

TLP112

Interfaces of measuring and control instruments

Digital Logic Isolation

Line Receiver

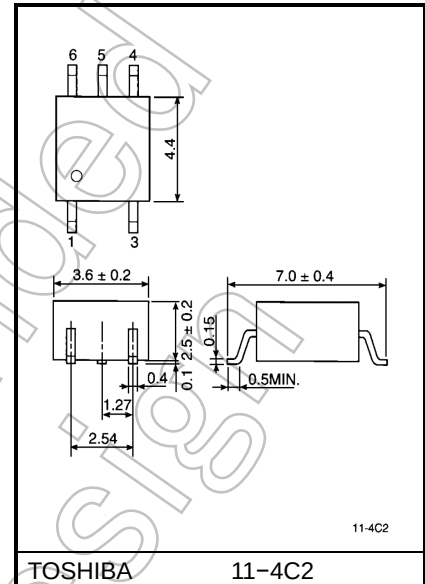
Switching Power Supply Feedback Control

Industrial Inverter

The TOSHIBA mini flat coupler TLP112 is a small outline coupler, suitable for surface mount assembly. TLP112 consists of an infrared emitting diode, optically coupled to a high speed detector of one chip photodiode-transistor.

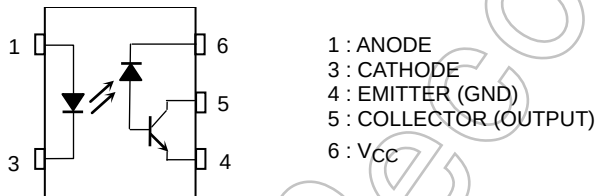
- Isolation voltage: 2500 Vrms (min)
- Switching speed: $t_{pHL} = 0.8\mu s$, $t_{pLH} = 2\mu s(\max)$
($R_L = 4.1 k\Omega$)
- TTL compatible by connecting external resistance
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
File No.E67349

Unit : mm

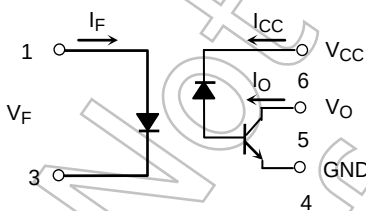


Weight: 0.09 g (typ.)

Pin Configuration (top view)



Schematic



Start of commercial production
1989-03

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	I _F	25	mA
	Forward Current Derating (Ta ≥ 70 °C)	Δ I _F /°C	-0.8	mA/°C
	Pulse forward current (Note 1)	I _{FP}	50	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)	Δ P _O /°C	-2	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 %)		BV _S	2500	V _{rms}

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 1.6mA / °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	$I_F = 16 \text{ mA}$	—	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	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	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}	$I_F = 0 \text{ mA}, V_{CC} = V_O = 15 \text{ V}$ $T_a = 70 \text{ °C}$	—	—	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. ≤ 60 % $V_S = 500 \text{ V}$ (Note 1)	5×10^{10}	10^{14}	—	Ω
	Stray capacitance between input to output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$ (Note 1)	—	0.8	—	pF

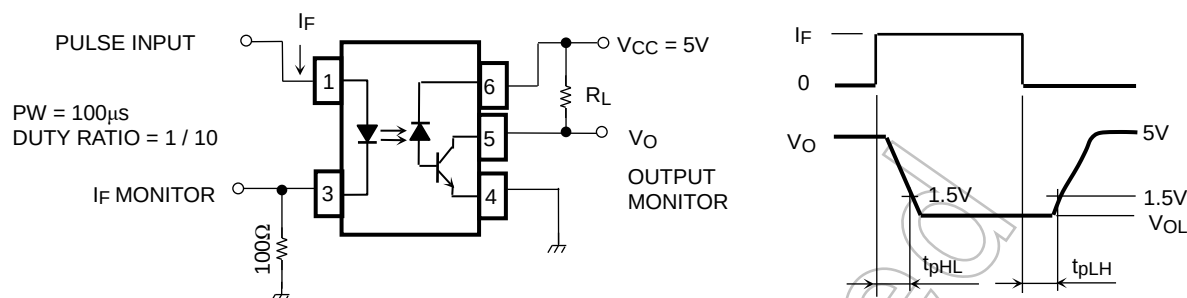
Note 1: Device considered a two-terminal device; Pins 1 and 3 shorted together and Pin 4, 5 and 6 shorted together.

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

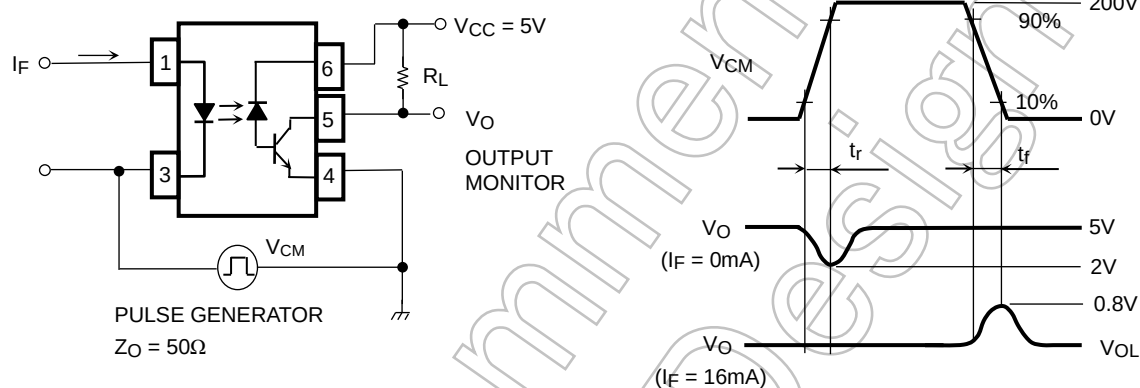
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Propagation delay time (H→L)	t_{pHL}	1	$I_F = 0 \rightarrow 16 \text{ mA}$ $V_{CC} = 5 \text{ V}, R_L = 4.1 \text{ k}\Omega$	—	—	0.8	μs
Propagation delay time (L→H)	t_{pLH}	1	$I_F = 16 \rightarrow 0 \text{ mA}$ $V_{CC} = 5 \text{ V}, R_L = 4.1 \text{ k}\Omega$	—	—	2.0	μs
Common mode transient immunity at high output level (Note2)	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 (Note2)	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 2 : CM_L is the maximum falling common mode voltage waveform (voltage/time) that can keep low level ($V_O < 0.8 \text{ V}$).
 CM_H is the maximum rising common mode voltage waveform (voltage/time) that can keep high level ($V_O > 2.0 \text{ V}$)

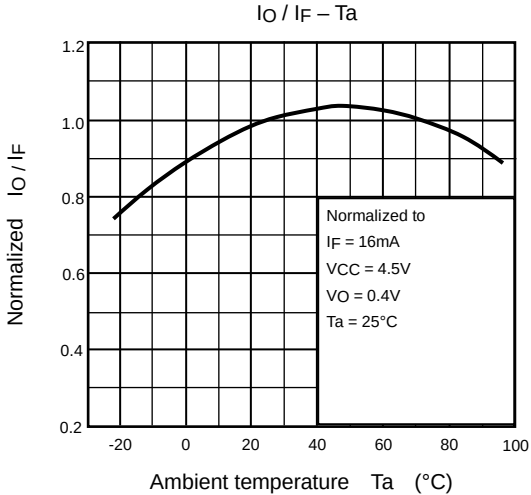
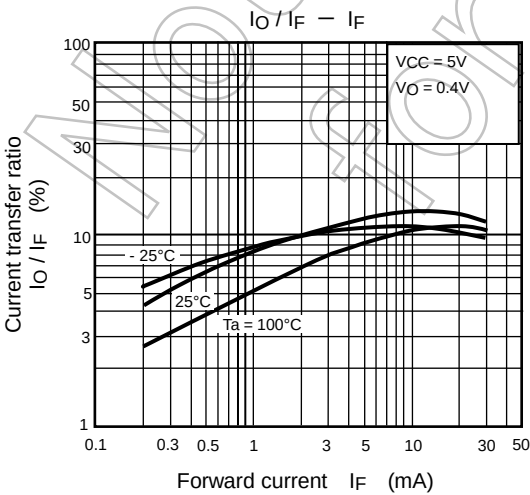
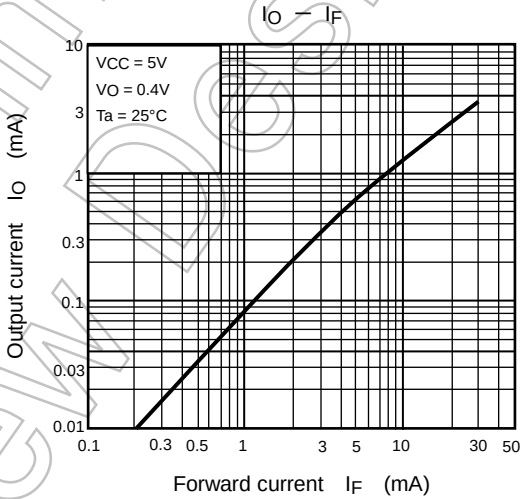
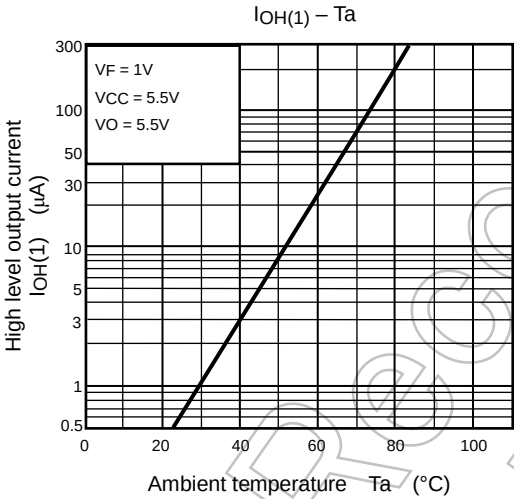
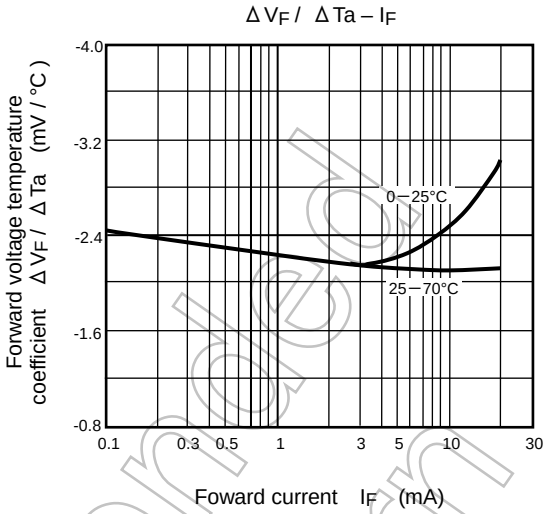
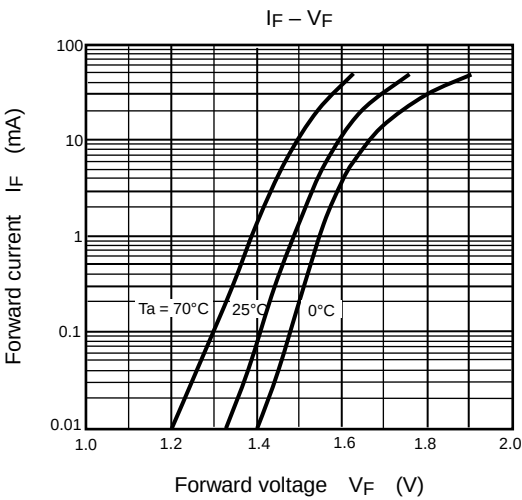
Test Circuit 1: Switching Time Test Circuit



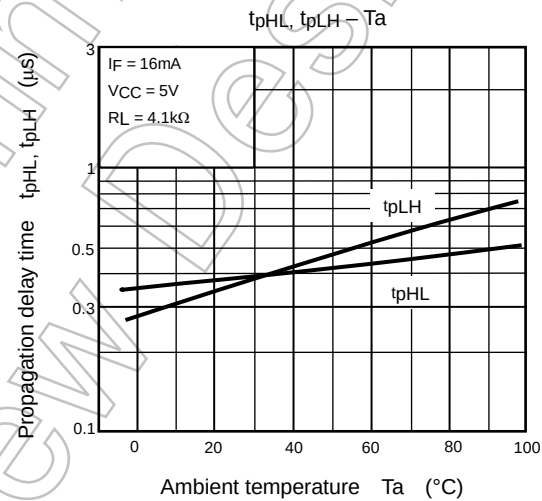
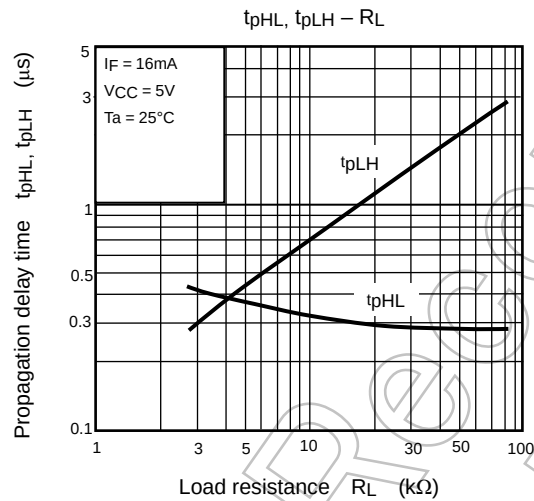
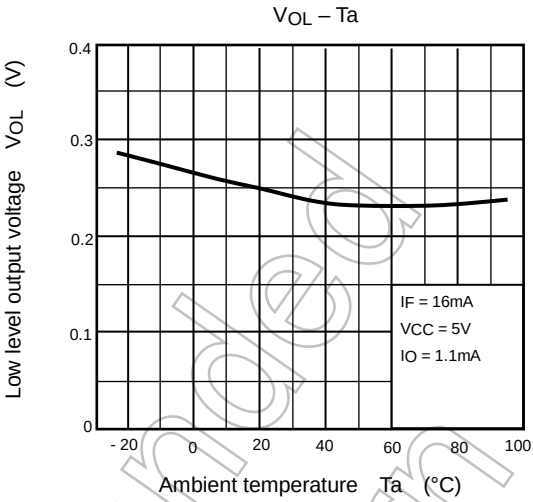
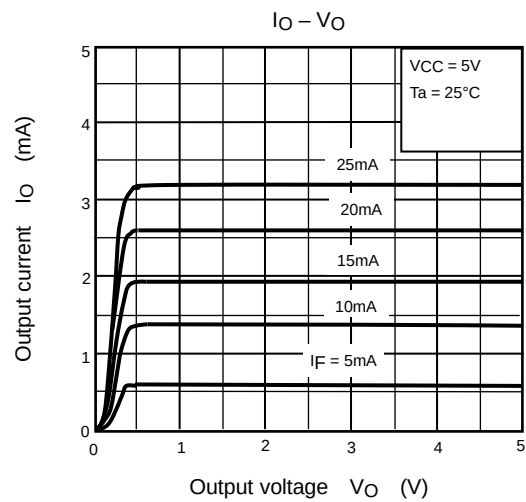
Test Circuit 2: Common Mode Transient Immunity Test Circuit



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



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



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