



T4 Series

SNUBBERLESSTM & LOGIC LEVEL

4A TRIACs

Table 1: Main Features

| Symbol | Value | Unit |
|-------------------|------------|------|
| $I_{T(RMS)}$ | 4 | A |
| V_{DRM}/V_{RRM} | 600 to 800 | V |
| $I_{GT} (Q_1)$ | 5 to 35 | mA |

DESCRIPTION

Based on ST's Snubberless / Logic level technology providing high commutation performances, the **T4** series is suitable for use on AC inductive loads.

They are recommended for applications using universal motors, electrovalves.... such as kitchen aid equipments, power tools, dishwashers,... Available in a fully insulated package, the T4...-...W version complies with UL standards (ref. E81734).

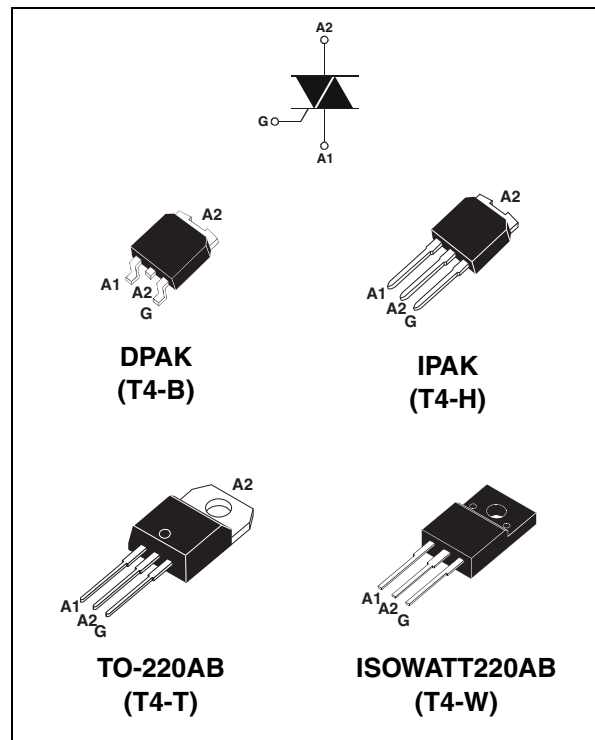


Table 2: Order Codes

| Part Number | Marking |
|--------------|----------------------------|
| T405-xxxB | See page table 8 on page 9 |
| T405-xxxB-TR | |
| T405-xxxH | |
| T405-xxxT | |
| T405-xxxW | |
| T410-xxxB | |
| T410-xxxB-TR | |
| T410-xxxH | |
| T4105-xxxT | |
| T410-xxxW | |
| T435-xxxB | |
| T435-xxxB-TR | |
| T435-xxxH | |
| T435-xxxT | |
| T435-xxxW | |

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Table 3: Absolute Maximum Ratings

| Symbol | Parameter | | | Value | Unit |
|--------------------|--|--------------------------|---------------------------|--------------------------------|------------------------|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | IPAK/DPAK/ TO-220AB | $T_c = 110^\circ\text{C}$ | 4 | A |
| | | ISOWATT220AB | $T_c = 105^\circ\text{C}$ | | |
| I_{TSM} | Non repetitive surge peak on-state current (full cycle, T_j initial = 25°C) | F = 50 Hz | t = 20 ms | 30 | A |
| | | F = 60 Hz | t = 16.7 ms | 31 | |
| I^2t | I^2t Value for fusing | $t_p = 10$ ms | | 5.1 | A^2s |
| dI/dt | Critical rate of rise of on-state current $I_G = 2 \times I_{GT}$, $t_r \leq 100$ ns | F = 120 Hz | $T_j = 125^\circ\text{C}$ | 50 | $\text{A}/\mu\text{s}$ |
| I_{GM} | Peak gate current | $t_p = 20$ μs | $T_j = 125^\circ\text{C}$ | 4 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | $T_j = 125^\circ\text{C}$ | 1 | W |
| T_{stg} T_j | Storage junction temperature range Operating junction temperature range | | | - 40 to + 150 - 40 to + 125 | $^\circ\text{C}$ |

Tables 4: Electrical Characteristics ($T_j = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Test Conditions | Quadrant | | T4 | | | Unit |
|--------------|---|--------------|------|------|------|------|------------------------|
| | | | | T405 | T410 | T435 | |
| I_{GT} (1) | $V_D = 12$ V $R_L = 30$ Ω | I - II - III | MAX. | 5 | 10 | 35 | mA |
| V_{GT} | | I - II - III | MAX. | 1.3 | | | V |
| V_{GD} | $V_D = V_{DRM}$ $R_L = 3.3$ k Ω $T_j = 125^\circ\text{C}$ | I - II - III | MIN. | 0.2 | | | V |
| I_H (2) | $I_T = 100$ mA | | MAX. | 10 | 15 | 35 | mA |
| I_L | $I_G = 1.2$ I_{GT} | I - III | MAX. | 10 | 25 | 50 | mA |
| | | II | | 15 | 30 | 60 | |
| dV/dt (2) | $V_D = 67\%$ V_{DRM} gate open $T_j = 125^\circ\text{C}$ | | MIN. | 20 | 40 | 400 | $\text{V}/\mu\text{s}$ |
| (dI/dt)c (2) | (dV/dt)c = 0.1 $\text{V}/\mu\text{s}$ $T_j = 125^\circ\text{C}$ | | MIN. | 1.8 | 2.7 | - | A/ms |
| | (dV/dt)c = 10 $\text{V}/\mu\text{s}$ $T_j = 125^\circ\text{C}$ | | | 0.9 | 2.0 | - | |
| | Without snubber $T_j = 125^\circ\text{C}$ | | | - | - | 2.5 | |

Note 1: minimum I_{GT} is guaranteed at 5% of I_{GT} max.

Note 2: for both polarities of A2 referenced to A1.

Table 5: Static Characteristics

| Symbol | Test Conditions | | | Value | Unit | |
|------------------------|-------------------------|--------------------------|---------------------------|-------|------|---------------|
| $V_T(2)$ | $I_{TM} = 5.5\text{ A}$ | $t_p = 380\ \mu\text{s}$ | $T_j = 25^\circ\text{C}$ | MAX. | 1.56 | V |
| $V_{to}(2)$ | Threshold voltage | | $T_j = 125^\circ\text{C}$ | MAX. | 0.89 | V |
| $R_d(2)$ | Dynamic resistance | | $T_j = 125^\circ\text{C}$ | MAX. | 120 | m Ω |
| I_{DRM} I_{RRM} | $V_{DRM} = V_{RRM}$ | | $T_j = 25^\circ\text{C}$ | MAX. | 5 | μA |
| | | | $T_j = 125^\circ\text{C}$ | | 1 | mA |

Note 1: minimum I_{GT} is guaranteed at 5% of I_{GT} max.

Note 2: for both polarities of A2 referenced to A1.

Table 6: Thermal resistance

| Symbol | Parameter | | Value | Unit | |
|---------------|-----------------------|-------------------------|-------------------------|------|--------------------|
| $R_{th(j-c)}$ | Junction to case (AC) | | IPAK / DPAK / TO-220AB | 2.6 | $^\circ\text{C/W}$ |
| | | | ISOWATT220AB | 4.0 | |
| $R_{th(j-a)}$ | Junction to ambient | S = 0.5 cm ² | DPAK | 70 | $^\circ\text{C/W}$ |
| | | | TO-220AB / ISOWATT220AB | 60 | |
| | | | IPAK | 100 | |

S = Copper surface under tab.

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Figure 1: Maximum power dissipation versus RMS on-state current (full cycle)

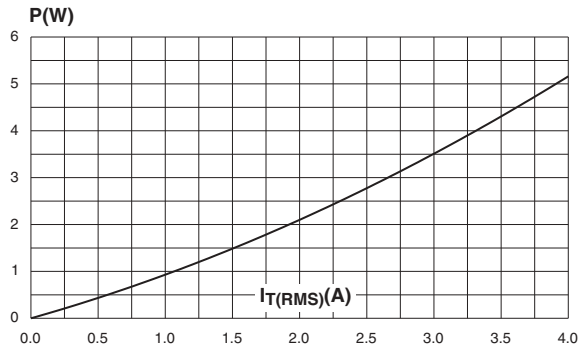


Figure 2: RMS on-state current versus case temperature (full cycle)

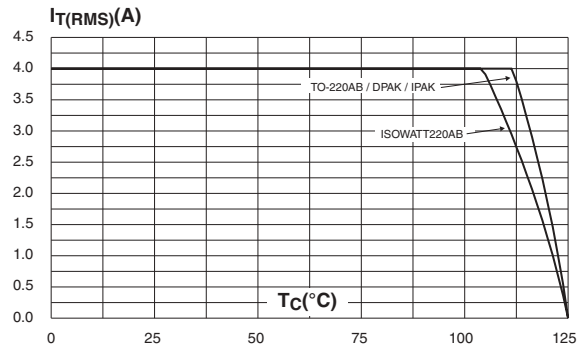


Figure 3: RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35µm) (full cycle)

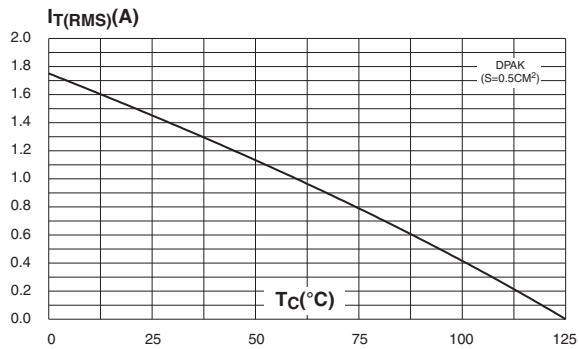


Figure 4: Relative variation of thermal impedance versus pulse duration

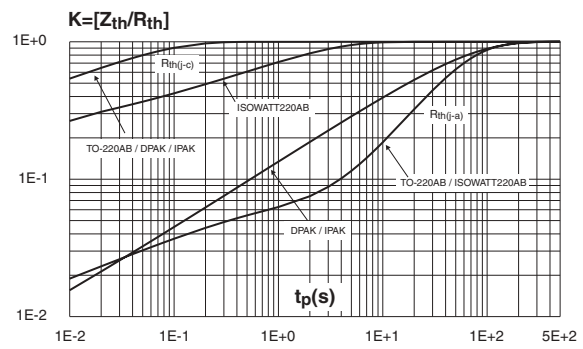


Figure 5: On-state characteristics (maximum values)

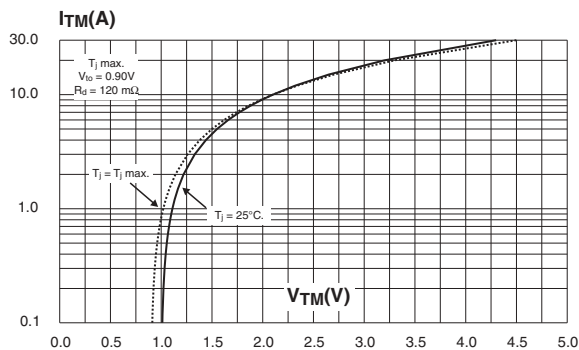


Figure 6: Surge peak on-state current versus number of cycles

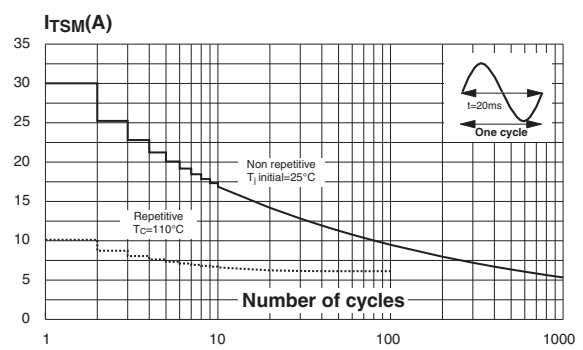


Figure 7: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10$ ms and corresponding value of I^2t

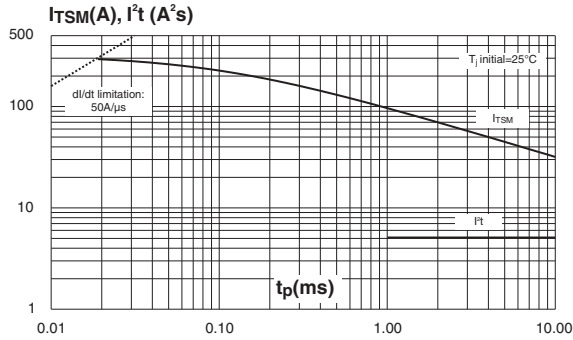


Figure 8: Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values)

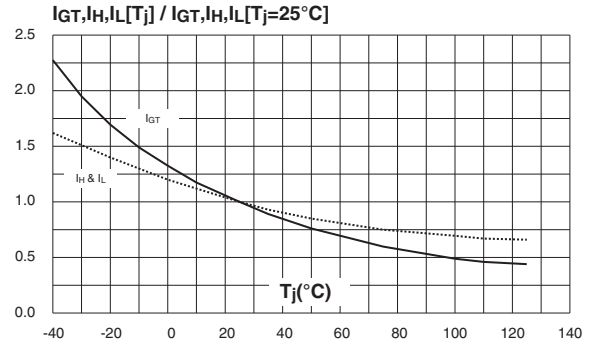


Figure 9: Relative variation of critical rate of decrease of main current versus $(dV/dt)_c$ (typical values)

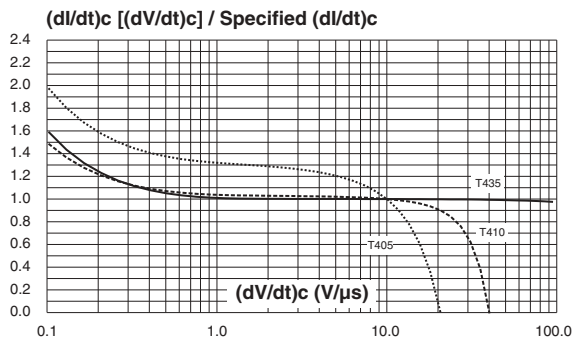


Figure 10: Relative variation of critical rate of decrease of main current versus junction temperature

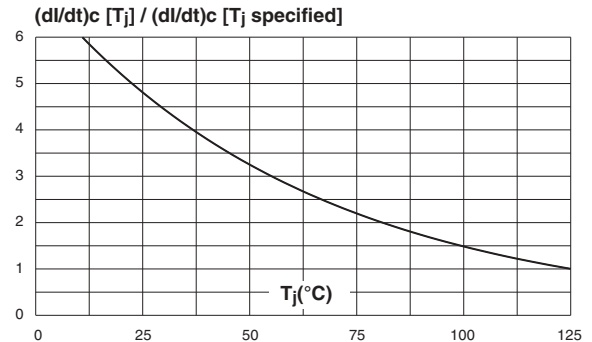
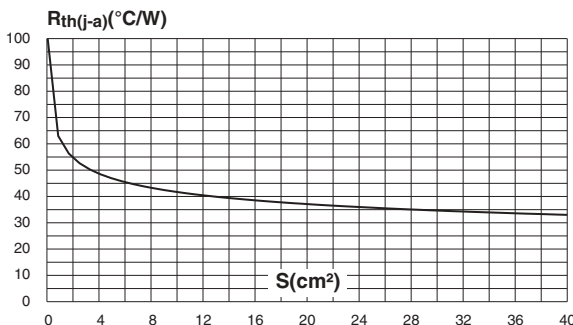


Figure 11: DPAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35 μm)



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Figure 12: Ordering Information Scheme

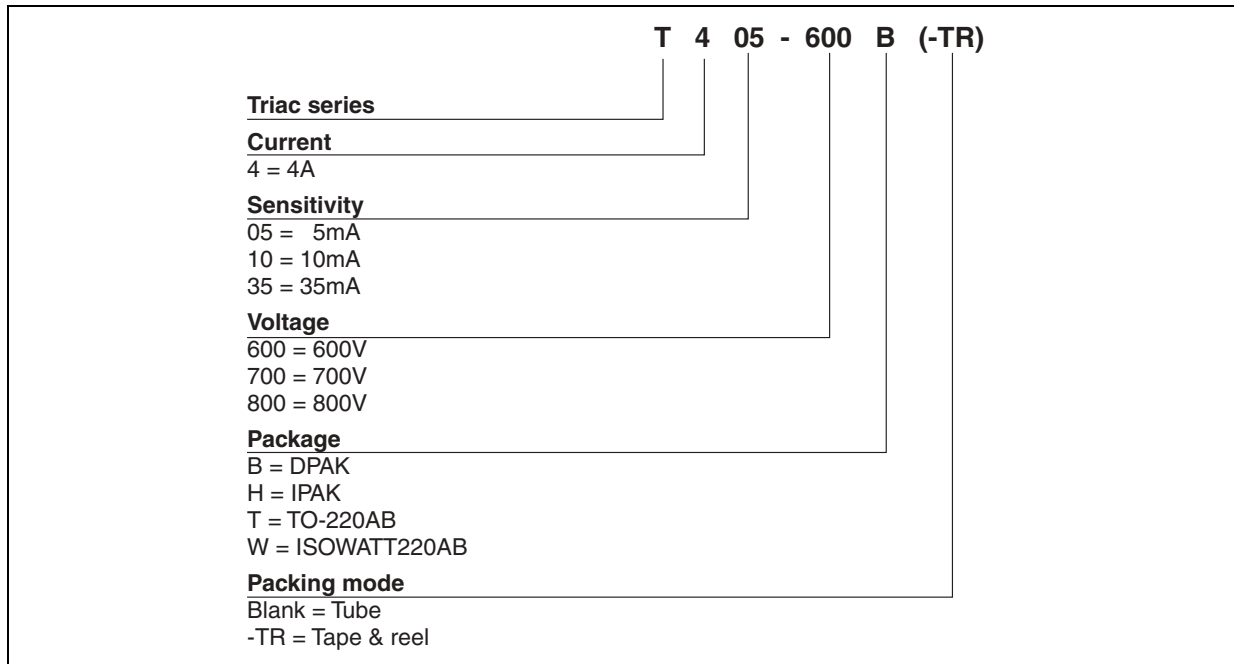


Table 7: Product Selector

| Part Number | Voltage (xxx) | | | Sensitivity | Type | Package |
|-------------|---------------|-------|-------|-------------|-------------|--------------|
| | 600 V | 700 V | 800 V | | | |
| T405-xxxB | X | X | X | 5 mA | Logic level | DPAK |
| T405-xxxH | X | X | X | 5 mA | Logic level | IPAK |
| T405-xxxT | X | X | X | 5 mA | Logic level | TO-220AB |
| T405-xxxW | X | X | X | 5 mA | Logic level | ISOWATT220AB |
| T410-xxxB | X | X | X | 10 mA | Logic level | DPAK |
| T410-xxxH | X | X | X | 10 mA | Logic Level | IPAK |
| T410-xxxT | X | X | X | 10 mA | Logic Level | TO-220AB |
| T410-xxxW | X | X | X | 10 mA | Logic Level | ISOWATT220AB |
| T435-xxxB | X | X | X | 35 mA | Snubberless | DPAK |
| T435-xxxH | X | X | X | 35 mA | Snubberless | IPAK |
| T435-xxxT | X | X | X | 35 mA | Snubberless | TO-220AB |
| T435-xxxW | X | X | X | 35 mA | Snubberless | ISOWATT220AB |

Figure 13: DPAK Package Mechanical Data

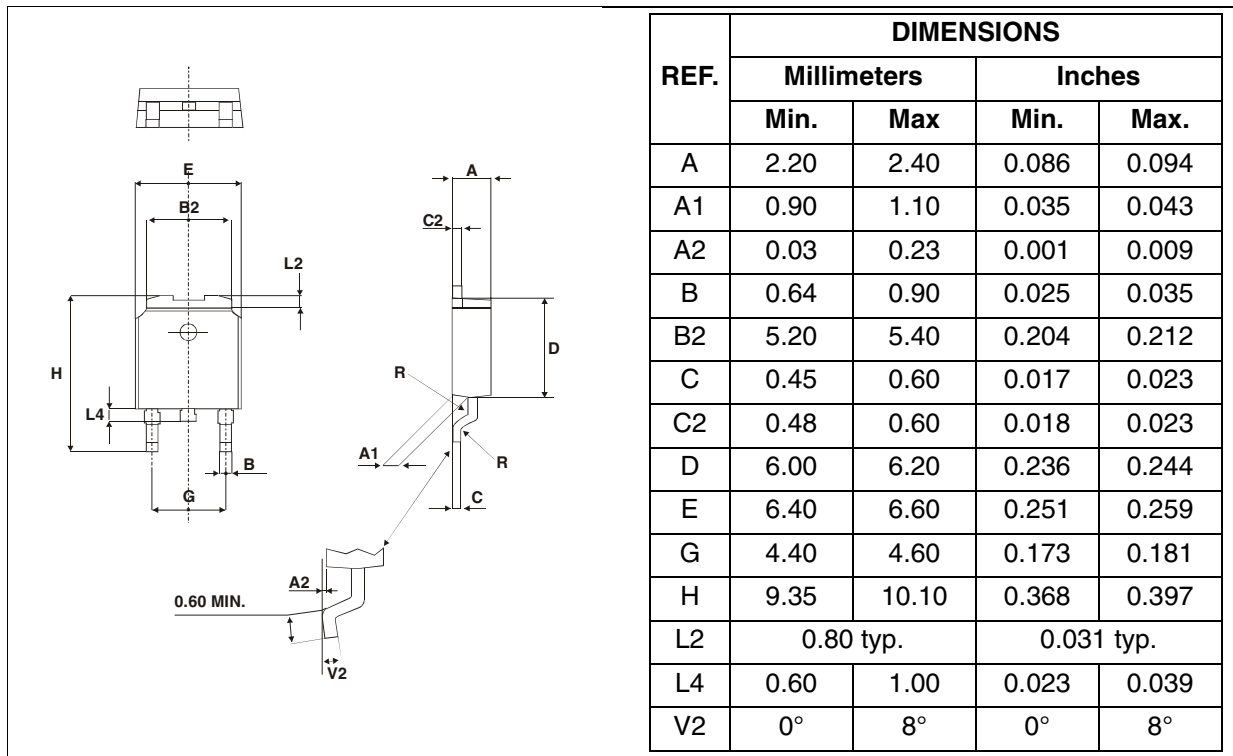
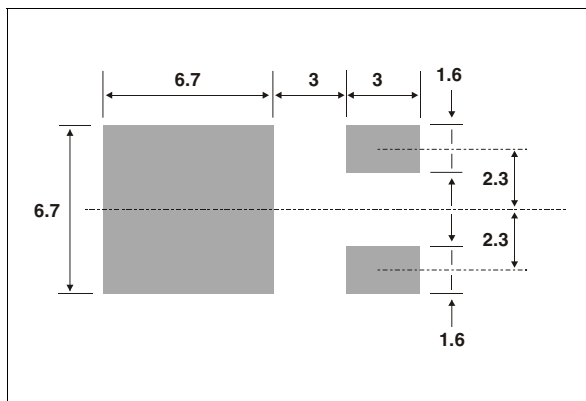


Figure 14: DPAK Foot Print Dimensions (in millimeters)



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Figure 15: ISOWATT220AB Package Mechanical Data

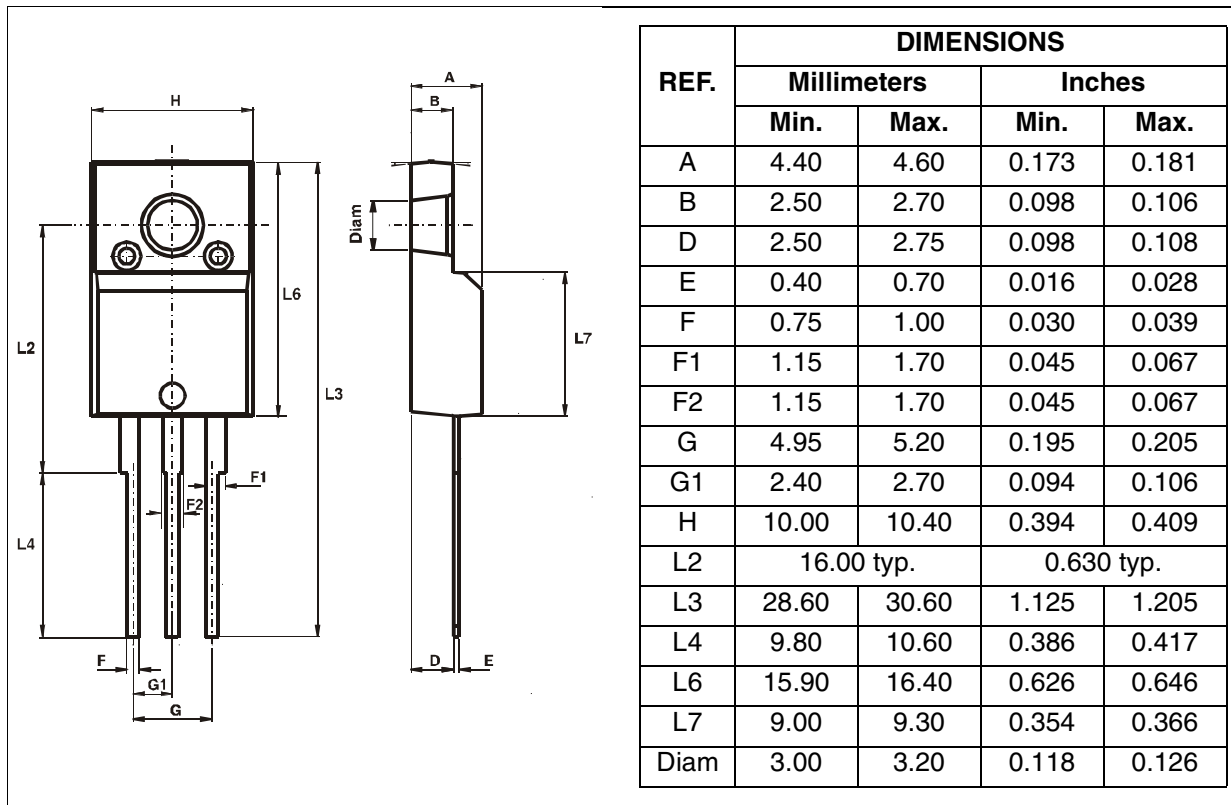


Figure 16: IPAK Package Mechanical Data

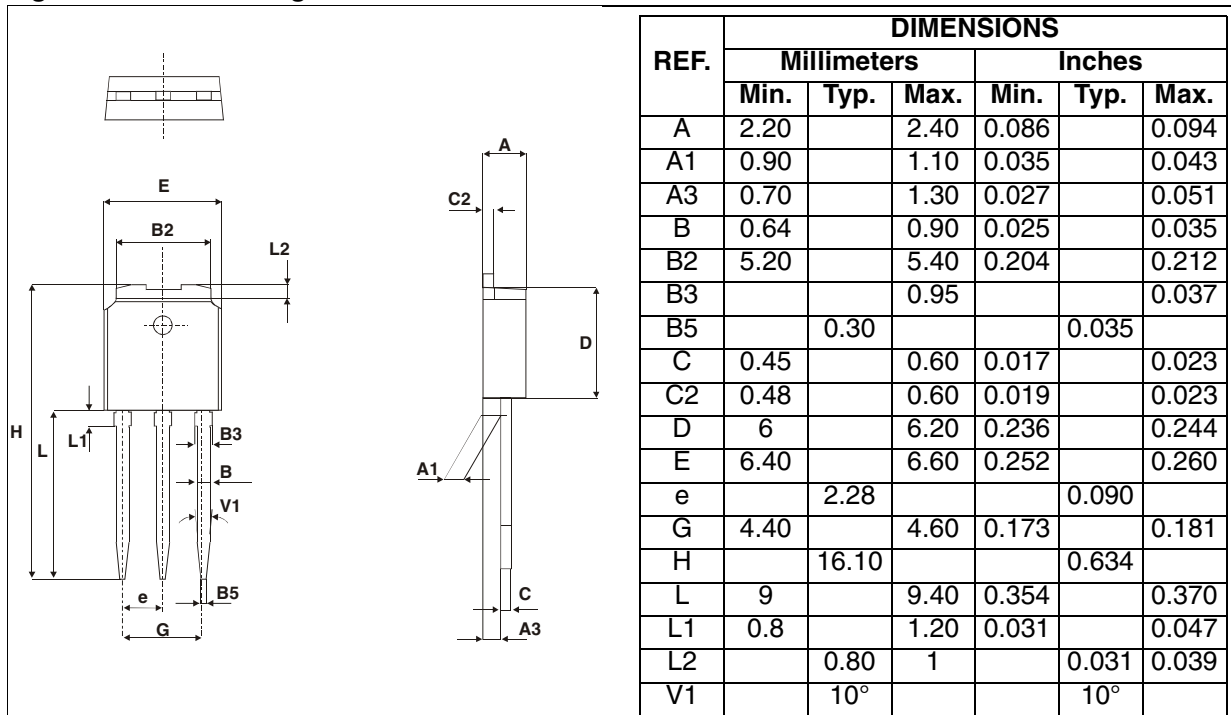


Figure 17: TO-220AB Package Mechanical Data

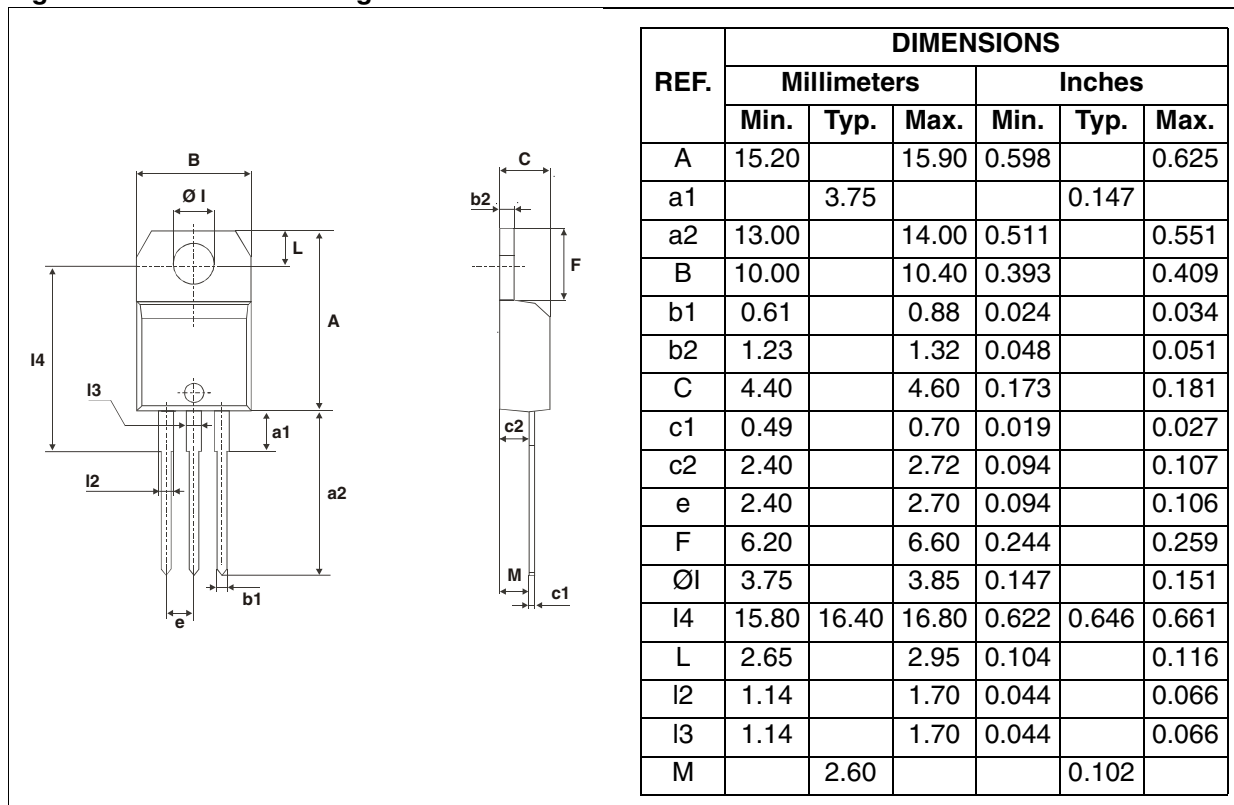


Table 8: Ordering Information

| Ordering type | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|-----------|--------------|--------|----------|---------------|
| T4xx-yyyB | T4 xxyy | DPAK | 0.3 g | 75 | Tube |
| T4xx-yyyB-TR | T4 xxyy | DPAK | 0.3 g | 2500 | Tape & reel |
| T4xx-yyyH | T4 xxyy | IPAK | 0.4 g | 75 | Tube |
| T4xx-yyyT | T4xx yyyT | TO-220AB | 2.3 g | 50 | Tube |
| T4xx-yyyB | T4xxyyyW | ISOWATT220AB | 2.1 g | 50 | Tube |

Note: xxx = voltage, yy = sensitivity

Table 9: Revision History

| Date | Revision | Description of Changes |
|-------------|----------|-----------------------------------|
| Jun-2003 | 5 | Last update. |
| 25-Mar-2005 | 6 | Layout update. No content change. |
| 25-Jan-2005 | 7 | Markings changed in Table 8 |

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