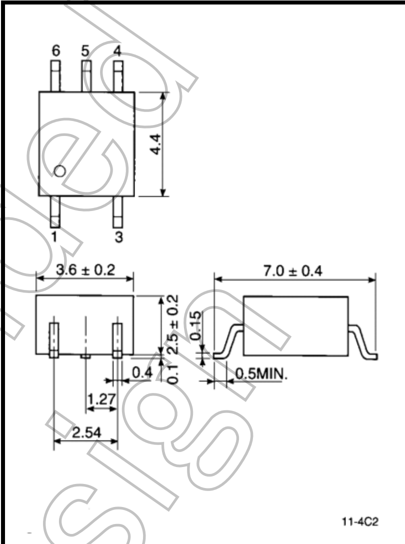
TOSHIBA Photocoupler IRED & Photo−IC

TLP112A

Interfaces of measuring and control instruments
Digital Logic Isolation
Line Receiver
Switching Power Supply Feedback Control
Industrial Inverter

Unit : mm



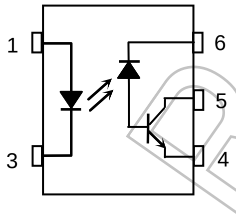
JEDEC	―
JEITA	―
TOSHIBA	11−4C2

Weight: 0.09 g (typ.)

The TOSHIBA mini flat coupler TLP112A is a small outline coupler, suitable for surface mount assembly.
TLP112A consists of a high output power infrared emitting diode, optically coupled to a high speed detector of one chip photodiode−transistor.

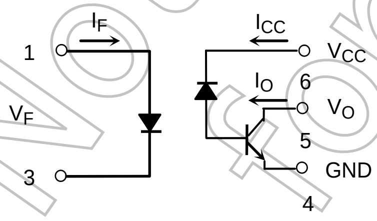
- Isolation voltage: 2500Vrms (min)
- Switching speed: t_{pHL}=0.8μs, t_{pLH}=0.8μs(max)(@R_L=1.9kΩ)
- TTL compatible by connecting external resistance
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A File No.E67349

Pin Configuration(top view)



1: Anode
3: Cathode
4: Emitter (GND)
5: Collector (Output)
6: V_{CC}

Schematic



Start of commercial products
1989-05

Absolute Maximum Ratings (Ta = 25°C)

Characteristics			Symbol	Rating	Unit
LED	Forward current		I_F	20	mA
	Forward Current Derating (Ta ≥ 70 °C)		ΔIF/°C	-0.36	mA/°C
	Pulse forward current	(Note 1)	I_{FP}	40	mA
	Peak transient forward current	(Note 2)	I_{FPT}	1	A
	Reverse voltage		V_R	5	V
	Diode power dissipation	(Note 3)	P_D	45	mW
Detector	Output current		I_O	8	mA
	Peak output current		I_{OP}	16	mA
	Supply voltage		V_{CC}	−0.5 to 15	V
	Output voltage		V_O	−0.5 to 15	V
	Output power dissipation		P_o	100	mW
	Output Power Dissipation Derating (Ta ≥ 70°C)		ΔPo/°C	-1.8	mW/°C
Operating temperature range			T_{opr}	−55 to 100	°C
Storage temperature range			T_{stg}	−55 to 125	°C
Lead soldering temperature(10 s)			T_{sol}	260	°C
Isolation voltage (AC, 60 s, R.H ≤ 60 %)		(Note 4)	BV_S	2500	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

(Note 1) 50 % duty cycle,1ms pulse width. Derate 1.6 mA / °C above 70 °C

(Note 2) Pulse width ≤ 1 μs, 300 pps.

(Note 3) Derate 0.9 mW / °C above 70 °C

(Note 4) This device is regarded as a two terminal device: pins 1 and 3 are shorted together, as are pins 4, 5 and 6.

Electrical Characteristics(Ta = 25°C)

	Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	I_F = 16 mA	1.22	1.42	1.72	V
	Forward voltage temperature coefficient	$\Delta V_F / \Delta Ta$	I_F = 16 mA	—	−2	—	mV / °C
	Reverse current	I_R	V_R = 3 V	—	—	10	μA
	Capacitance between terminals	C_T	V_F = 0 V, f = 1 MHz	—	30	—	pF
Detector	High level output current	$I_{OH(1)}$	I_F = 0 mA, V_{CC} = V_O = 5.5 V	—	3	500	nA
		$I_{OH(2)}$	I_F = 0 mA, V_{CC} = V_O = 15 V	—	—	5	μA
		I_{OH}	I_F = 0 mA, V_{CC} = V_O = 15 V Ta = 70 °C	—	—	50	
	High level supply current	I_{CCH}	I_F = 0 mA, V_{CC} = 15 V	—	0.01	1	μA
Coupled	Current transfer ratio	I_O / I_F	I_F = 16 mA, V_{CC} = 4.5 V V_O = 0.4 V	20	—	—	%
	Low level output voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V I_O = 2.4 mA	—	—	0.4	V
	Isolation resistance	R_S	R.H .≤ 60 % V_S = 500 VDC (Note 1)	5×10^{10}	10^{14}	—	Ω
	Stray capacitance between input to output	C_S	V_S = 0 V, f = 1 MHz (Note 1)	—	0.8	—	pF

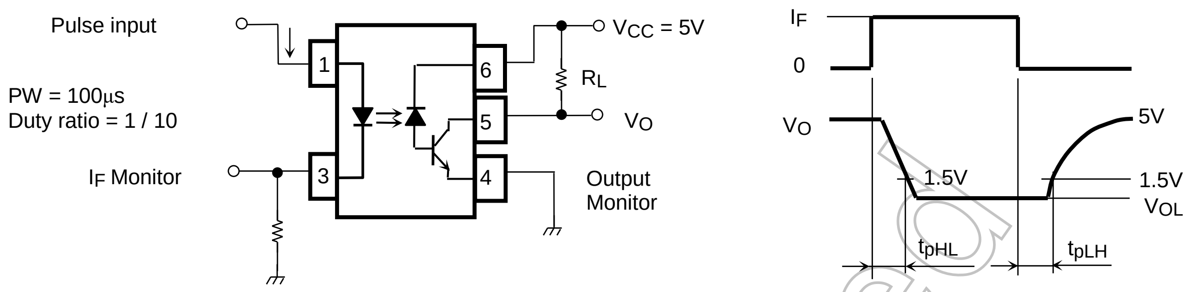
(Note 1) Device considered a two−terminal device: Pins 1 and 3 shorted together and pin 4, 5 and 6 shorted together.

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

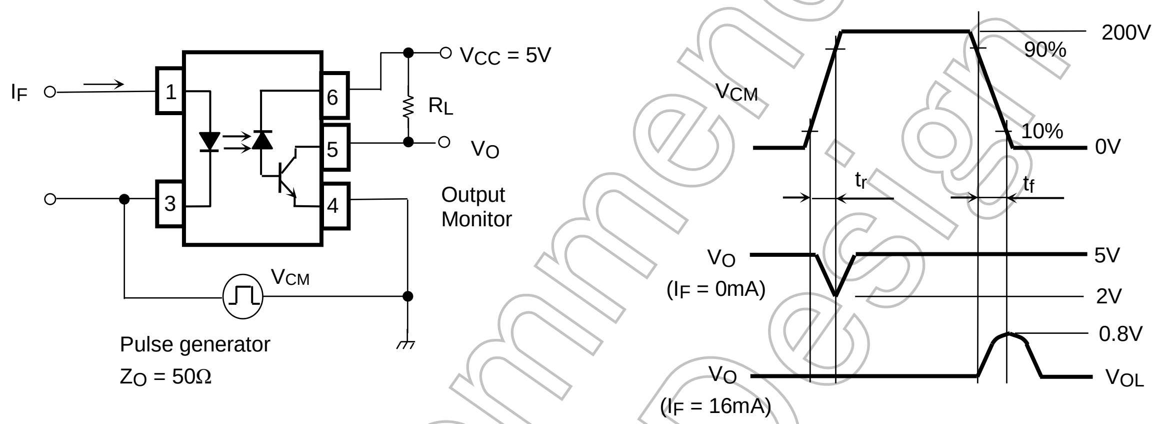
Characteristics	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	t_{pHL}	1	I_F = 0→16 mA V_{CC} = 5 V, R_L = 1.9 kΩ	—	—	0.8	μs
Propagation delay time (L→H)	t_{pLH}	1	I_F = 16→0 mA V_{CC} = 5 V, R_L = 1.9 kΩ	—	—	0.8	μs
Common mode transient imunity at high output level	CM_H (Note 2)	2	I_F = 0 mA, V_{CM} = 200 V_{p-p} R_L = 4.1 kΩ	—	1500	—	V / μs
Common mode transient imunity at low output level	CM_L (Note 2)	2	I_F = 16 mA, V_{CM} = 200 V_{p-p} R_L = 4.1 kΩ	—	−1500	—	V / μs

(Note 2) : CM_L is the maximum falling common mode voltage waveform (voltage/time) that can keep low level (V_O <0.8 V).
CM_H is the maximum rising common mode voltage waveform (voltage/time) that can keep high level (V_O> 2.0 V).

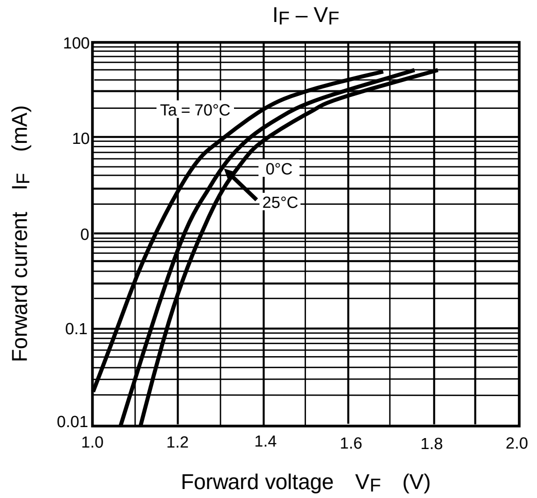
Test Circuit 1: Switching Time Test Circuit

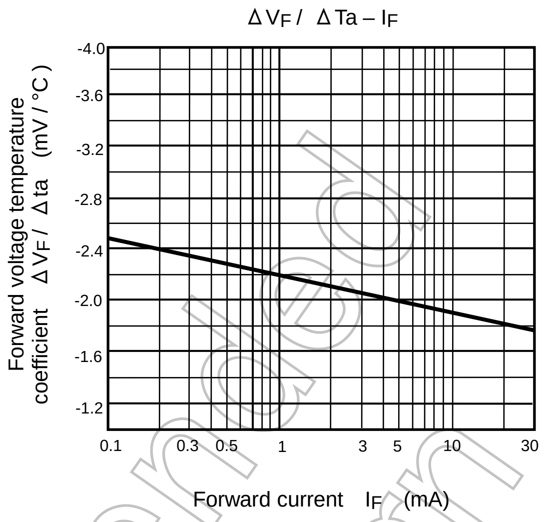


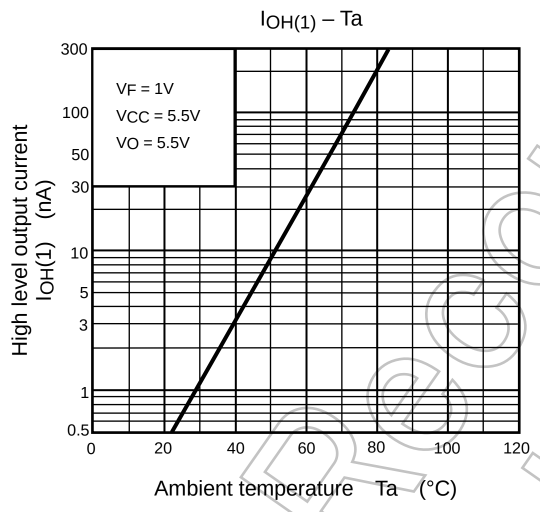
Test Circuit 2: Common Mode Transient Immunity Test Circuit

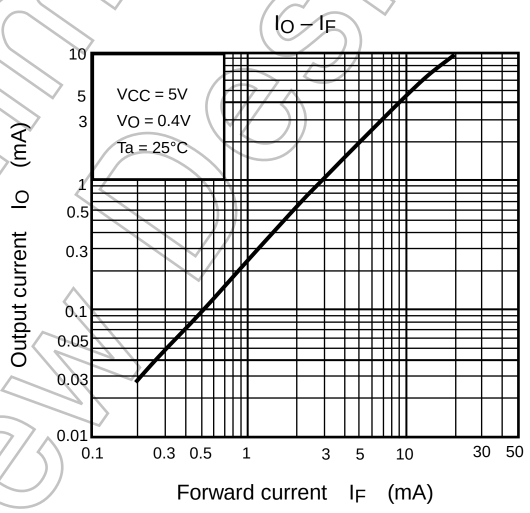


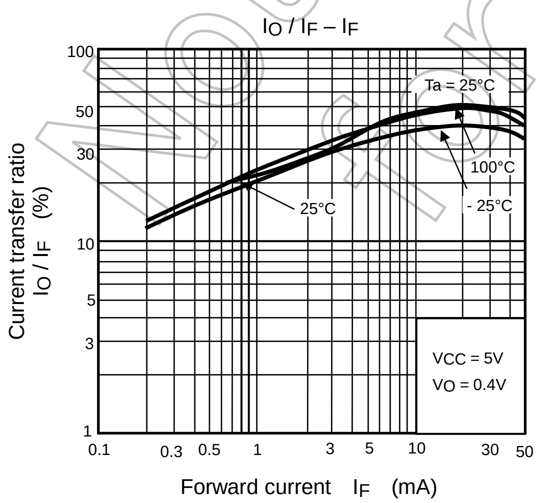
$$CM_H = \frac{160(V)}{t_r(\mu s)}, CM_L = \frac{160(V)}{t_f(\mu s)}$$

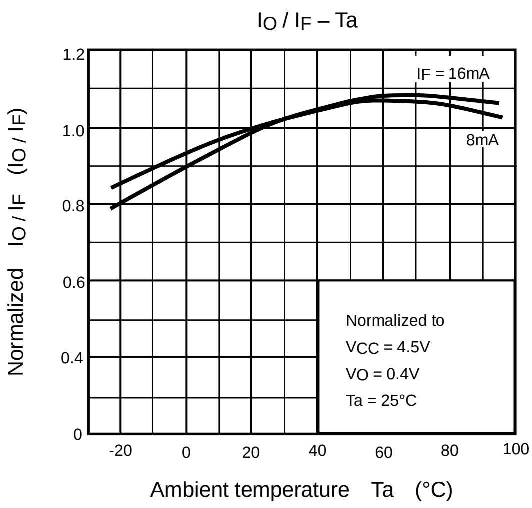




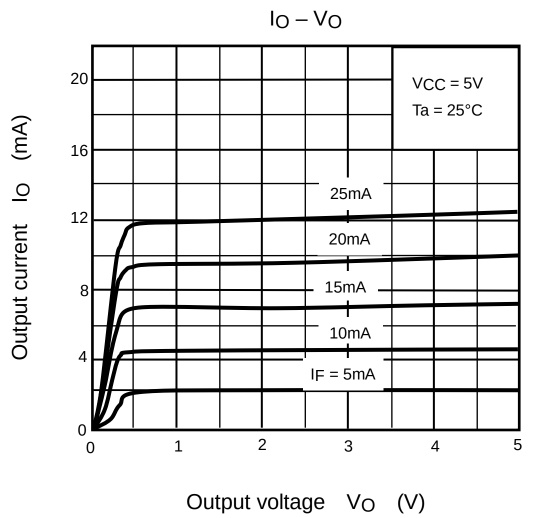


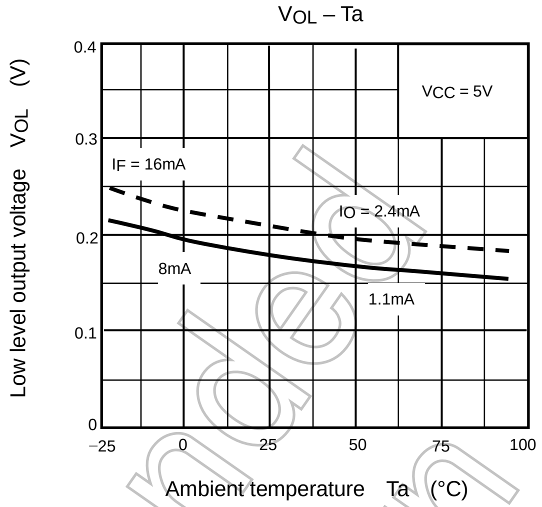


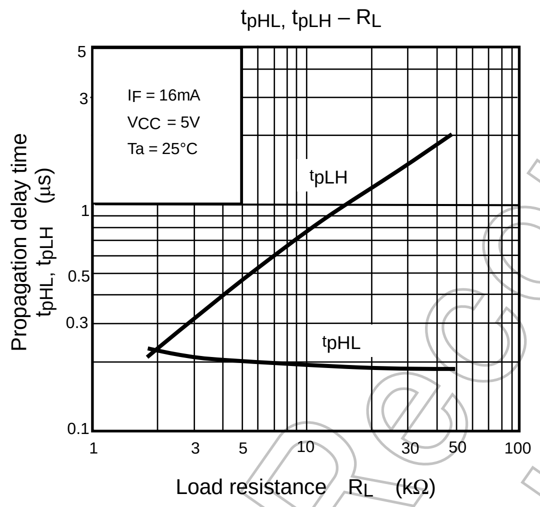


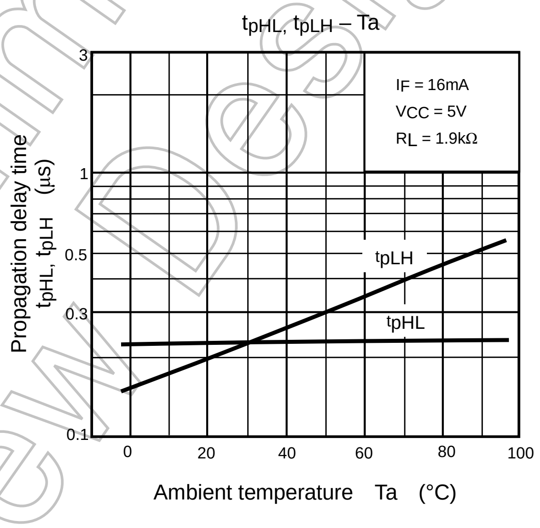


NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.









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