

# MINIATURE HIGH-VOLTAGE POWER SUPPLY & MINIATURE HIGH-VOLTAGE CONTROLLER

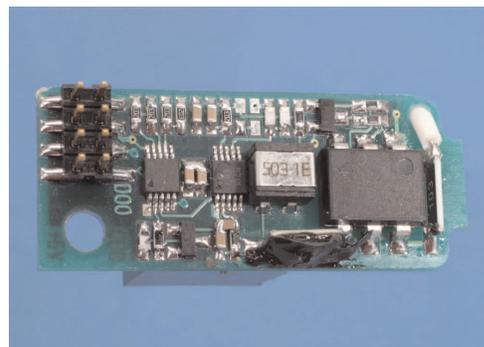
US Pat. No.: 7,012,342; 7,400,119; 7,710,086; 7,161,334; 7,348,688

Technology Readiness Level: 5

*The basic technological components are integrated so it can be tested in a simulated environment*

Many microfluidics systems use electrokinetic (EK) pumping of fluid. These applications generally require high voltage at a low current. Sandia has developed two custom power supply designs with miniaturization, modularity, and scalability in mind. Each supply version is available in a variety of voltage ranges and polarities, with some ranges extending to 10,000 V.

The modular version of the high-voltage supply has one output channel and can source or sink current with a maximum source power of 0.5 W. Its output voltage is proportional to an externally-applied low-voltage control signal that can also switch the output to a floating condition. With the floating output feature, two supplies can be connected in parallel to allow a single node to swing positive or negative with no switching. A monitor output is provided that is proportional to the output current and indicates both polarities. The modular high-voltage power supply requires only a single +5 V source, and each modular supply measures only 0.6" W x 1.5" L x 0.75" H. A user can mix voltages and polarities to suit a particular application while minimizing development time, expense, and volume. The modularity also simplifies repairs and changes in the field.



Modular high voltage power supply

The scalable version of the high-voltage supply is tailored for cost- and space-constrained applications that require many outputs of the same polarity and voltage range. While the modular supply has been packaged in a standard form factor for universal use, the scalable supply packaging is customized for each application. Total output power for all channels sharing the same high-voltage converter is limited to 0.5 W, and the polarity must be the same. Each supply output can source or sink current, and is accompanied by its own proportional current monitor signal. Each channel's output voltage is proportional to its corresponding control signal. Applications that require different high-voltage polarities or ranges can combine multiple instances of the scalable supply. All versions of the scalable supply require only a single +5 V power source.

## TECHNICAL BENEFITS

- Proven, manufacturable design with years of fielded use
- Flexible configuration
- Small size: 0.7 in<sup>3</sup>
- Easy to change or repair, even in the field
- Common control/monitor interface
- Can source or sink current
- Low capacitance with current limit to prevent damage from accidental arcs
- Bipolar output voltage (when paralleled)
- Output rise and fall time of 20 ms
- Low-side current monitoring

## INDUSTRIES & APPLICATIONS

- EK and electrophoretic transport
- Microfluidics and microseparators
- Photomultiplier and drift tubes
- Field emissions sources
- Electron optics