

Seeing is believing.

A Guide to SpikeSafe™ Current Source Modes

- 10A 44.8V Pulse
- 99.99 μ s Pulse Width
- 863.2ns Rise Time

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DC Mode

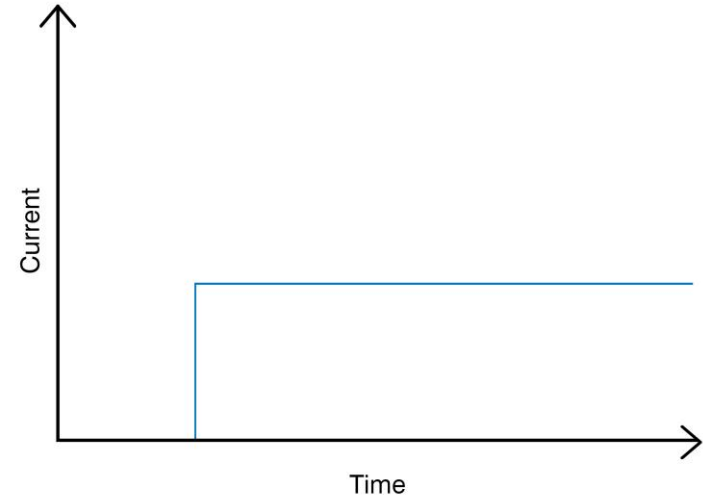
DC is an abbreviation for Direct Current. Also known as Constant Current, or 100% duty cycle. Since DC-biased lasers produce a continuous output waveform, DC drive is sometimes called CW (continuous waveform in the laser community).

Some test methods turn DC sources on and off to produce slow pulses (pseudo pulses) in the millisecond or second range.

DC Mode is typically used for reliability, burn-in, LM-80 and HASS (highly accelerated stress system) testing.

DC Mode is applicable for light measurement applications where device heating is desired. Measurements are then taken after a long stabilization time. LM-85 describes a DC Mode with a fast turn on and a temperature control system to set device junction temperature.

To use DC Mode, the maximum compliance voltage and current are set. When off, the current is 0. When on, accurate stable current is output after a controlled ramp-up (not shown). The ramp rate is set by the Ramp Mode parameter.



With continuous power conversion, Vektrex current source models support DC Mode with voltages up to 400V, maximum currents to 60A and total output power up to 6.4kW.

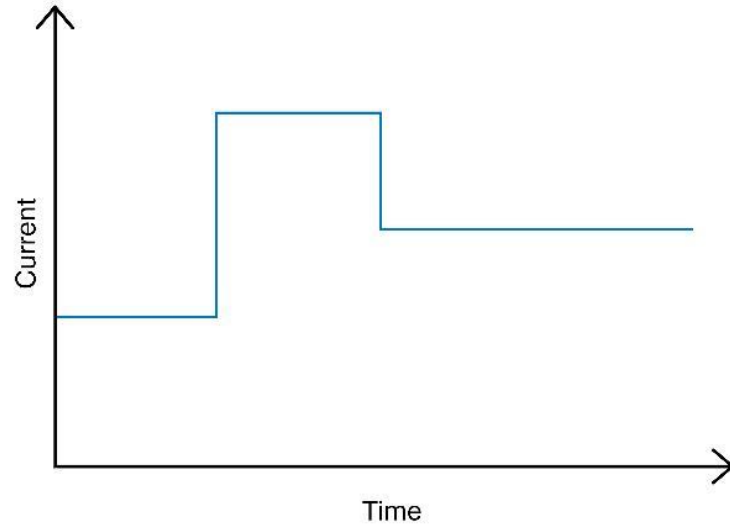
Available in SpikeSafe Models			
DC	DCP	PRF	MINI
✓	✓	✓	✓

DC Dynamic Mode

DC Dynamic Mode is similar to DC Mode, with two primary differences:

- 1) The current is not ramped up linearly, the output transitions to full current in one step.
- 2) The current may be changed while the output is enabled.

DC Dynamic may be used for software-controlled sweeps, arbitrary, programmed ramps, low speed > 10s pulsing and TEC control. Software commands control the transition.



Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		✓	✓

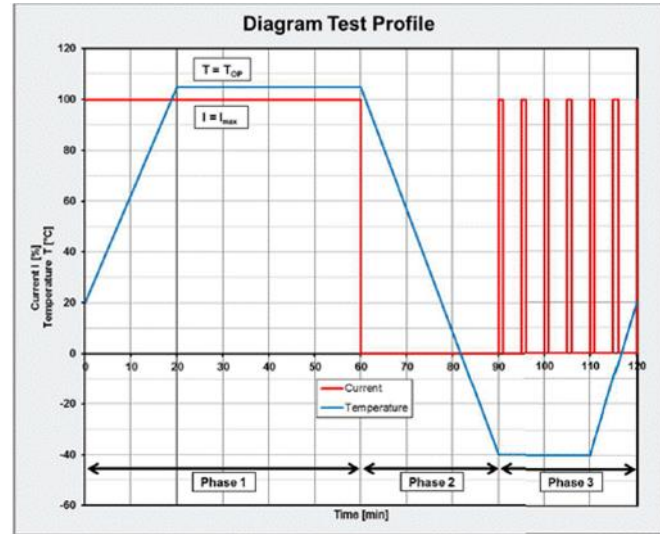
Modulated Current (MODI) Mode

Modulated Current Mode, also known as Modulated DC mode, produces an arbitrary waveform. A waveform is described as a sequence of DC current steps and downloaded into the current source for execution once, multiple times or infinitely. Modulated Current may also be known as Modulated DC. Step resolution is 1ms.

Applications for Modulated Current include cell phone flash emulation and rectifier ripple emulation. A sequence may be developed to mimic the red eye flash test. Other specific sequences may be developed to support the automotive electronic tests.

This mode can have high internal power dissipation.

Available in SpikeSafe Models			
DC	DCP	PRF	MINI
	Option	Option	Option



Shown above is an automotive electrical test (IEC test) that may be implemented and executed from a modulated current sequence file.

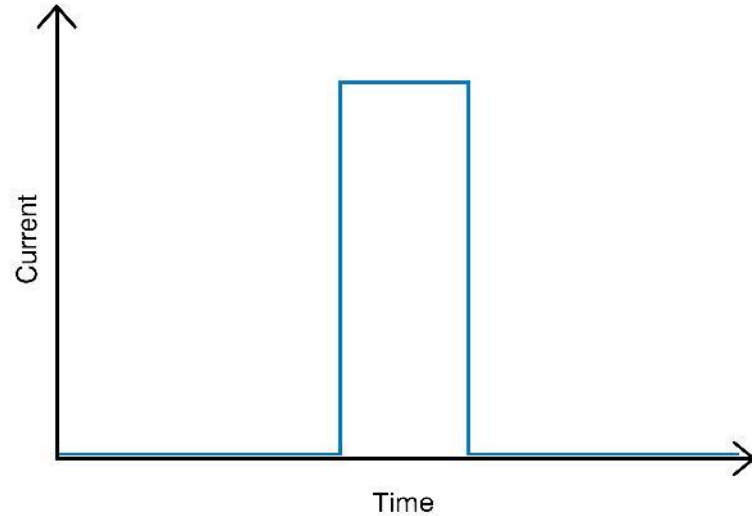
Waveform synchronization across source channels is possible.

Single Pulse Mode

Single Pulse Mode produces a waveform that consists of one (1) single pulse. Also known as Mono Pulse and DC on/off mode (pseudo pulse mode).

Single Pulse Mode is typically used in light measurement applications for characterization, R&D and production.

Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		✓	✓



Single Pulse Mode differs from the commonly used pseudo pulse mode (DC on/off) in the following ways:

- Single Pulse Mode for measurement repeatability is described in the LM-85 standard.
- Pulse Width is used to describe the ON time for a Single Pulse.
- Pulse on timing is accurate.
- Pulse rise and fall is controlled.

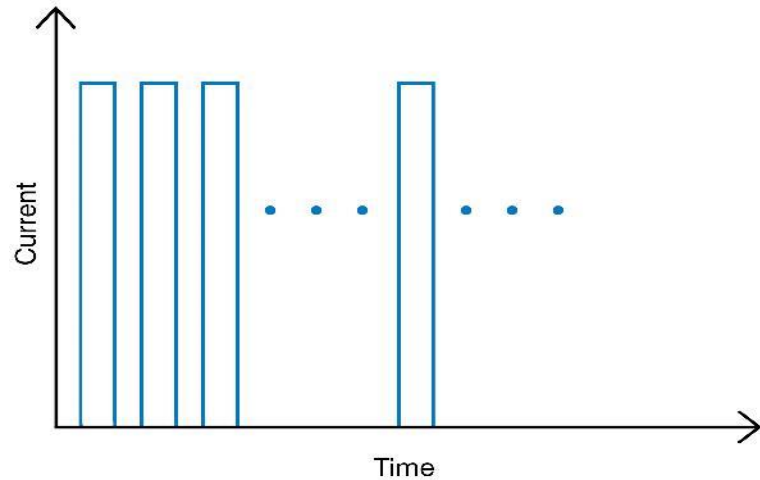
Continuous Pulse Mode

In Continuous Pulse Mode, a Continuous Pulse train that transitions from off (0) to on, defined by maximum compliance voltage, the output is current and configured pulse parameters.

Continuous Pulse Mode is useful for a number of applications and commonly used in reliability, burn-in and LM-80 test systems.

Continuous Pulse Mode reduces junction temperature resulting in the highest measurement repeatability. Special hardware triggering for the spectrometer is not necessary in Continuous Pulse Mode.

Available in SpikeSafe Models			
DC	DCP	PRF	MINI
	✓	✓	✓



Continuous Pulse Mode for measurement repeatability is described in the LM-85 standard.

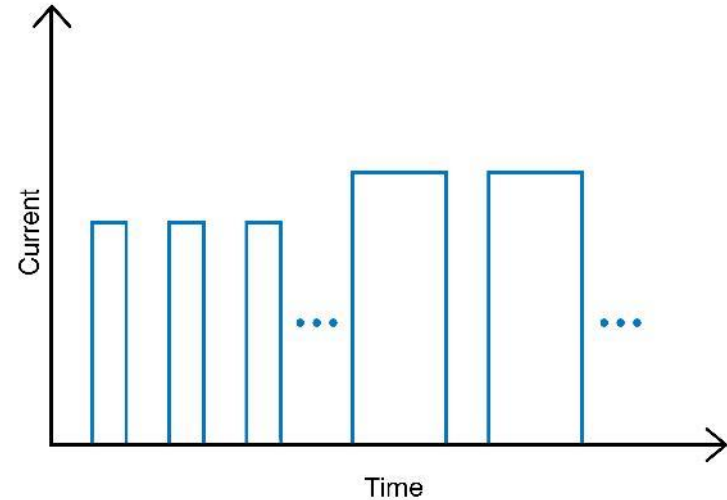
Continuous Dynamic Mode

Continuous Dynamic Mode is similar to Continuous Mode, with three primary differences:

- 1) The current is not ramped up linearly, the output transitions to full current at the first pulse
- 2) Pulse parameters may be changed while the output is enabled.
- 3) The amplifier headroom is not tuned for efficiency.

Continuous Dynamic is the best mode for production binning, closed-loop power control or precision photometric measurements.

Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		✓	✓



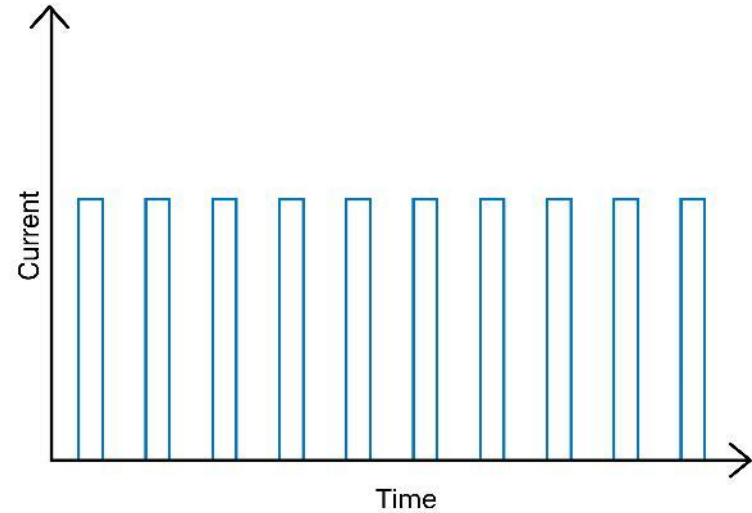
Pulse rise and fall times can be shortened and overshoot can be reduced by increasing the Maximum Compliance voltage setting in Continuous Dynamic Mode. This gives the amplifier additional operating range to overcome circuit inductance.

Multiple Pulse Mode

Multiple Pulse Mode outputs a defined number of identical pulses. This mode involves a two-part sequence: 1) the channel is enabled to pulse, and 2) pulses are produced upon receipt of a hardware or software trigger. After the pulses are complete the channel remains enabled and it can be re-triggered.

Multiple Pulse Mode is designed for high speed testing. It executes much faster than Single Pulse Mode and so it should be used instead of Single Pulse Mode when speed is critical.

Multiple Pulse Mode may be used to execute the Simulated Lightning Strikes Test (10,000 pulses). Multiple Pulse Mode may also be used for other applications where stopping the pulse train at a set pulse count is important.



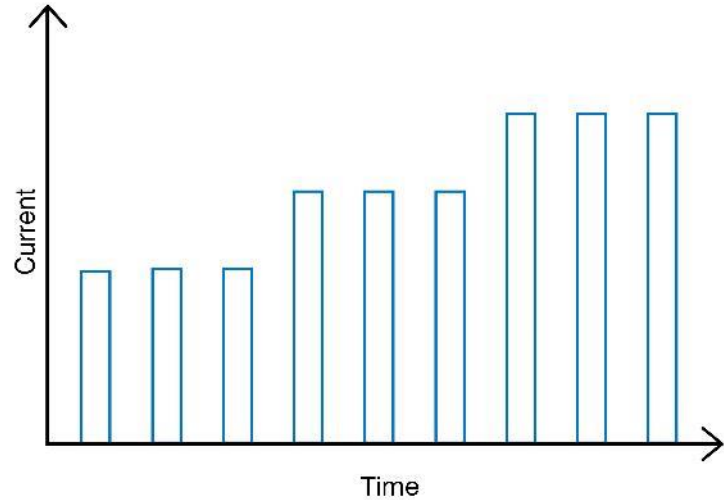
Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		✓	✓

Multiple Pulsed Sweep With Pulse Count > 1

Pulsed Sweep Mode normally produces only one pulse for each current step. By setting the Pulse Count parameter >1, a sweep with multiple pulses is generated at each current step.

This mode is useful to test lasers in QCW (Quasi Continuous Wave) mode. It may also be used to do LM-85 Continuous Pulse Mode testing of LEDs. The Pulse Count parameter is programmed for enough pulses to allow the spectrometer or other instrument to make the required measurement.

The resulting measurements are more accurate and less noisy than single pulse/step measurements.



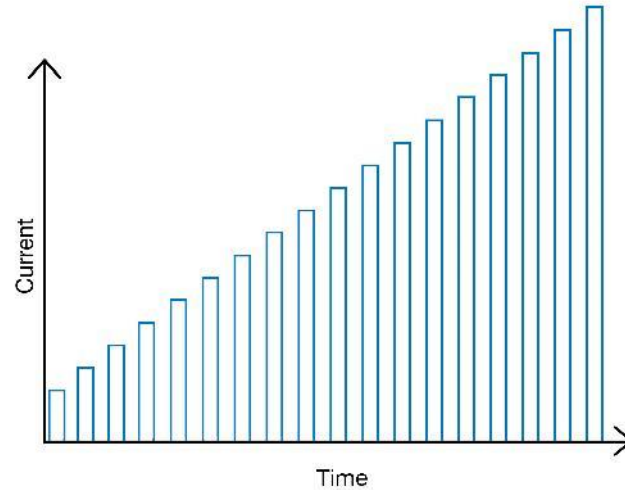
Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		✓	✓

Pulsed Sweep Mode

Pulse Sweep Mode produces a series of current pulses that increase or decrease in amplitude.

Pulsed Sweep Mode is typically used to generate IV (current vs voltage), LI (light vs current) or LIV (light vs current vs voltage) plots for LEDs, VCSEL, laser diodes and other semiconductor devices.

If the sweep results in a device failure such as an open circuit, the SpikeSafe reports the sweep step that failed. This feature makes Pulsed Sweep Mode very useful for pulsed withstand testing, overcurrent protection tests, and other similar applications.



Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		✓	✓

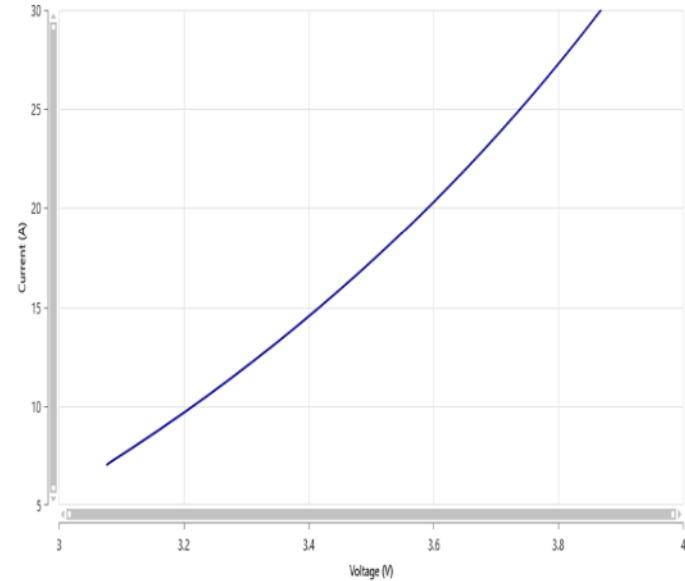
Pulsed Sweep Mode - IV Plot

The industry standard IV plot graphs device current over voltage.

Using the Pulsed Sweep Mode, Vektrex's Control Panel Software application can automatically generate IV plots.

By programming long on times and short off times, IV plots generated using the SpikeSafe Pulsed Sweep Mode can duplicate plots generated with Keithley current sources.

The real power is in performing pulsed sweeps with short pulses that reduce heating. Compared to other current sources, the resulting plots more accurately represent voltage vs current at a constant junction temperature.

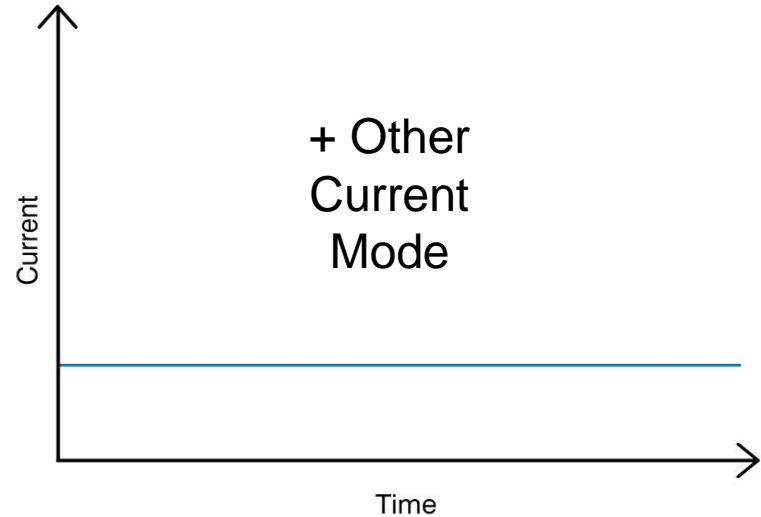


Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		W/ Control Panel	W/ Control Panel

Bias Modes

The optional SpikeSafe Bias current modes add a second low-current current source to the output channel to support thermal measurements including Junction Temperature (T_J) and Thermal Resistance ($R\theta$). The Bias Modes are:

- **Bias Only**
- **Single Pulse + Bias**
- **Continuous Pulse + Bias**
- **Continuous Dynamic + Bias**
- **Pulsed Sweep + Bias**



Available in SpikeSafe Models			
DC	DCP	PRF	MINI
		Option	✓



Thank you.

For questions please email
support@vektrex.com.