

TOSHIBA PHOTOINTERRUPTER INFRARED LED + PHOTO IC

TLP1023

OA EQUIPMENT SUCH AS COPYING MACHINE, PRINTER, FACSIMILE, ETC.

AUTOMATIC SERVICE EQUIPMENT SUCH AS VENDING MACHINE, TICKETING MACHINE, ETC.

VARIOUS POSITION DETECTION

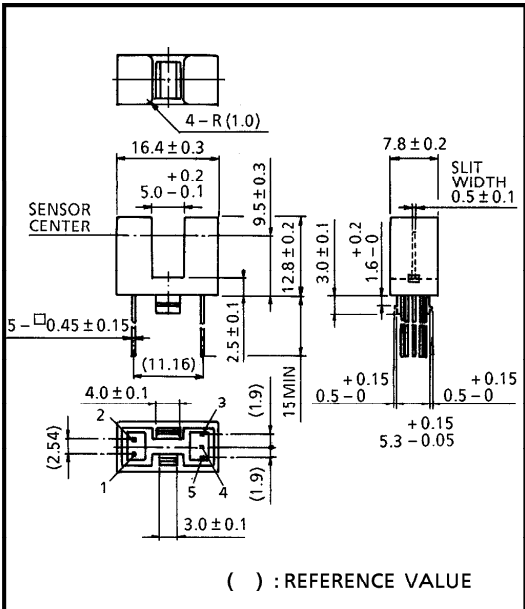
TLP1023 is a digital output photointerrupter with an GaAs infrared LED and a high sensitive and high gain Si photo IC combined.

It is not greatly influenced by dust because there is no powered dust accumulation at detecting slit part.

Directly connectable to TTL, LSTTL and CMOS.

- Built-in dustproof cover
- Printed wiring board direct mounting type (1.6mm thickness of PWB)
- Gap : 5mm
- Resolution : Slit width 0.5mm
- Digital output (open collector, high level output at shielding)
- Built-in Schmitt trigger circuit
- Threshold input current : $I_{FHL}=7\text{mA}$ (max) at $T_a=25^\circ\text{C}$
- Operating supply voltage : $V_{CC}=4.5\sim 17\text{V}$
- Fast response speed
- Material of the package : Polycarbonate

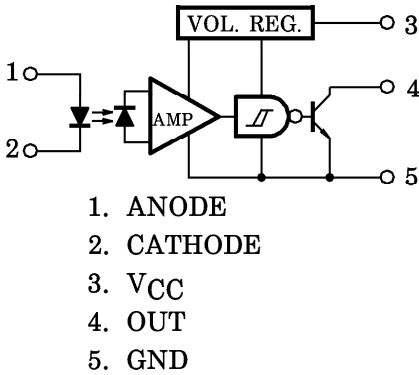
Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	11-16B2

Weight : 1.33g (typ.)

PIN CONNECTION



961001EBC2

● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

● Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

● The products described in this document are subject to foreign exchange and foreign trade control laws.

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● The information contained herein is subject to change without notice.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating (Ta > 25°C)	$\Delta I_F / ^\circ\text{C}$	-0.33	mA / °C
	Reverse Voltage	V_R	5	V
DETECTOR	Supply Voltage	V_{CC}	17	V
	Output Voltage	V_O	30	V
	Output Current	I_O	50	mA
	Power Dissipation	P_O	250	mW
	Power Dissipation Derating (Ta > 25°C)	$\Delta P_O / ^\circ\text{C}$	-3.33	mW / °C
Operating Temperature Range		T_{opr}	-25~85	°C
Storage Temperature Range		T_{stg}	-40~100	°C
Soldering Temperature (5s)		T_{sol}	260	°C

RECOMMENDED OPERATING CONDITIONS

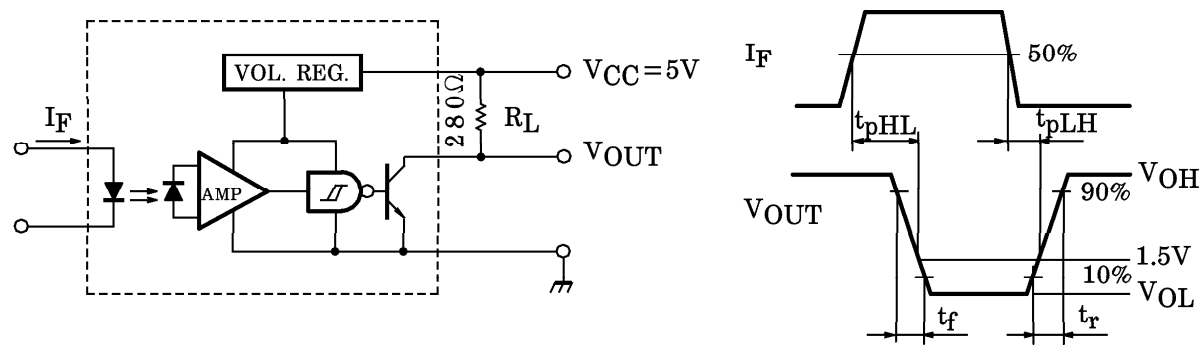
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Forward Current	I_F	22*	—	30	mA
Supply Voltage	V_{CC}	4.5	5.0	17	V
Output Voltage	V_O	—	5.0	24	V
Low Level Output Current	I_{OL}	—	—	16	mA
Operating Temperature	T_{opr}	-25	—	70	°C

* 22mA is a value when 50% LED deterioration is taken into consideration.
Initial threshold input current shall be 10.9mA max

OPTO-ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta = -25~70°C, VCC = 5V ± 10%)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	$I_F=10\text{mA}$, $T_a=25^\circ\text{C}$	1.00	1.15	1.30	V
	Reverse Current	I_R	$I_R=5\text{V}$, $T_a=25^\circ\text{C}$	—	—	10	μA
	Peak Emission Wavelength	λ_P	$I_F=15\text{mA}$, $T_a=25^\circ\text{C}$	—	940	—	nm
DETECTOR	Low Level Supply Current	I_{CCL}	$I_F=15\text{mA}$	—	—	5.0	mA
			$I_F=15\text{mA}$, $V_{CC}=17\text{V}$	—	—	5.2	
	High Level Supply Current	I_{CCH}	$I_F=0$	—	—	3.2	mA
			$I_F=0$, $V_{CC}=17\text{V}$	—	—	3.2	
	Low Level Output Voltage	V_{OL}	$I_{OL}=16\text{mA}$, $I_F=15\text{mA}$ $T_a=25^\circ\text{C}$	—	0.07	0.3	V
			$I_{OL}=16\text{mA}$, $I_F=15\text{mA}$ $V_{CC}=17\text{V}$	—	—	0.4	
	High Level Output Current	I_{OH}	$I_F=0$, $V_O=30\text{V}$	—	—	15	μA
	Peak Sensitivity Wavelength	λ_P	—	—	900	—	nm
COUPLED	Threshold Input Current (H→L)	I_{FHL}	$T_a=25^\circ\text{C}$	—	—	7	mA
			$V_{CC}=17\text{V}$	—	—	10.9	
	Hysteresis Ratio	I_{FHL}/I_{FLH}	$T_a=25^\circ\text{C}$	—	1.5	—	—
	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)	—	6	—	μs
		(H→L) t_{pHL}		—	3	—	
	Rise Time	t_r		—	0.1	—	
	Fall Time	t_f		—	0.05	—	

NOTE : SWITCHING TIME TEST CIRCUIT



PRECAUTION

Please be careful of the followings.

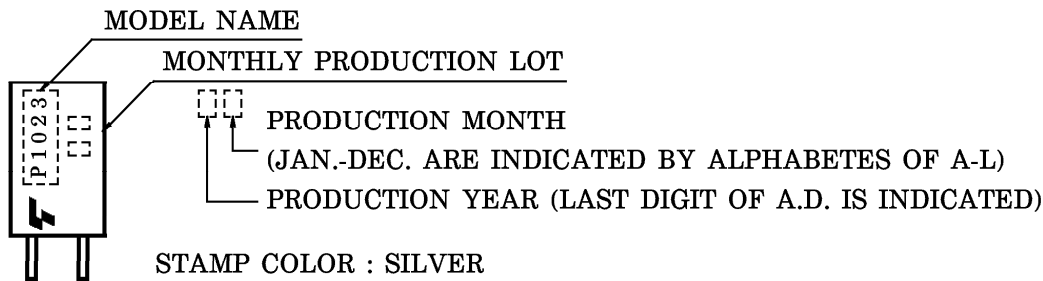
- 1. This product contains dustproof cover at detecting slit part but does not contain at back burface.
- 2. Soldering should be performed after lead forming.
- 3. If chemicals are used for cleaning, the soldered surface only shall be cleaned with chemicals avoiding the whole cleaning of the package.
- 4. The container is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol, and aliphatic hydrocarbons however, with pectochemicals (such as benzene, toluene, and acetone), alkali, aromatic hydrocarbons, or chloric hydrocarbons, polycarbonate becomes cracked, swollen, or melted. Please take care when chosing a packaging material by referencing the table below.

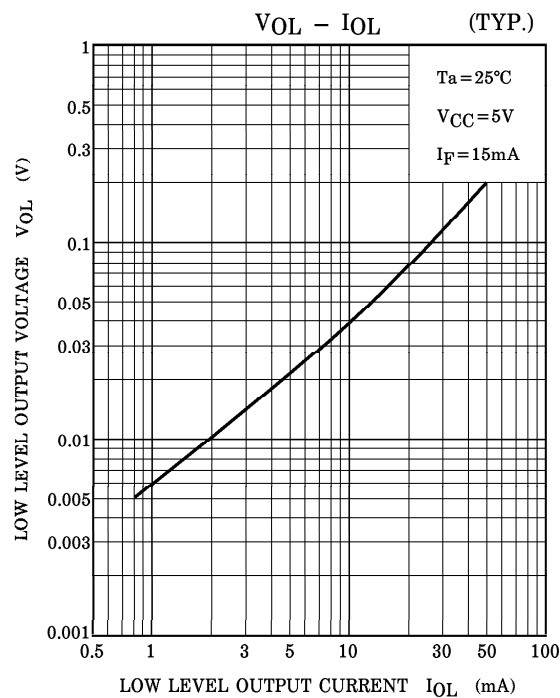
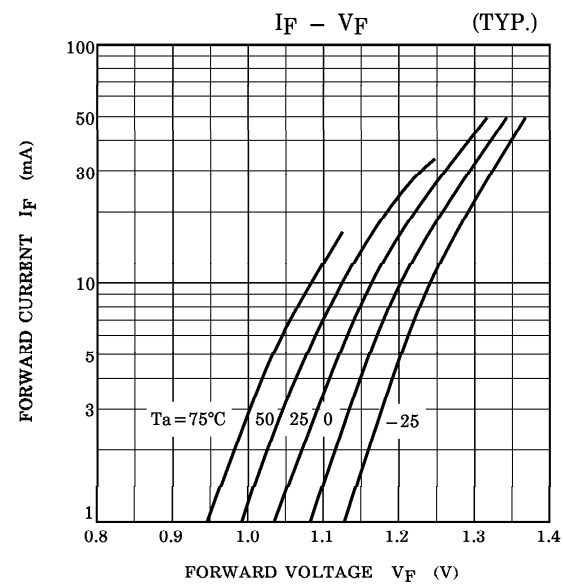
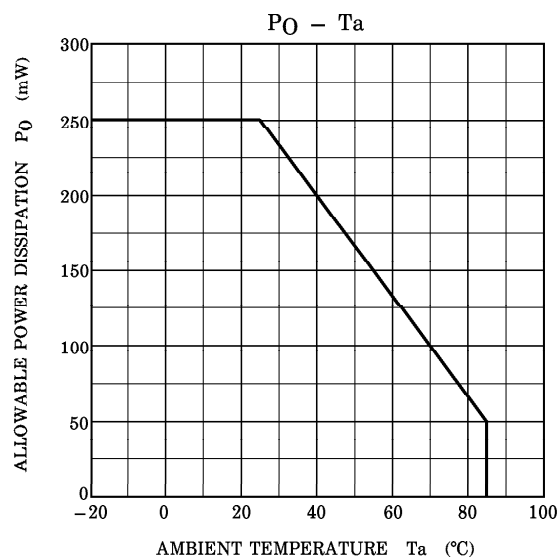
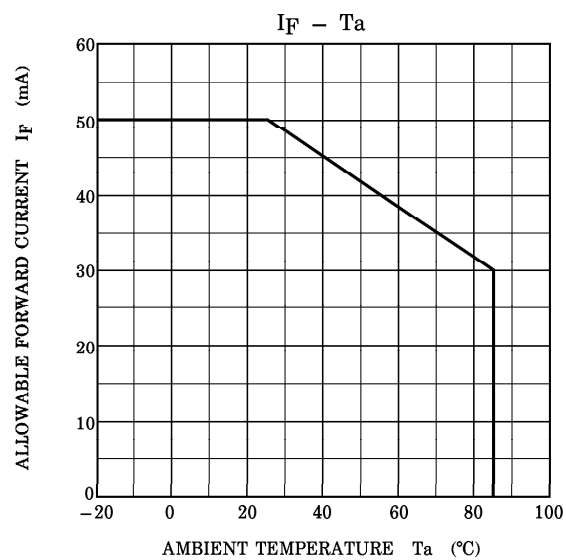
<Chemicals to avoid with polycarbonate>

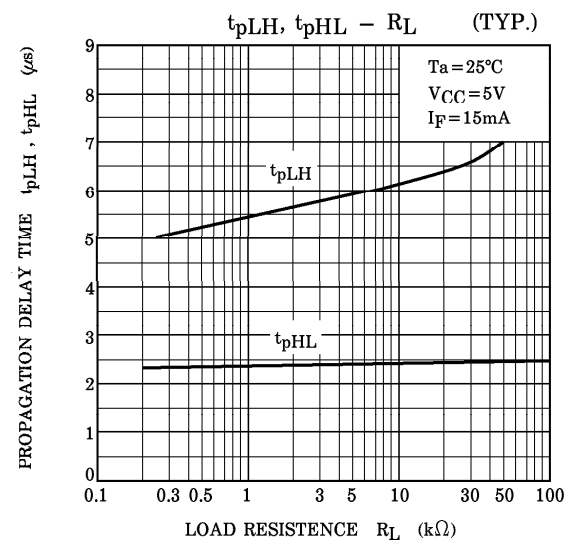
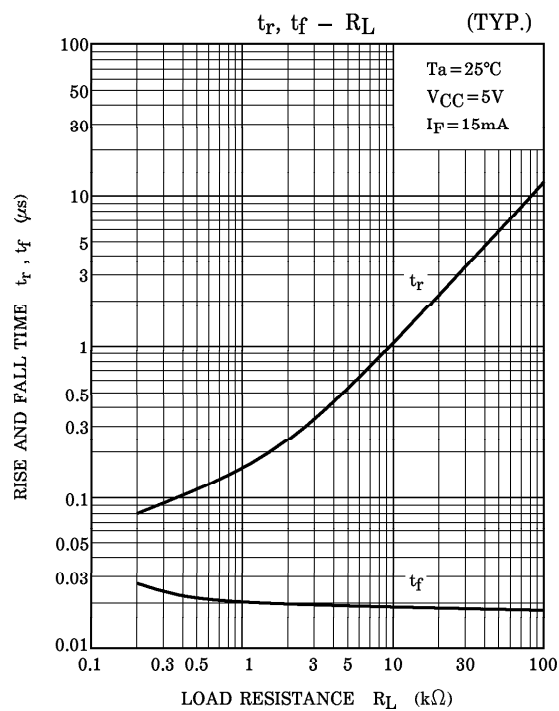
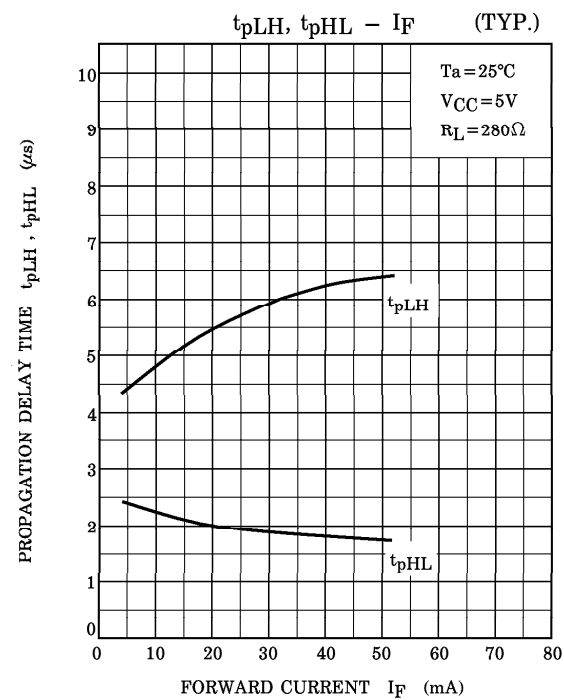
	PHENOMENON	CHEMICALS
A	Little deterioration but staining	• nitric acid (low concentration), hydrogen peroxide, chlorine
B	Cracked, crazed, or swollen	• acetic acid (70% or more) • gasoline • methyl ethyl ketone, ehtyl acetate, butyl acetate • ethyl methacrylate, ethyl ether, MEK • acetone, m-amino alcohol, carbon tetrachloride • carbon disulfide, trichloroethylene, cresol • thinners, oil of turpentine • triethanolamine, TCP, TBP
C	Melted { } : Used as solvent.	• concentrated sulfuric acid • benzene • styrene, acrylonitrile, vinyl acetate • ethylenediamine, diethylenediamine • {chloroform, methyl chloride, tetrachloromethane, dioxane, } • {1, 2-dichloroethane }
D	Decomposed	• ammonia water • other alkali

- 5. During 100μs after turning ON V_{CC}, output voltage changes for stabilizing the inner circuit.
- 6. Supply the by-pass condenser up to 0.01μF between V_{CC} and GND near device to stabilize the power supply line.

PRODUCT INDICATION

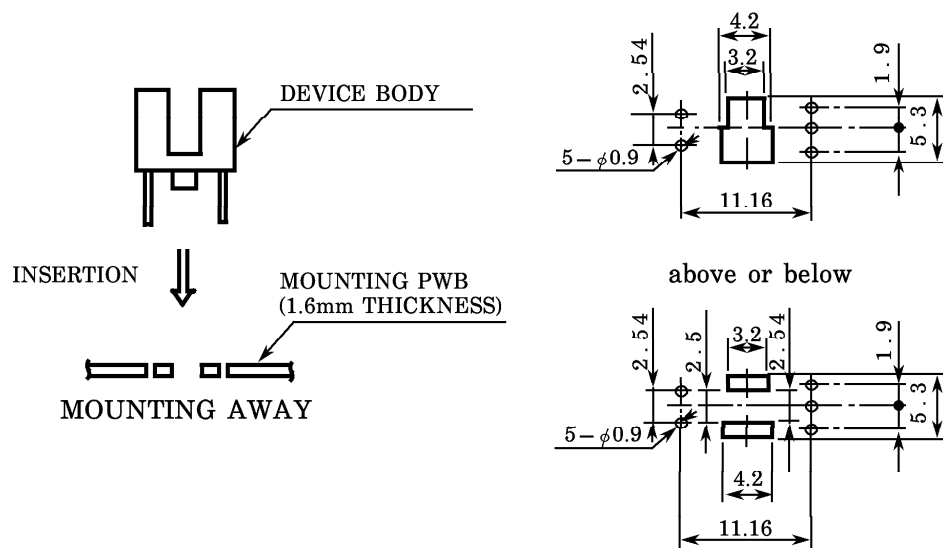






RECOMMENDED MOUNTING HOLE

UNIT IN mm

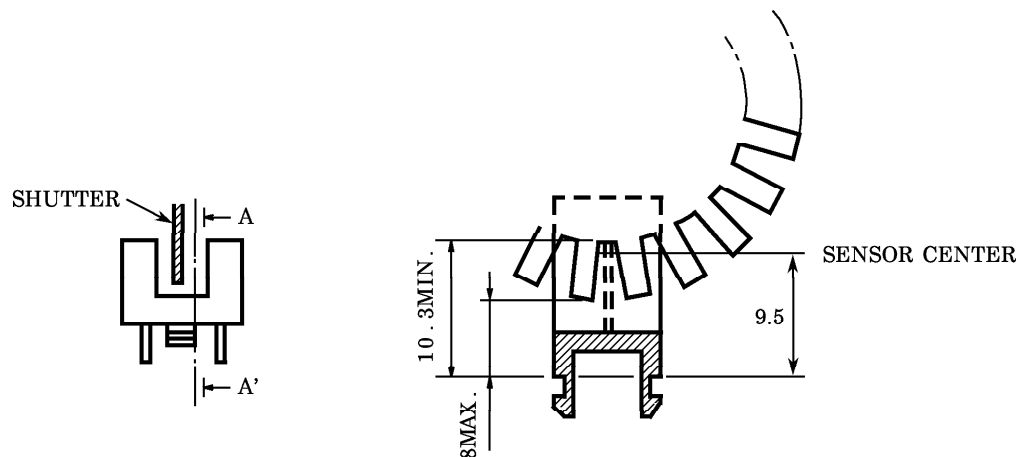


RECOMMENDED MOUNTING HOLE

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.



A-A' CROSS SECTION