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**）

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

■ Features

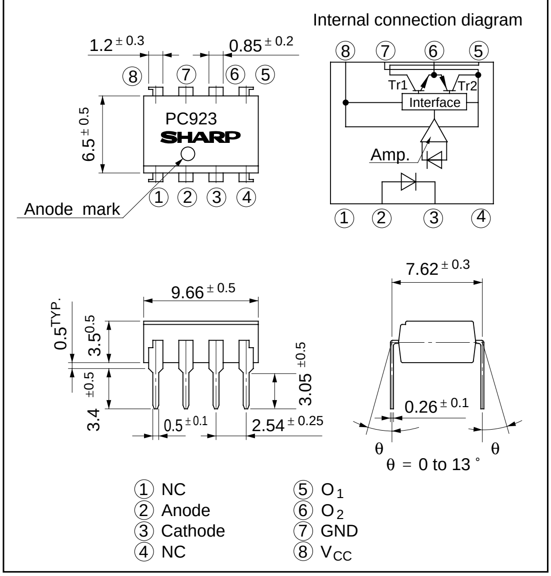
1. Built-in direct drive circuit for MOS-FET/ IGBT drive
   (I_{O1P}, I_{O2P} : 0.4A)
2. High speed response
   (t_{PLH} , t_{PHL} : MAX. 0.5μs)
3. Wide operating supply voltage range
   (Vcc : 15 to 30V, Ta = -10 to 60˚C)
4. High noise reduction type
   (CM_H = MIN. - 1 500V/μs)
   (CM_L = MIN. 1 500V/μs)
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	I_F	20	mA
	*1Reverse voltage	V_R	6	V
Output	Supply voltage	V_{CC}	35	V
	O_1 output current	I_1	0.1	A
	*2O_1 peak output current	I_{O1P}	0.4	A
	O_2 output current	I_{O2}	0.1	A
	*2O_2 peak output current	I_{O2P}	0.4	A
	O_1 output voltage	V_{O1}	35	V
	Power dissipation	P_O	500	mW
Total power dissipation		P_{tot}	550	mW
*3Isolation voltage		V_{iso}	5 000	V_{rms}
Operating temperature		T_{opr}	- 25 to + 80	˚C
Storage temperature		T_{stg}	- 55 to + 125	˚C
*4Soldering temperature		T_{sol}	260	˚C

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

■ Electro-optical Characteristics

(Ta = T_{opr} unless otherwise specified)

Parameter			Symbol	*5 Conditions	MIN.	TYP.	MAX.	Unit	Fig.
Input	Forward voltage		V_{F1}	Ta = 25˚C, I_F = 10mA	-	1.6	1.75	V	-
			V_{F2}	Ta = 25˚C, I_F = 0.2mA	1.2	1.5	-	V	-
	Reverse current		I_R	Ta = 25˚C, V_R = 5V	-	-	10	μA	-
	Terminal capacitance		C_t	Ta = 25˚C, V = 0, f = 1MHz	-	30	250	pF	-
Output	Operating supply voltage		V_{CC}	Ta = - 10 to 60˚C	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}	V_{CC} = 24V, I_{02} = 0.1A, I_F = 0	-	1.2	2.0	V	3
	O_1 leak current		I_{O1L}	Ta = 25˚C, V_{CC} = V_{01} = 35V, I_F = 0	-	-	500	μA	4
	O_2 leak current		I_{O2L}	Ta = 25˚C, V_{CC} = V_{02} = 35V, I_F = 5mA	-	-	500	μA	5
	High level supply current		I_{CCH}	Ta = 25˚C, 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˚C, V_{CC} = 24V, I_F = 0	-	8	13	mA	
				V_{CC} = 24V, I_F = 0	-	-	17	mA	
Transfer characteristics	*6 "Low→High" threshold input current		I_{FLH}	Ta = 25˚C, V_{CC} = 24V	0.3	1.5	3.0	mA	7
				V_{CC} = 24V	0.2	-	5.0	mA	
	Isolation resistance		R_{ISO}	Ta = 25˚C, DC = 500V, 40 to 60% RH	5×10^{10}	10^{11}	-	Ω	-
	Response time	"Low→High" propagation delay time	t_{PLH}	Ta = 25˚C, V_{CC} = 24V, I_F = 5mA R_C = 47Ω, C_G = 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˚C, V_{CM} = 600V(peak) I_F = 5mA, V_{CC} = 24V, ΔV_{O2H} = 2.0V	-	- 30	-	kV/μs	9
	Instantaneous common mode rejection voltage "Output : Low level"		CM_L	Ta = 25˚C, V_{CM} = 600V(peak) I_F = 0, V_{CC} = 24V, ΔV_{O2L} = 2.0V	-	30	-	kV/μs	

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

*6 I_{FLH} represents forward current when O_2 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

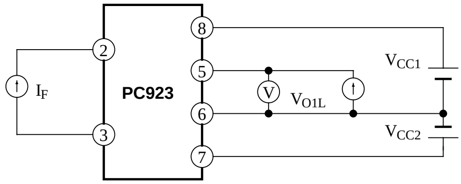


Fig. 2

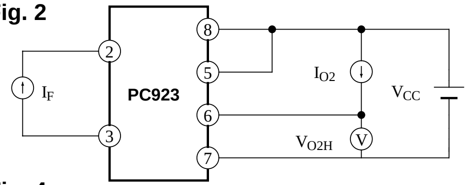


Fig. 3

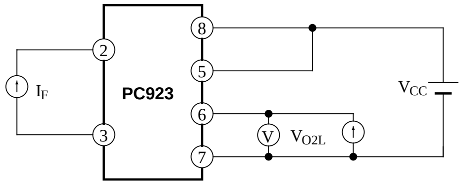


Fig. 4

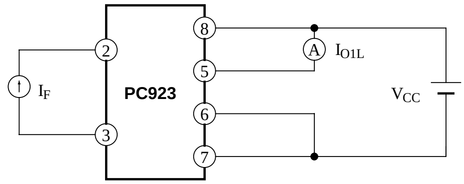


Fig. 5

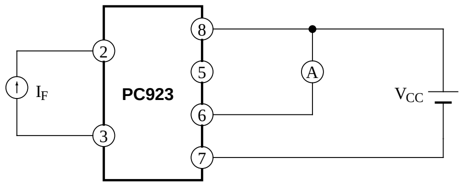


Fig. 6

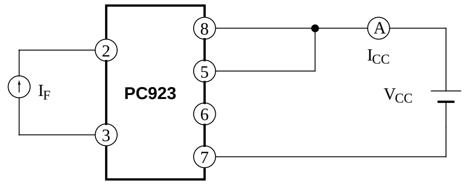


Fig. 7

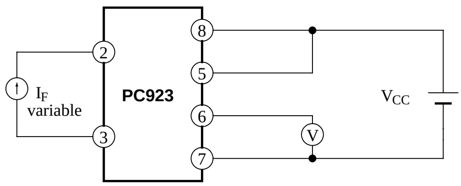


Fig. 8

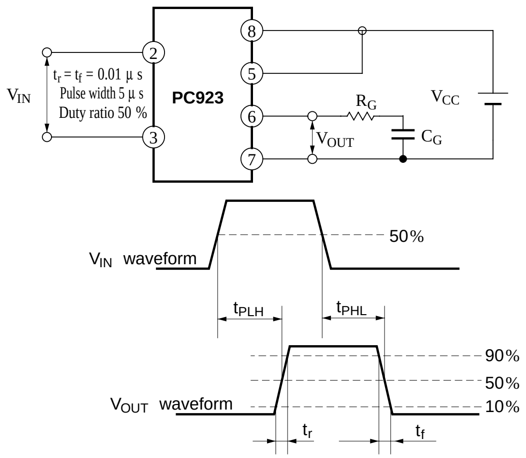


Fig. 9

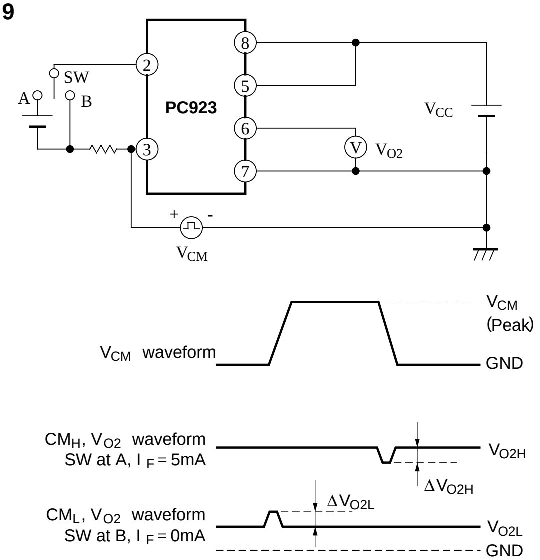


Fig.10 Forward Current vs. Ambient Temperature

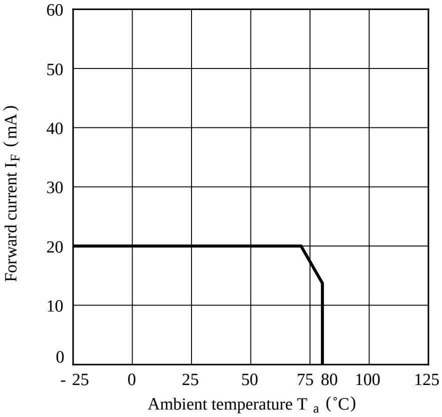


Fig.11 Power Dissipation vs. Ambient Temperature

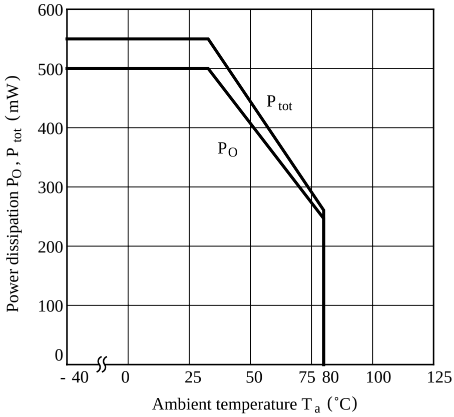


Fig.12 Forward Current vs. Forward Voltage

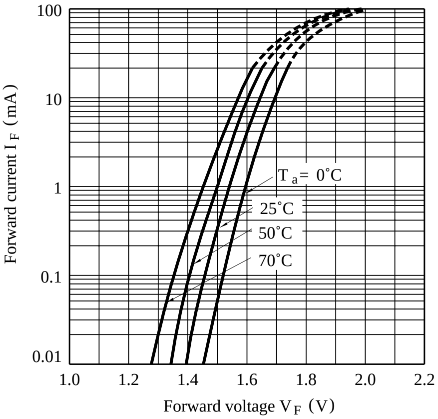


Fig.13 " Low→High " Relative Threshold Input Current vs. Supply Voltage

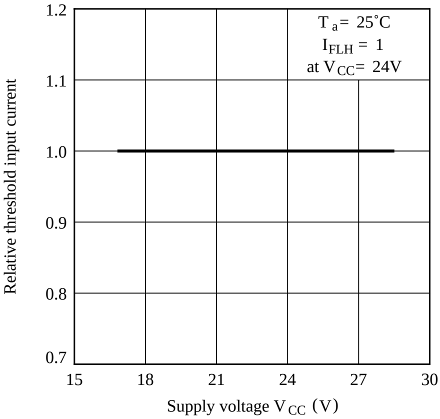


Fig.14 " Low→High " Relative Threshold Input Current vs. Ambient Temperature

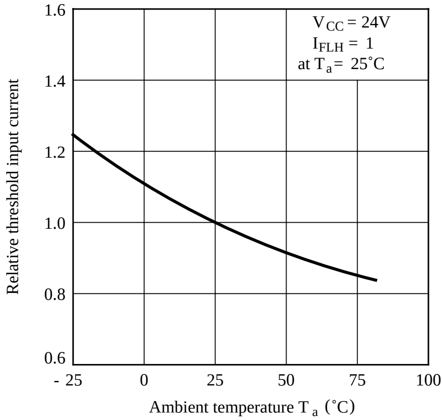


Fig.15 O_1 Low Level Output Voltage vs. O_1 Output Current

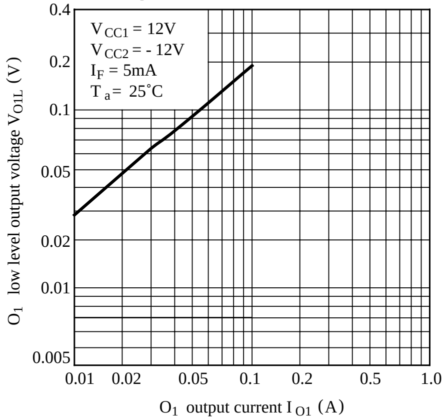


Fig.16 O_1 Low Level Output Voltage vs. Ambient Temperature

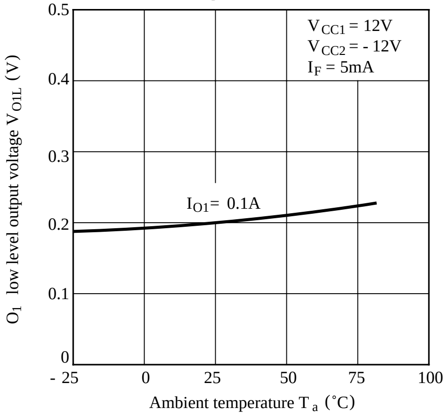


Fig.17 O_2 High Level Output Voltage vs. Supply Voltage

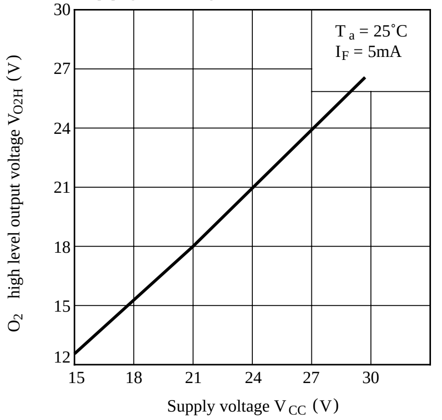


Fig.18 O_2 High Level Output Voltage vs. Ambient Temperature

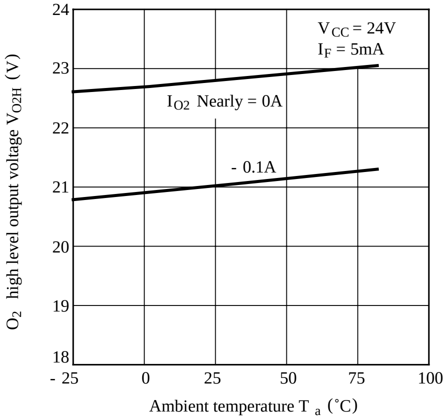


Fig.19 O_2 Low Level Output Voltage vs. O_2 Output Current

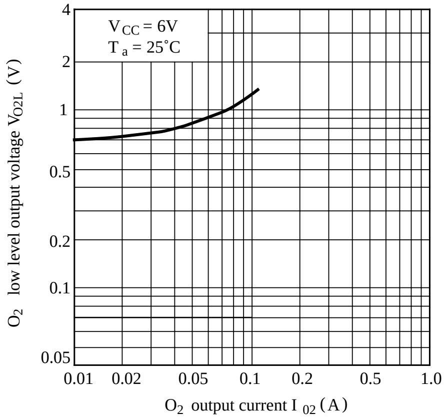


Fig.20 O_2 Low Level Output Voltage vs. Ambient Temperature

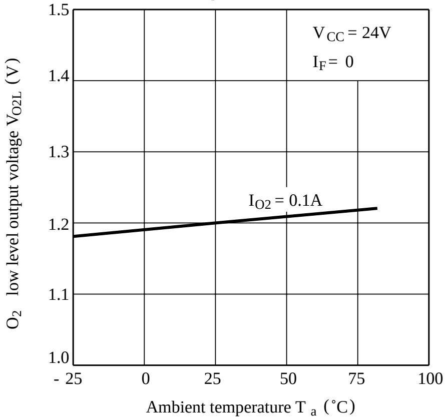


Fig.21 High Level Supply Current vs. Supply Voltage

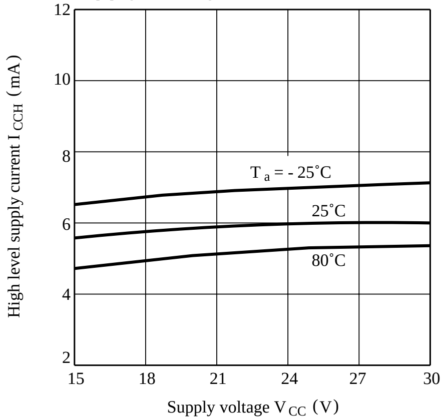


Fig.22 Low Level Supply Current vs. Supply Voltage

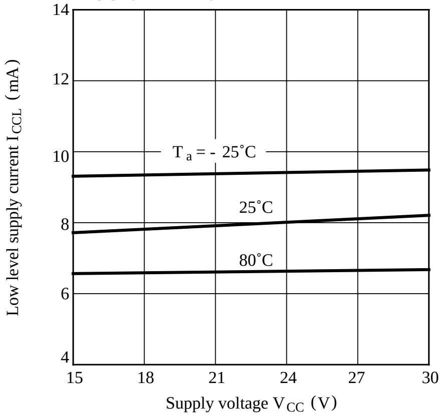


Fig.23 Propagation Delay Time vs. Forwrad current

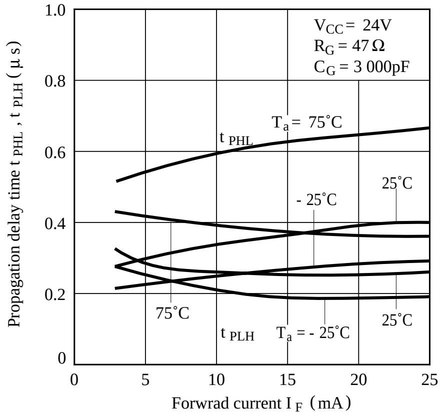
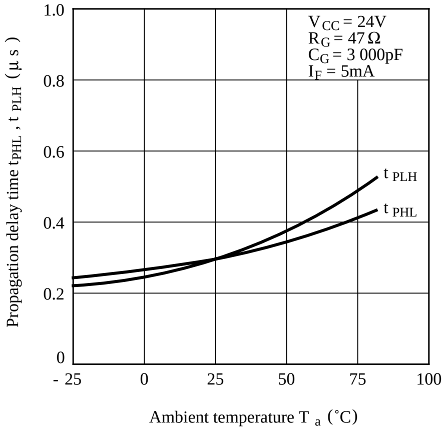
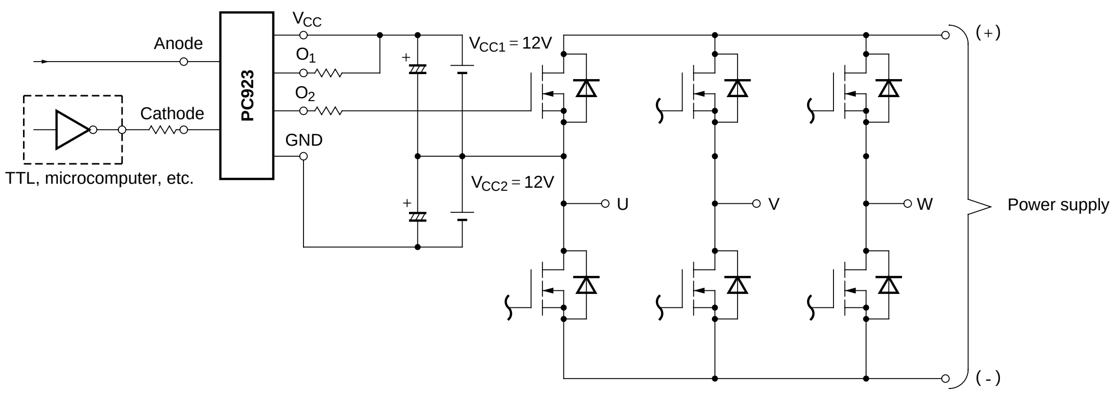


Fig.24 Propagation Delay Time vs. Ambient Temperature



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



● Please refer to the chapter "Precautions for Use."