

Transmittance (T) units: %

λnm	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390
T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.3	1.3	5.3
λnm	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590
T	8.8	8.9	9.2	10.2	10.2	11.6	13.5	13.9	13.5	13.2	13.1	13.1	13.4	13.7	14.3	14.7	14.8	14.4	13.5	12.7
λnm	600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790
T	12.5	12.8	13.1	13.2	13.0	12.8	13.0	13.4	14.6	16.0	17.2	18.0	18.2	18.0	17.6	17.0	16.3	15.7	15.0	14.4
λnm	800	810	820	830	840	850	860	870	880	890	900	910	920	930	940	950	960	970	980	990
T	13.8	13.3	12.9	12.5	12.1	11.7	11.4	11.1	10.8	10.5	10.2	9.9	9.7	9.4	9.2	8.9	8.7	8.5	8.3	8.2
λnm	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1120	1140	1160	1180	1200				
T	8.0	7.8	7.7	7.6	7.4	7.3	7.2	7.1	7.1	7.0	6.9	6.9	6.9	6.9	7.0	7.1				

Refractive Index/Absorption coefficient/Reflection coefficient

λnm	400	500	600	700	800	900	1000
n	1.539	1.523	1.516	1.512	1.509	1.508	1.507
K	3.1E-05	3.2E-05	4.0E-05	3.9E-05	5.1E-05	6.7E-05	8.0E-05
P	0.914	0.918	0.919	0.920	0.921	0.921	0.922

Classes of Bubbles and Inclusions

Bubble Class
3

Color Specification

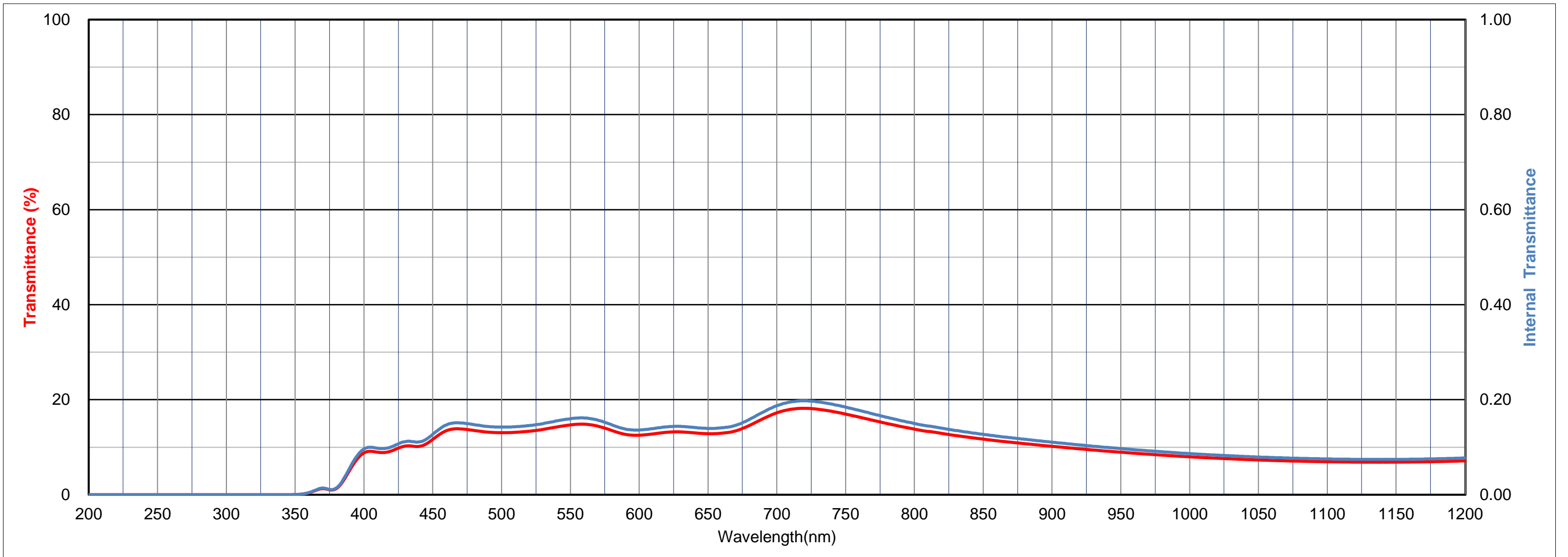
	x	y	Y	λ <sub>d</sub>	P <sub>e</sub>
A	0.447	0.419	14	569	7
C	0.315	0.337	14	562	7
D65	0.318	0.350	14	561	7

Properties

Chemical		Thermal				Mechanical		Others
D <sub>w</sub>	D <sub>A</sub>	T <sub>g</sub>	T <sub>s</sub>	α <sub>-30/70</sub>	α <sub>100/300</sub>	H <sub>K</sub>	F <sub>A</sub>	d
1	1	535	595	58	68	530	100	2.43

Tolerance of Transmittance (T)

Average Transmittance at 400nm-700nm	
T <sub>av</sub> (%)	OD
12.5±2	0.90±0.1





HOYA CANDEO OPTRONICS CORPORATION

Thickness (2.42) mm

ND13

Transmittance (T) units: %

λnm	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390
T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.3	1.3	5.3
λnm	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590
T	8.8	8.9	9.2	10.2	10.2	11.6	13.5	13.9	13.5	13.2	13.1	13.1	13.4	13.7	14.3	14.7	14.8	14.4	13.5	12.7
λnm	600	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790
T	12.5	12.8	13.1	13.2	13.0	12.8	13.0	13.4	14.6	16.0	17.2	18.0	18.2	18.0	17.6	17.0	16.3	15.7	15.0	14.4
λnm	800	810	820	830	840	850	860	870	880	890	900	910	920	930	940	950	960	970	980	990
T	13.8	13.3	12.9	12.5	12.1	11.7	11.4	11.1	10.8	10.5	10.2	9.9	9.7	9.4	9.2	8.9	8.7	8.5	8.3	8.2
λnm	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190
T	8.0	7.8	7.7	7.6	7.4	7.3	7.2	7.1	7.1	7.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	7.0	7.0
λnm	1200	1210	1220	1230	1240	1250	1260	1270	1280	1290	1300	1310	1320	1330	1340	1350	1360	1370	1380	1390
T	7.1	7.2	7.4	7.5	7.7	7.9	8.1	8.4	8.6	8.9	9.2	9.5	9.9	10.3	10.8	11.2	11.6	12.0	12.2	12.6
λnm	1400	1410	1420	1430	1440	1450	1460	1470	1480	1490	1500	1510	1520	1530	1540	1550	1560	1570	1580	1590
T	12.9	13.4	13.9	14.4	14.8	15.2	15.6	16.0	16.4	16.9	17.3	17.7	18.1	18.5	18.8	19.1	19.5	19.8	20.1	20.4
λnm	1600	1610	1620	1630	1640	1650	1660	1670	1680	1690	1700	1710	1720	1730	1740	1750	1760	1770	1780	1790
T	20.7	21.0	21.2	21.4	21.6	21.8	22.0	22.2	22.3	22.5	22.7	22.8	23.0	23.1	23.2	23.4	23.5	23.7	23.8	24.0
λnm	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990
T	24.2	24.4	24.5	24.7	24.9	25.2	25.4	25.6	25.8	26.0	26.2	26.4	26.6	26.9	27.1	27.3	27.5	27.7	27.9	28.1
λnm	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950
T	28.3	29.4	30.2	30.8	31.1	31.9	33.0	33.8	33.9	34.3	34.5	34.6	34.7	34.8	35.0	35.0	35.3	35.3	35.4	35.2
λnm	3000	3050	3100	3150	3200	3250	3300	3350	3400	3450	3500	3550	3600	3650	3700	3750	3800	3850	3900	3950
T	34.6	33.6	30.4	22.5	13.1	7.2	4.3	3.0	2.4	2.2	2.1	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.5	2.6
λnm	4000	4050	4100	4150	4200	4250	4300	4350	4400	4450	4500	4550	4600	4650	4700	4750	4800	4850	4900	4950
T	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.3	4.4	4.5
λnm	5000																			
T	4.6																			

