

PC9D17

※ Lead forming type (I type) and taping reel type (P type) are also available. (PC9D17I/PC9D17P)

■ Features

1. Built-in 2-channel
2. High speed response
(t_{PHL} , t_{PLH} : TYP. 0.3 μ s at $R_L = 1.9k\Omega$)
3. High instantaneous common mode rejection voltage
 CM_H : TYP. 1kV/ μ s
4. Standard dual-in-line package
5. Recognized by UL, file No. E64380

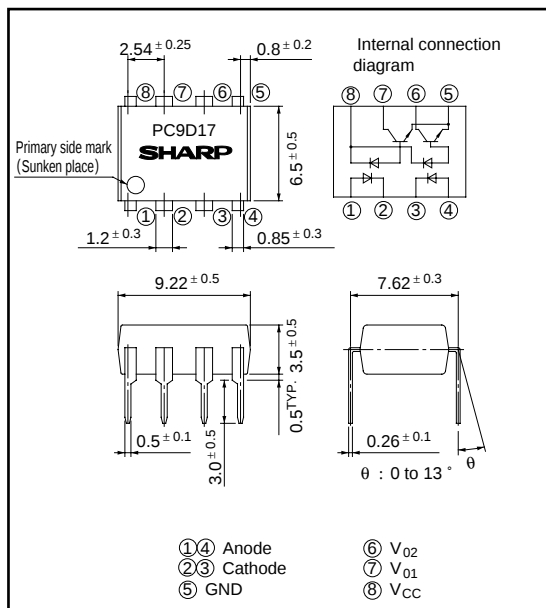
■ Applications

1. Electronic calculators, measuring instruments
2. Digital audio equipment
3. High speed receivers
4. Switching regulators

High Speed, High Common Mode Rejection, 2-channel OPIC Photocoupler

■ 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

($T_a = 25^\circ\text{C}$)

	Parameter	Symbol	Rating	Unit
Input	*1 Forward current	I_F	25	mA
	*1 Reverse voltage	V_R	5	V
	*1 Power dissipation	P	45	mW
Output	Supply voltage	V_{CC}	- 0.5 to + 15	V
	*1 Output voltage	V_O	- 0.5 to + 15	V
	*1 Output current	I_O	8	mA
	*1 Power dissipation	P_O	35	mW
	*2 Isolation voltage	V_{iso}	2 500	V_{rms}
	Operating temperature	T_{opr}	- 55 to + 100	$^\circ\text{C}$
	Storage temperature	T_{stg}	- 55 to + 125	$^\circ\text{C}$
	*3 Soldering temperature	T_{sol}	260	$^\circ\text{C}$

*1 Each channel

*2 40 to 60% RH, AC for 1 minute

*3 For 10 seconds

■ Electro-optical Characteristics

(Unless otherwise specified, Ta = 0 to + 70°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F	$T_a = 25^{\circ}\text{C}, I_F = 16\text{mA}$	-	1.7	1.95	V
	Reverse current	I_R	$T_a = 25^{\circ}\text{C}, V_R = 5\text{V}$	-	-	10	μA
	Terminal capacitance	C_t	$T_a = 25^{\circ}\text{C}, V_F = 0, f = 1\text{MHz}$	-	60	250	pF
Output	High level output current (1)	$I_{OH(1)}$	$T_a = 25^{\circ}\text{C}, I_F = 0, V_{CC} = V_O = 5.5\text{V}$	-	-	500	nA
	High level output current (2)	$I_{OH(2)}$	$T_a = 25^{\circ}\text{C}, I_F = 0, V_{CC} = V_O = 15\text{V}$	-	-	1	μA
	High level output current (3)	$I_{OH(3)}$	$I_F = 0, V_{CC} = V_O = 15\text{V}$	-	-	50	μA
	Low level output voltage	V_{OL}	$I_F = 16\text{mA}, I_O = 2.4\text{mA}, V_{CC} = 4.5\text{V}$	-	-	0.4	V
	Low level supply current	I_{CCL}	$I_F = 16\text{mA}, V_O = \text{open}, V_{CC} = 15\text{V}$	-	400	-	μA
	High level supply current (1)	$I_{CCH(1)}$	$T_a = 25^{\circ}\text{C}, I_F = 0, V_O = \text{open}, V_{CC} = 15\text{V}$	-	0.02	1	μA
	High level supply current (2)	$I_{CCH(2)}$	$I_F = 0, V_O = \text{open}, V_{CC} = 15\text{V}$	-	-	2	μA
	Current transfer ratio	CTR	$T_a = 25^{\circ}\text{C}, I_F = 16\text{mA}, V_O = 0.4\text{V}, V_{CC} = 4.5\text{V}$	19	-	-	%
Transfer characteristics	Isolation resistance	R_{ISO}	$T_a = 25^{\circ}\text{C}, \text{DC}500\text{V}, 40 \text{ to } 60\% \text{ RH}$	5×10^{10}	10^{11}	-	Ω
	Floating capacitance	C_f	$T_a = 25^{\circ}\text{C}, V = 0, f = 1\text{MHz}$	-	0.6	-	pF
	“High→Low” propagation delay time	t_{PHL}	$T_a = 25^{\circ}\text{C}, R_L = 1.9\text{k}\Omega$ $I_F = 16\text{mA}, V_{CC} = 5\text{V}$ Fig. 1	-	0.3	0.8	μs
	“Low→High” propagation delay time	t_{PLH}	$T_a = 25^{\circ}\text{C}, R_L = 1.9\text{k}\Omega$ $I_F = 16\text{mA}, V_{CC} = 5\text{V}$ Fig. 1	-	0.3	0.8	μs
	Instantaneous common mode rejection voltage “High level output”	CM_H	$T_a = 25^{\circ}\text{C}, I_F = 0, R_L = 1.9\text{k}\Omega$ $V_{CM} = 10\text{Vp-p}, V_{CC} = 5\text{V}$ Fig. 2	-	1 000	-	V/ μs
	Instantaneous common mode rejection voltage “Low level output”	CM_L	$T_a = 25^{\circ}\text{C}, I_F = 16\text{mA}, R_L = 19\text{k}\Omega$ $V_{CM} = 10\text{Vp-p}, V_{CC} = 5\text{V}$ Fig. 2	-	- 1 000	-	V/ μs

All typical values : at Ta = 25°C

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Forward current	I_F	-	-	16	mA
Supply voltage	V_{CC}	-	5	-	V
Operating temperature	T_{opr}	0	-	70	°C

Fig. 1 Test Circuit for Propagation Delay Time

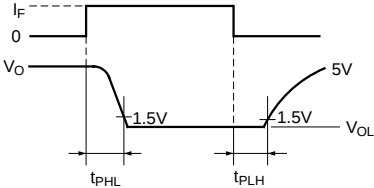
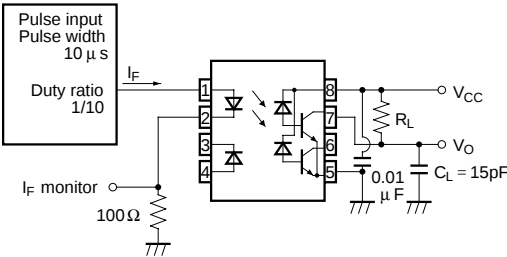


Fig. 2 Test Circuit for Instantaneous Common Mode Rejection Voltage

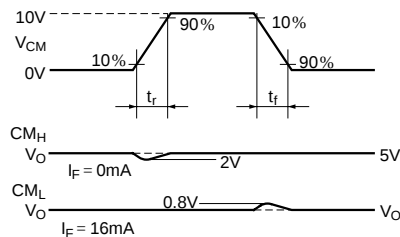
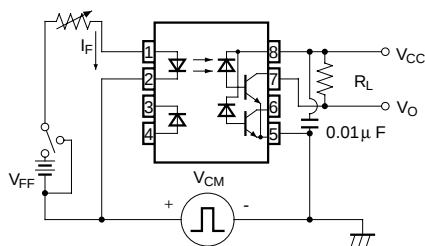


Fig. 3 Forward Current vs. Ambient Temperature

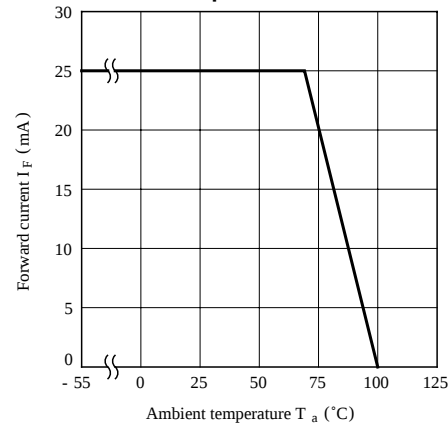


Fig. 4 Power Dissipation vs. Ambient Temperature

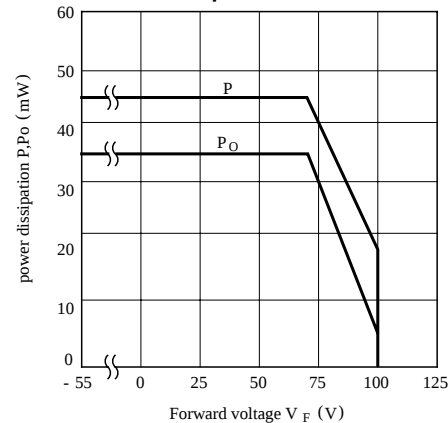


Fig. 5 Forward Current vs. Forward Voltage

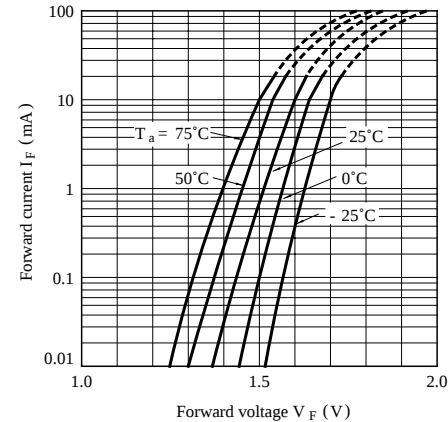


Fig. 6 Output Current vs. Output Voltage (Dotted line shows pulse characteristics)

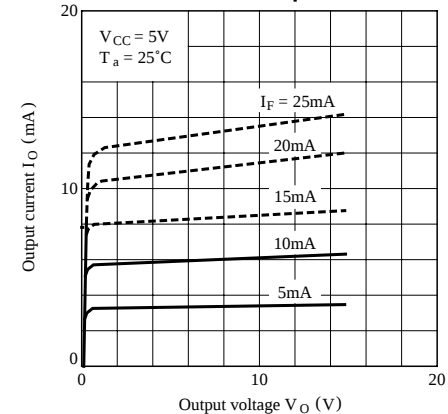


Fig. 7 Relative Current Transfer Ratio vs. Forward Current

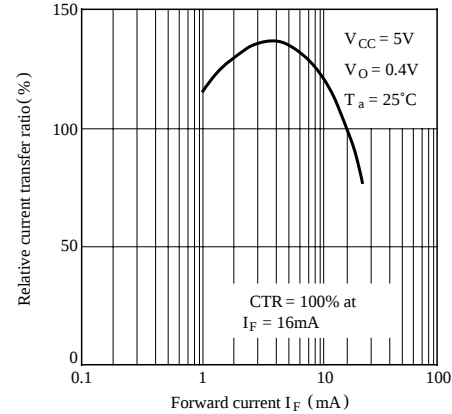


Fig. 8 Relative Current Transfer Ratio vs. Ambient Temperature

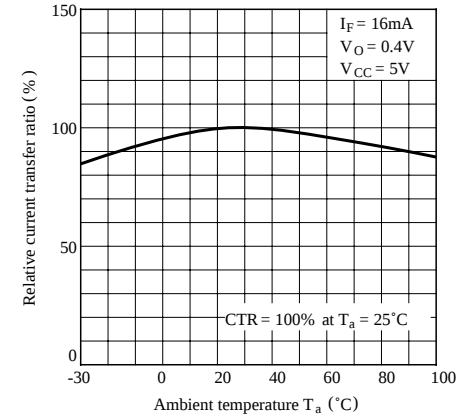


Fig. 9 Propagation Delay Time vs. Ambient Temperature

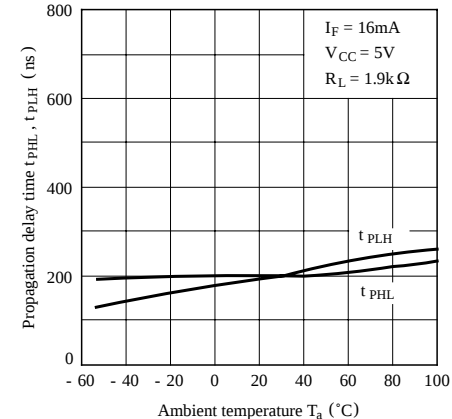


Fig.10 Propagation Delay Time vs. Load Resistance

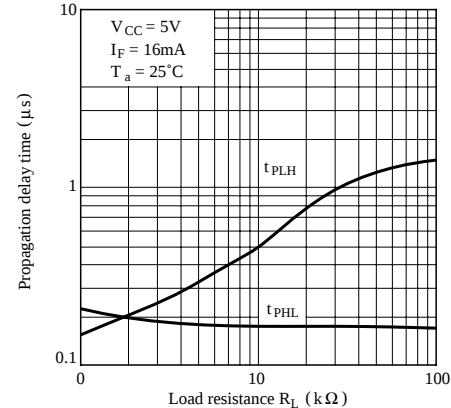


Fig.11 Output Voltage vs. Forward Current

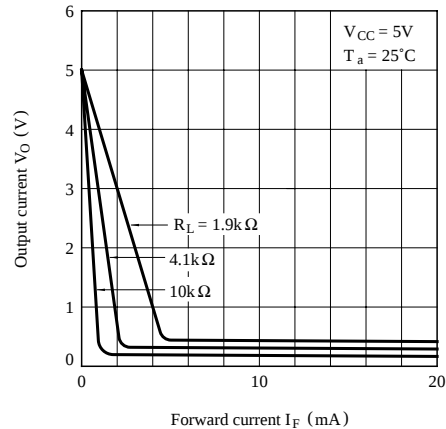


Fig.12 High Level Output Current vs. Ambient Temperature

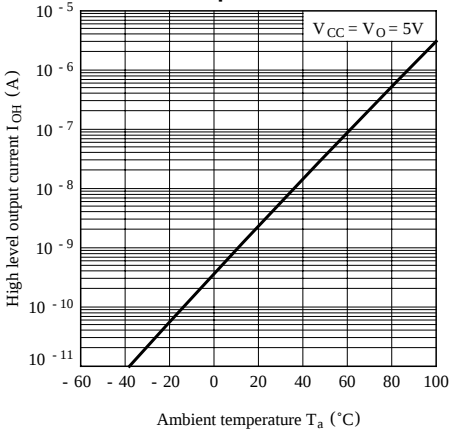
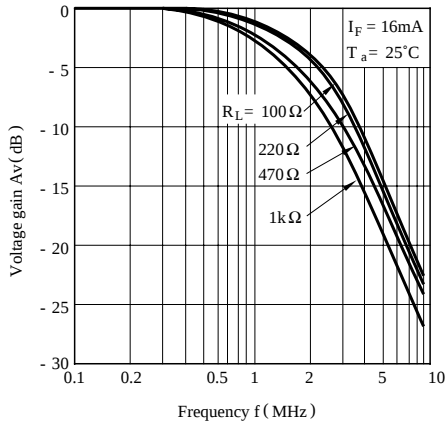
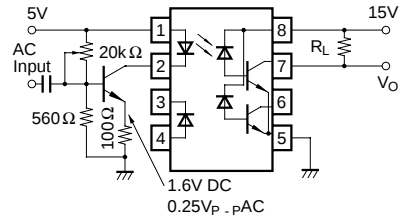


Fig.13 Frequency Response



Test Circuit for Frequency Response



■ Precautions for Use

- (1) It is recommended that a by-pass capacitor of more than $0.01\mu\text{F}$ is added between V_{CC} and GND near the device in order to stabilize power supply line.
- (2) Transistor of detector side in bipolar configuration is apt to be affected by static electricity for its minute design. When handling them, general counterplan against static electricity should be taken to avoid breakdown of devices or degradation of characteristics.
- (3) As for other general cautions, refer to the chapter "Precautions for Use".

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:
 - (i) The devices in this publication are designed for use in general electronic equipment designs such as:
 - Personal computers
 - Office automation equipment
 - Telecommunication equipment [terminal]
 - Test and measurement equipment
 - Industrial control
 - Audio visual equipment
 - Consumer electronics
 - (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
 - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
 - Traffic signals
 - Gas leakage sensor breakers
 - Alarm equipment
 - Various safety devices, etc.
 - (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
 - Space applications
 - Telecommunication equipment [trunk lines]
 - Nuclear power control equipment
 - Medical and other life support equipment (e.g., scuba).
- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
- This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.