# PC917X/PC918X

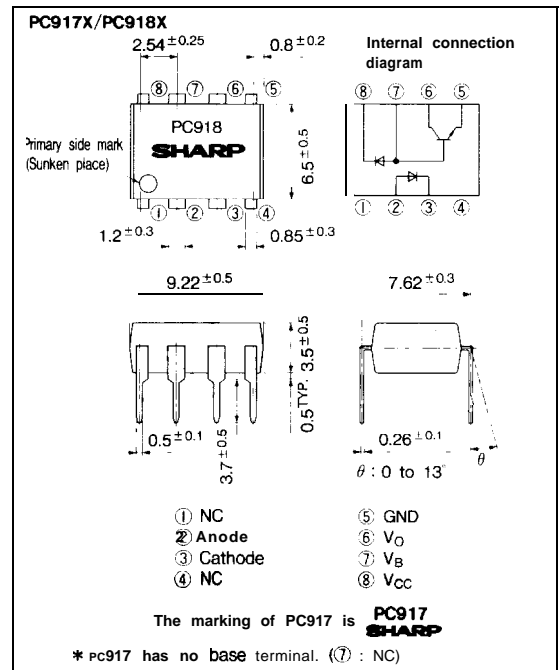## High Speed, High CMR OPIC Photocoupler

### ■ Features

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

### ■ Amtioria

1. Computers, measuring instruments, controllers
2. High speed line receivers high speed logic
3. Switing regulators
4. Signal transmission between circuits of different potentials and impedances

### ■ Outline Dimensions    (Unit : mm)



PC917X/PC918X

Internal connection diagram

Primary side mark (Sunken piace)

The marking of PC917 is PC917 SHARP

* PC917 has no base terminal. (⑦ : NC)

① NC          ⑤ GND
② Anode       ⑥ $V_O$
③ Cathode     ⑦ $V_B$
④ NC          ⑧ $V_{CC}$

* "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.

### ■ Absoulte Maximum Ratings        (Ta= 25℃)

|  | Parameter | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward cur-rent | $I_F$ | 25 | mA |
|  | Reverse voltage | $V_R$ | 5 | v |
|  | Power dissipation | P | 45 | mW |
| output | Supply voltage | $V_{CC}$ | −0.5 to + 15 | v |
|  | Output voltage | $V_O$ | −0.5 to +15 | V |
|  | *'Emitter-base voltage | $V_{EBO}$ | 5 | v |
|  | Output current | $I_O$ | 8 | mA |
|  | Power dissipation | $P_O$ | 100 | mW |
|  | *²Isolation voltage | v).'' | 2 500 | v rms |
|  | Operating temperature | $T_{opr}$ | −55 to +100 | ℃ |
|  | Storage temperature | $T_{stg}$ | −55 to +125 | ℃ |
|  | *³Soldering temperature | $T_{sol}$ | 260 | ℃ |

*1 Voltage between pin 5 and pin 7 (applies to PC918X)
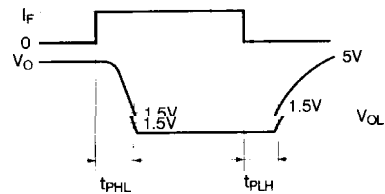*2 40 to 60%RH, AC for 1 minute
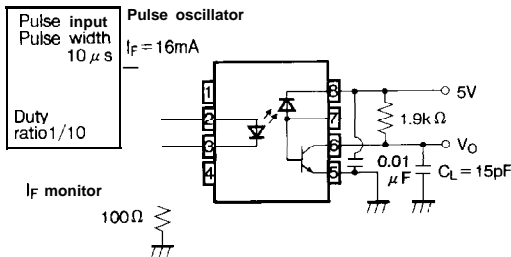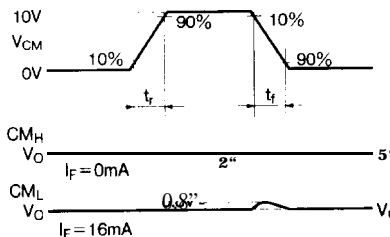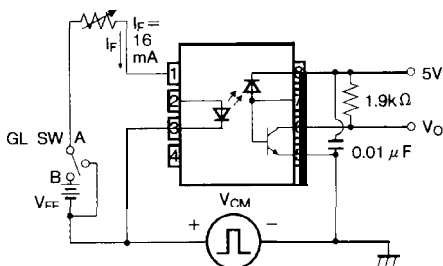*3 For 10 seconds

## ■ Electro-optical Characteristics          (Unless otherwise specified, Ta = 0 to + 70"C )

| | Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|---|
| Input | Forward voltage | $V_F$ | Ta=25°C, $I_F$=16mA | — | 1.7 | 1.95 | v |
| | Reverse current | $I_R$ | Ta=25°C, $V_R$=5V | | — | 10 | $\mu$A |
| | Terminal capacitance | $C_t$ | Ta=25°C, $V_F$=0, f=1MHz | — | 60 | 250 | pF |
| output | High level output current (1) | $I_{OH(1)}$ | Ta=25°C, $I_F$=0, $V_{CC}$=$V_O$=5.5V | — | 3 | 500 | nA |
| | High level output current (2) | $I_{OH(2)}$ | Ta=25°C, $I_F$=0, $V_{CC}$=$V_O$=15V | — | — | 1 | $\mu$A |
| | High level output current (3) | $I_{OH(3)}$ | $I_F$=0, $V_{CC}$=$V_O$=15V | | — | 50 | $\mu$A |
| | Low level output voltage | $V_{OL}$ | $I_F$=16mA, $I_O$=2.4mA, $V_{CC}$=4.5V | | — | 0.4 | v |
| | Low level supply current | $I_{CCL}$ | $I_F$=16mA, $V_O$=open, $V_{CC}$=15V | — | 200 | — | $\mu$A |
| | High level SUPPI y current (1) | $I_{CCH(1)}$ | Ta=25°C, $I_F$=0, $V_O$=open $V_{CC}$=15V | — | 0.02 | 1 | $\mu$A |
| | High level supply current (2) | $I_{CCH(2)}$ | $I_F$=0, $V_O$=open, $V_{CC}$=15V | - | — | 2 | $\mu$A |
| Transfer charac teristics | Current transfer ratio | CTR | Ta=25°C, $I_F$=16mA, $V_O$=0.4V, $V_{CC}$=4.5V | 19 | | | % |
| | Isolation resistance | $R_{iso}$ | Ta=25°C, DC500V, 40 to 60%RH | $5\times10^{10}$ | $10^{11}$ | | $\Omega$ |
| | Floating capacitance | $C_f$ | Ta=25°C, V=O, f=1MHz | — | 0.6 | 1 | pF |
| | *[4] "High→Low" propagation delay time | $t_{PHl}$ | Ta=25°C, $R_L$=1.9k$\Omega$ $I_F$=16mA, $V_{CC}$=5V | — | 0.3 | 0.8 | $\mu$s |
| | *[4] "Low→High' propagation delay time | $t_{PLH}$ | Ta=25°C, $R_L$=1.9k$\Omega$ $I_F$=16mA, $V_{CC}$=5V | — | 0.3 | 1.2 | $\mu$s |
| | *[5] Instantaneous common mode rejection voltage "Output : High level" | $CM_H$ | Ta=25°C, $I_F$=0, $R_L$=1.9k$\Omega$ $V_{CM}$=10Vp-p, $V_{CC}$= 5V | — | 1 000 | — | V/$\mu$s |
| | *[5] Instantaneous common mode rejection voltage "Output:Low level" | $CM_L$ | Ta=25°C, $I_F$=16mA, $R_L$=1.9k$\Omega$ $V_{CM}$ = 10Vp-p, $V_{CC}$= 5V | — | – 1000 | — | V/$\mu$s |

## *4 Test Circuit for Propagation Delay Time ( PC918X)



## *5 Test Circuit for Instantaneous Common Mode Rejection Voltage ( PC918X)



When the switch for in frared light emitting diode sets to A.

When the switch for infrared light emitting diode sets to B.

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Photocouplers

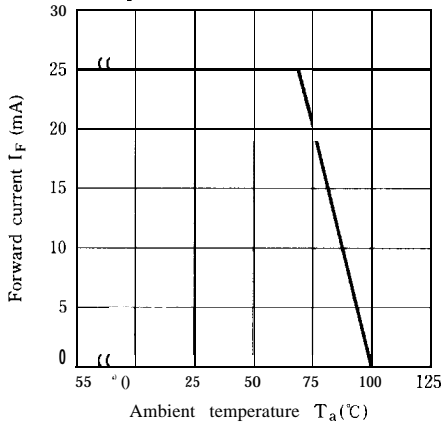Fig. 1  Forward Current vs. Ambient Temperature

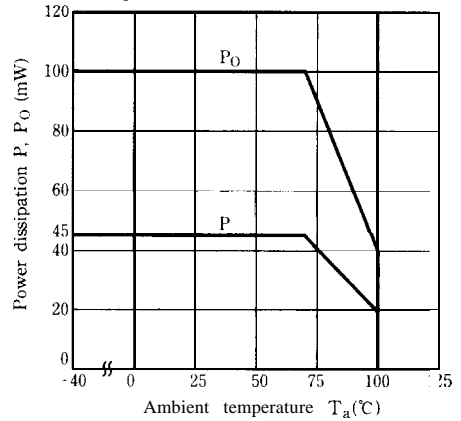Fig. 2 Power Dissipation vs. Ambient Temperature
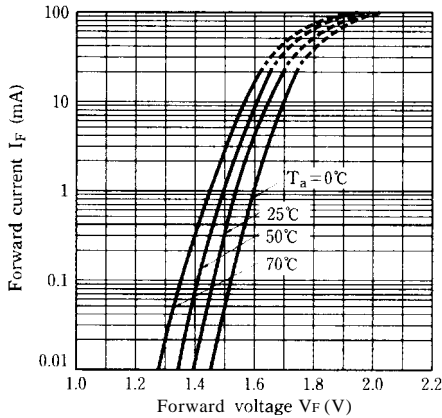
Fig. 3 Forward Current ve. Forward Voltage

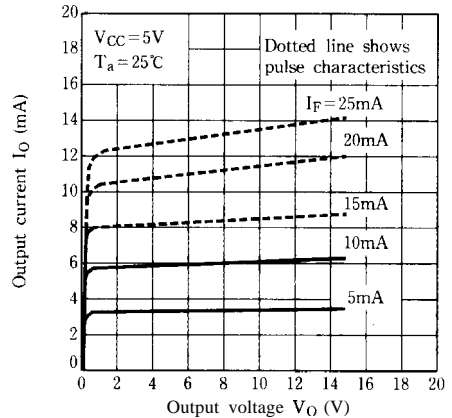Fig. 4 Output Current vs. Output Voltage
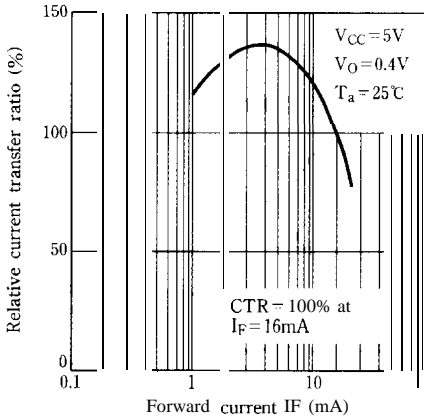
Fig. 5 Relative Current Transfer Ratio vs. Forward Current

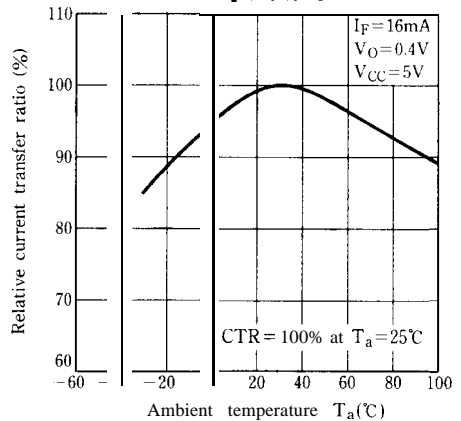Fig. 6 Relative Current Transfer Ratio vs. Ambient Temperature

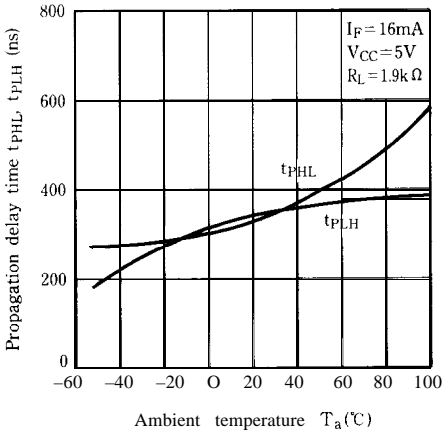## Fig. 7 Propagation Delay Time vs. Ambient Temperature



$I_F = 16mA$
$V_{CC} = 5V$
$R_L = 1.9k\Omega$

Propagation delay time $t_{PHL}$, $t_{PLH}$ (ns)

$t_{PHL}$

$t_{PLH}$

Ambient temperature $T_a$ (℃)

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



$V_{CC} = V_O = 5V$

High level output current $I_{OH}$ (A)

Ambient temperature $T_a$ (℃)

## Fig. 9 Frequency Response



$I_F = 16mA$
$T_a = 25℃$

Voltage gain Av (dB)

$R_L = 100\Omega$

$220\Omega$
$470\Omega$

$1k\Omega$

Frequency f (MHz)

## Test Circuit for Frequency Response (PC918X)



15V

5V

$R_L$

$20k\Omega$

$V_O$

AC Input

$560\Omega$

$100\Omega$

1.6V DC
0.25V$_{P-P}$AC

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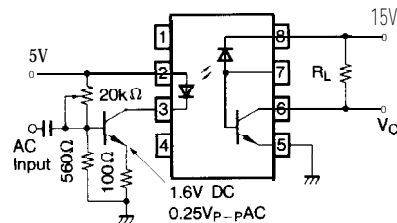**Photocouplers**

## ■ Precautions for use

(1) It is recommended that a by-pass capacitor of more than 0.01 $\mu$ 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" (Page 78 to 93).