

PC942

High Power Output Type OPIC Photocoupler

■ Features

1. Built-in base amplifier for inverter drive
2. High power (I_{O1} : MAX. 0.5A (DC))
(I_{O2P} : MAX. 2.0A (pulse))
3. High isolation voltage (Viso : 5 000Vrms)
4. High speed response (t_{PHL}, t_{PLH} : MAX. 5 μ s)

■ Applications

1. Inverter controlled air conditioners
2. Small capacitance general purpose inverters

■ Absolute Maximum Ratings

($T_a = T_{opr}$ unless otherwise specified)

	Parameter	Symbol	Rating	Unit
Input	*1 Forward current	I_F	25	mA
	*2 Reverse voltage	V_R	6	V
Output	Supply voltage	V_{CC}	18	V
	O ₁ output current	I_{O1}	0.5	A
	*3 O ₁ peak output current	I_{O1P}	1.0	A
	O ₂ output current	I_{O2}	0.6	A
	*3 O ₂ peak output current	I_{O2P}	2.0	A
	O ₁ output voltage	V_{O1}	18	V
	*4 Power dissipation	P_O	500	mW
*5 Total power dissipation		P_{tot}	550	mW
*6 Isolation voltage		V_{iso}	5 000	V _{rms}
Operating temperature		T_{opr}	-20 to +80	°C
Storage temperature		T_{stg}	-55 to +125	°C
*7 Soldering temperature		T_{sol}	260	°C

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig.8

*2 $T_a = 25^\circ\text{C}$

*3 Pulse width $\leq 5\mu\text{s}$, Duty ratio: 0.01

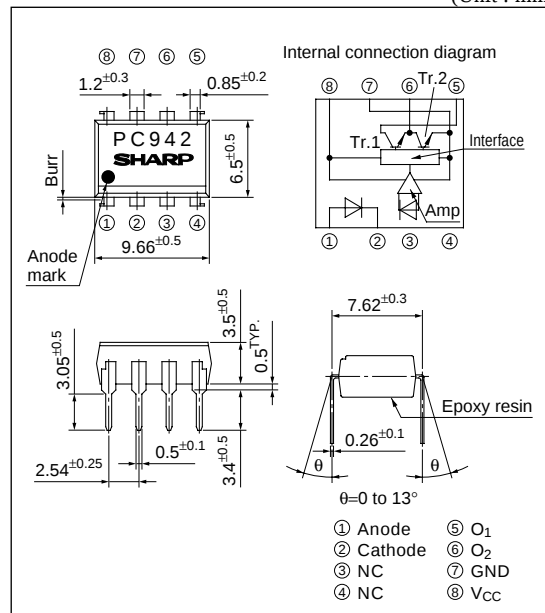
*4, 5 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig.9

*6 AC for 1min, 40 to 60%RH $T_a = 25^\circ\text{C}$

*7 For 10s

■ Outline Dimensions

(Unit : mm)



* "OPIC" (Optical IC) is a trademark of the SHARP Corporation.

An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

■ Electro-optical Characteristics

(Ta=T_{opr} unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V _{F1}	Ta=25°C, I _F =5mA	—	1.1	1.4	V
		V _{F2}	Ta=25°C, I _F =0.2mA	0.6	0.9	—	V
	Reverse current	I _R	Ta=25°C, V _R =3V	—	—	10	μA
	Terminal capacitance	C _t	Ta=25°C, V=0, f=1kHz	—	30	250	pF
Output	Operating supply voltage	V _{CC}		5.4	—	13	V
	O ₁ low level output voltage	V _{O1L}	V _{CC} =6V, I _{O1} =0.4A, R _{L2} =10Ω, I _F =5mA	—	0.2	0.4	V
	O ₂ high level output voltage	V _{O2H}	V _{CC} =6V, I _{O2} =-0.4A, I _F =5mA	4.5	5.0	—	V
	O ₂ low level output voltage	V _{O2L}	V _{CC} =6V, I _{O2} =0.5A, I _F =0	—	0.2	0.4	V
	O ₁ leak current	I _{O1L}	V _{CC} =13V, I _F =0	—	—	200	μA
	O ₂ leak current	I _{O2L}	V _{CC} =13V, I _F =5mA	—	—	200	μA
	High level supply current	I _{CCH}	Ta=25°C, V _{CC} =6V, I _F =5mA	—	9	13	mA
			V _{CC} =6V, I _F =5mA	—	—	17	mA
	Low level supply current	I _{CCL}	Ta=25°C, V _{CC} =6V, I _F =0	—	11	15	mA
			V _{CC} =6V, I _F =0	—	—	20	mA
Transfer characteristics	*8 "Low→High" threshold input current	I _{FLH}	Ta=25°C, V _{CC} =6V, R _{L1} =5Ω, R _{L2} =10Ω	0.3	1.5	3.0	mA
			V _{CC} =6V, R _{L1} =5Ω R _{L2} =10Ω	0.2	—	5.0	mA
	Isolation resistance	R _{ISO}	Ta=25°C, DC=500V, 40 to 60%RH	5×10 ¹⁰	1×10 ¹¹	—	Ω
	Response time	"Low→High" propagation delay time	Ta=25°C, V _{CC} =6V I _F =5mA, R _{L1} =5Ω R _{L2} =10Ω	—	2	5	μs
		"High→Low" propagation delay time		—	2	5	μs
		Rise time		—	0.2	1	μs
		Fall time		—	0.1	1	μs
	Instantaneous common mode rejection voltage "Output : High level"	CM _H	Ta=25°C, V _{CM} =600V(peak) I _F =5mA, R _{L1} =470Ω, R _{L2} =1kΩ, ΔV _{O2H} =0.5V(max)	-10	—	—	kV/μs
	Instantaneous common mode rejection voltage "Output : Low level"	CM _L	Ta=25°C, V _{CM} =600V(peak) I _F =0, R _{L1} =470Ω, R _{L2} =1kΩ, ΔV _{O2L} =0.5V(max)	10	—	—	kV/μs

*8 I_{FLH} represents forward current when output goes from "Low" to "High".

■ Truth Table

Input	O ₂ Output	Tr. 1	Tr. 2
ON	High level	ON	OFF
OFF	Low level	OFF	ON

Test Circuit

Fig. 1

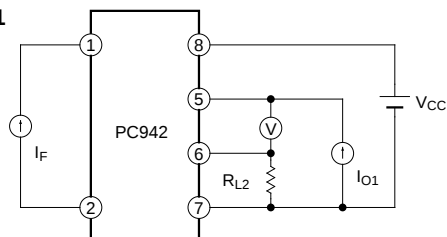


Fig. 3

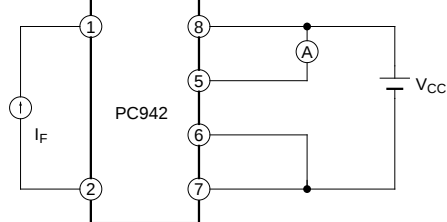


Fig. 5

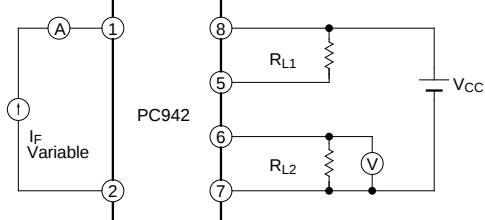


Fig. 7

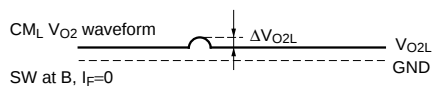
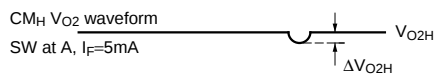
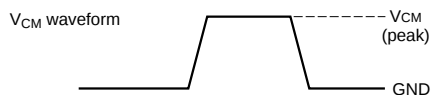
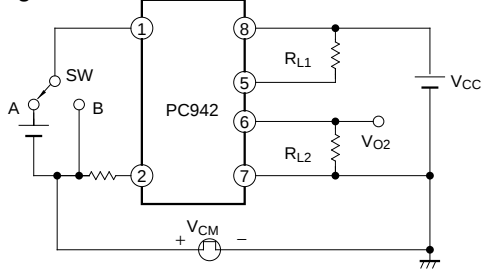


Fig. 2

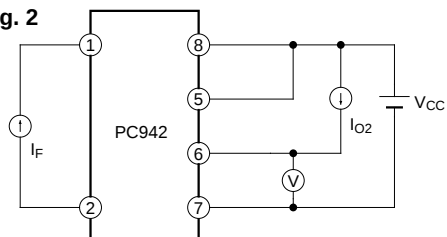


Fig. 4

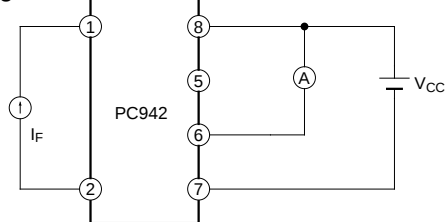


Fig. 6

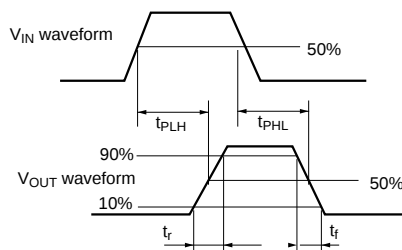
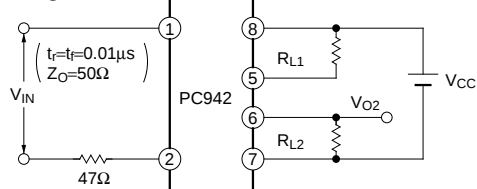


Fig.8 Forward Current vs. Ambient Temperature

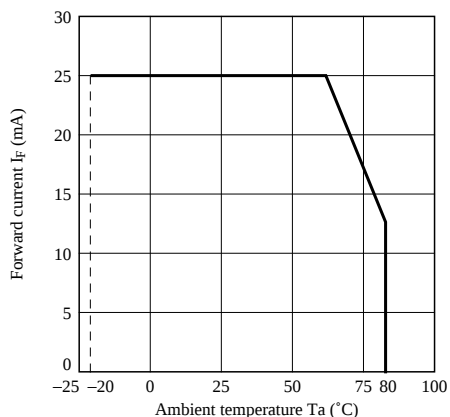


Fig.9 Power Dissipation vs. Ambient Temperature

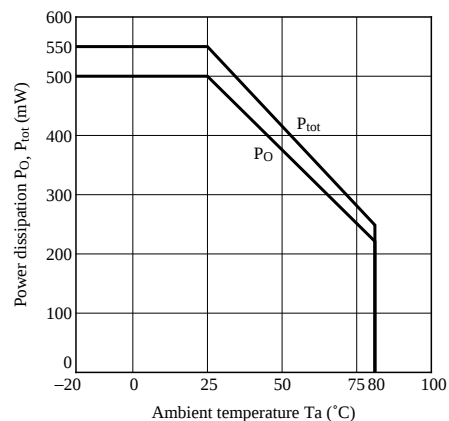


Fig.10 Forward Current vs. Forward Voltage

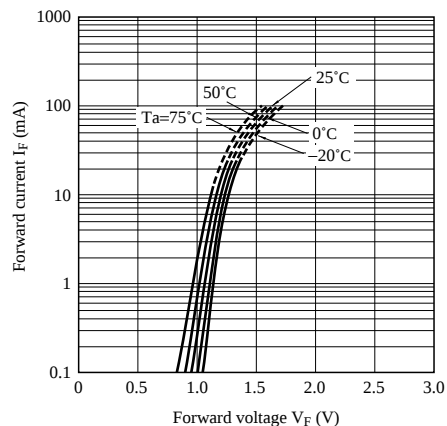


Fig.11 "Low→High" Relative Threshold Input Current vs. Supply Voltage

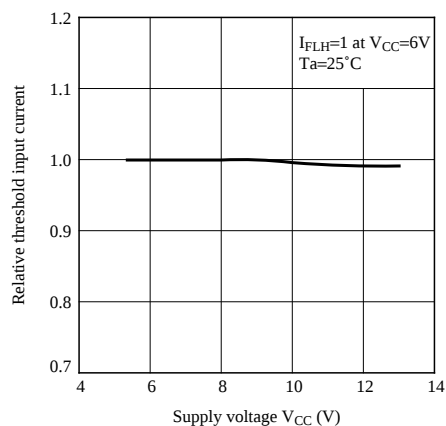


Fig.12 "Low→High" Relative Threshold Input Current vs. Ambient Temperature

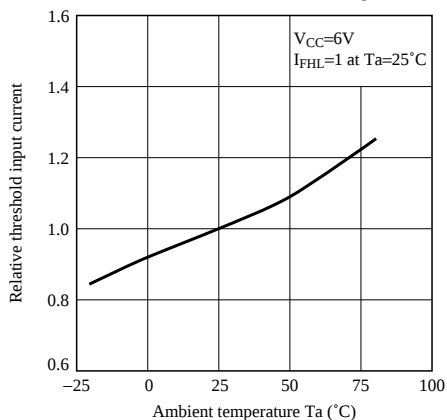


Fig.13 O₁ Low Level Output Voltage vs. O₁ Output Current

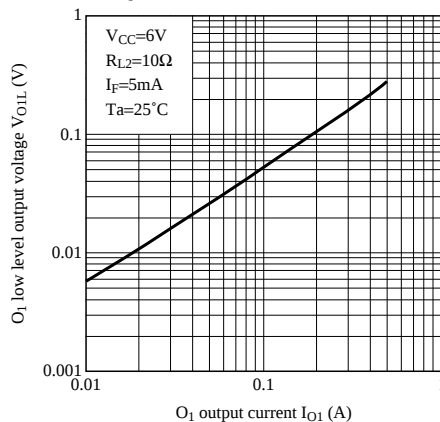


Fig.14 O₁ Low Level Output Voltage vs. Ambient Temperature

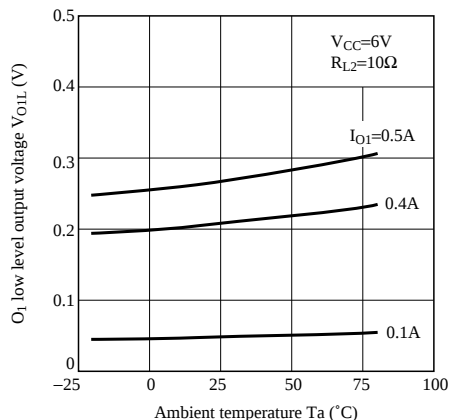


Fig.15 O₂ High Level Output Voltage vs. O₂ Output Current

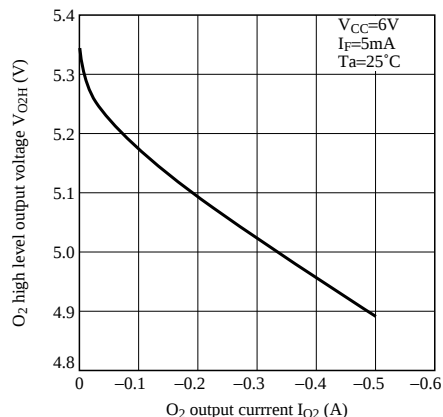


Fig.16 O₂ High Level Output Voltage vs. Ambient Temperature

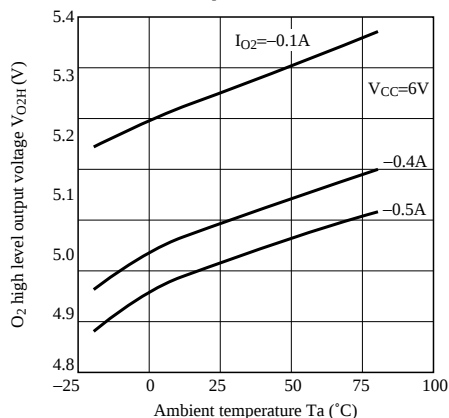


Fig.17 O₂ Low Level Output Voltage vs. O₂ Output Current

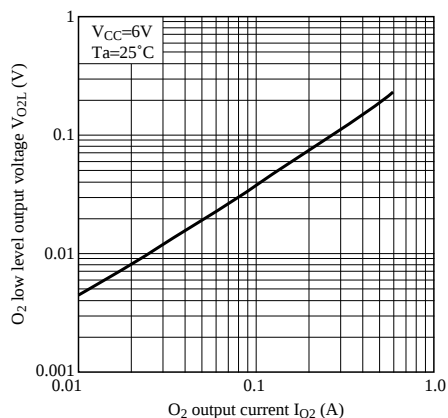


Fig.18 O₂ Low Level Output Voltage vs. Ambient Temperature

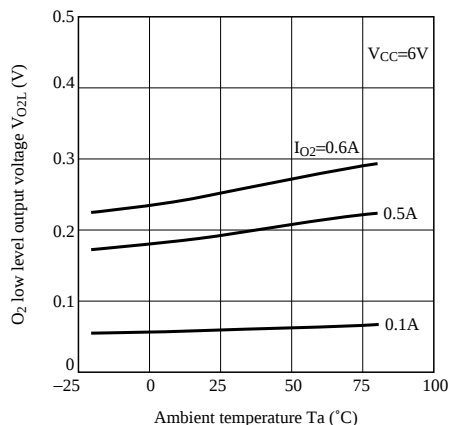


Fig.19 High Level Supply Current vs. Supply Voltage

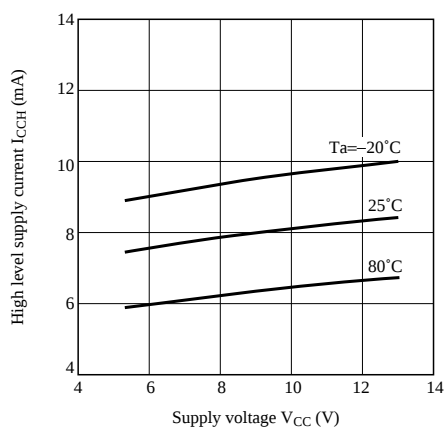


Fig.20 Low Level Supply Current vs. Supply Voltage

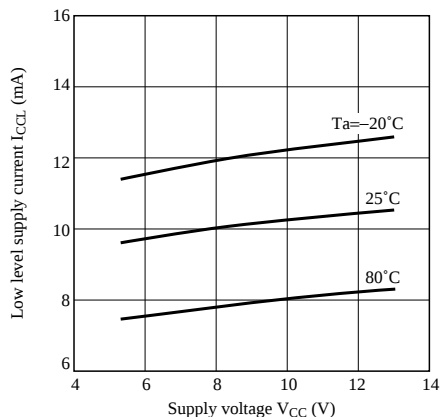


Fig.21 Propagation Delay Time vs. Forward Current

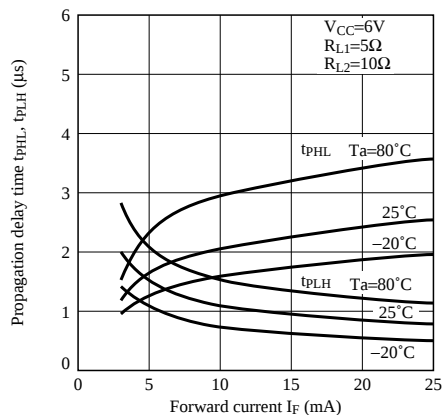


Fig.22 Propagation Delay Time vs. Ambient Temperature

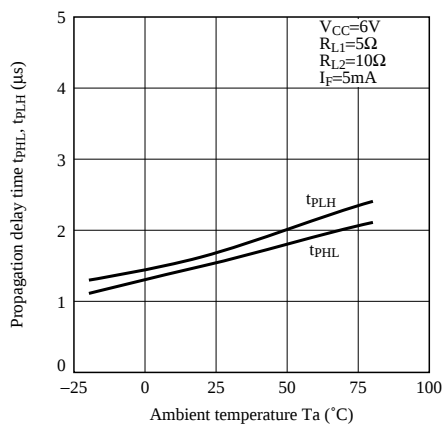


Fig.23 O₂ Peak Output Current vs. O₂ Low Level Output Voltage

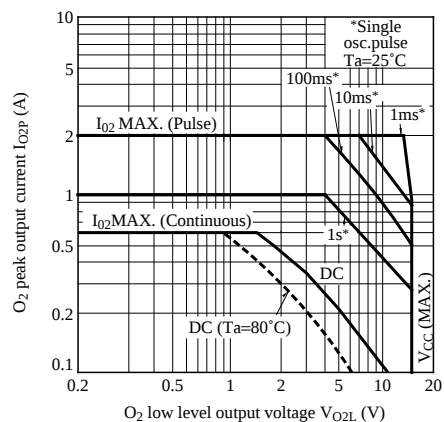
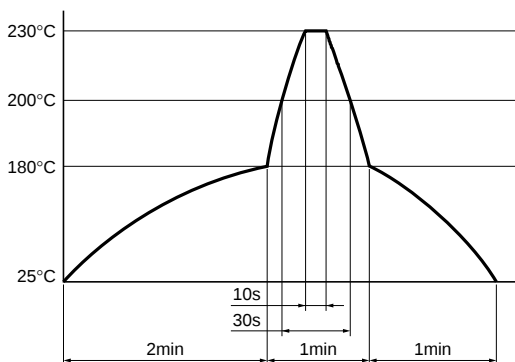
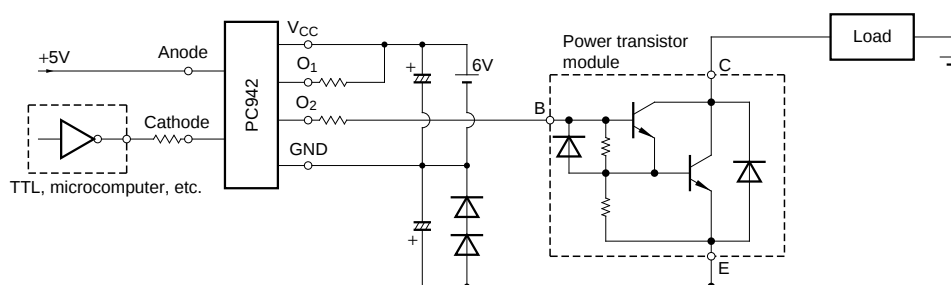


Fig.24 Reflow Soldering

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



■ Application Circuit



■ Precautions for Use

1. It is recommended that a by-pass capacitor of more than $0.01\mu\text{F}$ is added between V_{CC} and GND near the device in order to stabilize power supply line.
2. Handle this product the same as with other integrated circuits against static electricity.
3. As for other general cautions, refer to the chapter "Precautions for Use".

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