TLP281, TLP281-4

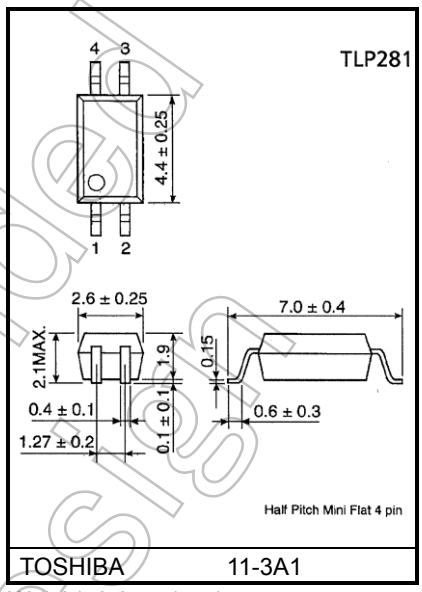
PROGRAMMABLE CONTROLLERS
AC/DC-INPUT MODULE
PC CARD MODEM(PCMCIA)

TLP281 and TLP281-4 is a very small and thin coupler, suitable for surface mount assembly in applications such as PCMCIA Fax modem, programmable controllers.
TLP281 and TLP281-4 consist of photo transistor, optically coupled to an infrared emitting diode.

- Collector-Emitter Voltage : 80 V (min)
- Current Transfer Ratio : 50% (min)
  Rank GB : 100% (min)
- Isolation Voltage : 2500 Vrms (min)
- UL-recognized : UL 1577, File No.E67349
- cUL-recognized : CSA Component Acceptance Service No.5A
  File No.E67349
- VDE-approved : EN 60747-5-5 (Note 1)

Note 1: When a VDE approved type is needed,
please designate the **Option(V4)**.

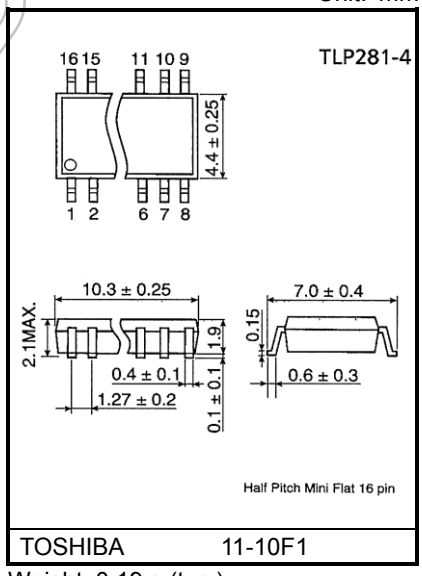
Unit: mm



TOSHIBA 11-3A1

Weight: 0.05 g (typ.)

Unit: mm

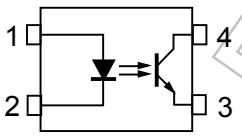


TOSHIBA 11-10F1

Weight: 0.19 g (typ.)

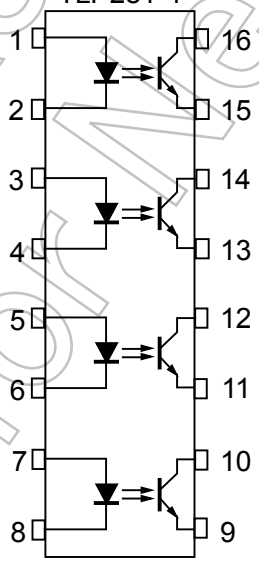
Pin Configuration (top view)

TLP281



1:ANODE
2:CATHODE
3:EMITTER
4:COLLECTOR

TLP281-4



1,3,5,7 :ANODE
2,4,6,8 :CATHODE
9,11,13,15 :EMITTER
10,12,14,16 :COLLECTOR

Start of commercial production
1996-03

Current Transfer Ratio

TYPE	Classification (Note 1)	Current Transfer Ration (%) (I_C/I_F) I_F = 5 mA, V_{CE} = 5 V, Ta = 25°C		Marking of Classification
		Min	Max	
TLP281	Blank	50	600	Blank, Y■, YE, G, G■, GR, B, BL, GB
	Rank Y	50	150	YE, Y■
	Rank GR	100	300	GR, G, G■
	Rank BL	200	600	BL, B
	Rank GB	100	600	GB, GR, G, G■, BL, B
	Rank YH	75	150	Y■
	Rank GRL	100	200	G
	Rank GRH	150	300	G
	Rank BLL	200	400	B
TLP281-4	Blank	50	600	Blank, GB
	Rank GB	100	600	GB

Note 1: Ex. rank GB: TLP281 (GB)

Note: Application type name for certification test, please use standard product type name, i.e.
TLP281 (GB): TLP281, TLP281-4 (GB): TLP281-4

Absolute Maximum Ratings (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP281	TLP281-4	
LED	Forward Current	I_F	50		mA
	Forward Current Derating	ΔI_F/°C	-0.7 (Ta≥53°C)	-0.5 (Ta≥25°C)	mA/°C
	Pulse Forward Current (100 μs pulse, 100 pps)	I_{FP}	1		A
	Reverse Voltage	V_R	5		V
	Diode power dissipation	P_D	100	70	mW
	Diode power dissipation derating	ΔP_D/°C	-1.39 (Ta≥53°C)	-0.7 (Ta≥25°C)	mW/°C
	Junction Temperature	T_j	125		°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	80		V
	Emitter-Collector Voltage	V_{ECO}	7		V
	Collector Current	I_C	50		mA
	Collector Power Dissipation (1 Circuit)	P_C	150	100	mW
	Collector Power Dissipation Derating(Ta≥25°C) (1 Circuit)	ΔP_C/°C	-1.5	-1.0	mW/°C
	Junction Temperature	T_j	125		°C
Operating Temperature Range		T_{opr}	-55 to 100		°C
Storage Temperature Range		T_{stg}	-55 to 125		°C
Lead Soldering Temperature (10 s)		T_{sol}	260		°C
Total Package Power Dissipation (1 Circuit)		P_T	200	170	mW
Total Package Power Dissipation Derating (Ta≥25°C) (1 Circuit)		ΔP_T/°C	-2.0	-1.7	mW/°C
Isolation Voltage (AC, 60 s, R.H.≤ 60 %) (Note 1)		BV_S	2500		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).

Note 1: Device considered a two terminal device : LED side pins shorted together and DETECTOR side pins shorted together.

Electrical Characteristics (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
LED	Forward Voltage	V_F	I_F = 10 mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0 V, f = 1 MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)\ CEO}$	I_C = 0.5 mA	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)\ ECO}$	I_E = 0.1 mA	7	—	—	V
	Collector Dark Current (Note 1)	I_{CEO}	V_{CE} = 48 V	—	0.01	0.1	μA
			V_{CE} = 48 V, Ambient Light Below (100 ℓx) (Note 2)	—	2	10	μA
			V_{CE} = 48 V, Ta = 85 °C	—	2	50	μA
			V_{CE} = 48 V, Ambient Light Below (100 ℓx) (Note 2)	—	4	50	μA
	Capacitance (Collector to Emitter)	C_{CE}	V = 0 V, f = 1 MHz	—	10	—	pF

Note 1: Because of the construction,leak current might be increased by ambient light.
Please use photocoupler with less ambient light.

Note 2: Irradiation to marking side using standard light bulb.

Coupled Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Current Transfer Ratio	I_C/I_F	I_F = 5 mA, V_{CE} = 5 V	50	—	600	%
		I_F = 5 mA, V_{CE} = 5 V, Rank GB	100	—	600	%
Saturated CTR	$I_C/I_{F(sat)}$	I_F = 1 mA, V_{CE} = 0.4 V	—	60	—	%
		I_F = 1 mA, V_{CE} = 0.4 V, Rank GB	30	—	—	%
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 2.4 mA, I_F = 8 mA	—	—	0.4	V
		I_C = 0.2 mA, I_F = 1 mA	—	0.2	—	V
		I_C = 0.2 mA, I_F = 1 mA, Rank GB	—	—	0.4	V
Off-State Collector Current	$I_{C(off)}$	V_F = 0.7 V, V_{CE} = 48 V	—	—	10	μA

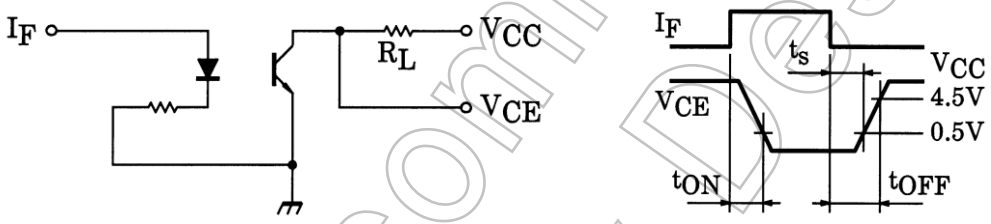
Isolation Characteristics (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Capacitance (Input to Output)	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500 V, R.H. ≤ 60 %	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 60 s	2500	—	—	Vrms

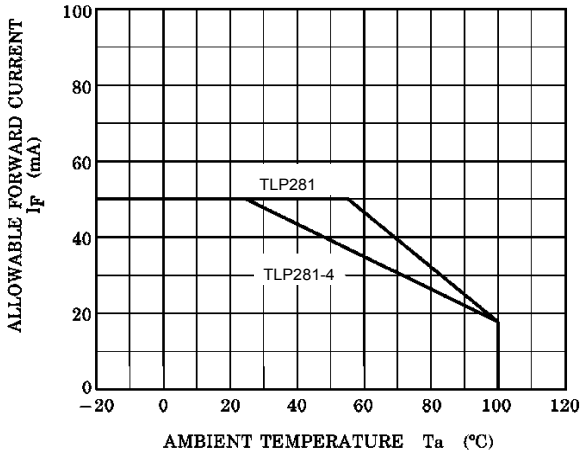
Switching Characteristics (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Rise Time	t_r	V_{CC} = 10 V, I_C = 2 mA R_L = 100 Ω	—	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 (Fig.1) V_{CC} = 5 V, I_F = 16 mA	—	2	—	μs
Storage Time	t_s		—	25	—	
Turn-Off Time	t_{OFF}		—	40	—	

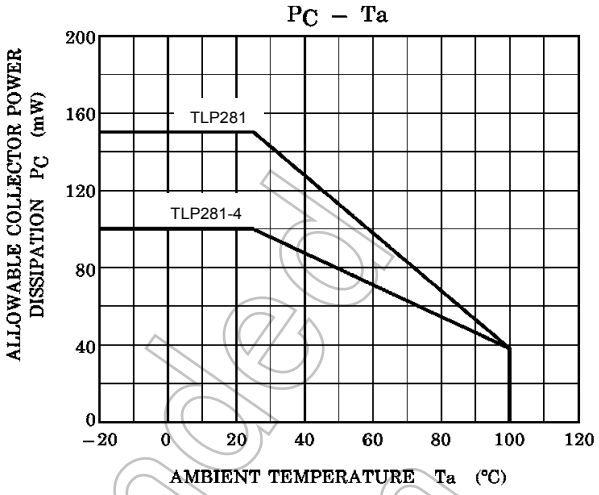
Fig.1: SWITCHING TIME TEST CIRCUIT



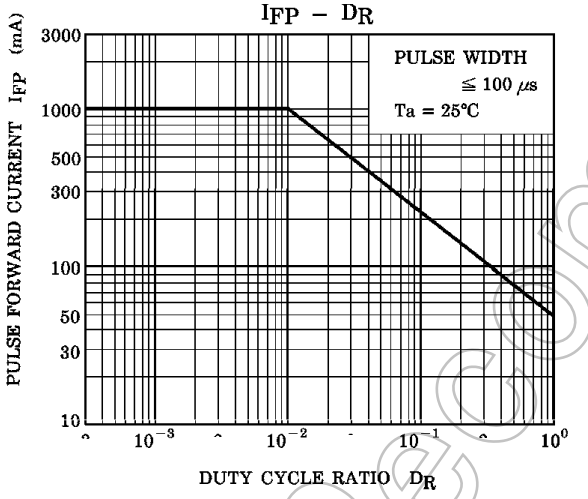
I_F – Ta



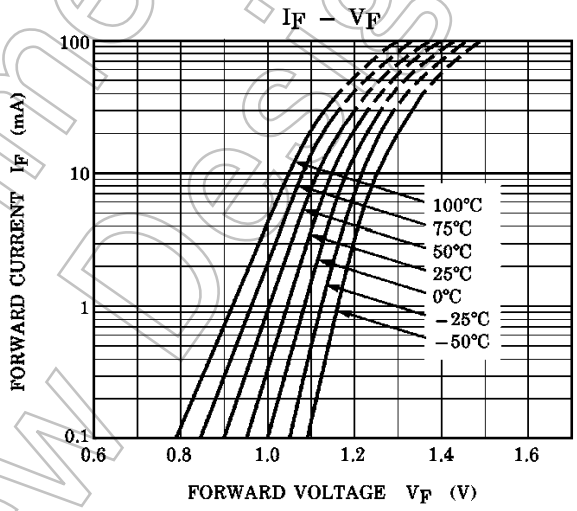
P_C – Ta



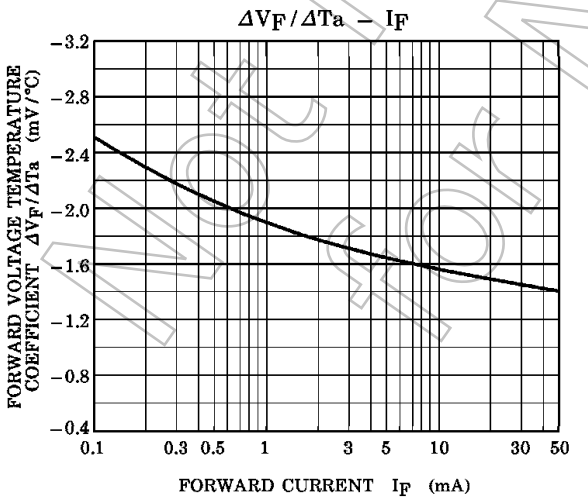
I_{FP} – D_R



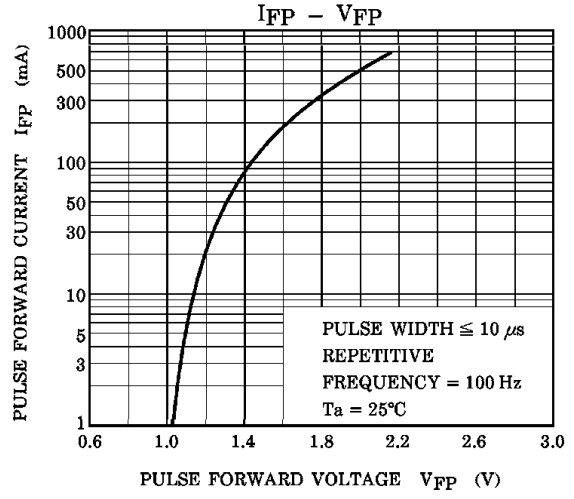
I_F – V_F



$\Delta V_F / \Delta Ta$ – I_F



I_{FP} – V_{FP}



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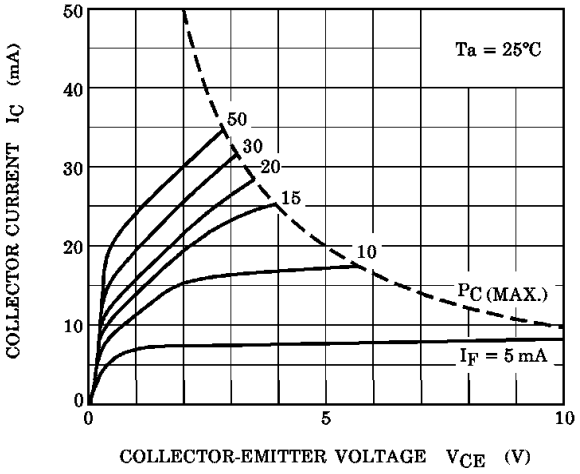
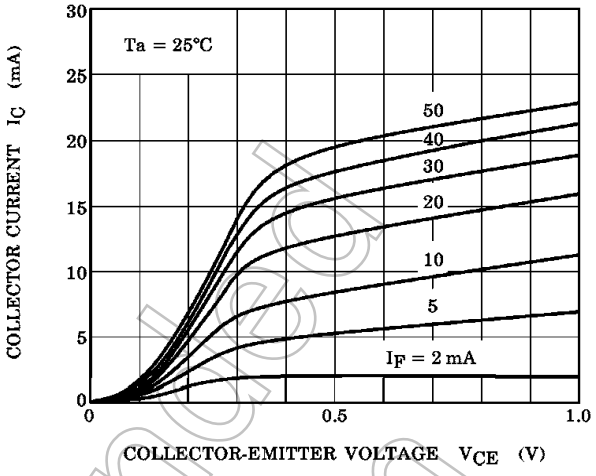
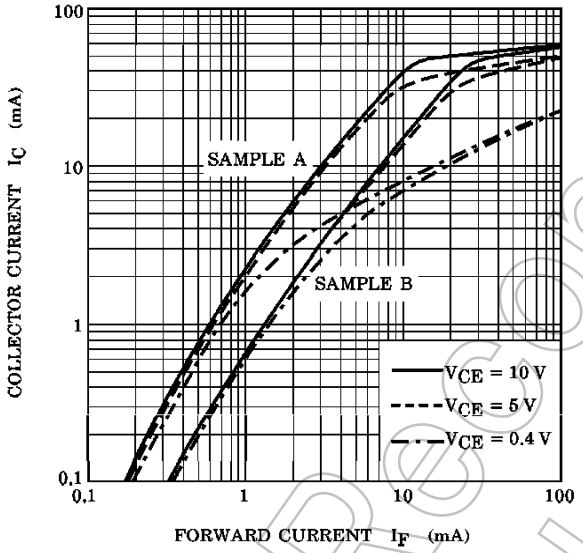
$I_C - V_{CE}$



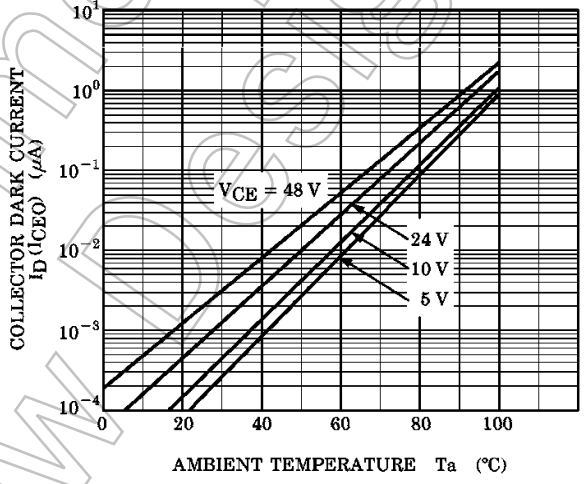
$I_C - V_{CE}$



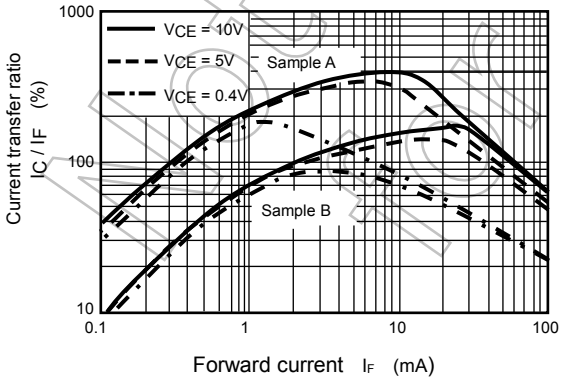
$I_C - I_F$



$I_{CEO} - Ta$



$I_C / I_F - I_F$



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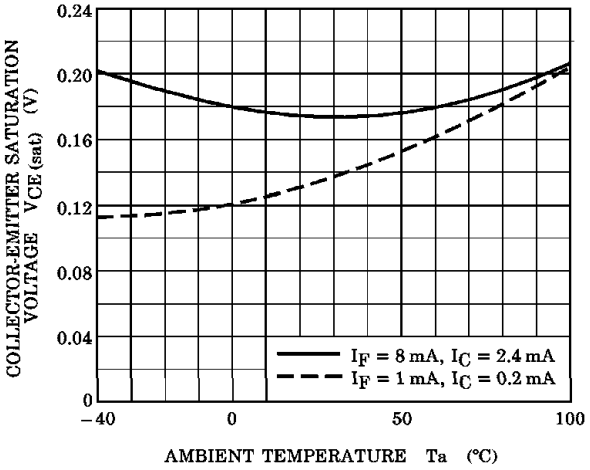
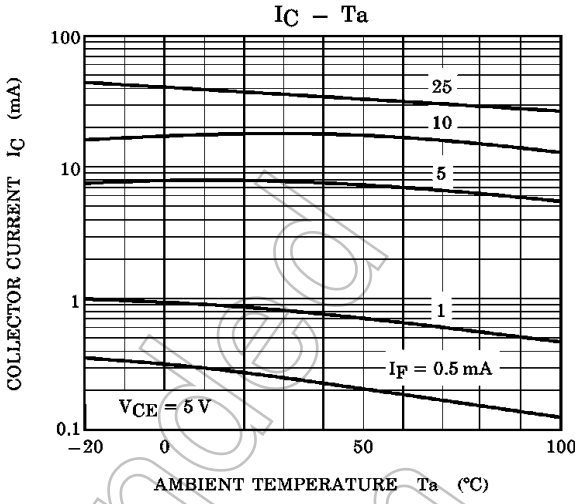
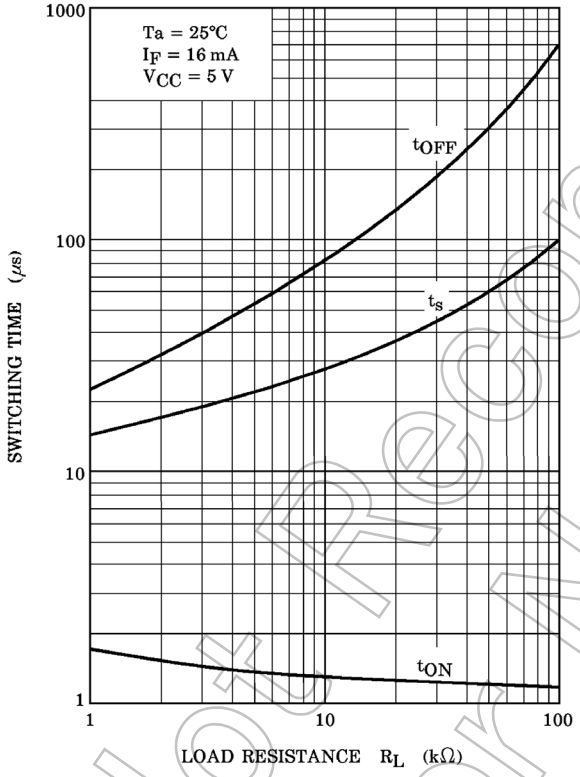
$V_{CE\,(sat)}$ – Ta



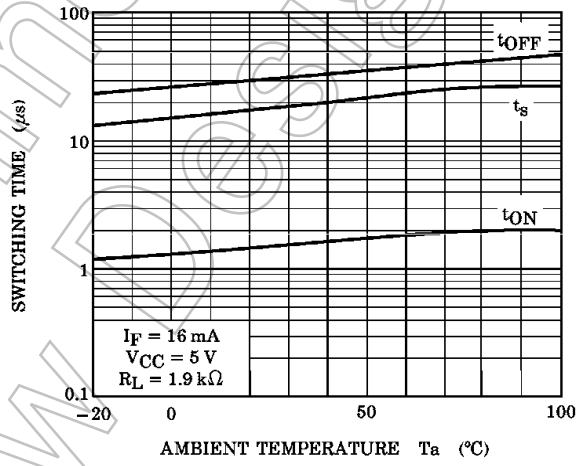
I_C – Ta



SWITCHING TIME – R_L



SWITCHING TIME – Ta



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