

+100V / +100A into 1.0Ω

The AVOZ-A and AVOZ-B series are voltage pulsers with very high maximum current ratings (20 Amps or 100 Amps). These pulsers are designed for delivering pulses with very fast rise times to laser diodes and other low impedance loads. For applications requiring higher voltages (e.g., for driving series-connected laser diode arrays), please see the new AVOZ-D series, which offers 500V / 50A and 700V / 70A models.

The AVOZ-A1A-B model will provide amplitudes of up to 40V into load impedances of 2Ω or higher, providing currents of up to 20 Amps. The rise and fall times are less than 20 ns, and the pulse repetition frequency (PRF) is variable up to 1 MHz. The pulse width is variable from 25 to 150 ns, subject to a maximum duty cycle limit of 2.5%.

The AVOZ-A3-B and AVOZ-A4-B models provide up to 100V into 1Ω or higher (i.e., 100 Amps). The AVOZ-A3-B offers pulse widths from 50 ns to 2 us, with 35 ns rise time, and PRF to 20 kHz. The AVOZ-A4-B offers wider pulses (100 ns to 5 us), with 35 ns rise times and PRF to 10 kHz.

The high-current, high-power AVOZ-B3-B provides up to 100A into load impedances of 1Ω or higher (i.e., 100 Amps). The rise time is less than 35 ns, and the PRF is variable to 10 kHz. The pulse width is variable from 100 ns to 2 us. The maximum average output power is 100 Watts.

The very-high-power, high PRF model AVOZ-B4-B provides up to 100A into load impedances of 1Ω or higher (i.e., 100 Amps). The rise time is less than 35 ns, and the PRF is variable to 200 kHz. The pulse width is variable from 0.1 us to 2 us. The maximum duty cycle is 4%, and the maximum average output power is 400 Watts. An external user-supplied DC power supply (capable of supplying 110V, 400W) is required when using the AVOZ-B4-B. This power supply controls the amplitude of the output pulse. For automated test systems, this power supply should

have a GPIB port for remote control.

The AVOZ instruments are voltage pulsers. A user-supplied resistor must be connected in series with the diode under test to limit the current to the maximum rated current (or less). The output current (I_{OUT}) can be related to the pulser output voltage (V_{OUT}), the diode forward voltage drop (V_D) and the required series resistance (R_{SERIES}) by:

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

All AVOZ models provide a rear-panel output connector to which a unique 60 cm long high-current transmission line may be attached. This line has a characteristic impedance approximately equal to the expected load impedance. This allows the laser diode to be placed away from the instrument without degrading the pulse shape significantly. A terminating resistor must be placed in series with the diode to provide a net resistive load to the line of 1Ω (2Ω for the AVOZ-A1A-B). A medium-power test load (5 Watts) is provided with these models for the convenience of initial testing purposes.

See <http://www.avtechpulse.com/transmission/av-clz1> and <http://www.avtechpulse.com/accessories/av-ctl1> for more information about the cabling and test loads.

The device under test must be located very close to the end of the AV-CLZ cabling (a few centimeters). Any added inductance from wiring or cabling (L) must be minimized such that the inductive time constant:

$$\tau = L / R$$

is less than the instrument's specified rise time, where R is the load resistance ($\sim 1\Omega$ for most models). *Values of L larger than this may damage the output transistors.* For instance, the AVOZ-B4-B has a specified rise time of 35 ns and operates into $\sim 1\Omega$ loads, so the inductance of any added wiring should be less than 35 nH. Users should be aware that this is quite restrictive.

Either output polarity (positive or negative) can be provided. AVOZ-A models are available with a dual polarity option. On dual polarity units, two output connectors are provided, but only one polarity is active at a time.

A delay control and a sync output are provided for scope triggering purposes. The units can also be triggered externally using a TTL-level pulse. All models are available with optional remote analog electronic control (0 to +10V) of the output amplitude. Electronic control units also include the standard front-panel one-turn controls.

All models include a complete computer control interface (see <http://www.avtechpulse.com/gpib> for details). This provides GPIB and RS-232 computer-control, as well as front panel keypad and adjust knob control of the output pulse parameters. A large backlit LCD displays the output amplitude (except on the AVOZ-B4-B, where the amplitude is controlled by the DC power supply), 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

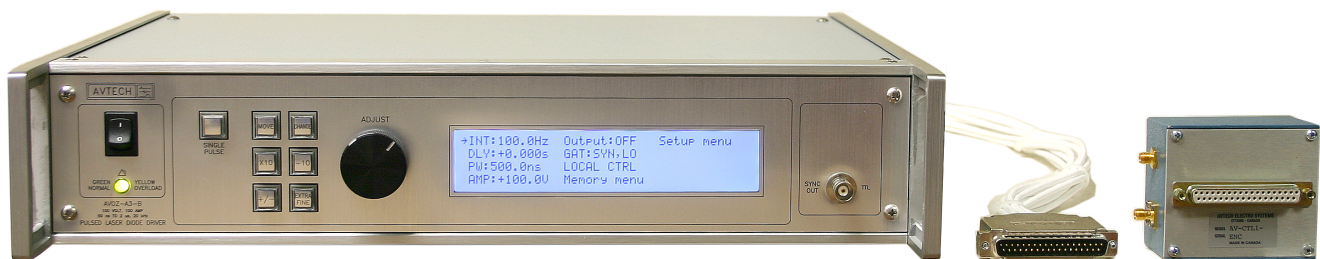
are available at <http://www.avtechpulse.com/labview>.

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. For additional details, please see <http://www.avtechpulse.com/options/vxi>.

All models require 100-240V, 50-60 Hz prime power. The AVOZ-B4-B requires an external user-supplied DC power supply as well.

Many aspects of these models can be customized for particular applications. Some models can optionally be equipped with a DC offset input, if required, although this may degrade switching times slightly. Contact Avtech with your special requirements (info@avtechpulse.com)!

See the continuously-updated applications note area of the Avtech web site for general applications assistance: <http://www.avtechpulse.com/appnote>.



AVOZ-A3-B, shown with the supplied accessories (AV-CLZ1-60 cable and AV-CTL1-ENC test load).
See <http://www.avtechpulse.com/transmission/av-clz1> for more information about the AV-CLZ1-60 cable.
See <http://www.avtechpulse.com/accessories/av-ctl1> for more information about the AV-CTL1-ENC test load.

Use the "Pick the Perfect Pulser" parametric search engine
at <http://www.avtechpulse.com/pick>
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SPECIFICATIONS

AVOZ-A, AVOZ-B SERIES

Model ¹ :	AVOZ-A1A-B	AVOZ-A3-B	AVOZ-A4-B	AVOZ-B3-B	AVOZ-B4-B ⁷
Amplitude, voltage ^{2,3,11} :	< 4 to 40V				
Maximum current:	20A	100A			
Minimum load impedance ⁴ :	2 Ω	1 Ω			
Pulse width (FWHM):	25 - 150 ns	50ns - 2us	100ns - 5us	100ns - 2us	
Rise, fall times (20%-80%) ⁹ :	≤ 20 ns	≤ 35 ns			
Maximum PRF:	1 MHz	20 kHz	10 kHz	10 kHz	200 kHz
Duty cycle: (max)	2.5%	0.1%		1 %	4 %
Output impedance:	≤ 0.2 Ω	≤ 0.05 Ω		≤ 0.05 Ω	≤ 0.05 Ω
Average output power:	20 W max.	10 W max.		100 W max.	400 W max.
Droop:	≤ 5%, at maximum pulse width and maximum amplitude				
Polarity ⁵ :	Positive or negative or dual polarity (specify)			Positive or Negative (specify)	
GPIB & RS-232 control ¹ :	Standard on -B units.				
LabView drivers:	Check http://www.avtechpulse.com/labview for availability and downloads				
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 (excluding the AVOZ-B4-B).				
Settings accuracy:	Typically ± 3% (plus ±1V or ± 2 ns) after 10 minute warmup, at low duty cycles ¹² . For high-accuracy applications requiring traceable calibration, verify the output parameters with a calibrated oscilloscope ¹³ .				
Propagation delay:	≤ 100 ns (Ext trig in to pulse out)				
Jitter:	≤ ± 35ps ± 0.015% RMS (sync out to pulse out)				
Trigger modes:	Internal trigger, external trigger (TTL-level pulse, > 10 ns, 1 kΩ input impedance), front-panel "Single Pulse" pushbutton, or single pulse trigger via computer command.				
Variable delay:	Sync to main out: 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.				
Included output cable:	Detachable high-current transmission line cable assembly.				
Part number: length, Zo:	AV-CLZ2-60 1.8Ω, 60 cm	AV-CLZ1-60 (see http://www.avtechpulse.com/transmission/av-clz1) 1 Ω, 60 cm			
Output connection:	End of cable: DB-37 male. Pins 1-19 = signal, pins 20-37 = ground.				
Supplied test load ⁶ :	AV-CTL2	AV-CTL1-ENC			
Other signal connectors:	Trig, Gate, Sync: BNC				
DC power connectors ⁷ :	AVOZ-B4-B only: 6 mm plug / 4 mm sockets ⁸ (+ red, - black)				
Power required:	AC:	100 - 240 Volts, 50 - 60 Hz			0-110V DC, 400 Watts ⁷
	DC:	N/A			
Dimensions: (H x W x D)	Most models: 100 x 430 x 375 mm (3.9" x 17" x 14.8") Except AVOZ-B4-B: 145 x 430 x 375 mm (5.7" x 17" x 14.8")				
Chassis material:	Anodized aluminum, with blue plastic trim				
Optional rack-mount kit:	Add -R5 suffix.				Add -R6 suffix.
Temperature range:	+5°C to +40°C				

- 1) -B suffix indicates IEEE-488.2 GPIB and RS-232 control of pulse amplitude, pulse width, delay and PRF. (See <http://www.avtechpulse.com/gpib>).
- 2) For remote analog electronic control (0 to + 10V) of the amplitude, suffix model number with -EA. Electronic control units also include standard front-panel controls. Not available for the AVOZ-B4-B.
- 3) For operation at voltage amplitudes of less than 10% of the full-scale voltage, better results may be obtained by setting the amplitude near full-scale and increasing the load impedance accordingly.
- 4) Required to limit output current. For applications where additional resistance must be added in series with the device under test, Avtech recommends connecting multiple Ohmite OY-series (<http://www.ohmite.com>) ceramic composition resistors in parallel to create a high-power, low-inductance effective resistance.
- 5) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity option.
- 6) The supplied test load is for low-duty-cycle basic operational tests only. The power rating of the load is 5 Watts. It is not capable of supporting the instrument's full maximum average output power. See <http://www.avtechpulse.com/accessories/> for details about the AV-CTL series of test loads.
- 7) The AVOZ-B4-B requires a user-supplied 0 to 110V DC power supply that is capable of supplying the maximum average power output of the instrument (i.e., 400 Watts worst-case). The polarity of the power supply must be the same as that of the

- AVOZ-B4-B. The Xantrex (<http://www.xantrex.com/>) XHR 150-7 is one example of a suitable power supply.
- 8) Multi-Contact (<http://www.multi-contact.com> or <http://www.multi-contact-usa.com>) ID/S6AR-N-B4S series, or similar. For mating cables, specify the -AK3 option, which includes two 1m cables (1 red, 1 black) with 6mm safety sockets, and two 6mm safety plug to M6 stud adapters (1 red, 1 black).
- 9) Measured when the load resistance is equal to the minimum rated load impedance.
- 10) Typically < 10 ns measured at rear-panel output connector. The supplied AV-CLZ11-60 cable, if used, will degrade the rise and fall times to < 15 ns, approximately.
- 11) The maximum and actual amplitudes will fall by up to 25% for pulse widths less than 3 times the specified rise/fall time, due to the "rounding" of the pulse.
- 12) The amplitude may decrease ~10% relative to the programmed setting if the instrument is operating at or near the maximum specified duty cycle.
- 13) These instruments are provided with a basic calibration checklist, showing a selection of measured output parameters. These measurements are performed with equipment that is calibrated on a regular basis by a third-party ISO/IEC 17025:2005 accredited calibration laboratory. However, Avtech itself does not claim any accreditation. For applications requiring traceable performance, use a calibrated measurement system rather than relying on the accuracy of the pulse generator settings.