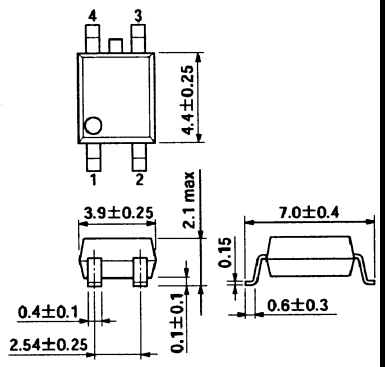
TOSHIBA Photocoupler Photorelay

TLP170J

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

Unit: mm



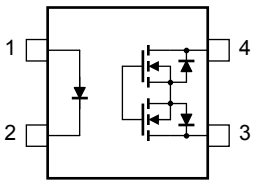
JEDEC	—
JEITA	—
TOSHIBA	11-5H1

Weight: 0.1 g (typ.)

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 1mA of LED current to turn it on. It is suitable for applications that need electrical power savings.

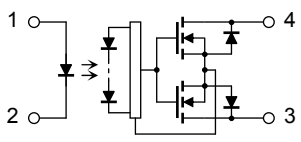
- 4-pin SOP (2.54SOP4): Height = 2.1 mm, Pitch = 2.54 mm
- 1-Form-A
- Peak OFF-state voltage: 600 V (min)
- Trigger LED current: 1 mA (max)
- ON-state current: 90 mA (max)
- ON-state resistance: 40 Ω (max, t < 1 s)
- ON-state resistance: 60 Ω (max, continuous)
- Isolation voltage: 1500 Vrms (min)
- UL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

Pin Configuration (top view)



1: Anode
2: Cathode
3: Drain
4: Drain

Internal Circuit



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 min, R.H. ≤ 60%) (Note 1)		BV_S	1500	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: 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 mA	—	0.4	1	mA
Return LED current	I_{FC}	I_{OFF} = 100 μA	0.1	—	—	mA
ON-state resistance	R_{ON}	I_{ON} = 90 mA, I_F = 2 mA, t < 1 s	—	—	40	Ω
		I_{ON} = 90 mA, I_F = 2 mA, continuous	—	45	60	

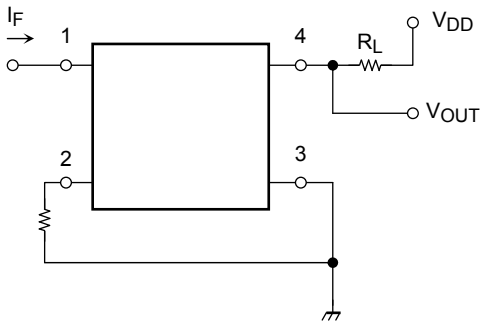
Isolation Characteristics (Ta = 25°C)

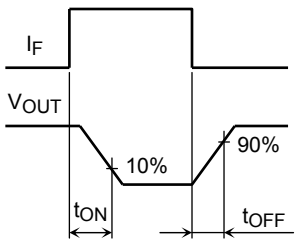
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 min	1500	—	—	Vrms
		AC, 1 s, in oil	—	3000	—	
		DC, 1 min, in oil	—	3000	—	Vdc

Switching Characteristics (Ta = 25°C)

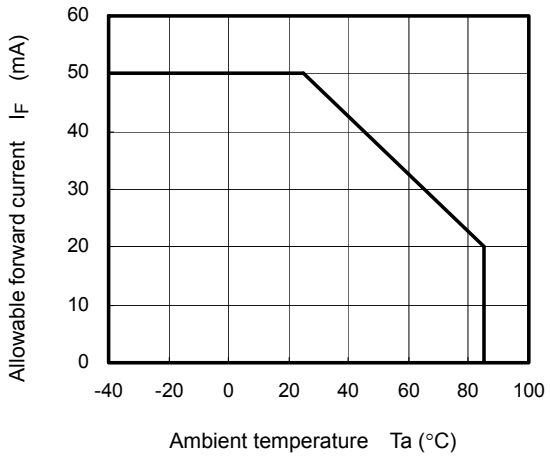
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	R_L = 200 Ω, V_{DD} = 10 V, I_F = 2 mA (Note 2)	—	2.0	8.0	ms
Turn-on time	t_{ON}	R_L = 200 Ω, V_{DD} = 10 V, I_F = 5 mA (Note 2)	—	—	5.0	
Turn-off time	t_{OFF}	R_L = 200 Ω, V_{DD} = 10 V, I_F = 2 mA (Note 2)	—	0.5	3.0	

Note 2: Switching time test circuit

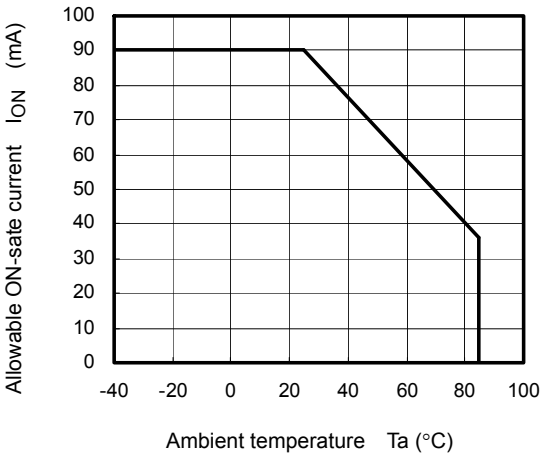




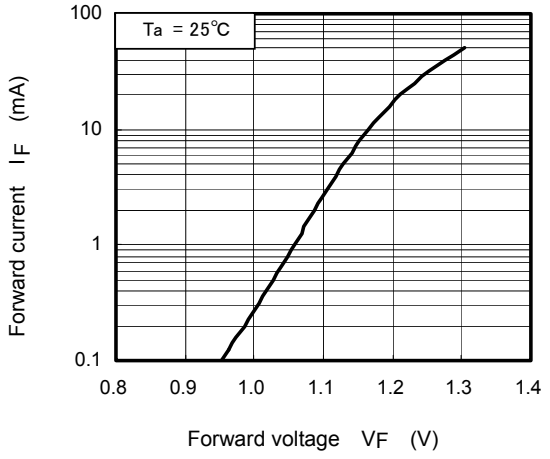
I_F – Ta



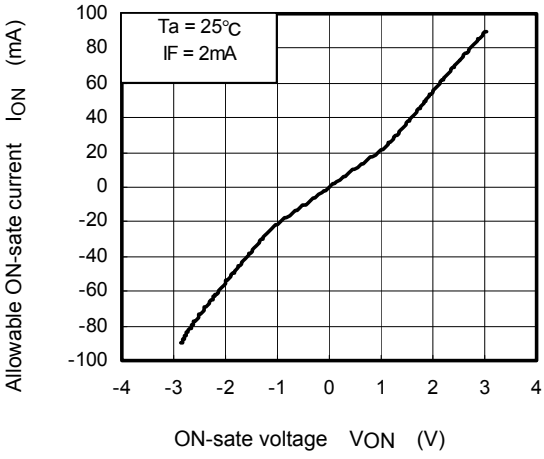
I_{ON} – Ta



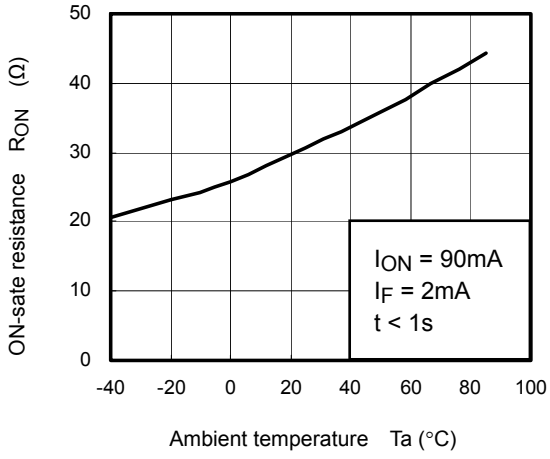
I_F – V_F



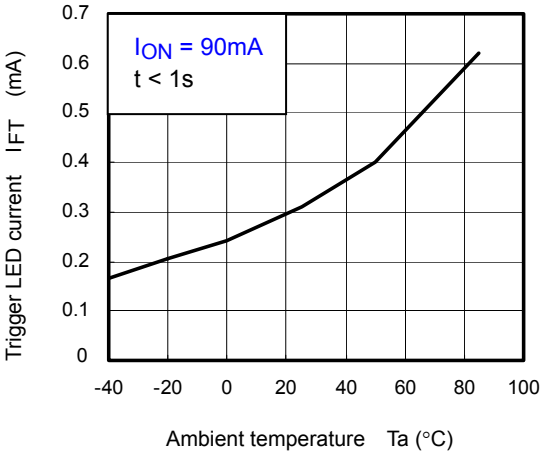
I_{ON} – V_{ON}



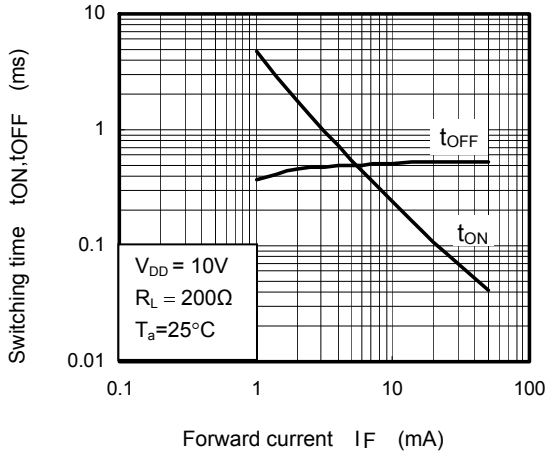
R_{ON} – Ta



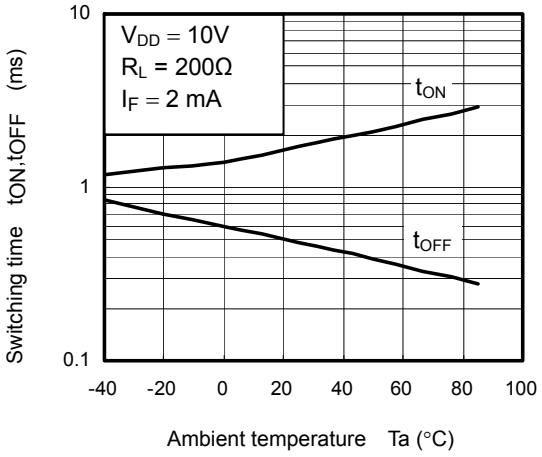
I_{FT} – Ta



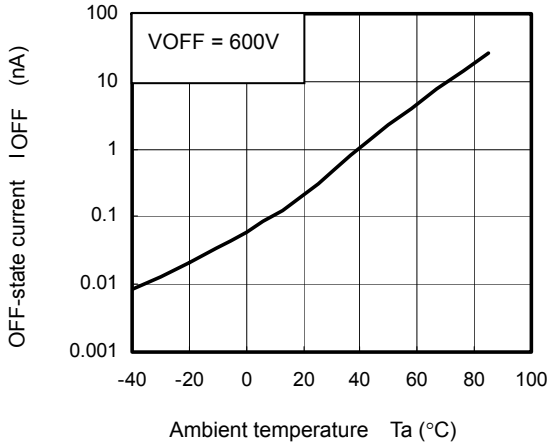
tON,tOFF ─ IF



tON,tOFF ─ Ta



IOFF ─ Ta



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