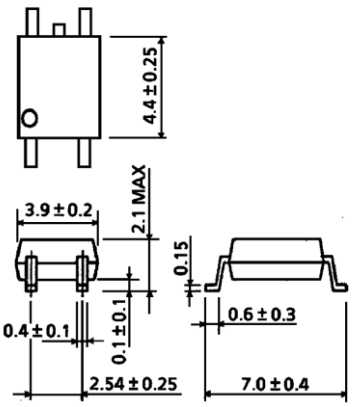
TOSHIBA Photocoupler GaAs Ired & Photo−MOS FET

TLP176A

PBX
Measurement Instrument
Data Acouisition
Measurement Equipment

Unit mm



JEDEC	—
JEITA	—
TOSHIBA	11-5H1

Weight: 0.1 g (typ.)

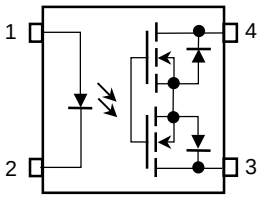
The TOSHIBA TLP176A consists of gallium arsenide infrared emitting diode optically coupled to a photo−MOS FET in a SOP, which is suitable for surface mount assembly.
The TLP176A is suitable for replacement of mechanical relays in many applications ehich require space savings.

- 4-pin SOP(2.54SOP4)
- Peak off−state voltage : 60V(min)
- Trigger LED current : 3mA(max)
- On-state current : 400mA(max)
- On-state resistance : 2Ω(max)
- Isolation voltage : 1500Vrms(min)
- UL recognized: UL1577, file No. E67349
- cUL recognized: CSA Component Acceptance Service No. 5A
  File No.E67349

- Option(V4) type
  VDE approved: EN 60747-5-5 (Note)

(Note) When an EN 60747-5-5 approved type is needed,
Please designate the “Option(V4)”

Pin Configuration (top view)



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

Start of commercial production
1998-03

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		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 (100μs pulse,100pps)	I_{FP}	1	A
	Reverse voltage	V_R	5	V
	Diode power dissipation	P_D	50	mW
	Diode power dissipation derating (Ta ≥25°C)	$\triangle P_D$ /°C	-0.5	mW/°C
	Junction temperature	T_j	125	°C
Detector	Off−state output terminal voltage	V_{OFF}	60	V
	On−state current	I_{ON}	400	mA
	On−state current derating (Ta ≥ 25°C)	ΔI_{ON} / °C	−4.0	mA / °C
	Output power dissipation	P_O	180	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP_O / °C	−1.8	mW / °C
	Junction temperature	T_j	125	°C
Storage temperature range		T_{stg}	−55 to 100	°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)		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: Pin 1 and 2 shorted together and pin 3 and 4 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{DD}	—	—	48	V
Forward current	I_F	5	7.5	25	mA
On−state current	I_{ON}	—	—	300	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.

Individual Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	VF = 0 V,f = 1 MHz	—	30	—	pF
Detector	Off−state current	I_{OFF}	V_{OFF} = 60V	—	—	1	μA
	Capacitance	C_{OFF}	V = 0 V,f = 1MHz	—	130	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}	I_{ON} = 400mA	—	1	3	mA
On−state resistance	R_{ON}	I_{ON} = 400mA,I_F = 5mA	—	1	2	Ω
Return LED current	I_{FC}	$I_{OFF=}$ 100μA	0.1	—	—	mA

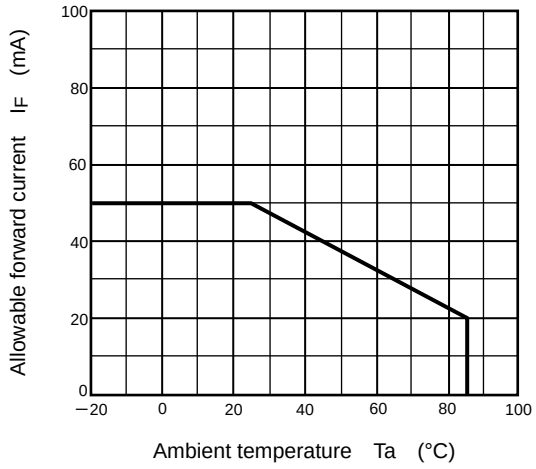
Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V,f = 1MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500V,R.H ≤ 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

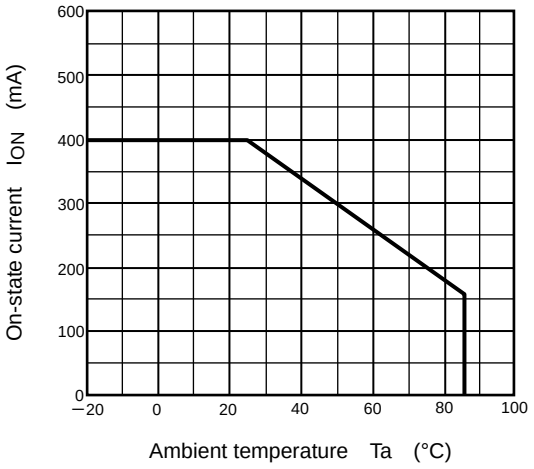
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn−on time	t_{ON}	R_L = 200Ω	—	0.6	2	ms
Turn−off time	t_{OFF}	V_{CC} = 20V, I_F = 5mA	—	0.1	1	

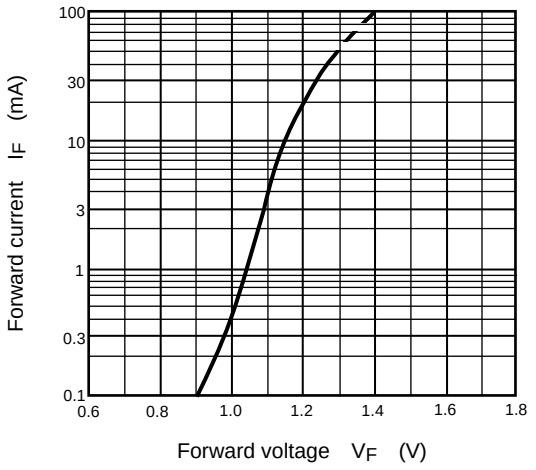
I_F – Ta



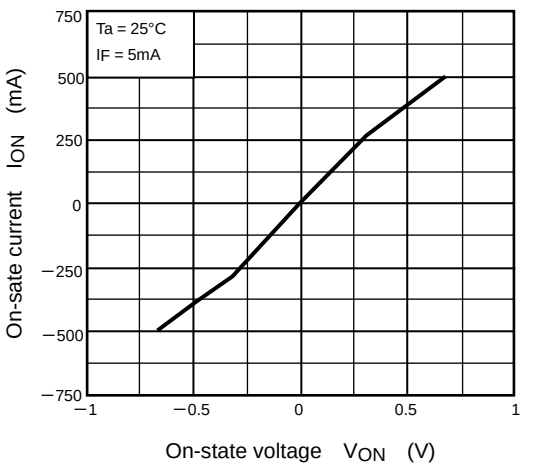
I_{ON} – Ta



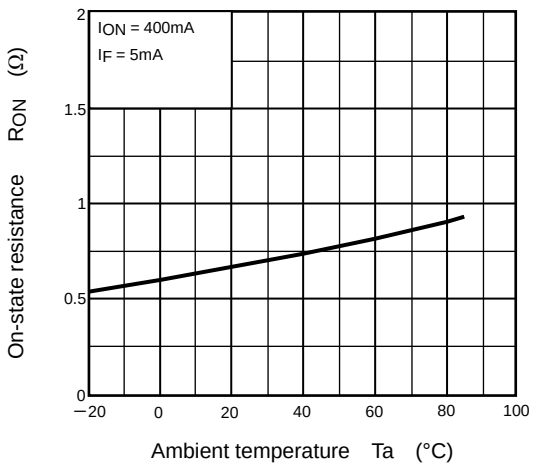
I_F – V_F



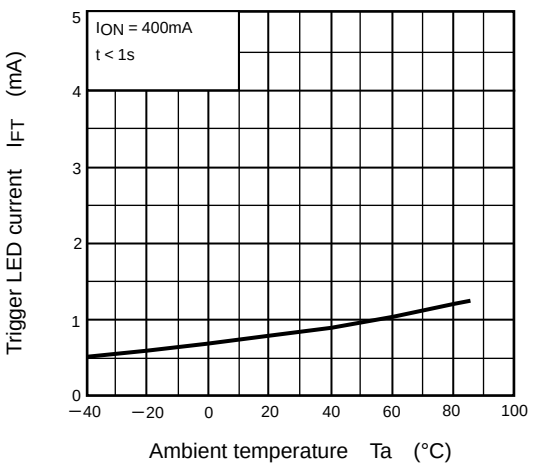
I_{ON} –V_{ON}



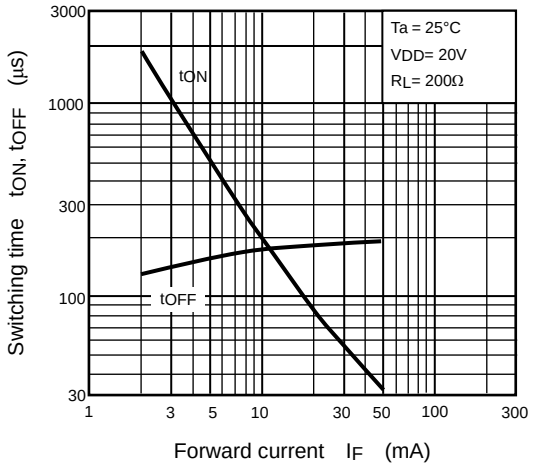
R_{ON} – Ta



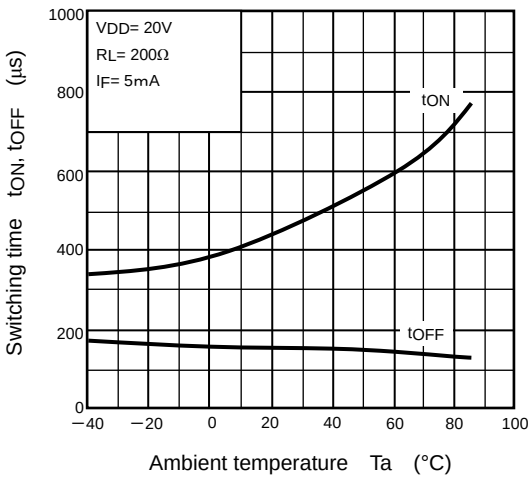
I_{FT} – Ta



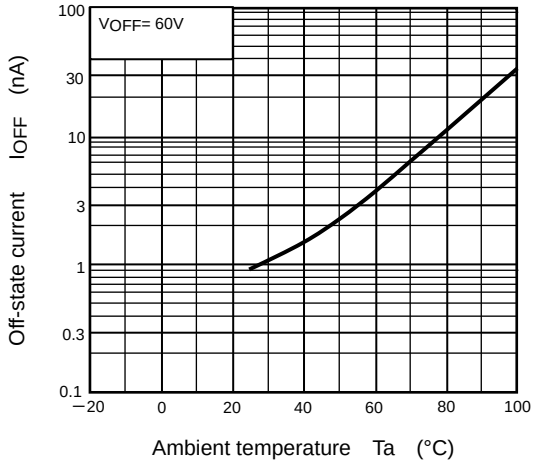
t_{ON}, t_{OFF} – I_F



t_{ON}, t_{OFF} – Ta



I_{OFF} – Ta



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