

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

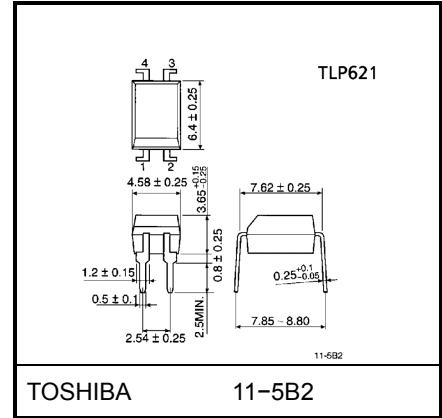
TLP621, TLP621-2, TLP621-4

Programmable Controller
AC / DC-Input Module
Solid State Relay

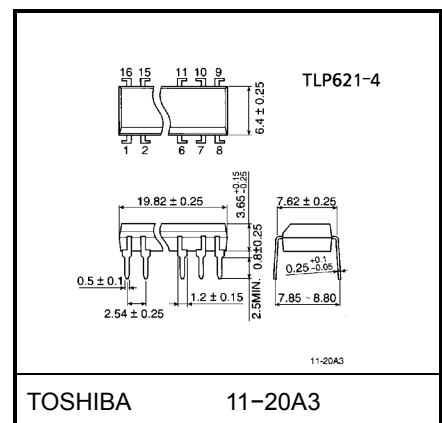
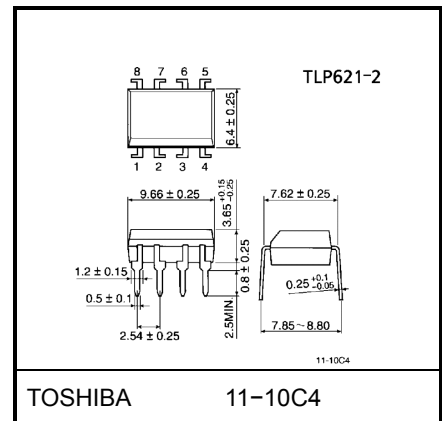
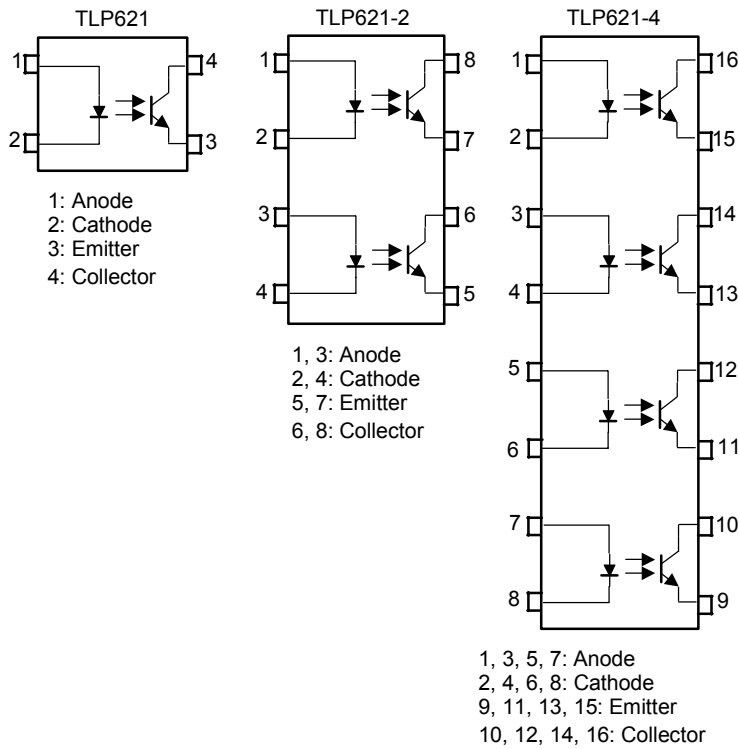
The TOSHIBA TLP621, -2 and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP621-2 offers two isolated channels in an eight lead plastic DIP, which the TLP621-4 provides four isolated channels in a sixteen plastic DIP.

- Collector-emitter voltage: 55 V (min.)
- Current transfer ratio: 50% (min.)
Rank GB: 100% (min.)

Unit in mm



Pin Configurations (top view)



● Current Transfer Ratio

| Type | Classi- fication *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. | |
| 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 TLP621-4 | (None) | 50 | 600 | Blank, GR, BL, GB |
| | 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)

- Option (D4) type

VDE approved: DIN VDE0884 / 06.92, certificate no. 68384

Maximum operating insulation voltage: 890 VPK

Highest permissible over voltage: 8000 VPK

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

| | 7.62 mm pich standard type | 10.16 mm pich (LF2) type |
|----------------------|-------------------------------|-----------------------------|
| • Creepage distance | : 6.4 mm (min.) | 8.0 mm (min) |
| Clearance | : 6.4 mm (min.) | 8.0 mm (min) |
| Insulation thickness | : 0.4 mm (min.) | 0.4 mm (min) |

Maximum Ratings (Ta = 25°C)

| Characteristic | | Symbol | Rating | | Unit |
|--|---|-------------------------|------------------------------|----------------------|-----------|
| | | | TLP621 | TLP621-2 TLP621-4 | |
| LED | Forward current | I_F | 60 | 50 | mA |
| | Forward current derating | $\Delta I_F / ^\circ C$ | -0.7 (Ta > 39°C) | -0.5 (Ta = 25°C) | mA / °C |
| | Pulse forward current | I_{FP} | 1 (100µs pulse, 100pps) | | A |
| | Power dissipation | P_D | 100 | 70 | mW |
| | Power dissipation derating | $\Delta P_D / ^\circ C$ | -1.0 | -0.7 | mW / °C |
| | Reverse voltage | V_R | 5 | | V |
| | Junction temperature | T_j | 125 | | °C |
| Detector | Collector-emitter voltage | V_{CEO} | 55 | | 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, Ta ≥ 25°C) | $\Delta P_C / ^\circ C$ | -1.5 | -1.0 | mW / °C |
| | Junction temperature | T_j | 125 | | °C |
| Storage temperature range | | T_{stg} | -55~125 | | °C |
| Operating temperature range | | T_{opr} | -55~100 | | °C |
| Lead soldering temperature | | T_{sol} | 260 (10 s) | | °C |
| Total package power dissipation | | P_T | 250 | 150 | mW |
| Total package power dissipation derating (Ta ≥ 25°C) | | $\Delta P_T / ^\circ C$ | -2.5 | -1.5 | mW / °C |
| Isolation voltage (Note 1) | | BV_S | 5000 (AC, 1min., R.H. ≤ 60%) | | V_{rms} |

(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_{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 |

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 | μA |
| | Capacitance | C_T | $V = 0, f = 1 \text{ MHz}$ | — | 30 | — | pF |
| Detector | Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C = 0.5 \text{ mA}$ | 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 | μA |
| 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 | $V_S = 500 \text{ V}$ | 1×10^{12} | 10^{14} | — | Ω |
| Isolation voltage | BV_S | AC, 1 minute | 5000 | — | — | V_{rms} |
| | | AC, 1 second, in oil | — | 10000 | — | V_{dc} |
| | | DC, 1 minute, in oil | — | 10000 | — | |

Switching Characteristics (Ta = 25°C)

| Characteristic | 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 | | — | 15 | — | |
| Turn-off time | t_{OFF} | | — | 25 | — | |

Fig. 1 Switching time test circuit

