

# TLP160J

- Triac Drive
- Programmable Controllers
- AC-Output Module
- Solid State Relay

The TOSHIBA mini flat coupler TLP160J is a small outline coupler, suitable for surface mount assembly. The TLP160J consists of a photo triac, optically coupled to a gallium arsenide infrared emitting diode.

- Peak off-state voltage: 600 V (min.)
- Trigger LED current: 10 mA (max.)
- On-state current: 70 mA (max.)
- Isolation voltage: 2500 Vrms (min.)
- UL recognized: UL1577, file No. E67349

## Trigger LED Current

| Classi-<br>fication* | Trigger LED Current (mA)                 |      | Marking Of<br>Classification |
|----------------------|--|------|------------------------------|
|                      | V <sub>T</sub> =6V, T <sub>a</sub> =25°C |      |                              |
|                      | Min.                                     | Max. |                              |
| (IFT7)               | —  | 7    | T7                           |
| Standard             | —  | 10   | T7, blank                    |

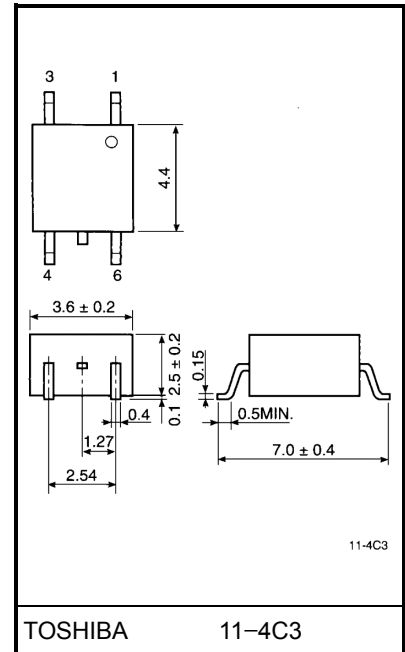
\*Ex. (IFT7); TLP160J (IFT7)

(Note) Application type name for certification test, please

use standard product type name, i.e.

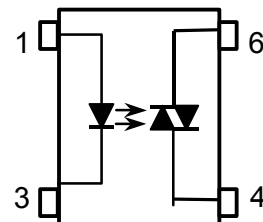
TLP160J (IFT7): TLP160J

Unit in mm



Weight: 0.09 g

## Pin Configurations



- 1. Anode
- 3. Cathode
- 4. Terminal 1
- 6. Terminal 2

## Maximum Ratings (Ta = 25°C)

| Characteristic                                    |  | Symbol                        | Rating | Unit    |
|---|--|-------------------------------|--------|---------|
| LED   | Forward current                                    | $I_F$                         | 50     | mA      |
|   | Forward current derating (Ta ≥ 53°C)               | $\Delta I_F / ^\circ\text{C}$ | -0.7   | mA / °C |
|   | Peak 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                  | $V_{DRM}$                     | 600    | V       |
|   | On-state RMS current                               | Ta=25°C                       | 70     | mA      |
|   |  | Ta=70°C                       | 40     |         |
|   | On-state current derating (Ta ≥ 25°C)              | $\Delta I_T / ^\circ\text{C}$ | -0.67  | mA / °C |
|   | Peak on-state current (100μs pluse, 120pps)        | $I_{TP}$                      | 2      | A       |
|   | Peak nonrepetitive surge current (PW=10ms, DC=10%) | $I_{TSM}$                     | 1.2    | A       |
|   | Junction temperature                               | $T_j$                         | 115    | °C      |
| Storage temperature range                         | $T_{stg}$  | -55~125                       | °C     |         |
| Operating temperature range                       | $T_{opr}$  | -40~100                       | °C     |         |
| Lead soldering temperature (10 s)                 | $T_{sol}$  | 260                           | °C     |         |
| Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note) | $BV_S$   | 2500                          | Vrms   |         |

(Note) Device considered a two terminal device: Pins 1 and 3 shorted together and pins 4 and 6 shorted together.

## Recommended Operating Conditions

| Characteristic        | Symbol    | Min. | Typ. | Max. | Unit |
|-----------------------|-----------|------|------|------|------|
| Supply voltage        | $V_{AC}$  | —    | —    | 240  | Vac  |
| Forward current       | $I_F$     | 15   | 20   | 25   | mA   |
| Peak on-state current | $I_{TP}$  | —    | —    | 1    | A    |
| Operating temperature | $T_{opr}$ | -25  | —    | 85   | °C   |

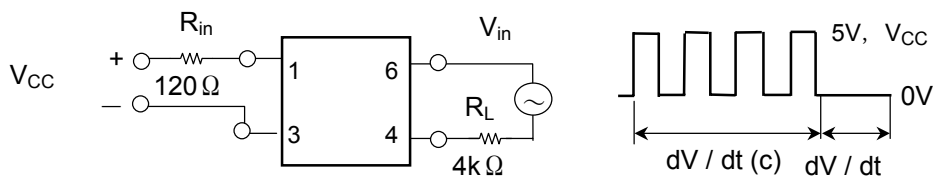
**Individual Electrical Characteristics (Ta = 25°C)**

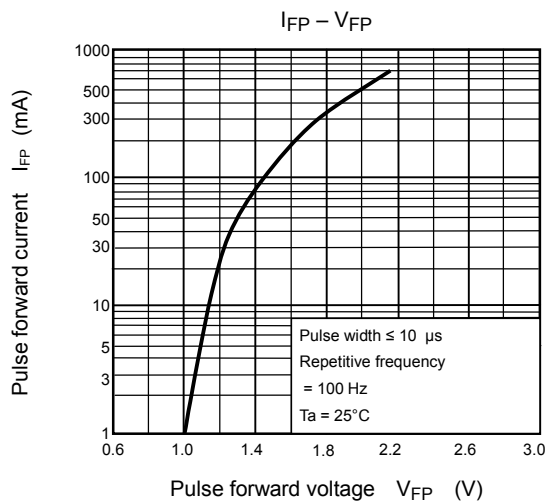
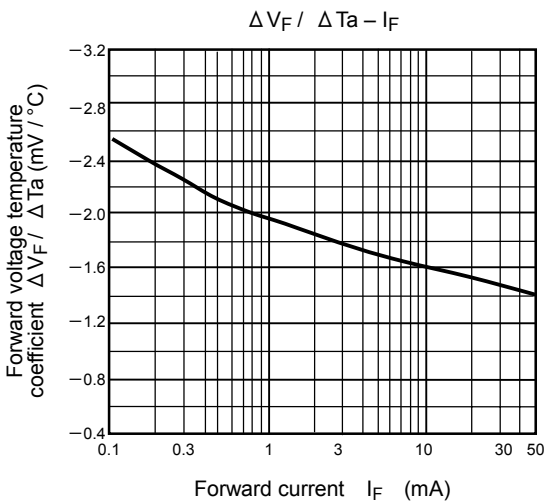
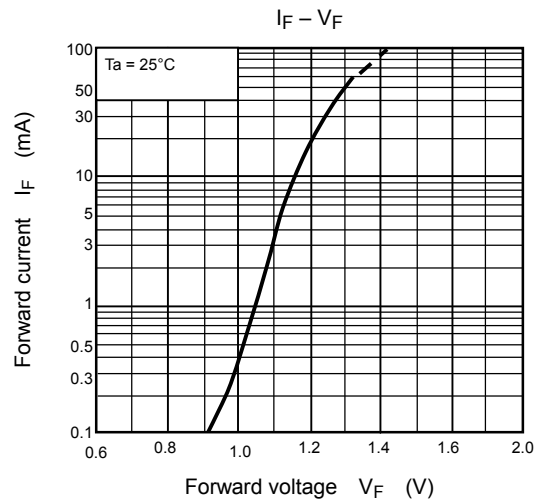
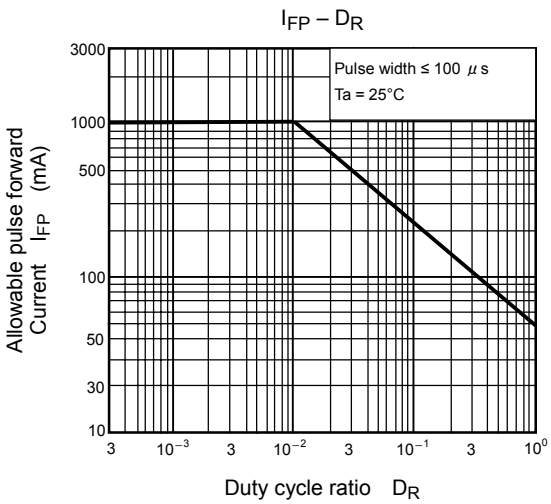
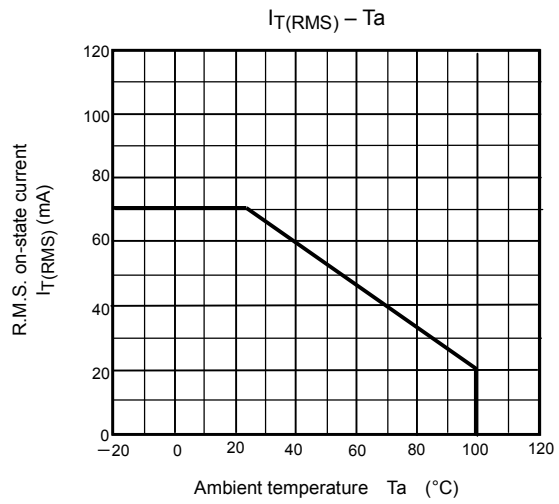
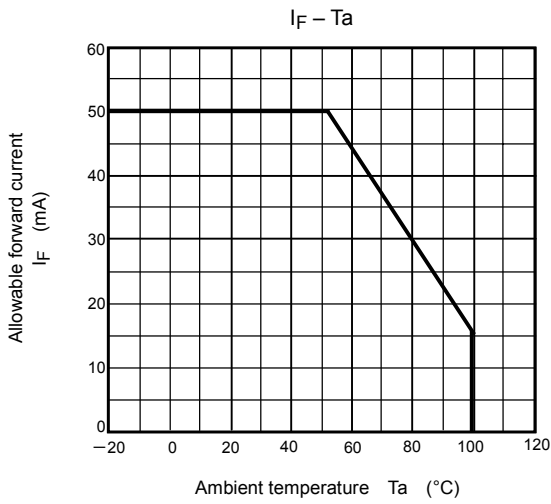
| Characteristic |  | Symbol       | Test Condition  | Min. | Typ. | Max. | Unit                     |
|----------------|--|--------------|---|------|------|------|--------------------------|
| LED            | Forward voltage                              | $V_F$        | $I_F = 10 \text{ mA}$                                       | 1.0  | 1.15 | 1.3  | V                        |
|                | Reverse current                              | $I_R$        | $V_R = 5 \text{ V}$   | —    | —    | 10   | $\mu\text{A}$            |
|                | Capacitance                                  | $C_T$        | $V = 0, f = 1 \text{ MHz}$                                  | —    | 30   | —    | pF                       |
| Detector       | Peak off-state current                       | $I_{DRM}$    | $V_{DRM} = 600 \text{ V}$                                   | —    | 10   | 1000 | nA                       |
|                | Peak on-state voltage                        | $V_{TM}$     | $I_{TM} = 70 \text{ mA}$                                    | —    | 1.7  | 2.8  | V                        |
|                | Holding current                              | $I_H$        | —   | —    | 1.0  | —    | mA                       |
|                | Critical rate of rise of off-state voltage   | $dv / dt$    | $V_{in} = 240 \text{ Vrms}, T_a = 85^\circ\text{C}$ (Fig.1) | —    | 500  | —    | $\text{V} / \mu\text{s}$ |
|                | Critical rate of rise of commutating voltage | $dv / dt(c)$ | $I_T = 15 \text{ mA}, V_{in} = 60 \text{ Vrms}$ (Fig.1)     | —    | 0.2  | —    | $\text{V} / \mu\text{s}$ |

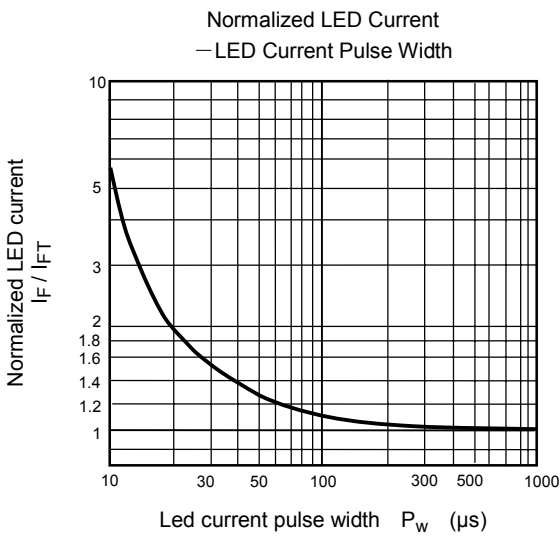
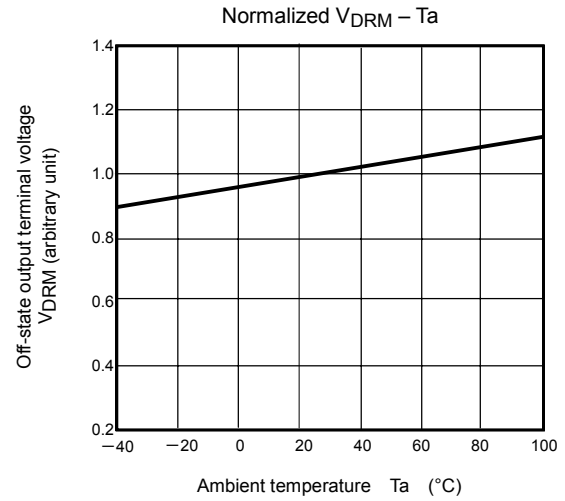
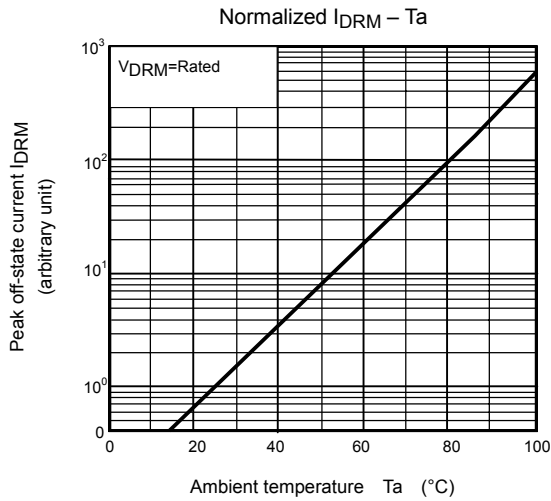
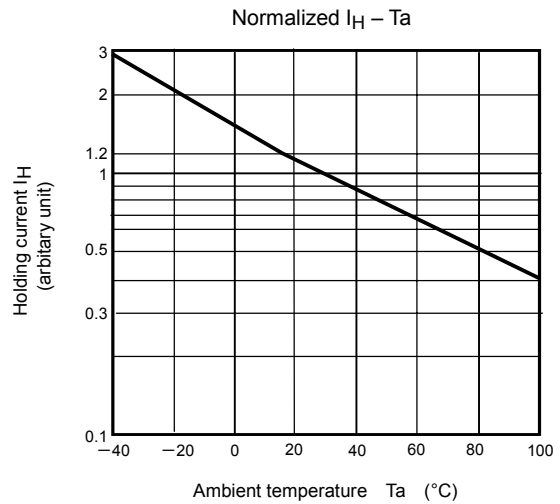
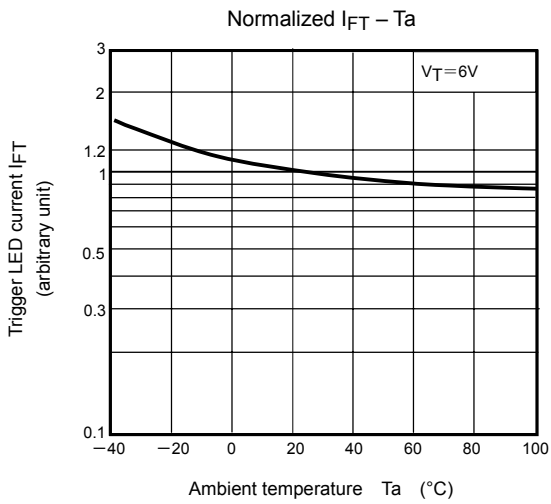
**Coupled Electrical Characteristics (Ta = 25°C)**

| Characteristic              | Symbol   | Test Condition   | Min.               | Typ.      | Max. | Unit          |
|-----------------------------|----------|--|--------------------|-----------|------|---------------|
| Trigger LED current         | $I_{FT}$ | $V_T = 6 \text{ V}$  | —                  | 5         | 10   | mA            |
| Capacitance input to output | $C_S$    | $V_S = 0, f = 1 \text{ MHz}$   | —                  | 0.8       | —    | pF            |
| Isolation resistance        | $R_S$    | $V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$   | $1 \times 10^{12}$ | $10^{14}$ | —    | $\Omega$      |
| Isolation voltage           | $BV_S$   | AC, 1 minute   | 2500               | —         | —    | Vrms          |
|                             |          | AC, 1 second, in oil   | —                  | 5000      | —    | —             |
|                             |          | DC, 1 minute, in oil   | —                  | 5000      | —    | Vdc           |
| Turn-on time                | $t_{ON}$ | $V_D = 6 \rightarrow 4 \text{ V}, R_L = 100 \Omega$<br>$I_F = \text{rated } I_{FT} \times 1.5$ | —                  | 30        | 100  | $\mu\text{s}$ |

Fig.1  $dv / dt$  test circuit







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