

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP281, TLP281-4

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

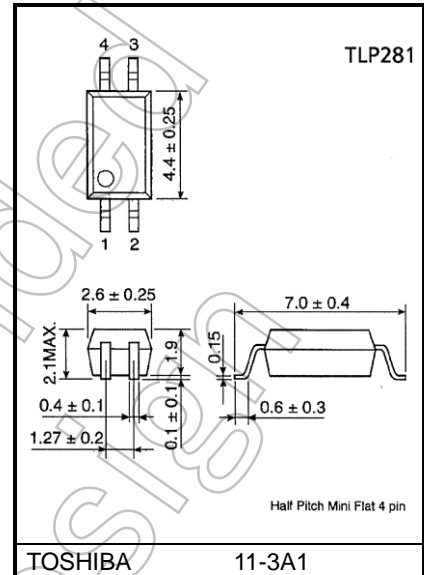
TLP281 and TLP281-4 is a very small and thin coupler, suitable for surface mount assembly in applications such as PCMCIA Fax modem, programmable controllers.

TLP281 and TLP281-4 consist of photo transistor, optically coupled to a gallium arsenide 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 : UL1577, File No. E67349
- cUL approved: CSA Component Acceptance Service No. 5A
File No.E67349
- Option (V4) type
VDE approved: EN60747-5-5 (Note)

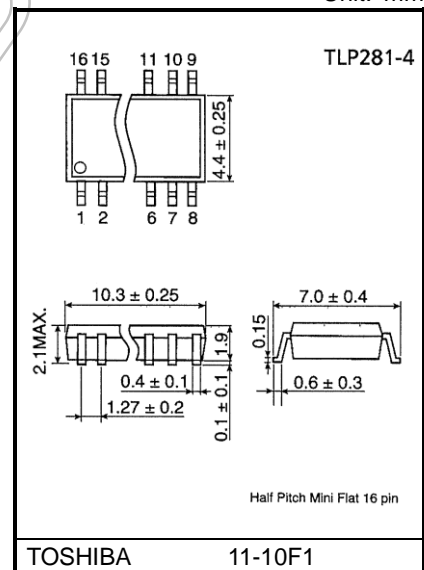
Note: When a EN60747-5-5 approved type is needed, Please designate "Option(V4)"

Unit: mm



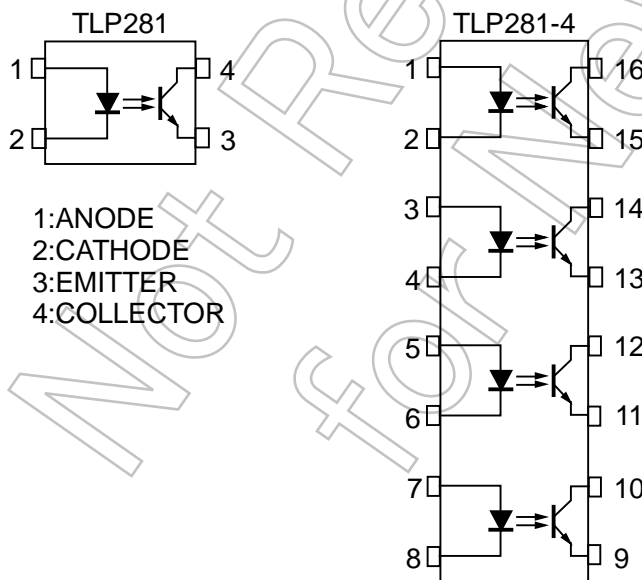
TOSHIBA 11-3A1
Weight: 0.05 g (typ.)

Unit: mm



TOSHIBA 11-10F1
Weight: 0.19 g (typ.)

Pin Configuration (top view)



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

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 Ratio (%) (I_C/I_F)		Marking of Classification
		$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}, T_a = 25^\circ\text{C}$		
		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

Not Recommended for New Design

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			TLP281	TLP281-4	
LED	Forward Current	IF	50		mA
	Forward Current Derating	$\Delta I_F/^\circ\text{C}$	-0.7 (Ta \geq 53°C)	-0.5 (Ta \geq 25°C)	mA/°C
	Pulse Forward Current (100 μ s pulse, 100 pps)	IFP	1		A
	Reverse Voltage	VR	5		V
	Diode power dissipation	PD	100	70	mW
	Diode power dissipation derating	$\Delta P_D/^\circ\text{C}$	-1.39 (Ta \geq 53°C)	-0.7 (Ta \geq 25°C)	mW/°C
	Junction Temperature	Tj	125		°C
DETECTOR	Collector-Emitter Voltage	VCEO	80		V
	Emitter-Collector Voltage	VECO	7		V
	Collector Current	IC	50		mA
	Collector Power Dissipation (1 Circuit)	PC	150	100	mW
	Collector Power Dissipation Derating (Ta \geq 25°C) (1 Circuit)	$\Delta P_C/^\circ\text{C}$	-1.5	-1.0	mW/°C
	Junction Temperature	Tj	125		°C
	Operating Temperature Range	Topr	-55 to 100		°C
Storage Temperature Range	Tstg	-55 to 125		°C	
Lead Soldering Temperature (10 s)	Tsol	260		°C	
Total Package Power Dissipation (1 Circuit)	PT	200	170	mW	
Total Package Power Dissipation Derating (Ta \geq 25°C) (1 Circuit)	$\Delta P_T/^\circ\text{C}$	-2.0	-1.7	mW/°C	
Isolation Voltage (AC, 60 s, R.H. \leq 60%) (Note 1)	BVS	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
			Ambient Light Below (100 lx) (Note 2)	—	2	10	
			V _{CE} = 48 V, Ta = 85°C	—	2	50	μA
Ambient Light Below (100 lx) (Note 2)	—	4	50				
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 Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	I _C /I _{F(sat)}	I _F = 1 mA, V _{CE} = 0.4 V Rank GB	—	60	—	%
			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 Rank GB	—	0.2	—	
			—	—	0.4	
Off-State Collector Current	I _{C(off)}	V _F = 0.7 V, V _{CE} = 48 V	—	—	10	μA

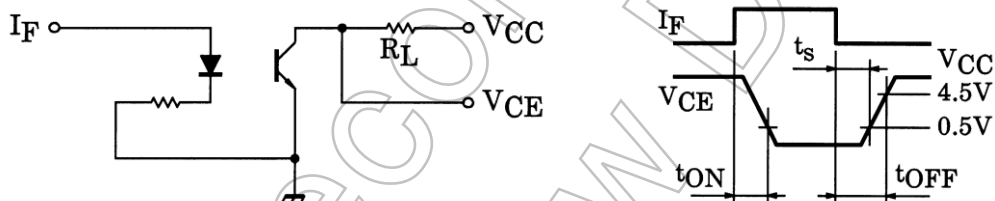
Isolation Characteristics (Ta = 25°C)

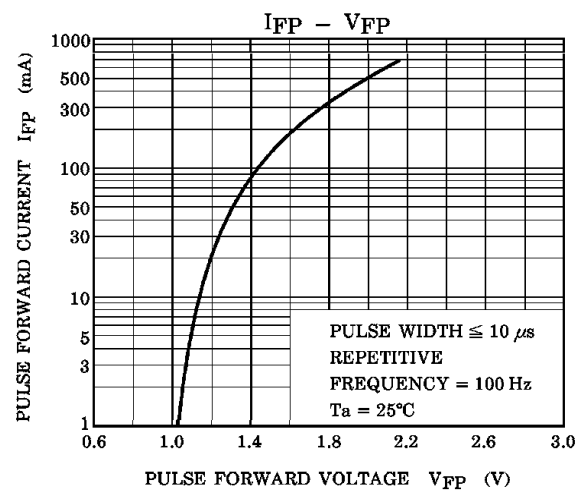
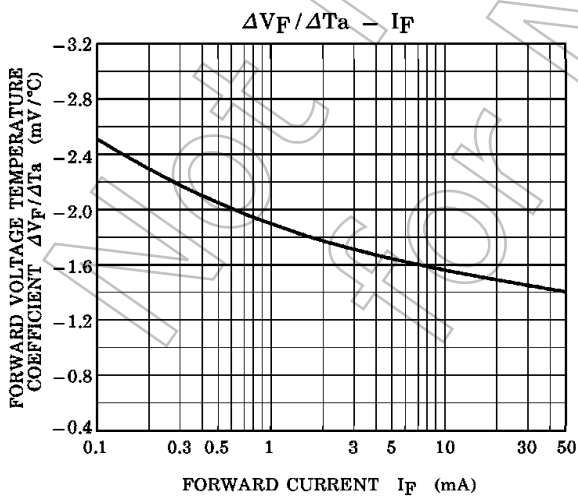
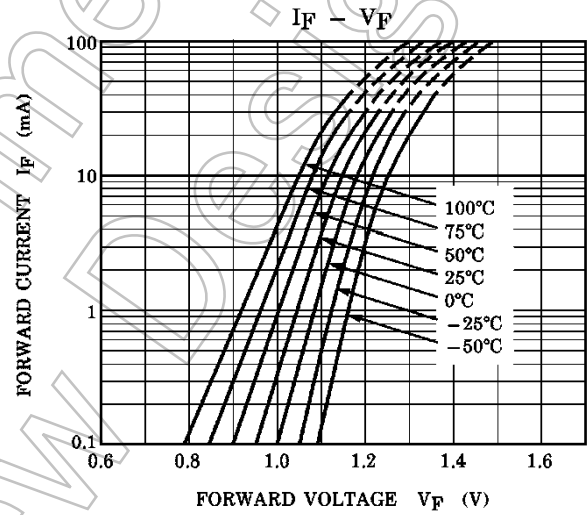
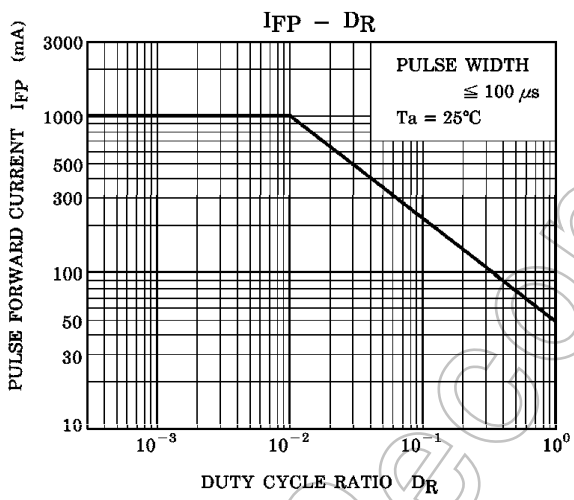
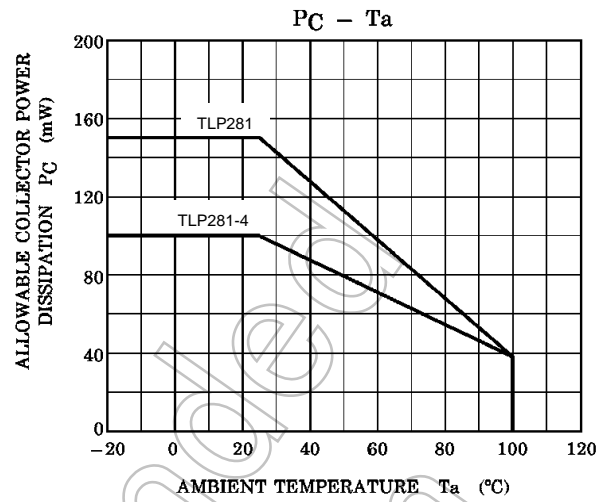
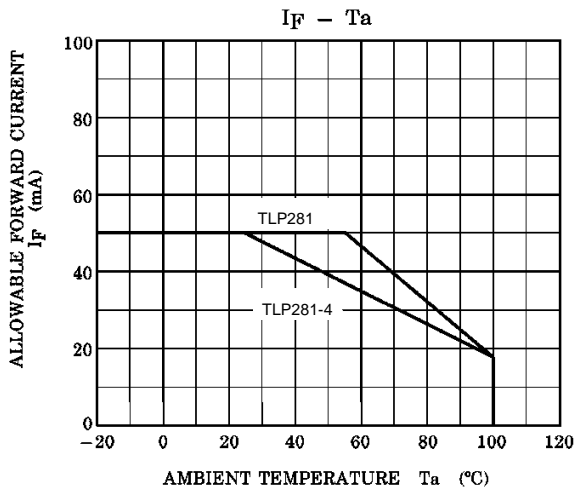
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Capacitance (Input to Output)	C _S	V _S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R _S	V _S = 500 V, R.H. ≤ 60%	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation Voltage	BV _S	AC, 60 s	2500	—	—	V _{rms}
		AC, 1 s, in oil	—	5000	—	
		DC, 60 s, in oil	—	5000	—	V _{dc}

Switching Characteristics (Ta = 25°C)

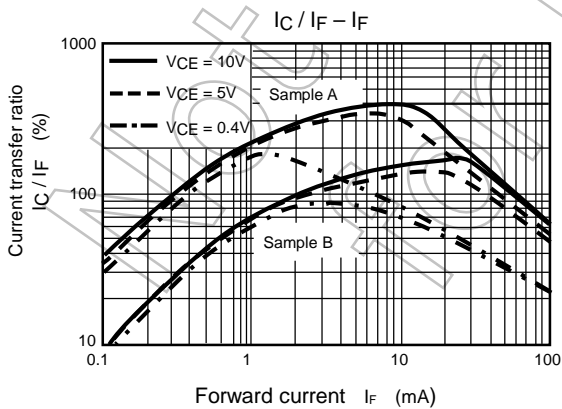
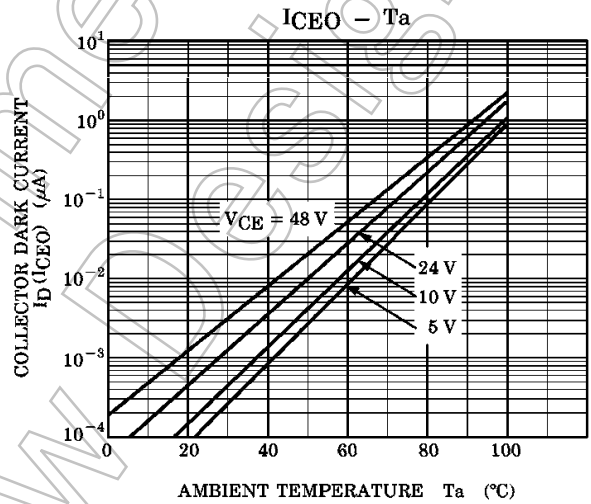
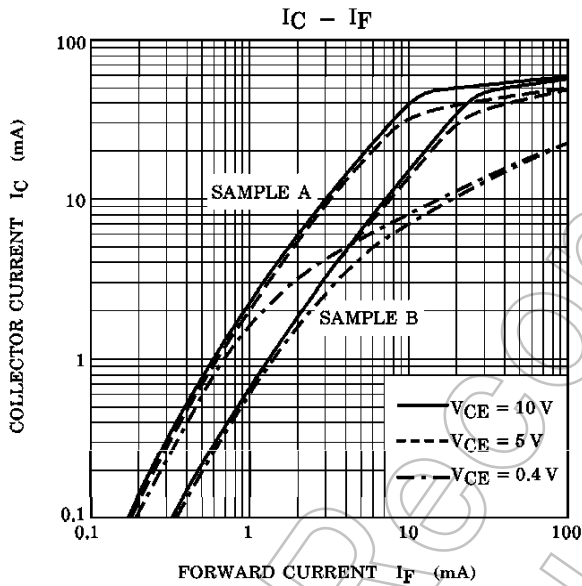
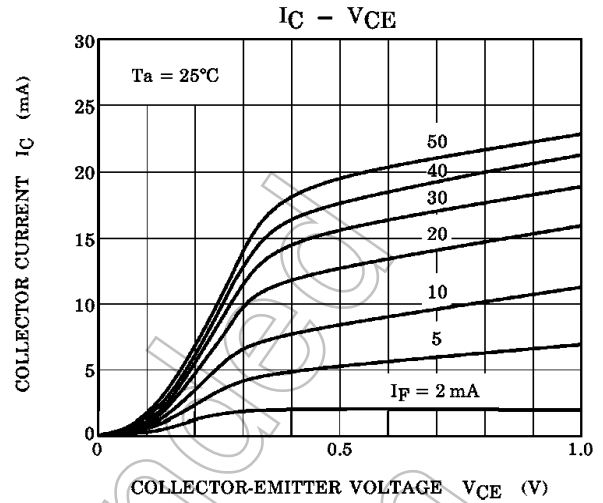
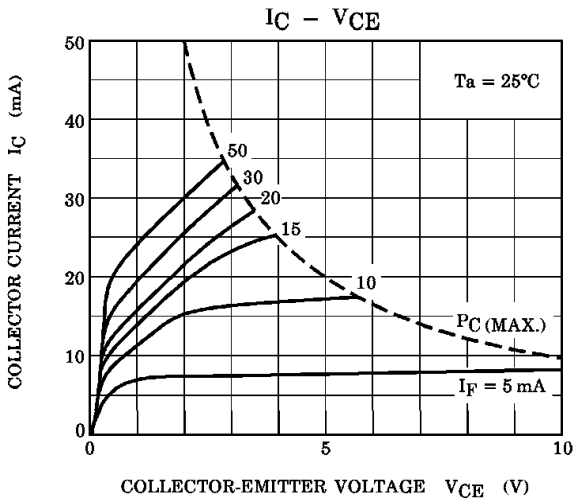
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Rise Time	t _r	V _{CC} = 10 V, I _C = 2 mA R _L = 100 Ω	—	2	—	μs
Fall Time	t _f		—	3	—	
Turn-On Time	t _{on}		—	3	—	
Turn-Off Time	t _{off}		—	3	—	
Turn-On Time	t _{ON}	R _L = 1.9 kΩ V _{CC} = 5 V, I _F = 16 mA (Fig. 1)	—	2	—	μs
Storage Time	t _s		—	25	—	
Turn-Off Time	t _{OFF}		—	40	—	

Fig.1: SWITCHING TIME TEST CIRCUIT

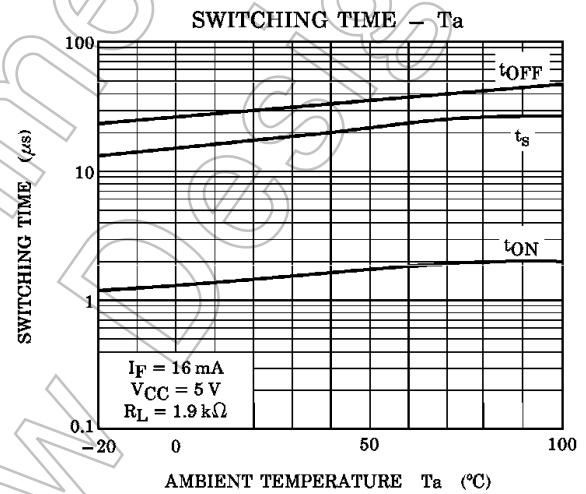
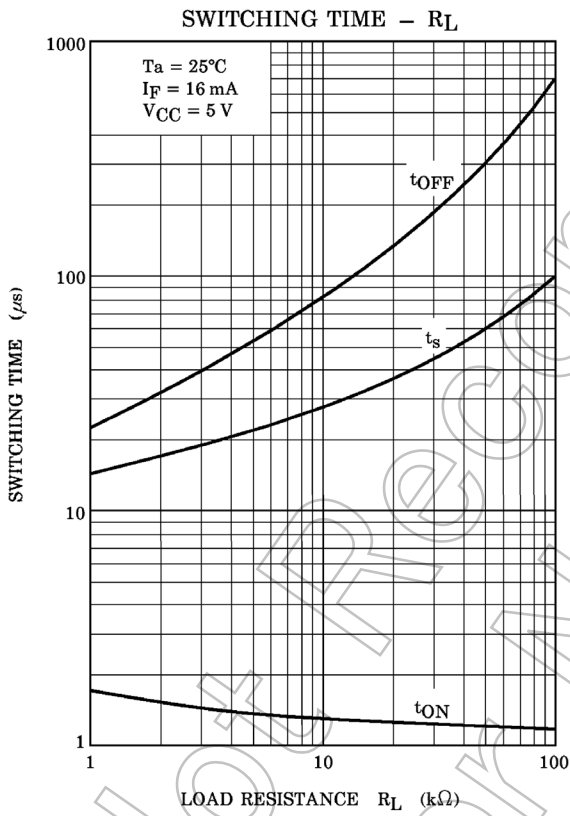
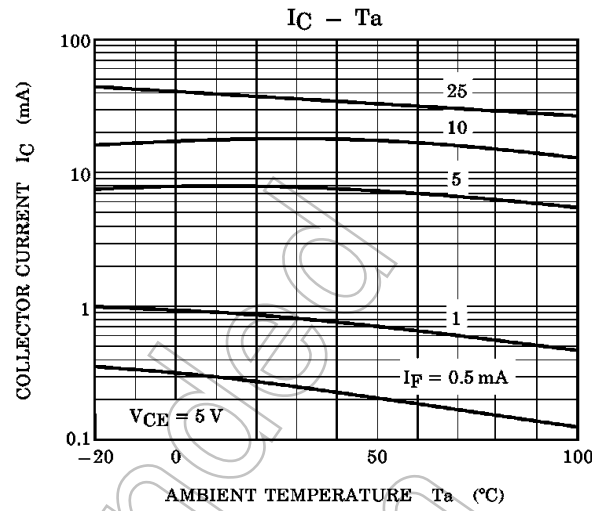
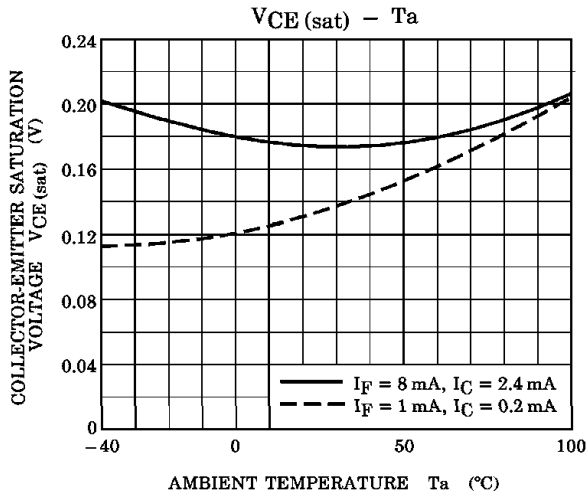




*The above graphs show typical characteristic.



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