

# TOSHIBA SM12(G,J)48,USM12(G,J)48,SM12(G,J)48A,USM12(G,J)48A

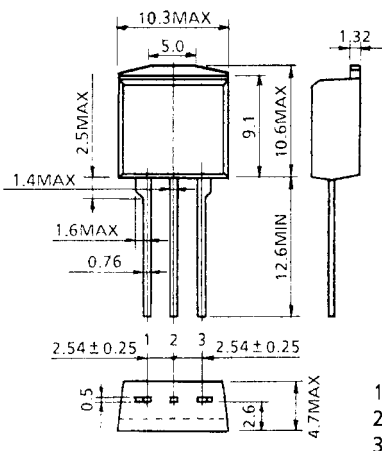
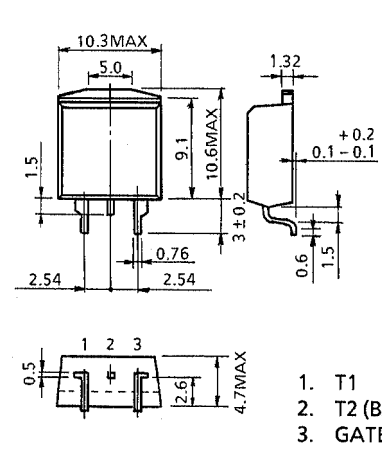
TOSHIBA BI-DIRECTIONAL TRIODE THYRISTOR SILICON PLANAR TYPE

## SM12G48,USM12G48,SM12J48,USM12J48 SM12G48A,USM12G48A,SM12J48A,USM12J48A

### AC POWER CONTROL APPLICATIONS

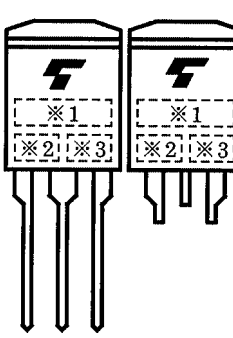
- Repetitive Peak Off-State Voltage :  $V_{DRM}=400, 600V$
- R.M.S. On-State Current :  $I_T (RMS) =12A$
- Gate Trigger Current :  $I_{GT}=30mA$  Max.  
:  $I_{GT}=20mA$  Max. ("A"Type)

Unit in mm

| SM12G48, SM12J48, SM12G48A, SM12J48A                                               | USM12G48, USM12J48, USM12G48A, USM12J48A                                            |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |
| JEDEC —                                                                            | JEDEC —                                                                             |
| JEITA —                                                                            | JEITA —                                                                             |
| TOSHIBA 13-10J1A                                                                   | TOSHIBA 13-10J2A                                                                    |

Weight : 1.7g

### MARKING

|  | NUMBER | SYMBOL                                                                                                         | MARK                                                                     |
|-------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|                                                                                     | *1     | TYPE                                                                                                           | SM12G48, SM12G48A, USM12G48, USM12G48A                                   |
|                                                                                     |        |                                                                                                                | SM12J48, SM12J48A, USM12J48, USM12J48A                                   |
|                                                                                     | *2     |                                                                                                                | SM12G48A, SM12J48A, USM12G48A, USM12J48A                                 |
|                                                                                     | *3     | Lot Number<br>□ □ ← Month (Starting from Alphabet A)<br>↑ Year (Last Decimal Digit of the Year of Manufacture) | Example<br>8A : January 1998<br>8B : February 1998<br>8L : December 1998 |

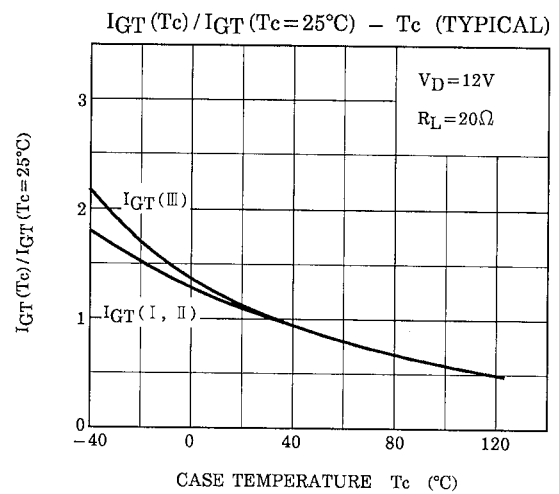
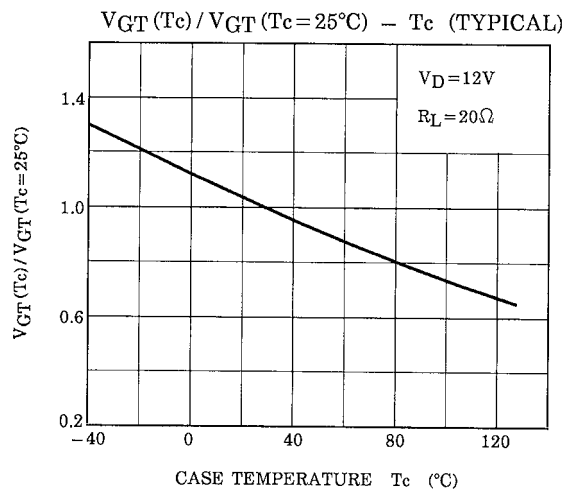
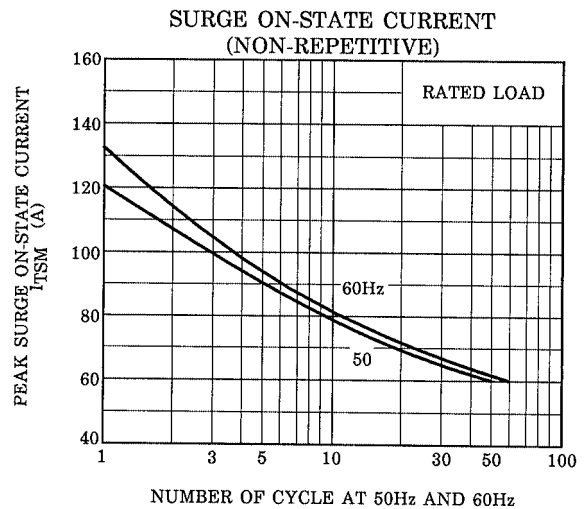
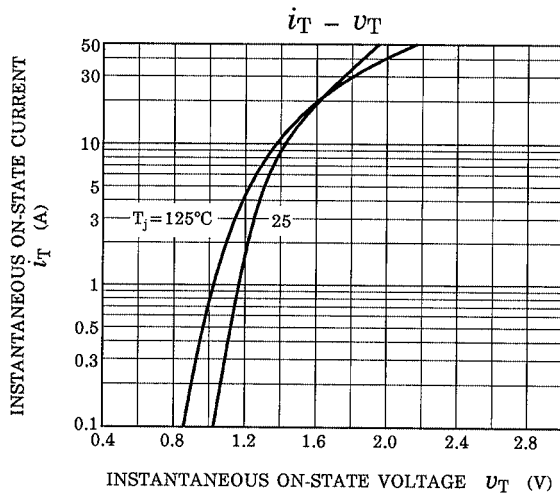
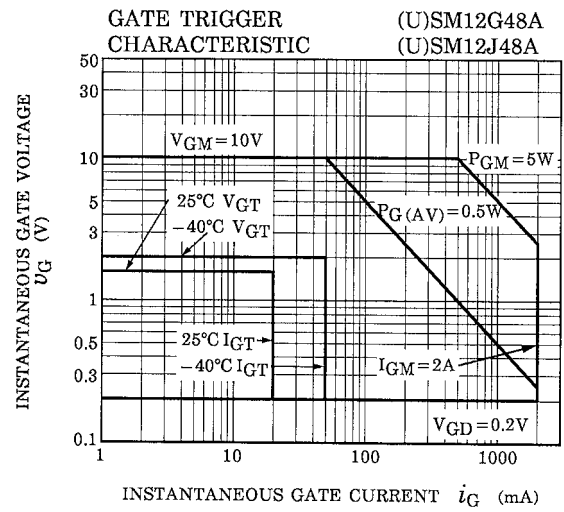
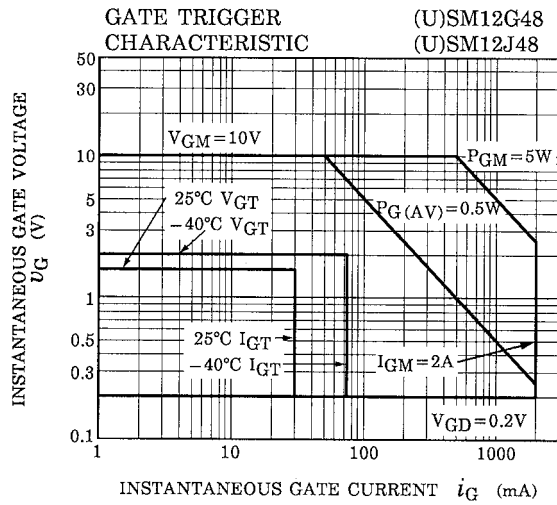
## MAXIMUM RATINGS

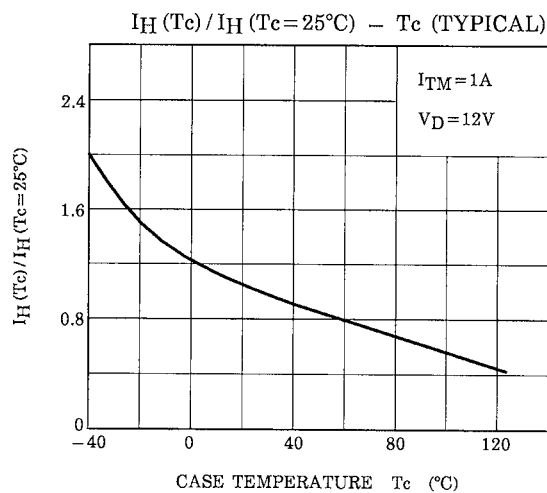
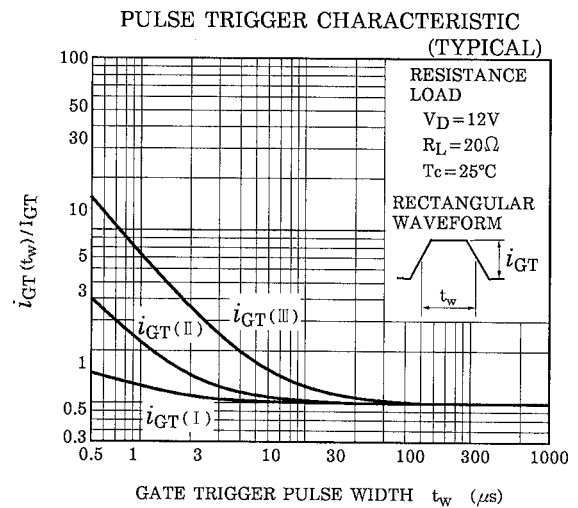
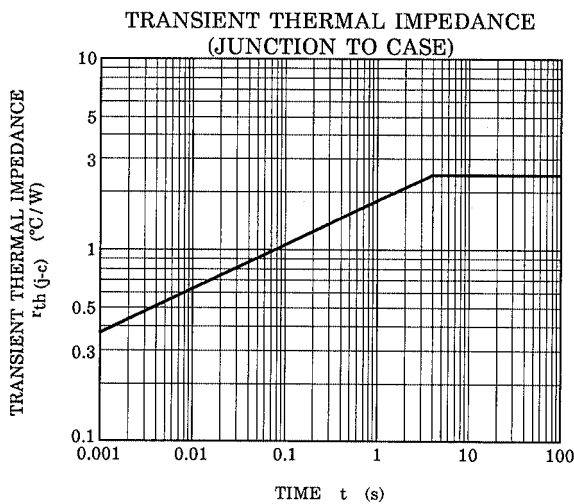
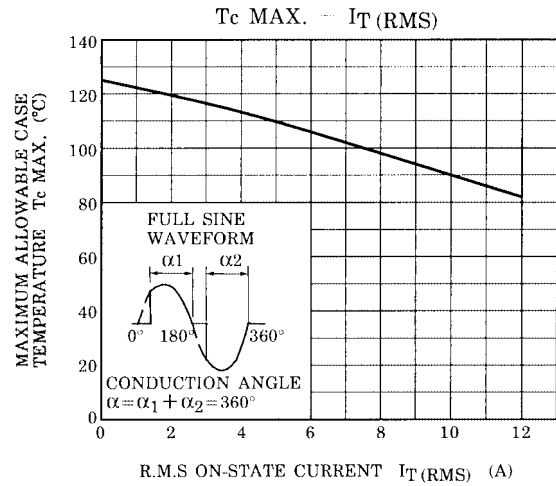
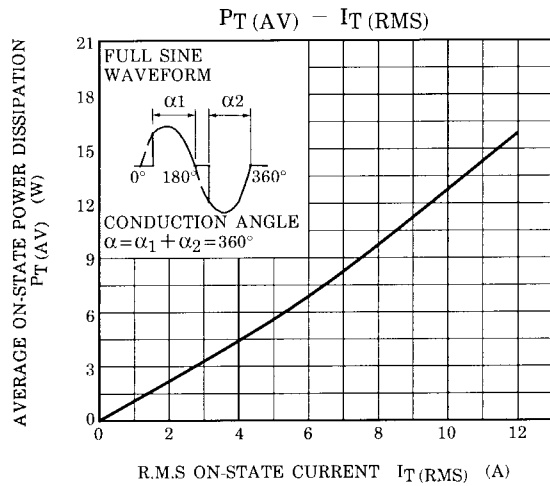
| CHARACTERISTIC                                         |                           | SYMBOL                      | RATING     | UNIT                     |
|--------------------------------------------------------|---------------------------|-----------------------------|------------|--------------------------|
| Repetitive Peak Off-State Voltage                      | (U)SM12G48<br>(U)SM12G48A | $V_{\text{DRM}}$            | 400        | V                        |
|                                                        | (U)SM12J48<br>(U)SM12J48A |                             | 600        |                          |
| R.M.S On-State Current                                 |                           | $I_{\text{T}} (\text{RMS})$ | 12         | A                        |
| Peak One Cycle Surge On-State Current (Non-Repetitive) |                           | $I_{\text{TSM}}$            | 120 (50Hz) | A                        |
|                                                        |                           |                             | 132 (60Hz) |                          |
| $I^2 t$ Limit Value                                    |                           | $I^2 t$                     | 72         | $\text{A}^2 \text{s}$    |
| Critical Rate of Rise of On-State Current (Note 1)     |                           | $di / dt$                   | 50         | $\text{A} / \mu\text{s}$ |
| Peak Gate Power Dissipation                            |                           | $P_{\text{GM}}$             | 5          | W                        |
| Average Gate Power Dissipation                         |                           | $P_{\text{G}} (\text{AV})$  | 0.5        | W                        |
| Peak Forward Gate Voltage                              |                           | $V_{\text{GM}}$             | 10         | V                        |
| Peak Forward Gate Current                              |                           | $I_{\text{GM}}$             | 2          | A                        |
| Junction Temperature                                   |                           | $T_{\text{j}}$              | -40~125    | $^{\circ}\text{C}$       |
| Storage Temperature Range                              |                           | $T_{\text{stg}}$            | -40~125    | $^{\circ}\text{C}$       |

Note 1 :  $V_{\text{DRM}}=0.5 \times \text{Rated}$   
 $I_{\text{TM}} \leq 15\text{A}$   
 $t_{\text{gw}} \geq 10\mu\text{s}$   
 $t_{\text{gr}} \leq 250\text{ns}$   
 $i_{\text{gp}} = I_{\text{GT}} \times 2.0$

## ELECTRICAL CHARACTERISTICS ( $T_{\text{a}}=25^{\circ}\text{C}$ )

| CHARACTERISTIC                                            |                            | SYMBOL                | TEST CONDITION                                                          |                                            | MIN.              | TYP. | MAX. | UNIT   |
|-----------------------------------------------------------|----------------------------|-----------------------|-------------------------------------------------------------------------|--------------------------------------------|-------------------|------|------|--------|
| Repetitive Peak Off-State Current                         |                            | I <sub>DRM</sub>      | V <sub>DRM</sub> =Rated                                                 |                                            | —                 | —    | 20   | μA     |
| Gate Trigger Voltage                                      |                            | I                     | V <sub>GT</sub>                                                         | V <sub>D</sub> =12V<br>R <sub>L</sub> =20Ω | T2 (+) , Gate (+) |      | 1.5  | V      |
|                                                           |                            | II                    |                                                                         |                                            | T2 (+) , Gate (–) |      | 1.5  |        |
|                                                           |                            | III                   |                                                                         |                                            | T2 (–) , Gate (–) |      | 1.5  |        |
|                                                           |                            | IV                    |                                                                         |                                            | T2 (–) , Gate (+) |      | —    |        |
| Gate Trigger Current                                      | SM12G48<br>SM12J48         | I                     | I <sub>GT</sub>                                                         | V <sub>D</sub> =12V<br>R <sub>L</sub> =20Ω | T2 (+) , Gate (+) |      | 30   | mA     |
|                                                           |                            | II                    |                                                                         |                                            | T2 (+) , Gate (–) |      | 30   |        |
|                                                           |                            | III                   |                                                                         |                                            | T2 (–) , Gate (–) |      | 30   |        |
|                                                           |                            | IV                    |                                                                         |                                            | T2 (–) , Gate (+) |      | —    |        |
|                                                           | SM12G48A<br>SM12J48A       | I                     |                                                                         |                                            | T2 (+) , Gate (+) |      | 20   |        |
|                                                           |                            | II                    |                                                                         |                                            | T2 (+) , Gate (–) |      | 20   |        |
|                                                           |                            | III                   |                                                                         |                                            | T2 (–) , Gate (–) |      | 20   |        |
|                                                           |                            | IV                    |                                                                         |                                            | T2 (–) , Gate (+) |      | —    |        |
| Peak On-State Voltage                                     |                            | V <sub>TM</sub>       | I <sub>TM</sub> =17A                                                    |                                            | —                 | —    | 1.5  | V      |
| Gate Non-Trigger Voltage                                  |                            | V <sub>GD</sub>       | V <sub>D</sub> =Rated, T <sub>c</sub> =125°C                            |                                            | 0.2               | —    | —    | V      |
| Holding Current                                           |                            | I <sub>H</sub>        | V <sub>D</sub> =12V, I <sub>TM</sub> =1A                                |                                            | —                 | —    | 50   | mA     |
| Thermal Resistance                                        |                            | R <sub>th</sub> (j-c) | Junction to Case, AC                                                    |                                            | —                 | —    | 2.4  | °C / W |
| Critical Rate of Rise of Off-State Voltage                | (U)SM12G48<br>(U)SM12J48   | dv / dt               | V <sub>DRM</sub> =Rated, T <sub>j</sub> =125°C<br>Exponential Rise      |                                            | —                 | 300  | —    | V / μs |
|                                                           | (U)SM12G48A<br>(U)SM12J48A |                       |                                                                         |                                            | —                 | 200  | —    |        |
| Critical Rate of Rise of Off-State Voltage at Commutation | (U)SM12G48<br>(U)SM12J48   | (dv / dt) c           | V <sub>DRM</sub> =400V, T <sub>j</sub> =125°C<br>(di / dt) c=–6.5A / ms |                                            | 10                | —    | —    | V / μs |
|                                                           | (U)SM12G48A<br>(U)SM12J48A |                       |                                                                         |                                            | 4                 | —    | —    |        |





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