



- Amplitudes to 50, 100, 200, 250, or 400 Volts
- IEEE-488.2 GPIB and RS-232 interfaces
- Optional ethernet port for VXI-11.3 support
- 10 and 15 ns rise and fall times
- Pulse widths variable from 0.1 to 100 us
- PRF to 10 kHz or 100 kHz
- Peak power to 3.2 kW, average power to 50W & 100 W
- For time-of-flight and many other applications

The AVR models are high-voltage pulse generators capable of driving 50Ω (or higher) loads and operating over a wide pulse width range. The instruments include IEEE-488.2 GPIB and RS-232 interfaces. For diode loads, these models can be used to provide up to 1, 2, 4, 5 or 8 Amps of pulsed current if the diode is connected in series with 50Ω. All models operate over a wide pulse width range of 100 ns to 100 us.

Model AVR-1A-B provides amplitudes of up to 50 Volts with rise times of 10 ns. The pulse repetition frequency (PRF) is variable from 1 Hz to 100 kHz, provides average output powers up to 25 Watts and a maximum duty cycle of 50%.

Models AVR-2A-B and AVR-2B-B provide up to 100 Volts with rise times of 10 ns, and repetition rates up to 100 kHz. These models provide average output powers up to 50 and 100 Watts with maximum duty cycles of 25 and 50%, respectively.

The AVR-3-B provides up to 200 Volts with rise times of 10 ns. The PRF is variable from 1 Hz to 10 kHz. This model will provide peak output power of 800 Watts and average outputs of 16 Watts (i.e. 2% maximum duty cycle).

The AVR-3HE-B is similar to the AVR-3-B, but offers higher maximum PRF (to 100 kHz), higher duty cycles (to 10%), and a maximum average output power of 80 Watts.

The AVR-3HF-B offers higher amplitudes (up to 250V), at duty cycles to 4% and maximum average output power of 50 Watts.

The AVR-4-B provides up to 400 Volts out with rise times of 15 ns, and pulse widths variable from 100 ns to 100 us. The PRF is variable from 1 Hz to 10 kHz. This model will provide peak output power of 3.2 kW and average output power of 16 Watts (i.e. 0.5% maximum duty cycle).

The MOSFET 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 five seconds if an average power overload exists. The AVR-3-B output stage will source up to 4A, and will automatically shut down if the load current exceeds 4.8A, approximately. Similarly, the AVR-3HF-B will supply 5A and shut down at 6A, and the AVR-4-B will supply up to 8A and shut down at 10A.

Aside from the internal clock, these instruments 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 scope triggering. A gate input is also provided.

All models include a complete computer control interface (see <http://www.avtechpulse.com/gpib>). 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.

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. See <http://www.avtechpulse.com/options/vxi>.

All models are available with positive or negative outputs. A dual-polarity option is also available. The polarity must be specified when ordering, by adding the suffix “-P”, “-N”, or “-PN” to the model number. The output polarity of units with the -PN dual-polarity option can be controlled by the front-panel settings, or by computer commands.

All models are available with a DC-voltage-controlled output amplitude option (0 to +10 V). All models require 100 - 240 Volts, 50 - 60 Hz, and are mounted in a rugged all-metal 4” x 17” x 15” chassis.

LabView drivers for these instruments are available for download at <http://www.avtechpulse.com/labview>.

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

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

- <http://www.avtechpulse.com/medium/avr-2a/#testresults>
- <http://www.avtechpulse.com/medium/avr-2b/#testresults>
- <http://www.avtechpulse.com/medium/avr-3/#testresults>
- <http://www.avtechpulse.com/medium/avr-3hf/#testresults>
- <http://www.avtechpulse.com/medium/avr-4/#testresults>

For higher-voltage applications, Avtech also offers the AVR-5B (500V), AVR-7B (700V), and AVR-8A (1000V) families.



SPECIFICATIONS

AVR-1, -2, -3 & -4 SERIES

Model ¹ :	AVR-1A-B	AVR-2A-B	AVR-2B-B	AVR-3-B	AVR-3HE-B	AVR-3HF-B	AVR-4-B
Amplitude ^{2,3} : ($R_{LOAD} \geq 50 \text{ Ohms}$)	2.5 to 50 V	5 to 100 V		10 to 200 V	10 to 200 V	10 to 250 V	20 to 400 V
Rise & fall times (20%-80%):	$\leq 10 \text{ ns}$						$\leq 15 \text{ ns}$
Pulse width (FWHM):	100 ns to 100 μs			50 ns to 100 μs	100 ns to 100 μs		
Maximum PRF:	100 kHz			10 kHz	100 kHz	100 kHz	10 kHz
Duty cycle (max):	50%	25%	50%	2%	10%	4%	0.5%
Max. average power out:	25 Watts	50 Watts	100 Watts	16 Watts	80 Watts	50 Watts	16 Watts
Polarity ⁴ :	Positive or negative or both (specify)						
Output Impedance:	1.5 Ω , approximately						
Propagation delay:	$\leq 150 \text{ ns}$ (Ext trig in to pulse out)						
Jitter:	$\pm 100 \text{ ps} \pm 0.03\%$ 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. 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.						
Connectors:	Out, Trig, Sync, Gate: BNC						
GPIB & RS-232 control ¹ :	Standard feature on all -B units.						
LabView drivers:	Available for download at http://www.avtechpulse.com/labview .						
Ethernet port, for remote control using VXI-11.3, ssh, telnet, & web:	Optional ⁵ . 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 $\pm 1\text{V}$ or $\pm 2 \text{ ns}$) after 10 minute warmup. For high-accuracy applications requiring traceable calibration, verify the output parameters with a calibrated oscilloscope.						
Power requirements:	100 - 240 Volts, 50 - 60 Hz						
Dimensions:	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. Add -R5 to the model number to add a rack-mount kit.						
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 10% of full-scale, best results will be obtained by setting the amplitude near full-scale and using external attenuators on the output.

3) For analog electronic control (0 to +10V) of amplitude, suffix the

model number with -EA. These units also include the standard front-panel controls.

4) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative), or -PN for dual polarity option.

5) Add the suffix -VXI to the model number to specify the Ethernet port.



AVR-3-B-PN