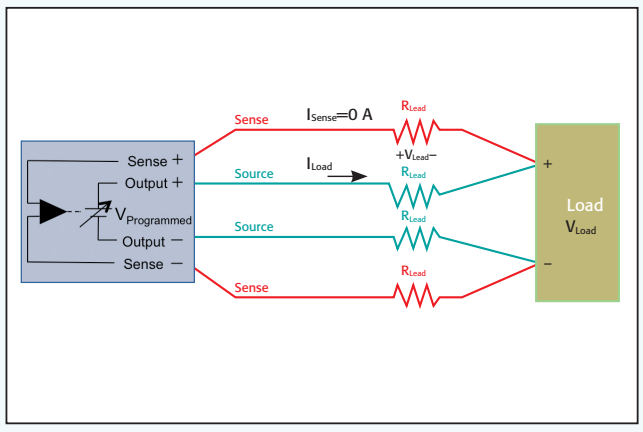
MAXIMIZE THE PERFORMANCE OF YOUR POWER SUPPLIES

Ensure that the Programmed Voltage is Accurately Delivered to the Load

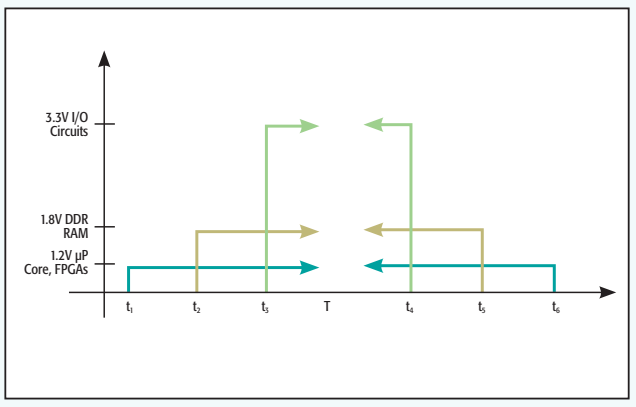


No matter how accurate your power supply output is, you cannot guarantee that the programmed voltage is the same as the voltage at the DUT's load. A power supply without sense leads regulates its output at its output terminals. However, the voltage you want regulated is at the DUT's power inputs. The power supply and the load are separated by lead wires that have a resistance, R_{Lead}; thus, the voltage at the load is:

$V_{Load} = V_{Programmed} - 2 \bullet V_{Lead} = V_{Programmed} - 2 \bullet I_{Load} \bullet R_{Lead}$

The remote sensing technique overcomes the voltage drop in the leads by extending the power supply feedback loop to the load. Two sense lines are connected to the load's power inputs. These sense leads are voltage measuring lines that connect to a high impedance voltage measuring circuit in the power supply. The voltage drop in the sense leads is negligible. The voltage at the load is fed back to the power supply by the sense leads and ensures that $V_{Load} = V_{Programmed}$.

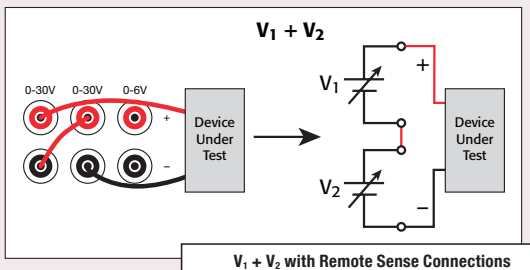
Safely Power Up and Power Down Circuits in the Proper Sequence

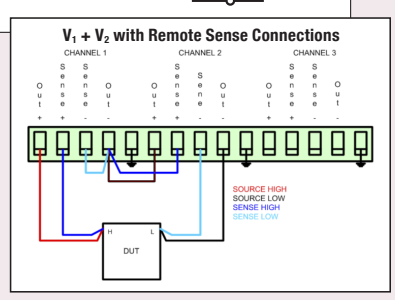


Digital board designs often have circuits that operate at different voltages. When testing these circuits with external power supplies, it is important to power the circuits in the correct order to avoid stressing and damaging the low-voltage circuits. Ensure your 3-channel power supplies allow independent control of each channel so that the channels can be powered on in a desired sequence. For example, channel 1 could output 1.2V to power a microprocessor core and FPGA circuit block, then channel 2 could power up 1.8V DDR memory circuits, and, finally, channel 3 could output 3.3V for an I/O circuit. When testing is complete, the channels can be powered down in the opposite sequence to de-energize the circuits starting with the high-voltage circuit.

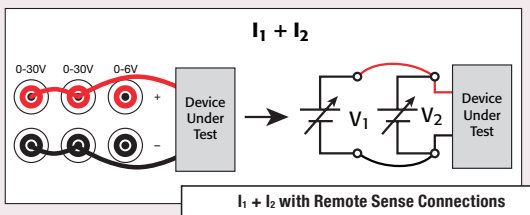
Extend the Range of Your Outputs Using a Multi-Channel Power Supply

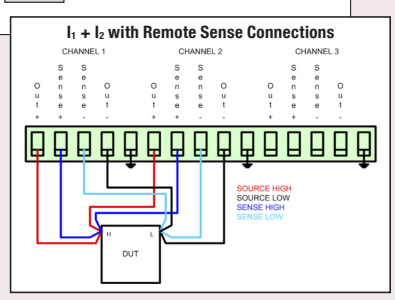
Double Output Voltage



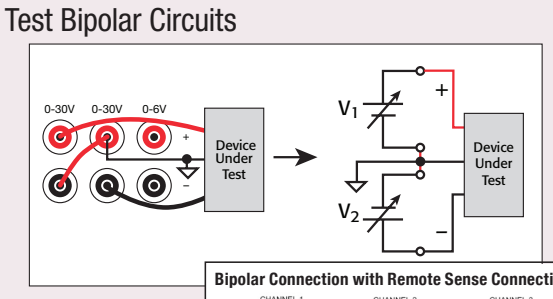


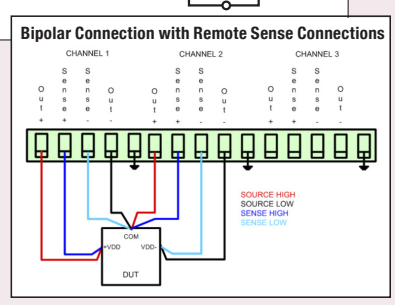
Double Output Current





Test Bipolar Circuits

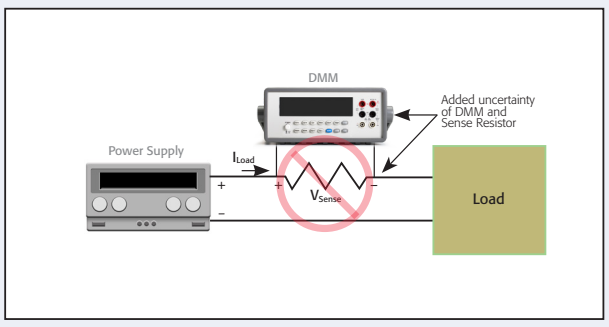


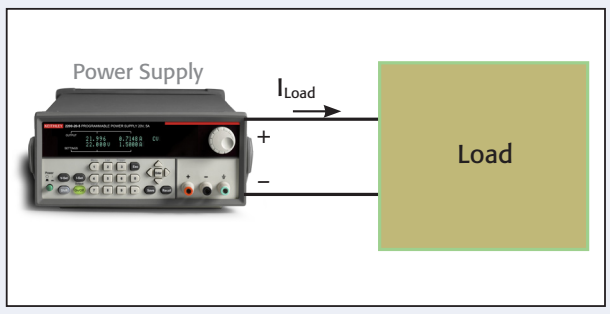


Ensure that your multi-channel power supply has isolated channels, which enables the channels to be combined in either series or parallel to double output voltage or double output current. In addition, two channels can be connected to effectively provide a positive output and a negative output to power bipolar circuits. Some supplies include the capability to have both channels change simultaneously (track) for testing a circuit over its voltage operating range.

See the above figures for proper remote sensing connections when using the two channels in the three combinations. Care must be taken to ensure that the sense leads are measuring at the appropriate locations to properly control each channel's output voltage.

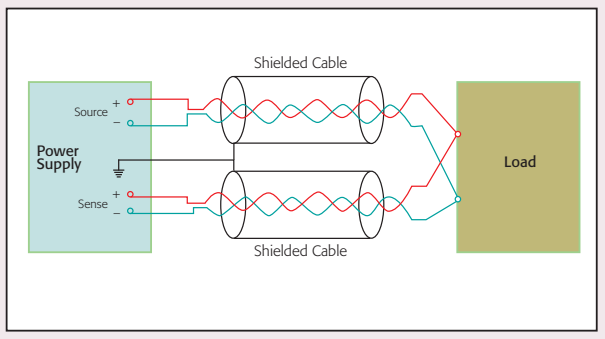
Accurately Measure Load Currents





Do you need to measure the current that the load is drawing? You could put a sense resistor in the line and use a DMM to determine load current. If your power supply has good readback accuracy and high resolution, then the power supply can measure the load current directly without the complexity of the sense resistor and the DMM. Also, the sense resistor causes an extra voltage drop in the circuit and reduces the load current. Eliminate the extra complexity and instrument cost. Select power supplies with high readback accuracy and resolution, and use those supplies to measure load currents.

Minimize Noise When Powering Low Power and Sensitive Circuits



Keep external environmental noise out of test circuits by using shielded cables to source power and to feed back the remote voltage to the power supply via the sense lines. The sense lines should always be shielded since they are transmitting a signal to a high impedance measurement circuit. Even small amounts of noise current can create a large error voltage in a high impedance circuit. For that reason, the sense lines should be in their own shield, separate from all other wiring. For devices-under-test that measure small signals, the source lines should be shielded as well to eliminate all potential sources of interfering signals.

Furthermore, ensure the circuit is grounded at only one point to eliminate ground currents that can create error voltages in conducting pathways.

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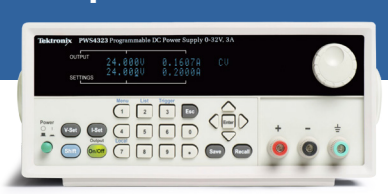

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