Model 609E-6

High-Voltage Power Amplifier



The Trek Model 609E-6 high-voltage DC-stable power amplifier is designed to provide precise control of bi-polar output voltages in the range of 0 to ±4 kV DC or peak AC with an output current capability of ±20 mA DC or peak AC. The Model 609E-6 can be configured as a noninverting amplifier with a fixed gain of 1000 V/V, or as an inverting or differential amplifier.

Applications for the Model 609E-6 include AC and DC biasing of electrophotographic charging rollers, electrorheological fluid research, and dielectric material characterization. Features include an all-solid-state design, a slew rate greater than 150 V/µs, a small signal-bandwidth of greater than 35 kHz, and low noise operation. The four-quadrant active output stage sinks or sources current into reactive or resistive loads throughout the output voltage range. This technique is essential for achieving the accurate output responses and high slew rates demanded by reactive loads.

The Model 609E-6 features a switch selectable current trip or current limit mode with an adjustable 0 to 20 mA current range using the Current Trip/Limit Adjust potentiometer on the front panel. When the Model 609E-6 enters a current trip condition, the high-voltage output is disabled, the Trip Status indicator will illuminate and the Trip Monitor output will provide a TTL low.

The Model 609E-6 is protected against over-voltage and over-current conditions that may be generated by active loads or by output short circuits to ground. Precision voltage and current monitors provide low-voltage output signals for monitoring purposes or for use as a feedback signal in closed-loop control systems. This makes the 609E-6 suitable for automated or computer controlled systems. A Digital Enable feature provides a connection for a remote device to turn the high voltage on and off.

The 609E-6 can also be operated on a bench top or, with optional hardware, in a standard 19-inch rack.

Output voltage range
0 to ±4 kV

Output current range
0 to ±20 mA

Precise control of bi-polar voltages

Adjustable current limit or current trip

Slew rate greater than 150 V/µs

Dynamic adjustment for optimizing AC response

Remote high-voltage ON/OFF capability

CE compliant

CONTROL WITHOUT COMPROMISE

Model 609E-6 Specifications

All specifications are with no load unless otherwise noted.

Output

Output Voltage Range
0 to ±4 kV DC or peak AC.

Output Current Range
0 to ±20 mA DC or peak AC.
(See Automatic Power Limit feature for limitations.)

Amplifier Input

Input Voltage Range
0 to ±4 V DC or peak AC.

Input Impedance
Noninverting
25 kΩ, nominal.
Inverting
50 kΩ, nominal.
Differential
50 kΩ, nominal.

Features

Amplifier Input
A three pin input connector that can be configured for inverting, noninverting, or differential amplification.

Digital Enable
An input providing a connection for a TTL compatible signal to turn on and off the high-voltage output. A TTL high (or open) turns off the high-voltage output. A TTL low turns on the high-voltage output.

Response Adjust
A graduated one-turn potentiometer used to optimize the AC response of the Model 609E-6.

Trip/Limit
A switch selects either a Current Trip mode or Current Limit mode. A graduated one-turn potentiometer is used to adjust the current trip/limit value from 0 to 20 mA.

Out Of Regulation Indicator
An indicator will illuminate when the Model 609E-6 fails to produce the required high-voltage output such as during current limit.

Trip Status
An indicator will illuminate and the Trip Monitor BNC connector will provide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level.

For more information about this or other products, contact TREK, INC.

Features (cont.)

Voltage Monitor
A buffered output provides a low-voltage replica of the high voltage output.
Scale
1/1000th of the high-voltage output signal.
DC Accuracy
Better than 0.1% of full scale.
AC Accuracy
Calibrated using a Ross Model VD 30-4.1-BD-KC-ALU high-voltage divider.
Offset Voltage
Less than ±2.5 mV.
Output Noise
Less than 2 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).
Output Impedance
0.1 Ω.

Current Monitor
A buffered output provides a low-voltage representation of the load current.
Scale
0.5 V/mA.
DC Accuracy
Better than 0.5 % of full scale.
Offset Voltage
Less than ±5 mV.
Output Noise
Less than 10 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).
Bandwidth (-3db)
DC to greater than 10 kHz.
Output Impedance
47 Ω.

Performance

DC Voltage Gain
Noninverting Configuration (V_A)
1000 V/V.
Inverting Configuration (V_B)
-1000 V/V
Differential Configuration
Function of the difference between two input signals. Represented by the equation:

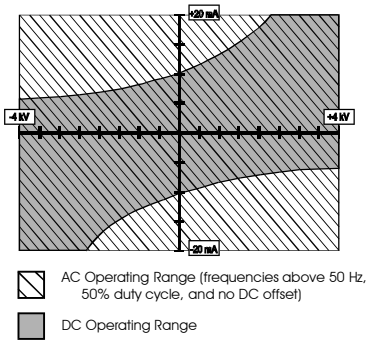
$$V_{out} = 1000\ (V_A - V_B)$$

DC Voltage Gain Accuracy
Better than 0.1% of full scale.
Offset Voltage
Less than ±1 V.
Output Noise
Less than 80 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter). Detailed information concerning the output noise is available upon request.

Performance (cont.)

Slew Rate (10% to 90%, typical)
Greater than 150 V/µs.
Large Signal Bandwidth (1% distortion)
DC to greater than 6 kHz.
Small Signal Bandwidth (-3dB)
DC to greater than 35 kHz.
Settling Time (to 1%)
Less than 150 µs for a 0 to 4 kV step.
Stability
Drift with Time
Less than 100 ppm/hr, noncumulative.
Drift with Temperature
Less than 200 ppm/°C.

Automatic Power Limit
Automatically limits the internal power dissipation to protect the Model 609E-6 from overheating. The following graph illustrates the automatic power limit output capability.



General

Dimensions
134 mm H x 432 mm W x 439 mm D
(5.25″ H x 17″ W x 17.25″ D).
Weight
13.2 kg (29 lb).
High-Voltage Output Connector
Alden high-voltage connector.
Amplifier Input
Amphenol panel mount.
Voltage/Current Monitor Connectors
BNC coaxial connectors.
Digital Enable Connector
BNC coaxial connector
Trip/Limit Connector
BNC coaxial connector.
AC Line Receptacle
Standard IEC three-prong AC line connector with integral fuse holder.
Power Requirements
Line Voltage
Factory set for one of two ranges: 90 to 127 V AC or 180 to 250 V AC, at 48 to 63 Hz (specify when ordering).
Power Consumption
220 VA, maximum.

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