

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO IC

TLP559

DIGITAL LOGIC GROUND ISOLATION

LINE RECEIVER

MICROPROCESSOR SYSTEM INTERFACES

SWITCHING POWER SUPPLY FEEDBACK CONTROL

TRANSISTOR INVERTOR

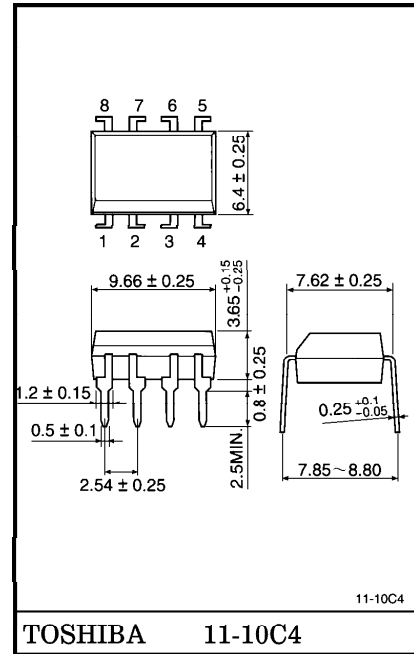
The TOSHIBA TLP559 consists of a GaAs high-output light emitting diode and a high speed detector of one chip photo diode-transistor. This unit is 8-lead DIP package.

TLP559 has no internal base connection, and a Faraday shield integrated on the photodetector chip provides an effective common mode noise transient immunity.

So this is suitable for application in noisy environmental condition.

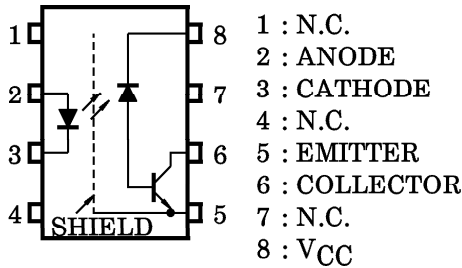
- Isolation Voltage : 2500Vrms (Min.)
- Switching Speed : $t_{pHL} = 0.3\mu s$ (Typ.)
 $t_{pLH} = 0.5\mu s$ (Typ.) ($R_L = 1.9k\Omega$)
- TTL Compatible
- UL Recognized : UL1577, File No. E67349

Unit in mm

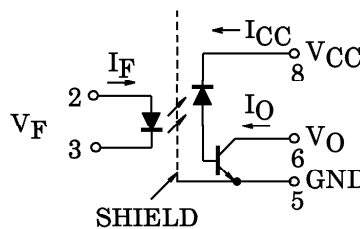


Weight : 0.54g

PIN CONFIGURATION (TOP VIEW)



SCHEMATIC



961001EBC2

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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 | -55~100 | °C |

| | | | |
|---|------------------|------|------------------|
| Isolation Voltage (AC, 1min., R.H. ≤ 60%) (Note 7) | B _V S | 2500 | V _{rms} |
|---|------------------|------|------------------|

(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 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 | $I_F = 16\text{mA}$ | — | 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 | $V_F = 0, f = 1\text{MHz}$ | — | 45 | — | 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} | $I_F = 0\text{mA}, V_{CC} = 15\text{V}$ $V_O = 15\text{V}, T_a = 70^\circ\text{C}$ | — | — | 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 | $I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$ $V_O = 0.4\text{V}$ | 20 | 40 | — | % |
| | Low Level Output Voltage | V_{OL} | $I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$ $I_O = 2.4\text{mA}$ | — | — | 0.4 | V |
| | Resistance (Input-Output) | R_S | R.H. $\leq 60\%$, $V_S = 500\text{VDC}$ (Note 7) | 5×10^{10} | 10^{14} | — | Ω |
| | Capacitance (Input-Output) | C_S | $V_S = 0, f = 1\text{MHz}$ (Note 7) | — | 0.8 | — | pF |

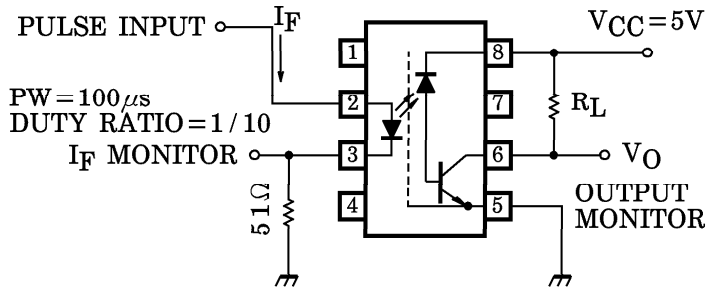
SWITCHING CHARACTERISTICS (Ta = 25°C, VCC = 5V)

| CHARACTERISTIC | SYMBOL | TEST CIRCUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--|-----------|--------------|--|-------|--------|------|------------------|
| Propagation Delay Time (H→L) | t_{pHL} | 1 | $I_F = 16\text{mA}, R_L = 1.9\text{k}\Omega$ | — | 0.2 | 0.8 | μs |
| Propagation Delay Time (L→H) | t_{pLH} | | | — | 0.3 | 0.8 | μs |
| Common Mode Transient Immunity at Logic High Output (Note 8) | CM_H | 2 | $I_F = 0\text{mA}, V_{CM} = 400\text{Vp-p}$ $R_L = 4.1\text{k}\Omega$ | 2000 | 10000 | — | V/ μs |
| Common Mode Transient Immunity at Logic High Output (Note 8) | CM_L | | | -2000 | -10000 | — | V/ μs |

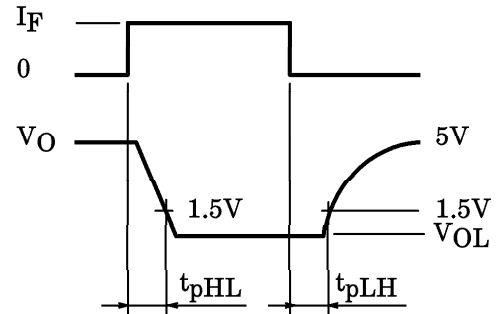
(Note 8) CM_L is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O < 0.8\text{V}$).
 CM_H is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state ($V_O < 2.0\text{V}$).

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

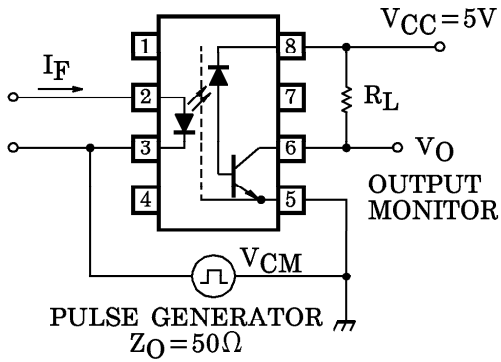
TEST CIRCUIT 1 : Switching Time Test Circuit



PW = 100 μs
DUTY RATIO = 1 / 10



TEST CIRCUIT 2 : Common Mode Noise Immunity Test Circuit



$$CM_H = \frac{320 (V)}{t_r (\mu s)}, \quad CM_L = \frac{320 (V)}{t_f (\mu s)}$$

