

TOSHIBA Photocoupler GaAlAs Ired & Photo-IC

## TLP114A

Digital Logic Isolation.

Line Receiver.

Power Supply Control Feedback Control.

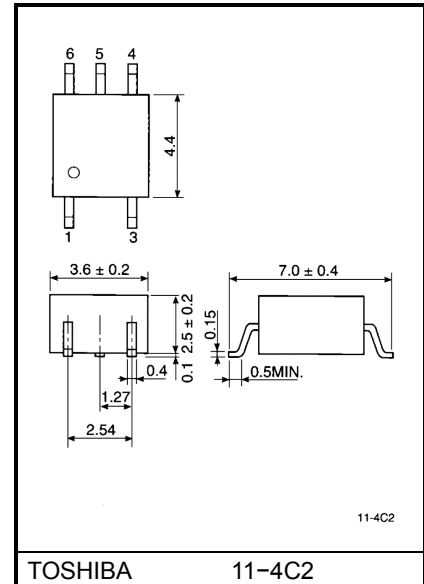
Switching Power Supply.

Transistor Invertor.

The TOSHIBA mini flat coupler TLP114A is a small outline coupler, suitable for surface mount assembly. TLP114A consists of a high output power GaAlAs light emitting diode, optically coupled to a high speed detector of one chip photodiode-transistor.

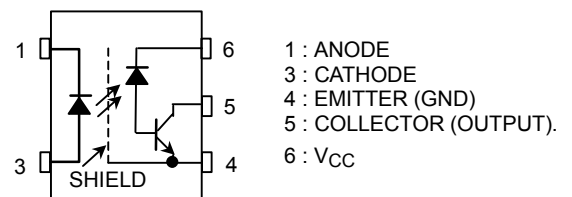
- Isolation voltage: 3750 Vrms (min.)
- Switching speed:  $t_{pHL} = 0.8\mu s$ ,  $t_{pLH} = 0.8\mu s$  (max.) ( $R_L = 1.9 k\Omega$ )
- TTL compatible
- UL recognized: UL1577, file no. E67349

Unit in mm

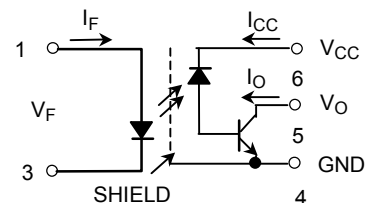


Weight: 0.09g

### Pin Configuration (top view)



### Schematic



## Maximum Ratings (Ta = 25°C)

| Characteristic                                         |                                         | Symbol           | Rating  | Unit             |
|--------------------------------------------------------|-----------------------------------------|------------------|---------|------------------|
| LDE                                                    | Forward current (Note 1)                | I <sub>F</sub>   | 20      | mA               |
|                                                        | Pulse forward current (Note 2)          | I <sub>FP</sub>  | 40      | mA               |
|                                                        | Peak transient forward current (Note 3) | I <sub>FPT</sub> | 1       | A                |
|                                                        | Reverse voltage                         | V <sub>R</sub>   | 5       | V                |
| Detector                                               | Output current                          | I <sub>O</sub>   | 8       | mA               |
|                                                        | Peak output current                     | I <sub>OP</sub>  | 16      | mA               |
|                                                        | Supply voltage                          | V <sub>CC</sub>  | −0.5~30 | V                |
|                                                        | Output voltage                          | V <sub>O</sub>   | −0.5~20 | V                |
|                                                        | Output power dissipation (Note 4)       | 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(10 sec.)                       |                                         | T <sub>sol</sub> | 260     | °C               |
| Isolation Voltage<br>(AC, 1 min., R.H. ≤ 60%) (Note 5) |                                         | BV <sub>S</sub>  | 3750    | V <sub>rms</sub> |

(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    |
|----------------|-------------------------------------------|---------------------------|---------------------------------------------------------------------------------------|--------------------|-----------|------|---------|
| LDE            | 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      |
|                |                                           | $I_{OH(2)}$               | $I_F = 0\text{mA}, V_{CC} = 30\text{V}$<br>$V_O = 20\text{V}$                         | —                  | —         | 5    | μA      |
|                |                                           | $I_{OH}$                  | $I_F = 0\text{mA}, V_{CC} = 30\text{V}$<br>$V_O = 20\text{V}, T_a = 70^\circ\text{C}$ | —                  | —         | 50   |         |
|                | High level supply current                 | $I_{CCH}$                 | $I_F = 0\text{mA}, V_{CC} = 30\text{V}$                                               | —                  | 0.01      | 1    | μA      |
| Coupled        | Current transfer ratio                    | $I_O / I_F$               | $I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$<br>$V_O = 0.4\text{V}$                      | 20                 | —         | —    | %       |
|                | Low level output voltage                  | $V_{OL}$                  | $I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$<br>$I_O = 2.4\text{mA}$                     | —                  | —         | 0.4  | V       |
|                | Isolation resistance                      | $R_S$                     | R.H. ≤ 60%, $V_S = 500\text{V}$ (Note 5)                                              | $5 \times 10^{10}$ | $10^{14}$ | —    | Ω       |
|                | Stray capacitance between input to output | $C_S$                     | $V_S = 0, f = 1\text{MHz}$ (Note 5)                                                   | —                  | 0.8       | —    | pF      |

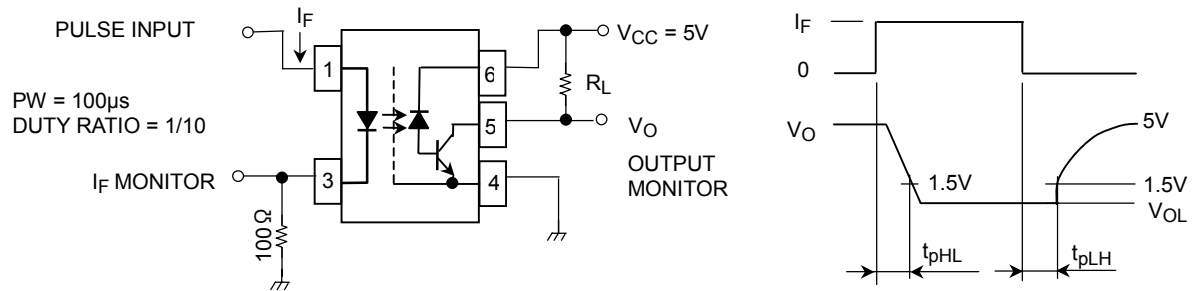
## Switching Characteristics (Ta = 25°C, VCC = 5V)

| Characteristic                                      | Symbol    | Test Circuit | Test Condition                                                                     | Min.  | Typ.   | Max. | Unit   |
|-----------------------------------------------------|-----------|--------------|------------------------------------------------------------------------------------|-------|--------|------|--------|
| Propagation delay time (H → L)                      | $t_{pHL}$ | 1            | $I_F = 0 \rightarrow 16\text{mA}$<br>$V_{CC} = 5\text{V}, R_L = 1.9\text{k}\Omega$ | —     | —      | 0.8  | μs     |
| Propagation delay time (L → H)                      | $t_{pLH}$ | 1            | $I_F = 16 \rightarrow 0\text{mA}$<br>$V_{CC} = 5\text{V}, R_L = 1.9\text{k}\Omega$ | —     | —      | 0.8  | μs     |
| Common mode transient immunity at high output level | $C_{MH}$  | 2            | $I_F = 0\text{mA}$ ,<br>$V_{CM} = 400\text{V}_{p-p}$<br>$R_L = 4.1\text{k}\Omega$  | 5000  | 10000  | —    | V / μs |
| Common mode transient immunity at low output level  | $C_{ML}$  | 2            | $I_F = 16\text{mA}$ ,<br>$V_{CM} = 400\text{V}_{p-p}$<br>$R_L = 4.1\text{k}\Omega$ | -5000 | -10000 | —    | V / μs |

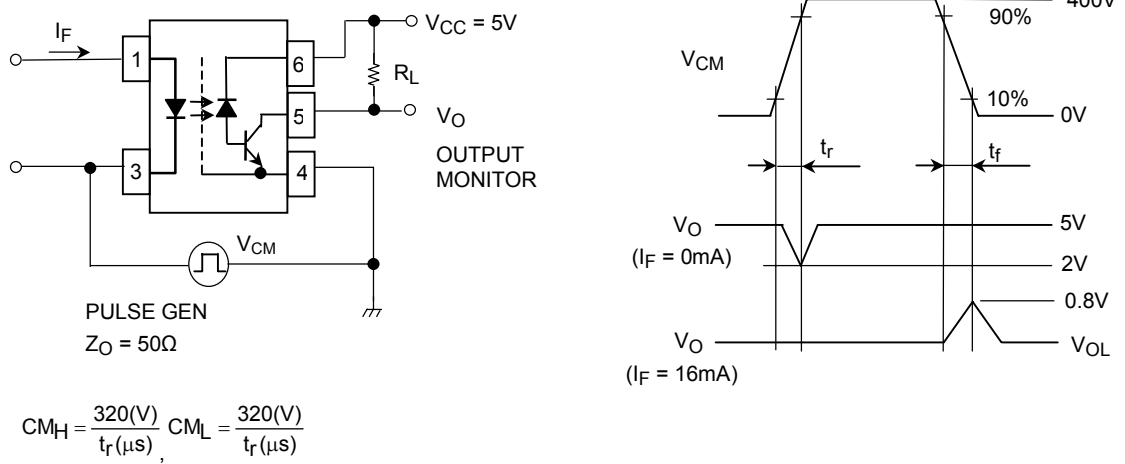
(Note 5) Device considered a two-terminal device: Pins 1 and 3 shorted together, and pins 4, 5 and 6 shorted together.

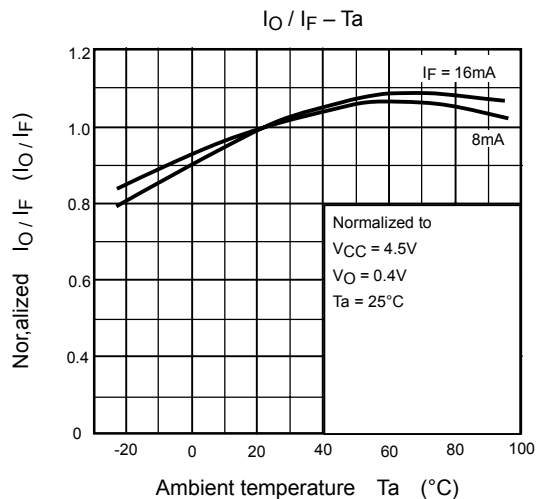
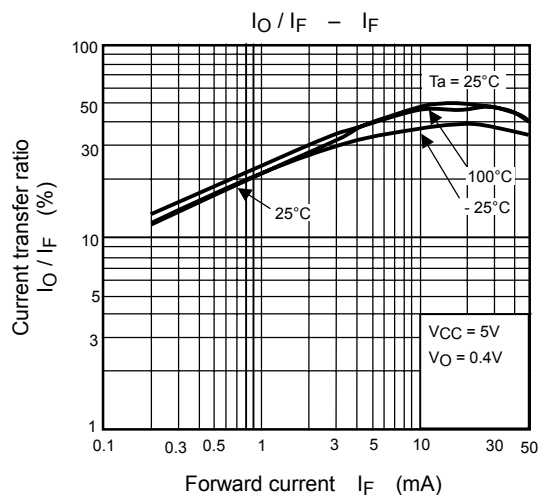
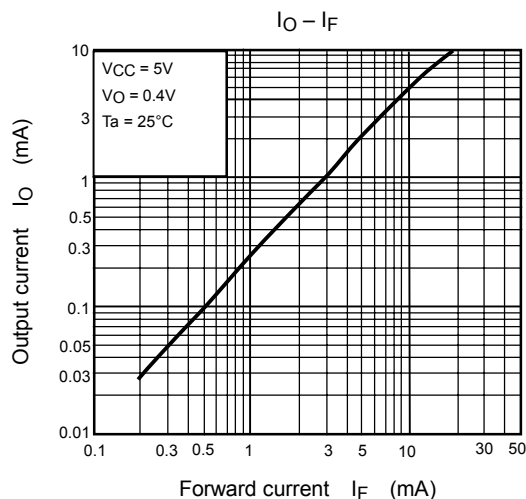
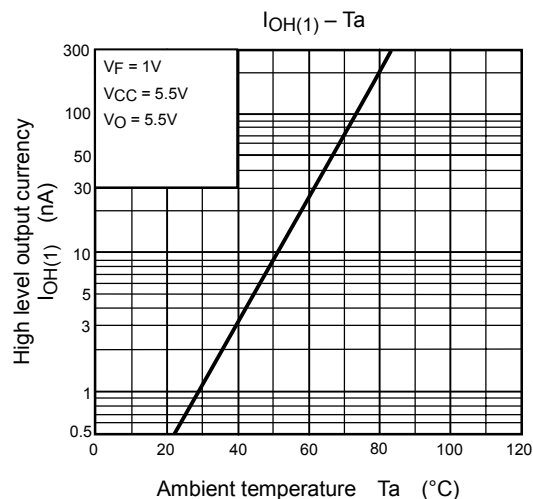
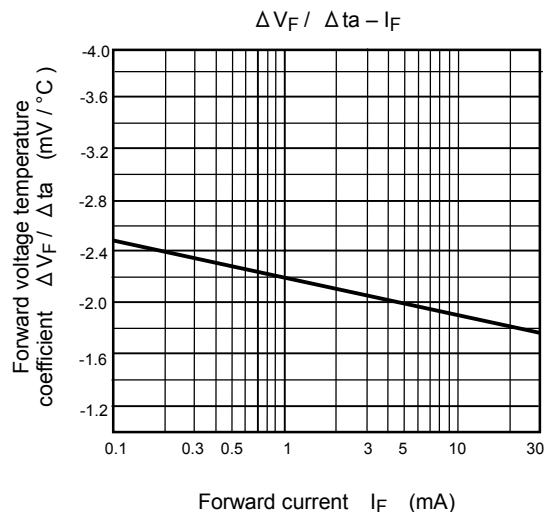
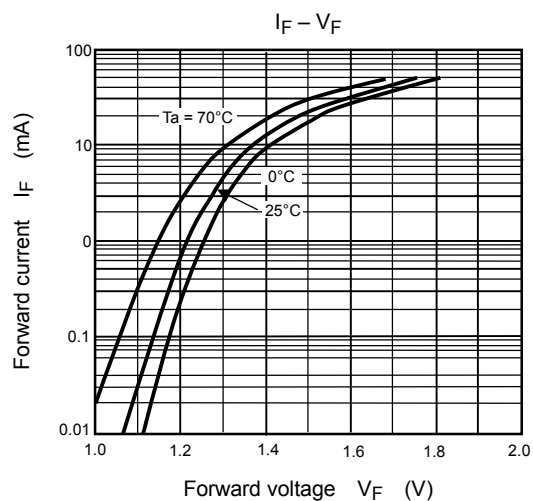
(Note 6) Maximum electrostatic discharge voltage for any pins: 100V(C=200pF, R=0)

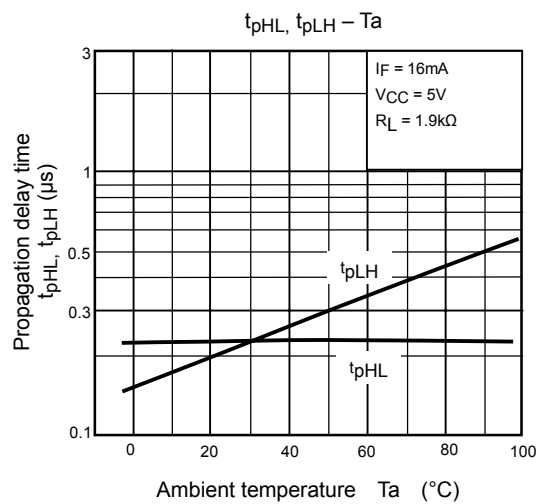
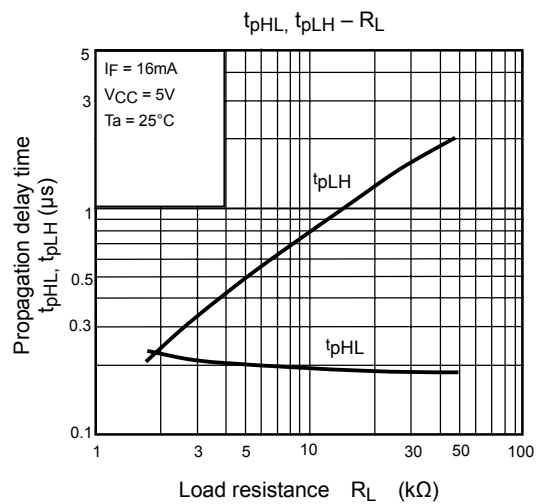
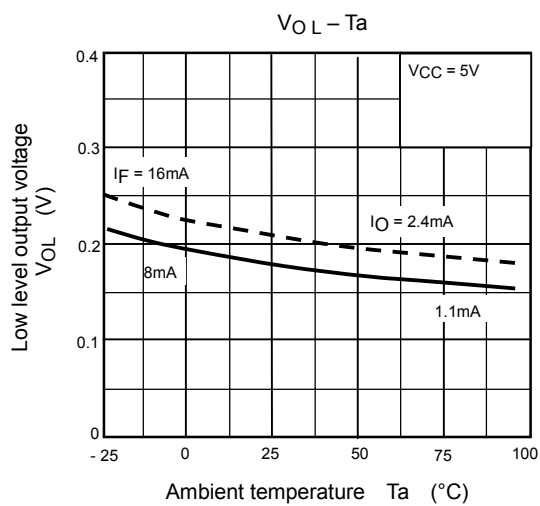
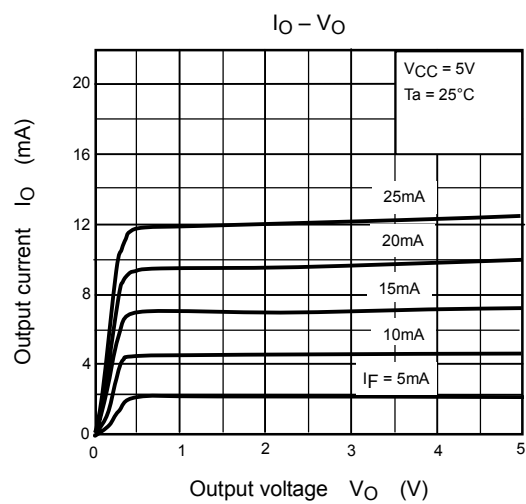
## Test Circuit 1: Switching Time Test Circuit



## Test Circuit =2: Common Mode Transient Immunity Test Circuit







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