

PC921 High Power OPIC Photocoupler

T-41-83

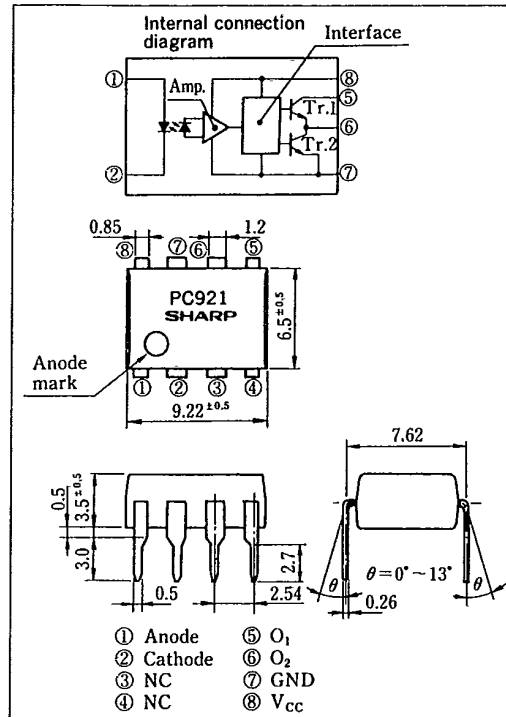
■ Features

1. Built-in base amplifier for power transistor drive
2. High power (I_{O1} : MAX. 0.5A (DC)
 $(I_{O2P}$: MAX. 2.0A (pulse))
3. High speed response
 $(t_{PHL}, t_{PLH}$: MAX. 5 μ s)
4. High sensitivity (I_{FLH} : MAX. 5mA)
5. UL recognized, file No. E64380

■ Applications

1. Inverter controlled air conditioners
2. Low capacitance general purpose inverter

■ Outline Dimensions (Unit : mm)



※ OPIC is a registered trademark of Sharp and stands for Optical IC. It has a light detecting element and signal processing circuitry integrated onto a single chip.

■ Absolute Maximum Ratings (Unless otherwise specified, $T_a = T_{opr}$)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	25	mA
	*1 Reverse voltage	V_R	6	V
Output	Supply voltage	V_{CC}	15	V
	O_1 output current	I_{O1}	0.5	A
	*2 O_1 peak output current	I_{O1P}	1.0	A
	O_2 output current	I_{O2}	0.6	A
	*2 O_2 peak output current	I_{O2P}	2.0	A
	O_1 Output voltage	V_{O1}	15	V
	Power dissipation	P_O	500	mW
Total power dissipation		P_{tot}	550	mW
*3 Isolation voltage		V_{iso}	2,000	Vrms
Operating temperature		T_{opr}	-20 ~ +80	°C
Storage temperature		T_{stg}	-55 ~ +125	°C
*4 Soldering temperature		T_{sol}	260	°C

- *1 $T_a = 25^\circ\text{C}$
- *2 Pulse width $\leq 5\mu\text{s}$, Duty ratio = 0.01
- *3 RH = 40 ~ 60%, AC for 1 minute, $T_a = 25^\circ\text{C}$
- *4 For 10 seconds

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■ Electro-optical Characteristics

(Unless otherwise specified Ta=T_{opr})

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Fig.	
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 _F =3V	—	—	10	μA	—	
Terminal capacitance		C _t	Ta=25°C, V=0, f=1kHz	—	30	250	pF	—	
Operating supply voltage		V _{CC}	—	5.4	—	13	V	—	
Output	O ₁ low level output voltage	V _{O1L}	V _{CC} =6V, I _{O1} =0.4A, R _{L1} =10Ω, I _F =5mA	—	0.2	0.4	V	1	
	O ₂ high level output voltage	V _{O2H}	V _{CC} =6V, I _{O2} =-0.4A, I _F =5mA	4.5	5.0	—	V	2	
	O ₂ low level output voltage	V _{O2L}	V _{CC} =6V, I _{O2} =0.5A, I _F =0	—	0.2	0.4	V	2	
	O ₁ leak current	I _{O1L}	V _{CC} =13V, I _F =0	—	—	200	μA	3	
	O ₂ leak current	I _{O2L}	V _{CC} =13V, I _F =5mA	—	—	200	μA	4	
	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	—	
*5 "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	5	
			V _{CC} =6V, R _{L1} =5Ω, R _{L2} =10Ω	0.2	—	5.0	mA	5	
Isolation resistance		R _{ISO}	Ta=25°C, DC=500V, RH=40~60%	5×10 ¹⁰	10 ¹¹	—	Ω	—	
Transfer characteristics	Response time	"Low→High" propagation time	t _{PLH}	—	2	5	μs	6	
		"High→Low" propagation time	t _{PHL}	Ta=25°C, V _{CC} =6V, I _F =5mA	—	2	5		μs
		Rise time	t _r	R _{L1} =5Ω, R _{L2} =10Ω	—	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 _{O1L} =0.5V, V _{CC} =6V	-1000	—	—	V/μs	7
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 _{O1L} =0.5V, V _{CC} =6V	1000	—	—	V/μs	7	

*5 I_{FLH} represents forward current when output goes from low to high.

■ Truth Table

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

6

■ Test Circuit

Fig. 1

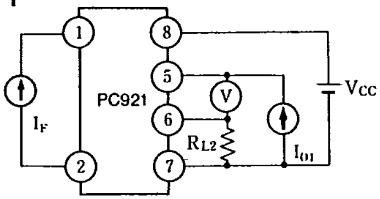


Fig. 2

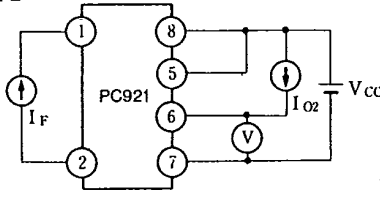


Fig. 3

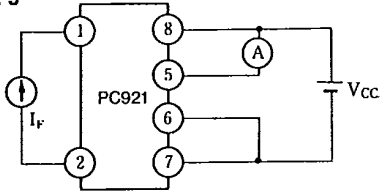


Fig. 4

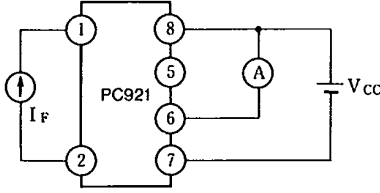


Fig. 5

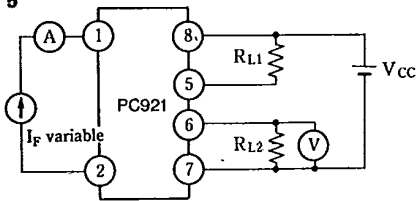


Fig. 6

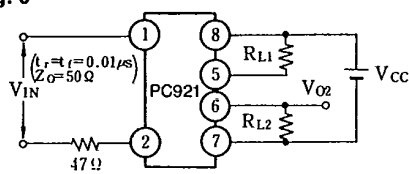


Fig. 7

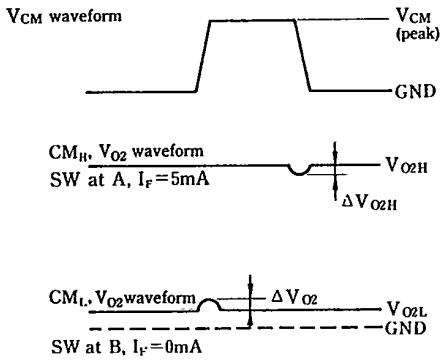
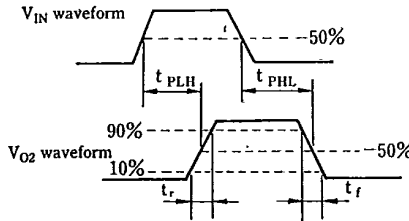
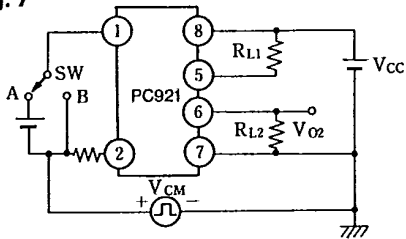
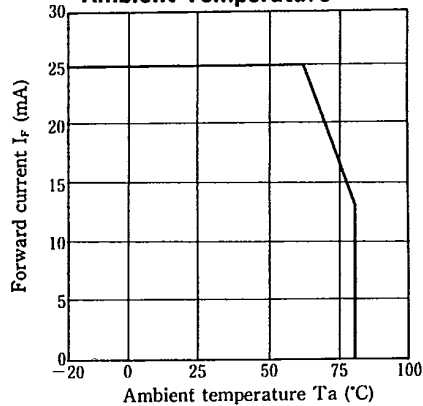


Fig. 8 Forward Current vs. Ambient Temperature



T-41-83

Fig. 9 Output Power Dissipation vs. Ambient Temperature

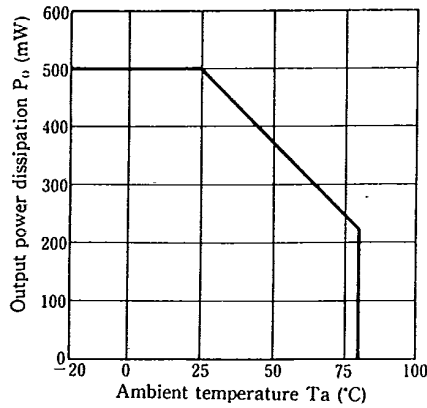


Fig. 10 Total Power Dissipation vs. Ambient Temperature

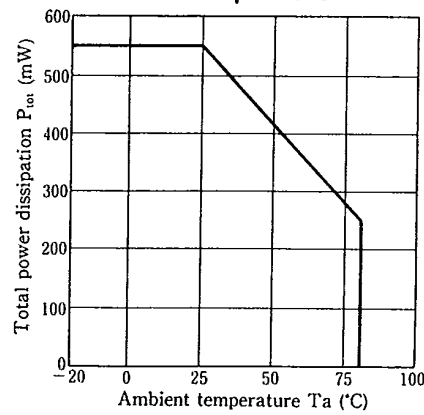


Fig. 11 Forward Current vs. Forward Voltage

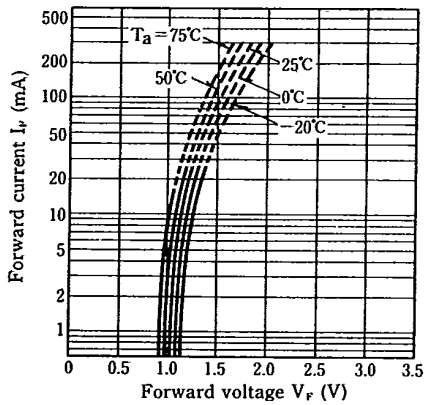
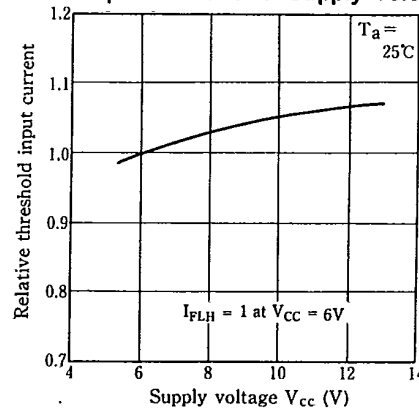


Fig. 12 "Low → High" Relative Threshold Input Current vs. Supply Voltage



6

Fig. 13 "Low → High" Relative Threshold Input Current vs. Ambient Temperature

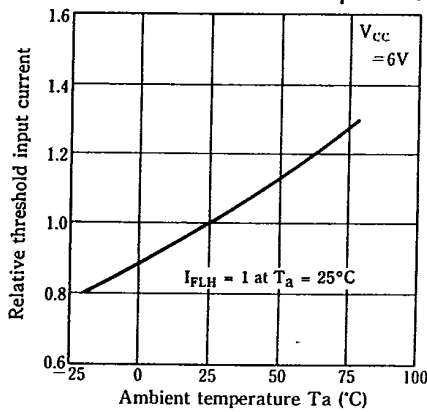
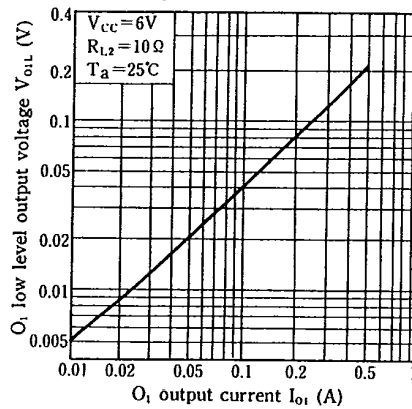


Fig. 14 O₁ Low Level Output Voltage vs. O₁ Output Current



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Fig. 15 O₁ Low Level Output Voltage vs. Ambient Temperature

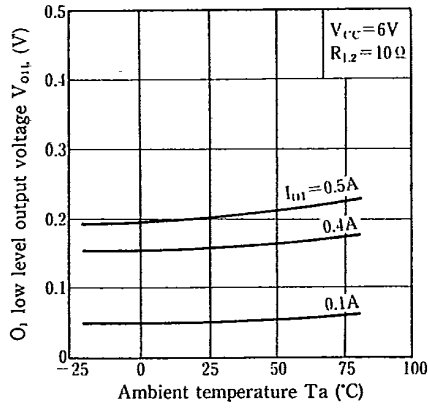


Fig. 16 O₂ High Level Output Voltage vs. O₂ Output Current

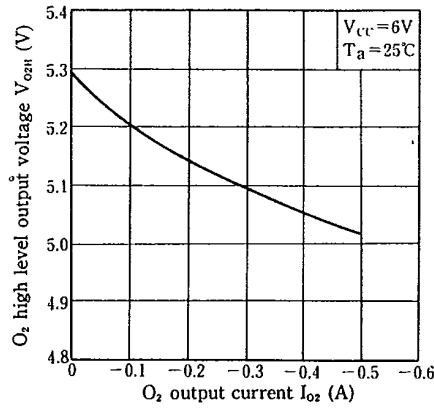


Fig. 17 O₂ High Level Output Voltage vs. Ambient Temperature

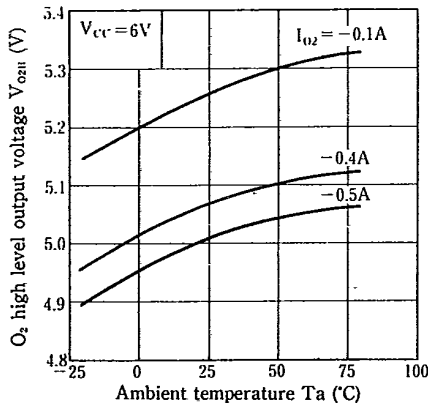


Fig. 18 O₂ Low Level Output Voltage vs. O₂ Output Current

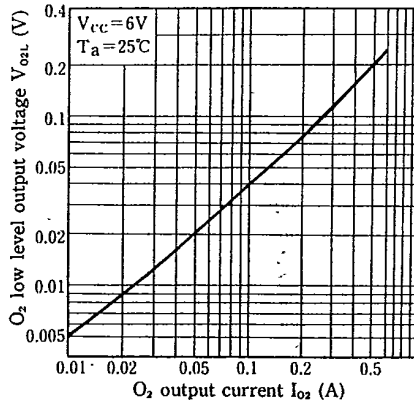


Fig. 19 O₂ Low Level Output Voltage vs. Ambient Temperature

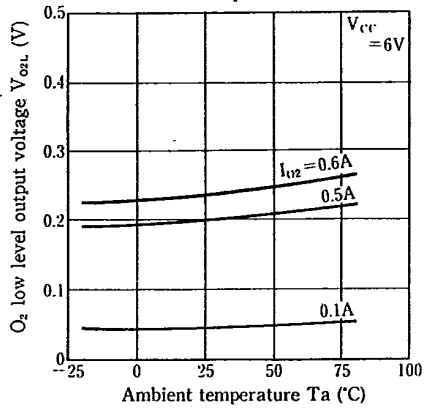


Fig. 20 High Level Supply Current vs. Supply Voltage

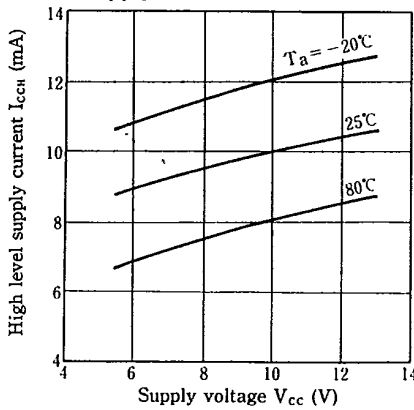


Fig. 21 Low Level Supply Current vs. Supply Voltage

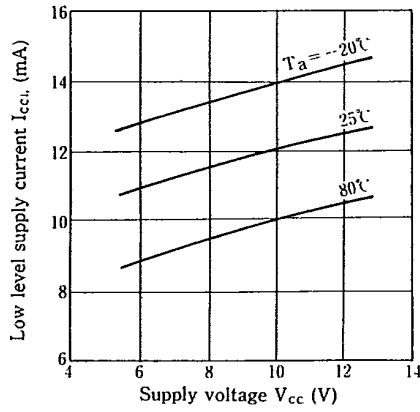


Fig. 22 Propagation Time vs. Forward Current

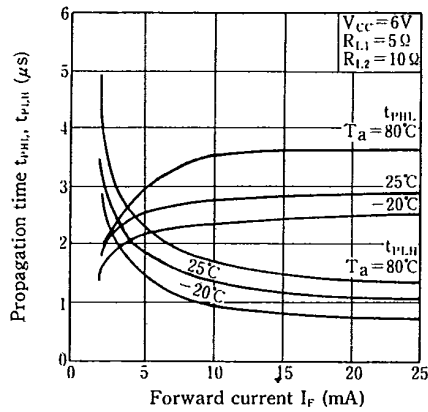


Fig. 23 Propagation Time vs. Ambient Temperature

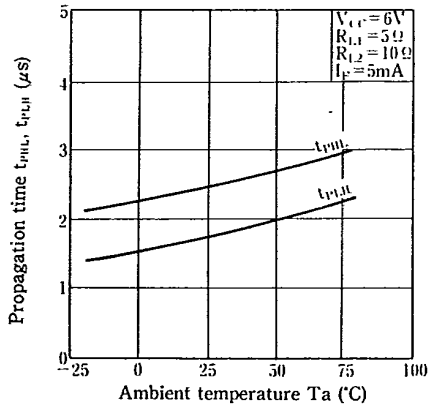
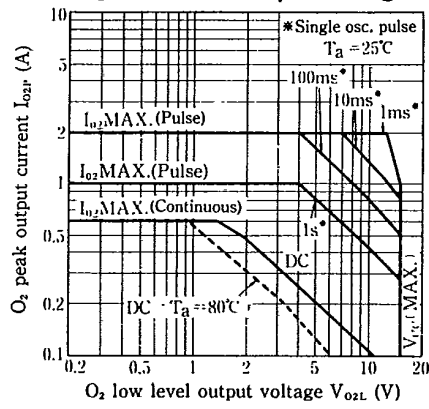


Fig. 24 O_2 Peak Output Current vs. O_2 Low Level Output Voltage



6