

TLP651

DIGITAL LOGIC GROUND ISOLATION

LINE RECEIVER

MICROPROCESSOR SYSTEM INTERFACES

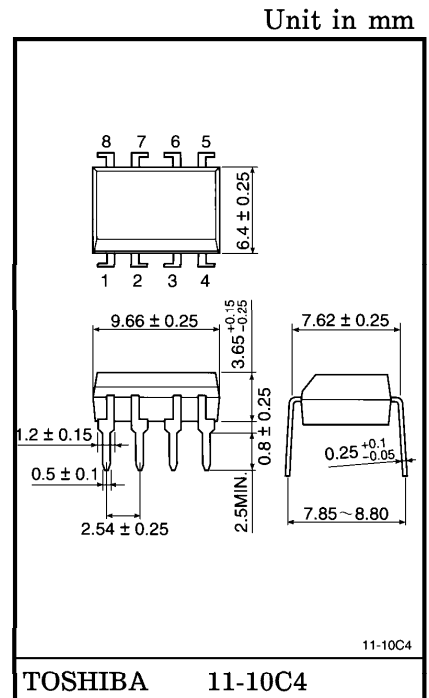
SWITCHING POWER SUPPLY FEEDBACK CONTROL

ANALOG SIGNAL ISOLATION

The TOSHIBA TLP651 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.

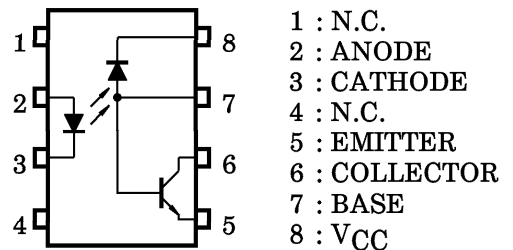
TLP651 has internal base connection. This base pin should be used for analog application or enable operation. If base pin is open, output signal will be noisy by environmental condition. For this case, TLP650 is suitable.



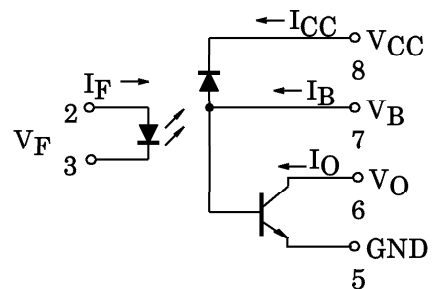
Weight : 0.54g

- Isolation Voltage : 5000V_{rms} (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
- BSI Approved : BS EN60065 : 1994
Certificate No. 7613
BS EN60950 : 1992
Certificate No. 7614

PIN CONFIGURATION (TOP VIEW)



SCHEMATIC



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 |
| | Base Current | I _B | 5 | mA |
| | Emitter-Base Reverse Voltage | V _{EB} | 5 | 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) (Note 6) | | T _{sol} | 260 | °C |
| Isolation Voltage (AC, 1min., R.H ≤ 60%) (Note 7) | | BVS | 5000 | 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 the 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 = 16mA | | — | 1.65 | 1.85 | V |
| | Forward Voltage Temperature Coefficient | ΔV _F /ΔTa | I _F = 16mA | | — | -2 | — | mV/°C |
| | Reverse Current | I _R | V _R = 5V | | — | — | 10 | μA |
| | Capacitance Between Terminal | C _T | V _F = 0, f = 1MHz | | — | 45 | — | pF |
| DETECTOR | High Level Output Current | I _{OH} (1) | I _F = 0mA, V _{CC} = V _O = 5.5V | | — | 3 | 500 | nA |
| | | I _{OH} (2) | I _F = 0mA, V _{CC} = V _O = 15V | | — | — | 5 | μA |
| | | I _{OH} | I _F = 0mA, V _{CC} = V _O = 15V Ta = 70°C | | — | — | 250 | μA |
| | High Level Supply Voltage | I _{CCH} | I _F = 0mA, V _{CC} = 15V | | — | 0.01 | 1 | μA |
| COUPLED | Current Transfer Ratio | I _O /I _F | I _F = 16 mA V _{CC} = 4.5V V _O = 0.4V | Ta = 25°C | 10 | 30 | — | % |
| | | | | Rank : 0 | 19 | 30 | — | |
| | | | | Ta = 0~70°C | 5 | — | — | |
| | Rank : 0 | 15 | — | — | | | | |
| | Low Level Output Voltage | V _{OL} | I _F = 16mA, V _{CC} = 4.5V, I _O = 1.1mA (Rank 0 : I _O = 2.4mA) | | — | — | 0.4 | V |
| Isolation Resistance | R _S | R.H. ≤ 60%, V _S = 500V _{DC} (Note 7) | | 5 × 10 ¹⁰ | 10 ¹⁴ | — | Ω | |
| Capacitance Between Input to Output | C _S | V _S = 0, f = 1MHz (Note 7) | | — | 0.8 | — | pF | |

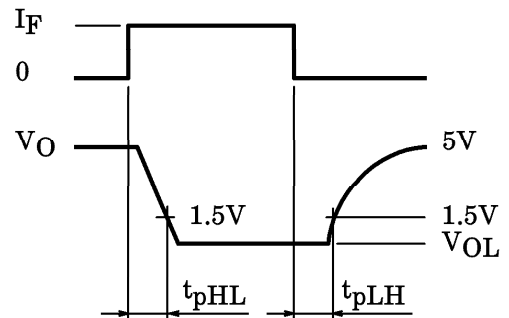
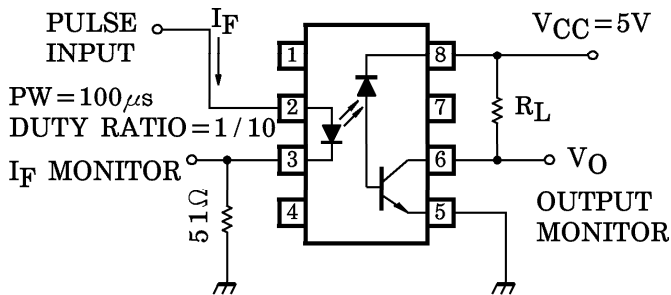
SWITCHING CHARACTERISTICS (Ta = 25°C, V_{CC} = 5V)

| CHARACTERISTIC | SYMBOL | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|------------------|---------------|---|------|-------|------|--------|
| Propagation Delay Time (H→L) | t _{pHL} | 1 | I _F = 0→16mA, V _{CC} = 5V, R _L = 4.1kΩ | — | 0.2 | 0.8 | μs |
| | | | Rank 0 : R _L = 1.9kΩ | — | 0.3 | 0.8 | |
| Propagation Delay Time (L→H) | t _{pLH} | 1 | I _F = 16→0mA, V _{CC} = 5V, R _L = 4.1kΩ | — | 1.0 | 2.0 | μs |
| | | | Rank 0 : R _L = 1.9kΩ | — | 0.5 | 1.2 | |
| Common Mode Transient Immunity at Logic High Output (Note8) | C _{MH} | 2 | I _F = 0mA, V _{CM} = 200Vp-p R _L = 4.1kΩ (Rank 0 : R _L = 1.9kΩ) | — | 400 | — | V / μs |
| Common Mode Transient Immunity at Logic Low Output (Note8) | C _{ML} | | I _F = 16mA, V _{CM} = 200Vp-p R _L = 4.1kΩ (Rank 0 : R _L = 1.9kΩ) | — | -1000 | — | V / μs |

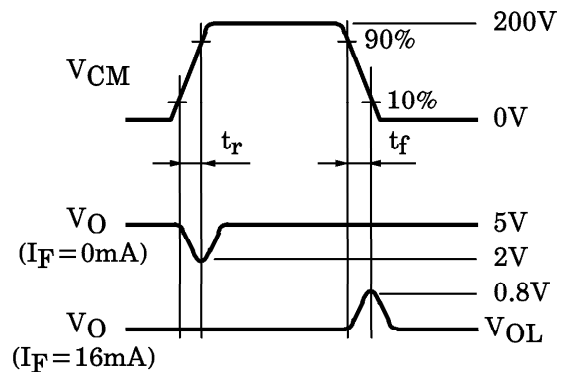
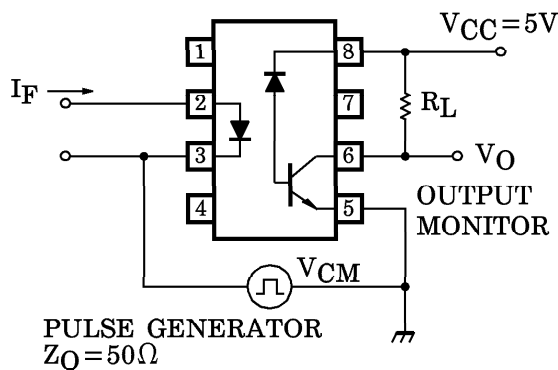
- (Note 8) CM_L is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O < 0.8V$).
 CM_H is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state ($V_O > 2.0V$).

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

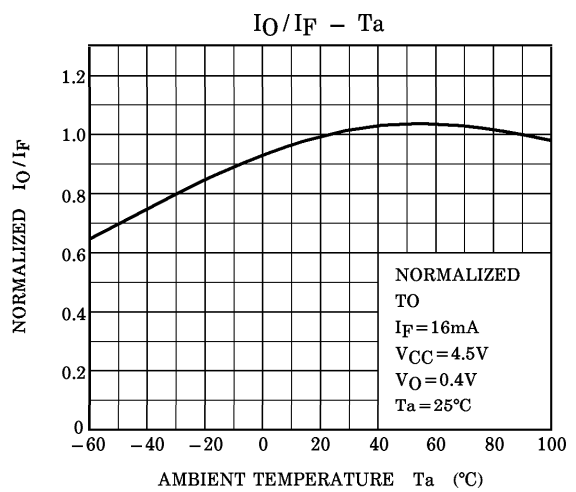
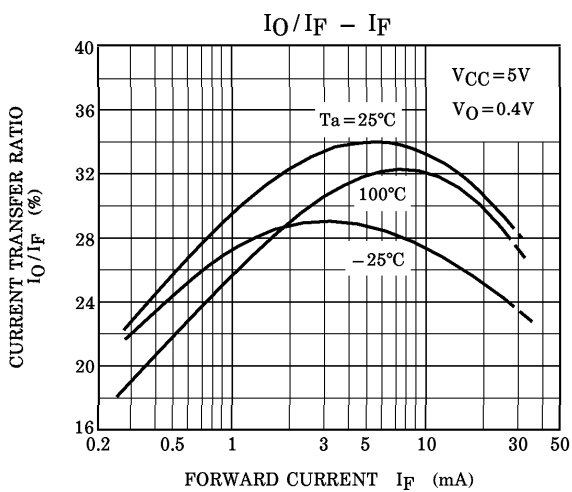
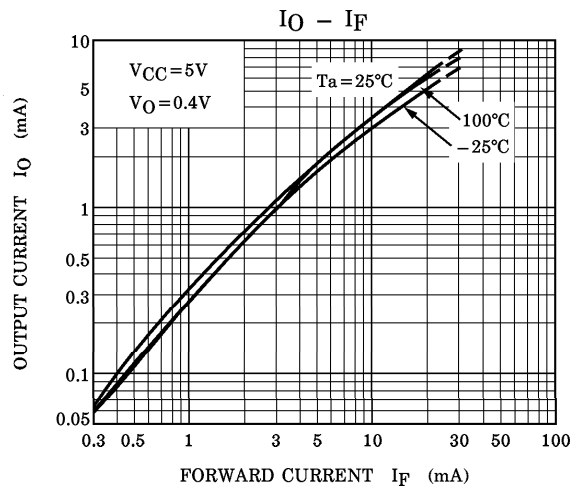
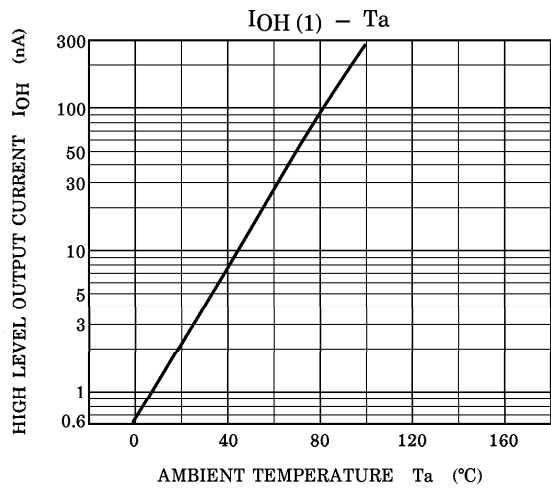
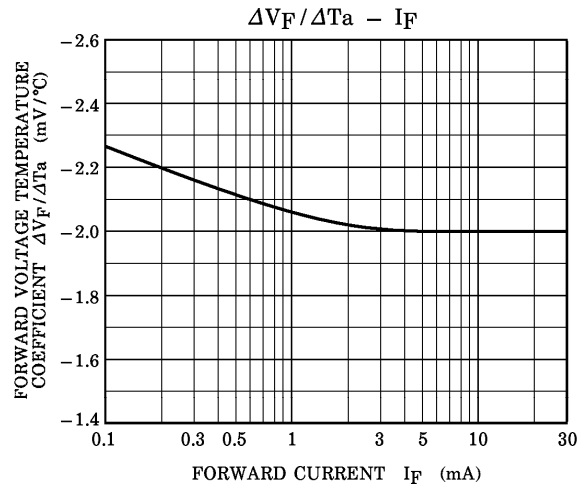
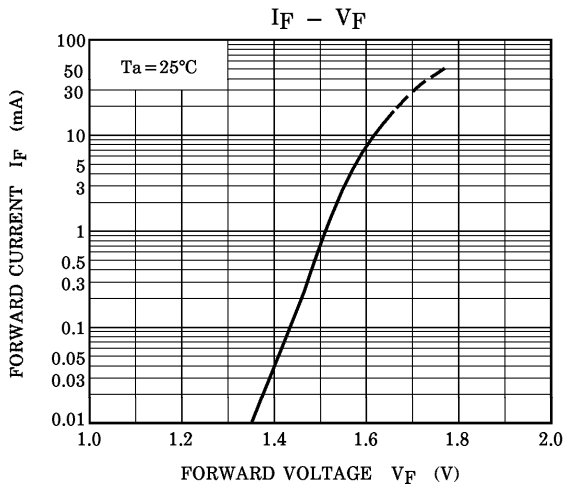
TEST CIRCUIT 1 : Switching Time Test Circuit

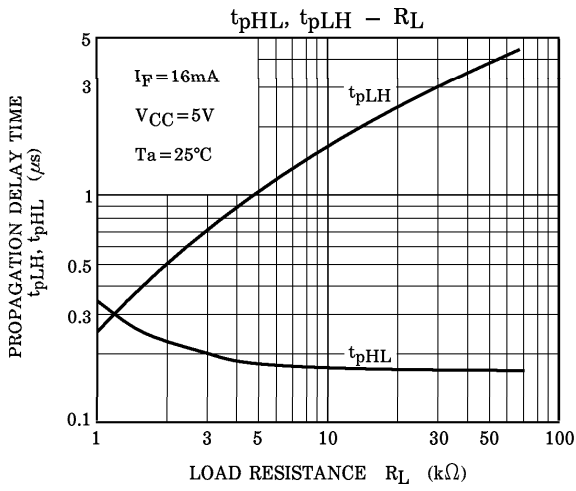
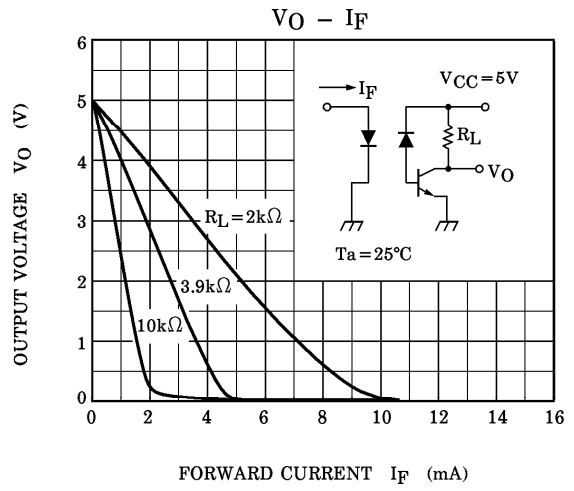
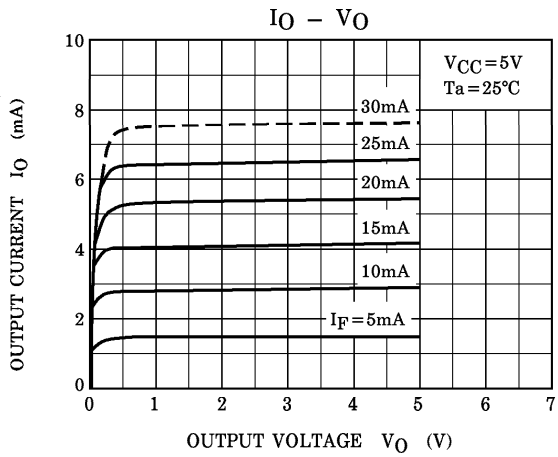


TEST CIRCUIT 2 : Common Mode Noise Immunity Test Circuit



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





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