

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP127

Programmable Controllers

DC-Output Module

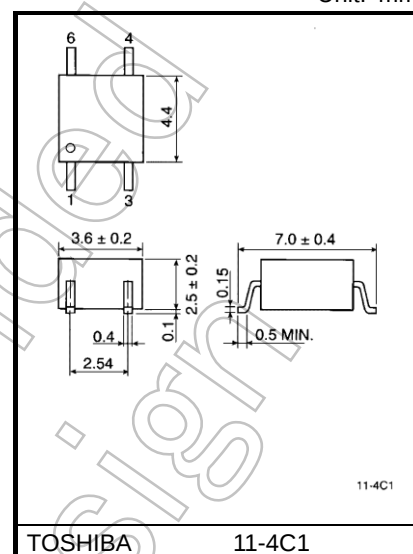
Telecommunication

Unit: mm

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.

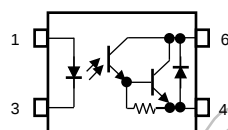
- Collector-emitter voltage: 300 V (min)
- Current transfer ratio: 1000 % (min)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1577, file no. E67349
- cUL recognized: CSA Component Acceptance Service No. 5A
File No.E67349
- Option (V4) type
VDE approved: DIN EN 60747-5-5



Weight: 0.09 g (typ.)

Note: When a VDE approved type is needed, please designate the Option (V4)

Pin Configurations (top view)



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

Start of commercial production
1988-04

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I _F	50	mA
	Forward current derating (Ta ≥ 53°C)	ΔI _F /°C	-0.7	mA/°C
	Pulse forward current (100 μs pulse, 100 pps)	I _{FP}	1	A
	Reverse voltage	V _R	5	V
	Diode power dissipation	P _D	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	ΔP _D /°C	-1.39	mW/°C
	Junction temperature	T _j	125	°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 ≥ 25°C)	ΔP _C /°C	-1.5	mW/°C
	Junction temperature	T _j	125	°C
	Storage temperature range	T _{stg}	-55 to 125	°C
Operating temperature range		T _{opr}	-55 to 100	°C
Lead soldering temperature (10 s)		T _{sol}	260	°C
Total package power dissipation		P _T	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔP _T /°C	-2.0	mW/°C
Isolation voltage (AC, 60 s, R.H. ≤ 60%) (Note 1)		BVS	2500	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: Pins 1, 3 shorted together and pins 4, 6 shorted together.

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.

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	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	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	μA
	Capacitance collector to emitter	C_{CE}	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	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	$I_C/I_{F(sat)}$	$I_F = 10 \text{ mA}, V_{CE} = 1 \text{ V}$	500	—	—	%
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 10 \text{ mA}, I_F = 1 \text{ mA}$	—	—	1.0	V
		$I_C = 100 \text{ mA}, I_F = 10 \text{ mA}$	0.3	—	1.2	
Off-state collector current	$I_{C(off)}$	$V_F = 0.7 \text{ V}, V_{CE} = 200 \text{ V}$	—	—	20	μA

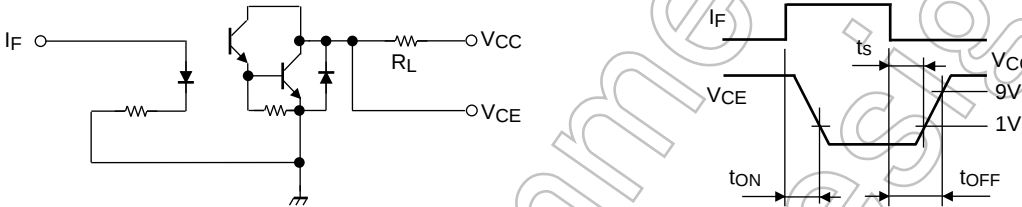
Isolation Characteristics (Ta = 25°C)

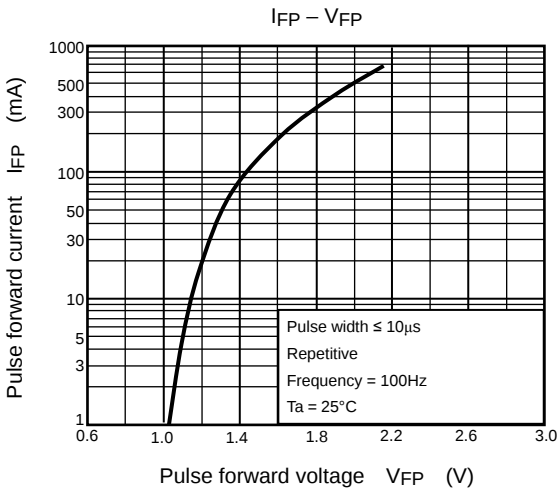
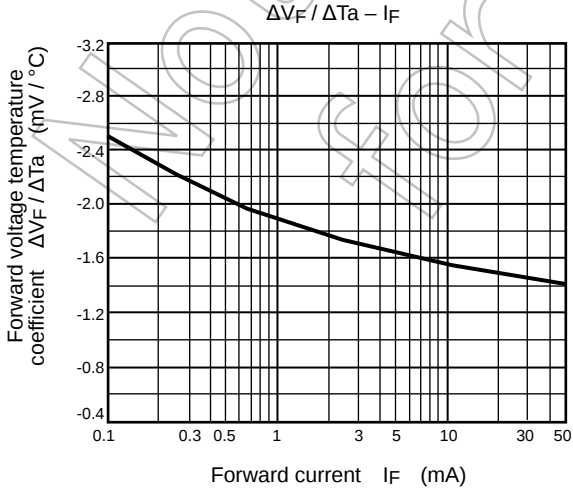
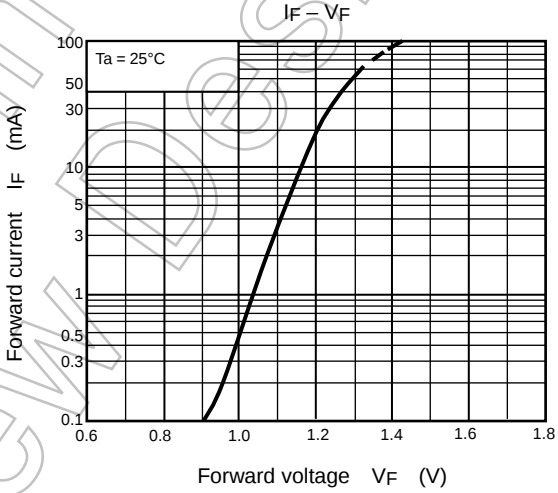
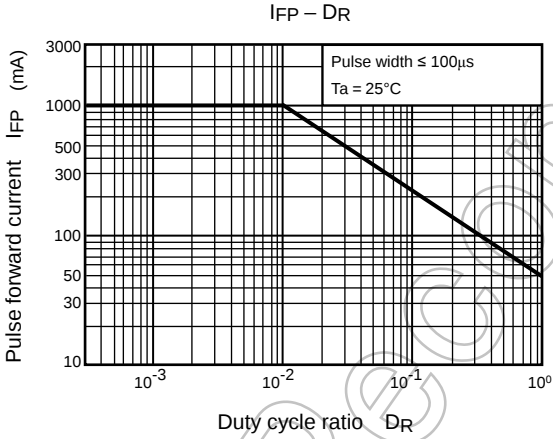
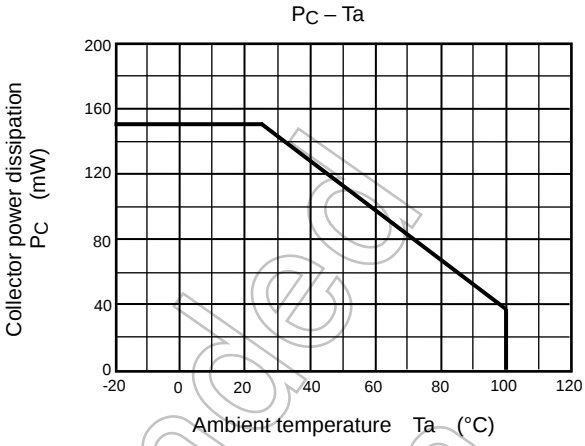
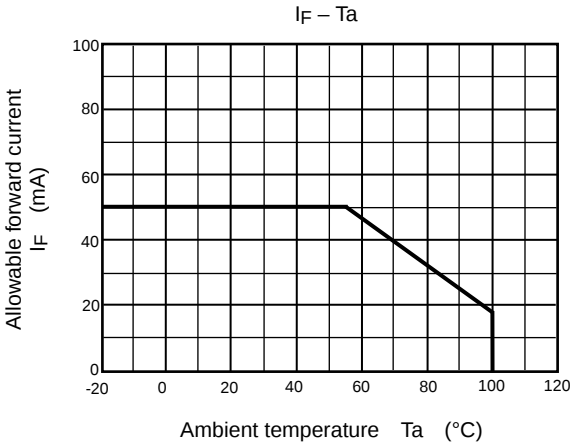
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	2500	—	—	V_{rms}
		AC, 1 s, in oil	—	5000	—	
		DC, 60 s, in oil	—	5000	—	V_{dc}

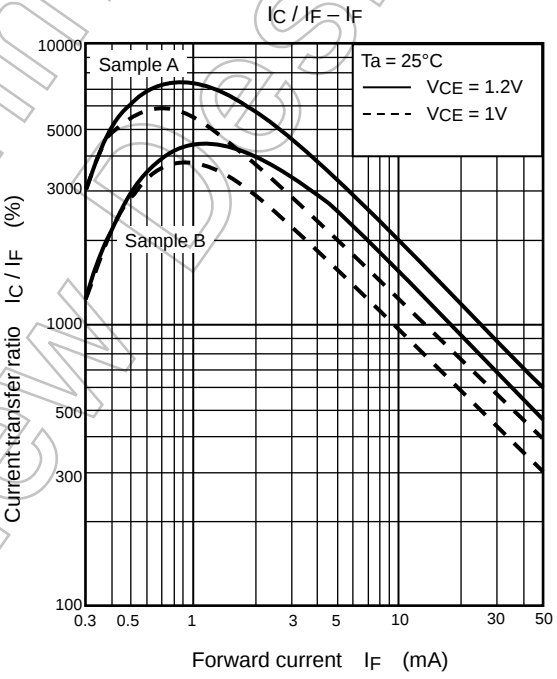
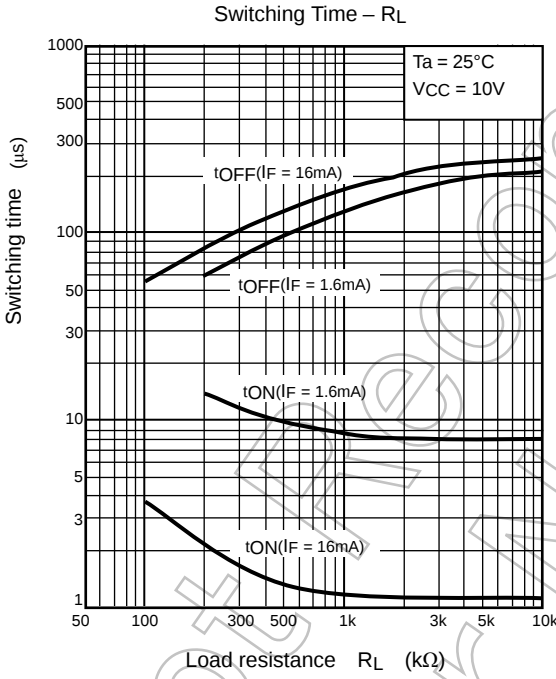
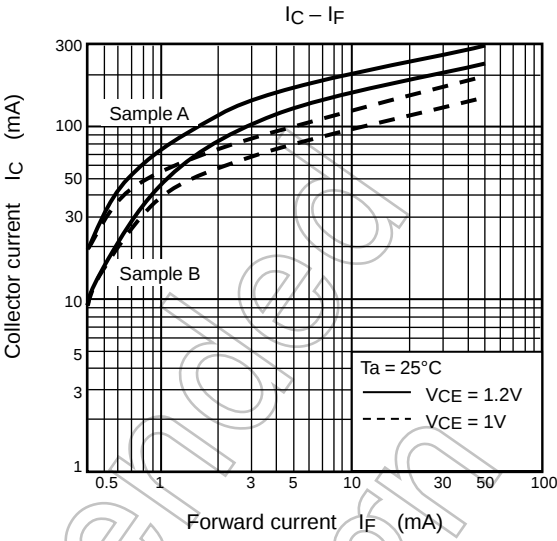
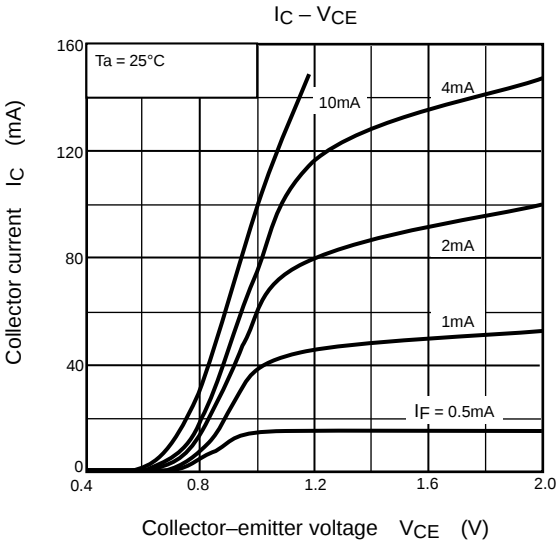
Switching Characteristics (Ta = 25°C)

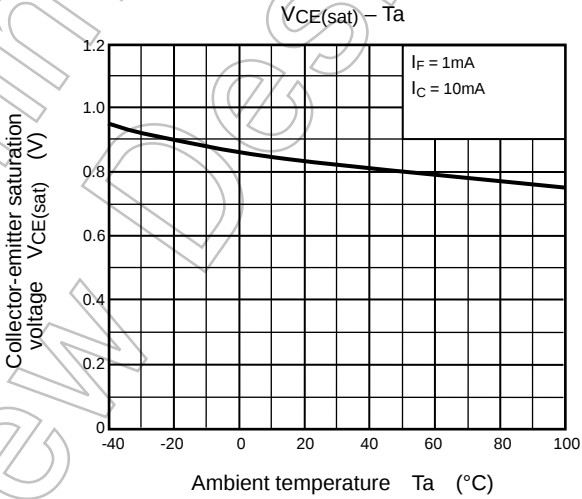
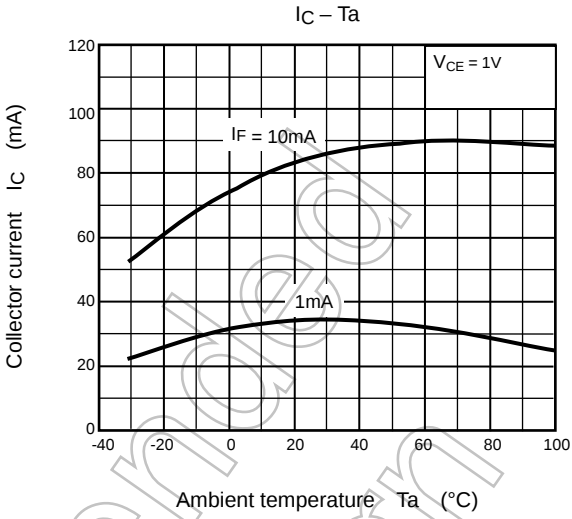
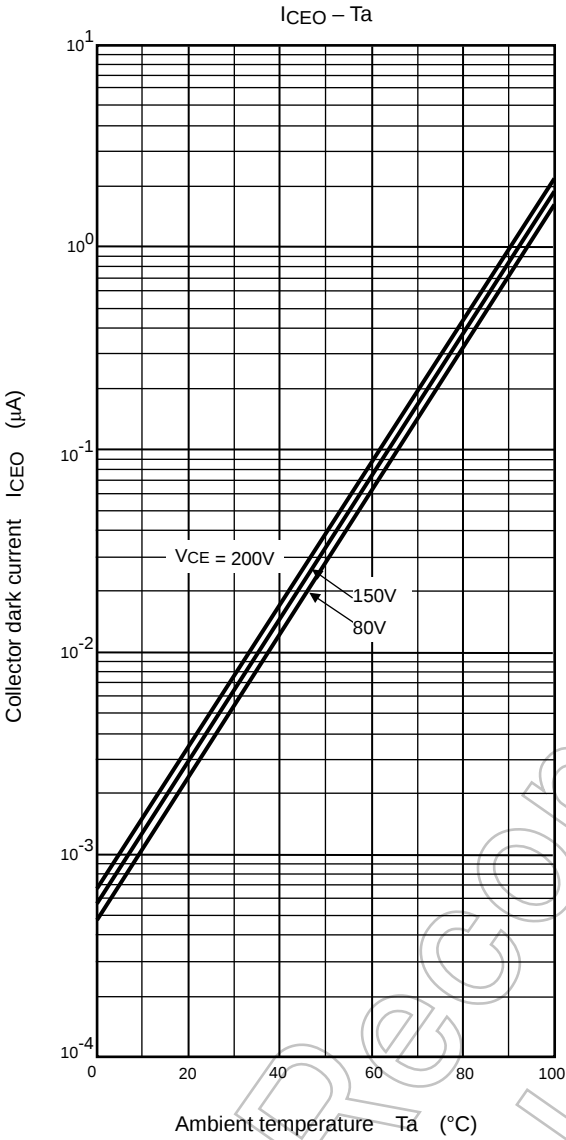
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}$, $I_C = 10\text{ mA}$ $R_L = 100\ \Omega$	—	40	—	μs
Fall time	t_f		—	15	—	
Turn-on time	t_{on}		—	50	—	
Turn-off time	t_{off}		—	15	—	
Turn-on time	t_{ON}	$R_L = 180\ \Omega$ $V_{CC} = 10\text{ V}$, $I_F = 16\text{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

Fig.1: Switching time test circuit









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