

TOSHIBA Photocoupler Photorelay

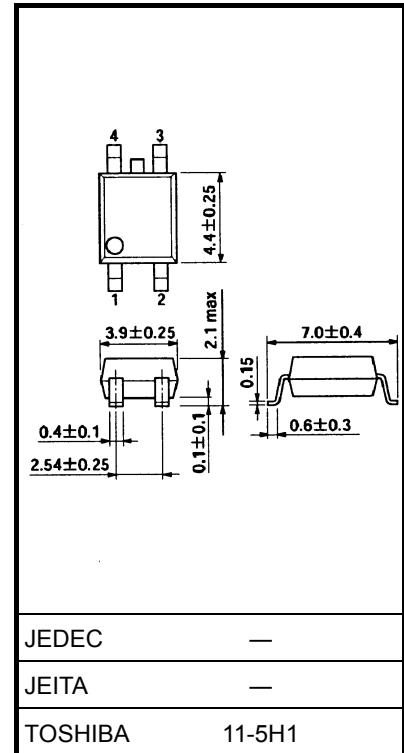
TLP170J

Modem·Fax Cards, Modems in PC
Telecommunications
PBX
Security Equipment
Measurement Equipment

The Toshiba TLP170J consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a 4-pin SOP package. This photorelay requires 1 mA of LED current to turn it on. It is suitable for applications that need electrical power savings.

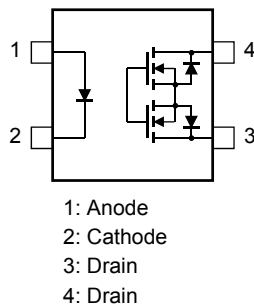
- 4-pin SOP (2.54SOP4): Height = 2.1 mm, Pitch = 2.54 mm
 - 1-Form-A
 - Peak OFF-state voltage: 600 V (min)
 - Trigger LED current: 1 mA (max)
 - ON-state current: 90 mA (max)
 - ON-state resistance: 40 Ω (max, $t < 1$ s)
 - ON-state resistance: 60 Ω (max, continuous)
 - Isolation voltage: 1500 Vrms (min)
 - UL recognized: UL1577, File No.E67349
 - c-UL recognized
- CSA Component Acceptance Service No. 5A File No.E67349

Unit: mm

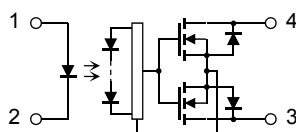


Weight: 0.1 g (typ.)

Pin Configuration (top view)



Internal Circuit



Start of commercial production
2009/06

Absolute Maximum Rating (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	5	V
	Junction temperature	T _j	125	°C
Detector	OFF-state output terminal voltage	V _{OFF}	600	V
	ON-state current	I _{ON}	90	mA
	ON-state current derating (Ta ≥ 25°C)	ΔI _{ON} /°C	−0.9	mA/°C
	Junction temperature	T _j	125	°C
Storage temperature range		T _{stg}	−55~125	°C
Operating temperature range		T _{opr}	−40~85	°C
Lead soldering temperature (10 s)		T _{sol}	260	°C
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note 1)		BV _S	1500	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: LED side pins shorted together, and detector side pins shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V _{DD}	—	—	480	V
Forward current	I _F	—	2	25	mA
ON-state current	I _{ON}	—	—	70	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, f = 1 MHz	—	30	—	pF
Detector	OFF-state current	I _{OFF}	V _{OFF} = 600 V	—	1	1000	nA
	Capacitance	C _{OFF}	V = 0, f = 1 MHz	—	75	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}	$I_{ON} = 90 \text{ mA}$	—	0.4	1	mA
Return LED current	I_{FC}	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
ON-state resistance	R_{ON}	$I_{ON} = 90 \text{ mA}$, $I_F = 2 \text{ mA}$, $t < 1 \text{ s}$	—	—	40	Ω
		$I_{ON} = 90 \text{ mA}$, $I_F = 2 \text{ mA}$, continuous	—	45	60	

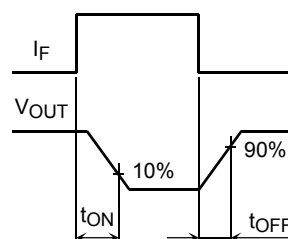
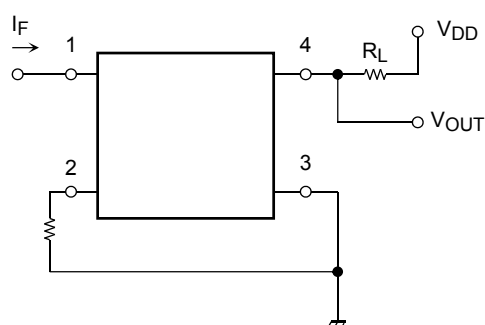
Isolation Characteristics (Ta = 25°C)

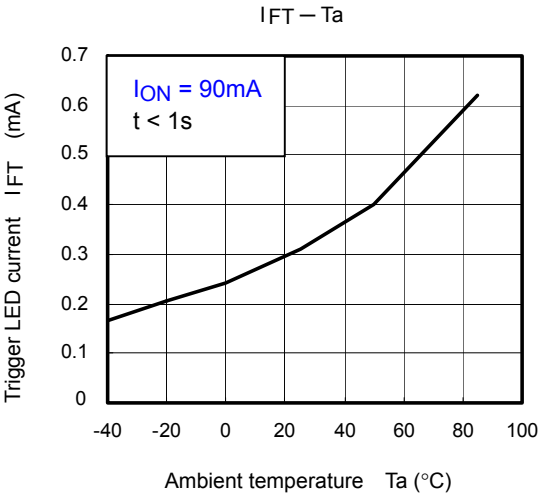
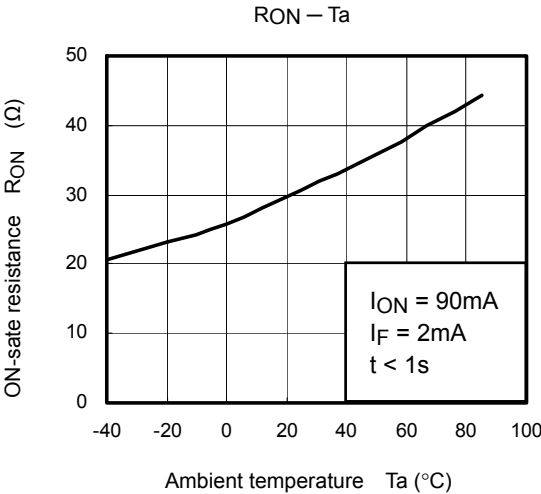
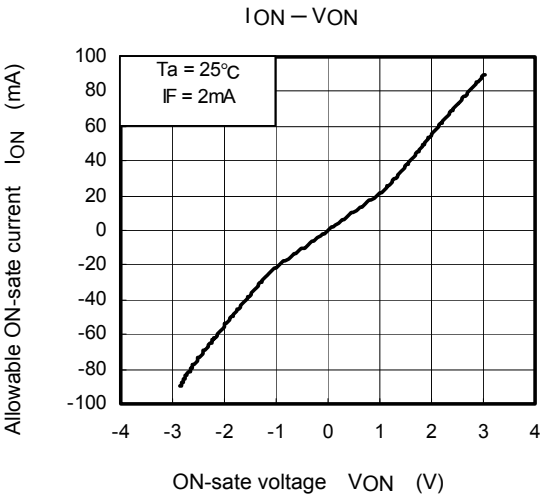
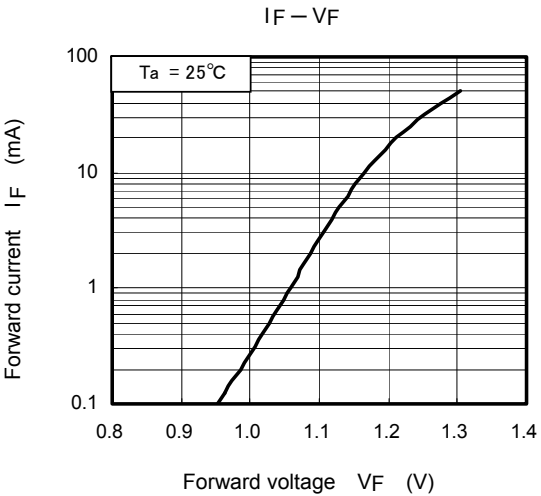
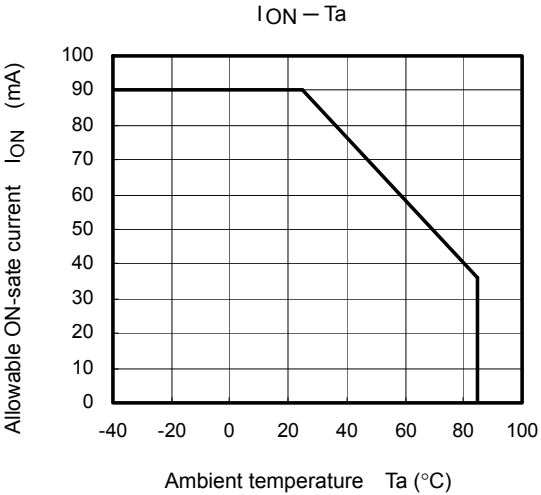
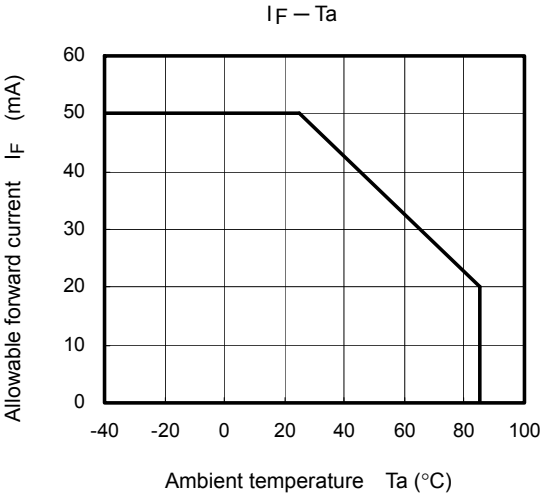
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}$, $f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}$, R.H. $\leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	1500	—	—	Vrms
		AC, 1 second, in oil	—	3000	—	
		DC, 1 minute, in oil	—	3000	—	Vdc

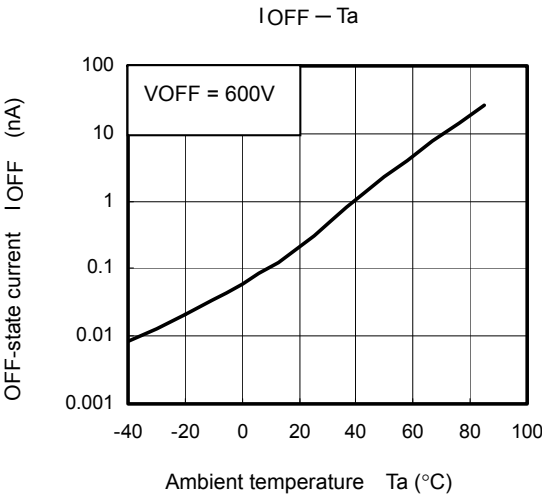
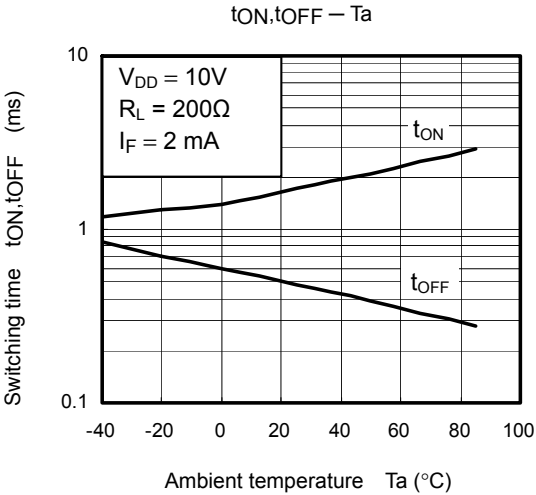
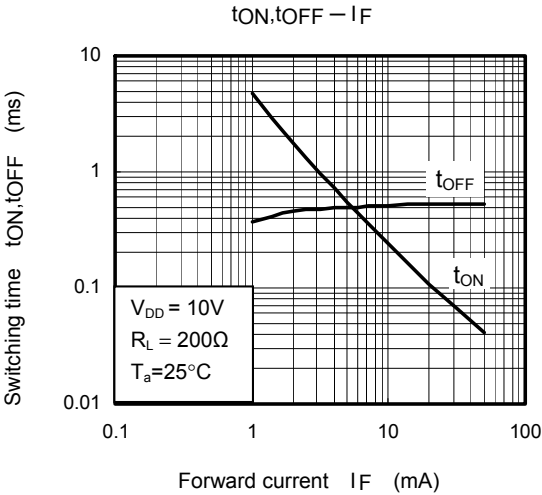
Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	$R_L = 200 \Omega$ $V_{DD} = 10 \text{ V}$, $I_F = 2 \text{ mA}$ (Note 2)	—	2.0	8.0	ms
Turn-on time	t_{ON}	$R_L = 200 \Omega$ $V_{DD} = 10 \text{ V}$, $I_F = 5 \text{ mA}$ (Note 2)	—	—	5.0	
Turn-off time	t_{OFF}	$R_L = 200 \Omega$ $V_{DD} = 10 \text{ V}$, $I_F = 2 \text{ mA}$ (Note 2)	—	0.5	3.0	

Note 2: Switching time test circuit







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