# TEST REPORT



| | | |
|---|---|---|
| **Applicant** | : | Dongguan Olight E-Commerce Technology Co., Ltd |
| **Applicant Address** | : | 4th Floor Building 4 Kegu Industrial Park No6 Zhongnan Road, Changan Town, Dongguan City ,Guangdong, China |
| **Manufacturer** | : | Dongguan Olight E-Commerce Technology Co., Ltd |
| **Manufacturer Address** | : | 4th Floor Building 4 Kegu Industrial Park No6 Zhongnan Road, Changan Town, Dongguan City ,Guangdong, China |
| **Date of Receipt Sample** | : | Nov.02, 2020 |
| **Testing Period** | : | Nov.02, 2020 to Nov.09, 2020 |
| **Date Of Issue** | : | Nov.11, 2020 |
| **Test Requested** | : | In accordance with the RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863, to determine the 10 restricted substances content in the submitted sample. |
| **Test Conclusion** | : | **Pass** (Based on the performed tests on the submitted samples, the results comply with the requirement of EU RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863). |

******FOR FURTHER DETAILS, PLEASE REFER TO THE FOLLOWING PAGE(S) ******

Signed for and on behalf of
Waltek Testing Group (Shenzhen) Co., Ltd.
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| Tested by: | Reviewed by: | Approved by: |
|---|---|---|
| Charles Wang | Eric Lu | Hugo Chen |

Declaration：The results shown in this test report refer only to the sample(s) tested; this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be considered invalidated without specific seal for test institute and the signatures of compiler and approver.

**Sample Name.....** : Flashlight

**Model No. .....** : Marauder 2, ODIN MINI, Freyr

**Reference Model No. .....** : N/A

**Brand.....** : N/A

**Test Method：**

- IEC 62321-3-1:2013, screening - Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry (XRF)
- IEC 62321-4:2017 for mercury (Hg), analyzed by ICP-OES
- IEC 62321-5:2013 for lead (Pb) and cadmium (Cd), analyzed by ICP-OES
- IEC 62321-7-2:2017 and/or IEC 62321-7-1:2015 for hexavalent chromium ($Cr^{6+}$), analyzed by UV-Vis
- IEC 62321-6:2015 for PBBs and PBDEs, analyzed by GC-MS
- IEC 62321-8:2017 for phthalates, analyzed by GC-MS

**Test Results:**

**1. Lead, Mercury, Cadmium, Hexavalent Chromium, PBBs and PBDEs**

| No. | Part Description | Result of XRF | | | | | Result of Chemical Testing (mg/kg) |
|---|---|---|---|---|---|---|---|
| | | Pb | Cd | Hg | Cr | Br | |
| 1 | Black rubber | BL | BL | BL | BL | BL | NA |
| 2 | White rubber ring | BL | BL | BL | BL | BL | NA |
| 3 | Black rubber ring | BL | BL | BL | BL | BL | NA |
| 4 | Black plastic film w/glue | BL | BL | BL | BL | BL | NA |
| 5 | Transparent hard plastic plate | BL | BL | BL | BL | BL | NA |
| 6 | Black plastic | BL | BL | BL | BL | BL | NA |
| 7 | Black FPC | BL | BL | BL | BL | BL | NA |
| 8 | Black triode SMD | BL | BL | BL | BL | BL | NA |
| 9 | Red plastic wire jacket 1 | BL | BL | BL | BL | BL | NA |
| 10 | Black plastic wire jacket 2 | BL | BL | BL | BL | BL | NA |
| 11 | Red plastic wire jacket 2 | BL | BL | BL | BL | BL | NA |
| 12 | Silvery metal wire core | BL | BL | BL | BL | NA | NA |

| No. | Part Description | Result of XRF | | | | | Result of Chemical Testing (mg/kg) |
|---|---|---|---|---|---|---|---|
| | | Pb | Cd | Hg | Cr | Br | |
| 13 | Black IC SMD | BL | BL | BL | BL | BL | NA |
| 14 | Blue plastic film shell（battery） | BL | BL | BL | BL | BL | NA |
| 15 | Red plastic wire jacket 3 | BL | BL | BL | BL | BL | NA |
| 16 | Black plastic wire jacket 3 | BL | BL | BL | BL | BL | NA |
| 17 | Yellow plastic film adhesive tape（battery） | BL | BL | BL | BL | BL | NA |
| 18 | Black IC SMD 1（battery） | BL | BL | BL | BL | BL | NA |
| 19 | Black IC SMD 2（battery） | BL | BL | BL | BL | BL | NA |
| 20 | Green cladding PCB board（battery） | BL | BL | BL | BL | IN | PBBs：ND<br>PBDEs：ND |
| 21 | Solder（battery） | BL | BL | BL | BL | NA | NA |
| 22 | Silvery metal pole（battery） | BL | BL | BL | BL | NA | NA |
| 23 | Gray thermal conductive silicone | BL | BL | BL | BL | BL | NA |
| 24 | Silvery metal ring | BL | BL | BL | BL | NA | NA |
| 25 | Transport soft material（LED） | BL | BL | BL | BL | BL | NA |

| No. | Part Description | Result of XRF | | | | | Result of Chemical Testing (mg/kg) |
|---|---|---|---|---|---|---|---|
| | | Pb | Cd | Hg | Cr | Br | |
| 26 | White LED body （LED） | BL | BL | BL | BL | BL | NA |
| 27 | Black plastic（LED） | BL | BL | BL | BL | BL | NA |
| 28 | Transparent glass（LED） | BL | BL | BL | BL | BL | NA |
| 29 | Coppery metal | BL | BL | BL | BL | NA | NA |
| 30 | Solder | BL | BL | BL | BL | NA | NA |
| 31 | Black rubber cover 1 ( capacitor ) | BL | BL | BL | BL | BL | NA |
| 32 | Silvery metal shell 1 ( capacitor ) | BL | BL | BL | BL | NA | NA |
| 33 | Black plastic | BL | BL | BL | BL | BL | NA |
| 34 | Black plastic （USB Type-C） | BL | BL | BL | BL | BL | NA |
| 35 | Silvery metal （USB Type-C） | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 36 | Green cladding PCB board | BL | BL | BL | BL | IN | PBBs：ND<br>PBDEs：ND |
| 37 | Solder | BL | BL | BL | BL | NA | NA |
| 38 | Black rubber cover 2（capacitor） | BL | BL | BL | BL | BL | NA |

| No. | Part Description | Result of XRF | | | | | Result of Chemical Testing (mg/kg) |
|---|---|---|---|---|---|---|---|
| | | Pb | Cd | Hg | Cr | Br | |
| 39 | Silvery metal shell 2（capacitor） | BL | BL | BL | BL | NA | NA |
| 40 | Coppery metal coil（Inductance） | BL | BL | BL | BL | NA | NA |
| 41 | Gray solid material（Inductance） | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 42 | Black IC SMD | BL | BL | BL | BL | BL | NA |
| 43 | Black plastic | BL | BL | BL | BL | IN | PBBs：ND<br>PBDEs：ND |
| 44 | Golden cladding metal body | IN | BL | BL | BL | NA | Pb:12100# |
| 45 | Silvery metal spring | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 46 | Black IC SMD | BL | BL | BL | BL | BL | NA |
| 47 | White plastic（socket） | BL | BL | BL | BL | BL | NA |
| 48 | Black plastic（socket） | BL | BL | BL | BL | BL | NA |
| 49 | Black plastic | BL | BL | BL | BL | BL | NA |
| 50 | Golden cladding metal column | IN | BL | BL | BL | NA | Pb:16500# |
| 51 | Black IC SMD | BL | BL | BL | BL | BL | NA |

| No. | Part Description | Result of XRF | | | | | Result of Chemical Testing (mg/kg) |
|---|---|---|---|---|---|---|---|
| | | Pb | Cd | Hg | Cr | Br | |
| 52 | Black cladding metal shell | BL | BL | BL | BL | NA | NA |
| 53 | Blue cladding metal ring | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 54 | Silvery metal body | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 55 | Silvery metal | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 56 | Black cladding metal | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 57 | Black cladding metal screw | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |
| 58 | Silvery metal screw | BL | BL | BL | BL | NA | NA |
| 59 | Golden cladding metal screw | BL | BL | BL | BL | NA | NA |
| 60 | Golden cladding metal | IN | BL | BL | BL | NA | Pb:14700# |
| 61 | Silvery metal body | BL | BL | BL | IN | NA | $Cr^{6+}$：Negative |

**Note:**

(1) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-VIS (for $Cr^{6+}$) and GC-MS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1: 2013 (unit: mg/kg)

| Element | Polymer | Metal | Composite Materials |
|---|---|---|---|
| Cd | BL ≤ (70-3σ) < IN < (130+3σ) ≤ OL | BL ≤ (70-3σ) < IN < (130+3σ) ≤ OL | LOD < IN < (150+3σ) ≤ OL |
| Pb | BL ≤ (700-3σ) < IN < (1300+3σ) ≤ OL | BL ≤ (700-3σ) < IN < (1300+3σ) ≤ OL | BL ≤ (500-3σ) < IN < (1500+3σ) ≤ OL |
| Hg | BL ≤ (700-3σ) < IN < (1300+3σ) ≤ OL | BL ≤ (700-3σ) < IN < (1300+3σ) ≤ OL | BL ≤ (500-3σ) < IN < (1500+3σ) ≤ OL |
| Cr | BL ≤ (700-3σ) < IN | BL ≤ (700-3σ) <IN | BL ≤ (500-3σ) < IN |
| Br | BL ≤ (300-3σ) < IN | -- | BL ≤ (250-3σ) < IN |

BL= Below Limit OL= Over Limit LOD = Limit of Detection -- = Not Regulated

(2) “IN” expresses the inconclusive region, and further chemical testing to confirm whether it complies with the requirement of RoHS Directive.

(3) The XRF screening test for RoHS elements – the reading may be different to the actual content in the sample be of non-uniformity composition.

(4) mg / kg =milligram per kilogram=ppm, μg/cm2= Micrograms per square centimeter.

(5) ND = Not Detected, less than the value of Method Detection Limit.

(6) NA = Not Applicable, as the XRF screening test result was below the limit, it was not need to conduct the chemical testing.

(7) MDL= Method Detection Limit in chemical test.

| Test Items | Pb | Cd | Hg | $Cr^{6+}$ | | PBB | PBDE |
|---|---|---|---|---|---|---|---|
| Units | mg/kg | mg/kg | mg/kg | mg/kg | μg/cm² | mg/kg | mg/kg |
| MDL | 10 | 10 | 10 | 10 | 0.1 | 10 | 10 |

The MDL for single compound of PBBs and PBDEs is 10mg/kg, MDL of $Cr^{6+}$ for polymer and composite sample is 10mg/kg and MDL of $Cr^{6+}$ for metal sample is 0.1μg/cm².

(8) Requirement as per RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863

| Restricted Substances | Limits |
|---|---|
| Cadmium (Cd) | 0.01% (100 mg/kg) |
| Lead (Pb) | 0.1% (1000 mg/kg) |
| Mercury (Hg) | 0.1% (1000 mg/kg) |
| Chromium (VI) ($Cr^{6+}$) | 0.1% (1000 mg/kg) |
| Polybrominated Biphenyls (PBBs) | 0.1% (1000 mg/kg) |
| Polybrominated Diphenyl Ethers (PBDEs) | 0.1% (1000 mg/kg) |

(9) According to IEC 62321-7-1:2015, determined of $Cr^{6+}$ on metal sample by boiling water extraction test method, and result is shown as Positive/Negative.

Boiling water extraction:

Negative = Absence of $Cr^{6+}$ coating, the detected concentration in boiling water extraction solution is less than 0.10μg/cm².

Positive = Presence of $Cr^{6+}$ coating, the detected concentration in boiling water extraction solution is greater than 0.13μg/cm².

Information on storage conditions and production date of the tested sample is unavailable and thus $Cr^{6+}$ results represent status of the sample at the time of testing.

(10) Abbreviation:

"Pb" denotes Lead, "Cd" denotes Cadmium, "Hg" denotes Mercury, "Cr" denotes Chromium, "$Cr^{6+}$" denotes Hexavalent Chromium, "Br" denotes Bromine, "PBBs" denotes Total Polybrominated Biphenyls, "PBDEs" denotes Total Polybrominated Diphenyl Ethers.

(11) #= Sample is copper alloy. The lead content which is under 4% (40000ppm) is exempted from the requirement of RoHS Directive (2011/65/EU).

**2. Phthalates (DEHP, BBP, DBP, DIBP)**

| Serial No. | Part No. | Result (mg/kg) | | | |
|---|---|---|---|---|---|
| | | DIBP | DBP | BBP | DEHP |
| T01 | 3 | ND | ND | ND | ND |
| T02 | 9 | ND | ND | ND | ND |
| T03 | 1+2△ | ND | ND | ND | ND |
| T04 | 10+11△ | ND | ND | ND | ND |
| T05 | 15+16△ | ND | 190 | ND | ND |
| T06 | 13+18+19+20△ | ND | ND | ND | ND |
| T07 | 23+25+26+27△ | ND | ND | ND | ND |
| T08 | 31+34+36+38△ | ND | ND | ND | ND |
| T09 | 33+43+47+48△ | ND | ND | ND | ND |
| T10 | 4+14+17△ | ND | ND | ND | ND |
| T11 | 42+46+49+51△ | ND | ND | ND | ND |
| T12 | 5+6+7+8△ | ND | ND | ND | ND |

**Note:**

(1) mg/kg =milligram per kilogram= ppm.

(2) Requirement as per RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863

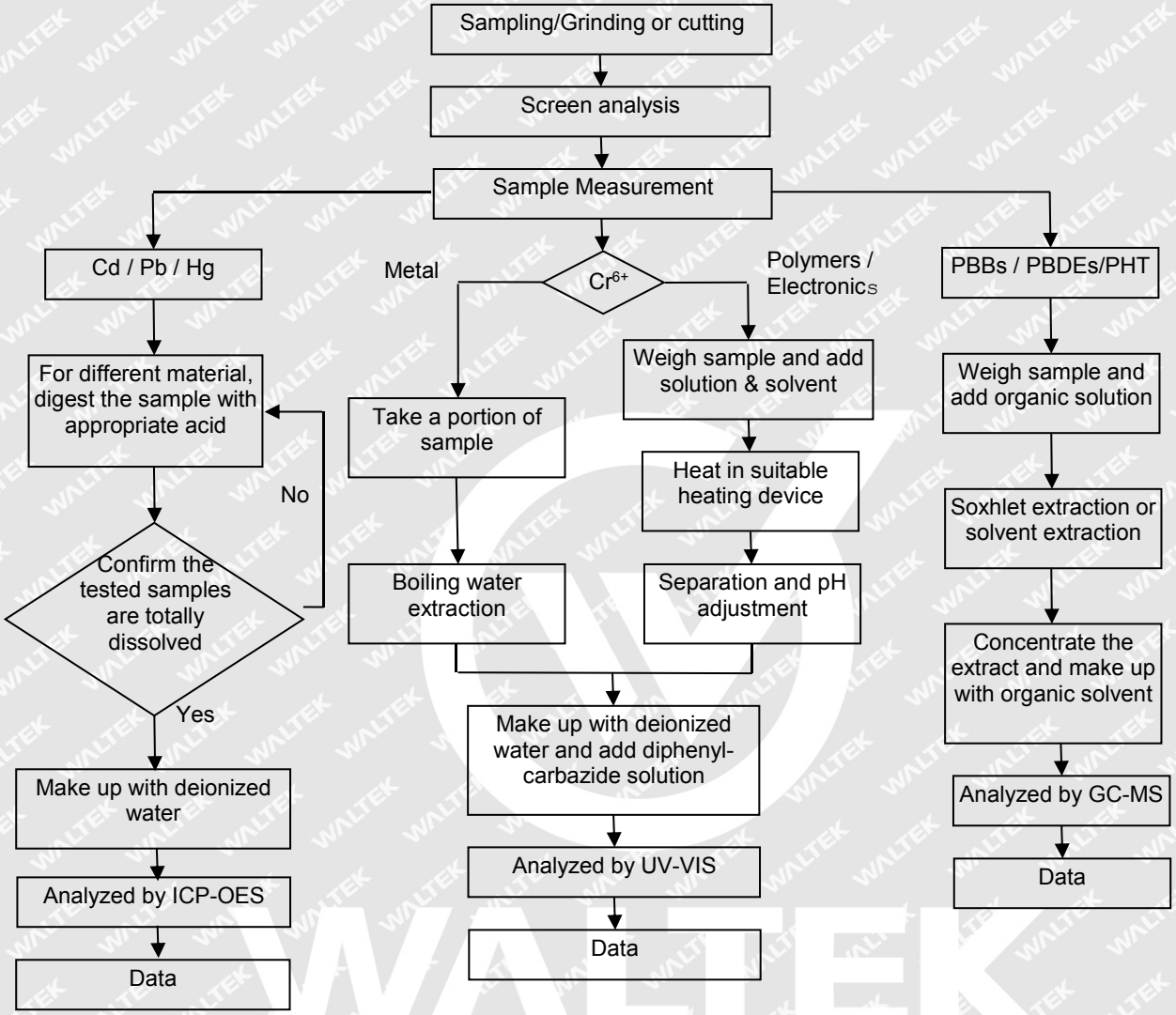
| Test Item(s) | Limit（mg/kg） |
|---|---|
| Bis (2-ethylhexyl)- phthalate (DEHP) | 1000 |
| Dibutyl phthalate (DBP) | 1000 |
| Benzylbutyl phthalate (BBP) | 1000 |
| Diisobutyl phthalate (DIBP) | 1000 |

(3) Abbreviation:
"DBP" denotes Dibutyl phthalate, "BBP" denotes Benzyl butyl phthalate (BBP), "DEHP" denotes Bis(2-ethylhexyl)-phthalate, "DIBP" denotes Diisobutyl phthalate, "PHT" denotes Phthalates.

(4) Method Detection Limit (MDL) : 50mg/kg for each of phthalate.

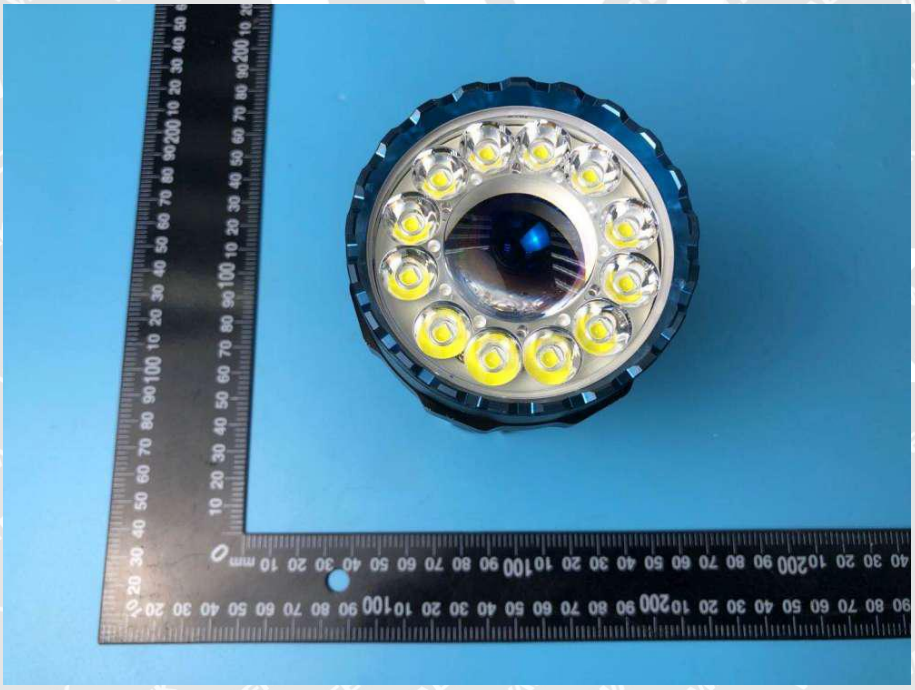
(5) "△"= As client's requirement, the testing was conducted based on mixed components. Results are calculated by the minimum weight of mixed components.

**Measurement Flow chart:**



**Sample Photo:**






OLIGHT


14000lm 330m

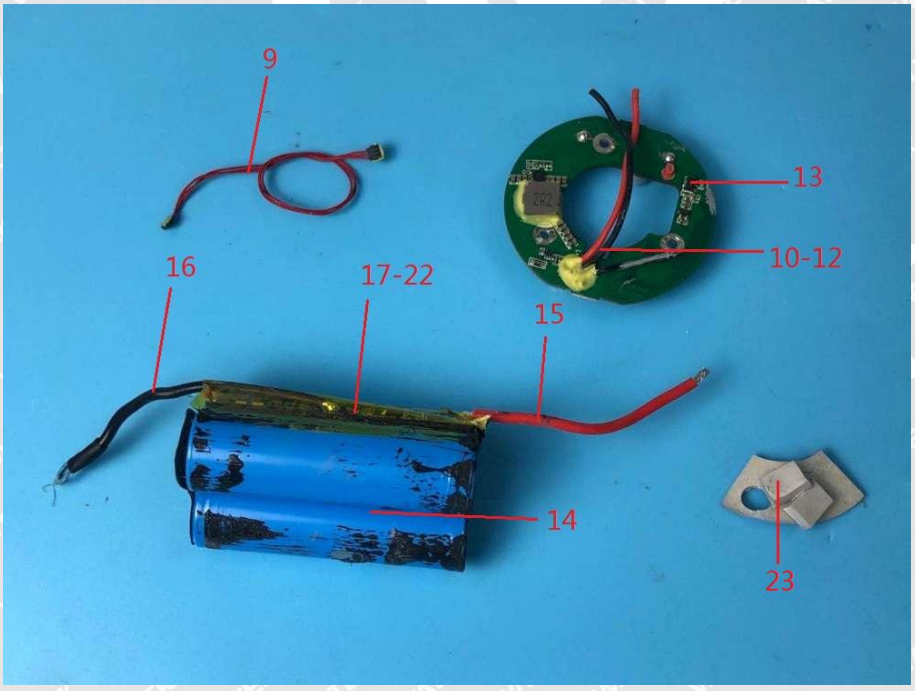


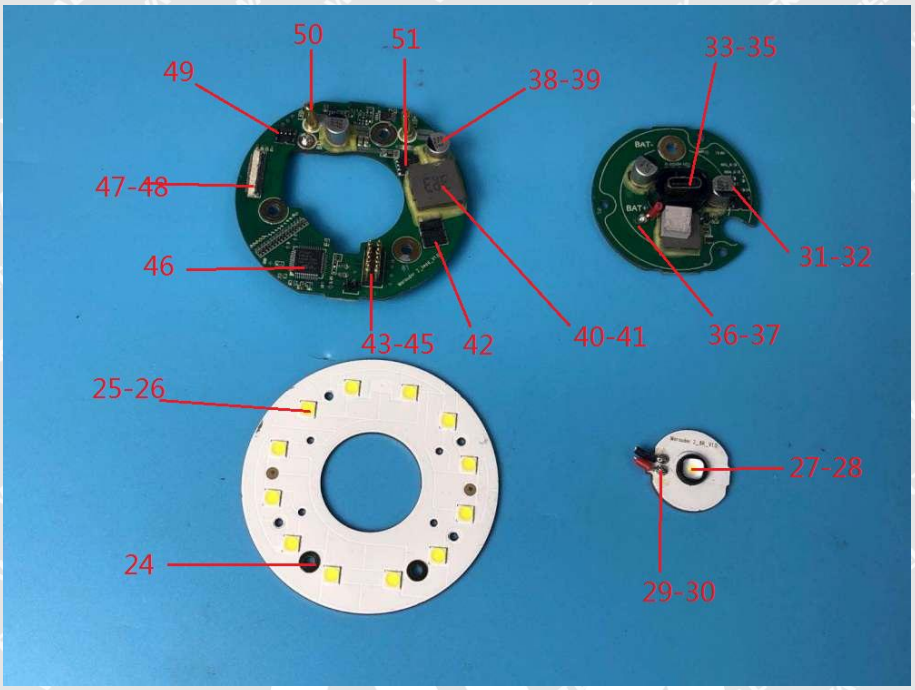



Freyr

**Photograph of parts tested ：**









====== End of Report ======