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: 80 V (min)

• Current transfer ratio: 50% (min)

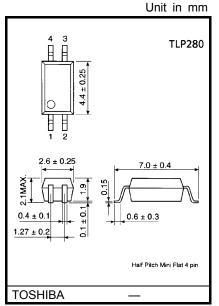
Rank GB: 100% (min)

• Isolation voltage: 2500 Vrms (min)

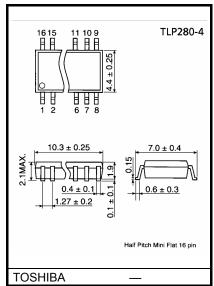
• UL recognized: UL1577, file No. E67349

• BSI approved: BS EN 60065: 2002,

BS EN 60950-1: 2002 Certificate No. 8143, 8144

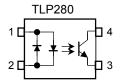


Weight: 0.05 g

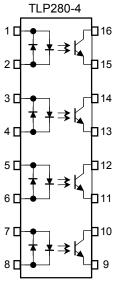


Weight: 0.19 g

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



Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rat	Unit		
	Characteristic	Symbol	TLP280	TLP280-4	Offic	
	Forward current	I _{F(RMS)}	±50		mA	
LED	Forward current derating	ΔI _F /°C	-0.7 (Ta ≥ 53°C) $-0.5 (Ta ≥ 25°C)$		mA /°C	
	Pulse forward current	I _{FP}	±1 (100µs pulse, 100pps)		Α	
	Junction temperature	Tj	125		°C	
	Collector-emitter voltage	V _{CEO}	80		V	
	Emitter-collector voltage	V _{ECO}	7	7		
'n	Collector current	IC	50		mA	
Detector	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	Tj	125		°C	
Storage temperature range		T _{stg}	−55~125		°C	
Operating temperature range		T _{opr}	−55~100		°C	
Lead soldering temperature		T _{sol}	260 (10s)		°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)		BVS	2500 (AC, 1min., R.H.≤ 60%)		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): 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	Тур	Max	Unit
LED	Forward voltage	V _F	I _F = ±10 mA	1.0	1.15	1.3	V
	Capacitance	C _T	V = 0, f = 1 MHz	_	60	_	pF
	Collector–emitter breakdown voltage	V _(BR) CEO	I _C = 0.5 mA	80	_	1	٧
Detector	Emitter-collector breakdown voltage	V _(BR) ECO	I _E = 0.1 mA	7	_	-	٧
	Collector dark current (Note 1)	ICEO	V _{CE} = 48 V, Ambient light below (100 1x)	_	0.01 (2)	0.1 (10)	μΑ
			V _{CE} = 48 V, Ta = 85°C Ambient light below (100 1x)		2 (4)	50 (50)	μΑ
	Capacitance (collector to emitter)	C _{CE}	V = 0, f = 1 MHz	_	10		pF

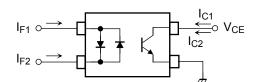
(Note 1): Because of the construction, leak current might be increased by ambient light. Please use photocoupler with less ambient light.

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	MIn	Тур.	Max	Unit
Current transfer ratio	I _C / I _F	$I_F = \pm 5$ mA, $V_{CE} = 5$ V Rank GB	50	_	600	- %
			100	_	600	
Saturated CTR	I _C / I _{F (sat)}	IF = ±1 mA, V _{CE} = 0.4 V Rank GB	_	60	_	- %
			30	_	_	
		I _C = 2.4 mA, I _F = ±8 mA	_	_	0.4	
Collector–emitter saturation voltage	V _{CE} (sat)	I_C = 0.2 mA, I_F = ±1 mA Rank GB	-	0.2	_	V
			_	_	0.4	
Off-state collector current	I _{C(off)}	V _F = ± 0.7 V, V _{CE} = 48 V	_	_	10	μΑ
CTR symmetry	I _{C (ratio)}	$I_C (I_F = -5 \text{ mA}) / I_C (I_F = 5 \text{ mA})$ (Note 2)	0.33	_	3	_

(Note 2):

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





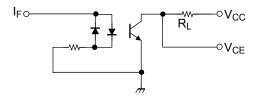
Isolation Characteristics (Ta = 25°C)

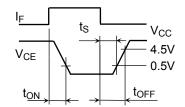
Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Capacitance input to output	Cs	V _S = 0V, f = 1 MHz	_	0.8	_	pF
Isolation resistance	R _S	V _S = 500 V, R.H.≤ 60%	5×10 ¹⁰	10 ¹⁴	_	Ω
		AC, 1 minute	2500	_	_	- V _{rms}
Isolation voltage	BVS	AC, 1 second, in oil	_	5000	_	
		DC, 1 minute, in oil	_	5000	_	V _{dc}

Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Rise time	t _r		_	2	_	
Fall time	t _f	V _{CC} = 10 V, I _C = 2 mA	_	3	_	μs
Turn-on time	t _{on}	$R_L = 100\Omega$	_	3	_	
Turn-off time	t _{off}		_	3	_	
Turn-on time	t _{ON}		_	2	_	
Storage time	ts	$R_L = 1.9 \text{ k}\Omega$ (Fig.1) $V_{CC} = 5 \text{ V}, I_F = \pm 16 \text{ mA}$	_	25	_	μs
Turn-off time	toff	7 1	_	40	_	

(Fig. 1): Switching time test circuit





3000

1000

300

100

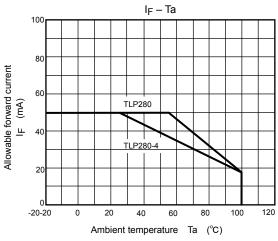
50 30

10

10

윤 500

Pulse forward current

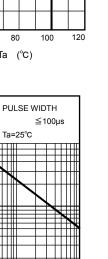


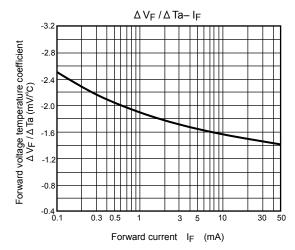
 $\mathsf{I}_{FP}-\mathsf{D}_R$

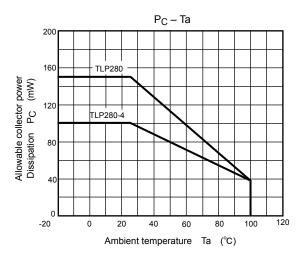
Duty cycle ratio DR

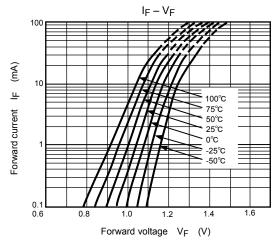
Ta=25°C

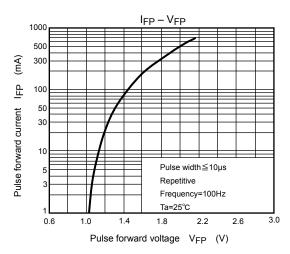
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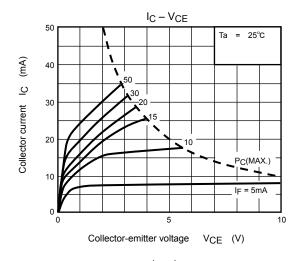


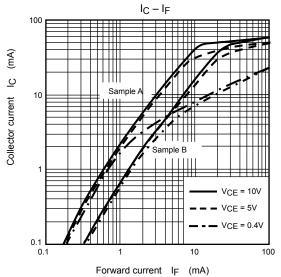


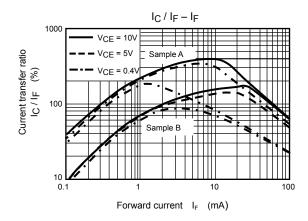


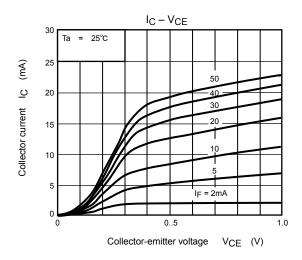


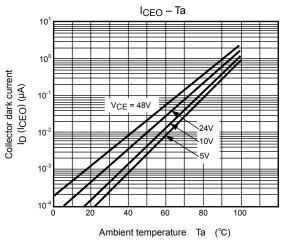


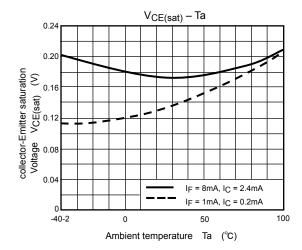


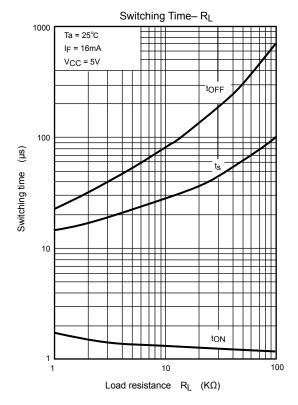


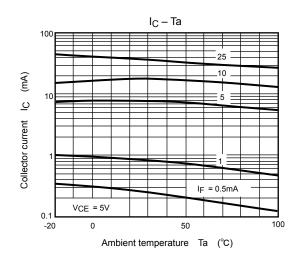


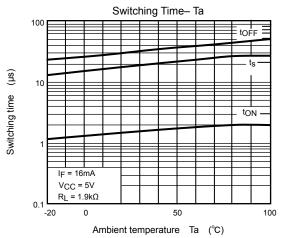












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