TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP185

Office Machine **Programmable Controllers AC** Adapter I/O Interface Board

The TOSHIBA mini flat coupler TLP185 is a small outline coupler, suitable for surface mount assembly.

TLP185 consists of a photo transistor optically coupled to a gallium arsenide infrared emitting diode. Since TLP185 is smaller than DIP package, it's suitable for high-density surface mounting applications such as programmable controllers.

- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 50 % (min)

Rank GB: 100% (min)

- Isolation voltage: 3750 Vrms (min)
- Operation Temperature:-55 to 110 °C
- Safety Standards

UL approved: UL1577, File No. E67349

cUL approved: CSA Component Acceptance Service No. 5A

File No.E67349

CQC approved:GB4943.1,GB8898 Japan and Thailand Factory



全 仅适用干海拔 2000m 以下地区安全使用

Option (V4) type

VDE approved: EN60747-5-5 ,EN60065,EN60950-1 (Note 1)

Under application EN62368-1

Note 1: When a EN60747-5-5 approved type is needed, Please designate "Option(V4)"

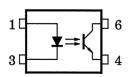
Construction mechanical rating

Creepage distance : 5.0 mm (min) Clearance : 5.0 mm (min) : 0.4 mm (min) Insulation thickness

Unit: mm TOSHIBA 11-4M1S

Weight: 0.08 g (typ.)

Pin Configuration (top view)



- 1: Anode
- 3: Cathode
- 4: Emitter
- 6: Collector

Current Transfer Ratio

		Current Transfer	Ratio (%) (I _C / I _F)			
Туре	Classification (Note1)	I _F = 5 mA, V _{CE} :	= 5 V, Ta = 25°C	Marking Of Classification		
		Min	Max	\wedge		
	Blank	50	400	Blank, YE, GR, GB, Y+, G, G+, B		
	Rank Y	50	150	YE , Y+		
	Rank GR	100	300	GR , G ,G+		
TLP185	Rank GB	100	400	GB, GR, G, G+, BL, B,		
11100	Rank YH	75	150	Y+		
	Rank GRL	100	200	G		
	Rank GRH	150	300	G+		
	Rank BLL	200	400	В		

Note1: Ex Rank GB: TLP185 (GB,E

Note: Application, type name for certification test, please use standard product type name, i, e.





Absolute Maximum Ratings (Ta = 25°C)

	Characteristic	Symbol	Rating	Unit
	Forward current	lF	50	mA
	Forward current derating (Ta ≥ 90°C)	ΔIF/°C	-1.5	mA/°C
	Pulse forward current (Note 1)	IFP	1	А
ED	Reverse voltage	VR	5	V
	Diode power dissipation	PD	100	mW
	Diode power dissipation derating (Ta >90°C)	∆P _D /°C	-2.9	mW/°C
	Junction temperature	Tj	125	<i>))</i> °c
	Collector-emitter voltage	VCEO	80	V
	Emitter-collector voltage	VECO		V
Detector	Collector current	Ic	50	mA (
Dete	Collector power dissipation	Pc	150	mW
	Collector power dissipation derating (Ta ≥ 25°C)	ΔP _C /°C	1.5	mW/°C
	Junction temperature	Tj	125	~ °C//
Оре	rating temperature range	Topr	-55 to 110	, \\c
Stor	rage temperature range	Tstg	-55 to 125	°C
Lead soldering temperature (10 s)		T _{sol} 260		<i>_</i> //∘c
Total package power dissipation		PT	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔΡτ/°C	-2.0	mW/°C
Isola	ation voltage (AC, 60 s, R.H. ≤ 60%) (Note 2)	BVs	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 1: Pulse width $\leq 100 \, \mu s$, $f = 100 \, Hz$

Note 2: Device considered a two terminal device: Pins 1 and 3 shorted together and 4 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min	Тур.	Max	Unit
Supply voltage	Vcc	_	5	48	V
Forward current	lF	_	16	20	mA
Collector current	Ic	_	1	10	mA

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.

TLP185

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit
	Forward voltage	VF	IF = 10 mA	1.1	1.25	1.4	V
LED	Reverse current	IR	V _R = 5 V	_	_	5	μΑ
	Capacitance	CT	V = 0 V, f = 1 MHz	/_	30	_	pF
	Collector-emitter breakdown voltage	V(BR)CEO	IC = 0.5 mA	80	_	_	٧
ō	Emitter-collector breakdown voltage	V(BR)ECO	IE = 0.1 mA	X) /_	_	٧
Detector	Collector dark current ICEO	loso	VCE = 48 V) <u> </u>	0.01	0.08	μΑ
۵		V _{CE} = 48 V, Ta = 85°C	\mathcal{A}	2	50	μΑ	
	Capacitance (collector to emitter)	CCE	V = 0 V, f = 1 MHz	_	10	-	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Current transfer ratio	I _C /I _F	I _F = 5 mA, V _{CE} = 5 V Rank GB	50 100	\mathcal{F}	400	%
Saturated CTR	I _C /I _{F(sat)}	I _F = 1 mA, V _{CE} = 0.4 V Rank GB	30	60	_ _	%
	(6	IC = 2.4 mA, IF = 8 mA) –	_	0.3	,
Collector-emitter saturation voltage	VCE(sat)	$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	/ — —	0.2	0.3	V
Off-state collector current	IC(off)	VF = 0.7 V, VCE = 48 V	_	1	10	μΑ

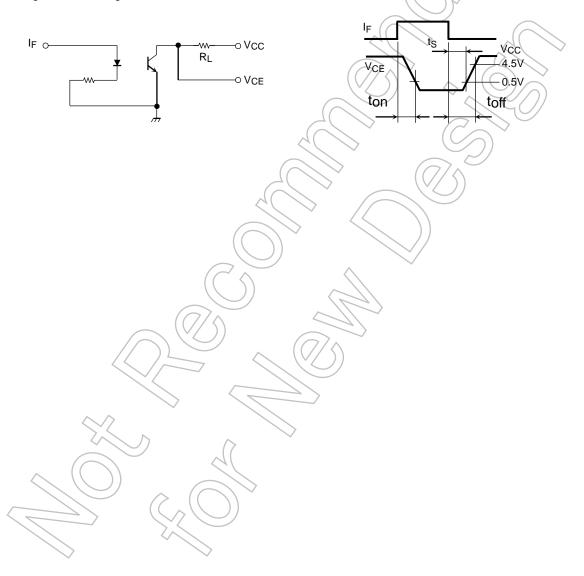
Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Capacitance (input to output)	Cs	Vs = 0 V, f = 1 MHz	_	0.8	_	pF
Isolation resistance	Rs	Vs = 500 V, R.H. ≤ 60%	1×10 ¹²	10 ¹⁴	_	Ω
		AC, 60 s	3750	_	_	Vrms
Isolation voltage	BVs	AC, 1 s, in oil	_	10000	_	VIIIIS
		DC, 60 s, in oil	_	10000	_	Vdc

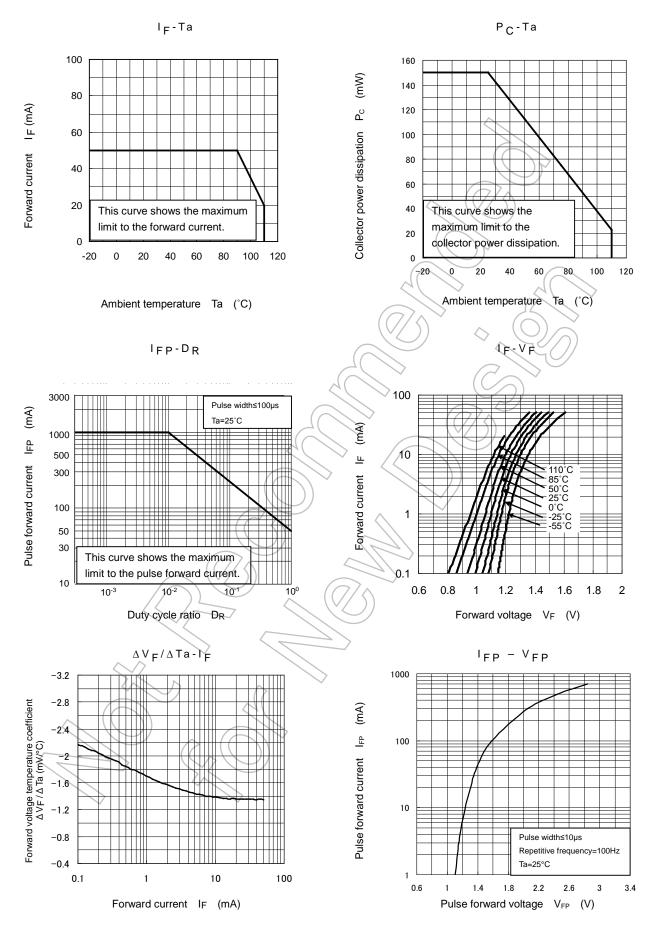
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Rise time	tr		_	5	_	
Fall time	tf	$V_{CC} = 10 \text{ V}, I_{C} = 2 \text{ mA}$ $R_{L} = 100 \Omega$	_	9	_	
Turn-on time	t _{on}		7	9	_	μs
Turn-off time	t _{off}		(-)	9	_	
Turn-on time	ton		1) / 2	_	
Storage time	ts	$R_L = 1.9 \text{ k}\Omega$ (Fig.1) $V_{CC} = 5 \text{ V, I}_F = 16 \text{ mA}$	77	30	_	μs
Turn-off time	t _{off}		$\bigcirc)$	70	_	

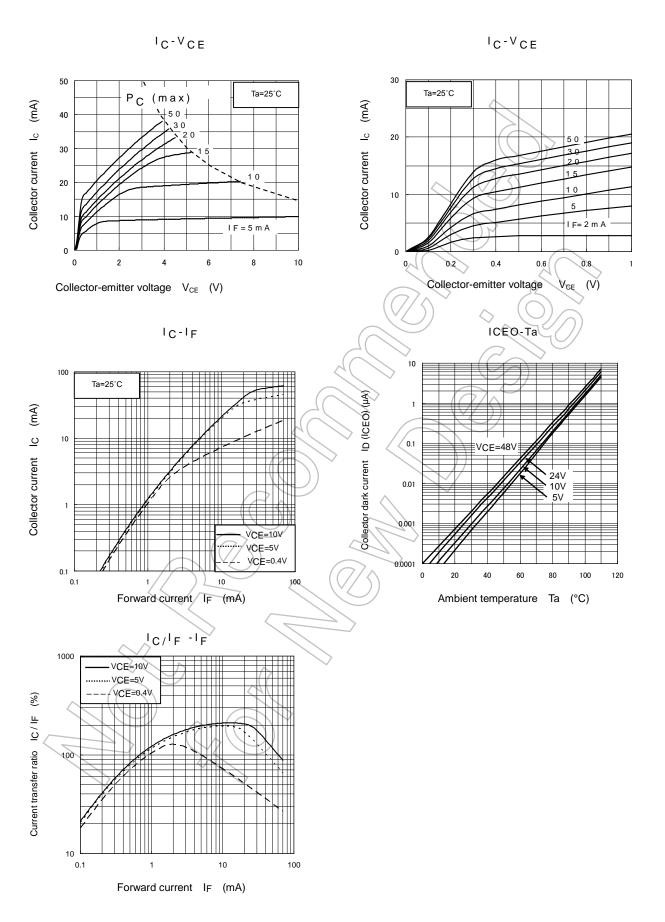
Fig. 1 Switching time test circuit



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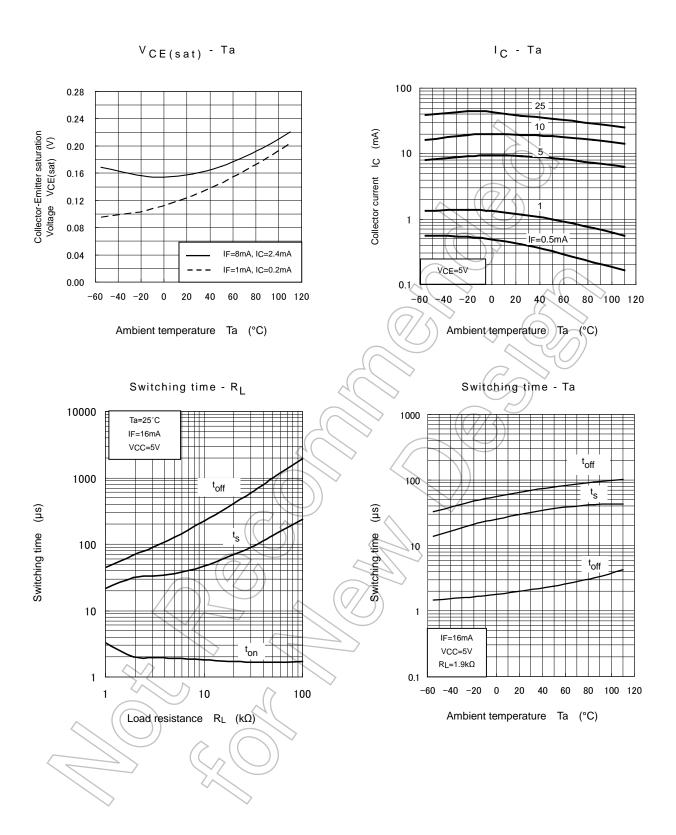


^{*}The above graphs show typical characteristic.



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Soldering and Storage

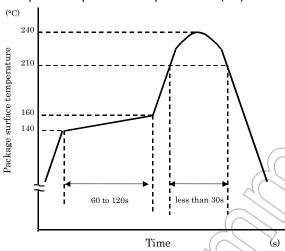
1. Soldering

1.1 Soldering

When using a soldering iron or medium infrared ray/hot air reflow, avoid a rise in device temperature as much as possible by observing the following conditions.

1) Using solder reflow

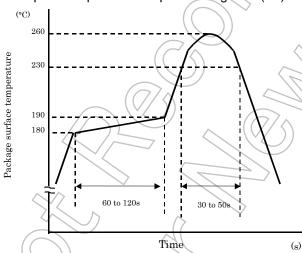
·Temperature profile example of lead (Pb) solder



This profile is based on the device's maximum heat resistance guaranteed value.

Set the preheat temperature/heating temperature to the optimum temperature corresponding to the solder paste type used by the customer within the described profile.

·Temperature profile example of using lead (Pb)-free solder



This profile is based on the device's maximum heat resistance guaranteed value.

Set the preheat temperature/heating temperature to the optimum temperature corresponding to the solder paste type used by the customer within the described profile.

Reflow soldering must be performed once or twice.

The mounting should be completed with the interval from the first to the last mountings being 2 weeks.

2) Using solder flow (for lead (Pb) solder, or lead (Pb)-free solder)

Please preheat it at 150°C between 60 and 120 seconds.

Complete soldering within 10 seconds below 260°C. Each pin may be heated at most once.

3) Using a soldering iron

Complete soldering within 10 seconds below 260°C, or within 3 seconds at 350°C. Each pin may be heated at most once.

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2. Storage

- 1) Avoid storage locations where devices may be exposed to moisture or direct sunlight.
- 2) Follow the precautions printed on the packing label of the device for transportation and storage.
- 3) Keep the storage location temperature and humidity within a range of 5°C to 35°C and 45% to 75%, respectively.
- 4) Do not store the products in locations with poisonous gases (especially corrosive gases) or in dusty conditions.
- 5) Store the products in locations with minimal temperature fluctuations. Rapid temperature changes during storage can cause condensation, resulting in lead oxidation or corrosion, which will deteriorate the solderability of the leads.
- 6) When restoring devices after removal from their packing, use anti-static containers.
- 7) Do not allow loads to be applied directly to devices while they are in storage.
- 8) If devices have been stored for more than two years under normal storage conditions, it is recommended that you check the leads for ease of soldering prior to use.

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