

## TLP127

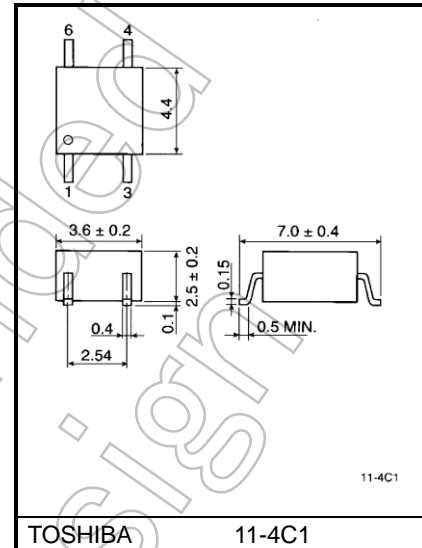
Programmable Controllers  
DC-Output Module  
Telecommunication

Unit: mm

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

TLP127 consists of an 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 : UL 1577, File No. E67349
- cUL-recognized : CSA Component Acceptance Service No.5A  
File No.E67349
- VDE-approved : EN 60747-5-5 (Note 1)

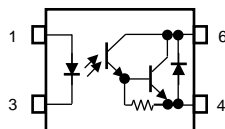


TOSHIBA 11-4C1

Weight: 0.09 g (typ.)

Note 1: 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 <sub>F</sub>	50	mA
	Forward current derating (Ta ≥ 53°C)	ΔI <sub>F</sub> /°C	-0.7	mA/°C
	Pulse forward current (100 μs pulse, 100 pps)	I <sub>FP</sub>	1	A
	Reverse voltage	V <sub>R</sub>	5	V
	Diode power dissipation	P <sub>D</sub>	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	ΔP <sub>D</sub> /°C	-1.39	mW/°C
	Junction temperature	T <sub>j</sub>	125	°C
Detector	Collector-emitter voltage	V <sub>CEO</sub>	300	V
	Emitter-collector voltage	V <sub>ECO</sub>	0.3	V
	Collector current	I <sub>C</sub>	150	mA
	Collector power dissipation	P <sub>C</sub>	150	mW
	Collector power dissipation derating (Ta ≥ 25°C)	ΔP <sub>C</sub> /°C	-1.5	mW/°C
	Junction temperature	T <sub>j</sub>	125	°C
	Storage temperature range	T <sub>stg</sub>	-55 to 125	°C
Operating temperature range	T <sub>opr</sub>	-55 to 100	°C	
Lead soldering temperature (10 s)	T <sub>sol</sub>	260	°C	
Total package power dissipation	P <sub>T</sub>	200	mW	
Total package power dissipation derating (Ta ≥ 25°C)	ΔP <sub>T</sub> /°C	-2.0	mW/°C	
Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1)	BVs	2500	V <sub>rms</sub>	

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 <sub>CC</sub>	—	—	200	V
Forward current	I <sub>F</sub>	—	16	25	mA
Collector current	I <sub>C</sub>	—	—	120	mA
Operating temperature	T <sub>opr</sub>	-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	$\mu\text{A}$
	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
			$V_{CE} = 200 \text{ V}, T_a = 85 \text{ }^\circ\text{C}$	—	—	20	$\mu\text{A}$
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	$I_C/I_F(\text{sat})$	$I_F = 10 \text{ mA}, V_{CE} = 1 \text{ V}$	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	
Off-state collector current	$I_{C(\text{off})}$	$V_F = 0.7 \text{ V}, V_{CE} = 200 \text{ V}$	—	—	20	$\mu\text{A}$

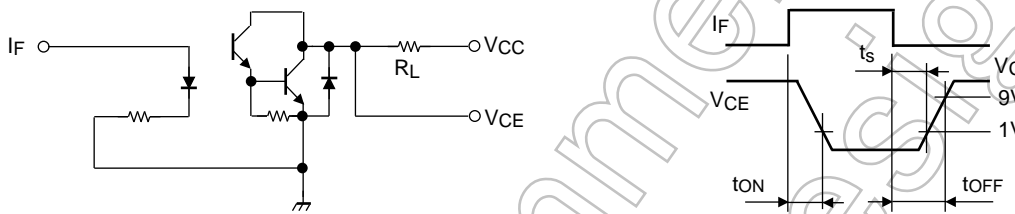
## Isolation Characteristics (Ta = 25°C)

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	$R_S$	$V_S = 500 \text{ V}, R.H. \leq 60 \%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 60 s	2500	—	—	$V_{\text{rms}}$

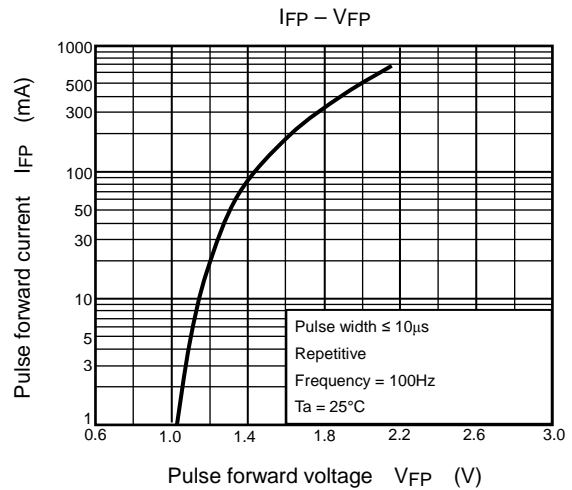
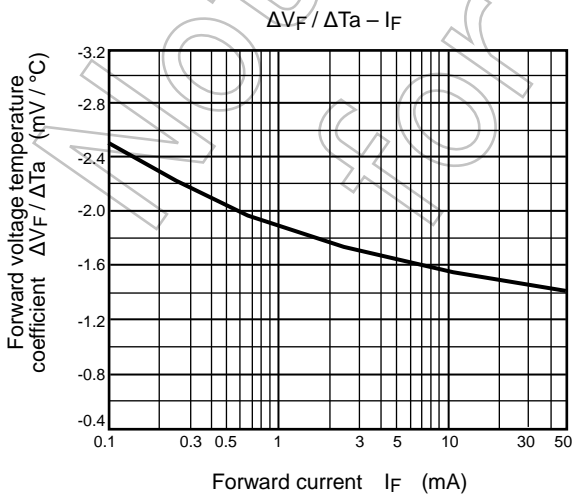
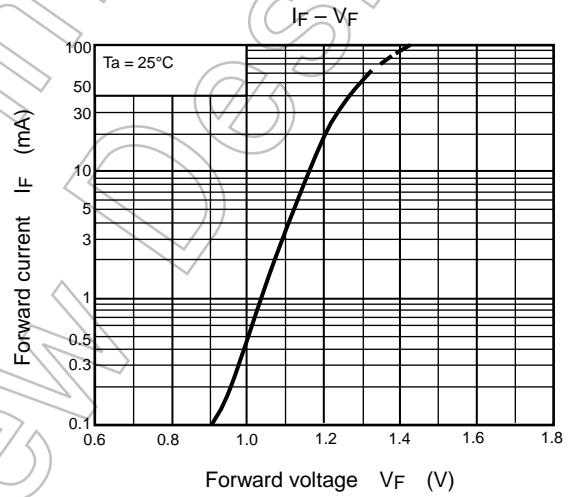
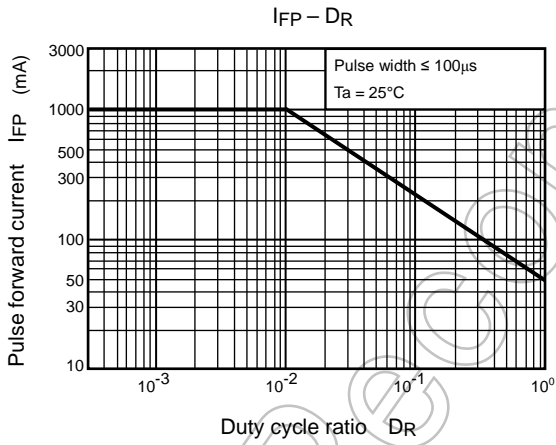
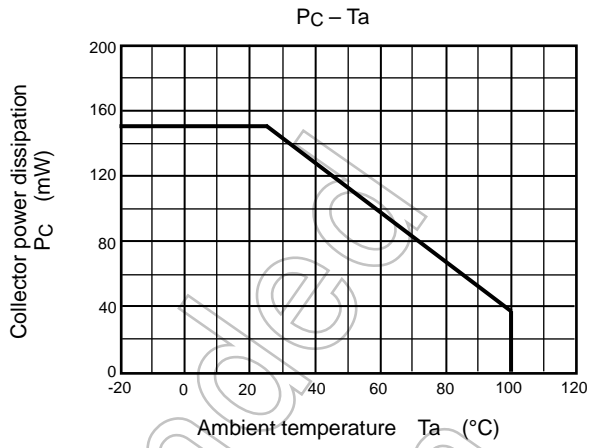
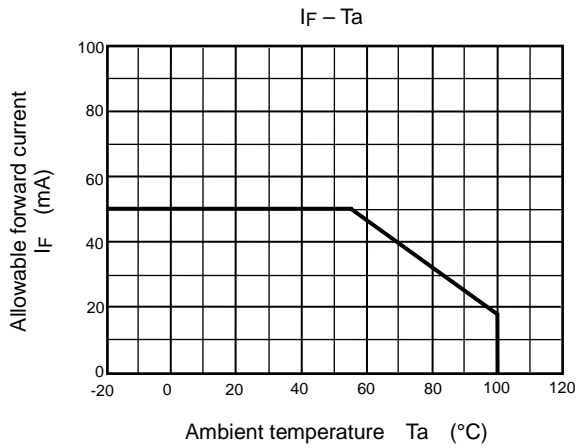
**Switching Characteristics (Ta = 25°C)**

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	—	

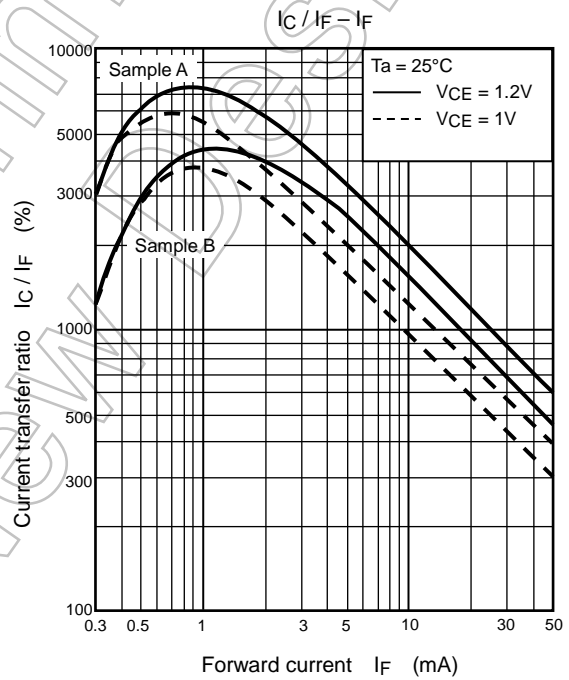
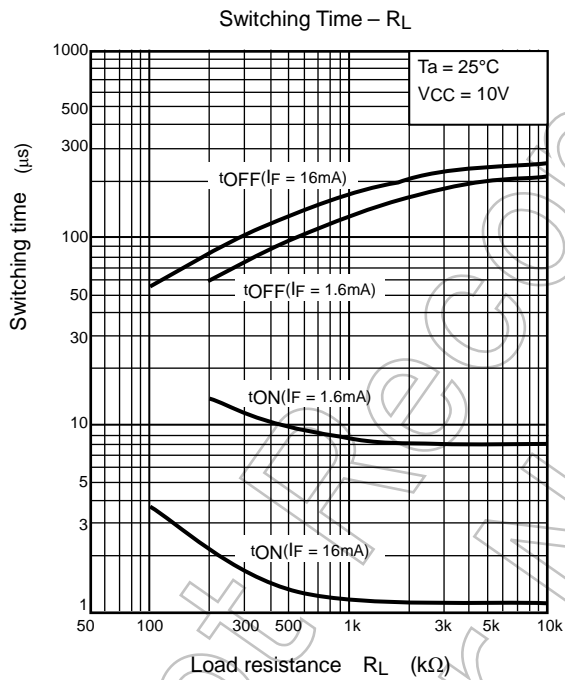
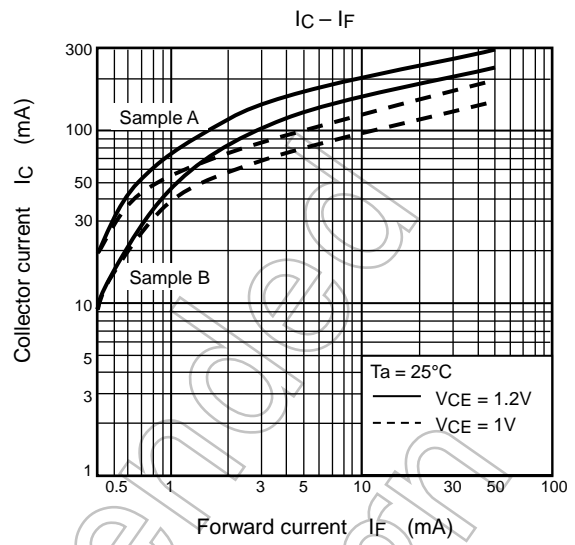
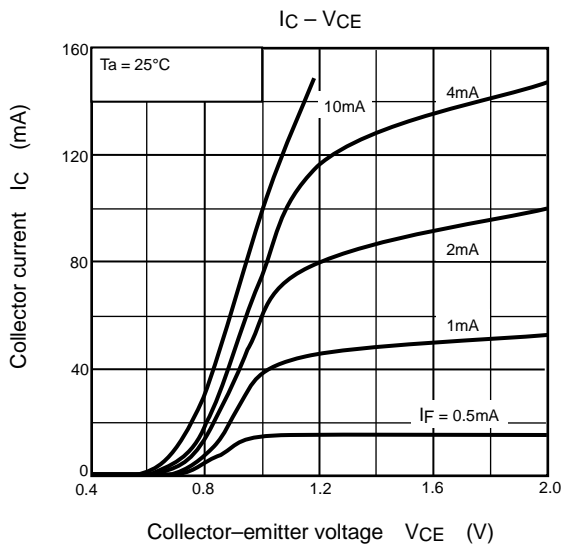
Fig.1: Switching time test circuit



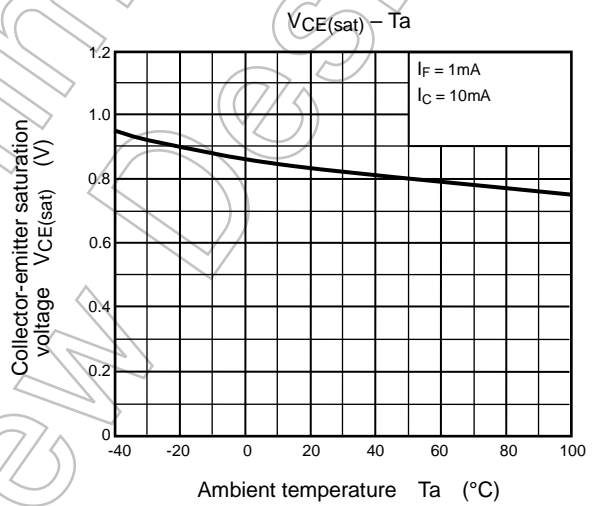
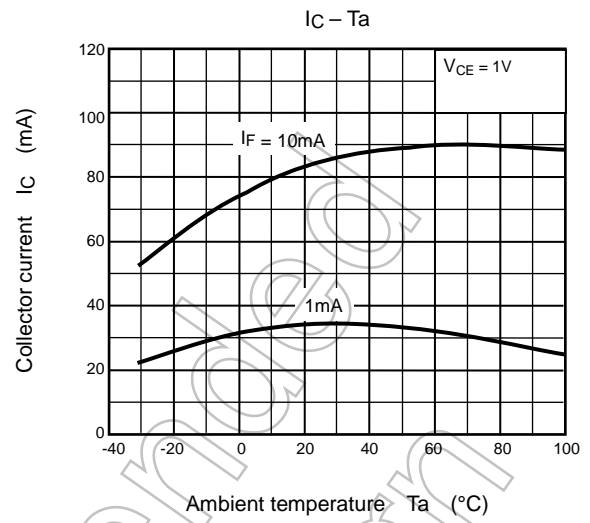
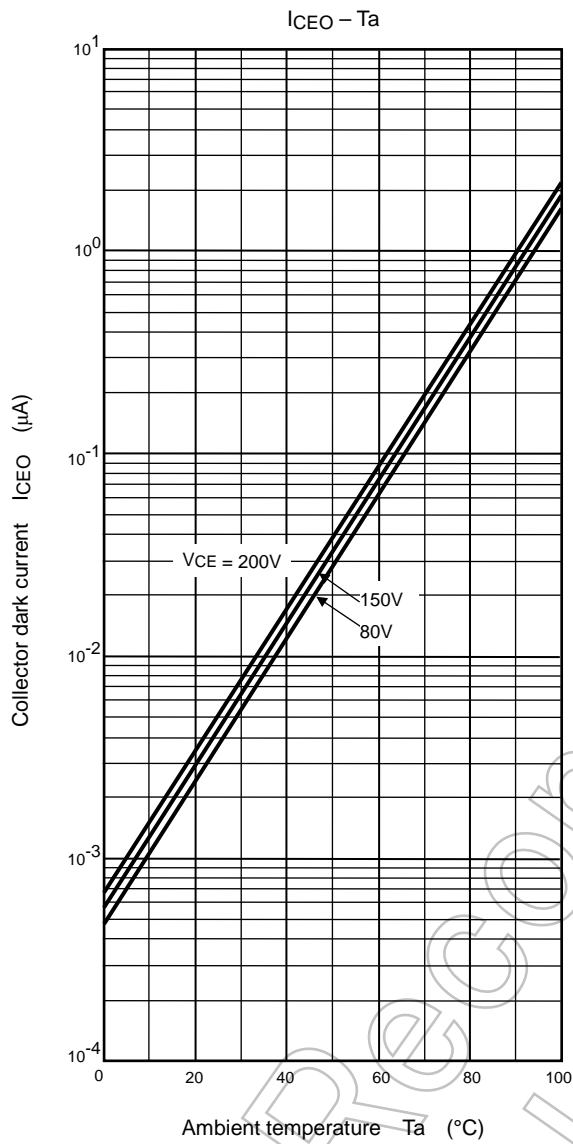
Not Recommended for New Design



NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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