

TENTATIVE

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-MOS FET

TLP176A

MEASUREMENT INSTRUMENT

DATA ACQUISITION

TELECOMMUNICATION

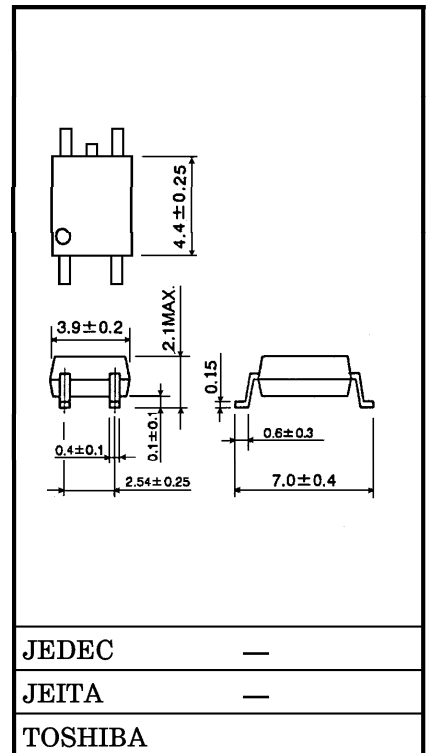
PROGRAMMABLE CONTROL

The TOSHIBA TLP176A consists of gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a SOP, which is suitable for surface mount assembly.

The TLP176A is suitable for replacement of mechanical relays in many applications which require space savings.

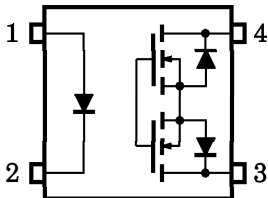
- SOP 4 pin (2.54SOP4) : 1-Form-A
- Peak Off-State Voltage : 60 V (MIN.)
- Trigger LED Current : 3 mA (MAX.)
- On-State Current : 400 mA (MAX.)
- On-State Resistance : 2 Ω (MAX.)
- Isolation Voltage : 1500 V_{rms} (MIN.)
- UL Recognized : UL1577, File No. E67349

Unit in mm



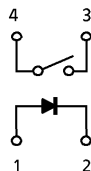
Weight : 0.1 g

PIN CONFIGURATION (TOP VIEW)

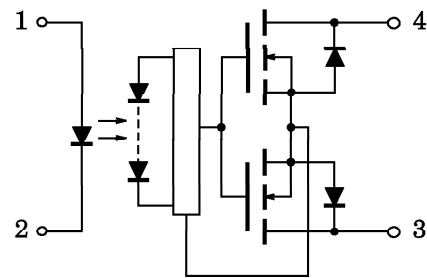


- 1 : ANODE
- 2 : CATHODE
- 3 : DRAIN
- 4 : DRAIN

1-Form-A



SCHEMATIC



MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|----------------------|---------|------------------|
| LED | Forward Current | I _F | 50 | mA |
| | Forward Current Derating (Ta ≥ 25°C) | ΔI _F /°C | -0.5 | mA/°C |
| | Pulse Forward Current (100 μs pulse, 100 pps) | I _{FP} | 1 | A |
| | 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} | 400 | mA |
| | On-State RMS Current Derating (Ta ≥ 25°C) | ΔI _{ON} /°C | -4.0 | mA/°C |
| | Junction Temperature | T _j | 125 | °C |
| Storage Temperature Range | | T _{stg} | -55~125 | °C |
| Operating Temperature Range | | T _{opr} | -40~85 | °C |
| Lead Soldering Temperature (10 s) | | T _{sol} | 260 | °C |
| Isolation Voltage (AC, 1 min., R.H. ≤ 60%) (Note 1) | | BV _S | 1500 | V _{rms} |

(Note 1) Device considered a two-terminal device : pins 1 and 2 shorted together and pins 3 and 4 shorted together.

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | 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} | — | — | 400 | mA |
| Operating Temperature | T _{opr} | -20 | — | 65 | °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 | Off-State Current | I_{OFF} | $V_{OFF} = 60 \text{ V}$ | — | — | 1 | μA |
| | Capacitance | C_{OFF} | $V = 0, f = 1 \text{ MHz}$ | — | 140 | — | pF |

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---------------------|----------|---|------|------|------|----------|
| Trigger LED Current | I_{FT} | $I_{ON} = 400 \text{ mA}$ | — | 1 | 3 | mA |
| On-State Resistance | R_{ON} | $I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$ | — | 1 | 2 | Ω |

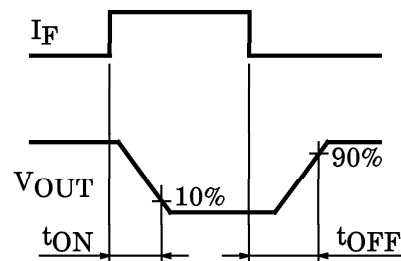
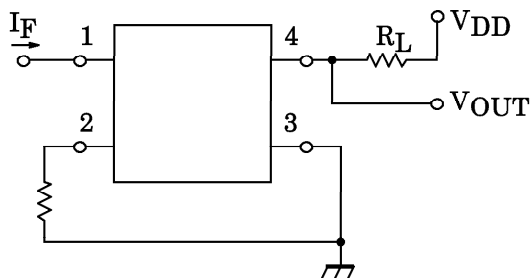
ISOLATION CHARACTERISTICS (Ta = 25°C)

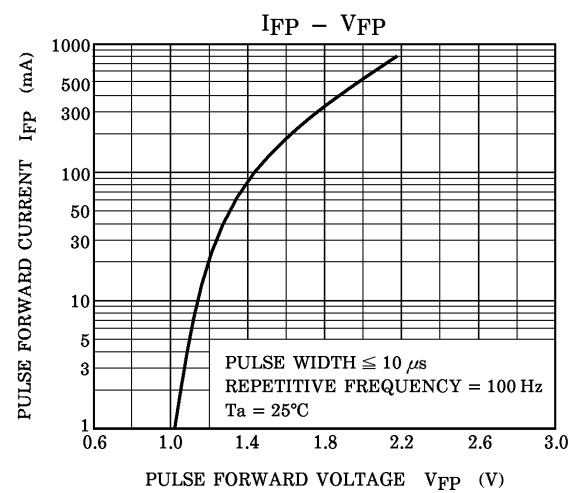
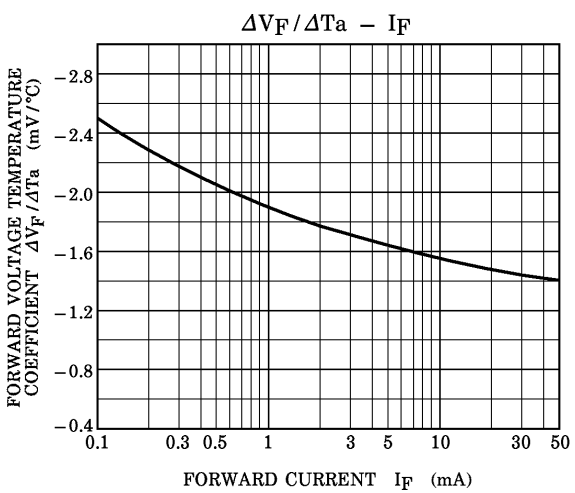
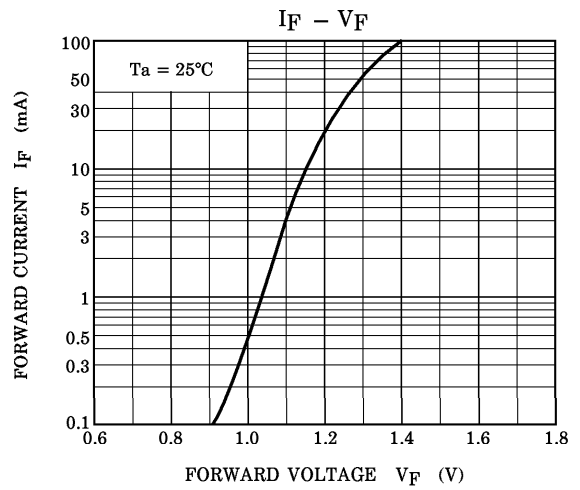
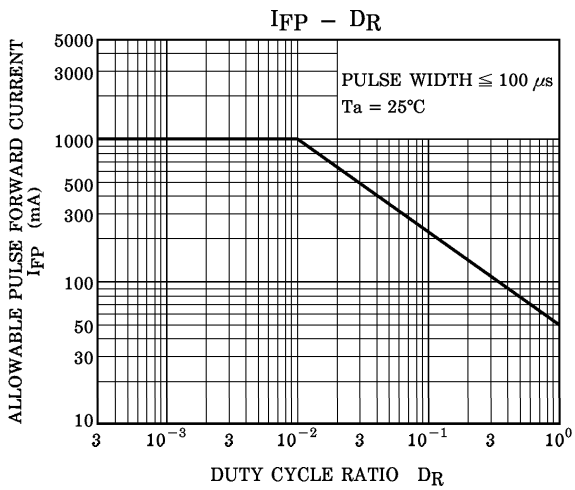
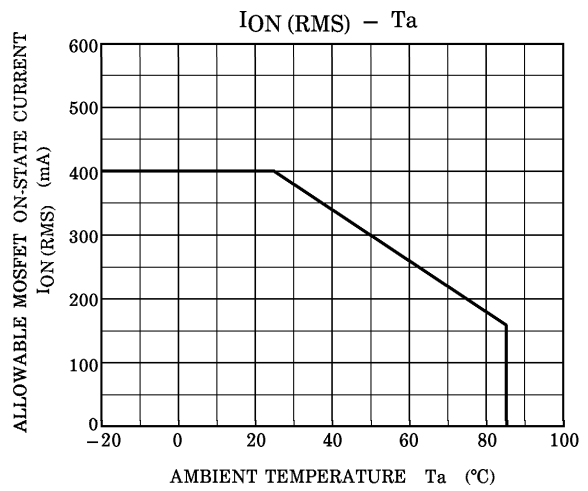
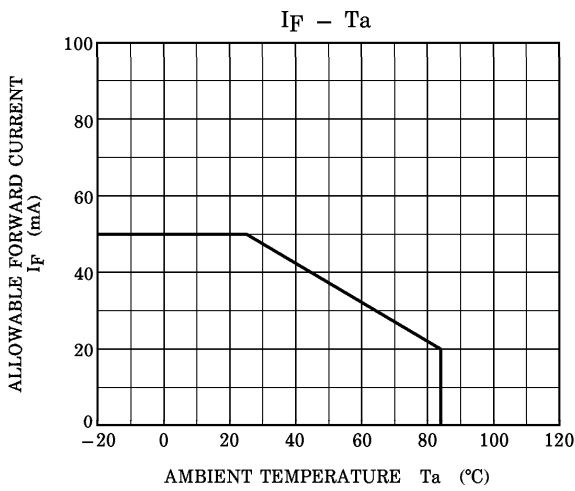
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-----------------------------|--------|---------------------------------------|--------------------|-----------|------|-----------|
| Capacitance Input to Output | C_S | $V_S = 0, f = 1 \text{ MHz}$ | — | 0.8 | — | pF |
| Isolation Resistance | R_S | $V_S = 500 \text{ V}, R.H. \leq 60\%$ | 5×10^{10} | 10^{14} | — | Ω |
| Isolation Voltage | BV_S | AC, 1 minute | 1500 | — | — | V_{rms} |
| | | AC, 1 second (in oil) | — | 3000 | — | |
| | | DC, 1 minute (in oil) | — | 3000 | — | Vdc |

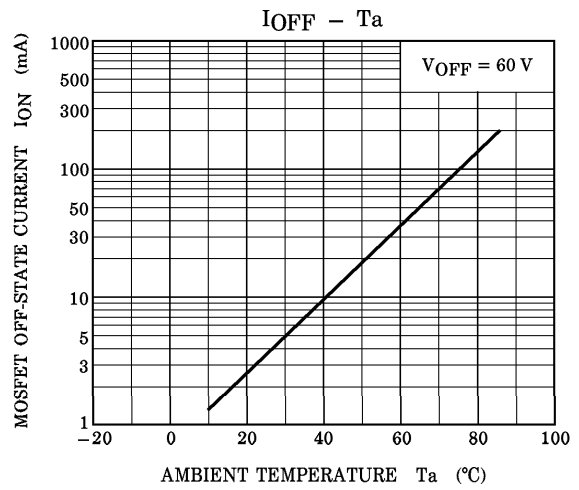
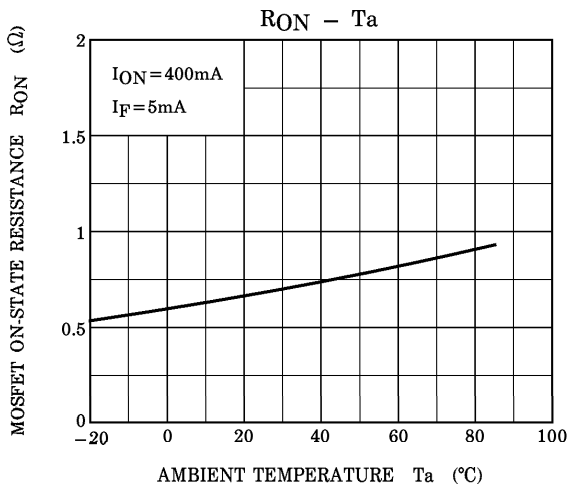
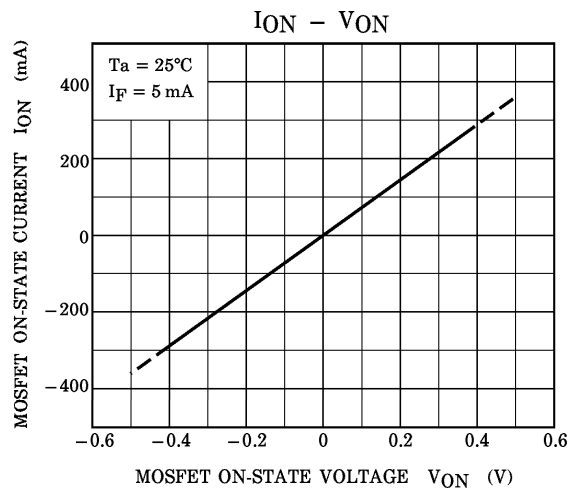
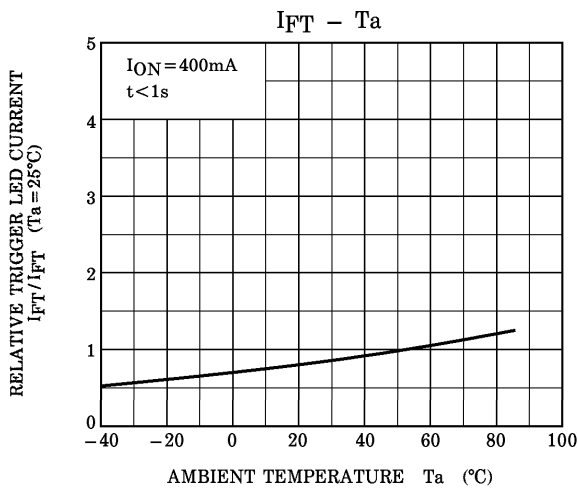
SWITCHING CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------|-----------|---|------|------|------|------|
| Turn-on Time | t_{ON} | $R_L = 200 \Omega$ (Note 2) | — | 0.9 | 2.0 | ms |
| Turn-off Time | t_{OFF} | $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ | — | 0.1 | 1.0 | |

(Note 2) Switching Time Test Circuit







RESTRICTIONS ON PRODUCT USE

020704EBC

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