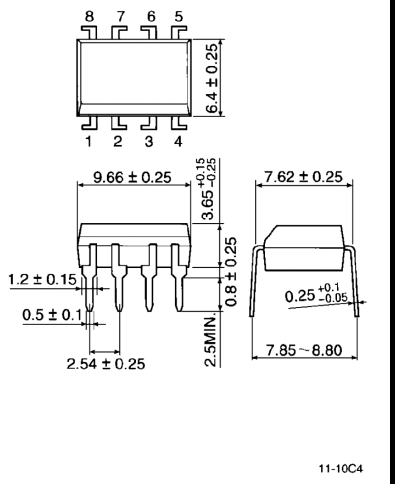
TOSHIBA Photocoupler Infrared LED + Photo IC

TLP550

Digital Logic Isolation
Line Receiver Feedback Control
Power Supply Control
Switching Power Supply
Transistor Inverter

Unit in mm



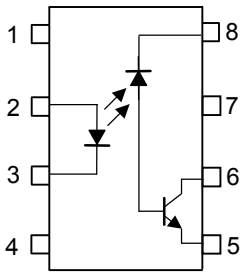
TOSHIBA 11−10C4

Weight: 0.54 g (typ.)

TLP550 constructs a high emitting diode and a one chip photo diode−transistor.
TLP550 has no base connection, and is suitable for application at noisy environmental condition.
This unit is 8−lead DIP package.

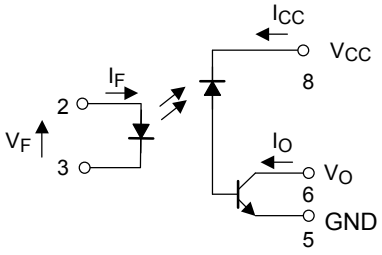
- Isolation voltage: 2500 Vrms (min.)
- Switching speed: t_{pHL}, t_{pLH} = 0.5μs (typ.)(R_L=1.9 kΩ)
- TTL compatible
- UL recognized: UL1577, file No. E67349

Pin Configuration (top view)



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

Schematic



Current Transfer Ratio

Classification	Current Transfer Ratio (%) (IC/IF)		Marking of Classification
	MIN	MAX	
(None)	10	—	Blank, O, Y
Rank O	19	—	O
Rank Y	35	—	Y

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
	Supply voltage		V_{CC}	−0.5~15	V
	Output voltage		V_O	−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)			T_{sol}	260	°C
Isolation voltage (AC, 1min., R.H. = 40~60%)		(Note 6)	BV_S	2500	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.

Electrical Characteristics (Ta = 25°C)

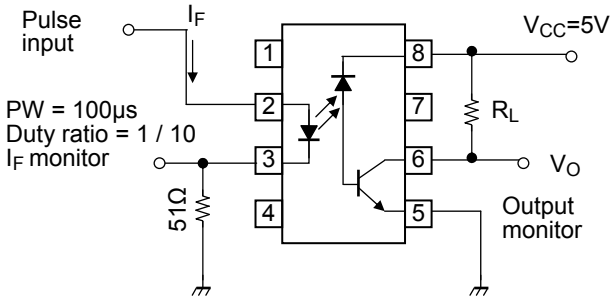
Characteristic		Symbol	Test condition		Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	I_F = 16 mA		1.45	1.65	1.85	V
	Forward voltage temperature coefficient	$\Delta V_F / \Delta Ta$	I_F = 16 mA		—	−2	—	mV / °C
	Reverse current	I_R	V_R = 5 V		—	—	10	μA
	Capacitance between terminal	C_T	V_F = 0, f = 1MHz		—	60	—	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	μA
	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	Ta = 25°C	10	30	—	%
				Rank : 0	19	30	—	
				Rank : Y	35	50		
				Ta = 0~70°C	5	—	—	
				Rank : 0, Y	15	—	—	
	Low level output voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V I_O = 1.1 mA (rank 0: I_O = 2.4mA)		—	—	0.4	V
	Isolation resistance	R_S	R.H. = 40~60%, V = 1kV DC (Note 6)		—	10^{12}	—	Ω
	Capacitance between input to output	C_S	V = 0, f = 1MHz		—	0.8	—	pF

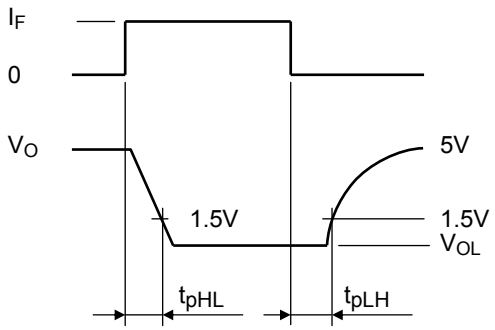
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Propagation delay time (H→ L)	t_{pHL}	I_F = 0→ 16 mA, V_{CC} = 5V, R_L = 4.1 kΩ		—	0.3	0.8	μs
		(Note 7)	Rank 0: R_L = 1.9 kΩ	—	0.5	0.8	
Propagation delay time (L→ H)	t_{pLH}	I_F = 16→ 0 mA, V_{CC} = 5V, R_L = 4.1 kΩ		—	1.0	2.0	μs
		(Note 7)	Rank 0: R_L = 1.9 kΩ	—	0.6	1.2	
Common mode transient immunity at high output level	C_{MH}	I_F = 0 mA, V_{CM} = 200 V_{p-p} R_L = 4.1 kΩ (rank 0: R_L = 1.9 kΩ) (Note 8)		—	1500	—	V /μs
Common mode transient immunity at low output level	C_{ML}	I_F = 16 mA, V_{CM} = 200 V_{p-p} R_L = 4.1 kΩ (rank 0: R_L = 1.9 kΩ) (Note 8)		—	−1500	—	V /μs

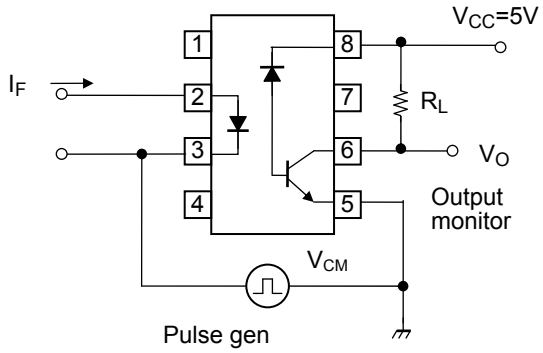
(Note 6) Device considered two−terminal device: Pins 1, 2, 3 and 4 shorted together and pin 5, 6, 7 and 8 shorted together.

(Note 7) Switching time test circuit.



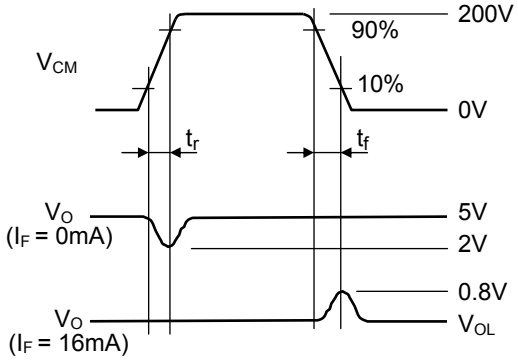


(Note 8) Common mode transient immunity test circuit.



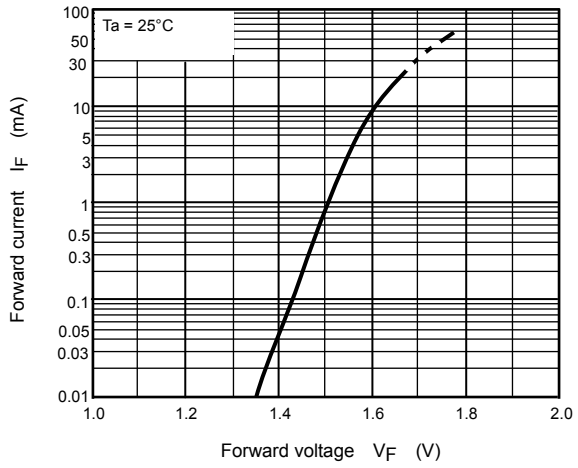
Z_O=50Ω

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

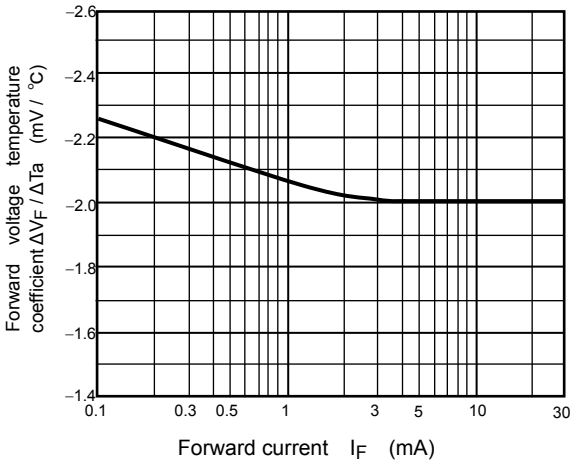


(Note 9) Maximum electrostatic discharge voltage for any pins: 100V (C = 200pF, R = 0)

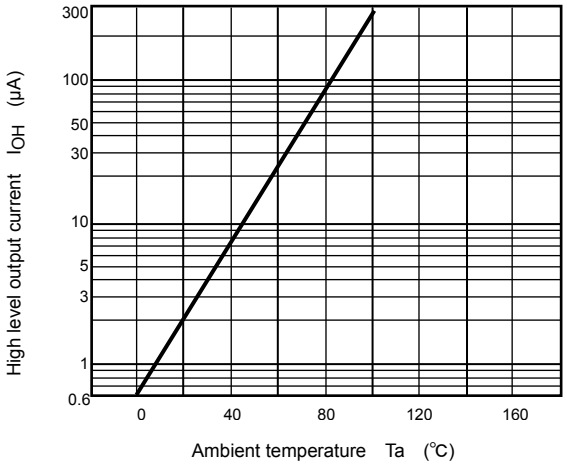
$I_F - V_F$



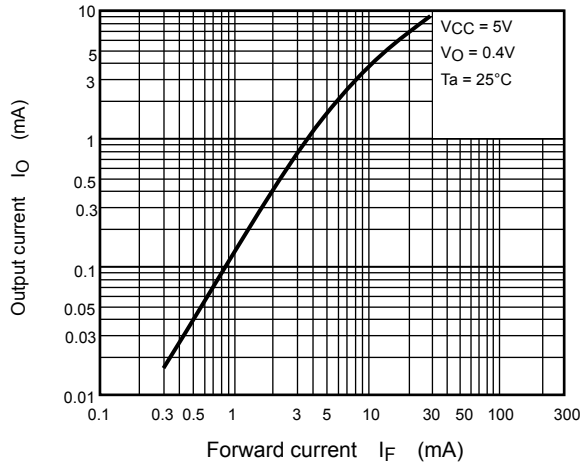
$\Delta V_F / \Delta Ta - I_F$



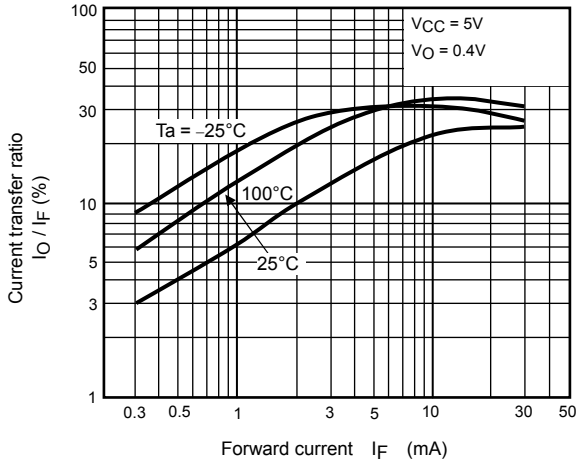
I_{OH} (1) – Ta



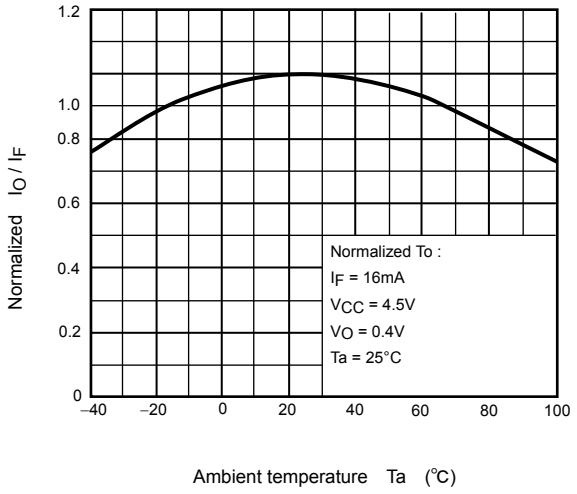
$I_O - I_F$



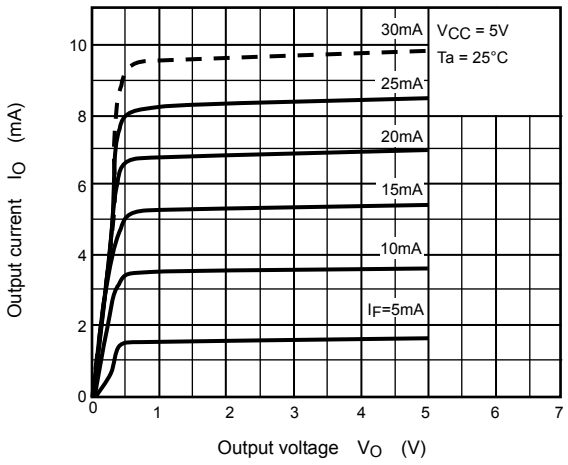
$I_O / I_F - I_F$



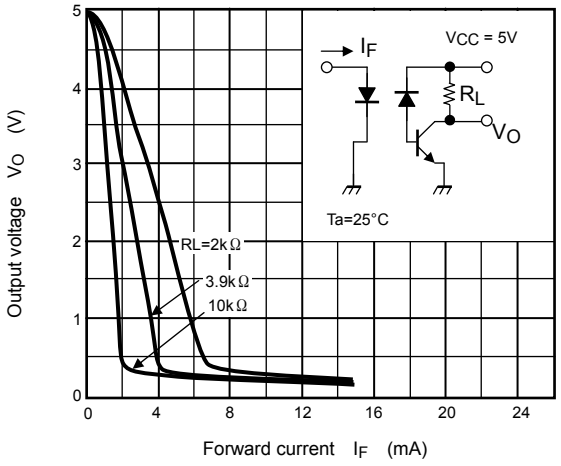
$I_O / I_F - Ta$



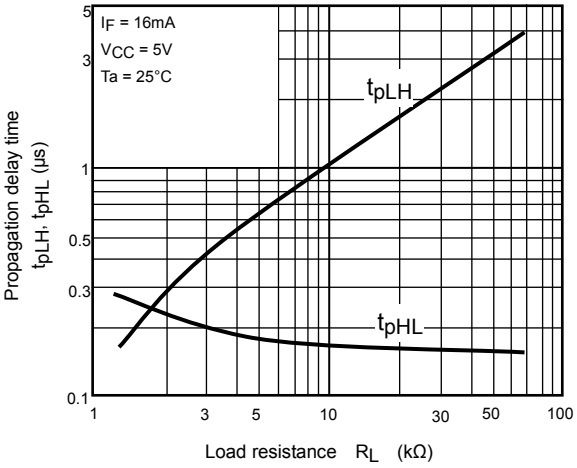
$I_O - V_O$



$V_O - I_F$



$t_{pHL}, t_{pLH} - R_L$



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20070701-EN

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