TEST REPORT

UL 1598: JUNE 18, 2021

Standard for Safety - Luminaires

Report Number.....:	LCSB082222045S
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Manufacture's name.....:	FOSHAN RAYVEN LIGHTING CO., LTD
Address.....:	A1 New Lighting Source Industry Zone, Luocun, Nanhai District, Foshan, Guangdong, China, 528200
Test specification:	
Standard.....:	UL 1598: JUNE 18, 2021
Test procedure.....:	Fractional test
Non-standard test method.....:	N/A
Test item description.....:	LED Ceiling light
Trade Mark.....:	N/A
Test Date.....:	1-Sep-2022 to 23-Sep-2022
Model/Type reference.....:	RAVOLE2600C, RAVOLE2400C, RAVOLE2300C
Ratings.....:	RAVOLE2600C: 120Vac, 60Hz, 50W RAVOLE2400C: 120Vac, 60Hz, 25W RAVOLE2300C: 120Vac, 60Hz, 18W

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Modified Information

Version	Report No.	Revision Date	Summary
V1.0	LCSB082222045S	/	Original Version

General product information:

- This report shall not be reproduced except in full without the written approval of the testing laboratory.
- At client's require, fractional test were conducted and the test results presented in this report relate only to the item tested.
- Unless otherwise specified, the model RAVOLE2600C was selected as representative model to perform all tests.
- The product covered by this report are wall mounted, LED ceiling lights, suitable for damp location.

Critical Component list:

- Canopy: (UR)
Manufacturer: CHI MEI CORPORATION (E56070)
Model: PC-681U(f1)(a)
Technical data: PC, 5VA, 120°C, min.3.0mm thickness. For all models.

- Mounting bar: (UR)
Manufacturer: CHI MEI CORPORATION
Model: PC-681U(f1)(a)
Technical data: PC, 5VA, 120°C, min.3.0mm thickness. For all models.

- Light guide plate: (UR)
Manufacturer: CHI MEI CORPORATION
Model: PC-681U(f1)(a)
Technical data: PC, 5VA, 120°C, min.3.0mm thickness. For all models.

- Light guide plate: (UR)
Manufacturer: Various
Model: Various
Technical data: PC, min. HB, min.80°C, min.1.0mm thickness. For all models.

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Critical Component list:

- Reflector: (UR)
Manufacturer: Various
Model: Various
Technical data: PET, min. HB, min.80°C, min. 0.18mm thickness. For all models.

- Frame: (UR)
Manufacturer: CHI MEI CORPORATION
Model: PC-681U(f1)(a)
Technical data: PC, 5VA, 120°C, min.3.0mm thickness. Used to secure diffuser. For all models.

- Internal wire: (UR)
Manufacturer: Various
Model: Various
Technical data: Min. 300V, min. 105°C, min. 18AWG for Pri. wire and extend min.150mm into outlet box, min.24AWG for Sec. wire. For all models.

- LED driver 1:
Manufacturer: FOSHAN RAYVEN LIGHTING CO., LTD
Model: 18W
Technical data: Input:120Vac, 60Hz, 18W. Non-isolated output. For model RAVOLE2300C.

- LED driver 2:
Manufacturer: FOSHAN RAYVEN LIGHTING CO., LTD
Model: 25W
Technical data: Input:120Vac, 60Hz, 25W. Non-isolated output. For model RAVOLE2400C.

- LED driver 3:
Manufacturer: FOSHAN RAYVEN LIGHTING CO., LTD
Model: 50W
Technical data: Input:120Vac, 60Hz, 50W. Non-isolated output. For model RAVOLE2600C.

-Fuse resistor of LED driver 1: (UR)
Manufacturer: SHENZHEN GREAT ELECTRONICS CO LTD (E301541)
Model: SRF-0.5W
Technical data: 2.2R, 0.5W.

-Fuse of LED driver 2 and LED driver 3: (UR)
Manufacturer: DONGGUAN CHEVRON ELECTRONIC TECHNOLOGY CO LTD (E358589)
Model: SET
Technical data: 3.15A, 250V.

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Critical Component list:

-Alt. Fuse of LED driver 2 and LED driver 3: (UR)
Manufacturer: Dongguan Reomax Electronics Technology Co Ltd (EE340427)
Model: MTS
Technical data: 3.15A, 250V.

- Connector of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: SHENZHEN JUNAD CONNECTOR CO LTD (E496826)
Model: A3961
Technical data: 250Vac, 8A

- Varistor of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: SPD type 5. Min. 150V, min. 105°C,.

- Magnet wire of inductor of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: Min. 130°C.

- Magnet wire of inductor of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: Min. 130°C.

- Insulating tapes of inductor of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: Min. 130°C.

- Triple insulated wire of inductor of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: Min. 130°C.

- Driver PCB of inductor of LED driver 1, LED driver 2 and LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: V-0, Min. 130°C.

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Critical Component list:

- X-cap LED driver 3: (UR)
Manufacturer: Various
Model: Various
Technical data: X2, 0.22uF, min.150Vac, min. 110°C.

- Wire connector: (UL)
Manufacturer: Various
Model: Various
Technical data: Min. 300V, min. 90°C. For all models.

- LED PCB: (UL)
Manufacturer: Various
Model: Various
Technical data: V-0, min.105°C. For all models.

- Label: (UR)
Manufacturer: Various
Model: Various
Technical data: Min. 90°C. Suitable for damp location. For all models.

Markings requirement:

- applicant's name, trade name or trade mark
- model number
- date of manufacture
- electrical ratings

Cautionary Markings:

- SUITABLE FOR DAMP LOCATIONS.
- THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.

Instruction requirements:

- Using circumstance.
- Proper wiring connection method, proper installation method.

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Luminaires [U L 1598: JUNE 18, 2021]

TESTS TO BE CONDUCTED:			
Test No.	Done[3]	Test Name	**[x]** Comments
1.	x	NORMAL TEMPERATURE TEST	Pass
2.	x	MOLD STRESS RELIEF TEST	Pass
3.	x	POLYMERIC SUPPORT TEST	Pass
4.	x	LOADING TEST	Pass
5.	x	IMPACT TEST	Pass
6.	x	DIELECTRIC VOLTAGE-WITHSTAND TEST	Pass

UL 8750 – LIGHT EMITTING DIODE (LED) EQUIPMENT FOR USE IN LIGHTING PRODUCTS [UL 8750: SEPTEMBER 23, 2021]

TESTS TO BE CONDUCTED:			
Test No.	Done[3]	Test Name	**[x]** Comments
7.	x	INPUT TEST	Pass
8.	x	ABNORMAL TESTS – COMPONENT FAILURE TEST	Pass
9.	x	ABNORMAL TESTS – OUTPUT LOADING TEST	Pass
10.	x	ENVIRONMENTAL TEST - HUMIDITY EXPOSURE TEST	Pass

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NORMAL TEMPERATURE TEST FOR MODEL RAVOLE2300C

Input: 120 Vac, 60 Hz, 18.6 W 0.164 A
Remark: The Infrared Thermometer should be used to determine the hottest point of mounting surface.

Result:

Channel	Location	Actual Temp to amb. 25 (°C)	Limit (°C)
101	Input wire of LED driver	52.3	105
102	Output connect of LED driver	60.1	105
103	Varistor	71.6	105
104	C4	78.6	105
105	C8	83.2	105
106	T2 winding	96.5	130
107	Mounting bar	45.8	120
108	Diffuser, inside	56.4	80
109	LED PCB	66.9	105
110	Enclosure, near LED	65.1	120
111	Mounting surface	36.5	90
112	Marking	33.2	90
113	Ambient	25.0	-

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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NORMAL TEMPERATURE TEST FOR MODEL RAVOLE2400C

Input: 120 Vac, 60 Hz, 25.0 W 0.210 A
Remark: The Infrared Thermometer should be used to determine the hottest point of mounting surface.

Result:

Channel	Location	Actual Temp to amb. 25 (°C)	Limit (°C)
101	Input wire of LED driver	55.1	105
102	Output connect of LED driver	62.3	105
103	Fuse	73.4	100
104	Varistor	77.5	105
105	C23	86.5	105
106	C5	92.6	105
107	L7 winding	98.2	130
108	Mounting bar	56.5	120
109	Diffuser, inside	65.3	80
110	LED PCB	72.2	105
111	Enclosure, near LED	70.3	120
112	Mounting surface	42.3	90
113	Marking	34.8	90
114	Ambient	25.0	-

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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NORMAL TEMPERATURE TEST FOR MODEL RAVOLE2600C

Input: 120 Vac, 60 Hz, 51.4 W 0.433 A
Remark: The Infrared Thermometer should be used to determine the hottest point of mounting surface.

Result:

Channel	Location	Actual Temp to amb. 25 (°C)	Limit (°C)
101	Input wire of LED driver	62.8	105
102	Output connect of LED driver	66.2	105
103	Fuse	83.4	100
104	Varistor	90.3	105
105	CX1	92.7	110
106	C24	98.4	105
107	C5	94.2	105
108	L6 winding	100.3	130
109	Mounting bar	58.6	120
110	Diffuser, inside	70.3	80
111	LED PCB	78.2	105
112	Enclosure, near LED	75.9	120
113	Mounting surface	44.6	90
114	Marking	38.5	90
115	Ambient	25.0	-

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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MOLD STRESS RELIEF TEST

Method:

A sample of the complete thermoplastic enclosure shall be placed in a circulating air oven and maintained at a temperature 10 °C higher than the maximum temperature measured on the surface of the enclosure during the normal temperature test but in no case less than 70 °C, for a period of 7 h.

Results:

- ✧ The test temperature is 86 ºC.
- ✧ After the sample has cooled to room temperature, the sample shall (☒ **did** / ☐ **did not**) comply with the applicable requirements of this Standard.

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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POLYMERIC SUPPORT TEST

Method:

A polymeric part shall support for 1 minute, without distortion, four times the weight of a part (4 x 2.91= 11.64 Kg) it is relied upon to suspend in its intended application.
The test shall be performed in an oven maintained at a temperature 10 °C higher than the maximum normal operating temperature of the polymeric part measured during the normal temperature test of Clause 14. The test temperature is 70 °C;
A polymeric part shall be installed as intended, with the weight evenly distributed.

Results:

✧ There (☒ **was no** / ☐ **was**) distortion during and after the test.

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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LOADING TEST

Method:

A supporting device shall support for 1 hour a load equal to 4 times of the mass to be supported under intended operating conditions. Load shall be applied in the direction of actual loading conditions.
Where more than one support is provided, the load shall be distributed as follows:
(a) where the parts supported are no more than 11.3 kg (25 lb), the full load shall be applied to each support; or
(b) where the parts supported are more than 11.3 kg (25 lb), the distribution of the load shall be similar to that encountered in the field.

Whole Weight (Kg)	Test Weight (Kg)
2.91	11.64

Results*:*

✧ There (☒ **was no /** ☐ **was**) deflection or deformation either during or after loading that reduces electrical spacing or compromises safety.

Overall Comments:

This result (☒ **did /** ☐ **did not**) comply with the requirement.

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IMPACT TEST

Method:

- The sample luminaires shall be held in place and subjected to a single 7 J (5 ft·lb) impact, using the impact test apparatus described in Clause 19.21, falling through a vertical height of 1.29 m (4.24 ft), on surfaces being tested. The test samples shall be conditioned by placing them in a conditioning environment in accordance with Table 17.41.1 for at least 3 h prior to the test.

Table 16.41.1
Sample conditioning

Location marking	Preconditioning temperature
Dry	23 ± 2.0 C
Damp	0.0 ± 2.0 C
Wet	-35 ± 2.0 C

- The number of samples and the sequence of the procedure shall be in accordance with Figure 17.2.3.1.

Figure 16.2.3.1
Procedure for impact test
(See Clause 16.2.3.2.)

Series Number	Sample Number											
	1	2	3	1	2	3	1	2	3	1	2	3
1	A	N	N	A	N	N	A	N	N	A	N	N
2	A	N	N	A	N	N	U	A	N	U	A	N
3	A	N	N	U	A	N		A	N		U	A

NOTES
(1) Arrows indicate sequence of test procedure.
(2) A indicates acceptable results from drop.
(3) U indicates unacceptable results from drop.
(4) N indicates that no test is necessary.

Results:

- ✧ There (☒ **was not** / ☐ **was**) any visible damage to the enclosure of the unit that would result in the exposure of live parts as determined by contact with the accessibility probe.
- ✧ There (☒ **was not** / ☐ **was**) any damaged to the enclosure of the unit that would result in an increase in the risk of electric shock as determined by compliance with the Dielectric Voltage-Withstand Test.
- ✧ There (☒ **was not** / ☐ **was**) any cracking or denting of the enclosure of the unit that would affect the function of any safety controls or constructional features.

Remark: Damp locaion, Preconditioning temperature 0 °C.
Test part: Diffuser, canopy, enclosure, frame.

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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DIELECTRIC VOLTAGE-WITHSTAND TEST

Test voltage: 1240V 60Hz for all models

Method:

- A luminaire shall withstand for a period of **1 minute**, without breakdown, a test potential applied between live parts and accessible non-current-carrying metal parts, including parts accessible only during relamping.
- The test potential shall be 1000 V for incandescent-type luminaires and 1000 V plus twice the rated input voltage for all other types of luminaire.
- The applied potential shall be gradually increased from zero at a uniform rate until the required test value is reached or breakdown occurs. During the test, any switches or other controls shall be in the ON position.
- The test shall be performed on a fully assembled luminaire. Non-current-carrying parts or decorative parts not likely to become energized shall not be required to be in place.
- Solid state components that are not relied upon to reduce the risk of electric shock and that can be damaged by the applied dielectric potential may be disconnected for the test. The circuitry may be rearranged for the purpose of the test to reduce the likelihood of solid state component damage while retaining the representative dielectric stress on the circuit.

Results:

✧ During the above test, (☒ **no breakdown** / ☐ **breakdown**) occurred.

Overall Comments:

This result (☒ **did** / ☐ **did not**) comply with the requirement.

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INPUT TEST

Method:

The input current (or wattage, if so rated) of a LED array, module, or package shall be measured at rated input voltage.

The input current (or wattage, if so rated) of a LED controller or driver shall be measured at rated input voltage and supplying rated load.

Results:

Model No.	Input, Vac/Hz	Input, A	Input, W	Limited, W
RAVOLE2600C	120/60	0.433	51.4	55
RAVOLE2400C	120/60	0.210	25.0	27.5
RAVOLE2300C	120/60	0.164	18.6	19.8

The measured input wattage, which (☒ **did not/** ☐ **did**) exceed the 110% rated value.

Overall Comments:

This result (☒ **did /** ☐ **did not**) comply with the requirement.

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ABNORMAL TEST – COMPONENT FAILURE TEST

Method:

A unit shall not exhibit a risk of fire or electric shock when a simulated short circuit is imposed on electrolytic capacitors or semiconductor devices.

Each electrolytic capacitor and semiconductor device is to be short circuited, one at a time (one fault per test). Each test shall continue until either the unit is no longer operable, or until conditions are obviously stable (as determined by no visual changes or detectable thermal increase) for at least 30 minutes.

Results:

For LED driver 1: Input: 120V, 60Hz

Component	Action (S/C or O/C)	Results (Rating, Observation)
BD1	S/C	Fuse open.
CB1	S/C	Fuse open.
C4	S/C	Circuit protected. Unit shut down. No fire, No hazard and recoverable.
C6	S/C	Circuit protected. Unit shut down. No fire, No hazard and recoverable.
D4	S/C	Working Normally. No fire, No hazard and recoverable.
D8	S/C	Working Normally. No fire, No hazard and recoverable.

For LED driver 2: Input: 120V, 60Hz

Component	Action (S/C or O/C)	Results (Rating, Observation)
BD1	S/C	Fuse open.
C5	S/C	Circuit protected. Unit shut down. No fire, No hazard and recoverable.
C8	S/C	Fuse open.
D2	S/C	Circuit protected. Unit shut down. No fire, No hazard and recoverable.
D5	S/C	Working Normally. No fire, No hazard and recoverable.

For LED driver 3: Input: 120V, 60Hz

Component	Action (S/C or O/C)	Results (Rating, Observation)
BD1	S/C	Fuse open.
CB1	S/C	Fuse open.
C21	S/C	Fuse open.
C5	S/C	Circuit protected. Unit shut down. No fire, No hazard and recoverable.
D5	S/C	Working Normally. No fire, No hazard and recoverable.
D2	S/C	Working Normally. No fire, No hazard and recoverable.

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ABNORMAL TEST – COMPONENT FAILURE TEST (Continue)

The ground fuse (☒ **did not/** ☐ **did**) open;
The cheesecloth (☒ **did not/** ☐ **did**) charred;
There (☒ **were not/** ☐ **were**) emission of flame or molten material from the unit;
There (☒ **were not/** ☐ **were**) ignition or dripping of a compound from the unit;
There (☒ **were not/** ☐ **were**) exposure of live parts that pose a risk of electric shock;
There (☒ **were not/** ☐ **were**) breakdown during the subsequent dielectric voltage withstand test.

Overall Comments:

This result (☒ **did /** ☐ **did not**) comply with the requirement.

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ABNORMAL TEST – OUTPUT LOADING TEST

Method:

A circuit protector provided as part of the unit is to remain in the circuit, and a user replaceable fuse is to be replaced by the largest fuse the fuseholder will accept.

A manually reset protector is to be operated for 10 cycles and the protector contacts shall be operative upon completion of the test. If an automatic reset protector is provided, or the input current is a value other than zero, the test is to be continued for:

a) 7 hours, or

b) 15 days if required in accordance with 7.11.2.4.

For units with more than one output, the remaining outputs are to be open circuited or loaded to rated conditions, whichever results in a more severe operating condition.

Each output is to be short-circuited in turn.

Each output is to be overloaded in turn. Each overload condition is to be conducted with the output loaded to a current (IL) equal to the rated current (IR) plus X percent of the difference between the maximum obtainable output current (Imax) and the rated output current (IR). In the tests, the values of X are to be 100, 75, 50, 25, 20, 15, 10, and 5, in that order. If a load current results in continuous operation, further tests need not be conducted. For each test, a variable resistance load is to be adjusted to the required value and readjusted, if necessary, one minute after application of the source of supply.

IL=IR + X (Imax – IR)/100 X= 100, 75, 50, 25, 20, 15, 10, 5

Results: Input: 120Vac, 60Hz

☒ For Item 1:

Model	Ambient (°C)	Test Condition	Test Duration	Observations
LED driver 1	25.0	SC output	7hours	Pass. No fire, No hazard.
LED driver 2	25.0	SC output	7hours	Pass. No fire, No hazard.
LED driver 3	25.0	SC output	7hours	Pass. No fire, No hazard.

☒ For Item 2:

Model	Ambient (°C)	Test Condition	Test Duration	Observations
LED driver 1	25.0	Load at max. Output current	7hours	Pass. No fire, No hazard. Working normally.
LED driver 2	25.0	Load at max. Output current	7hours	Pass. No fire, No hazard. Working normally.
LED driver 3	25.0	Load at max. Output current	7hours	Pass. No fire, No hazard. Working normally.

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ABNORMAL TEST – OUTPUT LOADING TEST (Continue)

The temperature of the enclosure (☒ **did not/** ☐ **did**) exceed 90°C during short-output test.
The ground fuse (☒ **did not/** ☐ **did**) open;
The cheesecloth (☐ **did not/** ☐ **did**) charred;
There (☒ **were not/** ☐ **were**) emission of flame or molten material from the unit;
There (☒ **were not/** ☐ **were**) ignition or dripping of a compound from the unit;
There (☒ **were not/** ☐ **were**) exposure of live parts that pose a risk of electric shock;
There (☒ **were not/** ☐ **were**) breakdown during the subsequent dielectric voltage withstand test.

Overall Comments:

This result (☒ **did /** ☐ **did not**) comply with the requirement.

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HUMIDITY EXPOSURE TEST

Method:

A unit intended for use in damp or wet locations shall be exposed for 168 hours to moist air having a relative humidity of 88 ±2 percent at a temperature of 32.0 ±2.0°C (89.6 ±3.6°F).

A unit intended only for damp locations is to be subject to the dielectric voltage withstand test.

Results:

✧ There (☒ **could/** ☐ **could not**) withstand the dielectric voltage-withstand test after the conditions.

Overall Comments:

This result (☒ **did /** ☐ **did not**) comply with the requirement.

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Attachment No.1

Photo Documentation

Photo 1 - External view of model RAVOLE2600C

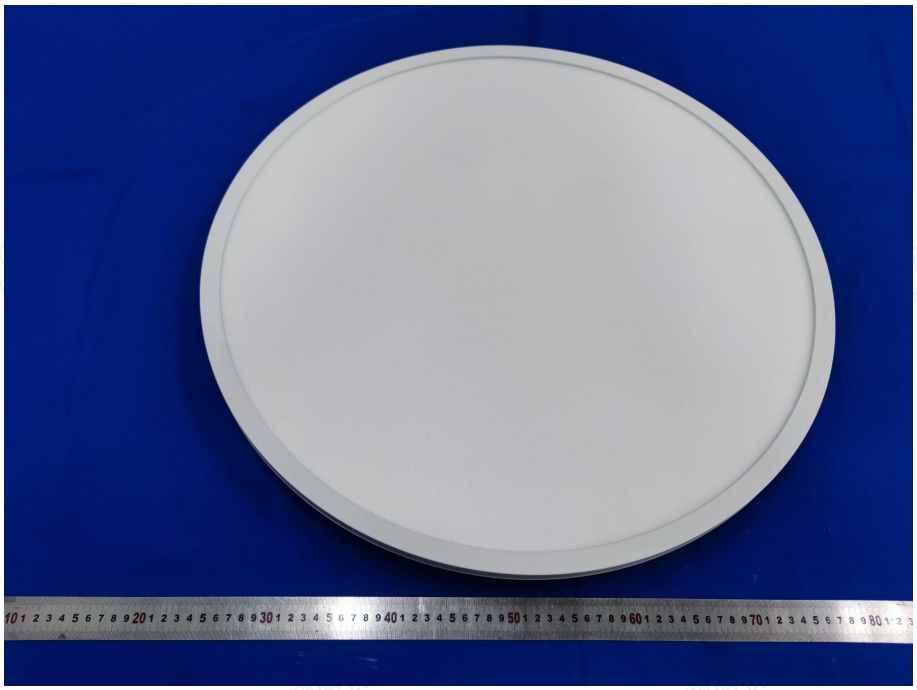

Photo 2 - External view of model RAVOLE2600C

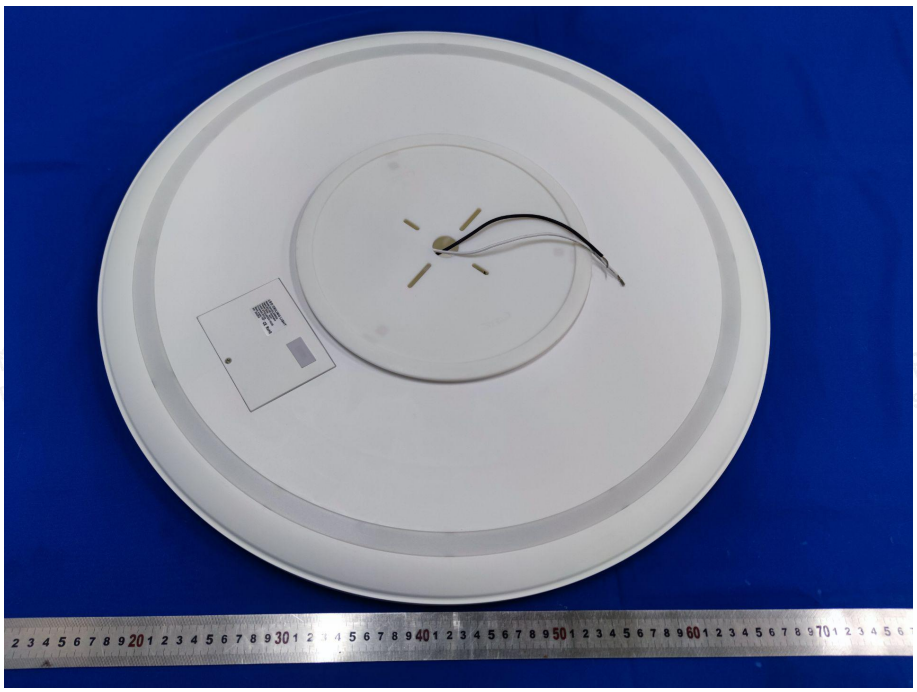

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Photo 3 - External view of model RAVOLE2400C

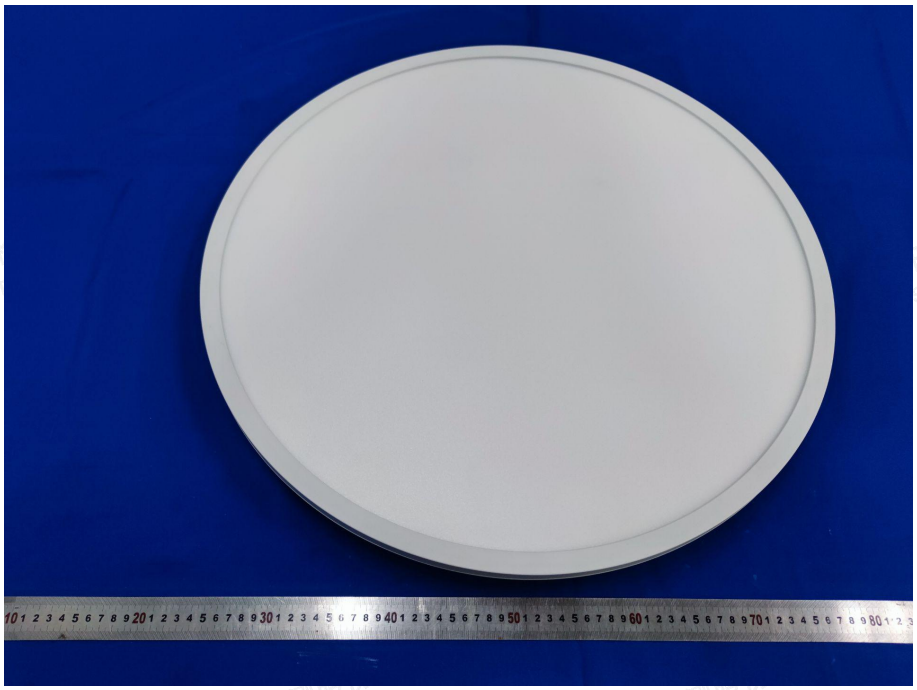

Photo 4 - External view of model RAVOLE2400C

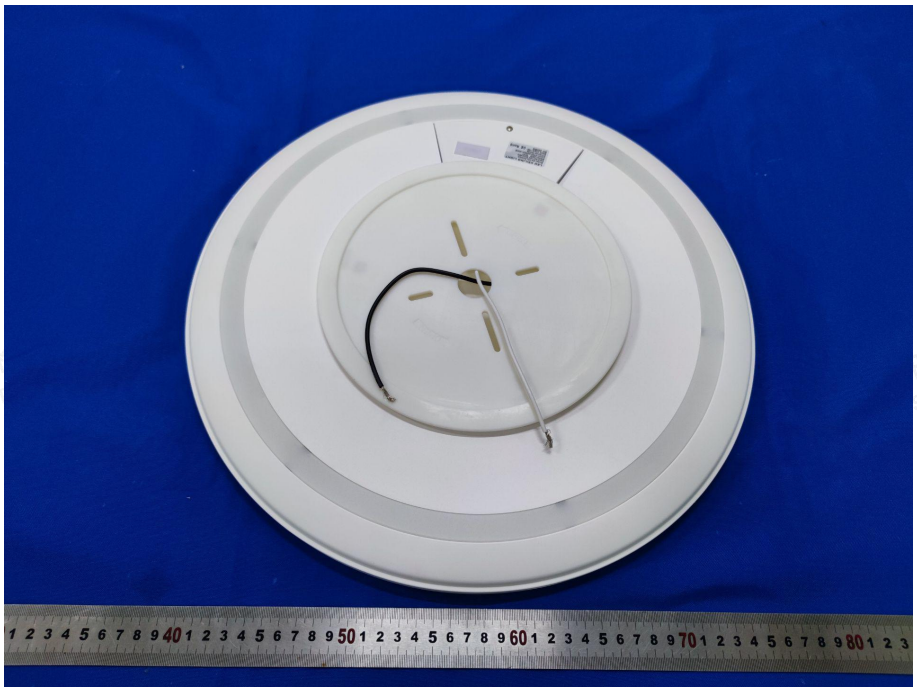

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Photo 5 - External view of model RAVOLE2300C

Photo 6 - External view of model RAVOLE2300C

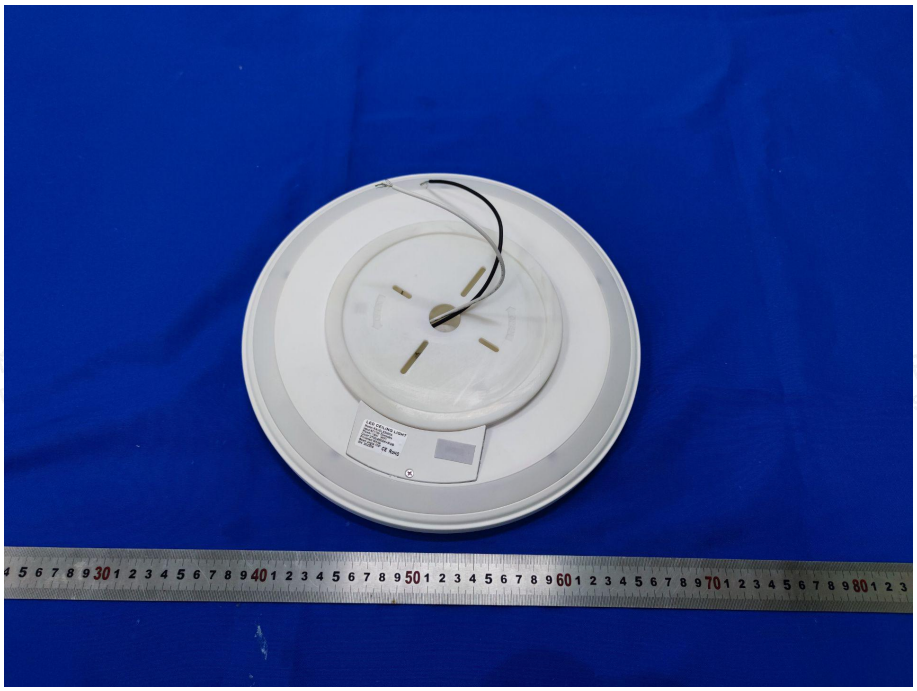

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Photo 7 - Internal view of model RAVOLE2600C, also represents others

Photo 8 - Internal view of model RAVOLE2600C, also represents others

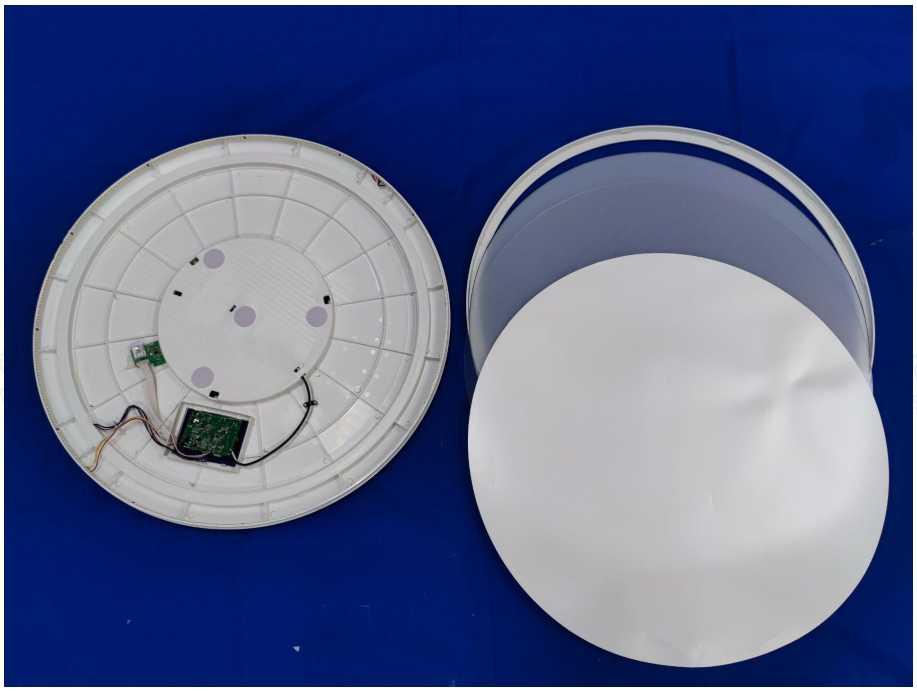

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Photo 9 - Internal view of model RAVOLE2600C, also represents others

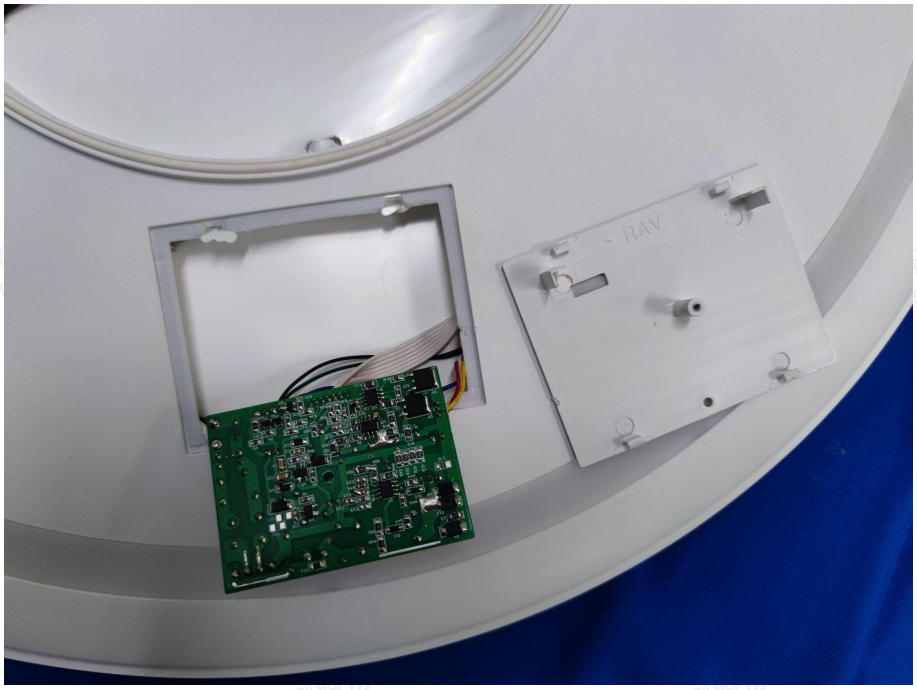

Photo 10 - Internal view of model RAVOLE2600C, also represents others

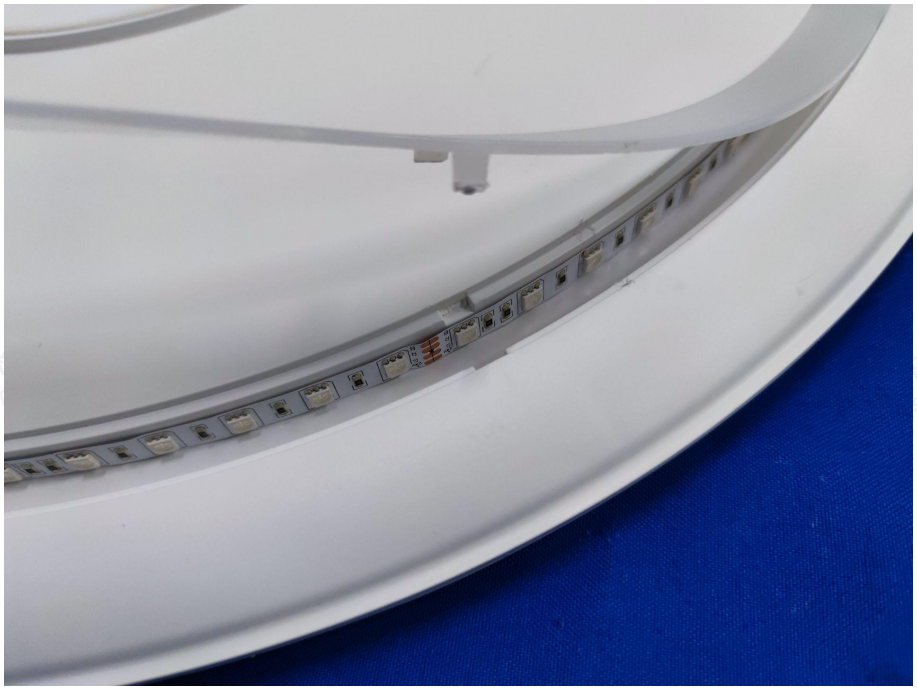

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Photo 11 - Internal view of model RAVOLE2600C, also represents others

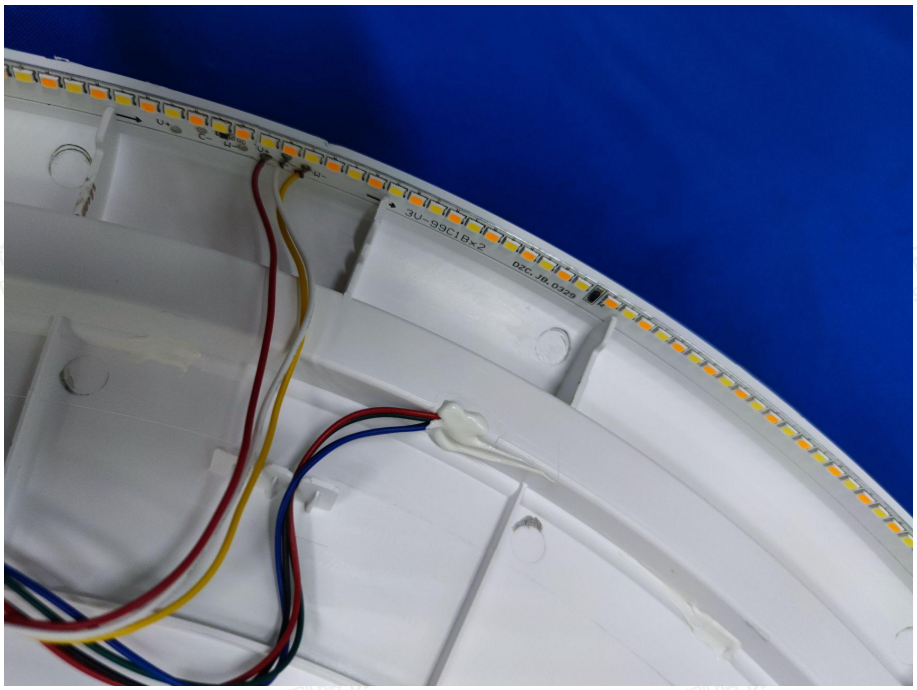

Photo 12 - LED driver 1 view of model RAVOLE2300C

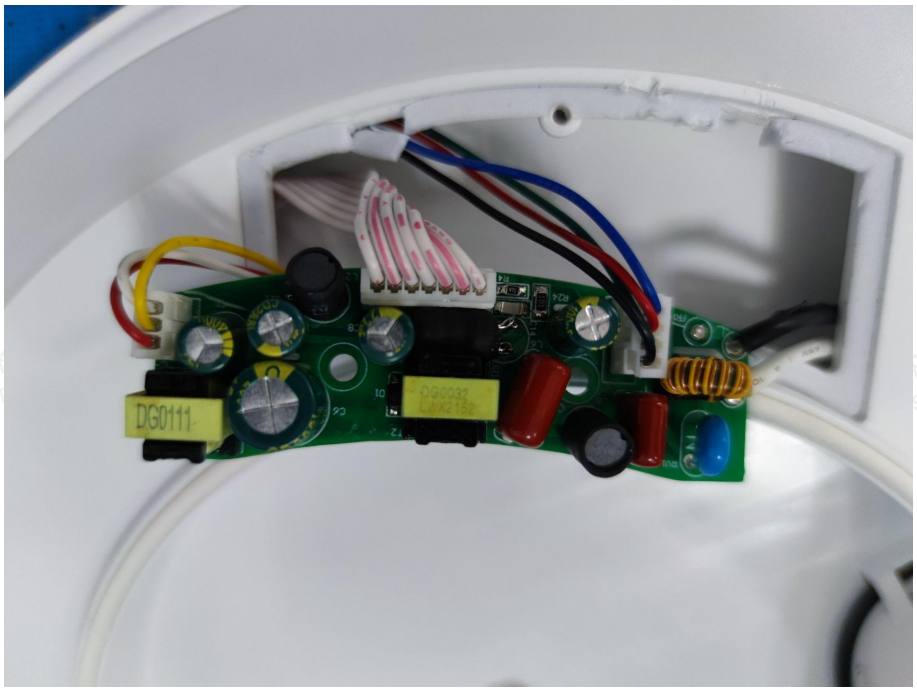

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Photo 13 - LED driver 1 view of model RAVOLE2300C

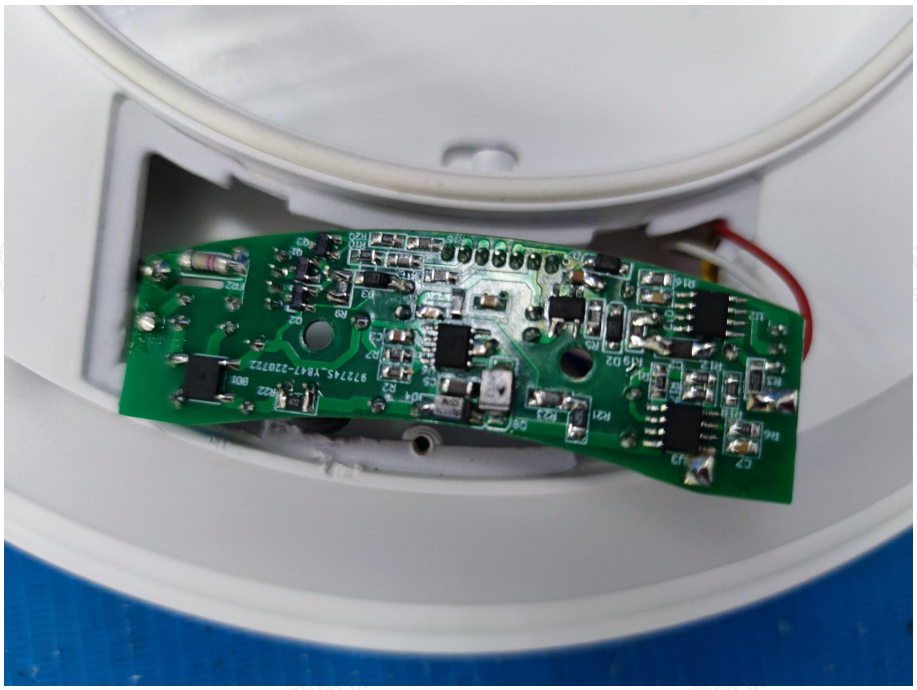

Photo 14 - LED driver 2 view of model RAVOLE2400C

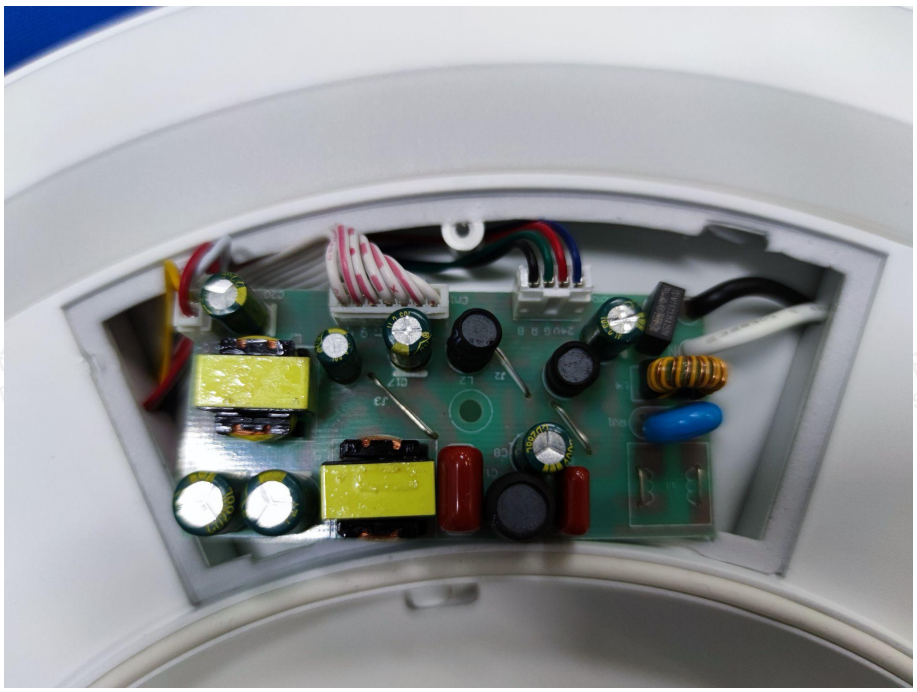

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Photo 15 - LED driver 2 view of model RAVOLE2400C

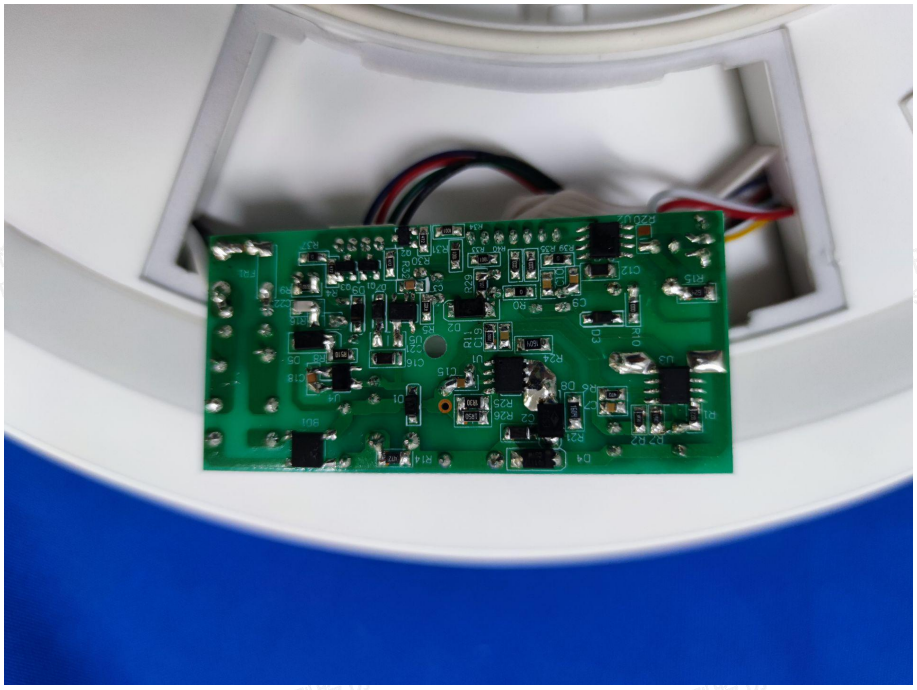

Photo 16 - LED driver 3 view of model RAVOLE2600C

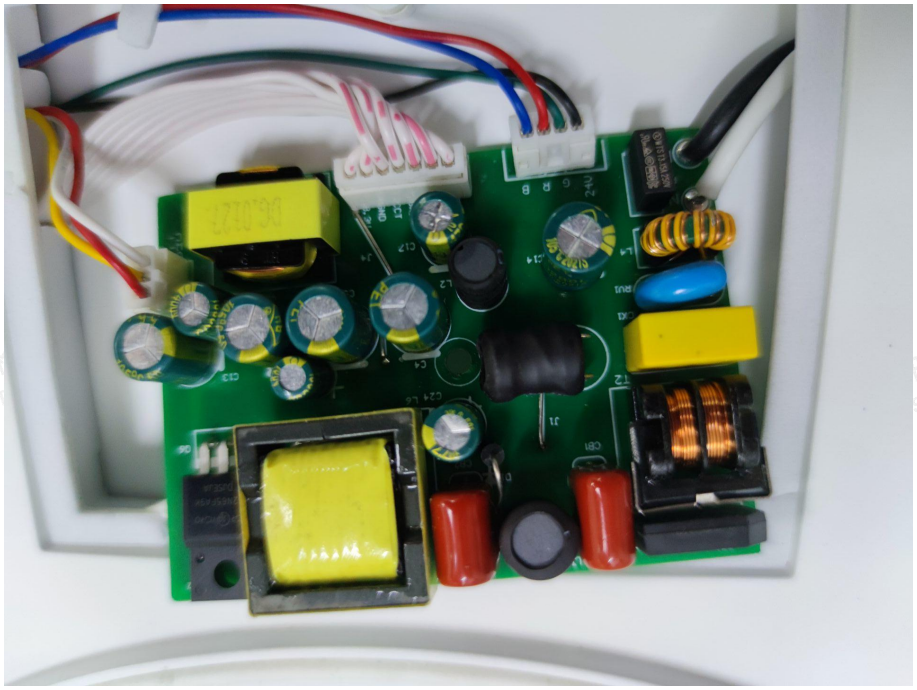

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Photo 17 - LED driver 3 view of model RAVOLE2600C

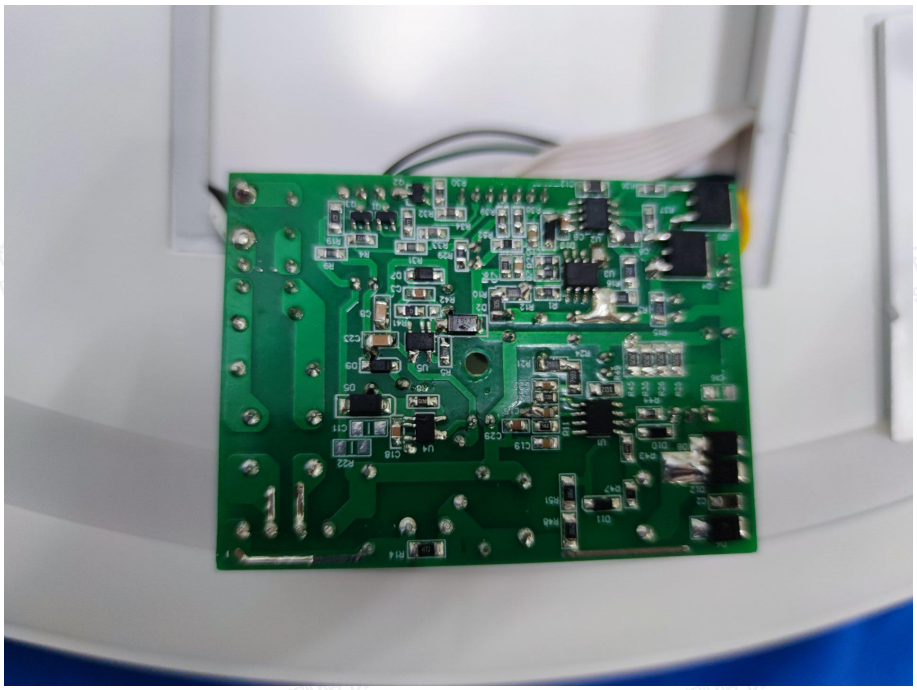
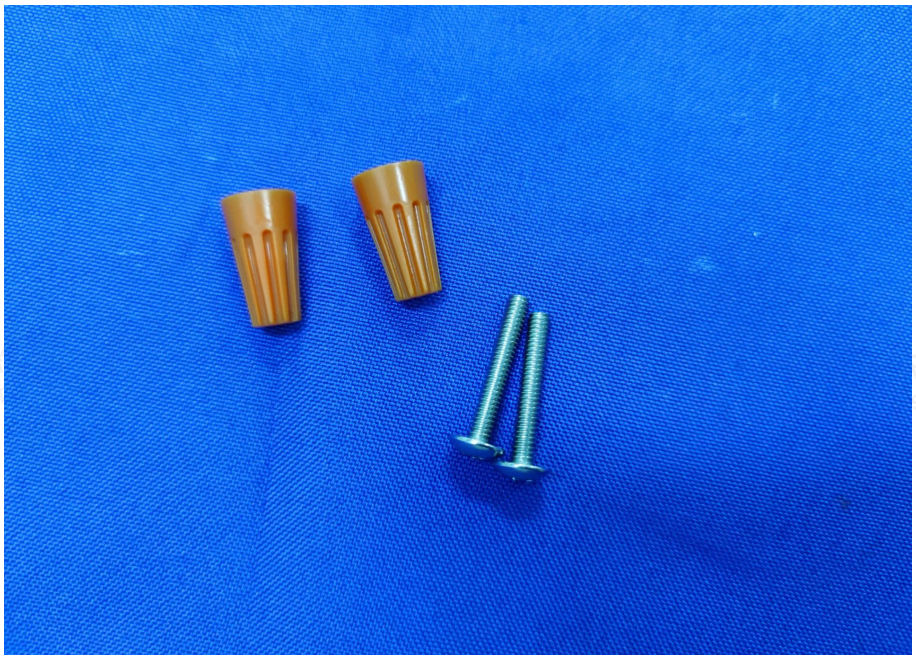


Photo 17 - Mounting screws and connector for all models



----------End of Test Report----------

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