

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

# TLP624, TLP624-2, TLP624-4

PROGRAMMABLE CONTROLLERS  
AC/DC-INPUT MODULE  
TELECOMMUNICATION

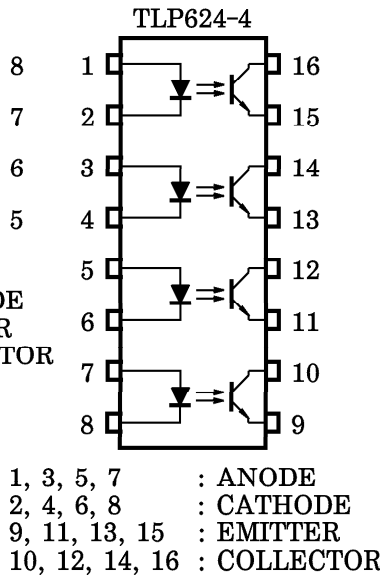
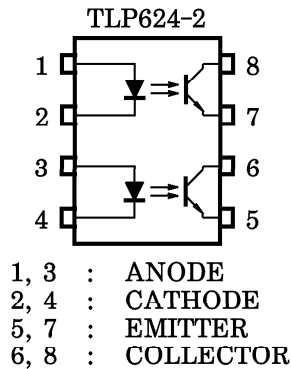
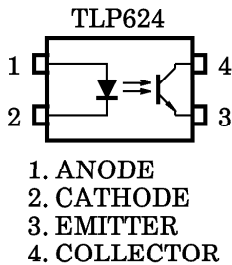
The TOSHIBA TLP624, -2 and -4 consist of a gallium arsenide infrared emitting diode optically coupled to a photo-transistor. The TLP624-2 offers two isolated channels in an eight lead plastic DIP, while the TLP624-4 provides four isolated channels in a sixteen lead plastic DIP.

- Collector-Emitter Voltage : 55V Min.
- Current Transfer Ratio

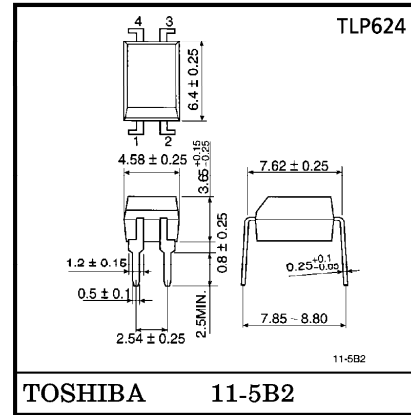
CLASSIFICATION	CURRENT TRANSFER RATIO (Min.)			MARKING OF CLASSIFICATION
	Ta = 25°C		Ta = -25~75°C	
	IF = 1mA VCE = 0.5V	IF = 0.5mA VCE = 1.5V	IF = 1mA VCE = 0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, Blank

- Isolation Voltage : 5000V<sub>rms</sub> Min.
- UL Recognized : UL1577, File No. E67349
- BSI Approved : BS EN60065 : 1994 Certificate No.7426  
BS EN60950 : 1992 Certificate No.7427
- Note : Application type name for certification test, please use standard product type name, i.e.  
TLP624 (BV) : TLP624  
TLP624-2 (BV) : TLP624-2

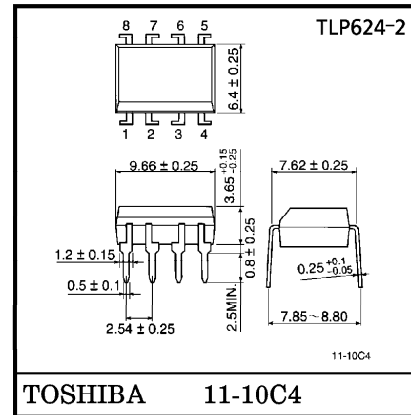
**PIN CONFIGURATIONS (TOP VIEW)**



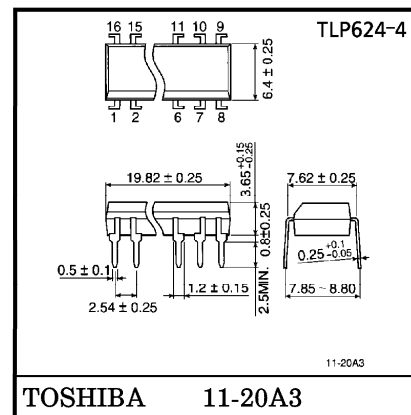
Unit in mm



Weight : 0.26g



Weight : 0.54g



Weight : 1.1g

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• TOSHIBA is continually working to improve the quality and the 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 observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product 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 products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			TLP624	TLP624-2 TLP624-4	
LED	Forward Current	I <sub>F</sub>	60	50	mA
	Forward Current Detating	ΔI <sub>F</sub> / °C	-0.7 (Ta ≥ 39°C)	-0.5 (Ta ≥ 25°C)	mA / °C
	Pulse Forward Current	I <sub>FP</sub>	1 (100μs pulse, 100pps)		A
	Power Dissipation (1 Circuit)	P <sub>D</sub>	100	70	mW
	Power Dissipation Derating (Ta ≥ 25°C, 1 Circuit)	ΔP <sub>D</sub> / °C	-1.0	-0.7	mW/°C
	Reverse Voltage	V <sub>R</sub>	5		V
	Junction Temperature	T <sub>j</sub>	125		°C
DETECTOR	Collector-Emitter Voltage	V <sub>CEO</sub>	55		V
	Emitter-Collector Voltage	V <sub>ECO</sub>	7		V
	Collector Current	I <sub>C</sub>	50		mA
	Collector Power Dissipation (1 Circuit)	P <sub>C</sub>	150	100	mW
	Collector Power Dissipation Derating (Ta ≥ 25°C, 1 Circuit)	ΔP <sub>C</sub> / °C	-1.5	-1.0	mW / °C
	Junction Temperature	T <sub>j</sub>	125		°C
	Storage Temperature Range	T <sub>stg</sub>	-55~125		°C
Operating Temperature Range	P <sub>opr</sub>	-55~100		°C	
Lead Soldering Temperature	T <sub>sol</sub>	260 (10s)		°C	
Total Package Power Dissipation (1 Circuit)	P <sub>T</sub>	250	150	mW	
Total Package Power Dissipation Derating (Ta ≥ 25°C, 1 Circuit)	ΔP <sub>T</sub> / °C	-2.5	-1.5	mW / °C	
Isolation Voltage	BV <sub>S</sub>	5000 (AC, 1min., RH ≤ 60%)		V <sub>rms</sub>	

(Note 1) Device considered a two terminal device : LED side pins shorted together, and DETECTOR side pins shorted together.

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	—	5	24	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

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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.
- The products described in this document are subject to foreign exchange and foreign trade control 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.

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	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	$I_{CEO}$	$V_{CE} = 24\text{V}$	—	10	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	$\mu\text{A}$
Capacitance Collector to Emitter	$C_{CE}$	$V = 0, f = 1\text{MHz}$	—	12	—	pF	

COUPLED ELECTRICAL CHARACTERISTICS (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	$I_C / I_F$ (low)	$I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ Rank BV	50	—	—	%
			100	—	—	
Collector-Emitter Saturation Voltage	$V_{CE}$ (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	

COUPLED ELECTRICAL CHARACTERISTICS (Ta = -25°C~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	$I_C / I_F$ (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=1MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> =500V	5×10 <sup>10</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 1 minute	5000	—	—	V <sub>rms</sub>
		AC, 1 second, 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> =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

