

## T2321XF

### THERMALLY CONDUCTIVE FILM

#### TECHNICAL DATA

January, 2015

#### Product Description

TechFilm T2321XF is an ionically clean, B-staged epoxy film adhesive that meets the requirements of MIL-STD 883, Method 5011 and NASA outgassing criteria. It features a high glass transition temperature above 200°C and good adhesion to metals and ceramics. It also features excellent resistance to a variety of liquids.

APPLICATIONS	FEATURES	RECOMMENDED SUBSTRATES
<ul style="list-style-type: none"> <li>All purpose bonding</li> <li>Piezoelectric sensors</li> </ul>	<ul style="list-style-type: none"> <li>Meets Requirements of MIL-STD 883, Method 5011</li> <li>Meets NASA Outgassing Criteria</li> <li>High Thermal Conductivity</li> </ul>	<ul style="list-style-type: none"> <li>Aluminum</li> </ul>

CURED PROPERTIES*		
Property	Value	Test Method
Color	Cream	Visual
Specific Gravity	2.1	ASTMD 790
Specific Heat Capacity, J/g-K	1.06	ASTM E1461
Glass Transition Temperature, C	205	DMA
Thermal diffusivity, thickness = 1.05 mm, cm <sup>2</sup> /s-°K	0.0042	ASTM E1461
Thermal Conductivity, W/M-K	0.9	ASTM E1461
Volume Resistivity @25C, Ohm-cm	>2.0 x10 <sup>14</sup>	ASTM D257
Linear Coefficient of Thermal Expansion, x 10 <sup>-6</sup> /C	Alpha 1 (below Tg): 46	ASTM E831
	Alpha 2 (above Tg): 220	ASTM E831
Weight Loss, TGA, 20C/min, N <sub>2</sub> , %	@ 150C: 0.08	ASTM D3850 and MIL-STD-883, Method 5011
	@ 200C: 0.15	
	@ 300C: 0.47	
Space Simulated Outgassing, Total Mass Loss (TML), %	0.597	ASTM E595
Space Simulated Outgassing, Collected Volatiles (CVCN), %	0.093	ASTM E595
Space Simulated Outgassing, Water Vapor Recovered (WVR), %	0.202	ASTM E595
Total Ionic Content (mS/m)	0.34	MIL-STD-883J, METHOD 5011.6
Hydrogen (pH)	8.1	MIL-STD-883J, METHOD 5011.6
Fluoride (ppm)	<5	MIL-STD-883J, METHOD 5011.6
Chloride (ppm)	13.8	MIL-STD-883J, METHOD 5011.6
Sodium (ppm)	15.1	MIL-STD-883J, METHOD 5011.6
Potassium (ppm)	<5	MIL-STD-883J, METHOD 5011.6

TENSILE SHEAR STRENGTH*		
Property	Value	Test Method
to Aluminum @ 25C, psi	1850	ASTM D1002

CURE SCHEDULE*		
Property	Value	Test Method
Cure Time @ 180°C, min	60	Typical Cure Schedule

**Storage:** Store in dry conditions, out of sunlight and in tightly sealed containers.  
**Shelf Life:** One month @ 20°C Two months @ 10°C Three months @ -10°C One year @ -40°C

Revision Number: 2 Date: 07 January, 2015

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<b>CHEMICAL RESISTANCE TABLE*</b>		
<b>Solvent</b>	<b>Weight Gain (+) Loss (-) after 24hrs @ 25C, (%)</b>	<b>Weight Gain (+) Loss (-) after 48hrs @ 50C, (%)</b>
Water/antifreeze	0.6	2.2
Transmission fluid	6	2.2
Antifreeze	1.2	8.3
Salt Water, 1.4M	1.4	0.7
Tap Water	0.7	0.9
Deionized Water	0.8	1
Ferric Nitrate/Water, pH2	0.8	0.9
Sodium Hydroxide / Water, pH12	0.8	0.9
Solution of 1 M Methanol, 1M Sulfuric Acid in Water	0.7	1.4
N-Methyl-2-pyrrolidone	0.4	0.9
Acetone	0.3	1.3
Isopropyl Alcohol	-0.1	0.2
Alconox Water, Saturated solution	0.9	2.5
10 to 15 psi Steam, @ >100C	1.4*	_____

\*All samples were 0.005 to 0.007 inches thick, 1 inch wide and 3 inches long. A modified ASTM D570 testing procedure was used. Due to the thin samples, used adsorption numbers may be artificially inflated when compared to industrial standards for measuring chemical resistance.

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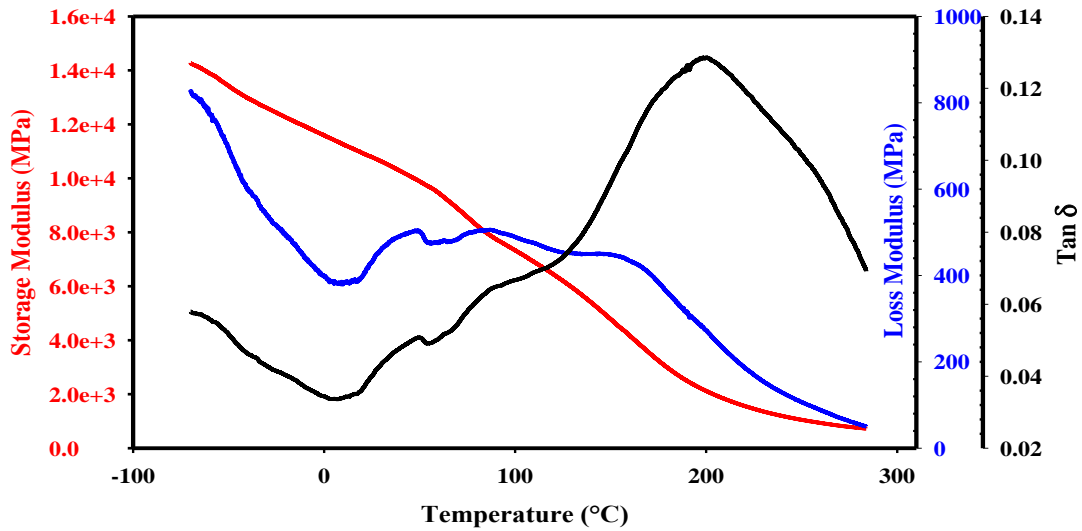
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**TECHNICAL DATA**

January, 2015

**DMA SCANS**



**Modulus Data**

Property	Temperature			
	-70°C	-40°C	25°C	100°C
Storage Modulus, MPa	14300	13000	10800	7300
Loss Modulus MPa	830	601	430	490
Tan d	0.058	0.046	0.04	0.067

Revision Number: 1-New Date: 07 January, 2015

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