

**TEST REPORT**  
**IEC 60825-1**  
**Safety of laser products**  
**Part 1: Equipment classification and requirements**

**Report Number** .....: GZES200702262931

**Date of issue** .....: 2020-07-28

**Total number of pages** .....: 12

**Name of Testing Laboratory preparing the Report** .....: SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch  
 198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China

**Applicant's name** .....: Shenzhen Litra Technology Ltd.

**Address** .....: 5/F, Block 2, Tingwei Industrial Park, No. 6 Liufang Road, Baoan District, Shenzhen, Guangdong, China

**Test specification:**

**Standard** .....: IEC 60825-1:2014

**Test procedure** .....: Test Report

**Non-standard test method** .....: N/A

**Test Report Form No.** .....: IEC60825\_1F

**Test Report Form(s) Originator** .....: OVE

**Master TRF** .....: Dated 2019-10-14

**Copyright © 2019 IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE System). All rights reserved.**

This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**General disclaimer:**

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

|                                    |                   |
|------------------------------------|-------------------|
| <b>Test item description</b> ..... | Lidar             |
| <b>Trade Mark</b> .....            | —                 |
| <b>Manufacturer</b> .....          | Same as applicant |
| <b>Model/Type reference</b> .....  | LTME-02A          |
| <b>Ratings</b> .....               | DC 12 V; 5 W      |



|   |   |   |
|---|---|---|
| <b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b> |   |   |
| <input checked="" type="checkbox"/>   | <b>Testing Laboratory:</b>                      | SGS-CSTC Standards Technical Services Co., Ltd.<br>Guangzhou Branch                               |
| <b>Testing location/ address.....:</b>  |   | 198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China |
| <input type="checkbox"/>  | <b>Associated Testing Laboratory:</b>           | N/A   |
| <b>Testing location/ address.....:</b>  |   |   |
| <b>Tested by (name, function, signature) .....</b>  |   | Simon Chen / Project Engineer <i>Simon Chen</i>   |
| <b>Approved by (name, function, signature)....:</b>   |   | Ivory Lu / Reviewer <i>Ivory Lu</i>   |
| <input type="checkbox"/>  | <b>Testing procedure: TMP/CTF Stage 1:</b>      | N/A   |
| <b>Testing location/ address.....:</b>  |   |   |
| <b>Tested by (name, function, signature) .....</b>  |   |   |
| <b>Approved by (name, function, signature)....:</b>   |   |   |
| <input type="checkbox"/>  | <b>Testing procedure: WMT/CTF Stage 2:</b>      | N/A   |
| <b>Testing location/ address.....:</b>  |   |   |
| <b>Tested by (name, function, signature) .....</b>  |   |   |
| <b>Witnessed by (name, function, signature)....:</b>  |   |   |
| <b>Approved by (name, function, signature)....:</b>   |   |   |
| <input type="checkbox"/>  | <b>Testing procedure: SMT/CTF Stage 3 or 4:</b> | N/A   |
| <b>Testing location/ address.....:</b>  |   |   |
| <b>Tested by (name, function, signature) .....</b>  |   |   |
| <b>Witnessed by (name, function, signature)....:</b>  |   |   |
| <b>Approved by (name, function, signature)....:</b>   |   |   |
| <b>Supervised by (name, function, signature) :</b>  |   |   |

|  |  |
|--|--|
| <b>List of Attachments (including a total number of pages in each attachment):</b><br>Attachment 1: Photo documentation (total 3 pages).   |  |
| <b>Summary of testing:</b><br>The product is evaluated to be Class 1 according to IEC 60825-1: 2014. Only Clause 4 & Clause 5 were taken into account.   |  |
| <b>Tests performed (name of test and test clause):</b><br>Clause 4 Classification principles<br>Clause 5 Determination of the accessible emission level and product classification                                     | <b>Testing location:</b><br>SGS-CSTC Standards Technical Services Co., Ltd.<br>Guangzhou Branch<br>198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China |
| <b>Summary of compliance with National Differences:</b><br>—   |  |
| <b>Copy of marking plate</b><br>—  |  |
| <b>Test item particulars:</b><br>Classification of installation and use .....: Portable<br>Supply Connection.....: —<br>Mass of the equipment .....: —   |  |
| <b>Classification of laser product:</b><br>Laser product class of the equipment .....: Class 1   |  |
| <b>Possible test case verdicts:</b><br>- test case does not apply to the test object.....: N/A<br>- test object does meet the requirement.....: P (Pass)<br>- test object does not meet the requirement.....: F (Fail) |  |
| <b>Testing .....</b><br>Date of receipt of test item.....: 2020-07-15<br>Date (s) of performance of tests .....: 2020-07-15 to 2020-07-28  |  |

|   |  |
|---|--|
| <b>General remarks:</b>   |  |
| <p>"(See Enclosure #)" refers to additional information appended to the report.<br/> "(See appended table)" refers to a table appended to the report.</p> <p><b>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</b></p> <p>When determining for test conclusion, measurement uncertainty of tests has been considered.</p> <p>This document is issued by the Company subject to its General Conditions of Service, available on request or accessible at <a href="http://www.sgs.com/en/Terms-and-Conditions.aspx">http://www.sgs.com/en/Terms-and-Conditions.aspx</a> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <a href="http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx">http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx</a>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.</p> |  |
| Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60068-2-2:   |  |
| The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided .....:  | <input type="checkbox"/> Yes<br><input checked="" type="checkbox"/> Not applicable |
| <b>When differences exist; they shall be identified in the General product information section.</b>   |  |
| —   |  |
| Name and address of factory (ies) .....: Same as applicant  |  |
| <b>General product information:</b>   |  |
| The product can emit infrared light when powered.   |  |

| <b>IEC60825-1</b> |  |                 |         |
|-------------------|--|-----------------|---------|
| Clause            | Requirement + Test   | Result - Remark | Verdict |
| <b>4</b>          | <b>CLASSIFICATION PRINCIPLES</b>   |                 |         |
| 4.3               | Classification rules   |                 | —       |
| 4.3a              | Radiation of a single wavelength   |                 | P       |
| 4.3b              | Radiation of multiple wavelengths  |                 | N/A     |
|                   | 1) Laser product emits at two or more wavelengths shown as additive in Table 1   |                 | N/A     |
|                   | 2) Laser product emits at two or more wavelengths not shown as additive in Table 1   |                 | N/A     |
| 4.3c              | Radiation from extended sources (see 5.4.3)  |                 | N/A     |
| 4.3d              | Non-uniform, non-circular or multiple apparent source  |                 | N/A     |
| 4.3 e             | Time bases   |                 | —       |
|                   | 1) 0,25 s  |                 | N/A     |
|                   | 2) 100 s   |                 | P       |
|                   | 3) 30000 s   |                 | N/A     |
| 4.3f              | Repetitively pulsed or modulated lasers  |                 | P       |
|                   | 1) Any single pulse  |                 | P       |
|                   | 2) Average power for pulse trains  |                 | P       |
|                   | 3) Pulse duration $t \leq T_i$ .....:<br>Number of pulses N and $C_5$ .....:   |                 | P       |
|                   | 3) Pulse duration $t > T_i$ .....:<br>Number of pulses N and $C_5$ .....:  |                 | N/A     |
| 4.4               | Laser products designed to function as conventional lamps.   |                 | N/A     |
|                   | $\alpha$ measured at 200 mm distance from closest point of human access ( $\alpha > 5$ mrad).  |                 | N/A     |
|                   | Un-weighted radiance L measured at 200 mm distance (comparison with $L_T = 1 \text{ MWm}^{-2}\text{sr}^{-1}/\alpha$ ) under reasonably foreseeable single fault conditions.  |                 | N/A     |
|                   | Evaluation of emission according to IEC 62471 series (optional):<br>Standard applied (IEC 62471 series).....:<br>Risk Group.....:<br>Labelling.....:<br><br>Classification of product based on accessible laser radiation (if no laser radiation accessible: Class 1). |                 | N/A     |
| <b>5</b>          | <b>DETERMINATION OF THE ACCESSIBLE EMISSION LEVEL and PRODUCT CLASSIFICATION</b>   |                 |         |

| <b>IEC60825-1</b> |   |   |         |
|-------------------|---|---|---------|
| Clause            | Requirement + Test  | Result - Remark                                       | Verdict |
| 5.1               | Tests   |   | —       |
|                   | Compliance under reasonably foreseeable single fault conditions.  |   | P       |
| 5.3               | Determination of the class of the laser product ....:<br>For Class 1C: vertical safety standard applied with requirements for Class 1C. |   | P       |
| 5.4               | Measurement geometry  |   | —       |
| 5.4.1             | General   |   | —       |
| 5.4.2             | Default (simplified) evaluation   |   | P       |
|                   | Conditions applied .....  | Condition 1 and Condition 3                           | P       |
|                   | Aperture diameter .....   | 50 mm (for Condition 1)<br>7 mm (for Condition 3)     | P       |
|                   | Reference point : .....   |   | N/A     |
|                   | Measurement distance .....  | 2000 mm (for Condition 1)<br>100 mm (for Condition 3) | P       |
| 5.4.3             | Evaluation condition for extended sources   |   | —       |
|                   | Conditions applied .....  |   | N/A     |
|                   | Most restrictive position .....   |   | N/A     |
|                   | Angular subtense of the apparent source $\alpha$ and $C_6$ :<br>(for each condition)  |   | N/A     |
| 5.4.3 a           | Aperture diameters (for each condition).....  |   | N/A     |
| 5.4.3b            | Angle of acceptance(for each condition).....  |   | N/A     |
|                   |   |   |         |
| <b>6</b>          | <b>ENGINEERING SPECIFICATIONS</b>   |   | —       |
| <b>7</b>          | <b>LABELLING</b>  |   | —       |
| <b>8</b>          | <b>OTHER INFORMATIONAL REQUIREMENTS</b>   |   | —       |
| <b>9</b>          | <b>ADDITIONAL REQUIREMENTS FOR SPECIFIC LASER PRODUCTS</b>  |   | —       |

| <b>TABLE: Critical components information</b>  |   |                       |                       |                   |   |
|--|---|-----------------------|-----------------------|-------------------|---|
| <b>Object / part No.</b>   | <b>Manufacturer/ trademark</b>            | <b>Type / model</b>   | <b>Technical data</b> | <b>Standard</b>   | <b>Mark(s) of conformity<sup>1)</sup></b> |
| Laser diode  | Shenzhen Raybow Optoelectronics Co., Ltd. | RB-905C-70-25-0.75-SE | 8,2 V; 905 nm         | IEC 60825-1: 2014 | Tested with appliance                     |
| Supplementary information:   |   |                       |                       |                   |   |
| <sup>1)</sup> Provided evidence ensures the agreed level of compliance. See OD-CB2039. |   |                       |                       |                   |   |

## Measured laser radiation, calculations and comparison with AEL limits:

### 1. TEST CONDITIONS

#### (1) General requirement

Temperature: 20 – 25 °C  
Relative humidity: Max. 75 %

#### (2) Normal operation

The Laser is simulating normal operation to emit intentional optical power.

#### (3) Fault condition: Refer to the test result.

### 2. MEASUREMENT METHOD

#### (1) Measurement of Peak wavelength

The peak wavelength of Laser is measured under normal operation, used SPR-5000B spectrometer.

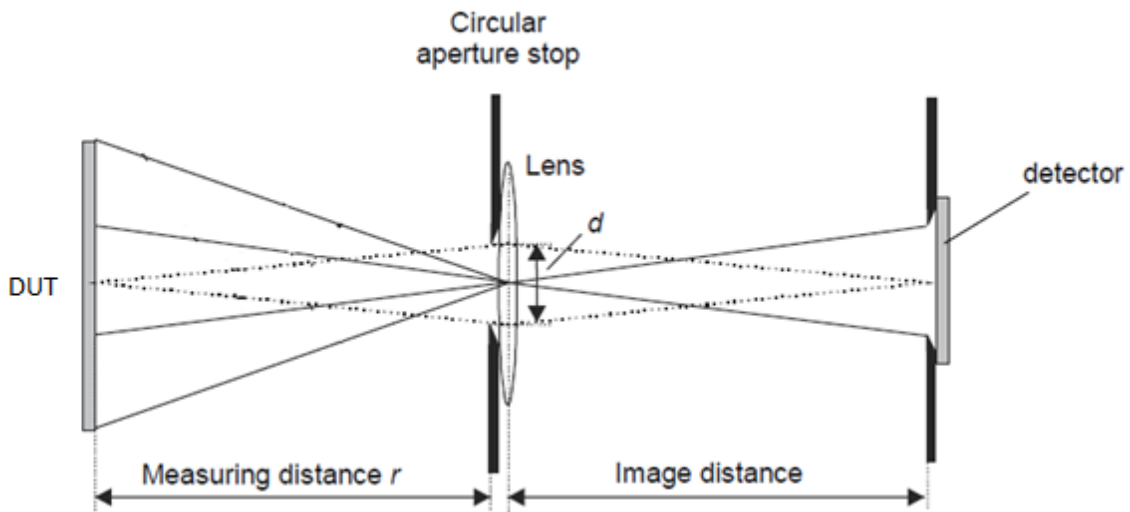
#### (2) Measuring distance

For condition 1:  $r = 2000$  mm.  
For condition 3:  $r = 100$  mm.

#### (3) Measurement of radiant power (used optical power meter)

The radiant power emitted from Laser of the product is measured under normal operation.

In case of condition 1, the Laser radiation is collected through a circular aperture stop having a diameter 50 mm and its location is 2000 mm away from the closet point of human access, consists of a lens with 150 mm focal length. See below picture.



In case of condition 3, same as condition 1 except the Laser radiation is collected through a circular aperture stop having a diameter 7 mm and its location is 100 mm away from the apparent source, and focal length of the lens is 35 mm.

In case of condition Skin Thermal Hazard, Laser radiation is collected through a circular aperture stop having a diameter 3,5 mm and its location is 0 mm away from the apparent source.

The measurement is performed at a position to detect a maximum radiation emitted from the apparent source.



### 3. TEST RESULT

All below measurements were performed at dark room with ambient temperature  $24,5 \pm 0,5$  °C, Relative humidity  $60 \pm 5\%$ , the product was powered by DC 12 V.

(1) Measurement of wavelength  
 $\lambda_1 = 905$  nm (infrared)

(2) Measurement of radiant power

Normal operation:

For condition 1:  
 Obviously, condition 3 was harsher than condition 1 and was not tested.

For condition 3  
 $Q_{\lambda 1} = 1,32 \times 10^{-8}$  J

Single fault condition:

Condition 3:

Fault #1: C9 bridged: not worked, 0 W.

Fault #2: C12 bridged: not worked, 0 W.

Fault #3: C18 bridged: not worked, 0 W.

Fault #4: R2 bridged: not worked, 0 W.

### 4. CLASSIFICATION OF LASER RADIATION

(1) Compare the accessible emission level of radiation emitted from Laser of the product with the accessible emission limit of certain class. This comparison is evaluated using the measurement value under each condition. Accessible emission levels are measurement value or calculated from the measurement value if necessary.

(2) Time base  
 The time base is 100 s.

(3) Correction factor for Laser

For simplified (default) method: Correction factor  $C_4 = 2,57$ ;  $C_5 = 0,6756$ ;  $C_7 = 1$

(4) Comparison with AEL

The pulse width is 5 ns,  $F=300$  pulses in 1 s so  $N = 3000$ :

| Condition   | Evaluation method               | Distance (mm) | AE (J)                  | AEL Class 1  |
|-------------|---------------------------------|---------------|-------------------------|--|
| Condition 3 | Simplified (default) evaluation | 100           | $1,32 \times 10^{-8}$ J | a) $AEL_{single}: 7,7 \times 10^{-8} C_4 J = 1,97 \times 10^{-7} J$<br>b) $AEL_T: 3,9 \times 10^{-4} C_4 C_7 W$ ;<br>So $AEL_{s,p,T} = 3,34 \times 10^{-6} J$<br>c) $AEL_{s,p,train}: AEL_{single} \times C_5 = 1,33 \times 10^{-7} J$ |

Conclusion:

Measured emission energy for infrared laser was not exceed the AEL for Class 1, therefore the product is classified as Class 1 laser product.

Attachment 1: Photo documentation

Details of: View for product

View:

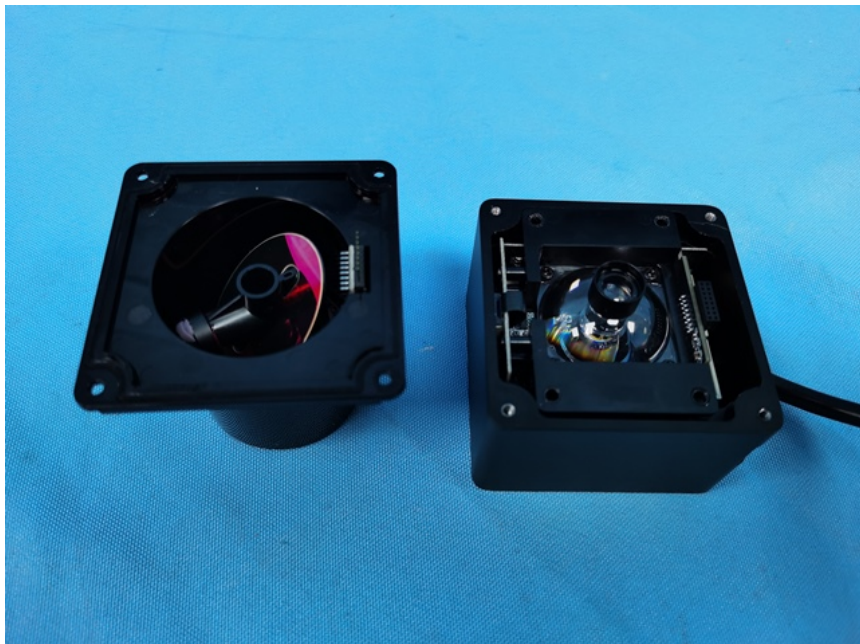
- general
- front
- rear
- right
- left
- top
- bottom
- internal



Details of: Internal view

View:

- general
- front
- rear
- right
- left
- top
- bottom
- internal

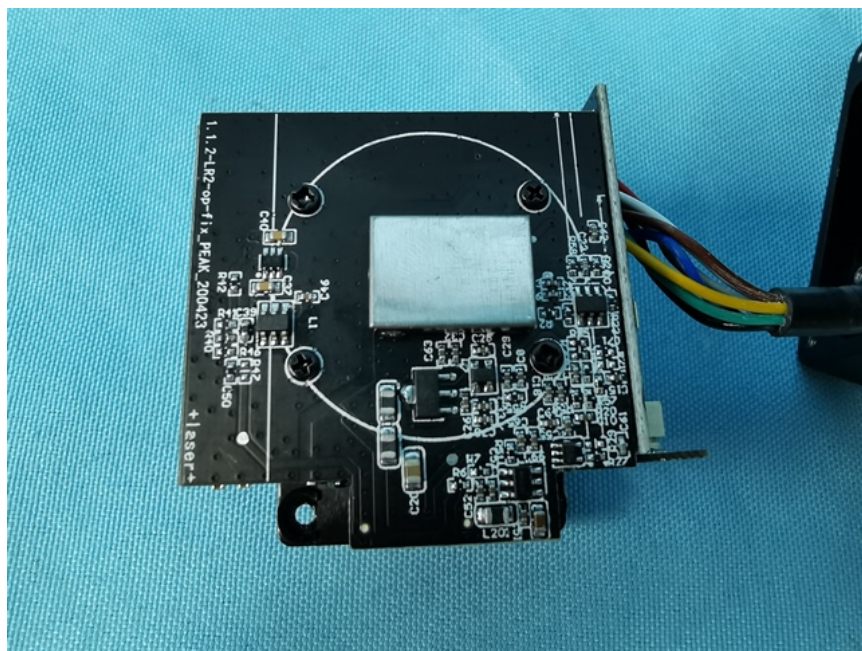


Attachment 1: Photo documentation

Details of: PCB

View:

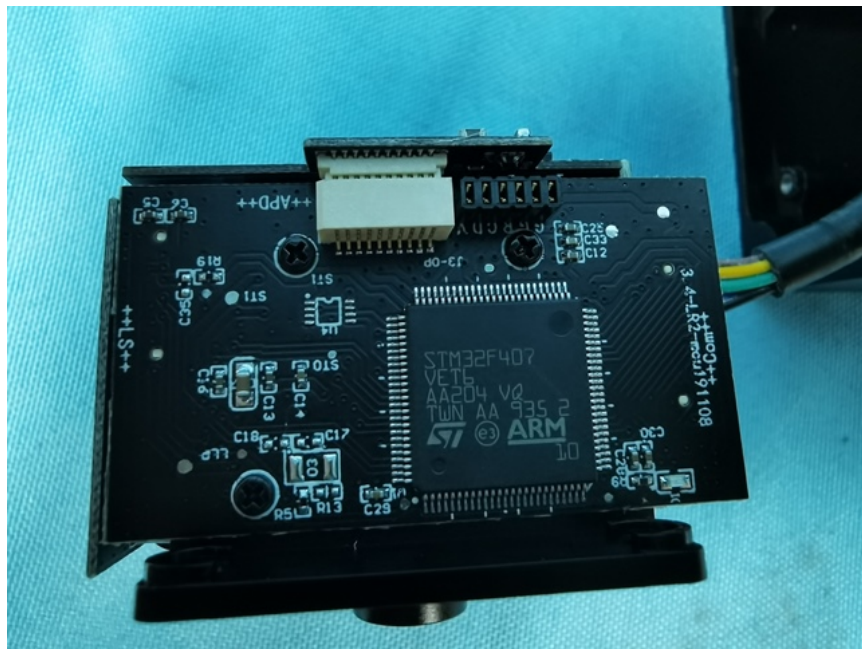
- general
- front
- rear
- right
- left
- top
- bottom
- internal



Details of: PCB

View:

- general
- front
- rear
- right
- left
- top
- bottom
- internal

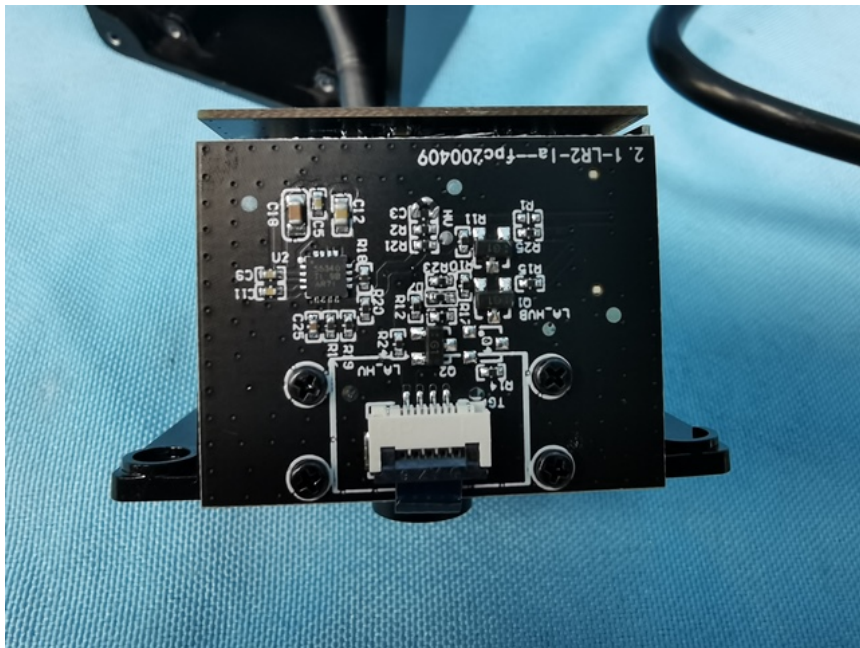


Attachment 1: Photo documentation

Details of: PCB

View:

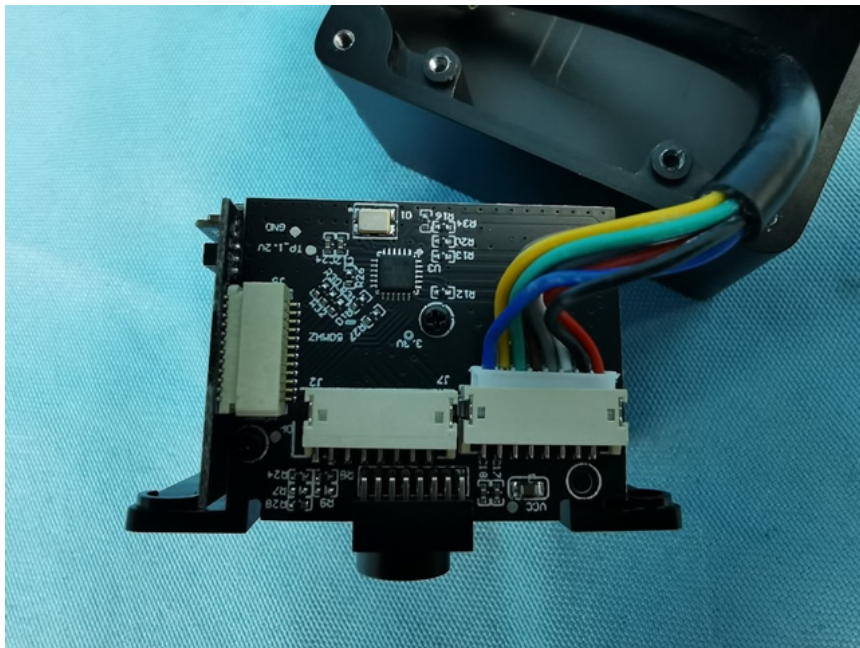
- general
- front
- rear
- right
- left
- top
- bottom
- internal



Details of: PCB

View:

- general
- front
- rear
- right
- left
- top
- bottom
- internal



--- END OF REPORT ---