TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP180

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

TELECOMMUNICATION

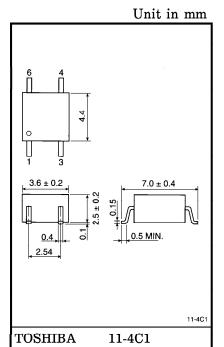
The TOSHIBA MINI FLAT COUPLER TLP180 is a small outline coupler, suitable for surface mount assembly.

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.)

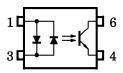
Isolation Voltage : 3750V_{rms} (Min.)

UL Recognized : UL1577, File No. E67349



Weight: 0.09g

PIN CONFIGURATION (TOP VIEW)



1: ANODE, CATHODE 3: CATHODE, ANODE

4 : EMITTER 6 : COLLECTOR

961001EBC2

TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

The products described in this document are subject to foreign exchange and foreign trade control laws.

The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of TOSHIBA CORPORATION or others.

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
	Forward Current	I _F (RMS)	±50	mA
Ü	Forward Current Detating (Ta≥53°C)	ΔI _F /°C	-0.7	mA/°C
LED	Pulse Forward Current (Note	1) I _{FP}	±1	A
	Junction Temperature	$T_{\rm j}$	125	°C
	Collector-Emitter Voltage	v_{CEO}	80	V
E E	Emitter-Collector Voltage	v_{ECO}	7	V
DETECTOR	Collector Current	$\mathbf{I}_{\mathbf{C}}$	50	mA
LEC	Power Dissipation	$P_{\mathbf{C}}$	150	mW
DE.	Power Dissipation Derating (Ta≥25°C)	$\Delta P_{\mathbf{C}} / {^{\circ}\mathbf{C}}$	-1.5	mW/°C
	Junction Temperature	$\mathrm{T_{j}}$	125	°C
Sto	rage Temperature Range	${ m T_{stg}}$	-55~125	°C
Оре	erating Temperature Range	$T_{ m opr}$	-55~100	°C
Lea	d Soldering Temperature (10s)	T_{sol}	260	°C
Tot	al Package Power Dissipation	P_{T}	200	mW
Tot	al Package Power Dissipation Derating (Ta≥25°C)	$\Delta P_{\mathrm{T}}/^{\circ}\mathrm{C}$	-2.0	mW/°C
Isol	ation Voltage (AC, 1 min., R.H.≤60%) (Note	2) BV _S	3750	V _{rms}

Note 1 : Pulse width \leq 100 μ s, f=100Hz

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	$I_{\mathbf{C}}$	_	1	10	mA
Operating Temperature	$T_{ m opr}$	-25	_	85	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

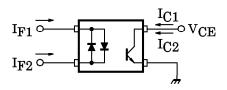
	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	$V_{\mathbf{F}}$	$I_{ extbf{F}} = \pm 10 \text{mA}$	1.0	1.15	1.3	V
TE	Capacitance	$\mathbf{c_T}$	V=0, f=1MHz		60	_	pF
	Collector-Emitter Breakdown Voltage	V (BR) CEO	$I_{ m C}\!=\!0.5{ m mA}$	80	_	_	V
٠,	Emitter-Collector Breakdown Voltage	V (BR) ECO	$I_{ extbf{E}}\!=\!0.1 ext{mA}$	7	_	_	V
DETECTOR	Collector Dark Current I _{CEO}	I a a	V _{CE} =48V (Ambient Light Below 1000 lx (Note 3)	_	0.01 (2)	0.1 (10)	μ A
		1CEO	V _{CE} =48V Ta=85°C (Ambient Light) Below 1000 lx (Note 3)	_	2 (4)	50 (50)	μ A
	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	$I_F = \pm 5 \text{mA}, \ V_{CE} = 5 \text{V}$	50	_	600	%
Current Transfer Ratio		Rank GB	100	_	600	70
Saturated CTR	IC/IF(sat)	$I_F = \pm 1 \text{mA}, V_{CE} = 0.4 \text{V}$	_	60		%
		Rank GB	30	_	_	70
		$I_C=2.4$ mA, $I_F=\pm 8$ mA	_	_	0.4	
Collector-Emitter Saturation Voltage	V _{CE} (sat)	$V_{CE (sat)} I_{C} = 0.2 \text{mA}, I_{F} = \pm 1 \text{mA}$	_	0.2	_	V
Voltage		Rank GB	_	_	0.4	
Off-State Collector Current	I _{C (off)}	$V_F = \pm 0.7V, V_{CE} = 48V$	_	1	10	μ A
CTR Symmetry	I _{C (ratio)}	$I_{C} (I_{F} = -5\text{mA})/I_{C} (I_{F} = 5\text{mA})$ (Note 4)	0.33	1	3	

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	$c_{\mathbf{S}}$	$V_S=0V, f=1MHz$	_	0.8	_	pF
Isolation Resistance	$R_{\mathbf{S}}$	V _S =500V, R.H.≤60%	5×10^{10}	10^{14}		Ω
		AC, 1 minute	3750	50 —	_	37
Isolation Voltage	$\mathrm{BV}_{\mathbf{S}}$	AC, 1 second, in oil	a oil — 10000	10000	_	$V_{ m rms}$
		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	$V_{\rm CC}$ =10V, $I_{\rm C}$ =2mA $R_{\rm L}$ =100 Ω	_	2	_	
Fall Time	t_f		_	3		
Turn-On Time	ton		_	3	_	μ s
Turn-Off Time	t _{off}		_	3	_	
Turn-On Time	toN	D 1010 (E: 1)	_	2	_	
Storage Time	t_s	$R_L = 1.9 \text{k}\Omega$ (Fig.1) $V_{CC} = 5 \text{V}, I_F = \pm 16 \text{mA}$	_	25		μ s
Turn-Off Time	tOFF		_	40	_	

Fig.1: Switching time test circuit

