

**Description:**

POLYONICS PolyFLEX™ XF-106 is a high temperature, high opacity flexible substrate that includes a 1 mil black polyimide film coated with a durable, highly reflective white top coat that can be printed with conductive inks.

**Features:**

- High Opacity
- High reflectivity
- Minimal light leakage
- 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:**

- Lighting devices (LEDs, etc.) that require substrates with both high reflectivity and minimal light leakage (high opacity)
- 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).
- 1 mil polyimide materials are well suited for Digital and Flexographic print methods.
- 5 mil polyimide is best suited for screen print methods where vacuum ports are used for positioning the substrate.
- 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:**

- For screen printed applications that use vacuum ports for holding substrates in place during printing, the 1 mil polyimide should be evaluated to confirm film deflection does not cause print defects.
- 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.

**1 mil White Coated Black Polyimide Film**

- 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.
- Customers desiring to develop specifications or performance criteria for specific product applications should contact Polyonics for further information

**Technical Data**

PROPERTIES	TEST METHODS	AVERAGE RESULTS	
		Value	Units
<b>Thickness</b>	ASTM D1000 1 mil Black Polyimide	0.0014 (35.6)	Inch (µm)
<b>Gloss</b>		High Gloss, 75-80 GU	
<b>Color</b>		L = 85 - 90; a = -1.5 +/- 0.5; b = -4.0 +/- 1.0 (CIE L*a*b*)	
<b>Opacity</b>		>90%	
<b>Reflectivity</b>		>90%	
<b>Thermal expansion</b>	TMA 1 mil Polyimide	20	PPM/degree Celsius
<b>Thermal Conductivity</b>	ASTM F-433-77 (1987)	0.12	W/m·K
<b>Tensile Strength</b>	ASTM D882 1 mil Polyimide	231	MPa
<b>Tensile Modulus</b>	ASTM D882 1 mil Polyimide	2.5	GPa
<b>Elongation</b>	ASTM D882 1 mil Polyimide	72%	@ 20C
<b>Volume Resistivity</b>	ASTM D-257 1 mil Polyimide	10 <sup>17</sup>	Ohm-cm
<b>Dielectric Constant</b>	IPCTM-650 1 mil Polyimide	3.4	@1 MHz
<b>Breakdown Voltage</b>	ASTM D-149 1 mil Polyimide	7.7 (303)	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



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		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	Immersed in chemical at 70°C 5 min.	Image Degradation <sup>1</sup>
		Kyzen Corp. Aquanox SSA 30% aqueous, 70°C, 5 min.	No degradation
		Re-entry KNI 2000 Terpene 40-45°C, 5 min.	No degradation
		Alpha Metals 2110 Saponifier 10% aqueous, 70°C, 5 min	No degradation
		Isopropanol 99%, 70°C, 5 min.	No degradation
		Kyzen XJN+, 30% 70°C, 5min.	No degradation
<b>Weathering Test</b>	ASTM G154	No Visible Effect	
<b>Temperature Rating:</b>	@ higher temperatures, short dwell only	-40 to 932°F (-40 to 500°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.

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**References:**

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

**Trademarks:**

XJN+ & Aquanox SSA-TM is a trademark of Kyzen Corporation RE-ENTRYTM is a registered trademark of Environsolv Inc.





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**WARRANTY-LIMITATION**

Polyonics' products are sold with the understanding that the Buyer will test them in actual use and determine for him/herself their adaptability to his/her intended uses. Polyonics warrants to the buyer that its products are free from defects in material and workmanship, but limits its obligations under this warranty to replacement of the products shown to Polyonics' satisfaction to have been defective, provided that the Buyer has complied with the handling, storage and shelf life requirements as specified by Polyonics in applicable materials specifications.

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