

TLP126

Programmable Controllers

AC / DC-Input Module

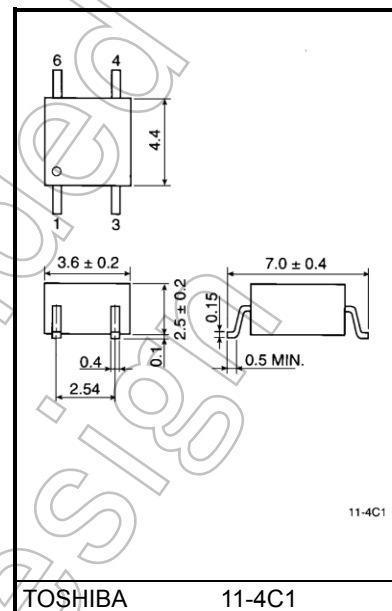
Telecommunication

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

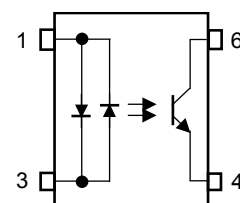
- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 100% (min)
- Isolation voltage: 3750 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
File No.E67349

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)

Characteristics		Symbol	Rating	Unit
LED	Forward current	$I_{F(RMS)}$	50	mA
	Forward current derating (Ta ≥ 53°C)	$\Delta I_F/^\circ\text{C}$	-0.7	mA/°C
	Peak forward current (100 μs pulse, 100 pps)	I_{FP}	1	A
	Diode power dissipation	P_D	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	$\Delta P_D/^\circ\text{C}$	-1.39	mW/°C
	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 (10 ms pulse, 100 pps)	I_{CP}	100	mA
	Power dissipation	P_C	150	mW
	Power dissipation derating (Ta ≥ 25°C)	$\Delta P_C/^\circ\text{C}$	-1.5	mW/°C
	Junction temperature	T_j	125	°C
Storage temperature range		T_{stg}	-55 to 125	°C
Operating temperature range		T_{opr}	-55 to 100	°C
Lead soldering temperature (10 s)		T_{sol}	260	°C
Total package power dissipation		P_T	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		$\Delta P_T/^\circ\text{C}$	-2.0	mW/°C
Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1)		BVS	3750	Vrms

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

Characteristics	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

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)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V _F	I _F = ±10 mA	1.0	1.15	1.3	V
	Capacitance	C _T	V = 0 V, f = 1 MHz	—	60	—	pF
Detector	Collector-emitter breakdown voltage	V _(BR) CEO	I _C = 0.5 mA	80	—	—	V
	Emitter-collector breakdown voltage	V _(BR) ECO	I _E = 0.1 mA	7	—	—	V
	Collector dark current	I _{CEO}	V _{CE} = 48 V	—	10	100	nA
			V _{CE} = 48 V, Ta = 85 °C	—	2	50	μA
	Capacitance collector to emitter	C _{CE}	V = 0 V, f = 1 MHz	—	12	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

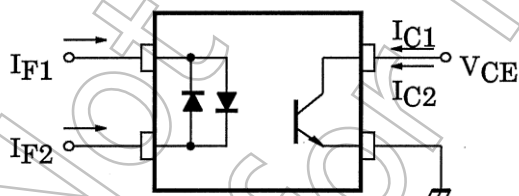
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I _C /I _F	I _F = ±1 mA, V _{CE} = 0.5 V	100	—	1200	%
Low input CTR	I _C /I _{F(low)}	I _F = ±0.5 mA, V _{CE} = 1.5 V	50	—	—	%
Collector-emitter saturation voltage	V _{CE(sat)}	I _C = 0.5 mA, I _F = ±1 mA	—	—	0.4	V
		I _C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

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I _C /I _F	I _F = ±1 mA, V _{CE} = 0.5 V	50	—	—	%
Low input CTR	I _C /I _{F(low)}	I _F = ±0.5 mA, V _{CE} = 1.5 V	—	50	—	%

Note 2:

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



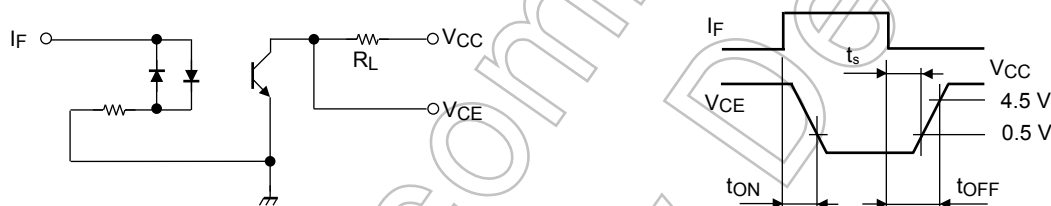
Isolation characteristics (Ta = 25°C)

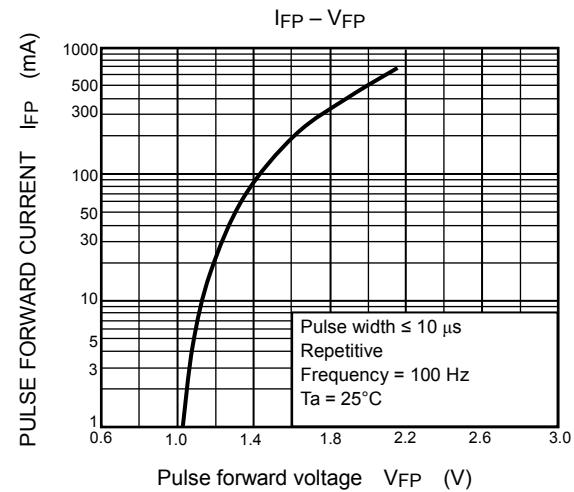
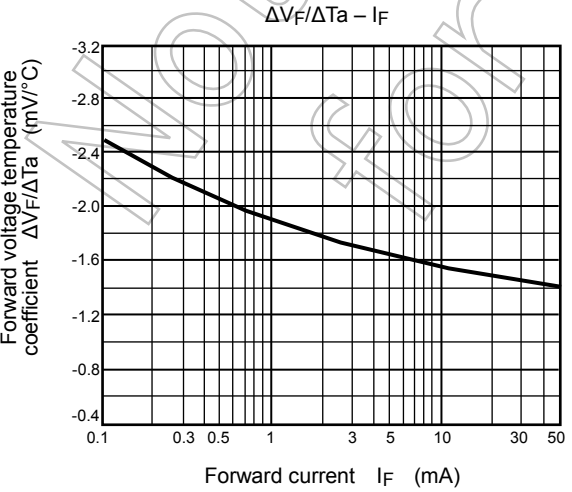
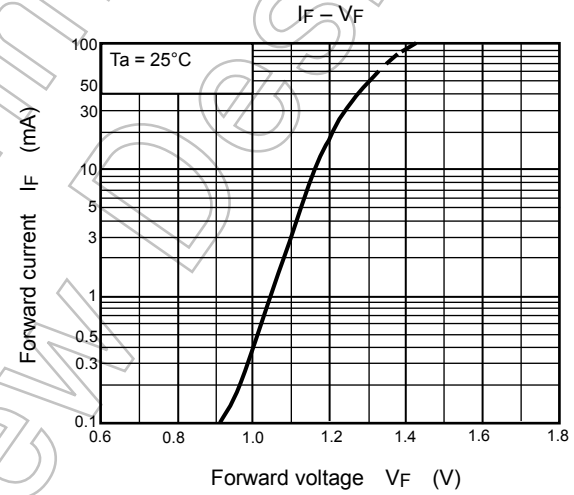
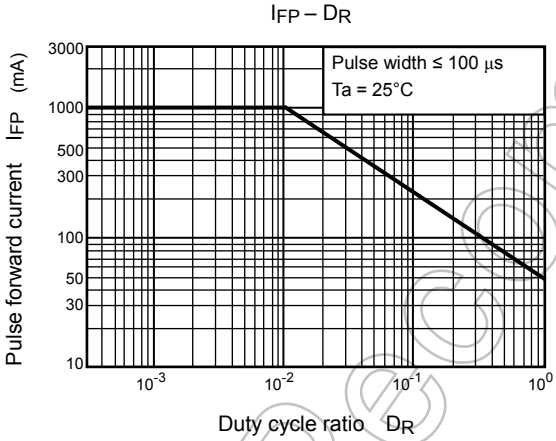
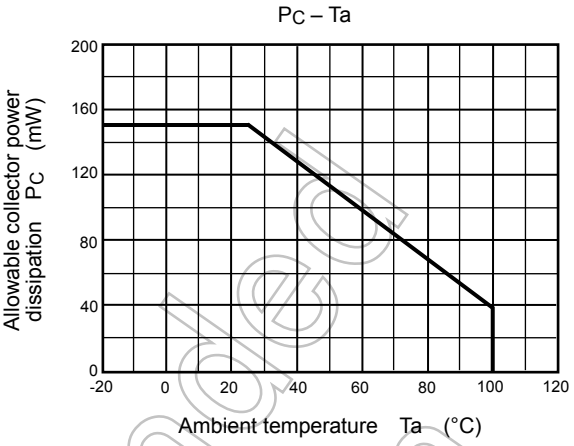
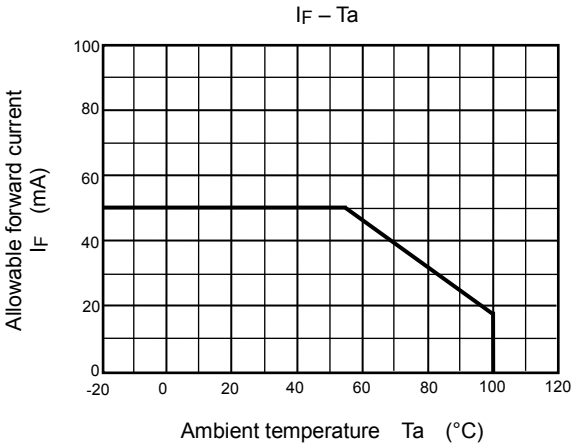
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C _S	V _S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500 V, R.H. ≤ 60 %	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 60 s	3750	—	—	Vrms

Switching Characteristics (Ta = 25°C)

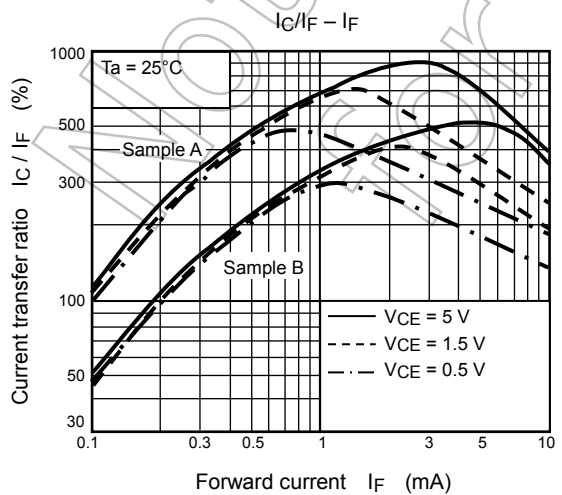
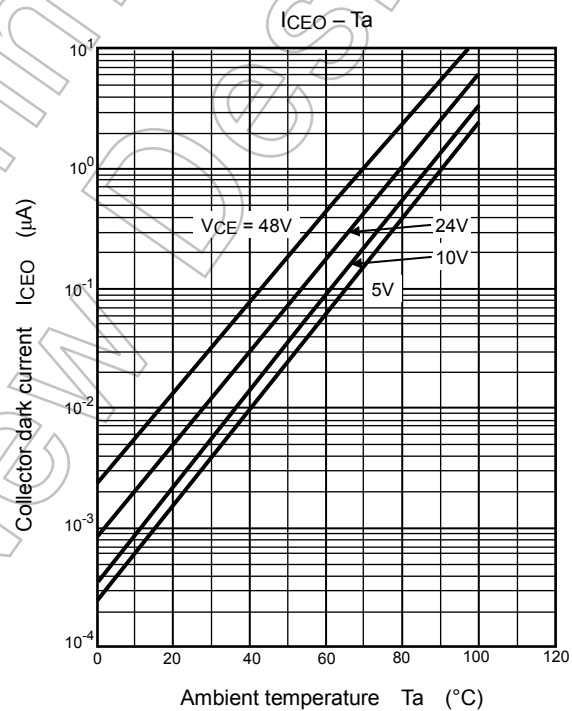
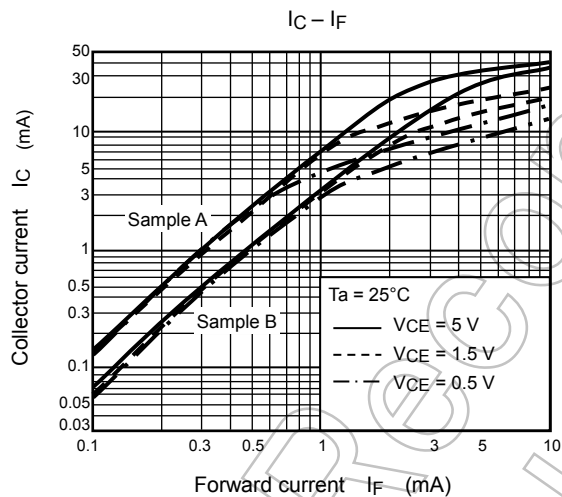
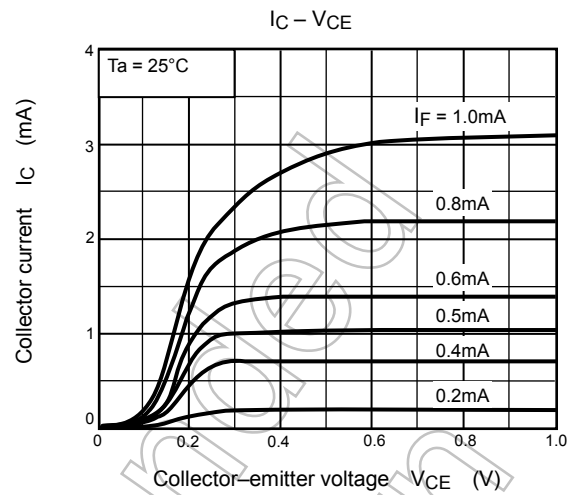
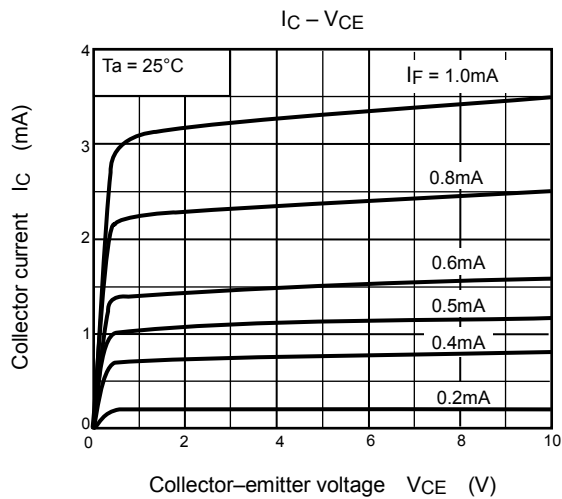
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t _r	V _{CC} = 10 V, I _C = 2 mA R _L = 100Ω	—	8	—	μs
Fall time	t _f		—	8	—	
Turn-on time	t _{on}		—	10	—	
Turn-off time	t _{off}		—	8	—	
Turn-on time	t _{ON}	V _{CC} = 5 V, I _F = ±1.6 mA R _L = 4.7 kΩ (Fig.1)	—	10	—	μs
Storage time	t _s		—	50	—	
Turn-off time	t _{OFF}		—	300	—	

Fig. 1 Switching time test circuit

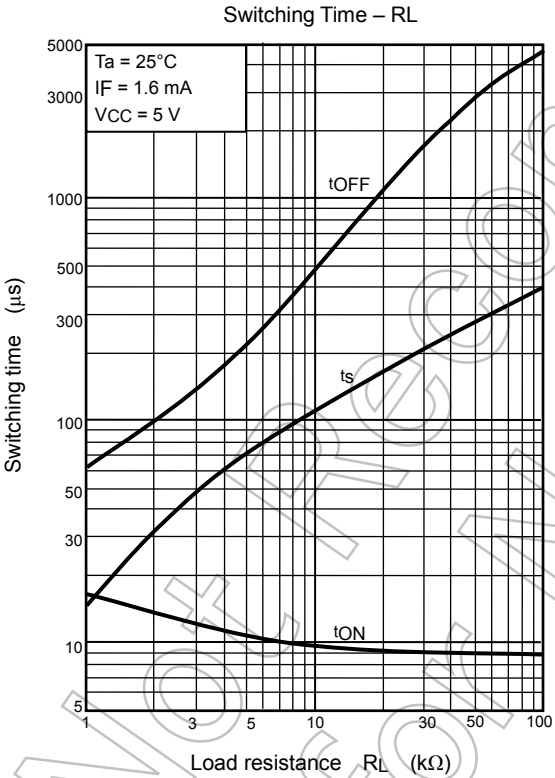
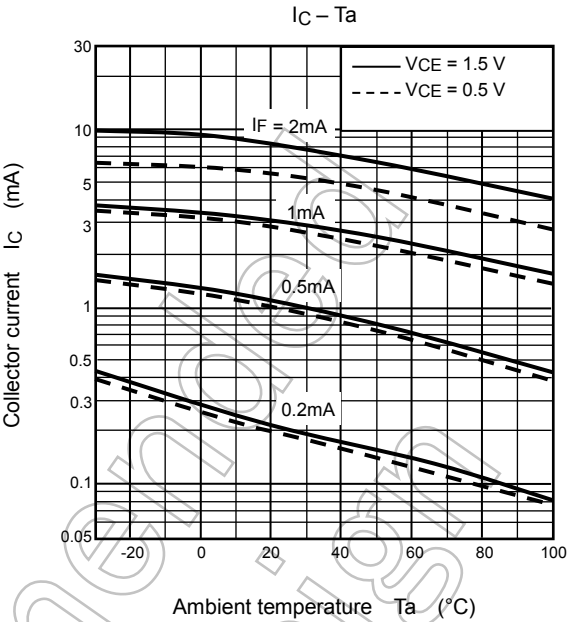
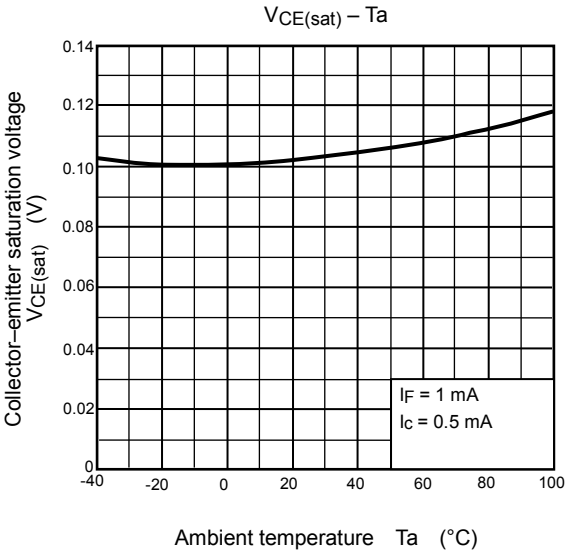




NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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