



SEC-B175-7A Hardware Datasheet

175V 7A Bi-directional smart DC-DC Converter



SEC-B175-7A is a smart DC-DC bidirectional boost converter. The converter has a fully digital control topology, and open-source software.

Its light weight and super energy efficient hardware design ensures that this device can be used in the most demanding applications. Some examples are:

- Maximum power point tracking
- Battery charging
- Efficient Power conversion



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Description

The SEC-B175-7A boost converter runs on Open Smart Energy converter (Open-SEC), opens source software. It is designed to work as a maximum power point tracking boost converter, working with output voltages up to 175V and input current up to 7A. Its efficiency can reach as high as 99.4%.

The OpenSEC software comes with a configuration tool, the Reboost PC tool. This tool can be used to connect to the hardware, view and change settings, upgrade firmware and view live data from the device. These features ensure ease of integration.

Features of SEC-B175-7A include the following. More details on these features can be found in the Open SEC Software Manual.

- Open-source Software
- High efficiency, high bandwidth Hardware
- Maximum power point tracking
- Isolated CAN-bus interface
- Over-current and over-voltage protection
- Integrated fuse
- Easy integration with a tool for editing settings

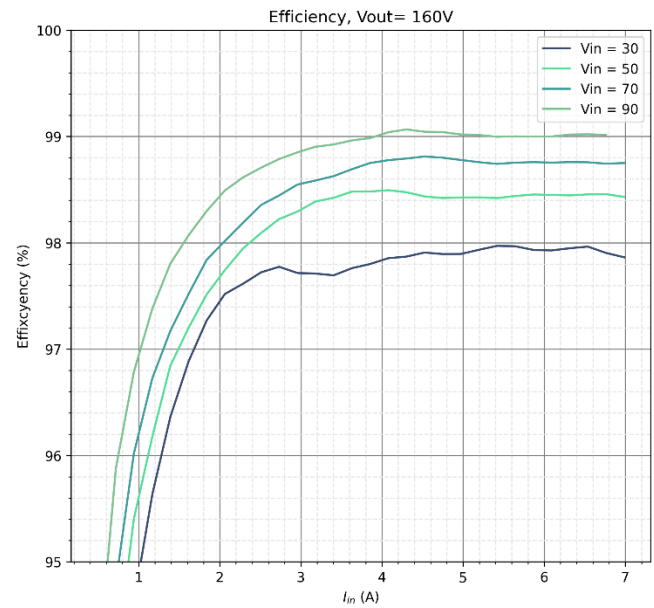
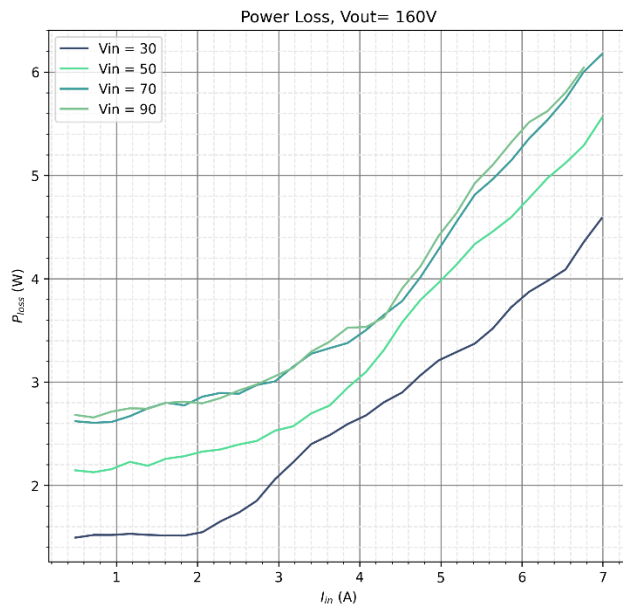
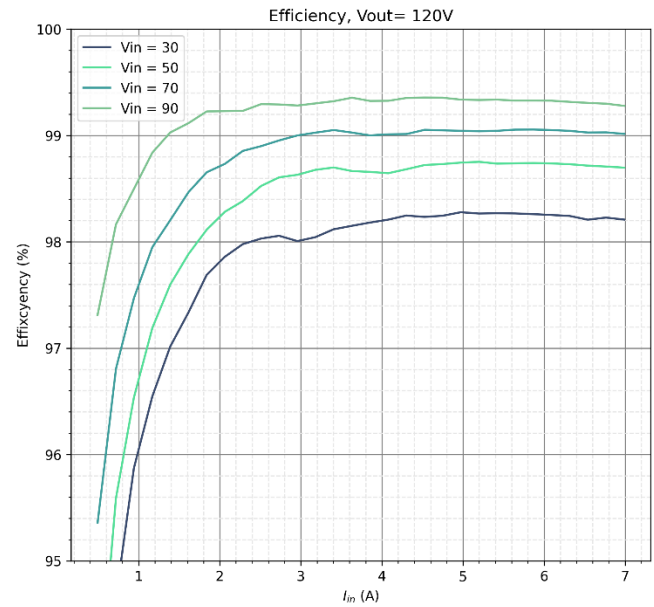
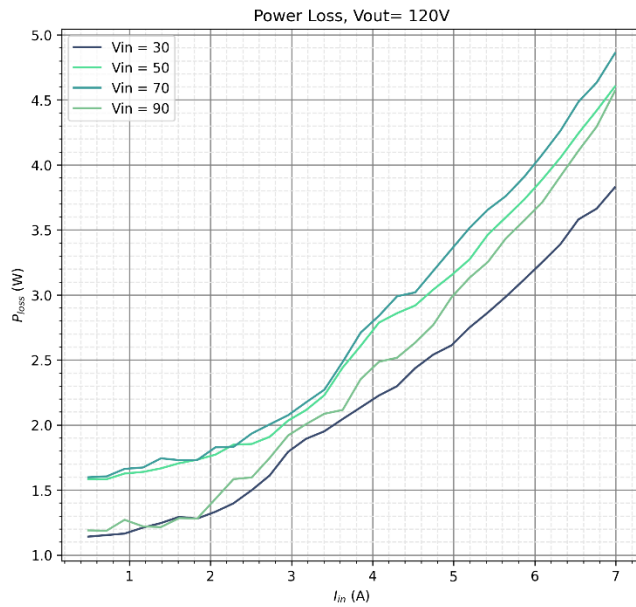


Hardware Specifications

Parameter		Min	Max	Unit
Output voltage range	V_{out}	30	175	V
Absolute maximum voltage			200	V
Input Voltage range	V_{in}	6	$0.97 \times V_{out}$	V
Input Current Range	I_{in}	0	7	A
Power losses	$V_{out}=120V, I_{in}=6.5A$		4.5	Watt
	$V_{out}=175V, I_{in}=7A$		7	Watt
Small signal Bandwidth		1		kHz
Slew rate			13	V_{ms}^{-1}
CAN Bus supply voltage	V_{can}	6	48	V
CAN Bus power usage			75	mW
CAN Bus speed		125	1000	kbps
CAN circuit isolation		1		kV
Weight			200	Gram
Heatsink Temperature		0	80	°C
Thermal resistance			5	°C/Watt
Relative Humidity			95%	



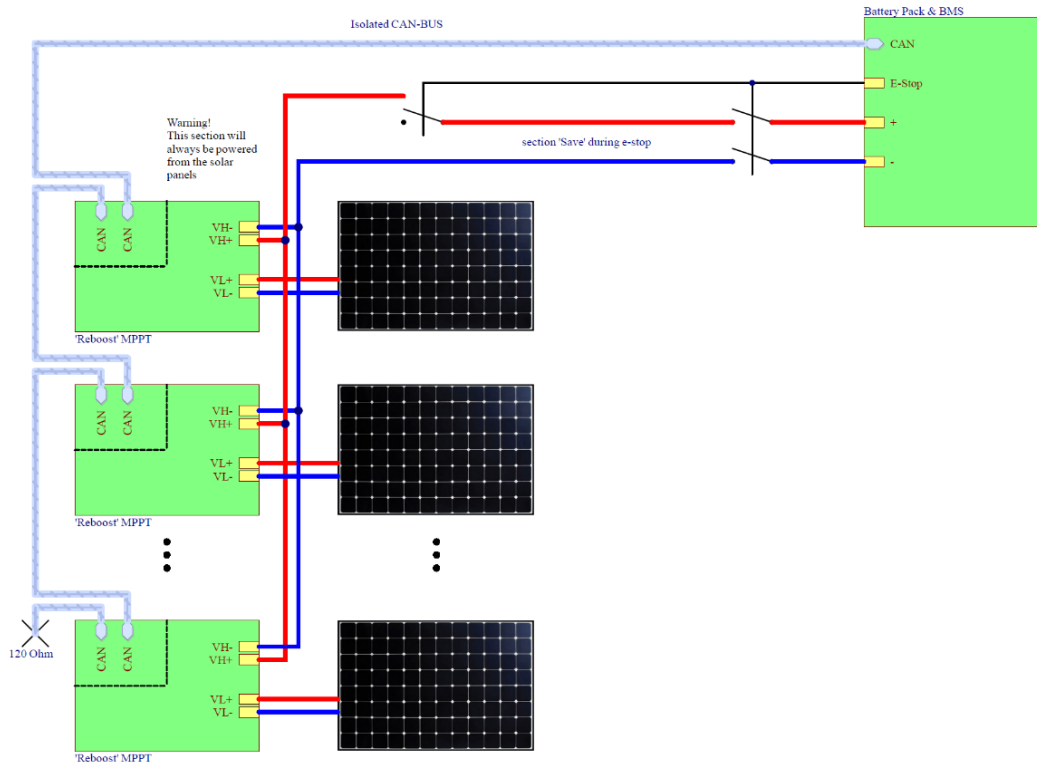
Efficiency Data



Functional Description

Installation

The SEC-B175 is typically used to charge a battery, with multiple units in parallel. Care must be taken that the negative side of the PV connection is not connected to any other unit. An example of a typical installation is can be seen in the following figure. Note to please check the pinout of your hardware in the respective hardware datasheet.



Turn on and Pre-charging

The device is turned on by applying a voltage higher than 6V on the CAN-bus supply voltage and providing a voltage higher than 30V to the output. This voltage might come from the PV panel connected to the unit, via the internal bypass diode.

If the device is connected to a battery via contactors or switches, it must first be properly pre-charged and connected to the battery before turning on. If the voltage on the output of the unit does not match the voltage of the battery, large current spikes might appear when the contactors or switches are engaged, which can damage the device or other parts of the system. The device contains 440μF of capacitance on the battery output.

When connecting units connected in parallel, they might already be charged. They are usually charged when connected to a PV panel. Hence the device should also be pre-charged when connecting units in parallel.

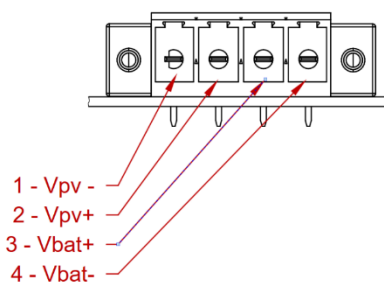
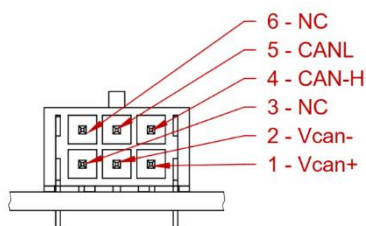


Cooling

Even though the device is energy efficient, heat is still generated in the device. If the temperature of the device rises above its specified limit, it will try to reduce heat generation by limiting the input current. To prevent this from happening, adequate cooling must be provided through airflow over the heatsink of the device

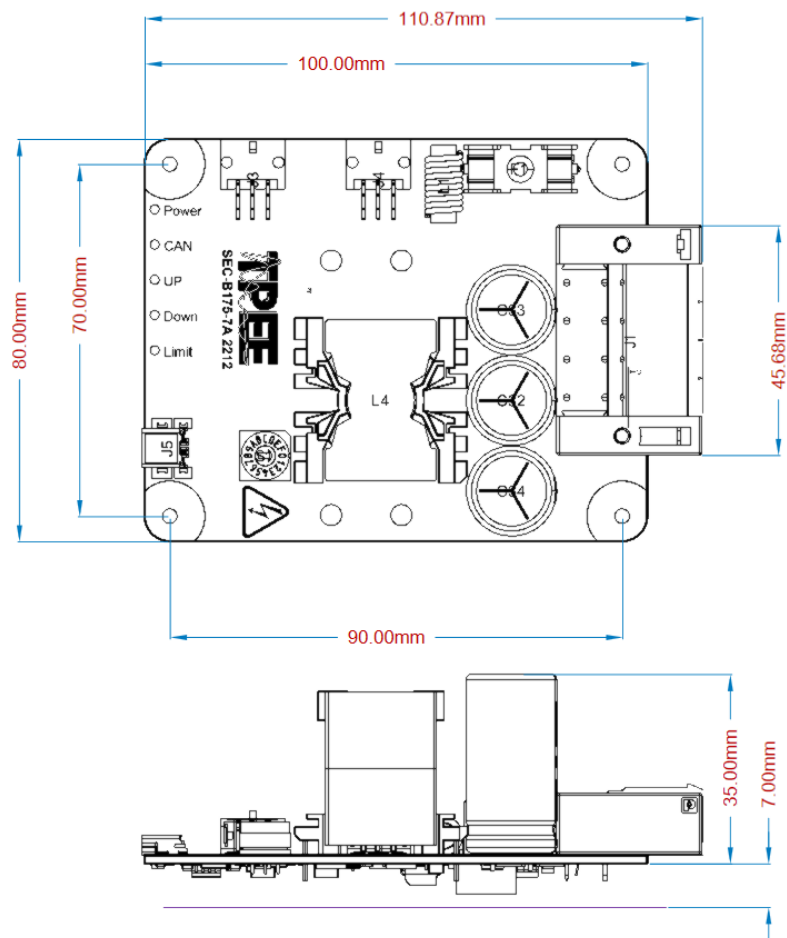
Connectors and Pinout

Connector	Pin	Name	Description
CAN (2x) Molex Micro-Fit 3.0 Mating MPN: 430250600	1	Vcan+	CAN-bus supply voltage
	2	Vcan-	CAN ground
	3	NC	No internal connection
	4	CANH	CAN High signal
	5	CANL	CAN low signal
	6	NC	No internal connection
Power Phenix contact Mating MPN: PC 4/4-STF-7.62	1	V _L -	Negative low side (PV)
	2	V _L +	Positive low side (PV)
	3	V _h +	Positive high side (Battery)
	4	V _h -	Negative high side (Battery)





Mechanical Dimensions





Name Convention

SEC-	B	175	-7A
Smart Energy Converter	Bi-directional	High side voltage	7 Ampere current rating

Document History

Revision	Changes
Rev. 1	Initial release, preliminary datasheet.
Rev. 2	Added mechanical drawings Added functional description Updated Electrical specifications
Rev 3	Added Can bus protocol
Rev 4	Added changes for Firmware version 1.3
Rev 5	Split up the document into the OpenSEC manual and SEC-B175-7A Hardware Datasheet.
Rev 6	Updated intended use diagram to better reflect pinout.