DIVERSIFIED TECHNOLOGIES, INC.

PROVEN HIGH VOLTAGE HIGH POWER SYSTEMS

LEADERSHIP STATEMENT

Diversified Technologies, Inc. (DTI) designs, manufactures, and markets the patented PowerMod™ line of high-voltage, solid-state, pulsed power modulators, switching power supplies, and control systems. DTI's PowerMod™ technology is the recipient of prestigious local and national awards, and is recognized as a true breakthrough in high-voltage electronic design. DTI has provided hundreds of systems to customers including the Department of Energy, Department of Defense, National Science Foundation, leading universities, national laboratories, and private sector companies. DTI's systems are critical elements for a range of high power applications including radar transmitters, medical electronics, high energy physics research, energy conversion, and food, wastewater, and biomass processing. DTI seeks to continually extend the state-of-the-art in the design, manufacture, and integration of the highest quality solid-state systems for decades of reliable performance.

CORE COMPETENCIES

POWERMOD™ TECHNOLOGY

DTI's PowerMod™ technology delivers the revolutionary advantages of solid-state high power switching to demanding pulsed power and power conversion applications. DTI's solid-state switches are built from series stacks of IGBTs configured for very high voltage standoff and operated as a single, nearly ideal switch. Highly synchronized gate drives ensure the load on the switch is shared equally between devices. The entire switch can be closed or opened in less than a microsecond, safely disconnecting the load in the event of an arc. The reliability, variability, and ruggedness of DTI's PowerMod™ technology are ideal for use in a diverse range of high-power applications.

TRUSTED PERFORMANCE

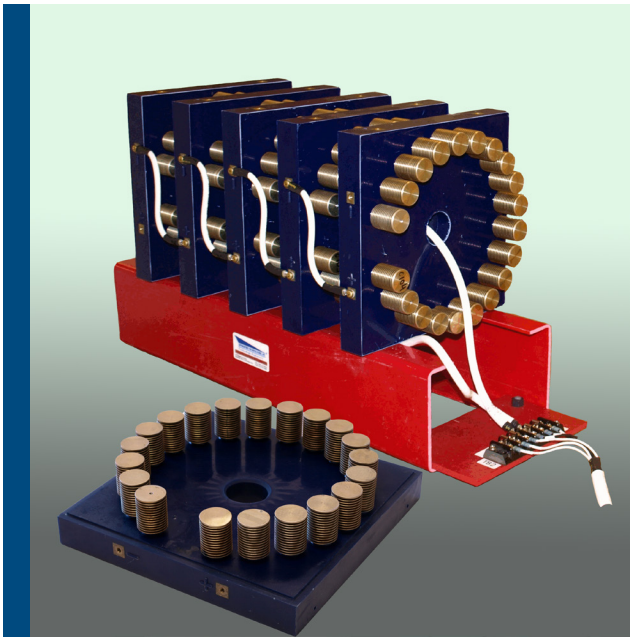
- Solid-State Systems
- Reliable & Fault Tolerant Designs
- µs Load Arc Response

HIGH POWER CONTROL

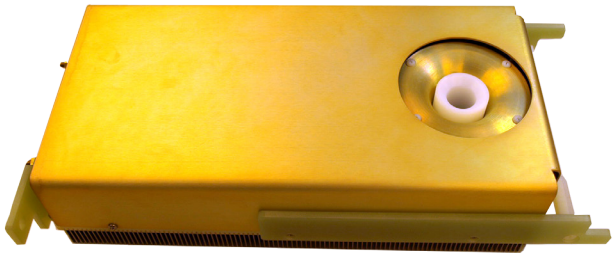
- Voltages to 500 kV
- Peak Currents to 10 kA
- Average Power to MWs

PRECISE POWER DELIVERY

- Variable Frequencies (DC – MHz)
- Fast Switching Times (ns - µs)
- Highly Repeatable Pulses



Switch Modules handle lower current applications. Individual modules are rated at 5-10 kV, 10-50 A.



Switch Plates are used in high-current applications. This plate is rated at 3 kV, 1 kA.

PRODUCTS AND APPLICATION AREAS

PowerMod™ 20 kV, 30 kW rack-mount switching power supply.

Free-standing 50 kV, 250 kW switching power supply.

DTI 270 kV, 250 A, 10 µs klystron modulator.

DC POWER SUPPLIES

PowerMod™ high voltage power supplies offer typical voltage regulation to ± 0.1% and voltage ripple of <0.1%. Regulation to <0.01% and ripple <0.001% are available. Power supplies up to 250 kW average at voltages up to 200 kV are available in a single rack; multiple supplies offer much higher (tens of MW) outputs.

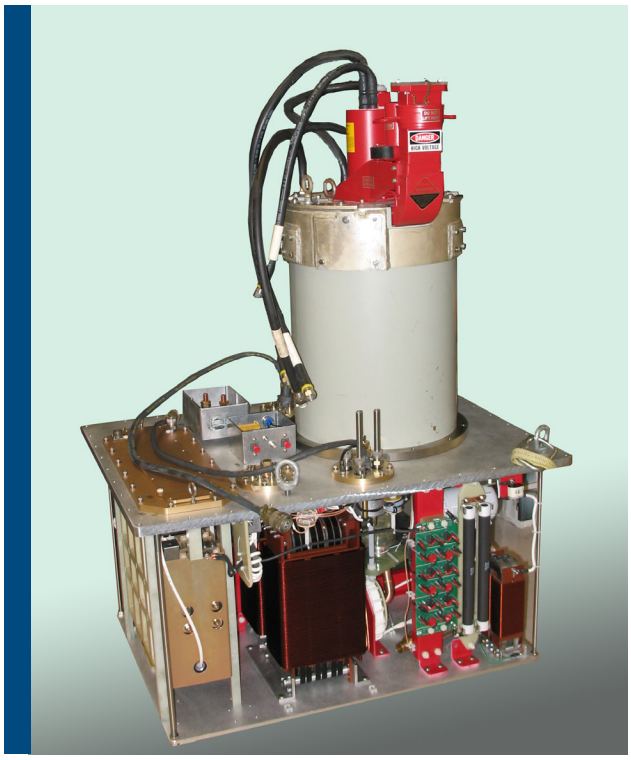
When combined with a DTI solid-state switch, the power supply system offers very fast response to arcs, limiting arc energy while the power supply remains at full voltage. Power can be restored immediately after the arc clears, or, if the arc clears quickly enough, operation will continue uninterrupted.

PULSE MODULATORS

DTI's PowerMod™ modulators offer breakthrough advantages with nearly ideal "flat-top" pulses critical to performance in many pulsed power applications. DTI's high-efficiency solid-state modulators are inherently pulsewidth agile: with fast rise- and fall-times and the ability to open in less than a microsecond, the need for a conventional crowbar is eliminated. DTI's pulse modulators provide performance and lifetime unmatched by vacuum tube modulators, including:

- Fast rise and fall times (ns - µs)
- Outstanding pulse stability
- Compact size and weight
- High repeatability with low droop
- >90% efficiency
- Up to 500 kV peak
- Rugged design for decades of reliable operation
- Integrated fault detection with full internal protection and µs response

This solid-state cathode modulator assembly replaced the entire mod-anode modulator and crowbar circuit for the AN/SPQ-9A.



Compact, 21 kW average power klystron system.

TRANSMITTERS

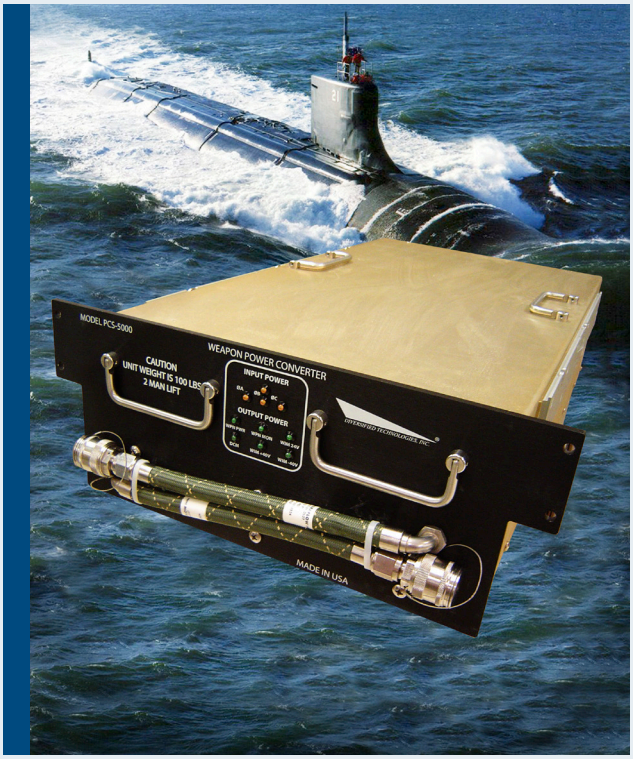
Meeting the most demanding military and commercial requirements, DTI's transmitter solutions are fully solid-state, bringing together high performance power supplies, pulse modulators, voltage regulators, and state-of-the-art control systems.

DTI's solid-state, high voltage switches function as high power cathode modulators for a variety of vacuum electron devices (VEDs) such as klystrons, CFAs or magnetrons, and as low power modulators for tubes that use modulating anodes, grids, or control electrodes.

DTI builds compact, turn-key transmitter systems for a wide range of fixed and mobile radar and RF applications. These systems typically include all required electronics between the power source and the VED or RF output device, as well as power distribution units, transmitter controls, environmental controls, and cooling/air conditioning networks. Form-fit-function configurations for integration into existing systems are also available.

DTI'S RADAR TRANSMITTERS OFFER:

- Compact solid-state topologies
- Precision pulse control
- State-of-the-art controls
- Rugged design for years of reliable operation
- Complete cooling systems
- Integrated fault detection with full, internal protection and µs response
- Deployment-ready, turn-key solutions
- "Plug and Play" retrofits to complete systems in transportable shelters
- MIL-QUAL compliance for ground, ship, air, and undersea applications.



MIL-qualified Weapons Power Converter. This 400 Hz weapons power converter was designed as a drop-in replacement for the baseline converters used on the Navy's Virginia-class submarines.

Industrial scale PEF systems range in power from 75 to 600 kW.

Laboratory scale PEF systems range in power from 4 to 12 kW.

POWER CONVERSION

Commercial and military power systems require power conversion between many different formats. Traditionally, the conversion from one voltage and frequency to another involves several steps, each performed by separate electronics. DTI's solid-state PowerMod™ systems withstand high voltages and employ high frequency switching to perform the conversion within a single unit, eliminating power losses incurred through the multiple steps required by traditional electronics and enabling direct conversion to and from high voltage DC in a compact package. This results in higher efficiency, reducing power costs and cooling requirements. DTI's systems offer a modular design that can be scaled to different power requirements in virtually any combination of voltage and current. They feature high reliability, instantaneous recovery from failures, and components that can be replaced easily during periodic maintenance.

PULSED ELECTRIC FIELD SYSTEMS

Pulsed Electric Field (PEF) technology is a low cost, low energy process that applies high voltage electric pulses to liquids and pumpable slurries. These pulses rupture the cell walls of plants or microorganisms through electroporation, increasing the availability of intracellular materials for downstream separation and extraction and killing harmful microorganisms.

DTI provides custom systems for laboratory and batch testing as well as large industrial systems for processing upwards of 40,000 liters per hour.

PROFILE

Founded in 1987 by Dr. Marcel Gaudreau, P.E., a graduate of the Massachusetts Institute of Technology Plasma Fusion Center, Diversified Technologies, Inc. (DTI) has world-recognized expertise in the application of solid-state devices. DTI develops advanced technologies through a wide range of commercial and government contracts via core competencies in power electronics, electromagnetics, RF design, and system integration.

DTI is headquartered in Bedford, Massachusetts, in the heart of the Route 95/128 high-technology corridor. Company headquarters include 33,000 square feet of prime office, lab, and manufacturing space, which house engineering, sales and marketing, and support functions. DTI sells its products worldwide, and is represented by local distributors in select overseas markets.

DTI is a two time winner of R&D Magazine's R&D 100 Award, as the developer of "one of the most technologically significant products" of the year, and was selected as a Small Business Innovative Research Award Winner by the Massachusetts Technology Collaborative.

CORE ADVANTAGE

DTI boasts a broad range of expertise encompassing a wide variety of fields and technologies. Our employees are a dynamic team of electrical, mechanical, RF and aeronautical engineers, physicists, and systems analysts with decades of experience designing and developing multi-megawatt solid-state power supplies, modulators, and advanced military systems. DTI has an amazing track record for delivering and installing hundreds of rugged, highly reliable, high precision systems for demanding applications.

DTI's modern facility includes electronics labs, machine shop, high voltage assembly and test areas, high bay fabrication and manufacturing capabilities, and sufficient power and cooling for high-power system testing. The company's quality manufacturing and production procedures enable products built to the highest commercial and MIL-QUAL standards.

DTI has a broad base of loyal customers both in the US and overseas and has recently partnered with SigmaPhi Electronics (France) as part of a targeted effort to increase presence in Europe.

PULSED ELECTRIC FIELD SYSTEM APPLICATIONS

PEF has been used in a wide range of applications, including:

- **Algal Oil Extraction:** The PEF system ruptures algae cells, easing access to intracellular oil, which is released into the surrounding solution.
- **Dehydration:** The PEF system ruptures cellulosic cells, allowing physical pressing to remove greatly increased quantities of water, reducing the need for energy-intensive drying.
- **Non-Thermal Pasteurization of Liquids and Semi-Solid Foods:** The PEF system kills microorganisms, preserving the fresh qualities of food without heating.
- **Sugar/Juice Extraction:** Similar in practice to algae oil extraction, the PEF system opens intracellular material (such as fruit juice) into the surrounding solution, increasing product yields.
- **Wastewater Treatment:** The PEF system can be used to kill pathogens or to open cells for enhanced digestion, reducing the volume of solids requiring disposal and increasing the amount of material available for conversion to energy via cogeneration.

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