

Index of Refraction

Ultraviolet Materials

Wavelength (nm)	MgF ₂ η_e	MgF ₂ η_o	CaF ₂ η	Sapphire η_e	Sapphire η_o	Crystal Quartz η_e	Crystal Quartz η_o	Fused Silica
193	1.44127	1.42767	1.50153	1.91743	1.92879	1.67455	1.66091	1.56077
213	1.42933	1.41606	1.48544	1.87839	1.88903	1.64452	1.63224	1.53539
222	1.42522	1.41208	1.47996	1.86504	1.87540	1.63427	1.62238	1.52669
226	1.42358	1.41049	1.47779	1.85991	1.87017	1.63033	1.61859	1.52335
244	1.41735	1.40447	1.46957	1.84075	1.85059	1.61562	1.60439	1.51086
248	1.41618	1.40334	1.46803	1.83719	1.84696	1.61289	1.60175	1.50855
257	1.41377	1.40102	1.46488	1.82972	1.83932	1.60714	1.59620	1.50368
266	1.41164	1.39896	1.46209	1.82358	1.83304	1.60242	1.59164	1.49968
280	1.40877	1.39620	1.45836	1.81509	1.82437	1.59589	1.58533	1.49416
308	1.40429	1.39188	1.45255	1.80198	1.81096	1.58577	1.57556	1.48564
325	1.40216	1.38983	1.44981	1.79582	1.80467	1.58102	1.57097	1.48164
337	1.40086	1.38859	1.44814	1.79206	1.80082	1.57812	1.56817	1.47919
351	1.39952	1.38730	1.44642	1.78825	1.79693	1.57518	1.56533	1.47672
355	1.39917	1.38696	1.44597	1.78732	1.79598	1.57446	1.56463	1.47612

Visible Materials

Wavelength (nm)	Schott BK7	Schott F2	Schott SF10	Schott SF11	Molded Glasses S-LAM60M	Molded Glasses S-BSL7M	Crystal Quartz η_e	Crystal Quartz η_o	Fused Silica
400	1.53085	1.65215	1.77826	1.84512	1.76489	1.52724	1.56730	1.55772	1.47012
442	1.52611	1.64058	1.75970	1.82242	1.75556	1.52250	1.56266	1.55324	1.46622
458	1.52461	1.63716	1.75434	1.81592	1.75272	1.52104	1.56119	1.55181	1.46498
488	1.52224	1.63178	1.74602	1.80590	1.74819	1.51868	1.55885	1.54955	1.46301
515	1.52049	1.62784	1.73999	1.79867	1.74479	1.51690	1.55711	1.54787	1.46156
532	1.51947	1.62569	1.73673	1.79479	1.74293	1.51591	1.55610	1.54690	1.46071
590	1.51670	1.61983	1.72794	1.78435	1.73774	1.51313	1.55333	1.54421	1.45838
633	1.51509	1.61654	1.72307	1.77860	1.73477	1.51152	1.55171	1.54264	1.45702
670	1.51391	1.61421	1.71965	1.77458	1.73264	1.51034	1.55051	1.54148	1.45601
694	1.51322	1.61290	1.71773	1.77233	1.73143	1.50967	1.54981	1.54080	1.45542
755	1.51172	1.61009	1.71367	1.76758	1.72879	1.50818	1.54827	1.53932	1.45414
780	1.51118	1.60911	1.71227	1.76595	1.72785	1.50764	1.54771	1.53878	1.45367
800	1.51078	1.60839	1.71124	1.76475	1.72716	1.50724	1.54729	1.53837	1.45332
820	1.51039	1.60771	1.71028	1.76364	1.72650	1.50686	1.54688	1.53798	1.45298
860	1.50966	1.60648	1.70854	1.76163	1.72528	1.50614	1.54612	1.53724	1.45234
980	1.50779	1.60349	1.70441	1.75688	1.72223	1.50429	1.54409	1.53531	1.45067
1064	1.50663	1.60183	1.70217	1.75434	1.72043	1.50315	1.54282	1.53410	1.44963
1320	1.50346	1.59785	1.69706	1.74863	1.71570	1.49999	1.53922	1.53068	1.44669
1550	1.50065	1.59487	1.69348	1.74474	1.71175	1.49719	1.53596	1.52761	1.44402
2010	1.49435	1.58905	1.68693	1.73784	1.70331	1.49095	1.52863	1.52073	1.43794

For up-to-date information on materials compliance with European Union RoHS, see www.cvimellesgriot.com

Infrared Materials

Wavelength (μm)	Zinc Selenide ZnSe	IR grade Calcium Fluoride CFIR	Germanium Ge	Silicon Si
0.6328	2.590	1.43289	5.3900	3.9200
1.40	2.461	1.42673	4.3400	3.4900
1.50	2.458	1.42626	4.3500	3.4800
1.66	2.454	1.42551	4.3300	3.4700
1.82	2.449	1.42475	4.2900	3.4600
2.05	2.446	1.42360	4.2500	3.4500
2.06	2.446	1.42355	4.2400	3.4900
2.15	2.444	1.42308	4.2400	3.4700
2.44	2.442	1.42146	4.0700	3.4700
2.50	2.441	1.42110	4.2200	3.4400
2.58	2.440	1.42062	4.0600	3.4364
2.75	2.439	1.41954	4.0526	3.4335
3.00	2.438	1.41785	4.0540	3.4307
3.42	2.436	1.41469	4.0370	3.4277
3.50	2.435	1.41404	4.0356	3.4272
4.36	2.432	1.40609	4.0227	3.4223
5.00	2.430	1.39896	4.0177	3.4203
6.00	2.426	1.38560	4.0138	3.4188
6.24	2.425	1.38197	4.0100	3.4185
7.50	2.420	1.36000	4.0095	3.4171
8.66	2.414	1.33504	4.0071	3.4161
9.50	2.410	1.31375	4.0064	3.4158
9.72	2.409	1.30768	4.0062	3.4155
10.60	2.400	1.28116	4.0058	3.4155
11.00	2.400	1.26783	4.0059	3.4155
11.04	2.400	1.26645	4.0059	3.4155
12.50	2.390	1.20951	4.0000	3.4155
13.02	2.385	1.18573	4.0000	3.4155
13.50	2.380	1.16187	4.0000	3.4155
15.00	2.370	1.07290	4.0000	3.4155
16.00	2.360	0.99783	4.0000	3.4155
16.90	2.350	0.91507	4.0000	3.4155
17.80	2.340	0.81173	4.0000	3.4155
18.60	2.330	0.69336	4.0000	3.4155
19.30	2.320	0.55456	4.0000	3.4155
20.00	2.310	0.34029	4.0000	3.4155

Note: Refractive index calculated at 25° C except for those from H.W. Icenogle reference which was calculated at 22.85° C.

Germanium 633-2500 nm

Reference: S. Adachi, "Model dielectric constants of Si and Ge," Phys. Rev. B, Vol. 38, No. 18, 15 Dec. 1988, pp. 12966-12976.

Germanium 2750-11040 nm

Reference: H. W. Icenogle, B. C. Platt, and W. L. Wolfe, "Refractive indexes and temperature coefficients of germanium and silicon," Appl. Opt. Vol. 15, No. 10, October 1976, pp. 2348-2351.

Germanium 12500-20000 nm

Reference: G. Ghosh and H. Yajima, "Coefficients of a dispersion equation for the pressure-optic coefficients in Ge and GaAs," Phys. Rev. B, Vol. 59, No. 19, 15 May 1999, pp. 12208-12211.

ZnSe

Values from 446 to 700 nm are from Ref. 1. Index values for wavelengths beyond 700 nm are from Ref. 2 and apply to bulk ZnSe.

References:

- [1] M. Ukita, H. Okuyama, M. Ozawa, A. Ishibashi, K. Akimoto, and Y. Mori, "Refractive index of ZnMgSSe alloys lattice matched to GaAs," Appl. Phys. Lett., Vol. 63, No. 15, 11 October 1993, pp. 2082-2084
 [2] II-VI Incorporated Optics Catalog, July 1998 Revision, p. 6 and at www.ii-vi.com.

Si 633-2440 nm

- [1] S. Adachi, "Model dielectric constants of Si and Ge," Phys. Rev. B, Vol. 38, No. 18, 15 Dec. 1988, pp. 12966-12976.

- [2] J. Humlíček, M. Garriga, M. I. Alonso, and M. Cardona, "Optical spectra of SixGe1-x alloys," J. Appl. Phys. Vol. 65, No. 7, 1 April 1989, pp. 2827-2832.

Si 2580-9720 nm

Reference: H. W. Icenogle, B. C. Platt, and W. L. Wolfe, "Refractive indexes and temperature coefficients of germanium and silicon," Appl. Opt. Vol. 15, No. 10, October 1976, pp. 2348-2351.

Si 10600 nm

[1] J. Lamb, Miscellaneous data on materials for millimeter and submillimeter optics, www.ovro.caltech.edu/~lamb/ALMA/Receivers/mmMaterialProperties1.pdf