

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

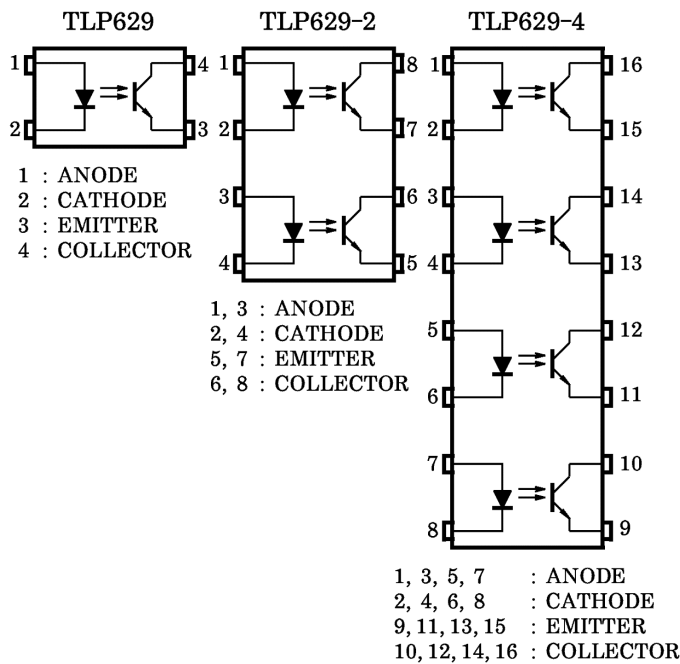
# TLP629, TLP629-2, TLP629-4

Telecommunication  
Office Machine  
Telephone Use Equipment

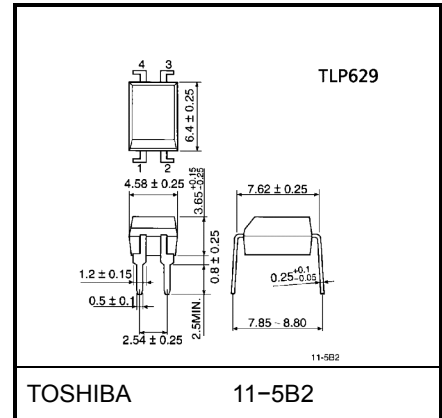
The TOSHIBA TLP629, -2, and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP629-2 offers two isolated channels in an eight lead plastic DIP, while the TLP629-4 provides four isolated channels in a sixteen plastic DIP. This is suitable for application of DC input current up to 150mA.

- I<sub>F</sub> maximum rating: 150mA
- Collector-emitter voltage: 55V (min.)
- Current transfer ratio: 25% (min.) (I<sub>F</sub>=20mA)
- Isolation voltage: 5000V<sub>rms</sub> (min.)
- UL recognized: UL1577, file no. E67349

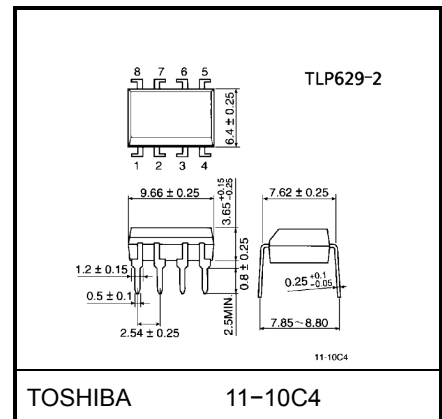
## Pin Configurations (top view)



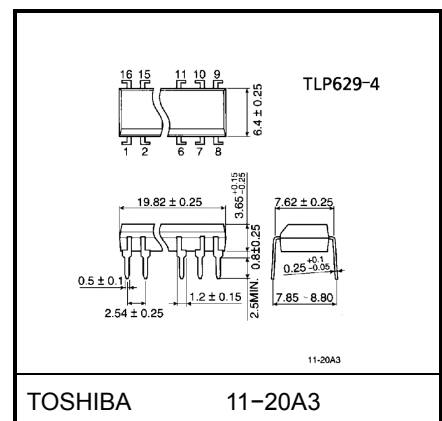
Unit in mm



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g

## Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating		Unit
			TLP629	TLP629-2,4	
LED	Forward current	$I_F$	150		mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-1.5 (Ta ≥ 25°C)		mA / °C
	Pulse forward current	$I_{FP}$	1 (100µs pulse, 100pps)		A
	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	$I_C$	80		mA
	Collector power dissipation (1 circuit)	$P_C$	150	100	mW
	Collector power dissipation derating (1 circuit, Ta ≥ 25°C)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / °C
	Junction temperature	$T_j$	125		°C
Storage temperature range		$T_{stg}$	-55~125		°C
Operating temperature range		$T_{opr}$	-55~100		°C
Lead soldering temperature		$T_{sol}$	260 (10s)		°C
Total package power dissipation		$P_T$	250	200	mW
Total package power dissipation derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ\text{C}$	-2.5	2.0	mW / °C
Isolation voltage (Note 1)		$BV_S$	5000 (AC, 1min., RH ≤ 60%)		$V_{rms}$

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

## Recommended Operating Conditions

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{CC}$	—	5	24	V
Forward current	$I_F$	—	20	120	mA
Collector current	$I_C$	—	1	10	mA
Operating temperature	$T_{opr}$	-25	—	85	°C

## Individual Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	$V_F$	$I_F = 100 \text{ mA}$	—	1.4	1.7	V
	Forward current	$I_F$	$V_F = 0.7 \text{ V}$	—	2.5	20	$\mu\text{A}$
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	50	—	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	$C_{CE}$	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF	

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	$I_C / I_F$	$I_F = 20 \text{ mA}, V_{CE} = 1 \text{ V}$	25	—	—	%
	$I_C / I_F$ (high)	$I_F = 100 \text{ mA}, V_{CE} = 1 \text{ V}$	20	—	80	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 2.4 \text{ mA}, I_F = 20 \text{ mA}$	—	—	0.4	V
		$I_C = 2.4 \text{ mA}, I_F = 100 \text{ mA}$	—	—	0.4	
Off-state collector current	$I_{C(off)}$	$V_F = 0.7 \text{ V}, V_{CEO} = 24 \text{ V}$	—	1	1.0	$\mu\text{A}$

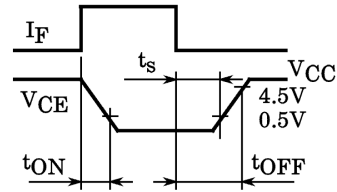
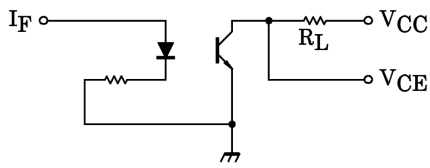
## Isolation Characteristics (Ta = 25°C)

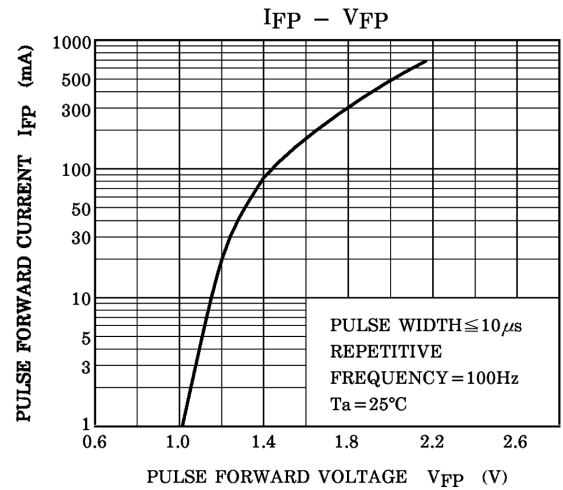
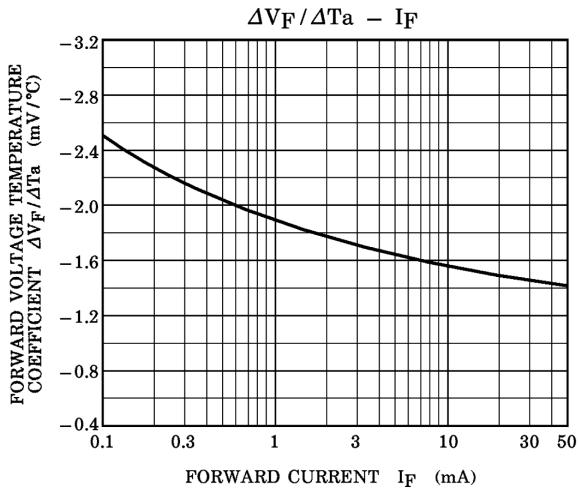
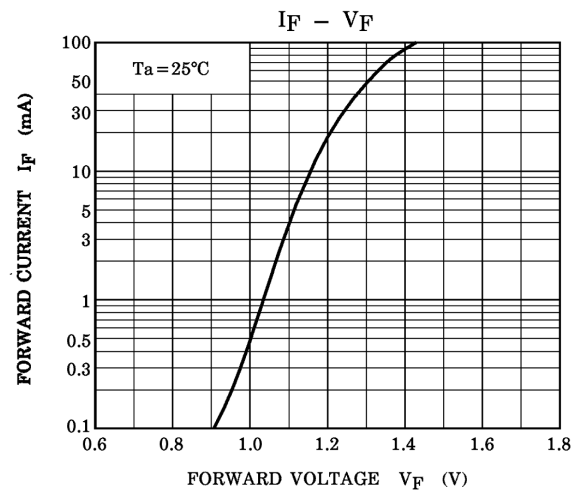
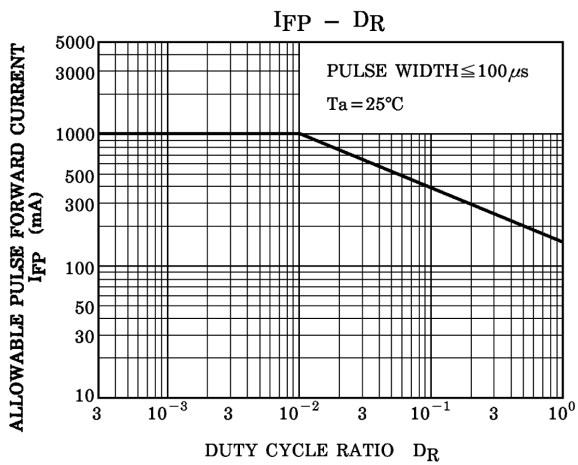
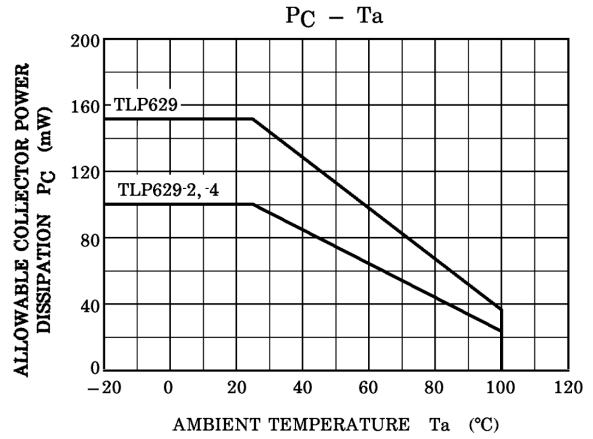
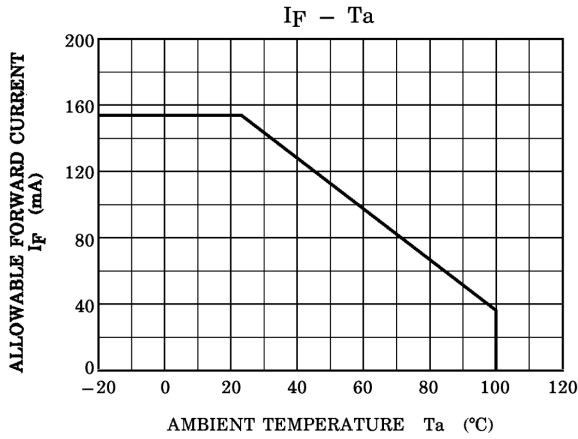
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	5000	—	—	$V_{rms}$
		AC, 1 second, in oil	—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

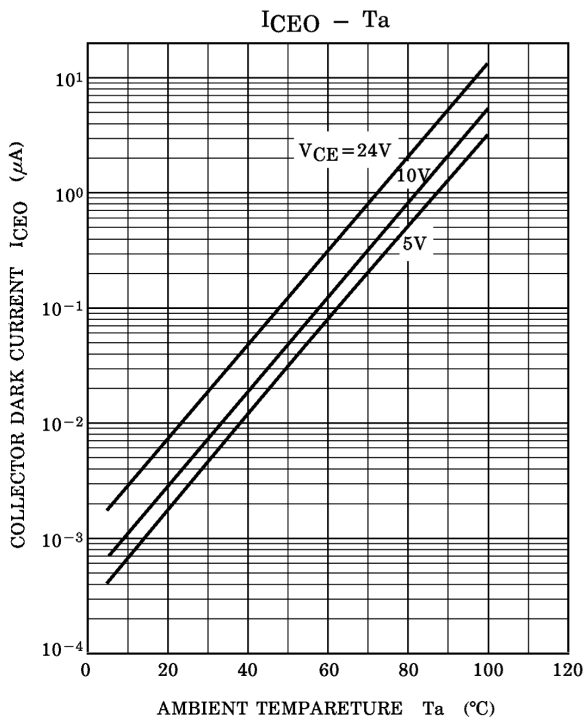
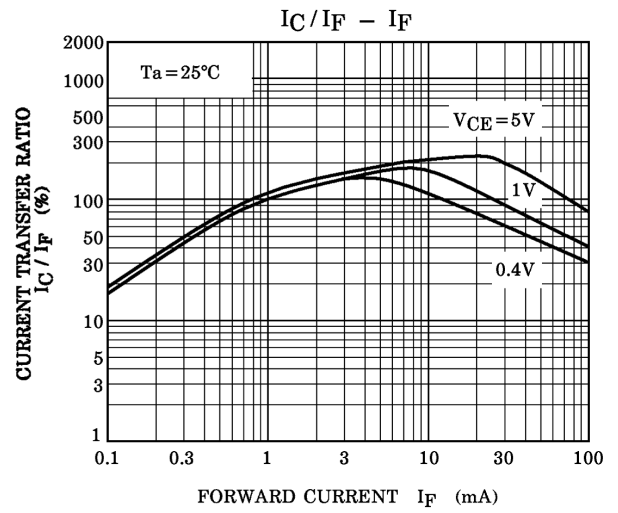
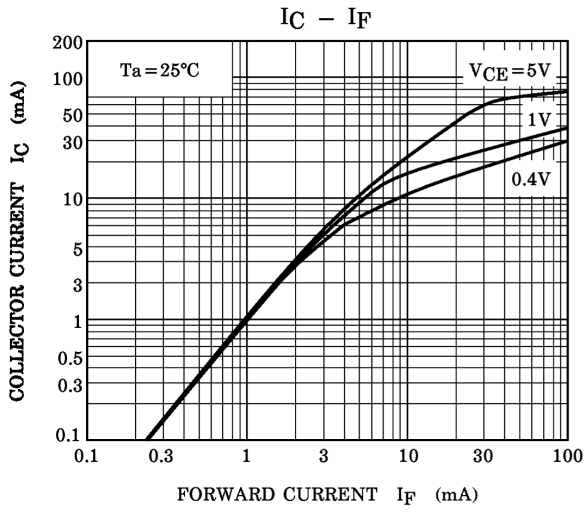
**Switching Characteristics (Ta = 25°C)**

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	$t_r$	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\Omega$	—	2	—	$\mu\text{s}$
Fall time	$t_f$		—	3	—	
Turn-on time	$t_{on}$		—	3	10	
Turn-off time	$t_{off}$		—	3	10	
Turn-on time	$t_{ON}$	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = 16\text{ mA}$ (Fig.1)	—	2	—	$\mu\text{s}$
Storage time	$t_s$		—	15	—	
Turn-off time	$t_{OFF}$		—	25	—	

Fig. 1 Switching time test circuit







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