

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP124

Office Machine

Programmable Controllers

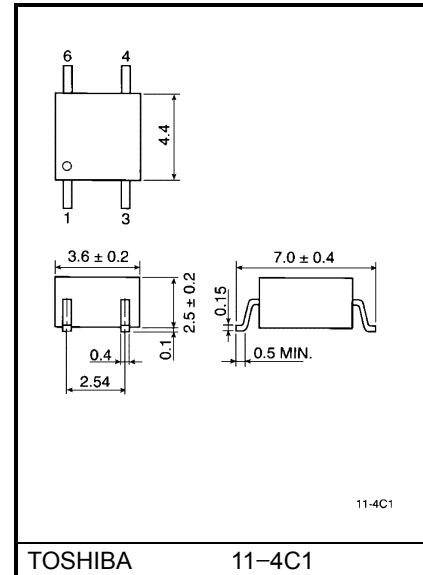
AC / DC-Input Module

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.

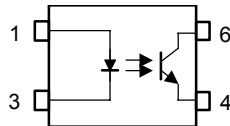
- Collector-emitter voltage: 80 V min.
- Current transfer ratio: 100% min.
Rank BV: 200% min.
- Isolation voltage: 3750Vrms min.
- UL recognized: UL1577, file No. E67349

Unit in mm



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 _F = 1mA V _{CE} = 0.5V	I _F = 0.5mA V _{CE} = 1.5V	I _F = 1mA V _{CE} = 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 _F	50	mA
	Forward current derating	ΔI _F / °C	-0.7 (Ta ≥ 53°C)	mA / °C
	Peak forward current (100μs pulse, 100pps)	I _{FP}	1	A
	Reverse voltage	V _R	5	V
	Junction temperature	T _j	125	°C
Detector	Collector-emitter voltage	V _{CEO}	80	V
	Emitter-collector valtage	V _{ECO}	7	V
	Collector current	I _C	50	mA
	Peak collector current (10ms pulse, 100pps)	I _{CP}	100	mA
	Power dissipation	P _C	150	mW
	Power dissipation derating (Ta ≥ 25°C)	ΔP _C / °C	-1.5	mA / °C
	Junction temperature	T _j	125	°C
Storage temperature range		T _{stg}	-55~125	°C
Operating temperature range		T _{opr}	-55~100	°C
Lead soldering temperature (10s)		T _{sol}	260	°C
Total package power dissipation		P _T	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔP _T / °C	-2.0	mW / °C
Isolation voltage (AC, 1min., R.H. ≤ 60%) (Note 1)		BV _S	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	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	$V_{CE} = 48\text{ V}$	—	10	100	nA
			$V_{CE} = 48\text{ V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	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	μA

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	—	%

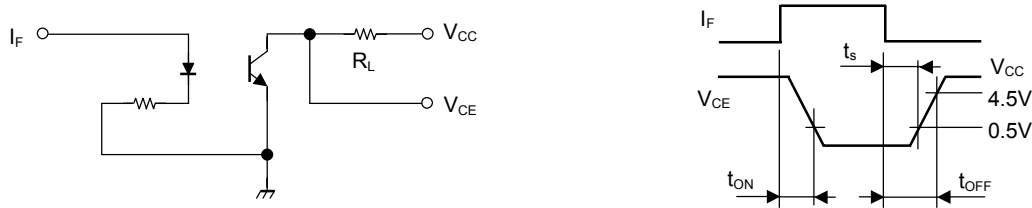
Isolation Characteristics (Ta = 25°C)

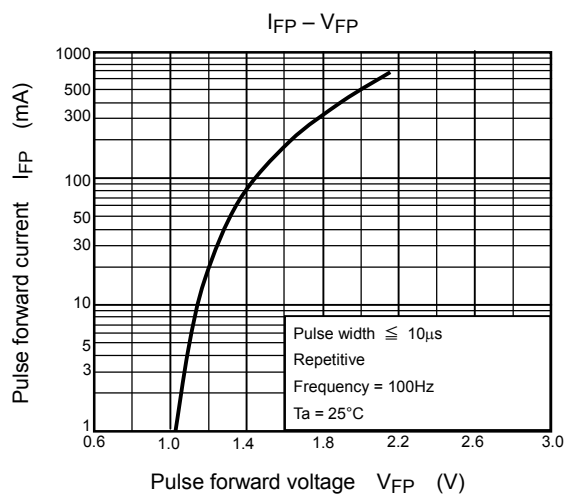
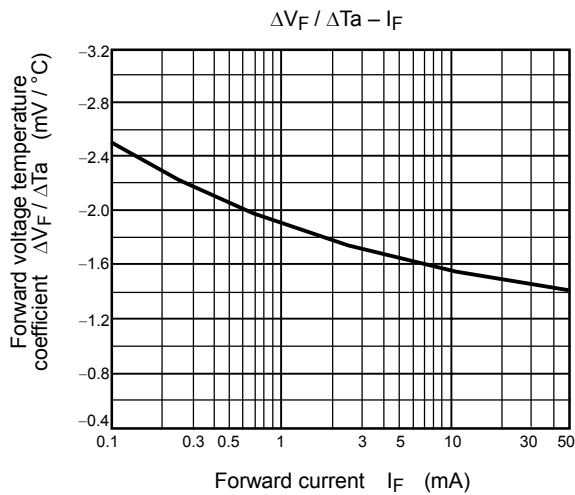
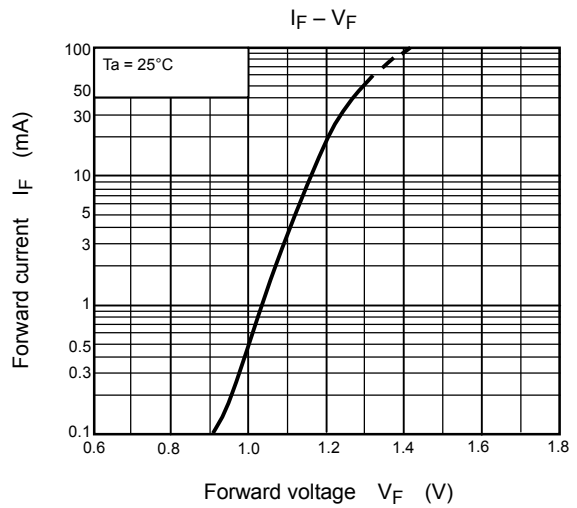
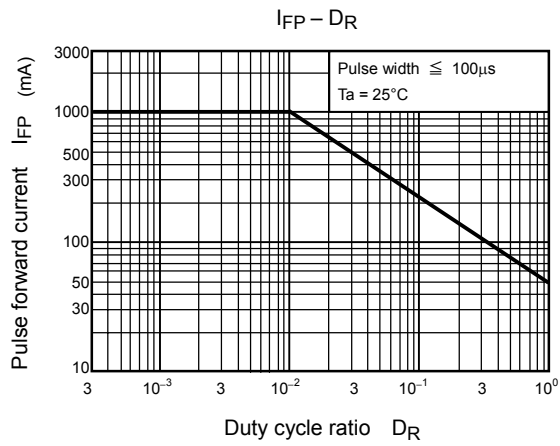
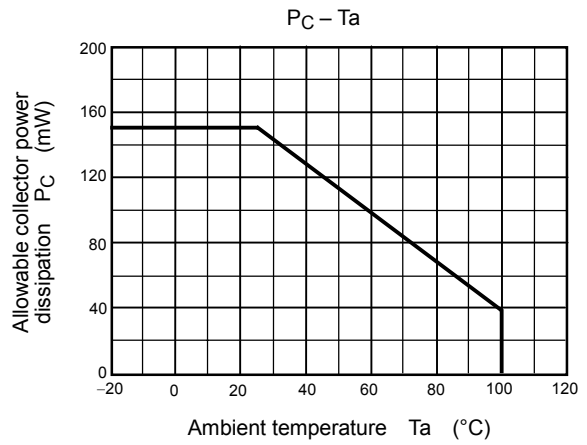
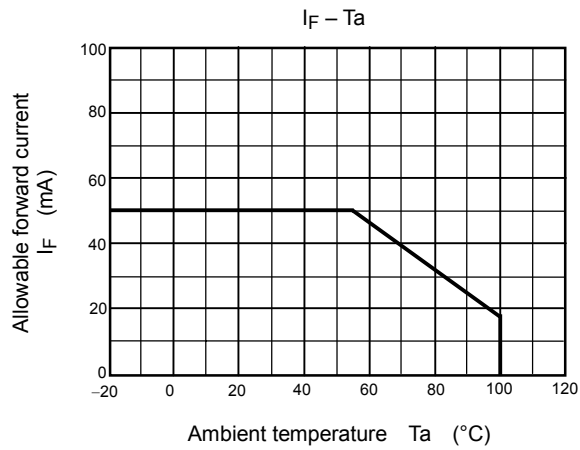
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	CS	VS = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	RS	VS = 500 V, R.H. ≤ 60%	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BVS	AC, 1 minute	3750	—	—	Vrms
		AC, 1 s, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

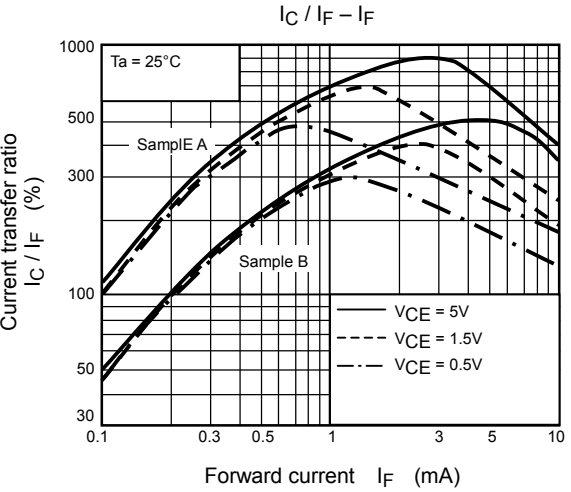
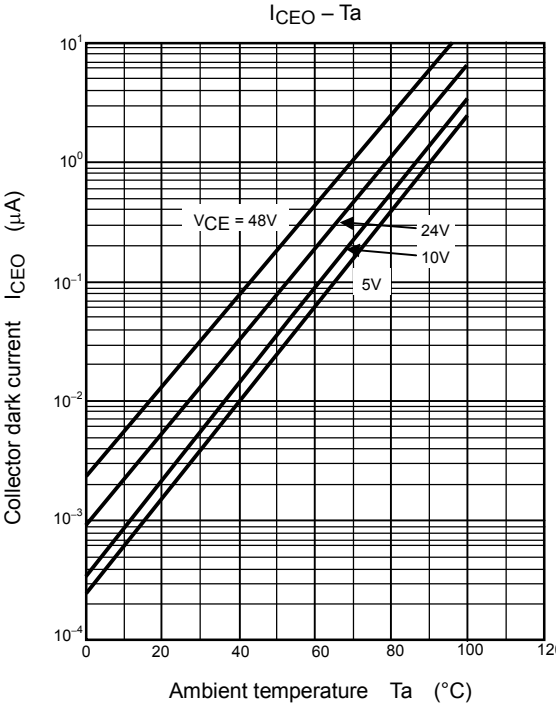
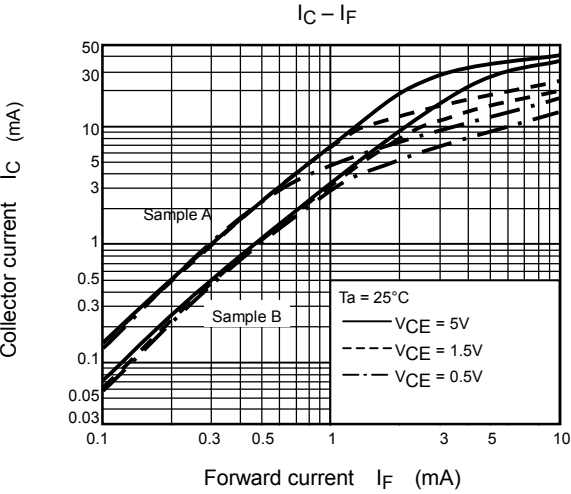
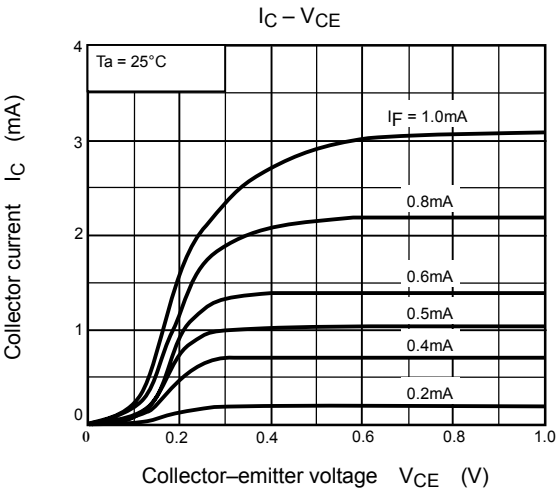
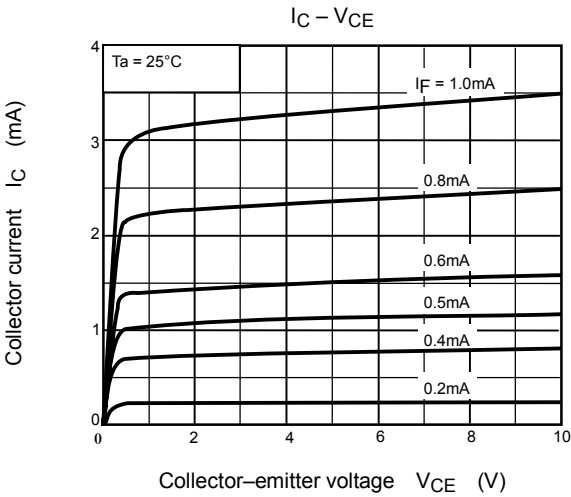
Switching Characteristics (Ta = 25°C)

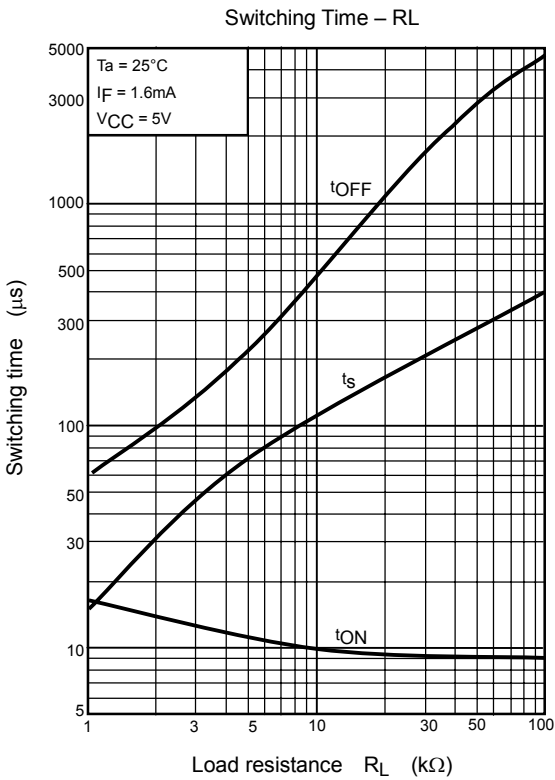
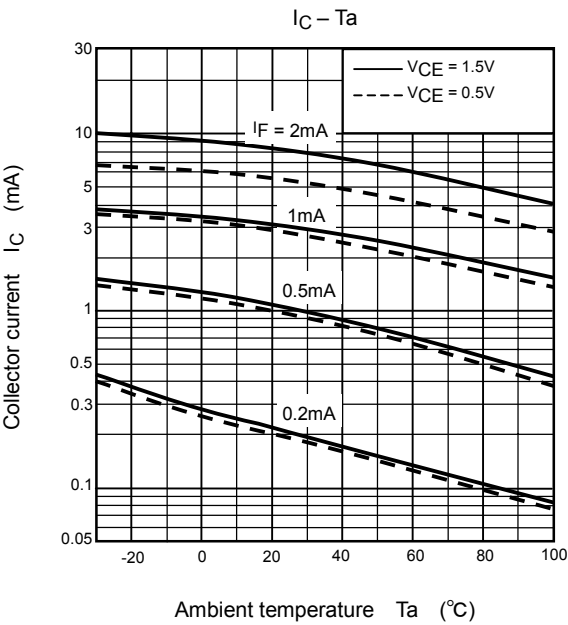
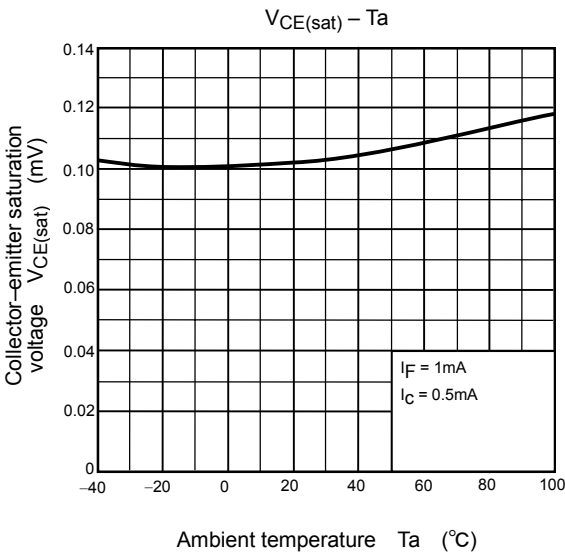
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	tr	VCC = 10 V, IC = 2 mA RL = 100Ω	—	8	—	μs
Fall time	tf		—	8	—	
Turn-on time	tON		—	10	—	
Turn-off time	tOFF		—	8	—	
Turn-on time	tON	RL = 4.7 kΩ VCC = 5 V, IF = 1.6 mA (Fig.1)	—	10	—	μs
Storage time	ts		—	50	—	
Turn-off time	tOFF		—	300	—	

Fig. 1 Switching time test circuit









RESTRICTIONS ON PRODUCT USE

000707EBC

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- 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.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.