



AVRL-3-B output, -200V, 200 ns PW

- ◆ Amplitudes to -200 or -700 Volts
- ◆ Pulse widths as low as 5 ns, as high as 1 ms
- ◆ Rise times as fast as 2 ns
- ◆ For microchannel plate image intensifiers
- ◆ IEEE-488.2 GPIB and RS-232 interfaces

The AVRL series was specifically designed for gating microchannel plate image intensifiers, such as the ITT F4144 and F4129. This series provides output pulse widths covering the range of 5 ns to 1 ms and output amplitudes of 200 Volts and 700 Volts. The versatile AVRL technology can be readily adapted to provide a wide range of output waveforms. Contact Avtech if your plate-driving requirement is not covered by the standard models.

The AVRL-1 models generate fixed-amplitude -200V pulses, having pulse widths adjustable from 5 to 100 ns, with 2 ns rise times. The maximum pulse repetition frequency (PRF) is 5 kHz. The AVRL-1 models require a 50  $\Omega$  termination

For applications requiring much higher pulse repetition rates, the AVRL-3 family operates at PRFs as high as 1 MHz, and provides a fixed amplitude of -200 Volts, with a pulse width variable from 10 to 200 ns and a rise time of 5 ns. This family is intended for driving high impedance loads ( $\geq 1$  k $\Omega$ ).

The AVRL-4 models features rise and fall times of 2 ns, with a pulse width range of 0.1 to 5  $\mu$ s, and a maximum pulse repetition frequency to 1 kHz. AVRL-4 models require a 50  $\Omega$  termination.

For applications requiring still wider pulse width ranges, the AVRL-5 models cover the pulse width range of 20ns to 1ms, with -200V amplitudes and maximum PRFs of 1 kHz. This family is intended for driving high impedance loads ( $\geq 10$  k $\Omega$ ).

Lastly, the AVRL-7 family was designed for applications requiring voltages in the range of -200 to -700 Volts (with adjustable amplitude) and pulse widths in the range of 100 ns to 1 ms, for loads of 100 k $\Omega$  and higher.

All models are available with an optional DC offset feature which allows an externally applied DC offset of 0 to  $\pm 50$  Volts to be superimposed on the output pulse.

A typical connection of an AVRL series pulse generator to a grounded MCP input device is shown on the following page. This configuration is particularly suitable for pulse generators requiring a 50 Ohm termination. The DC blocking capacitor  $C_B$  is necessary if a DC offset is employed. (See ITT technical

note E23 for guidance on connecting pulse generators to MCP image intensifiers).

Instruments with the -B suffix 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 freely available for download at <http://www.avtechpulse.com/labview>.

The -C versions provide output pulse parameters similar to those of the -B models, but do not include the GPIB or RS-232 interfaces (i.e. no computer control or LCD display). The output parameters are controlled by front-panel range switches and one-turn controls. All models require 100-240V, 50-60 Hz AC power.

A delay control and a sync output are provided on all models for oscilloscope triggering purposes. The units can also be triggered externally using a TTL-level pulse.

Avtech has a number of other high-voltage pulse generators families which may also be suitable for plate-driving applications. Models in the AVR-G and AVR-GHV families are general-purpose adjustable-amplitude pulsers for high-impedance loads, at amplitudes up to 800V, but with generally slower rise and fall times than the AVRL models. Models in the AVR-3, AVR-4, AVR-5, AVR-7B, and AVR-8A families are also general-purpose high-voltage adjustable-amplitude models, capable of driving both high-impedance and 50 Ohm loads. See the complete list of medium and high voltage models at:

<http://www.avtechpulse.com/medium>

A parametric search engine is also available to assist you in selecting the most appropriate model, at:

<http://www.avtechpulse.com/pick>

Contact Avtech engineers directly ([info@avtechpulse.com](mailto:info@avtechpulse.com)) with your special requirements!



AVRL-3-B

Model:	AVRL-1-C <sup>1</sup> AVRL-1-B <sup>2</sup>	AVRL-3-C <sup>1</sup> AVRL-3-B <sup>2</sup>	AVRL-4-C <sup>1</sup> AVRL-4-B <sup>2</sup>	AVRL-5-C <sup>1</sup> AVRL-5-B <sup>2</sup>	AVRL-7-C <sup>1</sup> AVRL-7-B <sup>2</sup>
Amplitude:	-200V, fixed <sup>9</sup>	-200V, fixed	-200V, fixed	-200V, fixed	-200V to -700V, adjustable
Pulse width (FWHM):	5 to 100 ns	10 to 200 ns	0.1 to 5 $\mu$ s	20 ns to 1 ms	100 ns to 1 ms
Rise times (20%-80%) <sup>3</sup> :	2 ns	5 ns	2 ns	5 ns, PW <100 ns 10 ns, PW >100 ns	30 ns
Fall times (80%-20%) <sup>3</sup> :	5 ns				
Maximum PRF:	5 kHz <sup>9</sup>	1 MHz	1 kHz	1 kHz	1 kHz
Required load impedance <sup>4</sup> :	50 $\Omega$	$\geq 1$ k $\Omega$	50 $\Omega$	$\geq 10$ k $\Omega$	$\geq 100$ k $\Omega$
Maximum load capacitance <sup>5</sup> :	36 pF				
Maximum duty cycle:	N/A	20%	N/A	20%	20%
Related product family <sup>8</sup> :	AVL-2-B	N/A	AVR-S3-B	AVR-3-B	AVR-7B-B
Front-panel controls:	-B units: keypad and adjust knob, and GPIB / RS-232 control -C units: decade range switches & one-turn dials for PRF, pulse width & delay; one-turn dial for amplitude.				
GPIB and RS-232 control <sup>2</sup> :	Standard on -B units. Not available on -C.				
LabView drivers:	-B units only: check <a href="http://www.avtechpulse.com/labview">http://www.avtechpulse.com/labview</a> for availability and downloads				
Propagation delay: (Ext trig in to pulse out)	$\leq 250$ ns	$\leq 150$ ns			
Jitter:	$\pm 100$ ps $\pm 0.03\%$ of sync delay, Ext trig in to pulse out				
DC offset or bias insertion <sup>4,6</sup> :	Option available. Apply required DC offset or bias in the range of $\pm 50$ Volts, (1 mA max) to back panel solder terminal.				
Trigger required:	External trigger mode: +5 Volts, 50 ns or wider (TTL)				
Variable sync delay: (Sync out to pulse out)	-C units: 0 to $\pm 1$ $\mu$ s -B units: 0 to $\pm 1$ s				
Sync output:	+3 Volts, 200 ns, will drive 50 Ohm loads				
Gate input: (-B units only)	Active high or low, switchable. Suppresses triggering when active.				
Connectors, out:	BNC			Type N <sup>7</sup>	
Connectors, other:	Out, Trig, Sync, Gate (-B only): BNC				
Dimensions (H x W x D):	100 mm x 430 mm x 375 mm (3.9" x 17" x 14.8")				
Power requirements:	100 - 240 Volts, 50 - 60 Hz				
Chassis material:	Cast aluminum frame & handles, blue vinyl on aluminum cover plates				
Mounting:	Any				
Temperature range:	$+5^{\circ}\text{C}$ to $+40^{\circ}\text{C}$				

- 1) -C suffix indicates stand-alone lab instrument with internal clock and line powering. No suffix indicates miniature module requiring DC power and external trigger. (See <http://www.avtechpulse.com/formats> for details of the four basic instrument formats).
- 2) -B suffix indicates IEEE-488.2 GPIB and RS-232 control of amplitude, pulse width, PRF and delay (See <http://www.avtechpulse.com/gpib>).
- 3) With a load capacitance of 0 pF, including cabling.
- 4) This termination must be placed across the input to image intensifier. If a

- DC offset is employed a DC block capacitor must be placed in series with the termination.
- 5) Including cabling. Contact Avtech if your load is more capacitive than this.
- 6) To specify the DC offset option, add -OS to the model number.
- 7) Other connectors can be provided upon request.
- 8) These AVRL models are based on the related models noted in the table.
- 9) The amplitude may fall somewhat (10%-20%) for PRFs above 2 kHz.

