TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

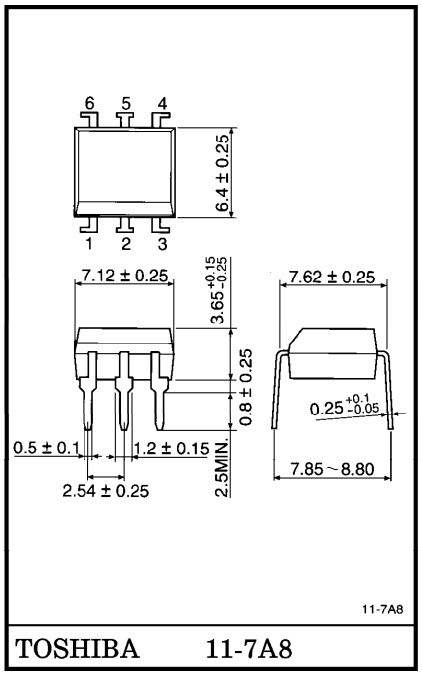
TLP630

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

TELECOMMUNICATION

Unit in mm



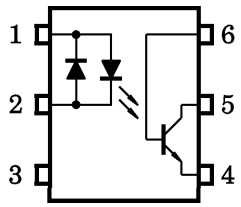
TOSHIBA 11-7A8

Weight : 0.4g

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

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)

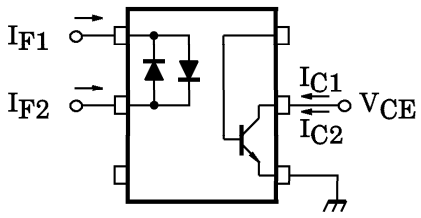
	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Forward Current	I_F	V_F = 0.7V	—	2.5	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)\,CEO}$	I_C = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown 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)

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



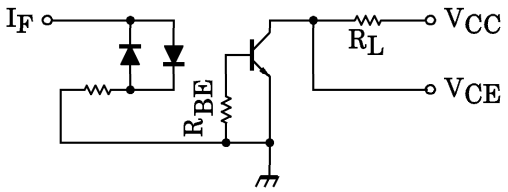
ISOLATION CHARACTERISTICS (Ta = 25°C)

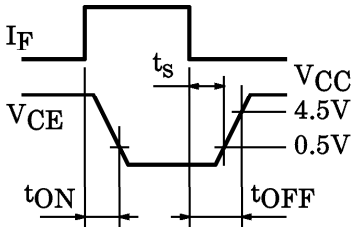
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C_S	V_S = 0, f = 1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500V, R.H. ≦ 60%	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

SWITCHING CHARACTERISTICS (Ta = 25°C)

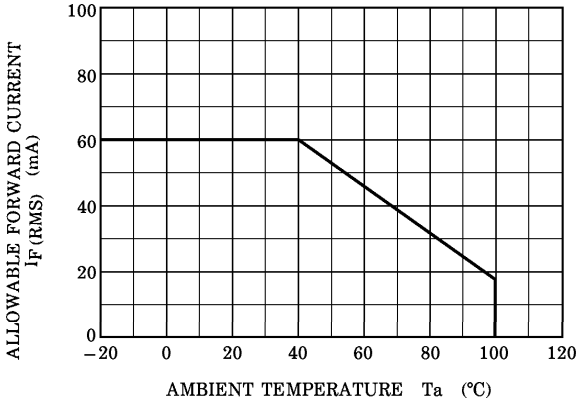
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC} = 10V, I_C = 2mA R_L = 100Ω	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-on Time	t_{ON}		—	3	—	
Turn-off Time	t_{OFF}		—	3	—	
Turn-on Time	t_{ON}	R_L = 1.9kΩ (Note 2) R_{BE} = OPEN V_{CC} = 5V, I_F = ±16mA	—	2	—	μs
Storage Time	t_s		—	15	—	
Turn-off Time	t_{OFF}		—	25	—	
Turn-on Time	t_{ON}	R_L = 1.9kΩ (Note 2) R_{BE} = 220kΩ, V_{CC} = 5V I_F = ±16mA	—	2	—	μs
Storage Time	t_s		—	12	—	
Turn-off Time	t_{OFF}		—	20	—	

(Note 2) SWITCHING TIME TEST CIRCUIT

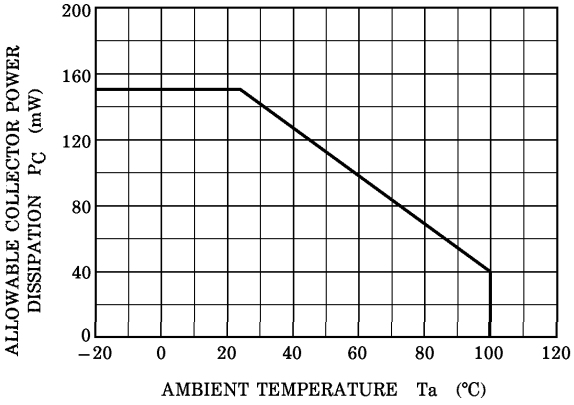




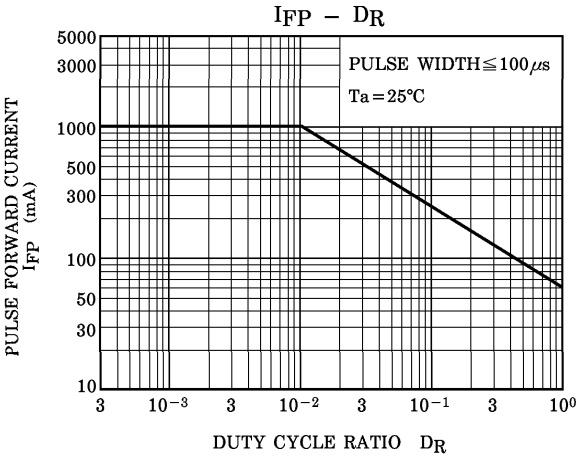
$I_{F\,(RMS)}$ – Ta



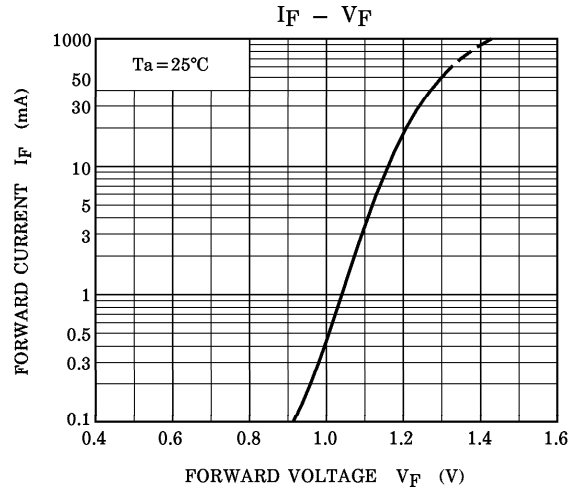
P_C – Ta



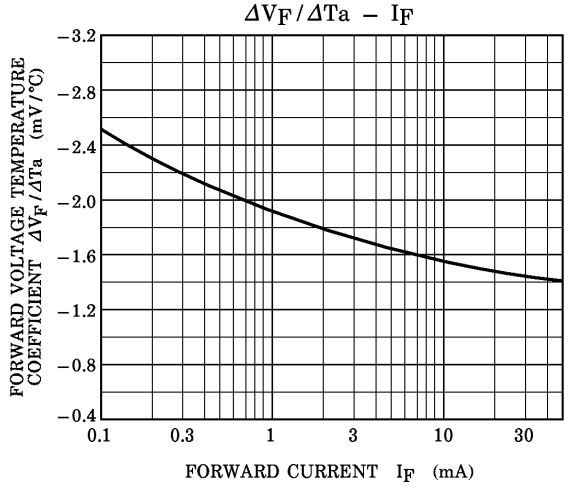
I_{FP} – D_R



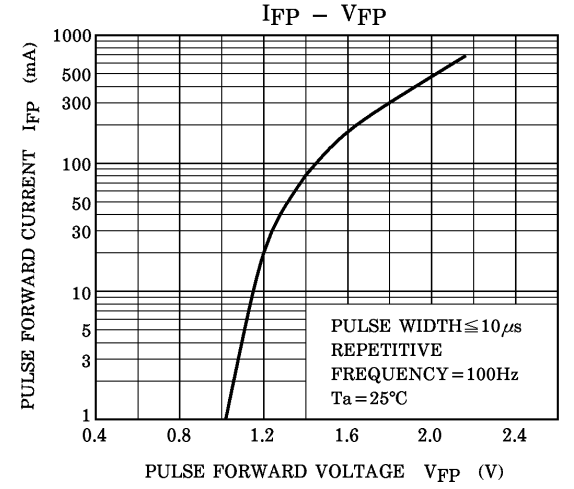
I_F – V_F



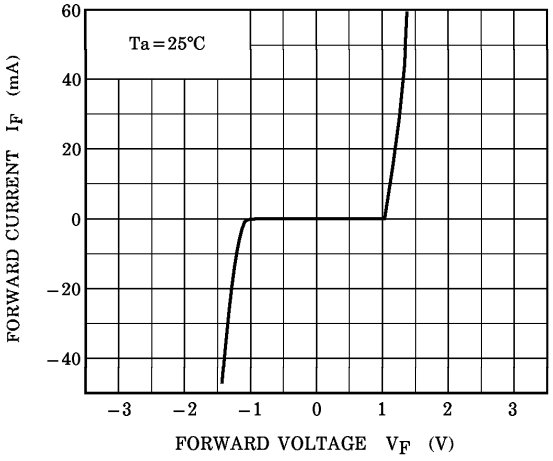
$\Delta V_F / \Delta Ta$ – I_F



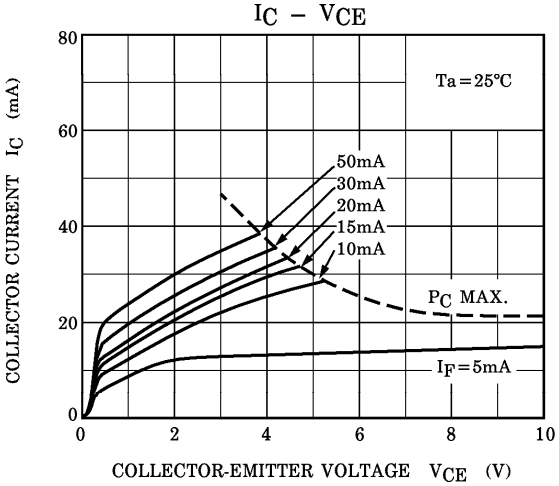
I_{FP} – V_{FP}



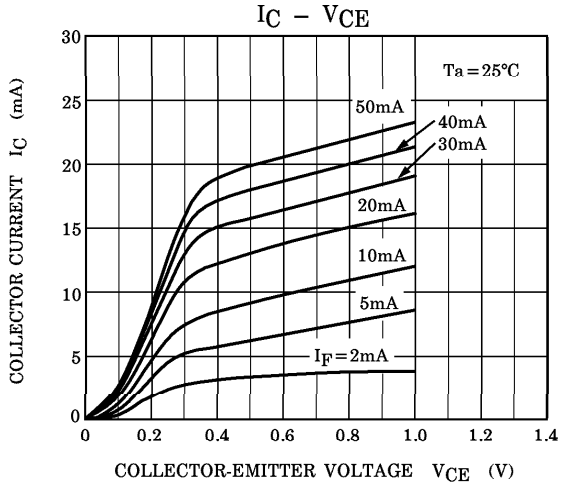
$I_F - V_F$



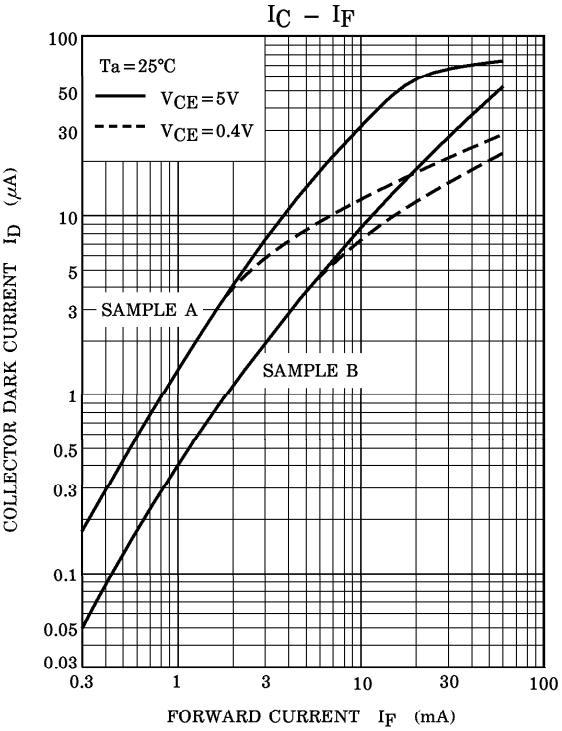
$I_C - V_{CE}$



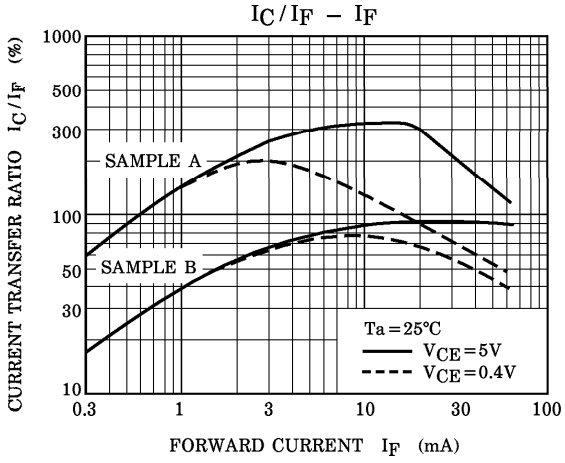
$I_C - V_{CE}$



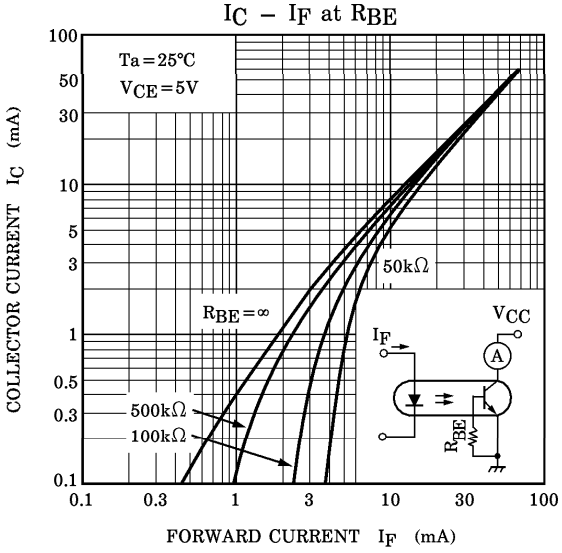
$I_C - I_F$



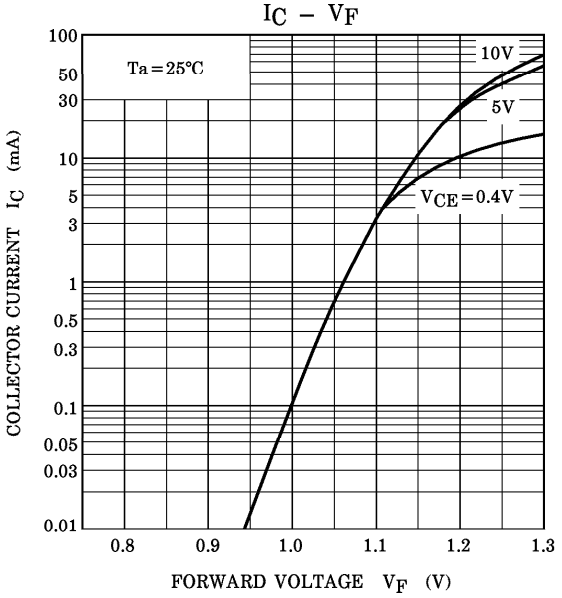
$I_C / I_F - I_F$



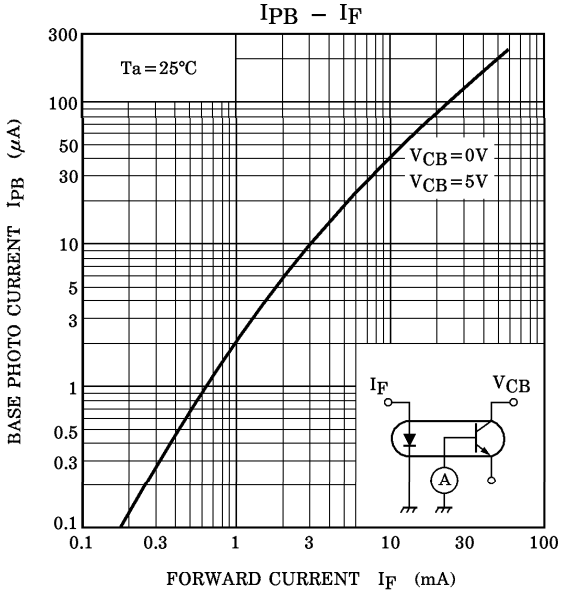
$I_C - I_F$ at R_{BE}



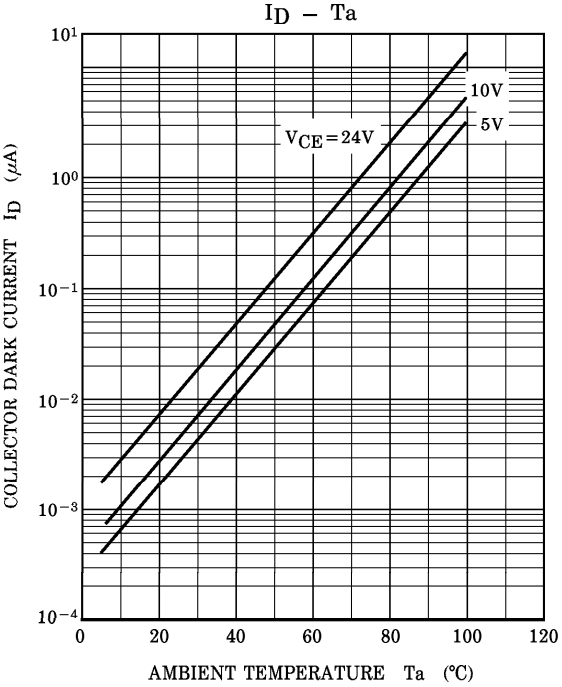
$I_C - V_F$



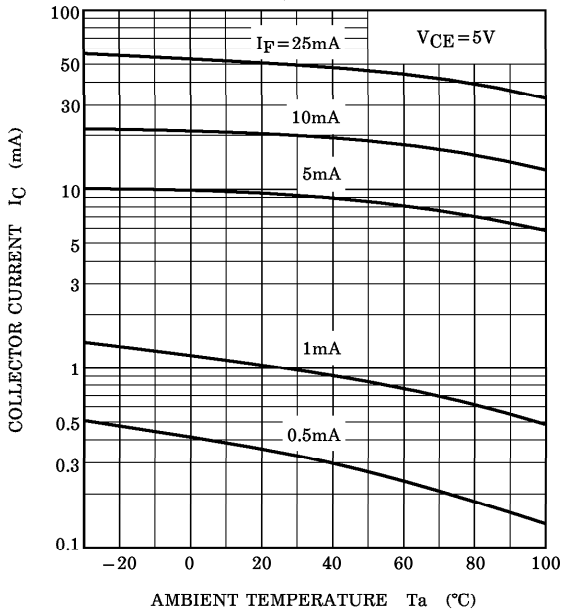
$I_{PB} - I_F$



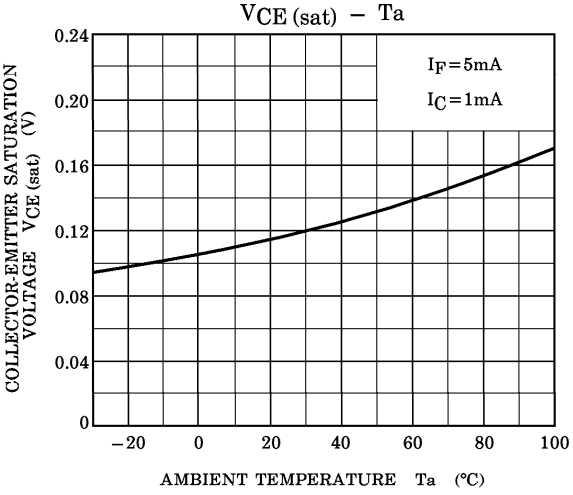
$I_D - Ta$



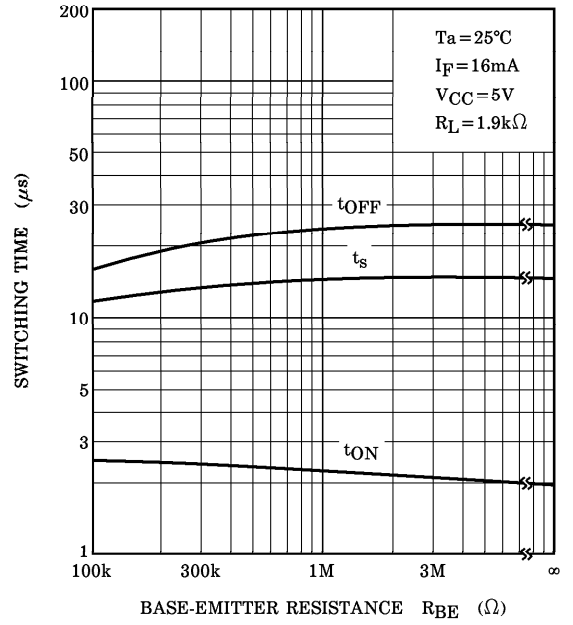
I_C – Ta



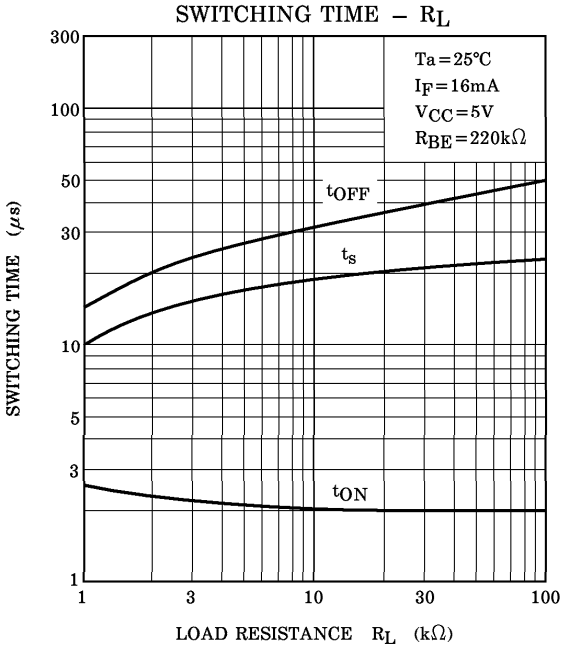
V_{CE} (sat) – Ta



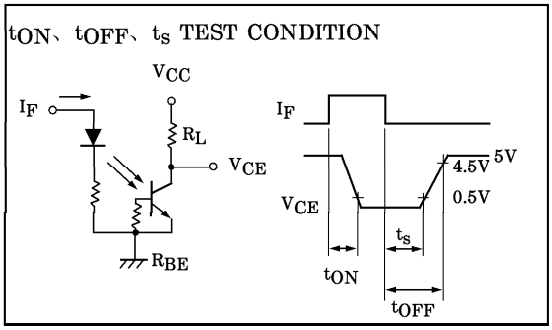
R_{BE} – SWITCHING TIME



SWITCHING TIME – R_L



t_{ON}、t_{OFF}、t_S TEST CONDITION



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