

FCC Test Report

Report No.: HQ200114JL10-FI

Applicant name: Dongguan Shunlang Electronics Co., Ltd

Applicant address: Floor 5, Building 2, Shenxiang Industrial Park, Dabandi Cuntou Community, Humen town, Dongguan City

Product name am/fm digital dual alarm clock radio with under pillow vibrator

FCC ID No.: 2AVMZ-G0183A433

Brand Name:   **ANJANK**  soundmaster®

Test model name: G0183_AM/FM

Additional model: G0183_FM; G0183_CLOCK; TT183; TT183_FM; 11304; AC189; JCR-255; AC198; UR580SW; G0183;

JCR-255XXXXX (where XXXXX denote any printable characters in the ASCII Standard Character Table to represent variances in cosmetics or buyers)

Test date: Jan. 11, 2020~Apr. 25, 2020

Issued Date: Apr. 25, 2020

Issued By: Hwa-Hsing (Dongguan) Testing Co., Ltd.

Lab Address: No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China

FCC Designation Number: CN1255

Standards: FCC Part 15, Subpart C, Section 15.231e

The above equipment has been tested by **Hwa-Hsing (Dongguan) Testing Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Tank, **Date:** Apr. 25, 2020
Tank Tan//Engineer

Approved by : Harry Li, **Date:** Apr. 25, 2020
Harry Li/ Supervisor

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Release Control Record

| Issue No. | Description | Date Issued |
|-----------------|-------------------|---------------|
| HQ200114JL10-FI | Original release. | Apr. 25, 2020 |

1 Summary of Test Results

The EUT has been tested according to the following specifications:

| Applied standard: FCC part 15, Subpart C (section 15.231) | | | |
|---|-----------------------------------|------------------------------------|---------|
| Clause | Test Item | Result/Remarks | Verdict |
| §15.203 | Antenna Requirement | Meets the requirements of Standard | Pass |
| §15.207 (a) | AC Power Line Conducted Emissions | Meets the requirements of Standard | Pass |
| §15.231(b) §15.35 | Radiated Emission | Meets the requirements of Standard | Pass |
| §15.209 §15.231(e) | Deactivation Testing | Not apply | Pass |
| §15.231 (e) | Emission Bandwidth Measurement | Meets the requirements of Standard | Pass |

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.
2. The EMC test data please see the FCC Part 15B Report(The report No.: HP190906DC012-FS).

1.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUTas specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.



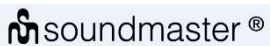
| Measurement | Frequency | Expanded Uncertainty (k=2) (±) |
|------------------------------------|----------------|--------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 2.66 dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GHz | 3.47 dB |
| Radiated Emissions above 1 GHz | Above 1GHz | 4.84 dB |
| Temperature | | ±1°C |
| Humidity | | ±5.0 % |
| Voltages(DC) | | ±1.0 % |
| Voltages(AC, <10kHz) | | ±2.0 % |

1.2 Modification Record

There were no modifications required for compliance.

2 General Information

2.1 General Description of EUT

| | |
|---------------------|---|
| Product name | am/fm digital dual alarm clock radio with under pillow vibrator |
| Brand name |   ANJANK  |
| Test Model | G0183_AM/FM |
| Series Models | G0183_FM; G0183_CLOCK; TT183; TT183_FM; 11304; AC189; JCR-255; AC198; UR580SW; G0183; JCR-255XXXXX (where XXXXX denote any printable characters in the ASCII Standard Character Table to represent variances in cosmetics or buyers) |
| Models difference | See the Section 2.1 note 5 |
| Operating Software | N/A |
| Power Supply Rating | TX Clock: DC5V output from adapter and adapter input: AC 100V~240V 50Hz~60Hz RX vibrator: DC4.5V battery(1.5V*3 AAA) |
| Modulation type | FSK |
| Operating frequency | 433.92MHz |
| Antenna type | Wire Antenna, with 0dBi gain |
| Accessory Device | RX vibrator: DC4.5V battery(1.5V*3 AAA) |
| Cable Supplied | N/A |




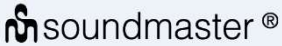
Note:

1. For a more detailed features description, please refer to the manufacturer's specification or the User's Manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: HQ200114JL10) for detailed product photo.
4. Adapter information as below:

| Model name | Input | Output | Cable support |
|------------------------|-------------------------------|--------|-----------------------------|
| GN12-050100-AG1 | AC100V-240V~50/60Hz 0.5A Max. | DC5V1A | 1.8m DC cable no core |
| OBL-0503000U | AC100V-240V~50/60Hz 1.0A Max | DC5V3A | 1.8m DC cable with one core |

Note: These adapters are testing with UUT for conducted emission and radiated emission below 1GHz. The worst case model using for radiated emission above 1GHz. The worst-case adapter: GN12-050100-AG1.

5. The differences between the added series model and the test model are as follows:

| Model Name | Product | Brand | Models difference noted |
|--------------------|---|---|---|
| G0183_AM/FM | am/fm digital dual alarm clock radio with under pillow vibrator |     | The testing model(with FM&AM function) |
| G0183_FM | | | Base the G0183_AM/FM disable the AM function |
| G0183_CLOCK | | | Base the G0183_AM/FM disable the AM&FM function |
| G0183; | | | Same as the G0183_AM/FM only difference for model name for trade |
| TT183 | | | Same as the G0183_AM/FM only difference for model name for trade |
| TT183_FM | | | Base the G0183_AM/FM disable the AM function, and difference model name for trade |
| 11304 | | | Base the G0183_AM/FM disable the AM&FM function and difference model name for trade |
| AC189 | | | Base the G0183_AM/FM disable the AM&FM function and difference model name for trade |
| JCR-255 | | | Same as the G0183_AM/FM only difference for model name for trade |
| JCR-255XXXXX | | | Same as the G0183_AM/FM only difference for model name for trade |
| AC198 | | | Same as the G0183_AM/FM only difference for model name for trade |
| UR580SW | | | Same as the G0183_AM/FM only difference for model name for trade |

2.2 Operating Modes of EUT and description of EUT

| Sample | Mode | Frequency |
|--------|--------------|-----------|
| TX | Transmitting | 433.92MHz |
| RX | Receiving | 433.92MHz |

EUT Description:

| | | |
|---|-------------------|--------------|
| TX:Remote Controller | Operation mode | TX Frequency |
| | Transmitting only | 433.92MHz |
| TX Clock: DC5V adapter input: AC 120V/60Hz. | | |
| RX:Sensor | Operation mode | RX Frequency |
| | Receiving only | 433.92MHz |
| RX vibrator: DC4.5V battery(1.5V*3 AAA) | | |

2.3 Test mode applicability and tested channel detail

| EUT configure mode | Applicable to | | | | | Description |
|--------------------|---------------|---------|-----|----|----|------------------------|
| | RE ≥ 1G | RE < 1G | PLC | EB | DT | |
| 1 | √ | √ | - | √ | √ | TX: DC 5V from adapter |

Where:

RE ≥ 1G: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission
DT: Deactivation Time measurement

RE < 1G: Radiated Emission below 1GHz
EB: 20dB Bandwidth measurement

Noted for Radiated Emission:

EUT has been pre-test the positioned of each 3 axis.

Pretest mode: 433.92MHz TX

The worst case was found when positioned on **X-plane**

| X-plane | Worst mode |
|---------|------------|
| Y-plane | - |
| Z-plane | - |

Radiated emission test (above 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT configure mode | Available channel | Operating frequency (MHz) | Modulation type |
|--------------------|-------------------|---------------------------|-----------------|
| - | 1 | 433.92 | FSK |

Radiated emission test (below 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT configure mode | Available channel | Operating frequency (MHz) | Modulation type |
|--------------------|-------------------|---------------------------|-----------------|
| - | 1 | 433.92 | FSK |

Emission bandwidth measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, packet type, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT configure mode | Available channel | Operating frequency (MHz) | Modulation type |
|--------------------|-------------------|---------------------------|-----------------|
| - | 1 | 433.92 | FSK |

Deactivation time measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT configure mode | Available channel | Operating frequency (MHz) | Modulation type |
|--------------------|-------------------|---------------------------|-----------------|
| - | 1 | 433.92 | FSK |

Test condition:

| Applicable to | Environmental conditions | Test voltage | Tested by |
|-----------------|--------------------------|--|-----------|
| RE≥1G | 25deg. C, 62%RH | TX Clock: DC5V adapter output input: AC 120V 60Hz | Tank Tan |
| RE<1G | 25deg. C, 62%RH | TX Clock: DC5V adapter output input: AC 120V 60Hz | Tank Tan |
| EB | 24deg. C, 60%RH | TX Clock: DC5V adapter output input: AC 120V 60Hz | Tank Tan |
| DT | 24deg. C, 60%RH | TX Clock: DC5V adapter output input: AC 120V 60Hz | Tank Tan |

2.4 General description of applied standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

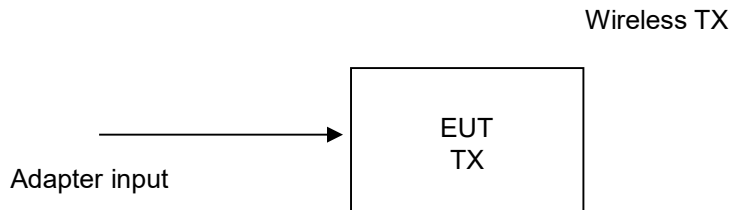
FCC Part 15, Subpart C Section 15.231e
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

3 Configuration and Connections with EUT

3.1 Connection Diagram of EUT and Peripheral Devices

Configuration 1: TX



3.2 Configuration of Peripheral Devices and Cable Connections

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|---------|-------|-----------|------------|--------|---------|
| A. | N/A | N/A | N/A | N/A | N/A | N/A |

Note:

1. N/A
2. Items E~G acted as communication partners to transfer data.

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|---------|
| 1. | DC Line | 1 | 0.6 | No | 0 | |

4 Test types and results

4.1 Conducted emission measurement

4.1.1 Limits of conducted emission measurement

| Frequency (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|-----------------|----------------|---------|----------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 79 | 66 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 73 | 60 | 56 | 46 |
| 5.0 - 30.0 | 73 | 60 | 60 | 50 |

Notes: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 Test Instruments

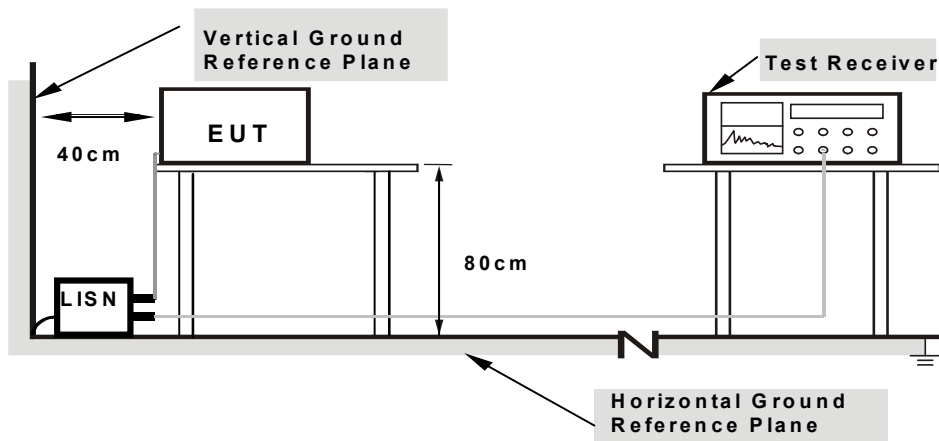
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---------------------|--------------|------------|------------|
| EMI Test Receiver Rohde&Schwarz | ESCI3 | 101418 | 2019-9-19 | 2020-9-18 |
| Artificial Mains Network Rohde&Schwarz | ENV216 | 3560.6550.15 | 2019-10-18 | 2020-10-17 |
| Test software FARAD | EZ_EMCC V1.1.4.2 | N/A | N/A | N/A |
| Hygrothermograph YuhuaZe | HTC-1 | NA | 2019-10-18 | 2020-10-17 |
| Digital Multimeter FLUKE | 15B+ | 43512617WS | 2019-10-18 | 2020-10-17 |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
 2. The test was performed in Shielded Room

4.1.3 Test Arrangement

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

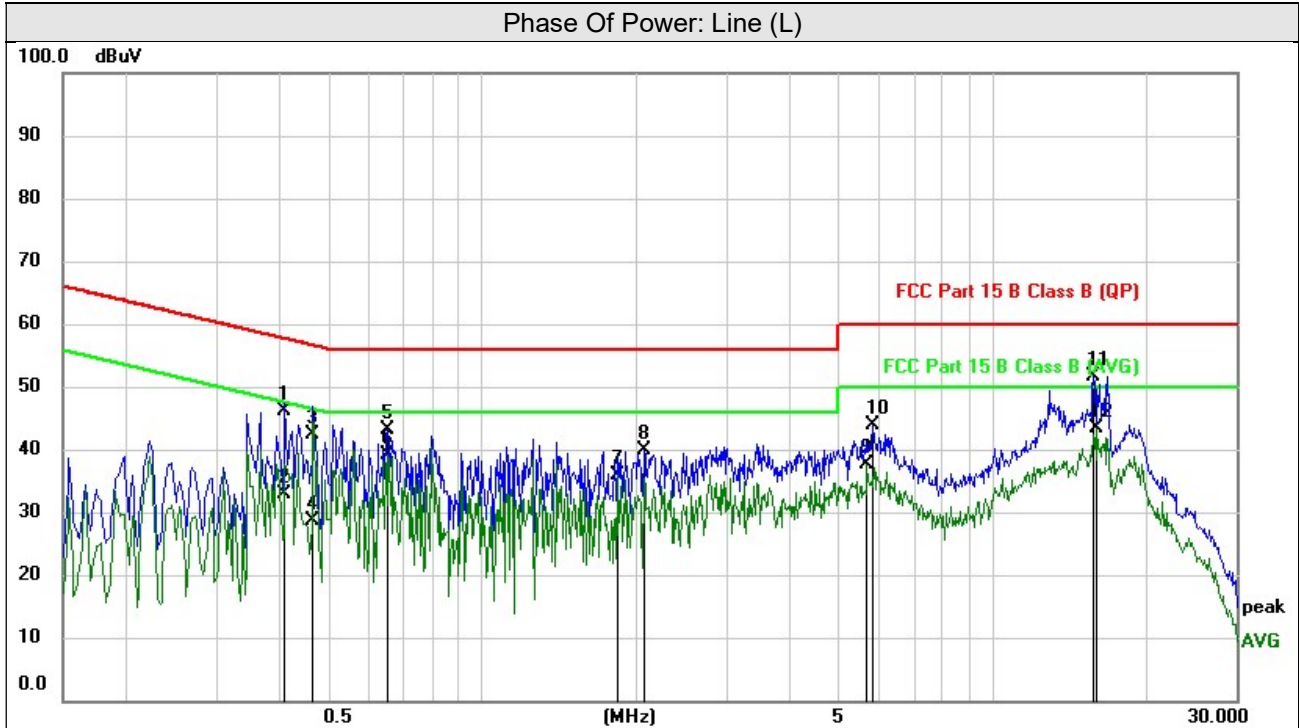
Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



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

4.1.4 Test Results

| | | | |
|-----------------|----------------|--|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 25°C, 60%RH |
| Tested by | Tank Tan | Test Date | 2020/04/02 |

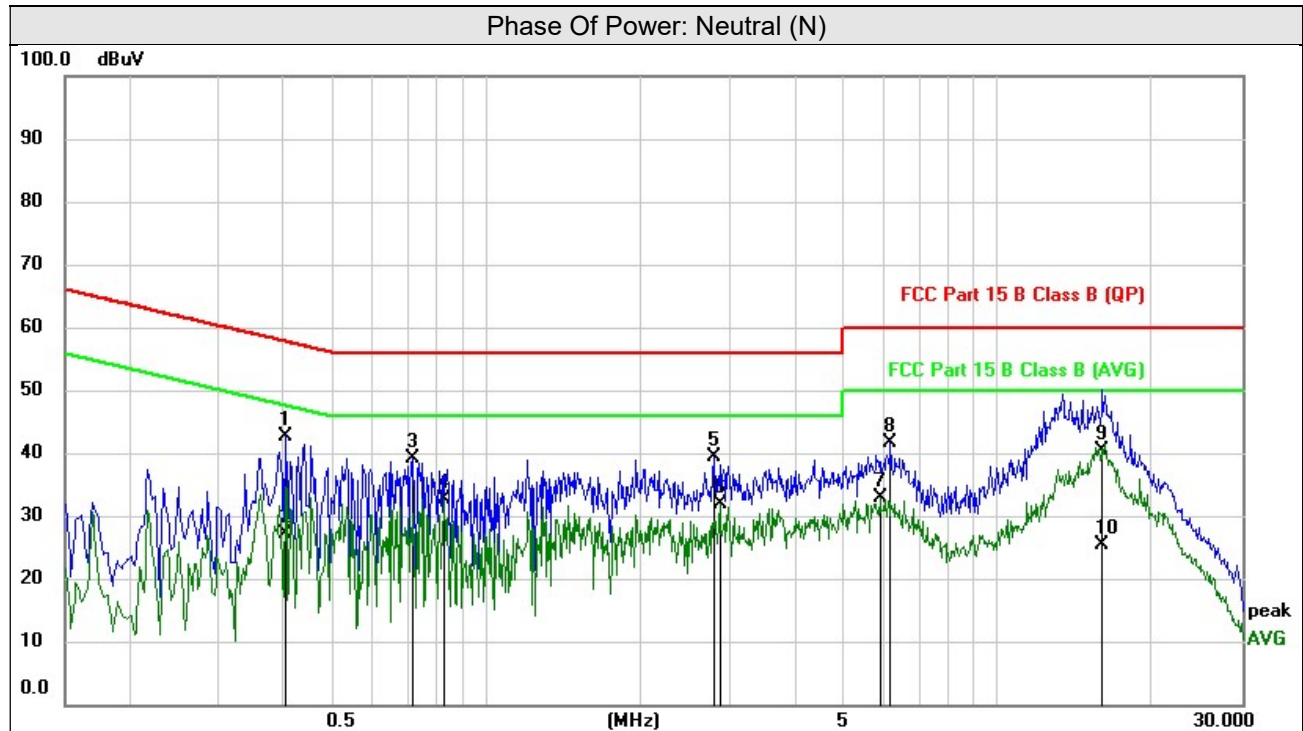


| No | Frequency (MHz) | Reading (dBuV) | Correct | Result | Limit | Margin | Remark |
|----|-----------------|----------------|---------|--------|--------|--------|----------|
| | | | dB | (dBuV) | (dBuV) | (dB) | Detector |
| 1 | 0.4100 | 36.55 | 9.59 | 46.14 | 57.65 | -11.51 | QP |
| 2 | 0.4100 | 23.31 | 9.59 | 32.90 | 47.65 | -14.75 | AVG |
| 3 | 0.4660 | 32.88 | 9.59 | 42.47 | 56.58 | -14.11 | QP |
| 4 | 0.4660 | 19.07 | 9.59 | 28.66 | 46.58 | -17.92 | AVG |
| 5 | 0.6540 | 33.62 | 9.60 | 43.22 | 56.00 | -12.78 | QP |
| 6 | 0.6540 | 29.64 | 9.60 | 39.24 | 46.00 | -6.76 | AVG |
| 7 | 2.0740 | 30.33 | 9.56 | 39.89 | 56.00 | -16.11 | QP |
| 8 | 1.8380 | 26.42 | 9.56 | 35.98 | 46.00 | -10.02 | AVG |
| 9 | 5.8260 | 34.27 | 9.59 | 43.86 | 60.00 | -16.14 | QP |
| 10 | 5.6820 | 27.98 | 9.60 | 37.58 | 50.00 | -12.42 | AVG |
| 11 | 15.7300 | 41.50 | 10.09 | 51.59 | 60.00 | -8.41 | QP |
| 12 | 16.0500 | 33.34 | 10.12 | 43.46 | 50.00 | -6.54 | AVG |

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

| | | | |
|-----------------|----------------|--|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 25°C, 60%RH |
| Tested by | Tank Tan | Test Date | 2020/04/02 |



| No | Frequency (MHz) | Reading (dBuV) | Correct | Result | Limit | Margin | Remark |
|----|-----------------|----------------|---------|--------|--------|--------|----------|
| | | | dB | (dBuV) | (dBuV) | (dB) | Detector |
| 1 | 0.4060 | 33.09 | 9.59 | 42.68 | 57.73 | -15.05 | QP |
| 2 | 0.4060 | 17.49 | 9.59 | 27.08 | 47.73 | -20.65 | AVG |
| 3 | 0.7180 | 29.53 | 9.60 | 39.13 | 56.00 | -16.87 | QP |
| 4 | 0.8300 | 23.16 | 9.57 | 32.73 | 46.00 | -13.27 | AVG |
| 5 | 2.7900 | 29.77 | 9.57 | 39.34 | 56.00 | -16.66 | QP |
| 6 | 2.8660 | 22.40 | 9.57 | 31.97 | 46.00 | -14.03 | AVG |
| 7 | 6.1660 | 32.04 | 9.59 | 41.63 | 60.00 | -18.37 | QP |
| 8 | 5.8740 | 23.26 | 9.59 | 32.85 | 50.00 | -17.15 | AVG |
| 9 | 16.0459 | 30.17 | 10.12 | 40.29 | 60.00 | -19.71 | QP |
| 10 | 16.0459 | 15.20 | 10.12 | 25.32 | 50.00 | -24.68 | AVG |
| 11 | 0.4060 | 33.09 | 9.59 | 42.68 | 57.73 | -15.05 | QP |
| 12 | 0.4060 | 17.49 | 9.59 | 27.08 | 47.73 | -20.65 | AVG |

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

4.2 Radiated emission measurement

4.2.1 Limits of radiated emission measurement

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

According to §15.231(e), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency (MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emission (microvolts/meter) |
|-----------------------------|--|--|
| 40.66–40.70 | 1000 | 100 |
| 70–130 | 500 | 50 |
| 130–174 | 1500 to 1500 | 150 to 150 |
| 174–260 | 1500 | 150 |
| 260–470 | 11500 to 5000 | 1150 to 500 |
| Above 470 | 5000 | 500 |

Note:

- ¹ Linear interpolation.
- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 Test instruments

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|--|----------------|-------------|------------|------------|------------|
| Loop antenna (9kHz~30MHz) | Daze | ZN30900A | 0708 | 2019-10-18 | 2020-10-17 |
| EMI Test Receiver Rohde&Schwarz | ESCI 7 | 100962 | 2019-5-20 | 2019-10-18 | 2020-10-17 |
| Broadband antenna Schwarzbeck | VULB 9168 | 00937 | 2018-11-18 | 2019-10-18 | 2020-10-17 |
| 3m Semi-anechoic Chamber MAORUI | 9m*6m*6m | NSEMC003 | 2018-10-20 | 2018-10-19 | 2020-10-18 |
| Signal Amplifier Com-power | PAM-103 | 18020051 | 2018-11-29 | 2019-10-18 | 2020-10-17 |
| Attenuator Rohde&Schwarz | TS2GA-6dB | 18101101 | N/A | N/A | N/A |
| Test software FARAD | EZ_EMCV1.1.4.2 | N/A | N/A | N/A | N/A |
| Digital Multimeter FLUKE | 15B+ | 43512617WS | 2018-11-10 | 2019-10-18 | 2020-10-17 |
| Horn Antenna Schwarzbeck | BBHA 9170 | 01959 | 2018-11-18 | 2019-10-18 | 2020-10-17 |
| Spectrum Analyzer Rohde&Schwarz | FSV-40N | 101783 | 2018-12-11 | 2019-10-18 | 2020-10-17 |
| Broadband Coaxial Preamplifier Schwarzbeck | BBV 9718 | 00025 | 2018-10-29 | 2019-10-18 | 2020-10-17 |
| Horn Antenna Schwarzbeck | BBHA 9170 | BBHA9170242 | 2018-05-5 | 2019-10-18 | 2020-10-17 |
| Pre-Amplifier EMCI | EMC 184045 | 980102 | 2018-11-20 | 2019-10-18 | 2020-10-17 |
| Spectrum Keysight | N9020A | MY51240612 | 2018-10-29 | 2019-10-18 | 2020-10-17 |

- Note:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.
 2. The test was performed in Chamber

4.2.3 Test procedures

The basic test procedure was in accordance with ANSI C63.10 (section 12).

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its 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.
- d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position Y, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using new battery. The turntable was rotated to maximize the emission level.
- h. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.

NOTE:

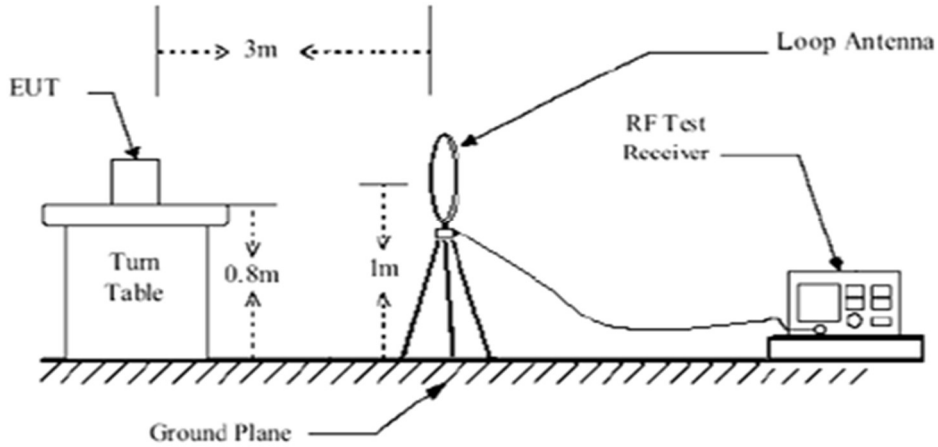
1. The resolution bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. 3MHz for Peak detection at frequency above 1GHz.
4. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
5. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
6. Margin value = Emission level – Limit value.
7. Fundamental AV value =PK Emission +AV Factor.

4.2.4 Deviation from test standard

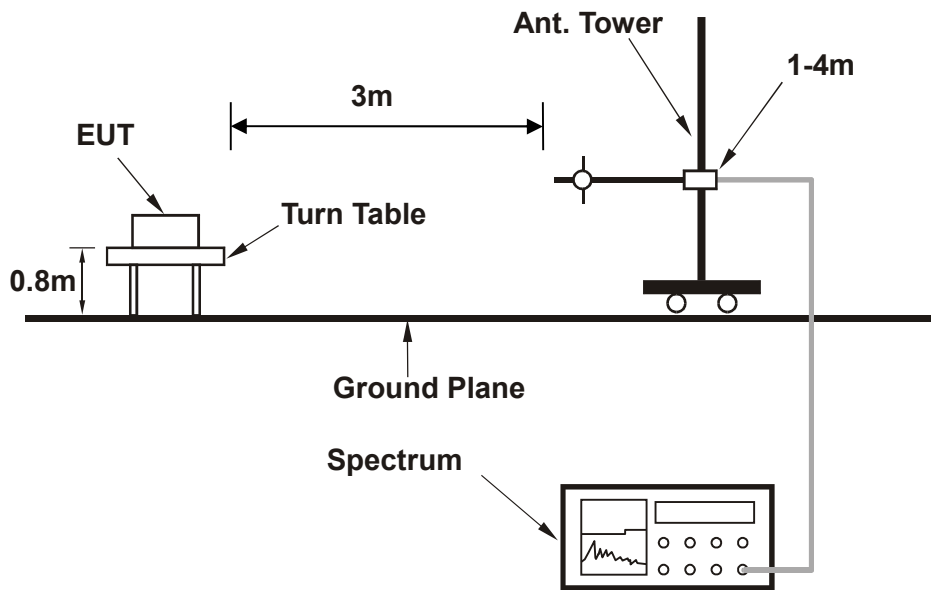
No deviation

4.3 Test setup

Below 30MHz test setup

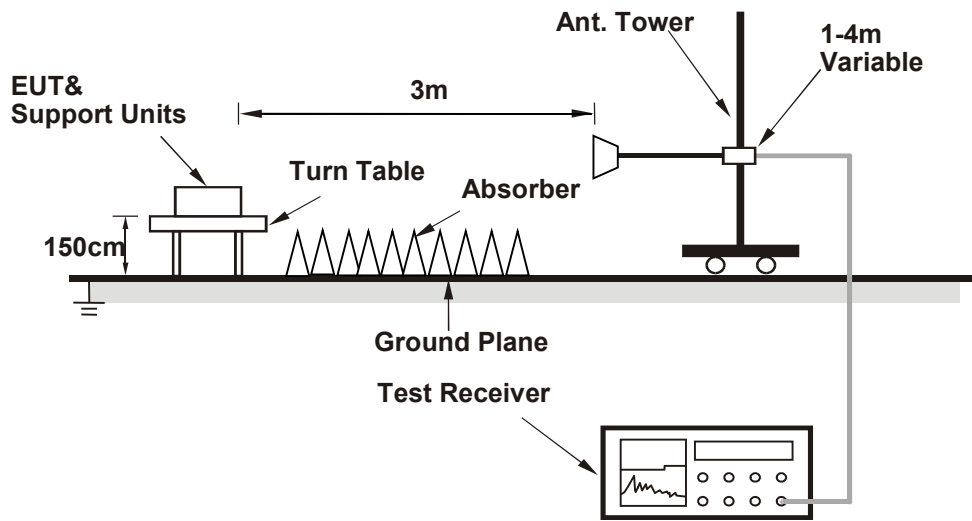


Below 1GHz test setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Above 1GHz test setup



Note: For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.3.1 Deviation from test standard

No deviation.

4.3.2 EUT operating conditions

- Placed the EUT on the testing table.
- Enable EUT under transmission condition continuously at specific channel frequency.

4.3.3 Test Results

9kHz ~ 30MHz Data:

The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

Below 1GHz worst-case data:

| | | | |
|-------------------|-----------------------------------|--------------------------|-------------|
| Frequency Range | 25MHz ~ 1GHz(below 1GHz) | | |
| Operation Channel | 433.92MHz TX | | |
| Input Power | Power supply by battery | Environmental Conditions | 27°C, 60%RH |
| Tested by | Tank Tan | Test Date | 2019/09/13 |

| Antenna Polarity & Test Distance : Horizontal at 3 m | | | | | | | | | |
|--|------------------|----------------|--------------|-----------------------|--------------|---------------|--------------------|----------------------|-------------|
| No | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission Level (dBuV) | Limit (dBuV) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Detector |
| 1 | 106.0126 | 39.58 | -17.03 | 22.55 | 33.98 | -11.43 | 200 | 137 | QP |
| 2 | 151.5972 | 43.20 | -13.23 | 29.97 | 38.66 | -8.69 | 100 | 220 | QP |
| 3 | 159.7844 | 40.35 | -12.32 | 28.03 | 40.44 | -12.41 | 100 | 348 | QP |
| 4 | 434.0650 | 72.95 | -8.74 | 64.21 | 92.19 | -27.98 | 150 | 265 | Peak |
| 5 | 434.0650* | 64.21 | | 57.74 | 72.19 | -14.45 | | | AVG |
| 6 | 607.7867 | 32.68 | -5.31 | 27.37 | 53.98 | -26.61 | 200 | 323 | QP |
| 7 | 750.1083 | 32.79 | -2.40 | 30.39 | 53.98 | -23.59 | 200 | 83 | QP |
| 8 | 932.2715 | 31.08 | 1.76 | 32.84 | 53.98 | -21.14 | 197 | 155 | QP |

| Antenna Polarity & Test distance: Vertical at 3m | | | | | | | | | |
|--|------------------|----------------|--------------|-----------------------|--------------|---------------|--------------------|----------------------|-------------|
| No | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission Level (dBuV) | Limit (dBuV) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Detector |
| 1 | 46.5030 | 45.46 | -14.82 | 30.64 | 40.00 | -9.36 | 100 | 142 | QP |
| 2 | 56.0007 | 44.00 | -14.22 | 29.78 | 40.00 | -10.22 | 100 | 183 | QP |
| 3 | 106.0126 | 40.64 | -17.03 | 23.61 | 33.98 | -10.37 | 107 | 153 | QP |
| 4 | 157.0074 | 33.50 | -12.58 | 20.92 | 39.84 | -18.92 | 121 | 297 | QP |
| 5 | 434.0650 | 65.96 | -8.74 | 57.22 | 92.19 | -34.97 | 121 | 297 | peak |
| 6 | 434.0650* | 57.22 | | 50.75 | 72.19 | -21.44 | | | AVG |
| 7 | 760.7036 | 31.51 | -1.30 | 30.21 | 54.00 | -23.77 | 100 | 251 | QP |
| 8 | 942.1305 | 31.83 | 1.47 | 33.30 | 54.00 | -20.68 | 114 | 108 | QP |

Remarks:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
4. Margin value = Emission level – Limit value.
5. For the test results, the EUT had been tested from 9KHz ~5GHz. But only the worst case was shown in test report.
6. Fundamental AV value =PK Emission +20*log(duty cycle)Where the duty factor is calculated from following formula:20 log (Duty cycle) = 20*Log (Ton/Tp) = -6.47dB, Please see page 22~23 for plotted duty.

| | | | |
|-------------------|--------------------------|--------------------------|-------------|
| Frequency Range | 1GHz ~ 25GHz(Above 1GHz) | | |
| Operation Channel | 2440MHz TX | | |
| Input Power | Power supply by battery | Environmental Conditions | 27°C, 60%RH |
| Tested by | Tank Tan | Test Date | 2019/07/3 |

| Antenna Polarity & Test Distance : Horizontal at 3 m | | | | | | | | | |
|--|-----------------|----------------|-------------|-----------------------|--------------|-------------|--------------------|----------------------|----------|
| No | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission Level (dBuV) | Limit (dBuV) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Detector |
| 1 | 1031.328 | 58.47 | -6.15 | 52.32 | 74.00 | -21.68 | 178 | 265 | peak |
| 2* | 1031.328 | 52.32 | | 45.85 | 54.00 | -8.15 | | | AVG |
| 3 | 2605.468 | 53.96 | -0.06 | 53.90 | 74.00 | -20.10 | 212 | 175 | peak |
| 4* | 2605.468 | 53.90 | | 47.43 | 54.00 | -6.57 | | | AVG |
| 5 | 3038.613 | 49.97 | 1.34 | 51.31 | 74.00 | -22.69 | 147 | 221 | peak |
| 6* | 3038.613 | 51.31 | | 44.84 | 54.00 | -9.16 | | | AVG |
| Antenna Polarity & Test distance: Vertical at 3m | | | | | | | | | |
| No | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission Level (dBuV) | Limit (dBuV) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Detector |
| 1 | 1301.332 | 56.70 | -4.63 | 52.07 | 74.00 | -21.93 | 100 | 163 | peak |
| 2* | 1301.332 | 52.07 | | 45.60 | 54.00 | -8.40 | | | AVG |
| 3 | 2600.760 | 54.49 | -0.08 | 54.41 | 74.00 | -19.59 | 100 | 231 | peak |
| 4* | 2600.760 | 54.41 | | 47.94 | 54.00 | -6.06 | | | AVG |
| 5 | 3037.063 | 53.04 | 1.34 | 54.38 | 74.00 | -19.62 | 100 | 195 | peak |
| 6* | 3037.063 | 54.38 | | 47.91 | 54.00 | -6.09 | | | AVG |

Remarks:

- 1 The resolution bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection (PK) at frequency above 1GHz.
- 2 Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
- 3 Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 4 Margin value = Emission level – Limit value.
- 5 * Fundamental AV value =PK Emission +20*log(duty cycle)Where the duty factor is calculated from following formula:20 log (Duty cycle) = 20*Log (Ton/Tp) = -6.47dB, Please see page 22~23 for plotted duty.

4.4 Duty cycle

4.4.1 Limits of duty cycle

According to FCC 15.231 (b)(2) and 15.35 (c), For pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

4.4.2 Test instruments

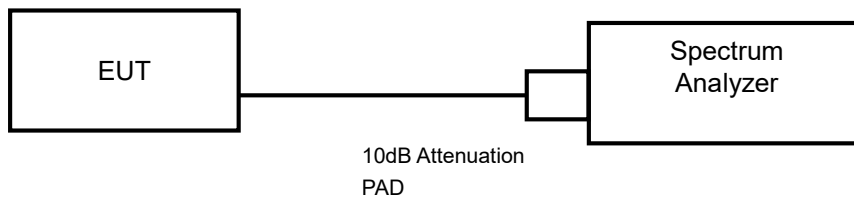
| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|----------------------------|-----------|------------|---------------------|-------------------------|
| Spectrum Keysight | N9020A | MY51240612 | 2019-10-18 | 2020-10-17 |
| Attenuator Rohde&Schwarz | TS2GA-6dB | 18101101 | N/A | N/A |

- NOTE:** 1.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA
 2. The test site was performed in RF Chamber

4.4.3 Test procedures

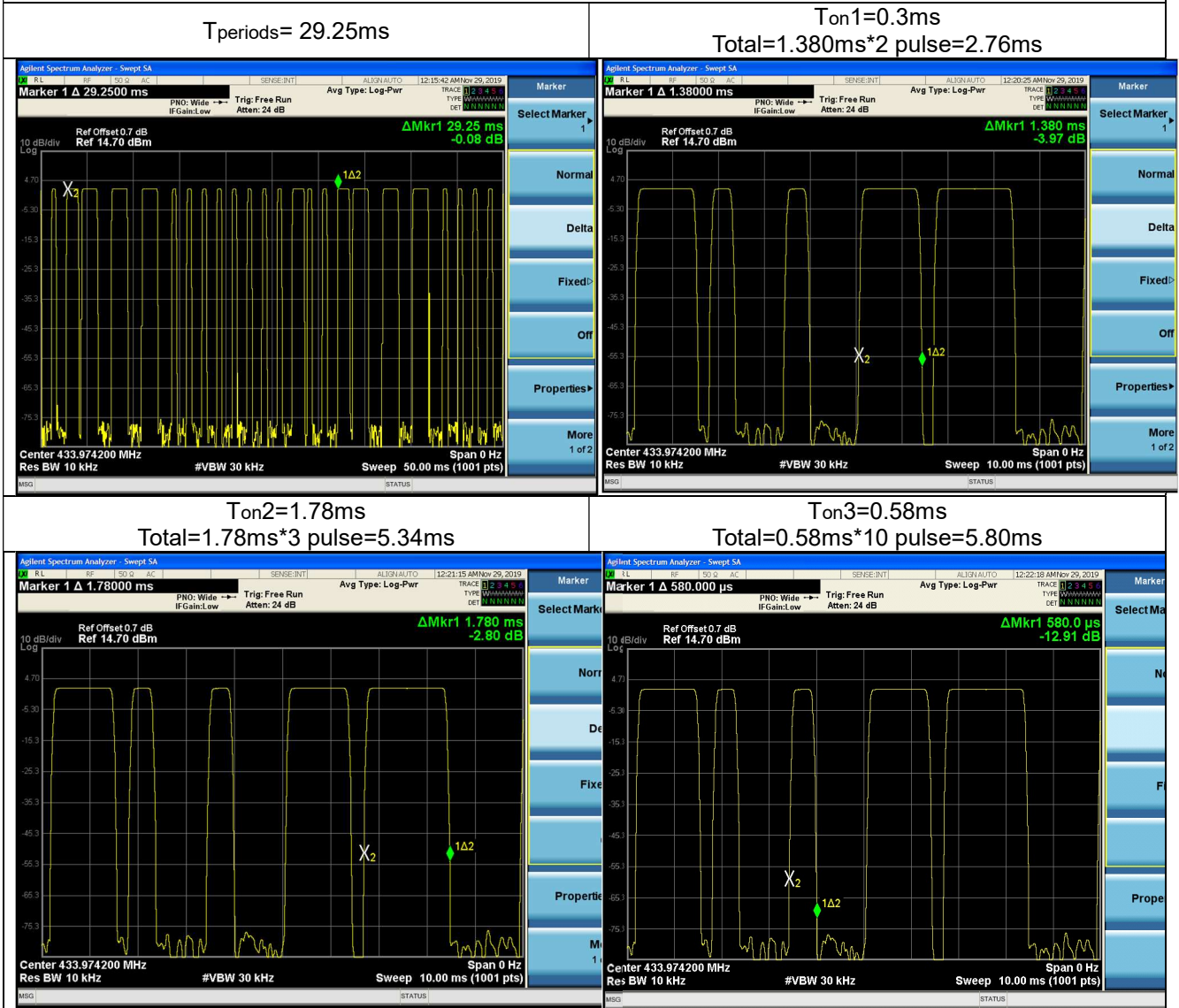
The basic test procedure was in accordance with ANSI C63.10

4.4.4 Test setup



4.4.5 Test results

| |
|--|
| $T_p = 29.25\text{ms}$ |
| $T_{on} = 13.90\text{ms}$ |
| $T_{off} = T_p - T_{on} = 29.25 - 13.90\text{ms} = 15.35\text{ms}$ |
| $\text{Duty Cycle} = T_{on} / T_{periods} * 100\% = 13.90 / 29.25 * 100\% = 47.45\%$ |
| $\text{Factor} = 20 * \text{Log} (T_{on} / T_p) = -6.47\text{dB}$ |
| The pulse desensitization correction factor: $\text{RBW}(10\text{kHz}) > (2/PW)$ therefore PDCF is not needed. $2/PW = 2/0.58 = 3.44\text{kHz}$ |



4.5 20dB Bandwidth measurement

4.5.1 Limit of 20dB bandwidth measurement

According to FCC 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Limit=Fundamental Frequency×0.25%=433.92MHz×0.25%=1084.8 kHz

4.5.2 Test instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|----------------------------|-----------|------------|---------------------|-------------------------|
| Spectrum Keysight | N9020A | MY51240612 | 2019-10-18 | 2020-10-17 |
| Attenuator Rohde&Schwarz | TS2GA-6dB | 18101101 | N/A | N/A |

NOTE: 1.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA

2. The test site was performed in RF Chamber

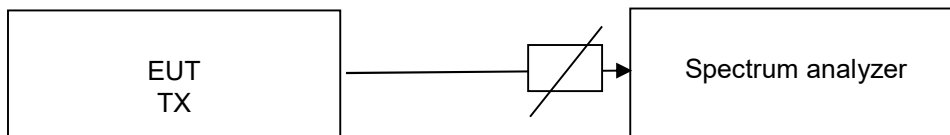
4.5.3 Test procedure

The spectrum analyzer was receiving the maximum emission level. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.5.4 Deviation from test standard

No deviation.

4.5.5 Test Setup

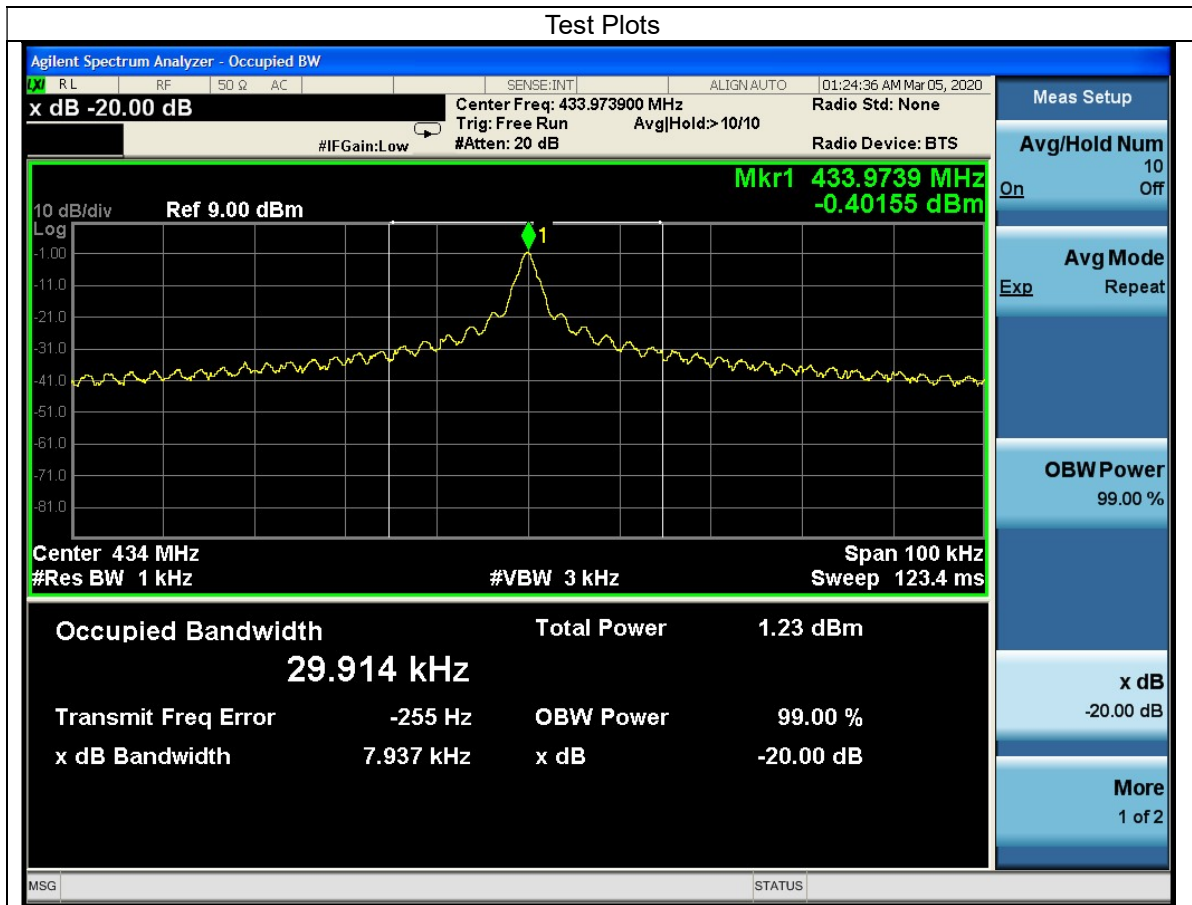


4.5.6 EUT operating conditions

- Placed the EUT on the testing table.
- Enable EUT under transmission condition continuously at specific channel frequency.

4.5.7 Test Results

| Frequency (MHz) | 20dB bandwidth (kHz) | Maximum limit (kHz) | Pass/Fail |
|-----------------|----------------------|---------------------|-----------|
| 433.92 | 7.937 | 1084.8 | PASS |



4.6 Deactivation test

4.6.1 Limits of deactivation test

15.231 (e) A automatically operated transmitter shall employ operate at a periodic rate.

15.231 (e) In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

4.6.2 Test instruments

| Description & Manufacturer | Model No. | Serial No. | Date of Calibration | Due Date of Calibration |
|----------------------------|-----------|------------|---------------------|-------------------------|
| Spectrum Keysight | N9020A | MY51240612 | 2019-10-18 | 2020-10-17 |
| Attenuator Rohde&Schwarz | TS2GA-6dB | 18101101 | N/A | N/A |

NOTE: 1.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA

2. The test site was performed in RF Chamber

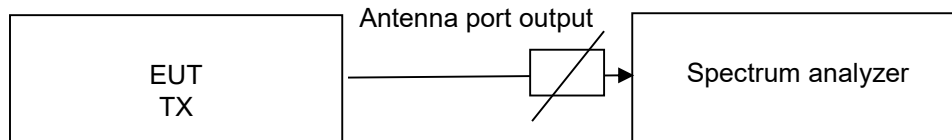
4.6.3 Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the transmission duration was measured and recorded.

4.6.4 Deviation from test standard

No deviation.

4.6.5 Test Setup



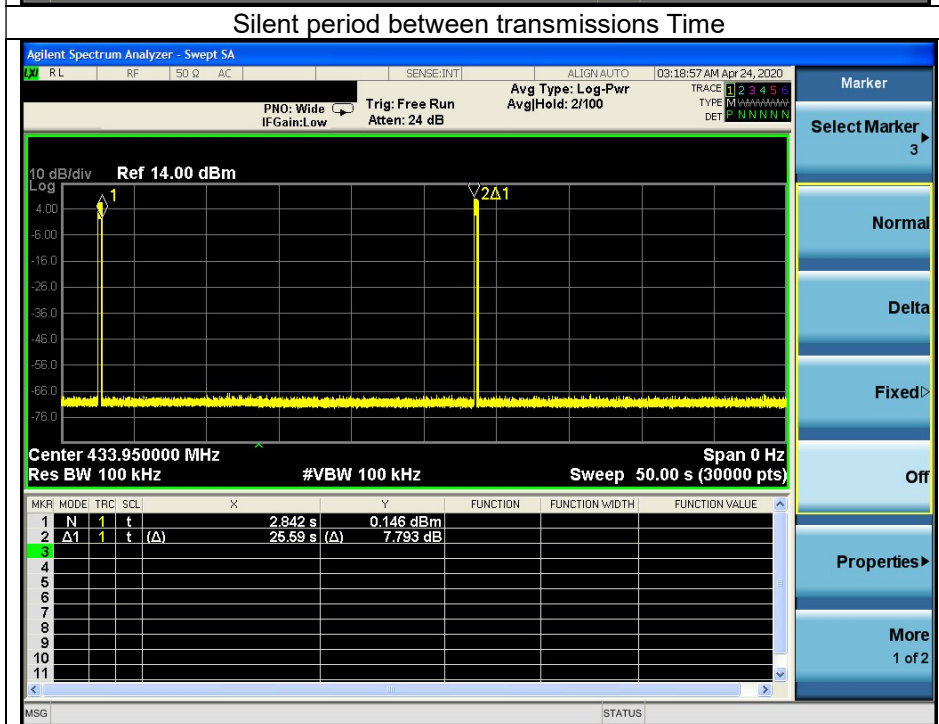
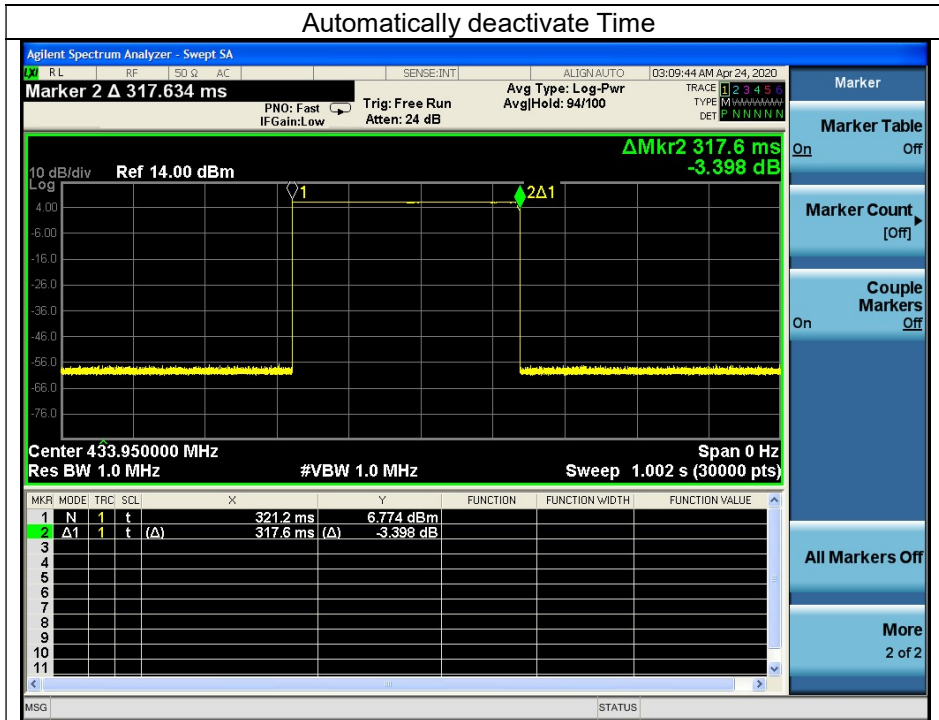
4.6.6 EUT operating conditions

- Placed the EUT on the testing table.
- Enable EUT under transmission condition continuously at specific channel frequency.

4.6.7 Test Results

| Frequency (MHz) | Automatically deactivate Time(Sec.) | Maximum limit (Sec.) | Pass/Fail |
|-----------------|-------------------------------------|----------------------|-----------|
| 433.92 | 0.3179 | 1 | PASS |

| Frequency (MHz) | Silent period between transmissions Time(Sec.) | Minimum limit (Sec.) | Pass/Fail |
|-----------------|--|----------------------|-----------|
| 433.92 | 25.59 | 10 | PASS |



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).



6 Appendix – Information on the Testing Laboratories

We, [Hwa-Hsing \(Dongguan\) Co., Ltd.](#), A global provider of TESTING and CERTIFICATION services for consumer products, electronic products and wireless information technology products. Adhering to the core values “HONEST and TRUSTWORTHY, OBJECTIVE and IMPARTIALITY, RIGOROUS and AFFICIENT”, commitment to provide professional, perfect and efficient comprehensive ONE-STOP solution of TESTING and CERTIFICATION services for Manufacturers, Buyers, Traders, Brands, Retailers. Assist client to better manage risk, protect their brands, reduce costs and cut time to over 150 markets in global. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lab Address: [No.101, Bld N1, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China](#)

Contact Tel: [0769-83078199](tel:0769-83078199)

Email: customerservice.dg@hwa-hsing.com

Web Site: www.hwa-hsing.com

The address and road map of all our labs can be found in our web site also.

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