Tektronix

2601B-PULSE Example TSP Script

CurrentPulseSweep.tsp

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Script Description

- This example script creates (and subsequently calls) a function that can be used with the Model 2601B-PULSE current pulser to output a linear staircase current pulse sweep. While general in nature, this type of sweep is commonly used to measure the IV characteristics of diode devices, such as LEDs and LASER diodes, including VCSELs. The ability of the pulser to generate 10µs current pulses at levels up to 10A at 10V, makes it a good choice for testing many of these optical devices.

- The function could be modified to synchronize an optical output power measurement with the electrical measurements in the IV sweep to create what is known as an LIV (Light-Current-Voltage) sweep. This is one of the fundamental tests performed to determine the operating characteristics of the aforementioned optical devices.

Note: Refer to the 2601B-PULSE Reference Manual for additional information about instrument operation and programming.

Function Description

sweep_current_level(starti,stopi, npulse, pulse_period, pulse_width, meas_aperture, meas_delay, rangev, rangei, bias_current)

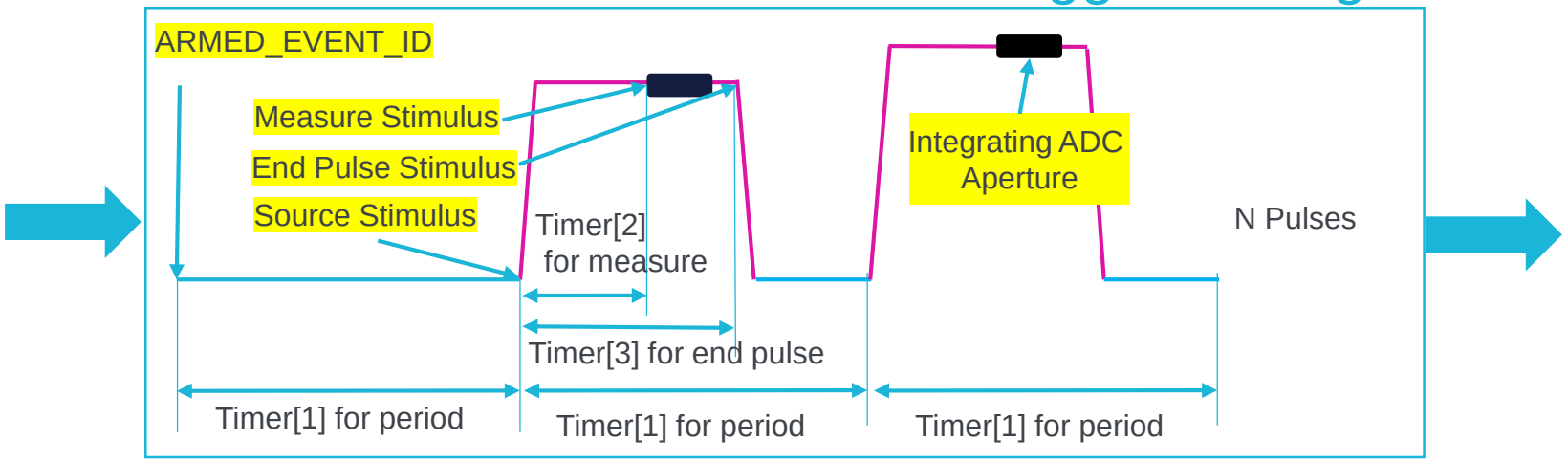
- Pass Parameters:
  - starti : Current level of the first pulse in amps
  - stopi : Current level of the last pulse in amps
  - npulse : Number of pulses in the sweep
  - pulse_period : Time between start of consecutive pulses in seconds
  - pulse_width : Width of current pulses in seconds
  - meas_aperture : Effective integration time in seconds
  - meas_delay : Time from pulse start to measure start in seconds
  - rangev : Voltage measure range in volts
  - rangei : Current source and measure range in amps
  - bias_current : Idle current level in amps (base level for pulses)

Function Description - continued

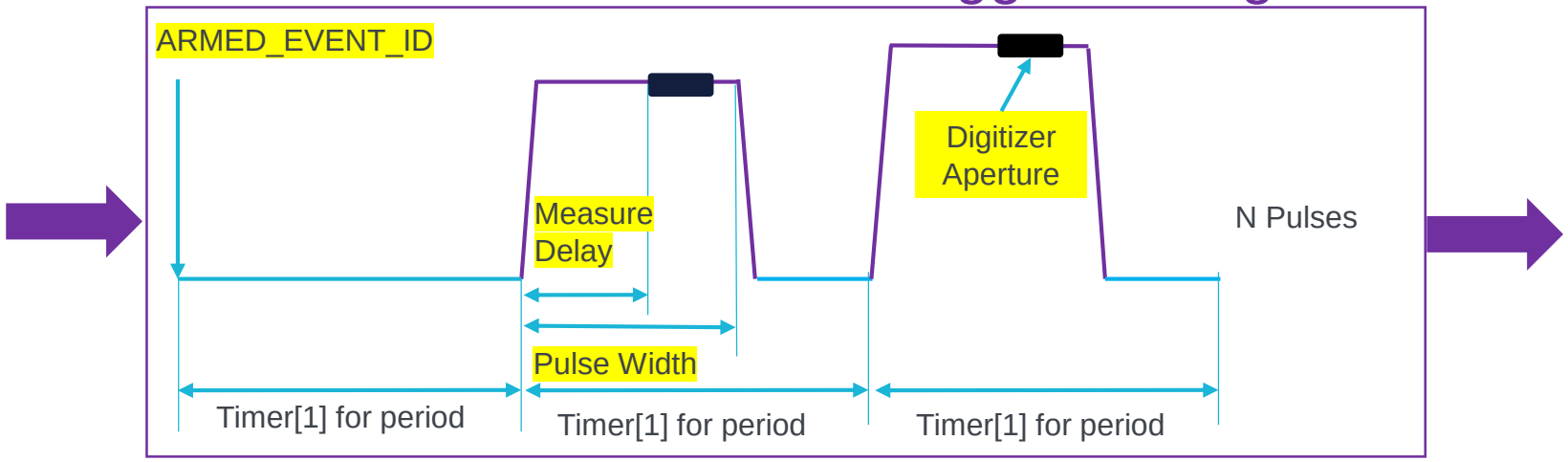
- The sweep is generated using the instrument's Synchronous Trigger Model. 2601B-PULSE sweep operation is similar to that of the original Model 2601B, except as noted below.
- The Pulse Period is controlled using a standard Trigger Timer.
- The Pulse Width and Measure Delay (settling time) are determined by new pulser commands, which provide more precise timing than a Trigger Timer. Needed to support pulses as short as 10µs.
  - smua.trigger.source.pulsewidth
  - smua.pulser.measure.delay
- Using the dual 1MS/s digitizers built into the current pulser, the voltage and current are measured simultaneously at the top of each pulse.
- New aperture command sets the effective integration time for the measurement.
  - smua.pulser.measure.aperture

New Trigger Timing Options for 2601B-PULSE

Common 2601B-PULSE SMU Trigger Timing Scheme

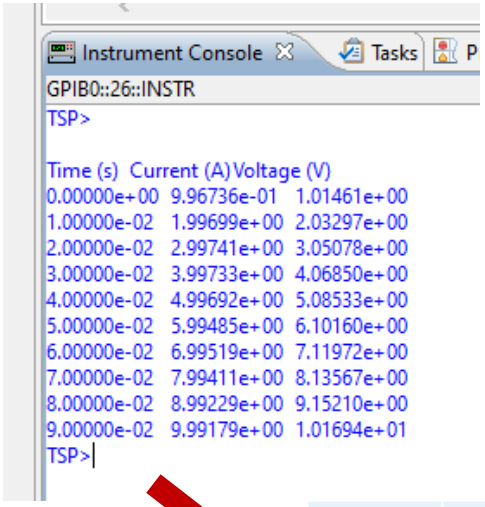


New 2601B-PULSE Pulser Trigger Timing Scheme

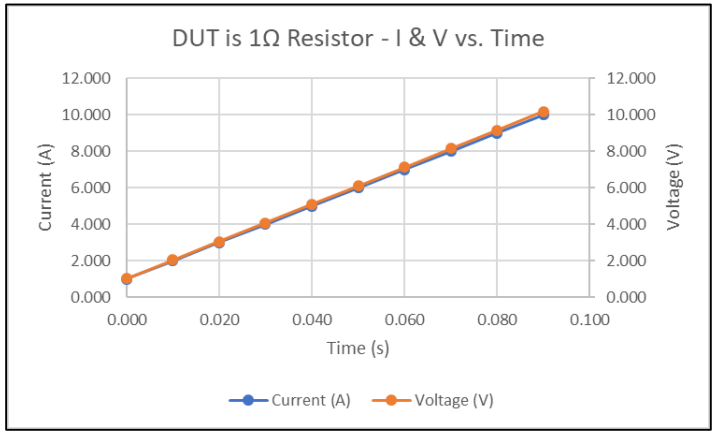


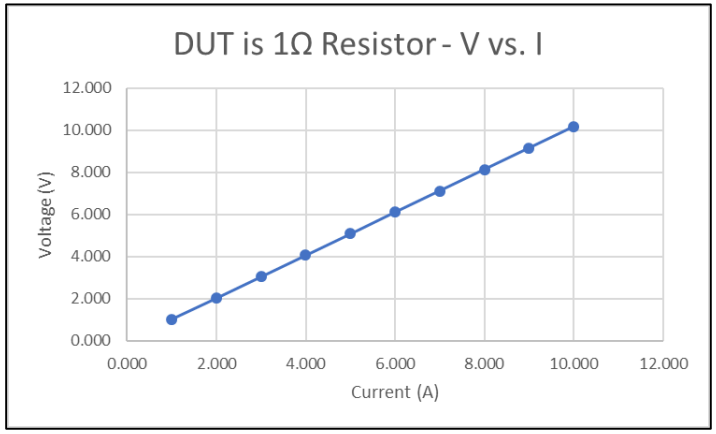
Function Description - continued

- Upon completion of the sweep, the data is printed to the Test Script Builder Instrument Console in a format that is suitable for copying and pasting into Microsoft Excel for graphing and analysis.



Time (s)	Current (A)	Voltage (V)
0.00000E+00	9.96736E-01	1.01461E+00
1.00000E-02	1.99699E+00	2.03297E+00
2.00000E-02	2.99741E+00	3.05078E+00
3.00000E-02	3.99733E+00	4.06850E+00
4.00000E-02	4.99692E+00	5.08533E+00
5.00000E-02	5.99485E+00	6.10160E+00
6.00000E-02	6.99519E+00	7.11972E+00
7.00000E-02	7.99411E+00	8.13567E+00
8.00000E-02	8.99229E+00	9.15210E+00
9.00000E-02	9.99179E+00	1.01694E+01



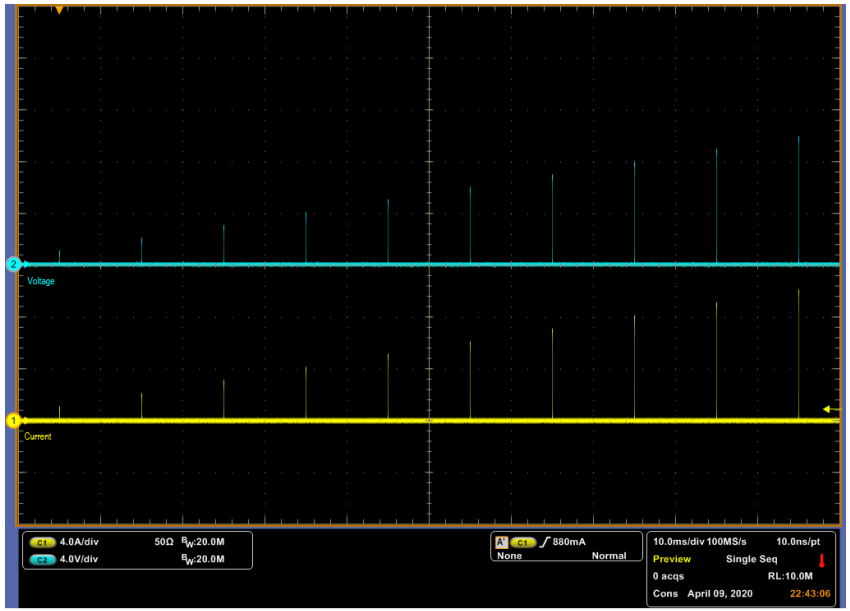


The Resulting Sweep

sweep_current_level(1,10,10,10e-3,10e-6,1e-6,9e-6,10,10,0)

Sweep Current From 1A To 10A; Pulse Width = 10µs; Period = 10ms

Full Sweep
4A/div and 4V/div



Zoom on 10th Pulse
2A/div and 2V/div