



## FCC REPORT

**Applicant:** Trane US, Inc.  
**Address of Applicant:** 6200 Troup Highway Tyler TX 75707  
**Equipment Under Test (EUT)**  
Product Name: COLOR WIFI Z-WAVE THERMOSTAT  
Model No.: AZON1050AC52ZAA, TZON1050AC52ZAA  
**FCC ID:** XVRZON1050  
**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.249:2015  
**Date of sample receipt:** September 14, 2016  
**Date of Test:** September 14-20, 2016  
**Date of report issued:** September 20, 2016  
**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Robinson Lo**  
**Laboratory Manager**

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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## 2 Version

| Version No. | Date               | Description |
|-------------|--------------------|-------------|
| 00          | September 20, 2016 | Original    |
|             |                    |             |
|             |                    |             |
|             |                    |             |
|             |                    |             |

**Prepared By:**

*Yang. Liu*

**Date:**

*September 20, 2016*

**Project Engineer**

**Check By:**

*Andy. Wu*

**Date:**

*September 20, 2016*

**Reviewer**

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## 4 Test Summary

| Test Item                                | Section in CFR 47     | Result |
|------------------------------------------|-----------------------|--------|
| Antenna requirement                      | 15.203                | Pass   |
| AC Power Line Conducted Emission         | 15.207                | Pass   |
| Field strength of the fundamental signal | 15.249 (a)            | Pass   |
| Spurious emissions                       | 15.249 (a) (d)/15.209 | Pass   |
| Band edge                                | 15.249 (d)/15.205     | Pass   |
| 20dB Occupied Bandwidth                  | 15.215 (c)            | Pass   |

*Pass: The EUT complies with the essential requirements in the standard.*

Remark: Test according to ANSI C63.10 2013 and ANSI C63.4: 2014

### 4.1 Measurement Uncertainty

| Test Item                        | Frequency Range | Measurement Uncertainty | Notes |
|----------------------------------|-----------------|-------------------------|-------|
| Radiated Emission                | 9kHz ~ 30MHz    | $\pm 4.34\text{dB}$     | (1)   |
| Radiated Emission                | 30MHz ~ 1000MHz | $\pm 4.24\text{dB}$     | (1)   |
| Radiated Emission                | 1GHz ~ 26.5GHz  | $\pm 4.68\text{dB}$     | (1)   |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | $\pm 3.45\text{dB}$     | (1)   |

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 Client Information

|                         |                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Applicant:              | Trane US, Inc.                                                                                                                |
| Address of Applicant:   | 6200 Troup Highway Tyler TX 75707                                                                                             |
| Manufacturer:           | Computime Limited                                                                                                             |
| Address of Manufacturer | 9/F, Tower One, Lippo Centre, 89 Queensway, Hong Kong                                                                         |
| Factory:                | Computime Electronics (shenzhen) Company Limited                                                                              |
| Address of Factory:     | Yuekenguangyu Industrial Park,Kangqiao Road 88#, Danzhutou Community, Nanwan Street Office Longgang District, Shenzhen, China |

### 5.2 General Description of EUT

|                                                                                                                                                                             |                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Product Name:                                                                                                                                                               | COLOR WIFI Z-WAVE THERMOSTAT     |
| Model No.:                                                                                                                                                                  | AZON1050AC52ZAA, TZON1050AC52ZAA |
| Test Model No. :                                                                                                                                                            | AZON1050AC52ZAA                  |
| Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits.<br>The only difference is the model name for commercial purpose. |                                  |
| Operation Frequency:                                                                                                                                                        | 908.4MHz<br>916 MHz              |
| Modulation type:                                                                                                                                                            | GFSK                             |
| Antenna Type:                                                                                                                                                               | Integral antenna                 |
| Antenna gain:                                                                                                                                                               | 0dBi(declare by Applicant)       |
| Power supply:                                                                                                                                                               | AC 24V                           |

## 5.3 Test mode

|                                                                                                                                                                                                                                              |                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Transmitting mode                                                                                                                                                                                                                            | Keep the EUT in continuously transmitting mode. |
| <i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i> |                                                 |

### Pre-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

| Axis                   | X     | Y     | Z     |
|------------------------|-------|-------|-------|
| Field Strength(dBuV/m) | 92.10 | 92.33 | 91.89 |

### Final Test Mode:

According to ANSI C63.4 standards, the test results are both the "worst case" and "worst setup":  
Y axis (see the test setup photo)

## 5.4 Description of Support Units

|      |
|------|
| None |
|------|

## 5.5 Test Facility

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

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 600491, June 22, 2016

- **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

## 5.6 Test Location

|                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All tests were performed at:                                                                                                                                                                                                                     |
| Global United Technology Services Co., Ltd.<br>Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102<br>Tel: 0755-27798480<br>Fax: 0755-27798960 |

## 5.7 Other Information Requested by the Customer

|       |
|-------|
| None. |
|-------|

## 6 Test Instruments list

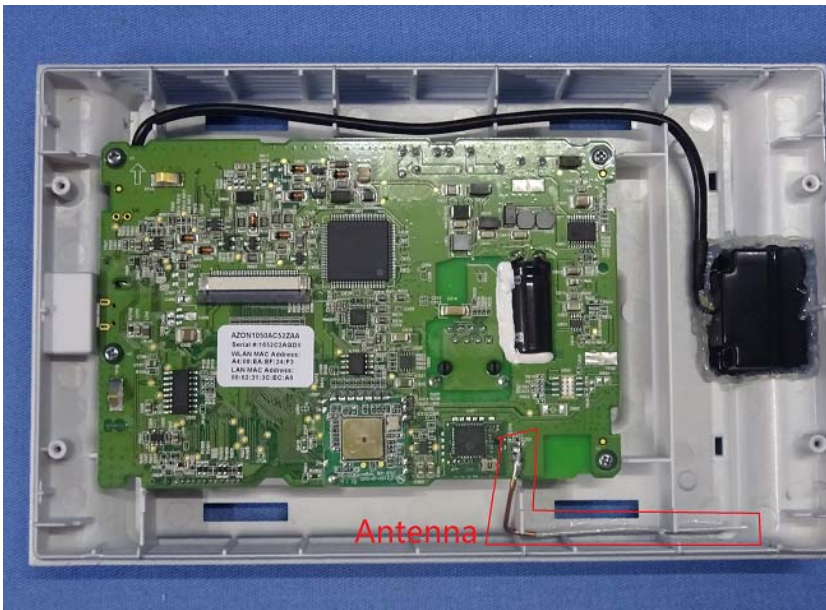
| Radiated Emission: |                               |                                |                             |               |                     |                         |
|--------------------|-------------------------------|--------------------------------|-----------------------------|---------------|---------------------|-------------------------|
| Item               | Test Equipment                | Manufacturer                   | Model No.                   | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                  | 3m Semi- Anechoic Chamber     | ZhongYu Electron               | 9.2(L)*6.2(W)* 6.4(H)       | GTS250        | July. 03 2015       | July. 02 2020           |
| 2                  | Control Room                  | ZhongYu Electron               | 6.2(L)*2.5(W)* 2.4(H)       | GTS251        | N/A                 | N/A                     |
| 3                  | Spectrum Analyzer             | Agilent                        | E4440A                      | GTS533        | June 29 2016        | June 28 2017            |
| 4                  | EMI Test Receiver             | Rohde & Schwarz                | ESU26                       | GTS203        | June 29 2016        | June 28 2017            |
| 5                  | BiConiLog Antenna             | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB9163                    | GTS214        | June 29 2016        | June 28 2017            |
| 6                  | Double -ridged waveguide horn | SCHWARZBECK<br>MESS-ELEKTRONIK | 9120D-829                   | GTS208        | June 29 2016        | June 28 2017            |
| 7                  | Horn Antenna                  | ETS-LINDGREN                   | 3160                        | GTS217        | June 29 2016        | June 28 2017            |
| 8                  | EMI Test Software             | AUDIX                          | E3                          | N/A           | N/A                 | N/A                     |
| 9                  | Coaxial Cable                 | GTS                            | N/A                         | GTS213        | June 29 2016        | June 28 2017            |
| 10                 | Coaxial Cable                 | GTS                            | N/A                         | GTS211        | June 29 2016        | June 28 2017            |
| 11                 | Coaxial cable                 | GTS                            | N/A                         | GTS210        | June 29 2016        | June 28 2017            |
| 12                 | Coaxial Cable                 | GTS                            | N/A                         | GTS212        | June 29 2016        | June 28 2017            |
| 13                 | Amplifier(100kHz-3GHz)        | HP                             | 8347A                       | GTS204        | June 29 2016        | June 28 2017            |
| 14                 | Amplifier(2GHz-20GHz)         | HP                             | 8349B                       | GTS206        | June 29 2016        | June 28 2017            |
| 15                 | Amplifier (18-26GHz)          | Rohde & Schwarz                | AFS33-18002<br>650-30-8P-44 | GTS218        | June 29 2016        | June 28 2017            |
| 16                 | Band filter                   | Amindeon                       | 82346                       | GTS219        | June 29 2016        | June 28 2017            |

| Conducted Emission: |                          |                     |                      |               |                     |                         |
|---------------------|--------------------------|---------------------|----------------------|---------------|---------------------|-------------------------|
| Item                | Test Equipment           | Manufacturer        | Model No.            | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                   | Shielding Room           | ZhongYu Electron    | 7.3(L)x3.1(W)x2.9(H) | GTS252        | May 16 2014         | May 15 2019             |
| 2                   | EMI Test Receiver        | R&S                 | ESCI 7               | GTS552        | June 29 2016        | June 28 2017            |
| 3                   | Pulse Limiter            | R&S                 | ESH3-Z2              | GTS224        | June 29 2016        | June 28 2017            |
| 4                   | Coaxial Switch           | ANRITSU CORP        | MP59B                | GTS225        | June 29 2016        | June 28 2017            |
| 5                   | Artificial Mains Network | SCHWARZBECK<br>MESS | NSLK8127             | GTS226        | June 29 2016        | June 28 2017            |
| 6                   | Coaxial Cable            | GTS                 | N/A                  | GTS227        | June 29 2016        | June 28 2017            |
| 7                   | EMI Test Software        | AUDIX               | E3                   | N/A           | N/A                 | N/A                     |
| 8                   | Thermo meter             | KTJ                 | TA328                | GTS233        | June 29 2016        | June 28 2017            |

| General used equipment: |                |              |           |               |                     |                         |
|-------------------------|----------------|--------------|-----------|---------------|---------------------|-------------------------|
| Item                    | Test Equipment | Manufacturer | Model No. | Inventory No. | Cal.Date (mm-dd-yy) | Cal.Due date (mm-dd-yy) |
| 1                       | Barometer      | ChangChun    | DYM3      | GTS257        | June 29 2016        | June 28 2017            |

## 7 Test results and Measurement Data

### 7.1 Antenna requirement:

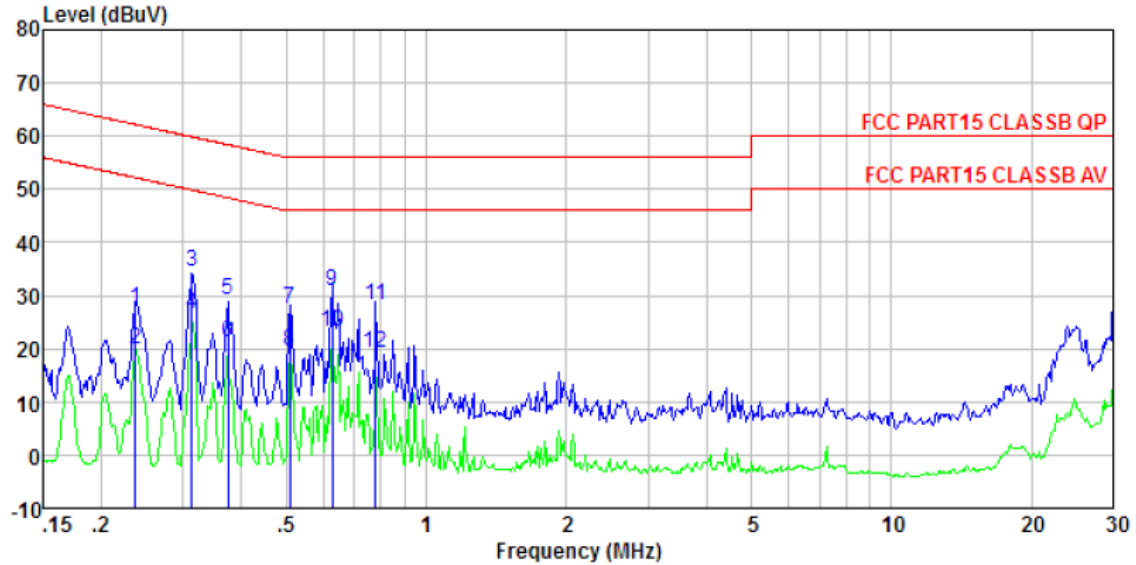
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b>Standard requirement:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | FCC Part15 C Section 15.203 |
| <b>15.203 requirement:</b><br><p>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.</p> |                             |
| <b>EUT Antenna:</b><br><p><i>The antenna is integral antenna, the best case gain of the antenna is 0dBi</i></p>                                                                                                                                                                                                                                                                                                                                                                         |                             |
|                                                                                                                                                                                                                                                                                                                                                                                                      |                             |

## 7.2 Conducted Emissions

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |           |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|-----------|
| Test Requirement:                                | FCC Part15 C Section 15.207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |           |           |
| Test Method:                                     | ANSI C63.10:2013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |           |           |
| Test Frequency Range:                            | 150KHz to 30MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |           |           |
| Class / Severity:                                | Class B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |           |           |
| Receiver setup:                                  | RBW=9KHz, VBW=30KHz, Sweep time=auto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |           |           |
| Limit:                                           | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Limit (dBuV) |           |           |
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 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 setup:                                      | <div><p style="text-align: center;"><b>Reference Plane</b></p><p style="text-align: center;">Test table/Insulation plane</p><p><i>Remark:<br/>E.U.T: Equipment Under Test<br/>LISN: Line Impedance Stabilization Network<br/>Test table height=0.8m</i></p></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |
| Test procedure:                                  | <div><div>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</div><div>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</div><div>3. Both sides of A.C. line are checked for maximum conducted interference. 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.</div></div> |              |           |           |
| Test Instruments:                                | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |           |           |
| Test mode:                                       | Refer to section 5.3 for details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |           |           |
| Test results:                                    | Pass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |           |           |

### Measurement data:

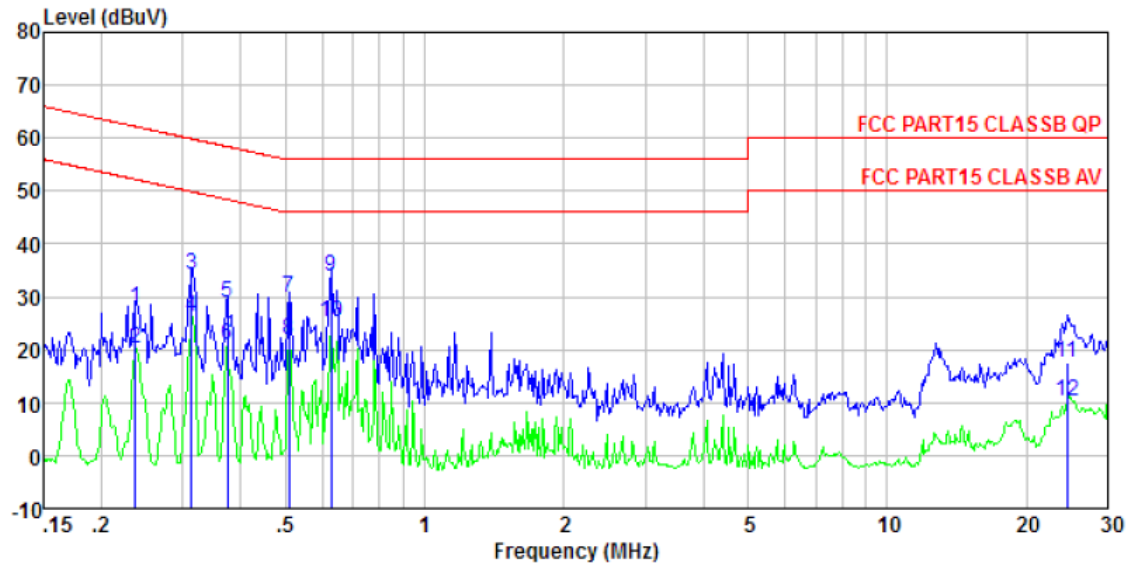
Line:



Site : Shielded room  
 Condition : FCC PART15 CLASSB QP LISN-2013 LINE  
 Job No. : 018  
 Test Mode : Transmitting mode  
 Test Engineer: Boy

|    | Freq  | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark  |
|----|-------|------------|-------------|------------|-------|------------|------------|---------|
|    | MHz   | dBuV       | dB          | dB         | dBuV  | dBuV       | dB         |         |
| 1  | 0.237 | 27.38      | 0.12        | 0.12       | 27.62 | 62.22      | -34.60     | QP      |
| 2  | 0.237 | 19.72      | 0.12        | 0.12       | 19.96 | 52.22      | -32.26     | Average |
| 3  | 0.313 | 34.36      | 0.11        | 0.10       | 34.57 | 59.88      | -25.31     | QP      |
| 4  | 0.313 | 26.22      | 0.11        | 0.10       | 26.43 | 49.88      | -23.45     | Average |
| 5  | 0.375 | 28.90      | 0.11        | 0.10       | 29.11 | 58.39      | -29.28     | QP      |
| 6  | 0.375 | 21.05      | 0.11        | 0.10       | 21.26 | 48.39      | -27.13     | Average |
| 7  | 0.510 | 27.29      | 0.12        | 0.11       | 27.52 | 56.00      | -28.48     | QP      |
| 8  | 0.510 | 19.34      | 0.12        | 0.11       | 19.57 | 46.00      | -26.43     | Average |
| 9  | 0.627 | 30.73      | 0.13        | 0.12       | 30.98 | 56.00      | -25.02     | QP      |
| 10 | 0.627 | 22.84      | 0.13        | 0.12       | 23.09 | 46.00      | -22.91     | Average |
| 11 | 0.779 | 28.03      | 0.14        | 0.13       | 28.30 | 56.00      | -27.70     | QP      |
| 12 | 0.779 | 19.10      | 0.14        | 0.13       | 19.37 | 46.00      | -26.63     | Average |

## Neutral:



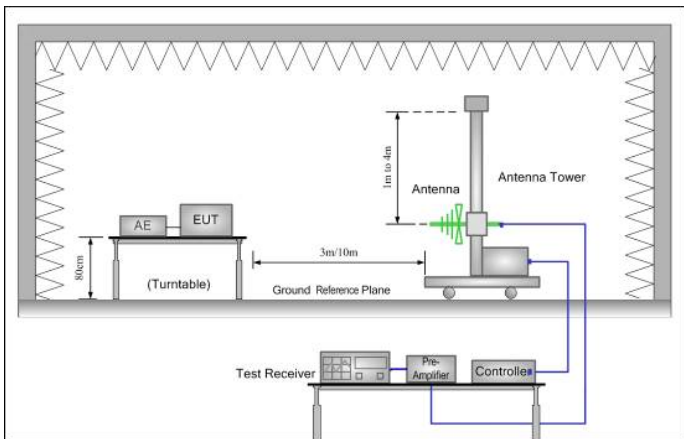
Site : Shielded room  
 Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL  
 Job No. : 018  
 Test Mode : Transmitting mode  
 Test Engineer: Boy

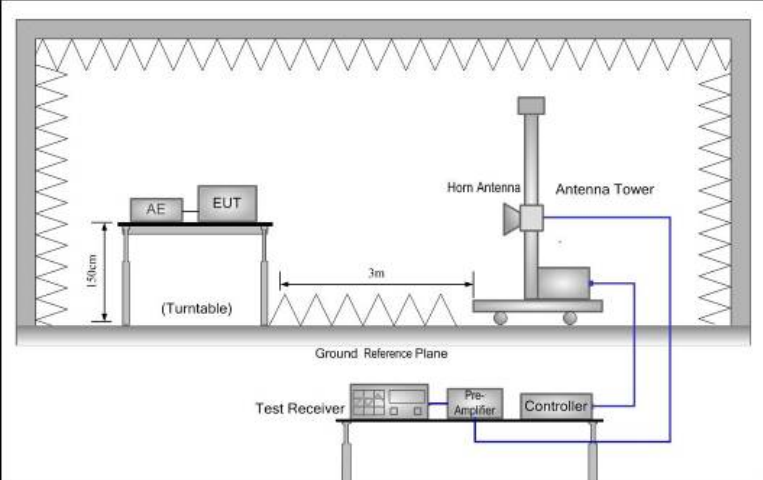
|    | Freq   | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark  |
|----|--------|------------|-------------|------------|-------|------------|------------|---------|
|    | MHz    | dBuV       | dB          | dB         | dBuV  | dBuV       | dB         |         |
| 1  | 0.237  | 27.58      | 0.06        | 0.12       | 27.76 | 62.22      | -34.46     | QP      |
| 2  | 0.237  | 19.91      | 0.06        | 0.12       | 20.09 | 52.22      | -32.13     | Average |
| 3  | 0.313  | 34.05      | 0.06        | 0.10       | 34.21 | 59.88      | -25.67     | QP      |
| 4  | 0.313  | 25.94      | 0.06        | 0.10       | 26.10 | 49.88      | -23.78     | Average |
| 5  | 0.375  | 28.72      | 0.06        | 0.10       | 28.88 | 58.39      | -29.51     | QP      |
| 6  | 0.375  | 20.88      | 0.06        | 0.10       | 21.04 | 48.39      | -27.35     | Average |
| 7  | 0.510  | 29.63      | 0.06        | 0.11       | 29.80 | 56.00      | -26.20     | QP      |
| 8  | 0.510  | 21.76      | 0.06        | 0.11       | 21.93 | 46.00      | -24.07     | Average |
| 9  | 0.627  | 33.49      | 0.07        | 0.12       | 33.68 | 56.00      | -22.32     | QP      |
| 10 | 0.627  | 24.90      | 0.07        | 0.12       | 25.09 | 46.00      | -20.91     | Average |
| 11 | 24.529 | 16.45      | 1.01        | 0.23       | 17.69 | 60.00      | -42.31     | QP      |
| 12 | 24.529 | 9.12       | 1.01        | 0.23       | 10.36 | 50.00      | -39.64     | Average |

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

## 7.3 Radiated Emission Method

|                                                      |                                                                                                                                                                                                                                                                |                    |        |                  |                  |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------|------------------|------------------|
| Test Requirement:                                    | FCC Part15 C Section 15.209                                                                                                                                                                                                                                    |                    |        |                  |                  |
| Test Method:                                         | ANSI C63.4:2014                                                                                                                                                                                                                                                |                    |        |                  |                  |
| Test Frequency Range:                                | 30MHz to 10GHz                                                                                                                                                                                                                                                 |                    |        |                  |                  |
| Test site:                                           | Measurement Distance: 3m                                                                                                                                                                                                                                       |                    |        |                  |                  |
| Receiver setup:                                      | Frequency                                                                                                                                                                                                                                                      | Detector           | RBW    | VBW              | Remark           |
|                                                      | 30MHz-1GHz                                                                                                                                                                                                                                                     | Quasi-peak         | 120KHz | 300KHz           | Quasi-peak Value |
|                                                      | Above 1GHz                                                                                                                                                                                                                                                     | Peak               | 1MHz   | 3MHz             | Peak Value       |
|                                                      |                                                                                                                                                                                                                                                                | Peak               | 1MHz   | 10Hz             | Average Value    |
| Limit:<br>(Field strength of the fundamental signal) | Frequency                                                                                                                                                                                                                                                      | Limit (dBuV/m @3m) |        | Remark           |                  |
|                                                      | 902MHz-928MHz                                                                                                                                                                                                                                                  | 94.00              |        | Quasi-peak Value |                  |
| Limit:<br>(Spurious Emissions)                       | Frequency                                                                                                                                                                                                                                                      | Limit (dBuV/m @3m) |        | Remark           |                  |
|                                                      | 30MHz-88MHz                                                                                                                                                                                                                                                    | 40.00              |        | Quasi-peak Value |                  |
|                                                      | 88MHz-216MHz                                                                                                                                                                                                                                                   | 43.50              |        | Quasi-peak Value |                  |
|                                                      | 216MHz-960MHz                                                                                                                                                                                                                                                  | 46.00              |        | Quasi-peak Value |                  |
|                                                      | 960MHz-1GHz                                                                                                                                                                                                                                                    | 54.00              |        | Quasi-peak Value |                  |
|                                                      | Above 1GHz                                                                                                                                                                                                                                                     | 54.00              |        | Average Value    |                  |
| 74.00                                                |                                                                                                                                                                                                                                                                | Peak Value         |        |                  |                  |
| Limit:<br>(band edge)                                | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation. |                    |        |                  |                  |
| Test setup:                                          | Below 1GHz                                                                                                                                                                                                                                                     |                    |        |                  |                  |
|                                                      | <div></div>                                                                                                                                                                |                    |        |                  |                  |
|                                                      | Above 1GHz                                                                                                                                                                                                                                                     |                    |        |                  |                  |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>Test Procedure:</p>   | <ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol> |
| <p>Test Instruments:</p> | <p>Refer to section 6.0 for details</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>Test mode:</p>        | <p>Refer to section 5.3 for details</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>Test results:</p>     | <p>Pass</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Measurement data:

## 7.3.1 Field Strength of The Fundamental Signal

Quasi-peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 908.40          | 89.30             | 23.15                 | 4.88            | 29.10                    | 88.23          | 94.00               | -5.77           | Vertical     |
| 908.40          | 89.30             | 23.15                 | 4.88            | 29.10                    | 88.23          | 94.00               | -5.77           | Horizontal   |
| 916.00          | 92.71             | 23.21                 | 4.91            | 29.10                    | 91.73          | 94.00               | -2.27           | Vertical     |
| 916.00          | 91.11             | 23.21                 | 4.91            | 29.10                    | 90.13          | 94.00               | -3.87           | Horizontal   |

## 7.3.2 Spurious emissions

■ Below 1GHz

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 41.13           | 42.64             | 15.57                 | 0.67            | 30.04                    | 28.84          | 40.00               | -11.16          | Vertical     |
| 53.13           | 45.91             | 15.10                 | 0.80            | 29.97                    | 31.84          | 40.00               | -8.16           | Vertical     |
| 105.64          | 51.22             | 14.63                 | 1.24            | 29.66                    | 37.43          | 43.50               | -6.07           | Vertical     |
| 112.13          | 52.80             | 13.83                 | 1.30            | 29.62                    | 38.31          | 43.50               | -5.19           | Vertical     |
| 191.75          | 44.52             | 12.56                 | 1.80            | 29.23                    | 29.65          | 43.50               | -13.85          | Vertical     |
| 264.75          | 43.20             | 14.22                 | 2.19            | 29.75                    | 29.86          | 46.00               | -16.14          | Vertical     |
| 93.44           | 47.09             | 14.58                 | 1.14            | 29.73                    | 33.08          | 43.50               | -10.42          | Horizontal   |
| 108.27          | 50.69             | 14.39                 | 1.26            | 29.64                    | 36.70          | 43.50               | -6.80           | Horizontal   |
| 191.07          | 52.91             | 12.56                 | 1.80            | 29.23                    | 38.04          | 43.50               | -5.46           | Horizontal   |
| 211.53          | 50.61             | 12.93                 | 1.91            | 29.31                    | 36.14          | 43.50               | -7.36           | Horizontal   |
| 264.75          | 47.60             | 14.22                 | 2.19            | 29.75                    | 34.26          | 46.00               | -11.74          | Horizontal   |
| 302.48          | 44.72             | 15.08                 | 2.37            | 29.98                    | 32.19          | 46.00               | -13.81          | Horizontal   |

## ■ Above 1GHz

### 908.4MHz

#### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| 1816.80         | 36.68             | 25.37                 | 4.87            | 34.14              | 32.78          | 74.00               | -41.22          | Vertical     |
| 2725.20         | 36.39             | 28.21                 | 5.69            | 33.64              | 36.65          | 74.00               | -37.35          | Vertical     |
| 3633.60         | 33.62             | 29.17                 | 7.21            | 32.60              | 37.40          | 74.00               | -36.60          | Vertical     |
| 4542.00         | 31.58             | 31.42                 | 8.38            | 31.96              | 39.42          | 74.00               | -34.58          | Vertical     |
| 5450.40         | 28.78             | 31.89                 | 9.45            | 32.41              | 37.71          | 74.00               | -36.29          | Vertical     |
| 1816.80         | 36.58             | 25.37                 | 4.87            | 34.14              | 32.68          | 74.00               | -41.32          | Horizontal   |
| 2725.20         | 37.08             | 28.21                 | 5.69            | 33.64              | 37.34          | 74.00               | -36.66          | Horizontal   |
| 3633.60         | 32.95             | 29.17                 | 7.21            | 32.60              | 36.73          | 74.00               | -37.27          | Horizontal   |
| 4542.00         | 32.22             | 31.42                 | 8.38            | 31.96              | 40.06          | 74.00               | -33.94          | Horizontal   |
| 5450.40         | 29.46             | 31.89                 | 9.45            | 32.41              | 38.39          | 74.00               | -35.61          | Horizontal   |

#### Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| 1816.80         | 26.42             | 25.37                 | 4.87            | 34.14              | 22.52          | 54.00               | -31.48          | Vertical     |
| 2725.20         | 26.93             | 28.21                 | 5.69            | 33.64              | 27.19          | 54.00               | -26.81          | Vertical     |
| 3633.60         | 23.97             | 29.17                 | 7.21            | 32.60              | 27.75          | 54.00               | -26.25          | Vertical     |
| 4542.00         | 21.41             | 31.42                 | 8.38            | 31.96              | 29.25          | 54.00               | -24.75          | Vertical     |
| 5450.40         | 18.46             | 31.89                 | 9.45            | 32.41              | 27.39          | 54.00               | -26.61          | Vertical     |
| 1816.80         | 26.18             | 25.37                 | 4.87            | 34.14              | 22.28          | 54.00               | -31.72          | Horizontal   |
| 2725.20         | 27.26             | 28.21                 | 5.69            | 33.64              | 27.52          | 54.00               | -26.48          | Horizontal   |
| 3633.60         | 22.35             | 29.17                 | 7.21            | 32.60              | 26.13          | 54.00               | -27.87          | Horizontal   |
| 4542.00         | 22.68             | 31.42                 | 8.38            | 31.96              | 30.52          | 54.00               | -23.48          | Horizontal   |
| 5450.40         | 19.73             | 31.89                 | 9.45            | 32.41              | 28.66          | 54.00               | -25.34          | Horizontal   |

## 916MHz

### Peak value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| 1832.00         | 37.33             | 25.42                 | 4.87            | 34.17              | 33.45          | 74.00               | -40.55          | Vertical     |
| 2748.00         | 37.99             | 28.24                 | 5.71            | 33.61              | 38.33          | 74.00               | -35.67          | Vertical     |
| 3664.00         | 33.29             | 29.20                 | 7.27            | 32.56              | 37.20          | 74.00               | -36.80          | Vertical     |
| 4580.00         | 31.07             | 31.49                 | 8.40            | 31.98              | 38.98          | 74.00               | -35.02          | Vertical     |
| 5496.00         | 28.88             | 31.98                 | 9.51            | 32.42              | 37.95          | 74.00               | -36.05          | Vertical     |
| 1832.00         | 37.07             | 25.42                 | 4.87            | 34.17              | 33.19          | 74.00               | -40.81          | Horizontal   |
| 2748.00         | 38.17             | 28.24                 | 5.71            | 33.61              | 38.51          | 74.00               | -35.49          | Horizontal   |
| 3664.00         | 33.32             | 29.20                 | 7.27            | 32.56              | 37.23          | 74.00               | -36.77          | Horizontal   |
| 4580.00         | 31.78             | 31.49                 | 8.40            | 31.98              | 39.69          | 74.00               | -34.31          | Horizontal   |
| 5496.00         | 29.92             | 31.98                 | 9.51            | 32.42              | 38.99          | 74.00               | -35.01          | Horizontal   |

### Average value:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------|----------------|---------------------|-----------------|--------------|
| 1832.00         | 27.79             | 25.42                 | 4.87            | 34.17              | 23.91          | 54.00               | -30.09          | Vertical     |
| 2748.00         | 27.23             | 28.24                 | 5.71            | 33.61              | 27.57          | 54.00               | -26.43          | Vertical     |
| 3664.00         | 23.71             | 29.20                 | 7.27            | 32.56              | 27.62          | 54.00               | -26.38          | Vertical     |
| 4580.00         | 21.27             | 31.49                 | 8.40            | 31.98              | 29.18          | 54.00               | -24.82          | Vertical     |
| 5496.00         | 18.56             | 31.98                 | 9.51            | 32.42              | 27.63          | 54.00               | -26.37          | Vertical     |
| 1832.00         | 26.96             | 25.42                 | 4.87            | 34.17              | 23.08          | 54.00               | -30.92          | Horizontal   |
| 2748.00         | 28.05             | 28.24                 | 5.71            | 33.61              | 28.39          | 54.00               | -25.61          | Horizontal   |
| 3664.00         | 23.16             | 29.20                 | 7.27            | 32.56              | 27.07          | 54.00               | -26.93          | Horizontal   |
| 4580.00         | 21.94             | 31.49                 | 8.40            | 31.98              | 29.85          | 54.00               | -24.15          | Horizontal   |
| 5496.00         | 19.88             | 31.98                 | 9.51            | 32.42              | 28.95          | 54.00               | -25.05          | Horizontal   |

### Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

### 7.3.3 Bandedge emissions

*All of the restriction bands were tested, and only the data of worst case was exhibited.*

#### Quasi-peak value:

##### 908.4MHz:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 902.00          | 24.83             | 23.12                 | 4.87            | 29.10                    | 23.72          | 46.00               | -22.28          | Vertical     |
| 928.00          | 36.52             | 23.28                 | 4.96            | 29.10                    | 35.66          | 46.00               | -10.34          | Vertical     |
| 960.00          | 42.38             | 23.49                 | 5.08            | 29.10                    | 41.85          | 46.00               | -4.15           | Vertical     |
| 902.00          | 26.81             | 23.12                 | 4.87            | 29.10                    | 25.70          | 46.00               | -20.30          | Horizontal   |
| 928.00          | 33.95             | 23.28                 | 4.96            | 29.10                    | 33.09          | 46.00               | -12.91          | Horizontal   |
| 960.00          | 40.81             | 23.49                 | 5.08            | 29.10                    | 40.28          | 46.00               | -5.72           | Horizontal   |

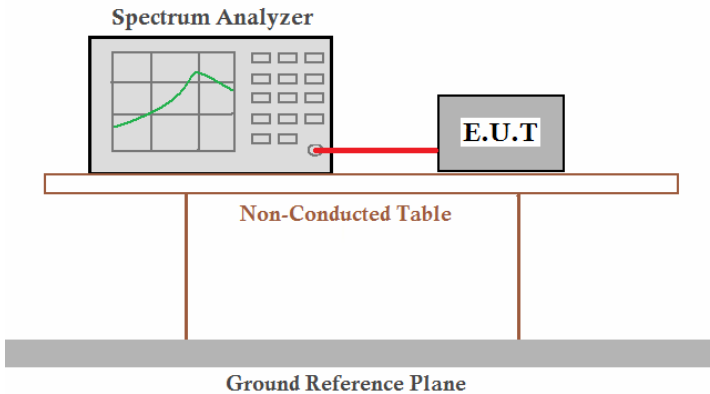
##### 916MHz:

| Frequency (MHz) | Read Level (dBuV) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Factor (dB) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|-------------------|-----------------------|-----------------|--------------------------|----------------|---------------------|-----------------|--------------|
| 902.00          | 24.96             | 23.12                 | 4.87            | 29.10                    | 23.85          | 46.00               | -22.15          | Vertical     |
| 928.00          | 37.00             | 23.28                 | 4.96            | 29.10                    | 36.14          | 46.00               | -9.86           | Vertical     |
| 960.00          | 42.60             | 23.49                 | 5.08            | 29.10                    | 42.07          | 46.00               | -3.93           | Vertical     |
| 902.00          | 27.04             | 23.12                 | 4.87            | 29.10                    | 25.93          | 46.00               | -20.07          | Horizontal   |
| 928.00          | 34.30             | 23.28                 | 4.96            | 29.10                    | 33.44          | 46.00               | -12.56          | Horizontal   |
| 960.00          | 41.10             | 23.49                 | 5.08            | 29.10                    | 40.57          | 46.00               | -5.43           | Horizontal   |

#### Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

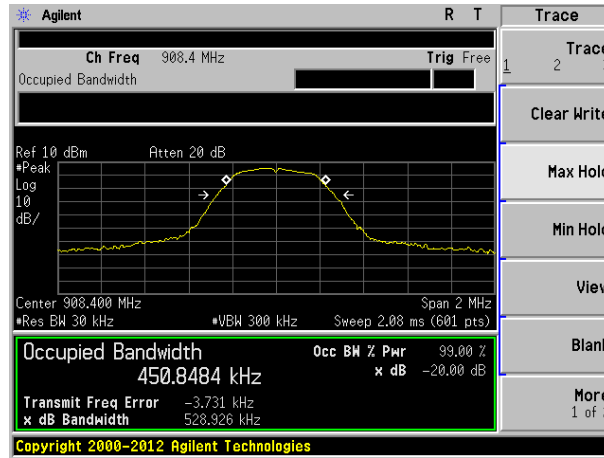
## 7.4 20dB Occupy Bandwidth

|                   |                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Requirement: | FCC Part15 C Section 15.249/15.215                                                                                                                                                                                                                                                                                                                  |
| Test Method:      | ANSI C63.10:2013                                                                                                                                                                                                                                                                                                                                    |
| Limit:            | Operation Frequency range 2400MHz~2483.5MHz                                                                                                                                                                                                                                                                                                         |
| Test setup:       |  <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p> |
| Test Instruments: | Refer to section 6.0 for details                                                                                                                                                                                                                                                                                                                    |
| Test mode:        | Refer to section 5.3 for details                                                                                                                                                                                                                                                                                                                    |
| Test results:     | Pass                                                                                                                                                                                                                                                                                                                                                |

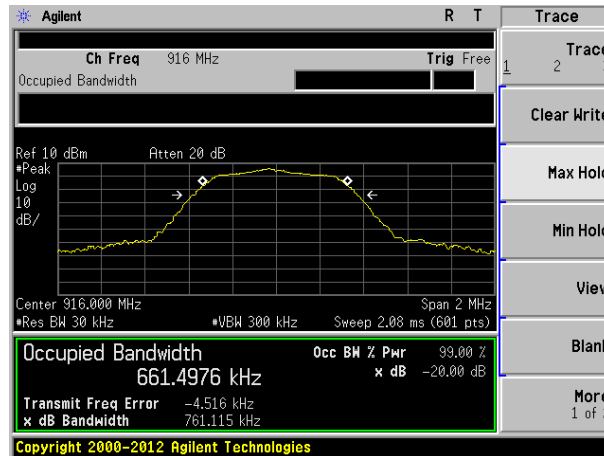
### Measurement Data

| Test channel | 20dB bandwidth(kHz) | Result |
|--------------|---------------------|--------|
| 908.40MHz    | 528.93              | Pass   |
| 916.00MHz    | 761.12              | Pass   |

Test plot as follows:



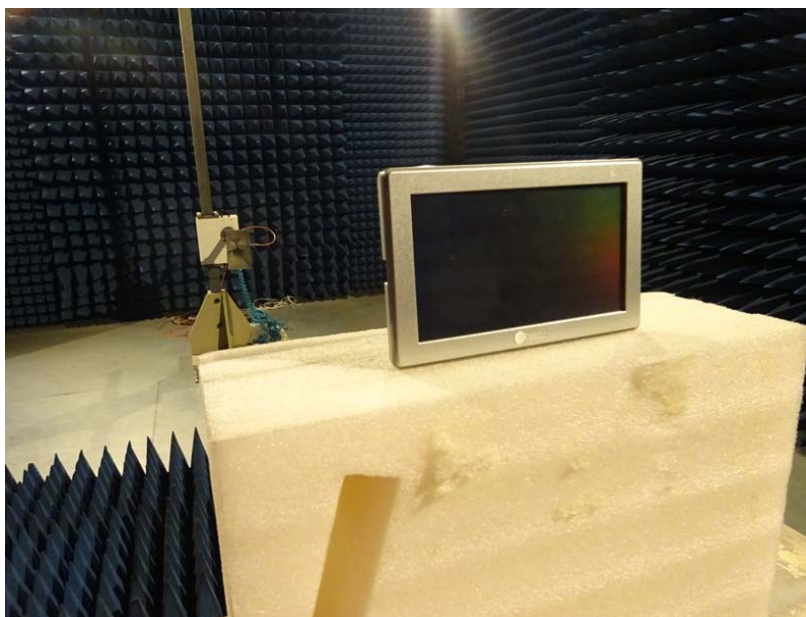
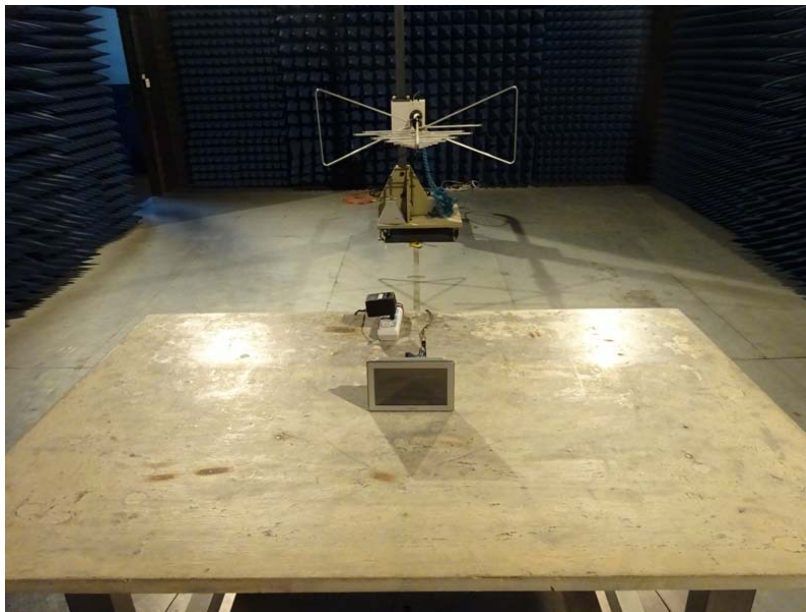
908.40MHz



916.00MHz

## 8 Test Setup Photo

Radiated Emission



## Conducted Emission



## 9 EUT Constructional Details

Reference to the test report No. GTS201609000018E01

-----End-----