

## PC924X

## OPIC Photocoupler

### OPIC Photocoupler for IGBT Drive of Inverter

#### ■ Features

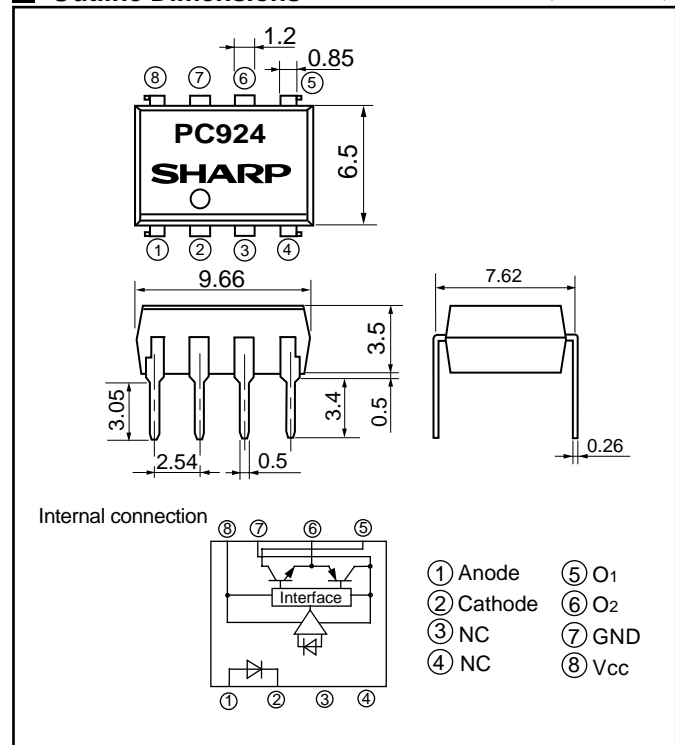
- (1) Built-in direct drive circuit for IGBT drive  
( $I_{O1P}, I_{O2P}$  : 0.4 A)
- (2) High speed response  
( $t_{PHL}, t_{PLH}$  : MAX. 2.0  $\mu$ s)
- (3) Wide operating supply voltage range  
( $V_{CC}$  : 15 to 30 V,  $T_a = -10$  to 60 °C)
- (4) High noise reduction type  
( $CMH = \text{MIN. } -1\ 500$  V/ $\mu$ s)  
( $CML = \text{MIN. } 1\ 500$  V/ $\mu$ s)
- (5) High isolation voltage ( $V_{iso(rms)}$  : 5 kV)

#### ■ Applications

- (1) IGBT drive for inverter control

#### ■ 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

(Unless specified,  $T_a = T_{opr}$ )

Parameter		Symbol	Ratings	Unit
Input	Forward current	$I_F$	25	mA
	*1 Reverse voltage	$V_R$	6	V
	Supply voltage	$V_{CC}$	35	V
Output	O <sub>1</sub> Output current	$I_{O1}$	0.1	A
	*2 O <sub>1</sub> Peak output current	$I_{O1P}$	0.4	A
	O <sub>2</sub> Output current	$I_{O2}$	0.1	A
	*2 O <sub>2</sub> Peak output current	$I_{O2P}$	0.4	A
	O <sub>1</sub> Output voltage	$V_{O1}$	35	V
	Power dissipation	$P_o$	500	mW
	Total power dissipation	$P_{tot}$	550	mW
*3 Isolation voltage	$V_{iso(rms)}$	5.0	kV	
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  $\leq 0.15$   $\mu$ s, duty ratio = 0.01

\*3 40 to 60% RH, AC for 1 minute,  $T_a = 25^\circ\text{C}$

\*4 For 10s

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### ■ Electro-optical Characteristics

(Unless specified,  $T_a=T_{opr}$ )

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	$V_{F1}$	$T_a=25\text{ }^\circ\text{C}$ , $I_F=20\text{ mA}$	–	1.2	1.4	V	
		$V_{F2}$	$T_a=25\text{ }^\circ\text{C}$ , $I_F=0.2\text{ mA}$	0.6	0.9	–	V	
	Reverse current	$I_R$	$T_a=25\text{ }^\circ\text{C}$ , $V_R=4\text{ V}$	–	–	10	$\mu\text{A}$	
	Terminal capacitance	$C_t$	$T_a=25\text{ }^\circ\text{C}$ , $V=0$ , $f=1\text{ kHz}$	–	30	250	pF	
Output	Operation temperature supply voltage	$V_{CC}$	$T_a=-10\text{ to }60\text{ }^\circ\text{C}$	15	–	30	V	
			–	15	–	24	V	
	O1 low level output voltage	$V_{O1L}$	$V_{CC1}=12\text{ V}$ , $V_{CC2}=-12\text{ V}$ , $I_{O1}=0.1\text{ A}$ , $I_F=10\text{ mA}$	–	0.2	0.4	V	
	O2 high level output voltage	$V_{O2H}$	$V_{CC}=V_{O1}=24\text{ V}$ , $I_{O2}=-0.1\text{ A}$ , $I_F=10\text{ mA}$	18	21	–	V	
	O2 low level output voltage	$V_{O2L}$	$V_{CC}=24\text{ V}$ , $I_{O2}=0.1\text{ A}$ , $I_F=0$	–	1.2	2.0	V	
	O1 leak current	$I_{O1L}$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CC}=V_{O1}=35\text{ V}$ , $I_F=0\text{ mA}$	–	–	500	$\mu\text{A}$	
	O2 leak current	$I_{O2L}$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CC}=V_{O2}=35\text{ V}$ , $I_F=10\text{ mA}$	–	–	500	$\mu\text{A}$	
	High level supply current	$I_{CCH}$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CC}=24\text{ V}$ , $I_F=10\text{ mA}$	–	6	10	mA	
			$V_{CC}=24\text{ V}$ , $I_F=10\text{ mA}$	–	–	14	mA	
	Low level supply current	$I_{CCL}$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CC}=24\text{ V}$ , $I_F=0\text{ mA}$	–	8	13	mA	
$V_{CC}=24\text{ V}$ , $I_F=0\text{ mA}$			–	–	17	mA		
Transfer characteristics	"Low→High" thresh hold input current *5	$I_{FLH}$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CC}=24\text{ V}$	1.0	4.0	7.0	mA	
			$V_{CC}=24\text{ V}$	0.6	–	10.0	mA	
	Isolation resistance	$R_{ISO}$	$T_a=25\text{ }^\circ\text{C}$ , DC= 500 V 40 to 60 %RH	$5 \times 10^{10}$	$1 \times 10^{11}$	–	$\Omega$	
	Response time	"Low→High" transfer time	$t_{PLH}$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CC}=24\text{ V}$ , $I_F=10\text{ mA}$ , $R_G=47\text{ }\Omega$ , $C_G=3000\text{ pF}$	–	1.0	2.0	$\mu\text{s}$
		"High→Low" transfer time	$t_{PHL}$		–	1.0	2.0	
		Rise time	$t_r$		–	0.2	0.5	
		Fall time	$t_f$		–	0.2	0.5	
	Instantaneous common mode rejection voltage "Output:High level"	$CM_H$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CM}=600\text{ V}_{(peak)}$ , $I_F=10\text{ mA}$ $V_{CC}=24\text{ V}$ , $\Delta V_{O2H}=2.0\text{ V}$	-1 500	–	–	V $\mu\text{s}$	
Instantaneous common mode rejection voltage "Output: Low level"	$CM_L$	$T_a=25\text{ }^\circ\text{C}$ , $V_{CM}=600\text{ V}_{(peak)}$ , $I_F=0\text{ mA}$ $V_{CC}=24\text{ V}$ , $\Delta V_{O2L}=2.0\text{ V}$	1 500	–	–	V $\mu\text{s}$		

\*5  $I_{FLH}$  is forward current when output become "Low" to "High"

\*6 When measuring output and transfer characteristics, connect a by-pass capacitor(0.01 $\mu\text{F}$  or more) between  $V_{CC}$  and GND near the device.

### ■ Truth Table

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

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