

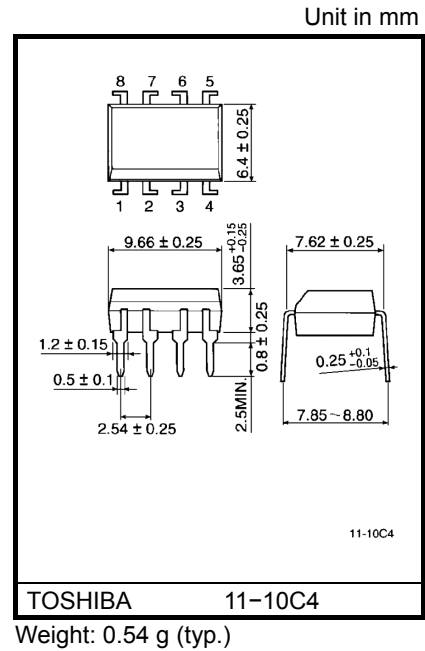
TOSHIBA Photocoupler Infrared LED + Photo IC

# TLP550

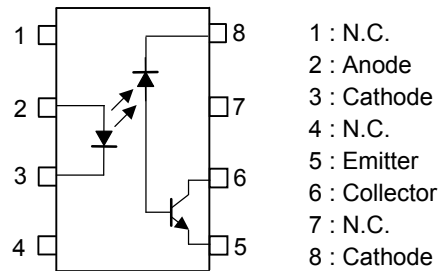
- Digital Logic Isolation
- Line Receiver Feedback Control
- Power Supply Control
- Switching Power Supply
- Transistor Inverter

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.

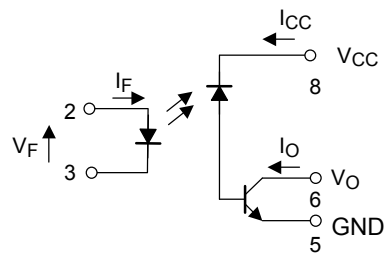
- Isolation voltage: 2500 Vrms (min.)
- Switching speed:  $t_{pHL}, t_{pLH} = 0.5\mu s$  (typ.) ( $R_L = 1.9 k\Omega$ )
- TTL compatible
- UL recognized: UL1577, file No. E67349



### Pin Configuration (top view)



### 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 <sub>F</sub>	25	mA
	Pulse forward current (Note 2)	I <sub>FP</sub>	50	mA
	Peak transient forward current (Note 3)	I <sub>FPT</sub>	1	A
	Reverse voltage	V <sub>R</sub>	5	V
	Diode power dissipation (Note 4)	P <sub>D</sub>	45	mW
Detector	Output current	I <sub>O</sub>	8	mA
	Peak output current	I <sub>OP</sub>	16	mA
	Supply voltage	V <sub>CC</sub>	-0.5~15	V
	Output voltage	V <sub>O</sub>	-0.5~15	V
	Output power dissipation (Note 5)	P <sub>O</sub>	100	mW
Operating temperature range		T <sub>opr</sub>	-55~100	°C
Storage temperature range		T <sub>stg</sub>	-55~125	°C
Lead solder temperature (10s)		T <sub>sol</sub>	260	°C
Isolation voltage (AC, 1min., R.H. = 40~60%) (Note 6)		BV <sub>S</sub>	2500	V <sub>rms</sub>

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)

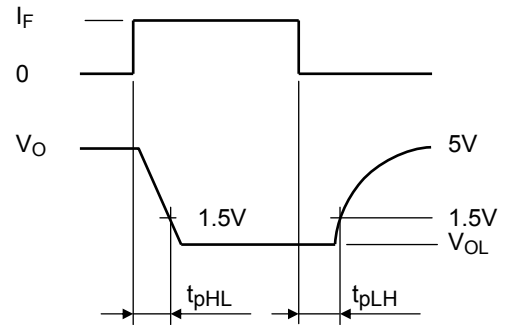
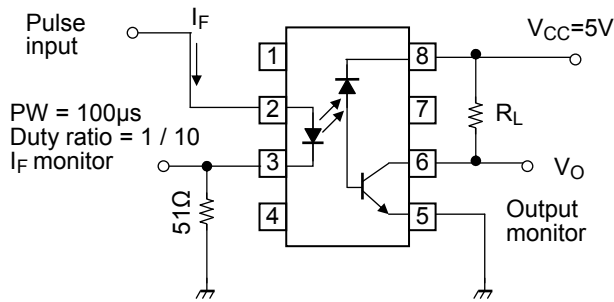
Characteristic		Symbol	Test condition	Min.	Typ.	Max.	Unit	
LED	Forward voltage	$V_F$	$I_F = 16 \text{ mA}$	1.45	1.65	1.85	V	
	Forward voltage temperature coefficient	$\Delta V_F / \Delta T_a$	$I_F = 16 \text{ mA}$	—	-2	—	mV / °C	
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$	
	Capacitance between terminal	$C_T$	$V_F = 0, f = 1 \text{ MHz}$	—	60	—	pF	
Detector	High level output current	$I_{OH(1)}$	$I_F = 0 \text{ mA}, V_{CC} = V_O = 5.5 \text{ V}$	—	3	500	nA	
		$I_{OH(2)}$	$I_F = 0 \text{ mA}, V_{CC} = V_O = 15 \text{ V}$	—	—	5	$\mu\text{A}$	
		$I_{OH}$	$I_F = 0 \text{ mA}, V_{CC} = V_O = 15 \text{ V}$ $T_a = 70^\circ\text{C}$	—	—	50	$\mu\text{A}$	
High level supply voltage	$I_{CCH}$	$I_F = 0 \text{ mA}, V_{CC} = 15 \text{ V}$	—	0.01	1	$\mu\text{A}$		
Coupled	Current transfer ratio	$I_O / I_F$	$I_F = 16 \text{ mA}$ $V_{CC} = 4.5 \text{ V}$ $V_O = 0.4 \text{ V}$	$T_a = 25^\circ\text{C}$	10	30	—	%
				Rank : 0	19	30	—	
				Rank : Y	35	50	—	
				$T_a = 0\sim 70^\circ\text{C}$	5	—	—	
		Rank : 0, Y	15	—	—			
	Low level output voltage	$V_{OL}$	$I_F = 16 \text{ mA}, V_{CC} = 4.5 \text{ V}$ $I_O = 1.1 \text{ mA}$ (rank 0: $I_O = 2.4 \text{ mA}$ )	—	—	0.4	V	
Isolation resistance	$R_S$	R.H. = 40~60%, V = 1kV DC (Note 6)	—	$10^{12}$	—	$\Omega$		
Capacitance between input to output	$C_S$	$V = 0, f = 1 \text{ MHz}$	—	0.8	—	pF		

## Switching Characteristics (Ta = 25°C)

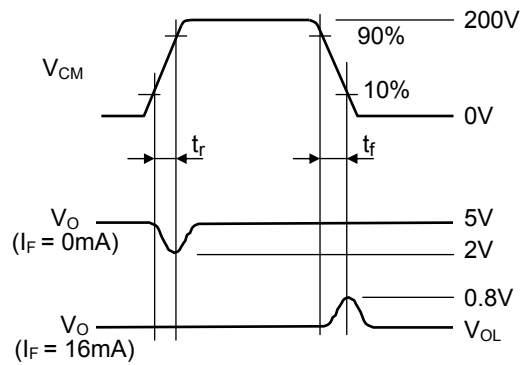
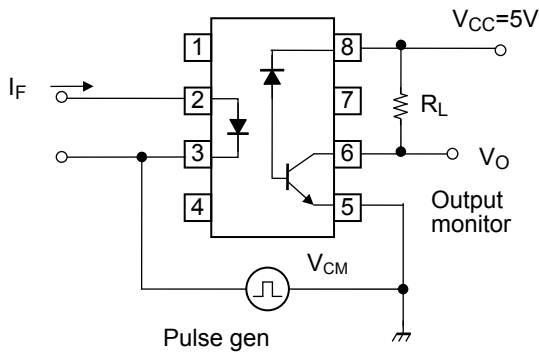
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	$t_{pHL}$	$I_F = 0 \rightarrow 16 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 4.1 \text{ k}\Omega$	—	0.3	0.8	$\mu\text{s}$
		(Note 7) Rank 0: $R_L = 1.9 \text{ k}\Omega$	—	0.5	0.8	
Propagation delay time (L→H)	$t_{pLH}$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

(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.



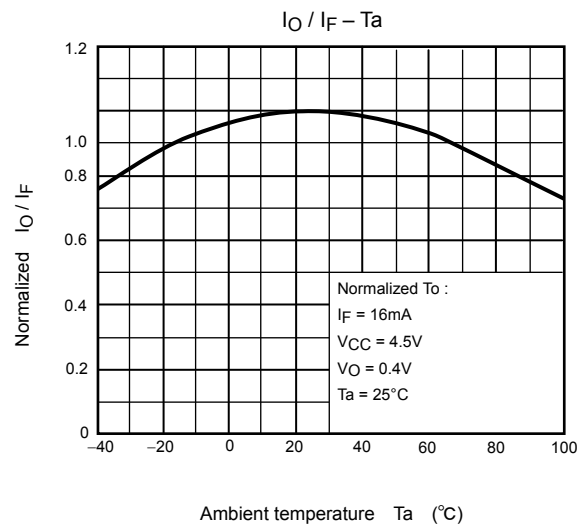
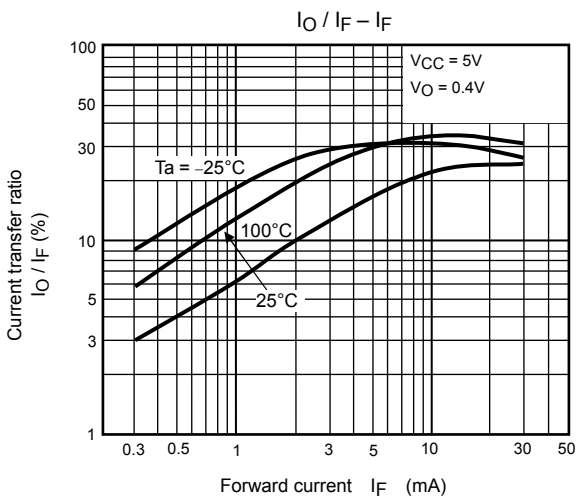
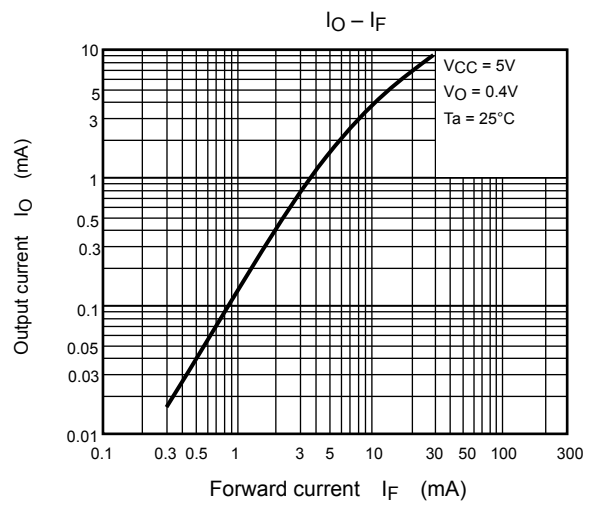
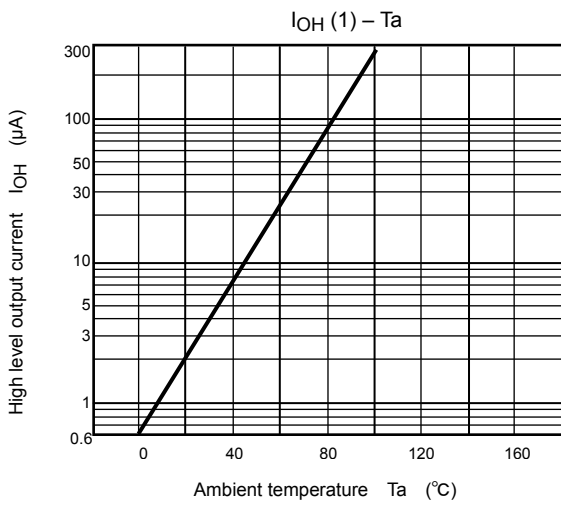
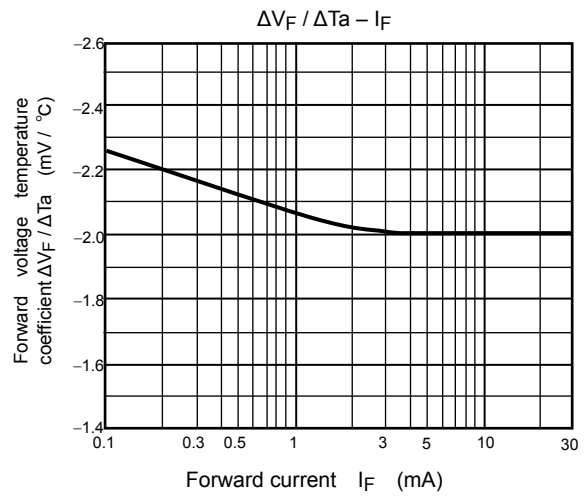
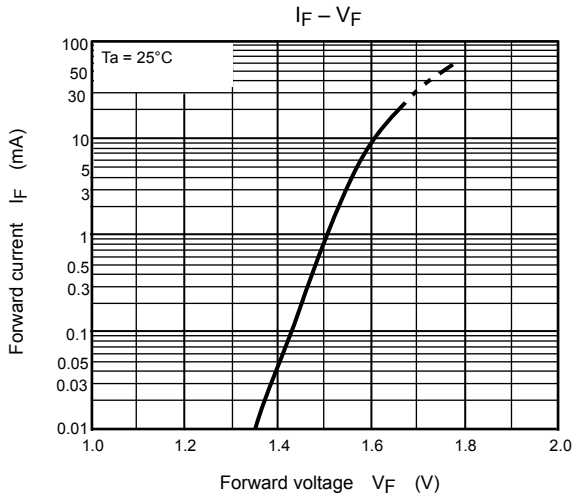
(Note 8) Common mode transient immunity test circuit.

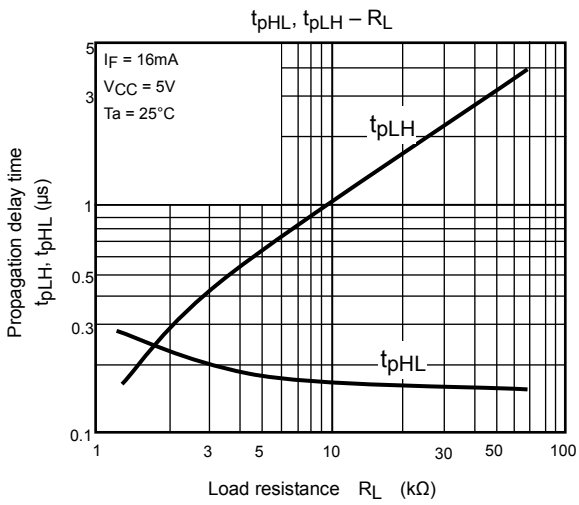
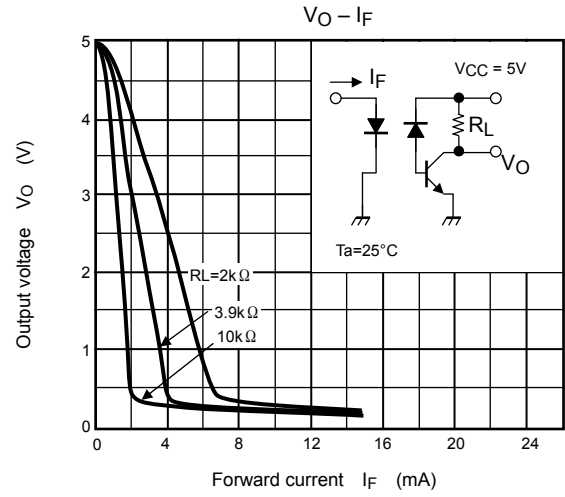
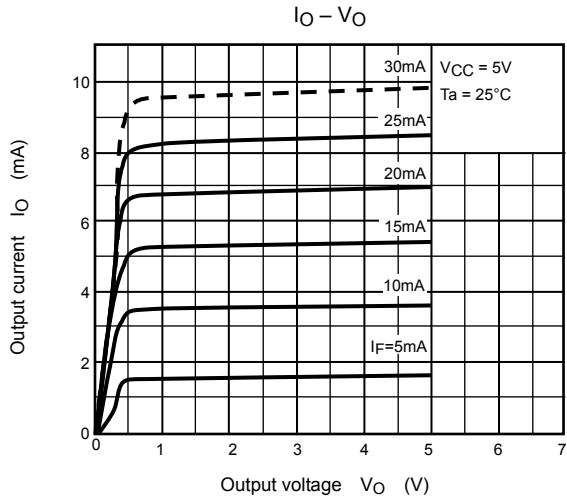


$Z_0=50\Omega$

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

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





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