

# TEST REPORT

**FCC ID: 2ACMLT201502**

Applicant : Condeco Ltd  
Address : 8<sup>th</sup> Floor, Exchange Tower, 2 Harbour Exchange Square, London  
E14 9GE UK

## Equipment Under Test (EUT):

Name : V2 Touch Screen  
Model : T201502  
Trademark : CONDECO

In Accordance with: FCC CFR47 Part 15 Section 15C: 2014

Report No : C1850317 10  
Date of Test : August 04, 2015- August 11, 2015  
Date of Issue : August 12, 2015

Test Result: **PASS**

In the configuration tested, the EUT complied with the standards specified above

Authorized Signature



(Mark Zhu)

General Manager

The manufacture should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Certification Technology Service Co., Ltd. Or test done by Shenzhen Certification Technology Service Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Certification Technology Service Co., Ltd. Approvals in writing.

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## 1. General Information

### 1.1. Description of Device (EUT)

|                       |   |  |
|-----------------------|---|--|
| EUT                   | : | V2 Touch Screen  |
| Model No.             | : | T201502  |
| DIFF                  | : | N/A  |
| Trade mark            | : | CONDECO  |
| Power supply          | : | DC 48V from POE or DC 12V from adapter.  |
| Radio Technology      | : | RFID   |
| Operation frequency   | : | 125KHz   |
| Antenna Type and Gain | : | Integrated antenna, PK Gain: 0dBi  |
| Applicant             | : | Condeco Ltd  |
| Address               | : | 8th Floor, Exchange Tower, 2 Harbour Exchange Square, London<br>E14 9GE UK               |
| Manufacturer          | : | NOTE Electronics (Dongguan) Ltd  |
| Address               | : | 6 Lindong Third Road, Lincun Industrial Center, Tangxia,<br>Dongguan 523710, P. R. China |

## 1.2. Accessories of device (EUT)

Accessories 1 : N/A

M/N : N/A

## 1.3. Test Lab information

Shenzhen Certification Technology Service Co., Ltd.  
2F, Building B, East Area of Nanchang Second Industrial Zone,  
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China  
FCC Registered No.:197647

## 2. Summary of test

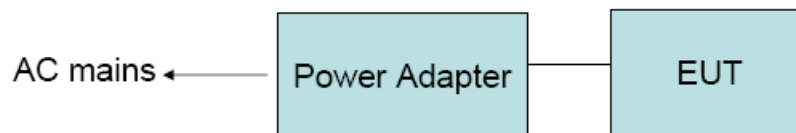
### 2.1. Summary of test result

| Description of Test Item                         | Standard                                | Results |
|--|---|---------|
| Radiated Emission<br>(9KHz-1.25MHz)              | FCC Part 15: 209<br>ANSI C63.4 :2014    | PASS    |
| 20dB Bandwidth                                   | FCC Part 15.215                         | PASS    |
| Power Line Conducted Emissions<br>(150KHz-30MHz) | FCC Part 15: 15.207<br>ANSI C63.4 :2014 | PASS    |
| Antenna Requirement                              | FCC Part 15: 15.203                     | PASS    |

### 2.2. Assistant equipment used for test

N/A

### 2.3. Block Diagram



### 2.4. Test mode

| Tested mode, channel, and data rate information   |         |                    |
|---|---------|--------------------|
| Mode  | Channel | Frequency<br>(KHz) |
| 1   | CH1     | 125                |
| Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test. |         |                    |

### 2.5. Test Conditions

|                   |           |
|-------------------|-----------|
| Temperature range | 21-25°C   |
| Humidity range    | 40-75%    |
| Pressure range    | 86-106kPa |

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

| Item   | MU                 | Remark      |
|--|--------------------|-------------|
| Uncertainty for Power point Conducted Emissions Test                     | 2.42dB             |             |
| Uncertainty for Radiation Emission test in 3m chamber<br>(below 30MHz)   | 2.13 dB            | Polarize: V |
|  | 2.57dB             | Polarize: H |
| Uncertainty for Radiation Emission test in 3m chamber<br>(30MHz to 1GHz) | 3.54dB             | Polarize: V |
|  | 4.1dB              | Polarize: H |
| Uncertainty for Radiation Emission test in 3m chamber<br>(1GHz to 25GHz) | 2.08dB             | Polarize: H |
|  | 2.56dB             | Polarize: V |
| Uncertainty for radio frequency  | $1 \times 10^{-9}$ |             |
| Uncertainty for conducted RF Power                                       | 0.65dB             |             |
| Uncertainty for temperature  | 0.2°C              |             |
| Uncertainty for humidity   | 1%                 |             |
| Uncertainty for DC and low frequency voltages                            | 0.06%              |             |

## 2.7. Test Equipment

| Equipment              | Manufacture   | Model No.               | Serial No.        | Last cal.  | Cal Interval |
|------------------------|---------------|-------------------------|-------------------|------------|--------------|
| 3m Semi-Anechoic       | ETS-LINDGREN  | N/A                     | SEL0017           | 2015.01.19 | 1 Year       |
| Spectrum analyzer      | Agilent       | E4407B                  | MY46185649        | 2015.01.19 | 1 Year       |
| Receiver               | R&S           | ESCI                    | 1166.5950K03-1011 | 2015.01.19 | 1 Year       |
| Receiver               | R&S           | ESCI                    | 101202            | 2015.01.19 | 1 Year       |
| Bilog Antenna          | Schwarzbeck   | VULB 9168               | VULB9168-438      | 2015.01.21 | 1 Year       |
| Horn Antenna           | EMCO          | 3115                    | 640201028-06      | 2015.01.21 | 1 Year       |
| Active Loop Antenna    | Beijing Daze  | ZN30900A                | SEL0097           | 2015.01.21 | 1 Year       |
| Cable                  | Resenberger   | N/A                     | No.1              | 2015.01.19 | 1 Year       |
| Cable                  | SCHWARZBECK   | N/A                     | No.2              | 2015.01.19 | 1 Year       |
| Cable                  | SCHWARZBECK   | N/A                     | No.3              | 2015.01.19 | 1 Year       |
| Pre-amplifier          | Schwarzbeck   | BBV9743                 | 9743-019          | 2015.01.19 | 1 Year       |
| Pre-amplifier          | R&S           | AFS33-18002650-30-8P-44 | SEL0080           | 2015.01.19 | 1 Year       |
| Base station           | Agilent       | E5515C                  | GB44300243        | 2015.01.19 | 1 Year       |
| Temperature controller | Terchy        | MHQ                     | 120               | 2015.01.19 | 1 Year       |
| Power divider          | Anritsu       | K240C                   | 020346            | 2015.01.19 | 1 Year       |
| Signal Generator       | HP            | 83732B                  | VS3449051         | 2015.01.19 | 1 Year       |
| Power Meter            | Anritsu       | ML2487A                 | 6K00001491        | 2015.01.19 | 1 Year       |
| Power sensor           | Anritsu       | ML2491A                 | 32516             | 2015.01.19 | 1 Year       |
| L.I.S.N.#1             | Schwarzbeck   | NSLK8126                | 8126466           | 2015.01.19 | 1 Year       |
| L.I.S.N.#2             | ROHDE&SCHWARZ | ENV216                  | 101043            | 2015.01.19 | 1 Year       |

### 3. Radiated emissions

#### 3.1. Limit(FCC 15.209)

| Frequency<br>(MHz) | Field Strength |                 | Field Strength Limit at 3m Measurement Dist |                                |
|--------------------|----------------|-----------------|---|--------------------------------|
|                    | uV/m           | Distance<br>(m) | uV/m  | dBuV/m                         |
| 0.009 ~ 0.490      | 2400/F(kHz)    | 300             | 10000 * 2400/F(kHz)                         | $20\log^{(2400/F(kHz))} + 80$  |
| 0.490 ~ 1.705      | 24000/F(kHz)   | 30              | 100 * 24000/F(kHz)                          | $20\log^{(24000/F(kHz))} + 40$ |
| 1.705 ~ 30         | 30             | 30              | 100 * 30                                    | $20\log^{(30)} + 40$           |
| 30 ~ 88            | 100            | 3               | 100   | $20\log^{(100)}$               |
| 88 ~ 216           | 150            | 3               | 150   | $20\log^{(150)}$               |
| 216 ~ 960          | 200            | 3               | 200   | $20\log^{(200)}$               |
| Above 960          | 500            | 3               | 500   | $20\log^{(500)}$               |

Note:

- a) The tighter limit applies at the band edges.

For example: F.S limit at 88MHz is 100uV/m

- b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of  $L_{d1} = L_{d2} * (d2/d1)^2$ .

For example:

F.S Limit at 30m(d2) distance is 30uV/m( $L_{d2}$ ), then F.S Limit at 3m(d1) distance is

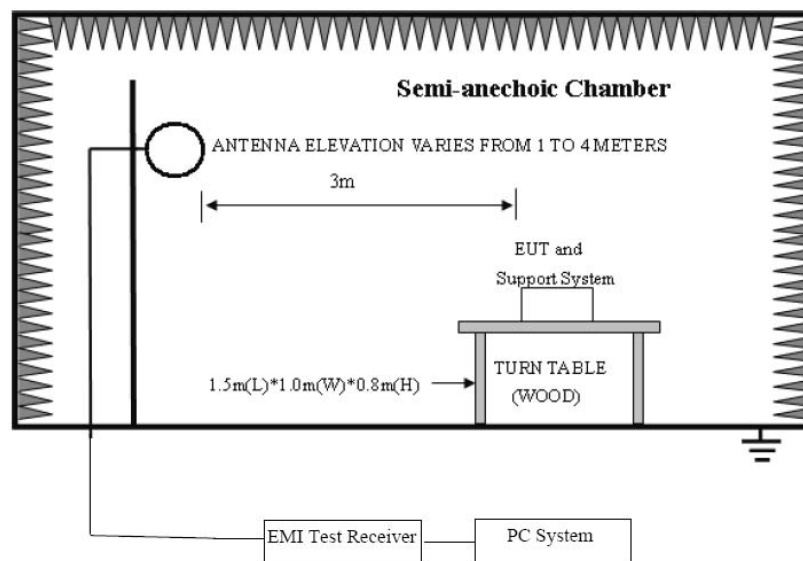
$$L_{d1} = 30\text{uV/m} * (30/3)^2 = 100 * 30\text{uV/m} = 69.54 \text{ dBuV/m}$$

#### 3.2. Block Diagram of Test setup

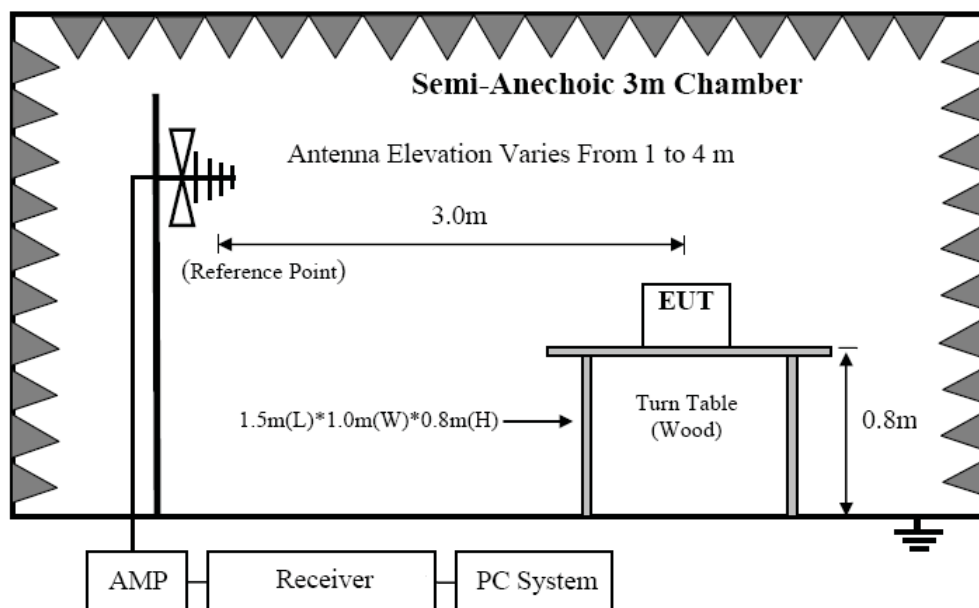
In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



#### 4.2. Block diagram of test setup



In 3m Anechoic Chamber Test Setup Diagram for frequency 30MHz-1GHz



### 3.3. Test Procedure

#### Procedure of Preliminary Test

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 4.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4:2014.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable.

No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.10:2013. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Receiver quickly scanned from 9KHz to 30MHz and 30MHz to 1GHz The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in clause 2.4 were scanned during the preliminary test:

After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

#### **Procedure of Final Test**

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Receiver scanned from 9KHz to 30MHz and 30MHz to 1GHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 200Hz for 9 KHz to 150 KHz measure, 10 KHz for 150 KHz to 30MHz measure and 120 KHz for 30 MHz to 1GHz measure.

### **3.4. Test Result**

**PASS. (See below detailed test result)**

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | AV<br>Limit<br>(dBuV/m) |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|-------------------------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                         |
| 0.110          | H               | 22.16                     | ---                     | 24.80                   | 46.96            | ---            | 106.8                   |
| 0.125          | H               | 38.29                     | ---                     | 24.80                   | 63.09            | ---            |                         |
| 0.495          | H               | 23.06                     | ---                     | 25.03                   | 48.09            | ---            | 73.7                    |
| 0.500          | H               | 22.69                     | ---                     | 25.03                   | 47.72            | ---            | 73.6                    |
| N/A            |                 |                           |                         |                         |                  |                |                         |

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | AV<br>Limit<br>(dBuV/m) |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|-------------------------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                         |
| 0.110          | V               | 22.35                     | ---                     | 24.80                   | 47.15            | ---            | 106.8                   |
| 0.125          | V               | 38.42                     | ---                     | 24.80                   | 63.22            | ---            |                         |
| 0.495          | V               | 23.51                     | ---                     | 25.03                   | 48.54            | ---            | 73.7                    |
| 0.500          | V               | 22.77                     | ---                     | 25.03                   | 47.8             | ---            | 73.6                    |
| N/A            |                 |                           |                         |                         |                  |                |                         |

Remark: Test from 9KHz to 1.25MHz ,only worse case is reported

## 4. 20dB bandwidth

### 4.1. Limit

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 the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 4.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3KHz RBW and 10kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

### 4.3. Test Setup



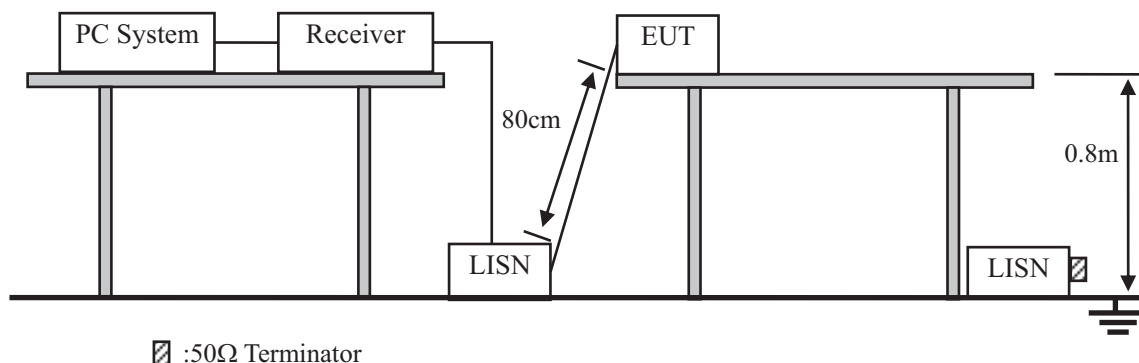
Remark: Peak detector RBW 1kHz ,VBW 3kHz

### 4.4. Test Result

| EUT: V2 Touch Screen      M/N: T201502 |            |                      |             |                   |
|--|------------|----------------------|-------------|-------------------|
| Test date: 2015-08-04                  |            | Test site: RF site   |             | Tested by: Simple |
| Mode                                   | Freq (MHz) | 20dB Bandwidth (KHz) | Limit (kHz) | Conclusion        |
| Tx Mode                                | 0.125      | 13.29                | /           | PASS              |

## 5. Power Line Conducted Emissions

### 5.1. Block Diagram of Test Setup



### 5.2. Limit

| Frequency       | Maximum RF Line Voltage    |                         |
|-----------------|----------------------------|-------------------------|
|                 | Quasi-Peak Level<br>dB(μV) | Average Level<br>dB(μV) |
| 150kHz ~ 500kHz | 66 ~ 56*                   | 56 ~ 46*                |
| 500kHz ~ 5MHz   | 56                         | 46                      |
| 5MHz ~ 30MHz    | 60                         | 50                      |

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

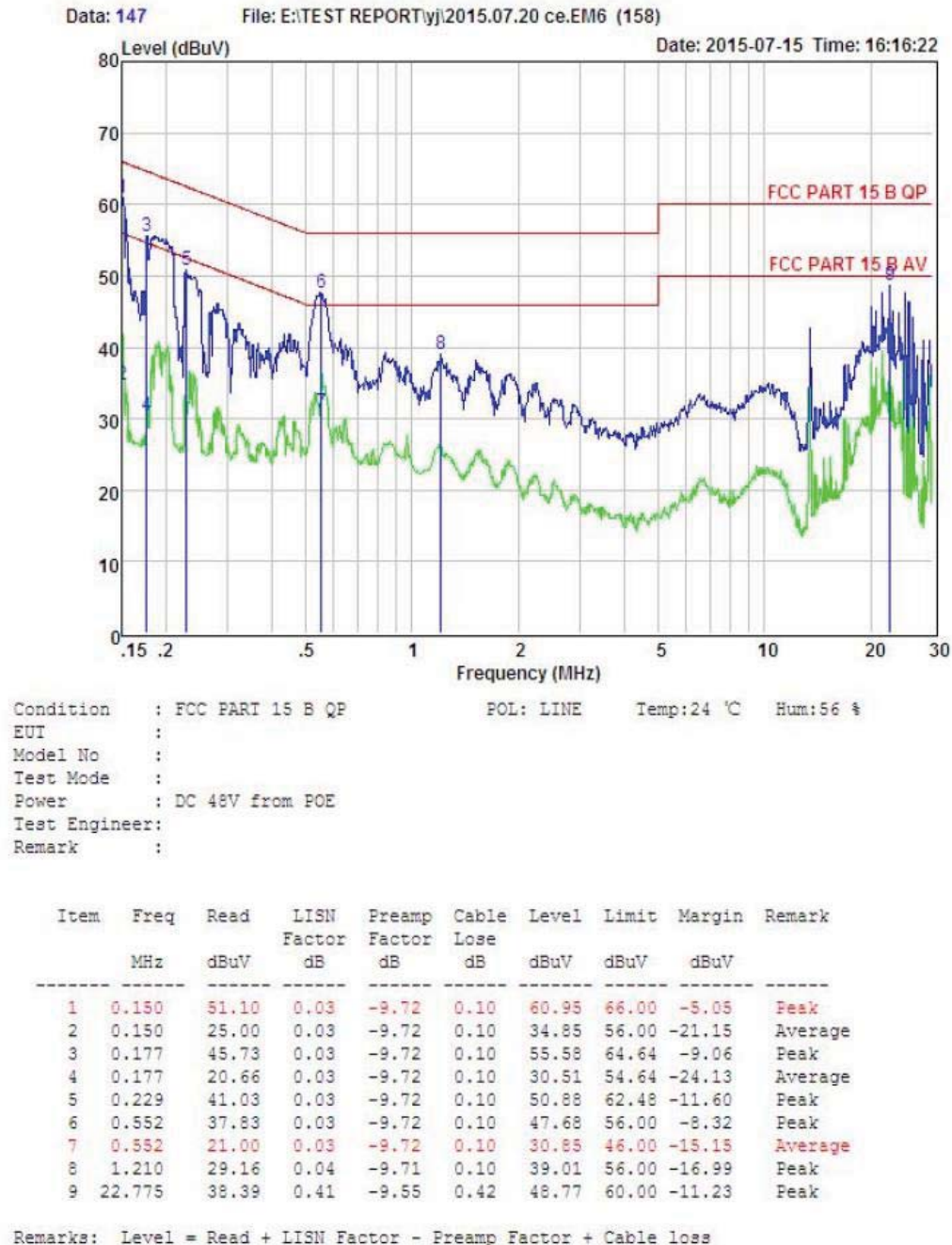
2. The lower limit shall apply at the transition frequencies.

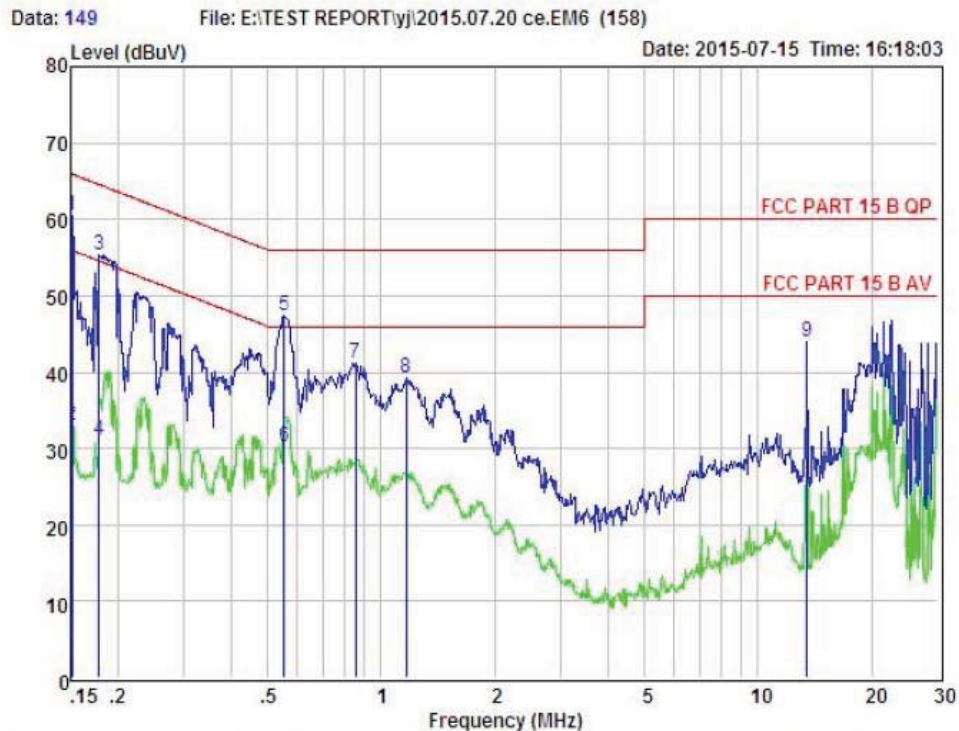
### 5.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N1), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4 2014 and ANSI C63.10:2013 on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

## 5.4. Test Result

**PASS.** (See below detailed test data)





Condition : FCC PART 15 B QP POL: NEUTRAL Temp:24 °C Hum:56 %  
 EUI :  
 Model No :  
 Test Mode :  
 Power : DC 48V from POE  
 Test Engineer:  
 Remark :

| Item | Freq<br>MHz | Read<br>dBuV | LISN<br>Factor<br>dB | Preamp<br>Factor<br>dB | Cable<br>Loss<br>dB | Level<br>dBuV | Limit<br>dBuV | Margin<br>dBuV | Remark  |
|------|-------------|--------------|----------------------|------------------------|---------------------|---------------|---------------|----------------|---------|
| 1    | 0.151       | 50.64        | 0.03                 | -9.72                  | 0.10                | 60.49         | 65.96         | -5.47          | Peak    |
| 2    | 0.151       | 23.24        | 0.03                 | -9.72                  | 0.10                | 33.09         | 55.96         | -22.87         | Average |
| 3    | 0.179       | 45.58        | 0.03                 | -9.72                  | 0.10                | 55.43         | 64.55         | -9.12          | Peak    |
| 4    | 0.179       | 21.21        | 0.03                 | -9.72                  | 0.10                | 31.06         | 54.55         | -23.49         | Average |
| 5    | 0.552       | 37.60        | 0.03                 | -9.72                  | 0.10                | 47.45         | 56.00         | -8.55          | Peak    |
| 6    | 0.552       | 20.45        | 0.03                 | -9.72                  | 0.10                | 30.30         | 46.00         | -15.70         | Average |
| 7    | 0.853       | 31.38        | 0.04                 | -9.71                  | 0.10                | 41.23         | 56.00         | -14.77         | Peak    |
| 8    | 1.166       | 29.34        | 0.04                 | -9.71                  | 0.10                | 39.19         | 56.00         | -16.81         | Peak    |
| 9    | 13.479      | 34.15        | 0.23                 | -9.42                  | 0.22                | 44.02         | 60.00         | -15.98         | Peak    |

Remarks: Level = Read + LISN Factor - Preamp Factor + Cable loss

## **6. Antenna Requirements**

### **6.1. Limit**

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.209, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **6.2. Result**

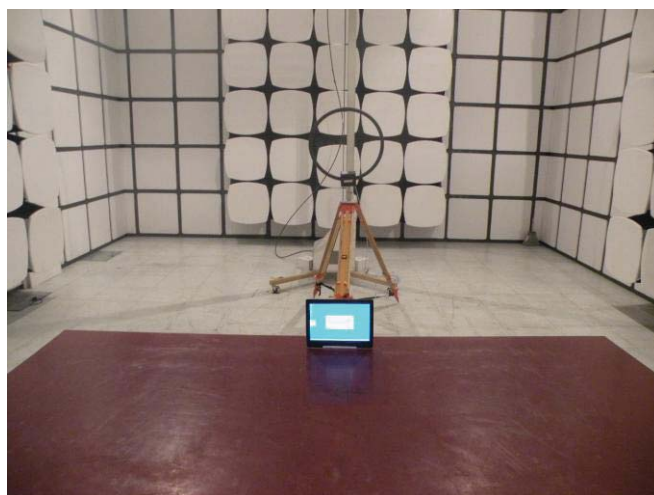
The antennas used for this product are integral Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi.



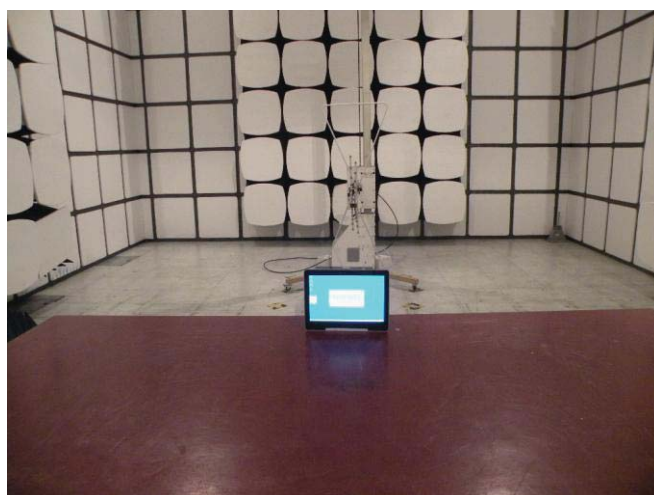
## 7. Test setup photo

### Photographs-Radiated Emission Test Setup in Chamber

Below 30M



30M-1G

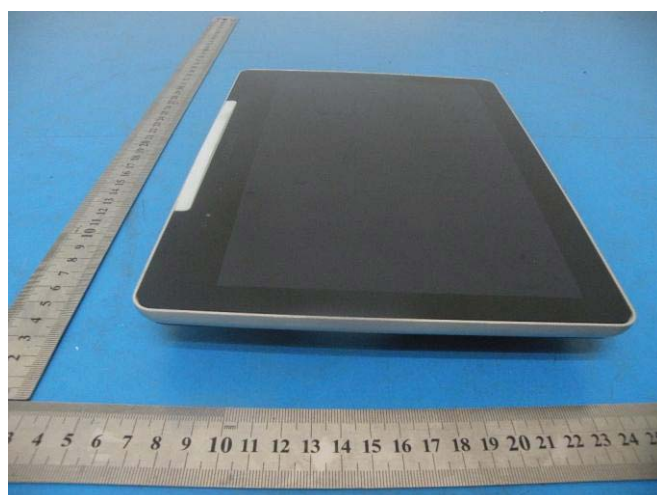


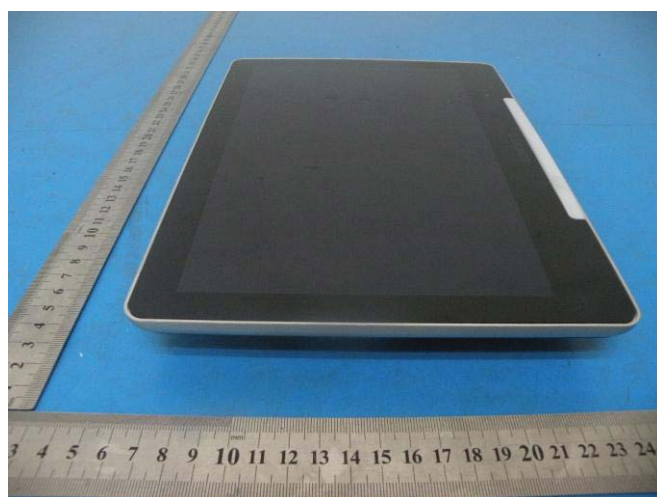
## Photographs-Conducted Emission Test Setup



## 8. Photos of EUT

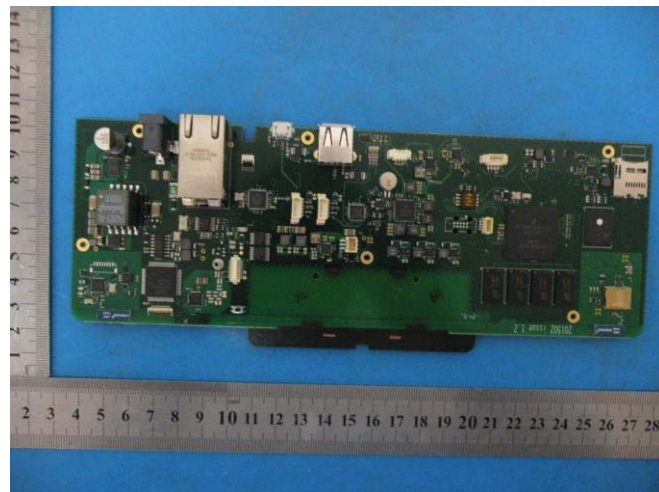
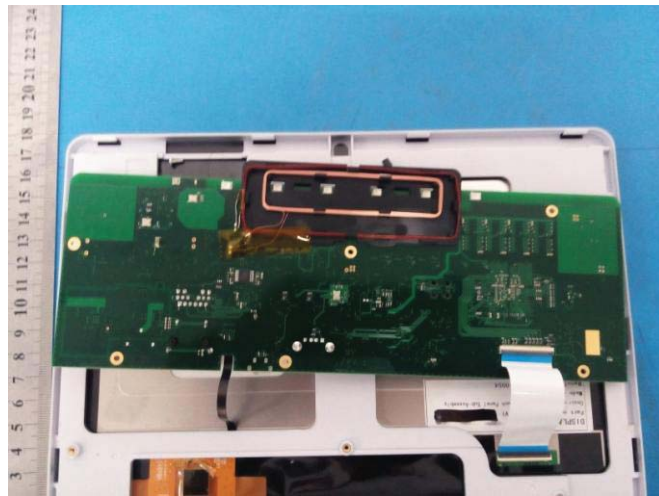


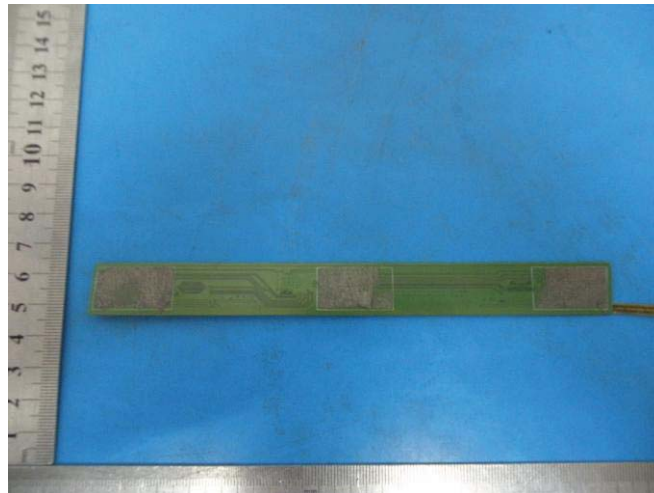












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