TOSHIBA Photocoupler GaAs IRed & Photo−Transistor

TLP630

Programmable Controllers

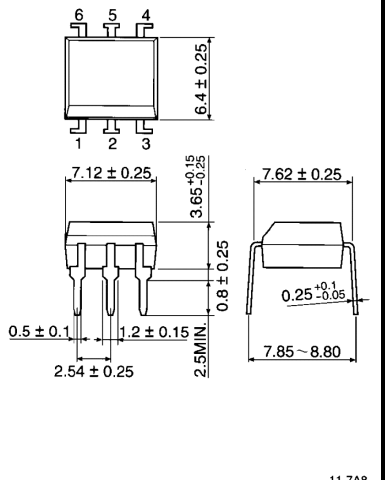
AC / DC−Input Module

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

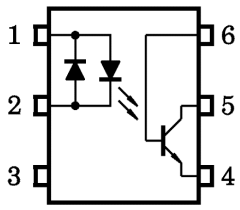
Unit in mm



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

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	$I_{F(RMS)}$	60	mA
	Forward current derating (Ta ≥ 39°C)	ΔI_F / °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)	ΔP_C / °C	−1.5	mW / °C
Operating temperature range		T_{opr}	−55~100	°C
Storage temperature range		T_{stg}	−55~125	°C
Lead soldering temperature nction 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		ΔP_T / °C	−2.5	mW / °C
Isolation voltage (AC, 1 min., R.H. ≤ 60%)		BV_S	5000	Vrms

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

Individual Electrical Characteristics (Ta = 25°C)

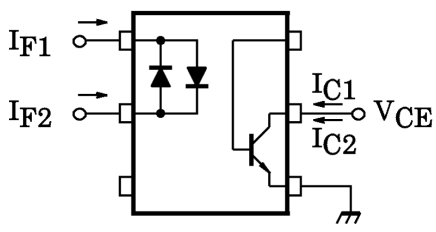
	Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Forward current	I_F	V_F = 0.7V	—	2.5	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	60	—	pF
Detector	Collector−emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 0.5mA	55	—	—	V
	Emitter−collector breakdown voltage	$V_{(BR)ECO}$	I_E = 0.1mA	7	—	—	V
	Collector−base breakdown voltage	$V_{(BR)CBO}$	I_C = 0.1mA	80	—	—	V
	Emitter−base breakdown voltage	$V_{(BR)EBO}$	I_E = 0.1mA	7	—	—	V
	Collector dark current	$I_D(I_{CEO})$	V_{CE} = 24V	—	10	100	nA
			V_{CE} = 24V, Ta = 85°C	—	2	50	μA
	Collector dark current	I_{CBO}	V_{CB} = 10V	—	0.1	—	nA
	Capacitance (collector to emitter)	C_{CE}	V = 0, f = 1MHz	—	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 = ±5mA, V_{CE} = 5V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	I_C / $I_{F(sat)}$	I_F = ±1mA, V_{CE} = 0.4V	—	60	—	%
		Rank GB	30	—	—	
Base photo−current	I_{PB}	I_F = ±5mA, V_{CB} = 5V	—	10	—	μA
Collector−emitter saturation voltage	$V_{CE(sat)}$	I_C = 2.4mA, I_F = ±8mA	—	—	0.4	V
Off−state collecter current	$I_{C(off)}$	V_F = ±0.7V, V_{CE} = 24V	—	1	10	μA
CTR symmetry	$I_{C(ratio)}$	$I_C(I_F = -5mA)$ / $I_C(I_F = +5mA)$ (Note 1)	0.33	1	3	—

(Note 1)

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



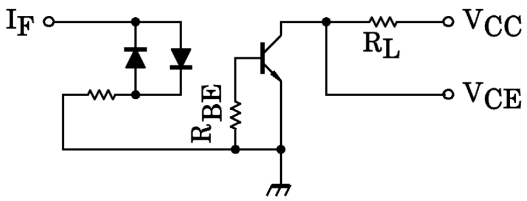
Isolation Characteristics (Ta = 25°C)

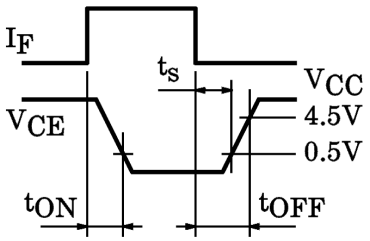
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	C_S	V_S = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500V, R.H. ≤ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

Switching Characteristics (Ta = 25°C)

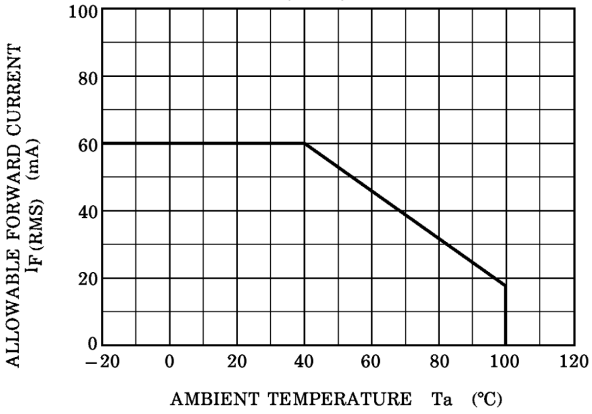
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	V_{CC} = 10V, I_C = 2mA R_L = 100Ω	—	2	—	μs
Fall time	t_f		—	3	—	
Turn−on time	t_{ON}		—	3	—	
Turn−off time	t_{OFF}		—	3	—	
Turn−on time	t_{ON}	R_L = 1.9 kΩ (Note 2) R_{BE} = OPEN V_{CC} = 5 V, I_F = ±16mA	—	2	—	μs
Storage time	t_S		—	15	—	
Turn−off time	t_{OFF}		—	25	—	
Turn−on time	t_{ON}	R_L = 1.9kΩ (Note 2) R_{BE} = 220kΩ, V_{CC} = 5 V I_F = ±16mA	—	2	—	μs
Storage time	t_S		—	12	—	
Turn−off time	t_{OFF}		—	20	—	

(Note 2) Switching time test circuit

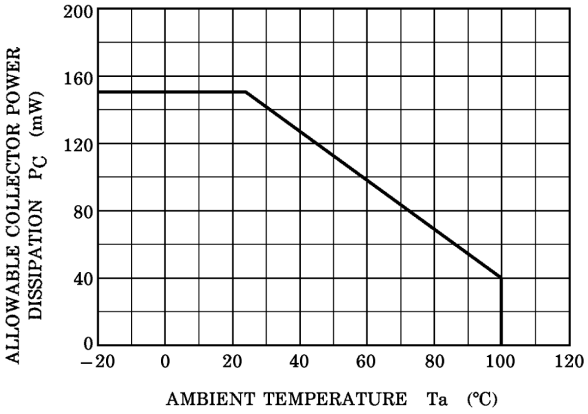




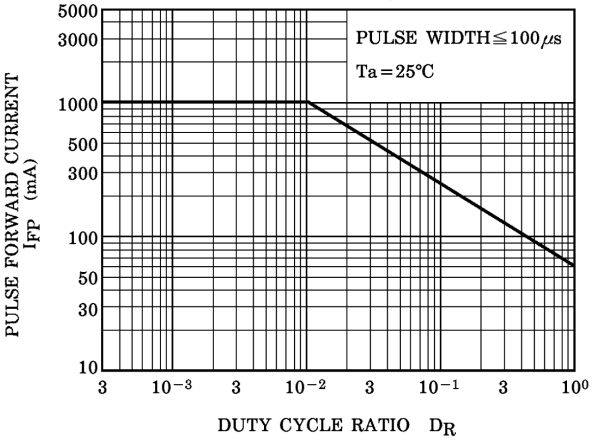
$I_{F\,(RMS)}$ – Ta



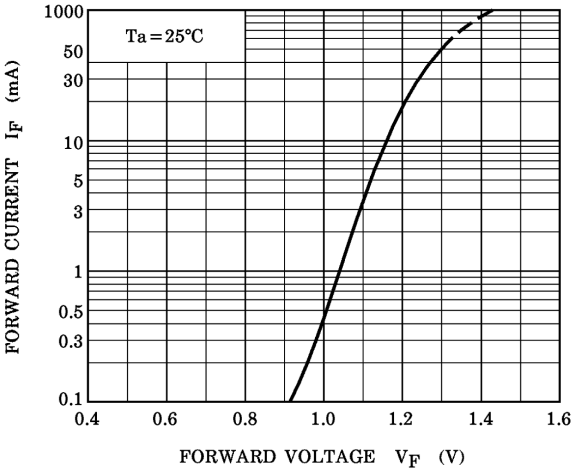
P_C – Ta



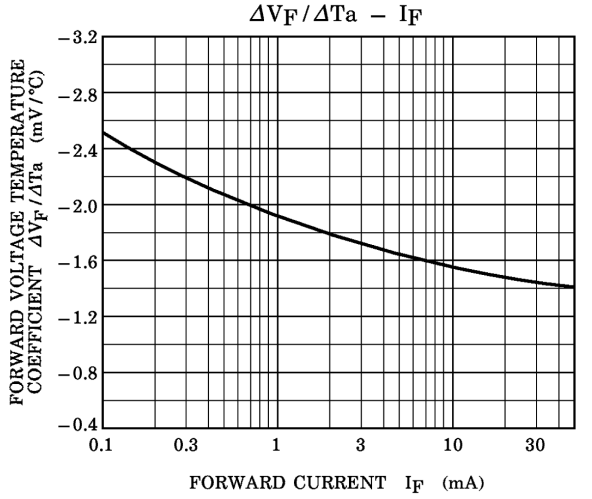
I_{FP} – D_R



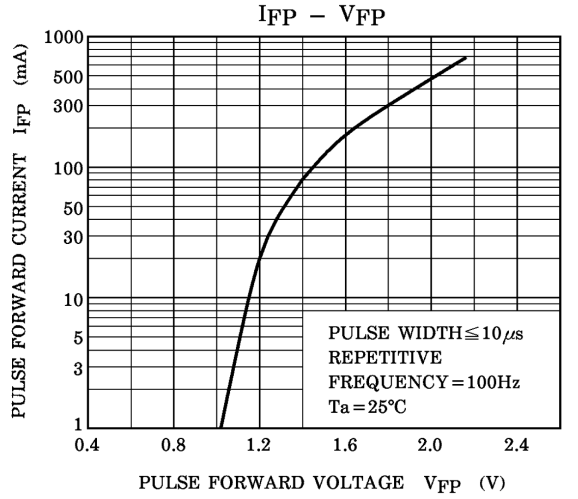
I_F – V_F



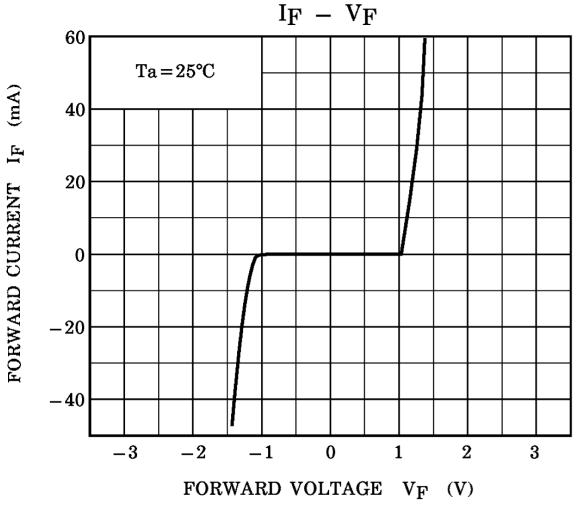
$\Delta V_F / \Delta Ta$ – I_F



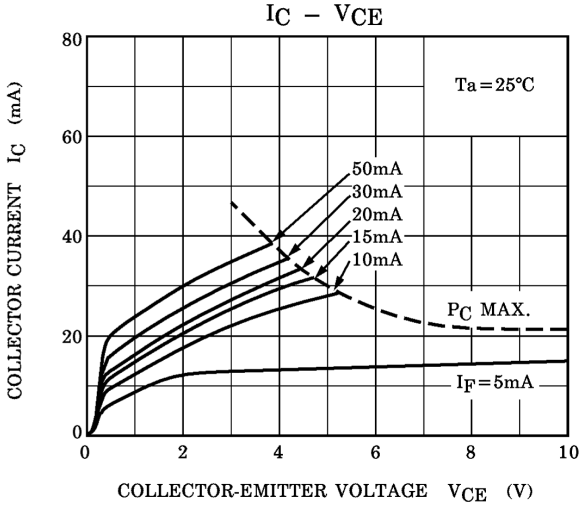
I_{FP} – V_{FP}



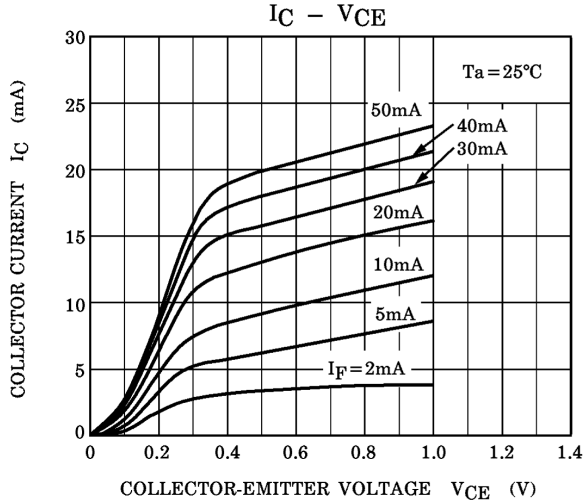
$I_F - V_F$



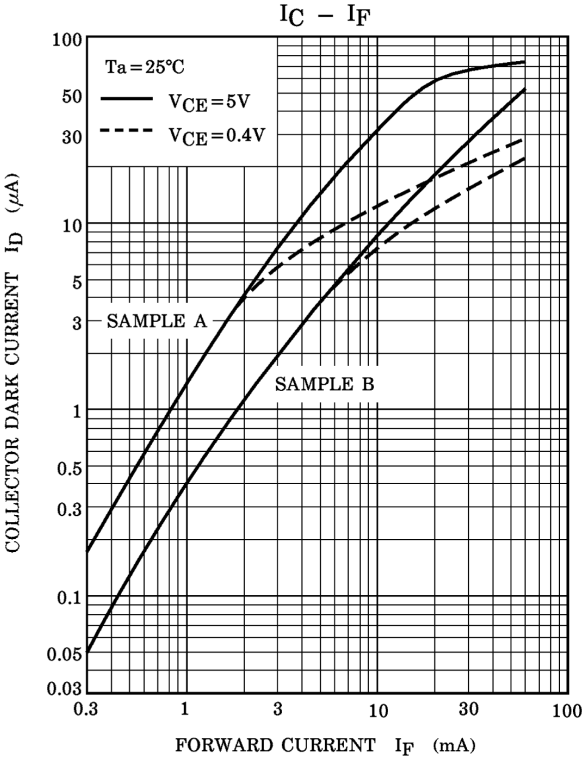
$I_C - V_{CE}$



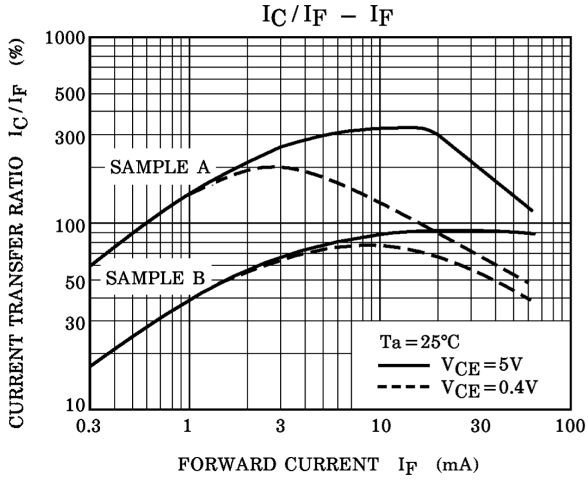
$I_C - V_{CE}$



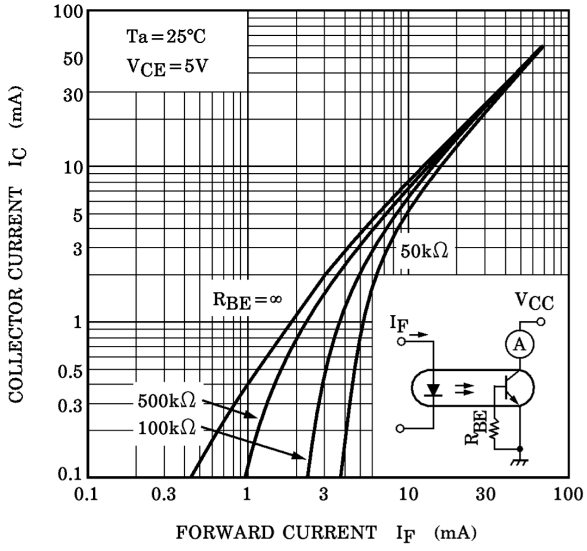
$I_C - I_F$



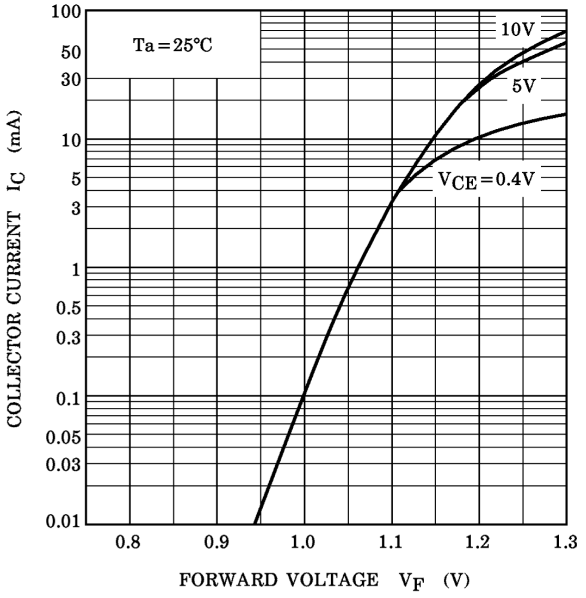
$I_C / I_F - I_F$



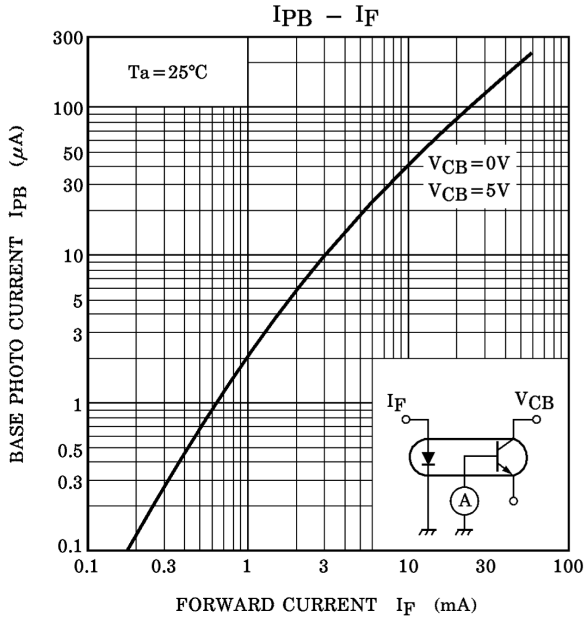
I_C – I_F at R_{BE}



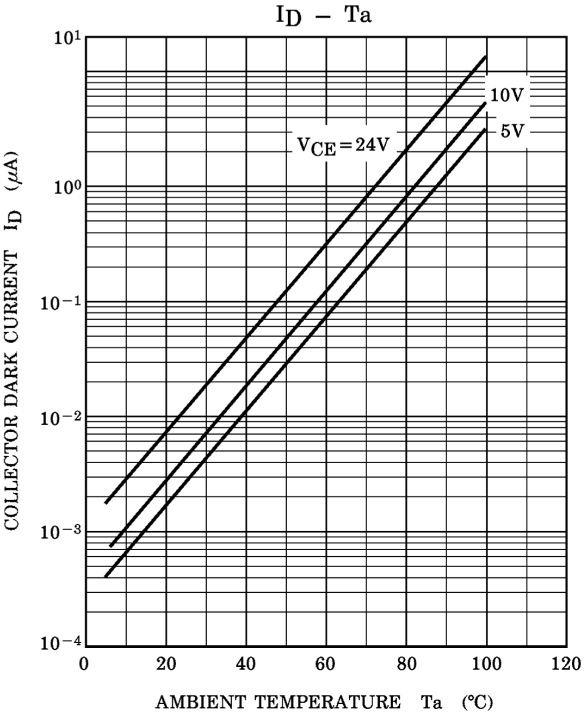
I_C – V_F



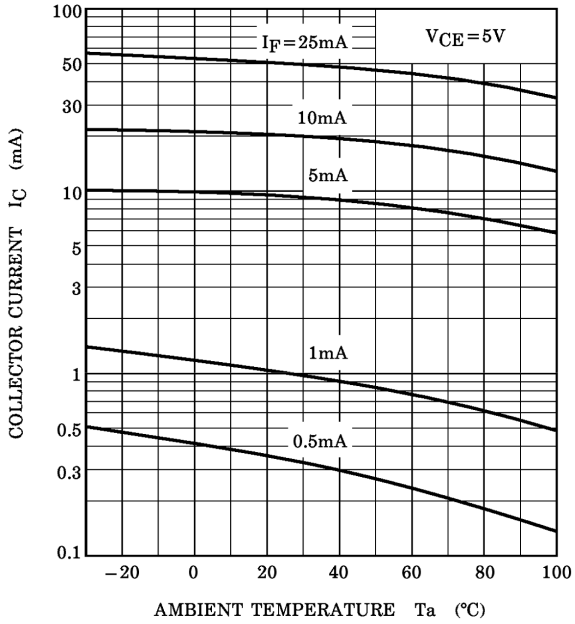
I_{PB} – I_F



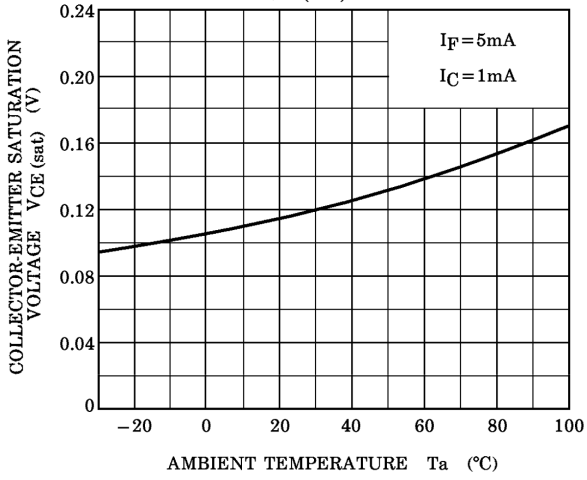
I_D – Ta



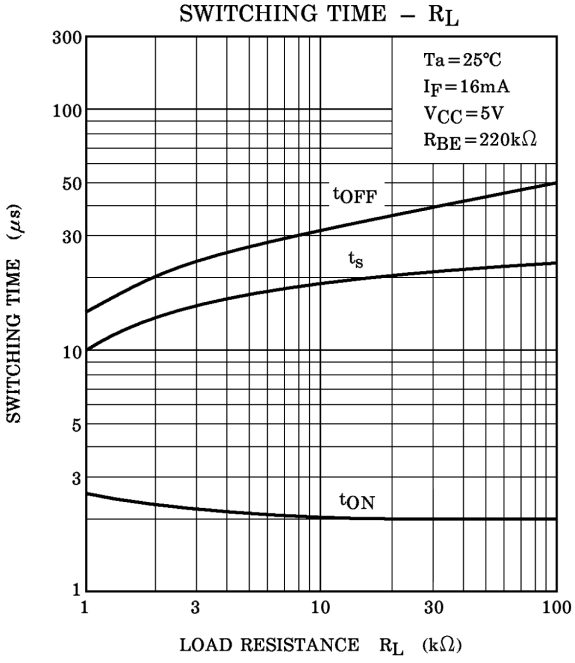
I_C – Ta



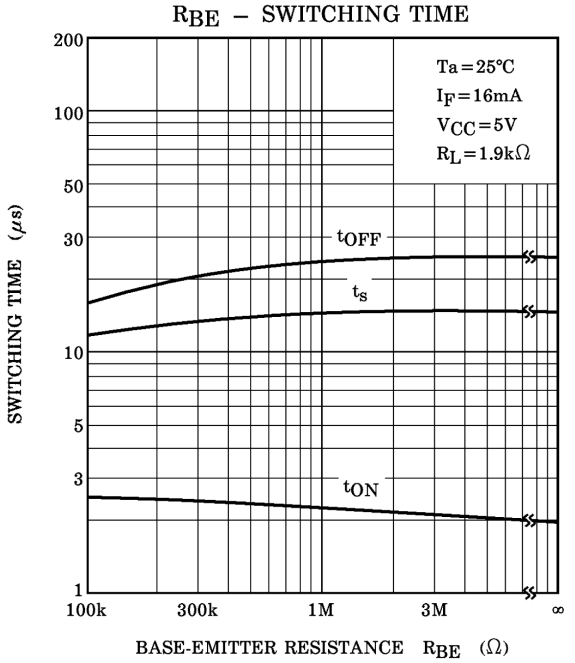
$V_{CE\,(sat)}$ – Ta



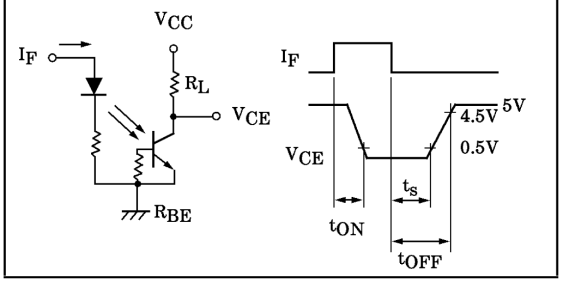
SWITCHING TIME – R_L



R_{BE} – SWITCHING TIME



t_{ON}、t_{OFF}、t_s TEST CONDITION



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