PC921 High Power OPIC Photocoupler

T-41-83

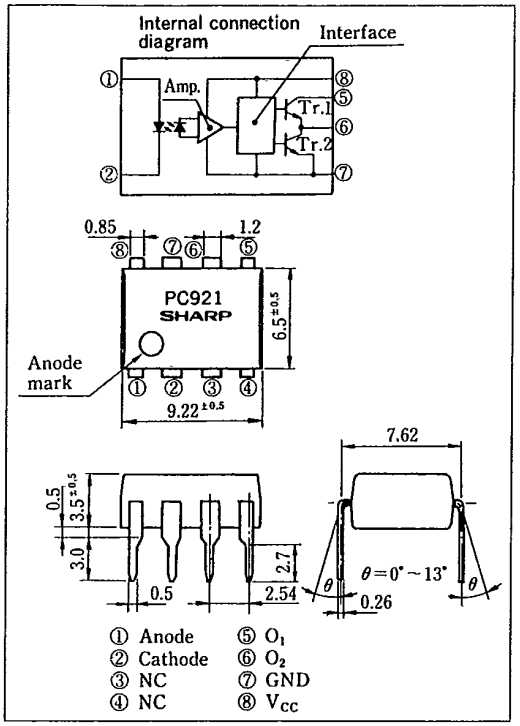
■ Features

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. 5μs)
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, Ta=T_{opr})

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

*1 Ta=25°C
*2 Pulse width≦5μs, Duty ratio=0.01
*3 RH=40~60%, AC for 1 minute, Ta=25°C
*4 For 10 seconds

■ 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_{L2}=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	—
Transfer characteristics	*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	—
	Response time	"Low→High" propagation time	t_{PLH}	Ta=25°C, V_{CC}=6V, I_F=5mA, R_{L1}=5Ω, R_{L2}=10Ω	—	2	5	μs	6
		"High→Low" propagation 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}=600$V_{(peak)}$, I_F=5mA, R_{L1}=470Ω, R_{L2}=1kΩ, Δ_{O2H}=0.5V, V_{CC}=6V	−1000	—	—	V/μs	7
	Instantaneous common mode rejection voltage "Output : low level"		CM_L	Ta=25°C, V_{CM}=600$_{(peak)}$, 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.

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■ Truth Table

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

■ Test Circuit

Fig. 1

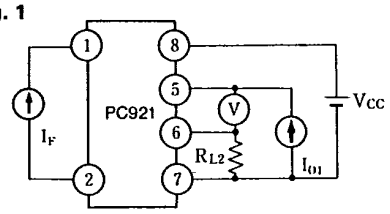


Fig. 2

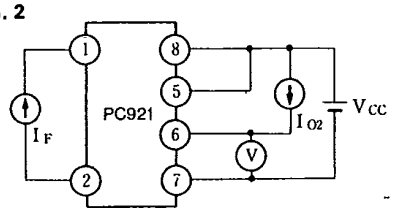


Fig. 3

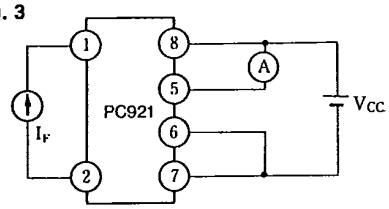


Fig. 4

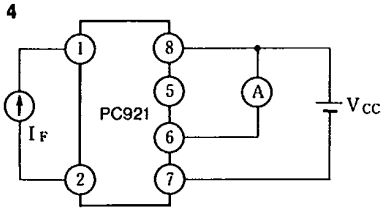


Fig. 5

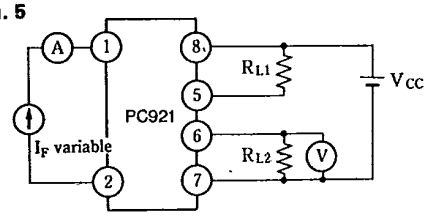
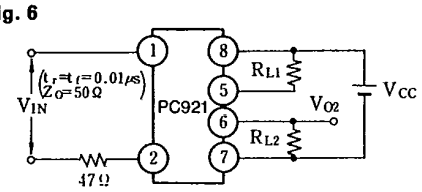


Fig. 6



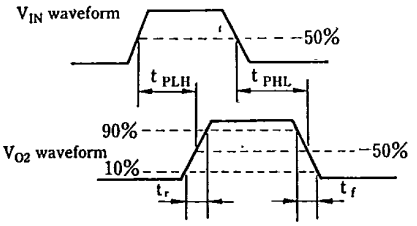
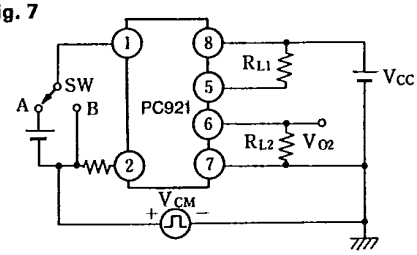


Fig. 7



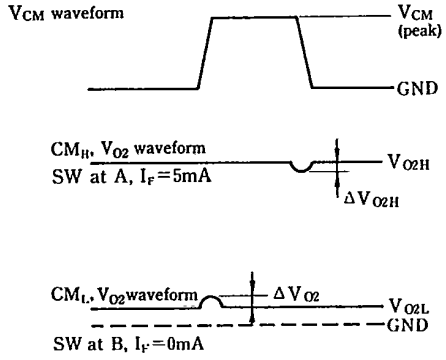


Fig. 8 Forward Current vs. Ambient Temperature

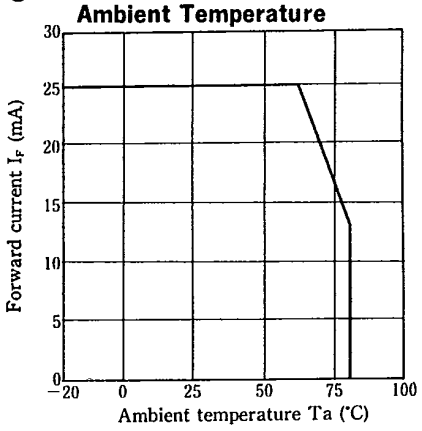


Fig. 9 Output Power Dissipation vs. Ambient Temperature

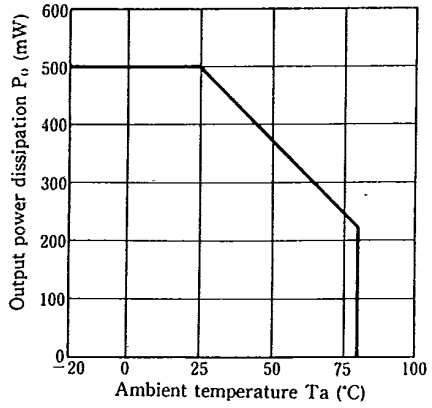


Fig. 10 Total Power Dissipation vs. Ambient Temperature

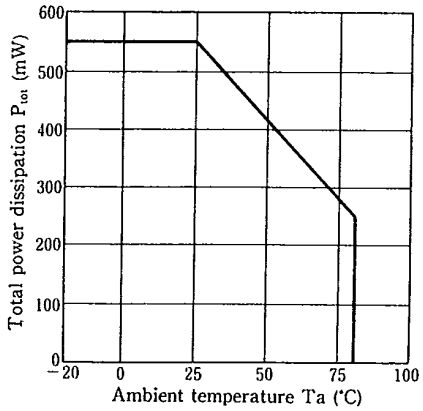


Fig. 11 Forward Current vs. Forward Voltage

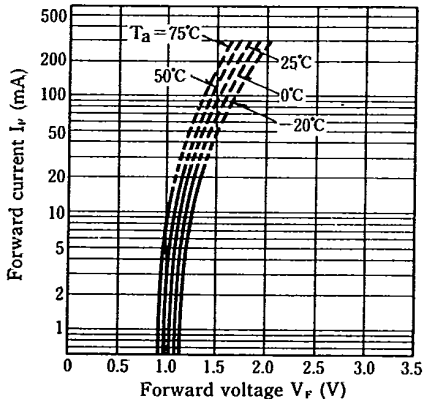


Fig. 12 "Low →High" Relative Threshold Input Current vs. Supply Voltage

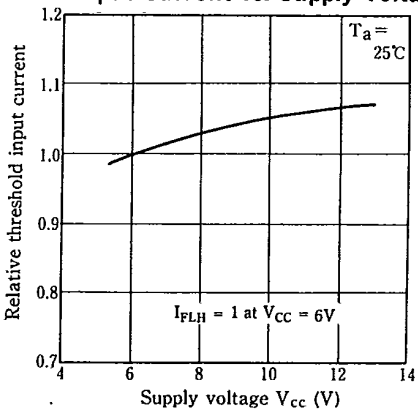


Fig. 13 "Low→High" Relative Threshold Input Current vs. Ambient Temperature

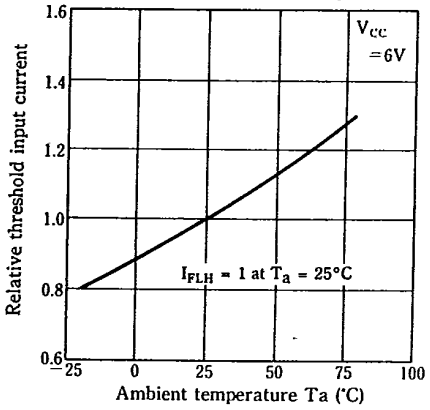


Fig. 14 O_1 Low Level Output Voltage vs. O_1 Output Current

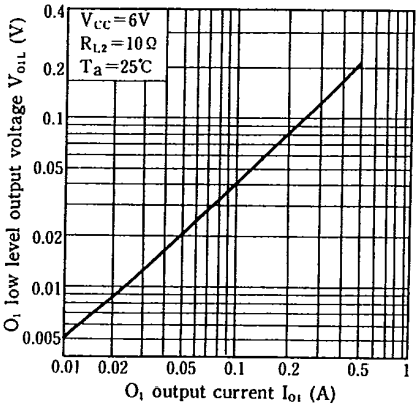


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Fig. 15 O_1 Low Level Output Voltage vs. Ambient Temperature

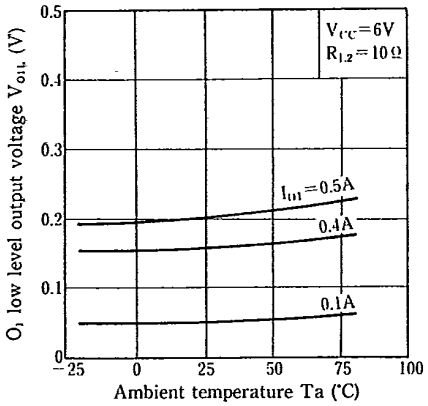


Fig. 16 O_2 High Level Output Voltage vs. O_2 Output Current

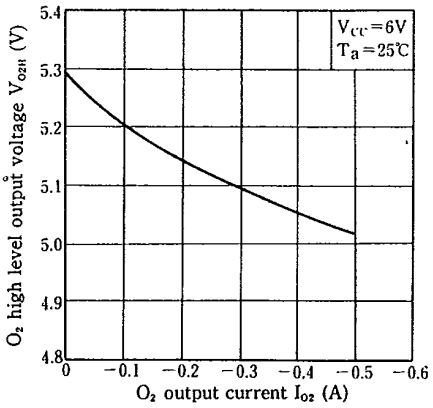


Fig. 17 O_2 High Level Output Voltage vs. Ambient Temperature

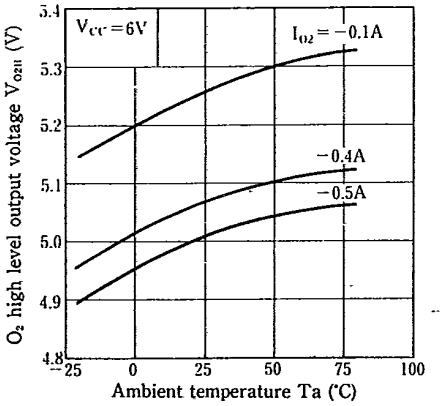


Fig. 18 O_2 Low Level Output Voltage vs. O_2 Output Current

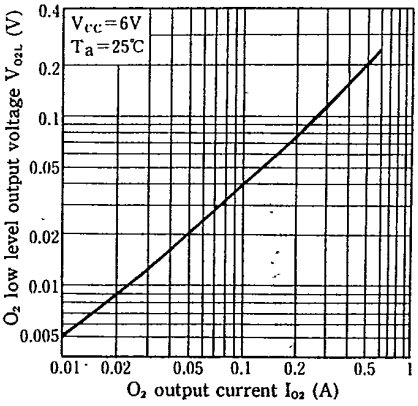


Fig. 19 O_2 Low Level Output Voltage vs. Ambient Temperature

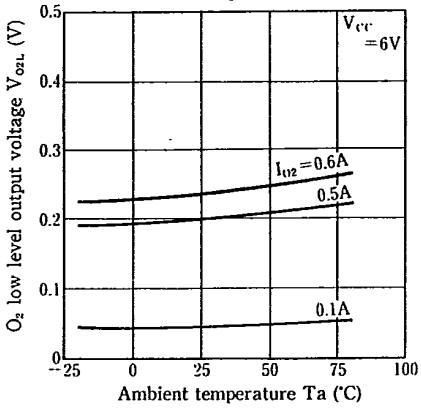


Fig. 20 High Level Supply Current vs. Supply Voltage

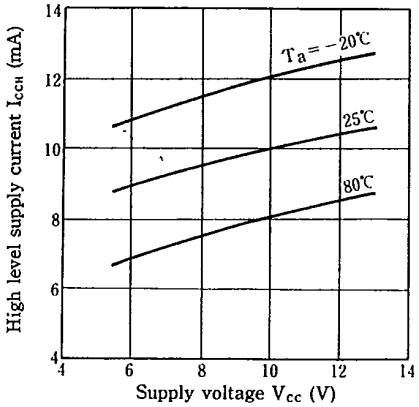


Fig. 21 Low Level Supply Current vs. Supply Voltage

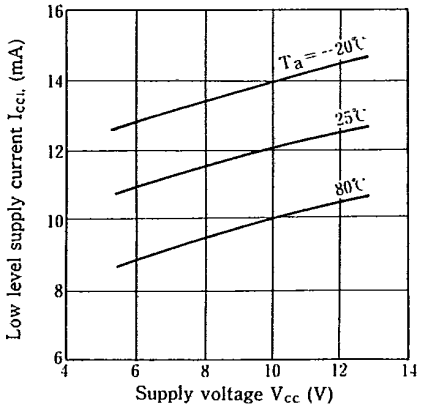


Fig. 22 Propagation Time vs. Forward Current

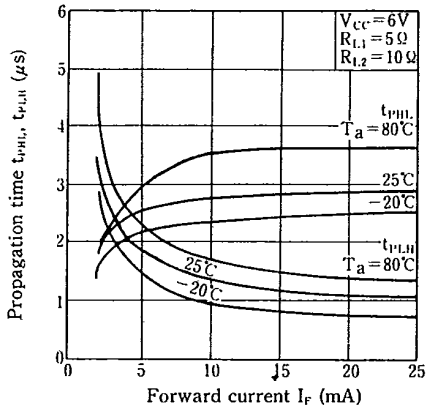


Fig. 23 Propagation Time vs. Ambient Temperature

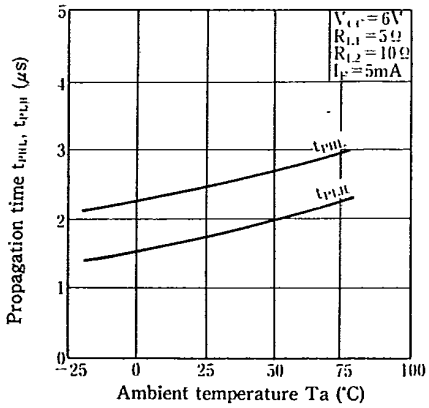
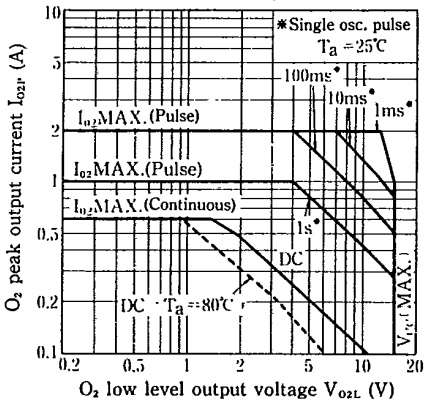


Fig. 24 O_2 Peak Output Current vs. O_2 Low Level Output Voltage



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