TOSHIBA PHOTOINTERRUPTER INFRARED LED + PHOTO IC

TLP1029

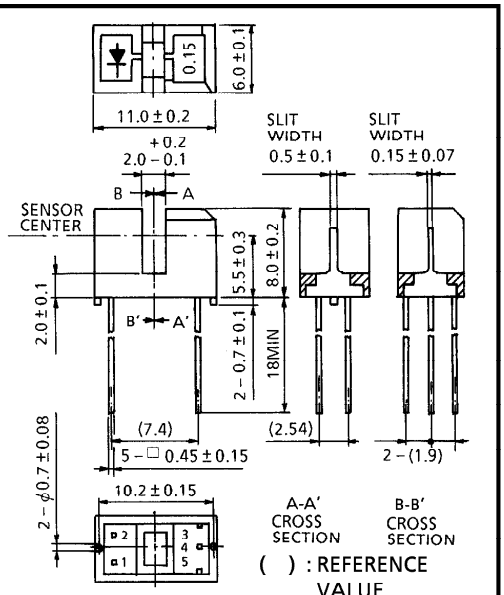
PRINTER, ELECTRONIC TYPEWRITER

COPYING MACHINE, FACSIMILE

TRACK BALL

VARIOUS POSITION DETECTION

Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	11-11A2

Weight : 0.6g (Typ.)

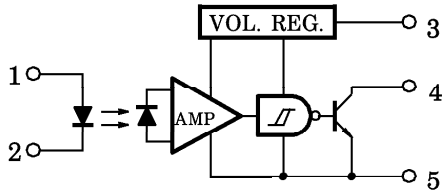
TLP1029 is a digital output photointerrupter with a GaAs infrared LED and a high sensitive and high gain Si photo IC combined. This photointerrupter has a switching time shorter than the phototransistor output and is capable of high speed position detection.

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

Its output becomes low level when the light is shielded.

- Printing wiring board direct mounting type
- Gap : 2mm
- High resolution : Slit width 0.5mm (LED side), 0.15mm (detector side)
- Digital output (open collector)
- Threshold input current : I_{FHL} = 6mA (Max.) at Ta = 25°C
- Supply voltage : V_{CC} = 4.5~17V
- Switching time : t_{pLH} = 6μs, t_{pHL} = 3μs (Typ.)
- Detector side is of visible light cut type.

PIN CONNECTION



1. ANODE
2. CATHODE
3. V_{CC}
4. OUT
5. GND

961001EBC2

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating (Ta > 25°C)	ΔI_F / °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)	ΔP_O / °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

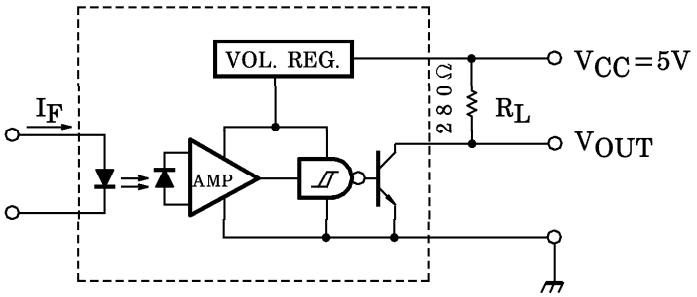
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Forward Current	I_F	21*	—	25	mA
Supply Voltage	V_{CC}	4.5	5.0	17	V
Output Voltage	V_O	—	5.0	24	V
Low Level Output Current	I_{OL}	—	—	16	mA
Operating Temperature	T_{opr}	−25	—	85	°C

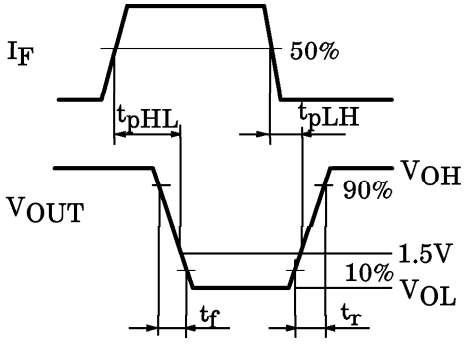
* 21mA is a value when 50% LED deterioration is taken into consideration. Initial threshold input current shall be 10.5mA MAX.

ELECTRICAL CHARACTERISTICS (Unless Otherwise Specified, Ta = −25~85°C, V_{CC} = 5V ± 10%)

	CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Current		V_F	I_F = 10mA, Ta = 25°C	1.00	1.15	1.30	V
	Reverse Current		I_R	V_R = 5V, Ta = 25°C	—	—	10	μA
	Peak Emitter Wavelength		λ_P	I_F = 15mA, Ta = 25°C	—	940	—	nm
DETECTOR	Low Level Supply Current		I_{CCL}	I_F = 15mA	—	—	5.0	mA
				I_F = 15mA, V_{CC} = 17V	—	—	5.2	
	High Level Supply Current		I_{CCH}	I_F = 0	—	—	3.0	mA
				I_F = 0, V_{CC} = 17V	—	—	3.2	
	Low Level Output Voltage		V_{OL}	I_{OL} = 16mA, I_F = 15mA Ta = 25°C	—	0.07	0.3	V
				I_{OL} = 16mA, I_F = 15mA V_{CC} = 17V	—	—	0.4	
	High Level Output Current		I_{OH}	I_F = 0, V_O = 30V	—	—	15	μA
	Peak Sensitivity Wavelength		λ_P	Ta = 25°C	—	900	—	nm
COUPLED	Threshold Input Current (H→L)		I_{FHL}	Ta = 25°C	—	—	6	mA
				V_{CC} = 17V	—	—	10.5	
	Hysteresis Ratio		I_{FHL}/I_{FLH}		—	1.5	—	—
	Propagation Delay Time	L→H	t_{pLH}	V_{CC} = 5V, I_F = 15mA (Note) R_L = 280Ω, Ta = 25°C	—	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.

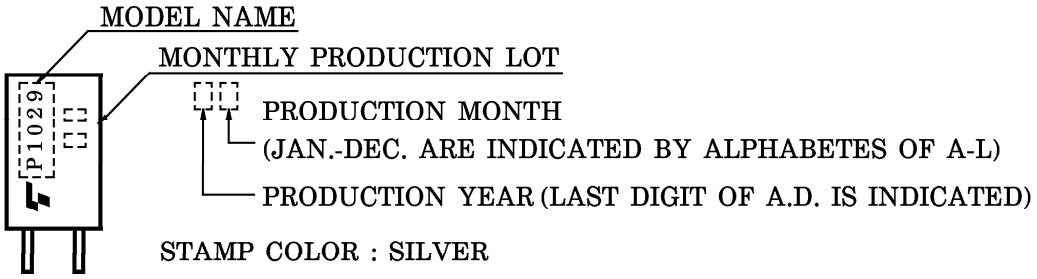
1. Soldering should be performed after lead forming.
2. If chemicals are used for cleaning, the soldered surface only shall be cleaned with chemicals avoiding the whole cleaning of the package.
3. The container is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol, and aliphatic hydrocarbons however, with pertochemicals (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>

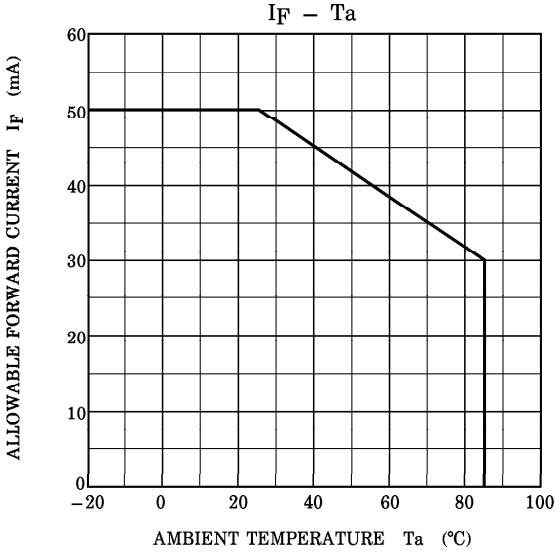
	PHENOMENON	CHEMICALS
A	Little deterioration but staining	• nitric acid (low concentration), hydrogen peroxide, chlorine
B	Cracked, crazed, or swollen	• acetic acid (70% or more) • gasoline • methyl ethyl ketone, ehtyl acetate, butyl acetate • ethyl methacrylate, ethyl ether, MEK • acetone, m-amino alcohol, 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

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

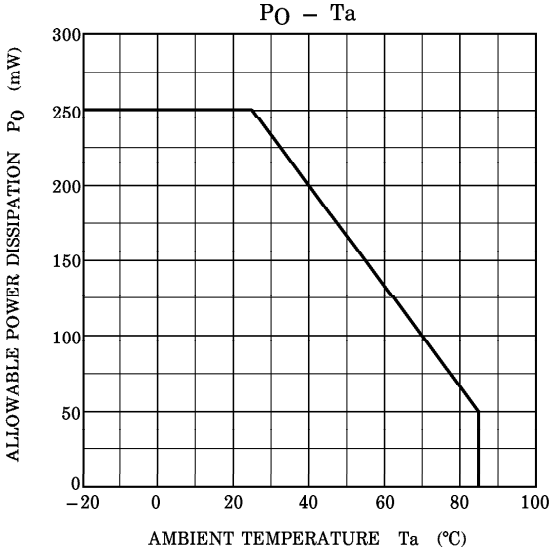
PRODUCT INDICATION



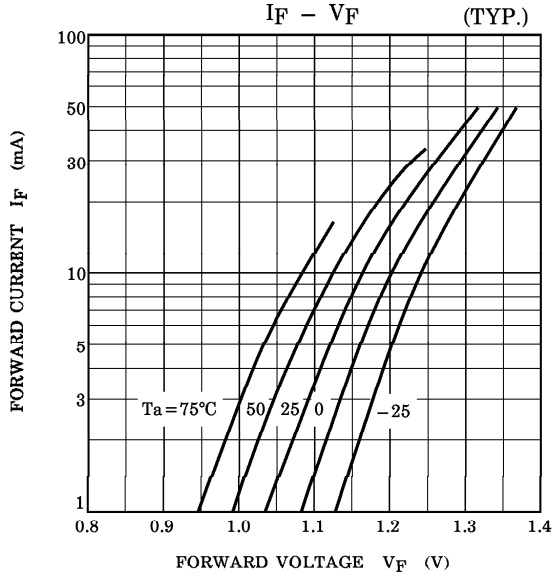
I_F – Ta



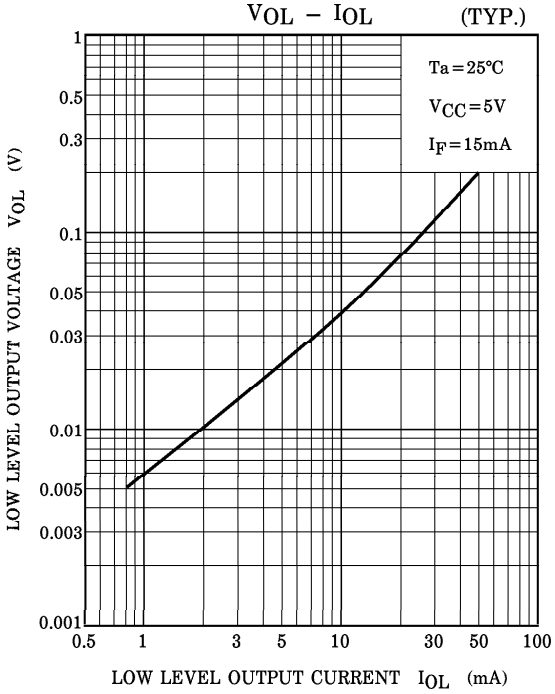
P_O – Ta



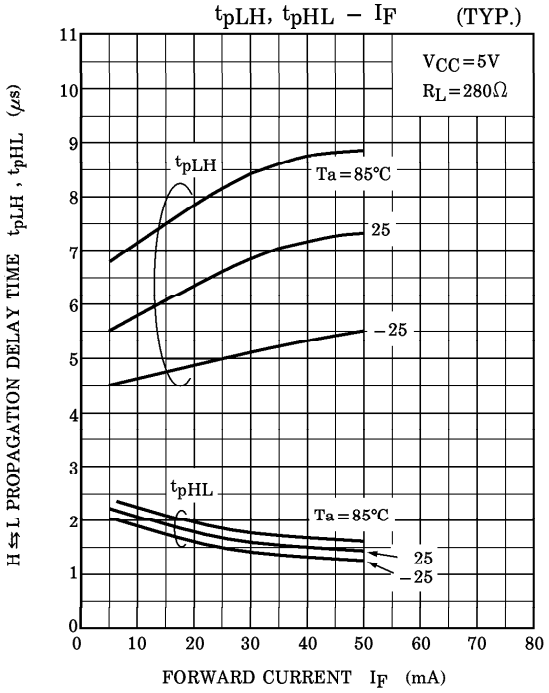
I_F – V_F (TYP.)



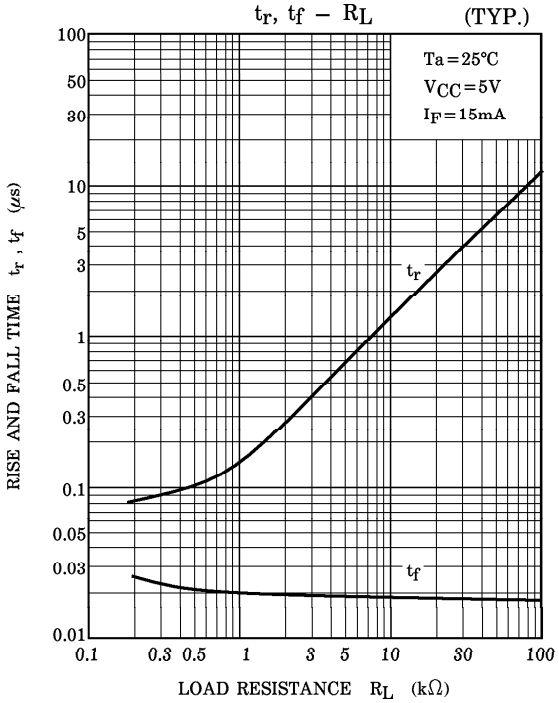
V_{OL} – I_{OL} (TYP.)



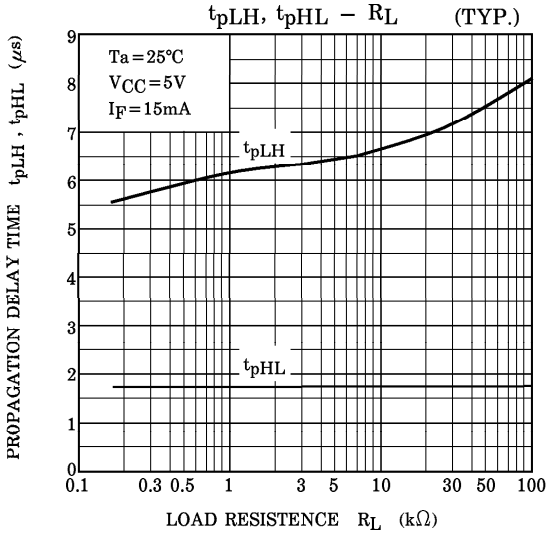
t_{pLH}, t_{pHL} – I_F (TYP.)

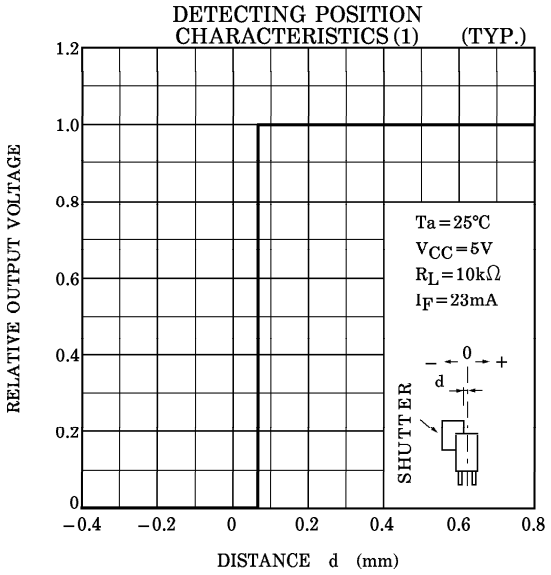


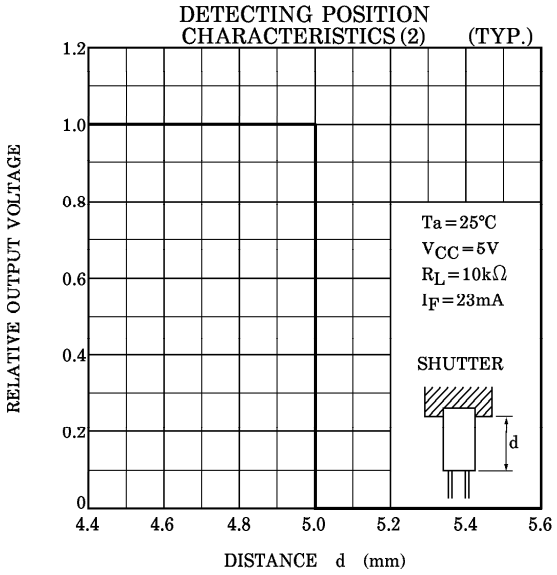
t_r, t_f – R_L (TYP.)



t_{pLH}, t_{pHL} – R_L (TYP.)



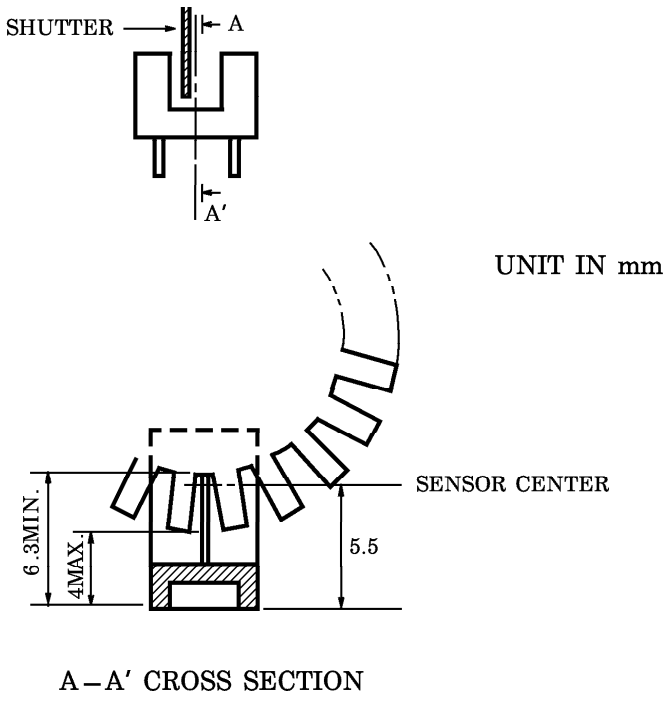




POSITIONING OF SHUTTER AND DEVICE

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

The shit 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