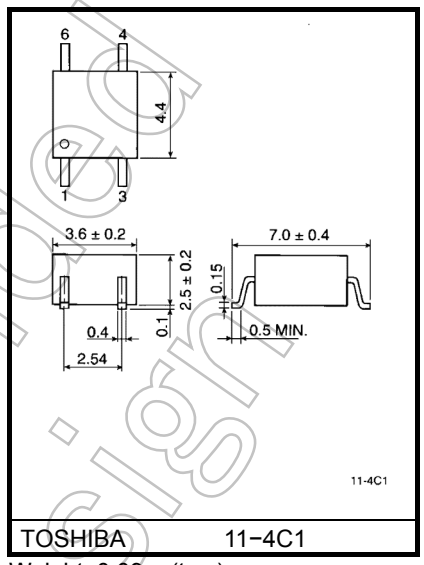
TOSHIBA Photocoupler GaAs Ired & Photo−Transistor

TLP127

Programmable Controllers
DC−Output Module
Telecommunication

Unit: mm



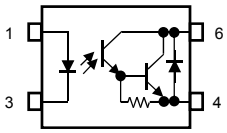
TOSHIBA 11−4C1

Weight: 0.09 g (typ.)

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 V_{CEO}.

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

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	ΔI_F / °C	−0.7 (Ta ≥ 53°C)	mA / °C
	Pulse forward current	I_{FP}	1 (100μs pulse, 100pps)	A
	Reverse voltage	V_R	5	V
	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}	−55~125	°C
Operating temperature range		T_{opr}	−55~100	°C
Lead soldering temperature		T_{sol}	260 (10s)	°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 (Note 1)		BV_S	2500 (AC, 1minute, R.H.≤ 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 mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1 MHz	—	30	—	pF
Detector	Collector−emitter breakdown voltage	$V_{(BR)\ CEO}$	I_C = 0.1 mA	300	—	—	V
	Emitter−collector breakdown voltage	$V_{(BR)\ ECO}$	I_E = 0.1 mA	0.3	—	—	V
	Collector dark current	I_{CEO}	V_{CE} = 200 V	—	10	200	nA
			V_{CE} = 200 V, Ta = 85°C	—	—	20	μA
	Capacitance collector to emitter	C_{CE}	V = 0, f = 1 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 = 1mA, V_{CE} = 1 V	1000	4000	—	%
Saturated CTR	I_C / $I_{F\ (sat)}$	I_F = 10 mA, V_{CE} = 1 V	500	—	—	%
Collector−emitter saturation voltage	$V_{CE\ (sat)}$	I_C = 10 mA, I_F = 1 mA	—	—	1.0	V
		I_C = 100 mA, I_F = 10 mA	0.3	—	1.2	
Off−state collector current	$I_{C\ (off)}$	V_F = 0.7 V, V_{CE} = 200 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, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H.≤ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	2500	—	—	V_{rms}
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	V_{dc}

Switching Characteristics (Ta = 25°C)

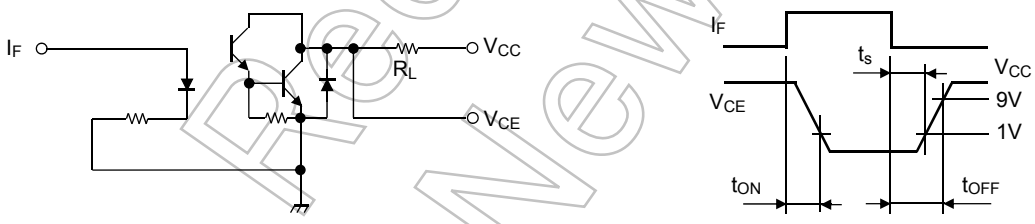
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	V_{CC} = 10 V, I_C = 10 mA R_L = 100 Ω	—	40	—	μs
Fall time	t_f		—	15	—	
Turn−on time	t_{on}		—	50	—	
Turn−off time	t_{off}		—	15	—	
Turn−on time	t_{ON}	R_L = 180 Ω (Fig.1) V_{CC} = 10 V, I_F = 16 mA	—	5	—	μs
Storage time	t_s		—	40	—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

Recommended Operating Conditions

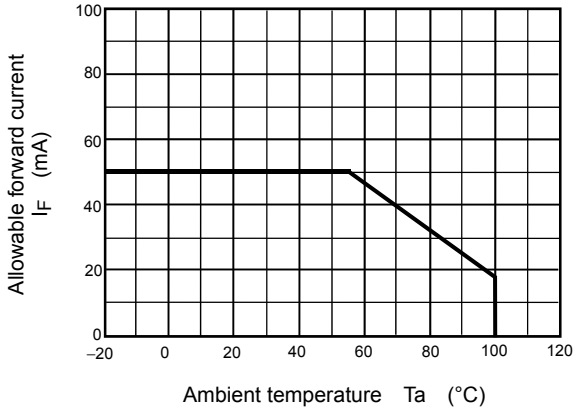
Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	—	200	V
Forward current	I_F	—	16	25	mA
Collector current	IC	—	—	120	mA
Operating temperature	T_{opr}	−25	—	85	°C

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.

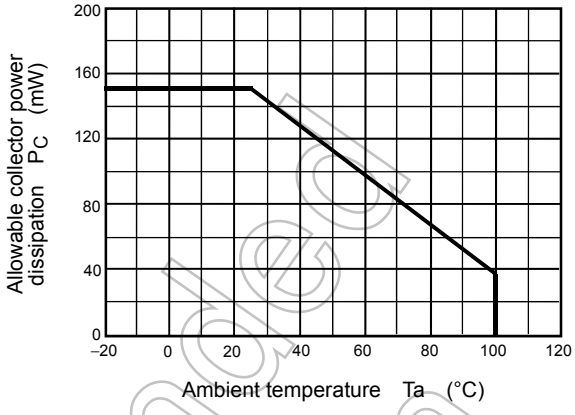
Fig. 1 Switching time test circuit



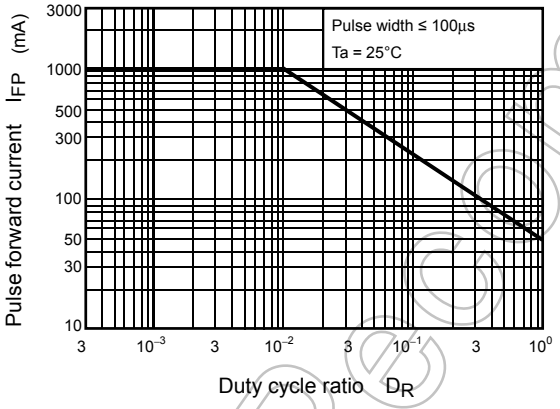
I_F – Ta



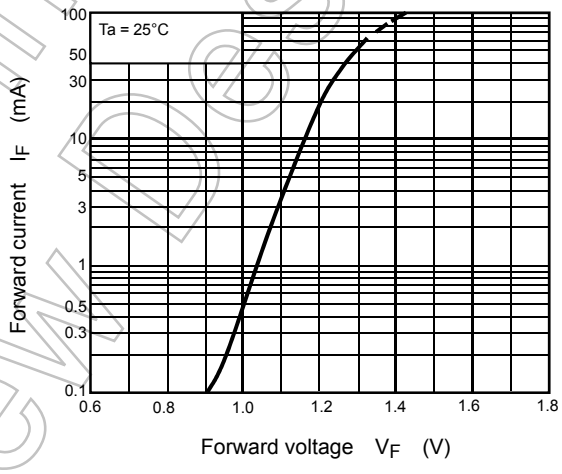
P_C – Ta



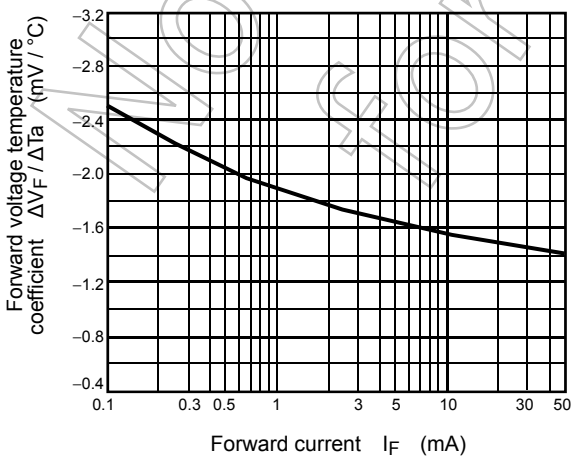
I_{FP} – D_R



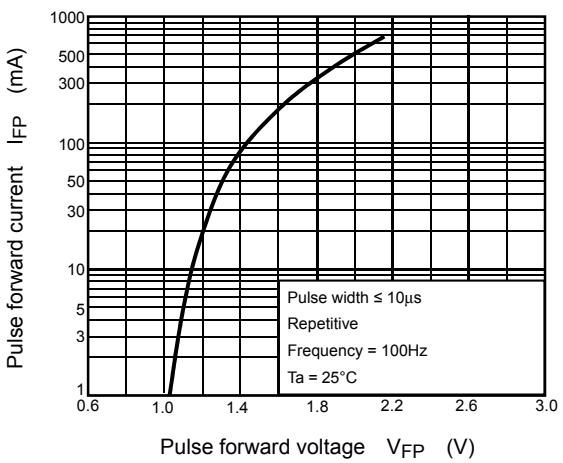
I_F – V_F



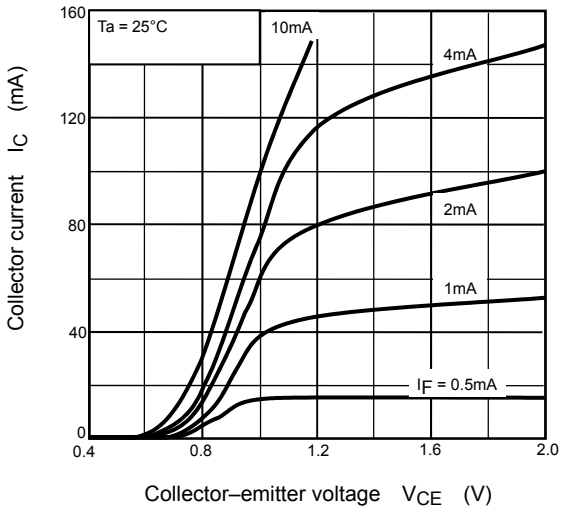
$\Delta V_F / \Delta Ta$ – I_F



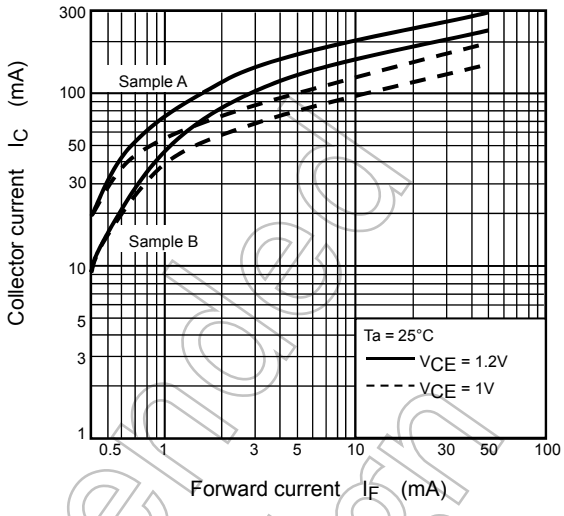
I_{FP} – V_{FP}



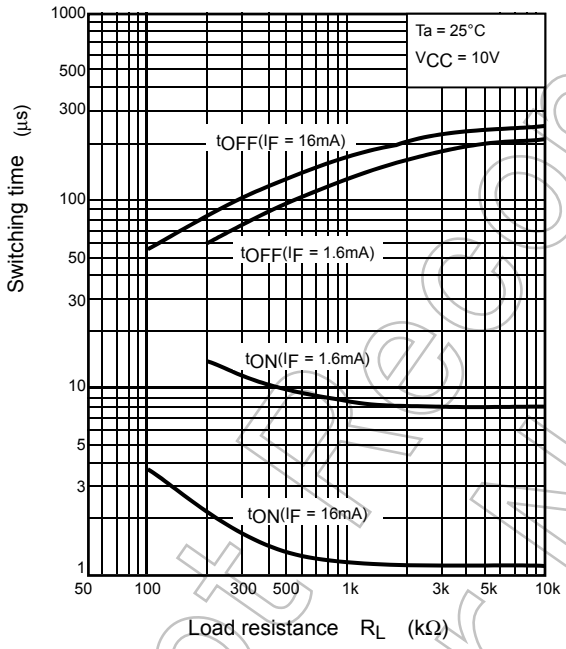
$I_C - V_{CE}$



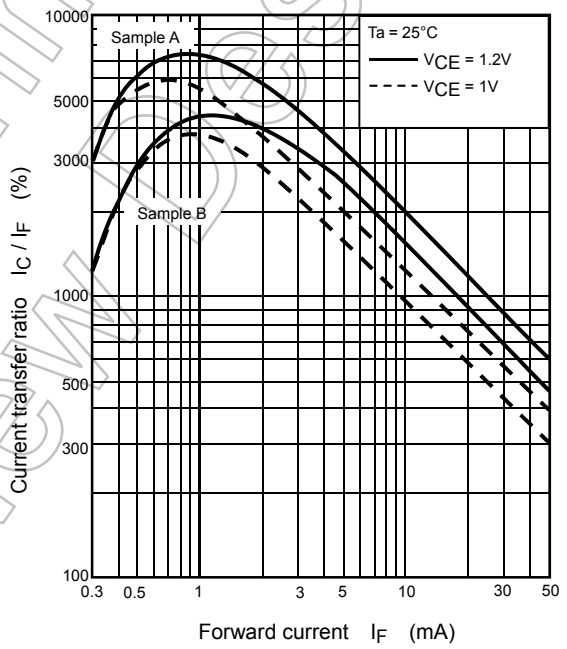
$I_C - I_F$



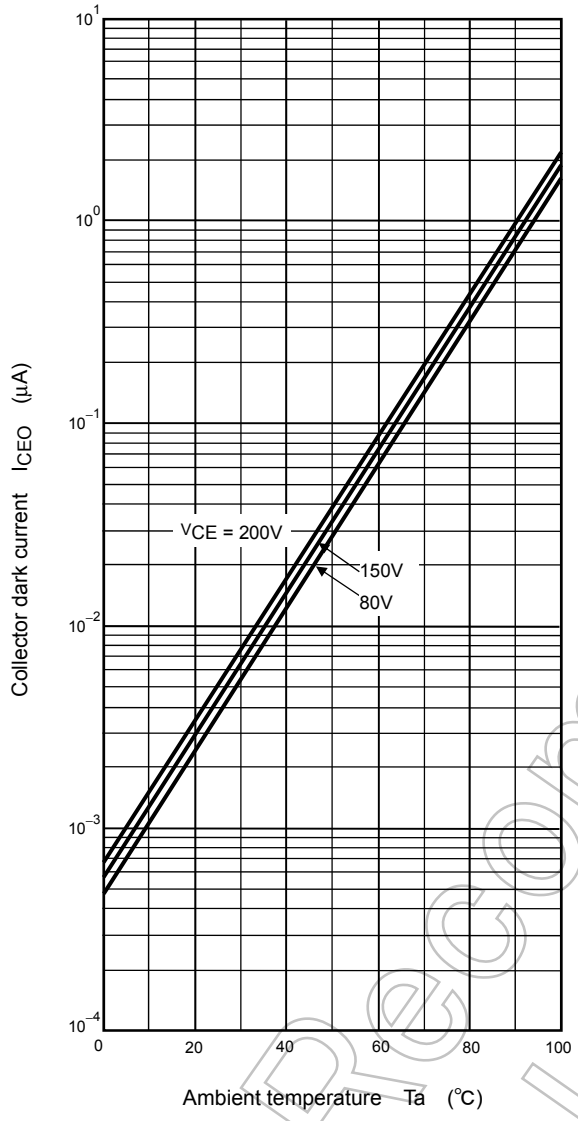
Switching Time – R_L



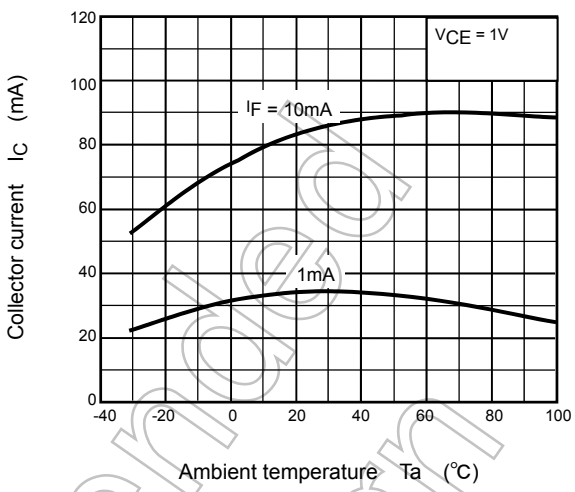
$I_C / I_F - I_F$



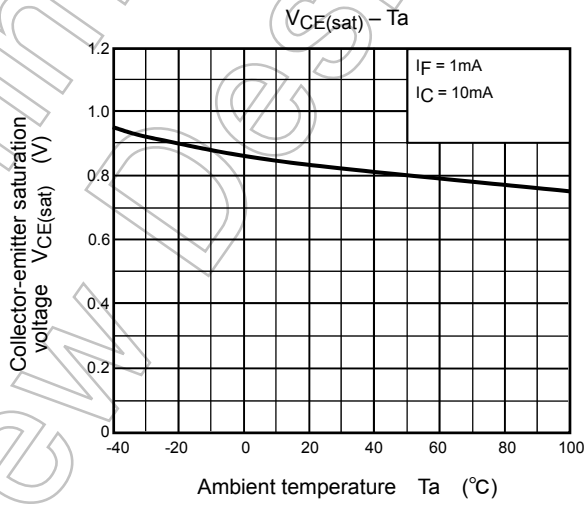
I_{CEO} – Ta



I_C – Ta



$V_{CE(sat)}$ – Ta



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