

Rotary Detection Sensor with Optical Reflection Type

FEATURES

- Miniature, thin package: 2.6mm × 2.5mm × 0.8mm
- Digital two outputs type: A/ B phases
- Resolution : 50.8LPI * Lines Per Inch
(2LPmm * Lines Per mm)
- Recommendation strip width: 0.25mm
- Pb free soldering re-flowing permitted: 255°C, 2times
- Halogen free, Pb free
- Compliant with RoHS directive

APPLICATION

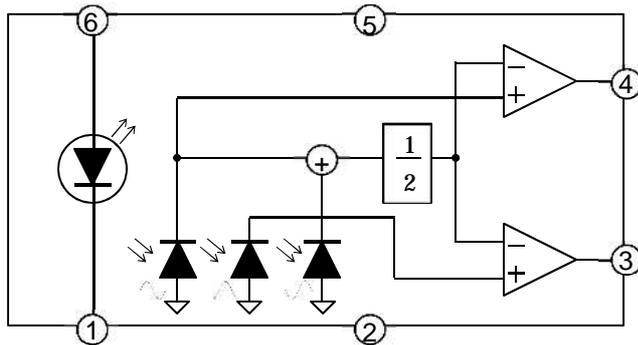
- Rotation detection of focus ring
- Rotation detection of the operation dial
- Rotation detection of the encoder plate

GENERAL DESCRIPTION

NJL5820R is the compact surface mount type photo reflector, which is built in a high Brightness Infrared LED and PDIC. It can obtain two-phase(A,B) digital signals with the recommended striped reflector.

It is the optimum sensor for various kinds of rotation detection, which can contribute to low power consumption of the set and simplification of the design.

EQUIVALENT CIRCUIT · BLOCK DIAGRAM

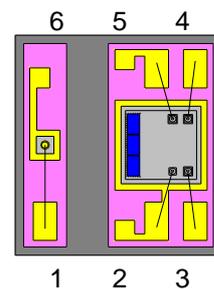


1. Cathode (LED)
2. GND
3. Vout2
4. Vout1
5. V_{CC}
6. Anode (LED)

PIN CONFIGURATION

PIN No	NAME	FUNCTION
1	Cathode (LED)	Cathode for LED
2	GND	Ground
3	Vout2	Output Voltage 2
4	Vout1	Output Voltage 1
5	V _{CC}	Power Supply
6	Anode (LED)	Anode for LED

(Top View)



ORDERING INFORMATION

PART NUMBER	PACKAGE OUTLINE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ(pcs)
NJL5820R	COBP	yes	yes	Au	No marking	8.9	3,000

■ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Emitter			
Forward Current (Continuous)	I_F	30	mA
Reverse Voltage (Continuous)	V_R	6	V
Power Dissipation	P_D	45	mW
Detector(PDIC)			
Supply Voltage	V_{CC}	6.0	V
Power Dissipation	P_{PDIC}	5	mW
Coupled			
Total Power Dissipation	P_{tot}	50	mW
Operating Temperature	T_{opr}	-30 to +85	°C
Storage Temperature	T_{stg}	-40 to +100	°C
Reflow Soldering Temperature	T_{sol}	255	°C

■RECOMMENDATION OPERATING CONDITION

PARAMETER	SYMBOL	VALUE	UNIT
Forward current	I_F	2 to 10	mA
Supply voltage	V_{CEO}	+2.7 to +5.5	V
Distance between sensor and reflector	Gap	0.5 to 1.5	mm

■ELECTRO-OPTICAL CHARACTERISTICS (Ta=25°C)

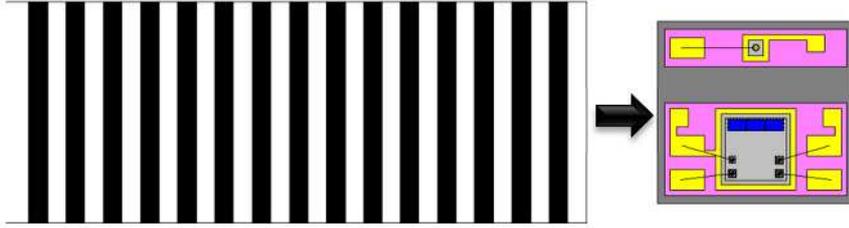
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Emitter						
Forward Voltage	V_F	$I_F=5mA$	1.1	1.4	1.7	V
Revers Voltage	I_R	$V_R=6V$	-	-	10	μA
Peak wavelength	λ_P		-	940	-	nm
Detector						
Supply Voltage	V_{CC}		2.7	3.0	5.5	V
Operating Current	I_{CC}	$V_{CC}=3V$, In the dark	-	100	300	μA
Coupled						
Minimum Operating Current	I_{Fmin}	$V_{CC}=3.0V, d=0.5mm$	1	-	-	mA
High Level Output Voltage	V_{OH}	$I_F=2mA, V_{CC}=3.0V, d=0.5mm$ (reflector surface) *1	$V_{CC}-0.5$	-	-	V
Low Level Output Voltage	V_{OL}	$I_F=2mA, V_{CC}=3.0V, d=0.5mm$ (non-reflector surface) *1	-	-	GND + 0.5	V
Phase Difference of output Voltage	V_P	$I_F=2mA, V_{CC}=3.0V, d=0.5mm$	-	90	-	deg.
Duty ratio	Duty	$I_F=2mA, V_{CC}=3.0V, d=0.5mm$	-	50	-	%
Rise Time	t_r		-	0.1	-	μsec
Fall Time	t_f		-	0.1	-	μsec

*1: NJRC recommend the stripe reflector with 0.25mm strip and 0.25mm space.

In the Electro-Optical characteristics table, items that are showed only the typical value are not tested in manufacturing process.

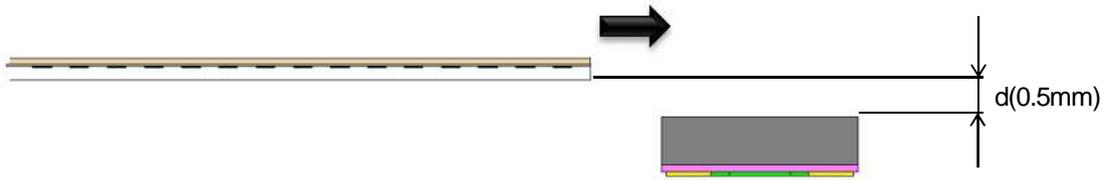
■METHOD OF THE OUTPUT VOLTAGE MEASUREMENT

Output voltage measures with NJRC recommended mirror.

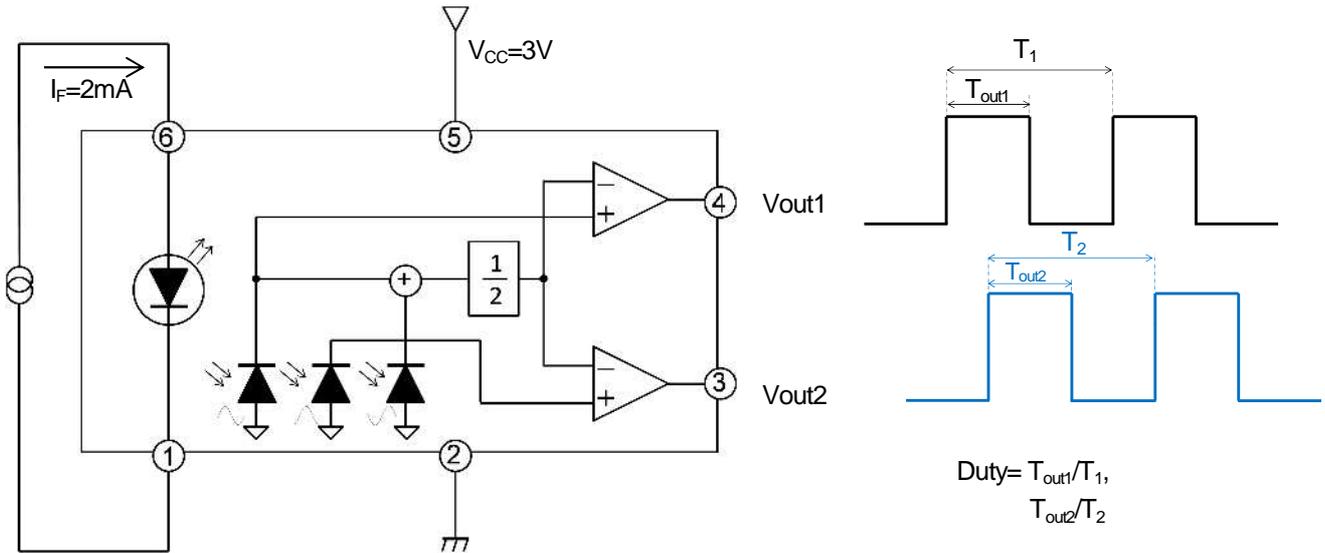


Strip mirror with PET film (0.25mm strip / 0.25mm space)

* Meltec Co.,Ltd.

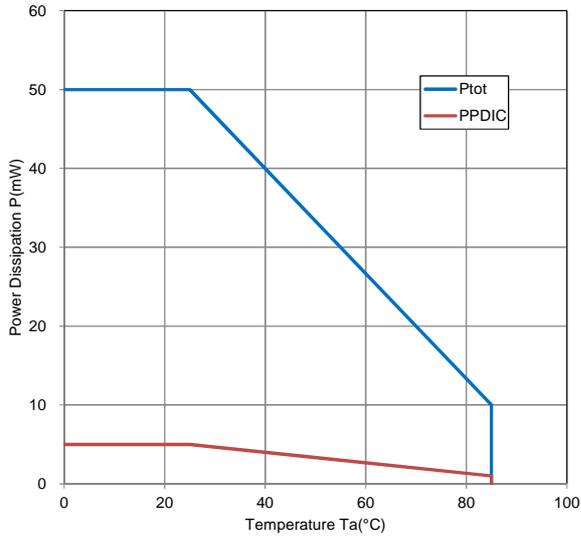


■TEST CIRCUIT OF OUTPUT VOLTAGE

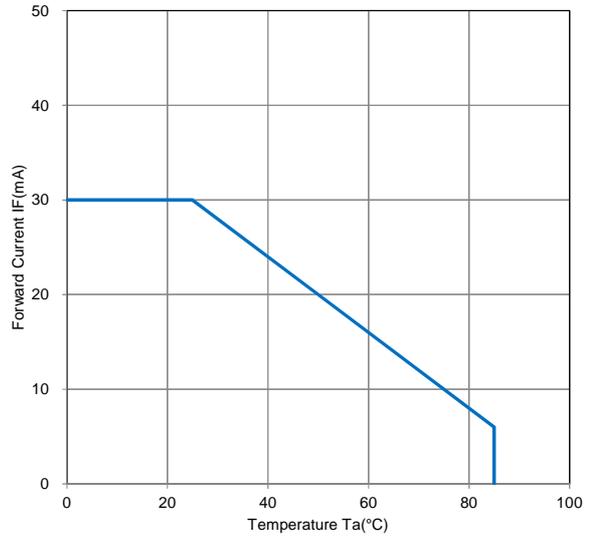


POWER DISSIPATION vs. AMBIENT TEMPERATURE

Power dissipation vs. Duty Ratio

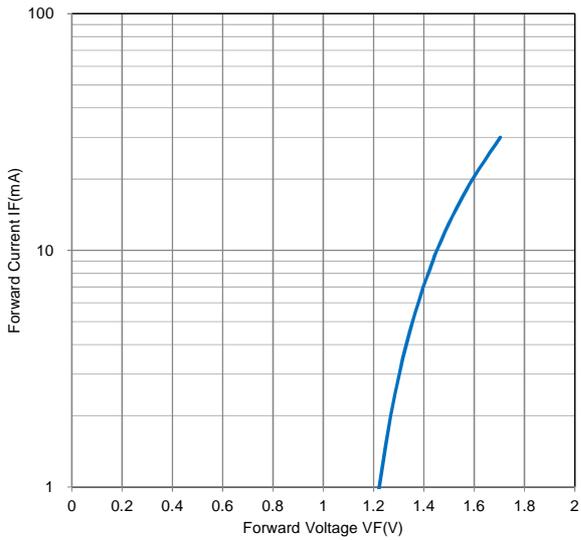


Forward Current vs. Temperature

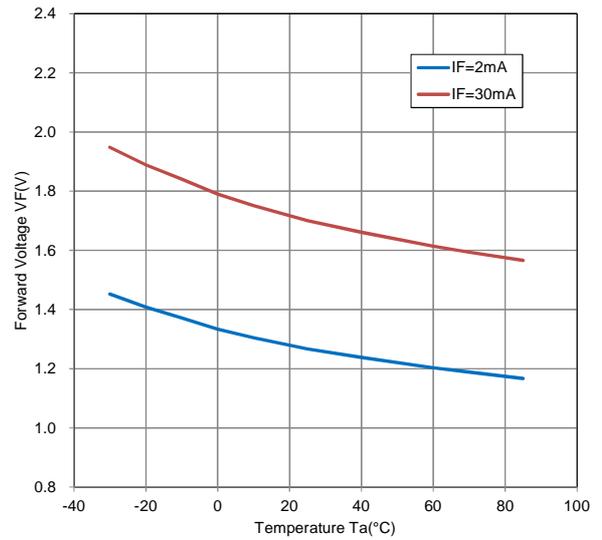


TYPICAL CHARACTERISTICS (Ta=25°C)

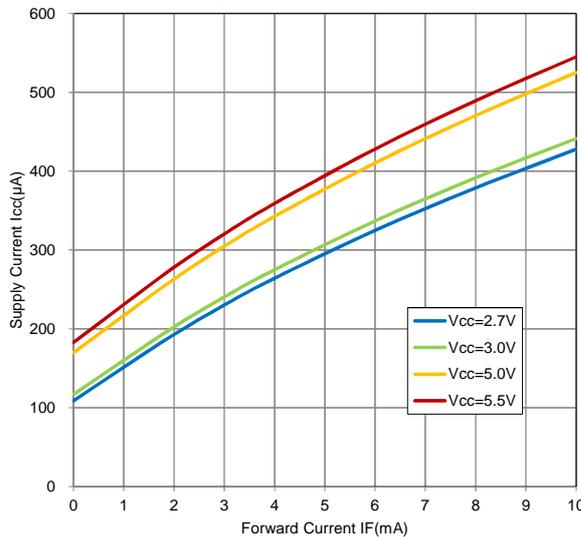
Forward Voltage vs. Forward Current



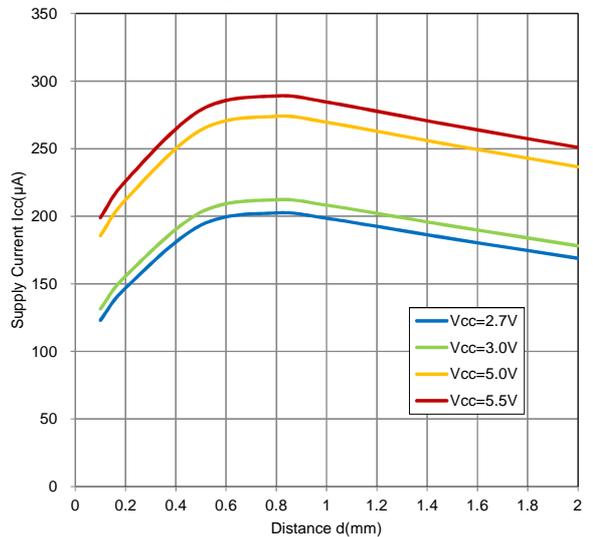
Forward Voltage vs. Temperature



Supply Current vs. Forward Current
@ d=0.5mm, RL=100kΩ

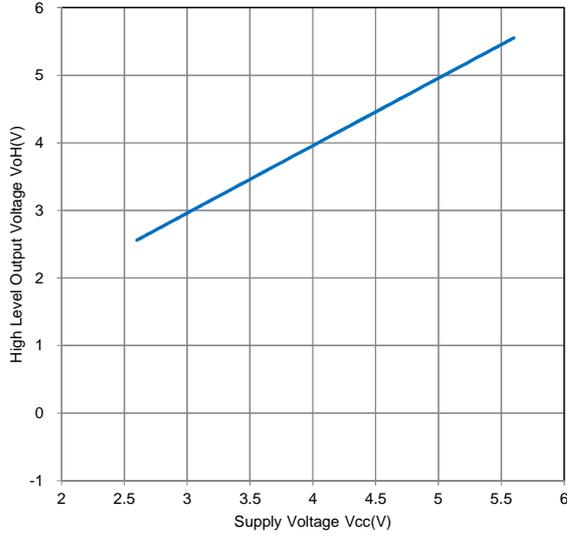


Supply Current vs. Distance
@ IF=2mA, RL=100kΩ

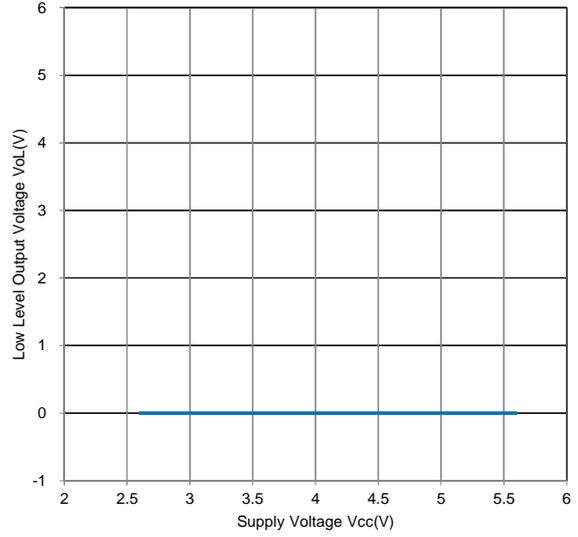


■ TYPICAL CHARACTERISTICS (Ta=25°C)

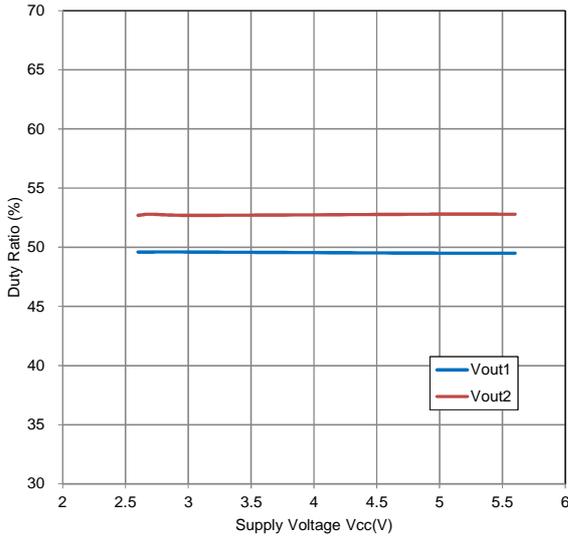
Supply Voltage vs. High Level Output Voltage
@ IF=2mA, d=0.5mm, RL=100kΩ



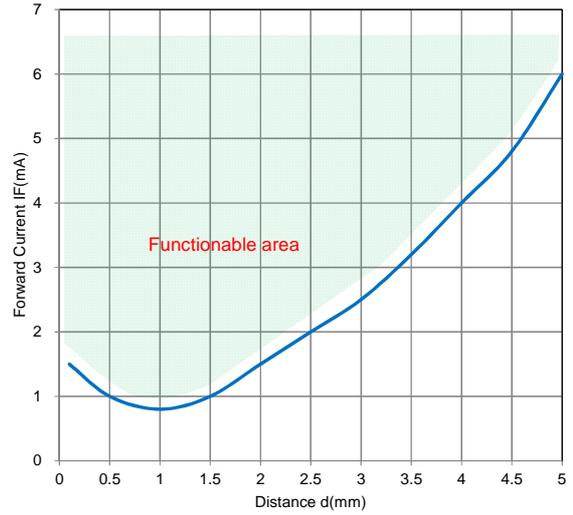
Supply Voltage vs. Low Level Output Voltage
@ IF=2mA, d=0.5mm, RL=100kΩ



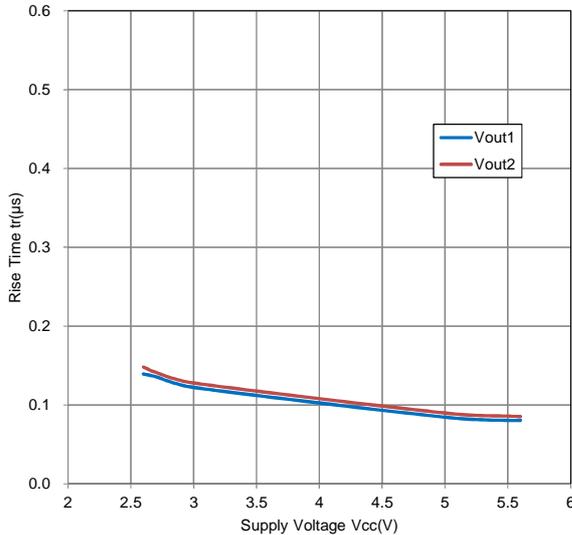
Supply Voltage vs. Duty Ratio
@ IF=2mA, d=0.5mm, RL=100kΩ



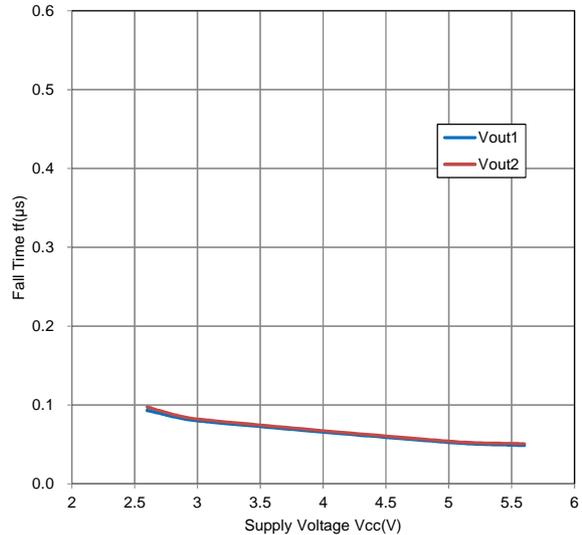
Functional Condition
Distance vs. Forward Current
@ V_{CC}=3V



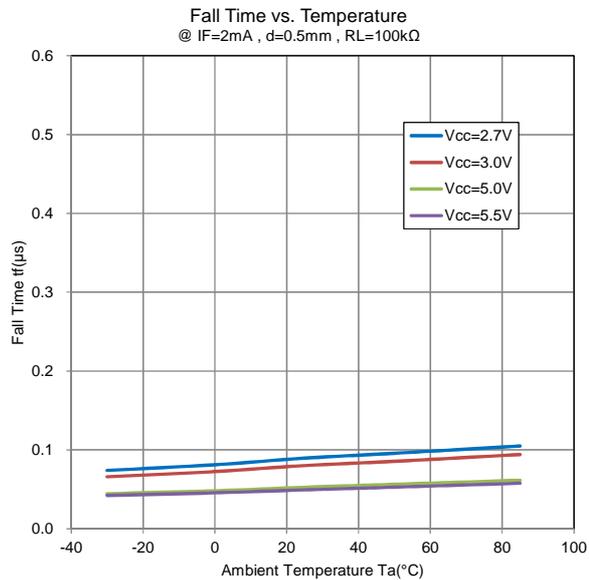
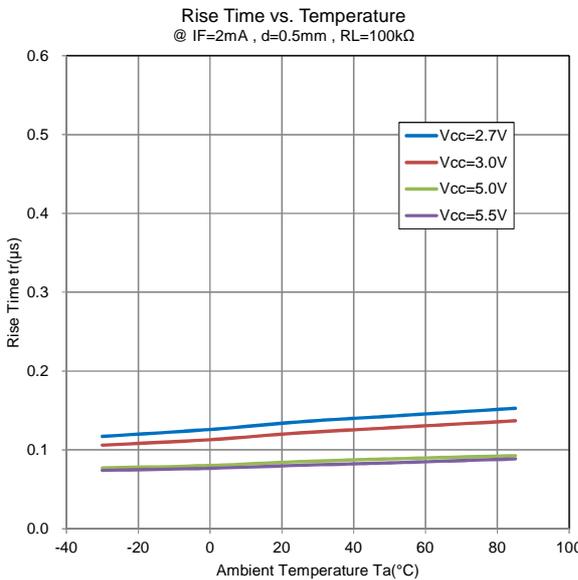
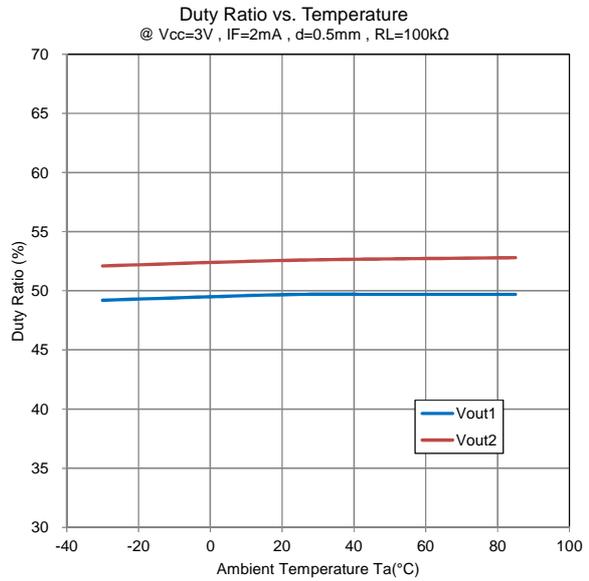
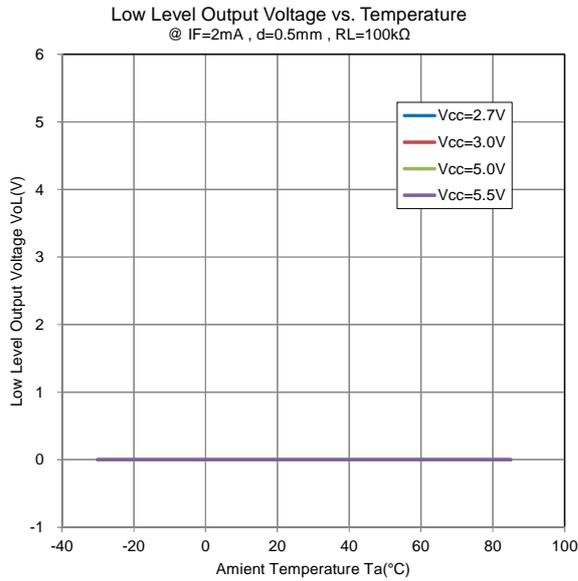
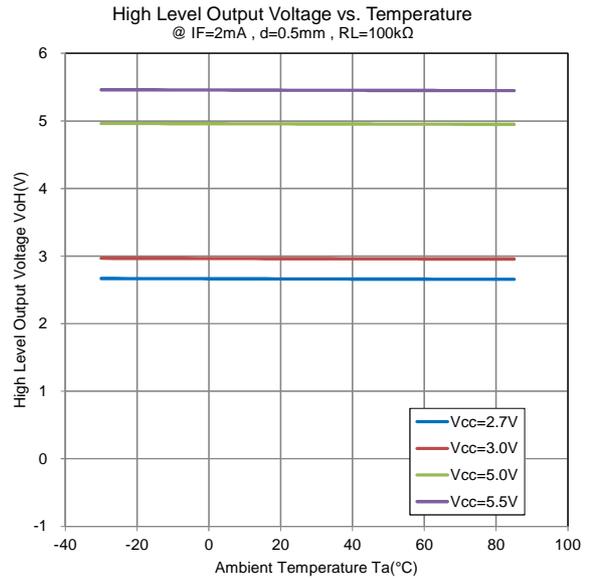
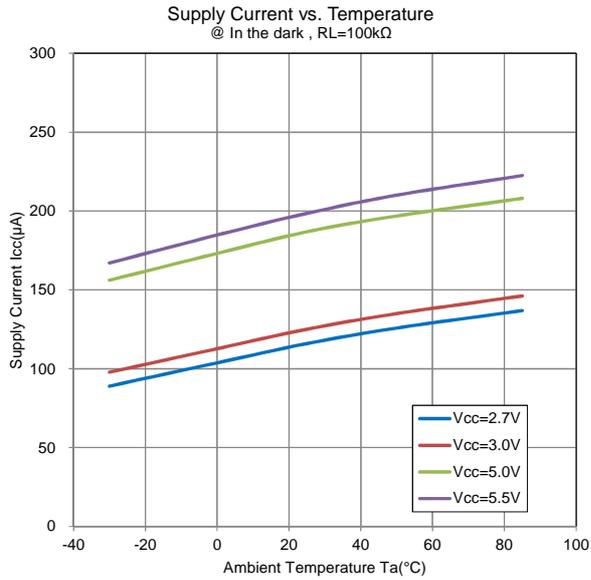
Supply Voltage vs. Rise Time
@ IF=2mA, d=0.5mm, RL=100kΩ



Supply Voltage vs. Fall Time
@ IF=2mA, d=0.5mm, RL=100kΩ



■ TYPICAL CHARACTERISTICS (Ta=25°C)



■APPLICATION NOTE**(1) Attention in handling**

Treat not to touch the light receiving and light emitting part.

Avoid to adhering the dust and any other foreign materials on the light receiving and light emitting part when using.

When LED has operated by voltage, it should be connected the resistor of current adjustment. Avoid to applying direct voltage to LED, because there is possibility that LED is destroyed.

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.

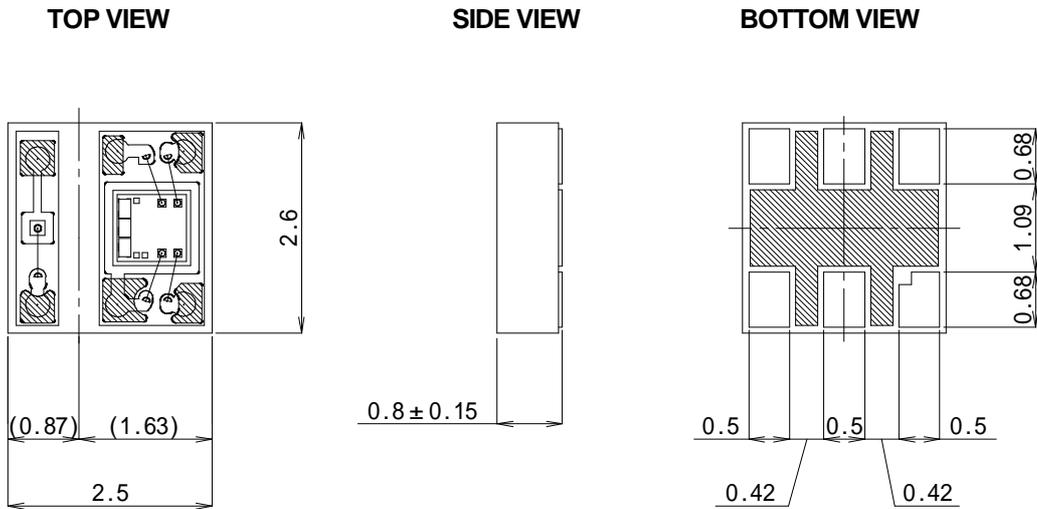
(2) Attention in designing

Avoid the entering ambient light into light receiving part for avoid the malfunction by ambient light. Furthermore, there is possibility of malfunction when there are the other mounted parts by near this product peripheral.

There will be changing characteristics by detection object. Refer to this datasheet and evaluate by actual detection object.

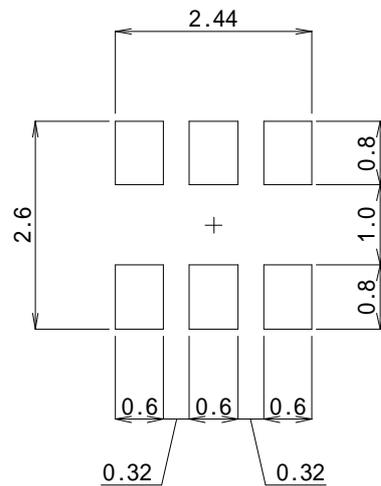
When LED has been applied continuous power on long period of time, the output current is dropped. If it uses by always applying power to LED, have to consider the circuit designing of including output current decrease.

■PACKAGE OUTLINE UNIT (mm)



- 1: Cathode(LED)
- 2: GND
- 3: Vout2
- 4: Vout1
- 5: V_{CC}
- 6: Anode(LED)

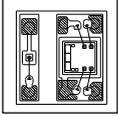
Unspecified tolerance: $\pm 0.1\text{mm}$



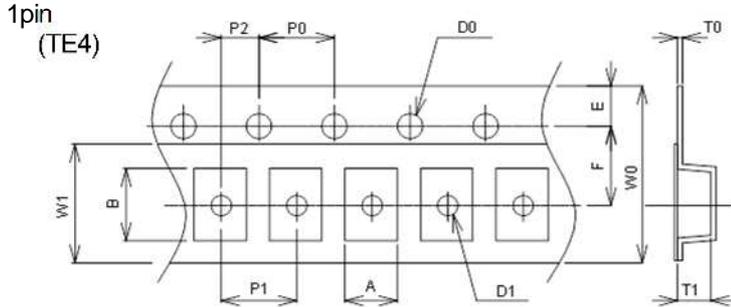
Foot Pattern

PACKING SPECIFICATION

PACKING DIMENSIONS UNIT: mm
Insert direction



Drawing direction →



SYMBOL	DIMENSION	REMARK
A	2.85±0.10	BOTTOM DIMENSSION
B	2.95±0.10	BOTTOM DIMENSSION
D0	φ1.50±0.10	
D1	φ1.05±0.10	
E	1.75±0.10	
F	3.50±0.10	
P0	4.00±0.10	
P1	4.00±0.10	
P2	2.00±0.10	
T0	0.20±0.10	
T1	1.20±0.10	
W0	8.0 ^{+0.3/-0.1}	
W1	(5.5)	THICKNESS 0.1MAX.

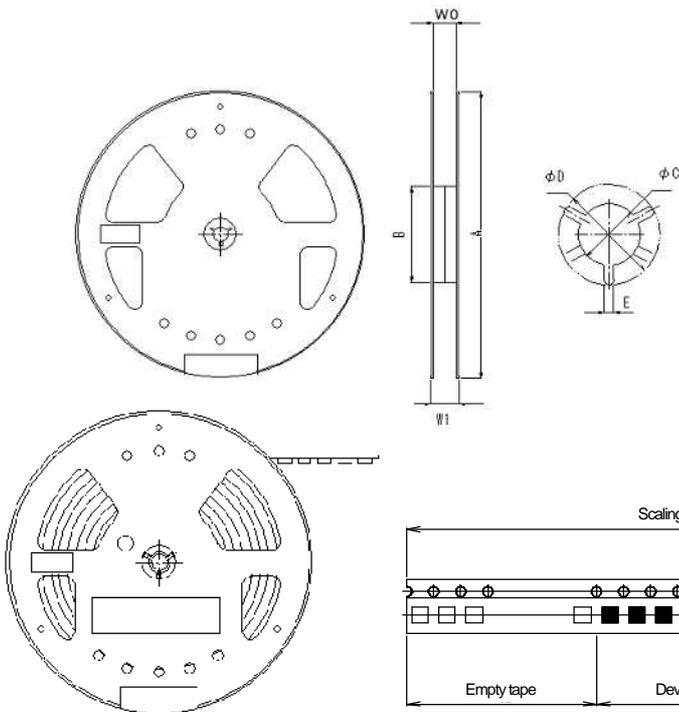
Carrier tape material: PC(Antistatic)
Cover tape material: PETP(Antistatic)

TAPING STRENGTH

There is a peel strength in the range of 0.2 to 0.7N when was peeled at a rate of 300mm per minute in opening angle 165 to 180° between the carrier tape and the cover tape.

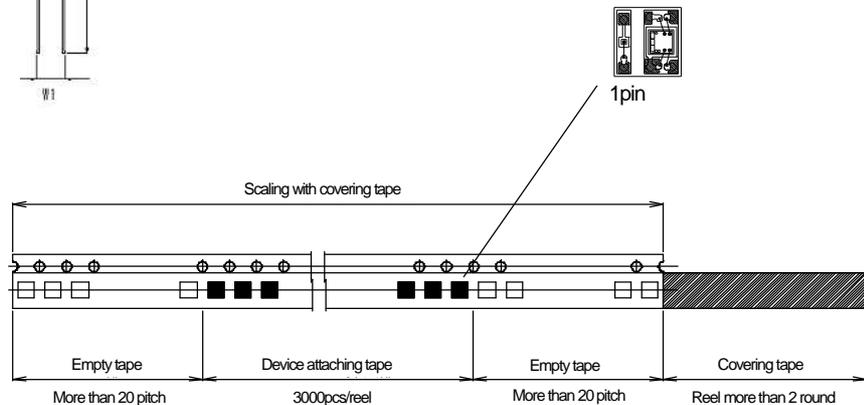
PACKAGING

- 1) The taped products are to be rolled up on the taping reel as on the drawing.
- 2) Rolling up specification
 - 2-1) Start rolling : Carrier tape open space more than 20 Pieces.
 - 2-2) End of rolling : Carrier tape open space more than 20 Pieces, and 2 round of reel space at the cover tape only.
- 3) Taping quantity : 3,000 Pieces
- 4) Seal off after putting each reels in a damp proof bag with silica gel.



SYMBOL	DIMENSION	REMARK
A	φ180.0 ^{+0/-3.0}	
B	φ60.0±1.0	
C	φ13.0±0.2	
D	φ21.0±0.8	
E	2.0±0.5	
W0	9.0±0.3	
W1	11.4±1.0	

Reel material: PS(Antistatic)



RECOMMENDED MOUNTING METHOD

NOTE

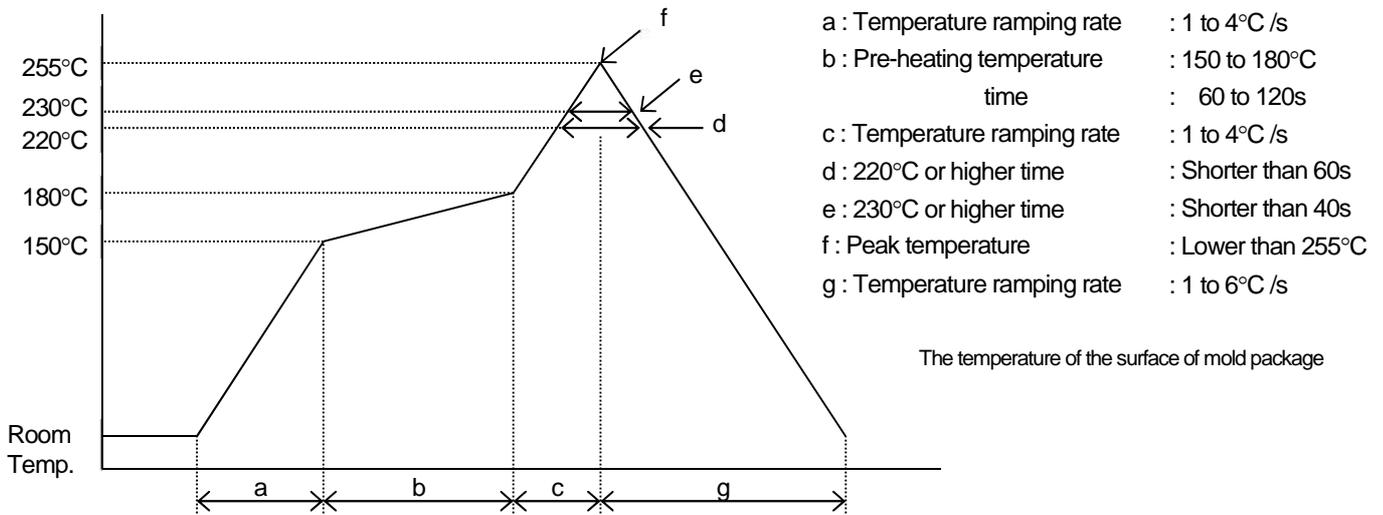
Mounting was evaluated with the following profiles in our company, so there was no problem.
However, confirm mounting by the condition of your company beforehand.

The exposure of device under higher temperature many affect to the reliability of the products, it is recommended to complete soldering in the shortest time possible.

Mounting: Two Times soldering is allowed.

INFRARED REFLOW SOLDERING METHOD

Recommended reflow soldering procedure



(NOTE1) Using reflow furnace with short wave infrared radiation heater such as halogen lamp

Regarding temperature profile, please refer to those fo reflow furnace.

In this case the resin surface temperature may become higher than lead terminals due to endothermic ally of black colored mold resin. Therefore, please avoid from direct exposure to mold resin.

(NOTE2) Other method

Such other methods of soldering as dipping the device into melted solder and vapor phase method (VPS) are not appropriate because the body of device will be heated rapidly. Therefore, these are not recommended to apply.

(NOTE3) The resin gets softened right after soldering, so, the following care has to be taken

Not to contact the lens surface to anything.

Not to dip the device into water or any solvents.

FLOE SOLDERING METHOD

Flow soldering is not possible.

IRON SOLDERING METHOD

Iron soldering is not possible.

■CLEANING

Avoid washing the device after soldering by reflow method.

■IC STORAGE CONDITIONS AND ITS DURATION

(1) Temperature and humidity ranges

Pack Sealing	Temperature:	5 to 40 [°C]
	Humidity:	40 to 80 [%]
Pack Opening	Temperature:	5 to 30 [°C]
	Humidity:	40 to 70 [%]

After opening the bag, solder products within 48h.

Avoid a dry environment below 40% because the products are easily damageable by the electrical discharge.

Store the products in the place where it does not create dew with the products due to a sudden change in temperature.

(2) When baking, place the reel vertically to avoid load to the side.

(3) Do not store the devices in corrosive-gas atmosphere.

(4) Do not store the devices in a dusty place.

(5) Do not expose the devices to direct rays of the sun.

(6) Do not allow external forces or loads to be applied to IC's.

(7) Be careful because affixed label on the reel might be peeled off when baking.

(8) The product is recommended to do the baking before using for the stability of the quality.

■BAKING

In case of keeping expect above condition be sure to apply baking.

Baking method: Ta=60°C, 48 to 72h, One time baking is allowed

■STORAGE DURATION

Within a year after delivering this device.

For the products stored longer than a year, confirm their terminals and solderability before they are used.

■MOISTURE SENSITIVITY LEVELS

JEDEC : Level 5

[CAUTION]

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The introduction of external contaminants (e.g. dust, oil or cosmetics) can result in failures of semiconductor products.
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5. Special care is required in designing devices, machinery or equipment which demand high levels of reliability. This is particularly important when designing critical components or systems whose failure can foreseeably result in situations that could adversely affect health or safety. In designing such critical devices, equipment or machinery, careful consideration should be given to amongst other things, their safety design, fail-safe design, back-up and redundancy systems, and diffusion design.
6. The products listed in the catalog may not be appropriate for use in certain equipment where reliability is critical or where the products may be subjected to extreme conditions. You should consult our sales office before using the products in any of the following types of equipment.

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Power Generator Control Equipment (Nuclear, Steam, Hydraulic)
Life Maintenance Medical Equipment
Fire Alarm/Intruder Detector
Vehicle Control Equipment (airplane, railroad, ship, etc.)
Various Safety devices
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