

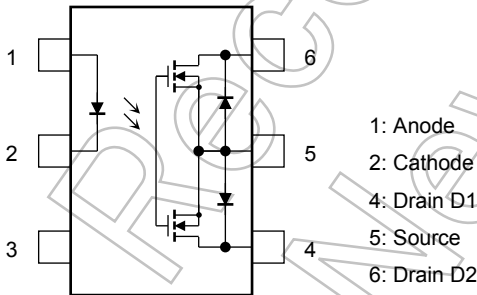
TLP592G

Telecommunications  
PBX  
Modems

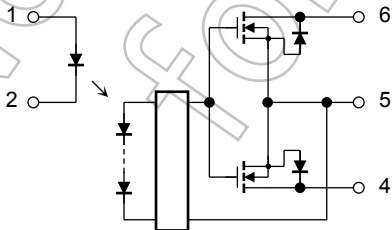
The Toshiba TLP592G consists of an infrared emitting diode optically coupled to a photo-MOSFET in a six lead plastic DIP package (DIP6).  
Since the TLP592G is a bi-directional switch, it can replace mechanical relays in many applications.

- 6-pin DIP (DIP6)
- 1-Form-A
- Peak Off-state voltage: 350 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 120 mA (max)
- On-state resistance: 35 Ω (max, t < 1 s)
- On-state resistance: 50 Ω (max, continuous)
- Isolation voltage: 2500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349

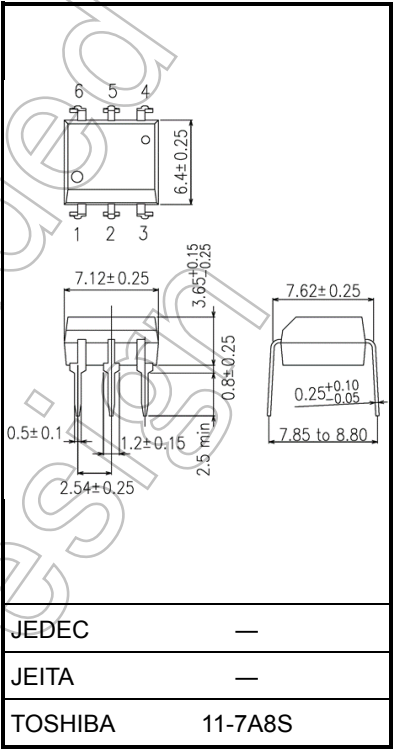
Pin Configuration (top view)



Schematic



Unit: mm



Weight: 0.4 g (typ.)

Start of commercial production  
2002-01

## Absolute Ratings (Ta = 25°C)

| Characteristics                                    |   |              | Symbol               | Rating     | Unit             |
|--|---|--------------|----------------------|------------|------------------|
| LED  | Forward current                               |              | I <sub>F</sub>       | 50         | mA               |
|  | Forward current derating (Ta ≥ 25°C)          |              | ΔI <sub>F</sub> /°C  | -0.5       | mA/°C            |
|  | Peak forward current(100 μs pulse, 100 pps)   |              | I <sub>FP</sub>      | 1          | A                |
|  | Reverse voltage                               |              | V <sub>R</sub>       | 5          | V                |
|  | Diode power dissipation                       |              | P <sub>D</sub>       | 50         | mW               |
|  | Diode power dissipation derating (Ta ≥ 25°C)  |              | ΔP <sub>D</sub> /°C  | -0.5       | mW/°C            |
|  | Junction temperature                          |              | T <sub>j</sub>       | 125        | °C               |
| Detector   | Off-state output terminal voltage             |              | V <sub>OFF</sub>     | 350        | V                |
|  | On-state current                              | A connection | I <sub>ON</sub>      | 120        | mA               |
|  |   | B connection |                      | 120        |                  |
|  |   | C connection |                      | 240        |                  |
|  | On-state current derating (Ta ≥ 25°C)         | A connection | ΔI <sub>ON</sub> /°C | -1.2       | mA/°C            |
|  |   | B connection |                      | -1.2       |                  |
|  |   | C connection |                      | -2.4       |                  |
|  | Output power dissipation                      |              | P <sub>O</sub>       | 450        | mW               |
|  | Output power dissipation derating (Ta ≥ 25°C) |              | ΔP <sub>O</sub> / °C | -4.5       | mW / °C          |
|  | Junction temperature                          |              | T <sub>j</sub>       | 125        | °C               |
| Storage temperature range                          |   |              | T <sub>stg</sub>     | -55 to 125 | °C               |
| Operating temperature range                        |   |              | T <sub>opr</sub>     | -40 to 85  | °C               |
| Lead soldering temperature (10 s)                  |   |              | T <sub>sol</sub>     | 260        | °C               |
| Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1) |   |              | BV <sub>S</sub>      | 2500       | V <sub>rms</sub> |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

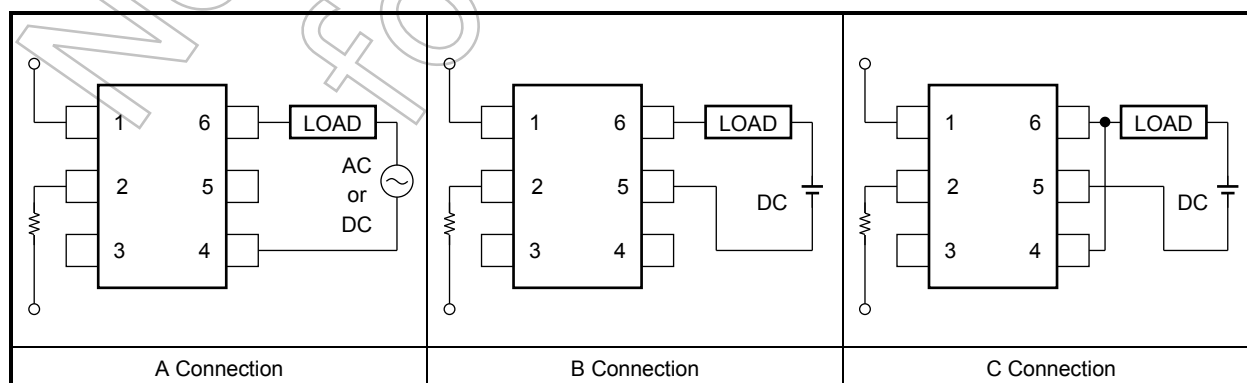
Note 1: Device considered a two-terminal device: LED side pins shorted together, and detector side pins shorted together.

## Recommended Operating Conditions

| Characteristics       | Symbol           | Min | Typ. | Max | Unit |
|-----------------------|------------------|-----|------|-----|------|
| Supply voltage        | V <sub>DD</sub>  | —   | —    | 280 | V    |
| Forward current       | I <sub>F</sub>   | 5   | 7.5  | 25  | mA   |
| On-state current      | I <sub>ON</sub>  | —   | —    | 100 | mA   |
| Operating temperature | T <sub>opr</sub> | -20 | —    | 65  | °C   |

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

## Circuit Connections



## Electrical Characteristics (Ta = 25°C)

| Characteristics |                   | Symbol           | Test Condition           | Min | Typ. | Max | Unit |
|-----------------|-------------------|------------------|--------------------------|-----|------|-----|------|
| LED             | Forward voltage   | V <sub>F</sub>   | I <sub>F</sub> = 10 mA   | 1.0 | 1.15 | 1.3 | V    |
|                 | Reverse current   | I <sub>R</sub>   | V <sub>R</sub> = 5 V     | —   | —    | 10  | μA   |
|                 | Capacitance       | C <sub>T</sub>   | V = 0 V, f = 1 MHz       | —   | 30   | —   | pF   |
| Detector        | Off-state current | I <sub>OFF</sub> | V <sub>OFF</sub> = 350 V | —   | —    | 1   | μA   |
|                 | Capacitance       | C <sub>OFF</sub> | V = 0 V, f = 1 MHz       | —   | 30   | —   | pF   |

## Coupled Electrical Characteristics (Ta = 25°C)

| Characteristics     |              | Symbol          | Test Condition   | Min | Typ. | Max | Unit |
|---------------------|--------------|-----------------|--|-----|------|-----|------|
| Trigger LED current |              | I <sub>FT</sub> | I <sub>ON</sub> = 120 mA                                 | —   | 1    | 3   | mA   |
| Return LED current  |              | I <sub>FC</sub> | I <sub>OFF</sub> = 100 μA                                | 0.1 | —    | —   | mA   |
| On-state resistance | A connection | R <sub>ON</sub> | I <sub>ON</sub> = 120 mA, I <sub>F</sub> = 5 mA, t < 1 s | —   | 25   | 35  | Ω    |
|                     |              |                 | I <sub>ON</sub> = 120 mA, I <sub>F</sub> = 5 mA          | —   | 35   | 50  |      |
|                     | B connection |                 | I <sub>ON</sub> = 120 mA, I <sub>F</sub> = 5 mA          | —   | 28   | 40  |      |
|                     | C connection |                 | I <sub>ON</sub> = 240 mA, I <sub>F</sub> = 5 mA          | —   | 14   | 20  |      |

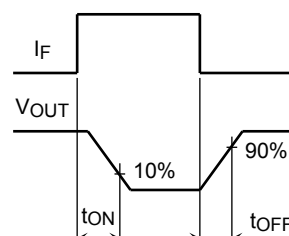
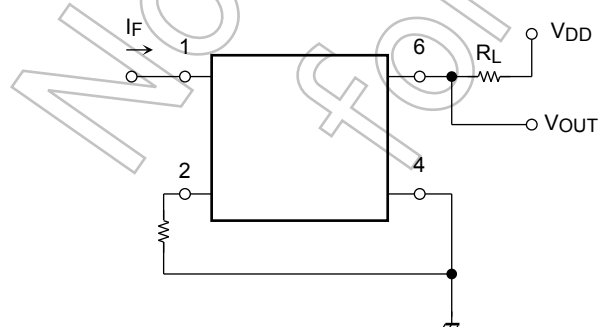
## Isolation Characteristics (Ta = 25°C)

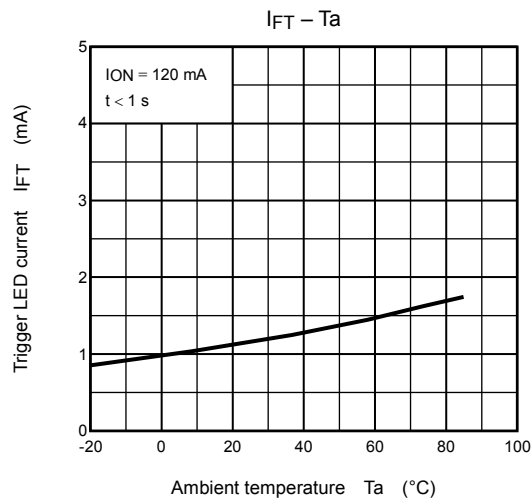
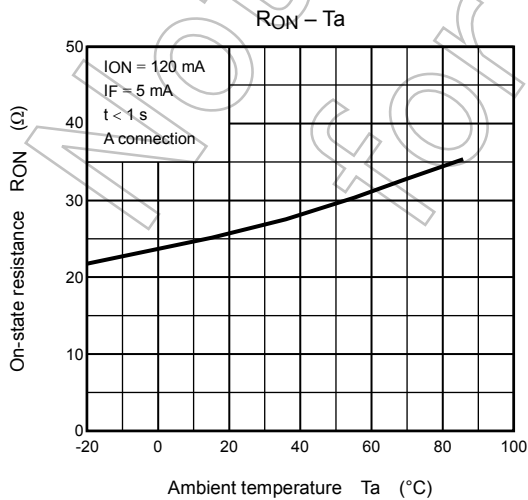
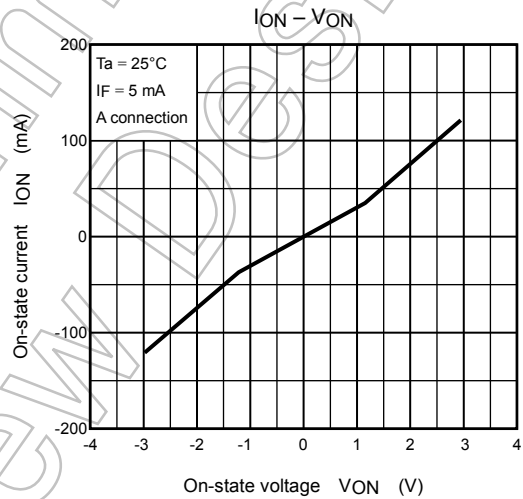
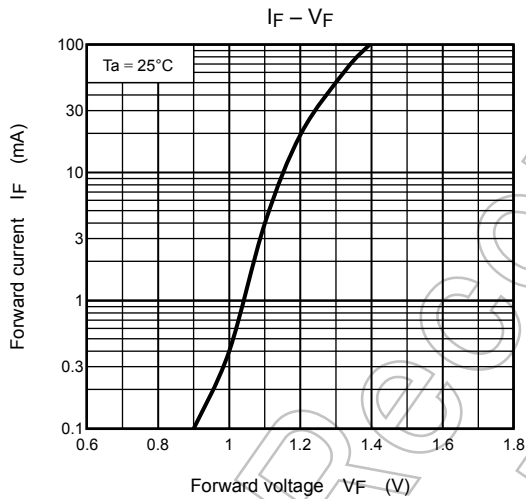
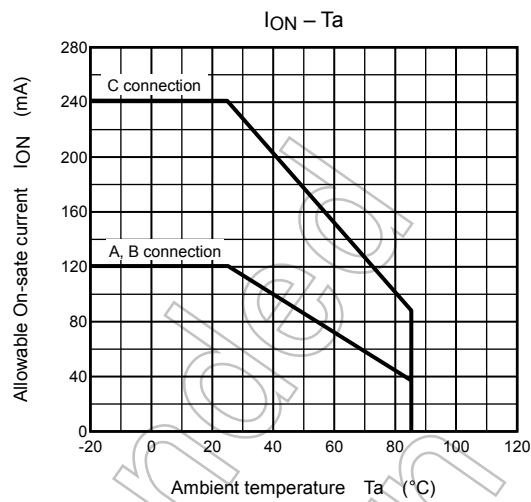
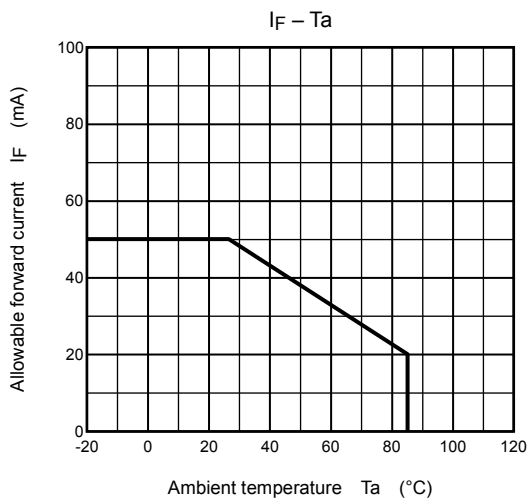
| Characteristics             | Symbol          | Test Condition                      | Min                  | Typ.             | Max | Unit             |
|-----------------------------|-----------------|-------------------------------------|----------------------|------------------|-----|------------------|
| Capacitance input to output | C <sub>S</sub>  | V <sub>S</sub> = 0 V, f = 1 MHz     | —                    | 0.8              | —   | pF               |
| Isolation resistance        | R <sub>S</sub>  | V <sub>S</sub> = 500 V, R.H. ≤ 60 % | 5 × 10 <sup>10</sup> | 10 <sup>14</sup> | —   | Ω                |
| Isolation voltage           | BV <sub>S</sub> | AC, 60 s                            | 2500                 | —                | —   | V <sub>rms</sub> |

## Switching Characteristics (Ta = 25°C)

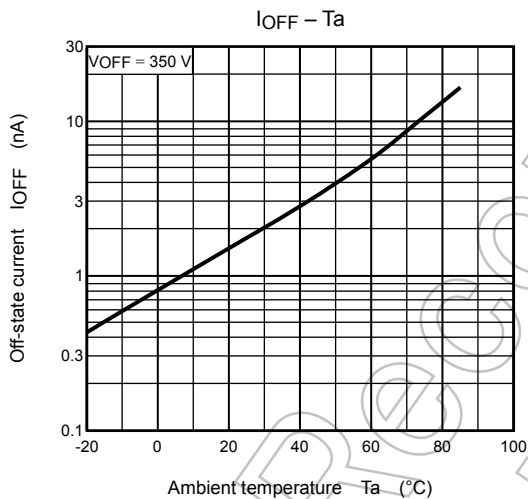
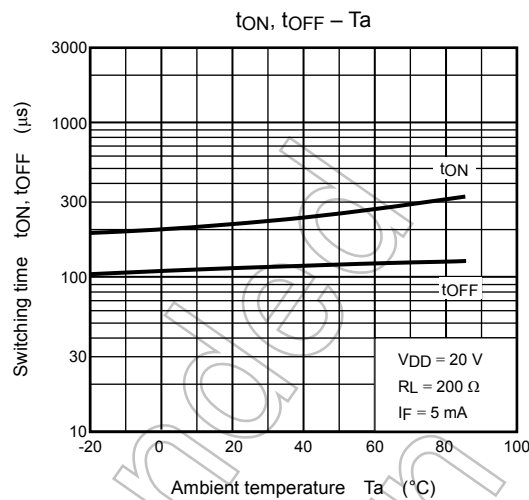
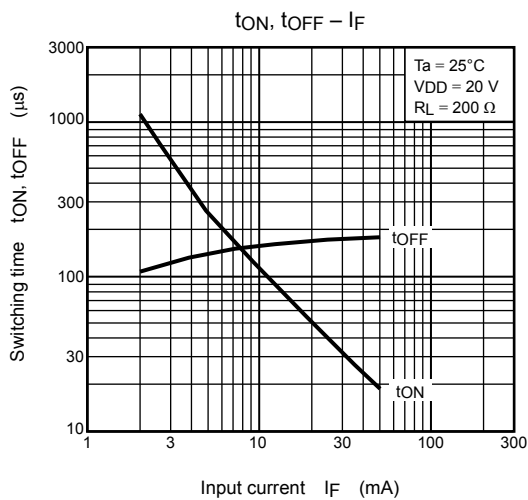
| Characteristics | Symbol           | Test Condition   | Min | Typ. | Max | Unit |
|-----------------|------------------|--|-----|------|-----|------|
| Turn-on time    | t <sub>ON</sub>  | R <sub>L</sub> = 200 Ω<br>V <sub>DD</sub> = 20 V, I <sub>F</sub> = 5 mA (Note 2) | —   | 0.3  | 1   | ms   |
| Turn-off time   | t <sub>OFF</sub> |  | —   | 0.1  | 1   |      |

Note 2: Switching time test circuit





NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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