

# PC417

## Compact, Surface Mount Ultra-high Speed Response OPIC Photocoupler

### ■ Features

1. Mini-flat package
2. Ultra-high speed response  
( $t_{PHL}$ ,  $t_{PLH}$  : TYP.  $0.3 \mu s$  at  $R_L = 1.9k\Omega$ )
3. Isolation voltage between input and output  
( $V_{iso}$  :  $2\,500 V_{rms}$ )
4. High instantaneous common mode rejection voltage ( $CM_H$  : TYP.  $1kV/\mu s$ )
5. Recognized by UL(No.64380)

### ■ Applications

1. Hybrid substrate which requires high density mounting
2. Personal computers, office computers and peripheral equipment
3. Audio equipment

### ■ Package Specifications

Model No.	Package specifications	Diameter of reel	Tape width
PC417	Taping package (Net:3 000pcs.)	$\phi 370mm$	12mm
PC417T	Taping package (Net: 750pcs.)	$\phi 178mm$	12mm
PC417Z	Sleeve package (Net: 100pcs.)	-	-

### ■ Absolute Maximum Ratings

( $T_a = 25^\circ C$ )

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	$I_F$	25	mA
	Reverse voltage	$V_R$	5	V
	Power dissipation	$P$	45	mW
Output	*2 Supply voltage	$V_{CC}$	- 0.5 to + 15	V
	Output voltage	$V_O$	- 0.5 to + 15	V
	Output current	$I_O$	8	mA
	Power dissipation	$P_O$	100	mW
Total power dissipation		$P_{tot}$	100	mW
*3 Isolation voltage		$V_{iso}$	2 500	$V_{rms}$
Operating temperature		$T_{opr}$	- 40 to + 100	$^\circ C$
Storage temperature		$T_{stg}$	- 40 to + 125	$^\circ C$
*4 Soldering temperature		$T_{sol}$	260	$^\circ C$

\*1  $T_a = 0$  to  $+ 70^\circ C$

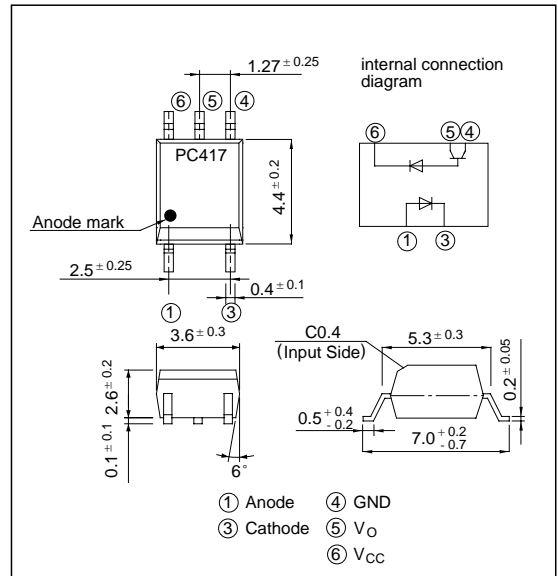
\*2 For 1 minute max.

\*3 40 to 60% RH. For AC 1 minute, Apply the specified voltage between the whole of the electrode pins on the input side and the whole of the electrode pins on the output side.

\*4 For 10 seconds.

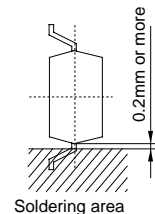
### ■ Outline Dimensions

(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.



## ■ Electro-optical Characteristics

(Ta= 25°C)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	$V_F$	$I_F = 16\text{mA}$	-	1.7	1.95	V
	Reverse current	$I_R$	$V_R = 5\text{V}$	-	-	10	$\mu\text{A}$
	Terminal capacitance	$C_t$	$V_F = 0, f = 1\text{MHz}$	-	60	250	pF
Output	High level output current	$I_{OH(1)}$	$I_F=0, V_{CC}=5.5\text{V}$ $V_O=5.5\text{V}$	-	3	500	nA
		$I_{OH(2)}$	$I_F=0, V_{CC}=15\text{V}, V_O=15\text{V}$	-	-	1.0	$\mu\text{A}$
		$I_{OH(3)}$	$I_F=0, V_{CC}=15\text{V}, V_O=15\text{V} *5$	-	-	50	
	High level supply current	$I_{CCH(1)}$	$I_F=0, V_{CC}=15\text{V}, V_O=\text{OPEN}$	-	0.02	1.0	$\mu\text{A}$
		$I_{CCH(2)}$	$I_F=0, V_{CC}=15\text{V}, V_O=\text{OPEN} *5$	-	-	2.0	
	Low level supply current	$I_{CCL}$	$I_F=16\text{mA}, V_{CC}=15\text{V}$ $V_O=\text{OPEN} *5$	-	200	-	$\mu\text{A}$
Low level output voltage	$V_{OL}$	$I_F=16\text{mA}, V_{CC}=4.5\text{V}$ $I_O=2.4\text{mA} *5$	-	-	0.4	V	
Transfer characteristics	Current transfer ratio	CTR	$I_F=16\text{mA}, V_{CC}=4.5\text{V}$ $V_O=0.4\text{V} *5$	19	-	-	%
	Isolation resistance	$R_{ISO}$	DC500V, 40 to 60% RH	$5 \times 10^{10}$	$10^{11}$	-	$\Omega$
	Floating capacitance	$C_f$	$V=0\text{V}, f=1\text{MHz}$	-	0.6	1.0	pF
	<sup>*6</sup> “H→L” propagation delay time	$t_{PHL}$	$I_F=16\text{mA}, V_{CC}=5\text{V}$ $R_L=1.9\text{k}\Omega$	-	0.3	0.8	$\mu\text{s}$
	<sup>*6</sup> “L→H” propagation delay time	$t_{PLH}$		-	0.3	1.2	
	<sup>*7</sup> Instantaneous common mode rejection voltage “High level output”	$CM_H$	$I_F=0, R_L=1.9\text{k}\Omega$ $V_{CM}=10\text{V}_{P-P},$ $V_{CC}=5\text{V}$	-	1 000	-	V/ $\mu\text{s}$
	<sup>*7</sup> Instantaneous common mode rejection voltage “Low level output”	$CM_L$	$I_F=16\text{mA}, R_L=1.9\text{k}\Omega$ $V_{CM}=10\text{V}_{P-P},$ $V_{CC}=5\text{V}$	-	- 1 000	-	V/ $\mu\text{s}$

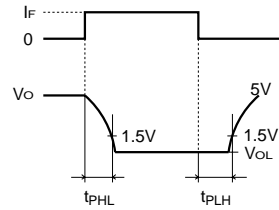
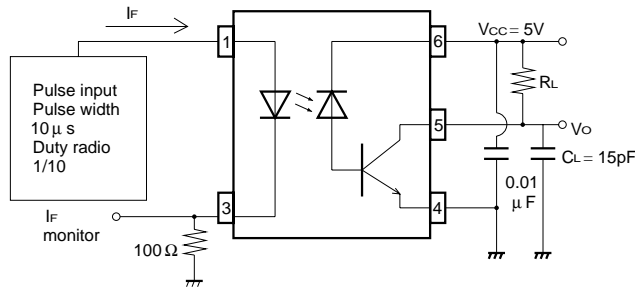
\*5 Temperature range : Ta = 0 to 70°C

\*6 Test circuit for propagation delay time is shown in the next page.

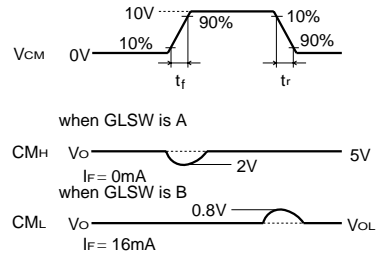
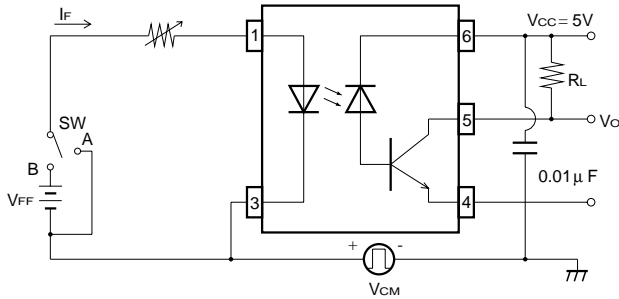
\*7 Test circuit for instantaneous common mode rejection voltage is shown in the next page.

Each characteristics shall be measured under opaque condition.

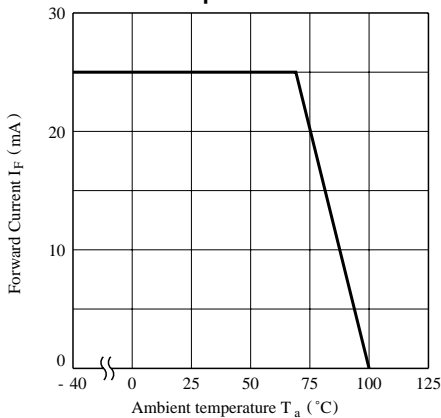
**\*6 Test Circuit for Propagation Delay Time**



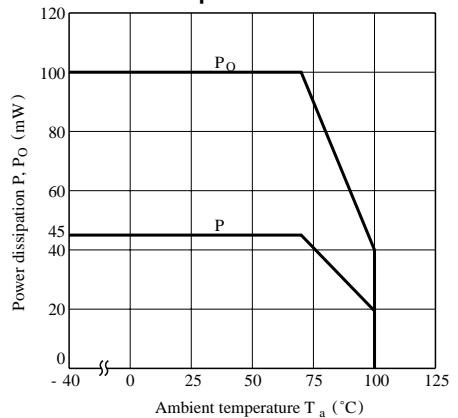
**\*7 Test Circuit for Instantaneous Common Mode Rejection Voltage**



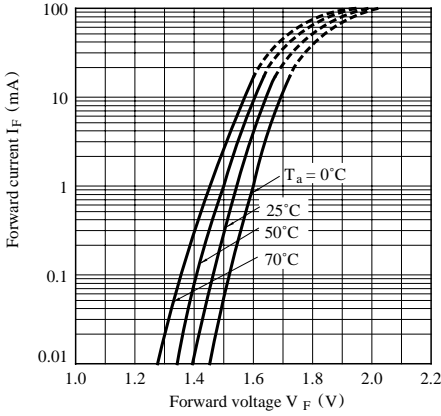
**Fig. 1 Forward Current vs. Ambient Temperature**



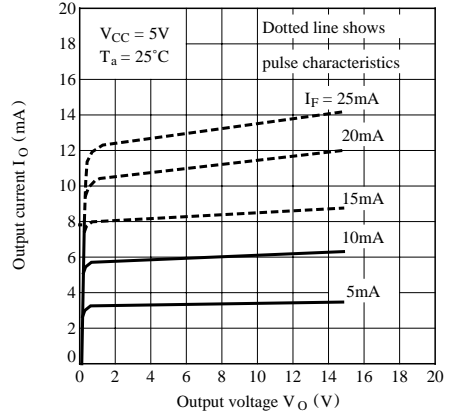
**Fig. 2 Power Dissipation vs. Ambient Temperature**



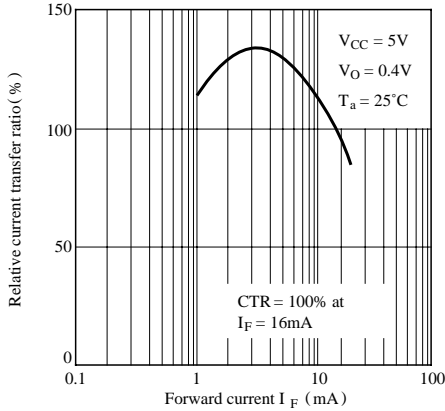
**Fig. 3 Forward Current vs. Forward Voltage**



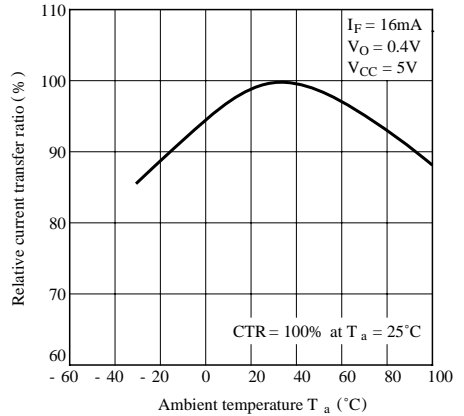
**Fig. 4 Output Current vs. Output Voltage**



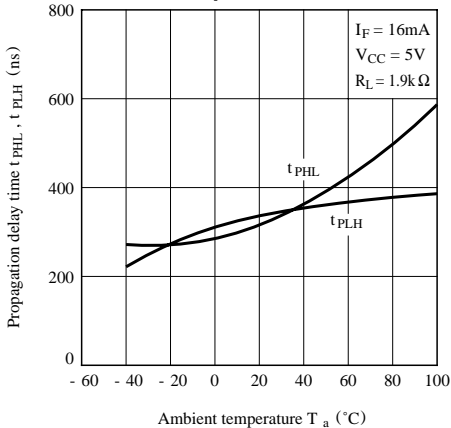
**Fig. 5 Relative Current Transfer Ratio vs. Forward Current**



**Fig. 6 Relative Current Transfer Ratio vs. Ambient Temperature**



**Fig. 7 Propagation Delay Time vs. Ambient Temperature**



**Fig. 8 High Level Output Current vs. Ambient Temperature**

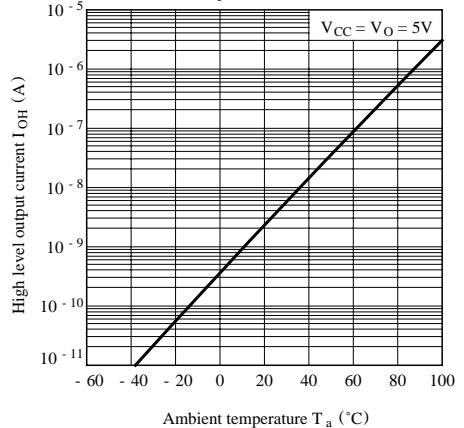
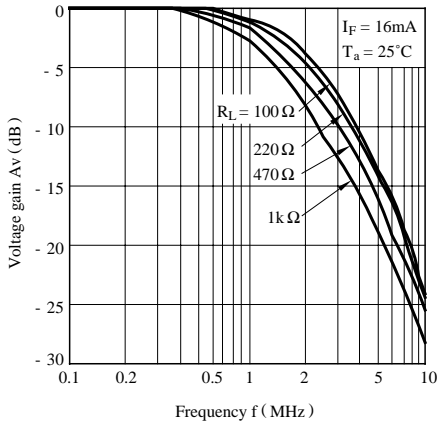
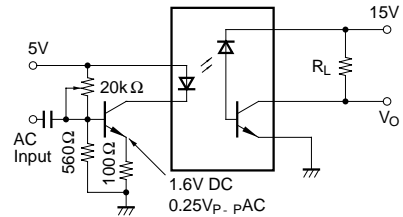


Fig. 9 Frequency Response



Test Circuit for Frequency Response



### ■ Precautions for Use

- (1) It is recommended that a by-pass capacitor of more than  $0.01\mu\text{F}$  be 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"