AVTECH

GPIB
IEEE-488

AVR-GHV SERIES

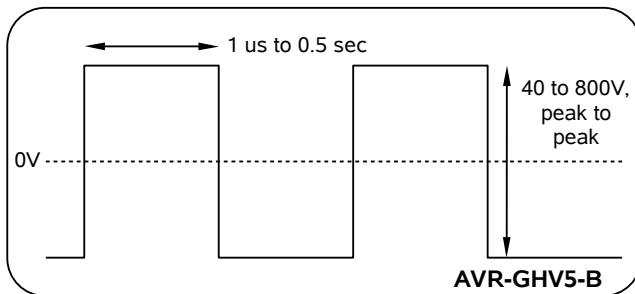### 400, 500 & 800 VOLT
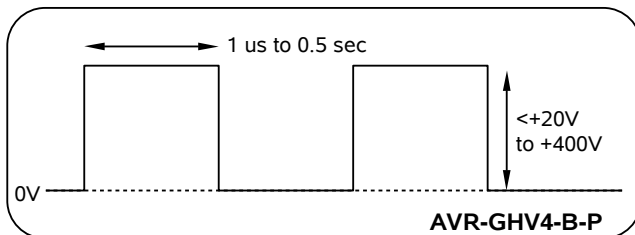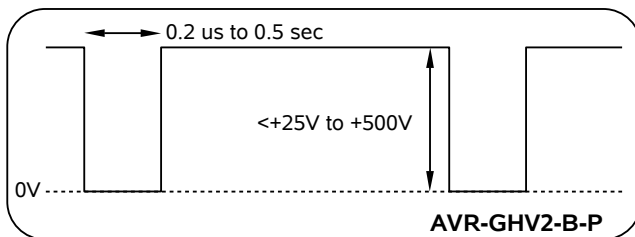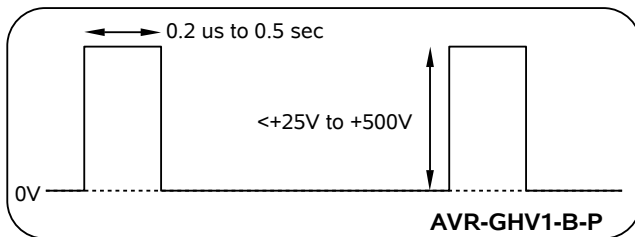### TIME-OF-FLIGHT BLANKING
AND GATING GENERATORS

- ◆ Amplitudes to ±500 Volts
- ◆ Pulse widths from 200 ns to 0.5 sec
- ◆ Rise, fall times as low as 30 ns
- ◆ PRF to 100 kHz
- ◆ Adaptable technology - easily customized
- ◆ Variety of pulsing styles (bipolar, inverted, etc)
- ◆ IEEE-488.2 GPIB / RS-232 standard
- ◆ Ethernet optional

0.2 us to 0.5 sec
<+25V to +500V
0V
AVR-GHV1-B-P

0.2 us to 0.5 sec
<+25V to +500V
0V
AVR-GHV2-B-P

1 us to 0.5 sec
<+20V to +400V
0V
AVR-GHV4-B-P

1 us to 0.5 sec
40 to 800V, peak to peak
0V
AVR-GHV5-B

0.2 us to 0.5 sec
< +25V to +500V
0V
< -25V to -500V
AVR-GHV6-B
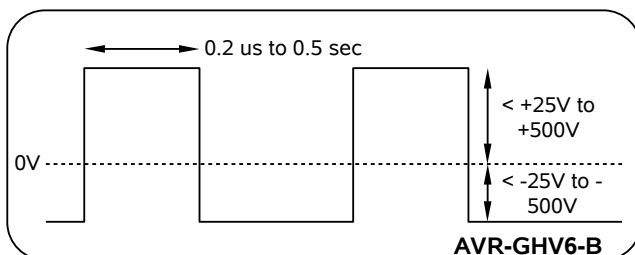
The AVR-GHV series is specifically designed for gating and beam blanking applications requiring amplitudes up to ±500V, pulse widths from ≤ 1 us to 0.5 seconds and duty cycles as high as 80%. This series is designed to drive high impedance loads such as microchannel plates, grids and beam deflection plates. The versatile AVR-GHV technology can be adapted to provide a wide variety of waveforms (e.g., higher voltages, dual outputs, alternating pulse polarity, capacitive loads, etc). Contact Avtech if your particular requirement is not covered by a standard model.

Model AVR-GHV1-B provides up to 500 Volts out, pulse widths from 200 ns to 0.5 sec, PRF to 1 kHz and duty cycles to 80%. Positive, negative, and dual polarity units are available. (Dual polarity units generate one polarity at a time. The polarity can be switched from the front panel, or by computer command. Contact Avtech if you require polarity that alternates with every pulse, or dual outputs.)

Model AVR-GHV2-B provides an output which is the logical complement of the AVR-GHV1-B output - that is, the output potential is high (and variable) during the inter-pulse interval, and zero during the pulse.

Model AVR-GHV4-B is similar to the AVR-GHV1-B, but has a much higher maximum PRF (100 kHz), with a slightly lower maximum amplitude (400V).

Model AVR-GHV5-B offers a bipolar output. The peak-to-peak output amplitude is variable from < 40 to 800V, and swings between negative and positive voltage levels of approximately equal magnitude. The pulse repetition frequency is variable from 1 Hz to 50 kHz.

Model AVR-GHV6-B swings from a negative adjustable voltage (between pulses) to a positive adjustable voltage (during pulsers). The two voltage levels are independently adjustable from <25V to 500V in magnitude.

For all models, the pulse timing may be set in terms of pulse width or duty cycle, as desired. The pulse repetition frequency is variable using the internal clock oscillator. 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. A manual push button is provided for one-shot operation. Models are protected from overload conditions (such as a short-circuited load) by an automatic control feature which limits the output power for as long as the overload condition persists. All models require 100 - 240V, 50 - 60 Hz prime power.

The output impedance of all models (i.e., the internal resistance in series with the output) is 50Ω, providing back-matching of systems that use coaxial cable on the output. This impedance will absorb transmission line reflections. It also provides passive short-circuit protection, in addition to the active short-circuit protection sensing circuits.

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 back-lit LCD displays the output amplitude, polarity, frequency, pulse width or duty cycle as appropriate, and delay. To allow easy integration into automated test systems, the programming command set is based on the SCPI standard. An Ethernet port is included (see http://www.avtechpulse.com/options/vxi for details).

For operation at lower voltages, see the AVR-G series.

Model:	AVR-GHV1-B[1]	AVR-GHV2-B[1]	AVR-GHV4-B[1]	AVR-GHV5-B[1]	AVR-GHV6-B[1]
Amplitude:	<25 to 500 Volts	<25 to 500 Volts	<20 to 400 Volts	<40 to 800 Volts	<25 to 500 Volts
Number of adjustable voltages:	1 (V_{SET})	1 (V_{SET})	1 (V_{SET})	1 (V_{SET})	2 (V_{SETPOS}, V_{SETNEG})
Waveform style (in terms of the set amplitude):	At V_{SET} during pulse, zero between pulses.	At V_{SET} between pulses, zero during pulses.	At V_{SET} during pulse, zero between pulses.	At $+V_{SET}/2$ during pulse, $-V_{SET}/2$ between pulses.	At $+V_{SETPOS}$ during pulse, $-V_{SETNEG}$ between pulses.
Pulse width (FWHM)[2]:	200 ns to 0.5 sec		1 us to 0.5 sec		200 ns to 0.5 sec
Load impedance:	≥ 100 kΩ				
Output impedance:	50 Ω (i.e., internal resistance in series with the output).				
Rise time (20%-80%)[5]:	≤ 40 ns	≤ 40 ns	≤ 30 ns	≤ 100 ns	≤ 100 ns
Fall time (80%-20%)[5]:	≤ 40 ns	≤ 40 ns	≤ 30 ns	≤ 100 ns	≤ 100 ns
PRF:	1 Hz to 1 kHz		1 Hz to 100 kHz	1 Hz to 50 kHz	1 Hz to 10 kHz
Duty cycle:	0 - 80 %				
Polarity[3]:	V_{SET} may be positive or negative or switchable (specify)			Bipolar waveform (standard)	
GPIB and 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.				
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[6].				
Propagation delay:	≤ 250 ns (Ext trig in to pulse out)				
Jitter (Ext trig in to pulse out):	± 100 ps ± 0.03% of sync delay				
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 Out: 0 to 1.0 seconds, for all trigger modes (including external trigger).				
Sync output:	+3 Volts, 100 ns, will drive 50 Ohm loads				
Gate input:	Synchronous or asynchronous, active high or low, switchable. Suppresses triggering when active.				
Connectors (OUT)[4]:	Type N				
Connectors (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. Add the suffix -R5 to the model number to include a rack-mount kit.				
Temperature range:	+5°C to +40°C				

1) -B suffix indicates IEEE-488.2 GPIB and RS-232 control of amplitude, pulse width or duty cycle (as appropriate), pulse repetition frequency, and delay (See http://www.avtechpulse.com/gpib).
2) When triggered externally, the pulse width can be set by the pulse instrument controls, or it may be set to track the input trigger pulse width.
3) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity option (controlled by a two-position switch which controls the polarity of the signal output port). Keypad polarity control on -B units.
4) HV, MHV or HN output connectors can also be provided. To specify, suffix the model number by -SHV, -MHV or -HN as required.
5) Valid when the load is connected with zero cable length (for instance, on a binding post adapter). The rise and fall times will degrade for non-zero

lengths of cable, due to the product of the 50 Ohm output impedance and the cable capacitance. The maximum cable length for operation (with degraded rise and fall times) is 2 meters (6 feet). If your application requires longer cable lengths, contact Avtech for appropriate modifications or applications assistance.
6) 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.

AVR-GHV1-B