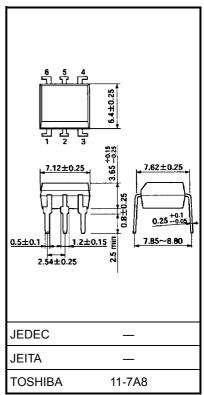
TOSHIBA Photocoupler GaAlAs IRED + Photo IC

TLP512

Digital Logic Ground Isolation Line Receiver Microprocessor System Interfaces Switching Power Supply Feedback Control Transistor Inverter

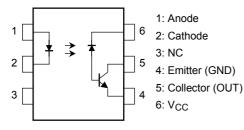
The TLP512 consists of a GaAlAs high-output light emitting diode and a high-speed detector that contains a PN photodiode and an amplifier transistor into a single chip.

- Isolation voltage: 2500 Vrms (min)
- Switching speed: t_{pHL} = 0.8 $\mu s,$ t_{pLH} = 0.8 μs (max) $@R_L = 1.9 \ k\Omega$
- TTL compatible
- UL recognized: UL1577, file No. E67349

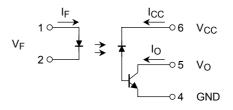


Weight: 0.4 g (typ.)

Pin Configuration (top view)



Schematic



Maximum Ratings (Ta = 25°C)

	Characteristics	Symbol	Rating	Unit	
LED	DC forward current	(Note 1)	١ _F	25	mA
	Pulse forward current	(Note 2)	I _{FP}	50	mA
	Peak transient forward current	(Note 3)	I _{FPT}	1	А
	DC reverse voltage		V _R	5	V
	Diode power dissipation	(Note 4)	PD	45	mW
Detector	Output current		Ι _Ο	8	mA
	Peak output current		I _{OP}	16	mA
	Output voltage		Vo	–0.5 to 15	V
ð	Supply voltage		V _{CC}	–0.5 to 15	V
	Output power dissipation	(Note 5)	Po	100	mW
Oper	Operating temperature range			-55 to 100	°C
Storage temperature range			T _{stg}	-55 to 125	°C
Sold	Soldering temperature (10 s) (Note 6)			260	°C
Isola	Isolation voltage (R.H. \leq 60%, AC 1 min) (Note 7)			2500	Vrms

Note 1: Decreases at the rate of 0.8 mA/°C with the ambient temperature of 70°C or higher.

- Note 3: Pulse width \leq 1 μ s, 300 pps
- Note 4: Decreases at the rate of 0.9 mW/°C with the ambient temperature of 70°C or higher.
- Note 5: Decreases at the rate of 2 mW/°C with the ambient temperature of 70°C or higher.
- Note 6: Soldering is performed 2 mm from the bottom of the package.
- Note 7: Device considered a two-terminal device: pins 1, 2, and 3 shorted together and pins 4, 5 and 6 shorted together.

Note 2: Duty cycle of 50%, pulse width of 1 ms. Decreases at the rate of 1.6 mA/°C with the ambient temperature of 70°C or higher.

Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
LED	Forward voltage	V _F	I _F = 16 mA	_	1.65	1.85	V
	Forward voltage temperature coefficient	∆V _F /∆Ta	I _F = 16 mA	_	-2	_	mV/°C
	Reverse current	I _R	$V_R = 5 V$	_	_	10	μA
	Pin-to-pin capacitance	CT	$V_F = 0, f = 1 MHz$	_	4.5	_	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	
		I _{OH}	$I_F = 0 \text{ mA}, V_{CC} = V_O = 15 \text{ V}$ $Ta = 70^{\circ}\text{C}$		_	50	μA
	High-level supply current	Іссн	I _F = 0 mA, V _{CC} = 15 V	_	0.01	1	μA

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Current transfer ratio	I _O /I _F	$ I_F = 16 \text{ mA}, \text{ V}_{CC} = 4.5 \text{ V} \\ V_O = 0.4 \text{ V} $	20	40	_	- %
		$ I_F = 16 \text{ mA}, V_{CC} = 4.5 \text{ V} \\ V_O = 0.4 \text{ V}, \text{ Ta} = 0 \text{ to } 70^\circ\text{C} $	15	_	_	
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 Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Capacitance input to output	CS	$V_S = 0, f = 1 \text{ MHz}$ (Note 7)	—	0.8		pF
Isolation resistance	R _S	$\label{eq:R.H.} R.H. \leq 60\%, V_S = 500 \; V \qquad (\text{Note 7})$	5 × 10 ¹⁰	10 ¹⁴	_	Ω
		AC 1 min	2500	_	_	Vrms
Isolation voltage	BVS	AC 1 s, in oil	_	5000	_	
		DC 1 min, in oil	—	5000	_	V _{dc}

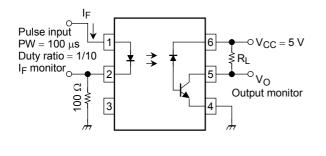
Switching Characteristics (Ta = 25°C)

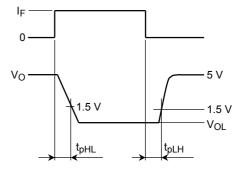
Characteristics	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Propagation delay time (H \rightarrow L)	t _{pHL}	1	I_F = 0 \rightarrow 16 mA, RL = 1.9 k Ω	_	—	0.8	μS
Propagation delay time (L \rightarrow H)	t _{pLH}] '	I_F = 16 \rightarrow 0 mA, RL = 1.9 k Ω	_	_	0.8	μS
Common mode transient immunity at logic high output (Note 8)	CM _H	2	I_F = 0 mA, V_{CM} = 200 V_{P-P} R_L = 1.9 $k\Omega$	_	1500	_	V/µs
Common mode transient immunity at logic low output (Note 8)	CML		I_F = 16 mA, V_{CM} = 200 V_{P-P} R_L = 1.9 $k\Omega$	_	-1500		V/µs

Note 8: Common mode transient immunity in logic high level is the maximum tolerable (positive) dV_{CM}/dt on the leading edge of the common mode pulse, V_{CM} , to assure that the output will remain in a logic high state ($V_{OUT} > 2.0 V$).

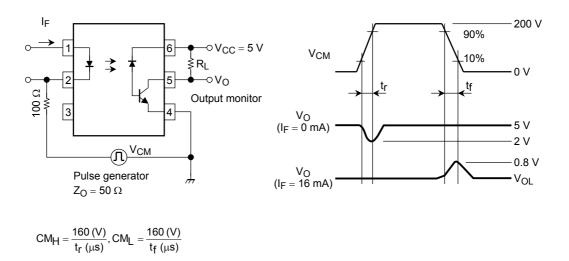
Common mode transient immunity in logic low level is the maximum tolerable (negative) dV_{CM}/dt on the trailing edge of the common mode pulse, V_{CM} , to assure that the output will remain in a logic low state ($V_{OUT} < 0.8 \text{ V}$).

Test Circuit 1: Switching Time Test Circuit



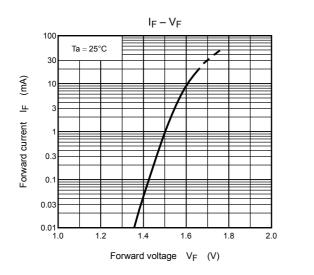


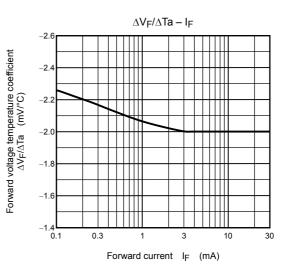
Test Circuit 2: Common Mode Noise Immunity Test Circuit

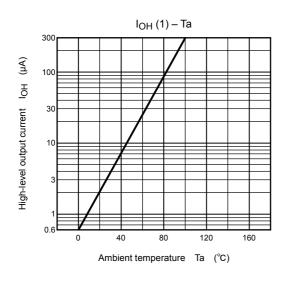


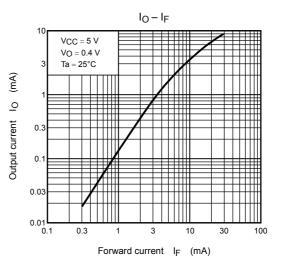
Note 9: Electrostatic discharge immunity (pin to pin): 100 V (max) $(C \le 200 \text{ pF}, \text{ R} = 0)$

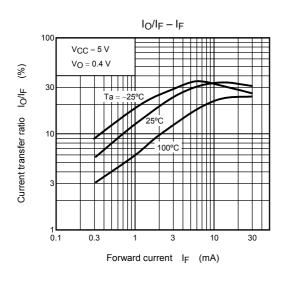
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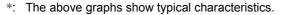


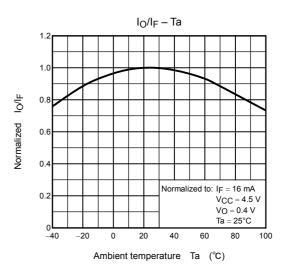




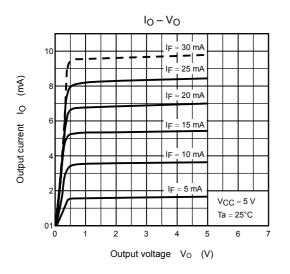


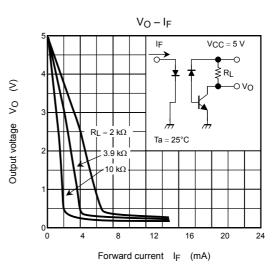


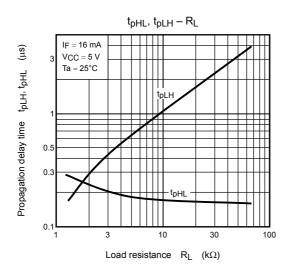




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*: The above graphs show typical characteristics.

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