



FCC PART 15

Test Report

Report No.: AGC01320131101EF02

FCC ID : YMUTCF200-12LNX

PRODUCT DESIGNATION : TCF200-12LNX

BRAND NAME : RFRemotech

TEST MODEL : TCF200-12LNX

CLIENT : RFRemotech Company

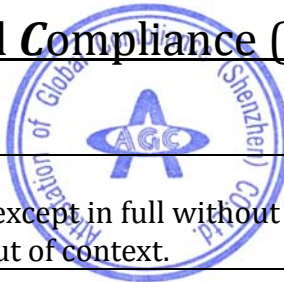
DATE OF ISSUE : Nov.21, 2013

STANDARD(S) : FCC Part 15 Rules

Attestation of Global Compliance (Shenzhen) Co., Ltd

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VERIFICATION OF COMPLIANCE

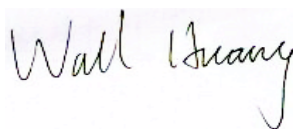
Applicant	RFRemotech Company
	Room G210, Building G, Guangzhou International Business Incubator, No.3 Lanyue Rd., Guangzhou Science Park, Guangzhou, China
Manufacturer	RFRemotech Company
	Room G210, Building G, Guangzhou International Business Incubator, No.3 Lanyue Rd., Guangzhou Science Park, Guangzhou, China
Product Designation	TCF200-12LNX
Brand Name	RFRemotech
Model Name	TCF200-12LNX
Date of Test	Nov.15, 2013 ~ Nov.20, 2013

WE HEREBY CERTIFY THAT:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003). The sample tested as described in this report is in compliance with the FCC Rules Part 15 and RSS-210 requirements.

The test results of this report relate only to the tested sample identified in this report.

Tested By



Huang Wall

Nov.21, 2013


Reviewed By



Kidd Yang

Nov.21, 2013

Approved By



Solger Zhang

Nov.21, 2013

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Product Designation:	TCF200-12LNX
Brand Name:	RFRemotech
Test Model:	TCF200-12LNX
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	433.92MHz
Modulation Bandwidth:	314.159KHz
Modulation:	FSK
Number of Channels	1 Channel
Antenna Designation:	Integral antenna which designed as an indispensable part of the equipment
Power Supply:	DC 12V by battery

Note: 1. The EUT is a manually operated transmitter.

2. The EUT worked in the modulated mode normally, the telegram of each buttons is the control signal write by manufacturer.

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: YMUTCF200-12LNX, filing to comply with the FCC Part 15 requirements.

1.3 TEST METHODOLOGY

Radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 TEST FACILITY

The test site used to collect the radiated data is located on the address of Attestation of Global Compliance (Shenzhen) Co., Ltd. 2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

FCC register No.: 259865.

1.5 SPECIAL ACCESSORIES

Refer to section 2.2.

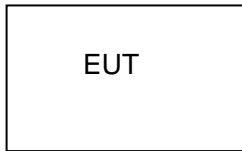
1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 CONFIGURATION OF TESTED SYSTEM

Configure 1



Note: All the accessories have been used during the test.

2.2 EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	RFRomotech	N/A	TCF200-12LNX	EUT

3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.231/§15.209	Radiated Emission	Compliant
§15.231	20dB Bandwidth	Compliant
§15.231	Transmission Cease Time	Compliant
§15.203	Antenna Requirement	Compliant
§15.207	Conducted Emission	N/A

NOTE:

1. N/A- Not Applicable.

4. DESCRIPTION OF TEST MODES

The EUT has been operated in one modulation: FSK independently.

The following operating modes were applied for the related test items.

Three axles had been tested.

No.	TEST MODES
1	TX on 433.92MHz
2	Standby

- Note:** 1. All the test modes can be supply by a new battery.
2. All the buttons had been tested, but only the result of the worst case was recorded in the report.
3. The EUT had been tested under engineering mode (continuously transmit mode).

5. RADIATED EMISSION

5.1 LIMITS

FCC §15.231 and §15.209

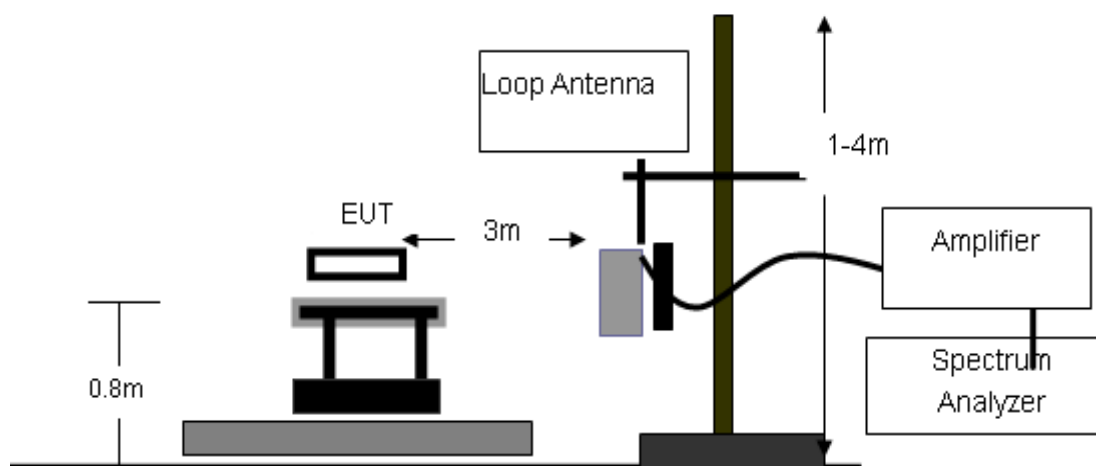
5.2 MEASUREMENT PROCEDURE

- 1). The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2). The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 3). Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4). Set the spectrum analyzer in the following setting as:
Below 1GHz: RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

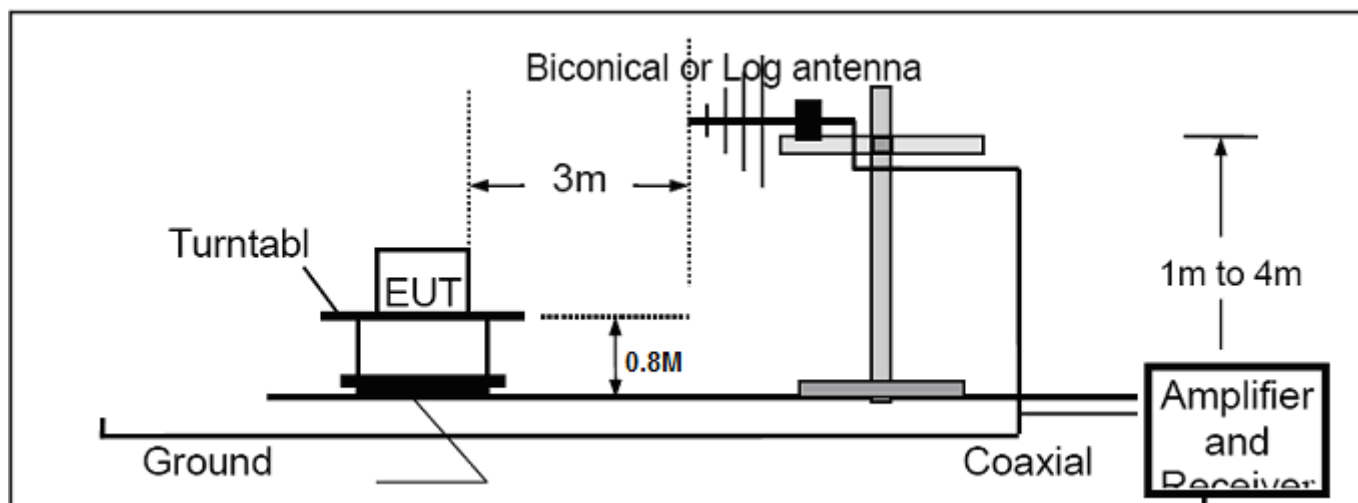
Repeat above procedures until the measurements for all frequencies are complete

5.3 TEST SETUP

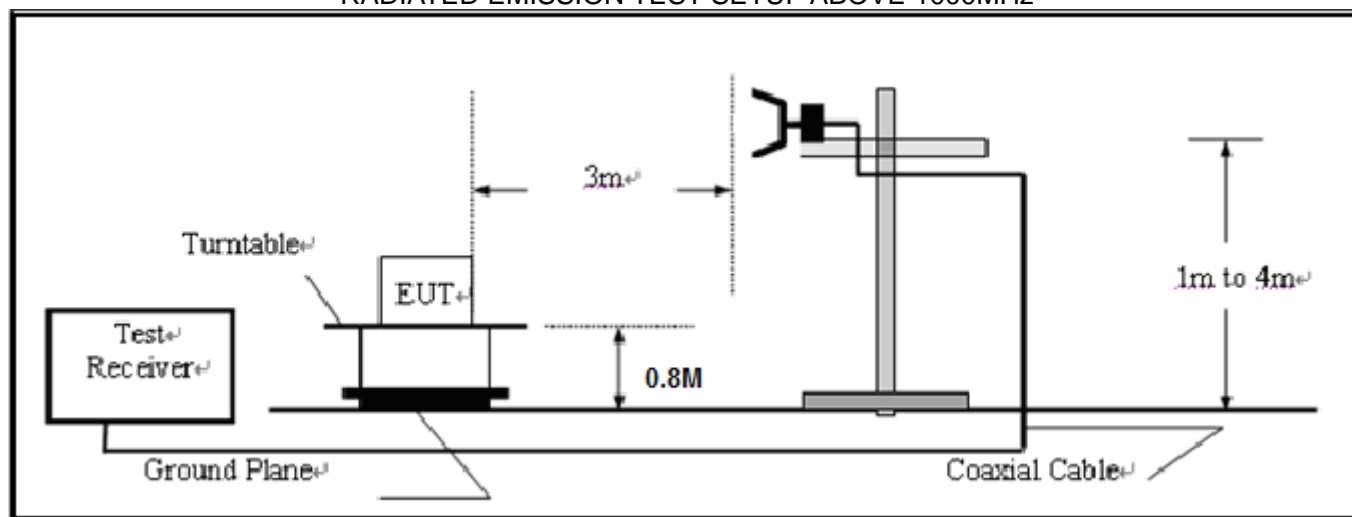
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



5.4 TEST EQUIPMENT LIST

Description	Manufacturer	Model	SERIAL NUMBER	Cal. Date	Cal. Due
SPECTRUM ANALYZER	Agilent	E4440A	N/A	07/18/2012	07/17/2013
AMPLIFIER	EM	EM30180	0607030	07/18/2012	07/17/2013
HORN ANTENNA	EM	EM-AH-10180	N/A	07/18/2012	07/17/2013
HORN ANTENNA	A.H. Systems Inc.	SAS-574	--	07/18/2012	07/17/2013
EMI TEST RECEIVER	Rohde & Schwarz	ESCI	N/A	07/18/2012	07/17/2013
AMPLIFIER	EM	EM30180	N/A	07/18/2012	07/17/2013
BIOLOGICAL ANTENNA	A.H. Systems Inc.	SAS-521-4	N/A	07/18/2012	07/17/2013
LOOP ANTENNA	Daze	ZN30900N	SEL0097	07/18/2012	07/17/2013
ISOLATION TRANSFORMER	LETEAC	LTBK	--	07/18/2012	07/17/2013

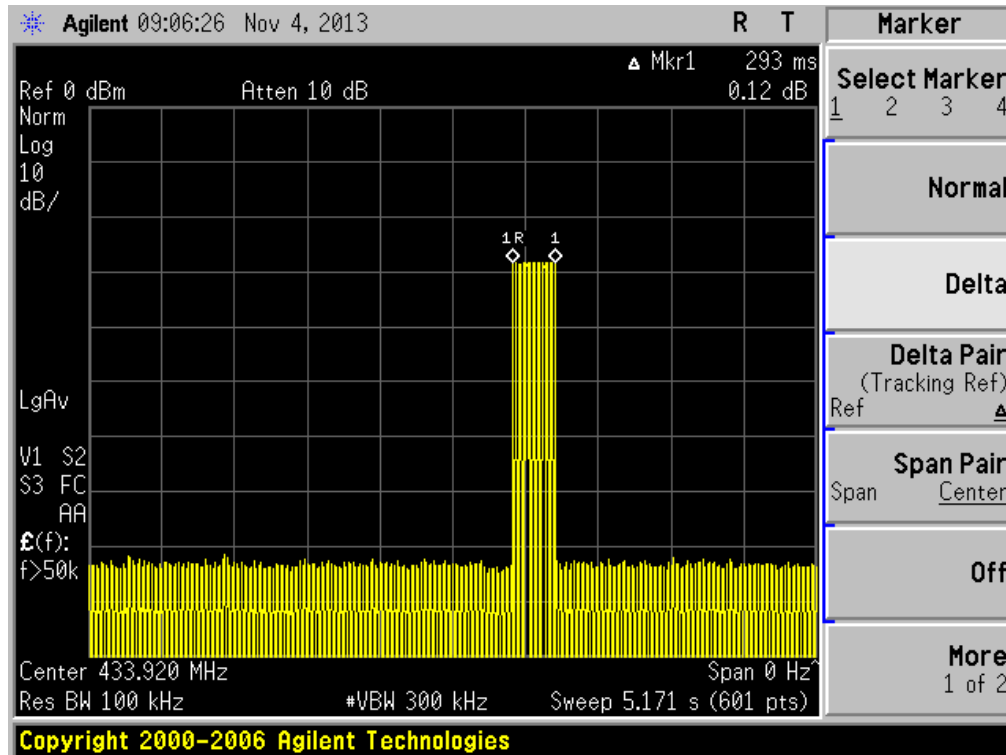
5.5 TEST RESULT

RADIATED EMISSION BELOW 30MHZ

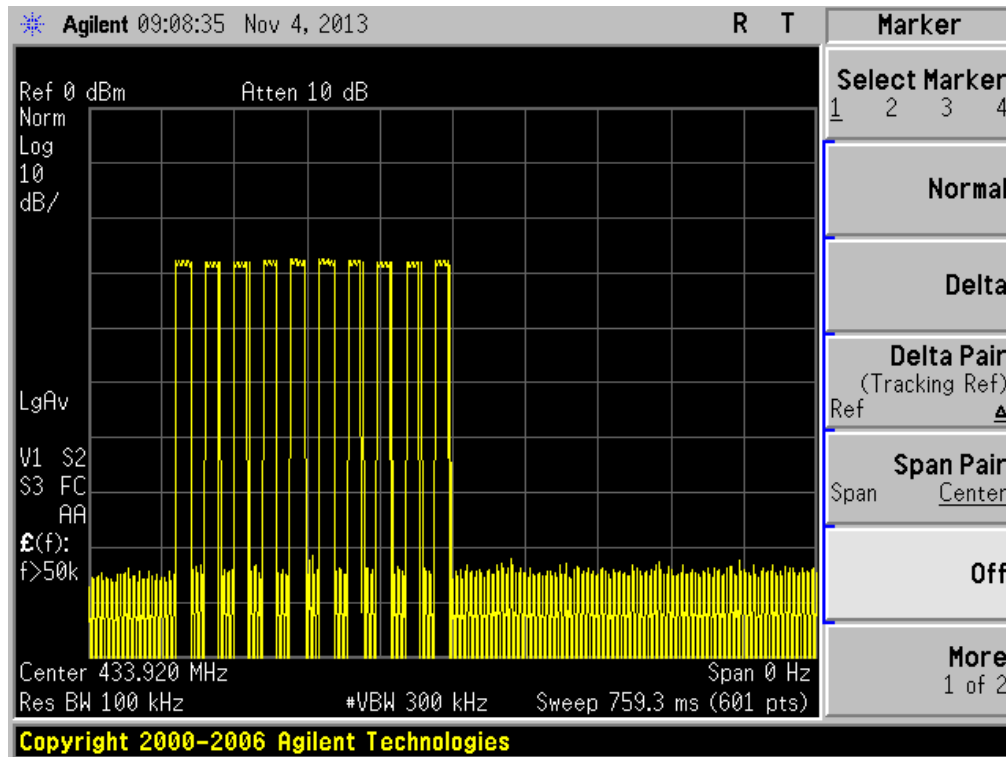
Frequency	antenna	reading level(Peak	Factor	AV	Measurement level(dBuV/m)	Limit (dBuV/m)	Margin(dB)		
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	Peak	AVG	Peak	AVG	Peak
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	H	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--
--	V	--	--	--	--	--	--	--	--

Note: Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

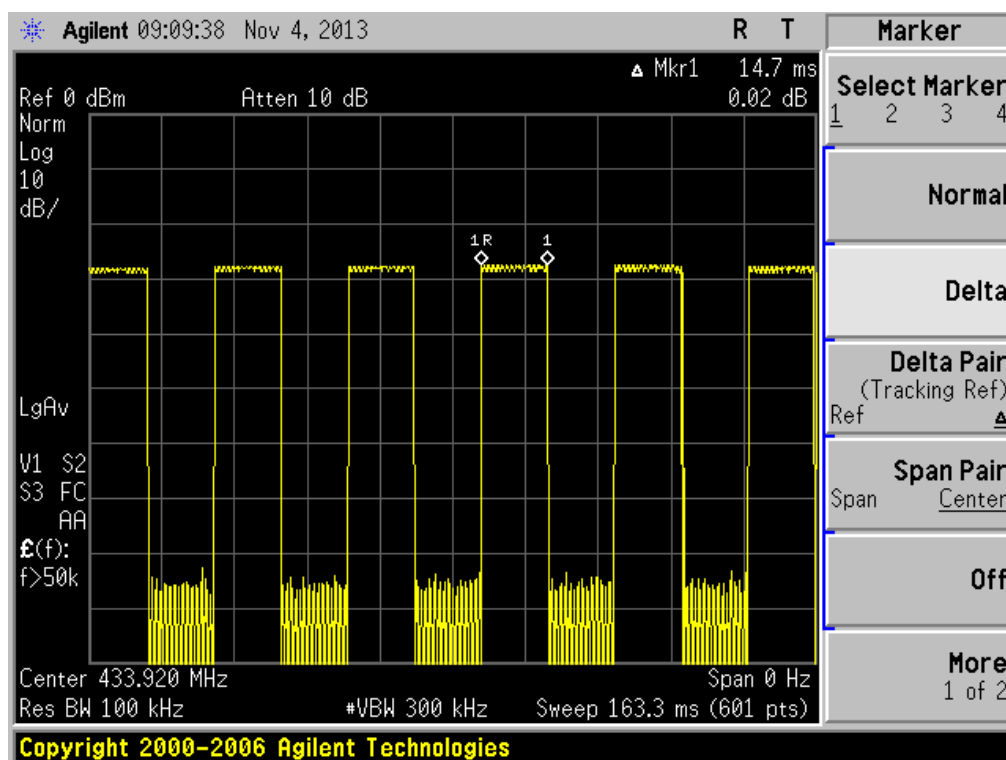
DUTY CYCLE TEST PLOT-1



DUTY CYCLE TEST PLOT-2



DUTY CYCLE TEST PLOT-3



Duty Cycle= $14.7 \times 10 / 293 = 0.502$

Duty Cycle Correction Factor (AV Factor) = $20 \times \log [0.502] = -5.99\text{dB}$

RADIATED EMISSION BELOW 1GHZ

Frequency	antenna	Reading level(Peak)	Factor	AV	Measurement level(dBuV/m)		Limit (dBuV/m)		Margin(dB)	
(MHz)	Polarization	(dBuV/m)	(dB)	(dB)	Peak	AVG	Peak	AVG	Peak	AVG
433.92	H	63.98	19.65	-5.99	83.63	77.64	100.8	80.8	-17.17	-3.16
526.54	H	50.42	21.42	-5.99	71.84	65.85	100.8	80.8	-28.96	-15
867.84	H	54.23	23.11	-5.99	77.34	71.35	100.8	80.8	-23.46	-9.45
--	H	--	--	--	--	--	--	--	--	--
433.92	V	64.56	18.74	-5.99	83.3	77.31	100.8	80.8	-17.5	-3.49
526.54	V	49.98	20.68	-5.99	70.66	64.67	100.8	80.8	-30.14	-16.1
867.84	V	54.05	22.71	-5.99	76.76	70.77	100.8	80.8	-24.04	-10
--	V	--	--	--	--	--	--	--	--	--

Note: Measurement level (Peak) = Reading level + Factor

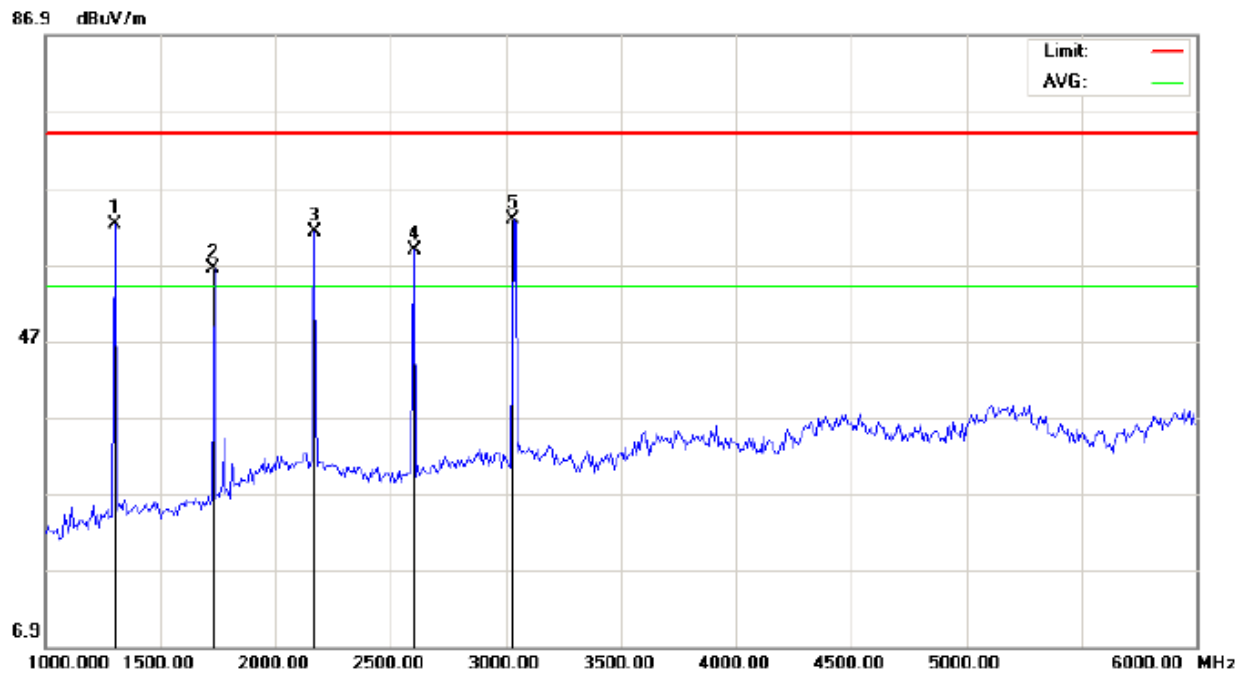
Measurement level (AVG) = Measurement level (Peak) + AV Factor

Margin (Peak) = Measurement level (Peak) - Limit (Peak)

Margin (AVG) = Measurement level (AVG) - Limit (AVG)

Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

RADIATED EMISSION ABOVE 1GHZ- HORIZONTAL



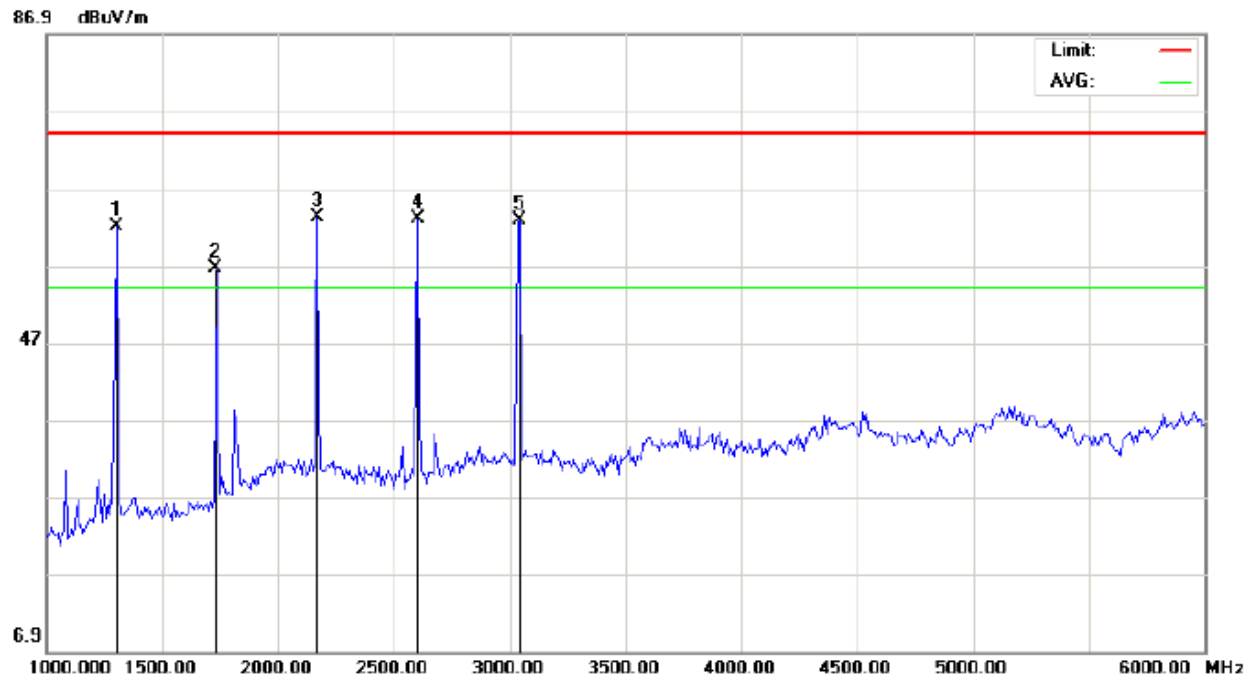
Site: site #1
Limit: FCC Class B 3M Radiation above 1GHZ(PK)
EUT: TCF200-12LNX
M/N: TCF200-12LNX
Mode: Mode 1
Note:

Polarization: *Horizontal*
Power:
Distance: 3M

Temperature: 26
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1300.000	77.61	-15.46	62.15	74.00	-11.85	peak			
2		1733.333	69.24	-12.93	56.31	74.00	-17.69	peak			
3		2166.667	71.05	-9.94	61.11	74.00	-12.89	peak			
4		2600.000	68.08	-9.33	58.75	74.00	-15.25	peak			
5	*	3033.333	71.18	-8.33	62.85	74.00	-11.15	peak			

RADIATED EMISSION ABOVE 1GHZ-VERTICAL



Site: site #1 Polarization: **Vertical** Temperature: 26
Limit: FCC Class B 3M Radiation above 1GHz(PK) Power: Humidity: 60 %
EUT: TCF200-12LNX Distance: 3M
M/N: TCF200-12LNX
Mode: Mode 1
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1300.000	77.53	-15.46	62.07	74.00	-11.93	peak			
2		1733.333	69.60	-12.93	56.67	74.00	-17.33	peak			
3	*	2166.667	73.21	-9.94	63.27	74.00	-10.73	peak			
4		2600.000	72.35	-9.33	63.02	74.00	-10.98	peak			
5		3041.667	71.05	-8.32	62.73	74.00	-11.27	peak			

6. 20DB BANDWIDTH

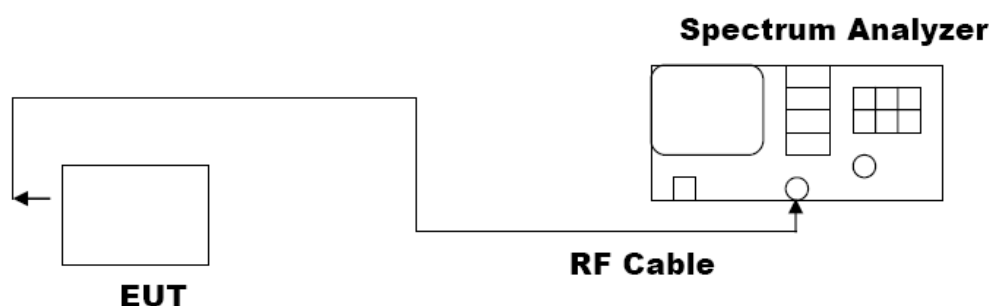
6.1 LIMITS

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 900MHz.

6.2 MEASUREMENT PROCEDURE

- 1). The EUT was placed on a table which is 0.8m above ground plane.
- 2). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 3). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 4). Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz,VBW= 300KHz.
- 5). Set SPA Trace 1 Max hold, then View.

6.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



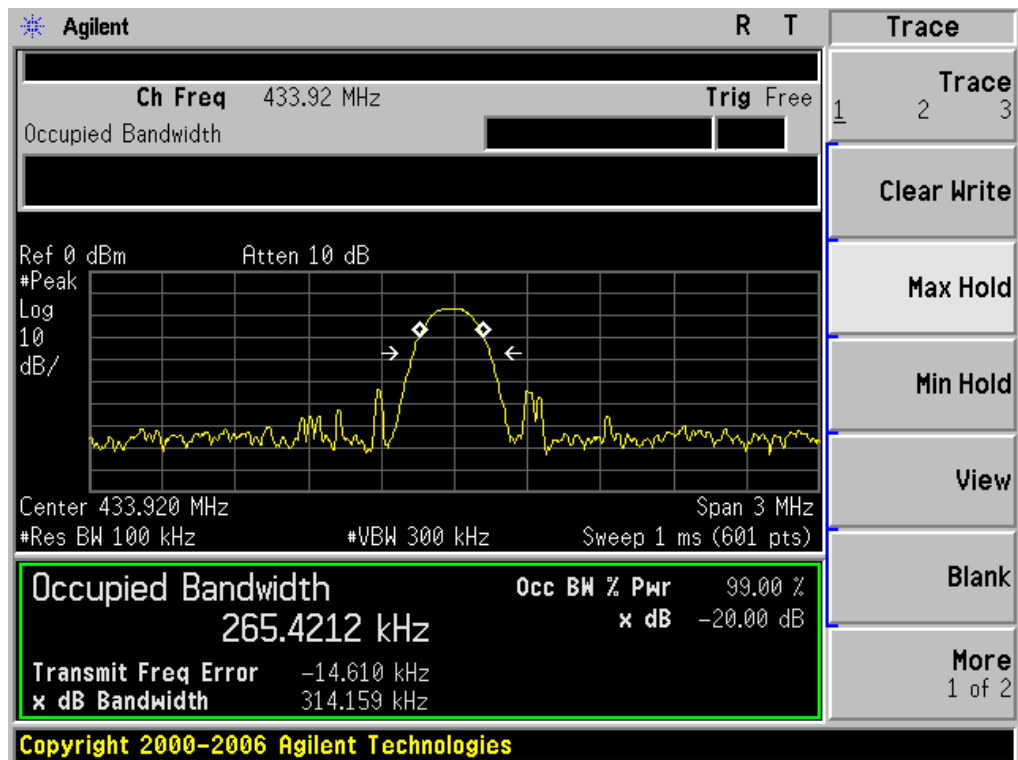
6.4 MEASUREMENT EQUIPMENT USED

Description	Manufacturer	Model	SERIAL NUMBER	Cal. Date	Cal. Due
Spectrum Analyzer	Agilent	E4440A	N/A	07/18/2012	07/17/2013
RF attenuator	N/A	RFA20db	N/A	N/A	N/A

6.5 MEASUREMENT RESULTS

Frequency (MHz)	20 dB Bandwidth (KHz)	Limit (MHz)	Result
433.92	314.159	1.08	Pass

TEST PLOT OF 20dB BANDWIDTH



7. TRANSMISSION CEASE TIME

7.1 LIMITS

According to FCC Part 15 Section 15.231(a), 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.

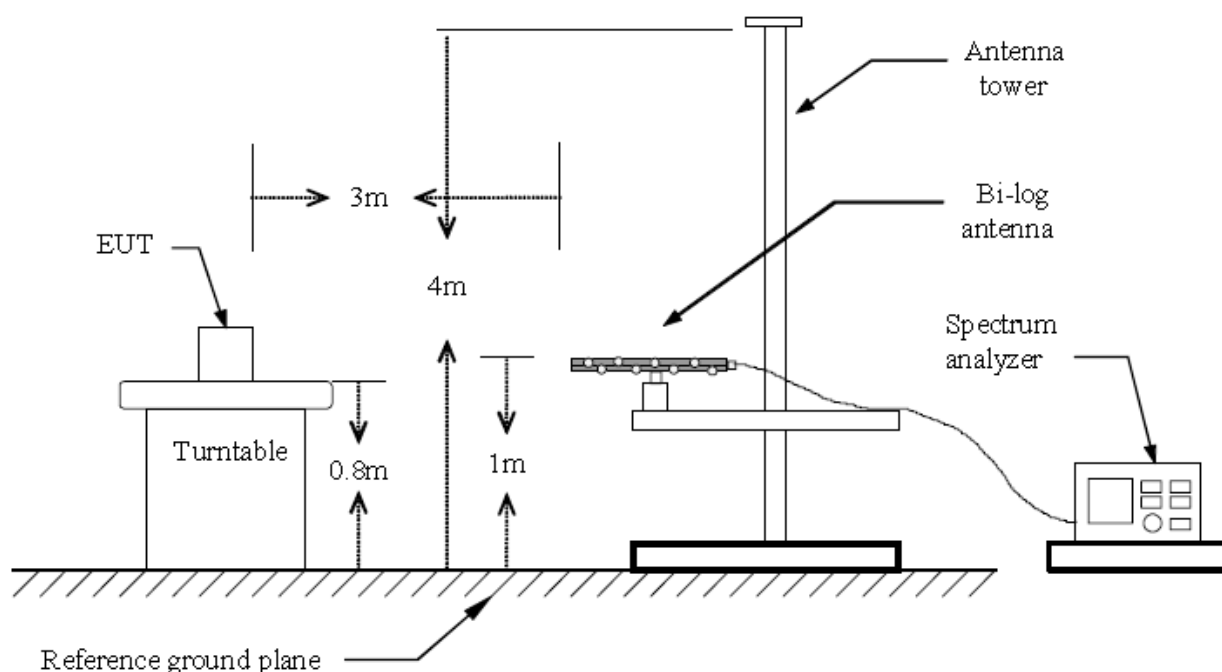
According to FCC section 15.231(a):

- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

7.2 MEASUREMENT PROCEDURE

- 1). The EUT was placed on a turn table which is 0.8m above ground plane.
- 2). Set SPA Center Frequency = fundamental frequency, RBW= 100KHz, VBW= 300KHz, Span =0 Hz.
- 3). Press the transmit switch and then released.
- 4). Record the transmission cease time.

7.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



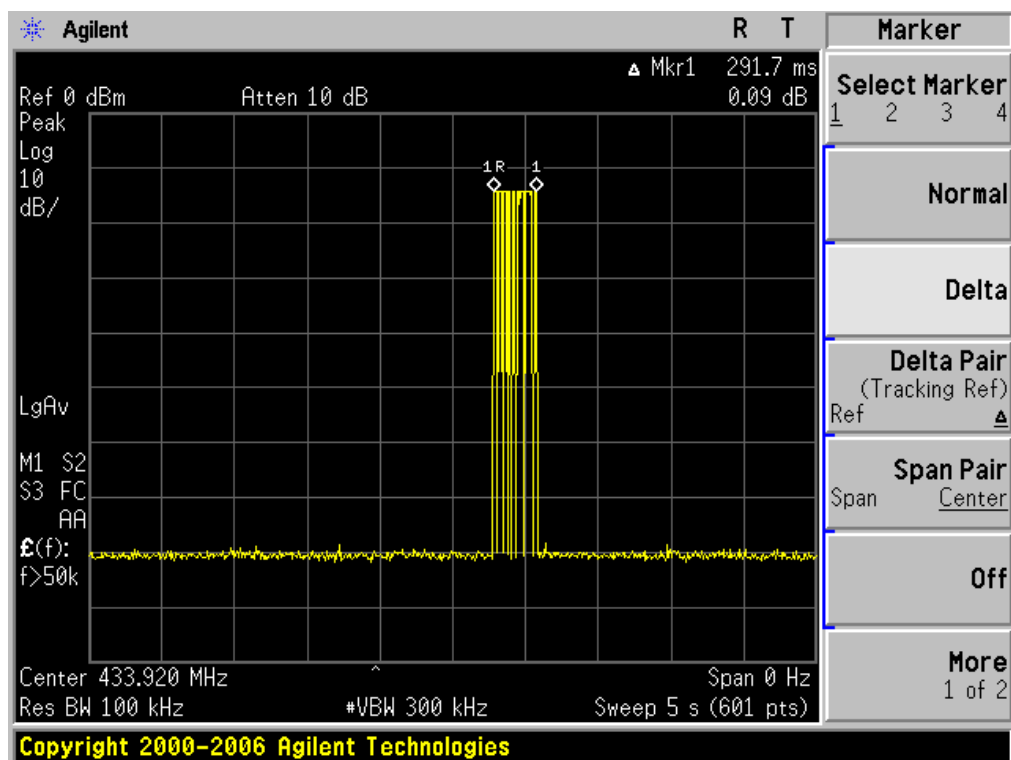
7.4 MEASUREMENT EQUIPMENT USED

Description	Manufacturer	Model	SERIAL NUMBER	Cal. Date	Cal. Due
Spectrum Analyzer	Agilent	E4440A	N/A	07/18/2012	07/17/2013
RF attenuator	N/A	RFA20db	N/A	N/A	N/A

7.5 MEASUREMENT RESULTS

Test Results	LIMIT	RESULT
291.7ms	5S	PASS

TEST PLOT OF TRANSMISSION CEASE TIME



8. ANTENNA REQUIREMENT

8.1 DEFINITION

An analysis of the EUT was performed to determine compliance with FCC Section 15.203. This section requires specific handling and control of antennas used for devices subject to regulations.

8.2 EVALUATION PROCEDURE

The structure and application of the EUT was analyzed with respect to the rules. The antenna is an internal antenna, and is not accessible to the user. An auxiliary antenna port is not present.

8.3 EVALUATION CRITERIA

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

- (a) Antenna must be permanently attached to the unit.
- (b) Antenna must use a unique type of connector to attach to the EUT.
- (c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

8.4 EVALUATION RESULTS

The EUT have an internal antenna inaccessible to the user.

The EUT is therefore compliant.

APPENDIX I
PHOTOGRAPHS OF THE EUT
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW EUT



OPEN VIEW-1 OF EUT



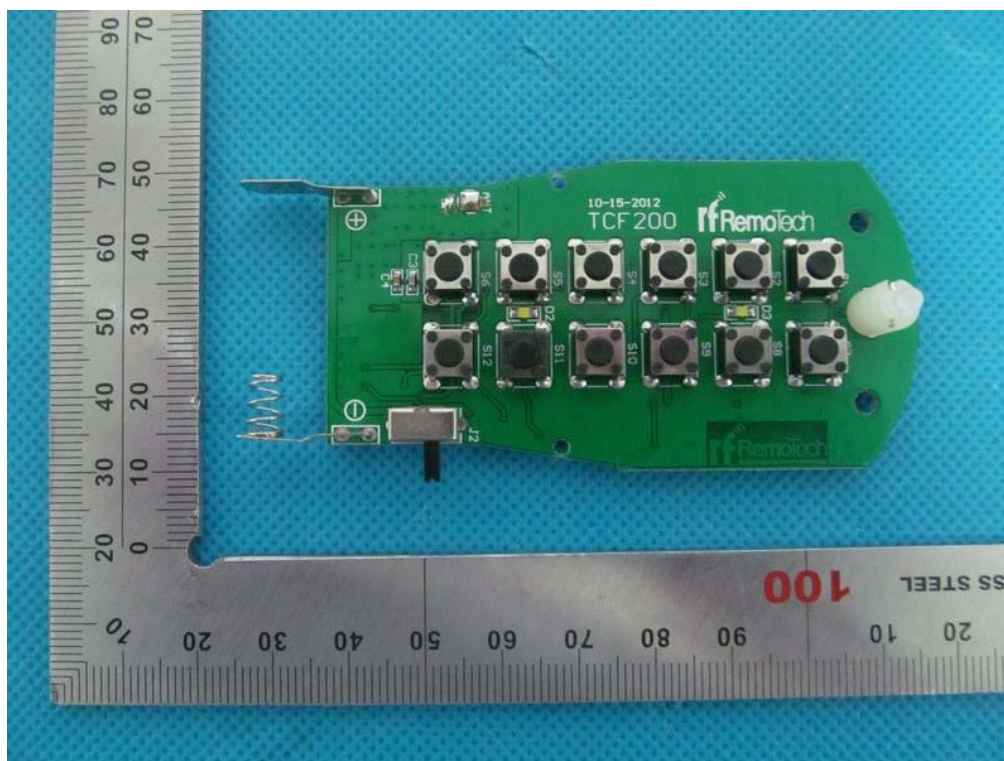
OPEN VIEW-2 OF EUT



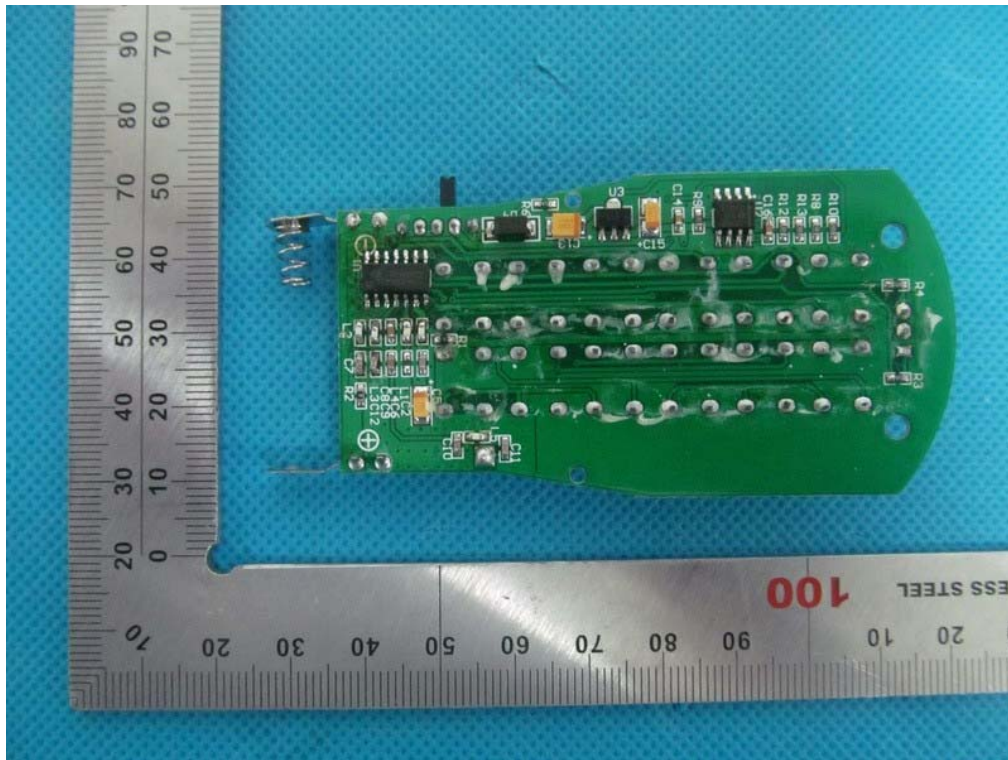
OPEN VIEW-3 OF EUT



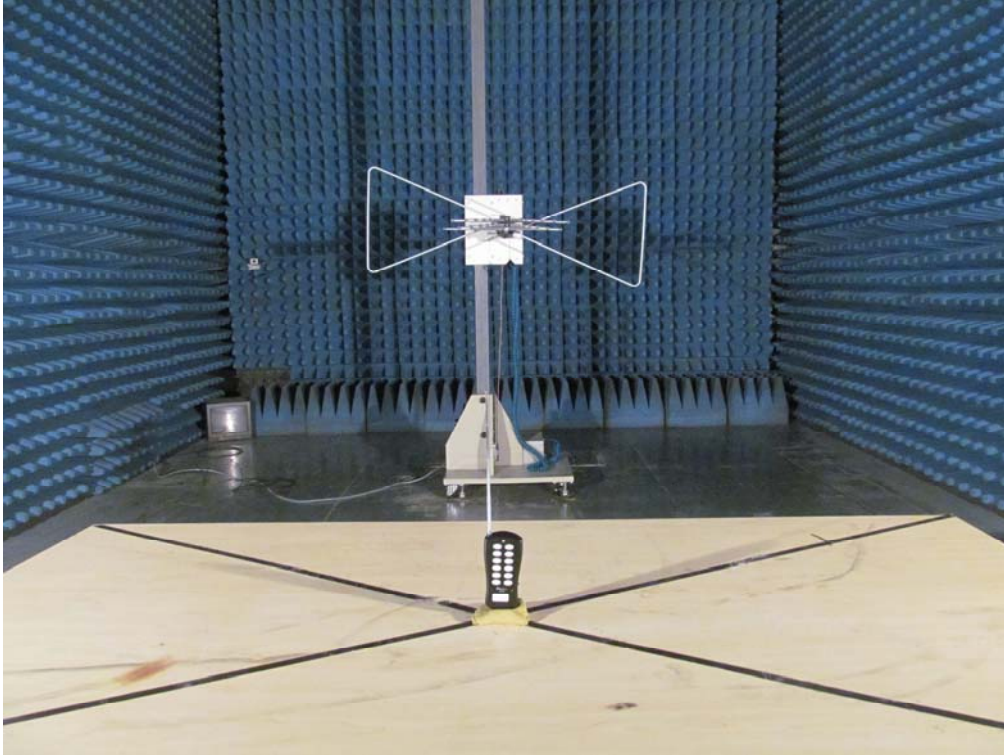
INTERNAL VIEW-1 OF EUT



INTERNAL VIEW-2 OF EUT



APPENDIX II
PHOTOGRAPHS OF THE TEST SETUP
RADIATED SPURIOUS EMISSION



----END OF REPORT----