

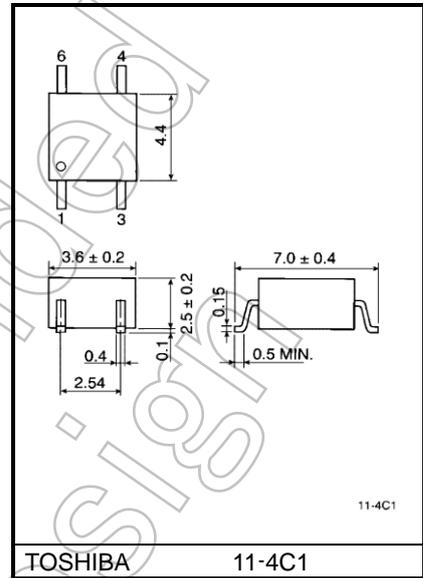
# TLP124

Programmable Controllers  
 AC / DC-Input Module  
 Solid-State Relays

Unit: mm

The TOSHIBA mini flat coupler TLP124 is a small outline coupler, suitable for surface mount assembly. TLP124 consists of a photo transistor optically coupled to an infrared emitting diode.

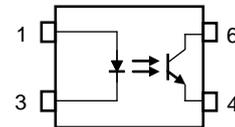
- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 100% (min)  
 Rank BV: 200% (min)
- Isolation voltage: 3750 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A  
 File No.E67349



TOSHIBA 11-4C1

Weight: 0.09g (typ.)

### Pin Configurations (top view)



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

Start of commercial production  
 1988-04

## Current Transfer Ratio

Classification (Note 1)	Current Transfer Ratio (min)			Marking of Classification
	Ta = 25°C		Ta = -25 to 75°C	
	If = 1 mA VCE = 0.5 V	If = 0.5 mA VCE = 1.5 V	If = 1 mA VCE = 0.5 V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, Blank

Note 1: Ex, rank BV: TLP124(BV)

Note: Application type name for certification test, please use standard product type name, i. e.  
TLP124(BV): TLP124

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

Characteristics		Symbol	Rating	Unit
LED	Forward current	If	50	mA
	Forward current derating (Ta ≥ 53°C)	ΔIf/°C	-0.7	mA/°C
	Peak forward current (100 μs pulse, 100 pps)	Ifp	1	A
	Reverse voltage	VR	5	V
	Diode power dissipation	PD	100	mW
	Diode power dissipation derating (Ta ≥ 53°C)	ΔPD/°C	-1.39	mW/°C
	Junction temperature	Tj	125	°C
Detector	Collector-emitter voltage	VCEO	80	V
	Emitter-collector voltage	VECO	7	V
	Collector current	IC	50	mA
	Peak collector current (10 ms pulse, 100 pps)	ICP	100	mA
	Power dissipation	PC	150	mW
	Power dissipation derating (Ta ≥ 25°C)	ΔPC/°C	-1.5	mW/°C
	Junction temperature	Tj	125	°C
Storage temperature range	Tstg	-55 to 125	°C	
Operating temperature range	Topr	-55 to 100	°C	
Lead soldering temperature (10 s)	Tsol	260	°C	
Total package power dissipation	PT	200	mW	
Total package power dissipation derating (Ta ≥ 25°C)	ΔPT/°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: Pins1, 3 shorted together and pins 4, 6 shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{CC}$	—	5	48	V
Forward current	$I_F$	—	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	$V_F$	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse Current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	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
			$V_{CE} = 48 \text{ V}, T_a = 85 \text{ °C}$	—	2	50	$\mu\text{A}$
Capacitance collector to emitter	$C_{CE}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	12	—	pF	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	$I_C/I_F$	$I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$ Rank BV	100	—	1200	%
			200	—	1200	
Low input CTR	$I_C/I_F(\text{low})$	$I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$ Rank BV	50	—	—	%
			100	—	—	
Collector-emitter saturation voltage	$V_{CE(\text{sat})}$	$I_C = 0.5 \text{ mA}, I_F = 1 \text{ mA}$ $I_C = 1 \text{ mA}, I_F = 1 \text{ mA}$ Rank BV	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off-state collector current	$I_{C(\text{off})}$	$V_F = 0.7 \text{ V}, V_{CE} = 48 \text{ V}$	—	—	10	$\mu\text{A}$

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

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	$I_C/I_F$	$I_F = 1 \text{ mA}, V_{CE} = 0.5 \text{ V}$ Rank BV	50	—	—	%
			100	—	—	%
Low input CTR	$I_C/I_F(\text{low})$	$I_F = 0.5 \text{ mA}, V_{CE} = 1.5 \text{ V}$ Rank BV	—	50	—	%
			—	100	—	%

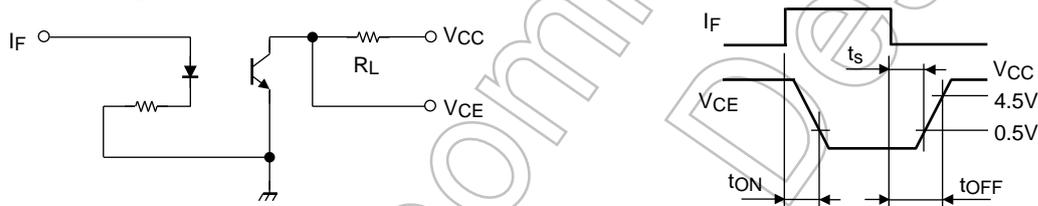
### Isolation Characteristics (Ta = 25°C)

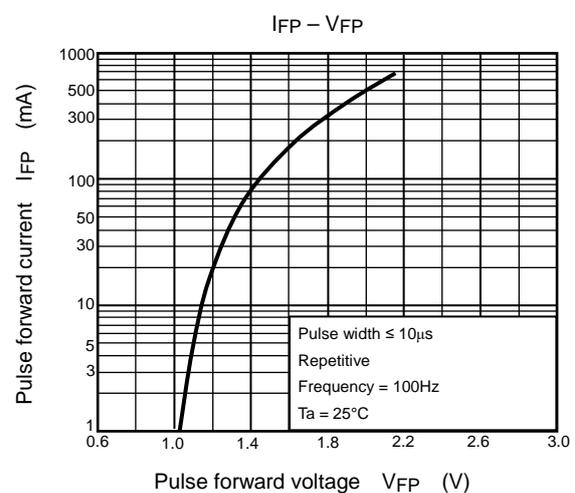
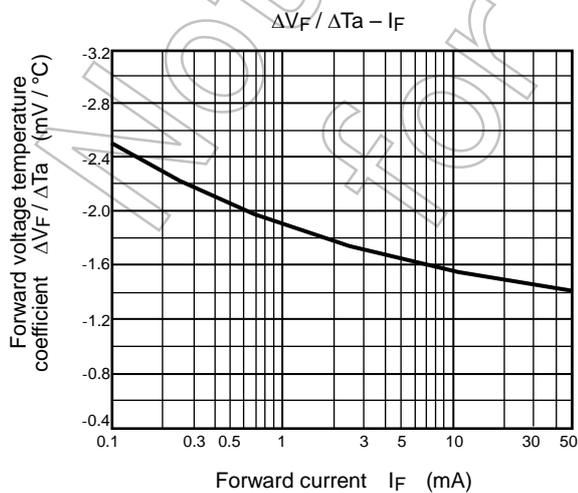
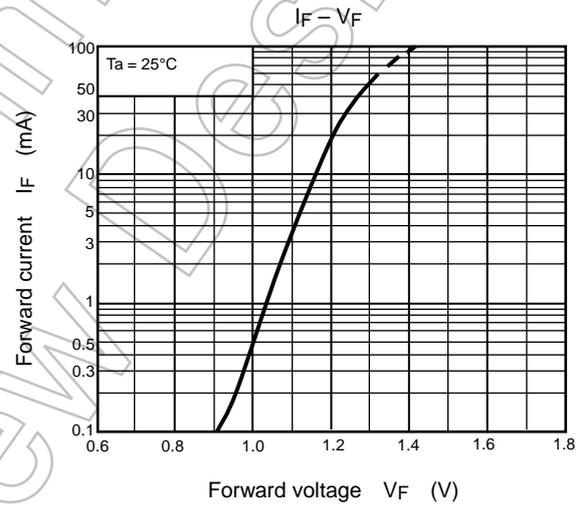
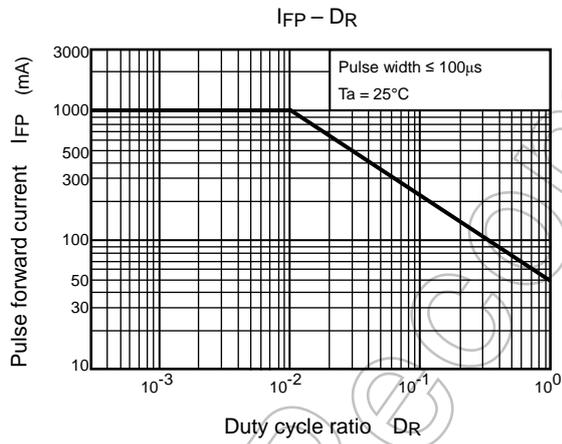
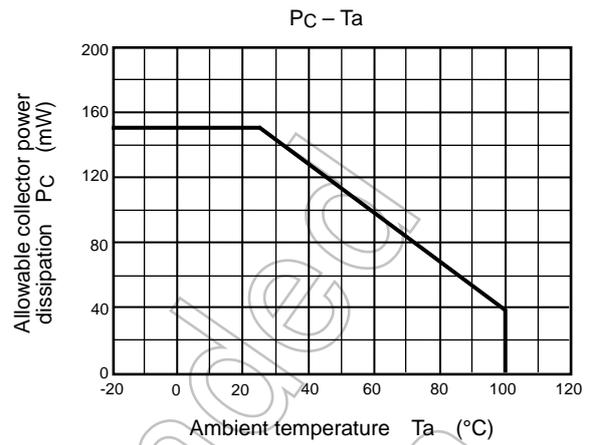
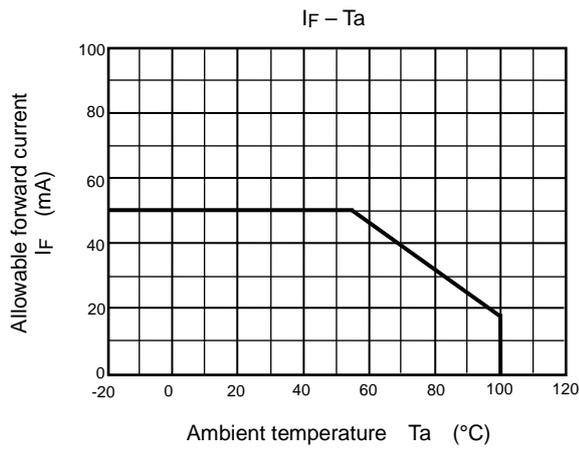
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	Cs	V <sub>S</sub> = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500 V, R.H. ≤ 60 %	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 60 s	3750	—	—	V <sub>rms</sub>

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

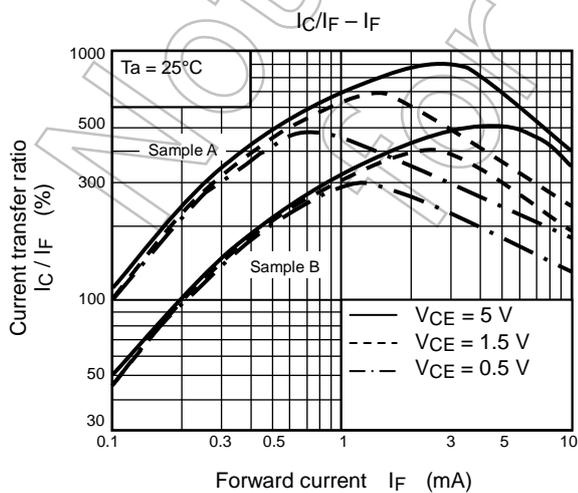
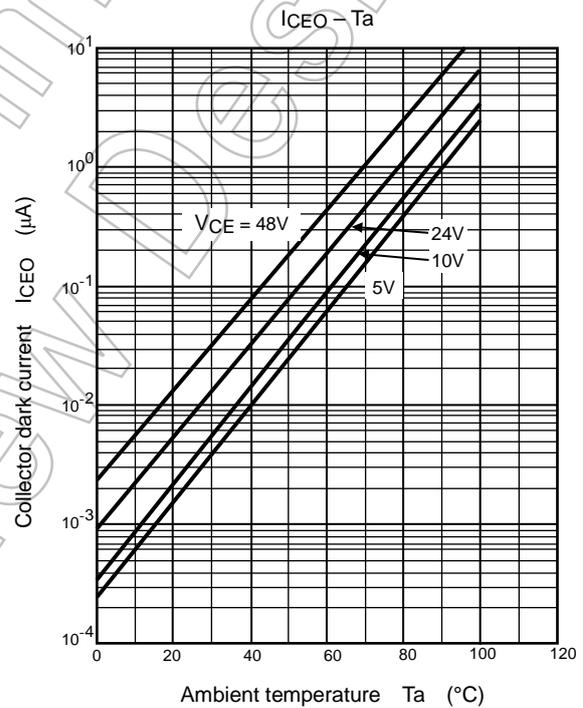
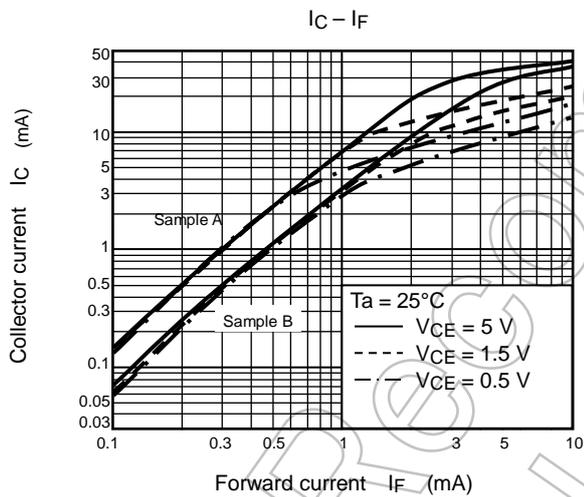
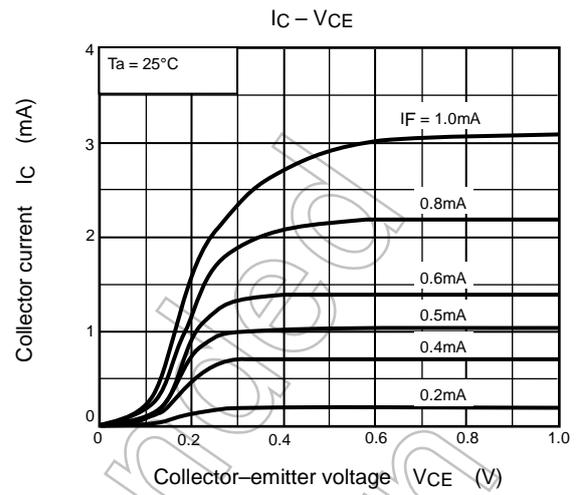
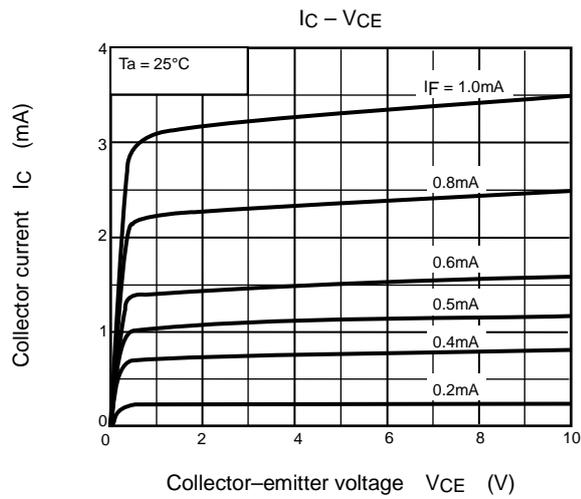
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10 V, I <sub>C</sub> = 2 mA R <sub>L</sub> = 100 Ω	—	8	—	μs	
Fall time	t <sub>f</sub>		—	8	—		
Turn-on time	t <sub>ON</sub>		—	10	—		
Turn-off time	t <sub>OFF</sub>		—	8	—		
Turn-on time	t <sub>ON</sub>	R <sub>L</sub> = 4.7 kΩ V <sub>CC</sub> = 5 V, I <sub>F</sub> = 1.6 mA	—	10	—	μs	
Storage time	t <sub>s</sub>		(Fig.1)	—	50		—
Turn-off time	t <sub>OFF</sub>		—	—	300		—

Fig. 1 Switching time test circuit

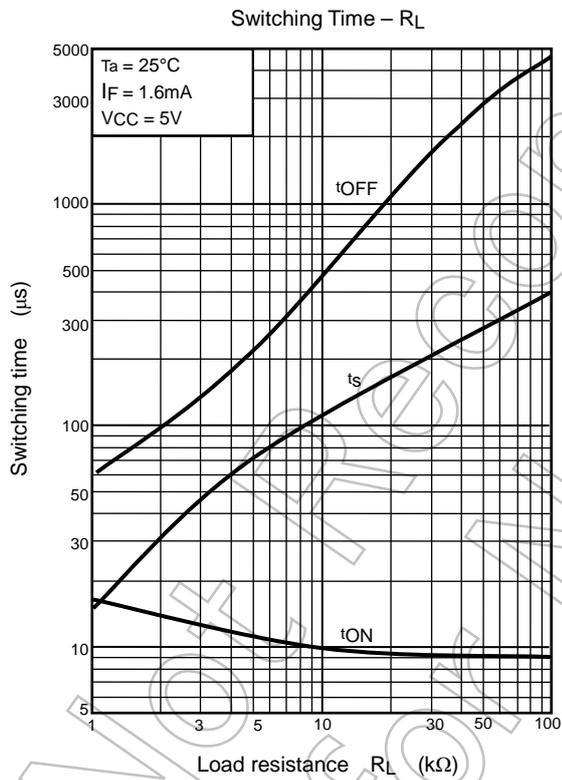
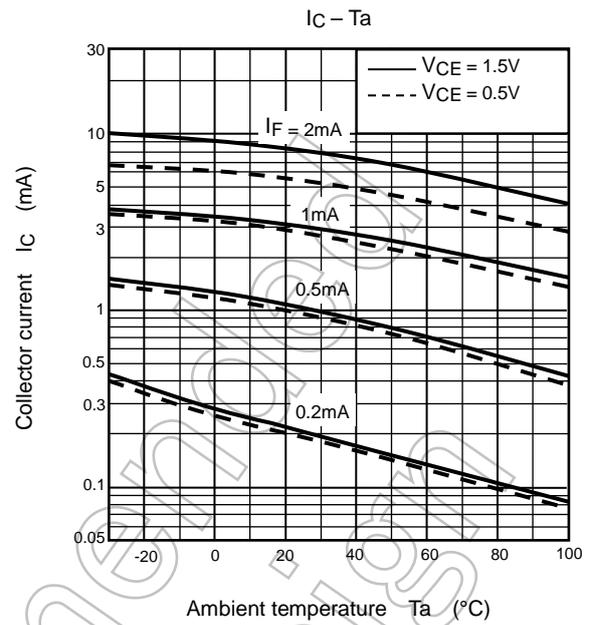
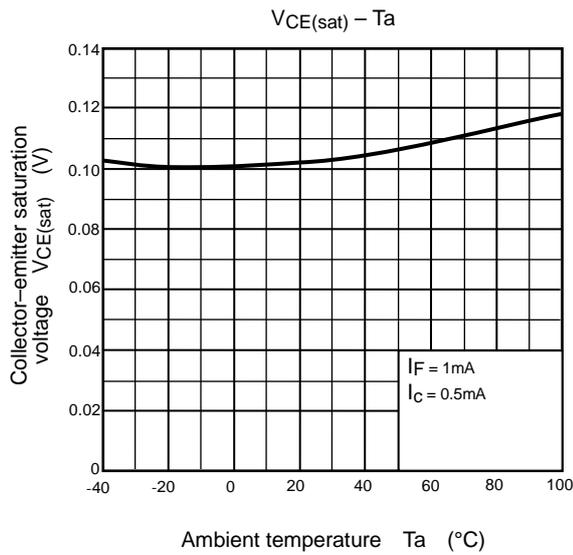




NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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