

# TLP112

Digital Logic Isolation

Line Receiver

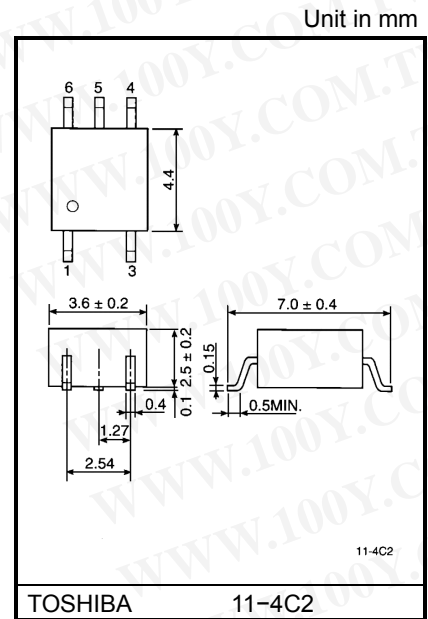
Switching Power Supply Feedback Control

Transistor Inverter

The TOSHIBA mini flat coupler TLP112 is a small outline coupler, suitable for surface mount assembly.

TLP112 consists of a GaAlAs light emitting diode, optically coupled to a high speed detector of one chip photodiode-transistor.

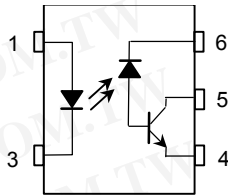
- Isolation voltage: 2500 Vrms (min.)
- Switching speed:  $t_{pHL} = 0.8\mu s$ ,  $t_{pLH} = 2\mu s$ (max.)  
( $R_L = 4.1\text{ k}\Omega$ )
- TTL compatible
- UL recognized: UL1577, file no. E67349



TOSHIBA 11-4C2

Weight: 0.09g

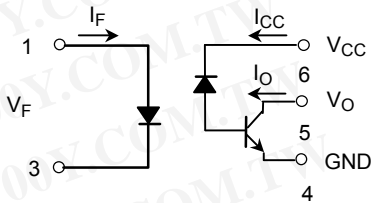
## Pin Configuration (top view)



- 1 : ANODE
- 3 : CATHODE
- 4 : EMITTER (GND)
- 5 : COLLECTOR (OUTPUT)
- 6 : Vcc

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## 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
	Supply voltage	$V_{CC}$	-0.5~15	V
	Output voltage	$V_O$	-0.5~15	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 soldering temperature(10s)		$T_{sol}$	260	°C
Isolation voltage (AC, 1 min., R.H ≤ 60%, Note 6)		$BVS$	2500	Vrms

(Note 1) Derate 0.8 mA / °C 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.

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## 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	$\mu\text{A}$
	Capacitance between terminals	$C_T$	$V_F = 0, f = 1\text{MHz}$	—	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	$\mu\text{A}$
		$I_{OH}$	$I_F = 0\text{mA}, V_{CC} = V_O = 15\text{V}$ $T_a = 70^\circ\text{C}$	—	—	50	
	High level supply current	$I_{CCH}$	$I_F = 0\text{mA}, V_{CC} = 15\text{V}$	—	0.01	1	$\mu\text{A}$
Coupled	Current transfer ratio	$I_O / I_F$	$I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$ $V_O = 0.4\text{V}$	10	—	—	%
	Low level output voltage	$V_{OL}$	$I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$ $I_O = 1.1\text{mA}$	—	—	0.4	V
	Isolation resistance	$R_S$	R.H. $\leq 60\%$ $V_S = 500\text{V DC}$ (Note 6)	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
	Stray capacitance between input to output	$C_S$	$V_S = 0, f = 1\text{MHz}$ (Note 6)	—	0.8	—	pF

## Switching Characteristics (Ta = 25°C)

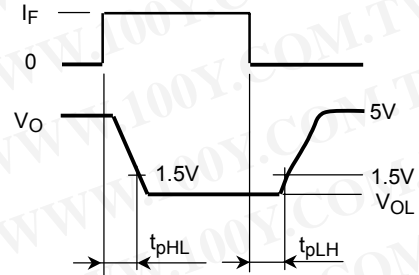
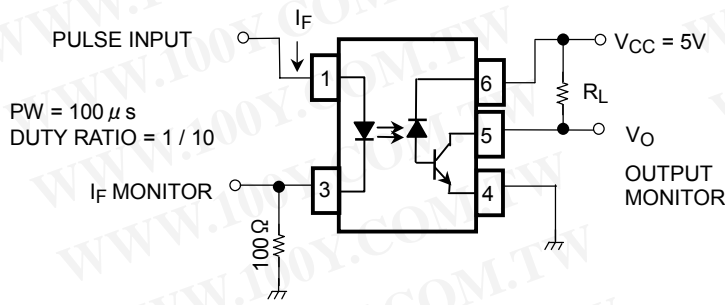
Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	$t_{pHL}$	1	$I_F = 0 \rightarrow 16\text{mA}$ $V_{CC} = 5\text{V}, R_L = 4.1\text{k}\Omega$	—	—	0.8	$\mu\text{s}$
Propagation delay time (L→H)	$t_{pLH}$	1	$I_F = 16 \rightarrow 0\text{mA}$ $V_{CC} = 5\text{V}, R_L = 4.1\text{k}\Omega$	—	—	2.0	$\mu\text{s}$
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 / $\mu\text{s}$
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 / $\mu\text{s}$

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

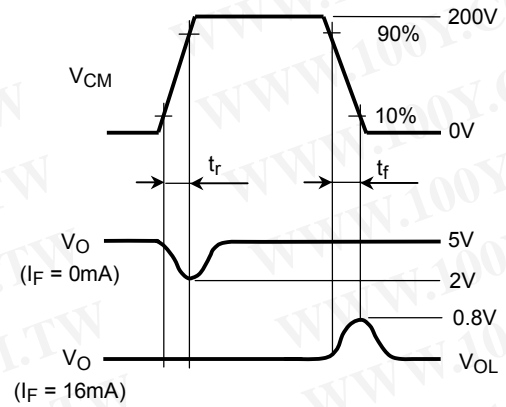
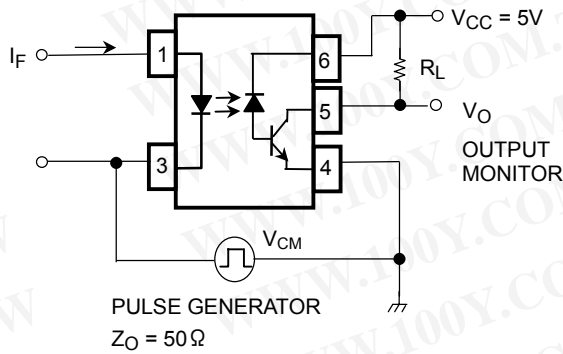
(Note 7) Maximum electrostatic discharge voltage for any pins: 100V (C=200pF, R=0)

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## Test Circuit 1: Switching Time Test Circuit

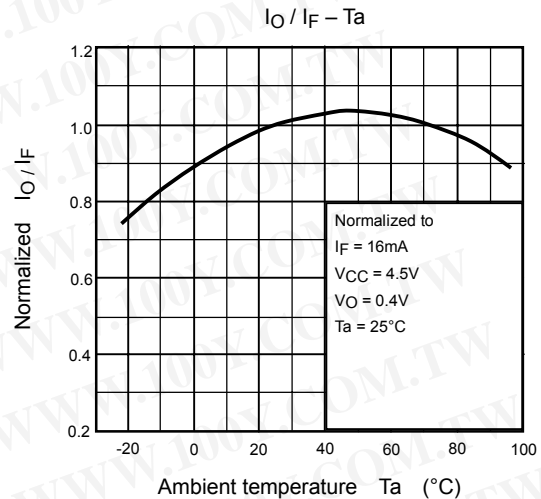
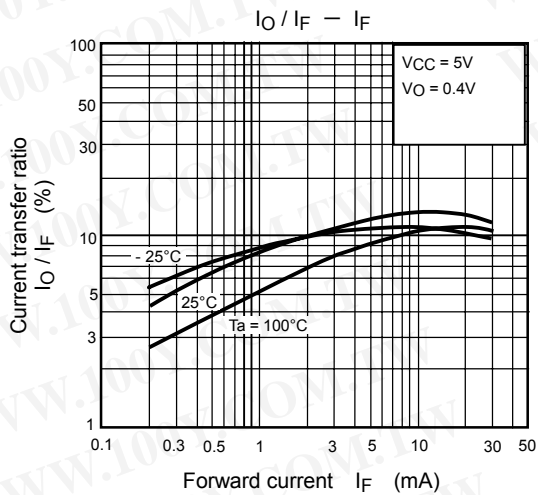
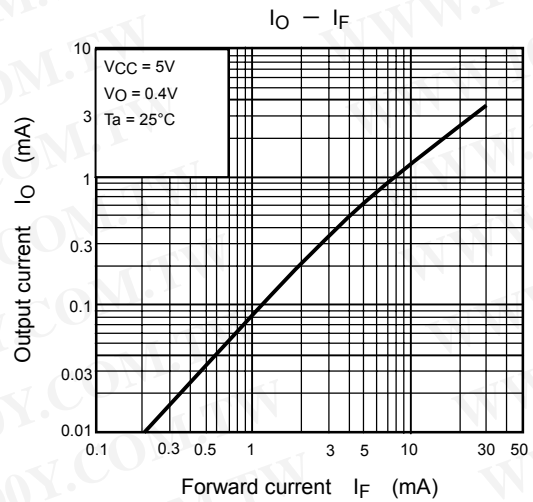
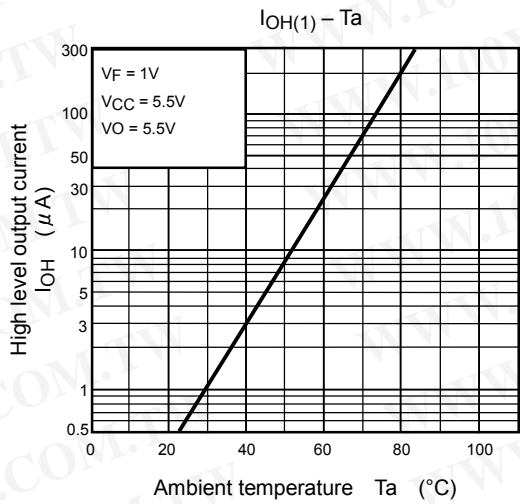
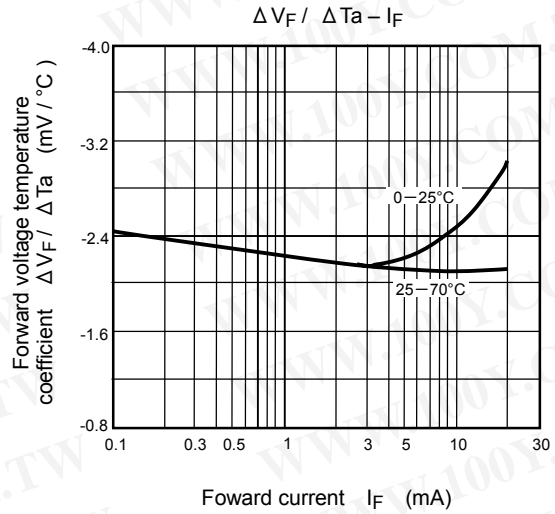
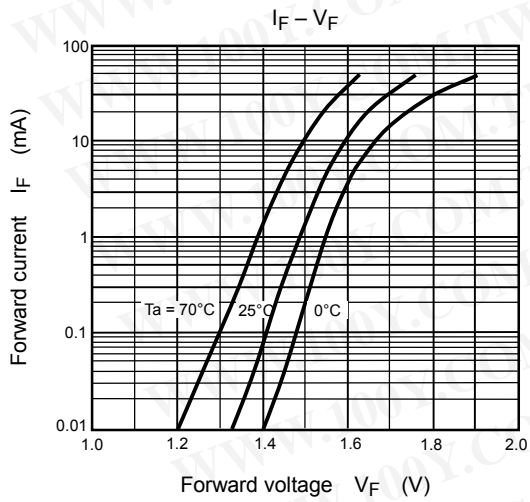


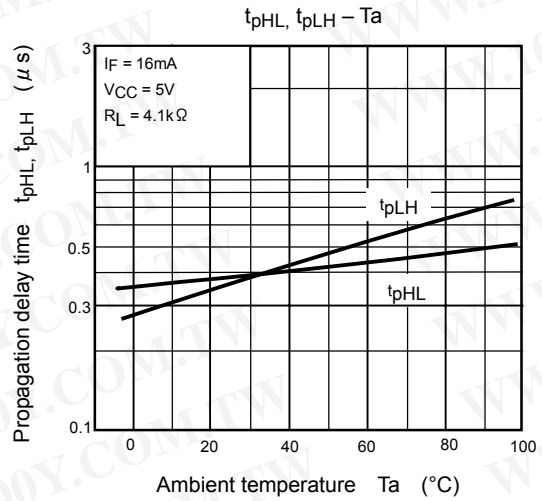
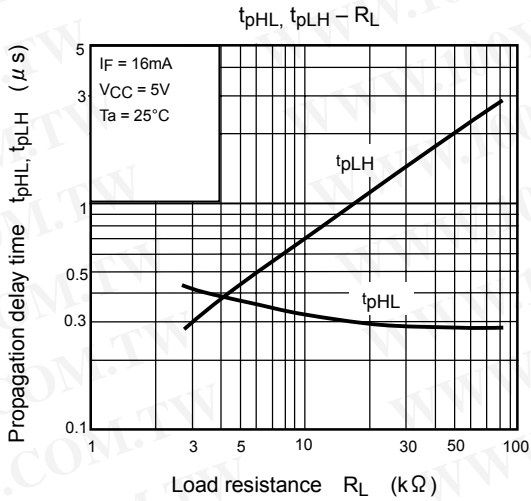
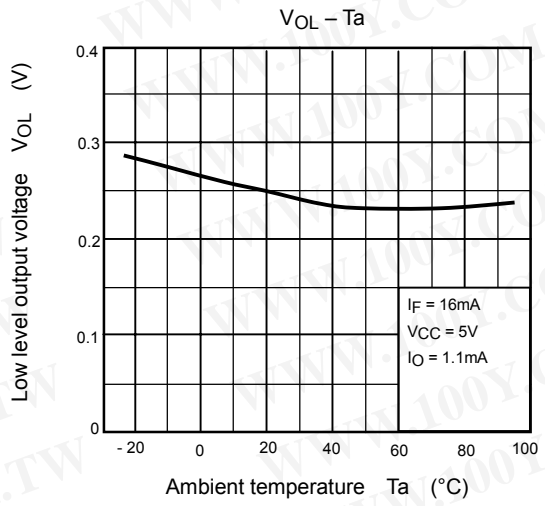
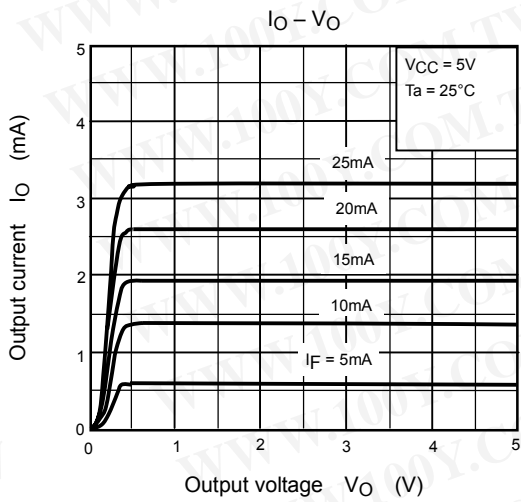
## Test Circuit 2: Common Mode Transient Immunity Test Circuit



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

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