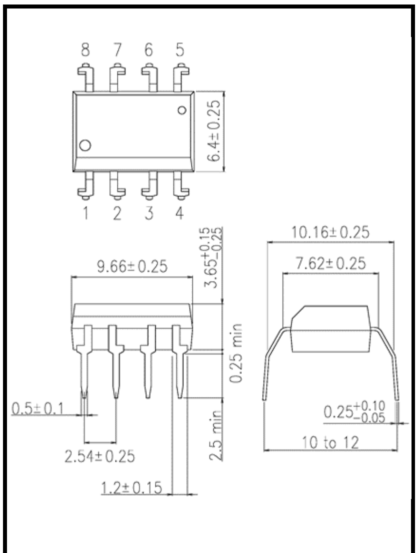
TOSHIBA Photocoupler IRED+Photo−IC

TLP759F

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

Unit: mm



TOSHIBA 11−10C402S

Weight: 0.54 g (typ.)

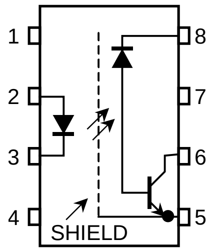
The TOSHIBA TLP759F consists of a high−output infrared emitting diode and a high speed detector of one chip photo diode−transistor. This unit is 8-lead DIP.
TLP759F has no internal base connection, and a Faraday shield integrated on the photodetector chip provides an effective common mode noise transient immunity.
So this is suitable for application in noisy environmental condition.

- Isolation voltage: 5000 Vrms (min)
- Switching speed: t_{pHL} = 0.2μs (typ.)
  t_{pLH} = 0.3μs (typ.) (R_L=1.9 kΩ)
- TTL compatible
- 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 (D4)**.

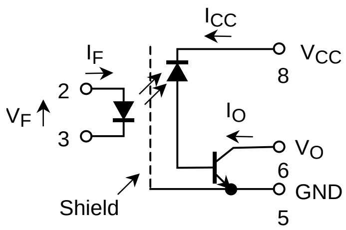
- Mechanical Parameters
  Creepage distance: 8.0 mm (min)
  Clearance: 8.0 mm (min)
  Insulation thickness: 0.4 mm (min)

Pin Configuration (top view)



1: N.C.
2: Anode
3: Cathode
4: N.C.
5: Emitter(gnd)
6: Collector(output)
7: N.C.
8: Vcc

Schematic



Start of commercial production
1995-08

Absolute Maximum Ratings (Ta = 25°C)

	Characteristic		Symbol	Rating	Unit
LED	Forward current		I_F	25	mA
	Forward current derating (Ta ≥70°C)		IF / Ta	-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
	Output voltage		V_O	−0.5 to 20	V
	Supply voltage		V_{CC}	−0.5 to 30	V
	Output power dissipation		P_O	100	mW
	Output power dissipation derating (Ta ≥70°C)		Po / Ta	-2	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)		(Note 4)	T_{sol}	260	°C
Isolation voltage (AC, 60 s, R.H. ≤ 60 %)		(Note 5)	BV_S	5000	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 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) Soldering portion of lead: Up to 2 mm from the body of the device.

(Note 5) Device considered a two terminal device: Pins 1, 2, 3 and 4 shorted together and pins 5, 6, 7 and 8 shorted together.

Electrical Characteristics (Ta = 25°C)

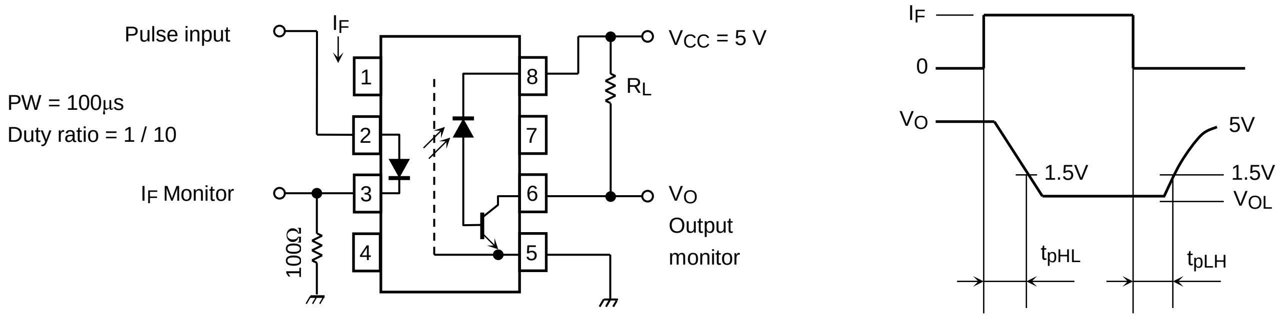
	Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
LDE	Forward voltage	V_F	I_F = 16 mA	—	1.65	1.85	V
	Forward voltage temperature coefficient	$\Delta V_F / \Delta Ta$	I_F = 16 mA	—	−2	—	mV /°C
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance between terminals	C_T	V = 0 V, f = 1 MHz	—	45	—	pF
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} = 30 V, V_O = 20 V	—	—	5	μA
		I_{OH}	I_F = 0 mA, V_{CC} = 30 V, V_O = 20 V Ta = 70 °C	—	—	50	
	High level supply voltage	I_{CCH}	I_F = 0 mA, V_{CC} = 30 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	40	—	%
	Low level output voltage	V_{OL}	I_F = 16 mA, V_{CC} = 4.5 V I_O = 2.4 mA	—	—	0.4	V
	Resistance (input−output)	R_S	R.H.≤ 60 %, V_S = 500 V (Note 5)	1×10^{12}	10^{14}	—	Ω
	Capacitance (input−output)	C_S	V_S = 0 V, f = 1 MHz (Note 5)	—	0.8	—	pF
	Isolation voltage	BV_S	AC, 60 s (Note 5)	5000	—	—	Vrms

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

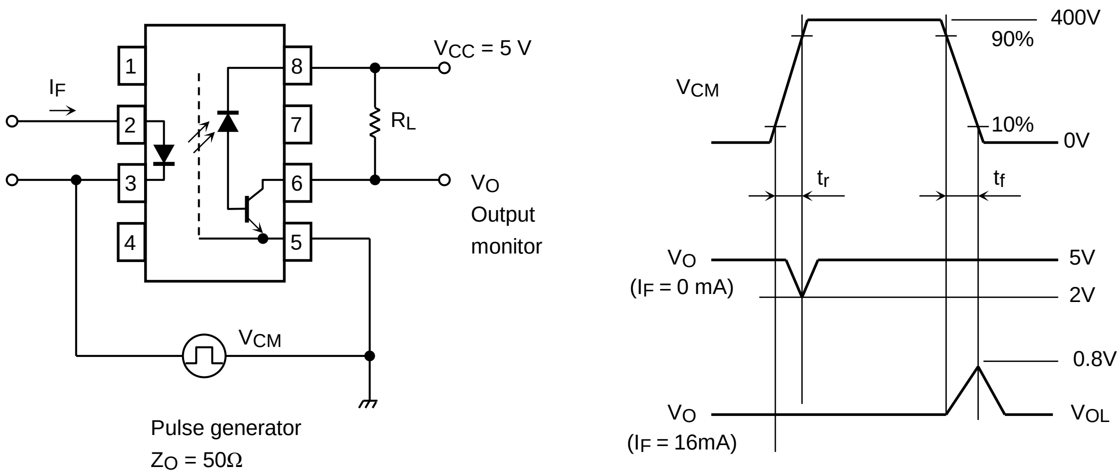
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Propagation delay time (H→ L)	t_{pHL}	1	I_F = 0→ 16 mA, R_L = 1.9 kΩ	—	0.2	0.8	μs
Propagation delay time (L→ H)	t_{pLH}		I_F = 16→ 0 mA, RL = 1.9 kΩ	—	0.3	0.8	μs
Common mode transient immunity at logic high output (Note 1)	CM_H	2	I_F = 0 mA, V_{CM} = 400 V_{p-p} R_L = 4.1 kΩ	5000	10000	—	V / μs
Common mode transient immunity at logic low output (Note 1)	CM_L		I_F = 16 mA, V_{CM} = 400 V_{p-p} R_L = 4.1 kΩ	−5000	−10000	—	V / μs

(Note 1) CM_L is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state (V_O < 0.8 V).
CM_H is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state (V_O > 2.0 V).

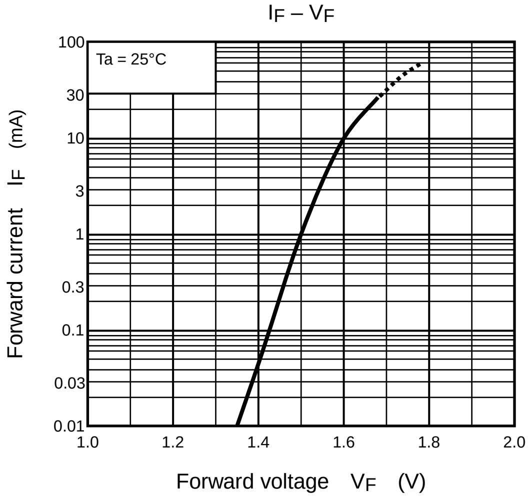
Test Circuit 1: Switching Time Test Circuit

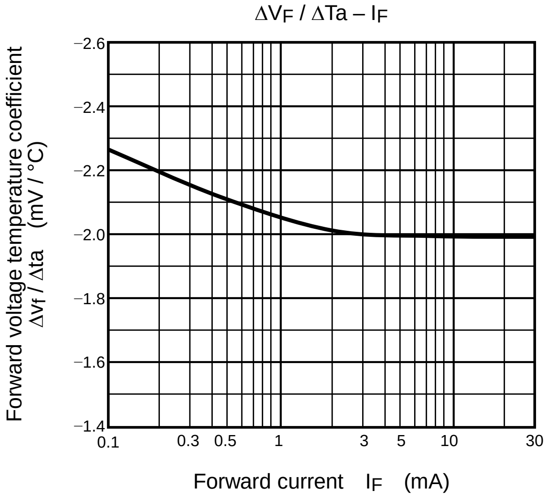


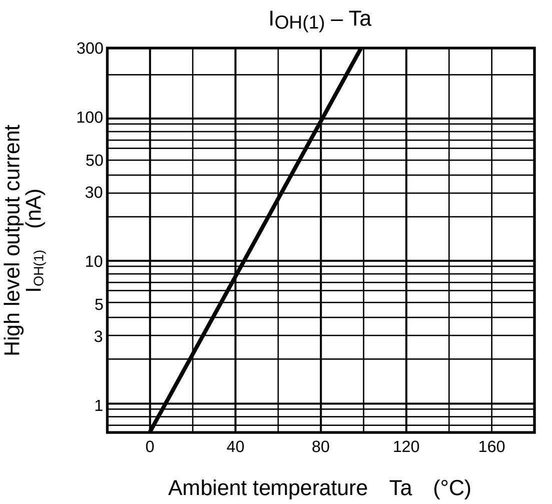
Test Circuit 2: Common Mode Noise Immunity Test Circuit

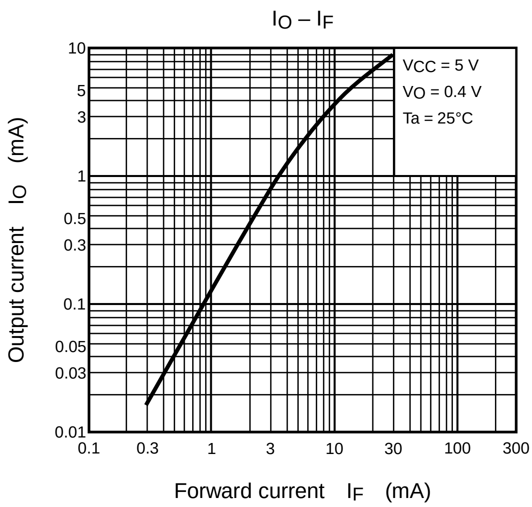


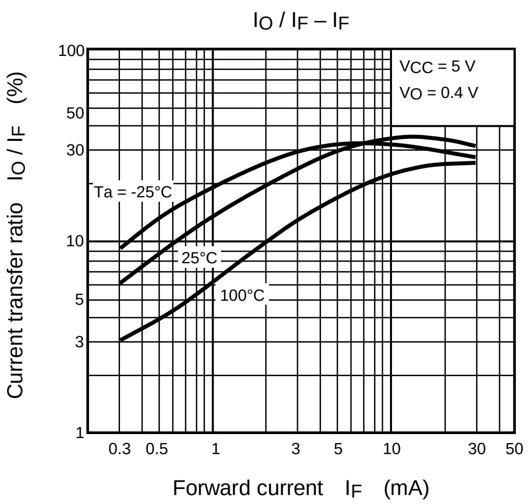
$$CM_H = \frac{320\ (V)}{t_r\ (\mu s)},\ CM_L = \frac{320\ (V)}{t_f\ (\mu s)}$$

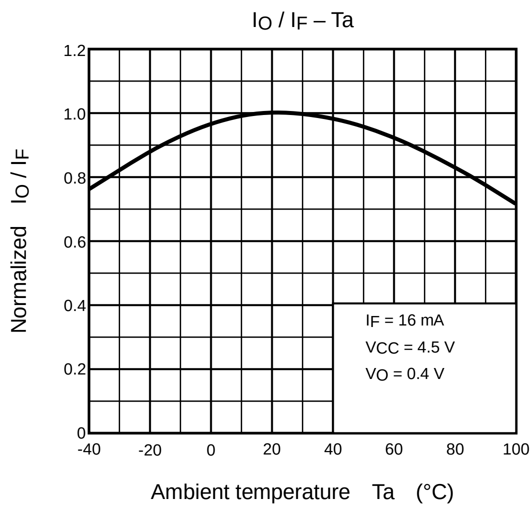




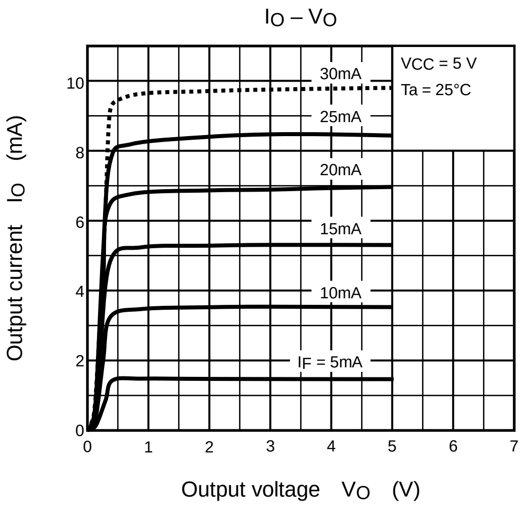


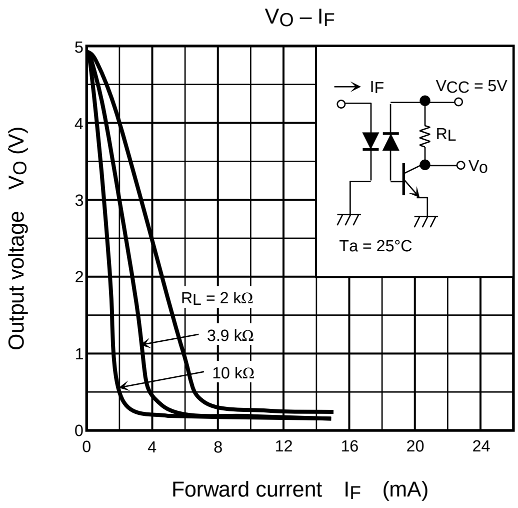


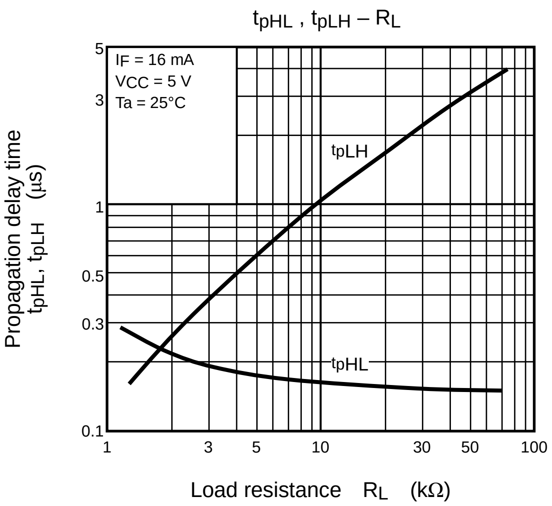




NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.







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