

PC923X

OPIC Photocoupler

High Speed OPIC Photocoupler for MOS-FET/IGBT Drive

Features

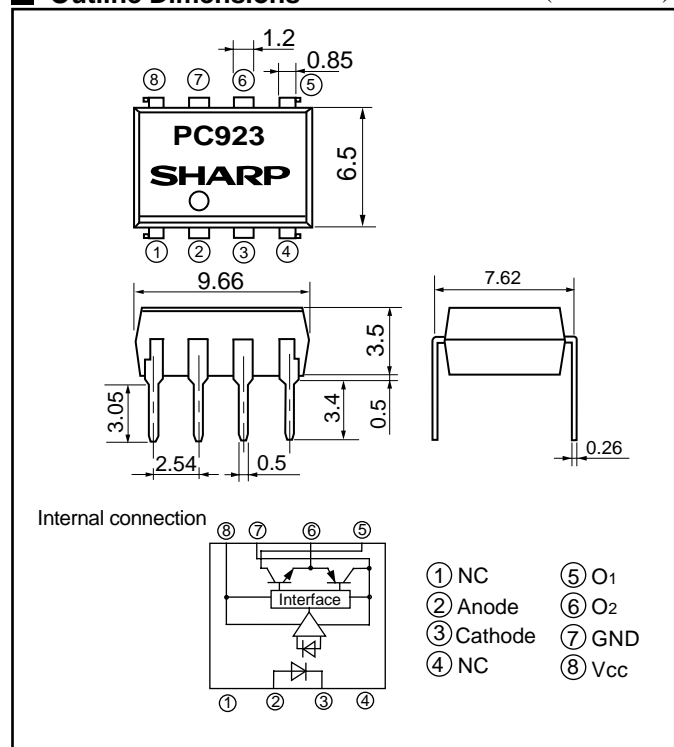
- (1) Built-in direct drive circuit for MOS-FET/IGBT drive
(I_{O1P}, I_{O2P} : 0.4 A)
- (2) High speed response
(t_{PHL}, t_{PLH} : MAX. 0.5 μ s)
- (3) Wide operating supply voltage range
(V_{CC} : 15 to 30 V, T_a = -10 to 60 °C)
- (4) High noise reduction type
(C_{MH} = MIN. -1 500 V/ μ s)
(C_{ML} = MIN. 1 500 V/ μ s)
- (5) High isolation voltage ($V_{iso(rms)}$: 5 kV)

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

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

Parameter		Symbol	Ratings	Unit
Input	Forward current	I_F	20	mA
	*1 Reverse voltage	V_R	6	V
	Supply voltage	V_{CC}	35	V
Output	O ₁ Output current	I_{O1}	0.1	A
	*2 O ₁ Peak output current	I_{O1P}	0.4	A
	O ₂ Output current	I_{O2}	0.1	A
	*2 O 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
*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 $\leq 0.15 \mu\text{s}$, 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, $T_a=T_{opr}$)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V_{F1}	$T_a=25\text{ }^\circ\text{C}$, $I_F=10\text{ mA}$	–	1.6	1.75	V	
		V_{F2}	$T_a=25\text{ }^\circ\text{C}$, $I_F=0.2\text{ mA}$	1.2	1.5	–	V	
	Reverse current	I_R	$T_a=25\text{ }^\circ\text{C}$, $V_R=5\text{ V}$	–	–	10	μA	
	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	
	O ₁ low level output voltage	V_{O1L}	$V_{CC1}=12\text{ V}$, $V_{CC2}=-12\text{ V}$, $I_{O1}=0.1\text{ A}$, $I_F=5\text{ mA}$	–	0.2	0.4	V	
	O ₂ high level output voltage	V_{O2H}	$V_{CC}=V_{O1}=24\text{ V}$, $I_{O2}=-0.1\text{ A}$, $I_F=5\text{ mA}$	18	21	–	V	
	O ₂ 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	
	O ₁ leak current	I_{O1L}	$T_a=25\text{ }^\circ\text{C}$, $V_{CC}=V_{O1}=35\text{ V}$, $I_F=0\text{ mA}$	–	–	500	μA	
	O ₂ leak current	I_{O2L}	$T_a=25\text{ }^\circ\text{C}$, $V_{CC}=V_{O2}=35\text{ V}$, $I_F=5\text{ mA}$	–	–	500	μA	
	High level supply current	I_{CCH}	$T_a=25\text{ }^\circ\text{C}$, $V_{CC}=24\text{ V}$, $I_F=5\text{ mA}$	–	6	10	mA	
			$V_{CC}=24\text{ V}$, $I_F=5\text{ mA}$	–	–	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}	$T_a=25\text{ }^\circ\text{C}$, $V_{CC}=24\text{ V}$	0.3	1.5	3.0	mA	
			$V_{CC}=24\text{ V}$	0.2	–	5.0	mA	
	Isolation resistance	R_{ISO}	$T_a=25\text{ }^\circ\text{C}$, DC= 500 V 40 to 60 %RH	5×10^{10}	1×10^{11}	–	Ω	
	Response time	"Low→High" transfer time	t_{PLH}	$T_a=25\text{ }^\circ\text{C}$, $V_{CC}=24\text{ V}$, $I_F=5\text{ mA}$, $R_G=47\text{ }\Omega$, $C_G=3000\text{ pF}$	–	0.3	0.5	μs
		"High→Low" transfer time	t_{PHL}		–	0.3	0.5	
		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	$T_a=25\text{ }^\circ\text{C}$, $V_{CM}=600\text{ V}_{(peak)}$, $I_F=5\text{ mA}$ $V_{CC}=24\text{ V}$, $\Delta V_{O2H}=2.0\text{ V}$	-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 O₂ become "Low" to "High"

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

■ Truth Table



Input	O ₂ output	Tr. 1	Tr. 2
ON	High level	ON	OFF
OFF	Low level	OFF	ON

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