

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.

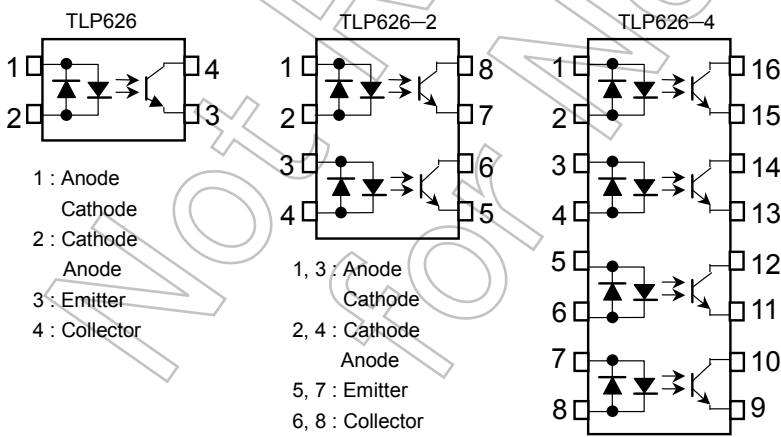
The TLP626-2 offers two isolated channels in an eight lead plastic DIP, while the TLP626-4 provides four isolated channels in a sixteen plastic DIP.

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

Classification	Current Transfer Ratio (min)			Marking of Classification
	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

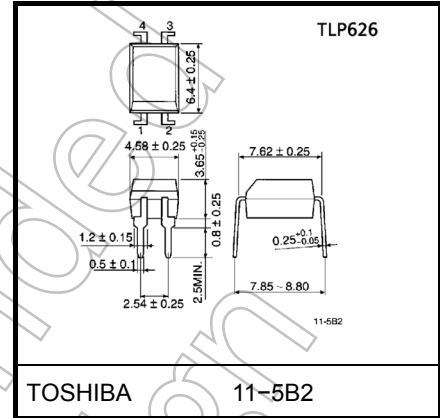
- Isolation voltage: 5000V_{rms} (min)
- UL recognized: UL1577, file no.E67349
- BSI approved: BS EN60065: 2002 certificate no.7426
BS EN60950-1: 2002 certificate no.7427
- Note: Application type name for certification test, please use standard product type name, i.e. TLP626(BV): TLP626

Pin Configuration (top view)

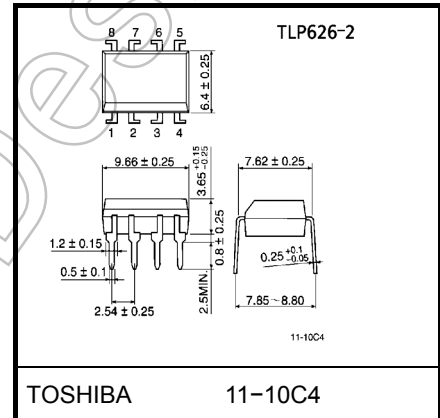


1, 3, 5, 7 : Anode, Cathode
2, 4, 6, 8 : Cathode, Anode
9, 11, 13, 15 : Emitter
10, 12, 14, 16 : Collector

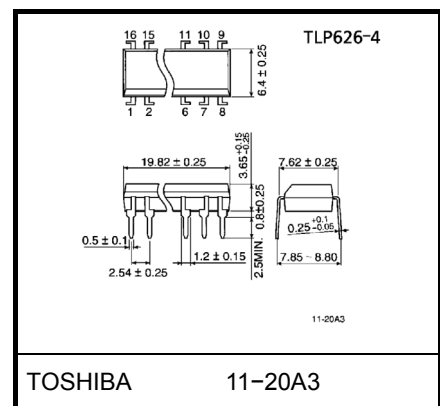
Unit: mm



Weight: 0.26 g (typ.)



Weight: 0.54 g (typ.)



Weight: 1.1 g (typ.)

Start of commercial production
1984/04

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 to 125		°C
Operating temperature range		P_{opr}	-55 to 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, 1minute, R.H.≤60%)		V rms

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	μA
	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	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	μA
Capacitance collector to emitter	C_{CE}	$V=0, f=1\text{MHz}$	—	12	—	pF	

Coupled Electrical Characteristics (Ta = 25°C)

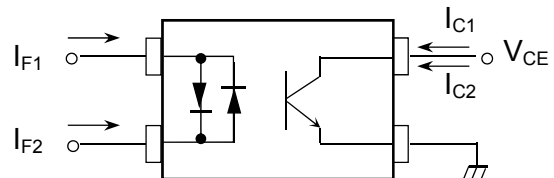
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_C / I_F	$I_F = \pm 1\text{mA}, V_{CE} = 0.5\text{V}$ rank BV	100	—	1200	%
			200	—	1200	
Low input CTR	$I_C / I_F(\text{low})$	$I_F = \pm 0.5\text{mA}, V_{CE} = 1.5\text{V}$ rank BV	50	—	—	%
			100	—	—	
Collector-emitter 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	μA
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

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



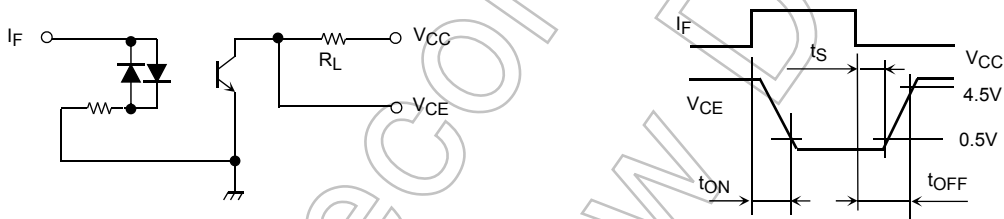
Isolation Characteristics (Ta = 25°C)

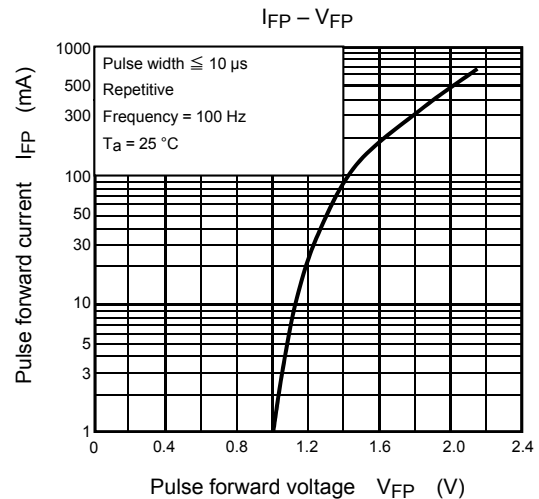
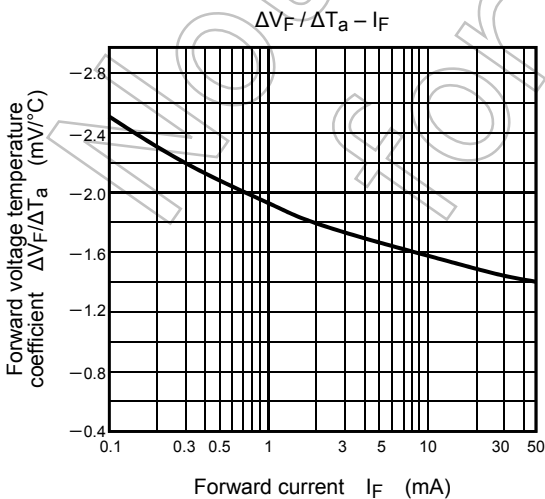
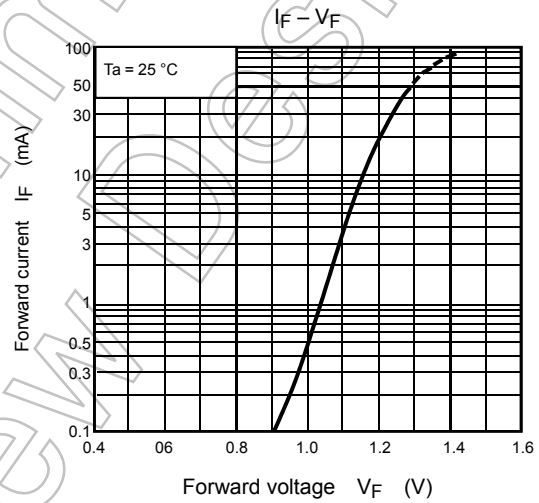
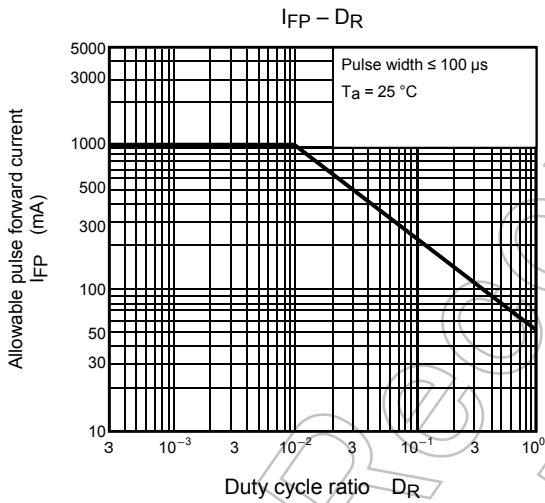
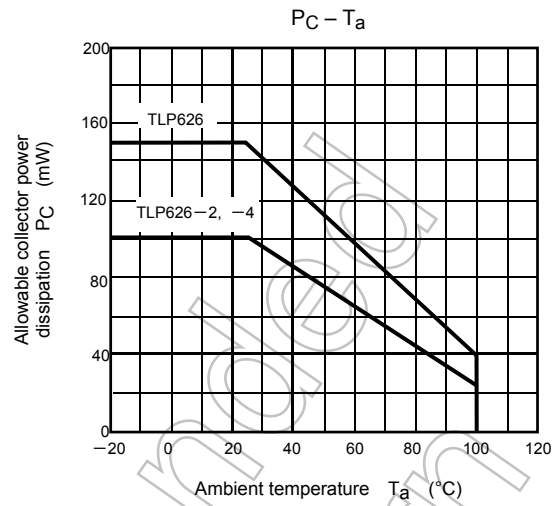
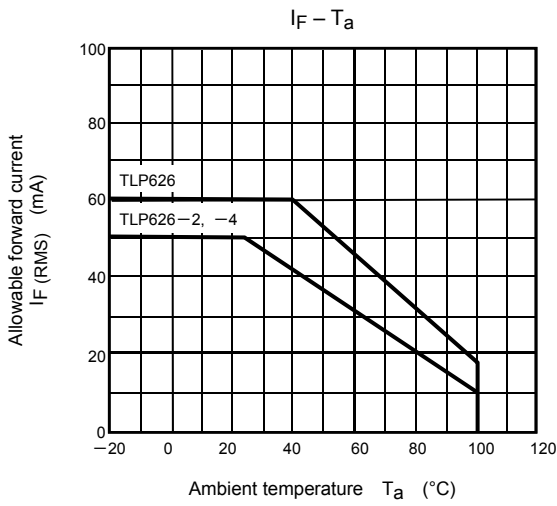
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C _S	V _S = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500V	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	—
		DC, 1 minute, in oil	—	10000	—	Vdc

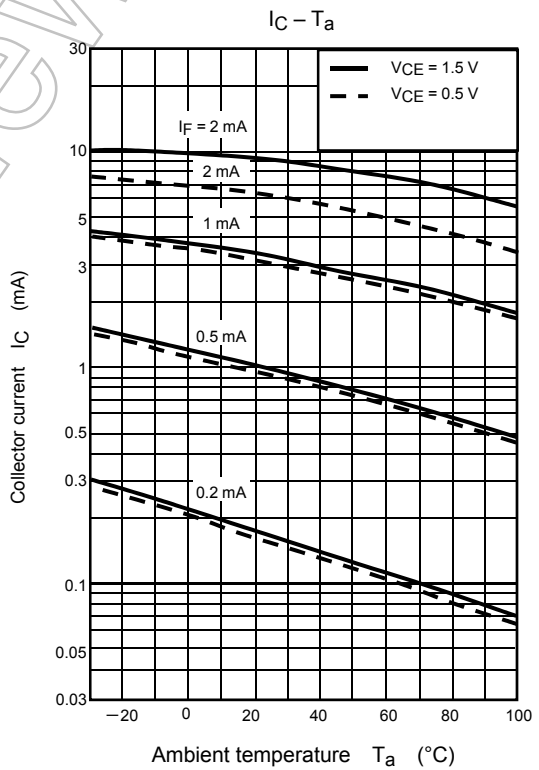
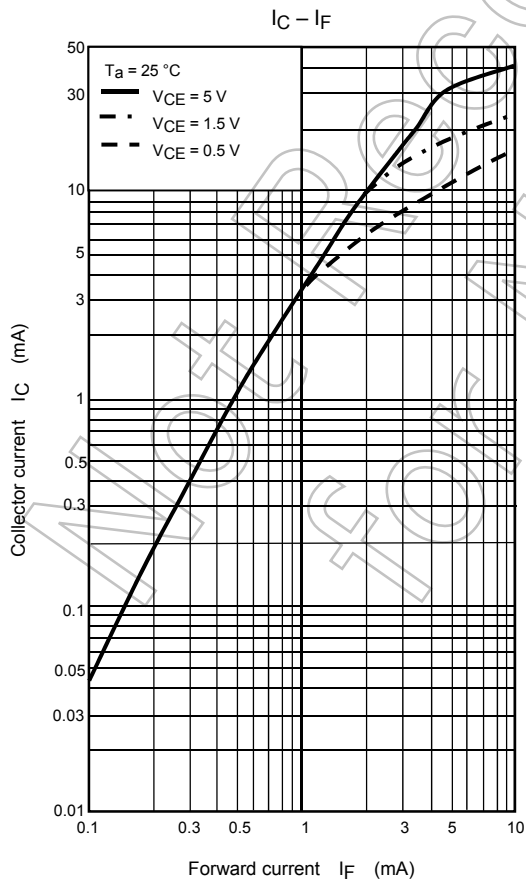
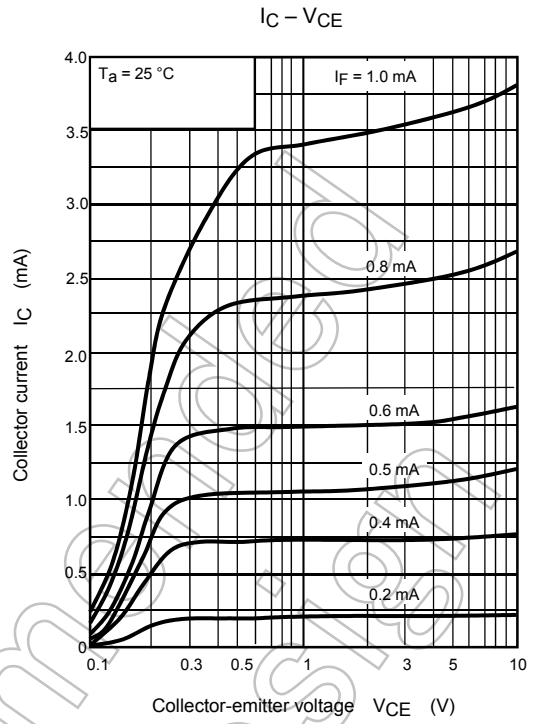
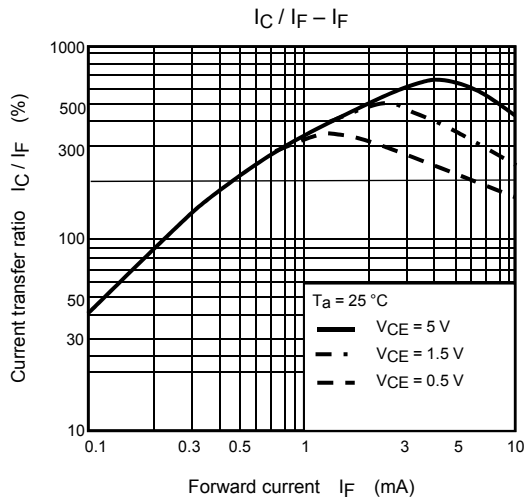
Switching Characteristics (Ta = 25°C)

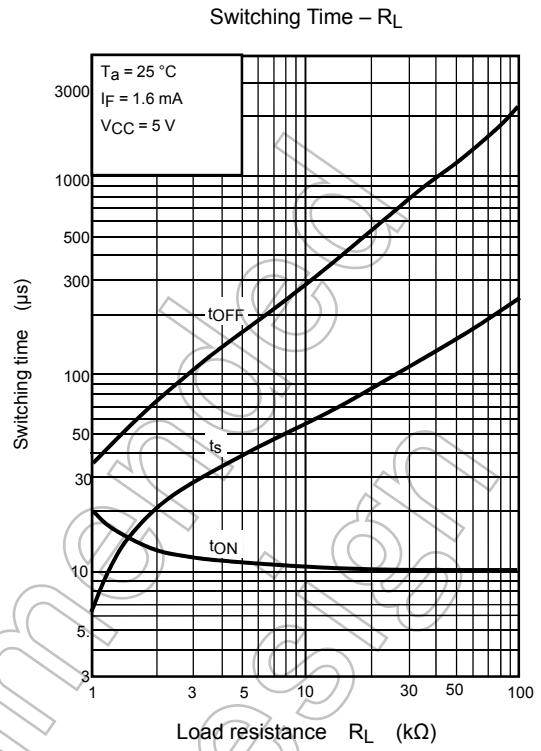
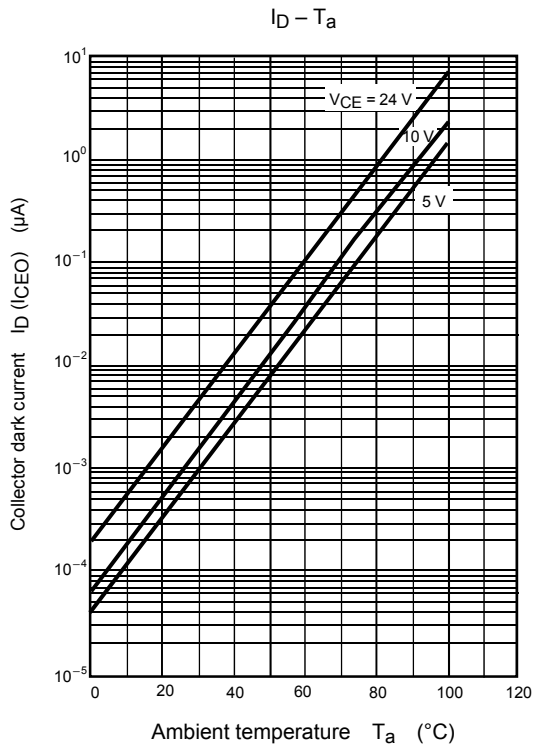
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t _r	V _{CC} = 10V, I _C = 2mA R _L = 100Ω	—	8	—	μs
Fall time	t _f		—	8	—	
Turn-on time	t _{on}		—	10	—	
Turn-off time	t _{off}		—	8	—	
Turn-on time	t _{ON}	R _L = 4.7kΩ (Fig.1) V _{CC} = 5V, I _F = ±1.6mA	—	10	—	μs
Storage time	t _s		—	50	—	
Turn-off time	t _{OFF}		—	300	—	

Fig. 1 Switching operating conditions









Not Recommended for New Design

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