

SHENZHEN LIOWN ELECTRONICS CO., LTD

# TEST REPORT

## SCOPE OF WORK

EMC TESTING—LU5074

ADDITIONAL MODELS: LU5076, 994442, LU5674T-L, 994440, 994441, 994448, 994449, 994450, 1600-115, 1601-115, 1602-115

## REPORT NUMBER

SZHH01587799-001

## ISSUE DATE

11 JUL 2021

## PAGES

23

## DOCUMENT CONTROL NUMBER

EN55015/EN 61547\_d

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## EMC VERIFICATION SUMMARY

Intertek Report No.: SZHH01587799-001

☒ Lighting

Model: LU5074 Additional Models: LU5076, 994442, LU5674T-L, 994440, 994441, 994448, 994449, 994450, 1600-115, 1601-115, 1602-115  Product Description: 2AA Battery Operated Moving Flame Candle  Sample Receipt Date: 25 Jun 2021	Applicant: SHENZHEN LIOWN ELECTRONICS CO., LTD 13F, FINANCE CENTRE BUILDING, NO. 22, TAIZI ROAD, SHEKOU, NANSHAN DISTRICT, SHENZHEN, GUANGDONG, CHINA 518067  Test Conducted Date: 25 Jun 2021 to 11 Jul 2021		
<input checked="" type="checkbox"/> 1 <sup>st</sup> TEST <input type="checkbox"/> 2 <sup>nd</sup> TEST	ALL TESTS WERE CONDUCTED IN ACCORDANCE WITH:  *EN IEC 55015: 2019 + A11: 2020 *EN 61547: 2009		
Test Site and Location:	Intertek Testing Services Shenzhen Ltd. Longhua Branch (CNAS L0327) 1-2/F, Building B, Qiao'an Scientific Technology Park, Shangpeng Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China/518110  Sub-contracting Lab: Shenzhen EMTEK Co., Ltd. Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China, 518052		
Test Result	OK	Not OK	Remark
*EN IEC 55015: 2019 + A11: 2020	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
*EN 61547: 2009	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When determining the test conclusion, the Measurement Uncertainty of test has been considered.			

Remark: Partial test was witnessed in Sub-contracting Lab.

**Prepared and Checked By:**
**Approved By:**
**Sign on File**  
**Tom Li**  
**Engineer**

Digitally signed  
by Jimmy Wen  
Location:  
Intertek Testing  
Services

**Signature**
**Jimmy Wen**  
**Assistant Manager**  
**11 Jul 2021**
**Date**

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### EMC Results Conclusion (with Justification)

RE: EMC Testing Pursuant to Electromagnetic Compatibility Directive (2014/30/EU) Performed On the 2AA Battery Operated Moving Flame Candle, Models: LU5074

We tested the 2AA Battery Operated Moving Flame Candle, Model: LU5074, to determine if it was in compliance with the relevant EN standards as marked on the EMC Verification Summary. We found that the unit met the requirement of EN 55015, EN61547 standards when tested as received.

The Models: LU5076, 994442, LU5674T-L, 994440, 994441, 994448, 994449, 994450, 1600-115, 1601-115, 1602-115 are the same as the Model: LU5074 in hardware aspect. The difference in model number serves as marketing strategy.

The production units are required to conform to the initial sample as received when the units are placed on the market.

## LABORATORY MEASUREMENTS

### Configuration Information

<b>Equipment Under Test (EUT):</b>	2AA Battery Operated Moving Flame Candle
<b>Model:</b>	LU5074
<b>Serial No.:</b>	Not Labelled
<b>Support Equipment:</b>	N/A
<b>Cables:</b>	N/A
<b>Adaptor:</b>	N/A
<b>Rating:</b>	TX: DC 3.0V (1 x 3.0V CR2025 battery) RX: DC 3.0V (2 x 1.5V AA batteries) & DC 3.0V (1 x 3.0V CR2450 battery)

## PERFORMANCE CRITERIA FOR IMMUNITY

The performance criteria are referred to the test standard: EN 61547

### Performance criteria A

During the test no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

### Performance criteria B

During the test the luminous intensity may change to any value. After the test the luminous intensity shall be restored to its initial value within 1 min.

Regulating controls need not function during the test, but after the test the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

### Performance criteria C

During and after the test any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal if necessary by temporary interruption of the mains supply and/or operating the regulating control.

Additional requirement for lighting equipment incorporating a starting device:

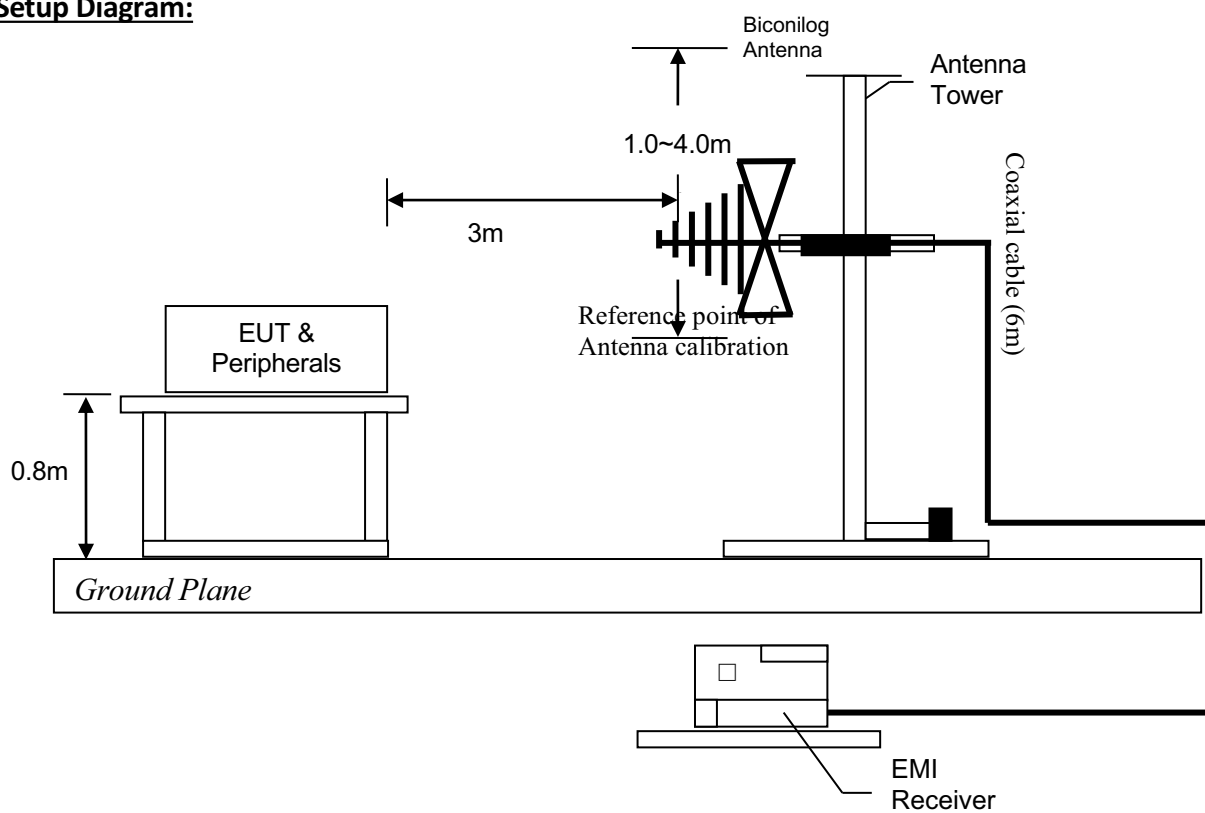
After the test the lighting equipment is switched off. After half an hour it is switched on again. The lighting equipment shall start and operate as intended.

**RADIATED DISTURBANCE PURSUANT TO EN 55015: EMISSIONS REQUIREMENT****Used Test Equipment**

<b>Equip No.</b>	<b>Description</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Cal. Date</b>	<b>Due Date</b>
SZ185-01	EMI Receiver	R & S	ESCI	22 Dec 2020	22 Dec 2021
SZ061-03	Biconilog Antenna	ETS	3142E	24 May 2019	24 May 2022
SZ188-01	Anechoic Chamber	ETS	FACT 3-2.0	15 Dec 2018	15 Dec 2021

- Notes:
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
  2. Frequency range scanned: 30MHz to 1000MHz.
  3. Only emissions significantly above equipment noise floor are reported.
  4. Uncertainty:  $\pm 4.8\text{dB}$  at a level of confidence of 95%.

**Test Setup Diagram:**



(Radiated Emission Measurements Test Setup)

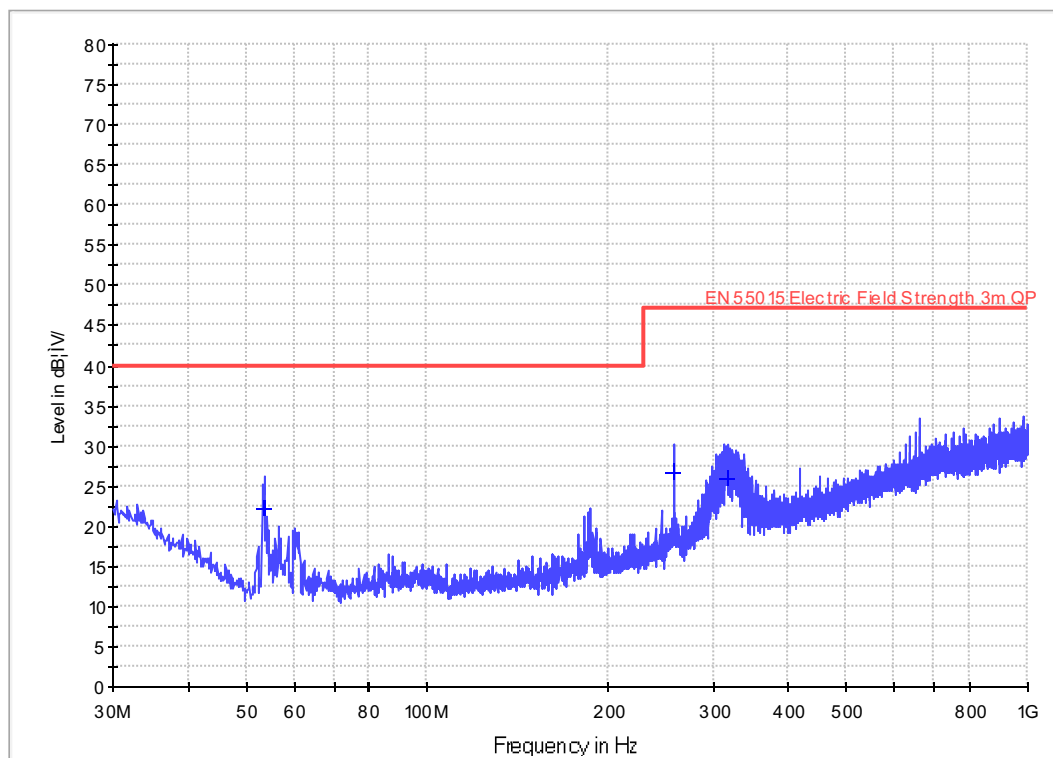
Model: LU5074

Worst Case Operating Mode: Lighting

**Test Data**  
**Radiated Disturbance**  
**Pursuant to EN55015: Emissions Requirement**

**Horizontal**

EN55015



**Limit and Margin**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
53.765000	22.3	1000.0	120.000	0.0	H	7.7	17.7	40.0
257.707500	26.7	1000.0	120.000	0.0	H	14.2	20.3	47.0
316.028750	25.9	1000.0	120.000	0.0	H	16.3	21.1	47.0

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit QPK (dBµV/m) – QuasiPeak (dBµV/m)



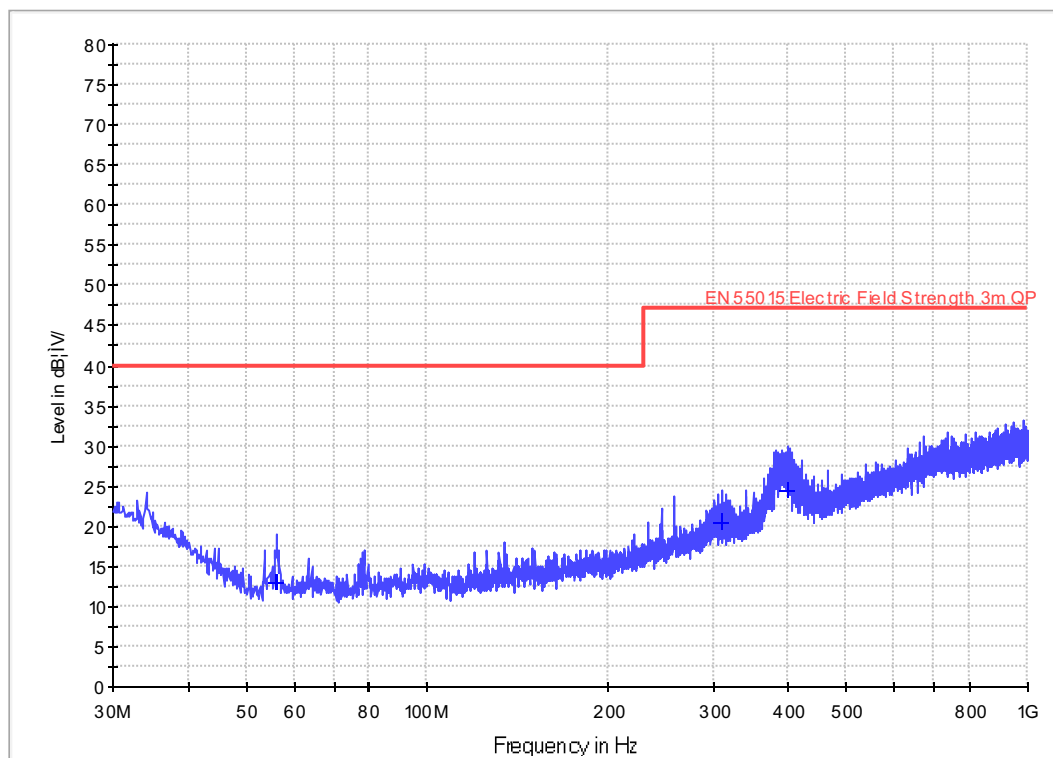
Model: LU5074

Worst Case Operating Mode: Lighting

**Test Data**  
**Radiated Disturbance**  
**Pursuant to EN55015: Emissions Requirement**

**Vertical**

EN55015



**Limit and Margin**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
56.190000	12.9	1000.0	120.000	0.0	V	7.7	27.1	40.0
309.117500	20.5	1000.0	120.000	0.0	V	16.1	26.5	47.0
398.357500	24.5	1000.0	120.000	0.0	V	18.6	22.5	47.0

Remark:

1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit QPK (dBµV/m) – QuasiPeak (dBµV/m)

**EN 55015**  
**RADIATED ELECTROMAGNETIC DISTURBANCES TEST**

**Used Test Equipment**

Equip No.	Description	Manufacturer	Model No.	Cal. Date	Due Date
EE144	Test Receiver	Rohde & Schwarz	ESCI	20 May 2021	20 May 2022
EE011-2	Loop Antenna	Laplace Instrument Ltd	RF300	21 May 2021	21 May 2022
EE041	50Ω Coaxial Switch	Anritsu	MP59B	21 May 2021	21 May 2022

- Notes:
1. Peak detector quick scan are showed on the graph and final quasi-peak detector data are measured, the worst-case is recorded in the following graph and table.
  2. Frequency range scanned: 9kHz to 30MHz.
  3. Only emissions significantly above equipment noise floor are reported.
  4. Uncertainty:  $\pm 2.5\text{dB}$  at a level of confidence of 95%.
  5. This test was subcontracted in EMTEK (Shenzhen) Co., Ltd.

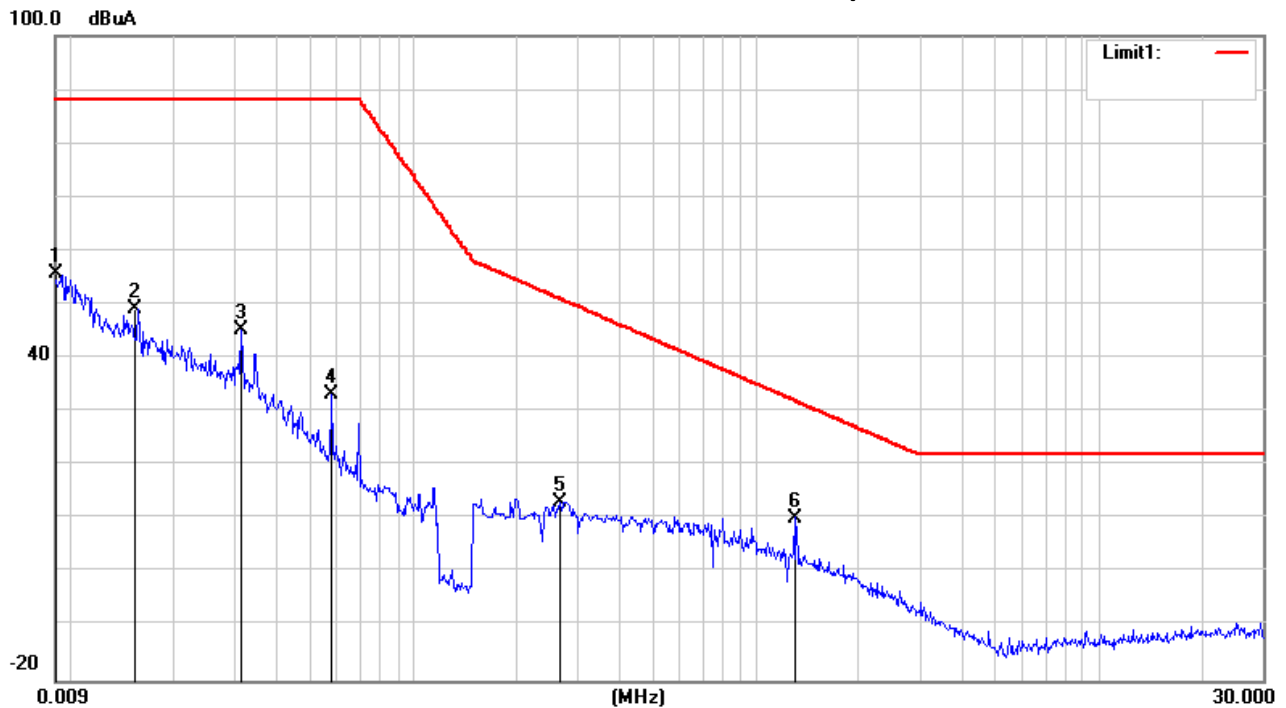
Model: LU5074

Worst Case Operating Mode: Lighting

Phase: LOOP A

## Test Data

### Radiated Electromagnetic Disturbances Test Pursuant to EN 55015: Emissions Requirement



## Test Data

No.	Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector
1		0.0090	-31.38	87.02	55.64	88.00	-32.36	QP
2		0.0154	-30.36	79.66	49.30	88.00	-38.70	QP
3		0.0313	-22.47	67.64	45.17	88.00	-42.83	QP
4		0.0577	-23.01	56.23	33.22	88.00	-54.78	QP
5		0.2671	-18.46	31.59	13.13	51.07	-37.94	QP
6	*	1.2900	-6.90	17.20	10.30	32.14	-21.84	QP

## Remark:

1. Over = Reading Level (dBuA) – Limit (dBuA)

2. "-" means blow the limit

3. Remark: The emissions were very low against the limit.

Model: LU5074

## EN 61000-4-2 Electrostatic Discharge

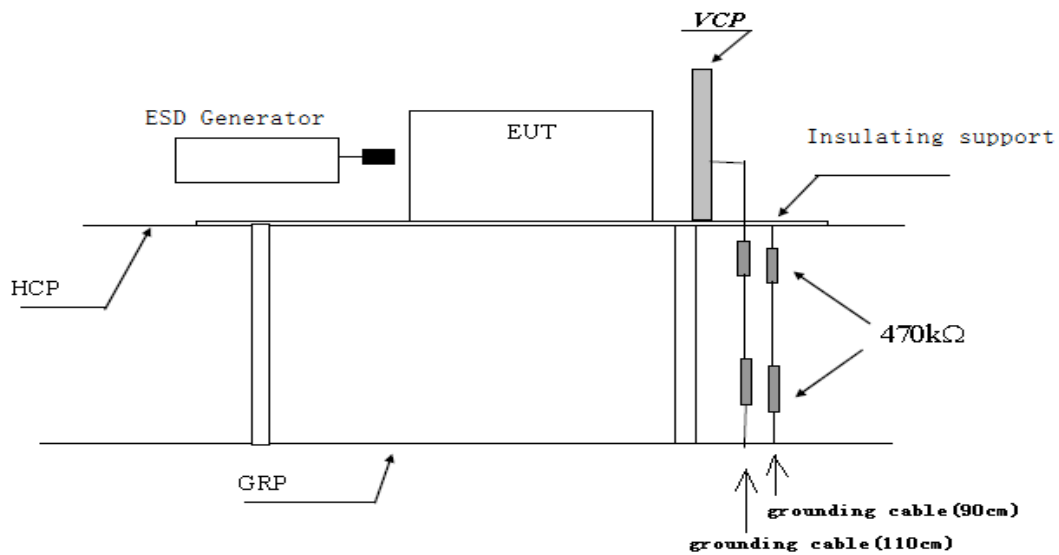
### Test Summary (Pursuant to EN 61547)

Basic Standard:	EN 61000-4-2
Port:	Enclosure
Required Performance Criterion:	B
Limit:	±8.0kV (Air Discharge)
	±4.0kV (Contact Discharge)
	±4.0kV (Indirect Contact Discharge)
Temperature:	25.0°C
Relative Humidity:	50.0%
Test Mode:	Lighting
Test Setup:	Table-top
Test of Post-Installation:	N/A
Time Between Each Discharge:	1 second

### Used Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Cal. Date	Due Date
SZ189-01	ESD Simulator	KIKUSUI	KES4021	11 Nov 2020	11 Nov 2021

### Test Setup Diagram



### Test set-up of electrostatic discharge

Model: LU5074

## Test Results

### EN 61000-4-2 Electrostatic Discharge

Discharge Type	Applied Voltage	Result (Pursuant to EN 61547 criterion B)
Contact Discharge	±4kV	OK
Air Discharge	±8kV	OK
Indirect HCP Discharge	±4kV	OK
Indirect VCP Discharge	±4kV	OK

- No. of discharge: 10 discharge for +ve and 10 discharge for –ve.
- Time between each discharge: at least 1 second.

☒ Additional Information

☒ No observable change.

Model: LU5074

## EN 61000-4-3 RADIATED IMMUNITY

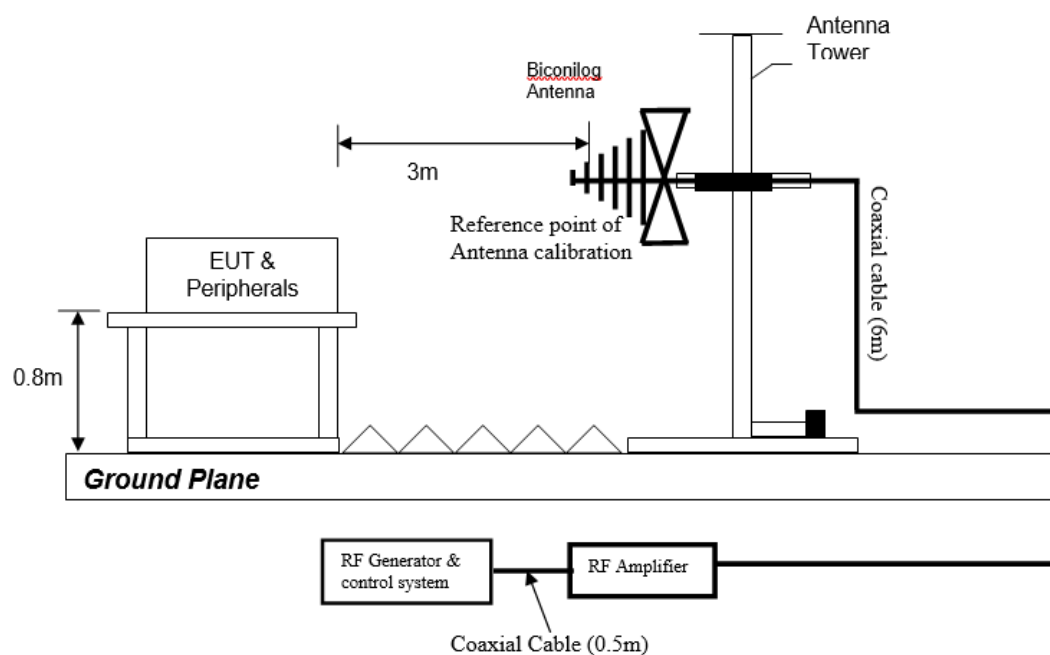
### Test Summary (Pursuant to EN 61547)

Basic Standard:	IEC 61000-4-3
Port:	Enclosure
Required Performance Criterion:	A
Limit:	3.0V/m (rms)
Test Modulation:	1kHz, 80% AM
Frequency:	80MHz to 1000MHz
Dwell Time:	1s
Frequency Step:	1%
Temperature:	21.7°C
Relative Humidity:	53.2%
Test Facility:	Full Anechoic Chamber
Antenna Polarization:	Horizontal and Vertical
Type of Antenna:	Log-periodic
Test Distance:	3 meters
Test Mode:	Lighting
Test Setup:	Table-top

### Used Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	24 May 2019	24 May 2022
SZ180-02	Signal Generator	Aeroflex	2023A	5 Jan 2021	5 Jan 2022
SZ181-01	Amplifier	PRANA	AP32 MT215	5 Jan 2021	5 Jan 2022
SZ188-02	Anechoic Chamber	ETS	RFD-F/A-100	15 Dec 2018	15 Dec 2021

# Test Setup Diagram



Test set-up of Immunity to Radiated Electric Fields



Model: LU5074

**Test Results****EN 61000-4-3  
Radiated Immunity**

Frequency (MHz)	Exposed Side	Field Strength V/m (rms)	Result (Pursuant to EN 61547, Criterion A)
80 to 1000	Front	3	OK
80 to 1000	Left	3	OK
80 to 1000	Rear	3	OK
80 to 1000	Right	3	OK

☒ Additional Information☒ No observable change

**Photos of EUT**

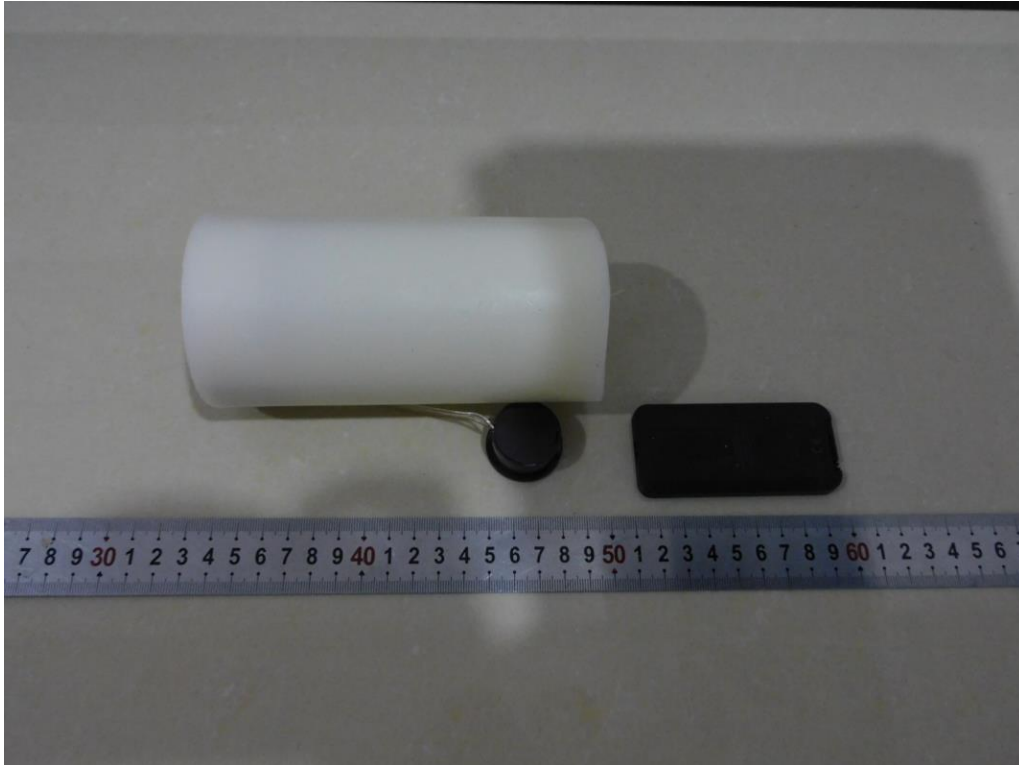
External Photo



External Photo



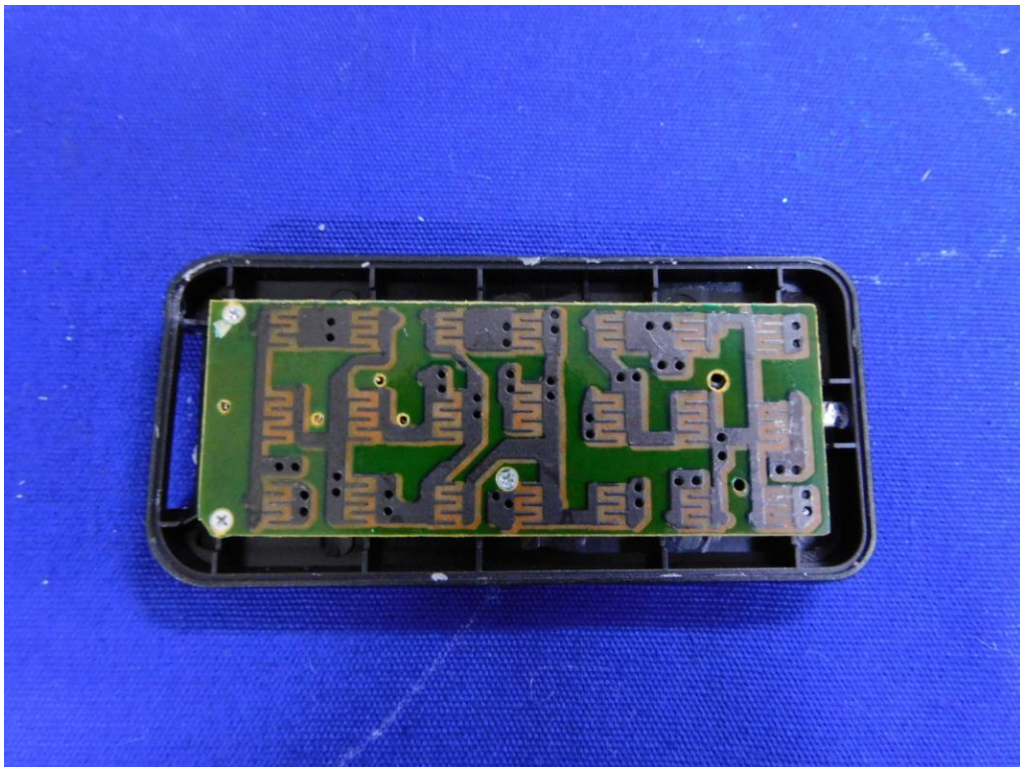
External Photo



Internal Photo (TX)

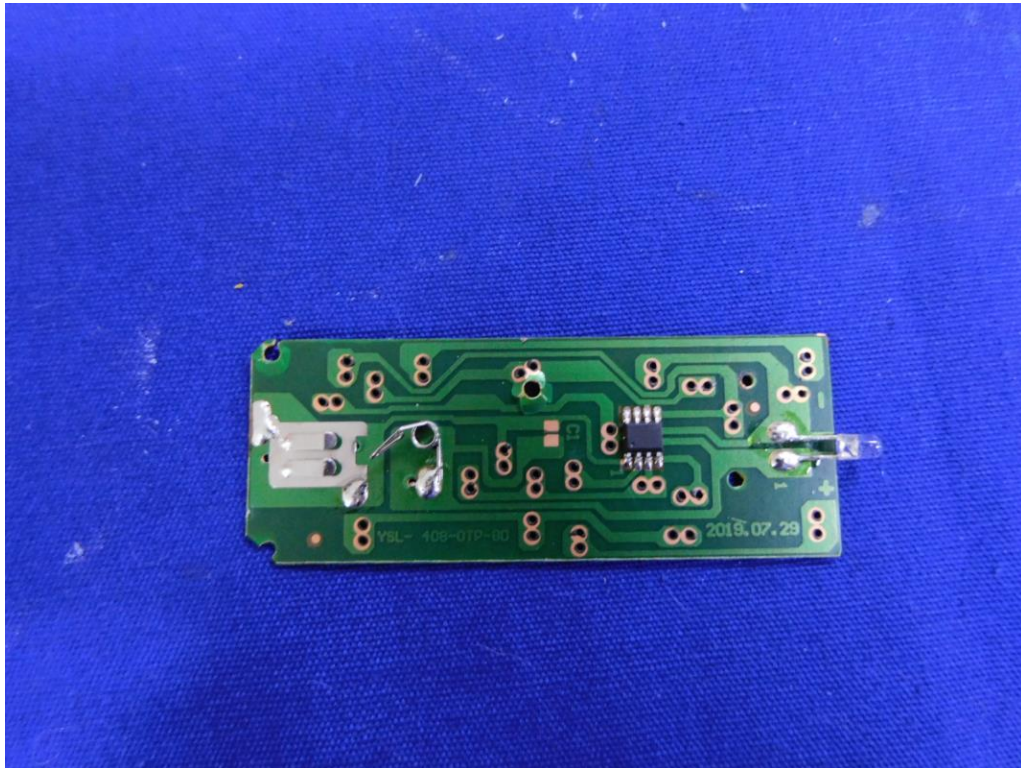


Internal Photo (TX)





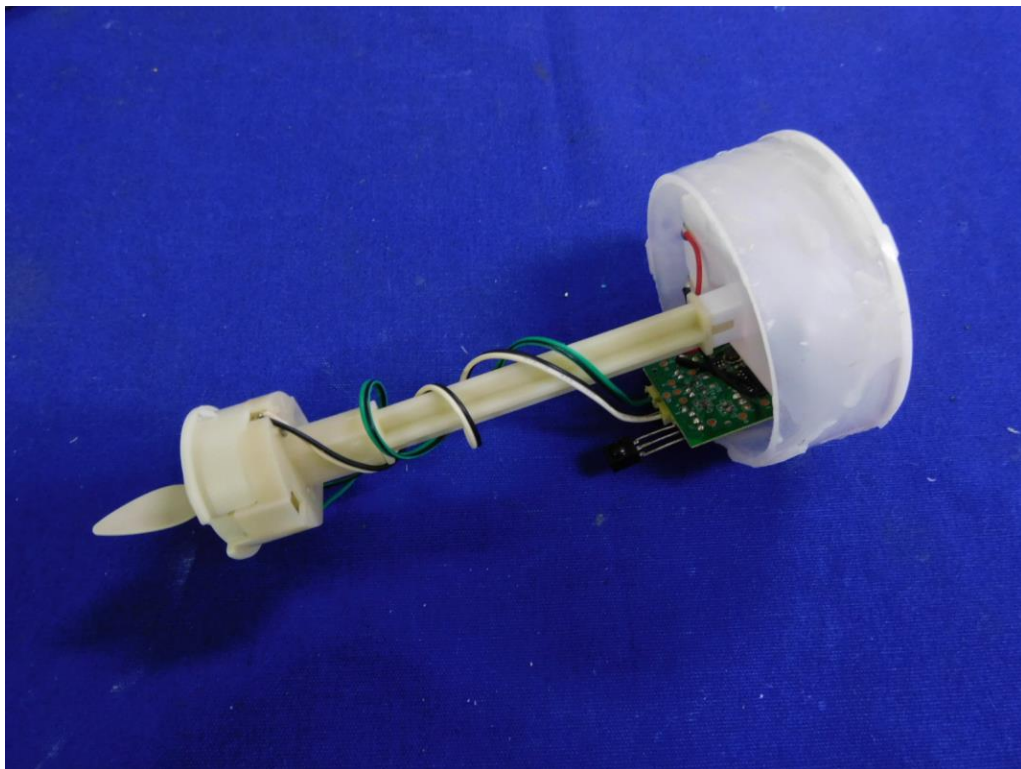
Internal Photo (TX)



Internal Photo (RX)

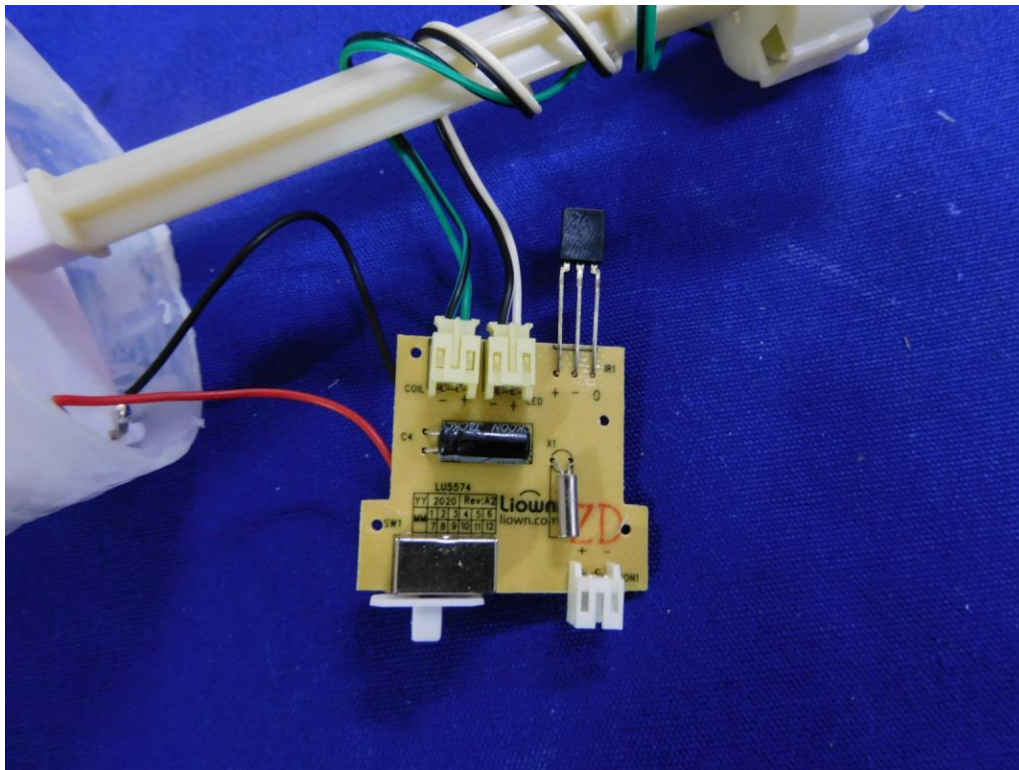


Internal Photo (RX)

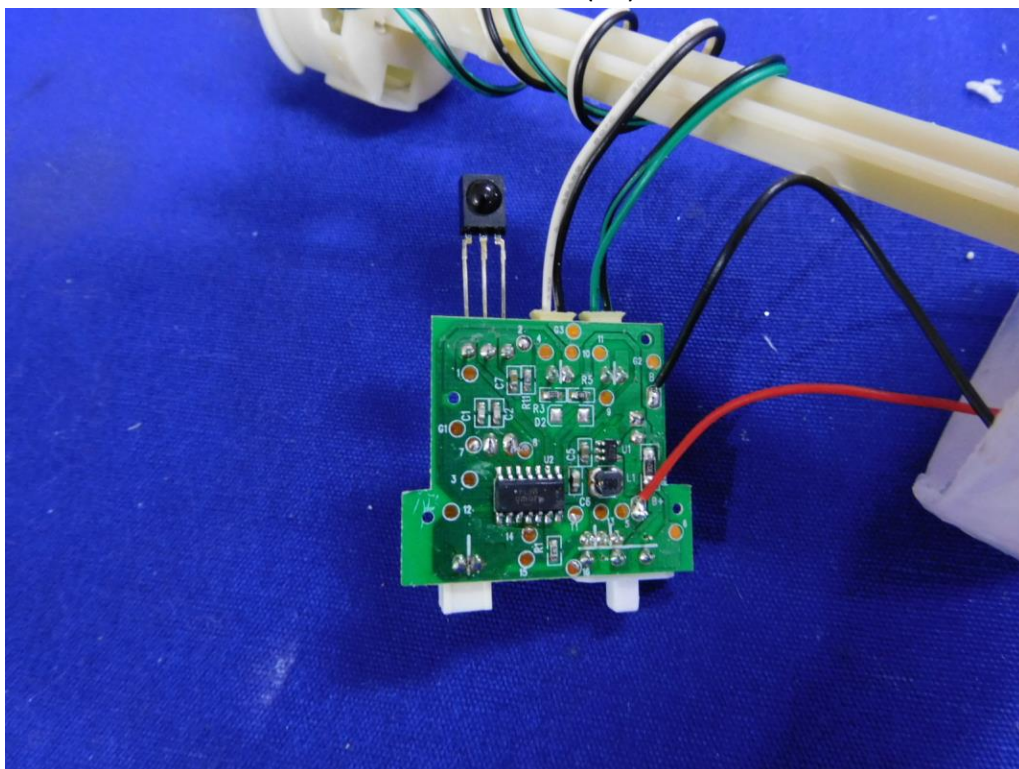




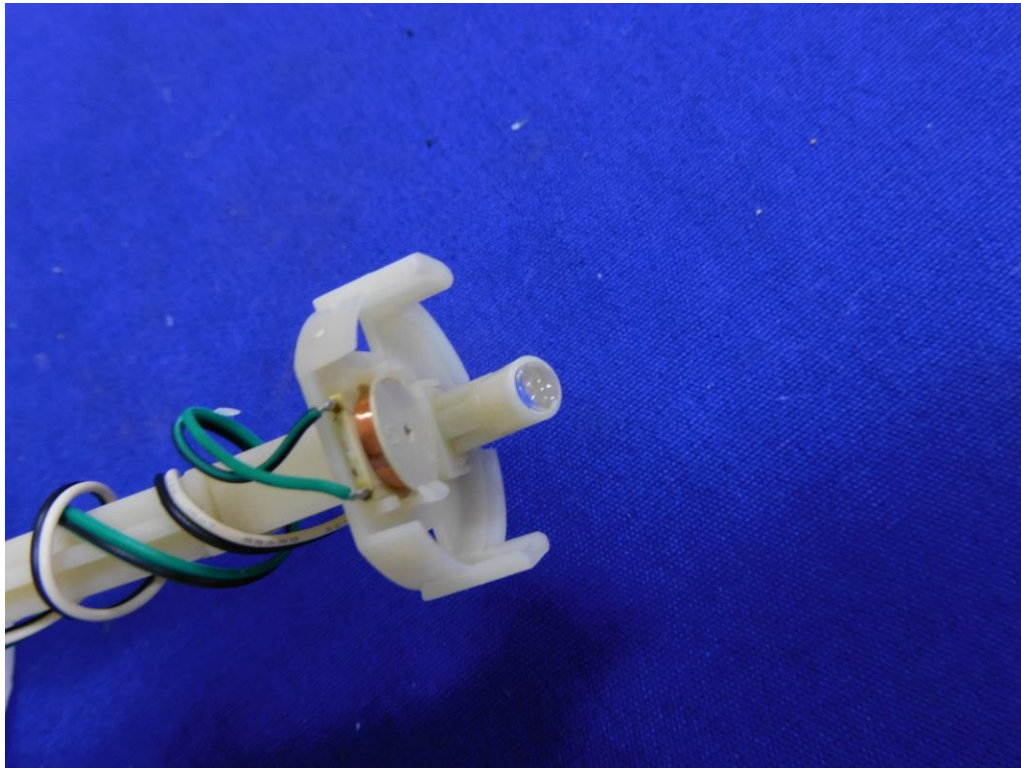
Internal Photo (RX)



Internal Photo (RX)



Internal Photo (RX)



Internal Photo (RX)



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