Q'nApps #S59

Q: How does the HiLevel Current Limit work?

Current Limit on DUT Power Supplies

It is crucial to protect the power circuit in the event of a short or even just an excessive current demand. Current Limit is like a fuse that doesn't "blow"; rather, the power supply "folds back" to protect fixtures, probes, DUTs, and the tester. When we first added current limit to our Internal Power Supplies (IPS), we realized that some customers might want to be able to obtain the set current value. (This was particularly applicable to maximum current values.)

So we designed the software to comply with the following formula:

$$I_a = I_s + \Delta \pm \delta$$

Where I_a is the actual current, I_s is the specified current, Δ is the maximum deviation from the specified current (for systems within 12 months of NIST calibration), and δ is the nominal deviation at the time of measure. Hence, over time Δ may drift some, say, 8%, while results from measurement to measurement may vary by, say, ± 1% maximum. Therefore, the inaccuracy of the measured current could be nearly 10%.

How bad is that? Well, if we designed a fuse, how would 10% inaccuracy stack up against high-grade fuses? And there is the crux to the matter. The current limit feature was designed in for one purpose only: To act as a fuse. When probing a wafer there can be cases of dead shorts. Without current limit, expensive probe needles would easily become history. Therefore, by the way we designed the software users must ensure that probe needles can handle the specified current plus 10%.

How about using current limit to create programmable current source for measuring current? The feature was not designed with that in mind. However, there is no law that should prevent it. On the other hand, we've never tested for anything but the aforementioned application.

Oh, one last thing. When we measure current limit, we employ a most basic method. Using pause mode, we just set the power supply voltage to the desired value and hit run. By adjusting an active load instrument we determine when the current reaches its threshold.

Of course we use the same method for positive and negative voltages. Typically, IPS #2 and #3 can handle 1.1 A.

Related information:
Q'nApp #S9: Iddq
Q'nApp #S20: Power and Ground
Q'nApp #S22: Bypass Capacitors