

# PC922

## High Power OPIC Photocoupler

※ Lead forming type ( I type ) and taping reel type ( P type ) are also available. ( **PC922I/PC922P** )

※※ TÜV ( VDE 0884 ) approved type is also available as an option.

### ■ Features

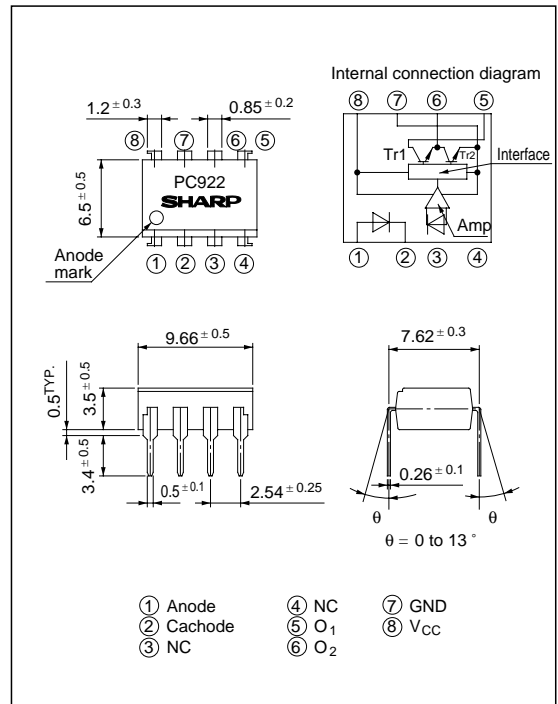
1. Built-in base amplifier for inverter drive
2. High power (  $I_{O1}$ : MAX. 0.5A ( DC ) )  
(  $I_{O2P}$ : MAX. 2.0A ( pulse ) )
3. High isolation voltage between input and output (  $V_{iso}$ : 5 000V<sub>rms</sub> )
4. High noise reduction type
5. High speed response (  $t_{PHL}$ ,  $t_{PLH}$ : MAX. 5  $\mu$ s )
6. High sensitivity (  $I_{FLH}$ : MAX. 3mA )
7. Recognized by UL, file No. E64380

### ■ Applications

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

### ■ 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.

### ■ Absolute Maximum Ratings

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

	Parameter	Symbol	Rating	Unit
Input	Forward current	$I_F$	25	mA
	*1 Reverse voltage	$V_R$	6	V
	Supply voltage	$V_{CC}$	18	V
Output	O <sub>1</sub> output current	$I_{O1}$	0.5	A
	*2 O <sub>1</sub> peak output current	$I_{O1P}$	1.0	A
	O <sub>2</sub> output current	$I_{O2}$	0.6	A
	*2 O <sub>2</sub> peak output current	$I_{O2P}$	2.0	A
	O <sub>1</sub> output voltage	$V_{O1}$	18	V
	Power dissipation	$P_O$	500	mW
	Total power dissipation	$P_{tot}$	550	mW
	*3 Isolation voltage	$V_{iso}$	5 000	V <sub>rms</sub>
	Operating temperature	$T_{opr}$	- 20 to + 80	°C
	Storage temperature	$T_{stg}$	- 55 to + 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 40 to 60% RH, AC for 1 minute,

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

\*4 For 10 seconds

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## ■ Electro-optical Characteristics

(Ta = T<sub>opr</sub> unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Fig.		
Input	Forward voltage	V <sub>F1</sub>	T <sub>a</sub> = 25°C, I <sub>F</sub> = 5mA	-	1.1	1.4	V	-		
		V <sub>F2</sub>	T <sub>a</sub> = 25°C, I <sub>F</sub> = 0.2mA	0.6	0.9	-	V	-		
	Reverse current	I <sub>R</sub>	T <sub>a</sub> = 25°C, V <sub>R</sub> = 3V	-	-	10	μA	-		
	Terminal capacitance	C <sub>t</sub>	T <sub>a</sub> = 25°C, V = 0, f = 1kHz	-	30	250	pF	-		
Operating supply voltage		V <sub>CC</sub>		5.4	-	13	V	-		
Output	O <sub>1</sub> low level output voltage	V <sub>O1L</sub>	V <sub>CC</sub> = 6V, I <sub>O1</sub> = 0.4A, R <sub>L1</sub> = 10Ω, I <sub>F</sub> = 5mA	-	0.2	0.4	V	1		
	O <sub>2</sub> high level output voltage	V <sub>O2H</sub>	V <sub>CC</sub> = 6V, I <sub>O2</sub> = -0.4A, I <sub>F</sub> = 5mA	4.5	5.0	-	V	2		
	O <sub>2</sub> low level output voltage	V <sub>O2L</sub>	V <sub>CC</sub> = 6V, I <sub>O2</sub> = 0.5A, I <sub>F</sub> = 0	-	0.2	0.4	V	-		
	O <sub>1</sub> leak current	I <sub>O1L</sub>	V <sub>CC</sub> = 13V, I <sub>F</sub> = 0	-	-	200	μA	3		
	O <sub>2</sub> leak current	I <sub>O2L</sub>	V <sub>CC</sub> = 13V, I <sub>F</sub> = 5mA	-	-	200	μA	4		
	High level supply current	I <sub>CCH</sub>	T <sub>a</sub> = 25°C, V <sub>CC</sub> = 6V, I <sub>F</sub> = 5mA	-	9	13	mA	-		
			V <sub>CC</sub> = 6V, I <sub>F</sub> = 5mA	-	-	17	mA	-		
Low level supply current	I <sub>CCL</sub>	T <sub>a</sub> = 25°C, V <sub>CC</sub> = 6V, I <sub>F</sub> = 0	-	11	15	mA	-			
		V <sub>CC</sub> = 6V, I <sub>F</sub> = 0	-	-	20	mA	-			
Transfer characteristics	*5 "Low→High" threshold input current		I <sub>FLH</sub>	T <sub>a</sub> = 25°C, V <sub>CC</sub> = 6V, R <sub>L1</sub> = 5Ω, R <sub>L2</sub> = 10Ω	0.3	1.5	3.0	mA	5	
				V <sub>CC</sub> = 6V, R <sub>L1</sub> = 5Ω R <sub>L2</sub> = 10Ω	0.2	-	5.0	mA	5	
	Isolation resistance		R <sub>ISO</sub>	T <sub>a</sub> = 25°C, DC = 500V 40 to 60% RH	5 × 10 <sup>10</sup>	10 <sup>11</sup>	-	Ω	-	
	Response time	"Low→High" propagation delay time		t <sub>PLH</sub>	T <sub>a</sub> = 25°C, V <sub>CC</sub> = 6V I <sub>F</sub> = 5mA, R <sub>L1</sub> = 5Ω R <sub>L2</sub> = 10Ω	-	2	5	μs	6
		"High→Low" propagation delay time		t <sub>PHL</sub>		-	2	5	μs	
		Rise time		t <sub>r</sub>		-	0.2	1	μs	
		Fall time		t <sub>f</sub>		-	0.1	1	μs	
	Instantaneous common mode rejection voltage "Output : High level"		CM <sub>H</sub>	T <sub>a</sub> = 25°C, V <sub>CM</sub> = 600V <sup>(peak)</sup> I <sub>F</sub> = 5mA, R <sub>L1</sub> = 470Ω, R <sub>L2</sub> = 1kΩ, ΔV <sub>O2H</sub> = 0.5V	-1 500	-	-	V/μs	7	
Instantaneous common mode rejection voltage "Output : Low level"		CM <sub>L</sub>	T <sub>a</sub> = 25°C, V <sub>CM</sub> = 600V <sup>(peak)</sup> I <sub>F</sub> = 0, R <sub>L1</sub> = 470Ω, R <sub>L2</sub> = 1kΩ ΔV <sub>O2L</sub> = 0.5V	1 500	-	-	V/μs	7		

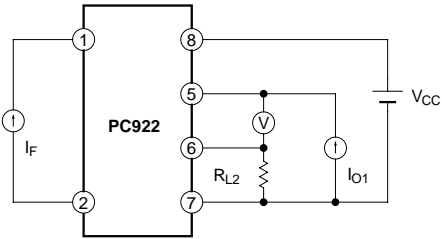
\*5 I<sub>FLH</sub> represents forward current when output goes from low to high.

## ■ Truth Table

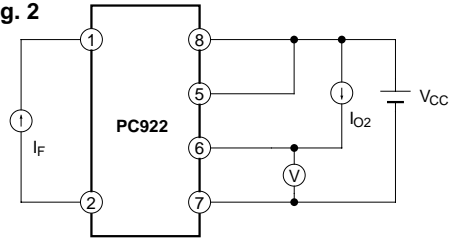
Input	O <sub>2</sub> Output	Tr. 1	Tr. 2
ON	High level	ON	OFF
OFF	Low level	OFF	ON

**Test Circuit**

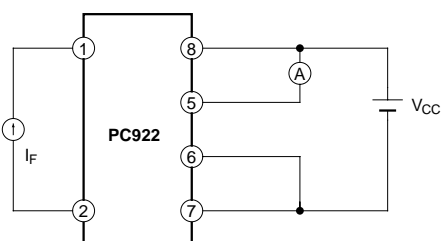
**Fig. 1**



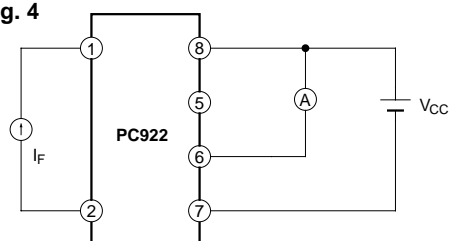
**Fig. 2**



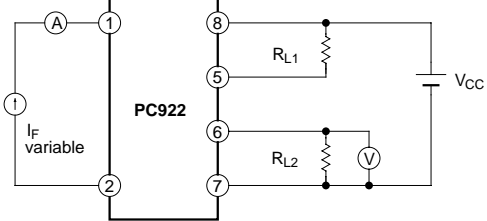
**Fig. 3**



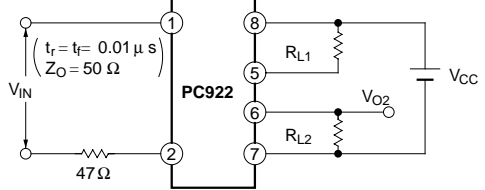
**Fig. 4**



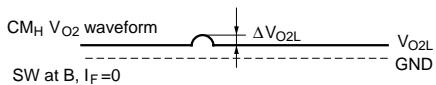
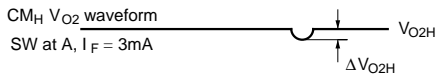
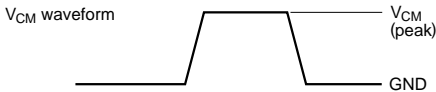
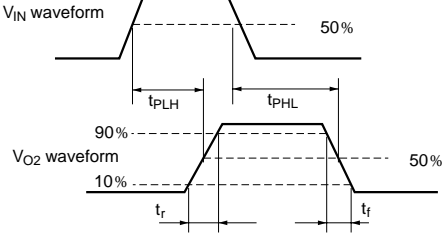
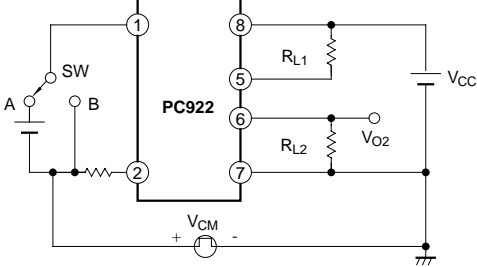
**Fig. 5**



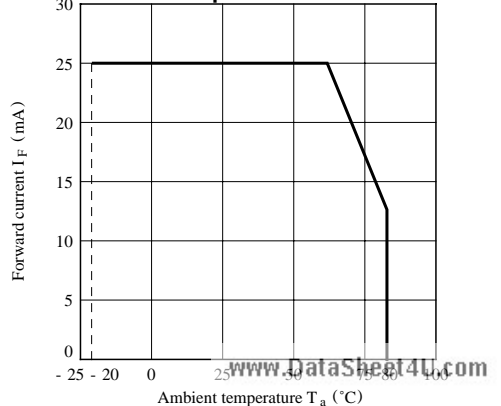
**Fig. 6**



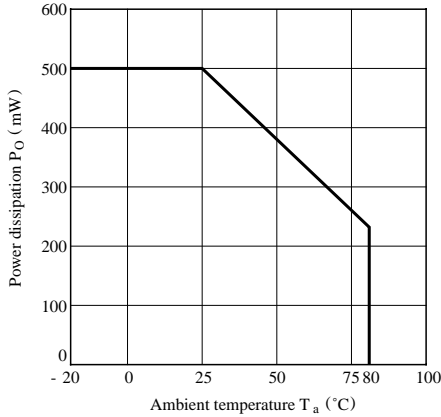
**Fig. 7**



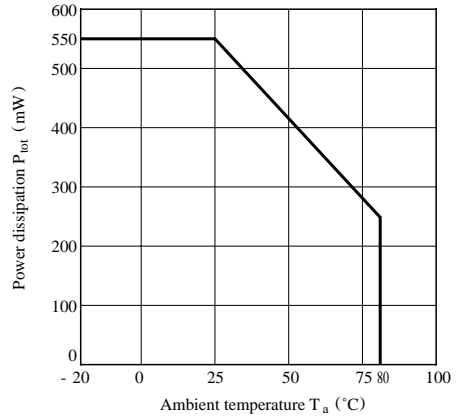
**Fig. 8 Forward Current vs. Ambient Temperature**



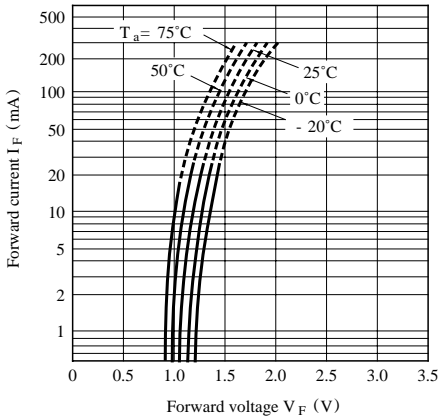
**Fig. 9-a Power Dissipation vs. Ambient Temperature**



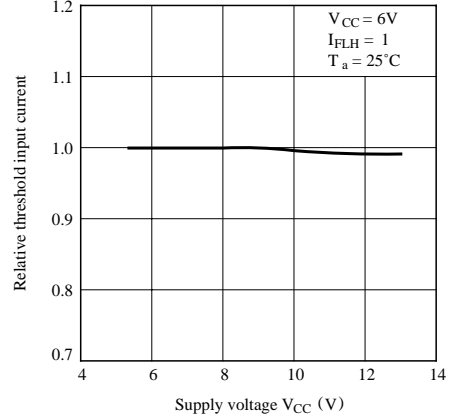
**Fig. 9-b Power Dissipation vs. Ambient Temperature**



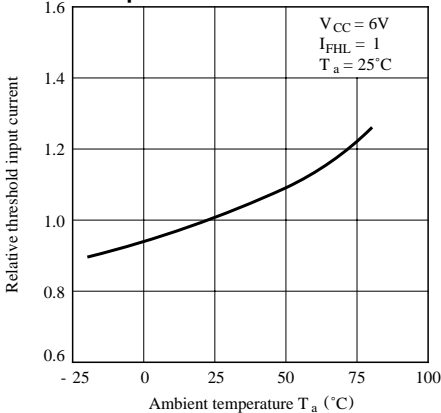
**Fig. 10 Forward Current vs. Forward Voltage**



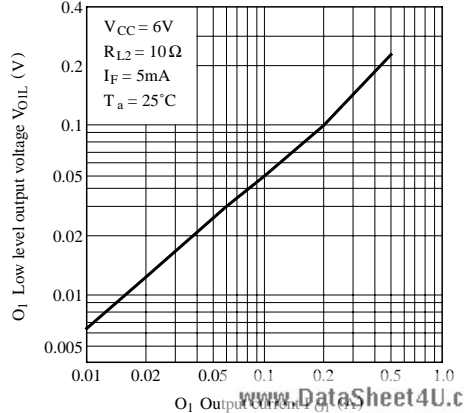
**Fig.11 “ Low→High ” Relative Threshold Input Current vs. Supply Voltage**



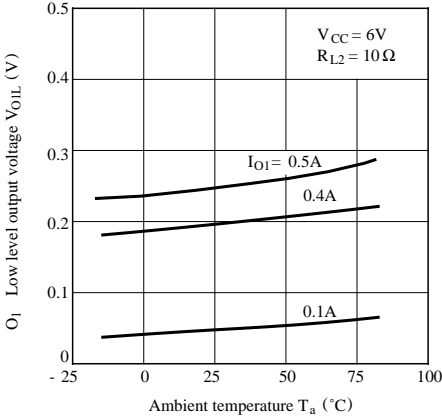
**Fig.12 “ Low→High ” Relative Threshold Input Current vs. Ambient Temperature**



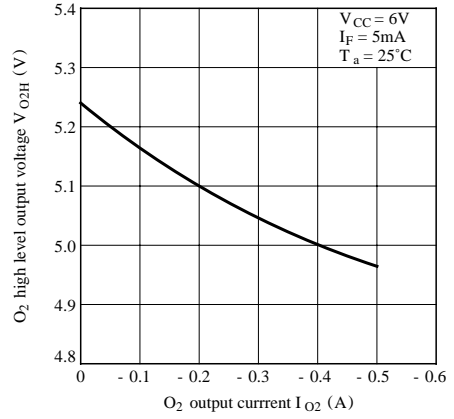
**Fig.13 O<sub>1</sub> Low Level Output Voltage vs. O<sub>1</sub> Output Current**



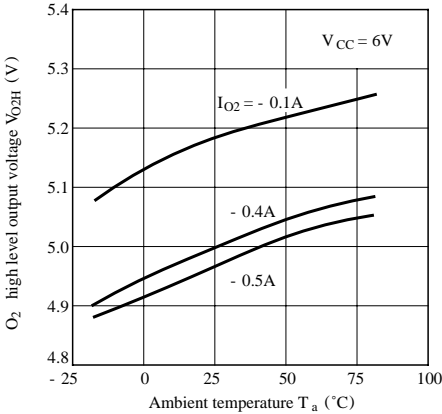
**Fig.14 O<sub>1</sub> Low Level Output Voltage vs. Ambient Temperature**



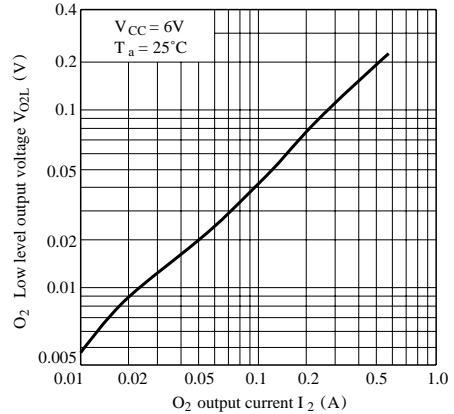
**Fig.15 O<sub>2</sub> High Level Output Voltage vs. O<sub>2</sub> Output Current**



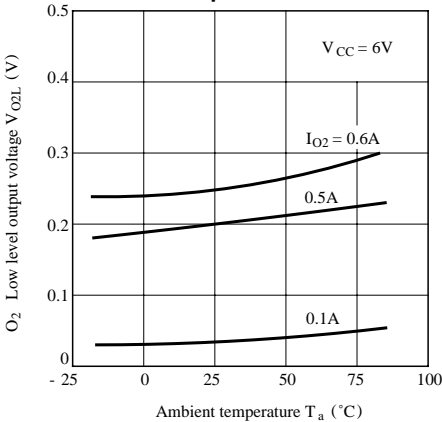
**Fig.16 O<sub>2</sub> High Level Output Voltage vs. Ambient Temperature**



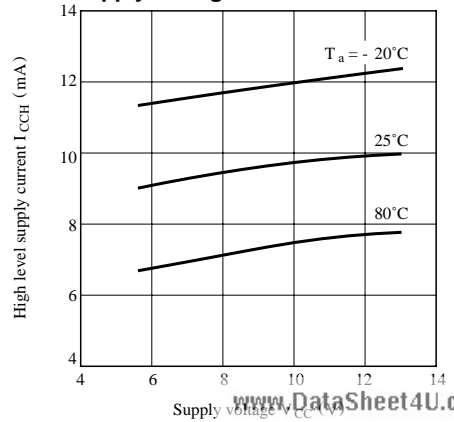
**Fig.17 O<sub>2</sub> Low Level Output Voltage vs. O<sub>2</sub> Output Current**



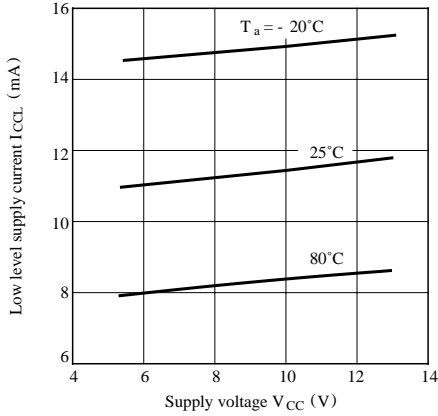
**Fig.18 O<sub>2</sub> Low Level Output Voltage vs. Ambient Temperature**



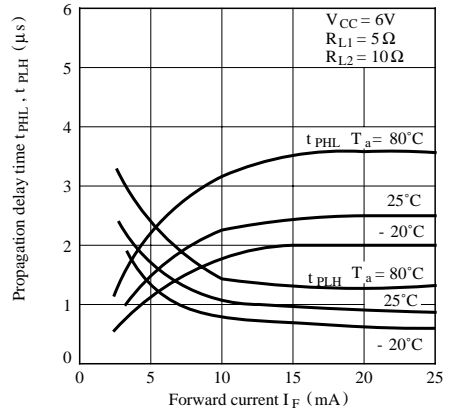
**Fig.19 High Level Supply Current vs. Supply Voltage**



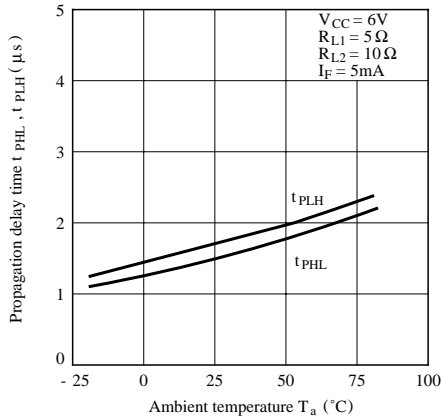
**Fig.20 Low Level Supply Current vs. Supply Voltage**



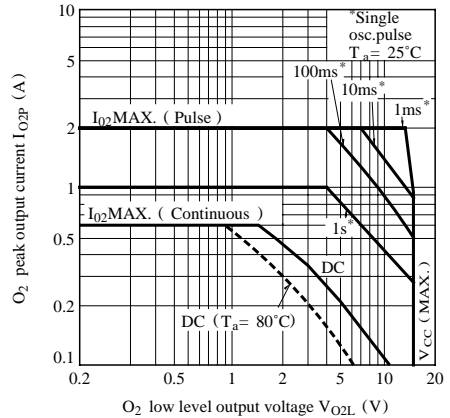
**Fig.21 Propagation Delay Time vs. Forward Current**



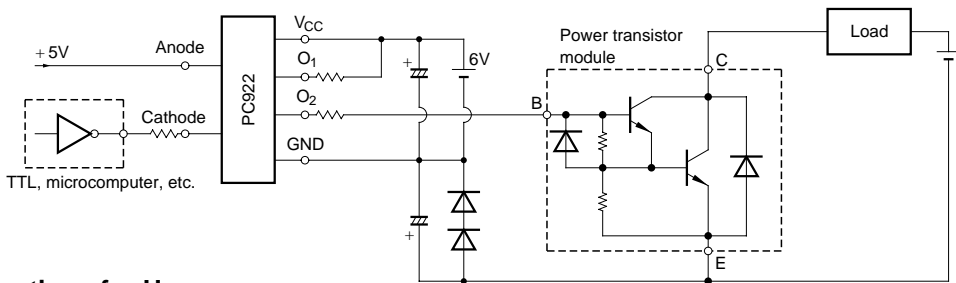
**Fig.22 Propagation Delay Time vs. Ambient Temperature**



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



**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".