

Programmable Controllers

AC/DC-Input Module

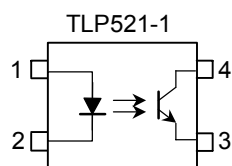
Solid State Relay

The TLP521-1, -2 and -4 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode.

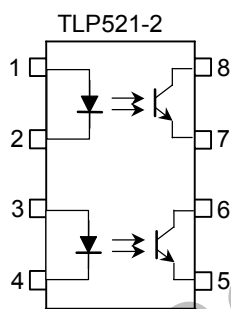
The TLP521-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP521-4 provides four isolated channels in a sixteen plastic DIP package.

- Collector-emitter voltage: 55 V (min)
- Current transfer ratio: 50% (min) Rank GB: 100% (min)
- Isolation voltage: 2500 Vrms (min)

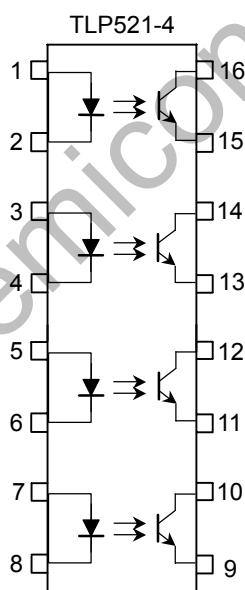
Pin Configurations (top view)



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

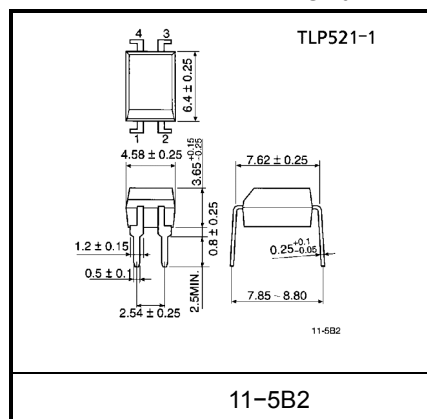


1, 3 : Anode
2, 4 : Cathode
5, 7 : Emitter
6, 8 : Collector

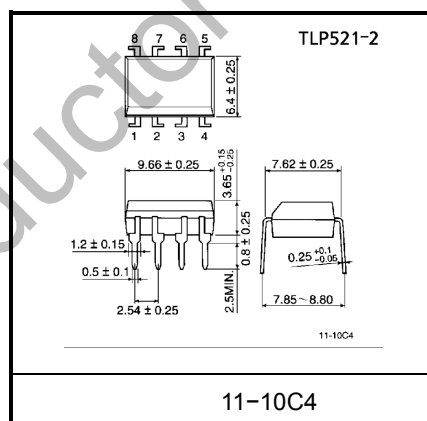


1, 3, 5, 7 : Anode
2, 4, 6, 8 : Cathode
9, 11, 13, 15 : Emitter
10, 12, 14, 16 : Collector

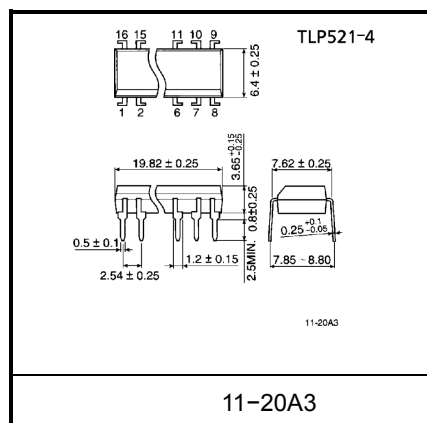
Unit in mm



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating		Unit
			TLP521-1	TLP521-2 TLP521-4	
LED	Forward current	I_F	70	50	mA
	Forward current derating	$\Delta I_F / ^\circ\text{C}$	-0.93 (Ta $\geq 50^\circ\text{C}$)	-0.5 (Ta $\geq 25^\circ\text{C}$)	mA / $^\circ\text{C}$
	Pulse forward current	I_{FP}	1 (100 μ pulse, 100pps)		A
	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 (1 circuit Ta $\geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-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 (10 s)		$^\circ\text{C}$
Total package power dissipation		P_T	250	150	mW
Total package 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		BV_S	2500 (AC, 1min., R.H. $\leq 60\%$) (Note 1)		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	25	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	-25	—	85	$^\circ\text{C}$

Type	Classi- fication (*1)	Current Transfer Ratio (%) (I _C / I _F)		Marking Of Classification
		I _F = 5mA, V _{CE} = 5V, T _a = 25°C		
		Min	Max	
TLP521	A	50	600	Blank, Y, Y [■] , G, G [■] , B, B [■] , GB
	Rank Y	50	150	Y, Y [■]
	Rank GR	100	300	G, G [■]
	Rank BL	200	600	B, B [■]
	Rank GB	100	600	G, G [■] , B, B [■] , GB
TLP521-2 TLP521-4	A	50	600	Blank, GR, BL, GB
	Rank GB	100	600	GR, BL, GB

*1: Ex. rank GB: TLP521-1 (GB)

(Note): Application type name for certification test, please use standard product type name, i.e.

TLP521-1 (GB): TLP521-1, TLP521-2 (GB): TLP521-2

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}	$V = 0, f = 1 \text{ MHz}$	—	10	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_C / I_F	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-emitter saturation voltage	$V_{CE} (\text{sat})$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$	—	—	0.4	V
		$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	—	0.2	—	
			—	—	0.4	

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	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	—	10^{11}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	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	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ (Fig.1) $V_{CC} = 5\text{ V}$, $I_F = 16\text{ mA}$	—	2	—	μs
Storage time	t_s		—	15	—	
Turn-off time	t_{OFF}		—	25	—	

Fig.1 : SWITCHING TIME TEST CIRCUIT

