

## THICK FILM PRINTED HEATERS



### MARATHON HEATER (I) PVT. LTD. (I) PVT

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**PRINTED FEXIBLE HEATER**

Marathon makes printed flexible heaters can be customized in various sizes.

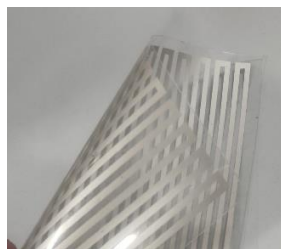
The printed heaters have uniform temperature distribution with easy mounting. The heaters can be designed with concentrating power where it is needed. The heating element can be trace with widened or narrowed structures as per requirements.

Marathon makes printed flexible PTC heaters has self-regulating properties through which it can automatically control the temperature (40°C/ 60°C/ 90°C). The PTC ink is selected as per required temperature. The electrical resistance of material increases with increase of the temperature. It is capable of controlling the temperature itself by regulating it heating power via its electric resistance to temperature.

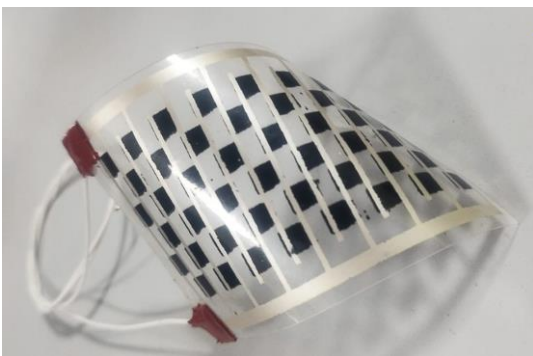
**Construction**

The printed heaters can be developed using different types of conductive and resistive inks. The heating element can be patterned on flexible base (PET/ Polyimide/ PEN etc.) using the required ink. The pattern is covered with same as base material or laminating it with an insulating material.

An additional layer of PSA can be placed at bottom to mount directly on the surface to be heated.



Flexible Printed heater



Flexible Printed PTC heater

**Termination**

The termination pads or areas allow for attachment of lead wires by clamping or bonding through conductive epoxy. The termination pads should be the highly conductive.

**Advantages and Benefits**

1. Formulating the pastes with a wide resistance range to deliver sufficient wattage
2. Adjusting printing width and depth to supplement the resistivity of the paste
3. Capability to apply heat with very predictable heat distribution across the surface or just in certain areas
4. Different shapes and geometry to fit target areas for unique heating patterns.

**Unique Characteristics**

Printed Flexible Heaters offer low mass, low leakage current.

- Temperature: 105°C to 120 °C
- Low out-gassing
- Durable, safe and reliable
- Water and acid resistant
- Minimal material waste, resulting in lower production costs compared to etched, where sheets are chemically etched to create the circuit.
- It is an additive process with selective deposition capability
- Consume less power
- Cost effective and easy fabrication

**Technical Specifications**

<b>Max Length</b>	~ 20 inches
<b>Max Width</b>	~ 18 inches
<b>Thickness</b>	0.150 - 0.50 mm
<b>Watt Density</b>	0.3 W/cm <sup>2</sup>
<b>Wattage Tolerance</b>	±10%
<b>Maximum Temperature</b>	Permanent temperatures of up to 100°C (max. 120°C for short periods)
<b>Voltage</b>	1 V to 240V AC or DC
<b>Heating Element</b>	Silver/ Carbon/ PTC

## Application Areas

Printed heaters can have several benefits within the automotive and aerospace industries. They can be used as:

- Seat Warmers
- Steering Wheel Warmer
- Defroster
- Floorboard Warmer
- Apparel
- Heat source to cook
- Space Heater

## Requirments from customer

To develop a customized Heaters the given below details are necessary:

Dimensions,  
Input Voltage (V),  
Heat Output (Watts), etc.