

# TLP630

Unit in mm

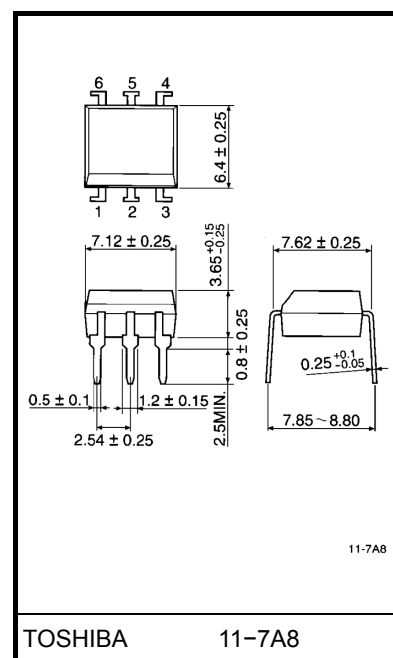
Programmable Controllers

AC / DC-Input Module

Telecommunication

The TOSHIBA TLP630 consists of a photo-transistor optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel in a six lead plastic DIP package.

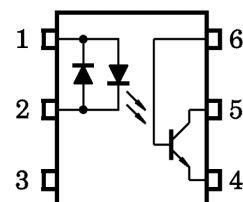
- Collector-emitter voltage: 55V min.
- Current transfer ratio: 50% min.  
Rank GB: 100% min.
- Isolation voltage: 5000Vrms min.
- UL recognized: UL1577 file no. E67349



TOSHIBA 11-7A8

Weight: 0.4g

## Pin Configurations(top view)



- 1 : ANODE, CATHODE
- 2 : CATHODE, ANODE
- 3 : N.C.
- 4 : EMITTER
- 5 : COLLECTOR
- 6 : BASE

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

Characteristic		Symbol	Rating	Unit
LED	Forward current	$I_{F(RMS)}$	60	mA
	Forward current derating (Ta ≥ 39°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
Detector	Peak forward current (100µs pulse, 100pps)	$I_{FPT}$	±1	A
	Collector-emitter voltage	$V_{CEO}$	55	V
	Collector-base voltage	$V_{CBO}$	80	V
	Emitter-collector voltage	$V_{ECO}$	7	V
	Emitter-base voltage	$V_{EBO}$	7	V
	Collector current	$I_C$	50	mA
	Power dissipation	$P_C$	150	mW
	Power dissipation derating (Ta ≥ 25°C)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / °C
Operating temperature range		$T_{opr}$	-55~100	°C
Storage temperature range		$T_{stg}$	-55~125	°C
Lead soldering temperature		$T_{sol}$	260(10s)	°C
Junction temperature		$T_j$	125	°C
Total package power dissipation		$P_T$	250	mW
Total package power dissipation derating		$\Delta P_T / ^\circ\text{C}$	-2.5	mW / °C
Isolation voltage (AC, 1 min., R.H. ≤ 60%)		$BV_S$	5000	Vrms

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).

## Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{CC}$	—	5	24	V
Forward current	$I_{F(RMS)}$	—	16	25	mA
Collector current	$I_C$	—	1	10	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)

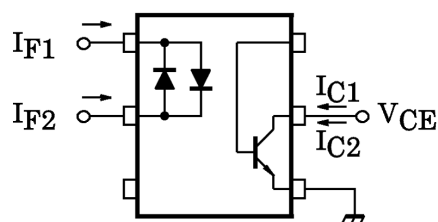
Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = 10\text{mA}$	1.0	1.15	1.3	V
	Forward current	$I_F$	$V_F = 0.7\text{V}$	—	2.5	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	60	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector dark current	$I_D(I_{CEO})$	$V_{CE} = 24\text{V}$	—	10	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
	Collector dark current	$I_{CBO}$	$V_{CB} = 10\text{V}$	—	0.1	—	nA
	Capacitance (collector to emitter)	$C_{CE}$	$V = 0, f = 1\text{MHz}$	—	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	$I_C / I_{F(\text{sat})}$	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Base photo-current	$I_{PB}$	$I_F = \pm 5\text{mA}, V_{CB} = 5\text{V}$	—	10	—	$\mu\text{A}$
Collector-emitter saturation voltage	$V_{CE(\text{sat})}$	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$	—	—	0.4	V
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	$I_{C(\text{ratio})}$	$I_{C(I_F = -5\text{mA})} / I_{C(I_F = +5\text{mA})}$ (Note 1)	0.33	1	3	—

(Note 1)

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



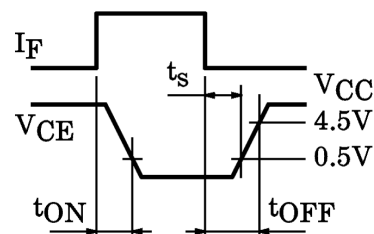
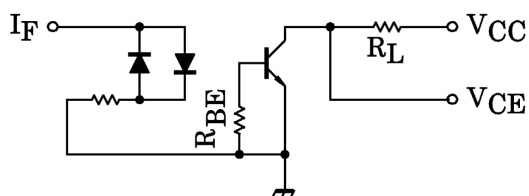
## Isolation Characteristics (Ta = 25°C)

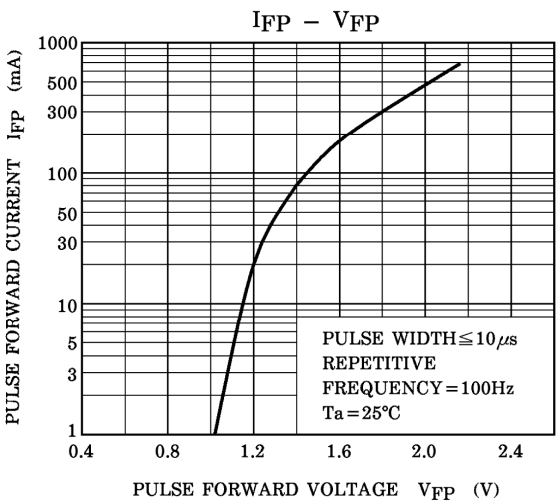
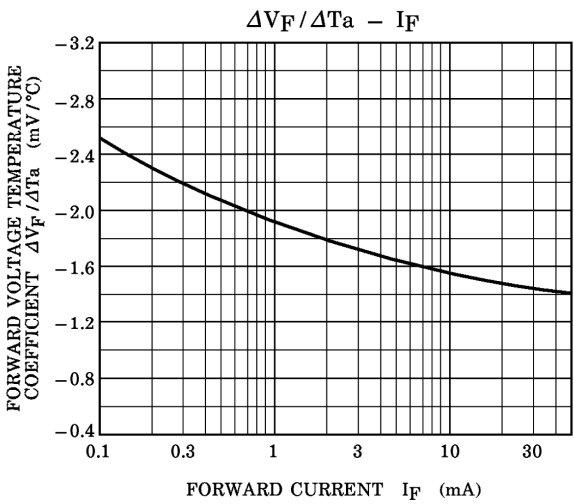
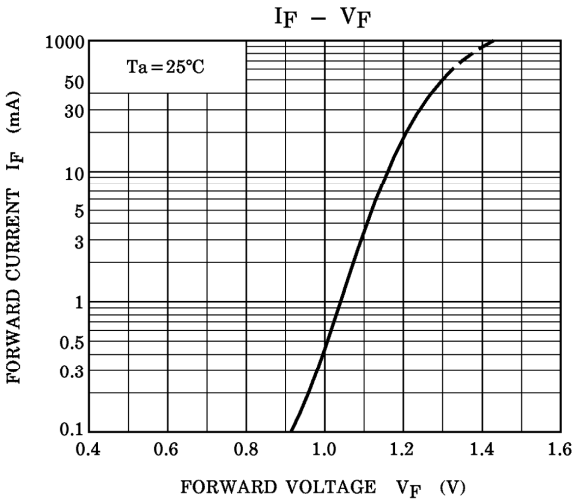
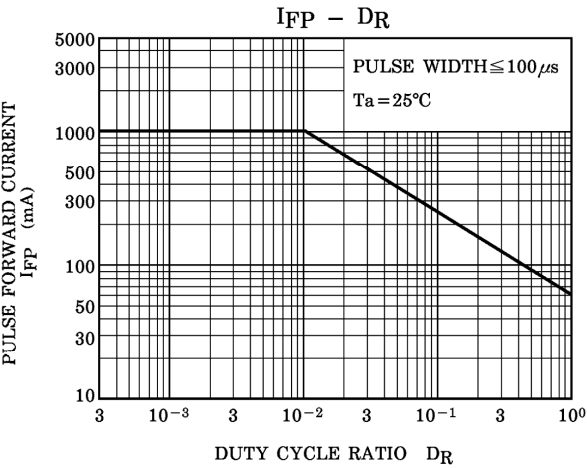
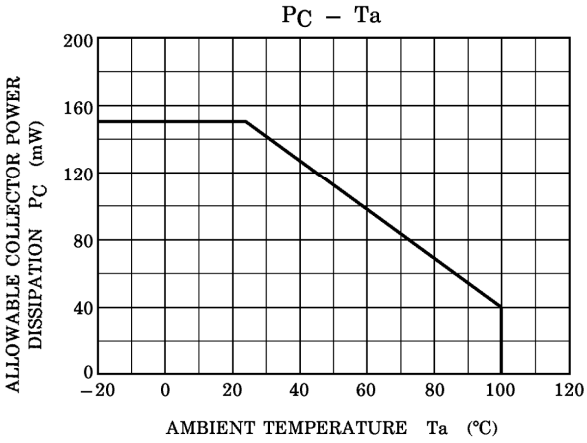
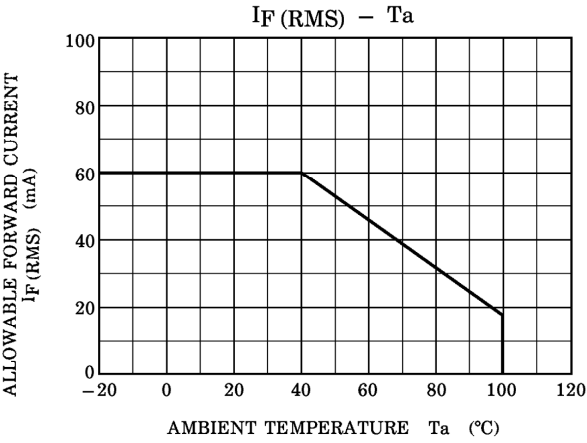
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500V, R.H. ≤ 60%	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 1 minute	5000	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dc</sub>

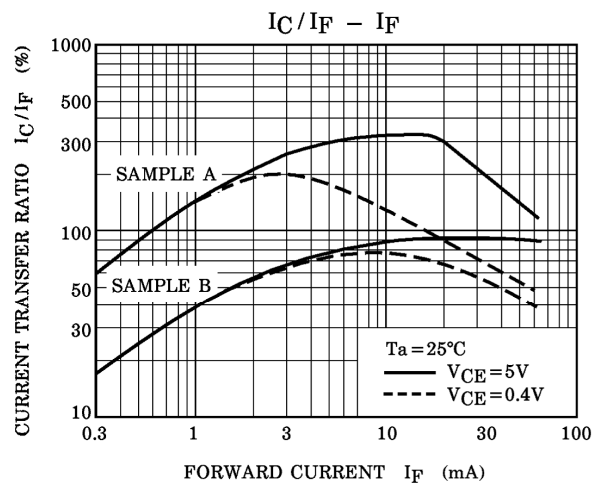
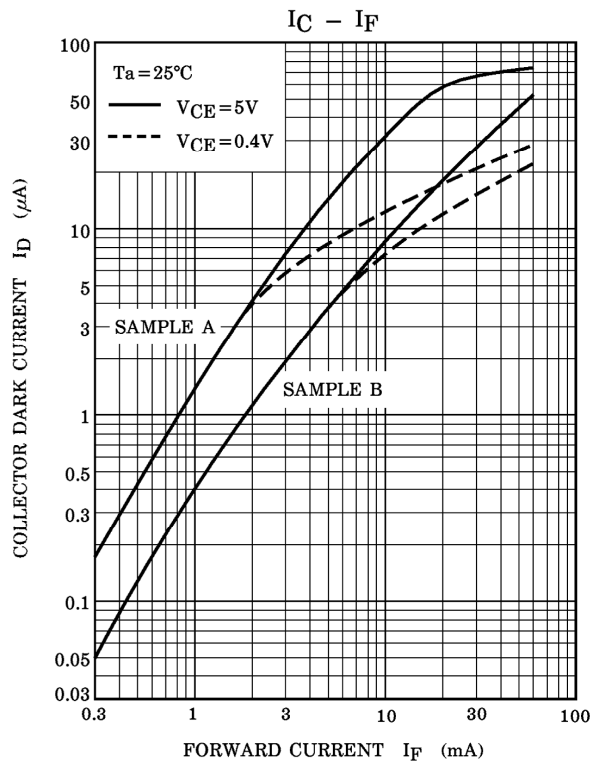
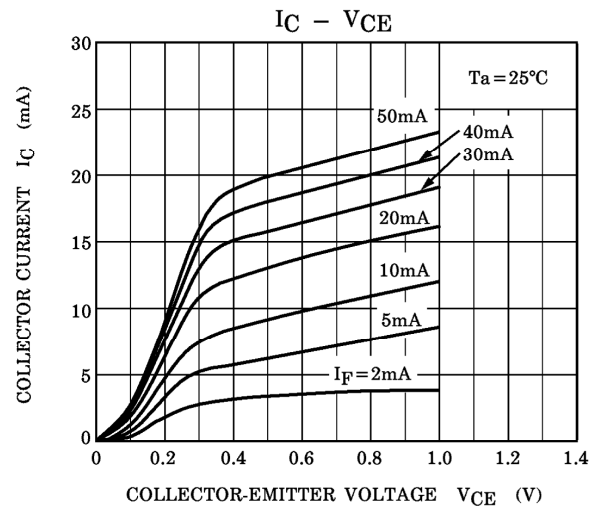
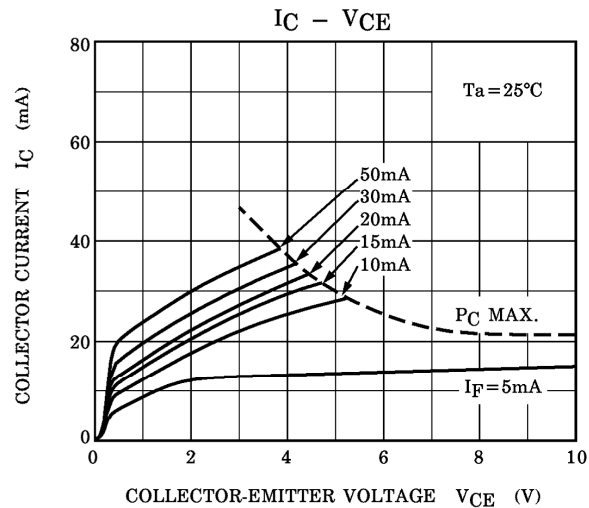
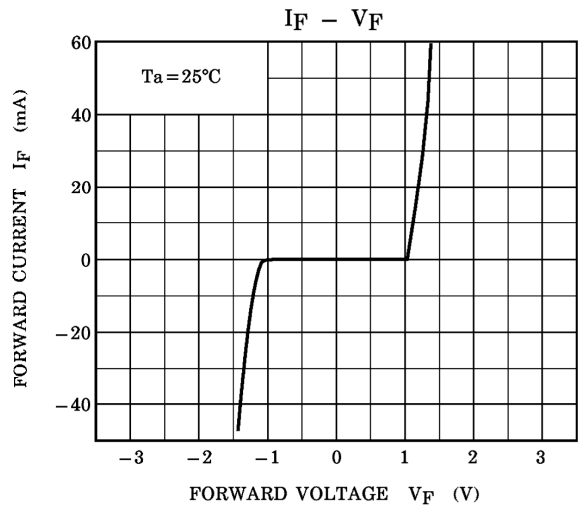
## Switching Characteristics (Ta = 25°C)

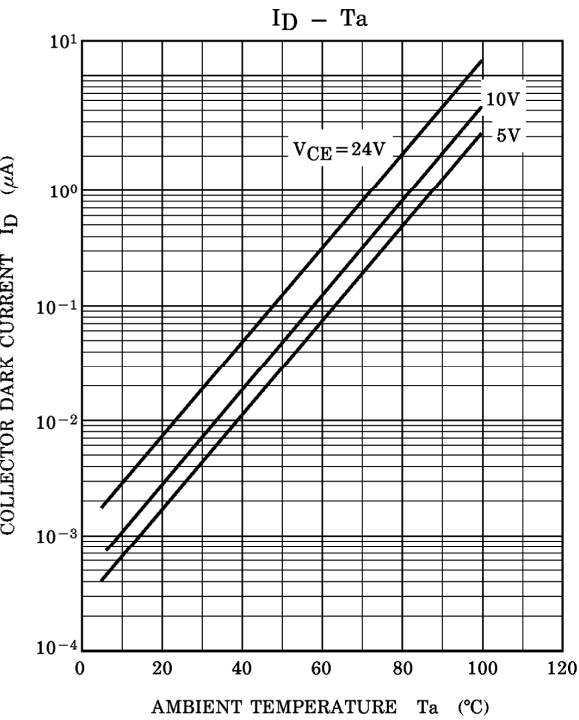
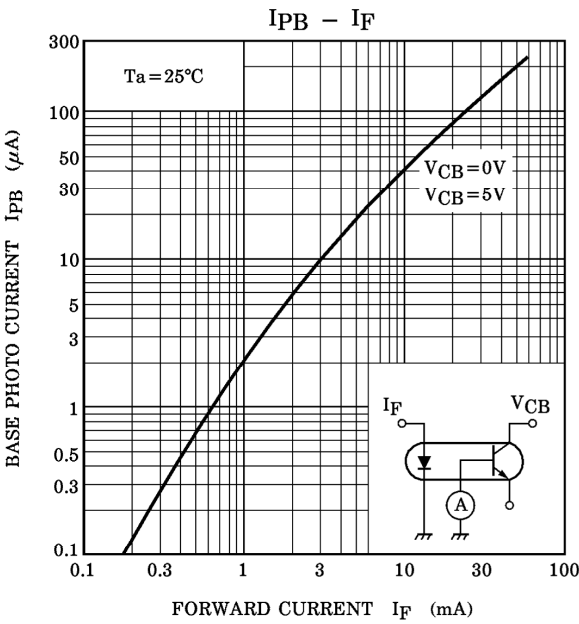
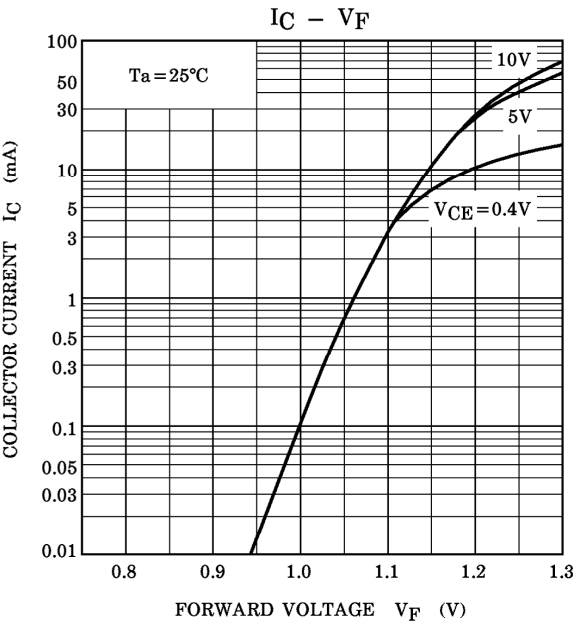
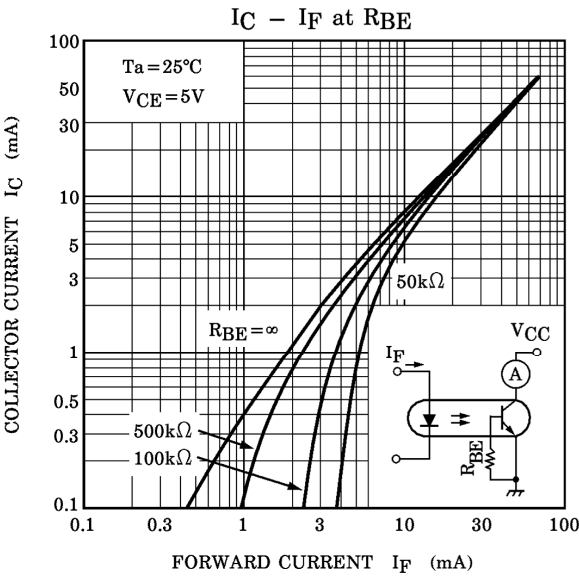
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10V, I <sub>C</sub> = 2mA R <sub>L</sub> = 100Ω	—	2	—	μs
Fall time	t <sub>f</sub>		—	3	—	
Turn-on time	t <sub>ON</sub>		—	3	—	
Turn-off time	t <sub>OFF</sub>		—	3	—	
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 1.9 kΩ (Note 2) R <sub>BE</sub> = OPEN V <sub>CC</sub> = 5 V, I <sub>F</sub> = ±16mA	—	2	—	μs
Storage time	t <sub>S</sub>		—	15	—	
Turn-off time	t <sub>OFF</sub>		—	25	—	
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 1.9kΩ (Note 2) R <sub>BE</sub> = 220kΩ, V <sub>CC</sub> = 5 V I <sub>F</sub> = ±16mA	—	2	—	μs
Storage time	t <sub>S</sub>		—	12	—	
Turn-off time	t <sub>OFF</sub>		—	20	—	

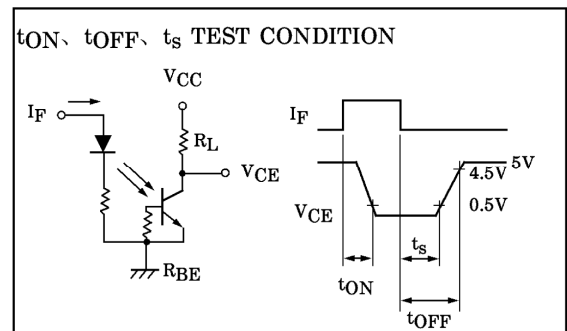
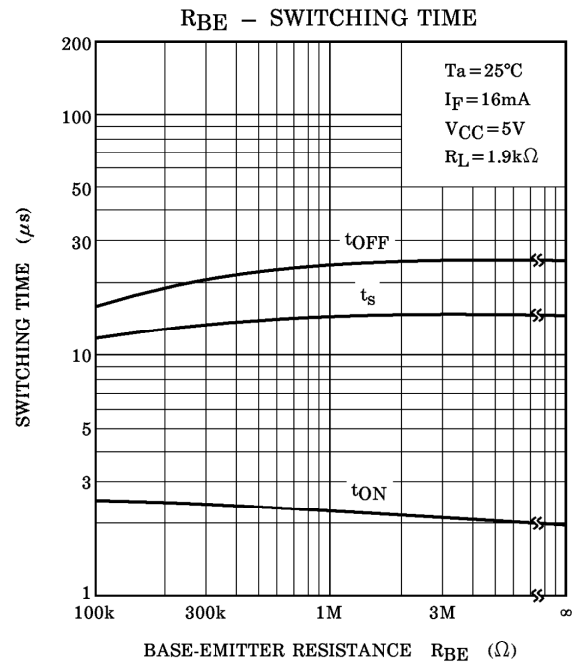
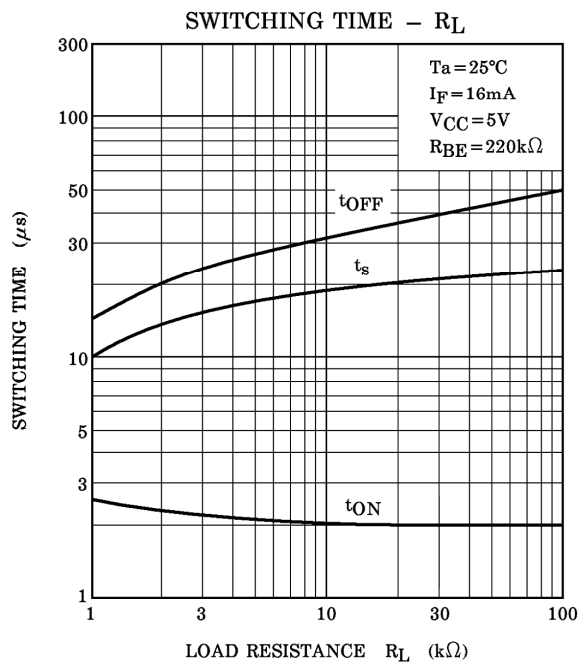
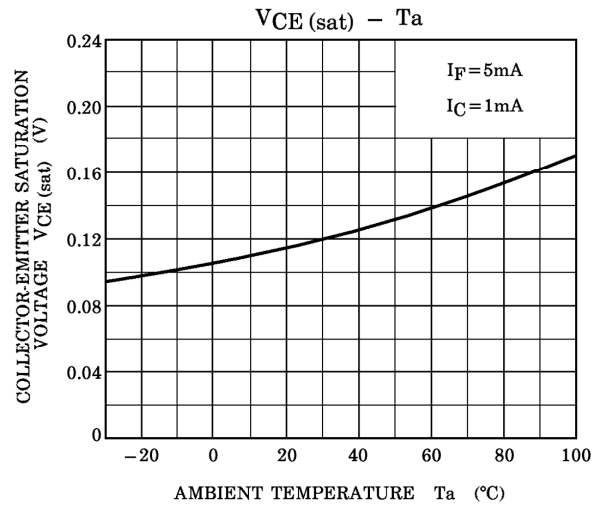
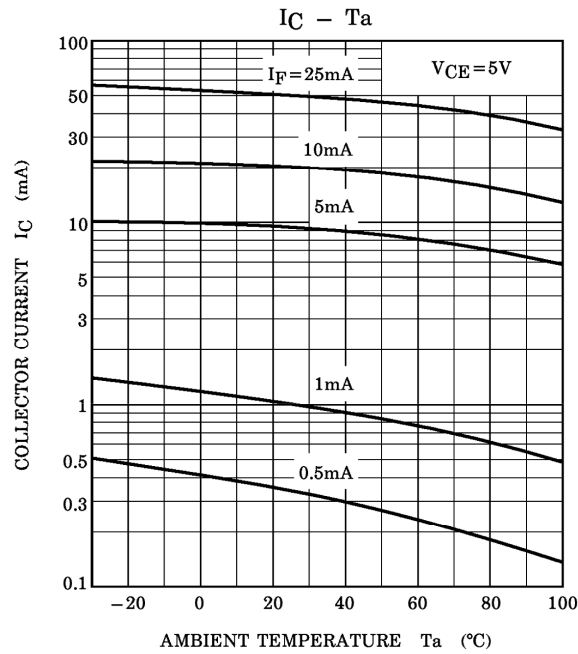
(Note 2) Switching time test circuit













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