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. 5μs)

■ Applications

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

■ Absolute Maximum Ratings

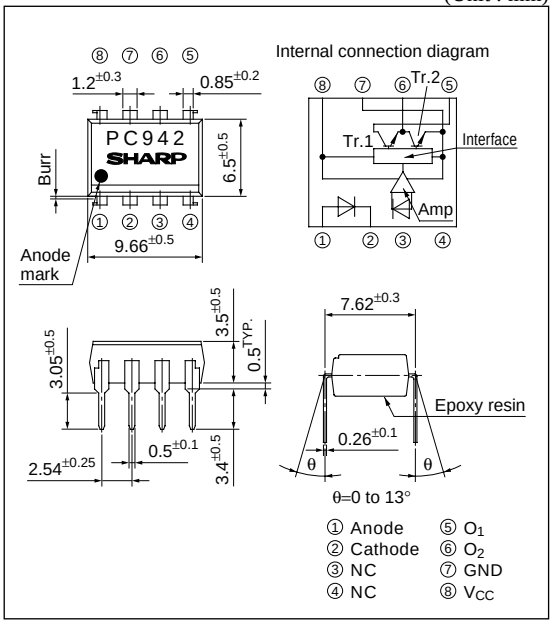
(Ta=T_{opr} unless otherwise specified)

Parameter		Symbol	Rating	Unit
Input	*1Forward current	I_F	25	mA
	*2Reverse voltage	V_R	6	V
Output	Supply voltage	V_{CC}	18	V
	O_1 output current	I_{O1}	0.5	A
	*3O_1 peak output current	I_{O1P}	1.0	A
	O_2 output current	I_{O2}	0.6	A
	*3O_2 peak output current	I_{O2P}	2.0	A
	O_1 output voltage	V_{O1}	18	V
	*4Power dissipation	P_O	500	mW
*5Total power dissipation		P_{tot}	550	mW
*6Isolation voltage		V_{iso}	5 000	V_{rms}
Operating temperature		T_{opr}	−20 to +80	˚C
Storage temperature		T_{stg}	−55 to +125	˚C
*7Soldering temperature		T_{sol}	260	˚C

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig.8
*2 Ta=25˚C
*3 Pulse width<=5μs, 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 Ta=25˚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	t_{PLH}	Ta=25˚C, V_{CC}=6V I_F=5mA, R_{L1}=5Ω R_{L2}=10Ω	–	2	5	μs
		"High→Low" propagation delay time	t_{PHL}		–	2	5	μs
		Rise time	t_r		–	0.2	1	μs
		Fall time	t_f		–	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

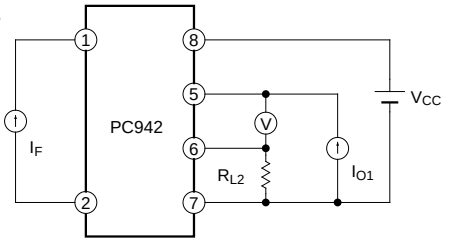


Fig. 2

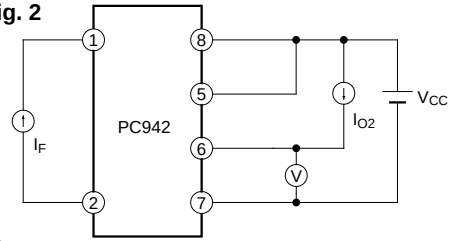


Fig. 3

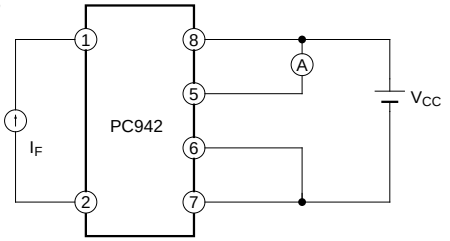


Fig. 4

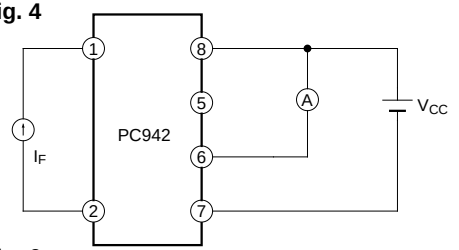


Fig. 5

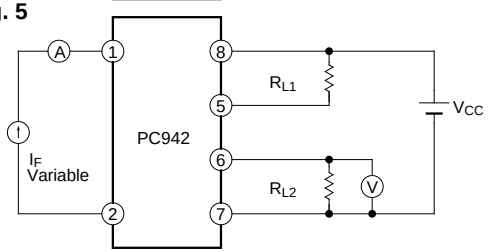
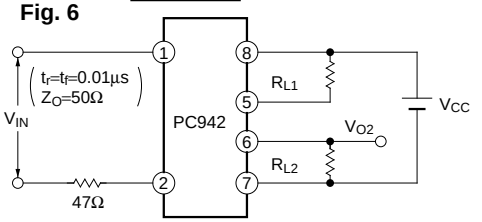


Fig. 6



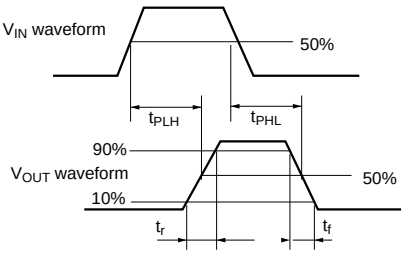
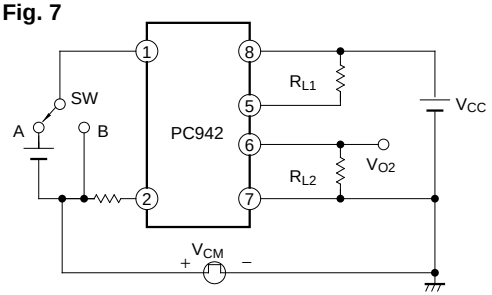
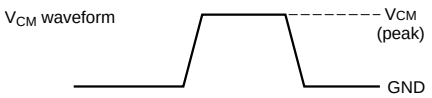
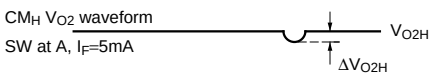


Fig. 7







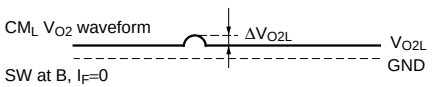


Fig.8 Forward Current vs. Ambient Temperature

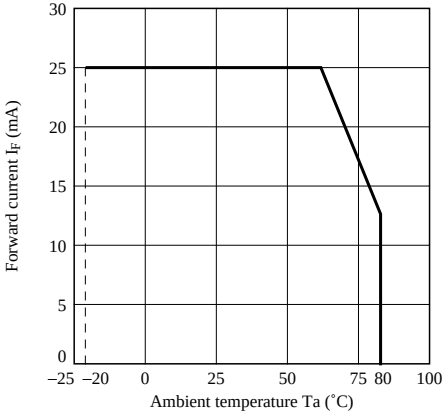


Fig.9 Power Dissipation vs. Ambient Temperature

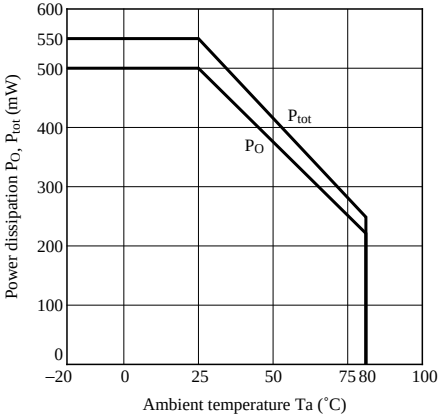


Fig.10 Forward Current vs. Forward Voltage

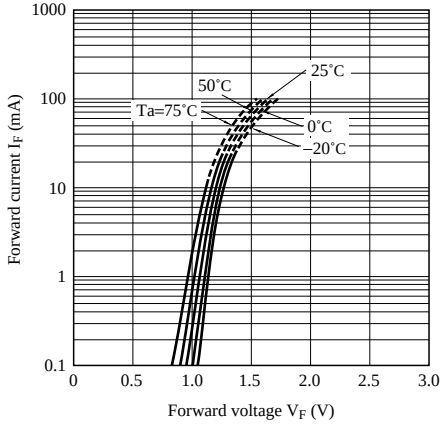


Fig.11 "Low→High" Relative Threshold Input Current vs. Supply Voltage

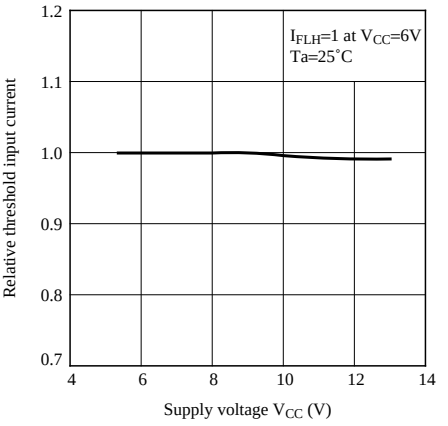


Fig.12 "Low→High" Relative Threshold Input Current vs. Ambient Temperature

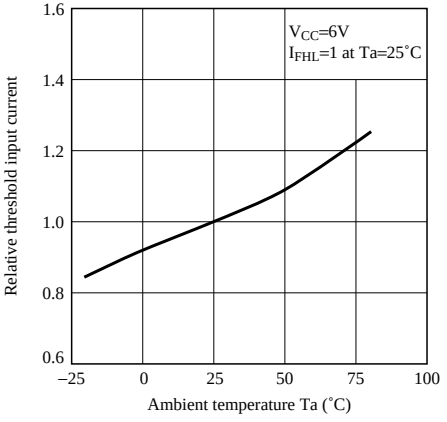


Fig.13 O_1 Low Level Output Voltage vs. O_1 Output Current

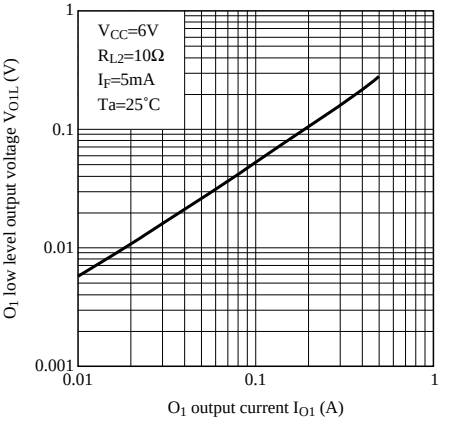


Fig.14 O_1 Low Level Output Voltage vs. Ambient Temperature

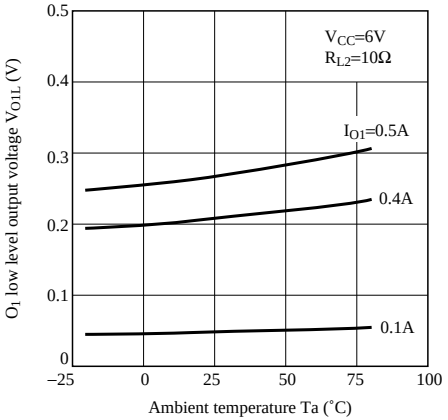


Fig.15 O_2 High Level Output Voltage vs. O_2 Output Current

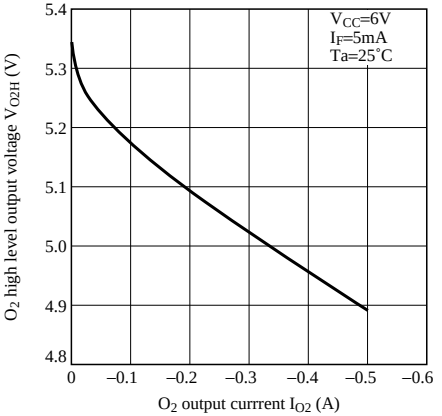


Fig.16 O_2 High Level Output Voltage vs. Ambient Temperature

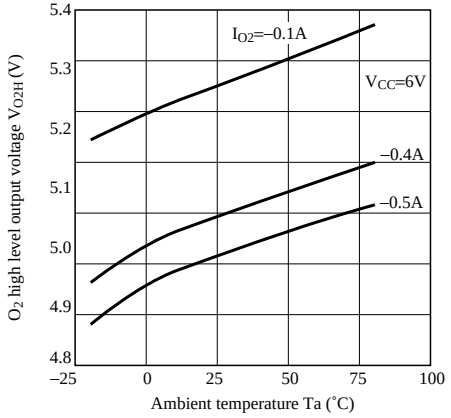


Fig.17 O_2 Low Level Output Voltage vs. O_2 Output Current

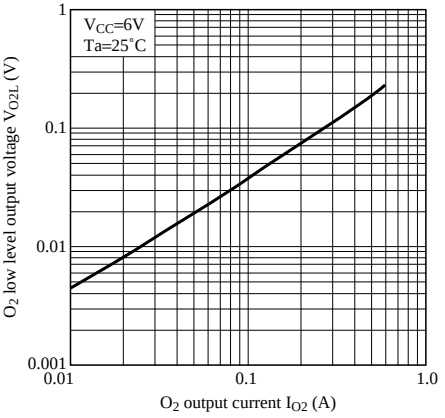


Fig.18 O_2 Low Level Output Voltage vs. Ambient Temperature

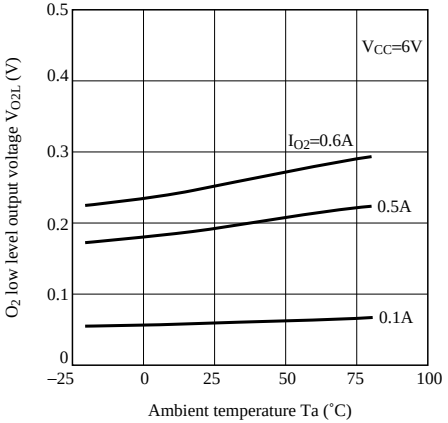


Fig.19 High Level Supply Current vs. Supply Voltage

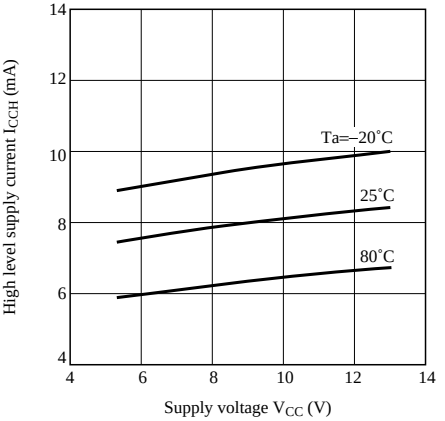


Fig.20 Low Level Supply Current vs. Supply Voltage

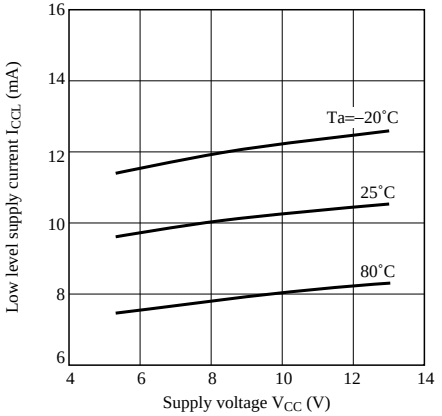


Fig.21 Propagation Delay Time vs. Forward Current

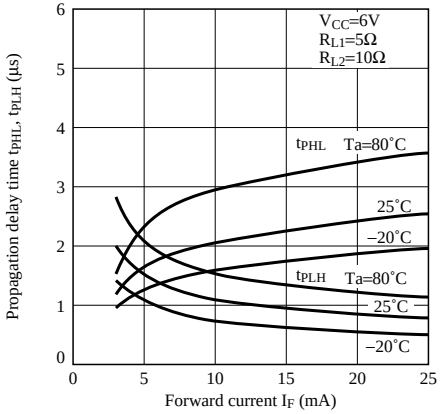


Fig.22 Propagation Delay Time vs. Ambient Temperature

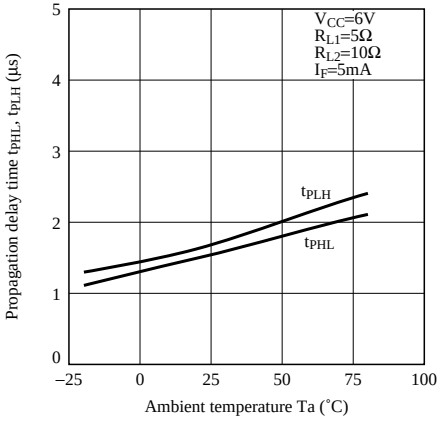


Fig.23 O_2 Peak Output Current vs. O_2 Low Level Output Voltage

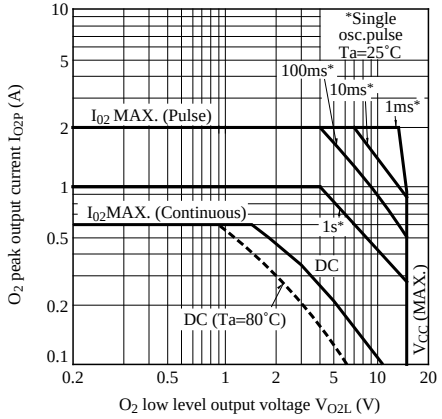
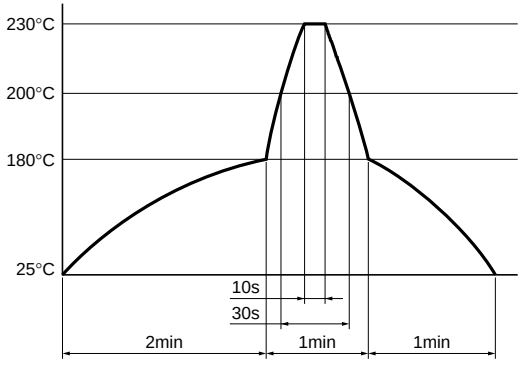
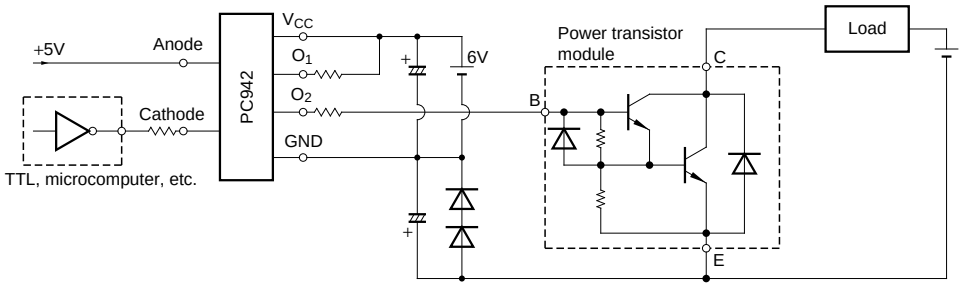


Fig.24 Reflow Soldering

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 0.01µF 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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— Telecommunication equipment [terminal]
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— Industrial control
— Audio visual equipment
— Consumer electronics

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— Traffic signals
— Gas leakage sensor breakers
— Alarm equipment
— Various safety devices, etc.

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