

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP523, TLP523-2, TLP523-4

Unit in mm

Programmable Controllers

DC-Output Module

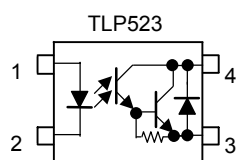
Solid State Relay

The TOSHIBA TLP523, -2 and -4 consists of a gallium arsenide infrared emitting diode coupled with a silicon, darlington connected, phototransistor which has an integral base-emitter resistor to optimize switching speed and elevated temperature characteristics.

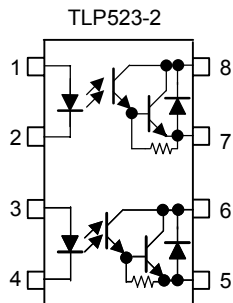
The TLP523-2 offers two isolated channels in a eight lead plastic DIP package, while the TLP523-4 provide four isolated channels per package.

- Current transfer ratio: 500% (min.) ($I_F = 1 \text{ mA}$)
- Isolation voltage: 2500 Vrms (min.)
- Collector-emitter voltage: 55 V (min.)
- Leakage current: $10 \mu\text{A}$ (max.) ($T_a = 85^\circ\text{C}$)
- UL recognized: UL1577, file no. E67349

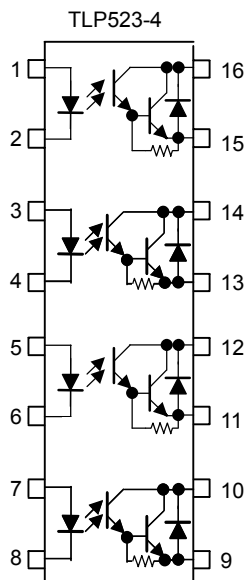
Pin Configurations (top view)



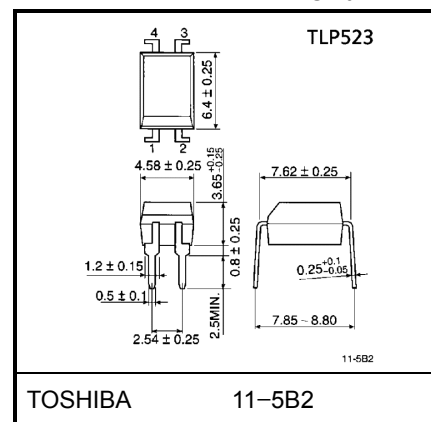
1 : Anode
2 : Cathode
3 : Emitter
4 : Collector



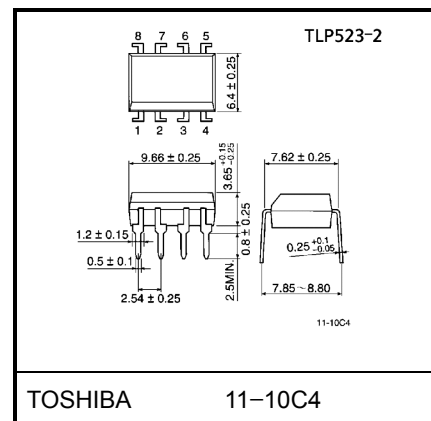
1, 3 : Anode
2, 4 : Cathode
5, 7 : Emitter
6, 8 : Collector



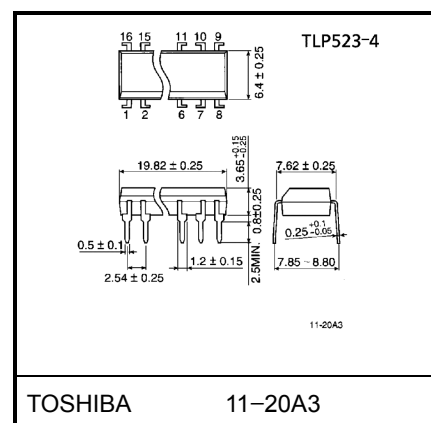
1, 3, 5, 7 : Anode
2, 4, 6, 8 : Cathode
9, 11, 13, 15 : Emitter
10, 12, 14, 16 : Collector



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating		Unit
			TLP523	TLP523-2 TLP523-4	
LED	Forward current	I_F	60	50	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-0.7 (Ta $\geq 39^\circ\text{C}$)	-0.5 (Ta $\geq 25^\circ\text{C}$)	mA / $^\circ\text{C}$
	Pulse forward current	I_{FP}	1 (100 μs pulse, 100pps)		A
	Reverse voltage	V_R	5		V
Detector	Collector-emitter voltage	V_{CEO}	55		V
	Emitter-collector voltage	V_{ECO}	0.3		V
	Collector current	I_C	150		mA
	Collector power dissipation (1 circuit)	P_C	150	100	mW
	Collector power dissipation derating (1 circuit (Ta $\geq 25^\circ\text{C}$))	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / $^\circ\text{C}$
Operating temperature range		T_{opr}	-55~100		$^\circ\text{C}$
Storage temperature range		T_{stg}	-55~125		$^\circ\text{C}$
Lead soldering temperature (10 s)		T_{sol}	260		$^\circ\text{C}$
Total power dissipation		P_T	250	150	mW
Total power dissipation derating (Ta $\geq 25^\circ\text{C}$)		$\Delta P_T / ^\circ\text{C}$	-2.5	-1.5	mW / $^\circ\text{C}$
Isolation voltage (Note 1)		BV_S	2500 (AC, 1min., R.H. $\leq 60\%$)		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	—	16	20	mA
Operating temperature range	T_{opr}	-25	—	85	$^\circ\text{C}$

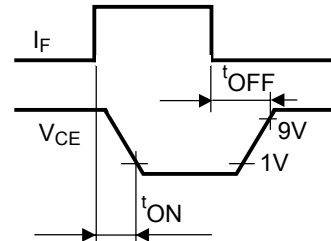
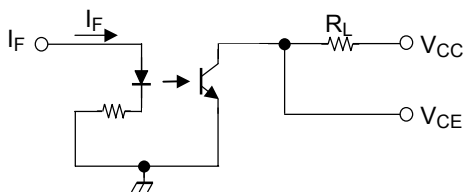
Electrical Characteristics (Ta = 25°C)

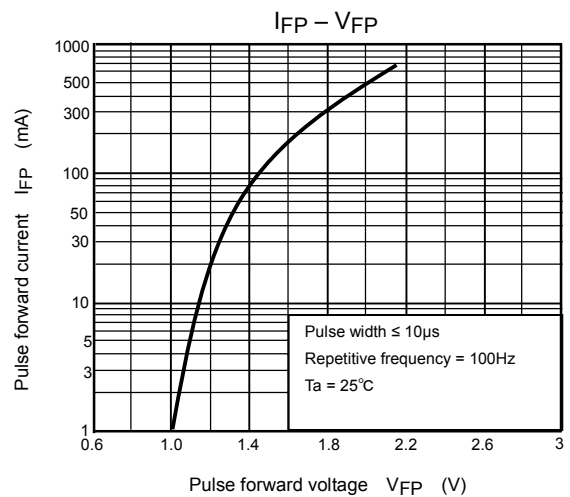
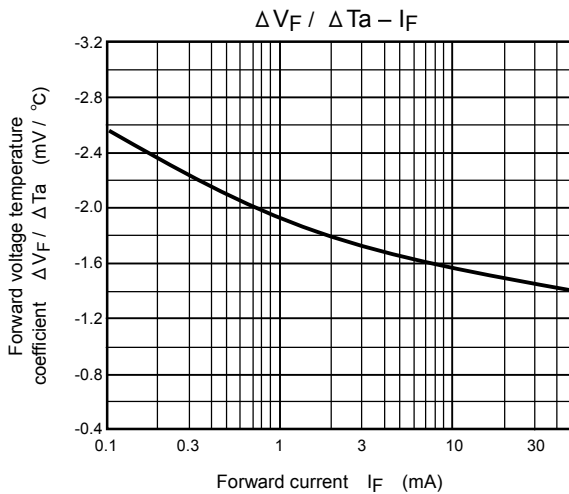
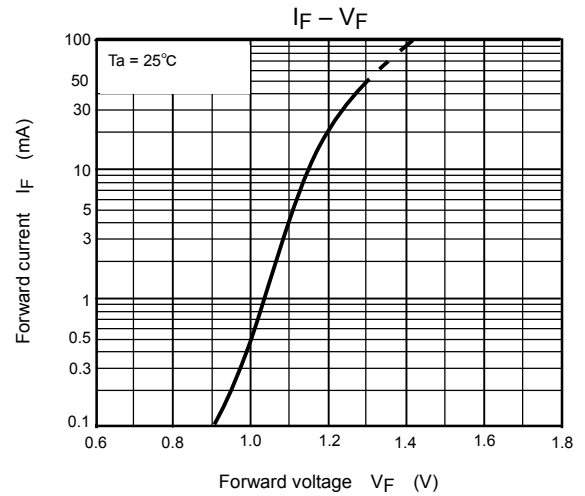
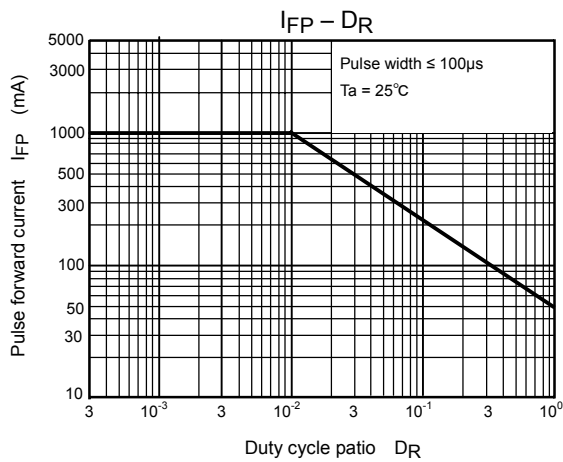
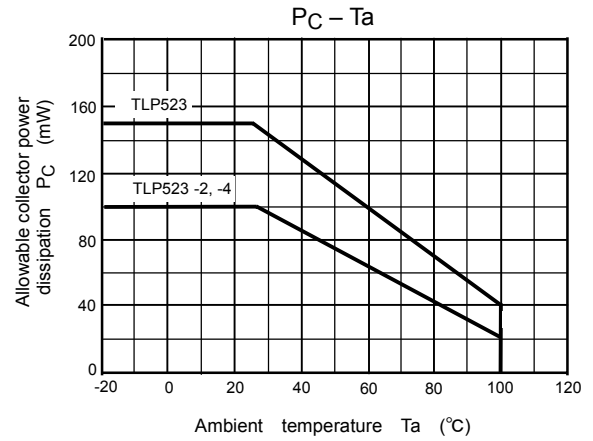
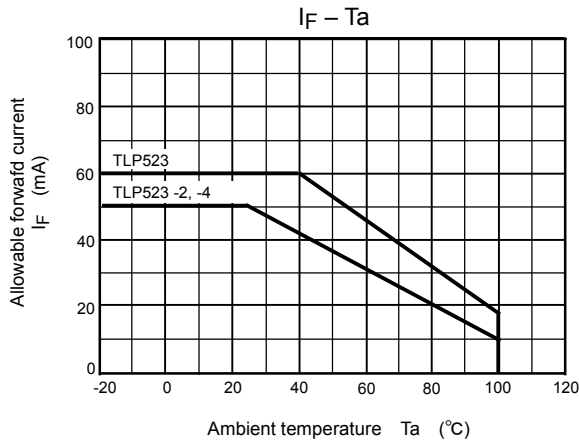
Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	C_T	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1 \text{ mA}$	55	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 24 \text{ V}$	—	10	200	nA
			$V_{CE} = 24 \text{ V}, T_a = 85^\circ\text{C}$	—	0.5	10	μA
	Capacitance collector to emitter	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF
Coupled	Current transfer ratio	I_C / I_F	$I_F = 1 \text{ mA}, V_{CE} = 1 \text{ V}$	500	2000	—	%
	Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 50 \text{ mA}, I_F = 10 \text{ mA}$	—	—	1	V
	Capacitance input to output	C_S	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
	Isolation resistance	R_S	$V_S = 500 \text{ V}, R.H. \leq 60\%$	5×10^{10}	10^{14}	—	Ω

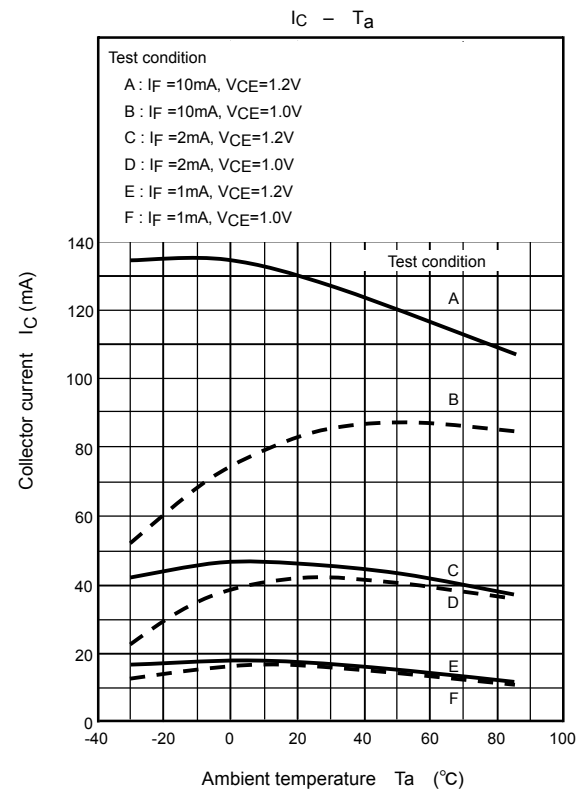
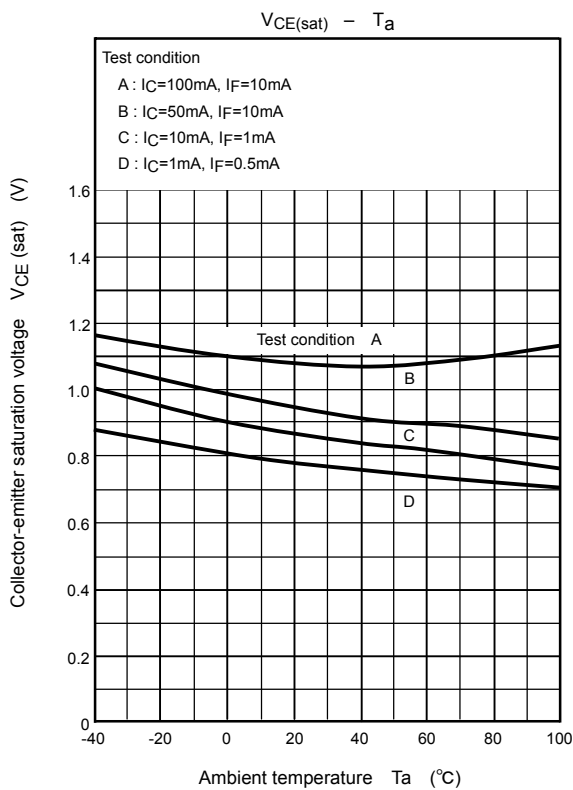
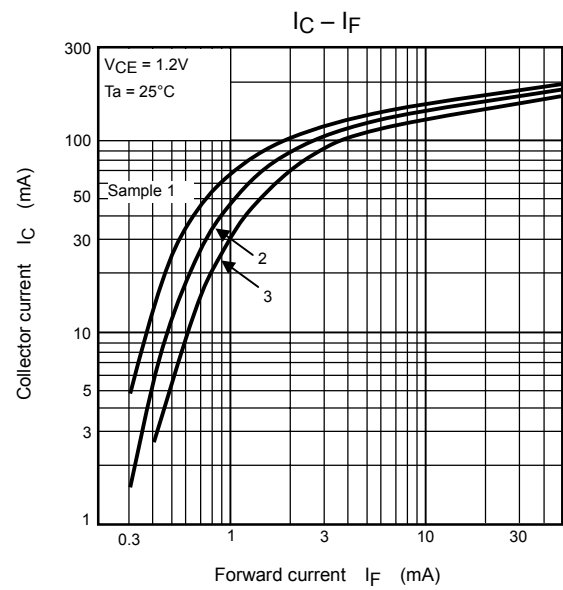
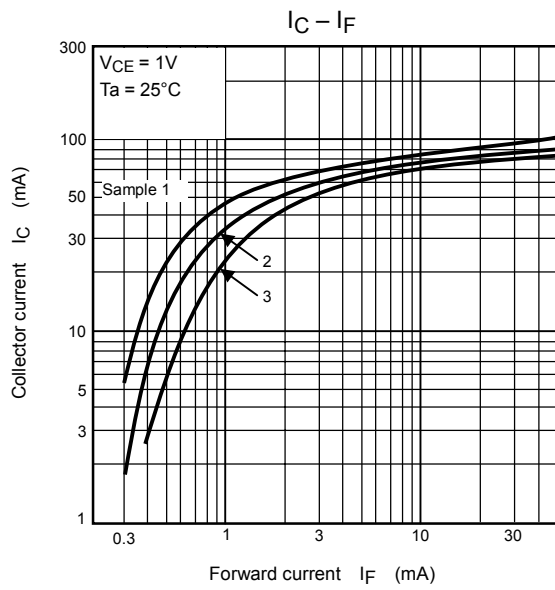
Switching Characteristics (Ta = 25°C)

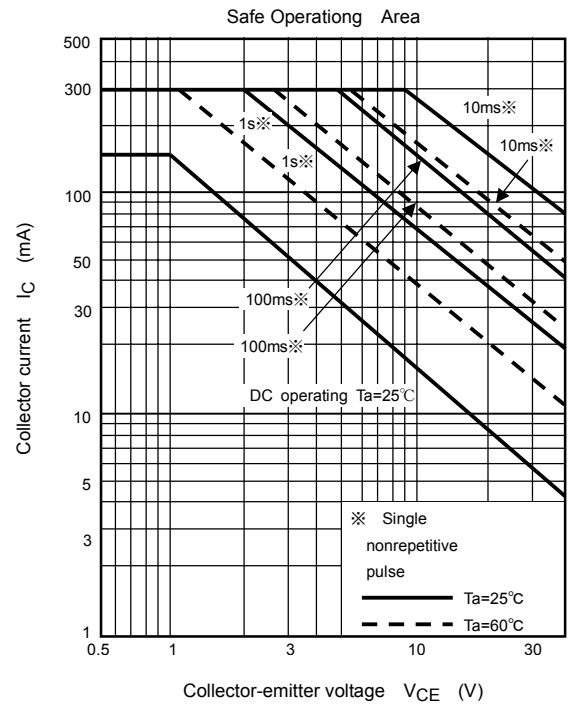
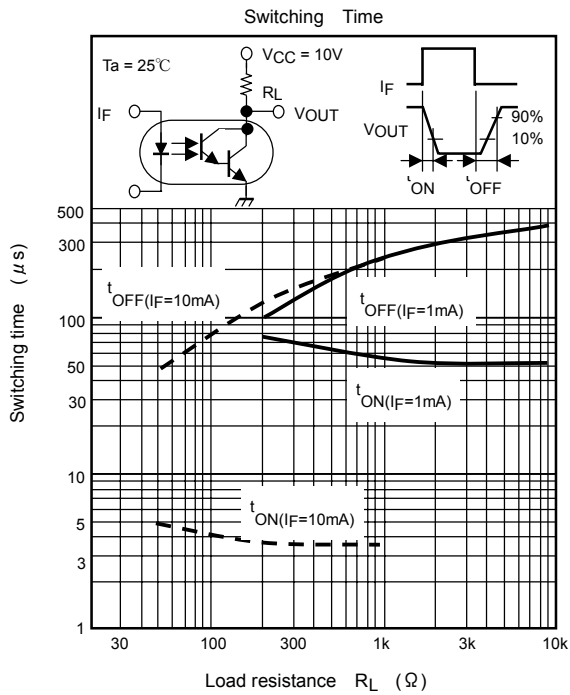
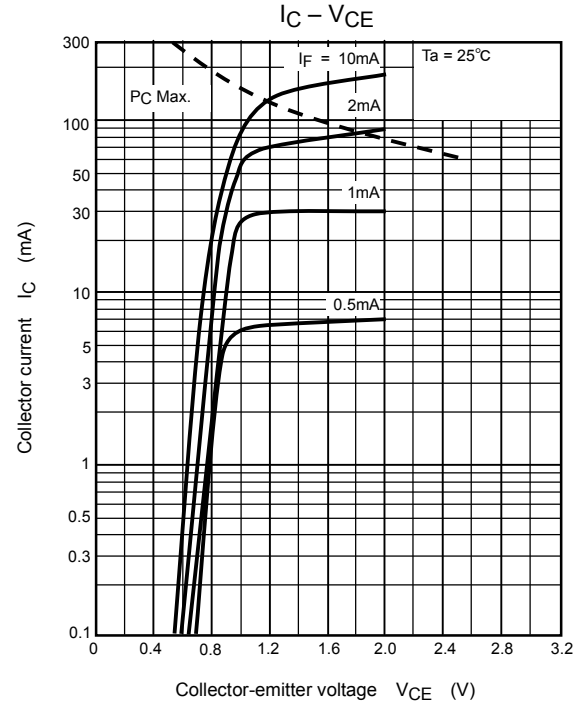
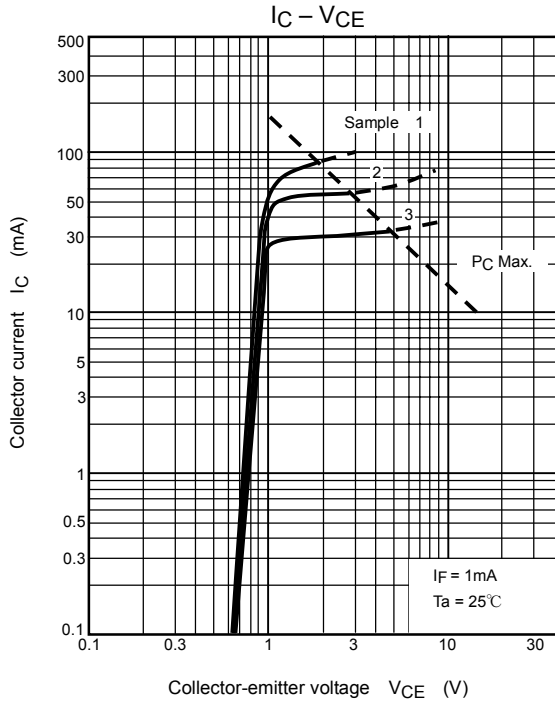
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Turn-on time	t_{ON}	$V_{CC} = 10 \text{ V}, R_L = 180 \Omega$ $I_F = 16 \text{ mA}$	—	3	—	μs
Turn-off time	t_{OFF}		—	80	—	μs

Switching Time Test Circuit









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