TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP521-1,TLP521-2,TLP521-4

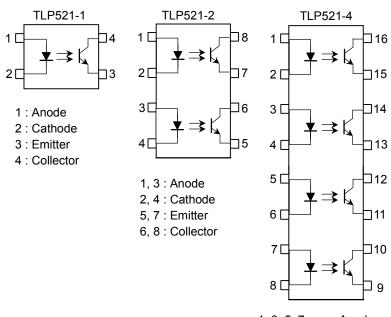
Programmable Controllers AC/DC-Input Module Solid State Relay

The TOSHIBA 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.

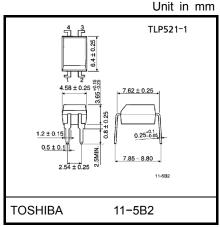
- Collector-emitter voltage: 55 V (min)
- Current transfer ratio: 50% (min)
- Rank GB: 100% (min)
- Isolation voltage: 2500 Vrms (min)
- UL recognized

made in Japan: UL1577, file No. E67349 made in Thailand: UL1577, file No. E152349

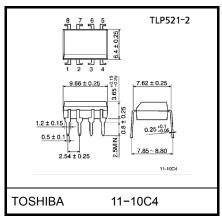
Pin Configurations (top view)



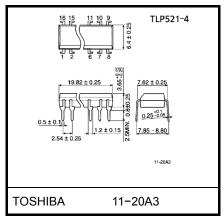
1, 3, 5, 7 : Anode 2, 4, 6, 8 : Cathode 9, 11, 13, 15 : Emitter 10, 12, 14, 16: Collector



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g



Absolute Maximum Ratings (Ta = 25°C)

			Rat	ting	
	Characteristic	Symbol	TLP521-1	TLP521–2 TLP521–4	Unit
	Forward current	lF	70	50	mA
	Forward current derating	ΔI _F /°C	–0.93 (Ta ≥ 50°C)	–0.5 (Ta ≥ 25°C)	mA /°C
LED	Pulse forward current	I _{FP}	1 (100µ pulse, 100pps)		Α
	Reverse voltage	V _R	5		V
	Junction temperature	Tj	12	25	°C
	Collector-emitter voltage	V _{CEO}	5	5	V
	Emitter-collector voltage	V _{ECO}	7		V
'n	Collector current	I _C	50		mA
Detector	Collector power dissipation (1 circuit)	PC	150	100	mW
	Collector power dissipation derating (1 circuit Ta ≥ 25°C)	ΔP _C /°C	-1.5	-1.0	mW /°C
	Junction temperature	Tj	12	25	°C
Stor	rage temperature range	T _{stg}	<i>−</i> 55~125		°C
Оре	erating temperature range	T _{opr}	−55~100		°C
Lead soldering temperature		T _{sol}	260 (10 s)		°C
Total package power dissipation		PT	250 150		mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔP _T /°C	-2.5	-1.5	mW /°C
Isola	ation voltage	BVS	2500 (AC, 1min., R.H.≤ 60%) (Note 1)		Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

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	Тур.	Max	Unit
Supply voltage	V _{CC}	_	5	24	V
Forward current	lF	_	16	25	mA
Collector current	IC	_	1	10	mA
Operating temperature	T _{opr}	-25	_	85	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Туре	Classi– fication (*1)	(I _C	sfer Ratio (%) / I _F) = 5V, Ta = 25°C	Marking Of Classification		
		Min	Max			
	Α	50	600	Blank, Y, Y [*] , G, G [*] , B, B [*] , GB		
	Rank Y	50	150	Y, Y**		
TLP521	Rank GR	100	300	G, G*		
	Rank BL	200	600	B, B [■]		
	Rank GB	100	600	G, G [*] , B, B [*] , GB		
TLP521-2	Α	50	600	Blank, GR, BL, GB		
TLP521-4	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	Тур.	Max	Unit
	Forward voltage	V _F	I _F = 10 mA	1.0	1.15	1.3	V
LED	Reverse current	I _R	V _R = 5 V	_	_	10	μΑ
	Capacitance	C _T	V = 0, f = 1 MHz	_	30	-	pF
	Collector–emitter breakdown voltage	V _(BR) CEO	I _C = 0.5 mA	55	_	1	٧
ctor	Emitter-collector breakdown voltage	V _(BR) ECO	I _E = 0.1 mA	7	_	1	٧
Detector	Collector dark current	lone	V _{CE} = 24 V	_	10	100	nA
	Collector dark current	ICEO	V _{CE} = 24 V, Ta = 85°C		2	50	μΑ
	Capacitance (collector to emitter)	C _{CE}	V = 0, f = 1 MHz		10		pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	MIn	Тур.	Max	Unit
Current transfer ratio	I _C / I _F	Pank CD	600	- %		
Current transfer fatto	IC7 IF		100	_	600	/0
Saturated CTR	lo/le/ o	IF = 1 mA, V _{CE} = 0.4 V Rank GB I _C = 2.4 mA, I _F = 8 mA	1	60	1	%
Saturated CTK	I _C / I _{F (sat)}		30	_	_	
Collector–emitter saturation voltage		I _C = 2.4 mA, I _F = 8 mA	_	_	0.4	
	V _{CE} (sat)	I _C = 0.2 mA, I _F = 1 mA	_	0.2	_	V
		Rank GB	_	_	0.4	

Isolation Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Capacitance (input to output)	CS	V _S = 0, f = 1 MHz	_	0.8	_	pF
Isolation resistance	R _S	V _S = 500 V, R.H.≤ 60%	_	10 ¹¹	_	Ω
	AC, 1 i	AC, 1 minute	2500	_	_	Vrms
Isolation voltage	BV_S	AC, 1 second, in oil	_	5000	_	VIIIIS
		DC, 1 minute, in oil	_	5000	_	Vdc

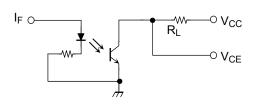


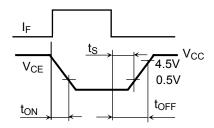
Switching Characteristics (Ta = 25°C)

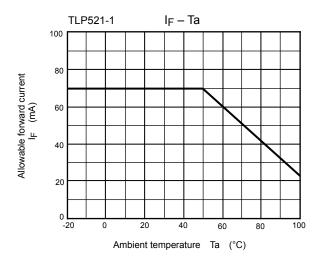
Characteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Rise time	t _r	V_{CC} = 10 V I_{C} = 2 mA R_{L} = 100 Ω	_	2	_	
Fall time	t _f		_	3	_	116
Turn-on time	t _{on}		_	3	_	μs
Turn-off time	t _{off}		_	3	_	
Turn-on time	ton	R_L = 1.9 kΩ (Fig.1) V _{CC} = 5 V, I _F = 16 mA	_	2	_	
Storage time	ts		_	15	_	μs
Turn-off time	t _{OFF}		_	25	_	

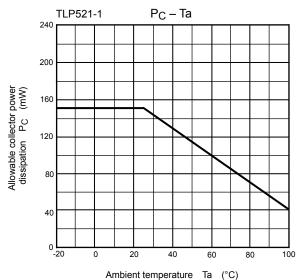
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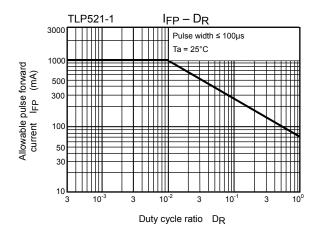
Fig.1: SWITCHING TIME TEST CIRCUIT

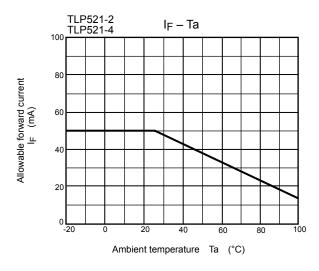


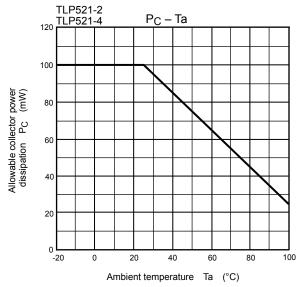


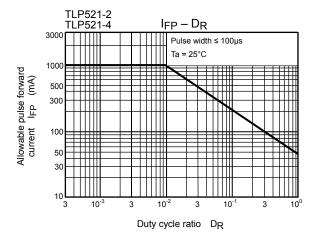


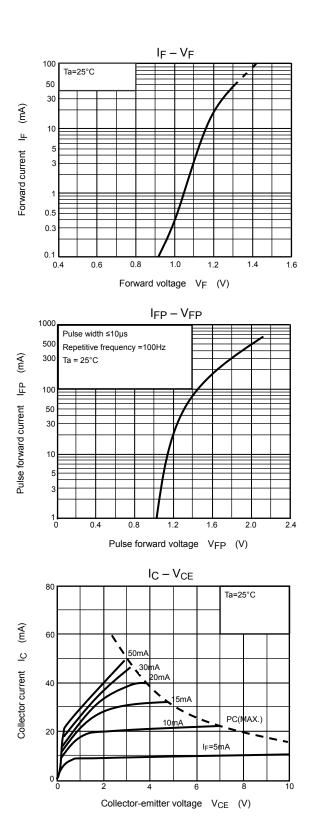


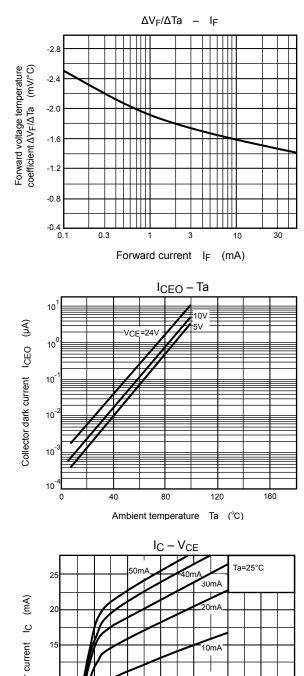


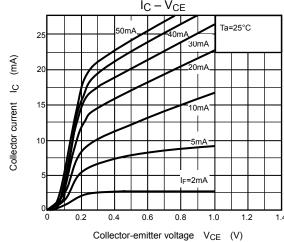




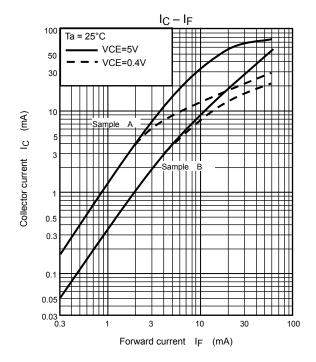


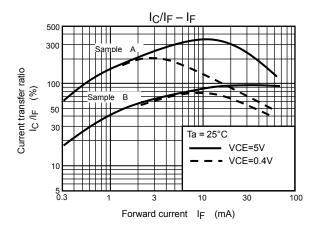


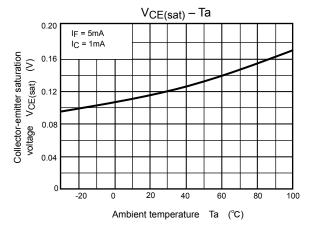


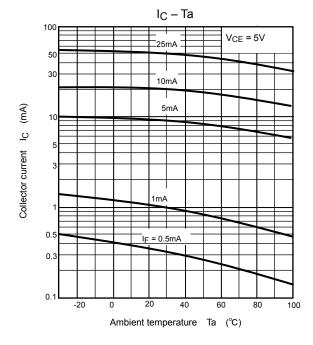


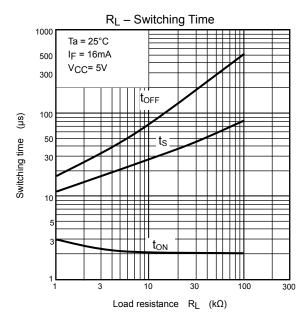
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