# PC357NJ0000F **Series**

# Mini-flat Package, **General Purpose Photocoupler**



# Description

HARP

PC357NJ0000F Series contains an IRED optically coupled to a phototransistor.

It is packaged in a 4-pin Mini-flat package.

Input-output isolation voltage(rms) is 3.75kV.

Collector-emitter voltage is 80V and CTR is 50% to 600% at input current of 5mA.

#### Features

- 1. 4-pin Mini-flat package
- 2. Double transfer mold package (Ideal for Flow Soldering)
- 3. High collector-emitter voltage (V<sub>CEO</sub> : 80V)
- 4. Current transfer ratio (CTR) : MIN. 50% at I<sub>F</sub>=5mA,  $V_{CF}=5V$
- 5. Several CTR ranks available
- 6. High isolation voltage between input and output  $(V_{iso(rms)}: 3.75kV)$
- 7. Lead-free and RoHS directive compliant

# Agency approvals/Compliance

- 1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. PC357)
- 2. Package resin : UL flammability grade (94V-0)

#### Applications

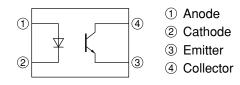
- 1. Hybrid substrates that require high density mounting
- 2. Programmable controllers

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#### Internal Connection Diagram

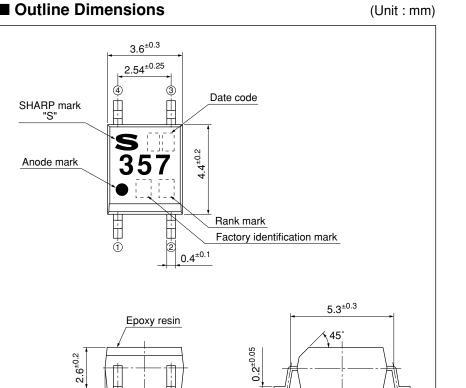


# ■ Outline Dimensions

<u>0</u>.1<sup>±0.1</sup>

Product mass : approx. 0.1g

6°



Plating material : SnCu (Cu : TYP. 2%)

0.5+0.4

7.0<sup>+0.2</sup>



# Date code (2 digit)

1st digit				2nd digit		
	Year of p	roduction		Month of production		
A.D.	Mark	A.D	Mark	Month	Mark	
1990	A	2002	Р	January	1	
1991	В	2003	R	February	2	
1992	C	2004	S	March	3	
1993	D	2005	Т	April	4	
1994	Е	2006	U	May	5	
1995	F	2007	V	June	6	
1996	Н	2008	W	July	7	
1997	J	2009	Х	August	8	
1998	K	2010	А	September	9	
1999	L	2011	В	October	0	
2000	М	2012	С	November	N	
2001	N	:	:	December	D	
	I	1	1	1	I	

repeats in a 20 year cycle

# Factory identification mark

Factory identification Mark	Country of origin	
no mark	Japan	
	Indonesia	
	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

			-	(-a)
	Parameter	Symbol	Rating	Unit
	Forward current	I <sub>F</sub>	50	mA
Input	*1 Peak forward current	I <sub>FM</sub>	1	А
Ing	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation	Р	70	mW
	Collector-emitter voltage	V <sub>CEO</sub>	80	V
put	Emitter-collector voltage	V <sub>ECO</sub>	6	V
Output	Collector current	I <sub>C</sub>	50	mA
	Collector power dissipation	P <sub>C</sub>	150	mW
Total power dissipation		P <sub>tot</sub>	170	mW
Operating temperature		T <sub>opr</sub>	-30 to +100	°C
Storage temperature		T <sub>stg</sub>	-40 to +125	°C
*2 Isolation voltage		V <sub>iso (rms)</sub>	3.75	kV
*3 Soldering temperature		T <sub>sol</sub>	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

 $(T_a=25^{\circ}C)$ Symbol MIN. TYP. Parameter Conditions MAX. Unit V<sub>F</sub> 1.2 Forward voltage I<sub>F</sub>=20mA 1.4 V \_  $V_R=4V$ Reverse current  $I_R$ 10 Input \_ \_ μΑ  $\mathbf{C}_{t}$ 250 Terminal capacitance V=0, f=1kHz 30 \_ pF Collector dark current  $I_{\text{CEO}}$ V<sub>CE</sub>=50V, I<sub>F</sub>=0 \_ \_ 100 nA BV<sub>CEO</sub> Output Collector-emitter breakdown voltage  $I_{C}=0.1mA, I_{F}=0$ 80 V \_ \_ V Emitter-collector breakdown voltage  $BV_{ECO}$  $I_E=10\mu A, I_F=0$ 6 \_ \_ Collector current  $I_F=5mA, V_{CE}=5V$ 2.5 5 30  $I_{C}$ mА 0.1 V Collector-emitter saturation voltage V<sub>CE (sat)</sub>  $I_F=20mA$ ,  $I_C=1mA$ 0.2 \_ Transfer  $5 \times 10^{10}$  $1 \times 10^{11}$ Isolation resistance DC500V, 40 to 60%RH Ω R<sub>ISO</sub> \_ charac-V=0, f=1MHz1.0 Floating capacitance  $C_{\rm f}$ 0.6 pF \_ teristics Rise time 4 18  $t_r$ \_ μs Response time  $V_{CE}=2V$ ,  $I_C=2mA$ ,  $R_L=100\Omega$ Fall time 3 18  $t_{f}$ \_ μs

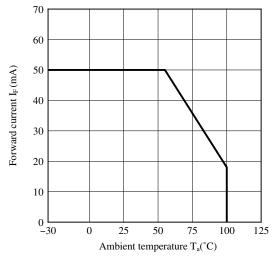
 $(T_{a}=25^{\circ}C)$ 

# ■ Model Line-up

Package	Tap	oing	Rank mark	I <sub>C</sub> [mA]
	3 000pcs/reel	750pcs/reel	Kalik Illaik	$(I_F=5mA, V_{CE}=5V, T_a=25^{\circ}C)$
	PC357NJ0000F	PC357NTJ000F	with or without	2.5 to 30.0
	PC357N1J000F	PC357N1TJ00F	А	4.0 to 8.0
	PC357N2J000F	PC357N2TJ00F	В	6.5 to 13.0
	PC357N3J000F	PC357N3TJ00F	С	10.0 to 20.0
Model No.	PC357N4J000F	PC357N4TJ00F	D	15.0 to 30.0
Model No.	PC357N5J000F	PC357N5TJ00F	A or B	4.0 to 13.0
	PC357N6J000F	PC357N6TJ00F	B or C	6.5 to 20.0
	PC357N7J000F	PC357N7TJ00F	C or D	10.0 to 30.0
	PC357N8J000F	PC357N8TJ00F	A, B or C	4.0 to 20.0
	PC357N9J000F	PC357N9TJ00F	B, C or D	6.5 to 30.0
	PC357N0J000F	PC357N0TJ00F	A, B, C or D	4.0 to 30.0

Please contact a local SHARP sales representative to inquire about production status.

Fig.1 Forward Current vs. Ambient Temperature





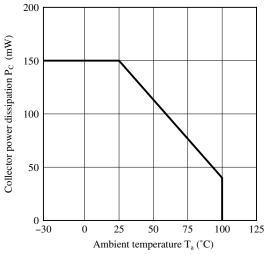


Fig.5 Peak Forward Current vs. Duty Ratio

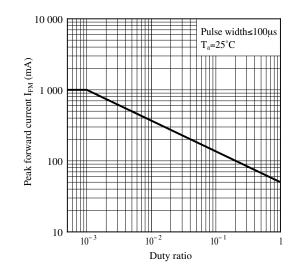
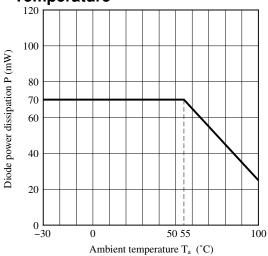
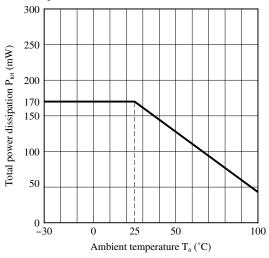


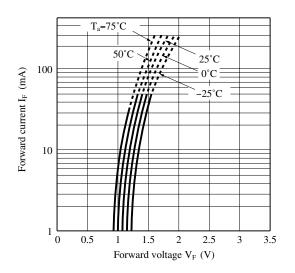
Fig.2 Diode Power Dissipation vs. Ambient Temperature



### Fig.4 Total Power Dissipation vs. Ambient Temperature

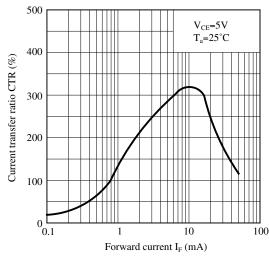




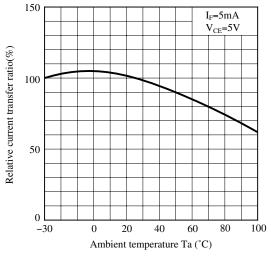




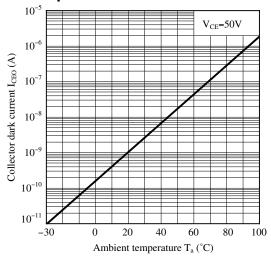
#### Fig.7 Current Transfer Ratio vs. Forward Current



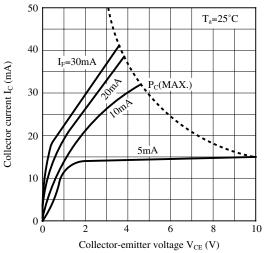




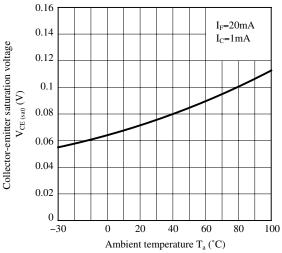




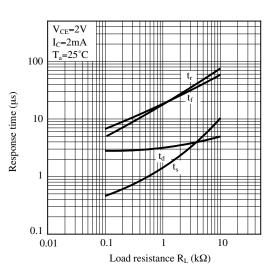
# Fig.8 Collector Current vs. Collector-emitter Voltage



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









# Fig.13 Test Circuit for Response Time

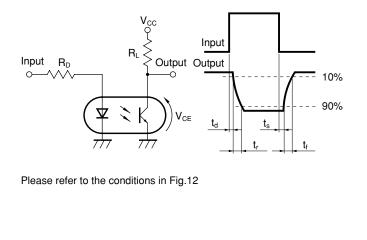
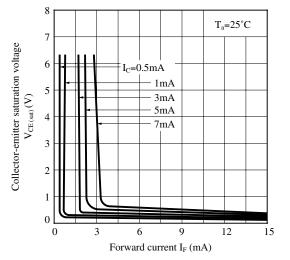


Fig.14 Collector-emitter Saturation Voltage vs. Forward Current



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



#### Design Considerations

### Design guide

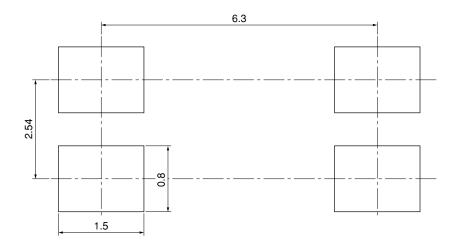
While operating at  $I_{F}$ <1.0mA, CTR variation may increase. Please make design considering this fact.

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

# 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 5 years) into the design consideration.

# • Recommended Foot Print (reference)



(Unit : mm)

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

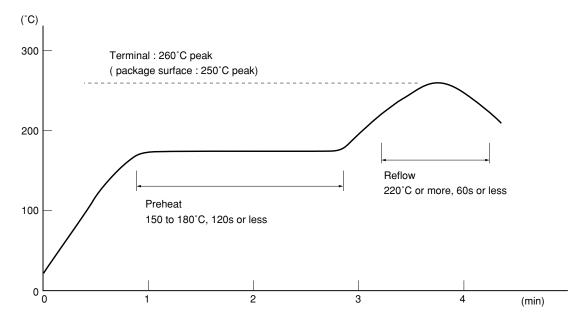


#### Manufacturing Guidelines

#### 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 260°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 3 minutes 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 product. 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.

This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).
•Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).



#### ■ Package specification

# • Tape and Reel package

1. 3 000pcs/reel

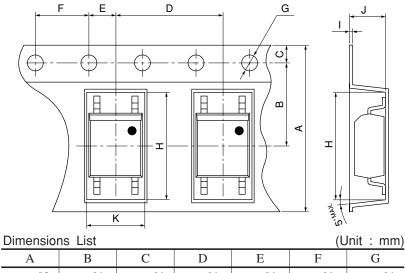
Package materials

Carrier tape : A-PET (with anti-static material)

Cover tape : PET (three layer system)

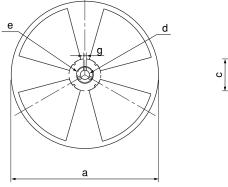
Reel : PS

Carrier tape structure and Dimensions



A	В	C	D	E	F	G
12.0 <sup>±0.3</sup>	$5.5^{\pm 0.1}$	$1.75^{\pm 0.1}$	$8.0^{\pm 0.1}$	$2.0^{\pm 0.1}$	$4.0^{\pm 0.1}$	φ1.5 <del>-</del> 8
Н	Ι	J	K			
$7.4^{\pm 0.1}$	$0.3^{\pm 0.05}$	3.1 <sup>±0.1</sup>	$4.0^{\pm 0.1}$			

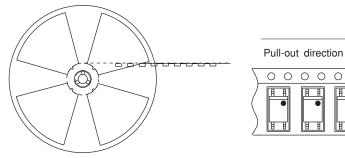
#### Reel structure and Dimensions



U U	
f b	

Dimensio	ns List	(Unit : mm)		
а	b	с	d	
370	370 13.5 <sup>±1.5</sup>		13 <sup>±0.5</sup>	
e	f	g		
21 <sup>±1.0</sup>	2.0 <sup>±0.5</sup>	2.0 <sup>±0.5</sup>		

# Direction of product insertion



[Packing: 3 000pcs/reel]



2.750pcs/reel

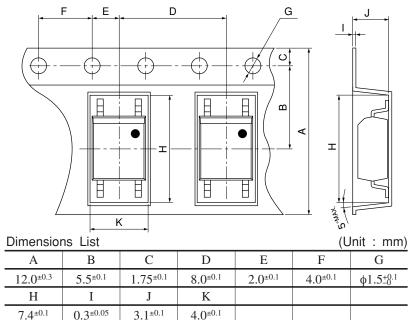
Package materials

Carrier tape : A-PET (with anti-static material)

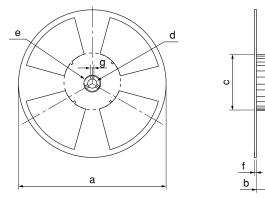
Cover tape : PET (three layer system)

Reel : PS

Carrier tape structure and Dimensions

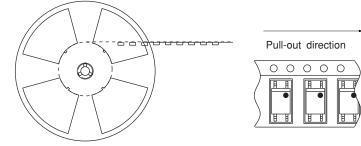


# Reel structure and Dimensions



Dimensions List			(Unit : mm)		
	а	a b		d	
	180 13.5 <sup>±1.5</sup>		80 <sup>±1.0</sup>	13 <sup>±0.5</sup>	
	e	f	g		
	21 <sup>±1.0</sup>	$2.0^{\pm 0.5}$	2.0 <sup>±0.5</sup>		

#### Direction of product insertion



[Packing : 750pcs/reel]

# SHARP

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- --- 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:

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

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