PC923

High Speed Photocoupler for MOS-FET / IGBT Drive

※ Lead forming type (I type) and taping reel type (P type) are also available. (PC923I/PC923P) (Page 656)

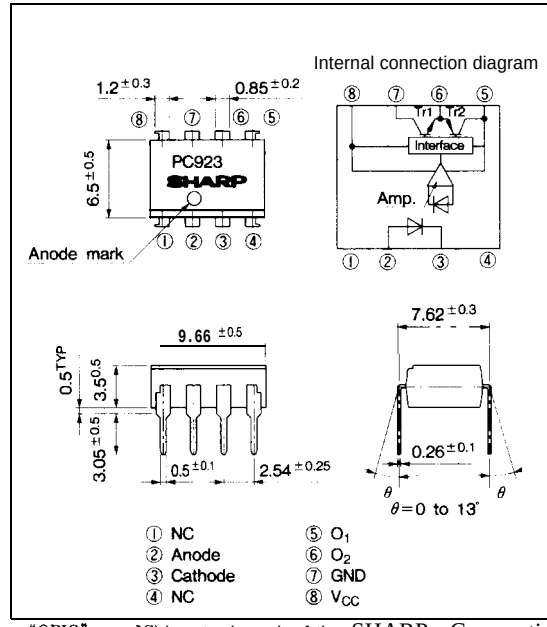
■ Features

1. Built-in direct drive circuit for MOS-FET/ IGBT drive (I_{O1P}, I_{O2P} : 0.4A)
2. High speed response (t_{PLH},t_{PHL}: MAX. 0.5P s)
3. Wide operating supply voltage range (Vcc :15 to 30V, Ta= –10 to 60℃)
4. High noise reduction type (CM_H = MIN. −1 500V/μs) (CM_L = MIN. 1 500V/μs)
5. Recognized by UL, file No. E64380
6. High isolation voltage between input and output (V_{ISO} = 5 000 V_{rms})

■ Applications

1. Inverter controlled air conditioners

■ 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 (Ta = T_{opr} unless otherwise specified)

Parameter		Symbol	Rating	Unit
Input	Forward current	IF	20	mA
	*1 Reverse voltage	V_R	6	v
output	Supply voltage	Vcc	35	v
	O_1 output current	1,	0.1	A
	*2 O_1 peak output current	I_{O1P}	0.4	A
	O_2 output current	102	0.1	A
	*2 O_2 peak outputcurrent	I_{O2P}	0.4	A
	O_1 output voltage	V_{O1}	35	v
	Power dissipation	Po	500	mW
Total rower dissipation		P_{tot}	550	mW
'Isolation voltage		v iso	5000	v rms
Operating temperature		T_{opr}	–25 to +80	℃
Storage temperature		T_{stg}	–55 to +125	℃
'Soldering temperature		T_{sol}	260	℃

*1 Ta=25℃
*2 Puise width ≦0.15 μs, Duty ratio=0.01
*3 40 to 60%RH, AC for 1 minute, Ta=25℃
*4 For 10 seconds

■ Electro-optical Characteristics

(Ta = T_{opr} unless otherwise specified)

Parameter		Symbol	'Conditions	MIN.	TYP.	MAX.	Unit	Fig.
Input	Forward voltage	V_{F1}	Ta = 25℃, I_F = 10mA		1.6	1.75	V	–
		V_{F2}	Ta = 25℃, I_F = 0.2mA	1.2	1.5	–	V	–
	Reverse current	I_R	Ta = 25℃, V_R = 5V	–	–	10	μA	–
	Terminal capacitance	C_t	Ta = 25℃, V = 0, f = 1 MHz	–	30	250	pF	–
output	Operating supply voltage	V_{CC}	Ta = −10 to 60℃	15	–	30	V	–
				15	–	24	V	
	O_1 low level output voltage	V_{O1L}	V_{CC1} = 12V, V_{CC2} = −12V I_{01} = 0.1A, I_F = 5mA	–	0.2	0.4	V	1
	O_2 high level output voltage	V_{O2H}	V_{CC} = V_{01} = 24V, I_{02} = −0.1A, I_F = 5mA	18	21	–	V	2
	O_2 low level output voltage	V_{O2L}	VCC=24V, I_{02} = 0.1A, I_F = 0		1,2	2.0	v	3
	O_1 leak current	I_{O1L}	Ta = 25℃, V_{CC} = V_{01} = 35V, I_F = 0	–	–	500	μA	4
	O_2 leak current	I_{O2L}	Ta = 25℃, V_{CC} = V_{02} = 35V, I_F = 5mA	–	–	500	μA	5
	High level supply current	I_{CCH}	Ta = 25℃, V_{CC} = 24V, I_F = 5mA	–	6	10	mA	6
			V_{CC} = 24V, I_F = 5mA		–	14	mA	
	Low level supply current	I_{CCL}	Ta = 25℃, VCC=24V, I_F = 0	–	8	13	mA	
			VCC=24V, I_F = 0		–	17	mA	
Transfer characteristics	*5 "Low→ High" threshold input current	I_{FLH}	Ta = 25℃, VCC=24V	0.3	1.5	3.0	mA	7
			V_{CC} = 24V	0.2	–	5.0	mA	
	Isolation resistance	R_{ISO}	Ta = 25℃, DC=500V, 40 to 60%RH	5×10^{10}	10^{11}	–	Ω	–
	Response time "Low→High" propagation delay time	t_{PLH}	Ta = 25℃, V_{CC} = 24V, I_F = 5mA R_C = 47Ω, CC=3 000pF	–	0.3	0.5	μs	8
	"High→Low" propagation delay time	t_{PHL}		–	0.3	0.5	μs	
	Rise time	t_r		–	0.2	0.5	μs	
	Fall time	t_f		–	0,2	0.5	μs	
	Instantaneous common mode rejection voltage "Output : High level"	CH_M	Ta = 25℃, V_{CM} = 600V(peak) I_F = 5mA, V_{CC} = 24V, ΔV_{02H} = 2.0V	−1500	–	–	V/μs	9
	Instantaneous common mode rejection voltage "Output : Low level"	CM_L	Ta = 25℃, V_{CM} = 600V(peak) I_F = 0, V_{CC} = 24V, ΔV_{O2L} = 2.0V	1500	–	–	V/μs	

*5 When measuring output and transfer characteristics, connect a by-pass capacitor (0.01 μF or more) between Vcc and GND near the PC923.

*6 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

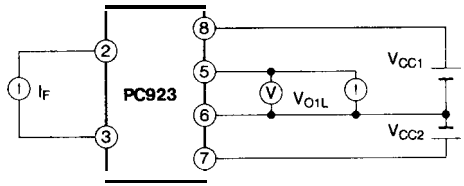


Fig. 2

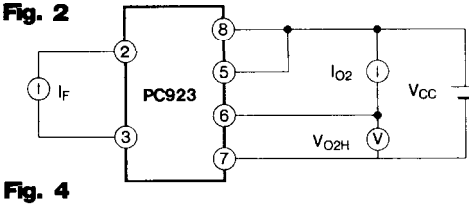


Fig. 3

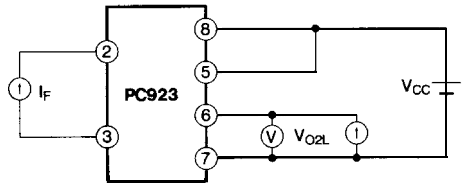


Fig. 4

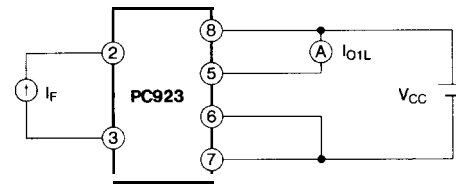


Fig. 5

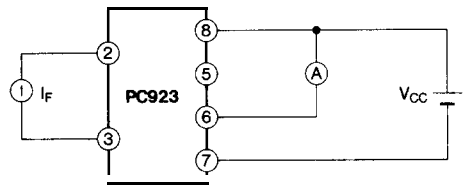


Fig. 6

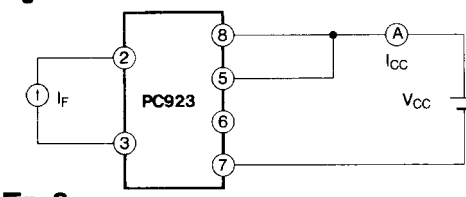


Fig. 7

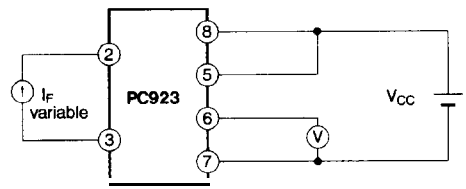
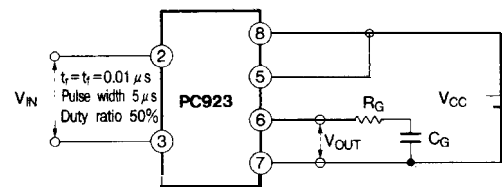


Fig. 8



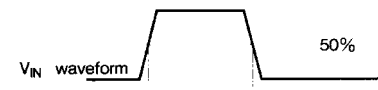
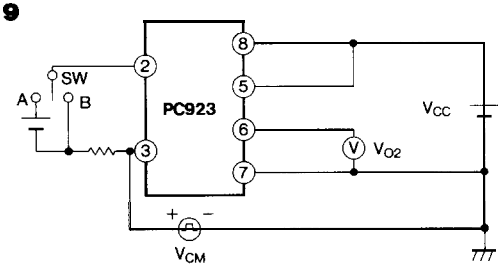
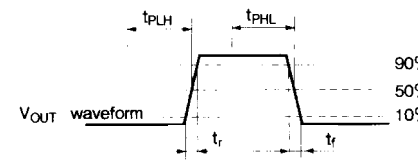


Fig. 9





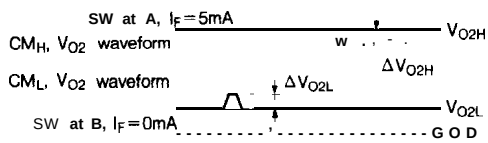


Fig.10 Forward Current vs. Ambient Temperature

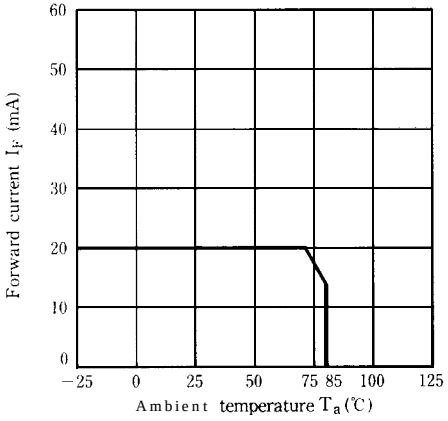


Fig.11 Power Dissipation vs. Ambient Temperature

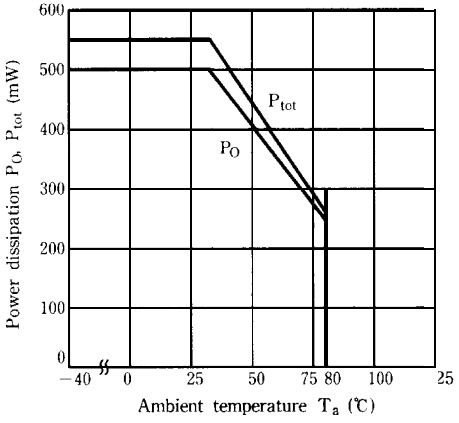


Fig.12 Forward Current vs. Forward Voltage

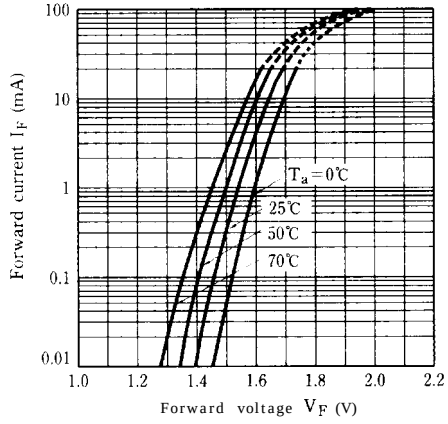


Fig.13 "Low→High" Relative Threshold Input Current vs. Supply Voltage

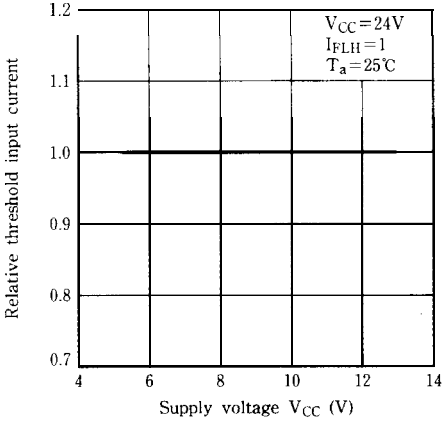
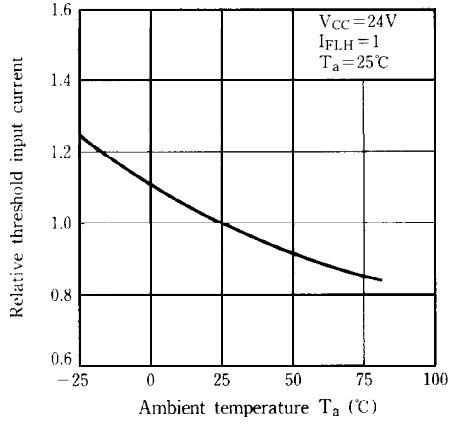


Fig.14 "Low→High" Relative Threshold Input Current vs. Ambient Temperature



Figmls o, Low Level Output Voltage vs. O_1 Output Current

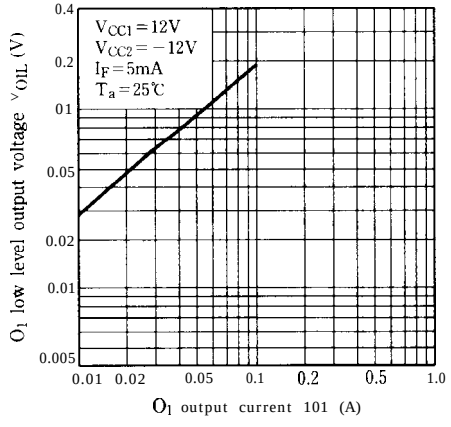


Fig.16 O_1 Low Level Output Voltage vs. Ambient Temperature

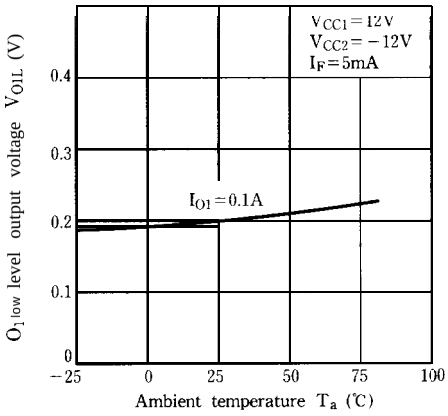


Fig.17 O_2 High Level Output Voltage vs. Supply Voltage

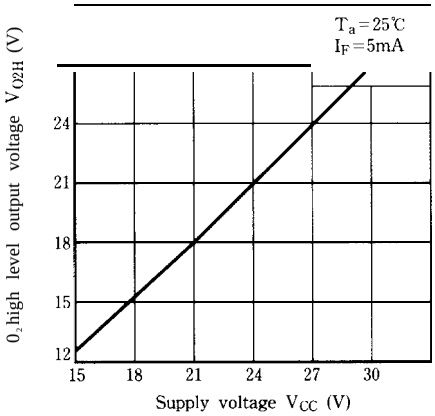


Fig.18 O_2 High Level Output Voltage vs. Ambient Temperature

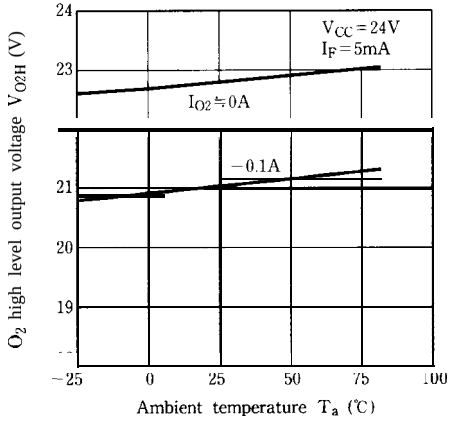


Fig.19 O_2 Low Level Output Voltage vs. O_2 Output Current

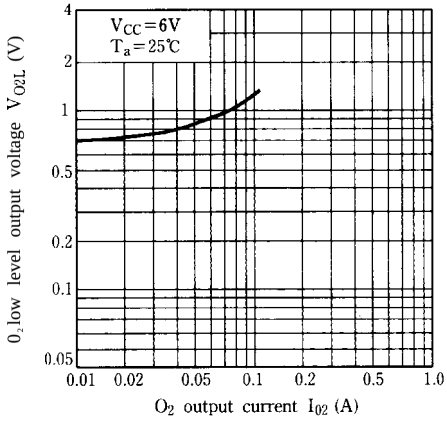


Fig.20 O_2 Low Level Output Voltage vs. Ambient Temperature

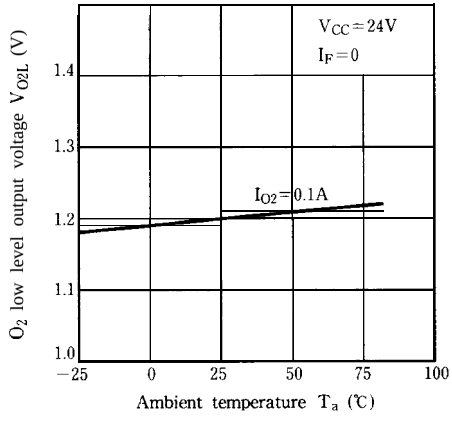
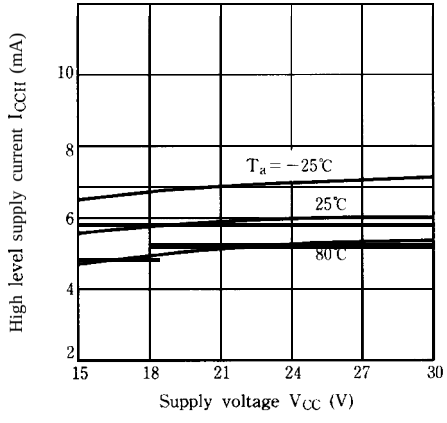


Fig.21 High Level Supply Current vs. Supply Voltage



Figm22 Low Level supply current vs. Supply voltage

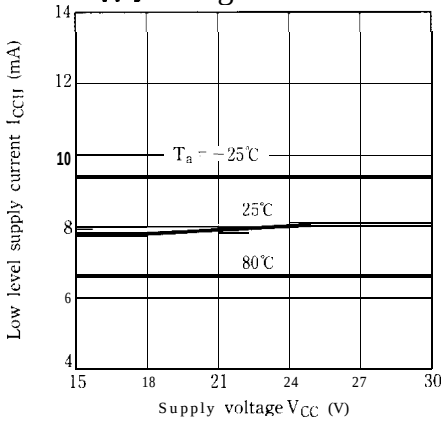


Fig.23 Propagation Delay Time vs. Forwrad current

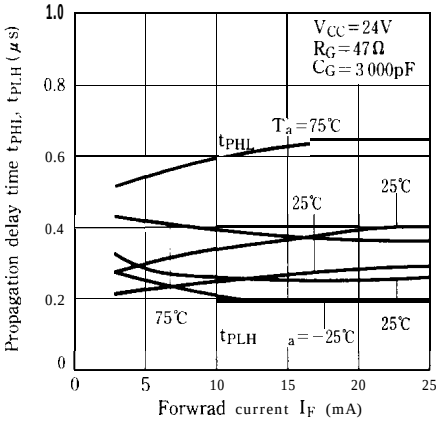
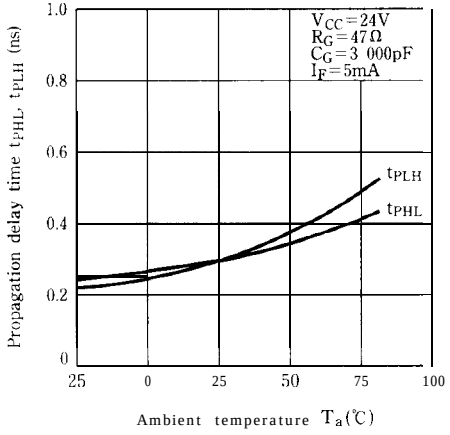
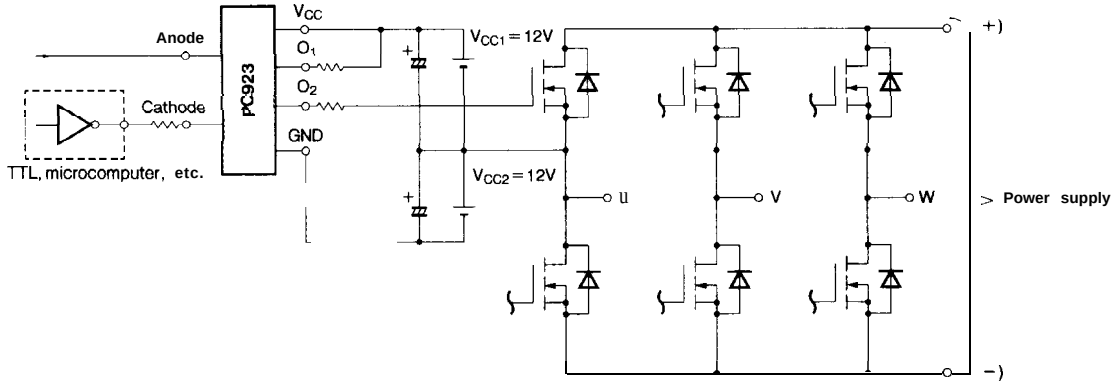


Fig.24 Propagation Delay Time vs. Ambient Temperature



■ Application Circuit (For Power MOS-FET Driving Inverter)



● Please refer to the chapter “Precautions for Use.” (Page 78 to 93)