

SEMICONDUCTOR  
**TOSHIBA**  
 TECHNICAL DATA

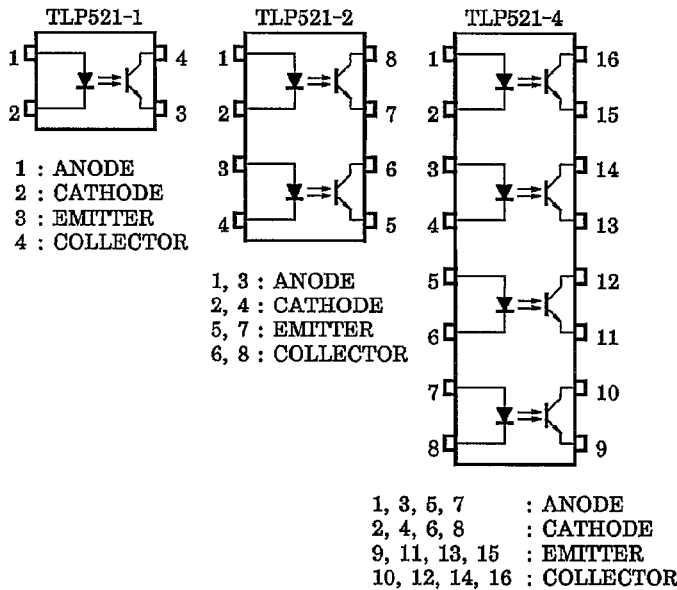
TOSHIBA PHOTOCOUPLER  
**TLP521-1, TLP521-2, TLP521-4**  
 GaAs IRED & PHOTO-TRANSISTOR

(TLP521-1)  
 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 : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)  
 Rank GB : 100% (Min.)
- Isolation Voltage : 2500Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATIONS (TOP VIEW)



Unit in mm

TLP521-1	Weight :0.26g
JEDEC	—
EIAJ	—
TOSHIBA	11-5B1
TLP521-2	Weight :0.54g
JEDEC	—
EIAJ	—
TOSHIBA	11-10C1
TLP521-4	Weight :1.1g
JEDEC	—
EIAJ	—
TOSHIBA	11-20A1

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TLP521-1 - 1

1995-2-20

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(TLP521-1)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING		UNIT	
		TLP521-1	TLP521-2, 4		
LED	Forward Current	I <sub>F</sub>	70	50	mA
	Forward Current Derating	ΔI <sub>F</sub> / °C	-0.7 (Ta ≥ 39°C)	-0.5 (Ta ≥ 25°C)	mA / °C
	Pulse Forward Current	I <sub>FP</sub>	1 (100μ pulse, 100pps)		A
	Reverse Voltage	V <sub>R</sub>	5		V
	Junction Temperature	T <sub>j</sub>	125		°C
DETECTOR	Collector-Emitter Voltage	V <sub>CEO</sub>	55		V
	Emitter-Collector Voltage	V <sub>ECO</sub>	7		V
	Collector Current	I <sub>C</sub>	50		mA
	Collector Power Dissipation (1 Circuit)	P <sub>C</sub>	150	100	mW
	Collector Power Dissipation Derating (1 Circuit, Ta ≥ 25°C)	ΔP <sub>C</sub> / °C	-1.5	-1.0	mW / °C
	Junction Temperature	T <sub>j</sub>	125		°C
	Storage Temperature Range	T <sub>stg</sub>	-55~125		°C
Operating Temperature Range	T <sub>opr</sub>	-55~100		°C	
Lead Soldering Temperature	T <sub>sold</sub>	260 (10 sec.)		°C	
Total Package Power Dissipation	P <sub>T</sub>	250	150	mW	
Total Package Power Dissipation Derating (Ta ≥ 25°C)	ΔP <sub>T</sub> / °C	-2.5	-1.5	mW / °C	
Isolation Voltage	BV <sub>S</sub>	2500 (AC, 1 min., RH ≤ 60%) (Note 1)		Vrms	

Note 1 : Device considered a two terminal device : LED side pins shorted together and DETECTOR side pins shorted together.

(TLP521-1)

TYPE	CLASSIFICATION *1	CURRENT TRANSFER RATIO (%) ( $I_C/I_F$ )		MARKING OF CLASSIFICATION
		$I_F=5mA, V_{CE}=5V, T_a=25^\circ C$		
		MIN.	MAX.	
TLP521	A	50	600	BLANK, Y, Y <sup>■</sup> , G, G <sup>■</sup> , B, B <sup>■</sup> , GB
	Rank Y	50	150	Y, Y <sup>■</sup>
	Rank GR	100	300	G, G <sup>■</sup>
	Rank BL	200	600	B, B <sup>■</sup>
	Rank GB	100	600	G, G <sup>■</sup> , B, B <sup>■</sup> , GB
TLP521-2	A	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

TLP521-1 - 3

1995-2-20

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(TLP521-1)

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	$\mu\text{A}$
	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	$\mu\text{A}$
	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	$I_C/I_F$	$I_F=5\text{mA}, V_{CE}=5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C/I_{F(sat)}$	$I_F=1\text{mA}, V_{CE}=0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=2.4\text{mA}, I_F=8\text{mA}$	—	—	0.4	V

ISOLATION CHARACTERISTICS (Ta = 25°C)

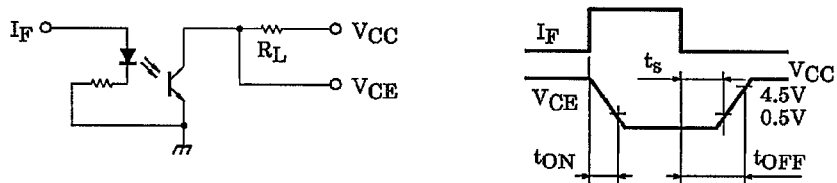
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	$C_S$	$V_S=0, f=1\text{MHz}$	—	0.8	—	pF
Isolation Resistance	$R_S$	$V_S=500\text{V}, \text{R.H.} \leq 60\%$	—	$10^{11}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms

(TLP521-1)

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	$t_r$	$V_{CC}=10V$ $I_C=2mA$ $R_L=100\Omega$	—	2	—	$\mu s$
Fall Time	$t_f$		—	3	—	
Turn-on Time	$t_{on}$		—	3	—	
Turn-off Time	$t_{off}$		—	3	—	
Turn-on Time	$t_{ON}$	$R_L=1.9k\Omega$ (Fig.1) $V_{CC}=5V, I_F=16mA$	—	2	—	$\mu s$
Storage Time	$t_s$		—	15	—	
Turn-off Time	$t_{OFF}$		—	25	—	

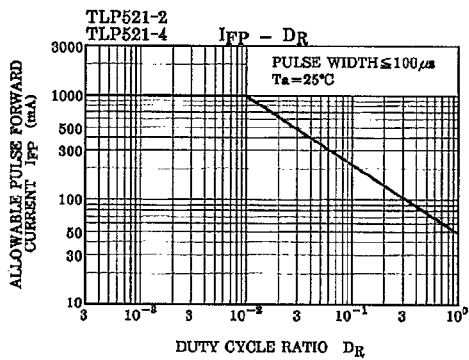
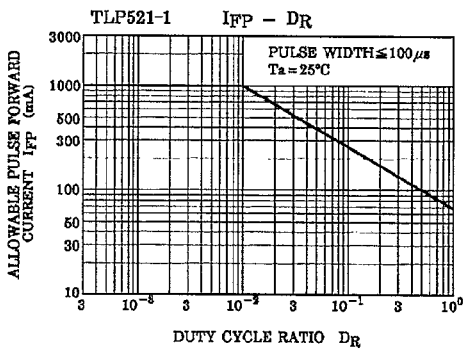
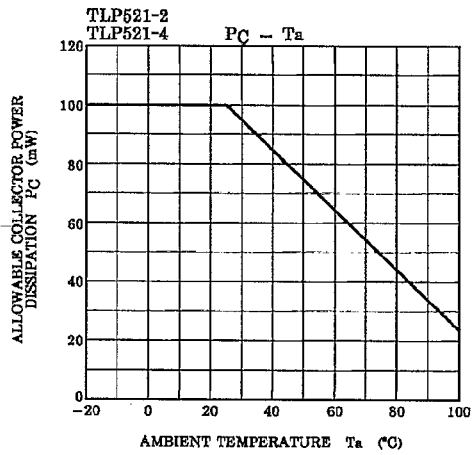
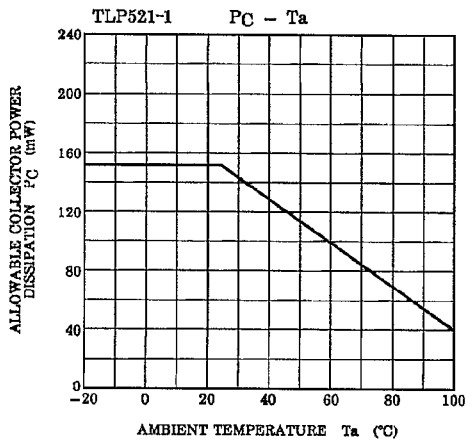
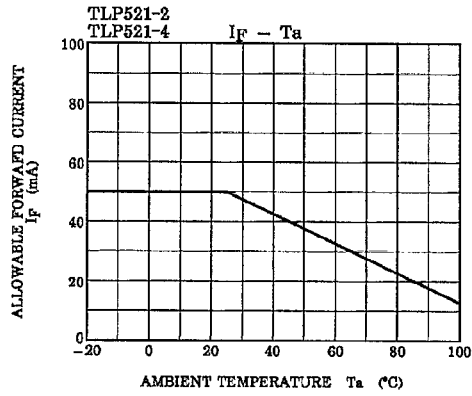
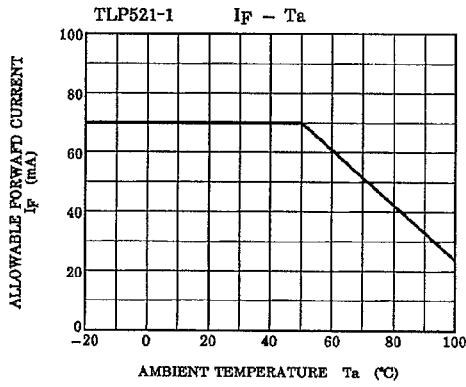
Fig.1 SWITCHING TIME TEST CIRCUIT



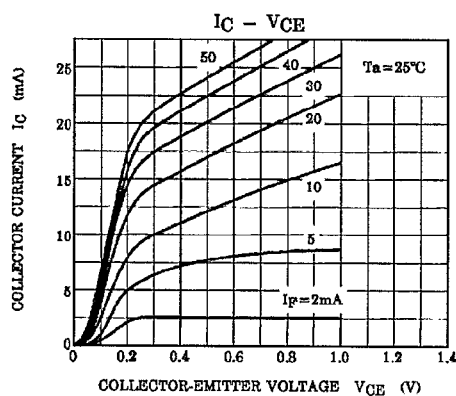
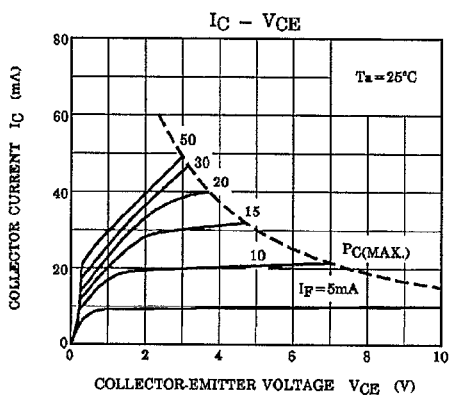
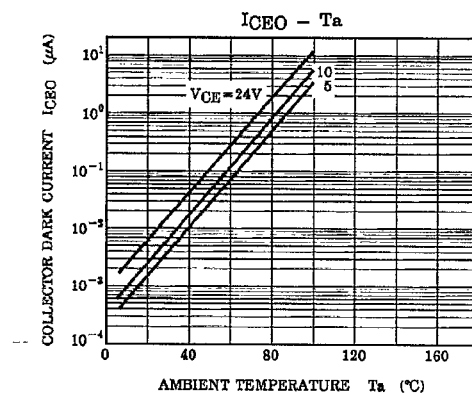
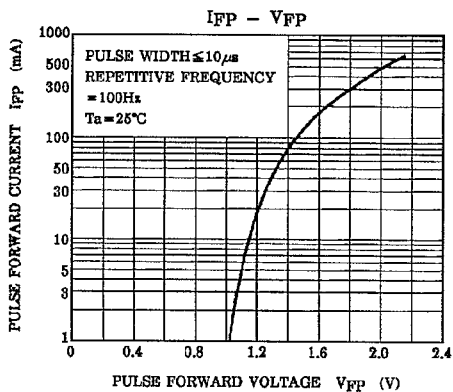
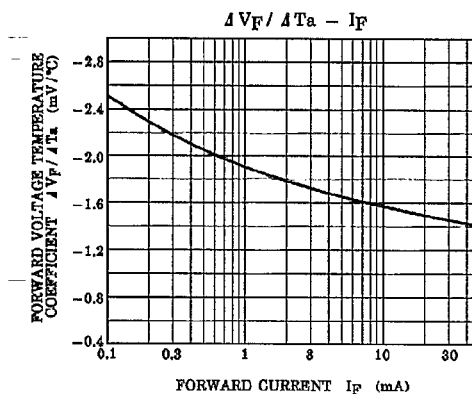
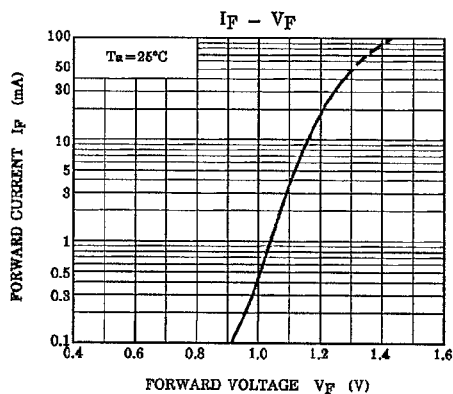
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	$V_{CC}$	—	5	24	V
Forward Current	$I_F$	—	16	20	mA
Collector Current	$I_C$	—	1	10	mA
Operating Temperature	$T_{opr}$	-25	—	85	°C

(TLP521-1)



(TLP521-1)



(TLP521-1)

