

Specialty Heaters



ULTRAMIC® Advanced Ceramic Heaters

Watlow's high performance ULTRAMIC® advanced ceramic heaters are designed for thermal applications that require optimal effectiveness of equipment and processes.

Constructed with aluminum nitride (AlN), ULTRAMIC heaters' thermally matched proprietary heating element provides maximum performance in challenging applications. AlN is especially suitable for applications that require a clean, non-contaminating heat source. Its excellent geometric stability ensures consistent part-to-part thermal contact during heating cycles.

Watlow AlN heaters operate up to 400°C (752°F)^① 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 its excellent thermal characteristics, the ULTRAMIC provides high electrical isolation and typically provides superior chemical resistance compared to traditional metal heaters.

Performance Capabilities

- Standard operating temperature up to 400°C (752°F)^①
- Watt densities up 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
- Supports 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

Superior electrical performance

- Assures low leakage current
- Enables high breakdown voltage

^① 400°C (752°F) maximum operating temperature is standard. Higher temperature operation up to 600°C (1112°F) is available as an extended capability.



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 reliable heater/sensor interface
- Improves accuracy with optimized temperature sensing
- Provides ramping applications with a high response rate

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
- Clinical diagnostic equipment
- High speed packaging/sealing
- Respiratory therapy equipment

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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>

Dimensional Tolerance (length/width/diameter)

- $\pm 1\%$ of dimension ($\pm 0.13\text{ mm}$ minimum)

Electrical Properties

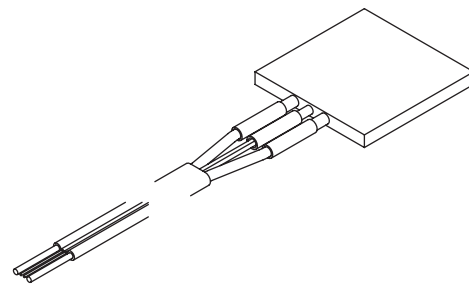
- TCR: $0.0015/^{\circ}\text{C}$
- Resistance tolerance: $\pm 25\%$

Intellectual Property

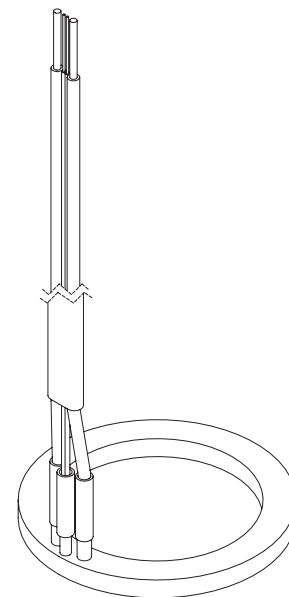
- U.S. Patents 7,696,455, 7,832,616 and 8,242,416

Lead Wire and Terminations

- Power terminals exit locations — extended from side edge or top face
- PTFE 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

Specialty Heaters

**EXTENDED
CAPABILITY**



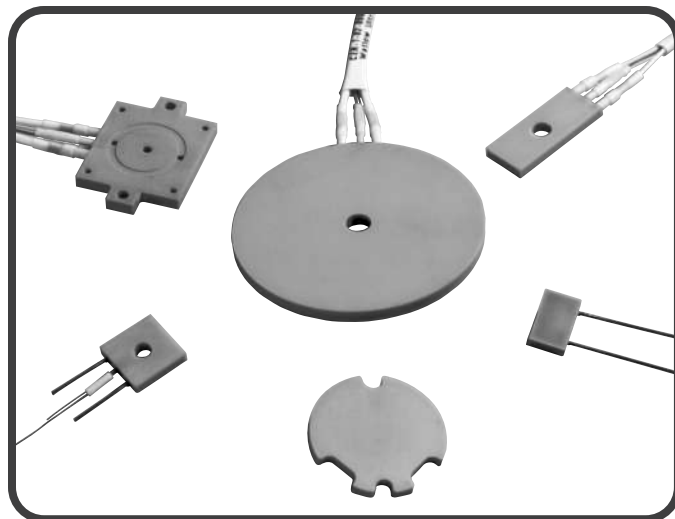
Extended Capabilities for ULTRAMIC Advanced Ceramic Heaters

Mounting Guidelines^①

- 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 Sensors

- 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

Dimensional Features				
	Length	Width	Thickness	Aspect Ratio
Flat Square	Min: 8 mm (0.315 in.) Max: 100 mm (3.94 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. 100 mm (3.94 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	
Width: 0.5 mm (0.019 in.)			Min: 0.5 mm (0.019 in.)	
Electrical Properties				
Voltage			Max. Temperature	
12 to 480V			400°C (752°F) standard, 600°C (1112°F) extended capability	

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Product Ordering Information

Part Number	Dimensions mm (in.)	Thickness mm (in.)	Watt Density	Watts	Volts	Lead Exit
Square						
CER-1-01-00002	25 mm x 25 mm (0.98 in. x 0.98 in.)	2.5 mm (0.10 in.)	High	900	240	Side
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
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
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
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
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
CER-1-01-00335	8 mm x 8 mm (0.31 in. x 0.31 in.)	3.0 mm (0.12 in.)	Low	21.6	12	Top
Heaters With Holes						
CER-1-01-00540	12 mm x 12 mm ^① (0.47 in. x 0.47 in.)	2.5 mm (0.10 in.)	Medium	100	24	Side
CER-1-01-00541	25 mm x 25 mm ^② (0.98 in. x 0.98 in.)	2.5 mm (0.10 in.)	High	800	120	Side
CER-1-01-00542	50 mm x 50 mm ^② (1.97 in. x 1.97 in.)	3.0 mm (0.12 in.)	Medium	1500	240	Side
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
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
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
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
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
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
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
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
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
CER-1-02-00074	25.4 mm solid disk (1 in.)	2.5 mm (0.10 in.)	Medium	300	120	Side

① 3 mm (0.12 in.) hole in center of heater

② 5 mm (0.19 in.) hole in center of heater

Note: For the most up-to-date options for ULTRAMIC heaters, please use the VISUAL DESIGNER™ tool or e-Solutions configurator.

Configurations include:

- Power lead wires with 305 mm (12 in.) of PTFE insulation
- Bonded Type K thermocouple with 305 mm (12 in.) PTFE insulated lead wires

Note: Maximum temperature is 400°C (752°F). Lead wires are rated to 205°C (401°F).
If ceramic beads are required,

