

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

# TLP626, TLP626-2, TLP626-4

Programmable Controllers  
AC / DC-Input Module  
Telecommunication

The TOSHIBA TLP626, -2 and -4 consist of gallium arsenide infrared emitting diodes connected in inverse parallel, optically coupled to a photo-transistor.

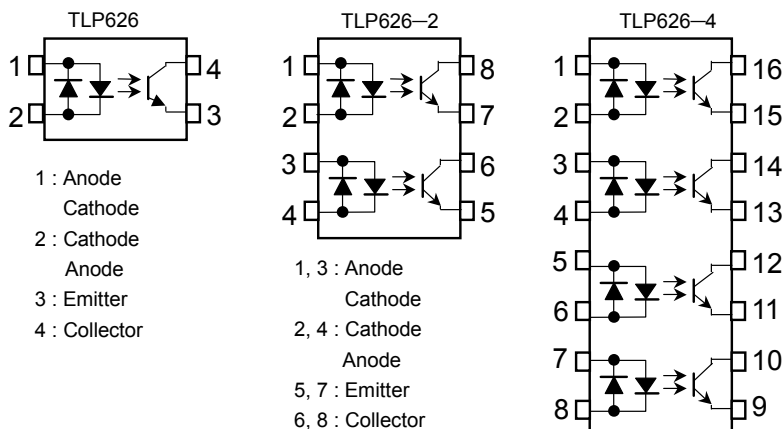
The TLP626-2 offers two isolated channels in an eight lead plastic DIP, while the TLP626-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-emitter voltage: 55V(min.)
- Current transfer ratio

Classi- fication	Current Transfer Ratio(min.)			Marking Of Classi- fication
	Ta = 25°C		Ta = -25~75°C	
	If = ±1mA VCE = 0.5V	If = ±0.5mA VCE = 1.5V	If = ±1mA VCE = 0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, blank

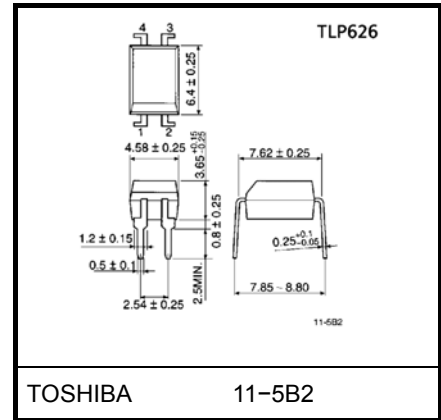
- Isolation voltage: 5000V<sub>rms</sub> min.
- UL recognized: UL1577, file no.E67349
- BSI approved: BS EN60065: 2002 certificate no.7426  
BS EN60950-1: 2002 certificate no.7427
- Note: Application type name for certification test,  
please use standard product type name, i.e.  
TLP626(BV): TLP626

## Pin Configuration (top view)



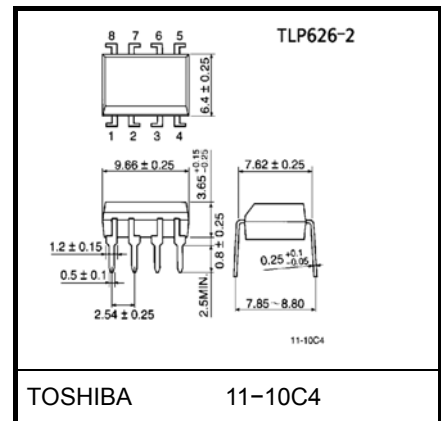
1, 3, 5, 7 : Anode, Cathode  
2, 4, 6, 8 : Cathode, Anode  
9, 11, 13, 15 : Emitter  
10, 12, 14, 16 : Collector

Unit in mm



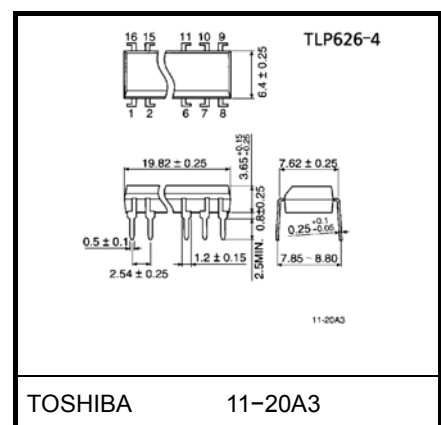
TOSHIBA 11-5B2

Weight: 0.26 g (typ.)



TOSHIBA 11-10C4

Weight: 0.54 g (typ.)



TOSHIBA 11-20A3

Weight: 1.1 g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating		Unit
			TLP626	TLP626-2 TLP626-4	
LED	Forward current	$I_F$	60	50	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-0.7(Ta ≥ 39°C)	-0.5(Ta ≥ 39°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
	Junction temperature	$T_j$	125		°C
Detector	Collector-emitter voltage	$V_{CEO}$	55		V
	Emitter-collector voltage	$V_{ECO}$	7		V
	Collector current	$I_C$	50		mA
	Collector power dissipation (1 circuit)	$P_C$	150	100	mW
	Collector power dissipation derating (Ta ≥ 25°C, 1 circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / °C
	Junction temperature	$T_j$	125		°C
Storage temperature range		$T_{stg}$	-55~125		°C
Operating temperature range		$P_{opr}$	-55~100		°C
Lead soldering temperature		$T_{sol}$	260(10s)		°C
Total package power dissipation (1 circuit)		$P_T$	250	150	mW
Total package power dissipation derating (Ta ≥ 25°C, 1 circuit)		$\Delta P_T / ^\circ\text{C}$	-2.5	-1.5	mW / °C
Isolation voltage (Note 1)		$BV_S$	5000(AC, 1min., RH≤60%)		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: LED side pins shorted together, and detector side pins shorted together.

## Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{CC}$	—	5	24	V
Forward current	$I_{F(RMS)}$	—	1.6	20	mA
Collector current	$I_C$	—	1	10	mA
Operating temperature	$T_{opr}$	-25	—	75	°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)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = \pm 10\text{mA}$	1.0	1.15	1.3	V
	Reverse current	$I_F$	$V_F = \pm 0.7\text{V}$	—	2.5	20	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	60	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector dark current	$I_{CEO}$	$V_{CE} = 24\text{V}$	—	10	10	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
Capacitance collector to emitter	$C_{CE}$	$V=0, f=1\text{MHz}$	—	12	—	pF	

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

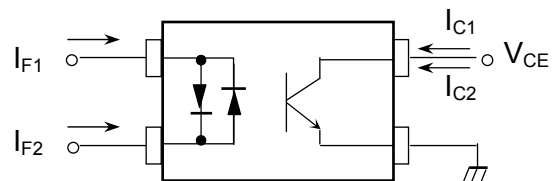
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	$I_C / I_F$	$I_F = \pm 1\text{mA}, V_{CE} = 0.5\text{V}$ rank BV	100	—	1200	%
			200	—	1200	
Low input CTR	$I_C / I_F(\text{low})$	$I_F = \pm 0.5\text{mA}, V_{CE} = 1.5\text{V}$ rank BV	50	—	—	%
			100	—	—	
Collector-emitter saturation voltage	$V_{CE(\text{sat})}$	$I_C = 0.5\text{mA}, I_F = \pm 1\text{mA}$ $I_C = 1\text{mA}, I_F = \pm 1\text{mA}$ rank BV	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off-state collector current	$I_{C(\text{off})}$	$V_F = \pm 0.7\text{V}, V_{CE} = 24\text{V}$	—	1	10	$\mu\text{A}$
CTR symmetry *1	$I_{C(\text{ratio})}$	$I_C(I_F = -1\text{mA}) / I_C(I_F = 1\text{mA})$	0.5	—	2	—

## Coupled Electrical Characteristics (Ta = -25~75°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	$I_C / I_F$	$I_F = 1\text{mA}, V_{CE} = 0.5\text{V}$ rank BV	50	—	—	%
			100	—	—	
Low input CTR	$I_C / I_F(\text{low})$	$I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ rank BV	—	50	—	%
			—	100	—	

\*1

$$I_{C(\text{ratio})} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 5\text{V})}{I_{C1}(I_F = I_{F1}, V_{CE} = 5\text{V})}$$



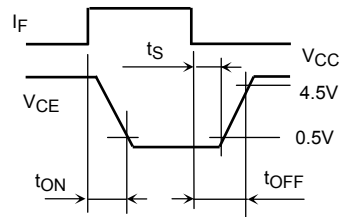
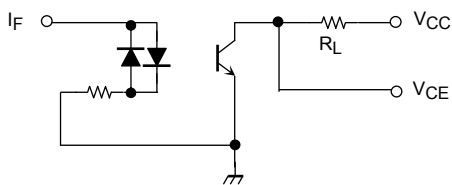
## Isolation Characteristics (Ta = 25°C)

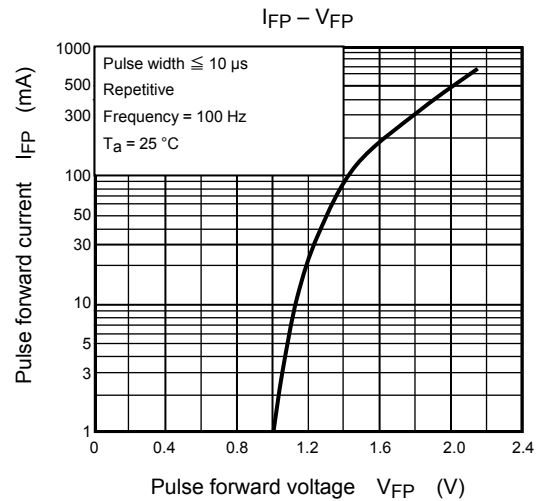
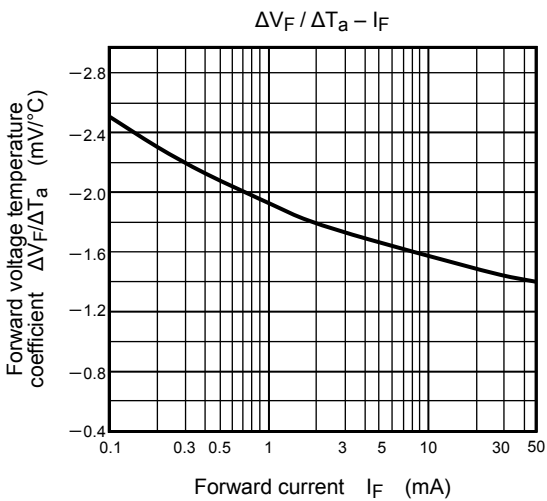
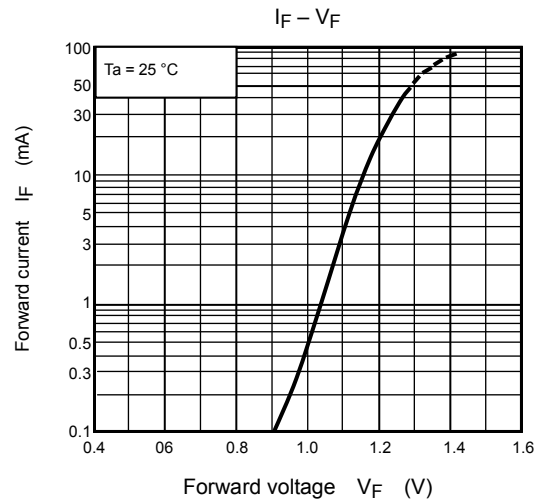
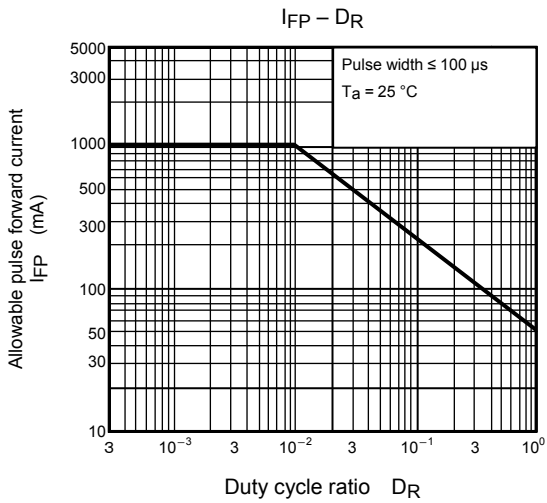
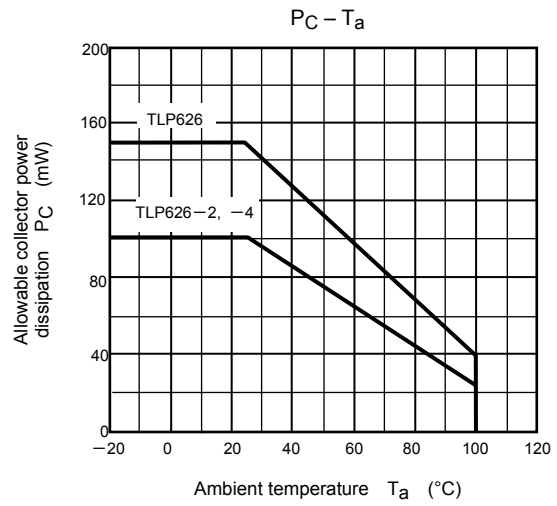
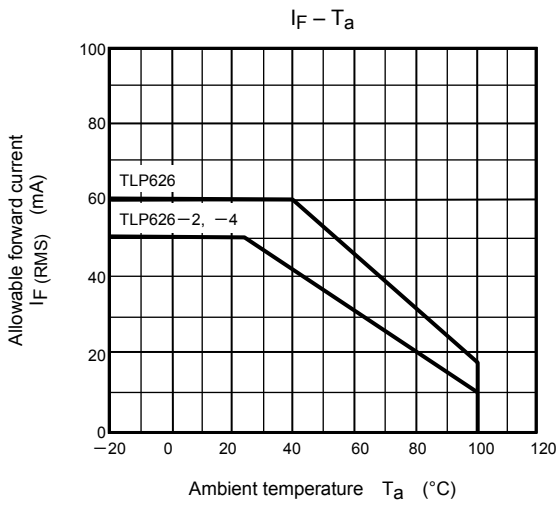
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500V	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	Vrms
		DC, 1 minute, in oil	—	10000	—	Vdc

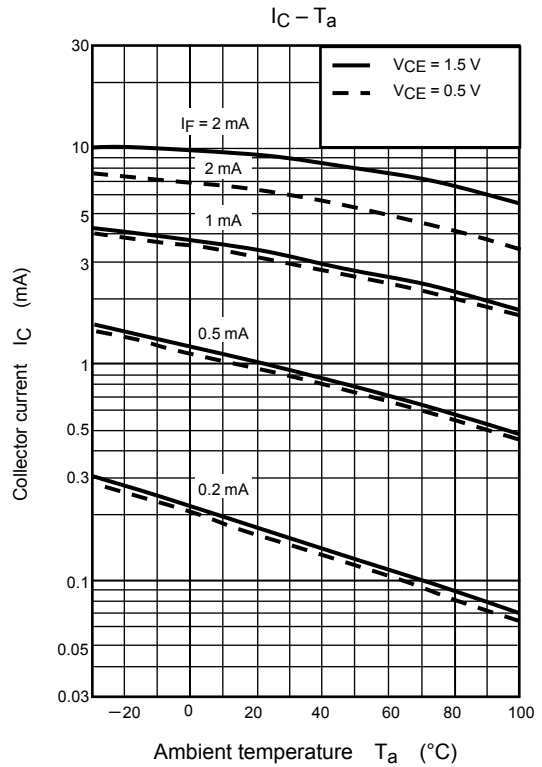
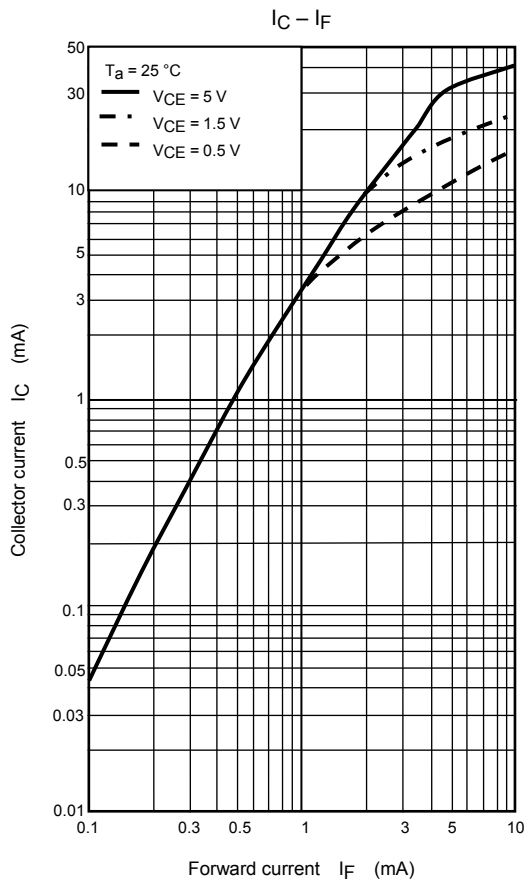
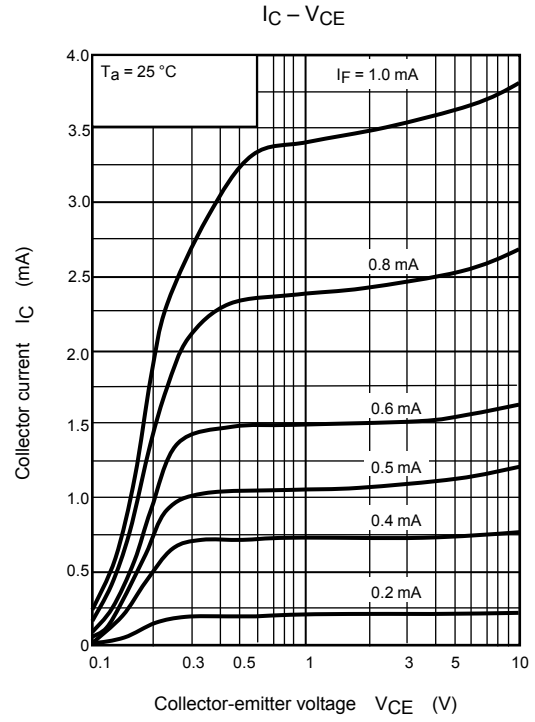
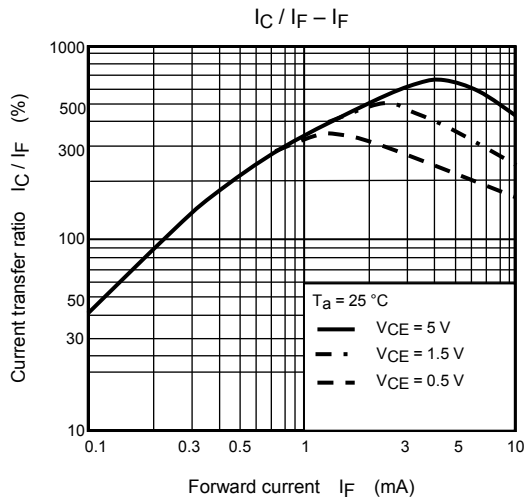
## Switching Characteristics (Ta = 25°C)

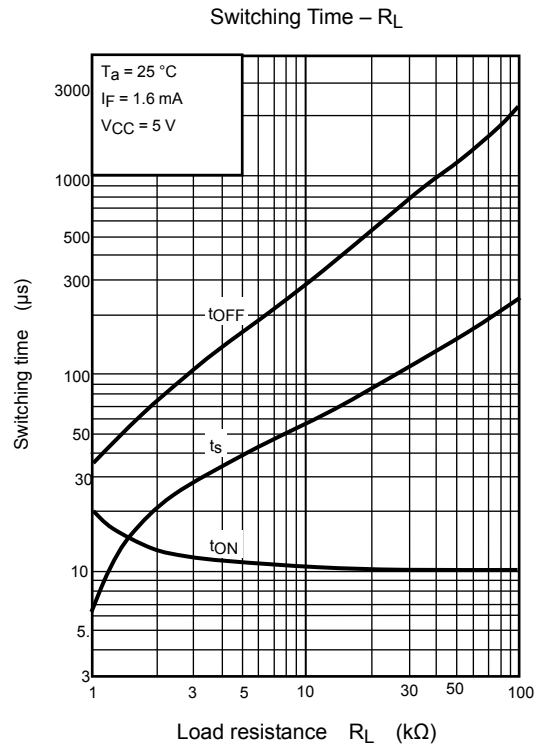
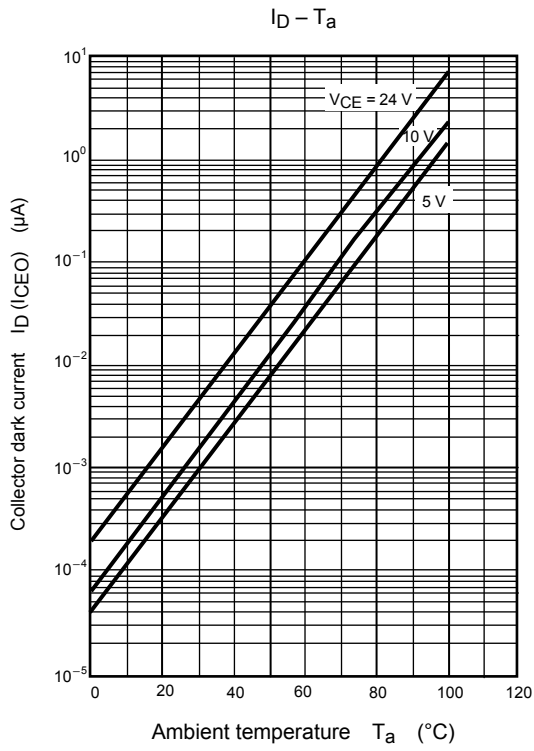
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10V, I <sub>C</sub> = 2mA R <sub>L</sub> = 100Ω	—	8	—	μs
Fall time	t <sub>f</sub>		—	8	—	
Turn-on time	t <sub>on</sub>		—	10	—	
Turn-off time	t <sub>off</sub>		—	8	—	
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 4.7kΩ (Fig.1) V <sub>CC</sub> = 5V, I <sub>F</sub> = ±1.6mA	—	10	—	μs
Storage time	t <sub>s</sub>		—	50	—	
Turn-off time	T <sub>OFF</sub>		—	300	—	

Fig. 1 Switching operating conditions









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