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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.

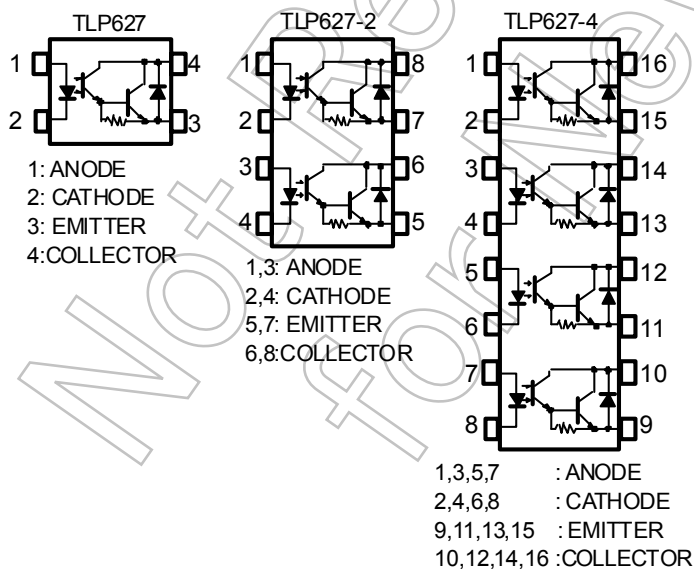
- Collector-Emitter Voltage : 300 V (min)
- Current Transfer Ratio : 1000 % (min)
- Isolation Voltage : 5000 Vrms (min)
- UL Recognized : UL1577, File No.E67349

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

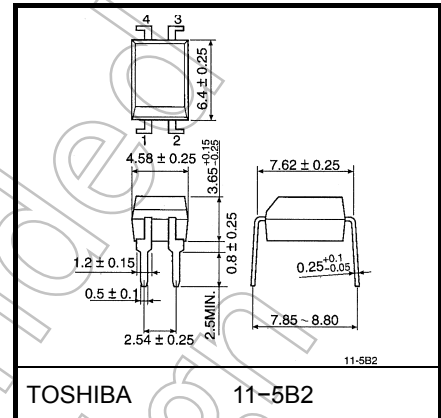
*1 UL1577

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

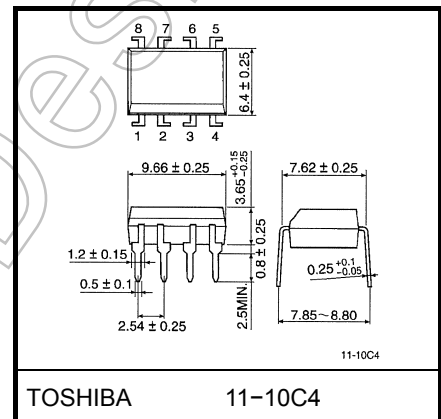
Pin Configuration (top view)



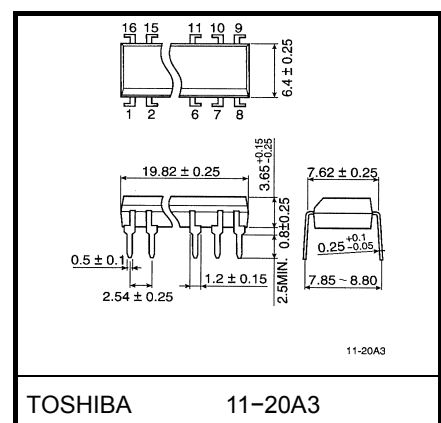
Unit: mm



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 _{rms}	

*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	μA
	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	μA
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	

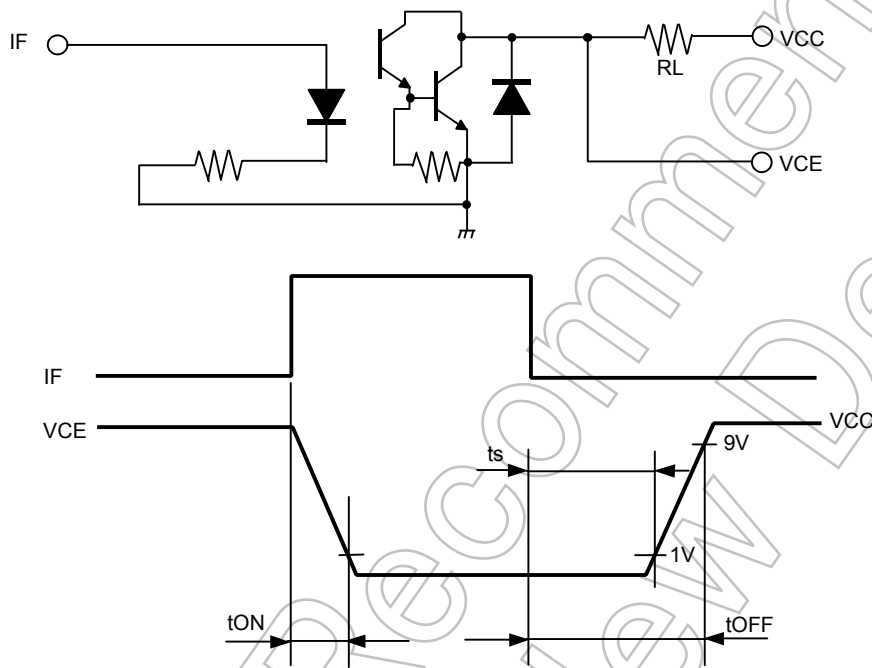
Isolation Electrical Characteristics (Ta=25°C)

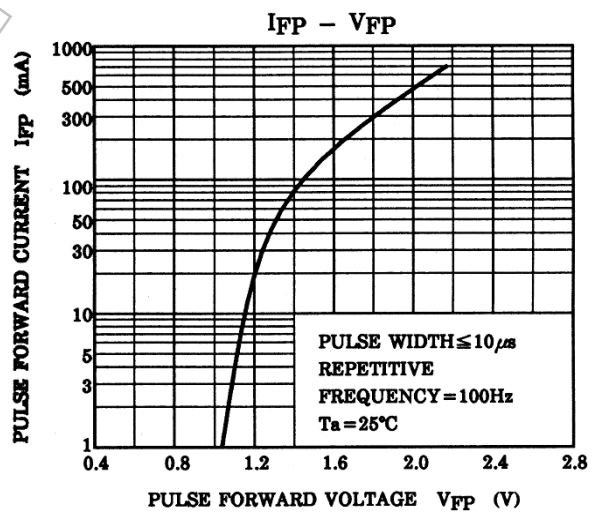
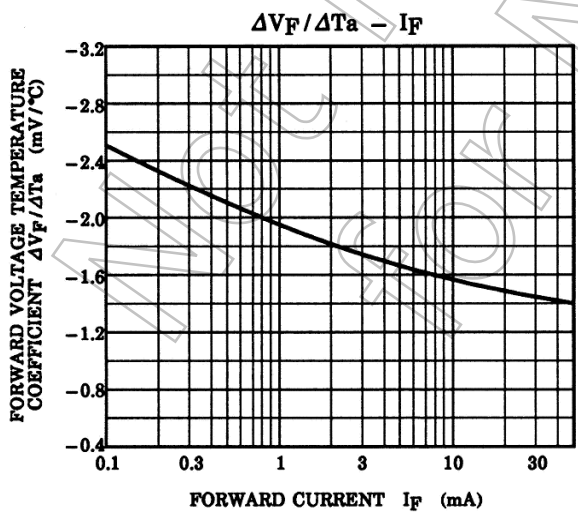
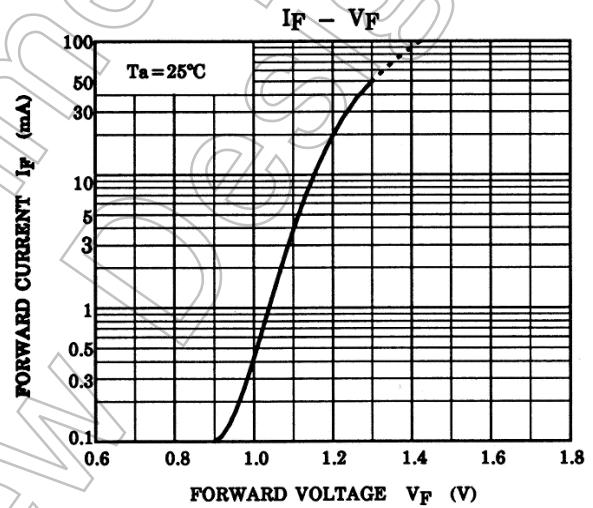
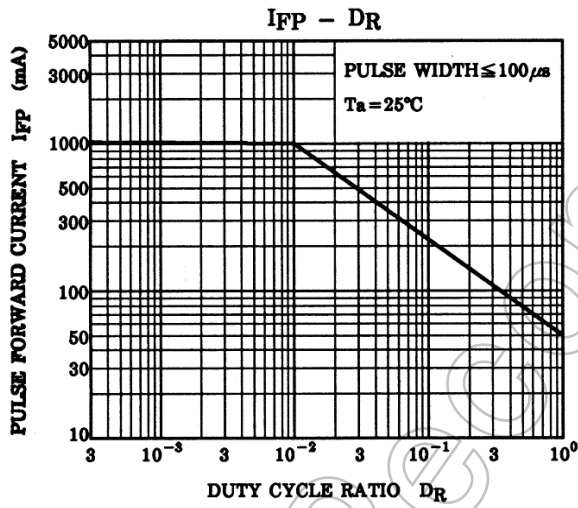
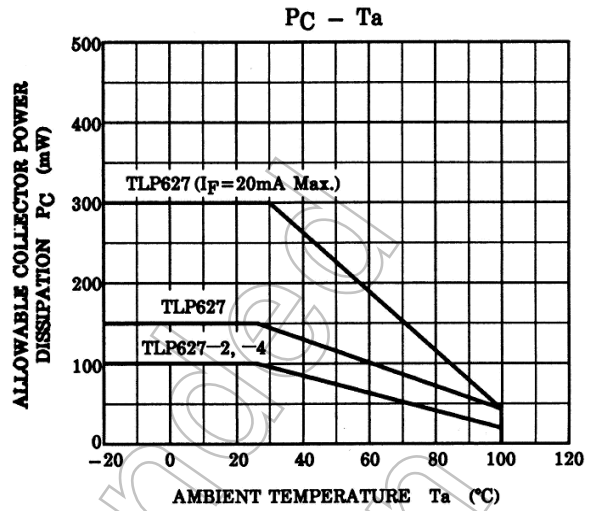
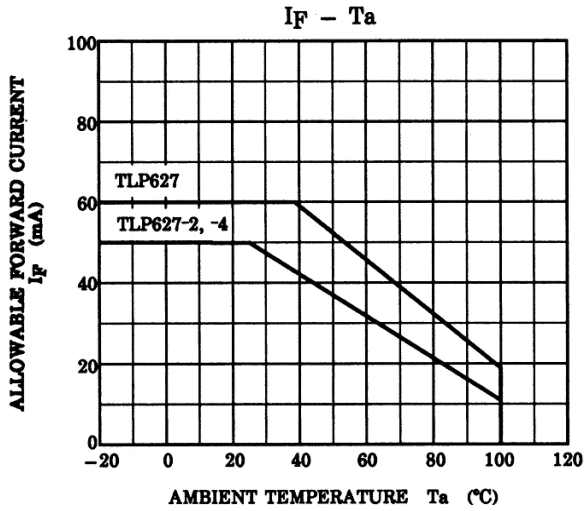
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance Input to Output	C_S	$V_S=0, f=1\text{MHz}$	—	0.8	—	pF
Isolation Resistance	R_S	$V_S=500\text{V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1minute	5000	—	—	Vrms
		AC, 1second, in oil	—	10000	—	
		DC, 1 minute,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

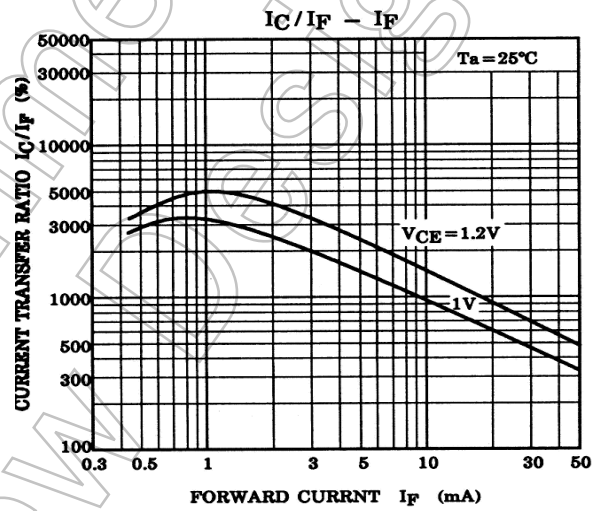
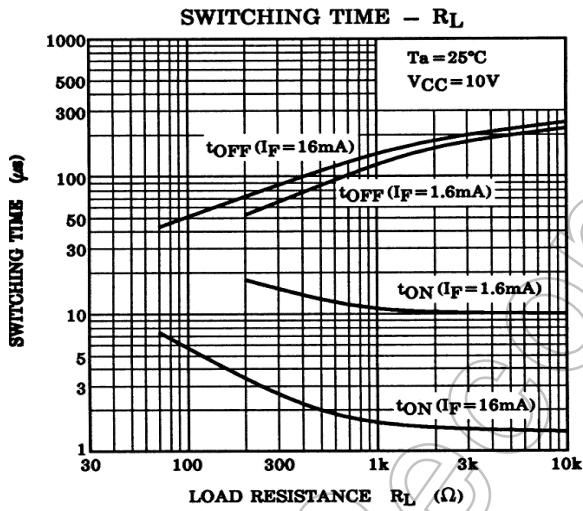
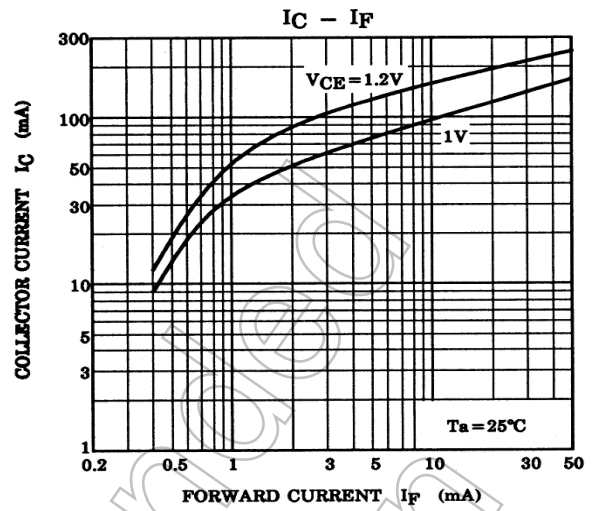
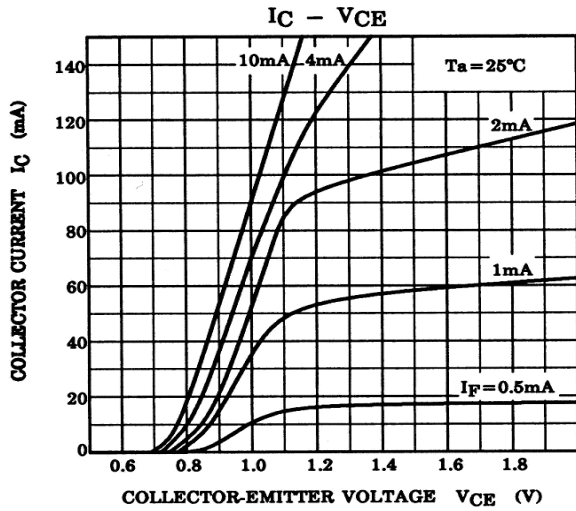
Switching Characteristics (Ta=25°C)

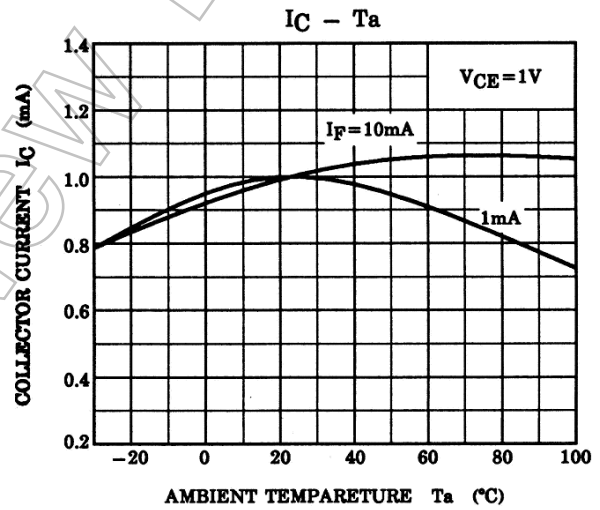
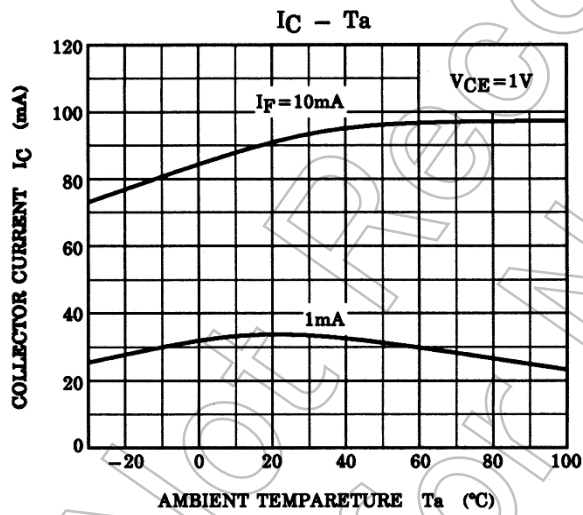
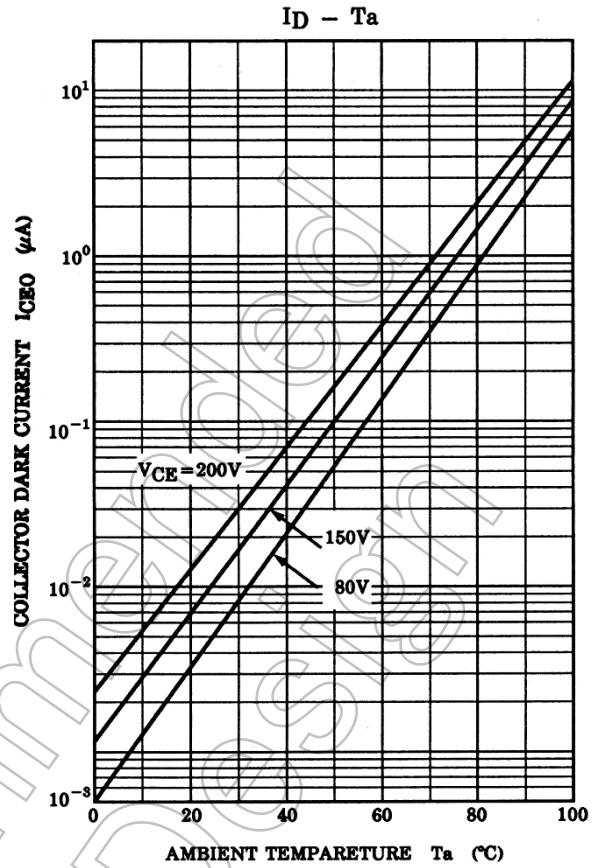
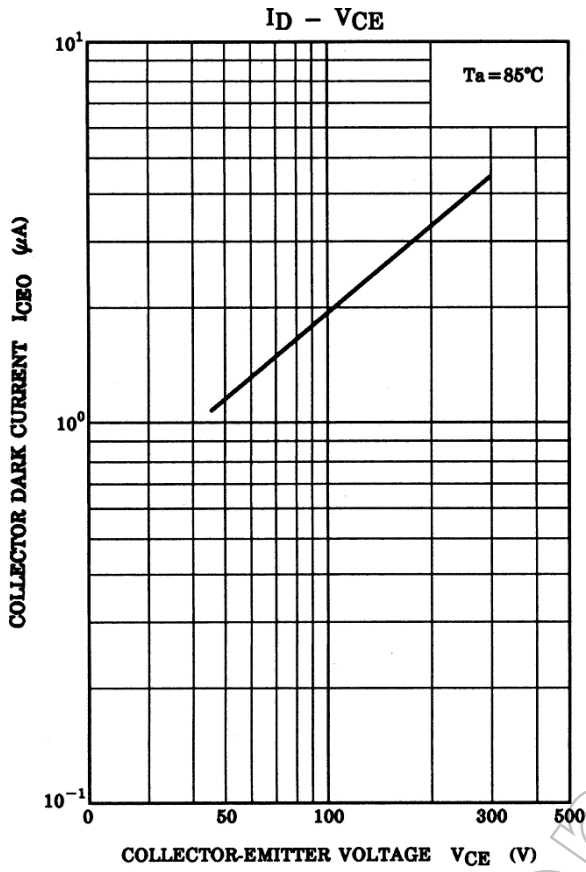
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise Time	t_r	$V_{CC}=10V$ $I_C=10mA$ $R_L=100\Omega$	—	40	—	μs
Fall Time	t_f		—	15	—	
Turn-on Time	t_{on}		—	50	—	
Turn-off Time	t_{off}		—	15	—	
Turn-on Time	t_{ON}	$R_L=180\Omega$ (Fig.1) $V_{CC}=10V, I_F=16mA$	—	5	—	
Storage Time	t_s		—	40	—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

Fig.1 Switching Time Test Circuit









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