

TOSHIBA Photocoupler GaAs IRED & Photo-Transistor

# TLP627, TLP627-2, TLP627-4

Programmable Controllers  
DC-output Module  
Telecommunication

The TOSHIBA TLP627,-2 and -4 consist of a gallium arsenide infrared emitting diode optically coupled to a Darlington connected phototransistor which has an integral base-emitter resistor to optimize switching speed and elevated temperature characteristics.

The TLP627-2 offers two isolated channels in a eight lead plastic DIP, while the TLP627-4 provide four isolated channels per package.

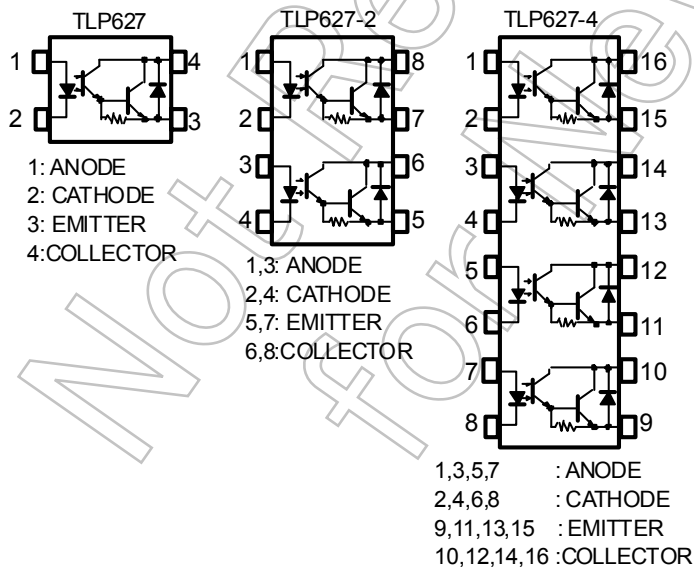
- Collector-Emitter Voltage : 300 V (min)
- Current Transfer Ratio : 1000 % (min)
- Isolation Voltage : 5000 Vrms (min)
- UL Recognized : UL1577, File No.E67349

	Made in Japan		Made in Thailand	
UL Recognized	E67349	*1	E152349	*1
BSI Approved	7426, 7427	*2	7426, 7427	*2

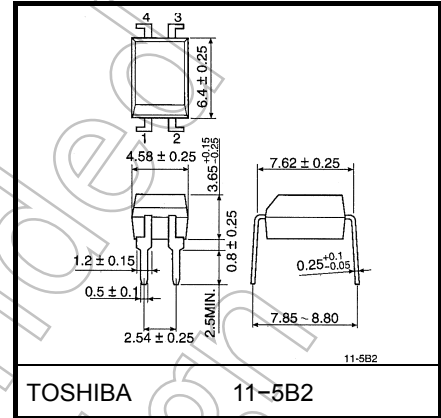
\*1 UL1577

\*2 BS EN60065: 2002, BS EN60950-1: 2002

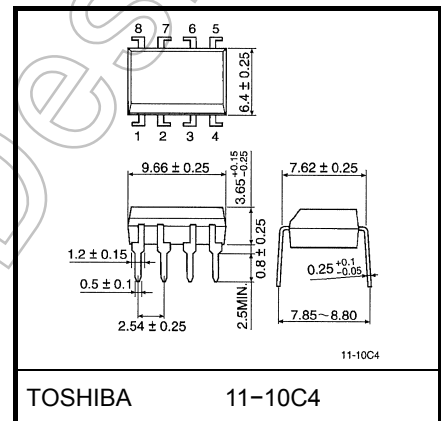
### Pin Configuration (top view)



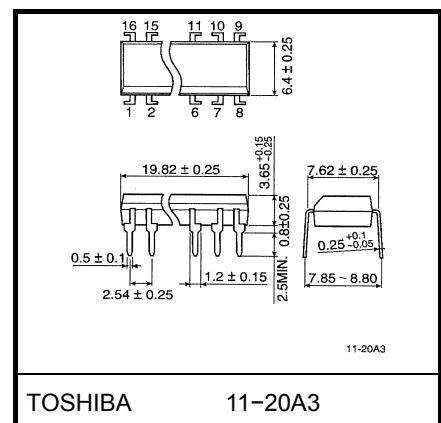
Unit: mm



Weight: 0.26 g (typ.)



Weight: 0.54 g (typ.)



Weight: 1.1 g (typ.)

Start of commercial production  
1984/08

## Absolute Maximum Ratings (Ta=25°C)

Characteristics		Symbol	Rating		Unit
			TLP627	TLP627-2 TLP627-4	
LED	Forward Current	$I_F$	60	50	mA
	Forward Current Derating	$\Delta I_F / ^\circ\text{C}$	$-0.7(T_a \geq 39^\circ\text{C})$	$-0.5(T_a \geq 25^\circ\text{C})$	mA / °C
	Pulse Forward Current	$I_{FP}$	1(100µs pulse, 100pps)		A
	Power Dissipation (1 Circuit)	$P_D$	100	70	mW
	Power Dissipation Derating (Ta≥25°C, 1 Circuit)	$\Delta P_D / ^\circ\text{C}$	-1.0	-0.7	mW / °C
	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 (1 Circuit)	$P_C$	150(*300)	100	mW
	Collector Power Dissipation Derating (Ta≥25°C, 1 Circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5(*-3.5)	-1.0	mW / °C
	Junction Temperature	$T_j$	125		°C
	Operating Temperature Range	$T_{opr}$	-55 to 100		°C
Storage Temperature Range	$T_{stg}$	-55 to 125		°C	
Lead Soldering Temperature (10s)	$T_{sol}$	260(10sec)		°C	
Total Package Power Dissipation	$P_T$	250(*320)	150	mW	
Total Package Power Dissipation Derating (Ta≥25°C, 1 Circuit)	$\Delta P_T / ^\circ\text{C}$	-2.5(*-3.2)	-1.5	mW / °C	
Isolation Voltage (AC, 1minute, R.H. ≤ 60%) (Note1)	$BV_S$	5000		V <sub>rms</sub>	

\*IF=20mA Max

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).

(Note1) Device considered a two terminal device : LED side pins Shorted together and DETECTOR side pins shorted together.

## Recommended Operating Conditions

Characteristics	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.

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

Characteristics		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	$C_{CE}$	$V=0, f=1\text{MHz}$	—	10	—	pF	

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

Characteristics	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	

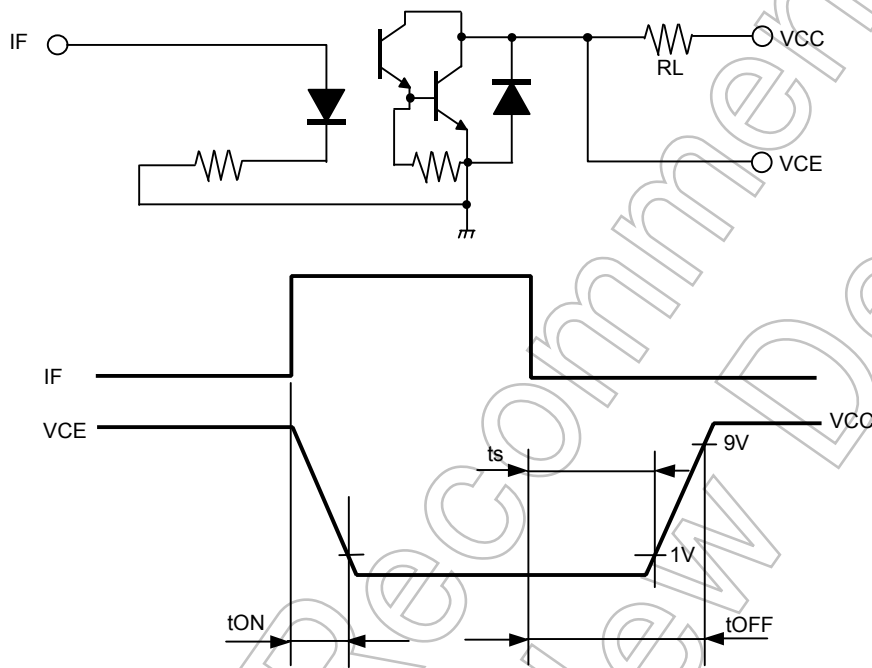
## Isolation Electrical Characteristics (Ta=25°C)

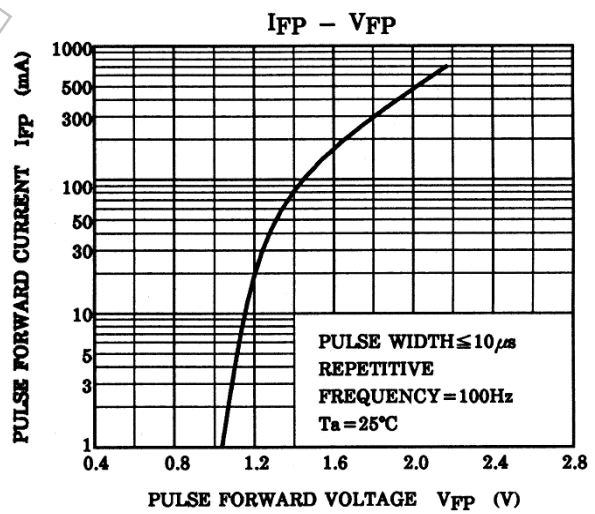
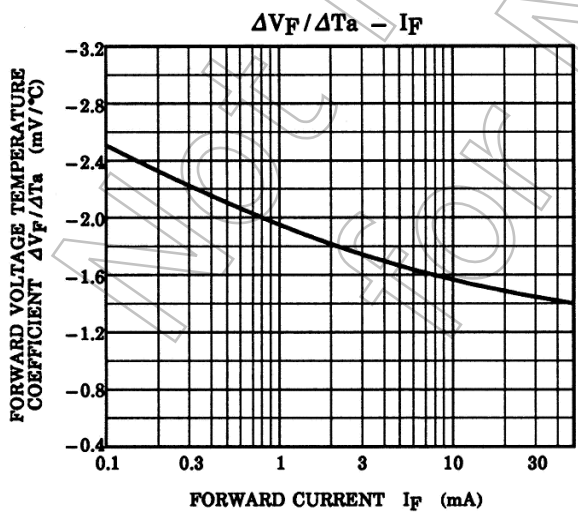
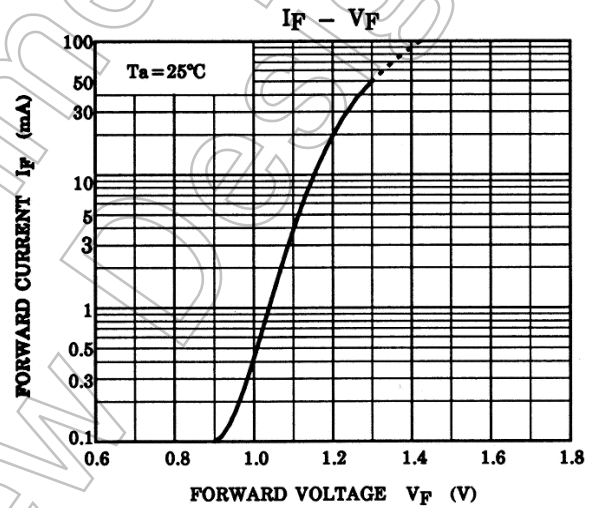
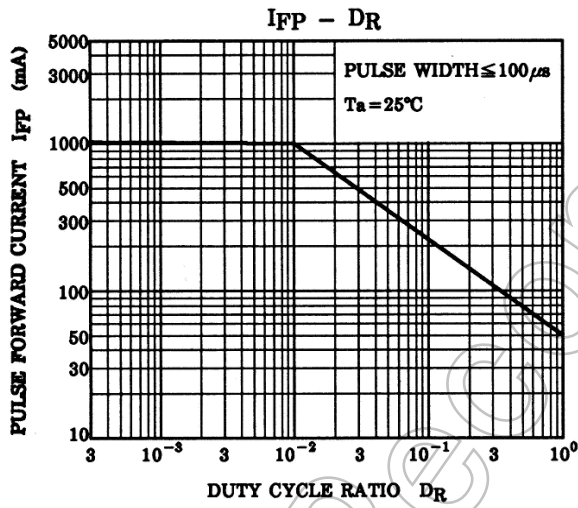
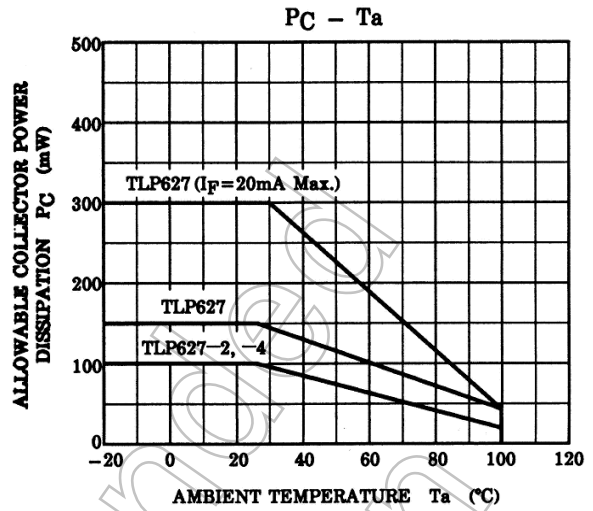
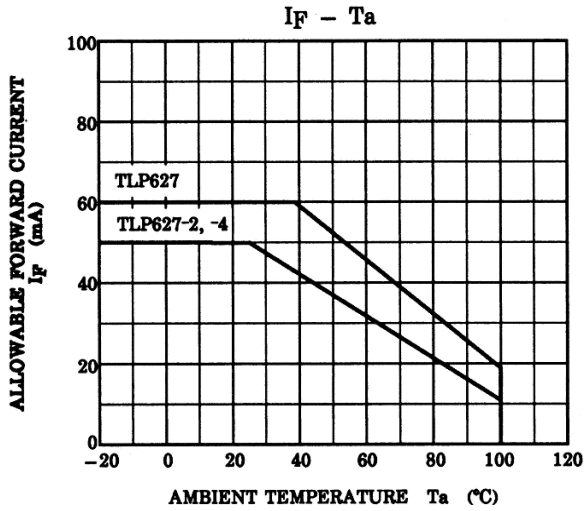
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance Input to Output	$C_S$	$V_S=0, f=1\text{MHz}$	—	0.8	—	pF
Isolation Resistance	$R_S$	$V_S=500\text{V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1minute	5000	—	—	Vrms
		AC, 1second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

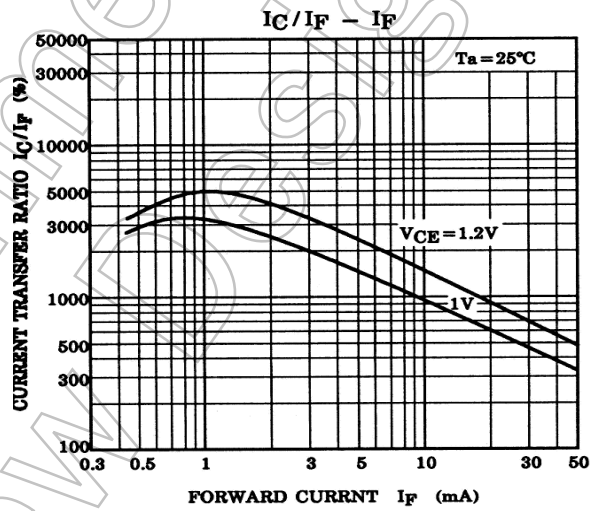
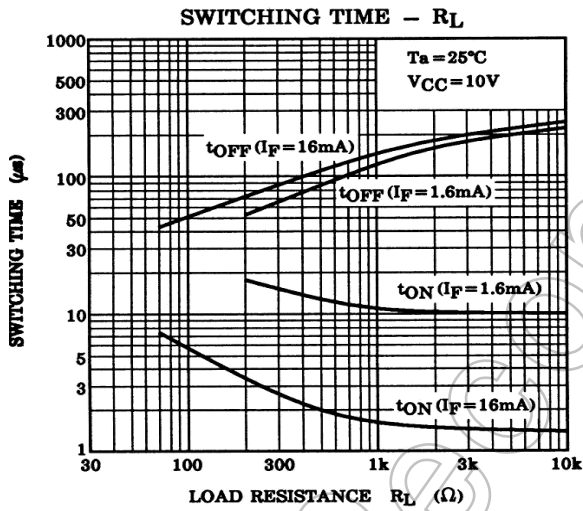
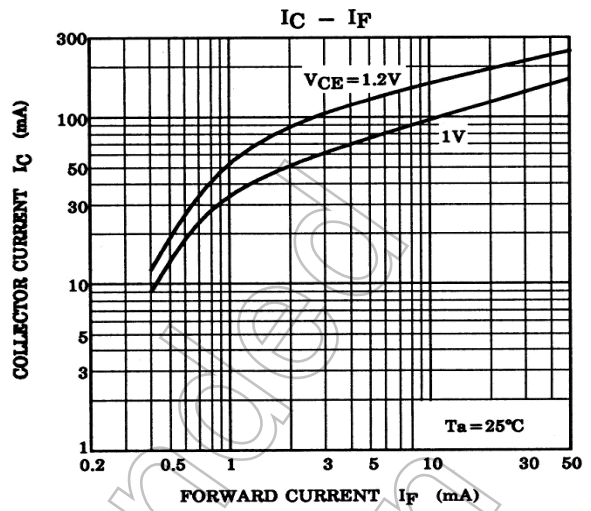
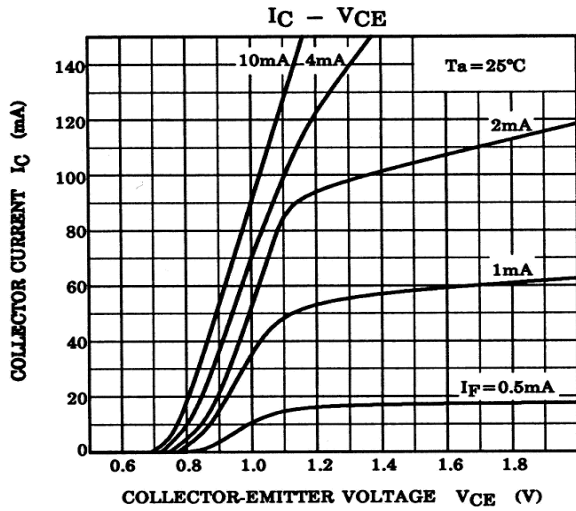
**Switching Characteristics (Ta=25°C)**

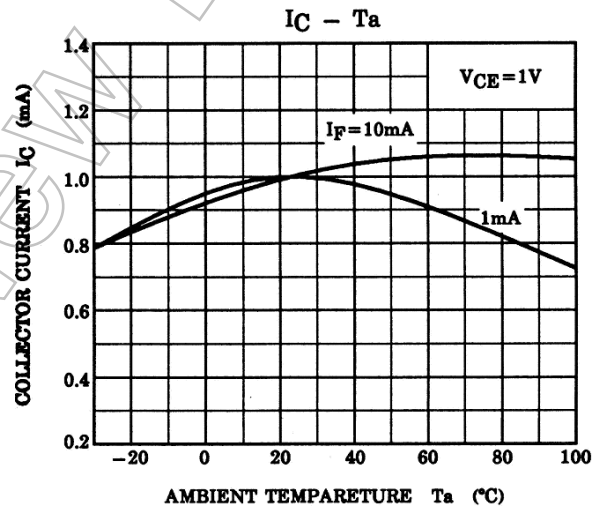
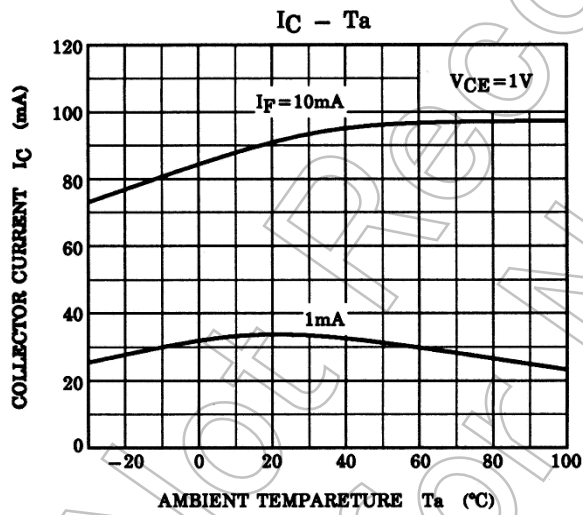
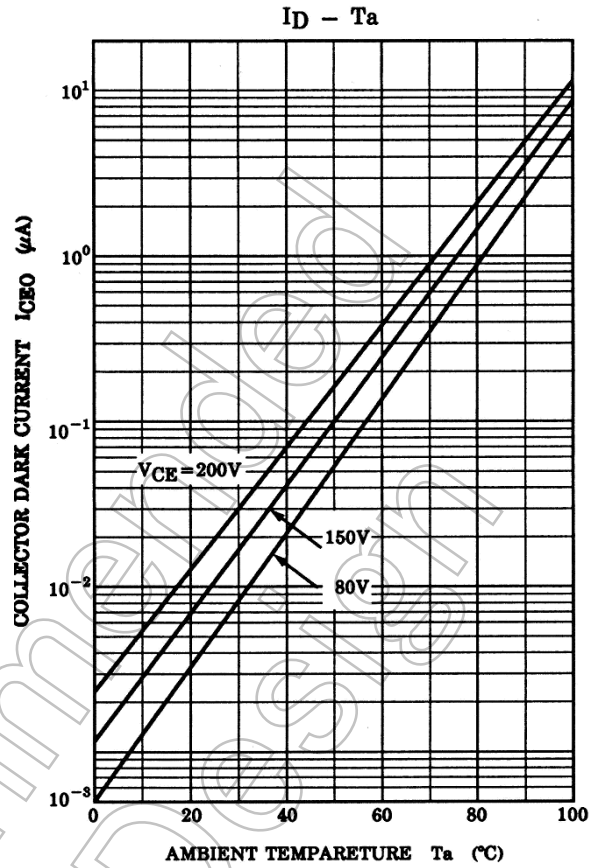
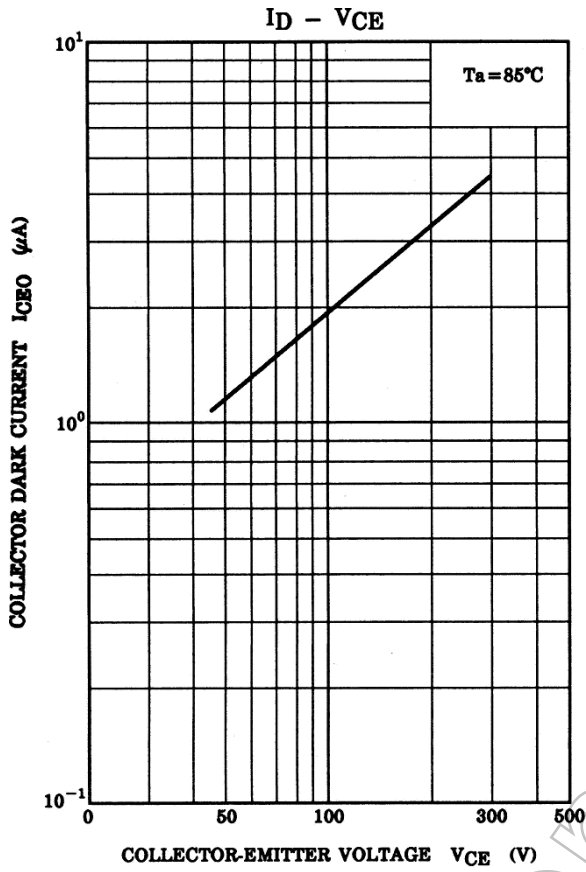
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise Time	$t_r$	$V_{CC}=10V$ $I_C=10mA$ $R_L=100\Omega$	—	40	—	$\mu s$
Fall Time	$t_f$		—	15	—	
Turn-on Time	$t_{on}$		—	50	—	
Turn-off Time	$t_{off}$		—	15	—	
Turn-on Time	$t_{ON}$	$R_L=180\Omega$ (Fig.1) $V_{CC}=10V, I_F=16mA$	—	5	—	
Storage Time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

**Fig.1 Switching Time Test Circuit**









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