TOSHIBA Photocoupler IRED & Photo-IC

TLP114A

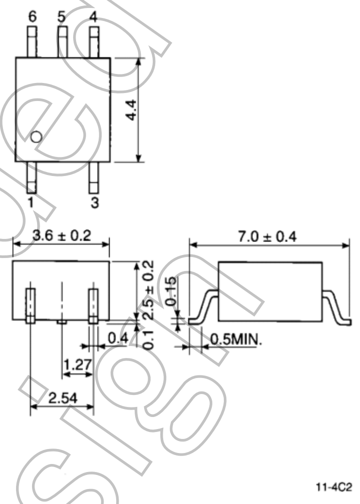
Interfaces of measuring and control instruments
High Speed Digital Logic Isolation
Line Receiver
Switching Power Supply Feedback Control
Transistor Inverter

The TOSHIBA mini flat coupler TLP114A is a small outline coupler, suitable for surface mount assembly.
TLP114A consists of a high output power infrared emitting diode, optically coupled to a high speed detector of one chip photodiode-transistor.
The TLP114A has an internal shield at receive area, which provides a high common-mode transient immunity, and have high noise immunity between input and output.
It is suitable for transistor inverter drive circuit applications such as variable speed motor control.
TLP114A : Mini Flat Package, 5Pin, one circuit.

- Isolation voltage: 3750 Vrms (min)
- Switching speed: t_{pHL} = 0.8μs, t_{pLH} = 0.8μs (max) (@R_L = 1.9 kΩ)
- TTL compatible by connecting external resistance.
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A File No.E67349
- VDE-approved: EN 60747-5-5 (Note 1)

Note 1 : When a VDE approved type is needed, please designate the **Option(V4)**.

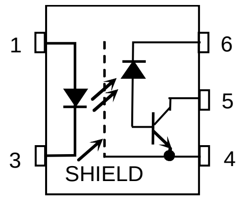
Unit : mm



JEDEC	―
JEITA	―
TOSHIBA	11−4C2

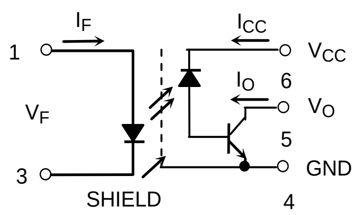
Weight: 0.09g (Typ.)

Pin Configuration (top view)



1 : ANODE
3 : CATHODE
4 : EMITTER (GND)
5 : COLLECTOR (OUTPUT)
6 : V_{CC}

Schematic



Start of commercial production
1993-04

Absolute Maximum Ratings (Ta = 25°C)

Characteristic			Symbol	Rating	Unit
LED	Forward current		I_F	20	mA
	Forward current derating	(Ta ≥ 70 °C)	Δ IF/°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
	Input power dissipation		P_D	45	mW
	Input power dissipation derating	(Ta ≥ 70 °C)	ΔPD/°C	-0.82	mW/°C
Detector	Output current		I_O	8	mA
	Output current derating	(Ta ≥ 70 °C)	Δ IO/°C	-0.3	mA/°C
	Peak output current		I_{OP}	16	mA
	Supply voltage		V_{CC}	−0.5 to 30	V
	Output voltage		V_O	−0.5 to 20	V
	Output power dissipation		P_O	100	mW
	Output power dissipation derating	(Ta ≥ 70 °C)	Po/°C	-1.8	mW/°C
Operating temperature range			T_{opr}	−55 to 100	°C
Storage temperature range			T_{stg}	−55 to 125	°C
Lead solder temperature(10 s)			T_{sol}	260	°C
Isolation Voltage (AC,60 s., R.H.≤ 60°%)		(Note 3)	BV_S	3750	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, 1 ms pulse width. Derate 0.72mA / °C above 70 °C.

(Note 2): Pulse width ≤ 1 μs, 300 pps.

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

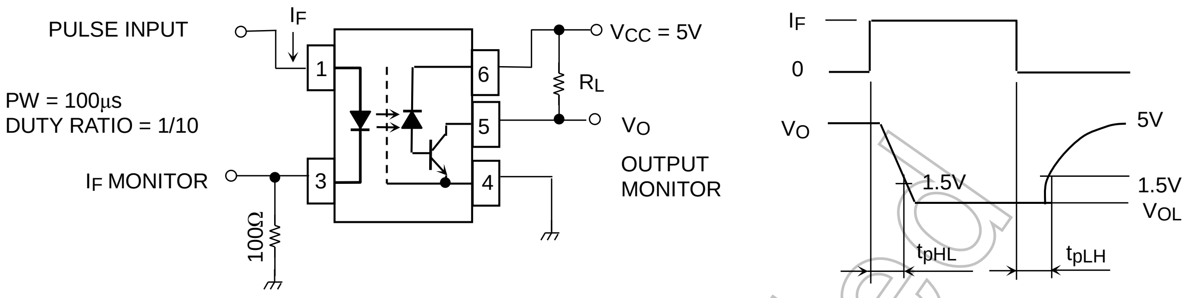
Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	I_F = 16 mA	1.22	1.42	1.72	V
LED	Forward voltage temperature coefficient	$\Delta V_F / \Delta Ta$	I_F = 16 mA	—	−2	—	mV /°C
LED	Reverse current	I_R	V_R = 3 V	—	—	10	μA
LED	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
Detector	High level output current	$I_{OH\ (2)}$	I_F = 0 mA, V_{CC} = 30 V V_O = 20 V	—	—	5	μA
Detector	High level output current	I_{OH}	I_F = 0 mA, V_{CC} = 30 V V_O = 20 V, Ta = 70 °C	—	—	50	μA
Detector	High level supply current	I_{CCH}	I_F = 0 mA, V_{CC} = 30 V	—	0.01	1	μA
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 V	5×10^{10}	10^{14}	—	Ω
Stray capacitance between input to output		C_S	V_S= 0 V, f = 1 MHz	—	0.8	—	pF
Isolation		BV_S	AC, 60 s	3750	—	—	Vrms

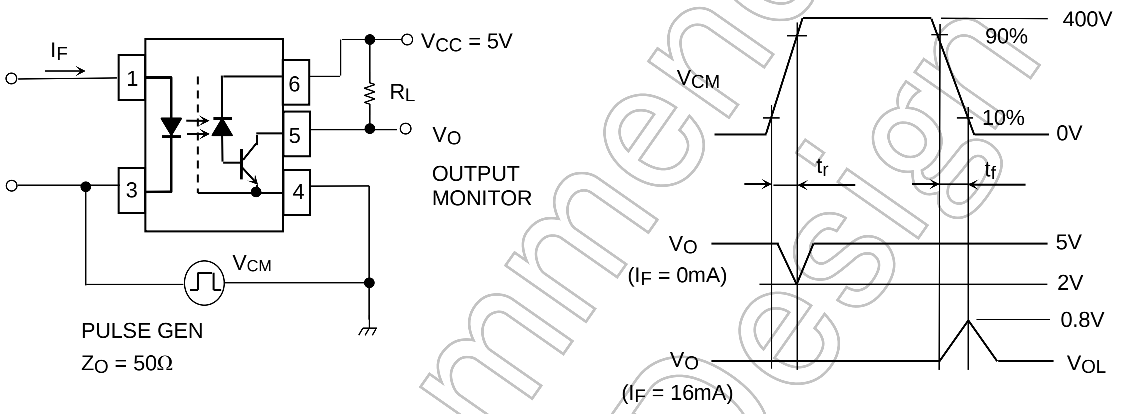
Switching Characteristics (Ta = 25°C, VCC = 5V)

Characteristic	Symbol	Test Cir–cuit	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 immunity at high output level	C_{MH}	2	I_F = 0 mA, V_{CM} = 400 V_{p-p} R_L = 4.1 kΩ	5000	10000	—	V / μs
Common mode transient immunity at low output level	C_{ML}	2	I_F = 16 mA, V_{CM} = 400 V_{p-p} R_L = 4.1 kΩ	−5000	−10000	—	V / μs

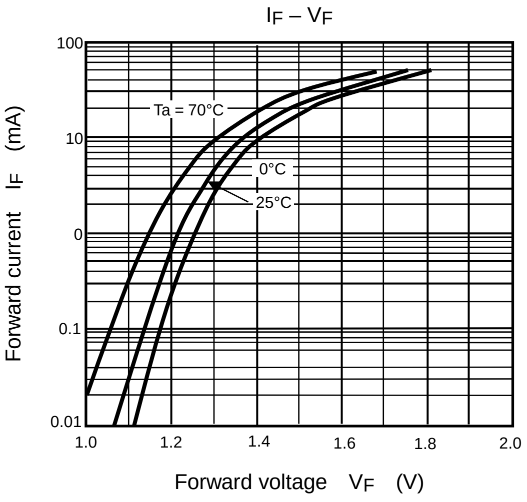
Test Circuit 1: Switching Time Test Circuit

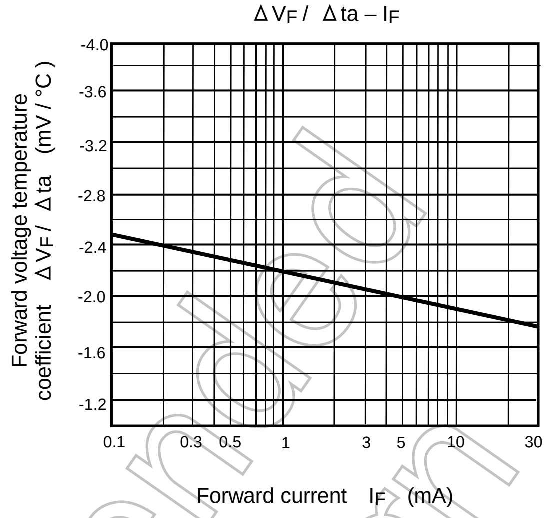


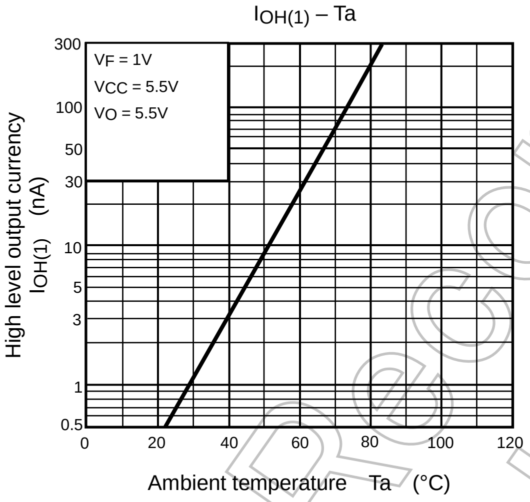
Test Circuit 2: Common Mode Transient Immunity Test Circuit

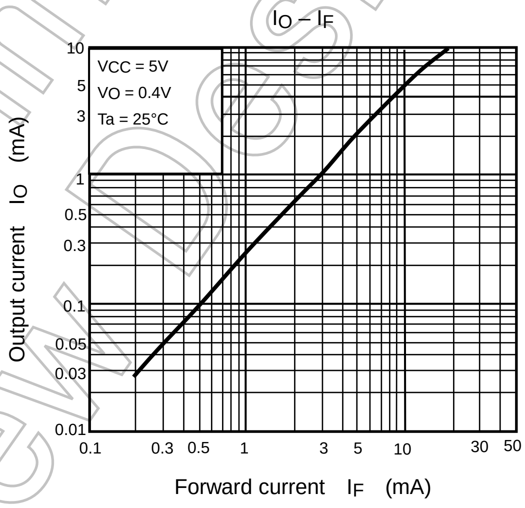


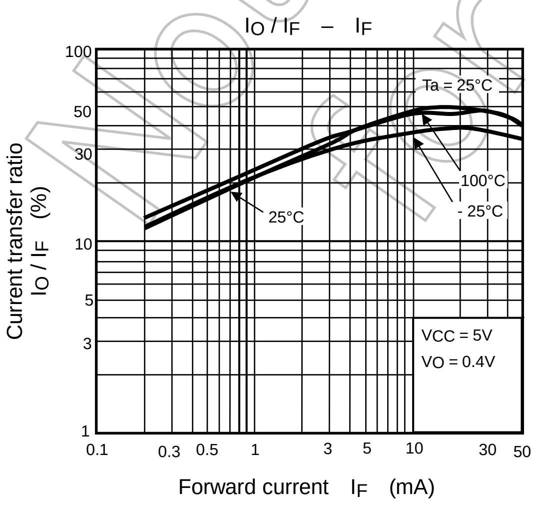
$CM_H = \frac{320(V)}{t_r(\mu s)}$, $CM_L = \frac{320(V)}{t_r(\mu s)}$

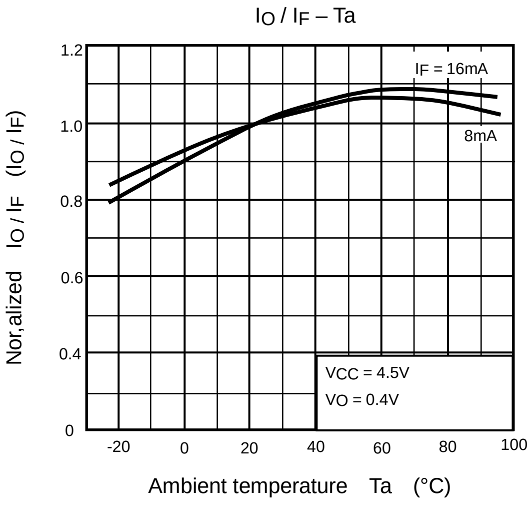






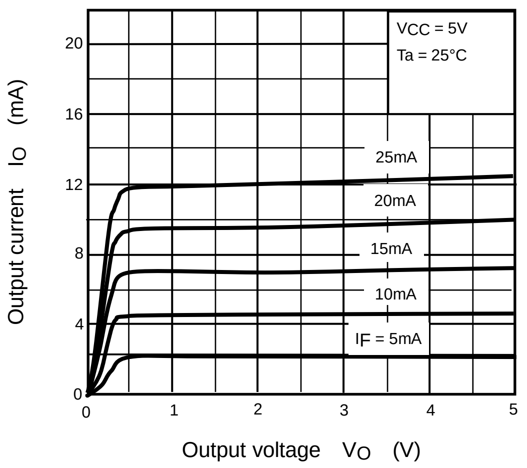




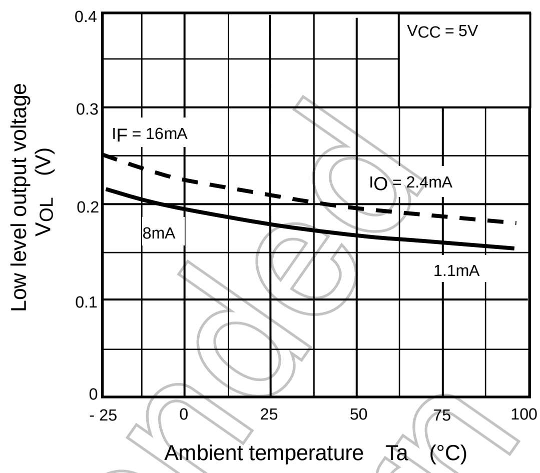


NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

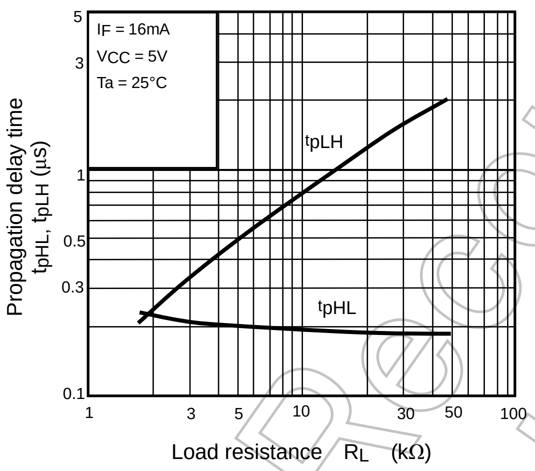
I_O – V_O



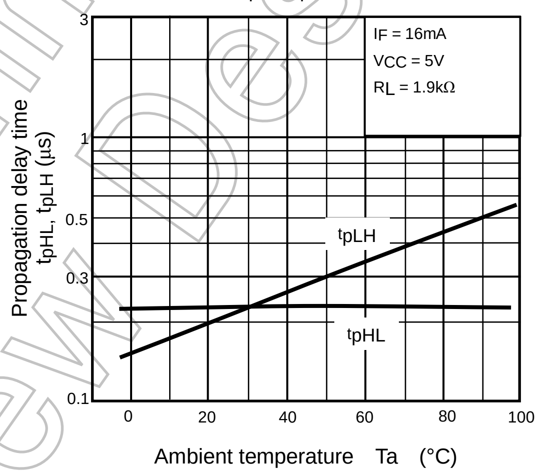
V_{OL} – Ta



t_{pHL}, t_{pLH} – R_L



t_{pHL}, t_{pLH} – Ta



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