

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP181

Office Machine

Programmable Controllers

AC Adapter

I/O Interface Board

The TOSHIBA mini flat coupler TLP181 is a small outline coupler, suitable for surface mount assembly.

TLP181 consist of a photo transistor optically coupled to a gallium arsenide infrared emitting diode. Since TLP181 is smaller than DIP package, it's suitable for high-density surface mounting applications such as programmable controllers

- Collector-emitter voltage: 80V (min)
- Current transfer ratio: 50% (min)
Rank GB: 100% (min)
- Isolation voltage: 3750Vrms (min)
- Operation Temperature:-55 to 110 °C
- Safety Standards
UL recognized: UL1577, File No. E67349
cUL recognized: CSA Component Acceptance Service No. 5A
File No.E67349
- BSI approved: BS EN60065:2002, certificate No.8285
BS EN60950-1:2006 certificate No.8286

Option (V4) type

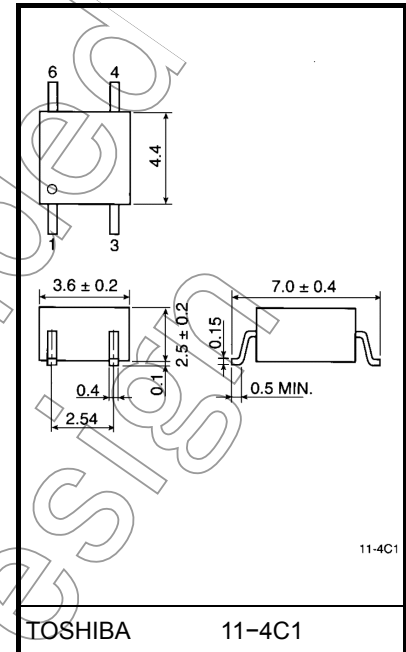
VDE approved : EN60747-5-2

Maximum Operating Insuration Voltage: 565 Vpk

Highest Permissible Overvoltage: 6000 Vpk

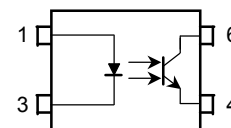
**(Note) : When a EN60747-5-2 approved type is needed,
Please designate "Option(V4)"**

Unit in mm



Weight: 0.09 g (Typ.)

Pin Configuration (top view)



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

Current Transfer Ratio

Type	Classification *1	Current Transfer Ratio (%) (I _C / I _F)		Marking Of Classification
		I _F = 5mA, V _{CE} = 5V, Ta = 25°C		
		Min	Max	
TLP181	Blank	50	600	Blank ,Y,Y [■] ,YE,G,G [■] ,GR,B, 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 [■]
	Rank GRL	100	200	G
	Rank GRH	150	300	G [■]
	Rank BLL	200	400	B [■]

*1: EX, Rank GB: TLP181 (GB)

(Note) Application, type name for certification test, please use standard product type name, i. e.
TLP181 (GB): TLP181

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I_F	50	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-1.4 (Ta $\geq 89^\circ\text{C}$)	mA / $^\circ\text{C}$
	Pulse forward current (100 μs pulse, 100pps)	I_{FP}	1	A
	Reverse voltage	V_R	5	V
	Junction temperature	T_j	125	$^\circ\text{C}$
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 (1 Circuit Ta $\geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / $^\circ\text{C}$
	Junction temperature	T_j	125	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 125	$^\circ\text{C}$
Operating temperature range		T_{opr}	-55 to 110	$^\circ\text{C}$
Lead soldering temperature		T_{sol}	260 (10s)	$^\circ\text{C}$
Total package power dissipation		P_T	200	mW
Total package power dissipation derating (Ta $\geq 25^\circ\text{C}$)		$\Delta P_T / ^\circ\text{C}$	-2.0	mW / $^\circ\text{C}$
Isolation voltage (AC, 1min., R.H. $\leq 60\%$) (Note 1)		BVS	3750	V_{rms}

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: Pin1, 3 shorted together and pins 4, 6 shorted together

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	48	V
Forward current	I_F	—	16	20	mA
Collector current	I_C	—	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.

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	$V_{(BR) \text{ CEO}}$	$I_C = 0.5 \text{ mA}$	80	—	—	V
	Emitter–collector breakdown voltage	$V_{(BR) \text{ ECO}}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{\text{CE}} = 48 \text{ V}, (\text{ Ambient light below } 1000 \text{ lx})$	—	0.01 (2)	0.1 (10)	μA
			$V_{\text{CE}} = 48 \text{ V}, T_a = 85^{\circ}\text{C}, (\text{ Ambient light below } 1000 \text{ lx})$	—	2 (4)	50 (50)	μA
	Capacitance (collector to emitter)	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_C / I_F	$I_F = 5 \text{ mA}, V_{\text{CE}} = 5 \text{ V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1 \text{ mA}, V_{\text{CE}} = 0.4 \text{ V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-emitter saturation voltage	$V_{\text{CE}} (\text{sat})$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$	—	—	0.4	V
		$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	—	0.2	—	
			—	—	0.4	
Off-state collector current	$I_C (\text{off})$	$V_F = 0.7 \text{ V}, V_{\text{CE}} = 48 \text{ V}$	—	1	10	μA

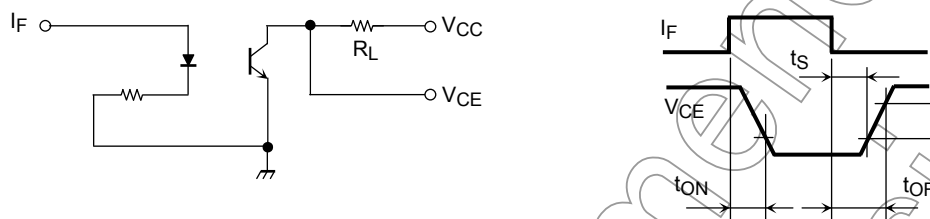
Isolation Characteristics (Ta = 25°C)

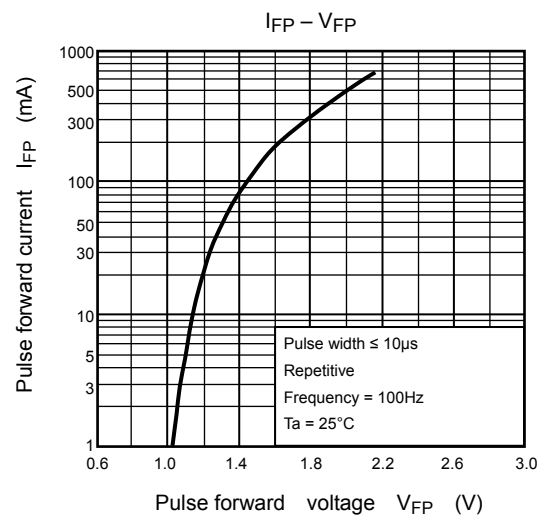
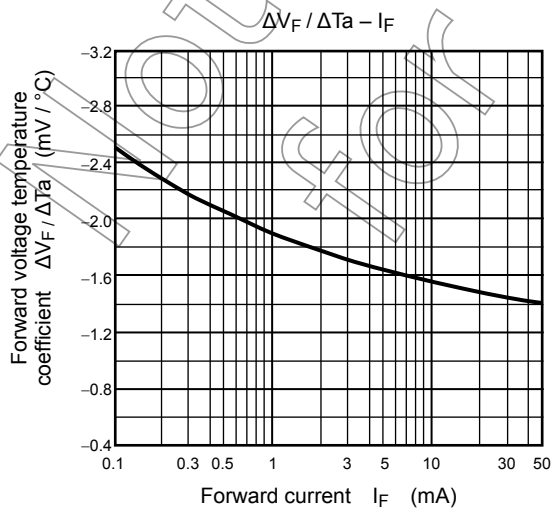
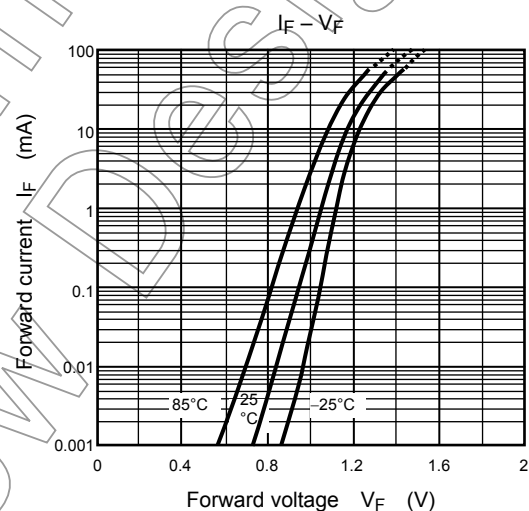
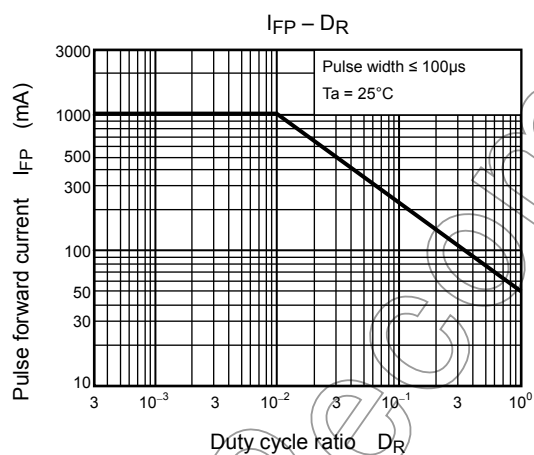
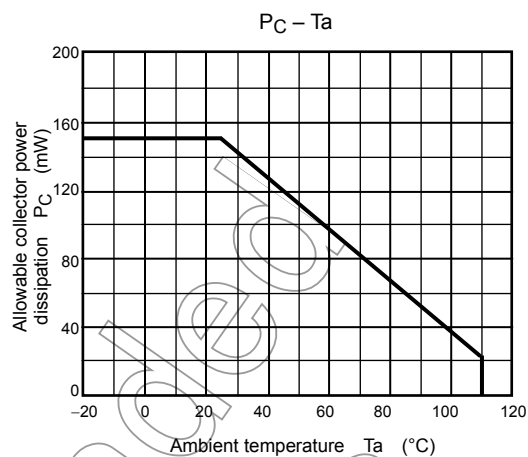
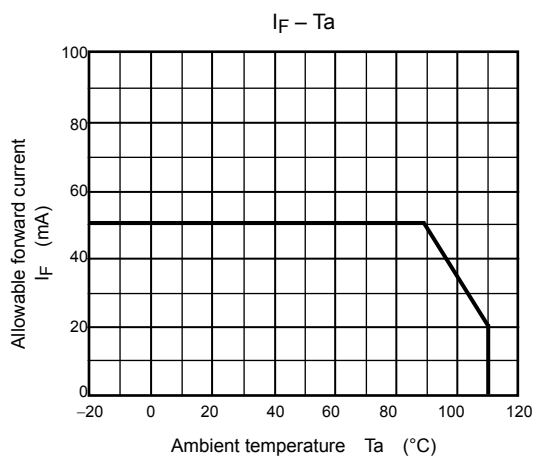
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	1×10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	3750	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V_{dc}

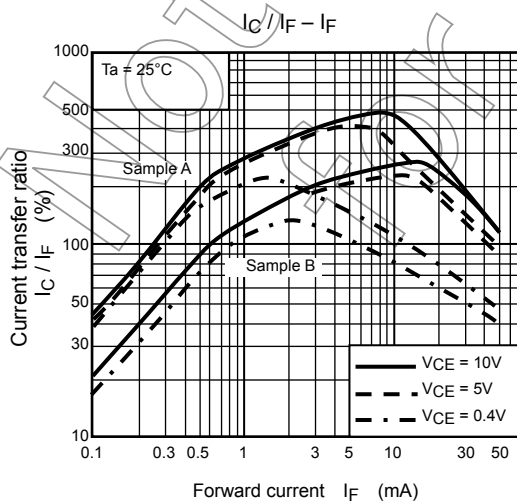
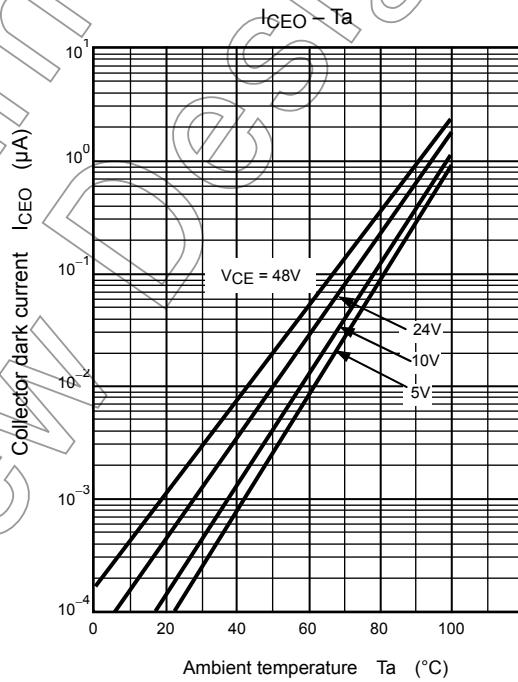
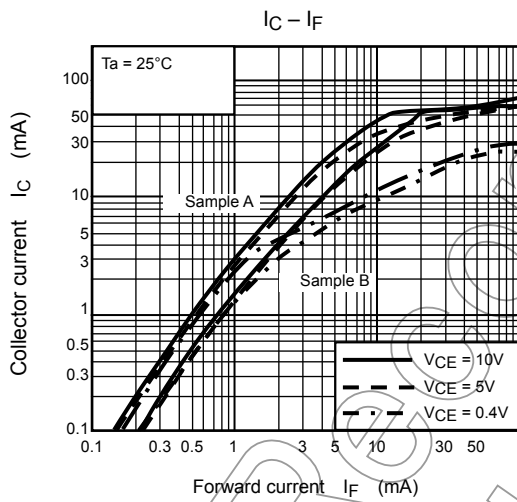
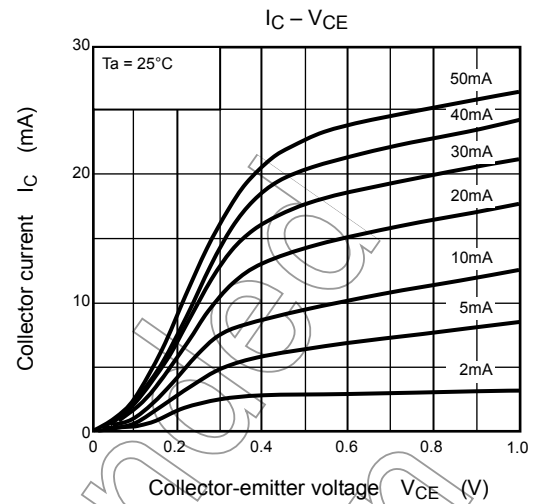
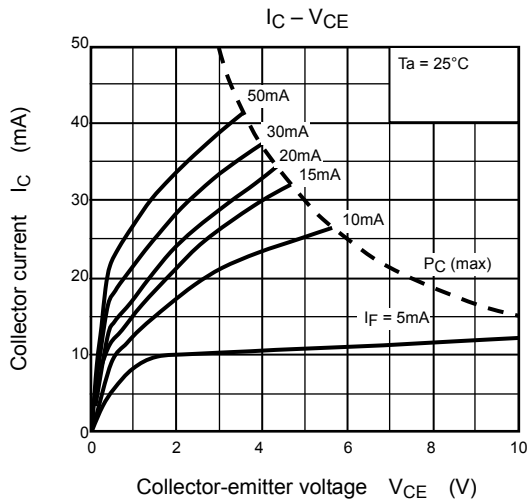
Switching Characteristics (Ta = 25°C)

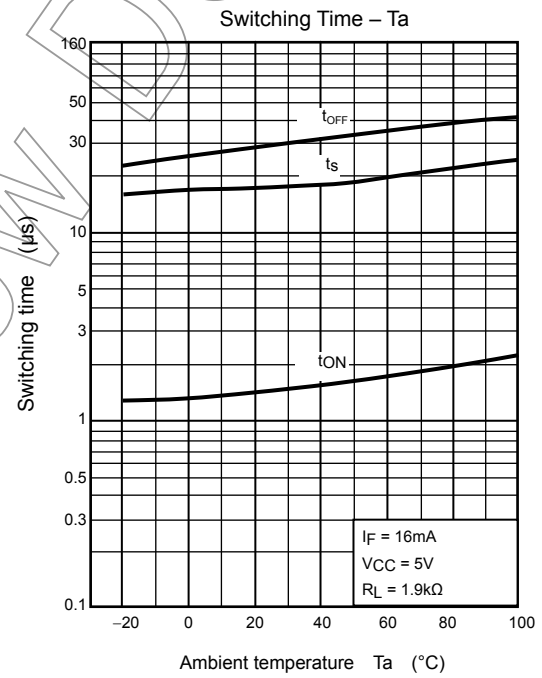
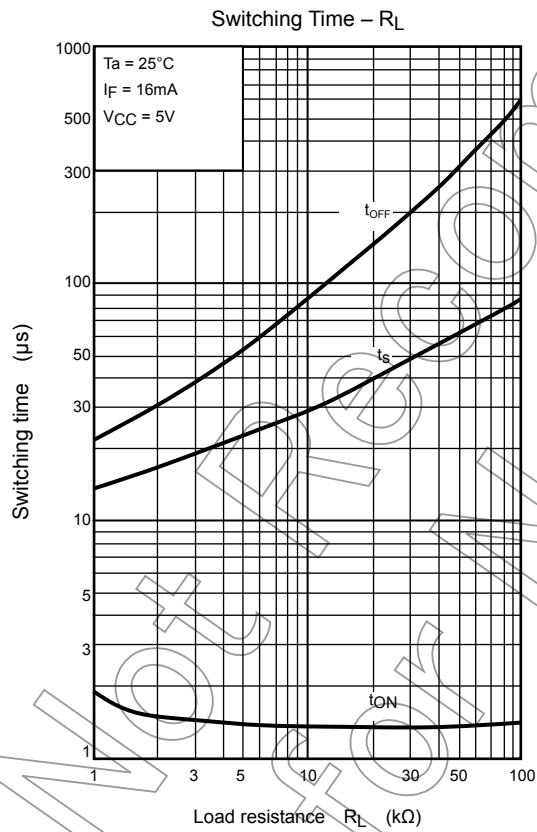
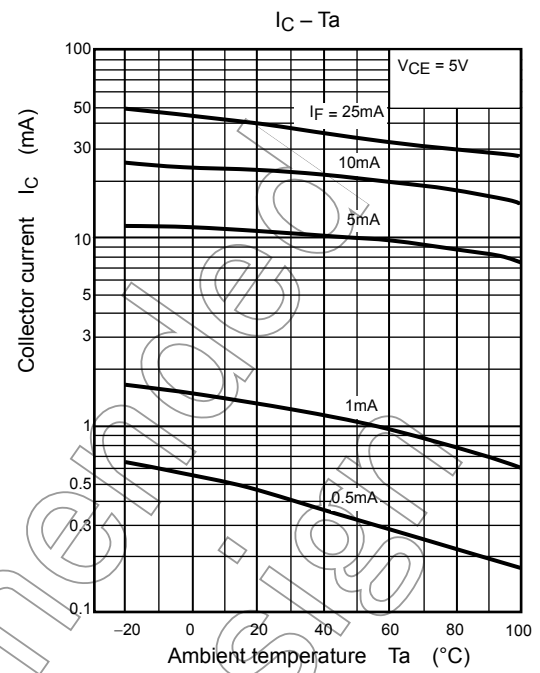
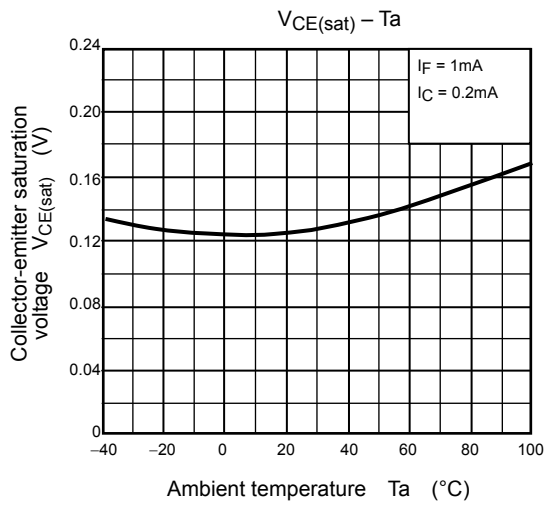
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = 16\text{ mA}$ (Fig.1)	—	2	—	μs
Storage time	t_s		—	25	—	
Turn-off time	t_{OFF}		—	40	—	

Fig. 1 Switching time test circuit









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