

TOSHIBA PHOTOINTERRUPTER INFRARED LED + PHOTO IC

# TLP1024

PRINTER, ELECTRONIC TYPEWRITER, FACSIMILE

COPYING MACHINE, LATHER BEAMING PRINTER

VCR, VIDEODISC, COMPACT DISC

VARIOUS POSITION DETECTION

TLP1024 is a digital output photointerrupter with a GaAs infrared LED and a high sensitive and high gain Si photo IC combined.

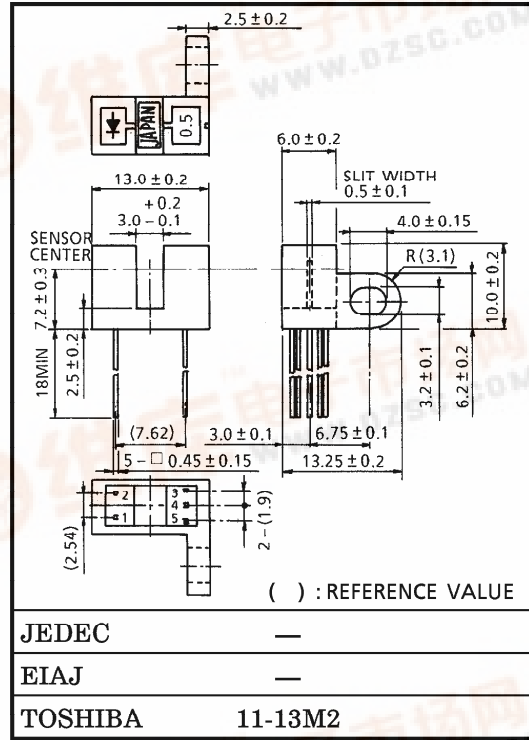
This photointerrupter has a response speed faster than the phototransistor output and is capable of high speed position detection.

Further because of large output current and a built-in Schmitt trigger circuit, this photointerrupter is connectable directly to a microcomputer or logic IC.

Its output becomes low level when the light is shielded. The TLP1034 with a pull-up resistor in the same shape as this photointerrupter is also available.

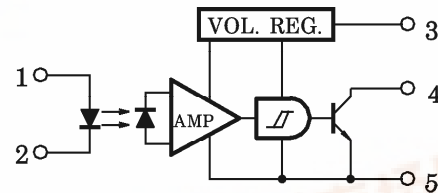
- Side mounting type
- Gap : 3mm
- Resolution : Slit width 0.5mm
- Digital output (open collector)
- Digital connectable to TTL, LSTTL and CMOS.
- Threshold input current :  $I_{FLH}=4\text{mA}$  (Max.) at  $T_a=25^\circ\text{C}$
- Operating supply voltage :  $V_{CC}=4.5\sim 17\text{V}$
- Built-in Schmitt trigger circuit
- Fast response speed :  $t_{pLH}=3\mu\text{s}$ ,  $t_{pHL}=6\mu\text{s}$  (Typ.)
- Detector side is of visible light cut type.

Unit in mm



Weight : 0.87g (Typ.)

### PIN CONNECTION



1. ANODE
2. CATHODE
3. VCC
4. OUT
5. GND

961001EBC2

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MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I <sub>F</sub>	50	mA
	Forward Current Derating (Ta > 25°C)	ΔI <sub>F</sub> / °C	-0.33	mA / °C
	Reverse Voltage	V <sub>R</sub>	5	V
DETECTOR	Supply Voltage	V <sub>CC</sub>	17	V
	Output Voltage	V <sub>O</sub>	30	V
	Output Current	I <sub>O</sub>	50	mA
	Power Dissipation	P <sub>O</sub>	250	mW
	Power Dissipation Derating (Ta > 25°C)	ΔP <sub>O</sub> / °C	-3.33	mW / °C
	Operating Temperature Range	T <sub>opr</sub>	-25~85	°C
Storage Temperature Range	T <sub>stg</sub>	-40~100	°C	
Soldering Temperature (5s)	T <sub>sol</sub>	260	°C	

RECOMMENDED OPERATING CONDITIONS

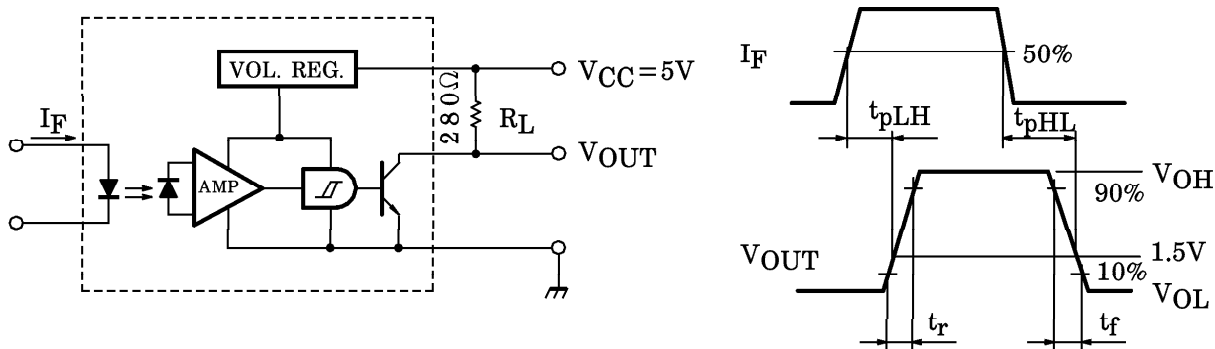
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Forward Current	I <sub>F</sub>	14*	—	20	mA
Supply Voltage	V <sub>CC</sub>	4.5	5	17	V
Output Voltage	V <sub>O</sub>	—	5	24	V
Low Level Output Current	I <sub>OL</sub>	—	—	16	mA
Operating Temperature	T <sub>opr</sub>	-25	—	85	°C

\* 14mA is a value when 50% LED deterioration is taken into consideration. Initial threshold input current shall be 7mA MAX.

OPTO-ELECTRICAL CHARACTERISTICS (Unless Otherwise Specified, Ta = -25~85°C, VCC = 4.5~5.5V)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
LED	Forward Current	$V_F$	$I_F = 10\text{mA}$ , $T_a = 25^\circ\text{C}$	1.00	1.15	1.30	V	
	Reverse Current	$I_R$	$V_R = 5\text{V}$ , $T_a = 25^\circ\text{C}$	—	—	10	$\mu\text{A}$	
	Peak Emission Wavelength	$\lambda_P$	$I_F = 25\text{mA}$ , $T_a = 25^\circ\text{C}$	—	940	—	nm	
DETECTOR	Supply Voltage	$V_{CC}$	—	4.5	—	17	V	
	Low Level Supply Current	$I_{CCL}$	$I_F = 0$	—	—	5.0	mA	
			$I_F = 0$ , $V_{CC} = 17\text{V}$	—	—	5.2		
	High Level Supply Current	$I_{CCH}$	$I_E = 15\text{mA}$	—	—	3.0	mA	
			$I_F = 15\text{mA}$ , $V_{CC} = 17\text{V}$	—	—	3.2		
	Low Level Output Voltage	$V_{OL}$	$I_{OL} = 16\text{mA}$ , $I_F = 0$ $T_a = 25^\circ\text{C}$	—	0.07	0.3	V	
			$I_{OL} = 16\text{mA}$ , $I_F = 0$ $V_{CC} = 17\text{V}$	—	—	0.4		
High Level Output Current	$I_{OH}$	$I_F = 15\text{mA}$ , $V_O = 30\text{V}$	—	—	15	$\mu\text{A}$		
Peak Sensitivity Wavelength	$\lambda_P$	$T_a = 25^\circ\text{C}$	—	900	—	nm		
COUPLED	Threshold Input Current (L→H)	$I_{FLH}$	$T_a = 25^\circ\text{C}$	—	—	4	mA	
			$V_{CC} = 17\text{V}$	—	—	7		
	Hysteresis Ratio	$I_{FHL} / I_{FLH}$	$T_a = 25^\circ\text{C}$	—	0.67	—	—	
	Propagation Delay Time	L→H	$t_{pLH}$	$V_{CC} = 5\text{V}$ , $I_F = 15\text{mA}$ $R_L = 280\Omega$ , $T_a = 25^\circ\text{C}$ (Note)	—	3	—	$\mu\text{s}$
		H→L	$t_{pHL}$		—	6	—	
Rise Time	$t_r$	—	0.1		—			
Fall Time	$t_f$	—	0.05		—			

NOTE : SWITCHING TIME TEST CIRCUIT



**PRECAUTION**

Please be careful of the followings.

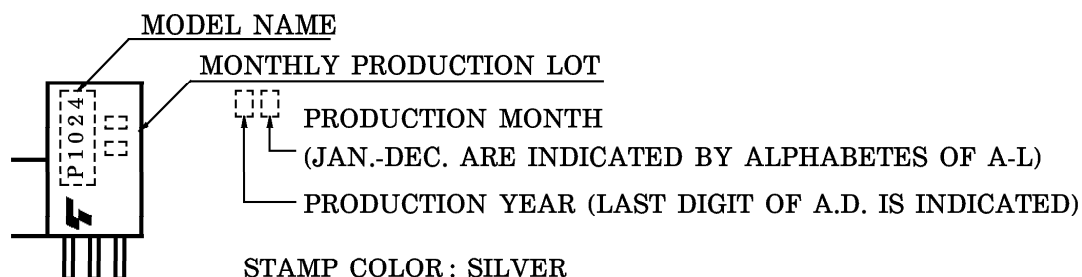
1. Soldering should be performed after lead forming.
2. If chemicals are used for cleaning, the soldered surface only shall be cleaned with chemicals avoiding the whole cleaning of the package.
3. The container is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol, and aliphatic hydrocarbons however, with peroxochemicals (such as benzene, toluene, and acetone), alkali, aromatic hydrocarbons, or chloric hydrocarbons, polycarbonate becomes cracked, swollen, or melted. Please take care when choosing a packaging material by referencing the table below.

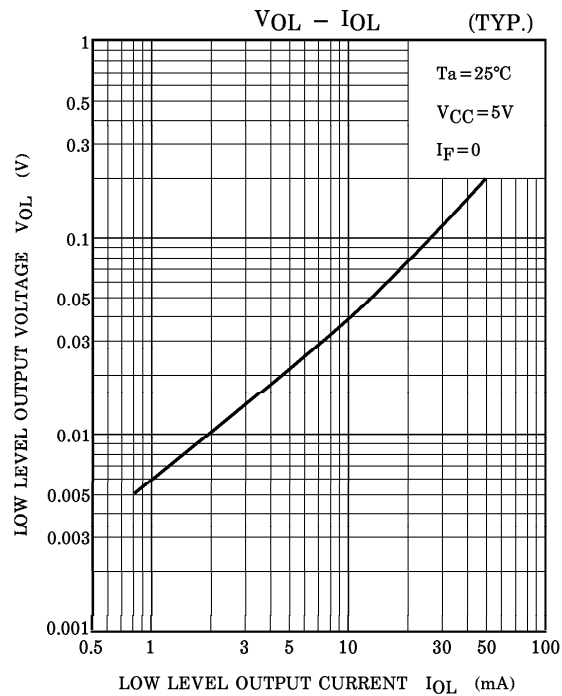
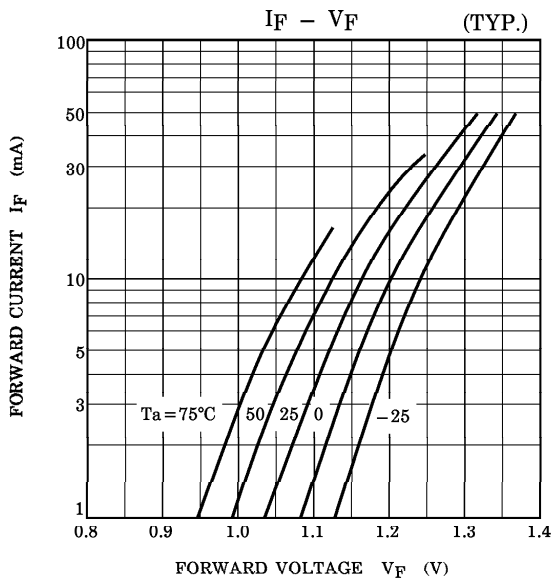
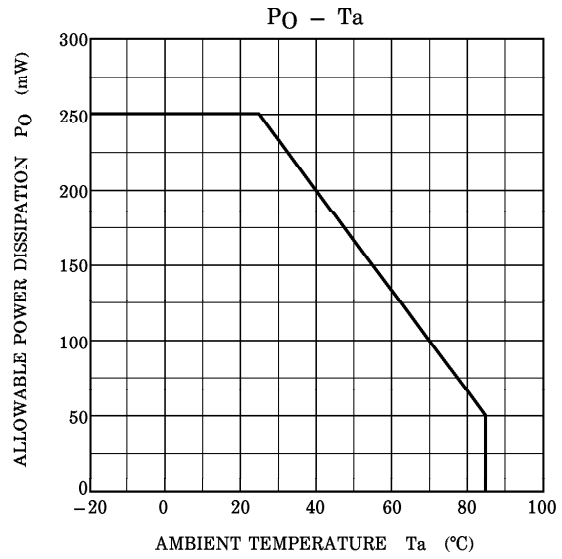
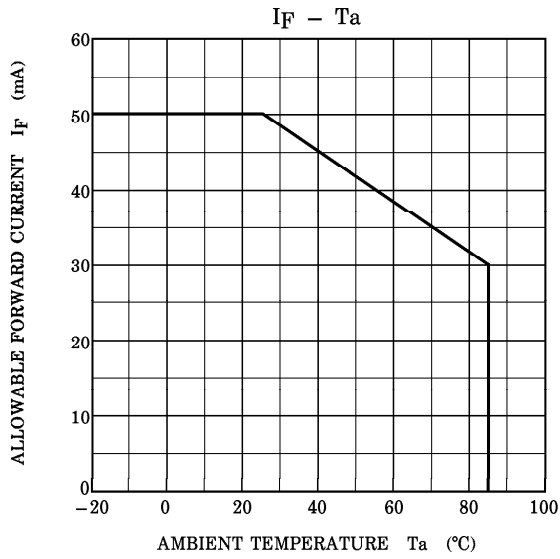
<Chemicals to avoid with polycarbonate>

	PHENOMENON	CHEMICALS
A	Little deterioration but staining	<ul style="list-style-type: none"> <li>• nitric acid (low concentration), hydrogen peroxide, chlorine</li> </ul>
B	Cracked, crazed, or swollen	<ul style="list-style-type: none"> <li>• acetic acid (70% or more)</li> <li>• gasoline</li> <li>• methyl ethyl ketone, ethyl acetate, butyl acetate</li> <li>• ethyl methacrylate, ethyl ether, MEK</li> <li>• acetone, m-amino alcohol, carbon tetrachloride</li> <li>• carbon disulfide, trichloroethylene, cresol</li> <li>• thinners, oil of turpentine</li> <li>• triethanolamine, TCP, TBP</li> </ul>
C	Melted { } : Used as solvent.	<ul style="list-style-type: none"> <li>• concentrated sulfuric acid</li> <li>• benzene</li> <li>• styrene, acrylonitrile, vinyl acetate</li> <li>• ethylenediamine, diethylenediamine</li> <li>• {chloroform, methyl chloride, tetrachloromethane, dioxane, } • {1, 2-dichloroethane }</li> </ul>
D	Decomposed	<ul style="list-style-type: none"> <li>• ammonia water</li> <li>• other alkali</li> </ul>

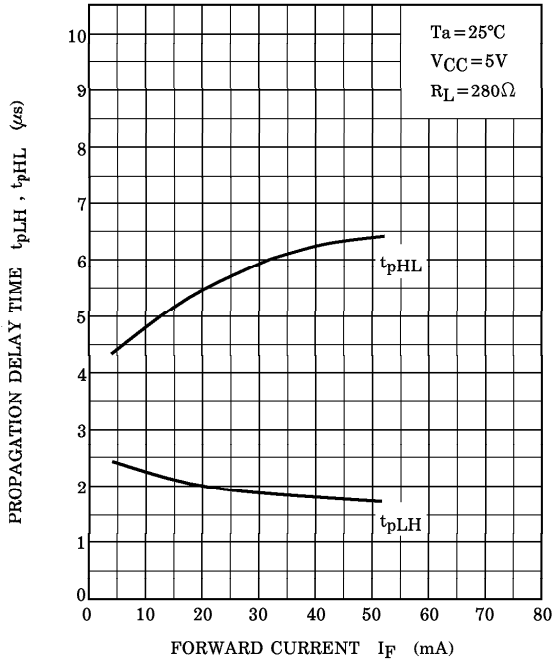
4. During 100 $\mu$ s after turning on VCC, output voltage changes for stabilizing the inner circuit.
5. Supply the by-pass condenser up to 0.01 $\mu$ F between VCC and GND near device to stabilize the power supply line.
6. Screw shall be tightened to clamping torque of 0.59N·m.

**PRODUCT INDICATION**

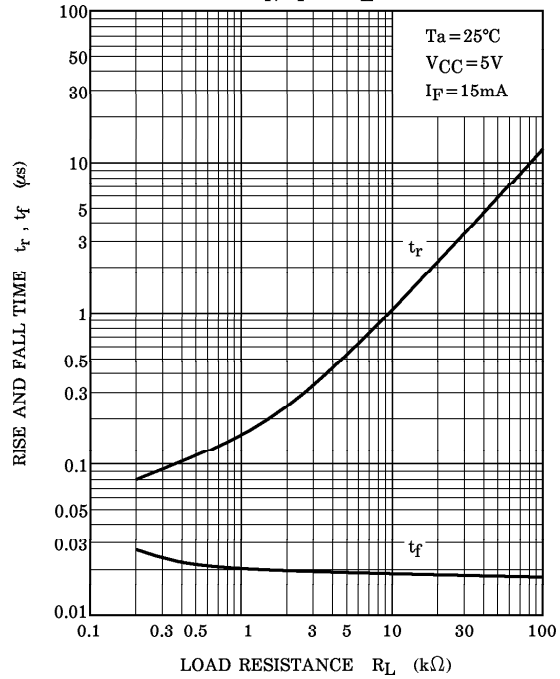




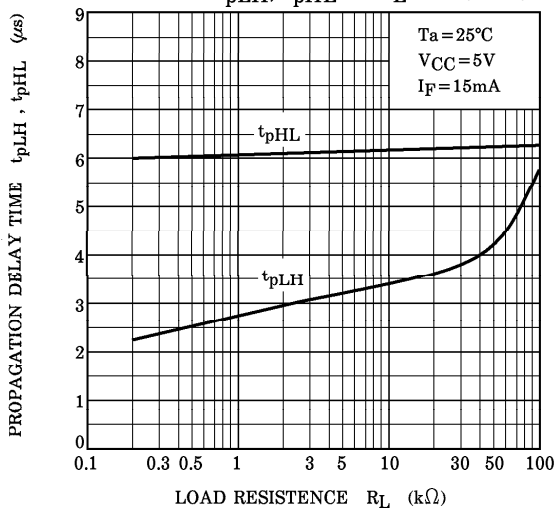
$t_{pLH}, t_{pHL} - I_F$  (TYP.)

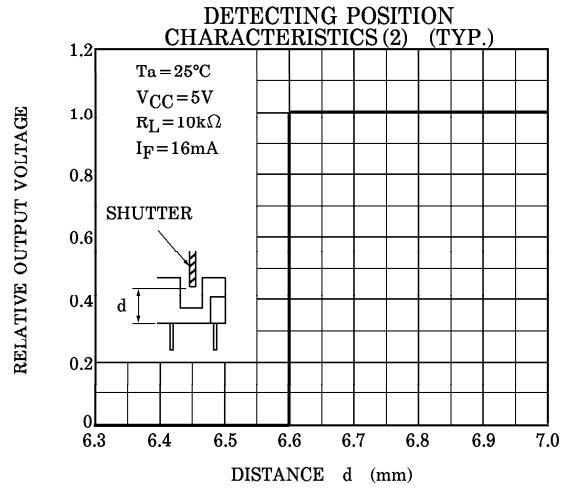
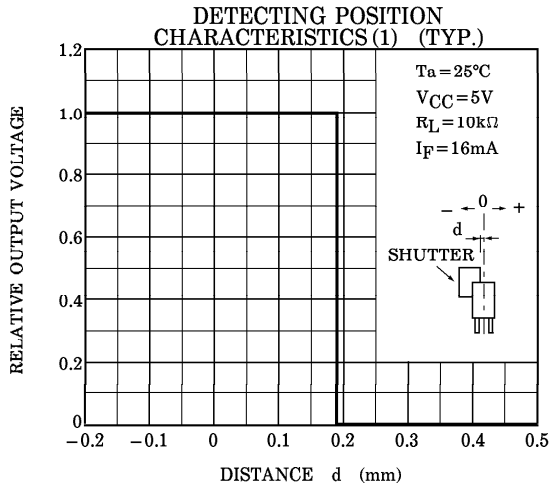


$t_r, t_f - R_L$  (TYP.)



$t_{pLH}, t_{pHL} - R_L$  (TYP.)





**POSITIONING OF SHUTTER AND DEVICE**

To operate correctly, make sure that the shutter and the device are positioned as shown in the figure below.

The slit pitch of the shutter must be set wider than the slit width of the device. Determine the width taking the switching time into consideration.

