

# TEST REPORT

**Product** : WCDMA Digital Mobile Phone  
**Trade mark** : RugGear  
**Model/Type reference** : RG310, RG310EX, RG320EX  
**Serial Number** : N/A  
**Report Number** : EED32I00185907  
**FCC ID** : ZLE-RG310  
**Date of Issue** : Jul. 29, 2016  
**Test Standards** : 47 CFR Part 15 Subpart C (2015)  
**Test result** : PASS

Prepared for:

**Power Idea Technology Limited.**

**4th Floor, A Section, Languang Science&technology Xinx RD,  
Hi-Tech Industrial Park North, Nanshan, ShenZhen, China**

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Date:

Jul. 18, 2016

Check No.: 2384307786



## 2 Version

| Version No. | Date          | Description |
|-------------|---------------|-------------|
| 00          | Jul. 29, 2016 | Original    |
|             |               |             |
|             |               |             |

### 3 Test Summary

| Test Item                        | Test Requirement                                            | Test method      | Result |
|----------------------------------|-------------------------------------------------------------|------------------|--------|
| AC Power Line Conducted Emission | 47 CFR Part 15 Subpart C Section 15.207                     | ANSI C63.10-2013 | PASS   |
| Radiated Emission                | 47 CFR Part 15 Subpart C Section 15.209; 15.225(a)(b)(c)(d) | ANSI C63.10-2013 | PASS   |
| Frequency Tolerance              | 47 CFR Part 15 Subpart C Section 15.225(e)                  | ANSI C63.10-2013 | PASS   |
| Occupied Bandwidth               | 47 CFR Part 15 Subpart C Section 15.215                     | ANSI C63.10-2013 | PASS   |

Remark:

The tested sample and the sample information are provided by the client.

Model No.: RG310, RG310EX, RG320EX

Only the model RG310 was tested, the PCB, Schematic, Hardware etc were identical for the above models, Only different model name due to difference agent and marketing purposes.

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## 5 General Information

### 5.1 Client Information

|                          |                                                                                                                    |
|--------------------------|--------------------------------------------------------------------------------------------------------------------|
| Applicant:               | Power Idea Technology Limited.                                                                                     |
| Address of Applicant:    | 4th Floor, A Section, Languang Science&technology Xinx RD, Hi-Tech Industrial Park North, Nanshan, ShenZhen, China |
| Manufacturer:            | Power Idea Technology Limited.                                                                                     |
| Address of Manufacturer: | 4th Floor, A Section, Languang Science&technology Xinx RD, Hi-Tech Industrial Park North, Nanshan, ShenZhen, China |

### 5.2 General Description of EUT

|                                  |                                                                                      |
|----------------------------------|--------------------------------------------------------------------------------------|
| Product Name:                    | WCDMA Digital Mobile Phone                                                           |
| Mode No.(EUT):                   | RG310, RG310EX, RG320EX                                                              |
| Test Mode No.:                   | RG310                                                                                |
| Trade Mark:                      | RugGear                                                                              |
| EUT Supports Radios application: | 13.56MHz                                                                             |
| Power Supply:                    | Model: HKC0055010-2D<br>Input: 100-240V~ 50/60Hz 0.2A<br>Output: 5.0V $\approx$ 1.0A |
| Battery                          | Li-ion 3.7V/3600mAh                                                                  |

### 5.3 Product Specification subjective to this standard

|                       |                                |
|-----------------------|--------------------------------|
| Carrier Frequency:    | 13.56MHz                       |
| Modulation Type:      | ASK                            |
| Sample Type:          | Portable production            |
| Antenna Type:         | Integral                       |
| Test voltage:         | AC 120V, 60Hz                  |
| Sample Received Date: | Jun. 30, 2016                  |
| Sample tested Date:   | Jun. 30, 2016 to Jul. 29, 2016 |

### 5.4 Test Environment and Mode

|                               |                                                               |
|-------------------------------|---------------------------------------------------------------|
| <b>Operating Environment:</b> |                                                               |
| Temperature:                  | 21°C                                                          |
| Humidity:                     | 54 % RH                                                       |
| Atmospheric Pressure:         | 1010mbar                                                      |
| <b>Test mode:</b>             |                                                               |
| Transmitter mode:             | Keep the EUT in transmitting mode (NFC mode) with modulation. |

### 5.5 Description of Support Units

The EUT has been tested independently.

## 5.6 Test Location

*All tests were performed at:*

*Centre Testing International Group Co., Ltd.*

*Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101*

*Telephone: +86 (0) 755 3368 3668 Fax: +86 (0) 755 3368 3385*

*No tests were sub-contracted.*

## 5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### **CNAS-Lab Code: L1910**

Centre Testing International Group Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories..

### **A2LA-Lab Cert. No. 3061.01**

Centre Testing International Group Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### **FCC-Registration No.: 886427**

Centre Testing International Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 886427.

### **IC-Registration No.: 7408A-2**

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A-2 .

### **IC-Registration No.: 7408B-1**

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B-1.

### **NEMKO-Aut. No.: ELA503**

Centre Testing International Group Co., Ltd. has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

### **VCCI**

The Radiation 3 & 10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.

Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563.

Telecommunication Ports Conducted Disturbance Measurement of

Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.

The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

## 5.8 Deviation from Standards

None.

## 5.9 Abnormalities from Standard Conditions

None.

## 5.10 Other Information Requested by the Customer

None.

## 5.11 Measurement Uncertainty (95% confidence levels, k=2)

| No. | Item                       | Measurement Uncertainty |
|-----|----------------------------|-------------------------|
| 1   | Radio Frequency            | $7.9 \times 10^{-8}$    |
| 2   | Radiated Spurious emission | 4.5dB (30MHz-1GHz)      |
|     |                            | 4.8dB (1GHz-12.75GHz)   |
| 3   | Conduction emission        | 3.6dB (9kHz to 150kHz)  |
|     |                            | 3.2dB (150kHz to 30MHz) |
| 4   | Temperature                | 0.64°C                  |
| 5   | Humidity                   | 2.8%                    |
| 6   | DC power voltages          | 0.025%                  |

## 6 Equipment List

| Conducted disturbance Test      |              |          |               |                        |                            |
|---------------------------------|--------------|----------|---------------|------------------------|----------------------------|
| Equipment                       | Manufacturer | Mode No. | Serial Number | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| Receiver                        | R&S          | ESCI     | 100009        | 06-16-2016             | 06-15-2017                 |
| Temperature/ Humidity Indicator | TAYLOR       | 1451     | 1905          | 04-27-2016             | 04-26-2017                 |
| Communication test set          | Agilent      | E5515C   | GB47050534    | 04-01-2016             | 03-31-2017                 |
| Communication test set          | R&S          | CMW500   | 152394        | 04-01-2016             | 03-31-2017                 |
| LISN                            | R&S          | ENV216   | 100098        | 06-16-2016             | 06-15-2017                 |
| LISN                            | schwarzbeck  | NNLK8121 | 8121-529      | 06-16-2016             | 06-15-2017                 |
| Voltage Probe                   | R&S          | ESH2-Z3  | --            | 07-09-2014             | 07-07-2017                 |
| Current Probe                   | R&S          | EZ17     | 100106        | 06-16-2016             | 06-15-2017                 |
| ISN                             | TESEQ GmbH   | ISN T800 | 30297         | 01-29-2015             | 01-27-2017                 |

| 3M Semi/full-anechoic Chamber    |               |                              |               |                        |                            |
|----------------------------------|---------------|------------------------------|---------------|------------------------|----------------------------|
| Equipment                        | Manufacturer  | Mode No.                     | Serial Number | Cal. date (mm-dd-yyyy) | Cal. Due date (mm-dd-yyyy) |
| 3M Chamber & Accessory Equipment | TDK           | SAC-3                        | ---           | 06-05-2016             | 06-05-2019                 |
| TRILOG Broadband Antenna         | SCHWARZBECK   | VULB9163                     | 9163-484      | 05-23-2016             | 05-22-2017                 |
| Microwave Preamplifier           | Agilent       | 8449B                        | 3008A02425    | 02-04-2016             | 02-03-2017                 |
| Horn Antenna                     | ETS-LINDGREN  | 3117                         | 00057410      | 06-30-2015             | 06-28-2018                 |
| Horn Antenna                     | A.H.SYSTEMS   | SAS-574                      | 374           | 06-30-2015             | 06-28-2018                 |
| Loop Antenna                     | ETS           | 6502                         | 00071730      | 07-30-2015             | 07-28-2017                 |
| Spectrum Analyzer                | R&S           | FSP40                        | 100416        | 06-16-2016             | 06-15-2017                 |
| Receiver                         | R&S           | ESCI                         | 100435        | 06-16-2016             | 06-15-2017                 |
| Multi device Controller          | maturo        | NCD/070/10711<br>112         | ---           | 01-12-2016             | 01-11-2017                 |
| LISN                             | schwarzbeck   | NNBM8125                     | 81251547      | 06-16-2016             | 06-15-2017                 |
| LISN                             | schwarzbeck   | NNBM8125                     | 81251548      | 06-16-2016             | 06-15-2017                 |
| Signal Generator                 | Agilent       | E4438C                       | MY45095744    | 04-01-2016             | 03-31-2017                 |
| Signal Generator                 | Keysight      | E8257D                       | MY53401106    | 04-01-2016             | 03-31-2017                 |
| Temperature/ Humidity Indicator  | TAYLOR        | 1451                         | 1905          | 04-27-2016             | 04-26-2017                 |
| Communication test set           | Agilent       | E5515C                       | GB47050534    | 04-01-2016             | 03-31-2017                 |
| Cable line                       | Fulai(7M)     | SF106                        | 5219/6A       | 01-12-2016             | 01-11-2017                 |
| Cable line                       | Fulai(6M)     | SF106                        | 5220/6A       | 01-12-2016             | 01-11-2017                 |
| Cable line                       | Fulai(3M)     | SF106                        | 5216/6A       | 01-12-2016             | 01-11-2017                 |
| Cable line                       | Fulai(3M)     | SF106                        | 5217/6A       | 01-12-2016             | 01-11-2017                 |
| Communication test set           | R&S           | CMW500                       | 152394        | 04-01-2016             | 03-31-2017                 |
| High-pass filter                 | Sinoscite     | FL3CX03WG18<br>NM12-0398-002 | ---           | 01-12-2016             | 01-11-2017                 |
| High-pass filter                 | MICRO-TRONICS | SPA-F-63029-4                | ---           | 01-12-2016             | 01-11-2017                 |
| band rejection filter            | Sinoscite     | FL5CX01CA09C                 | ---           | 01-12-2016             | 01-11-2017                 |

|                       |           |                              |     |            |            |
|-----------------------|-----------|------------------------------|-----|------------|------------|
|                       |           | L12-0395-001                 |     |            |            |
| band rejection filter | Sinoscite | FL5CX01CA08C<br>L12-0393-001 | --- | 01-12-2016 | 01-11-2017 |
| band rejection filter | Sinoscite | FL5CX02CA04C<br>L12-0396-002 | --- | 01-12-2016 | 01-11-2017 |
| band rejection filter | Sinoscite | FL5CX02CA03C<br>L12-0394-001 | --- | 01-12-2016 | 01-11-2017 |

| Conducted RF test             |                           |                              |               |                           |                               |
|-------------------------------|---------------------------|------------------------------|---------------|---------------------------|-------------------------------|
| Equipment                     | Manufacturer              | Mode No.                     | Serial Number | Cal. date<br>(mm-dd-yyyy) | Cal. Due date<br>(mm-dd-yyyy) |
| Spectrum Analyzer             | R&S                       | FSP40                        | 100416        | 06-16-2016                | 06-15-2017                    |
| Receiver                      | R&S                       | ESCI                         | 100435        | 06-16-2016                | 06-15-2017                    |
| Noise generator               | Beijing damping<br>jidian | DM1661                       | 126001        | 04-01-2016                | 03-31-2017                    |
| Attenuator                    | HuaXiang                  | INMET64671                   | INMET64671    | 04-01-2016                | 03-31-2017                    |
| Signal Generator              | Agilent                   | E4438C                       | MY45095744    | 04-01-2016                | 03-31-2017                    |
| Attenuator                    | HuaXiang                  | SHX370                       | 15040701      | 04-01-2016                | 03-31-2017                    |
| Signal Generator              | Keysight                  | E8257D                       | MY53401106    | 04-01-2016                | 03-31-2017                    |
| High-pass filter(3-<br>18GHz) | Sinoscite                 | FL3CX03WG18<br>NM12-0398-002 | ---           | 01-12-2016                | 01-11-2017                    |
| High-pass filter(5-<br>18GHz) | MICRO-<br>TRONICS         | SPA-F-63029-4                | ---           | 01-12-2016                | 01-11-2017                    |
| band rejection filter         | Sinoscite                 | FL5CX01CA09C<br>L12-0395-001 | ---           | 01-12-2016                | 01-11-2017                    |
| band rejection filter         | Sinoscite                 | FL5CX01CA08C<br>L12-0393-001 | ---           | 01-12-2016                | 01-11-2017                    |
| band rejection filter         | Sinoscite                 | FL5CX02CA04C<br>L12-0396-002 | ---           | 01-12-2016                | 01-11-2017                    |

## 7 Test Result & Measurement Data

### 7.1 Antenna Requirement

**Standard Requirement:** 47 CFR Part 15C Section 15.203

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.



The antenna is integrated on the main PCB and no consideration of replacement.

### 7.2 Conducted Emissions

**Test Requirement:** 47 CFR Part 15C Section 15.207

**Test Method:** ANSI C63.10-2013

**Test Frequency Range:** 150kHz to 30MHz

**Limit:**

| Frequency range (MHz) | Limit (dBμV) |           |
|-----------------------|--------------|-----------|
|                       | Quasi-peak   | Average   |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |
| 0.5-5                 | 56           | 46        |
| 5-30                  | 60           | 50        |

\* Decreases with the logarithm of the frequency.

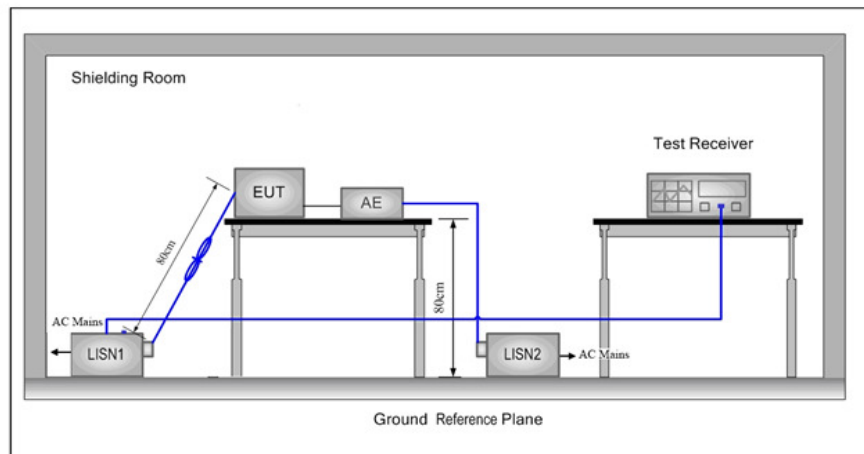
**Test Procedure:**

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a  $50\Omega/50\mu\text{H} + 5\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) 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,
- 4) The test was performed with a vertical ground reference plane. The rear of

the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.

#### Test Setup:



**Test Mode:**

Transmitter mode

**Instruments Used:**

Refer to section 6 for details

**Test Results:**

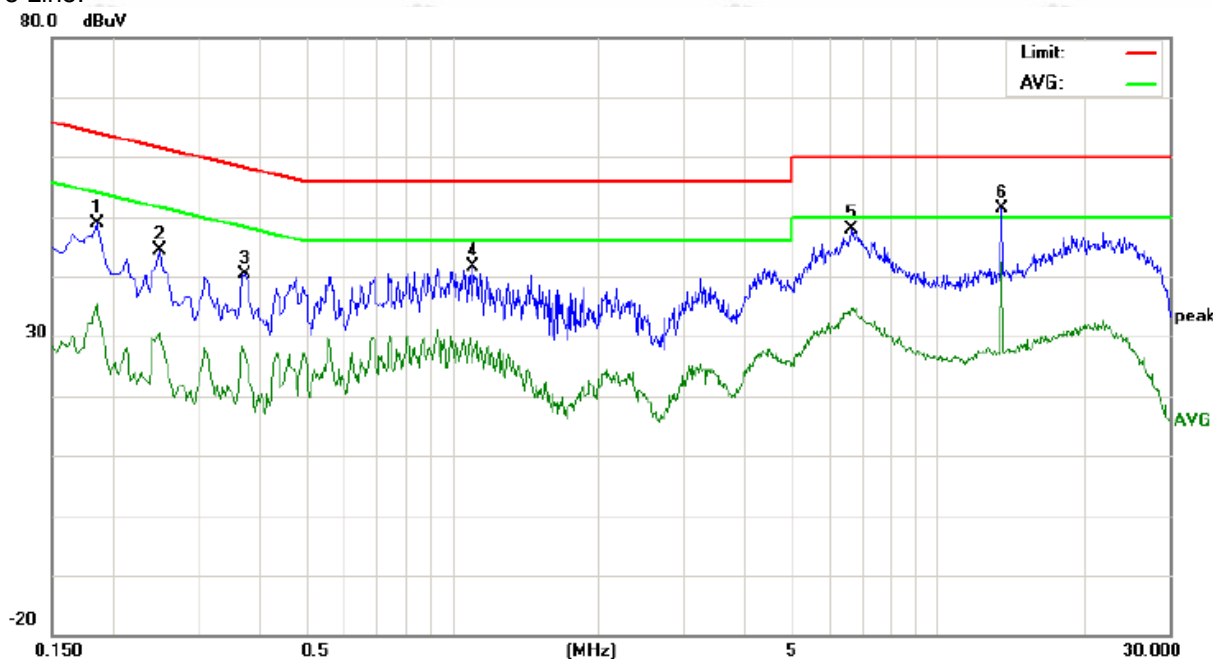
Pass

#### Test Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

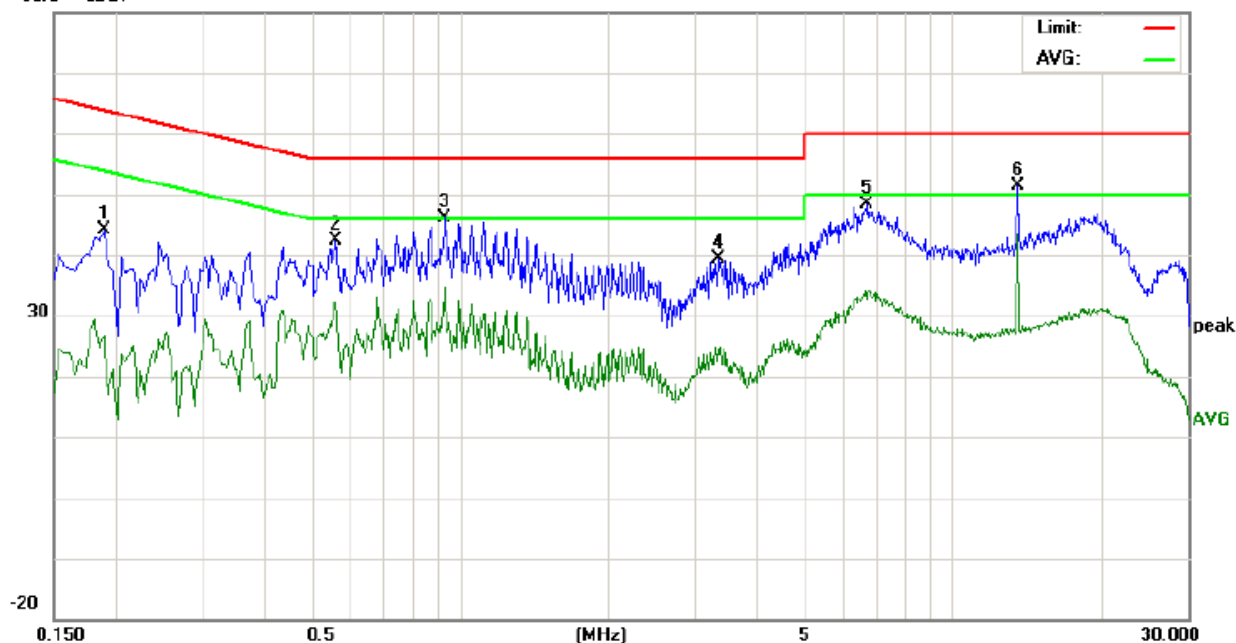
Live Line:



| No. | Freq.<br>MHz | Reading_Level<br>(dBuV) |       |       | Correct<br>Factor<br>dB | Measurement<br>(dBuV) |       |       | Limit<br>(dBuV) |       | Margin<br>(dB) |        | P/F | Comment |
|-----|--------------|-------------------------|-------|-------|-------------------------|-----------------------|-------|-------|-----------------|-------|----------------|--------|-----|---------|
|     |              | Peak                    | QP    | AVG   |                         | peak                  | QP    | AVG   | QP              | AVG   | QP             | AVG    |     |         |
| 1   | 0.1860       | 38.97                   | 31.30 | 25.47 | 9.80                    | 48.77                 | 41.10 | 35.27 | 64.21           | 54.21 | -23.11         | -18.94 | P   |         |
| 2   | 0.2500       | 34.69                   | 28.40 | 20.81 | 9.80                    | 44.49                 | 38.20 | 30.61 | 61.75           | 51.75 | -23.55         | -21.14 | P   |         |
| 3   | 0.3740       | 30.44                   | 25.40 | 17.00 | 9.87                    | 40.31                 | 35.27 | 26.87 | 58.41           | 48.41 | -23.14         | -21.54 | P   |         |
| 4   | 1.1100       | 31.66                   | 22.60 | 17.25 | 10.00                   | 41.66                 | 32.60 | 27.25 | 56.00           | 46.00 | -23.40         | -18.75 | P   |         |
| 5   | 6.6580       | 37.99                   | 31.00 | 24.62 | 10.00                   | 47.99                 | 41.00 | 34.62 | 60.00           | 50.00 | -19.00         | -15.38 | P   |         |
| 6   | 13.5620      | 41.34                   | 40.40 | 32.40 | 10.07                   | 51.41                 | 50.47 | 42.47 | 60.00           | 50.00 | -9.53          | -7.53  | P   |         |

Neutral Line:

90.0 dBuV



| No. | Freq.<br>MHz | Reading_Level<br>(dBuV) |       |       | Correct<br>Factor<br>dB | Measurement<br>(dBuV) |       |       | Limit<br>(dBuV) |       | Margin<br>(dB) |        | P/F | Comment |
|-----|--------------|-------------------------|-------|-------|-------------------------|-----------------------|-------|-------|-----------------|-------|----------------|--------|-----|---------|
|     |              | Peak                    | QP    | AVG   |                         | peak                  | QP    | AVG   | QP              | AVG   | QP             | AVG    |     |         |
| 1   | 0.1900       | 34.38                   | 28.30 | 16.90 | 9.80                    | 44.18                 | 38.10 | 26.70 | 64.03           | 54.03 | -25.93         | -27.33 | P   |         |
| 2   | 0.5620       | 32.45                   | 27.70 | 22.18 | 9.90                    | 42.35                 | 37.60 | 32.08 | 56.00           | 46.00 | -18.40         | -13.92 | P   |         |
| 3   | 0.9340       | 36.02                   | 31.90 | 24.65 | 10.00                   | 46.02                 | 41.90 | 34.65 | 56.00           | 46.00 | -14.10         | -11.35 | P   |         |
| 4   | 3.3580       | 29.26                   | 23.60 | 14.38 | 10.00                   | 39.26                 | 33.60 | 24.38 | 56.00           | 46.00 | -22.40         | -21.62 | P   |         |
| 5   | 6.7060       | 38.47                   | 30.80 | 23.71 | 10.00                   | 48.47                 | 40.80 | 33.71 | 60.00           | 50.00 | -19.20         | -16.29 | P   |         |
| 6   | 13.5620      | 41.42                   | 39.20 | 33.29 | 10.07                   | 51.49                 | 49.27 | 43.36 | 60.00           | 50.00 | -10.73         | -6.64  | P   |         |

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

### 7.3 Radiated Emissions

**Test Requirement:** 47 CFR Part 15 Subpart C Section 15.209; 15.225(a)(b)(c)(d)

**Test Method:** ANSI C63.10-2013

**Test Site:** 3m (Semi-Anechoic Chamber)

**Requirements:**

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

**Receiver Setup:**

| Frequency         | Detector   | RBW     | VBW    | Remark     |
|-------------------|------------|---------|--------|------------|
| 0.009MHz-0.090MHz | Quasi-peak | 10kHz   | 30kHz  | Peak       |
| 0.009MHz-0.090MHz | Quasi-peak | 10kHz   | 30kHz  | Average    |
| 0.090MHz-0.110MHz | Quasi-peak | 10kHz   | 30kHz  | Quasi-peak |
| 0.110MHz-0.490MHz | Quasi-peak | 10kHz   | 30kHz  | Peak       |
| 0.110MHz-0.490MHz | Quasi-peak | 10kHz   | 30kHz  | Average    |
| 0.490MHz -30MHz   | Quasi-peak | 10kHz   | 30kHz  | Quasi-peak |
| 30MHz-1GHz        | Quasi-peak | 120 kHz | 300kHz | Quasi-peak |
| Above 1GHz        | Peak       | 1MHz    | 3MHz   | Peak       |
|                   | Peak       | 1MHz    | 10Hz   | Average    |

**Test Setup:**

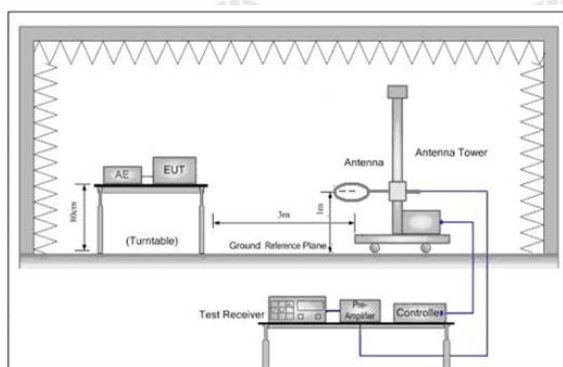


Figure 1. Below 30MHz

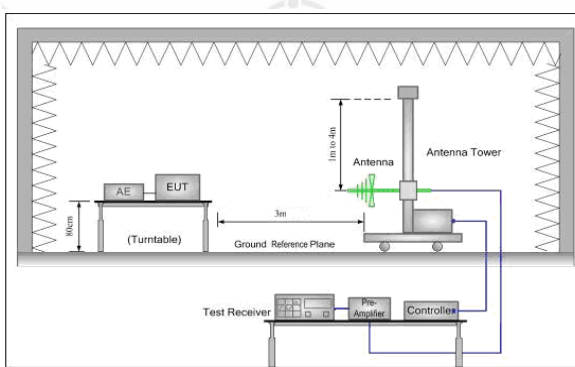


Figure 2. 30MHz to 1GHz

**Test Procedure:**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The limit 1.705MHz to 30MHz in clause 4.3 are specified at 30 meters, and measurements were made at 3 meters, the limit is translated to 3 meters by using a formula as follows:  
$$\text{Limit}_{3m} = \text{Limit}_{30m} + 40\log(30m/3)$$
8. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

**Test Mode:**

Transmitter mode

**Instruments Used:**

Refer to section 6 for details

**Test Result:**

Pass

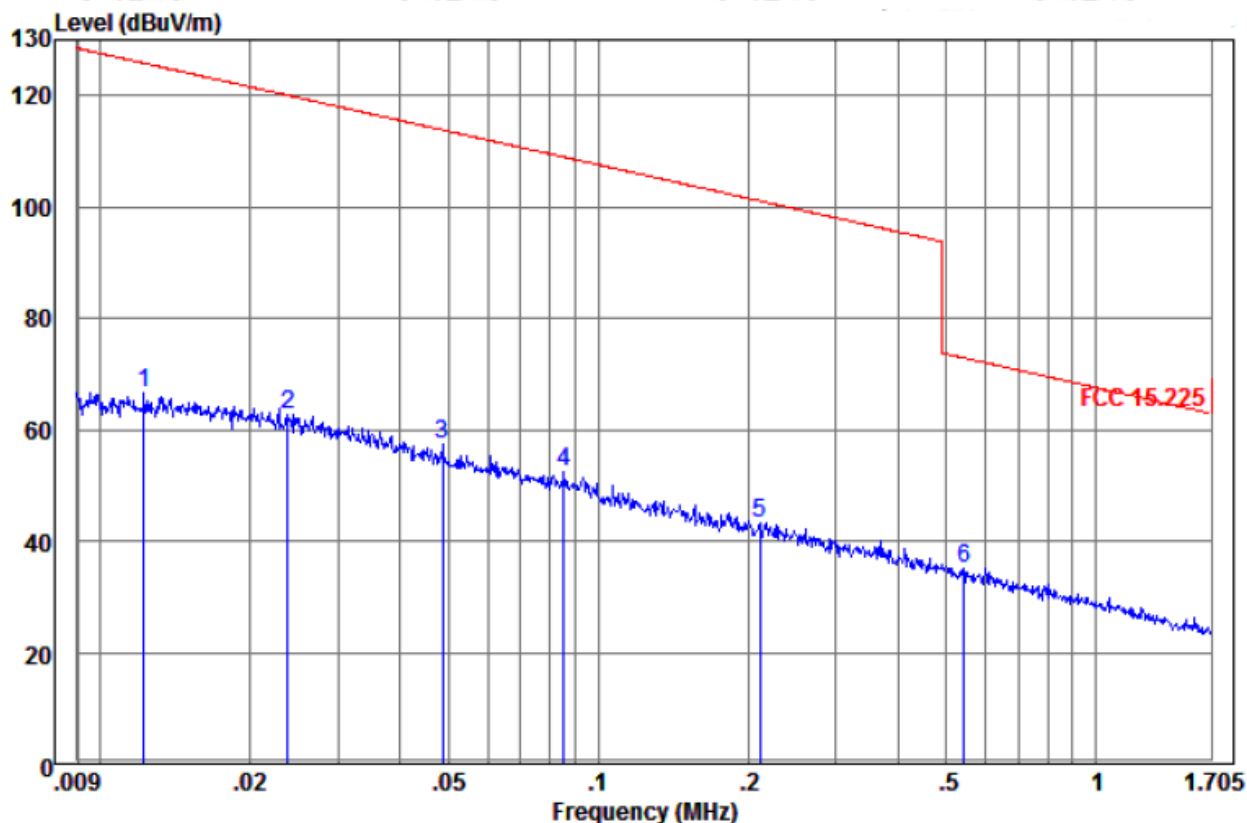
**1.705-30MHz**

**Mode**

Test Procedure: For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.4: 2014, section 8.2.1. The center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

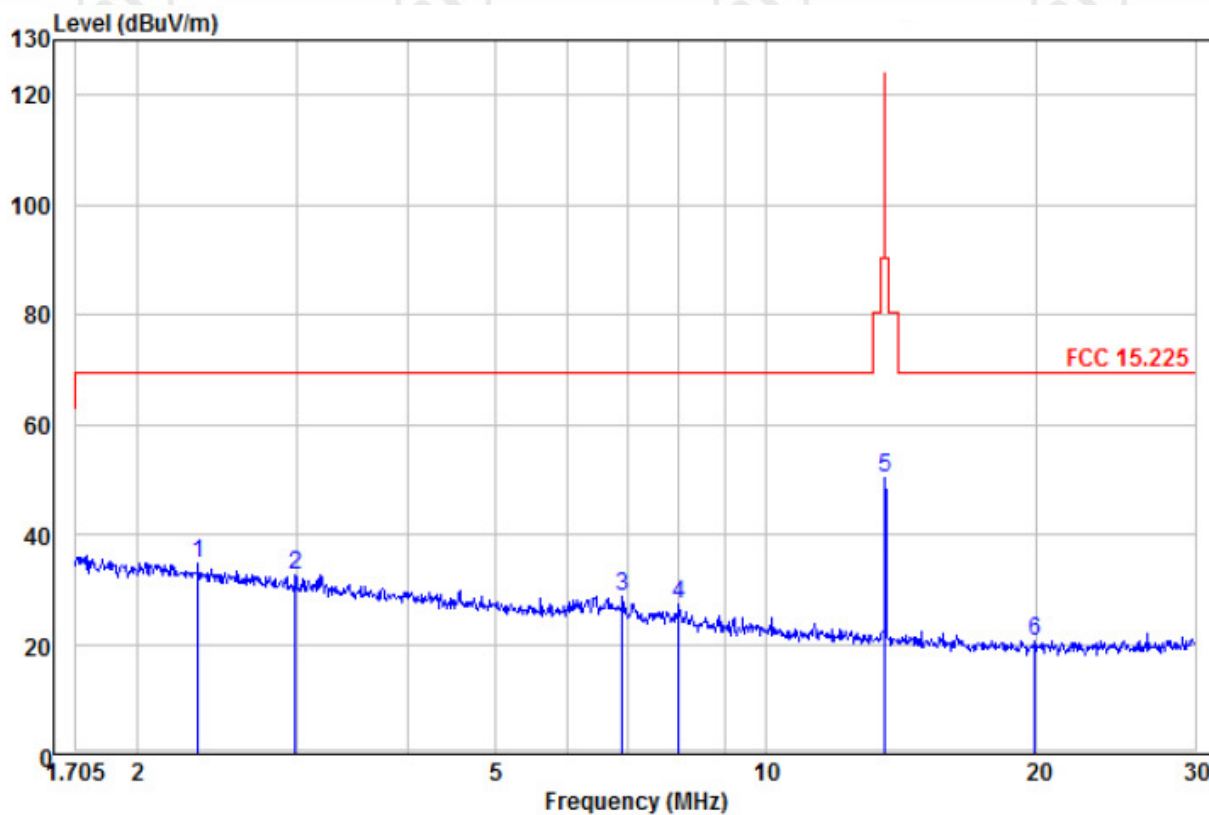
**Test data:**

9 kHz-1.705MHz

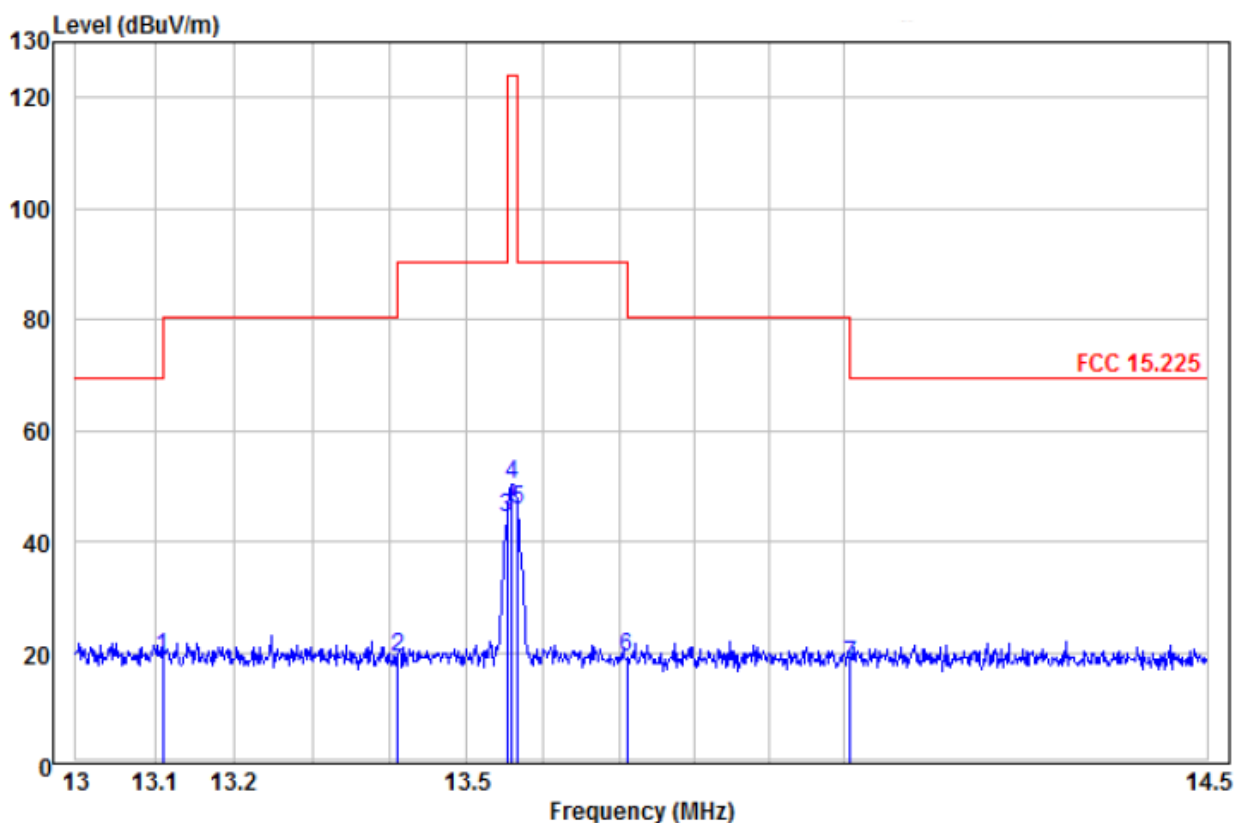


| Freq<br>(MHz) | Antenna_Factor<br>(dB/m) | Cable_Loss<br>(dB) | Read_Level<br>(dBUV) | Level<br>(dBUV/m) | Limit_Line<br>(dBUV/m) | Over_Limit<br>(dB) | Polarization | Remark |
|---------------|--------------------------|--------------------|----------------------|-------------------|------------------------|--------------------|--------------|--------|
| 0.01226       | 18.19                    | 0.03               | 48.21                | 66.43             | 125.81                 | -59.38             | X            | PK     |
| 0.02387       | 15.57                    | 0.05               | 47.21                | 62.83             | 120.03                 | -57.2              | X            | PK     |
| 0.04871       | 11.84                    | 0.07               | 45.37                | 57.28             | 113.84                 | -56.56             | X            | PK     |
| 0.08537       | 11.46                    | 0.10               | 40.77                | 52.33             | 108.97                 | -56.64             | X            | PK     |
| 0.21149       | 11.33                    | 0.11               | 31.87                | 43.31             | 101.09                 | -57.78             | X            | PK     |
| 0.54354       | 11.30                    | 0.12               | 23.67                | 35.09             | 72.89                  | -37.8              | X            | QP     |

1.705MHz-30MHz

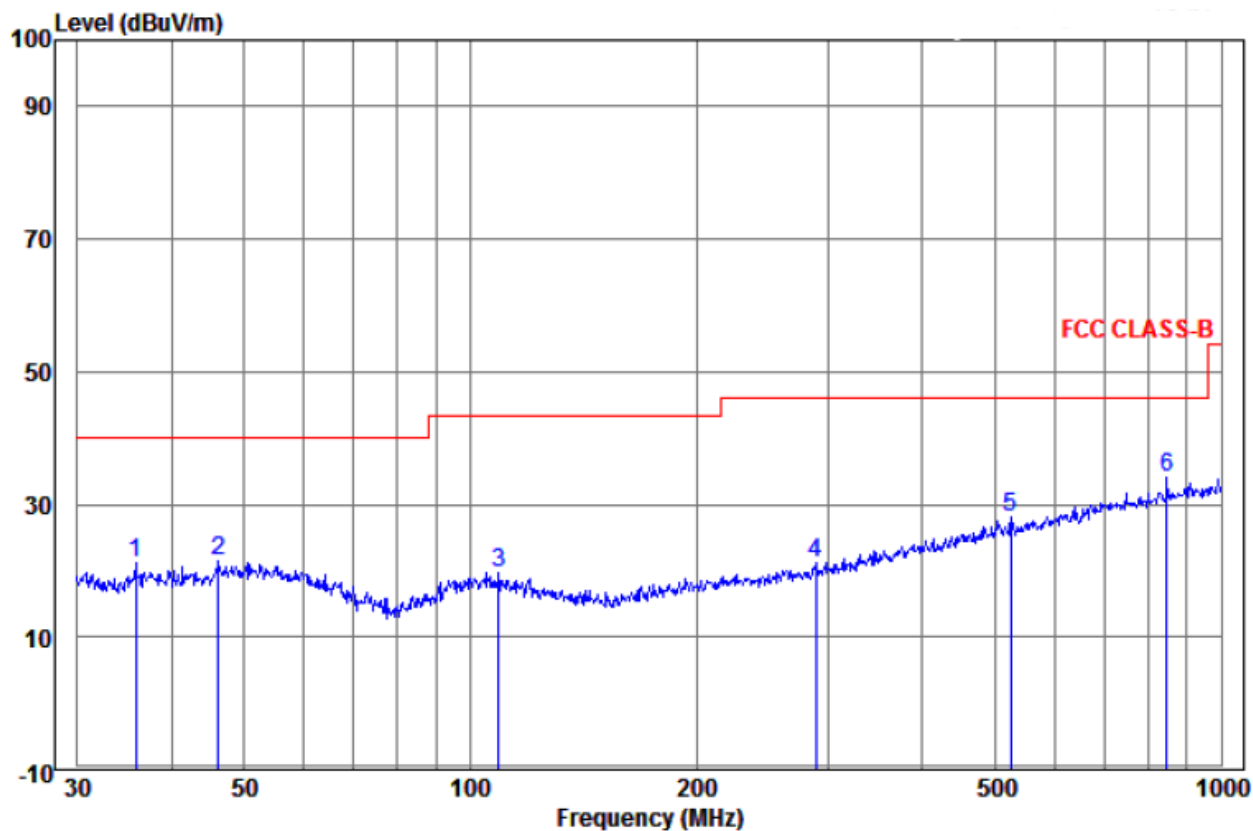


| Freq (MHz) | Antenna_Factor (dB/m) | Cable_Loss (dB) | Read_Level (dBuV) | Level (dBuV/m) | Limit_Line (dBuV/m) | Over_Limit (dB) | Polarization | Remark |
|------------|-----------------------|-----------------|-------------------|----------------|---------------------|-----------------|--------------|--------|
| 2.331      | 11.44                 | 0.18            | 23.10             | 34.72          | 69.5                | -34.78          | X            | QP     |
| 2.991      | 11.50                 | 0.16            | 21.03             | 32.69          | 69.5                | -36.81          | X            | QP     |
| 6.910      | 11.06                 | 0.37            | 17.22             | 28.65          | 69.5                | -40.85          | X            | QP     |
| 7.998      | 11.00                 | 0.48            | 15.65             | 27.13          | 69.5                | -42.37          | X            | QP     |
| 13.556     | 10.75                 | 0.69            | 38.80             | 50.24          | 123.9               | -73.66          | X            | QP     |
| 19.908     | 10.11                 | 0.77            | 9.64              | 20.52          | 69.5                | -48.98          | X            | QP     |

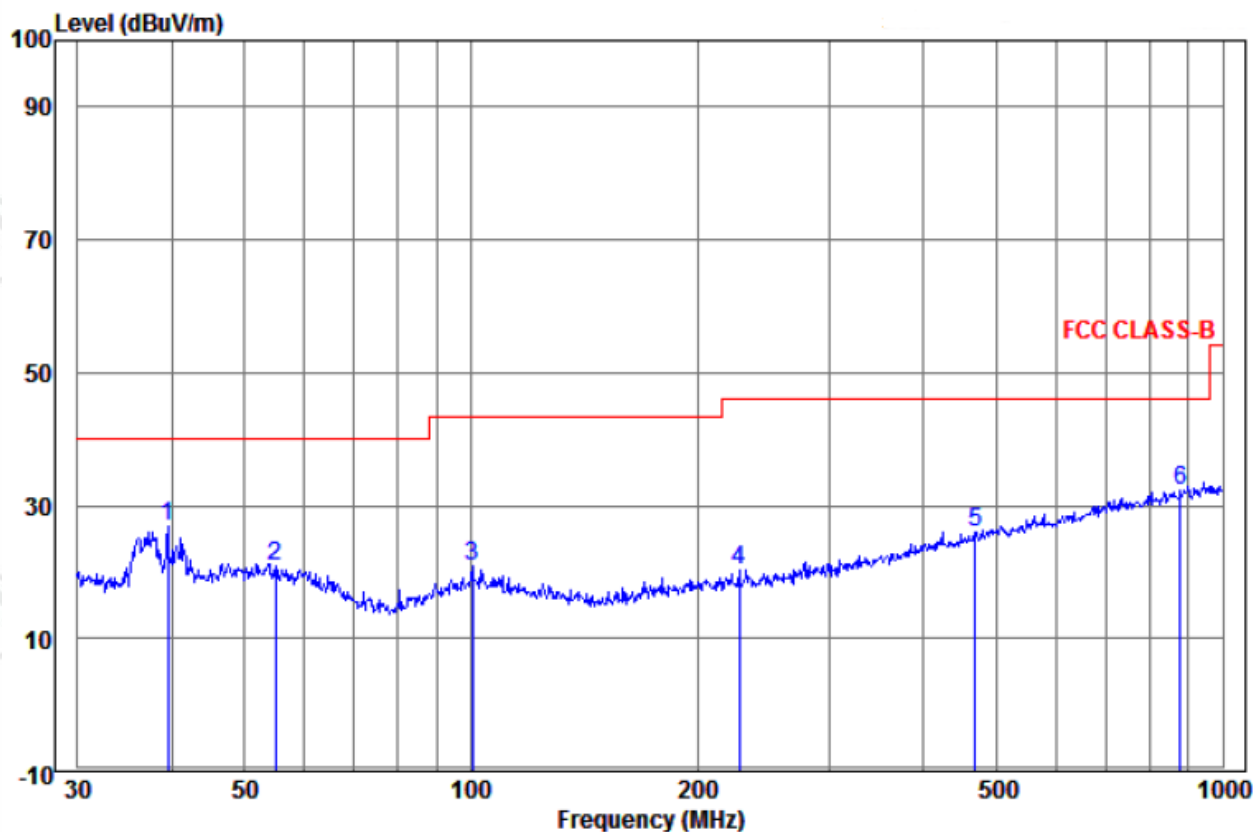


| Freq (MHz) | Antenna_Factor (dB/m) | Cable_Loss (dB) | Read_Level (dBuV) | Level (dBuV/m) | Limit_Line (dBuV/m) | Over_Limit (dB) | Polarization | Remark |
|------------|-----------------------|-----------------|-------------------|----------------|---------------------|-----------------|--------------|--------|
| 13.11      | 10.77                 | 0.68            | 7.64              | 19.09          | 80.5                | -61.41          | X            | QP     |
| 13.41      | 10.76                 | 0.68            | 7.53              | 18.97          | 90.4                | -71.43          | X            | QP     |
| 13.553     | 10.75                 | 0.68            | 32.79             | 44.22          | 90.4                | -46.18          | X            | QP     |
| 13.56      | 10.75                 | 0.69            | 38.81             | 50.25          | 123.9               | -73.65          | X            | QP     |
| 13.567     | 10.75                 | 0.69            | 34.11             | 45.55          | 123.9               | -78.35          | X            | QP     |
| 13.71      | 10.74                 | 0.69            | 7.78              | 19.21          | 90.4                | -71.19          | X            | QP     |
| 14.01      | 10.73                 | 0.69            | 6.29              | 17.71          | 80.5                | -62.79          | X            | QP     |

**Remark:** The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case X axis is shown in the report.



| Freq<br>(MHz) | Antenna_Factor<br>(dB/m) | Cable_Loss<br>(dB) | Read_Level<br>(dBuV) | Level<br>(dBuV/m) | Limit_Line<br>(dBuV/m) | Over_Limit<br>(dB) | Polarization | Remark |
|---------------|--------------------------|--------------------|----------------------|-------------------|------------------------|--------------------|--------------|--------|
| 35.875        | 13.56                    | 0.78               | 6.8                  | 21.14             | 40                     | -18.86             | Horizontal   | QP     |
| 46.178        | 14.78                    | 1.09               | 5.61                 | 21.48             | 40                     | -18.52             | Horizontal   | QP     |
| 109.029       | 12.45                    | 1.57               | 5.64                 | 19.66             | 43.5                   | -23.84             | Horizontal   | QP     |
| 289.002       | 13.27                    | 2.37               | 5.64                 | 21.28             | 46                     | -24.72             | Horizontal   | QP     |
| 524.554       | 18.50                    | 3.17               | 6.53                 | 28.20             | 46                     | -17.80             | Horizontal   | QP     |
| 848.056       | 21.89                    | 4.17               | 7.98                 | 34.04             | 46                     | -11.96             | Horizontal   | QP     |



| Freq (MHz) | Antenna_Factor (dB/m) | Cable_Loss (dB) | Read_Level (dBuV) | Level (dBuV/m) | Limit_Line (dBuV/m) | Over_Limit (dB) | Polarization | Remark |
|------------|-----------------------|-----------------|-------------------|----------------|---------------------|-----------------|--------------|--------|
| 39.576     | 14.14                 | 0.55            | 12.32             | 27.01          | 40                  | -12.99          | Vertical     | QP     |
| 55.027     | 14.42                 | 1.42            | 5.12              | 20.96          | 40                  | -19.04          | Vertical     | QP     |
| 100.581    | 13.15                 | 1.57            | 6.02              | 20.74          | 43.5                | -22.76          | Vertical     | QP     |
| 227.691    | 12.06                 | 2.29            | 6.04              | 20.39          | 46                  | -25.61          | Vertical     | QP     |
| 468.876    | 17.61                 | 3.04            | 5.32              | 25.97          | 46                  | -20.03          | Vertical     | QP     |
| 878.322    | 22.19                 | 4.27            | 5.88              | 32.34          | 46                  | -13.66          | Vertical     | QP     |

Remark:

- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

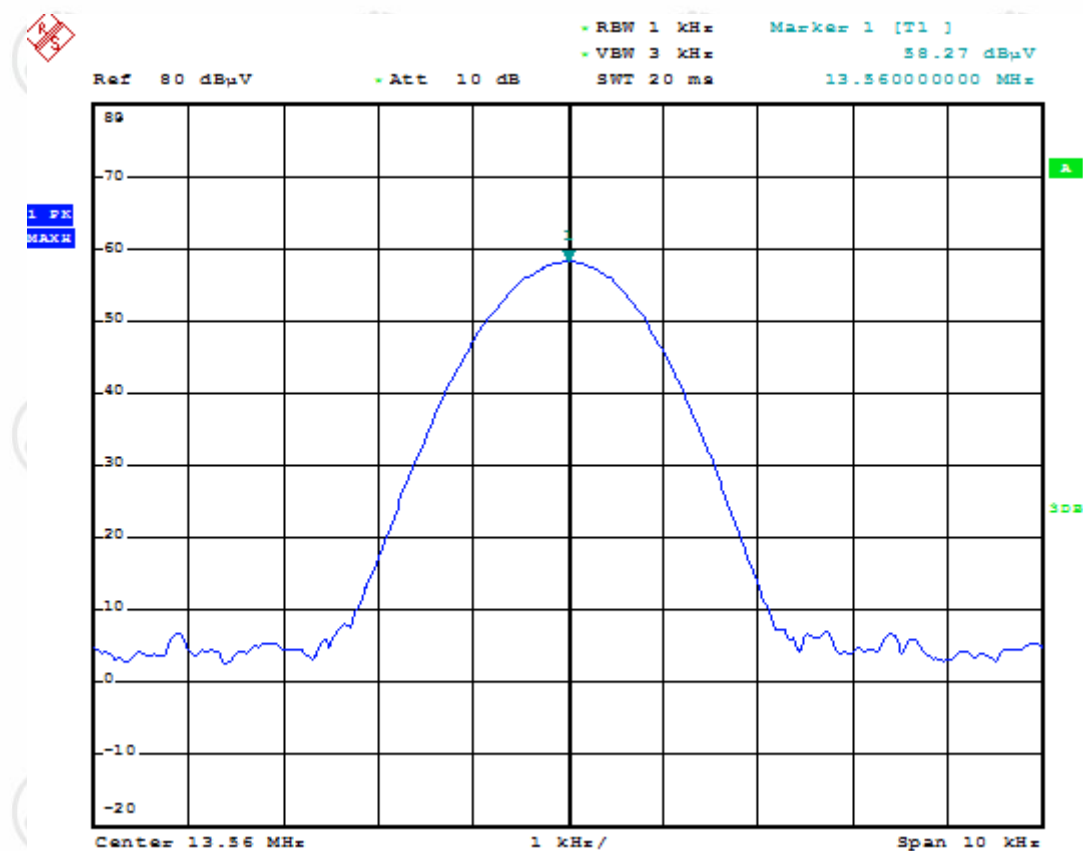
## 7.4 Frequency Tolerance

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b>      | 47 CFR Part 15 Subpart C Section 15.225(e)                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Test Method:</b>           | ANSI C63.10-2013                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Frequency range:</b>       | Operation within the band 13.110-14.010 MHz                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Requirement :</b>          | The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery. |
| <b>Test Mode:</b>             | Transmitter mode                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Method of measurement:</b> | The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.                                                                                                                                                                                                                                                                 |
| <b>Instruments Used:</b>      | Refer to section 6 for details                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Test Result:</b>           | Pass                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Test Frequency: 13.56MHz |                   |                 |             | Temperature:22℃ |
|--------------------------|-------------------|-----------------|-------------|-----------------|
| Supply Voltage (V)       | Test Result (MHz) | Deviation (kHz) | Limit (kHz) | Result          |
| 3.7                      | 13.56000          | 0               | 1.356       | Pass            |

| Test Frequency: 13.56MHz |                   |                 |             | Temperature:20℃ |
|--------------------------|-------------------|-----------------|-------------|-----------------|
| Supply Voltage (V)       | Test Result (MHz) | Deviation (kHz) | Limit (kHz) | Result          |
| 3.1                      | 13.55999          | 0.01            | 1.356       | Pass            |
| 3.4                      | 13.56000          | 0               | 1.356       | Pass            |
| 3.7                      | 13.56000          | 0               | 1.356       | Pass            |
| 4.0                      | 13.56000          | 0               | 1.356       | Pass            |
| 4.3                      | 13.55998          | 0.02            | 1.356       | Pass            |

| Test Frequency: 13.56MHz |                   |                 |             | Voltage: 12V |
|--------------------------|-------------------|-----------------|-------------|--------------|
| Temperature (℃)          | Test Result (MHz) | Deviation (kHz) | Limit (kHz) | Result       |
| -20                      | 13.55999          | 0.01            | 1.356       | Pass         |
| -10                      | 13.55999          | 0.01            | 1.356       |              |
| 0                        | 13.55999          | 0.01            | 1.356       |              |
| 10                       | 13.56000          | 0               | 1.356       |              |
| 20                       | 13.56000          | 0               | 1.356       |              |
| 30                       | 13.56000          | 0               | 1.356       |              |
| 40                       | 13.56000          | 0               | 1.356       |              |
| 50                       | 13.55999          | 0.01            | 1.356       |              |



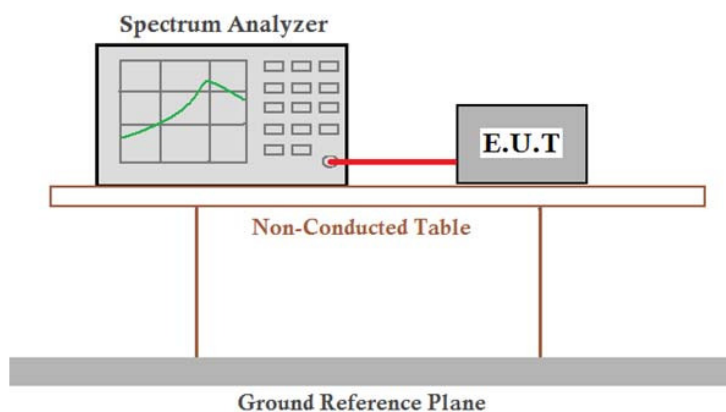
## 7.5 Occupied Bandwidth

**Test Requirement:** 47 CFR Part 15C Section 15.215 (C)  
**Test Method:** ANSI C63.10-2013  
**Frequency range:** Operation within the band 13.110 – 14.010 MHz

**Requirement :**

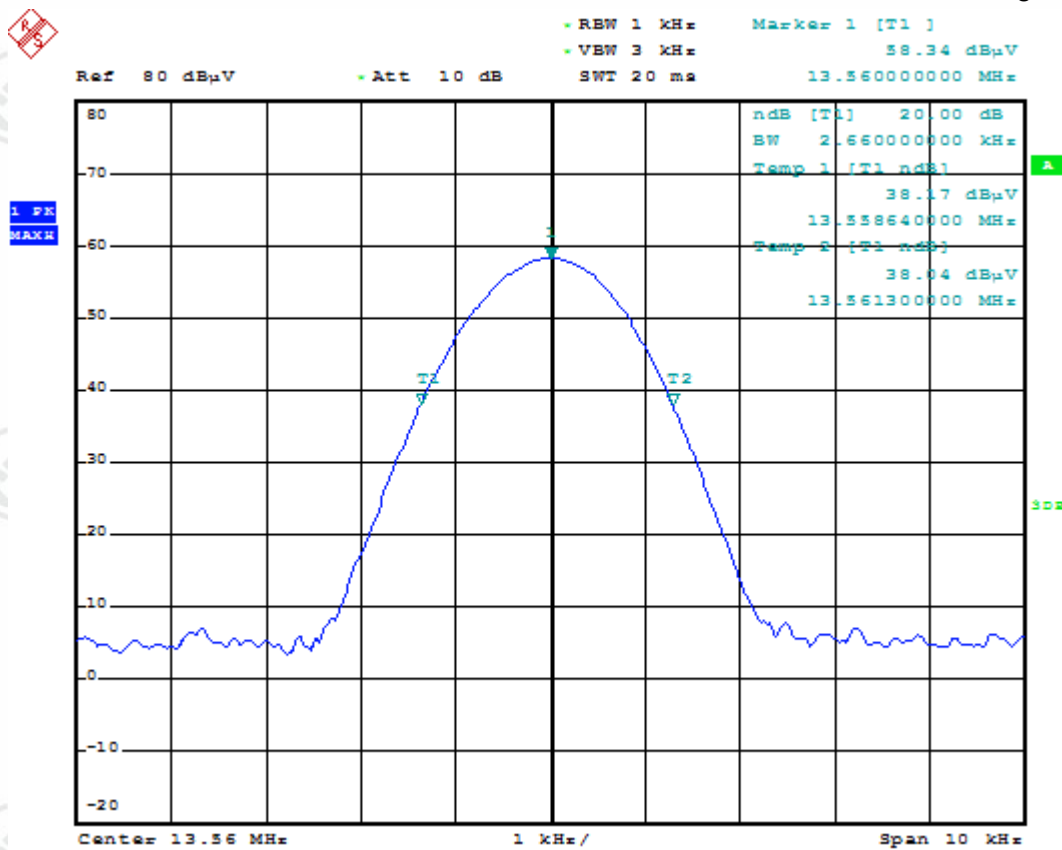
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equip compliance with the 20dB attenuation specification may base on measurement at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be demonstrated by measuring the radiated emissions.

**Test Setup:**



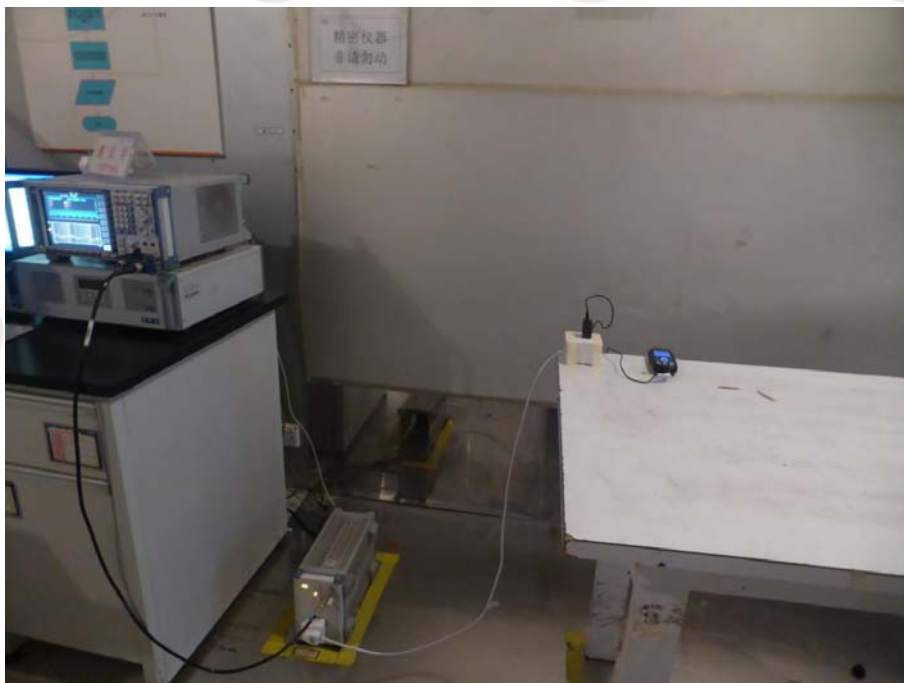
**Test Mode:** Transmitter mode  
**Instruments Used:** Refer to section 6 for details  
**Test Result:** Pass

The graph as below: represents the emissions take for this device.

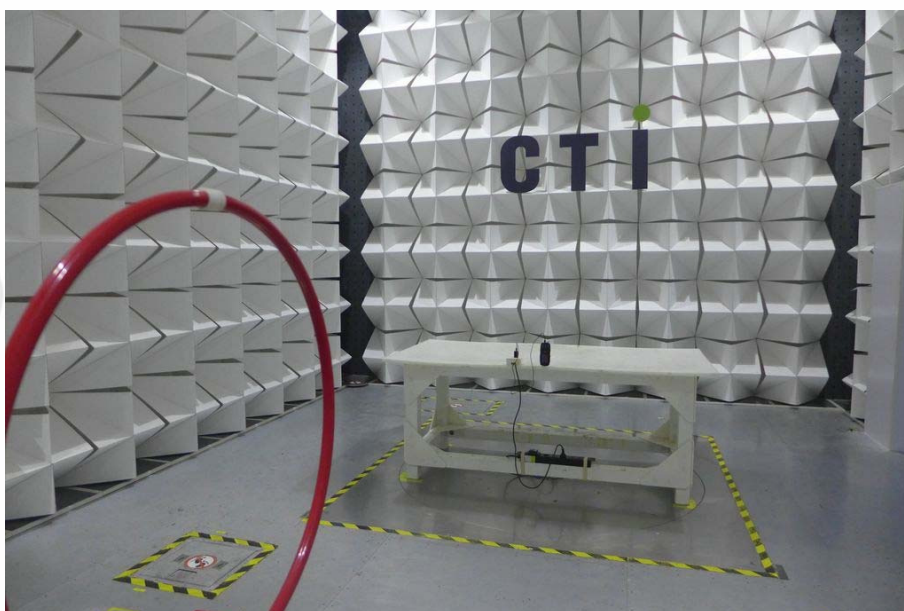


## APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

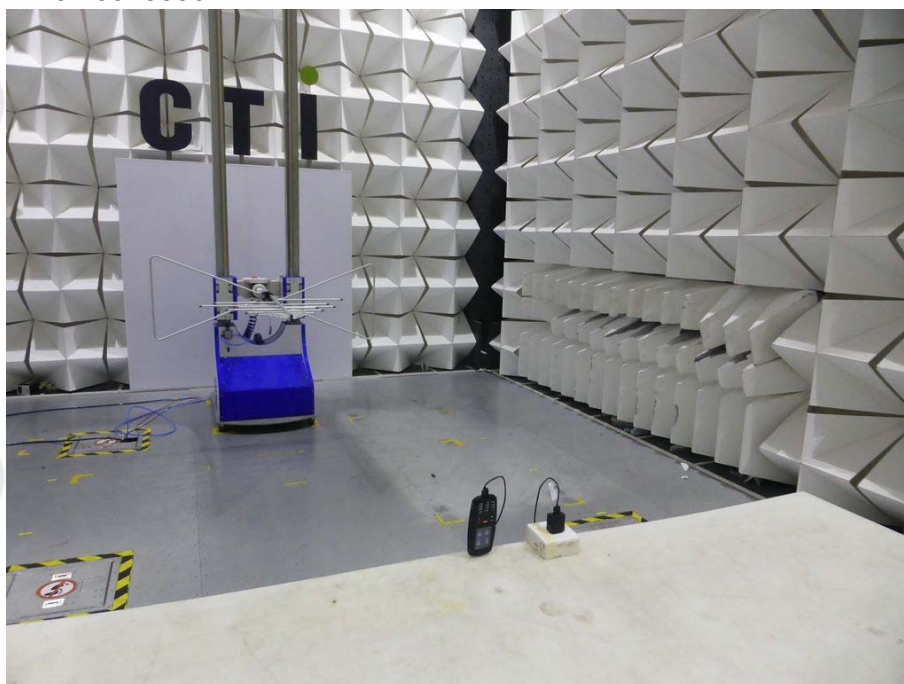
Test Model No.: RG310



**Conducted Emissions**



**Radiated emission Test Setup (9kHz~30MHz)**



**Radiated emission Test Setup (30MHz~1000MHz)**

## APPENDIX 2 PHOTOGRAPHS OF EUT

Test Model No.: RG310



View of Product-1



View of Product-2



View of Product-3



View of Product-4



View of Product-5



View of Product-6



View of Product-7



View of Product-8



View of Product-9



View of Product-10



View of Product-11



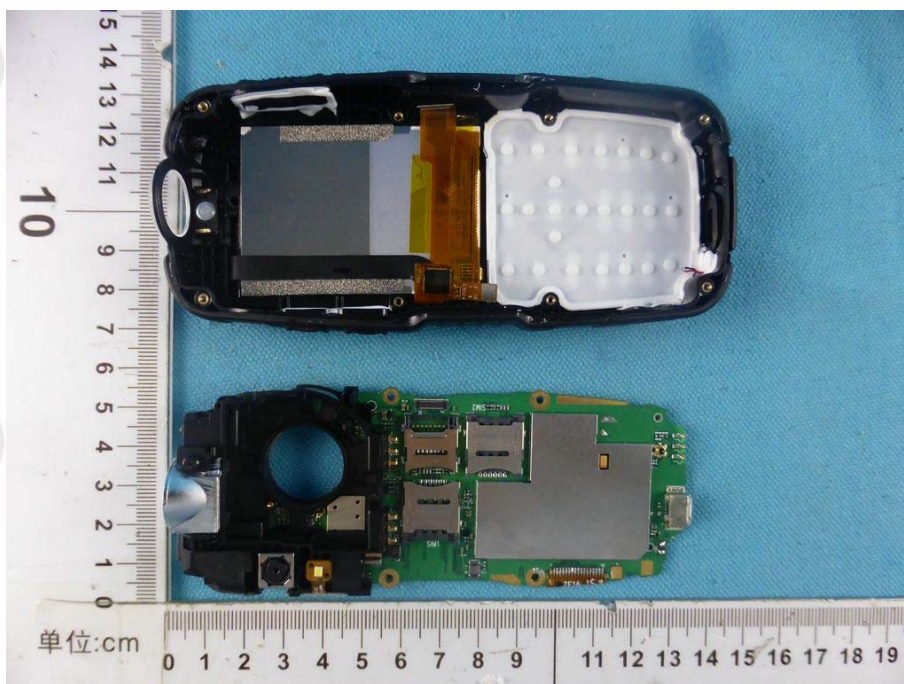
View of Product-12



View of Product-13



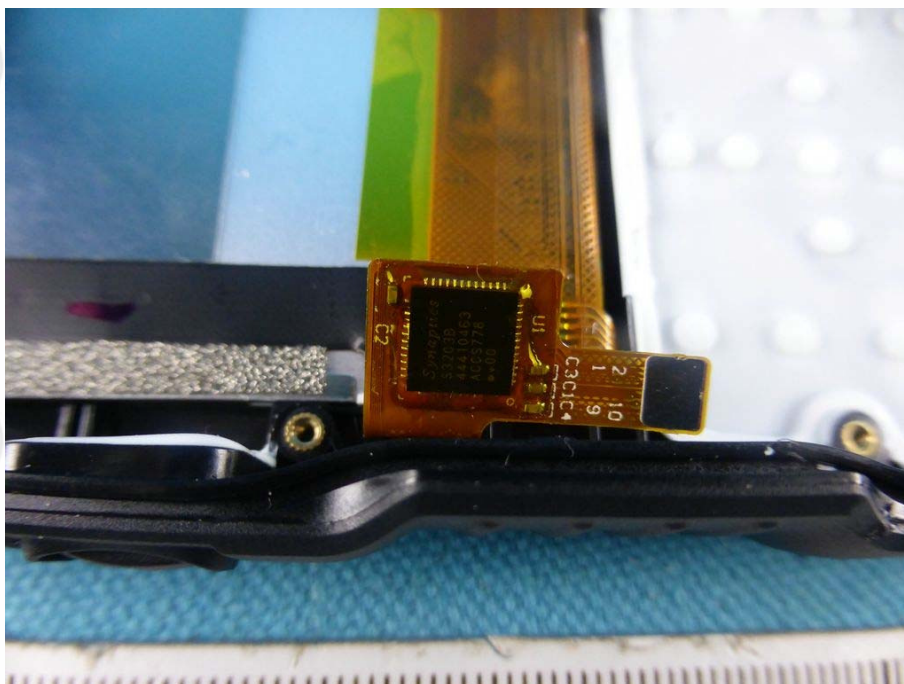
View of Product-14



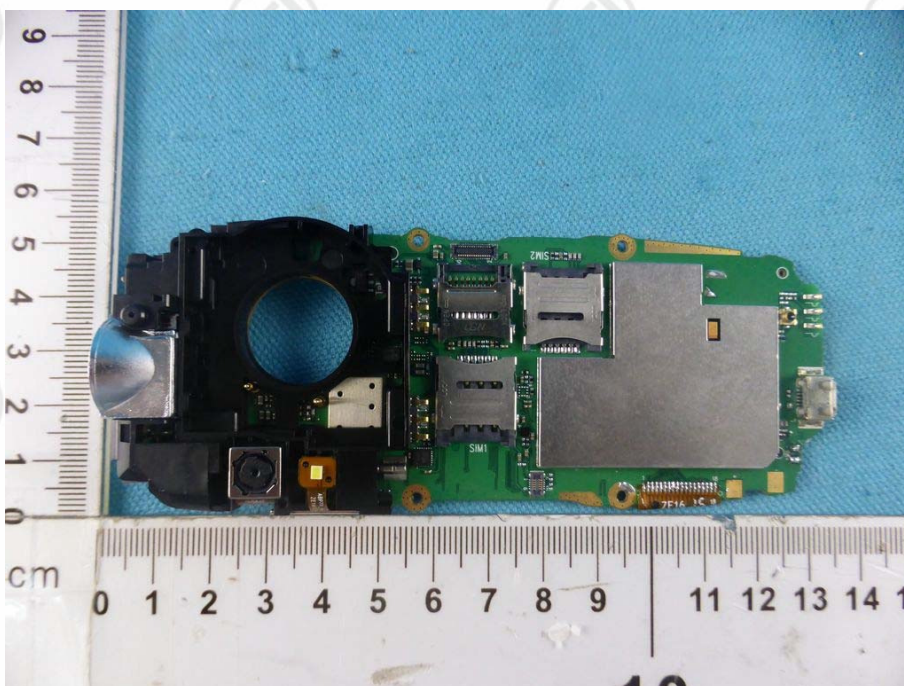
View of Product-15



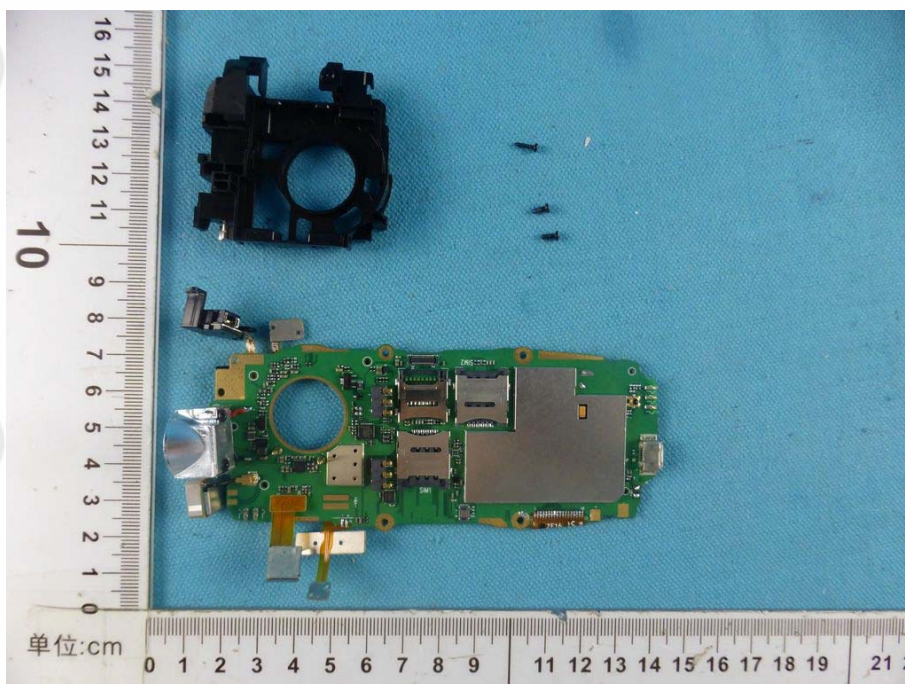
View of Product-16



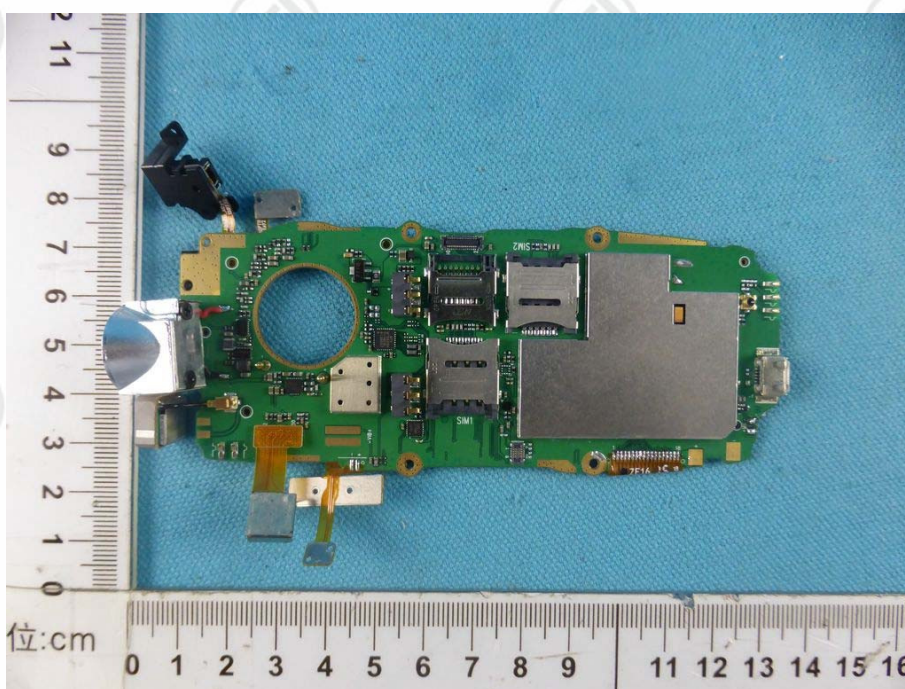
View of Product-17



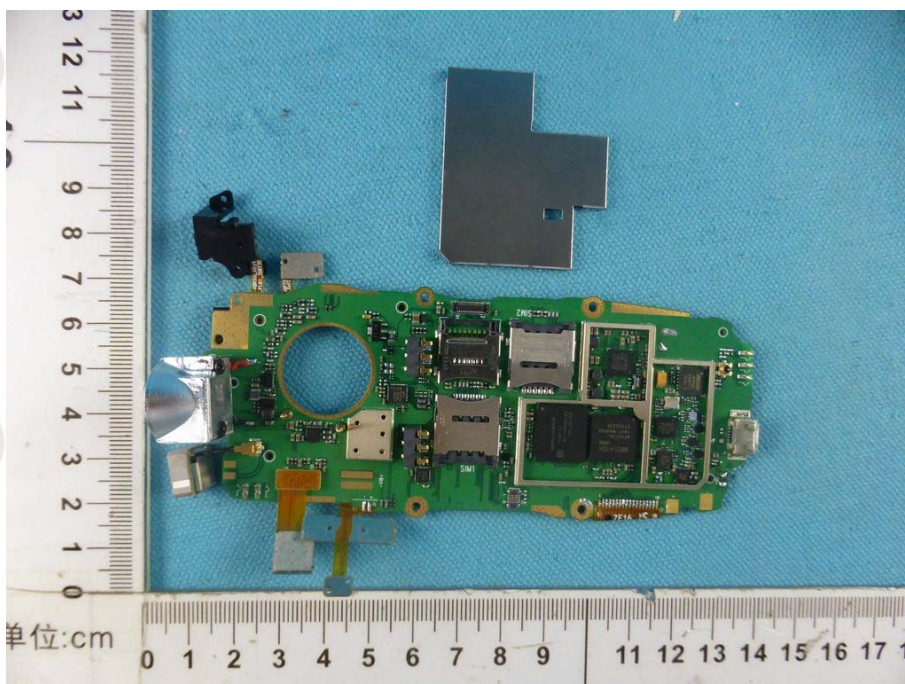
View of Product-18



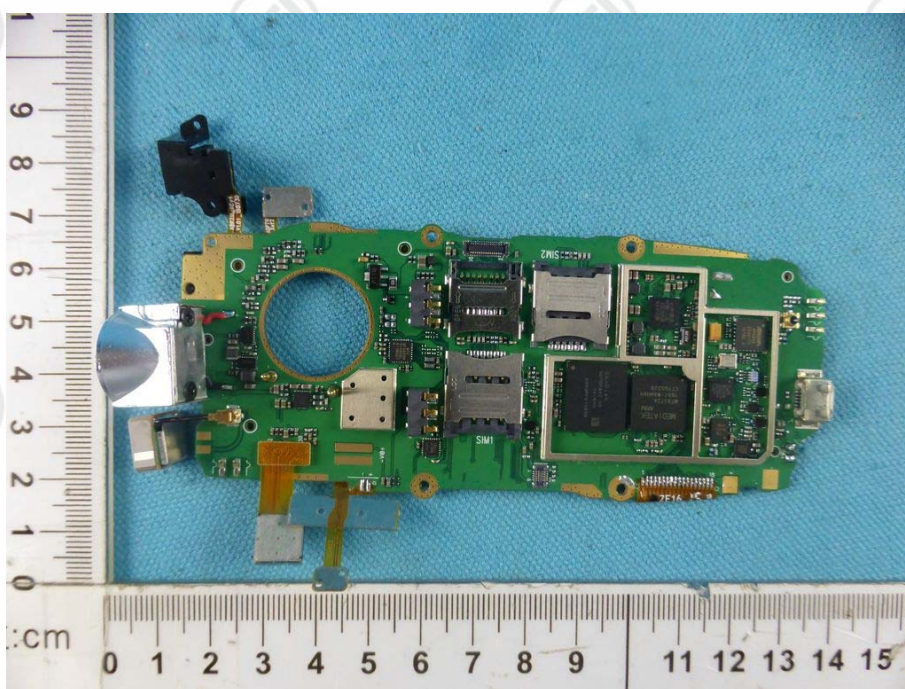
View of Product-19



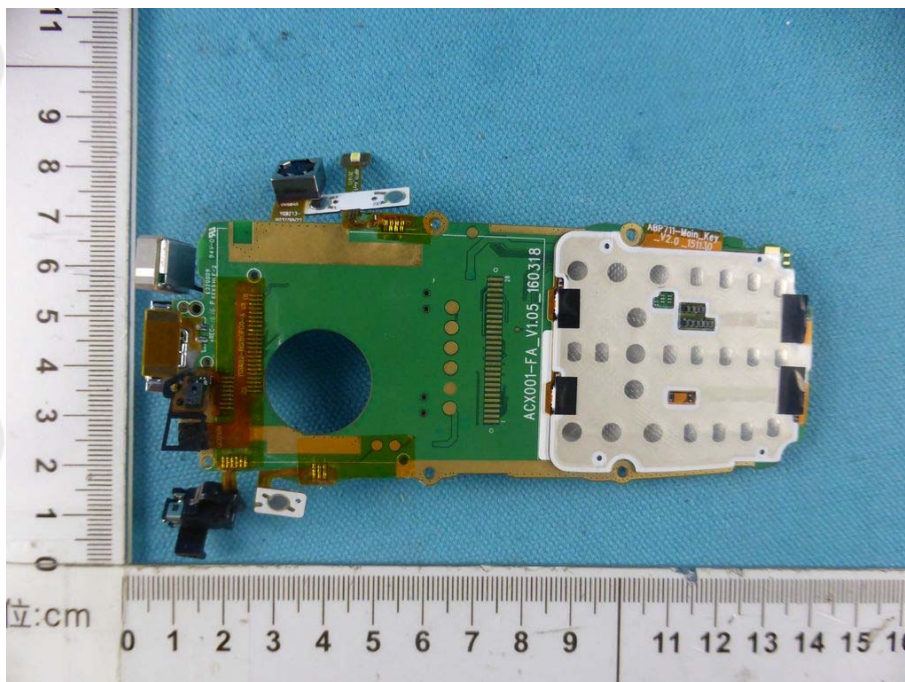
View of Product-20



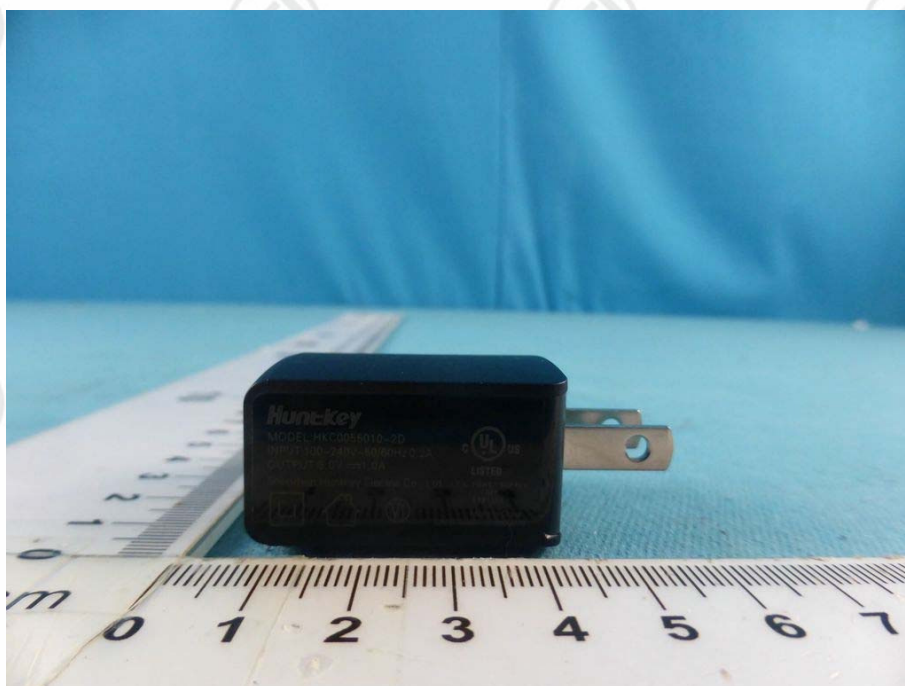
View of Product-21



View of Product-22



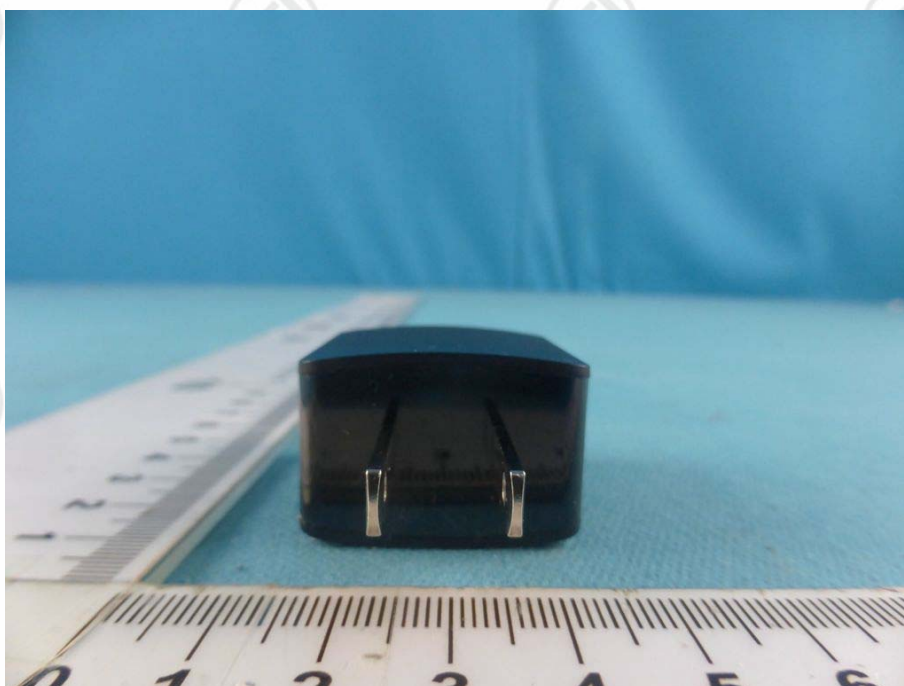
View of Product-23



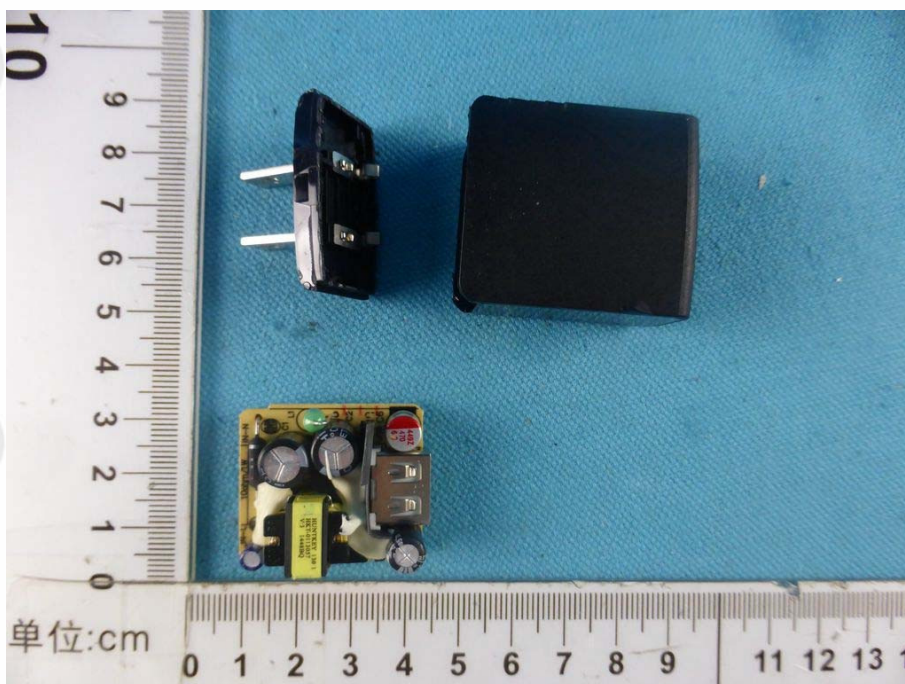
View of Product-24



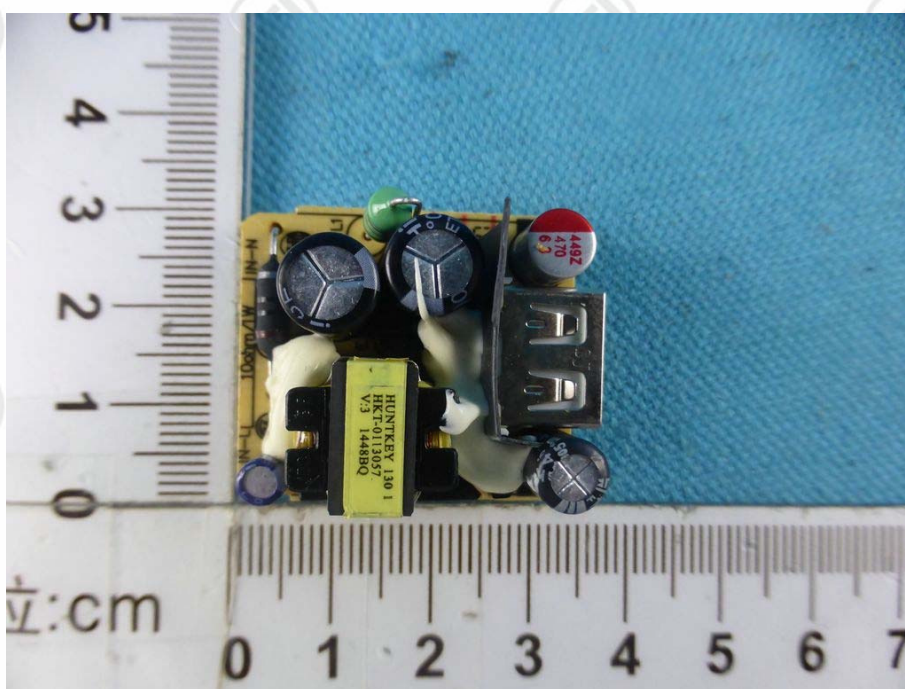
View of Product-25



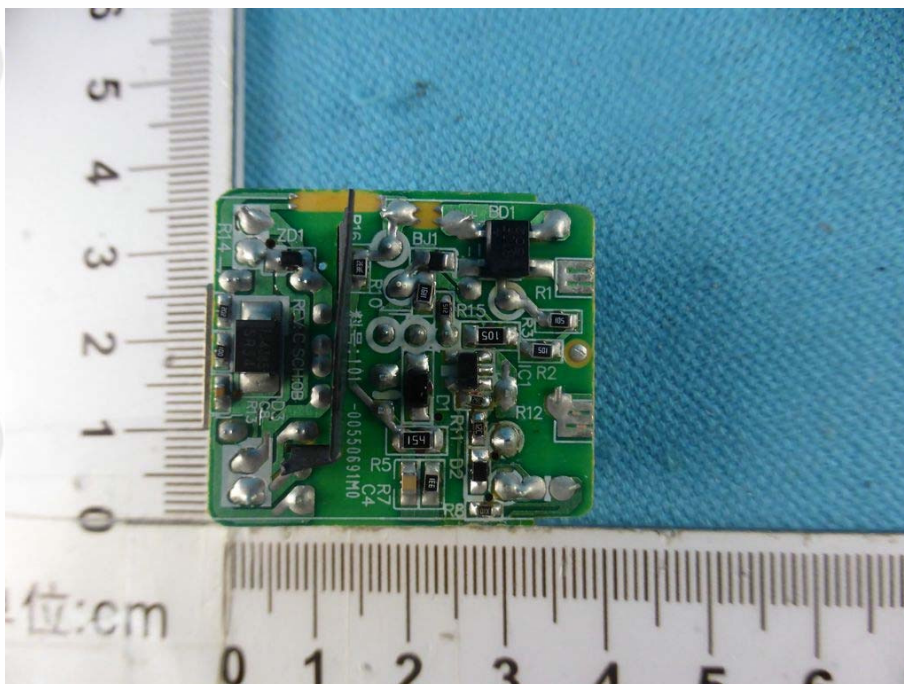
View of Product-26



View of Product-27



View of Product-28



View of Product-29

\*\*\* End of Report \*\*\*

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