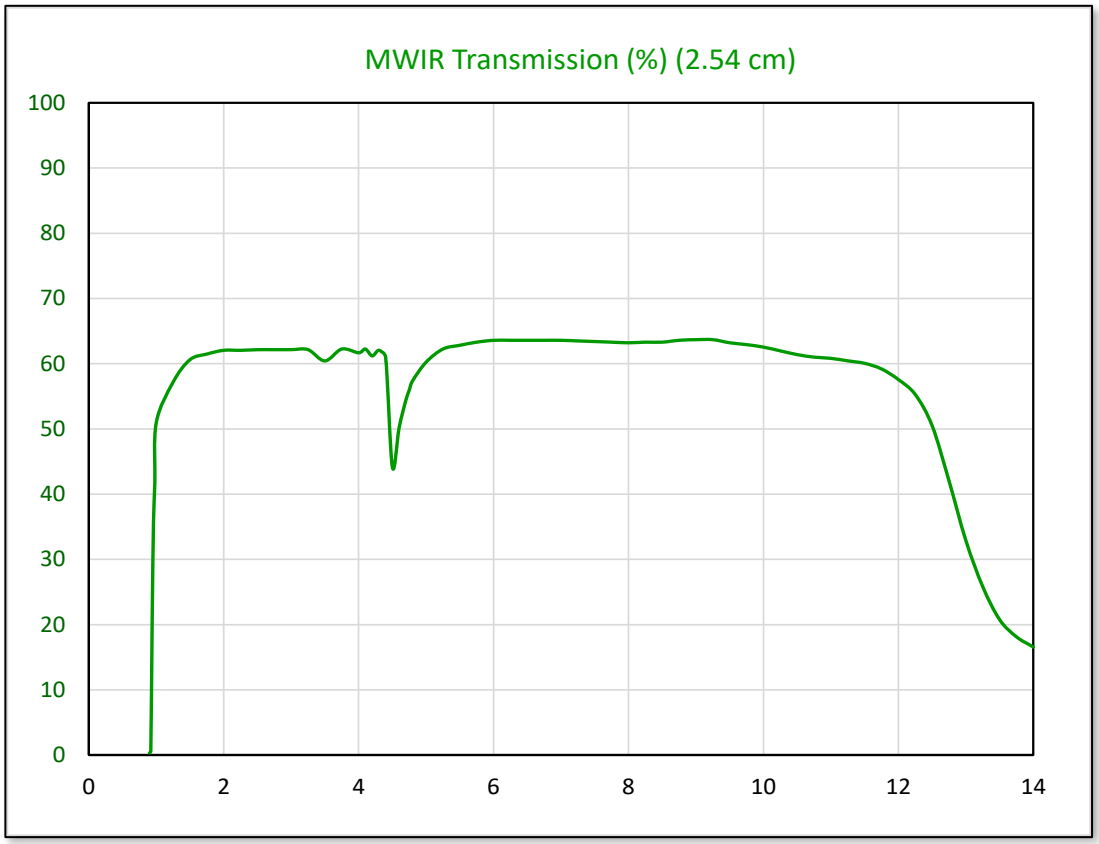
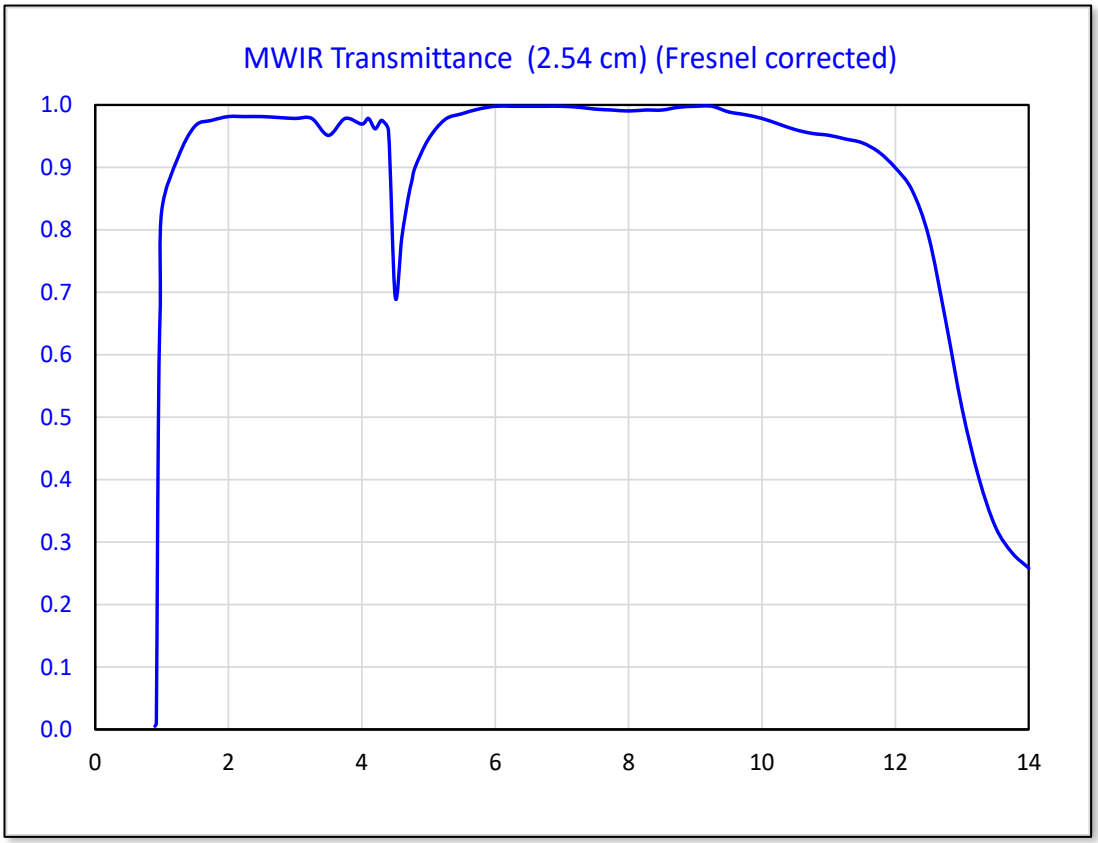
# AMTIR-2 Material Properties

| Property | METRIC UNITS | ENGLISH UNITS |
|---|---|---|
| Composition | AsSe | |
| Glass Transition Temperature (Tg) | 158 °C | 316 °F |
| Annealing Temperature | 165 °C | 329 °F |
| Dilatometric Softening Point | 177 °C | 351 °F |
| Thermal Expansion Coefficient | 22.5 ppm / °C | 1.25 ppm / °F |
| Thermal Conductivity | $5.3 \times 10^{-4}$ cal /sec-cm-°K | $1.28 \times 10^{-1}$ BTU/ Hr-ft-°F |
| Specific Heat | 0.068 cal/gm- °C | 0.068 btu/lb-ft |
| Knoop Hardness | 110 | |
| Young's Modulus (E) | 18.5 | $2.68 \times 10^{6}$ lbs /in² |
| Shear Modulus (G) | 7.44 | $1.08 \times 10^{6}$ lbs/ in² |
| Poisson's Ratio | 0.244 | |
| Tensile Strength | 10.3 MPa | 1490 lbs / in² |
| Compressive Strength | 63.8 MPa | 9,250 lbs / in² |
| Rupture Modulus (ASTM-C158) | 18.2 MPa | 2640 lbs / in² |
| Density | 4.66 gm/cm³ | 290.9 lbs/ft³ |
| Dielectric Constant | 8.9 | |
| Resistivity | $> 1 \times 10^{10}$ ohm-cm | $> 4 \times 10^{9}$ ohm-in |
| Refractive Index @ 3.0 um (20 °C) | 2.78342 | |
| Refractive Index @ 8.5 um (20 °C) | 2.77396 | |
| Refractive Index @ 12.5 um (20 °C) | 2.76248 | |
| $\delta n/\Delta T$ @ 3.0 um | 0.0000302 | |
| $\delta n/\Delta T$ @ 8.5 um | 0.0000309 | |
| $\delta n/\Delta T$ @ 12.5 um | 0.0000323 | |
| Chemical Durability (weight loss in milligrams in a 4 Hour Period) | | |
| **Solution** | **Temperature (°C)** | **Milligrams** |
| $H_2O$ | 90 °C | 0 |
| 2% $HH_4OH$ | 60 °C | 20 |
| 2% KOH | 60 °C | 30 |
| HCl, $H_2SO_4$, $HNO_3$ & EtOH (all conc) | 60 °C | 0 |

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.





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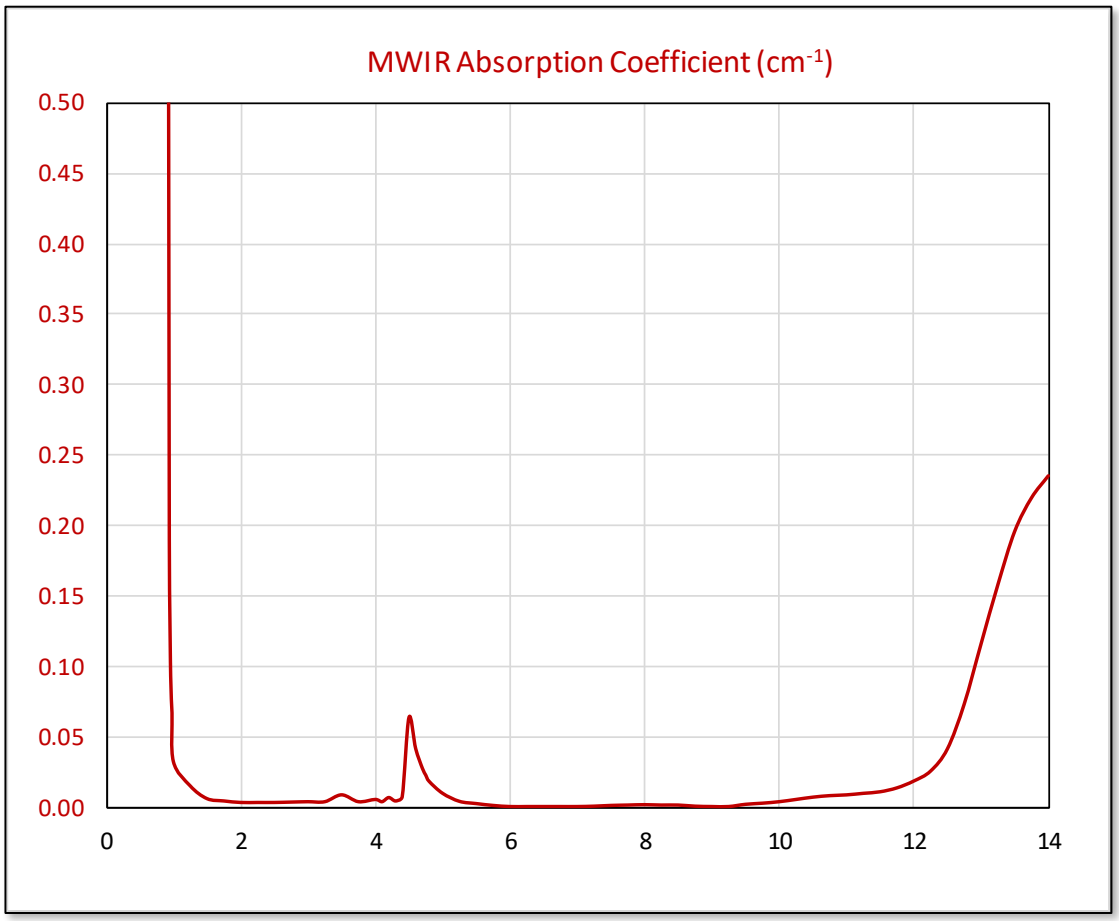


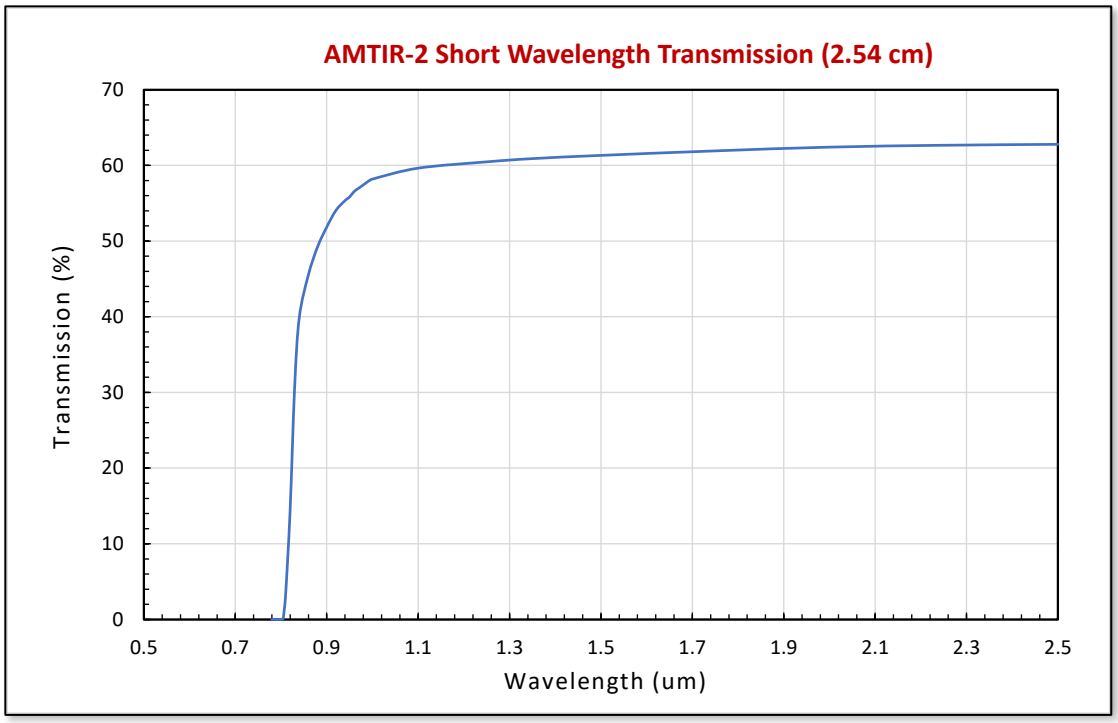



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| Wavelength (um) | Fresnel Coefficient | Transmission (%) (2.54 cm) | Transmittance (2.54 cm) (corrected) | Absorption Coefficient ($cm^{-1}$) |
|---|---|---|---|---|
| 1.000 | 0.613 | 50.9 | 0.830 | 0.0323 |
| 2.000 | 0.632 | 62.0 | 0.982 | 0.0032 |
| 3.000 | 0.635 | 62.1 | 0.978 | 0.0038 |
| 4.000 | 0.636 | 61.7 | 0.969 | 0.0054 |
| 5.000 | 0.637 | 60.2 | 0.945 | 0.0097 |
| 6.000 | 0.637 | 63.6 | 0.998 | 0.0004 |
| 7.000 | 0.637 | 63.6 | 0.998 | 0.0004 |
| 8.000 | 0.638 | 63.2 | 0.990 | 0.0017 |
| 9.000 | 0.638 | 63.7 | 0.998 | 0.0004 |
| 10.000 | 0.639 | 62.5 | 0.978 | 0.0038 |
| 11.000 | 0.639 | 60.8 | 0.952 | 0.0086 |
| 12.000 | 0.640 | 57.6 | 0.899 | 0.0184 |
| 13.000 | 0.640 | 32.9 | 0.513 | 0.1158 |
| 14.000 | 0.641 | 16.6 | 0.258 | 0.2351 |

**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 ( $Abs_\lambda$ ) = $-\text{Log}_{10}$ ($T_i$) $_\lambda$ or $Abs_\lambda = \text{Log}_{10}$ (1/ $T_i$) $_\lambda$
**ABSORPTION COEFFICIENT** ( $A_\lambda$ ) = $Abs_\lambda$ / thickness(cm)


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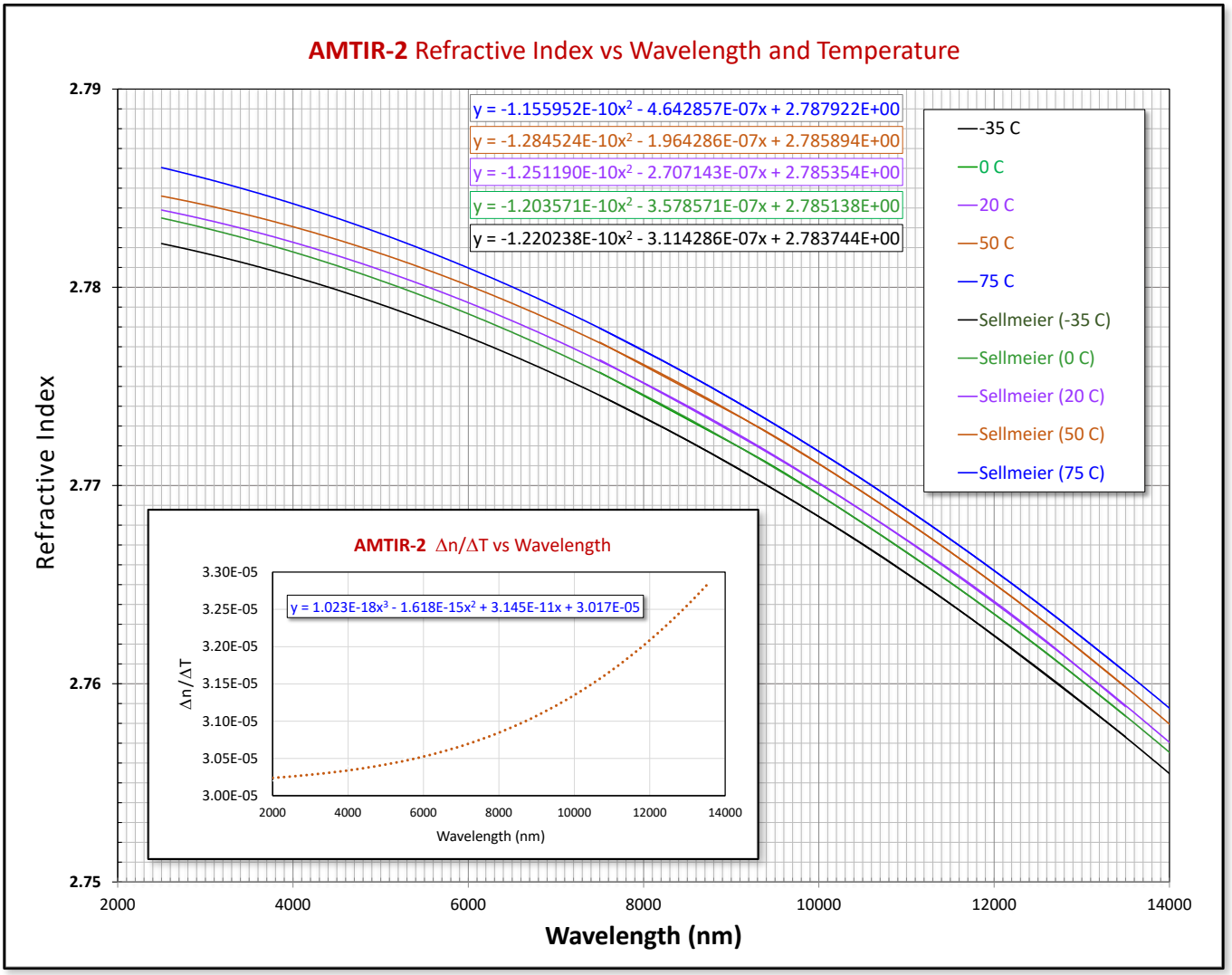


| Δn/ΔT | Wavelength (microns) | Refractive Index (20 °C) |
|---|---|---|
| **0.0000302** | 1.50 | **2.78467** |
| **0.0000302** | 2.00 | **2.78431** |
| **0.0000303** | 3.00 | **2.78342** |
| **0.0000303** | 4.00 | **2.78227** |
| **0.0000304** | 5.00 | **2.78087** |
| **0.0000305** | 6.00 | **2.77923** |
| **0.0000307** | 7.00 | **2.77733** |
| **0.0000308** | 8.00 | **2.77518** |
| **0.0000311** | 9.00 | **2.77278** |
| **0.0000313** | 10.00 | **2.77013** |
| **0.0000317** | 11.00 | **2.76724** |
| **0.0000321** | 12.00 | **2.76409** |
| **0.0000326** | 13.00 | **2.76069** |
| **0.0000331** | 14.00 | **2.75704** |


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