

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP180

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

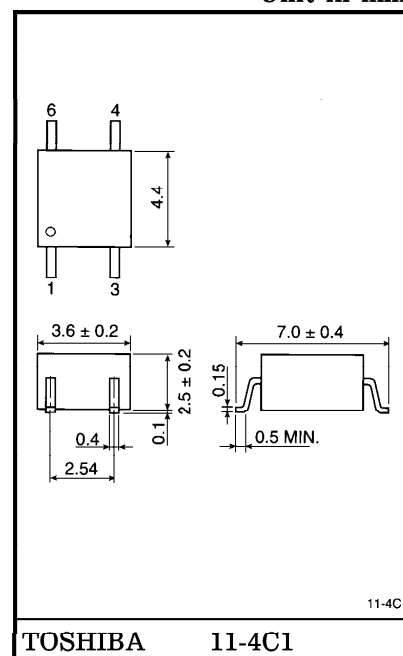
TELECOMMUNICATION

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.

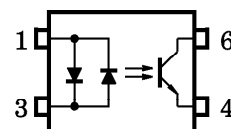
- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)
Rank GB : 100% (Min.)
- Isolation Voltage : 3750V_{rms} (Min.)
- UL Recognized : UL1577, File No. E67349

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)

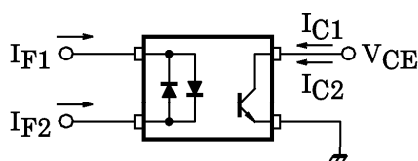
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V _F	I _F = ±10mA	1.0	1.15	1.3	V
	Capacitance	C _T	V = 0, f = 1MHz	—	60	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	V (BR) CEO	I _C = 0.5mA	80	—	—	V
	Emitter-Collector Breakdown Voltage	V (BR) ECO	I _E = 0.1mA	7	—	—	V
	Collector Dark Current	I _{CEO}	V _{CE} = 48V (Ambient Light) Below 1000 lx (Note 3)	—	0.01 (2)	0.1 (10)	μA
			V _{CE} = 48V (Ambient Light) Ta = 85°C Below 1000 lx (Note 3)	—	2 (4)	50 (50)	μA
	Capacitance (Collector to Emitter)	C _{CE}	V = 0, f = 1MHz	—	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 = ±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	—	—	0.4	V
		I _C = 0.2mA, I _F = ±1mA Rank GB	—	0.2	—	
			—	—	0.4	
Off-State Collector Current	I _C (off)	V _F = ±0.7V, V _{CE} = 48V	—	1	10	μA
CTR Symmetry	I _C (ratio)	I _C (I _F = -5mA) / I _C (I _F = 5mA) (Note 4)	0.33	1	3	—

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



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	$V_S = 500V, R.H. \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	3750	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V_{dc}

SWICHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	$V_{CC} = 10V, I_C = 2mA$ $R_L = 100\Omega$	—	2	—	μs
Fall Time	t_f		—	3	—	
Turn-On Time	t_{on}		—	3	—	
Turn-Off Time	t_{off}		—	3	—	
Turn-On Time	t_{ON}	$R_L = 1.9k\Omega$ (Fig.1) $V_{CC} = 5V, I_F = \pm 16mA$	—	2	—	μs
Storage Time	t_s		—	25	—	
Turn-Off Time	t_{OFF}		—	40	—	

Fig.1 : Switching time test circuit

