



+100V / +100A into 1.0Ω

The AVOZ-A and AVOZ-B series are voltage pulsers with very high maximum current ratings (ranging from 2 Amps to 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-A1B-B model will provide amplitudes of up to 20V into load impedances of 10Ω or higher, providing currents of up to 2 Amps. The rise and fall times are less than 10 ns, and the pulse repetition frequency (PRF) is variable up to 10 MHz. The pulse width is variable from 20 ns to 20 us. The maximum duty cycle is 20%.

Models AVOZ-A1A-B and AVOZ-A1-B provide up to 20A. The AVOZ-A1A-B provides up to 40V into load impedances of 2Ω or higher, and the AVOZ-A1-B provides up to 20V into 1Ω. The AVOZ-A1A-B offers 20 ns rise times, PRF variable to 1 MHz, and covers the pulse width range of 25 to 150 ns. The AVOZ-A1-B offers wider pulses (40 ns to 1 us), with 30 ns rise times and PRF variable to 20 kHz.

The AVOZ-A2-B model provides up to 50V into load impedances of 1Ω or higher (i.e., 50 Amps). The rise time is less than 30 ns, and the PRF is variable to 20 kHz. The pulse width is variable from 40 ns to 1 us.

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 30 ns rise time, and PRF to 20 kHz. The AVOZ-A4-B offers wider pulses (100 ns to 5 us), with 30 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 30 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.

- Up to 100 Amps, 400 Watts
- Pulse widths from 20 ns to 5 us
- Rise times from 10 to 100 ns
- Average power output to 400 Watts
- Rugged 60 cm output cables
- IEEE-488.2 GPIB and RS-232 interfaces
- Optional ethernet port for VXI-11.3 support

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 30 ns, and the PRF is variable to 400 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 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-A models (as well as the AVOZ-B3-B) have 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. A matching 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, or 10Ω for the AVOZ-A1B-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.

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

A DC offset option is available. Units with this option

include a “diode-OR gate” function to combine the pulse and the user supplied DC bias (two high-current diodes are connected to allow the larger of the pulse or the DC offset to pass to the output). The DC bias polarity must be the same as the pulse polarity. The required DC bias (generated by a user-supplied power supply) is applied directly to the rear panel solder terminals.

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>.

The -VXI option adds a rear-panel Ethernet connector, allowing an 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.

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.

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SPECIFICATIONS

AVOZ-A, AVOZ-B SERIES

Model ¹ :	AVOZ-A1B-B	AVOZ-A1A-B	AVOZ-A1-B	AVOZ-A2-B	AVOZ-A3-B	AVOZ-A4-B	AVOZ-B3-B	AVOZ-B4-B ⁷	
Amplitude ^{2,3,13} : current: voltage:	0 to 2A 0 to 20V	0 to 20A 0 to 40V	0 to 20A 0 to 20V	0 to 50A 0 to 50V	0 to 100A 0 to 100V	0 to 100A 0 to 100V	0 to 100A 0 to 100V	0 to 100A 0 to 100V	
Minimum load impedance ⁴ :	10 Ω	2 Ω	1 Ω	1 Ω	1 Ω	1 Ω	1 Ω	1 Ω	
Pulse width (FWHM):	20ns - 20us	25 - 150 ns	40ns - 1us	40ns - 1us	50ns - 2us	100ns - 5us	100ns - 2us	100ns - 2us	
Rise, fall times (20%-80%) ¹⁰ :	≤ 10 ns ¹²	≤ 20 ns	≤ 30 ns	≤ 30 ns	≤ 30 ns	≤ 30 ns	≤ 30 ns	≤ 30 ns	
Maximum PRF:	10 MHz	1 MHz	20 kHz	20 kHz	20 kHz	10 kHz	10 kHz	400 kHz	
Duty cycle: (max)	20 %	2%		0.4 %	0.1%		1 %	4 %	
Output impedance:	≤ 3 Ω	≤ 0.2 Ω		≤ 0.1 Ω	≤ 0.05 Ω		≤ 0.05 Ω	≤ 0.05 Ω	
Average output power:	8 W max.	16 W max.	8 W max.	10 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)						Pos or Neg (specify)		
Max. DC offset (option ¹¹):	N/A	N/A	2A	5A	5A	5A	N/A	N/A	
GPiB & RS-232 control ¹ :	Standard on -B units.								
LabView drivers:	Check http://www.avtechpulse.com/labview for availability and downloads								
Ethernet port:	Optional ⁸ , for remote control using VXI-11.3, ssh, telnet, & web. 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 varies, but is always better than 0.15% of the set value. The amplitude resolution (on units other than the AVOZ-B4-B) is typically 0.02% of the maximum amplitude								
Settings accuracy:	Typically ± 3% (plus ±1V or ± 2 ns) after 10 minute warmup, at low duty cycles ¹⁴ . For high-accuracy applications requiring traceable calibration, verify the output parameters with a calibrated oscilloscope.								
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.								
Sync delay:	Variable, 0 to ± 1.0 seconds, sync out to pulse out								
Sync output:	+ 3 Volt, 100 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, Z ₀ :	AV-CLZ11-60 10.8Ω, 60 cm	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-CTL11	AV-CTL2	AV-CTL1			AV-CTL1-ENC			
Other signal connectors:	Trig, Gate, Sync: BNC								
DC power connectors ⁷ :	AVOZ-B4-B only: 6 mm plug / 4 mm sockets ⁹ (+ red, - black)								
Power required:	AC:	100 - 240 Volts, 50 - 60 Hz							
	DC:	N/A						0-110V DC, 400 Watts ⁷	
Dimensions: (H x W x D)	100 x 430 x 375 mm (3.9" x 17" x 14.8")						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								

- 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>).
- 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.
- 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.
- 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.
- Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity option.
- 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.
- 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.
- Add the suffix -VXI to the model number to specify the Ethernet port.
- 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).
- Valid when the load resistance is equal to the minimum rated load impedance. Higher load resistances will degrade the fall times noticeably.
- For DC offset option, suffix model number with -OS. The DC offset must be generated by a user-supplied power supply. The offset is combined with the pulse output using a diode-OR gate, which permits the larger of the two signals (pulse versus offset) to flow to the main output. Contact Avtech (info@avtechpulse.com) if you require higher DC current ratings or other offset configurations.
- Measured at rear-panel output connector. The supplied AV-CLZ11-60 cable, if used, will degrade the rise and fall times by 3 ns, approximately.
- The maximum and actual amplitudes will fall by 10-20% approximately for pulse widths less than 3 times the specified rise/fall time.
- The amplitude may decrease ~10% relative to the programmed setting if the instrument is operating at or near the maximum specified duty cycle.