

TOSHIBA Photocoupler Photorelay

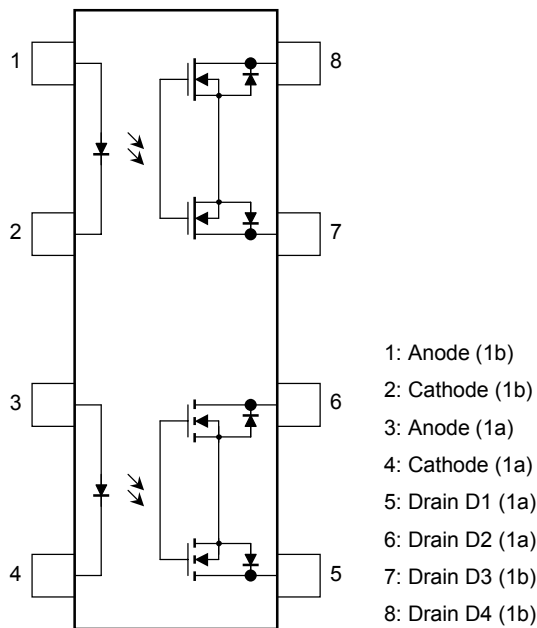
# TLP4007G

Telecommunication  
 Measurement Equipment  
 Security Equipment  
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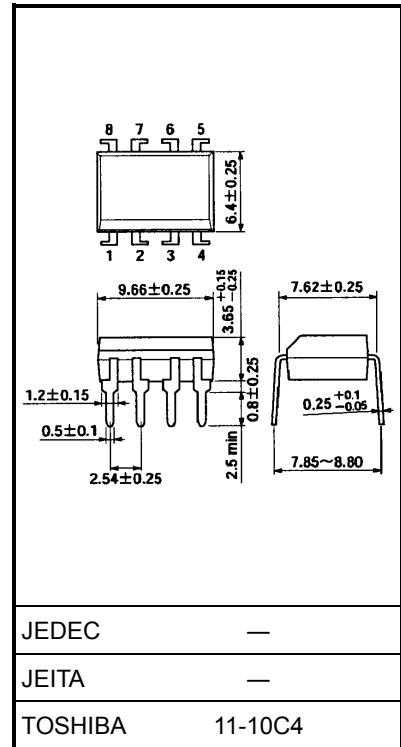
The Toshiba TLP4007G consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET and is the 1-form-A/B photorelay with 350-V withstanding voltage.

- 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: 100 mA (max)
- On-state resistance: 50 Ω (max)
- Isolation voltage: 2500 Vrms (min)

### Pin Configuration (top view)



Unit: mm



Weight: 0.54 g (typ.)

## Maximum Ratings (Ta = 25°C)

Characteristics		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	
	Peak forward current	$I_{FP}$	1	A	
	Reverse voltage	$V_R$	5	V	
	Junction temperature	$T_j$	125	°C	
Detector	Off-state output terminal voltage	$V_{OFF}$	350	V	
	On-state current	One channel operation	$I_{ON}$	100	mA
		Two channel operations (1a1b simultaneous operation)			
	On-state current derating (Ta ≥ 25°C)	One channel operation	$\Delta I_{ON}/^\circ\text{C}$	-1.0	mA/°C
		Two channel operations (1a1b simultaneous operation)			
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 min, R.H. ≤ 60%) (Note 1)		$BV_S$	2500	Vrms	

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	10	25	mA
On-state current	$I_{ON}$	—	—	100	mA
Operating temperature	$T_{opr}$	-20	—	65	°C

## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 350 \text{ V}$	—	—	1	μA
	Capacitance (1b)	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}, I_F = 5 \text{ mA}$	—	30	—	pF
	Capacitance (1a)		$V = 0, f = 1 \text{ MHz}$	—	30	—	

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

Characteristics	Form	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	1a	$I_{FT}$	$I_{ON} = 100 \text{ mA}$	—	1	3	mA
	1b	$I_{FC}$	$I_{OFF} = 10 \text{ } \mu\text{A}$				
Return LED current	1a	$I_{FC}$	$I_{OFF} = 10 \text{ } \mu\text{A}$	0.1	—	—	mA
	1b	$I_{FT}$	$I_{ON} = 100 \text{ mA}$				
On-state resistance (Note 2)	—	$R_{ON}$	$I_{ON} = 100 \text{ mA}, t < 1 \text{ s}$	—	30	35	$\Omega$
			$I_{ON} = 100 \text{ mA}$	—	40	50	

Note 2: 1-form-A:  $I_F = 5 \text{ mA}$ , 1-form-B:  $I_F = 0 \text{ mA}$

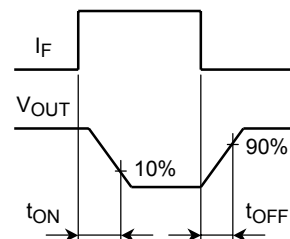
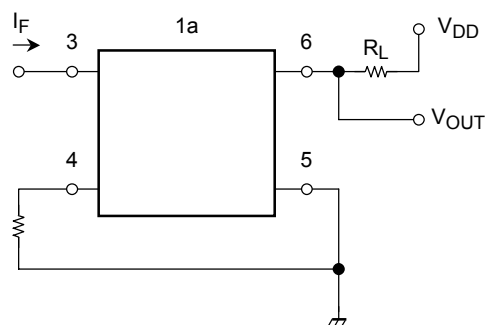
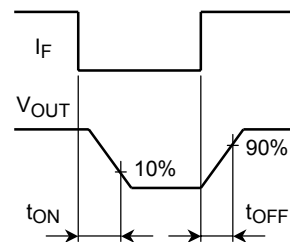
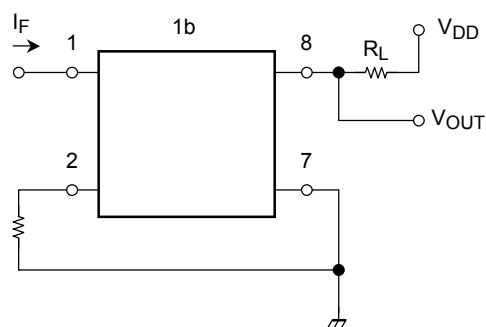
## Isolation Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	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 min	2500	—	—	Vrms
		AC, 1 s, in oil	—	5000	—	—
		DC, 1 min, in oil	—	5000	—	Vdc

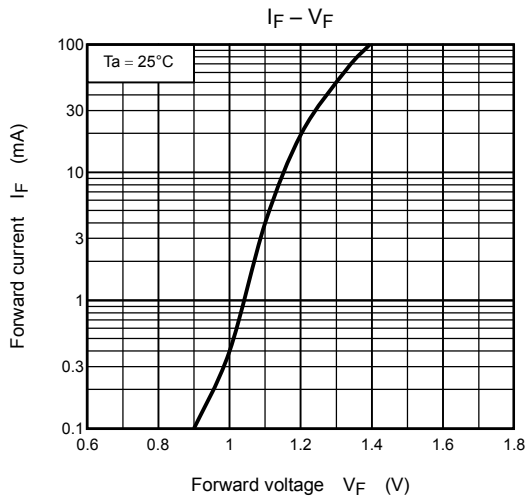
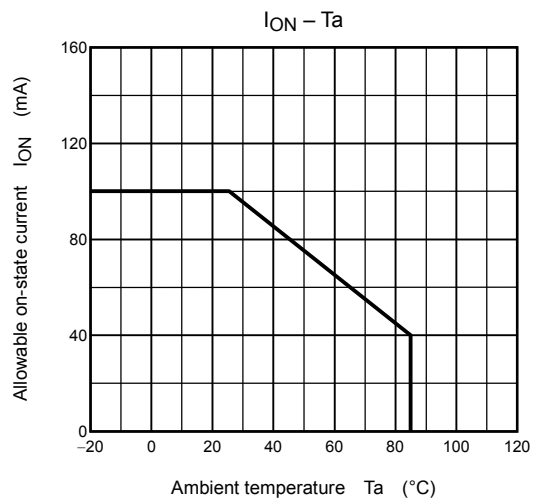
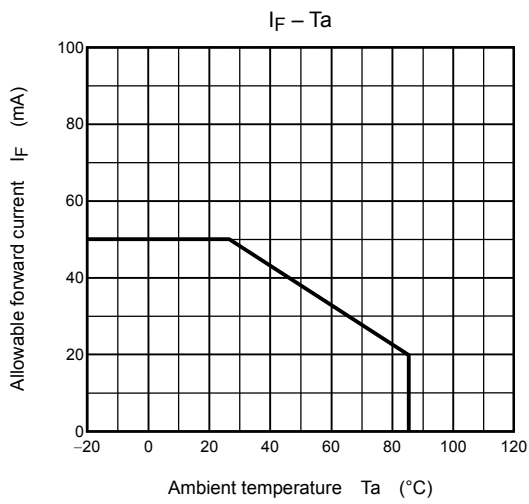
## Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
1b	Turn-on time	$R_L = 200 \text{ } \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 3)	—	0.25	1	ms
	Turn-off time					
1a	Turn-on time	$R_L = 200 \text{ } \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 3)	—	0.3	1	ms
	Turn-off time					

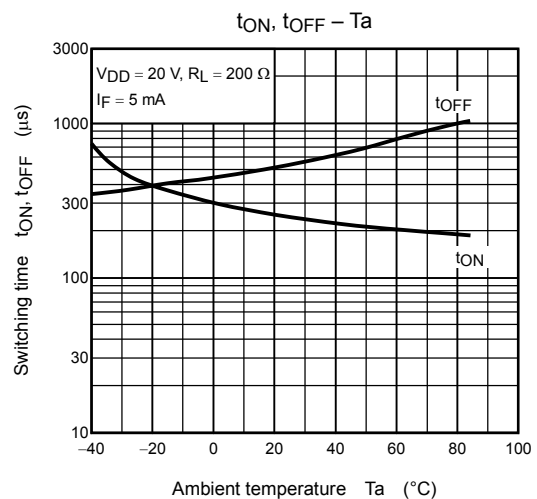
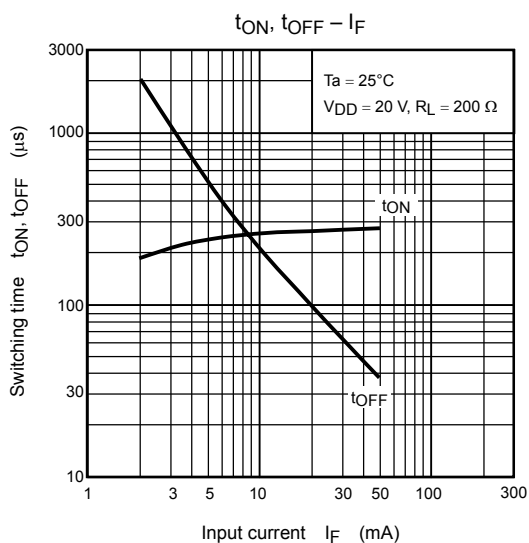
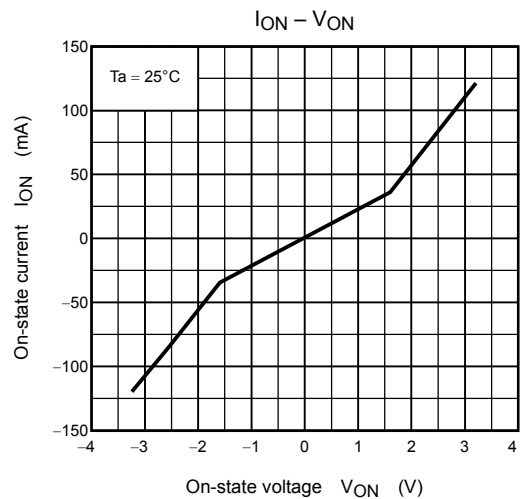
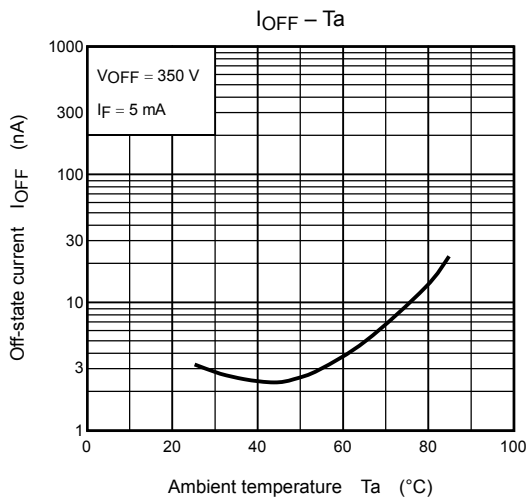
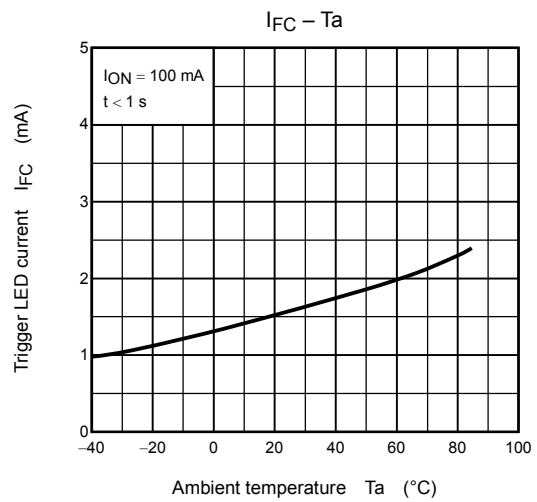
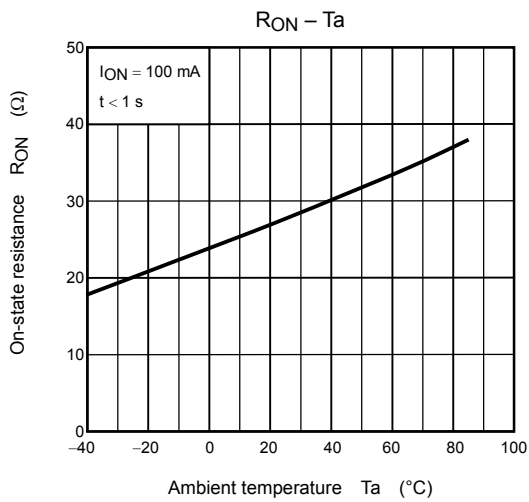
Note 3: Switching time test circuit



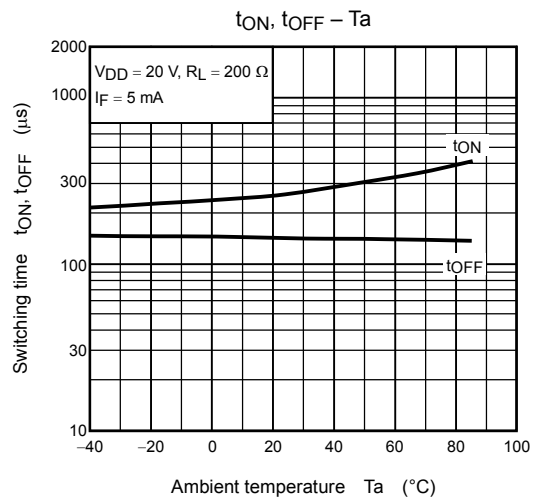
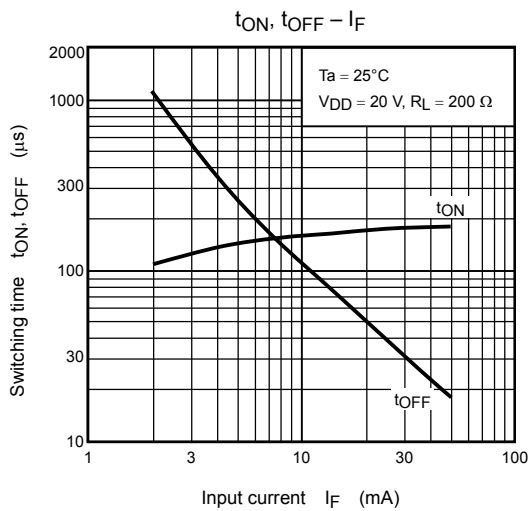
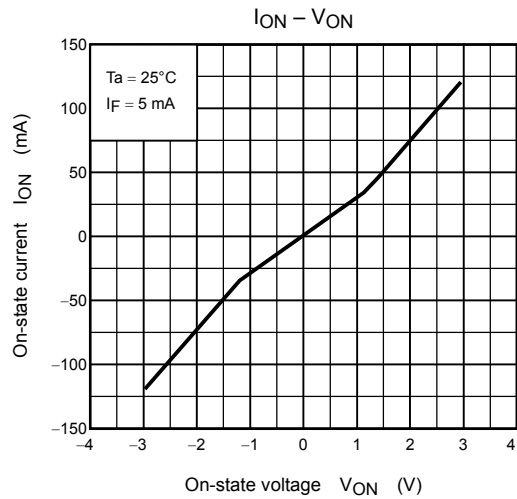
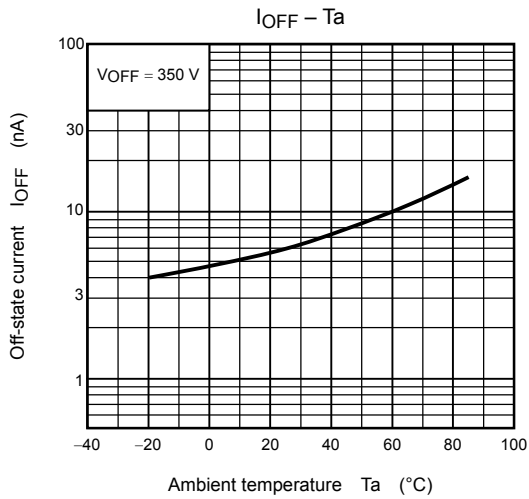
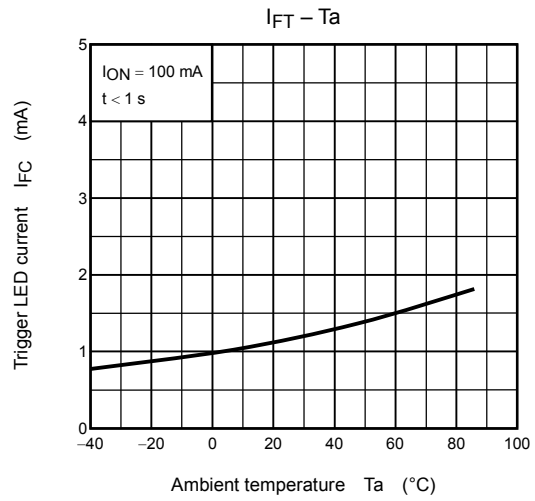
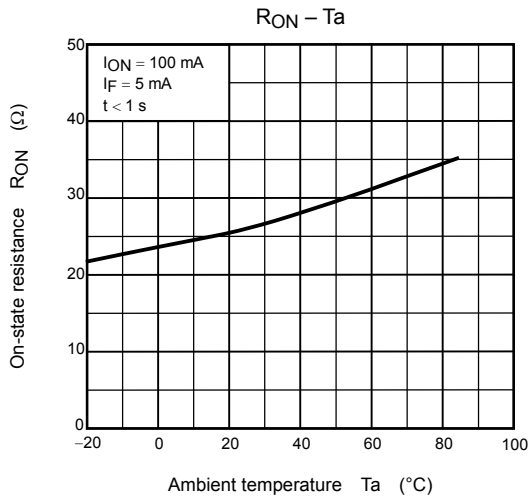
**Characteristics curves for 1-form-A/B**



## Characteristics curves for 1-form-B



**Characteristics curves for 1-form-A**



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