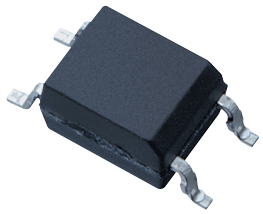
PC357N Series

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}≥70V.

■ Agency approvals/Compliance

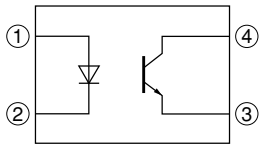
1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. **PC357**)
2. Package resin : UL flammability grade (94V-0)

■ Applications

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

Sheet No.: D2-A00101EN
Date Sep. 30. 2003

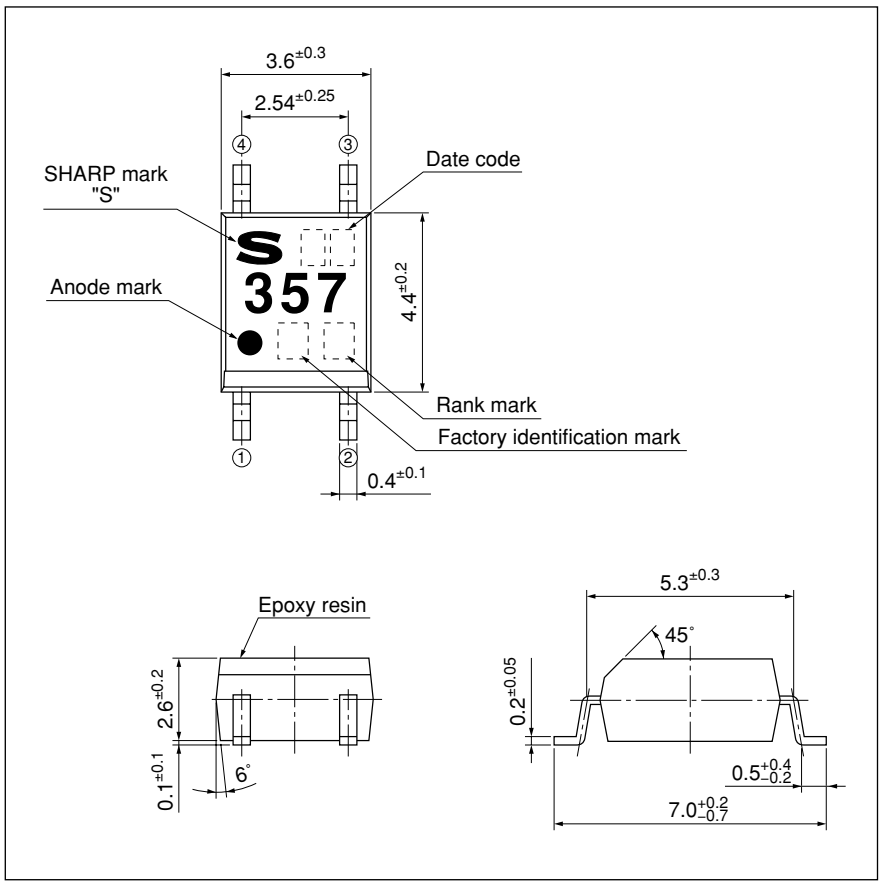
■ Internal Connection Diagram



① Anode
② Cathode
③ Emitter
④ Collector

■ Outline Dimensions

(Unit : mm)



Product mass : approx. 0.1g

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	t_r	V_{CE}=2V, I_C=2mA, R_L=100Ω	–	4	18	μs
		Fall time	t_f		–	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

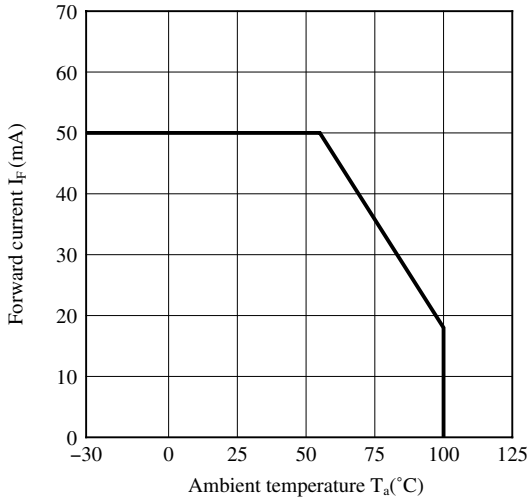


Fig.2 Diode Power Dissipation vs. Ambient Temperature

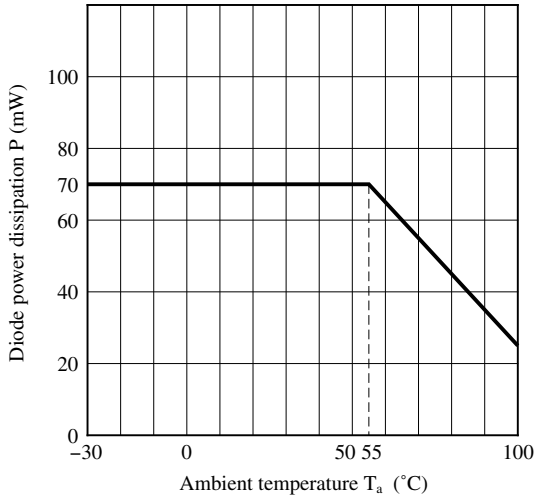


Fig.3 Collector Power Dissipation vs. Ambient Temperature

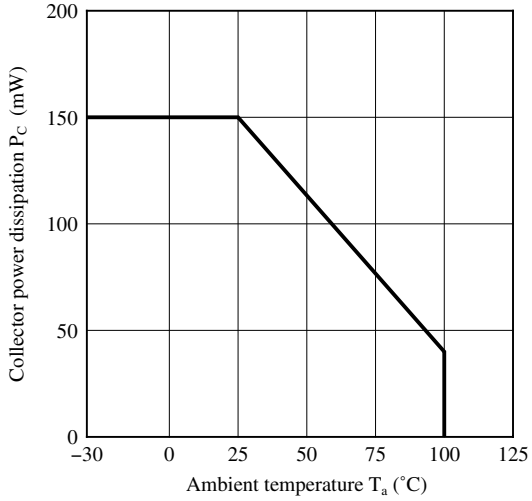


Fig.4 Total Power Dissipation vs. Ambient Temperature

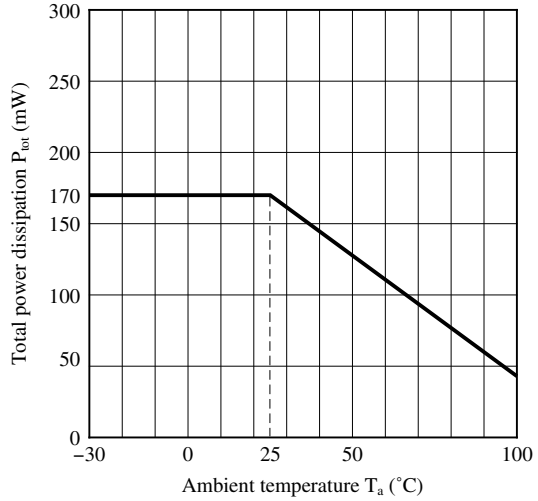


Fig.5 Peak Forward Current vs. Duty Ratio

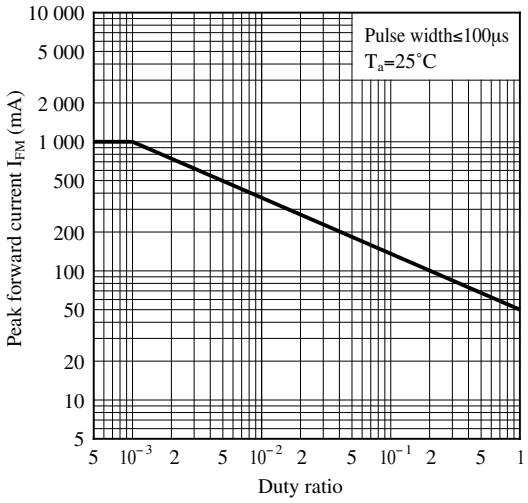


Fig.6 Forward Current vs. Forward Voltage

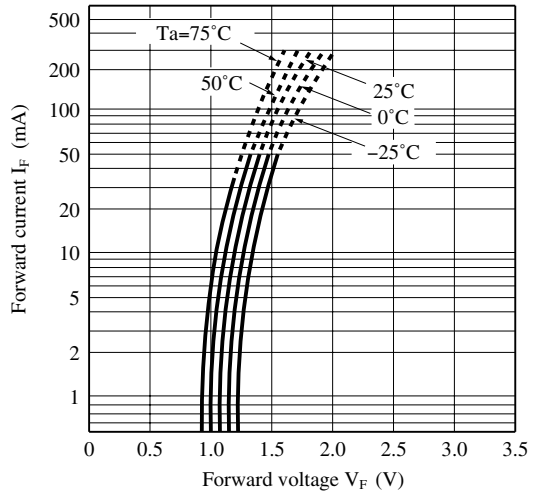


Fig.7 Current Transfer Ratio vs. Forward Current

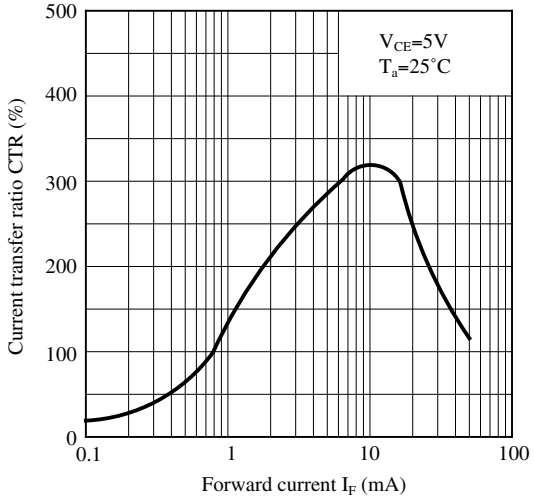


Fig.8 Collector Current vs. Collector-emitter Voltage

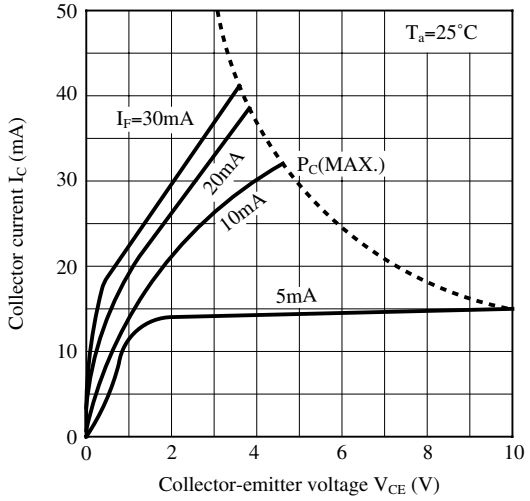


Fig.9 Relative Current Transfer Ratio vs. Ambient Temperature

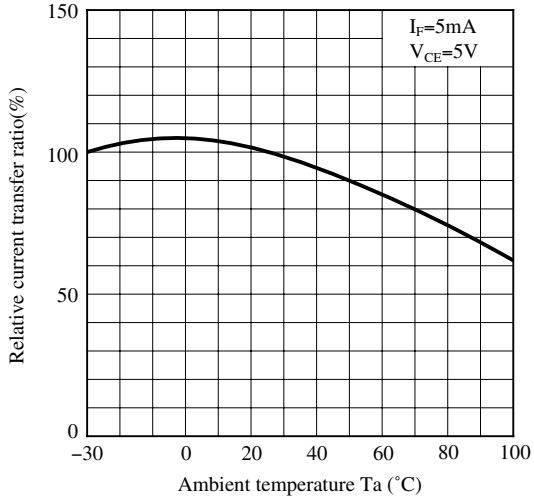


Fig.10 Collector - emitter Saturation Voltage vs. Ambient Temperature

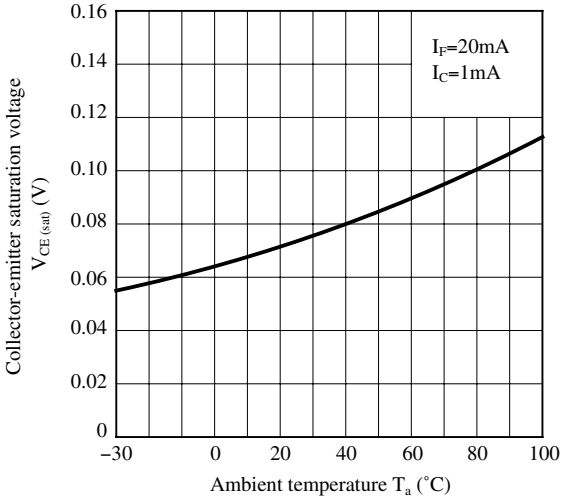


Fig.11 Collector Dark Current vs. Ambient Temperature

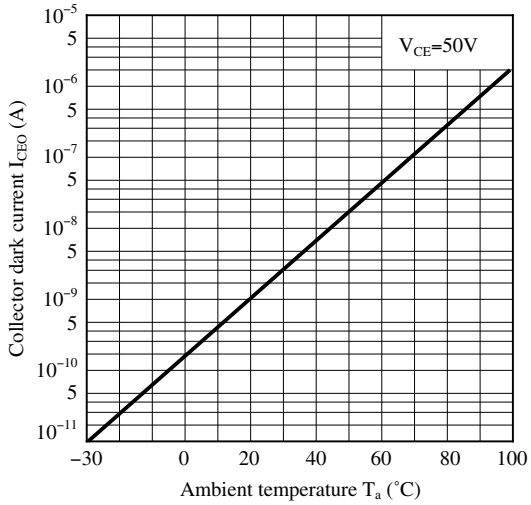


Fig.12 Response Time vs. Load Resistance

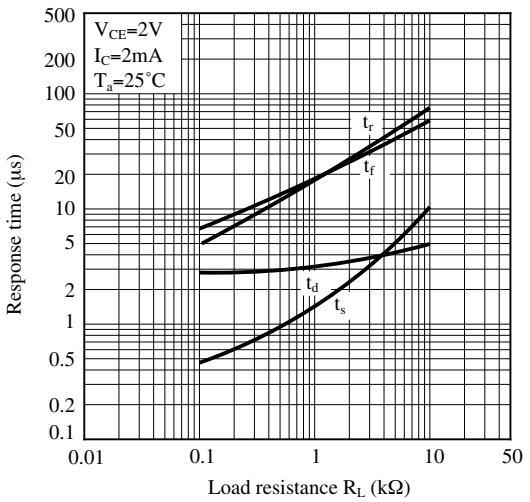
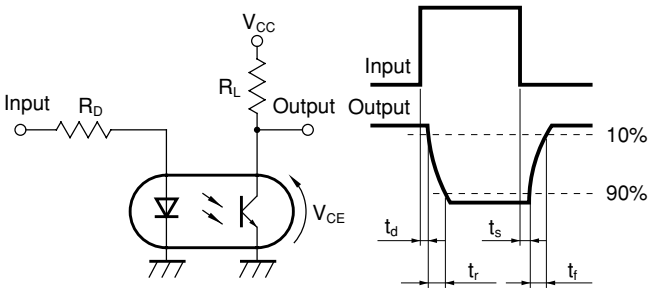
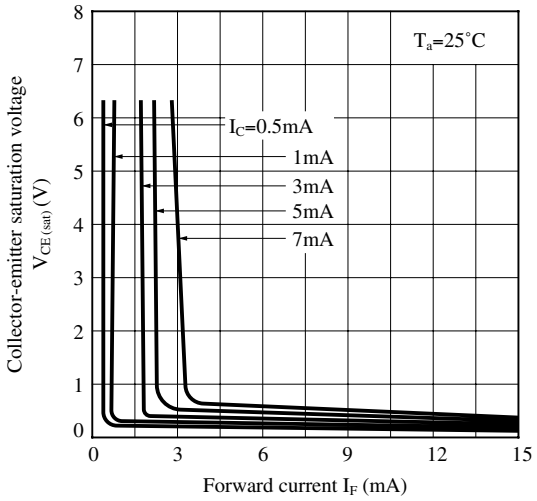


Fig.13 Test Circuit for Response Time



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

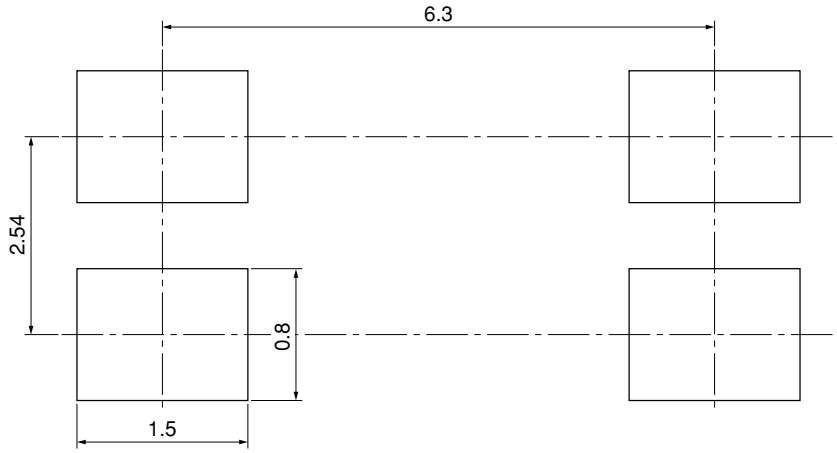
While operating at I_F<1.0mA, CTR variation may increase.
Please make design considering this fact.

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 5years) into the design consideration.

● Recommended Foot Print (reference)



(Unit : mm)

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