Unit: mm

TOSHIBA Photocoupler Photorelay

# TLP176GA

### **PBX**

Telecommunication

Modem · FAX Cards, Modems In PC

Measurement Instrumentation

The TOSHIBA TLP176GA consists of an infrared emitting diode optically coupled to a photo-MOSFET in a SOP, which is suitable for surface mount assembly.

The TLP176GA is suitable for the modem applications which require space savings.

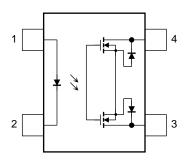
- 4 pin SOP (2.54SOP4): 2.1 mm high, 2.54 mm pitch
- 1-form-A
- Peak off-state voltage: 400 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance:  $35 \Omega$  (max)
- Isolation voltage: 1500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- VDE-approved: EN 60747-5-5 (Note 1)

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

# JEDEC — JEITA — TOSHIBA 11-5H1

Weight: 0.1 g (typ.)

### Pin Configuration (top view)



- 1: ANODE
- 2: CATHODE
- 3: DRAIN
- 4: DRAIN

Start of commercial production 2001-06

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

	Characteristics	Symbol	Rating	Unit
	Forward current	lF	50	mA
	Forward current derating (Ta≥25°C)	ΔI <sub>F</sub> /°C	-0.5	mA/°C
	Peak forward current (100 μs pulse, 100 pps)	IFP	1	Α
ED.	Reverse voltage	VR	5	V
	Diode power dissipation	PD	50	mW
	Diode power dissipation derating (Ta ≥25°C)	△P <sub>D</sub> /°C	-0.5	mW/°C
	Junction temperature	Tj	125	°C
	Off-state output terminal voltage	Voff	400	V
	On-state current	Ion	120	mA
Detector	On-state current derating (Ta≥25°C)	Δlon/°C	-1.2	mA/°C
Dete	Output power dissipation	Pc	350	mW
	Output power dissipation derating (Ta ≥ 25°C)	ΔP <sub>C</sub> / °C	-3.5	mW / °C
	Junction temperature	Tj	125	°C
Ope	Operating temperature range		-40 to 85	°C
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
	tion voltage 60 s, R.H.≤ 60 %) (Note 1)	BVs	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	Тур.	Max	Unit
Supply voltage	VDD	_	_	320	٧
Forward current	lF	5	7.5	25	mA
On-state current	Ion	_	_	120	mA
Operating temperature	Topr	-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)

	Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
	Forward voltage	VF	IF = 10 mA	1.0	1.15	1.3	V
LED	Reverse current	IR	V <sub>R</sub> = 5 V	_	_	10	μΑ
	Capacitance	Ст	V = 0 V, f = 1 MHz	_	30	_	pF
ctor	Off-state current	loff	Voff = 400 V			1	μА
Detector	Capacitance	C <sub>OFF</sub>	V = 0 V, f = 1 MHz	_	70	_	pF

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Trigger LED current	l <sub>FT</sub>	I <sub>ON</sub> = 120 mA	_	1	3	mA
Return LED current	IFC	IOFF = 100 μA	0.1	_	_	mA
On-state resistance	RON	$I_{ON} = 120 \text{ mA}, I_F = 5 \text{ mA}$	_	17	35	Ω

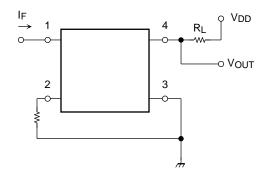
# **Isolation Characteristics (Ta = 25°C)**

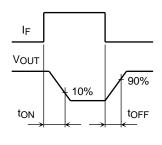
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Capacitance input to output	Cs	V <sub>S</sub> = 0 V, f = 1 MHz	_	0.8	_	pF
Isolation resistance	Rs	V <sub>S</sub> = 500 V, R.H.≤ 60 %	5 × 10 <sup>10</sup>	10 <sup>14</sup>	_	Ω
Isolation voltage	BVS	AC, 60 s	1500	_	_	Vrms

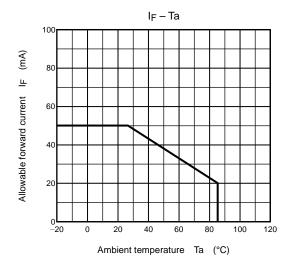
# **Switching Characteristics (Ta = 25°C)**

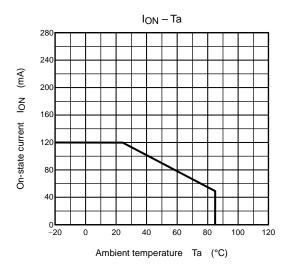
Characteristics Symbol Test Condition		Min	Тур.	Max	Unit	
Turn-on time	toN	$R_L = 200 \Omega$ (Note 2)	_	0.3	1	ms
Turn-off time	tOFF	$V_{DD} = 20 \text{ V}, \text{ IF} = 5 \text{ mA}$	_	0.1	1	ms

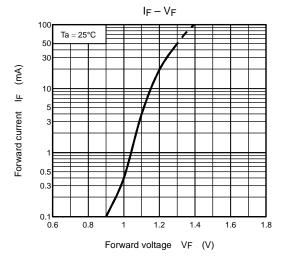
Note 2: Switching time test circuit

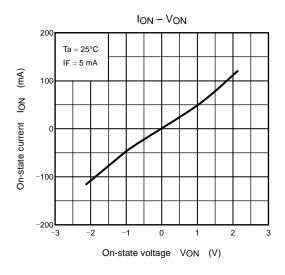


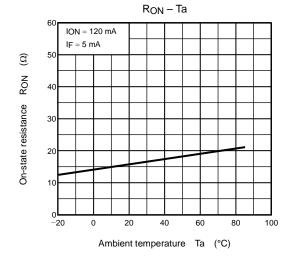


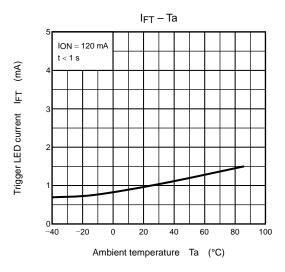




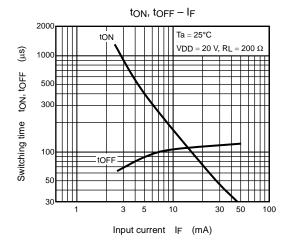


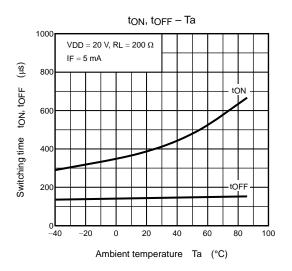


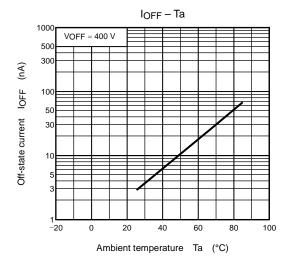




NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.







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TLP176GA



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