

**Description:**

POLYONICS PolyFLEX™ XF-104 is a 2 mil polyimide film coated with a durable, hi-resolution white printable surface designed for superior ink receptivity with conductive inks.

**Features:**

- REACH and RoHS compliant
- Dimensionally stable at high temperatures
- Chemically resistant
- Heat, cold, solvent and voltage resistant

**Uses:**

PolyFLEX polyimide films are intended to be used for printed electronics applications that require dimensional stability, temperature resistance, good electrical properties, low profile, and flexibility. The white top coat is designed to be ink receptive with conductive inks. The clear top coat is durable and passes the requirements of circuit board processing as noted by MIL-STD-202G, Notice 12, Method 215K and MIL-STD-883E, Notice 4, Method 2015.13.

**Applications:**

- The gloss amber polyimide is intended to be printed with conductive, semi conductive, and resistive ink via flexographic, digital, and screen print methods.
- The amber polyimide is intended to be used for applications that require a traditional flex circuit or polyimide appearance (amber color).
- The amber polyimide is an ideal choice for those electronic applications that are exposed to temperature extremes, cycling between high and low temperatures, or high temperatures for a prolonged period of time where dimensional stability of the film is critical to prevent breaks in the printed circuits.
- The amber polyimide is an ideal choice for those applications where dimensional stability of the film is critical due to extreme temperature exposures.
- The amber polyimide is an ideal choice for those applications that need high volume resistivity, withstand a strong electric field, and resist high voltages.
- The top coat on the amber polyimide is a good choice for high density printed circuits that require high resolution printing.

**Special Considerations:**

- The conductive ink manufacturers identified have printed on the gloss white polyimide and found acceptable results in terms of image quality and ink anchorage. Please consult with these manufacturers for suitable inks for your applications.

**Technical Data**

PROPERTIES	TEST METHODS	AVERAGE RESULTS	
		Value	Units
<b>Thickness</b>	ASTM D1000	0.0024 (61)	Inch (µm)
<b>Surface Finish</b>	High Gloss >75 GU		
<b>Thermal expansion</b> 2 mil Polyimide	TMA	32	PPM/degree Celsius
<b>Thermal Conductivity</b> 2 mil Polyimide	ASTM F-433-77 (1987)	0.12	W/m·K
<b>Tensile Strength</b> 2 mil Polyimide	ASTM D882	140	MPa
<b>Tensile Modulus</b> 2 mil Polyimide	ASTM D882	3.1	GPa
<b>Elongation</b> 2 mil Polyimide	ASTM D882	60%	@ 20C
<b>Volume Resistivity</b> 2 mil Polyimide	ASTM D-257	10 <sup>13</sup>	Ohm-cm
<b>Dielectric Constant</b> 2 mil Polyimide	IPCTM-650	3.9	@48-62 Hz
<b>Breakdown Voltage</b> 2 mil Polyimide	ASTM D-149	5.0 (200)	kV/mil (kV/µm)
<b>Ink systems recognized</b>	Conductive Compounds, HC Starck Clevios, Johnson Matthey		

**Durability Testing**

Properties	Test Method	Test Fluid	Results
<b>Chemical Resistance</b>	MIL-STD-202G, Notice 12, Method 215K MIL-STD-883E, Notice 4, Method 2015.13	Solvent A- 1 part IPA, 3 parts mineral spirits	No visible effect
		Solvent B- 1, 1, 1-Trichloroethane	Solvent deleted per notice 12
		Solvent C- Terpene Defluxer	No visible effect
		Solvent D- Saponifier	No visible effect
<b>Heat/Chemical</b>	Polyonics 80386	<b>Immersed in chemical at 70°C for 5 min</b>	<b>Image Degradation</b>
		Kyzen Corp. Aquanox SSA 30% aqueous	No degradation
		Re-entry KNI 2000 Terpene 40-45°C.	No degradation
		Alpha Metals 2110 Saponifier 10% aqueous	No degradation
		Isopropanol 99%	No degradation



PolyFLEX Substrates

**XF-104**

**2 mil White Coated Polyimide Film**

<b>Weathering Test</b>	ASTM G154	No Visible Effect
<b>Temperature Rating:</b>	<b>Long Term</b>	100 hours at 302°F (125°C)
	<b>Operating</b>	5 minutes at 500°F (260°C)
	<b>Short Term</b>	90 seconds at 572°F (300°C)
<b>Shelf Life</b>	1 year below 80°F (27°C) and 60% R.H.	

**Polyonics Material Compliance**

<b>RoHS-</b> Restriction of Hazardous Substances (EU Directive 2002/95/EC)	Limits set forth in Directive 2005/618/EC amending Directive 2002/95/EC
<b>REACH-</b> Registration Evaluation and Authorization of Chemicals (EU Directive 1907/2006/EC)	Limits set forth in Directive 1907/2006/EC Article 7 (2)
<b>Halogens-</b> Restriction use of Halogen (IEC 61249-2-21)	Limits set forth in International Electrochemical Commission

All SI units are mathematically derived from U.S. conventional units.

**NOTE:** All values shown are averages and should not be used for specification purposes. Test data and test results contained in this document are for general information only and shall not be relied upon by POLYONICS customers for designs and specifications, or be relied on as meeting specified performance criteria. Customers desiring to develop specifications or performance criteria for specific product applications should contact POLYONICS for further information.

**References:**

ASTM: American Society for Testing and Materials (U.S.A.) SI: International Systems of Units.

**Trademarks:**

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