

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

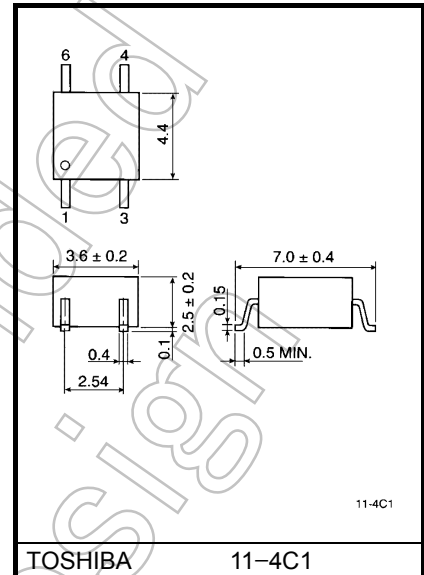
TLP124

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.

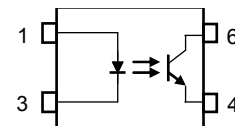
- Collector-emitter voltage: 80 V (min)
- Current transfer ratio: 100% (min)
 Rank BV: 200% (min)
- Isolation voltage: 3750Vrms (min)
- UL recognized: UL1577, file No. E67349

Unit: mm



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	Current Transfer Ratio (min.)			Marking of Classification
	Ta = 25°C		Ta = -25~75°C	
	If = 1mA VCE = 0.5V	If = 0.5mA VCE = 1.5V	If = 1mA VCE = 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

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	If	50	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-0.7 (Ta ≥ 53°C)	mA / °C
	Peak forward current (100µs pulse, 100pps)	Ifp	1	A
	Reverse voltage	VR	5	V
	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 (10ms pulse, 100pps)	ICP	100	mA
	Power dissipation	PC	150	mW
	Power dissipation derating (Ta ≥ 25°C)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / °C
	Junction temperature	Tj	125	°C
Storage temperature range		Tstg	-55~125	°C
Operating temperature range		Topr	-55~100	°C
Lead soldering temperature (10s)		Tsol	260	°C
Total package power dissipation		PT	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ\text{C}$	-2.0	mW / °C
Isolation voltage (AC, 1 minute, 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, 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

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.

Individual Electrical Characteristics (Ta = 25°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	μA
	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	$V_{CE} = 48 \text{ V}$ $V_{CE} = 48 \text{ V}, T_a = 85^\circ\text{C}$	—	10	100	nA μA
	Capacitance collector to emitter	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	12	—	pF

Coupled Electrical Characteristics (Ta = 25°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	$V_{CE (\text{sat})}$	$I_C = 0.5 \text{ mA}, I_F = 1 \text{ mA}$ $I_C = 1 \text{ mA}, I_F = 1 \text{ mA}$ 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	μA

Coupled Electrical Characteristics (Ta = -25~75°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	—	%

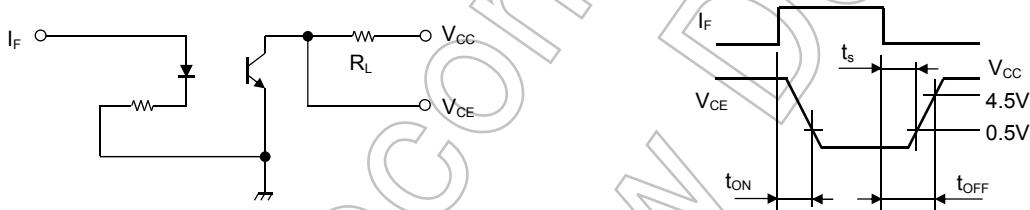
Isolation Characteristics (Ta = 25°C)

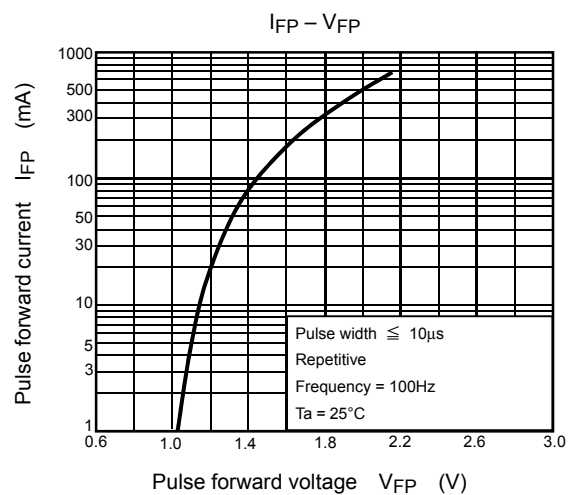
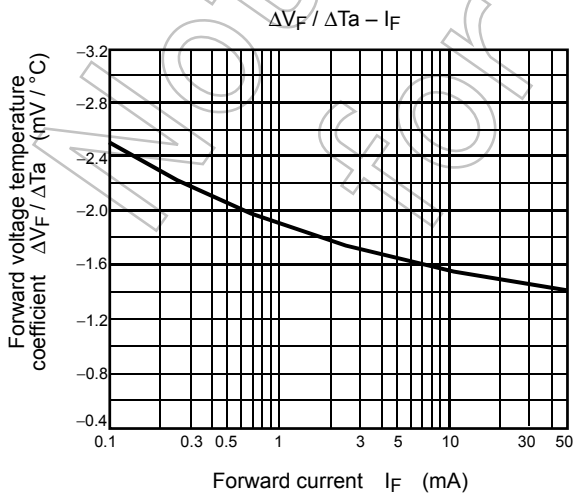
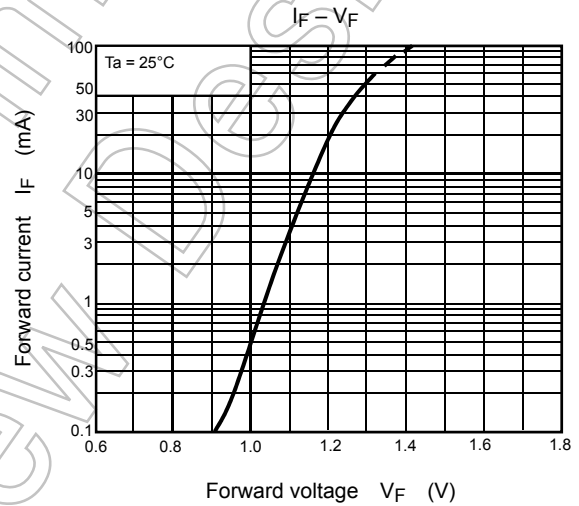
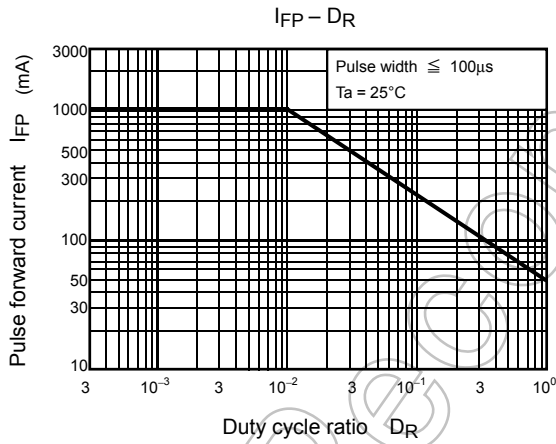
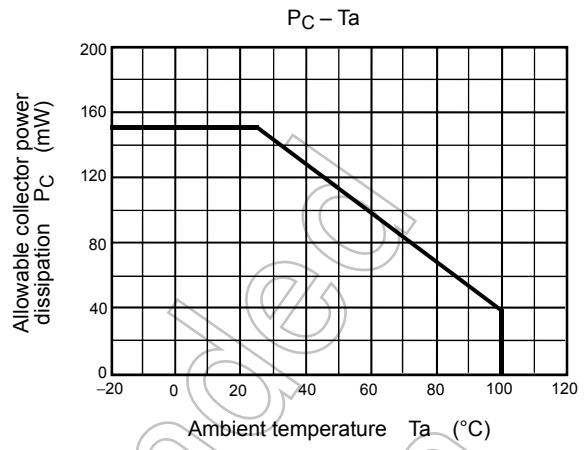
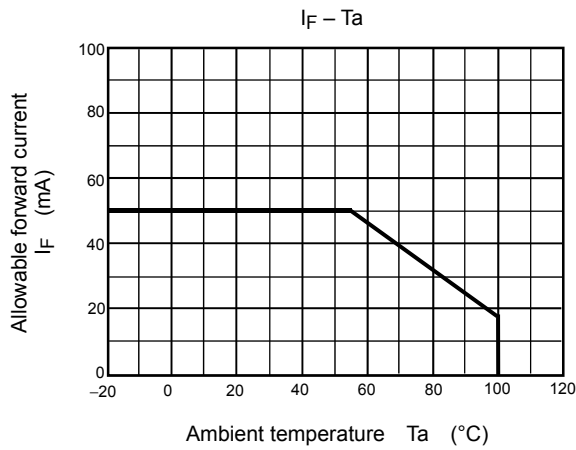
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	C _S	V _S = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500 V, R.H. ≤ 60%	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 1 minute	3750	—	—	V _{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil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

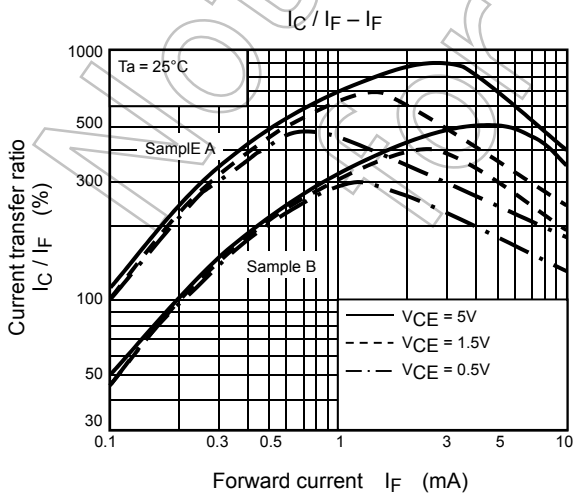
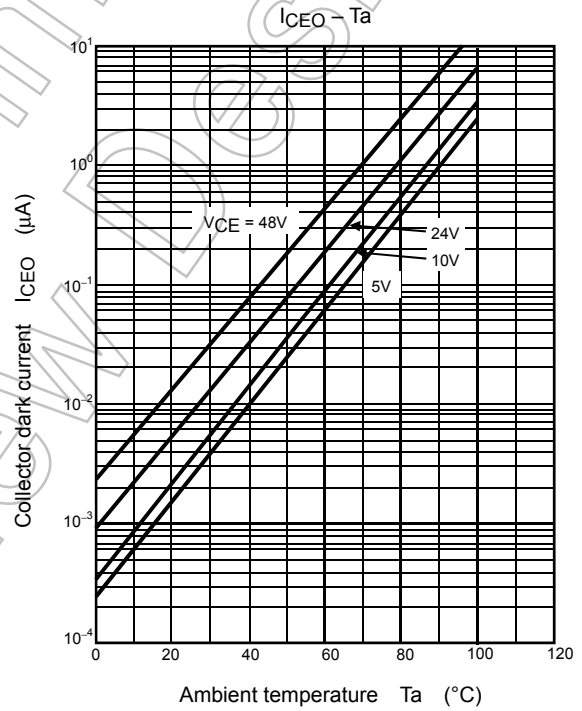
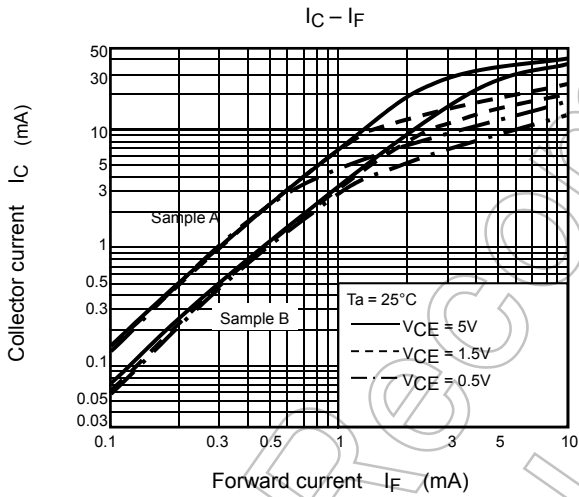
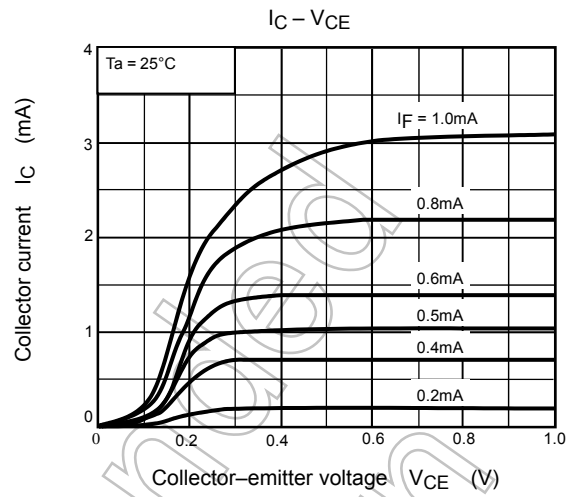
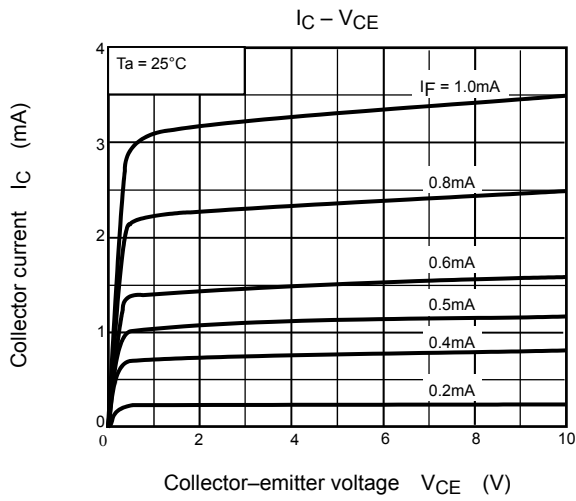
Switching Characteristics (Ta = 25°C)

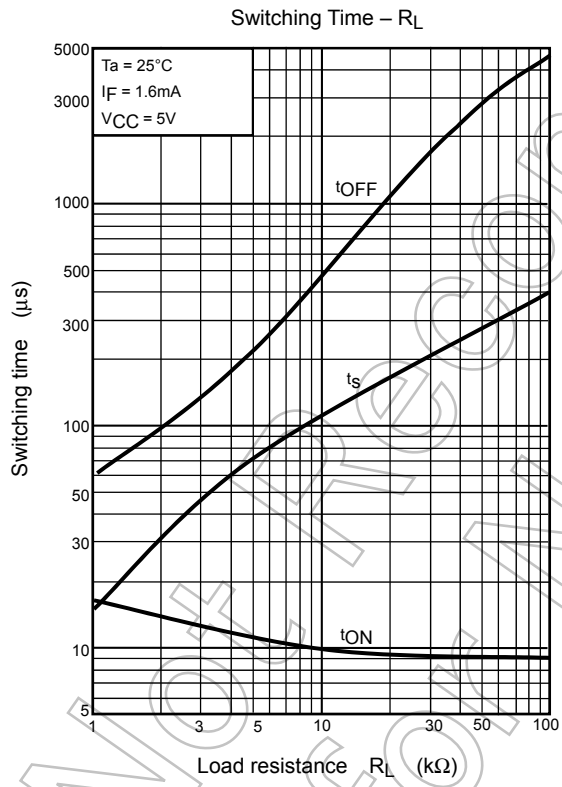
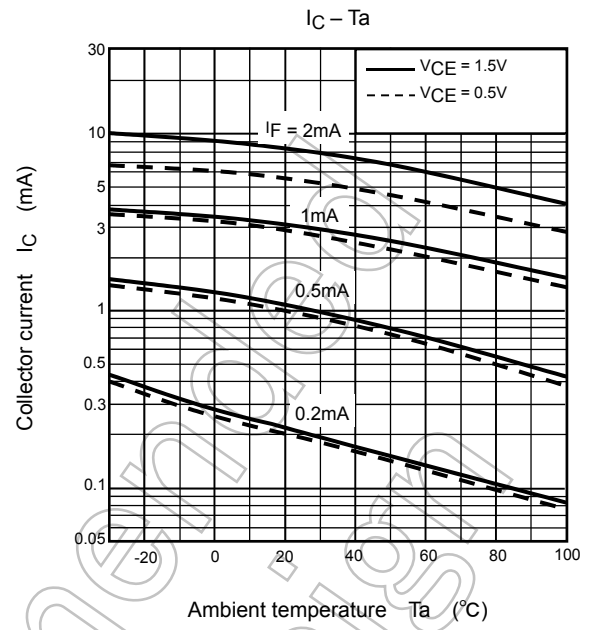
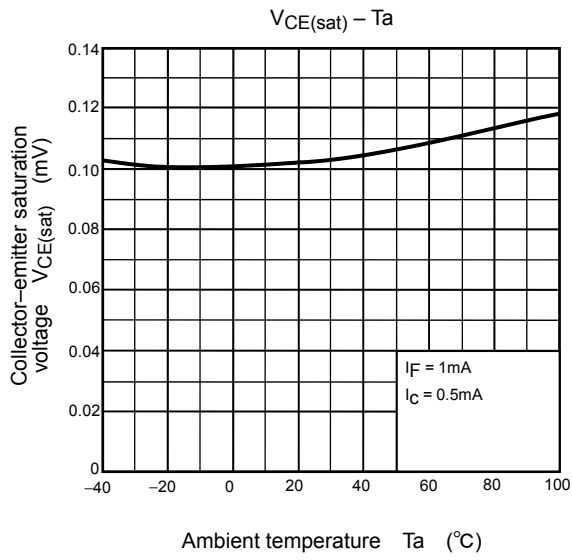
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t _r	V _{CC} = 10 V, I _C = 2 mA R _L = 100Ω	—	8	—	μs
Fall time	t _f		—	8	—	
Turn-on time	t _{ON}		—	10	—	
Turn-off time	t _{OFF}		—	8	—	
Turn-on time	t _{ON}	R _L = 4.7 kΩ V _{CC} = 5 V, I _F = 1.6 mA (Fig.1)	—	10	—	μs
Storage time	t _s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

Fig. 1 Switching time test circuit









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