

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-IC

TLP112

DIGITAL LOGIC ISOLATION

LINE RECEIVER

SWITCHING POWER SUPPLY FEEDBACK CONTROL

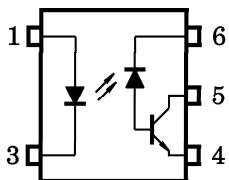
TRANSISTOR INVERTOR

The TOSHIBA MINI FLAT COUPLER TLP112 is a small outline coupler, suitable for surface mount assembly.

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

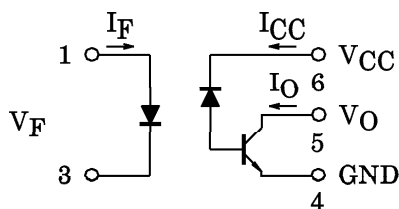
- Isolation Voltage : 2500Vrms (Min.)
- Switching Speed : $t_{pHL} = 0.8\mu s$, $t_{pLH} = 2\mu s$ (Max.)
($R_L = 4.1k\Omega$)
- TTL Compatible
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATION (TOP VIEW)

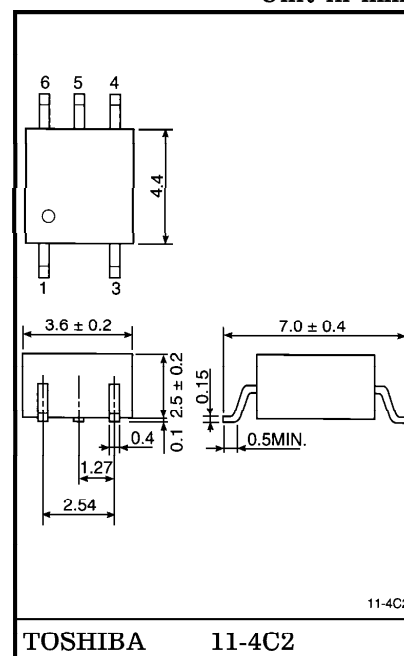


- 1 : ANODE
- 3 : CATHODE
- 4 : EMITTER (GND)
- 5 : COLLECTOR (OUTPUT)
- 6 : VCC

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 _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)		BV _S	2500	V _{rms}

(Note 1) Derate 0.8mA / °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.

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	μA
	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	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	$I_F = 16\text{mA}, V_{CC} = 4.5\text{V}$ $V_O = 0.4\text{V}$	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)	5×10^{10}	10^{14}	—	Ω
	Stray Capacitance Between Input to Output	C_S	$V_S = 0, f = 1\text{MHz}$ (Note 6)	—	0.8	—	pF

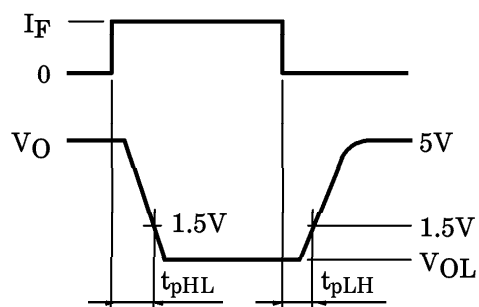
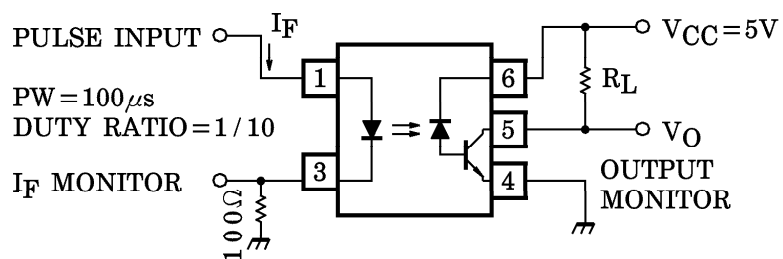
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time (H→L)	t_{pHL}	1	$I_F = 0 \rightarrow 16\text{mA}$ $V_{CC} = 5\text{V}, R_L = 4.1\text{k}\Omega$	—	—	0.8	μs
Propagation Delay Time (L→H)	t_{pLH}	1	$I_F = 16 \rightarrow 0\text{mA}$ $V_{CC} = 5\text{V}, R_L = 4.1\text{k}\Omega$	—	—	2.0	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

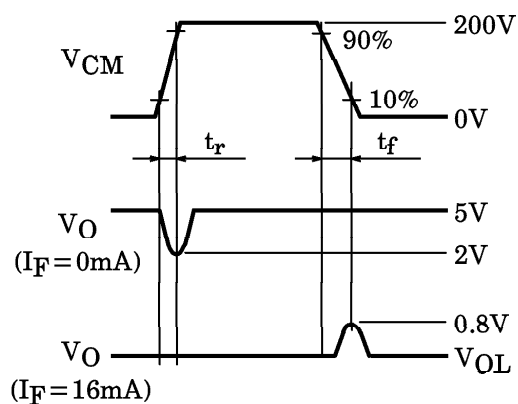
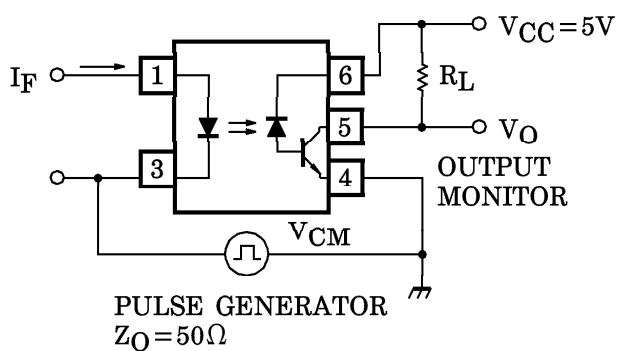
(Note 6) Device considered a two-terminal device : Pins 1 and 3 shorted together and Pin 4, 5 and 6 shorted together.

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

TEST CIRCUIT 1 : Switching Time Test Circuit



TEST CIRCUIT 2 : Common Mode Transient Immunity Test Circuit



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

