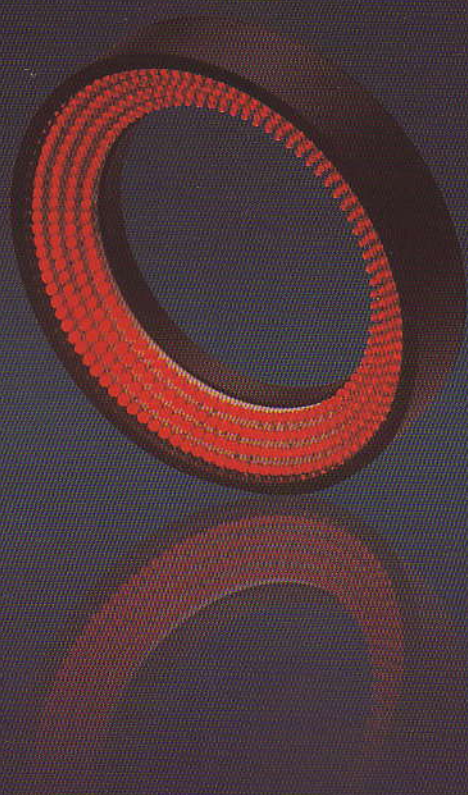


**OPTEX**  
**FA**

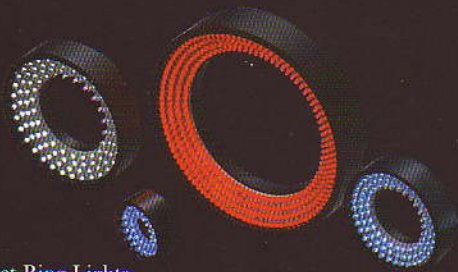
LED Lighting  
for  
Machine Vision



OPTEX FA CO.,LTD.



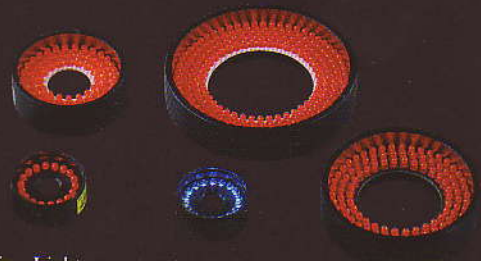
# A GROUP OF PRODUCTS



Direct Ring Lights

**OPDR**

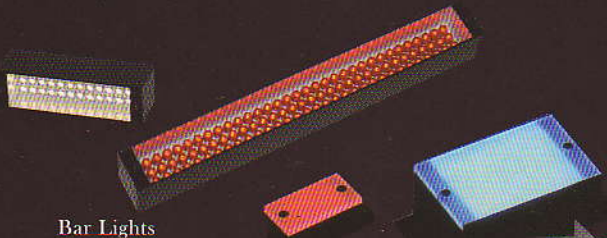
P03



Flat Ring Lights

**OPDR-F**

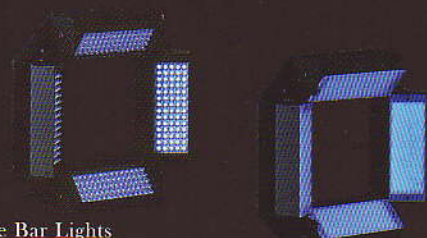
P04



Bar Lights

**OPDB**

P07



Square Bar Lights

**OPDB-Q**

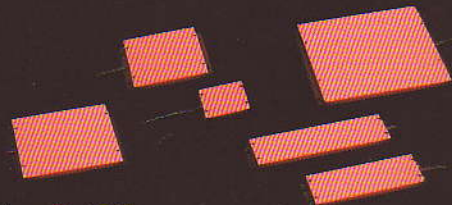
P08



Indirect Low-angle Ring Lights,  
Indirect Low-angle Square Lights

**OPLR.OPLQ**

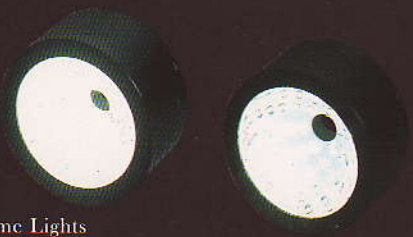
P09



Surface Mount Back Lights

**OPSM**

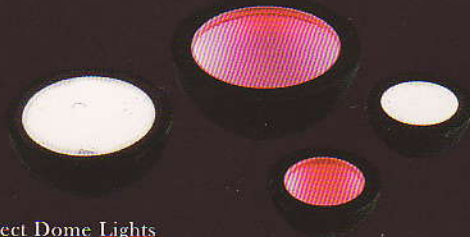
P10



Direct Dome Lights

**OPDD**

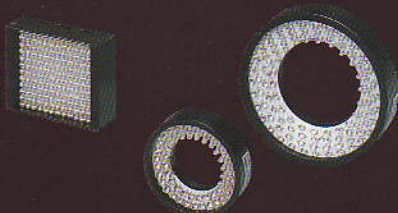
P13



Indirect Dome Lights

**OPID**

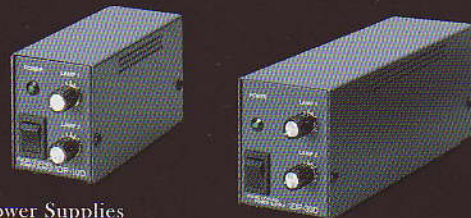
P13



Infrared Lights

**IR**

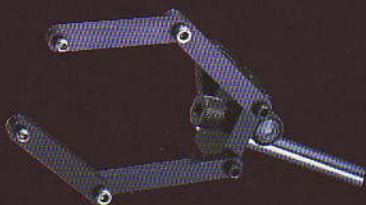
P15



Power Supplies

**OPPW**

P16



Arm unit for Lighting Setting

**OPAU**

P18

## USE

- Inspection for the flaws and defects of glossy surfaces in metal, film, glass(the breaking of glass pins and its sides), etc..
- Inspection for the external appearance of diodes, resistors, capacitors, etc.
- Inspection for the lead bends of QFP and SOP.
- Inspection for the surface of electronic components.





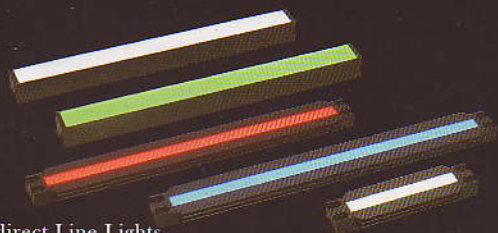
Low-angle Ring Lights  
**OPDR-LA**

P05



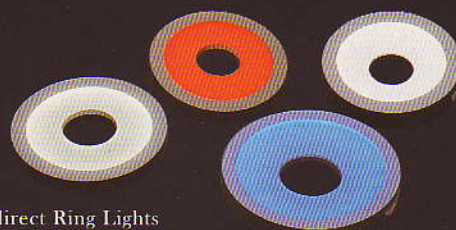
Horizontal Ring Lights  
**OPDR-H**

P06



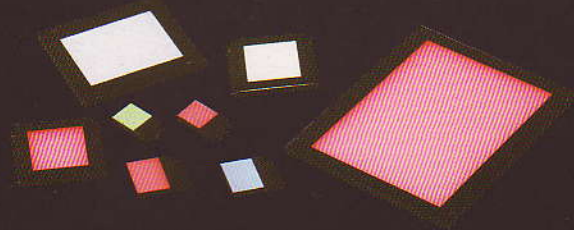
Indirect Line Lights  
**OPIL.OPIL-H**

P08



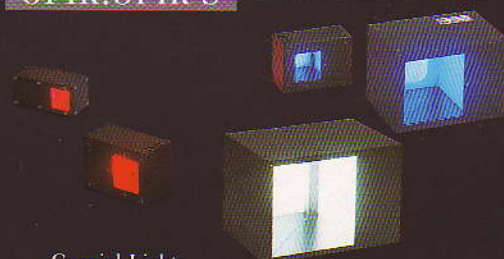
Indirect Ring Lights  
**OPIR.OPIR-S**

P09



Edge Mount Back Lights  
**OPEM**

P11



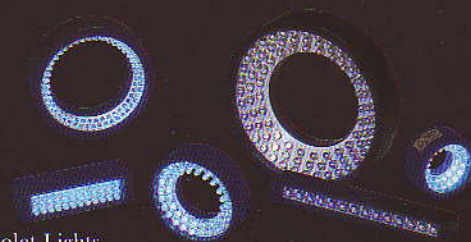
Coaxial Lights  
**OPCX**

P12



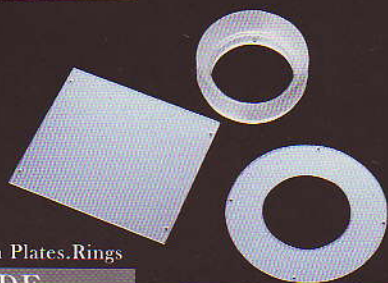
Spot Lights  
**OPS.OPHS**

P14



Ultraviolet Lights  
**UV**

P15



Diffusion Plates/Rings  
**DF**

P17



Polarizing Plates  
**PL**

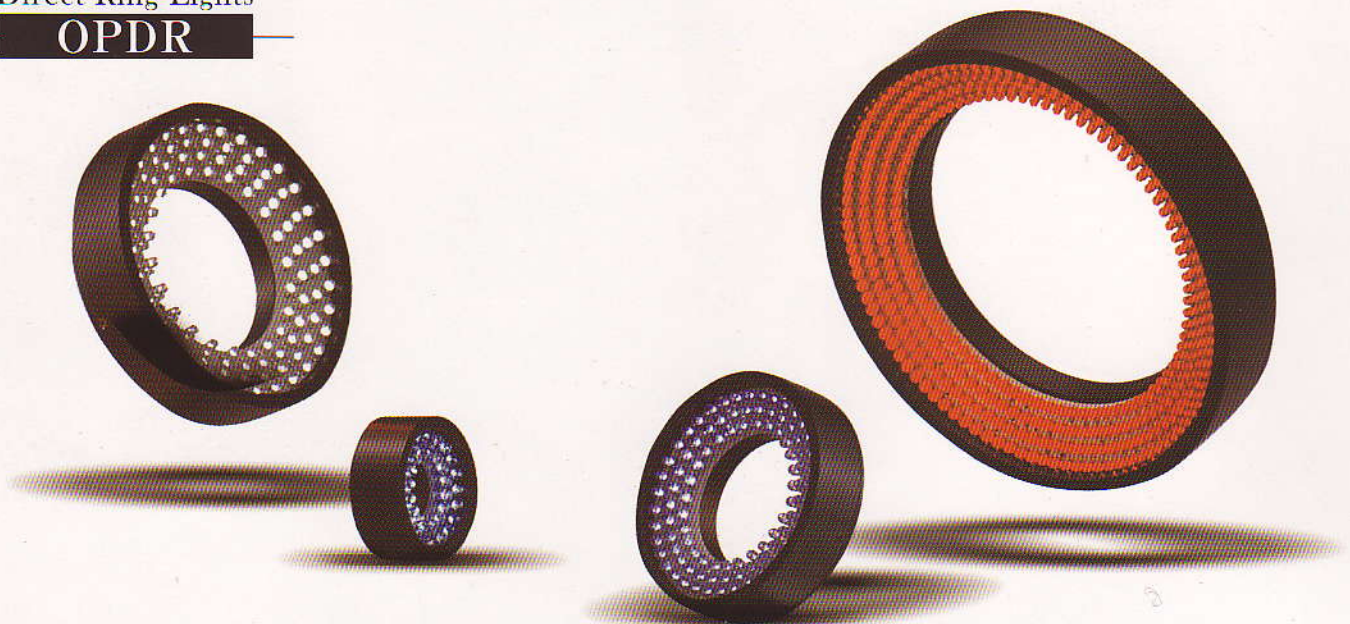
P17

- Inspection for wafer surface.
- Inspection for soldering
- Inspection for labels.
- Mounter.
- Inspection for the location and area of BGA soldering balls.



## Direct Ring Lights

## OPDR



### ■ A variety of uses!

Designed to be able to focus from a constant distance because the high-intensity LEDs are mounted in a ring shape and their angles are set on the mount board. It can be used by mounting on a camera lens itself or near a camera. This is the most popular LED Lighting, and has a variety of uses. If an optional diffusing plate is mounted, illumination evenness is improved.

### ● Features

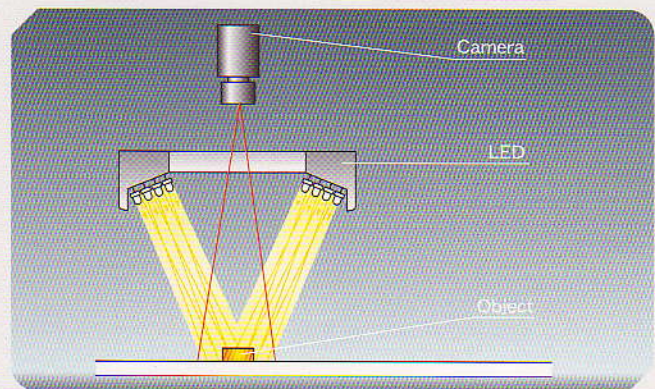
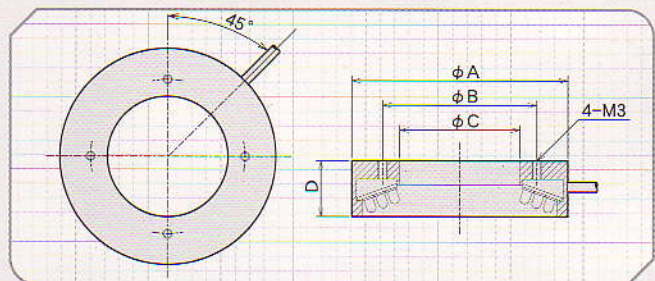
- Constant distance focus with LEDs mounted toward the center of the ring
- High evenness due to illumination from the outer circumference of the ring
- Wide area of illumination from the outer diameter

### ● Applications

- Suitable for measuring the difference in reflectance between target objects

e.g.: Imaging the alignment mark

Identification of package characters lead inspection  
Inspection of board parts  
Label inspection



### Specifications

Model	Dimension (mm)				LED color	The Number of LED	Power Consumption(W)	WD (mm)
	A	B	C	D				
OPDR-38-15R	38	28	15	16	Red	36	1.5	20~35
OPDR-38-15□	38	28	15	16	White, Blue, Green	36	2.9	20~35
OPDR-40-25R	40	32	25	15	Red	24	1.0	25~45
OPDR-40-25□	40	32	25	15	White, Blue, Green	24	2.0	25~45
OPDR-50-28R	50	40	28	16	Red	54	2.2	15~30
OPDR-50-28□	50	40	28	16	White, Blue, Green	45	3.6	15~30
OPDR-66-36R	66	50	36	20	Red	114	4.6	40~70
OPDR-66-36□	66	50	36	20	White, Blue, Green	90	7.2	40~70
OPDR-70-39R	70	50	39	18	Red	120	4.8	25~60
OPDR-70-39□	70	50	39	18	White, Blue, Green	96	7.7	25~60
OPDR-90-50R	90	70	50	20.5	Red	216	8.7	40~90
OPDR-90-50□	90	70	50	20.5	White, Blue, Green	108	8.7	40~90
OPDR-110-60R	110	85	60	26	Red	252	10.1	35~90
OPDR-110-60□	110	85	60	26	White, Blue, Green	159	12.8	35~90
OPDR-140-95R	140	120	95	28	Red	360	14.4	50~110
OPDR-140-95□	140	120	95	28	White, Blue, Green	180	14.4	50~110

Either W (white), B (blue), or G (Green) can be entered in □.

A diffusing plate (optional) can be mounted.

The numbers in the model number represent the dimensions. (OPDR-xx-xx = OPDR-outside diameter - inside diameter).



## Flat Ring Lights OPDR-F



### ■ Wide illumination area!

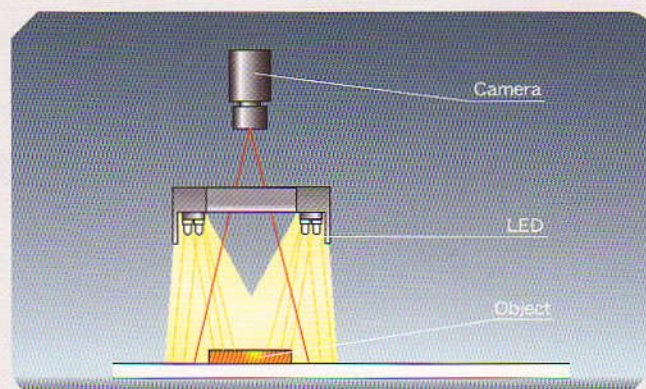
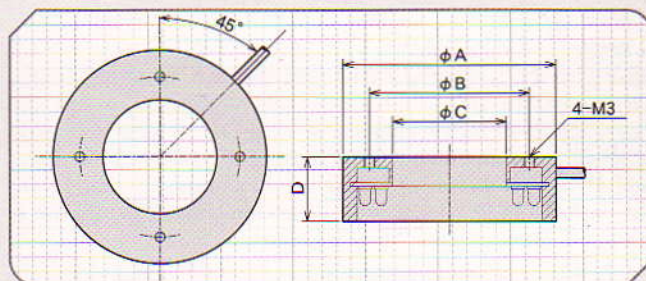
The high-intensity LEDs are mounted on a flat ring-shaped board. Compared with a direct ring light, this Lighting is more suitable for illuminating a wider area, using the same number of elements. By increasing the distance to the object, the illumination area widens further. If an optional diffusing plate is mounted, illumination evenness is improved.

### ● Features

- A wide illumination area with LEDs mounted on the flat ring board
- A wide illumination area due to lack of focus point

### ● Applications

- Suitable for measuring the difference in reflectance between target objects in a wide area  
e.g.: Inspection of board parts  
Label inspection



### ■ Specifications

Model	Dimension (mm)				LED color	The Number of LED	Power Consumption(W)
	A	B	C	D			
OPDR-F32-10R	32	14	10	15	Red	18	0.8
OPDR-F32-10□	32	14	10	15	White, Blue, Green	18	1.5
OPDR-F43-15R	43	28	15	20	Red	36	1.5
OPDR-F43-15□	43	28	15	20	White, Blue, Green	36	2.9
OPDR-F50-15R	50	35	15	18	Red	54	2.2
OPDR-F50-15□	50	35	15	18	White, Blue, Green	54	4.4
OPDR-F60-32R	60	45	32	18	Red	60	2.4
OPDR-F60-32□	60	45	32	18	White, Blue, Green	60	4.8
OPDR-F70-37R	70	50	37	18	Red	108	4.4
OPDR-F70-37□	70	50	37	18	White, Blue, Green	93	7.5
OPDR-F90-50R	90	70	50	18	Red	204	8.2
OPDR-F90-50□	90	70	50	18	White, Blue, Green	102	8.2
OPDR-F100-50R	100	70	50	20	Red	216	8.7
OPDR-F100-50□	100	70	50	20	White, Blue, Green	108	8.7
OPDR-F110-60R	110	85	60	22	Red	240	9.6
OPDR-F110-60□	110	85	60	22	White, Blue, Green	159	12.8

Either W (white), B (blue), or G (Green) can be entered in □.

A diffusing plate (optional) can be mounted.

The numbers in the model number represent the dimensions. (OPDR-F xx-xx = OPDR-F outside diameter - inside diameter).



## Low-angle Ring Lights

## OPDR-LA



### ■ Perfect for edge detection and embossing!

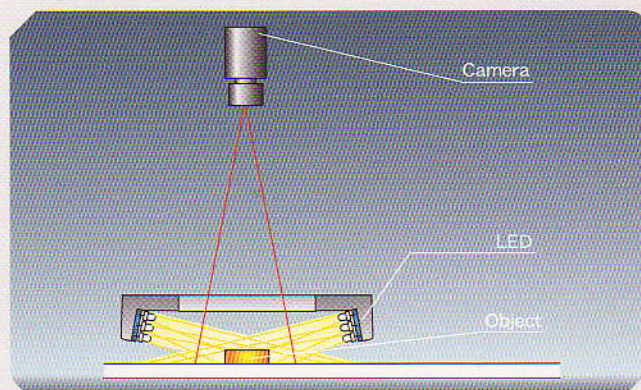
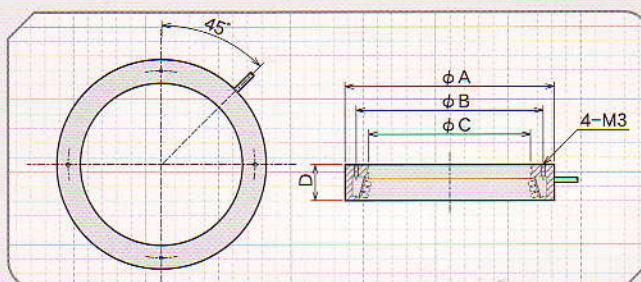
Designed to be able to focus from a close distance because the high-intensity LEDs are mounted in a ring shape and a large angle is set on the mount board. If the Lighting is set close to the object and illuminates the object from a diagonal angle, irregularities on the surface can be clearly seen. If an optional diffusing plate is mounted, illumination evenness is improved.

### ● Features

- Illumination from a shallow angle toward the object to detect any scratches on the surface
- Illumination from a diagonal angle to control reflection and to detect differences in the scattering rate

### ● Applications

- Marking reading by laser
- BGA soldering ball inspection
- Inspection for scratches or stains on the wafer or glass board
- Other inspections, such as edge detection
- Edge inspection of the board or sheet



### Specifications

Model	Dimension (mm)				LED color	The Number of LED	Power Consumption(W)	WD (mm)
OPDR-LA38-15R-2	A	B	C	D	Red	36	1.5	5~10
OPDR-LA38-15□-2	38	28	15	16	White, Blue, Green	36	2.9	5~10
OPDR-LA50-24R-2	50	36	24	18	Red	48	2.0	10~20
OPDR-LA50-24□-2	50	36	24	18	White, Blue, Green	48	3.9	10~20
OPDR-LA74-48R-2	74	60	48	19	Red	90	3.6	15~30
OPDR-LA74-48□-2	74	60	48	19	White, Blue, Green	90	7.2	15~30
OPDR-LA100-68R-3	100	84	68	22	Red	180	7.2	20~40
OPDR-LA100-68□-3	100	84	68	22	White, Blue, Green	90	7.2	20~40
OPDR-LA120-70R-3	120	90	70	21	Red	228	9.2	20~40
OPDR-LA120-70□-3	120	90	70	21	White, Blue, Green	114	9.2	20~40
OPDR-LA140-108R-3	140	125	108	24	Red	264	10.6	15~40
OPDR-LA140-108□-3	140	125	108	24	White, Blue, Green	132	10.6	15~40
OPDR-LA200-170R-3	200	186	170	22	Red	396	15.9	40~45
OPDR-LA200-170□-3	200	186	170	22	White, Blue, Green	315	25.2	40~45

Either W (white), B (blue), or G (Green) can be entered in □.

A diffusing plate (optional) can be mounted.

The numbers in the model number represent the dimensions. (OPDR-LA xx-xx = OPDR-LA outside diameter - inside diameter).





### ■ Edge-on lighting to emphasize uneven surfaces!

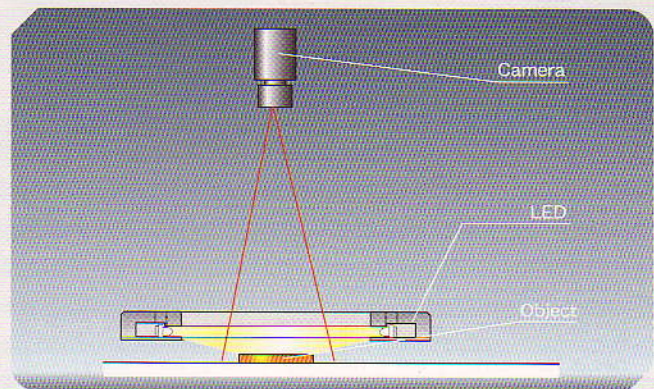
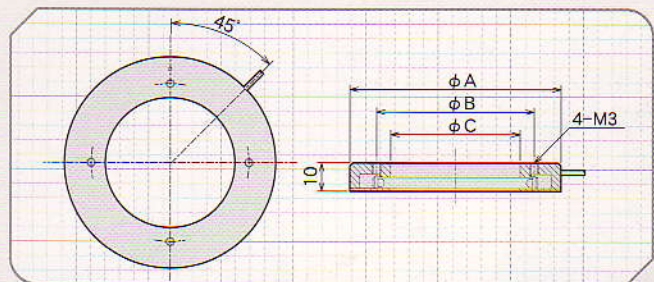
The high-intensity LEDs are mounted in a ring shape from a horizontal direction toward the center of the ring. If the Lighting is set at its closest distance to the object, the small LED light illuminates the object at an angle close to edge-on. Suitable for inspecting the work edge.

### ● Features

- Illumination horizontal to the object to emphasize fine stains on the surface or edges

### ● Applications

- BGA soldering ball inspection
- Inspection for scratches or stains on the wafer or glass board
- Other inspections, such as edge detection



### Specifications

Model	Dimension (mm)			LED color	The Number of LED	Power Consumption(W)
	A	B	C			
OPDR-H50-20R-1	50	36	20	Red	21	1.7
OPDR-H50-20□-1	50	36	20	White, Blue, Green	21	1.7
OPDR-H75-46R-1	75	56	46	Red	48	2.0
OPDR-H75-46□-1	75	56	46	White, Blue, Green	48	3.9
OPDR-H84-54R-1	84	70	54	Red	48	2.0
OPDR-H84-54□-1	84	70	54	White, Blue, Green	48	3.9
OPDR-H96-60R-1	96	80	60	Red	60	2.4
OPDR-H96-60□-1	96	80	60	White, Blue, Green	60	4.8
OPDR-H122-92R-1	122	110	92	Red	77	3.2
OPDR-H122-92□-1	122	110	92	White, Blue, Green	77	6.3
OPDR-H152-114R-1	152	130	114	Red	96	3.9
OPDR-H152-114□-1	152	130	114	White, Blue, Green	96	7.7
OPDR-H176-140R-1	176	160	140	Red	120	4.8
OPDR-H176-140□-1	176	160	140	White, Blue, Green	120	9.6
OPDR-H206-170R-1	206	190	170	Red	144	5.8
OPDR-H206-170□-1	206	190	170	White, Blue, Green	144	11.6

Either W (white), B (blue), or G (Green) can be entered in □.

The numbers in the model number represent the dimensions. (OPDR-H xx-xx = OPDR-H outside diameter - inside diameter).



## Bar Lights

## OPDB



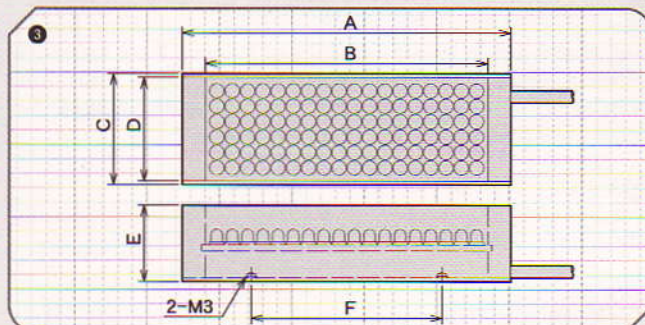
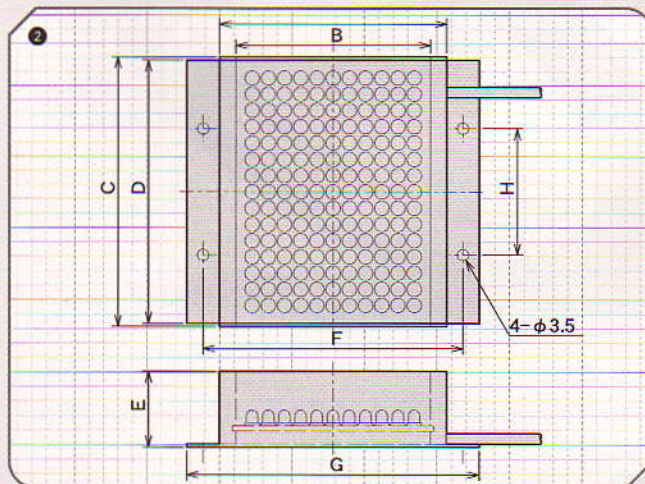
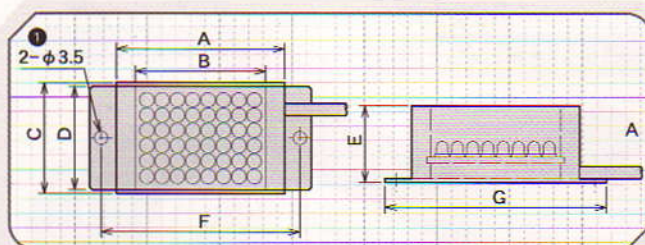
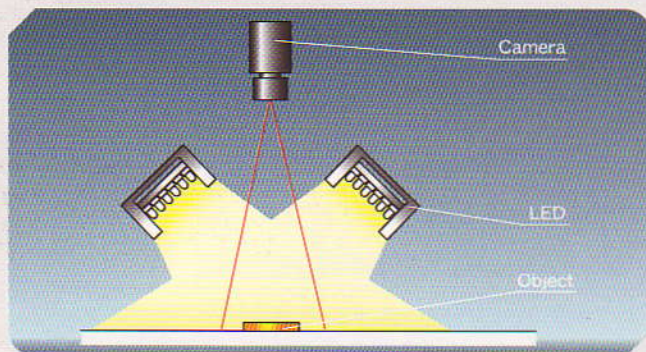
■ Various Lighting options including light-tilting or backlight! The high-intensity LEDs are mounted on the flat board. They can be used as oblique lighting or also as a backlight.

## ● Features

- Bar-shaped Lighting using LEDs mounted on a flat board
- Various illumination angles allowing illumination from the optimal position
- Reflection control by mounting a diffusion plate
- Flexible installation to enable a wide range of applications
- Usable as high-intensity surface lighting

## ● Applications

- Crack/exterior inspection of molding
- Trimming/forming inspection of IC lead
- Exterior inspection of connector
- Character inspection of chip part



## Specifications

Model	Dimension (mm)								LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F	G	H				
OPDB-14×11R	24	14	12	11	11	30	36	-	Red	6	0.3	1
OPDB-14×11□	24	14	12	11	11	30	36	-	White, Blue, Green	6	0.5	
OPDB-34×27R	44	34	29	27	20	52	58	-	Red	48	2.0	
OPDB-34×27□	44	34	29	27	20	52	58	-	White, Blue, Green	48	3.9	
OPDB-50×15R	60	50	17	15	20	30	-	-	Red	36	1.5	3
OPDB-50×15□	60	50	17	15	20	30	-	-	White, Blue, Green	36	2.9	
OPDB-74×27R	86	74	29	27	20	50	-	-	Red	108	4.4	
OPDB-74×27□	86	74	29	27	20	50	-	-	White, Blue, Green	70	5.8	
OPDB-100×11R	110	100	12.8	11.2	20	80	-	-	Red	48	2.0	3
OPDB-100×11□	110	100	12.8	11.2	20	80	-	-	White, Blue, Green	48	3.9	
OPDB-100×15R	110	100	17	15	20	80	-	-	Red	72	2.9	
OPDB-100×15□	110	100	17	15	20	80	-	-	White, Blue, Green	72	5.8	
OPDB-132×15R	142	132	17	15	20	80	-	-	Red	96	3.9	3
OPDB-132×15□	142	132	17	15	20	80	-	-	White, Blue, Green	96	7.7	
OPDB-140×11R	150	140	13	11	20	80	-	-	Red	70	2.9	
OPDB-140×11□	150	140	13	11	20	80	-	-	White, Blue, Green	70	5.8	
OPDB-25×25R-DF	35	25	27	25	30	15	-	-	Red	36	1.5	1
OPDB-25×25□-DF	35	25	27	25	30	15	-	-	White, Blue, Green	36	2.9	
OPDB-26×15R-DF	36	26	17	15	20	44	50	-	Red	18	0.8	
OPDB-26×15□-DF	36	26	17	15	20	44	50	-	White, Blue, Green	18	1.5	
OPDB-50×48R-DF	62	50	50	48	30	Note 1	-	-	Red	144	5.8	3
OPDB-50×48□-DF	62	50	50	48	30	Note 1	-	-	White, Blue, Green	90	7.2	
OPDB-75×68R-DF	85	75	70	68	30	95	105	60	Red	168	6.8	
OPDB-75×68□-DF	85	75	70	68	30	95	105	60	White, Blue, Green	168	13.5	
OPDB-186×30R-DF	198	186	38	30	22	Note 2	-	-	Red	216	8.7	3
OPDB-186×30□-DF	198	186	38	30	22	Note 2	-	-	White, Blue, Green	216	17.3	
OPDB-200×15R-DF	210	200	23	15	22	100	-	-	Red	147	6.0	
OPDB-200×15□-DF	210	200	23	15	22	100	-	-	White, Blue, Green	147	11.8	
OPDB-288×27R-DF	300	288	35	27	22	160	-	-	Red	426	17.1	3
OPDB-288×27□-DF	300	288	35	27	22	160	-	-	White, Blue, Green	426	34.1	

Note 1: 4-M3 pitch 40×40, Note 2: 3-M3 pitch 70

Either W (white), B (blue), or G (Green) can be entered in □.

The numbers in the model number represent the dimensions. (OPDB-xx×xx) represents the dimensions of the emission surface. The letters "DF" in the model number represent the standard mounting specification of the diffusion plate.

A diffusing plate (optional) can be mounted.

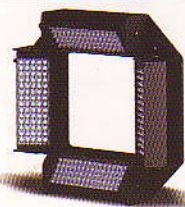
\* 1 \_ If a diffusing plate is attached, the Size of E becomes 20.

The position of the cable depends on the kind of Lighting. (For more details, please contact us.)



## Square Bar Lights

### OPDB-Q



### Multi-angle illumination (0-90°)!

Can arrange the bar lights in four directions and change the angle of illumination freely depending to the target object. Can also illuminate in all directions because each light can be moved independently.

### Features

- Lighting with bar-shaped lights in four corners
- Each bar-shaped light is adjustable with an illumination angle of 0 to 90 degrees.

### Applications

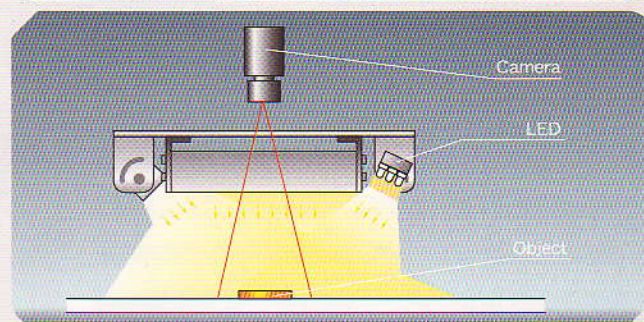
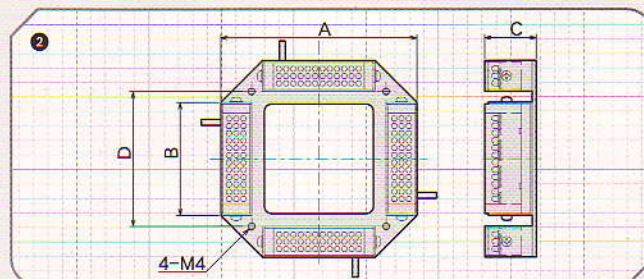
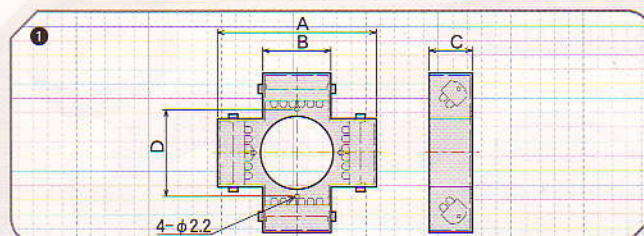
- IC package inspection for cracking, character and orientation
- Grinding line work of the metal board etc.
- IC inspection within the taping

### Specifications

Model	Dimension(mm)				LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D				
OPDB-Q27X11R	70	30	19	38	Red	12×4	2.0	1
OPDB-Q27X11□	70	30	19	38	White, Blue, Green	12×4	3.9	2
OPDB-Q50X15R	108	62	27.3	74	Red	36×4	5.8	
OPDB-Q50X15□	108	62	27.3	74	White, Blue, Green	36×4	11.6	
OPDB-Q74X27R	155	86	34	100	Red	108×4	17.3	
OPDB-Q74X27□	155	86	34	100	White, Blue, Green	70×4	23.2	

Either W (white), B (blue), or G (Green) can be entered in □.

A diffusing plate (optional) can be mounted.



## Indirect Line Lights

### OPIL-OPIL-H



### Lighting with high evenness and high illuminance!

Bar Lighting with high evenness suitable for use with a line sensor camera. It is mounted with high-intensity chip LEDs, and the diffusing plate maintains illumination evenness. Suitable for oblique and permeable lighting.

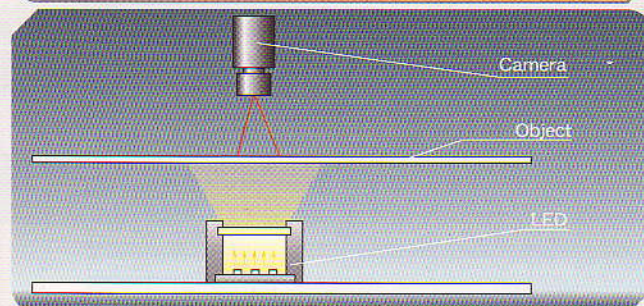
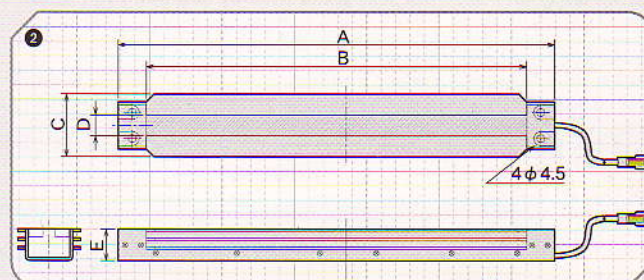
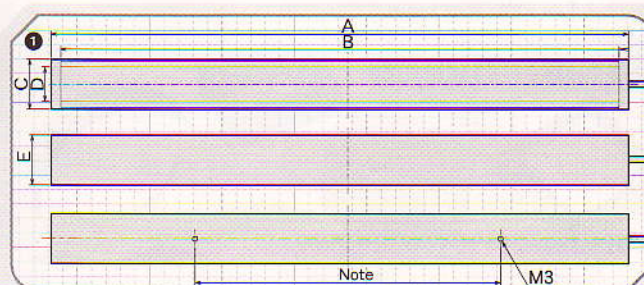
OPIL-H is a bar light with extra-high evenness. The high-intensity chip LEDs are densely mounted, and the diffusing plate maintains illumination evenness. To cope with the generation of heat, the case is made from resin aluminum heat sink.

### Applications

- Permeable illumination for use with a line camera
- Appearance inspection of sheets and films

### Specifications

Model	Dimension(mm)					LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E				
OPIL-300×20R-DF	310	300	26	18	26	Red	174	7.0	1
OPIL-300×20□-DF	310	300	26	18	26	White, Blue, Green	174	7.0	
OPIL-600×20R-DF	610	600	26	18	26	Red	348	14.0	
OPIL-600×20□-DF	610	600	26	18	26	White, Blue, Green	348	14.0	
OPIL-900×20R-DF	910	900	26	18	26	Red	522	20.9	
OPIL-900×20□-DF	910	900	26	18	26	White, Blue, Green	522	20.9	
OPIL-1200×20R-DF	1210	1200	26	18	26	Red	696	27.9	
OPIL-1200×20□-DF	1210	1200	26	18	26	White, Blue, Green	696	27.9	
OPIL-H100×12R-DF	133	101	36	12	18	Red	84	6.8	2
OPIL-H100×12□-DF	133	101	36	12	18	White, Blue, Green	84	6.8	
OPIL-H300×12R-DF	333	301	36	12	18	Red	252	20.0	
OPIL-H300×12□-DF	333	301	36	12	18	White, Blue, Green	252	20.0	



Note: The number of holes and angle depend on the kind of lighting. (For more details, please contact us.)

Either W (white), B (blue), or G (Green) can be entered in □.

The numbers in the model number represent the dimensions. (OPIL-H \*\* x \*\*) represents the dimensions of the emission surface.



## Indirect Ring Lights

## OPIR.OPIR-S



## A variety of uses!

The LEDs illuminate from around a ring-shaped light guide, and because there are no LED elements on the luminescent surface they are not reflected on the object. Effective for inspecting objects with a glossy surface or spherical objects. The brightness is lower than that of the direct ring light, but the illumination is more even than that of the direct ring light with a diffusing plate attached. OPIR-S is a model which has an angle of inclination on the luminescent surface and light is focused toward the center.

## Features

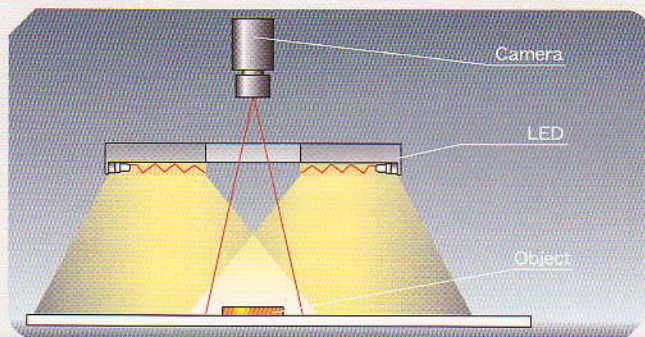
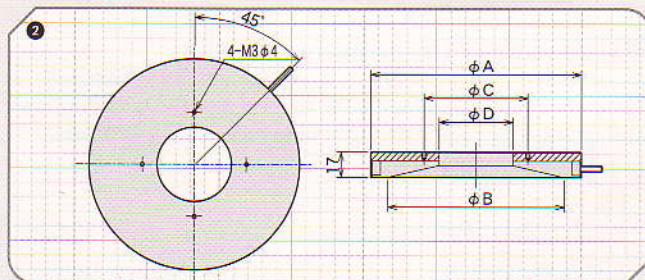
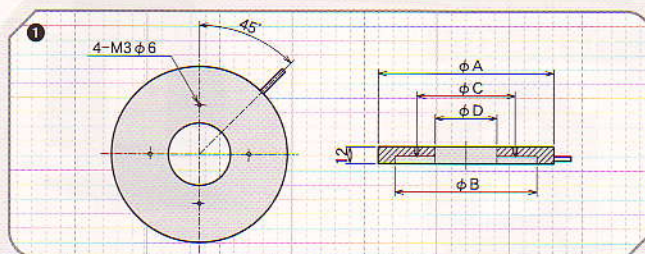
- Ring-shaped light with light guide
- Diffusive light illumination with controlled flat element by LEDs mounted around the outer circumference
- Surface emission allowing illumination to be even without LED reflection

## Applications

- Coating inspection and burr inspection of the molding
- Soldering inspection
- Inspection of board parts

## Specifications

Model	Dimension (mm)				LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D				
OPIR-100R	102	78	70	33	Red	72	2.9	1
OPIR-100□	102	78	70	33	White, Blue, Green	72	5.8	
OPIR-130R	125	101	70	44	Red	90	3.6	
OPIR-130□	125	101	70	44	White, Blue, Green	90	7.2	
OPIR-S100R	102	80	70	33	Red	72	2.9	2
OPIR-S100□	102	80	70	33	White, Blue, Green	72	5.8	
OPIR-S150R	142	119	70	50	Red	102	4.1	
OPIR-S150□	142	119	70	50	White, Blue, Green	102	8.2	



Either W (white), B (blue), or G (Green) can be entered in □.

Indirect Low-angle Ring Lights,  
Indirect Low-angle Square Lights

## OPLR.OPLQ



**Saving power and less heat generation by oblique, even light!**  
This Lighting is set at a close distance from the object, LED light is illuminated from the light guide side, and only indirect light is emitted from the internal oblique side.

OPLQ is a box-typed surface Lighting in which the light is emitted from four surfaces. It can illuminate square-shaped objects etc evenly.

## Features

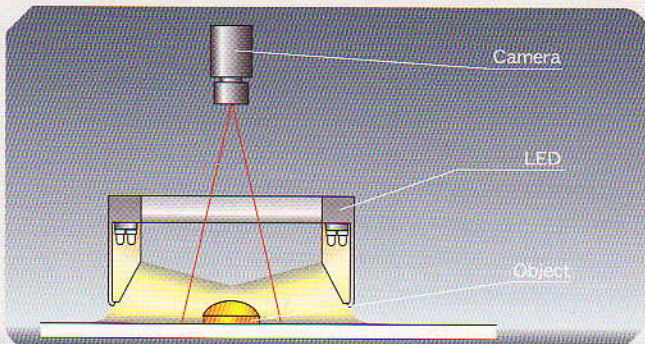
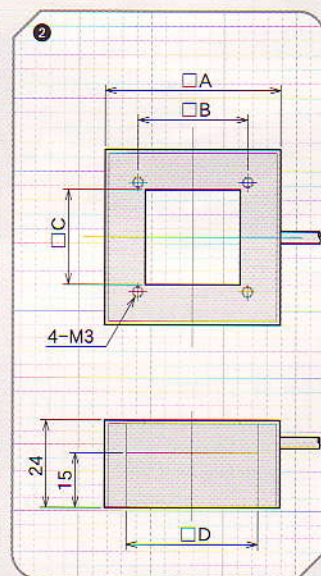
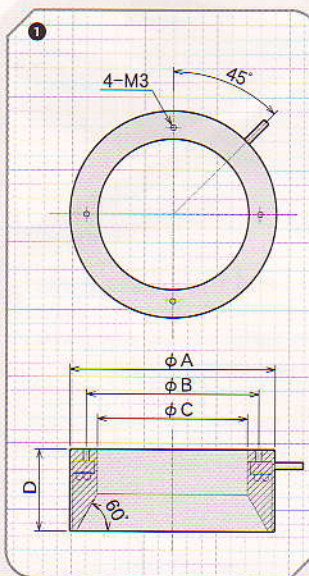
- Low angle light using a light guide
- Diffusive light illumination from a low angle

## Applications

- IC character inspection
- IC lead inspection within the embossed tape
- IC void inspection
- IC orientation identification, NG mark inspection

## Specifications

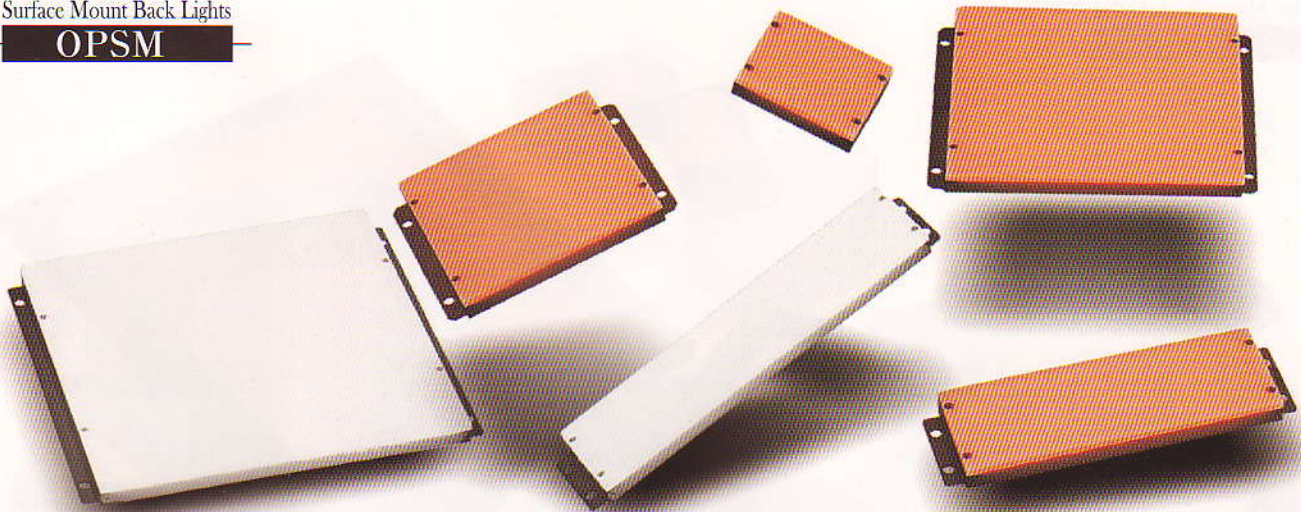
Model	Dimension (mm)				LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D				
OPLR-100-73R	100	84	73	40	Red	132	5.3	1
OPLR-100-73□	100	84	73	40	White, Blue, Green	132	10.6	
OPLR-136-109R	136	120	109	40	Red	180	7.2	
OPLR-136-109□	136	120	109	40	White, Blue, Green	180	14.4	
OPLR-180-153R	180	168	153	40	Red	258	10.4	2
OPLR-180-153□	180	168	153	40	White, Blue, Green	258	20.8	
OPLQ-32R	32	15	10	20	Red	12	0.5	
OPLQ-32□	32	15	10	20	White, Blue, Green	12	1.0	
OPLQ-48R	48	30	26	36	Red	24	1.0	2
OPLQ-48□	48	30	26	36	White, Blue, Green	24	2.0	
OPLQ-75R	75	57	53	63	Red	48	2.0	
OPLQ-75□	75	57	53	63	White, Blue, Green	48	3.9	
OPLQ-96R	96	78	70	84	Red	84	3.4	2
OPLQ-96□	96	78	70	84	White, Blue, Green	84	6.8	
OPLQ-120R	120	102	98	108	Red	84	6.8	
OPLQ-120□	120	102	98	108	White, Blue, Green	84	6.8	



Either W (white), B (blue), or G (Green) can be entered in □.

The numbers in the model number represent the dimensions. (OPLR/OPLQ-xx = OPLR/OPLQ- outside dimension).





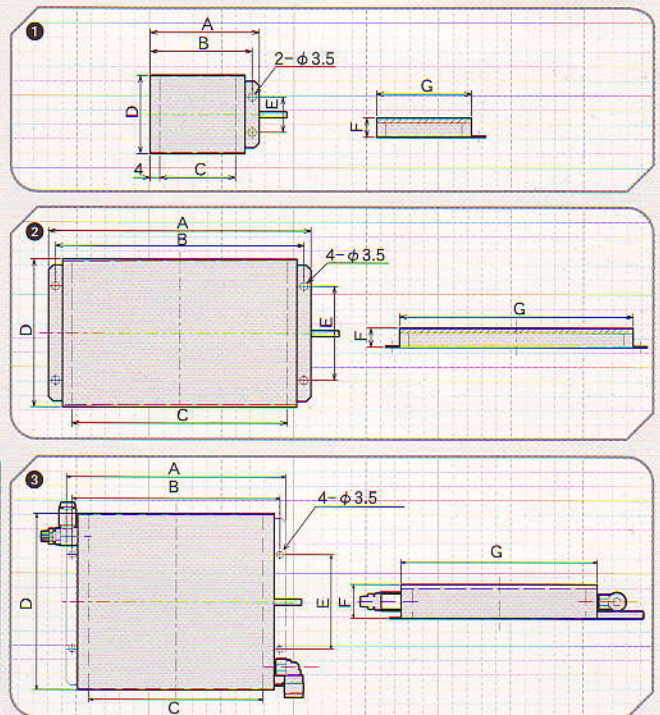
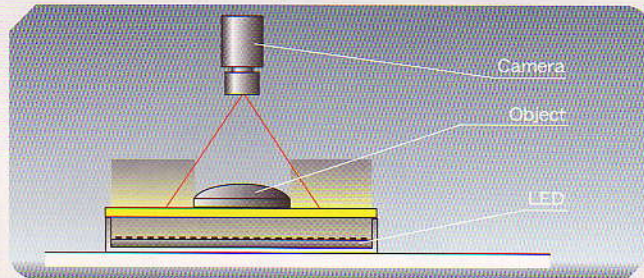
■ A slim-type light mounted with red chip LEDs. This light has low illuminance compared with the bar light, but it can be used in narrow spaces because of its 8.2mm thickness. Also, it is densely mounted with chip LEDs, and thus even illumination is possible. It is also suitable for permeable lighting.

### ● Features

- Lighting with red chip LEDs mounted on the surface producing even light via a diffusion plate
- Can be used to judge the shape from the silhouette by illuminating from the back of an object

### ● Applications

- Inspection of dimension and shape of electronic parts
- Inspection of dimension and shape of lead frame
- Lighting inspection of liquid crystal panel
- IC lead inspection
- Recognition of alignment sign of glass board and 2D code



## Specifications

Model	Dimension (mm)							LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F	G				
OPSM-32×32R-T	46	43	32	33	15	8.2	40	Red	36	1.5	1
OPSM-32×32W-T	46	43	32	33	15	18	40	White	36	2.9	
OPSM-62×32R-T	46	43	32	63	40	8.2	40	Red	72	2.9	
OPSM-62×32W-T	46	43	32	63	40	18	40	White	72	5.8	
OPSM-62×62R-T	76	73	62	63	40	8.2	70	Red	144	5.8	
OPSM-62×62W-T	76	73	62	63	40	18	70	White	144	11.6	
OPSM-92×32R-T	112	106	92	33	15	8.2	100	Red	108	4.4	2
OPSM-92×32W-T	112	106	92	33	15	18	100	White	108	8.7	
OPSM-92×62R-T	112	106	92	63	40	8.2	100	Red	216	8.7	
OPSM-92×62W-T	116	110	92	63	20	18	104	White	216	17.3	3
OPSM-92×92R-T	112	106	92	93	70	8.2	100	Red	324	13.0	2
OPSM-92×92W-T	116	110	92	93	50	18	104	White	324	26.0	3
OPSM-122×32R-T	142	136	122	33	15	8.2	130	Red	144	5.8	2
OPSM-122×32W-T	142	136	122	33	15	18	130	White	144	11.6	
OPSM-122×62R-T	142	136	122	63	40	8.2	130	Red	288	11.6	
OPSM-122×62W-T	146	140	122	63	20	18	134	White	288	23.1	3
OPSM-122×92R-T	142	136	122	93	70	8.2	130	Red	432	17.3	2
OPSM-122×92W-T	146	140	122	93	50	18	134	White	432	34.6	3
OPSM-122×122R-T	142	136	122	123	100	8.2	130	Red	576	23.1	2
OPSM-122×122W-T	146	140	122	123	80	18	134	White	576	46.1	3

The numbers in the model number represent the dimensions. (OPSM- \*\* X \*\*) represents the dimensions of the emission surface.



## Edge Mount Back Lights

## OPEM



### ■ Slim-type, low power-consuming, low heat-generating, even illumination!

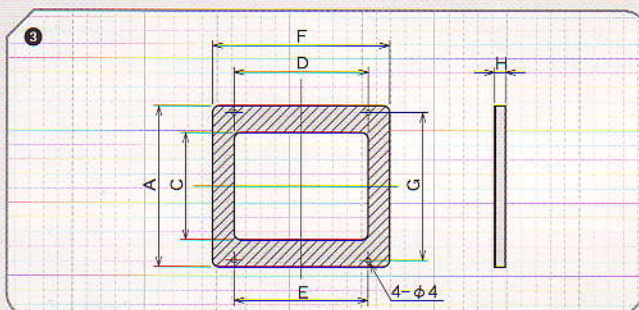
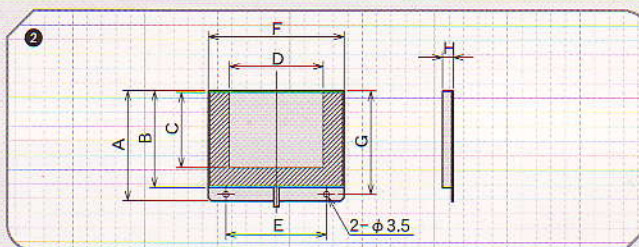
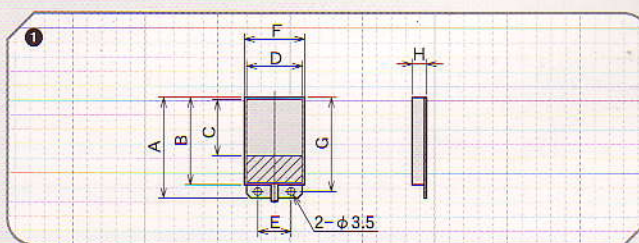
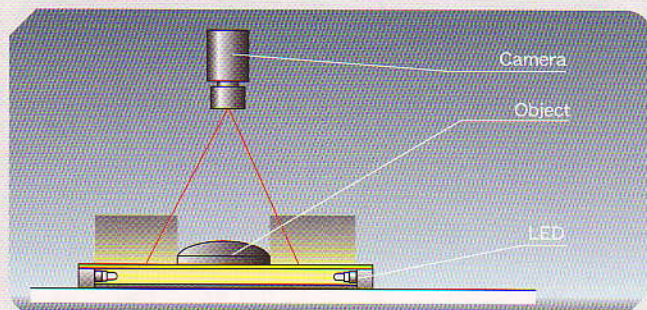
The LEDs illuminate from around a light guide on the whole surface, and thus the LED elements are not reflected and the illumination is even. The brightness is lower than that of the bar lights or the surface mount back lights, but this slim-type light can be used in narrow spaces. However, if the light area grows wider, light cannot reach the center and thus illuminance is decreased compared with the surrounding area.

#### ● Features

- Slim-type Lighting with LEDs mounted around the light guide to brighten it
- Even illumination on the surface allowing only the LED mounted outer circumference to be brightened

#### ● Applications

- Inspection of dimension and shape of electronic parts
- Inspection of dimension and shape of lead frame
- IC lead inspection
- Recognition of alignment sign of glass board and 2D code



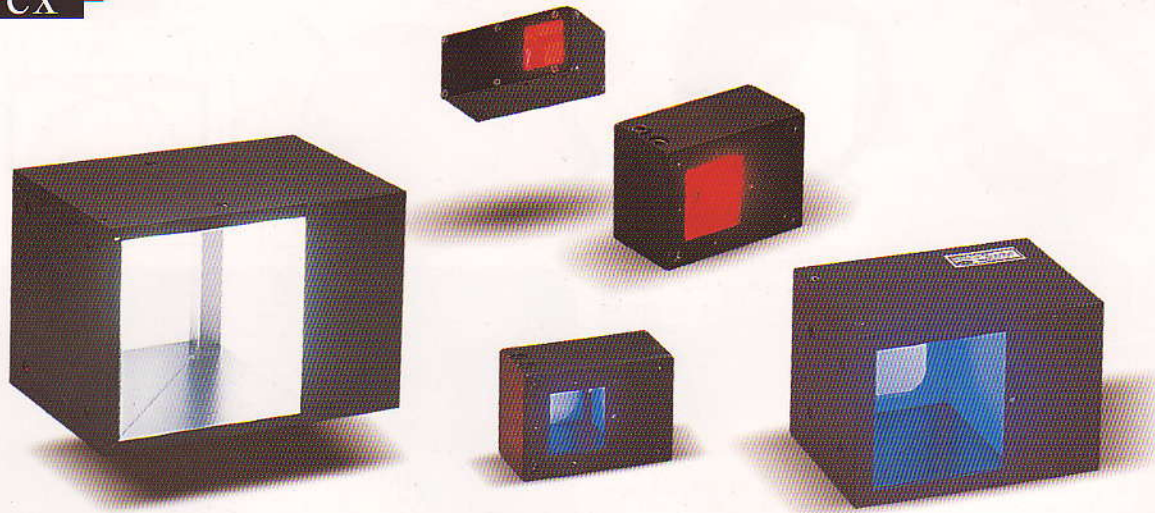
### ■ Specifications

Model	Dimension (mm)								LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F	G	H				
OPEM-25×25R	45	38	25	25	15	26	42	7	Red	6	0.3	1
OPEM-25×25□	45	38	25	25	15	26	42	7	White, Blue, Green	6	0.5	
OPEM-41×30R	52	42	30	41	30	42	47	7	Red	10	0.5	
OPEM-41×30□	52	42	30	41	30	42	47	7	White, Blue, Green	10	1.2	
OPEM-50×50R	84	74	50	50	60	74	79	8.5	Red	48	2.0	2
OPEM-50×50□	84	74	50	50	60	74	79	8.5	White, Blue, Green	48	3.9	
OPEM-100×80R	122	—	80	100	100	134	110	8	Red	84	3.4	3
OPEM-100×80□	122	—	80	100	100	134	110	8	White, Blue, Green	84	6.8	
OPEM-100×100R	142	—	100	100	100	134	130	8	Red	96	3.9	
OPEM-100×100□	142	—	100	100	100	134	130	8	White, Blue, Green	96	7.7	
OPEM-180×135R	177	—	135	180	180	214	166	8	Red	144	5.8	
OPEM-180×135□	177	—	135	180	180	214	166	8	White, Blue, Green	144	11.6	
OPEM-200×150R	190	—	150	200	200	232	180	8	Red	168	6.8	
OPEM-200×150□	190	—	150	200	200	232	180	8	White, Blue, Green	168	13.5	

Either W (white), B (blue), or G (Green) can be entered in □.

The numbers in the model number represent the dimensions. (OPEM- \*\* x \*\*) represents the dimensions of the emission surface.





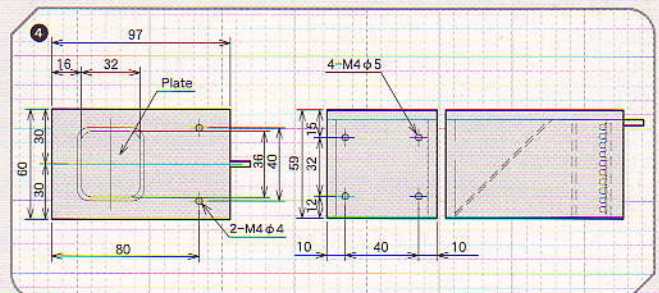
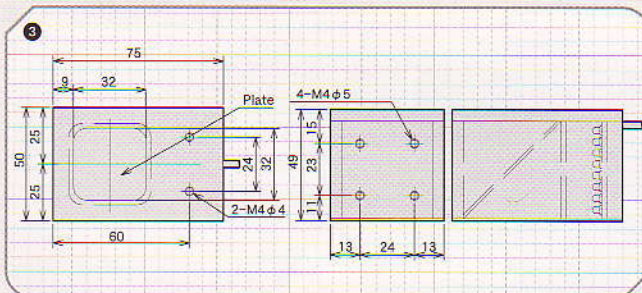
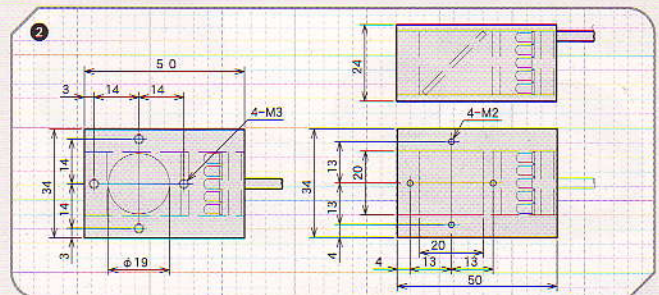
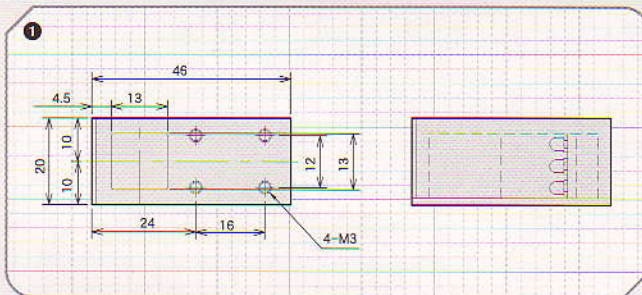
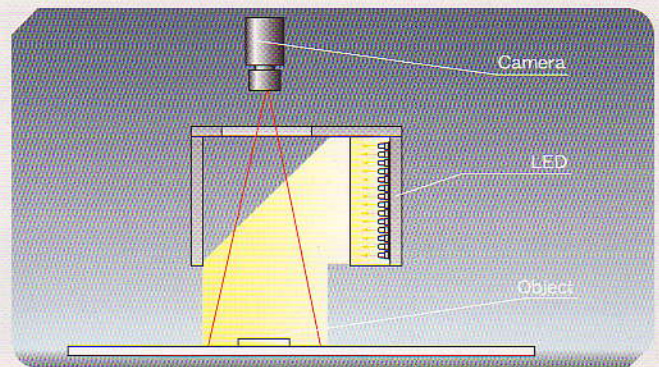
Can get reflected images by emitting LED light from the side of a half mirror. This is a coaxial light for mounting on the front of a camera lens.

### Features

- Illumination from the coaxial side of a lens via a half mirror
- Illuminating light directly to the object for reflected images

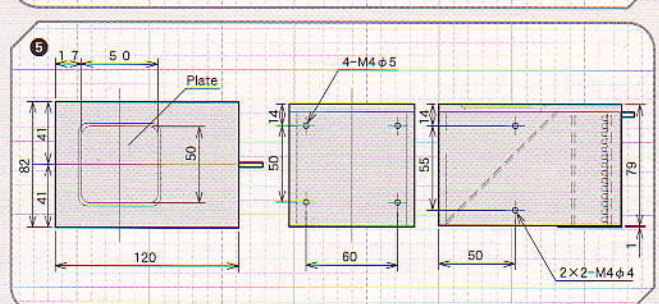
### Applications

- IC void inspection
- Pattern inspection of the print board
- Alignment mark on the board
- Inspection for scratches on the chips and wafers
- Inspection for scratches on the surface of the glass board
- Inspection for dents on the lead frame



### Specifications

Model	LED color	The Number of LED	Power Consumption(W)	Outline Drawing
OPCX-13R	Red	9	0.8	1
OPCX-13□	White, Blue, Green	9	0.8	1
OPCX-20R	Red	25	1.2	2
OPCX-20□	White, Blue, Green	25	2.2	2
OPCX-40R	Red	64	2.7	3
OPCX-40□	White, Blue, Green	49	4.8	3
OPCX-50R	Red	100	4.8	4
OPCX-50□	White, Blue, Green	81	6.5	4
OPCX-70R	Red	168	6.8	5
OPCX-70□	White, Blue, Green	168	13.5	5

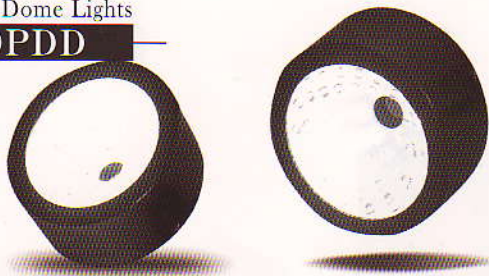


Either W (white), B (blue), or G (Green) can be entered in □.



## Direct Dome Lights

## OPDD



## ■ Strong illumination in all directions!

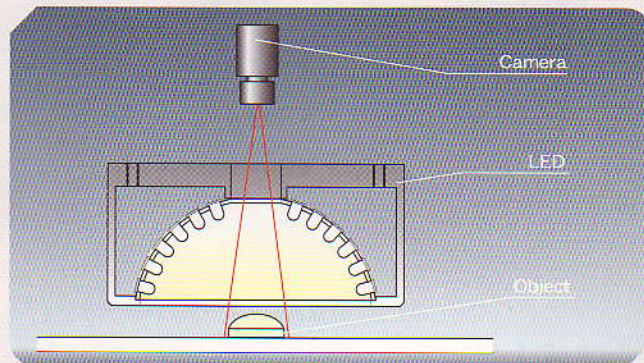
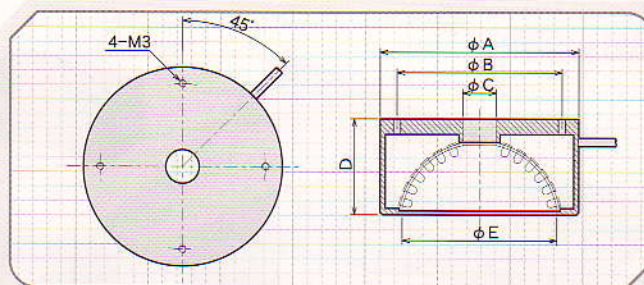
The LEDs are mounted inside a dome, and thus strong illumination can be provided in all whole angles. If the diffusing dome (optional) is mounted, strong diffused light that does not reflect easily on spherical objects can be obtained. There is also a model in which lines of LEDs are separated into several vertical circuits, and each line can regulate light independently.

## ● Features

- Emitting light directly to the object from all directions from LEDs mounted inside the dome
- The optional diffusion plate allowing illumination of diffused light

## ● Applications

- BGA soldering ball inspection
- Soldered surface inspection of IC
- Inspection of objects with rounded or curved surfaces



## Specifications

Model	Dimension (mm)					LED color	The Number of LED	Power Consumption(W)
	A	B	C	D	E			
OPDD-60-13R	77	64	13	38	60	Red	66	2.7
OPDD-60-13□	77	64	13	38	60	White, Blue, Green	66	5.3
OPDD-120-30R	150	70	30	70	94	Red	312	12.5
OPDD-120-30□	150	70	30	70	94	White, Blue, Green	312	25.0

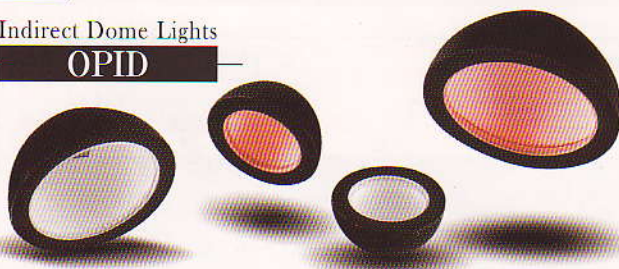
Either W (white), B (blue), or G (Green) can be entered in □.

A diffusing dome (optional) can be mounted.

The numbers in the model number represent the dimensions. (OPDD-\*\*-\*\* = OPDD-bore diameter-inside diameter).

## Indirect Dome Lights

## OPID



## ■ Reflective, even illumination!

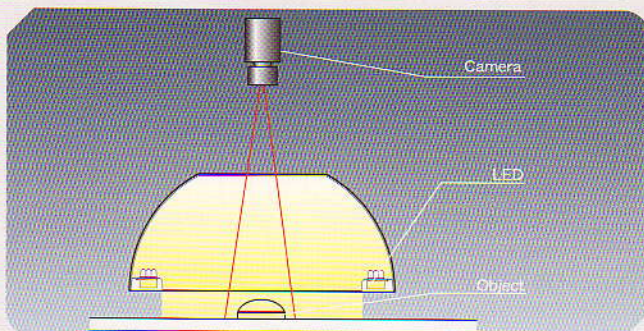
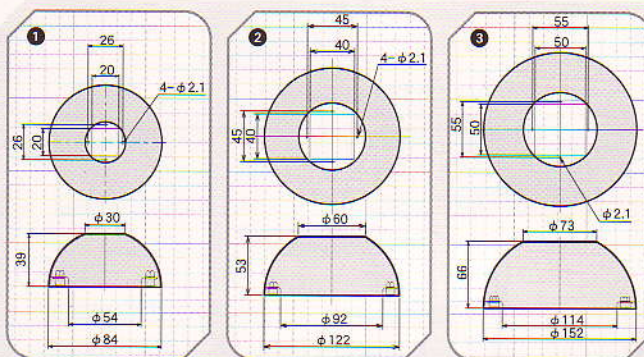
The light of the LEDs illuminate inside a dome and the reflected light only illuminates the work. Thus, the LED elements are not reflected. Effective for illuminating objects at a close distance from various angles.

## ● Features

- LEDs illuminate inside the dome and the reflected light is used to illuminate the object.
- Even illumination of the object from all the directions

## ● Applications

- Appearance and character inspections of objects with glossy surfaces



## Specifications

Model	Dimension (mm)								LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F	G	H				
OPID-80R	26	20	26	20	30	39	54	84	Red	96	3.9	1
OPID-80□	26	20	26	20	30	39	54	84	White, Blue, Green	72	5.8	
OPID-120R	45	40	45	40	60	53	92	122	Red	156	6.3	2
OPID-120□	45	40	45	40	60	53	92	122	White, Blue, Green	120	9.6	
OPID-150R	55	50	55	50	73	66	114	152	Red	270	10.8	3
OPID-150□	55	50	55	50	73	66	114	152	White, Blue, Green	216	17.3	

Either W (white), B (blue), or G (Green) can be entered in □.



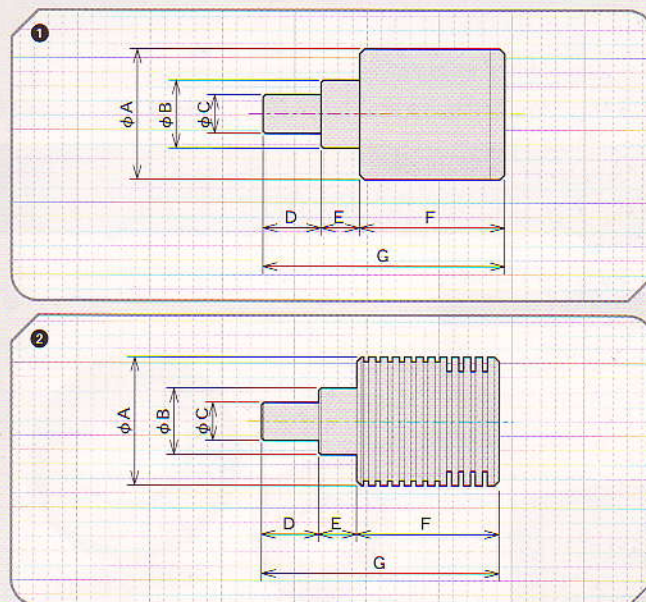
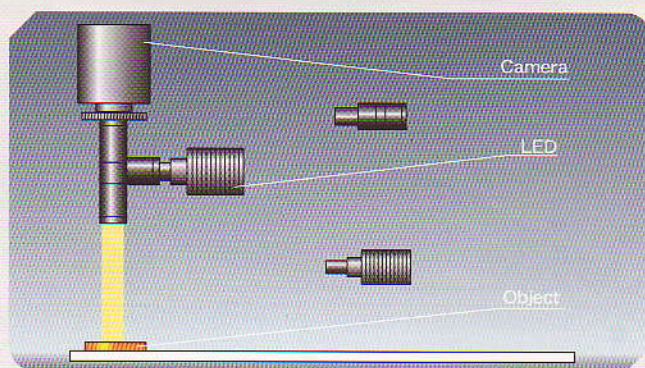


### ■ Small spot lighting of ultra-high illuminance!

This is a substitute LED coaxial light which can be used as the lighting source of a halogen light guide for a telecentric lens. The OPS type uses high-intensity LEDs and the OPHS type uses power LEDs which are several times brighter than high-intensity LEDs. The OPHS has  $\phi \geq 27$  and  $\phi \geq 18$  external diameter models, but even with the smaller size, the brightness remains the same because of our independent optical design.

### ● Applications

- Light for a coaxial lens
- Alignment mark on the board



### Specifications

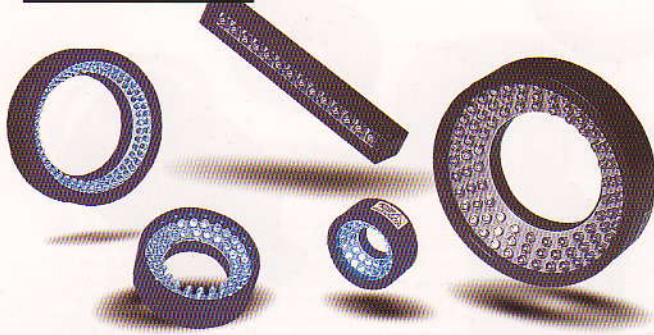
Model	Dimension (mm)							LED color	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F	G				
OPS-14R	13.9	—	8	12.2	—	15	27.2	Red	1	0.3	1
OPS-14□	13.9	—	8	12.2	—	15	27.2	White, Blue, Green	1	0.3	
OPS-27R	27	14	8	12	8	30	50	Red	7	0.6	
OPS-27□	27	14	8	12	8	30	50	White, Blue, Green	7	0.8	
OPHS-18R	18	14	8	12	8	20	40	Red	1	4.2	2
OPHS-18□	18	14	8	12	8	20	40	White, Blue, Green	1	4.2	
OPHS-27R	27	14	8	12	8	30	50	Red	1	4.2	
OPHS-27□	27	14	8	12	8	30	50	White, Blue, Green	1	4.2	

Either W (white), B (blue), or G (Green) can be entered in  $\Delta$ .



## Ultraviolet Lights

## UV

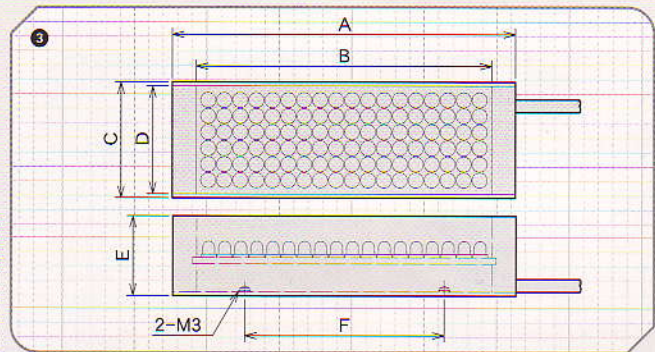
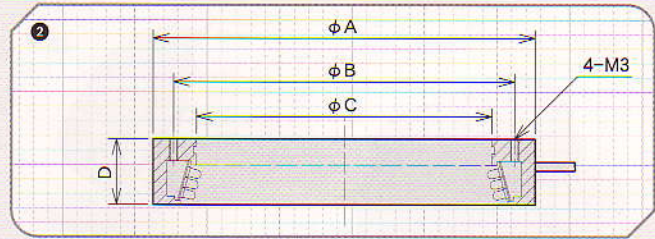
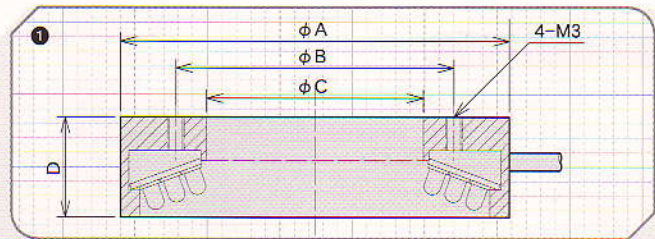


### Can inspect with higher precision than a visible ray!

The UV-400 type is a  $\Phi 3$  mold LED element with a peak wavelength of 400nm, and thus most standard shapes, such as ring, bar, coaxial, dome, etc. can be manufactured with the same number of elements as a visible ray. Compared with can-typed LED element Lighting, the number of LEDs is higher. Thus, an ultraviolet light with high output and excellent evenness can be obtained. Effective for UV hardening or fluorescent excitation as well as the treatment of images.

### Specifications

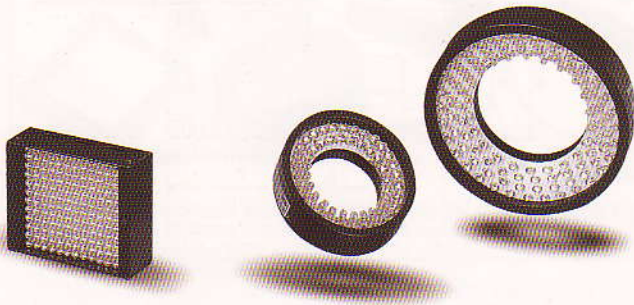
Model	Dimension (mm)						Wavelength (nm)	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F				
OPDR-50-28UV-400	50	40	28	16	—	—	400	45	3.6	1
OPDR-LA74-48UV-400	74	60	48	19	—	—	400	90	7.2	2
OPDB-50×15UV-400	60	50	17	15	20	30	400	36	2.9	3



Either W (white), B (blue), or G (Green) can be entered in ☐.  
A diffusing plate (optional) can be mounted.

## Infrared Lights

## IR



### Inspections based on infrared wavelength!

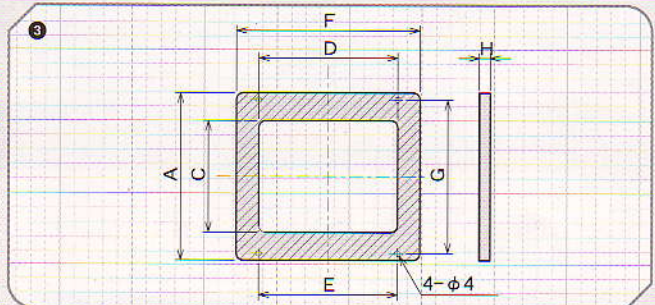
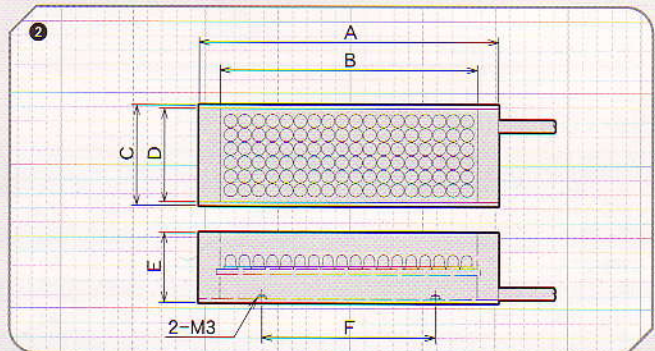
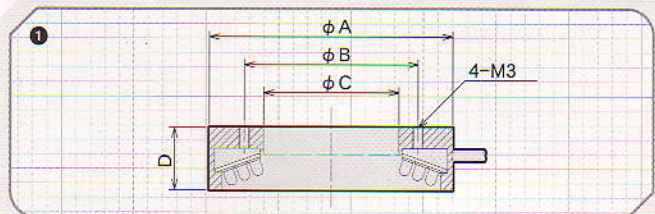
With peak wavelength infrared region LED elements, we can manufacture in most standard lighting shapes, such as ring, bar, dome, and edge light. The standard wavelength is 850nm, but also 780nm, 810nm, 890nm, and 940nm are available.

### Applications

- Permeation inspection
- Deleting color data

### Specifications

Model	Dimension (mm)								Wavelength (nm)	The Number of LED	Power Consumption(W)	Outline Drawing
	A	B	C	D	E	F	G	H				
OPDR-50-28IR-850	50	40	28	16	—	—	—	—	850	54	2.2	1
OPDR-90-50IR-850	90	70	50	20.5	—	—	—	—	850	108	4.4	
OPDB-50×15IR-850	60	50	17	15	20	30	—	—	850	36	1.5	2
OPDB-72×24IR-850	86	74	29	27	20	50	—	—	850	70	2.9	
OPDB-132×15IR-850	142	132	17	15	20	80	—	—	850	96	3.9	3
OPDM-50×50IR-850	84	74	50	50	60	74	79	8.5	850	90	3.6	
OPDM-100×80IR-850	122	—	80	100	100	134	110	8	850	84	3.4	



We can manufacture the same type as visible lights other than the above.



## Power Supplies

### OPPW



- The input voltage is AC100/240V and this power supply has obtained a CE mark.  
(The standard auxiliary power cable is for 100VAC.)

- The V type (knob volume), and the H type (semi-fixed volume) are available.

#### Light control method of power supply

Light is controlled using the Pulse Width Modulation (PWM) method. [OPPW : approx. 60KHz].

It is controlled by changing the output time ratio during a cycle.

Advantages: Even illuminance due to less affect from Vf fluctuation of LED elements.

Disadvantages: As the shutter speed of the camera increases, the image brightness fluctuates.

(Fluctuation rate at shutter speed 1/4000 second: 60KHz: 6.7%)

This is because the start of imaging on the camera side and the pulse on the power supply side are not synchronized.

#### Time lag when controlling light

The LED is a semiconductor, which has a high power-generation capability. Turning the light on and off does not shorten its life. Thus we recommend using the product with the ON/OFF control function for long use with minimum heat generation.

The response speed of the control function is approximately 20 μs or less from the inputting of trigger signal and outputs at 90 %.

Product Type	OPPW
Input Power	100~240VAC 50/60Hz
Output Voltage	12VDC
Ambient Temp.	-10~+40°C
Ambient Humidity	20~70%RH(No dew)
Light Control	External Input ON/OFF
Dimmer	approx. 60KHz, Pulse Width Modulation

### External Controller

pins	2ch Signals	4ch Signals	8ch Signals
1	LAMP1 ON/OFF	LAMP1 ON/OFF	LAMP1 ON/OFF
2	LAMP2 ON/OFF	LAMP2 ON/OFF	LAMP2 ON/OFF
3	External Control	LAMP3 ON/OFF	LAMP3 ON/OFF
4	GND	LAMP4 ON/OFF	LAMP4 ON/OFF
5	—	External Control	LAMP5 ON/OFF
6	—	GND	LAMP6 ON/OFF
7	—	—	LAMP7 ON/OFF
8	—	—	LAMP8 ON/OFF
9	—	—	External Control
10	—	—	GND

External Control is given by making short between connector "External Control" and "GND".  
At this moment LED's put off at all CH at same time.

Under this condition short between "LAMP ON/OFF" and "GND", light up at LAMP\*.

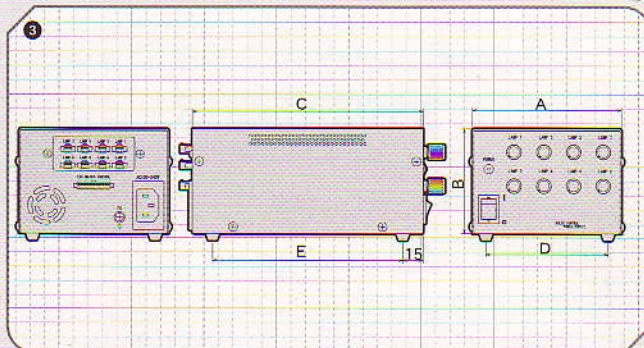
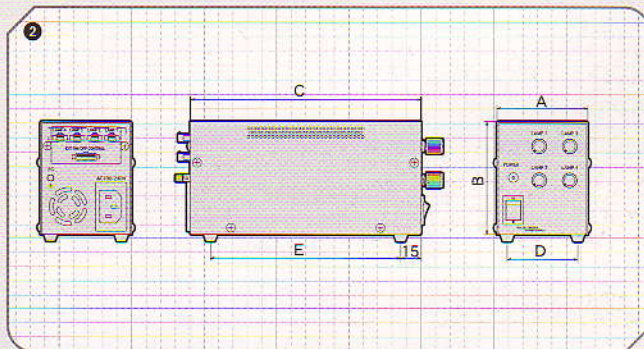
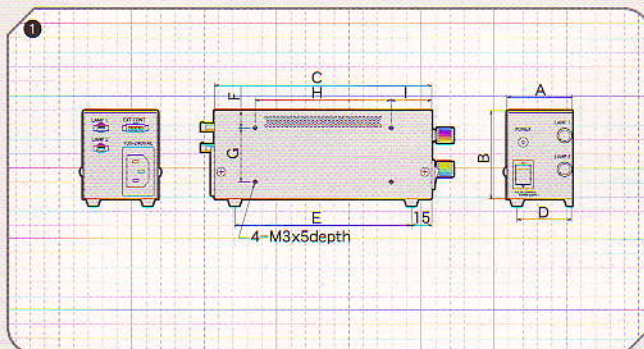
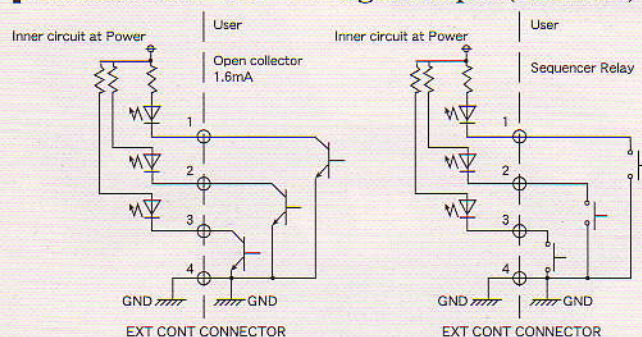
### Specifications

Model	Dimension (mm)										CH	Volume (W)	Outline Drawing
	A	B	C	D	E	F	G	H	I				
OPPW-10-□	50	60	131	35	100	7.25	44	80	25.5		2	10	1
OPPW-30-□	55	65	160	40	130	12.5	40	100	30		2	30	
OPPW-50-□	66	75	235	48	205	8	50	150	42.5		2	50	
OPPW-100-□	70	80	257	52	227	8	58	173	42		2	100	
OPPW-10-4□	67	83	170	52	140	—	—	—	—		4	10	2
OPPW-30-4□	67	83	170	52	140	—	—	—	—		4	30	
OPPW-50-4□	70	80	257	52	227	—	—	—	—		4	50	
OPPW-100-4□	70	80	257	52	227	—	—	—	—		4	100	
OPPW-30-8□	110	77	170	90	140	—	—	—	—		8	30	3
OPPW-50-8□	110	77	257	90	227	—	—	—	—		8	50	
OPPW-100-8□	110	77	257	90	227	—	—	—	—		8	100	

□ can be replaced by either H (semi-fixed type which requires adjustment by a screwdriver) or V (knob type which requires manual adjustment). Please choose a power supply in which the total consumption power of lights connected to each channel does not exceed the volume of the power supply.

(Example) When the lights of 15W and 6W are connected to a power supply of channel 2, 15W+6W=21W and thus a power supply of 30W should be chosen.

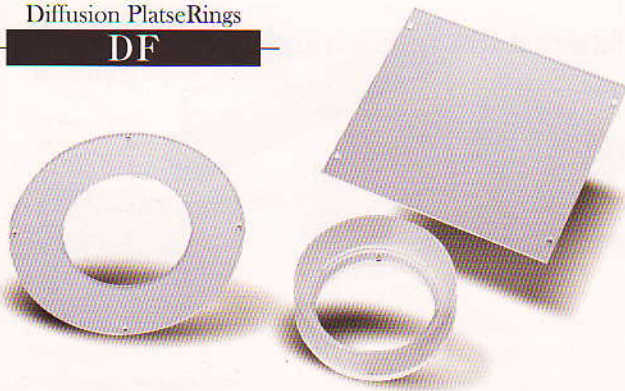
### External ON/OFF wiring example (i.c. NPN)





## Diffusion Plate/Rings

## DF



## ■ Diffusing Plate for Bar and Ring Lighting

This is a diffusing plate for a bar and ring lighting only. If the plate is mounted, it can reduce the reflection of LED elements on the object by diffusing the light.

An acrylic plate of 2mm thickness which has a rough surface and resin transparency diffuses the light. A standard type has a resin transparency of 80% and there are also models with a resin transparency of 60% and 30% with the same thickness.

## ■ Diffusing Ring for Low Angle Ring Lighting

This is a diffusing ring for low angle ring lighting only. If the plate is mounted, it can reduce the reflection of LED elements on the object by diffusing the light.

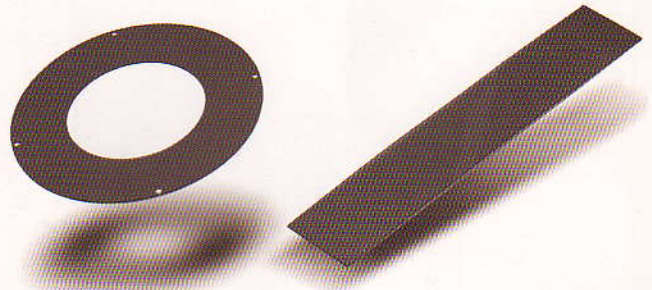
## Specifications

	Model	Applied Lighting
Bar Lights	DF□□-OPDB-14×11	OPDB-14×11
	DF□□-OPDB-25×25	OPDB-25×25
	DF□□-OPDB-26×15	OPDB-26×15
	DF□□-OPDB-34×27	OPDB-34×27
	DF□□-OPDB-50×15	OPDB-50×15
	DF□□-OPDB-50×48	OPDB-50×48
	DF□□-OPDB-74×27	OPDB-74×27
	DF□□-OPDB-75×68	OPDB-75×68
	DF□□-OPDB-100×11	OPDB-100×11
	DF□□-OPDB-100×15	OPDB-100×15
	DF□□-OPDB-132×15	OPDB-132×15
	DF□□-OPDB-140×11	OPDB-140×11
	DF□□-OPDB-186×30	OPDB-186×30
	DF□□-OPDB-200×15	OPDB-200×15
Direct Ring Lights	DF□□-OPDB-288×27	OPDB-288×27
	DF□□-OPDR-38-12	OPDR-38-15
	DF□□-OPDR-40-21	OPDR-40-25
	DF□□-OPDR-50-24	OPDR-50-28
	DF□□-OPDR-66-32	OPDR-66-36
	DF□□-OPDR-70-35	OPDR-70-39
	DF□□-OPDR-90-46	OPDR-90-50
	DF□□-OPDR-110-56	OPDR-110-60
	DF□□-OPDR-140-90	OPDR-140-95
	DF□□-OPDR-F32-10	OPDR-F32-10
	DF□□-OPDR-F43-15	OPDR-F43-15
	DF□□-OPDR-F50-15	OPDR-F50-15
	DF□□-OPDR-F60-32	OPDR-F60-32
	DF□□-OPDR-F70-37	OPDR-F70-37
	DF□□-OPDR-F90-50	OPDR-F90-50
	DF□□-OPDR-F100-50	OPDR-F100-50
	DF□□-OPDR-F110-60	OPDR-F110-60
Low-angle Ring Lights	DF-OPDR-LA50-24	DF-OPDR-LA50-24
	DF-OPDR-LA74-48	DF-OPDR-LA74-48
	DF-OPDR-LA100-68	DF-OPDR-LA100-68
	DF-OPDR-LA120-70	DF-OPDR-LA120-70
	DF-OPDR-LA140-108	DF-OPDR-LA140-108
	DF-OPDR-LA200-170	DF-OPDR-LA200-170

□□ can be replaced by the transmission rate, 80(%), 60(%), or 30(%).

## Polarizing Plates

## PL



By attaching the PL filter to the light and the camera lens, it is possible to cancel the reflection element only.

The light intensity decreases because only the scattering light reaches the lens of camera. LED elements on the object by diffusing the light.

## Specifications

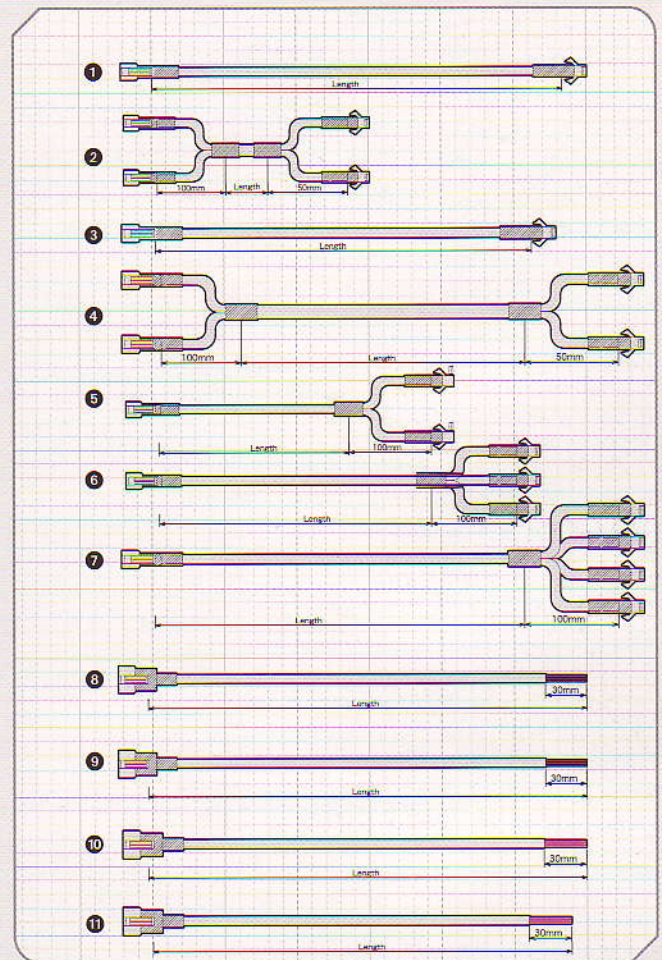
	Model	Applied Lighting
Bar Lights	PL-OPDB-14×11	OPDB-14×11
	PL-OPDB-25×25	OPDB-25×25
	PL-OPDB-26×15	OPDB-26×15
	PL-OPDB-34×27	OPDB-34×27
	PL-OPDB-50×15	OPDB-50×15
	PL-OPDB-50×48	OPDB-50×48
	PL-OPDB-74×27	OPDB-74×27
	PL-OPDB-75×68	OPDB-75×68
	PL-OPDB-100×11	OPDB-100×11
	PL-OPDB-100×15	OPDB-100×15
	PL-OPDB-132×15	OPDB-132×15
	PL-OPDB-140×11	OPDB-140×11
	PL-OPDB-186×30	OPDB-186×30
	PL-OPDB-200×15	OPDB-200×15
Direct Ring Lights	PL-OPDB-288×27	OPDB-288×27
	PL-OPDR-38-12	OPDR-38-15
	PL-OPDR-40-21	OPDR-40-25
	PL-OPDR-50-24	OPDR-50-28
	PL-OPDR-66-32	OPDR-66-36
	PL-OPDR-70-35	OPDR-70-39
	PL-OPDR-90-46	OPDR-90-50
	PL-OPDR-110-56	OPDR-110-60
	PL-OPDR-140-90	OPDR-140-95
	PL-OPDR-F32-10	OPDR-F32-10
	PL-OPDR-F43-15	OPDR-F43-15
	PL-OPDR-F50-15	OPDR-F50-15
	PL-OPDR-F60-32	OPDR-F60-32
	PL-OPDR-F70-37	OPDR-F70-37
	PL-OPDR-F90-50	OPDR-F90-50
	PL-OPDR-F100-50	OPDR-F100-50
	PL-OPDR-F110-60	OPDR-F110-60



## Specifications

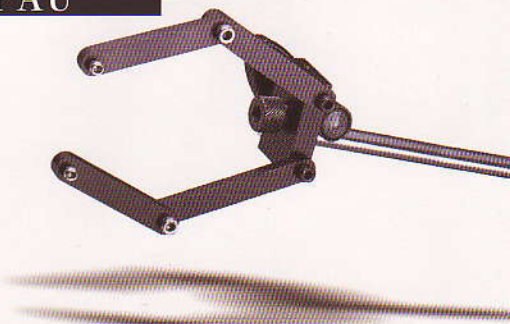
	Model	Length(m)	
Extension Cable 1ch	OP-CB1-2	2	1
	OP-CB1-3	3	
	OP-CB1-5	5	
Extension Cable 2ch	OP-CB2-2	2	2
	OP-CB2-3	3	
	OP-CB2-5	5	
Extension Robot Cable 1ch	OP-RCB1-2	2	3
	OP-RCB1-3	3	
	OP-RCB1-5	5	
Extension Robot Cable 2ch	OP-RCB2-2	2	4
	OP-RCB2-3	3	
	OP-RCB2-5	5	
Extension Diverged Cable 2Branch	OP-CBD2-2	2	5
	OP-CBD2-3	3	
	OP-CBD2-5	5	
Extension Diverged Cable 3Branch	OP-CBD3-2	2	6
	OP-CBD3-3	3	
	OP-CBD3-5	5	
Extension Diverged Cable 4Branch	OP-CBD4-2	2	7
	OP-CBD4-3	3	
	OP-CBD4-5	5	

	Model	Length(m)	
External Control Cable 1ch	OP-ECB1-2	2	8
	OP-ECB1-3	3	
	OP-ECB1-5	5	
External Control Cable 2ch	OP-ECB2-2	2	9
	OP-ECB2-3	3	
	OP-ECB2-5	5	
External Control Cable 4ch	OP-ECB4-2	2	10
	OP-ECB4-3	3	
	OP-ECB4-5	5	
External Control Cable 8ch	OP-ECB8-2	2	11
	OP-ECB8-3	3	
	OP-ECB8-5	5	



## Arm unit for Lighting Setting

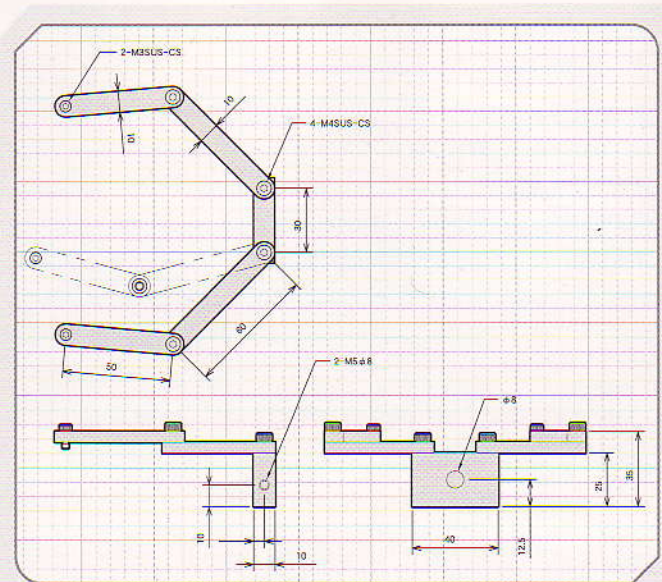
## OPAU



Suitable for installing ring Lighting and available for setting temporarily and experimenting

## Specifications

Model	Magnet Base	Specification
OPAU-150	No	Available for attaching a Lighting device with an angle of 30~150mm to the part.
OPAU-150MB-B	Yes	





# Features of LED lights

- Flexible in shape
  - Allows light directivity
  - Selectable wavelength
  - Long life
- High efficiency, low power consumption
  - Low total running cost
  - Very fast response time
  - Durable against switching

## Elements required for image processing Lighting:

### 1. Image with high SN rate

For a stable image processing inspection, the images to be inspected must be as clear as possible.

The LED lights create an image with a high SN rate, by selecting the optimal shape and wavelength for the target object, which leads to high inspection quality.

### 2. Even lighting

Even illumination intensity in the imaging area is required when extracting the inspection item by LED light.

Unevenness of illumination intensity prevents correct reflection of the object's surface condition and causes unstable inspection.

### 3. Stable illumination intensity

A large change in illumination intensity over time or due to the surrounding environment can cause inspection accuracy to decrease.

Even with a low initial cost, light which needs frequent maintenance will increase long-term costs.

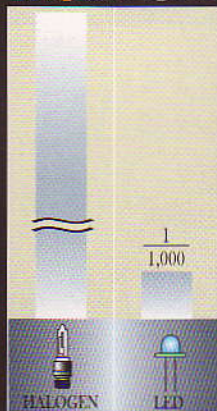
Installing long lasting and stable illumination reduces the total running cost.

## Comparison list of LED lights and other lights

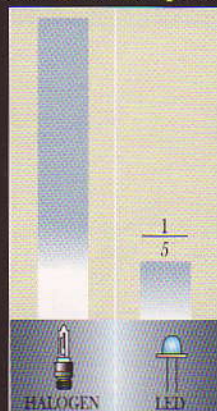
Light source	Life	Brightness	Wave length selection	Shape flexibility	Evenness	Directivity	Cost	Switching characteristics	Power consumption
LED Lights	◎	○	◎	◎	◎	◎	○	◎	◎
Halogen	×	◎	△	△	△	△	○	△	×
orescent Lamp	△	○	×	×	◎	△	◎	△	○
Xenon	×	◎	△	△	△	△	○	◎	×

The reason the LED light is selected as a light source for image processing is because it facilitates optimal lighting for inspection.

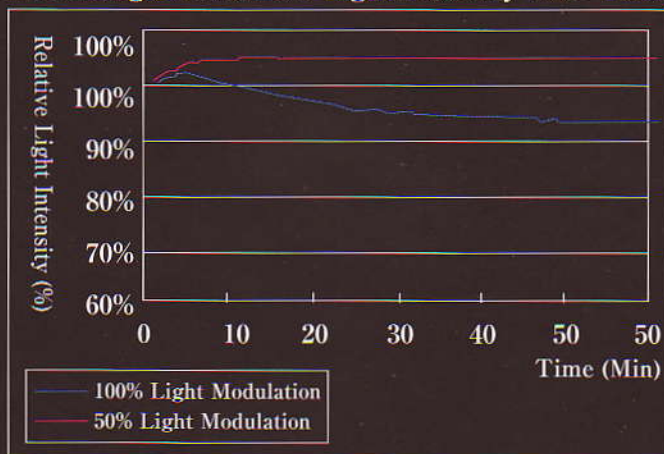
### Response speed



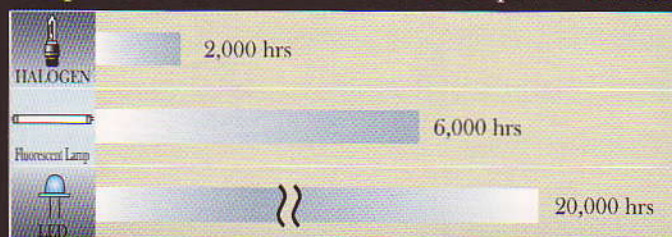
### Power consumption



### The Change in Relative Light Intensity over Time



## Comparison with the lifetimes of other power sources



Lighting Used: OPDB-74 × 27W, with diffusion plate.

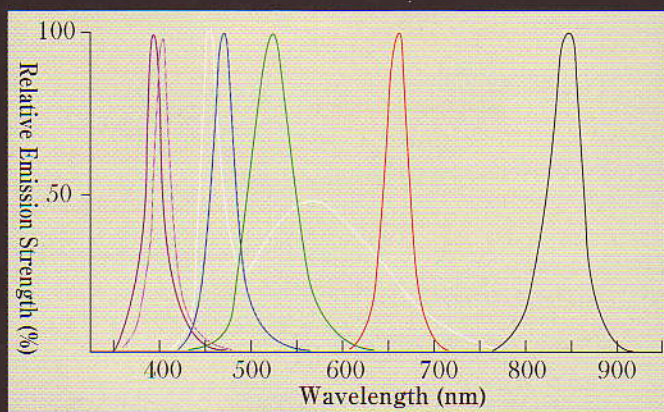
Measuring Conditions: In a thermostatic oven with a temperature of 25°C.

For 100% Light Modulation, the alteration width is big, and thus it takes some time until light intensity stabilizes. Compared with this, for 50% Light Modulation, the alteration width is small due to low generation of heat and light intensity stabilizes quickly.



## LED Spectral Distribution

A fluorescent lamp and Halogen have wide wavelength distribution, but LED includes a specific emission of light wavelength in each. When selecting a wavelength, please consider the points below:



	Peak Wavelength	Main Inspection Uses	Scattering Rate
White	—	Color treating, etc	—
Ultraviolet	375nm 400nm	Inspection for fine scratches, etc.	Approx.9 Approx.8
Blue	470nm	Inspection for scratches, etc.	Approx.4
Green	525nm	Visual Inspection, etc.	Approx.2.5
Red	660nm	Used for backlight, etc.	Approx.1
Infrared	850nm	Permeable Illumination	Approx.0.4

### Scattering Rate:

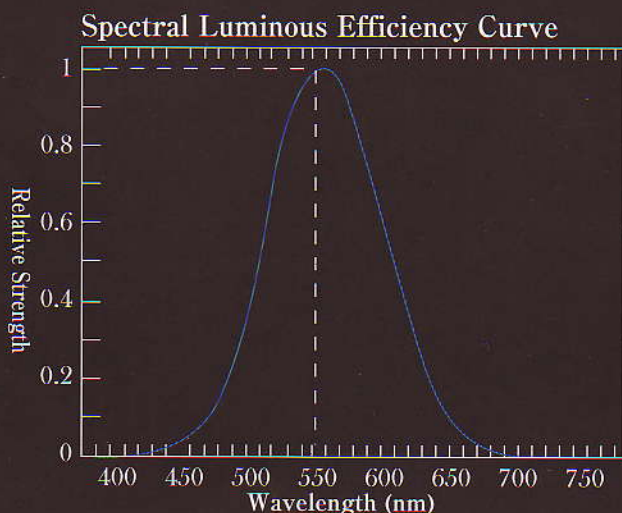
The comparative scattering rate for each wavelength is shown when the red scattering rate is counted as 1. The scattering rate increases as the wavelength gets shorter.

When using a wavelength with a high scattering rate, it becomes easier to observe scattering light from the object surface. However, please note that when using a wavelength shorter than green, the camera's sensitivity may decrease.

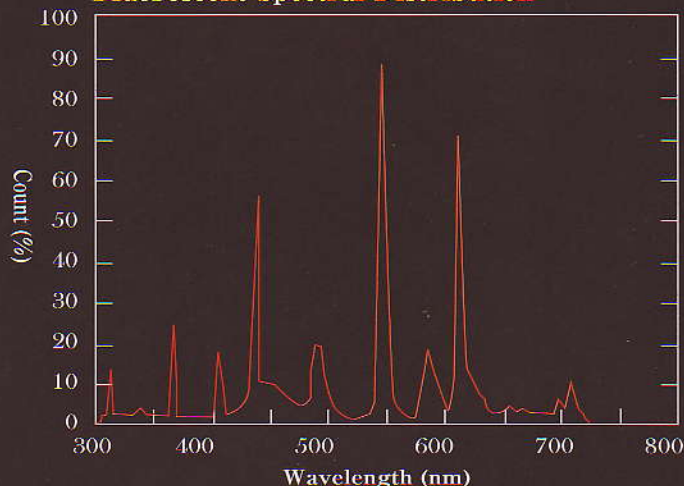
When using a long wavelength, permeability increases. Infrared lighting, in particular, is effective for inspecting permeability.

Visible light is light that can be seen by human eyes. Visible light generally has a wavelength of between 380nm and 780nm. Light with a wavelength higher than 780nm is infrared and light with a wavelength lower than 380nm is ultraviolet.

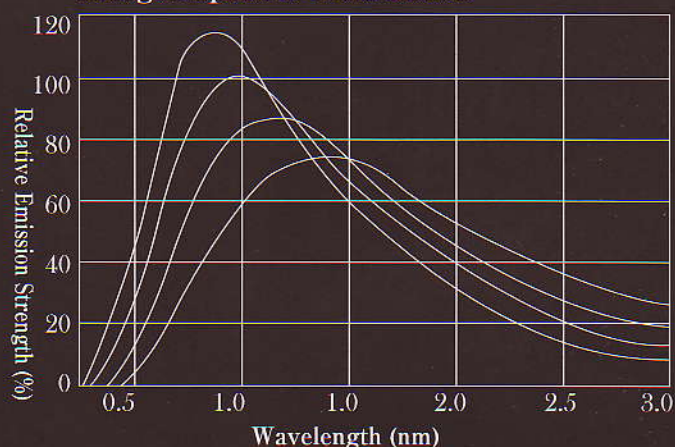
The human eye is most sensitive to green light with a wavelength of 555nm. Sensitivity decreases if the wavelength increases or decreases. The sensitivity curve when this 555nm is counted as 1 is called the Spectral Luminous Efficiency. Measurements of brightness such as lux and cd/m2 are coefficients of this Spectral Luminous Efficiency.



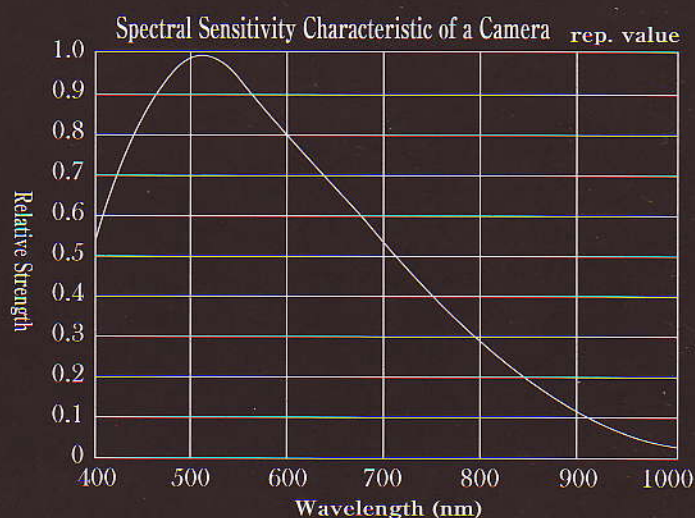
## Fluorescent Spectral Distribution



## Halogen Spectral Distribution



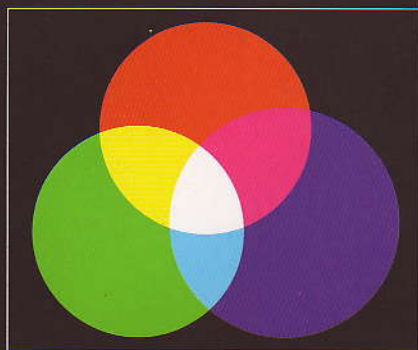
The spectral sensitivity of a camera does not necessarily have the same distribution as the Spectral Luminous Efficiency. The sensitivity of some cameras is set to match infrared or ultraviolet ranges. When setting Lighting, please check that the light distribution matches the camera you are using.



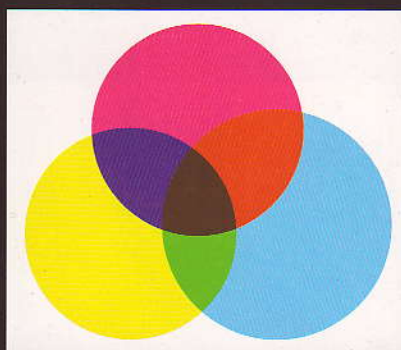
During image processing, because generally a CCD or CMOS camera is used, illumination brightness must be evaluated with the camera, and not human eyes.



## Color Setting Guide



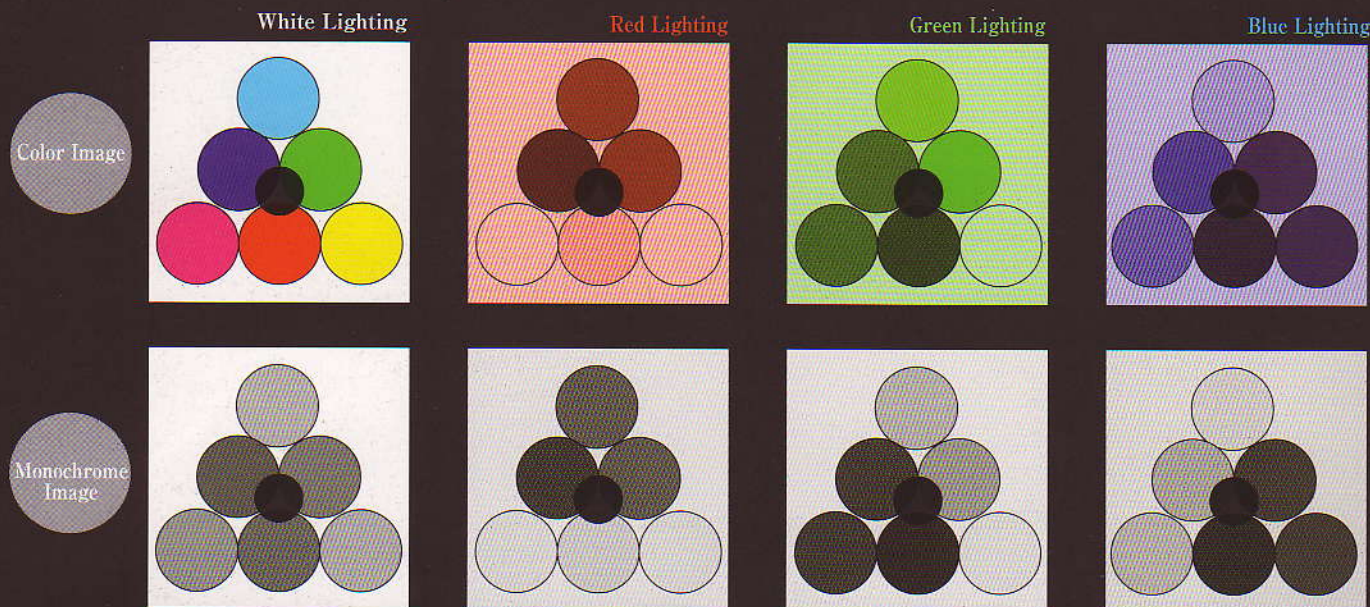
Additive Primary Colors



Subtractive Primary Colors

By combining the light of red, green and blue (additive primary colors) you can create other colors. Green(G) and blue(B) make Cyan(C), B and red(R) make Magenta(M), and R and G make yellow(Y). By combining R, G, and B lights of the same strength, white(W) is created. Combining colors in this way is called additive color mixing. Colors can also be created by absorbing parts of light. C absorbs R, M absorbs G, and Y absorbs B. C, M, and Y absorb all of the light, and black(K) is created. Combining colors in this way is called subtractive color mixing and CMY are called subtractive primary colors.

The color pattern using CMY is shown below. Also, color images using white, red, green, and blue and the monochrome image are shown. The contrast varies depending on the color of the light. When recognizing the object during image processing, it is important that there is sufficient contrast. During image processing, please select a light color where there is a large contrast between the object color and background color, referring to the color patterns below.



## Differences in observation light due to the relative positions of the Lighting, camera and object.

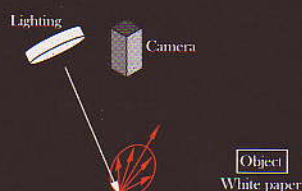
Depending on the type of object, positional differences of the Lighting, camera and object can affect the image. Each situation is described below:

## Observing mirror-reflected light (bright field)



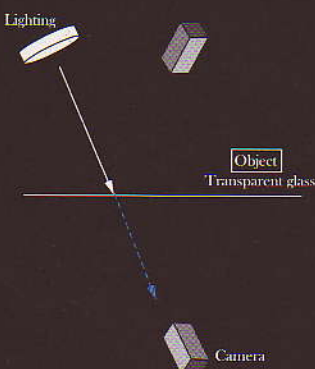
The camera and Lighting are on the same side of the mirror, and it is the same as looking directly at the Lighting. Only the direction of the light is different, and the reflected light is captured by the camera. The reflected light and the camera are along the same axis. Evenness rather than brightness is required of the reflected light. Irregularities on the surface and areas of low reflectance are comparatively dark.

## Observing scatter reflection light (dark field)



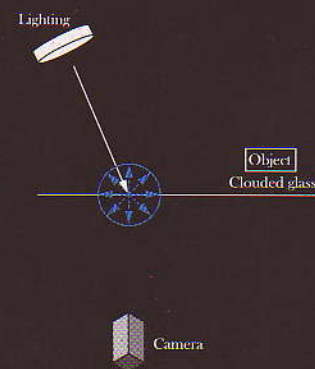
The camera captures images of a part of scattered light reflected off the surface. Light is reflected in every direction so the camera's observation axis is not restricted. Since only a part of the light can be captured, brightness rather than evenness is required. Irregularities on the surface and areas of high reflectance are comparatively bright.

## Observing specular transmission light (bright field)



The camera and Lighting are on opposite sides of the glass, and it is the same as looking directly at the Lighting. The camera is aligned with the direction of the light, and the reflected light is captured by the camera. The transmitted light and the camera are along the same axis. Evenness rather than brightness is required of the reflected light. Irregularities on the surface and areas of low reflectance are comparatively dark.

## Observing scatter transmission light (dark field)

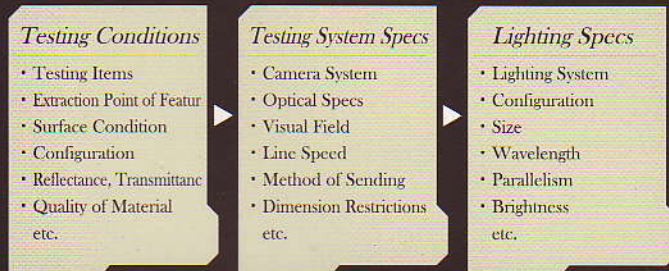


The camera captures images of a part of scattered light transmitted from the surface. Light is reflected in every direction so the camera's observation axis is not restricted. Since only a part of the light can be captured, brightness rather than evenness is required. Irregularities on the surface and areas of high reflectance are comparatively bright.



## Points when setting the Lighting

When setting the Lighting it is necessary to consider several factors. Even when using the same Lighting, if the set height is different the captured images are completely different. Also, if the Lighting wavelength (color) is different, the images change. When setting Lighting, please consider the points below:



## How to Use and Maintain LED Lighting

To get the best performance from LED Lighting:

### 1. Please avoid using LED lights in a high-temperature environment.

Doing so may lower the illuminance and facilitate deterioration. If the LED element becomes heated, illuminance is reduced and general performance deteriorates. The half-life of the illuminance of an LED element is said to be about 20,000 hours (Typ.), but if the element is continuously used in a high-temperature environment, its performance may deteriorate quicker.

### 2. To prevent illuminance reduction and performance deterioration due to the generation of heat:

- Improve the heat dissipation of the LEDs.
  - Mount the Lighting on a bracket with good heat conductivity.
  - Install a ventilating device.
  - Install a fan.

We recommend creating a cool environment which allows easy heat dissipation.

### ● Turn the Lighting on only when imaging.

The performance of LED Lighting is not affected much by switching the power on and off.

To extend the LED's life, utilize the on/off function controlled by external signals powered by this company, and only turn the LED on when necessary.

### ● Use lights at low volumes.

If the light is set to a low volume, the current flowing into the LED decreases and the heat generation is suppressed.

To choose Lighting with sufficient brightness, evaluate each Lighting when the camera's aperture is as open as possible.

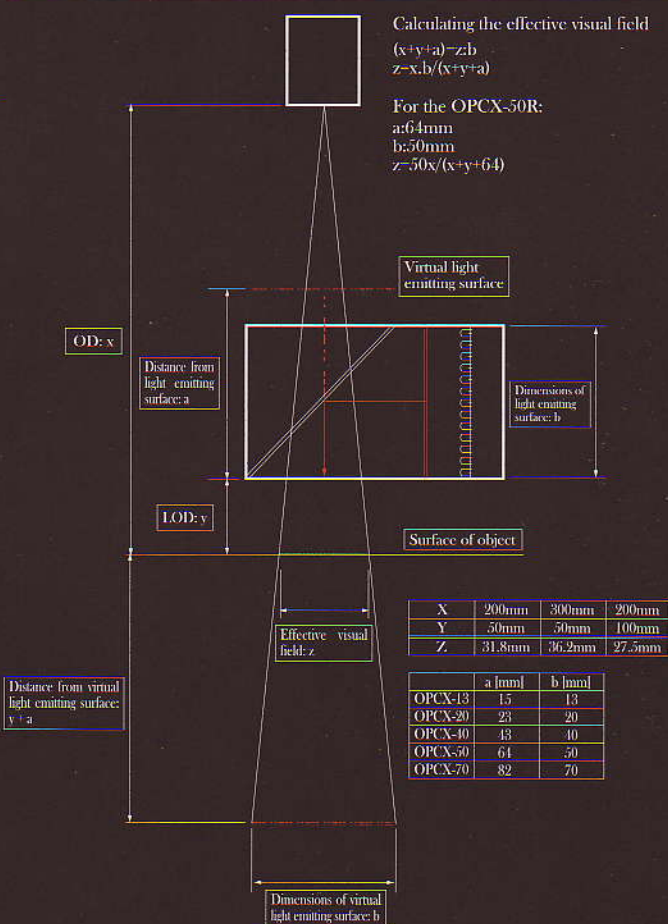
If using the Lighting continuously, we recommend a volume of 50%. (Even if performance deteriorates and illuminance is reduced, normal use can be restored by increasing the volume.)

### 3. Use the Lighting as close as possible to the target object.

- Since the element itself is small, LEDs can be manufactured as small and lightweight lights. The illuminance is inversely proportionate to the square of the distance, and thus using the Lighting at a close distance can increase the light intensity greatly. (We can create a Lighting design to suit for your needs.)

## The Visual Field of Coaxial Lighting

Coaxial Lighting is a type of Lighting in which the surface emitting part of the LED emits light along the same axis as the camera lens, via a half-mirror. The effective visual field of coaxial lighting is dependent upon the distance between the camera and object (OD), the distance between the Lighting and object (LOD), and the size of the light emitting surface. If the OD increases, the visual field grows, but if the LOD increases, the visual field shrinks. The method of calculating the effective visual field is shown below. It is necessary to keep the object within the effective visual field, especially for objects with a high reflectance. This effective visual field is calculated based on the size of the light emitting surface. It is recommended that you set a sufficient visual field, taking into consideration the lower luminance in the surrounding area.



## Notes for use

- Do not look at the source of light directly.
  - Do not disassemble or reconstruct the light or power supply.
  - Do not touch a product under operation with wet hands.
  - Do not use in a high-temperature or high-humidity environment.
  - Avoid installing in a dusty place.
  - Please use following the recommended guidelines concerning heat generation.
  - Please do not use a power supply other than the one provided.
  - The AC power supply should have a different power supply from the motive power, electromagnetic valve etc.
  - A power supply with an earth terminal should be grounded.
  - When installing Lighting, follow all instructions carefully.
- ※ Please note that the specifications of our products are subject to change without prior notice.

## Warranty

### ● Period of Warranty

The warranty period of this device is one year from delivery.

● The manufacturer will repair or replace the device free of charge. If a malfunction occurs where the manufacturer is liable, during the warranty period. However, malfunctions caused by the following shall be excluded from the manufacturer's warranty.

1. Damage caused by abuse, misuse, or misapplication
2. Damage where the cause is not the delivered product
3. Damage caused by an unapproved modification or repair.
4. Damage due to natural or other disasters
5. Damage caused by use which exceeds standard product use
6. Damage caused by failure to adhere to guidelines or warnings

The warranty stated herein shall cover only the delivered product. Damage or injury sustained due to a malfunction to this product is not covered by this warranty.