

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP321, TLP321-2, TLP321-4

PROGRAMMABLE CONTROLLERS

DC-OUTPUT MODULE

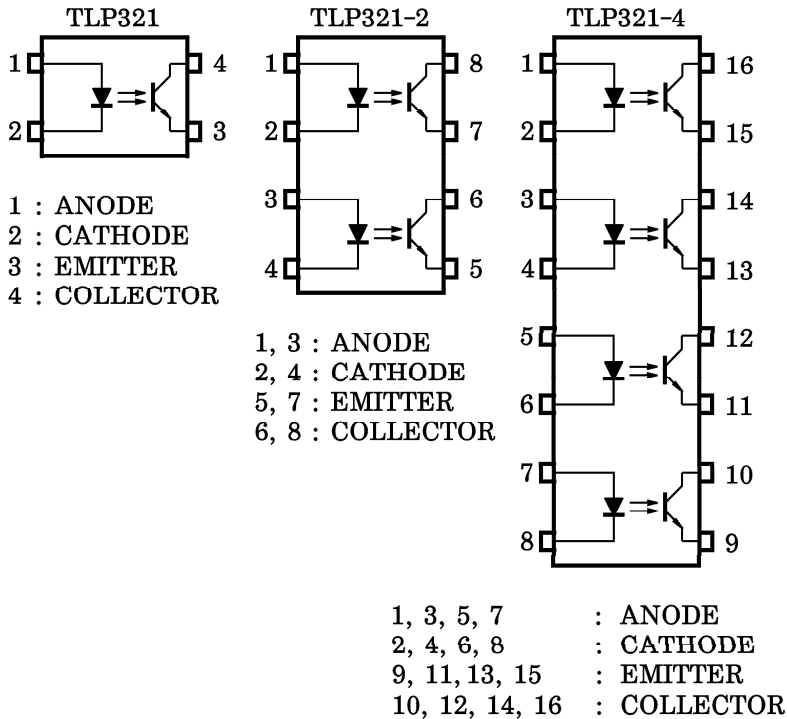
TELECOMMUNICATION

The TOSHIBA TLP321, -2 and -4 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP321-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP321-4 provides four isolated channels in a sixteen plastic DIP package.

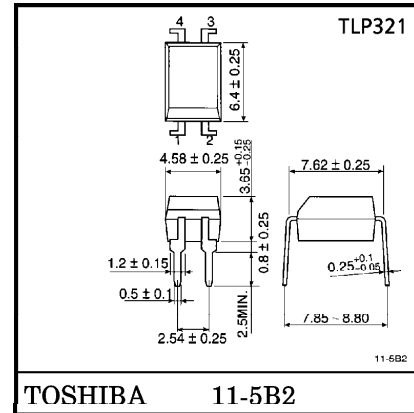
TLP321/-2/-4 have high V_{CEO} Voltage ($V_{CEO}=80V$).

- Collector-Emitter Voltage : 80V (Min.)
- Current Transfer Ratio : 50% (Min.)
Rank GB : 100% (Min.)
- Isolation Voltage : 5000Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

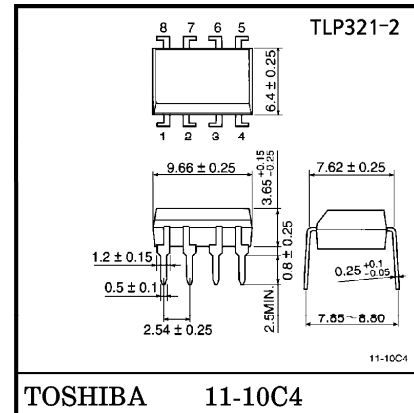
PIN CONFIGURATIONS (TOP VIEW)



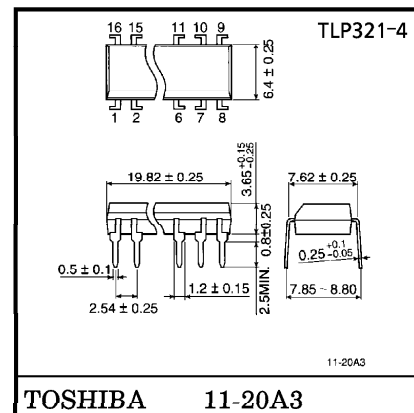
Unit in mm



Weight : 0.26g



Weight : 0.54g



Weight : 1.1g

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● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

CURRENT TRANSFER RATIO

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.	
TLP321	(None)	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
TLP321-2	(None)	50	600	BLANK, GR, BL, GB
TLP321-4	Rank GB	100	600	GR, BL, GB

*1 : Ex. Rank GB : TLP321 (GB)

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

TLP321 (GB) : TLP321

TLP321-2 (GB) : TLP321-2

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- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
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MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			TLP321-1	TLP321-2 TLP321-4	
LED	Forward Current	I_F	60	50	mA
	Forward Current Derating	$\Delta I_F / ^\circ\text{C}$	$-0.7 (T_a \geq 39^\circ\text{C})$	$-0.5 (T_a \geq 25^\circ\text{C})$	mA / $^\circ\text{C}$
	Pulse Forward Current	I_{FP}	1 (100 μs pulse, 100pps)		A
	Reverse Voltage	V_R	5		V
	Junction Temperature	T_j	125		$^\circ\text{C}$
DETECTOR	Collector-Emitter Voltage	V_{CEO}	80		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, $T_a \geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-1.5	-1.0	mW / $^\circ\text{C}$
	Junction Temperature	T_j	125		$^\circ\text{C}$
Storage Temperature Range		T_{stg}	$-55 \sim 125$		$^\circ\text{C}$
Operating Temperature Range		T_{opr}	$-55 \sim 100$		$^\circ\text{C}$
Lead Soldering Temperature		T_{sol}	260 (10s)		$^\circ\text{C}$
Total Package Power Dissipation		R_T	250	150	mW
Total Package Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)		$\Delta P_T / ^\circ\text{C}$	-2.5	-1.5	mW / $^\circ\text{C}$
Isolation Voltage (Note 1)		BV_S	5000 (AC, 1 min., $RH \leq 60\%$)		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}	—	12	48	V
Forward Current	I_F	—	16	20	mA
Collector Current	I_C	—	1	10	mA
Operating Temperature	T_{opr}	-25	—	85	°C

INDIVIDUAL ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	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	$V_{(BR) CEO}$	$I_C = 0.5\text{mA}$	80	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR) ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	I_{CEO}	$V_{CE} = 48\text{V}$	—	10	100	nA
			$V_{CE} = 48\text{V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	Capacitance (Collector to Emitter)	C_{CE}	$V = 0, f = 1\text{MHz}$	—	10	—	pF

COUPLED ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	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
		$I_C = 0.2\text{mA}, I_F = 1\text{mA}$	—	0.2	—	
		Rank GB	—	—	0.4	

ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	CS	VS=0, f=1MHz	—	0.8	—	pF
Isolation Resistance	RS	VS=500V, R.H.≤60%	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation Voltage	BVS	AC, 1 minute	5000	—	—	Vrms
		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	tr	VCC=10V IC=2mA RL=100Ω	—	2	—	μs
Fall Time	tf		—	3	—	
Turn-on Time	ton		—	3	—	
Turn-off Time	toff		—	3	—	
Turn-on Time	tON	RL=1.9kΩ (Fig.1) VCC=5V, IF=16mA	—	2	—	μs
Storage Time	ts		—	15	—	
Turn-off Time	tOFF		—	25	—	

Fig.1 Switching Time Test Circuit

