

TENTATIVE

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP280, TLP280-4

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

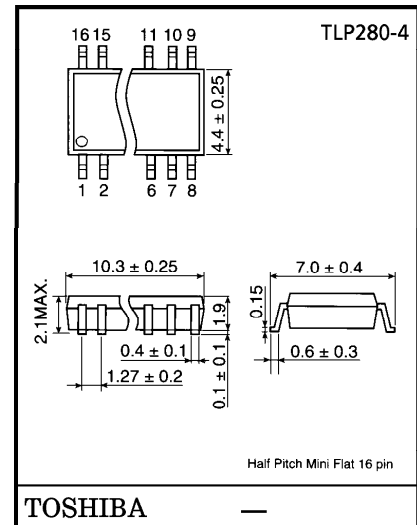
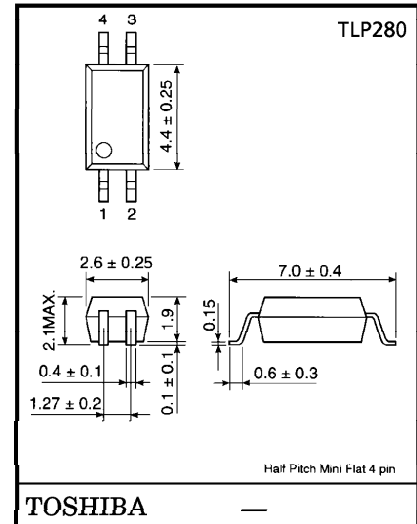
PC CARD MODEM (PCMCIA)

TLP280 and TLP280-4 is a very small and thin coupler, suitable for surface mount assembly in applications such as PCMCIA Fax modem, programmable controllers.

TLP280 and TLP280-4 consist of photo transistor, optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel, and can operate directly by AC input current

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

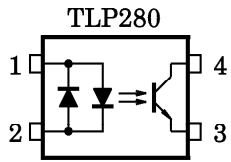
Unit in mm



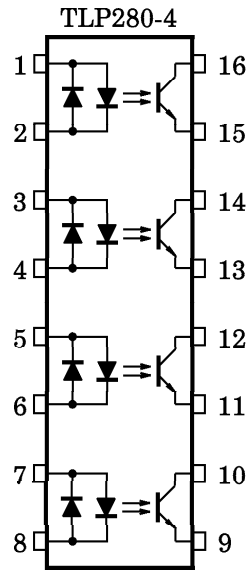
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PIN CONFIGURATION (Top view)



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



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

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			TLP280	TLP280-4	
LED	Forward Current	I_F (RMS)	± 50		mA
	Forward Current Derating	$\Delta I_F / ^\circ\text{C}$	-0.7 (Ta $\geq 53^\circ\text{C}$)	-0.5 (Ta $\geq 25^\circ\text{C}$)	mA / $^\circ\text{C}$
	Pulse Forward Current	I_{FP}	± 1 (100 μs pulse, 100pps)		A
	Junction Temperature	T_j	125		$^\circ\text{C}$
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 $\geq 25^\circ\text{C}$) (1 Circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / $^\circ\text{C}$
	Junction Temperature	T_j	125		$^\circ\text{C}$
	Storage Temperature Range	T_{stg}	$-55 \sim 125$		$^\circ\text{C}$
Operating Temperature Range	T_{opr}	$-55 \sim 100$		$^\circ\text{C}$	
Lead Soldering Temperature	T_{sol}	260 (10s)		$^\circ\text{C}$	
Total Package Power Dissipation (1 Circuit)	P_T	200	170	mW	
Total Package Power Dissipation Derating (Ta $\geq 25^\circ\text{C}$) (1 Circuit)	$\Delta P_T / ^\circ\text{C}$	-2.0	-1.7	mW / $^\circ\text{C}$	
Isolation Voltage (Note)	BV_S	2500 (AC, 1min., R.H. $\leq 60\%$)		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 = ±10mA	1.0	1.15	1.3	V
	Capacitance	C _T	V = 0, f = 1MHz	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	V _{(BR) CEO}	I _C = 0.5mA	80	—	—	V
	Emitter-Collector Breakdown Voltage	V _{(BR) ECO}	I _E = 0.1mA	7	—	—	V
	Collector Dark Current (Note 1)	I _{CEO}	V _{CE} = 48V, Ambient Light Below (100 lx)	—	0.01 (2)	0.1 (10)	μA
			V _{CE} = 48V, Ta = 85°C Ambient Light Below (100 lx)	—	2 (4)	50 (50)	μA
Capacitance (Collector to Emitter)	C _{CE}	V = 0, f = 1MHz	—	10	—	pF	

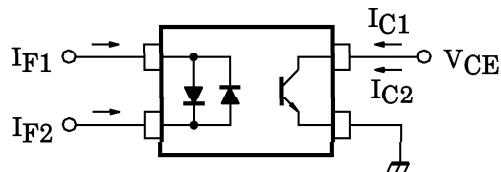
(Note 1) Because of the construction, leak current might be increased by ambient light.
Please use photocoupler with less ambient light.

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I _C / I _F	I _F = ±5mA, V _{CE} = 5V Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	I _C / I _F (sat)	I _F = ±1mA, V _{CE} = 0.4V Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	V _{CE} (sat)	I _C = 2.4mA, I _F = ±8mA I _C = 0.2mA, I _F = ±1mA Rank GB	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off-State Collector Current	I _C (off)	V _F = ±0.7V, V _{CE} = 48V	—	—	10	μA
CTR Symmetry	I _C (ratio)	I _C (I _F = -5mA) / I _C (I _F = 5mA) (Note 2)	0.33	—	3	—

(Note 2)

$$I_C \text{ (ratio)} = \frac{I_{C2} (I_F = I_{F2}, V_{CE} = 5V)}{I_{C1} (I_F = I_{F1}, V_{CE} = 5V)}$$



ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	C _S	V _S =0V, f=1MHz	—	0.8	—	pF
Isolation Resistance	R _S	V _S =500V, 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} = 10V, I _C = 2mA R _L = 100Ω	—	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 = 1.9kΩ (Fig.1) V _{CC} = 5V, I _F = ±16mA	—	2	—	μs
Storage Time	t _s		—	25	—	
Turn-Off Time	t _{OFF}		—	40	—	

(Fig.1) SWITCHING TIME TEST CIRCUIT

