



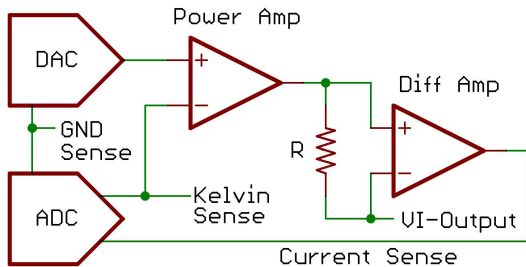
# SMU-410

## Precision 4-Channel Source & Measure Unit

### Description

The SMU-410 is a precision 3U PXI module that forces and senses both voltages and currents,  $\pm 10V$  and  $\pm 200mA$ . Each of the four channels is independent and electrically isolated from the PXI power supply, chassis, and each other.

Voltages and currents are generated using 16-bit DAC's, with 7 current ranges. Measurement resolution is up to 24-bits. Nonvolatile memory stores resistor, offset and gain calibration constants. The DB25 front panel connector includes Kelvin sense lines and driven guards.



Simplified Block Diagram, each channel

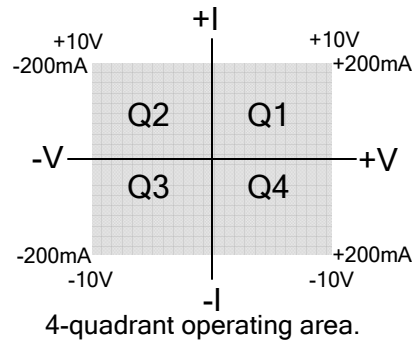
### Features

- 4 isolated SMU channels, for legacy & hybrid PXI
- 4-quadrant: Voltage =  $\pm 10V$ , Current  $\pm 200mA$
- 7 current ranges,  $\pm 200nA$  to  $\pm 200mA$  full scale
- 24-bit ADC's, programmable time vs. resolution
- 16-bit DAC's, sub-LSB offset & gain adjustments
- VS DLL's, LabView VI's, Sample GUI
- Synchronous & asynchronous triggering functions
- Excellent accuracy, from  $\pm 0.03\% \pm 2mV$

### Accuracy

Src/Sink & Measure      Range       $\pm\%$  of reading  $\pm$  offset

V-output	$\pm 10V$	$0.03\% + 2mV$
I-src/sink	$\leq \pm 20mA$	$0.05\% + 0.05\%FS$
I-src/sink-hi	$\pm 20mA$ to $\pm 200mA$	$0.08\% + 0.05\%FS$
V-measure	$\pm 10V$	$0.03\% + 2mV$
I-measure	$\leq \pm 20mA$	$0.05\% + 0.05\%FS$
I-measure-hi	$\pm 20mA$ to $\pm 200mA$	$0.08\% + 0.05\%FS$



## Additional Specifications

Settling Time 10% of current range: 10usec typical  
90% of current range: 100usec typical

Transient Response for  $\pm 20\text{mV}$  after 80% load current change: 100usec typ.

Noise: 20uV (0.1Hz to 10Hz)  
Wideband Noise: 25mV RMS (20Hz to 20MHz)

Isolation Voltage:  
Channel to Channel  
Channel to PXI ground  
Channel to Chassis

Absolute Maximum Voltage within a Channel

PXI power: 2A from 3.3V rail, 2A from 5V rail.

## Pinout Notes

Output pins for the SMU are "VI\_A" through "VI\_D". Connect the "KLVN" Kelvin sense to the "VI" pins, and the "GNDS" ground sense to the "GND" pins, directly at the load. These connections are meant to eliminate the cable resistance. Both are internally connected with a 1K resistor, and therefore may be left floating, but with reduced accuracy.

The "GUARD" pins are buffered voltage followers driven through a 10K resistor. These pins may be used to drive the shield on cables used for low current measurement, for example. (Cables not included).

