

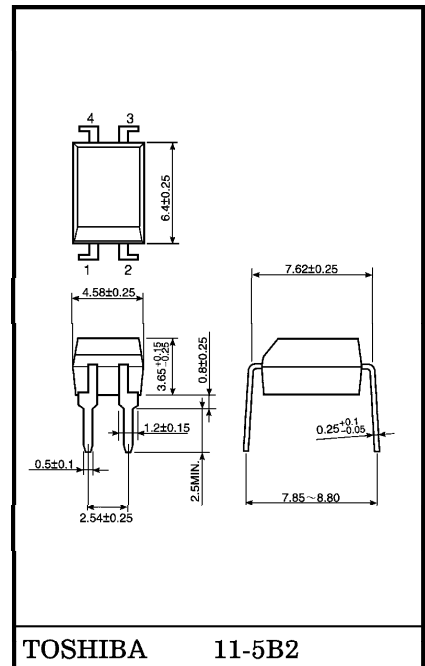
TLP421

- OFFICE EQUIPMENT
- HOUSEHOLD APPLIANCES
- SOLID STATE RELAYS
- SWITCHING POWER SUPPLIES
- VARIOUS CONTROLLERS
- SIGNAL TRANSMISSION BETWEEN DIFFERENT VOLTAGE CIRCUITS

The TOSHIBA TLP421 consists of a silicone photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a four lead plastic DIP (DIP4) with having high isolation voltage (AC : 5k V_{RMS} (min)).

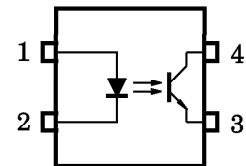
- Collector-Emitter Voltage : 80 V (min)
- Current Transfer Ratio : 50% (min)
Rank GB : 100% (min)
- Isolation Voltage : 5000 V_{rms} (min)
- UL Recognized : UL1577
- BSI Approved : BS EN60065 : 1994
Approved No. 8411
BS EN60950 : 1992
Approved No. 8412
- SEMKO Approved : EN60065, EN60950, EN60335
Approved No. 9910249 / 01

Unit in mm



Weight : 0.26 g

PIN CONFIGURATIONS (TOP VIEW)



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

980910EBC1

● 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.

● 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 the foreign exchange and foreign trade 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.

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|--|---|---------------------|---------|------------------|
| LED | Forward Current | I _F | 60 | mA |
| | Forward Current Derating (Ta ≥ 39°C) | ΔI _F /°C | -0.7 | mA/°C |
| | Pulse Forward Current (Note 2) | I _{FP} | 1 | A |
| | Power Dissipation | P _D | 100 | mW |
| | Power Dissipation Derating | ΔP _D /°C | -1.0 | mW/°C |
| | Reverse Voltage | V _R | 5 | V |
| Junction Temperature | | T _j | 125 | °C |
| DETECTOR | Collector-Emitter Voltage | V _{CEO} | 80 | V |
| | Emitter-Collector Voltage | V _{ECO} | 7 | V |
| | Collector Current | I _C | 50 | mA |
| | Power Dissipation (Single Circuit) | P _C | 150 | mW |
| | Power Dissipation Derating (Ta ≥ 25°C) (Single Circuit) | ΔP _C /°C | -1.5 | mW/°C |
| | Junction Temperature | T _j | 125 | °C |
| Operating Temperature Range | | T _{opr} | -55~100 | °C |
| Storage Temperature Range | | T _{stg} | -55~125 | °C |
| Lead Soldering Temperature (10 s) | | T _{sol} | 260 | °C |
| Total Package Power Dissipation | | P _T | 250 | mW |
| Total Package Power Dissipation Derating (Ta ≥ 25°C) | | ΔP _T /°C | -2.5 | mW/°C |
| Isolation Voltage (Note 3) | | BV _S | 5000 | V _{rms} |

(Note 2) : 100 μs pulse, 100 Hz frequency

(Note 3) : AC, 1 min., R.H. ≤ 60%. Apply voltage to LED pin and detector pin together.

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | MIN | TYP. | MAX | UNIT |
|-----------------------|------------------|-----|------|-----|------|
| Supply Voltage | V _{CC} | — | 5 | 24 | V |
| Forward Current | I _F | — | 16 | 25 | mA |
| Collector Current | I _C | — | 1 | 10 | mA |
| Operating Temperature | T _{opr} | -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 mA | 1.0 | 1.2 | 1.3 | V |
| | Reverse Current | I _R | V _R = 5 V | — | — | 10 | μA |
| | Capacitance | C _T | V = 0, f = 1 MHz | — | 30 | — | pF |
| DETECTOR | Collector-Emitter Breakdown Voltage | V (BR) CEO | I _C = 0.5 mA | 80 | — | — | V |
| | Emitter-Collector Breakdown Voltage | V (BR) ECO | I _E = 0.1 mA | 7 | — | — | V |
| | Collector Dark Current | I _D (I _{CEO}) | V _{CE} = 24 V (Ambient Light Below 1000 lx) | — | 0.01 (0.1) | 0.1 (10) | μA |
| | | | V _{CE} = 24 V (Ambient Light Below 1000 lx) Ta = 85°C | — | 0.6 (1) | 50 (50) | μA |
| Capacitance (Collector to Emitter) | C _{CE} | V = 0, f = 1 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 mA, V _{CE} = 5 V Rank GB | 50 | — | 600 | % |
| | | | 100 | — | 600 | |
| Saturated CTR | I _C / I _F (sat) | I _F = 1 mA, V _{CE} = 0.4 V Rank GB | — | 60 | — | % |
| | | | 30 | — | — | |
| Collector-Emitter Saturation Voltage | V _{CE} (sat) | I _C = 2.4 mA, I _F = 8 mA | — | — | 0.4 | V |
| | | I _C = 0.2 mA, I _F = 1 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 MHz | — | 0.8 | — | pF |
| Isolation Resistance | R _S | V _S = 500 V | 1 × 10 ¹² | 10 ¹⁴ | — | Ω |
| 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)

| CHARACTERISTICS | SYMBOL | TEST CONDITION | MIN | TYP. | MAX | UNIT |
|-----------------|-----------|--|-----|------|-----|---------------|
| Rise Time | t_r | $V_{CC} = 10\text{ V}$, $I_C = 2\text{ mA}$ $R_L = 100\ \Omega$ | — | 2 | — | μs |
| Fall Time | t_f | | — | 3 | — | |
| Turn-on Time | t_{on} | | — | 3 | — | |
| Turn-off Time | t_{off} | | — | 3 | — | |
| Turn-on Time | t_{ON} | $R_L = 1.9\text{ k}\Omega$ (Fig.1) $V_{CC} = 5\text{ V}$, $I_F = 16\text{ mA}$ | — | 2 | — | μs |
| Storage Time | t_s | | — | 25 | — | |
| Turn-off Time | t_{OFF} | | — | 50 | — | |

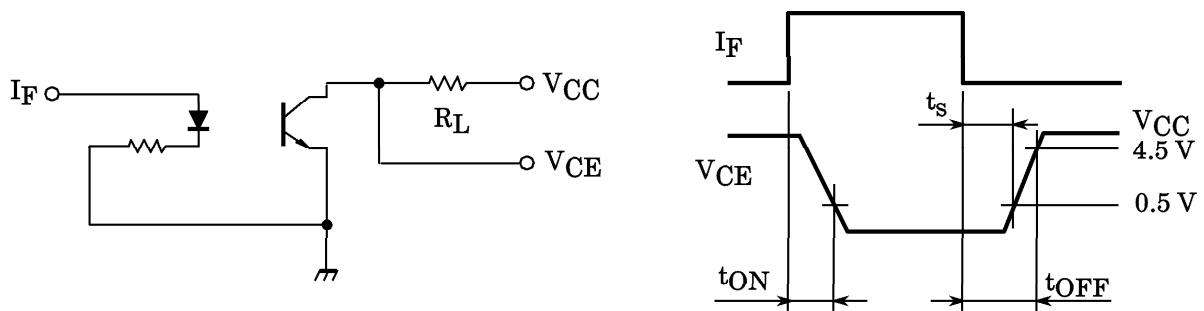


Fig.1 Switching Time Test Circuit

