

Version	Change Description	Date (dd/mm/yyyy)
0	First edition	4/3/2021

6KW DCDC Convertor Liquid Cooling System (rear)



Model Number: GVD510-1CM6R0LD

Rated Power: 6000W

Input Voltage Range: 180-750VDC

Output Voltage: 27.5Vdc

Dimensions: 368mm×210.6mm×82mm

Specification

1. Product Overview

The new energy automobile industry is currently in the early stage of development and is in a period of policy support and guidance. OEMs are highly dependent on policies. At the same time, equipment manufacturers are required to adapt to the development of the industry and provide products required by the market.

The DC/DC converter is used for voltage conversion, instead of the traditional alternator, converts the energy of the high-voltage power battery into a 27V low-voltage, and provides the electricity demand of the low-voltage power system of the entire vehicle. When the power of the 27V low-voltage battery is insufficient, it is necessary to charge the 27V low-voltage battery to ensure that the battery has sufficient power to meet the needs of automotive electrical appliances. The electrical system interface of the DC/DC part should include high-voltage input, low-voltage output and control communication signals.

2. Product model name description

GVD510 – 1 C M 6R0 L D

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Mark	Description	Details
①	Product series	GVD510
②	Delimiter	--
③	Product generation	1st generation;
④	Input voltage range	C: Working voltage range 200-800VDC
⑤	Output voltage	M: 27.5V (24V battery or air conditioner power supply)
⑥	Output Power	6KW --- 6R0
⑦	System	L: Stand-alone Liquid cooling
⑧	Power conversion method	D: One-way DC (only charging)

3. Product model and its main rated electrical parameters

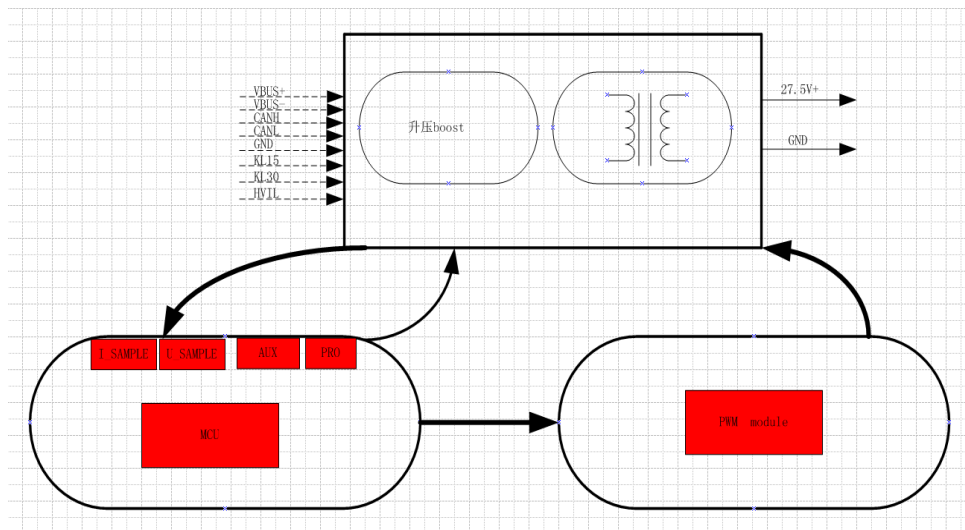
3-1 Model

Product name	Model Number
6KW DCDC	GVD510-1CM6R0LD

3-2 Electrical parameters

Model Number	Specifications	Parameters
GVD510-1CM6R0LD	Rated power	6KW
	Input voltage range	180-750VDC
	Output voltage	27.5Vdc
	Input current range	0-25A
	Output rated current	220A
	Weighted efficiency	≥90%
	Peak efficiency	≥94%

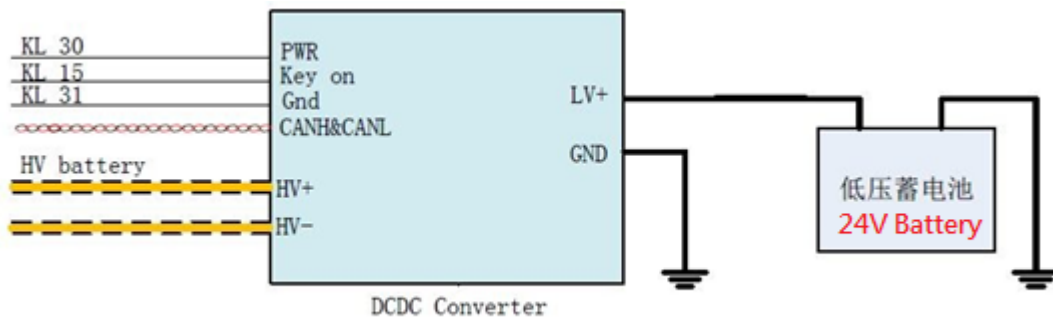
4. System block diagram



5. Main circuit terminal composition

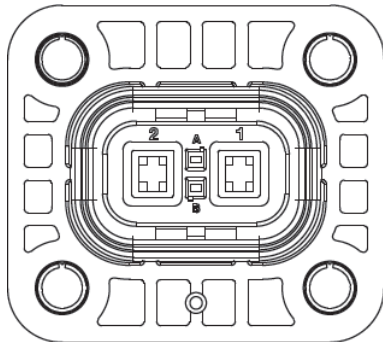
5.1 Logic block diagram of the main loop

This product is a 6KWDCDC single product. In actual applications, external interfaces: DC input terminals, low-voltage DC output terminals, low-voltage signal terminals.

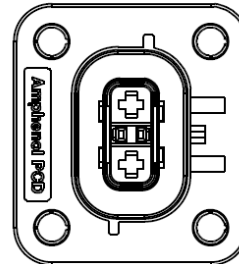


5.2 Main circuit terminal function description

1. High voltage DC input



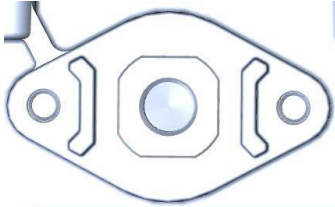

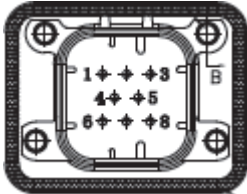
HVSL282022B (KEY B)



PIN definition

PIN	Description	Function	Wire diameter	Model & Maker
1	High voltage input	Input positive	4mm ²	Model: HVSL282022B Maker: Amphenol
2	High voltage input	Input negative	4mm ²	
A,B	High voltage interlock signal	NA	NA	

2. Low voltage output connectors

<p>Output positive terminal (use M8*16 screws for wiring)</p> 	<p>Output positive terminal (use M8*16 screws for wiring)</p> 
<p>Low voltage signal terminal</p>	<p>Model: GVT03-RS013-8-L02 Brand: Guoweitong Plug model: GE01-P008-8NNB-Y01 Low voltage signal terminal socket</p> 

Signal definition

PIN	Function	Description	Remarks	Model & Maker
1	High voltage interlock	HVIL1		Model: GVT03-RS013-8-L02 Brand: Guoweitong Plug model: GE01-P008-8NNB-Y01
2	High voltage interlock	HVIL2		
3	Hardware wakeup	KL_15		
4	Low voltage power supply	KL_31		
5		KL_30		
6	CAN signal	CAN_H	Twisted pair	
7		CAN_L		
8	No function signal port floating	NA		

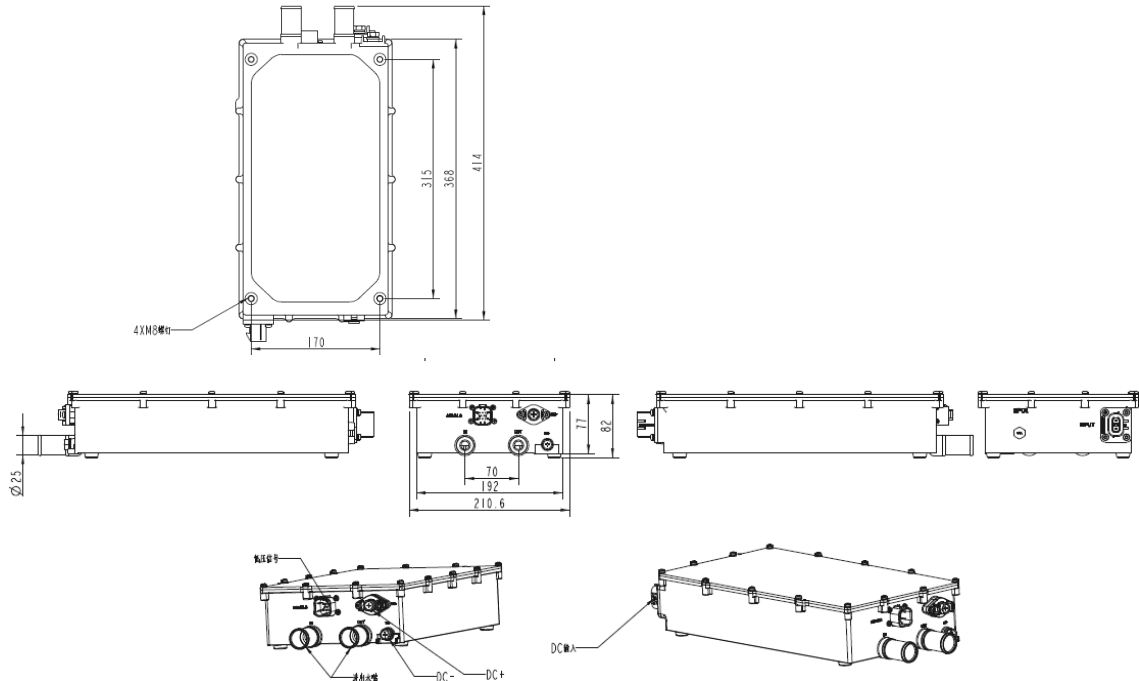
6 Key technical indicators

1、 Input characteristics				
Item	Description	Parameters	Unit	Remarks
1.1	Rated input voltage	540V DC	V	
	Input voltage range	180-750 VDC		
1.2	Maximum input current	25	A	Rms (effective value)
1.3	Static current consumption	3	mA	After the input voltage is increased, the voltage conversion needs to be increased, and the quiescent current needs to be tested and confirmed by the actual
1.4	Auxiliary source input control voltage	10-32	Vdc	
2、 Output characteristics				
2.2	Rated output voltage	27.5±0.3	Vdc	Voltage sampling accuracy ≤1%
2.3	Rated output current	220A	A	Current measurement accuracy ≤±2%。
2.4	Rated output power	6000	W	
2.5	Weighted efficiency	≥90%	%	Calculated according to the national standard weighting coefficient

2.6	Output ripple voltage		$V_{p-p} \leq 1V$	Vp-p	Rated voltage and current, with oscilloscope The width should be 20MHz, and the probe should be connected in parallel with a 10uF+100nF capacitor
2.7	Turn-on and turn-off overshoot range		$\leq \pm 10$	%	Full and no-load conditions
2.8	Dynamic load dump test	Overshoot amplitude	$\Delta V: \leq \pm 10$	%	Refer to GB/T for test conditions
		Recovery Time	$\Delta t: \leq 5$	mS	
2.9	Stabilization accuracy	main road	$\leq \pm 1$	%	
2.10	Load Regulation	main road	$\leq \pm 1$	%	
3、Protection characteristics					
3.1	Input undervoltage protection point		$170 \pm 5V$	Vdc	Automatic recovery
3.2	Input undervoltage recovery point		$180 \pm 5V$	Vdc	Automatic recovery
3.3	Input overvoltage protection point		$760 \pm 5V$	Vac	Automatic recovery
3.4	Input overvoltage recovery point		$750 \pm 5V$	Vac	Automatic recovery
3.5	Output overvoltage protection point		33 ± 0.5	Vdc	
3.6	Output undervoltage protection point		19 ± 0.5	Vdc	
3.7	Maximum output current limit		240 ± 2	A	Automatic recovery
3.8	Short circuit protection		yes	-	Automatic recovery
3.9	Over temperature protection point		112	°C	Can be automatically restored, 100 enters derating, 112 °C protection

7 Overall structure plan and process requirements

The overall picture is as follows:



model: GVD510-1CM6R0LD-XX

- Overall dimensions (without nozzle connector): 368mm×210.6mm×82mm
- Housing, aluminum die-casting
- Cover plate: aluminum plate, meeting mechanical strength requirements
- The packaging design meets the demand for single-machine shipments, and special attention should be paid to the protection of external connectors to prevent damage during transportation.
- For the cable inlet interface, refer to 5.2 Description of Main Circuit Function Terminals.
- Meet the requirements of electrical clearance, creepage distance, and grounding safety regulations
- Meet the needs of OEM production
- Warning signs for electric shock protection and scald protection are set on the outside of the machine
- The structure meets the horizontal installation method

8 Safety requirements

Item	Description	Standard test	Remarks
1	Dielectric strength	Input-Output	2800Vdc/1mA/1min No breakdown or flashover
		Input-Chassis	2800Vdc/1mA/1min No breakdown or flashover
2	Insulation resistance	Input-Output Input-shell	$\geq 10M\Omega$ DC/DC converter for electric vehicles (GBT24347-2020 draft).pdf
3	Electric clearance, creepage distance	GB/T24347-2009 ; IEC/EN61800-5-1(Part of electric clearance and creepage distance)	Except for electrical clearance and creepage distance, others are in accordance with the requirements of GB/T24347

9 Environmental requirements

In order to give full play to the performance of DCDC and maintain its functions for a long time, this product belongs to the platform module and does not contain any protective casing. The environmental requirements for DCDC refer to the requirements that the module can be assembled into a casing with a protection level of $\geq IP67$:

Table 12-1 Environmental requirements

Environmental conditions	fulfill the standard	
working environment	Installation site	1. The materials used in the product must not cause personal injury in extreme situations such as fire; 2. Insulation resistance $\geq 10M\Omega$ (high voltage input to housing and output); 3. Withstand voltage meets the requirements of GB/T 18488.1-2015; 4. Contact current $\leq 5mA$, meeting the requirements in GB/T 18488.1-2015; 5. Electromagnetic compatibility meets the limit requirements specified by GBT 18387 electromagnetic compatibility
	Ambient temperature	$-40^{\circ}C \sim +85^{\circ}C$
	Relative humidity	5%~90%
	Other climatic conditions	In a place where there is no condensation, no icing, no dripping or stagnant water
	Vibration and shock	Meet ISO 16750-3
Storage environment	Storage place	Store in a clean, dry indoor place
	Ambient temperature	$-40^{\circ}C \sim +85^{\circ}C$, the air temperature change is less than $1^{\circ}C/min$
	Relative humidity	5%~90%
	Storage time	The total delivery and storage time should not exceed 6 months. If the storage time is longer, the storage should be improved Release conditions (such as lowering the temperature range)
Transport environment	Means of transport	In the standard packing box, it can be transported by cars, trains, planes, ships and other similar tools.
	Ambient temperature	$-40^{\circ}C \sim +85^{\circ}C$
	Relative humidity	At $+40^{\circ}C$, less than 85%
	vibration	Meet ISO 16750-3
Warranty	Warranty requirements	100,000 kilometers in 8 years

10 Environment and reliability test

Table 13-1 Description of environment and reliability test

Item	Description	experiment method	DV	PV	Remarks
1	Structural inspection	N/A	√	√	
2	High and low temperature storage	ISO16750-4:5.1.1.1 & 5.1.2.1	√	√	
3	Thermal shock	ISO16750-4:5.3.2	√	√	
4	Random vibration and temperature cycle test	ISO 16750-3:4.1.2.4.2/ ISO 16750-3 Figure1	√	√	
5	Constant heat and humidity	ISO16750-4:5.7	√	√	
6	Temperature step test	ISO 16750-4:5.2	√	√	
7	High and low temperature operation	GS 95024-3-1:july3013 & 14.3	√	√	
8	Life cycle test	EN60068-2-14	√	√	
9	Temperature cycle test	ISO16750-4:5.3.1.2	√	√	
10	Damp heat cycle test	ISO16750-4:2 & 5.6.2.3	√	√	

11 ROHS requirements

ROHS grade	Is it satisfied	Description
ROHS	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	All materials meet

12 Optional accessories specifications

All devices must meet design specifications.

13 Product installation, operation and maintenance requirements

13.1 Installation

Installed in the customer's vehicle, fixed on the fixed frame.

13.2 Operation

- (1) The power must be cut off when connecting DCDC high and low voltage connectors.
- (2) Make sure that the connectors are in place before you can start the DCDC.

13.3 Maintenance

- (1) DCDC maintenance, inspection or component replacement must be carried out by trained and qualified professionals.
- (2) Before the DCDC terminal wiring operation, the connection between the connecting wire and the high-voltage battery must be cut off.
- (3) During maintenance, maintenance and component replacement, measures must be taken to prevent conductive objects such as screws and cables from entering the DCDC.
- (4) During maintenance, maintenance and component replacement, it is necessary to avoid DCDC and components

contacting or attaching flammable materials。

- (5) After maintenance and maintenance, insulation test and Hipot test must be done。
- (6) In the process of maintenance, maintenance and component replacement, anti-static measures must be taken for DCDC and internal components。

14 Product production, testing, marking, packaging and transportation requirements

14.1 Manufacturability requirements

- (1) Working tools are commonly used sockets, wrenches, screw knives, forklifts, etc.。
- (2) Multiple people are required to coordinate production and assembly. Install as a component first, then as a unit
- (3) Install in accordance with the process instructions

14.2 Testability requirements

- (1) Single board test meets the requirements of automatic test on tooling
- (2) The system test requires a complete test of the electrical performance and control performance of the entire system, including the system's power-on sequence, terminal function, host computer function, full load test, etc., refer to the production debugging instructions

14.3 Logo

- a) The positive and negative markings of the product wiring are clear;
- b) Product production batch;

14.4 Packaging requirements

Platform module products, packaging meets in-plant inventory packaging requirements

14.5 Transportation requirements

The product should be rain-proof and moisture-proof during transportation, loading and unloading in a civilized manner, beating and violent collisions are forbidden, and should comply with relevant transportation regulations。

15 Referenced standards and specifications

GB/T 2423.22-2002 Environmental testing of electrical and electronic products Part 2: Test methods Test N: Temperature change
GB/T 2423.26-2008 Basic environmental testing procedures for electrical and electronic products Test Z/BM: High temperature/low pressure comprehensive test
GB/T 17626.2 -2006 Electromagnetic compatibility test and measurement technology Electrostatic discharge immunity test
GB/T 17626.3-2006 Electromagnetic compatibility test and measurement technology Radio frequency electromagnetic field immunity test
GB/Z 17625.6-2003 Electromagnetic compatibility limit limits the harmonic current generated by equipment with a rated current greater than 32A in the low-voltage power supply system
GB/T 18384 Safety requirements for electric vehicles
QC/T 238 Storage and custody of auto parts
GB/T 24347-2009 DC/DC converters for electric vehicles
IEC 60068-2-13 Environmental test. Part 2: Test. Test M: Low air pressure
IEC 60068-2-30-2005 Basic Environmental Test Procedure. Part 2: Test. Test Db and Guidelines: Alternating Humidity and Heat
EN 60068-2-27-1993 Basic environmental test procedures. Part 2: Tests. Test Ea and guidelines: Shock
CAN Specification V2.0-BOSCH