



# T1620T-8I, T1635T-8I

## Snubberless™ 16 A Triac

Datasheet — production data

### Features

- High static and dynamic commutation
- Three quadrants
- Snubberless device
- Package is RoHS (2002/95/EC) compliant
- Tab insulated, voltage = 2500 V rms
- UL certified (ref. file E81734)

### Applications

- General purpose AC line load switching
- Home appliances:
  - Fan
  - Pump
  - Solenoid
- Lighting
- Heaters
- Inrush current limiting circuits
- Overvoltage crowbar protection circuits

### Description

Available in TO220AB-Ins. (ceramic insulated), the T1620T-8I, and T1635T-8I Triacs can be used as on/off or phase angle function controllers in general purpose AC switching.

These devices can be used without snubber (R + C networks) if the datasheet limits are respected.

Provides insulation rated at 2500 V rms (TO-220AB insulated package).

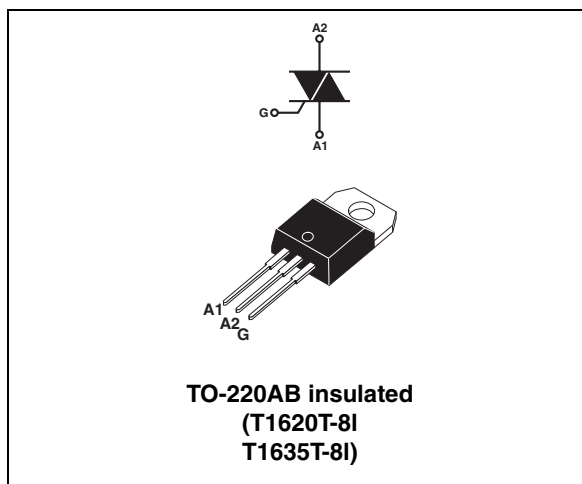


Table 1. Device summary

| Order code | Quadrants    | Value $I_{GT}$ (mA) |
|------------|--------------|---------------------|
| T1620T-8I  | I - II - III | 20                  |
| T1635T-8I  | I - II - III | 35                  |

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# 1 Characteristics

**Table 2. Absolute maximum rating ( $T_j = 25\text{ °C}$ , unless otherwise specified)**

| Symbol             | Parameter                                                                                |                         |                        | Value       | Unit        |
|--------------------|------------------------------------------------------------------------------------------|-------------------------|------------------------|-------------|-------------|
| $I_{T(RMS)}$       | On-state rms current (full sine wave)                                                    |                         | $T_c = 108\text{ °C}$  | 16          | A           |
|                    |                                                                                          |                         | $T_c = 119\text{ °C}$  | 12          |             |
| $I_{TSM}$          | Non repetitive surge peak on-state current (full cycle, $T_j$ initial = $25\text{ °C}$ ) | $F = 50\text{ Hz}$      | $t_p = 20\text{ ms}$   | 120         | A           |
|                    |                                                                                          | $F = 60\text{ Hz}$      | $t_p = 16.7\text{ ms}$ | 126         |             |
| $I^2t$             | $I^2t$ Value for fusing                                                                  |                         | $t_p = 10\text{ ms}$   | 95          | $A^2s$      |
| $V_{DRM}/V_{RRM}$  | Repetitive peak off-state voltage, gate open                                             |                         | $T_j = 150\text{ °C}$  | 600         | V           |
|                    |                                                                                          |                         | $T_j = 125\text{ °C}$  | 800         |             |
| $V_{DSM}, V_{RSM}$ | Non repetitive surge peak off-state voltage                                              | $t_p = 10\text{ ms}$    | $T_j = 25\text{ °C}$   | 900         | V           |
| $di/dt$            | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$                        |                         | $F = 100\text{ Hz}$    | 100         | $A/\mu s$   |
| $I_{GM}$           | Peak gate current                                                                        | $t_p = 20\text{ }\mu s$ | $T_j = 150\text{ °C}$  | 4           | A           |
| $P_{G(AV)}$        | Average gate power dissipation                                                           |                         | $T_j = 150\text{ °C}$  | 1           | W           |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range                                                       |                         |                        | -40 to +150 | $^{\circ}C$ |
|                    | Operating junction temperature range                                                     |                         |                        | -40 to +150 |             |
| $T_L$              | Lead temperature for soldering during 10 s<br>(at 4 mm from case for TO220AB-ins.)       |                         |                        | 260         | $^{\circ}C$ |
| $V_{ins}$<br>(rms) | Insulation rms voltage, 1 minute, TO220AB ceramic insulated                              |                         |                        | 2500        | V           |

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

| Symbol            | Test conditions                                                                                                                                                       | Quadrant                            |      | Value  |        | Unit             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------|--------|--------|------------------|
|                   |                                                                                                                                                                       |                                     |      | T1620T | T1635T |                  |
| $I_{GT}^{(1)}$    | $V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$                                                                                                                        | I - II - III                        | MIN. | 1      | 1.75   | mA               |
|                   |                                                                                                                                                                       | I - II - III                        | MAX. | 20     | 35     | mA               |
| $V_{GT}$          | $V_D = 12\text{ V}$ , $R_L = 30\text{ }\Omega$                                                                                                                        | All                                 | MAX. | 1.3    |        | V                |
| $V_{GD}$          | $V_D = 800\text{ V}$ , $R_L = 3.3\text{ k}\Omega$ , $T_j = 125\text{ }^{\circ}\text{C}$                                                                               | All                                 | MIN. | 0.2    |        | V                |
| $I_H^{(1)}$       | $I_T = 500\text{ mA}$                                                                                                                                                 |                                     | MAX. | 25     | 45     | mA               |
| $I_L$             | $I_G = 1.2\text{ }I_{GT}$                                                                                                                                             | I - III                             | MAX. | 35     | 55     | mA               |
|                   |                                                                                                                                                                       | II                                  |      | 40     | 65     |                  |
| $dV/dt^{(1)}$     | $V_D = 67\% \times 800\text{ V}$ gate open                                                                                                                            | $T_j = 125\text{ }^{\circ}\text{C}$ | MIN. | 1000   | 2000   | V/ $\mu\text{s}$ |
|                   | $V_D = 67\% \times 600\text{ V}$ gate open                                                                                                                            | $T_j = 150\text{ }^{\circ}\text{C}$ |      | 500    | 1000   |                  |
| $(dI/dt)_c^{(1)}$ | $(dV/dt)_c = \text{snubberless} (> 20\text{ V}/\mu\text{s})$                                                                                                          | $T_j = 125\text{ }^{\circ}\text{C}$ | MIN. | 6      | 16     | A/ms             |
|                   |                                                                                                                                                                       | $T_j = 150\text{ }^{\circ}\text{C}$ |      | 4.5    | 12     |                  |
| $t_{GT}$          | gate controlled turn on time $I_{TM} = 13\text{ A}$ , $V_D = 400\text{ V}$ , $I_G = 100\text{ mA}$ , $dI_G/dt = 100\text{ mA}/\mu\text{s}$ , $R_L = 30\text{ }\Omega$ | I - II - III                        | TYP. | 2      |        | $\mu\text{s}$    |

1. For both polarities of A2 referenced to A1

**Table 4. Static characteristics**

| Symbol                 | Test conditions                                           |                                     |      | Value | Unit             |
|------------------------|-----------------------------------------------------------|-------------------------------------|------|-------|------------------|
| $V_{TM}^{(1)}$         | $I_{TM} = 22.6\text{ A}$ , $t_p = 380\text{ }\mu\text{s}$ | $T_j = 25\text{ }^{\circ}\text{C}$  | MAX. | 1.55  | V                |
| $V_{to}^{(1)}$         | Threshold voltage                                         | $T_j = 150\text{ }^{\circ}\text{C}$ | MAX. | 0.85  | V                |
| $R_d^{(1)}$            | Dynamic resistance                                        | $T_j = 150\text{ }^{\circ}\text{C}$ | MAX. | 30    | $\text{m}\Omega$ |
| $I_{DRM}$<br>$I_{RRM}$ | $V_{DRM} = V_{RRM} = 800\text{ V}$                        | $T_j = 25\text{ }^{\circ}\text{C}$  | MAX. | 5     | $\mu\text{A}$    |
|                        |                                                           | $T_j = 125\text{ }^{\circ}\text{C}$ |      | 1     | mA               |
|                        | $V_{DRM} = V_{RRM} = 600\text{ V}$                        | $T_j = 150\text{ }^{\circ}\text{C}$ |      | 3.6   |                  |

1. for both polarities of A2 referenced to A1

**Table 5. Thermal resistance**

| Symbol        | Parameter             | Value | Unit                        |
|---------------|-----------------------|-------|-----------------------------|
| $R_{th(j-c)}$ | Junction to case (AC) | 2.1   | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | Junction to ambient   | 60    | $^{\circ}\text{C}/\text{W}$ |

Figure 1. Maximum power dissipation versus on-state rms current (full cycle)

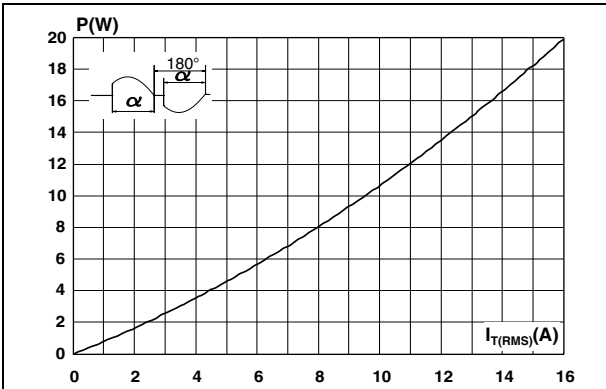


Figure 2. On-state rms current versus case temperature (full cycle)

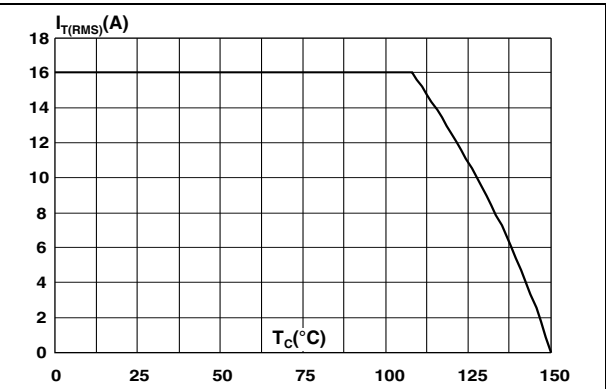


Figure 3. On-state rms current versus ambient temperature (free air convection)

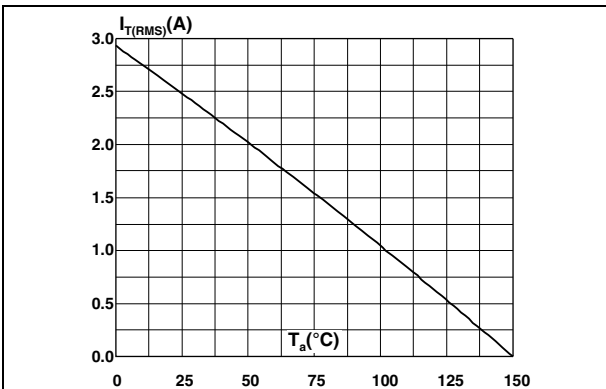


Figure 4. Relative variation of thermal impedance versus pulse duration

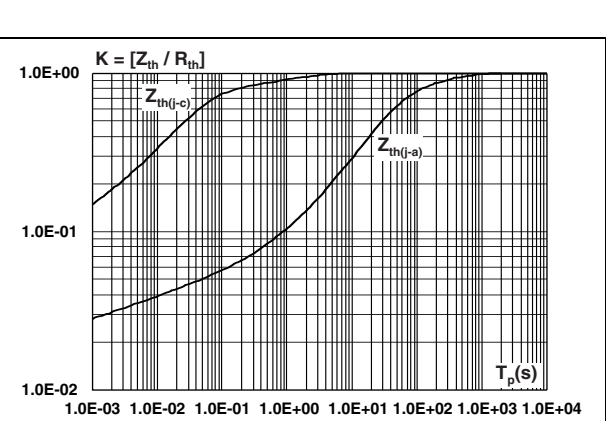


Figure 5. On-state characteristics (maximum values)

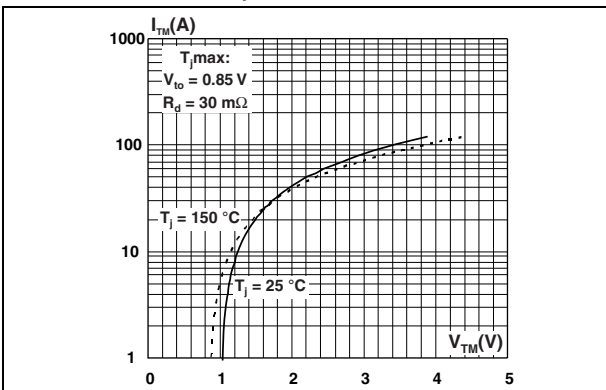
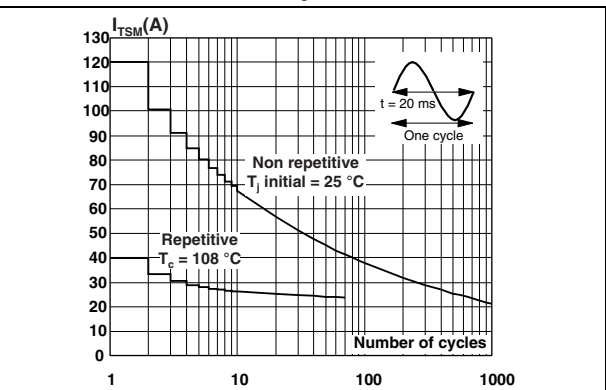
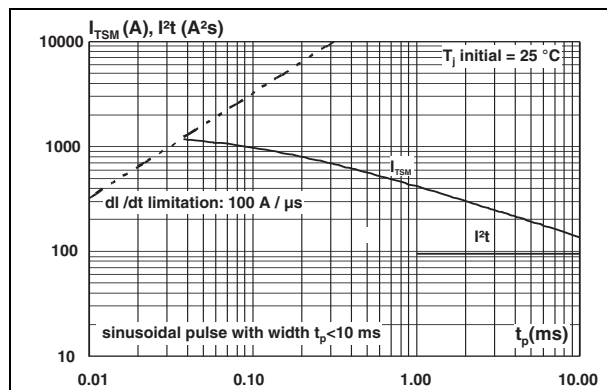


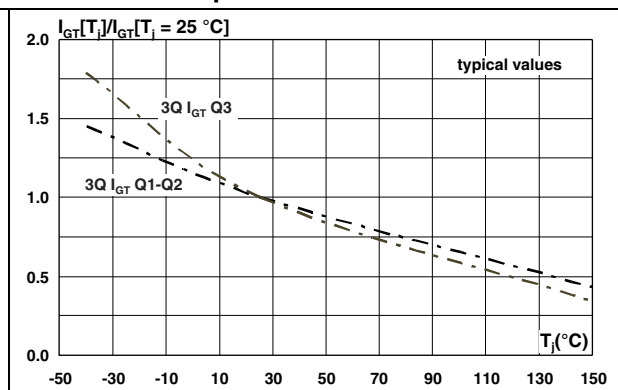
Figure 6. Surge peak on-state current versus number of cycles



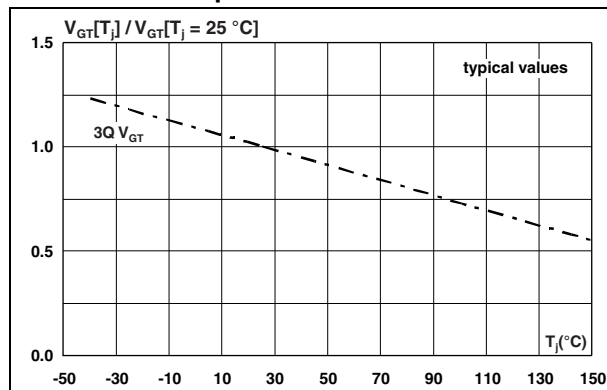
**Figure 7. Non repetitive surge peak on-state current and corresponding values of  $I^2t$**



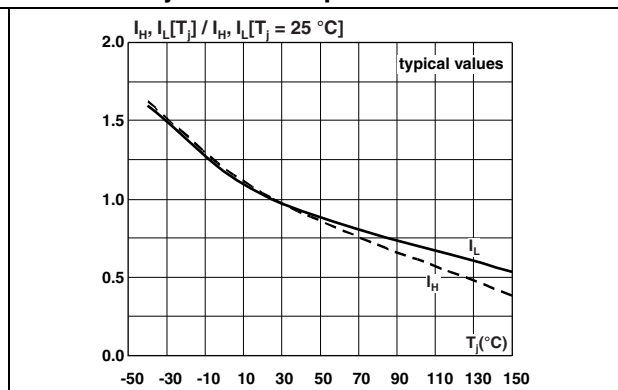
**Figure 8. Relative variation of gate trigger current versus junction temperature**



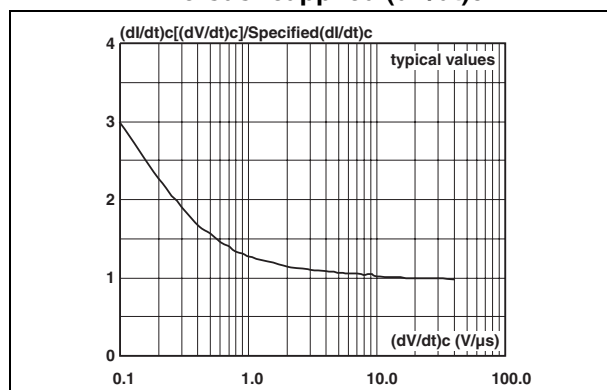
**Figure 9. Relative variation of gate trigger voltage versus junction temperature**



**Figure 10. Relative variation of holding current and latching current versus junction temperature**



**Figure 11. Relative variation of critical rate of decrease of main current ( $di/dt$ )c versus reapplied ( $dV/dt$ )c**



**Figure 12. Relative variation of critical rate of decrease of main current ( $di/dt$ )c versus junction temperature**

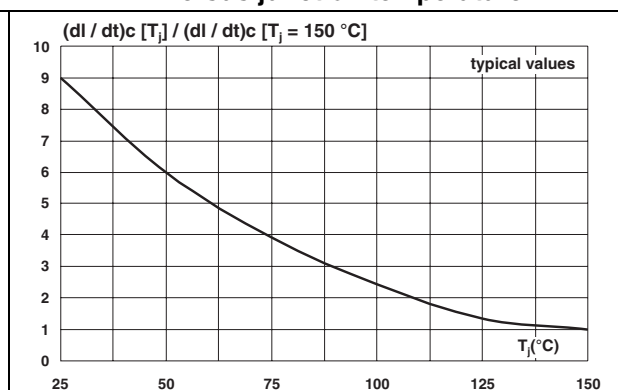
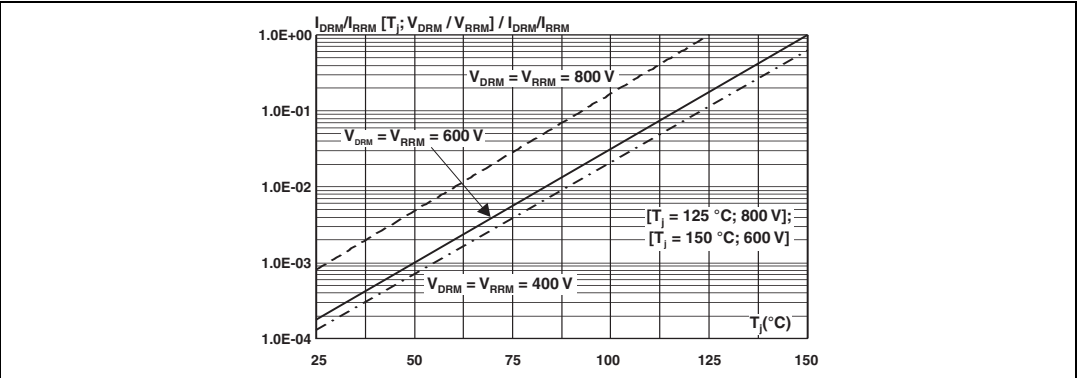


Figure 13. Relative variation of leakage current versus junction temperature for different values of blocking voltage



## 2 Package information

- Epoxy meets UL94, V0
- Recommended torque value: 0.4 to 0.6 N·m

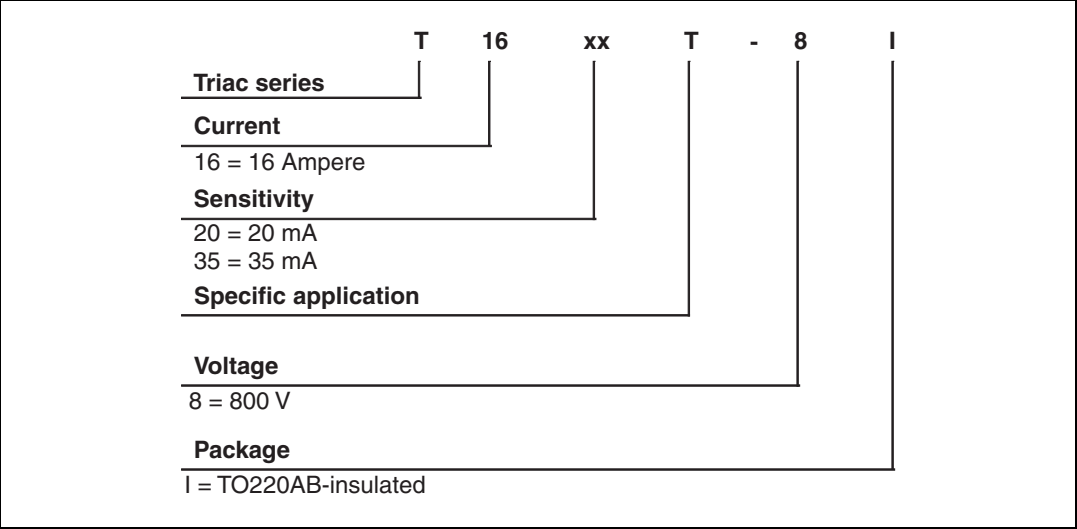
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**Table 6. TO-220AB insulated dimensions**

| 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 scheme

Figure 14.    Ordering information scheme





## 4 Ordering information

Table 7. Ordering information

| Order code | Marking   | Package               | Weight | Base qty | Delivery mode |
|------------|-----------|-----------------------|--------|----------|---------------|
| T1620T-8I  | T1620T-8I | TO-220AB<br>insulated | 2.3    | 50       | Tube          |
| T1635T-8I  | T1635T-8I | TO-220AB<br>insulated | 2.3    | 50       | Tube          |

## 5 Revision history

Table 8. Document revision history

| Date        | Revision | Changes                   |
|-------------|----------|---------------------------|
| 20-Jan-2012 | 1        | First issue.              |
| 25-Apr-2012 | 2        | Updated UL certification. |

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