

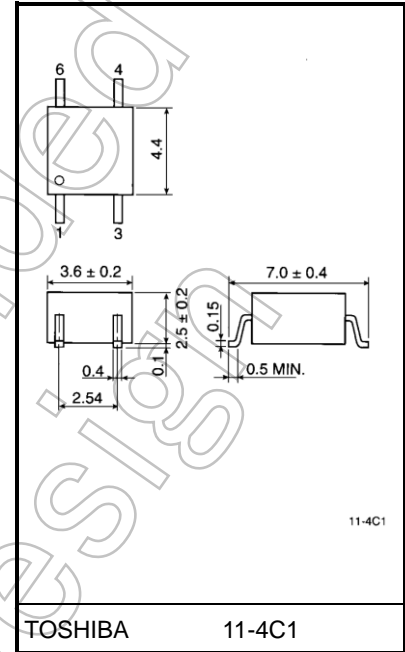
# TLP126

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 two gallium arsenide infrared emitting diodes connected inverse parallel, and provides high CTR at low AC input current.

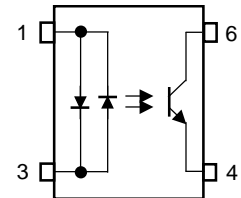
- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 100% (min)
- Isolation voltage: 3750 Vrms (min)
- UL recognized: UL1577, file No. E67349
- c-UL approved :CSA Component Acceptance Service  
 No. 5A, File No.E67349

Unit: mm



Weight: 0.09 g (typ.)

### Pin Configurations (top view)



- 1 : Anode, Cathode
- 3 : Cathode, Anode
- 4 : Emitter
- 6 : Collector

Start of commercial production  
 1988-04

## Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I <sub>F(RMS)</sub>	50	mA
	Forward current derating (Ta ≥ 53°C)	ΔI <sub>F</sub> /°C	-0.7	mA/°C
	Peak forward current (100 μs pulse, 100 pps)	I <sub>FP</sub>	1	A
	Diode power dissipation	P <sub>D</sub>	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	ΔP <sub>D</sub> /°C	-1.39	mW/°C
	Junction temperature	T <sub>j</sub>	125	°C
Detector	Collector-emitter voltage	V <sub>CEO</sub>	80	V
	Emitter-collector voltage	V <sub>ECO</sub>	7	V
	Collector current	I <sub>C</sub>	50	mA
	Peak collector current (10 ms pulse, 100 pps)	I <sub>CP</sub>	100	mA
	Power dissipation	P <sub>C</sub>	150	mW
	Power dissipation derating (Ta ≥ 25°C)	ΔP <sub>C</sub> /°C	-1.5	mW/°C
	Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range		T <sub>stg</sub>	-55 to 125	°C
Operating temperature range		T <sub>opr</sub>	-55 to 100	°C
Lead soldering temperature (10 s)		T <sub>sol</sub>	260	°C
Total package power dissipation		P <sub>T</sub>	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔP <sub>T</sub> /°C	-2.0	mW/°C
Isolation voltage (AC, 60 s, R.H. ≤ 60%) (Note 1)		BV <sub>S</sub>	3750	V <sub>rms</sub>

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 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 <sub>CC</sub>	—	5	48	V
Forward current	I <sub>F(RMS)</sub>	—	1.6	20	mA
Collector current	I <sub>C</sub>	—	1	10	mA
Operating temperature	T <sub>opr</sub>	-25	—	75	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

## Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V <sub>F</sub>	I <sub>F</sub> = ±10 mA	1.0	1.15	1.3	V
	Capacitance	C <sub>T</sub>	V = 0 V, f = 1 MHz	—	60	—	pF
Detector	Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 0.5 mA	80	—	—	V
	Emitter-collector breakdown voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 0.1 mA	7	—	—	V
	Collector dark current	I <sub>CEO</sub>	V <sub>CE</sub> = 48 V	—	10	100	nA
			V <sub>CE</sub> = 48 V, Ta = 85°C	—	2	50	μA
Capacitance collector to emitter	C <sub>CE</sub>	V = 0 V, f = 1 MHz	—	12	—	pF	

## Coupled Electrical Characteristics (Ta = 25°C)

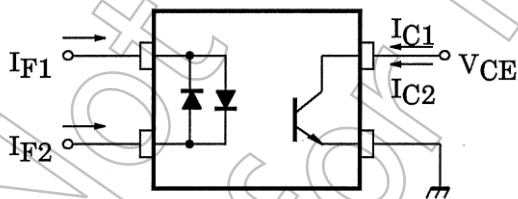
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I <sub>C</sub> /I <sub>F</sub>	I <sub>F</sub> = ±1 mA, V <sub>CE</sub> = 0.5 V	100	—	1200	%
Low input CTR	I <sub>C</sub> /I <sub>F(low)</sub>	I <sub>F</sub> = ±0.5 mA, V <sub>CE</sub> = 1.5 V	50	—	—	%
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 0.5 mA, I <sub>F</sub> = ±1 mA	—	—	0.4	V
		I <sub>C</sub> = 1 mA, I <sub>F</sub> = ±1 mA	—	0.2	—	
Off-state collector current	I <sub>C(off)</sub>	V <sub>F</sub> = ±0.7 V, V <sub>CE</sub> = 48 V	—	1	10	μA
CTR symmetry	I <sub>C(ratio)</sub>	I <sub>C</sub> (I <sub>F</sub> = -1 mA) / I <sub>C</sub> (I <sub>F</sub> = 1 mA) (Note 2)	0.3	—	3	—

## Coupled Electrical Characteristics (Ta = -25 to 75°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I <sub>C</sub> /I <sub>F</sub>	I <sub>F</sub> = ±1 mA, V <sub>CE</sub> = 0.5 V	50	—	—	%
Low input CTR	I <sub>C</sub> /I <sub>F(low)</sub>	I <sub>F</sub> = ±0.5 mA, V <sub>CE</sub> = 1.5 V	—	50	—	%

Note 2:

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



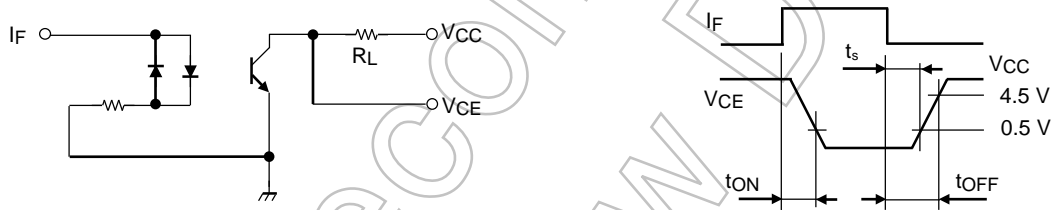
**Isolation characteristics (Ta = 25°C)**

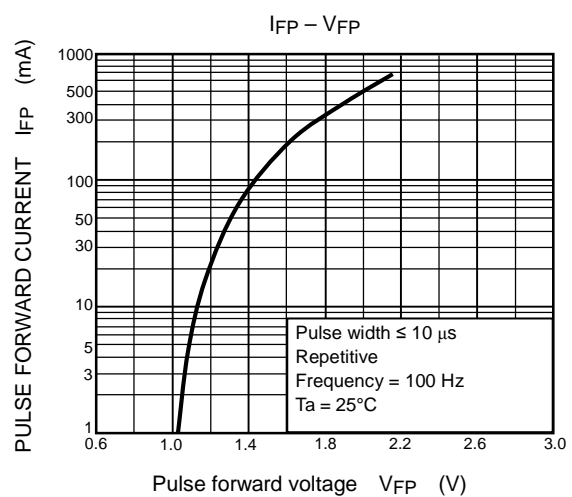
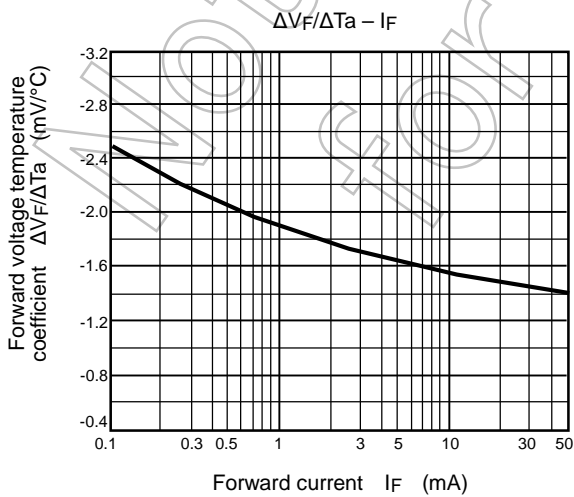
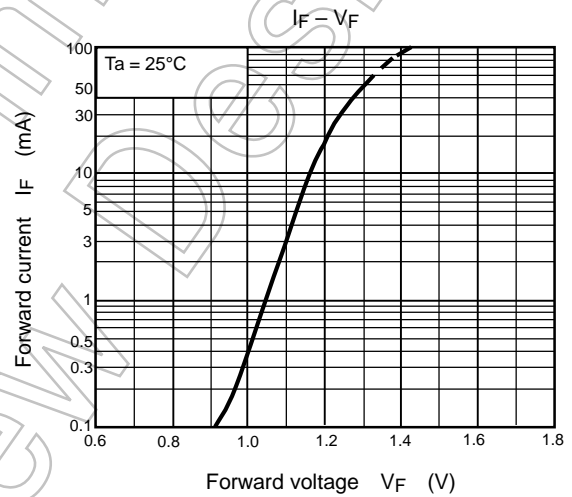
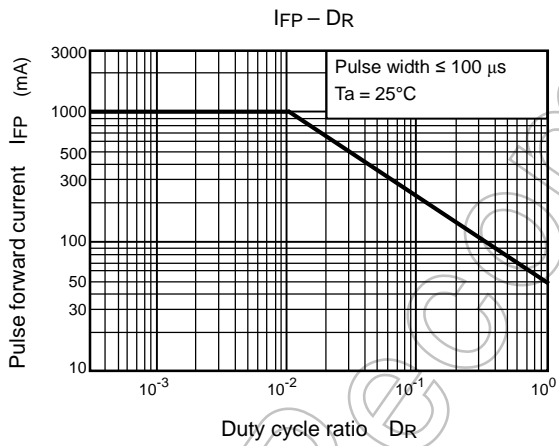
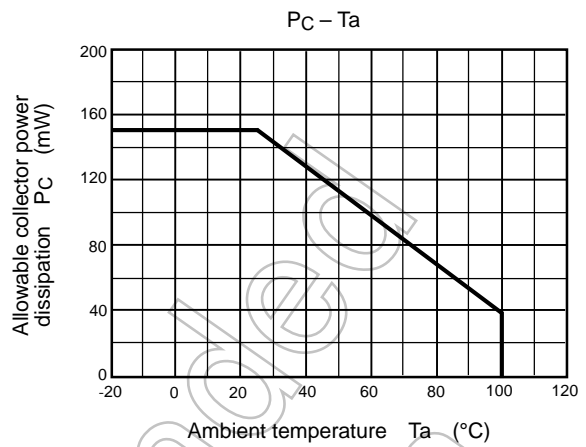
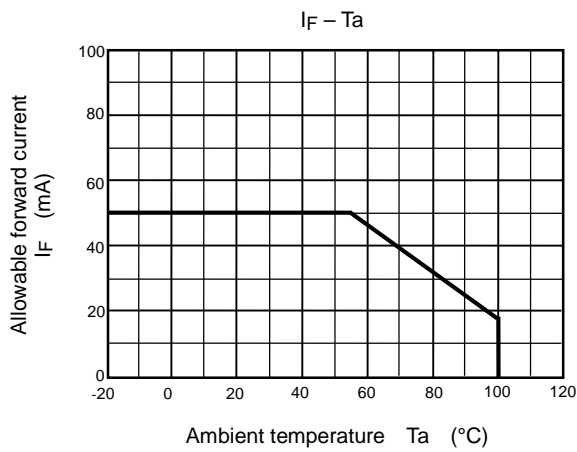
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	Cs	Vs = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	Rs	Vs = 500 V, R.H. ≤ 60%	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BVs	AC, 60 s	3750	—	—	Vrms
		AC, 1 s, in oil	—	10000	—	
		DC, 60 s, in oil	—	10000	—	Vdc

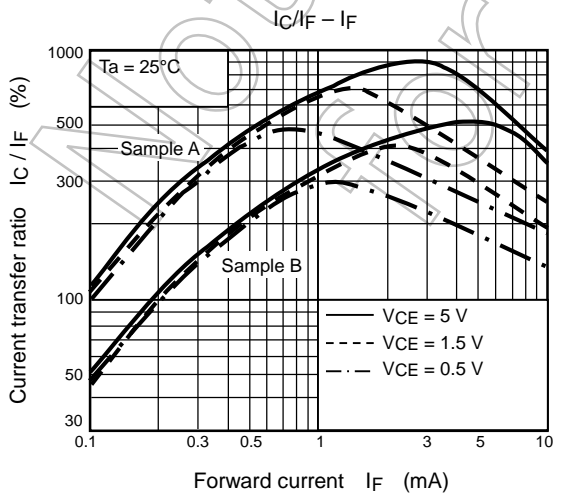
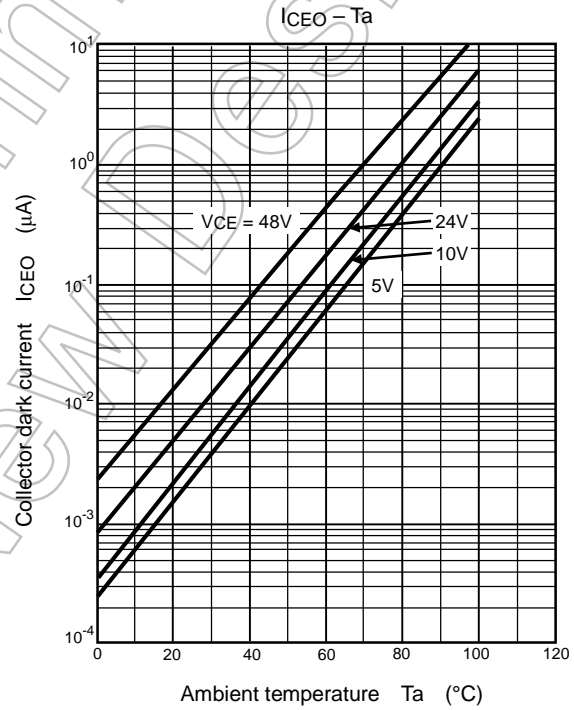
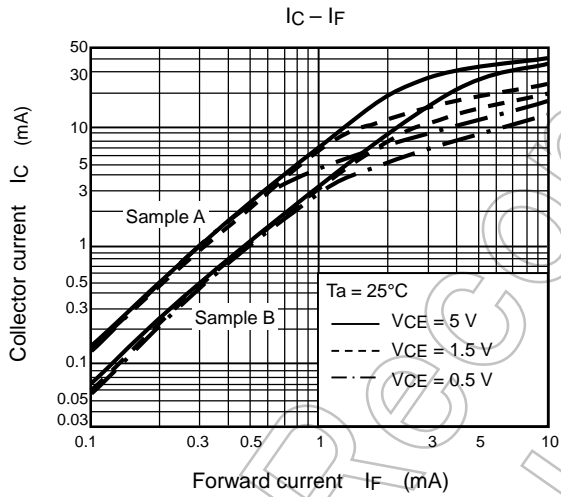
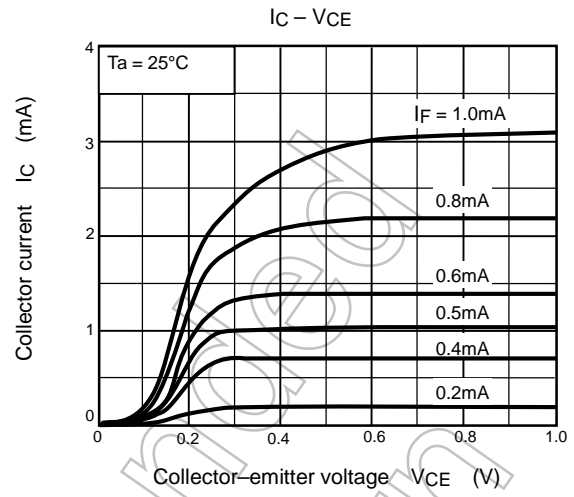
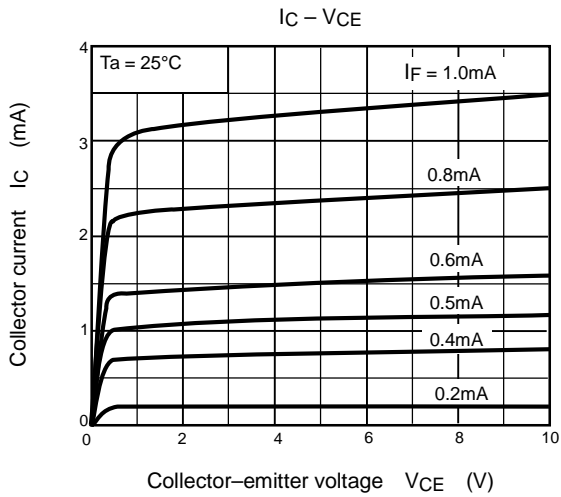
**Switching Characteristics (Ta = 25°C)**

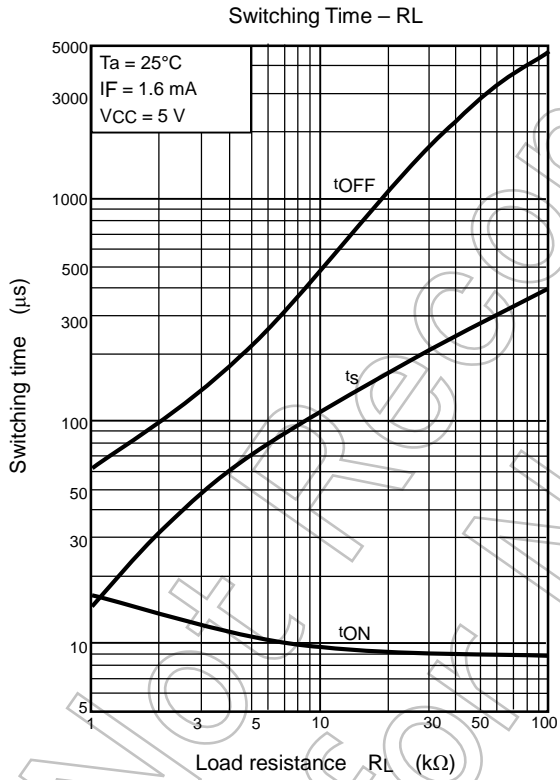
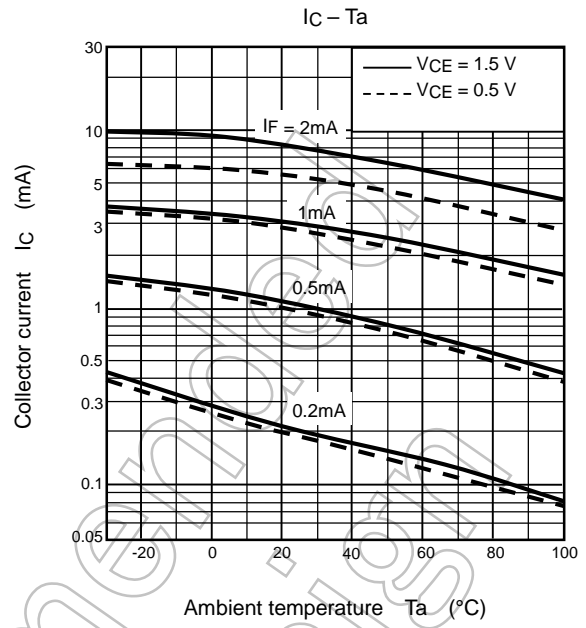
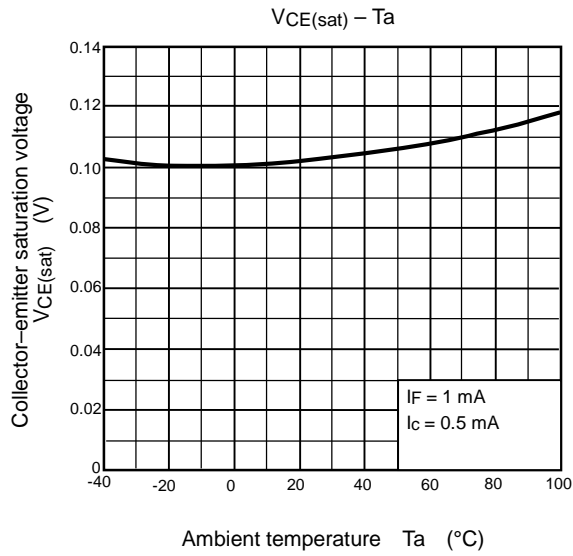
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	tr	VCC = 10 V, IC = 2 mA RL = 100Ω	—	8	—	μs
Fall time	tf		—	8	—	
Turn-on time	ton		—	10	—	
Turn-off time	toff		—	8	—	
Turn-on time	tON	VCC = 5 V, IF = ±1.6 mA RL = 4.7 kΩ (Fig.1)	—	10	—	μs
Storage time	ts		—	50	—	
Turn-off time	tOFF		—	300	—	

Fig. 1 Switching time test circuit









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