TEST REPORT
UL 2089
Standard for Vehicle Battery Adapters

Job Number:	SiCT2412161864S
Test by (print+signature):	Collin Zhou
Checked by (print+signature):	Jean Shu
Approved by (print+signature):	Andy Wang
Date of issue:	Dec. 24, 2024
Total number of pages:	23 pages
Name of Testing Laboratory preparing the Report:	**Shenzhen SiCT Technology Co., Ltd.** 202, Building 3, No.111, Huanguan Middle Road, Songyuanxia Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China
Applicant's name:	**Coolgear Inc**
Address:	5120 110th Ave N Clearwater FL 33760 U.S.A
Manufacturer's name:	**Coolgear Inc**
Address:	5120 110th Ave N Clearwater FL 33760 U.S.A
Test specification:	
Standard:	UL 2089, 3rd Ed., Dated Nov. 22, 2011, Rev. date: April 25, 2023
Test procedure:	Type test
Non-standard test method:	N/A
Test Report Form No:	UL2089_2023
Test Report Form(s) Originator:	SiCT
Master TRF:	Dated 2023-10
Test item description:	USB Type-C PD Charger
Trade Mark:	coolgear
Model/Type reference:	CG-PD99PPS, WTF-PD99UL
Ratings:	Input: 12-24V⎓15A Max Output: Total combined output: 129.8W Max(93.8W+36W) USB Type-C: 5V⎓5A/9V⎓3A/15V⎓3A/20V⎓4.69A (93.8W Max) 5–15V⎓5A PPS (Max: 75W) USB-A: 5V⎓3A/9V⎓3A/12V⎓3A(36W Max)

Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing:	
Date of receipt of test item.....:	Dec. 16, 2024
Date (s) of performance of tests.....:	Dec. 16, 2024 - Dec. 24, 2024

General product information:

The product covered in this report is a USB Type-C PD Charger, which is supplied from a vehicle cigarette lighter receptacle, and provides USB output port.

Relevant Technical consideration：

-Mass of equipment (kg): 109g Max.

-Maximum ambient temperature: 25°C.

All the test was carried on the model CG-PD99PPS and complied with the requirement. All models are identical except the model's name and appearance.

Name and address of factory (ies): Coolgear Inc
5120 110th Ave N Clearwater FL 33760 U.S.A

Copy of marking plate:

USB Type-C PD Charger
Model: CG-PD99PPS
Input: 12-24V⎓15A Max
Output: Total combined output: 129.8W Max(93.8W+36W)
USB Type-C: 5V⎓5A/9V⎓3A/15V⎓3A/20V⎓4.69A (93.8W Max)
5–15V⎓5A PPS (Max: 75W)
USB-A: 5V⎓3A/9V⎓3A/12V⎓3A(36W Max)

Manufacturer: Coolgear Inc

Marking label

Notes:

- The above markings are the minimum requirements required by the safety standard as a reference marking label. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.

- The date code "MMYY" denote the manufacturer date, for example, "0524", the "05" denote the month of May, the "24" denote the year of 2024.

UL 2089			
Clause	Requirement + Test	Result - Remark	Verdict
INTRODUCTION			P
1	Scope	Rated 12-24Vdc, supplied from vehicle cigarette lighter	P
2	Components	Certified Component with suitable rating.	P
3	Units of Measurement	Considered	P
4	Undated References	Considered	P
5	Glossary	Considered	P
CONSTRUCTION			P
6	Mechanical Assembly	-All parts reliably secured in place, no sharp to constitute a risk of injury to person, not necessary to open or remove the enclosure when to use. -Overall mass of the cigarette lighter connector is not exceed 250g	P
7	Enclosure	-Enclosure house all current-carrying parts without a risk of electric shock. -No openings. -Polymer enclosure used. -Plastic enclosure with flammability class: V-0, -HAI: 2 -HWI: 0 - No conductive coating applied to inside surface. - Snap joint assemblies for fixing, no adhesive used. - The plastic enclosure complies with UL746C, See test data	P
8	Protection Against Corrosion	- Plated steel and stainless were used for all metal part.	P
9	Switches	No such switches	N/A
10	Protective Devices	-Built in fuse considered as protective device. -Fuse is located in the positive side of the supply within the cigarette lighter connector. -Not greater than ampacity of the interconnecting cord and not greater than 20A.	P

UL 2089			
Clause	Requirement + Test	Result - Remark	Verdict
		-Fuse has suitable rating of voltage and current comparing with those of circuit in which it is connected.	
11	Components	All components have efficient permanence and stability.	P
12	Coil Insulation	All coil insulation is film-coated magnet wire which is moisture resistant.	P
13	Flexible Cords	No flexible cord used	N/A
14	Input Contacts	-The diameter of the center (positive) contact is 5.75mm (limit ≥ 3.57mm)	P
15	Output Connections	USB output terminal used.	P
15.1	General	USB output terminal is considered as a) terminates in a connector for connection to a low voltage appliance.	P
15.2	Low voltage limited energy circuits	-No circuit exceeded 42.4Vpeak or 60Vdc with energy available to the circuit limited 8A which is measured after 1minute of operation by fixed impedance or reliable regulating network.	P
15.3	Output connectors	-Secure connection. -DC female contact does not received the blades of a standard attachment plug.	P
15.4	Bushings		N/A
16	Accessibility of Live Parts		P
16.1	General	No live part can be accessible	P
16.2	Live parts other than expose wiring terminals	Force 4.4N, No live parts with voltage greater than 16.2.2 can be accessible.	P
16.3	Exposed wiring terminal	Force 25N, No live parts with voltage greater than 16.2.2 can be accessible.	P
17	Live Parts	Current-carrying part is plated steel or stainless steel.	P
18	Strain Relief	See clause 29	P
19	Internal Wiring		N/A
20	Insulating Materials	Approved polymer material used.	P

UL 2089			
Clause	Requirement + Test	Result - Remark	Verdict
21	Printed-Wiring Boards	PCB used V-1 at least	P
PERFORMANCE			P
22	General		P
23	Maximum Output Voltage Test		P
24	Power Input Test		P
25	Temperature Test		P
26	Dielectric Voltage – Withstand Test		P
27	Abnormal Test		P
27.1	General		P
27.2	Reverse polarity test		N/A
27.3	Component breakdown test		P
27.4	Battery-supply cord short circuit test		N/A
27.5	Abnormal temperature test		P
28	Resistance to Crushing Test		P
29	Strain Relief Test		P
30	Push-Back Relief Test		N/A
MARKINGS			P
31	General		P
32	Cautionary Markings	Markings is legibly and permanently marked where it is readily visible.	P
INSTRUCTIONS			P
33	General	See below	P
34	Assembly Instructions	Instructions is provided with explicit important safety, operation and maintenance instructins for users.	P
35	Operating Instructions	See clause 34	P
36	Maintenance Instructions	See clause 34	P
37	Moving and Storage Instructions	See clause 34	P
APPENDIX A			P
--	Standards for Compnents	--	--

Clause 11: Critical components information					
Component Name	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity**
Enclosure & Inlet holder	--	--	Metal	UL 2089	Test in appliance
PCB	GUANGZHOU EXCELLENCE ELECTRONIC CO LTD	GEE-02	V-0, 130°C	UL94, UL 796	UL E317030
Current Fuse (F1)	ADVANCED SURGETECH MATERIALS LTD	12 110.5	10A, 32Vdc	UL	UL E355868
Remark:					

Clause 15.2 Low voltage limited energy circuits

15.2.1 A low-voltage limited-energy (LVLE) circuit is defined as a circuit with an open-circuit potential of not more than 42.4 V peak ac, or 60 V dc, with the energy available to the circuit limited:
a) So that the current under any condition of load including short circuit is not more than 8 A for potentials up to 42.4 V peak, and 150/V_{max} for potentials from 30 to 60 V dc, measured after 1 minute of operation by:
1) An isolating transformer; or
2) A fixed impedance or reliable regulating network; or
b) By a fuse or nonadjustable manually reset circuit protective device that is rated or set at not more than the value specified in Table 15.1.

Table 15.1
Rating for fuse or circuit protector

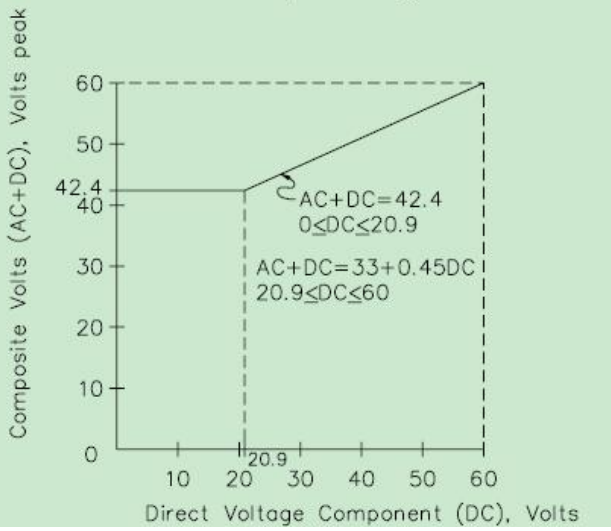
Open-circuit potential, V	Current rating, A
0 – 21.2 (peak)	5
21.3 – 42.4 (peak)	3.2
Over 30 to 60 dc only	150/V_{max}[a]
[a] V_{max} is defined as the maximum voltage obtained under any condition of load or no load in volts rms.	

Measurement			P
Condition:	Output Voltage (Vmax)	Output current (Imax A)	Limited
Type-C output	5.123	4.53	42.4V peak, <8A; 30~60Vdc, <150V/Vmax
Type-C output	9.106	3.76	42.4V peak, <8A; 30~60Vdc, <150V/Vmax
Type-C output	15.112	3.48	42.4V peak, <8A; 30~60Vdc, <150V/Vmax
Type-C output	20.105	5.68	42.4V peak, <8A; 30~60Vdc, <150V/Vmax
USB-A output	5.111	4.53	42.4V peak, <8A; 30~60Vdc, <150V/Vmax
USB-A output	9.101	3.38	42.4V peak, <8A; 30~60Vdc, <150V/Vmax
USB-A output	12.112	3.68	42.4V peak, <8A; 30~60Vdc, <150V/Vmax

Clause 23 Maximum output voltage test

23.1 The maximum output voltage under any load condition (including no load) between any two output terminations of a unit shall not be more than the peak voltages specified in 16.2.2.
23.2 If a unit has more than one pair of output terminations, the output voltage mentioned in 23.1 is to be measured with any combination of interconnections of the output terminations.
23.3 The maximum voltage between output terminations of a multiple output unit may exceed the values specified in 23.1 when the output terminations are interconnected, if the following conditions are met:
a) The maximum output voltage between any two terminations is not more than the values indicated in 16.2.2 when no connections are made between the output terminations; and

b) The unit is marked in accordance with 32.6.

Measurement		P
Condition:	Measured Voltage	Limit
Lighter connector using rated input voltage, with any loading, inlcude no loading.	1. 9V supplied: Normal load:19.998V No load: 20.118V 2. 24V supplied: Normal load: 19.968V No load: 20.122V	≤ 42,4 Vpeak a.c., or ≤ 60 Vdc, or ≤ 24,8 Vpeak d.c., @ 200 Hz, < 50% duty cycle, or In the range of below table for AC+DC Figure 15.3 Maximum acceptable voltage 

Clause 24 Power input test

The current or watts input to a vehicle battery adapter, shall not be more than 110 percent of the rated value.

24	TABLE: Electrical data					P
U (V)	I (A)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status
12 Vdc	11.103	15.0	133.24	FS1	11.103	Load: 129.8W
24Vdc	5.561	15.0	133.46	FS1	5.561	Load: 129.8W
Remark:						

Clause 25. Temperature test (including Cl 27.5 Abnormal temperature test)

25&27.5	Thermal requirements					P
Supply voltage (V): Normal: Input: 12 Vdc.		normal	—	abnormal		—
Maximum measured temperature T of part/at::		dT (K)	Allowed dT (°C) Normal	dT (K)		Allowed dT (°C) Abnormal
	Supply voltage	12Vdc	--	10.8Vdc	13.2Vdc	--
1	E-Cap C1	33.4	80(105-25)	41.5	48.4	100(80+20)
2	PCB near U1	53.2	105(130-25)	48.1	50.1	125(105+20)
3	E-Cap C2	66.0	80(105-25)	66.5	62.9	100(80+20)
4	L1 body	64.8	105(130-25)	61.4	59.2	125(105+20)
5	L2 body	56.1	105(130-25)	61.4	59.8	125(105+20)
6	L3 body	46.0	105(130-25)	46.2	51.0	125(105+20)
7	Enclosure outside near L1	45.8	50	42.2	44.1	70(50+20)
	Ambient	25.0	--	25.0	24.9	--
Remark:						

Clause 25. Temperature test (including Cl 27.5 Abnormal temperature test) (Cont'd)

25&27.5	Thermal requirements					P
Supply voltage (V): Normal: Input: 24 Vdc.		normal	—	abnormal		—
Maximum measured temperature T of part/at::		dT (K)	Allowed dT (°C) Normal	dT (K)		Allowed dT (°C) Abnormal
	Supply voltage	24Vdc	--	21Vdc	29Vdc	--
1	E-Cap C1	73.9	80(105-25)	79.3	78.1	100(80+20)
2	PCB near U1	92.8	105(130-25)	91.4	89.8	125(105+20)
3	E-Cap C2	79.5	80(105-25)	73.9	75.2	100(80+20)
4	L1 body	91.6	105(130-25)	92.3	93	100(80+20)
5	L2 body	94.3	105(130-25)	91.7	93.4	100(80+20)
6	L3 body	92.2	105(130-25)	90.3	88.3	100(80+20)
7	Enclosure outside near L1	48.9	50	49.1	48.1	70(50+20)
8	Ambient	25.2	--	25.1	25.0	--
Remark:						

Clause 26-Dielectric Voltage-Withstand Test

While still in a heated condition, a unit shall withstand for 1 min without breakdown the application of a 60-Hz essentially sinusoidal potential of:
a) 500 V between a circuit operating at 60 V dc or less or 50 V ac rms (70 V peak) or less and dead metal parts; and
b) 1000 V plus twice the maximum circuit voltage between a circuit operating at more than 60 V dc or more than 50 V ac rms (70 V peak) and dead metal parts.

26 Electric strength		P
Test voltage applied between:	Test voltage (V)	Breakdown
Positive and negative polarity	500	~~Yes~~ / No
Output and accessible enclosure with foil	500	~~Yes~~ / No
Withstanding Voltage Tester		

Clause 27-Abnormal tests Abnormal operation

27.1.1 A unit shall not emit flame or molten metal or become a risk of fire or electric shock when subjected to the reverse polarity, component breakdown and battery-supply cord short circuit tests. 26.1.2 A risk of fire or electric shock is considered to exist if any of the following occurs:
a) Charring of cheesecloth;
b) Emission of flame or molten material from the unit enclosure and output cord, if provided; or,
c) Any condition that exposes live parts which present a risk of electric shock as specified in Section 15.
27.1.2 A risk of fire or electric shock is considered to exist if any of the following occurs:
a) Charring of cheesecloth;
b) Emission of flame or molten material from the unit enclosure and output cord, if provided; or,
c) Any condition that exposes live parts which present a risk of electric shock as specified in Section 16, Accessibility of Live Parts.
27.1.3 Each test is to be conducted on a separate sample unless the manufacturer requests that more than one test be conducted on the same sample.
27.1.4 A polarity-protection circuit provided to prevent output-current flow until a battery is connected as intended to the output is to be made inoperative so that the required output current will flow.
27.1.5 During all abnormal tests the unit is to be draped with a double layer of cheesecloth conforming to the outline of the unit.

Clause 27.3-Component breakdown test

27.3.1 A unit having components – such as diodes, resistors, transistors, capacitors, and the like – with a single component fault of short or open, shall not result in the output exceeding the levels specified in 16.3.2, or any condition as specified in 27.1.2. The unit is to be connected to the maximum test voltage and operated until ultimate conditions are observed, or for 4 hours if cycling of an automatically reset protector occurs.

Ambient temperature						25.0 °C
No.	component	fault	test voltage (V)	test time	Input current (A)	result
1	C1	S	24V	30minutes	0	The fuse FS1 opened immediately, no hazards
2	C2	S	24V	30minutes	0.05	The unit shutdown immediately, no damage, no hazards.
3	C3	S	24V	30minutes	0.05	The unit shutdown immediately, no damage, no hazards.
4	R1	S	24V	30minutes	5.561	The unit normal operation, no damage, no hazards.
5	U1(1-4)	S	24V	30minutes	0.05	The unit shutdown immediately, no damage, no hazards.
6	U1(1-8)	S	24V	30minutes	0.05	The unit shutdown immediately, no damage, no hazards.
7	R1	S	24V	30minutes	5.561	The unit normal operation, no damage, no hazards.
Note: S: Short-circuited; O: Open-circuited; O/L: Overloaded; B: Blocked; L: Locked. Observation: The observations during and after fault condition tests. Damaged: Which component (components) damaged during the fault condition test. Max. Voltage: The maximum accessible voltage of DC output terminal during the fault condition test.						

Clause 28-Resistance to Crushing Test

Test Method:

28.1 One sample of the cigarette lighter connector shall withstand for 1 min a steady crushing force of 75 lbf (334 N). The cigarette lighter connector is to be tested between two parallel, flat, maple blocks, each not less than 1/2 in (12.7 mm) thick. The crushing force is to be applied gradually in a direction normal to the mounting surface.

Results:

These results (☒ did / ☐ did not) comply with the requirements.

Clause 30-Push-Back Relief Test N/A

Test Method:

30.1 To determine compliance with 18.2, a product shall be tested in accordance with 30.2 without occurrence of any of the conditions specified in 18.2 (a) – (d).
30.2 The cord is to be held 1 inch (25.4 mm) from the point where the cord or lead emerges from the product and is then to be pushed back into the product. When a removable bushing which extends further than 1 inch is present it is to be removed prior to the test. When the bushing is an integral part of the cord, then the test is to be carried out by holding the bushing. The cord or lead is to be pushed back into the product in 1 inch (25.4 mm) increments until the cord buckles or the force to push the cord into the product exceed 6 pounds-force (26.7 N). The cord or lead within the product is to be manipulated to determine compliance with 18.2.

Results:

These results (☐ did / ☐ did not) comply with the requirements.

UL 746C, cl 29: Mold Stress-Relief Distortion Test for enclosure

Test Method:

The sample of the completed equipment or the part under consideration shall be placed in a circulating air oven for 7 hours at a temperature 10 °C above the maximum attained on the enclosure during the Normal Temperature test or 70 °C, whichever is higher .

The temperature of the test was __70__ °C.

Result:

Following the conditioning, there (☐ was / ☒ was no) softening of the material as determined by handling immediately.

There (☐ was / ☒ was no) reduction of spacing below those required by the standard.

There (☐ was / ☒ was no) exposure of live parts or internal wiring or defeating the integrity of the enclosure so that acceptable mechanical protection is not afforded to internal parts of the equipment.

There (☐ was / ☒ was no) conditions that causing interference with the intended operation or servicing of the equipment.

Results:

These results (☒ did / ☐ did not) comply with the requirements.

UL 746C, cl 31: Strain Relief Test After Mold Stress-Relief Distortion N/A

Test Method:

a) The sample of the completed equipment or the part under consideration shall be placed in a circulating air oven for 7 hours at a temperature 10 °C above the maximum attained on the enclosure during the Normal Temperature test or 70 °C, whichever is higher.

The temperature of the test was ____°C.

After the test sample has cooled to room temperature following the oven conditioning, the strain relief test was performed.

b) A pull of 20 / 35 pounds force was applied to the attached flexible cord for 1 minute. The connections of the cord inside of the appliance were disconnected.

Record:

The strain relief means provided (☐ could / ☐ could not) withstand the pull applied on the flexible cord.

Results:

These results (☐ did / ☐ did not) comply with the requirements.

Pictures

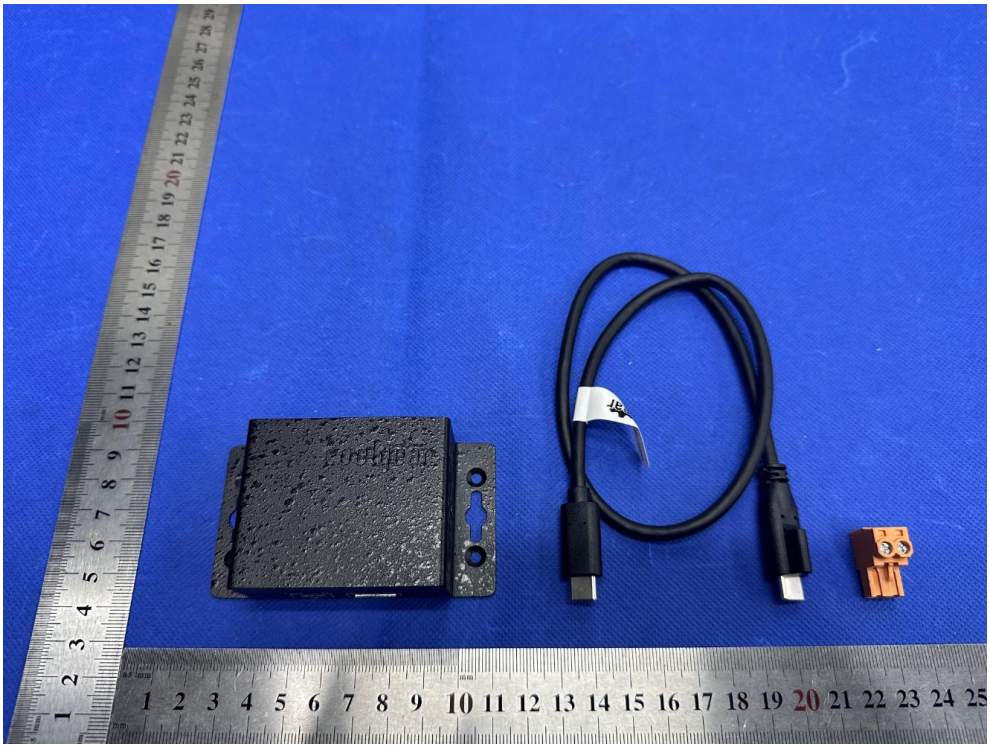


Figure 1(For model: CG-PD99PPS)

Figure 2 (For model: CG-PD99PPS)

Pictures

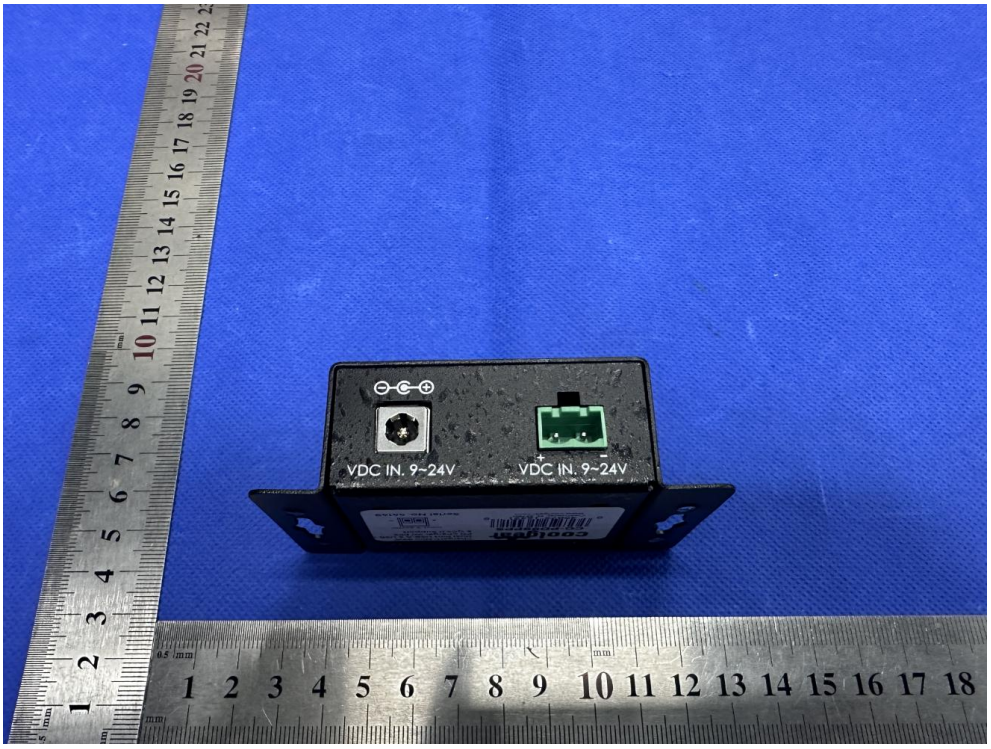


Figure 3 (For model: CG-PD99PPS)

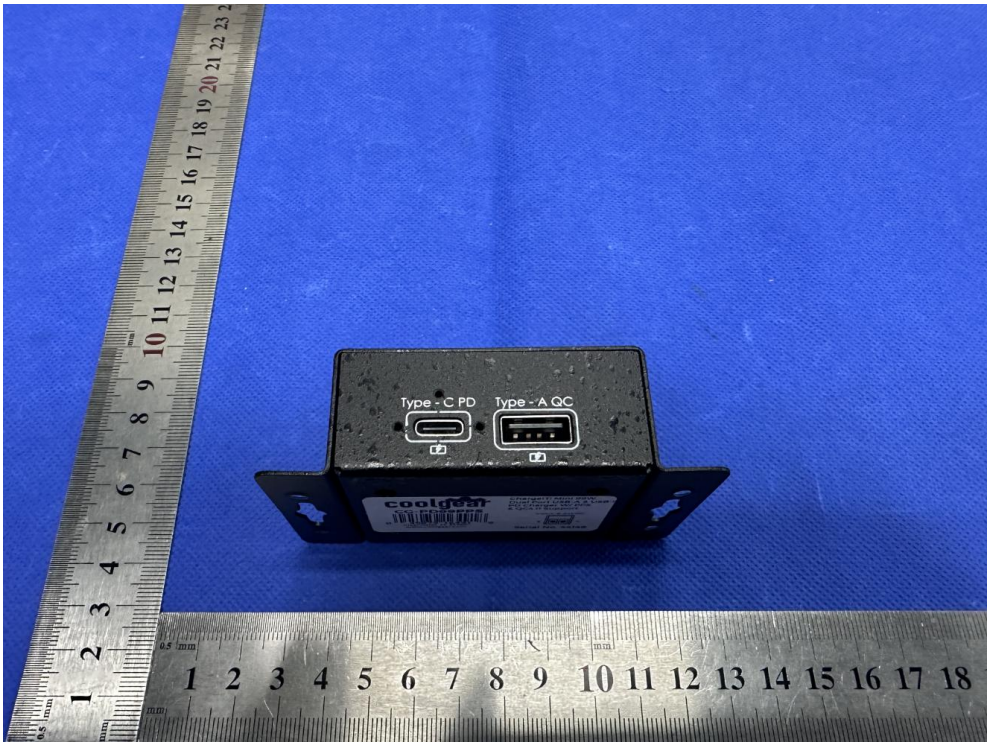


Figure 4 (For model: CG-PD99PPS)

Pictures

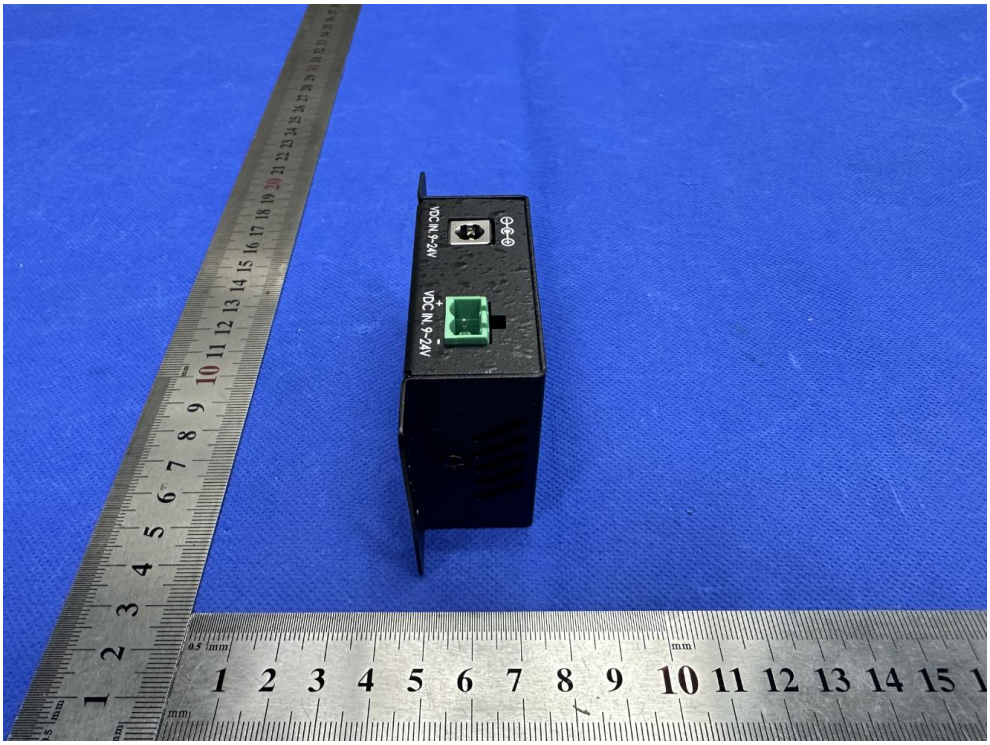


Figure 5 (For model: CG-PD99PPS)

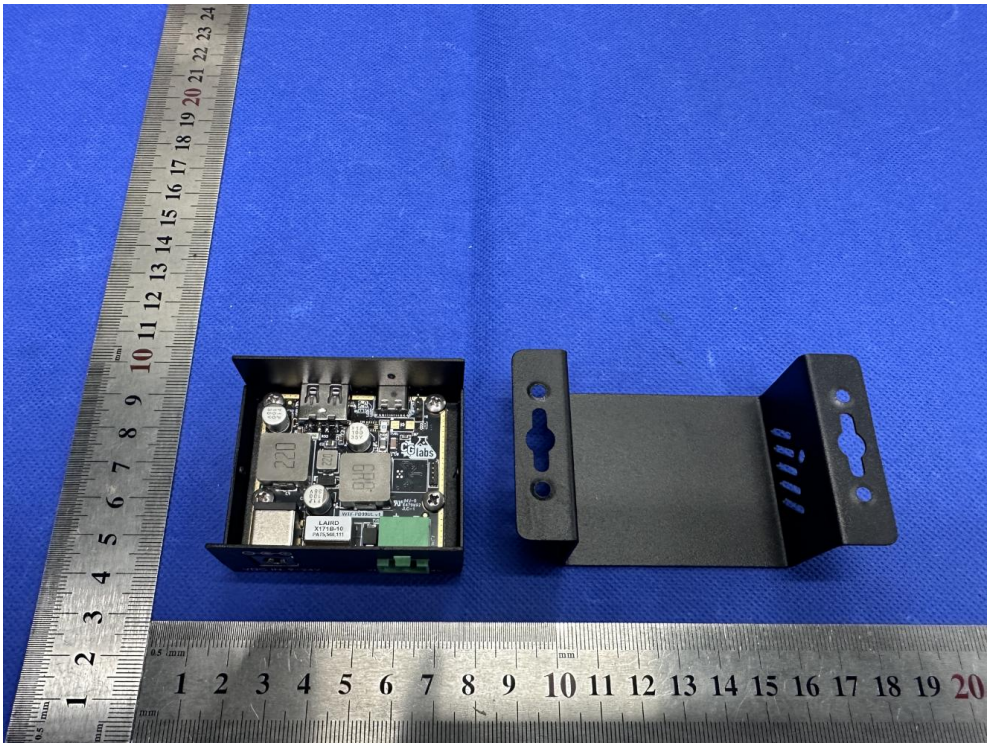


Figure 6 (For model: CG-PD99PPS)

Pictures

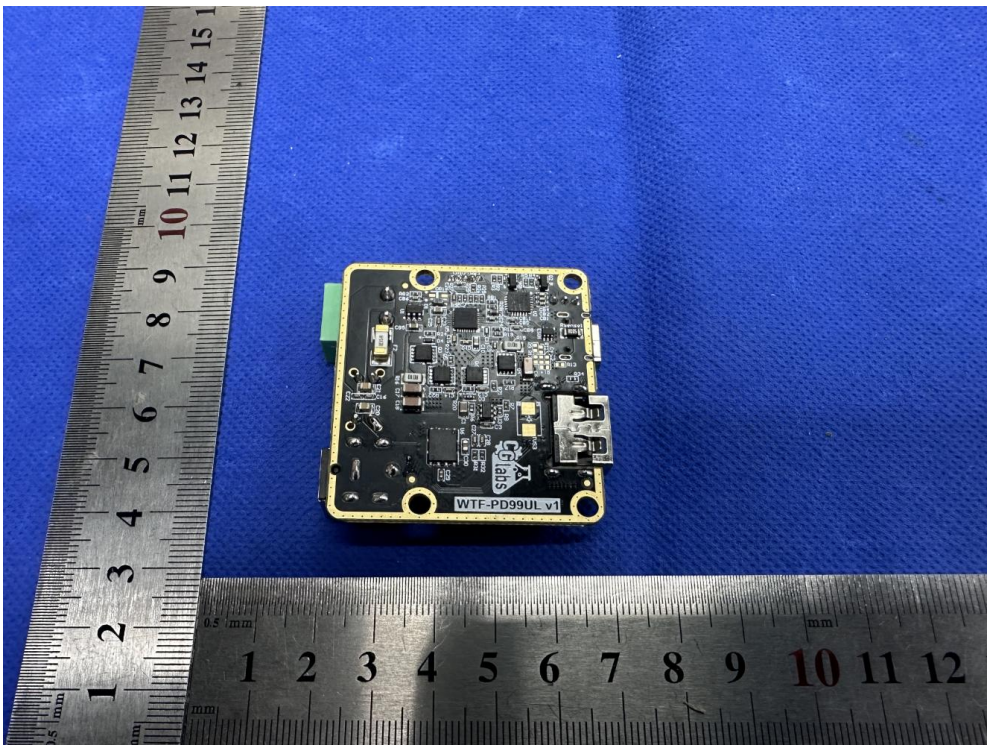


Figure 7 (For model: CG-PD99PPS)

********** End of report **********