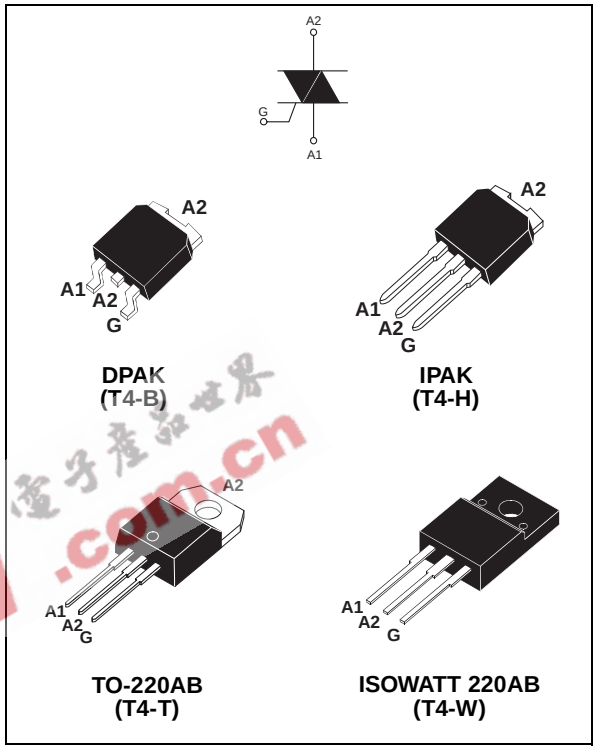
# T4 Series

**SNUBBERLESS™ & LOGIC LEVEL** — 4A TRIACs

## MAIN FEATURES:

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




DPAK (T4-B) — IPAK (T4-H)

TO-220AB (T4-T) — ISOWATT 220AB (T4-W)

## 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).

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $I_{T(RMS)}$ | RMS on-state current (full sine wave) | DPAK / IPAK TO-220AB | Tc = 110°C | 4 | A |
| | | ISOWATT 220AB | Tc = 105°C | | |
| $I_{TSM}$ | Non repetitive surge peak on-state current (full cycle, Tj 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 | tp = 10 ms | | 5.1 | $A^2s$ |
| dI/dt | Critical rate of rise of on-state current $I_G$ = 2 x $I_{GT}$ , tr ≤ 100 ns | F = 120 Hz | Tj = 125°C | 50 | A/µs |
| $I_{GM}$ | Peak gate current | tp = 20 µs | Tj = 125°C | 4 | A |
| $P_{G(AV)}$ | Average gate power dissipation | | Tj = 125°C | 1 | W |
| $T_{stg}$<br>$T_j$ | Storage junction temperature range<br>Operating junction temperature range | | | - 40 to + 150<br>- 40 to + 125 | °C |

## ELECTRICAL CHARACTERISTICS (Tj = 25°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 |
| $V_{GD}$ | $V_D = V_{DRM}$ $R_L$ = 33 kΩ Tj = 125°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 Tj = 125°C | | MIN. | 20 | 40 | 400 | V/µs |
| (dI/dt)c (2) | (dV/dt)c = 0.1 V/µs Tj = 125°C | | MIN. | 1.8 | 2.7 | - | A/ms |
| | (dV/dt)c = 10 V/µs Tj = 125°C | | | 0.9 | 2.0 | - | |
| | Without snubber Tj = 125°C | | | - | - | 2.5 | |

## STATIC CHARACTERISTICS

| Symbol | Test Conditions | | | Value | Unit |
|---|---|---|---|---|---|
| $V_{TM}$ (2) | $I_{TM}$ = 5.5 A tp = 380 µs | Tj = 25°C | MAX. | 1.6 | V |
| $V_{to}$ (2) | Threshold voltage | Tj = 125°C | MAX. | 0.9 | V |
| $R_d$ (2) | Dynamic resistance | Tj = 125°C | MAX. | 120 | mΩ |
| $I_{DRM}$ | $V_{DRM} = V_{RRM}$ | Tj = 25°C | MAX. | 5 | µA |
| $I_{RRM}$ | | Tj = 125°C | | 1 | mA |

**Note 1:** minimum IGT is guaranted at 5% of IGT max.

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

## THERMAL RESISTANCES

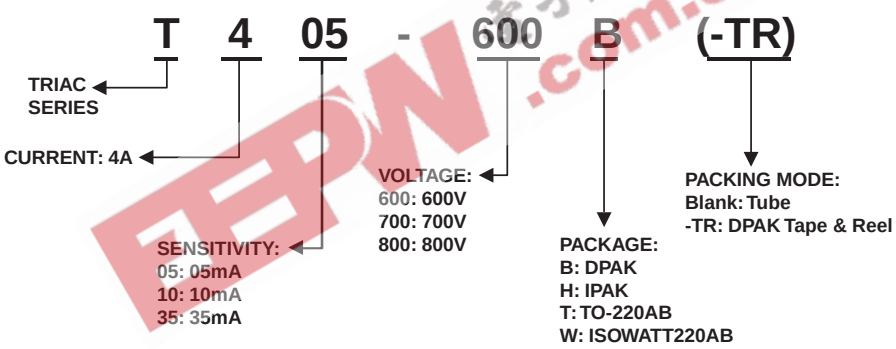
| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Junction to case (AC) | | DPAK IPAK TO-220AB | 2.6 | °C/W |
| | | | ISOWATT220AB | 4.0 | |
| $R_{th(j-a)}$ | Junction to ambient | S = 0.5 $cm^2$ | DPAK | 70 | °C/W |
| | | | TO-220AB ISOWATT220AB | 60 | |
| | | | IPAK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

S = Copper surface under tab

## 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 |

## ORDERING INFORMATION




## OTHER INFORMATION

| Part Number | Marking | Weight | Base quantity | Packing mode |
|---|---|---|---|---|
| T4xx-yyyB | T4xxyyyB | 0.3 g | 75 | Tube |
| T4xx-yyyB-TR | T4xxyyyB | 0.3 g | 2500 | Tape & reel |
| T4xx-yyyH | T4xxyyy | 0.4 g | 75 | Tube |
| T4xx-yyyT | T4xxyyyT | 2.3 g | 50 | Tube |
| T4xx-yyyW | T4xxyyyW | 2.1 g | 50 | Tube |

**Note:** xx = sensitivity, yyy = voltage

**Fig. 1:** Maximum power dissipation versus RMS on-state current (full cycle).

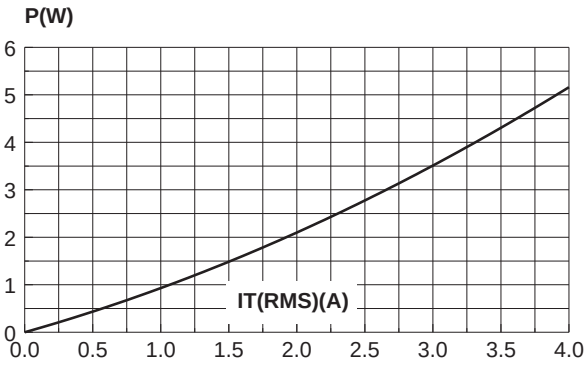



**Fig. 2-1:** RMS on-state current case versus temperature (full cycle).

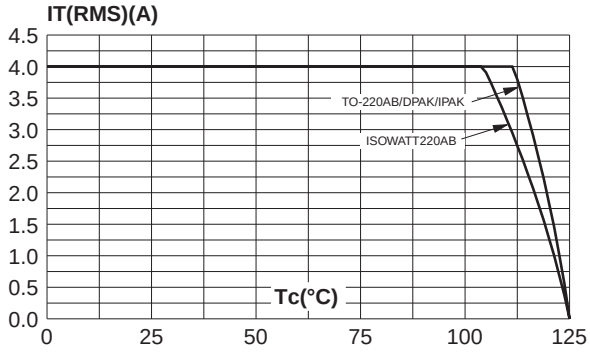



**Fig. 2-2:** RMS on-state current versus ambient temperature (printed circuit FR4, copper thickness: 35µm),full cycle.

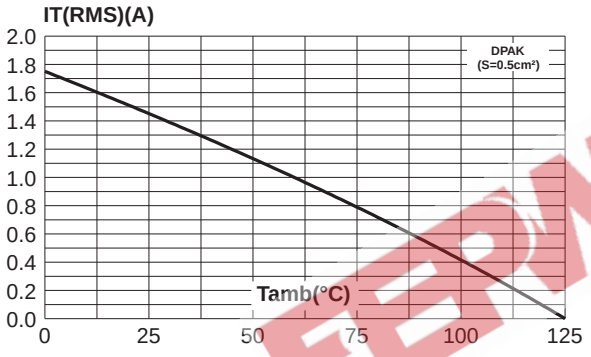



**Fig. 3:** Relative variation of thermal impedance versus pulse duration.

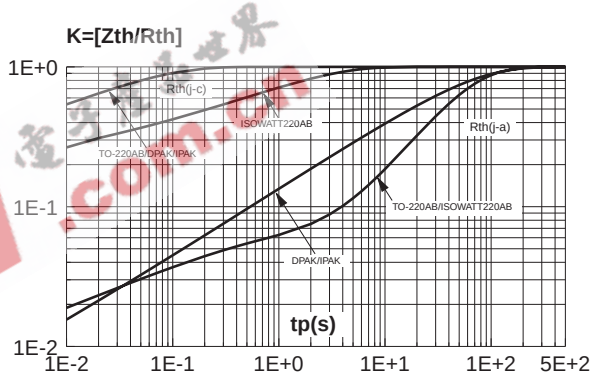



**Fig. 4:** Relative variation of gate trigger current, holding current and latching current versus junction temperature (typical values).

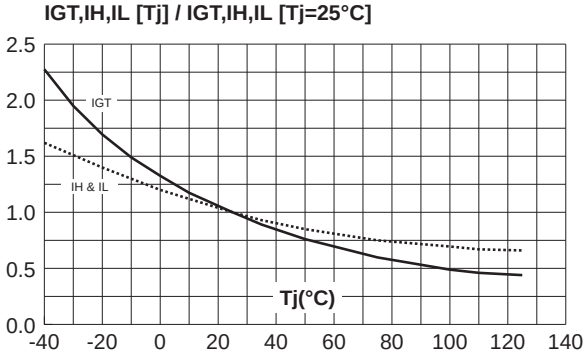



**Fig. 5:** Surge peak on-state current versus number of cycles.

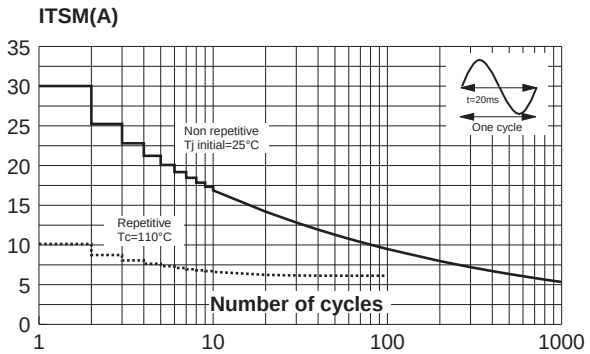


**Fig. 6:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10ms, and corresponding value of I²t.

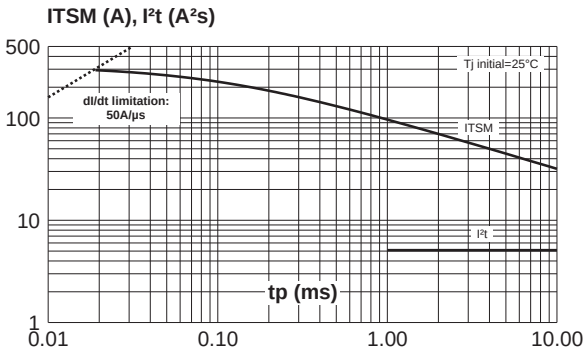



**Fig. 7:** On-state characteristics (maximum values).

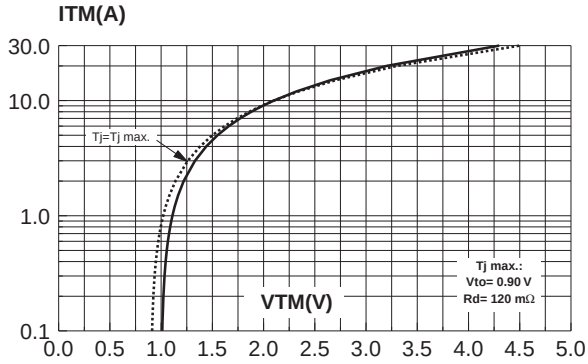



**Fig. 8:** Relative variation of critical rate of decrease of main current versus (dV/dt)c (typical values).

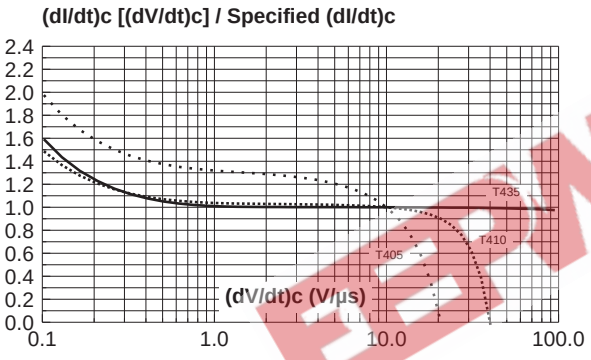



**Fig. 9:** Relative variation of critical rate of decrease of main current versus junction temperature.

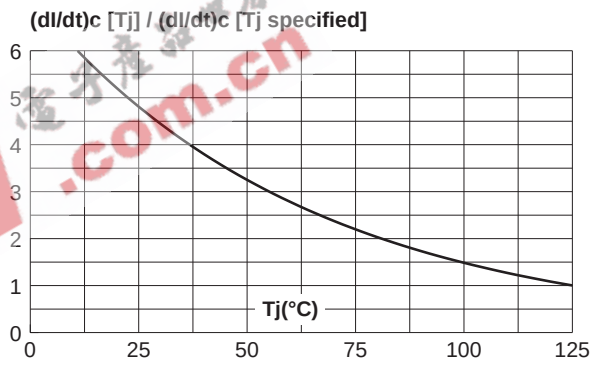
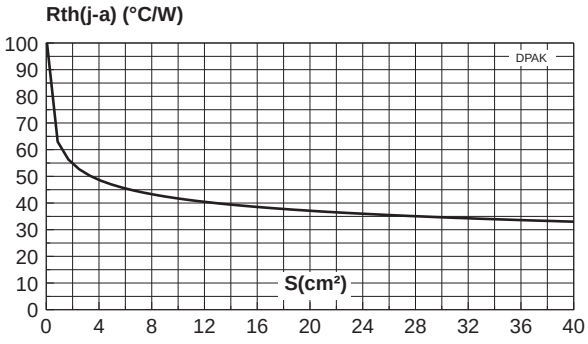
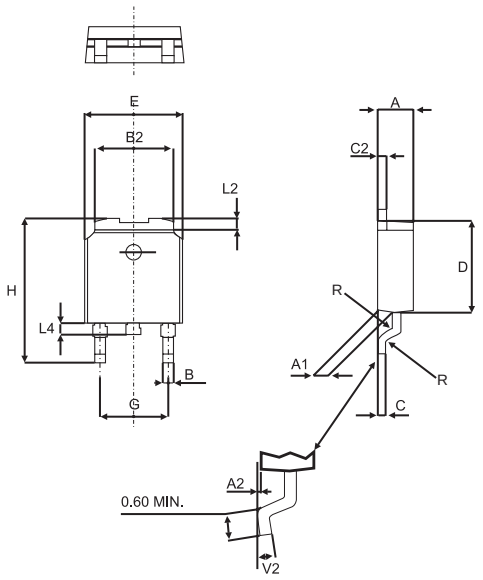



**Fig. 10:** DPAK thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, copper thickness: 35µm).



## PACKAGE MECHANICAL DATA

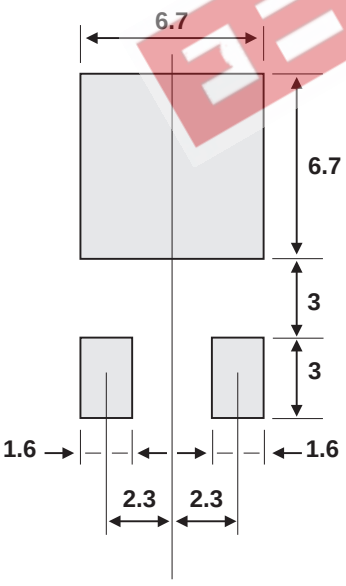
DPAK (Plastic)




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max | Min. | Max. |
| A | 2.20 | 2.40 | 0.086 | 0.094 |
| A1 | 0.90 | 1.10 | 0.035 | 0.043 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.64 | 0.90 | 0.025 | 0.035 |
| B2 | 5.20 | 5.40 | 0.204 | 0.212 |
| C | 0.45 | 0.60 | 0.017 | 0.023 |
| C2 | 0.48 | 0.60 | 0.018 | 0.023 |
| D | 6.00 | 6.20 | 0.236 | 0.244 |
| E | 6.40 | 6.60 | 0.251 | 0.259 |
| G | 4.40 | 4.60 | 0.173 | 0.181 |
| H | 9.35 | 10.10 | 0.368 | 0.397 |
| L2 | 0.80 typ. | | 0.031 typ. | |
| L4 | 0.60 | 1.00 | 0.023 | 0.039 |
| R | 0.2 typ. | | 0.007 typ. | |
| V2 | 0° | 8° | 0° | 8° |

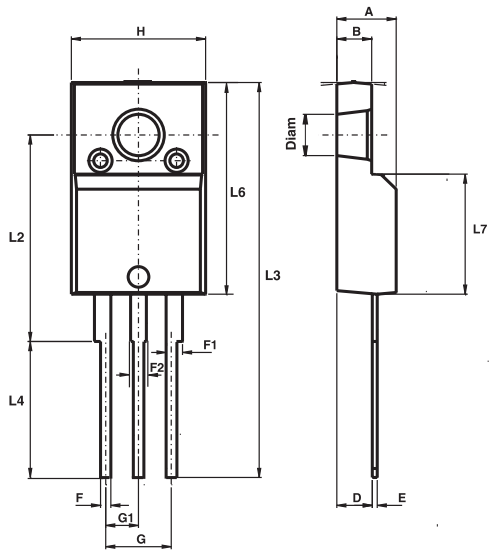
**FOOTPRINT DIMENSIONS** (in millimeters)

DPAK (Plastic)



## PACKAGE MECHANICAL DATA

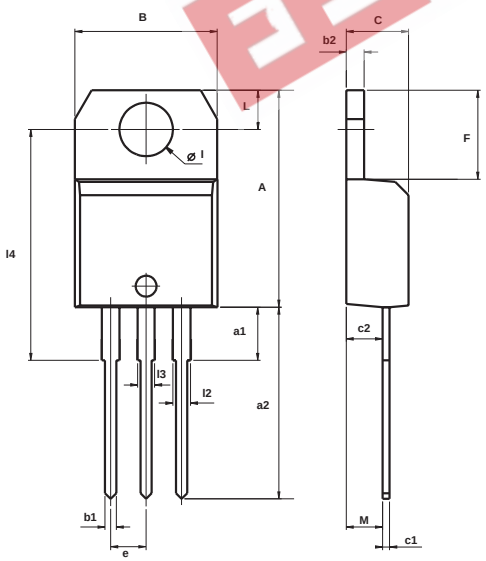
ISOWATT220AB (Plastic)




| REF. | DIMENSIONS | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| B | 2.50 | 2.70 | 0.098 | 0.106 |
| D | 2.50 | 2.75 | 0.098 | 0.108 |
| E | 0.40 | 0.70 | 0.016 | 0.028 |
| F | 0.75 | 1.00 | 0.030 | 0.039 |
| F1 | 1.15 | 1.70 | 0.045 | 0.067 |
| F2 | 1.15 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.20 | 0.195 | 0.205 |
| G1 | 2.40 | 2.70 | 0.094 | 0.106 |
| H | 10.00 | 10.40 | 0.394 | 0.409 |
| L2 | 16.00 typ. | | 0.630 typ. | |
| L3 | 28.60 | 30.60 | 1.125 | 1.205 |
| L4 | 9.80 | 10.60 | 0.386 | 0.417 |
| L6 | 15.90 | 16.40 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Diam | 3.00 | 3.20 | 0.118 | 0.126 |

## PACKAGE MECHANICAL DATA

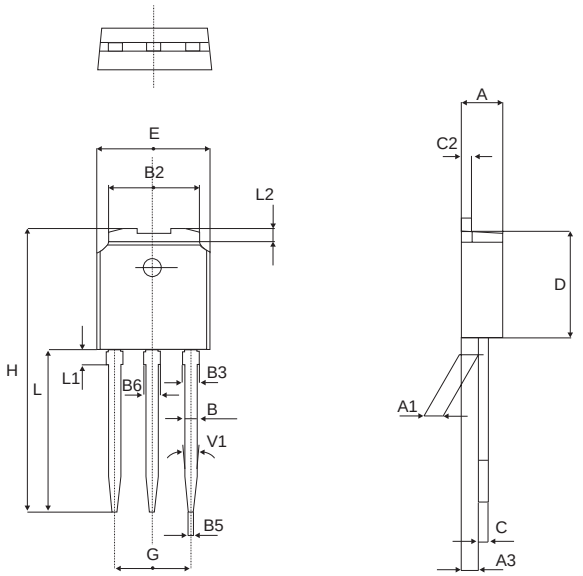
TO-220AB (Plastic)




| 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 |
| I | 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 | |

## PACKAGE MECHANICAL DATA

IPAK (Plastic)




| REF. | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A3 | 0.7 | | 1.3 | 0.027 | | 0.051 |
| B | 0.64 | | 0.9 | 0.025 | | 0.035 |
| B2 | 5.2 | | 5.4 | 0.204 | | 0.212 |
| B3 | | | 0.85 | | | 0.033 |
| B5 | | 0.3 | | | 0.035 | |
| B6 | | | 0.95 | | | 0.037 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.6 | 0.019 | | 0.023 |
| D | 6 | | 6.2 | 0.236 | | 0.244 |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| G | 4.4 | | 4.6 | 0.173 | | 0.181 |
| H | 15.9 | | 16.3 | 0.626 | | 0.641 |
| L | 9 | | 9.4 | 0.354 | | 0.370 |
| L1 | 0.8 | | 1.2 | 0.031 | | 0.047 |
| L2 | | 0.8 | 1 | | 0.031 | 0.039 |
| V1 | | 10° | | | 10° | |