10 TIPS TO ENHANCE DC POWER TESTING AND ANALYSIS

Use these 10 tips to take advantage of test setups that are simpler and more effective.

1 PROGRAM YOUR POWER SUPPLY CORRECTLY TO OPERATE IN CONSTANT VOLTAGE OR CONSTANT CURRENT MODE

Constant Voltage
Default operating mode for most power supplies when output is regulating at voltage setting

Constant Current
Power supply switches to CC mode when output is regulating at current limit setting

2 USE REMOTE SENSE TO REGULATE VOLTAGE AT YOUR LOAD

Output leads can cause a significant voltage drop affecting the voltage across the load.

Remote sensing can help compensate for these voltage drops.

3 USE YOUR POWER SUPPLY TO MEASURE DUT CURRENT

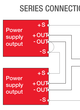
A power supply often has enough accuracy to measure a DUTs current eliminating the need for an additional DMM.

The key is selecting the right size and performance power supply.

Power supply current readback accuracy	
Output current level	Typical accuracy
100% of rated output	0.1% to 0.5%
10% of rated output	0.5% to 1%
1% of rated output	Near 10%

4 CONNECT POWER SUPPLY OUTPUTS IN SERIES OR PARALLEL FOR MORE POWER

You can connect two or more power supply outputs in series to get more voltage, or connect outputs in parallel to get more current.



5 MINIMIZE NOISE FROM YOUR POWER SUPPLY TO YOUR DUT

Start at the Source - Choose a power supply that has low noise

	RMS noise	Peak-to-peak noise
Linearly regulated power supply	~ 500 µV	~ 4 mV
Switching-regulated power supply	~ 750 µV	~ 5 mV

This can be achieved through a typical linear supply or a performance switching supply.

SHIELD SUPPLY-TO-DUT CONNECTIONS
The most effective way to remove noise is to ensure your load and sense connections use shielded two-wire cables.

BALANCE OUTPUT-TO-GROUND IMPEDANCE
Use a common-mode choke in series with the output leads and a shunt capacitor from each lead to ground to accomplish this task.

6 SAFEGUARD YOUR DUT USING BUILT-IN POWER SUPPLY PROTECTION FEATURES

Most DC power supplies have features that protect sensitive DUTs and circuitry from exposure to potentially damaging voltage or current. The most common are:

Power supply front panel showing over-voltage protection, over-current protection, constant voltage, and constant current mode

OVER-VOLTAGE PROTECTION
OVP is a value set in volts designed to protect your DUT from excessive voltage. When the power supply output voltage exceeds your OVP setting, the protection will trip and turn off the output.

OVER-CURRENT PROTECTION
OCP shuts off the output to prevent excessive current flow to the DUT.

7 USE OUTPUT RELAYS TO PHYSICALLY DISCONNECT YOUR DUT

In critical applications where you need to ensure there is no current flowing to or from your DUT you will need to physically disconnect your DUT.

When available, built-in output disconnect relays provide these advantages over external relays:

- Less complexity
- Less wiring
- No external relay control circuitry
- Consumes less space
- Better built-in synchronization of relay open/close with other power-related events
- Relays open upon fault conditions such as over-voltage and over-current

8 CAPTURE DYNAMIC WAVEFORMS USING A POWER SUPPLY'S BUILT-IN DIGITIZER

When you make a digitizing measurement, you can set **two** of the following **three** parameters:

TIME INTERVAL
Time between samples

NUMBER OF SAMPLES
Total number of samples you want to take

ACQUISITION TIME
Total time during which you want to take samples

9 CREATE TIME-VARYING VOLTAGES USING POWER SUPPLY LIST MODE

The list mode on a power supply can be an effective tool for running two types of tests:

VOLTAGE SEQUENCE TEST
A test where measurements are taken while the DUT is exposed to discrete stimulus voltage values

VOLTAGE WAVEFORM TEST
A test where measurements are taken while the DUT is exposed to a stimulus voltage waveform

10 CONTROL INSTRUMENTS, AUTOMATE TESTS AND PERFORM ANALYSIS WITH SOFTWARE

CONTROL INSTRUMENTS
Easily connect, record results, and visualize measurements across multiple instruments simultaneously.

AUTOMATE TEST SEQUENCES
Rapidly build custom sequences to quickly create tests that used to require days of traditional programming.

ANALYZE DATA
Gain deep insights into power consumption by visualizing measurements and analyzing extensive data logs captured by software.

Download the full application note

KEYSIGHT TECHNOLOGIES

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