

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP180

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

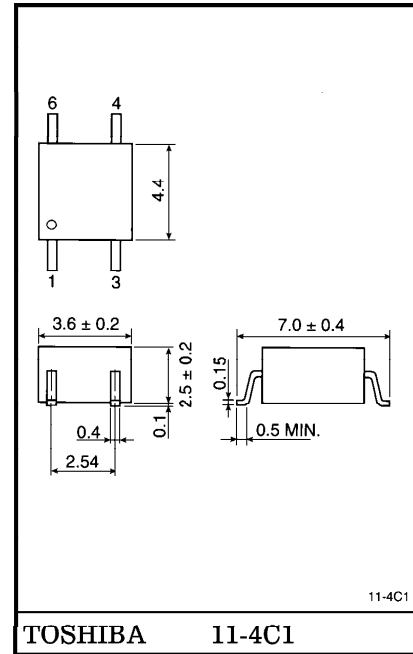
TELECOMMUNICATION

The TOSHIBA MINI FLAT COUPLER TLP180 is a small outline coupler, suitable for surface mount assembly.

TLP180 consist of a photo transistor, optically coupled to a gallium arsenide infrared emitting diode connected inverse parallel, and can operate directly by AC input current.

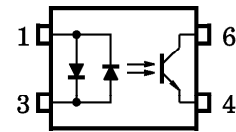
- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)
Rank GB : 100% (Min.)
- Isolation Voltage : 3750V_{rms} (Min.)
- UL Recognized : UL1577, File No. E67349

Unit in mm



Weight : 0.09g

PIN CONFIGURATION (TOP VIEW)



- 1 : ANODE, CATHODE
- 3 : CATHODE, ANODE
- 4 : EMITTER
- 6 : COLLECTOR

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MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I _F (RMS)	±50	mA
	Forward Current Derating (Ta ≥ 53°C)	ΔI _F / °C	−0.7	mA / °C
	Pulse Forward Current (Note 1)	I _{FP}	±1	A
	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
	Power Dissipation	P _C	150	mW
	Power Dissipation Derating (Ta ≥ 25°C)	ΔP _C / °C	−1.5	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 (10s)		T _{sol}	260	°C
Total Package Power Dissipation		P _T	200	mW
Total Package Power Dissipation Derating (Ta ≥ 25°C)		ΔP _T / °C	−2.0	mW / °C
Isolation Voltage (AC, 1 min., R.H. ≤ 60%) (Note 2)		BV _S	3750	V _{rms}

Note 1 : Pulse width ≤ 100 μs, f = 100 Hz

Note 2 : Device considered a two terminal device : Pins 1 and 3 shorted together and 4 and 6 shorted together.

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V _{CC}	—	5	48	V
Forward Current	I _F (RMS)	—	16	20	mA
Collector Current	I _C	—	1	10	mA
Operating Temperature	T _{opr}	−25	—	85	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

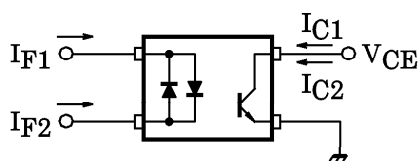
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	$I_F = \pm 10\text{mA}$	1.0	1.15	1.3	V
	Capacitance	C_T	$V = 0, f = 1\text{MHz}$	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	I_{CEO}	$V_{CE} = 48\text{V}$ (Ambient Light) (Below 1000 lx) (Note 3)	—	0.01 (2)	0.1 (10)	μA
			$V_{CE} = 48\text{V}$ (Ambient Light) $T_a = 85^\circ\text{C}$ (Below 1000 lx) (Note 3)	—	2 (4)	50 (50)	μA
	Capacitance (Collector to Emitter)	C_{CE}	$V = 0, f = 1\text{MHz}$	—	10	—	pF

Note 3 : Please use standard electric lamp to light up the device's marking surface.

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$	—	—	0.4	V
		$I_C = 0.2\text{mA}, I_F = \pm 1\text{mA}$ Rank GB	—	0.2	—	
			—	—	0.4	
Off-State Collector Current	$I_C (\text{off})$	$V_F = \pm 0.7\text{V}, V_{CE} = 48\text{V}$	—	1	10	μA
CTR Symmetry	$I_C (\text{ratio})$	$I_C (I_F = -5\text{mA}) / I_C (I_F = 5\text{mA})$ (Note 4)	0.33	1	3	—

$$\text{Note 4 : } I_C (\text{ratio}) = \frac{I_{C2} (I_F = I_{F2}, V_{CE} = 5\text{V})}{I_{C1} (I_F = I_{F1}, V_{CE} = 5\text{V})}$$



ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	CS	VS=0V, f=1MHz	—	0.8	—	pF
Isolation Resistance	RS	VS=500V, R.H.≤ 60%	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation Voltage	BVS	AC, 1 minute	3750	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

SWICHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	tr	VCC=10V, IC=2mA RL=100Ω	—	2	—	μs
Fall Time	tf		—	3	—	
Turn-On Time	ton		—	3	—	
Turn-Off Time	toff		—	3	—	
Turn-On Time	tON	RL=1.9kΩ (Fig.1) VCC=5V, IF=±16mA	—	2	—	μs
Storage Time	ts		—	25	—	
Turn-Off Time	tOFF		—	40	—	

Fig.1 : Switching time test circuit

