

## PC924X

## OPIC Photocoupler

### OPIC Photocoupler for IGBT Drive of Inverter

#### ■ Features

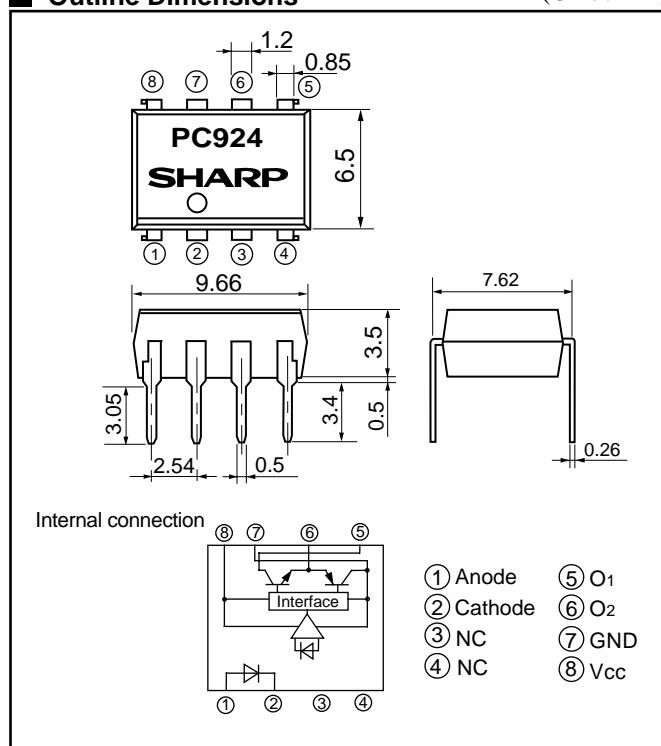
- (1) Built-in direct drive circuit for IGBT drive  
( $I_{O1P}, I_{O2P}$  : 0.4 A)
- (2) High speed response  
( $t_{PHL}, t_{PLH}$  : MAX. 2.0  $\mu$ s)
- (3) Wide operating supply voltage range  
( $V_{CC}$  : 15 to 30 V,  $T_a$  = -10 to 60 °C)
- (4) High noise reduction type  
( $CMH$  = MIN. -1 500 V/ $\mu$ s)  
( $CML$  = 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
	Reverse voltage	$V_R$	6
	Supply voltage	$V_{CC}$	35
Output	O <sub>1</sub> Output current	$I_{O1}$	0.1
	*2 O <sub>1</sub> Peak output current	$I_{O1P}$	0.4
	O <sub>2</sub> Output current	$I_{O2}$	0.1
	*2 O <sub>2</sub> Peak output current	$I_{O2P}$	0.4
	O <sub>1</sub> Output voltage	$V_{O1}$	35
	Power dissipation	$P_o$	500
	Total power dissipation	$P_{tot}$	550
*3	Isolation voltage	$V_{iso(rms)}$	5.0
	Operating temperature	$T_{opr}$	-20 to +80
	Storage temperature	$T_{stg}$	-55 to +125
*4	Soldering temperature	$T_{sol}$	260

\*1  $T_a = 25^\circ\text{C}$

\*2 Pulse width  $\leq 0.15 \mu\text{s}$ , 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, Ta=T<sub>opr</sub>)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V <sub>F1</sub>	T <sub>a</sub> = 25 °C, I <sub>F</sub> =20 mA	—	1.2	1.4	V
		V <sub>F2</sub>	T <sub>a</sub> = 25 °C, I <sub>F</sub> = 0.2 mA	0.6	0.9	—	V
	Reverse current	I <sub>R</sub>	T <sub>a</sub> = 25 °C, V <sub>R</sub> = 4 V	—	—	10	μA
	Terminal capacitance	C <sub>t</sub>	T <sub>a</sub> =25 °C, V= 0, f= 1 kHz	—	30	250	pF
Output	Operation temperature supply voltage	V <sub>CC</sub>	T <sub>a</sub> = -10 to 60 °C	15	—	30	V
			—	15	—	24	V
	O <sub>1</sub> low level output voltage	V <sub>O1L</sub>	V <sub>CC1</sub> =12 V, V <sub>CC2</sub> = -12 V, I <sub>O1</sub> = 0.1 A, I <sub>F</sub> = 10 mA	—	0.2	0.4	V
	O <sub>2</sub> high level output voltage	V <sub>O2H</sub>	V <sub>CC</sub> =V <sub>O1</sub> = 24 V, I <sub>O2</sub> = -0.1 A, I <sub>F</sub> = 10 mA	18	21	—	V
	O <sub>2</sub> low level output voltage	V <sub>O2L</sub>	V <sub>CC</sub> = 24 V, I <sub>O2</sub> = 0.1 A, I <sub>F</sub> = 0	—	1.2	2.0	V
	O <sub>1</sub> leak current	I <sub>O1L</sub>	T <sub>a</sub> = 25 °C, V <sub>CC</sub> =V <sub>O1</sub> = 35 V, I <sub>F</sub> =0 mA	—	—	500	μA
	O <sub>2</sub> leak current	I <sub>O2L</sub>	T <sub>a</sub> = 25 °C, V <sub>CC</sub> =V <sub>O2</sub> = 35 V, I <sub>F</sub> =10 mA	—	—	500	μA
	High level supply current	I <sub>CCH</sub>	T <sub>a</sub> =25 °C, V <sub>CC</sub> = 24 V, I <sub>F</sub> = 10 mA	—	6	10	mA
			V <sub>CC</sub> = 24 V, I <sub>F</sub> = 10 mA	—	—	14	mA
	Low level supply current	I <sub>CCL</sub>	T <sub>a</sub> =25 °C, V <sub>CC</sub> = 24 V, I <sub>F</sub> = 0 mA	—	8	13	mA
			V <sub>CC</sub> = 24 V, I <sub>F</sub> = 0 mA	—	—	17	mA
Transfer characteristics	"Low→High" thresh hold input current *5	I <sub>FLH</sub>	T <sub>a</sub> =25°C, V <sub>CC</sub> = 24 V	1.0	4.0	7.0	mA
			V <sub>CC</sub> = 24 V	0.6	—	10.0	mA
	Isolation resistance	R <sub>ISO</sub>	T <sub>a</sub> = 25 °C, DC= 500 V 40 to 60 %RH	5 x 10 <sup>10</sup>	1 x 10 <sup>11</sup>	—	Ω
	Response time	"Low→High"transfer time	T <sub>a</sub> = 25 °C, V <sub>CC</sub> = 24 V, I <sub>F</sub> = 10 mA, R <sub>G</sub> = 47 Ω, C <sub>G</sub> = 3000 pF	—	1.0	2.0	μs
		"High→Low"transfer time		—	1.0	2.0	
		Rise time		—	0.2	0.5	
		Fall time		—	0.2	0.5	
	Instantaneous common mode rejection voltage "Output:High level"	CM <sub>H</sub>	T <sub>a</sub> =25 °C, V <sub>CM</sub> =600 V <sub>(peak)</sub> , I <sub>F</sub> =10 mA V <sub>CC</sub> = 24 V, ΔV <sub>O2H</sub> = 2.0 V	-1 500	—	—	V/μs
	Instantaneous common mode rejection voltage "Output: Low level"	CM <sub>L</sub>	T <sub>a</sub> =25 °C, V <sub>CM</sub> =600 V <sub>(peak)</sub> , I <sub>F</sub> = 0 mA V <sub>CC</sub> = 24 V, ΔV <sub>O2L</sub> = 2.0 V	1 500	—	—	V/μs

\*5 I<sub>FLH</sub> is forward current when output become "Low" to "High"

\*6 When measuring output and transfer characteristics, connect a by-pass capacitor(0.01μF or more) between V<sub>CC</sub> 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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