

The AV-108E and AV-108F series of pulsed constant current generators are designed for driving laser diodes and other low impedance loads with constant current pulses as high as 200 Amperes, pulse widths from 10 us to 10 ms and average output powers to 40 or 400 Watts.

The 40 Watt models (the AV-108E series) are entirely self-contained in a single chassis, and are powered from a standard AC line connection (100-240 Volts, 50-60 Hz). The AV-108E-1-B can generate current pulses of up to 50 Amps peak (2A average), for load voltages in the range of 0 to 20 Volts. Similarly, the AV-108E-2-B operates to 100 Amps peak (0.8A average) and 50 Volts, and the AV-108E-3-B operates to 200 Amps peak (2A average) and 20 Volts. The pulse width for these models is adjustable from 20 us to 1 ms. The AV-108E-4-B operates to 150A (0.4A average) for load voltages of up to 100V, with pulse widths from 20 to 200 us.

The high-power 400 Watt models (the AV-108F series) require an external user-supplied DC power supply in addition to standard AC power. This permits operation at higher duty cycles. The AV-108F-1-B operates to 50 Amps peak (20A average) and 20 Volts, the AV-108F-2-B operates to 100 Amps peak (8A average) and 50 Volts, and the AV-108F-3-B operates to 200 Amps peak (20A average) and 20 Volts. The higher-voltage AV-108F-4-B operates to 150A peak (4A average) into loads of up to 100V, making it ideal for testing diode arrays.

The duty cycle, peak current, and average current are related by  $I_{AVG} = I_{PEAK} \times \text{duty cycle}$ . (The duty cycle is never permitted to exceed 50%).

For the AV-108F models, the external DC power supply must be capable of supplying the necessary average current to the instrument ( $I_{AVG}$ ). The peak current is supplied by a large capacitor bank inside the pulser. The voltage from the external power supply ( $V_{DC}$ ) must be at least 2 Volts greater than the maximum expected load voltage ( $V_{LOAD}$ ). The maximum difference between  $V_{DC}$  and the maximum  $V_{LOAD}$  must also be controlled to limit the power dissipation in the instrument to 80 Watts:

$$V_{DC} - V_{LOAD} > 2 \text{ Volts (5V for the AV-108F-4-B)}$$

$$(V_{DC} - V_{LOAD}) \times I_{AVG} < 80 \text{ Watts}$$

For example, if the AV-108F-1-B is operating at maximum current (50A) and duty cycle (40%), then  $V_{DC}$  should be between 2 and 4 Volts higher than  $V_{LOAD}$ . The same range applies to the AV-108F-3-B. For the AV-108F-2-B at maximum amplitude and duty cycle,  $V_{DC}$  should be 2 to 10 Volts higher than  $V_{LOAD}$ . For the AV-108F-4-B at maximum amplitude and duty cycle,  $V_{DC}$  should be 5 to 20 Volts higher than  $V_{LOAD}$ . Protective sensors will disable the output if these conditions are violated.

These models offer two output connector arrangements: a high-average-power connector optimized for high average power, and a lower-average-power connector optimized for fast rise times. (The two output connectors are wired in parallel to the same point internally.) The high-average-power output connectors will accept 6 mm safety sockets, or 4 mm "banana" plugs. (6 mm safety sockets will have considerably higher current capability). The AV-108F models use similar connectors for the DC and ground inputs. Accessory kits with 1 meter lengths of cable with 6 mm sockets on each end, and mating 6 mm plug to M6 stud adapters are available for connecting to loads and power supplies. These

- ◆ 40 Watt and 400 Watt series (average output)
- ◆ 20 - 200 Ampere models
- ◆ IEEE-488.2 GPIB and RS-232 control
- ◆ Network control (Telnet & Web) is optional
- ◆ Pulse widths from 10 us to 10 ms
- ◆ 10 or 15 us rise times
- ◆ 20, 50, or 100 Volt compliance voltage ratings
- ◆ Current monitor output

cables introduce approximately 0.6 uH / meter of inductance, which may degrade the observed rise times. These connectors are preferred when the fastest possible rise time is not required.

The lower-average-power connector is a DB-37 female connector that will mate to Avtech AV-CLZ transmission lines (see <http://www.avtechpulse.com/transmission/av-clz1>). This output is not rated for use above 75A of average current. However, the transmission line nature of the AV-CLZ cable and its low inductance ensure that the current rise time is not noticeably degraded by the cabling. The AV-CLZ cables must be ordered as an option, or they can be ordered as separate items. Longer cable lengths are available.

All AV-108 units include a monitor output feature that provides an attenuated coincident replica of the main output current pulse ( $V_{MON} = k \times I_{OUT}$ ). The monitor is accurate within  $\pm 3\%$ .

Temperature and voltage sensors protect the output from overheating and excessively high power supply voltages. The average output power ( $P_{AVG}$ ) is also monitored, and the output is disabled if the output power is excessive.

All models include an Output On/Off function, as well as power on/off protection circuitry, to protect attached loads.

The pulse repetition frequency is variable for all models from 1 Hz to 1 kHz using the internal oscillator. A delay control and a sync output are provided for oscilloscope triggering purposes. A pushbutton is provided for one-shot operation. The units can also be triggered externally using a TTL-level pulse. When triggered externally, the output pulse width can be set to follow the input trigger pulse width ( $PW_{OUT} = PW_{IN}$ ), if desired.

Either output polarity can be provided (positive = sourcing current, negative = sinking current).

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, frequency, pulse width, and delay. (For the AV-108F models, the DC power supply must be equipped with a GPIB feature, if you wish to remotely control all aspects of the system.) To allow easy integration into automated test systems, the programming command set is based on the SCPI standard, and LabView drivers are available at <http://www.avtechpulse.com/labview>.

Some aspects of these instruments are adaptable for special applications. For instance, maximum duty cycles can be extended if the maximum load voltage rating is reduced. Contact Avtech ([info@avtechpulse.com](mailto:info@avtechpulse.com)) with your special requirement!



AV-108E-1-B Front Panel



# SPECIFICATIONS

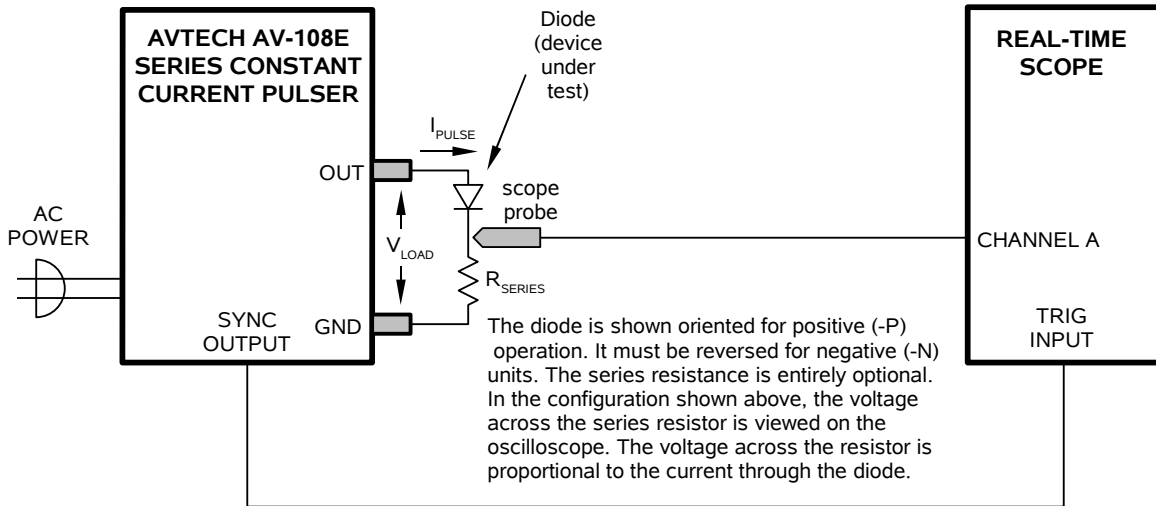
# AV-108 SERIES

Model <sup>1</sup> :	AV-108E-1-B	AV-108E-2-B	AV-108E-3-B	AV-108E-4-B	AV-108F-1-B	AV-108F-2-B	AV-108F-3-B	AV-108F-4-B
Maximum peak amplitude ( $I_{PEAK}$ ) <sup>2</sup> :	50 Amps	100 Amps	200 Amps	150 Amps	50 Amps	100 Amps	200 Amps	150 Amps
Load voltage range:	0 - 20 Volts	0 - 50 Volts	0 - 20 Volts	0 - 100 Volts	0 - 20 Volts	0 - 50 Volts	0 - 20 Volts	0 - 100 Volts
Max. average amplitude ( $I_{AVG}$ ) <sup>11</sup> :	2 Amps	0.8 Amps	2 Amps	0.4 Amps	20 Amps	8 Amps	20 Amps	4 Amps
Maximum average power out: (delivered to load)	40 Watts				400 Watts			
Pulse width (FWHM) <sup>6,12</sup> :	20 us - 1 ms			20 - 200 us	20us - 10ms	20 us - 1 ms		20 - 200 us
Rise and fall times (20%-80%) <sup>10</sup> :	10 us			15 us	10 us			15 us
PRF:	Internal trigger: 1 Hz to 1 kHz.				External trigger: 0 Hz to 1 kHz			
Output current regulation:	≤ 5% (for load voltage change from 0 Volts to maximum voltage)							
Polarity <sup>3</sup> :	Positive or negative (specify)							
Controls:	Keypad and adjust knob, and GPIB / RS-232 control							
GPIB & RS-232 control <sup>1</sup> :	Standard on -B units.							
LabView drivers:	Check <a href="http://www.avtechpulse.com/labview">http://www.avtechpulse.com/labview</a> for availability and downloads							
Internet control <sup>4</sup> :	Keypad and adjust knob, and GPIB / RS-232 control							
Burst mode:	Optional <sup>13</sup> . Generates 1-500 pulses per trigger event. See <a href="http://www.avtechpulse.com/options/br">http://www.avtechpulse.com/options/br</a> .							
Propagation delay:	≤ 1 us (Ext trig in to start of pulse out)							
Jitter:	± 100 ps ± 0.03% of sync delay (Ext trig in to pulse out)							
Trigger required:	For external trigger mode: TTL-level (low = 0V, high = 3-5V) pulse, > 50 ns in width							
Sync delay:	Variable, ± 1.0 seconds (Sync out to pulse out)							
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.							
Monitor output:	Provides an attenuated coincident replica of output current pulse.							
Connectors:	High Average Power:	6 mm plug / 4 mm sockets <sup>7</sup> (OUT yellow, GND green). Beware that the mating cables may degrade the performance <sup>12</sup> .						
	Low Average Power:	DB-37 female. Pins 1-19 = signal, pins 20-37 = ground. Suitable for mating to AV-CLZ1 type cables ( <a href="http://www.avtechpulse.com/transmission/av-clz1">http://www.avtechpulse.com/transmission/av-clz1</a> ). Not for use for average currents > 75 Amps.						
	DC Power (+ and -):	Not required			6 mm plug / 4 mm sockets <sup>7</sup> (+ red, - black)			
Power requirements, DC <sup>5</sup> :	Not required				25V, 20A (worst-case)	55V, 8A (worst-case)	25V, 20A (worst-case)	115V, 4A (worst-case)
Possible DC power supplies <sup>12</sup> :	Not required				XHR 33-33 LHP 33-33 JQE 25-20M HP 6032A SM35-45	XHR 60-18 LHP 60-18 JQE 55-10M HP 6032A SM70-22	XHR 33-33 LHP 33-33 JQE 25-20M HP 6032A SM35-45	XHR 150-7 LHP 150-7 JQE 150-7M N5750A SM120-13
Maximum internal dissipation, ( $V_{DC} - V_{LOAD}$ ) × $I_{AVG}$ :	Not applicable				80 Watts. $V_{DC}$ must be set appropriately to respect this limit.			
Optional recommended accessory kits <sup>9</sup> :	-AK5 option: Provides two 1 m cables (1 yellow, 1 green) with 6mm safety sockets <sup>8</sup> , and two 6mm safety plug to M6 stud adapters <sup>7</sup> (1 yellow, 1 green)				-AK4 option: Provides four 1 m cables (1 each of red, black, green, yellow) with 6 mm safety sockets <sup>8</sup> , and four 6 mm safety plug to M6 stud adapters <sup>7</sup> (1 each of red, black, green, yellow)			
	-AK6 option: Provides one AV-CLZ1-60 cable (60 cm length, $Z_0 = 1$ Ohm, see <a href="http://www.avtechpulse.com/transmission/av-clz1">http://www.avtechpulse.com/transmission/av-clz1</a> ) and one AV-CTLX cable-to-PCB adapter ( <a href="http://www.avtechpulse.com/accessories/av-ctlx">http://www.avtechpulse.com/accessories/av-ctlx</a> )							
Power requirements, AC:	100 - 240 Volts, 50 - 60 Hz							
Dimensions (H x W x D):	138 mm x 430 mm x 425 mm (5.5" x 17" x 16.8")							
Rack-mount kit:	Add the suffix -R6 to the model number to include 19" rack mount kit.							
Chassis material:	Anodized aluminum, with blue plastic trim							
Temperature range:	+5°C to +40°C							

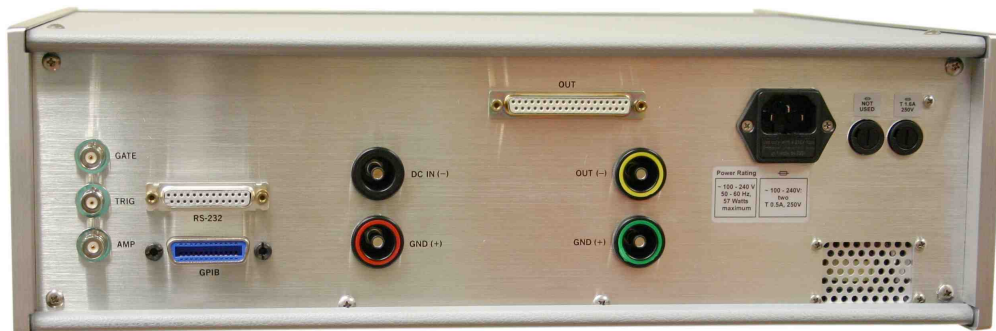
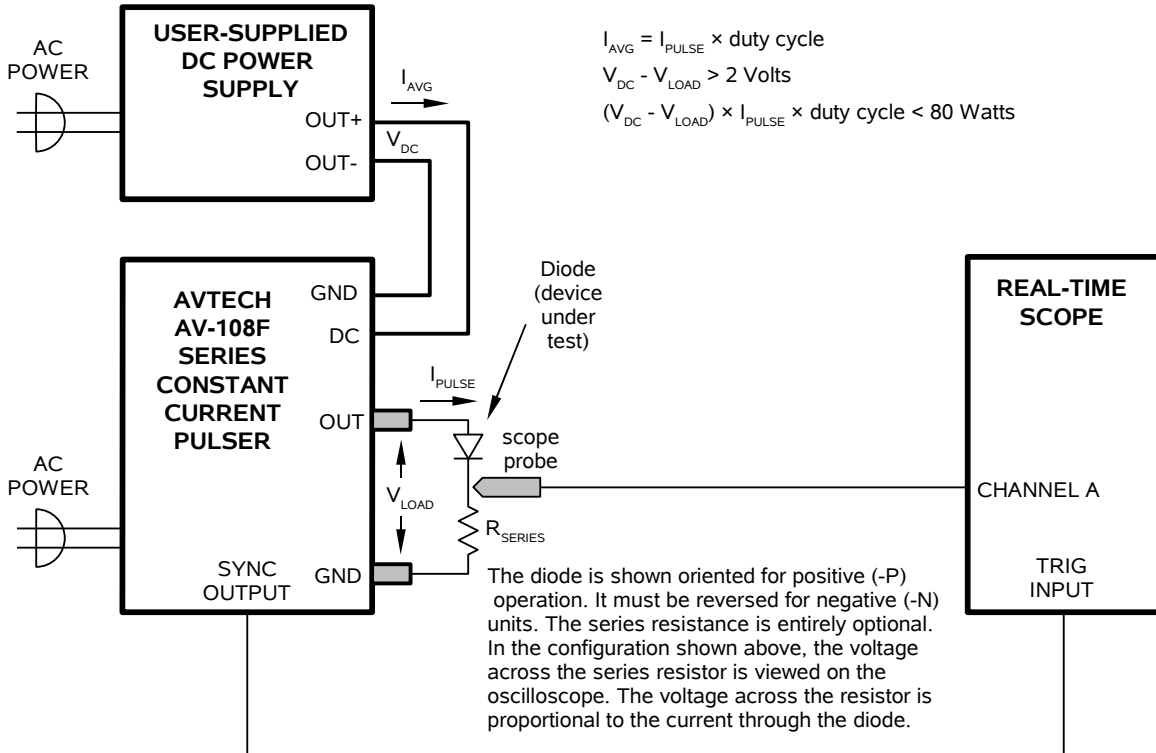
- B suffix indicates IEEE-488.2 GPIB and RS-232 control of pulse width, PRF and delay. (See <http://www.avtechpulse.com/gpiib> for details).
- The minimum useful amplitude is 3% of the maximum amplitude.
- Indicate desired polarity by suffixing the model number with -P or -N (i.e. positive or negative).
- Add the suffix -TNT to the model number to specify the Internet control (Telnet and Web) option.
- The AV-108F models require a user-supplied DC power supply. Avtech suggests Xantrex as a source of DC power supplies (<http://www.xantrex.com>). Contact Avtech for recommendations about DC power supplies appropriate for your application. The cables for connecting the external DC power supply are not included with the standard models. 6 mm plug to 6 mm plug cables are available in the optional -AK4 and -AK5 accessory kits. These may or may not be suitable for your power supply, depending on the power supply's connectors. It is possible to cut and strip the ends of the optional accessory cables, and to attach other terminations. Multi-Contact (<http://www.multi-contact.com> or <http://www.multi-contact-usa.com>) can supply 6 mm plug to cable lug cables, and other configurations.
- When externally triggered, the output pulse width can be controlled by the front panel controls (or computer command), or it can be set to follow the input pulse

- width (i.e.,  $PW_{IN} = PW_{OUT}$  mode).
- Multi-Contact (<http://www.multi-contact.com> or <http://www.multi-contact-usa.com>) ID/S6AR-N-B4S series, or similar.
- Multi-Contact (<http://www.multi-contact.com> or <http://www.multi-contact-usa.com>) SLK616-AR/BGG series, or similar.
- Add the suffix(es) -AK4, -AK5, and/or -AK6 as appropriate, to the model number to include the accessory kit(s).
- Valid for non-inductive loads installed directly on the output connectors (i.e., zero cable length) using low-inductance adapters. Lengths of cable or inductive loads may degrade the observed rise and fall times. The 6 mm cables supplied with the optional accessory kits have an inductance of 0.6 uH / meter, approximately. The rise time degradation can be estimated as  $2.2 \times D \times L / R$ , where D is the cable length, L = 0.6 uH/m, and R is the load resistance. With a 2m cable length and a 0.2Ω load, the rise time would degrade by 13.2 us. The AV-CLZ1-60 transmission lines do not display this inductive effect.
- Subject to a maximum duty cycle limit of 50%.
- Many other models are also possible. These are just suggestions.
- Add the suffix -BR to the model number to specify the burst mode option. See <http://www.avtechpulse.com/options/br> for details about this option.

## Typical Connection Arrangement for AV-108E Series



## Typical Connection Arrangement for AV-108F Series



Rear panel of a AV-108F series instrument, with the -DB37 option.