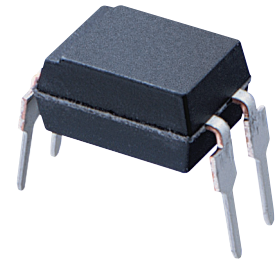


PC8110xNSZ Series

DIP 4pin
High Speed under High Load Resistance
Photocoupler



■ Description

PC8110xNSZ Series contains an IRED optically coupled to a phototransistor built-in schottky barrier diode.

It is packaged in a 4-pin DIP, and SMT gullwing lead-form option.

Input-output isolation voltage(rms) is 5.0kV.

CTR is 50% to 400% at input current of 5mA.

■ Features

1. 4pin DIP package
2. Double transfer mold package (Ideal for Flow Soldering)
3. High speed response at turn-off time due to built-in schottky barrier diode (at saturation mode)
4. High isolation voltage between input and output
($V_{iso(rms)}$: 5kV)

■ Agency approvals/Compliance

1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. **PC8110**)
2. Package resin : UL flammability grade (94V-0)

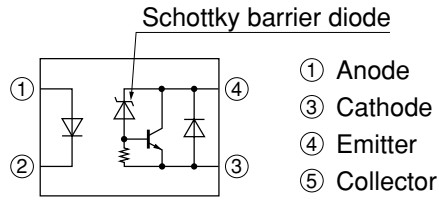
■ Applications

1. Home appliances

Notice The content of data sheet is subject to change without prior notice.

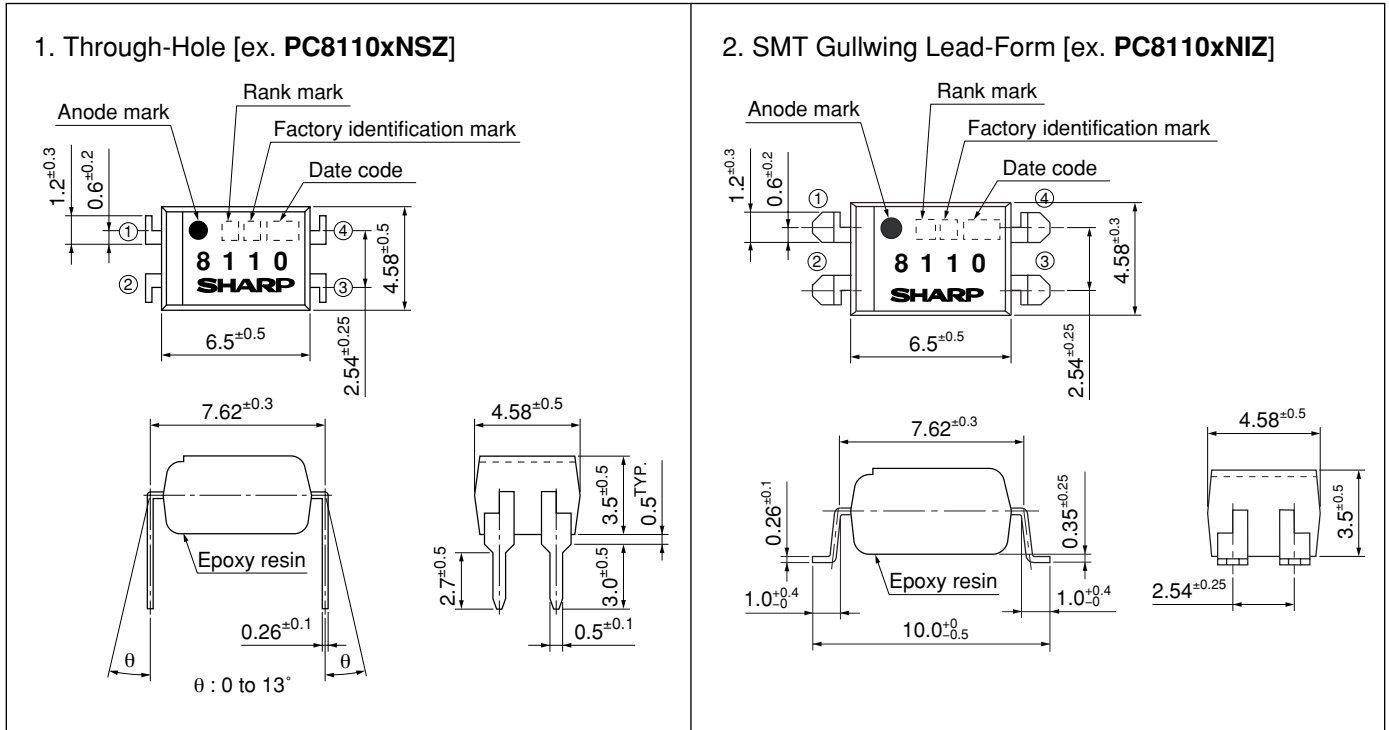
In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

■ Internal Connection Diagram



■ Outline Dimensions

(Unit : mm)







Product mass : approx. 0.21g

Date code (2 digit)

1st digit				2nd digit	
Year of production				Month of production	
A.D.	Mark	A.D.	Mark	Month	Mark
1990	A	2002	P	January	1
1991	B	2003	R	February	2
1992	C	2004	S	March	3
1993	D	2005	T	April	4
1994	E	2006	U	May	5
1995	F	2007	V	June	6
1996	H	2008	W	July	7
1997	J	2009	X	August	8
1998	K	2010	A	September	9
1999	L	2011	B	October	O
2000	M	2012	C	November	N
2001	N	∴	∴	December	D

repeats in a 20 year cycle

Factory identification mark

Factory identification Mark	Country of origin
no mark	Japan
	
	Indonesia
	Philippines
	China

* This factory marking is for identification purpose only.
Please contact the local SHARP sales representative to see the actual status of the production.

Rank mark

Refer to the Model Line-up table

■ Absolute Maximum Ratings (T_a=25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I _F	50	mA
	*1 Peak forward current	I _{FM}	1.0	A
	Reverse voltage	V _R	6	V
	Power dissipation	P	70	mW
Output	Collector-emitter voltage	V _{CEO}	70	V
	Emitter-collector voltage	V _{ECO}	0.1	V
	Collector current	I _C	30	mA
	Collector power dissipation	P _C	150	mW
	Total power dissipation	P _{tot}	200	mW
	*2 Isolation voltage	V _{iso (rms)}	5.0	kV
	Operating temperature	T _{opr}	-30 to +100	°C
	Storage temperature	T _{stg}	-55 to +125	°C
	*3 Soldering temperature	T _{sol}	260	°C

*1 Pulse width ≤ 100μs, Duty ratio : 0.001

*2 40 to 60%RH, AC for 1 minute, f=60Hz

*3 For 10s

■ Electro-optical Characteristics (T_a=25°C)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V _F	I _F =20mA	-	1.2	1.4	V	
	Peak forward voltage	V _{FM}	I _{FM} =0.5A	-	-	3.0	V	
	Reverse Current	I _R	V _R =4V	-	-	10	μA	
	Terminal capacitance	C _t	V=0, f=1kHz	-	30	250	pF	
Output	Collector dark current	I _{CEO}	V _{CE} =50V, I _F =0	-	-	100	nA	
	*4 Collector-emitter breakdown voltage	BV _{CEO}	I _C =0.1mA, I _F =0	70	-	-	V	
Transfer characteristics	Collector current	I _C	I _F =5mA, V _{CE} =5V	2.5	-	20	mA	
	Collector-emitter saturation voltage	V _{CE(sat)}	I _F =20mA, I _C =1mA	-	0.15	0.35	V	
	Isolation resistance	R _{ISO}	DC500V, 40 to 60%RH	5×10 ¹⁰	10 ¹¹	-	Ω	
	Floating capacitance	C _f	V=0, f=1MHz	-	0.6	1.0	pF	
	Response time	Not saturated	Rise time	V _{CE} =2V, I _C =2mA, R _L =100Ω	-	3	20	μs
			Fall time					
		Saturated 1	Turn-on time	V _{CC} =5V, I _C =20mA, R _L =10kΩ	-	2	13	
			Storage time					
		Saturated 2	Turn-off time	V _{CC} =5V, I _C =20mA, R _L =100kΩ	-	23	90	
			Turn-on time					
Turn-off time	t _{off}	-	10	50				
Turn-off time	t _{off}	-	27	100				

*4 The collector-emitter voltage has negative resistance characteristics since this device has built-in base-emitter resistor. Therefore, please be careful not to provide the voltage that goes beyond absolute maximum ratings.

■ Model Line-up

Lead Form	Through-Hole	SMT Gullwing		Rank mark	I _C [mA] (I _F =5mA, V _{CE} =5V, T _a =25°C)
Package	100pcs/sleeve	100pcs/sleeve	2000pcs/reel		
Model No.	PC81100NSZ	PC81100NIZ	PC81100NIP	with or without	2.5 to 20.0
	PC81101NSZ	PC81101NIZ	PC81101NIP	A	3.0 to 6.0
	PC81102NSZ	PC81102NIZ	PC81102NIP	B	5.0 to 10.0
	PC81103NSZ	PC81103NIZ	PC81103NIP	C	7.5 to 15.0
	PC81105NSZ	PC81105NIZ	PC81105NIP	A or B	3.0 to 10.0
	PC81106NSZ	PC81106NIZ	PC81106NIP	B or C	5.0 to 15.0
	PC81108NSZ	PC81108NIZ	PC81108NIP	A, B or C	3.0 to 15.0

Please contact a local SHARP sales representative to inquire about production status and Lead-Free options.

Fig.1 Forward Current vs. Ambient Temperature

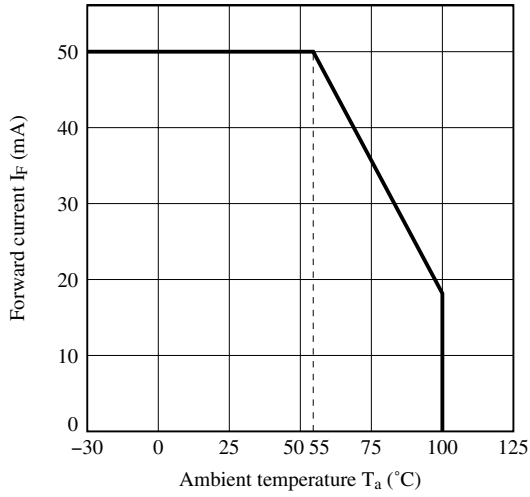


Fig.2 Diode Power Dissipation vs. Ambient Temperature

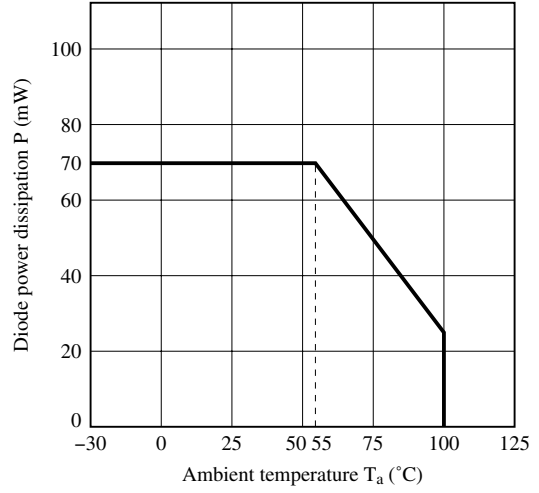


Fig.3 Collector Power Dissipation vs. Ambient Temperature

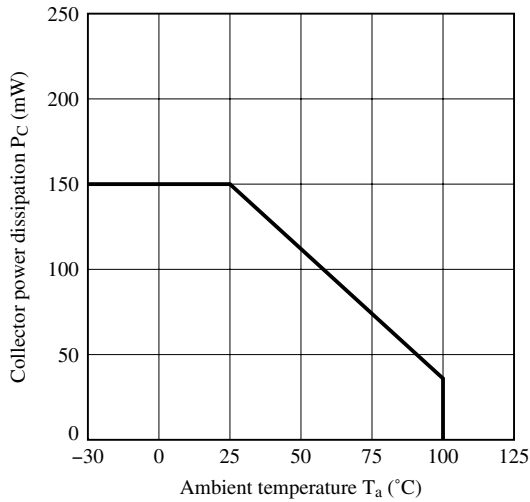


Fig.4 Total Power Dissipation vs. Ambient Temperature

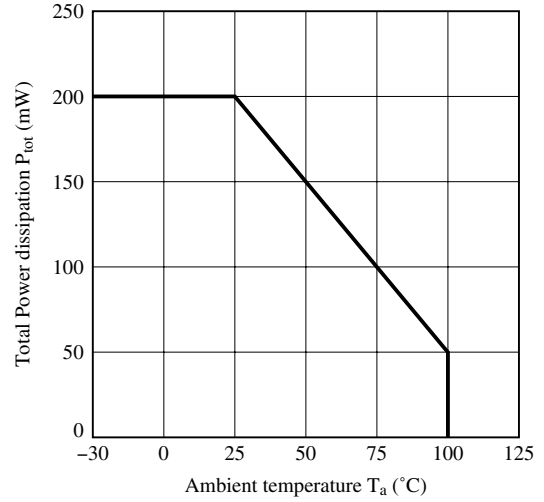


Fig.5 Peak Forward Current vs. Duty Ratio

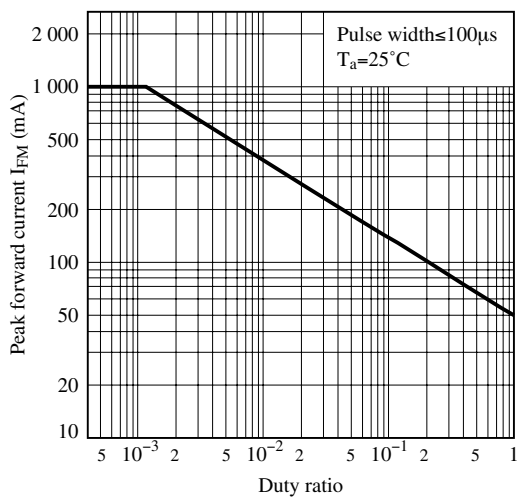


Fig.6 Forward Current vs. Forward Voltage

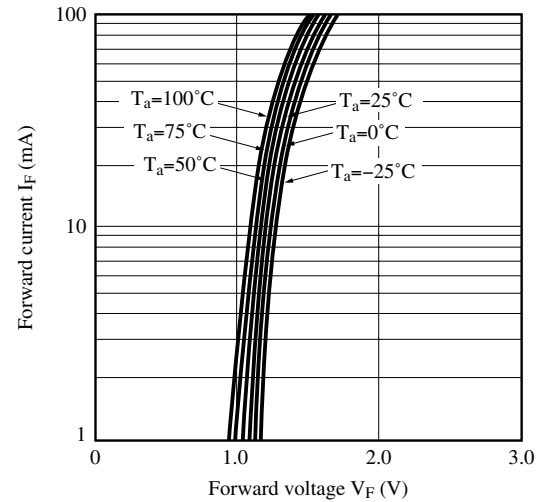


Fig.7 Current Transfer Ratio vs. Forward Current

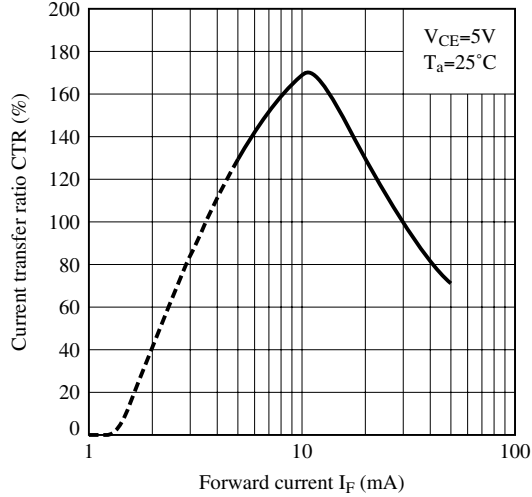


Fig.8 Collector Current vs. Collector-emitter Voltage

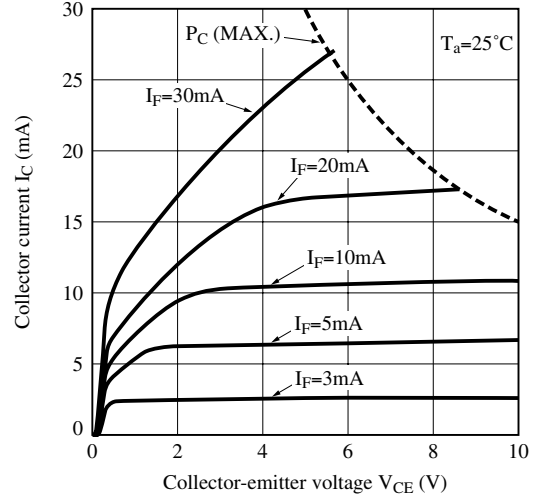


Fig.9 Relative Current Transfer Ratio vs. Ambient Temperature

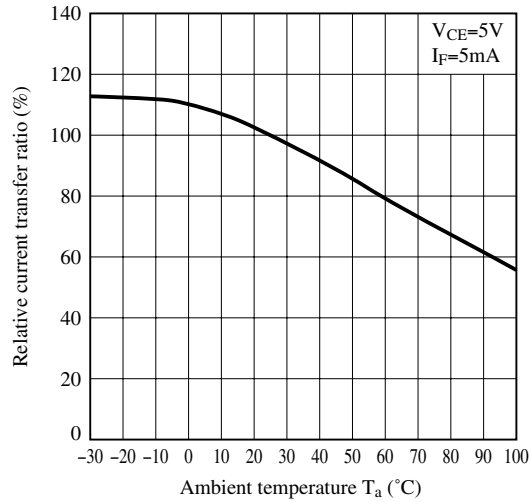


Fig.10 Collector - emitter Saturation Voltage vs. Ambient Temperature

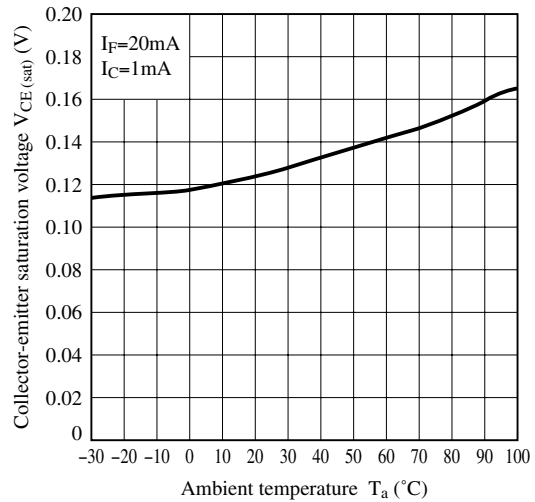


Fig.11 Collector Dark Current vs. Ambient Temperature

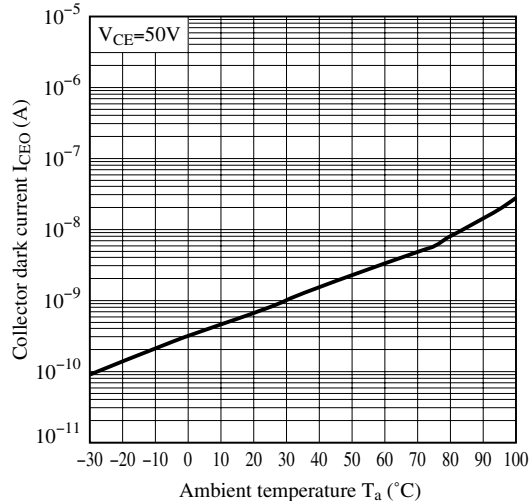


Fig.12 Response Time vs. Load Resistance (saturation region)

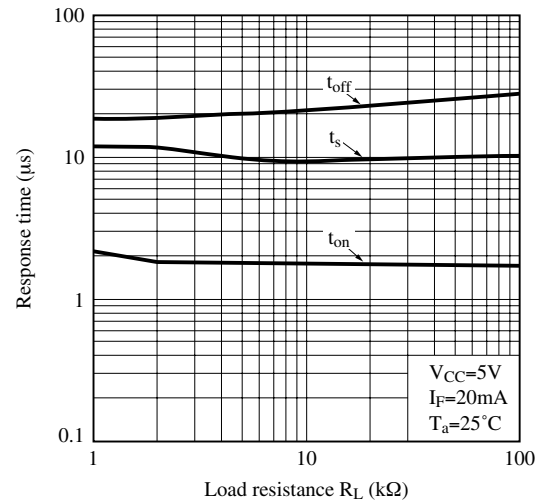


Fig.13 Response Time vs. Load Resistance (active region)

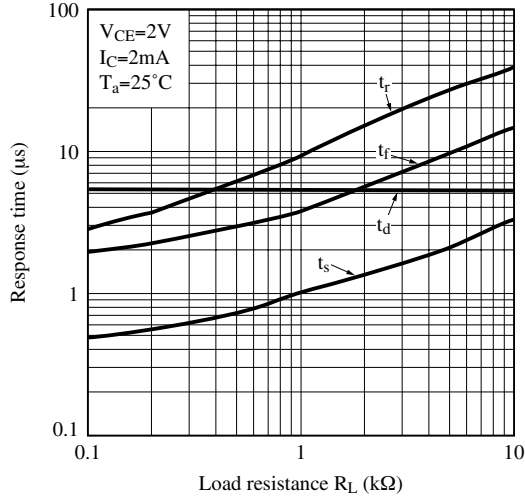
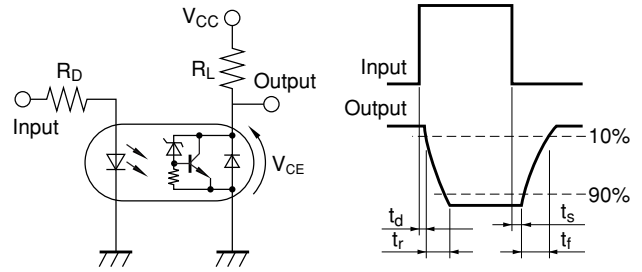


Fig.14 Test Circuit for Response Time



Please refer to the conditions in Fig.12 and Fig.13

Fig.15 Frequency Response

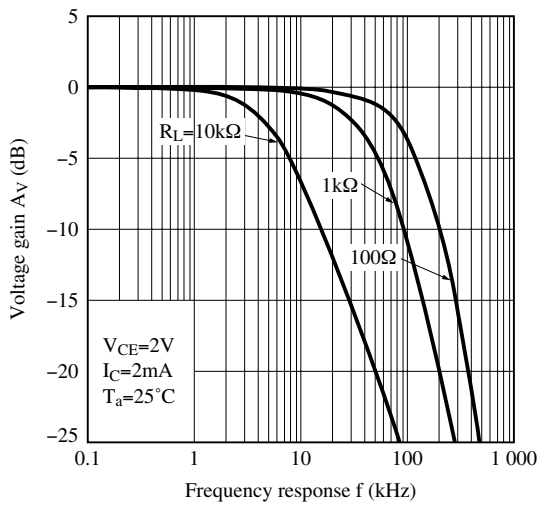
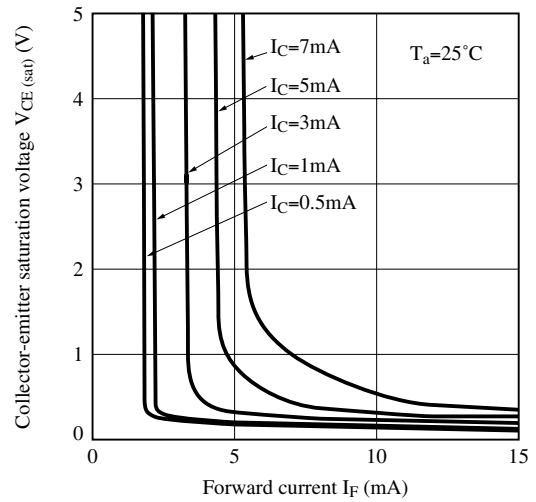


Fig.16 Collector-emitter Saturation Voltage vs. Forward Current



Remarks : Please be aware that all data in the graph are just for reference and not for guarantee.

■ Design Considerations

● Design guide

While operating at $I_F < 5.0\text{mA}$, CTR variation may increase.
Please make design considering this fact.

This product is not designed against irradiation and incorporates non-coherent IRED.

The collector-emitter voltage has negative resistance characteristics since this device has built-in base-emitter resistor.

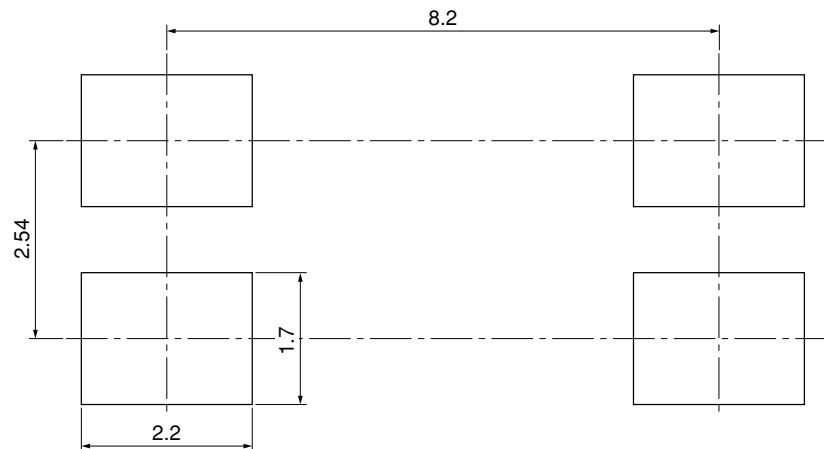
Therefore, please be careful not to provide the voltage that goes beyond absolute maximum ratings.

● Degradation

In general, the emission of the IRED used in photocouplers will degrade over time.

In the case of long term operation, please take the general IRED degradation (50% degradation over 5years) into the design consideration.

● Recommended Foot Print (reference)



(Unit : mm)

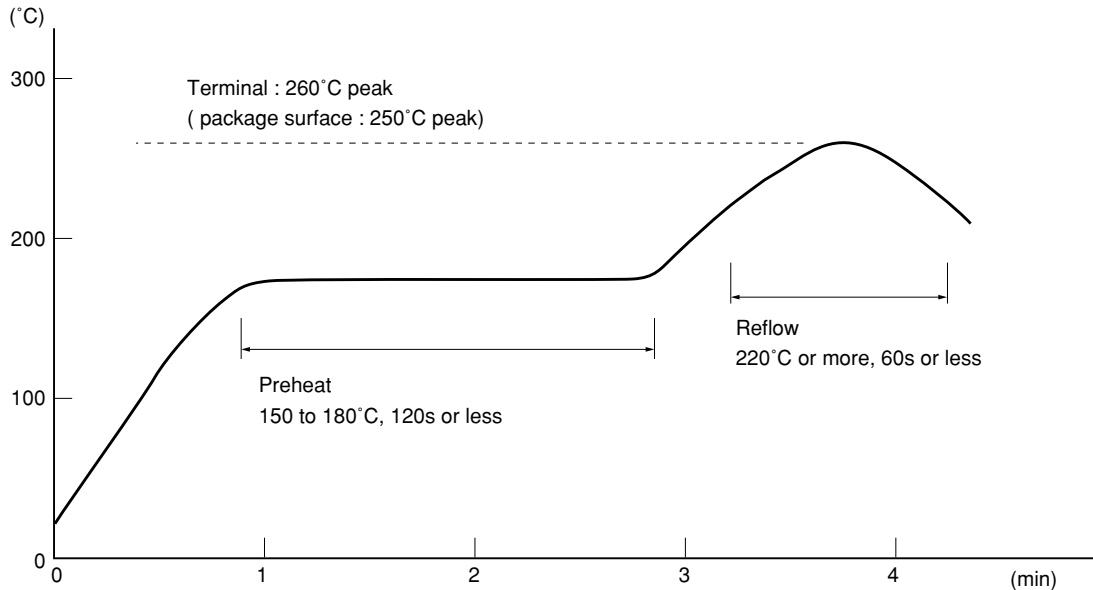
☆ For additional design assistance, please review our corresponding Optoelectronic Application Notes.

■ Manufacturing Guidelines

● Soldering Method

Reflow Soldering:

Reflow soldering should follow the temperature profile shown below.
Soldering should not exceed the curve of temperature profile and time.
Please don't solder more than twice.



Flow Soldering :

Due to SHARP's double transfer mold construction submersion in flow solder bath is allowed under the below listed guidelines.

Flow soldering should be completed below 270°C and within 10s.
Preheating is within the bounds of 100 to 150°C and 30 to 80s.
Please don't solder more than twice.

Hand soldering

Hand soldering should be completed within 3s when the point of solder iron is below 400°C.
Please don't solder more than twice.

Other notices

Please test the soldering method in actual condition and make sure the soldering works fine, since the impact on the junction between the device and PCB varies depending on the tooling and soldering conditions.

● Cleaning instructions**Solvent cleaning:**

Solvent temperature should be 45°C or below Immersion time should be 3minutes or less

Ultrasonic cleaning:

The impact on the device varies depending on the size of the cleaning bath, ultrasonic output, cleaning time, size of PCB and mounting method of the device.

Therefore, please make sure the device withstands the ultrasonic cleaning in actual conditions in advance of mass production.

Recommended solvent materials:

Ethyl alcohol, Methyl alcohol and Isopropyl alcohol

In case the other type of solvent materials are intended to be used, please make sure they work fine in actual using conditions since some materials may erode the packaging resin.

● Presence of ODC

This product shall not contain the following materials.

And they are not used in the production process for this device.

Regulation substances:CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

Specific brominated flame retardants such as the PBBOs and PBBs are not used in this product at all.

■ **Package specification**

● **Sleeve package**

Package materials

Sleeve : HIPS (with anti-static material)

Stopper : Styrene-Elastomer

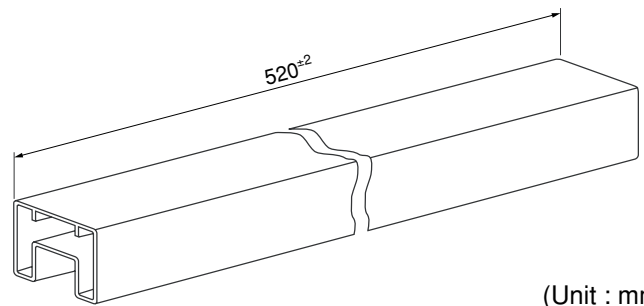
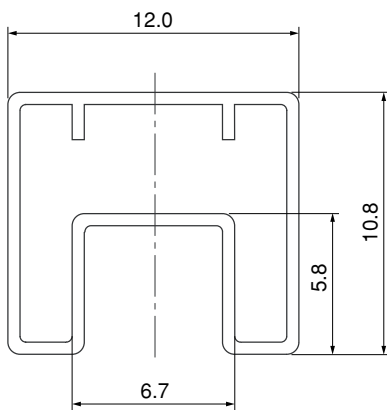
Package method

MAX. 100pcs of products shall be packaged in a sleeve. Both ends shall be closed by tabbed and tabless stoppers.

The product shall be arranged in the sleeve with its anode mark on the tabless stopper side.

MAX. 20 sleeves in one case.

Sleeve outline dimensions



● **Tape and Reel package**

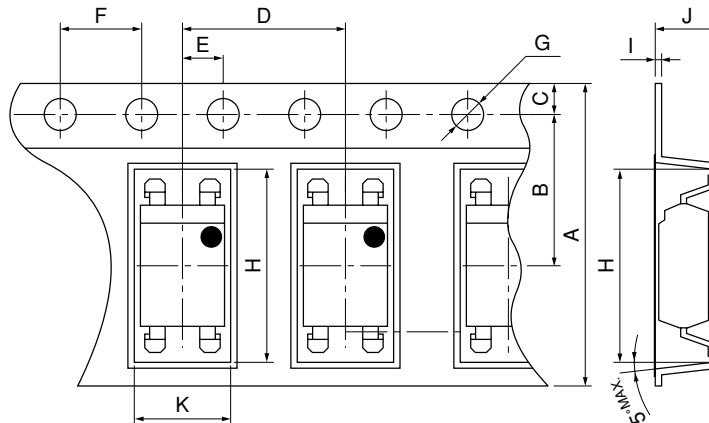
Package materials

Carrier tape : PS

Cover tape : PET (three layer system)

Reel : PS

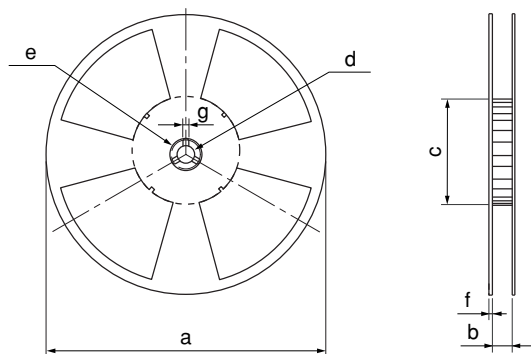
Carrier tape structure and Dimensions



Dimensions List (Unit : mm)

A	B	C	D	E	F	G
16.0±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1	φ1.5 ^{+0.1} ₋₀
H	I	J	K			
10.4±0.1	0.4±0.05	4.2±0.1	5.1±0.1			

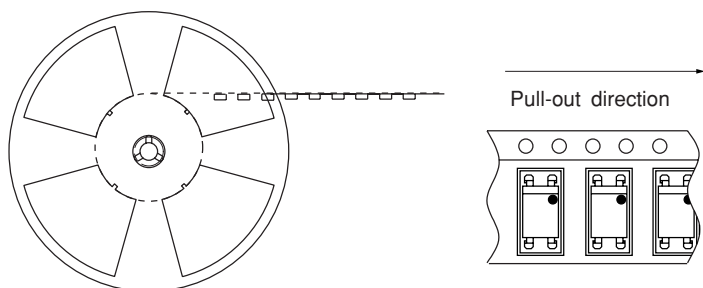
Reel structure and Dimensions



Dimensions List (Unit : mm)

a	b	c	d
330	17.5±1.5	100±1.0	13±0.5
e	f	g	
23±1.0	2.0±0.5	2.0±0.5	

Direction of product insertion



[Packing : 2 000pcs/reel]

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(i) The devices in this publication are designed for use in general electronic equipment designs such as:

- Personal computers
- Office automation equipment
- Telecommunication equipment [terminal]
- Test and measurement equipment
- Industrial control
- Audio visual equipment
- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

with equipment that requires higher reliability such as:

- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

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- Telecommunication equipment [trunk lines]
- Nuclear power control equipment
- Medical and other life support equipment (e.g., scuba).

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