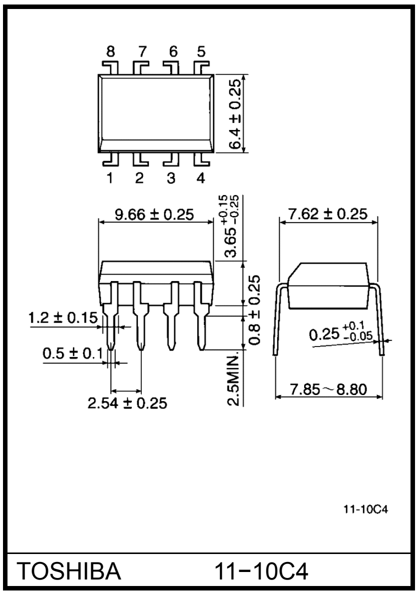
TOSHIBA Photocoupler GaAℓAs Ired + Photo IC

TLP751

Digital 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

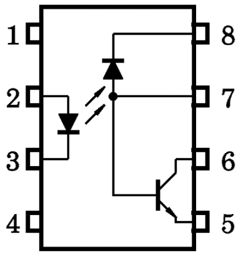
The TOSHIBA TLP751 consists of GaAℓAs high−output light emitting diode and a high speed detector of one chip photo diode−transistor. This unit is 8−lead DIP.
TLP751 has internal base connection. This base pin should be used for analog application or enable operation. If base pin is open, output signal will be noisy by environmental condition. For this case, TLP750 is suitable.

- Switching speed: $t_{pHL} = 0.3\mu s$ (typ.)
  $t_{pLH} = 0.5\mu s$ (typ.)(R_L=1.9kΩ)
- TTL compatible
- UL recognized: UL1577, file no. E67349
- BSI approved: BS EN60065: 2002,
  Certificate no. 8869
  BS EN60950-1: 2002,
  Certificate no. 8870
- Isolation voltage: 5000Vrms(min.)
- Option(D4)type
  VDE approved: DIN EN 60747-5-2,
  Certificate no. 40009302
  Maximum operating insulation voltage: 890V_{PK}
  Highest permissible over voltage: 8000V_{PK}

(Note) When a EN 60747-5-2 approved type is needed, please designate the “Option(D4)”

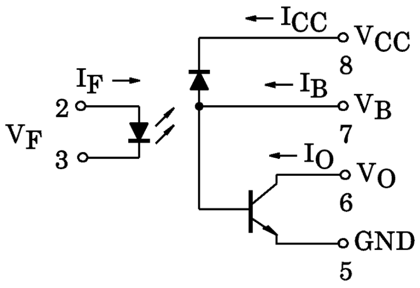
- Creepage distance: 6.4mm(min.)
  Clearance: 6.4mm(min.)
  Insulation thickness: 0.4mm(min.)

Pin Configuration(top view)



1 : N.C.
2 : ANODE
3 : CATHODE
4 : N.C.
5 : EMITTER
6 : COLLECTOR
7 : BASE
8 : V_{CC}

Schematic



Absolute 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
	Base current		I_B	5	mA
	Output power dissipation	(Note 5)	P_O	100	mW
	Emitter−base reverse voltage		V_{EB}	5	V
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	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

(Note 1) Derate 0.8mA 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 = 16 mA	—	1.65	1.85	V
	Forward voltage Temperature coefficient	ΔV_F / ΔTa	I_F = 16 mA	—	−2	—	mV / °C
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance between terminal	CT	V_F = 0, f = 1 MHz	—	45	—	pF
Detector	High level output current	$I_{OH\ (1)}$	I_F = 0 mA, V_{CC} = V_O = 5.5 V	—	3	500	nA
		$I_{OH\ (2)}$	I_F = 0 mA, V_{CC} = V_O = 15 V	—	—	5	μA
		I_{OH}	I_F = 0 mA, V_{CC} = V_O = 15 V Ta = 70°C	—	—	50	
	High level supply voltage	I_{CCH}	I_F = 0 mA, V_{CC} = 15 V	—	0.01	1	μA
Coupled	Current transfer ratio	I_O / I_F	I_F = 16 mA, V_{CC} = 4.5 V V_O = 0.4 V	10	30	—	%
	Low level output voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V I_O = 1.1 mA	—	—	0.4	V
	resistance(input−output)	R_S	R.H. ≤ 60%, V_S = 500 V_{DC} (Note7)	1×10^{12}	10^{14}	—	Ω
	Capacitance (input−output)	C_S	V_S = 0, f = 1 MHz (Note7)	—	0.8	—	pF

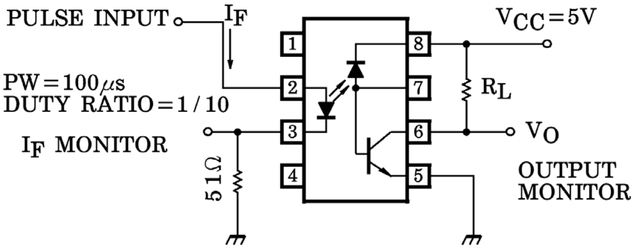
Switching Characteristics (Ta = 25°C, V_{CC} = 5V)

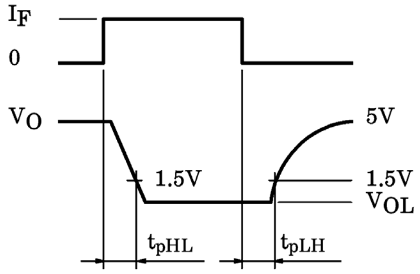
Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	t_{pHL}	1	I_F = 0→16mA, V_{CC} = 5V, R_L = 4.1 kΩ	—	0.2	—	μs
Propagation delay time (L→H)	t_{pLH}		I_F = 16→0mA V_{CC} = 5V, R_L = 4.1 kΩ	—	1.0	—	μs
Common mode transient immunity at logic high output (Note 8)	CM_H	2	I_F = 0 mA, V_{CM} = 200 V_{p-p} R_L = 4.1 kΩ	—	400	—	V / μs
Common mode transient immunity at logic low output (Note 8)	CM_L		I_F =16 mA V_{CM} = 200 V_{p-p} R_L = 4.1 kΩ	—	−1000	—	V / μs

(Note 8) CM_L 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).
CM_H 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).

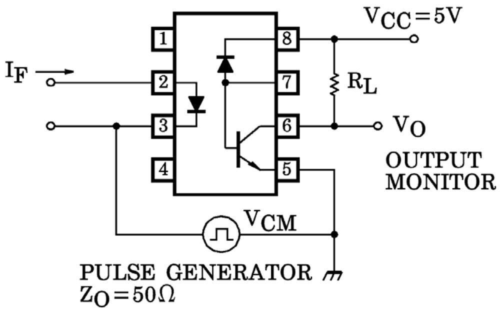
(Note 9) Maximum electrostatic discharge voltage for any pins: 100V (C = 200pF, R = 0).

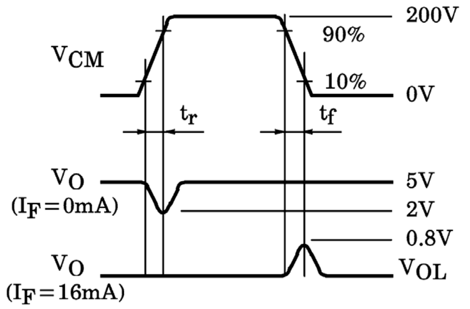
Test Circuit 1 : Switching Time Test Circuit



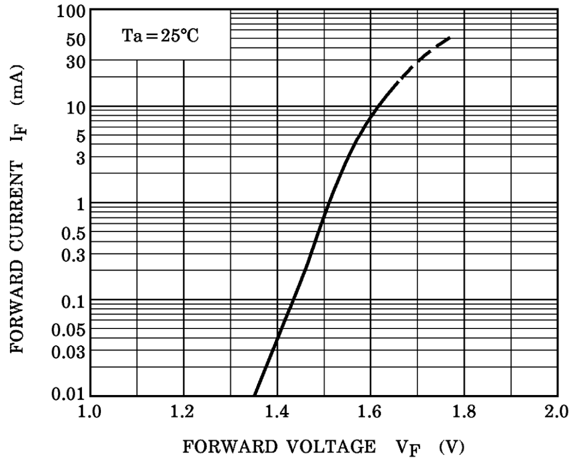


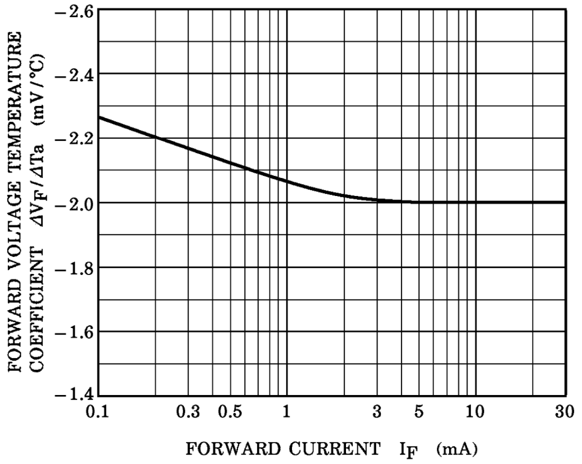
Test Circuit 2 : Common Mode Noise Immunity Test Circuit

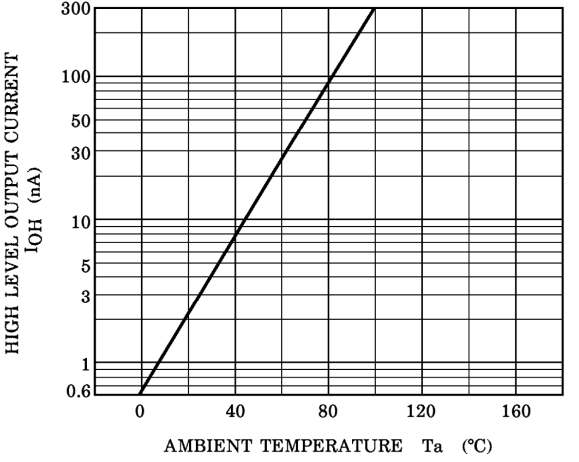


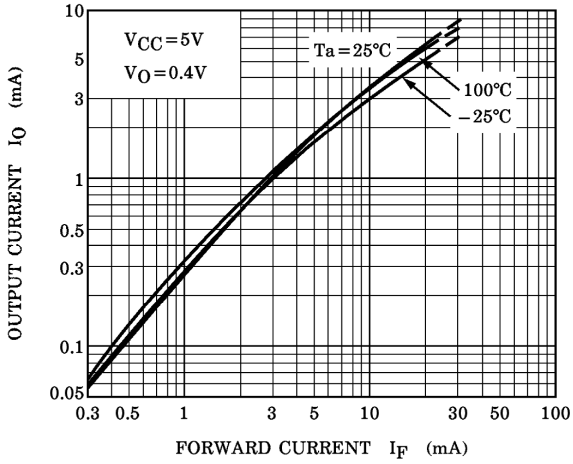


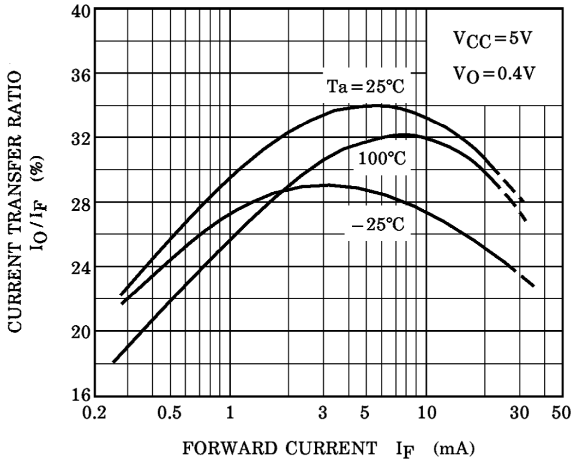
$$CM_H = \frac{160\ (V)}{t_r\ (\mu s)}, \quad CM_L = \frac{160\ (V)}{t_f\ (\mu s)}$$

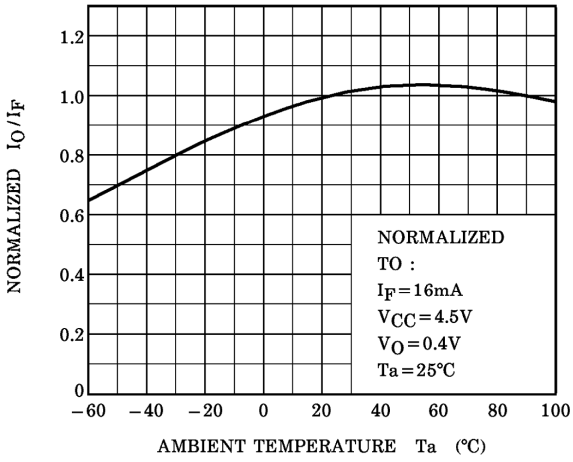

I_F – V_F

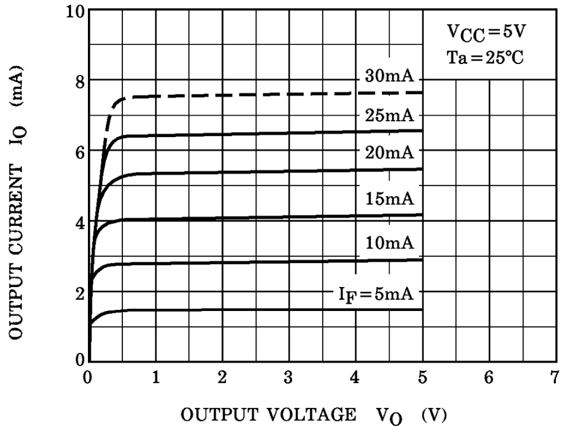

$\Delta V_F / \Delta Ta$ – I_F

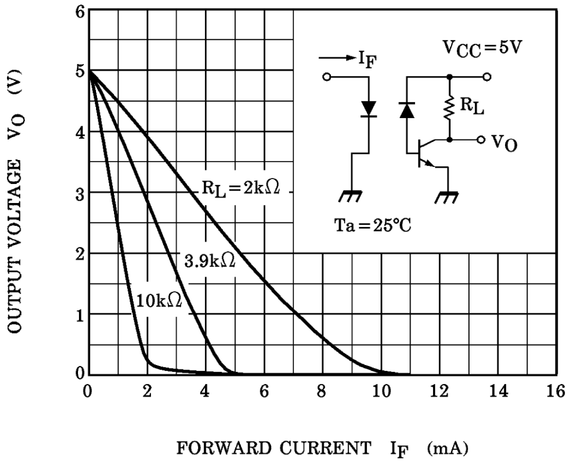

I_{OH} (1) – Ta

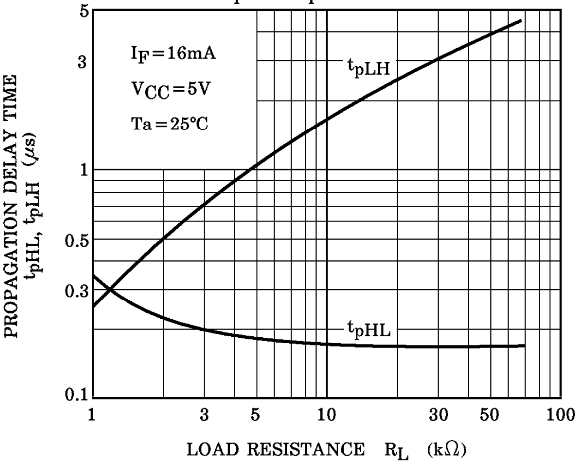

I_O – I_F


I_O / I_F – I_F


I_O / I_F – Ta


$I_O - V_O$


$V_O - I_F$


t_{pHL}, t_{pLH} – R_L

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20070701-EN

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