TOSHIBA Photocoupler GaAlAs Ired & Photo-IC

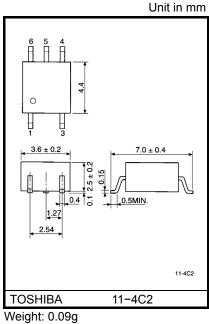
TLP114A

Digital Logic Isolation. Line Receiver. Power Supply Control Feedback Control. Switching Power Supply. Transistor Inverter.

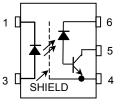
The TOSHIBA mini flat coupler TLP114A is a small outline coupler, suitable for surface mount assembly. TLP114A consists of a high output power GaAlAs light emitting diode,

optically coupled to a high speed detector of one chip photodiode-transistor.

- Isolation voltage: 3750 Vrms (min.)
- Switching speed: $t_{pHL} = 0.8\mu s$, $t_{pLH} = 0.8\mu s$ (max.) • $(R_L = 1.9 \text{ k}\Omega)$
- TTL compatible
- UL recognized: UL1577, file no. E67349

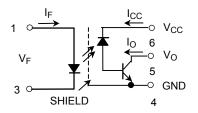


Pin Configuration (top view)



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

Schematic



Absolute Maximum Ratings (Ta = 25°C)

	Characteristic		Symbol	Rating	Unit
LDE	Forward current	(Note 1)	١ _F	20	mA
	Pulse forward current	(Note 2)	I _{FP}	40	mA
	Peak transient forward current	(Note 3)	I _{FPT}	1	А
	Reverse voltage		VR	5	V
	Output current		Ι _Ο	8	mA
ď	Peak output current		I _{OP}	16	mA
Detector	Supply voltage		V _{CC}	-0.5~30	V
ă	Output voltage		Vo	-0.5~20	V
	Output power dissipation	(Note 4)	PO	100	mW
Ope	Operating temperature range		T _{opr}	-55~100	°C
Sto	Storage temperature range		T _{stg}	-55~125	°C
Lea	Lead solder temperature(10 sec.)		T _{sol}	260	°C
	Isolation Voltage (AC,1 min., R.H.≤ 60°%) (Note		BVS	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) Derate 0.36mA / °C above 70°C.
- (Note 2) 50% duty cycle, Ims pulse width.

Derate 0.72mA / °C above 70°C.

- (Note 3) Pulse width≤ 1 μ s, 300pps.
- (Note 4) Derate 1.8mW / °C above 70°C.

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Тур.	Max.	Unit	
LDE	Forward voltage	V _F	I _F = 16mA	1.22	1.42	1.72	V	
	Forward voltage temperature coefficient	ΔV _F / ΔTa	I _F = 16mA		-2	_	mV /°C	
	Reverse current	I _R	V _R = 3V	_		10	μA	
	Capacitance between terminals	CT	V _F = 0, f = 1MHz		30	_	pF	
Detector	High level output current	I _{OH (1)}	I _F = 0mA, V _{CC} = V _O = 5.5V	_	3	500	nA	
		I _{OH (2)}	$I_F = 0mA, V_{CC} = 30V$ $V_O = 20V$	_	_	5	μA	
		I _{OH}	I_F = 0mA, V _{CC} = 30V V _O = 20V, Ta = 70°C	_	_	50		
	High level supply current	Іссн	I _F = 0mA, V _{CC} = 30V	_	0.01	1	μA	
Coupled	Current transfer ratio	I _O / I _F	I _F = 16mA, V _{CC} = 4.5V V _O = 0.4V	20	_	_	%	
	Low level output voltage	V _{OL}	I _F = 16mA, V _{CC} = 4.5V I _O = 2.4 mA	_		0.4	V	
	Isolation resistance	R _S	R.H.≤ 60%, V _S = 500V (Note 5)	5×10 ¹⁰	10 ¹⁴	_	Ω	
	Stray capacitance between input to output	CS	V _S = 0, f = 1MHz (Note 5)	_	0.8	_	pF	

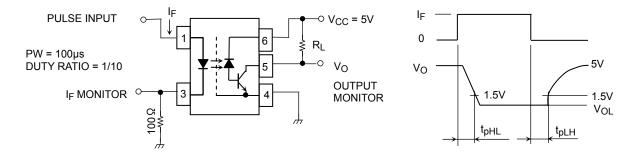
Switching Characteristics (Ta = 25°C, VCC = 5V)

Characteristic	Symbol	Test Cir– cuit	Test Condition	Min.	Тур.	Max.	Unit
Propagation delay time $(H \rightarrow L)$	t _{pHL}	1	$I_F = 0 → 16mA$ V _{CC} = 5V, R _L = 1.9kΩ	_	_	0.8	μs
Propagation delay time $(L \rightarrow H)$	t _{pLH}	1	IF = 16→ 0mA V _{CC} = 5V, R _L = 1.9kΩ	_	_	0.8	μs
Common mode transient immunity at high output level	C _{MH}	2	$I_F = 0mA,$ V _{CM} = 400V _{p-p} R _L = 4.1kΩ	5000	10000	_	V / µs
Common mode transient immunity at low output level	C _{ML}	2	$I_{F} = 16mA,$ $V_{CM} = 400V_{p-p}$ $R_{L} = 4.1k\Omega$	-5000	-10000	_	V / µs

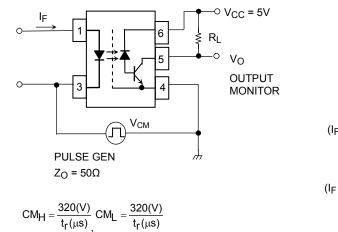
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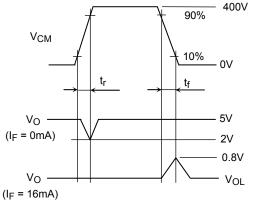
- (Note 5) Device considered a two-terminal device: Pins 1 and 3 shorted together, and pins 4, 5 and 6 shorted together.
- (Note 6) Maximum electrostatic discharge voltage for any pins: 100V(C=200pF, R=0)

Test Circuit 1: Switching Time Test Circuit

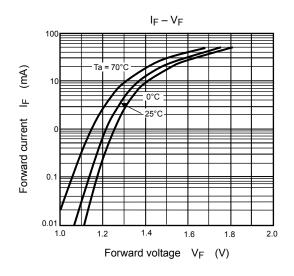


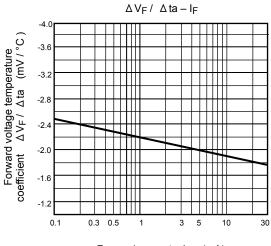
Test Circuit =2: Common Mode Transient Immunity Test Circuit



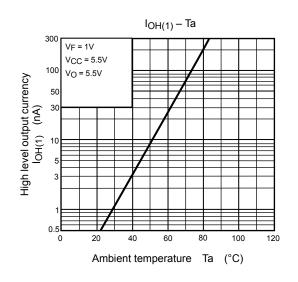


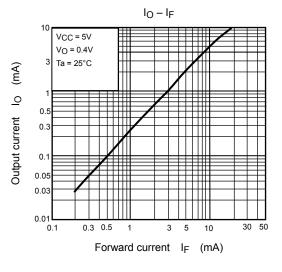
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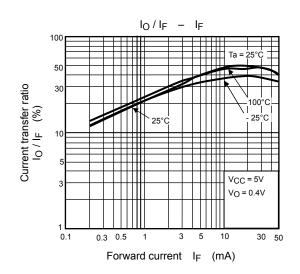




Forward current IF (mA)

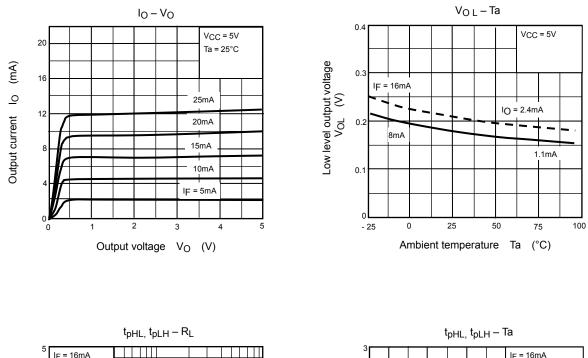


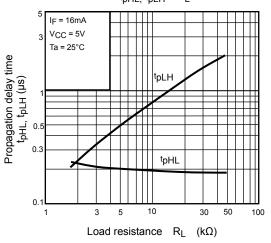


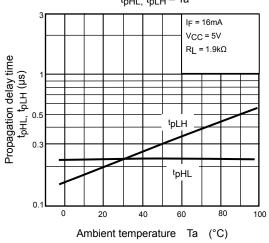


I_O / I_F – Ta 1.2 IF = 16mA Nor,alized Io / IF (Io / IF) 1.0 8mA 0.8 Normalized to V_{CC} = 4.5V VO = 0.4V 0.6 Ta = 25°C 0.4 0 -20 80 100 0 20 40 60 Ambient temperature Ta (°C)

TOSHIBA







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20070701-EN

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