

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP181

Office Machine

Programmable Controllers

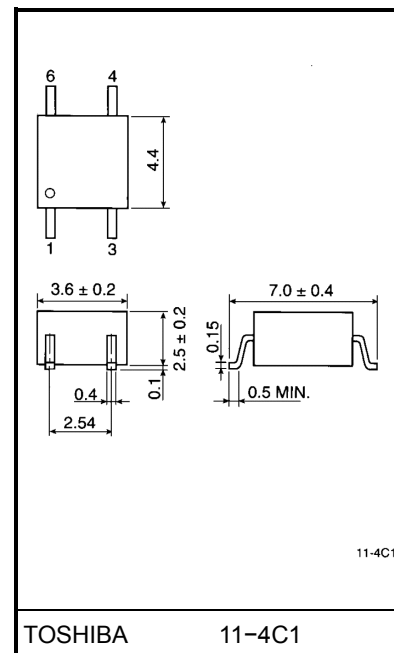
AC / DC-Input Module

Telecommunication

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.

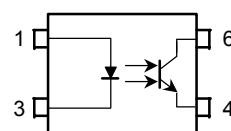
- Collector-emitter voltage: 80V (min.)
- Current transfer ratio: 50% (min.)
Rank GB: 100% (min.)
- Isolation voltage: 3750Vrms (min.)
- UL recognized: UL1577,
file no. E67349
- Option (V4) type
VDE approved: VDE0884 satisfied
Maximum operating insulation voltage: 565V_{PK}
Highest permissible over voltage: 6000V_{PK}

Unit in mm



Weight: 0.09 g

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	(None)	50	600	BLANK, Y, Y [■] , G, G [■] , B, B [■] , GB
	Rank Y	50	150	Y, Y [■]
	Rank GR	100	300	G, G [■]
	Rank BL	200	600	B, B [■]
	Rank GB	100	600	G, G [■] , B, B [■] , GB

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

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

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 $\geq 53^\circ\text{C}$)	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}	-55~125	$^\circ\text{C}$
Operating temperature range		T_{opr}	-55~100	$^\circ\text{C}$
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)		BV_S	3750	V_{rms}

(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
Operating temperature	T_{opr}	-25	—	85	$^\circ\text{C}$

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	$I_F = 5 \text{ mA}$, $V_{CE} = 5 \text{ V}$ 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	$V_{CE} (\text{sat})$	$I_C = 2.4 \text{ mA}$, $I_F = 8 \text{ mA}$	—	—	0.4	V
		$I_C = 0.2 \text{ mA}$, $I_F = 1 \text{ mA}$ Rank GB	—	0.2	—	
			—	—	0.4	
Off-state collector current	$I_C (\text{off})$	$V_F = 0.7 \text{ V}$, $V_{CE} = 48 \text{ V}$	—	1	10	μA

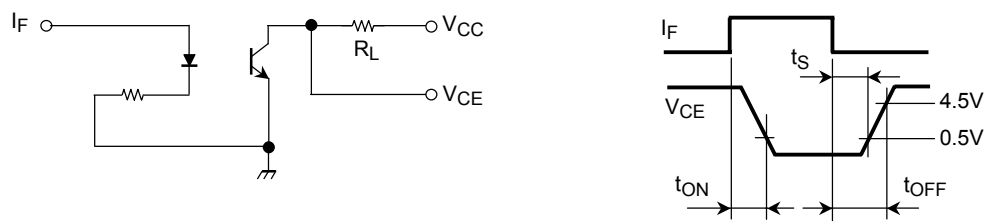
Isolation Characteristics (Ta = 25°C)

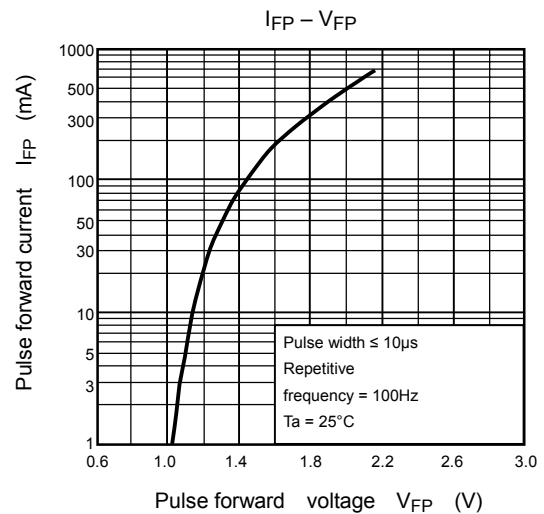
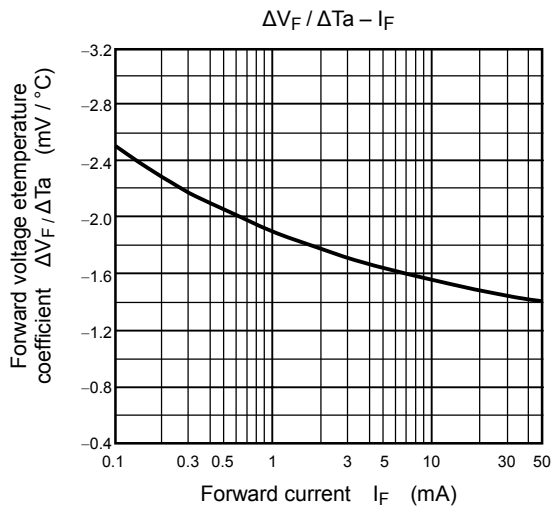
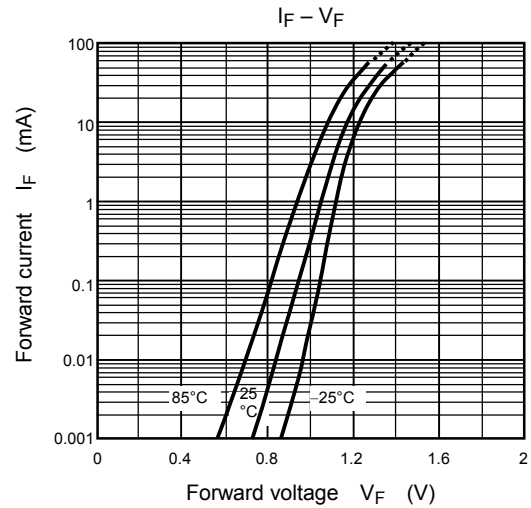
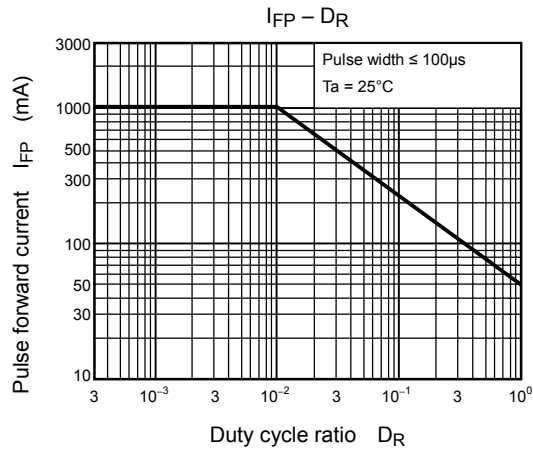
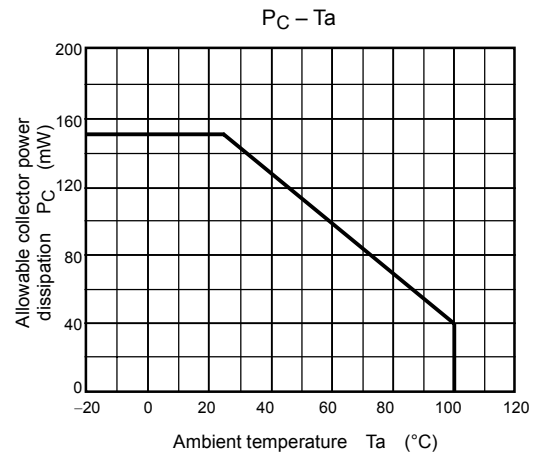
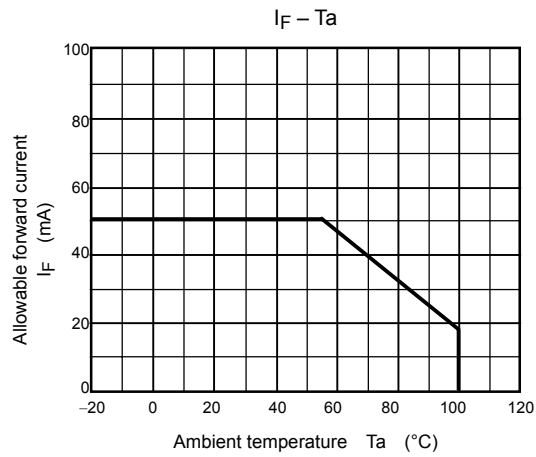
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	C_S	$V_S = 0 \text{ V}$, $f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}$, R.H. $\leq 60\%$	1×10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	3750	—	—	V_{rms}
		AC, 1 second, in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

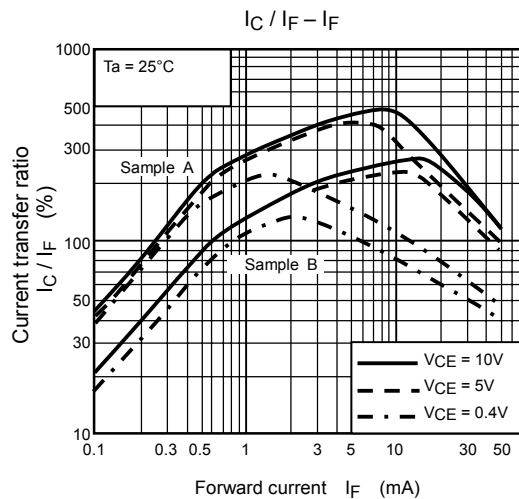
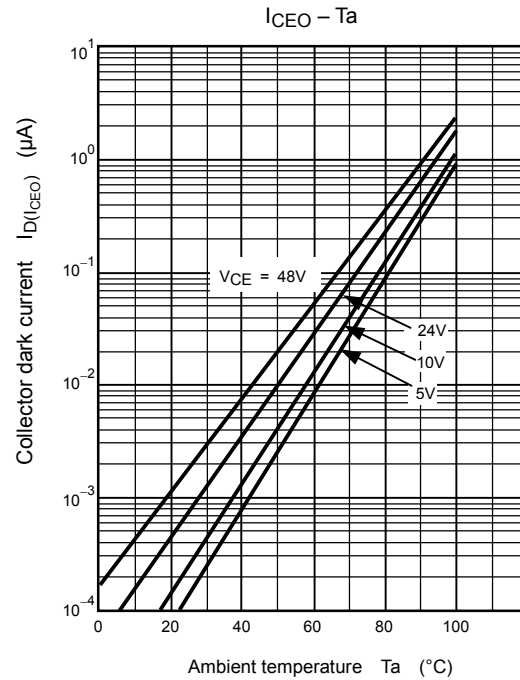
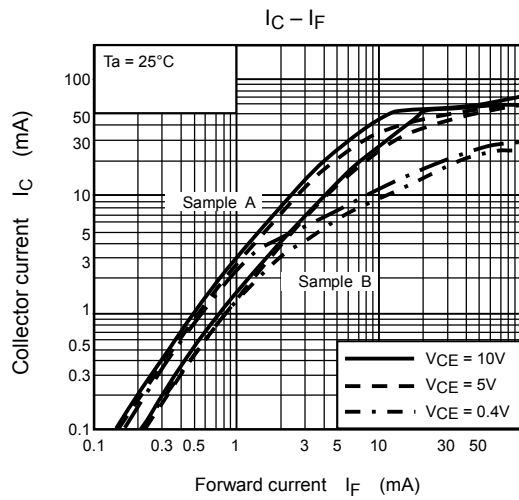
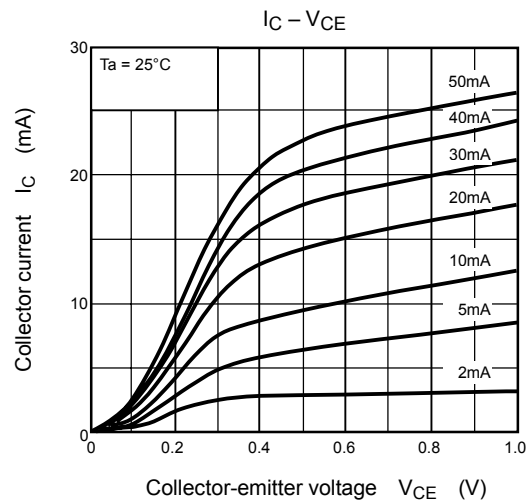
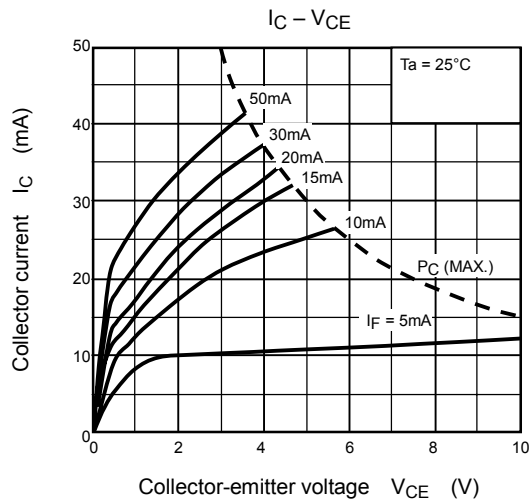
Switching Characteristics (Ta = 25°C)

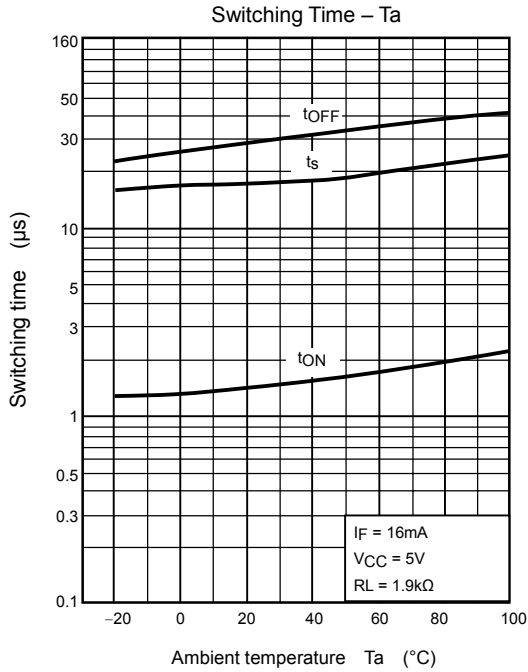
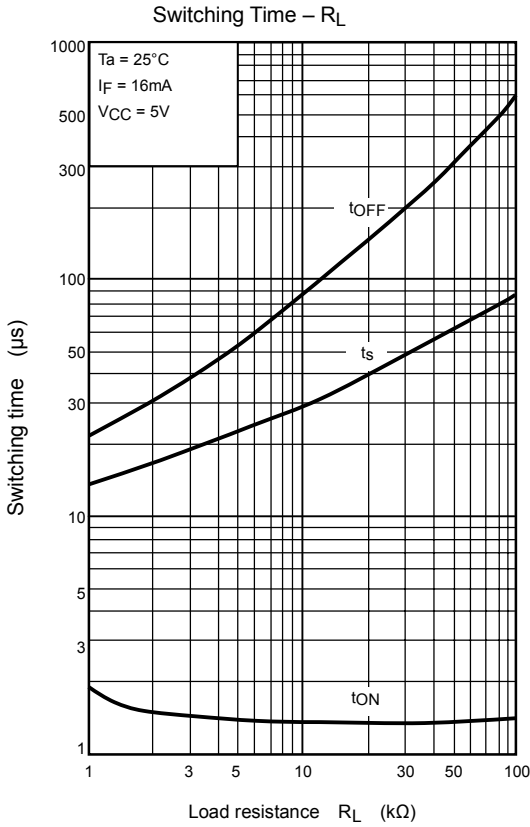
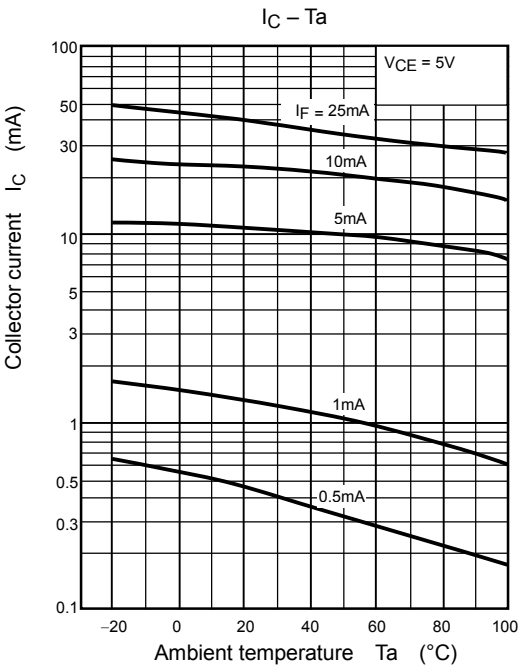
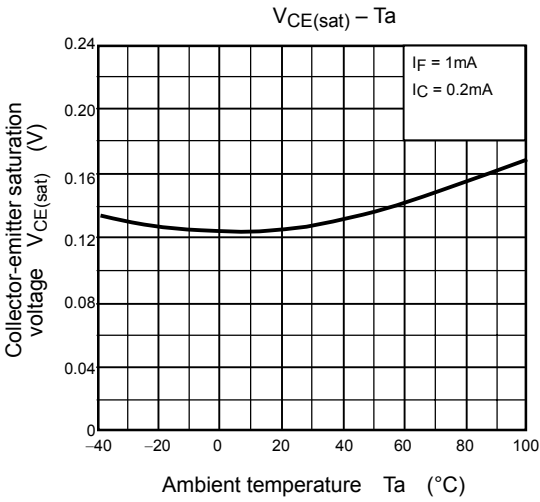
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = 16\text{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