

# TLP721

OFFICE MACHINE  
 HOUSEHOLD USE EQUIPMENT  
 SOLID STATE RELAY  
 SWITCHING POWER SUPPLY

The TOSHIBA TLP721 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a four lead plastic DIP.

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

	MADE IN JAPAN		MADE IN THAILAND	
UL Recognized	E67349	*1	E152349	*1
BSI Approved	7364, 7365	*2	7364, 7365	*2
SEMKO Approved	9325163	*3	9609169	*4
	9522142	*3		

- \*1 UL1577
- \*2 BS EN60065 : 1994, BS EN60950 : 1992
- \*3 SS EN4330784
- \*4 SS EN60950

- Option (D4) type VDE Approved

	MADE IN JAPAN	MADE IN THAILAND
VDE Approved	74285, 91835	91868
Maximum Operating Insulation Voltage	630, 890Vpk	890Vpk
Highest Permissible Over Voltage	6000, 8000Vpk	8000Vpk

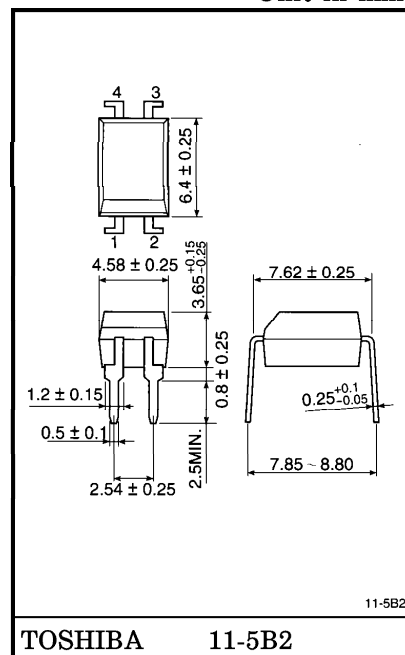
- \*5 VDE0884 / 06.92

(Note) When a VDE0884 approved type is needed, please designate the "Option (D4)"

7.62mm pich	10.16mm pich
TLP721 type	TLP721F type

- Creepage Distance : 7.0mm (Min.)      8.0mm (Min.)
- Clearance : 7.0mm (Min.)      8.0mm (Min.)
- Internal Creepage Path : 4.0mm (Min.)      4.0mm (Min.)
- Insulation Thickness : 0.5mm (Min.)      0.5mm (Min.)

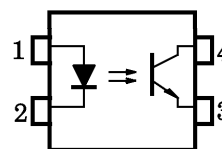
Unit in mm



TOSHIBA 11-5B2

Weight : 0.26g

PIN CONFIGURATIONS (TOP VIEW)



- 1 : ANODE
- 2 : CATHODE
- 3 : EMITTER
- 4 : COLLECTOR

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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	CLASSIFICATION *1	CURRENT TRANSFER RATIO (%) ( $I_C / I_F$ )		MARKING OF CLASSIFICATION
		$I_F = 5\text{mA}, V_{CE} = 5\text{V}, T_a = 25^\circ\text{C}$		
		MIN.	MAX.	
TLP721	(None)	50	600	BLANK, Y, Y <sup>■</sup> , G, G <sup>■</sup> , B, B <sup>■</sup> , GB
		50	150	Y, Y <sup>■</sup>
	Rank GR	100	300	G, G <sup>■</sup>
		200	600	B, B <sup>■</sup>
	Rank GB	100	600	G, G <sup>■</sup> , B, B <sup>■</sup> , GB

\*1 : Ex. Rank GB : TLP721 (GB)

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

TLP721 (GB) : TLP721

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	$I_F$	60	mA
	Forward Current Derating ( $T_a \geq 39^\circ\text{C}$ )	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / $^\circ\text{C}$
	Peak Forward Current (100 $\mu\text{s}$ pulse, 100pps)	$I_{FP}$	1	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
	Power Dissipation	$P_C$	150	mW
	Power Dissipation Derating ( $T_a \geq 25^\circ\text{C}$ )	$\Delta P_C / ^\circ\text{C}$	-1.5	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		$T_{opr}$	-40~100	$^\circ\text{C}$
Lead Soldering Temperature (10s)		$T_{sol}$	260	$^\circ\text{C}$
Total Package Power Dissipation		$P_T$	250	mW
Total Package Power Dissipation Derating ( $T_a \geq 25^\circ\text{C}$ )		$\Delta P_T / ^\circ\text{C}$	-2.5	mW / $^\circ\text{C}$
Isolation Voltage (AC, 1 min., R.H. $\leq 60\%$ ) (NOTE)		$BV_S$	4000	Vrms

NOTE. Device considered a two terminal device : pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

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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 laws.
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- The information contained herein is subject to change without notice.

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	25	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 <sub>F</sub>	I <sub>F</sub> = 10mA	1.0	1.15	1.3	V
	Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5V	—	—	10	μA
	Capacitance	C <sub>T</sub>	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	V (BR) CEO	I <sub>C</sub> = 0.5mA	55	—	—	V
	Emitter-Collector Breakdown Voltage	V (BR) ECO	I <sub>E</sub> = 0.1mA	7	—	—	V
	Collector Dark Current	I <sub>CEO</sub>	V <sub>CE</sub> = 24V (Ambient Light Below 1000 lx)	—	0.01 (2)	0.1 (10)	μA
			V <sub>CE</sub> = 24V (Ambient Light Below 1000 lx) Ta = 85°C	—	2 (4)	50 (50)	μA
Capacitance (Collector to Emitter)	C <sub>C</sub> E	V = 0, f = 1MHz	—	10	—	pF	

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I <sub>C</sub> / I <sub>F</sub>	I <sub>F</sub> = 5mA, V <sub>CE</sub> = 5V Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	I <sub>C</sub> / I <sub>F</sub> (sat)	I <sub>F</sub> = 1mA, V <sub>CE</sub> = 0.4V Rank GB	—	60	—	%
			30	—	—	
Collector-Emitter Saturation Voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 2.4mA, I <sub>F</sub> = 8mA	—	—	0.4	V
		I <sub>C</sub> = 0.2mA, I <sub>F</sub> = 1mA Rank GB	—	0.2	—	
			—	—	0.4	

ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C <sub>S</sub>	V <sub>S</sub> =0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R <sub>S</sub>	V <sub>S</sub> =500V, R.H.≤60%	1×10 <sup>12</sup>	10 <sup>14</sup>	—	Ω
Isolation Voltage	BV <sub>S</sub>	AC, 1 minute	4000	—	—	V <sub>rms</sub>
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V <sub>dc</sub>

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t <sub>r</sub>	V <sub>CC</sub> =10V, I <sub>C</sub> =2mA R <sub>L</sub> =100Ω	—	2	—	μs
Fall Time	t <sub>f</sub>		—	3	—	
Turn-on Time	t <sub>on</sub>		—	3	—	
Turn-off Time	t <sub>off</sub>		—	3	—	
Turn-on Time	t <sub>ON</sub>	R <sub>L</sub> =1.9kΩ (Fig.1) V <sub>CC</sub> =5V, I <sub>F</sub> =16mA	—	3	—	μs
Storage Time	t <sub>s</sub>		—	40	—	
Turn-off Time	t <sub>OFF</sub>		—	90	—	

Fig.1 Switching Time Test Circuit

