

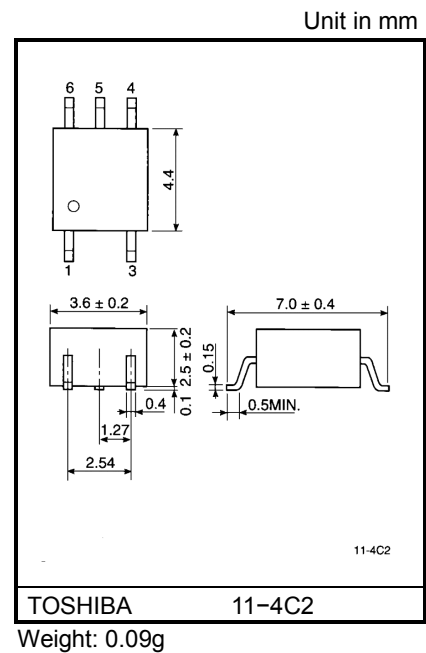
TOSHIBA Photocoupler GaAlAs Ired & Photo-IC

TLP112A

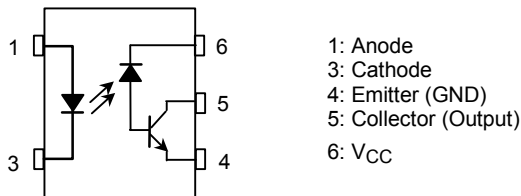
- Digital Logic Isolation
- Line Receiver
- Power Supply Control Feedback Control
- Switching Power Supply
- Transistor Invertor

The TOSHIBA mini flat coupler TLP112A is a small outline coupler, suitable for surface mount assembly. TLP112A consists of a high output power GaAlAs light emitting diode, optically coupled to a high speed detector of one chip photodiode-transistor.

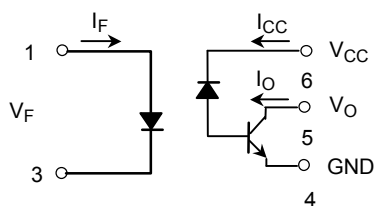
- Isolation voltage: 2500Vrms (min.)
- Switching speed: $t_{pHL}=0.8\mu s$, $t_{pLH}=0.8\mu s(\max.)$ ($R_L=1.9k\Omega$)
- TTL compatible
- UL recognized: UL1577, file no. E67349



Pin Configuration(top view)



Schematic



Maximum Ratings(Ta = 25°C)

| Characteristic | | Symbol | Rating | Unit |
|---|---|------------------|---------|------------------|
| LED | Forward current (Note 1) | I _F | 20 | mA |
| | Pulse forward current (Note 2) | I _{FP} | 40 | mA |
| | Peak transient forward current (Note 3) | I _{FPT} | 1 | A |
| | Reverse voltage | V _R | 5 | V |
| Detector | Output current | I _O | 8 | mA |
| | Peak output current | I _{OP} | 16 | mA |
| | Supply voltage | V _{CC} | -0.5~15 | V |
| | Output voltage | V _O | -0.5~15 | V |
| | Output power dissipation (Note 4) | P _O | 100 | mW |
| Operating temperature range | | T _{opr} | -55~100 | °C |
| Storage temperature range | | T _{stg} | -55~125 | °C |
| Lead soldering temperature(10s) | | T _{sol} | 260 | °C |
| Isolation voltage (AC, 1min., R.H.≤ 60%, Note 5) | | BV _S | 2500 | V _{rms} |

(Note 1) Derate 0.36mA / °C above 70°C.

(Note 2) 50% duty cycle, 1ms pulse width.
Derate 0.72mA / °C above 70°C.

(Note 3) Pulse width ≤ 1μs, 300pps.

(Note 4) Derate 1.8mW / °C above 70°C.

Electrical Characteristics(Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|----------------|---|---------------------------|---|--------------------|-----------|------|---------------|
| LED | Forward voltage | V_F | $I_F=16\text{mA}$ | 1.22 | 1.42 | 1.72 | V |
| | Forward voltage temperature coefficient | $\Delta V_F / \Delta T_a$ | $I_F=16\text{mA}$ | — | -2 | — | mV / °C |
| | Reverse current | I_R | $V_R=3\text{V}$ | — | — | 10 | μA |
| | Capacitance between terminals | C_T | $V_F=0, f=1\text{MHz}$ | — | 30 | — | 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} | $I_F=0\text{mA}, V_{CC}=V_O=15\text{V}$ $T_a=70^\circ\text{C}$ | — | — | 50 | |
| | High level supply current | 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 | — | — | % |
| | 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 |
| | Isolation resistance | R_S | R.H. $\leq 60\%$ $V_S=500\text{V DC}$ (Note 5) | 5×10^{10} | 10^{14} | — | Ω |
| | Stray capacitance between input to output | C_S | $V_S=0, f=1\text{MHz}$ (Note 5) | — | 0.8 | — | pF |

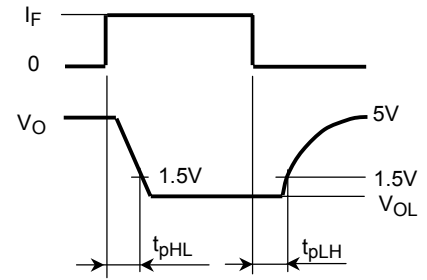
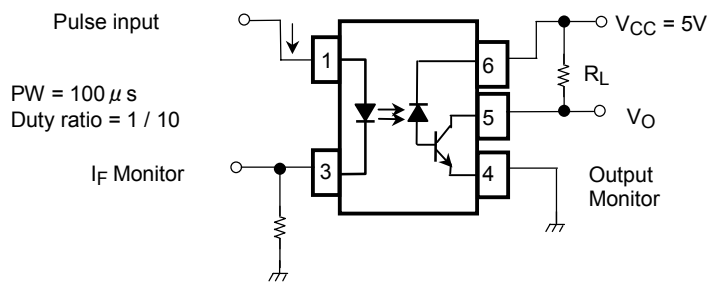
Switching Characteristics(Ta = 25°C)

| Characteristic | Symbol | Test Circuit | Test Condition | Min. | Typ. | Max. | Unit |
|---|-----------|--------------|--|------|-------|------|-------------------|
| Propagation delay time (H→L) | t_{pHL} | 1 | $I_F=0 \rightarrow 16\text{mA}$ $V_{CC}=5\text{V}, R_L=1.9\text{k}\Omega$ | — | — | 0.8 | μs |
| Propagation delay time (L→H) | t_{pLH} | 1 | $I_F=16 \rightarrow 0\text{mA}$ $V_{CC}=5\text{V}, R_L=1.9\text{k}\Omega$ | — | — | 0.8 | μs |
| Common mode transient immunity at high output level | CM_H | 2 | $I_F=0\text{mA}, V_{CM}=200\text{V}_{p-p}$ $R_L=4.1\text{k}\Omega$ | — | 1500 | — | V / μs |
| Common mode transient immunity at low output level | CM_L | 2 | $I_F=16\text{mA}, V_{CM}=200\text{V}_{p-p}$ $R_L=4.1\text{k}\Omega$ | — | -1500 | — | V / μs |

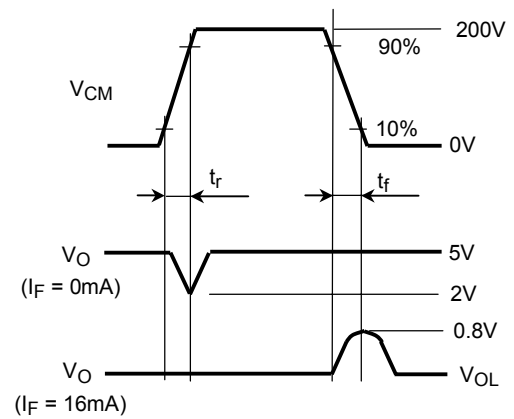
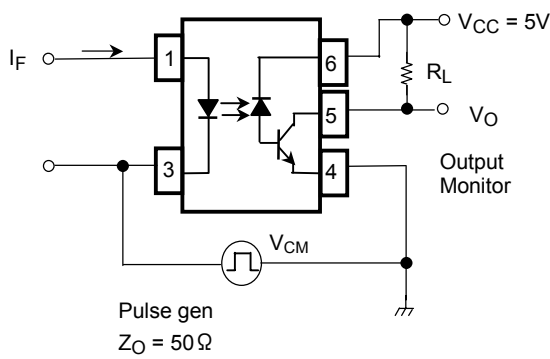
(Note 5) Device considered a two-terminal device: Pins 1 and 3 shorted together and pin 4, 5 and 6 shorted together.

(Note 6) Maximum electrostatic discharge voltage for any pins: 100V(C=200pF, R=0)

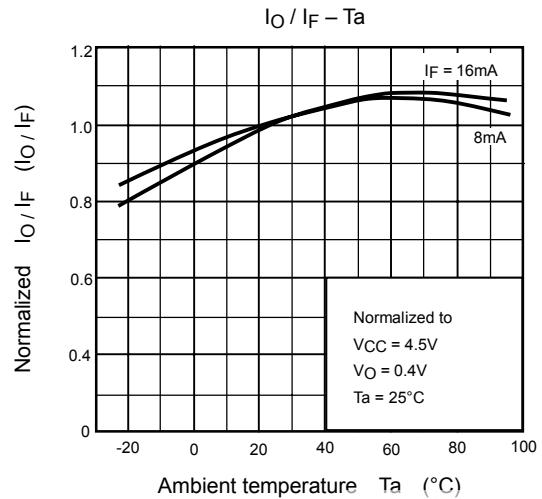
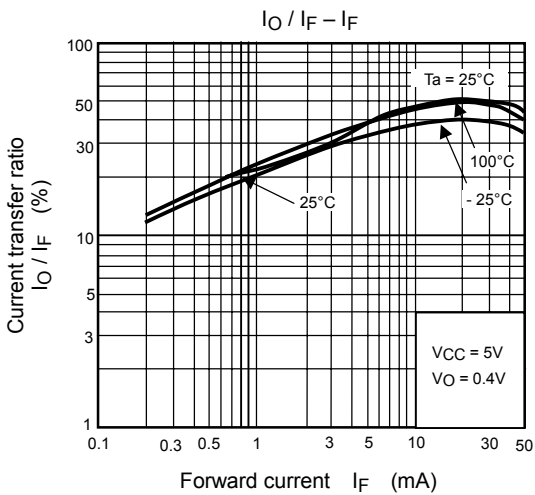
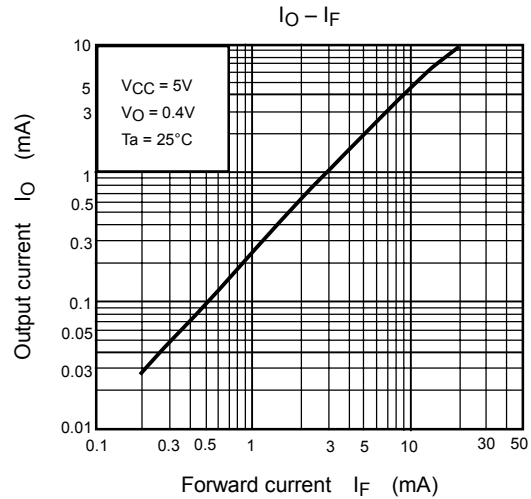
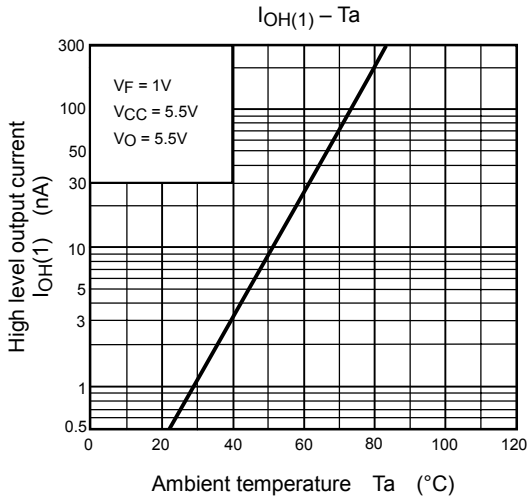
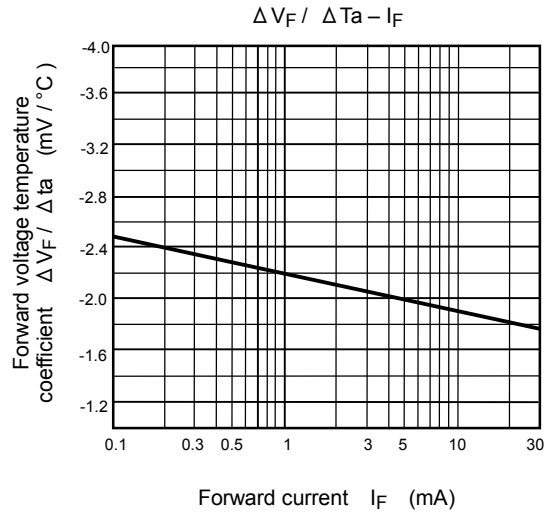
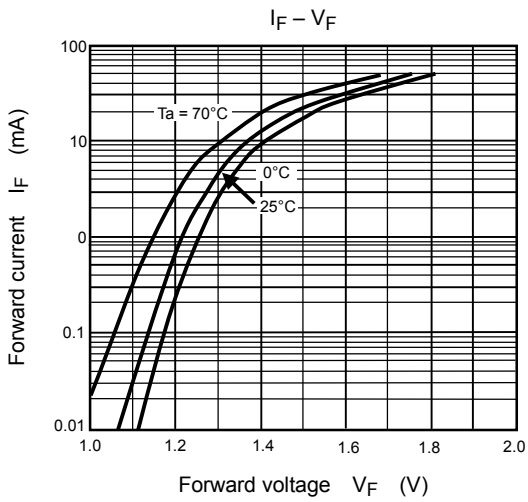
Test Circuit 1: Switching Time Test Circuit

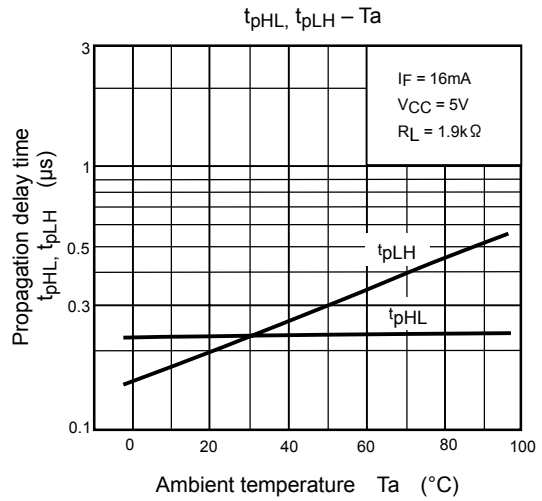
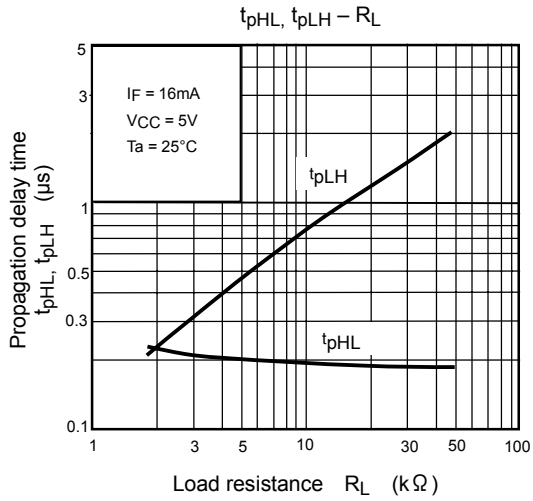
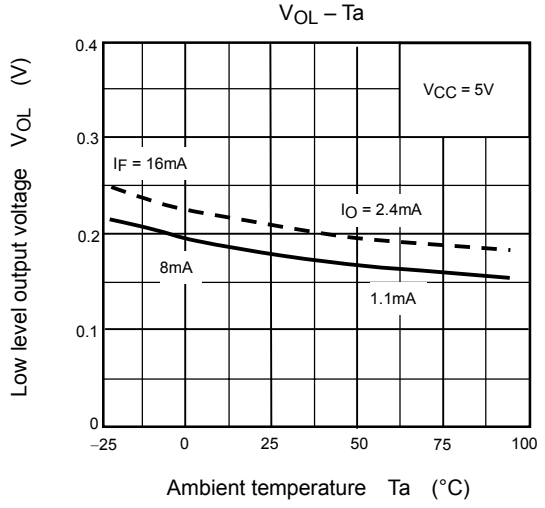
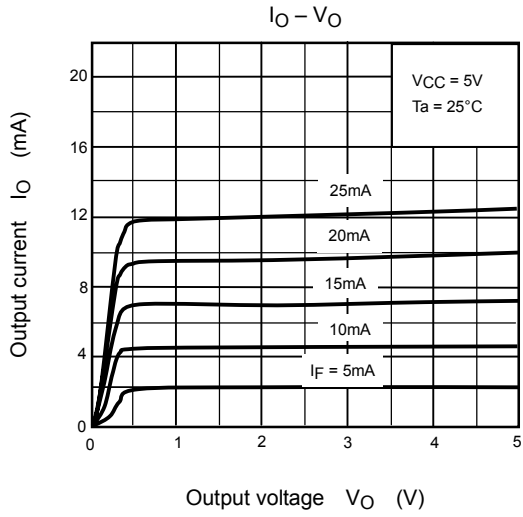


Test Circuit 2: Common Mode Transient Immunity Test Circuit



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





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