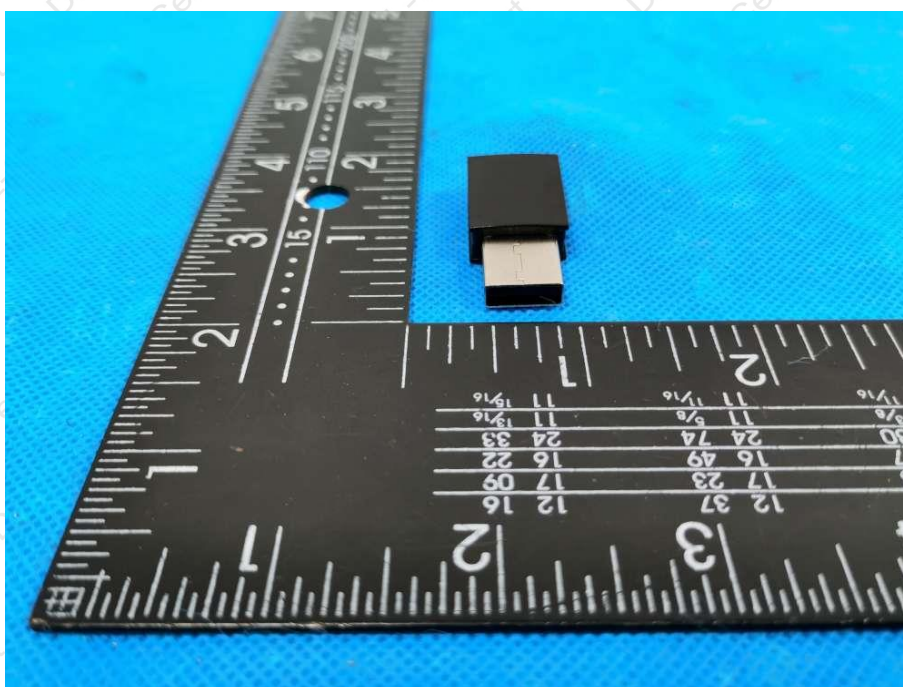
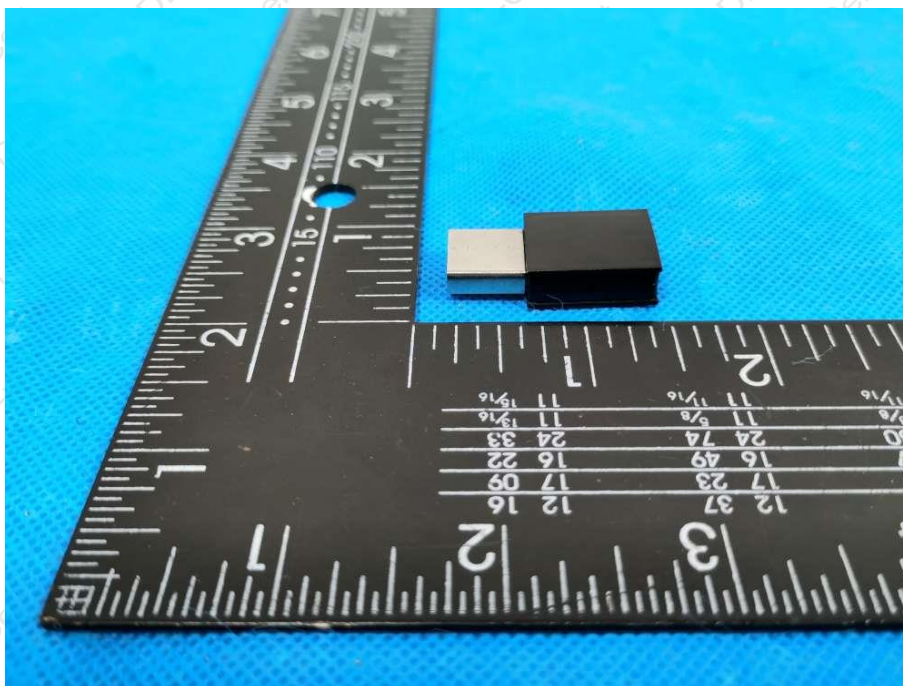




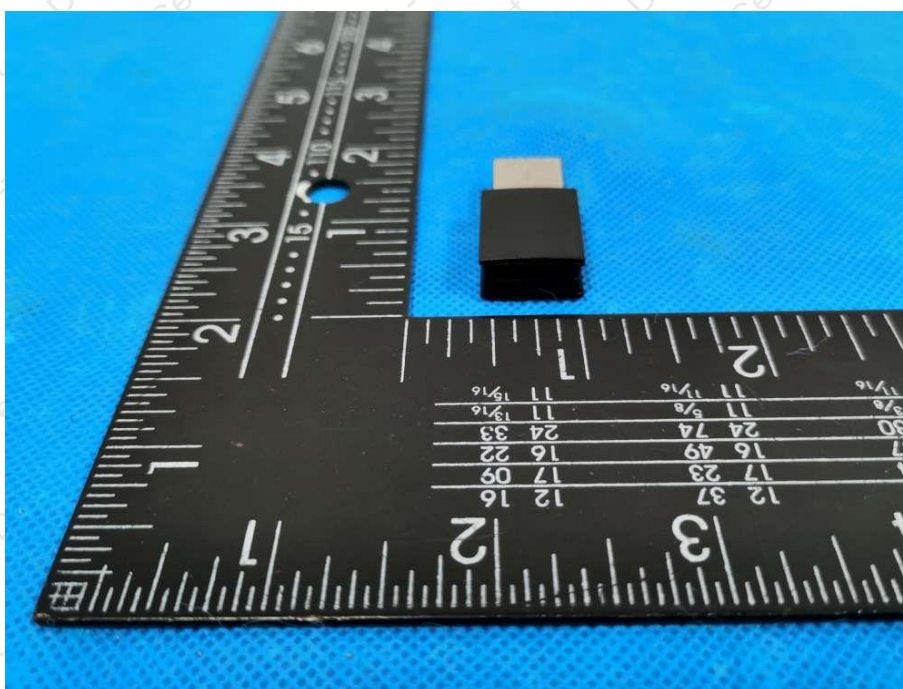
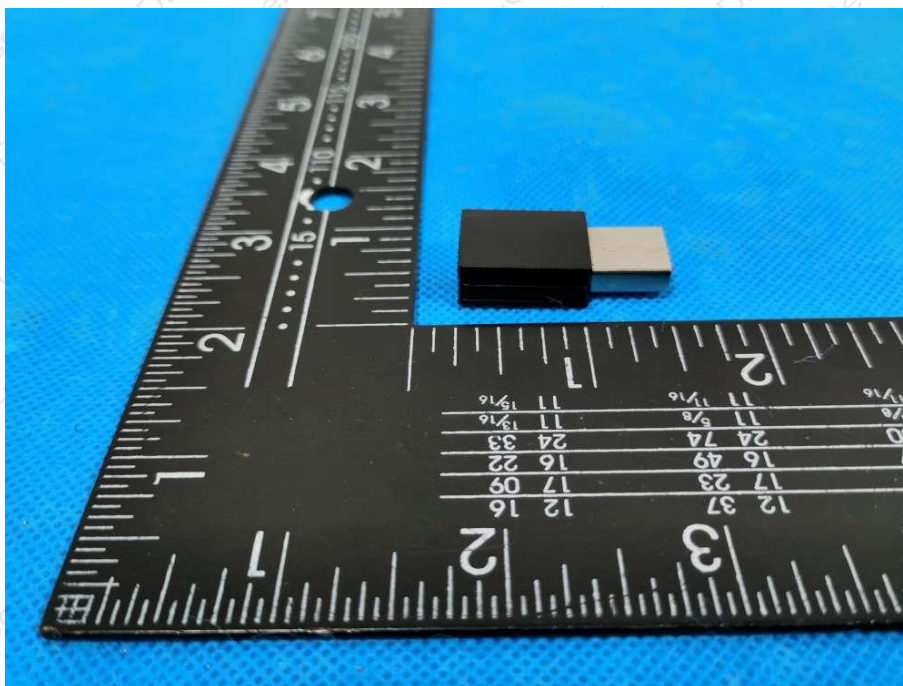


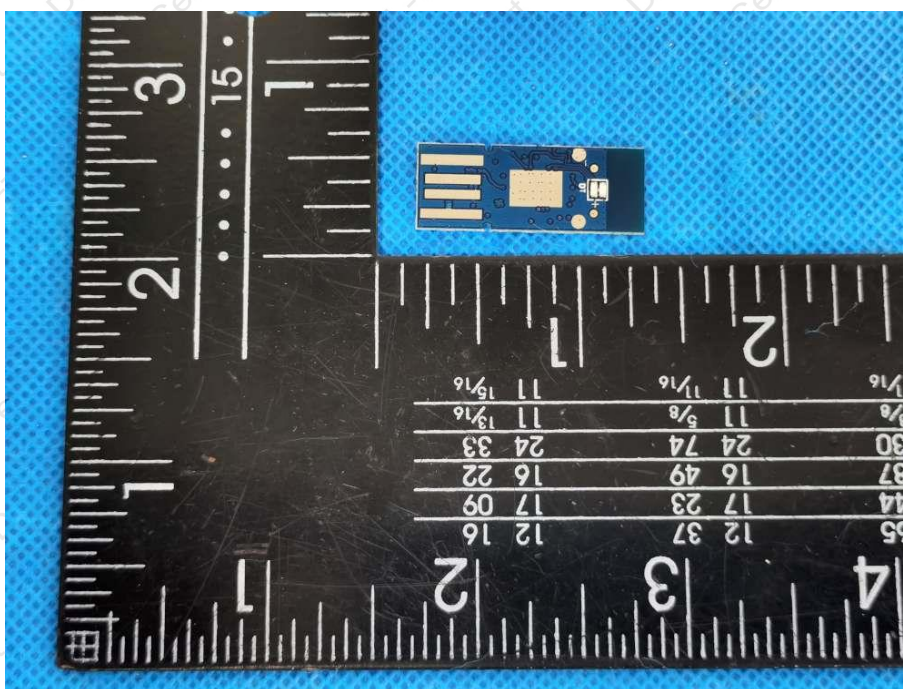
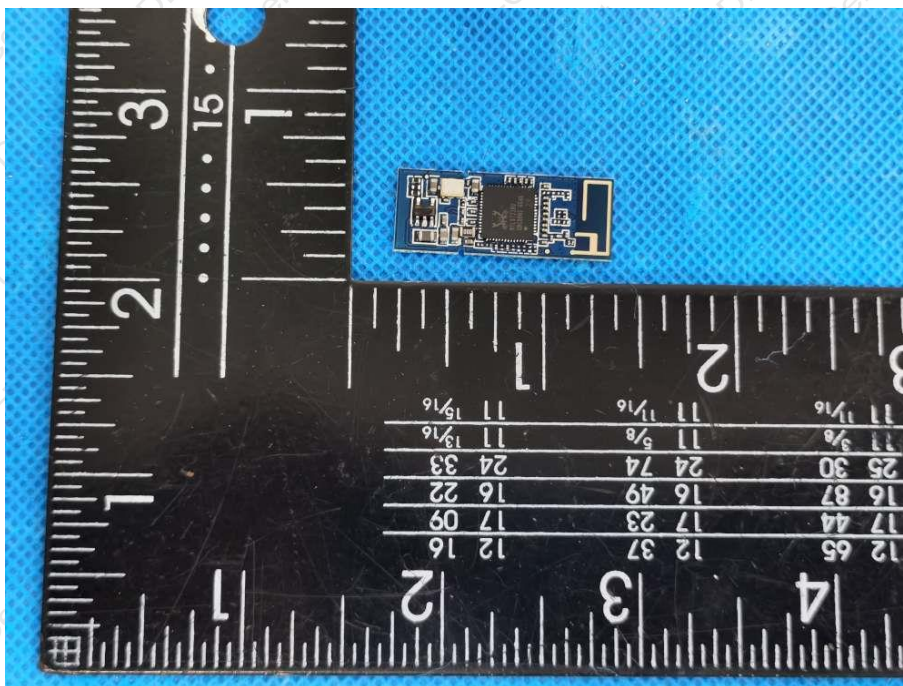
## 17. EUT PHOTOGRAPHS











\*\*\*\*\* END OF REPORT \*\*\*\*\*