

## TOSHIBA PHOTOCOUPLER PHOTO RELAY

# TLP3542

### TESTERS

### DATA RECORDING EQUIPMENTS

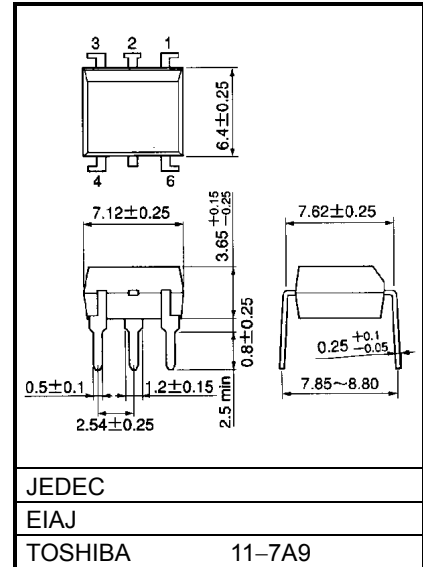
### MEASUREMENT EQUIPMENTS

The TOSHIBA TLP3542 consist of a aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a plastic DIP package.

The TLP3452 series are a bi-directional switch, which can replace mechanical relays in many applications. And its its high on-state current maximum rating is suitable to control a power line.

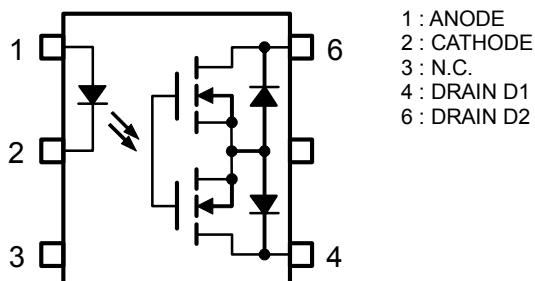
- 6 pin DIP (DIP6)
- 1-Form-A
- Peak Off-State Voltage : 60 V (MIN.)
- Trigger LED Current : 3 mA (MAX.)
- On-State Current : 2.5 A (MAX.)
- On-State Resistance : 100 mΩ (MAX.)
- Output capacitance : 600 pF (MAX.)
- Isolation Voltage : 2500 Vrms (MIN.)
- 

Unit: mm

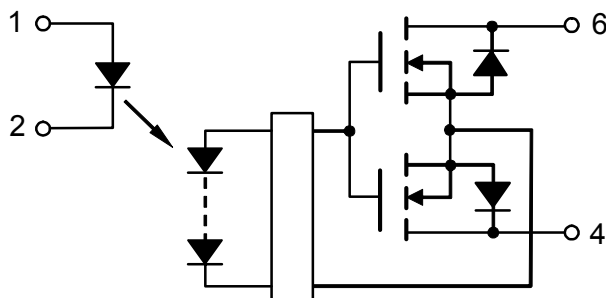


Weight: 0.4 g

### PIN CONFIGURATION (TOL VIEW)



### SCHEMATIC



**MAXIMUM RATINGS (Ta = 25°C)**

| CHARACTERISTIC                                            |                                            | SYMBOL                         | RATING  | UNIT  |
|-----------------------------------------------------------|--------------------------------------------|--------------------------------|---------|-------|
| LED                                                       | Forward Current                            | $I_F$                          | 30      | mA    |
|                                                           | Forward Current Derating (Ta $\geq$ 25°C)  | $\Delta I_F/^\circ\text{C}$    | -0.3    | mA/°C |
|                                                           | Reverse Voltage                            | $V_R$                          | 5       | V     |
|                                                           | Junction Temperature                       | $T_j$                          | 125     | °C    |
| DETECTOR                                                  | Off-State Output Terminal Voltage          | $V_{OFF}$                      | 60      | V     |
|                                                           | On-State Current                           | $I_{ON}$                       | 2.5     | A     |
|                                                           | On-State Current Derating (Ta $\geq$ 40°C) | $\Delta I_{ON}/^\circ\text{C}$ | -22     | mA/°C |
|                                                           | Junction Temperature                       | $T_j$                          | 125     | °C    |
| Storage Temperature Range                                 |                                            | $T_{stg}$                      | -40~125 | °C    |
| Operating Temperature Range                               |                                            | $T_{opr}$                      | -20~85  | °C    |
| Lead Soldering Temperature (10 s)                         |                                            | $T_{sol}$                      | 260     | °C    |
| Isolation Voltage (AC, 1 minute, R.H. $\leq$ 60%) (NOTE1) |                                            | $BV_S$                         | 2500    | Vrms  |

(NOTE1) :Device considered a two-terminal device : Pins 1, 2 and 3 shorted together, and pins 4 and 6 shorted together.

**RECOMMENDED OPERATING CONDITIONS**

| CHARACTERISTIC        | SYMBOL    | MIN. | TYP. | MAX. | UNIT |
|-----------------------|-----------|------|------|------|------|
| Supply Voltage        | $V_{DD}$  | —    | —    | 48   | V    |
| Forward Current       | $I_F$     | 10   | —    | 20   | mA   |
| On-State Current      | $I_{ON}$  | —    | —    | 2.5  | A    |
| Operating Temperature | $T_{opr}$ | 25   | —    | 60   | °C   |

## INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC |                   | SYMBOL    | TEST CONDITION             | MIN. | TYP. | MAX. | UNIT          |
|----------------|-------------------|-----------|----------------------------|------|------|------|---------------|
| LED            | Forward Voltage   | $V_F$     | $I_F = 10 \text{ mA}$      | 1.18 | 1.33 | 1.48 | V             |
|                | Reverse Current   | $I_R$     | $V_R = 5 \text{ V}$        | —    | —    | 10   | $\mu\text{A}$ |
|                | Capacitance       | $C_T$     | $V = 0, f = 1 \text{ MHz}$ | —    | 70   | —    | pF            |
| DETECTOR       | Off-State Current | $I_{OFF}$ | $V_{OFF} = 20 \text{ V}$   | —    | 0.1  | 1.5  | nA            |
|                |                   |           | $V_{OFF} = 60 \text{ V}$   | —    | 1.0  | 10   | nA            |
|                | Capacitance       | $C_{OFF}$ | $V = 0, f = 1 \text{ MHz}$ | —    | 400  | 600  | pF            |

## COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC      | SYMBOL   | TEST CONDITION                                                   | MIN. | TYP. | MAX. | UNIT       |
|---------------------|----------|------------------------------------------------------------------|------|------|------|------------|
| Trigger LED Current | $I_{FT}$ | $I_{ON} = 1.0 \text{ A}$                                         | —    | 1    | 3    | mA         |
| Return LED Current  | $I_{FC}$ | $I_{OFF} = 10 \mu\text{A}$                                       | 0.1  | —    | —    | mA         |
| On-State Resistance | $R_{ON}$ | $I_{ON} = 2.0 \text{ A}, I_F = 10 \text{ mA}, t = 10 \text{ ms}$ | —    | 65   | 100  | m $\Omega$ |

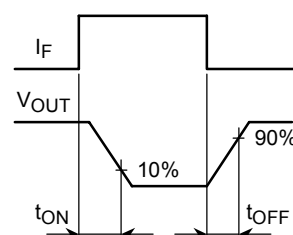
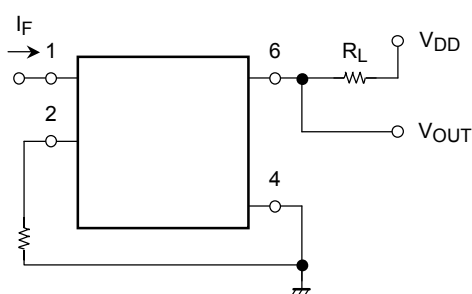
## ISOLATION CHARACTERISTICS (Ta = 25°C)

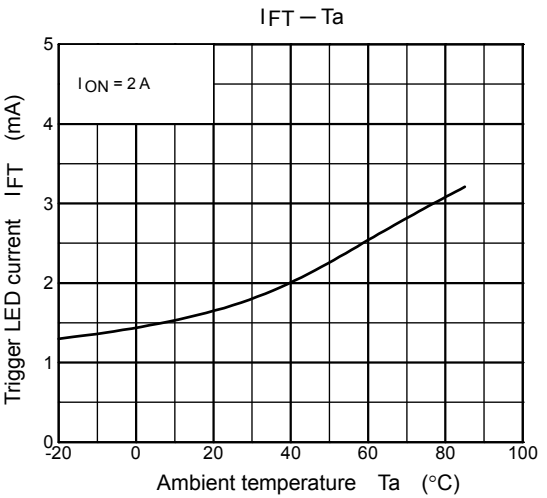
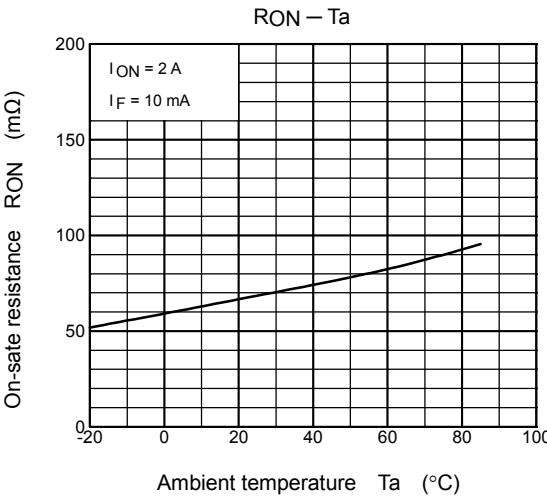
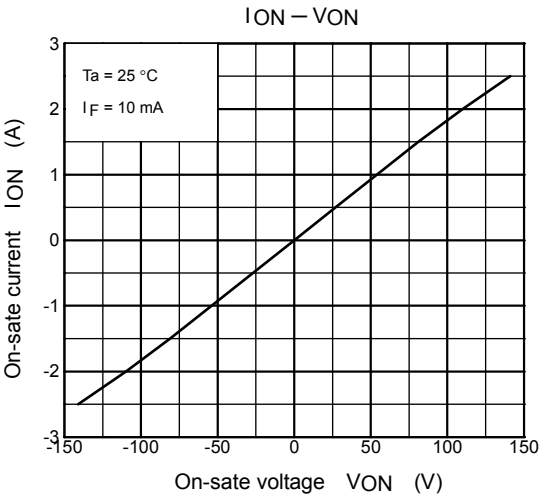
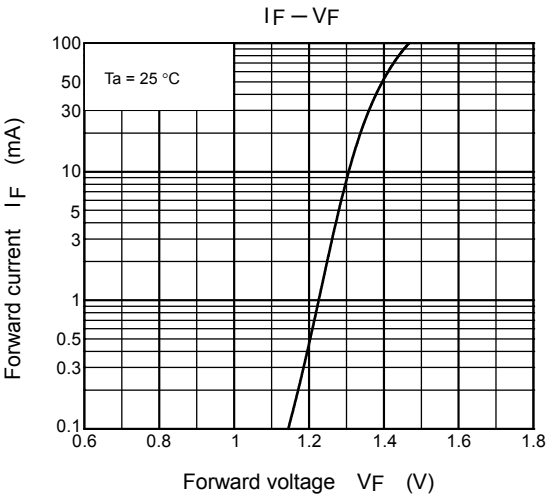
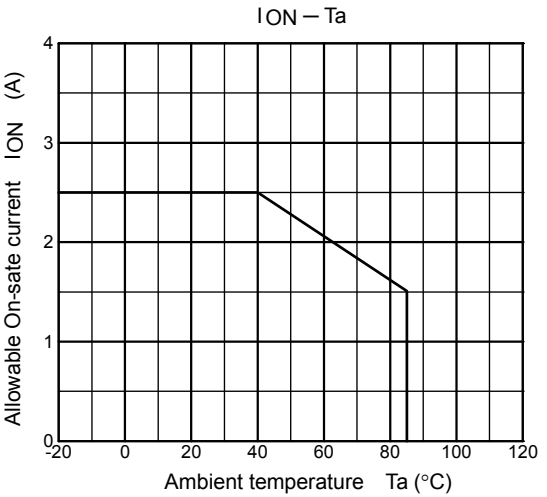
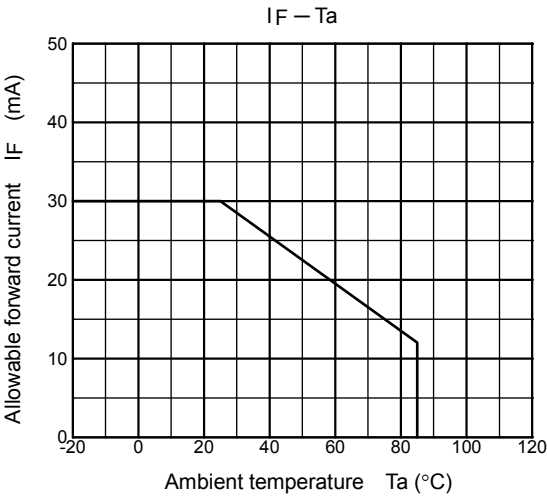
| CHARACTERISTIC              | SYMBOL | TEST CONDITION                               | MIN.               | TYP.      | MAX. | UNIT     |
|-----------------------------|--------|----------------------------------------------|--------------------|-----------|------|----------|
| Capacitance Input to 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, 1 minute                                 | 2500               | —         | —    | Vrms     |
|                             |        | AC, 1 second (in oil)                        | —                  | 5000      | —    |          |
|                             |        | DC, 1 minute (in oil)                        | —                  | 5000      | —    | Vdc      |

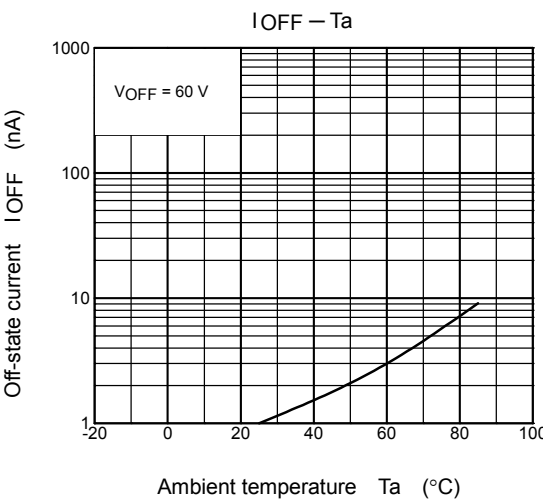
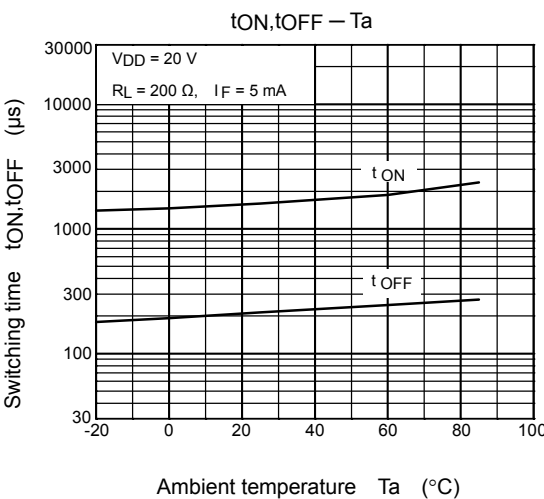
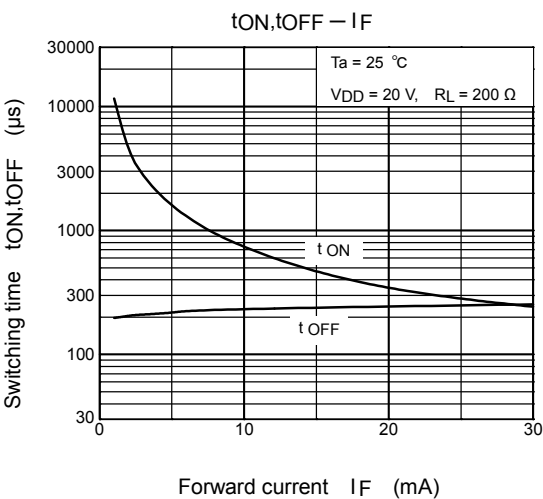
## SWITCHING CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL    | TEST CONDITION                                                              | MIN. | TYP. | MAX. | UNIT |
|----------------|-----------|-----------------------------------------------------------------------------|------|------|------|------|
| Turn-on Time   | $t_{ON}$  | $R_L = 200 \Omega$ (NOTE 2)<br>$V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$  | —    | 1.5  | 3.0  | ms   |
| Turn-off Time  | $t_{OFF}$ |                                                                             | —    | 0.2  | 0.6  |      |
| Turn-on Time   | $t_{ON}$  | $R_L = 200 \Omega$ (NOTE 2)<br>$V_{DD} = 20 \text{ V}, I_F = 10 \text{ mA}$ | —    | 1.0  | 1.5  | ms   |
| Turn-off Time  | $t_{OFF}$ |                                                                             | —    | 0.2  | 0.4  |      |

(NOTE 2) : SWITCHING TIME TEST CIRCUIT







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