EV On-Board DC-DC Converter

Features

- Constant current for battery charging applications
- Input and output polarity reverse protections
- Input pre-charge
- CAN2.0B interface
- Bootloader via CAN bus
- IP67 enclosure, liquid cooled
- Full set of protections

Absolute Maximum Rating

Excessive stresses over these absolute maximum ratings can cause damage to the converter. Operation should be limited to the conditions outlined under the Electrical Specification Section.

Parameter	Min	Max	Unit
Input Voltage (continuous)	-120	150	Vdc
Operating Temperature (case)	-40	85	˚C
Storage Temperature	-55	125	˚C

Electrical Specifications

These specifications are valid over the converter's full range of input voltage, output voltage, output current, and operating temperature unless noted otherwise.

Input Specifications

Parameter	Min	Typical	Max	Unit
Input Voltage	65	96	120	Vdc
Input Current	-	-	55	A
DCDC_EN High	7	12	16	Vdc
DCDC_EN Low	0	1.0	1.5	Vdc

Output Specifications

Parameter	Min	Typical	Max	Unit
Output Voltage Set Point (software adjustable)	-	14.2	-	Vdc
Output Current (software adjustable)	5	-	211	A
Output Voltage Set Point Accuracy (typical Vin; full load; Ta = 25°C)	-2	-	+2	%Vo
Output Voltage Set Point Accuracy (over all conditions)	-2	-	+2	%Vo
Output Ripple and Noise Voltage RMS Peak-to-peak (5 Hz to 20 MHz bandwidth, typical Vin)	 - -	 - -	 200 300	 mVrms mVp-p
Output Power	-	-	3,000	W
Efficiency Typical Vin; 20% of full load, Ta = 25°C Typical Vin; 50% of full load, Ta = 25° Typical Vin; full load, Ta = 25°C	 - - -	 91.0 93.0 92.0	 - - -	 %
Output Ripple Frequency	660	690	720	kHz
Dynamic Response (typical Vin; Ta = 25°C; load transient 0.1A/μs) Load step from 10% to 100% of full load Peak deviation Settling time (to 10% band of Vo deviation) Load step from 100% to10% of full load Peak deviation Settling time (to 10% band of Vo deviation)	 - - - -	 5 1 5 1	 - - - -	 %Vo ms %Vo ms
Turn-on Time (from applying DC input to Vo=90%)	-	30	-	ms

General Specifications

Parameter	Min	Typical	Max	Unit
Ingress Protection	IP67			
Isolation Capacitance	-	6,000	-	pF
Dimensions (not including terminals)	458.0 x 330.0 x 72.6			mm
Weight	-	10.0	-	kg
Operating Humidity	5	-	95	%RH
On/Off DC-DC Converter	Either DCDC_EN or CAN command*			

** The control logic is as follows:*
ON logic: Either "DCDC_EN=ON" or "CAN command=ON"
OFF logic: Both "DCDC_EN=OFF" and "CAN command=OFF"

Cooling Specifications

Parameter	Description
Cooling Style	Liquid cooled, inlet liquid temperature less than 70°C
Coolant Medium/Mixture	50/50 Ethylene Glycol/Water
Coolant Flow (typical)	5L
Pressure Drop	See Appendix I

Protection Specifications

Parameter	Notes	Min	Typical	Max	Unit
Input Under-voltage Protection		52	55	58	Vdc
Input Under-voltage Recovery	Auto-recovery	57	60	63	
Input Over-voltage Protection		-	126	-	
Input Over-voltage Recovery	Auto-recovery	-	120	-	
Output Over-voltage Protection		-	15.6	16.0	
Output Over-voltage Recovery	Auto-recovery	-	15	-	
Output Over-current Protection	Current limiting mode	-	211	-	A
Output Short Circuit Protection	Auto-recovery				
Over Temperature Protection		100	105	110	°C
Over Temperature Recovery	Auto-recovery	90	95	100	

Safety Specifications

Parameter	Notes	Min	Typical	Max	Unit
Isolation Voltage	Input-Output, 1 minute, <5mA	1,500	-	-	Vac
	Output-Case, 1 minute, <5mA	200	-	-	
Insulation Resistance	Input-Output, 1000Vdc, 90%RH, nominal air pressure	200	-	-	MΩ
	Input-Case, 1000Vdc, 90%RH, nominal air pressure	200	-	-	

Note: The negative output terminal is connected to Case.

Communication Specifications

Parameter	Description
Interface	Based on CAN2.0B interface at 500Kbps baud rate
Protocol	NetPower standard protocol, detailed in CAN matrix: CD1XKX-14L-J1939-V3.0
Functions	Turn on/turn off DC-DC converter
	Set output voltage
	Set maximum input current limit
	Monitor real-time parameters(voltages, currents and temperature) and faults
	Bootload software

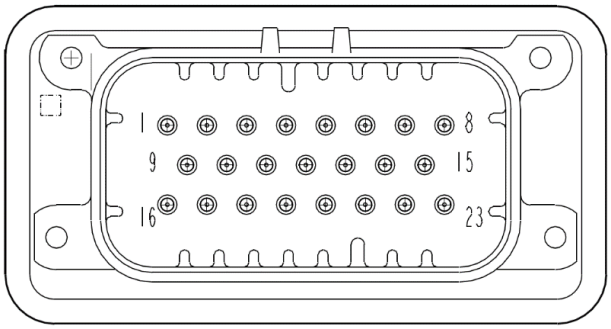
Customization Specifications

Parameter	Description
Parallel	Multiple DC-DC converters can operate in parallel to provide higher output power
CAN Communication Baud Rate	Choice of: 125kbps, 250kbps, 500kbps(default) or 1000kbps
UDS Diagnostic and Bootloader	ISO 14229 Road Vehicles—Unified Diagnostic Services(UDS) ISO 15765 Road Vehicles—Diagnostics on Controller Area Networks(CAN)
J1939 Communication, Diagnostic and Bootloader	SAE J1939-21 Data Link Layer SAE J1939-71 Vehicle Application Layer SAE J1939-73 Application Layer—Diagnostics SAE J1939-81 Network Management
Customized Protocol	According to customer requirements

Interface Definitions

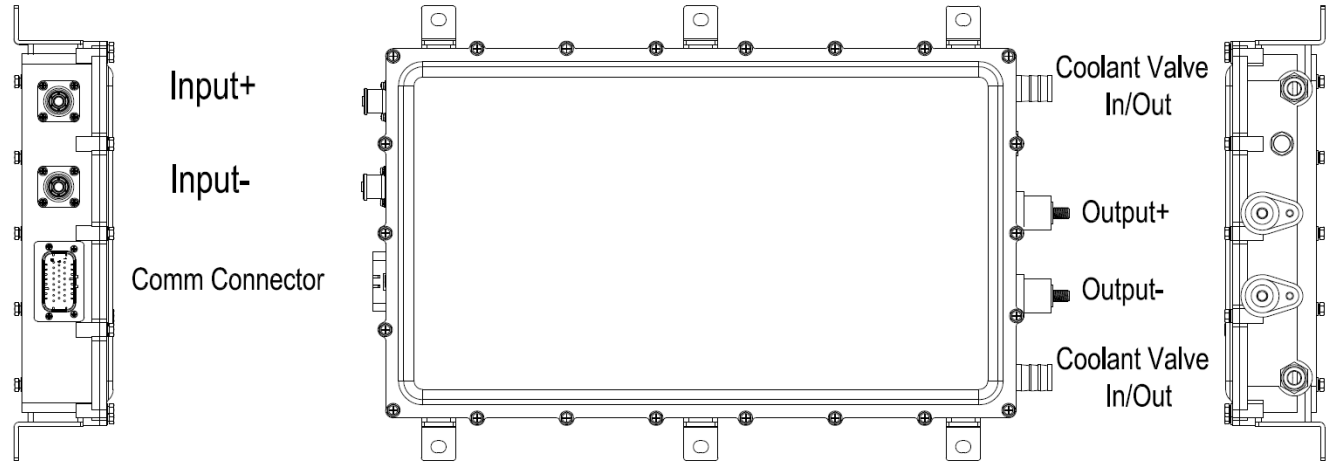
Connector	Connector Model	
	Connector PN	Mating Connector PN
Input Connector	Positive/Orange: SLPRBBPSO (C10-730189-010)	SLPPB50BSO (C10-730188-000)
	Negative/Black: SLPRBBPSB (C10-730189-110)	SLPPB50BSB (C10-730188-100)
	Supplier: Amphenol	
Output Connector	JK17-1L (ring terminal) Supplier: Jonhon	
Coolant Valves	3/4" x 2pcs	
Communication Connector	TE: 776087-1	TE: 770680-1; 770520-1; 770678-1
	See "Communication Connector Descriptions"	

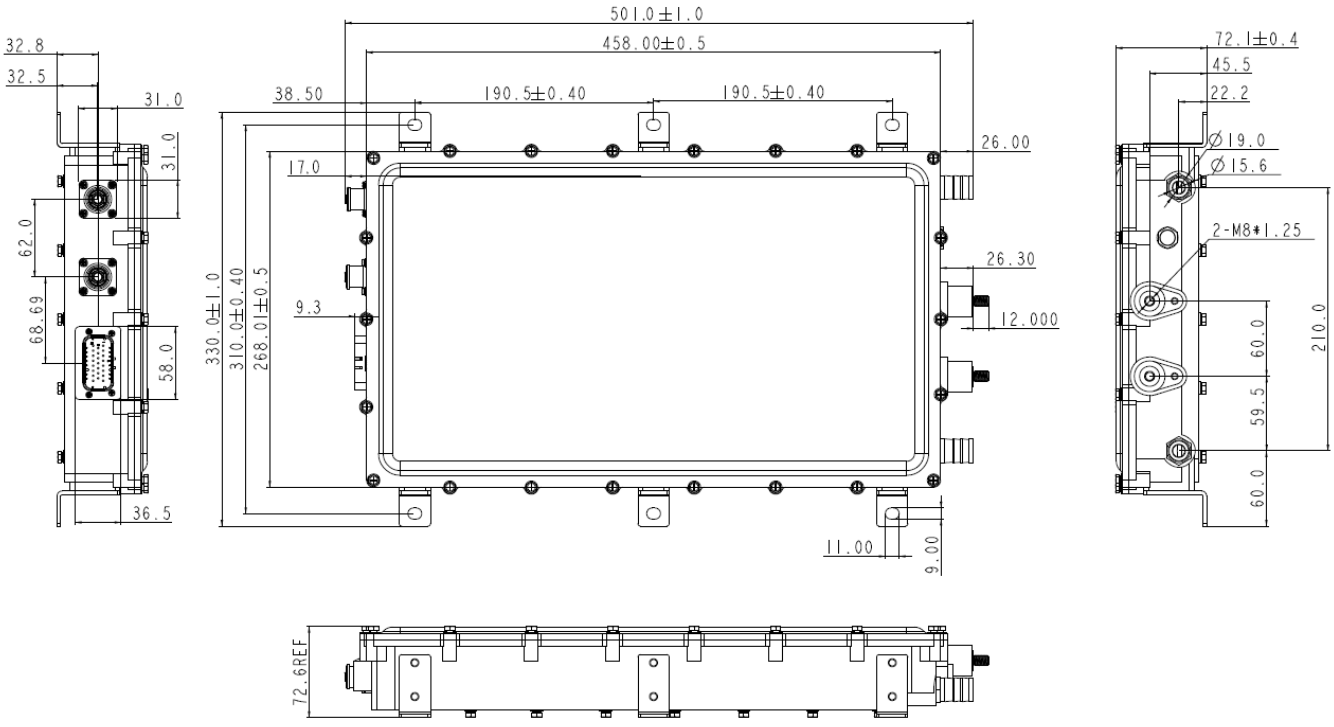
Communication Connector Descriptions

Pin	Name	Definition	Model: 776087-1 Supplier: TE
1	GND	Ground	
2	NC	No connection	
3	NC	No connection	
4	GND	Ground	
5	NC	No connection	
6	GND	Ground	
7	CAN_SHIELD	Shielding line for CAN	
8	GND	Ground	
9	NC	No connection	
10	NC	No connection	
11	GND	Ground	
12	GND	Ground	
13	NC	No connection	
14	GND	Ground	
15	CAN_H	CAN high	
16	NC	No connection	
17	NC	No connection	
18	NC	No connection	
19	NC	No connection	
20	DCDC_EN	Enable signal for DCDC power section	
21	NC	No connection	
22	GND	Ground	
23	CAN_L	CAN low	

Mechanical Drawing

Unit: mm





Appendix I

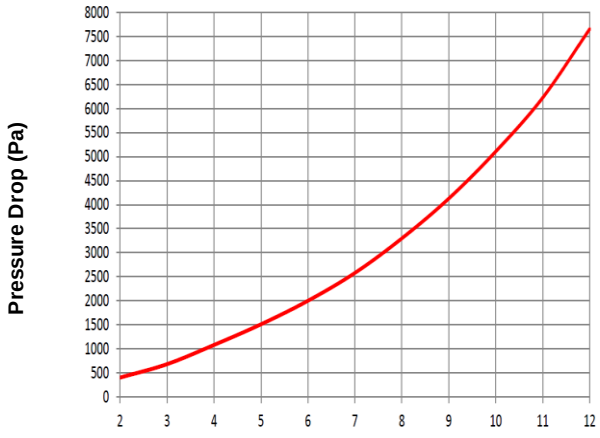


Figure 1. Pressure Drop vs. Coolant Flow