

TOSHIBA Photocoupler GaAs Ired & Photo-MOS FET

TLP176A

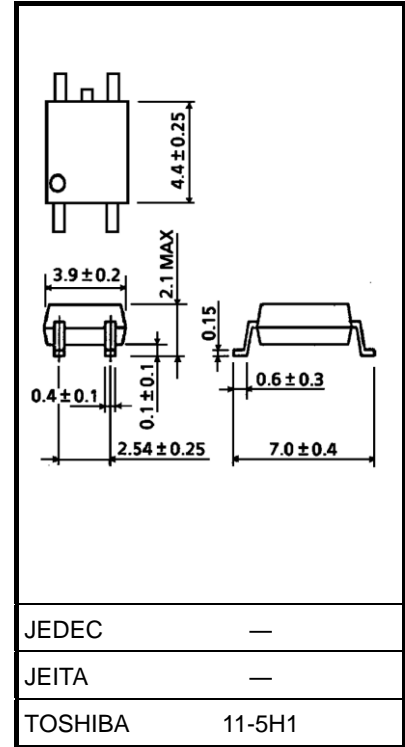
PBX
 Measurement Instrument
 Data Acquisition
 Measurement Equipment

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 which 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)

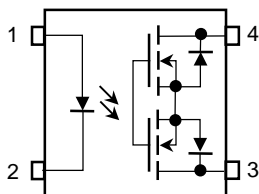
(Note) When an EN 60747-5-5 approved type is needed,
 Please designate the "Option(V4)"

Unit mm



Weight: 0.1 g (typ.)

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)	ΔP _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	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: 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	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Reverse current	I_R	$V_R = 5\text{V}$	—	—	10	μA
	Capacitance	C_T	$V_F = 0\text{V}, f = 1\text{MHz}$	—	30	—	pF
Detector	Off-state current	I_{OFF}	$V_{OFF} = 60\text{V}$	—	—	1	μA
	Capacitance	C_{OFF}	$V = 0\text{V}, f = 1\text{MHz}$	—	130	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

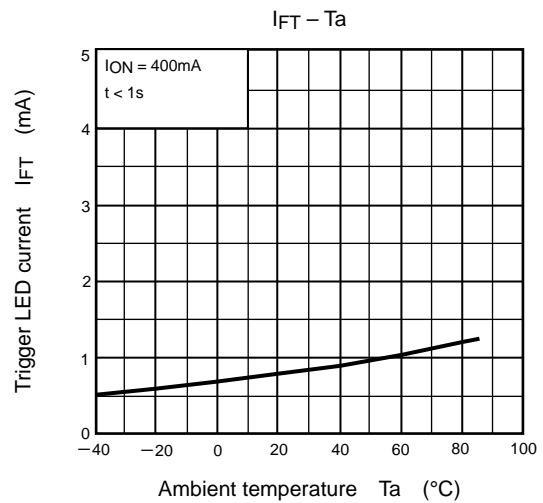
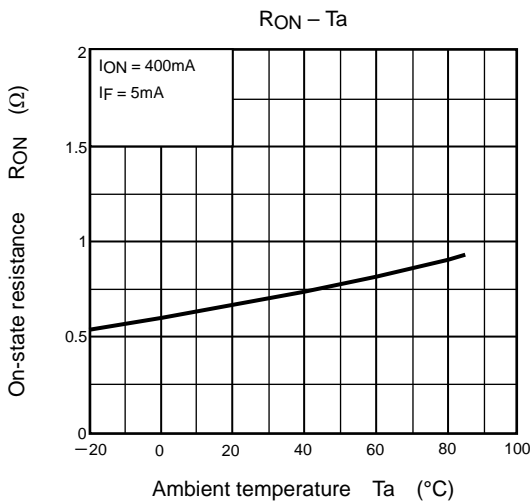
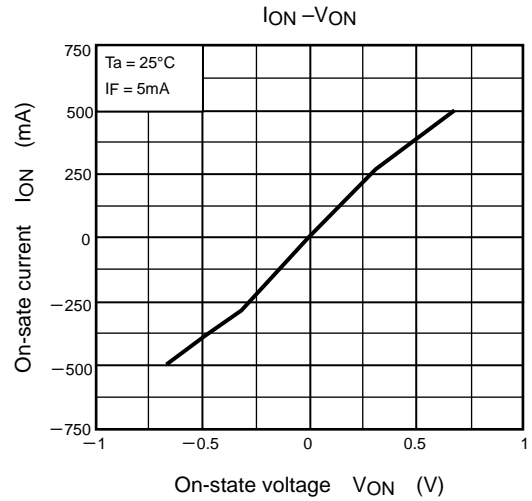
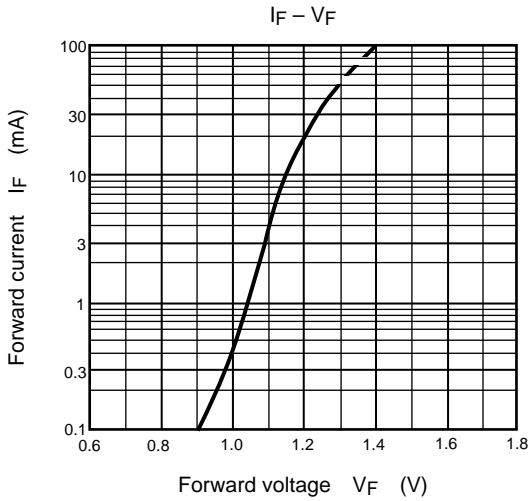
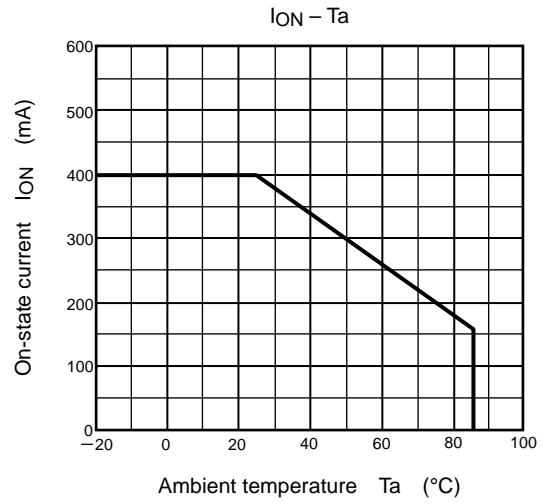
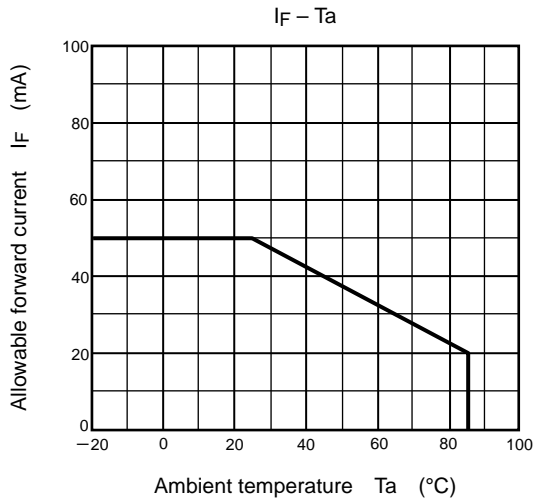
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}	$I_{ON} = 400\text{mA}$	—	1	3	mA
On-state resistance	R_{ON}	$I_{ON} = 400\text{mA}, I_F = 5\text{mA}$	—	1	2	Ω
Return LED current	I_{FC}	$I_{OFF} = 100\mu\text{A}$	0.1	—	—	mA

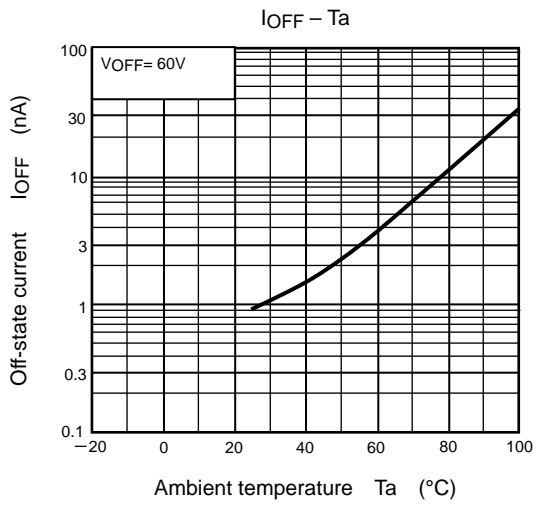
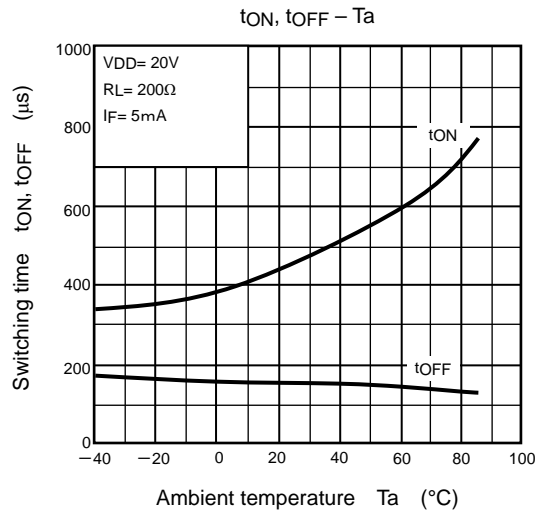
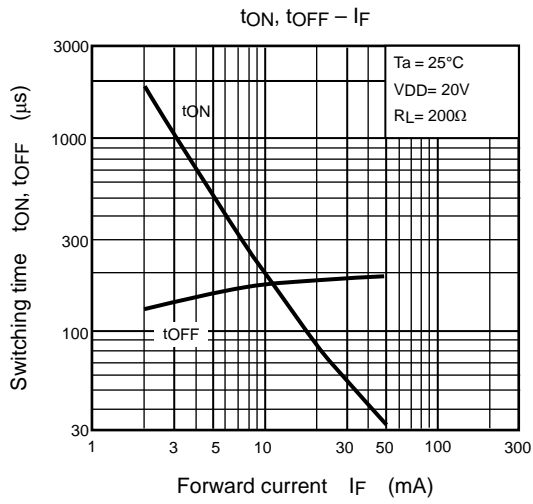
Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0\text{V}, f = 1\text{MHz}$	—	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	—	—	V_{rms}
		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}	$R_L = 200\Omega$	—	0.6	2	ms
Turn-off time	t_{OFF}	$V_{CC} = 20\text{V}, I_F = 5\text{mA}$	—	0.1	1	





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