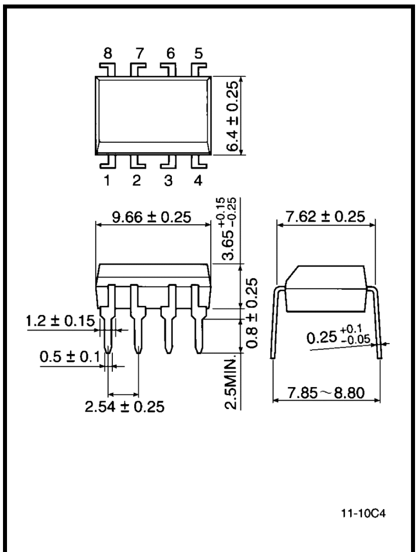
TOSHIBA Photocoupler GaAℓAs Ired + Photo IC

TLP750

Degital Logic Ground Isolation
Line Receiver
Microprocessor System Interfaces
Switching Power Supply Feedback Control
Analog Signal Isolation

Unit in mm



TOSHIBA 11−10C4

Weight: 0.54g

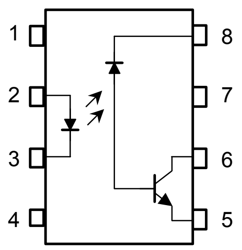
The TOSHIBA TLP750 consists of GaAℓAs high−output light emitting diode and a high speed detector of one chip photo diode−transistor.
This unit is 8−lead DIP.
TLP750 has no internal base connection, and is suitable for application in noisy environmental conditions.

- Switching speed: t_{pHL}=0.3μs(typ.)
- Switching speed: t_{pLH}=0.5μs(typ.)(R_L=1.9kΩ)
- UL recognized: UL1577, file No. E67349
- BSI approved: BS EN60065: 1994,
  Certificate No.7613
  BS EN60950: 1992,
  Certificate No.7614
- Isolation voltage: 5000V_{rms}(min.)
- Option(d4)type
  VDE approved: DIN VDE0884/06.92,
  Certificate No.68384
  Maximum operating insulation voltage: 890V_{PK}
  Highest permissible over voltage: 8000V_{PK}

(Note) When a VDE0884 approved type is needed, please designate the “Option(D4)”

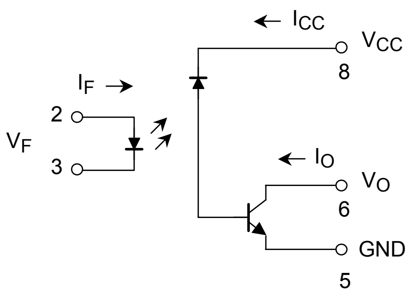
- Creepage distance: 6.4mm(min.)
  Clearance: 6.4mm(min.)
  Insulation thickness: 0.4mm(min.)

Pin Configuration (top view)



1 : N.C.
2 : Anode
3 : Cathode
4 : N.C.
5 : Emitter
6 : Collector
7 : N.C.
8 : Cathode

Schematic



Maximum Ratings (Ta = 25°C)

	Characteristic		Symbol	Rating	Unit
LED	Forward current	(Note 1)	I_F	25	mA
	Pulse forward current	(Note 2)	I_{FP}	50	mA
	Peak transient forward current	(Note 3)	I_{FPT}	1	A
	Reverse voltage		V_R	5	V
	Diode power dissipation	(Note 4)	P_D	45	mW
Detector	Output current		I_O	8	mA
	Peak output current		I_{OP}	16	mA
	Output voltage		V_O	−0.5~15	V
	Supply voltage		V_{CC}	−0.5~15	V
	Output power dissipation	(Note 5)	P_O	100	mW
Operating temperature range			T_{opr}	−55~100	°C
Storage temperature range			T_{stg}	−55~125	°C
Lead solder temperature(10s)		(Note 6)	T_{sol}	260	°C
Isolation voltage (AC, 1min., R.H=60%)		(Note 7)	BV_S	5000	V_{rms}

(Note 1) Derate 0.8mA / °C above 70°C.

(Note 2) 50% duty cycle, 1ms pulse width.
Derate 1.6mA / °C above 70°C.

(Note 3) Pulse width ≤ 1μs, 300pps.

(Note 4) Derate 0.9mW / °C above 70°C.

(Note 5) Derate 2mW / °C above 70°C.

(Note 6) Soldering portion of lead: Up to 2mm from the body of the device.

(Note 7) Device considered a two terminal device: Pins 1, 2, 3 and 4 shorted together and pins 5, 6, 7 and 8 shorted together.

Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	I_F=16mA		—	1.65	1.85	V
LED	Forward voltage temperature coefficient	$\Delta V_F / \Delta Ta$	I_F=16mA		—	−2	—	mV / °C
LED	Reverse current	I_R	V_R=5V		—	—	10	μA
LED	Capacitance between terminal	C_T	V_F=0, f=1MHz		—	45	—	pF
Detector	High level output current	$I_{OH(1)}$	I_F=0mA, V_{CC}=V_O=5.5V		—	3	500	nA
Detector		$I_{OH(2)}$	I_F=0mA, V_{CC}=V_O=15V		—	—	5	μA
Detector		I_{OH}	I_F=0mA, V_{CC}=V_O=15V Ta=70°C		—	—	50	μA
Detector	High level supply voltage	I_{CCH}	I_F=0mA, V_{CC}=15V		—	0.01	1	μA
Coupled	Current transfer ratio	I_O/I_F	I_F=16mA V_{CC}=4.5V V_O=0.4V	Ta=25°C	10	30	—	%
				Rank: 0	19	30	—	
				Ta=0~70°C	5	—	—	
				Rank: 0	15	—	—	
Coupled	Low level output voltage	V_{OL}	I_F=16mA, V_{CC}=4.5V, I_O=1.1mA (rank 0: I_O=2.4mA)		—	—	0.4	V
Coupled	Isolation resistance	R_S	R.H.=60%, V=5000V_{DC} (Note 7)		1×10^{12}	10^{14}	—	Ω
Coupled	Capacitance between input to output	C_S	V_S=0, f=1MHz (Note 8)		—	0.8	—	pF

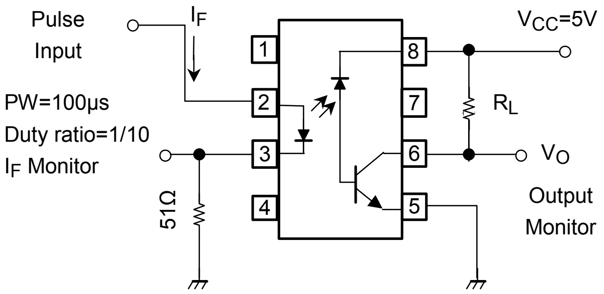
Switching Characteristics (Ta = 25°C, V_{CC} = 5V)

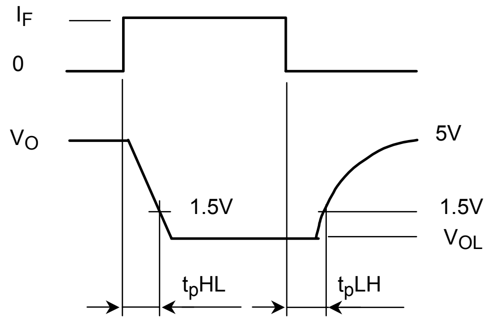
Characteristic	Symbol	Test Cir–cuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	t_{pHL}	1	I_F=0→16mA, V_{CC}=5V, R_L=4.1kΩ	—	0.2	0.8	μs
			Rank 0: R_L=1.9kΩ	—	0.3	0.8	
Propagation delay time (L→H)	t_{pLH}	1	I_F=16→0mA, V_{CC}=5V, R_L=4.1kΩ	—	1.0	2.0	μs
			Rank 0: R_L=1.9kΩ	—	0.5	1.2	
Common mode transient immunity at logic high output (Note 8)	C_{MH}	2	I_F=0mA, V_{CM}=200V_{p-p} R_L=4.1kΩ (Rank 0: R_L=1.9kΩ)	—	1500	—	V / μs
Common mode transient immunity at logic low output (Note 8)	C_{ML}	2	I_F=16mA, V_{CM}=200V_{p-p} R_L=4.1kΩ (Rank 0: R_L=1.9kΩ)	—	−1500	—	V / μs

(Note 8) CML is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state(V_O < 0.8V).
CMH is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state(V_O > 2.0V).

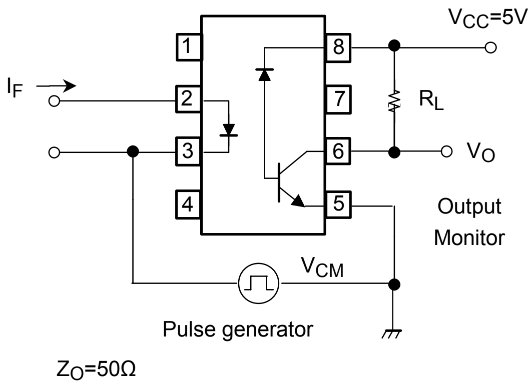
(Note 9) Maximum electrostatic discharge voltage for any pins: 100V(C=200pF, R=0)

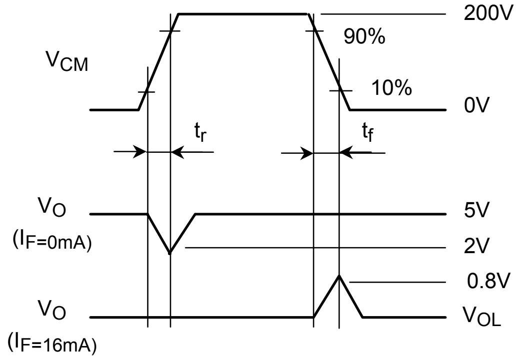
Test Circuit 1: Switching Time Test Circuit





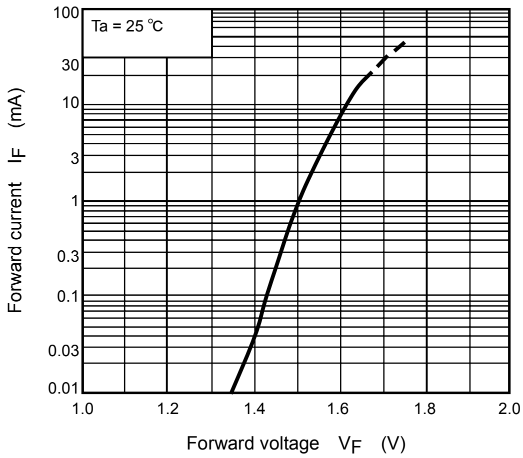
Test Circuit 2: Common Mode Noise Immunity Test Circuit



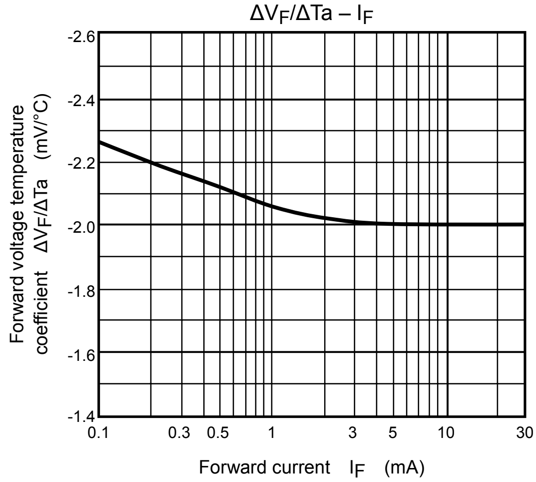


$$CM_H = \frac{160(V)}{t_r(\mu s)}, CM_L = \frac{160(V)}{t_f(\mu s)}$$

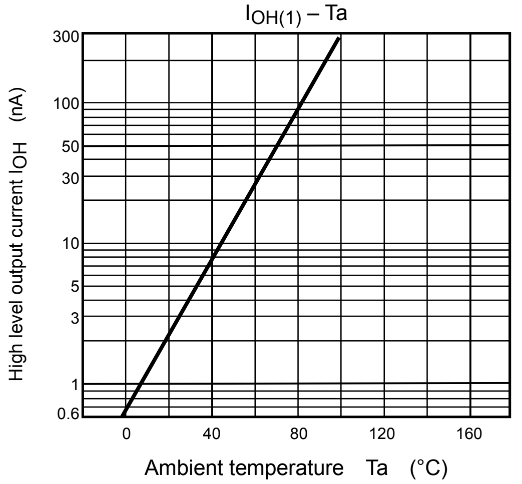
I_F – V_F



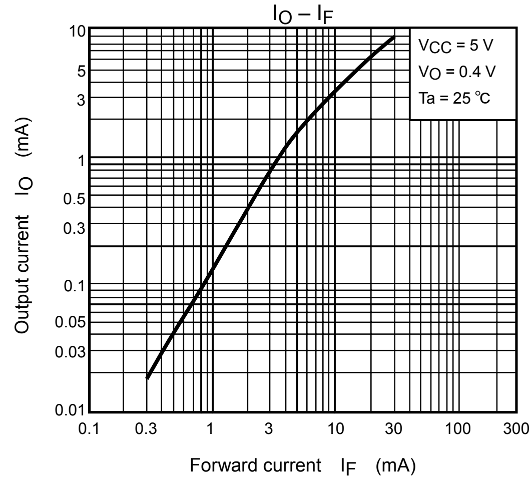
$\Delta V_F/\Delta Ta$ – I_F



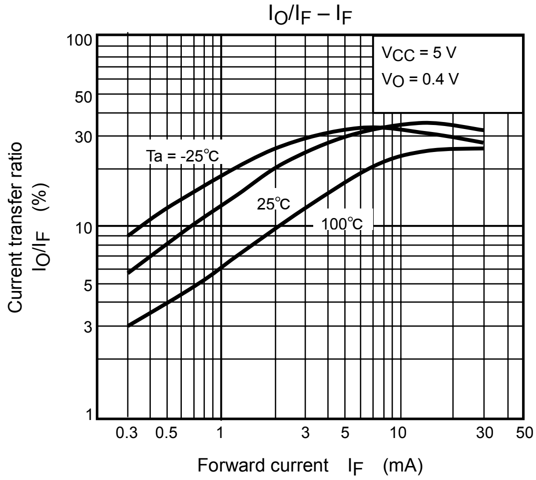
$I_{OH(1)}$ – Ta



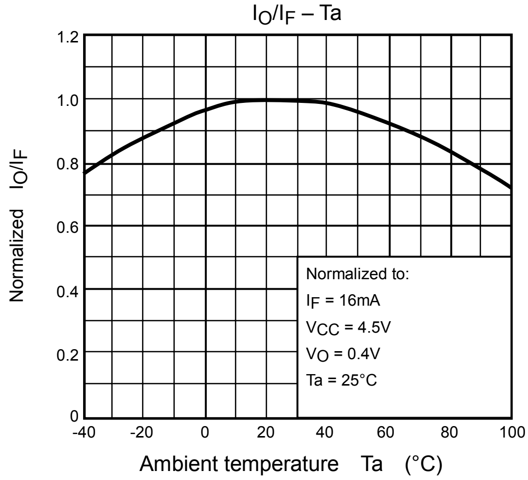
I_O – I_F

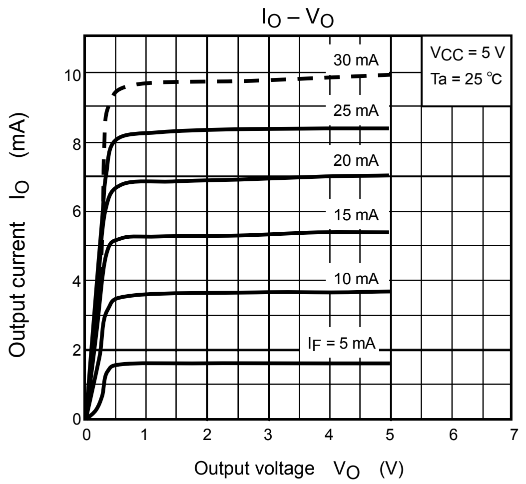


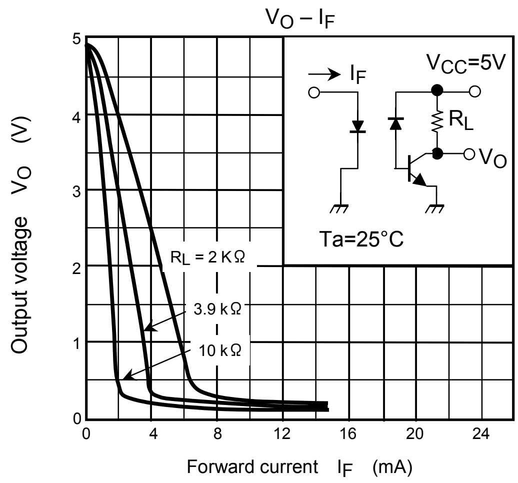
I_O/I_F – I_F

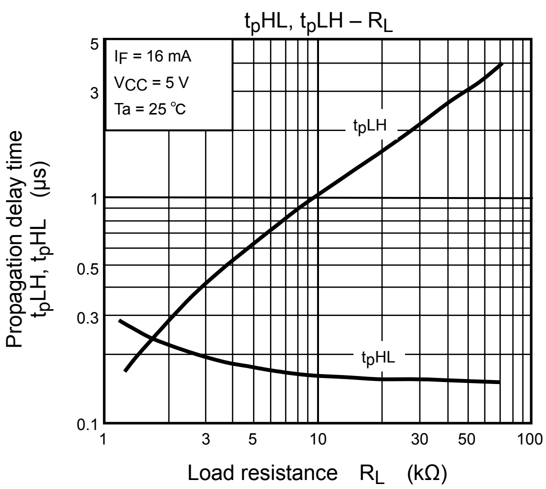


I_O/I_F – Ta




IO – VO
VCC = 5 V
Ta = 25 °C
30 mA
25 mA
20 mA
15 mA
10 mA
IF = 5 mA
Output current IO (mA)
Output voltage VO (V)


VO – IF
IF
VCC=5V
RL
VO
Ta=25°C
RL = 2 KΩ
3.9 kΩ
10 kΩ
Output voltage VO (V)
Forward current IF (mA)


tpHL, tpLH – RL
IF = 16 mA
VCC = 5 V
Ta = 25 °C
tpLH
tpHL
Propagation delay time tpLH, tpHL (μs)
Load resistance RL (kΩ)

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