

Model 609E-6

High-Voltage Power Amplifier



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/ μ s

Dynamic adjustment
for optimizing
AC response

Remote high-voltage
ON/OFF capability

CE compliant

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/ μ s, 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.

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 k Ω , nominal.

Inverting

50 k Ω , nominal.

Differential

50 k Ω , 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 under various load parameters.

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.

Features (cont.)

Voltage Monitor

A buffered output provides a low-voltage replica of the high voltage output.

Scale Factor

1/1000th of the high-voltage output signal.

DC Accuracy

Better than 0.1% of full scale.

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 Factor

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).

Slew Rate (10% to 90%, typical)

Greater than 150 V/ μ s.

Performance (cont.)

Large Signal Bandwidth (-3dB)

DC to greater than 13 kHz.

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 μ s for a 0 to 4 kV step.

Stability

Drift with Time

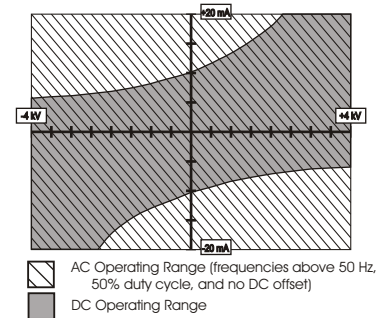
Less than 100 ppm/hr, noncumulative.

Drift with Temperature

Less than 200 ppm/ $^{\circ}$ 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

140 mm H x 432 mm W x 439 mm D
(5.5" 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 connectors.

Digital Enable Connector

BNC connector

Trip/Limit Connector

BNC 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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0840/JNC



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