DESIGN SPECIFICATION

180/300W DC-DC CONVERTER

POTTED

Revision History

Issue:	A	B
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1.0 Definition

The DC-DC Converter is a device that transforms 24-80v volts in a battery operated vehicle to 12 or 24v volts for accessory devices. The converter is a self-contained device that is isolated input to output and regulates the output voltage independent of any line or load variations.

2.0 Scope

This specification outlines the requirements around which this DC-DC converter must and will operate.

3.0 Electrical

The following sections define the electrical parameters of the DC-DC converter. Converter switching frequency is 62kHz.

3.1 Input Voltage

The DC-DC converter will operate from a nominal input voltage of:

24/36v (19.2v – 45v)
36/48v (28.8v – 60v)
72/80v (57.6v – 100v)

If the voltage drops below the minimum momentarily, the output voltage will shut down momentarily and the converter will restart within 300 milliseconds.

3.2 Surge Input Voltage

The peak input surge voltage will be no higher than 200 volts for 1 second.

3.3 Input Current

Maximum steady state input current at 72 volts will be less than 3.2 amps for the 180w model and 5.5 amps for the 300W model. Rating is continuous with the DC-DC converter at 100% load.

Surge current will be less 170 amps for 4 milliseconds.

3.4 Reflected Input Ripple Current

The input ripple current reflected to the dc source will be no greater than 3 amps from DC to 200Khz.

3.5 Nominal Output Voltage

The output voltage is specified at 12v, 13.4v, or 24v. This range is to include all variations of load, line, and temperature.

3.6 Output Voltage Regulation

The output voltage will be a regulation band of no greater than +/-5%, which will include the following:

- Load variation from no load to full load.
- Input voltage variation from 50-100v, see Figure 2.
- Temperature variation from –30C to +55C.

3.7 Output Current

The converter will deliver a load current of:

36/48v-12v, 180w, 15 amps
36/48v-12v, 300w, 20.4 amps
72/80v-12v, 180w, 15 amps
72/80v-12v, 300w, 24 amps

Current limit will occur at greater than 24 amps. If the load exceeds 24 amps, the power supply will current limit the output current. This is accomplished via primary power limiting and the output voltage will decay when the maximum current has been exceeded. After this action has taken place, the output will be enabled and current will start to flow again, rising to the point where the current will be exceeded if the over-current has not been removed. This is normally defined as "chirp mode" operation of the converter.

3.8 Input / Output Isolation

The input and output shall be isolated to 1500 volts ac, 60 Hz, for 1-minute minimum.

The input negative shall be isolated from the output negative.

3.9 Efficiency

Minimum efficiency of the converter is to be 84% minimum at 100% load. The minimum efficiency shall be no less than 75% based on a load of 10%.

4.0 Environmental

The following sections define the environmental aspects of the converter:

4.1 Temperature

Operating: -30 degrees C to +55 degrees C

Storage: -40 degrees C to +70 degrees C

Operating temperature is defined as the ambient temperature surrounding the outside of the converter.

4.2 Humidity

The converter will operate over a humidity range of 0% to 90% condensing over operating temperature range.

The units shall be completely potted.

4.3 Vibration

6 G force in x, y and z axis from 0 hertz to 200 hertz for 1 minute.

5.0 Mechanical

5.1 Dimensions

The converter will be of a rectangular construction and mounted on a base: 190mm long x 76mm wide x 5mm thick. Reference Figure 3.

All thermal parameters are to be measured with the converter mounted in the position with the appropriate base plate.

5.2 Input/Output Connections

Reference Figure 3 for pinout descriptions for 300w converter.

Mating connectors:

For 300w: (661/27009 connector kit)

- Molex housing: 42816-0412
- Molex pins: 42815-0011 (10-12 awg wire)

For 180w:

- Amp housing: 0-350778-1
- Amp sockets: 0350550-3 (14-20 awg wire)

5.3 Mounting

The converter must be mounted on a flat surface for adequate thermal transfer and to meet the output power requirements as stated in section 3.7 and 4.1.

Unit shall have 4 - 7.0 mm mounting holes as shown in Figure 3.

5.4 Input Fuse

Input fuse 15/20A (depending on voltage range)

5.5 Output Fuse

Output fuse 15/20A (depending on voltage range)

5.6 Label

A label is to be placed on the converter as shown in Figure 3. The label will be standard Sevcon.

6.0 Compliance Requirements

6.1 UL 1950

The converter must meet or exceed UL requirements for dc-dc converters for the United States. It must be designed to meet the UL 1950 requirement.

6.2 CSA 234

The converter must meet or exceed CSA requirements for dc-dc converters for Canada. It must be designed to meet the CSA 234 requirement.

6.3 IEC-950

The converter must meet or exceed IEC-950 requirements for dc-dc converters in Europe.

6.4 EMC

The converter must meet or exceed applicable EMC standards for US, Canada and Europe. EN55011-60555
IEC1004-2 thru -5

6.5 CE Mark

The power supply must have the CE mark.

6.6 Temperature

All surfaces of the converter must be less than the touch temperature for safety requirements (75 degree C max.).

7.0 Protection

7.1 Overcurrent

The power supply shall be protected from overload. This is accomplished via primary power limiting and is of the "chirp mode" type as described in section 3.7. The converter limits at no less than 24 amps but no higher than 125% of maximum specified current.

7.2 Reverse Voltage Protection

Reverse voltage protection is provided for on the input via a diode that allows current to flow in the correct direction only. The standoff voltage for the reverse protection shall be no less than 100 volts.

8.0 General

8.1 Changes

No changes in the design or specification shall be implemented without the written approval of Sevcon.

8.2 Components

All components must meet the requirements of section 6.0 as used in the application. They do not need to be individually approved, but must be able to meet the requirements of the safety and EMC specifications as listed.

Figure 1: Basic Conection Schematic

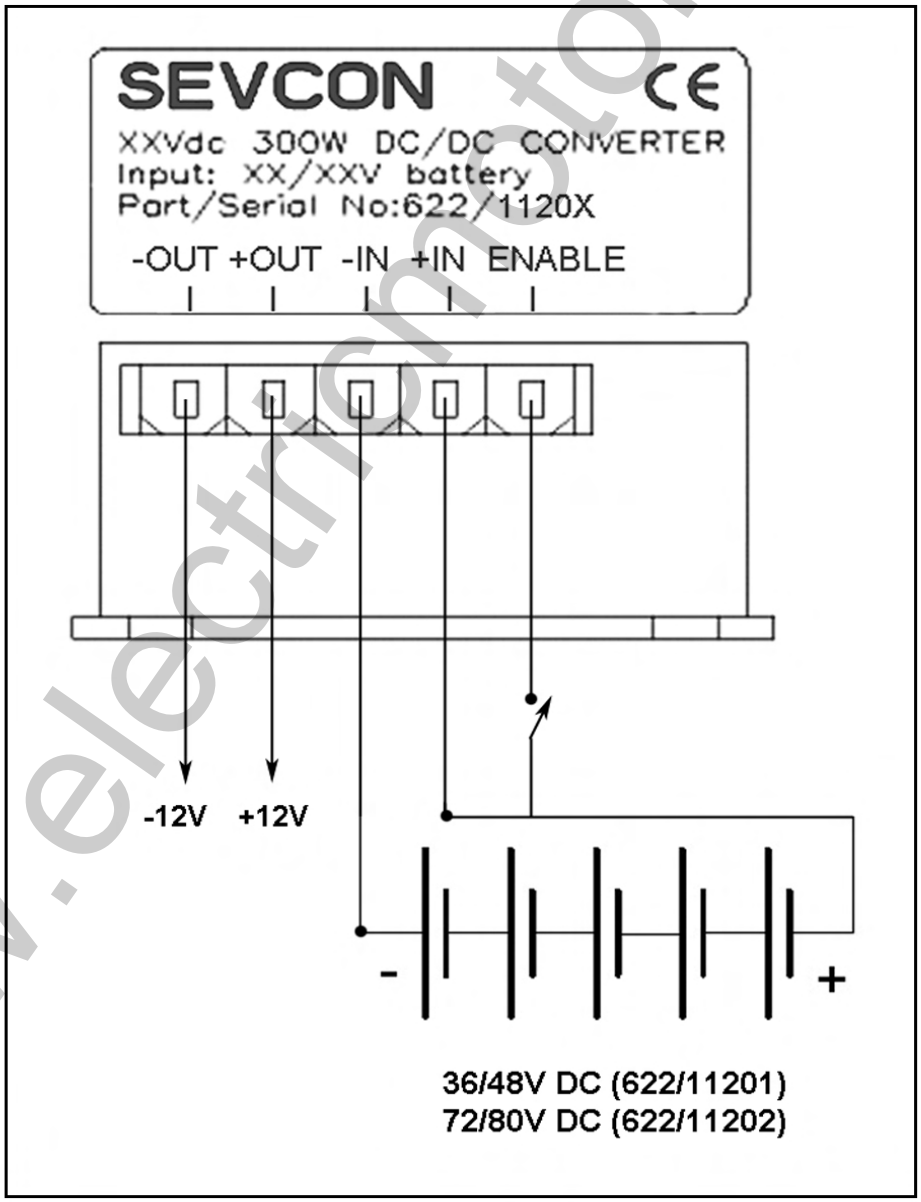

Figure 2: Temperature versus Output Power (180w unit)

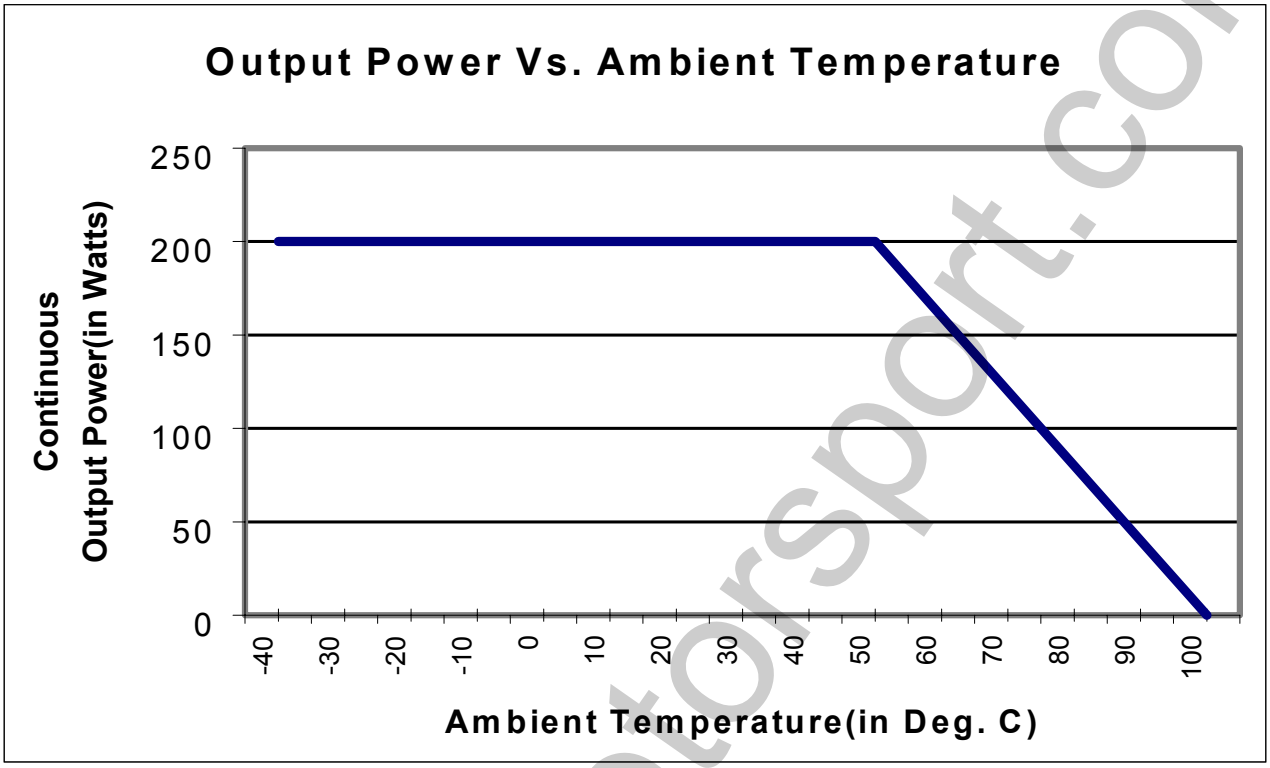

Figure 2

Figure 3 Output Voltage vs. Input Voltage