### AMTIR-6 Material Properties

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>METRIC UNITS</th>
<th>ENGLISH UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>As₂S₃</td>
<td></td>
</tr>
<tr>
<td>Glass Transition Temperature (Tg)</td>
<td>182 °C</td>
<td>360 °F</td>
</tr>
<tr>
<td>Annealing Temperature</td>
<td>190 °C</td>
<td>374 °F</td>
</tr>
<tr>
<td>Dilatometric Softening Point</td>
<td>202 °C</td>
<td>396 °F</td>
</tr>
<tr>
<td>Thermal Expansion Coefficient</td>
<td>22.5 ppm / °C</td>
<td>12.5 ppm / °F</td>
</tr>
<tr>
<td>Specific Heat</td>
<td>0.115 cal/gm-°C</td>
<td></td>
</tr>
<tr>
<td>Thermal Conductivity</td>
<td>7.9 x 10⁻⁴ cal /sec-cm-°K</td>
<td>1.91 x 10⁻¹ BTU/ Hr-ft-°F</td>
</tr>
<tr>
<td>Knoop Hardness</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>Young’s Modulus (E)</td>
<td>16.2 GPa</td>
<td>2.35 x 10⁴ lbs /in²</td>
</tr>
<tr>
<td>Shear Modulus (G)</td>
<td>6.2 GPa</td>
<td>8.99 x 10⁵ lbs / in²</td>
</tr>
<tr>
<td>Poisson’s Ratio</td>
<td>0.305</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>8.8 MPa</td>
<td>1,275 lbs / in²</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>74.5 MPa</td>
<td>10,800 lbs / in²</td>
</tr>
<tr>
<td>Rupture Modulus (ASTM-C158)</td>
<td>14.5 MPa</td>
<td>2100 lbs / in²</td>
</tr>
<tr>
<td>Density</td>
<td>3.20 gm/cm³</td>
<td>199.8 lbs/ft³</td>
</tr>
<tr>
<td>Dielectric Constant</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>Resistivity (@100Hz)</td>
<td>&gt;2x 10⁻¹² ohm-cm</td>
<td>&gt;8 x 10⁻¹¹ ohm-in</td>
</tr>
<tr>
<td>Refractive Index @ 0.9 um (22 °C)</td>
<td>2.4994</td>
<td></td>
</tr>
<tr>
<td>Refractive Index @ 3.0 um (22 °C)</td>
<td>2.4202</td>
<td></td>
</tr>
<tr>
<td>Refractive Index @ 6.0 um (22 °C)</td>
<td>2.4070</td>
<td></td>
</tr>
<tr>
<td>Refractive Index @ 8.0 um (22 °C)</td>
<td>2.3976</td>
<td></td>
</tr>
<tr>
<td>δn/ΔT @ 0.9 um</td>
<td>0.00002070</td>
<td></td>
</tr>
<tr>
<td>δn/ΔT @ 3.0 um</td>
<td>0.00000419</td>
<td></td>
</tr>
<tr>
<td>δn/ΔT @ 6.0 um</td>
<td>-0.00000265</td>
<td></td>
</tr>
<tr>
<td>δn/ΔT @ 8.0 um</td>
<td>-0.00000354</td>
<td></td>
</tr>
</tbody>
</table>

#### Chemical Durability (weight loss in milligrams in a 4 Hour Period)

<table>
<thead>
<tr>
<th>Solution</th>
<th>Temperature (°C)</th>
<th>Milligrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂O</td>
<td>90 °C</td>
<td>0</td>
</tr>
<tr>
<td>2% NH₄OH</td>
<td>60 °C</td>
<td>16</td>
</tr>
<tr>
<td>2% KOH</td>
<td>60 °C</td>
<td>45</td>
</tr>
<tr>
<td>HCl, H₂SO₄, HNO₃ &amp; EtOH (all conc)</td>
<td>60 °C</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

**NOTE:** All data provided on these datasheets are typical values and believed to be accurate and representative of standard AMI melt practice, at the time of publication.
### Summary Transmission and Absorption Data

<table>
<thead>
<tr>
<th>Wavelength (um)</th>
<th>Fresnel Coefficient</th>
<th>Transmission (%) (1.0 cm)</th>
<th>Transmittance (2.54 cm) (corrected)</th>
<th>Absorption Coefficient (cm(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.600</td>
<td>0.663</td>
<td>3.514</td>
<td>0.053</td>
<td>1.276</td>
</tr>
<tr>
<td>0.700</td>
<td>0.677</td>
<td>62.259</td>
<td>0.920</td>
<td>0.036</td>
</tr>
<tr>
<td>0.800</td>
<td>0.685</td>
<td>65.600</td>
<td>0.958</td>
<td>0.019</td>
</tr>
<tr>
<td>1.000</td>
<td>0.693</td>
<td>67.837</td>
<td>0.979</td>
<td>0.009</td>
</tr>
<tr>
<td>2.000</td>
<td>0.704</td>
<td>69.677</td>
<td>0.990</td>
<td>0.004</td>
</tr>
<tr>
<td>3.000</td>
<td>0.706</td>
<td>70.304</td>
<td>0.996</td>
<td>0.002</td>
</tr>
<tr>
<td>4.000</td>
<td>0.707</td>
<td>61.643</td>
<td>0.872</td>
<td>0.059</td>
</tr>
<tr>
<td>5.000</td>
<td>0.708</td>
<td>70.494</td>
<td>0.996</td>
<td>0.002</td>
</tr>
<tr>
<td>6.000</td>
<td>0.709</td>
<td>70.367</td>
<td>0.993</td>
<td>0.003</td>
</tr>
<tr>
<td>7.000</td>
<td>0.710</td>
<td>69.394</td>
<td>0.978</td>
<td>0.010</td>
</tr>
<tr>
<td>8.000</td>
<td>0.711</td>
<td>68.641</td>
<td>0.966</td>
<td>0.015</td>
</tr>
<tr>
<td>9.000</td>
<td>0.712</td>
<td>49.321</td>
<td>0.693</td>
<td>0.159</td>
</tr>
<tr>
<td>10.000</td>
<td>0.713</td>
<td>27.663</td>
<td>0.388</td>
<td>0.411</td>
</tr>
</tbody>
</table>

**NOTE:** Amorphous Materials, Inc. calculates the values for Absorption Coefficients, using the standard formulas and approach recommended by the Optical Society of America (OSA) and used routinely by most Optical Engineers.

Calculate the ABSORBANCE (\(Abs\)) at a given wavelength, corrected for multiple-internal reflections (i.e., Fresnel losses) and divide this value by the light path (i.e., sample thickness in centimeters).

**FRESNEL REFLECTION COEFFICIENT** \(R_\lambda\) = \(2n_\lambda/(n_\lambda^2 + 1)\); where \(n_\lambda\) = the Refractive Index @ \(\lambda\).

**INTERNAL TRANSMITTANCE** \(T_i\) \(\lambda\) = OVERALL TRANSMISSION \(T_o\) \(\lambda\) / \(R_\lambda\).

**ABSORBANCE** at the wavelength \(Abs_\lambda\) = -\(\log_{10} (T_i)\) \(\lambda\) or \(Abs_\lambda = \log_{10} (1/T_i)\) \(\lambda\).

**ABSORPTION COEFFICIENT** \(A_\lambda\) = \(Abs_\lambda\) / thickness(cm).
AMTIR-6 Refractive Index
(08/2016 Sellmeier Fit of M3-MSI Data @ 22°C)

\[ n = \sqrt{a + \frac{b\lambda^2}{\lambda^2-c} + \frac{d\lambda^2}{\lambda^2-e} + \frac{f\lambda^2}{\lambda^2-g}} \]

**Sellmeier Coefficients**

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1.950778</td>
<td>-75515.229</td>
<td>-51322354</td>
<td>1.3852162</td>
<td>0.02164238</td>
<td>2.5019545</td>
<td>0.10484956</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \Delta n / \Delta T )</th>
<th>Wavelength (microns)</th>
<th>Refractive Index (22°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00000626</td>
<td>0.6000</td>
<td>2.63707</td>
</tr>
<tr>
<td>0.0000406</td>
<td>0.7000</td>
<td>2.56561</td>
</tr>
<tr>
<td>0.00002840</td>
<td>0.8000</td>
<td>2.52501</td>
</tr>
<tr>
<td>0.00002070</td>
<td>0.9000</td>
<td>2.49936</td>
</tr>
<tr>
<td>0.00001602</td>
<td>1.0000</td>
<td>2.48197</td>
</tr>
<tr>
<td>0.00000913</td>
<td>2.0000</td>
<td>2.43042</td>
</tr>
<tr>
<td>0.00000419</td>
<td>3.0000</td>
<td>2.42023</td>
</tr>
<tr>
<td>0.00000080</td>
<td>4.0000</td>
<td>2.41512</td>
</tr>
<tr>
<td>-0.00000137</td>
<td>5.0000</td>
<td>2.41100</td>
</tr>
<tr>
<td>-0.00000265</td>
<td>6.0000</td>
<td>2.40689</td>
</tr>
<tr>
<td>-0.00000330</td>
<td>7.0000</td>
<td>2.40246</td>
</tr>
<tr>
<td>-0.00000354</td>
<td>8.0000</td>
<td>2.39757</td>
</tr>
<tr>
<td>-0.00000355</td>
<td>9.0000</td>
<td>2.39215</td>
</tr>
<tr>
<td>-0.00000348</td>
<td>10.0000</td>
<td>2.38616</td>
</tr>
</tbody>
</table>