TOSHIBA PHOTOINTERRUPTER INFRARED LED + PHOTO IC

TLP1025

STILL CAMERA

VIDEO CAMERA

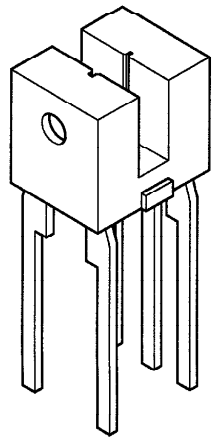
SMALL-SIZED PERSONAL OA EQUIPMENT

The TLP1025 photointerrupter with digital output combines a GaAs infrared LED and a high-sensitivity, high-gain Si photo IC into a single chip.

It has a narrow slit width and provides high resolution.

Thanks to its built-in Schmitt trigger circuit, the TLP1025 can be coupled directly with a microcomputer or logic IC. It outputs a high when light is blocked.

- Very small package
- Printed circuit board direct mounting type
- Gap : 1mm
- High resolution : Slit width 0.15mm (infrared LED side)
  0.1mm (photo IC side)
- Digital output (open collector)
- Built-in Schmitt trigger circuit for direct coupling with logic IC
- Low-voltage operation : V_{CC} = 2.4~7V
- High response speed



JEDEC	—
EIAJ	—
TOSHIBA	11-14G1

Weight : 0.09g (typ.)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
LED	Forward Current Derating (Ta ≧ 25°C)	I_F / °C	−0.66	mA / °C
LED	Reverse Voltage	V_R	5	V
DETECTER	Supply Voltage	V_{CC}	7	V
DETECTER	Output Voltage	V_O	7	V
DETECTER	Output Current	I_{OL}	10	mA
Operating Temperature		T_{opr}	−25~85	°C
Storage Temperature		T_{stg}	−40~100	°C
Soldering Temperature (5s) (Note 1)		T_{sol}	260	°C

Note 1 : At the location of 1.5mm from the resin package bottom

961001EBC2

RECOMMENDED OPERATING CONDITIONS

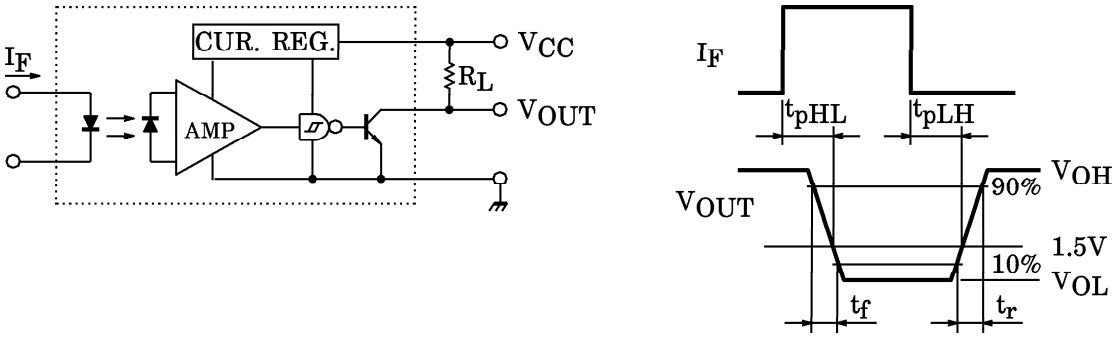
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward Current	I_F	12*	—	20	mA
Supply Voltage	V_{CC}	2.4	—	7	V
Output Voltage	V_O	—	—	7	V
Low Level Output Current	I_{OL}	—	—	10	mA

* 12mA is a value when 50% LED deterioration is taken into consideration. Initial threshold input current shall be 6mA max

OPTO ELECTRICAL CHARACTERISTICS (Ta = −25°C~85°C, V_{CC} = 2.4~7V, Typical values are all at 25°C)

	CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage		V_F	I_F=10mA, Ta=25°C	1.0	1.15	1.3	V
	Reverse Current		I_R	V_R=5V, Ta=25°C	—	0.01	10	μA
	Peak Emission Wavelength		λ_P	I_F=10mA	—	940	—	nm
DETECTOR	Supply Voltage		V_{CC}	—	2.4	—	7	V
	Low Level Supply Current		I_{CCL}	I_F=10mA	—	1.0	3.5	mA
	High Level Supply Current		I_{CCH}		—	1.3	3.2	mA
	Low Level Output Voltage		V_{OL}	I_F=10mA, I_{OL}=10mA	—	0.06	0.4	V
	High Level Output Current		I_{OH}	V_O=7V	—	—	30	μA
	Peak Sensitivity Wavelength		λ_P	Ta=25°C	—	870	—	nm
COUPLED	Threshold Input Current (H→L)		I_{FHL}		—	—	6	mA
	Hysteresis Ratio		I_{FHL}/I_{FLH}	Ta=25°C	—	1.25	—	—
	Switching Time	Propagation Delay Time (H→L)	t_{PHL}	I_F=10mA, R_L=750Ω, Ta=25°C (Note 2)	—	4	—	μs
		Propagation Delay Time (L→H)	t_{PLH}		—	26	—	
		Rise Time	t_r		—	0.07	—	
		Fall Time	t_f		—	0.08	—	

Note 2 : Switching time measurement circuit and waveform

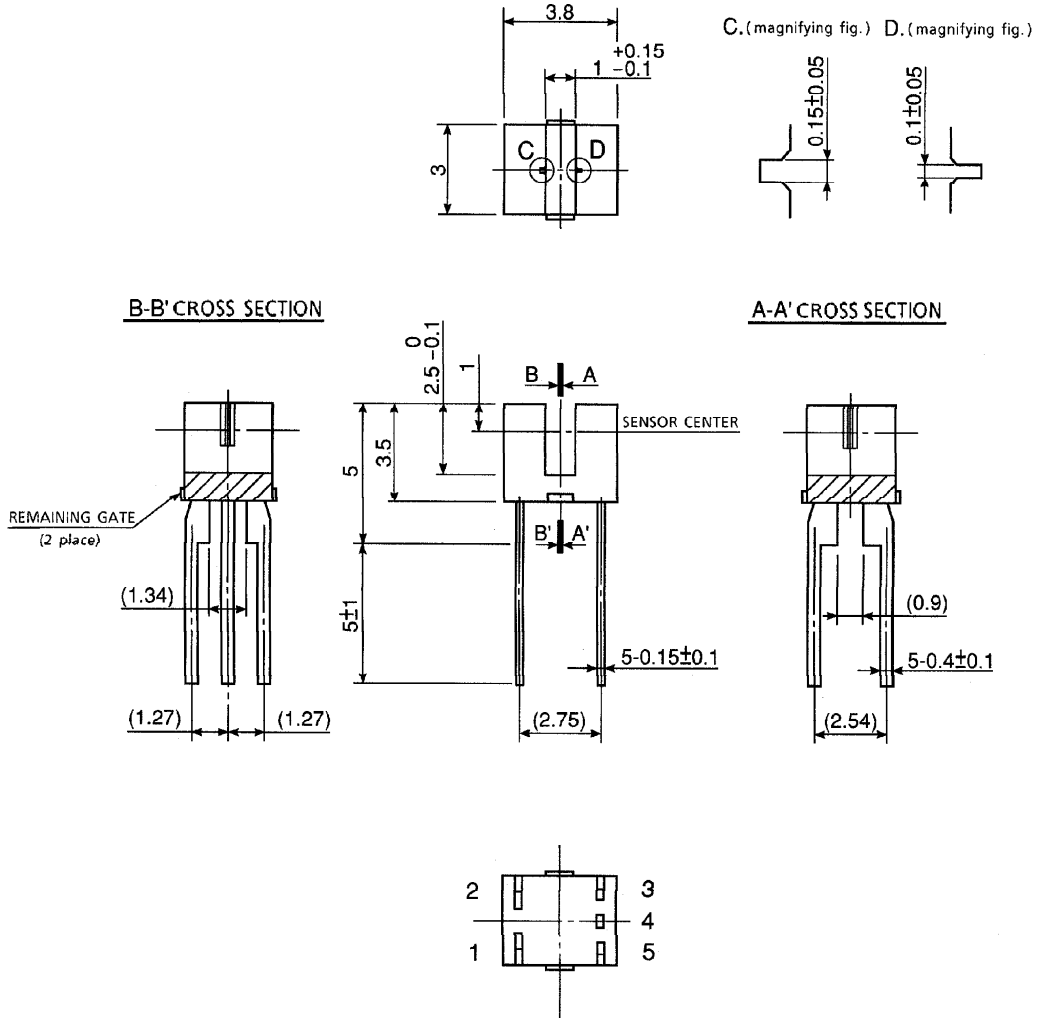


PRECAUTIONS

- When removing flux with chemicals after soldering, clean only the leads on the soldering side; do not dip the whole package for cleaning.
  Chemicals remaining on an LED or photo IC light emitter or receiver, if any, would have a bad influence to the optical characteristics and it may severely higher the threshold input current.
- The environment to install the device should be determined carefully. Oil or chemicals may cause the package to be dissolved or cracked.
- The device should be mounted on an unwarped surface.
- The photo IC contains a high-sensitivity amp. Toshiba recommends that a capacitor of approximately 0.01μF with good high frequency characteristics be inserted between V_{CC} and GND near the device to prevent unwanted oscillation.
- The threshold input current increases with time as the power to the infrared LED is turned on repeatedly over time. Therefore, fully consider the change of the device's characteristics with the passage of time when designing your circuit.
- Note that the device's output changes state for a 100μs period after it is powered on until the internal circuit is stabilized.
- Stress causing the package deformation or deterioration should not be given to the package.

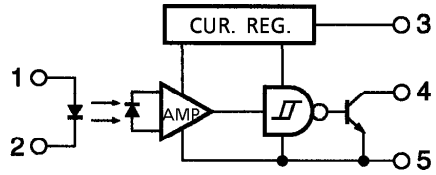
OUTLINE

Unit : mm
Tolerance : ±0.2mm unless otherwise specified
Values in parentheses ( ) are for reference.
The remaining gate should be 0.2mm or less.



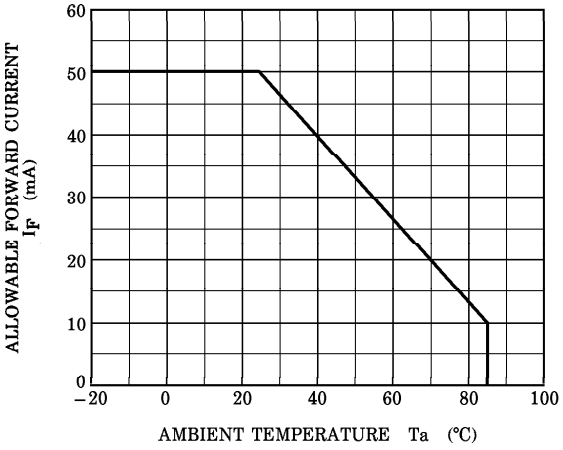
Weight : 0.09g (typ.)

PIN CONNECTION

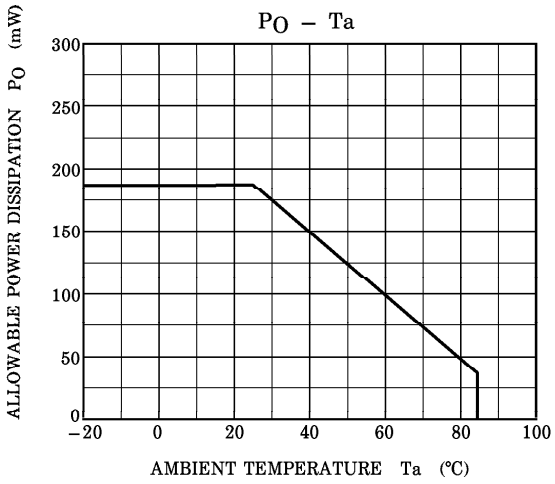


1. ANODE
2. CATHODE
3. V_{CC}
4. OUT
5. GND

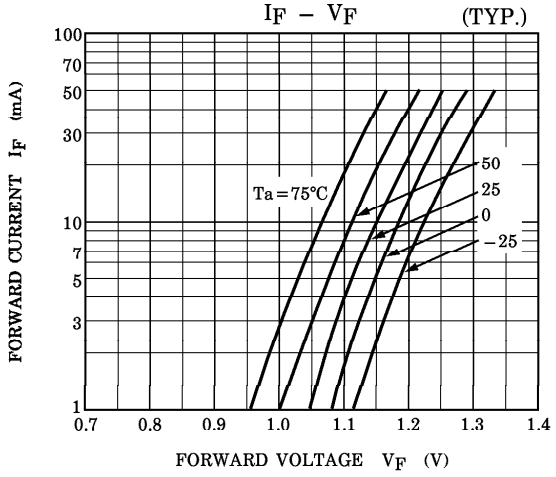
I_F – Ta



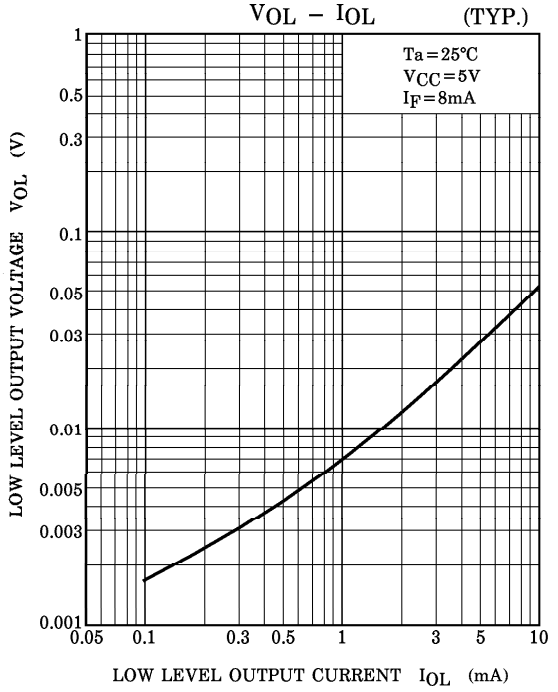
P_O – Ta



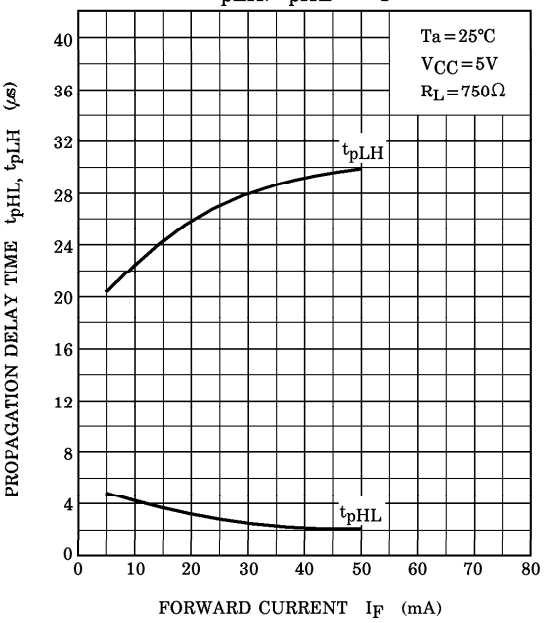
I_F – V_F (TYP.)



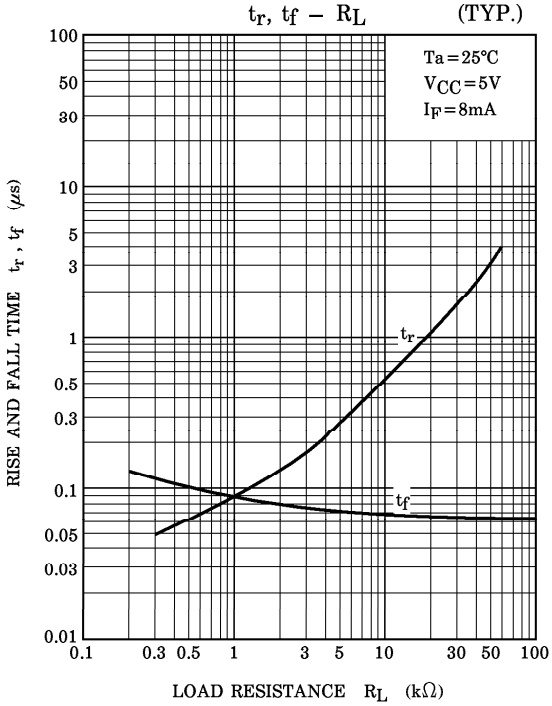
V_{OL} – I_{OL} (TYP.)



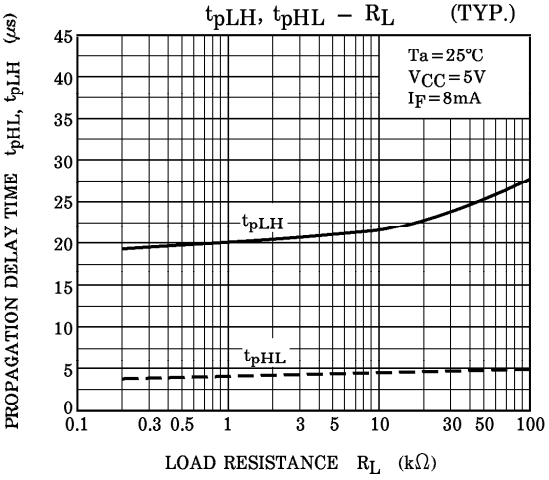
t_{pLH}, t_{pHL} – I_F (TYP.)

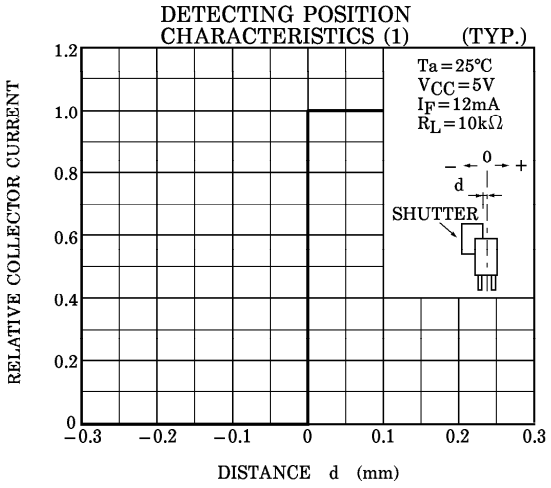


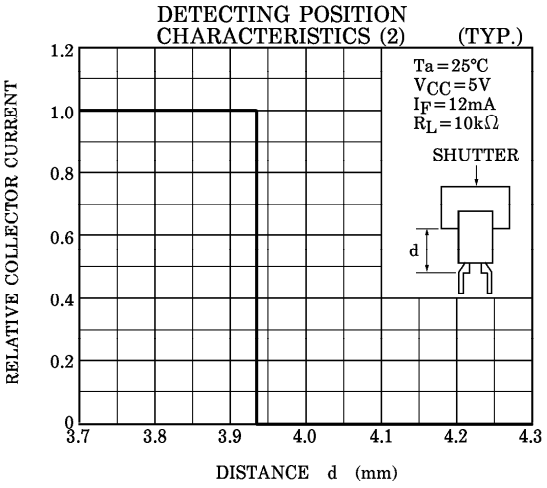
t_r, t_f – R_L (TYP.)



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.