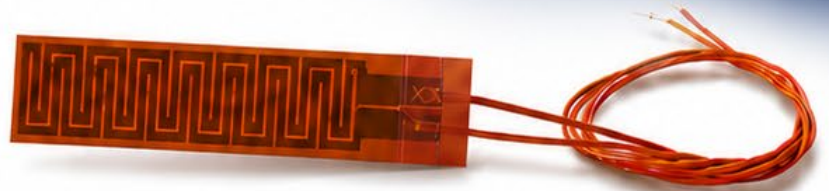


MINCO

POLYIMIDE HEATERS

WITH FEP ADHESIVE BETWEEN LAYERS



Advanced Performance. Proven Reliability.

MINCO polyimide heaters use FEP (Teflon®) adhesive between layers of polyimide for outstanding thermal performance and reliability in the most demanding space environments.

Adhesive required per S-311-P-079.



FEP ADHESIVE ADVANTAGES

✓ Low
Outgassing

✓ Thermally
Stable

✓ Space
Qualified

KEY PERFORMANCE SPECIFICATIONS



WATT DENSITY

50 watts/in²
@ 25°C



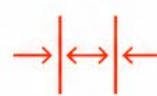
RESISTANCE DENSITY

50 ohms/in²
(preferred limit)
450 ohms/in²
(maximum)



TEMPERATURE RANGE

-200 to 200°C
(-328 to 392°F)



MIN. LINE WIDTH

.005"
(5 mils)



MIN. LINE SPACING

.005"
(5 mils)



MAXIMUM SIZE

10" x 22"
(254 x 559 mm)

ESA/ESCC AND NASA S311-P079 APPROVED



SPACE QUALIFIED

ESA/ESCC and
NASA S311-P079
Approved



FEP ADHESIVE

Adhesive required
per S-311-P-079.



THERMALLY STABLE

FEP maintains
performance over
a wide operating
temperature range.



ADHESIVE FLOW

FEP is a thermoplastic
that becomes
liquefied during the
cure cycle.



CHEMICAL RESISTANT

Resistant to most
chemicals and
solvents.



RESISTANCE CONTROLLED

50 ohms/in²
preferred limit.
450 ohms/in²
maximum.



HIGHER DENSITY OPTIONS

Higher resistance
densities, up to
450 Ω/in², possible,
with lower yields
affecting cost and
lead time.



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TYPICAL SPECIFICATIONS:

Watt Density	50 watts/in ² @ 25°C
Resistance Density	50 ohms/in ² (preferred limit) 450 ohms/in ² (maximum)
Min. Line Width	.005" (5 mils)
Min. Line Spacing	.005" (5 mils)
Maximum Size	10" x 22" (254 x 559 mm)
Temperature Range	-200 to 200°C (-328 to 392°F)
Maximum Temperature	200°C (392°F)
Construction	Polyimide with FEP (Teflon®) adhesive between layers
Compliance	ESA/ESCC and NASA S311-P079 Approved

FEP ADHESIVE BEHAVIOR & DESIGN CONSIDERATIONS



FEP is a thermoplastic that becomes liquefied during the cure cycle.



Liquification allows for adhesive flow between layers, during lamination creating a homogenized layer encapsulating the etched element foil.



Adhesive required per S-311-P-079.



FEP heaters are limited to 50 Ω /in² resistance density as the preferred limit.



Higher resistance densities, up to 450 Ω /in² (maximum), can be achieved.



Wide temperature operating range



FEP adhesive for space reliability



Low outgassing construction



Proven in demanding space environments



Custom sizes available up to 10" x 22"



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