SHARP

PC923X OPIC Photocoupler

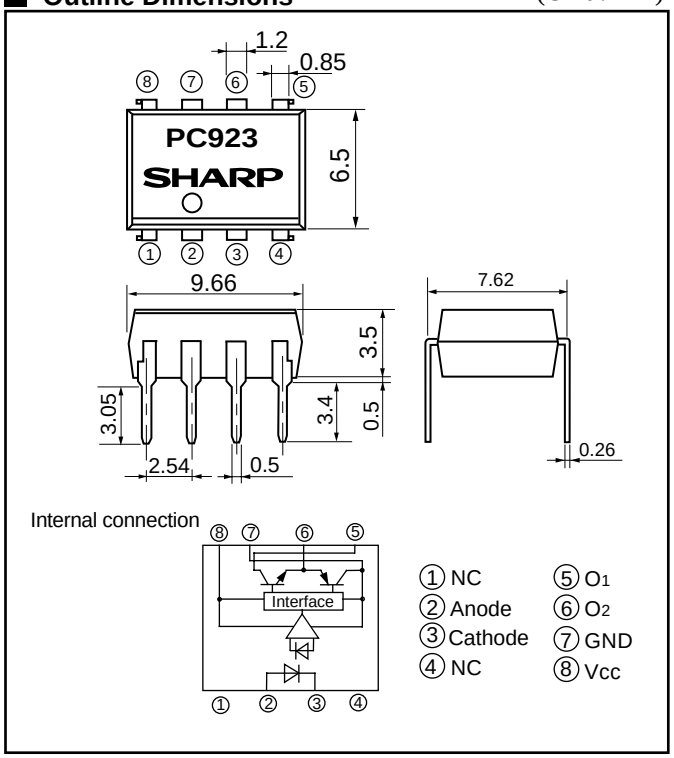
High Speed OPIC Photocoupler for MOS-FET/IGBT Drive

■ 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 µs)
(3) Wide operating supply voltage range
(V_{CC} : 15 to 30 V, Ta= -10 to 60 ˚C)
(4) High noise reduction type
(CM_H=MIN. -1 500 V/µs)
(CM_L=MIN. 1 500 V/µs)
(5) High isolation voltage ($V_{iso(rms)}$: 5 kV)

■ 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.

■ Applications

(1) Inverter controlled air conditioners

■ Absolute Maximum Ratings

(Unless specified, Ta=T_{opr})

Parameter			Symbol	Ratings	Unit
Input		Forward current	I_F	20	mA
	*1	Reverse voltage	V_R	6	V
Output		Supply voltage	V_{CC}	35	V
		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 Ta=25˚C
*2 Pulse width ≤ 0.15 µs, duty ratio= 0.01
*3 40 to 60%RH, AC for 1 minute, Ta=25˚C
*4 For 10s

■ Electro-optical Characteristics

(Unless specified, Ta=T_{opr})

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_{F1}	T_a= 25 ˚C, I_F =10 mA	–	1.6	1.75	V
			V_{F2}	T_a= 25 ˚C, I_F= 0.2 mA	1.2	1.5	–	V
	Reverse current		I_R	T_a= 25 ˚C, V_R= 5 V	–	–	10	μA
	Terminal capacitance		C_t	T_a=25 ˚C, V= 0, f= 1 kHz	–	30	250	pF
Output	Operation temperature supply voltage		V_{CC}	T_a= -10 to 60 ˚C	15	–	30	V
				–	15	–	24	V
	O_1 low level output voltage		V_{O1L}	V_{CC1}=12 V, V_{CC2}= -12 V, I_{O1}= 0.1 A, I_F= 5 mA	–	0.2	0.4	V
	O_2 high level output voltage		V_{O2H}	V_{CC}=V_{O1}= 24 V, I_{O2}= -0.1 A, I_F= 5 mA	18	21	–	V
	O_2 low level output voltage		V_{O2L}	V_{CC}= 24 V, I_{O2}= 0.1 A, I_F= 0	–	1.2	2.0	V
	O_1 leak current		I_{O1L}	T_a= 25 ˚C,V_{CC}=V_{O1}= 35 V, I_F=0 mA	–	–	500	μA
	O_2 leak current		I_{O2L}	T_a= 25 ˚C,V_{CC}=V_{O2}= 35 V, I_F=5 mA	–	–	500	μA
	High level supply current		I_{CCH}	T_a=25 ˚C, V_{CC}= 24 V, I_F= 5 mA	–	6	10	mA
				V_{CC}= 24 V, I_F= 5 mA	–	–	14	mA
	Low level supply current		I_{CCL}	T_a=25 ˚C, V_{CC}= 24 V, I_F= 0 mA	–	8	13	mA
				V_{CC}= 24 V, I_F= 0 mA	–	–	17	mA
Transfer characteristics	"Low→High" thresh hold input current *5		I_{FLH}	T_a=25˚C, V_{CC}= 24 V	0.3	1.5	3.0	mA
				V_{CC}= 24 V	0.2	–	5.0	mA
	Isolation resistance		R_{ISO}	T_a= 25 ˚C, DC= 500 V 40 to 60 %RH	5 x 10^{10}	1 x 10^{11}	–	Ω
	Response time	"Low→High"transfer time	t_{PLH}	T_a= 25 ˚C, V_{CC}= 24 V,I_F= 5 mA, R_G= 47 Ω, C_G= 3000 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_r		–	0.2	0.5	
	Instantaneous common mode rejection voltage "Output:High level"		CM_H	T_a=25 ˚C, V_{CM}=600 $V_{(peak)}$, I_F=5 mA V_{CC}= 24 V, ΔV_{O2H}= 2.0 V	-1 500	–	–	V/μs
	Instantaneous common mode rejection voltage "Output: Low level"		CM_L	T_a=25 ˚C, V_{CM}=600 $V_{(peak)}$, I_F= 0 mA V_{CC}= 24 V, ΔV_{O2L}= 2.0 V	1 500	–	–	V/μs

*5 I_{FLH} is forward current when output O_2 become "Low" to "High"

*6 When measuring output and transfer characteristics, connect a by-pass capacitor(0.01μF or more) between V_{CC} 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

Application Circuits

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- Audio visual equipment
- Consumer electronics

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- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

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