

FCC Part 15, Subpart B, Class A(sDoC)

TEST REPORT

BORN ELECTRONICS LIMITED

POE switch

Test Model: BI602PG2F

Additional Model No.: Refer to page 7

Prepared for : BORN ELECTRONICS LIMITED
Address : 157 SIXTH AVENUE LONDON E12 5PT

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : Room 101, 201, Building A and Room 301, Building C,
Juji Industrial Park, Yabianxueziwei, Shajing Street,
Bao' an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : May 21, 2020
Number of tested samples : 1
Serial number : Prototype
Date of Test : May 21, 2020 ~ May 28, 2020
Date of Report : April 08, 2021



**FCC TEST REPORT
FCC Part 15, Subpart B, Class A(sDoC)**

Report Reference No. : **LCS200518067AE100**

Date Of Issue..... : April 08, 2021

Testing Laboratory Name..... : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address..... : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District, Shenzhen, Guangdong, China

Testing Location/ Procedure.... : Full application of Harmonised standards
 Partial application of Harmonised standards
 Other standard testing method

Applicant's Name..... : **BORN ELECTRONICS LIMITED**

Address..... : 157 SIXTH AVENUE LONDON E12 5PT

Test Specification

Standard..... : FCC Part 15, Subpart B, Class A(sDoC), ANSI C63.4 -2014

Test Report Form No..... : LCSEMC-1.0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF..... : Dated 2011-03

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. is acknowledged as copyright owner and source of the material. SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test Item Description..... : **POE switch**

Test Model : BI602PG2F

Trade Mark..... : N/A

Ratings..... : Input: DC 48-57V

Result : **PASS**

Compiled by:

Lucky.xie

Lucky Xie/ File administrators

Supervised by:

Tom Wang

Tom Wang/ Technique principal

Approved by



Gavin Liang/ Manager

FCC -- TEST REPORT**Test Report No. : LCS200518067AE100**April 08, 2021

Date of issue

Test Model : BI602PG2F

EUT..... : POE switch

Applicant..... : BORN ELECTRONICS LIMITED

Address..... : 157 SIXTH AVENUE LONDON E12 5PT

Telephone..... : /

Fax..... : /

Manufacturer..... : BORN ELECTRONICS LIMITED

Address..... : 157 SIXTH AVENUE LONDON E12 5PT

Telephone..... : /

Fax..... : /

Factory..... : BORN ELECTRONICS LIMITED

Address..... : 157 SIXTH AVENUE LONDON E12 5PT

Telephone..... : /

Fax..... : /

Test Result according to the standards on page 6: **PASS**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

| Revision | Issue Date | Revisions | Revised By |
|----------|----------------|---------------|-------------|
| 000 | May 29, 2020 | Initial Issue | Gavin Liang |
| 100 | April 08, 2021 | Revised | Gavin Liang |
| | | | |

Remark :This report is based on the report No. LCS200518067E. This report is invalid without the original report.

for changing the following information:

- 1.Changed applicant and Manufacturer and Factory to Born Electronics limited
- 2.Changed applicant address to 157 SIXTH AVENUE LONDON E12 5PT
- 3.Product model changed to BI602PG2F
- 4.Change trade Test Additional Model No to BI604E1E, BI602PDG1F, BI608G, BI601E1F, BI601PG1F
- 5.Changed External and internal photos of the EUT

Other contents still remain the same with the previous one.

TABLE OF CONTENTS

| Test Report Description | Page |
|--|-----------|
| 1. SUMMARY OF STANDARDS AND RESULTS..... | 6 |
| 1.1. Description of Standards and Results..... | 6 |
| 2. GENERAL INFORMATION..... | 7 |
| 2.1. Description of Device (EUT)..... | 7 |
| 2.2. Description of Test Facility..... | 7 |
| 2.3. Statement of the Measurement Uncertainty..... | 8 |
| 2.4. Measurement Uncertainty..... | 8 |
| 3. TEST RESULTS..... | 9 |
| 3.1. POWER LINE CONDUCTED EMISSION MEASUREMENT..... | 9 |
| 3.2. Radiated emission Measurement..... | 13 |
| 4. PHOTOGRAPH..... | 16 |
| 5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT..... | 17 |

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

| EMISSION | | | |
|--|---|---------|---------|
| Description of Test Item | Standard | Limits | Results |
| Conducted disturbance at mains terminals | FCC Part 15, Subpart B, Class A(sDoC), ANSI C63.4 -2014 | Class A | PASS |
| Radiated disturbance | FCC Part 15, Subpart B, Class A(sDoC), ANSI C63.4 -2014 | Class A | PASS |

N/A is an abbreviation for Not Applicable.

Test Mode:

| | | |
|--------|----------|--------|
| Mode 1 | LAN Mode | Record |
|--------|----------|--------|

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : POE switch

Trade Mark : N/A

Test Model : BI602PG2F

Additional Model : BI604E1E, BI602PDG1F, BI608G, BI601E1F, BI601PG1F

Model Declaration : PCB board, structure and internal of these model(s) are the same, So no additional models were tested

Power Supply : Input: DC 48-57V

2.2. Support Equipment List

| Description | Manufacturer | Model | Serial Number |
|-------------|--------------|---------------|---------------|
| PC | DELL | vostro15-7570 | --- |

2.3. Description of Test Facility

Site Description

EMC Lab. : FCC Registration Number is 254912.

Industry Canada Registration Number is 9642A-1.

ESMD Registration Number is ARCB0108.

UL Registration Number is 100571-492.

TUV SUD Registration Number is SCN1081.

TUV RH Registration Number is UA 50296516-001.

NVLAP Registration Code is 600167-0.

2.4. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.5. Measurement Uncertainty

| Test | Parameters | Expanded Uncertainty (Ulab) | Expanded Uncertainty (Ucisp) |
|--------------------|-----------------------------------|-----------------------------|------------------------------|
| Conducted Emission | Level accuracy (9kHz to 150kHz) | ± 2.63 dB | ± 3.8 dB |
| | (150kHz to 30MHz) | ± 2.35 dB | ± 3.4 dB |
| Radiated Emission | Level accuracy (30MHz to 1000MHz) | ± 3.48 dB | ± 5.3 dB |
| Radiated Emission | Level accuracy (above 1000MHz) | ± 3.90 dB | ± 5.2 dB |

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. TEST RESULTS

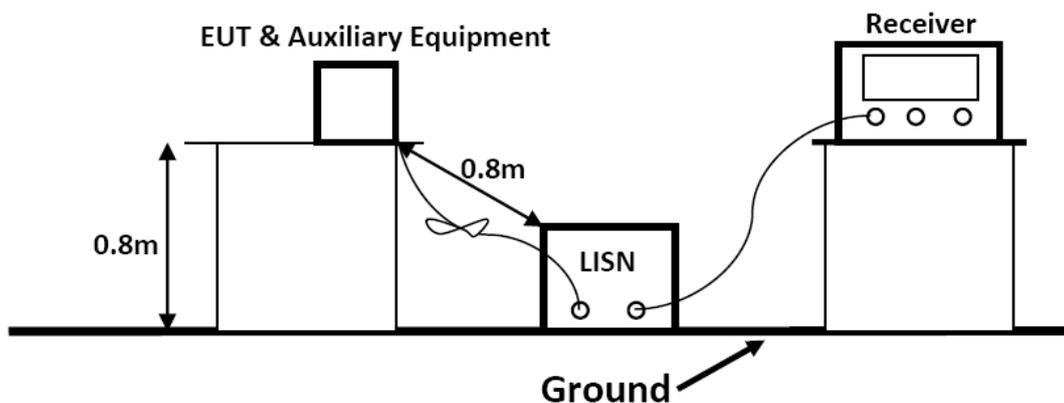
3.1. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1.1. Test Equipment

The following test equipments are used during the power line conducted measurement:

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. |
|------|---------------------------------|--------------|-------------|-----------------|------------|
| 1 | EMI Test Software | AUDIX | E3 | / | N/A |
| 2 | EMI Test Receiver | R&S | ESPI | 101840 | 2019-06-11 |
| 3 | Artificial Mains | R&S | ENV216 | 101288 | 2019-06-12 |
| 4 | 10dB Attenuator | SCHWARZBECK | MTS-IMP-136 | 261115-001-0032 | 2019-06-11 |
| 5 | Impedance Stabilization Network | TESEQ | ISN T800 | 45130 | 2018-11-15 |

3.1.2. Block Diagram of Test Setup



3.1.3. Test Standard

Power Line Conducted Emission Limits (Class A)

| Frequency (MHz) | | | Limit (dB μ V) | |
|-----------------|---|-------|--------------------|---------------|
| | | | Quasi-peak Level | Average Level |
| 0.15 | ~ | 0.50 | 79 | 66 |
| 0.50 | ~ | 30.00 | 73 | 60 |

NOTE1- Decreasing linearly with logarithm of frequency.

NOTE2- The lower limit shall apply at the transition frequencies.

3.1.4. EUT Configuration on Test

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

3.1.5. Operating Condition of EUT

3.1.5.1. Setup the EUT as shown on Section 3.1.2

3.1.5.2. Turn on the power of all equipments.

3.1.5.3. Let the EUT work in measuring Mode 1 and measure it.

3.1.6. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC/ANSI C63.4-2014 on Conducted Emission Measurement.

The bandwidth of the test receiver is set at 9kHz.

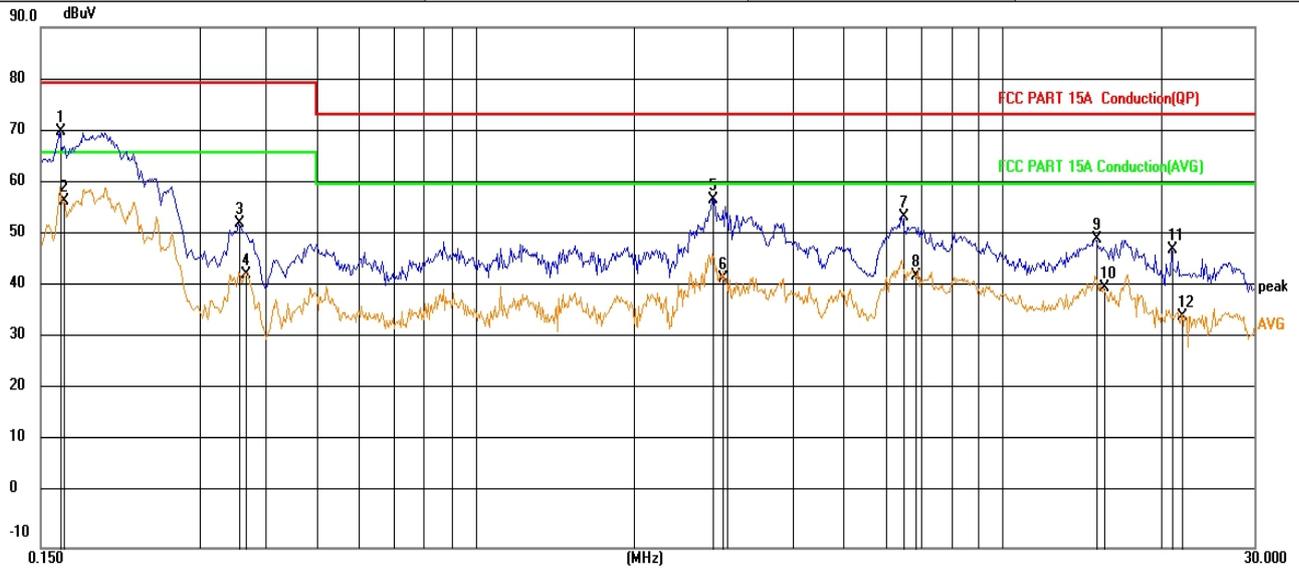
The frequency range from 150kHz to 30MHz is investigated

3.1.7. Test Results

PASS.

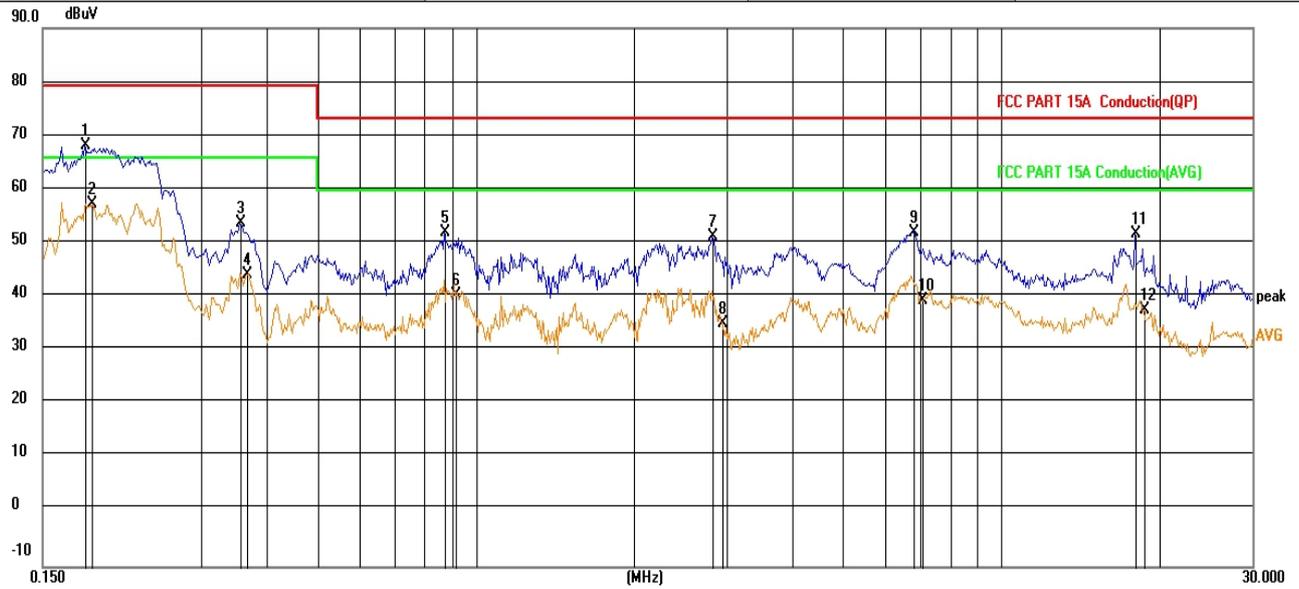
The test result please refer to the next page.

| | | | |
|---------------------------------|------------------|----------------------|--------------|
| Test Model | BI602PG2F | Test Mode | Mode 1 |
| Environmental Conditions | 23.3°C, 53.7% RH | Test Engineer | Jay Li |
| Pol | Line | Test Voltage | AC 120V/60Hz |



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|-----|-----------------|----------------|--------------|---------------|--------------|-------------|--------|
| 1 | 0.1635 | 50.85 | 19.15 | 70.00 | 79.00 | -9.00 | QP |
| 2 | 0.1658 | 37.57 | 19.16 | 56.73 | 66.00 | -9.27 | AVG |
| 3 | 0.3568 | 33.14 | 19.31 | 52.45 | 79.00 | -26.55 | QP |
| 4 | 0.3659 | 23.25 | 19.31 | 42.56 | 66.00 | -23.44 | AVG |
| 5 | 2.8093 | 37.49 | 19.46 | 56.95 | 73.00 | -16.05 | QP |
| 6 | 2.9400 | 22.23 | 19.47 | 41.70 | 60.00 | -18.30 | AVG |
| 7 | 6.4588 | 34.12 | 19.56 | 53.68 | 73.00 | -19.32 | QP |
| 8 | 6.8100 | 22.81 | 19.58 | 42.39 | 60.00 | -17.61 | AVG |
| 9 | 15.0000 | 29.15 | 20.15 | 49.30 | 73.00 | -23.70 | QP |
| 10 | 15.6074 | 19.85 | 20.19 | 40.04 | 60.00 | -19.96 | AVG |
| 11 | 20.9847 | 26.98 | 20.30 | 47.28 | 73.00 | -25.72 | QP |
| 12 | 21.8931 | 14.11 | 20.28 | 34.39 | 60.00 | -25.61 | AVG |

| | | | |
|---------------------------------|------------------|----------------------|--------------|
| Test Model | BI602PG2F | Test Mode | Mode 1 |
| Environmental Conditions | 23.3°C, 53.7% RH | Test Engineer | Jay Li |
| Pol | Neutral | Test Voltage | AC 120V/60Hz |



| No. | Frequency (MHz) | Reading (dBuV) | Correct (dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|-----|-----------------|----------------|--------------|---------------|--------------|-------------|--------|
| 1 | 0.1814 | 49.08 | 19.17 | 68.25 | 79.00 | -10.75 | QP |
| 2 | 0.1862 | 38.29 | 19.17 | 57.46 | 66.00 | -8.54 | AVG |
| 3 | 0.3568 | 34.64 | 19.31 | 53.95 | 79.00 | -25.05 | QP |
| 4 | 0.3672 | 24.87 | 19.31 | 44.18 | 66.00 | -21.82 | AVG |
| 5 | 0.8739 | 32.89 | 19.30 | 52.19 | 73.00 | -20.81 | QP |
| 6 | 0.9149 | 21.16 | 19.29 | 40.45 | 60.00 | -19.55 | AVG |
| 7 | 2.8093 | 31.99 | 19.46 | 51.45 | 73.00 | -21.55 | QP |
| 8 | 2.9400 | 15.73 | 19.47 | 35.20 | 60.00 | -24.80 | AVG |
| 9 | 6.7873 | 32.55 | 19.58 | 52.13 | 73.00 | -20.87 | QP |
| 10 | 7.0933 | 19.80 | 19.58 | 39.38 | 60.00 | -20.62 | AVG |
| 11 | 18.0330 | 31.68 | 20.27 | 51.95 | 73.00 | -21.05 | QP |
| 12 | 18.7118 | 17.34 | 20.30 | 37.64 | 60.00 | -22.36 | AVG |

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

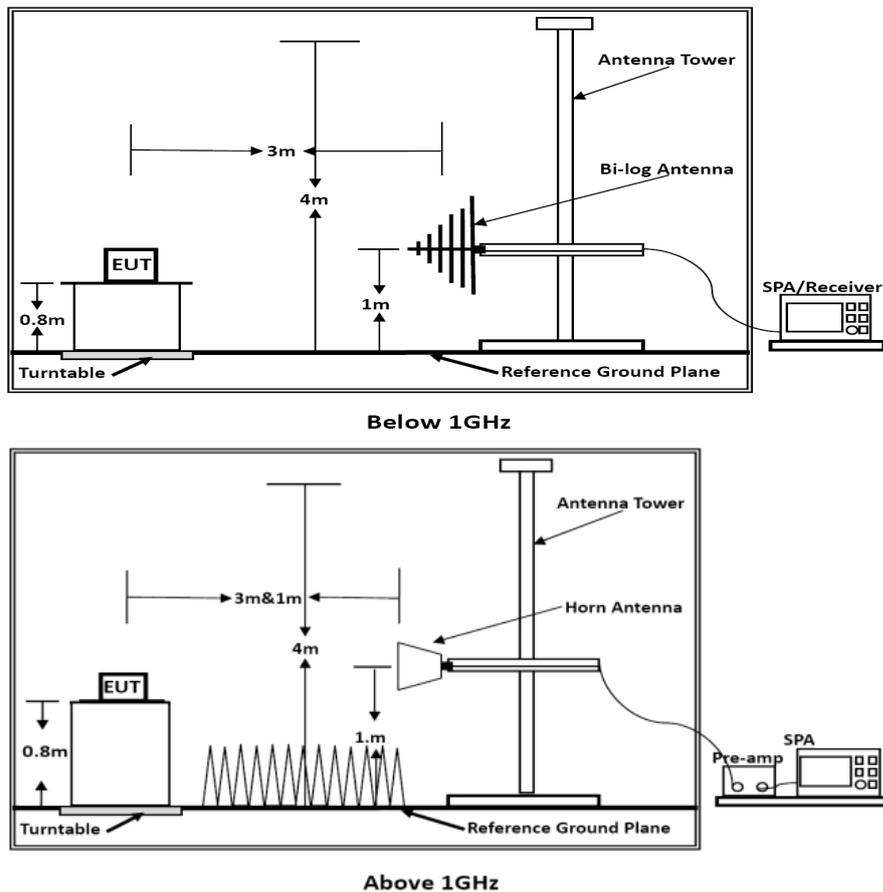
3.2. Radiated emission Measurement

3.2.1. Test Equipment

The following test equipments are used during the radiated emission measurement:

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. |
|------|--------------------------|----------------|--------------|------------|------------|
| 1 | EMI Test Software | AUDIX | E3 | / | N/A |
| 2 | 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 2019-06-12 |
| 3 | Positioning Controller | MF | MF-7082 | / | 2019-06-12 |
| 4 | By-log Antenna | SCHWARZBECK | VULB9163 | 9163-470 | 2019-07-25 |
| 5 | Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-1925 | 2019-07-01 |
| 6 | EMI Test Receiver | R&S | ESR 7 | 101181 | 2019-06-12 |
| 7 | RS SPECTRUM ANALYZER | R&S | FSP40 | 100503 | 2018-11-15 |
| 8 | Broadband Preamplifier | / | BP-01M18G | P190501 | 2019-07-01 |
| 9 | RF Cable-R03m | Jye Bao | RG142 | CB021 | 2019-06-12 |
| 10 | RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-HY | 2019-06-12 |

3.2.2. Block Diagram of Test Setup



3.2.3. Radiated Emission Limit (Class A)

Limits for Radiated Disturbance Below 1GHz

| FREQUENCY MHz | DISTANCE Meters | FIELD STRENGTHS LIMIT | |
|--|----------------------|---|--|
| | | $\mu\text{V}/\text{m}$ | $\text{dB}(\mu\text{V})/\text{m}$ |
| 30 ~ 88 | 3 | 90 | 50 |
| 88 ~ 216 | 3 | 150 | 53.5 |
| 216 ~ 960 | 3 | 200 | 56 |
| 960 ~ 1000 | 3 | 500 | 64 |
| Remark : (1) Emission level $(\text{dB})\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$ (2) The smaller limit shall apply at the cross point between two frequency bands. (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system. | | | |
| Limits for Radiated Emission Above 1GHz | | | |
| Frequency (MHz) | Distance (Meters) | Peak Limit ($\text{dB}\mu\text{V}/\text{m}$) | Average Limit ($\text{dB}\mu\text{V}/\text{m}$) |
| Above 1000 | 3 | 74 | 54 |
| ***Note: The lower limit applies at the transition frequency. | | | |

3.2.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.2.5. Operating Condition of EUT

3.2.5.1. Setup the EUT as shown in Section 3.2.2.

3.2.5.2. Let the EUT work in test Mode 1 and measure it.

3.2.6. Test Procedure

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2014 on radiated emission measurement.

The bandwidth of the EMI test receiver is set at 120kHz, 1000kHz.

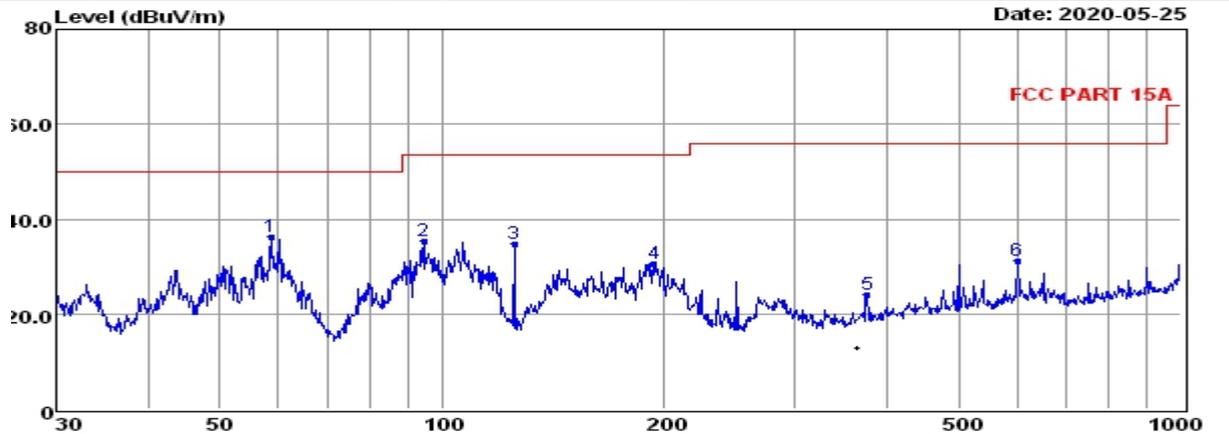
The frequency range from 30MHz to 1000MHz is checked.

3.2.7. Radiated Emission Noise Measurement Result

PASS.

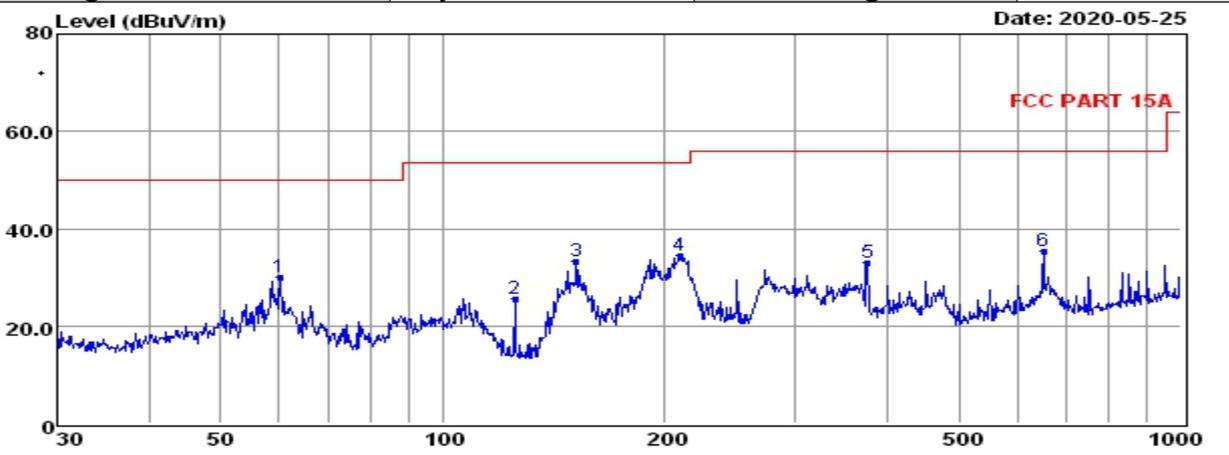
The scanning waveforms please refer to the next page.

| | | | |
|---------------------------------|------------------|--------------------------|--------------|
| Test Model | BI602PG2F | Test Mode | Mode 1 |
| Environmental Conditions | 22.2°C, 53.3% RH | Detector Function | Quasi-peak |
| Pol | Vertical | Distance | 3m |
| Test Engineer | Jay Li | Test Voltage | AC 120V/60Hz |



| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|--------|---------|--------|--------|----------|--------|--------|--------|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 58.61 | 22.95 | 0.49 | 12.78 | 36.22 | 50.00 | -13.78 | QP |
| 2 | 94.43 | 22.08 | 0.58 | 12.73 | 35.39 | 53.50 | -18.11 | QP |
| 3 | 125.01 | 24.29 | 0.71 | 9.70 | 34.70 | 53.50 | -18.80 | QP |
| 4 | 193.77 | 19.43 | 0.76 | 10.56 | 30.75 | 53.50 | -22.75 | QP |
| 5 | 375.94 | 8.55 | 1.10 | 14.56 | 24.21 | 56.00 | -31.79 | QP |
| 6 | 601.43 | 11.44 | 1.43 | 18.46 | 31.33 | 56.00 | -24.67 | QP |

| | | | |
|---------------------------------|------------------|--------------------------|--------------|
| Test Model | BI602PG2F | Test Mode | Mode 1 |
| Environmental Conditions | 22.2°C, 53.3% RH | Detector Function | Quasi-peak |
| Pol | Horizontal | Distance | 3m |
| Test Engineer | Jay Li | Test Voltage | AC 120V/60Hz |



| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|--------|---------|--------|--------|----------|--------|--------|--------|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 60.07 | 16.94 | 0.49 | 12.66 | 30.09 | 50.00 | -19.91 | QP |
| 2 | 125.01 | 15.14 | 0.71 | 9.70 | 25.55 | 53.50 | -27.95 | QP |
| 3 | 151.60 | 24.26 | 0.73 | 8.33 | 33.32 | 53.50 | -20.18 | QP |
| 4 | 209.31 | 22.79 | 0.86 | 10.86 | 34.51 | 53.50 | -18.99 | QP |
| 5 | 375.94 | 17.24 | 1.10 | 14.56 | 32.90 | 56.00 | -23.10 | QP |
| 6 | 651.94 | 15.03 | 1.58 | 18.64 | 35.25 | 56.00 | -20.75 | QP |

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

4. PHOTOGRAPH



Photo of Power Line Conducted Measurement



Photo of Radiated Measurement (Below 1GHz)

5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

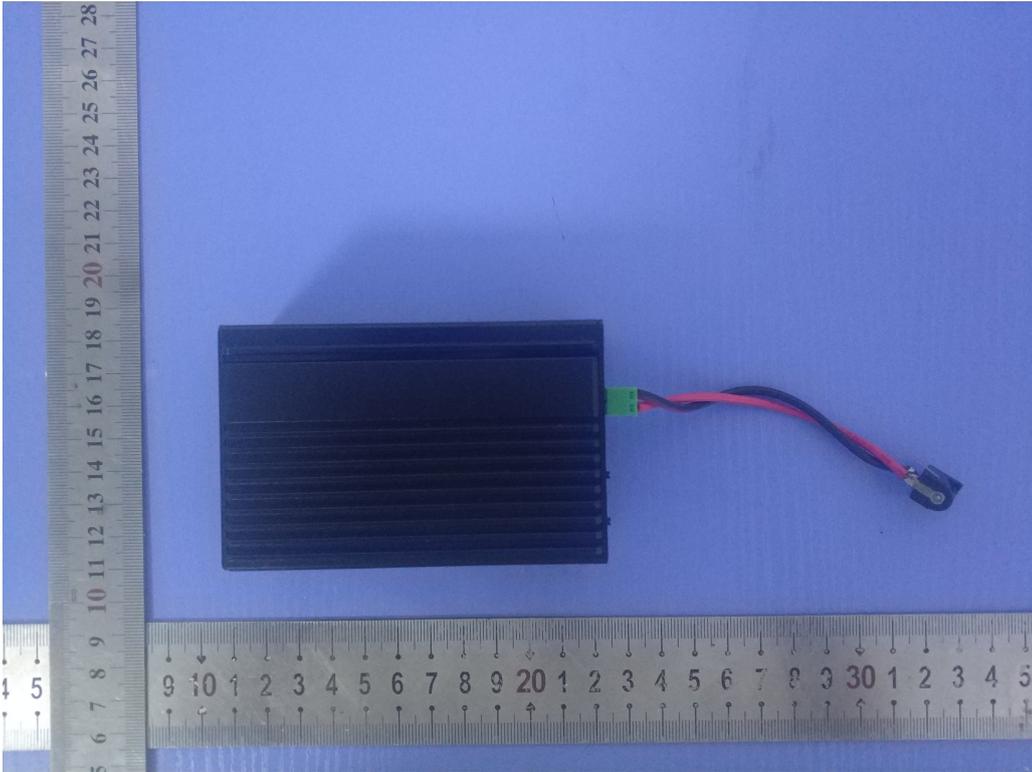


Fig. 1

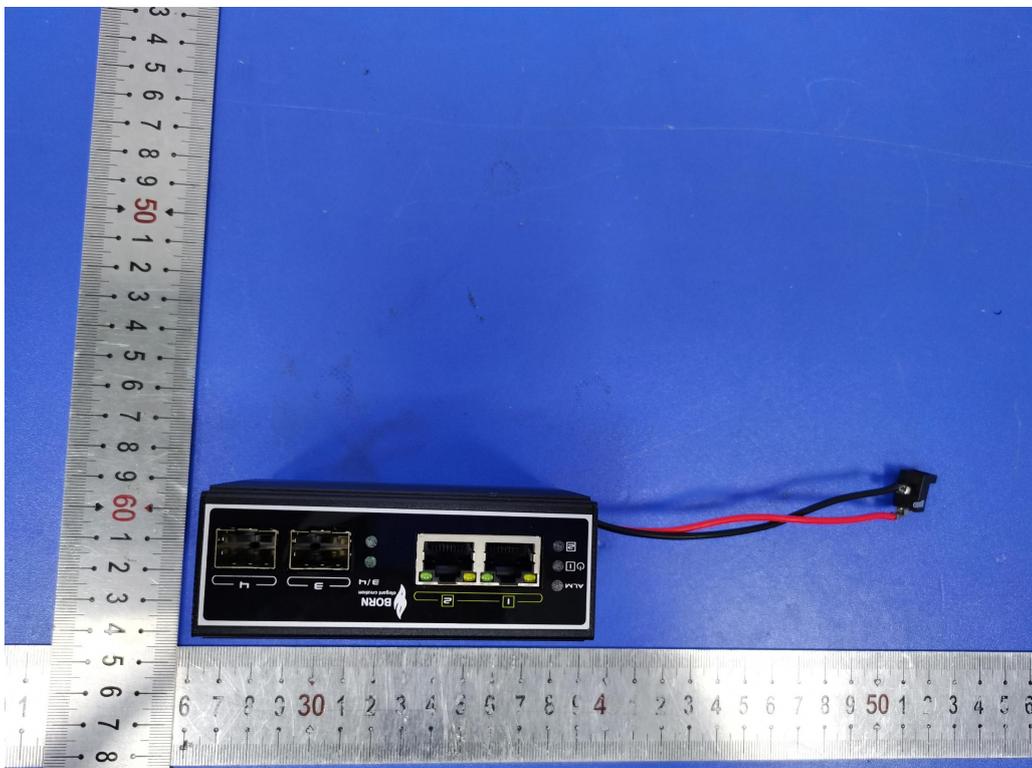


Fig. 2

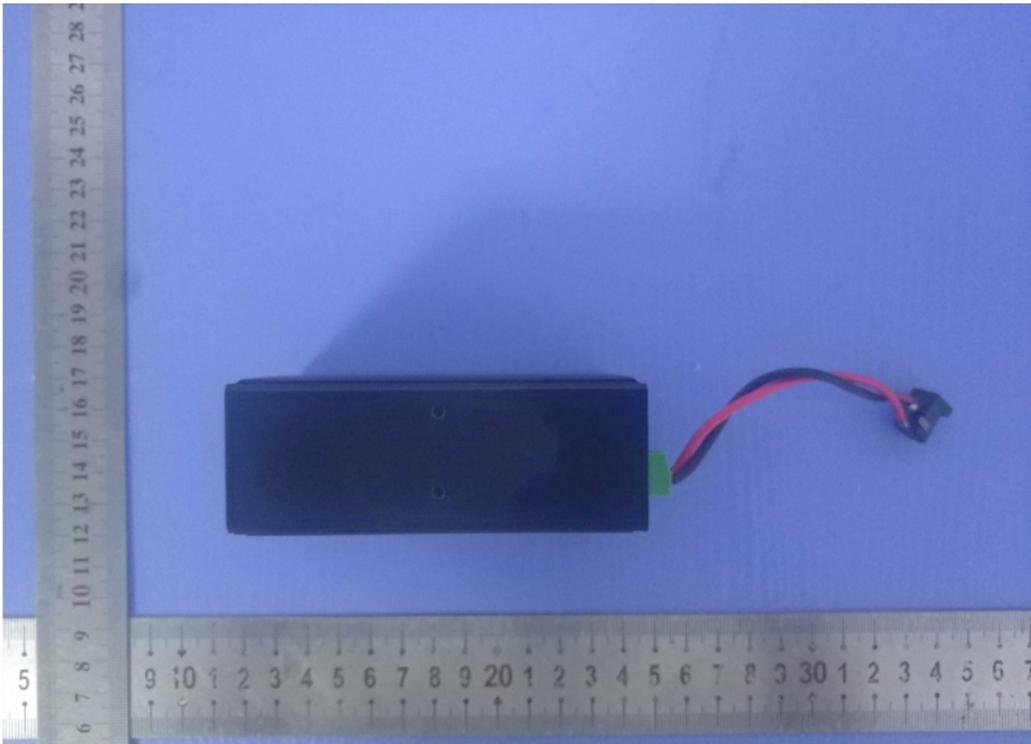


Fig. 3

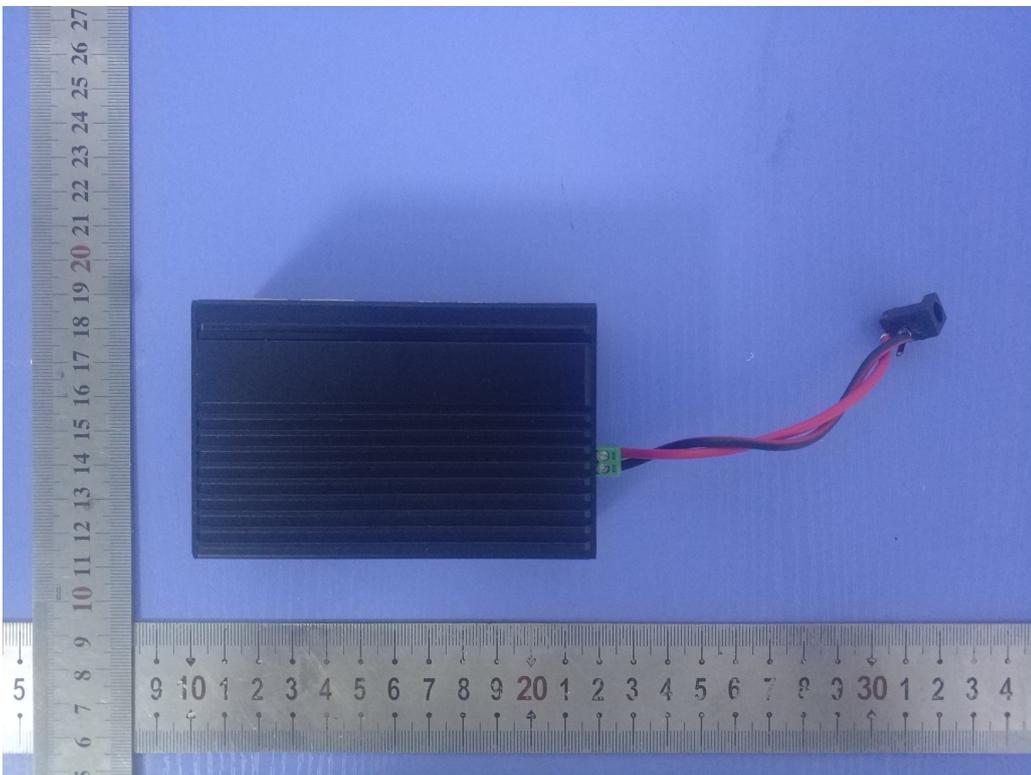


Fig. 4

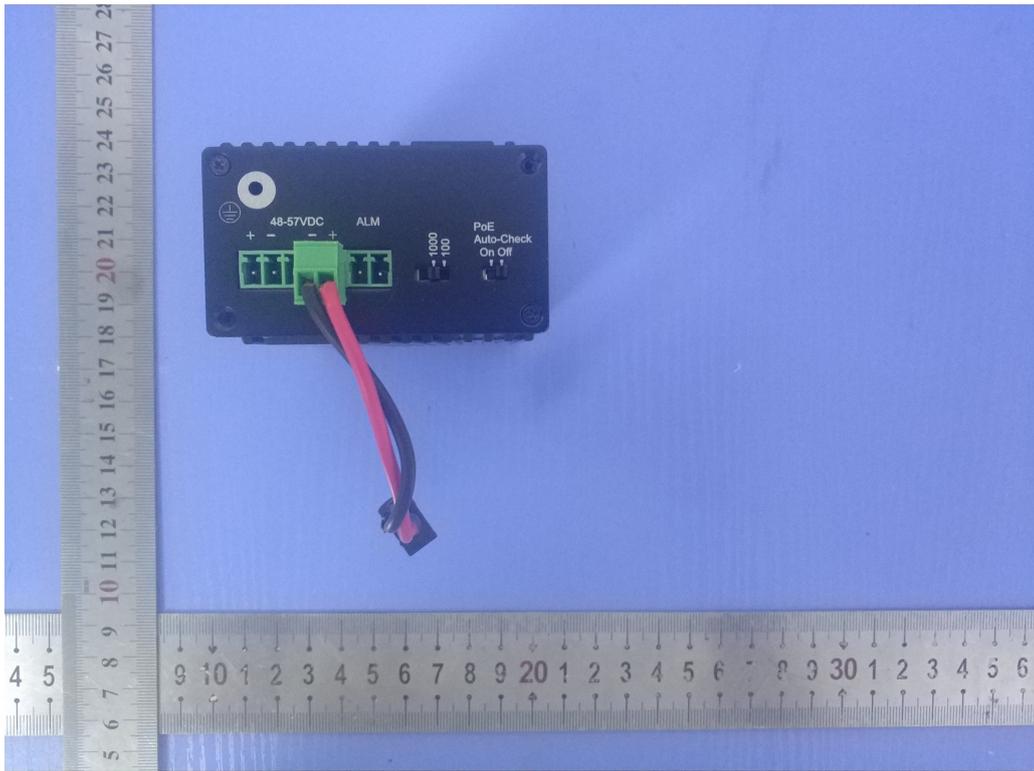


Fig. 5

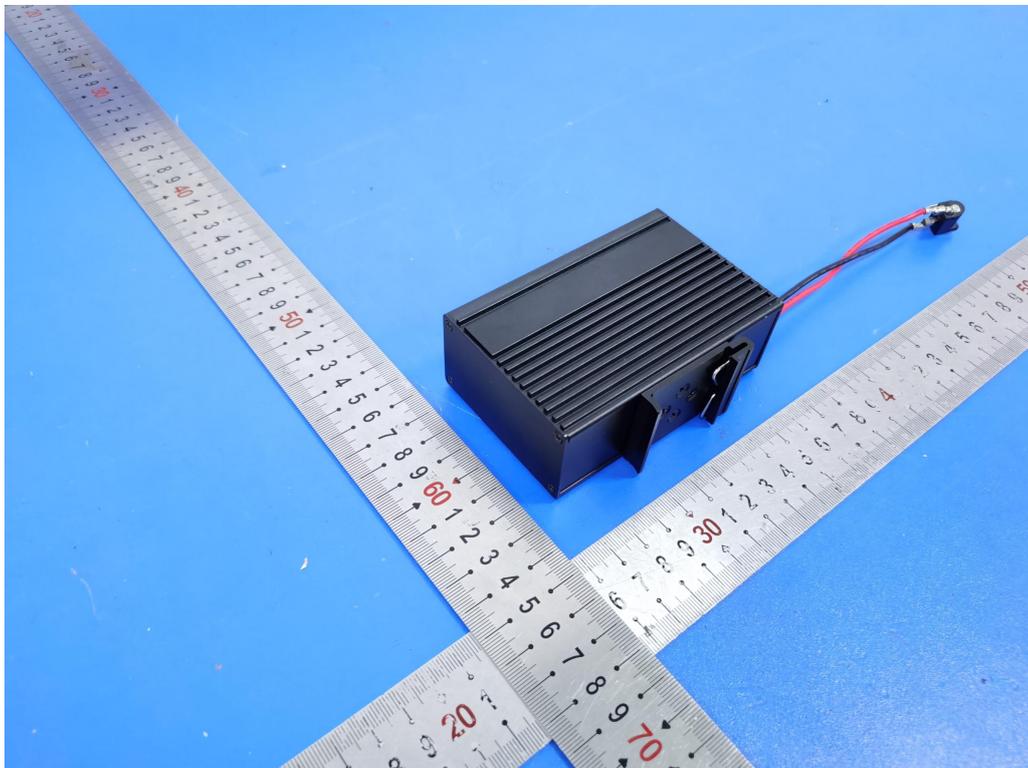


Fig. 6

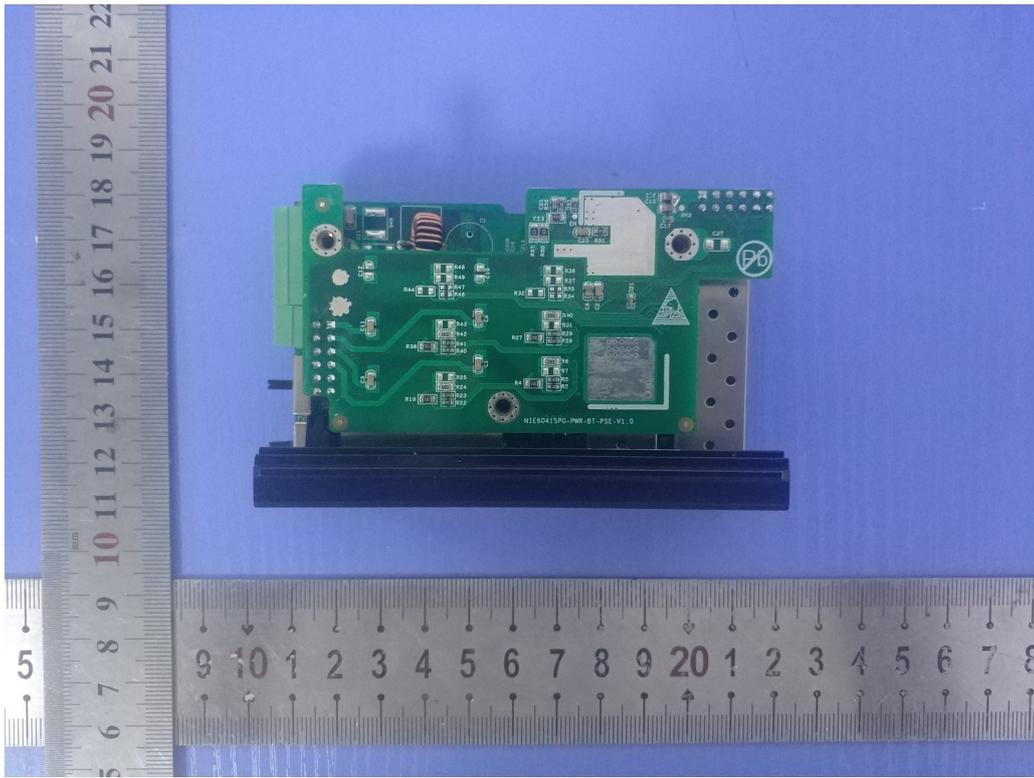


Fig. 7

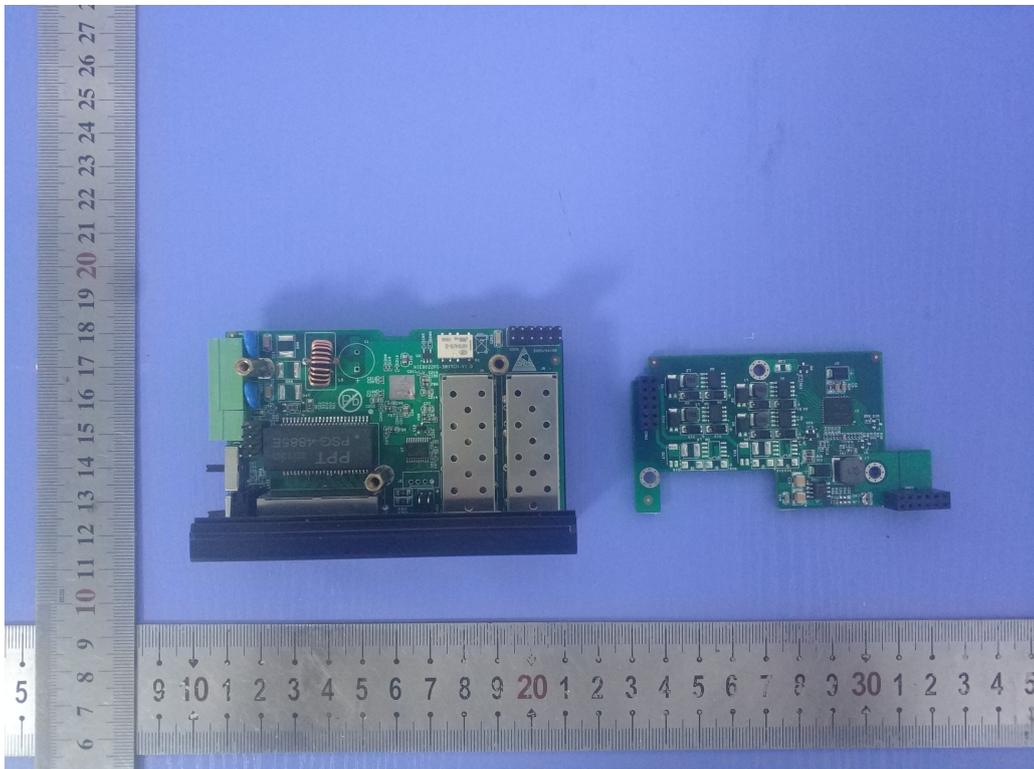


Fig. 8

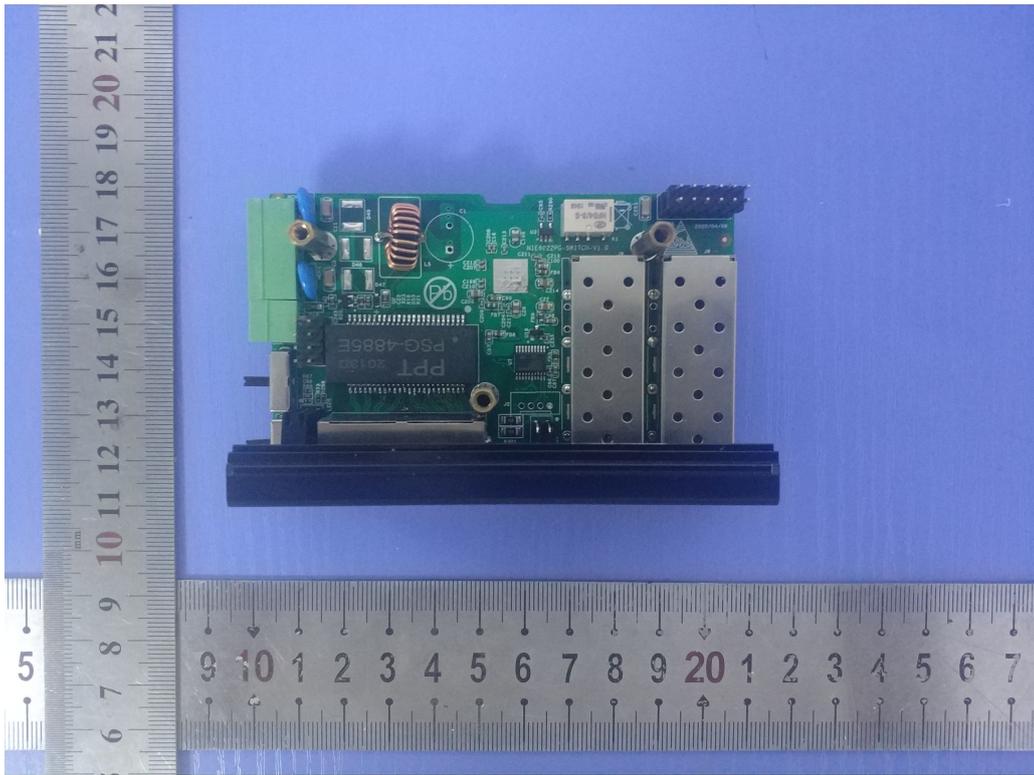
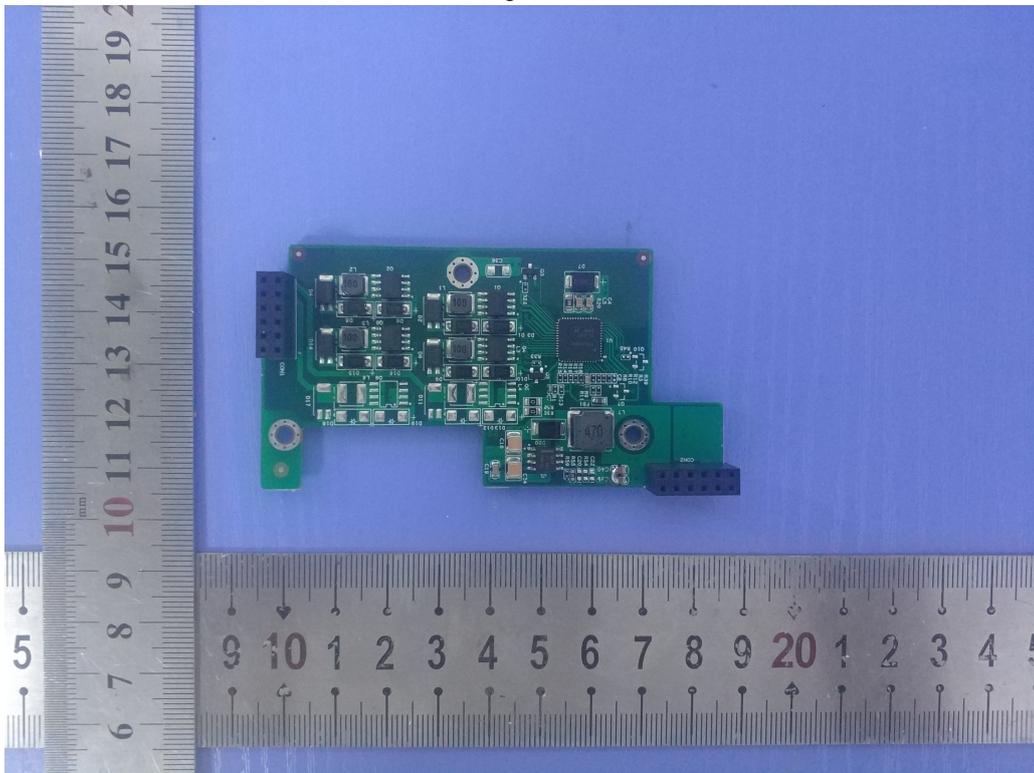


Fig. 9



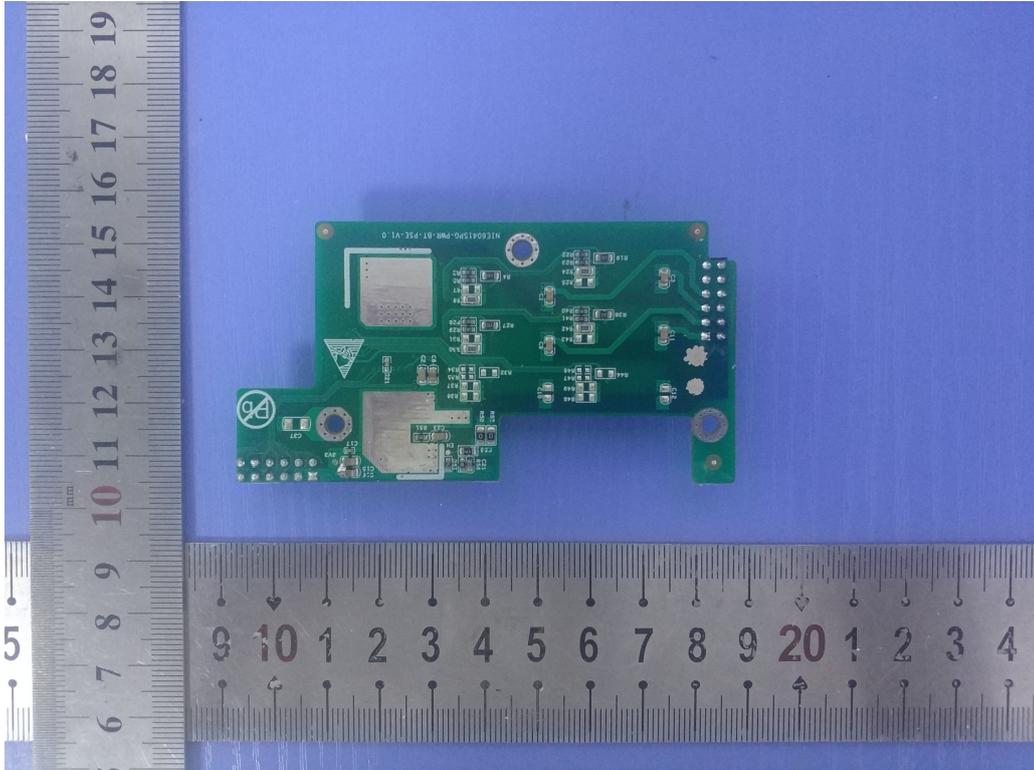


Fig. 10

-----THE END OF TEST REPORT-----