S T S L A B

# FCC TEST REPORT

Report No: STS1801201W01

Issued for

Shenzhen Benarlee Technology Co., Ltd

Third floor, Building B1, Nanshan Zhiyuan, Taoyuan Street, Nanshan District, ShenZhen, China

| | |
|---|---|
| **Product Name:** | Wireless charger |
| **Brand Name:** | BenarLee |
| **Model Name:** | V8 |
| **Series Model:** | V8-G,V8-R,V8-L,V8001,QI-NM80,E10,Q10, V8002,V8003,V8004,V8005,V8006,V8007 |
| **FCC ID:** | 2AOQUV8 |
| **Test Standard:** | FCC Part 15 Subpart C |

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# TEST RESULT CERTIFICATION

| | |
|---|---|
| **Applicant's name** : | Shenzhen Benarlee Technology Co., Ltd |
| Address : | Third floor, Building B1, Nanshan Zhiyuan, Taoyuan Street, Nanshan District, ShenZhen, China |
| **Manufacture's Name** : | Shenzhen Benarlee Technology Co., Ltd |
| Address : | Third floor, Building B1, Nanshan Zhiyuan, Taoyuan Street, Nanshan District, ShenZhen, China |

**Product description**

| | |
|---|---|
| Product Name .....: | Wireless charger |
| Brand Name .....: | BenarLee |
| Model Name .....: | V8 |
| Series Model .....: | V8-G,V8-R,V8-L,V8001,QI-NM80,E10,Q10, V8002,V8003,V8004,V8005,V8006,V8007 |
| **Test Standards**.....: | FCC Part 15 Subpart C |
| Test Procedure : | ANSI C63.10-2013 |

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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| | |
|---|---|
| Date of performance of tests: | 22 Jan. 2018 ~28 Jan. 2018 |
| Date of Issue : | 29 Jan. 2018 |
| Test Result : | **Pass** |

Testing Engineer : Chris chen

( Chris chen )

Technical Manager : Sean She

( Sean she )

Authorized Signatory : Vita Li

(Vita Li)

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## Revision History

| Rev. | Issue Date | Report NO. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | 29 Jan. 2018 | STS1801201W01 | ALL | Initial Issue |
| | | | | |

# 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| FCC Part15 , Subpart C | | | |
|---|---|---|---|
| Standard Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | |
| 15.209（a） | Radiated emission, Spurious Emission | PASS | |
| 2.1049 | 20 dB Bandwidth | PASS | |

## 1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.: L7649; FCC Registration No.: 625569
IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

## 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ±U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

| No. | Item | Uncertainty |
|---|---|---|
| 1 | Conducted Emission (9KHz-150KHz) | ±2.88dB |
| 2 | Conducted Emission (150KHz-30MHz) | ±2.67 dB |
| 3 | All emissions,radiated(<1G) 30MHz-200MHz | ±2.83dB |
| 4 | All emissions,radiated(<1G) 200MHz-1000MHz | ±2.94dB |
| 5 | Temperature | ±0.5°C |
| 6 | Humidity | ±2% |

# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Product Name | Wireless charger |
| Trade Name | BenarLee |
| Model Name | V8 |
| Series Model | V8-G,V8-R,V8-L,V8001,QI-NM80,E10,Q10, V8002,V8003,V8004,V8005,V8006,V8007 |
| Model Difference | Only different in model name and appearance |
| Equipemnt Category | Non-ISM frequency |
| Operating frequency | 112.825KHz-125.685KHz |
| Modulation Type | ASK |
| Antenna Gain | 0dBi |
| Power Rating | DC 5V |
| Hardware version number | N/A |
| Software version number | N/A |
| Connecting I/O Port(s) | Please refer to the User's Manual |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Table for Filed Antenna

| Ant | Brand | Model Name | Antenna Type | Connector | NOTE |
|---|---|---|---|---|---|
| 1 | BenarLee | V8 | Coil antenna | NA | Antenna |

3.

| Test Channel | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (KHz) | Channel | Frequency (KHz) | Channel | Frequency (KHz) |
| 00 | 112.825 | 01 | 119.125 | 02 | 125.685 |

## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|---|---|
| Mode 1 | Charging+TX Mode |

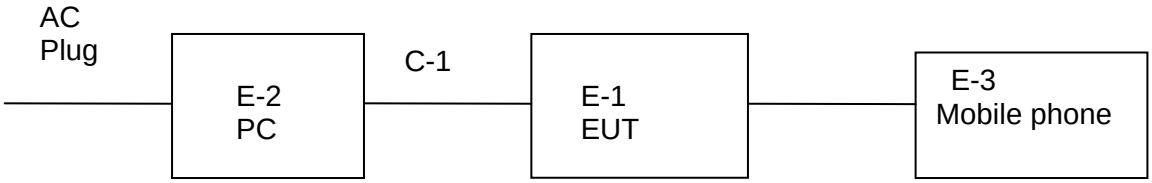
| **For Conducted Emission** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | Charging+TX Mode |

| **For Radiated Emission** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | Charging+TX Mode |

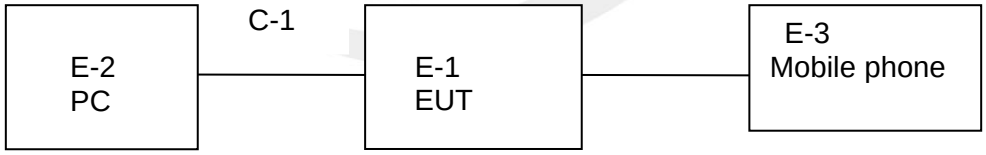
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Conducted Emission Test




Radiated EmissionTest



2.4 DESCRIPTION OF SUPPORT UNITS

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

| Item | Equipment | Mfr/Brand | Model/Type No. | Serial No. | Note |
|---|---|---|---|---|---|
| E-2 | PC | HP | 500-320cx | N/A | N/A |
| E-3 | Mobile phone | N/A | N/A | N/A | N/A |
| | | | | | |
| | | | | | |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| C-1 | USB Cable (FTP) | NO | 50cm | / |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Note:

(1) FCC DOC approved.
(2) FTP is Foiled Twisted Pair.

## 2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 101427 | 2017.10.15 | 2018.10.14 |
| Bilog Antenna | TESEQ | CBL6111D | 34678 | 2017.03.24 | 2018.03.23 |
| 50Ω Coaxial Switch | Anritsu | MP59B | 6200264416 | 2017.10.15 | 2018.10.14 |
| PreAmplifier | Agilent | 8449B | 60538 | 2017.10.15 | 2018.10.14 |
| Loop Antenna | EMCO | 6502 | 9003-2485 | 2017.10.15 | 2018.10.14 |
| USB RF power sensor | DARE | RPR3006W | 15I00041SNO03 | 2017.10.15 | 2018.10.14 |

Conduction Test equipment

| Kind of Equipment | Manufacturer | Type No. | Serial No. | Last calibration | Calibrated until |
|---|---|---|---|---|---|
| Test Receiver | R&S | ESCI | 101427 | 2017.10.15 | 2018.10.14 |
| LISN | R&S | ENV216 | 101242 | 2017.10.15 | 2018.10.14 |
| LISN | EMCO | 3810/2NM | 000-23625 | 2017.10.15 | 2018.10.14 |

# 3.CONDUCTED EMISSION TEST RESULT(SECTION 15.207)

## 3.1 POWER LINE CONDUCTED EMISSION LIMITS

Operating frequency band. In case the emission fall within the restricted band specified on Part 15.207 limit in the table below has to be followed.

| FREQUENCY (MHz) | Class B (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 -0.5 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 56.00 | 46.00 |
| 5.0 -30.0 | 60.00 | 50.00 |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

| **Receiver Parameters** | **Setting** |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |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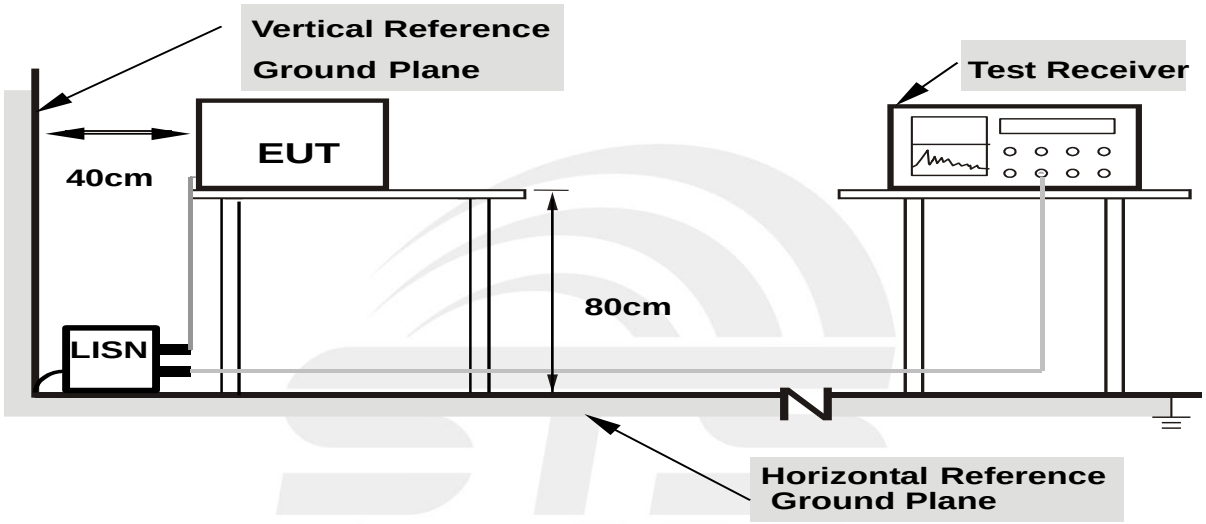
3.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP




**Note: 1.Support units were connected to second LISN.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

3.4 EUT OPERATING CONDITIONS

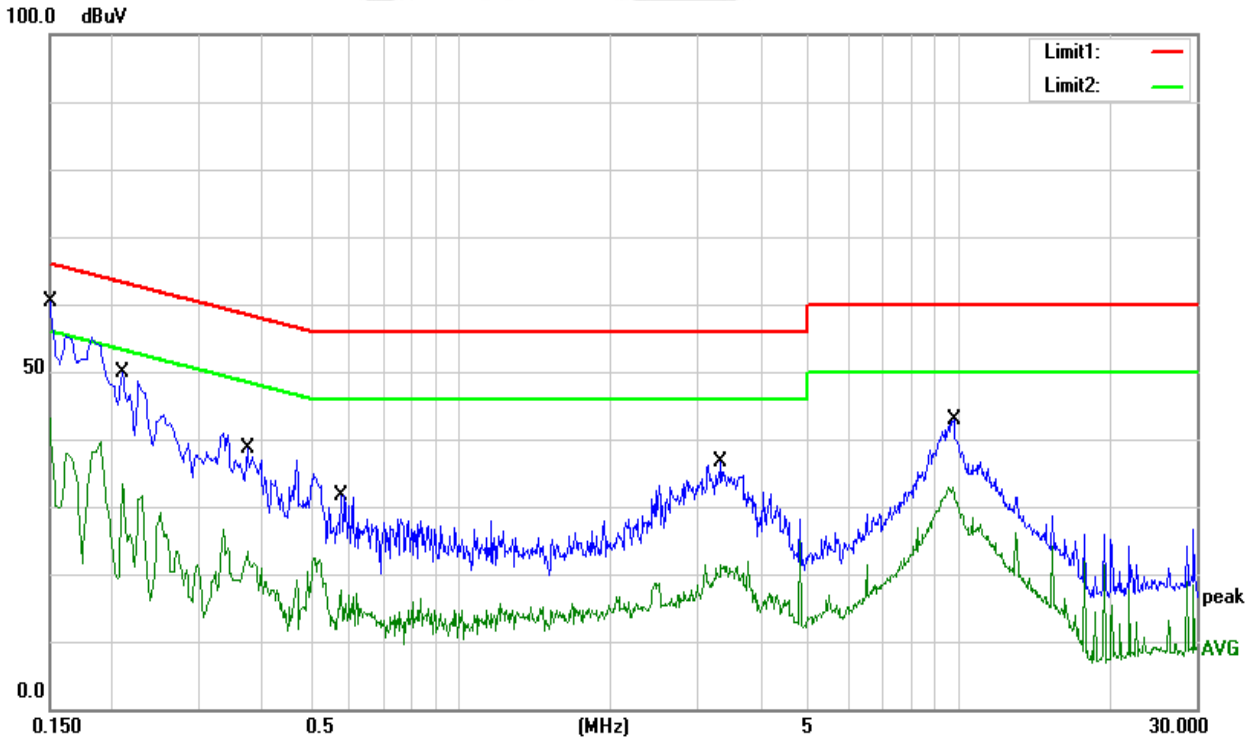
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.5TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature: | 23.5 ℃ | Relative Humidity: | 59% |
| Test Voltage: | AC 120V/60Hz | Phase: | L |
| Test Mode: | Mode 1 | | |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.1500 | 50.58 | 9.79 | 60.37 | 66.00 | -5.63 | QP |
| 2 | 0.1500 | 33.22 | 9.79 | 43.01 | 56.00 | -12.99 | AVG |
| 3 | 0.2100 | 39.96 | 9.82 | 49.78 | 63.21 | -13.43 | QP |
| 4 | 0.2100 | 23.57 | 9.82 | 33.39 | 53.21 | -19.82 | AVG |
| 5 | 0.3740 | 28.49 | 10.08 | 38.57 | 58.41 | -19.84 | QP |
| 6 | 0.3740 | 12.65 | 10.08 | 22.73 | 48.41 | -25.68 | AVG |
| 7 | 0.5780 | 21.67 | 9.96 | 31.63 | 56.00 | -24.37 | QP |
| 8 | 0.5780 | 7.63 | 9.96 | 17.59 | 46.00 | -28.41 | AVG |
| 9 | 3.3420 | 26.71 | 9.82 | 36.53 | 56.00 | -19.47 | QP |
| 10 | 3.3420 | 11.67 | 9.82 | 21.49 | 46.00 | -24.51 | AVG |
| 11 | 9.7740 | 32.76 | 10.19 | 42.95 | 60.00 | -17.05 | QP |
| 12 | 9.7740 | 21.45 | 10.19 | 31.64 | 50.00 | -18.36 | AVG |

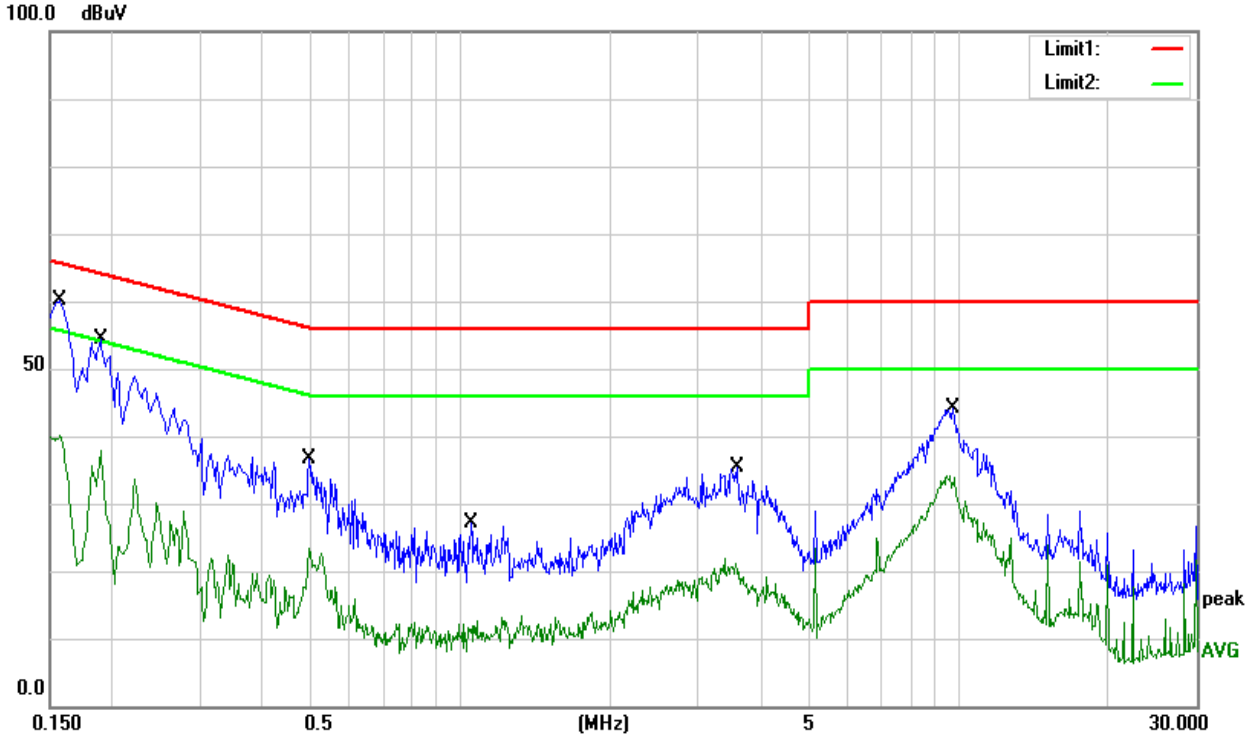
Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit



| | | | |
|---|---|---|---|
| Temperature: | 23.5 ℃ | Relative Humidity: | 59% |
| Test Voltage: | AC 120V/60Hz | Phase: | N |
| Test Mode: | Mode 1 | | |

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Result (dBuV) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|
| 1 | 0.1580 | 50.25 | 9.77 | 60.02 | 65.57 | -5.55 | QP |
| 2 | 0.1580 | 30.39 | 9.77 | 40.16 | 55.57 | -15.41 | AVG |
| 3 | 0.1900 | 44.55 | 9.85 | 54.40 | 64.04 | -9.64 | QP |
| 4 | 0.1900 | 27.09 | 9.85 | 36.94 | 54.04 | -17.10 | AVG |
| 5 | 0.4980 | 26.70 | 9.98 | 36.68 | 56.03 | -19.35 | QP |
| 6 | 0.4980 | 13.30 | 9.98 | 23.28 | 46.03 | -22.75 | AVG |
| 7 | 1.0540 | 17.35 | 9.80 | 27.15 | 56.00 | -28.85 | QP |
| 8 | 1.0540 | 1.17 | 9.80 | 10.97 | 46.00 | -35.03 | AVG |
| 9 | 3.5940 | 25.56 | 9.93 | 35.49 | 56.00 | -20.51 | QP |
| 10 | 3.5940 | 10.10 | 9.93 | 20.03 | 46.00 | -25.97 | AVG |
| 11 | 9.7300 | 34.30 | 9.93 | 44.23 | 60.00 | -15.77 | QP |
| 12 | 9.7300 | 23.26 | 9.93 | 33.19 | 50.00 | -16.81 | AVG |

Remark:
1. All readings are Quasi-Peak and Average values.
2. Margin = Result (Result =Reading + Factor )–Limit



# 4. RADIATED& FIELD EMISSION TEST RESULT(SECTIOU 15.209 )

## 4.1 Limit

| Frequency [MHz] | Field Strength [uV/m] | Measurement Distance [Meters] |
|---|---|---|
| 0.009 ~ 0.490 | 2400/F (kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F (kHz) | 30 |
| 1.705 ~ 30 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~90kHz / RB 200Hz for AV |
| Start ~ Stop Frequency | 90kHz~110kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 110kHz~490kHz / RB 200Hz for AV |
| Start ~ Stop Frequency | 490kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

§ 15.209(d)The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

## 4.2 TEST PROCEDURE

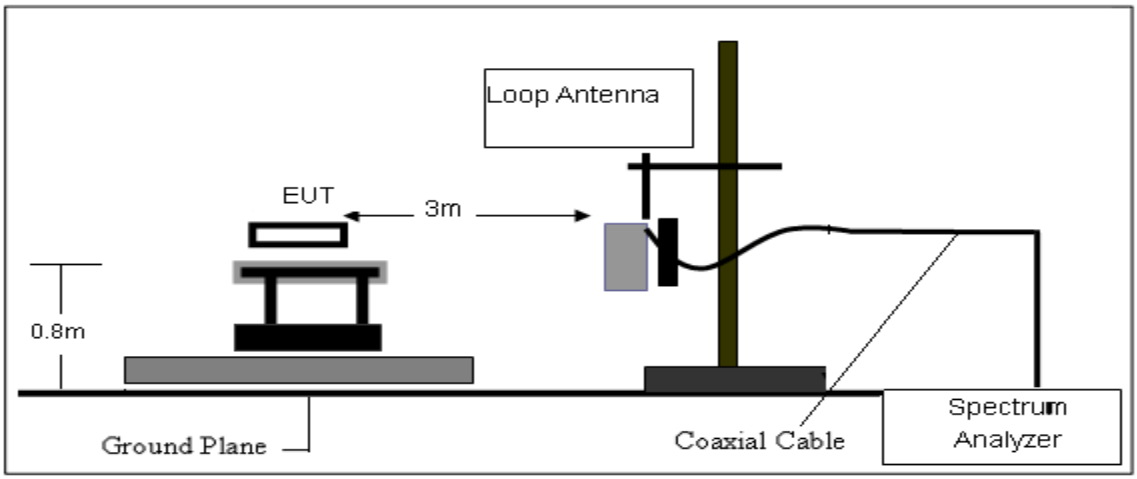
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
d. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

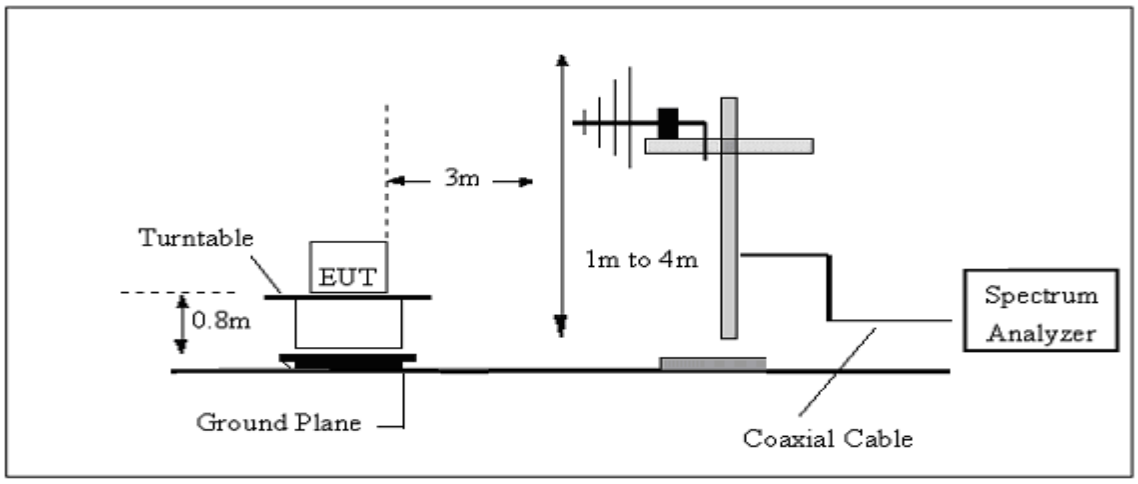
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

（A）Radiated Emission Test-Up Frequency Below 30MHz




（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



## 4.4 TEST RESULTS

| | | | |
|---|---|---|---|
| Temperature： | 24.6 ℃ | Relative Humidity： | 58% |
| Test Voltage ： | DC 5V | Test Mode ： | TX Mode |

### 4.4.1 Spurious Radiated Emission Below 30 MHz

| Frequency | Reading | Detector | Ant. Factor | Cable | Emission | Limits | Margin |
|---|---|---|---|---|---|---|---|
| (KHz) | (dBμV) | (PK/QP/AV) | (dB/m) | Loss | Level (dBμV/m) | (dBμV/m) | (dB) |
| 9 | 73.22 | PK | 28.16 | 0.1 | 101.48 | 148.52 | -47.04 |
| 9 | 58.43 | AV | 28.16 | 0.1 | 86.69 | 128.52 | -41.83 |
| 36 | 71.95 | PK | 22.03 | 0.1 | 94.08 | 136.48 | -42.40 |
| 36 | 55.14 | AV | 22.03 | 0.1 | 77.27 | 116.48 | -39.21 |
| 110 | 76.82 | PK | 10.04 | 0.1 | 86.96 | 126.78 | -39.82 |
| 110 | 61.53 | AV | 10.04 | 0.1 | 71.67 | 106.78 | -35.11 |
| 119.125 * | 95.58 | PK | 9.95 | 0.1 | 105.63 | 126.08 | -20.45 |
| 119.125 * | 79.49 | AV | 9.95 | 0.1 | 89.54 | 106.08 | -16.54 |
| 554 | 54.16 | QP | -16.36 | 0.1 | 37.90 | 72.73 | -34.83 |
| 23214 | 42.34 | QP | -17.9 | 0.9 | 25.34 | 53.98 | -28.64 |

1. "*" Means Fundamental frequency
2. Emission Level [dBμV/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]
3. Margin [dB] = Emission Level [dBμV/m] – Limit [dBμV/m]
4. Limit calculation: Limit at specified distance + 40log (300/3) = Limit + 80 dB for up to 0.49 MHz
   Limit at specified distance + 40log (30/3) = Limit + 40 dB for above 0.49 MHz, Below 30 MHz

4.4.2 Spurious Radiated Emission below 1 GHz

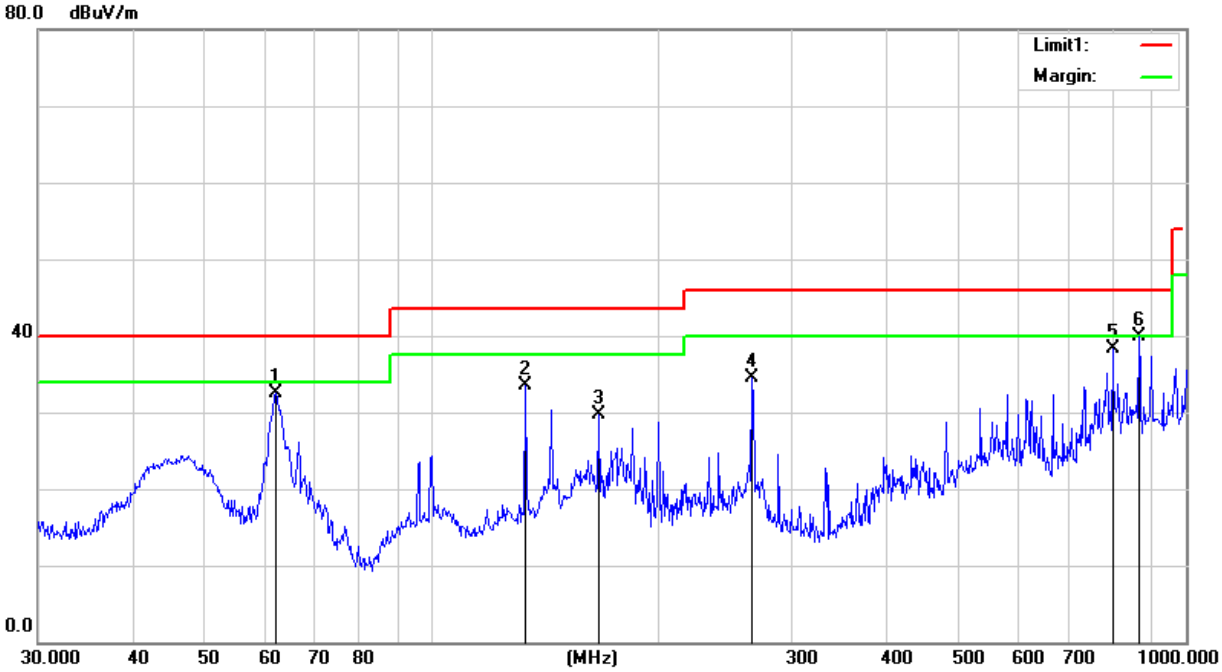
| | | | |
|---|---|---|---|
| Temperature： | 24.6 ℃ | Relative Humidity： | 58% |
| Test Voltage ： | DC 5V | Test Mode ： | Mode 1 |

The following table shows the highest levels of radiated emissions on polarizations of vertical

| Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|
| 61.9951 | 56.75 | -24.30 | 32.45 | 40.00 | -7.55 | QP |
| 133.1511 | 51.02 | -17.54 | 33.48 | 43.50 | -10.02 | QP |
| 166.0680 | 48.66 | -19.00 | 29.66 | 43.50 | -13.84 | QP |
| 265.6757 | 49.83 | -15.29 | 34.54 | 46.00 | -11.46 | QP |
| 798.9797 | 41.70 | -3.45 | 38.25 | 46.00 | -7.75 | QP |
| 866.0880 | 42.48 | -2.63 | 39.85 | 46.00 | -6.15 | QP |

Remark:

1. Margin = Result (Result =Reading + Factor )–Limit



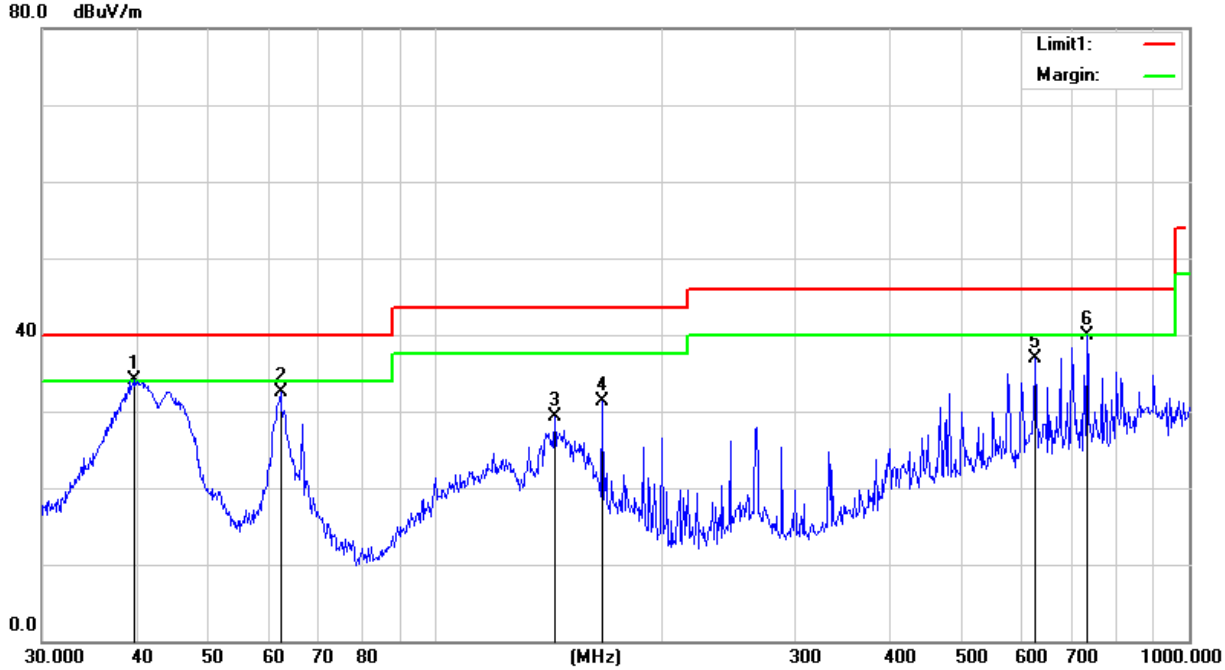
| | | | |
|---|---|---|---|
| Temperature： | 24.6 ℃ | Relative Humidity： | 58% |
| Test Voltage ： | DC 5V | Test Mode ： | Mode 1 |

The following table shows the highest levels of radiated emissions on polarizations of horizontal

| Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|
| 39.8542 | 50.44 | -16.24 | 34.20 | 40.00 | -5.80 | QP |
| 62.2128 | 56.73 | -24.30 | 32.43 | 40.00 | -7.57 | QP |
| 143.8295 | 46.99 | -17.69 | 29.30 | 43.50 | -14.20 | QP |
| 166.6514 | 50.42 | -19.05 | 31.37 | 43.50 | -12.13 | QP |
| 625.0780 | 43.42 | -6.43 | 36.99 | 46.00 | -9.01 | QP |
| 731.9203 | 43.89 | -3.97 | 39.92 | 46.00 | -6.08 | QP |

Remark:

1. Margin = Result (Result =Reading + Factor )–Limit



# 5. 20 DB BANDWIDTH TEST

## 5.1 Limit

FCC Part 2.1049, Only applicable to report.

## 5.2 TEST SETUP

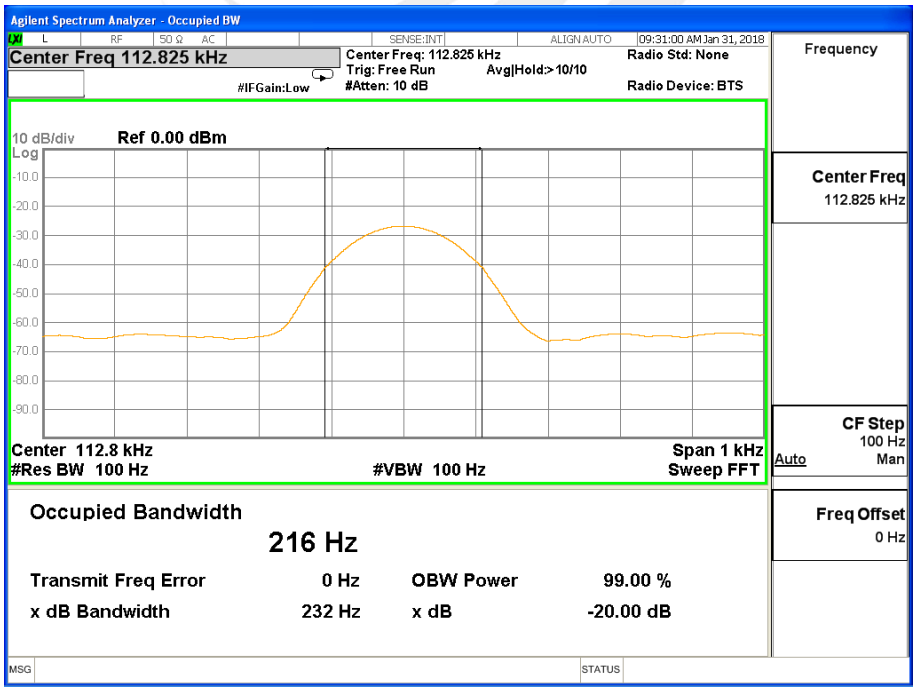
| Spectrum Parameter | Setting |
|---|---|
| Span Frequency | approximately 2 to 3 times the 20 dB bandwidth |
| RB | greater than 1 % of the 20 dB bandwidth, |
| VB | equal to the RBW |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

The test program and configuration,Refer to 4.2 and 4.3

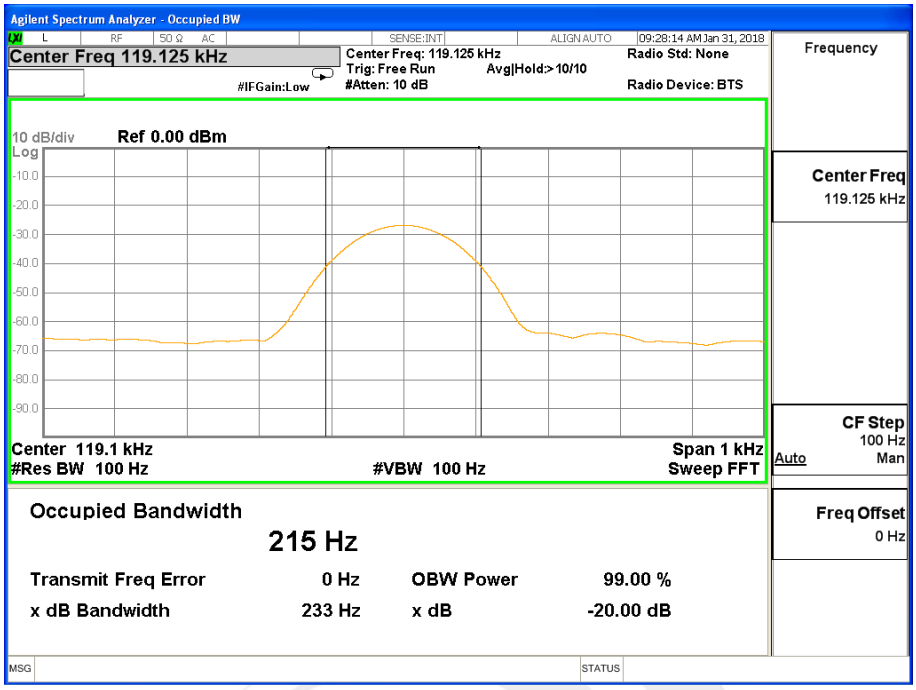
## 5.3 TEST RESULTS

| OperatingFrequency（kHz） | 20 dB Bandwhidth(Hz) |
|---|---|
| 112.825 | 232 |
| 119.125 | 223 |
| 125.685 | 232 |

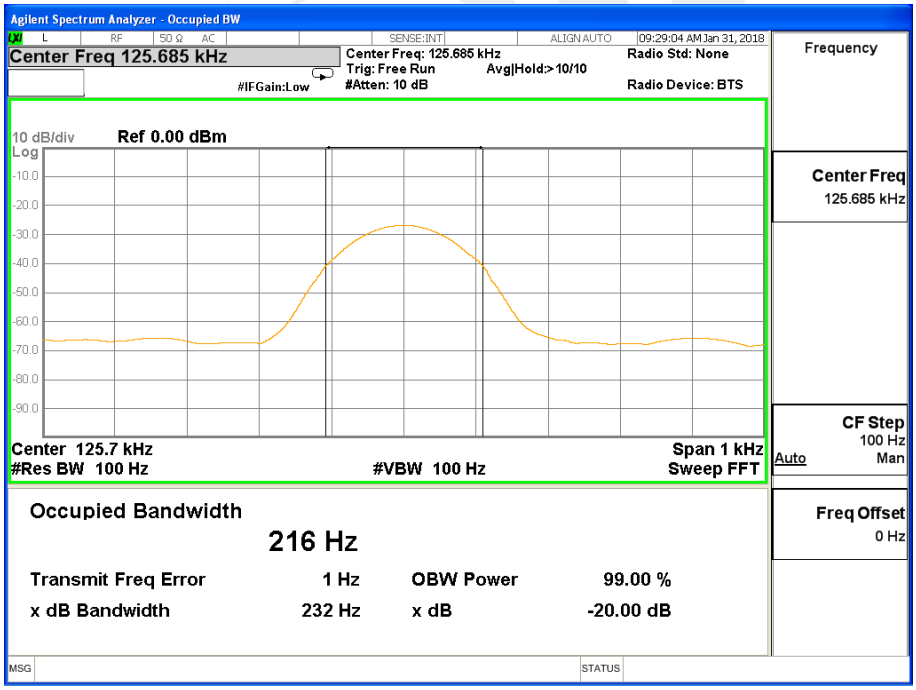
CH00



CH01

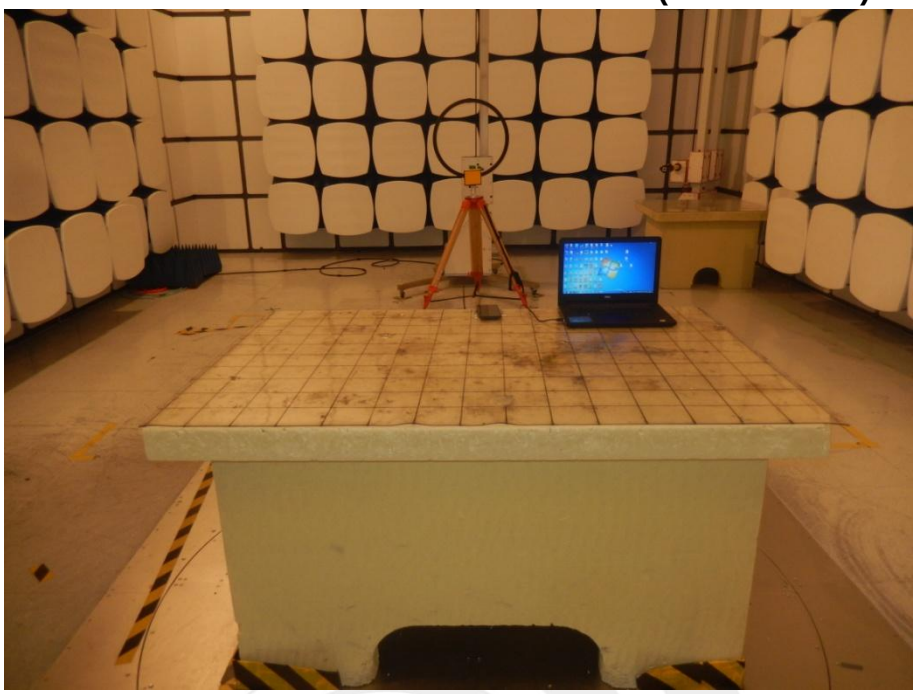

Agilent Spectrum Analyzer - Occupied BW
Center Freq 119.125 kHz
Center Freq: 119.125 kHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
09:28:14 AM Jan 31, 2018
10 dB/div
Ref 0.00 dBm
Center 119.1 kHz
#Res BW 100 Hz
#VBW 100 Hz
Span 1 kHz
Sweep FFT
Occupied Bandwidth
215 Hz
Transmit Freq Error 0 Hz
OBW Power 99.00 %
x dB Bandwidth 233 Hz
x dB -20.00 dB
Frequency
Center Freq 119.125 kHz
CF Step 100 Hz Man
Auto
Freq Offset 0 Hz
MSG
STATUS

CH02

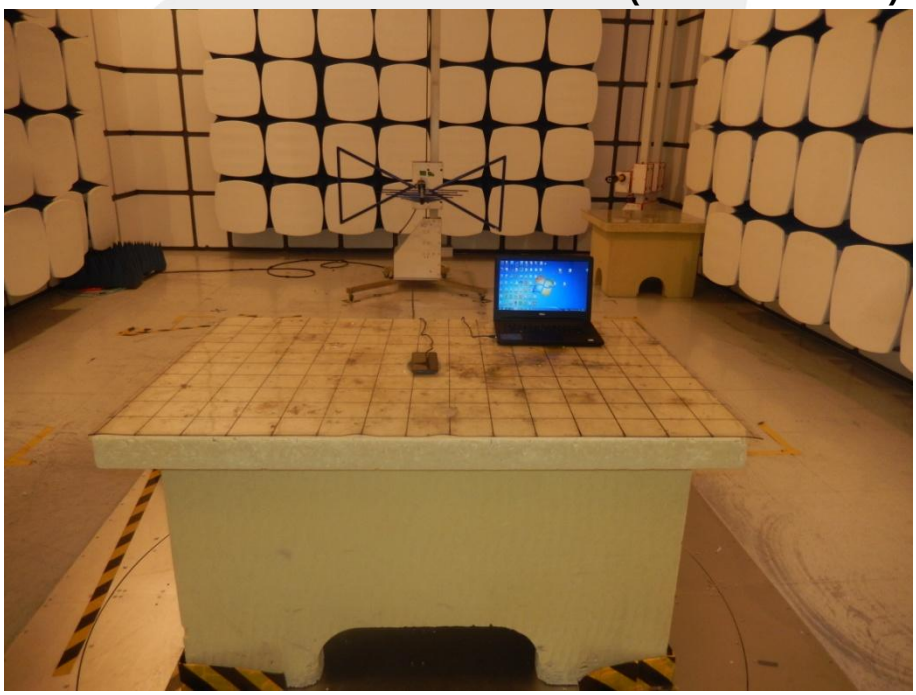

Agilent Spectrum Analyzer - Occupied BW
Center Freq 125.685 kHz
Center Freq: 125.685 kHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
09:29:04 AM Jan 31, 2018
10 dB/div
Ref 0.00 dBm
Center 125.7 kHz
#Res BW 100 Hz
#VBW 100 Hz
Span 1 kHz
Sweep FFT
Occupied Bandwidth
216 Hz
Transmit Freq Error 1 Hz
OBW Power 99.00 %
x dB Bandwidth 232 Hz
x dB -20.00 dB
Frequency
Center Freq 125.685 kHz
CF Step 100 Hz Man
Auto
Freq Offset 0 Hz
MSG
STATUS

## APPENDIX-PHOTOS OF TEST SETUP

### Radiated emission Measurement Photos(9KHz-30MHz)



### Radiated emission Measurement Photos(30MHz-1000MHz)



## ConductionMeasurement Photos

※※※※※END OF THE REPORT※※※※※