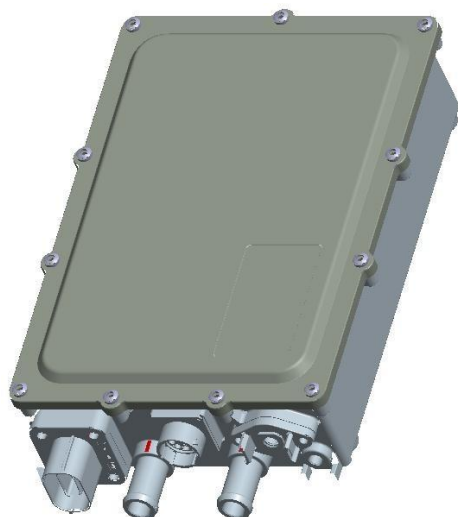


Version	Change Description	Date (dd/mm/yyyy)
0	First edition	24/09/2020

## 3KW DCDC Converter Liquid Cooling System



**Model Number: GVD510-3BM3R0LD**

**Rated Power: 3000W**

**Input Voltage Range: 400V-750V**

**Output Voltage: 24V**

**Dimensions: 249.6mm×176.6mm×68.3mm**

**Weight: 3.6KG**

## Specification

### 1 Product Overview

The GVD510-3BM3R0LD of DC/DC converter is used for voltage conversion instead of the traditional alternator. GVD510-3BM3R0LD is a high power density unidirectional DC/DC converter with a step-down operation mode, which can directly replace the existing DC/DC converter. Without changing the controller structure design, directly meet "Electric Passenger Car Safety Technical Conditions" raises the driving safety to a level. When working, it can convert the energy of the high-voltage power battery into 24V low-voltage to provide the electricity demand of the low-voltage power system of the vehicle.

### 2 Product model name description

**GVD510 – 3 B M 3R0 L D**  
 ①                      ②   ③   ④                      ⑤                      ⑥                      ⑦   ⑧

Mark	Description	Details
①	Product series	GVD510
②	Delimiter	--
③	Product generation	3rd generation
④	Input voltage range	B: Working voltage range 400-750VDC
⑤	Output voltage	M: 27.5V (24V battery or air conditioner power supply)
⑥	Output Power	3KW --- 3R0
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

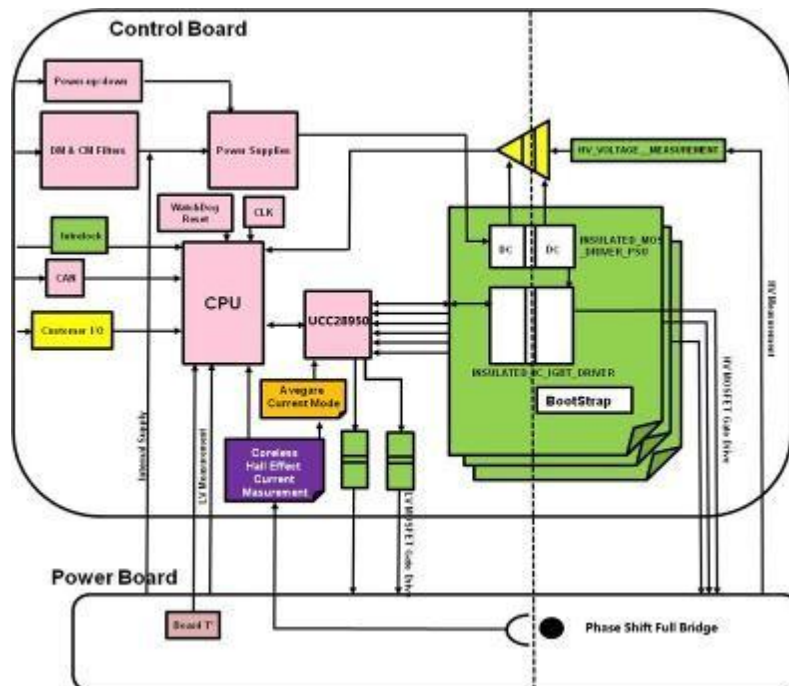
#### 3-1 Model

Product name	Model Number
3KW DCDC	GVD510-3BM3R0LD

#### 3-2 Electrical parameters

Model Number	Specifications	Parameters
GVD510-3BM3R0LD	Rated power	3KW
	Peak power	3.6KW
	Input voltage range	400- 750VDC
	Output voltage	27.5Vdc
	Input current range	0-10A
	Output peak current	133A
	Output rated current	110A
	Peak efficiency	≥0.94

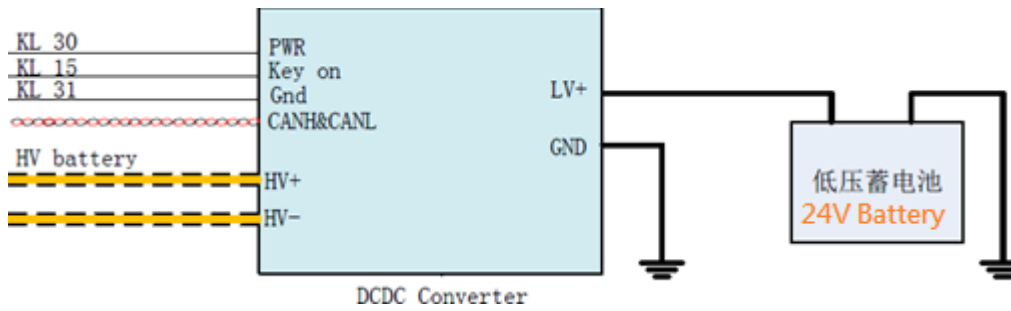
### 4 System block diagram



### 5 Main circuit terminal composition

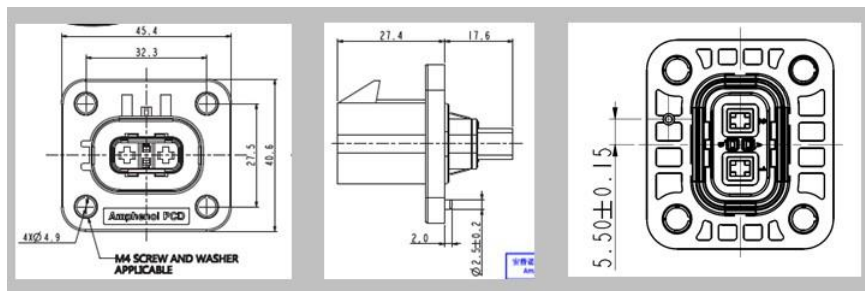
#### 5.1 Logic block diagram of the main loop

GVD510-3BM3R0LD is a one-way 3KW-DCDC stand-alone machine. In practical applications, the external interfaces: DC input, low-voltage DC output terminals, and low-voltage signals.



**5.2 Main circuit terminal function description**

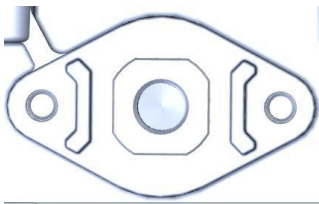
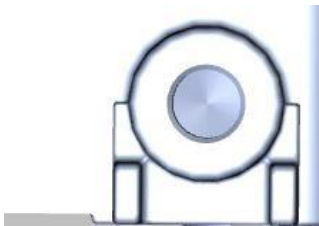
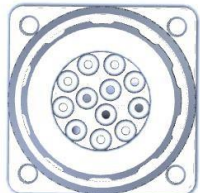
**1. High voltage DC input**



**PIN definition**

PIN	Description	Function	Wire diameter	Model & Maker
1	High voltage input	Input positive	2.5mm <sup>2</sup>	Model: HVSL282022B Maker: Amphenol
2	High voltage input	Input negative	2.5mm <sup>2</sup>	
A,B	High voltage interlock signal	NA	AWG22	

**2. Low voltage output connectors**

<p>DC Output positive connector (use M8*16 screws for wiring)</p> 	<p>DC Output negative connector (use M8*16 screws for the integrated wiring of the chassis)</p> 
<p>Low voltage signal connector</p>	<p>Model: RT001412PN03 Maker: Amphenol</p> 

**Signal definition**

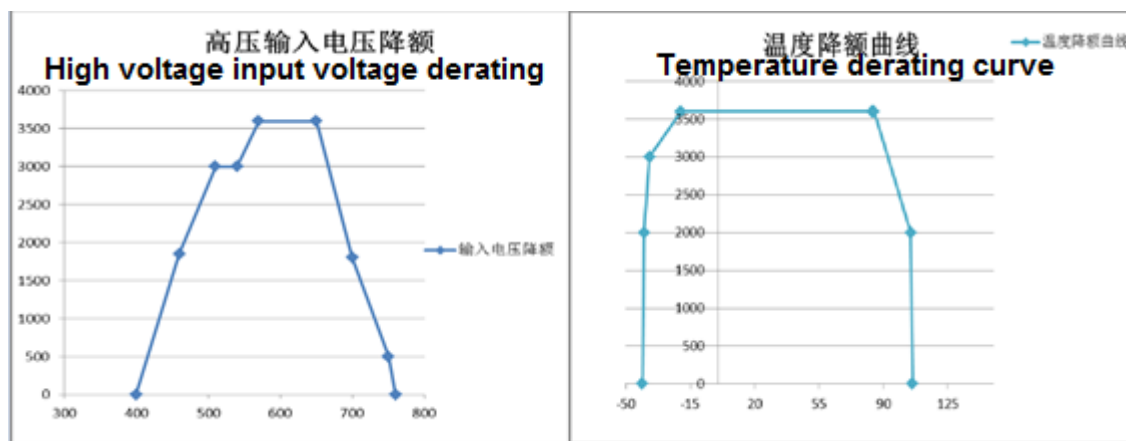
PIN	Function	Description	Remarks	Model & Maker
A	High voltage interlock	HVIL1		Model: RT001412PN03 Maker: Amphenol
B	High voltage interlock	HVIL2		
E	Hardware wakeup	KL_15		
D	Low voltage power supply	KL_31		
K		KL_30		
H	CAN signal	CAN_H	Twisted pair	
L		CAN_L		
*	No function signal port floating	NA		

**6 Key technical indicators**

1、Input characteristics					
Item	Description	Parameters	Unit	Remarks	
1.1	Rated input voltage	560VDC	V	Derated output below 510V	
	Input voltage range	400-750VDC			
1.2	Start transient surge current	≤15	A	Rated input, rated load	
1.3	Maximum input current	10	A	Rms (effective value)	
1.4	Static current consumption	≤0.5	mA	Sleep mode	
1.5	Input control voltage	10-32	Vdc		
2、Output characteristics					
2.1	Output voltage adjustment range	20-28	Vdc		
2.2	Rated output voltage	27.5	Vdc	Voltage sampling accuracy ≤1%	
	Maximum output current	133	A	Current measurement accuracy ≤±2%.	
2.3	Rated output power	3000	W	Rated power	
2.4	Overall efficiency	≥94	%	When output power ≥800W	
2.5	Output ripple voltage	$V_{p-p} \leq 700mV$	Vp-p	Rated voltage and current, the bandwidth of the oscilloscope should be 20MHz, the probe is connected in parallel with 10u+104 capacitance	
2.6	Turn on and turn off overshoot range	≤±10	%	Full and empty conditions	
2.7	Dynamic load dump test	Overshoot amplitude	$\Delta V: \leq \pm 20$	%	0%-100% or 100%-0% load Change, the jump rate jump cycle is 20ms.
		Recovery Time	$\Delta t: \leq 10$	mS	
2.8	Stabilization accuracy	main road	≤±1	%	
2.9	Load adjustment rate	main road	≤±1	%	
3、Protection characteristics					
3.1	Input undervoltage protection point	390±5	Vdc	Automatic recovery	

3.2	Input undervoltage recovery point	400±5	Vdc	Automatic recovery
3.3	Input overvoltage protection point	760±5	Vac	Automatic recovery
3.4	Input overvoltage recovery point	750±5	Vac	Automatic recovery
3.5	Enter the maximum current limit	26	A	Automatic recovery
3.6	Output overvoltage protection point	31±0.5	Vdc	Automatic recovery
3.7	Output undervoltage protection point	19±0.5	Vdc	Automatic recovery
3.8	Maximum output current limit	133	A	Automatic recovery
3.9	Short circuit protection	yes	-	Automatic recovery
3.10	Over temperature protection point	106	°C	Can be automatically restored, 85°C enters derating, 106°C protection, over temperature recovery point is 100°C
3.11	Short circuit protection	yes	-	Lock up
<b>4. Machine characteristics</b>				
4.1	Sleep mode	support	-	
4.2	Hardware wakeup	support	-	
4.3	CAN wake up	support	-	

## Derating Curve

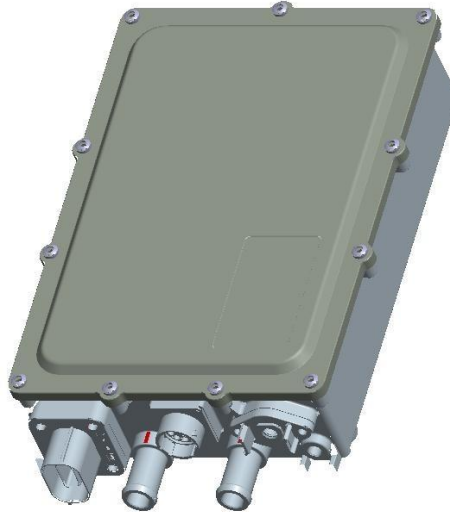


Input voltage derating curve

Temperature derating curve

## 7 Overall structure plan and process requirements

The overall picture is as follows:



model: GVD510-3BM3R0LD

- Overall dimensions (without nozzle connector): 249.6mm×176.6mm×68.3mm
- Outer diameter of water nozzle: 16mm
- DCDC power output terminals are connected to M8\*16 screws
- Housing, aluminum die casting
- Surface treatment: common passivation
- The packaging design meets the needs of single-machine shipments, and pay special attention to the protection of external connectors to prevent damage during transportation
- Reasonable structure layout, compact structure size;
- Single machine weight 3.6kg

## 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	≥10MΩ	
3	Electric clearance, creepage distance		GB/T24347-2009; IEC/EN61800-5-1 (electrical Clearance and creepage distance section)	Except for electrical clearance and creepage distance, other parts are GB/T24347 requirements
4	Protection level		IP67	The connector meets IP67 after mating

## 9 Environmental requirements

In order to give full play to the performance of DCDC and maintain its function for a long time, the environmental requirements of DCDC are as follows:

Environmental conditions		fulfill the standard
working environment	Installation site	1. The materials used in the product shall not cause personal injury in extreme situations such as fire; 2. Insulation resistance $\geq 10M\Omega$ (high voltage input to output); 3. Withstand voltage meets the requirements of GB/T 18488.1-2015; 4. Contact current $\leq 5mA$ , meeting the requirements of GB/T 18488.1-2015;
	Ambient temperature	-40°C~+85°C
	Relative humidity	5%~95%
	Other climatic conditions	In a place where there is no condensation, no icing, no dripping or stagnant water
	Salt spray and corrosive Gas content	Electric vehicle DC DC converter (GBT24347-2020 draft), 144 hours Time salt spray test: to ensure normal operation, no salt spray enters the shell
	Vibration and shock	Meet ISO 16750-3
Storage environment	Storage place	Store in a clean, dry indoor place
	Ambient temperature	-40 °C~ +85°C, the air temperature change is less than 1 °C/min
	Relative humidity	5%~95%
	Storage time	The total delivery and storage time should not exceed 6 months. If the storage time is longer, then Storage conditions should be improved (e.g. lower temperature range)
Transport environment	Transportation	In the standard packing box, car, train, airplane, ship and other relative Near tool transportation
	Ambient temperature	-40 °C~ +85°C
	Relative humidity	At +40 °C, less than 85%
	vibration	Meet ISO 16750-3
life	Life requirement	Product life is 8 years/10W kilometers, whichever comes first

## 10 Environment and reliability test

Refer to domestic testing requirements and meet the requirements of "DC DC Converter for Electric Vehicles (GBT24347-2020 Draft).pdf".

## 11 ROHS requirements

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

## 12 Product installation, operation and maintenance requirements

### 12.1 Installation

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

### 12.2 Operation

Within the allowable range of input, temperature, output and auxiliary power, DCDC works according to the instructions of the vehicle.

### 12.3 Maintenance

- (1) The maintenance, inspection or component replacement of DCDC must be performed by trained and qualified professionals.
- (2) Before connecting the DCDC terminal, the connection between the connecting wire and the high-voltage battery must be cut off.
- (3) During the process of maintenance, maintenance and component replacement, measures must be taken to prevent screws, cables and other conductive objects 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) During the process of maintenance, maintenance and component replacement, anti-static measures must be taken for the DCDC and internal components.

## 13 Transport requirements

The product should be rainproof 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.

## 14 Referenced standards and specifications

GB/T 2423.1-2008 Environmental testing of electrical and electronic products Part 2: Test method Test A: Low temperature  
 GB/T 2423.2-2008 Environmental testing of electrical and electronic products Part 2: Test method Test B: High temperature  
 GB/T 2423.18-2000 Environmental testing of electrical and electronic products Part 2: Test test Kb: Salt spray alternating (sodium chloride solution)  
 GB/T 2423.22-2002 Environmental testing of electrical and electronic products Part 2: Test method Test N: Temperature Variety  
 GB/T 2423.26-2008 Basic environmental test procedures for electrical and electronic products Test Z/BM: High temperature/low air pressure comprehensive test  
 GB 4208-2008 Enclosure protection class (IP code)  
 GB/T 12678-1990 Vehicle Reliability Test Method  
 GB/T 18384 Safety Requirements for Electric Vehicles  
 GB/T 18487.2-2001 Electric Vehicle Conductive Charging System, Electric Vehicle and AC/DC Power Supply Connection Requirements  
 B/T 191-2000 Packaging, Storage and Transportation Pictorial Sign  
 QC/T 238 Storage and custody of auto parts  
 QC/T 413-2002 Basic technical conditions for automotive electrical equipment  
 GB/T 24347-2009 DC/DC converters for electric vehicles  
 SJ 3212-1989 General technical requirements for electronic product transport packaging  
 CAN Specification V2.0-BOSCH