



THICK FILM HEATING ELEMENTS AND CIRCUITS

Heatron's Thick Film ceramic and metal core heaters and circuits provide design engineers with a multitude of fabrication options. Precisely applied heat delivers excellent response time to create faster thermal output and cool-down, even in the most demanding environments. Ideal solutions for high-temp, AC line voltage heater, power resistor & high-temperature circuit applications.



APPLICATIONS

Medical and Life Sciences

Dialysis, CPAP, DNA Analysis and Testing, Blood Diagnostics, Surgical Devices, Vessel Sealer, Blood/Fluid Warming, Instrument Warming, MRI Equipment, Temperature Therapy, Sterilization

Aviation and Transportation

Instrumentation, Personal Comfort, De-Icers, Over the Road Truck and Rail car Freeze Protection, Oil and Battery Heating, Auto and Motorcycles

Security

Chemical Detection, Explosives Detection, Alcohol Detection, Cameras

Food Service

Warming Cabinets, Display Shelves, Prep Stations, Heated Dishware, Fryer Systems, Grilling Platters, Appliances

Printing

3-D Printers, Laser Printers, Card Printers, Thermal Printers, Commercial and Industrial Printers

Industrial

Packaging Lines, Electronic Enclosures, Freeze Protection, Motor Heaters, Plastic Fabrications, Water Heating

Semiconductor

High Temperature Burn-In Boards and Testing Equipment, Wafer Chuck Heaters, Water Heating

DICING SERVICES

Heatron has diced our own thick film circuits for years. Put our saws to work for you. Our fleet of **ADT 7200 Series** dicers can easily handle the accuracy your application requires.

No job is too big or too small; our flex schedule allows us to easily scale from a single shift to 24/7 operation.

Our world class manufacturing facilities are audited nearly once per week to ensure best practices.

- **Safety:** UL/CSA/TUV/Intertek
- **Quality System:** ISO 9001
- **Environmental:** ISO 14001

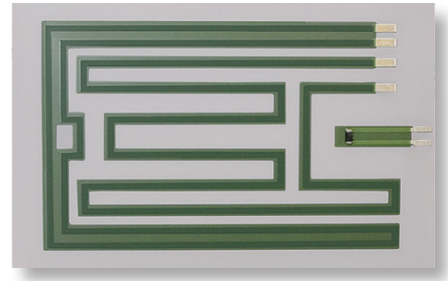
Dicing Capabilities

- 200 mm maximum diameter
- Silicone substrates
- Alumina (Al_2O_3) substrates
- Aluminum Nitride (AlN) substrates
- Other Ceramic substrates

CERAMIC CORE ALUMINA (AL₂O₃)

Featuring precise, controlled heat for high-temperature applications up to 1000°C, Thick Film Alumina heaters offer low mass, low leakage current, and excellent dielectric properties. Excellent smaller heaters where high heat resistance and high thermal conductivity are required.

- For high temperature applications between 350 °C and 1000 °C.
- High temperature uniformity.
- Excellent dielectric properties.
- Low mass: fast temperature ramp up and cool down.
- Low leakage current.
- No out-gassing with inorganic systems.
- Resistant to moisture and many chemicals



Configuration Options

- High temperature glass and conventional UV-cure resin-bases solder masks or encapsulants.
- Design single- or double-sided circuits, with one or two layers per side.
- Available in a multitude of purity levels.
- Larger, uneven shapes and three-dimensional configurations are possible with customization.

Wattage

- Custom watt density designs available for added efficiency and control.
- Multiple zone heating for greater control in target areas.
- Distributed wattage can be used to compensate for heat loss and create uniform temperature in application.

Voltage

- Custom designed to operate from 2 to 480 volts; including dual voltage.
- Functions with AC and DC voltage sources.

Surface Mount Sensors and Thermostats

- Printed RTDs or surface-mount thermistors for direct, on-board temperature feedback and control, as well as more complex heater system assembly.
- Large selection of thermostats and thermal fuses designed to provide maximum efficiency for your application.

Connecting Leads

- Broad range of connection schemes available, including wire harness.
- Custom connection solutions can be co-engineered with customer's design.
- Power leads soldered directly to board or mechanically secured.

CERAMIC CORE ALUMINUM NITRIDE (AlN)

Precision engineered to fit tight spaces and tolerances, Thick Film AlN heaters are found in the most critical medical, aerospace and commercial applications. Fast ramp-up time, low leakage and excellent dielectric properties make this our highest-performing thick film alternative.

- For high temperature applications up to 1000 °C
- Power densities to 155 W/cm² (1000 W/in²)
- Superior thermal conductivity (220 W/mK)
- Excellent dielectric properties
- Low coefficient of thermal expansion
- Low mass: fast temperature ramp up and cool down
- Low leakage current
- No out gassing with inorganic systems



Configuration Options

- High temperature glass and conventional UV-cure resin-based solder masks or encapsulants.
- Design single- or double-sided circuits, with one or two layers per side.
- Larger, uneven shapes and three-dimensional configurations are possible with customization.

Wattage

- Custom watt density designs available for added efficiency and control.
- Multiple zone heating for greater control in target areas.
- Distributed Wattage can be used to compensate for heat loss and create uniform temperature in application.

Voltage

- Custom designed to operate from 2 to 480 volts; including dual voltage.
- Functions with AC and DC voltage sources.

Surface Mount Sensors and Thermostats

- Printed RTDs or surface-mount thermistors for direct, on-board temperature feedback and control, as well as more complex heater system assembly.
- Large selection of thermostats and thermal fuses designed to provide maximum efficiency for your application.

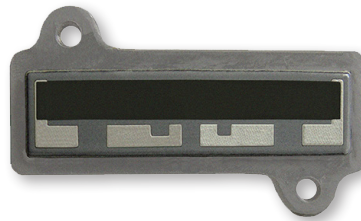
Connecting Leads

- Broad range of connection schemes available, including wire harness.
- Custom connection solutions can be co-engineered with customer's design.
- Power leads soldered directly to board or mechanically secured.

THICK FILM ALUMINUM (Al)

Thick Film Aluminum's exceptional thermal conductivity and high power densities make it an excellent option for low-heat applications that require a high-degree of control. The aluminum substrate allows for three dimensional forms with the flatness of a Thick Film heater. Available with integrated sensors, thermostats and a variety of mounting and attachment options.

- Steady, low heat up to 150°C
- Excellent thermal conductivity
- Low thermal resistance
- Fast ramp-up and cool-down
- High temperature uniformity
- Flexible and bendable to 90°
- Precise, repeatable heating pattern
- Distributed wattage



Configuration Options

- High strength solder connections.
- Available with integrated sensors, thermostats and a variety of mounting or attachment options.
- Three dimensional shapes and forms, including bending and folding.
- UL Component recognition (See brochure for details)

Wattage

- Custom watt density designs available for added efficiency and control.
- Multiple zone heating for greater control in target areas.
- Distributed wattage can be used to compensate for heat loss and create uniform temperature in application.

Voltage

- Custom designed to operate from 2 to 480 volts; including dual voltage.
- Functions with AC and DC voltage sources.

Surface Mount Sensors and Thermostats

- Printed RTDs or surface-mount thermistors for direct, on-board temperature feedback and control, as well as more complex heater system assembly.
- Large selection of thermostats and thermal fuses designed to provide maximum efficiency for your application.

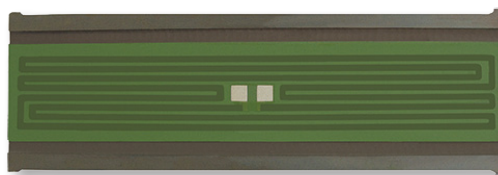
Connecting Leads

- Broad range of connection schemes available, including wire harness.
- Custom connection solutions can be co-engineered with customer's design.
- Power leads soldered directly to board or mechanically secured.

THICK FILM STAINLESS STEEL

Fast and reliable, these low-profile heaters are found in print heads, handheld devices, and other applications with tight tolerances and tighter form factors drive design. Thick Film Stainless Steel heaters are a compact, lightweight solution that maximize operating efficiency. Available with an array of options including leads, attachments, and thermistors to customize performance to your application.

- For temperature applications up to 650 °C
- Can be machined into complex shapes and forms
- Power densities greater than 31 W/cm² (200 W/in²)
- Low mass: fast temperature ramp up and cool down
- Low leakage current at low temperatures
- No out gassing with inorganic systems
- Low coefficient of thermal expansion
- Solid insulation properties due to glass encapsulation



Configuration Options

- High strength solder connections.
- Available with integrated sensors, thermostats and a variety of mounting or attachment options.
- Three dimensional shapes and forms, including bending and folding.
- UL Component recognition (See brochure for details)

Wattage

- Custom watt density designs available for added efficiency and control.
- Multiple zone heating for greater control in target areas.
- Distributed wattage can be used to compensate for heat loss and create uniform temperature in application.

Voltage

- Custom designed to operate from 2 to 480 volts; including dual voltage.
- Functions with AC and DC voltage sources.

Surface Mount Sensors and Thermostats

- Printed RTDs or surface-mount thermistors for direct, on-board temperature feedback and control, as well as more complex heater system assembly.
- Large selection of thermostats and thermal fuses designed to provide maximum efficiency for your application.

Connecting Leads

- Broad range of connection schemes available, including wire harness.
- Custom connection solutions can be co-engineered with customer's design.
- Power leads soldered directly to board or mechanically secured.

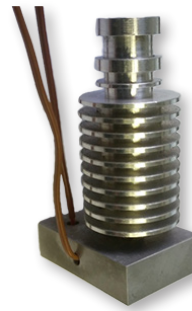
THICK FILM NOZZLE HEATER

The simplicity of Heatron's new thick film nozzle heater belies its power. By printing the heater directly on the block, we can direct heat precisely when and where it's needed. This gives 3D printer OEMs unprecedented control over hot end temperature, with a dramatically reduced thermal differential between the nozzle and the sensor.

Temperature variation in an FDM printer can lead to poor prints, clogged print heads and angry users. Heatron's new nozzle heater reduces the temperature differential between the nozzle and the sensor dramatically, giving you a more accurate picture of your printer's performance. Combined with the advanced thermal control inherent in thick film technology, you can increase printer efficiency and print quality by applying more even heat.

This nozzle heater includes the machined aluminum block and the lead assembly. Just add your own sensor and nozzle. The aluminum block can be provided by the customer, or machined by Heatron to your specifications.

- Printed circuit on aluminum block
- Eliminates separate cartridge heater
- Reduces thermal differential substantially
- Less variation in tip temperature
- Uniform block temperature
- Highly customizable to your specifications
- Easy assembly to existing components



Machined Block

- Use our standard machined aluminum block, or provide us with your own block. Heatron supply chain support can source your block design.

Thermocouple

- The sensor will be specified by each application, and can be provided to Heatron or sourced through our supply chain support team.

Wattage/Voltage

- The model listed above was tested at 12VAC. Design with other requirements is possible; contact Heatron to request engineering support.

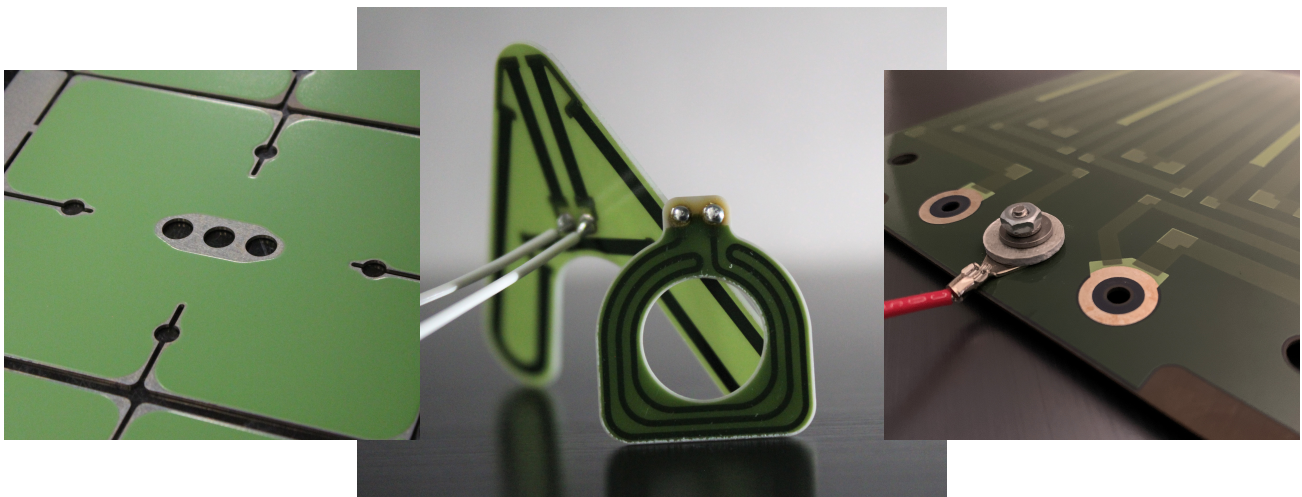
In-House Assembly

- Save time and speed time-to-market. Let Heatron's in-house assembly team expertly incorporate your nozzle heater into customer-supplied assemblies.

THICK FILM NOZZLE SPECIFICATIONS

Block Size	Block Material	Block Weight	Operating Temperature Range	Operating Temperature Maximum	Trial Watts	Trial Volts
38 mm x 25 mm 1.5" x 1"	Aluminum	5 g 0.176 oz	25 - 300 °C 77 - 572 °F	300 °C 572 °F	40 W	12 VAC

***Numbers above represent dimensions and performance of prototype unit. For custom solutions outside of the parameters listed here, please contact Heatron for design assistance*



ADDITIONAL SPECIFICATIONS				
	Ceramic Core Alumina (Al ₂ O ₃)	Ceramic Core Aluminum Nitride (AlN)	Thick Film Aluminum (Al)	Thick Film Stainless Steel
Max Application Temperature (° F)	662 - 1832	1832	302	1202
Max Power Density (W/in ²)	75	1000	400	200
Max Ramp Up Speed (° F/sec)	122	572	302	302
Thermal Conductivity (W/mK)	35	220	173	15
Density (g/cm ³)	3.75	3.26	2.70	7.80
Thermal Expansion Coefficient (10 ⁶ /° C)	8.1	2.56	24	5.8
Substrate Thickness (inch)	0.025 - 0.50	0.05 - 0.20	0.0014 - 0.75	0.004 - 0.12
Typical Max Dimension (inch)	6 x 12	5 x 12	12 x 24	12 x 24
Theoretical Total Wattage (W)	5,400	55,000	115,200	57,600

**For additional information or custom solutions outside of these specifications, contact a Heatron specialist.

***HEATRON TRANSFORMS YOUR VISION
INTO HIGHER PERFORMANCE PRODUCTS***

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ABOUT HEATRON

Heatron is a global leader in design, engineering and manufacturing for Heating solutions. Heatron's experienced engineers and designers offer complete solutions, from initial concept and design to complex integration and manufacturing. By bridging the gap between original concepts and commercialization, we accelerate the launch of new products that become recognized leaders in a global marketplace.

Our firm commitment to product and technical innovation, flexible design capabilities, and advanced patented technologies allow Heatron to provide a wide range of customers with next generation heating products. By working closely with our customers, we have a comprehensive understanding of design for performance, design for manufacturing and vast insights into the challenges you face.

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