

## 12 A high voltage Triacs

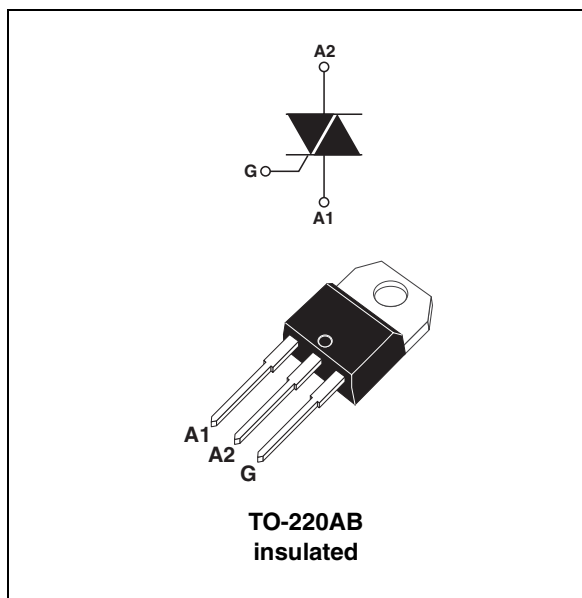
### Features

- On-state current ( $I_{T(RMS)}$ ): 12 A
- Max. blocking voltage ( $V_{DRM}/V_{RRM}$ ): 1200 V
- Gate current ( $I_{GT}$ ): 100 mA
- Commutation @ 10 V/ $\mu$ s: up to 42.5 A/ms
- Noise immunity: 2 kV/ $\mu$ s
- Insulated package:
  - 2,500 V rms (UL recognized: E81734).

### Description

The TXDVxx12 series uses a high performance alternistor technology.

Featuring very high commutation levels and high surge current capability, these devices are well adapted to power control for inductive and resistive loads (motor, transformer...) especially on three-phase power grid. Targeted three-phase applications include heating systems, motor starters, and induction motor speed control (especially for fans).



**Table 1. Device summary**

| Parameter                          | TXDV812RG | TXDV1212RG |
|------------------------------------|-----------|------------|
| Blocking voltage $V_{DRM}/V_{RRM}$ | 800 V     | 1200 V     |
| On-state current $I_{T(RMS)}$      | 12 A      |            |
| Gate current $I_{GT}$              | 100 mA    |            |

# 1 Characteristics

**Table 2. Absolute maximum ratings (limiting values)**

| Symbol                 | Parameter                                                                                       |                       | Value                          | Unit        |      |
|------------------------|-------------------------------------------------------------------------------------------------|-----------------------|--------------------------------|-------------|------|
| $I_{T(RMS)}$           | On-state rms current (180° conduction angle)                                                    |                       | $T_c = 90\text{ °C}$<br>12     | A           |      |
| $V_{DRM}$<br>$V_{RRM}$ | Repetitive peak off-state voltage                                                               | TXDV812               | $T_j = 125\text{ °C}$<br>800   | V           |      |
|                        |                                                                                                 | TXDV1212              |                                |             | 1200 |
| $I_{TSM}$              | Non repetitive surge peak on-state current                                                      | $t_p = 2.5\text{ ms}$ | $T_j = 25\text{ °C}$<br>170    | A           |      |
|                        |                                                                                                 | $t_p = 8.3\text{ ms}$ |                                |             | 125  |
|                        |                                                                                                 | $t_p = 10\text{ ms}$  |                                |             | 120  |
| $I^2t$                 | $I^2t$ value for fusing                                                                         | $t_p = 10\text{ ms}$  | 72                             | $A^2s$      |      |
| $di/dt$                | Critical rate of rise of on-state current<br>$I_G = 500\text{ mA}$ $di_G/dt = 1\text{ A}/\mu s$ | $F = 50\text{ Hz}$    | 100                            | $A/\mu s$   |      |
| $T_{stg}$<br>$T_j$     | Storage junction temperature range<br>Operating junction temperature range                      |                       | - 40 to + 150<br>- 40 to + 125 | $^{\circ}C$ |      |
| $V_{INS(RMS)}^{(1)}$   | Insulation rms voltage                                                                          |                       | 2500                           | V           |      |

1. A1, A2, gate terminals to case for 1 minute

**Table 3. Electrical characteristics ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol                 | Test conditions                                                    | Quadrant              |                               | Value   |          | Unit       |
|------------------------|--------------------------------------------------------------------|-----------------------|-------------------------------|---------|----------|------------|
|                        |                                                                    |                       |                               | TXDV812 | TXDV1212 |            |
| $I_{GT}$               | $V_D = 12\text{ V DC}$ , $R_L = 33\ \Omega$                        | I-II-III              | MAX.                          | 100     |          | mA         |
| $V_{GT}$               |                                                                    | I-II-III              | MAX.                          | 1.5     |          | V          |
| $V_{GD}$               | $V_D = V_{DRM}$ $R_L = 3.3\text{ k}\Omega$ $T_j = 110\text{ °C}$   | I-II-III              | MIN.                          | 0.2     |          | V          |
| $t_{gt}$               | $V_D = V_{DRM}$ $I_G = 500\text{ mA}$ $di_G/dt = 3\text{ A}/\mu s$ | I-II-III              | TYP.                          | 2.5     |          | $\mu s$    |
| $I_L$                  | $I_G = 1.2 \times I_{GT}$                                          | I-III                 | TYP.                          | 100     |          | mA         |
|                        |                                                                    | II                    |                               | 200     |          |            |
| $I_H^{(1)}$            | $I_T = 500\text{ mA}$ Gate open                                    |                       | MAX.                          | 100     |          | mA         |
| $dV/dt^{(1)}$          | Linear slope up to:<br>$V_D = 67\% V_{DRM}$ Gate open              |                       | $T_j = 125\text{ °C}$<br>MIN. | 2       |          | $kV/\mu s$ |
| $(di/dt)_c^{(1)}$      | $(dV/dt)_c = 10\text{ V}/\mu s$                                    |                       | $T_j = 110\text{ °C}$<br>MIN. | 42.5    | 30       | $A/ms$     |
| $V_{TM}^{(1)}$         | $I_{TM} = 17\text{ A}$ $t_p = 380\ \mu s$                          |                       | MAX.                          | 1.95    |          | V          |
| $V_{to}^{(1)}$         | Threshold voltage                                                  |                       | MAX.                          | 1.21    |          | V          |
| $R_d^{(1)}$            | Dynamic resistance                                                 |                       | MAX.                          | 40      |          | $m\Omega$  |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM}$                                                |                       | MAX.                          | 0.01    |          | mA         |
|                        |                                                                    | $T_j = 25\text{ °C}$  |                               | 2       | 5        |            |
|                        |                                                                    | $T_j = 110\text{ °C}$ |                               |         |          |            |

1. For either polarity of electrode  $A_2$  voltage with reference to electrode  $A_1$ .

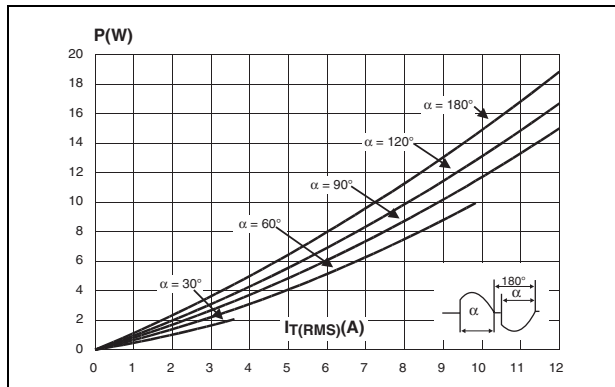
**Table 4. Gate characteristics (maximum values)**

| Symbol      | Parameter                      | Value                  | Unit |
|-------------|--------------------------------|------------------------|------|
| $P_{G(AV)}$ | Average gate power dissipation | 1                      | W    |
| $P_{GM}$    | Peak gate power dissipation    | $t_p = 20 \mu s$<br>10 | W    |
| $I_{GM}$    | Peak gate current              | $t_p = 20 \mu s$<br>4  | A    |
| $V_{GM}$    | Peak positive gate voltage     | $t_p = 20 \mu s$<br>16 | V    |

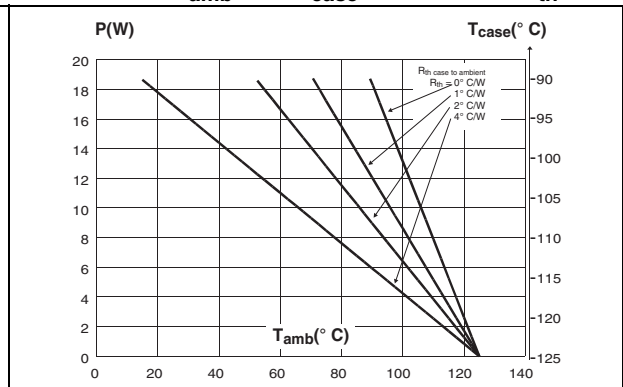
**Table 5. Thermal resistance**

| Symbol           | Parameter                                                           | Value | Unit          |
|------------------|---------------------------------------------------------------------|-------|---------------|
| $R_{th(j-a)}$    | Junction to ambient                                                 | 60    | $^{\circ}C/W$ |
| $R_{th(j-c)}$ DC | Junction to case for DC                                             | 2.5   | $^{\circ}C/W$ |
| $R_{th(j-c)}$ AC | Junction to case for 360 $^{\circ}$ Conduction angle ( $F = 50$ Hz) | 1.9   | $^{\circ}C/W$ |

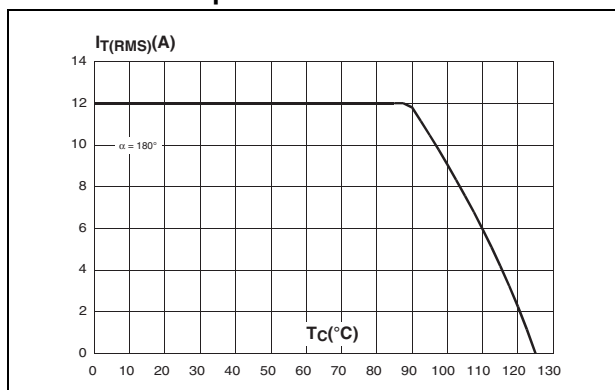
**Figure 1. Max. rms power dissipation versus on-state rms current ( $F = 50$ Hz). (curves limited by  $(di/dt)_c$ )**



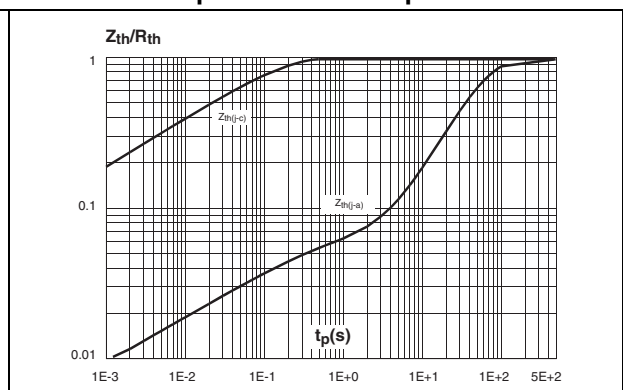
**Figure 2. Max. rms power dissipation and max. allowable temperatures ( $T_{amb}$  and  $T_{case}$ ) for various  $R_{th}$**



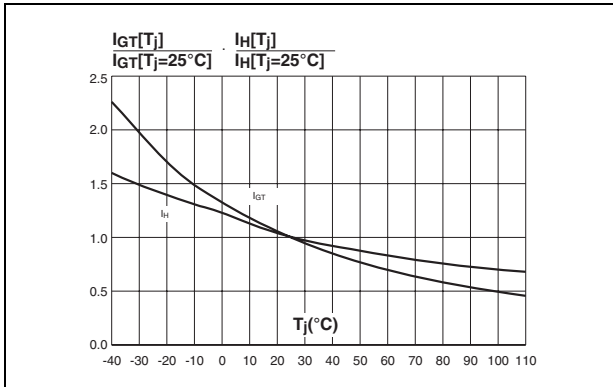
**Figure 3. On-state rms current versus case temperature**



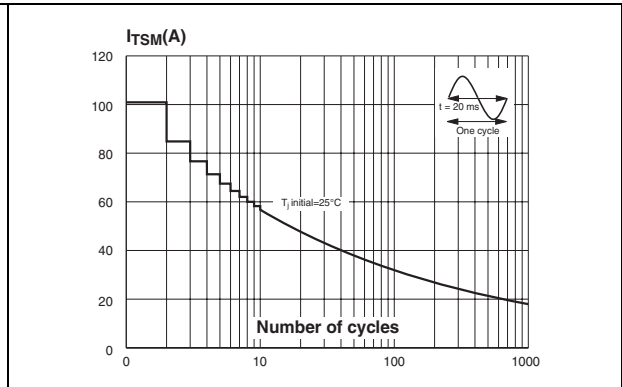
**Figure 4. Relative variation of thermal impedance versus pulse duration**



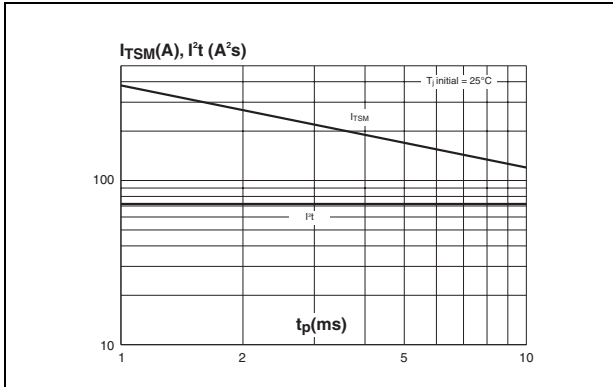
**Figure 5. Relative variation of gate trigger current and holding current versus junction temperature**



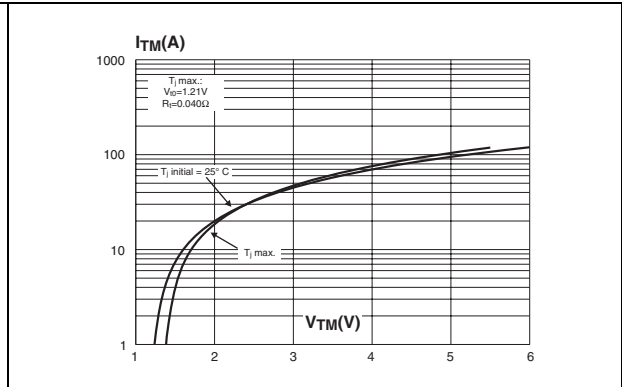
**Figure 6. Non repetitive surge peak on-state current versus number of cycles**



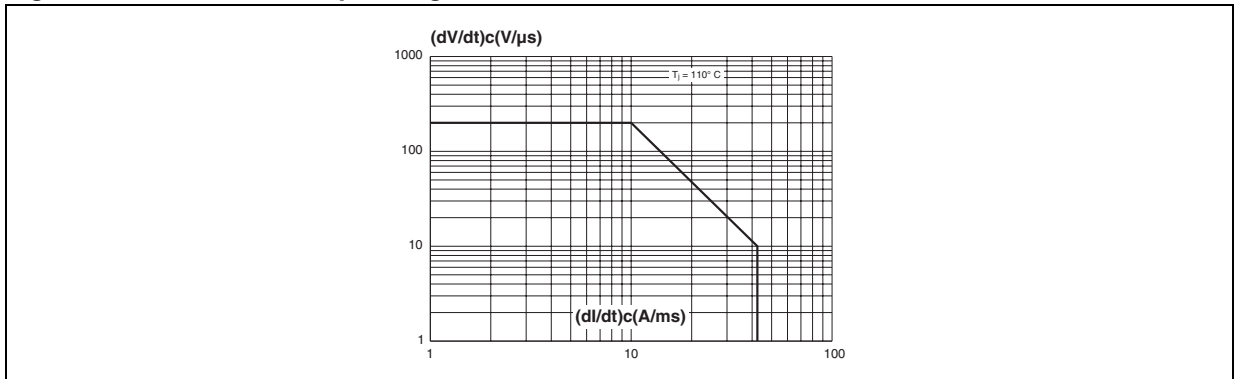
**Figure 7. Non-repetitive surge peak on-state current for a sinusoidal pulse and corresponding values of I²t**



**Figure 8. On-state characteristics (maximum values)**



**Figure 9. Safe turn-off operating area**



## 2 Package information

- Epoxy meets UL94,V0
- Cooling method: C (by conduction)
- Recommended torque value: 0.4 to 0.6 N·m

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**Table 6. TO-220AB insulated dimensions**

| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| A    | 15.20       |       | 15.90 | 0.598  |       | 0.625 |
| a1   |             | 3.75  |       |        | 0.147 |       |
| a2   | 13.00       |       | 14.00 | 0.511  |       | 0.551 |
| B    | 10.00       |       | 10.40 | 0.393  |       | 0.409 |
| b1   | 0.61        |       | 0.88  | 0.024  |       | 0.034 |
| b2   | 1.23        |       | 1.32  | 0.048  |       | 0.051 |
| C    | 4.40        |       | 4.60  | 0.173  |       | 0.181 |
| c1   | 0.49        |       | 0.70  | 0.019  |       | 0.027 |
| c2   | 2.40        |       | 2.72  | 0.094  |       | 0.107 |
| e    | 2.40        |       | 2.70  | 0.094  |       | 0.106 |
| F    | 6.20        |       | 6.60  | 0.244  |       | 0.259 |
| ØI   | 3.75        |       | 3.85  | 0.147  |       | 0.151 |
| I4   | 15.80       | 16.40 | 16.80 | 0.622  | 0.646 | 0.661 |
| L    | 2.65        |       | 2.95  | 0.104  |       | 0.116 |
| I2   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| I3   | 1.14        |       | 1.70  | 0.044  |       | 0.066 |
| M    |             | 2.60  |       |        | 0.102 |       |

### 3 Ordering information

**Table 7. Ordering information**

| Order code | Marking  | Package               | Weight | Base qty | Delivery mode |
|------------|----------|-----------------------|--------|----------|---------------|
| TXDV812RG  | TXDV812  | TO-220AB<br>insulated | 2.3 g  | 50       | Tube          |
| TXDV1212RG | TXDV1212 |                       |        |          |               |

### 4 Revision history

**Table 8. Document revision history**

| Date        | Revision | Changes                                                                                              |
|-------------|----------|------------------------------------------------------------------------------------------------------|
| 30-Mar-2011 | 1        | Initial release.                                                                                     |
| 13-Jan-2012 | 2        | Updated $dI/dt$ in <a href="#">Table 2</a> , and added $V_{t0}$ and $R_d$ in <a href="#">Table 3</a> |

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