

TOSHIBA Photocoupler GaAs Ired &amp; 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.

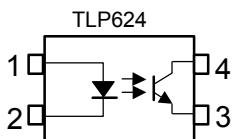
The TLP624-2 offers two isolated channels in an eight lead plastic DIP, while the TLP624-4 provides four isolated channels in a sixteen lead plastic DIP.

- Collector-emitter voltage: 55V min.
- Current transfer ratio

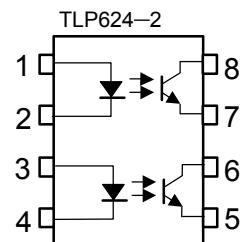
Classification	Current Transfer Ratio(min)			Marking of classification
	Ta = 25°C		Ta=-25~75°C	
	I <sub>F</sub> =1mA V <sub>CE</sub> =0.5V	I <sub>F</sub> =0.5mA V <sub>CE</sub> =1.5V	I <sub>F</sub> =1mA V <sub>CE</sub> =0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV,blank

- 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

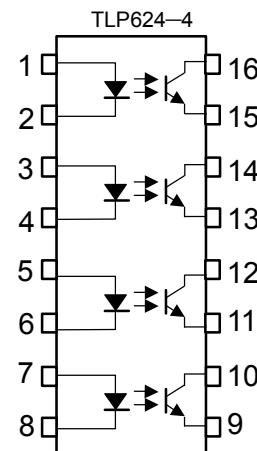
## Pin Configurations (top view)



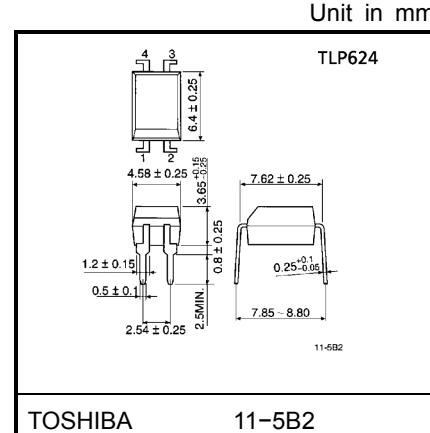
1. Anode  
2. Cathode  
3. Emitter  
4. Collector



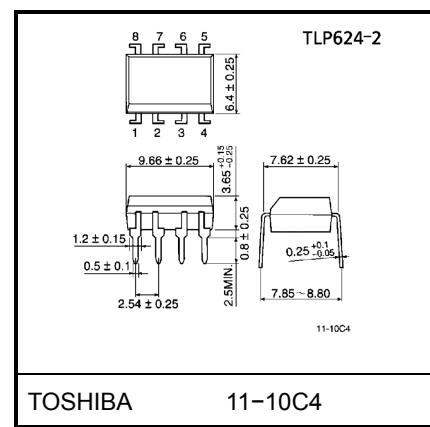
- 1,3 : Anode  
2,4 : Cathode  
5,7 : Emitter  
6,8 : Collector



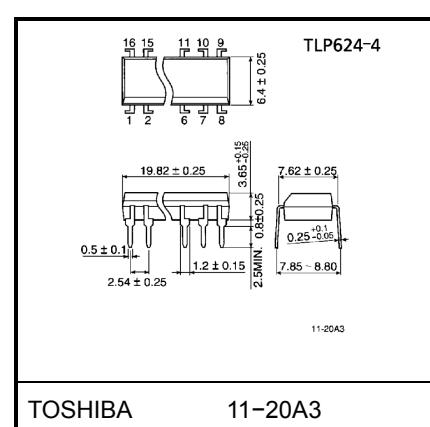
- 1,3,5,7: Anode  
2,4,6,8: Cathode  
9,11,13,15: Emitter  
10,12,14,16: Collector



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g

Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

	Characteristic	Symbol	Rating		Unit
			TLP624	TLP624-2 TLP624-4	
LED	Forward current	$I_F$	60	50	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-0.7( $T_a \geq 39^\circ\text{C}$ )	-0.5( $T_a \geq 25^\circ\text{C}$ )	mA / $^\circ\text{C}$
	Pulse forward current	$I_{FP}$	1(100 $\mu\text{s}$ , pulse, 100pps)		A
	Power dissipation(1 Circuit)	$P_D$	100	70	mW
	Power dissipation derating ( $T_a \geq 25^\circ\text{C}$ , 1 Circuit)	$\Delta P_D / ^\circ\text{C}$	-1.0	-0.7	mW / $^\circ\text{C}$
	Reverse voltage	$V_R$	5		V
	Junction temperature	$T_j$	125		$^\circ\text{C}$
Detector	Collector-emitter voltage	$V_{CEO}$	55		V
	Emitter-collector voltage	$V_{ECO}$	7		V
	Collector current	$I_C$	50		mA
	Collector power dissipation(1 circuit)	$P_C$	150	100	mW
	Collector power dissipation derating ( $T_a \geq 25^\circ\text{C}$ , 1 Circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / $^\circ\text{C}$
	Junction temperature	$T_j$	125		$^\circ\text{C}$
	Storage temperature range	$T_{stg}$	-55~125		$^\circ\text{C}$
Operating temperature range		$T_{opr}$	-55~100		$^\circ\text{C}$
Lead soldering temperature		$T_{sol}$	260(10s)		$^\circ\text{C}$
Total package power dissipation(1 Circuit)		$P_T$	250	150	mW
Total package power dissipation derating ( $T_a \geq 25^\circ\text{C}$ , 1 Circuit)		$\Delta P_T / ^\circ\text{C}$	-2.5	-1.5	mW / $^\circ\text{C}$
Isolation voltage (Note 1)		$BV_S$	5000(AC, 1min., RH≤60%)		Vrms

(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	$V_{CC}$	—	5	24	V
Forward current	$I_F$	—	1.6	20	mA
Collector current	$I_C$	—	1	10	mA
Operating temperature	$T_{opr}$	-25	—	75	$^\circ\text{C}$

**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	55	—	—	V
	Emitter-collector breakdown voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector dark current	I <sub>CEO</sub>	V <sub>CE</sub> = 24V	—	10	100	nA
			V <sub>CE</sub> = 24V, Ta = 85°C	—	2	50	µA
	Capacitance collector to emitter	C <sub>CE</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</sub> (sat)	I <sub>C</sub> = 0.5mA, I <sub>F</sub> = 1mA	—	—	0.4	V
		I <sub>C</sub> = 1mA, I <sub>F</sub> = 1mA Rank BV	—	0.2	—	
			—	—	0.4	

**Coupled Electrical Characteristics (Ta = -25°C~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	—	

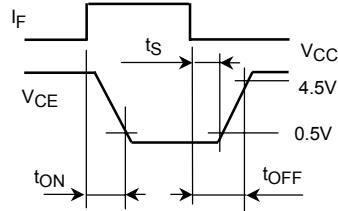
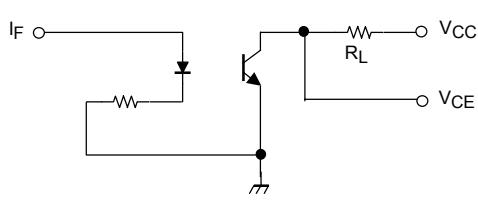
**Isolation Characteristics (Ta = 25°C)**

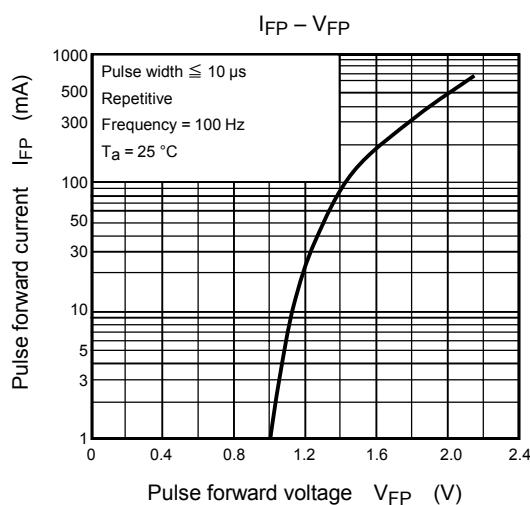
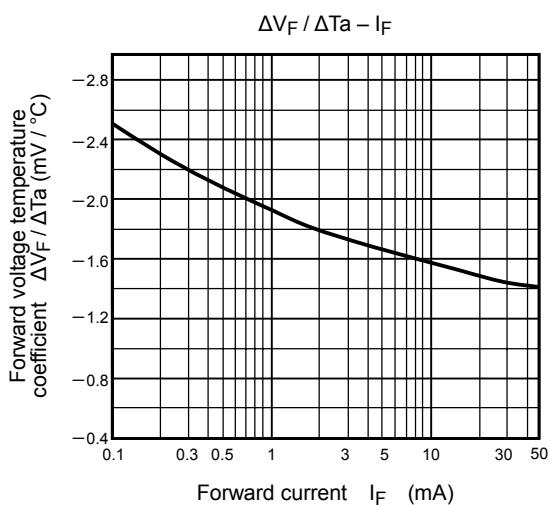
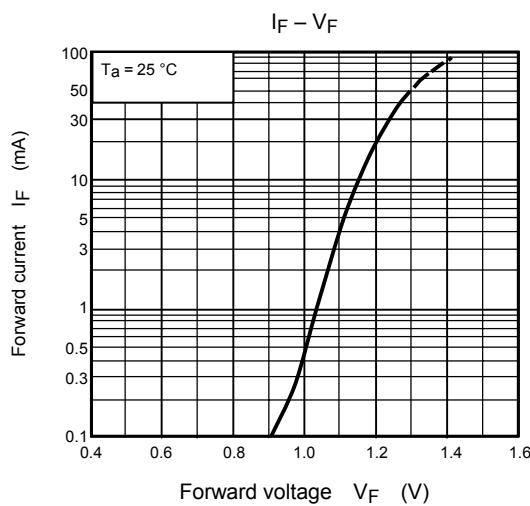
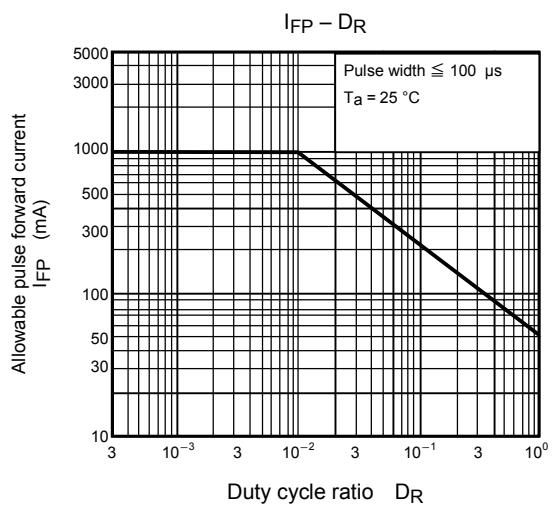
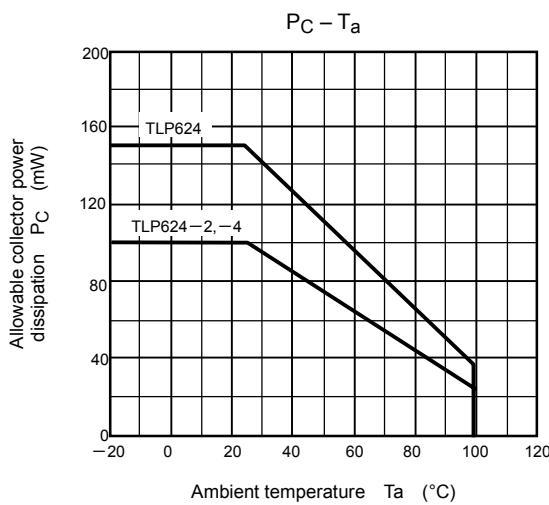
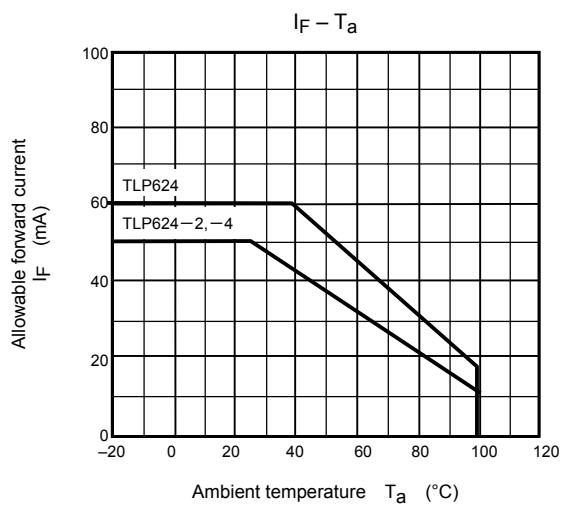
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	$C_S$	$V_S = 0$ , $f = 1\text{MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500\text{V}$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	5000	—	—	$\text{V}_{\text{rms}}$
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	$\text{V}_{\text{dc}}$

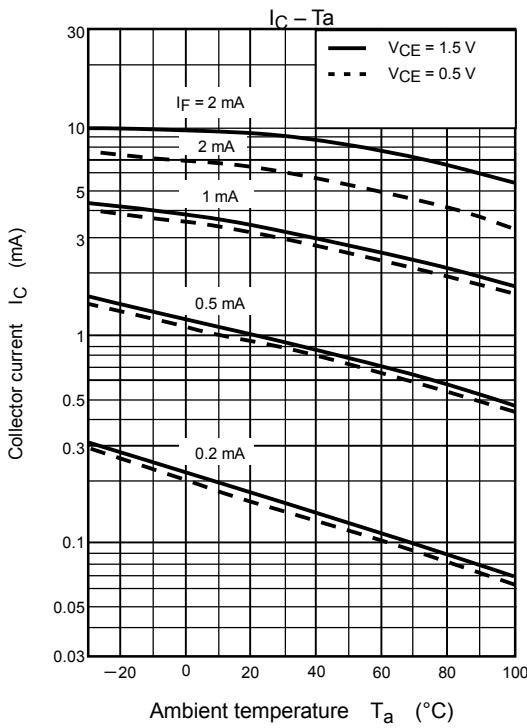
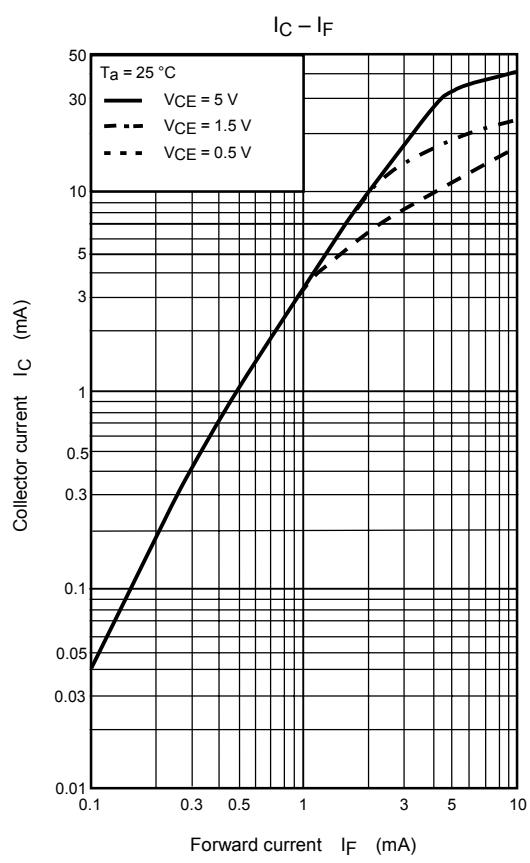
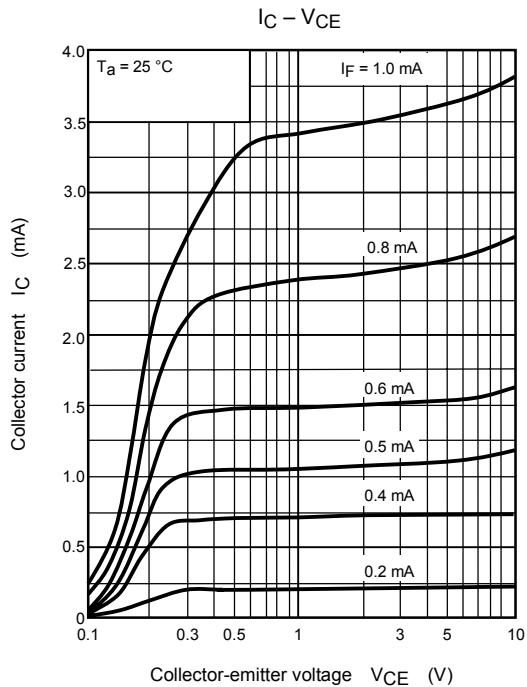
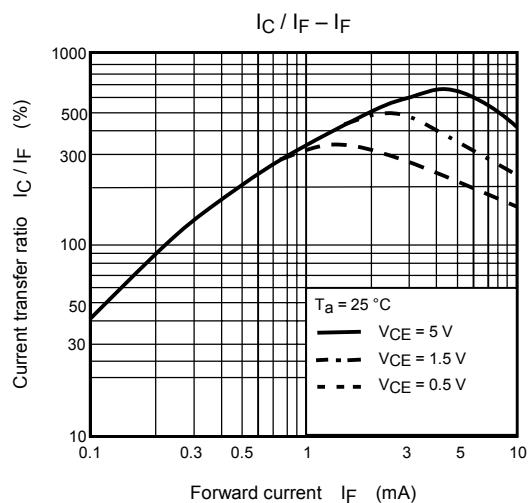
**Switching Characteristics (Ta = 25°C)**

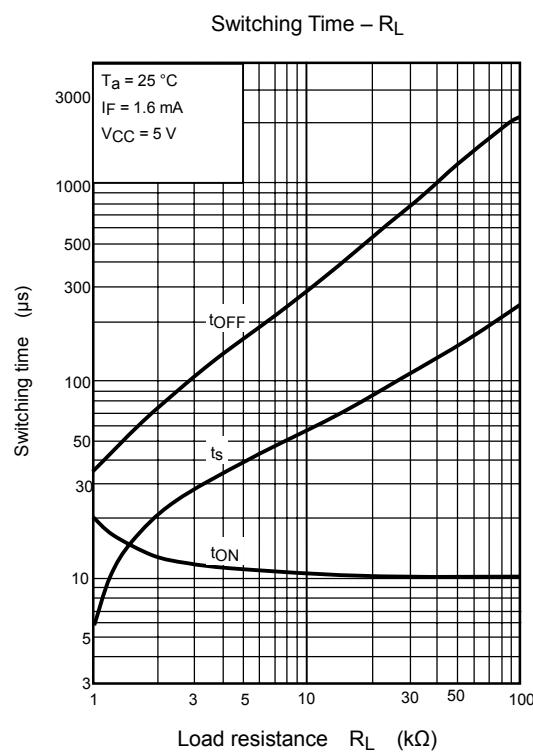
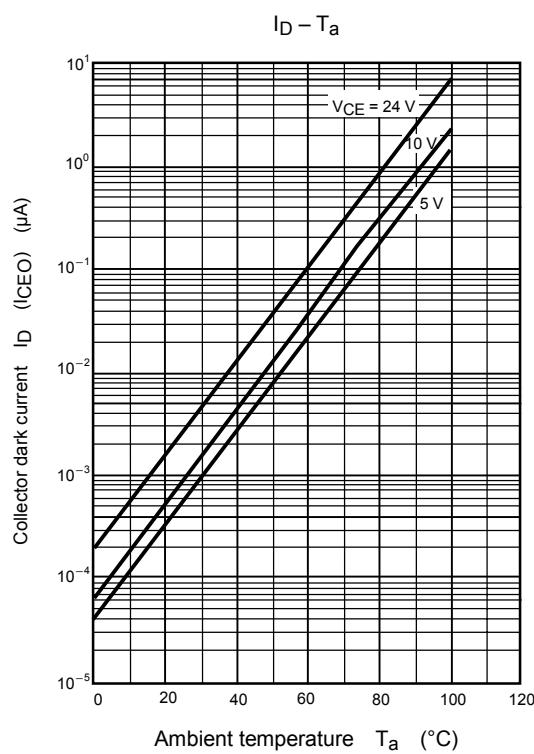
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	$t_r$	$V_{CC} = 10\text{V}$ , $I_C = 2\text{mA}$ $R_L = 100\Omega$	—	8	—	$\mu\text{s}$
Fall time	$t_f$		—	8	—	
Turn-on time	$t_{on}$		—	10	—	
Turn-off time	$t_{off}$		—	8	—	
Turn-on time	$t_{ON}$	$R_L = 4.7\text{ k}\Omega$ (Fig.1) $V_{CC} = 5\text{ V}$ , $I_F = 1.6\text{mA}$	—	10	—	$\mu\text{s}$
Storage time	$t_s$		—	50	—	
Turn-off time	$t_{OFF}$		—	300	—	

Fig. 1 Switching time test circuit









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