

TOSHIBA PHOTOCOUPLER GaAlAs IRED & PHOTO-IC

TLP112A

DIGITAL LOGIC ISOLATION

LINE RECEIVER

POWER SUPPLY CONTROL FEEDBACK CONTROL

SWITCHING POWER SUPPLY

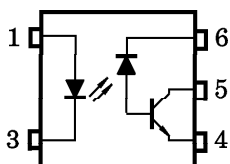
TRANSISTOR INVERTOR

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.

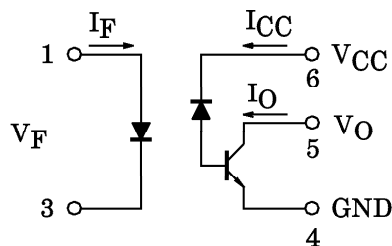
- Isolation Voltage : 2500Vrms (Min.)
- Switching Speed : $t_{pHL}=0.8\mu s$, $t_{pLH}=0.8\mu s$ (Max.) ($R_L=1.9k\Omega$)
- TTL Compatible
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATION (TOP VIEW)

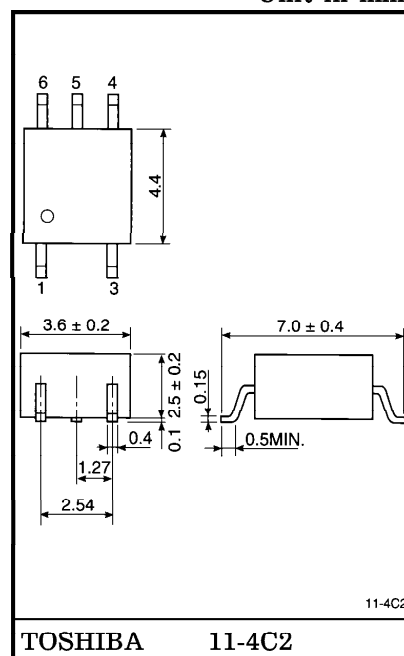


- 1 : ANODE
- 3 : CATHODE
- 4 : EMITTER (GND)
- 5 : COLLECTOR (OUTPUT)
- 6 : VCC

SCHEMATIC



Unit in mm



Weight : 0.09g

961001EBC2

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

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, 1 min., 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

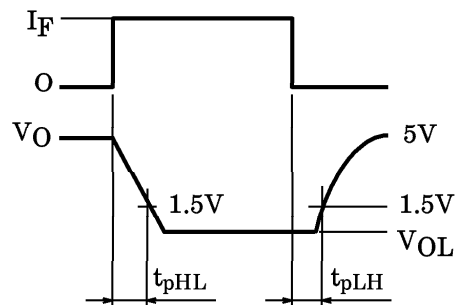
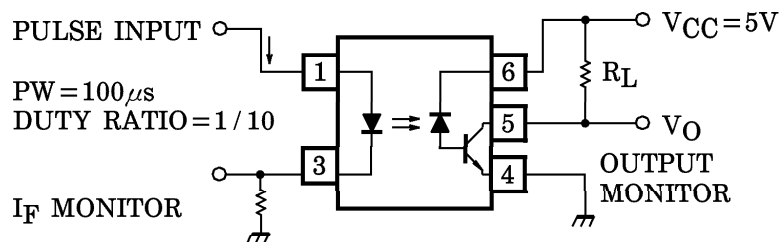
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	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

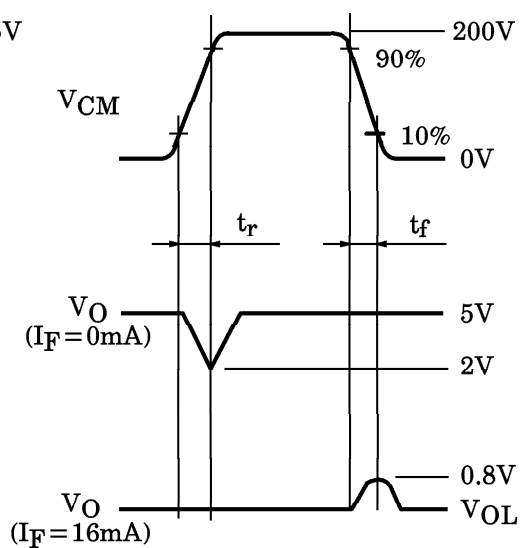
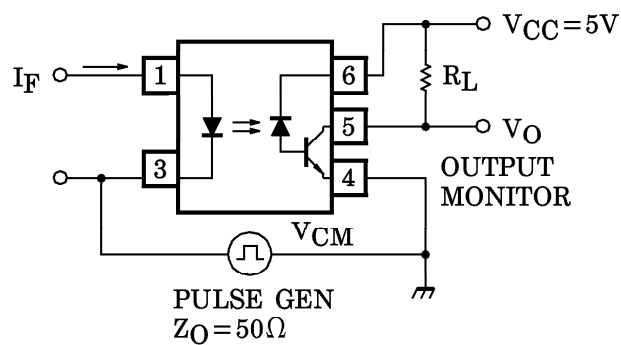
(Note 5) Device considered a two-terminal device : Pins 1 and 3 shorted together and Pin 4, 5 and 6 shorted together.

(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



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

