EMC TEST REPORT
No. SH08070554-001

Applicant	:	Ningbo Jiangdong C-Union Electronic Co.,Ltd No.11 Qixin Road,Jiangdong District, Ningbo, China, 315040
Manufacturer	:	Ningbo Jiangdong C-Union Electronic Co.,Ltd No.11 Qixin Road,Jiangdong District, Ningbo, China, 315040
Equipment	:	Remote control
Type/Model	:	T-03

SUMMARY

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

47CFR Part 15 (2007): Radio Frequency Devices

ANSI C63.4 (2003): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

RSS-210 Issue 7 (June 2007): Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

RSS-Gen Issue 2 (June 2007): General Requirements and Information for the Certification of Radiocommunication Equipment

Date of issue: Aug 5, 2008

Tested by: Wakeyou

Wakeyou Wang (*Project Engineer*)

Reviewed by: Daniel Zhao

Daniel Zhao (*Reviewer*)

Description of Test Facility

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IC Assigned Code: 2042B-1

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Content

1. General Information

1.1 Applicant Information

Applicant:		Ningbo Jiangdong C-Union Electronic Co.,Ltd No.11 Qixin Road,Jiangdong District, Ningbo, China, 315040
Name of contact:		Mr. Allan Chen
Tel: Fax:		86-574-87010278 86-574-87010396
Manufacturer:		Ningbo Jiangdong C-Union Electronic Co.,Ltd No.11 Qixin Road,Jiangdong District, Ningbo, China, 315040
Sample received date	:	July 26, 2008
Date of test	:	July 26, 2008 ~ July 30, 2008

1.2 Identification of the EUT

Equipment:	Remote control
Type/model:	T-03
FCC ID:	WJACL001
IC:	Not applied

1.3 Technical specification

Operation Frequency Band:	433.92MHz
Modulation:	2ASK
Antenna Designation:	Internal antenna, non-user removable.
Rating:	Built-in Battery: DC 12V Working frequency: 433.92MHz
Description of EUT:	There is one model only. The EUT is a transmitter to transmit wireless signal so as to control the on/off condition of receiver (socket).
Channel Description:	There is one channel only and working at the central frequency of 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 portable device, so three axes were observed.

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2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	EC 3045	2008-6-1	2009-5-31
Semi-anechoic chamber	-	Albatross project	EC 3048	2008-6-1	2009-5-31
A.M.N.	ESH2-Z5	R&S	EC 3119	2008-1-23	2009-1-22
Test Receiver	ESCS 30	R&S	EC 2107	2008-1-23	2009-1-22
Ultra-broadband antenna	HL 562	R&S	EC 3046-1	2008-6-30	2009-6-29
Horn antenna	HF 906	R&S	EC 3049	2008-6-30	2009-6-29
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2008-6-30	2009-6-29

2.2 Test Standard

47CFR Part 15 (2007)
ANSI C63.4: 2003
RSS-210 Issue 7 (June 2007)
RSS-Gen Issue 2 (June 2007)

2.3 Radiated test description

Test site: Semi-anechoic chamber

Test distance: 3m

Antenna: Ultra-broadband antenna (30MHz ~ 1GHz);
Horn antenna (1GHz ~ 18GHz)

Typical Gain of Preamplifiers: 30dB (for 1GHz ~ 18GHz)

Test Receiver set: RBW = 100kHz, VBW = 300kHz, internal amplifier: ON; (30MHz~1GHz)
RBW = 1MHz, VBW = 3MHz, internal amplifier: OFF; (>1GHz for PK);
RBW = 1MHz, VBW = 10Hz, internal amplifier: OFF; (>1GHz for AV);

Floor noise reading of the radiated test system (consisting of test site, antenna, preamplifier and receiver):

1GHz ~ 18GHz

Antenna	Frequency (MHz)	Uncorrected Reading (dBuV)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Detector
H	1000	45.20	-0.60	44.60	PK
H	8650	38.50	5.10	43.60	PK
H	15000	38.90	5.50	44.40	PK
V	1000	45.30	-0.60	44.70	PK
V	8650	38.40	5.10	43.50	PK
V	15000	38.80	5.50	44.30	PK
H	1000	29.10	-0.60	28.50	AV
H	8650	24.30	5.10	29.40	AV
H	15000	24.80	5.50	30.30	AV
V	1000	29.50	-0.60	28.90	AV
V	8650	24.60	5.10	29.70	AV
V	15000	24.10	5.50	29.60	AV

Remark: 1.Correct Factor = Antenna Factor + Cable Loss - Gain of Preamplifier.
Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB, Gain of Preamplifier = 32.00dB, then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m

2. Corrected Reading = Uncorrected Reading + Correct Factor
Example: Assuming Uncorrected Reading = 35.00dBuV, Correct Factor = 0.20dB/m, then Corrected Reading =35.00+0.20 = 35.20dBuV/m

2.4 Test Summary

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TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Fundamental & spurious emission	15.231(b)	RSS-210 Issue 7 Annex A1.1.2	Pass
Restrict band radiated emission	15.205	RSS-210 Issue 7 Clause 2	Pass
Power line conducted emission	15.207	RSS-Gen Issue 2 Clause 7.2.2	NA
Emission bandwidth	15.231(c)	RSS-Gen Issue 2 Annex A1.1.3	Pass
Deactivating time	15.231(a)(1)	RSS-210 Issue 7 Annex A1.1.1	Pass

3. Fundamental & Spurious Emission

Test result: **PASS**

3.1 Test limit

The emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must comply with the limits below:

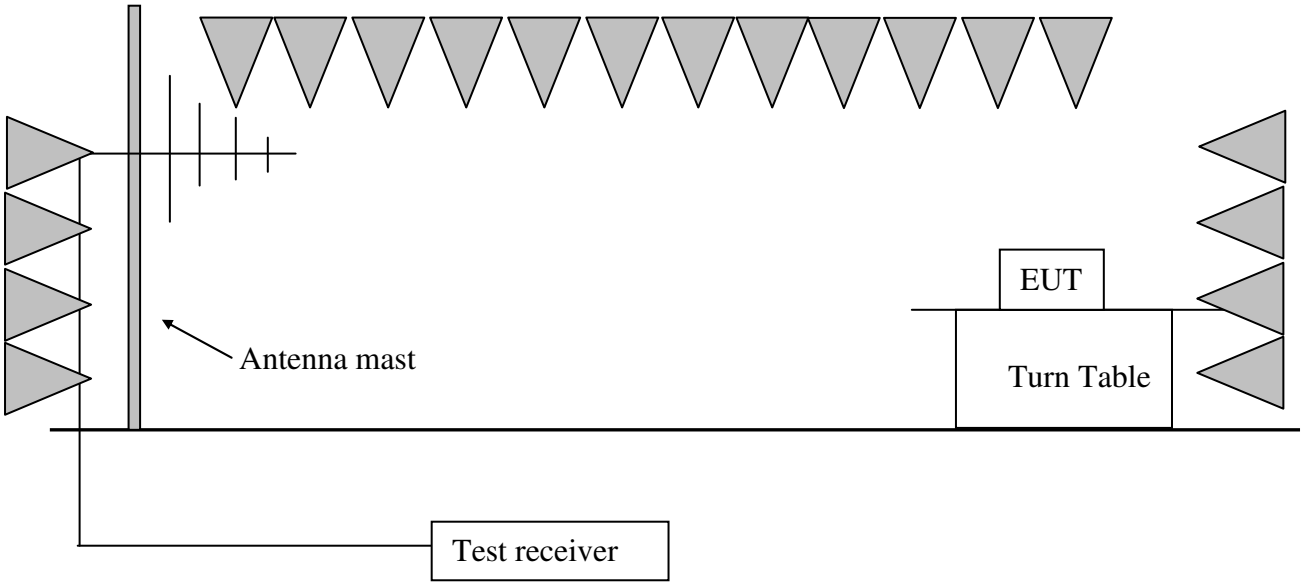
Fundamental Frequency (MHz)	Fundamental limit (uV/m)	Spurious limit (uV/m)
☐ 40.66 – 40.70	2250	225
☐ 70 – 130	1250	125
☐ 130 - 174	1250 to 3750	125 to 375
☐ 174 - 260	3750	375
☒ 260 – 470	3750 to 12500	375 to 1250
☐ Above 470	12500	1250

The formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(Frequency) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(Frequency) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

For that the EUT use fundamental frequency of 433.92MHz, after calculation, the limit is:

Fundamental limit = 41.6667 * 433.92 - 7083.3333 = 10996.68 uV/m = 81dBuV/m
Spurious limit = 81 – 20 = 61 dBuV/m

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 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.

3.4 Test protocol

30MHz ~ 1GHz

Channel	Antenna	Frequency (MHz)	Uncorrected Reading (dBuV)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Detector
1	H	433.94	61.90	16.20	78.10	81	QP
1	H	867.82	34.90	23.40	58.30	61	QP
1	V	433.94	60.70	16.20	76.90	81	QP
1	V	867.82	32.80	23.40	56.20	61	QP

Remark: 1.Correct Factor = Antenna Factor + Cable Loss
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. If the reading is submerged in the floor noise, it would be marked as *.
4. For more details, please refer to the test data (Corrected PK data).

1GHz ~ 5GHz

Channel	Antenna	Frequency (MHz)	Uncorrected Reading (dBuV)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Detector
1	H	1301.28	53.00	-0.20	52.80	61	PK
1	H	1472.95	43.20	-0.20	43.00	61	PK
1	V	1301.28	48.40	-0.20	48.20	61	PK
1	V	1472.95	44.40	-0.20	44.20	61	PK
1	H/V	Others	*	*	*	*	PK

Remark: 1.Correct Factor = Antenna Factor + Cable Loss + Amplifier
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. If the reading is submerged in the floor noise, it would be marked as *.
4. Here the PK reading is lower than AV limit. As a result, test with AV detector can be elided.
5. For more details, please refer to the test data (Uncorrected data).

3.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of radiated emission is: ± 5.31dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.

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.

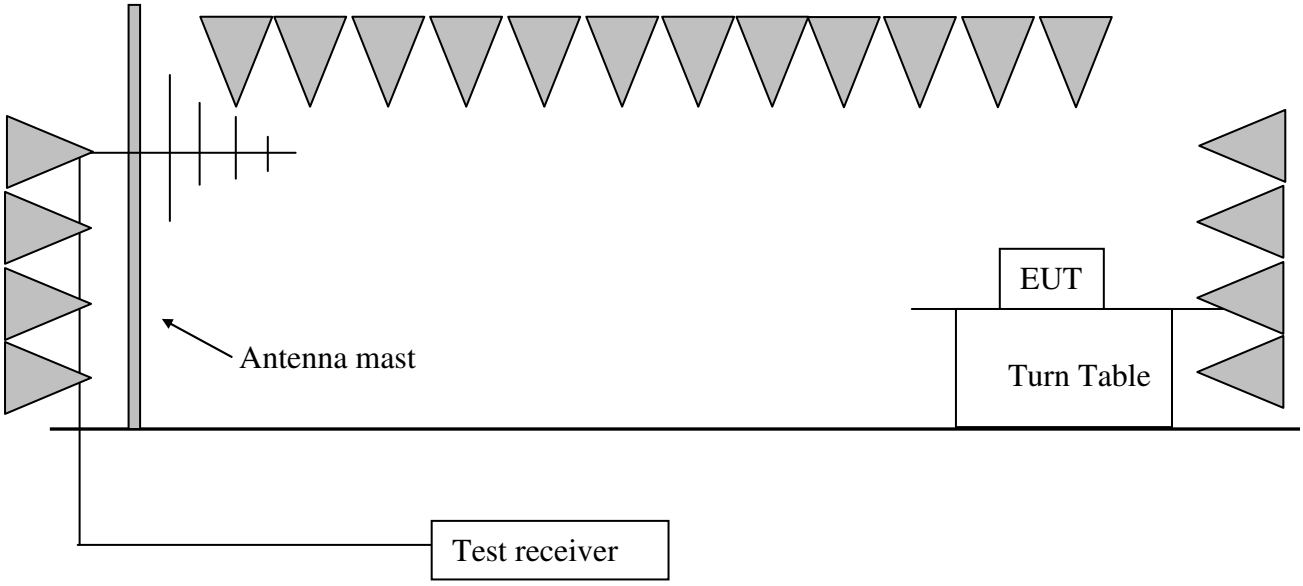
☐ (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

☐ (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: 180ms.
As a result, the EUT complies with the limit of 5s' deactivating time.

4.5 Measurement uncertainty

Measurement uncertainty is: 10ms.

5. Restrict band radiated emission

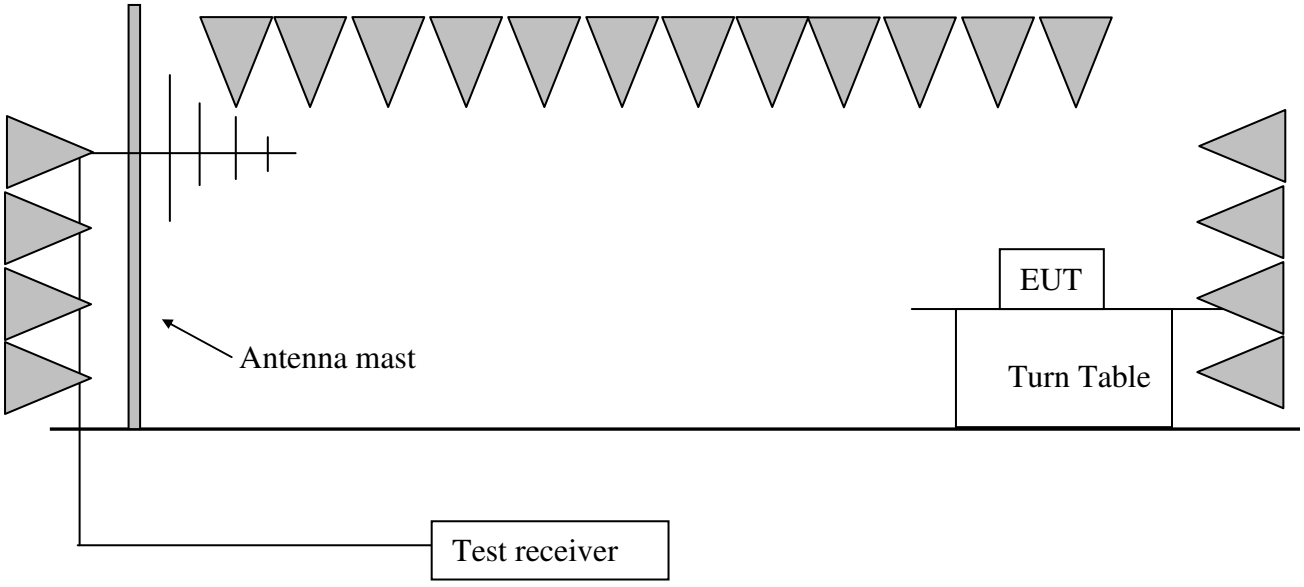
Test result: PASS

5.1 Test limit

The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

5.2 Test Configuration



5.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for restrict band emission higher than 1GHz, the pre-amplifier 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.

5.4 Test protocol

The two restrict bands below are adjacent from the fundamental or harmonic frequency.

Highest reading on restrict band 399MHz ~ 410MHz

Detector	Antenna Polarization (H/V)	Corrected Reading (dBuV/m)	Limit (dBuV/m)
PK	H	<30.88	46.00
PK	V	<31.74	46.00

Note: Because the PK reading is less than the AV limit, AV test is elided.

Highest reading on restrict band 960MHz ~ 1000MHz

Detector	Antenna Polarization (H/V)	Corrected Reading (dBuV/m)	Limit (dBuV/m)
PK	H	<43.16	54
PK	V	<43.64	54

Note: Because the PK reading is less than the AV limit, AV test is elided.

Emissions falling in other restrict band emissions fulfills with the limit. Please refer to the test data.

5.5 Measurement uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty of radiated emission is: ± 5.31dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.

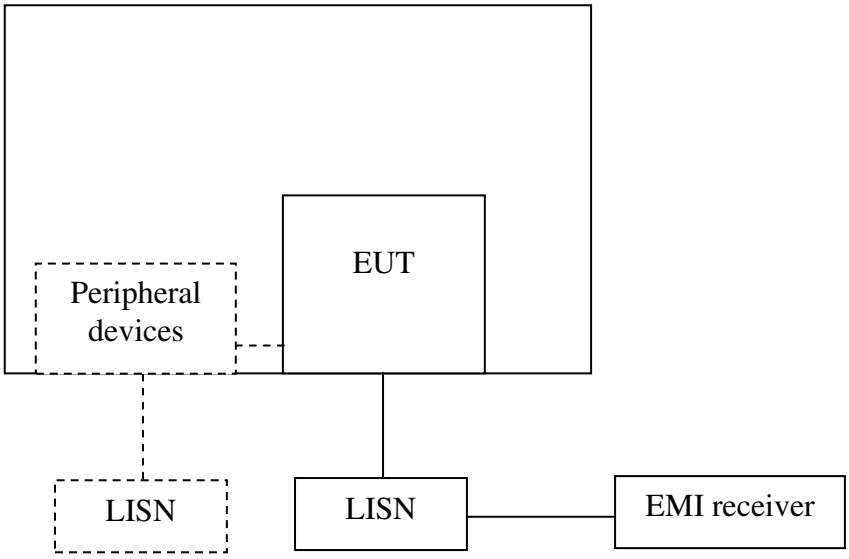
6. Power line conducted emission

Test result: **NA**

6.1 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.		

6.2 Test configuration



☐ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

6.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω 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.

6.4 Test protocol

Power line: L

Frequency	Correct Factor (dB)	Corrected Reading (dBuV) QP	AV	Limit (dBuV) QP	AV	Margin (dB) QP	AV
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).
2. Margin (dB) = Limit - Corrected Reading.
3. If the margin higher than 20dB, it would be marked as *.

Power line: N

Frequency	Correct Factor (dB)	Corrected Reading (dBuV) QP	AV	Limit (dBuV) QP	AV	Margin (dB) QP	AV
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB).
2. Margin (dB) = Limit - Corrected Reading.
3. If the margin higher than 20dB, it would be marked as *.

6.5 Measurement Uncertainty

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty at mains terminal: ± 1.99dB
The measurement uncertainty is given with a confidence of 95%, k=2.
The measurement uncertainty is traceable to internal procedure TI-036.

7. Emission Bandwidth

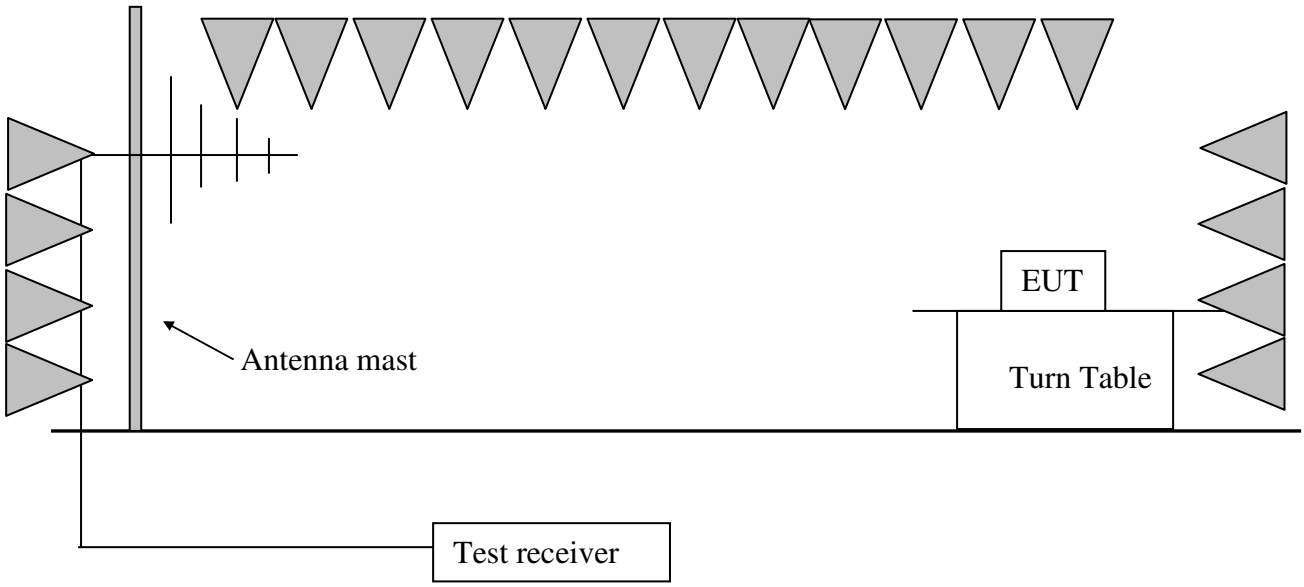
Test Status: Pass

7.1 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% * 433.92MHz = 1085kHz

7.2 Test Configuration



7.3 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 1meter to 4 meters to find out the maximum emission level.
The central frequency of test receiver was set near the operating frequency of EUT.

7.4 Test protocol

Temperature : 22 ℃

Relative Humidity : 43 %

Channel	Emission Bandwidth (kHz)	Limit (kHz)
1	56	1085

7.5 Measurement uncertainty

The measurement uncertainty is ±100Hz.