FRALOCK® Engineered Solutions for Optimal Design

CIRLEX® ENGINEERED MATERIAL FOR SEMICONDUCTOR WAFER FABRICATION EQUIPMENT

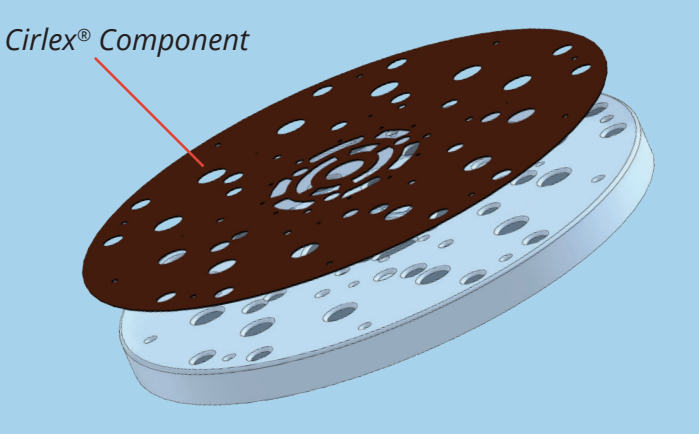
Technical Data Sheet

Cirlex® is an adhessiveless polyimide material that provides outstanding physical, electrical, and chemical performance ideal for applications with environmental extremes. Manufactured with Kapton®, it is available in a wide range of thicknesses up to 125 mil. Fralock designs and engineers Cirlex® products with flexible dimensions and properties that are unachievable with cast resins, ceramics, or laminated constructions with adhesives.

Cirlex® is exclusively manufactured by Fralock, and provides innovative engineered solutions for high-reliability semiconductor wafer fabrication equipment.

Applications

- Thermal Barriers
- Sealing Shims
- Lid Rings
- Stand-Offs
- Thermal Shields
- Gasket Rings
- Washers with Adhesive
- Electrical Isolation



Showerhead assembly with Cirlex® functioning as thermal break.

Features

- Maintains integrity at extreme temps from -269°C (-452°F) to 351°C (664°F)
- Low CTE, 30 ppm in-plane at -273°C (-459.67°F) (ASTM E831)
- Chemically inert
- Abrasion resistant
- Dielectric strength > 2790 volts/mil
- Low thermal conductivity: 0.17 W/m*K
- Tested and meets specifications:
  - NASA outgassing requirements
  - Flammability requirements: UL94V-0
- Inherently halogen free
- Glass transition temperature 351°C/663°F
- Micro-hole machining capability

Manufacturing Capabilities

Fralock produces Cirlex® to satisfy your specifications in a wide variety of applications. Our advanced capabilities enable custom fabrication to produce various shapes and sizes as needed.

Available in thicknesses from 8 mil (0.2032 mm) to 125 mil (3.175 mm) in 1 mil (0.0254 mm) increments. If additional thickness is required, please contact Fralock. Assembly and packaging services available with in-house clean rooms certified to ISO 14644-1, class 5 (100) to class 7 (10,000) standards.

Ordering Information

Material Reference Number: Cirlex-XXX (–XXX =thickness in mils)

Example: to request 40 mil thick Cirlex®, the reference # is Cirlex-40

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Cirlex® Properties

MECHANICAL

	Temperature	ASTM	Units	Typical Values
Ultimate Compressive Strength	23°C (73.4°F) 100°C (212°F) 200°C (392°F)	D695-15	kpsi	45.26 42.79 35.61
Ultimate Tensile Strength	23°C (73.4°F) 100°C (212°F) 200°C (392°F) 250°C (482°F)	D638	kpsi	32.49 21.40 17.40 16.50
Tensile Modulus	23°C (73.4°F) 100°C (212°F) 200°C (392°F) 250°C (482°F)	D638	kpsi	330 488 402 381
Tensile Yield @ 3% Elongation	23°C (73.4°F) 200°C (392°F)	D638	kpsi	6.11 5.49
Shear Strength	23°C (73.4°F) 100°C (212°F) 200°C (392°F) 250°C (482°F)	D3846	kpsi	- 6.40 5.40 5.00
Poisson's Ratio	23°C (73.4°F)	D3039-17	-	0.329

THERMAL

	Temperature	ASTM or Test Method	Units	Typical Values
Thermal Conductivity	-	-	W/m K	0.17
Glass Transition, Tg	-	-	°C	351
Specific Heat	-	-	J/g K	1.09
UL Rating	-	UL File # - E39505	-	UL 94V-0
CTE In-plane	(23° – 350° C)	ASTM E831	µm/m °C	30
CTE Thru-thickness	(23° – 350° C)	ASTM E831	µm/m °C	118
Outgassing TML	-	ASTM E595	-	0.50%
Outgassing CVCM	-	ASTM E595	-	<0.01%
Outgassing Water Vapor Regain	-	ASTM E595	-	0.42%

ELECTRICAL

	Temperature	ASTM	Units	Typical Values
Dielectric Strength	-	-	V/mil	2790
Dielectric Constant DC @ 10KHz	25°C	ASTM D150	KHz	3.45
Dielectric Constant Dissipation Factor	-	ASTM D150	-	0.004

PHYSICAL

	Temperature	ASTM	Units	Typical Values
Surface Roughness Average	-	-	µin	Ra ≤ 32
Specific Gravity	-	-	-	1.42