

OBC + DC-DC Technical Specification

Model: CD-MF Series

Name: 3.3KW OBC+1KW DC/DC Integrated

Version: V1.0

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1 Overview

1.1 Subject

CD-MF05 fully sealed on-board charger and DC/DC integrated is a product specially designed for new energy vehicles according to the standard QC/T895-2011 Conductive On-board Charger for Electric Vehicles and GB/T24347-2009 Electrical Vehicle DC/DC Converter, which functions as the battery charger for new energy vehicles and provides 12V low voltage DC power supply for low voltage devices. The output can connect to a 12V back-up battery. The DC-DC converter will perform the charge management for the back-up battery. This product not only has the advantages of high efficiency, small size, high stability and long lifetime but also has the performance of high protection level, high reliability and more protection functions. It is an ideal solution for electrical vehicles. A thermal sensor is built into the charger and provides over-temperature protection and can also auto-recover when the temperature decreases. Fully sealed protection level of IP67 makes sure the charger can work under complicated operation conditions.

1.2 Main Features

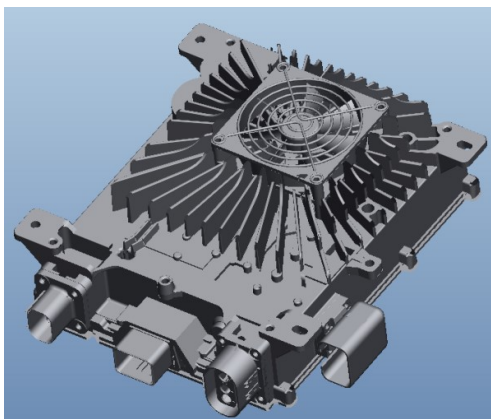
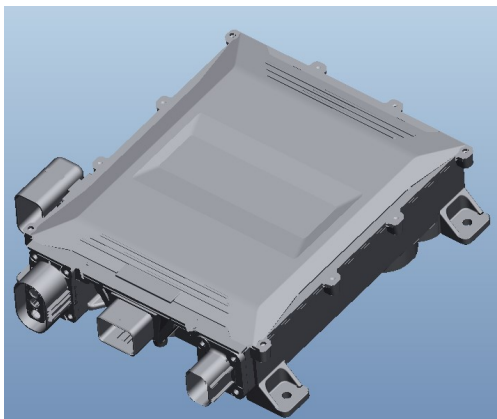
- 1.2.1 Support UDS diagnosis, with CAN wake-up function
- 1.2.2 Full-sealed process, can reliably work in the temperature of -40℃~60℃
- 1.2.3 Built-in thermal sensor, shut off when temperature up to 90℃
- 1.2.4 Protection level not lower than IP55

2 Size and Appearance

2.1 Size and Weight

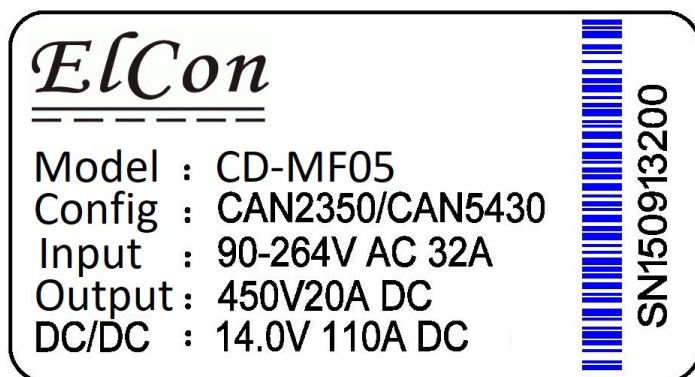
	Length (mm)	Width (mm)	Height (mm)	GW (KG)
Fan-cooled	244±2	287±5	94.±5	≤8

2.2 Appearance



Fan-cooled

2.3 Label



3 Environmental Specification

▲ Working environmental temperature

Area	Lowest Temperature	Highest Temperature
Global	-40℃	60℃

▲ Storage environmental temperature

Area	Lowest Temperature	Highest Temperature
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Global	-55℃	100℃
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▲Humidity: relative humidity 5%~95%, no condensation

▲Altitude: $\leq 5000\text{m}$

▲Working noisy: max when working $\leq 65\text{dB}$, meet China standard QTC 895-2011

4 Charger Technical Specification

4.1 Charger regulatory requirements and reference standards

The design and manufacture of this product must meet the related requirements of vehicle which applicable regulations and standards in China, reference standards as following:

No.	Standard Code	Standard Name	Remark
1	QC/T 895-2011	Conductive on-board charger of electrical vehicle	/
2	GB/T 30512-2014	Prohibited substances requirement	/
3	GB/T 18384-2015	Safety requirements of electrical vehicle	/
4	GB/T 18487-2015	Electric vehicle conductive charging system	/
5	GB/T 14023-2011	Limits and methods of measurement for radio disturbance characteristics of vehicles, ships and installations driven by internal combustion engines	/
21	GB/T 18655-2018	EMC technical requirements for electronic components and subsystems of passenger vehicles	/
22	GB/T 18655-2010	Limits and measurement methods for the radio disturbance characteristics of vehicles, ships and internal combustion engines used to protect vehicle-mounted receivers	/

4.2 Charger Safety Regulations Specification

	Condition	Requirement
Grounding resistance test	@25A/AC	$\leq 100\text{m}\Omega$
Input insulation test	@1000V/DC	$\geq 20\text{M}\Omega$
Output insulation test	@1000V/DC	$\geq 20\text{M}\Omega$
Input withstand test	@2000V/AC 1min	Leak current $\leq 10\text{ma}$
Output withstand test	@2000V/AC 1min	Leak current $\leq 10\text{ma}$

Input to Output withstand test	@2000V/AC 1min	Leak current $\leq 15\text{ma}$
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4.3 Charger Electrical Performance

4.3.1 Input

Input	Input voltage range	AC 90~265V
	Frequency	47~63Hz
	Input Current	$\leq 16\text{A}$
	Power Factor	$\geq 0.98 @ \geq 1650\text{W}$
	Stand-by power consumption	$\leq 5\text{W}$
	Starting inrush current	$\leq 24\text{A}$

4.3.2 Output

Nominal Voltage		144V	312V
Output	Output voltage range	50V~215V	105V-450V
	Max output current	23A	10A
	Output power	3300W@220VAC; 1650W@110VAC	
	Output way	CV/CC	
	Efficiency	$\geq 94\%$	
	CV accuracy	$\pm 1\%$	
	CC accuracy	$\pm 2\%$	
	Ripple voltage coefficient	$\pm 5\%$	
	Output voltage rising time	$< 5\text{S}$, overshoot $< 10\%$	
	Shut off response time	Current decreased below 10% in 300ms, and decreased to 0A in 500ms	

4.3.3 Low Voltage Output

Low voltage Output	Output way	CV
	Output voltage	12V
	Nominal current	5.5A
	CV accuracy	$\pm 2\%$
	Output Power	$\leq 66\text{W}$

	Ripple voltage coefficient	$\leq 1\%$
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4.3.4 Control Interface

Control interface	CC signal test	100Ω~10kΩ
	CP signal test	1%~99%, 5V~15V Vpp
	CC signal output	Optional for 220Ω and 680Ω
	Temperature test	Two ways input, support 1K and 10K
	12V wake-up input	$\leq 10\text{mA}$
	12V wake-up signal output	Max 0.2A
	12V CV	Sleep current $\leq 1\text{mA}$, peak current $\leq 5\text{A}$
	Electronic lock driving	Peak current 2.9A
	Electronic lock receiving signal	Switch volume
	CAN Communication	yes
	Baud rate	Optional for 125Kbps, 250Kbps, 500Kbps
	Terminal resistance	Not available

4.3.5 Other

Humidity Test	Meet QCT 895-2011 7.2.1
Low temperature working test	Meet QCT 895-2011 7.2.2.1
Low temperature storage test	Meet QCT 895-2011 7.2.2.2
High temperature working test	Meet QCT 895-2011 7.2.2.3
High temperature storage test	Meet QCT 895-2011 7.2.2.4
Salt spray test	Meet QCT 895-2011 7.8.5
EMI	Meet GB/T 18487.3-2001 11.3.1 and GB/T 18655-2018
EMD	Meet GB/T 18487.3-2001 11.3.2 and GB/T 18655-2018
Harmonic current	Meet GB 17625.1-2003 6.7.1.1
Protection level	IP67
Vibration resistance	10~25Hz swing 1.2mm, 25 - 500Hz 30m/S ² , 8hours each direction
MTBF	150000H

4.3.6 Charger Protection Functions

Protection functions	Input over-voltage protection	AC270±5V	
	Input low-voltage protection	AC85±5V	
	Output over-voltage protection	144V	312V
		>220±5V	>455±5V
	Output low-voltage protection	144V	312V
		<45±5V	<100±5V
	Over-temperature protection	Power start to decrease when internal temperature rise to 85℃, shut off when rise to 90℃	
	Output short circuit protection	Stop output	
	Output polarity reverse protection	yes	
	Grounding protection	≤100mΩ	
	CAN Communication protection	Automatically stop output when CAN communication fails	
	Power-off protection	Yes	

5 DC/DC Converter Technical Specification

5.1 DC/DC Converter Regulations requirements and reference standards

No.	Standard Code	Standard Name	Remark
1	GB/T 24347-2009	Electric vehicle DC/DC converter	/
2	GB/T 18488.1-2015	Electric motors and their controllers for electric vehicles - part 1: technical conditions	/
3	GB/T 18384.2-2015	Safety requirements for electric vehicles - part 2: functional safety and fault protection	/
4	GB/T 18384.3-2015	Safety requirements for electric vehicles - part 3: protection against shock to personnel	/
5	GB/T 18387-2008	Limits and measurement methods for electromagnetic field emission intensity of electric vehicles	/
6	GB 9254-2008	Limits and methods for measurement of radio harassment for information technology equipment	/
7	GB/T 18655-2010	Limits and measurement methods for radio disturbance	/

		characteristics of vehicles, ships and internal combustion engines used to protect vehicle-mounted receivers	
8	GB 29743-2013	Motor vehicle engine coolant	/
9	GB 4208	Enclosure protection level (IP code)	/
10	GB/T 28046-2	Environmental conditions and tests for electrical and electronic equipment for road vehicles - part 2: electrical loads	/
11	GB/T 28046-3	Road vehicles - environmental conditions and tests for electrical and electronic equipment - part 3: mechanical loads	/
12	GB/T 28046-4	Environmental conditions and tests for electrical and electronic equipment for road vehicles - part 4: climatic loads	/
13	GB/T 2423.34-2012	Environmental test - part 2: test method test Z/AD: combined temperature/humidity cycle test	/
14	GB/T 2423.1-2008	Environmental testing of electrical and electronic products - part 1: test methods - test B: low temperature	/
15	GB/T 2423.2-2008	Environmental tests for electrical and electronic products - part 2: test methods - test B: high temperature	/
16	GB/T 2423.3-2008	Electrical and electronic products - environmental tests - part 2: test methods - Cab: constant heat and humidity test	/
17	GB/T 2423.17-2008	Environmental tests for electrical and electronic products - part 2: test methods : salt spray	/
18	GB/T 30512-2014	Prohibited substances requirements for automobiles	/
19	QC/T 413	Basic technical conditions of automotive electrical equipment	/

5.2 DC/DC Converter Safety Regulations Specification

	Condition	Requirement
Grounding resistance test	@25A/AC	$\leq 100\text{m}\Omega$
Input insulation test	@1000V/DC	$\geq 20\text{M}\Omega$
Input withstand test	@2000V/DC 1min	Lead current $\leq 10\text{ma}$

5.3 DC/DC Converter Electrical Performance

5.3.1 Input

Nominal Voltage	144V	312V
Input voltage range	80V~195V	205v~455V

5.3.2 Output

Output	Nominal output voltage	14V
	Output voltage range	9~15V
	Nominal output current	72A
	Peak current	86A
	Nominal power	1000W
	Peak power	1200W last 6 minutes
	Efficiency	≥94%
	Dynamic response time	<50ms
	Voltage regulation	≤1%
	Load regulation	≤1%
	Voltage control accuracy	≤1%
	Current control accuracy	≤2%
	Quiescent current	≤1mA @14V
	Ripple voltage coefficient	≤2% @nominal working state

5.3.3 Other

Humidity test	Meet GB/T 24347-2009 6.1.2
Low temperature test	Meet GB/T 24347-2009 6.1.1.1
High temperature test	Meet GB/T 24347-2009 6.1.1.2
EMI	Meet GB/T 17619-1998 article 4
EMD	Meet GB 18655-2002 article 12 and 14
Protection level	IP67

Vibration resistance	10~25Hz swing 1.2mm, 25 - 500Hz 30m/s ² , 8 hours each direction
MTBF	150000H

5.3.4 DC/DC Converter Protection Functions

Protection Functions	Input over-voltage protection	144V	320V
		> 200±5V	> 460±5V
	Input low-voltage protection	144V	320V
		< 75±5V	< 200±5V
	Output over-voltage protection	Output voltage over-voltage protection threshold is 16±0.5V, working recovery after voltage back to ≤14±0.2V	
	Output low-voltage protection	Output voltage low-voltage protection threshold is 7±1V, working recovery when voltage rise to ≥9±0.2V	
	Output over-current protection	Stop output when output current > 90A	
	Over-temperature protection	Power start to decrease when internal temperature rise to 100°C, shut off when rise to 110°C, auto-recovery when power decreased	
	Short circuit protection	Yes, auto-recovery	

6 Interface

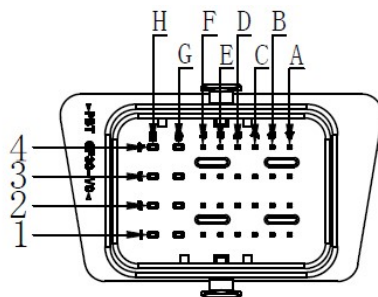
The interfaces in the charger can be grouped into two categories, one category is low voltage interface, the other is high voltage interface.

Low voltage interface includes control connector and DC/DC output

High voltage interface includes AC220V input, OBC output and DC/DC input.

Connectors can be appointed by customer if quantity order is more than 5000pcs.

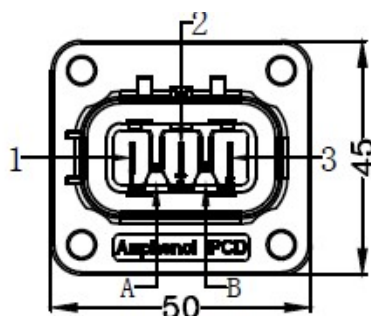
6.1 Low Voltage Connector and Pins Definition



Pin No.	Name	Definition	Description	Remark
1H	KL30 positive	9-16V battery +, hot at all times	Constant power supply input 9-16V, peak current 3A (electronic lock locking), time 1.5S, sleep current $\leq 1\text{mA}$	
2A	HW_wakeup_out	Output wake-up signal	Output 12V controlled voltage signal wake up the external device, max current is 200mA	
2B	IN_wakeup_EN	Input wake-up signal	Input 12V signal to wake up the sleeping OBC, internal resistance 10K, current 1mA	
2C	DC/DC 12V enable	DC/DC 12V enable input		
2F	CAN/GND			
2H	12V5A+	OBC low voltage power supply +	By controlled to output 13.8V, max output current capacity 5.5A (long time)	
4A	CAH-H	CAN H		
4B	CAN-L	CAN L		
4G	KL31 negative	9-16V battery negative, connected all the time	Can be connected with OBC grounding, voltage is 0V, peak current is 5A	
Others	NA	NA	NA	

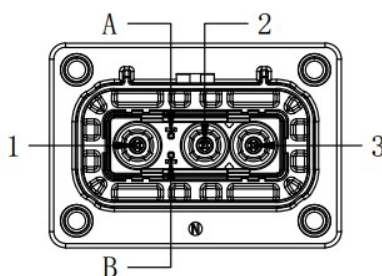
6.2 High Voltage Connectors and Pins Definition

6.2.1 AC Input



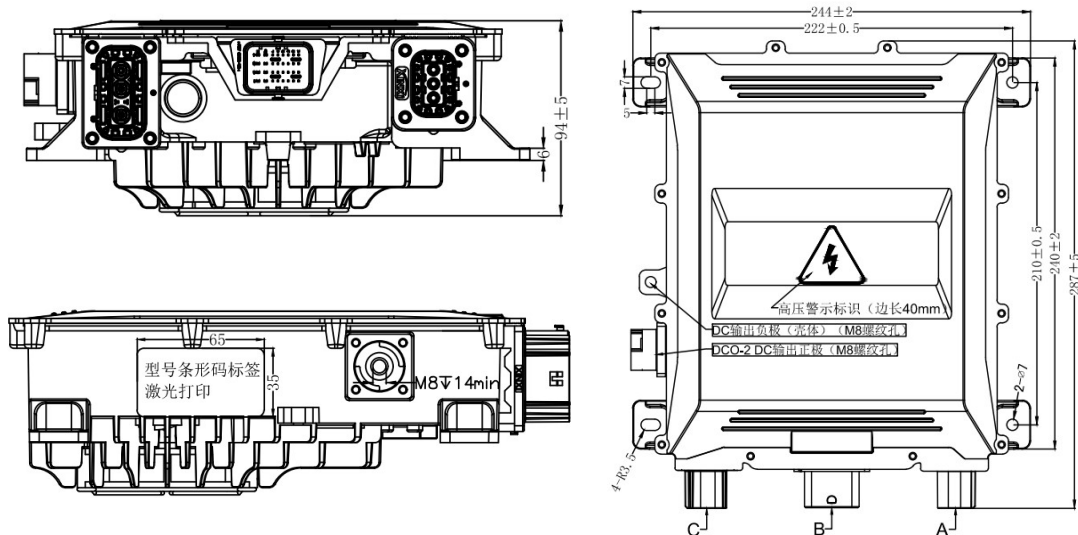
X02-S03-TE30A-N20 AC Input			
Brand	Pin	Definition	Wire diameter (mm)
Xinxi	1	火线 (L)	2.5
	2	地线 (PE)	2.5
	3	零线 (N)	2.5

6.2.2 OBC Output and DC-DC Input

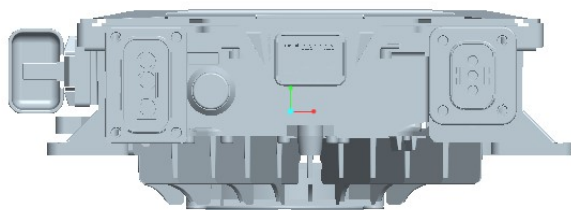


X02-S03-TE301-N20 OBC Output and DC/DC Input			
Brand	Pin	Definition	Wire diameter(mm)
Xinxi	1	OBC output +	2.5
	2	Sharing -	2.5
	3	DC input +	2.5
	A、B	HVIL	0.5

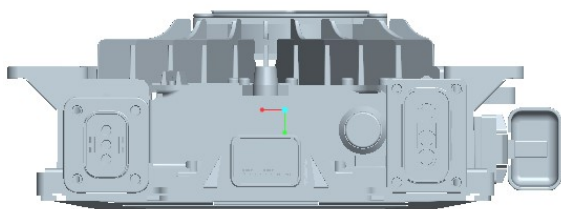
7 Installation Size



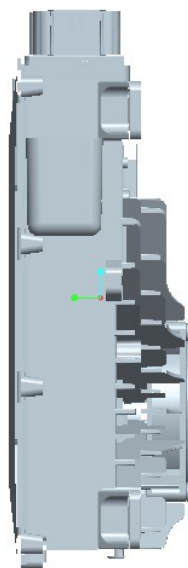
8. Installation Requirement



Best way to install
At least 50mm distance off to any obstacle



Forbidden way to install



Acceptable way to install