

PC921 High Power OPIC Photocoupler

T-41-83

■ Features

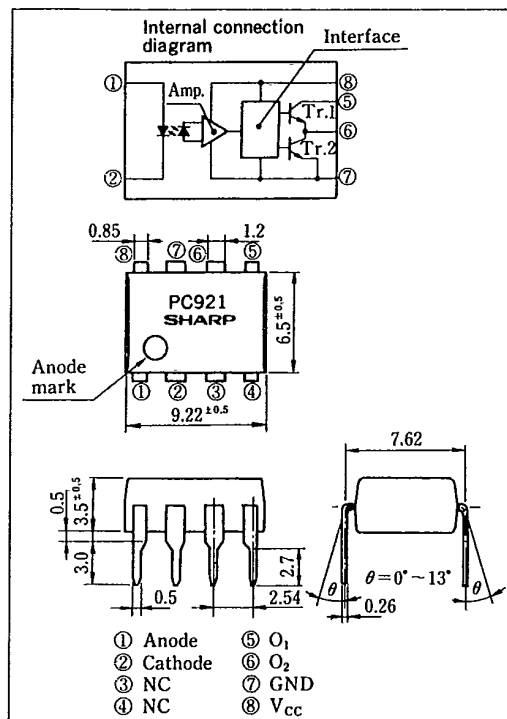
1. Built-in base amplifier for power transistor drive
2. High power (I_{O1} : MAX. 0.5A (DC))
(I_{O2P} : MAX. 2.0A (pulse))
3. High speed response
(t_{PHL} , t_{PLH} : MAX. 5 μ s)
4. High sensitivity (I_{FLH} : MAX. 5mA)
5. UL recognized, file No. E64380

■ Applications

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

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings (Unless otherwise specified, Ta=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 Ta=25°C

*2 Pulse width ≤ 5 μ s, Duty ratio=0.01

*3 RH=40~60%, AC for 1 minute, Ta=25°C

*4 For 10 seconds

※ 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.

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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	—
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 _{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
Transfer characteristics			V _{CC} =6V, R _{L1} =5Ω, R _{L2} =10Ω	0.2	—	5.0	mA	5
	Isolation resistance		Ta=25°C, DC=500V, RH=40~60%	5×10 ¹⁰	10 ¹¹	—	Ω	—
	Response time	"Low→High" propagation time	Ta=25°C, V _{CC} =6V, I _F =5mA R _{L1} =5Ω, R _{L2} =10Ω	—	2	5	μs	6
		"High→Low" propagation time		—	2	5	μs	
		Rise time		—	0.2	1	μs	
		Fall time		—	0.1	1	μs	
	Instantaneous common mode rejection voltage "Output : high level"		Ta=25°C, V _{CM} =600V _(peak) , I _F =5mA, R _{L1} =470Ω, R _{L2} =1kΩ, ΔV _{O2H} =0.5V, V _{CC} =6V	-1000	—	—	V/μs	7
	Instantaneous common mode rejection voltage "Output : low level"		Ta=25°C, V _{CM} =600V _(peak) , I _F =0, R _{L1} =470Ω, R _{L2} =1kΩ, ΔV _{O2L} =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

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■ Test Circuit

Fig. 1

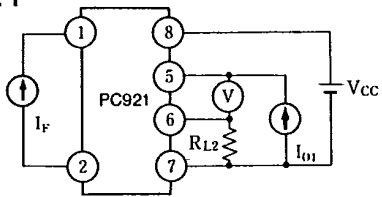


Fig. 2

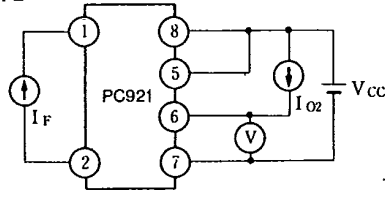


Fig. 3

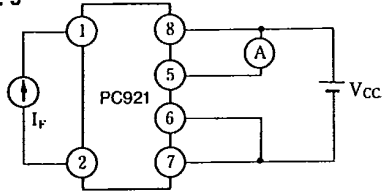


Fig. 4

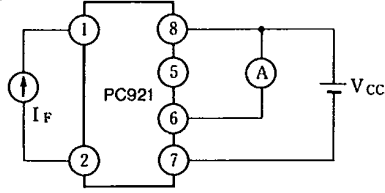


Fig. 5

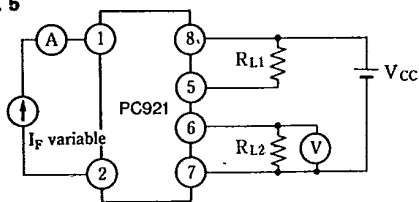


Fig. 6

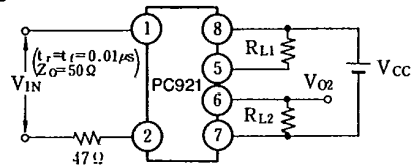


Fig. 7

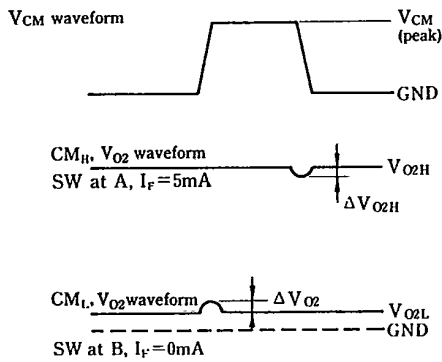
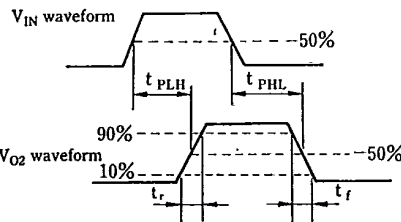
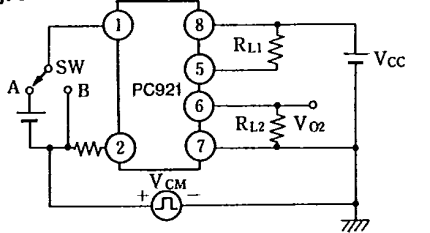
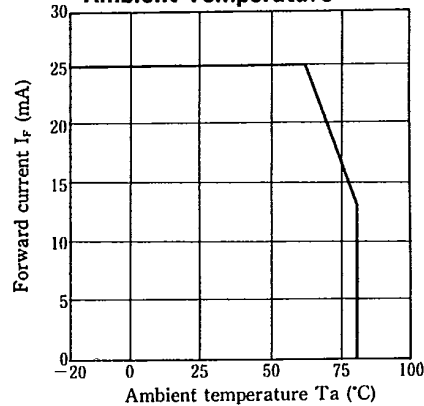


Fig. 8 Forward Current vs. Ambient Temperature



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Fig. 9 Output Power Dissipation vs. Ambient Temperature

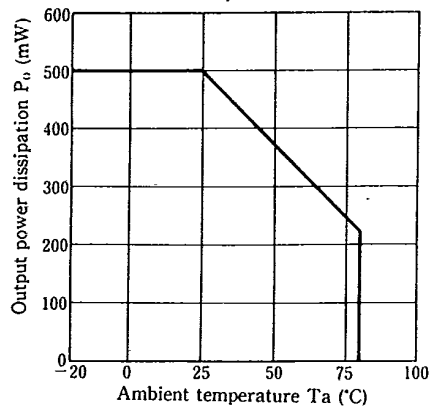


Fig. 10 Total Power Dissipation vs. Ambient Temperature

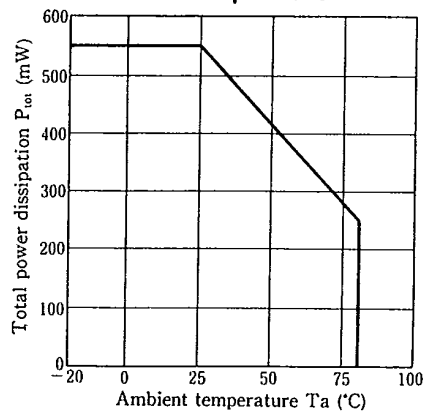


Fig. 11 Forward Current vs. Forward Voltage

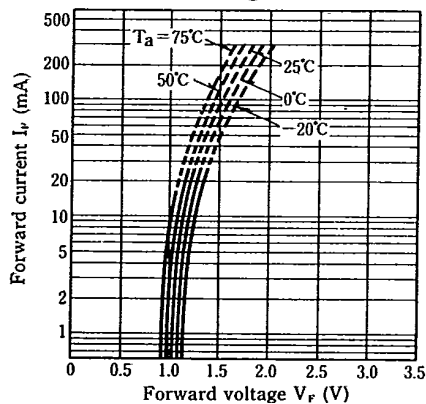


Fig. 12 "Low → High" Relative Threshold Input Current vs. Supply Voltage

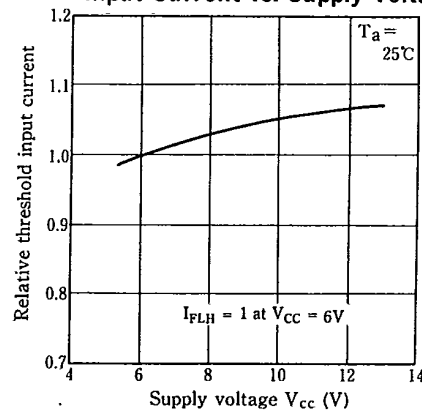


Fig. 13 "Low → High" Relative Threshold Input Current vs. Ambient Temperature

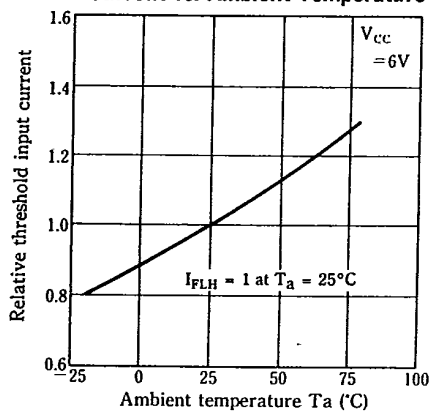
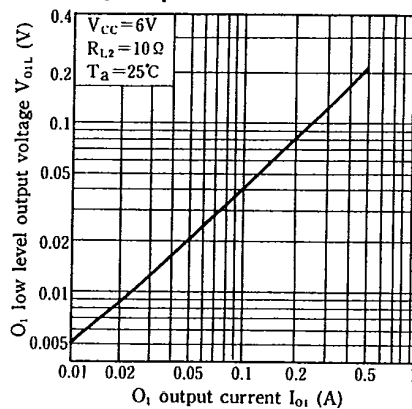
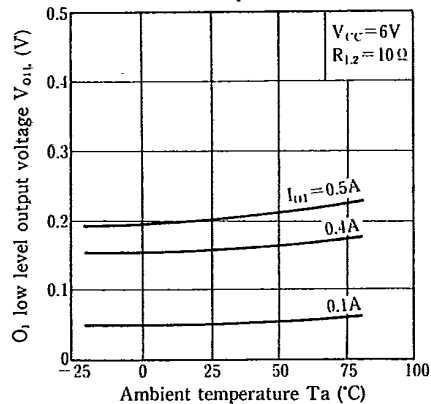
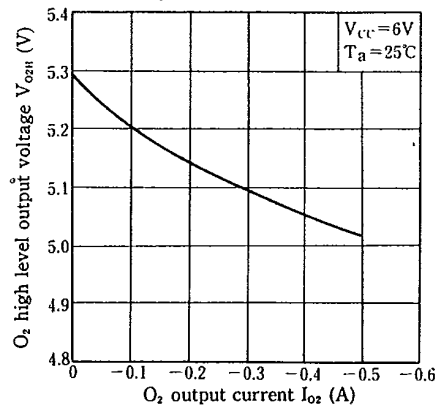
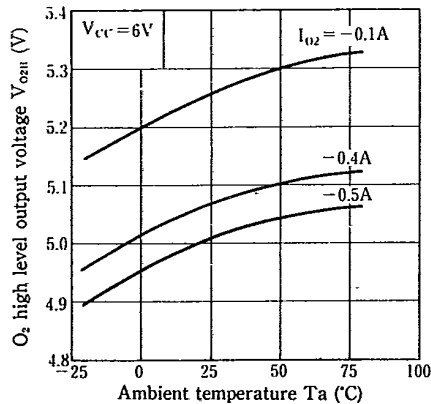
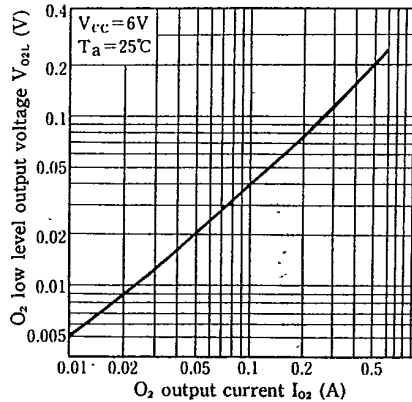
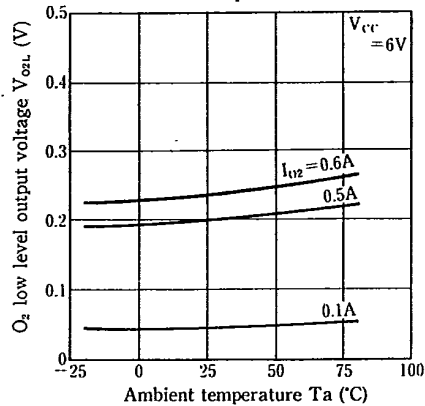
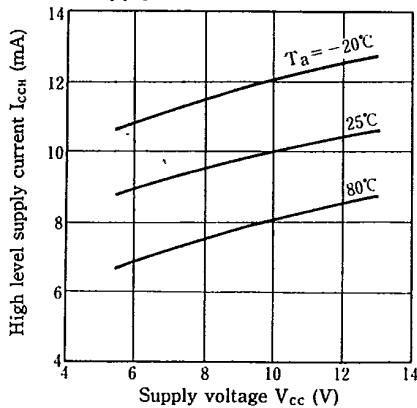


Fig. 14 O_1 Low Level Output Voltage vs. O_1 Output Current

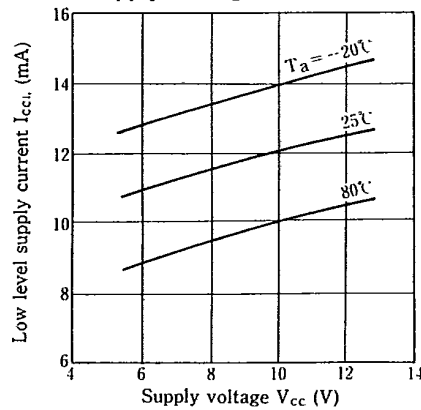
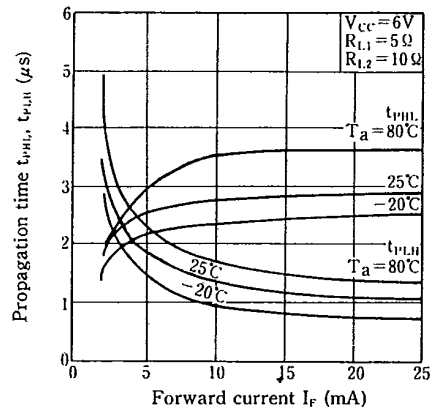
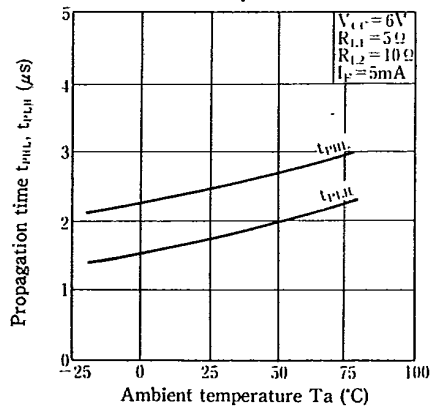
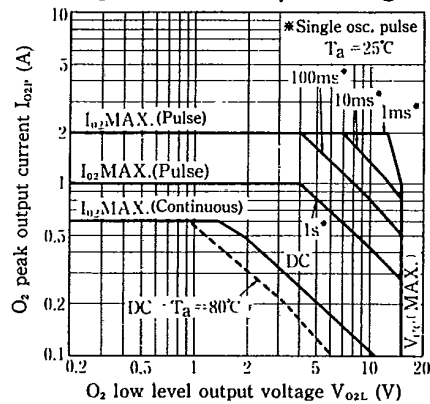


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Fig. 15 O₁ Low Level Output Voltage vs. Ambient Temperature**Fig. 16** O₂ High Level Output Voltage vs. O₂ Output Current**Fig. 17** O₂ High Level Output Voltage vs. Ambient Temperature**Fig. 18** O₂ Low Level Output Voltage vs. O₂ Output Current**Fig. 19** O₂ Low Level Output Voltage vs. Ambient Temperature**Fig. 20** High Level Supply Current vs. Supply Voltage

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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 O₂ Peak Output Current vs. O₂ Low Level Output Voltage**

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