

Possible oscillation using flying leads to connect a DUT

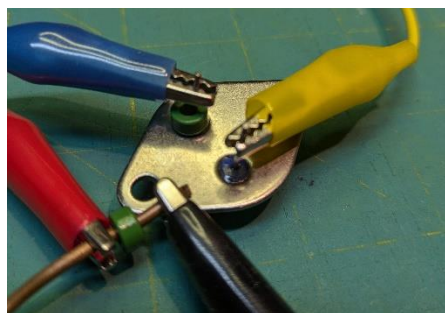
Maker Matt Webb noticed oscillations of the triangle waveform during the current limiting phase when using flying leads in combination with the 2mm banana jacks.

It turns out that although the Curve Tracer itself is inherently clean from oscillation, adding flying leads will add induction and that can cause issues, especially with higher currents during the current limiting phase.

The remedy is to use leads that are as short as possible, and/or shielded.

The oscillation can also be countered by adding a donut shaped ferrite bead on the Collector/Drain connection lead. The ferrite beads that Matt experimented with is listed in the OffPCBPartsBOM.

Here are some pictures that Matt made with a TO3 2N3055 power transistor to illustrate the problem.



The leads he used for this measurement have a length of 13cm (5inch).

Without any additional beads, the triangle waveform looked as follows:



Note that there is some hash on the current limited excursions of the Collector current in the two highest steps.

With one additional bead placed directly on the Collector connection, the hash goes away.

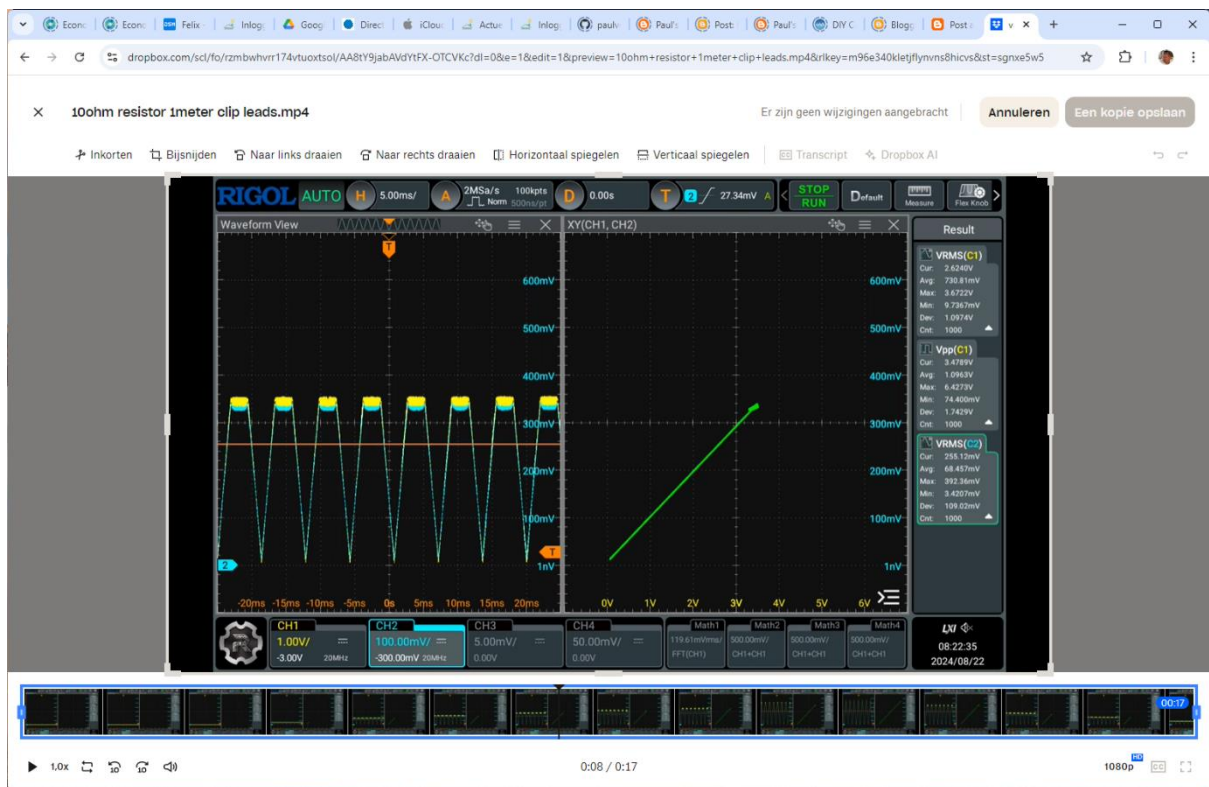


During the investigation of the root cause, I asked him to use a 10 Ohm power resistor, connected between the E/C terminals. This eliminated any Step Gen effects. First, he connected the resistor directly to one of the DUT sockets on the front panel.



There is no evidence of oscillation during the current limiting.

He then connected the 10R resistor with flying leads with a length of 1 meter (3 ft) to the 2mm banana jacks.



The added inductance of the flying leads causes oscillation during the current limiting phase. This shows up as hash on the flat portion of the triangle waveform, and also at the very end of the X-Y display, where the current is at maximum.

Connecting the 10R resistor by using a shielded cable of 75 Ohm coax with a length of 3 meter (10ft) shows that there is no oscillation visible.

