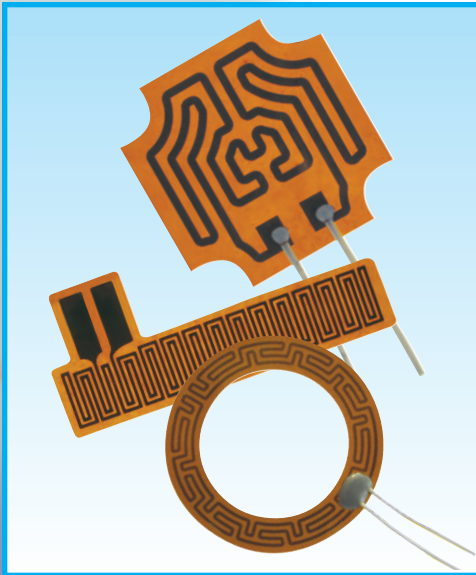


KAPTON HEATERS



Typical Heating Applications:

- *Vacuum Chambers*
- *Laser Printing*
- *Incubators*
- *Autoclaves*
- *Medical Equipment*
- *Optical Equipment*
- *Analytic Test Equipment*
- *Telecommunication Equipment*
- *Semiconductor Wafer Processing*

Kapton heaters are ultra-thin, ultra-flexible, lightweight and semitransparent. They derive their name from Kapton®, the polyimide film developed by Du Pont, which is used to encapsulate the resistive circuitry in the heater. Kapton heaters have superior dielectric properties. They are fast to heat up and cool down and can operate within temperatures as low as -320°F and as high as 392°F. These heaters exhibit excellent tensile strength, durability, and dimensional stability; they are ideal for applications with size/weight restrictions. Due to the highly controlled pattern of their heating circuits which are produced through a chemical-etching process, the heat distribution generated by Kapton heaters is uniform and precise. Moreover, these heaters can endure radiation, resist many chemicals, and being low in outgassing, are suitable for vacuum applications as well. Two types of adhesives are available to bond the different layers of a Kapton Heater; Teflon® FEP or acrylic. The choice of adhesive determines the thermal characteristics and cost of Kapton heaters.

Specifications		
Kapton Heaters	c/w FEP Adhesive	c/w Acrylic Adhesive
Max size	12" x 24"	12" x 30"
Thickness	0.008"	0.008"
Min Bend Radius	0.03in	0.03in
Max Temp	392°F	300°F
Max Voltage	240 VAC/125 VDC	
Watt Density*	Up to 50W/in ²	Up to 40W/in ²
Resistance Tolerance	-10/+10 %	
Dielectric strength	1000V	
Dimensional Tolerance	Up to 6in +/-0.030" 6in-12in +/-0.060" Over 12" +/-0.125"	

* Depending on application temperature and bonding method.

BUCAN KAPTON ULTRA THIN & FLEXIBLE HEATERS

Temperature Sensors and Thermostats

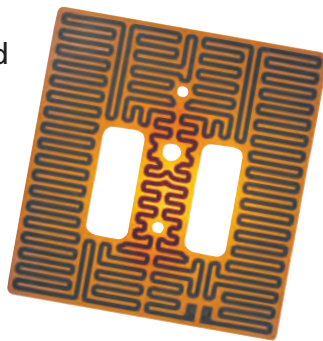
Kapton heaters can accommodate thermostats, thermal cut-offs, thermal fuses, external "J" type thermocouples and RTDs.

Each of these temperature sensing and controlling devices has a specific temperature range and maximum amperage capability



Holes and Cutouts

Kapton heaters can accommodate holes and cutouts. If the heat loss around the edges of these perforations is substantial, the heating circuit can be designed to have a distributed wattage pattern to compensate for these losses. Kapton heaters can be made with multiple zones that operate simultaneously or separately.



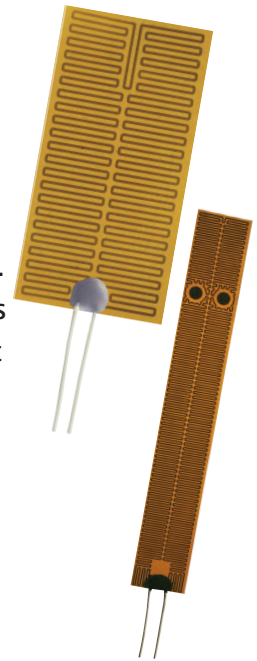
Attachment Methods

- The most common method to attach a Kapton heater to the surface of an application is through pressure sensitive adhesive (PSA), which is adequate for 300°F continuous (days, weeks) and 450°F intermittent (minutes, hours) operations.
- Kapton heaters could be clamped between surfaces.
- Self-fusing tape could be utilized to attach Kapton heaters to cylindrical surfaces by wrapping self-fusing tape around the Kapton heater.

Lead Wires

Kapton heaters can have Teflon, Silicone or Kapton insulated stranded lead wires that are attached to the weld tab of the resistive circuit. The attachments are covered with high temperature epoxy. The gauge/amps of lead wires (based on 212°F max ambient temperature) are as follows:

Gauge	Amps
30	1,5
26	3
24	5
20	11



Recommended Watt Densities

Because they don't have adequate mass, Kapton heaters should not be used in open air. They should always be bonded to a surface or clamped between two surfaces. The graph below is an illustration of recommended watt-densities with respect to part surface temperatures, in a process where the temperature is controlled through a temperature-controller. It should be noted that the attained temperature depends on heat-loss and the total wattage of the heater.

