Fig. 1

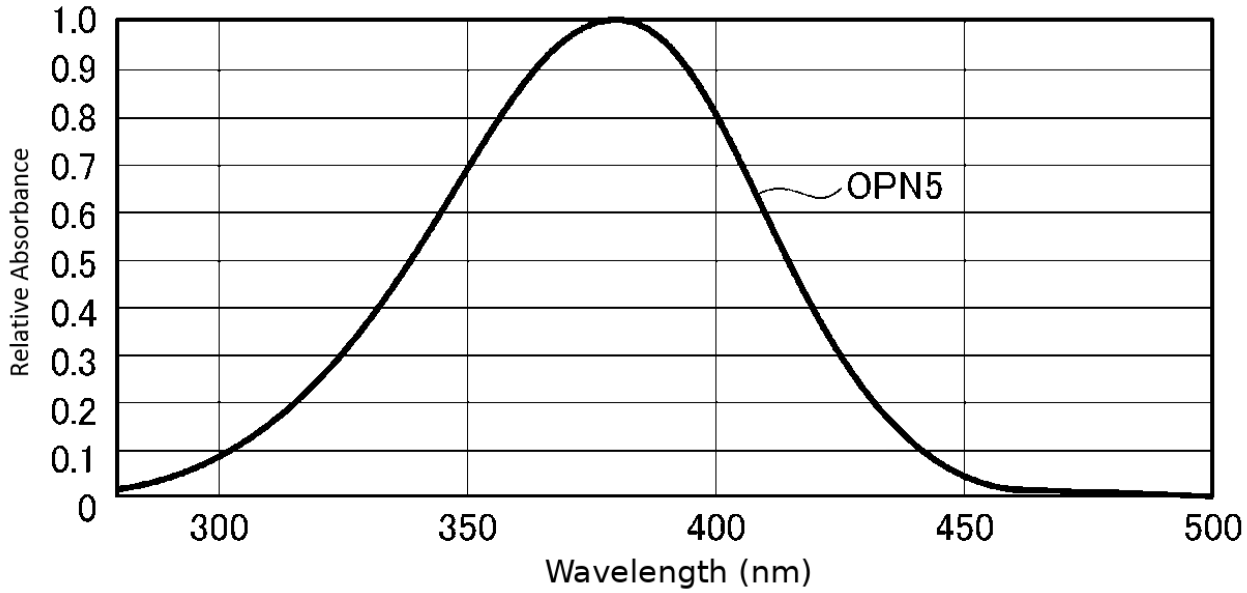

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Relative Absorbance
OPN5
300
350
400
450
500
Wavelength (nm)

Fig. 2

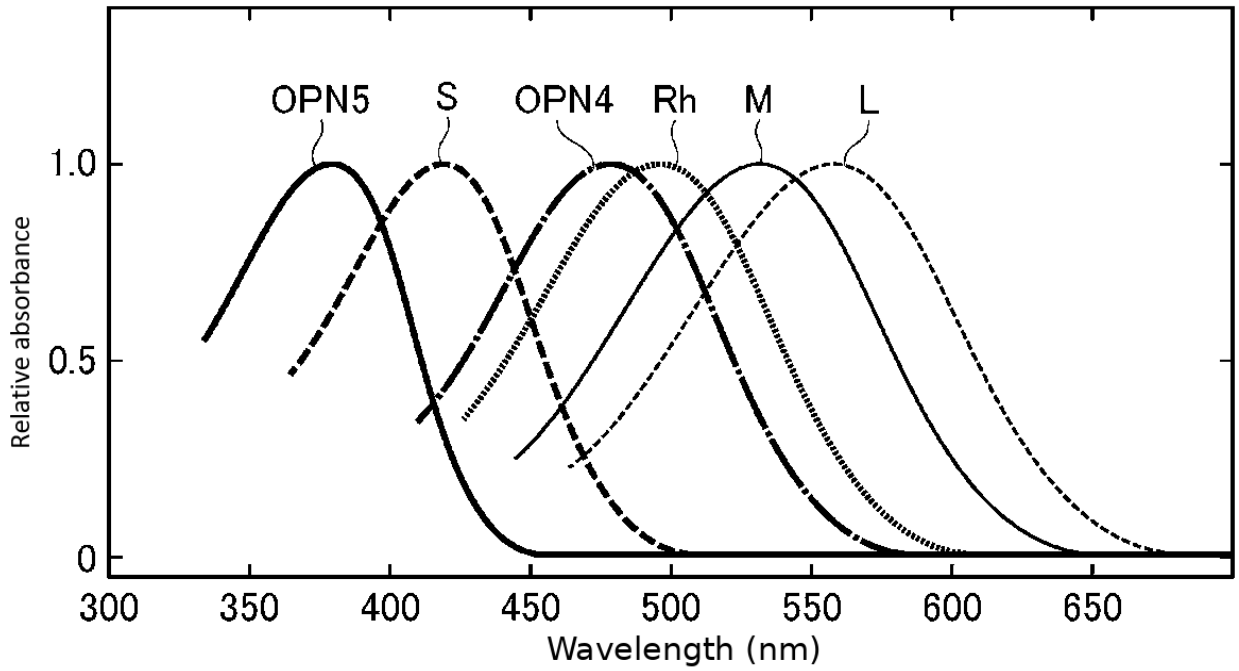

OPN5
S
OPN4
Rh
M
L
1.0
0.5
0
Relative absorbance
300
350
400
450
500
550
600
650
Wavelength (nm)

Fig. 3

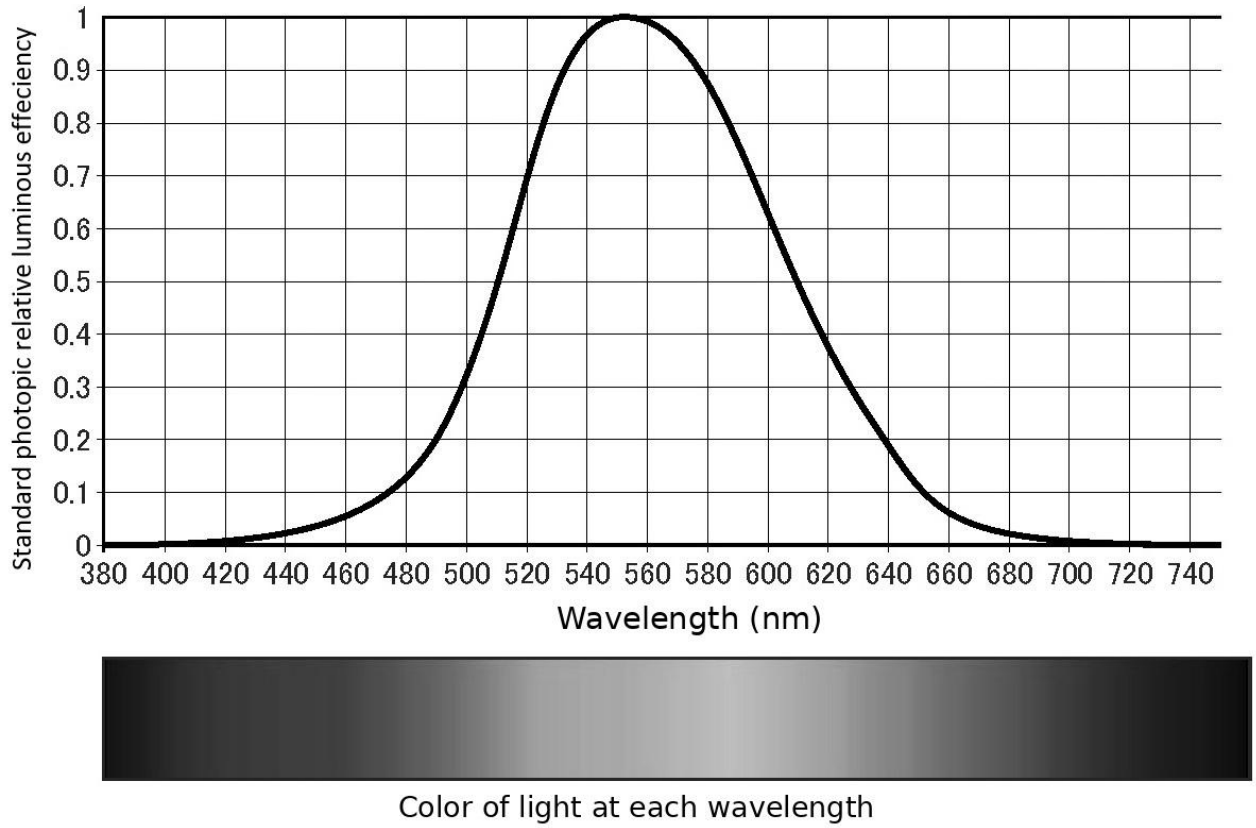

Standard photopic relative luminous effeciency
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740
Wavelength (nm)
Color of light at each wavelength

Fig. 4

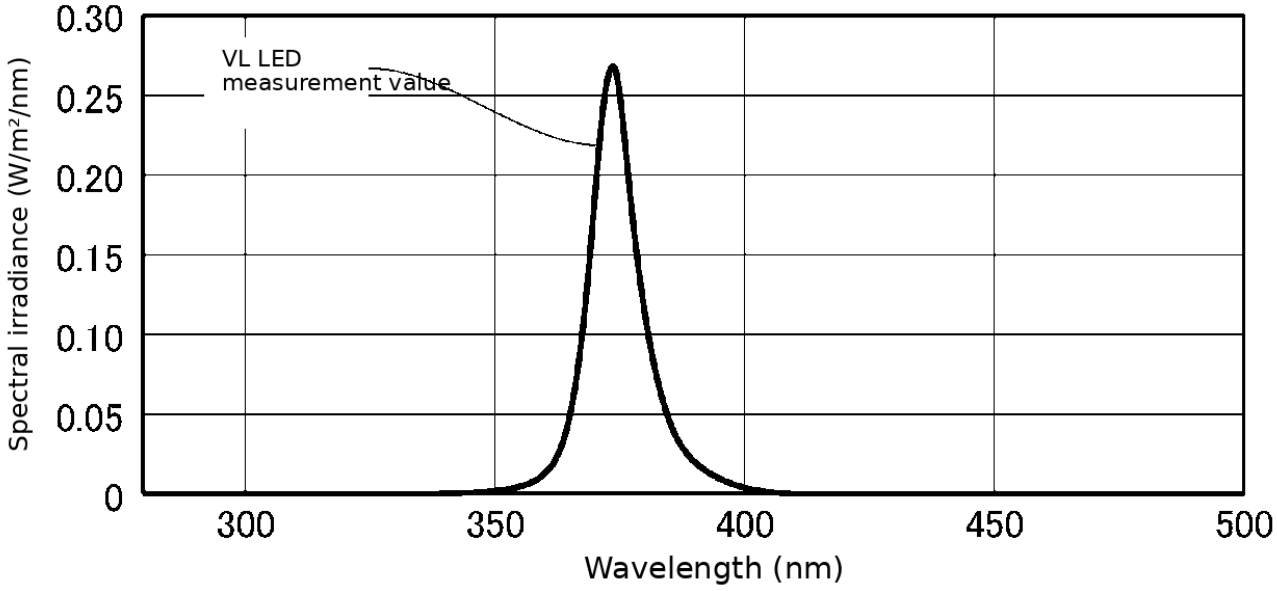

Spectral irradiance (W/m²/nm)
0.30
0.25
0.20
0.15
0.10
0.05
0
VL LED
measurement value
300
350
400
450
500
Wavelength (nm)

Fig. 5A

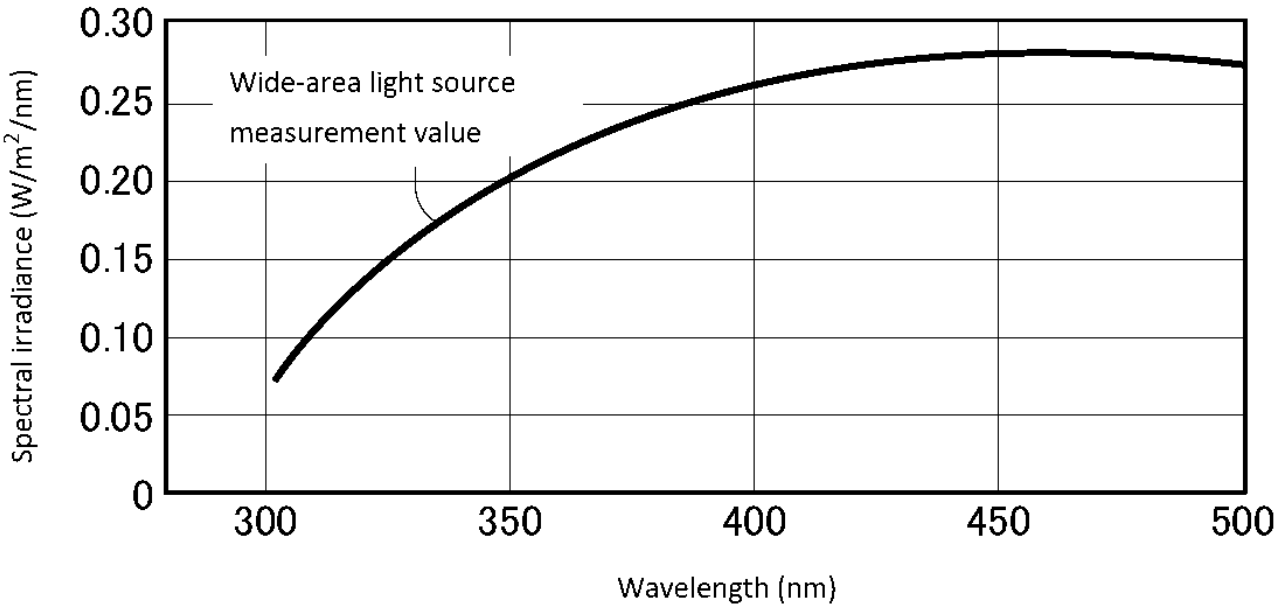

0.30
0.25
0.20
0.15
0.10
0.05
0
Spectral irradiance (W/m2/nm)
Wide-area light source
measurement value
300
350
400
450
500
Wavelength (nm)

Fig. 5B

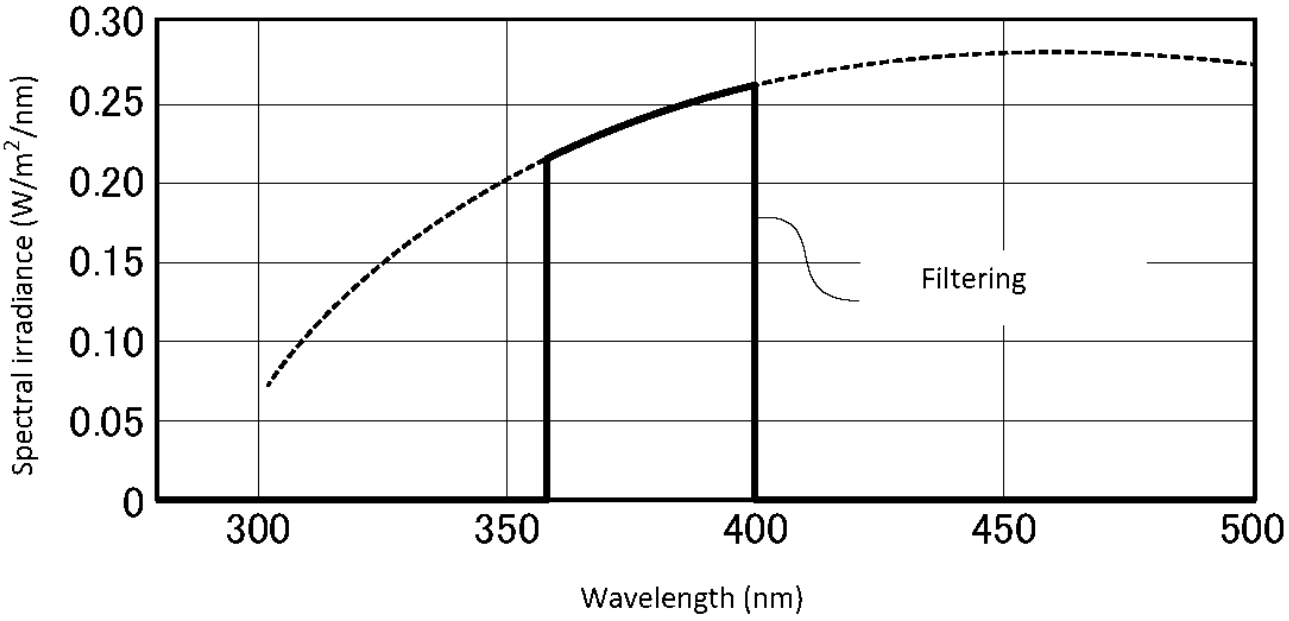

0.30
0.25
0.20
0.15
0.10
0.05
0
Spectral irradiance (W/m2/nm)
Filtering
300
350
400
450
500
Wavelength (nm)

Fig. 5C

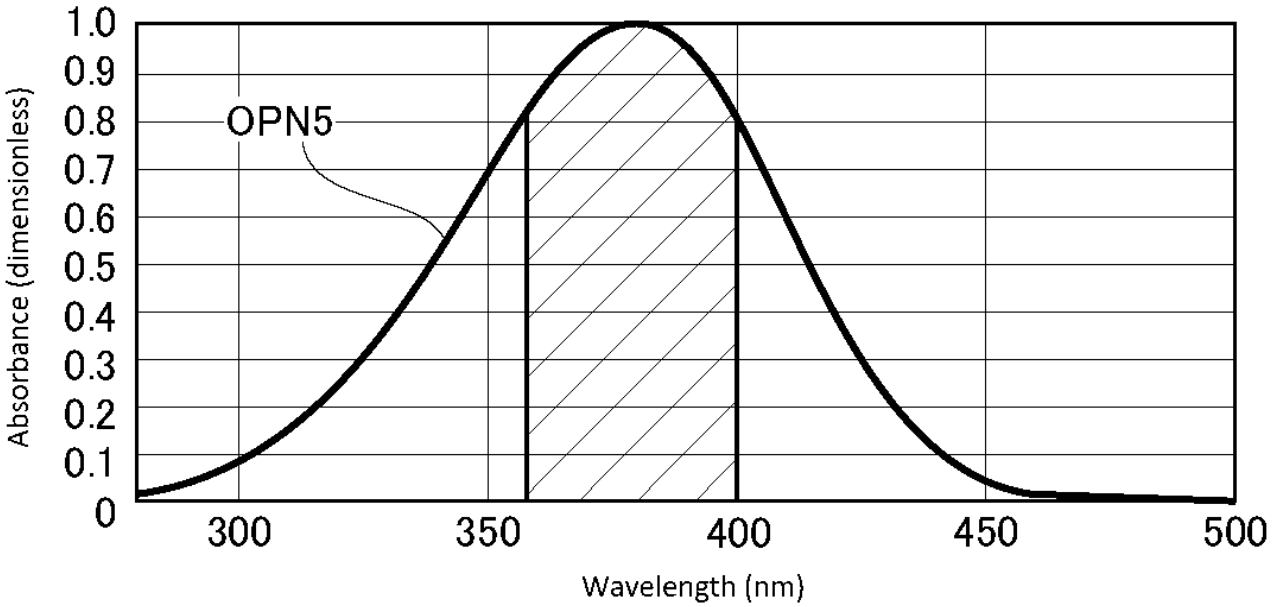

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Absorbance (dimensionless)
OPN5
300
350
400
450
500
Wavelength (nm)

Fig. 6

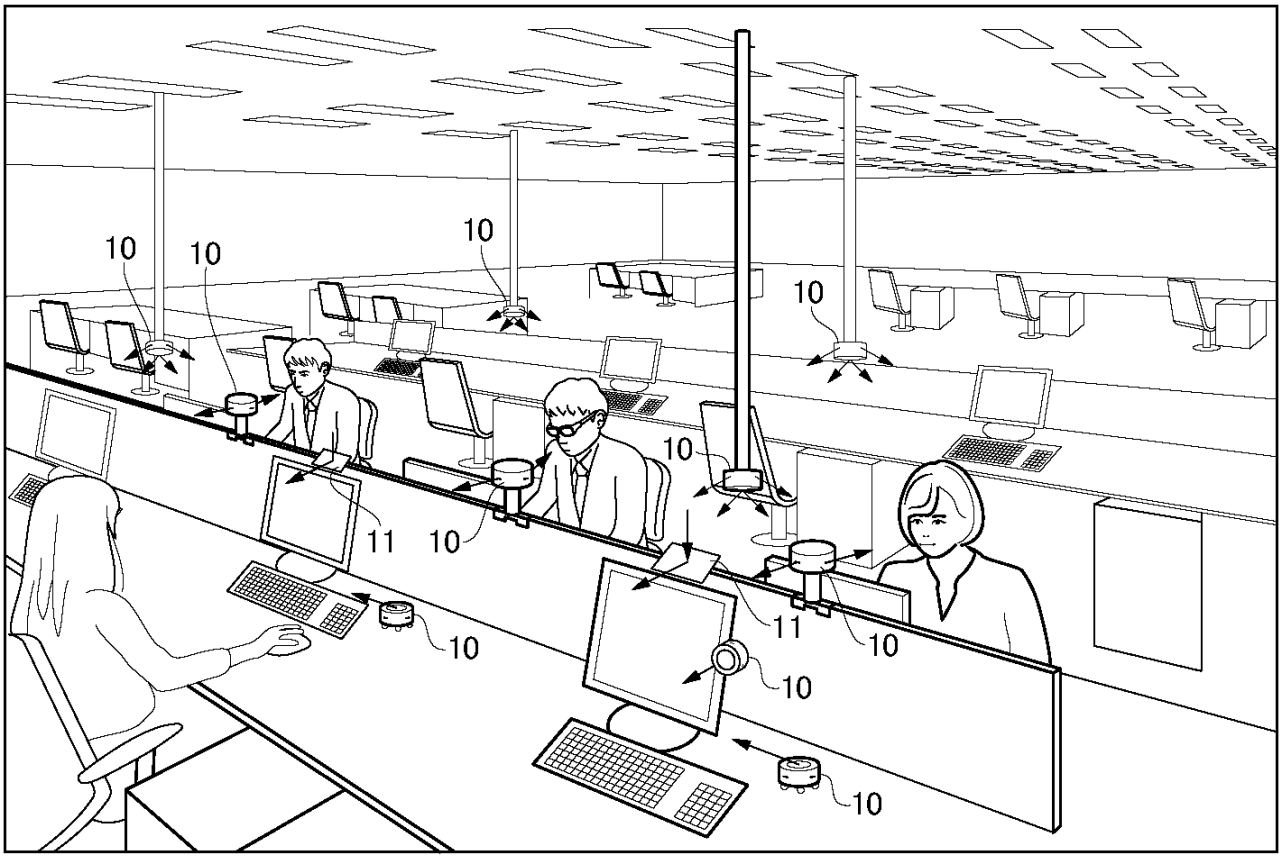

10
10
10
10
10
11
10
10
11
10
10
10

Fig. 7

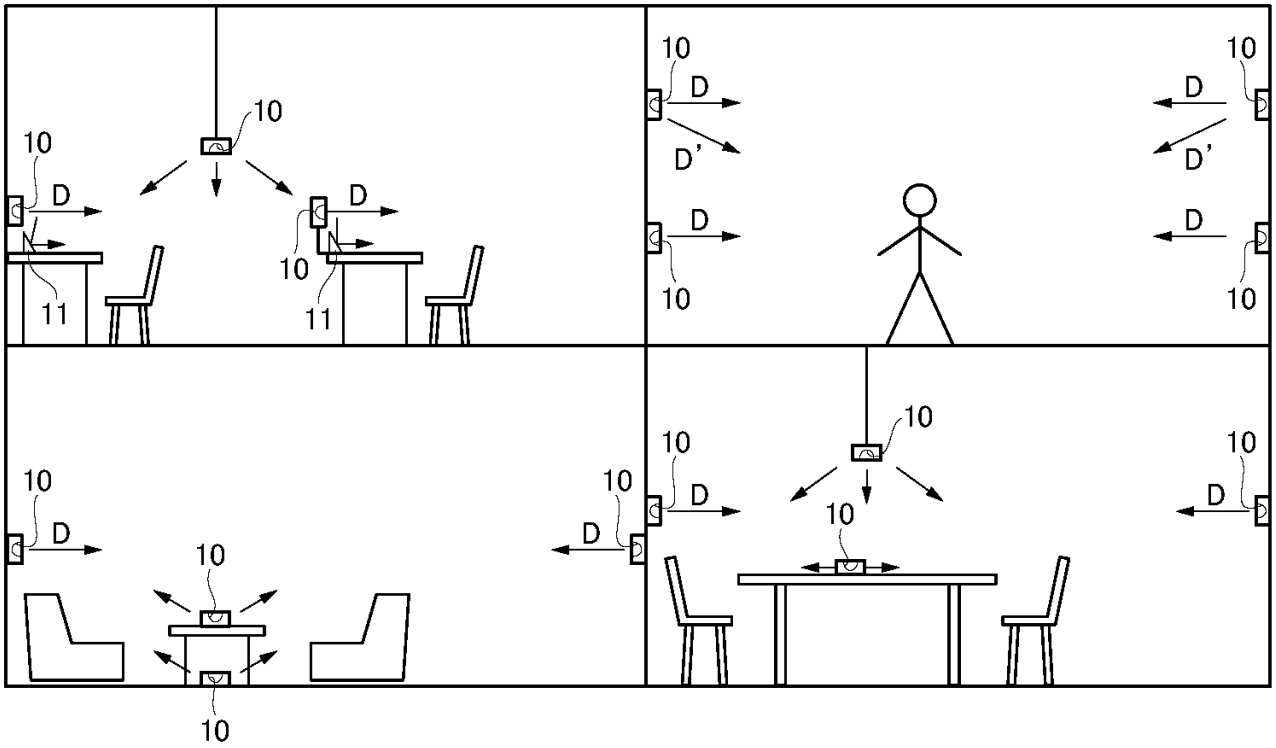


Fig. 8A

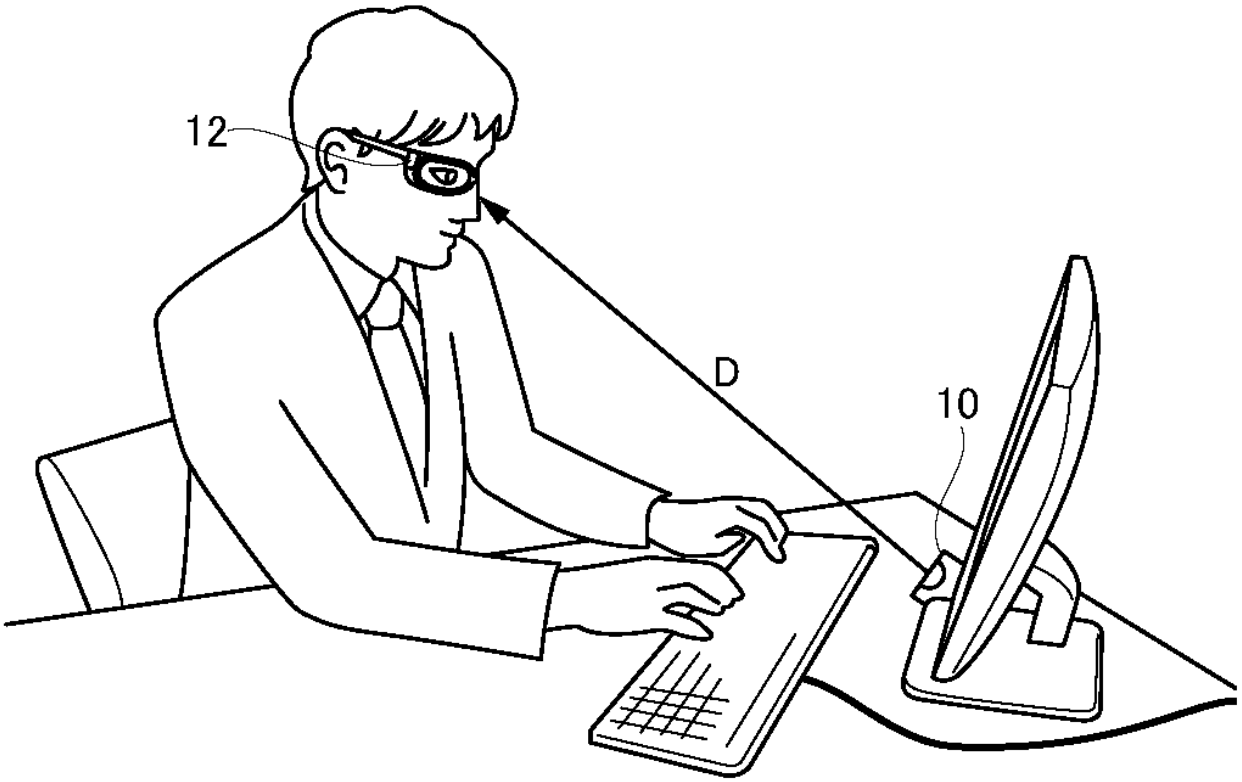


Fig. 8B

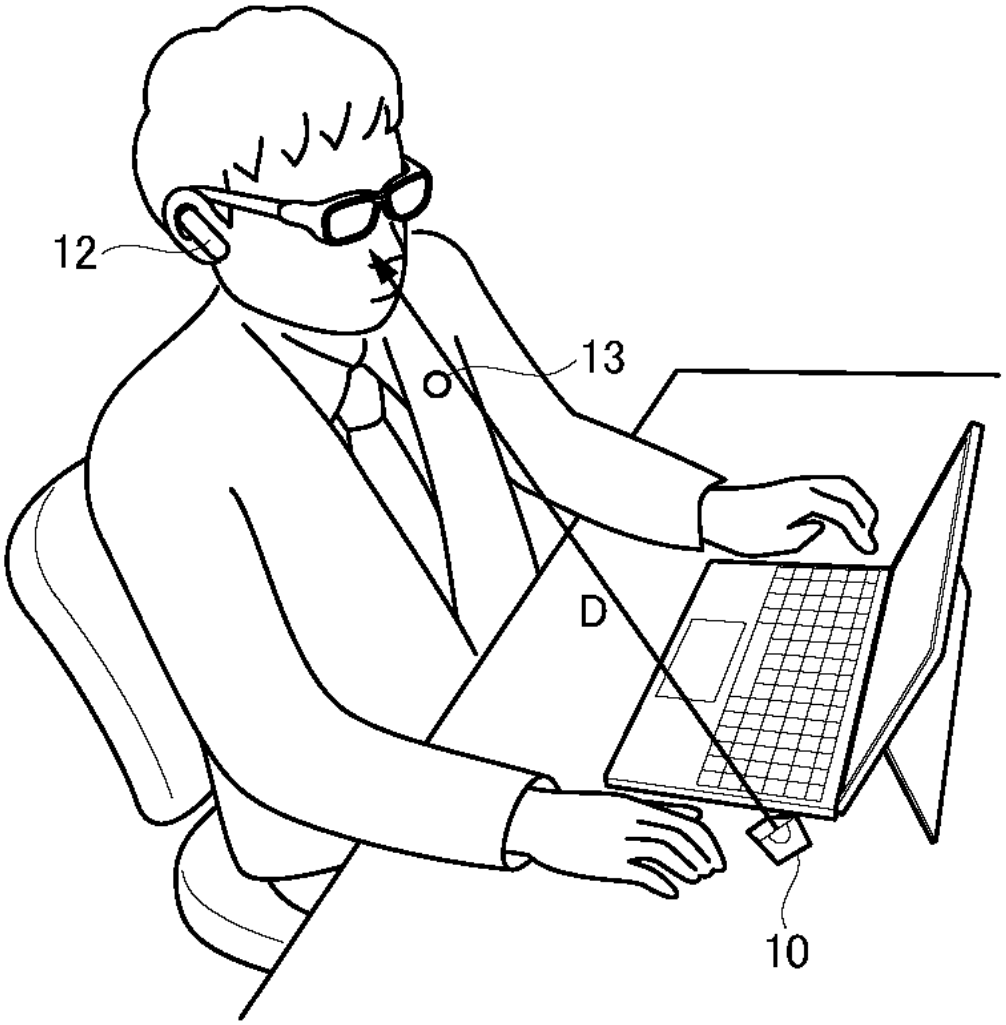

12
13
D
10

Fig. 9A

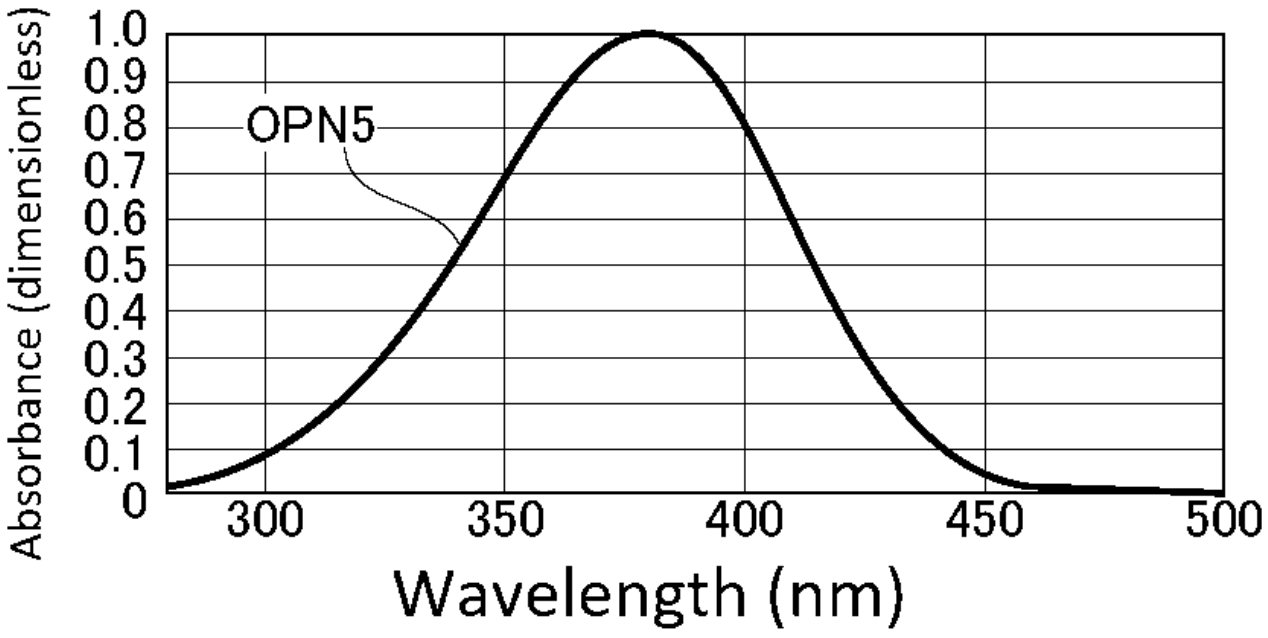

Absorbance (dimensionless)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
OPN5
300
350
400
450
500
Wavelength (nm)

Fig. 9B

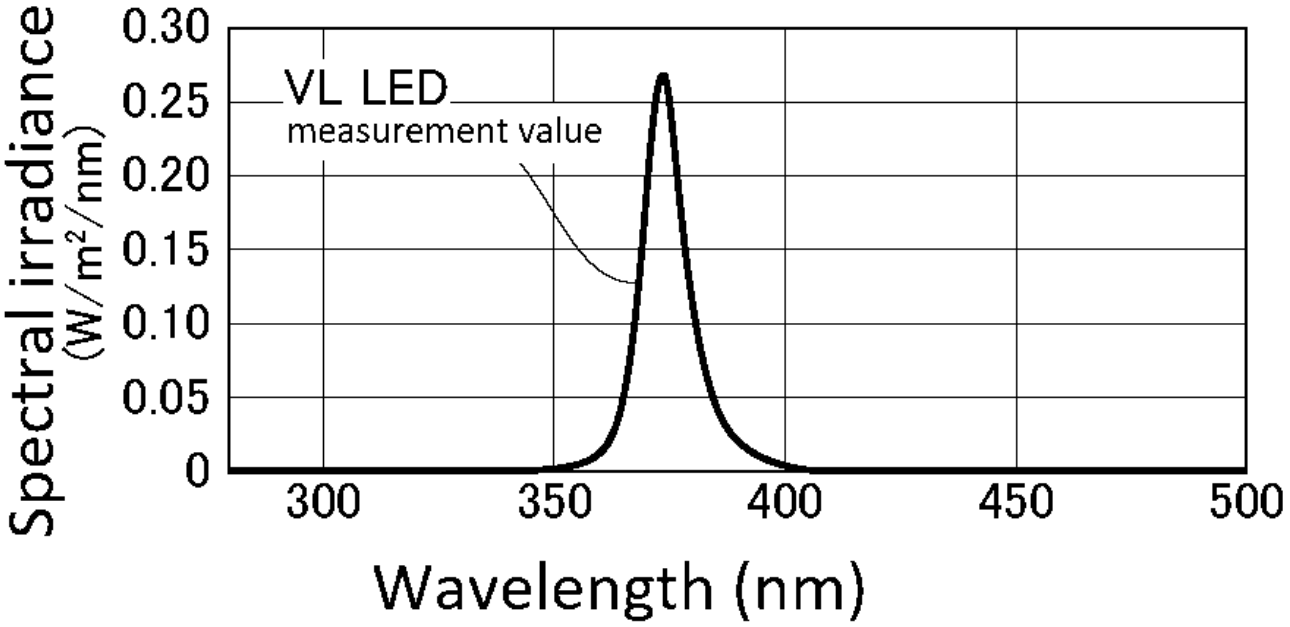

Spectral irradiance (W/m²/nm)
0.30
0.25
0.20
0.15
0.10
0.05
0
VL LED
measurement value
300
350
400
450
500
Wavelength (nm)

Fig. 9C

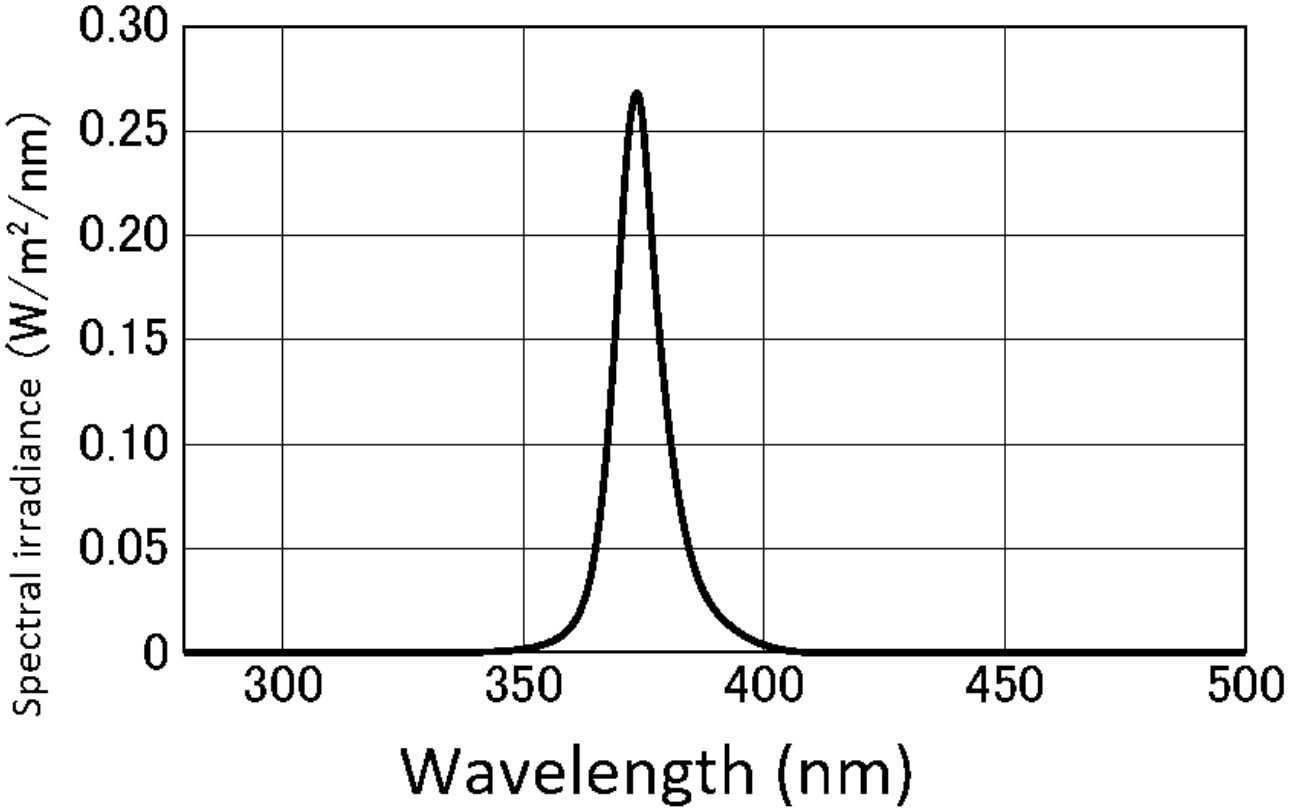

Spectral irradiance (W/m²/nm)
0.30
0.25
0.20
0.15
0.10
0.05
0
300
350
400
450
500
Wavelength (nm)

Fig. 10A

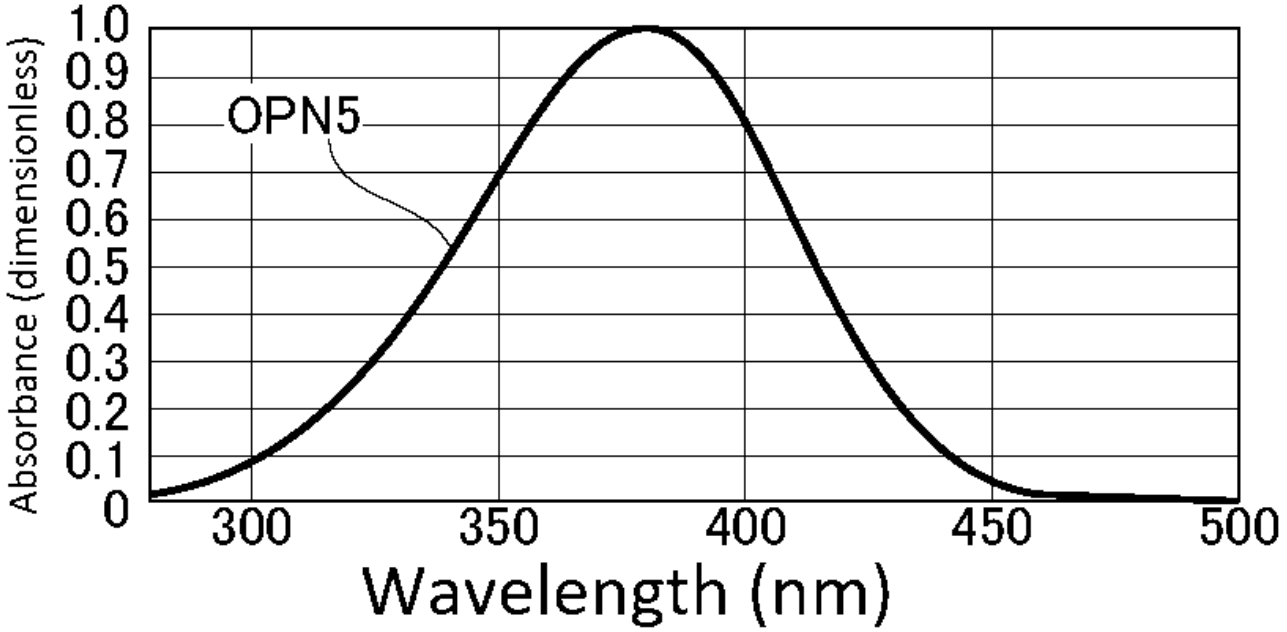


Fig. 10B

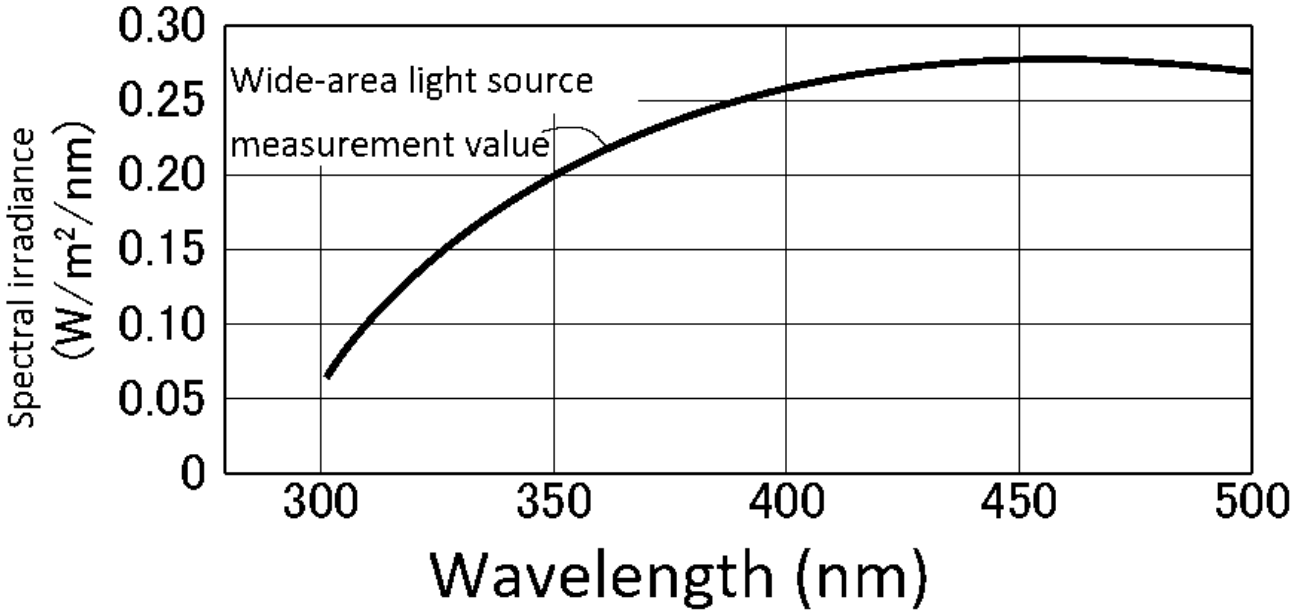


Fig. 10C

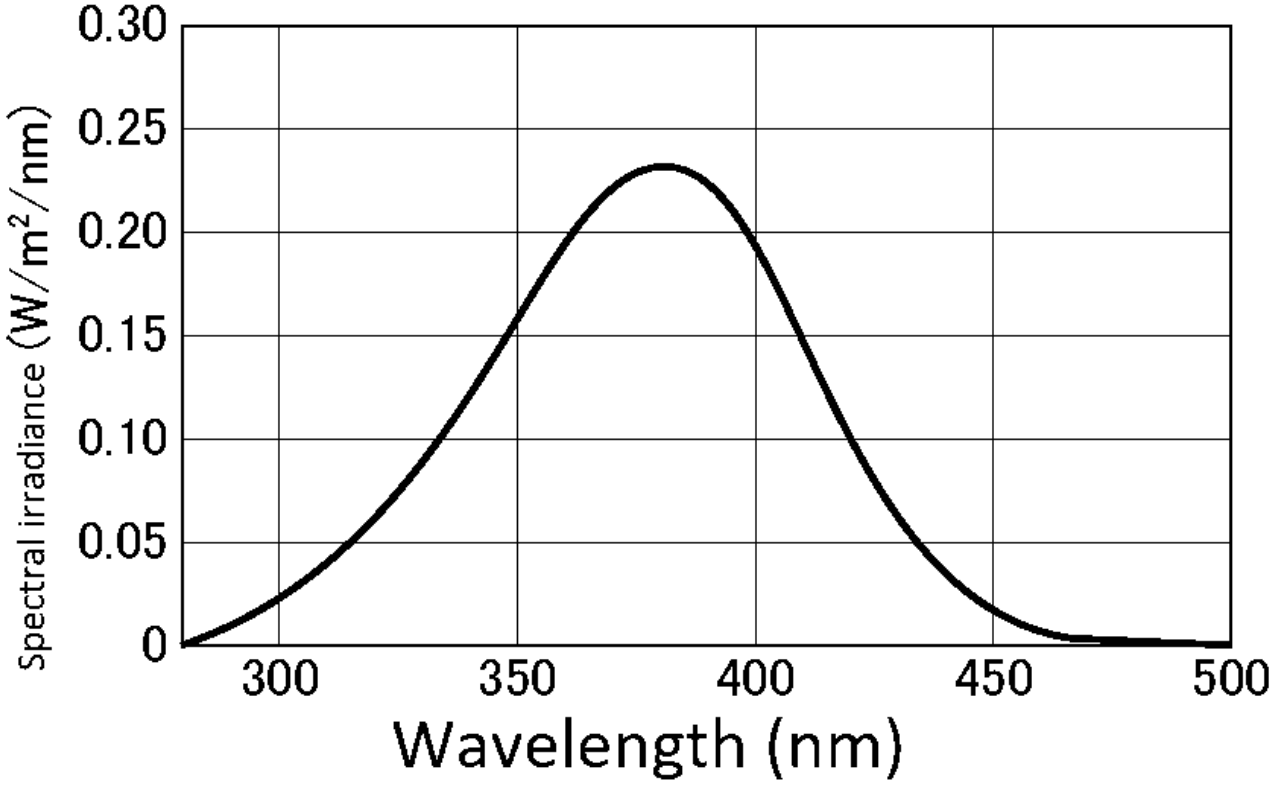


Fig. 11A

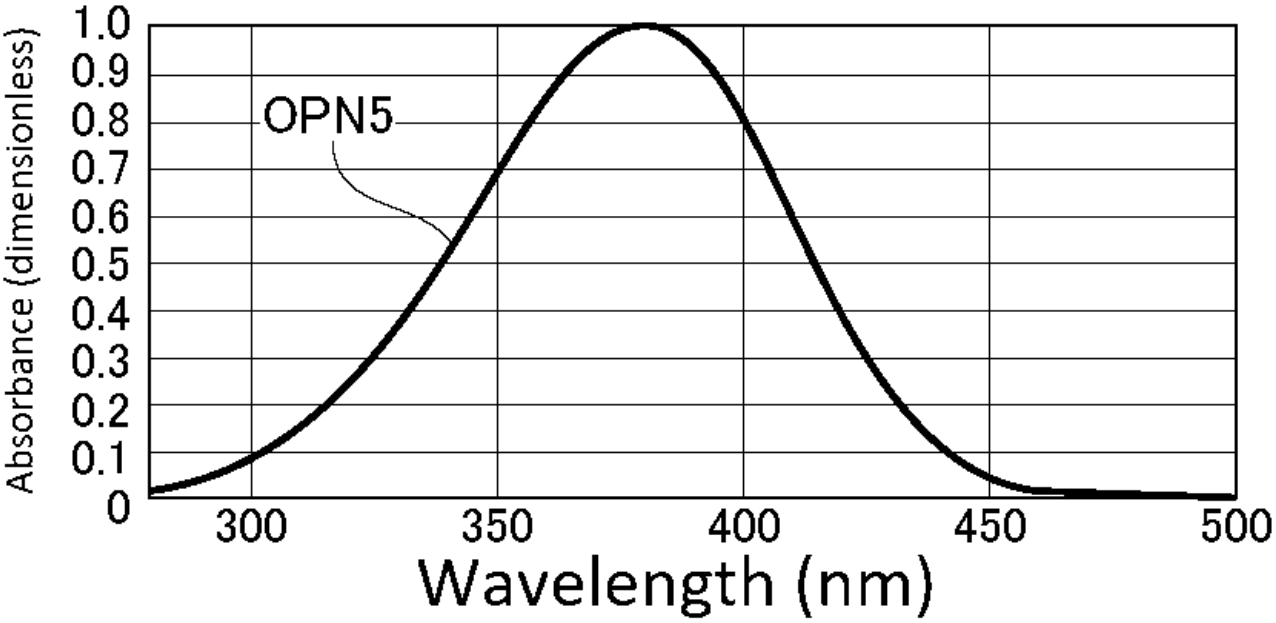


Fig. 11B

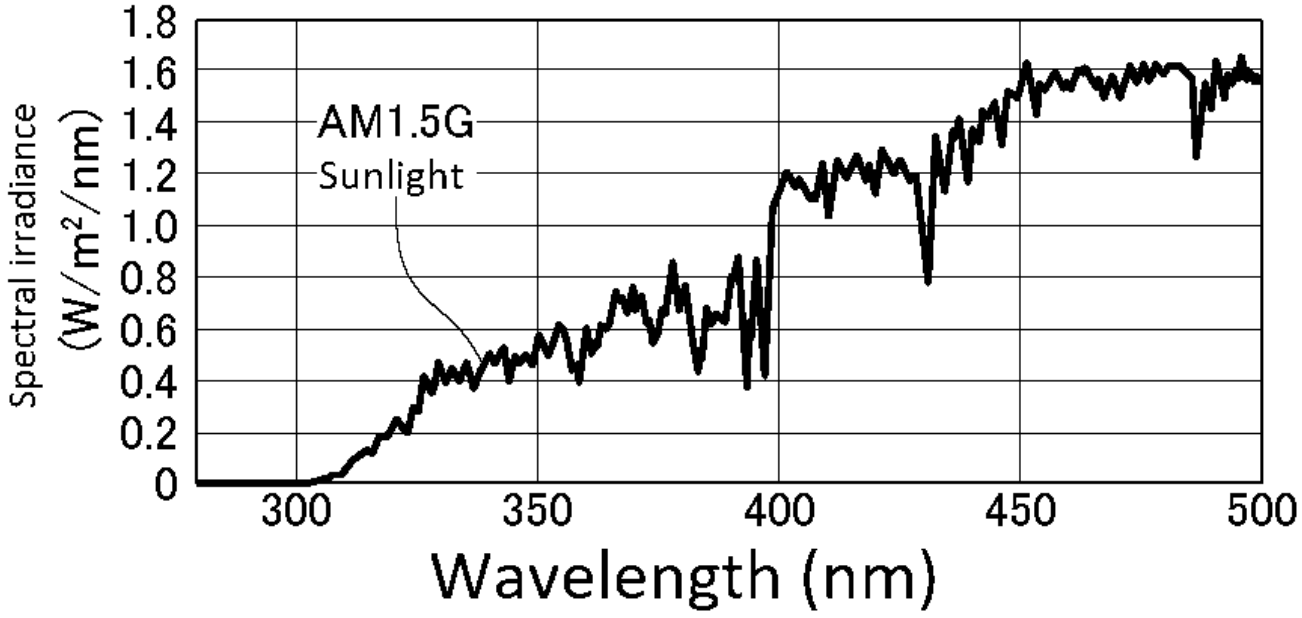


Fig. 11C

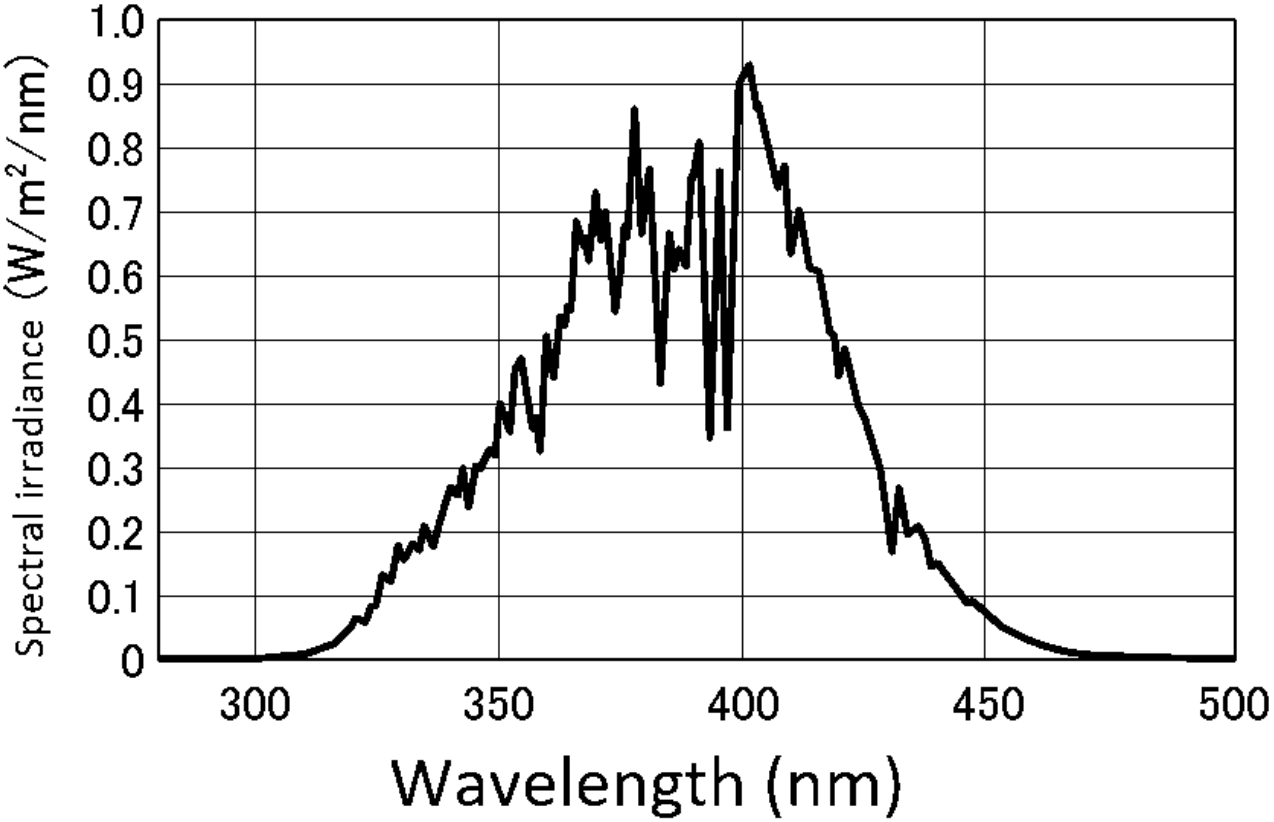


Fig. 12

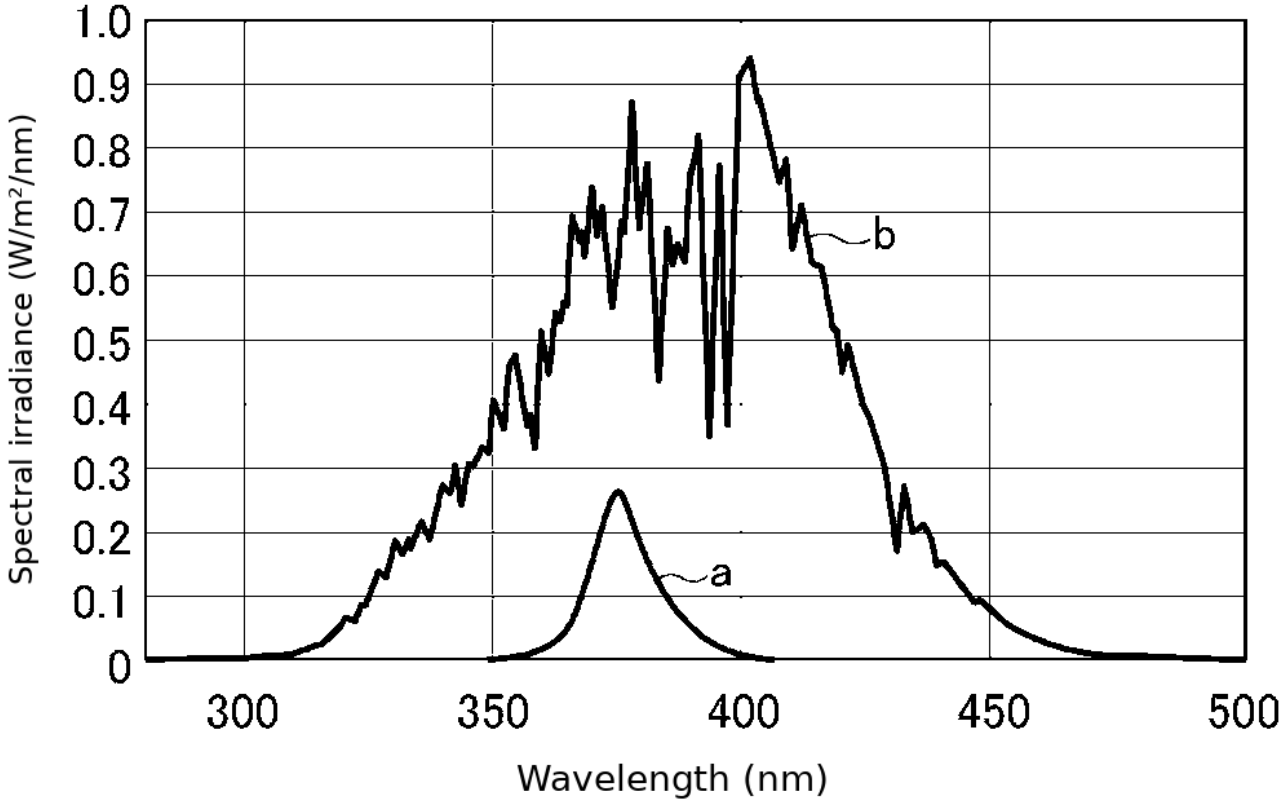

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Spectral irradiance (W/m²/nm)
b
a
300
350
400
450
500
Wavelength (nm)

Fig. 13

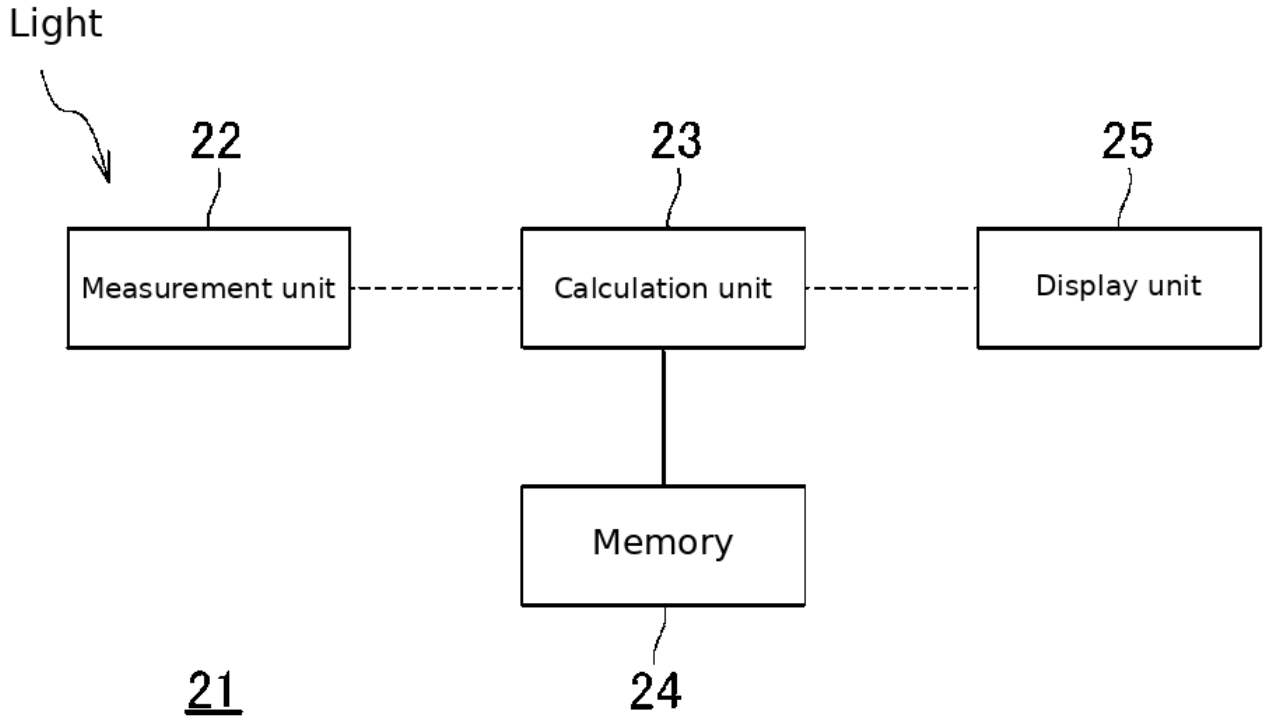
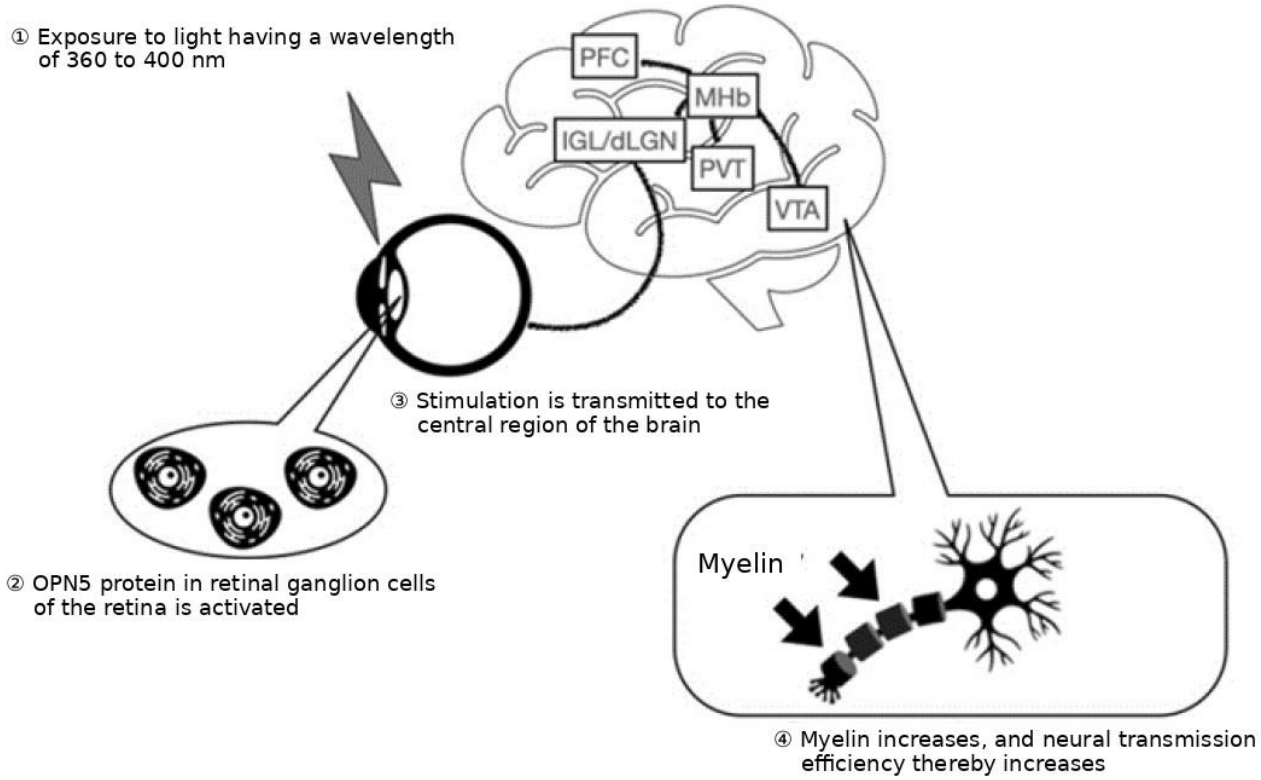

Light
22
23
25
Measurement unit
Calculation unit
Display unit
Memory
21
24

Fig. 14


① Exposure to light having a wavelength of 360 to 400 nm
PFC
MHb
IGL/dLGN
PVT
VTA
③ Stimulation is transmitted to the central region of the brain
② OPN5 protein in retinal ganglion cells of the retina is activated
Myelin
④ Myelin increases, and neural transmission efficiency thereby increases