# TEST REPORT

| | |
|---|---|
| **Applicant:** | Xiamen Topstar Co., Ltd. |
| **Address of Applicant:** | No.696 Meixi Road, Tongan District Xiamen City, Fujian Province, P.R.China |
| **Manufacturer:** | Xiamen Topstar Co., Ltd. |
| **Address of Manufacturer:** | No.696 Meixi Road, Tongan District Xiamen City, Fujian Province, P.R.China |
| **Factory:** | Xiamen Topstar Lighting Co., Ltd |
| **Address of Factory:** | 676 Meixi Avenue, Tong'an District, Xiamen, China |

**Equipment Under Test (EUT)**

| | |
|---|---|
| Product Name: | Electric Vehicle supply equipment |
| Model No.: | TSEB240V/48AUS-ZRE-H, TSEB240V/40AUS-ZRE-H, TSEB240V/32AUS-ZRE-H, TSEB240V/40AUS-ZRE-P-H, TSEB240V/32AUS-ZRE-P-H |
| **FCC ID:** | 2A9FM-TSEB240VT6 |
| **Applicable standards:** | FCC CFR Title 47 Part 15 Subpart C Section 15.231 |
| **Date of sample receipt:** | November 24, 2023 |
| **Date of Test:** | November 24, 2023-January 08, 2024 |
| **Date of report issued:** | January 09, 2024 |
| **Test Result :** | PASS * |

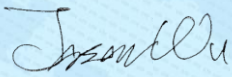
* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Robinson Luo**
**Laboratory Manager**

## 2 Version

| Version No. | Date | Description |
|---|---|---|
| *00* | *January 09, 2024* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Prepared By:***  ***Date:*** *January 09, 2024*

***Project Engineer***

***Check By:***  ***Date:*** *January 09, 2024*

***Reviewer***

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# 4 Test Summary

| Test Item | Section in | Result |
|---|---|---|
| Antenna requirement | CFR 47 15.203 | Pass |
| Conduction Emission | CFR 47 15.207 | Pass |
| Field strength of the fundamental signal | CFR 47 15.231(e) | Pass |
| Spurious emissions | CFR 47 15.231(e) &15.209 | Pass |
| Occupy Bandwidth | CFR 47 15.231(c) | Pass |
| Dwell time | CFR 47 15.231(e) | Pass |

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

## 4.1 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Radio Frequency | $\pm 7.25\times10^{-8}$ |
| 2 | Duty cycle | ±0.37% |
| 3 | Occupied Bandwidth | ±3% |
| 4 | RF conducted power | ±0.75dB |
| 5 | RF power density | ±3dB |
| 6 | Conducted Spurious emissions | ±2.58dB |
| 7 | AC Power Line Conducted Emission | ±3.44dB (0.15MHz ~ 30MHz) |
| 8 | Radiated Spurious emission test | ±3.1dB (9kHz-30MHz) |
| | | ±3.8039dB (30MHz-200MHz) |
| | | ±3.9679dB (200MHz-1GHz) |
| | | ±4.29dB (1GHz-18GHz) |
| | | ±3.30dB (18GHz-40GHz) |
| 9 | Temperature test | ±1°C |
| 10 | Humidity test | ±3% |
| 11 | Time | ±3% |

# 5 General Information

## 5.1 General Description of EUT

| | |
|---|---|
| Product Name: | Electric Vehicle supply equipment |
| Model No.: | TSEB240V/48AUS-ZRE-H, TSEB240V/40AUS-ZRE-H, TSEB240V/32AUS-ZRE-H, TSEB240V/40AUS-ZRE-P-H, TSEB240V/32AUS-ZRE-P-H |
| Test Model No: | TSEB240V/48AUS-ZRE-H |
| Remark: The EUT is Electric Vehicle AC Charger with RFID and 433MHz Function, it supports<br>WIFI, Bluetooth function, the wireless module FCC ID is 2AC7Z-ESP32WROOM32U.the wireless module IC is 21098-ESPWROOM32U<br>used in those models except for output current.<br>TSEB240V/48AUS-ZRE-H:208-240VAC, 60Hz, 48A<br>TSEB240V/40AUS-ZRE-H:208-240VAC, 60Hz, 40A<br>TSEB240V/32AUS-ZRE-H:208-240VAC, 60Hz, 32A with WIFI, BLE, RFID and 433MHz;<br>TSEB240V/40AUS-ZRE-P-H:208-240VAC, 60Hz, 40A<br>TSEB240V/32AUS-ZRE-P-H:208-240VAC, 60Hz, 32A with Plug, WIFI, BLE, RFID and 433MHz<br>So choose TSEB240V/48AUS-ZRE-H to test as representative | |
| Serial No.: | 92184044 |
| Test sample(s) ID: | GTS2023110215-1 |
| Sample(s) Status | Engineer sample |
| Operation Frequency: | 433.92MHz |
| Modulation type: | ASK |
| Antenna Type: | Integral Antenna |
| Antenna gain: | 2dBi(Declared by applicant) |
| Power supply: | AC 208-240V, 60Hz |

Remark:
1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

## 5.2 Test mode

| | |
|---|---|
| Transmitting mode | Keep the EUT in transmitting mode. |

**Per-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:

| 433.92MHz | Axis | X | Y | Z |
|---|---|---|---|---|
| | Field Strength(dBuV/m) | 71.34 | 72.83 | 70.64 |

**Final Test Mode:**

According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”:

Y axis (see the test setup photo)

## 5.3 Test Facility

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

● **FCC—Registration No.: 381383**

Designation Number: CN5029

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.

● **ISED—Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

## 5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
No. 123- 128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

## 5.5 Description of Support Units

None.

## 5.6 Deviation from Standards

None.

## 5.7 Abnormalities from Standard Conditions

None.

## 5.8 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 | June 23, 2021 | June 22, 2024 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESU26 | GTS203 | April 14, 2023 | April 13, 2024 |
| 4 | BiConiLog Antenna | SCHWARZBECK MESS-ELEKTRONIK | VULB9168 | GTS640 | March 19, 2023 | March 18, 2025 |
| 5 | Double -ridged waveguide horn | SCHWARZBECK MESS-ELEKTRONIK | BBHA 9120 D | GTS208 | April 17, 2023 | April 16, 2025 |
| 6 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 7 | Wideband Radio Communication Tester | Rohde & Schwarz | CMW500 | GTS575 | April 14, 2023 | April 13, 2024 |
| 8 | Loop Antenna | ZHINAN | ZN30900A | GTS534 | Nov. 13, 2023 | Nov.12, 2024 |
| 9 | Broadband Preamplifier | SCHWARZBECK | BBV9718 | GTS535 | April 14, 2023 | April 13, 2024 |
| 10 | Amplifier(1GHz-26.5GHz) | HP | 8449B | GTS601 | April 14, 2023 | April 13, 2024 |
| 11 | Horn Antenna (18-26.5GHz) | / | UG-598A/U | GTS664 | Oct. 29, 2023 | Oct. 28, 2024 |
| 12 | Horn Antenna (26.5-40GHz) | A.H Systems | SAS-573 | GTS665 | Oct. 29, 2023 | Oct. 28, 2024 |
| 13 | FSV·Signal Analyzer (10Hz-40GHz) | Keysight | FSV-40-N | GTS666 | March 13, 2023 | March 12, 2024 |
| 14 | Amplifier | / | LNA-1000-30S | GTS650 | April 14, 2023 | April 13, 2024 |
| 15 | CDNE M2+M3-16A | HCT | 30MHz-300MHz | GTS692 | Nov. 08, 2023 | Nov.07, 2024 |
| 16 | Wideband Amplifier | / | WDA-01004000-15P35 | GTS602 | April 14, 2023 | April 13, 2024 |
| 17 | Thermo meter | JINCHUANG | GSP-8A | GTS643 | April 19, 2023 | April 18, 2024 |
| 18 | RE cable 1 | GTS | N/A | GTS675 | July 31. 2023 | July 30. 2024 |
| 19 | RE cable 2 | GTS | N/A | GTS676 | July 31. 2023 | July 30. 2024 |
| 20 | RE cable 3 | GTS | N/A | GTS677 | July 31. 2023 | July 30. 2024 |
| 21 | RE cable 4 | GTS | N/A | GTS678 | July 31. 2023 | July 30. 2024 |
| 22 | RE cable 5 | GTS | N/A | GTS679 | July 31. 2023 | July 30. 2024 |
| 23 | RE cable 6 | GTS | N/A | GTS680 | July 31. 2023 | July 30. 2024 |
| 24 | RE cable 7 | GTS | N/A | GTS681 | July 31. 2023 | July 30. 2024 |
| 25 | RE cable 8 | GTS | N/A | GTS682 | July 31. 2023 | July 30. 2024 |

| RF Conducted Test: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | MXA Signal Analyzer | Agilent | N9020A | GTS566 | April 14, 2023 | April 13, 2024 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | April 14, 2023 | April 13, 2024 |
| 3 | PSA Series Spectrum Analyzer | Agilent | E4440A | GTS536 | April 14, 2023 | April 13, 2024 |
| 4 | MXG vector Signal Generator | Agilent | N5182A | GTS567 | April 14, 2023 | April 13, 2024 |
| 5 | ESG Analog Signal Generator | Agilent | E4428C | GTS568 | April 14, 2023 | April 13, 2024 |
| 6 | USB RF Power Sensor | DARE | RPR3006W | GTS569 | April 14, 2023 | April 13, 2024 |
| 7 | RF Switch Box | Shongyi | RFSW3003328 | GTS571 | April 14, 2023 | April 13, 2024 |
| 8 | Programmable Constant Temp & Humi Test Chamber | WEWON | WHTH-150L-40-880 | GTS572 | April 14, 2023 | April 13, 2024 |
| 9 | Thermo meter | JINCHUANG | GSP-8A | GTS641 | April 19, 2023 | April 18, 2024 |

| 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 | July 12, 2022 | July 11, 2027 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | April 14, 2023 | April 13, 2024 |
| 3 | LISN | ROHDE & SCHWARZ | ENV216 | GTS226 | April 14, 2023 | April 13, 2024 |
| 4 | Coaxial Cable | GTS | N/A | GTS227 | N/A | N/A |
| 5 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 6 | Thermo meter | JINCHUANG | GSP-8A | GTS642 | April 19, 2023 | April 18, 2024 |
| 7 | Absorbing clamp | Elektronik-Feinmechanik | MDS21 | GTS229 | April 14, 2023 | April 13, 2024 |
| 8 | ISN | SCHWARZBECK | NTFM 8158 | GTS565 | April 14, 2023 | April 13, 2024 |
| 9 | High voltage probe | SCHWARZBECK | TK9420 | GTS537 | April 14, 2023 | April 13, 2024 |
| 10 | Antenna end assembly | Weinschel | 1870A | GTS560 | April 14, 2023 | April 13, 2024 |

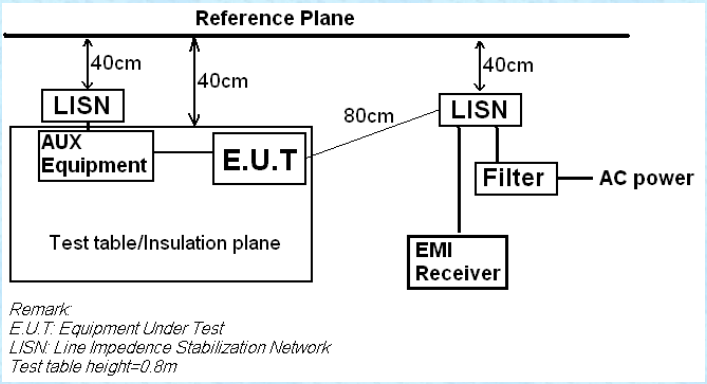
| General used equipment: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Barometer | KUMAO | SF132 | GTS647 | April 19, 2023 | April 18, 2024 |

# 7 Test results and Measurement Data

## 7.1 Antenna requirement

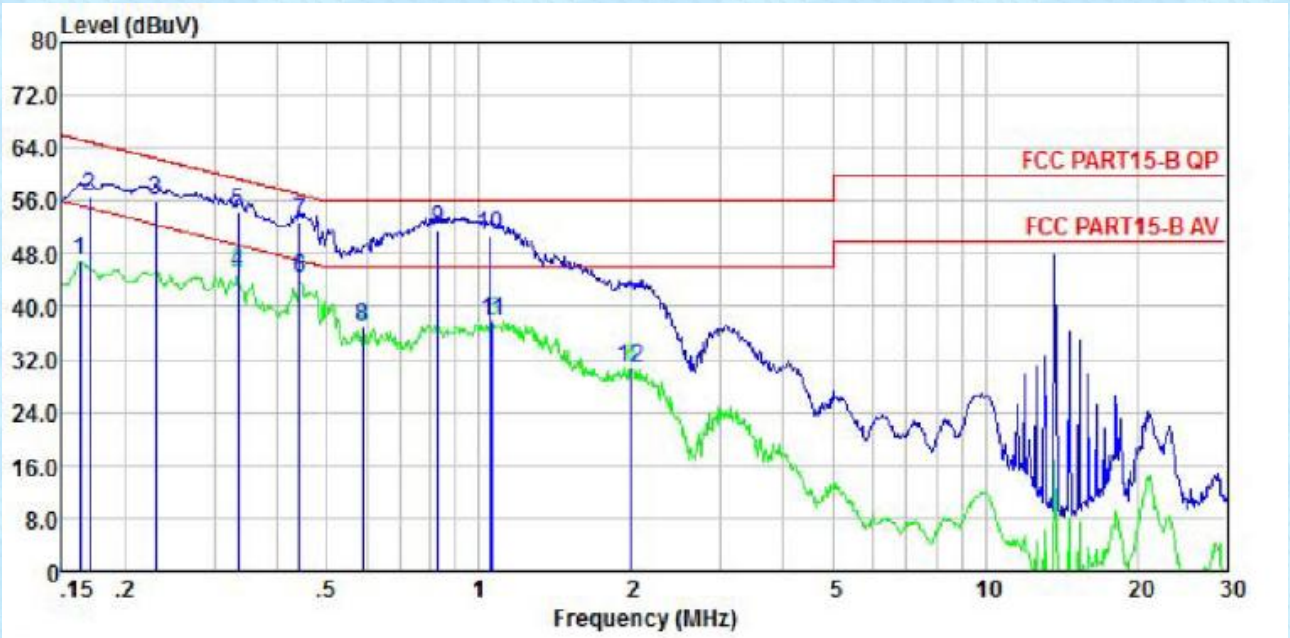
| | |
|---|---|
| **Standard requirement:** | FCC Part15 C Section 15.203 |
| **15.203 requirement:**<br>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of 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. | |
| **EUT Antenna:** | |
| The antenna is integral antenna, reference to the appendix II for details. | |

## 7.2 Conducted Emissions

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.207 |
| Test Method: | ANSI C63.10:2013 |
| Test Frequency Range: | 150KHz to 30MHz |
| Receiver setup: | RBW=9KHz, VBW=30KHz, Sweep time=auto |
| Limit: | Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average<br>0.15-0.5: 66 to 56* / 56 to 46*<br>0.5-5: 56 / 46<br>5-30: 60 / 50<br>* Decreases with the logarithm of the frequency. |
| Test setup: |  <br>*Remark:*<br>*E.U.T: Equipment Under Test*<br>*LISN: Line Impedence Stabilization Network*<br>*Test table height=0.8m* |
| Test procedure: | 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.<br>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).<br>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. |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test environment: | Temp.: 25 °C / Humid.: 52% / Press.: 1012mbar |
| Test voltage: | AC240V 60Hz |
| Test results: | Pass |

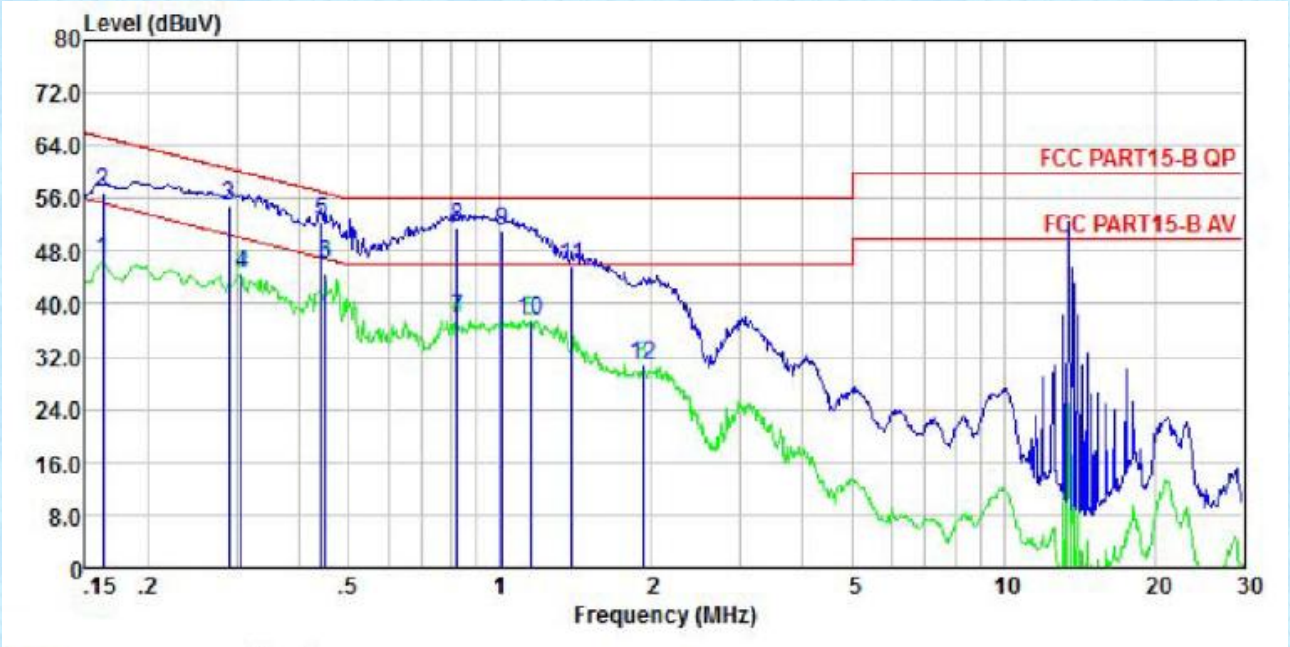
**Measurement data:**

**Line:**




| | Freq | Read Level | LISN Factor | Aux2 Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.162 | 36.98 | 0.10 | 9.88 | 0.01 | 46.97 | 55.34 | -8.37 | Average |
| 2 | 0.170 | 46.76 | 0.10 | 9.88 | 0.01 | 56.75 | 64.94 | -8.19 | QP |
| 3 | 0.230 | 46.07 | 0.10 | 9.88 | 0.02 | 56.07 | 62.44 | -6.37 | QP |
| 4 | 0.334 | 35.09 | 0.10 | 9.88 | 0.02 | 45.09 | 49.35 | -4.26 | Average |
| 5 | 0.334 | 44.44 | 0.10 | 9.88 | 0.02 | 54.44 | 59.35 | -4.91 | QP |
| 6 | 0.442 | 34.31 | 0.10 | 9.88 | 0.03 | 44.32 | 47.02 | -3.70 | Average |
| 7 | 0.442 | 42.73 | 0.10 | 9.88 | 0.03 | 52.74 | 57.02 | -4.28 | QP |
| 8 | 0.589 | 26.77 | 0.10 | 9.88 | 0.02 | 36.77 | 46.00 | -9.23 | Average |
| 9 | 0.830 | 41.69 | 0.10 | 9.88 | 0.03 | 51.70 | 56.00 | -4.30 | QP |
| 10 | 1.054 | 40.85 | 0.10 | 9.88 | 0.06 | 50.89 | 56.00 | -5.11 | QP |
| 11 | 1.065 | 27.83 | 0.10 | 9.88 | 0.07 | 37.88 | 46.00 | -8.12 | Average |
| 12 | 2.001 | 20.57 | 0.10 | 9.88 | 0.21 | 30.76 | 46.00 | -15.24 | Average |

**Neutral:**




| | Freq | Read Level | LISN Factor | Aux2 Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.162 | 36.61 | 0.10 | 9.88 | 0.01 | 46.60 | 55.34 | -8.74 | Average |
| 2 | 0.162 | 47.08 | 0.10 | 9.88 | 0.01 | 57.07 | 65.34 | -8.27 | QP |
| 3 | 0.289 | 45.01 | 0.10 | 9.88 | 0.03 | 55.02 | 60.54 | -5.52 | QP |
| 4 | 0.307 | 34.48 | 0.10 | 9.88 | 0.03 | 44.49 | 50.06 | -5.57 | Average |
| 5 | 0.442 | 42.51 | 0.10 | 9.88 | 0.03 | 52.52 | 57.02 | -4.50 | QP |
| 6 | 0.449 | 35.94 | 0.10 | 9.88 | 0.03 | 45.95 | 46.89 | -3.94 | Average |
| 7 | 0.822 | 27.64 | 0.10 | 9.88 | 0.03 | 37.65 | 46.00 | -8.35 | Average |
| 8 | 0.822 | 41.69 | 0.10 | 9.88 | 0.03 | 51.70 | 56.00 | -4.30 | QP |
| 9 | 1.010 | 41.18 | 0.10 | 9.88 | 0.05 | 51.21 | 56.00 | -4.79 | QP |
| 10 | 1.147 | 27.51 | 0.10 | 9.88 | 0.08 | 37.57 | 46.00 | -8.43 | Average |
| 11 | 1.388 | 35.69 | 0.10 | 9.88 | 0.13 | 45.80 | 56.00 | -10.20 | QP |
| 12 | 1.918 | 20.46 | 0.10 | 9.88 | 0.20 | 30.64 | 46.00 | -15.36 | 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.

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 C63.10:2013 |
| Test Frequency Range: | 9kHz to 6000MHz |
| Test site: | Measurement Distance: 3m |

Receiver setup:

| Frequency | Detector | RBW | VBW | Value |
|---|---|---|---|---|
| 9KHz-150KHz | Quasi-peak | 200Hz | 600Hz | Quasi-peak |
| 150KHz-30MHz | Quasi-peak | 9KHz | 30KHz | Quasi-peak |
| 30MHz-1GHz | Quasi-peak | 120KHz | 300KHz | Quasi-peak |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak |
| | Peak | 1MHz | 10Hz | Average |

Limit:
(Field strength of the fundamental signal)

| Frequency | Limit (dBuV/m @3m) | Remark |
|---|---|---|
| 433.92MHz | 72.87 | Average Value |
| | 92.87 | Peak Value |

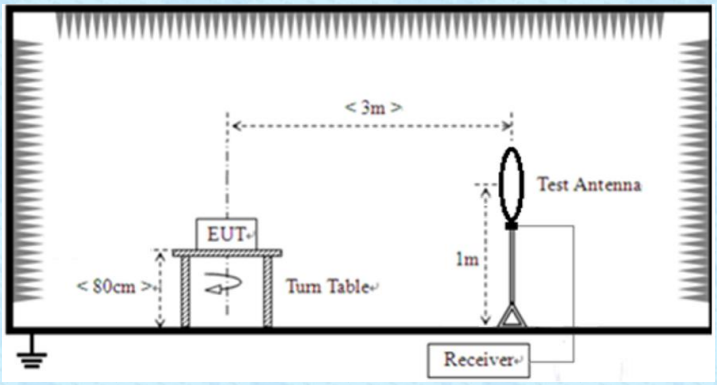
Limit:
(Spurious Emissions)

| Frequency | Limit (uV/m) | Value | Measurement Distance |
|---|---|---|---|
| 0.009MHz-0.490MHz | 2400/F(KHz) | QP | 300m |
| 0.490MHz-1.705MHz | 24000/F(KHz) | QP | 30m |
| 1.705MHz-30MHz | 30 | QP | 30m |
| 30MHz-88MHz | 100 | QP | 3m |
| 88MHz-216MHz | 150 | QP | |
| 216MHz-960MHz | 200 | QP | |
| 960MHz-1GHz | 500 | QP | |
| Above 1GHz | 500 | Average | |
| | 5000 | Peak | |

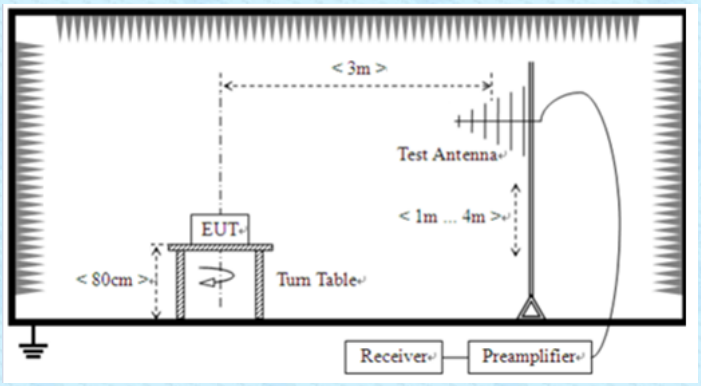
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits a higher field strength.

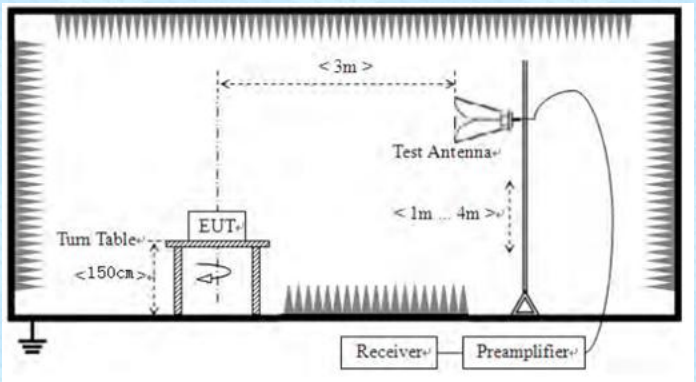
Test setup:

Below 30MHz




Below 1GHz

<table>
<tr><td></td><td> 

Above 1GHz

</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.<br>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.<br>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.<br>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.<br>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.<br>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.</td></tr>
<tr><td>Test Instruments:</td><td colspan="6">Refer to section 6.0 for details</td></tr>
<tr><td>Test mode:</td><td colspan="6">Refer to section 5.2 for details</td></tr>
<tr><td>Test environment:</td><td>Temp.:</td><td>25 °C</td><td>Humid.:</td><td>50%</td><td>Press.:</td><td>1 010mbar</td></tr>
<tr><td>Test voltage:</td><td colspan="6">AC240V 60Hz</td></tr>
<tr><td>Test results:</td><td colspan="6">Pass</td></tr>
</table>

**Measurement data:**

### 7.3.1 Field Strength of The Fundamental Signal

**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 |
|---|---|---|---|---|---|---|---|---|
| 433.935 | 83.42 | 16.39 | 3.02 | 30 | 72.83 | 72.87 | -0.04 | Horizontal |
| 433.935 | 80.34 | 16.39 | 3.02 | 30 | 69.75 | 72.87 | -3.12 | Vertical |

PK value lower than AV limit, so AV value will compliant

### 7.3.2 Spurious emissions

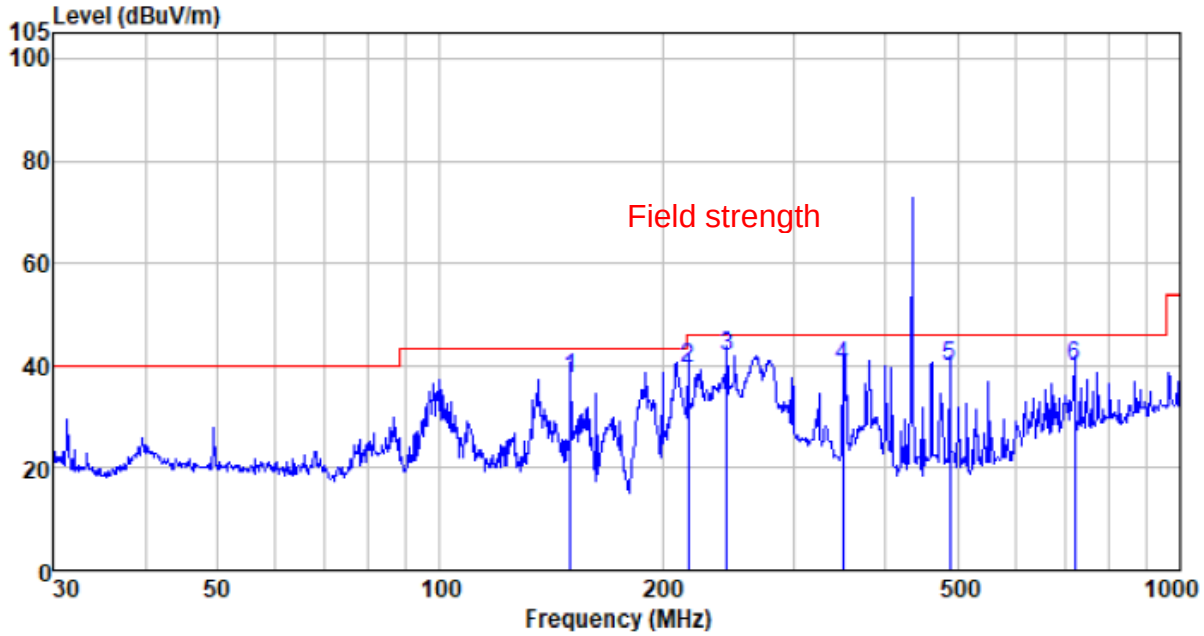
**Measurement data:**

**9 kHz ~ 30 MHz**

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

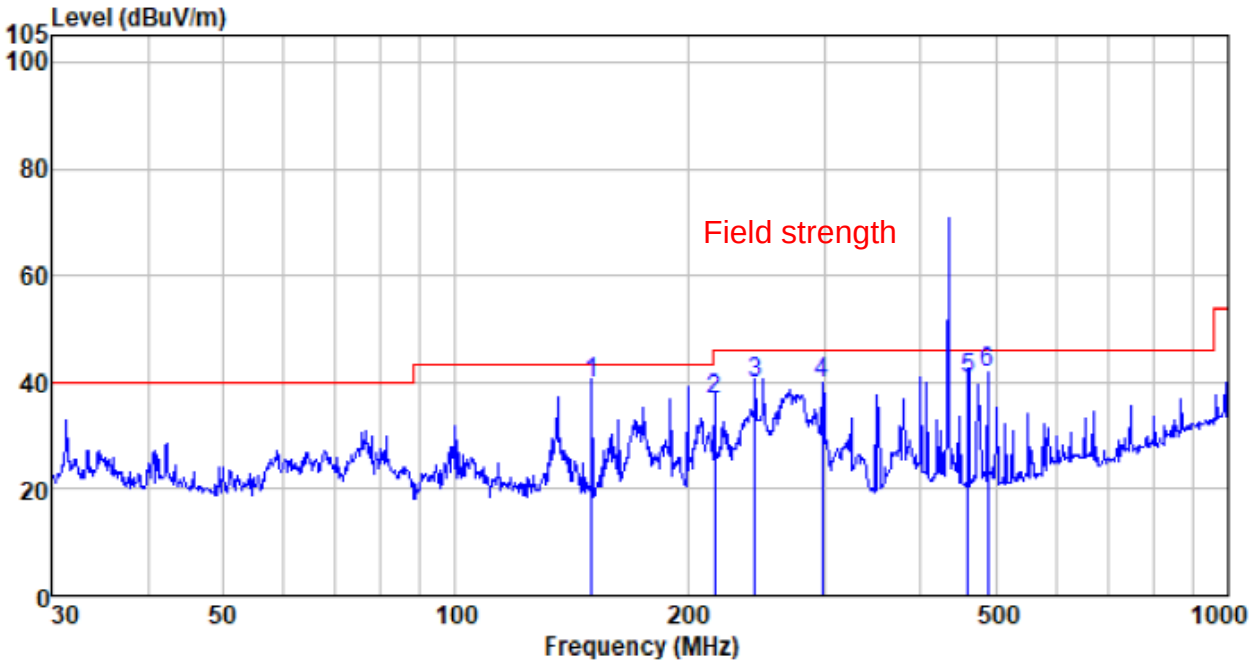
**Below 1GHz:**

| | | | |
|---|---|---|---|
| **Test channel:** | **433.92MHz** | **Polarization:** | **Horizontal** |




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV/m | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 150.011 | 53.47 | 12.50 | 1.57 | 30.00 | 37.54 | 43.50 | -5.96 | QP |
| 216.783 | 57.35 | 10.13 | 1.94 | 30.00 | 39.42 | 46.00 | -6.58 | QP |
| 244.232 | 58.18 | 11.53 | 2.09 | 30.00 | 41.80 | 46.00 | -4.20 | QP |
| 350.477 | 53.06 | 14.18 | 2.62 | 30.00 | 39.86 | 46.00 | -6.14 | QP |
| 489.027 | 49.25 | 17.41 | 3.26 | 30.00 | 39.92 | 46.00 | -6.08 | QP |
| 719.200 | 44.43 | 21.19 | 4.15 | 30.00 | 39.77 | 46.00 | -6.23 | QP |

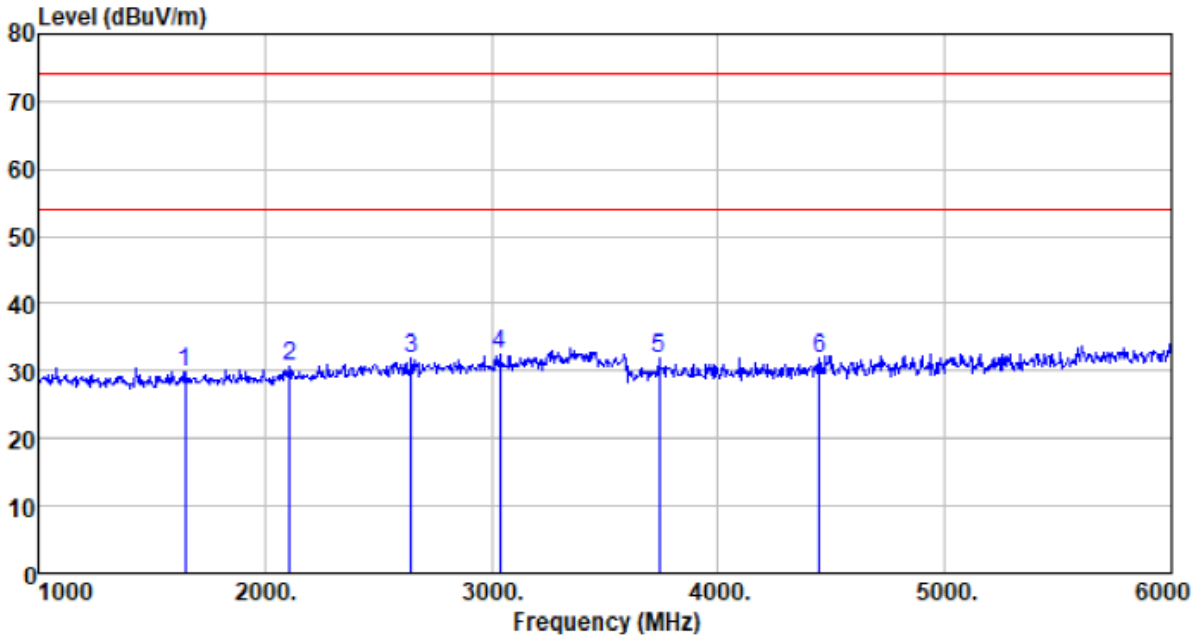
| Test channel: | 433.92MHz | Polarization: | Vertical |
|---|---|---|---|




| Freq | Reading level | Antenna factor | Cable loss | Preamp factor | level | Limit level | Over limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 150.011 | 55.70 | 12.50 | 1.57 | 30.00 | 39.77 | 43.50 | -3.73 | QP |
| 216.783 | 54.81 | 10.13 | 1.94 | 30.00 | 36.88 | 46.00 | -9.12 | QP |
| 244.232 | 56.11 | 11.53 | 2.09 | 30.00 | 39.73 | 46.00 | -6.27 | QP |
| 298.268 | 55.05 | 12.44 | 2.35 | 30.00 | 39.84 | 46.00 | -6.16 | QP |
| 460.727 | 50.61 | 16.90 | 3.14 | 30.00 | 40.65 | 46.00 | -5.35 | QP |
| 489.027 | 51.04 | 17.41 | 3.26 | 30.00 | 41.71 | 46.00 | -4.29 | QP |

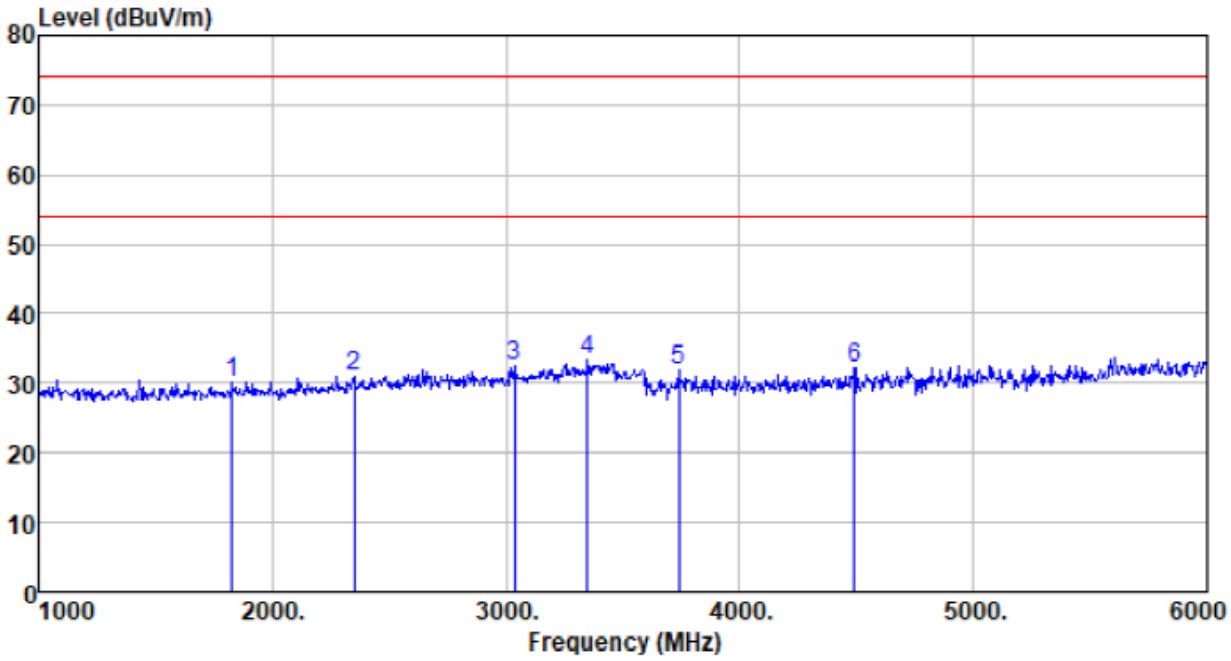
**Above 1G:**

| | | | |
|---|---|---|---|
| **Test channel:** | **433.92MHz** | **Polarization:** | **Horizontal** |




| Freq MHz | Reading level dBuV | Antenna factor dB/m | Cable loss dB | Preamp factor dB | level dBuV/m | Limit level dBuV/m | Over limit dB | Remark |
|---|---|---|---|---|---|---|---|---|
| 1650.000 | 38.17 | 25.56 | 2.37 | 36.28 | 29.82 | 74.00 | -44.18 | Peak |
| 2110.000 | 38.09 | 26.47 | 2.62 | 36.60 | 30.58 | 74.00 | -43.42 | Peak |
| 2645.000 | 37.92 | 27.92 | 3.13 | 37.05 | 31.92 | 74.00 | -42.08 | Peak |
| 3035.000 | 37.92 | 28.40 | 3.45 | 37.30 | 32.47 | 74.00 | -41.53 | Peak |
| 3740.000 | 36.36 | 29.09 | 3.89 | 37.38 | 31.96 | 74.00 | -42.04 | Peak |
| 4445.000 | 34.37 | 30.61 | 4.38 | 37.59 | 31.77 | 74.00 | -42.23 | Peak |

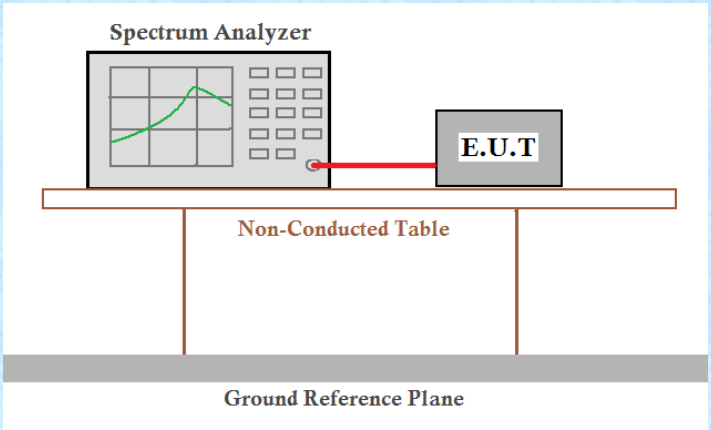
| Test channel: | 433.92MHz | Polarization: | Vertical |
|---|---|---|---|




| Freq | Reading level | Antenna factor | Cable loss | Preamp factor | level | Limit level | Over limit | Remark |
|---|---|---|---|---|---|---|---|---|
| MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1830.000 | 26.41 | 25.85 | 9.49 | 31.66 | 30.09 | 74.00 | -43.91 | Peak |
| 2350.000 | 24.42 | 27.26 | 10.49 | 31.21 | 30.96 | 74.00 | -43.04 | Peak |
| 3035.000 | 23.20 | 28.40 | 12.32 | 31.45 | 32.47 | 74.00 | -41.53 | Peak |
| 3350.000 | 22.56 | 28.40 | 13.73 | 31.19 | 33.50 | 74.00 | -40.50 | Peak |
| 3740.000 | 19.32 | 29.09 | 14.61 | 31.06 | 31.96 | 74.00 | -42.04 | Peak |
| 4490.000 | 16.71 | 30.70 | 16.36 | 31.52 | 32.25 | 74.00 | -41.75 | Peak |

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

## 7.4 Occupy Bandwidth

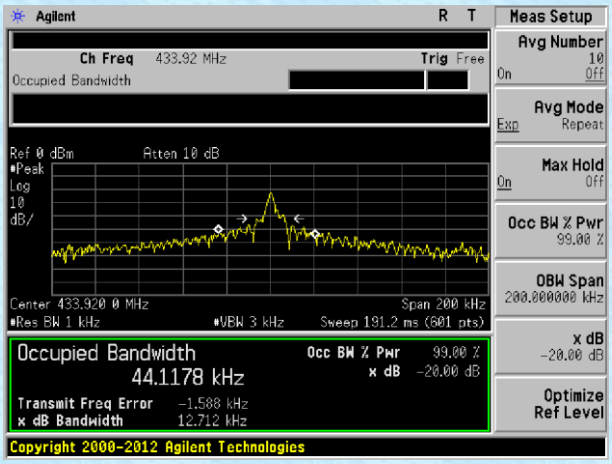
| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (c) |
| Test Method: | ANSI C63.10:2013 |
| Limit: | The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

**Measurement Data**

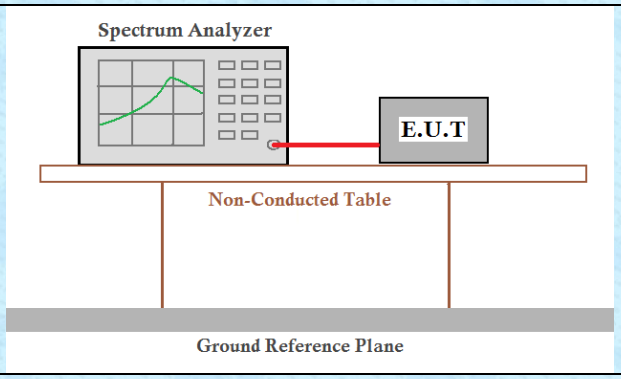
| Test Frequency (MHz) | 20dB bandwidth (kHz) | 99% bandwidth(kHz) | Limit (MHz) | Result |
|---|---|---|---|---|
| 433.92 | 12.712 | 44.1178 | 1.0848 | Pass |

Note: Limit= Fundamental frequency×0.25%

Test plot as follows:



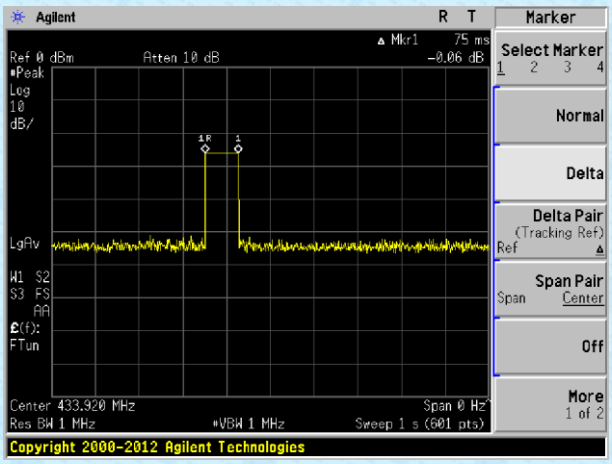
## 7.5 Dwell time

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (e) |
| Test Method: | ANSI C63.10:2013 |
| Receiver setup: | RBW=1MHz, VBW=1MHz, span=0Hz, detector: Peak |
| Limit: | Not more than 1 seconds |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

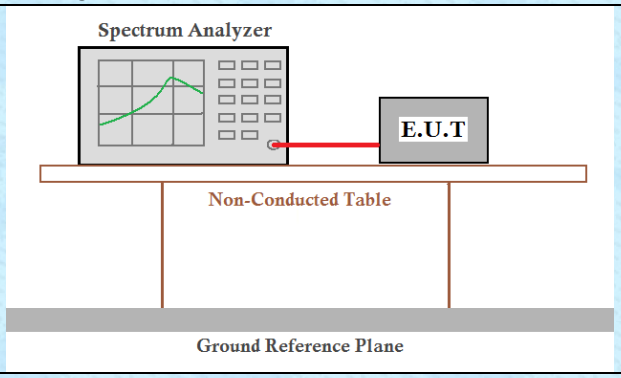
**Measurement data:**

| Test Frequency (MHz) | Duration of each TX (second) | Limit (second) | Result |
|---|---|---|---|
| 433.92 | 0.075 | <1.0 | Pass |

Test plot as follows:



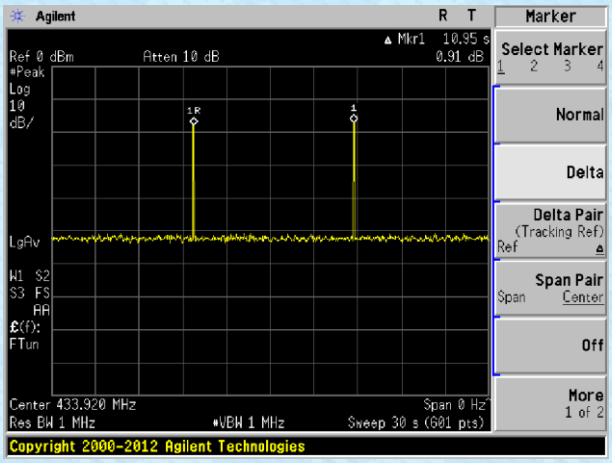
## 7.6 Silent period

| | |
|---|---|
| Test Requirement: | FCC Part15 C Section 15.231 (e) |
| Test Method: | ANSI C63.10:2013 |
| Receiver setup: | RBW=1MHz, VBW=1MHz, span=0Hz, detector: Peak |
| Limit: | at least 30 times the duration of the transmission<br>or more than 10 seconds |
| Test Procedure: | 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.<br>2. Set the EUT to proper test channel.<br>3. Single scan the transmit, and read the transmission time. |
| Test setup: |  |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.2 for details |
| Test results: | Pass |

**Measurement data:**

| Test Frequency (MHz) | Silent period (second) | Limit (second) | Result |
|---|---|---|---|
| 433.92 | 10.95 | >10 | Pass |

Test plot as follows:



# 8 Test Setup Photo

Reference to the **appendix I f**or details.

# 9 EUT Constructional Details

Reference to the **appendix II** for details.

------End------