

TOSHIBA PHOTOINTERRUPTER INFRARED LED + PHOTO IC

TLP1020

- IMAGE SCANNER, HANDY COPY
- PHOTOELECTRIC TYPE COUNTER
- COPYING MACHINE, FACSIMILE, PRINTER
- VARIOUS POSITION DETECTION

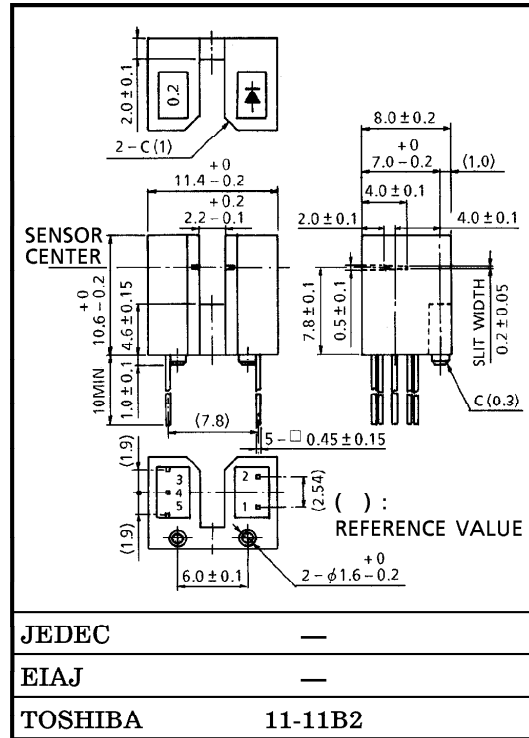
TLP1020 is a digital output photointerrupter combining GaAs infrared LED with high sensitive and high gain Si photo IC.

Because of the oblong detection slit, this photointerrupter is best suited to the upward-downward position detection.

Its output becomes low level when the light is shield. The same size TLP813 with phototransistor output is available.

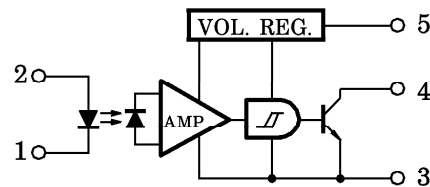
- Printed wiring board direct mounting type (with a locating pin).
- Gap : 2.2mm
- High resolution : Slit width 0.2×2.0mm (the oblong slit)
- Digital output (open collector)
- Directly connectable to TTL, LSTTL and CMOS.
- Threshold input current: $I_{FLH} = 10\text{mA}$ (max) at $T_a = 25^\circ\text{C}$
- Supply voltage range : $V_{CC} = 4.5\sim 17\text{V}$
- Built-in Schmitt 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 : 0.94g (typ.)

PIN CONNECTION



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

961001EBC2

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● 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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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

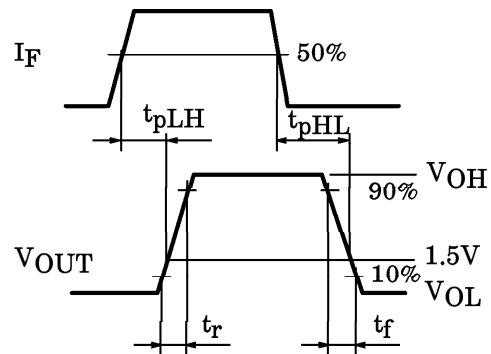
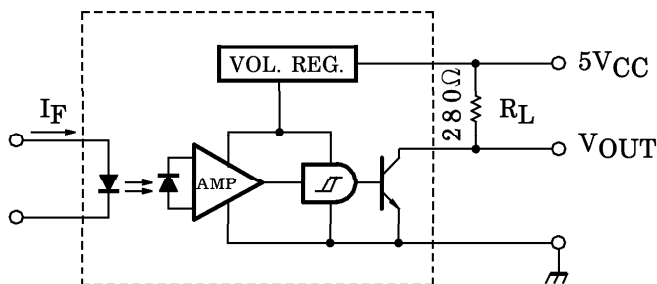
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Forward Current	I _F	23*	—	30	mA
Supply Voltage	V _{CC}	4.5	5	17	V
Output Voltage	V _O	—	5	24	V
Low Level Output Current	I _{OL}	—	—	16	mA

* 23mA is a value when 30% LED deterioration is taken into consideration.
Initial threshold input current shall be 15.5mA max

OPTO-ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_a = -25 \sim 70^\circ\text{C}$, $V_{CC} = 4.5 \sim 5.5\text{V}$)

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	$V_R = 5\text{V}$, $T_a = 25^\circ\text{C}$	—	—	10	μA	
	Peak Emission Wavelength	λ_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}	$I_F = 25\text{mA}$	—	—	3.0	mA	
			$I_F = 25\text{mA}$, $V_{CC} = 17\text{V}$	—	—	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}	$I_F = 25\text{mA}$, $V_O = 30\text{V}$	—	—	15	μA		
Peak Sensitivity Wavelength	λ_P	$T_a = 25^\circ\text{C}$	—	900	—	nm		
COUPLED	L→H Threshold Input Current	I_{FLH}	$T_a = 25^\circ\text{C}$	—	—	10	mA	
			$V_{CC} = 17\text{V}$	—	—	15.5		
	Hysteresis Ratio	I_{FHL} / I_{FLH}	$T_a = 25^\circ\text{C}$	—	0.67	—	—	
	Propagation Delay Time	(L→H)	t_{pLH}	$V_{CC} = 5\text{V}$, $I_F = 25\text{mA}$ $R_L = 280\Omega$, $T_a = 25^\circ\text{C}$ (Note)	—	3	—	μs
		(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.

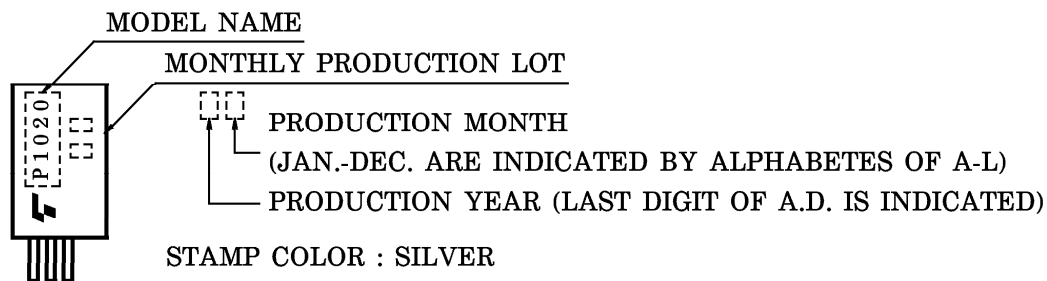
1. Soldering should be performed after lead forming.
2. If chemicals are used for cleaning, the soldered surface only shall be cleaned with chemicals avoiding the whole cleaning of the package.
3. The container is made of polycarbonate. Polycarbonate is usually stable with acid, alcohol, and aliphatic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

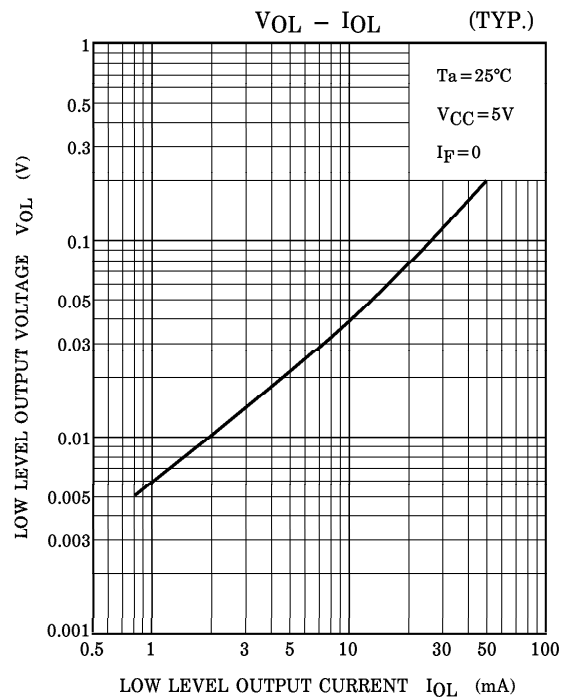
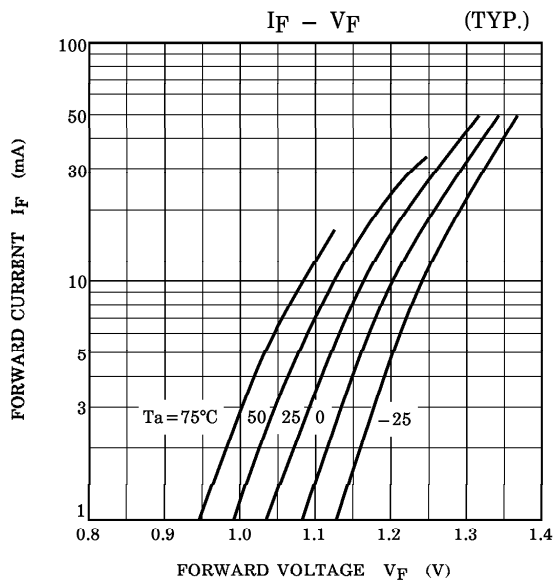
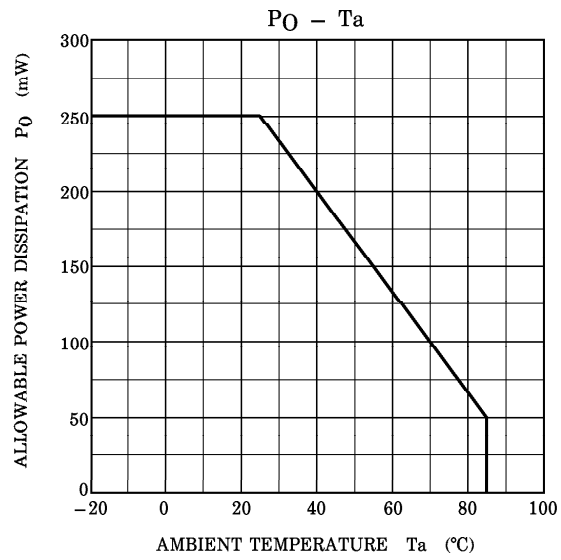
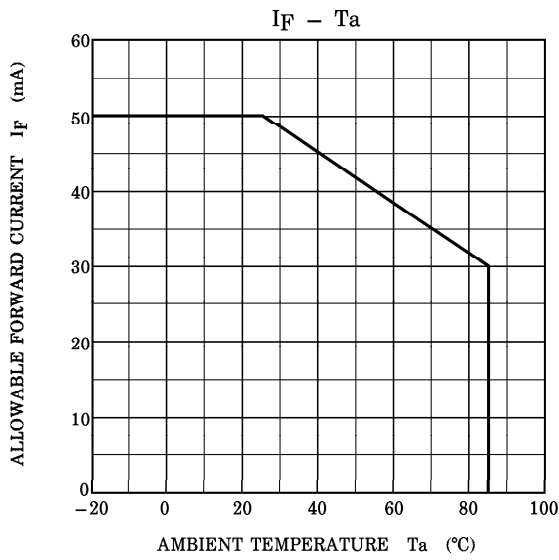
<Chemicals to avoid with polycarbonate>

	PHENOMENON	CHEMICALS
A	Little deterioration but staining	<ul style="list-style-type: none"> • nitric acid (low concentration), hydrogen peroxide, chlorine
B	Cracked, crazed, or swollen	<ul style="list-style-type: none"> • acetic acid (70% or more) • gasoline • methyl ethyl ketone, ethyl 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.	<ul style="list-style-type: none"> • concentrated sulfuric acid • benzene • styrene, acrylonitrile, vinyl acetate • ethylenediamine, diethylenediamine • {chloroform, methyl chloride, tetrachloromethane, dioxane, } • {1, 2-dichloroethane }
D	Decomposed	<ul style="list-style-type: none"> • ammonia water • other alkali

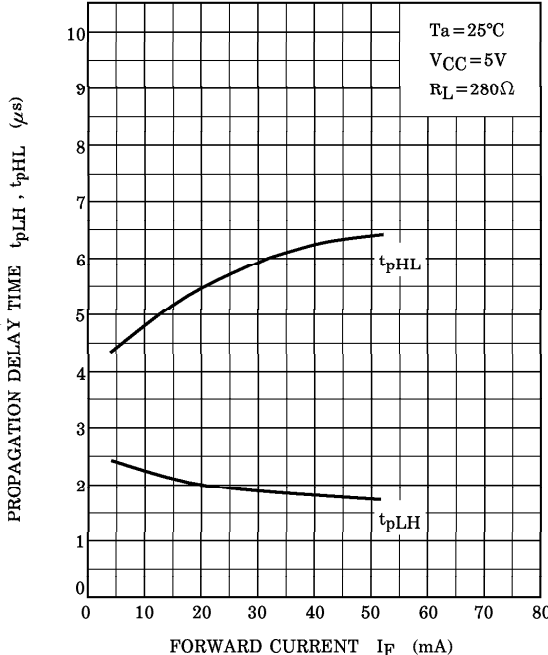
4. During 100 μ s after turning on V_{CC}, output voltage changes for stabilizing the inner circuit.
5. Supply the by-pass condenser up to 0.01 μ F between V_{CC} and GND near device to stabilize the power supply line.

PRODUCT INDICATION

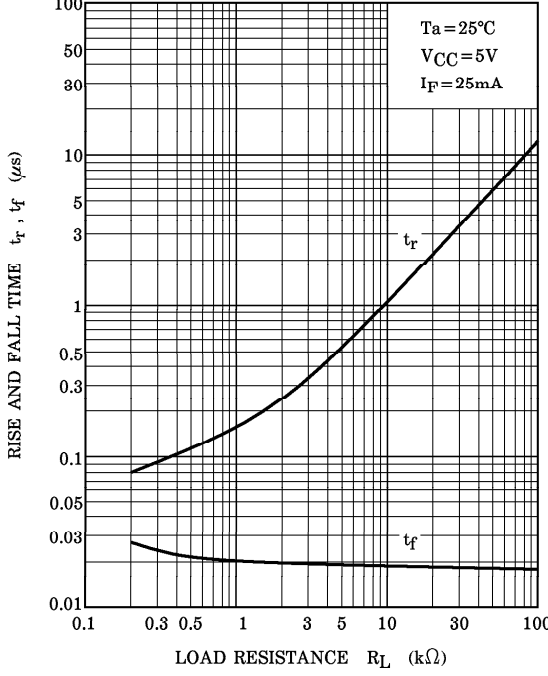




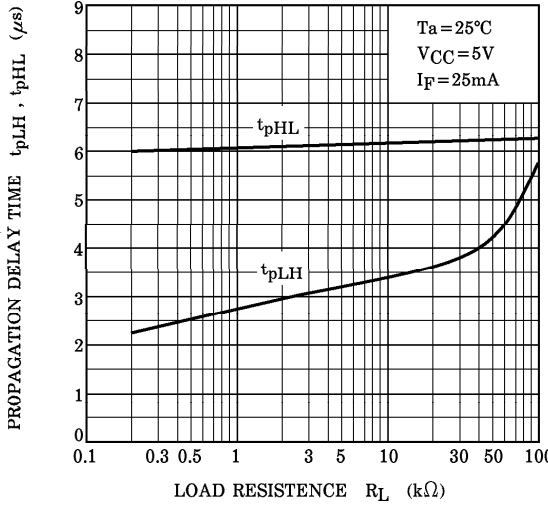
$t_{pLH}, t_{pHL} - I_F$ (TYP.)

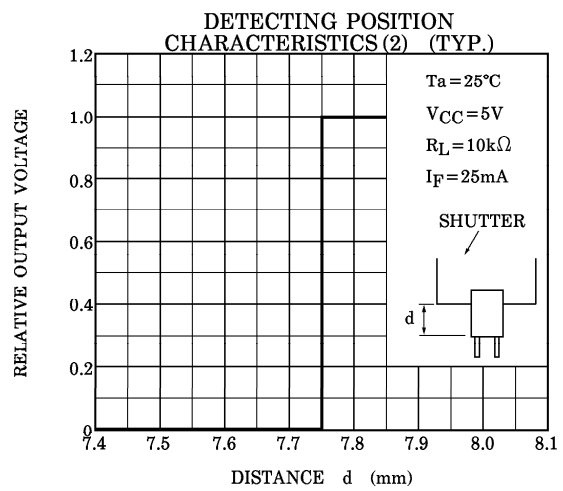
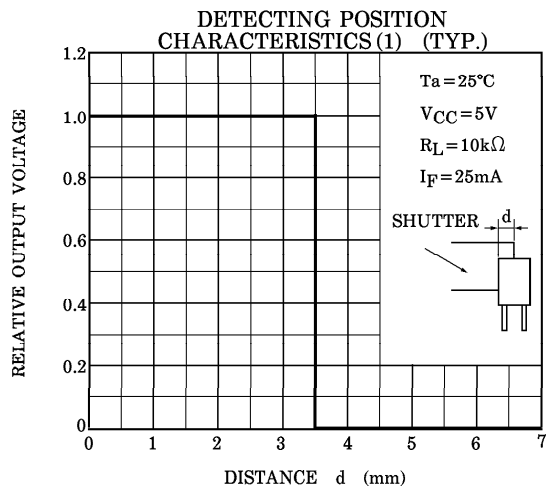


$t_r, t_f - R_L$ (TYP.)



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



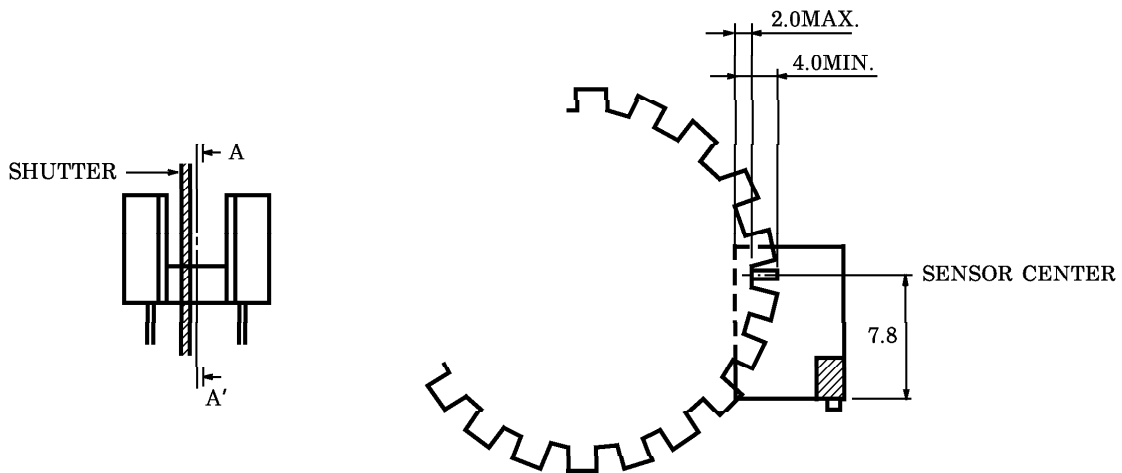


POSITIONING OF SHUTTER AND DEVICE

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.

UNIT IN mm



A-A' CROSS SECTION