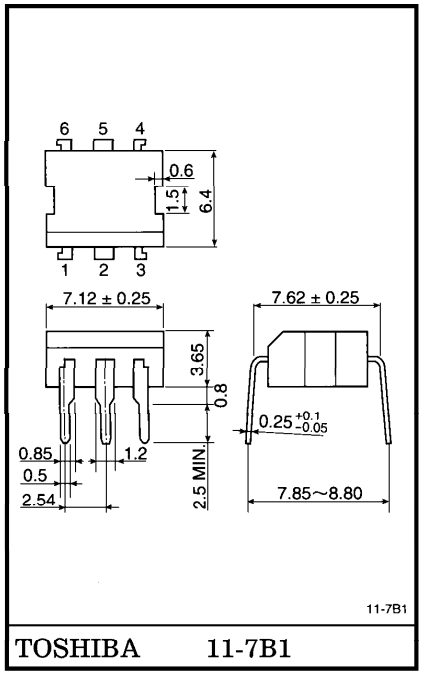
TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP731, TLP732

OFFICE MACHINE
HOUSEHOLD USE EQUIPMENT
SOLID STATE RELAY
SWITCHING POWER SUPPLY

Unit in mm



TOSHIBA 11-7B1

Weight : 0.35g

The TOSHIBA TLP731 and TLP732 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.
TLP732 is no-base internal connection for high-EMI environments.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)
  Rank GB : 100% (Min.)
- UL Recognized : UL1577, File No. E67349
- BSI Approved : BS EN60065 : 1994
  Certificate No. 6617
  BS EN60950 : 1992
  Certificate No. 7366

  Isolation Voltage : 4000V_{rms} (Min.)
- Option (D4) type
  VDE Approved : DIN VDE0884 / 08.87,
  Certificate No. 65640

  Maximum Operating Insulation Voltage : 630V_{PK}

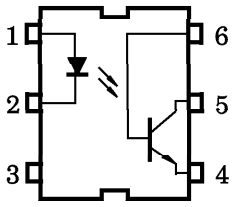
  Highest Permissible Over Voltage : 6000V_{PK}

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

		7.62mm pich standard type	10.16mm pich (LF2) type
Creepage Distance	:	7.0mm (Min.)	8.0mm (Min.)
Clearance	:	7.0mm (Min.)	8.0mm (Min.)
Insulation Thickness	:	0.5mm (Min.)	0.5mm (Min.)

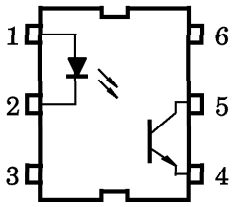
PIN CONFIGURATIONS (TOP VIEW)

TLP731



1 : ANODE
2 : CATHODE
3 : NC
4 : EMITTER
5 : COLLECTOR
6 : BASE

TLP732



1 : ANODE
2 : CATHODE
3 : NC
4 : EMITTER
5 : COLLECTOR
6 : NC

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	60	mA
	Forward Current Derating (Ta ≧ 39°C)	ΔI_F / °C	−0.7	mA / °C
	Peak Forward Current (100 μs pulse, 100pps)	I_{FP}	1	A
	Power Dissipation	P_D	100	mW
	Power Dissipation Derating (Ta ≧ 25°C)	ΔP_D / °C	−1.0	mW / °C
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55	V
	Collector-Base Voltage (TLP731)	V_{CBO}	80	V
	Emitter-Collector Voltage	V_{ECO}	7	V
	Emitter-Base Voltage (TLP731)	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
	Junction Temperature	T_j	125	°C
Storage Temperature Range		T_{stg}	−55~125	°C
Operating Temperature Range		T_{opr}	−55~100	°C
Lead Soldering Temperature (10s)		T_{sol}	260	°C
Total Package Power Dissipation		P_T	250	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C)		ΔP_T / °C	−2.5	mW / °C
Isolation Voltage (AC, 1 min., R.H. ≦ 60%)		BV_S	4000	V_{rms}

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	I_F	—	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
	Reverse Current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	30	—	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 (TLP731)	$V_{(BR)CBO}$	I_C = 0.1mA	80	—	—	V
	Emitter-Base Breakdown Voltage (TLP731)	$V_{(BR)EBO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 24V	—	10	100	nA
			V_{CE} = 24V, Ta = 85°C	—	2	50	μA
	Collector Dark Current (TLP731)	I_{CER}	V_{CE} = 24V, Ta = 85°C, R_{BE} = 1MΩ	—	0.5	10	μA
	Collector Dark Current (TLP731)	I_{CBO}	V_{CB} = 10V	—	0.1	—	nA
	DC Forward Current Gain (TLP731)	h_{FE}	V_{CE} = 5V, I_C = 0.5mA	—	400	—	—
	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 (TLP731)	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
		I_C = 0.2mA, I_F = 1mA	—	0.2	—	
		Rank GB	—	—	0.4	

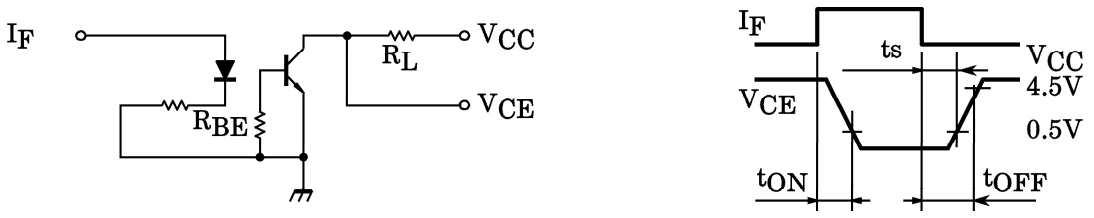
ISOLATION CHARACTERISTICS (Ta = 25°C)

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	1×10^{12}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	4000	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V_{dc}

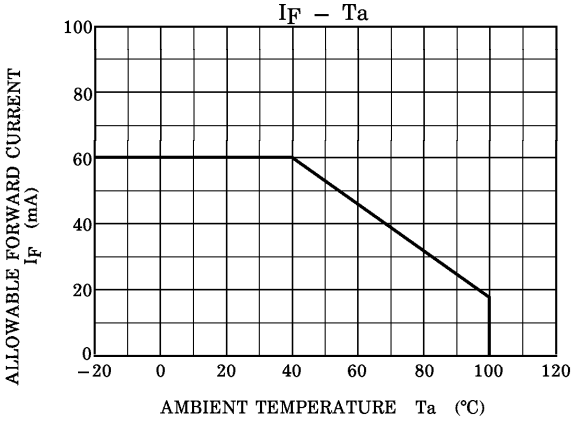
SWITCHING CHARACTERISTICS (Ta = 25°C)

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	10	
Turn-off Time	t_{off}		—	3	10	
Turn-on Time	t_{ON}	R_L = 1.9kΩ (Fig.1) 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 (Fig.1) R_{BE} = 220kΩ (TLP731) V_{CC} = 5V, I_F = 16mA	—	2	—	μs
Storage Time	t_s		—	12	—	
Turn-off Time	t_{OFF}		—	20	—	

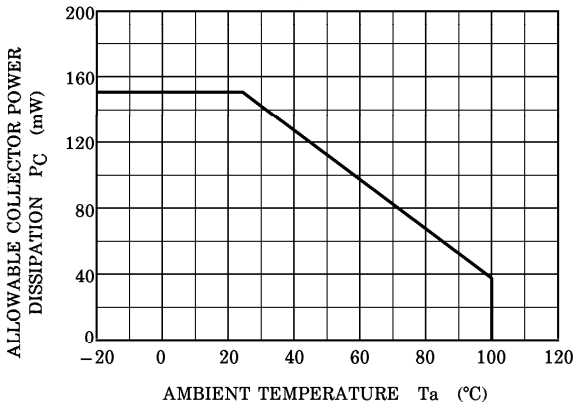
Fig. 1 SWITCHING TIME TEST CIRCUIT



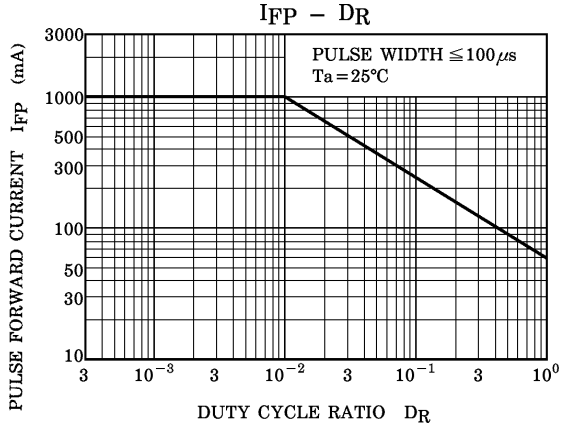
I_F – Ta



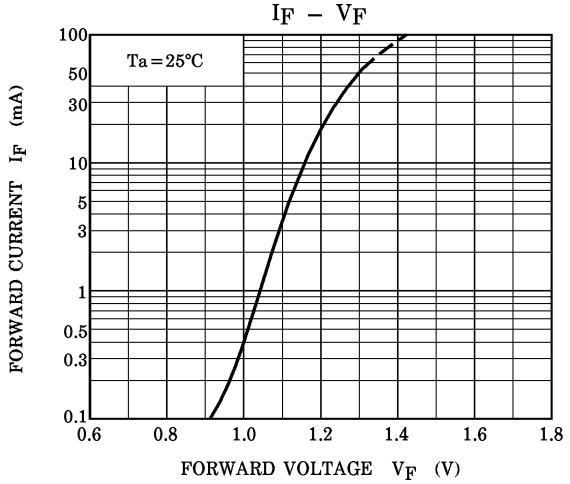
P_C – Ta



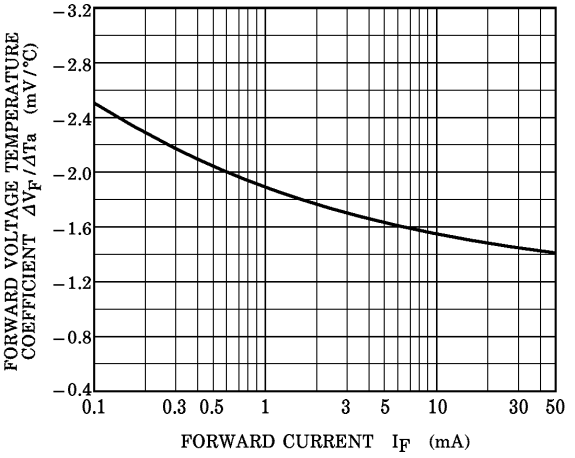
I_{FP} – D_R



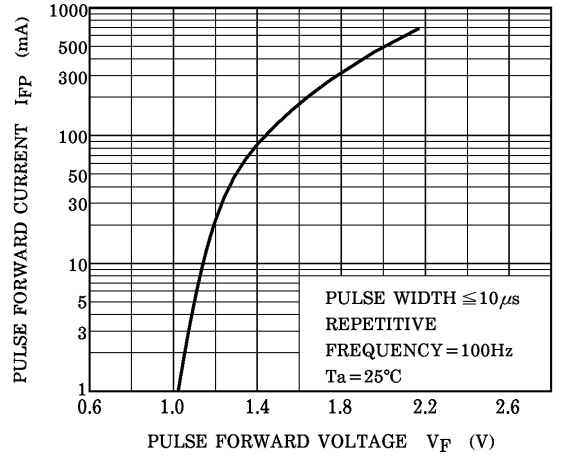
I_F – V_F



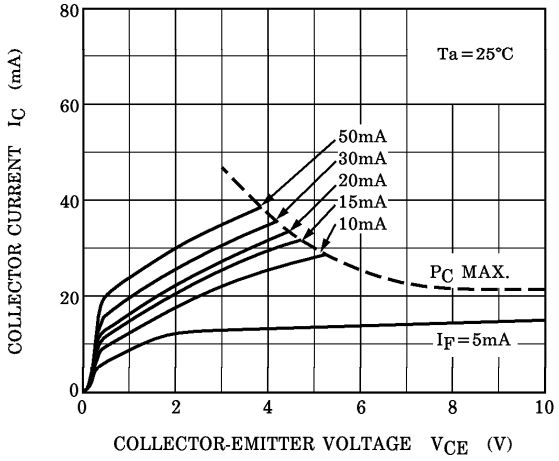
$\Delta V_F / \Delta Ta$ – I_F



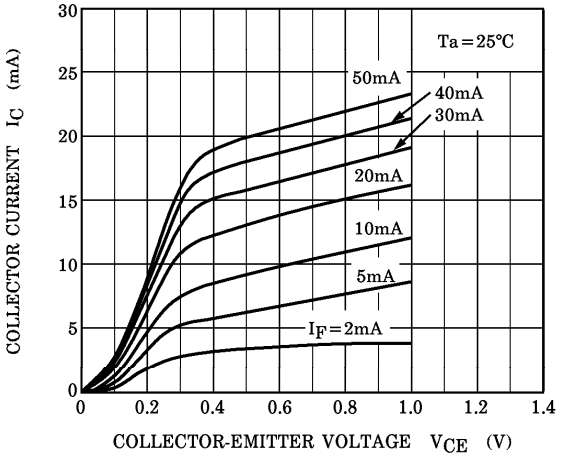
I_{FP} – V_{FP}



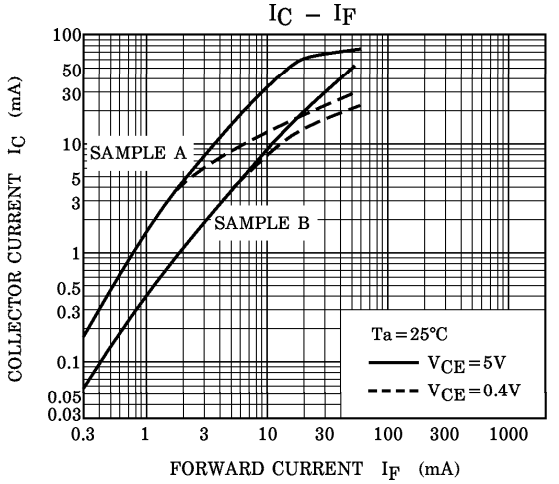
$I_C - V_{CE}$



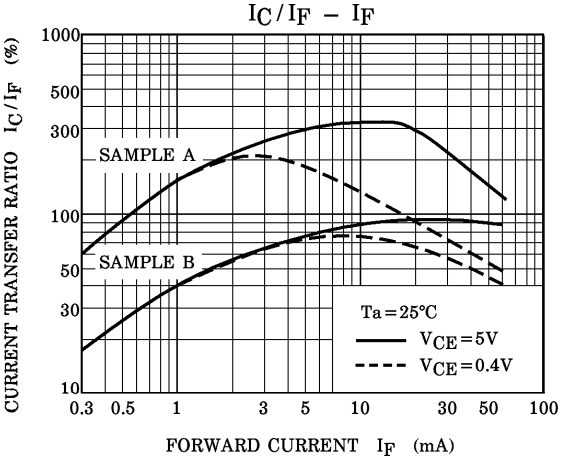
$I_C - V_{CE}$



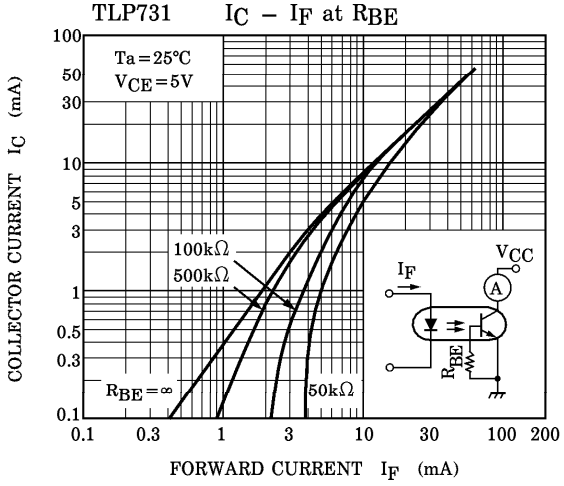
$I_C - I_F$



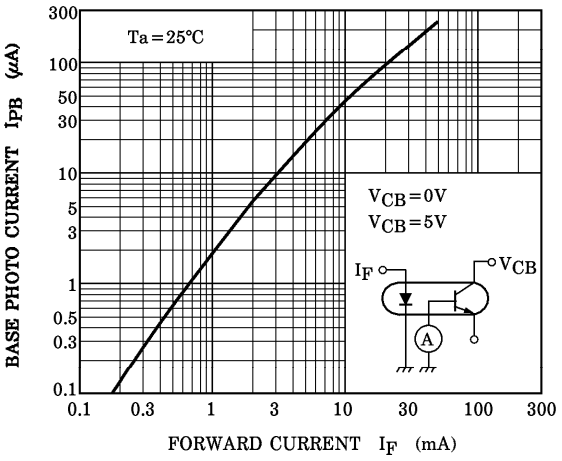
$I_C / I_F - I_F$



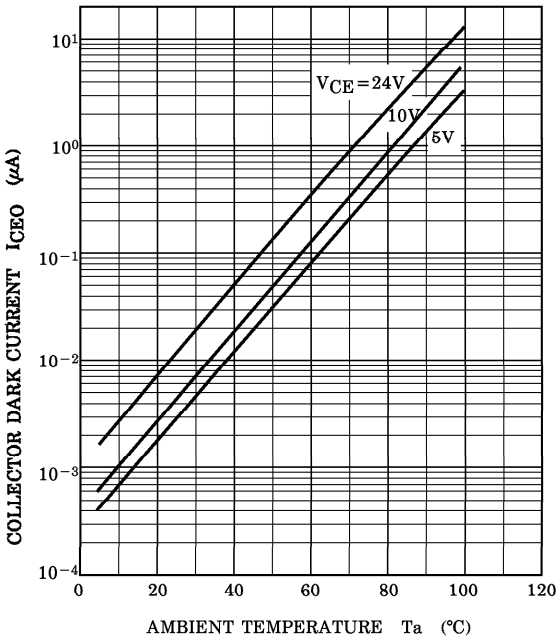
TLP731 $I_C - I_F$ at R_{BE}



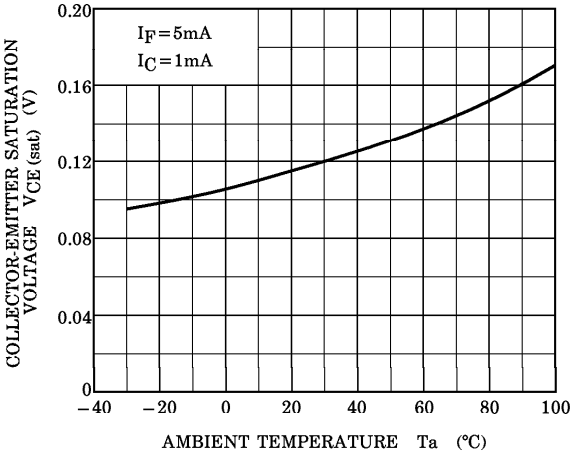
TLP731 $I_{PB} - I_F$



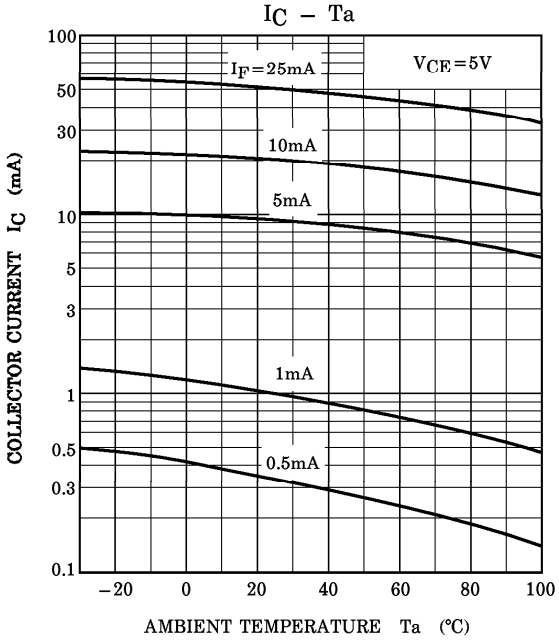
I_{CEO} – Ta



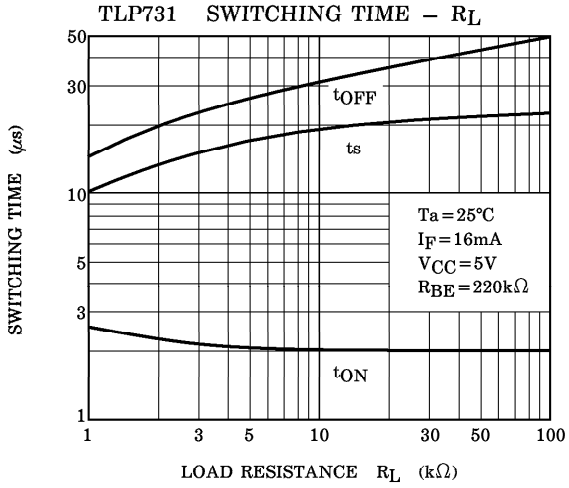
$V_{CE\,(sat)}$ – Ta



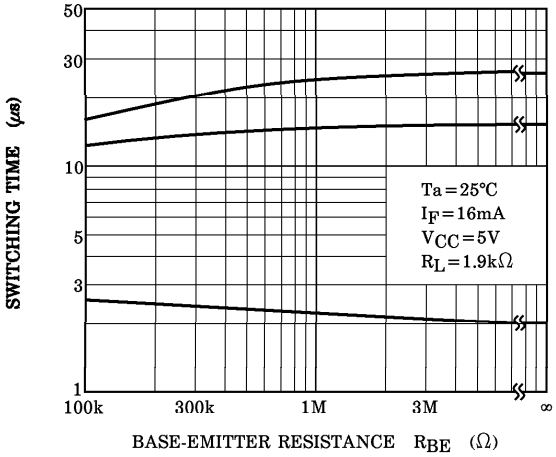
I_C – Ta



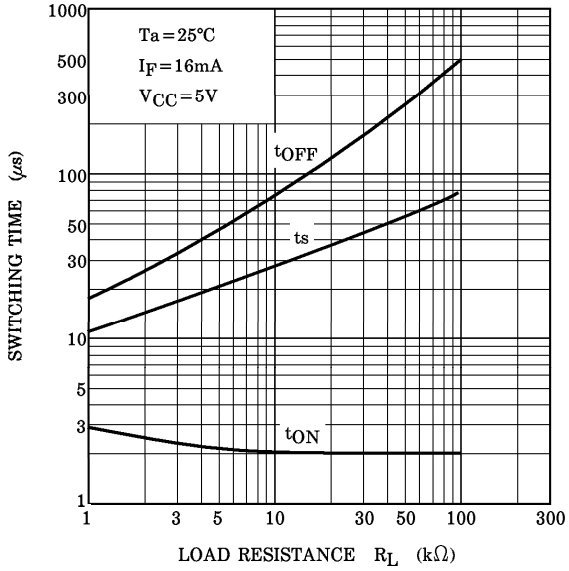
TLP731 SWITCHING TIME – R_L



TLP731 SWITCHING TIME – R_{BE}



SWITCHING TIME – R_L



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