TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP521-1, TLP521-2, TLP521-4

PROGRAMMABLE CONTROLLERS

AC / DC-INPUT MODULE

SOLID STATE RELAY

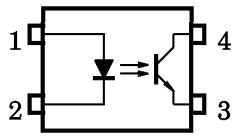
Unit in mm

The TOSHIBA TLP521-1, -2 and -4 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP521-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP521-4 provides four isolated channels in a sixteen plastic DIP package.

- Collector-Emitter Voltage : 55 V (min)
- Current Transfer Ratio : 50% (min)
  Rank GB : 100% (min)
- Isolation Voltage : 2500 Vrms (min)
- UL Recognized
  made in Japan : UL1577, File No. E67349
  made in Thailand : UL1577, File No. E152349

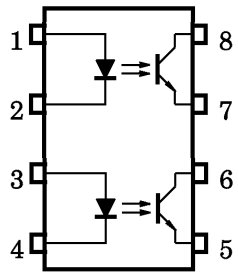
PIN CONFIGURATIONS (TOP VIEW)

TLP521-1



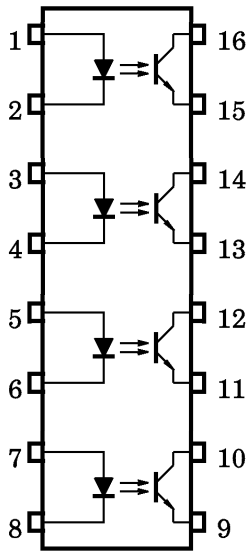
1 : ANODE
2 : CATHODE
3 : EMITTER
4 : COLLECTOR

TLP521-2



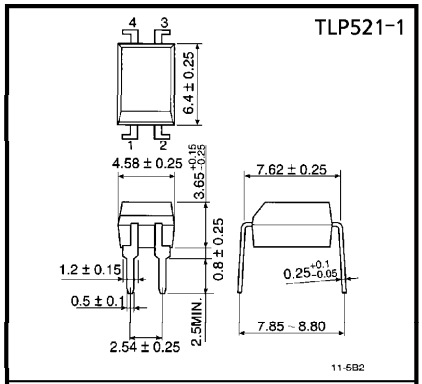
1, 3 : ANODE
2, 4 : CATHODE
5, 7 : EMITTER
6, 8 : COLLECTOR

TLP521-4



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

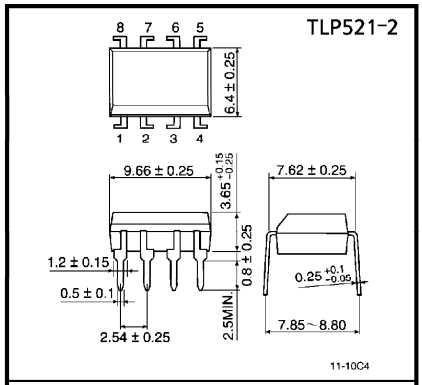
TLP521-1



TOSHIBA 11-5B2

Weight : 0.26 g

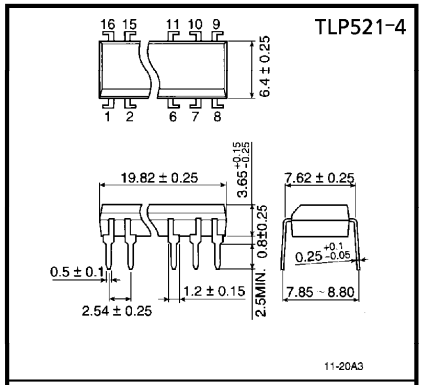
TLP521-2



TOSHIBA 11-10C4

Weight : 0.54 g

TLP521-4



TOSHIBA 11-20A3

Weight : 1.1 g

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MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP521-1	TLP521-2 TLP521-4	
LED	Forward Current	I_F	70	50	mA
	Forward Current Derating	ΔI_F / °C	−0.93 (Ta ≧ 50°C)	−0.5 (Ta ≧ 25°C)	mA / °C
	Pulse Forward Current	I_{FP}	1 (100 μ pulse, 100 pps)		A
	Reverse Voltage	V_R	5		V
	Junction Temperature	T_j	125		°C
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55		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 (1 Circuit, Ta ≧ 25°C)	ΔP_C / °C	−1.5	−1.0	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		T_{sol}	260 (10 s)		°C
Total Package Power Dissipation		P_T	250	150	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C)		ΔP_T / °C	−2.5	−1.5	mW / °C
Isolation Voltage		BV_S	2500 (AC, 1 min., R.H. ≦ 60%) (Note 1)		Vrms

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

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

000707EBC2'

- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
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- The information contained herein is subject to change without notice.

TYPE	CLASSI-FICATION (*1)	CURRENT TRANSFER RATIO (%) (I_C / I_F)		MARKING OF CLASSIFICATION
		I_F = 5 mA, V_{CE} = 5 V, Ta = 25°C		
		Min	Max	
TLP521	A	50	600	BLANK, Y, Y■, G, G■, B, B■, GB
	Rank Y	50	150	Y, Y■
	Rank GR	100	300	G, G■
	Rank BL	200	600	B, B■
	Rank GB	100	600	G, G■, B, B■, GB
TLP521-2 TLP521-4	A	50	600	BLANK, GR, BL, GB
	Rank GB	100	600	GR, BL, GB

*1 : Ex. Rank GB : TLP521-1 (GB)

(Note) : Application type name for certification test, please use standard product type name, i.e. TLP521-1 (GB) : TLP521-1, TLP521-2 (GB) : TLP521-2

INDIVIDUAL 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, f = 1 MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.5 mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1 mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 24 V	—	10	100	nA
			V_{CE} = 24 V, Ta = 85°C	—	2	50	μA
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, f = 1 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 = 5 mA, V_{CE} = 5 V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 1 mA, V_{CE} = 0.4 V	—	60	—	%
		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	—	
		Rank GB	—	—	0.4	

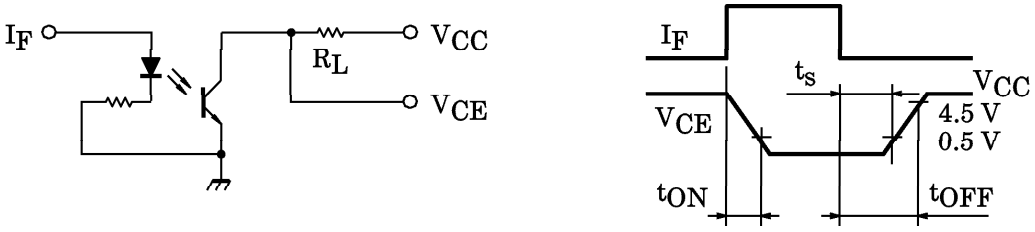
ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Capacitance (Input to Output)	C_S	V_S = 0, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500 V, R.H. ≦ 60%	—	10^{11}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	Vdc

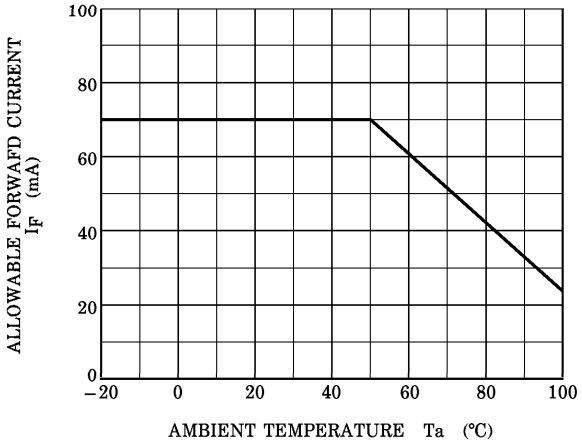
SWITCHING CHARACTERISTICS (Ta = 25°C)

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		—	15	—	
Turn-off Time	t_{OFF}		—	25	—	

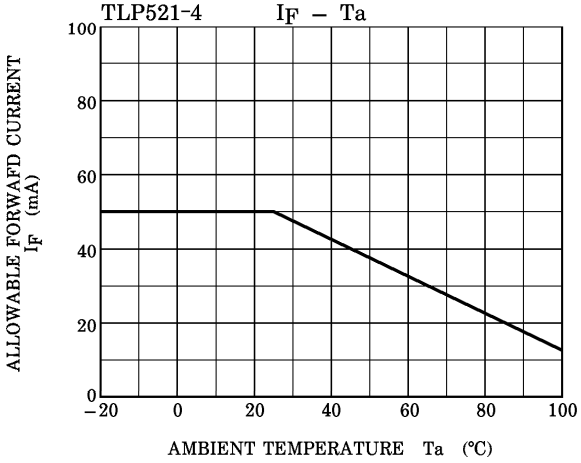
Fig.1 : SWITCHING TIME TEST CIRCUIT



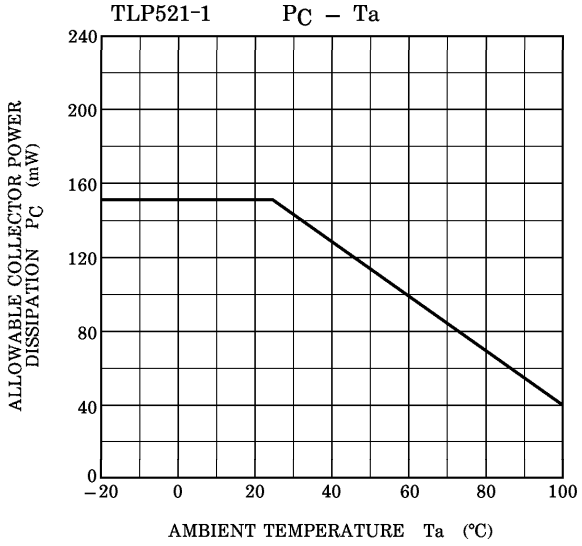
TLP521-1 I_F – Ta



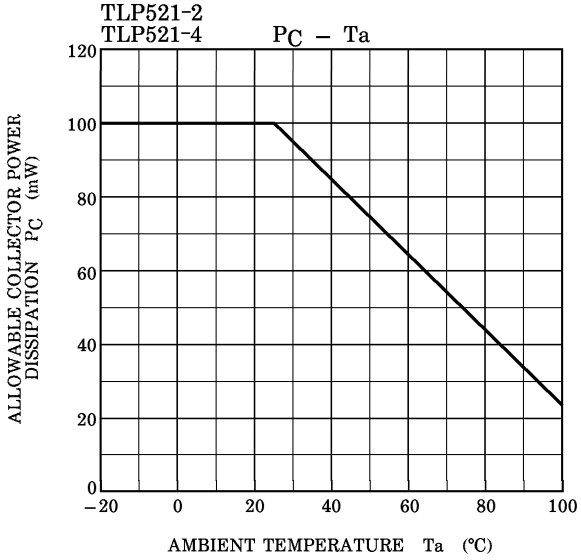
TLP521-2
TLP521-4 I_F – Ta



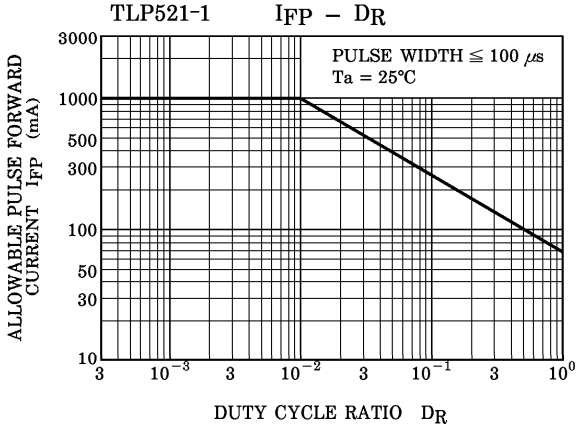
TLP521-1 P_C – Ta



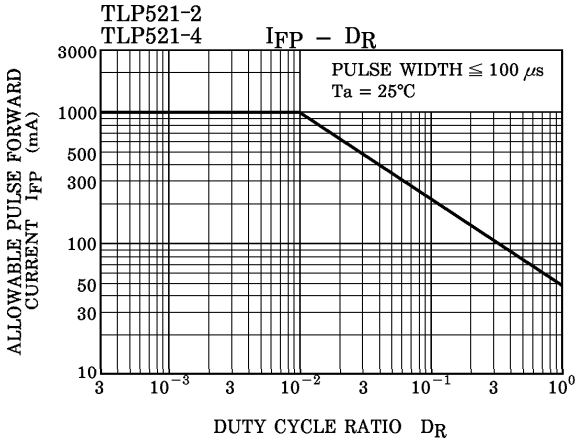
TLP521-2
TLP521-4 P_C – Ta



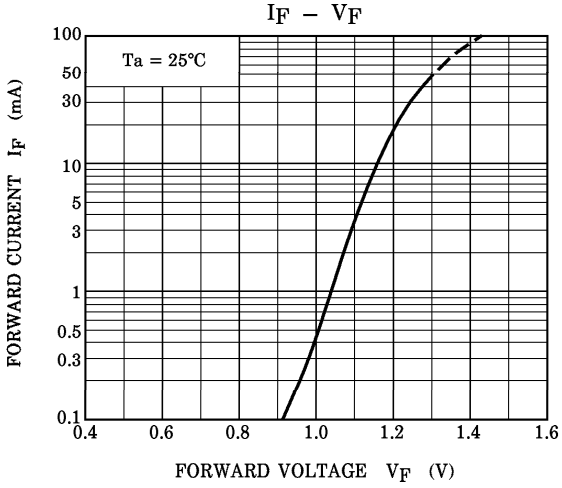
TLP521-1 I_{FP} – D_R



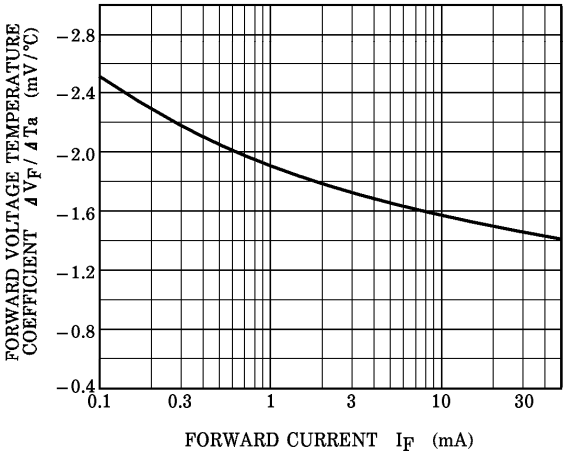
TLP521-2
TLP521-4 I_{FP} – D_R



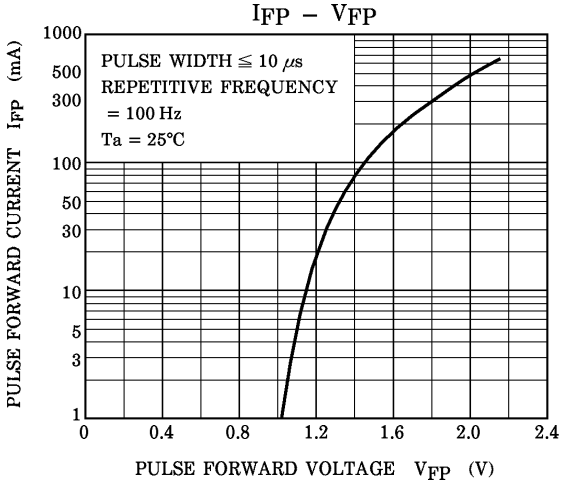
$I_F - V_F$



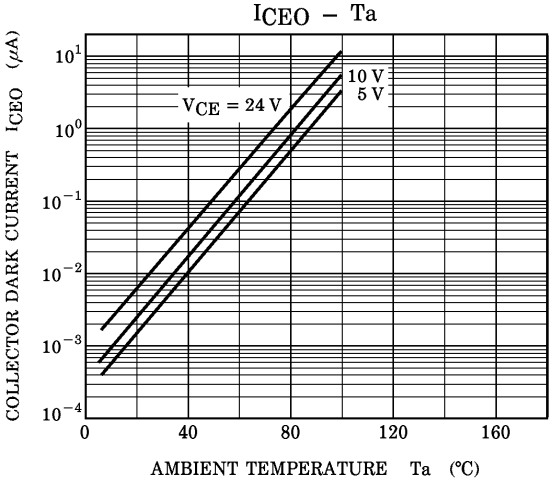
$\Delta V_F / \Delta Ta - I_F$



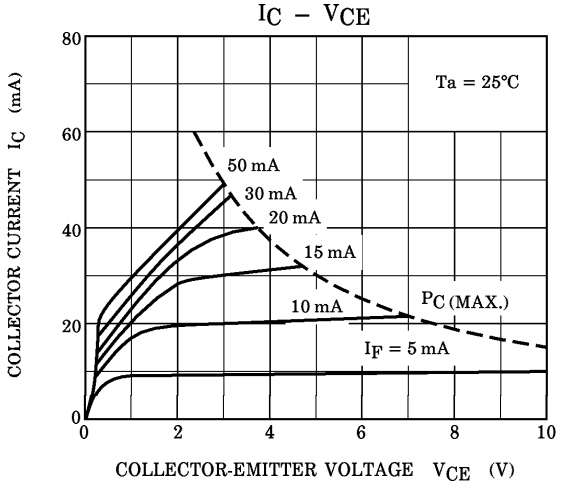
$I_{FP} - V_{FP}$



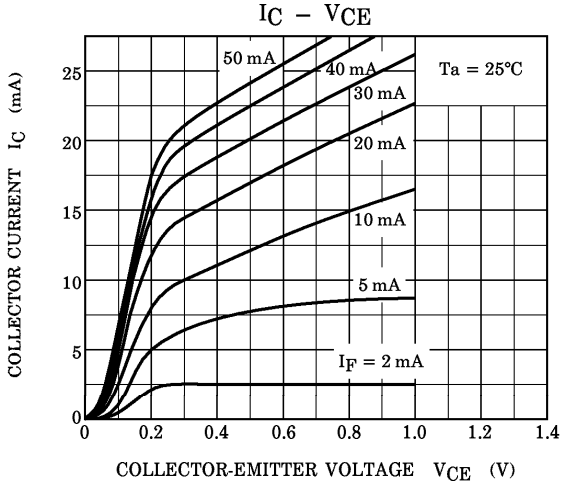
$I_{CEO} - Ta$



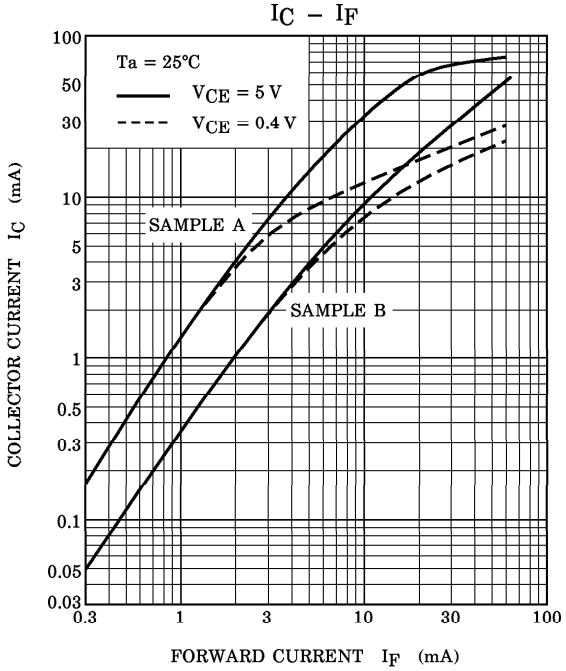
$I_C - V_{CE}$



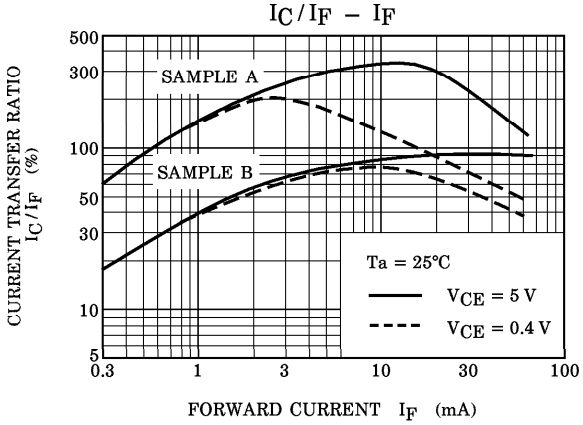
$I_C - V_{CE}$



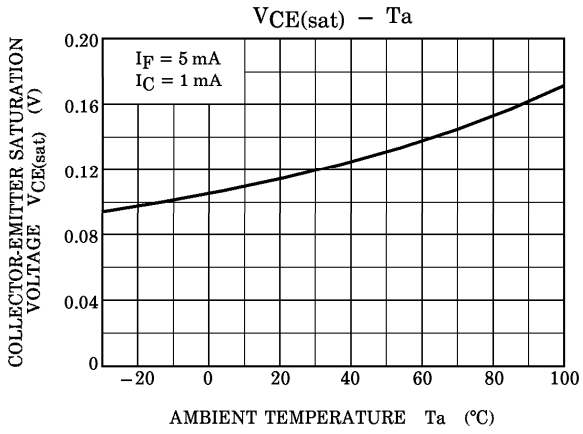
$I_C - I_F$



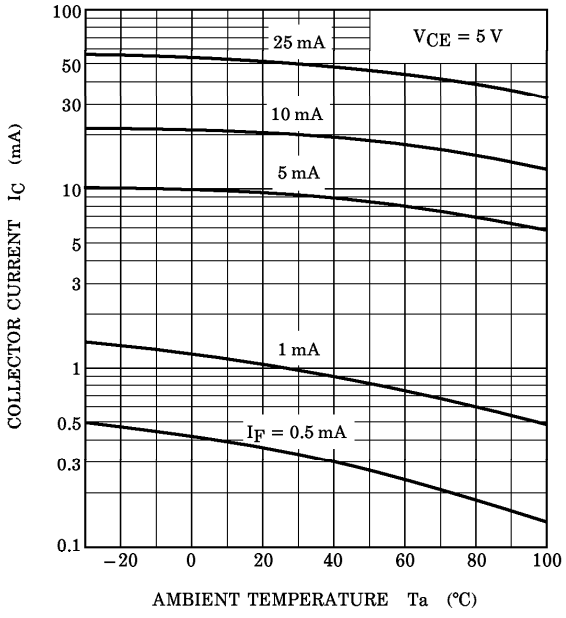
$I_C / I_F - I_F$



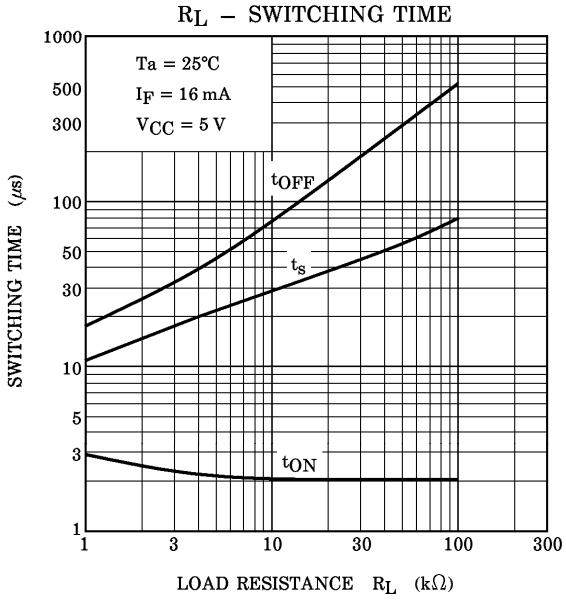
$V_{CE(sat)} - Ta$



$I_C - Ta$



R_L – SWITCHING TIME



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