FCC TEST REPORT

for

Shenzhen Chuangjiexing Electronics

RADIO TRANSMITTER

Model Number:CM1T

Prepared for : Shenzhen Chuangjiexing Electronics
Address : 3/F., Bldg. A6, Laodong 1st Industrial Zone, Xixiang,Shenzhen, China

Prepared by : Keyway Testing Technology Co., Ltd.
Address : Baishun Industrial Zone, Zhangmutou Town, Dongguan, Guangdong, China

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Report No. : 12KWE12367F
Date of Test : Dec.9 ,2012
Date of Report : Dec.12,2012

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Keyway Testing Technology Co., Ltd.

Applicant: **Address:**	Shenzhen Chuangjiexing Electronics 3/F Bldg. A5 Laodong 1ST Industrial Zone, Xixiang, BaoAn, Shenzhen, China		
Manufacturer: **Address:**	Shenzhen Chuangjiexing Electronics 3/F Bldg. A5 Laodong 1ST Industrial Zone, Xixiang, BaoAn, Shenzhen, China		
E.U.T:	RADIO TRANSMITTER		
Model Number:	CM1T		
Trade Name:	------	**Serial No.:**	------
Date of Receipt:	Dec.2, 2012	**Date of Test:**	Dec.2~12, 2012
Test Specification:	FCC Part 15 Subpart C Section 15.231:2010 ANSI C63.4:2003		
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied. **Issue Date: Dec.18, 2012**		

Tested by:	Reviewed by:	Approved by:
Andy Gao / Engineer	Jade Yang/ Supervisor	Chris Du / Manager

Other Aspects:

None.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

1. GENERAL PRODUCT INFORMATION

1.1. Product Function

Refer to Technical Construction Form and User Manual.

1.2. Description of Device (EUT)

Description	:	RADIO TRANSMITTER
M/N	:	CM1T
Power Supply	:	DC 3V
Operation Frequency	:	433.92MHz
Modulation Technology	:	ASK
Antenna Type	:	PCB Antenna
Antenna Gain	:	0dBi

1.3. Independent Operation Modes

The basic operation modes are:

1.3.1. Keep the EUT in transmitting mode.

1.4. Difference between Model Numbers

Note: The products are different for shell size. but the other are same.

2. TEST SITES

2.1. Test Facilities

Lab Qualifications : 944 Shielded Room built by ETS-Lindgren, USA
Date of completion: March 28, 2011

966 Chamber built by ETS-Lindgren, USA
Date of completion: March 28, 2011

Certificated by TUV Rheinland, Germany.
Registration No.: UA 50207153
Date of registration: July 13, 2011

Certificated by UL, USA
Registration No.: 100567-237
Date of registration: September 1, 2011

Certificated by Intertek
Registration No.: 2011-RTL-L1-31
Date of registration: October 11, 2011

Certificated by FCC, USA
Registration No.: 795647
Date of registration: November 7, 2011

Certificated by Industry Canada
Registration No.: 9868A
Date of registration: December 8, 2011

Name of Firm : Keyway Testing Technology Co., Ltd.

Site Location : Baishun Industrial Zone, Zhangmutou Town,
Dongguan, Guangdong, China

2.2. List of Test and Measurement Instruments

2.2.1. For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Jul. 7,12	Jul. 7,13
Bilog Antenna	ETS-LINDGREEN	3142D	135452	Jun. 28,12	Jun. 28,13
Horn Antenna	DAZE	ZN30701	11003	Jul. 11,12	Jul. 11,13
Spectrum Analyzer	Agilent	E4411B	MY4511304	Jul. 11,12	Jul. 11,13
3m Semi-anechoic Chamber	ETS-LINDGREEN	966	KW01	Aug.29,12	Aug.29,13
Signal Amplifier	SONOMA	310	187016	Jul. 7,12	Jul. 7,13
Signal Amplifier	DAZE	ZN3380C	11001	Jul. 7,12	Jul. 7,13
RF Cable	IMRO	IMRO-400	966 Cable 1#	Jul. 7,12	Jul. 7,13
MULTI-DEVICE Controller	ETS-LINDGREEN	2090	126913	N/A	N/A

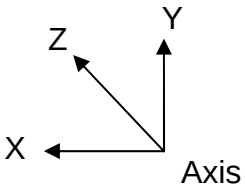
3. TEST SET-UP AND OPERATION MODES

3.1. Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

3.2. Block Diagram of Test Set-up

System Diagram of Connections between EUT and Simulators



EUT

(EUT: RADIO TRANSMITTER)

Note: 1:By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Y axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report. Test data as below.

Frequency (MHz)	Axis	Field Strength (dBuV/m)	Antenna Polarization
433.92	X	58.96	Vertical
433.92	Y	60.22	Vertical
433.92	Z	58.84	Vertical

2:Used new battery for all test.

3.3. Test Operation Mode and Test Software

Refer to Test Setup in clause 4.

3.4. Special Accessories and Auxiliary Equipment

None.

3.5. Countermeasures to Achieve EMC Compliance

None.

4. EMISSION TEST RESULTS

4.1. Radiated Emission Test

4.1.1. Limit 15.209 limits

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

4.1.2. Fundamental and harmonics emission limits

Frequency	Field Strength of Fundamental		Field Strength of Harmonics	
(MHz)	(μV/m@3m)	(dBμV/m@3m)	(μV/m@3m)	(dBμV/m@3m)
433.92	10996	80.8	1099.6	60.8

4.1.3. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	[2]

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

4.1.4. Test setup

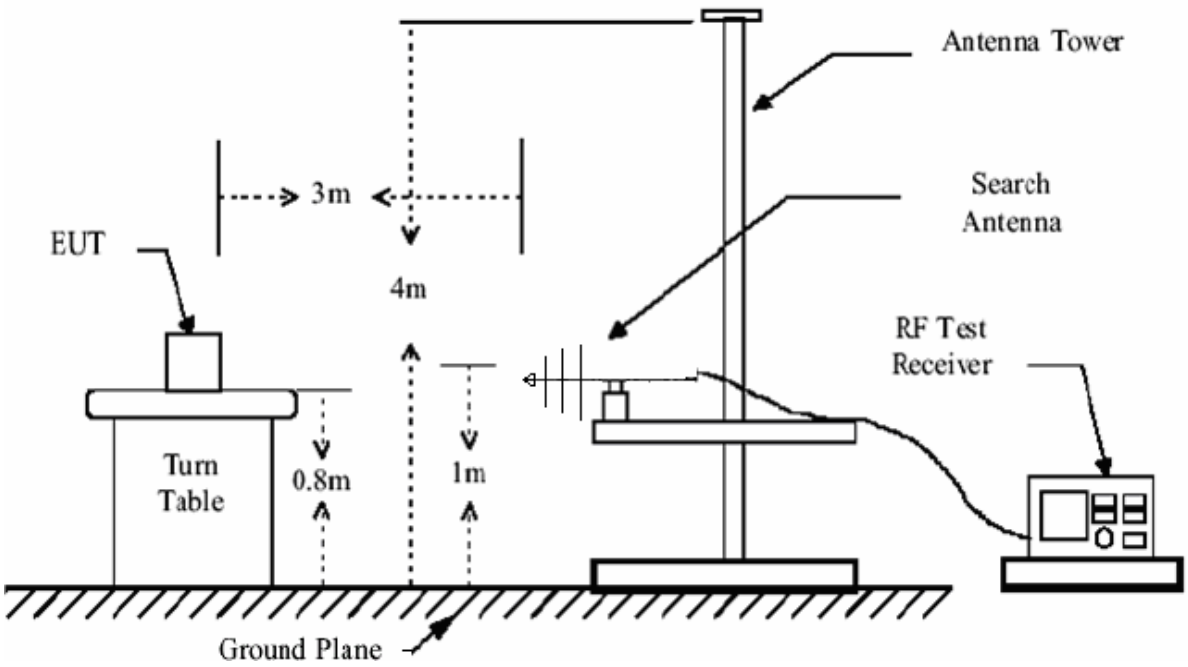
The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 3 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 3MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz.

The test data of the worst case condition(s) was reported on the following pages.



Test Data below 1GHz

EUT:	RADIO TRANSMITTER	Temperature:	24.9℃
M/N:	CM1T	Humidity:	56%
Test Mode:	Transmitting	Atmospheric Pressure:	101.52kPa
Input Voltage:	DC 3V		
Test Engineer:	Andy		

Frequency MHz	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Reading dBuV	Antenna Factor dB/m	Cable Loss dB	Preamp Factor dB	Antenna Polarization	Remark
61.04	19.11	40.00	-20.89	42.38	7.32	0.75	31.34	Vertical	QP
361.74	22.62	46.00	-23.38	34.93	16.12	2.18	30.61	Vertical	QP
433.92	60.22	100.80	-46.28	71.01	17.28	2.55	30.62	Vertical	peak
691.54	30.44	46.00	-15.56	35.41	21.93	3.82	30.70	Vertical	QP
823.46	32.17	46.00	-13.83	35.07	23.09	4.49	30.48	Vertical	QP
867.84	58.52	80.80	-25.90	60.73	23.39	4.67	30.27	Vertical	Peak
30.00	21.49	40.00	-18.51	33.54	18.80	0.56	31.41	Horizontal	QP
251.16	19.96	46.00	-26.04	36.33	12.90	1.70	30.97	Horizontal	QP
433.92	59.65	100.80	-47.28	70.44	17.28	2.55	30.62	Horizontal	Peak
806.00	32.05	46.00	-13.95	35.18	23.02	4.39	30.54	Horizontal	QP
867.84	58.15	80.80	-26.90	60.36	23.39	4.67	30.27	Horizontal	Peak
924.34	35.14	46.00	-10.86	35.44	24.68	4.87	29.85	Horizontal	QP

Notes: 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading-Preamp Factor.
2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.

For average:

Frequency MHz	Emission Level dBuV/m	Duty cycle factor	Limits dBuV/m	Peak Level dBuV/m	Margin dB	Antenna Polarization	Remark
433.92	48.75	-11.47	80.80	60.22	-32.05	Vertical	average
867.84	47.05	-11.47	60.80	58.52	-13.75	Vertical	average
433.92	48.18	-11.47	80.80	59.65	-32.62	Horizontal	average
867.84	46.68	-11.47	60.80	58.15	-14.12	Horizontal	average

Notes: 1. Emission Level = Peak Level + Duty cycle factor
2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.
3.Duty cycle level please see clause 5.

Test Data for 1GHz~5GHz

Frequency MHz	Emission Level dBuV/m	Limits dBuV/m	Margin dB	Reading dBuV	Antenna Factor dB/m	Cable Loss dB	Preamp Factor dB	Antenna Polarization	Remark
1301.76	57.22	74.00	-16.78	53.29	24.84	5.15	26.06	Vertical	Peak
1735.68	57.87	80.80	-22.93	51.42	26.75	5.85	26.15	Vertical	Peak
2169.60	59.27	80.80	-21.53	50.18	28.54	6.80	26.25	Vertical	Peak
2603.52	56.48	80.80	-24.32	45.80	29.08	8.02	26.38	Vertical	Peak
3037.44	46.93	80.80	-33.87	33.49	30.03	9.93	26.52	Vertical	Peak
3471.36	46.94	80.80	-33.86	33.22	30.47	9.98	26.73	Vertical	Peak
1301.76	51.65	74.00	-22.35	47.72	24.84	5.15	26.06	Horizontal	Peak
1735.68	58.34	80.80	-22.46	51.89	26.75	5.89	26.15	Horizontal	Peak
2169.60	59.74	80.80	-21.06	50.65	28.54	6.80	26.25	Horizontal	Peak
2603.52	58.25	80.80	-22.55	47.57	29.08	8.02	26.38	Horizontal	Peak
3037.44	45.30	80.80	-35.50	31.86	30.03	9.93	26.52	Horizontal	Peak
3471.36	46.14	80.80	-34.66	32.42	30.47	9.98	26.73	Horizontal	Peak

Frequency MHz	Emission Level dBuV/m	Duty cycle factor	Limits dBuV/m	Peak Level dBuV/m	Margin dB	Antenna Polarization	Remark
1301.76	45.75	-11.47	54.00	57.22	-8.25	Vertical	average
1735.68	46.40	-11.47	60.80	57.87	-14.40	Vertical	average
2169.60	47.80	-11.47	60.80	59.27	-13.00	Vertical	average
2603.52	45.01	-11.47	60.80	56.48	-15.79	Vertical	average
3037.44	35.46	-11.47	60.80	46.93	-25.34	Vertical	average
3471.36	35.47	-11.47	60.80	46.94	-25.33	Vertical	average
1301.76	40.18	-11.47	54.00	51.65	-13.82	Horizontal	average
1735.68	46.87	-11.47	60.80	58.34	-13.93	Horizontal	average
2169.60	48.27	-11.47	60.80	59.74	-12.53	Horizontal	average
2603.52	46.78	-11.47	60.80	58.25	-14.02	Horizontal	average
3037.44	33.83	-11.47	60.80	45.3	-26.97	Horizontal	average
3471.36	34.67	-11.47	60.80	46.14	-26.13	Horizontal	average

Notes: 1. Emission Level = Peak Level + Duty cycle factor
2. Measurement Uncertainty: ±3.2 dB at a level of confidence of 95%.
3.Duty cycle level please see clause 5.

5. CALCULATION OF AVERAGE FACTOR

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB =20 log (duty cycle)

The duration of one cycle = 64.8ms

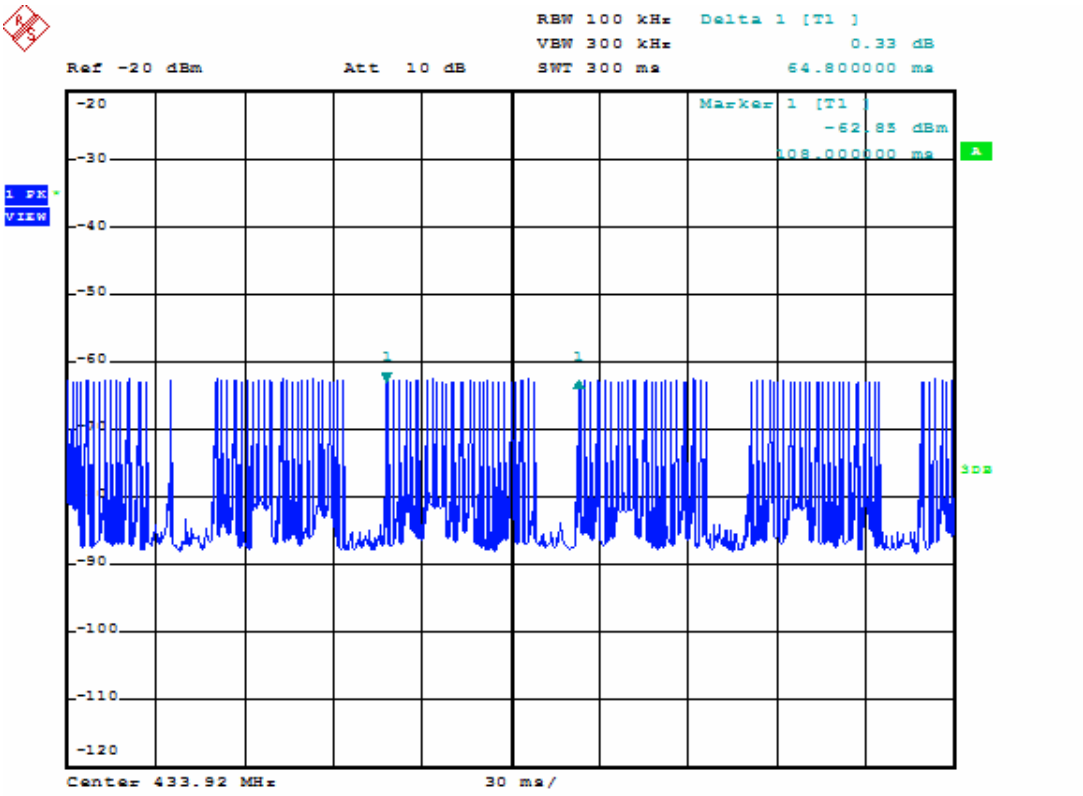
The duty cycle is simply the on-time divided the duration of one cycle

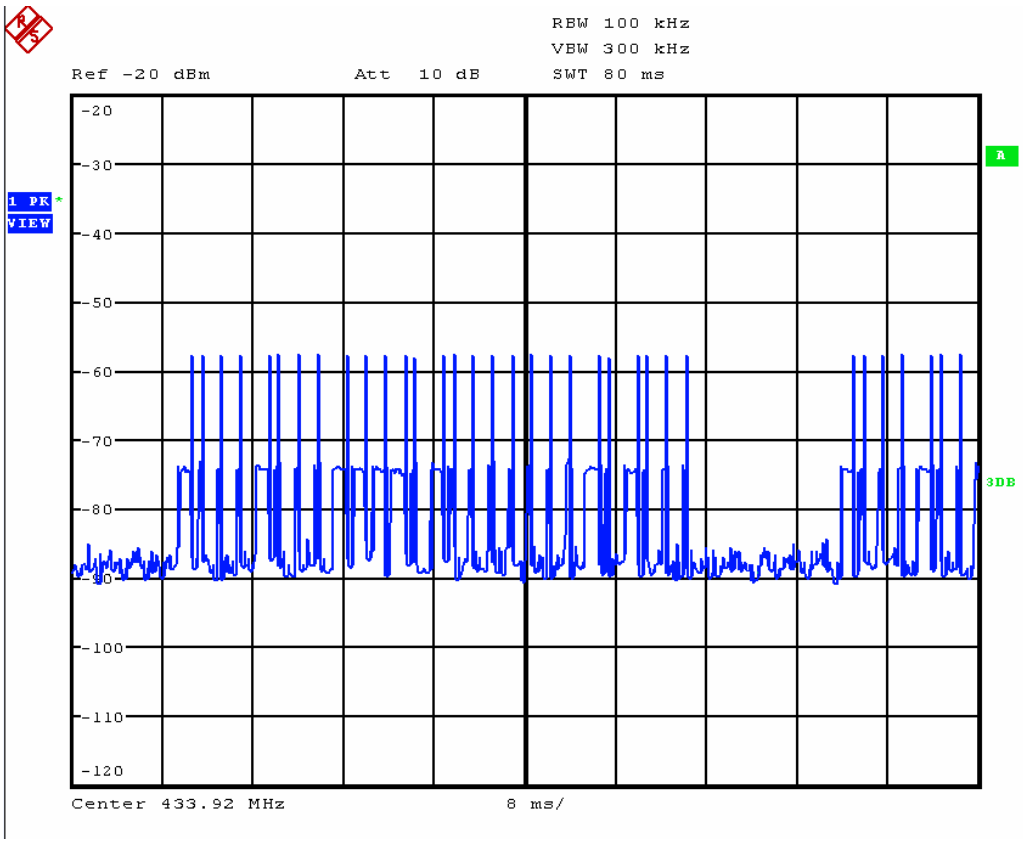
Duty Cycle = (1.2ms*9+0.36ms*18)/64.8=17.28ms / 64.8ms=0.267

Therefore, the averaging factor is found by 20 log 0.267 =**—11.47dB**

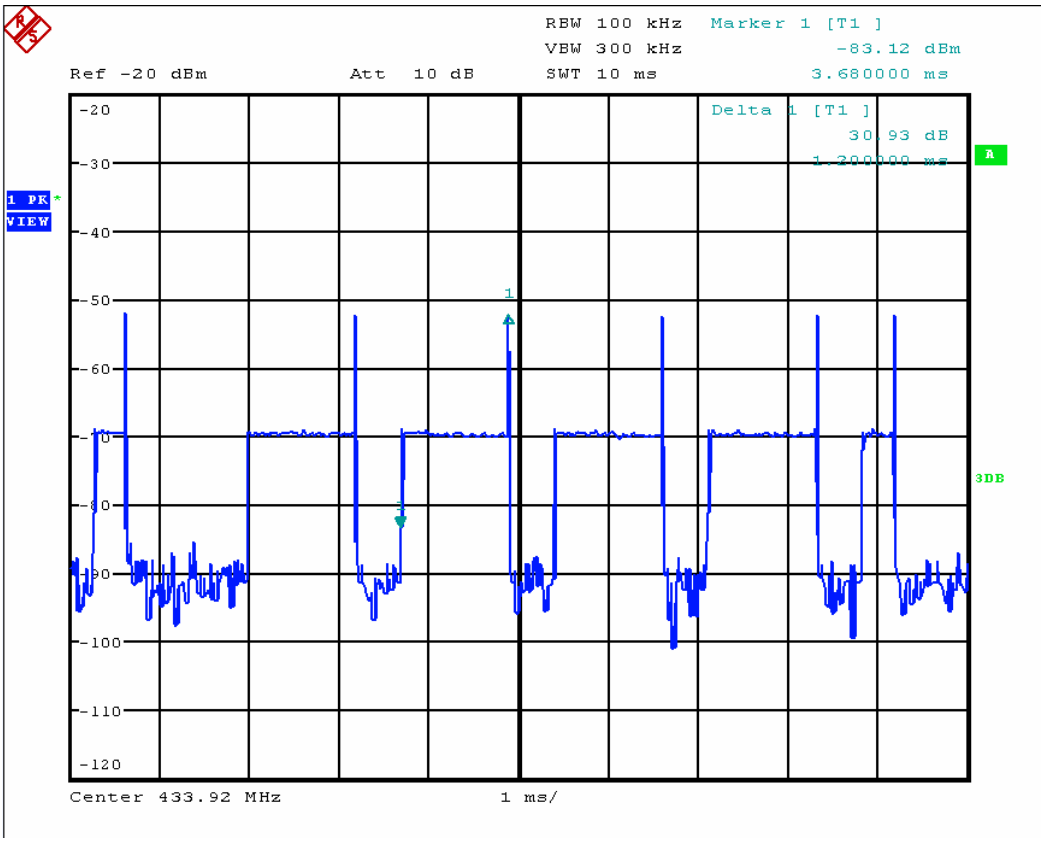
Test plot as follows:

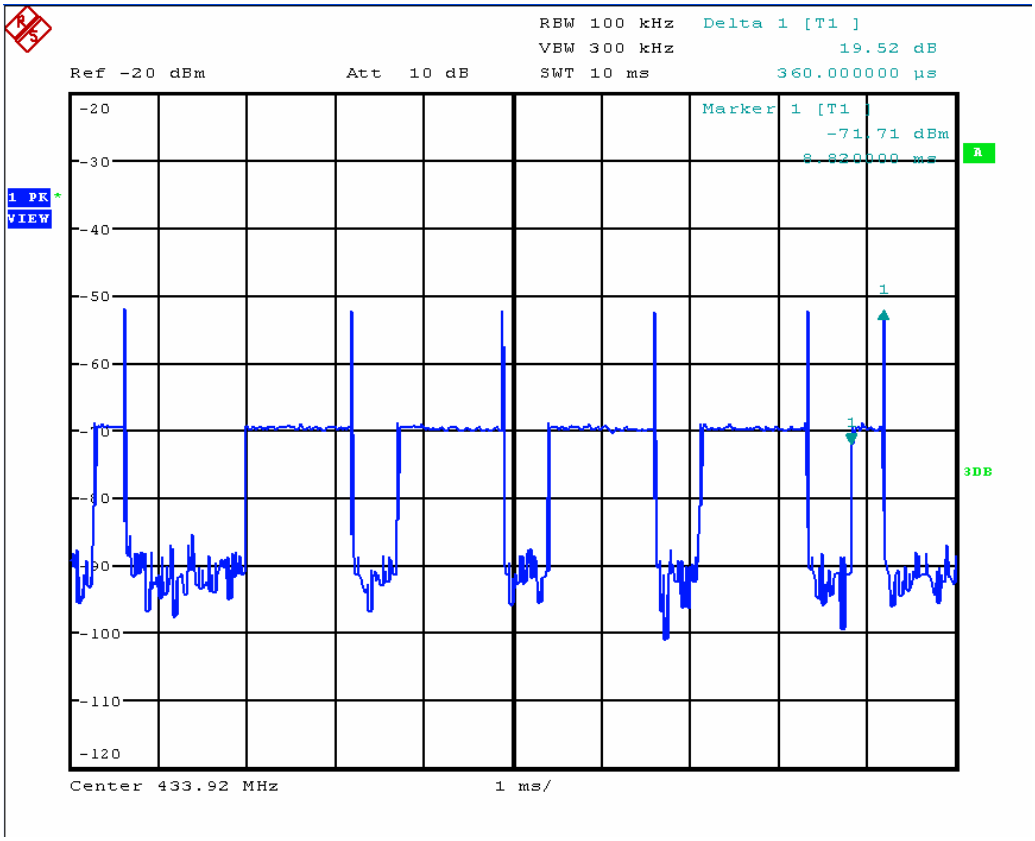
T period


RBW 100 kHz
VBW 300 kHz
SWT 300 ms
Delta 1 [T1]
0.33 dB
64.800000 ms
Ref -20 dBm
Att 10 dB
Marker 1 [T1]
-62.85 dBm
108.000000 ms
1 PK
VIEW
A
3DB
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.92 MHz
30 ms/


RBW 100 kHz
VBW 300 kHz
SWT 80 ms
Ref -20 dBm
Att 10 dB
1 PK
VIEW
A
3DB
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.92 MHz
8 ms/

T on time slot





6. 20DB OCCUPY BANDWIDTH

6.1. Limits

According to FCC 15.231(c) requirement:

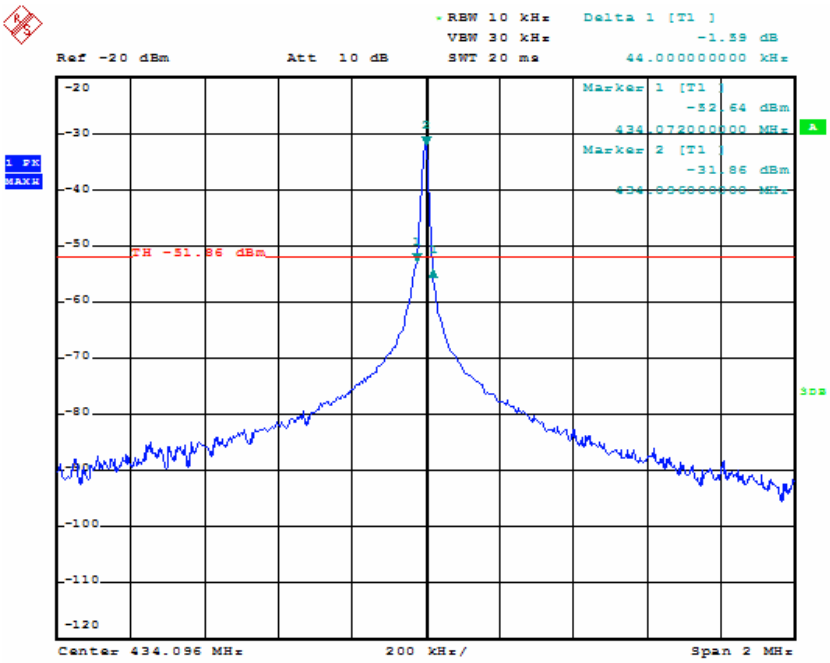
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the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

B.W (20dBc) Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1.0848MHz

Test data:

Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)	Result
433.92	44	1.0848	Pass

Test plot as follows:



7. DWELL TIME

7.1. Limits

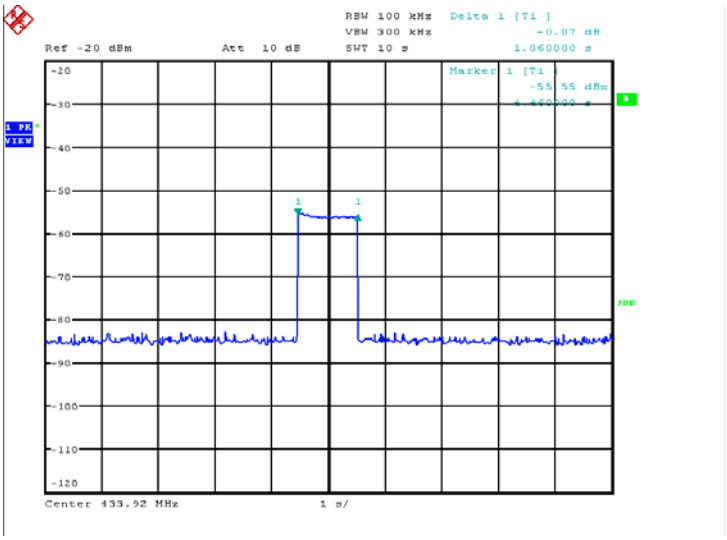
According to FCC 15.231(a) requirement:

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

Test Data:

Dwell time (second)	Limit (second)	Result
1.06s	<5s	Pass

Test plot as follows:



8. PHOTOGRAPHS OF TEST SET-UP

8.1. Set-up for Radiated Emission Test(Below 1GHz)

8.2. Set-up for Radiated Emission Test(Above 1GHz)

9. PHOTOGRAPHS OF THE EUT

Figure 1
General Appearance of the EUT

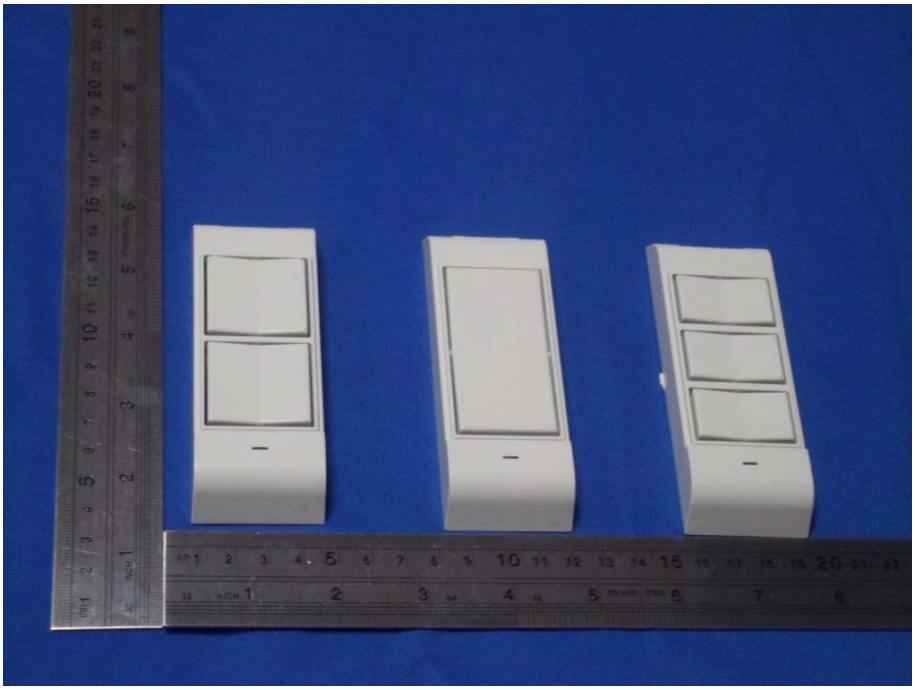


Figure 2
General Appearance of the EUT

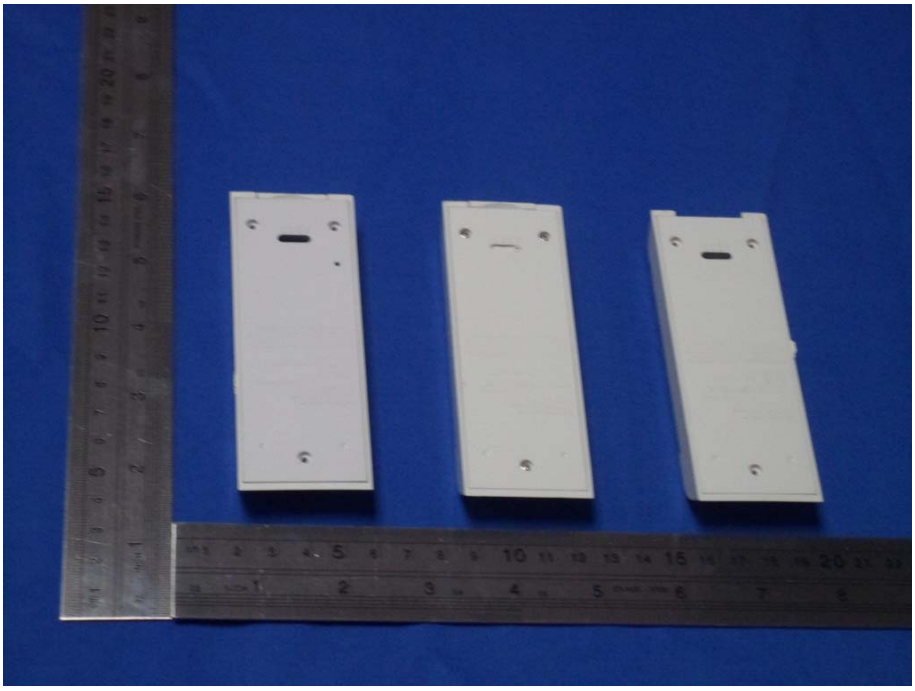


Figure 3
General Appearance of the EUT

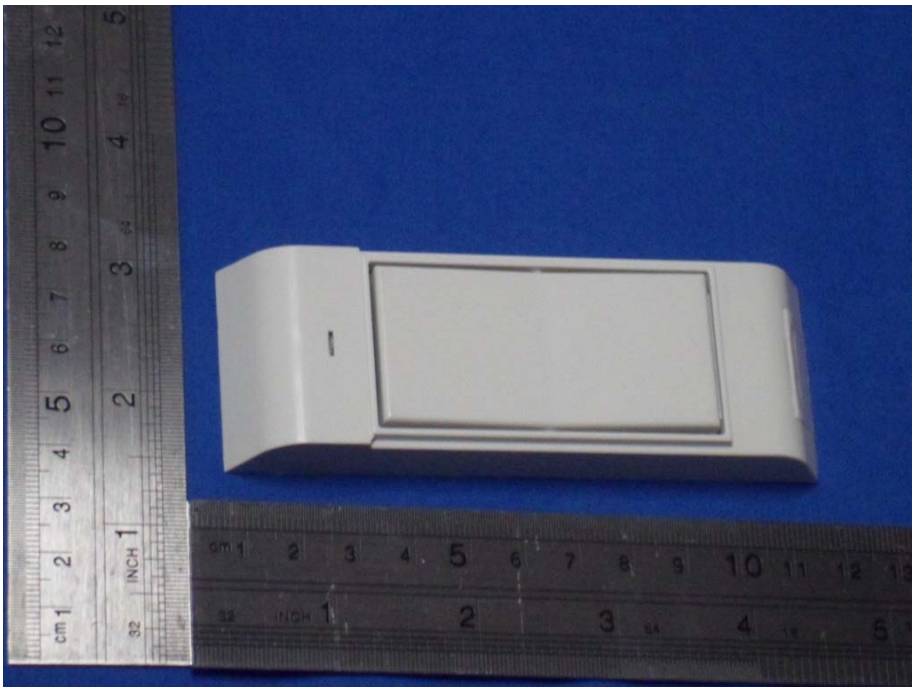


Figure 4
General Appearance of the EUT

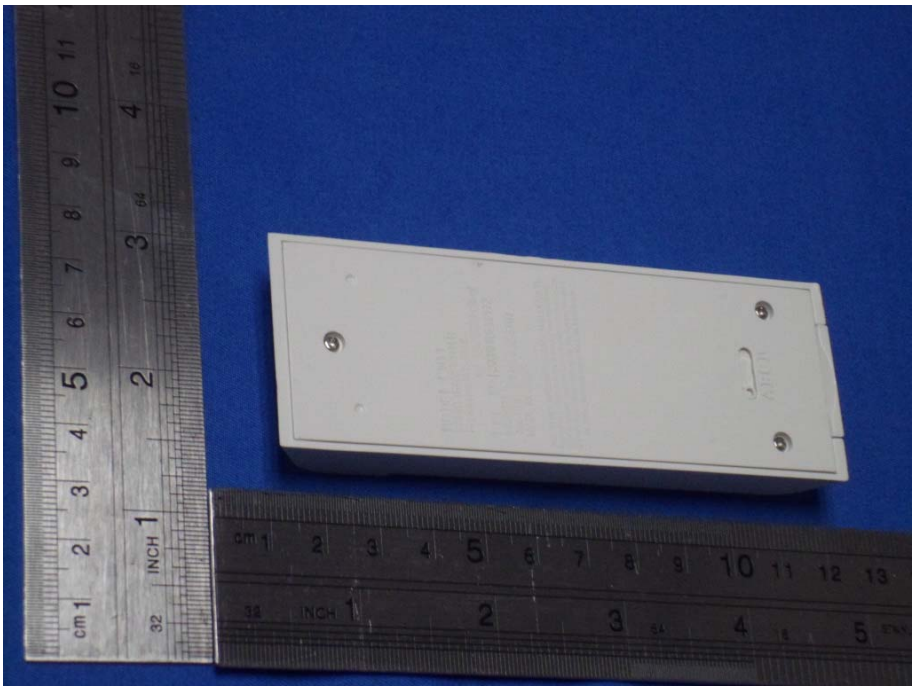


Figure 5
Inside View of the EUT

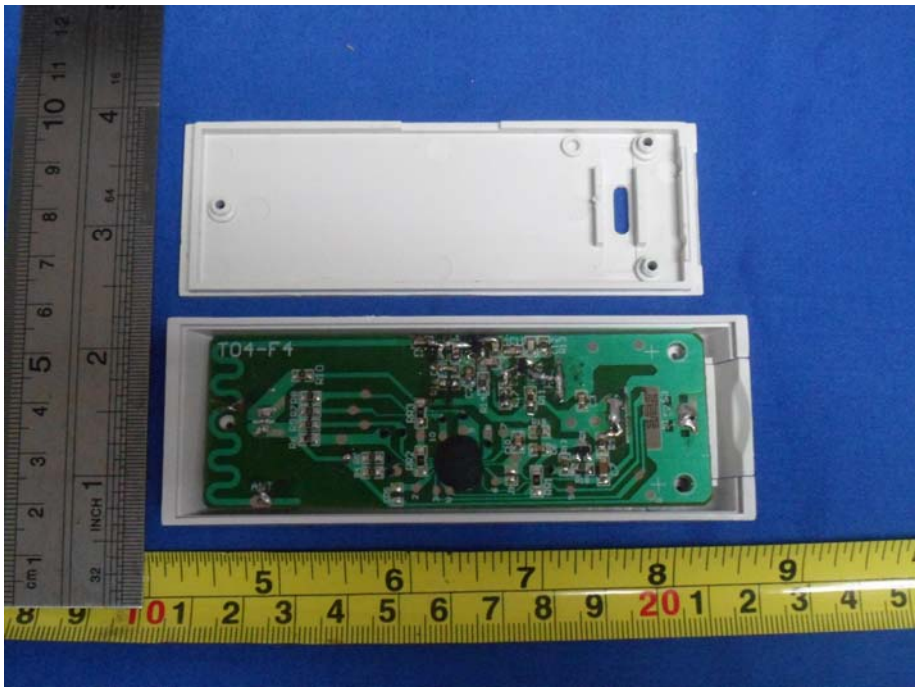


Figure 6
Inside View of the EUT

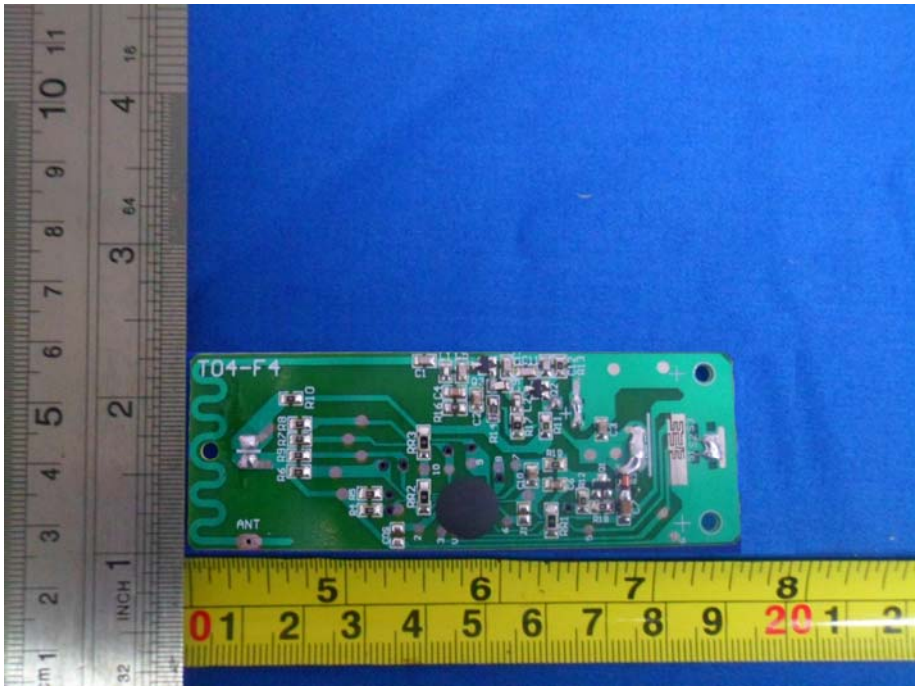
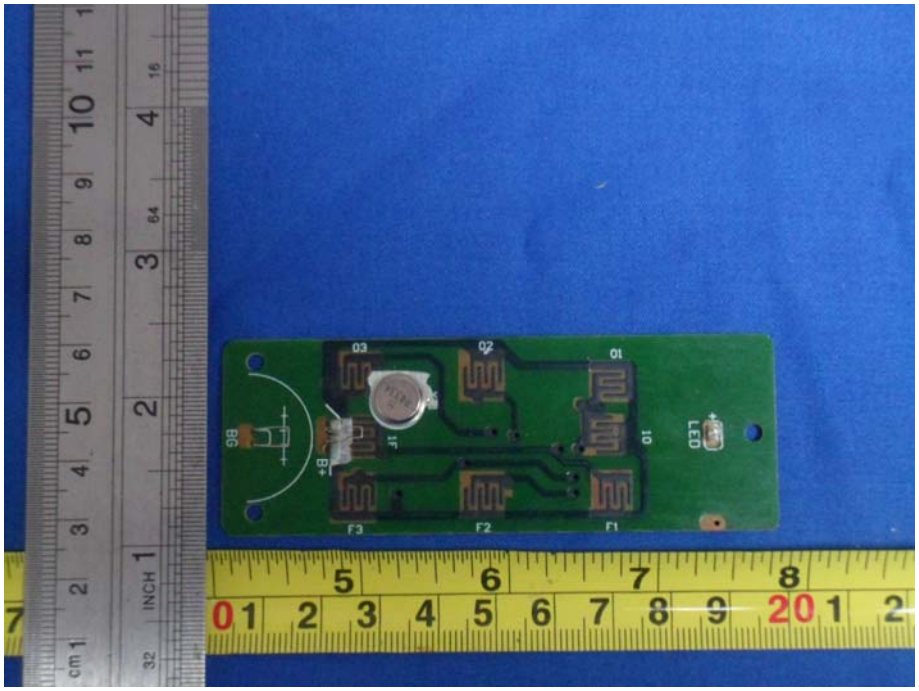


Figure 7
General Appearance of the PCB



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