

## Interfacing with UltraVolt High Voltage Power Supplies Models A, AA, C, 10A-25A, 30A-40A, and F Series

### Introduction

In this Technical Note, we provide tips for interfacing with the interconnection pins and leads of the UltraVolt high-voltage power supply series identified above. This document augments the data sheets for each of the series. Complete product data sheets can be found by visiting [advancedenergy.com/hv](http://advancedenergy.com/hv).

A few items of note about UltraVolt's high-voltage power supplies:

- The AA Series is similar to the A Series, but is smaller; the A Series has lower ripple.
- The C Series is intended primarily for charging capacitors and for applications that require fast rise time and low overshoot.
- The F Series is based on the A Series, but contains additional circuitry to reduce output ripple voltage.

### An Overview of the Connections

**Pin 1 – Input-Power Ground Return:** This pin is the Input-Power Ground for all the high-voltage power supplies in these series. Be sure to return the high-voltage (HV) load to HV Return.

**Pin 2 – Positive Power Input:** This pin is the Positive Power Input. The majority of the power supplies covered in this Technical Note are 24V input nominal. 4 watt power supplies are 12V input nominal. All models covered here are capable of a wide input operating range (from 9V through 32V input) with proper de-rating; refer to the individual models' data sheets for details.

**Pin 3 –  $I_{out}$  Monitor:** This pin serves as the  $I_{out}$  Monitor pin, as depicted in Figure 1. Scale factors vary and are unique to each model. The HV Multiplier in each high-voltage power supply is grounded through the  $R_{sense}$  resistor, as shown in Figure 1. The HV Feedback resistors and the HV Test Point resistors are returned to ground and are seen by the power supply as an internal load. This internal load is the source of an offset on the  $I_{out}$  monitor that must be accounted for when making output current measurements. Refer to the individual models' data sheets for details.

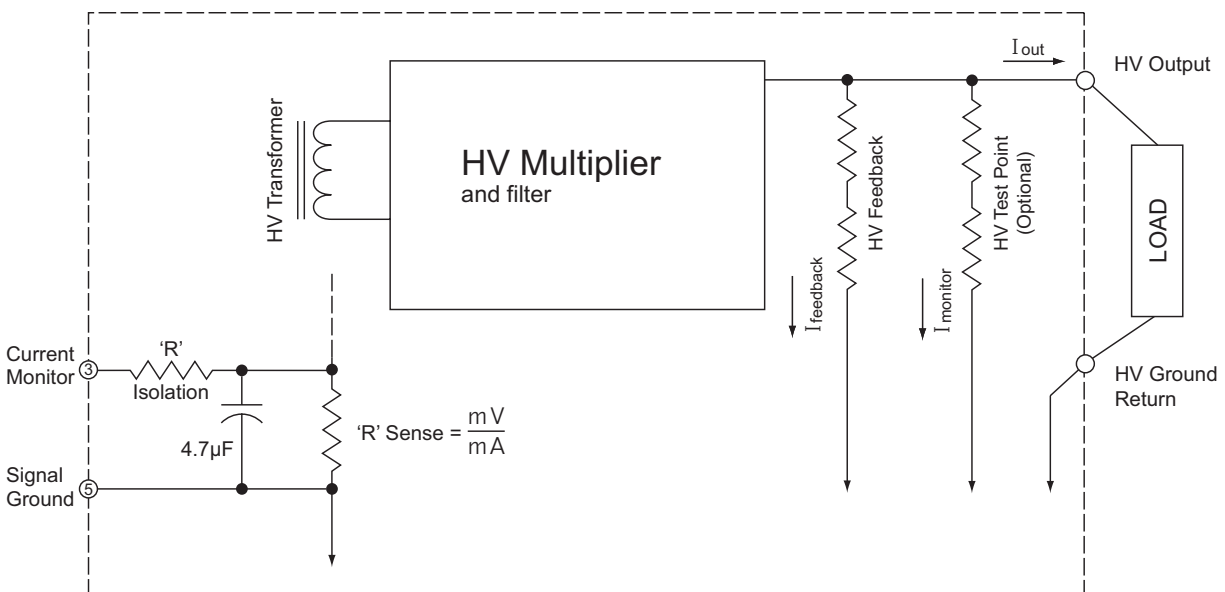


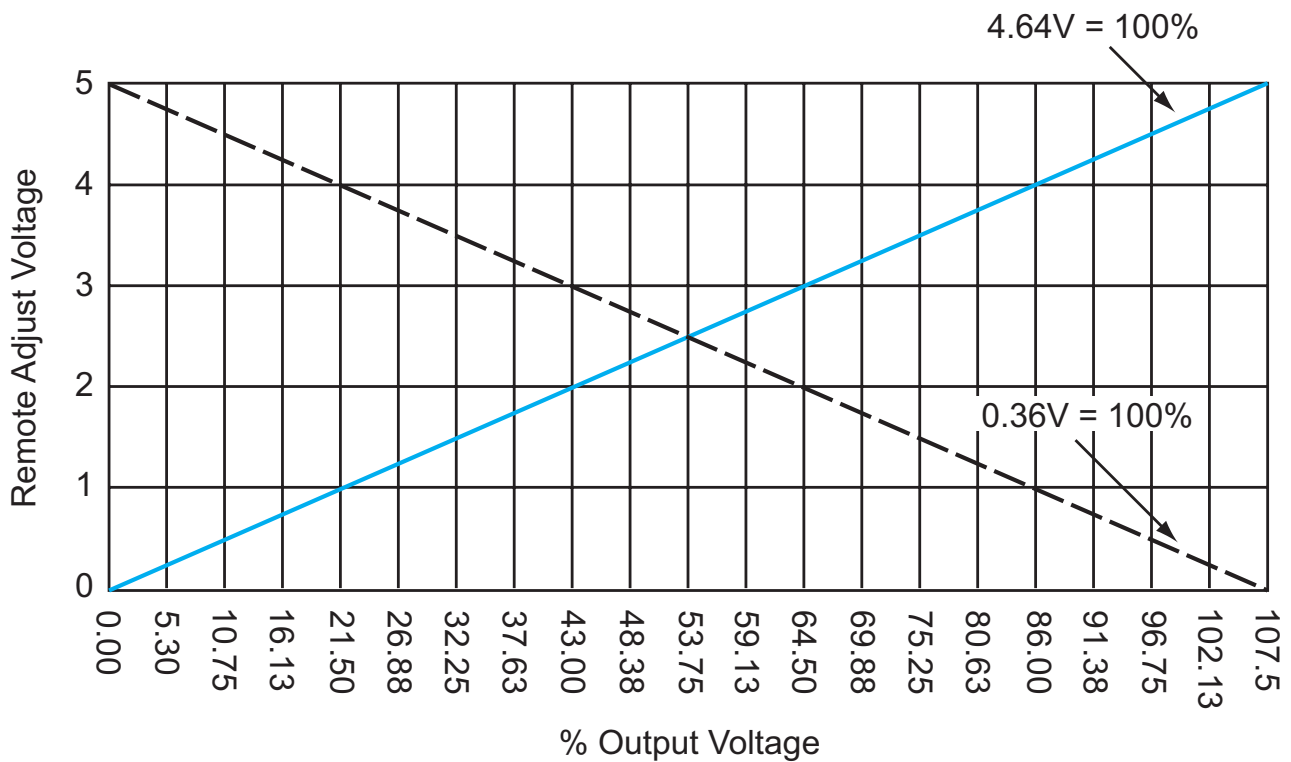
Figure 1. Current Monitoring Circuitry — a Simplified Diagram

**Pin 4 – Enable/Disable:** The enable function is the same for all models. A HIGH signal enables and a LOW signal disables the output. If pin 4 is left open, the power supply defaults to an enabled state.

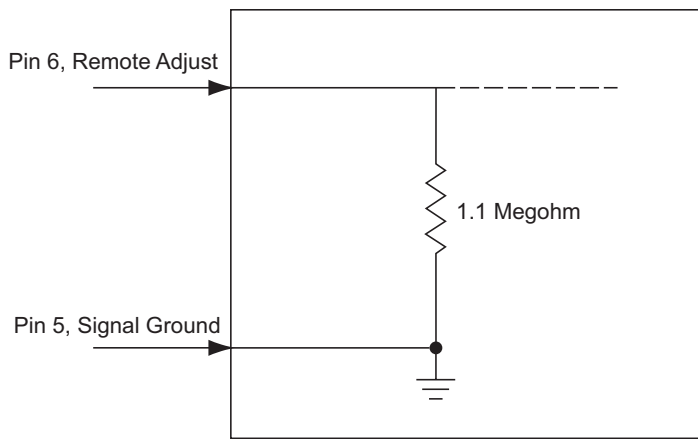
**Pin 5 – Signal Ground Return:** The signal ground should be used as the reference point for both the remote adjust and the monitors. Do not return the HV load here. If input current is allowed to flow through the signal return path, offsets and errors may occur in the control and monitoring functions.

**Pin 6 – Remote Adjust Input:** The remote adjust pin allows the high-voltage power supply to be programmed from 0% output voltage to 107.5% of nominal voltage. Positive power supplies are scaled so 4.64V on the remote adjust will result in 100% of output voltage, while 5.00V will provide a maximum of 107.5% of nominal voltage. The remote adjust pin has an input impedance of 1.1MΩ; this resistor to ground is provided to program the power supply to zero output if the control pin is left open. See Figure 3A.

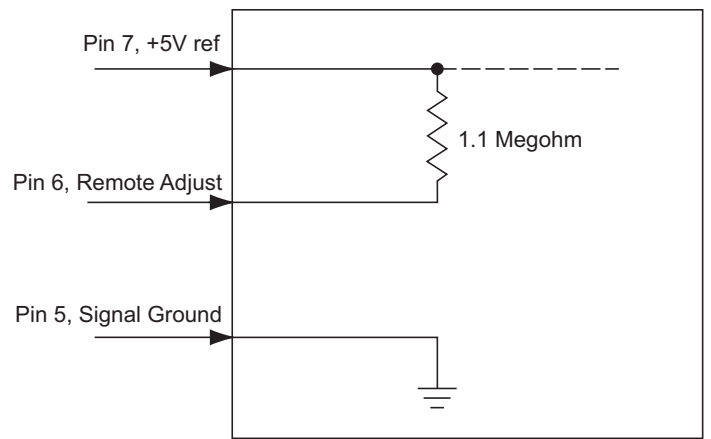
A negative power supply has the opposite sense on the control voltage (see Figure 2 below). 0V on the remote adjust programs the power supply for 107.5% of rated voltage and 0.36V provides 100% output. Driving the remote adjust pin to 5.00V on a negative power supply will program zero output voltage. A 1.1MΩ resistor pull up provides zero output voltage if the control pin is left open. See Figure 3B.



**Figure 2. Remote Adjust Inputs — Negative and Positive High Voltage Supplies**



A) Positive UltraVolt HVPS



B) Negative UltraVolt HVPS

**Figure 3. Remote Adjust Inputs**

**Pin 7 – +5VDC Reference Output:** A +5VDC reference voltage is provided for programming the power supply. The reference voltage has an output impedance of 464Ω. See the data sheet of your model for characteristics.

**Pin 8 – HV Ground Return:** Internally, the Power Ground, the HV Ground, and the Signal Ground are common. The high-voltage load return should be connected here.

**Pin 9 – HV Ground Return or E<sub>out</sub> Monitor (Output voltage monitor):** The function of this pin depends on the model of your HV power supply. The standard A Series does not have an E<sub>out</sub> Monitor unless it is ordered with the –Y5 option. The E<sub>out</sub> Monitor is standard on AA, 10A through 40A, and C Series power supplies.

The E<sub>out</sub> Monitor, when present, is accomplished with a high-voltage divider resistor set. The scale factor is model dependent and will be either 10:1, 100:1, or 1000:1 ratio. The divider resistor set is designed to be properly scaled with a 10MΩ input-impedance meter connected to the circuit. It is possible to shunt the lower divider resistor to create different scale factors. The resistor values are available in the model-specific data sheets.

**Pin 10 and 11 – HV Output:** The high-voltage output is provided on these pins for output voltages up to 6kV. Output voltages above 6kV are provided on an 18-inch flying lead in place of these pins.