

## EMC TEST REPORT

### No. 170601820SHA-002

Applicant : Kangtai Electric Co., Ltd.  
No.5, Kangtai Rd., Huanghua Industrial District,  
Yueqing, Zhejiang, P.R.China

Manufacturer : Kangtai Electric Co., Ltd.  
No.5, Kangtai Rd., Huanghua Industrial District,  
Yueqing, Zhejiang, P.R.China

Product Name : Remote control adaptor with WIFI function

Type/Model : 51064USA, 51067USA, 51090USA, 51073USA,  
51076USA

**TEST RESULT : PASS**

#### SUMMARY

The equipment complies with the requirements according to the following standard(s):

**47CFR Part 15 (2016):** Radio Frequency Devices (Subpart C)

**ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

**RSS-210 Issue 9 (December 2016):** Low-power Licence-exempt Radio communication Devices (All Frequency Bands): Category I Equipment

**RSS-Gen Issue 4 (December 2014):** General Requirements and Information for the Certification of Radio communication Equipment

Date of issue: Nov 3, 2017

Prepared by:



Teddy Yin (*Project Engineer*)

Reviewed by:



Daniel Zhao (*Reviewer*)

## **Description of Test Facility**

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## 1. General Information

### 1.1 Applicant Information

Applicant: Kangtai Electric Co., Ltd.  
No.5, Kangtai Rd., Huanghua Industrial District,  
Yueqing, Zhejiang, P.R.China

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Manufacturer: Kangtai Electric Co., Ltd.  
No.5, Kangtai Rd., Huanghua Industrial District,  
Yueqing, Zhejiang, P.R.China

Sample received date : Jul 28, 2017  
Date of test : Jul 29~Nov 1, 2017

### 1.2 Identification of the EUT

Equipment: Remote control adaptor with WIFI function

Type/model: 51064USA, 51067USA, 51090USA, 51073USA,  
51076USA

FCC ID: RHT064

IC: 22870-51064

### 1.3 Technical specification

Operation Frequency Band:	433.92MHz
Modulation:	ASK
Antenna Designation:	PCB antenna, non-user removable.
Gain of Antenna:	0dBi
Rating:	120V~, 60Hz, 15A, 1800W Resistive
Description of EUT:	The EUT is a Remote control adaptor with WIFI function, it supports WIFI 2.4G band and 433.92MHz. There are 5 models, they are same except for the model name and the enclosure. This report is for 433.92MHz.
Channel Description:	There is one channel only, namely 433.92MHz.

### 1.4 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.

The EUT is a handheld device, so three axes (X, Y, Z) were observed while the test receiver worked as “max hold” continuously and the highest reading (X axis) among the whole test procedure was recorded.

## 2. Test Specification

### 2.1 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESCS 30	EC 2107	2018-09-12
<input checked="" type="checkbox"/>	A.M.N.	R&S	ESH2-Z5	EC 3119	2017-12-01
<input checked="" type="checkbox"/>	Shielded room	Zhongyu	-	EC 2838	2018-01-08
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2018-09-12
<input checked="" type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2018-05-30
<input checked="" type="checkbox"/>	Horn antenna	R&S	HF 906	EC 3049	2018-09-23
<input checked="" type="checkbox"/>	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2018-07-09
<input checked="" type="checkbox"/>	Pre-amplifier	R&S	Pre-amp 18	EC5881	2018-06-19
<input checked="" type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2018-03-09
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESCI 7	EC 4501	2018-02-23
<input checked="" type="checkbox"/>	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2018-09-10
<input type="checkbox"/>	Power sensor	Agilent	U2021XA	EC 5338-1	2018-03-06
<input type="checkbox"/>	Vector Signal Generator	Agilent	N5182B	EC 5175	2018-03-06
<input type="checkbox"/>	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2018-03-03
<input type="checkbox"/>	Mobile Test System	Litepoint	Iqxel	EC 5176	2018-01-11
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 2323	2018-06-14
<input checked="" type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2018-03-23

## 2.2 Test Standard

47CFR Part 15: 2016

ANSI C63.10: 2013

RSS-210 Issue 9 (August 2016)

RSS-Gen Issue 4 (November 2014)

## 2.3 Measurement uncertainty

TEST ITEM	MEASUREMENT UNCERTAINTY
Maximum peak output power	$\pm 0.74\text{dB}$
Radiated Emissions in restricted frequency bands below 1GHz	$\pm 4.90\text{dB}$
Radiated Emissions in restricted frequency bands above 1GHz	$\pm 5.02\text{dB}$
Power line conducted emission	$\pm 3.19\text{dB}$

## 2.4 Test Summary

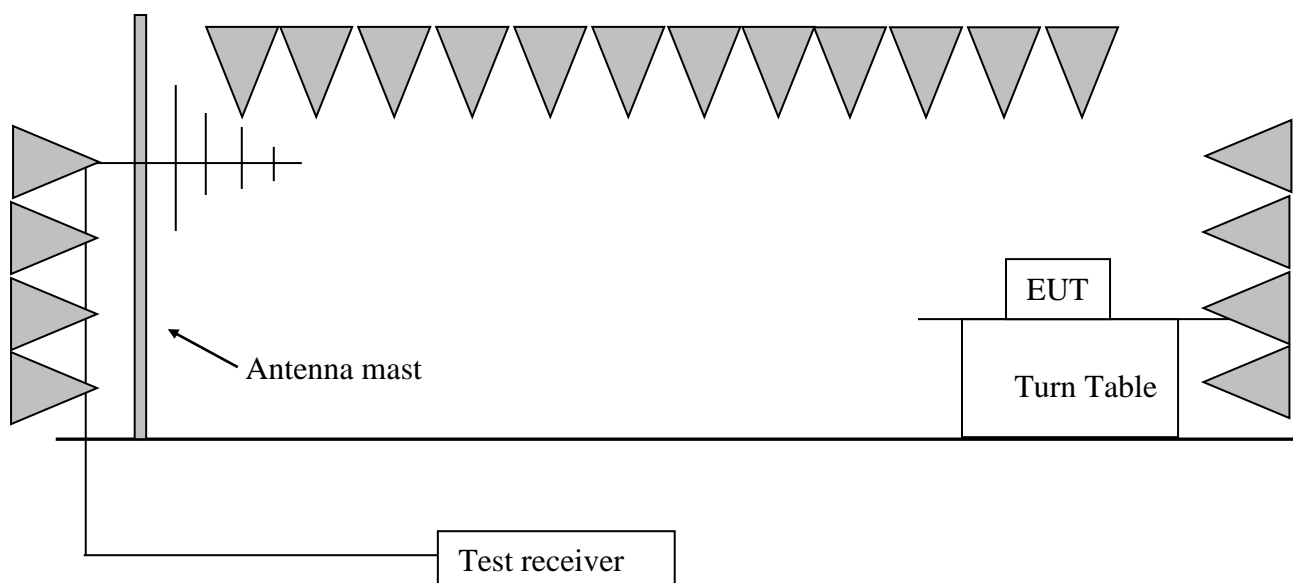
**This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.**

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Fundamental & spurious emission	15.231(b)	RSS-210 Issue 9 Annex A1.2	Pass
Restrict band radiated emission	15.205	RSS-210 Issue 9 Clause 4.1	Pass
Power line conducted emission	15.207	RSS-Gen Issue 4 Clause 8.8	Pass
Deactivating time	15.231(a)(1)	RSS-210 Issue 9 Annex A1.1	Pass
Emission bandwidth	15.231(c)	-	Pass
Occupied bandwidth	-	RSS-Gen Issue 4 Clause 6.6	Tested





### 3.2 Test Configuration



### 3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, the pre-amplifier and high pass filter is equipped just at the output terminal of the antenna.

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

Both horizontal and vertical polarities of the receiving antenna were assessed and the higher reading was listed in this report.

The radiated emission was measured using the test receiver with the resolutions bandwidth set as:

RBW=300 Hz, VBW=1 kHz (9 kHz~150 kHz);

RBW=10kHz, VBW=30kHz (150kHz~30MHz);

RBW = 100kHz, VBW = 300kHz (30MHz~1GHz)

RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

### 3.4 Test protocol

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Emission Type	Limit (dBuV/m)	Margin	Detector
H	433.92	83.50	19.90	Fundamental	100.80	17.30	PK
H	867.81	37.30	25.20	Spurious	80.80	43.50	PK
H	1296.59	41.80	-18.10	Spurious	80.80	39.00	PK
H	1731.46	47.00	-17.08	Spurious	80.80	33.80	PK
H	2603.20	50.10	-10.90	Spurious	80.80	30.70	PK
H	133.02	31.20	17.40	Restrict	46.00	14.80	PK
V	433.92	83.10	19.90	Fundamental	100.80	17.70	PK
V	867.81	26.70	25.20	Spurious	80.80	54.10	PK
V	1296.59	41.70	-18.10	Spurious	80.80	39.10	PK
V	1731.46	45.40	-17.08	Spurious	80.80	35.40	PK
V	2172.34	44.10	-12.70	Spurious	80.80	36.70	PK
V	2338.44	50.90	-10.55	Restrict	74.00	23.10	PK

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = limit - Corrected Reading

4. If PK reading is less than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,

Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV, limit = 40.00dBuV/m.

Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading =

10dBuV + 0.20dB/m = 10.20dBuV/m; Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

Calculating the AV value according to the duty cycle

Antenna	Frequency (MHz)	PK Reading (dBuV/m)	Correct Factor (dB)	AV Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)
H	433.92	83.50	-4.01	79.49	80.80	1.31

Remark: 1. Correct Factor =  $20\lg(\text{duty cycle}) = 20\lg(0.63) = -4.01$

2. AV Reading = PK Reading + Correct Factor

3. Margin = limit - AV Reading

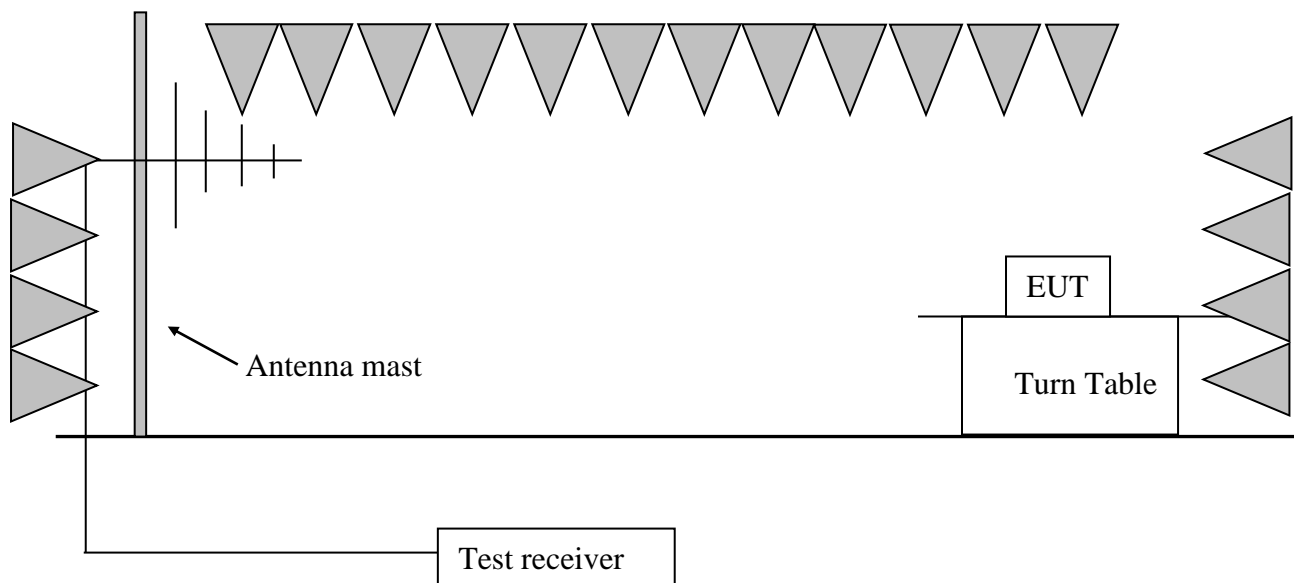
## 4. Deactivating time

**Test result:       PASS**

### 4.1 Test limit

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
- (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.
- (5) Transmission of set-up information for security systems may exceed the transmission duration limits in (1) and (2) above, provided such transmission are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

## 4.2 Test Configuration



## 4.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber.

The central frequency of test receiver was set as the operating frequency of EUT and the Span was set as 0.

The EUT was switched once. The test receiver recorded the whole time from the triggered moment to the time of stopping radiating. For manual switching, to avoid uncertainty, the operating above would be repeated five times and the worst data is recorded.

## 4.4 Test protocol

Whole time from the triggered moment to the time of stopping radiating: 0.22s.

As a result, the EUT complies with the limit of 5s' deactivating time.

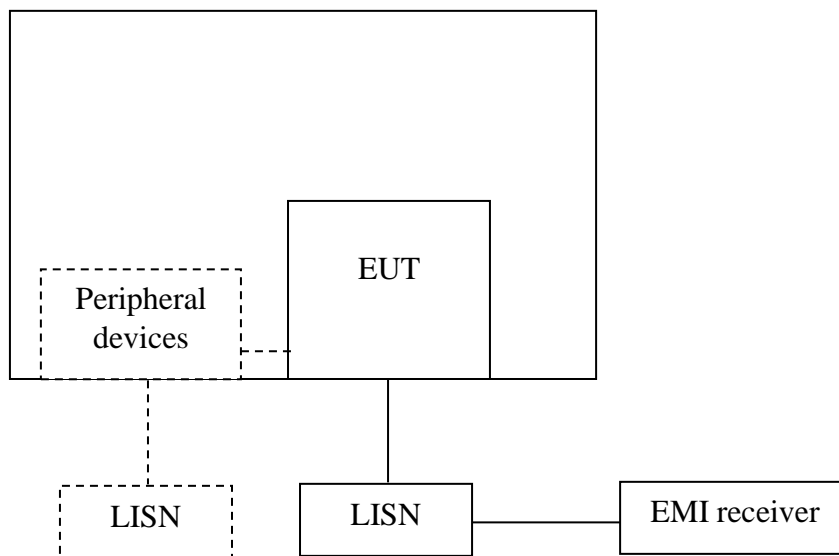
## 5. Power line conducted emission

**Test result: Pass**

**5.1 Limit**

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

**5.2 Test configuration**



- For table top equipment, wooden support is 0.8m height table
- For floor standing equipment, wooden support is 0.1m height rack.

**5.3 Test procedure and test set up**

The EUT are connected to the main power through a line impedance stabilization network

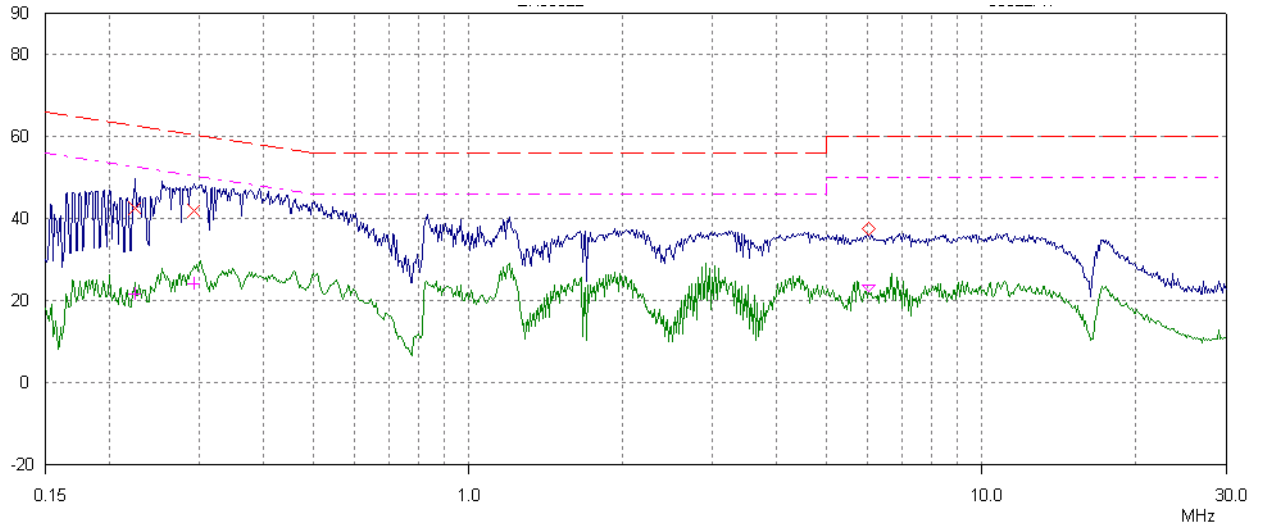
(LISN). This provides a  $50\Omega/50\mu\text{H}$  coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a  $50\Omega/50\mu\text{H}$  coupling impedance with  $50\Omega$  termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement. The bandwidth of the test receiver is set at 9 kHz.

## 5.4 Test protocol

L Line

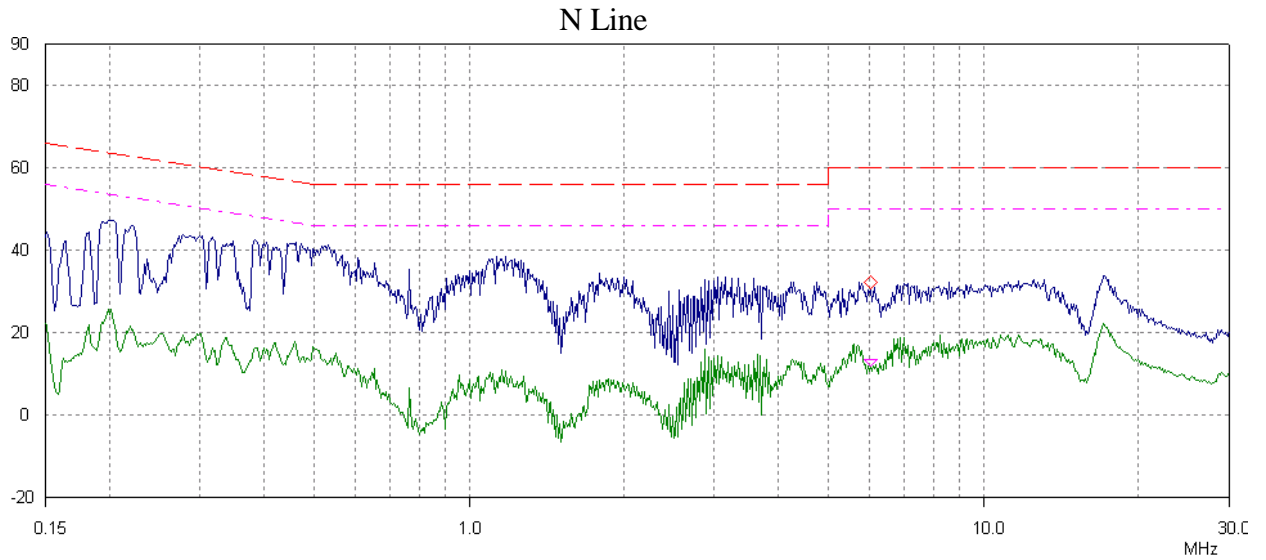




**Test Data:**

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.16	*	65.3	*	*	55.3	*
0.25	*	61.9	*	*	51.9	*
0.60	*	56.0	*	*	46.0	*
4.29	*	56.0	*	*	46.0	*
10.45	*	60.0	*	*	50.0	*
19.40	*	60.0	*	*	50.0	*

Note: \*means margin is more than 10dB.



**Test Data:**

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.16	*	65.2	*	*	55.2	*
0.25	*	61.8	*	*	51.8	*
0.95	*	56.0	*	*	46.0	*
4.14	*	56.0	*	*	46.0	*
10.32	*	60.0	*	*	50.0	*
19.24	*	60.0	*	*	50.0	*

Note: \*means margin is more than 10dB.

## 6. Emission Bandwidth

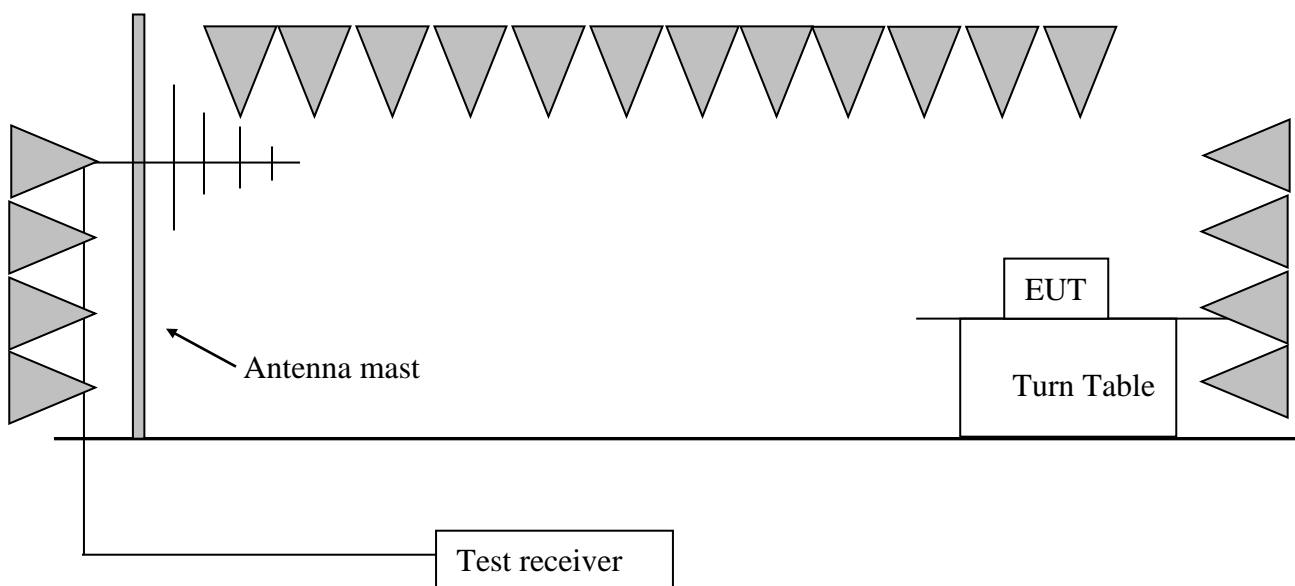
**Test Status: Pass**

### 6.1 Test limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

The limit for the EUT =  $0.25\% * 433.92\text{MHz} = 1085\text{kHz}$

### 6.2 Test Configuration



### 6.3 Test procedure and test setup

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1 meter to 4 meters to find out the maximum emission level.

The central frequency of test receiver was set near the operating frequency of EUT.

The test was conducted using the Spectrum Analyzer with the resolutions bandwidth set at 30kHz, the video bandwidth set at 100kHz.

#### 6.4 Test protocol

Temperature : 25 °C  
Relative Humidity : 55 %

Channel	Emission Bandwidth (kHz)	Limit (kHz)
1	183.9	1085

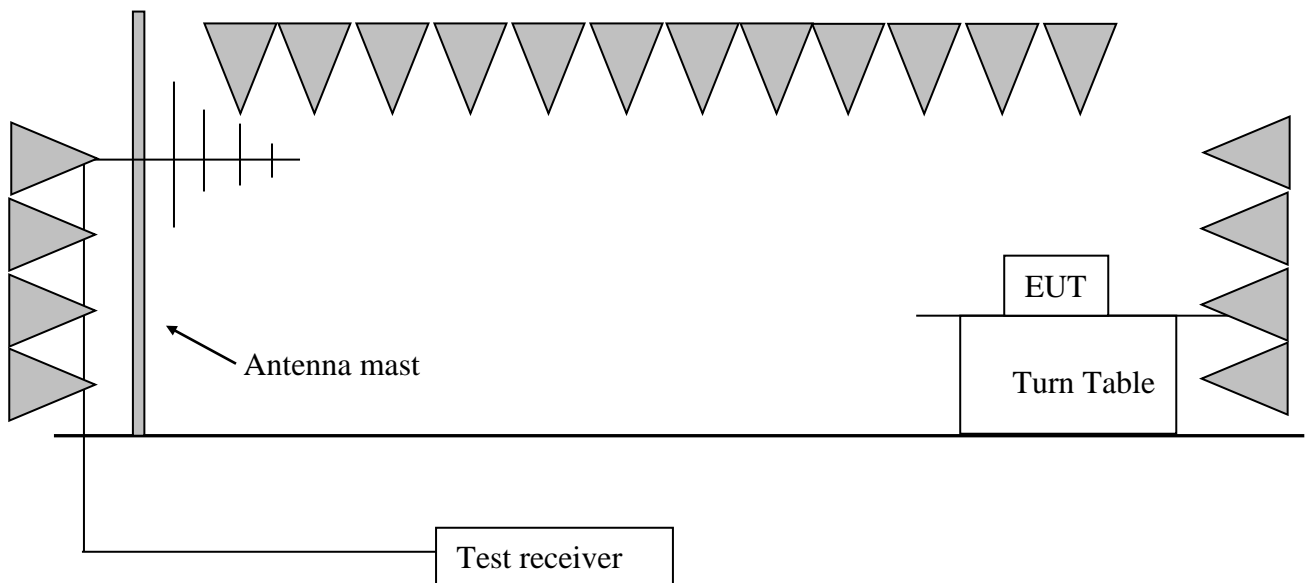
## 7. Occupied Bandwidth

Test Status: Tested

### 7.1 Test limit

None

### 7.2 Test Configuration



### 7.3 Test procedure and test setup

The occupied bandwidth per RSS-Gen Issue 4 Clause 4.6.1 was measured using the Spectrum Analyzer with the resolutions bandwidth set at 10kHz, the video bandwidth set at 30kHz.

#### 7.4 Test protocol

Temperature : 25 °C  
Relative Humidity : 55 %

Channel	Occupied Bandwidth (MHz)	Max. Value (MHz)
1	0.335	0.335

**Remark: “Max. Value” is the maximum test result of all the measured occupied bandwidth.**