

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

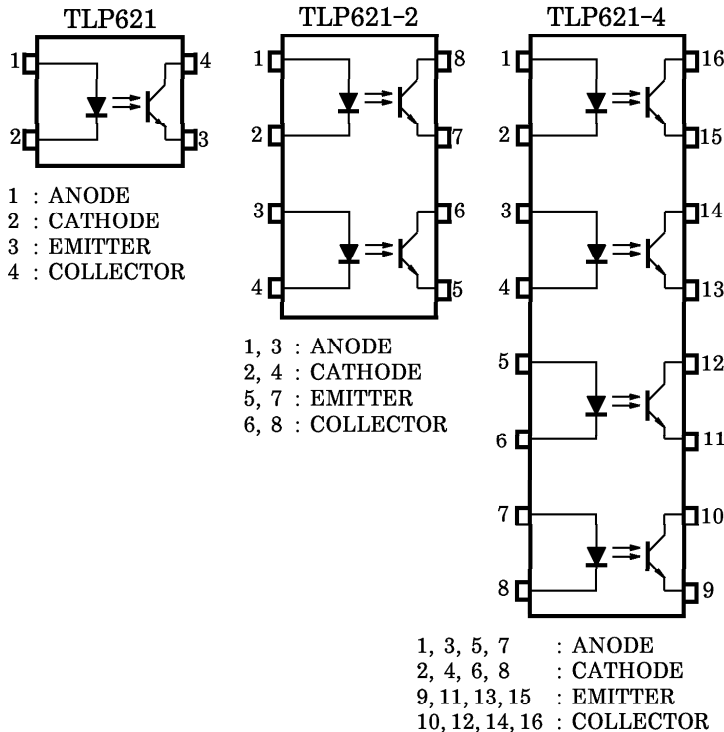
# TLP621, TLP621-2, TLP621-4

PROGRAMMABLE CONTROLLER  
AC/DC - INPUT MODULE  
SOLID STATE RELAY

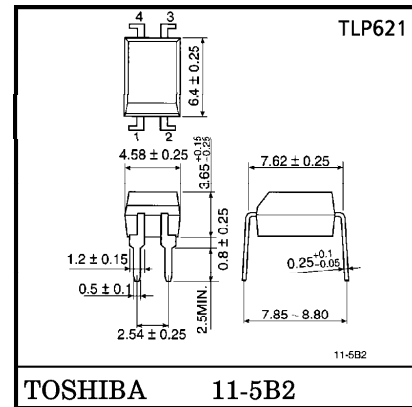
The TOSHIBA TLP621, -2, and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP621-2 offers two isolated channels in an eight lead plastic DIP, which the TLP621-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)
- Rank GB : 100% (Min.)

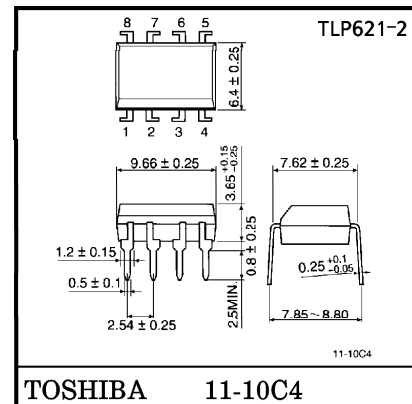
## PIN CONFIGURATIONS (TOP VIEW)



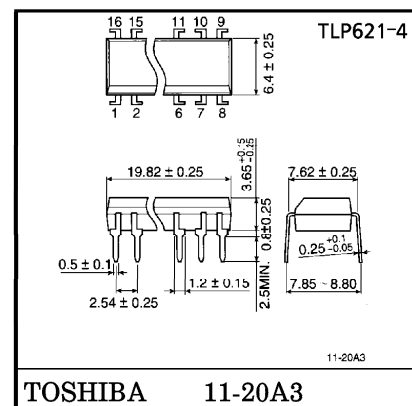
Unit in mm



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 <sub>C</sub> / I <sub>F</sub> )		MARKING OF CLASSIFICATION
		I <sub>F</sub> =5mA, V <sub>CE</sub> =5V, Ta=25°C		
		MIN.	MAX.	
TLP621	(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
TLP621-2	(None)	50	600	BLANK, GR, BL, GB
TLP621-4	Rank GB	100	600	GR, BL, GB

\*1 : Ex. Rank GB : TLP621 (GB)

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

TLP621 (GB) : TLP621

TLP621-2 (GB) : TLP621-2

	MADE IN JAPAN		MADE IN THAILAND	
UL Recognized	E67349	*2	E152349	*2
BSI Approved	6508, 7445	*3	6505, 7445	*3
SEMKO Approved	9735090 / 01	*4	—	

\*2 UL1577

\*3 BS EN60065 : 1994, BS EN60950 : 1992

\*4 EN60950 (Approved is TLP621 only)

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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.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

- Option (D4) type  
VDE Approved : DIN VDE0884 / 06.92, Certificate No. 68384  
Maximum Operating Insulation Voltage : 890V<sub>PK</sub>  
Highest Permissible Over Voltage : 8000V<sub>PK</sub>

(Note) When a VIDE0884 approved type is needed, please disignate the “Option (D4)”

	7.62mm pich standard type	10.16mm pich (LF2) type
Creepage Distance	: 6.4mm (Min.)	8.0mm (Min)
Clearance	: 6.4mm (Min.)	8.0mm (Min)
Insulation Thickness	: 0.4mm (Min.)	0.4mm (Min)

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING		UNIT
			TLP621	TLP621-2 TLP621-4	
LED	Forward Current	I <sub>F</sub>	60	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 (100 μs pulse, 100pps)		A
	Power Dissipation	P <sub>D</sub>	100	70	mW
	Power Dissipation Derating	ΔP <sub>D</sub> / °C	−1.0	−0.7	mW / °C
	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>sol</sub>	260 (10s)		°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 (Note 1)		BV <sub>S</sub>	5000 (AC, 1min., R.H. ≤ 60%)		V <sub>rms</sub>

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

## RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	—	5	24	V
Forward Current	I <sub>F</sub>	—	16	20	mA
Collector Current	I <sub>C</sub>	—	1	10	mA
Operating Temperature	T <sub>opr</sub>	−25	—	85	°C

## 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	$I_C / I_F (\text{sat})$	$I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$ 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	$R_S$	$V_S = 500\text{V}$	$1 \times 10^{12}$	$10^{14}$	—	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	5000	—	—	$V_{rms}$
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	$V_{dc}$

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERICTIC	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

