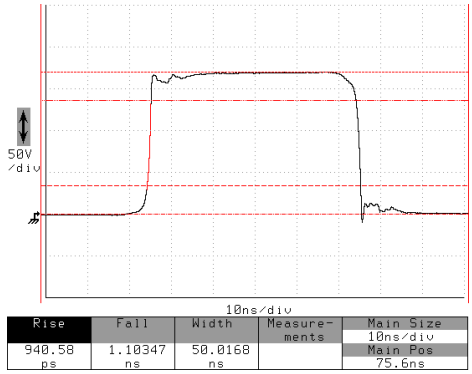
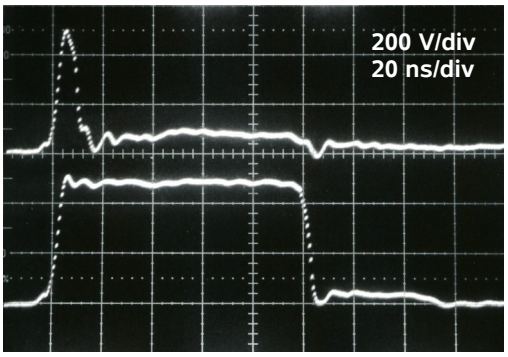
AVL SERIES

100, 160, 240, 450 VOLT
1.5 – 5 NS RISE TIME
PULSE GENERATORS



AVL-2A-W-B, +160V / 50 ns



AVL-5-B (Min and max pulse width)

- Amplitudes to 450 Volts
- Rise times in the range of 1.5 - 5 ns
- Pulse widths to 100 or 400 ns
- Double pulse option
- IEEE-488.2 GPIB and RS-232 control
- Ethernet port for VXI-11.3 support

The AVL series provides high amplitude (to 450V) pulse outputs with rise times as low as 1.5 ns and fall times of 2 ns, pulse repetition frequencies as high as 50 kHz, and maximum pulse widths variable from 3 to 400 ns.

The AVL-AV-1-W-B provides peak amplitudes of 100V with pulse widths variable from 5 to 400 ns. The rise time is < 2 ns, the fall time is < 3 ns, and the maximum pulse repetition frequency (PRF) is 50 kHz.

The AVL-2A-W-B provides peak amplitudes of 160 Volts with pulse widths variable from 3 to 400 ns. Rise times are 2 ns, with PRFs to 20 kHz.

The AVL-2D-B operates to 240V, with pulse widths of 10 to 100 ns, rise times of 1.5 ns, and fall times of 2 ns. The maximum PRF is 20 kHz.

The AVL-5 family provides output amplitudes variable from up to 450 Volts, with pulse widths variable from 8 to 100 ns, with 5 ns rise and fall times, and repetition rates to 2 kHz. (The AVL-5 has a small “back-porch” transient which is < 15% of the set amplitude, and may last as long as 150 ns after the rising edge. It is most noticeable at narrow pulse width settings. See the waveform photo above for an example.) The rise time can be reduced to 2.5 ns with the -TR option, with a slightly reduction in the maximum amplitude to 400V.

Either output polarity or optional dual output polarity can be provided. The output polarity of dual-polarity units can be switched from the front panel or by computer command.

AVL-5 models are available with a double-pulsing option, to permit the generation of closely-spaced pulse doublets. The first and second pulses in the doublet have independently variable amplitude and pulse width. Both must have the same polarity.

All instruments with the -B suffix include a complete computer control interface. This provides GPIB and RS-232 computer-control, as well as front panel keypad and adjust knob control of the output pulse parameters. (See http://www.avtechpulse.com/gpib for details.) 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 online 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. Please see http://www.avtechpulse.com/options/vxi for details.

All models may be triggered externally using a TTL-level pulse. All models include a delay control and sync output for oscilloscope triggering purposes.

A DC offset or bias insertion option is available. Units with this option include a circuit similar to the AVX-TB (see http://www.avtechpulse.com/bias) bias tee at the output. The required DC offset is applied directly to rear panel solder terminals. AVL units are also available with a monitor output option that provides an attenuated (20 dB or ÷10) coincident replica of the main output pulse.

All models require 100-240V, 50-60 Hz AC power.

Typical output waveforms from shipped units are available online:

http://www.avtechpulse.com/medium/avl-av-1-w/#testresults
http://www.avtechpulse.com/medium/avl-2a-w/#testresults
http://www.avtechpulse.com/medium/avl-2d/#testresults
http://www.avtechpulse.com/medium/avl-5/#testresults

For 100V applications, the AVR-E3 and AVR-E3A series should also be considered:

http://www.avtechpulse.com/speed/avr-e3/
http://www.avtechpulse.com/speed/avr-e3a/

For 200V applications, consider the AVIR-4D series:

http://www.avtechpulse.com/medium/avir-4d/

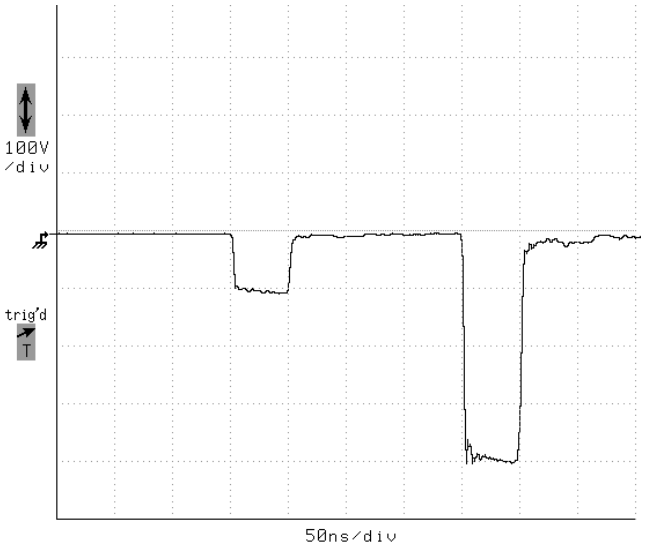
SPECIFICATIONS

AVL SERIES

Model[1]:	AVL-AV-1-W-B	AVL-2A-W-B	AVL-2D-B	AVL-5-B	AVL-5-B-TR
Maximum amplitude[2]: (50Ω load required[7])	100 V	160 V	240 V	450 V	400 V
Rise time (20%-80%):	≤ 2 ns	≤ 2 ns	≤ 1.5 ns	≤ 5 ns	≤ 2.5 ns
Fall time (80%-20%):	≤ 3 ns	≤ 3 ns	≤ 2 ns	≤ 5 ns	
Pulse width (FWHM):	5 - 400 ns	3 - 400 ns	10 - 100 ns	8 - 100 ns	
PRF:	0 to 50 kHz	0 to 20 kHz		0 to 2 kHz	
Polarity[3]:	Positive or negative or both (specify)				
Jitter:	± 100 ps ± 0.03% of sync delay (Ext trig in to pulse out)				
GPIB & 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 ± 4% (± 2 ns or ± 4% of max. amplitude) after 10 minute warmup. For high-accuracy applications requiring traceable calibration, verify the output parameters with a calibrated oscilloscope[9].				
DC offset or bias insertion[4]:	Option available. Apply required DC offset or bias in the range of ± 50 Volts (250 mA max) to back panel solder terminal.				
Standard 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.				
Double-trigger mode:	Optional[8] on AVL-5 models. Adds the ability to generate pulse doublets, instead of single pulses. The first and second pulses in the doublet have independently variable amplitude and pulse width. Both must have the same polarity. The second pulse will be delayed relative to the first by a minimum of 200 ns, and a maximum of 1 second (not to exceed 50% of the period). This delay is adjustable in the "Single External Trigger" and "Single External Trigger" modes. The delay is determined by the trigger signals in the "Double External Trigger mode". See the sample waveforms on the next page.				
Variable delay[5]:	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				
Propagation delay:	≤ 350 ns (Ext trig in to pulse out)				
Gate input:	Synchronous. Active high or low, switchable. Suppresses triggering when active.				
Monitor output option[6]:	Provides a 20 dB attenuated coincident replica of the main output				
Connectors:	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 & handles, blue vinyl on aluminum cover plates				
Mounting:	Any				
Temperature range:	+5°C to +40°C				

1) -B suffix indicates IEEE-488.2 GPIB and RS-232 control of amplitude, pulse width, PRF and delay (see http://www.avtechpulse.com/gpib).
2) For operation at amplitudes of less than 20% of full-scale, best results will be obtained by setting the amplitude near full-scale and using external attenuators on the output.
3) Indicate desired polarity by suffixing model number with -P or -N (i.e. positive or negative) or -PN for dual polarity option. Polarity reversal is achieved via keypad or computer control.
4) For DC offset option suffix model number with -OS.
5) Delay must be less than the period (1 / PRF).
6) For monitor option add suffix -M. The monitor, when used, will load down the main output slightly, causing a 10% drop in the maximum main output amplitude.
7) A 50 Ohm load is required. Other loads may damage the instrument. Consult Avtech (info@avtechpulse.com) if you need to drive other load impedances.
8) Add the -DPF model number suffix to specify the double pulse option.
9) 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.

-DPF DOUBLE PULSE OPTION



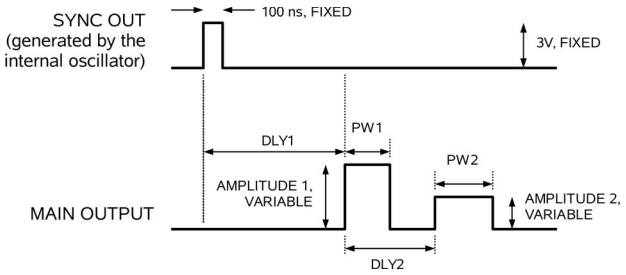
The -DPF option adds the ability to generate pulse doublets, instead of single pulses. The first and second pulses in the doublet have independently variable amplitude and pulse width. Both must have the same polarity. (For dual-polarity models, the polarity setting will affect both pulses in the doublet.)

In the internal trigger mode, the delay of the first pulse is adjustable over a range of 0 to 1.0 seconds, relative to the SYNC output. The second pulse is delayed relative to the first by an adjustable setting of 200 ns to 1.0 seconds (not to exceed 50% of the period). The separation resolution varies, but it is always better than 0.15% of (programmed separation + 20 ns).

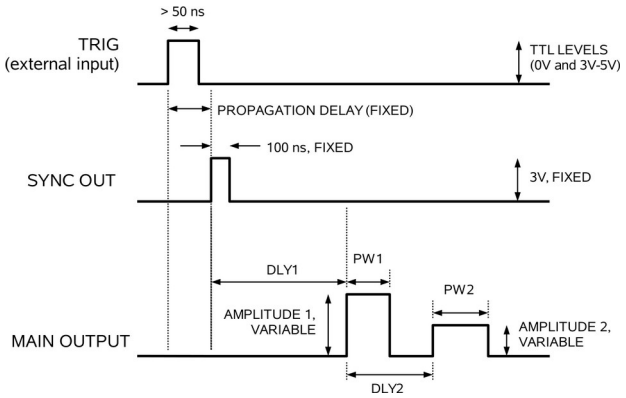
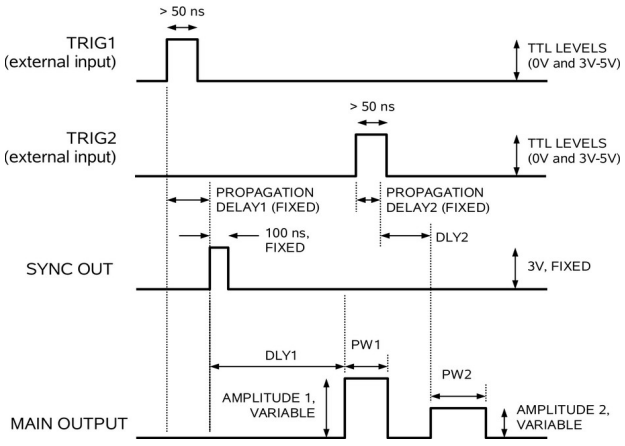
Two external trigger modes are provided. In the “Single External Trigger” mode, external trigger pulses are applied to one connector. Each external pulse triggers a pulse doublet, after a short fixed propagation delay (approximately 200 ns). The doublet amplitudes, pulse widths, and delays are controlled in the same manner as the internal trigger mode.

The “Double External Trigger” mode uses two external trigger connectors. A pulse on the first trigger connector (TRIG1) generates the first output pulse after a short fixed propagation delay and a variable delay (PROP1 + DLY1), with amplitude AMP1 and pulse width PW1. A pulse on the second trigger connector (TRIG2) generates the second output pulse after a short fixed propagation delay and a variable delay (PROP2 + DLY2), with amplitude AMP2 and pulse width PW2. As with the other modes, both output pulses appear on the same output connector. The user must ensure that the delay between the first output pulse and the second pulse is between 150 ns to 1s (and less than 50% of the period). The timing between the two pulses within the doublet is controlled by the DLY1 and DLY2 settings *and* the timing between the trigger pulses.

Internal Trigger mode waveforms:



Single External Trigger mode waveforms:



Double External Trigger mode waveforms: