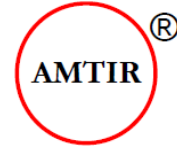


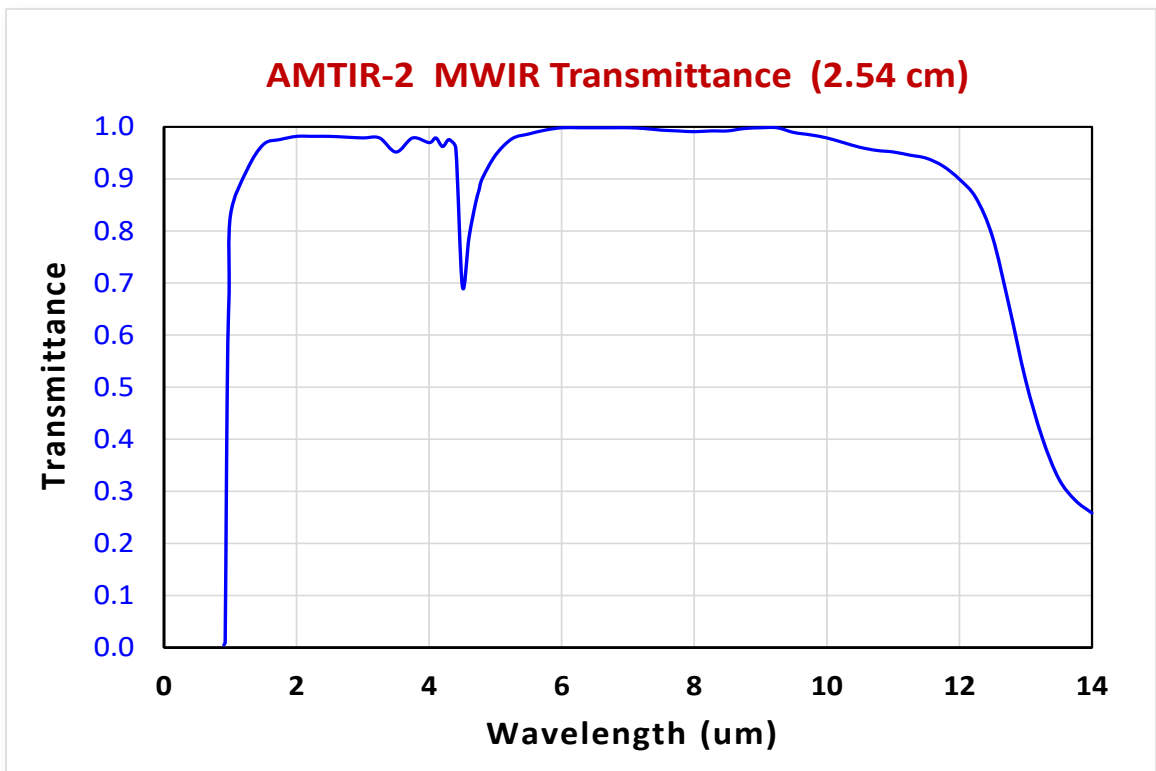
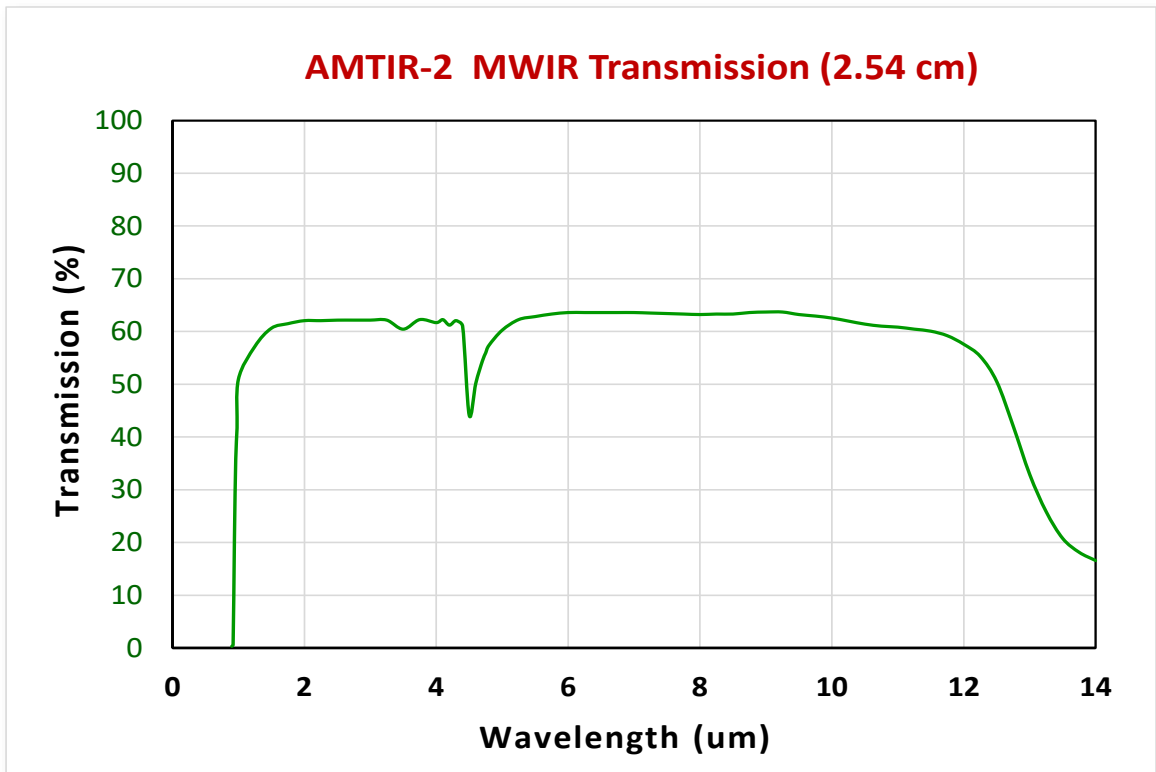
AMORPHOUS MATERIALS, INC.

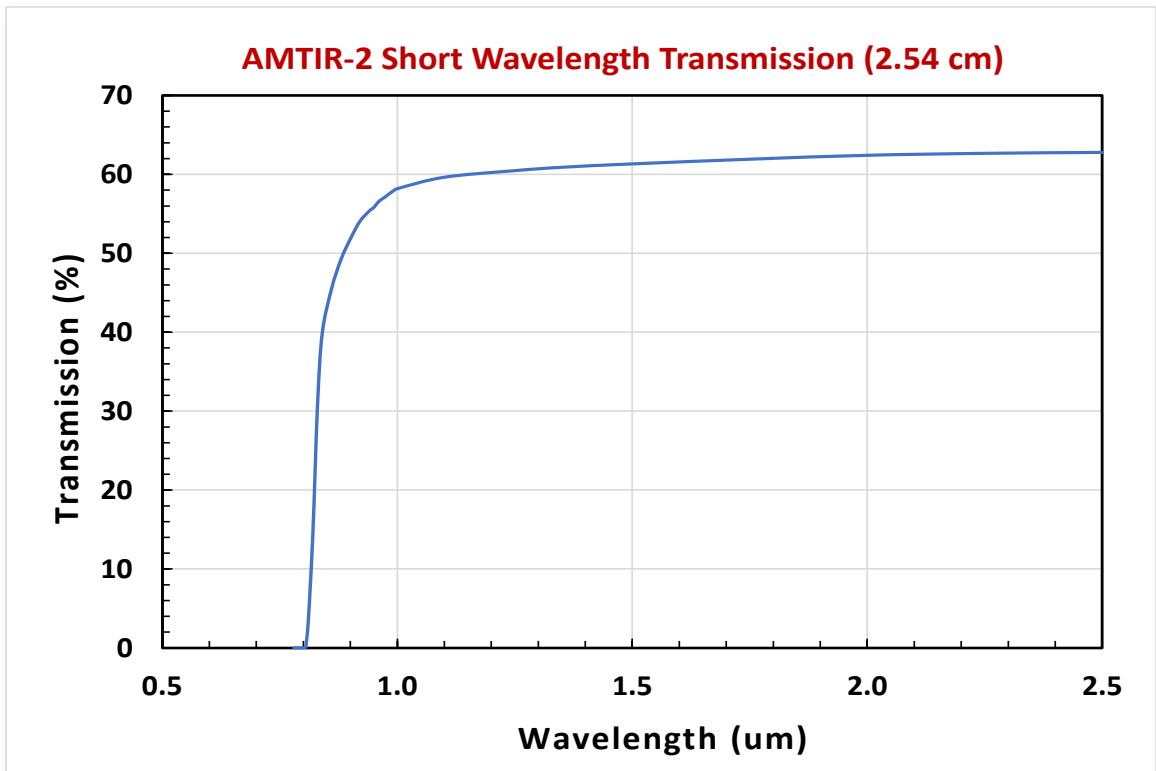
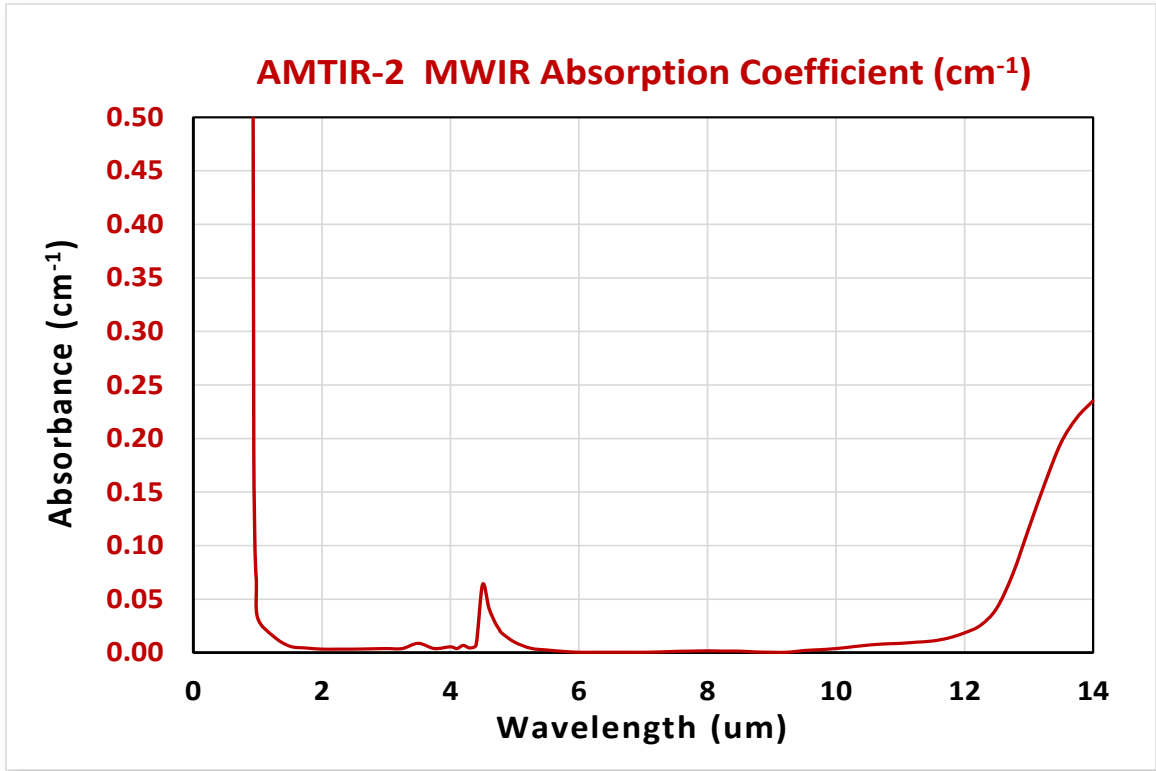
MANUFACTURER OF IR MATERIALS



AMTIR-2 Material Properties		
PROPERTY	METRIC UNITS	ENGLISH UNITS
Composition	AsSe	
Glass Transition Temperature (T _g)	159 °C	318 °F
Annealing Temperature	163 °C	325 °F
Dilatometric Softening Point	175 °C	347 °F
Upper Use Temperature	130 °C	266 °F
Thermal Expansion Coefficient (25 to 100 °C)	22.1 ppm / °C	12.3 ppm / °F
Thermal Expansion Coefficient (25 to 150 °C)	22.9 ppm / °C	12.7 ppm / °F
Thermal Conductivity	5.3 x 10 ⁻⁴ cal /sec-cm-°K	1.28 x 10 ⁻¹ BTU/ Hr-ft-°F
Specific Heat	0.068 cal/gm- °C	0.068 btu/lb-ft
Knoop (Vickers) Hardness	110 (100)	
Young's Modulus (E)	18.5	2.68 x 10 ⁶ lbs /in ²
Shear Modulus (G)	7.44	1.08 x 10 ⁶ lbs/ in ²
Poisson's Ratio	0.244	
Tensile Strength	10.3 MPa	1490 lbs / in ²
Compressive Strength	63.8 MPa	9,250 lbs / in ²
Rupture Modulus (ASTM-C158)	18.2 MPa	2640 lbs / in ²
Density	4.66 gm/cm ³	290.9 lbs/ft ³
Dielectric Constant	8.9	
Resistivity (@100 Hz)	> 1 x 10 ¹⁰ ohm-cm	> 4 x 10 ⁹ ohm-in
Refractive Index @ 3 um (20 °C)	2.79463	
Refractive Index @ 8 um (20 °C)	2.77633	
Refractive Index @ 12 um (20 °C)	2.76540	
SWIR Abbe Value	18	
MWIR Abbe Value	165	
LWIR Abbe Value	162	
Δn/ΔT @ 3 um	0.000042	
Δn/ΔT @ 8 um	0.000036	
Δn/ΔT @ 12 um	0.000036	
Chemical Durability (weight loss in milligrams in a 4 Hour Period)		
Solution	Temperature (°C)	Milligrams
H ₂ O	90 °C	0
2% HH ₄ OH	60 °C	20
2% KOH	60 °C	30
HCl, H ₂ SO ₄ , HNO ₃ & EtOH (all conc)	60 °C	0

NOTE: All data provided on these datasheets are typical melt values and believed to be accurate and representative of standard AMI melt practice, at the time of publication. Industry standard tolerances apply to all categories. Current maximum blank size available meeting standard quality specifications is Ø150 mm x 25 mm thick. (Larger diameters may be available in the future.) **(See AMI Supplemental Datasheet for AMTIR-2 Zemax Optic Studio and Synopsis Code-V information.)**





AMTIR-2 Transmission Properties

Wavelength (μm)	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

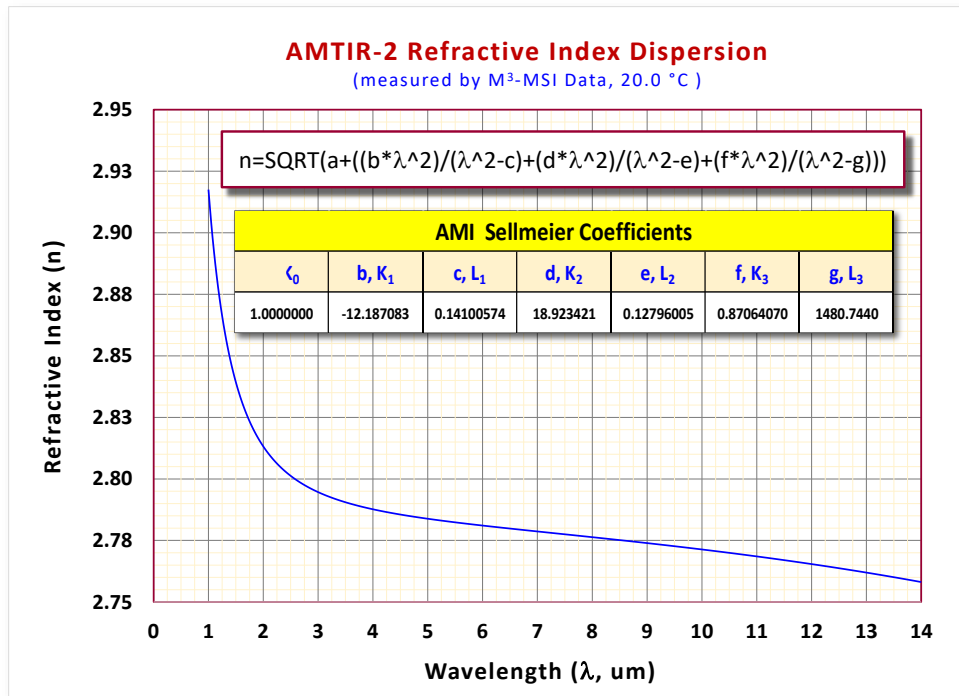
NOTE: Amorphous Materials, Inc. calculates the values for Absorption Coefficients, using the standard formulas and approach recommended by the Optical Society of America (OSA) and used routinely by most Optical Engineers. The applicable determines the ABSORBANCE, at a given wavelength (α_λ), by correcting for multiple-internal reflections (i.e., Fresnel losses) and dividing this value by the light path (i.e., sample thickness (“t”) in centimeters).

FRESNEL REFLECTION COEFFICIENT (r) at wavelength (λ) $r = \frac{(n-1)^2}{(n+1)^2}$

OVERALL TRANSMITTANCE (T) at wavelength (λ), $T = \frac{\%T}{100}$

ABSORBANCE at wavelength (λ) (a_λ) $a = -\left(\frac{1}{t}\right) \ln \left\{ \left[\frac{(1-r)^4}{4r^4T^2} + \frac{1}{r^2} \right]^{\frac{1}{2}} - \frac{(1-r)^2}{2r^2T} \right\}$

ABSORPTION COEFFICIENT (A_λ) = a / thickness(cm)



AMTIR-2 Refractive Index Properties (20.0 °C)

Wavelength (microns)	Refractive Index 20.0 °C	Average $\Delta n/\Delta T$
1.0000	2.91753	0.000048
1.5000	2.83924	0.000047
2.0000	2.81319	0.000045
2.5000	2.80123	0.000043
3.0000	2.79463	0.000042
3.5000	2.79050	0.000041
4.0000	2.78766	0.000040
4.5000	2.78552	0.000039
5.0000	2.78381	0.000038
5.5000	2.78235	0.000038
6.0000	2.78105	0.000037
6.5000	2.77983	0.000037
7.0000	2.77865	0.000036
7.5000	2.77749	0.000036
8.0000	2.77633	0.000036
9.0000	2.77392	0.000036
10.0000	2.77134	0.000036
11.0000	2.76852	0.000036
12.0000	2.76540	0.000036
13.0000	2.76194	0.000036
14.0000	2.75810	0.000035

NOTE: Refractive Index values are typical production values for well-annealed glass at 20 °C and may vary by ±0.0005 (group relative) melt-to-melt. $\Delta n/\Delta T$ values are group relative constants and do not vary significantly in the 6th decimal place.