

TOSHIBA Photocoupler Photorelay

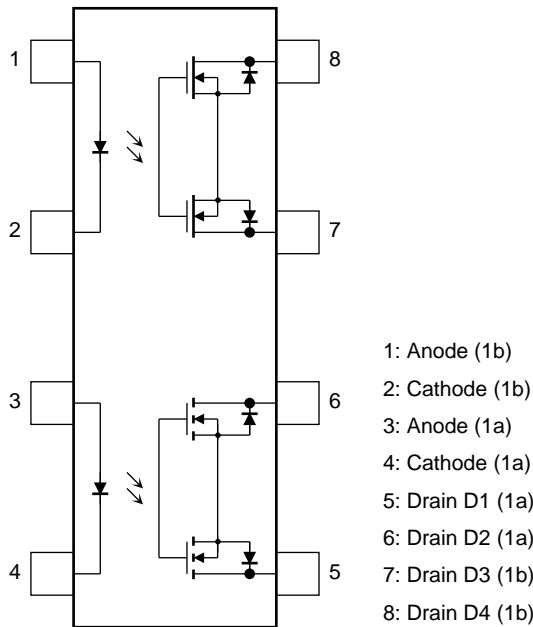
TLP4006G

Telecommunication
Measurement Equipment
Security Equipment
FA

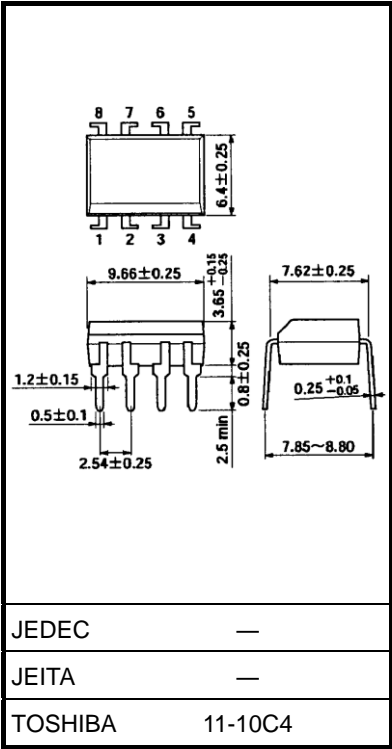
The Toshiba TLP4006G consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET and is the 1-form-A/B photorelay with 350-V withstanding voltage.

- Normally closed (1-form-B) device, normally opened (1-form-A) device
- Peak off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 25 Ω (max)
- Isolation voltage: 2500 Vrms (min)

Pin Configuration (top view)



Unit: mm



Weight: 0.54 g (typ.)

Start of commercial production
2002-09

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
	Peak forward current		I _{FP}	1	A
	Reverse voltage		V _R	5	V
	Input power dissipation		P _D	50	mW
	Input power dissipation derating (Ta ≥ 25°C)		ΔPD/°C	-0.5	mW/°C
	Junction temperature		T _j	125	°C
Detector	Off-state output terminal voltage		V _{OFF}	350	V
	On-state current	One channel operation	I _{ON}	120	mA
		Two channel operations (1a1b simultaneous operation)			
	On-state current derating (Ta ≥ 25°C)	One channel operation	ΔI _{ON} /°C	−1.2	mA/°C
		Two channel operations (1a1b simultaneous operation)			
	Output power dissipation		P _O	370	mW
	Output power dissipation derating (Ta ≥ 25°C)		ΔP _O /°C	-3.7	mW/°C
	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)		BVS	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: Pins 1, 2, 3 and 4 are shorted together, and pins 5, 6, 7 and 8 are shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V _{DD}	—	—	280	V
Forward current	I _F	5	—	25	mA
On-state current	I _{ON}	—	—	120	mA
Operating temperature	T _{opr}	-20	—	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)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V _F	I _F = 10 mA	1.0	1.15	1.3	V
	Reverse current	I _R	V _R = 5 V	—	—	10	μA
	Capacitance	C _T	V = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I _{OFF}	V _{OFF} = 350 V	—	—	1	μA
	Capacitance (1b)	C _{OFF}	V = 0 V, f = 1 MHz, I _F = 5 mA	—	65	—	pF
	Capacitance (1a)		V = 0 V, f = 1 MHz, I _F = 0 mA	—	65	—	

Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Form	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	1a	I _{FT}	I _{ON} = 120 mA	—	1	3	mA
	1b	I _{FC}	I _{OFF} = 10 μA				
Return LED current	1a	I _{FC}	I _{OFF} = 10 μA	0.1	—	—	mA
	1b	I _{FT}	I _{ON} = 120 mA				
On-state resistance (Note 2)	—	R _{ON}	I _{ON} = 120 mA	—	15	25	Ω

Note 2: 1-form-A: I_F = 5 mA, 1-form-B: I_F = 0 mA

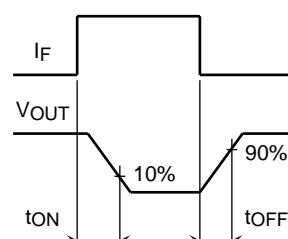
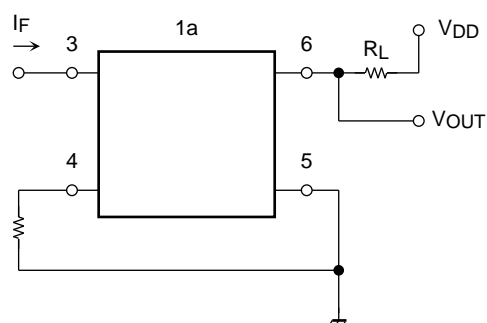
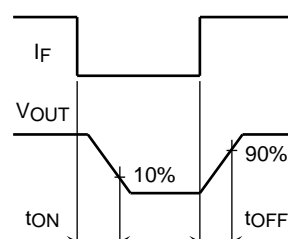
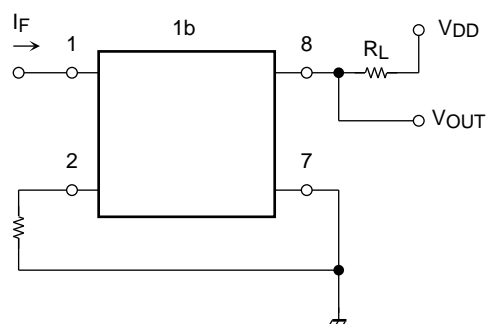
Isolation Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C _S	V _S = 0 V, 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	—	—	V _{rms}
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	V _{dc}

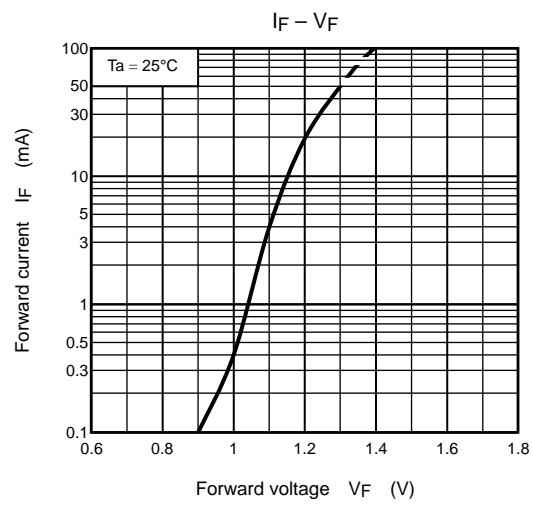
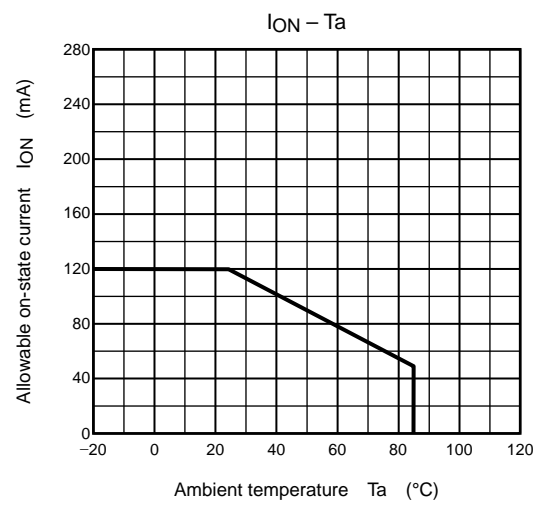
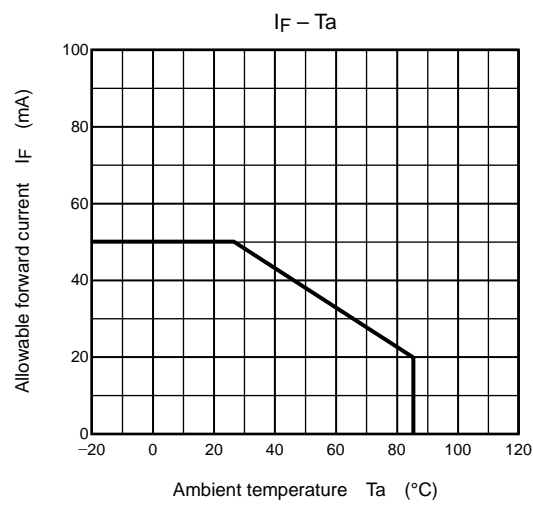
Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
1b	Turn-on time	R _L = 200 Ω V _{DD} = 20 V, I _F = 5 mA (Note 3)	—	—	1	ms
	Turn-off time		—	—	3	
1a	Turn-on time	R _L = 200 Ω V _{DD} = 20 V, I _F = 5 mA (Note 3)	—	—	1	ms
	Turn-off time		—	—	1	

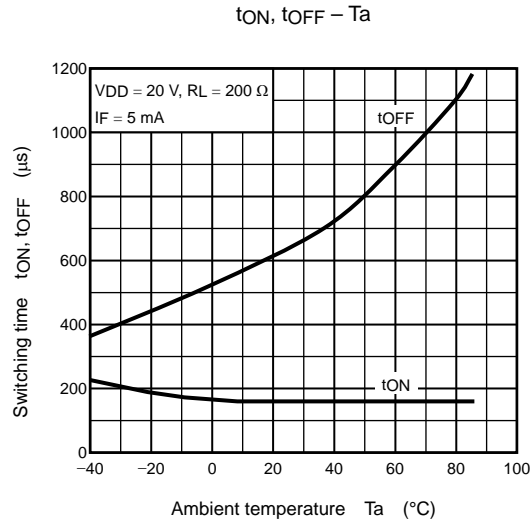
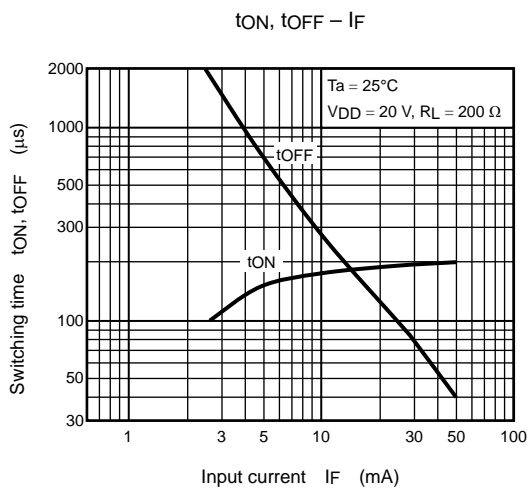
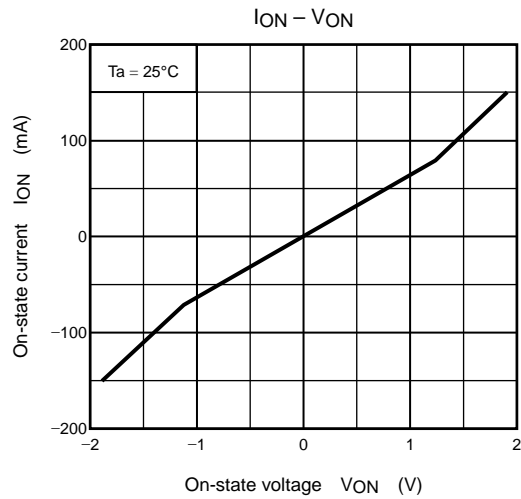
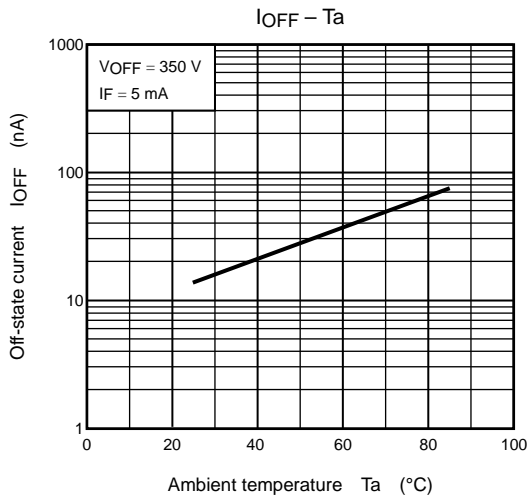
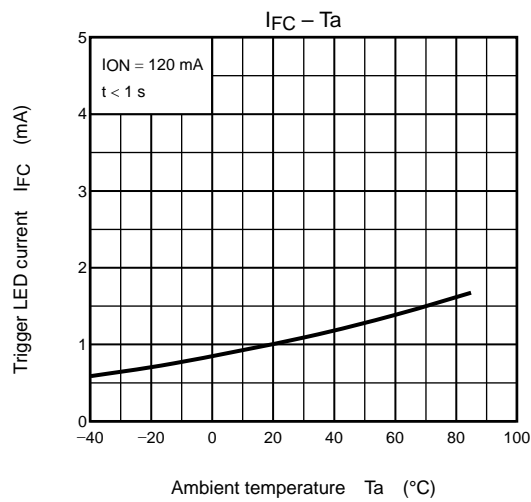
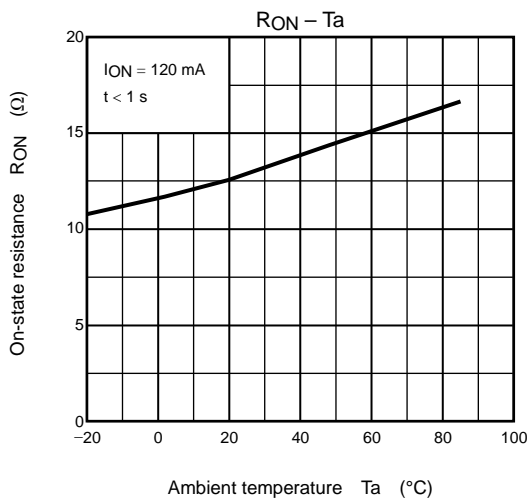
Note 3: Switching time test circuit



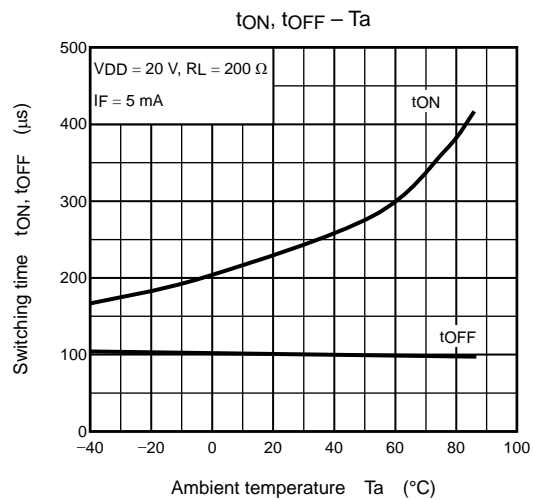
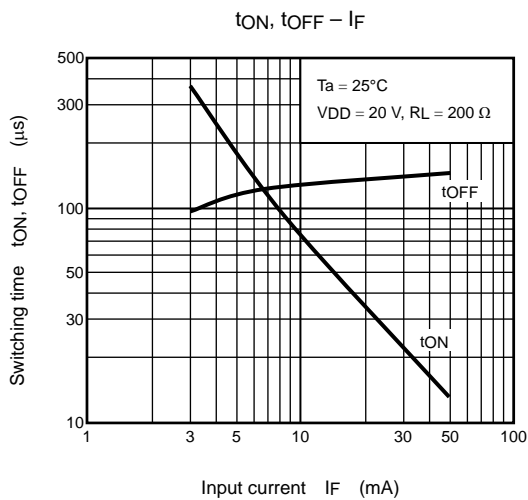
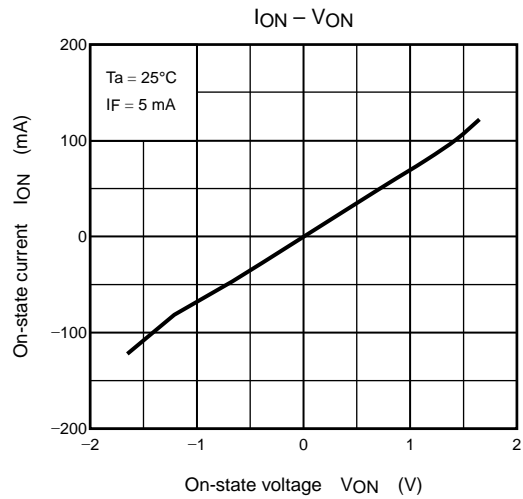
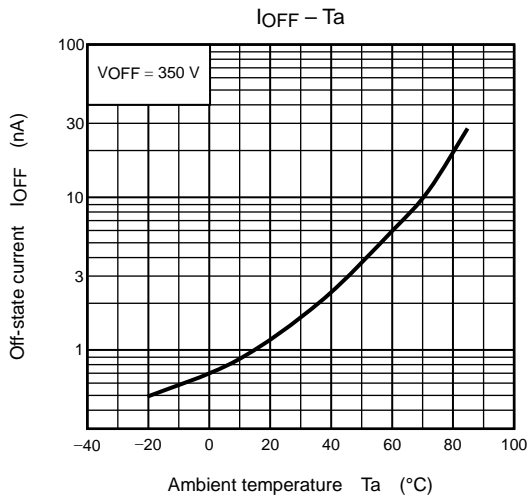
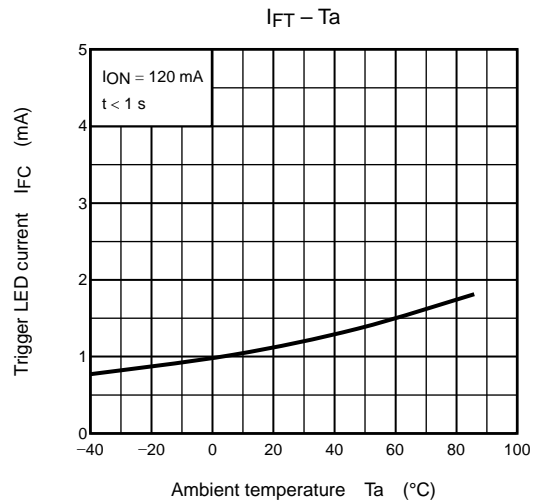
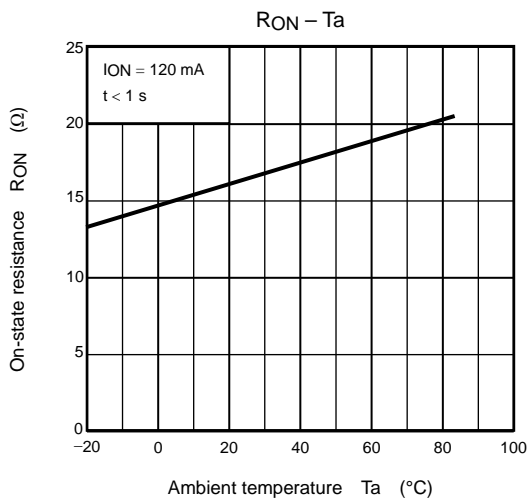
Characteristics curves for 1-form-A/B



Characteristics curves for 1-form-B



Characteristics curves for 1-form-A



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