

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

# TLP620, TLP620-2, TLP620-4

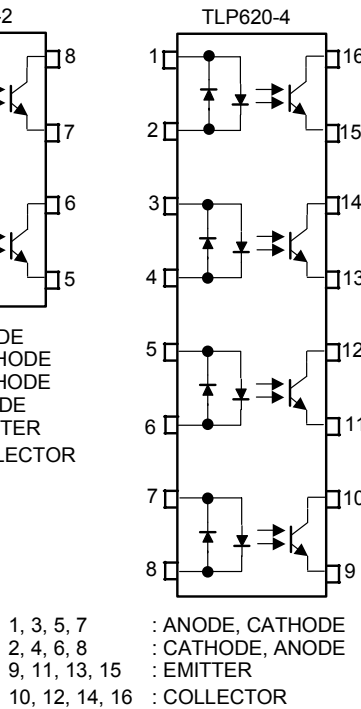
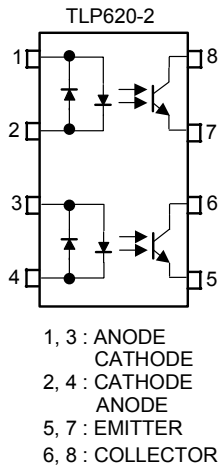
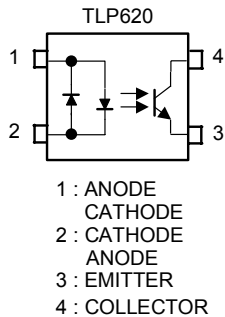
Programmable Controllers  
 AC / DC-Input Module  
 Telecommunication

The TOSHIBA TLP620, -2 and -4 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected in inverse parallel.

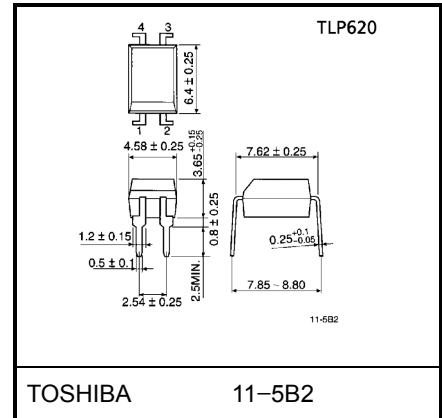
The TLP620-2 offers two isolated channels in an eight lead plastic DIP, while the TLP620-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-emitter voltage: 55V (min.)
- Current transfer ratio: 50% (min.)  
 Rank GB: 100% (min.)

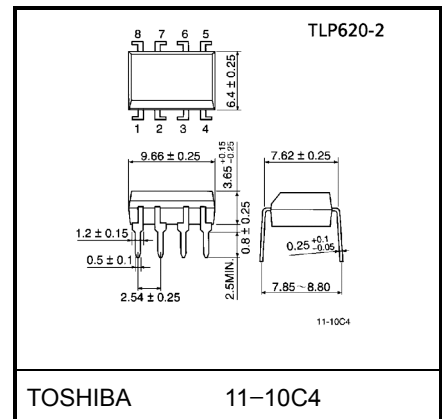
## Pin Configurations (top view)



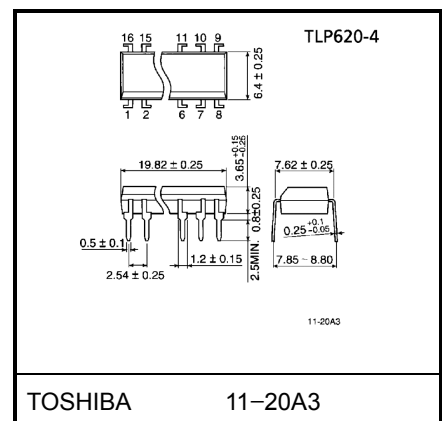
Unit in mm



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g

	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: 1994, BS EN60950: 1992

- Isolation voltage: 5000V<sub>rms</sub> (min.)
- Option (D4) type  
VDE approved: DIN VDE0884 / 06.92, certificate no. 68384  
Maximum operating insulation voltage: 890V<sub>PK</sub>  
Highest permissible over voltage: 8000V<sub>PK</sub>

**(Note) When a VDE0884 approved type is needed, please designate the "Option(D4)".**

- Creepage distance: 6.4mm (min.)  
Clearance: 6.4mm (min.)  
Insulation thickness: 0.4mm (min.)

## Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating		Unit	
		TLP620	TLP620-2 TLP620-4		
LED	Forward current	I <sub>F</sub> (RMS)	60	50	mA
	Forward current derating	ΔI <sub>F</sub> / °C	-0.7 (Ta ≥ 39°C)	-0.5 (Ta ≥ 25°C)	mA / °C
	Pulse forward current	I <sub>FP</sub>	1 (100μs pulse, 100pps)		A
	Power dissipation (1 circuit)	P <sub>D</sub>	100	70	mW
	Power dissipation derating	ΔP <sub>D</sub> / °C	-1.0	-0.7	mW / °C
	Junction temperature	T <sub>j</sub>	125		°C
Detector	Collector-emitter voltage	V <sub>CEO</sub>	55		V
	Emitter-collector voltage	V <sub>ECO</sub>	7		V
	Collector current	I <sub>C</sub>	50		mA
	Collector power dissipation (1 circuit)	P <sub>C</sub>	150	100	mW
	Collector power dissipation derating (1 circuit) (Ta ≥ 25°C)	ΔP <sub>C</sub> / °C	-1.5	-1.0	mW / °C
	Junction temperature	T <sub>j</sub>	125		°C
Storage temperature range	T <sub>stg</sub>	-55~125		°C	
Operating temperature range	T <sub>opr</sub>	-55~100		°C	
Lead soldering temperature	T <sub>sold</sub>	260 (10s)		°C	
Total package power dissipation	P <sub>T</sub>	250	150	mW	
Total package power dissipation derating (Ta ≥ 25°C, 1 circuit)	ΔP <sub>T</sub> / °C	-2.5	-1.5	mW / °C	
Isolation voltage	BV <sub>S</sub>	5000 (AC, 1 min., RH ≤ 60%)		V <sub>rms</sub>	

## Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{CC}$	—	5	24	V
Forward current	$I_F$ (RMS)	—	16	20	mA
Collector current	$I_C$	—	1	10	mA
Operating temperature	$T_{opr}$	-25	—	85	°C

## 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
	Forward 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	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
Capacitance (collector to emitter)	$C_{CE}$	$V_{CE} = 0, f = 1\text{MHz}$	—	10	—	pF	

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

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	$I_C / I_F$	$I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F$ (sat)	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-emitter saturation voltage	$V_{CE}$ (sat)	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$ $I_C = 0.2\text{mA}, I_F = \pm 1\text{mA}$ Rank GB	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off-state collector current	$I_C$ (off)	$V_F = \pm 0.7\text{V}, V_{CE} = 24\text{V}$	—	1	10	$\mu\text{A}$
CTR symmetry	$I_C$ (ratio)	$I_C (I_F = -5\text{mA}) / I_C (I_F = +5\text{mA})$	0.33	1	3	—

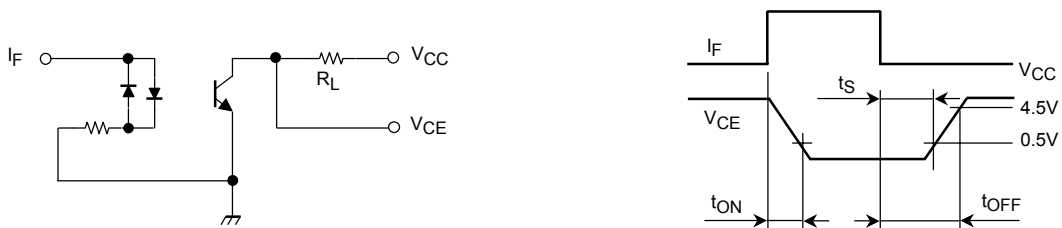
## Isolation Characteristics (Ta = 25°C)

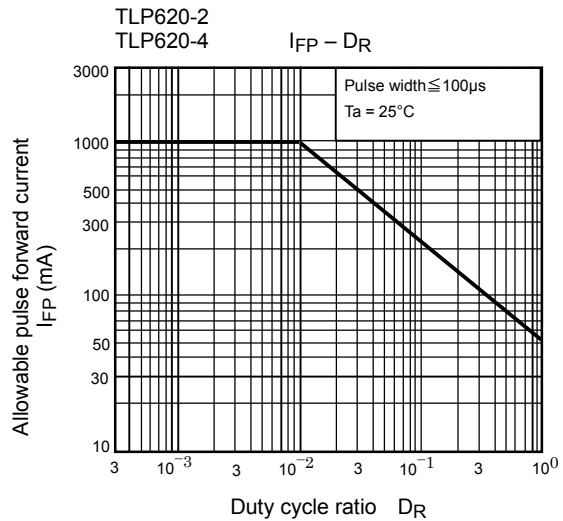
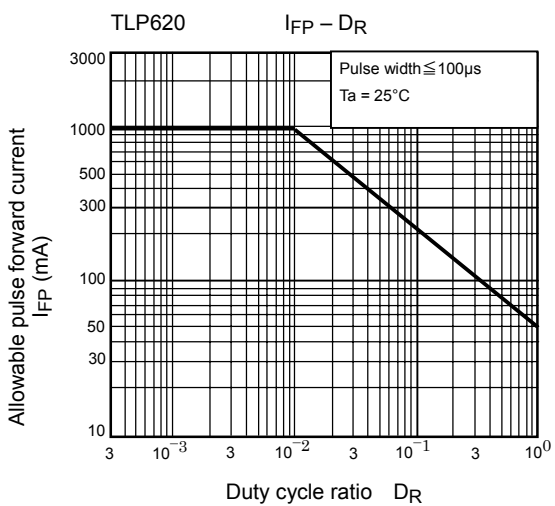
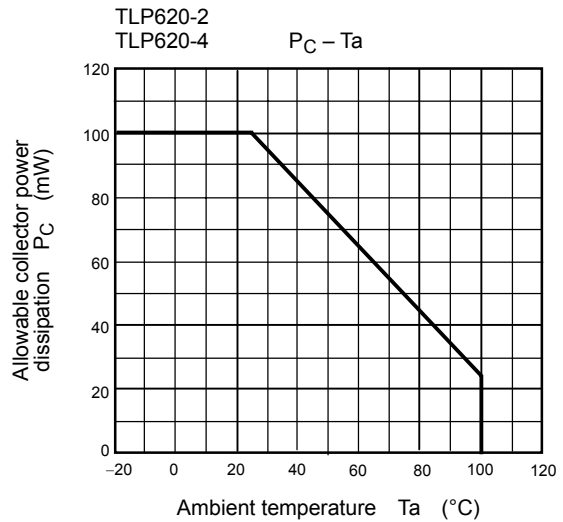
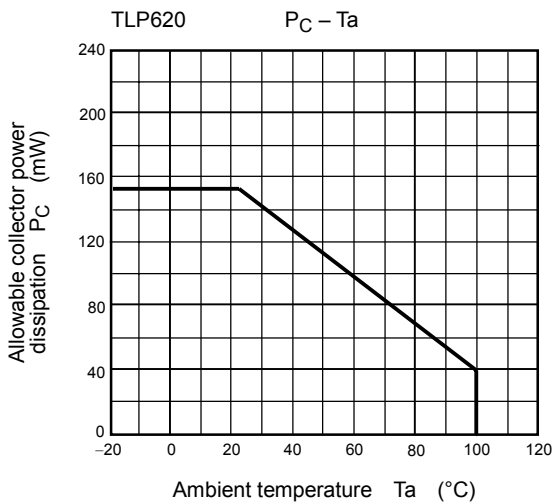
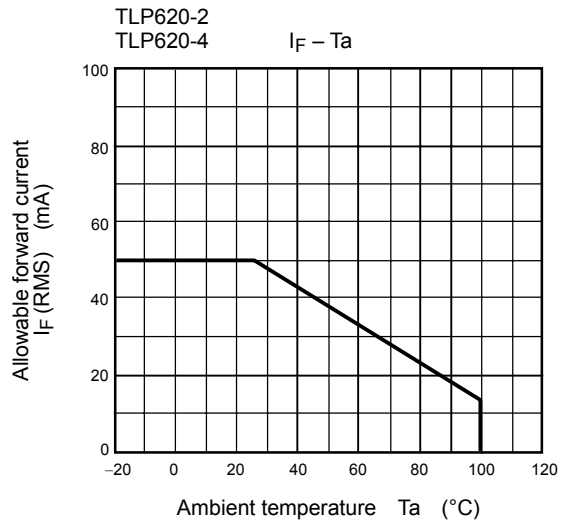
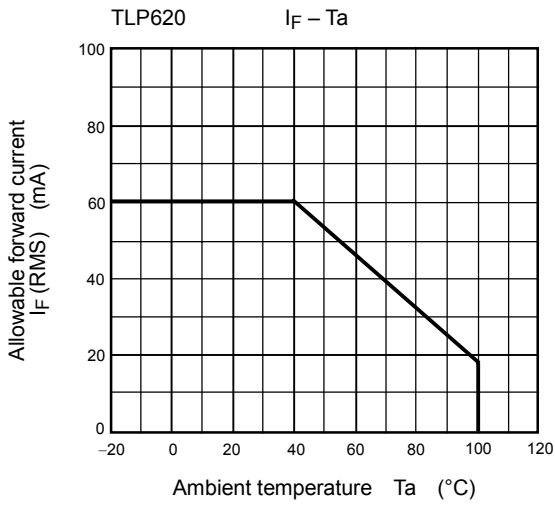
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500V	1×10 <sup>12</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 1 minute	5000	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dc</sub>

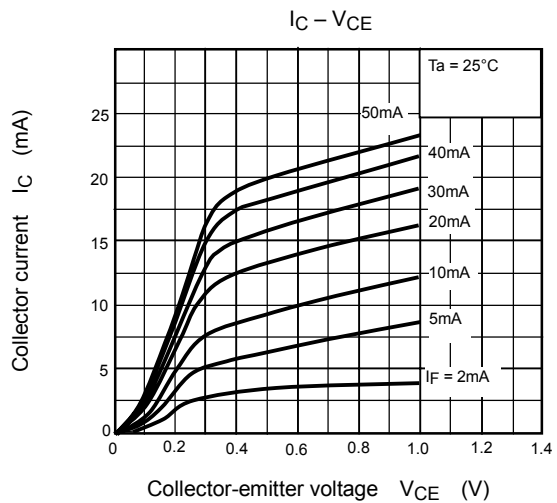
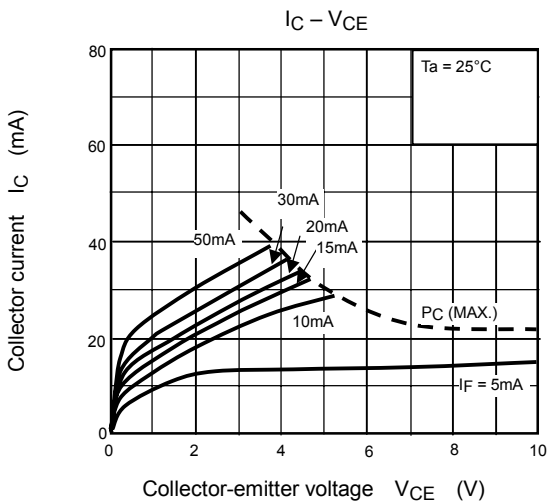
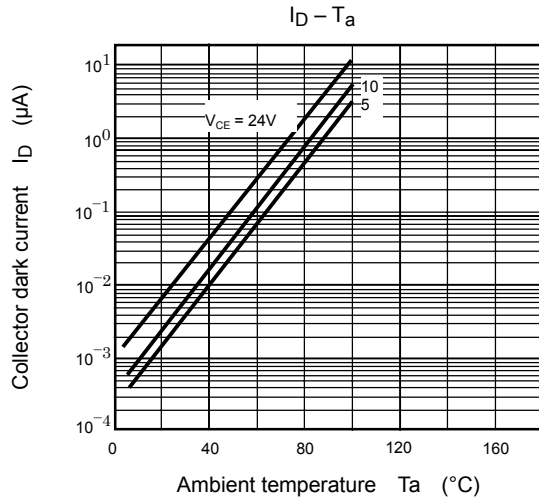
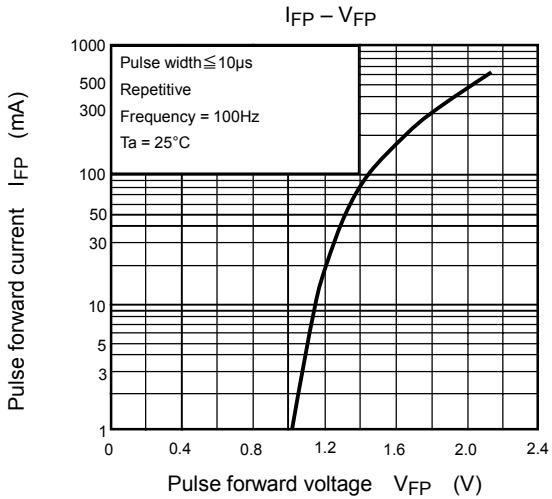
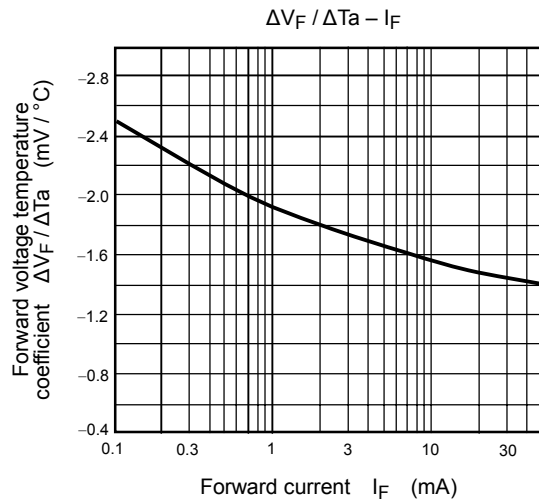
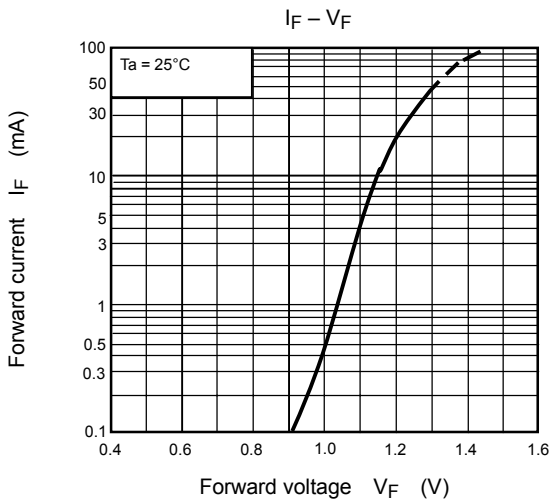
## Switching Characteristics (Ta = 25°C)

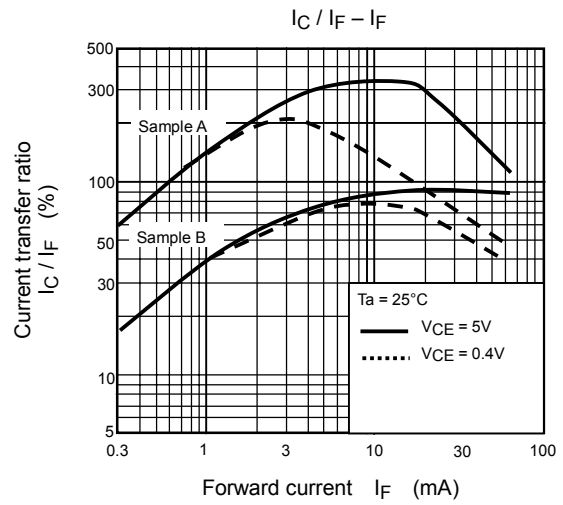
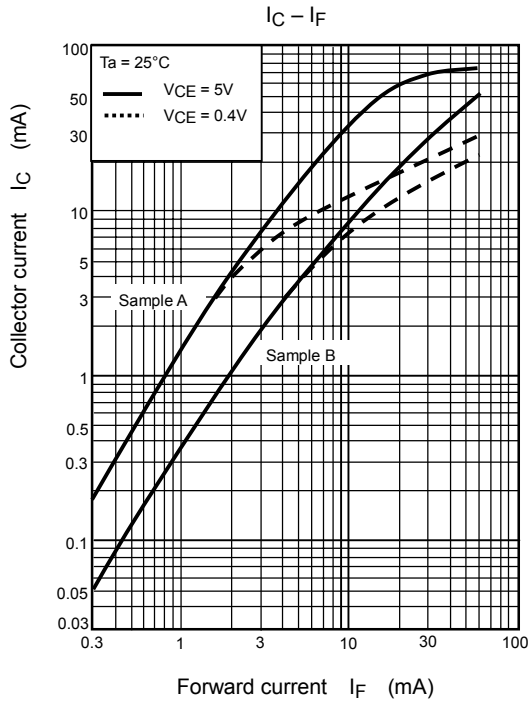
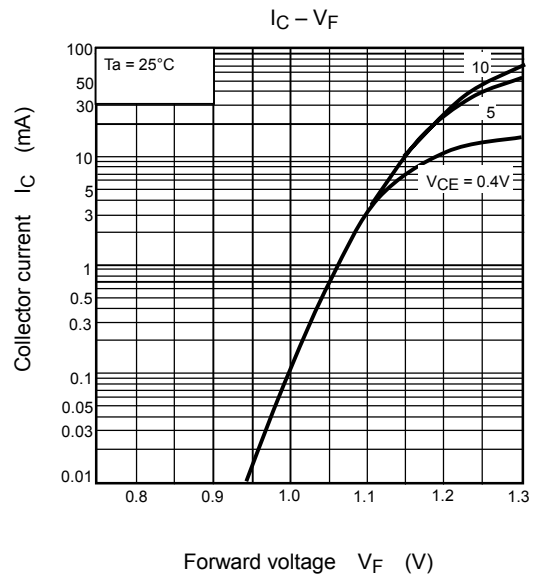
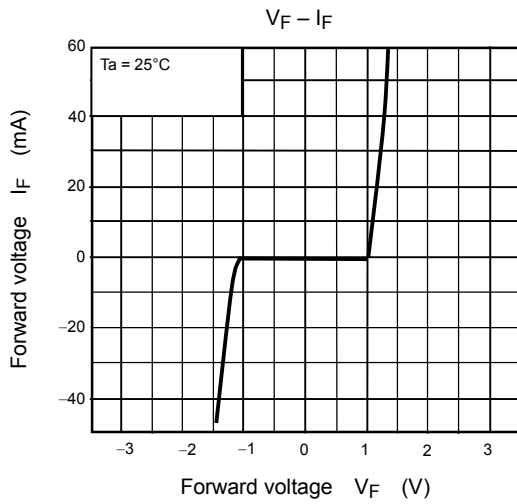
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10V I <sub>C</sub> = 2mA R <sub>L</sub> = 100Ω	—	2	—	μs
Fall time	t <sub>f</sub>		—	3	—	
Turn-on time	t <sub>on</sub>		—	3	—	
Turn-off time	t <sub>off</sub>		—	3	—	
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 1.9kΩ V <sub>CC</sub> = 5V, I <sub>F</sub> = ±16mA (Fig.1)	—	2	—	μs
Storage time	t <sub>s</sub>		—	15	—	
Turn-off time	t <sub>OFF</sub>		—	25	—	

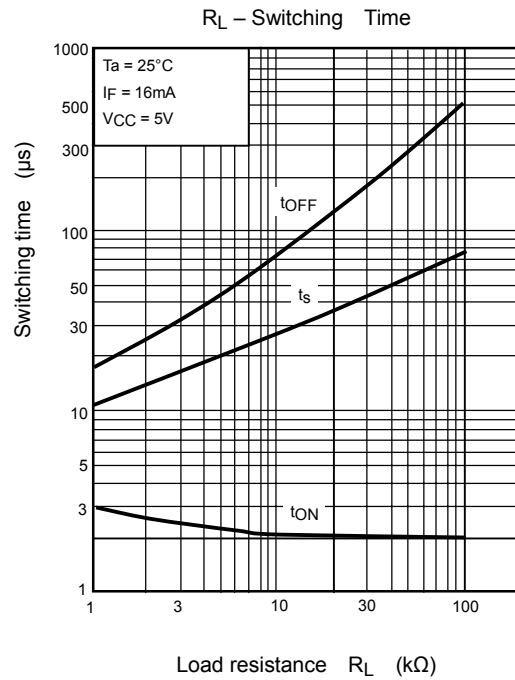
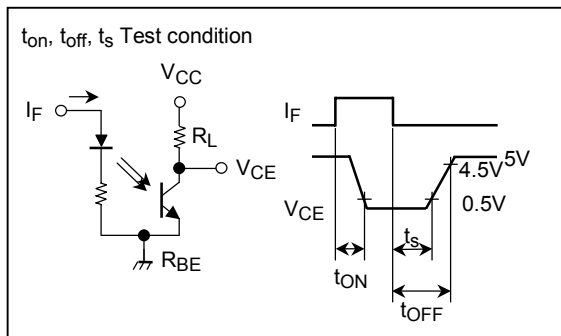
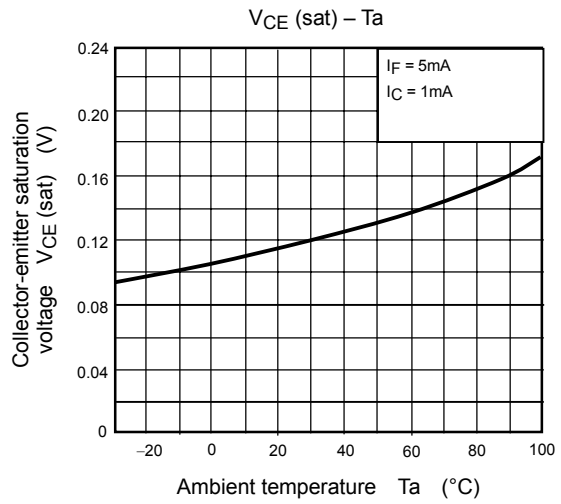
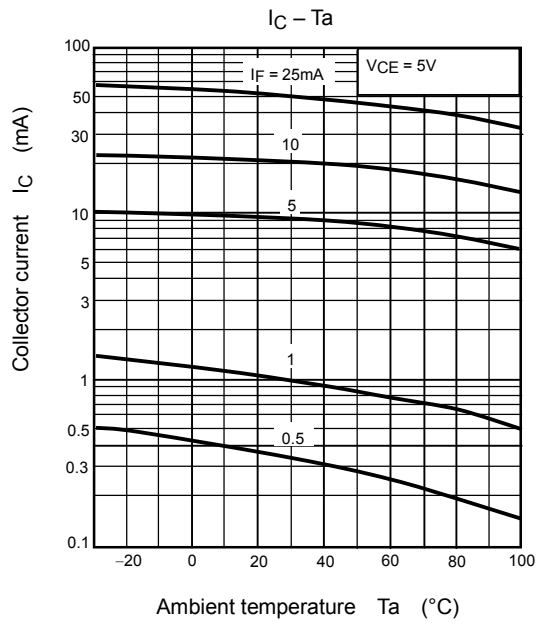
Fig. 1 Switching time test circuit













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