
FCC Test Report

Report No.: AGC03023150301FE03

FCC ID : 2ACIG-9751USTX15

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : THE ELF LIGHT WITH REMOTE CONTROL & STAND
(GREEN AND RED LIGHT)

BRAND NAME : ELF LIGHT

MODEL NAME : 9751

CLIENT : LF PRODUCTS PTE LTD

DATE OF ISSUE : Apr.11, 2015

STANDARD(S) : FCC Part 15 Rules

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr.11, 2015	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	LF PRODUCTS PTE LTD
Address	10 RAEBURN PARK, #03/08 BLOCK A Singapore 088702
Manufacturer	Max-Plus Co., Ltd.
Address	No.4 Floor, A Building, No.3 Jinye Street, Pingnan Village, Sanxiang Town, Zhongshan City, Guangdong Province, China
Product Designation	THE ELF LIGHT WITH REMOTE CONTROL & STAND (GREEN AND RED LIGHT)
Brand Name	ELF LIGHT
Test Model:	9751
Date of test	Apr.03, 2015 to Apr.11, 2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF (2013-03-01)

We hereby certify that:

The above equipment was tested by Shenzhen STS Test Services 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) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.231.

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	433.92MHz
Field Strength(3m)	78.6dBuV/m(AV)@3m
Modulation	ASK
Number of channels	1
Hardware Version	N/A
Software Version	N/A
Antenna Designation	Fixed antenna
Power Supply	DC12.0V by Battery

2.2. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ACIG-9751USTX15** filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules.

2.3. TEST METHODOLOGY

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

2.4. SPECIAL ACCESSORIES

Refer to section 5.1.

2.5. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 3.18\text{dB}$
2	All emissions, radiated	$\pm 3.91\text{dB}$
3	Temperature	$\pm 0.5^\circ\text{C}$
4	Humidity	$\pm 2\%$

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Transmitting mode
Note: 1. For Radiated Emission, 3axis were chosen for testing for each applicable mode. 2. The remote control will disable within 5 seconds after activation by manual pressing.	

5. SYSTEM TEST CONFIGURATION

5.1. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	N/A	N/A	N/A	N/A

5.2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.231(a)(1)	Manually	Compliant
§15.231(a)(2)	automatically	N/A
§15.231(a)(3)	periodic	N/A
§15.231(a)(4)	emergency(alarm)	N/A
§15.231(a)(5)	security	N/A
§15.231(b)	Average Factor	Compliant
§15.231(b) & §15.209	Field Strength of Fundamental and Spurious Emission	Compliant

§15.231(c)	Bandwidth	Compliant
§15.231(d)	Frequency Tolerance	N/A
§15.231(e)	Field Strength(periodic trasmitter)	N/A
§15.207	Conducted Emission	N/A

6. TEST FACILITY

Site	Shenzhen STS Test Services Co., Ltd.
Location	1/F, Building 2, Zhuoke Science Park, Chongqing Road,Fuyong, Baoan District, Shenzhen, China.
FCC Registration No.	842334
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009.

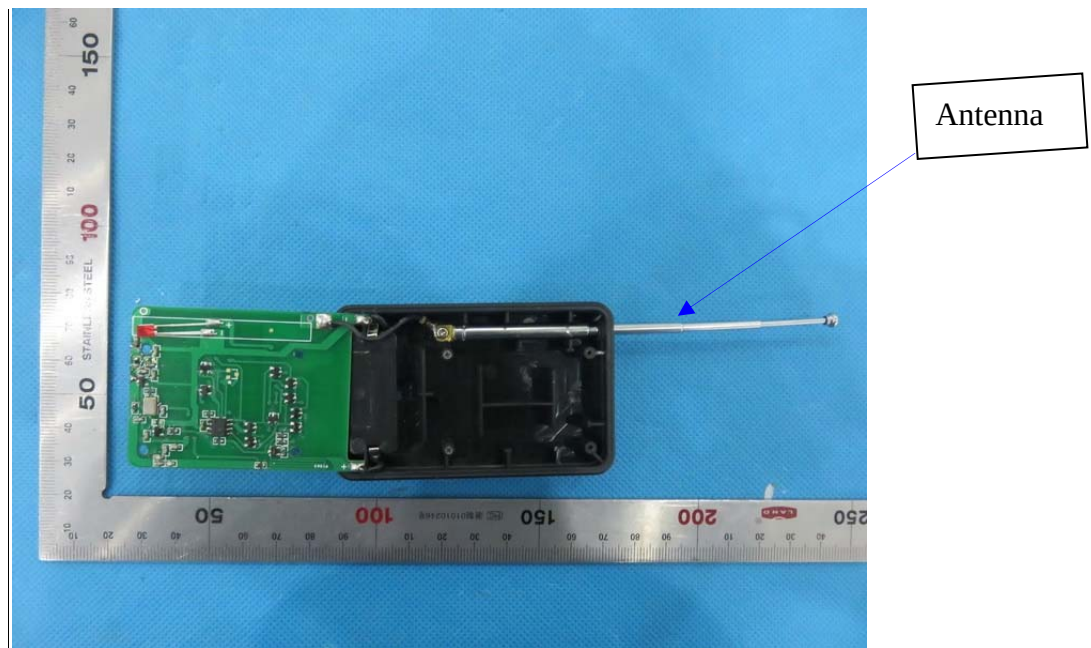
ALL TEST EQUIPMENT LIST

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.10.27	2015.10.26
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.06	2015.06.06
Horn Antenna	R&S	9120D	152265	2014.10.27	2015.10.26
Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05
Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21
Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07
Power Meter	Anritsu	ML2495A	1204003	2014.10.25	2015.10.24
Power Sensor	Anritsu	MA2411B	100309	2014.10.25	2015.10.24

7. ANTENNA REQUIREMENT

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EuT has fixed antenna, which accordance to the above sections, is considered sufficient to comply with the provisions of these sections. Please see EuT photo for details.



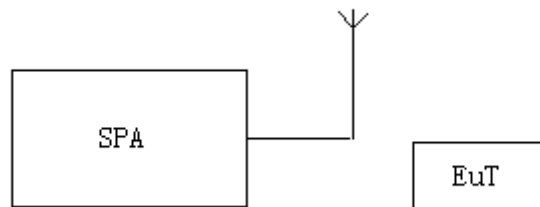
The requirements of section 15.203 are **FULFILLED**.

8. PROVISION FOR MOMENTARY OPERATION

8.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=VBW=3MHz
Span: 0Hz
Sweep time: 10S
2. Set the EUT to transmit by manually operated. Use the “View” function of SPA to find the transmission time of being released.
3. Record the data and Reported.

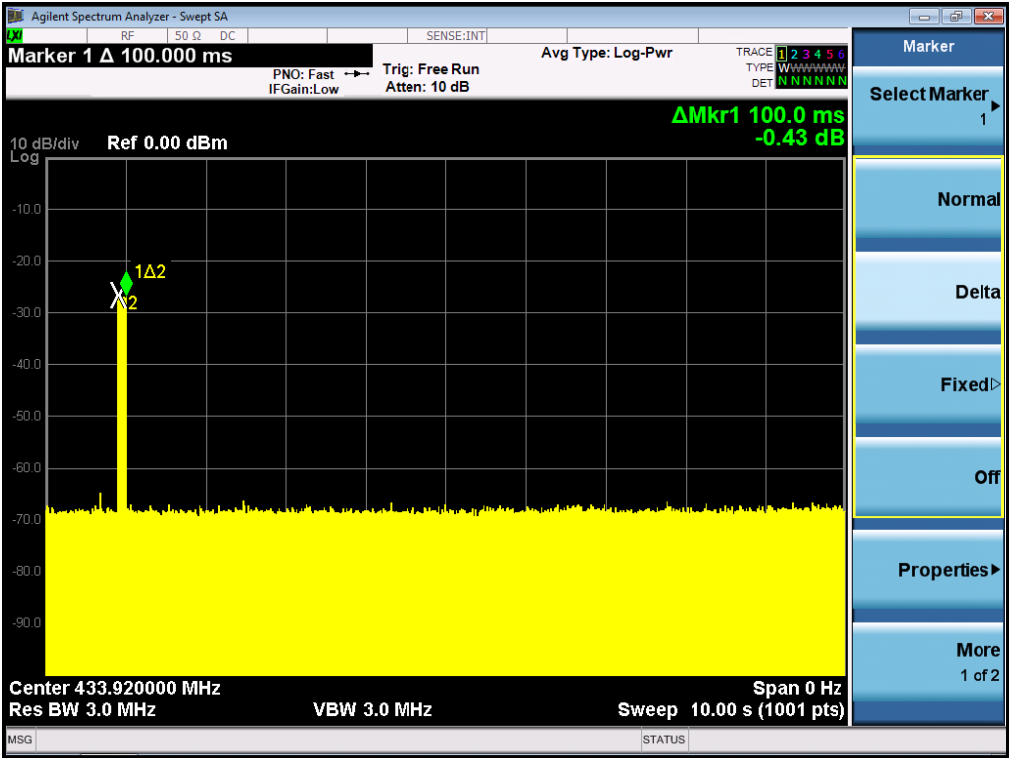
8.2 TEST SETUP



8.3 TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

The time of stopping transmission after switch releasing (s)	Limit (s)
0.1	5.00



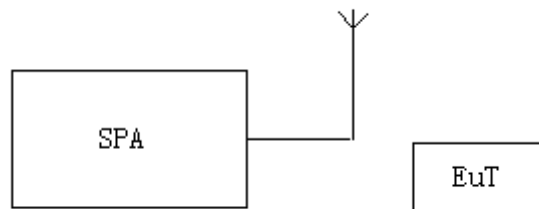
RESULT: PASS

9. DUTY CYCLE CORRECTION FACTOR

9.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=VBW=3MHz
Span: 0Hz
Sweep time: more than two pulse trains or more than each type of pulse occupancy time
2. Set the EUT to transmit by manually operated. Use the “Delta mark” function of SPA to find the period time between two pulse trains and each type of pulse occupancy time.
3. Record the plots and Reported.

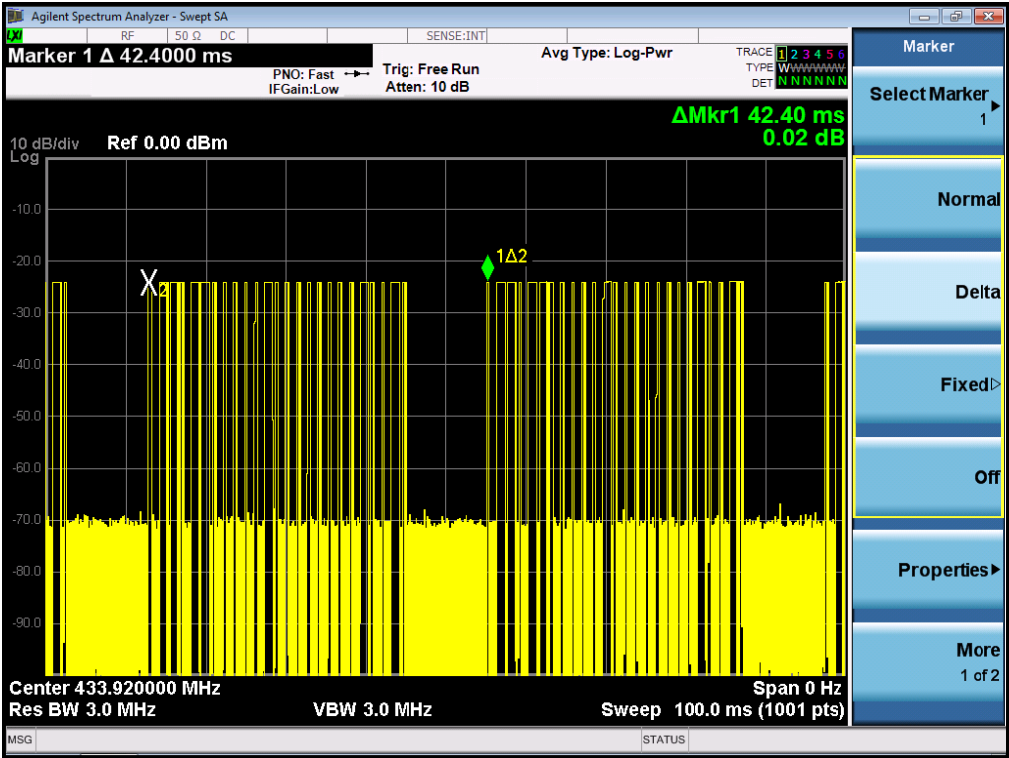
9.2 TEST SETUP

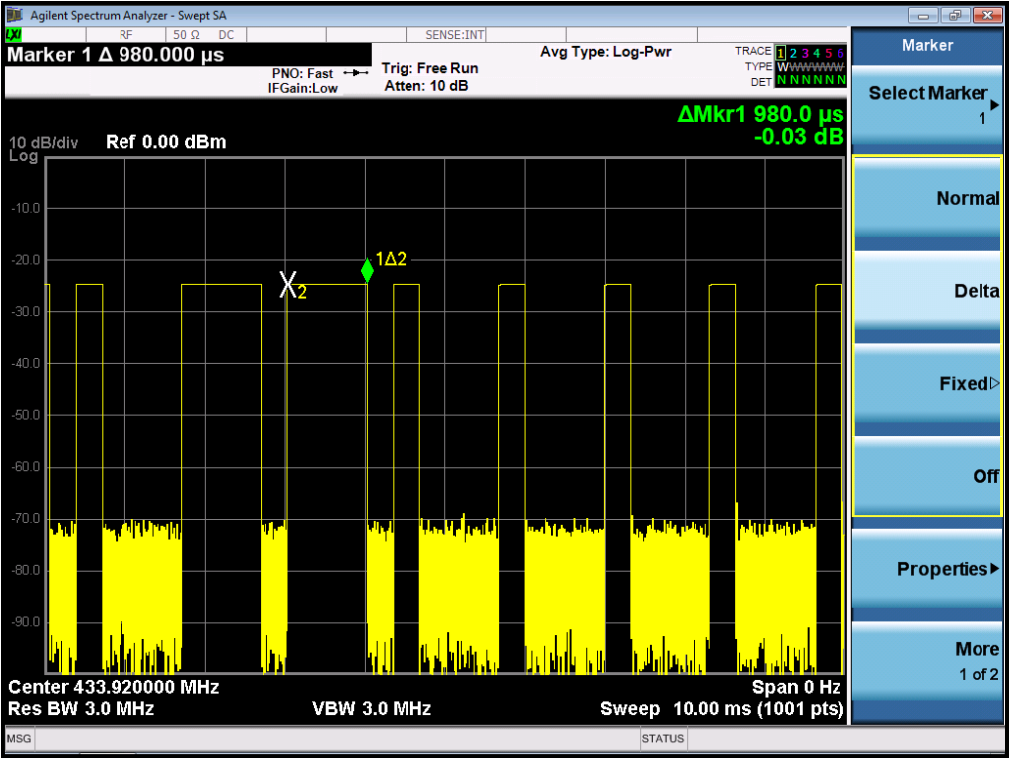
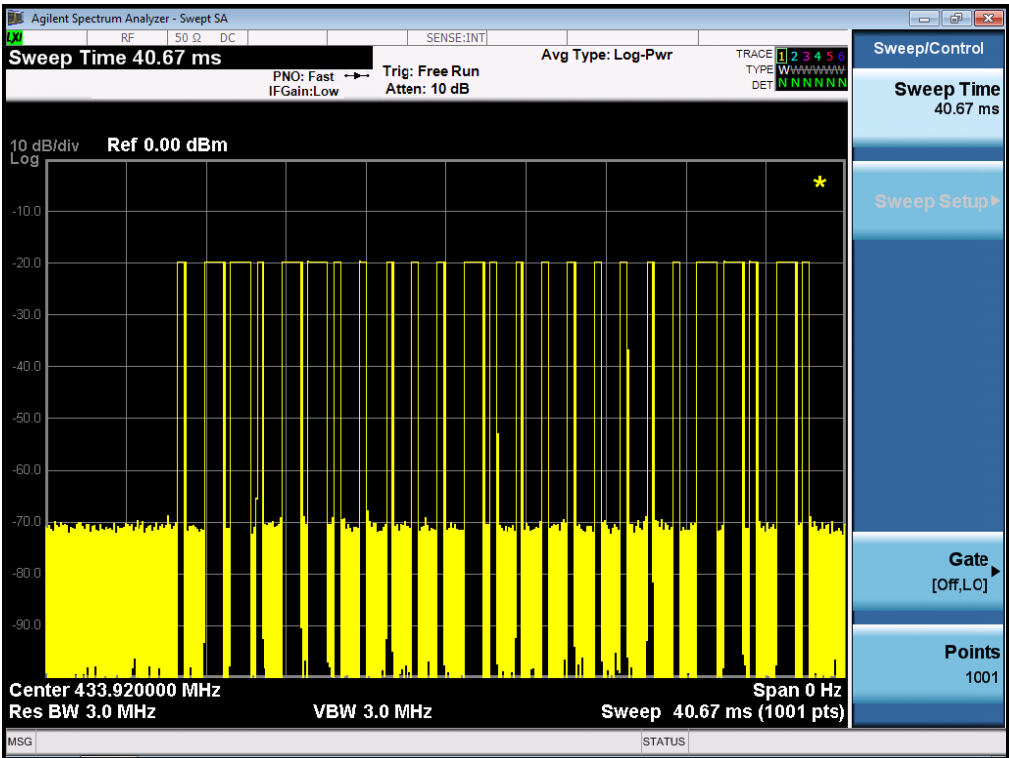


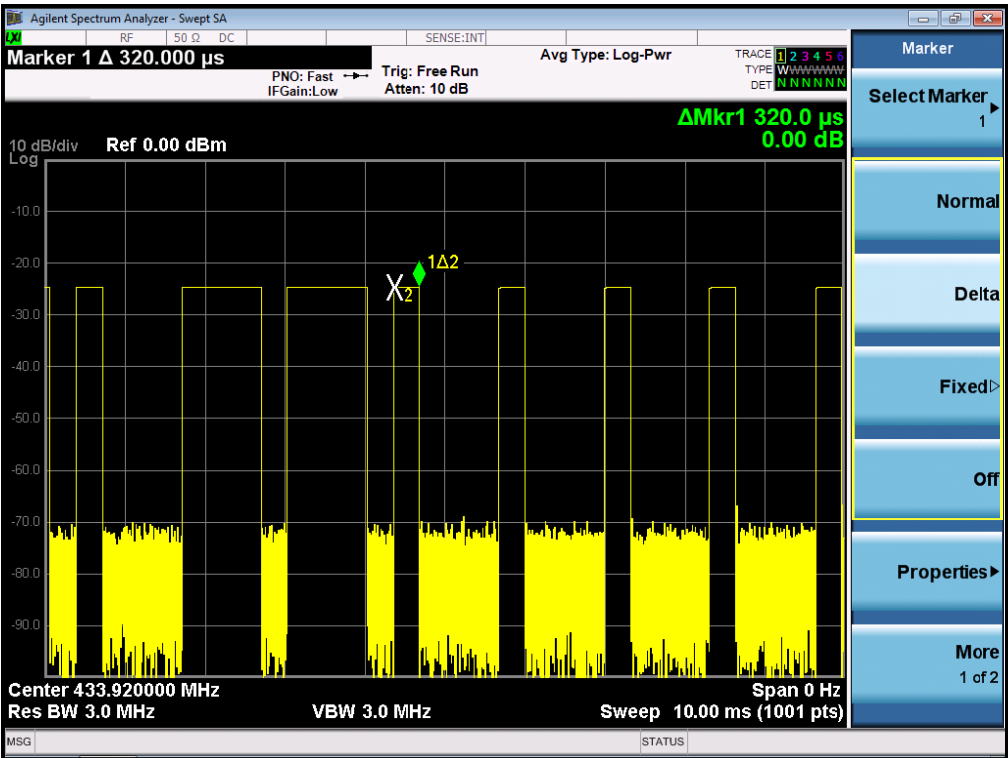
9.3 TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

Duty Cycle:	$(0.98\text{ms} \times 8 + 0.32\text{ms} \times 17) / 42.4\text{ms} = 0.3132$
Duty Cycle Correction Factor:	$20\lg(0.3132) = -10.1\text{dB}$







10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions below 1GHz, use 120KHz RBW and VBW $\geq$ 3RBW for QP reading.
7. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
8. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
9. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
10. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
11. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
12. Only the worst case is reported.

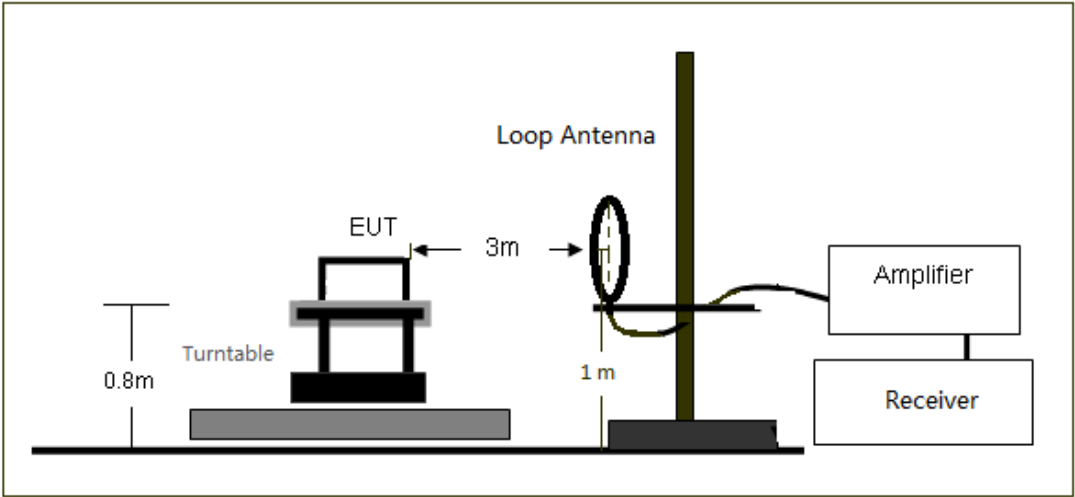
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

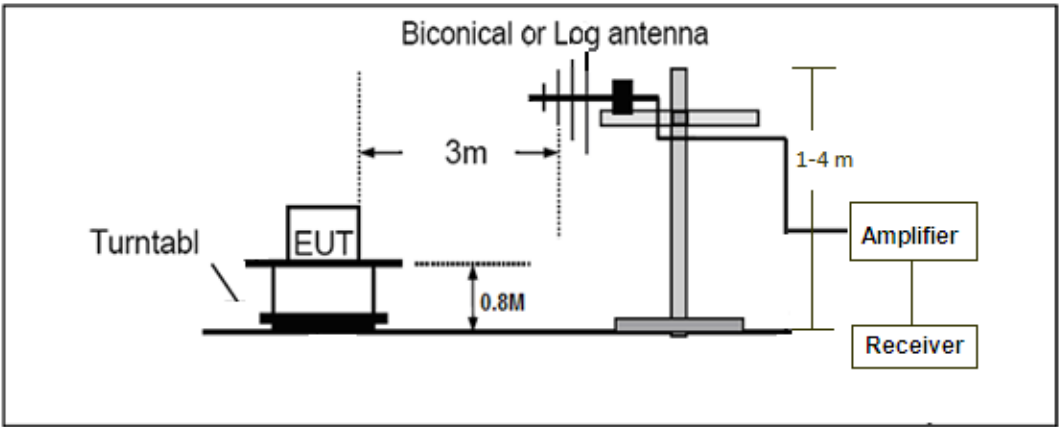
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

10.2. TEST SETUP

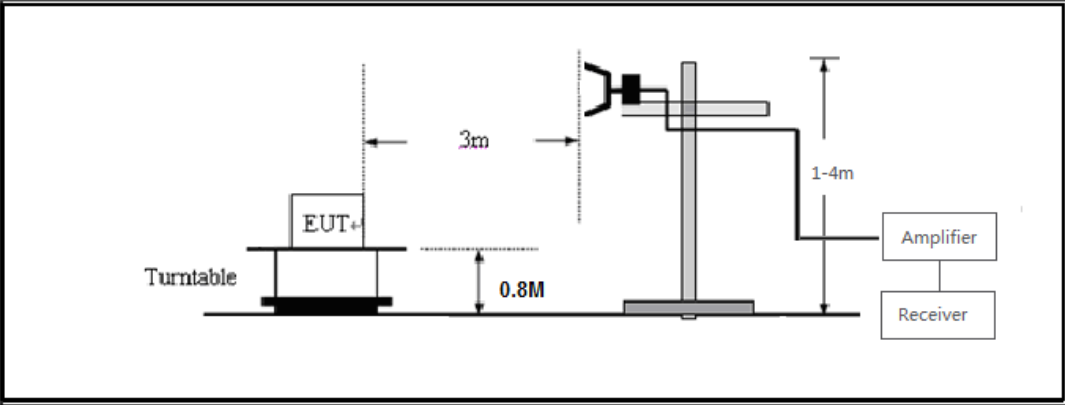
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



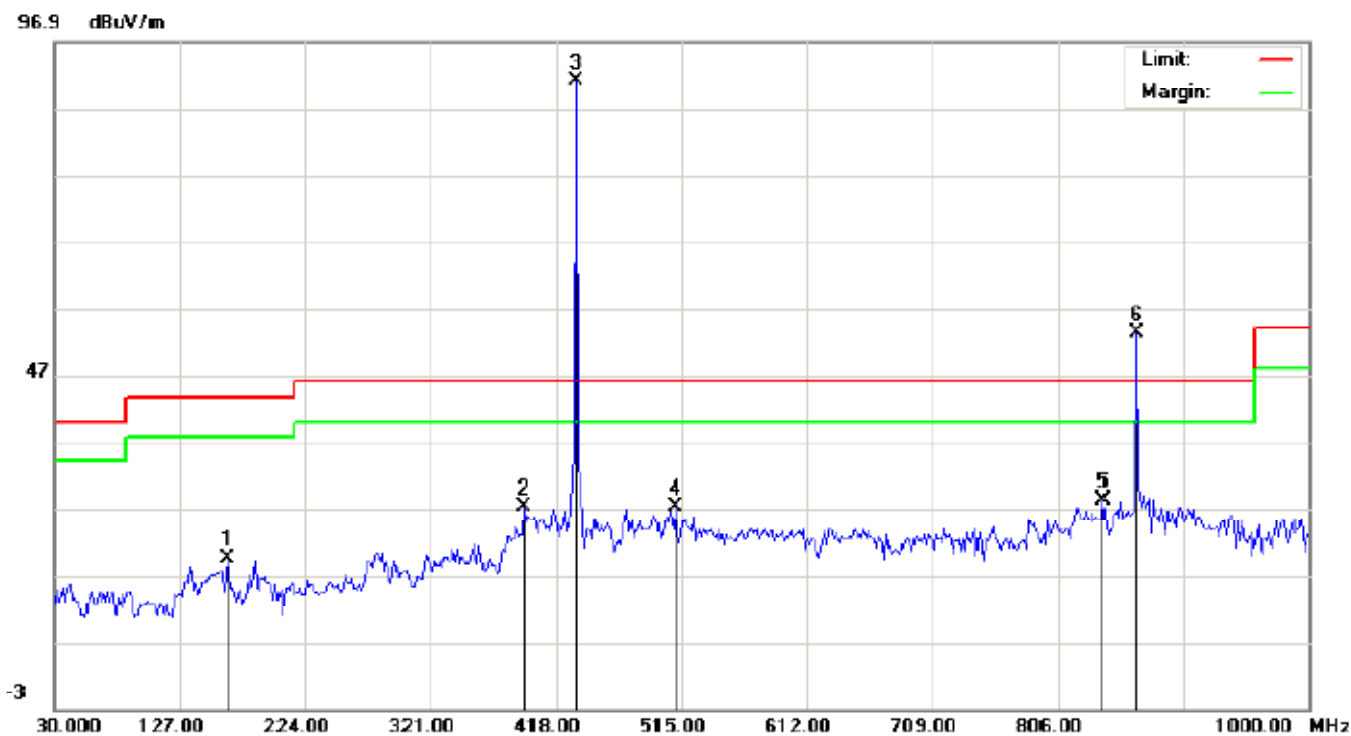
10.3. TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

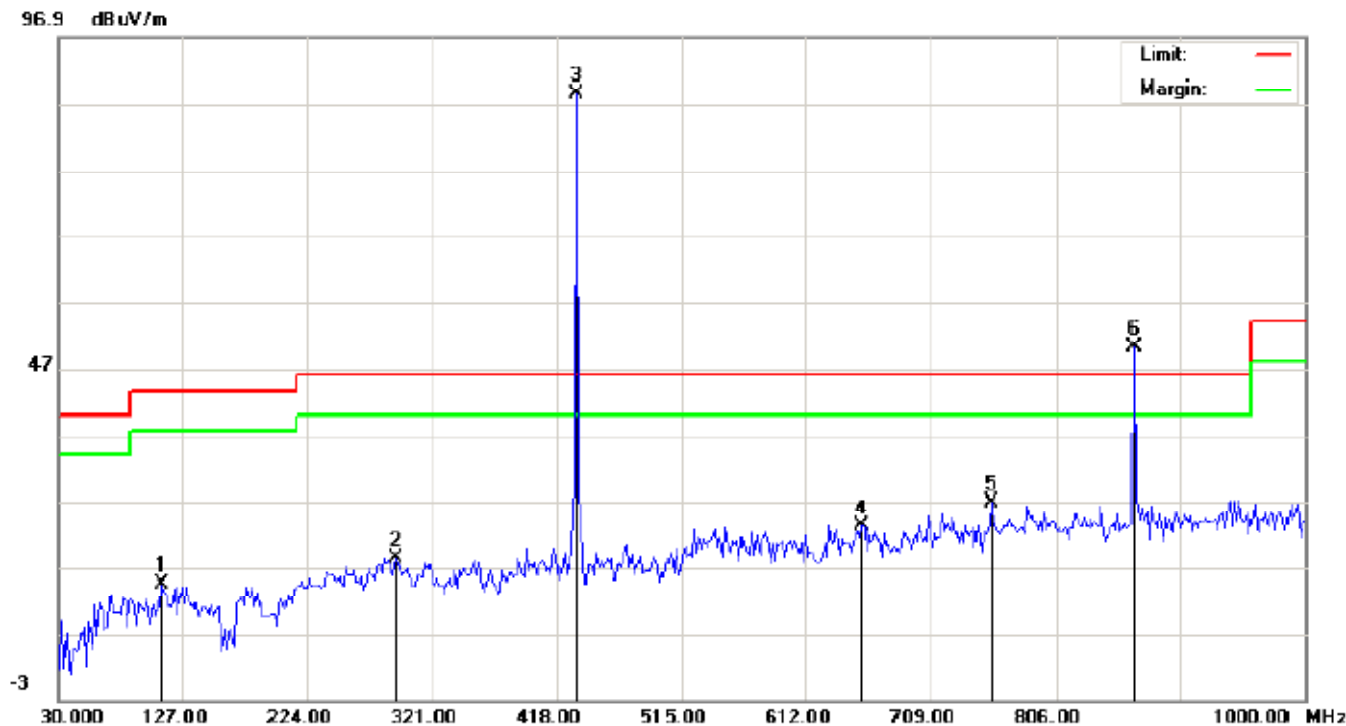
RADIATED EMISSION BELOW 1GHZ-Horizontal



Frequency MHz	Polarization	Reading dB(uV)	Factor dB(1/m)	PK Level dB(uV/m)	Limit dB(uV/m) PK	Margin dB PK	Pass/Fail	Detector	Remark
433.923	H	68.6	20.1	88.7	100.8	-12.1	Pass	PK	Fundamental
867.845	H	25.5	27.7	53.2	80.8	-27.8	Pass	PK	Harmonic

Frequency MHz	Polarization	PK Level dB(uV/m)	Duty Cycle Correction Factor: dB	AV Level dB(uV/m)	Limit dB(uV/m) AV	Margin dB AV	Pass/Fail	Detector	Remark
433.923	H	88.7	-10.1	78.6	80.8	-2.2	Pass	AV	Fundamental
867.845	H	53.2	-10.1	43.1	60.8	-17.7	Pass	AV	Harmonic

RADIATED EMISSION BELOW 1GHZ-Vertical



Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	PK Level dB(uV/m)	Limit dB(uV/m) PK	Margin dB PK	Pass/Fail	Detector	Remark
433.923	V	66.3	20.1	86.4	100.8	-14.4	Pass	PK	Fundamental
867.845	V	22.5	27.7	50.2	80.8	-30.6	Pass	PK	Harmonic

Frequency MHz	Polarization	Level dB(uV/m)	Duty Cycle Correction Factor: dB	AV Level dB(uV/m)	Limit dB(uV/m) AV	Margin dB AV	Pass/Fail	Detector	Remark
433.923	V	86.4	-10.1	76.3	80.8	-4.5	Pass	AV	Fundamental
867.845	V	50.2	-10.1	40.1	60.8	-20.7	Pass	AV	Harmonic

RESULT: PASS

- Note:** 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.
2. AV Level = PK Level + Duty cycle correction factor.
3. The “Factor” value can be calculated automatically by software of measurement system.
4. Emissions above 1G have 20dB margin. No recording in the test report.

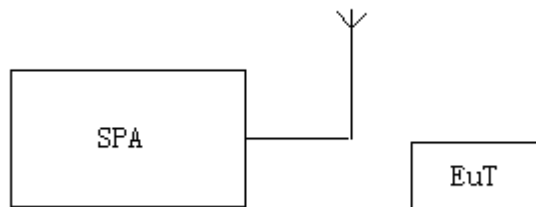
RESULT: PASS

11. BANDWIDTH

11.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=10KHz
VBW=30KHz
Span: 3MHz
Sweep time: Auto
2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
3. Record the plots and Reported.

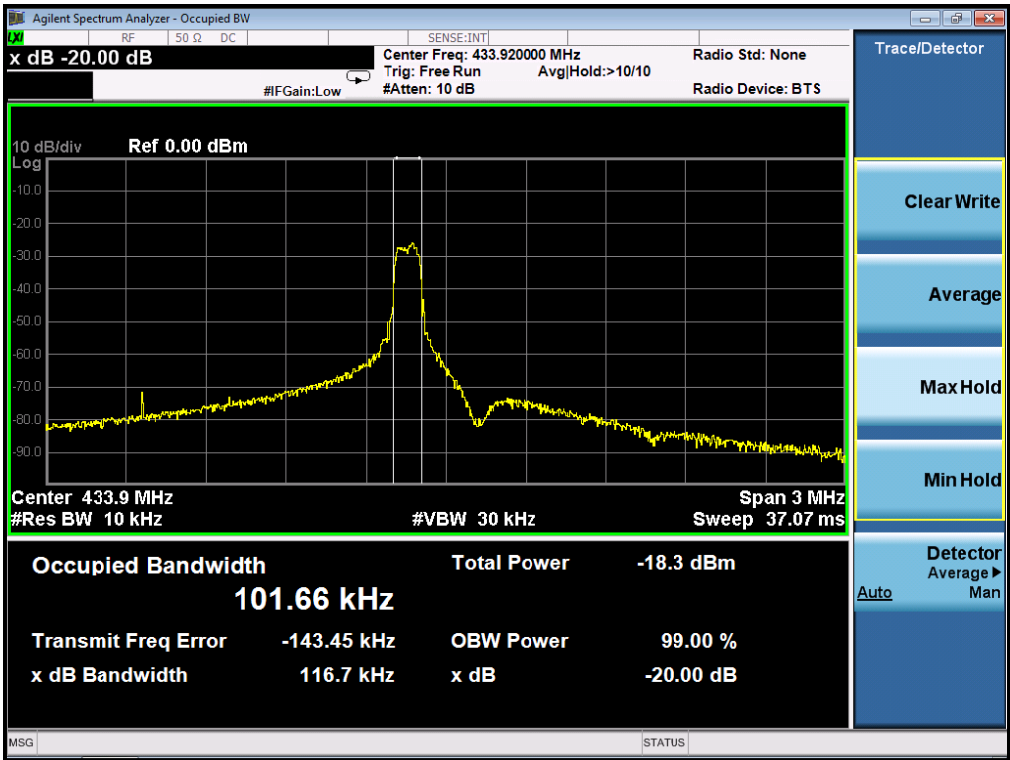
11.2. TEST SETUP



11.3. TEST RESULT

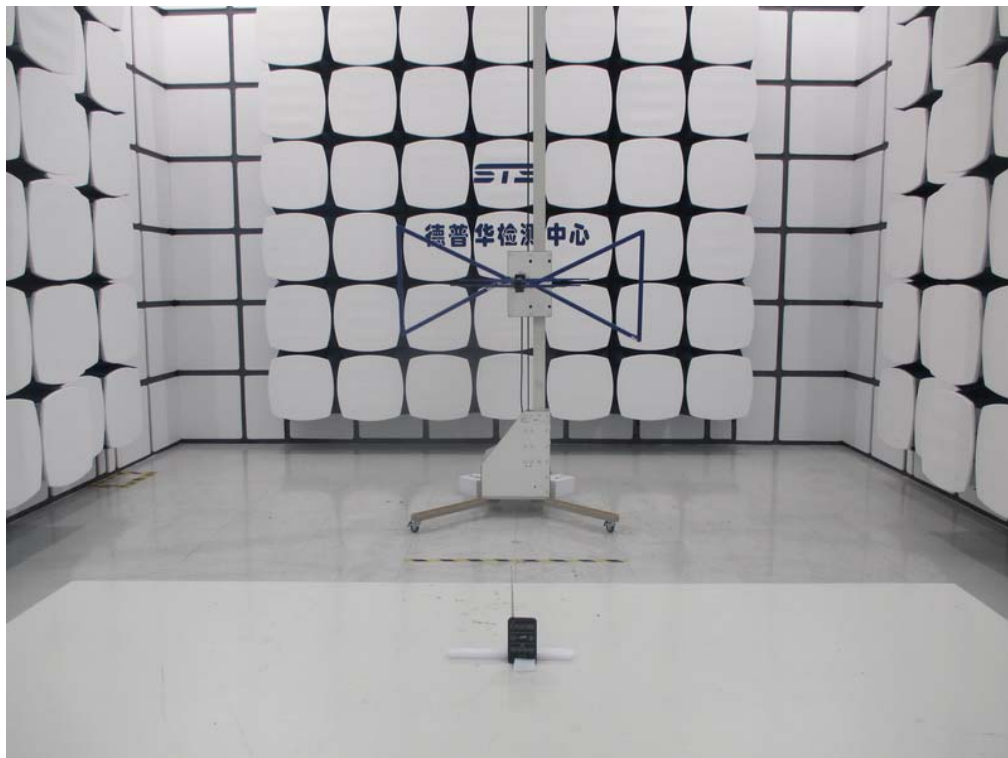
Test Mode: EUT @ 433.92MHz for RF Transmitter

OBW	LIMIT	RESULT
116.7kHz	1084.8KHz	Pass
Note: Limit= Operation Frequency x0.25%		

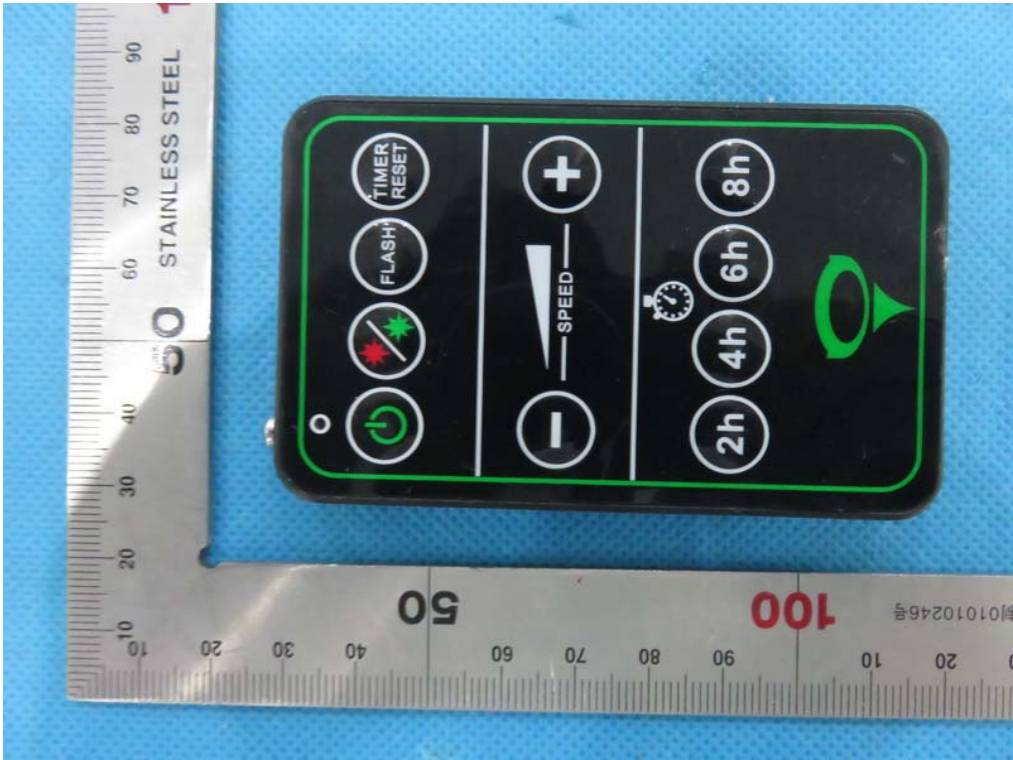


APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT
TOP VIEW OF EUT



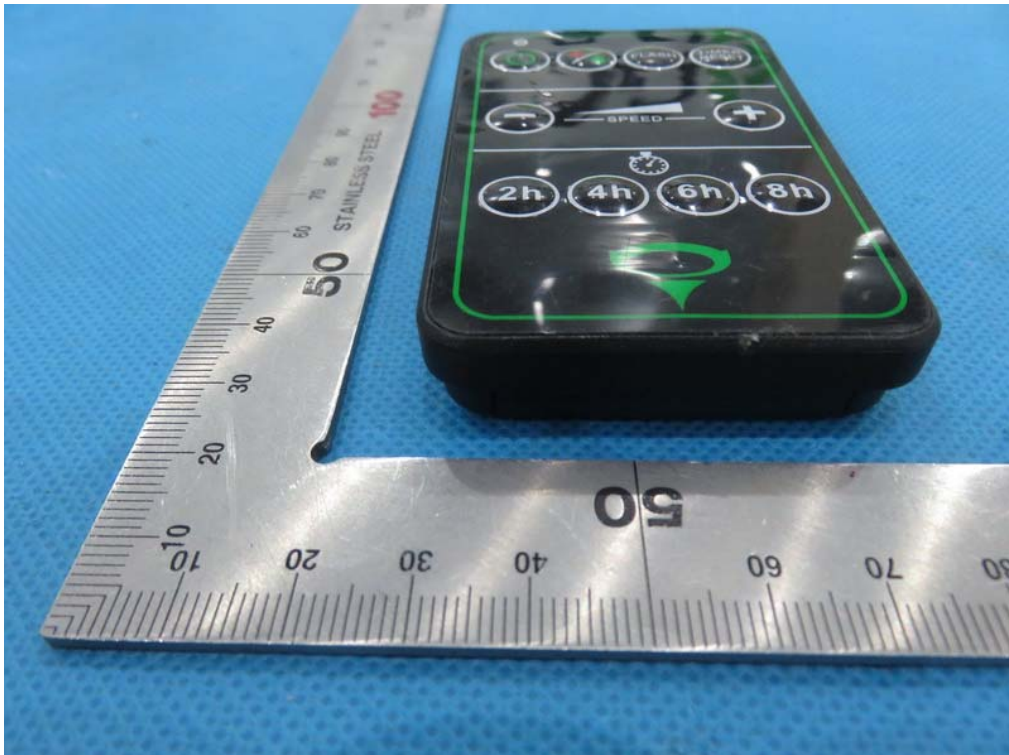
BOTTOM VIEW OF EUT



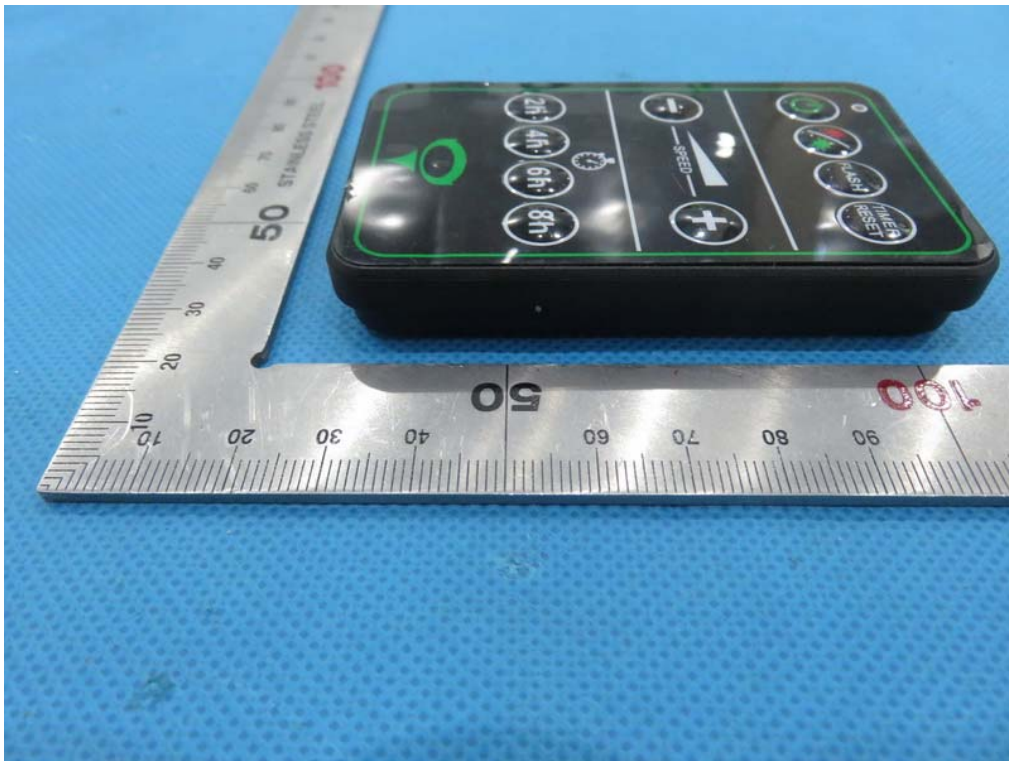
FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



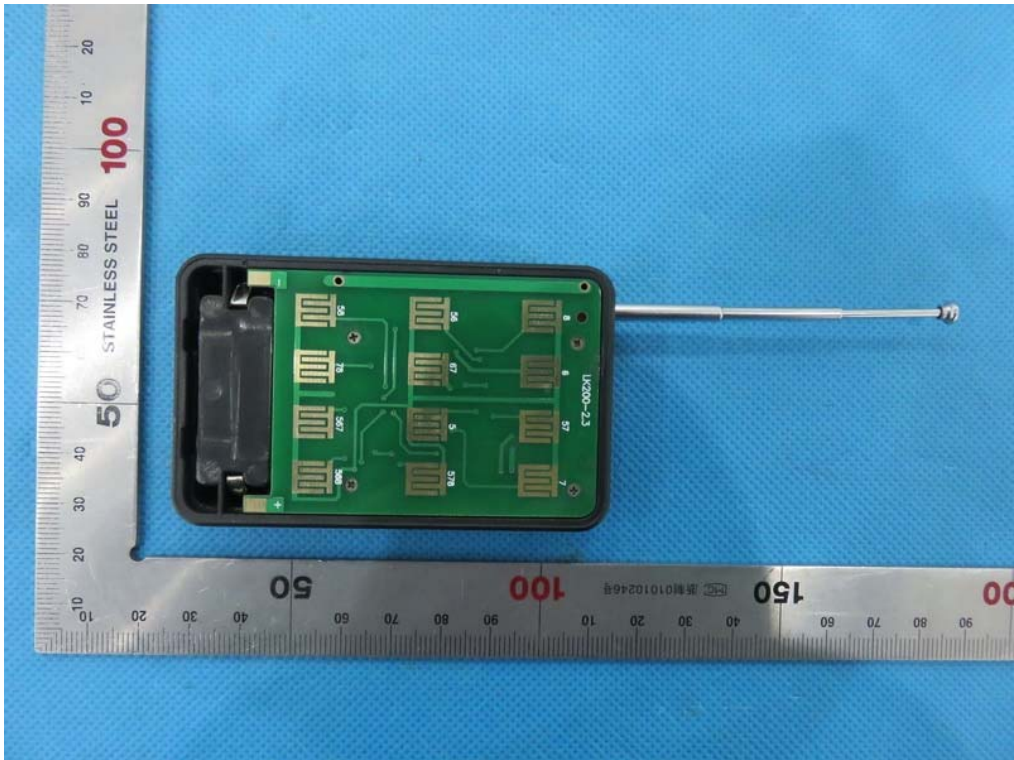
RIGHT VIEW OF EUT



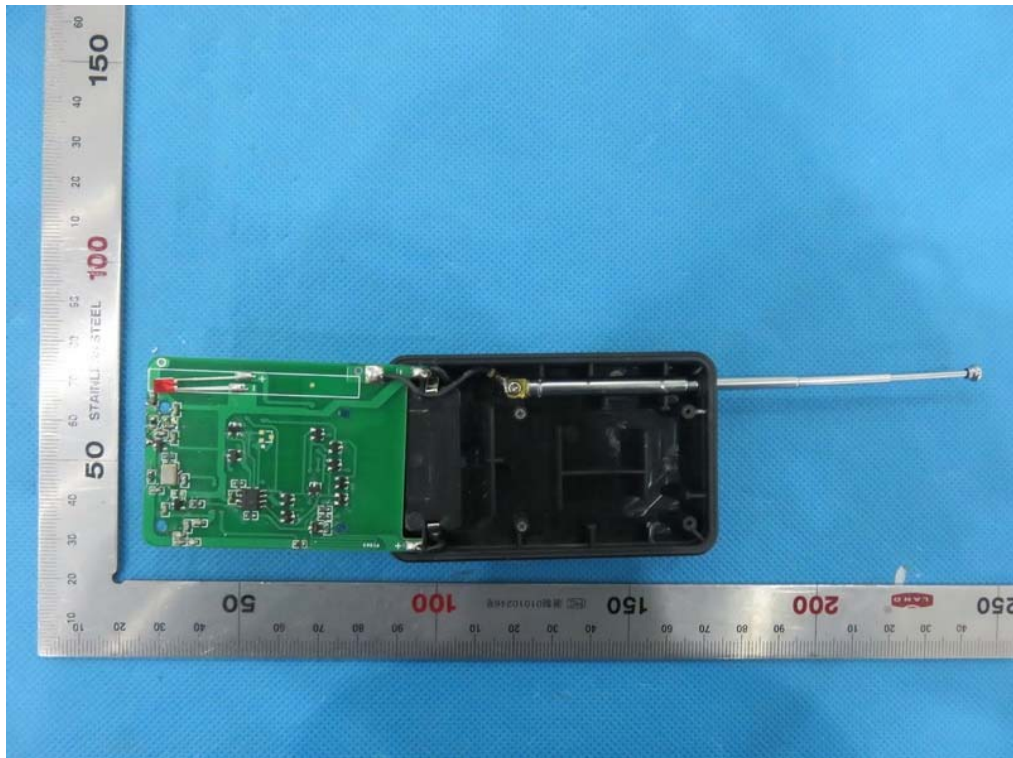
OPEN VIEW OF EUT-1



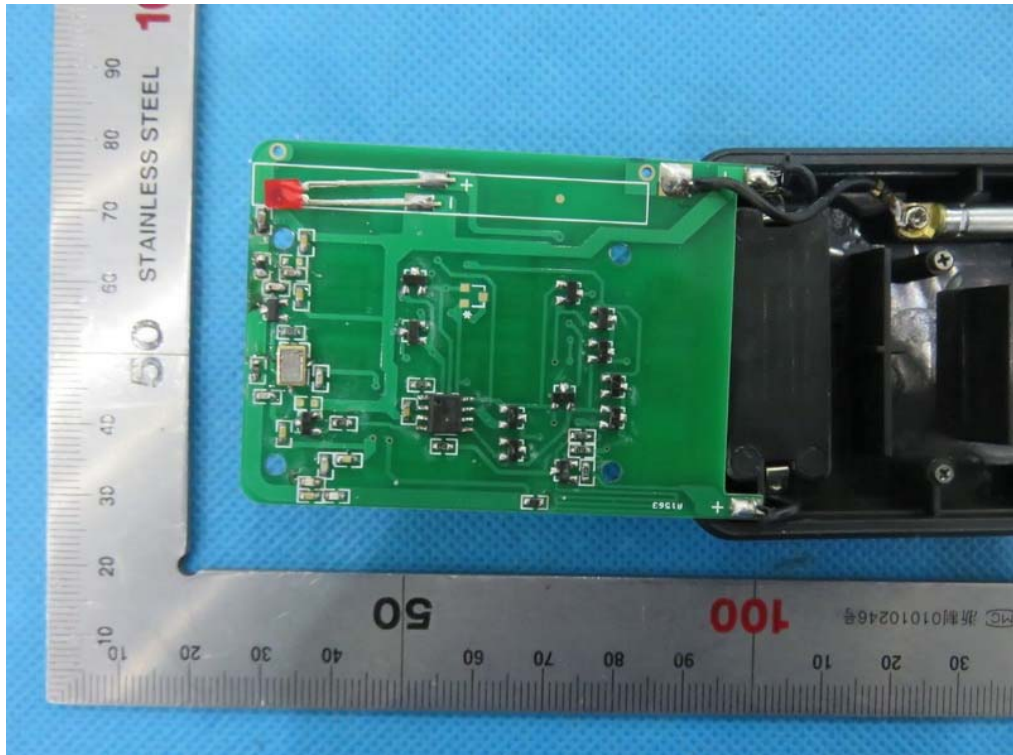
INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



-----END OF REPORT-----