

# TLP759

Digital Logic Ground Isolation  
Line Receiver  
Microprocessor System Interfaces  
Switching Power Supply Feedback Control  
Industrial Inverter

The TOSHIBA TLP759 consists of a GaAlAs high-output light emitting diode and a high speed detector of one chip photo diode-transistor. This unit is 8-lead DIP.

TLP759 has no internal base connection, and a Faraday shield integrated on the photodetector chip provides an effective common mode noise transient immunity.

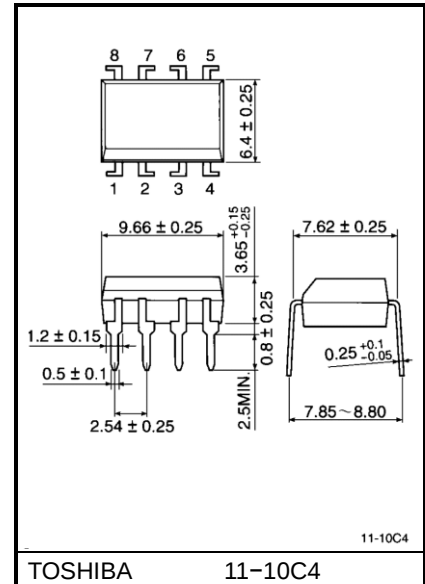
So this is suitable for application in noisy environmental condition.

- Isolation voltage: 5000 Vrms (min)
- Switching speed:  $t_{pHL} = 0.2\mu s$  (typ.)  
 $t_{pLH} = 0.3\mu s$  (typ.) ( $R_L = 1.9 k\Omega$ )
- TTL compatible
- UL Approved: UL1577, file No. E67349
- c-UL approved :CSA Component Acceptance Service  
No. 5A, File No.E67349
- Option (D4) type  
VDE Approved: DIN EN 60747-5-5 (Note 1)

**Note 1: When a EN 60747-5-5 approved type is needed, please designate the "Option (D4)"**

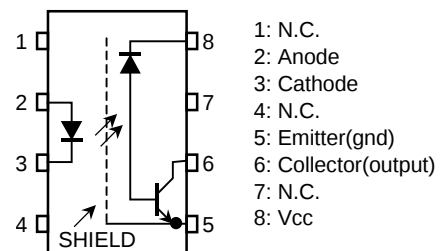
- Mechanical Parameters  
Creepage distance: 7.0 mm (min)  
Clearance: 7.0 mm (min)  
Insulation thickness: 0.4 mm (min)

Unit: mm

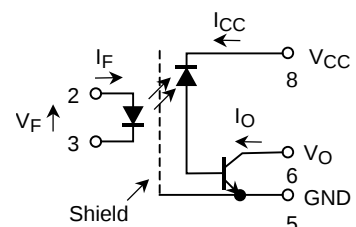


Weight: 0.54 g (typ.)

## Pin Configuration (top view)



## Schematic



Start of commercial production  
1993-01

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristic                                    |                                               | Symbol              | Rating     | Unit             |
|---------------------------------------------------|-----------------------------------------------|---------------------|------------|------------------|
| LED                                               | Forward current                               | I <sub>F</sub>      | 25         | mA               |
|                                                   | Forward current derating (Ta ≥ 70°C)          | I <sub>F</sub> / Ta | -0.8       | mA / °C          |
|                                                   | Pulse forward current (Note 1)                | I <sub>FP</sub>     | 50         | mA               |
|                                                   | Peak transient forward current (Note 2)       | I <sub>FPT</sub>    | 1          | A                |
|                                                   | Reverse voltage                               | V <sub>R</sub>      | 5          | V                |
|                                                   | Diode power dissipation (Note 3)              | P <sub>D</sub>      | 45         | mW               |
| Detector                                          | Output current                                | I <sub>O</sub>      | 8          | mA               |
|                                                   | Peak output current                           | I <sub>OP</sub>     | 16         | mA               |
|                                                   | Output voltage                                | V <sub>O</sub>      | -0.5 to 20 | V                |
|                                                   | Supply voltage                                | V <sub>CC</sub>     | -0.5 to 30 | V                |
|                                                   | Output power dissipation                      | P <sub>O</sub>      | 100        | mW               |
|                                                   | Output power dissipation derating (Ta ≥ 70°C) | P <sub>O</sub> / Ta | -2         | mW / °C          |
| Operating temperature range                       |                                               | T <sub>opr</sub>    | -55 to 100 | °C               |
| Storage temperature range                         |                                               | T <sub>stg</sub>    | -55 to 125 | °C               |
| Lead solder temperature (10 s) (Note 4)           |                                               | T <sub>sol</sub>    | 260        | °C               |
| Isolation voltage (AC, 60 s, R.H. ≤ 60%) (Note 5) |                                               | BV <sub>S</sub>     | 5000       | 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) 50% duty cycle, 1 ms pulse width. Derate 1.6mA / °C above 70°C.

(Note 2) Pulse width ≤ 1μs, 300pps.

(Note 3) Derate 0.9mW / °C above 70°C.

(Note 4) Soldering portion of lead: Up to 2mm from the body of the device.

(Note 5) 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    |
|----------------|-----------------------------------------|---------------------------------|--------------------------------------------------------------------------------|--------------------|------------------|------|---------|
| LDE            | Forward voltage                         | V <sub>F</sub>                  | I <sub>F</sub> = 16mA                                                          | —                  | 1.65             | 1.85 | V       |
|                | Forward voltage temperature coefficient | $\Delta V_F / \Delta T_a$       | I <sub>F</sub> = 16mA                                                          | —                  | -2               | —    | mV / °C |
|                | Reverse current                         | I <sub>R</sub>                  | V <sub>R</sub> = 5V                                                            | —                  | —                | 10   | μA      |
|                | Capacitance between terminals           | C <sub>T</sub>                  | V = 0 V, f = 1MHz                                                              | —                  | 45               | —    | pF      |
| Detector       | High level output current               | I <sub>OH</sub> (1)             | I <sub>F</sub> = 0mA, V <sub>CC</sub> = V <sub>O</sub> = 5.5V                  | —                  | 3                | 500  | nA      |
|                |                                         | I <sub>OH</sub> (2)             | I <sub>F</sub> = 0mA, V <sub>CC</sub> = 30V, V <sub>O</sub> = 20V              | —                  | —                | 5    | μA      |
|                |                                         | I <sub>OH</sub>                 | I <sub>F</sub> = 0mA, V <sub>CC</sub> = 30V, V <sub>O</sub> = 20V<br>Ta = 70°C | —                  | —                | 50   |         |
|                | High level supply voltage               | I <sub>CCH</sub>                | I <sub>F</sub> = 0mA, V <sub>CC</sub> = 30V                                    | —                  | 0.01             | 1    | μA      |
| Coupled        | Current transfer ratio                  | I <sub>O</sub> / I <sub>F</sub> | I <sub>F</sub> = 16mA, V <sub>CC</sub> = 4.5V<br>V <sub>O</sub> = 0.4V         | 20                 | 40               | —    | %       |
|                | Low level output voltage                | V <sub>OL</sub>                 | I <sub>F</sub> = 16mA, V <sub>CC</sub> = 4.5V<br>I <sub>O</sub> = 2.4 mA       | —                  | —                | 0.4  | V       |
|                | Resistance (input-output)               | R <sub>S</sub>                  | R.H. ≤ 60%, V <sub>S</sub> = 500V (Note 1)                                     | 1×10 <sup>12</sup> | 10 <sup>14</sup> | —    | Ω       |
|                | Capacitance (input-output)              | C <sub>S</sub>                  | V <sub>S</sub> = 0 V, f = 1MHz (Note 1)                                        | —                  | 0.8              | —    | pF      |
|                | Isolation voltage                       | BV <sub>S</sub>                 | AC, 60 s                                                                       | 5000               | —                | —    | Vrms    |
|                |                                         |                                 | AC, 1 s, in oil                                                                | —                  | 10000            | —    |         |
|                |                                         |                                 | DC, 60 s, in oil                                                               | —                  | 10000            | —    | Vdc     |

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

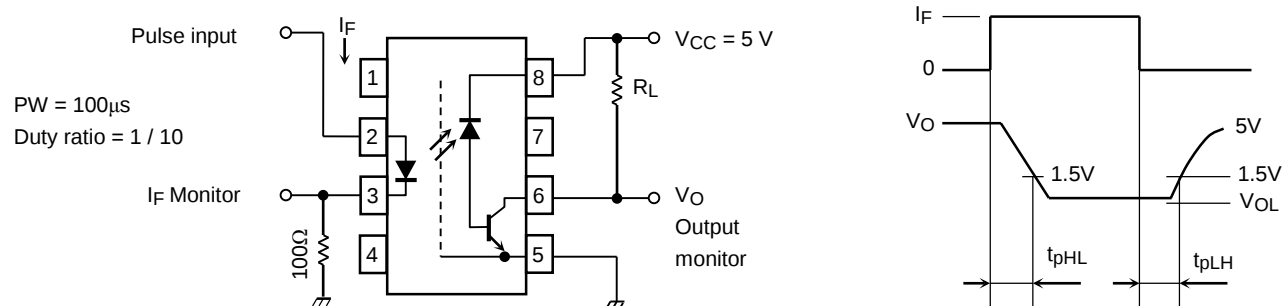
## Switching Characteristics (Ta = 25°C, VCC = 5V)

| Characteristic                                               | Symbol           | Test Circuit | Test Condition                                                                         | Min   | Typ.   | Max | Unit   |
|--------------------------------------------------------------|------------------|--------------|----------------------------------------------------------------------------------------|-------|--------|-----|--------|
| Propagation delay time (H → L)                               | t <sub>pHL</sub> | 1            | I <sub>F</sub> = 0 → 16mA,<br>R <sub>L</sub> = 1.9kΩ                                   | —     | 0.2    | 0.8 | μs     |
| Propagation delay time (L → H)                               | t <sub>pLH</sub> |              | I <sub>F</sub> = 16 → 0mA,<br>R <sub>L</sub> = 1.9kΩ                                   | —     | 0.3    | 0.8 | μs     |
| Common mode transient immunity at logic high output (Note 1) | CM <sub>H</sub>  | 2            | I <sub>F</sub> = 0mA, V <sub>CM</sub> = 400V <sub>p-p</sub><br>R <sub>L</sub> = 4.1kΩ  | 5000  | 10000  | —   | V / μs |
| Common mode transient immunity at logic low output (Note 1)  | CM <sub>L</sub>  |              | I <sub>F</sub> = 16mA, V <sub>CM</sub> = 400V <sub>p-p</sub><br>R <sub>L</sub> = 4.1kΩ | -5000 | -10000 | —   | V / μs |

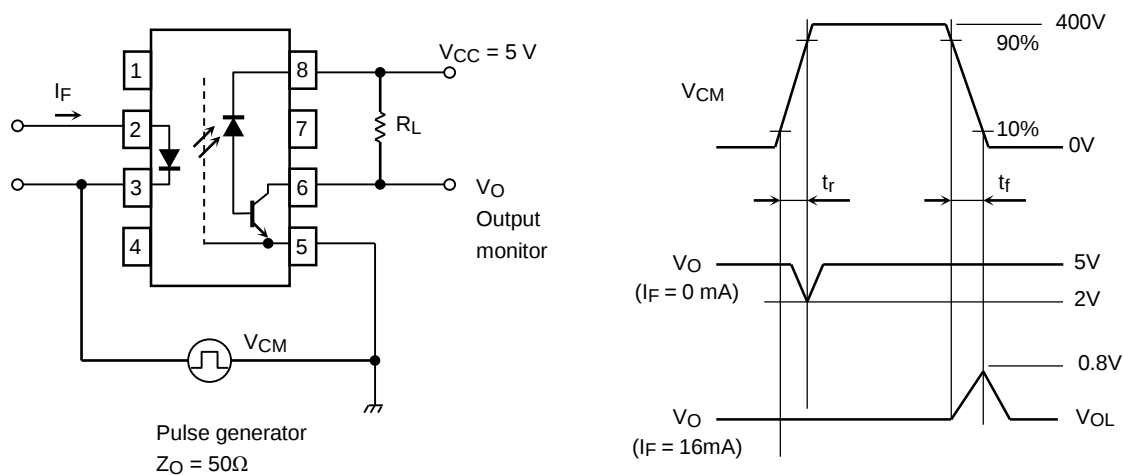
(Note 1) CM<sub>L</sub> is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state (V<sub>O</sub> < 0.8V).

CM<sub>H</sub> 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<sub>O</sub> > 2.0V).

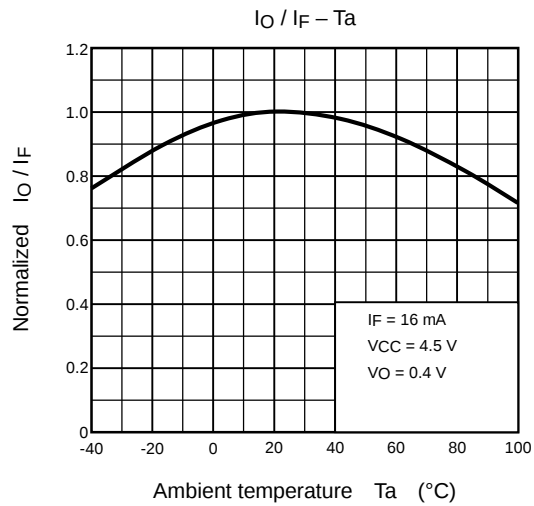
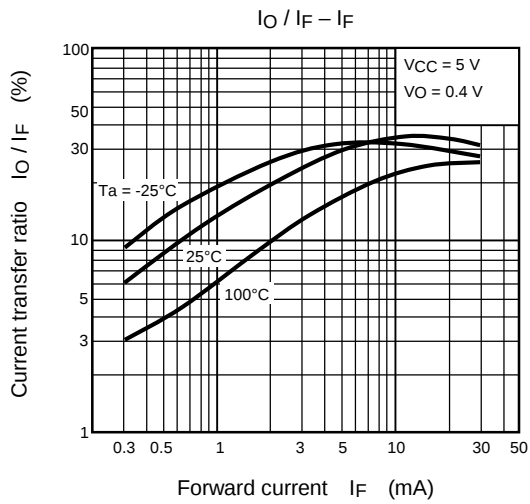
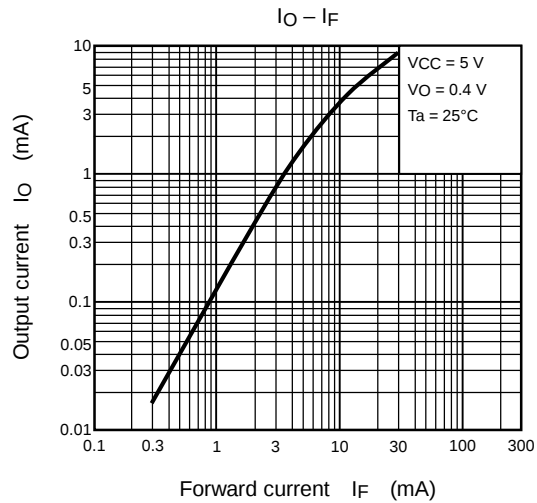
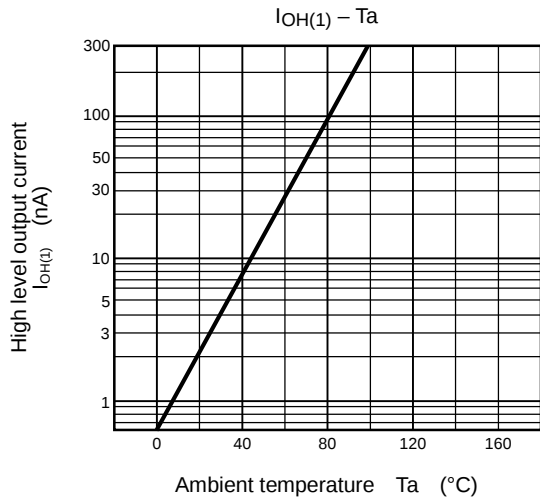
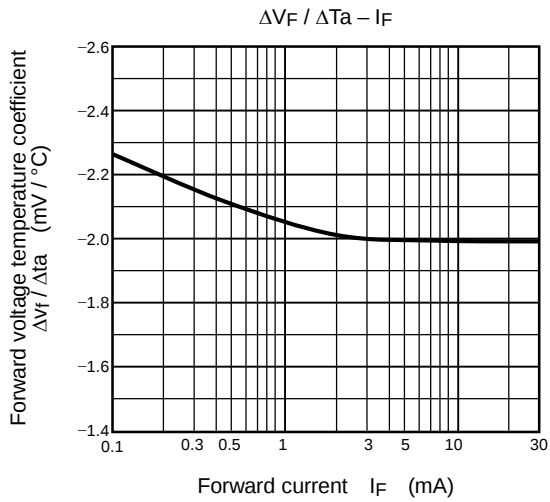
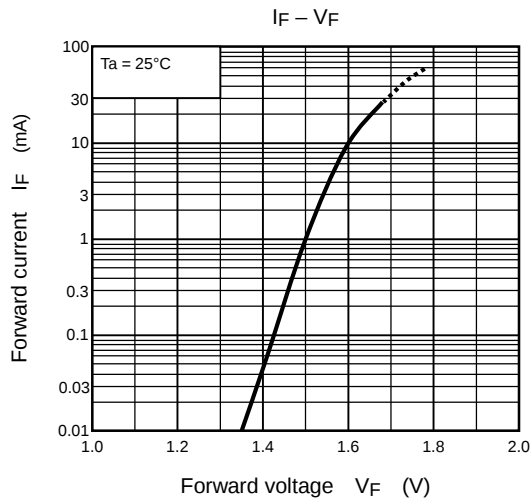
## Test Circuit 1: Switching Time Test Circuit

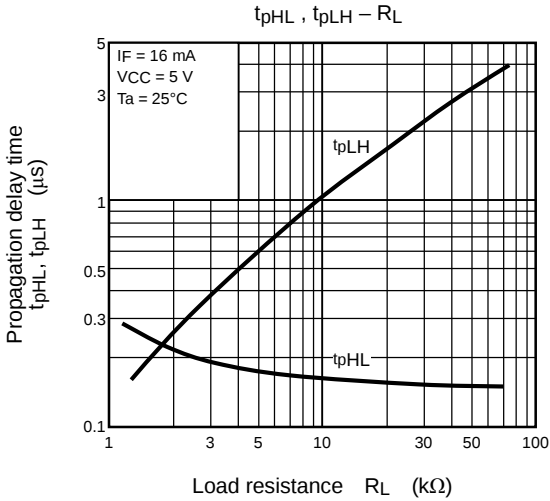
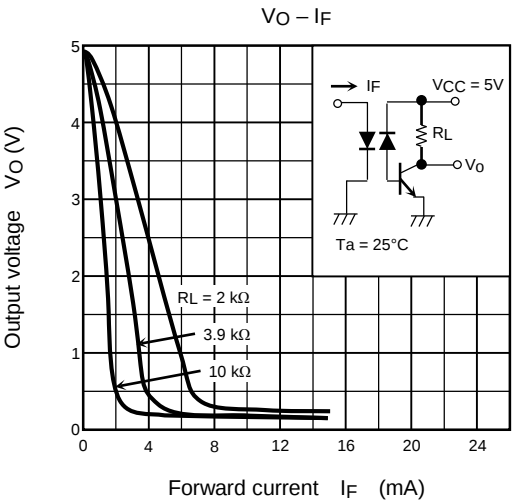
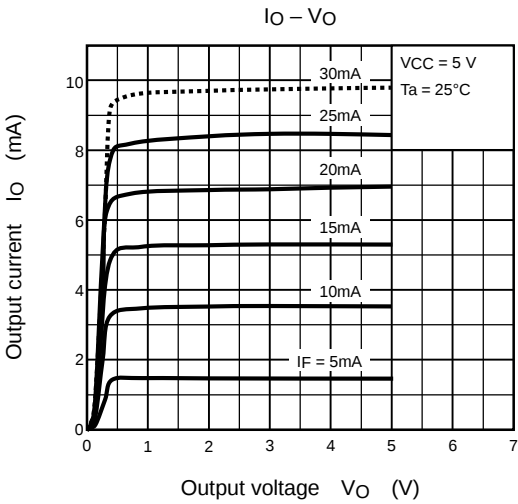


## Test Circuit 2: Common Mode Noise Immunity Test Circuit



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





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