

TOSHIBA PHOTOCOUPLER GaAlAs IRED & PHOTO-IC

# TLP112A

DIGITAL LOGIC ISOLATION

LINE RECEIVER

POWER SUPPLY CONTROL FEEDBACK CONTROL

SWITCHING POWER SUPPLY

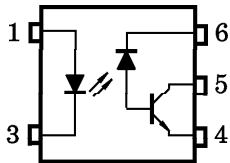
TRANSISTOR INVERTOR

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.

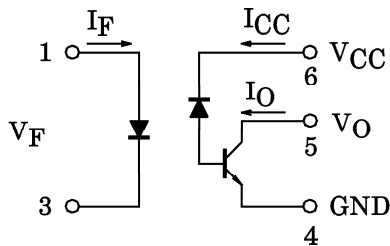
- Isolation Voltage : 2500Vrms (Min.)
- Switching Speed :  $t_{pHL} = 0.8\mu s$ ,  $t_{pLH} = 0.8\mu s$  (Max.) ( $R_L = 1.9k\Omega$ )
- TTL Compatible
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATION (TOP VIEW)

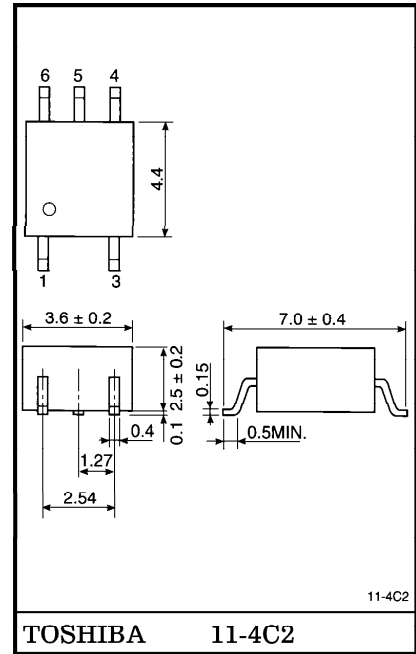


- 1 : ANODE
- 3 : CATHODE
- 4 : EMITTER (GND)
- 5 : COLLECTOR (OUTPUT)
- 6 : VCC

SCHEMATIC



Unit in mm



Weight : 0.09g

961001EBC2

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## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	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>	-0.5~15	V
	Output Voltage	V <sub>O</sub>	-0.5~15	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 Soldering Temperature (10s)		T <sub>sol</sub>	260	°C
Isolation Voltage (AC, 1 min., R.H. ≤ 60%, Note 5)		BVS	2500	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
LED	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 16mA	1.22	1.42	1.72	V
	Forward Voltage Temperature Coefficient	ΔV <sub>F</sub> /ΔTa	I <sub>F</sub> = 16mA	—	-2	—	mV/°C
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 3V	—	—	10	μA
	Capacitance Between Terminals	C <sub>T</sub>	V <sub>F</sub> = 0, f = 1MHz	—	30	—	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> = V <sub>O</sub> = 15V	—	—	5	μA
		I <sub>OH</sub>	I <sub>F</sub> = 0mA, V <sub>CC</sub> = V <sub>O</sub> = 15V Ta = 70°C	—	—	50	
	High Level Supply Current	I <sub>CC</sub> H	I <sub>F</sub> = 0mA, V <sub>CC</sub> = 15V	—	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 V <sub>O</sub> = 0.4V	20	—	—	%
	Low Level Output Voltage	V <sub>OL</sub>	I <sub>F</sub> = 16mA, V <sub>CC</sub> = 4.5V I <sub>O</sub> = 2.4mA	—	—	0.4	V
	Isolation Resistance	R <sub>S</sub>	R.H. ≤ 60% V <sub>S</sub> = 500V DC (Note 5)	5 × 10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
	Stray Capacitance Between Input to Output	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1MHz (Note 5)	—	0.8	—	pF

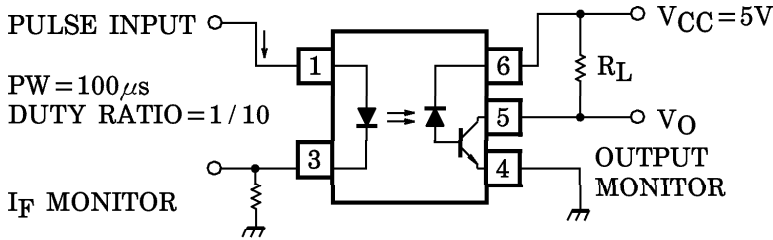
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time (H→L)	t <sub>pHL</sub>	1	I <sub>F</sub> = 0→16mA V <sub>CC</sub> = 5V, R <sub>L</sub> = 1.9kΩ	—	—	0.8	μs
Propagation Delay Time (L→H)	t <sub>pLH</sub>	1	I <sub>F</sub> = 16→0mA V <sub>CC</sub> = 5V, R <sub>L</sub> = 1.9kΩ	—	—	0.8	μs
Common Mode Transient Immunity at High Output Level	CM <sub>H</sub>	2	I <sub>F</sub> = 0mA, V <sub>CM</sub> = 200V <sub>p-p</sub> R <sub>L</sub> = 4.1kΩ	—	1500	—	V / μs
Common Mode Transient Immunity at Low Output Level	CM <sub>L</sub>	2	I <sub>F</sub> = 16mA, V <sub>CM</sub> = 200V <sub>p-p</sub> R <sub>L</sub> = 4.1kΩ	—	-1500	—	V / μs

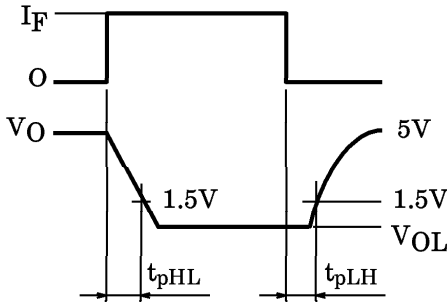
(Note 5) Device considered a two-terminal device : Pins 1 and 3 shorted together and Pin 4, 5 and 6 shorted together.

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

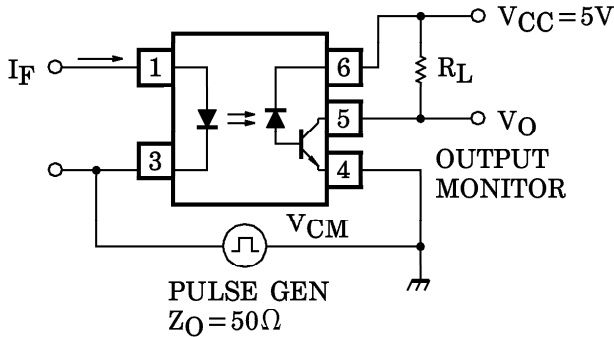
TEST CIRCUIT 1 : Switching Time Test Circuit



PW = 100 μs  
DUTY RATIO = 1 / 10



TEST CIRCUIT 2 : Common Mode Transient Immunity Test Circuit



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

