

TOSHIBA Photocoupler GaAs Ired & Photo-MOS FET

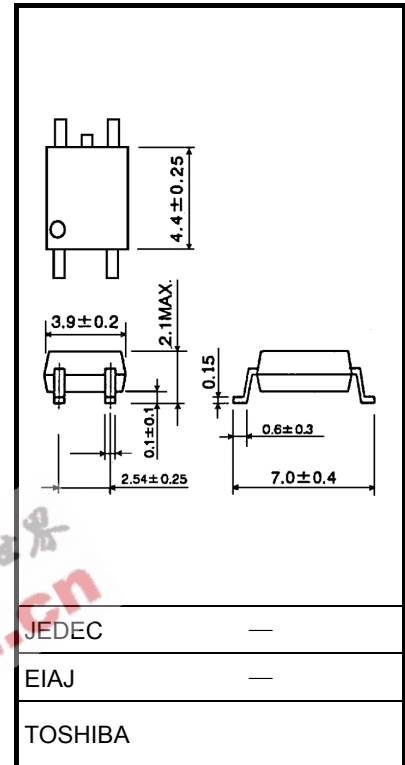
# TLP176G

Modems In PC  
 Modem-Fax Cards  
 Telecommunications

The TOSHIBA TLP176G 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 TLP176G is suitable for the modem applications which require space savings.

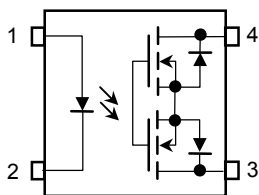
- Peak off-state voltage: 350V (min)
- Trigger LED current: 3mA (max)
- On-state resistance: 35Ω (max)
- Isolation voltage: 1500Vrms (min)
- UL recognized: UL1577, file No. E67349
- BSI approved
  - : BS EN60065: 2002, certificate No.8753
  - BS EN60950-1: 2002, certificate No.8754
- SEMKO approved: SS EN60065  
 SS EN60950
- Option(V4)type  
 TUV approved: DIN EN 60747-5-2  
 Certificate No.40009351

Unit in mm



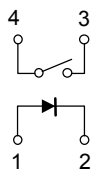
Weight: 0.1 g

## Pin Configuration (top view)

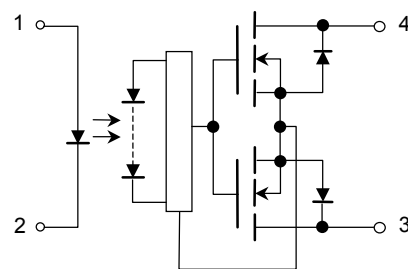


- 1. : Anode
- 2. : Cathode
- 3. : Drain
- 4. : Drain

1-Form-A



## Schematic



## Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I <sub>F</sub>	50	mA
	Forward current derating (Ta ≥ 25°C)	ΔI <sub>F</sub> / °C	-0.5	mA / °C
	Pulse forward current (100μs pulse, 100pps)	I <sub>FP</sub>	1	A
	Reverse voltage	V <sub>R</sub>	5	V
	Junction temperature	T <sub>j</sub>	125	°C
Detector	Off-state output terminal voltage	V <sub>OFF</sub>	350	V
	On-state current	I <sub>ON</sub>	120	mA
	On-state current derating (Ta ≥ 25°C)	ΔI <sub>ON</sub> / °C	-1.2	mA / °C
	Junction temperature	T <sub>j</sub>	125	°C
Total power dissipation		P <sub>T</sub>	350	mW
Total power dissipation derating (Ta ≥ 25°C)		ΔP <sub>T</sub> / °C	-0.35	mW / °C
Storage temperature range		T <sub>stg</sub>	-55~125	°C
Operating temperature range		T <sub>opr</sub>	-40~85	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note 1)		BV <sub>S</sub>	1500	V <sub>rms</sub>

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 <sub>DD</sub>	—	—	280	V
Forward current	I <sub>F</sub>	5	7.5	25	mA
On-state current	I <sub>ON</sub>	—	—	100	mA
Operating temperature	T <sub>opr</sub>	-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	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 350\text{V}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0, f = 1\text{MHz}$	—	40	—	pF

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

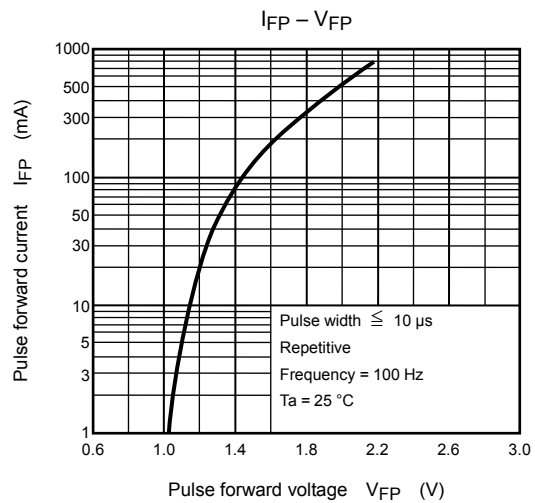
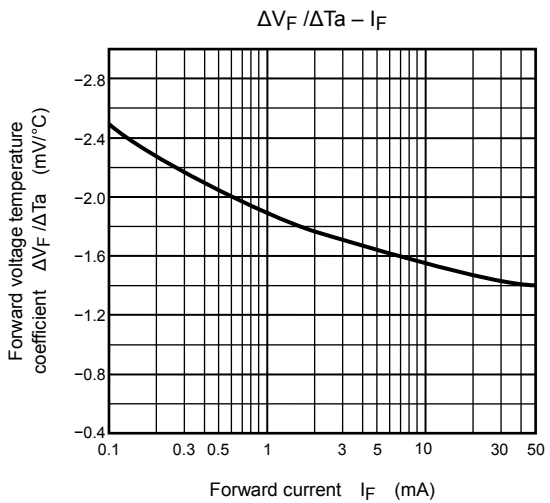
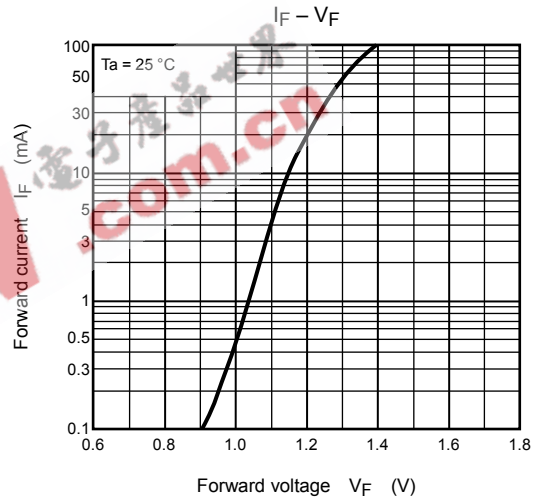
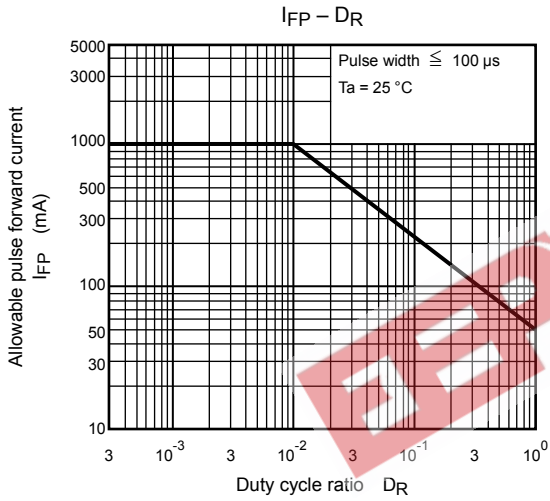
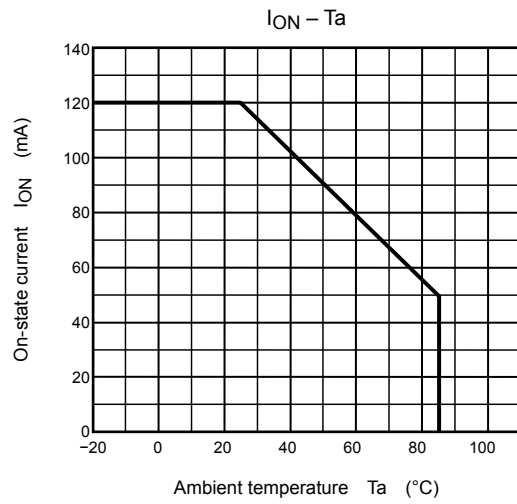
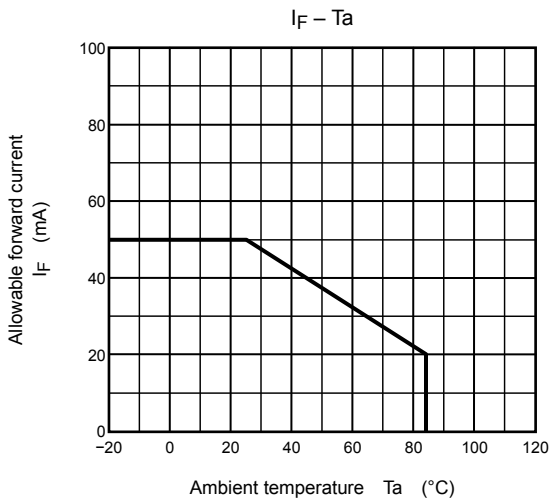
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 120\text{mA}$	—	1	3	mA
On-state resistance	$R_{ON}$	$I_{ON} = 120\text{mA}, I_F = 5\text{mA}$	—	22	35	$\Omega$

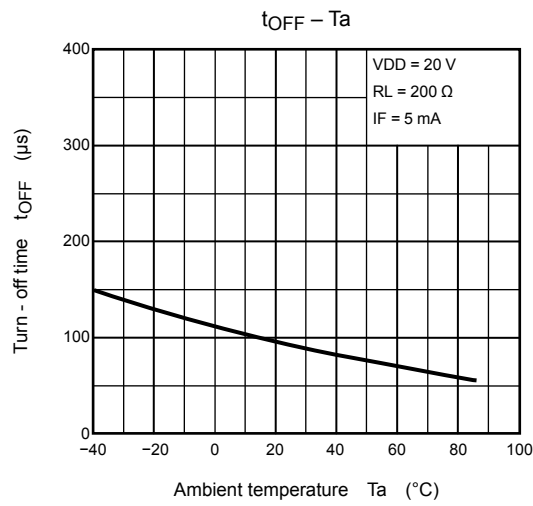
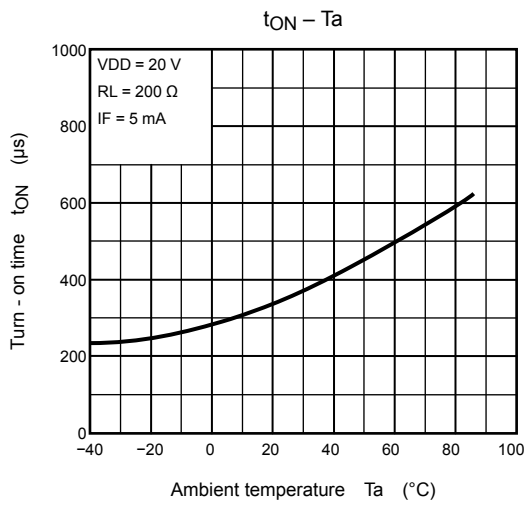
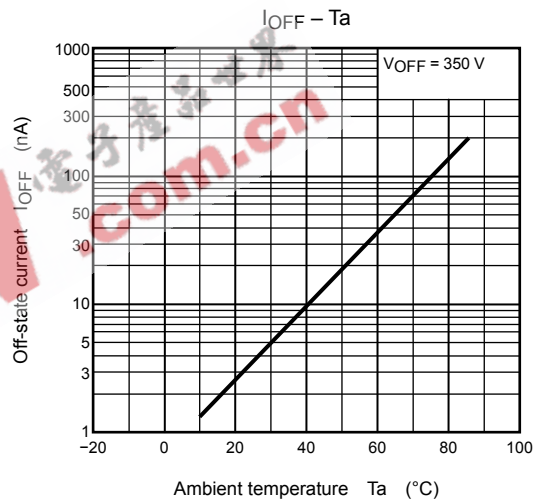
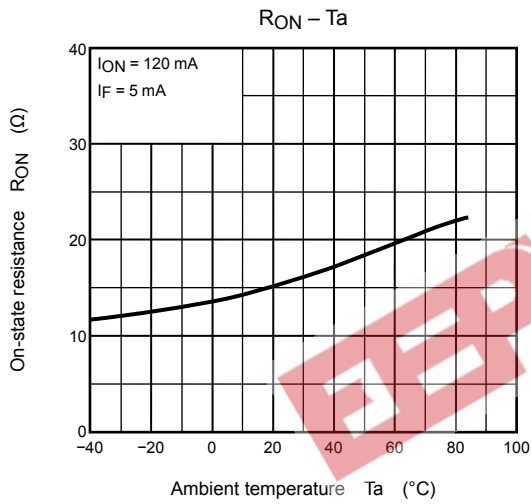
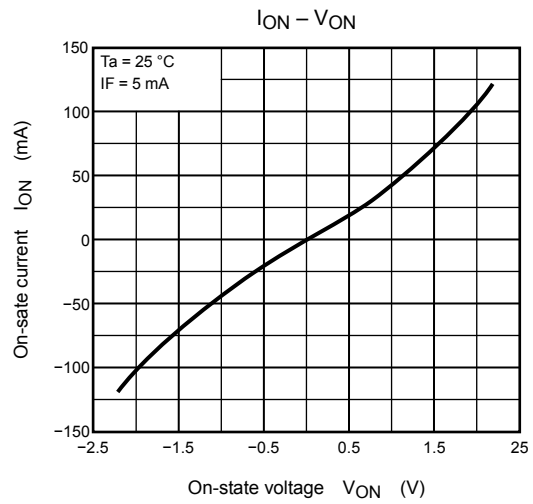
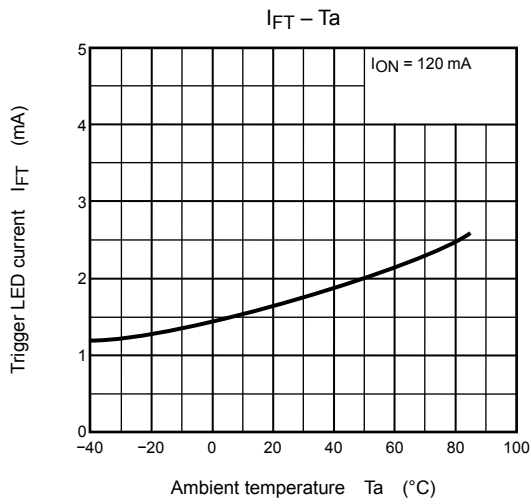
## Isolation Characteristics (Ta = 25°C)

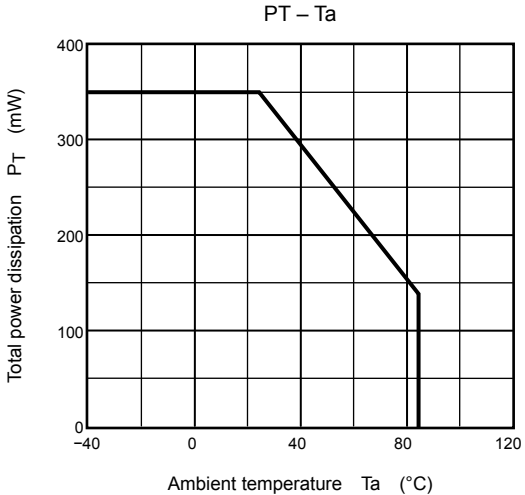
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	$C_S$	$V_S = 0, f = 1\text{MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500\text{V}, R.H \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1minute	1500	—	—	Vrms
		AC, 1second (in oil)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

## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on time	$t_{ON}$	$R_L = 200\Omega$	—	0.3	1	ms
Turn-off time	$t_{OFF}$	$V_{CC} = 20\text{V}, I_F = 5\text{mA}$	—	0.1	1	







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