

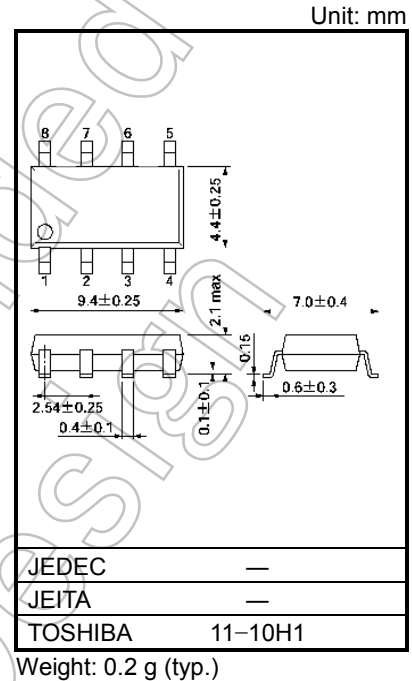
## TLP3125

### Replacement for Mechanical-Relay Measurement Instrumentation

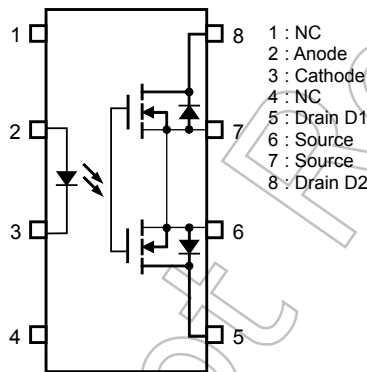
The TOSHIBA TLP3125 consists of an infrared-emitting diode optically coupled to a photo-MOSFET in a SOP, which is suitable for surface mount assembly.

#### Features

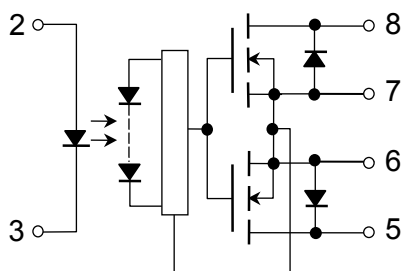
- 8-pin SOP (2.54SOP8): 2.1-mm high, 2.54-mm pitch
- 1-Form-A
- Peak off-state voltage: 400 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 200 mA (max)
- On-state resistance: 4 Ω (max)
- Isolation voltage: 1500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A  
File No.E67349



#### Pin Configuration (top view)



#### Schematic



Start of commercial production  
2003-06

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristic                                     |   | Symbol                           | Rating     | Unit    |
|--|---|----------------------------------|------------|---------|
| LED  | Forward current                               | $I_F$                            | 50         | mA      |
|  | Forward current derating (Ta ≥ 25°C)          | $\Delta I_F / ^\circ\text{C}$    | -0.5       | mA/°C   |
|  | Peak forward current (100 μs pulse, 100 pps)  | $I_{FP}$                         | 1          | A       |
|  | Reverse voltage                               | $V_R$                            | 5          | V       |
|  | Diode power dissipation                       | $P_D$                            | 50         | mW      |
|  | Diode power dissipation derating (Ta ≥ 25°C)  | $\Delta P_D / ^\circ\text{C}$    | -0.5       | mW/°C   |
|  | Junction temperature                          | $T_j$                            | 125        | °C      |
| Detector   | Off-state output terminal voltage             | $V_{OFF}$                        | 400        | V       |
|  | On-state current                              | $I_{ON}$                         | 200        | mA      |
|  | On-state current derating (Ta ≥ 25°C)         | $\Delta I_{ON} / ^\circ\text{C}$ | -2         | mA/°C   |
|  | Output power dissipation                      | $P_o$                            | 160        | mW      |
|  | Output power dissipation derating (Ta ≥ 25°C) | $\Delta P_o / ^\circ\text{C}$    | -1.6       | mW / °C |
|  | Junction temperature                          | $T_j$                            | 125        | °C      |
| Storage temperature range                          |   | $T_{stg}$                        | -55 to 125 | °C      |
| Operating temperature range                        |   | $T_{opr}$                        | -40 to 85  | °C      |
| Lead soldering temperature (10 s)                  |   | $T_{sol}$                        | 260        | °C      |
| Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1) |   | $BVs$                            | 1500       | Vrms    |

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

| Characteristic        | Symbol    | Min | Typ. | Max | Unit |
|-----------------------|-----------|-----|------|-----|------|
| Supply voltage        | $V_{DD}$  | —   | —    | 320 | V    |
| Forward current       | $I_F$     | 5   | 7.5  | 25  | mA   |
| Operating temperature | $T_{opr}$ | -20 | —    | 65  | °C   |

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.

## 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               | $I_R$     | $V_R = 5 \text{ V}$  | —   | —    | 2   | μA   |
|                | Capacitance between terminals | $C_T$     | $V_F = 0 \text{ V}, f = 1 \text{ MHz}$                     | —   | 30   | —   | pF   |
| Detector       | Off-state current             | $I_{OFF}$ | $V_{OFF} = 400 \text{ V}, T_a = 60 \text{ }^\circ\text{C}$ | —   | 60   | 100 | nA   |
|                | Capacitance between terminals | $C_{OFF}$ | $V = 0 \text{ V}, f = 1 \text{ MHz}$                       | —   | 410  | 500 | pF   |

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

| Characteristic      | Symbol   | Test Condition                                | Min | Typ. | Max | Unit     |
|---------------------|----------|---|-----|------|-----|----------|
| Trigger LED current | $I_{FT}$ | $I_{ON} = 200 \text{ mA}$                     | —   | 1    | 3   | mA       |
| Return LED current  | $I_{FC}$ | $I_{OFF} = 100 \mu\text{A}$                   | 0.1 | —    | —   | mA       |
| On-state resistance | $R_{ON}$ | $I_{ON} = 200 \text{ mA}, I_F = 5 \text{ mA}$ | —   | 3.4  | 4   | $\Omega$ |

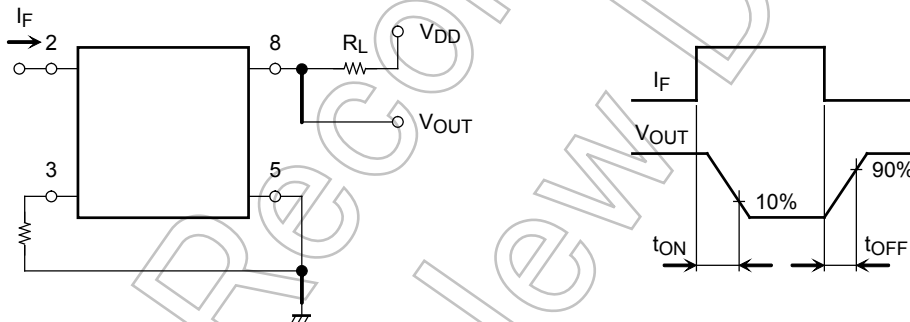
## Isolation Characteristics (Ta = 25°C)

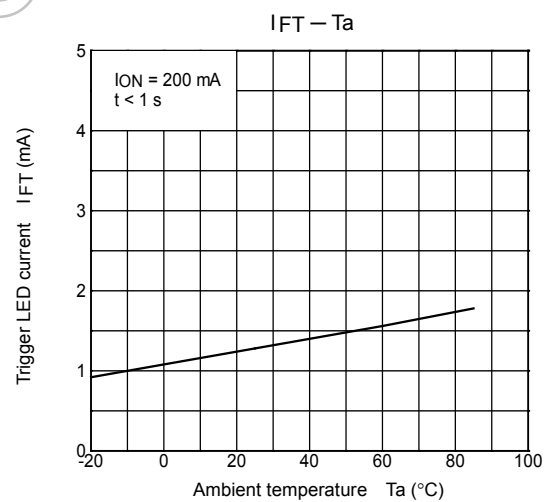
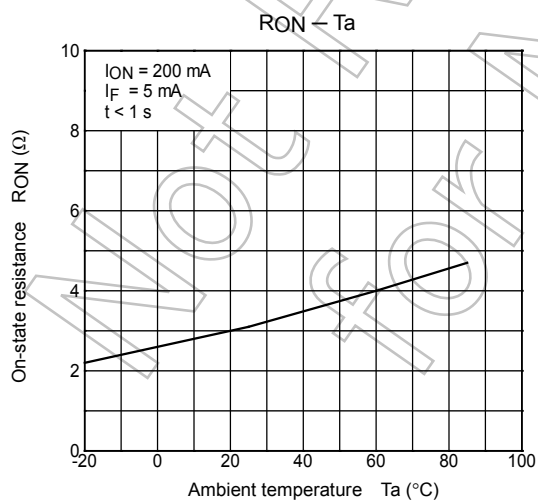
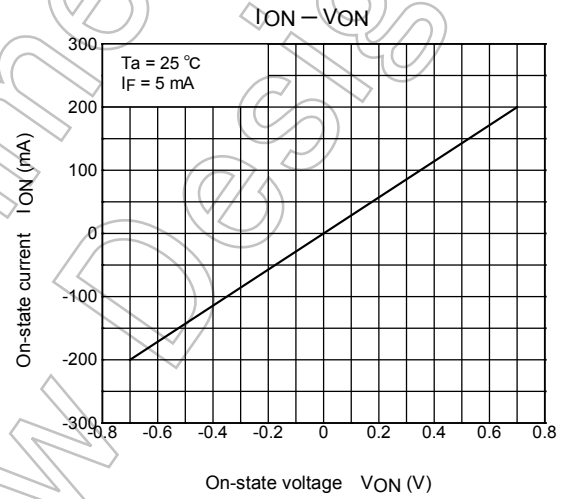
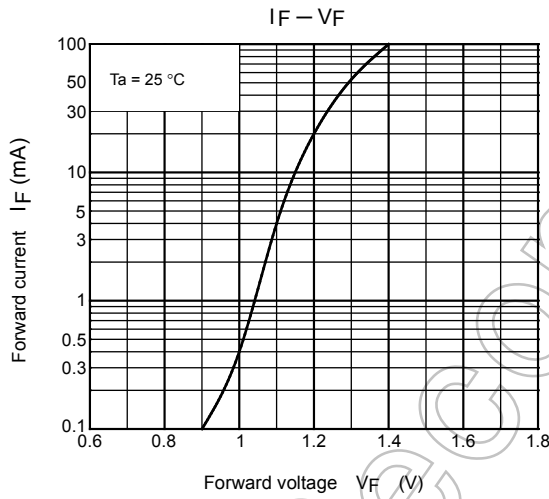
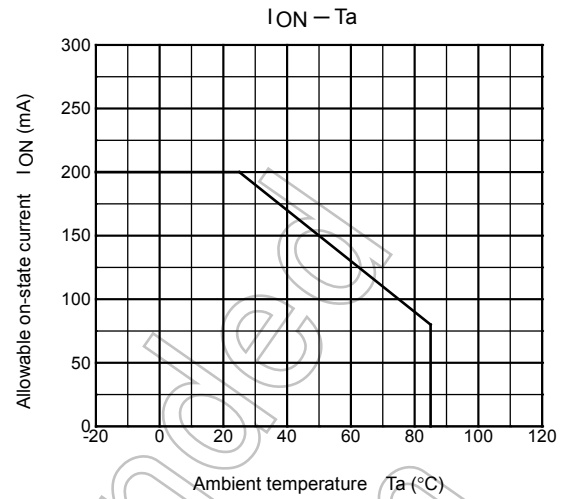
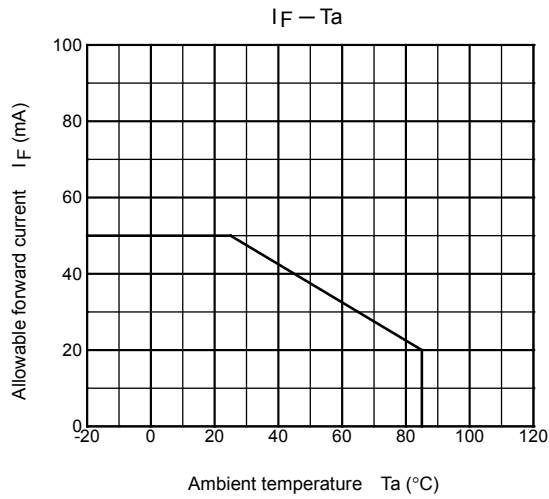
| Characteristic              | Symbol | Test Condition                                | Min                | Typ.      | Max | Unit     |
|-----------------------------|--------|---|--------------------|-----------|-----|----------|
| Capacitance input to output | $C_S$  | $V_S = 0 \text{ V}, f = 1 \text{ MHz}$        | —                  | 0.8       | —   | pF       |
| Isolation resistance        | $R_S$  | $V_S = 500 \text{ V}, \text{R.H.} \leq 60 \%$ | $5 \times 10^{10}$ | $10^{14}$ | —   | $\Omega$ |
| Isolation voltage           | $BV_S$ | AC, 60 s                                      | 1500               | —         | —   | Vrms     |

## Switching Characteristics (Ta = 25°C)

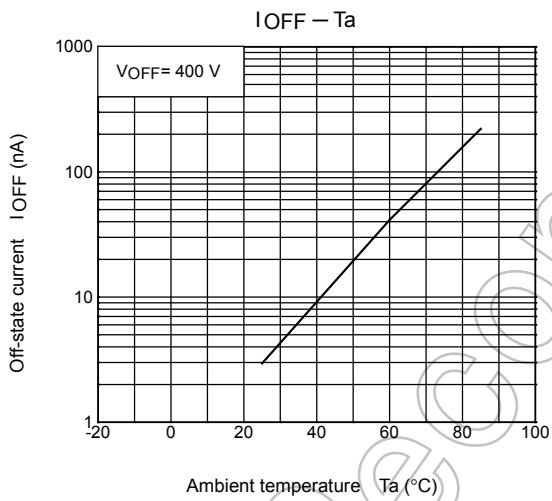
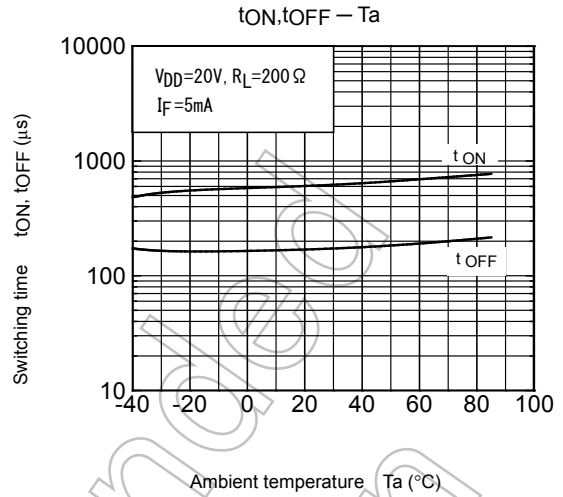
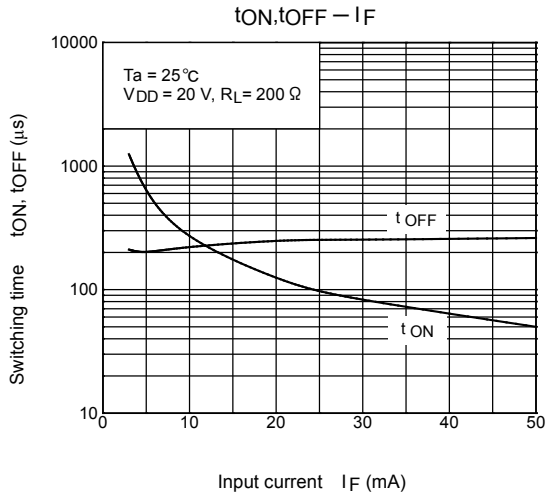
| Characteristic | Symbol    | Test Condition   | Min | Typ. | Max | Unit |
|----------------|-----------|--|-----|------|-----|------|
| Turn-on time   | $t_{ON}$  | $R_L = 200 \Omega$<br>$V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 2) | —   | 0.6  | 2   | ms   |
| Turn-off time  | $t_{OFF}$ |  | —   | 0.2  | 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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