

PC357N Series

Mini-flat Package, General Purpose Photocoupler



■ Description

PC357N 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_{CEO} : 80V^(*))
4. Current transfer ratio (CTR) : MIN. 50% at $I_F=5mA$, $V_{CE}=5V$
5. Several CTR ranks available
6. High isolation voltage between input and output ($V_{iso(rms)}$: 3.75kV)

(*) Up to Date code "P9" (September 2002) V_{CEO} : 35V.
From the production Date code "J5" (May 1997) to "P9" (September 2002), however the products were screened by $BV_{CEO} \geq 70V$.

■ 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)

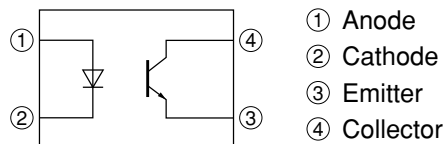
■ Applications

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

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

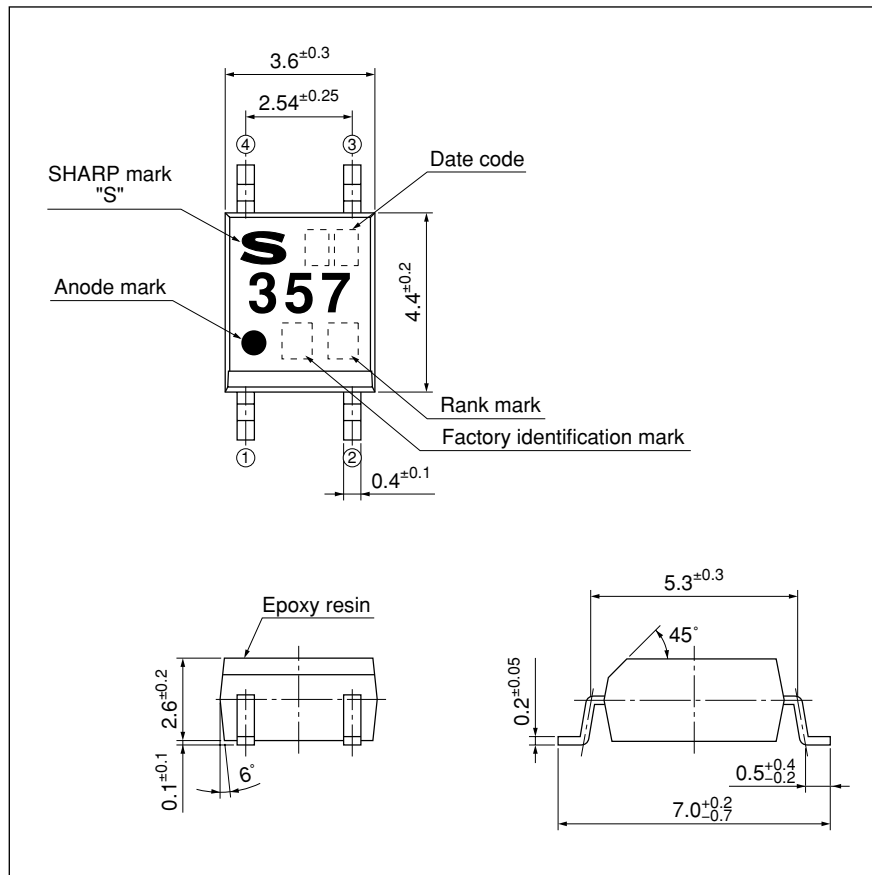
In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

Internal Connection Diagram



Outline Dimensions

(Unit : mm)



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	A
	Reverse voltage	V _R	6	V
	Power dissipation	P	70	mW
Output	Collector-emitter voltage	V _{CEO}	*4 80	V
	Emitter-collector voltage	V _{ECO}	6	V
	Collector current	I _C	50	mA
	Collector power dissipation	P _C	150	mW
	Total power dissipation	P _{tot}	170	mW
	Operating temperature	T _{opr}	−30 to +100	°C
	Storage temperature	T _{stg}	−40 to +125	°C
	*2 Isolation voltage	V _{iso (rms)}	3.75	kV
	*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

*4 Up to Date code "P9" (September 2002) V_{CEO}:35V.

■ 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
	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
	Collector-emitter breakdown voltage	BV _{CEO}	I _C =0.1mA, I _F =0	*5 80	–	–	V
	Emitter-collector breakdown voltage	BV _{ECO}	I _E =10μA, I _F =0	6	–	–	V
Transfer characteristics	Collector current	I _C	I _F =5mA, V _{CE} =5V	2.5	5	30	mA
	Collector-emitter saturation voltage	V _{CE (sat)}	I _F =20mA, I _C =1mA	–	0.1	0.2	V
	Isolation resistance	R _{ISO}	DC500V, 40 to 60%RH	5×10 ¹⁰	1×10 ¹¹	–	Ω
	Floating capacitance	C _f	V=0, f=1MHz	–	0.6	1.0	pF
	Response time	Rise time	V _{CE} =2V, I _C =2mA, R _L =100Ω	–	4	18	μs
		Fall time		–	3	18	μs

*5 From the production Date code "J5" (May 1997) to "P9" (September 2002), however the products were screened by BV_{CEO}≥70V.

■ Model Line-up

Package	Taping		Rank mark	I _C [mA] (I _F =5mA, V _{CE} =5V, T _a =25°C)
	3 000pcs/reel	750pcs/reel		
Model No.	PC357N	PC357NT	with or without	2.5 to 30.0
	PC357N1	PC357N1T	A	4.0 to 8.0
	PC357N2	PC357N2T	B	6.5 to 13.0
	PC357N3	PC357N3T	C	10.0 to 20.0
	PC357N4	PC357N4T	D	15.0 to 30.0
	PC357N5	PC357N5T	A or B	4.0 to 13.0
	PC357N6	PC357N6T	B or C	6.5 to 20.0
	PC357N7	PC357N7T	C or D	10.0 to 30.0
	PC357N8	PC357N8T	A, B or C	4.0 to 20.0
	PC357N9	PC357N9T	B, C or D	6.5 to 30.0
	PC357N0	PC357N0T	A, B, C or D	4.0 to 30.0

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

Fig.1 Forward Current vs. Ambient Temperature

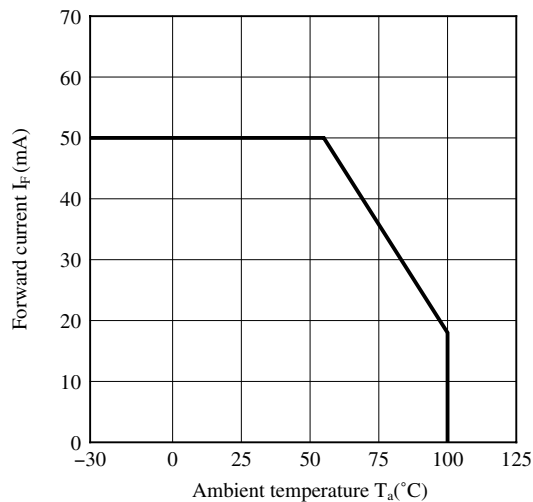


Fig.2 Diode Power Dissipation vs. Ambient Temperature

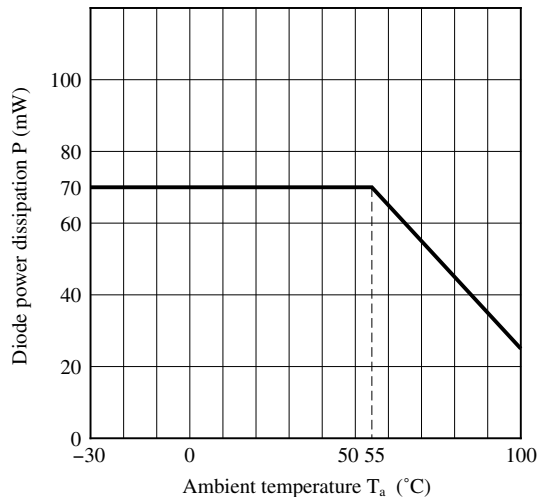


Fig.3 Collector Power Dissipation vs. Ambient Temperature

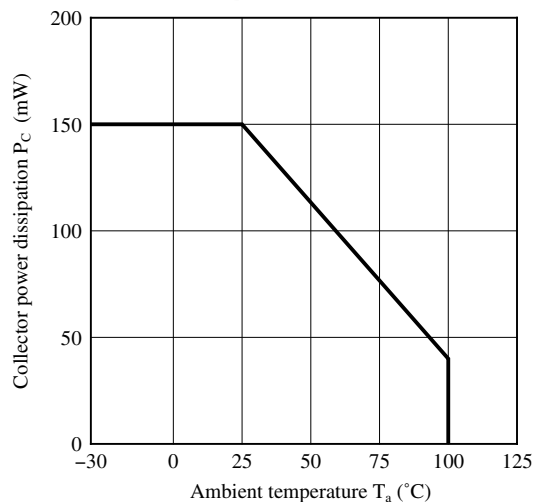


Fig.4 Total Power Dissipation vs. Ambient Temperature

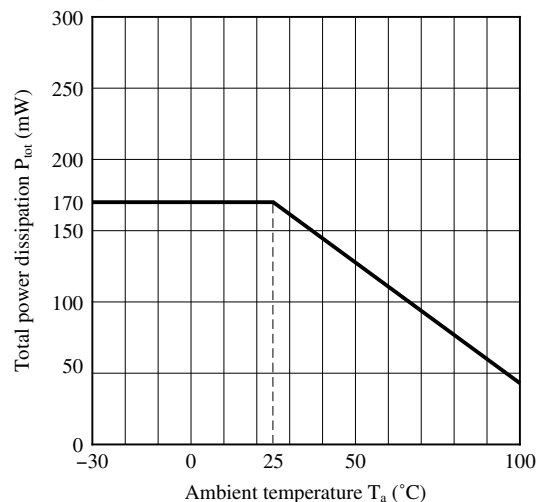


Fig.5 Peak Forward Current vs. Duty Ratio

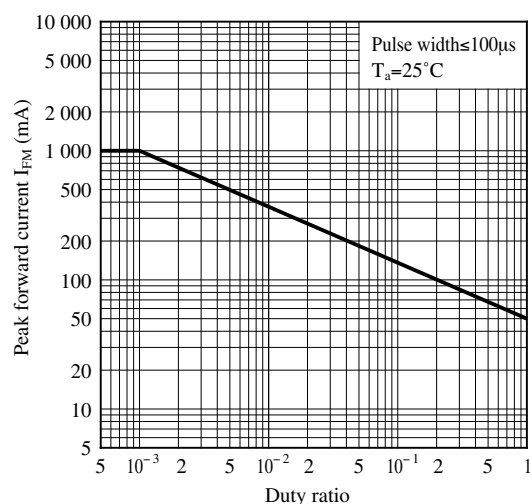


Fig.6 Forward Current vs. Forward Voltage

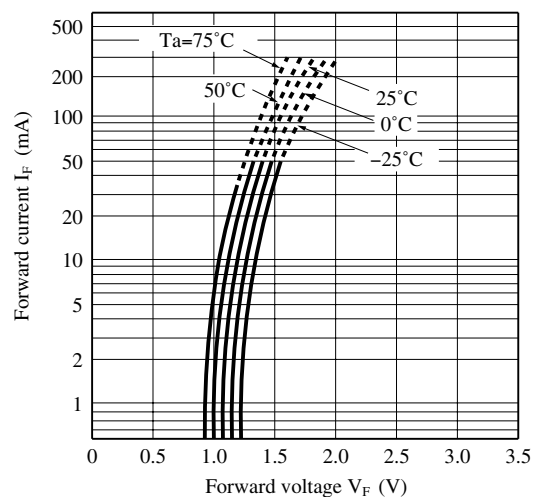


Fig.7 Current Transfer Ratio vs. Forward Current

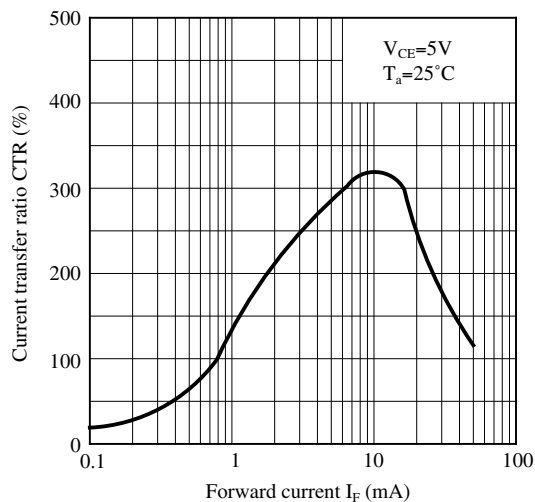


Fig.8 Collector Current vs. Collector-emitter Voltage

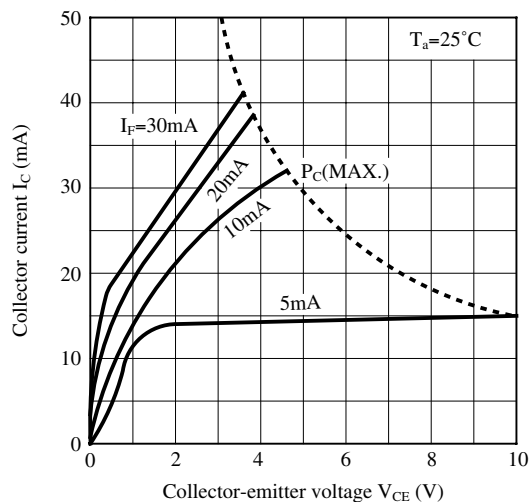


Fig.9 Relative Current Transfer Ratio vs. Ambient Temperature

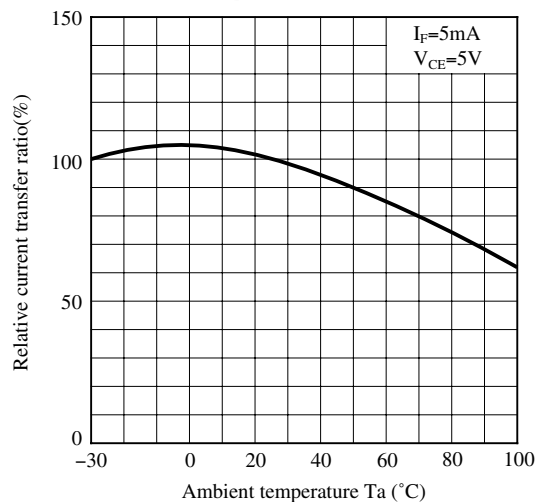


Fig.10 Collector - emitter Saturation Voltage vs. Ambient Temperature

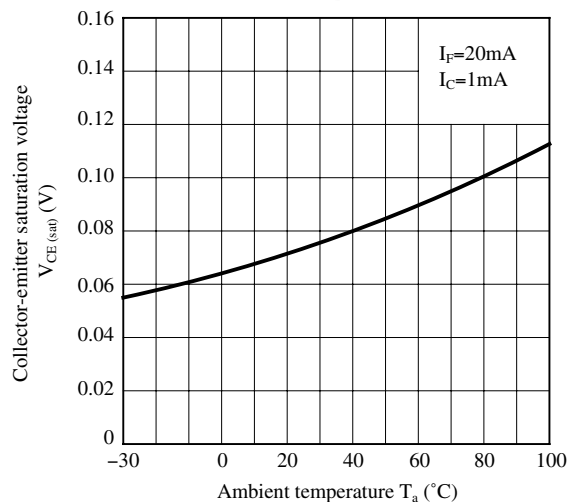


Fig.11 Collector Dark Current vs. Ambient Temperature

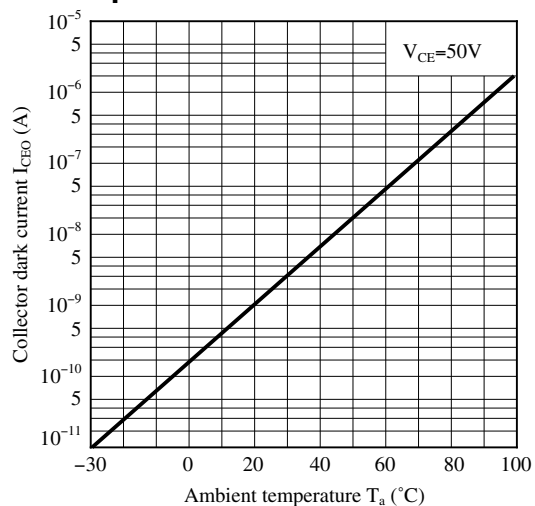


Fig.12 Response Time vs. Load Resistance

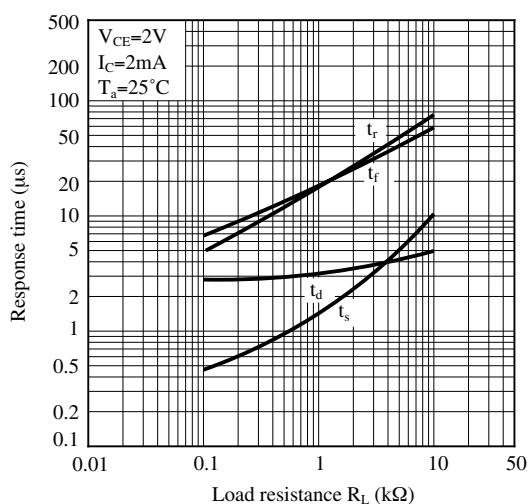
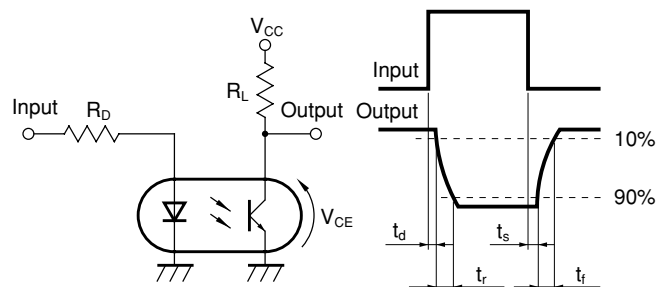
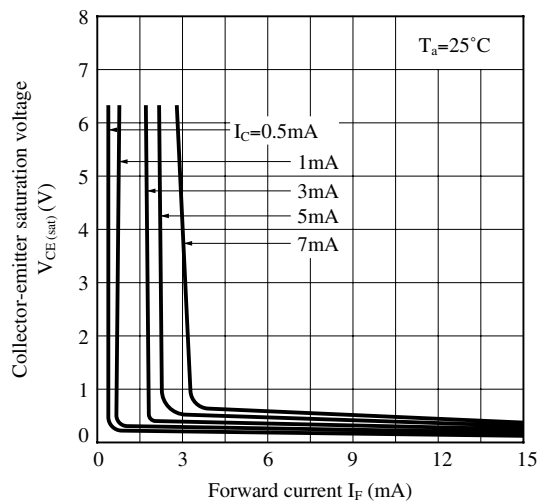


Fig.13 Test Circuit for Response Time



Please refer to the conditions in Fig.12

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 $I_F < 1.0\text{mA}$, CTR variation may increase.
Please make design considering this fact.

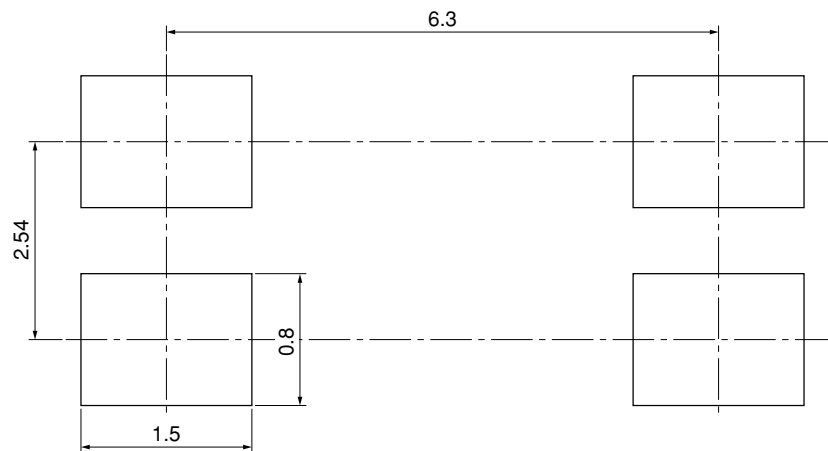
This product is not designed against irradiation and incorporates non-coherent IRED.

● 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.