

# PC1231xNSZ Series

## Low Input Current Type Long Creepage Distance Photocoupler

### ■ Features

1. Low input current type ( $I_f=0.5\text{mA}$ )
2. High resistance to noise due to high common mode rejection voltage (CMR:MIN.  $10\text{kV}/\mu\text{s}$ )
3. Long creepage distance type
4. Standard 4-pin dual-in-line package
5. Isolation voltage ( $V_{iso}$  :  $5\text{kVrms}$ )

### ■ Applications

1. Home appliances
2. Programmable controllers

### ■ Rank Table

Model No.	Rank mark	$I_c$ (mA)	Conditions
PC12310NSZ	A or no mark	0.25 to 2.0	$I_f=0.5\text{mA}$ $V_{CE}=5\text{V}$ $T_a=25^\circ\text{C}$
PC12311NSZ	A	0.5 to 1.25	

### ■ Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

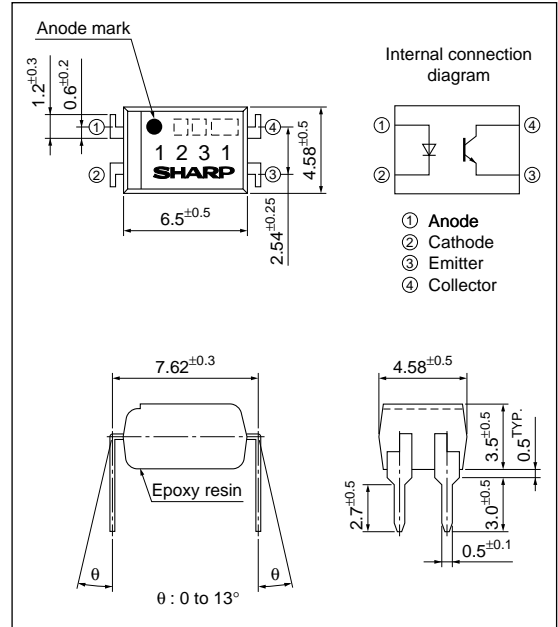
Parameter		Symbol	Rating	Unit
Input	Forward current	$I_f$	10	mA
	*1 Peak forward current	$I_{FM}$	200	mA
	Reverse voltage	$V_R$	6	V
	Power dissipation	$P$	15	mW
Output	Collector-emitter voltage	$V_{CEO}$	70	V
	Emitter-collector voltage	$V_{ECO}$	6	V
	Collector current	$I_c$	50	mA
	Collector power dissipation	$P_c$	150	mW
	Total power dissipation	$P_{tot}$	170	mW
Operating temperature		$T_{opr}$	-30 to +100	$^\circ\text{C}$
Storage temperature		$T_{sig}$	-55 to +125	$^\circ\text{C}$
*2 Isolation voltage		$V_{iso}$	5	$\text{kV}_{rms}$
*3 Soldering temperature		$T_{sol}$	260	$^\circ\text{C}$

\*1 Pulse width $\leq 100\mu\text{s}$ , Duty ratio=0.001

\*2 40 to 60%RH, AC for 1 minute,  $f=60\text{Hz}$

\*3 For 10s

### ■ Outline Dimensions (Unit : mm)



■ Electro-optical Characteristics

(Ta=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	$V_F$	$I_F=10\text{mA}$	-	1.2	1.4	V	
	Reverse current	$I_R$	$V_R=4\text{V}$	-	-	10	$\mu\text{A}$	
	Terminal capacitance	$C_t$	$V=0, f=1\text{kHz}$	-	30	250	pF	
Output	Collector dark current	$I_{CEO}$	$V_{CE}=50\text{V}, I_F=0$	-	-	100	nA	
	Collector-emitter breakdown voltage	$BV_{CEO}$	$I_C=0.1\text{mA}, I_F=0$	70	-	-	V	
	Emitter-collector breakdown voltage	$BV_{ECO}$	$I_E=10\mu\text{A}, I_F=0$	6	-	-	V	
Transfer characteristics	Collector current	$I_C$	$I_F=0.5\text{mA}, V_{CE}=5\text{V}$	0.25	-	2.0	mA	
	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_F=10\text{mA}, I_C=1\text{mA}$	-	-	0.2	V	
	Isolation resistance	$R_{ISO}$	DC500V, 40 to 60%RH	$5 \times 10^{10}$	$10^{11}$	-	$\Omega$	
	Floating capacitance	$C_f$	$V=0, f=1\text{MHz}$	-	0.6	1.0	pF	
	Response time	Rise time	$t_r$	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$	-	4	18	$\mu\text{s}$
		Fall time	$t_f$		-	3	18	$\mu\text{s}$
	*1 Common mode rejection voltage		CMR	$T_a=25^\circ\text{C}, R_L=470\Omega, V_{CM}=1.5\text{kV (peak)}, I_F=0\text{mA}, V_{CC}=9\text{V}, V_{np}=100\text{mV}$	10	-	-	kV/ $\mu\text{s}$

\*1 Refer to Fig. 1

Fig.1 Test Circuit for Common Mode Rejection Voltage

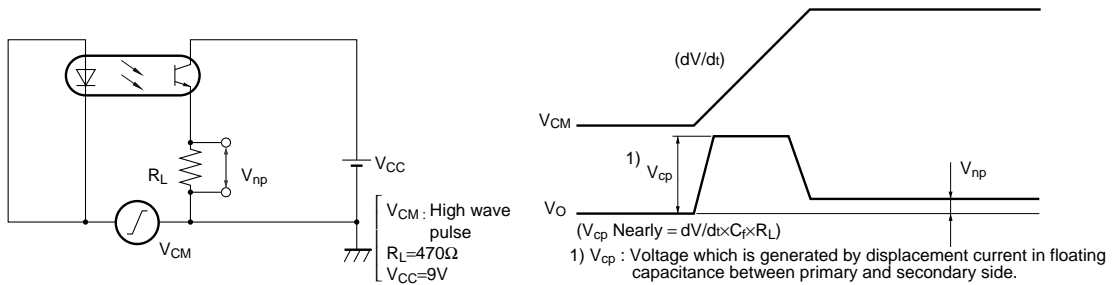


Fig.2 Forward Current vs. Ambient Temperature

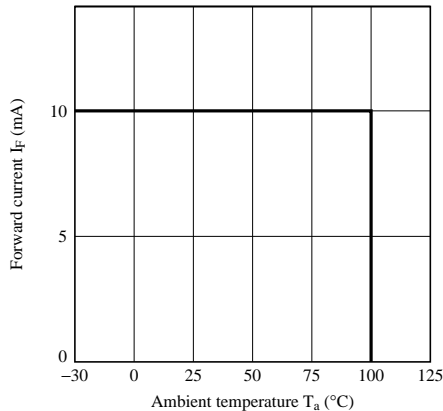
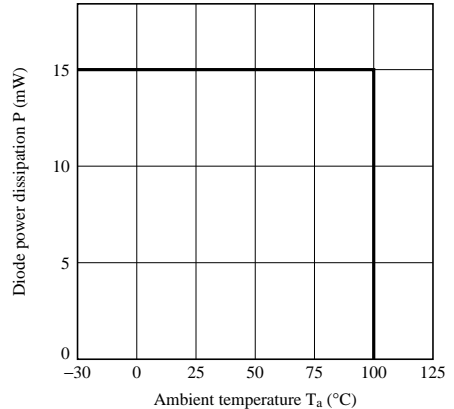
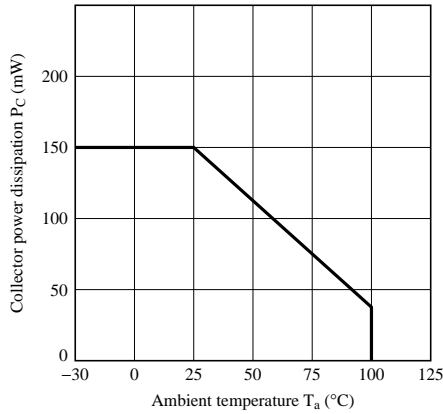


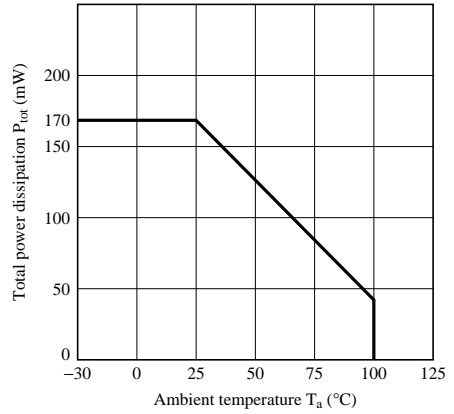
Fig.3 Diode Power Dissipation vs. Ambient Temperature



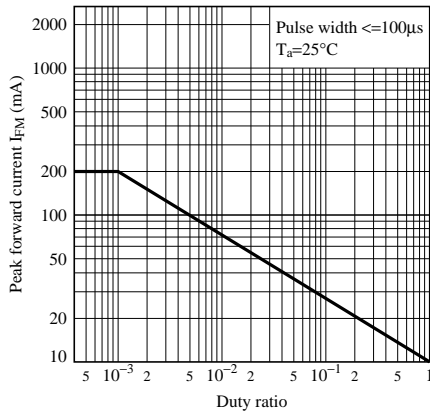
**Fig.4 Collector Power Dissipation vs. Ambient Temperature**



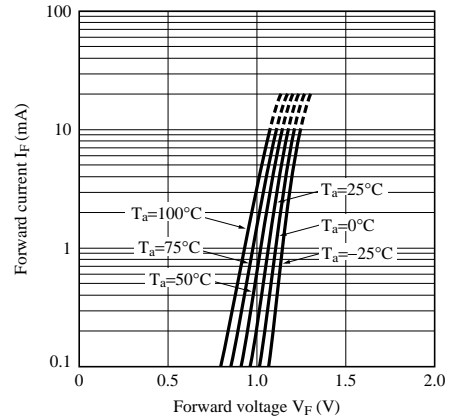
**Fig.5 Total Power Dissipation vs. Ambient Temperature**



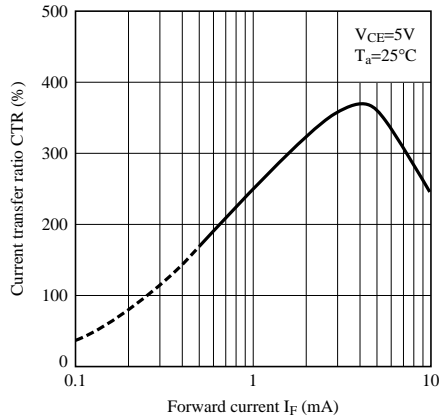
**Fig.6 Peak Forward Current vs. Duty Ratio**



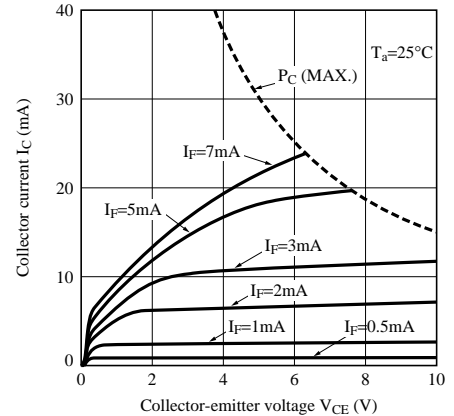
**Fig.7 Forward Current vs. Forward Voltage**



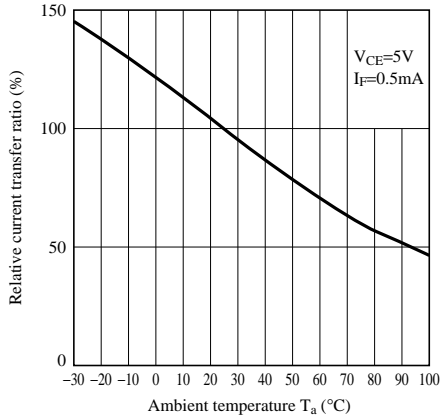
**Fig.8 Current Transfer Ratio vs. Forward Current**



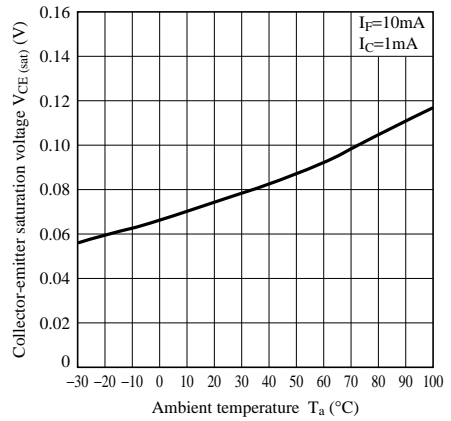
**Fig.9 Collector Current vs. Collector-emitter Voltage**



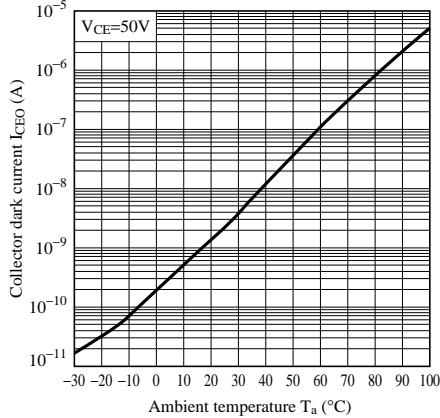
**Fig.10 Relative Current Transfer Ratio vs. Ambient Temperature**



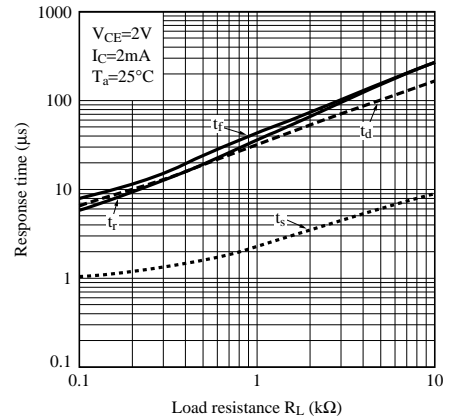
**Fig.11 Collector - emitter Saturation Voltage vs. Ambient Temperature**



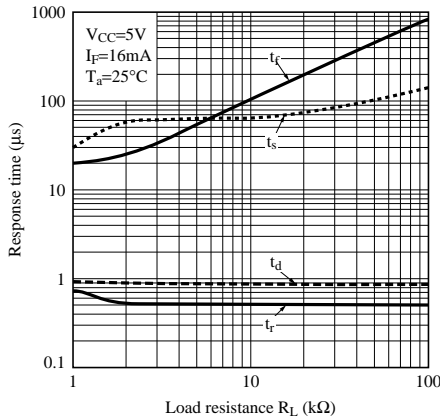
**Fig.12 Collector Dark Current vs. Ambient Temperature**



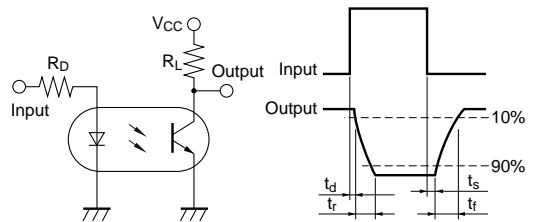
**Fig.13 Response Time vs. Load Resistance**



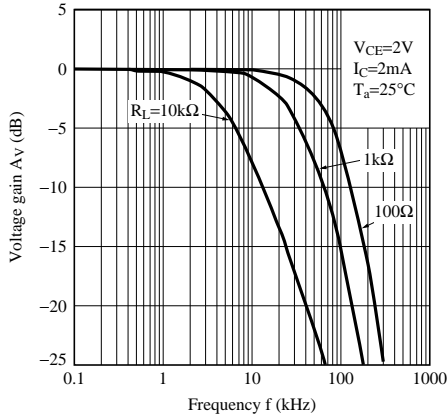
**Fig.14 Response Time vs. Load Resistance (Saturation)**



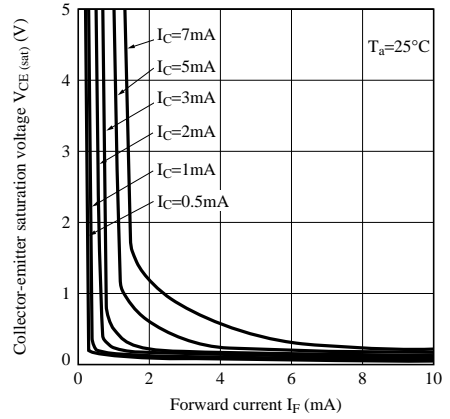
**Fig.15 Test Circuit for Response Time**



**Fig.16 Voltage gain vs Frequency**



**Fig.17 Collector-emitter Saturation Voltage vs. Forward Current**



**Fig.18 Reflow Soldering**

Only one time soldering is recommended within the temperature profile shown below.

