

# TLP3902

SOLID STATE RELAY  
PROGRAMMABLE CONTROLLERS  
MOSFET GATE DRIVER

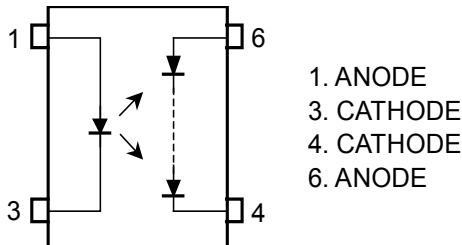
The TOSHIBA mini flat coupler TLP3902 is a small outline coupler, suitable for surface mount assembly.

The TLP3902 consists of an infrared emitting diode, optically coupled to a series connected photo diode array which is suitable for MOS FET gate drive.

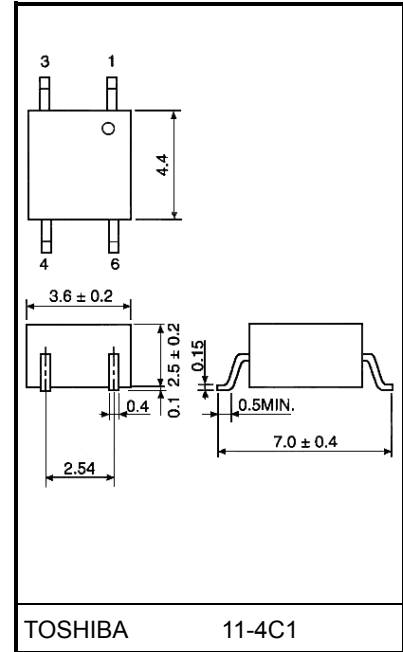
## Features

- Open Voltage : 7 V (min)
- Short Current : 5  $\mu$ A (min)
- Isolation Voltage : 2500 Vrms (min)
- UL-recognized : UL 1577, File No.E67349
- cUL-recognized : CSA Component Acceptance Service No.5A  
File No.E67349

## Pin Configuration (top view)



Unit: mm



Weight: 0.09 g (typ.)

Start of commercial production  
2006-06

## Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward Current	$I_F$	50	mA
	Forward Current Derating (Ta ≥ 25°C)	$\Delta I_F / ^\circ\text{C}$	-0.5	mA / °C
	Reverse Voltage	$V_R$	5	V
	Diode power dissipation	$P_D$	100	mW
	Diode power dissipation derating (Ta ≥ 25°C)	$\Delta P_D / ^\circ\text{C}$	-1.0	mW/°C
	Junction Temperature	$T_j$	125	°C
DETECTOR	Forward Current	$I_{FD}$	50	μA
	Reverse Voltage	$V_{RD}$	10	V
	Output power dissipation	$P_O$	0.5	mW
	Junction Temperature	$T_j$	125	°C
Storage Temperature Range		$T_{stg}$	-55 to 125	°C
Operating Temperature Range		$T_{opr}$	-40 to 85	°C
Lead Soldering Temperature (10 s)		$T_{sol}$	260	°C
Isolation Voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1)		$BV_S$	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: Device considered a two terminal device: Pins 1 and 3 shorted together and pins 4 and 6 shorted together.

## Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Forward Current	$I_F$	7	—	20	mA
Operating Temperature	$T_{opr}$	-25	—	65	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

## Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward Voltage	$V_F$	$I_F = 10 \text{ mA}$	1.10	1.15	1.3	V
	Reverse Current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	$C_T$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
DETECTOR	Forward Voltage	$V_{FD}$	$I_{FD} = 10 \text{ μA}$	—	9.6	—	V
	Reverse Current	$I_{RD}$	$V_{RD} = 10 \text{ V}$	—	1	—	nA
	Capacitance (Anode to Cathode)	$C_{TD}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	8	—	pF

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Open-Circuit Voltage	V <sub>OC</sub>	I <sub>F</sub> = 10 mA	7	9.5	—	V
Short-Circuit Current	I <sub>SC</sub>	I <sub>F</sub> = 10 mA	5	10	—	μA

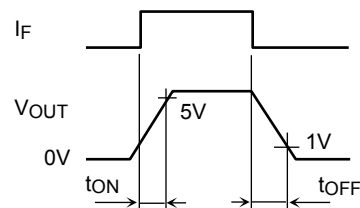
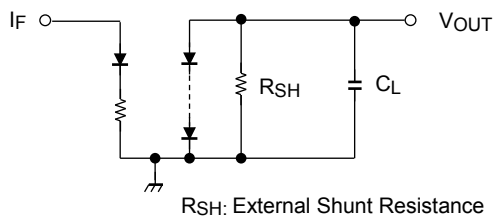
## Isolation Characteristics (Ta = 25°C)

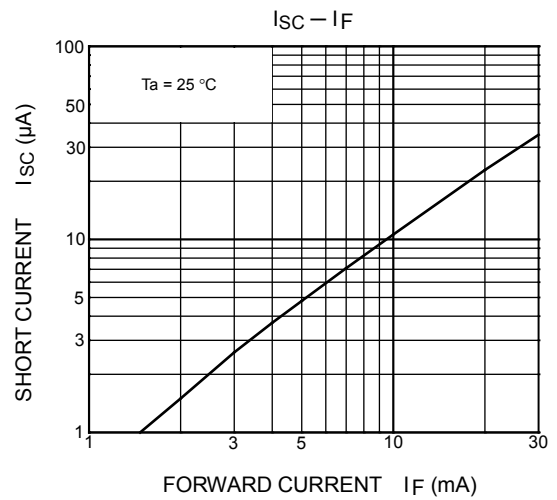
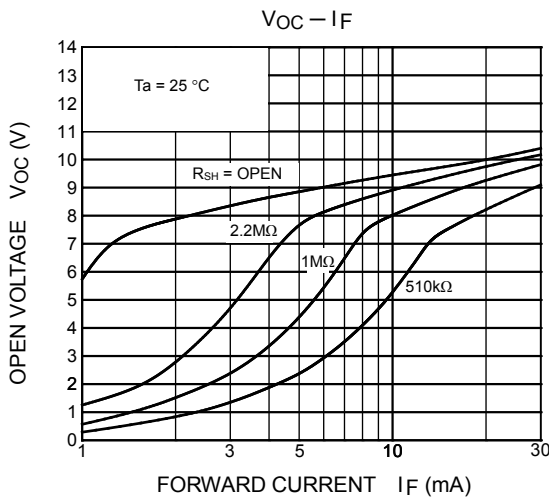
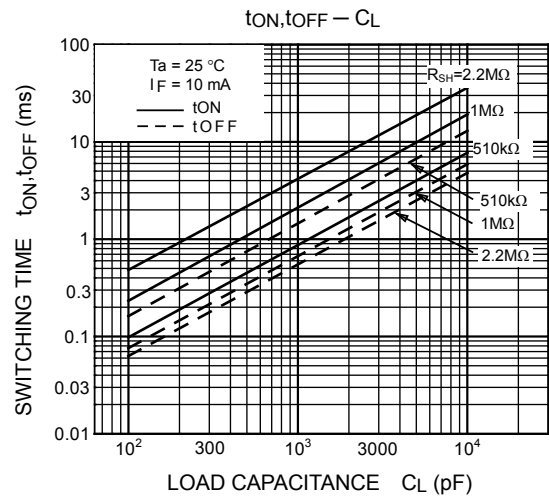
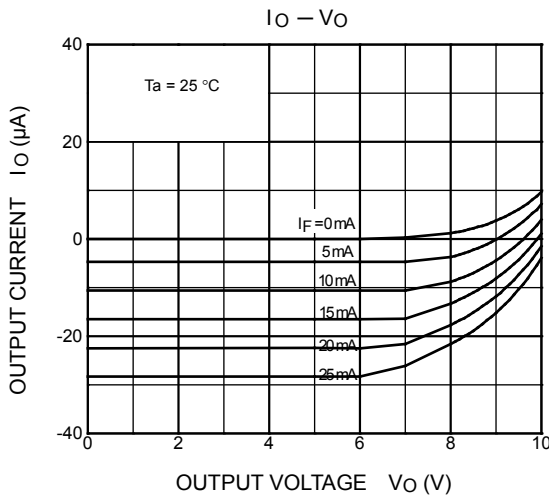
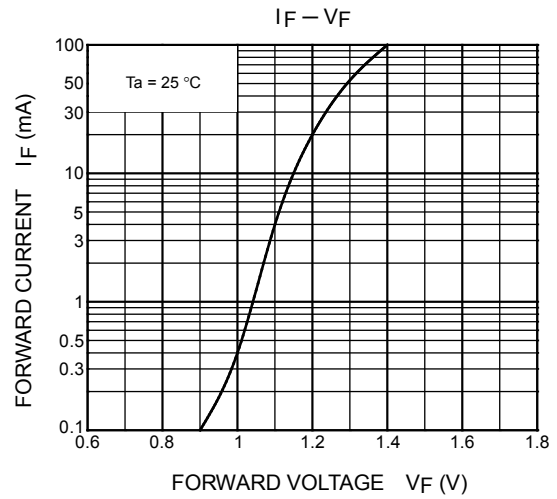
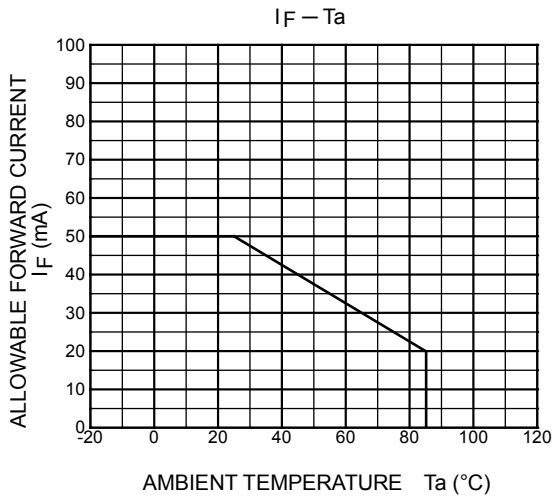
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance Input to Output	C <sub>S</sub>	V <sub>S</sub> = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> = 500 V, R.H. ≤ 60 %	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 60 s	2500	—	—	V <sub>rms</sub>

## Switching Characteristics (Ta = 25°C)

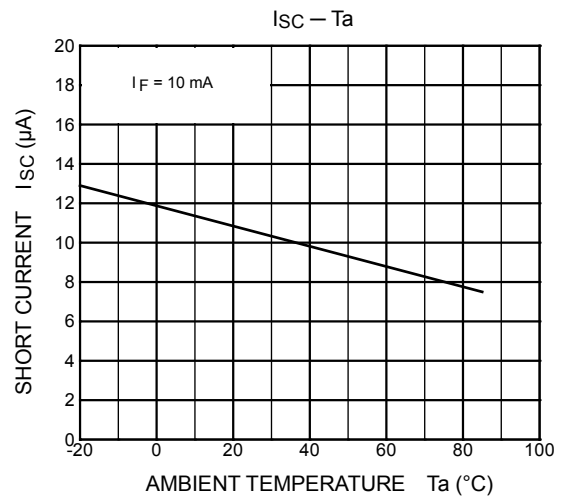
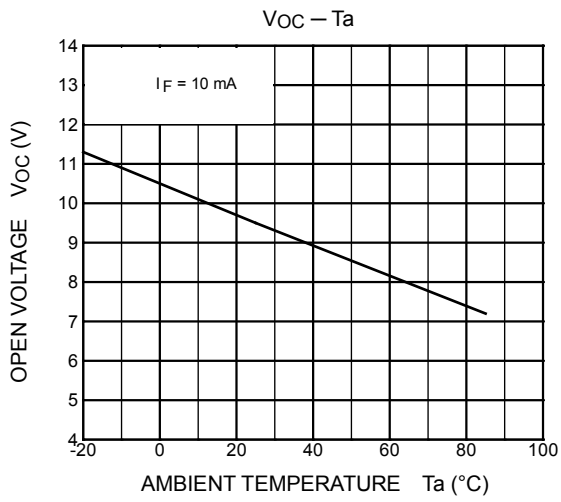
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on Time	t <sub>ON</sub>	I <sub>F</sub> = 10 mA, R <sub>SH</sub> = 1 MΩ C <sub>L</sub> = 1000 pF (Note 2)	—	0.6	—	ms
Turn-off Time	t <sub>OFF</sub>		—	2	—	ms

Note 2: SWITCHING TIME TEST CIRCUIT





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



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