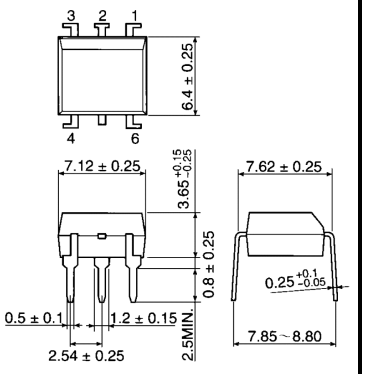
TOSHIBA Photocoupler GaAs Ired & Photo−Triac

# TLP561G

Triac Driver
Programmable Controllers
AC−Output Module
Solid State Relay

Unit : mm




TOSHIBA 11−7A9

Weight: 0.39g

The TOSHIBA TLP561G consists of a zero voltage crossing turn−on photo−triac optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

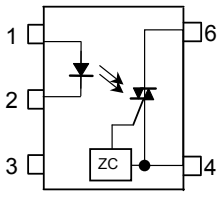
- Peak off−state voltage: 400V(min.)
- On−state current: 100mA(max.)
- Isolation voltage: 2500$V_{rms}$(min.)
- UL recognized: file no. E67349
- Isolation operating voltage: 2500$V_{ac}$ or 300$V_{dc}$ for isolation group C*1
- Trigger LED current

| Classi−fication* | Trigger LED Current (mA) $V_T$ = 6V, Ta = 25°C | | Marking Of Classification |
|---|---|---|---|
| | Min. | Max. | |
| (IFT5) | — | 5 | T5 |
| (IFT7) | — | 7 | T5, T7 |
| Standard | — | 10 | T5, T7, blank |

*Ex. (IFT5); TLP561G (IFT5)
(Note) Application type name for certification test, please use standard product type name, i.e.
TLP561G (IFT5): TLP561G

*1: According to VDE0110, table 4.

## Pin Configuration (top view)




1 : ANODE
2 : CATHODE
3 : N.C.
4 : TERMINAL 1
6 : TERMINAL 2

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

| Characteristic | | | Symbol | Rating | Unit |
|---|---|---|---|---|---|
| LED | Forward current | | $I_F$ | 50 | mA |
| | Forward current derating (Ta ≥ 53°C) | | $\Delta I_F$ / °C | −0.7 | mA / °C |
| | Peak forward current (100μs pulse, 100pps) | | $I_{FP}$ | 1 | A |
| | Reverse voltage | | $V_R$ | 5 | V |
| | Junction temperature | | $T_j$ | 125 | °C |
| Detector | Off−state output terminal voltage | | $V_{DRM}$ | 400 | V |
| | On−state RMS current | Ta = 25°C | $I_{T(RMS)}$ | 100 | mA |
| | | Ta = 70°C | | 50 | |
| | On−state current derating (Ta ≥ 25°C) | | $\Delta I_T$ / °C | −1.1 | mA / °C |
| | Peak on−state current (100μs pulse, 120pps) | | $I_{TP}$ | 2 | A |
| | Peak nonrepetitive surge current (Pw = 10ms) | | $I_{TSM}$ | 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 (10s) | | | $T_{sol}$ | 260 | °C |
| Isolation voltage (AC, 1 min., R.H. ≤ 60%) | | | $BV_S$ | 2500 | $V_{rms}$ |

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).

## Recommended Operating Conditions

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Supply voltage | $V_{AC}$ | — | — | 120 | $V_{ac}$ |
| Forward current | $I_F$ | 15 | 20 | 25 | mA |
| Peak on−state current | $I_{TP}$ | — | — | 1 | A |
| Operating temperature | $T_{opr}$ | −25 | — | 85 | °C |

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the devices. Each item also has its own independent guideline document. In developing designs using these products, please confirm the specified characteristics shown in these documents.

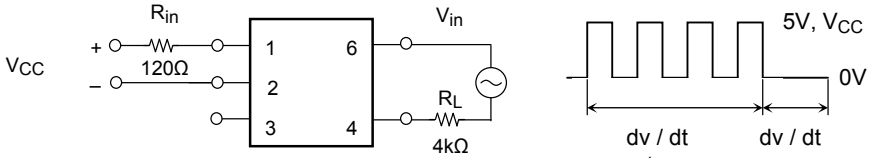
## Individual Electrical Characteristics (Ta = 25°C)

| Characteristic | | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| LED | Forward voltage | $V_F$ | $I_F$ = 10mA | 1.0 | 1.15 | 1.3 | V |
| | Reverse current | $I_R$ | $V_R$ = 5V | — | — | 10 | μA |
| | Capacitance | $C_T$ | V = 0, f = 1MHz | — | 30 | — | pF |
| Detector | Peak off−state current | $I_{DRM}$ | $V_{DRM}$ = 400V | — | 10 | 100 | nA |
| | Peak on−state voltage | $V_{TM}$ | $I_{TM}$ = 100mA | — | 1.7 | 3.0 | V |
| | Holding current | $I_H$ | — | — | 0.6 | — | mA |
| | Critical rate of rise of off−state voltage | dv / dt | $V_{in}$ = 120$V_{rms}$, Ta = 85°C (Fig.1) | 200 | 500 | — | V / μs |
| | Critical rate or rise of commutating voltage | dv / dt (c) | $V_{in}$ = 30$V_{rms}$, $I_T$ = 15mA (Fig.1) | — | 0.2 | — | V / μs |

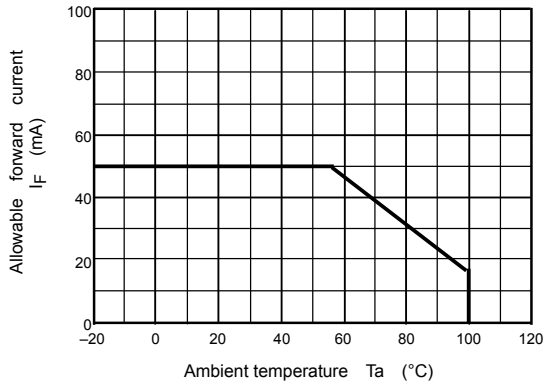
## Coupled Electrical Characteristics (Ta = 25°C)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Trigger LED current | $I_{FT}$ | $V_T$ = 3V, $R_L$ = 100Ω | — | 5 | 10 | mA |
| Inhibit voltage | $V_{IH}$ | $I_F$ = rated $I_{FT}$ | — | — | 40 | V |
| Leakage in inhibited state | $I_{IH}$ | $I_F$ = rated $I_{FT}$<br>$V_T$ = rated $V_{DRM}$ | — | 100 | 300 | μA |
| Capacitance (input to output) | $C_S$ | $V_S$ = 0, f = 1MHz | — | 0.8 | — | pF |
| Isolation resistance | $R_S$ | $V_S$ = 500V | $5\times10^{10}$ | $10^{14}$ | — | Ω |
| Isolation voltage | $BV_S$ | AC, 1 minute | 2500 | — | — | $V_{rms}$ |
| | | AC, 1 second, in oil | — | 5000 | — | |
| | | DC, 1 minute, in oil | — | 5000 | — | $V_{dc}$ |

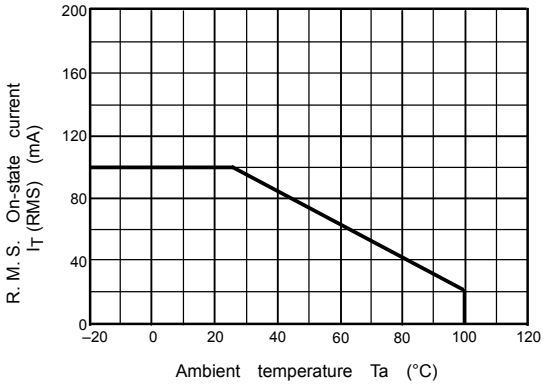
Fig.1: dv / dt test circuit



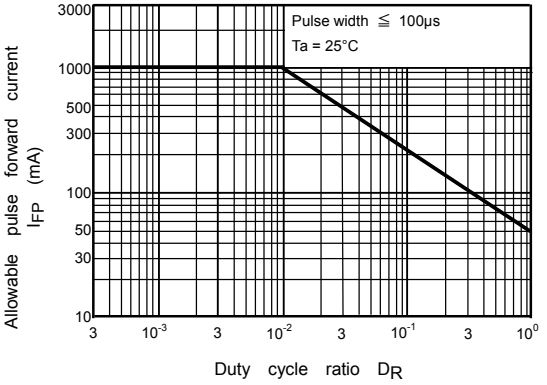
$I_F$ – Ta



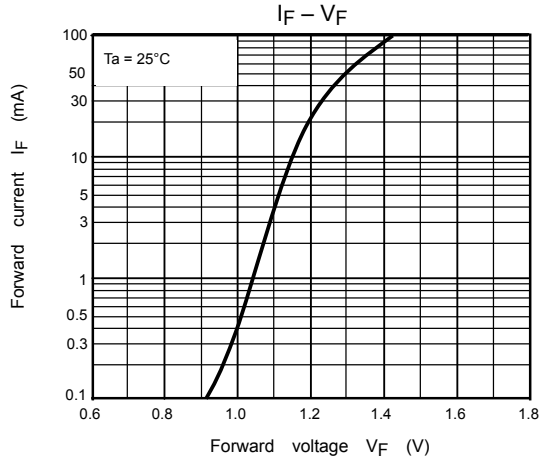

$I_{T(RMS)}$ – Ta



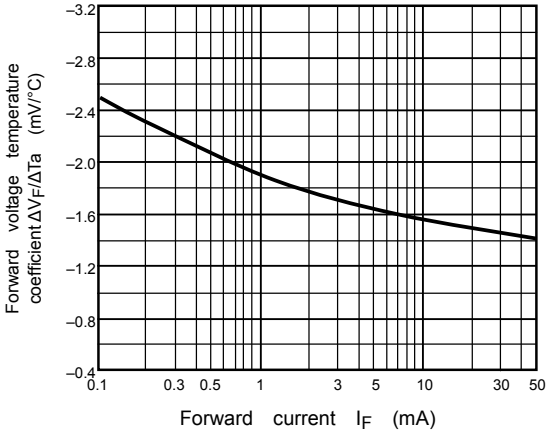

$I_{FP}$ – $D_R$



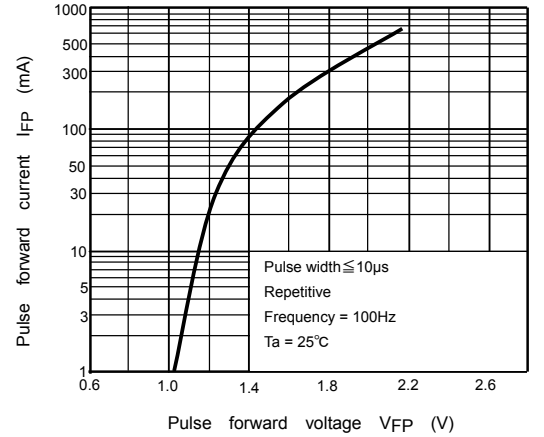

$I_F$ – $V_F$



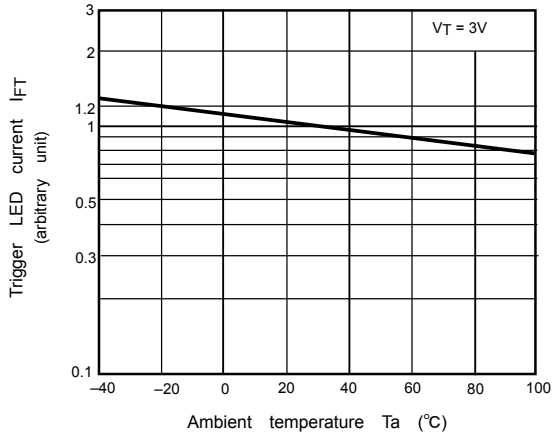

$\Delta V_F/\Delta Ta$ – $I_F$



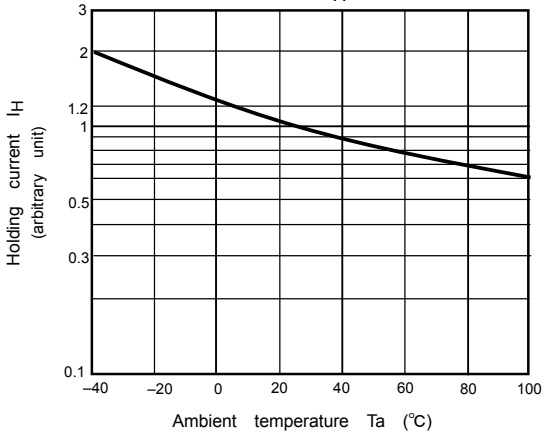

$I_{FP}$ – $V_{FP}$



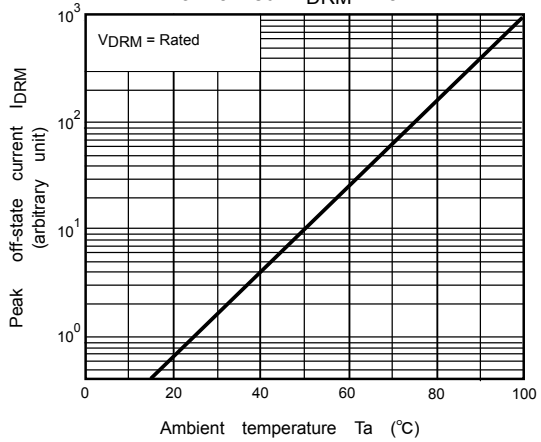
Normalized $I_{FT}$ – Ta



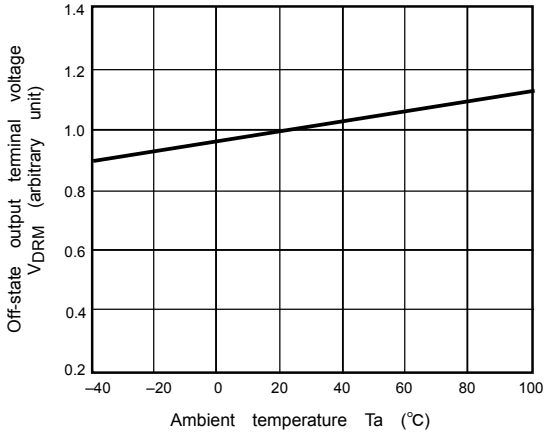

Normalized $I_H$ – Ta



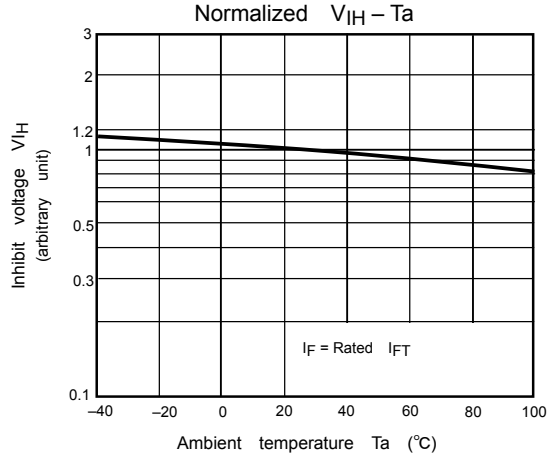

Normalized $I_{DRM}$ – Ta



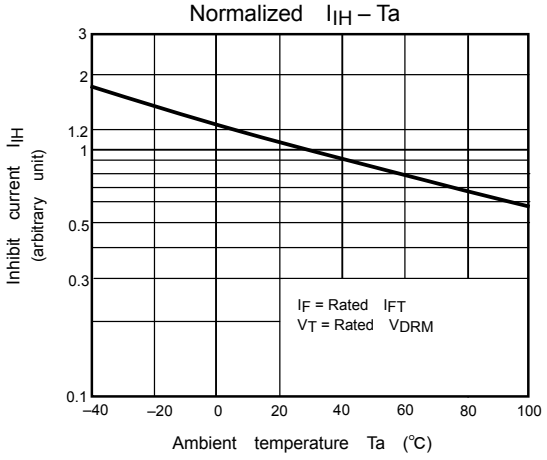

Normalized $V_{DRM}$ – Ta




Normalized $V_{IH}$ – Ta




Normalized $I_{IH}$ – Ta



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