Advanced Energy

ADVANCED CONTROL AND MONITORING WITH ULTRAVOLT® -I5 AND -I10 CONTROL INTERFACE OPTIONS

TN-I5-I10-1

The -I5 and -I10 control interface options provide significant additional controls and monitoring functions over the standard interface. These additional functions include current regulation, indicators showing when voltage regulation or current regulation is active, and 0 to 5 V or 0 to 10 V control regardless of the polarity of the output voltage.

This application note explains how to implement the various controls, programming, and monitoring functions of the -I5 and -I10 interface options. These options are available on many new UltraVolt® HV power supplies. Please contact AE for -I5/-I10 option specifications and product availability.

CONNECTIONS OVERVIEW

PIN(S)	FUNCTION	DESCRIPITON
Pin 1 and 8 (Pin 21 and 22 in 250 W Models)	Power Ground	Use these pins for the input power return. Do not allow input power return current to flow through the signal ground connections.
Pin 2 and 9 (Pin 19 and 20 in 250 W Models)	Input Power	Use these pins to supply the input power. Most UltraVolt high voltage power supplies use either 12 VDC or 24 VDC nominal Vin.
Pin 3	Current Monitor	The current monitor has the same scale factor as the current programming signal. 0 to +10 V (-I10) or 0 to +5 V (-I5) indicate 0 to 100% of rated current. The current monitor signal is derived internally from the current feedback and is buffered to provide low output impedance. The internal currents in the feedback divider are compensated for, providing a true output current monitor without any offsets.
Pin 4	Enable	Logic high between 2.4 V and Vin will enable the power supply a logic low between 0 and 0.8 V, or an open circuit will disable the power supply. The input impedance is 10 kΩ; an internal resistor to ground will disable the power supply when the pin is left open.
Pin 5	Signal Ground	The signal ground and power ground are common inside the power supply. This pin should be only used as reference for all control and monitoring signals. If input power current is allowed to flow through this pin, offsets that will degrade voltage regulation and monitoring accuracy can occur.
Pin 6	Voltage Programming	A 0 to +10 V (-I10) or 0 to +5 V (-I5) signal will program the power supply for 0 to 100% rated output voltage. The input impedance for this control pin is > 1 MΩ; an internal resistor to ground will program the power supply for zero output voltage if this pin is left open.
Pin 7	Reference Voltage	A precision, low temperature coefficient +10.00 V (-I10) or +5 V (-I5) reference voltage is available on this pin. Please see the related datasheet for accuracy and temperature characteristics.
Pin 10	No connection	--

Note: *The -I5 and -I10 options are identical in functionality with the exception of scaling. This application note is written for the -I10 option; it describes the -I5 option as well by substituting 5.00 V for 10.00 V, full scale on the programming inputs and monitor outputs.*

| PIN(S)	FUNCTION	DESCRIPITON
Pin 11	Current Mode Indicator	An open drain configuration indicates when the power supply is in current regulation. The indicator is an active low and will appear as an open circuit when the power supply is in voltage control or in a disabled state. An external pull up resistor can be used to create a logic signal, or the pin can be used to ground an LED to provide an illuminated indicator showing the operating control mode. Current must be externally limited to max 30 mA. See Figure 1 for usage suggestions.
Pin 12	Voltage Mode Indicator	An open drain configuration indicates when the power supply is in voltage regulation. The indicator is an active low and will appear as an open circuit when the power supply is in current control or in a disabled state. An external pull up resistor can be used to create a logic signal, or the pin can be used to ground an LED to provide an illuminated indicator showing the operating control mode. Current must be externally limited to max 30 mA. See Figure 1 for usage suggestions.
Pin 13	Current Programming	A 0 to +10 V (-I10) or 0 to +5 V (-I5) signal will program the power supply for 0 to 100% rated output current. The input impedance for this control pin is > 1 MΩ; an internal resistor to ground will program the power supply for zero output current if this pin is left open. NOTE: A current higher than 0 must be programmed in order to get an output voltage even with no load. A convenient way to program the current limit to 100% is to directly connect pin 13 to the reference voltage on pin 7.
Pin 14	Voltage Monitor	The voltage monitor has the same scale factor as the voltage programming signal. 0 to +10 V (-I10) or 0 to +5 V (-I5) indicates 0 to 100% of rated voltage. The voltage monitor signal is derived internally from the voltage feedback and is buffered to provide low output impedance.
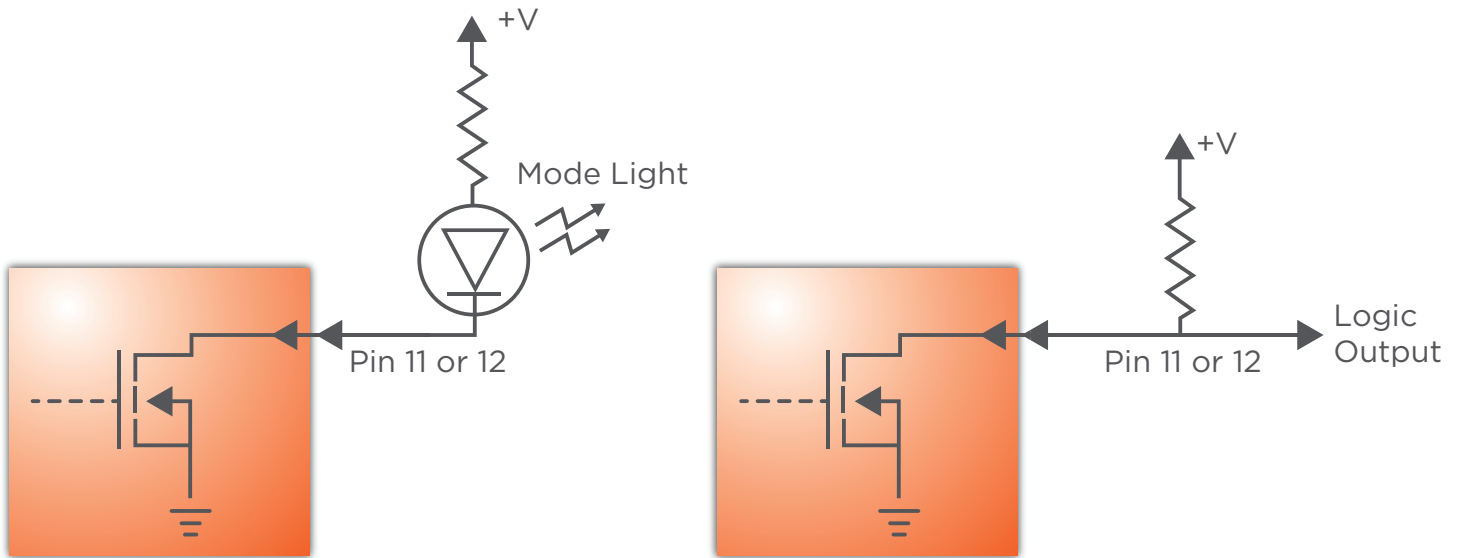
Figure 1. Typical mode indicator