MINCO
ESCC Qualified Flexible Heaters

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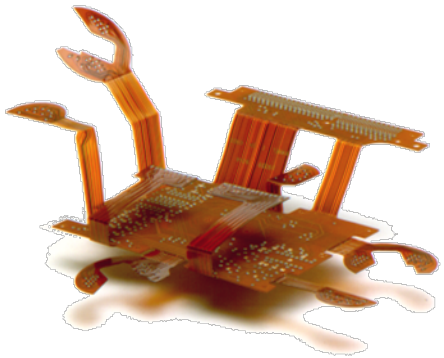
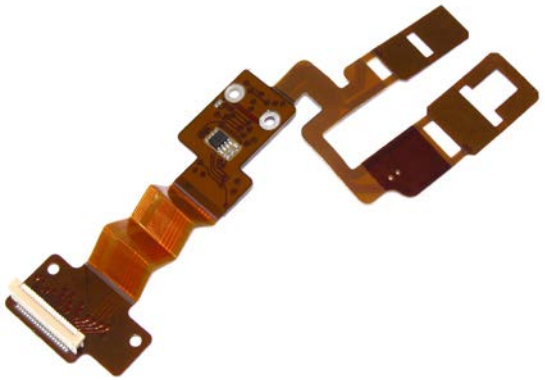
A critical component of your success™

Who we are . . .

Our Products and Technology





Flex Circuits	Sensors & Instruments	Thermal Solutions

Minco is a global provider of advanced *flexible circuits*, *sensors and instruments*, and integrated *thermal solutions* for demanding applications.

Our expert engineering capabilities help customers plan and integrate Minco components into their products, delivering proven quality and performance in thousands of applications worldwide.

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Who we are . . .

Our Global Presence

Wherever our customers need us

Growing Regional Centers - providing local applications engineering, sales and customer service support

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Space Experience

- Space heaters and thermal solutions for >30 years
- Initiated and co-authored NASA GSFC S-311-P-079 Heater Specification
- NASA certification since 1994
- Received ESA certification (April 2013)
- Simple flexible heaters to complete thermal packages (heaters, sensors, controllers, heat sinks)
- Over 20,000 space heaters produced to date
- Over 60 space programs
- US, India, Japan, EU programs

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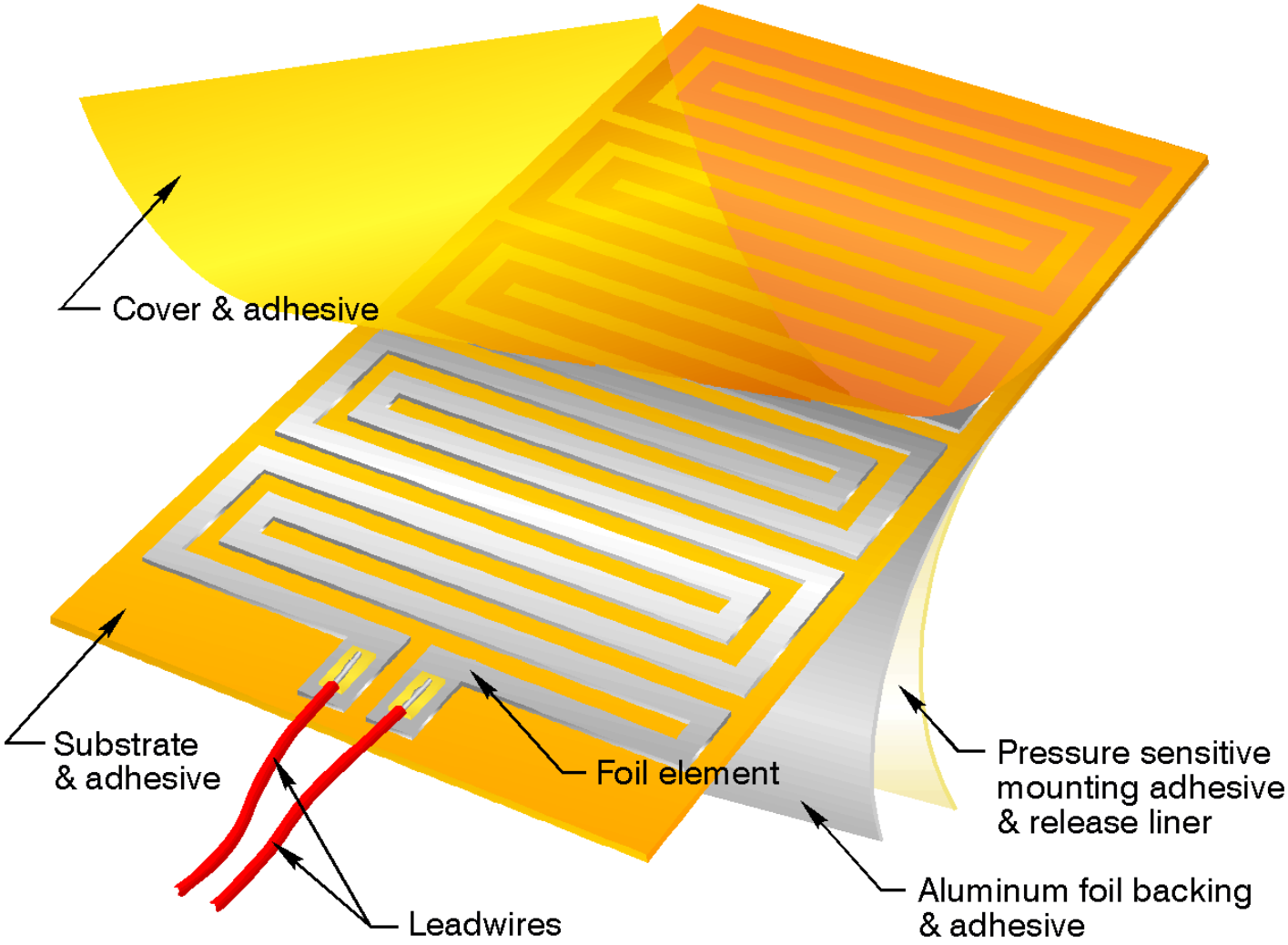
Flexible Heaters Layout



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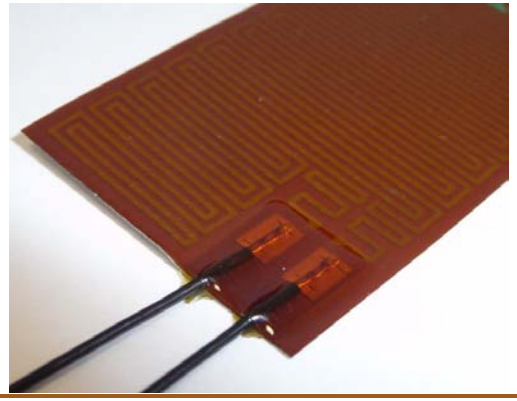
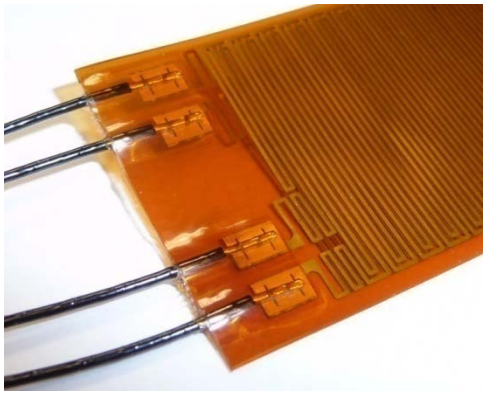
Flexible Heaters – Polyimide
ESCC Detail Specification No 4009/003

Variant 01



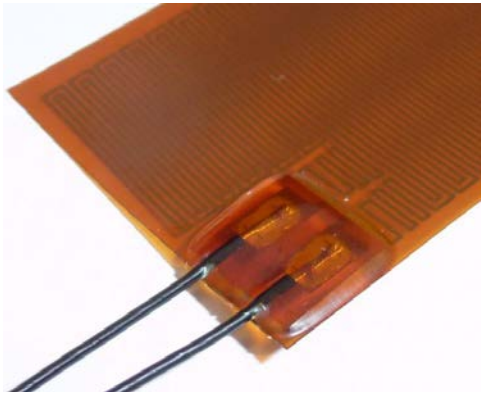
Material	Temp. range	Rated Power Density	Max. resistance density
Polyimide Film / Acrylic Adhesive	-65° to 150°C	0.38 W/cm²	70 Ω/cm²

Variant 02



Material	Temp. range	Rated Power Density	Max. resistance density
Polyimide Film / FEP adhesive	-65° to 200°C	0.54 W/cm²	70 Ω/cm²

Variant 03



Material	Temp. range	Rated Power Density	Max. resistance density
Polyimide Film / FEP Adhesive + Acrylic Adhesive Patch	-65 to 150°C	0.38 W/cm²	70 Ω/cm²

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Options available for each Variant

Options	Descriptions
Layer	Single or Dual
Resistive elements	One or more
Backing	Aluminium Backing factory bonded
Terminal Leads	ESCC Qualified Wires 3901/xxx
	Straight pair, Twisted, Shielded or Jacketed
	AWG#30 to AWG#20
Low magnetism and induction	Nickel/Chromium resistive element
	Dual layer, single resistive element heater

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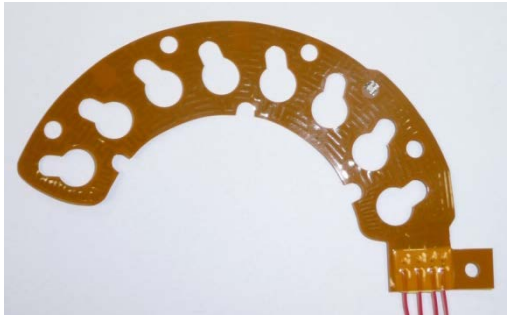
Advantages

- Various construction types (variants 01 to 03) to provide high reliability depending combinations of options
- Thin and lightweight technology (0.2mm for single and 0.3mm thick for dual layer)
- Flexibility & Customized shapes to provide a maximum heat transfer:



- Uniform heating
- Flatness increased on variant 01

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Agensat 2 Telecom
Amos Satellite
AMSU-A; SSM/T1
AOE Flight Model
Apogee boost engine
Ariane V
Cassini Satellite
Centaur Satellite
Ceres Satellite
CFVME Space Expermt.
Cluster Satellite
COBE
Erne/SOHO
ERS2
ESA satellite silex
ESA/Telcom II Series
Eureka Project
GOES
GPS/MARS/C3C4
HELIOS
HPP
HRSC

Hubble Telescope
IML-2
Insat II
Intelsat VII A
Iridium
Japanese N STAR
Leo Satelite Prog.
Locstar
Meteo sat
MOLA

MQS Satellite
Polar-Vis
PSLV
Radarsat
Sampex Satellite
Satcom
Seastar/Apax Sat.
SHOOT Project
Skynet D & E
ISS

Smart System
SMEX FAST
SOHO-PLM (ESA)
Solar Polar Mission
Space Shuttle
Spectrum RG Sat.
STE Solar Ray
SXRP/MOXE
Telcom II/Hispasat
Telcom II Series
Tempo DBS
Tiros
Topex Satellite
TSS
TV-Sat 2
UARS
Voyager
Mars Explorer
W.I.N.D. Satellite
Xlfn Rocket Heaters
XTE Satellite

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