

TOSHIBA Photocoupler Photorelay

## TLP222A, TLP222A-2

Telecommunications

Measurement and Control Equipment

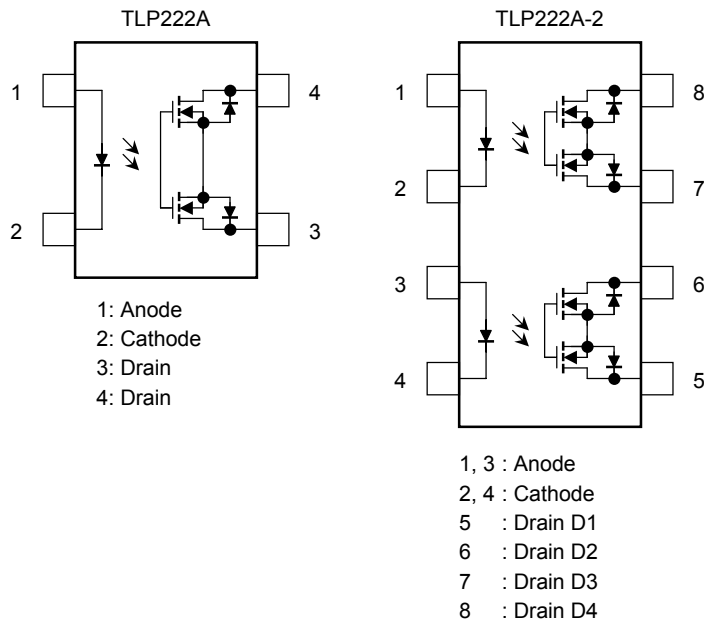
Data Acquisition System

Measurement Equipment

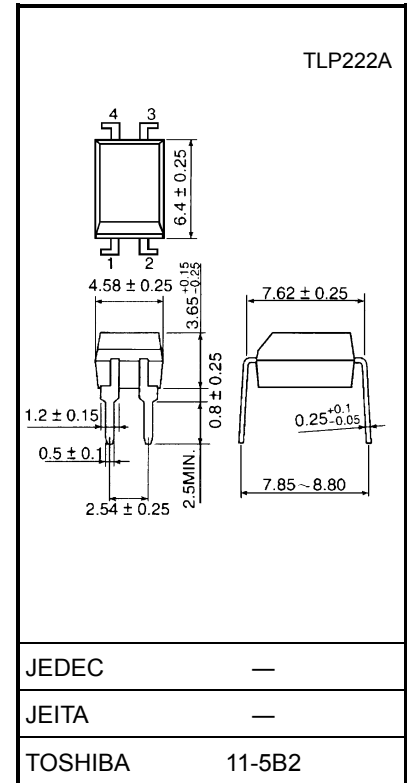
The Toshiba TLP222A and TLP222A-2 consist of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a DIP package whose withstanding voltage is 60 V. These photorelays have higher output current rating than phototransistor-type photocoupler; hence, they are suitable for use as On/Off control for high current.

- Normally open (1-form-A and 2-form-A) devices
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 500 mA (max)
- On-state resistance: 2  $\Omega$  (max)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1557, File No.E67349

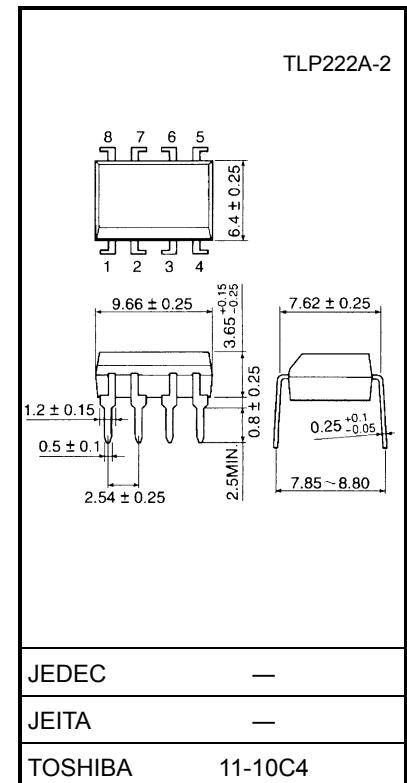
### Pin Configuration (top view)



Unit: mm



Weight: 0.26 g (typ.)



Weight: 0.54 g (typ.)

## Maximum Rating (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                 |           |                        | I <sub>FP</sub>      | 1                | A                |    |
|                                                       | Reverse voltage                      |           |                        | V <sub>R</sub>       | 5                | V                |    |
|                                                       | Junction temperature                 |           |                        | T <sub>j</sub>       | 125              | °C               |    |
| Detector                                              | Off-state output terminal voltage    |           |                        | V <sub>OFF</sub>     | 60               | V                |    |
|                                                       | On-state current                     | TLP222A   |                        | I <sub>ON</sub>      | 500              | mA               |    |
|                                                       |                                      | TLP222A-2 | One channel operation  |                      |                  |                  |    |
|                                                       |                                      |           | Two channel operations |                      |                  |                  |    |
|                                                       | Forward current derating (Ta ≥ 25°C) | TLP222A   |                        | ΔI <sub>ON</sub> /°C | −5.0             | mA/°C            |    |
|                                                       |                                      | TLP222A-2 | One channel operation  |                      |                  |                  |    |
|                                                       |                                      |           | Two channel operations |                      |                  |                  |    |
|                                                       | Junction temperature                 |           |                        | T <sub>j</sub>       | 125              | °C               |    |
|                                                       | Storage temperature                  |           |                        |                      | T <sub>stg</sub> | −55 to 125       | °C |
|                                                       | Operating temperature                |           |                        |                      | T <sub>opr</sub> | −40 to 85        | °C |
| Lead soldering temperature (10 s)                     |                                      |           |                        | T <sub>sol</sub>     | 260              | °C               |    |
| Isolation voltage (AC, 1 min, R.H. ≤ 60%)<br>(Note 1) |                                      |           |                        | BV <sub>S</sub>      | 2500             | V <sub>rms</sub> |    |

Note 1: LED pins are shorted together. Detector pins are also shorted together.

## Recommended Operating Conditions

| Characteristics       | Symbol    | Min | Typ. | Max | Unit |
|-----------------------|-----------|-----|------|-----|------|
| Supply voltage        | $V_{DD}$  | —   | —    | 48  | V    |
| Forward current       | $I_F$     | 5   | 7.5  | 25  | mA   |
| On-state current      | $I_{ON}$  | —   | —    | 500 | mA   |
| Operating temperature | $T_{opr}$ | -20 | —    | 65  | °C   |

## Electrical Characteristics (Ta = 25°C)

| Characteristics |                   | 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        | Off-state current | $I_{OFF}$ | $V_{OFF} = 60 \text{ V}$   | —   | —    | 1   | μA   |
|                 | Capacitance       | $C_{OFF}$ | $V = 0, f = 1 \text{ MHz}$ | —   | 130  | —   | pF   |

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

| Characteristics     | Symbol   | Test Condition                                   | Min | Typ. | Max | Unit     |
|---------------------|----------|--------------------------------------------------|-----|------|-----|----------|
| Trigger LED current | $I_{FT}$ | $I_{ON} = 500 \text{ mA}$                        | —   | 1.6  | 3   | mA       |
| Return LED current  | $I_{FC}$ | $I_{OFF} = 100 \mu\text{A}$                      | 0.1 | —    | —   | mA       |
| On-state resistance | $R_{ON}$ | $I_{ON} = 500 \text{ mA}$ , $I_F = 5 \text{ mA}$ | —   | 1    | 2   | $\Omega$ |

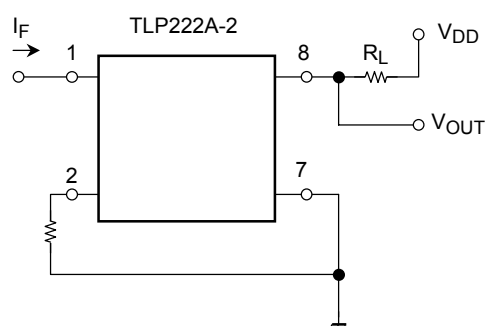
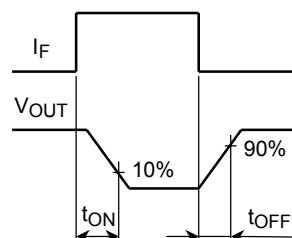
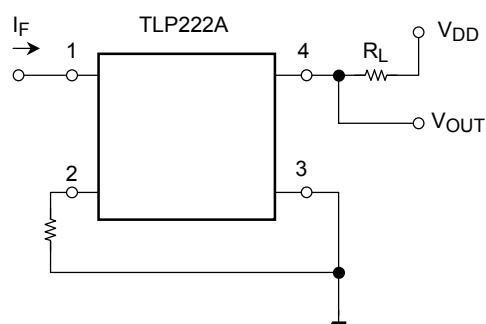
## Isolation Characteristics (Ta = 25°C)

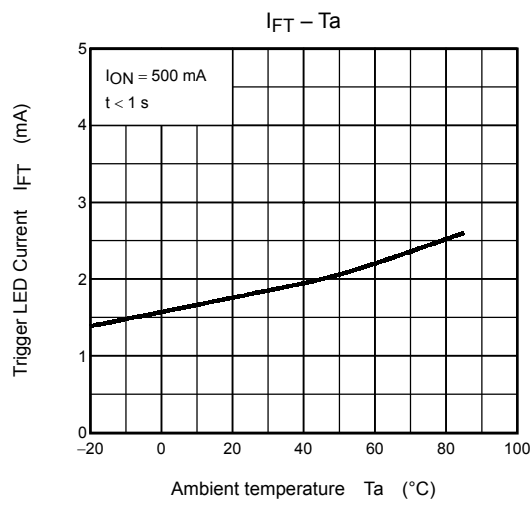
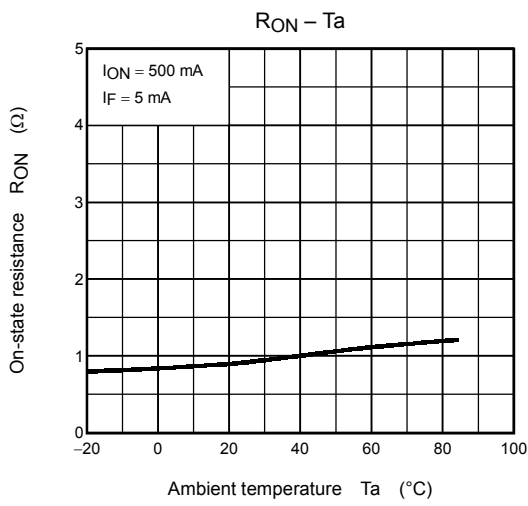
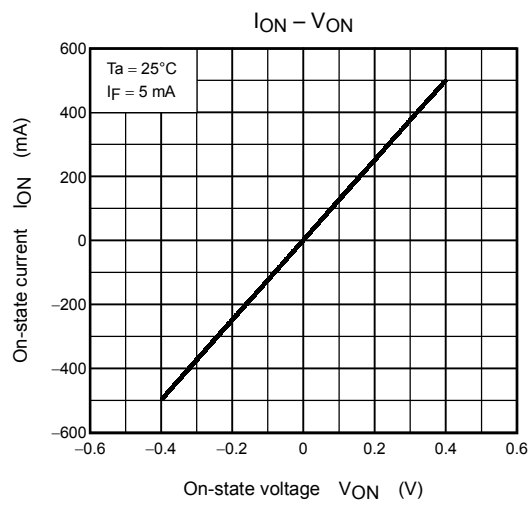
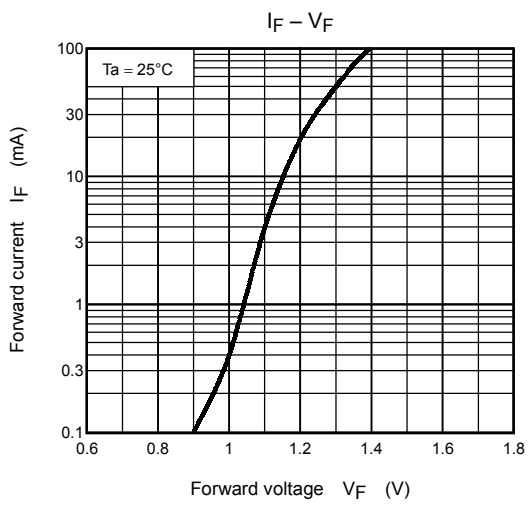
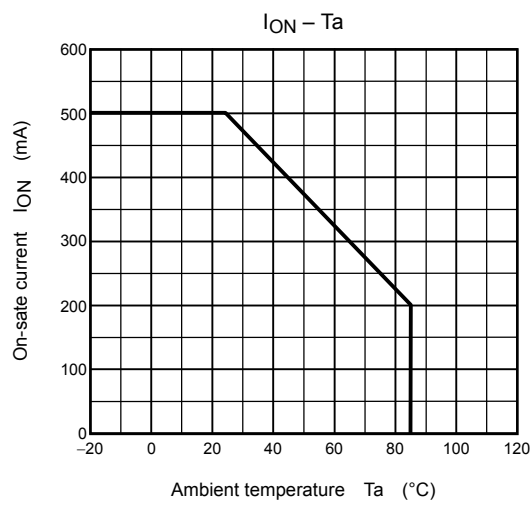
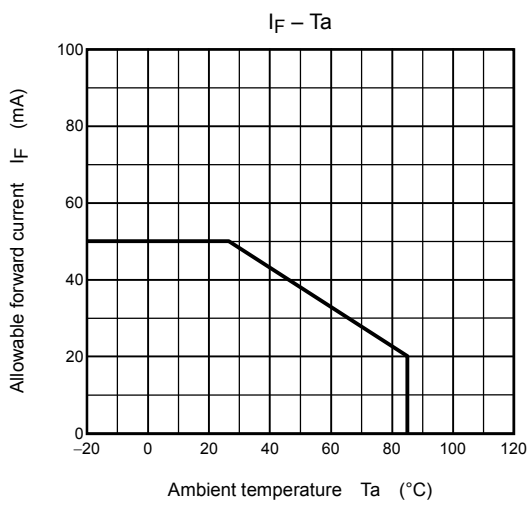
| Characteristics             | Symbol | Test Condition                            | Min                | Typ.      | Max | Unit     |
|-----------------------------|--------|-------------------------------------------|--------------------|-----------|-----|----------|
| Capacitance input to output | $C_S$  | $V_S = 0 \text{ V}$ , $f = 1 \text{ MHz}$ | —                  | 0.8       | —   | pF       |
| Isolation resistance        | $R_S$  | $V_S = 500 \text{ V}$ , R.H. $\leq 60\%$  | $5 \times 10^{10}$ | $10^{14}$ | —   | $\Omega$ |
| Isolation voltage           | $BV_S$ | AC, 1 min                                 | 2500               | —         | —   | Vrms     |
|                             |        | AC, 1 s, in oil                           | —                  | 5000      | —   |          |
|                             |        | DC, 1 min, in oil                         | —                  | 5000      | —   | Vdc      |

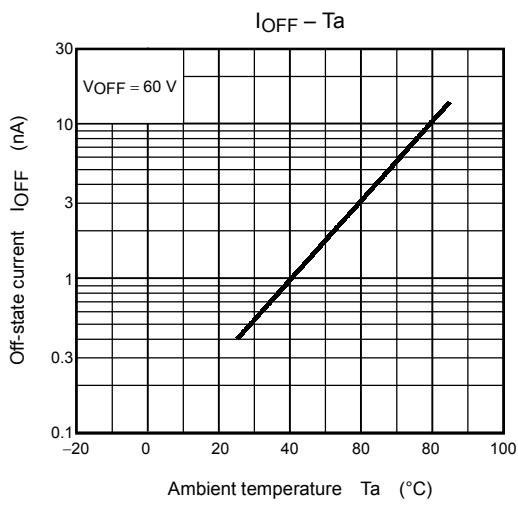
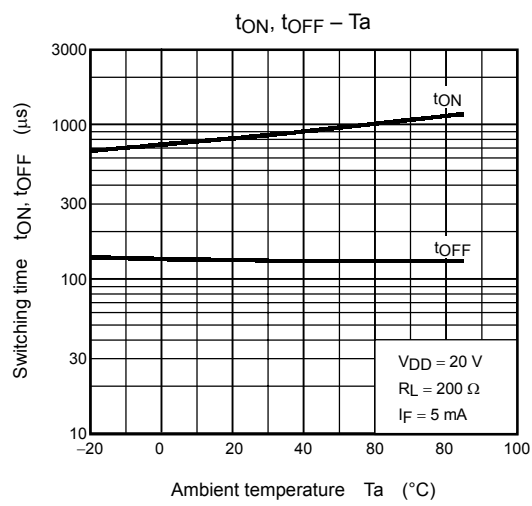
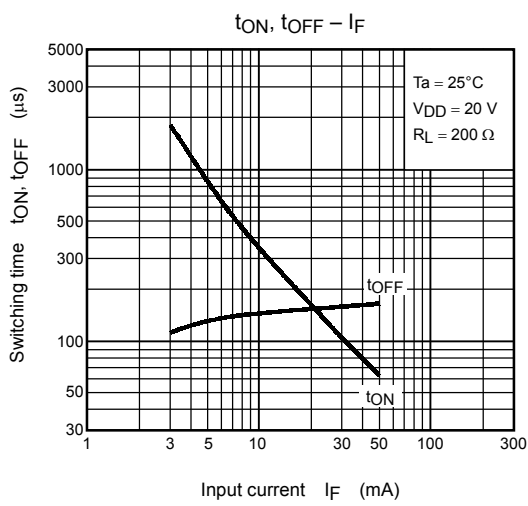
## Switching Characteristics (Ta = 25°C)

| Characteristics | 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) | —   | 0.8  | 2   | ms   |
| Turn-off time   | $t_{OFF}$ |                                                                               | —   | 0.1  | 0.5 |      |

Note 2: Switching time test circuit







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