TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP281, TLP281-4

PROGRAMMABLE CONTROLLERS

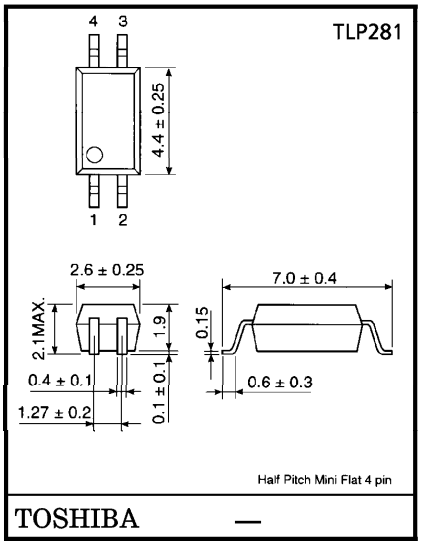
AC / DC-INPUT MODULE

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.

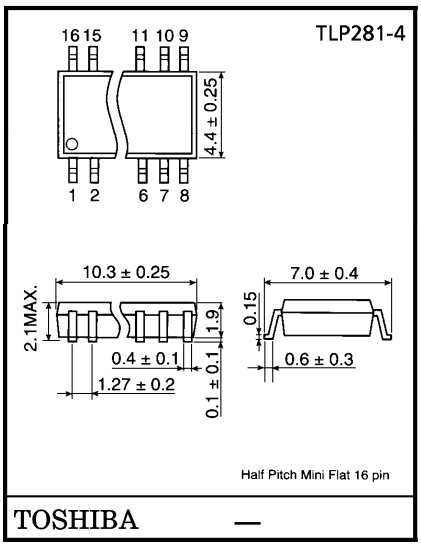
- Collector-Emitter Voltage : 80 V (Min.)
- Current Transfer Ratio : 50% (Min.)
  Rank GB : 100% (Min.)
- Isolation Voltage : 2500 V_{rms} (Min.)
- UL Recognized : UL1577, File No. E67349
- BSI Approved : BS EN 60065 : 1994,
  BS EN 41003 : 1997
  Certificate No. 8143, 8144

Unit in mm



TOSHIBA —

Weight : 0.05 g



TOSHIBA —

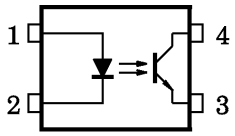
Weight : 0.19 g

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- 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.

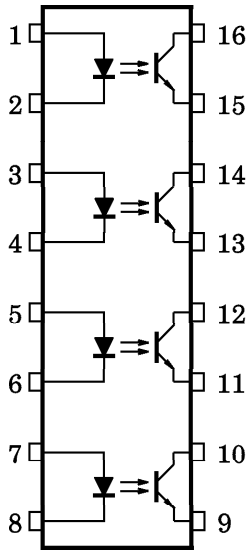
PIN CONFIGURATION (Top view)

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

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING		UNIT
			TLP281	TLP281-4	
LED	Forward Current	$I_{F\ (RMS)}$	50		mA
	Forward Current Derating	ΔI_F / °C	−0.7 (Ta ≧ 53°C)	−0.5 (Ta ≧ 25°C)	mA / °C
	Pulse Forward Current (Note 1)	I_{FP}	1		A
	Reverse Voltage	V_R	5		V
	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
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 (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 (Note)		BV_S	2500 (AC, 1 min., R.H. ≦ 60%)		V_{rms}

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

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	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, Ambient Light Below (100 1x)	—	0.01 (2)	0.1 (10)	μA
			V_{CE} = 48 V, Ta = 85°C Ambient Light Below (100 1x)	—	2 (4)	50 (50)	μA
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, 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.

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	
Off-State Collector Current	$I_{C(off)}$	V_F = 0.7 V, V_{CE} = 48 V	—	—	10	μA

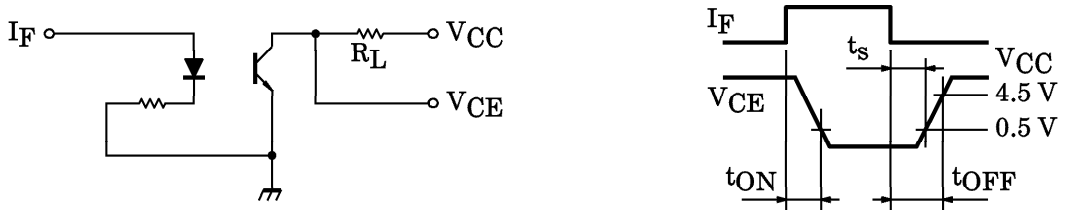
ISOLATION CHARACTERISTICS (Ta = 25°C)

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, 1 minute	2500	—	—	V_{rms}
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	V_{dc}

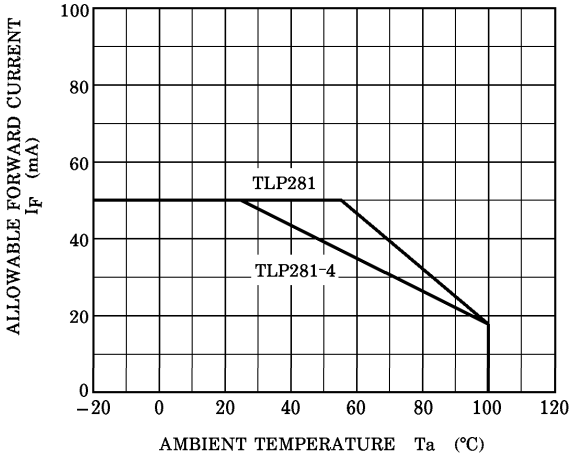
SWITCHING CHARACTERISTICS (Ta = 25°C)

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 (Fig.1) V_{CC} = 5 V, I_F = 16 mA	—	2	—	μs
Storage Time	t_s		—	25	—	
Turn-Off Time	t_{OFF}		—	40	—	

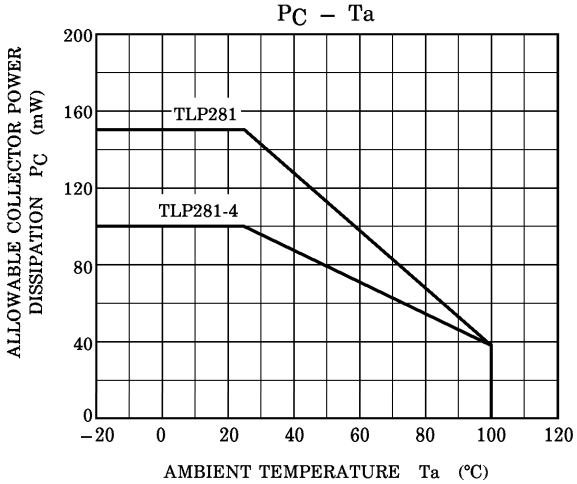
(Fig.1) SWITCHING TIME TEST CIRCUIT



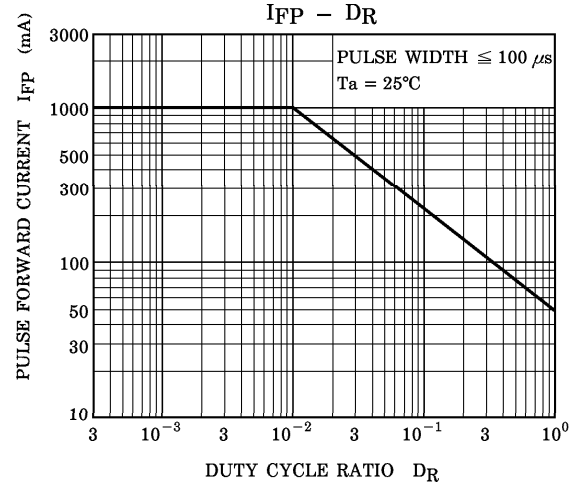
I_F – Ta



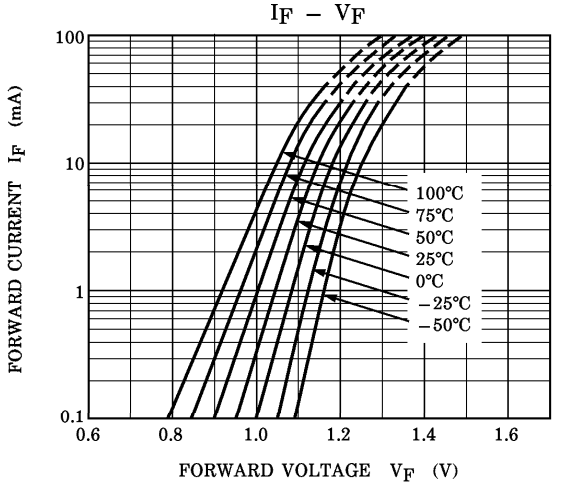
P_C – Ta



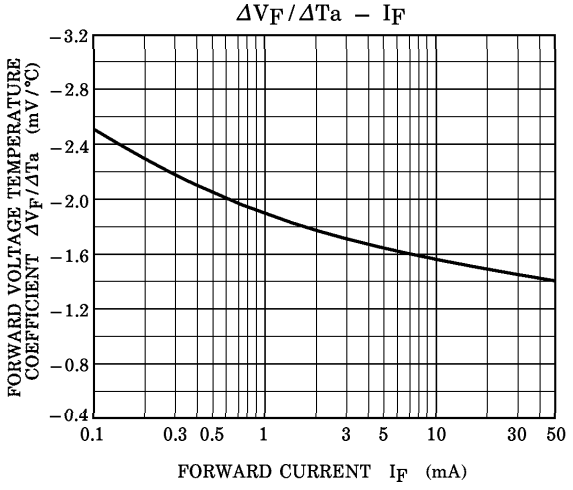
I_{FP} – D_R



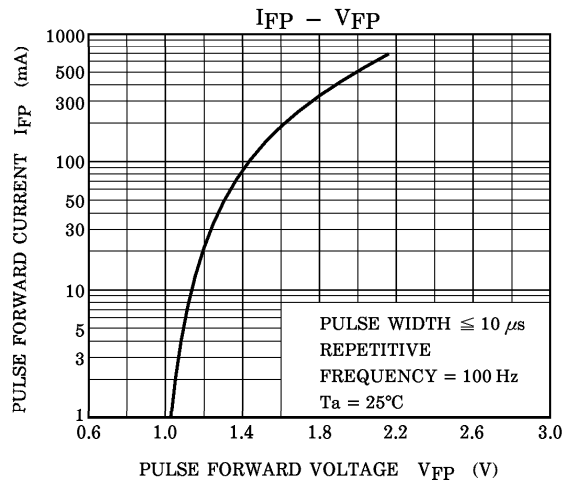
I_F – V_F



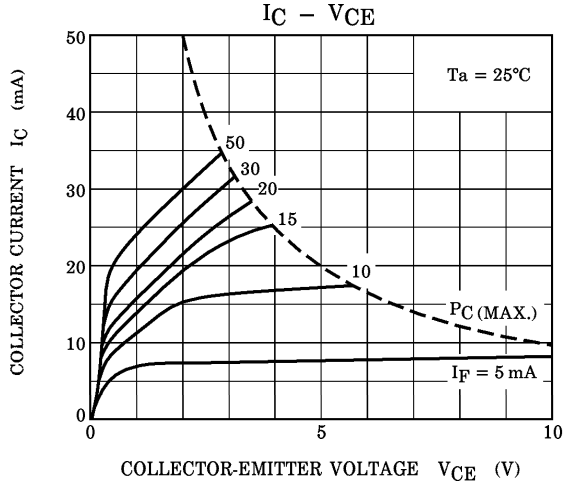
$\Delta V_F / \Delta Ta$ – I_F



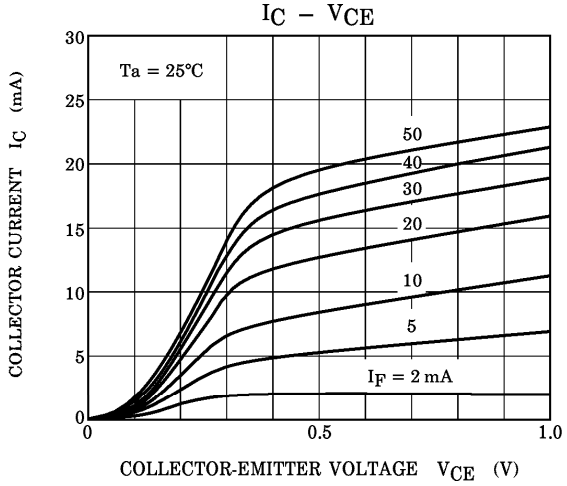
I_{FP} – V_{FP}



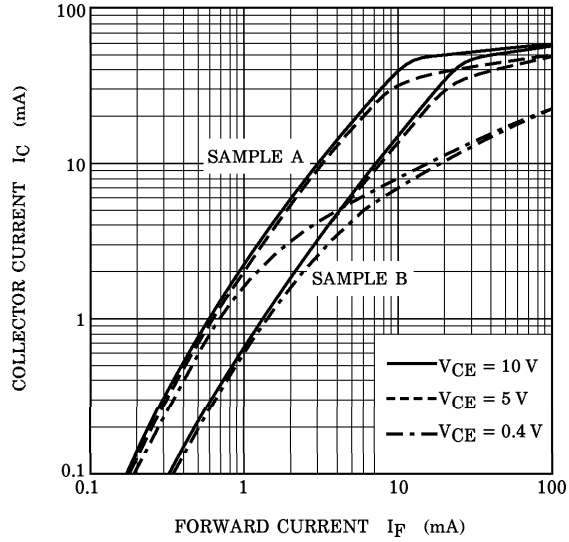
$I_C - V_{CE}$



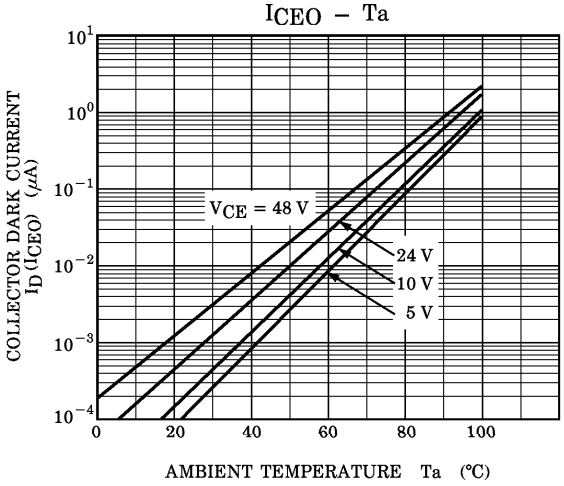
$I_C - V_{CE}$



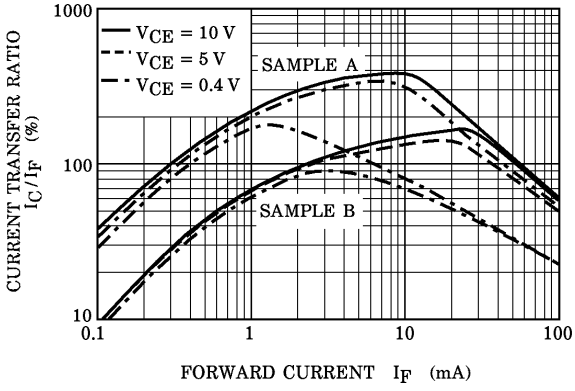
$I_C - I_F$



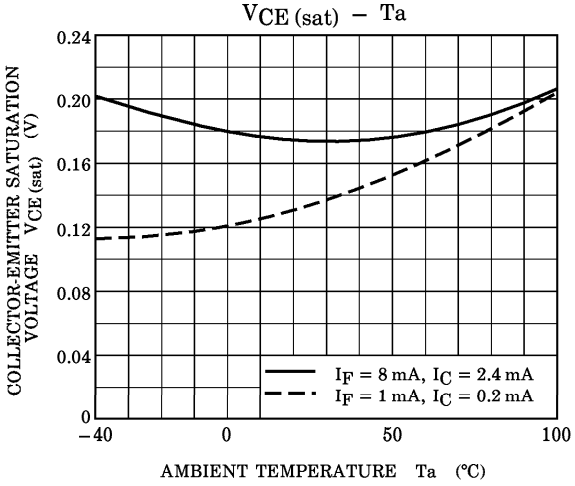
$I_{CEO} - Ta$



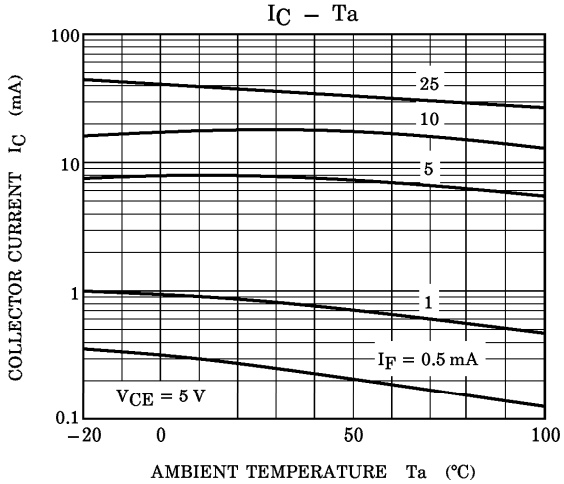
$I_C / I_F - I_F$



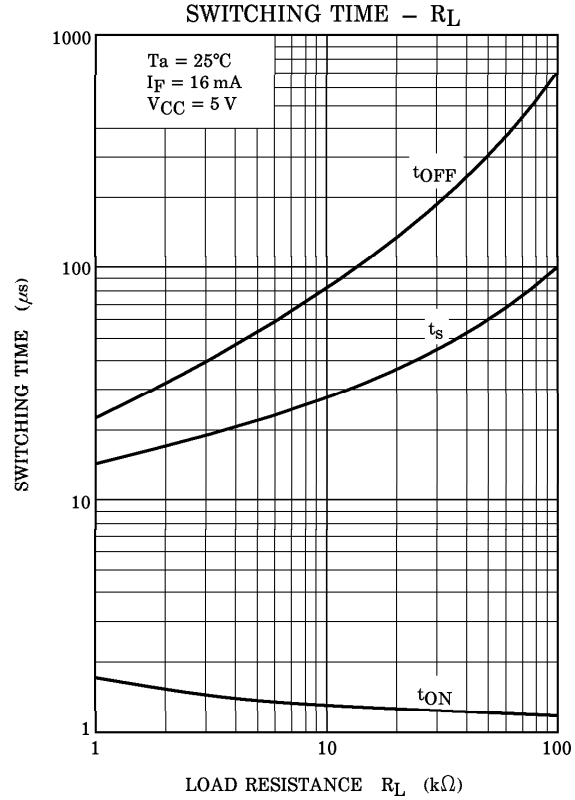
$V_{CE\,(sat)}$ – Ta



I_C – Ta



SWITCHING TIME – R_L



SWITCHING TIME – Ta

