

# Flexible Heaters

## Polyimide Heaters

Polyimide is a thin, lightweight organic polymer film which provides excellent tensile strength, tear resistance and dimensional stability. This heater is ideal for applications requiring low outgassing in a vacuum, or resistance to radiation, fungus and chemicals. Polyimide is also solvent resistant.

### Performance Capabilities

- For operating environments as low as -319°F (-195°C), heater temperature as high as 392°F (200°C)
- Watt densities up to 50 W/in<sup>2</sup> (7.75 W/cm<sup>2</sup>)<sup>①</sup>
- UR<sup>®</sup> and C-UR<sup>®</sup> recognitions

### Features and Benefits

#### Excellent physical and electrical properties

- Results in thermal stability over a wide temperature range

#### Transparent polyimide material

- Allows inspection of internal details

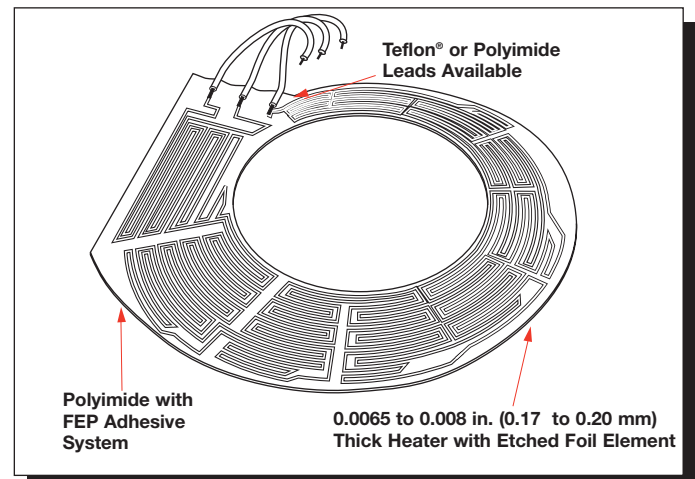
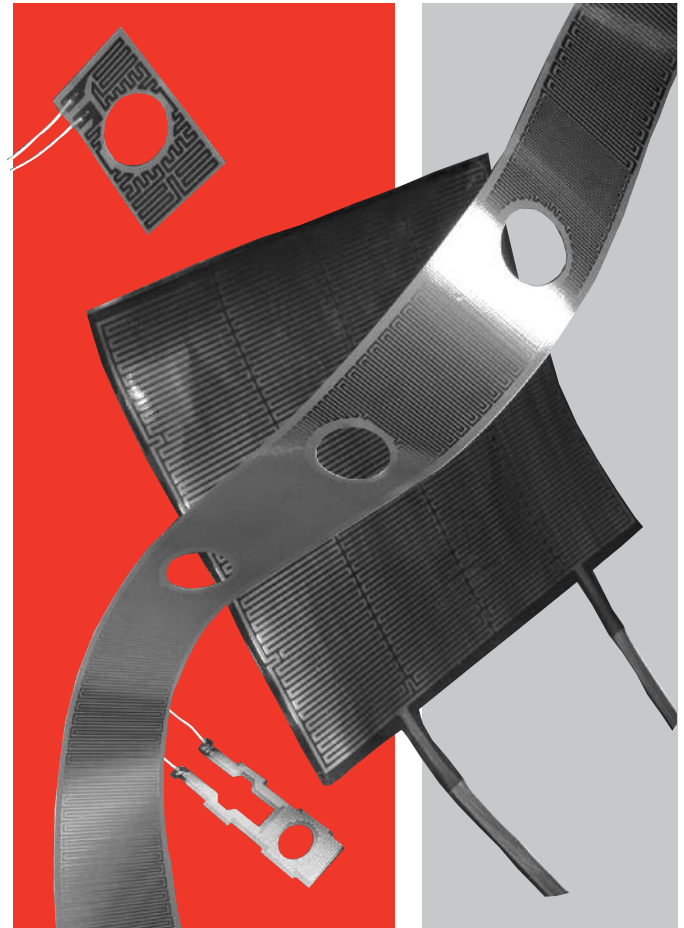
#### Resistance of radiation and fungus

- Allows it to be used in a wide range of applications

### Typical Applications

- Medical, where thorough cleaning or sterilization is needed
- Laboratory research
- Semiconductor processing equipment
- Optical equipment
- LCD displays
- Computer equipment
- Photographic equipment
- Military/aerospace, where low outgassing properties are required

<sup>①</sup> Watt density limits are application dependent (operating temperatures, bonding method and heat sink).



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### Technical Data

#### Specifications

##### Thickness

- 0.007 in. (0.2 mm)

##### Flexibility (min. radius)

- $\frac{1}{32}$  in. (0.8 mm)

##### Weight

- 1.5 oz./ft<sup>2</sup> (0.05 g/cm<sup>2</sup>)

##### Operating temperature: ②

- Max.: 392°F (200°C)
- Min.: -319°F (-195°C)

##### Watt density rating on stock units

- 5 W/in<sup>2</sup> (0.8W/cm<sup>2</sup>)

##### Dielectric strength

- Min. VAC: 1000

##### Flammability rating

- Self-extinguishing

##### Heater size limitations

- 18 x 26 in. (457 mm x 660 mm)

##### Weight loss (outgassing):

- 0.51%

##### Lead length

- 12 in. (305 mm) Teflon® E

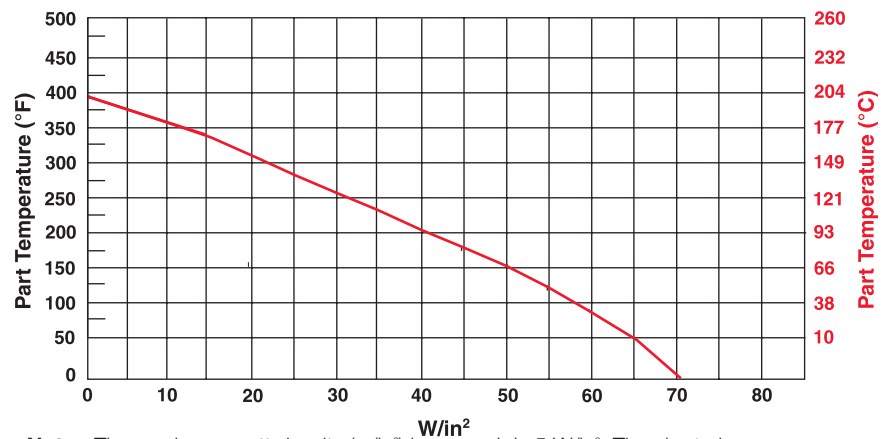
② We recommend maximum **part** temperature at 300°F (150°C).

### Options

#### Maximum Allowable Watt Density Versus Temperature

To achieve the optimum performance with your Watlow polyimide sample heater, a proper watt density must be used on the surface of the heater.

This graph illustrates recommended watt densities for given operating temperatures with the process being controlled with a temperature controller. It does not indicate the watt density necessary to achieve a given part temperature.



**Note:** The maximum watt density (w/in<sup>2</sup>) in open air is 5 W/in<sup>2</sup>. The chart above assumes bonding the polyimide heater to a part.

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*Options (Continued)*

Lead length, 12 in. (305 mm) “E” Teflon®

| Width<br>in. (mm) | Length<br>in. (mm) | Watts | 28V<br>Code Number | 120V<br>Code Number |
|-------------------|--------------------|-------|--------------------|---------------------|
| 0.5 (13)          | 2 (51)             | 5     | K005020C5-0009B    |                     |
| 1 (25)            | 1 (25)             | 5     | K010010C5-0009B    |                     |
|                   | 3 (76)             | 15    | K010030C5-0009B    |                     |
|                   | 5 (127)            | 25    |                    | K010050C3-0009B     |
|                   | 15 (381)           | 75    |                    | K010150C3-0009B     |
| 2 (51)            | 10 (254)           | 100   |                    | K020100C3-0009B     |
| 3 (76)            | 5 (127)            | 75    |                    | K030050C3-0009B     |
| 4 (102)           | 4 (102)            | 80    |                    | K040040C3-0009B     |
| 5 (127)           | 5 (127)            | 125   |                    | K050050C3-0009B     |

### **RAPID SHIP**

- 2 to 5 day shipment

### **Bonding Method**

- Pressure sensitive adhesive surface (PSAS)

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### Special Product Offering

| Code Number | Size<br>in. (mm)    | Circuit | Resistance | Max. Voltage | Watts @<br>Max. Voltage |
|-------------|---------------------|---------|------------|--------------|-------------------------|
| K05711980-A | ½ x 2½ (13 x 54)    | A       | 40         | 12           | 4                       |
| K05711980-B | 1 x 2½ (25 x 54)    | B       | 90         | 48           | 26                      |
| K05711980-C | 1½ x 2½ (38 x 54)   | C       | 145        | 75           | 39                      |
| K05711980-D | 2 x 2½ (51 x 54)    | D       | 205        | 105          | 54                      |
| K05711980-E | ½ x 3½ (13 x 34.9)  | E       | 80         | 48           | 29                      |
| K05711980-F | 1 x 3½ (25 x 92.1)  | F       | 165        | 90           | 49                      |
| K05711980-G | 1½ x 3½ (38 x 92.1) | G       | 275        | 120          | 52                      |
| K05711980-H | 2 x 3½ (51 x 92.1)  | H       | 375        | 120          | 38                      |
| K05711980-I | ½ x 5½ (13 x 146)   | I       | 130        | 60           | 28                      |
| K05711980-J | 1 x 5½ (25 x 146)   | J       | 255        | 120          | 56                      |
| K05711980-K | 1 x 1½ (25 x 28.6)  | K       | 28         | 12           | 5                       |
| K05711980-L | ½ x 1½ (13 x 28.6)  | L       | 13         | 6            | 3                       |
| K05711980-M | 1 in O.D. (25)      | M       | 32         | 12           | 5                       |
| K05711980-N | 2 in O.D. (51)      | N       | 180        | 105          | 61                      |
| K05711980-O | 4 in O.D. (102)     | O       | 185        | 120          | 78                      |
| K05711980-P | 1 x 1½ (25 x 34.9)  | P       | 45         | 24           | 13                      |

#### Notes:

- To order individual heater circuits from the polyimide kit, see the matrix above.
- Leads shipped loose not soldered.

**Example:** To order the J heater circuit with PSAS use K05711980A-J.

To order the J heater circuit with PSAS and leads use K05711980AL-J.

### Polyimide Handy Heater Kit—For Quick Heating Solutions

Watlow offers a convenient way to use polyimide heaters. The handy heater kit consists of 16 polyimide heaters — 13 rectangular and three circular—in different sizes and resistances. So when a small flexible heater is needed in a hurry, one can be picked that fits the application.

#### Other Features

- The heater sheet can be ordered with or without pressure sensitive adhesive (PSAS), depending on your needs. To specify PSAS add **A** to code number.
- The kit comes with instructions for wiring, lead attachment and selection and installation. Pre-tinned solder pads are provided for easy lead connections.
- The instructions also show how to dial in the desired wattage using a variable voltage transformer.
- The heaters can be wired individually, in series, or parallel for hundreds of variations to satisfy the special application.