

AVO-6C-B-N waveform. 10 kHz, 1 us, -250V into a 50Ω load (no output module). 100 V/div, 200 ns/div.

- ◆ IEEE-488.2 GPIB and RS-232 control
- ◆ Peak outputs to 1, 5 and 10 Amperes
- ◆ Pulse widths to 5 us and to 50 us

The AVO-6 series of pulsed voltage pulse generators is designed for pulsing laser diodes and other low impedance loads with rectangular current pulses as high as 10 Amperes and pulse widths as high as 50 us.

Each model consists of a mainframe voltage pulser (providing a voltage amplitude V_{OUT}), and an output module with an internal series resistance ($R_{SERIES} = 50, 12.5, \text{ or } 11 \text{ Ohms}$, $\pm 10\%$, depending on the model). When a diode is connected to the output module, the current is given by:

$$I_{DIODE} = (V_{OUT}/N - V_{DIODE}) / R_{SERIES}$$

where $N=1$ for most models ($N=2$ for the AVO-6D-B due to the presence of a current-doubling transformer). V_{DIODE} is the diode forward voltage drop.

The diode load is connected between two solder terminals on the output module. The module connects to the mainframe using 50Ω coaxial cable (or five coaxial cables in parallel for the AVO-6HZ-B, for lower impedance operation).

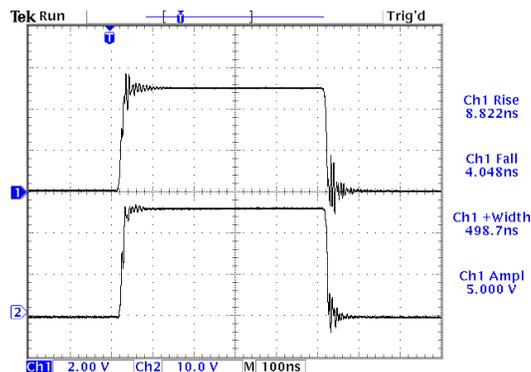
The output module contains the elements necessary to match the diode to the mainframe. Optional plug-in (or screw-in) socket mounting of the diode is also available. If the output module is not used, the mainframe can be used to drive a 50Ω load directly. (The AVO-6HZ-B can drive five 50Ω loads, or a single 10-11Ω load).

Model AVO-6A-B provides variable amplitudes (either polarity available) of up to 1 Amp, pulse width variable from 50 ns to 5 us, pulse repetition frequencies (PRF) to 20 kHz, and 10 ns rise times. Model AVO-6A1-B is similar but features 1 ns rise and fall times, and a maximum PRF of 10 kHz.

For higher current applications, Avtech offers model AVO-6F1-B, which provides up to 4 Amps and pulse widths to 5 us, with 3 ns rise and fall times. Model AVO-6C-B provides up to 5 Amperes at pulse widths to 5 us with 12 ns rise times.

For wider pulse applications, model AVO-6C1-B operates to 5A with pulse widths of 50 us and 12 ns rise time. The maximum PRF is 10 kHz, and the maximum duty cycle is 1%.

For higher PRF applications, the AVO-6HF-B operates to 5A, 100 kHz, at duty cycles up to 4%. The pulse width is variable from 50 ns to 50 us. The output module is fan-cooled. The AVO-6HZ-B is similar, but provides currents of up to 10A.



Top: Output of Tektronix CT-2 current probe, measuring an AVO-6C-B-P +5A current pulse through a 1N5819 diode soldered to the output module. 1A/div, 100 ns/div.

Bot: MON output, into a 50Ω load. 10V/div, 100 ns/div.

- ◆ Maximum duty cycles from 0.5 to 10%
- ◆ 8 basic models
- ◆ Customizations available

The AVO-6D-B is offered for applications requiring up to 10A with pulse widths to 5 us, and 15 ns rise times.

All models are protected from overload conditions by an automatic control feature which limits the output power for as long as the overload condition persists.

All instruments with the “-B” suffix include a complete computer control interface. This provides GPIB and RS-232 computer-control, as well as front panel keypad and adjust knob control of the output pulse parameters. (For details, please visit <http://www.avtechpulse.com/gpib>). A large back-lit LCD displays the output amplitude, polarity, frequency, pulse width, and delay. To allow easy integration into automated test systems, the programming command set is based on the SCPI standard, and LabView drivers are available at <http://www.avtechpulse.com/labview>.

A standard rear-panel Ethernet connector allows the instrument to be remotely controlled using the VXI-11.3, ssh, telnet, and web protocols. In particular, the VXI-11.3 features allows software like LabView to control an instrument using standard VISA communications drivers and network cabling, instead of using older-style GPIB cabling and GPIB controller cards. See <http://www.avtechpulse.com/options/vxi> for details.

All models require 100-240V, 50-60 Hz AC power.

A delay control and sync output is provided for scope triggering purposes. The units can also be triggered externally using a TTL-level pulse. The propagation delay in the externally triggered mode is typically 100 ns. Either output polarity or an optional dual output polarity can be provided. All models are available with a monitor output option which provides an attenuated coincident replica of the main output pulse voltage.

All models are also available with optional plug-in or screw-in socket mounting of the diode. When ordering, the customer must specify the diode package type (e.g. TO-18) and the required pin connections (e.g. anode, cathode, ground, etc.). See AVX-S Series for readily available package mounting. Contact Avtech for special or different packages.

Application notes are available on the Avtech web site, at <http://www.avtechpulse.com/appnote>.

Model:	AVO-6A-B ¹	AVO-6A1-B ¹	AVO-6F1-B ¹	AVO-6HF-B ¹	AVO-6C-B ¹	AVO-6C1-B ¹	AVO-6D-B ¹	AVO-6HZ-B ¹
Maximum amplitude at mainframe output (V_{OUT}) ² :	50V		200V	250V			250V	110V
Current transformer ratio (N):	1						2	1
Output impedance (R_{SERIES}):	50 Ω , $\pm 10\%$						12.5 Ω , $\pm 10\%$	11 Ω , $\pm 10\%$
Maximum current output ³ , (V_{OUT}/N) / R_{SERIES} :	1 Amp		4 Amps	5 Amps			10 Amps	
Pulse width (FWHM):	50 ns - 5 us		100 ns - 5 us	50 ns - 50 us	50 ns - 5 us	50 ns - 50 us	50 ns - 5 us	50 ns - 50 us
Rise & fall time (20%-80%):	≤ 10 ns	≤ 1 ns	≤ 3 ns	≤ 12 ns			≤ 15 ns	
Maximum PRF:	20 kHz	10 kHz	10 kHz	100 kHz	10 kHz		10 kHz	100 kHz
Duty cycle (max):	10 %	5 %	1 %	4 %	1 %		0.5 %	5 %
Polarity ³ :	Positive or negative or both (specify)							
DC offset or bias insertion:	Optional ⁴ Apply required DC bias current in the range of ± 100 mA to solder terminals on the output module. Not available on the AVO-6HF-B, AVO-6HZ-B, or AVO-6C1-B (50 us models).							
Propagation delay:	≤ 150 ns (Ext trig in to pulse out)							
Jitter:	$\leq \pm 100$ ps $\pm 0.03\%$ of sync delay (Ext trig in to pulse out)							
Trigger modes:	Internal trigger, external trigger (TTL-level pulse, > 10 ns, 1 k Ω input impedance), front-panel "Single Pulse" pushbutton, or single pulse trigger via computer command.							
Variable delay:	Sync to main output: 0 to ± 1.0 seconds, for all trigger modes (including external trigger).							
Sync output:	$> +3$ Volts, > 50 ns, will drive 50 Ohm loads							
Gate input:	Synchronous or asynchronous, active high or low, switchable. Suppresses triggering when active.							
Monitor output:	Optional ⁵ . Provides an attenuated coincident replica of output voltage.							
GPIB, RS-232 control ² :	Standard on -B units.							
Ethernet port, for remote control using VXI-11.3, ssh, telnet, & web:	Included. Recommended as a modern alternative to GPIB / RS-232. See http://www.avtechpulse.com/options/vxi for details.							
Settings resolution:	The resolution of the timing parameters (pulse width, delay, period) varies, but is always better than 0.15% of (set value + 20 ns). The amplitude resolution is $< 0.1\%$ of the maximum amplitude.							
Settings accuracy:	Typically $\pm 3\%$ (plus $\pm 1V$ or ± 3 ns) after 10 minute warmup, at low duty cycles ⁷ . For high-accuracy applications requiring traceable calibration, verify the output parameters with a calibrated oscilloscope.							
Output connectors:	Standard: Solder terminals (one for OUT, one for GND). -SMA option: replaces the two solder terminals with a single SMA connector ⁹ .							
Optional output device sockets:	The standard solder terminals can be replaced by a plug-in or screw-in socket. See http://www.avtechpulse.com/laser-bias/avx-s1 for examples. Contact Avtech (info@avtechpulse.com) with your special device mounting requirement.							
Optional alternative output connector and cable (AVO-6D-B only):	-CLZ option ⁶ : The output can be provided on a DB-9 male connector (Pins 1-5 = signal, pins 6-9 = ground), suitable for use with the Avtech AV-CLZ11 series of low impedance cables. Includes one AV-CLZ11-100 cable and one AV-CTLX DB-9-to-PCB adapter (see http://www.avtechpulse.com/transmission/av-clz11 and http://www.avtechpulse.com/accessories/av-ctlx for details.) The cable must be terminated by a user-supplied 11-13 Ohm resistance (or resistance in series with a diode).							
Connectors, other:	BNC							
Power requirements:	100 - 240 Volts, 50 - 60 Hz							
Dimensions: (H x W x D)	Mainframe: 100mm x 430 mm x 375mm (3.9" x 17" x 14.8") Output module (excludes AVO-6HF-B, AVO-6HZ-B): 41 mm x 66 mm x 76 mm (1.6" x 2.6" x 3.0") Output module (AVO-6HF-B, AVO-6HZ-B only): 150 mm x 150 mm x 150 mm (6" x 6" x 6")							
Chassis material:	Cast aluminum frame and handles, blue vinyl on aluminum cover plates							
Mounting:	Any							
Temperature range:	$+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$							

- 1) -B suffix indicates IEEE-488.2 GPIB and RS-232 control of amplitude and frequency. See <http://www.avtechpulse.com/gpib/> for details.
- 2) For operation at amplitudes of less than 20% of full-scale, best results will be obtained by setting the amplitude near full-scale and using external attenuators on the output (between the mainframe and the output module).
- 3) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity.
- 4) For DC offset option suffix model number with -OS. Not available for the models AVO-6HF-B, AVO-6HZ-B, or AVO-6C1-B (50 us models).
- 5) For monitor option add suffix -M.
- 6) Add the suffix -CLZ to the model number to specify this output

- 7) The amplitude may decrease $\sim 10\%$ relative to the programmed setting if the instrument is operating at or near the maximum specified duty cycle.
- 8) For $V_{DIODE} = 0V$.
- 9) This is only suitable for connecting to very short lengths of cable (less than 12 inches or 30 cm), since it is located after the impedance-matching resistance. Any length of cabling will introduce transmission line reflections due to the impedance mismatch. The cable will act as an inductance. The load should be located as close as possible to the output connector (regardless of whether solder terminals or the SMA connector is used).



AVO-6C-B