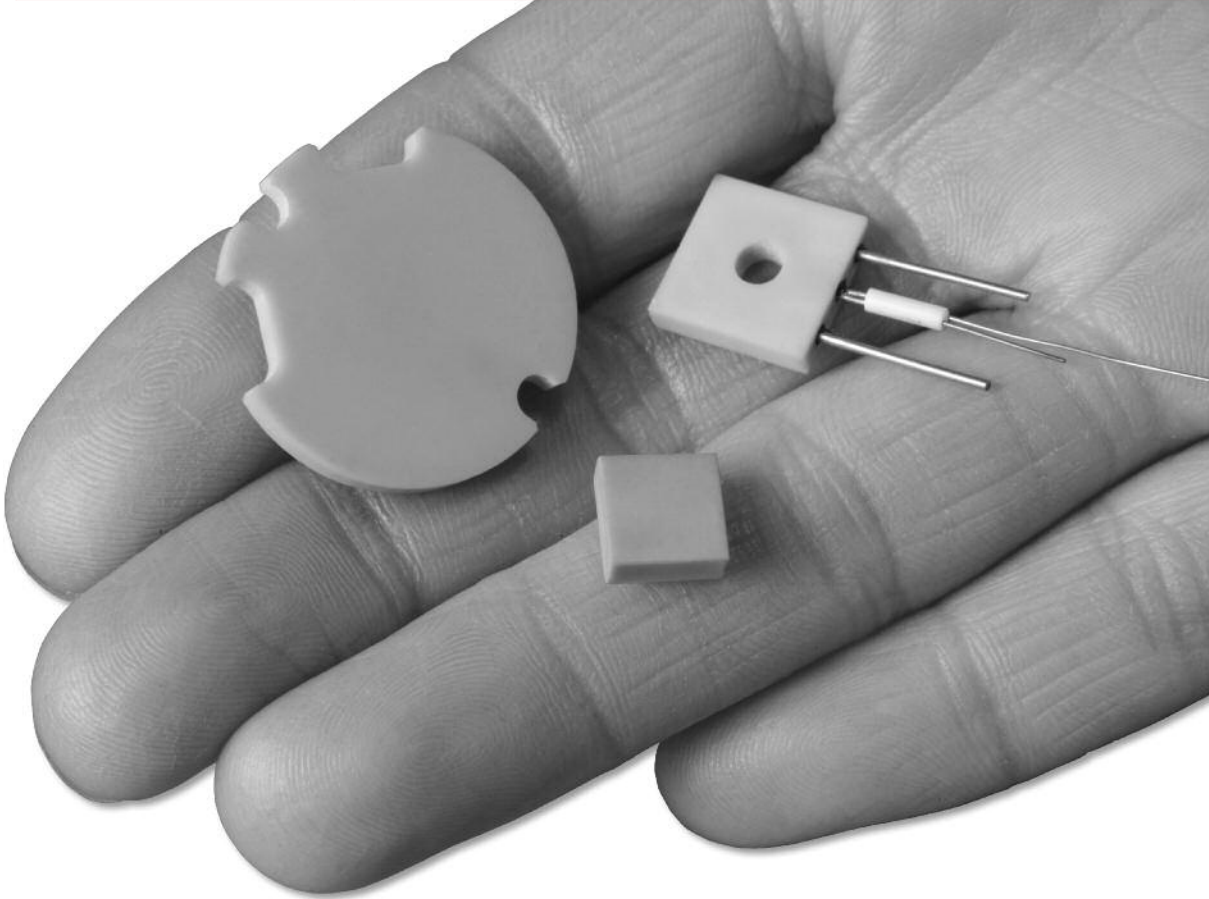


Specialty Heaters

Specialty Heaters	Sheath Materials	Max. Operating Temperatures		Typical Max. Watt Densities		Page
		°F	°C	W/in ²	W/cm ²	
ULTRAMIC® Advanced Ceramic	Aluminum nitride	752	400	1000	155	497
Thick Film Conduction	430 stainless steel	1025	550	75	11.6	501
Coil and Cable	304 stainless steel or Inconel® 600	1200	650	30	4.6	505



Specialty Heaters

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Specialty Heaters

ULTRAMIC® Advanced Ceramic Heaters

The ULTRAMIC® heaters from Watlow® are designed for thermal applications where the high performance of an advanced ceramic heater is required to ensure optimal effectiveness of the equipment and process.

ULTRAMIC heaters are constructed of aluminum nitride (AlN) and incorporate a thermally matched proprietary heating element that provides maximum performance in challenging applications. AlN is especially suitable for applications requiring a clean, non-contaminating heat source. Additionally, the excellent geometric stability ensures consistent part-to-part thermal contact during heating cycles.

Watlow AlN heaters can operate up to 400°C (752°F) with an ultra-fast ramp rate of up to 150°C (270°F) per second depending on the application, heater design and process parameters. In addition to excellent thermal characteristics, the ULTRAMIC has high electrical isolation and typically provides superior chemical resistance as compared to traditional metal heaters.

Performance Capabilities

- Operating temperature up to 400°C (752°F)
- Watt densities to 155 W/cm² (1000 W/in²)
- Temperature ramp rate up to 150°C (270°F) per second (depending on application parameters)

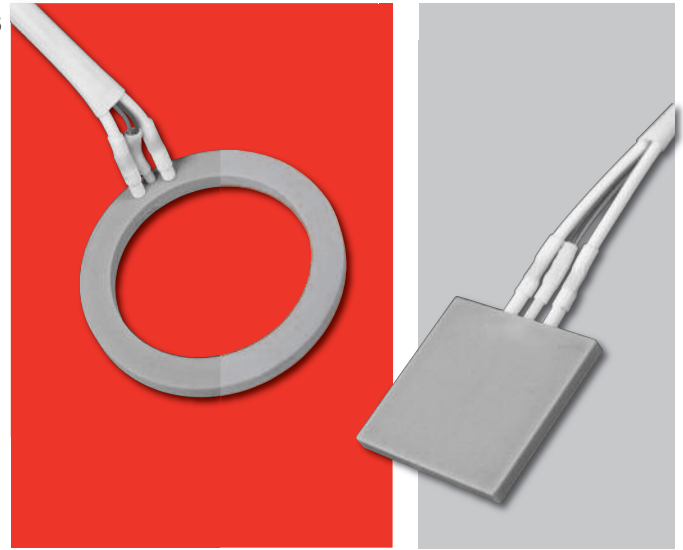
Features and Benefits

Robust AlN ceramic

- Creates a homogeneous assembly for atmospheric and vacuum applications
- Provides durable heater construction and thermal transfer necessary for high temperature and long heater life
- Permits the design of a high watt density, fast responding heater in a very small package
- Ensures geometric stability due to low coefficient of thermal expansion (CTE)
- Provides process temperatures up to 400°C (752°F) depending on application parameters, contact your Watlow representative for applications between 400 and 600°C (752 and 1112°F)

Superior electrical performance

- Assures low leakage current
- Enables high breakdown voltage



High thermal conductivity

- Makes for an ultra-fast temperature ramp rate of up to 150°C (270°F) per second (depending on application parameters)
- Allows for quick cool-down
- Provides extremely uniform temperatures over the heater's surface

Type K thermocouple integrated into assembly

- Ensures reliability of heater/sensor interface
- Improves accuracy with optimized temperature sensing
- Provides high response rate in ramping applications

UL® and CE agency compliance

- Meets global safety standards
- Includes RoHS compliance

Typical Applications

- Wire and die bonding
- Integrated circuit (IC) chip testing
- Mass spectrometry
- Medical devices
- Plastic welding/sealing
- Respiratory therapy equipment

Specialty Heaters

ULTRAMIC Advanced Ceramic Heaters

Technical Data

Mounting Guidelines

- Temperature <math><200^{\circ}\text{C}</math> (392°F): bond with high-temperature epoxy adhesive
- Clamp using single or multiple-point fasteners

Optional Thermocouple

- Bonded Type K thermocouple for <math><400^{\circ}\text{C}</math> (752°F)

Specifications and Tolerances

Surface Finish

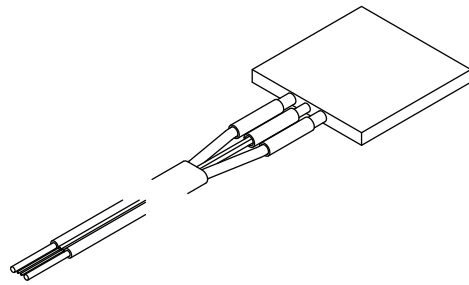
- Flatness: <math><0.05\text{ mm}</math> (0.002 in.)
- Parallelism: <math><0.05\text{ mm}</math> (0.002 in.)
- Surface roughness (Ra): <math><1.5\text{ }\mu\text{m}</math>

Electrical Properties

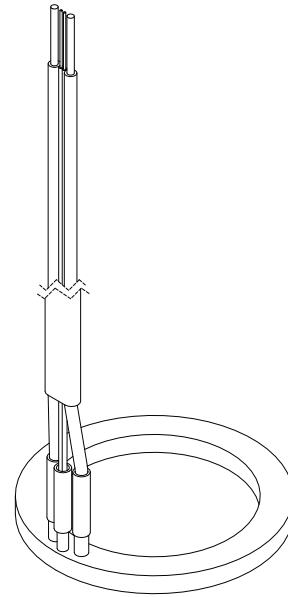
- TCR: $0.0015/^{\circ}\text{C}$
- Resistance tolerance: $\pm 25\%$

Lead Wire and Terminations

- Power terminals exit locations — extended from side edge or top face
- Teflon® insulated silver-plated copper lead extension
- Lead extension length — standard length 305 mm (12 in.)
- Optional length of ceramic beads



Side Lead Exit



Top Lead Exit

Extended Capabilities For ULTRAMIC Advanced Ceramic Heaters

Features and Benefits

Rapid prototyping with finite element analysis (FEA)

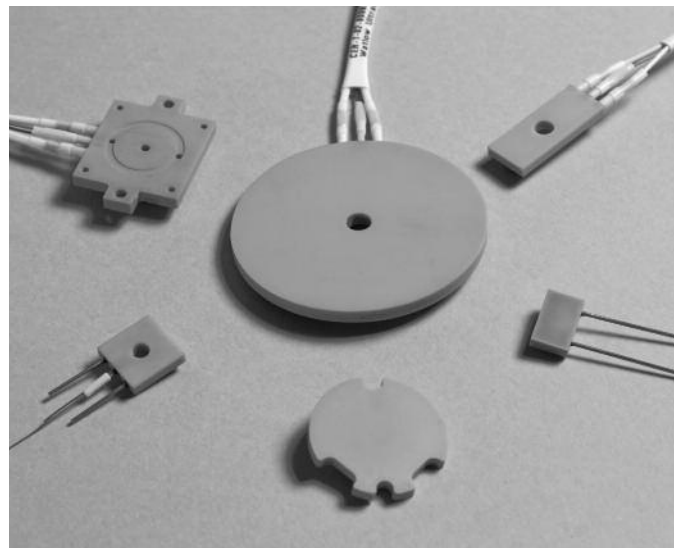
- Provides rapid “virtual prototyping” of heater performance prior to the manufacturing process
- Allows custom prototype delivery in weeks rather than months with innovative design and manufacturing practices

Mounting Guidelines

- In addition to the options listed on the previous page, a screw hole can be provided on custom designs (recommend insulation buffer such as mica spacer)

Optional Thermocouple

- In addition to, or in place of the standard bonded thermocouple, a drilled hole or slot can be provided for installing an externally mounted sensor



Configurations and Dimensions

Maximum Area 4032 mm ² (6.25 in ²)				
	Length	Width	Thickness	Aspect Ratio
Flat Square	Min: 10 mm (0.393 in.) Max: 63.5 mm (2.5 in.)		Min: 2.5 mm (0.098 in.) Max: 5 mm (0.196 in.)	1
Rectangular	Max: 100 mm (3.94 in.)	Min: 8 mm (0.315 in.)	Min: 2.5 mm (0.098 in.) Max: 5 mm (0.196 in.)	<10
	Inside Diameter I.D.	Outside Diameter O.D.	Thickness	Ring Wall Thickness
Ring	Min: 0	Max: O.D. 77.5 mm (3.05 in.)	Min: 2.5 mm (0.098 in.) Max: 5 mm (0.196 in.)	Min wall thickness: 3 mm (0.118 in.)
Machined Features				
Straight Groove Custom Feature			Hole Size Round Diameter	
Depth: 0.5 mm min. (0.019 in.) Width: 1 to 2 mm (0.039 to 0.078 in.)			Min: 1 mm (0.039 in.)	
Electrical Properties				
Voltage				
12 to 480V				

Specialty Heaters

ULTRAMIC Advanced Ceramic Heaters

Technical Data

Product Ordering Information

Code Number	Dimensions mm (in.)	Thickness mm (in.)	Watt Density	Watts	Volts	Lead Exit	Area mm (in.)
Square CER-1-01-00002	25 mm x 25 mm (0.98 in. x 0.98 in.)	2.5 mm (0.10 in.)	High	967	240	Side	625 mm ² (0.96 in ²)
CER-1-01-00374	50 mm x 50 mm (1.97 in. x 1.97 in.)	3.0 mm (0.12 in.)	Medium	1938	240	Side	2500 mm ² (3.88 in ²)
CER-1-01-00093	25 mm x 25 mm (0.98 in. x 0.98 in.)	2.5 mm (0.10 in.)	Low	150	120	Side	625 mm ² (0.96 in ²)
CER-1-01-00097	19 mm x 19 mm (0.75 in. x 0.75 in.)	2.5 mm (0.10 in.)	Low	200	120	Side	360 mm ² (0.56 in ²)
CER-1-01-00333	15 mm x 15 mm (0.59 in. x 0.59 in.)	2.5 mm (0.10 in.)	Medium	150	48	Side	225 mm ² (0.35 in ²)
CER-1-01-00334	12 mm x 12 mm (0.47 in. x 0.47 in.)	2.5 mm (0.10 in.)	High	200	48	Side	144 mm ² (0.22 in ²)
CER-1-01-00335	8 mm x 8 mm (0.31 in. x 0.31 in.)	3.0 mm (0.12 in.)	Low	21.5	12	Top	64 mm ² (0.099 in ²)
Rectangular CER-1-01-00001	25 mm x 15 mm (0.98 in. x 0.6 in.)	2.5 mm (0.10 in.)	High	580	120	Side	375 mm ² (0.59 in ²)
CER-1-01-00003	50 mm x 10 mm (1.97 in. x 0.39 in.)	2.5 mm (0.10 in.)	Medium	582	120	Side	500 mm ² (0.77 in ²)
CER-1-01-00004	50 mm x 10 mm (1.97 in. x 0.39 in.)	2.5 mm (0.10 in.)	High	770	240	Side	500 mm ² (0.77 in ²)
CER-1-01-00005	50 mm x 25 mm (1.97 in. x 0.98 in.)	2.5 mm (0.10 in.)	Medium	1453	240	Side	1250 mm ² (1.93 in ²)
CER-1-01-00007	75 mm x 25 mm (2.95 in. x 0.98 in.)	2.5 mm (0.10 in.)	Medium	1455	240	Side	1875 mm ² (2.89 in ²)
CER-1-01-00098	25 mm x 15 mm (0.98 in. x 0.6 in.)	2.5 mm (0.10 in.)	Low	180	120	Side	375 mm ² (0.59 in ²)
CER-1-01-00105	50 mm x 25 mm (1.97 in. x 0.98 in.)	2.5 mm (0.10 in.)	Low	100	120	Side	1250 mm ² (1.93 in ²)
Ring CER-1-02-00001	38 mm x 29 mm (1.50 in. x 1.14 in.)	3.0 mm (0.12 in.)	High	733	120	Top	473 mm ² (0.74 in ²)
CER-1-02-00002	77.5 mm x 59 mm (3.05 in. x 2.32 in.)	3.0 mm (0.12 in.)	Medium	770	240	Top	1982 mm ² (3.08 in ²)
CER-1-02-00074	25.4 mm solid disk (1 in.)	2.5 mm (0.10 in.)	Medium	300	120	Side	507 mm ² (0.79 in ²)

Delivery 1 to 3 working days

See page 498 for lead exit details (full drawings available upon request, contact your Watlow representative).

Configurations include:

- Power lead wires with 305 mm (12 in.) of Teflon® insulation
- Bonded Type K thermocouple with 305 mm (12 in.) Teflon® insulated lead wires
- Surface finish (Ra) <1.5 µm (60 µ-in.)

Note: Maximum temperature is 400°C. Lead wires are rated to 205°C.

If ceramic beads are required, please contact your Watlow representative for a quote.

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