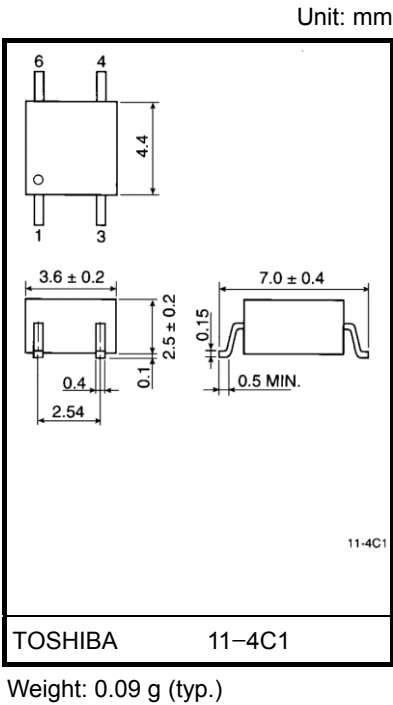


TLP190B

Telecommunications  
Programmable Controllers  
MOS Gate Drivers  
MOSFET Gate Drivers

The TOSHIBA TLP190B mini-flat photocoupler is suitable for surface-mount assembly.  
The TLP190B consists of a GaAlAs infrared light emitting diode optically coupled to a series connected photodiode array which is suitable for MOSFET gate drivers.  
TLP190 : Mini Flat Package, 4Pin, one circuit.

- Open voltage: 7.0V (min)
- Short current: 12.0  $\mu$ A (min)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1577, file no. E67349
- cUL approved :CSA Component Acceptance Service  
No. 5A, File No.E67349

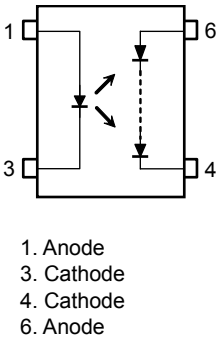


Short Current

Type Name	Classification	Short Current		Marking of Classification
		(min)	I <sub>F</sub>	
TLP190B	C20	20 $\mu$ A	10 mA	20
	Standard	12 $\mu$ A		20, blank

Note: Application type name for certification test, please use standard product type name, i.e.  
TLP190B(C20) : TLP190B

Pin Configuration (top view)



Start of commercial production  
1990-11

## 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
	Pulse forward current (100μs pulse 100pps)	$I_{FP}$	1	A
	Reverse voltage	$V_R$	3	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, 1 minute, R.H. ≤ 60%) Note 1		$BV_S$	2500	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: 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	$I_F$	—	20	25	mA
Operating temperature	$T_{opr}$	-25	—	85	°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.

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 10 \text{ mA}$	1.2	1.4	1.7	V
	Reverse current	$I_R$	$V_R = 3 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance between terminals	$C_T$	$V_F = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	60	pF
Detector	Forward voltage	$V_{FD}$	$I_{FD} = 10 \mu\text{A}$	—	7	—	V
	Reverse current	$I_{RD}$	$V_{RD} = 10 \text{ V}$	—	1	—	nA
	Capacitance (anode to cathode)	$C_{TD}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	—	—	pF

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

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Open voltage	$V_{OC}$	$I_F = 10 \text{ mA}$	7	8	—	V
Short current	$I_{SC}$	$I_F = 10 \text{ mA}$	12	20	—	$\mu\text{A}$

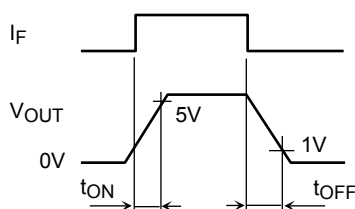
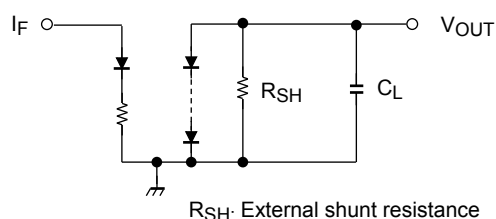
## Isolation Characteristics (Ta = 25°C)

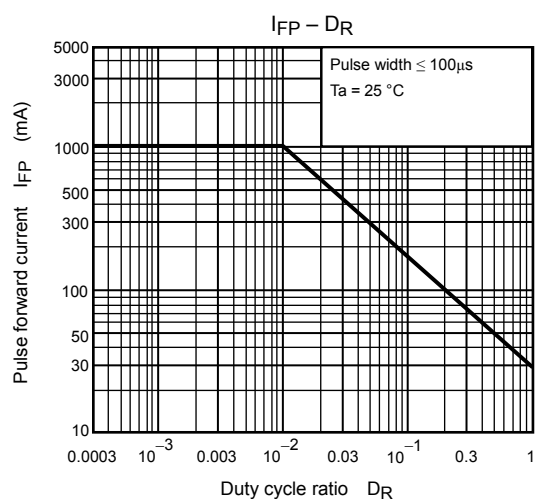
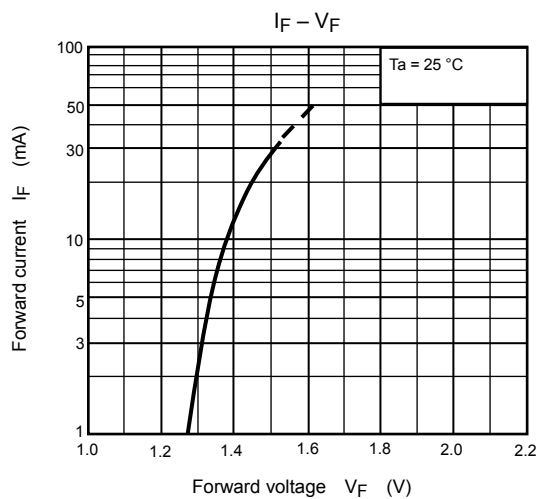
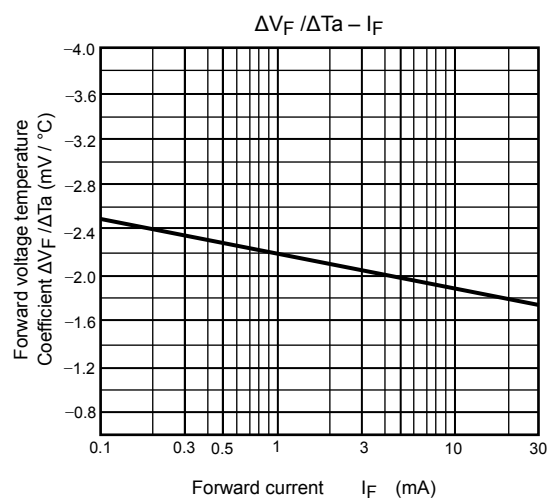
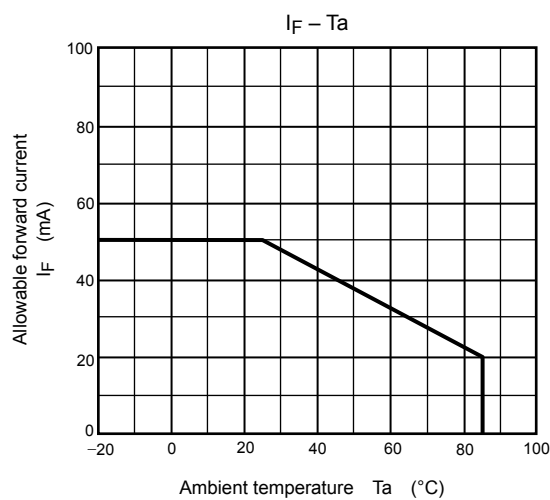
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second in oil	—	5000	—	
		DC, 1 minute in oil	—	5000	—	Vdc

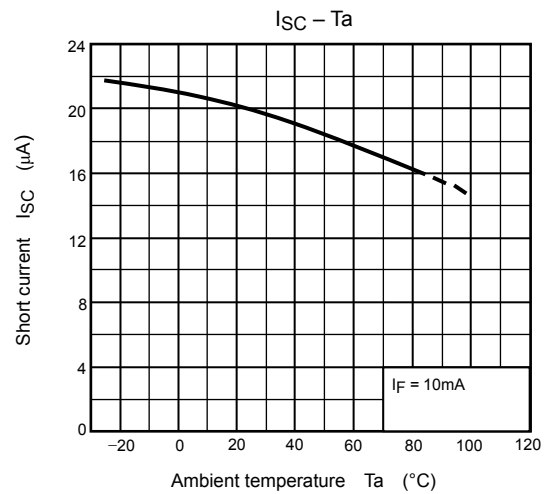
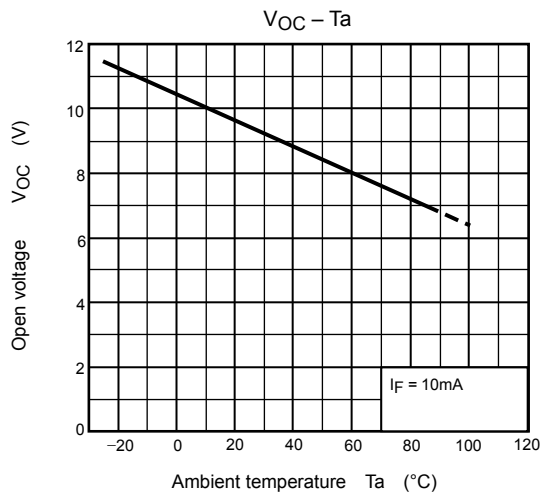
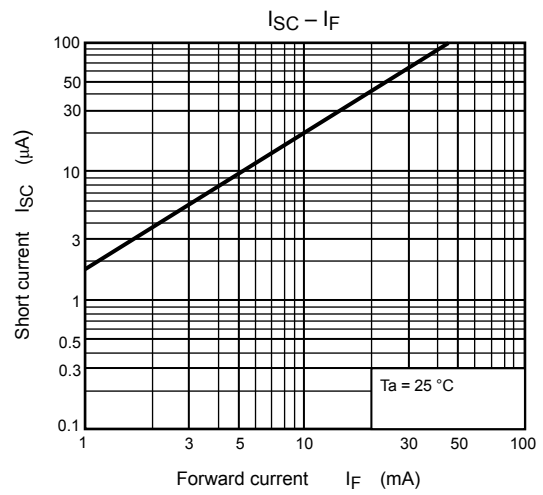
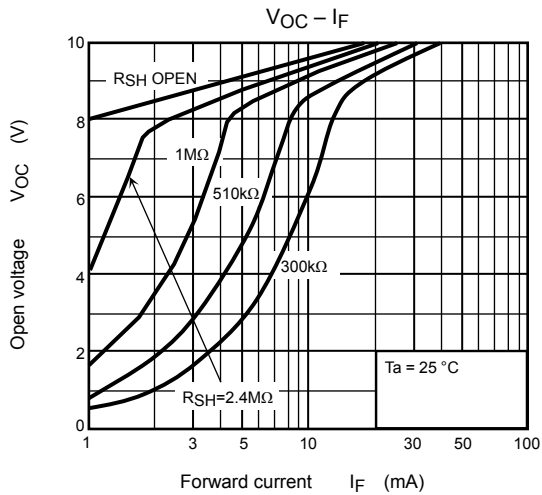
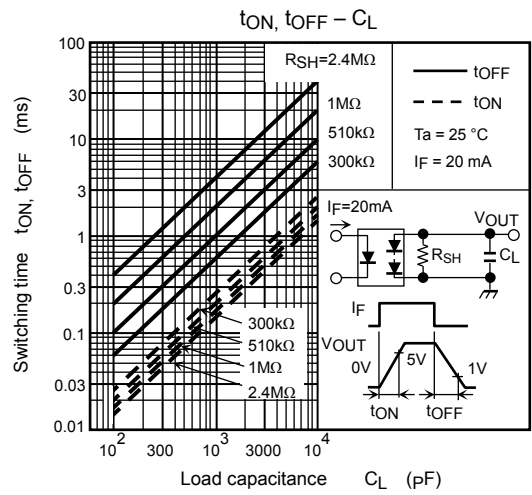
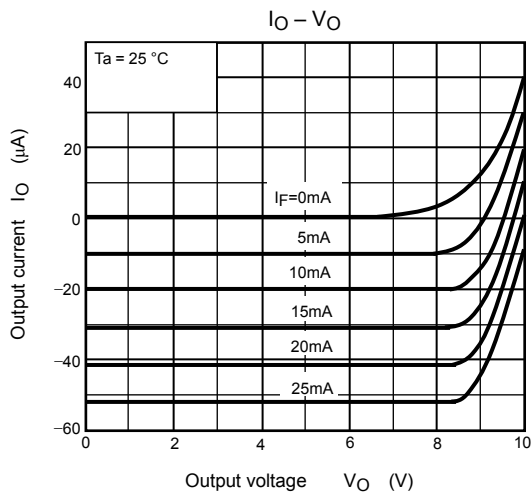
## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$I_F = 20 \text{ mA}, R_{SH} = 510 \text{ k}\Omega$	—	0.2	—	ms
Turn-off time	$t_{OFF}$	$C_L = 1000 \text{ pF}$ (Note 1)	—	1	—	ms

Note 1: Switching time test circuit







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