Variable load tests voltage sources

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The circuit in Figure 1 serves as a variable, current-sink load for testing voltage sources. You use digital commands to set the load current of the device under test over a wide range, independently of the device under test's output voltage. The circuit comprises an AD558 DAC, IC₁, which provides a reference voltage at Point A. Practically any type of DAC converter works well in this application. The AD558 is a single-supply type with an internal reference; these features simplify the design. IC₁ generates an output voltage of 0 to 2.55V (Table 1). The control inputs CE and CS in IC₁ allow you to control the DAC from a microprocessor bus. If your application does not involve a data bus, connect CE and CS to ground to obtain direct access to the DAC's data inputs.

The second part of the circuit in Figure 1 consists of an op amp, IC₂, driving transistors Q₁ and Q₂. IC₂ compares the reference voltage at Point A with the voltage across resistor R. IC₂'s output voltage controls Q₁ and Q₂ such that the voltage across R equals the reference voltage at point A. The voltage across R is proportional to the current from the device under test and is independent of the output voltage of the device under test. The value of R in Figure 1 is 1Ω; thus, the circuit provides a sink current of 1A when the voltage at point A is 1V. With the values shown in Figure 1, you can control currents of 0 to 2.55A over a device under test voltage range of 5 to 250V. Be sure to limit the power dissipation in Q₂ to 120W.