MICROCHIP

720W Platinum Rated AC/DC Reference Design

Efficiency Measurement Guidelines

General Guidelines

- **Use calibrated, precision test equipment**
  - see recommended list of equipment
- **Maintain optimum thermal conditions**
  - Testing at room temperature (25°C ambient)
  - Disable chassis mounted fans and do not provide external airflow
- **Test for efficiency after thermal stabilization**
  - Run system for at least 2 hours before taking measurements
- **To increase accuracy, record large sample set of measurements and calculate average**

Test Equipment

- **Recommended Test Equipment:**
  - Programmable AC Source with Vthd < 2%
  - Precision Power Meter with analog I/O capability
  - Data logger with at least 3 channels (simultaneous sampling preferred)
  - Electronic Load (800W or higher)
  - Current shunt resistor to measure load current
- **Equipment Used in Microchip Laboratory:**
  - Chroma Programmable AC source 61502
  - ZES Zimmer LMG95 with L95-O3 signal processing interface
  - Agilent 34970A/34972A with multiplexer card 34901A
  - Agilent N3300A mainframe with 2x N3304A load modules
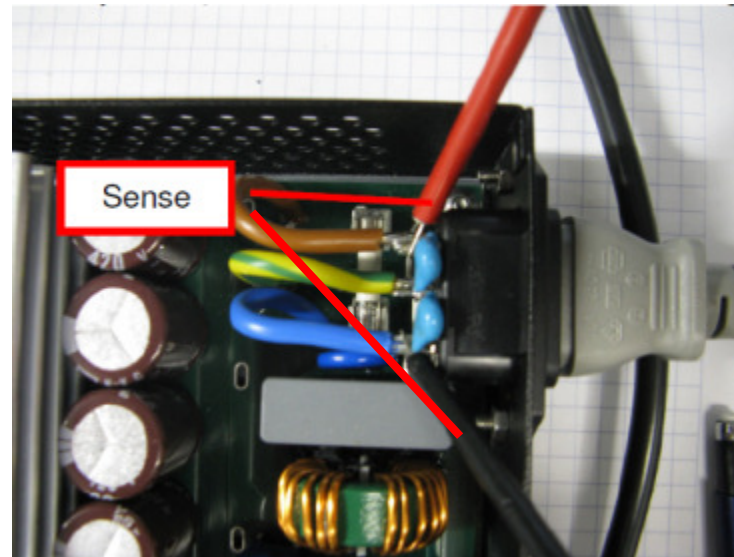 - LA-100-100 (100A, 100mV shunt resistor, ±0.25%)

Equipment Connections
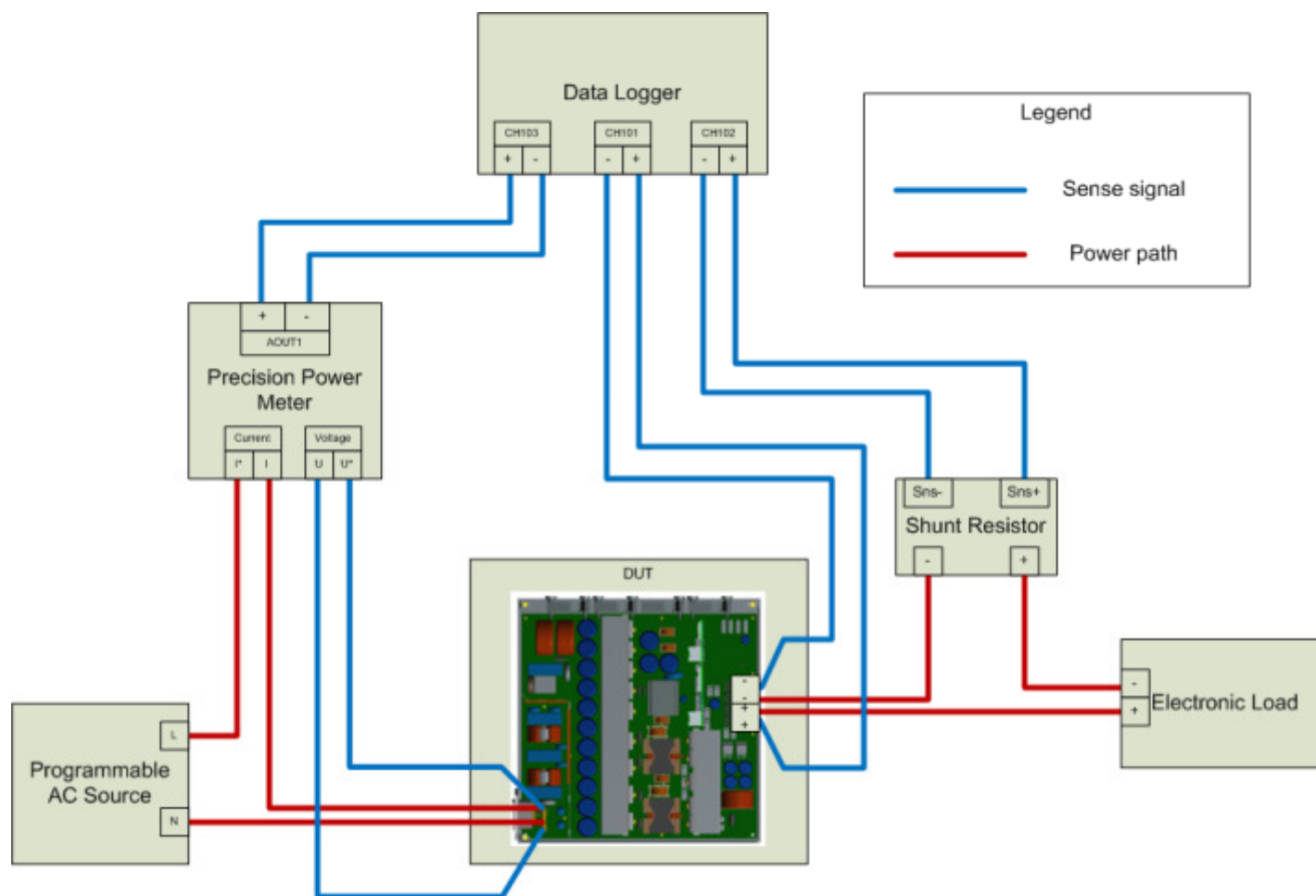
Input side Connection

- **Input current measured using internal shunt of the power meter**

- **Voltage measurement performed with connections as shown below**

Power Meter Settings

- **Configure power meter measurement settings as follows:**
  - Synchronize to: Input voltage
  - Coupling: AC+DC
  - Input Filter: 350Hz
  - Coupling for input filter: AC
  - Cycle time: 1sec
  - Averages: 10 cycles
- **Configure AOut1 on Analog I/O connector to transmit input power measurement data to data logger**

Output Connections

- **Use one pair of output terminals for loading**

- **Use the other pair of output terminals for sensing Vout**

Load +

Load -

Vout sense +

Vout sense -
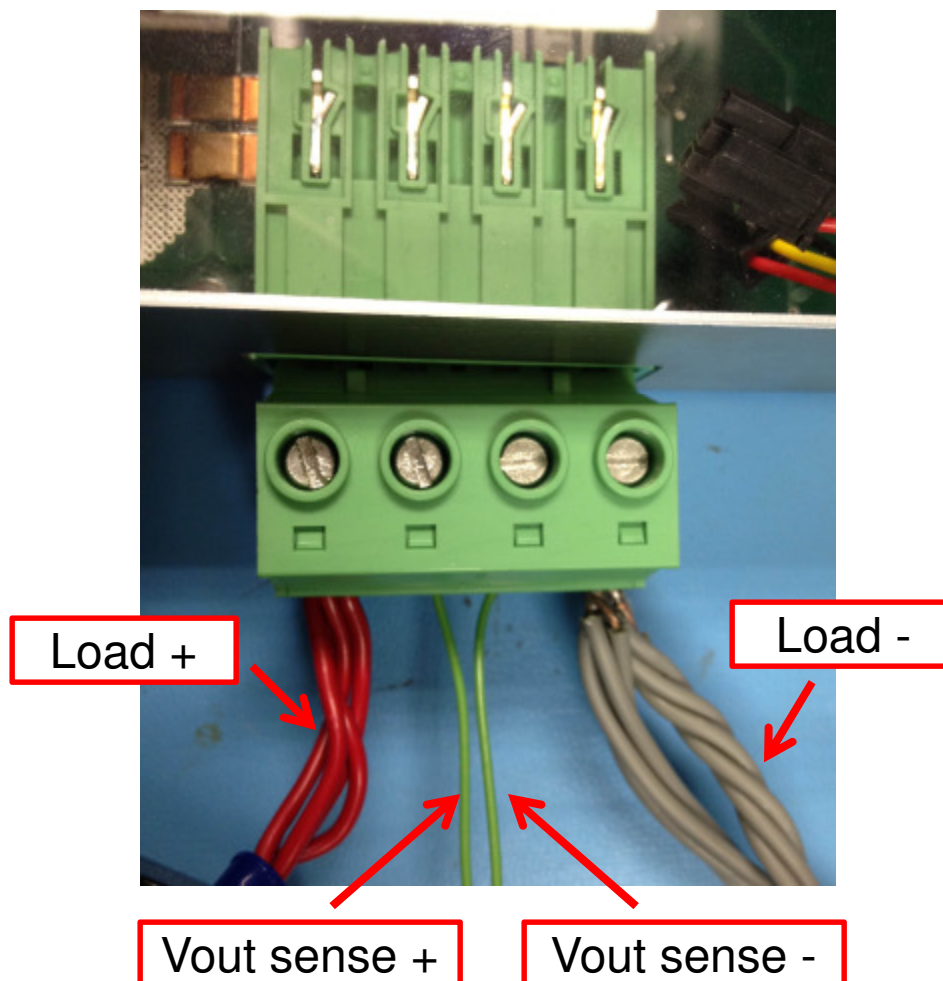
Data Logger settings

- **Use smallest available range for the signal to be measured. For e.g. use ±100mV range for load current, ±100V range for output voltage**

- **Use highest measurement resolution where possible (6.5 digits)**

- **Configure DC input resistance of 10MΩ**

- **Use channel delay of 0.2sec**

Measurement Errors

- **Based on recommended test setup, error for efficiency measurement can be up to ±0.25%**

- **Refer to 80PLUS power supply test protocol for equipment accuracy requirements (see next slide)**

References

- **80PLUS power supply test protocol:**
  http://efficientpowersupplies.epri.com/pages/ Latest_Protocol/Generalized_Internal_Power _Supply_Efficiency_Test_Protocol_R6.5.pdf

- **http://www.80plus.org**

- http://www.climatesaverscomputing.org

- http://www.microchip.com/smps