

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

# TLP126

PROGRAMMABLE CONTROLLERS

AC/DC-INPUT MODULE

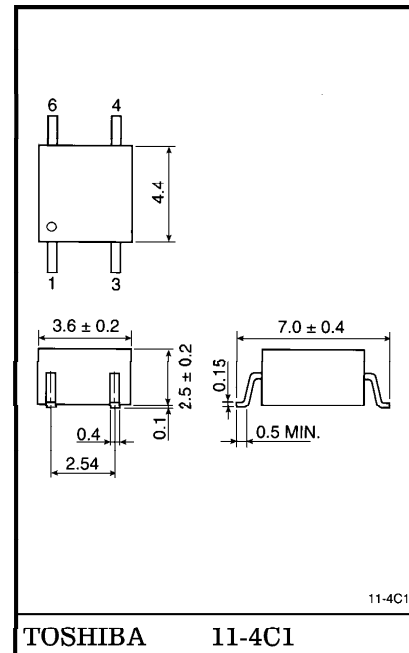
TELECOMMUNICATION

The TOSHIBA MINI FLAT COUPLER TLP126 is a small outline coupler, suitable for surface mount assembly.

TLP126 consists of a photo transistor, optically coupled to a gallium arsenide infrared emitting diode connected inverse parallel, and provides high CTR at low AC input current.

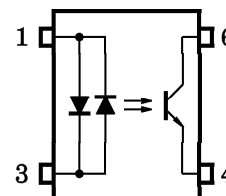
- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 100% (Min.)
- Isolation Voltage : 3750Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

Unit in mm



Weight : 0.09g

**PIN CONFIGURATIONS (TOP VIEW)**



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

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● 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.

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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)Δ	$\Delta I_F / ^\circ C$	-0.7	mA / °C
	Peak Forward Current (100μs pulse, 100pps)	$I_{FP}$	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
	Peak Collector Current (10ms pulse, 100pps)	$I_{CP}$	100	mA
	Power Dissipation	$P_C$	150	mW
	Power Dissipation Derating (Ta ≥ 25°C)	$\Delta P_C / ^\circ C$	-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 (10 sec.)		$T_{sold}$	260	°C
Total Package Power Dissipation		$P_T$	200	mW
Total Package Power Dissipation Derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ C$	-2.0	mW / °C
Isolation Voltage (AC, 1 min., RH ≤ 60%) (Note 1)		$BV_S$	3750	Vrms

(Note 1) 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	$I_{F(RMS)}$	—	1.6	20	mA
Collector Current	$I_C$	—	1	10	mA
Operating Temperature	$T_{opr}$	-25	—	75	°C

## INDIVIDUAL 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	$I_{CEO}$	$V_{CE} = 48\text{V}$	—	10	100	nA
			$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
Capacitance Collector to Emitter	$C_{CE}$	$V = 0, f = 1\text{MHz}$	—	12	—	pF	

## COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	$I_C / I_F$	$I_F = \pm 1\text{mA}, V_{CE} = 0.5\text{V}$	100	—	1200	%
Low Input CTR	$I_C / I_{F(\text{low})}$	$I_F = \pm 0.5\text{mA}, V_{CE} = 1.5\text{V}$	50	—	—	%
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_C = 0.5\text{mA}, I_F = \pm 1\text{mA}$	—	—	0.4	V
		$I_C = 1\text{mA}, I_F = \pm 1\text{mA}$	—	0.2	—	
Off-State Collector Current	$I_{C(\text{off})}$	$V_F = \pm 0.7\text{V}, V_{CE} = 48\text{V}$	—	1	10	$\mu\text{A}$
CTR Symmetry	$I_{C(\text{ratio})}$	$I_C (I_F = -1\text{mA}) / I_C (I_F = 1\text{mA})$	0.3	—	3	—

## COUPLED ELECTRICAL CHARACTERISTICS (Ta = -25~75°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	$I_C / I_F$	$I_F = 1\text{mA}, V_{CE} = 0.5\text{V}$	50	—	—	%
Low Input CTR	$I_C / I_{F(\text{low})}$	$I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$	—	50	—	%

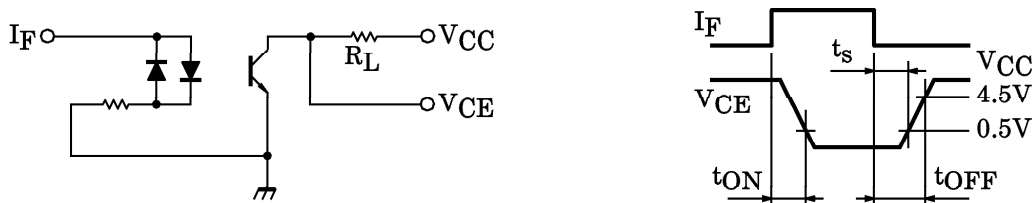
ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	C <sub>S</sub>	V <sub>S</sub> =0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> =500V	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 1 minute	3750	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dC</sub>

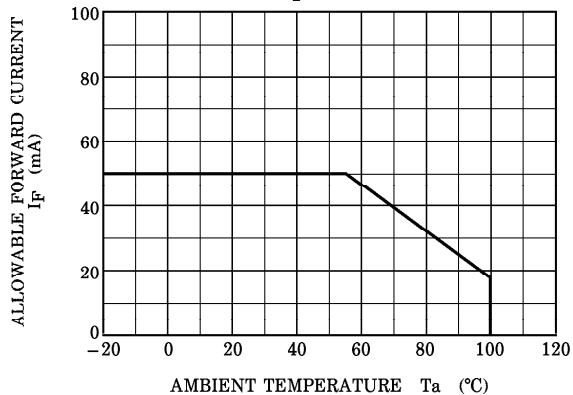
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t <sub>r</sub>	V <sub>CC</sub> =10V, I <sub>C</sub> =2mA R <sub>L</sub> =100Ω	—	8	—	μs
Fall Time	t <sub>f</sub>		—	8	—	
Turn-on Time	t <sub>on</sub>		—	10	—	
Turn-off Time	t <sub>off</sub>		—	8	—	
Turn-on Time	t <sub>ON</sub>	R <sub>L</sub> =4.7kΩ (Fig.1) V <sub>CC</sub> =5V, I <sub>F</sub> =±1.6mA	—	10	—	μs
Storage Time	t <sub>S</sub>		—	50	—	
Turn-off Time	t <sub>OFF</sub>		—	300	—	

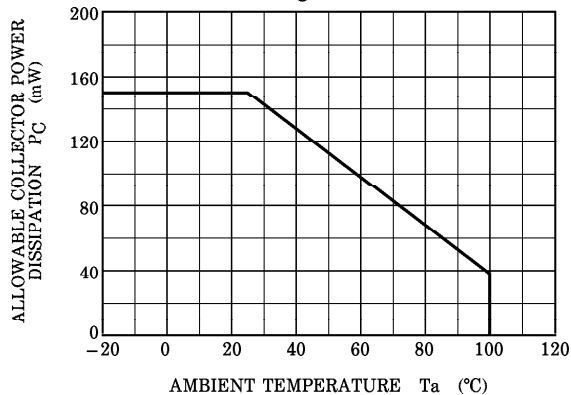
Fig.1 SWITCHING TIME TEST CIRCUIT



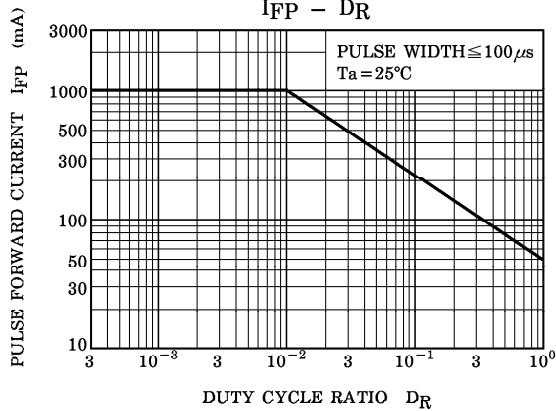
$I_F - T_a$



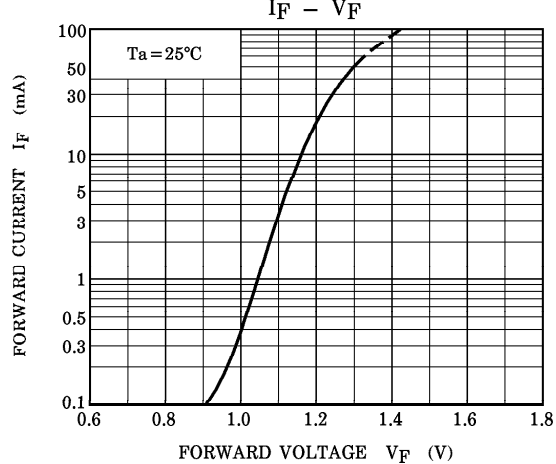
$P_C - T_a$



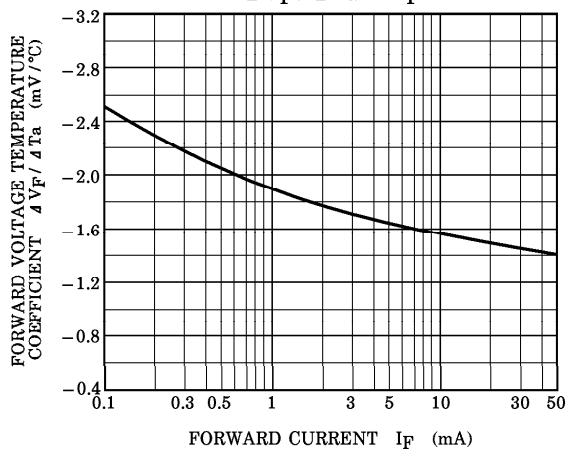
$I_{FP} - D_R$



$I_F - V_F$



$\Delta V_F / \Delta T_a - I_F$



$I_{FP} - V_{FP}$

