



- ◆ Amplitudes to 2000 or 3000 Volts
- ◆ 80 or 100 ns rise and fall times
- ◆ Pulse widths variable from 0.2 to 2.5 us
- ◆ PRF to 1 kHz
- ◆ IEEE-488.2 GPIB and RS-232 ports
- ◆ Ethernet port for VXI-11.3 support

The AVRH series of pulse generators use internal voltage-boosting transformers to provide amplitudes of 2 or 3 kilovolts into high-impedance loads (10 kΩ and higher).

Model AVRH-2-B provides a maximum output of 2 kV with a rise time of less than 80 ns. The pulse width is variable from 200 ns to 2.5 us, and the pulse repetition frequency is variable from 1 Hz to 1 kHz.

Model AVRH-3-B provides up to 3 kV, with rise and fall times of less than 100 ns.

The output stages in all models will safely withstand any combination of front panel control settings, output open or short circuits, and high-duty cycles. An internal power supply monitor removes the power to the output stage for several seconds if an average power overload exists. The peak instantaneous currents are also actively limited to protect the output.

The length of coaxial cable connected to the output should be minimized (3 feet / 1 meter or less) in order to avoid degrading the rise and fall times.

Aside from the internal clock, all models can also be triggered by a single-pulse pushbutton or an external TTL-level trigger input. When triggered externally, the output pulse width can be set to track the input trigger pulse width ($PW_{OUT} = PW_{IN}$). A delay control and a sync output are provided for oscilloscope triggering. A gate input is also provided. Either output polarity can be provided, as well as a dual output polarity option.

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.

Free LabView drivers for these instruments 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 additional details.

The output connector on standard units is an SHV jack. MHV or HN output connectors are optionally available. An adapter kit, consisting of an SHV plug to MHV female adapter and an MHV male to BNC female adapter, is also available.

All AVRH units operate from 100 - 240 Volts, 50 - 60 Hz AC power, and are enclosed in a rugged all-metal 2U-height rack-mountable chassis.

Models in the AVRH series may be suitable for replacing obsolete models from the former Velonex Corporation in many applications.

For 1 kV applications, consider the related AVR-8A-B series (<http://www.avtechpulse.com/medium/avr-8a>). The AVR-8A-B will drive 50Ω (and higher) loads with amplitudes up to 1 kV (without the use of internal transformers), rise times less than 50 ns, and a wide pulse width range of 200 ns to 200 us. The AVR-8A-B replaces the older discontinued AVRH-1-B model.

Alternatively, the Avtech AVRZ-5 pulse generator family (<http://www.avtechpulse.com/medium/avrz-5w>) provides 500V pulses into 50Ω loads, with rise and fall times below 10 ns.

Contact Avtech (info@avtechpulse.com) if you need help selecting an appropriate model for your application!

Actual test waveforms from shipped units are available from the online data pages for each model, at:

- <http://www.avtechpulse.com/medium/avrh-1/#testresults>
- <http://www.avtechpulse.com/medium/avrh-2/#testresults>
- <http://www.avtechpulse.com/medium/avrh-3/#testresults>

Model ¹ :	AVRH-2-B	AVRH-3-B
Amplitude (to R ≥ 10 kΩ):	< 20 to 2000 Volts	< 30 to 3000 Volts
Rise / fall times (20%-80%) ² :	≤ 80 ns	≤ 100 ns
Pulse width (FWHM):	200 ns to 2.5 us	
PRF:	Internal trigger: 1 Hz to 1 kHz. External trigger: 0 Hz to 1 kHz.	
Polarity ³ :	Positive or negative or both (specify)	
GPIB and RS-232 control ¹ :	Yes (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.	
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 ⁴ .	
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. In the external trigger mode, the pulse width may be set by the instrument, or it may be set to track the input pulse width.	
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	
Gated operation:	Synchronous or asynchronous, active high or low, switchable. Suppresses triggering when active.	
Connectors:	Out: SHV ^{5,6} Trig, Sync, Gate: BNC	
Power requirements:	100 - 240 Volts, 50 - 60 Hz	
Dimensions (H x W x D):	100 mm x 430 mm x 375 mm (3.9" x 17" x 14.8")	
Chassis material:	cast aluminum frame and handles, blue vinyl on aluminum cover plates	
Mounting:	Any	
Temperature range:	+5°C to + 40°C	

- 1) Provides IEEE-488.2 GPIB and RS-232 control of amplitude, pulse width, polarity, PRF and delay. (See <http://www.avtechpulse.com/gpib> for details).
- 2) For output coaxial cable lengths of less than 3 feet / 1 meter. Longer cable lengths will degrade the rise and fall times.
- 3) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity option.
- 4) 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.

- 5) MHV or HN output connectors can also be provided. To specify, suffix the model number with -MHV or -HN as required.
- 6) An adapter kit, consisting of an SHV PLUG to MHV FEMALE adapter and an MHV MALE to BNC FEMALE adapter, is available. Add the suffix -ADPT1 to the model number to order this kit.



AVRH-3-B

Use the "Pick the Perfect Pulser" parametric search engine at <http://www.avtechpulse.com/pick> to find the best pulser for your application!