

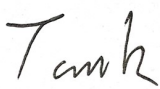
## FCC Test Report


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

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

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the federal government. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

**Table of Contents**

<b>Release Control Record .....</b>	<b>4</b>
<b>1 Summary of Test Results.....</b>	<b>5</b>
1.1 Measurement Uncertainty .....	5
1.2 Modification Record .....	5
<b>2 General Information .....</b>	<b>6</b>
2.1 General Description of EUT .....	6
2.2 Operating Modes of EUT and description of EUT .....	7
2.3 Test mode applicability and tested channel detail .....	8
2.4 General description of applied standards .....	9
<b>3 Configuration and Connections with EUT .....</b>	<b>10</b>
3.1 Connection Diagram of EUT and Peripheral Devices .....	10
3.2 Configuration of Peripheral Devices and Cable Connections .....	10
<b>4 Test types and results.....</b>	<b>11</b>
4.1 Conducted emission measurement.....	11
4.1.1 Limits of conducted emission measurement.....	11
4.1.2 Test Instruments.....	11
4.1.3 Test Arrangement.....	12
4.1.4 Test Results.....	13
4.2 Radiated emission measurement.....	15
4.2.1 Limits of radiated emission measurement .....	15
4.2.2 Test instruments.....	16
4.2.3 Test procedures .....	17
4.2.4 Deviation from test standard .....	17
4.3 Test setup .....	18
4.3.1 Deviation from test standard .....	19
4.3.2 EUT operating conditions.....	19
4.3.3 Test Results.....	19
4.4 Duty cycle.....	22
4.4.1 Limits of duty cycle.....	22
4.4.2 Test instruments.....	22
4.4.3 Test procedures .....	22
4.4.4 Test setup.....	22
4.4.5 Test results .....	23
4.5 20dB Bandwidth measurement.....	24
4.5.1 Limit of 20dB bandwidth measurement .....	24
4.5.2 Test instruments.....	24
4.5.3 Test procedure .....	24
4.5.4 Deviation from test standard .....	24
4.5.5 Test Setup .....	24
4.5.6 EUT operating conditions.....	24
4.5.7 Test Results.....	25
4.6 Deactivation test.....	26
4.6.1 Limits of deactivation test.....	26
4.6.2 Test instruments.....	26
4.6.3 Test Procedure .....	26
4.6.4 Deviation from test standard .....	26
4.6.5 Test Setup .....	26
4.6.6 EUT operating conditions.....	26
4.6.7 Test Results.....	27

<b>5</b>	<b>Pictures of Test Arrangements .....</b>	<b>28</b>
<b>6</b>	<b>Appendix – Information on the Testing Laboratories .....</b>	<b>29</b>

**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:

- There is no deviation to the applied test methods and requirements covered by the scope of this report.
- 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	orion.  <b>ANJANK</b>  soundmaster®
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




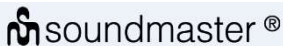
**Note:**

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
<b>GN12-050100-AG1</b>	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
<b>G0183_AM/FM</b>	am/fm digital dual alarm clock radio with under pillow vibrator	   	<b>The testing model(with FM&amp;AM function)</b>
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

**RE < 1G:** Radiated Emission below 1GHz

**PLC:** Power Line Conducted Emission

**EB:** 20dB Bandwidth measurement

**DT:** Deactivation Time 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
<b>RE<math>\geq</math>1G</b>	25deg. C, 62%RH	TX Clock: DC5V adapter output input: AC 120V 60Hz	Tank Tan
<b>RE&lt;1G</b>	25deg. C, 62%RH	TX Clock: DC5V adapter output input: AC 120V 60Hz	Tank Tan
<b>EB</b>	24deg. C, 60%RH	TX Clock: DC5V adapter output input: AC 120V 60Hz	Tank Tan
<b>DT</b>	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:

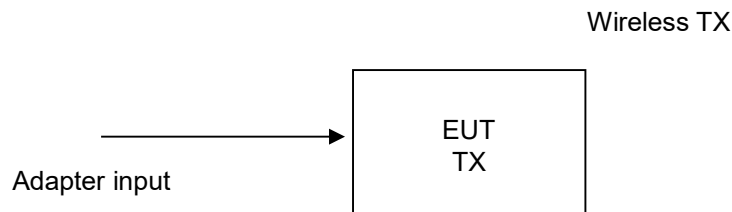
**FCC Part 15, Subpart C Section 15.231e**  
**ANSI C63.10-2013**

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 EMC 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

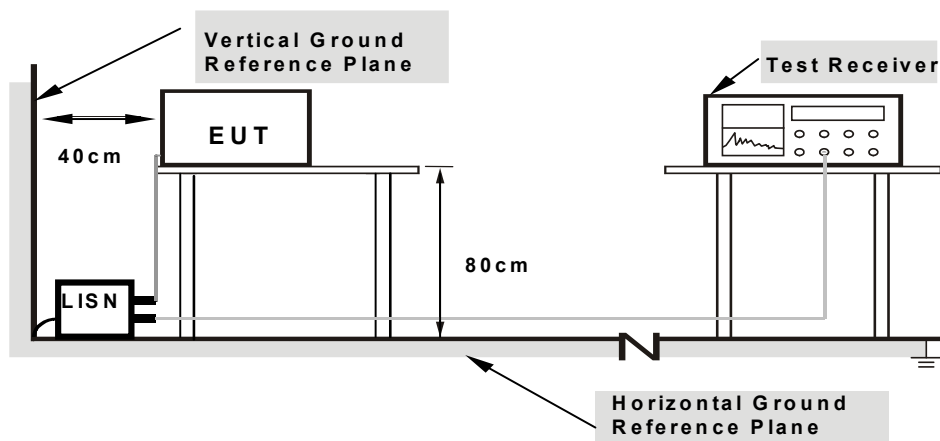
Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.

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.

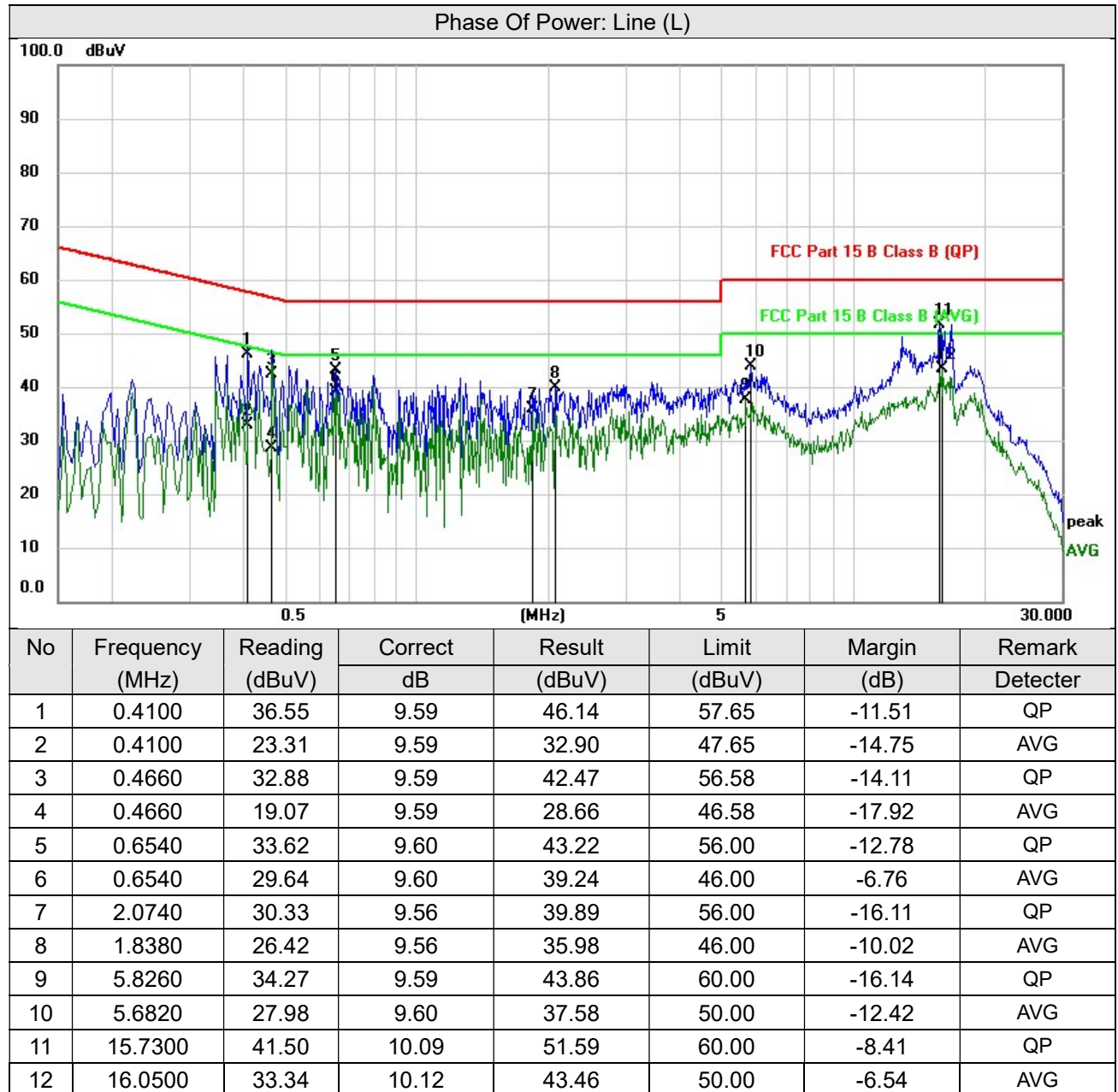


Note: 1.Support units were connected to second LISN.

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

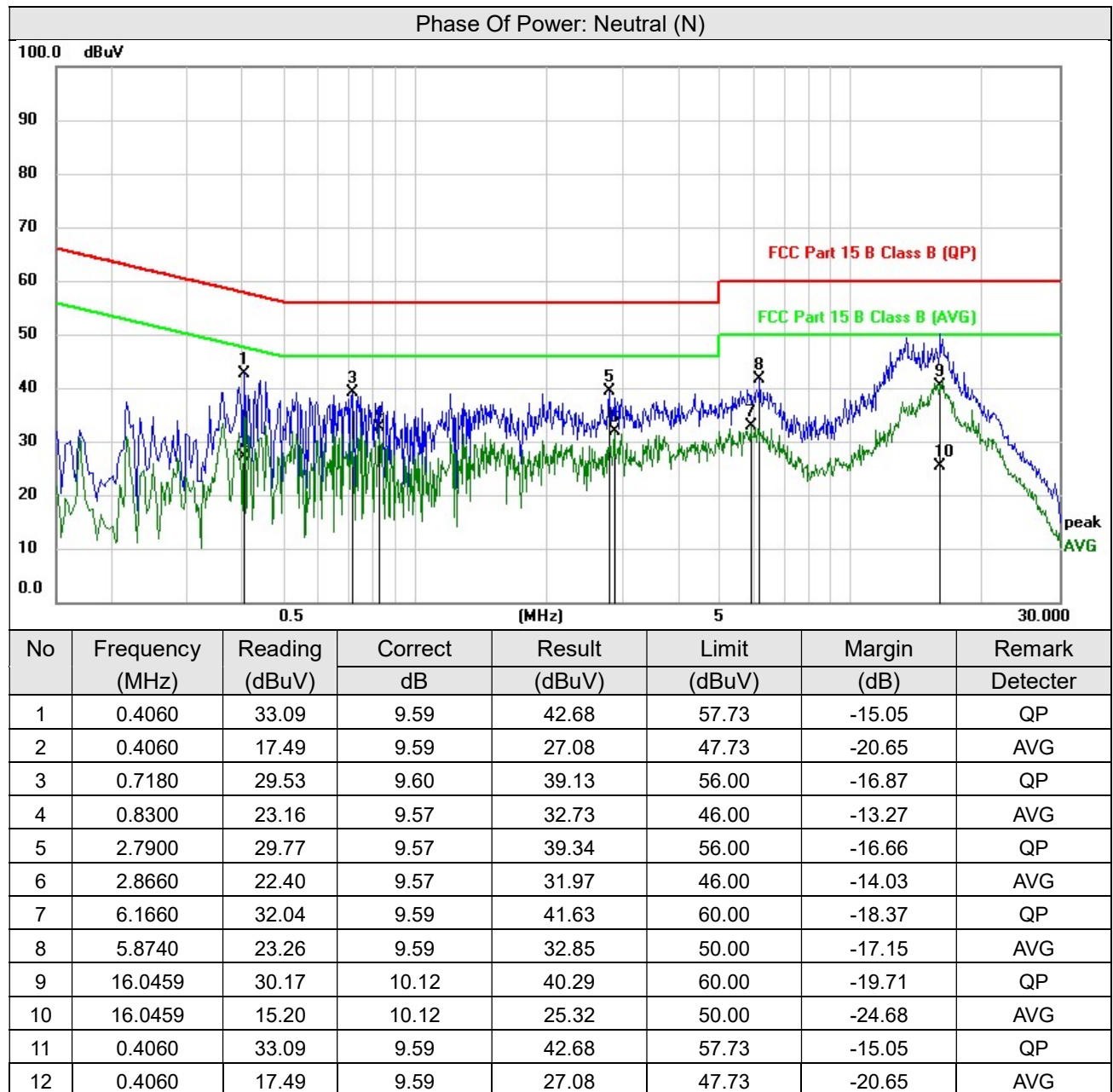
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution andwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 60%RH
Tested by	Tank Tan	Test Date	2020/04/02



#### 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 andwidth	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



#### 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	<sup>1</sup> 500 to 1500	<sup>1</sup> 50 to 150
174–260	1500	150
260–470	<sup>1</sup> 1500 to 5000	<sup>1</sup> 150 to 500
Above 470	5000	500

**Note:**

- <sup>1</sup> 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 EMC	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:**

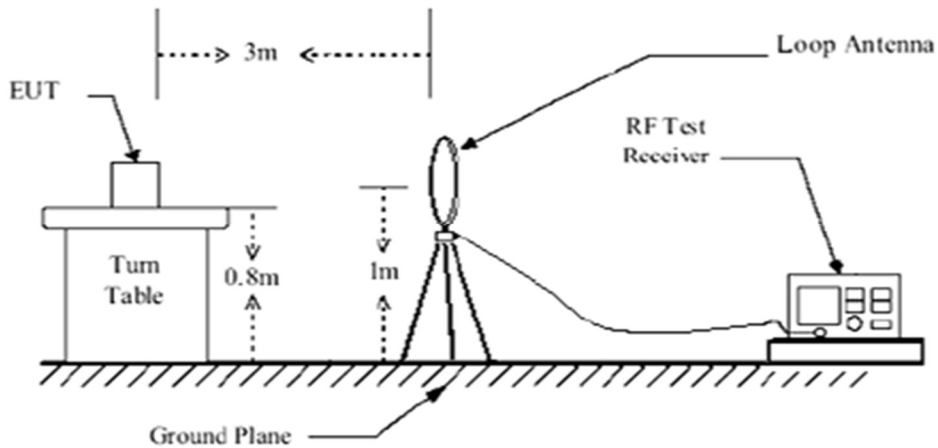
1. The resolution bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. 3MHz for Peak detection at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

#### 4.2.4 Deviation from test standard

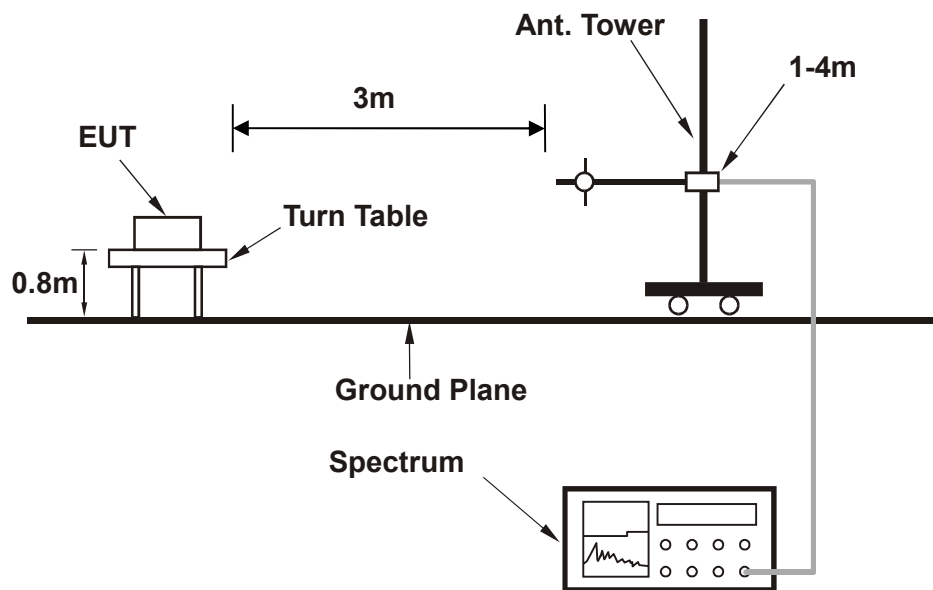
No deviation

### 4.3 Test setup

#### Below 30MHz test setup

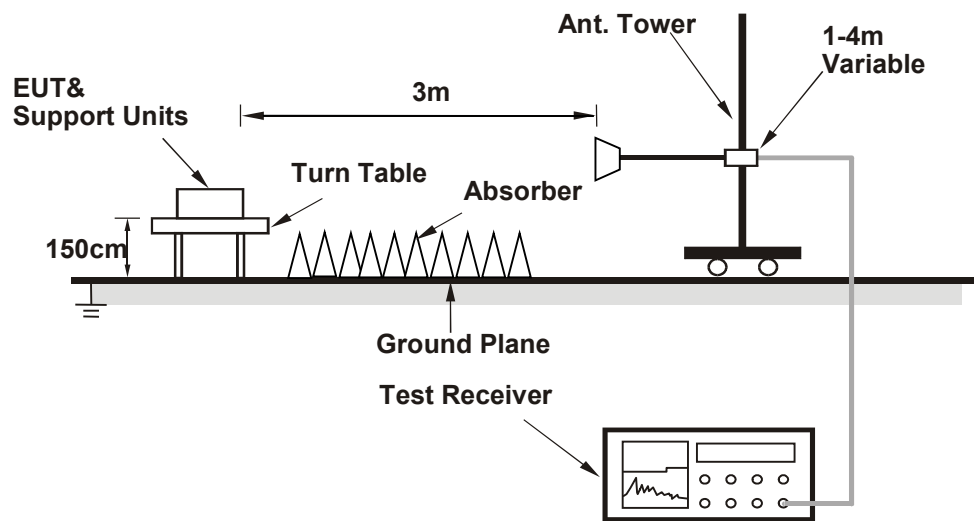


#### Below 1GHz test setup



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( <b>below 1GHz</b> )		
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
<b>4</b>	<b>434.0650</b>	<b>72.95</b>	<b>-8.74</b>	<b>64.21</b>	<b>92.19</b>	<b>-27.98</b>	<b>150</b>	<b>265</b>	<b>Peak</b>
<b>5</b>	<b>434.0650*</b>	<b>64.21</b>		<b>57.74</b>	<b>72.19</b>	<b>-14.45</b>			<b>AVG</b>
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
<b>5</b>	<b>434.0650</b>	<b>65.96</b>	<b>-8.74</b>	<b>57.22</b>	<b>92.19</b>	<b>-34.97</b>	<b>121</b>	<b>297</b>	<b>peak</b>
<b>6</b>	<b>434.0650*</b>	<b>57.22</b>		<b>50.75</b>	<b>72.19</b>	<b>-21.44</b>			<b>AVG</b>
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:

- The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) at frequency below 1GHz.
- Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- Margin value = Emission level – Limit value.
- For the test results, the EUT had been tested from 9KHz ~5GHz. But only the worst case was shown in test report.
- 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

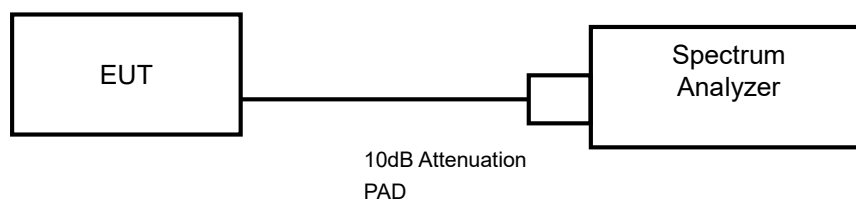
**NOTE:** 1.The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA

2. The test site was performed in RF Chamber

##### 4.4.3 Test procedures

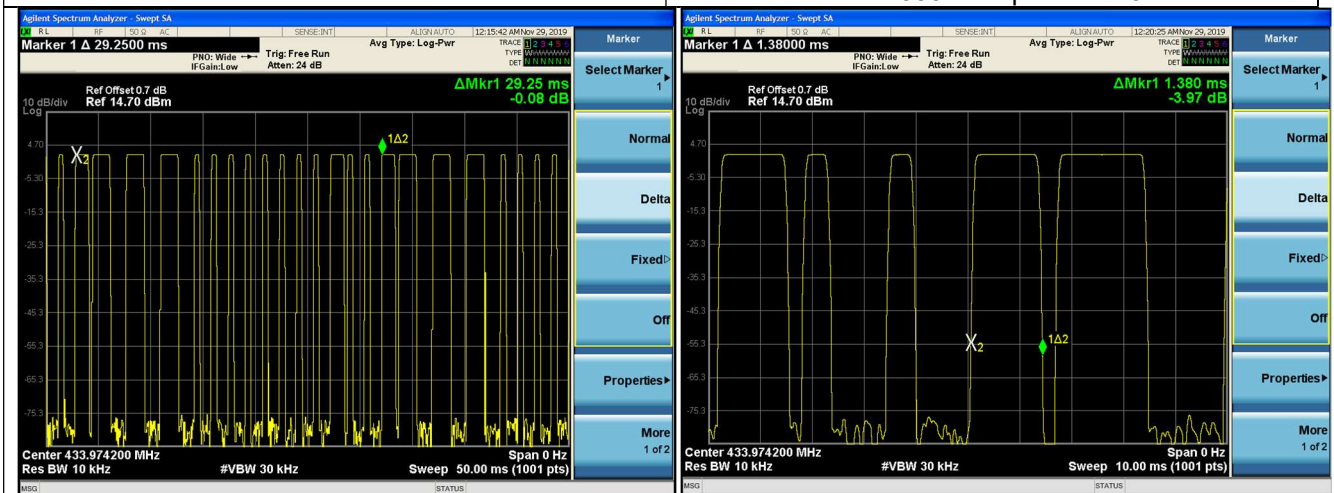
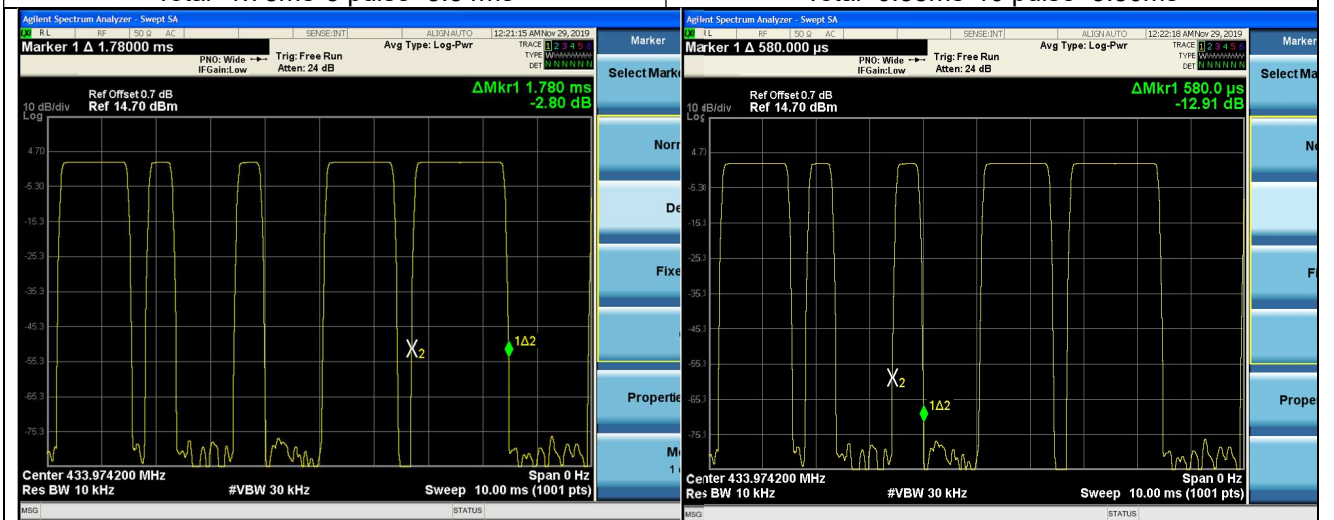
The basic test procedure was in accordance with ANSI C63.10

##### 4.4.4 Test setup



#### 4.4.5 Test results

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

 $T_{periods} = 29.25\text{ms}$ 
 $T_{on1} = 0.3\text{ms}$   
Total =  $1.380\text{ms} \times 2 \text{ pulse} = 2.76\text{ms}$ 

 $T_{on2} = 1.78\text{ms}$   
Total =  $1.78\text{ms} \times 3 \text{ pulse} = 5.34\text{ms}$ 
 $T_{on3} = 0.58\text{ms}$   
Total =  $0.58\text{ms} \times 10 \text{ pulse} = 5.80\text{ms}$ 


#### 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

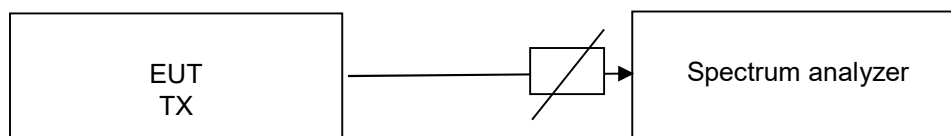
##### 4.5.3 Test procedure

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



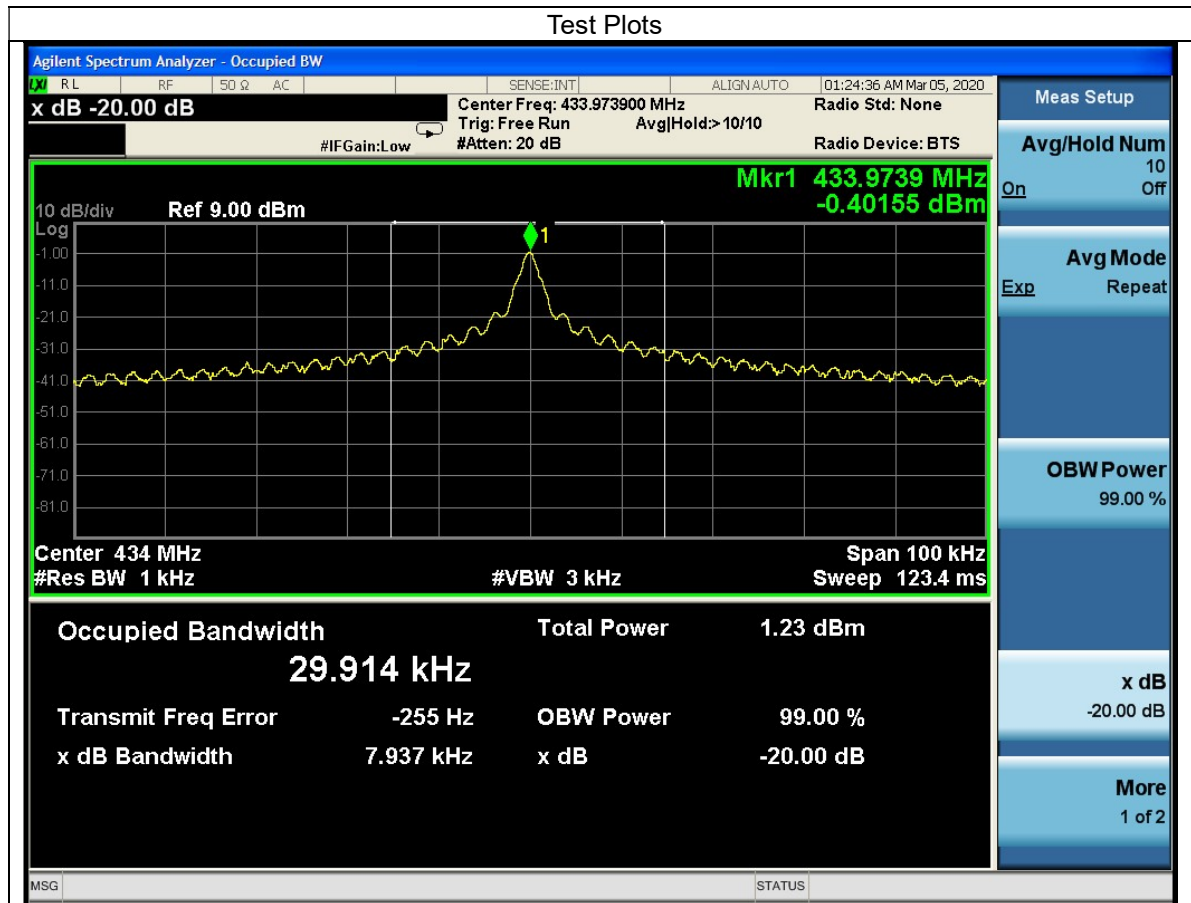
##### 4.5.6 EUT operating conditions

- 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

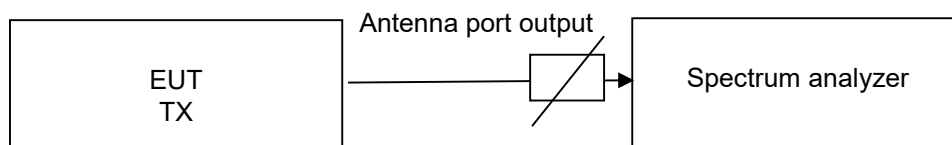
##### 4.6.3 Test Procedure

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



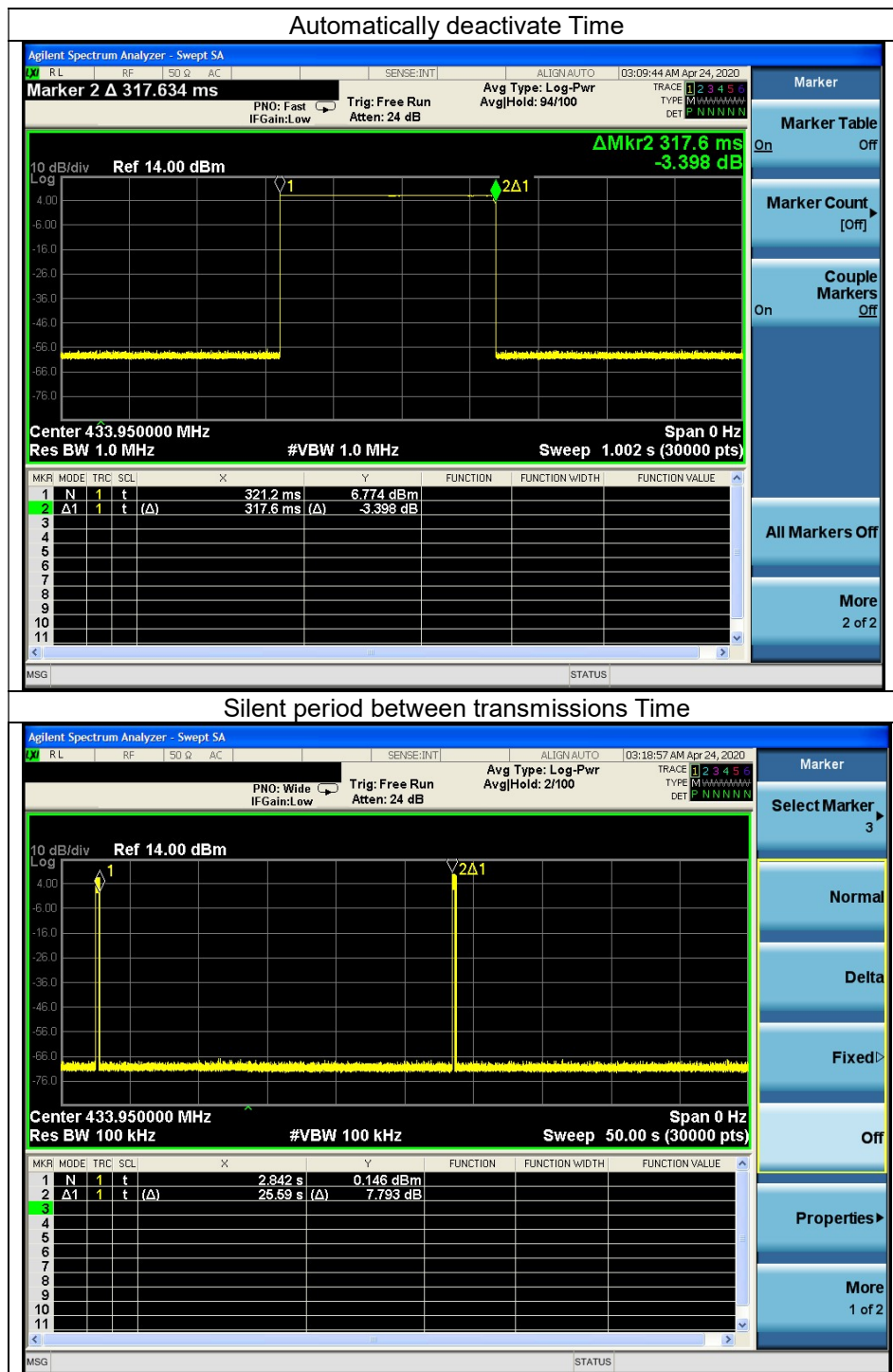
##### 4.6.6 EUT operating conditions

- 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](mailto:customerservice.dg@hwa-hsing.com)

**Web Site:** [www.hwa-hsing.com](http://www.hwa-hsing.com)

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

--- END ---