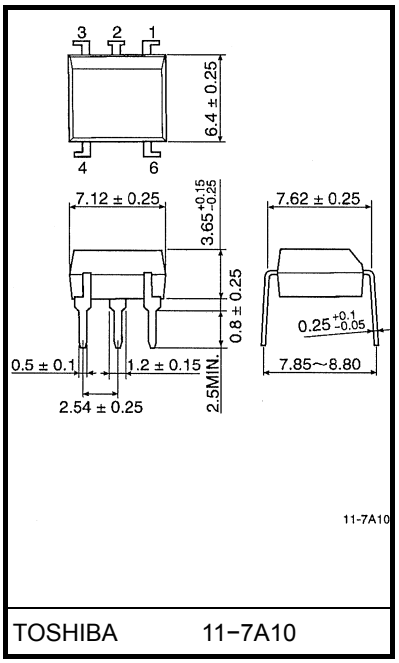
TOSHIBA Photocoupler GaAℓAs Ired & Photo−Diode Array

TLP590B

Telecommunications
Programmable Controllers
MOS Gate Drivers
MOSFET Gate Drivers

Unit: mm



Weight: 0.39 g (typ.)

The TOSHIBA TLP590B consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a series-connected photo−diode array in a six-lead plastic DIP package.
The TLP590B is suitable for MOSFET gate drivers.

- UL recognized: UL1577, file No. E67349

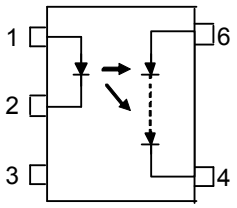
Short Current

Type Name	Classification	Short Current		Classification Marking
		(min)	I_F	
TLP590B	C20	20 μA	10 mA	20
	Standard	12 μA		20, blank

Note: When applying for a safety standard approval, use the type name of the standard device.

TLP590B(C20): TLP590B

Pin Configuration (Top View)



1: Anode
2: Cathode
3: NC
4: Cathode
6: Anode

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	I_F	50	mA
	Forward current derating (Ta ≥ 25°C)	ΔI_F / °C	−0.5	mA / °C
	Pulse forward current (100 μs pulse, 100 pps)	I_{FP}	1	A
	Reverse voltage	V_R	3	V
	Junction temperature	T_j	125	°C
Detector	Forward current	I_{FD}	50	μA
	Reverse voltage	V_{RD}	10	V
	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 sec.)		T_{sol}	260	°C
Isolation voltage (AC, 1 min., 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, 2 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 mA	1.2	1.4	1.7	V
	Reverse current	I_R	V_R = 3 V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1 MHz	—	30	60	pF
Detector	Forward voltage	V_{FD}	I_{FD} = 10 μA	—	7	—	V
	Reverse current	I_{RD}	V_{RD} = 10 V	—	1	—	nA

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Open voltage	V_{OC}	I_F = 10 mA	7.0	8.0	—	V
Short current	I_{SC}	I_F = 10 mA	12	20	—	μA

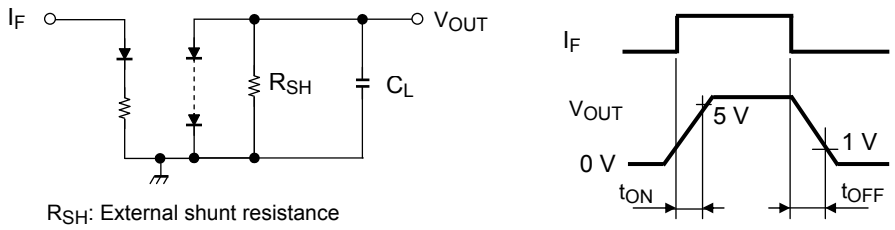
Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60%	5×10^{10}	10^{14}	—	Ω
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)

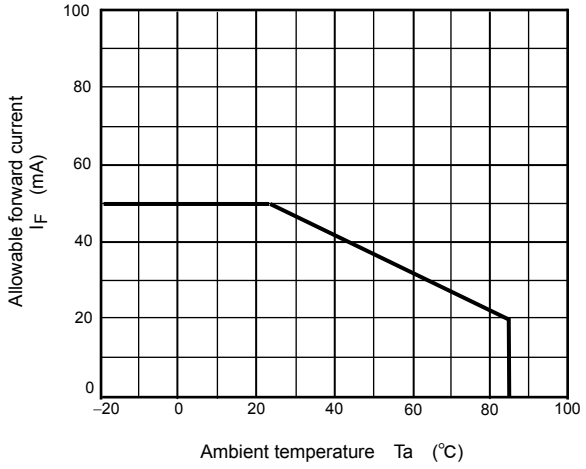
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn−on time	t_{ON}	I_F = 20 mA, R_{SH} = 510 kΩ C_L =1000 pF (Fig.1)	—	0.2	—	ms
Turn−off time	t_{OFF}		—	1	—	ms

Fig. 1: Switching time test circuit

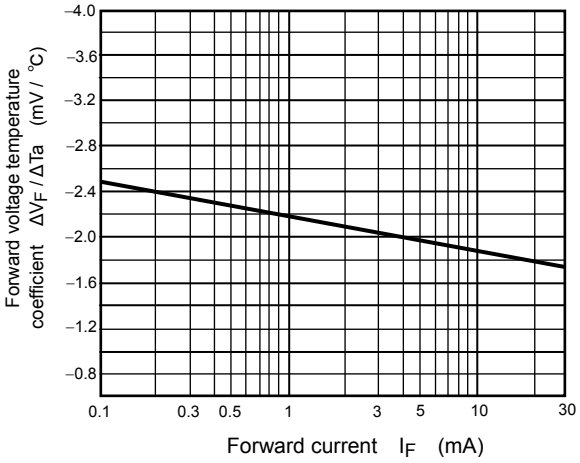


R_{SH}: External shunt resistance

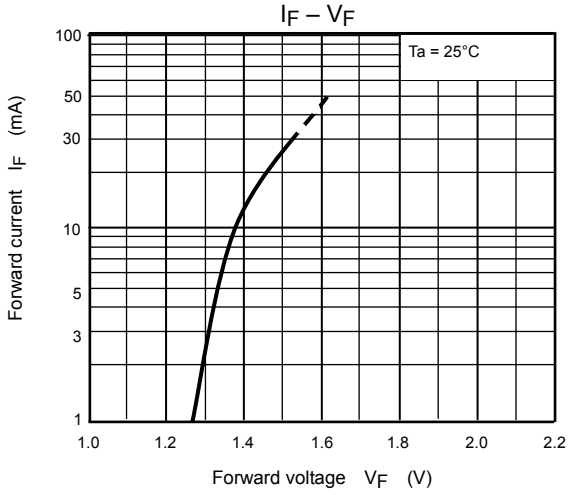
I_F – Ta



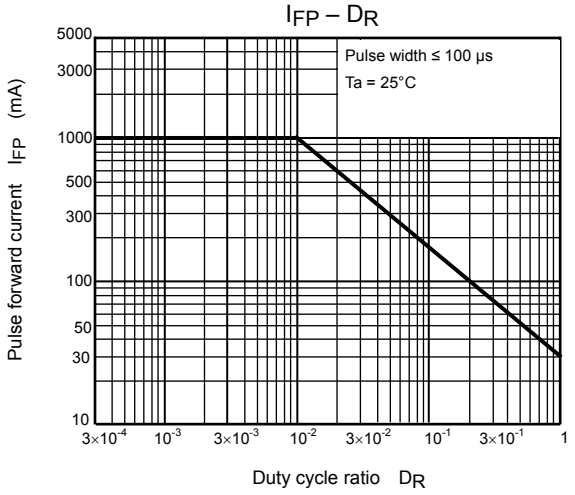
$\Delta V_F / \Delta Ta$ – I_F



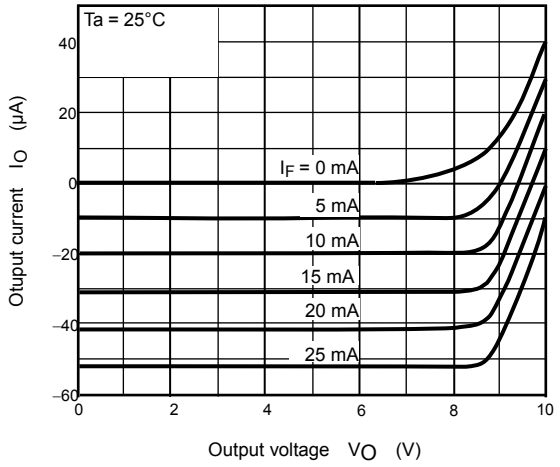
I_F – V_F



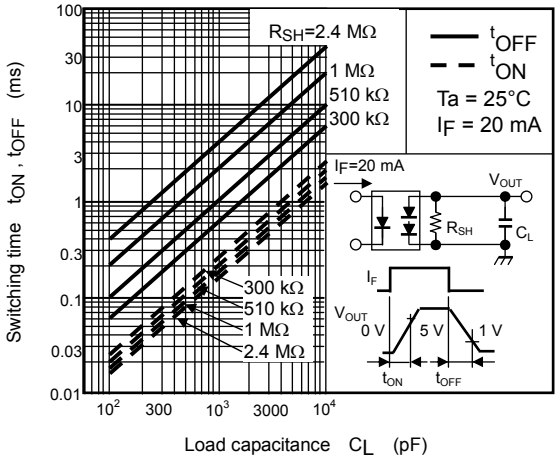
I_{FP} – D_R



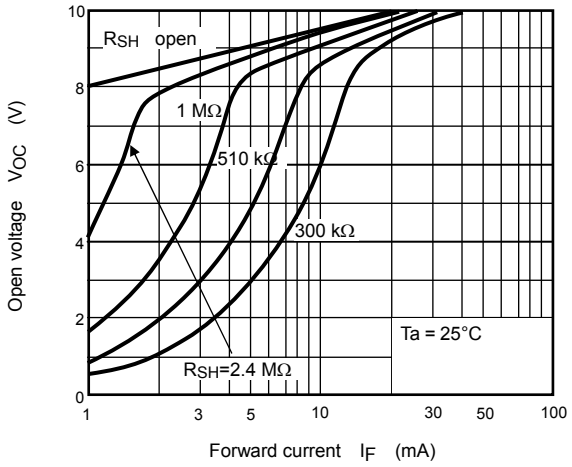
$I_O - V_O$



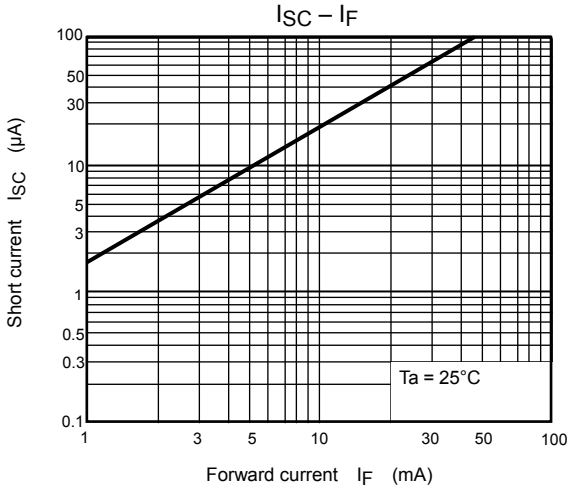
t_{ON}, t_{OFF} – C_L



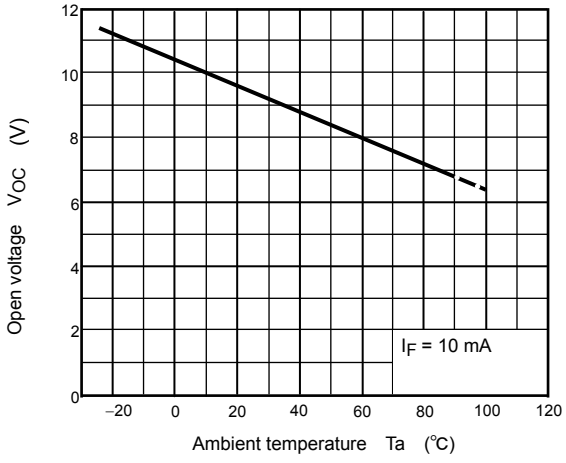
$V_{OC} - I_F$



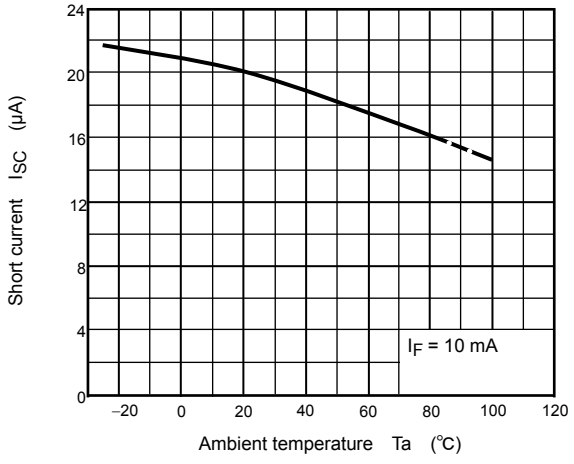
$I_{SC} - I_F$



V_{OC} – Ta



I_{SC} – Ta



RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.).These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in his document shall be made at the customer’s own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- GaAs(Gallium Arsenide) is used in this product. The dust or vapor is harmful to the human body. Do not break, cut, crush or dissolve chemically.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.