

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

# TLP124

Office Machine

Programmable Controllers

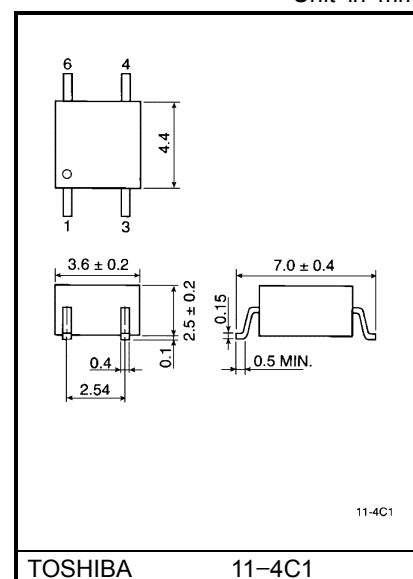
AC / DC-Input Module

Telecommunication

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 a gallium arsenide infrared emitting diode.

- Collector-emitter voltage: 80 V min.
- Current transfer ratio: 100% min.  
Rank BV: 200% min.
- Isolation voltage: 3750Vrms min.
- UL recognized: UL1577, file No. E67349

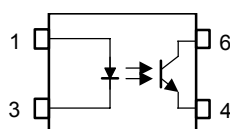
Unit in mm



TOSHIBA 11-4C1

Weight: 0.09g

## Pin Configurations (top view)



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

## Current Transfer Ratio

Classification	Current Transfer Ratio (min.)			Marking Of Classification
	Ta = 25°C		Ta = -25~75°C	
	I <sub>F</sub> = 1mA V <sub>CE</sub> = 0.5V	I <sub>F</sub> = 0.5mA V <sub>CE</sub> = 1.5V	I <sub>F</sub> = 1mA V <sub>CE</sub> = 0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, Blank

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

## Maximum Rations (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I <sub>F</sub>	50	mA
	Forward current derating	ΔI <sub>F</sub> / °C	-0.7 (Ta ≥ 53°C)	mA / °C
	Peak forward current (100μs pulse, 100pps)	I <sub>FP</sub>	1	A
	Reverse voltage	V <sub>R</sub>	5	V
	Junction temperature	T <sub>j</sub>	125	°C
Detector	Collector-emitter voltage	V <sub>CEO</sub>	80	V
	Emitter-collector valtage	V <sub>ECO</sub>	7	V
	Collector current	I <sub>C</sub>	50	mA
	Peak collector current (10ms pulse, 100pps)	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	mA / °C
	Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range		T <sub>stg</sub>	-55~125	°C
Operating temperature range		T <sub>opr</sub>	-55~100	°C
Lead soldering temperature (10s)		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, 1min., R.H. ≤ 60%) (Note 1)		BV <sub>S</sub>	3750	Vrms

(Note 1) Device considered a two terminal device: Pins1, 3 shorted together and pins 4, 6 shorted together.

## Recommended Operating Conditions

Characteristic	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

Individual Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

Characteristic		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	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	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	$I_D$	$V_{CE} = 48 \text{ V}$	—	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 ( $T_a = 25^\circ\text{C}$ )

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	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	$V_{CE} (\text{sat})$	$I_C = 0.5 \text{ mA}, I_F = 1 \text{ mA}$	—	—	0.4	V
		$I_C = 1 \text{ mA}, I_F = 1 \text{ mA}$ Rank BV	—	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 ( $T_a = -25 \sim 75^\circ\text{C}$ )

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	—	%

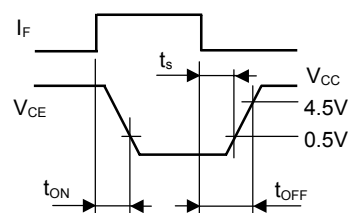
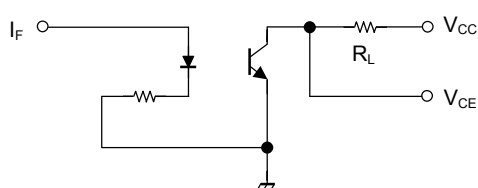
## Isolation Characteristics (Ta = 25°C)

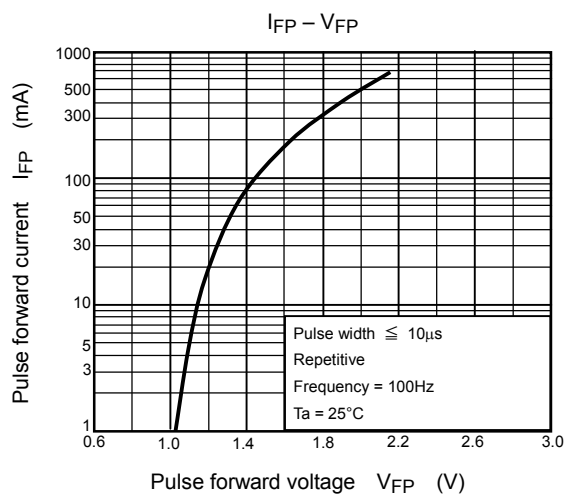
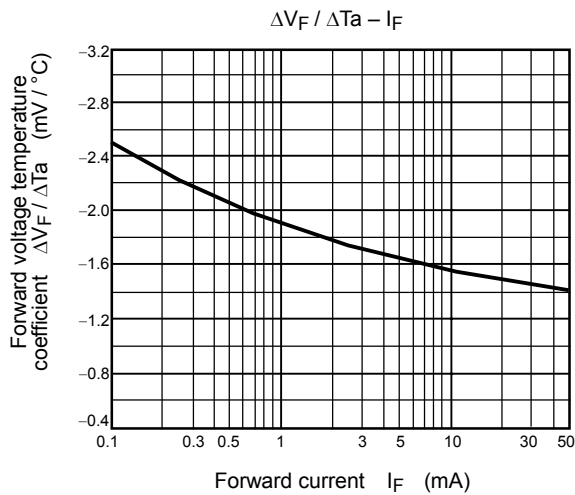
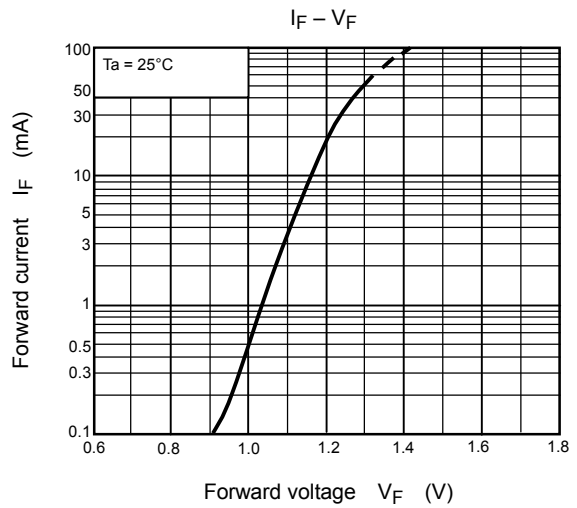
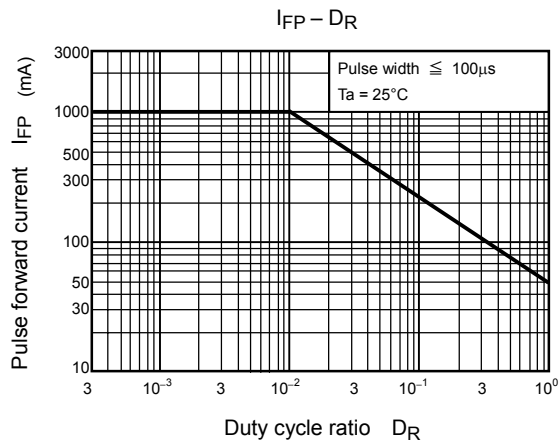
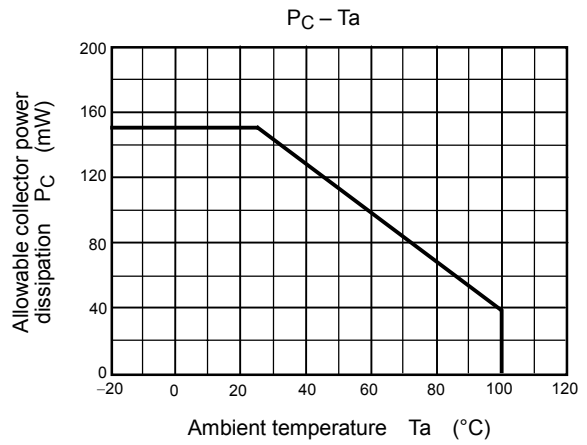
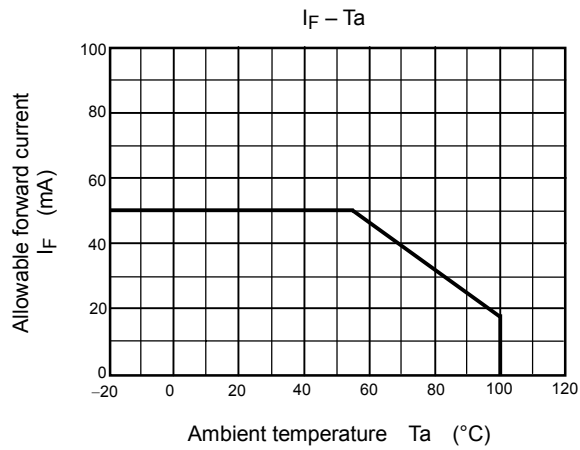
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	C <sub>S</sub>	V <sub>S</sub> = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R <sub>S</sub>	V <sub>S</sub> = 500 V, R.H. ≤ 60%	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation voltage	BV <sub>S</sub>	AC, 1 minute	3750	—	—	V <sub>rms</sub>
		AC, 1 s, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dc</sub>

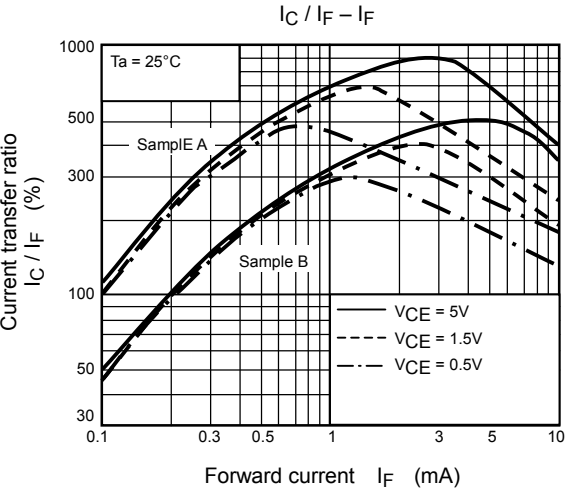
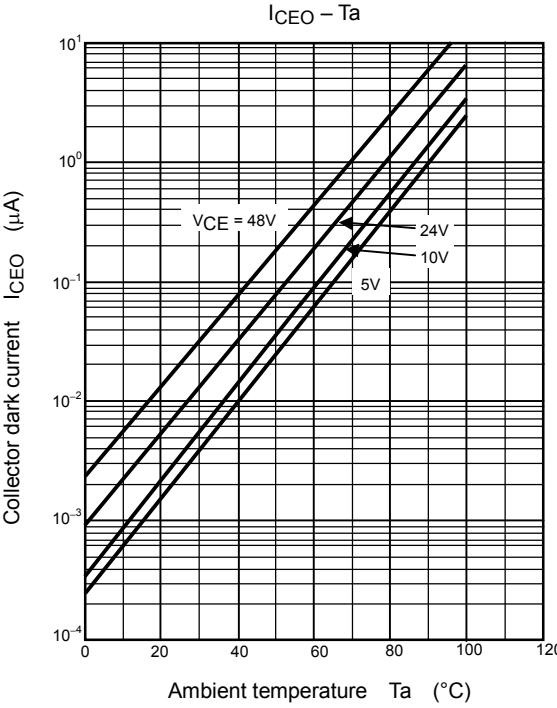
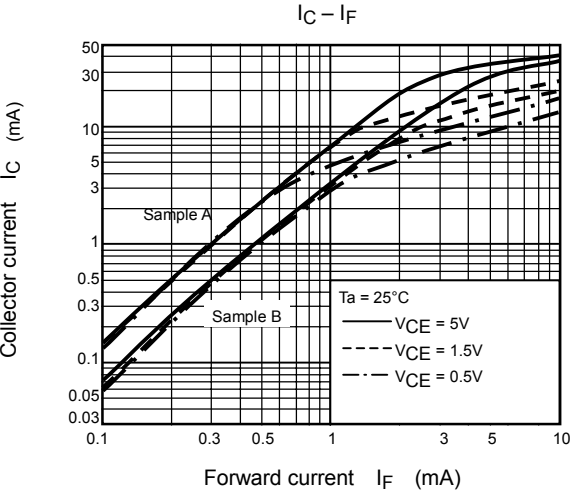
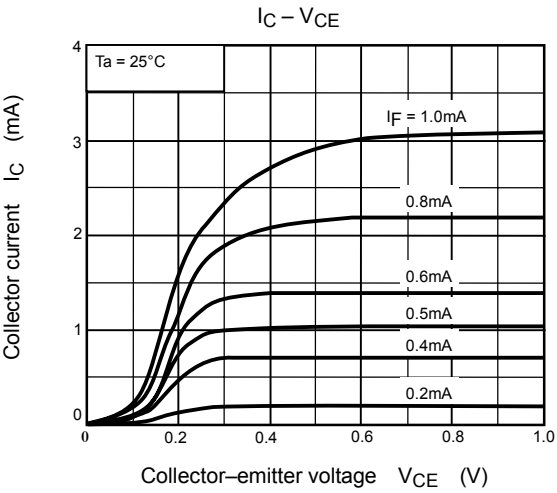
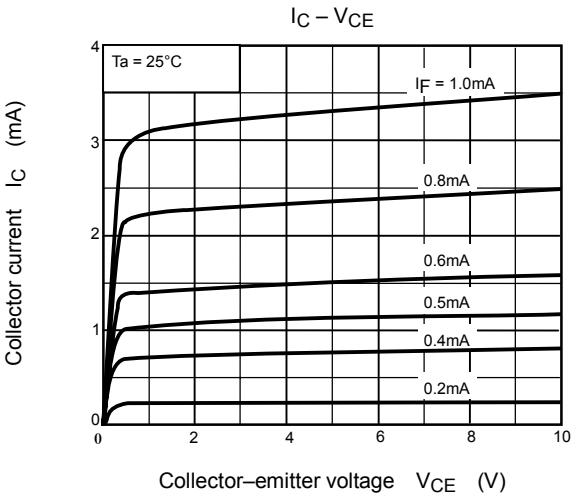
## Switching Characteristics (Ta = 25°C)

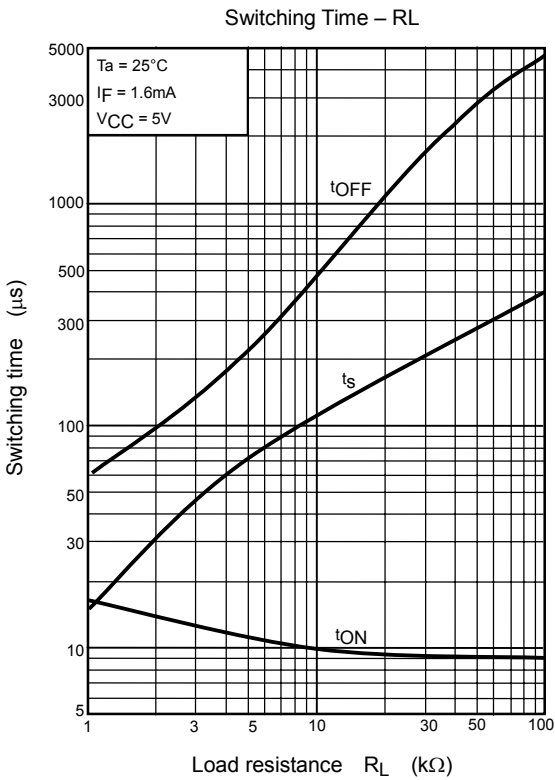
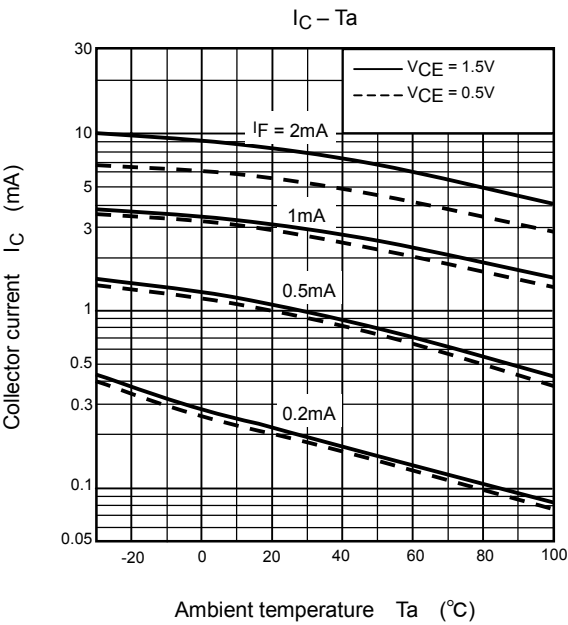
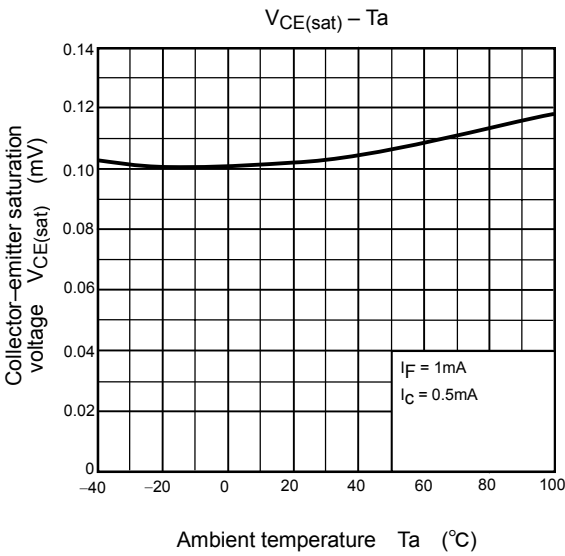
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t <sub>r</sub>	V <sub>CC</sub> = 10 V, I <sub>C</sub> = 2 mA R <sub>L</sub> = 100Ω	—	8	—	μs
Fall time	t <sub>f</sub>		—	8	—	
Turn-on time	t <sub>ON</sub>		—	10	—	
Turn-off time	t <sub>OFF</sub>		—	8	—	
Turn-on time	t <sub>ON</sub>	R 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

Fig. 1 Switching time test circuit









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