

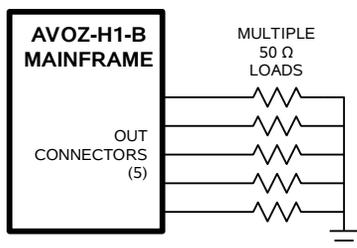
- Amplitudes to 60V
- Currents to 6A or 12A
- Peak and average powers to 360W
- PRF up to 100 kHz
- Pulse width of 200 ns up to 100 or 200 ms
- Rise times of 100 ns
- IEEE-488.2 GPIB and RS-232 interfaces
- Ethernet port for VXI-11.3 support

The AVOZ-H series is intended for high-voltage, high-current, high-duty-cycle applications.

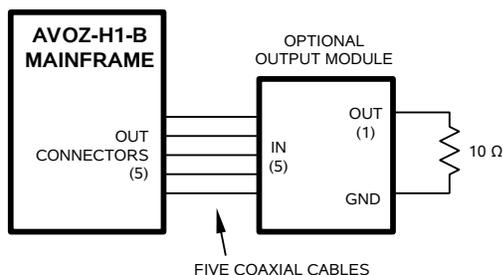
Model AVOZ-H1-B can provide voltage amplitudes of up to 60V, with load currents of up to 6 Amps. The pulse width can be adjusted from 200 ns to 200 ms. The pulse repetition frequency may be adjusted from 1 Hz to 50 kHz. In the pulse mode, the maximum duty cycle is 80%. A DC mode (100% duty cycle) is also provided.

The main output is provided on five rear-panel BNC connectors, which are wired to a common point internally (i.e., they are wired in parallel). These outputs can either be combined to drive a single low-impedance load (as low as 10Ω), or can be used separately to drive multiple 50Ω loads simultaneously. This unique flexibility makes the AVOZ-H series ideal for testing high-current laser diode arrays, as well as testing multiple identical lower-current devices (for instance, production testing of attenuators).

To drive multiple 50Ω loads, simply attach one load per output connector, using a coaxial cable for each load. No output module is required in this configuration:



When used to drive loads with impedances less than 50 Ohms, two or more outputs can be combined at the load in an optional output module:



If used, the output module is connected to the mainframe using up to five identical coaxial cables connected in parallel. (The cables are available in an optional accessory kit, or used-

supplied coaxial cables may be used.)

The mainframe rear-panel and the output module each have a matching number of connectors for this purpose. This allows the effective characteristic impedance of the cabling (Z_0) to be "tuned" to the load impedance, to provide excellent impedance matching and minimal waveform distortion. For instance, when five cables are used, $Z_0 = 50\Omega / 5 = 10\Omega$, allowing proper transmission matching to 10Ω loads. If two cables are used, $Z_0 = 50\Omega / 2 = 25\Omega$, allowing proper transmission line matching to 25 Ω loads. And if one cable is used, the instrument can be used to drive conventional 50Ω loads. This provides enormous versatility. This arrangement allows the load to be placed away from the instrument without degrading rise time or the pulse shape. The load is connected to the type-N output connector on the output module. An adapter may be required to mate to the user's load. See the next page for possible sources of appropriate adapters.

For non-critical applications that can tolerate some reflections caused by transmission line mismatches, the user may prefer to simply use one output cable and connector.

Model AVOZ-H2-B is similar, but it provides twice the current capability (12 Amps) and number of outputs (ten). The maximum duty cycle is limited to 50%, and the maximum pulse width is 100 ms. The maximum PRF is higher, at 100 kHz. The ten outputs can either be combined to drive a single low-impedance load (as low as 5Ω), or can be used separately to drive multiple 50Ω loads simultaneously.

All models in the AVOZ-H series are voltage pulsers. For purely resistive loads, the output current can be calculated using Ohm's Law:

$$I_{OUT} = V_{OUT} / R_{LOAD}$$

When driving diode loads, 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}):

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

Because of the high output voltages of these instruments (up to 60V), diodes or diode arrays with large forward voltage drops can be accommodated.

For all models, either output polarity can be provided.

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. In the external trigger mode, the output pulse width may also be set to track the input pulse width ($PW_{OUT} = PW_{IN}$ mode), up to 200 ms. This mode is particularly useful for generating waveforms with complex or varying timing, if used in conjunction with a user's pattern generator.

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, 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

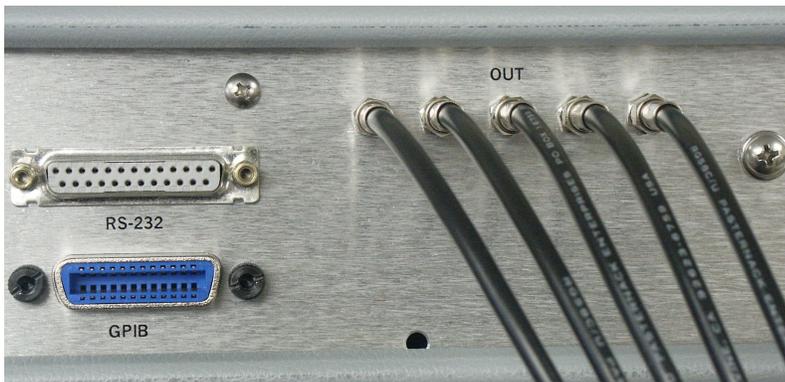
standard VISA communications drivers and network cabling, instead of using older-style GPIB cabling and GPIB controller cards. See <http://www.avtechpulse.com/options/vxi> for details.

All models require 100 - 240 Volt, 50 - 60 Hz AC prime power. No additional power supplies are necessary. These instruments do experience high AC turn-on surge currents, so they are not recommended for use with ground-fault protected circuits or residual-current devices (RCDs).

Avtech can customize models (including single quantities) to meet your particular test requirements. Contact Avtech (info@avtechpulse.com) with your requirement!



Mainframe, with -CK5 option (cables) and -OM5 option (output module)



OUTPUT CABLES ON THE REAR PANEL OF AN THE AVOZ-H1-B MAINFRAME.

The cables can be connected to five separate 50Ω loads (ten for the AVOZ-H2-B), or they can be connected to the output module (shown on the right) to drive a single load as small as 10Ω (5Ω for the AVOZ-H2-B). The cables can be ordered as an option, or be provided by the customer.



OUTPUT MODULE (-OM5 OPTION)

The following adapters may be useful if your load does not have a type-N connector. Be careful not to exceed any voltage ratings!

BNC adapter: Pasternack PE9002 or PE9127, www.pasternack.com

Breakout box: Pomona 2420, www.pomonaelectronics.com

NUMBERS OF CABLES TO USE WITH THE OUTPUT MODULE FOR A SINGLE LOAD

Load Impedance (R _L)	Number of Cables Used to Connect Mainframe to Output Module (N)	Effective Z ₀ of Cabling (Z ₀ = 50Ω / N)
5.0 Ohms	10 (AVOZ-H2-B only)	5.0 Ohms
7.0 Ohms	7 (AVOZ-H2-B only)	7.1 Ohms
10 Ohms	5	10.0 Ohms
11 to 14 Ohms	4	12.5 Ohms
14 to 20 Ohms	3	16.7 Ohms
20 to 35 Ohms	2	25.0 Ohms
35 to ∞ Ohms	1	50.0 Ohms



SPECIFICATIONS

AVOZ-H SERIES

Model ¹ :	AVOZ-H1-B	AVOZ-H2-B
Amplitude: voltage (each output): current (sum of all outputs):	< 3V to 60V, adjustable 0 to 6A	< 3V to 60V, adjustable 0 to 12A
Minimum load impedance: (parallel combination of loads on all outputs)	10 Ω The load must be non-inductive ²	5 Ω The load must be non-inductive ²
Maximum number of 50Ω loads (if outputs used separately):	5	10
Pulse width ⁴ :	200 ns - 200 ms, or DC.	200 ns - 100 ms
Rise & fall times (20%-80%):	< 100 ns	< 100 ns
Pulse repetition frequency (PRF):	1 Hz to 50 kHz, adjustable	1 Hz to 100 kHz, adjustable
Maximum duty cycle:	80% in the pulse mode. 100% in the DC mode.	50%
Output impedance (approx.):	0.1 Ohms	0.1 Ohms
Average output power:	60V × 6A = 360 Watts, maximum	60V × 12A × 50% = 360 Watts, maximum
Drop:	< 5%, at maximum pulse width and maximum amplitude	
Polarity:	Positive or negative (specify ³)	
GPIB & RS-232 control ¹ :	Standard on -B units. See http://www.avtechpulse.com/gpib for details.	
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.	
Settings accuracy:	Typically ± 3% (plus ±1V or ± 2 ns) after 10 minute warmup. For high-accuracy applications requiring traceable calibration, verify the output parameters with a calibrated oscilloscope ⁵ .	
Propagation delay:	< 200 ns (Ext trig in to pulse out)	
Jitter:	± 100 ps ± 0.03% of sync delay (Ext trig in 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.	
Output connectors: (see above for quantity)	Mainframe: Multiple SMA female connectors, for connection to an equal number of separate 50 Ohm loads, or for connection to the output module. Optional output module: Multiple SMA female connectors for connection to mainframe, and one Type-N female connector for connection to a low impedance load.	
Number of output connectors:	5	10
Optional cable kit: (RG58C/U cables, 5 feet / 152 cm)	5 cables. Add -CK5 to model number.	10 cables. Add -CK10 to model number.
Optional output module (for combining multiple outputs on to a single Type-N connector):	Add -OM5 to the model number.	Add -OM10 to the model number.
Other connectors:	Trig, Gate, Sync: BNC	
Power requirement:	100 - 240 Volts, 50 - 60 Hz, 500 Watts. These instruments experience high AC turn-on surge currents, so they are not recommended for use with ground-fault protected circuits or residual-current devices (RCDs).	
Dimensions:	Mainframe: 100 x 430 x 375 mm (3.9 x 17 x 14.8"), -OM5 optional output module: 28 x 36 x 58 mm (1.1 x 1.4 x 2.3")	
Chassis material:	Anodized aluminum, with blue plastic trim	
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 applications where additional resistance must be added in series with the device under test, Avtech recommends connecting multiple Ohmite (www.ohmite.com) OY-series ceramic composition resistors in parallel to create a high-power, low-inductance effective resistance. These resistors can be purchased readily at <http://www.digi-key.com>.
- 3) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity option.
- 4) In the external trigger mode, the output pulse width may also be set to track the input

- 5) These instruments are provided with a basic calibration checksheet, 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.