

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

# TLP124

OFFICE MACHINE

PROGRAMMABLE CONTROLLERS

AC/DC - INPUT MODULE

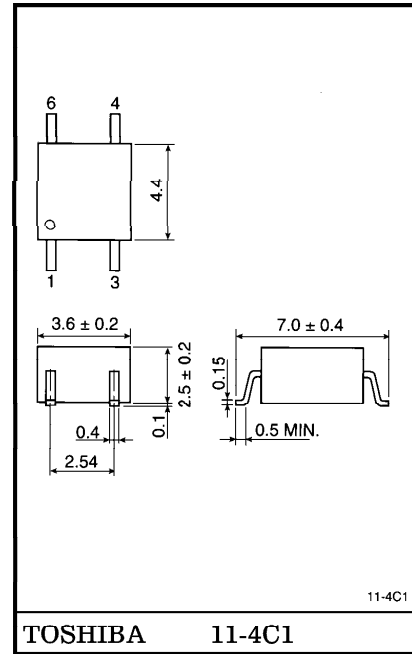
TELECOMMUNICATION

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.

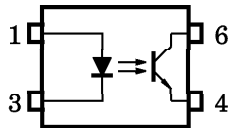
- Collector-Emitter Voltage : 80V Min.
- Current Transfer Ratio : 100% Min.  
Rank BV : 200% Min.
- Isolation Voltage : 3750 Vrms Min.
- UL Recognized : UL1577 File No. E67349

Unit in mm



Weight : 0.09g

**PIN CONFIGURATIONS (TOP VIEW)**



- 1 : ANODE
- 3 : CATHODE
- 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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## CURRENT TRANSFER RATIO

CLASSIFI- CATION	CURRENT TRANSFER RATIO (Min.)			MARKING OF CLASSIFI- CATION
	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 RATINGS (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 Voltage	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	V <sub>rms</sub>	

(Note 1) Device considered a two terminal device : Pins 1, 3 shorted together and pins 4, 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</sub>	—	1.6	20	mA
Collector Current	I <sub>C</sub>	—	1	10	mA
Operating Temperature	T <sub>opr</sub>	-25	—	75	°C

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA	1.0	1.15	1.3	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5V	—	—	10	μA
	Capacitance	C <sub>T</sub>	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector - Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 0.5mA	80	—	—	V
	Emitter - Collector Breakdown Voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector Dark Current	I <sub>D</sub>	V <sub>CE</sub> = 48V	—	10	100	nA
			V <sub>CE</sub> = 48V, Ta = 85°C	—	2	50	μA
Capacitance Collector to Emitter	C <sub>CCE</sub>	V = 0, f = 1MHz	—	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> = 1mA, V <sub>CE</sub> = 0.5V Rank BV	100	—	1200	%
			200	—	1200	
Low Input CTR	I <sub>C</sub> / I <sub>F</sub> (low)	I <sub>F</sub> = 0.5mA, V <sub>CE</sub> = 1.5V Rank BV	50	—	—	%
			100	—	—	
Collector - Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 0.5mA, I <sub>F</sub> = 1mA I <sub>C</sub> = 1mA, I <sub>F</sub> = 1mA Rank BV	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	
Off - State Collector Current	I <sub>C(off)</sub>	V <sub>F</sub> = 0.7V, V <sub>CE</sub> = 48V	—	—	10	μA

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I <sub>C</sub> / I <sub>F</sub>	I <sub>F</sub> = 1mA, V <sub>CE</sub> = 0.5V Rank BV	50	—	—	%
			100	—	—	
Low Input CTR	I <sub>C</sub> / I <sub>F</sub> (low)	I <sub>F</sub> = 0.5mA, V <sub>CE</sub> = 1.5V 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=1MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> =500V, R.H. ≤ 60%	5 × 10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 1minute	3750	—	—	V <sub>rms</sub>
		AC, 1s, in oil	—	10000	—	
		DC, 1minute, 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

