PC456L0NIP

High Speed and High CMR *OPIC Photocoupler

❋ VDE (VDE0884) approved type is also available as an option

■ Features

1. High resistance to noise (CMR:MIN. 15kV/μs)
2. High speed response
   (t_{PHL}:MAX.400ns, t_{PLH}:MAX.550ns)
3. Mini-flat package
4. Isolation voltage ($V_{iso\ (rms)}$:3.75kV)
5. Recognized by UL, file No. E64380 (Model No. PC456L)

■ Applications

1. Programmable controller
2. Inverter

■ Absolute Maximum Ratings

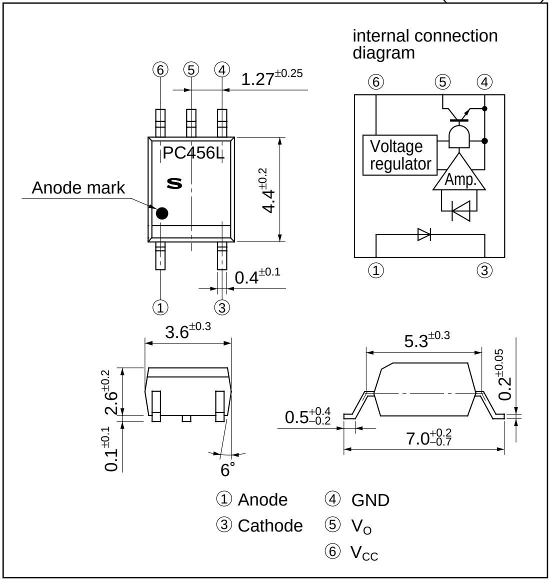
(T_a=25°C)

	Parameter	Symbol	Rating	Unit
Input	*1 Forward current	I_F	25	mA
Input	Reverse voltage	V_R	5	V
Input	*2 Power dissipation	P	45	mW
Output	Supply voltage	V_{CC}	–0.5 to +35	V
Output	Output voltage	V_O	–0.5 to +35	V
Output	Output current	I_O	15	mA
Output	*3 Power dissipation	P_O	100	mW
*4 Isolation voltage		$V_{iso\ (rms)}$	3.75	kV
Operating temperature		T_{opr}	–40 to +100	°C
Storage temperature		T_{stg}	–40 to +125	°C
*5 Soldering temperature		T_{sol}	270	°C

*1 When ambient temperature goes above 70°C, the power dissipation goes down at 0.45mA/°C.
*2 When ambient temperature goes above 70°C, the power dissipation goes down at 0.8mW/°C.
*3 When ambient temperature goes above 70°C, the power dissipation goes down at 1.8mW/°C.
*4 40 to 60%RH, AC for 1minute
*5 For 10s

■ 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 *6

(unless otherwise specified T_a=–40 to 100°C, V_{CC}=4.5 to 35V)

		Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input		Forward voltage	V_F	T_a=25˚C, I_F=10mA	–	1.6	1.95	V
Input		Reverse current	I_R	T_a=25˚C, V_R=5V	–	–	10	μA
Input		Terminal capacitance	C_t	T_a=25˚C, V_R=0, f=1MHz	–	60	250	pF
Output		Operating supply voltage	V_{CC}	–	4.5	–	35	V
Output		Low level output voltage	V_{OL}	I_F=10mA, I_O=2.4mA	–	0.3	0.6	V
Output		Low level output current	I_{OL}	I_F=10mA, V_O=0.6V	4.4	9	–	mA
Output		High level output current	I_{OH}	I_F=0, V_{CC}=V_O	–	5	50	μA
Output		High level supply current	I_{CCH}	I_F=0, V_O=OPEN	–	0.6	1.3	mA
Output		Low level supply current	I_{CCL}	I_F=10mA, V_O=OPEN	–	0.8	1.3	mA
Transfer characteristics		"High→Low" threshold input current	I_{FHL}	V_O=0.8V, R_L=20kΩ, V_{CC}=15V	–	1.5	5	mA
Transfer characteristics		Isolation resistance	R_{ISO}	T_a=25˚C, DC500V, 40 to 60%RH	5×10^{10}	10^{11}	–	Ω
Transfer characteristics		Floating capacitance	C_f	T_a=25˚C, V=0, f=1MHz	–	0.6	1	pF
Transfer characteristics	Response time	*8 "High→Low" propagation time	t_{PHL}	I_F=10mA (t_{PHL}), I_F=0 (t_{PLH}), V_{CC}=15V, R_L=20kΩ, C_L=100pF, V_{THLH}=2.0V, V_{THHL}=1.5V	30	210	400	ns
Transfer characteristics	Response time	*8 "Low→High" propagation time	t_{PLH}		270	400	550	ns
Transfer characteristics	Response time	*7 Distortion of pulse width	Δtw		–	190	450	ns
Transfer characteristics	Response time	Propagation delay difference between any two parts	T_{PSK}		–150	200	450	ns
Transfer characteristics	CMR	*9 Instantaneous common mode rejection voltage "Output : High level"	CM_H	T_a=25˚C, I_F=0, V_{CC}=15V, C_L=100pF, V_{CM}=1.5kV$_{(P-P)}$, R_L=20kΩ, V_O>3.0V	15	30	–	kV/μs
Transfer characteristics	CMR	*9 Instantaneous common mode rejection voltage "Output : Low level"	CM_L	T_a=25˚C, I_F=10mA, V_{CC}=15V, C_L=100pF, V_{CM}=1.5kV$_{(P-P)}$, R_L=20kΩ, V_O<1.0V	–15	–30	–	kV/μs

*6 It shall connect a by-pass capacitor of 0.01μF or more between V_{CC} (Pin ⑥) and GND (Pin ④) near the device, when it measures the transfer characteristics and the output side characteristics

*7 Distortion of pulse width Δtw= | t_{PHL}–t_{PLH} |

*8 Refer to Fig.1

*9 Refer to Fig.2

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Forward current	I_F	10	20	mA
Supply voltage	V_{CC}	4.5	35	V
Output voltage	V_O	0	35	V
Operating temperature	T_{opr}	–40	100	°C

Fig.1 Test Circuit for t_{PHL} and t_{PLH}

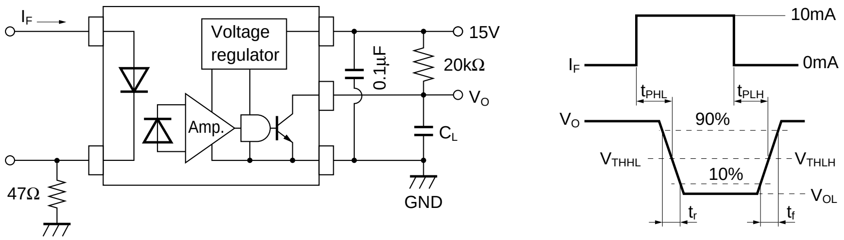


Fig.2 Test Circuit for CM_H and CM_L

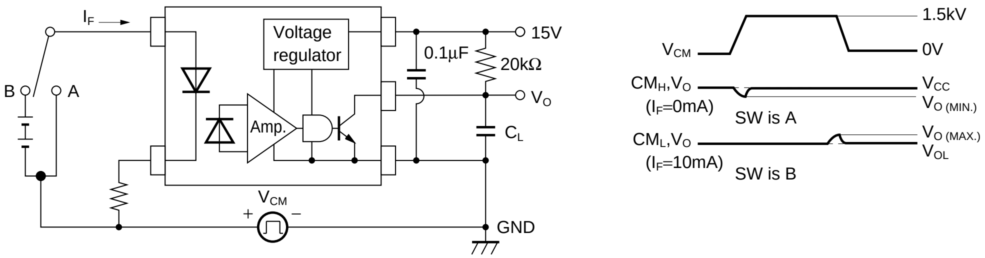


Fig.3 Forward Current vs. Ambient Temperature

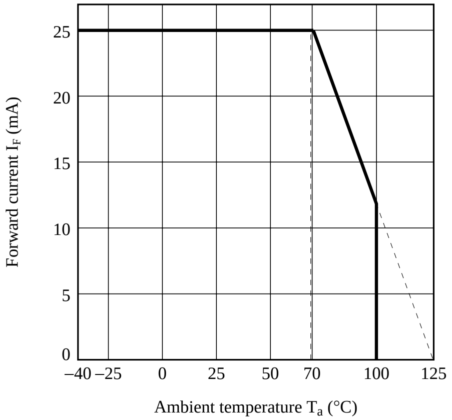


Fig.4 Power Dissipation vs. Ambient Temperature

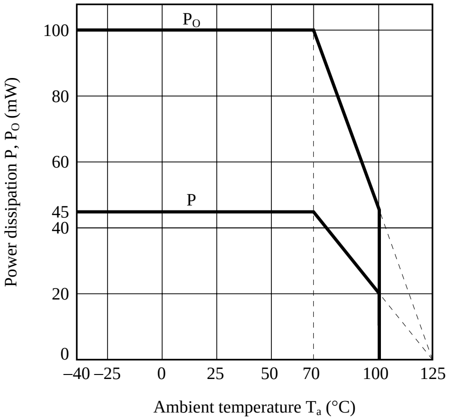


Fig.5 Output Current vs. Forward Current

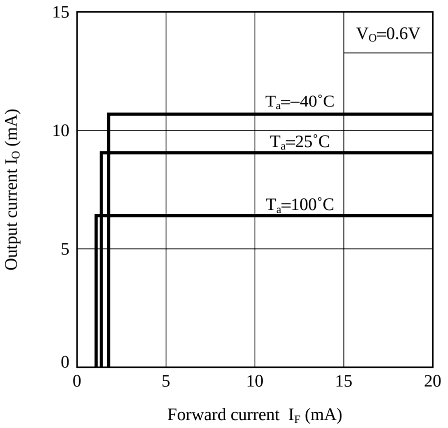


Fig.6 Forward Current vs. Forward Voltage

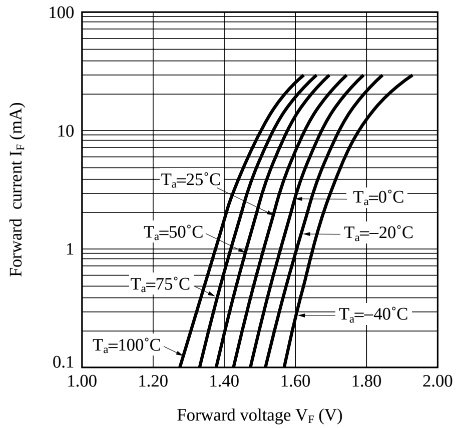


Fig.7 Relative Output Current vs. Ambient Temperature

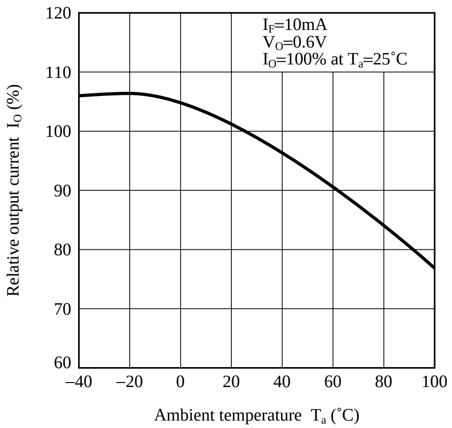


Fig.8 Threshold Input Current vs. Ambient Temperature

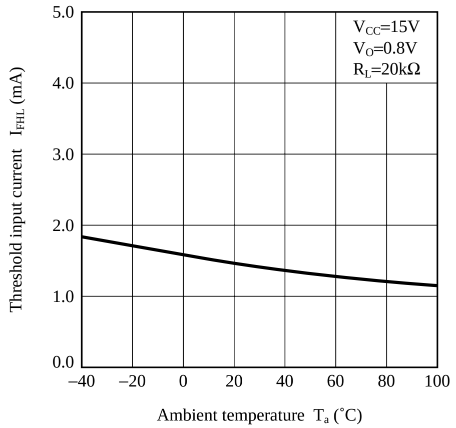


Fig.9 Low Level Output Voltage vs. Ambient Temperature

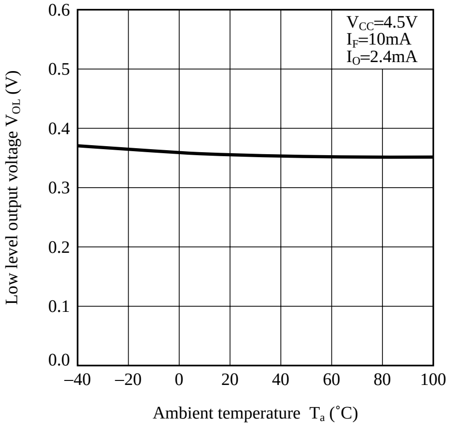


Fig.10 Supply Current vs. Ambient Temperature

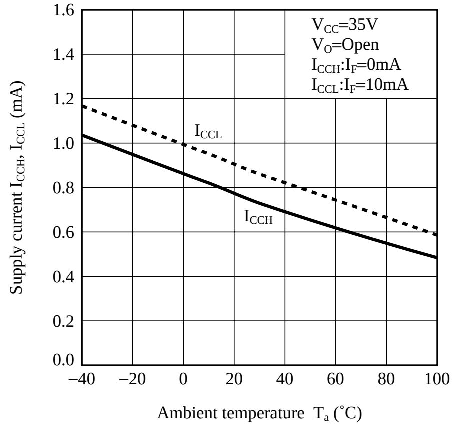


Fig.11 Propagation Delay Time vs. Ambient Temperature

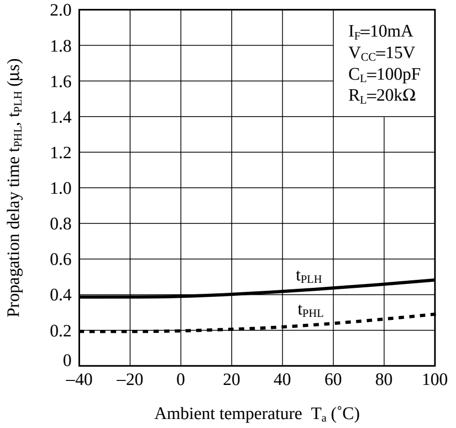


Fig.12 Propagation Delay Time vs. Load Resistance

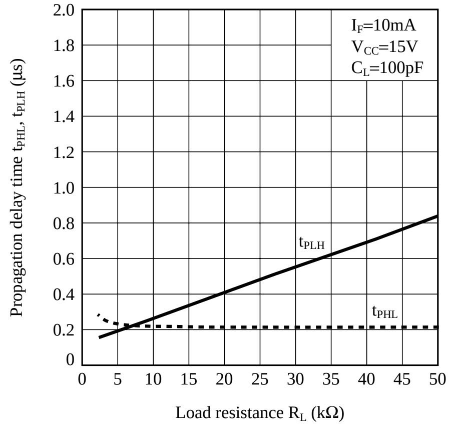


Fig.13 Propagation Delay Time vs. Load Capacitance

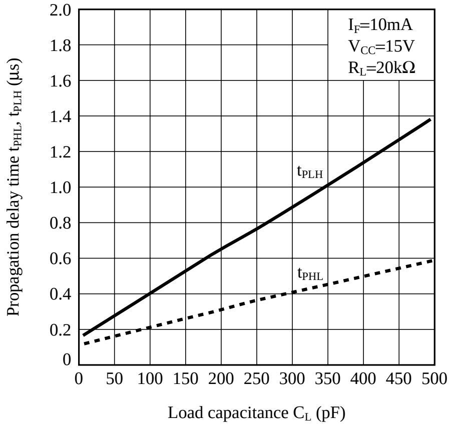


Fig.14 Propagation Delay Time vs. Supply Voltage

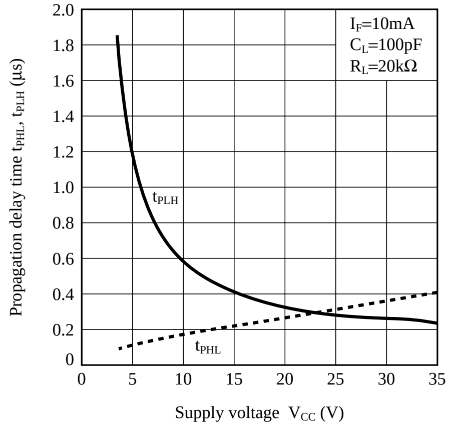
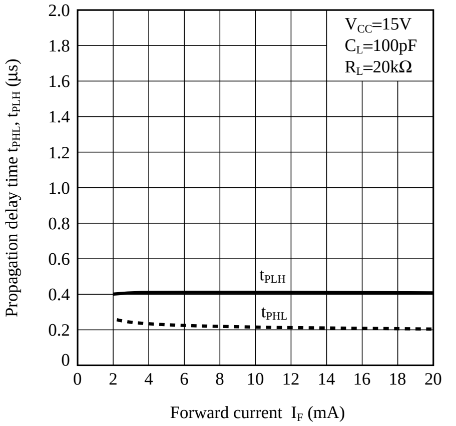


Fig.15 Propagation Delay Time vs. Forward Current



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  --- Office automation equipment
  --- Telecommunication equipment [terminal]
  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

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

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