

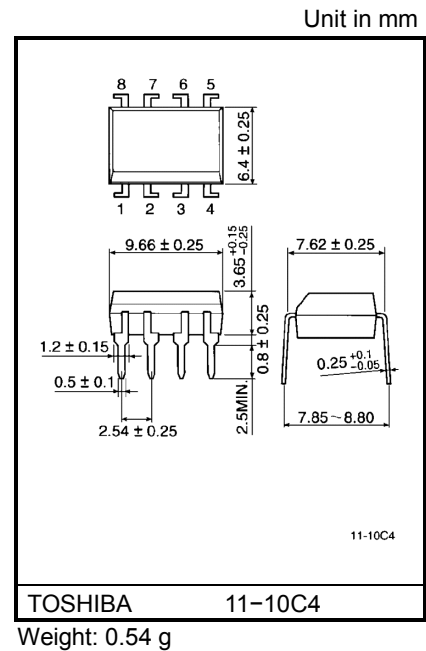
TOSHIBA Photocoupler Infrared LED + Photo IC

## TLP550

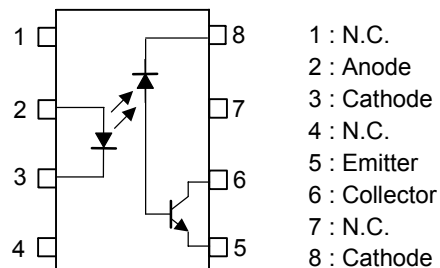
Digital Logic Isolation  
Line Receiver Feedback Control  
Power Supply Control  
Switching Power Supply  
Transistor Invertor

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.

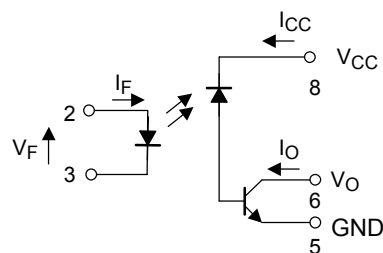
- Isolation voltage: 2500 Vrms (min.)
- Switching speed:  $t_{pHL}, t_{pLH} = 0.5\mu s$  (typ.) ( $R_L = 1.9 k\Omega$ )
- TTL compatible
- UL recognized: UL1577, file No. E67349



### Pin Configuration (top view)



### Schematic



## 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<br>(AC, 1min., R.H. = 40~60%) (Note 6) |                                         | BV <sub>S</sub>  | 2500    | V <sub>rms</sub> |

(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)

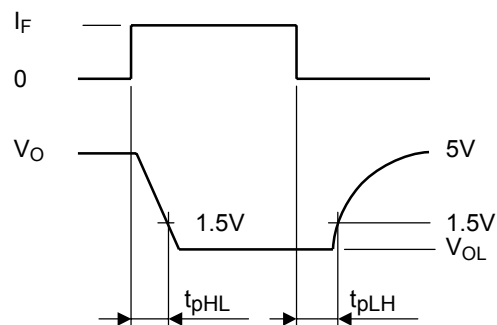
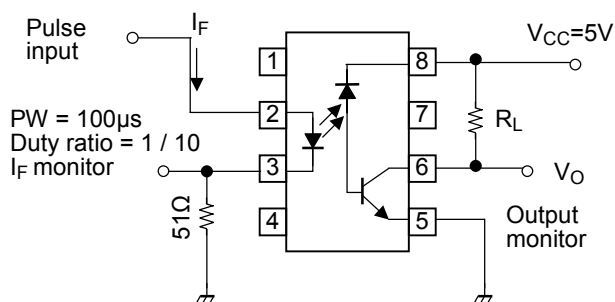
| Characteristic |                                         | Symbol                    | Test condition                                                                                               |                                 | Min. | Typ.      | Max. | Unit    |
|----------------|-----------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------|------|-----------|------|---------|
| 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   | μA      |
|                | 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    | μA      |
|                |                                         | $I_{OH}$                  | $I_F = 0 \text{ mA}, V_{CC} = V_O = 15 \text{ V}$<br>$T_a = 70^\circ\text{C}$                                |                                 | —    | —         | 50   | μA      |
|                | High level supply voltage               | $I_{CCH}$                 | $I_F = 0 \text{ mA}, V_{CC} = 15 \text{ V}$                                                                  |                                 | —    | 0.01      | 1    | μA      |
| Coupled        | Current transfer ratio                  | $I_O / I_F$               | $I_F = 16 \text{ mA}$<br>$V_{CC} = 4.5 \text{ V}$<br>$V_O = 0.4 \text{ V}$                                   | $T_a = 25^\circ\text{C}$        | 10   | 30        | —    | %       |
|                |                                         |                           |                                                                                                              | Rank : 0                        | 19   | 30        | —    |         |
|                |                                         |                           |                                                                                                              | $T_a = 0 \sim 70^\circ\text{C}$ | 5    | —         | —    |         |
|                |                                         |                           |                                                                                                              | Rank : 0                        | 15   | —         | —    |         |
|                | Low level output voltage                | $V_{OL}$                  | $I_F = 16 \text{ mA}, V_{CC} = 4.5 \text{ V}$<br>$I_O = 1.1 \text{ mA}$<br>(rank 0: $I_O = 2.4 \text{ mA}$ ) |                                 | —    | —         | 0.4  | V       |
|                | Isolation resistance                    | $R_S$                     | R.H. = 40~60%, $V = 1 \text{ kV DC}$<br>(Note 6)                                                             |                                 | —    | $10^{12}$ | —    | Ω       |
|                | Capacitance between input to output     | $C_S$                     | $V = 0, f = 1 \text{ MHz}$                                                                                   |                                 | —    | 0.8       | —    | pF      |

## Switching Characteristics (Ta = 25°C)

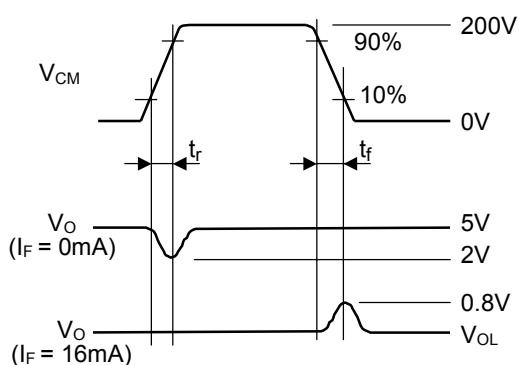
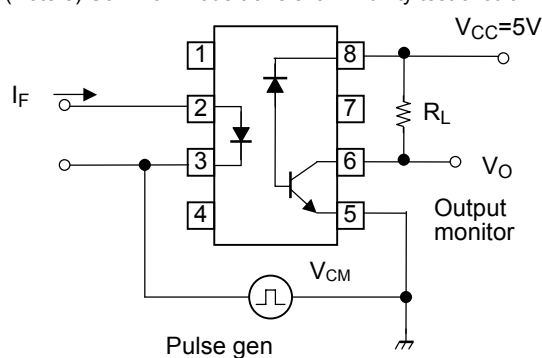
| Characteristic                                      | Symbol    | Test Condition                                                                                                                        |                                     | Min. | Typ.  | Max. | Unit   |
|-----------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------|-------|------|--------|
| 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  | μs     |
|                                                     |           | (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  | μs     |
|                                                     |           | (Note 7)                                                                                                                              | Rank 0: $R_L = 1.9 \text{ k}\Omega$ | —    | 0.6   | 1.2  |        |
| Common mode transient immunity at high output level | $C_{MH}$  | $I_F = 0 \text{ mA}, V_{CM} = 200 \text{ V}_{p-p}$<br>$R_L = 4.1 \text{ k}\Omega$ (rank 0: $R_L = 1.9 \text{ k}\Omega$ )<br>(Note 8)  |                                     | —    | 1500  | —    | V / μs |
| Common mode transient immunity at low output level  | $C_{ML}$  | $I_F = 16 \text{ mA}, V_{CM} = 200 \text{ V}_{p-p}$<br>$R_L = 4.1 \text{ k}\Omega$ (rank 0: $R_L = 1.9 \text{ k}\Omega$ )<br>(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.



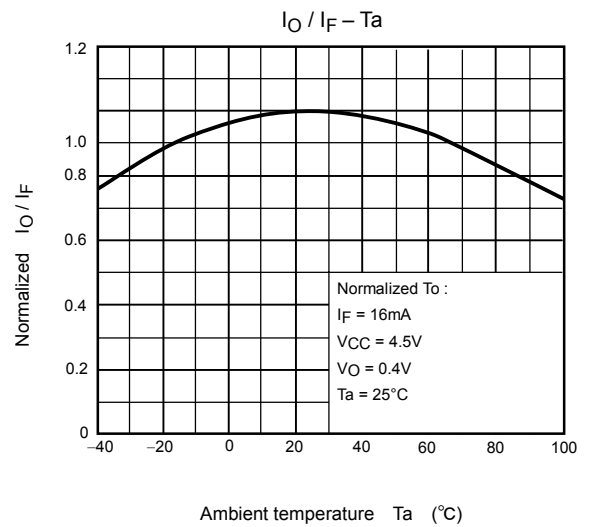
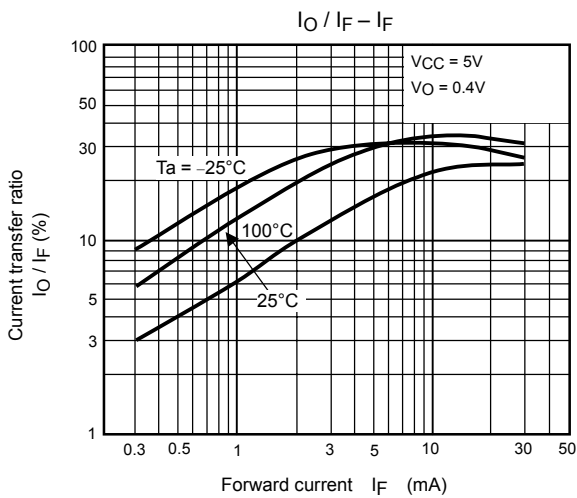
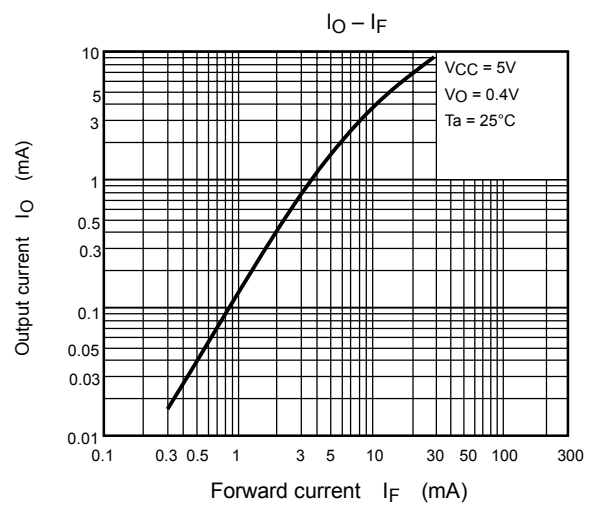
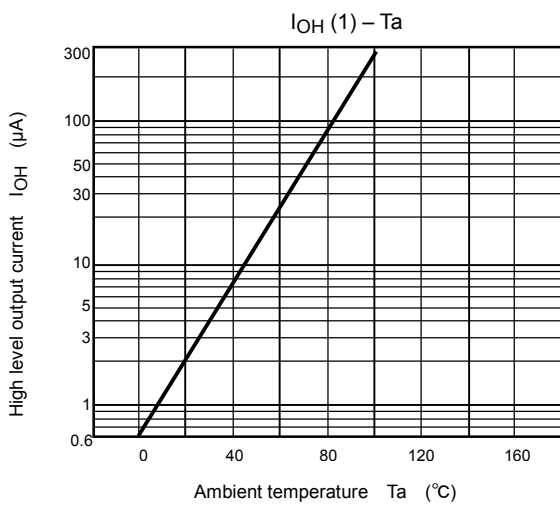
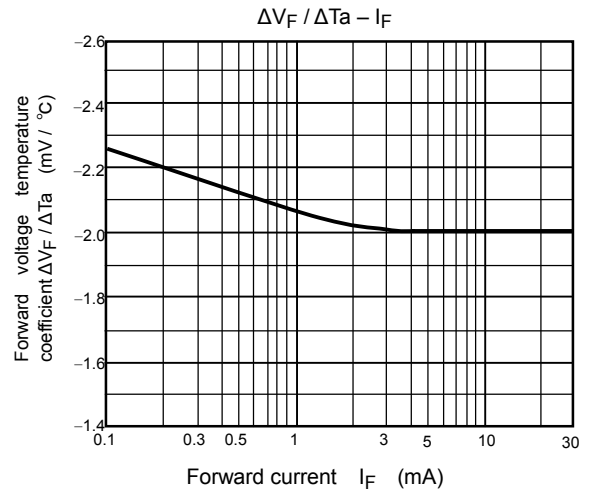
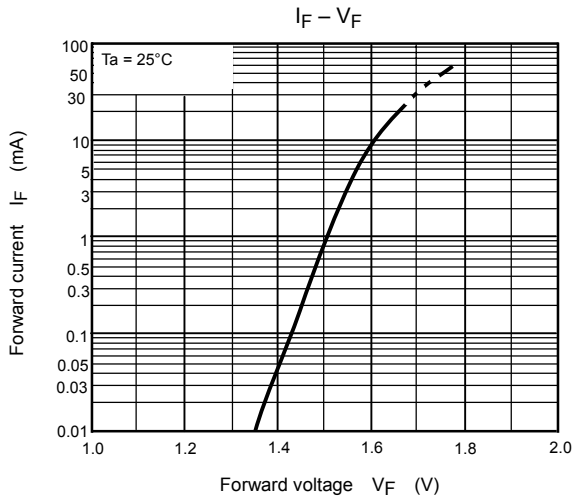
(Note 8) Common mode transient immunity test circuit.

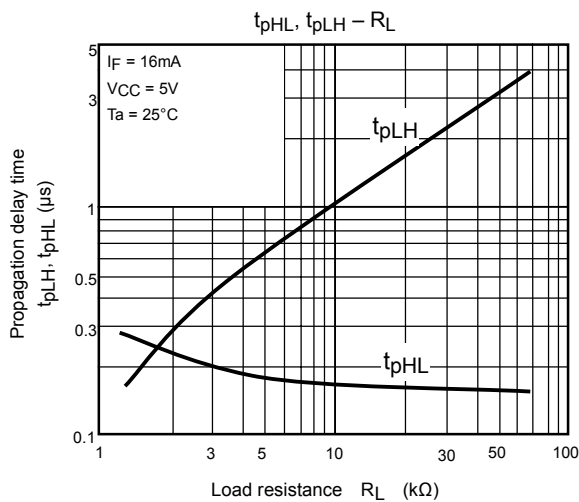
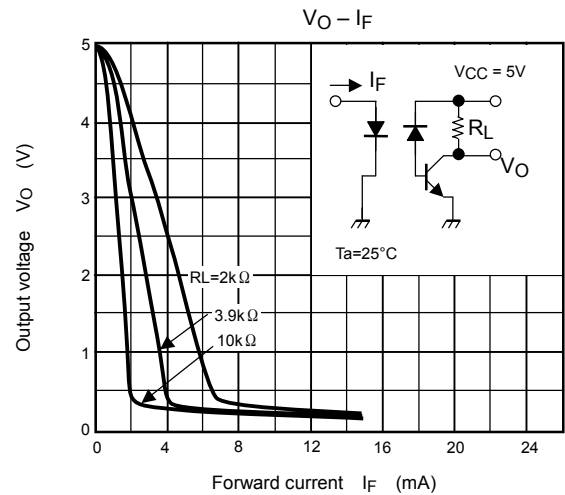
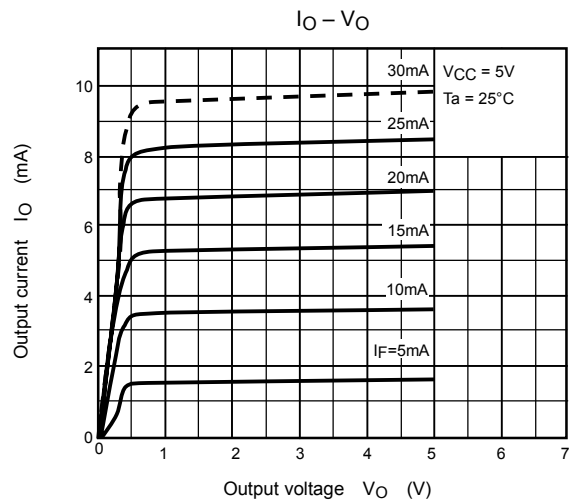


$Z_O = 50\Omega$

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

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





**RESTRICTIONS ON PRODUCT USE**

000707EAA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice