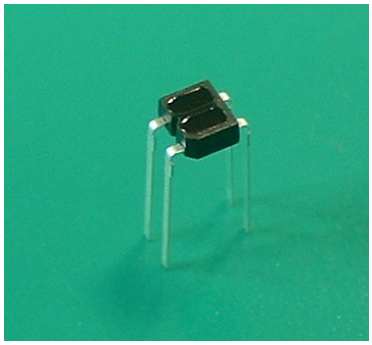
PHOTO INTERRUPTER (Reflective)



General Description

The OSG-105F series are super miniature and thin photo reflective sensors. The emitter and the detector are arranged in the same direction to the sense the presence of an object. The emitter is a high output infrared light emitting diode and the detector is a high sensitivity silicon transistor.

Features

- Very small package (super miniature and thin type) : 2.7mm × 3.2mm × 1.4mm
  OSG-105F：Compact DIP type
- Short detection distance : Optimum detection distance 0.8 ~ 1.2mm
- High speed response, high performance
- Wavelength : 940nm
- Widely applicable
- Meet RoHS

Applications

- Start and end mark detector of Video , Audio tape.
- Rotation detection of various motors, audio turntables.
- Edge detection of printer, X-Y recorder, typewriters .
- Various detection of industrial system, control equipment.
- Reading out the characters of bar code reader, encoder and the automatic vending machine.

Maximum Ratings

(Ta=25℃)

Item		Symbol	Rating	Unit
Input	Power dissipation	P_D	75	mW
	Forward current	I_F	50	mA
	Reverse voltage	V_R	5	V
	Pulse forward current *1	I_{FP}	1	A
Output	Collector power dissipation	P_C	100	mW
	Collector current	I_C	20	mA
	Collector-Emitter voltage	V_{CEO}	30	V
	Emitter-Collector voltage	V_{ECO}	5	V
Operating temp.		Topr.	-25 ~ +85	℃
Storage temp.		Tstg.	-30 ~ +100	℃
Soldering temp. *2		Tsol.	260	℃

*1. pulse width : tw ≦100usec. Period : t = 10msec

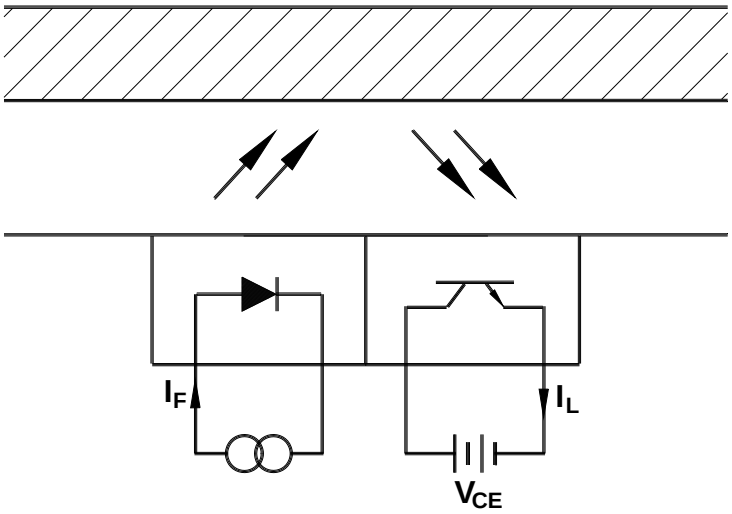
*2. Distance from end of the package = 2.0mm；time = 3 sec max.

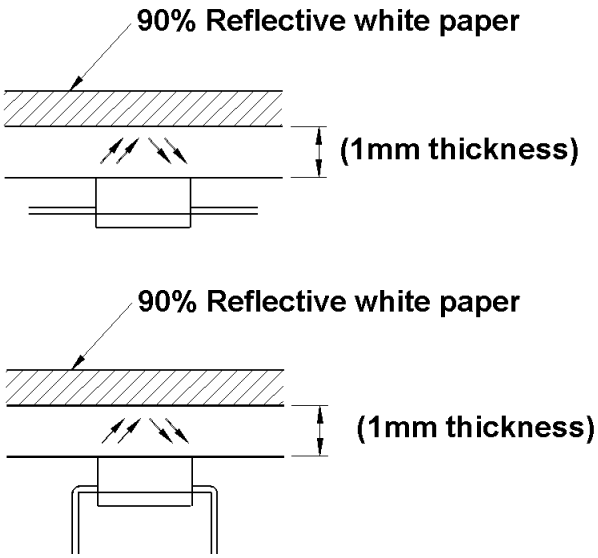
Electro-Optical Characteristics

(Ta=25℃)

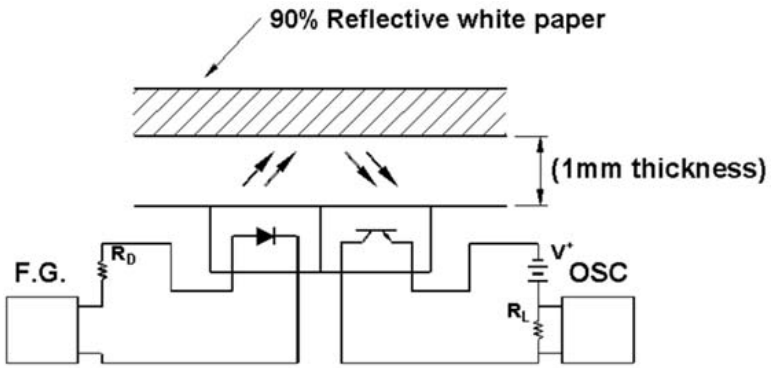
Item		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	Forward voltage	V_F	I_F=20mA	-	1.2	1.5	V
	Reverse current	I_R	V_R=5V	-	-	100	uA
	Peak wavelength	λp	I_F=20mA	-	940	-	nm
Output	Collector dark current	I_{CEO}	V_{CE}=10V	-	-	200	nA
	C-E saturation voltage	$V_{CE(sat)}$	I_C=0.25mA , I_F=10mA	-	-	0.4	V
Light current		I_L	V_{CE}=5V , I_F=10mA	240	-	960	uA
Swithching Speeds	Rise time	tr	V_{CE}=5V , I_F=20mA	-	20	-	usec
	Fall time	tf	R_L=1000Ω	-	20	-	usec

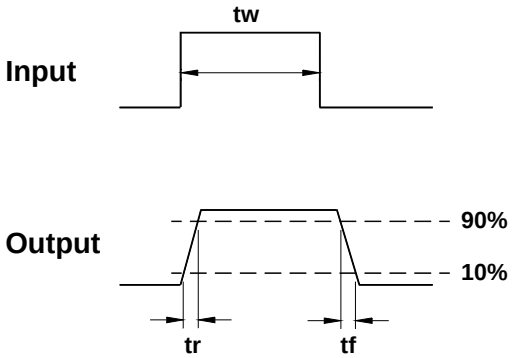
Measuring specification for light current





Measuring specification for response time





Precaution for soldering

- Soldering temperature ： 260℃ max, Soldering time ： 5sec max.
- The hatched area more than 2.0mm(flat lead type), 1.0mm(compact DIP type) away from the both edges of package as shown in the figure blow.

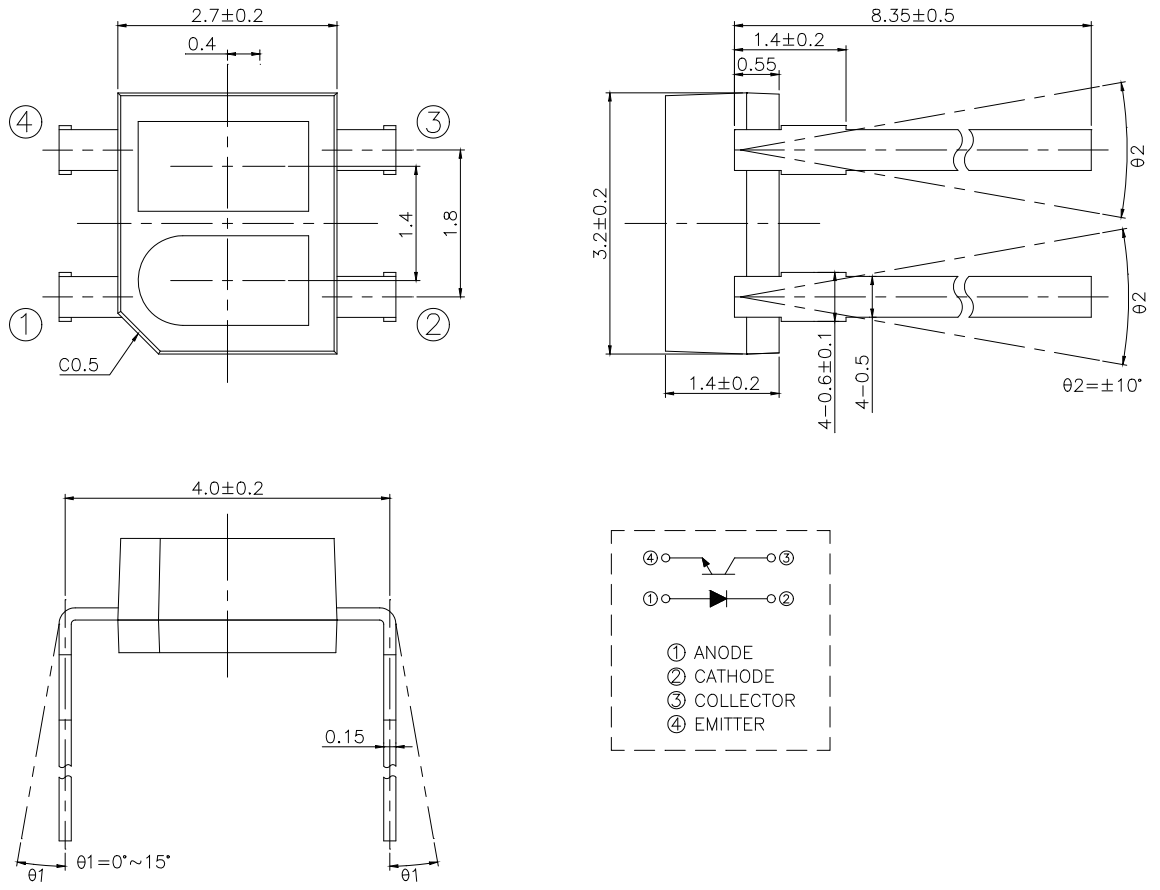
- When forming the leads, be careful not to apply stress to the main body of the device.
  Soldering must be performed after the leads have been formed.
  It is recommended not to solder when the leads or between the lead get pulled, depressed or twisted.
- In the case of using resin flux, be careful to avoid contact with the lens surface.
  If the lens is covered with the flux, the specified characteristics cannot be achieved.

Precaution for handling

- Treat not to touch the lens surface.
- Avoid dust and any other foreign materials (flux, paint, bonding material, etc) on the lens surface.
- When mounting, special care has to be taken on the mounting position and tilting of the device because it is very important to place the device to the optimum position to the object.
- The leads are silver plated and they are discolored if the device is left open to the air for long after taken out of the envelope.

  It causes deterioration of soldering characteristics. Mount the device as short as possible after opening the envelope.

DIMEMSIONS

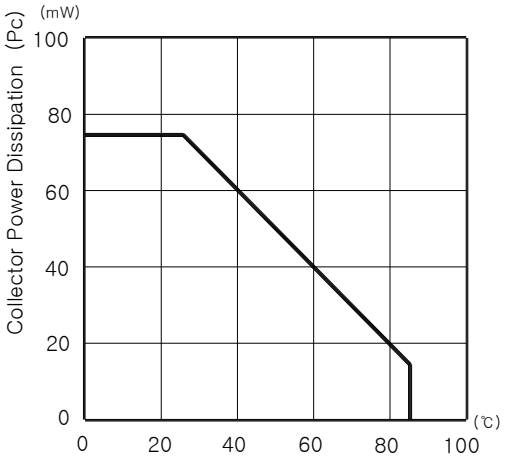


NOTES :

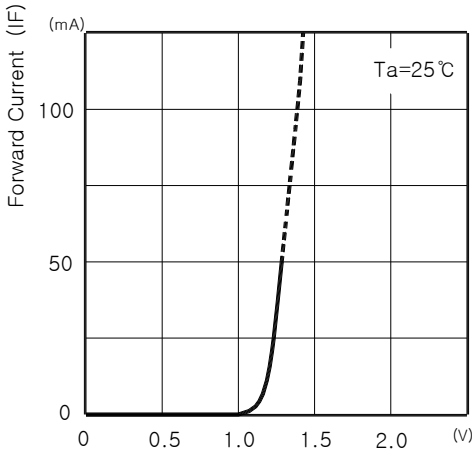
1. All dimensions are in millimeters.
2. Lead spacing is measured where the leads emerge form the package
3. Specifications are subject to change without notice.

Typical characteristics

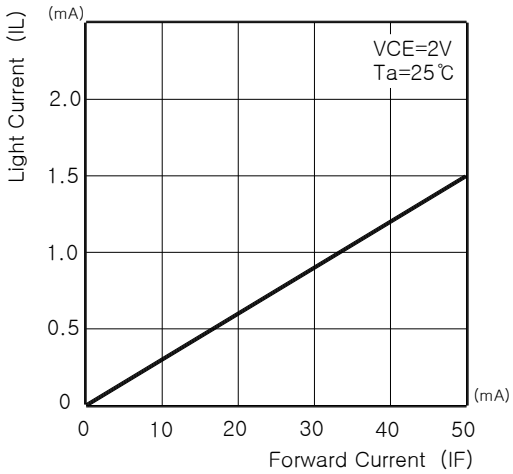
Collector Power Dissipation vs. Ambient Temperature



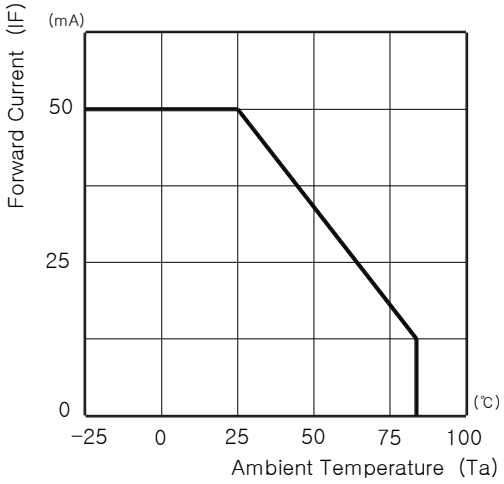
Forward Current vs. Forward Voltage



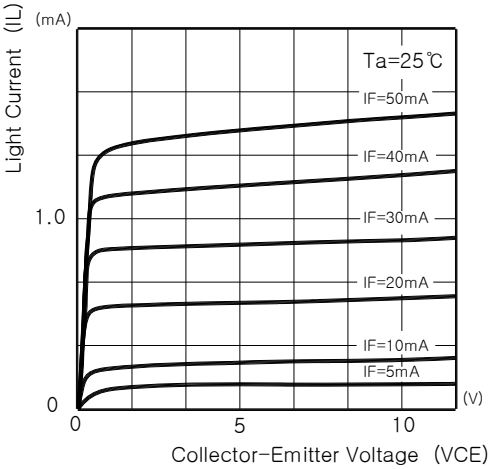
Light Current vs. Forward Current



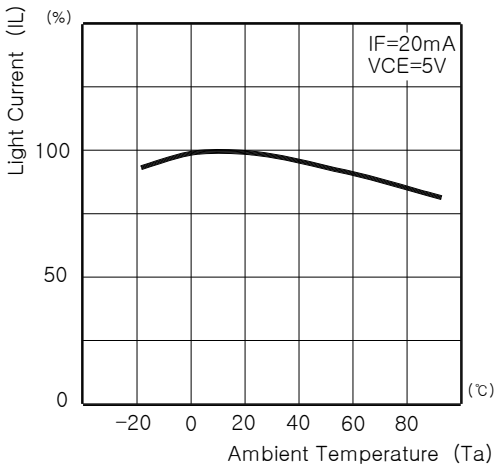
Forward Current vs. Ambient Temperature



Light Current vs. Collector-Emitter Voltage

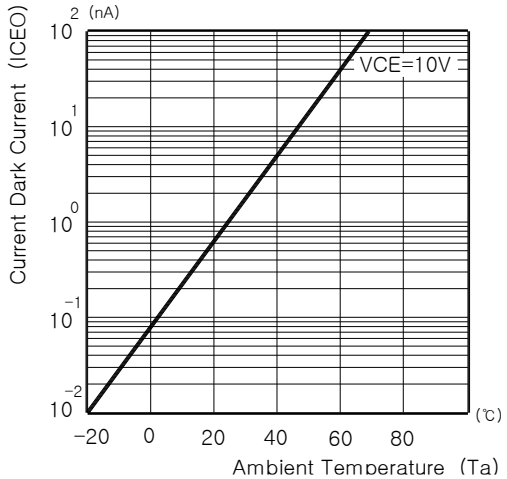


Light Current vs. Ambient Temperature

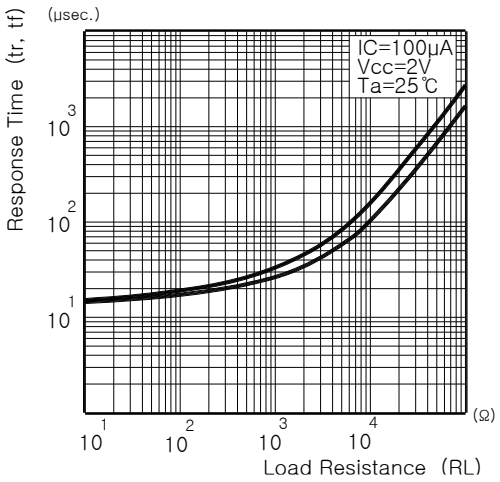


Typical characteristics

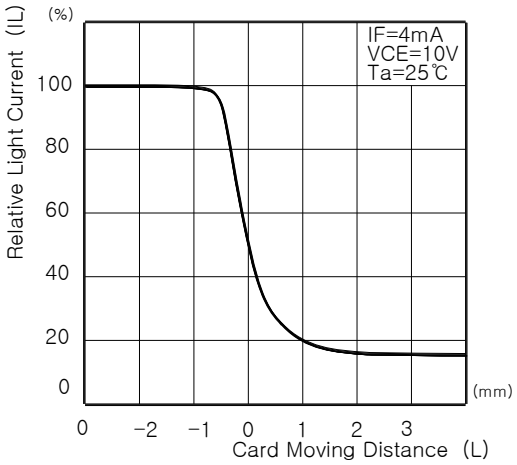
Collector dark Current vs. Ambient Temperature



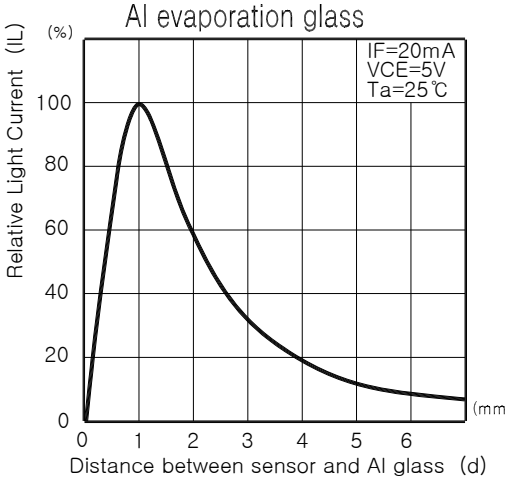
Response Time vs. Load Resistance



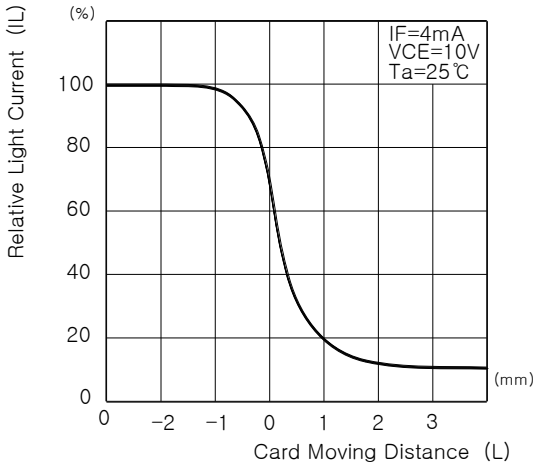
Detection Position Characteristics (1)



Relative Light Current vs. Distance between Sensor and Al evaporation glass

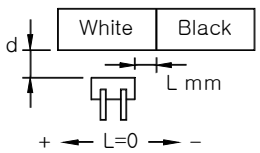


Detection Position Characteristics (2)



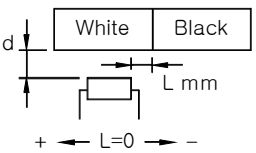
Detection Position (1)

Test condition
IF=4mA
VCE=2V
d=1mm



Detection Position (2)

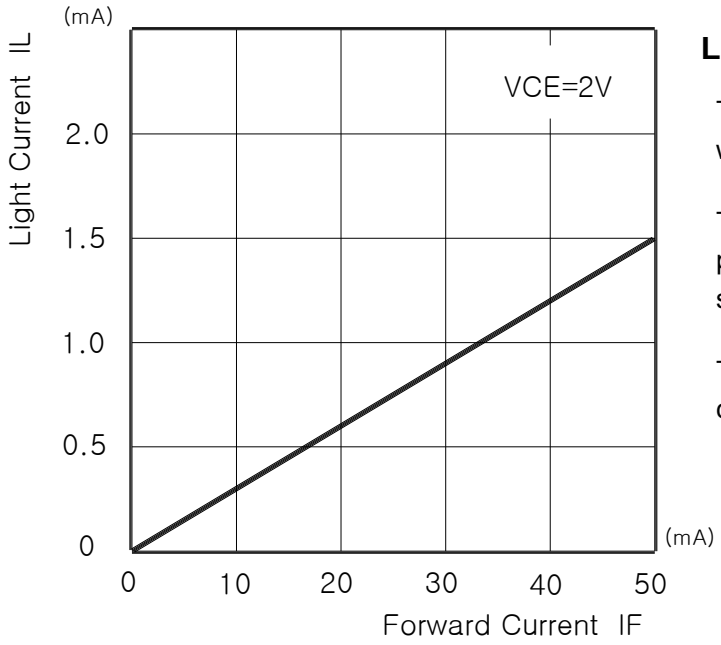
Test condition
IF=4mA
VCE=2V
d=1mm



Test card : Reflection ratio 90% for white color paper

Application of Reflective sensors

- Optoelectronic transmitters and receivers are used in pairs and linked optically.
- Emitting light is influenced by an object on its way to the detector.
- Change of the light signal causes a change in the electrical signal in the receiver.
- Transmitter is positioned next to the receiver used for a wide range of distances objects of different shapes.
- Important Diagram

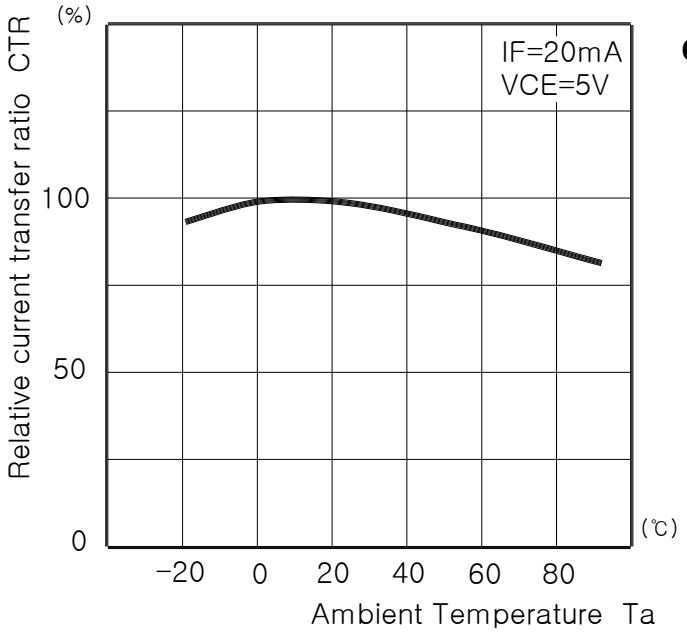


Light current vs. Forward current

The relation between output collector current and input for ward current is called CTR (current transfer ration).

The CTR can be the same for the combination of a high power emitter and a less sensitive detector or a for a high sensitive detector with a lower power emitter.

The CTR changes over temperature, life time and contamination of detective object

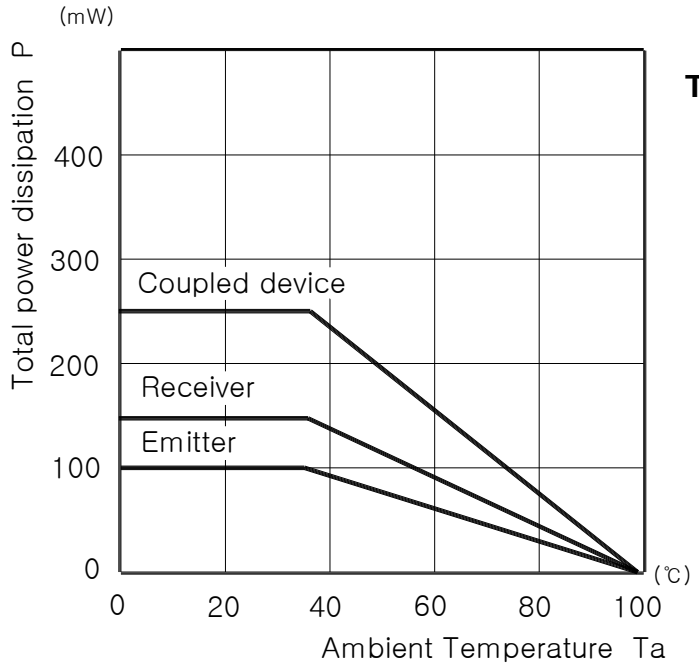


CTR vs. Temperature

The variation of the CTR is caused by the decreasing radiant intensity of the emitter (-1%/℃) and the increasing sensitivity of the detector (+0.3%/℃) over the temperature.

By matching the technologies of the emitter and the detector it's possible to compensate this effect at least for a certain temperature range.

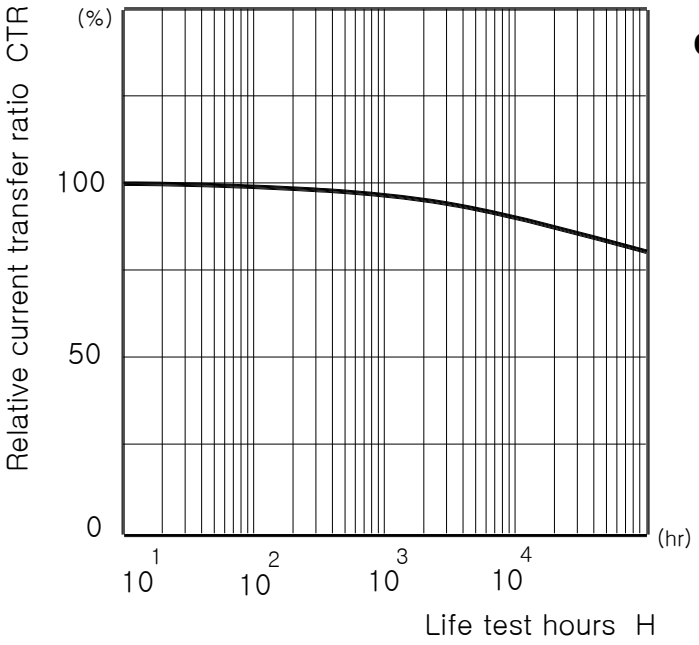
Application of Reflective sensors



Total power dissipation vs. Temperature

The absolute power dissipation of the sensor or of the single elements is very important for the design of the application.

The application should never exceed these values to avoid damage or even destruction of the sensor device.



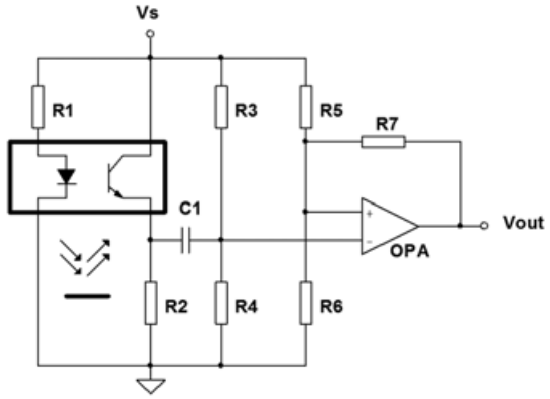
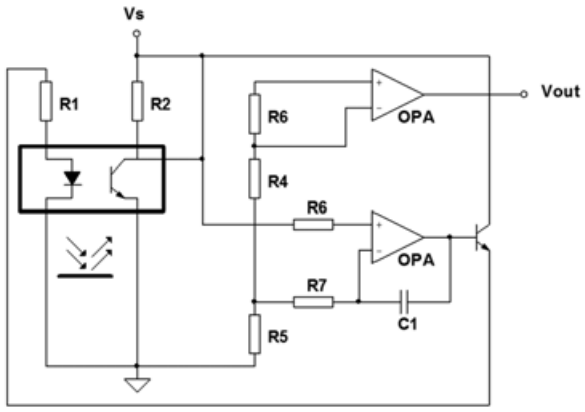
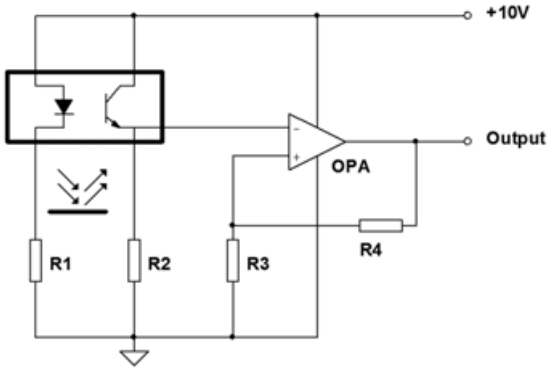
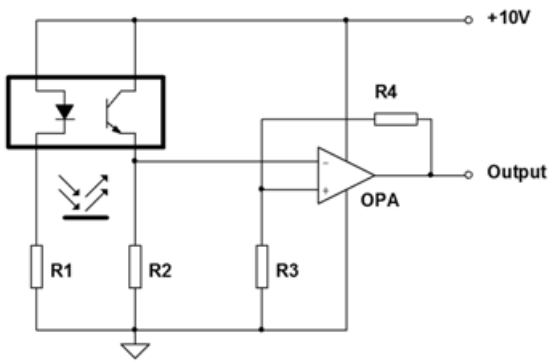
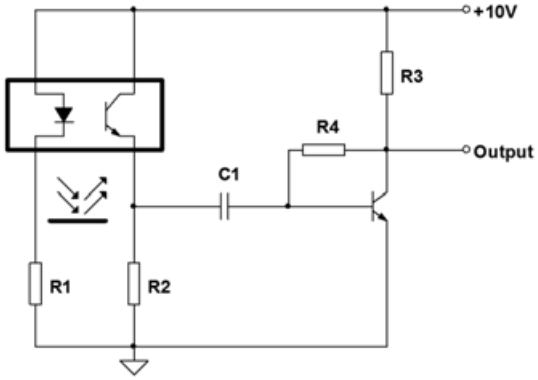
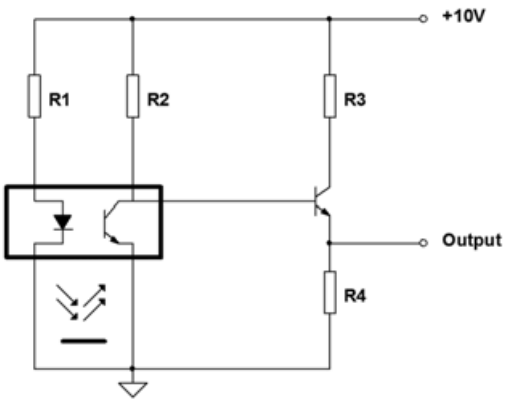
CTR vs. Operation time

Over long operation times, the current transfer ration drops.

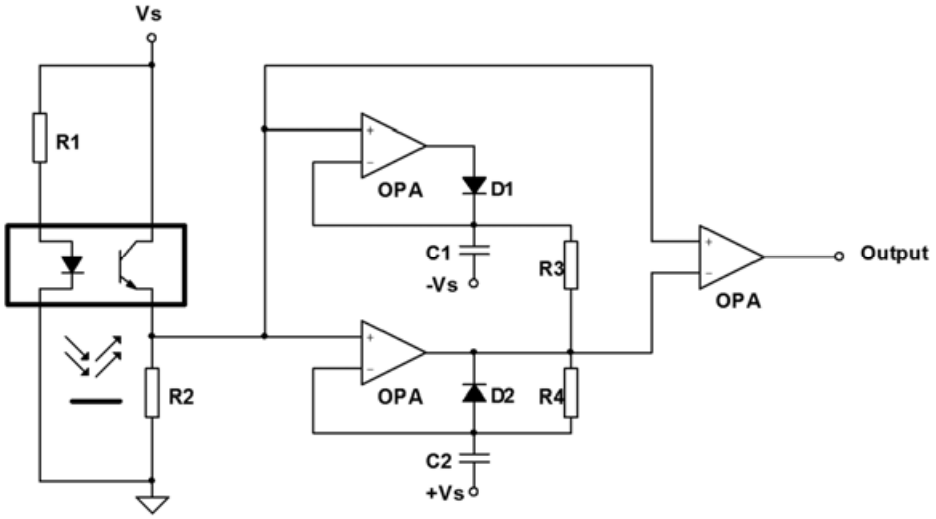
This is mainly caused by the lower radiant intensity of the emitter.

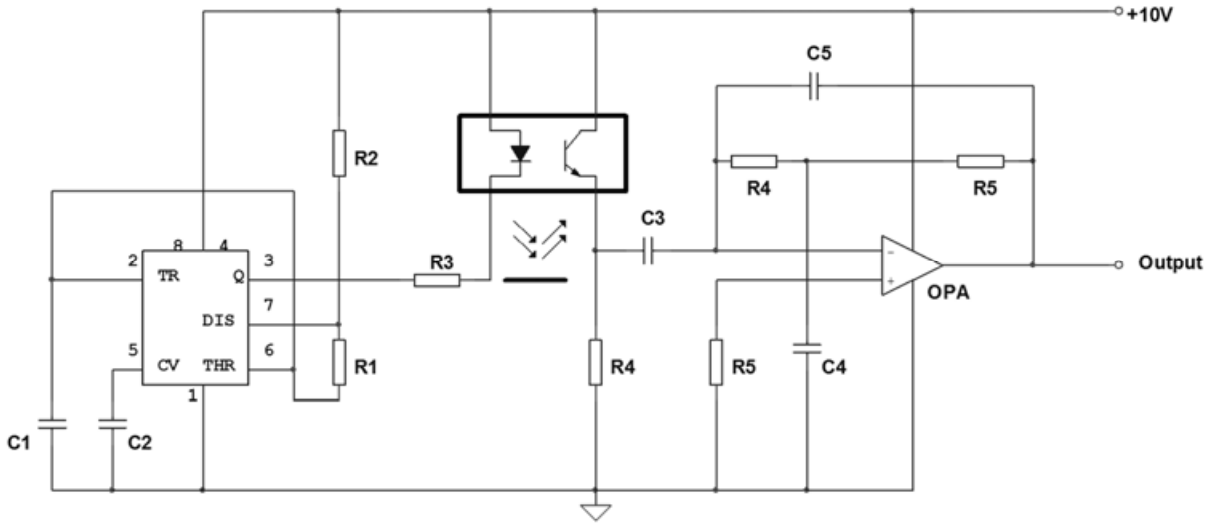
This fall must be considered during application design.

Application Circuits

Circuit with OPA AC coupling	Circuit with emitting light compensation
	
Circuit with operation amplifier	
	
Circuit with transistor amplifier	
	

Application Circuits

Circuit with floating comparator


Circuit with AC coupling and oscillating to suppress the ambient light


1. Packing unit Remote control module

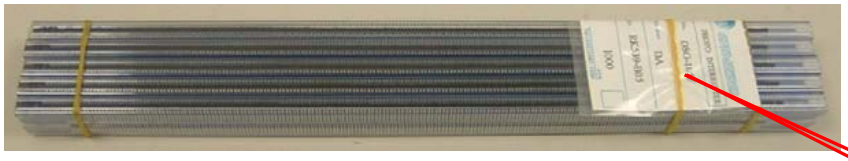
Package	Device	Packing Method	Units / Tube	Tubes / Bundle	Bundle / Plastic Bag	Plastic Bag / Outer Box
Transfer mold type		Tube	100	1000	5000	30000
				*Bundle #1	*Plastic Bag #1	*Outer Box #1

Outer Box #1 with Opto Sensor Logo (370mm * 260mm *250mm)

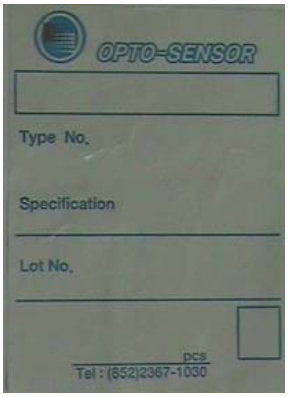
2. Packing method

1) Input max 100 units to one tube and fix with pin at the opposite.

2) 10 tubes were bundled up by bubber band



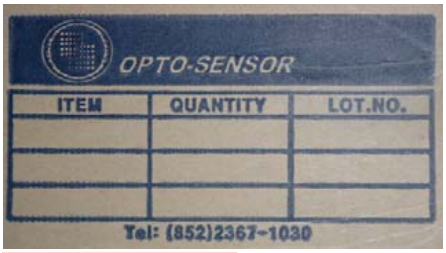
<Bundle #1>



Label #1

3) Input 5 Bundles into Plastic Bag.

<Plastic Bag #1>



Label #2

4) Input 6 Plastic Bag into Outer box.

<Outer Box #1>