

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP624, TLP624-2, TLP624-4

Programmable Controllers
AC/DC-Input Module
Telecommunication

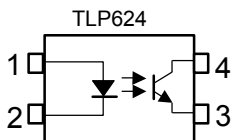
The TOSHIBA TLP624, -2 and -4 consist of a gallium arsenide infrared emitting diode optically coupled to a photo-transistor.
The TLP624-2 offers two isolated channels in an eight lead plastic DIP, while the TLP624-4 provides four isolated channels in a sixteen lead plastic DIP.

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

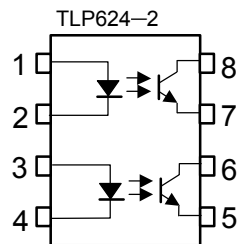
Classi- fication	Current Transfer Ratio(min)			Marking of classi- fication
	Ta = 25°C		Ta = -25~75°C	
	If=1mA VCE=0.5V	If=0.5mA VCE=1.5V	If=1mA VCE=0.5V	
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV,blank

- Isolation voltage: 5000V_{rms} 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

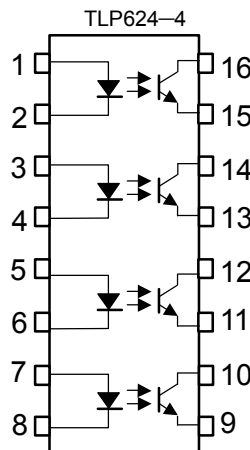
Pin Configurations(top view)



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

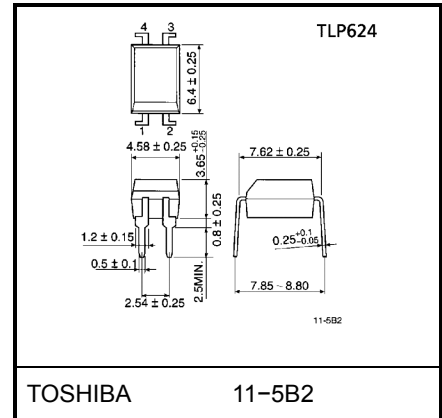


- 1,3 : Anode
- 2,4 : Cathode
- 5,7 : Emitter
- 6,8 : Collector



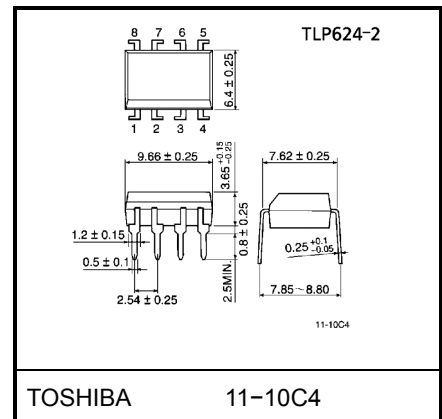
- 1,3,5,7: Anode
- 2,4,6,8: Cathode
- 9,11,13,15: Emitter
- 10,12,14,16: Collector

Unit in mm



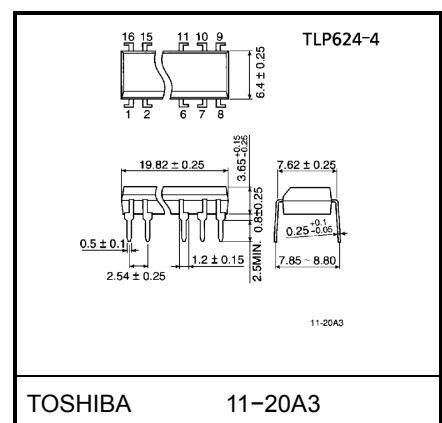
TOSHIBA 11-5B2

Weight: 0.26 g



TOSHIBA 11-10C4

Weight: 0.54 g



TOSHIBA 11-20A3

Weight: 1.1 g

Maximum Ratings (Ta = 25°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(Ta \geq 39°C)	-0.5(Ta \geq 25°C)	mA / °C
	Pulse forward current	I_{FP}	1(100 μ s, pulse, 100pps)		A
	Power dissipation(1 Circuit)	P_D	100	70	mW
	Power dissipation derating (Ta \geq 25°C, 1 Circuit)	$\Delta P_D / ^\circ\text{C}$	-1.0	-0.7	mW / °C
	Reverse voltage	V_R	5		V
	Junction temperature	T_j	125		°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 (Ta \geq 25°C, 1 Circuit)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / °C
	Junction temperature	T_j	125		°C
Storage temperature range		T_{stg}	-55~125		°C
Operating temperature range		P_{opr}	-55~100		°C
Lead soldering temperature		T_{sol}	260(10s)		°C
Total package power dissipation(1 Circuit)		P_T	250	150	mW
Total package power dissipation derating (Ta \geq 25°C, 1 Circuit)		$\Delta P_T / ^\circ\text{C}$	-2.5	-1.5	mW / °C
Isolation voltage (Note 1)		BV_S	5000(AC, 1min., RH \leq 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	°C

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	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	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	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 (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	—	

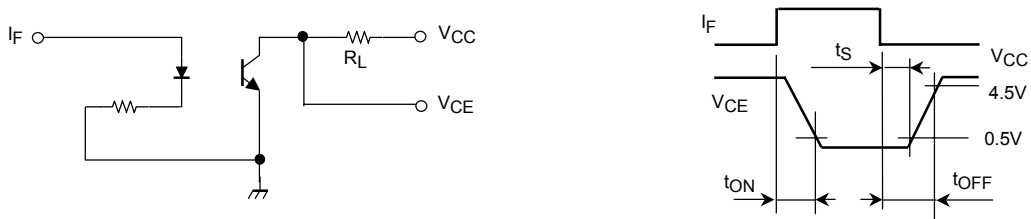
Isolation Characteristics (Ta = 25°C)

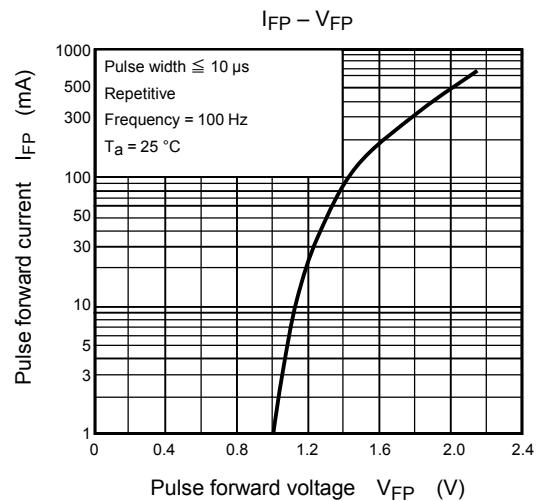
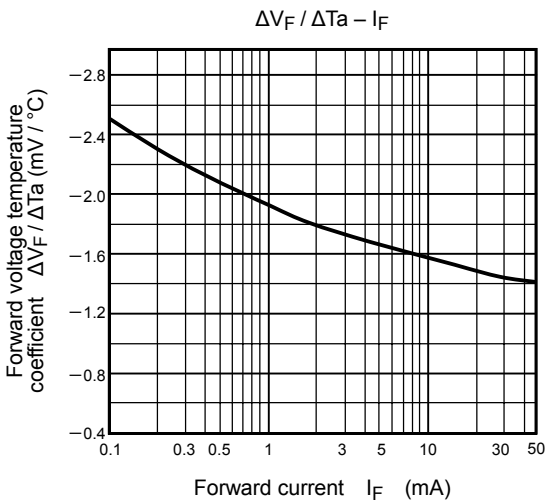
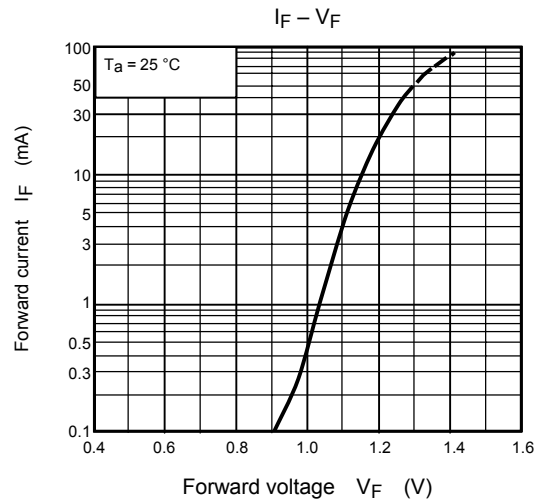
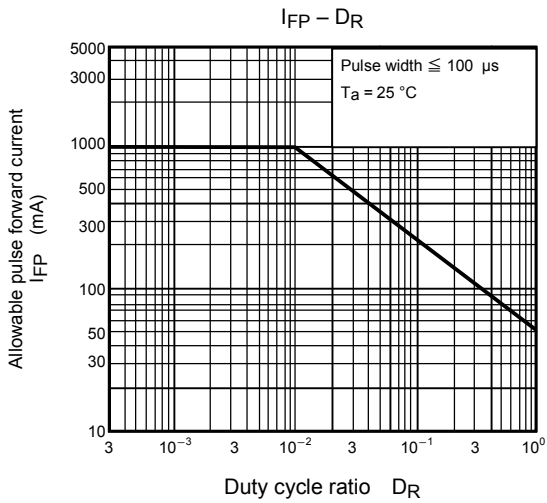
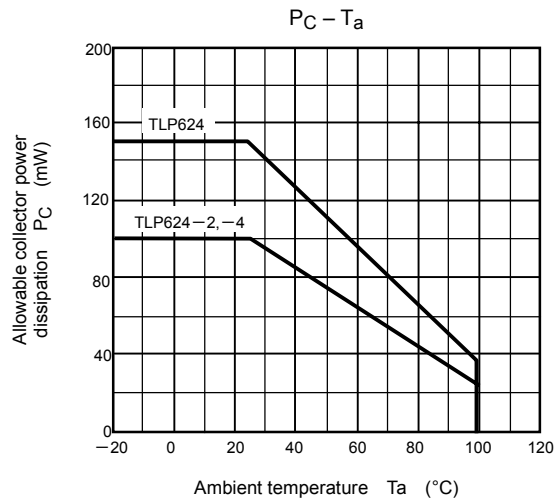
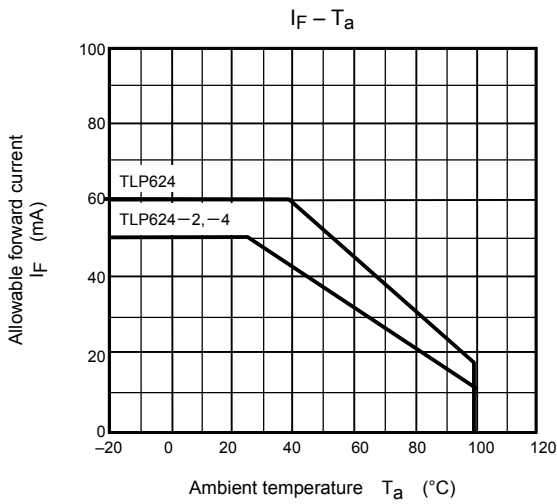
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	C _S	V _S = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500V	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 1minute	5000	—	—	V _{rms}
		AC, 1second, in oil	—	10000	—	—
		DC, 1 minute, in oil	—	10000	—	—

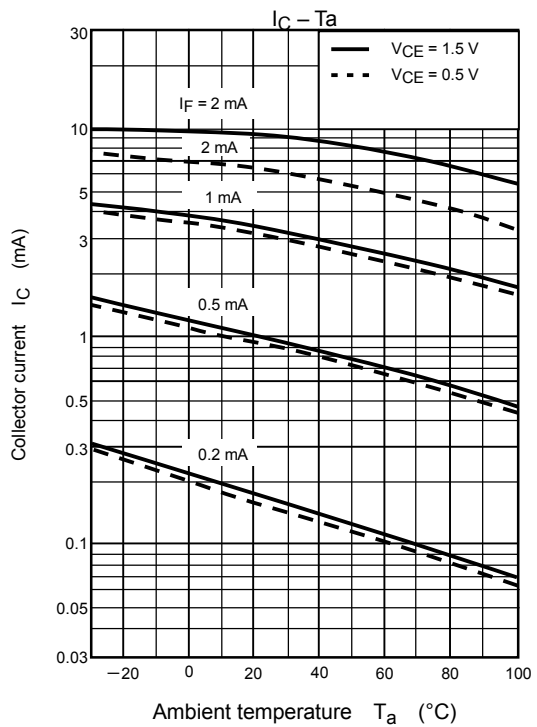
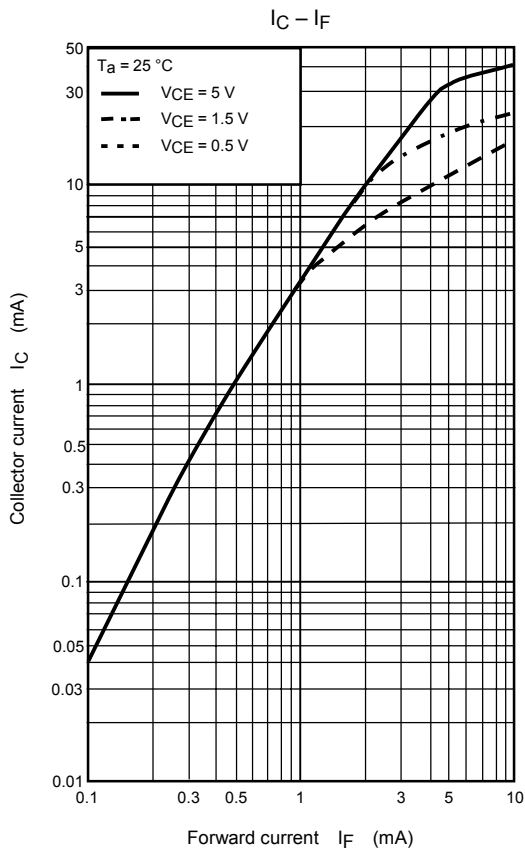
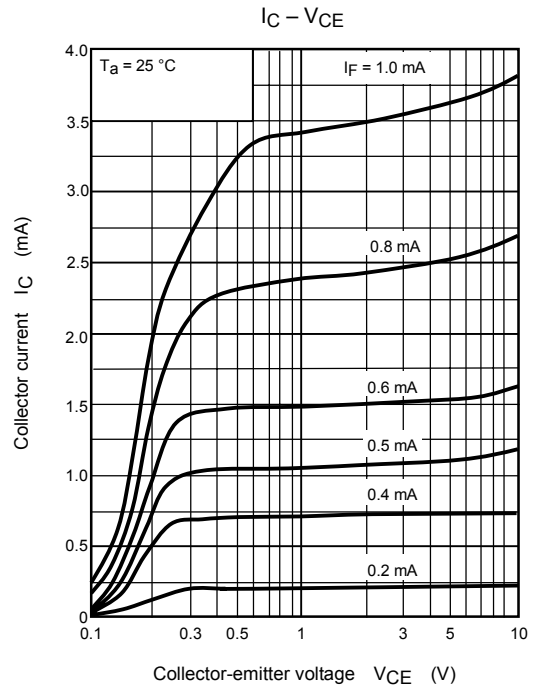
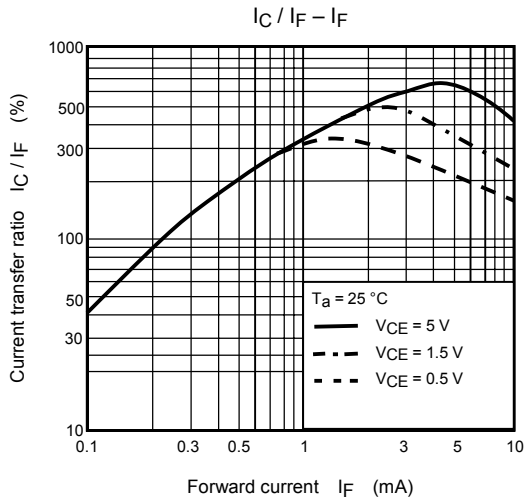
Switching Characteristics (Ta = 25°C)

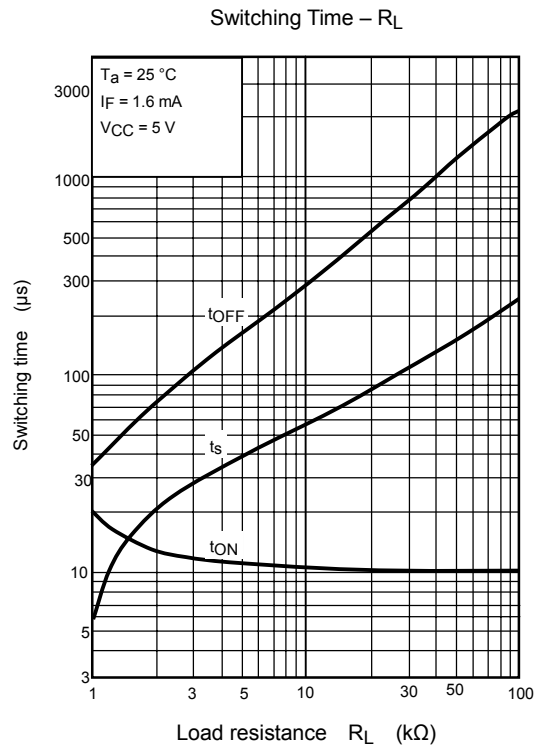
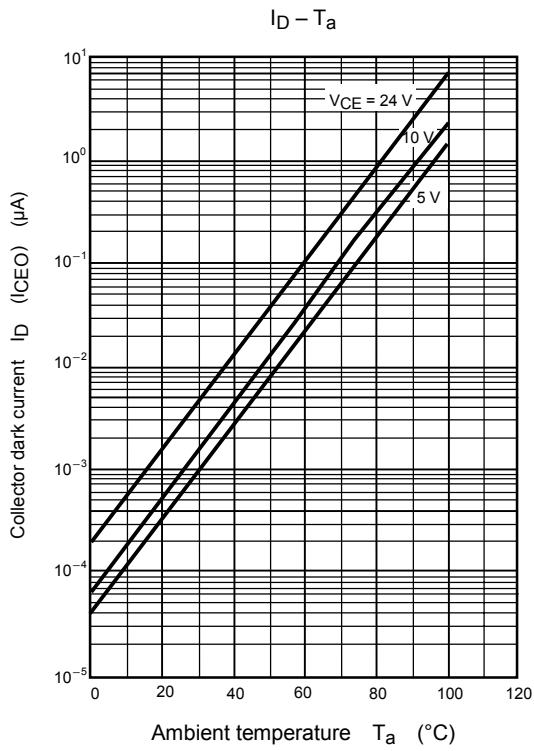
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t _r	V _{CC} = 10V, I _C = 2mA R _L = 100Ω	—	8	—	μs
Fall time	t _f		—	8	—	
Turn-on time	t _{on}		—	10	—	
Turn-off time	t _{off}		—	8	—	
Turn-on time	t _{ON}	R _L = 4.7 kΩ (Fig.1) V _{CC} = 5 V, I _F = 1.6mA	—	10	—	μs
Storage time	t _S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

Fig. 1 Switching time test circuit









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