

# TLP285

**SWITCHING POWER SUPPLIES**  
**PROGRAMMABLE CONTROLLERS**  
**AC/DC-INPUT MODULES**

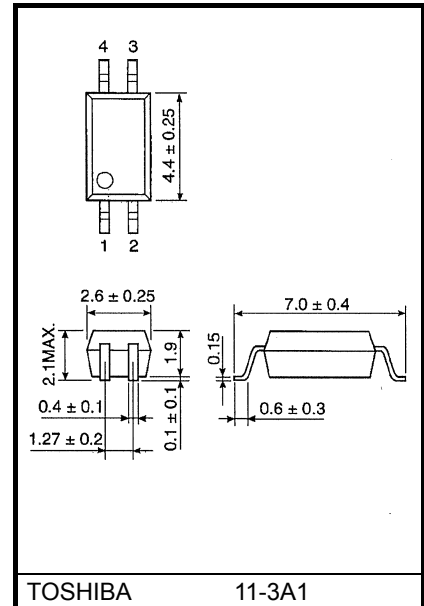
The TLP285 is a very small and thin photocopler, thus suitable for surface-mount assembly and used in small switching power supply and programmable controller applications.

The TLP285 consists of a gallium arsenide infrared emitting diode optically coupled to a phototransistor.

- Collector-Emitter Voltage: 80 V (min)
- Current Transfer Ratio: 50% (min)  
 Rank GB: 100% (min)
- Isolation Voltage: 3750 Vrms (min)
- UL (approved): UL1577, File No. E67349
- BSI (approved): BS EN 60065: 2002, BS EN 60950-1: 2006
- Option (V4) type  
 VDE(approved) : EN60747-5-2  
 Maximum Operating Insuration Voltage : 707 Vpk  
 Highest Permissible Over Voltage: 6000 Vpk

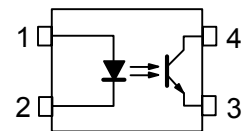
- Construction Mechanical Rating  
 Creepage Distance: 5.0 mm (min)  
 Clearance: 5.0 mm (min)  
 Insulation Thickness: 0.4 mm (min)

Unit: mm



Weight: 0.05 g (typ.)

**Pin Configuration (top view)**



- 1: ANODE
- 2: CATHODE
- 3: EMITTER
- 4: COLLECTOR

## Current Transfer Ratio

TYPE	Classification (Note1)	Current Transfer Ratio (%) ( $I_C / I_F$ )		Marking of Classification
		$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}, T_a = 25^\circ\text{C}$		
		Min	Max	
TLP285	Blank	50	600	Blank, Y <sup>■</sup> , YE, G, G <sup>■</sup> , GR, B, BL, GB
	Rank Y	50	150	YE
	Rank GR	100	300	GR
	Rank BL	200	600	BL
	Rank GB	100	600	GB
	Rank YH	75	150	Y <sup>■</sup>
	Rank GRL	100	200	G
	Rank GRH	150	300	G <sup>■</sup>
	Rank BLL	200	400	B

(Note 1): Ex. rank GB: TLP285 (GB)

(Note 2): Application type name for certification test, please use standard product type name, i.e.  
TLP285 (GB): TLP285

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

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	$I_F$	50	mA
	Forward Current Derating	$\Delta I_F / ^\circ\text{C}$	-0.7 (Ta ≥ 53°C)	mA / °C
	Pulse Forward Current (Note 3)	$I_{FP}$	1	A
	Reverse Voltage	$V_R$	5	V
	Junction Temperature	$T_j$	125	°C
DETECTOR	Collector-Emitter Voltage	$V_{CEO}$	80	V
	Emitter-Collector Voltage	$V_{ECO}$	7	V
	Collector Current	$I_C$	50	mA
	Collector Power Dissipation (1 Circuit)	$P_C$	150	mW
	Collector Power Dissipation Derating (Ta ≥ 25°C) (1 Circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / °C
	Junction Temperature	$T_j$	125	°C
	Operating Temperature Range	$T_{opr}$	-55~110	°C
	Storage Temperature Range	$T_{stg}$	-55~125	°C
	Lead Soldering Temperature	$T_{sol}$	260 (10 s)	°C
	Total Package Power Dissipation (1 Circuit)	$P_T$	200	mW
	Total Package Power Dissipation Derating (Ta ≥ 25°C) (1 Circuit)	$\Delta P_T / ^\circ\text{C}$	-2.0	mW / °C
	Isolation Voltage (Note 4)	$BV_S$	3750	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 3): Pulswidth ≤ 100 μs, 100 Hz frequency

(Note 4): AC, 1min., R.H. ≤ 60%. Apply voltage to LED pin and detector pin together.

## 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	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR) CEO}$	$I_C = 0.5 \text{ mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR) ECO}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector Dark Current (Note 6)	$I_{CEO}$	$V_{CE} = 48 \text{ V}$ , Ambient Light Below (100 lx) (Note 5)	—	0.01 (2)	0.1 (10)	μA
			$V_{CE} = 48 \text{ V}$ , Ta = 85°C Ambient Light Below (100 lx) (Note 5)	—	2 (4)	50 (50)	μA
	Capacitance (Collector to Emitter)	$C_{CE}$	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF

(Note 5): Irradiation to marking side using standard light bulb.

(Note 6): Because of the construction, leak current might be increased by ambient light.

Please use photocoupler with less ambient light.

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	$I_C / I_F$	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$ $I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	—	—	0.4	V
			—	0.2	—	
Off-State Collector Current	$I_C (\text{off})$	$V_F = 0.7 \text{ V}, V_{CE} = 48 \text{ V}$	—	—	10	$\mu\text{A}$

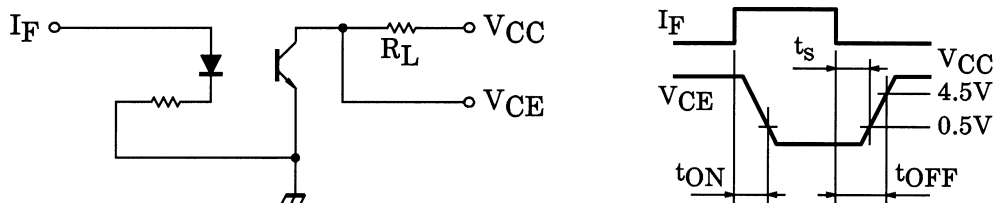
**Isolation Characteristics (Ta = 25°C)**

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	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	3750	—	—	Vrms
		AC, 1 second, in OIL	—	10000	—	Vdc
		DC, 1 minute, in OIL	—	10000	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	$t_r$	$V_{CC} = 10 \text{ V}, I_C = 2 \text{ mA}$ $R_L = 100 \Omega$	—	2	—	$\mu\text{s}$
Fall Time	$t_f$		—	3	—	
Turn-On Time	$t_{on}$		—	3	—	
Turn-Off Time	$t_{off}$		—	3	—	
Turn-On Time	$t_{ON}$	$R_L = 1.9 \text{ k}\Omega$ (Fig.1) $V_{CC} = 5 \text{ V}, I_F = 16 \text{ mA}$	—	2	—	$\mu\text{s}$
Storage Time	$t_s$		—	25	—	
Turn-Off Time	$t_{OFF}$		—	40	—	

(Fig.1) SWITCHING TIME TEST CIRCUIT



**RESTRICTIONS ON PRODUCT USE**

20070701-EN GENERAL

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