

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

# TLP127

Programmable Controllers

DC-Output Module

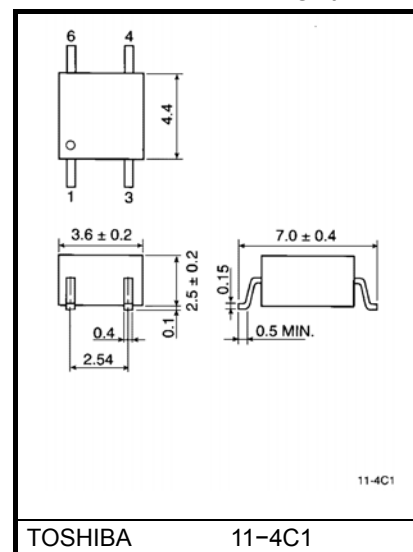
Telecommunication

The TOSHIBA mini flat coupler TLP127 is a small outline coupler, suitable for surface mount assembly.

TLP127 consists of a gallium arsenide infrared emitting diode, optically coupled to a darlington photo transistor with an integral base-emitter resistor, and provides 300V VCEO.

- Collector-emitter voltage: 300 V (min.)
- Current transfer ratio: 1000% (min.)
- Isolation voltage: 2500Vrms (min.)
- UL recognized: UL1577, file no. E67349
- BSI approved: BS EN60065:2002, certificate no.8927  
BS EN60950-1:2002, certificate no.8928

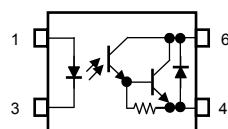
Unit in mm



TOSHIBA 11-4C1

Weight: 0.09 g (typ.)

## Pin Configurations (top view)



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

## 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 $\geq 53^\circ\text{C}$ )	mA / $^\circ\text{C}$
	Pulse forward current	$I_{FP}$	1 (100 $\mu\text{s}$ pulse, 100pps)	A
	Reverse voltage	$V_R$	5	V
	Junction temperature	$T_j$	125	$^\circ\text{C}$
Detector	Collector-emitter voltage	$V_{CEO}$	300	V
	Emitter-collector voltage	$V_{ECO}$	0.3	V
	Collector current	$I_C$	150	mA
	Collector power dissipation	$P_C$	150	mW
	Collector power dissipation derating (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 (Note 1)		$BV_S$	2500 (AC, 1min., R.H. $\leq 60\%$ )	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: Pins 1, 3 shorted together and pins 4, 6 shorted 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	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.1 \text{ mA}$	300	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1 \text{ mA}$	0.3	—	—	V
	Collector dark current	$I_{CEO}$	$V_{CE} = 200 \text{ V}$	—	10	200	nA
			$V_{CE} = 200 \text{ V}, T_a = 85^\circ\text{C}$	—	—	20	$\mu\text{A}$
	Capacitance collector to emitter	$C_{CE}$	$V = 0, f = 1 \text{ MHz}$	—	12	—	pF

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	$I_C / I_F$	$I_F = 1 \text{ mA}, V_{CE} = 1 \text{ V}$	1000	4000	—	%
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 10 \text{ mA}, V_{CE} = 1 \text{ V}$	500	—	—	%
Collector-emitter saturation voltage	$V_{CE (\text{sat})}$	$I_C = 10 \text{ mA}, I_F = 1 \text{ mA}$	—	—	1.0	V
		$I_C = 100 \text{ mA}, I_F = 10 \text{ mA}$	0.3	—	1.2	

## Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	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	2500	—	—	$V_{\text{rms}}$
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	$V_{\text{dc}}$

Switching Characteristics (Ta = 25°C)

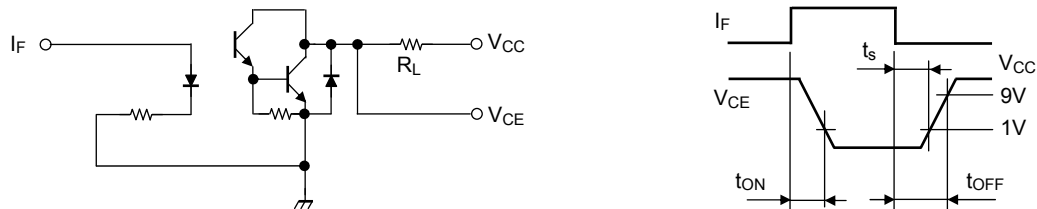
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	$t_r$	$V_{CC} = 10\text{ V}, I_C = 10\text{ mA}$ $R_L = 100\ \Omega$	—	40	—	$\mu\text{s}$
Fall time	$t_f$		—	15	—	
Turn-on time	$t_{on}$		—	50	—	
Turn-off time	$t_{off}$		—	15	—	
Turn-on time	$t_{ON}$	$R_L = 180\ \Omega$ $V_{CC} = 10\text{ V}, I_F = 16\text{ mA}$ (Fig.1)	—	5	—	$\mu\text{s}$
Storage time	$t_s$		—	40	—	
Turn-off time	$t_{OFF}$		—	80	—	

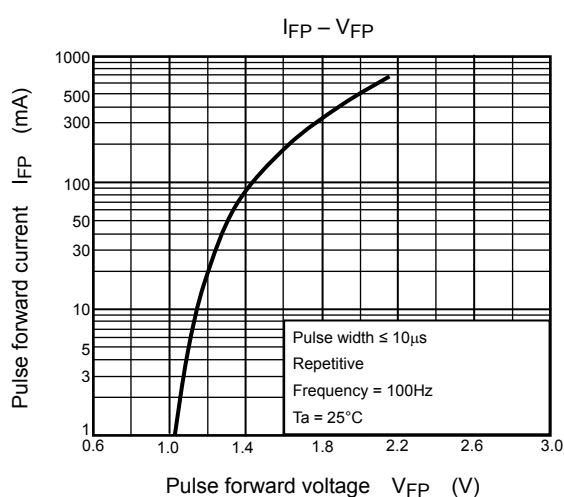
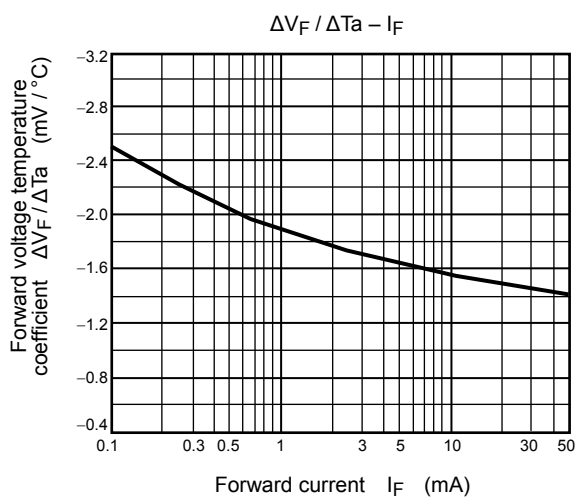
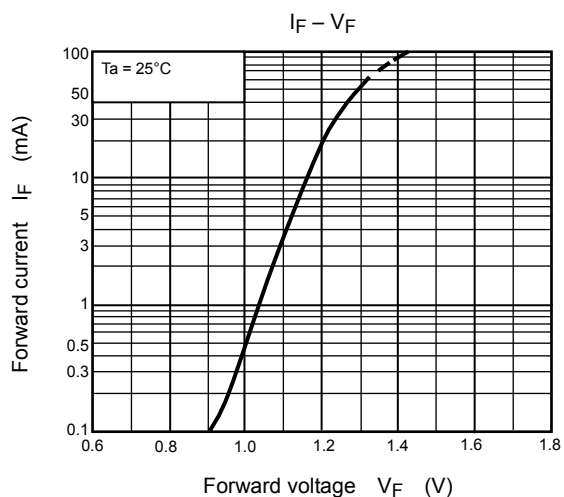
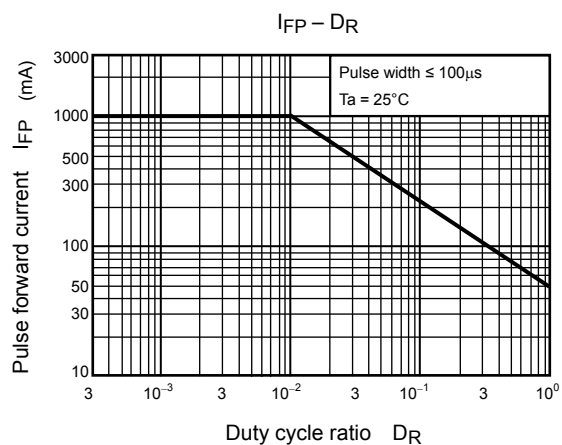
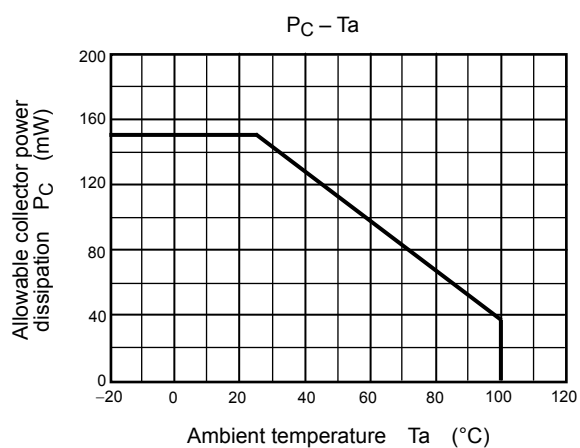
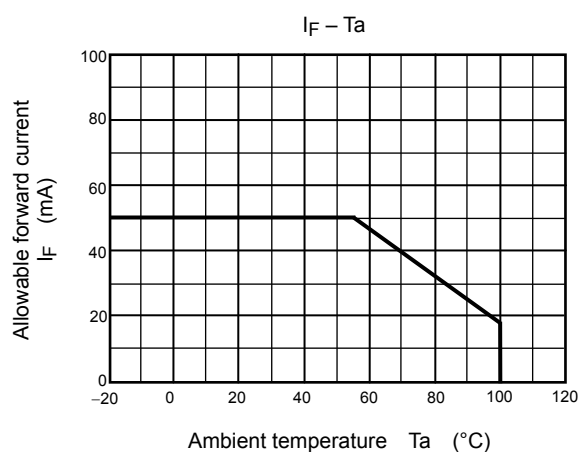
Recommended Operating Conditions

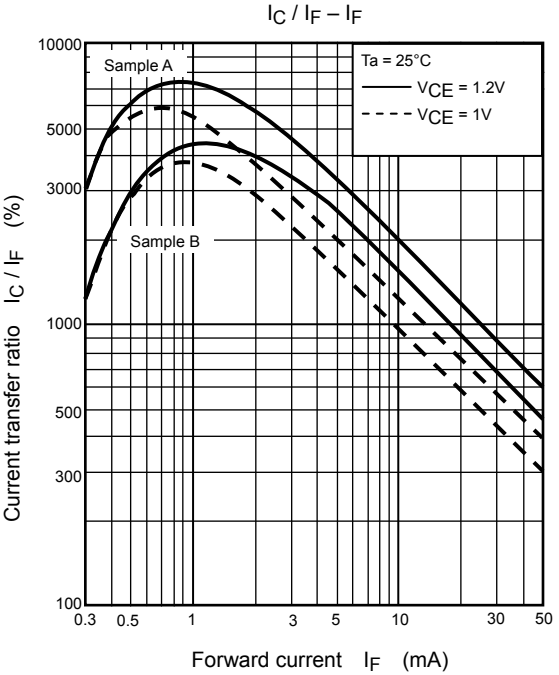
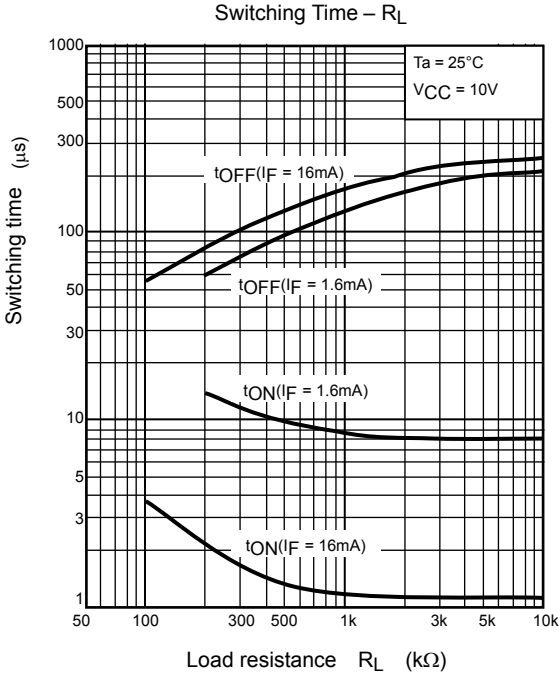
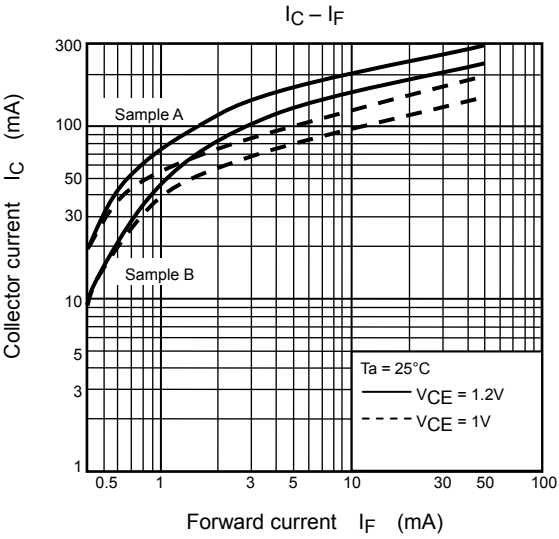
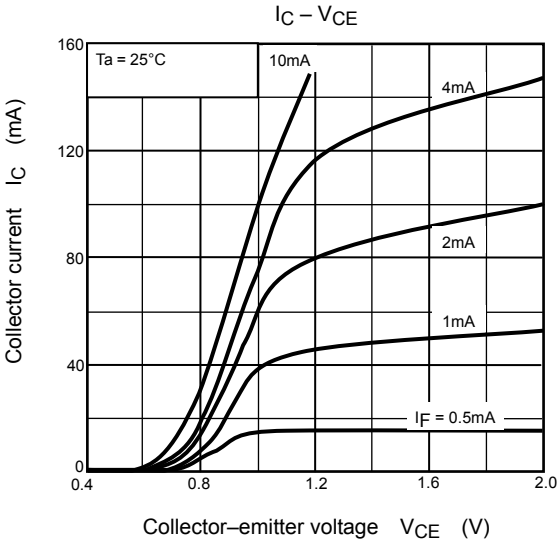
Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{CC}$	—	—	200	V
Forward current	$I_F$	—	16	25	mA
Collector current	$I_C$	—	—	120	mA
Operating temperature	$T_{opr}$	−25	—	85	°C

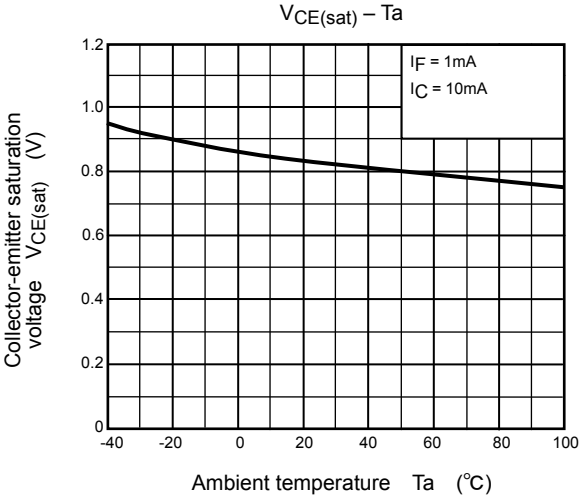
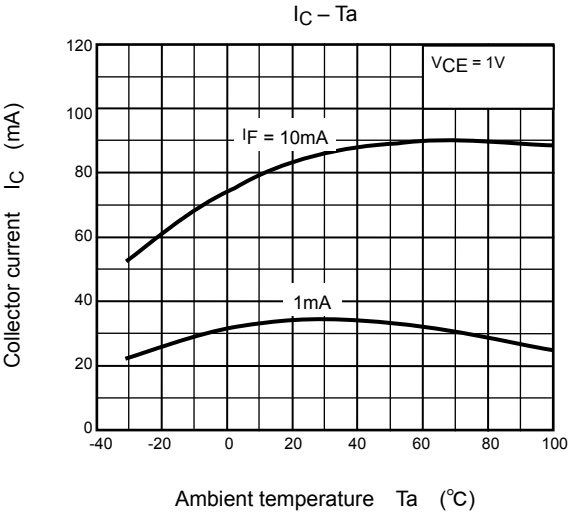
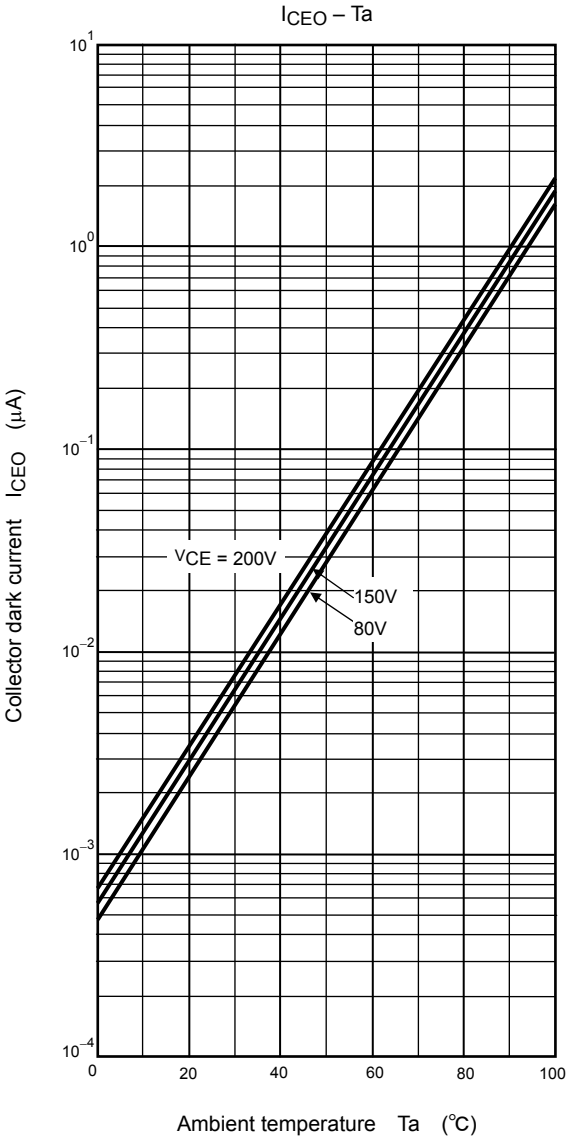
Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Fig. 1 Switching time test circuit









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