



TREK, INC.

◆ High-Voltage Power Amplifiers Power Supplies ◆ HV Function Generators ◆ Transconductance Amplifiers

Trek developed the world's first all-solid-state, high-voltage (± 20 kV), high speed, DC-stable amplifier in 1980. Since then, Trek has continued to design and build high-voltage amplifiers to serve the evolving needs of semiconductor equipment manufacturers and other OEMs with demanding requirements. Trek also provides high-voltage amplifiers to the research community for a variety of applications, such as polymer & ceramic poling, vibrations damping, electrophoresis and plasma chemistry.

Trek's amplifiers, using 4-quadrant output drive are specifically designed to drive reactive as well as resistive loads with high slew rates, wide bandwidth and excellent stability. Models are now available from ± 50 V to ± 40 kV DC or peak AC. See table inside for Trek's current models.



Model 615-10 HV AC/DC Generator

Trek Model 615-10 (formerly PM04015A) is a precision high-voltage AC/DC generator and amplifier system used in a broad range of R&D and production applications which include providing operating potentials required for electrostatic charger roller devices as used in electrophotographic processes (20 kV peak-to-peak, ± 10 mA DC). Three modes of operation include AC/DC Constant Voltage, AC/DC Constants Current, and Amplifier Mode (with or without DC offset bias). The Model 615-10 provides many extra features to provide versatility in operation such as voltage limiting control and current limiting controls.

Trek Model 10/10B-HS is a DC stable, high-voltage power amplifier capable of precise control of output voltages in the range of 0 to ± 10 kV DC or peak AC with an output current range of 0 to ± 10 mA or 40 mA peak AC for 1 ms. The Model 10/10B-HS is configured as a non-inverting amplifier with a fixed gain of 1000 V/V. It features an all-solid-state design for high slew rate, wide bandwidth and low-noise operation. A remote high voltage ON/OFF feature provides a connection for a remote device to turn on or turn off the high-voltage output.



Model 10/10B-HS HV Power Amplifier



Model 2220 Piezo-Driver Amplifier

Trek's 2200 Series of High-Voltage Piezo-Driver Amplifiers breaks new ground by offering high performance and attractive pricing. The first three models of this 40 Watt series provide output voltage ranges of ± 500 V, ± 1 kV and ± 2 kV. Trek stands behind this new series with a 2-year warranty. The units are also CE marked, RoHS compliant and HALT tested.

Some Trek Models combine an amplifier with a function generator, thereby providing precision control of output frequencies, voltages and current levels. In some cases Trek Models are utilized as power supplies with the added capability to sink and source current, enabled by Trek's four-quadrant active output stage. Conventional high-voltage power supply designs normally do not provide the capability to sink current, therefore, when reactive or active loads are connected, they can not precisely regulate their outputs.

High-Voltage Power Amplifiers/Piezo Drivers Electrostatic Measurement Instruments

HIGH-VOLTAGE AMPLIFIERS " POWER SUPPLIES " HV FUNCTION GENERATORS " TRANSCONDUCTANCE AMPLIFIERS

Most models have all of the following controls and adjustments: Remote High-Voltage ON/OFF control, Dynamic Adjustments for Waveforms, Current Limit/Trip options, Output Voltage and Current Monitors

Amplifier Model	Output Voltage Range (V DC or peak AC)	Output Current (DC or peak AC)	Slew Rate (greater than)	Large Signal Bandwidth DC to greater than	Small Signal Bandwidth DC to greater than	Special Features	Applications
603	0 to ±125 V or 0 to +250V or 0 to -250 V	±40 mA DC, ±80 mA peak AC	100 V/μs	150 kHz (5% distortion)		Dual channel units available	Piezoelectric driver, MEMS
2100HF	0 to ±150 V	±300 mA	2000 V/μs (typical)	2.6 MHz (-3dB)	3 MHz (-3 dB)	Slew Rate, Large Signal Bandwidth	Piezoelectric Driving, MEMS, Electro-Optic Modulation, Ultrasonics, Dielectric Material Characterization
PZD350A	0 to ±350V (bipolar) 0 to +700 V or 0 to -700 V (unipolar)	0 to ±200 mA (bipolar) 0 to ±100 mA (unipolar)	550V/μs (bipolar) 400 V/μs (unipolar)	250 kHz (-3 dB) (bipolar) 200 kHz (-3 dB) (unipolar)	350 kHz (-3 dB) (bipolar) 250 KHz (unipolar)	Dual channel units available, improved slew rate, large signal bandwidth	Semiconductor research, piezoelectric driving
PZD350A M/S		0 to ±400 mA (bipolar) 0 to ±200 mA (unipolar)				High current	Ion beam control, piezoelectric driving
601C	0 to ±500 V, 0 to +1 kV, 0 to -1 kV	±10 mA DC, ±20 mA peak AC	50 V/μs	8 kHz (1% distortion)	30 kHz (-3 db)	Dual channel units available, low noise	Modulating electrooptics, piezoelectric driving
2205	0 to ±500 V	±40 mA DC, ±80 mA peak AC	150 V/μs	75 kHz (-3 dB)	100 kHz (-3 dB)	DC stability, wide bandwidth, full four-quadrant class AB all-solid-state output stages	Piezoelectric driving
PZD700A, -1 and -2	0 to ±700 V (bipolar) or 0 to +1.4 kV or 0 to -1.4 kV (unipolar)	0 to ±100 mA (bipolar) 0 to ±50 mA (unipolar)	380 V/μs (bipolar) 370 V/μs (unipolar)	125 kHz (-3 dB) (bipolar) 120 kHz (-3 dB) (unipolar)	200 kHz 9-3 dB)	High current	Semiconductor research, piezoelectric driving
PZD700A M/S		0 to ±200 mA (bipolar)	380 V/μs (bipolar) 370 V/μs (unipolar)	150 kHz (-3 dB) (bipolar) 125 kHz (-3 dB) (unipolar)			
2210	0 to ±1 kV	±20 mA DC, ±40 mA peak AC	150 V/μs	40 kHz (-3 dB)	100 kHz (-3 dB)	DC stability, wide bandwidth, full four-quadrant class AB all-solid-state output stages	Piezoelectric driving
677B	0 to ±2 kV	0 to ±5 mA	15 V/μs	1.2 kHz (1% distortion)	5 kHz (-3 dB)	Amplifier & Power Supply, digital display	Piezoelectric driving, electrophoresis fluids
623B	0 to ±2 kV	0 to ±40 mA	300 V/μs	10 kHz (1% distortion)	40 kHz (-3 dB)	Inverting, noninverting & differential input configurations, low noise	Precise voltage control
2220	0 to ±2 kV	±10 mA DC, ±20 mA peak AC	100 V/μs	7.5 kHz (-3 dB)	50 kHz (-3 dB)	DC stability, wide bandwidth, full four-quadrant class AB all-solid-state output stages	Piezoelectric driving, electrophoresis research
PZD2000A	0 to ±2 kV	±200 mA DC, ±400 peak AC	750 V/μs	60 kHz (-3 dB)	100 kHz (-3 dB)	High current	Dielectric material characterization
609E-6	0 to ±4 kV	0 to ±20 mA	150 V/μs	13 kHz (-3 dB) 6 kHz (1% distortion)	35 kHz (-3 dB)	Inverting, noninverting & differential input configurations	AC and DC biasing, electrorheological fluids
5/80	0 to ±5 kV	0 to ±80 mA DC	1000 V/μs	50 kHz (3% distortion)	75 kHz (-3 dB)	Precise high-voltage control with high current	Polymer & ceramic corona charging, plasma chemistry
615-3	0 to 10 kV peak-to-peak AC 0 to ±5 kV DC bias	0 to 10 mA p-p or 5 mA average (Resistive or average AC current control)	80 V/μs	5 kHz (-3 dB0) 3 kHz (1% distortion)	10 kHz (-3 dB)	Amplifier, DC supply & waveform generator	R&D, Electrophotography, Charger Roller Supply
615-10	0 to 20 kV peak-to-peak AC 0 to ±10 DC bias	0 to ±35 mA peak AC 0 to ±10 mA DC	500 V/μs	7.5 kHz (2% distortion)	20 kHz (-3 dB)	Four quadrant high voltage stage design Sine, Square or Triangle wave output	Waveform generation
610E	0 to ±1 kV or 0 to ±10 kV	0 to ±200 μA or 0 to ±2000 μA	20 V/μs	1.2 kHz (-3 dB) 600 Hz (1% distortion)	10 kHz (-3 dB)	Amplifier, DC Supply & Transconductance Controller	R&D, Electrophotography
609B-3	0 to ±10 kV	0 to ±2 mA	30 V/μs	400 Hz (1% distortion)	10 kHz (-3 dB)	Inverting, noninverting & differential input configurations, low noise	Ferroelectric characterization
10/10B-HS	0 to ±10 kV	0 to ±10 mA DC ±40 peak AC for 1 ms	700 V/μs	19.5 kHz (-3 dB) 9.5 kHz (1% distortion)	60 kHz (3 db)	Adjustable current limit or current trip, slew rate, high speed, improved bandwidth	Precision voltage and current monitors
10/40A	0 to ±10 kV	0 to ±40 mA	750 V/μs	23 kHz (-3dB); 7.5 kHz (1% distortion)	25 kHz (3 db)	Adjustable current limit or current trip, slew rate, high speed, improved bandwidth	Precision voltage and current monitors
PD07016	0 to ±10 kV	0 to ±60 mA DC ±300 peak AC for 20 μs	1000 V/μs	7.5 kHz (2% distortion)	20 kHz (-3 dB0)	Precise high-voltage control	Electrostatic deflection, electroactive polymers
20/20C	0 to ±20 kV	0 to ±20 mA DC	450 V/μs	7.5 kHz (3% distortion) 3.75 kHz (1% distortion)	20 kHz (-3 dB)	Precise high-voltage control	Dielectric studies, electrostatic deflection
P0621P or N	0 to +30 kV; 0 to -30 kV	0 to ±20 mA	350 V/μs	3.5 kHz (1% distortion)	25 kHz (-3 dB)	Positive / negative unipolar voltage control	Positive: electrostatic deflection; Negative: poling of materials
30/20A	0 to ±30 kV	0 to ±20 mA	750 V/μs	5 kHz (2% distortion)	30 kHz (-3 dB)	Precise high-voltage control	Electrostatic deflection
40/15	0 to ±40 kV	0 to ±15 mA	350 V/μs	1.4 kHz (2% distortion)	20 kHz (-3 dB)	Precise high-voltage control with DC offset	Dielectric studies, electrostatic deflection
50/12	0 to ±50 kV	0 to ±12 mA	350 V/μs	1.4 kHz (2% distortion)	20 kHz (-3 dB)	Precise high-voltage control with DC offset	Dielectric studies, electrostatic deflection
605A	0 to ±1 kV	0 to ±1 mA	Adjustable in 1 volt increments by a precision dial or fixed at +1 kV or -1 kV Output accuracy better than 0.1% of full scale			Reference supply	DC reference supply
668B	0 to ±3 kV	0 to ± 5 mA	Adjustable in 1 volt increments by a precision dial or fixed at +1 kV or -1 kV Output accuracy better than 0.1% of full scale			Precision DC reference supply	DC reference / power supply
640	0 to ±2 kV DC or peak AC	0 to ± 5 mA or peak AC	15 V/μs	1.2 kHz (1% distortion)	1.2 kHz (1% distortion)	Computer interface, USB connector, current limiter indicator, HV ON indicator, integrated electrostatic voltmeter	On or two phase ESC systems
645	0 to ±2 kV DC or peak AC	0 to ± 2 mA, 5 mA peak				Software driven, amplifier-powered	Electrostatic bi-polar semiconductor wafer chucking (E-chuck) systems

About Trek: A Successful Company with Acknowledged Leadership Qualities

Founded on Technology

TREK, INC. was established in 1968 to serve the needs of the electrophotography industry for highly accurate, stable, cost-effective measurement instrumentation and devices.

Novel probe design technology provided the foundation for the company's first electrostatic voltmeter, which quickly became the industry standard. Trek's design ensures highly accurate measurements under extreme conditions.



Growth through Innovation

In the decades that followed, Trek established itself as a designer and manufacturer of high quality instrumentation.

Innovative designs and unique solutions have fueled product development over the years. Trek developed the world's first all-solid-state, high voltage, high-speed, DC-stable amplifier, which is now the product of choice for medium-current ion implantation systems in semiconductor fabrication facilities around the world. As a result of Trek's close working relationship with its customers, new designs are constantly being created to answer the needs of industry and R&D.



Established Technical Expertise and Application Knowledge

Our scientifically based measurement expertise, coupled with our application knowledge, has enabled us to establish an enviable position in the markets we serve.

We are the experts when it comes to highly accurate measurement instruments and high voltage amplifiers, and the technology that drives them. Customers can depend on Trek to understand both the technical and practical aspects of an application. In many cases Trek is viewed as a virtual member of the customer's product development team.

Expanded R&D Capabilities

In response to the needs of the marketplace, Trek recently established a separate R&D Center to expand and enhance its capabilities for research and development. In addition, a close working relationship with the nearby State University of New York at Buffalo assures that Trek has access to an extensive array of testing equipment and expertise to complement Trek's internal capabilities.

Whether it is understanding electrostatic discharge (ESD) in a manufacturing facility, or discussing an application with corporate or university R&D professionals, Trek has the expertise that will make a difference.

Dedicated to Excellence

Trek has a well-respected reputation for excellence. We are the premier resource for electrostatic measurement and high-voltage solutions due to our product leadership and engineering excellence.

Committed to the Global Marketplace

Long before globalization was popular, TREK, INC. established Trek Japan KK in Tokyo, Japan for the purpose of providing sales, application engineering support and service to customers in Japan and elsewhere in the Pacific Rim region. A global sales and service network now exists enabling Trek to serve the needs of customers throughout the world.



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TREK - Experts in Electrostatic Measurement and High Voltage Power Amplifiers

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