Interfacing with the SMHV Series

Sub-Miniature High Voltage DC to DC Converter

Introduction

This application note is intended to provide the pin assignments, input requirements, and output characteristics for the SMHV Series sub-miniature high voltage power supplies. This document should be used in conjunction with the product specification sheet to form a complete usage manual for the SMHV Series modules.

The SMHV Series is a family of sub-miniature single-output DC to DC converters supplying up to 10kV in 0.434 cubic inches (0.85" x 0.85" x 0.6"). The nominal input voltage is 5Vdc. See product specification sheet for specific models.

Functional Diagram

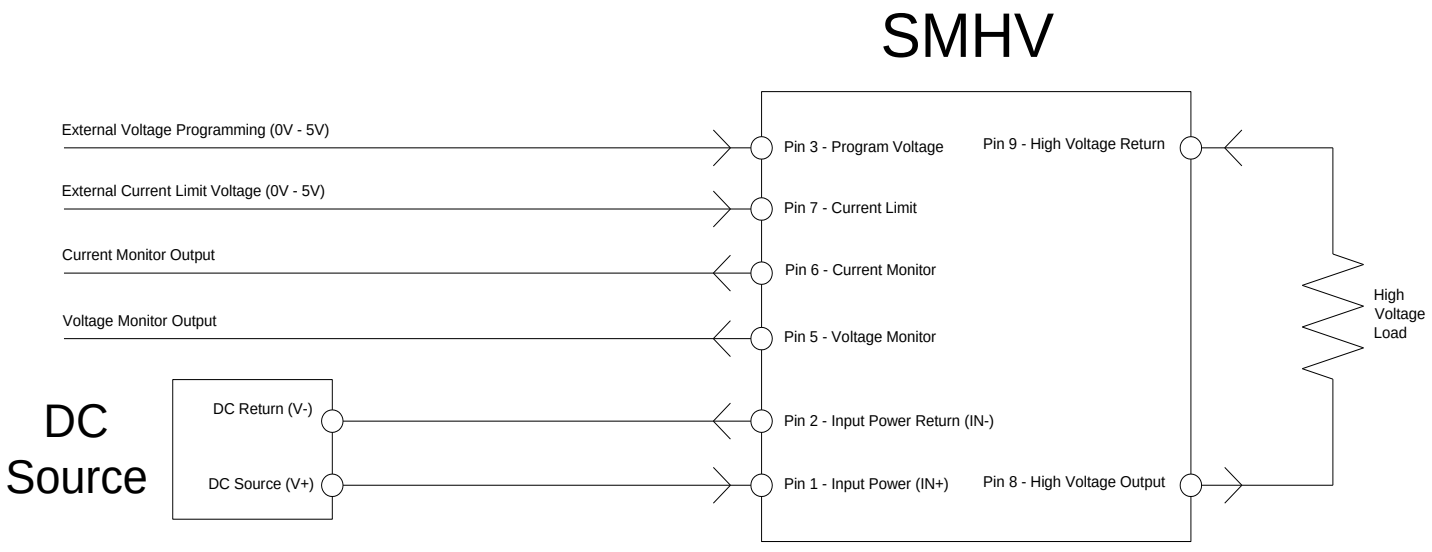

Figure 1. SMHV Series Functional Diagram, Positive Polarity Model

Pin Overview

Pin assignments are referenced from Figure 1 above.

Pin 1 – Input Power (IN+):

This pin is the power input for the SMHV module supplied by the DC source. This source must be capable of providing the input voltage and maximum input current necessary for operation of the SMHV module. These requirements vary by model and can be found in the Model Selection Guide table of the product specification sheet. Some examples of acceptable DC sources are batteries, AC/DC supplies, and DC/DC supplies.

Pin 2 – Input Power Return (IN-):

This pin is the return ground path to the input DC source that powers the module. This pin is also used as the return ground path for the program voltage signal.

Pin 3 – Program Voltage:

This pin is used to control the high voltage output of the device by using a low voltage analog signal. An input of 0Vdc to +5Vdc will linearly control the high voltage output from 0 to 100% of the max rated output as described in the product specification sheet for the chosen module. This pin has an input impedance of 75kΩ ±2%. The programming voltage signal can be from a wide variety of sources as long as those sources have a common ground return to the SMHV module, including operational amplifiers, digital to analog converters, and potentiometers.

Pin 4 – Not Used

Pin 5 – Voltage Monitor:

This pin provides a low voltage representation of the high voltage output. A voltage of 0Vdc to 1Vdc output from this pin corresponds to an output voltage of 0Vdc to 100% of rated voltage output. Refer to product specification sheet for specific model max ratings. This pin is buffered for a variety of measurement techniques and has an output impedance of 1kΩ.

Pin 6 – Current Monitor:

This pin provides a low voltage representation of the output current demand. A voltage of 0Vdc to 1Vdc output from this pin corresponds to an output current of 0µA to 100% of rated current output. Refer to

product specification sheet for specific model max ratings. This pin is buffered for a variety of measurement techniques and has an output impedance of 1kΩ.

Pin 7 – Current Limit:

This pin is used to clamp the output current draw from the SMHV module. A user supplied input voltage from 0Vdc to 1Vdc will set an output current clamp linearly from 0µA to 100% of rated current output. Refer to product specification sheet for specific model max ratings. As output current demand exceeds set limit point, the SMHV module will automatically lower the high voltage output to maintain set output current set point. In this condition, if the output current demand reverts back below current limit set point, the SMHV module will automatically adjust the high voltage output to normal operation. This pin has an input impedance of 10kΩ. The Current Limit function can be disabled by connecting the pin to the Input Power pin. Do not leave this pin floating.

Pin 8 – High Voltage Output:

This pin is the high voltage output of the SMHV module. This pin supplies an output power of 1W at single polarity voltages up to ±10kV. Refer to product specification sheet for specific model max ratings. The output adjusts linearly in response to the signal from the Program Voltage.

Pin 9 – High Voltage Return:

This pin provides a return path to the SMHV module for the high voltage output from the high voltage load. This return path is internally connected to the Input Power Return, and the High Voltage Output is referenced from this point.

Design Considerations

PCB Layout:

Always use best practices when designing the system PC board. The SMHV series can range up to ±10kV depending on model, so proper creepage and clearance spacing must be observed. If possible, PCB routing is recommended on higher voltage modules to isolate the high voltage output from the lower voltage pins. Avoid placing traces under the module, especially critical signal traces. Ground planes and/or power planes are recommended, but take caution to eliminate these layers near the High Voltage Output.

Soldering:

The SMHV series of modules is rated for hand soldering only. Unit damage may occur in convection or wave soldering machines. Module should be soldered to PCB using a temperature not to exceed 600°F for no longer than 5 seconds. Inspect all solder connections for conformance to industry standards.

Cleaning:

If contaminants are present on the unit or the connections, it is imperative to be cleaned prior to operation. The SMHV series are encased in a Thermoset plastic (Diallyl Phthalate) housing. Be sure any solvents used are compatible with the housing material and solder used.

Customization:

The SMHV series can be manufactured with modifications, if necessary. Contact the factory for information on wire outputs, custom voltage outputs, metal shielding, or other requests.

About HVM Technology

HVM Technology is the leading manufacturer of miniature high voltage products used in today's most advanced equipment. We design, manufacture and market high performance products for a variety of applications in the military, aerospace, scientific and analytical fields. Our expertise in high voltage miniaturization enables our customers to design the technology of the future.