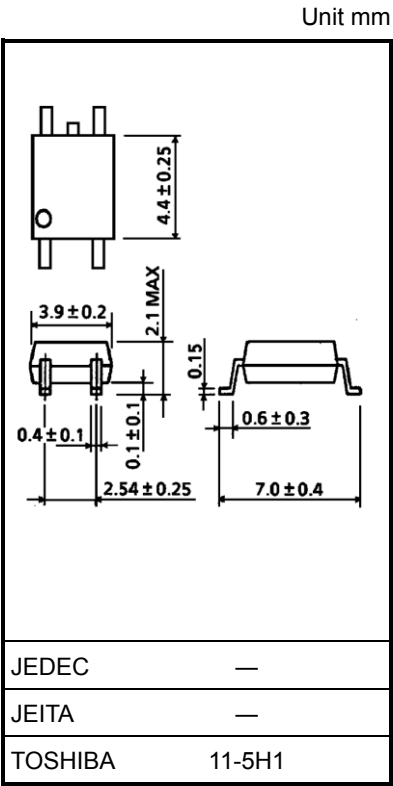


TLP176G

Modem-Fax Cards  
PBX  
STB  
Measurement Equipment

The TOSHIBA TLP176G consists of an infrared emitting diode optically coupled to a photo-MOS FET in a SOP, which is suitable for surface mount assembly.  
Because of the high-voltage MOSFET used to output terminals, TLP176G is suitable for a hook relay of a modem, a facsimile, and dial pulls relay.

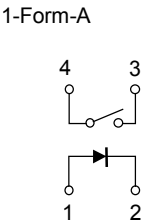
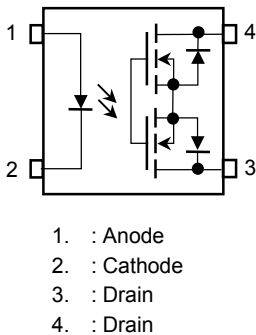
- 4-pin SOP(2.54SOP4)
- Peak off-state voltage: 350 V (min)  
On-state current:120 mA (max)
- Trigger LED current: 3 mA (max)
- On-state resistance: 35 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A  
File No.E67349
- VDE-approved: EN 60747-5-5 (Note 1)



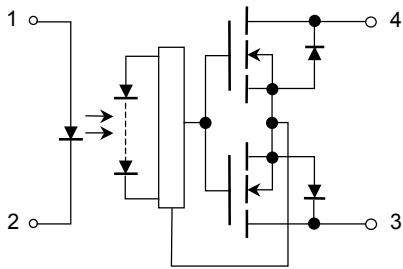
Weight: 0.1 g (typ.)

Note 1: When a VDE approved type is needed,  
please designate the **Option(V4)**.

Pin Configuration (top view)



Schematic



Start of commercial production  
1997-10

**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
	Diode power dissipation	P <sub>D</sub>	50	mW
	Diode power dissipation derating (Ta ≥ 25°C)	ΔP <sub>D</sub> / °C	-0.5	mW/°C
	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
	Output power dissipation	P <sub>O</sub>	300	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP <sub>O</sub> / °C	-3.0	mW / °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	-3.5	mW / °C
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C
Operating temperature range		T <sub>opr</sub>	-40 to 85	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
Isolation voltage (AC, 60 s, 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.

## 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	$C_T$	$V_F = 0\text{ V}$ , $f = 1\text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 350\text{ V}$	—	—	1	$\mu\text{A}$
	Capacitance between terminals	$C_{OFF}$	$V = 0\text{ V}$ , $f = 1\text{ MHz}$	—	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	$\Omega$
Return LED current	$I_{FC}$	$I_{OFF} = 100\text{ }\mu\text{A}$	0.1	—	—	mA

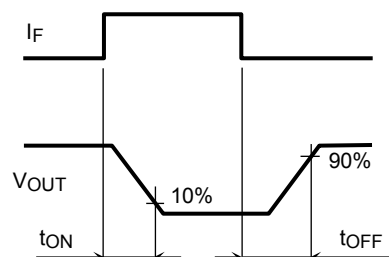
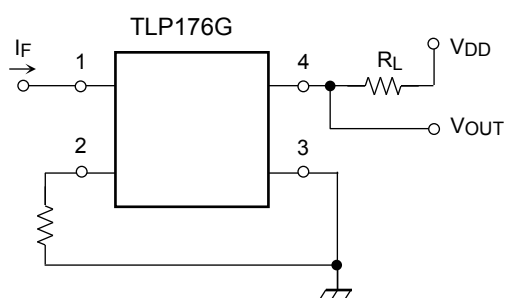
## Isolation Characteristics (Ta = 25°C)

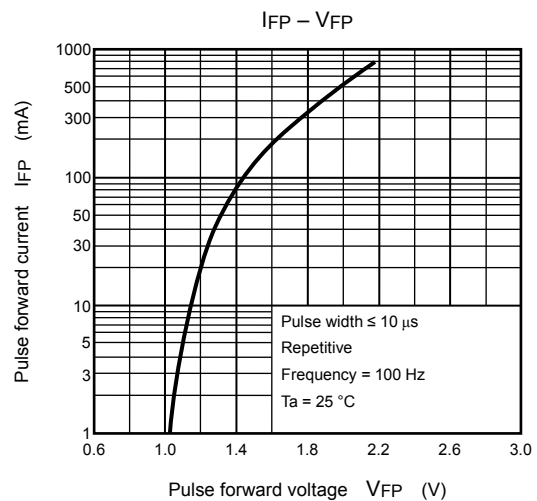
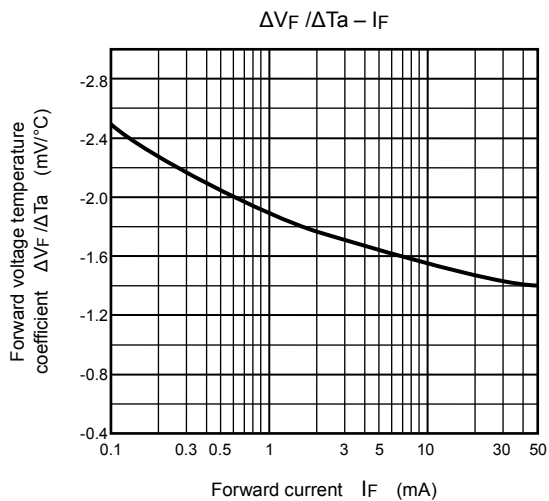
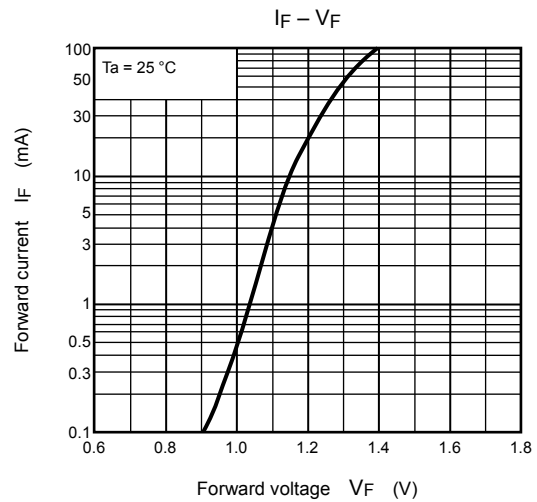
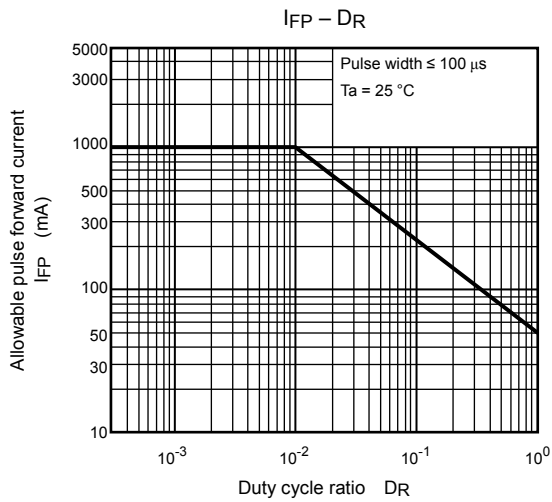
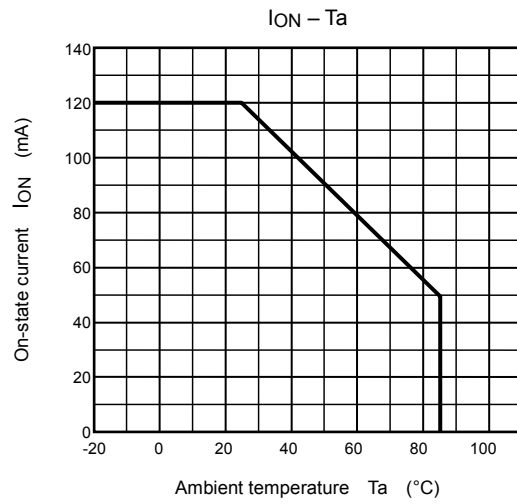
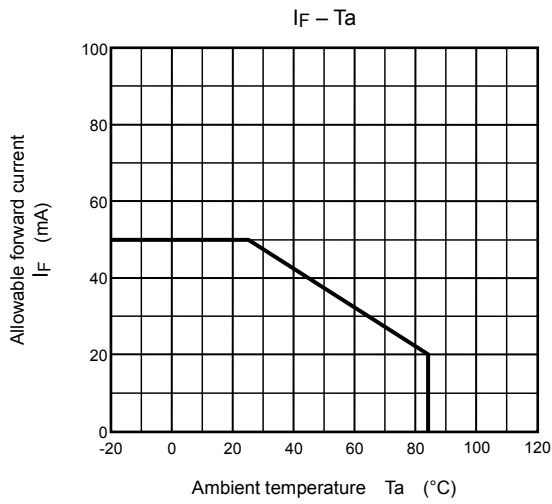
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0\text{ V}$ , $f = 1\text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500\text{ V}$ , $R.H \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 60 s	1500	—	—	Vrms

## Switching Characteristics (Ta = 25°C)

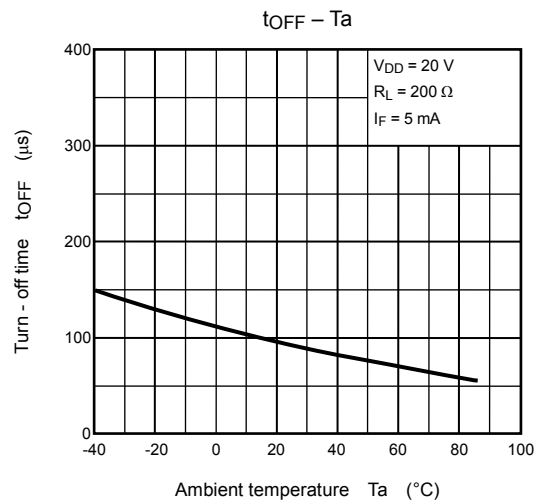
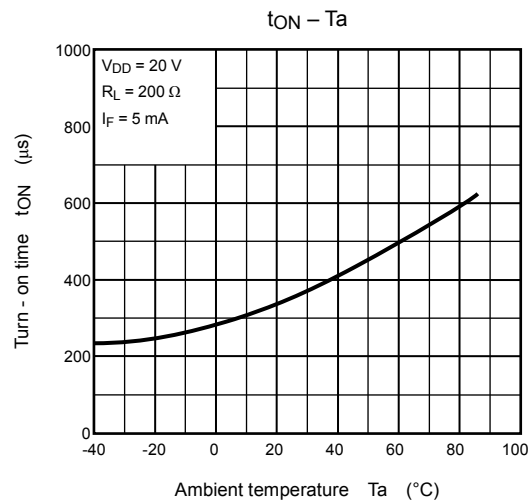
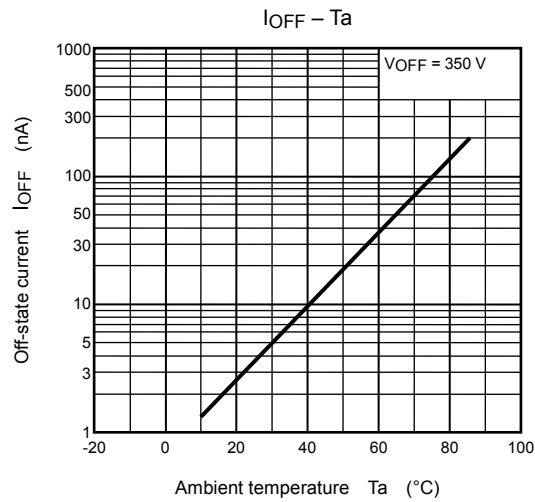
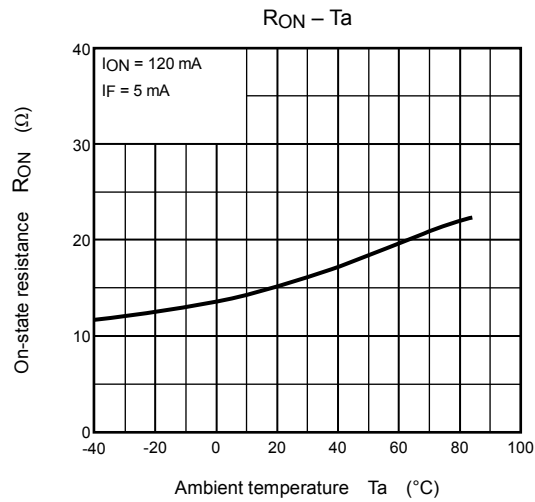
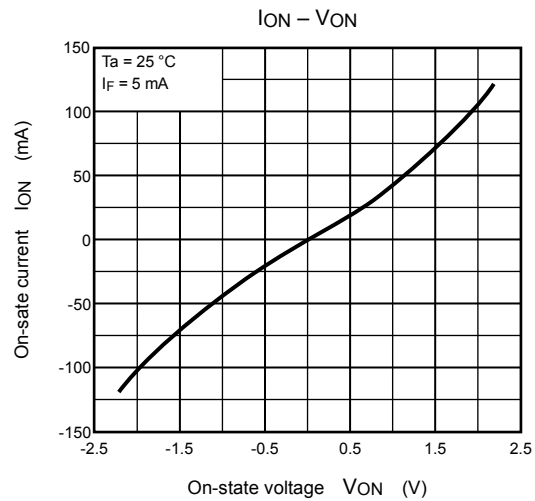
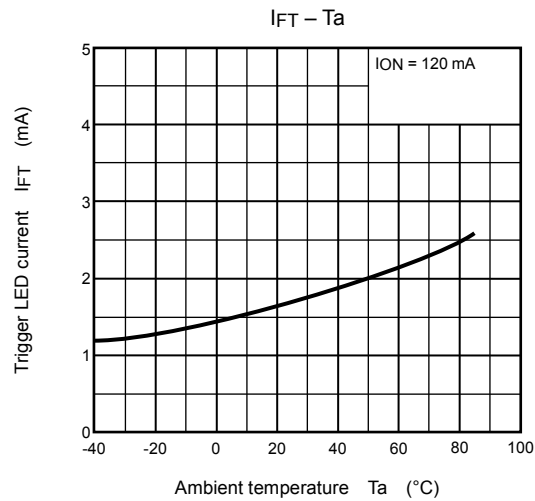
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200\text{ }\Omega$ (Note 2)	—	0.3	1	ms
Turn-off time	$t_{OFF}$	$V_{DD} = 20\text{ V}$ , $I_F = 5\text{ mA}$	—	0.1	1	

Note 2: Switching time test circuit





NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

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