

## TEST REPORT

Applicant	DaChang Industries Co., Ltd.
Address	JinBei Road, TuTang, ChangPing Town, DongGuan City, GuangDong Province

Manufacturer or Supplier	DaChang Industries Co., Ltd.
Address	JinBei Road, TuTang, ChangPing Town, DongGuan City, GuangDong Province
Product	Smart Car Mount with Alert Key
Brand Name	CAPDASE
Model	HR00-P00C
Additional Model & Model Difference	HR00-P0XX, HR00-P1XX( "x" can be replaced by digit 0-9 or letter A-Z), see item 2.1
Date of tests	Dec. 01, 2015 ~ Dec. 10, 2015

the tests have been carried out according to the requirements of the following standards:

☒ **FCC Part 15, Subpart C, Section 15.231a (2014-10)**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Prepared by Breeze Jiang  
Specialist / EMC Department

Approved by Chris Chen  
Assistant Manager / EMC Department

*Breeze*

*Chris*

Date: Dec. 10, 2015

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Test Report No.: RF151016N009

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF151016N009	Original release	Dec. 10, 2015

## 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)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	Compliant
§15.207 (a)	AC Power Conducted Emission	N/A	EUT is powered by battery
§15.209 §15.231(b)	Radiated Emission	PASS	Compliant
§15.231 (a)	Deactivation Testing	PASS	Compliant
§15.231(c)	Emission Bandwidth Measurement	PASS	Compliant

## 2 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	9KHz ~ 30MHz	2.74dB
	30MHz ~ 1GHz	3.55dB
	1GHz ~ 18GHz	4.84dB
	18GHz ~ 40GHz	4.84dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Smart Car Mount with Alert Key
<b>MODEL NO.</b>	HR00-P00C
<b>ADDITIONAL MODELS</b>	HR00-P0XX, HR00-P1XX ("x" can be replaced by digit 0-9 or letter A-Z)
<b>FCC ID</b>	2AD3J-HR00P
<b>NOMINAL VOLTAGE</b>	DC 3V from Battery
<b>MODULATION TYPE</b>	ASK
<b>OPERATING FREQUENCY</b>	433.90MHz
<b>NUMBER OF CHANNEL</b>	1
<b>ANTENNA TYPE</b>	Spring Antenna with 0dBi Gain
<b>I/O PORTS</b>	Refer to the user's manual

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. 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.: 151016N009) for detailed product photo.
4. Additional models HR00-P0XX, HR00-P1XX are identical with the test model HR00-P00C except the model no., structure and the color about the appearance for trading purpose.  
HR00-P0XX, HR00-P1XX: the "x" can be replaced by digit 0-9 or letter A-Z.

### 3.2 DESCRIPTION OF TEST MODES

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Z plane for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

FREQUENCY	TEST MODES
433.90MHz	Transmitting

### 3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	RE ≥ 1G	RE < 1G	PLC	EB	DT	
-	√	√	-	√	√	Power by Battery

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

#### POWER LINE CONDUCTED EMISSION TEST:

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

AVAILABLE CHANNEL	OPERATING FREQUENCY (MHz)	MODULATION TYPE
1	433.90	ASK

**RADIATED EMISSION TEST (ABOVE 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	OPERATING FREQUENCY (MHz)	MODULATION TYPE
1	433.90	ASK

**RADIATED EMISSION TEST (BELOW 1 GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	OPERATING FREQUENCY (MHz)	MODULATION TYPE
1	433.90	ASK

**EMISSION BANDWIDTH MEASUREMENT:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	OPERATING FREQUENCY (MHz)	MODULATION TYPE
1	433.90	ASK



**DEACTIVATION TIME MEASUREMENT:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	OPERATING FREQUENCY (MHz)	MODULATION TYPE
1	433.90	ASK

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE $\geq$ 1G	25deg. C, 54%RH	DC 3V From Battery	Sen He
RE<1G	25deg. C, 54%RH	DC 3V From Battery	Sen He
EB	25deg. C, 60%RH	DC 3V from Battery	Breeze Jiang
DT	25deg. C, 60%RH	DC 3V from Battery	Breeze Jiang

### 3.4 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 15.231a (2014-10)**  
**ANSI C63.10-2013**

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

### 3.5 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	

NOTE:

## 4. TEST TYPES AND RESULTS

### 4.1 RADIATED EMISSION MEASUREMENT

#### 4.1.1 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(b), 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	2,250	225
70–130	1,250	125
130–174	<sup>1</sup> 1,250 to 3,750	<sup>1</sup> 125 to 375
174–260	3,750	375
260–470	<sup>1</sup> 3,750 to 12,500	<sup>1</sup> 375 to 1,250
Above 470	12,500	1,250

**NOTE:**

- <sup>1</sup> Linear interpolations.
- 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.

#### 4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 27,15	Apr. 26,16
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Apr. 23,15	Apr. 22,16
Bilog Antenna	Teseq	CBL 6111D	30643	Jul. 16, 15	Jul. 15, 16
Horn Antenna	ETS-Lindgren	3117	00062558	May 30,14	May 29,16
Amplifier (9kHz-1GHz)	SONOMA	310D	186955	Mar. 04,15	Mar. 03, 16
Pre-Amplifier (0.5~18GHz)	SCHWARZBECK	BBV 9718	9718-266	Mar 26,14	Mar 25,16
GPS Generator+ Antenna	TOJOIN	GNSS-5000A	E1-010119	Aug. 08, 14	Aug. 07, 16
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Apr. 19,14	Apr. 18,16
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Jan. 21,14	Jan. 20,17
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 20,15	Nov. 19,16

**NOTE:**

1. The test was performed in 966 Chamber.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 494399.

#### 4.1.3 TEST PROCEDURES

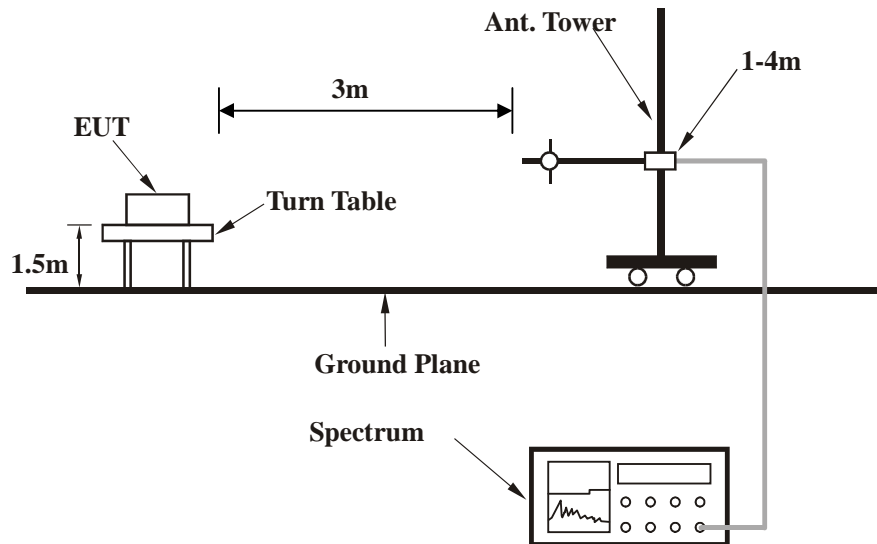
The basic test procedure was in accordance with ANSI C63.4 (section 12).

- a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meters Semi-anechoic chamber room. 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 height of antenna 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 when the test frequency is below 1 GHz.
- f. 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, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.1.5 TEST SETUP



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

#### 4.1.6 EUT OPERATING CONDITIONS

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

#### 4.1.7 TEST RESULTS

##### 433.90MHz

##### BELOW 1GHz WORST-CASE DATA: Transmitting

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	141.06	-18.15	28.27	10.12	43.50	-33.38	100	0
2	273.20	-15.88	28.11	12.23	46.00	-33.77	100	0
3	558.58	-5.90	29.13	23.23	46.00	-22.77	100	0
4	651.36	-5.37	34.19	28.82	46.00	-17.18	100	0
5	752.58	-2.54	29.60	27.06	46.00	-18.94	100	0
6	*433.90PK	-10.78	60.06	49.28	100.82	-51.54	100	0
7	*433.90AV	-	-	42.65	80.82	-38.17	-	-
8	#867.80PK	-1.01	58.17	57.16	80.82	-23.66	100	0
9	#867.80AV	-	-	50.53	60.82	-10.29	-	-
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	188.86	-20.65	34.53	13.88	43.50	-29.62	350	0
2	311.16	-14.70	28.13	13.43	46.00	-32.57	350	0
3	536.09	-6.92	29.28	22.36	46.00	-23.64	350	0
4	651.36	-5.37	34.22	28.85	46.00	-17.15	350	0
6	745.55	-2.55	29.71	27.16	46.00	-18.84	350	0
7	*433.90PK	-10.78	65.90	55.12	100.82	-45.70	100	0
8	*433.90AV	-	-	48.49	80.82	-32.33	-	-
9	#867.80PK	-1.01	45.72	44.71	80.82	-36.11	100	0
6	#867.80AV	-	-	38.08	60.82	-22.74	-	-

#### NOTE:

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. " \* ": Fundamental frequency.
6. " # ": Harmonic frequency
7. Fundamental AV value =PK Emission +20\*log(duty cycle)Where the duty factor is calculated from following formula:20 log (Duty cycle) = 20 log(46.59%)= -6.63dB, Please see page 17~18 for plotted duty.

**ABOVE 1GHz WORST-CASE DATA: Transmitting**

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3M</b>								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	1301.7PK	-5.44	58.13	52.69	74	-21.31	100	0
2	1301.7AV	-	-	46.06	54	-7.94	-	-
3	1735.6PK	-2.95	64.41	61.46	80.82	-19.36	100	0
4	1735.6AV	-	-	54.83	60.82	-5.99	-	-
5	2169.5PK	-0.15	49.42	49.27	80.82	-31.55	100	0
6	2169.5AV	-	-	42.64	60.82	-18.18	-	-
7	2603.4PK	0.82	55.01	55.83	80.82	-24.99	100	0
8	2603.4AV	-	-	49.20	60.82	-11.62	-	-
9	3037.3PK	1.52	48.05	49.57	80.82	-31.25	100	0
10	3037.3AV			42.94	60.82	-17.88		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3M</b>								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	1301.7PK	30.54	20.50	51.04	74	-22.96	100	0
2	1301.7AV	-	-	44.41	54	-9.59	-	-
3	1735.6PK	33.53	20.68	54.21	80.82	-26.61	100	0
4	1735.6AV	-	-	47.58	60.82	-13.24	-	-
5	2169.5PK	36.68	10.11	46.79	80.82	-34.03	100	0
6	2169.5AV	-	-	40.16	60.82	-20.66	-	-
7	2603.4PK	37.44	8.22	45.66	80.82	-35.16	100	0
8	2603.4AV	-	-	39.03	60.82	-21.79	-	-
9	3037.3PK	37.95	13.51	51.46	80.82	-29.36	100	0
10	3037.3AV	-	-	44.83	60.82	-15.99	-	-

**NOTE:**

- 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(46.59%)= -6.63dB, Please see page 17~18 for plotted duty.



### Duty Cycle:

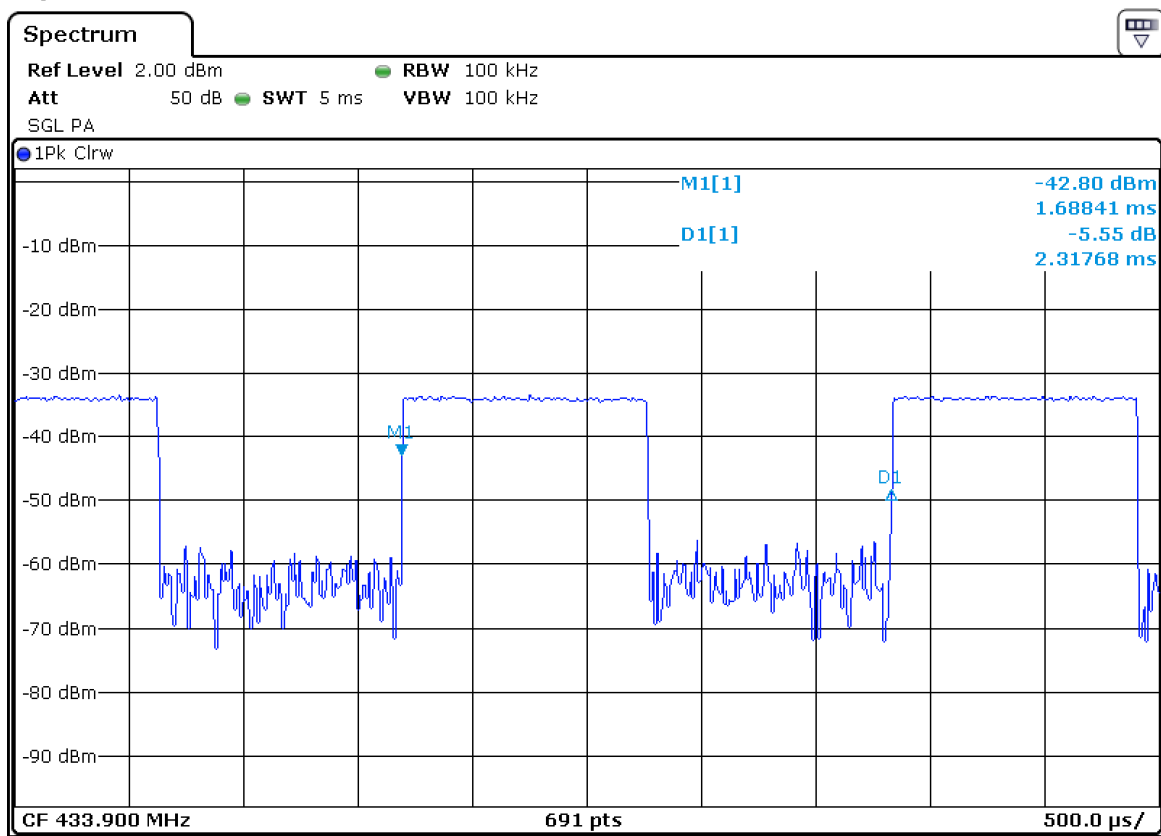
$T_p = 2.31768\text{ms}$

$T_{on} = 1.07971\text{ms}$

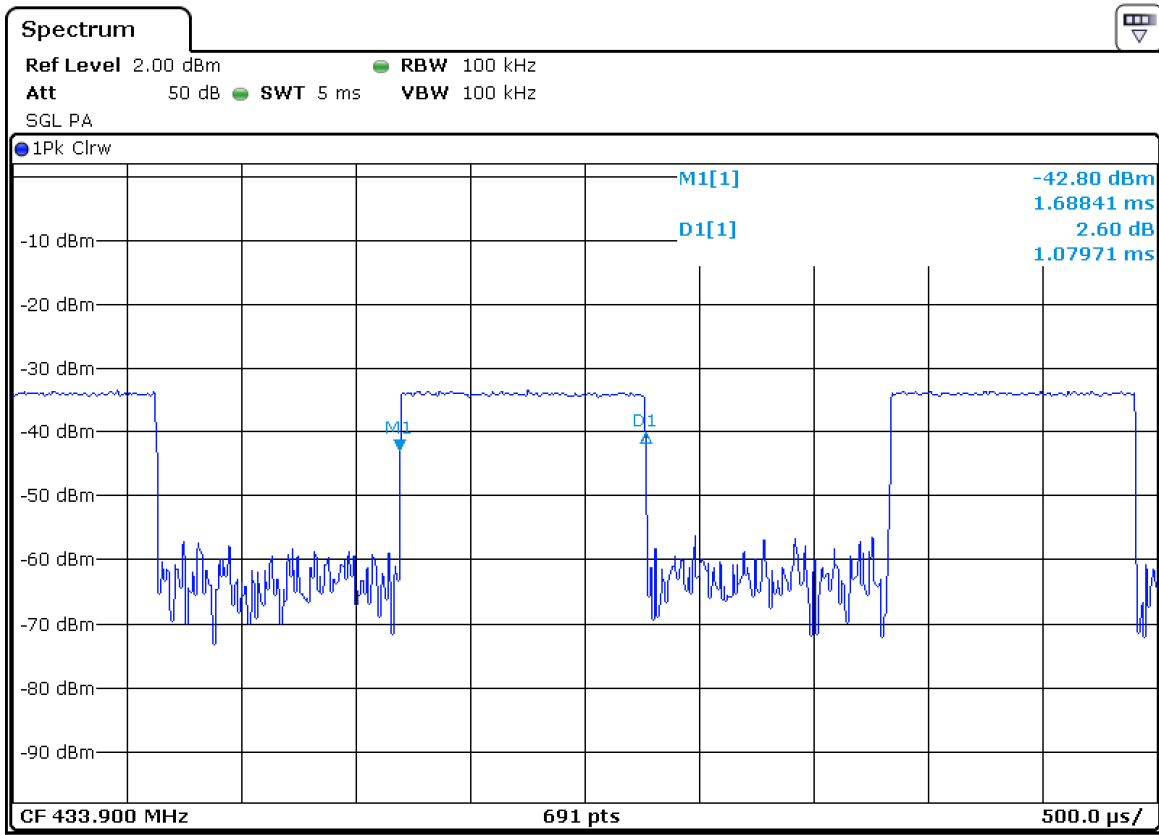
Duty Cycle =  $T_{on} / T_p * 100\% = 1.07971 / 2.31768 * 100\% = 46.59\%$

Factor =  $20\text{Log}(\text{Duty Cycle}) = 20\text{Log}(46.59\%) = -6.63\text{dB}$

**$T_p = 2.31768\text{ms}$**



***T on = 1.07971ms***



## 4.2 20dB BANDWIDTH MEASUREMENT

### 4.2.1 LIMITS 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. For 433.90MHz:

Limit=Fundamental Frequency $\times$ 0.25%=433.90MHz $\times$ 0.25%=1084.75 kHz

### 4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Sensor	Keysight	U2021XA	MY55060016	Feb. 18,15	Feb. 17,16
Power Sensor	Keysight	U2021XA	MY55060018	Feb. 18,15	Feb. 17,16
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 12, 15	Oct.11, 16
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.07,15	Sep. 06,16
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 05,15	Nov. 04,16
Signal Generator	Agilent	N5183A	MY50140980	Nov. 05,15	Nov. 04,16
ESG Vector Signal Generator	Agilent	E4438C	MY49072505	Apr. 22, 15	Apr. 21, 16
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Sep. 01,15	Aug. 31,16

#### NOTE:

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

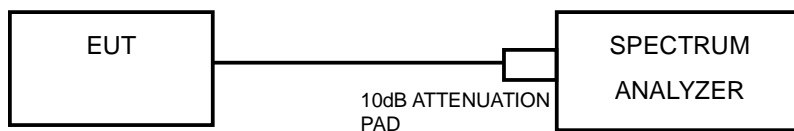
#### 4.2.3 TEST PROCEDURE

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.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



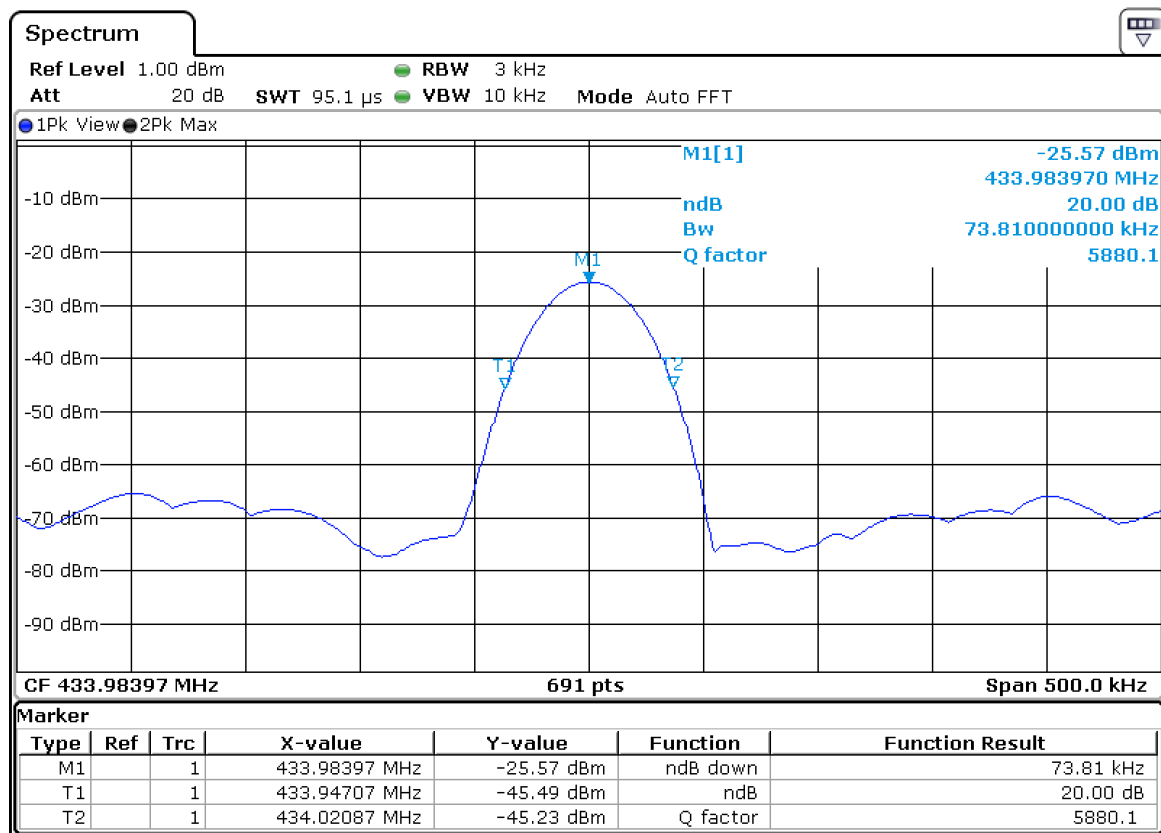
#### 4.2.6 EUT OPERATING CONDITIONS

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

## 4.2.7 TEST RESULTS

FREQUENCY (MHz)	20dB BANDWIDTH (kHz)	MAXIMUM LIMIT (kHz)	PASS/FAIL
433.90	73.81	1084.75	PASS

### Test Data:



### 4.3 DEACTIVATION TEST

#### 4.3.1 LIMITS OF DEACTIVATION TEST

15.231 (a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

15.231 (a)(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

#### 4.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Sensor	Keysight	U2021XA	MY55060016	Feb. 18,15	Feb. 17,16
Power Sensor	Keysight	U2021XA	MY55060018	Feb. 18,15	Feb. 17,16
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 12, 15	Oct.11, 16
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.07,15	Sep. 06,16
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 05,15	Nov. 04,16
Signal Generator	Agilent	N5183A	MY50140980	Nov. 05,15	Nov. 04,16
ESG Vector Signal Generator	Agilent	E4438C	MY49072505	Apr. 22, 15	Apr. 21, 16
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Sep. 01,15	Aug. 31,16

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

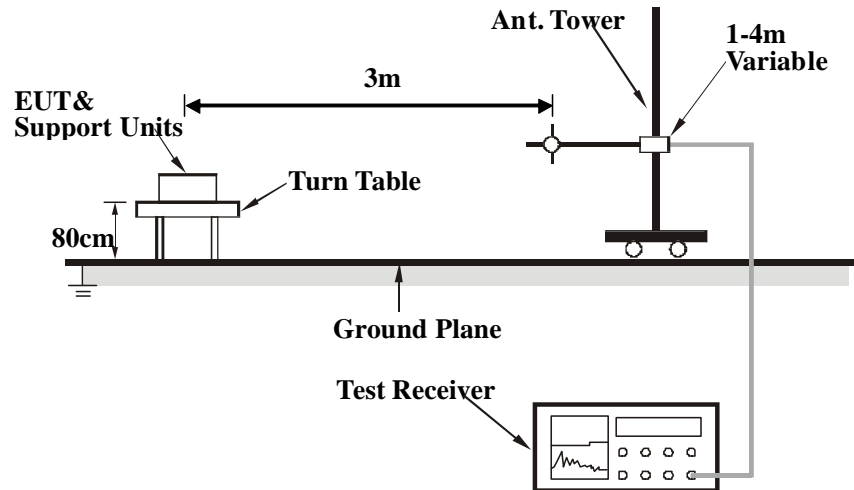
#### 4.3.3 TEST PROCEDURE

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.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.3.5 TEST SETUP



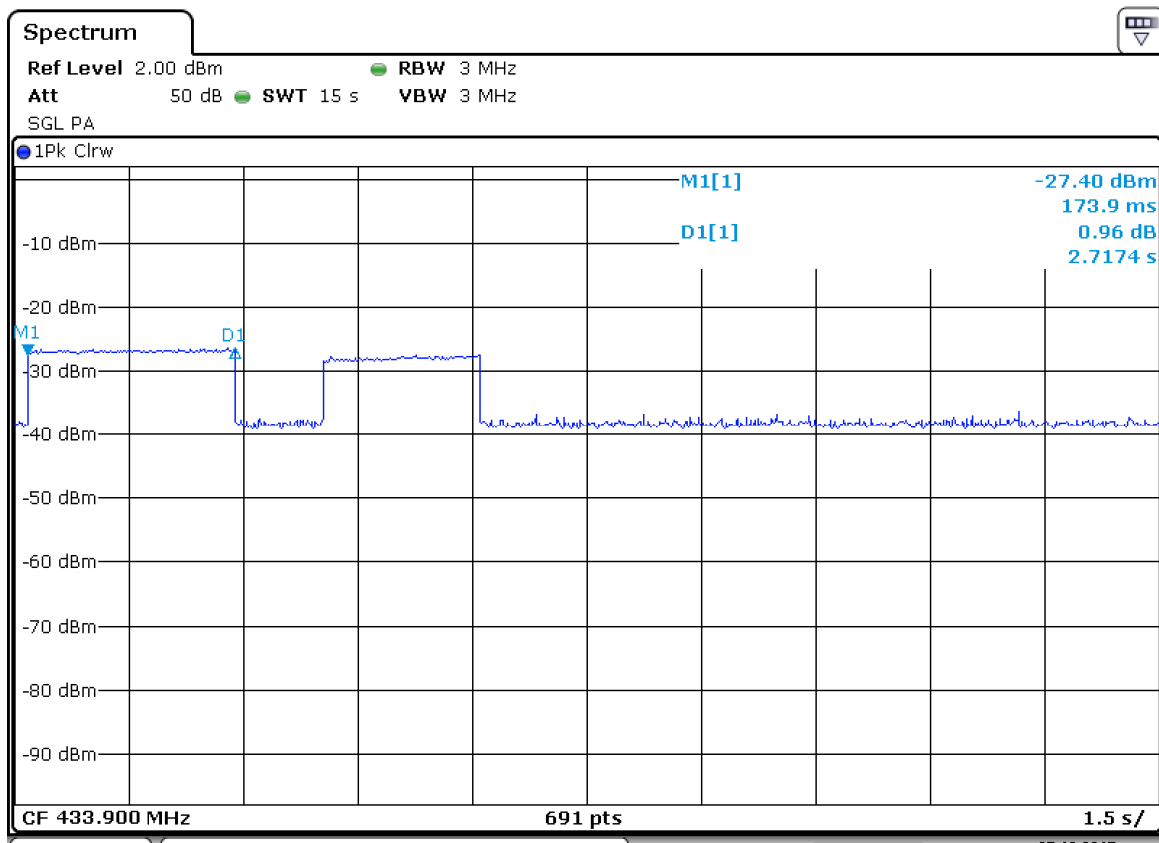
#### 4.3.6 EUT OPERATING CONDITIONS

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

#### 4.3.7 TEST RESULTS

FREQUENCY (MHz)	MAXIMUM LIMIT (sec)	PASS/FAIL
433.90	5	PASS

The plots of test results are attached as below.





## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

## **6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**