

HIGH FREQUENCY SECONDARY RECTIFIER

MAJOR PRODUCT CHARACTERISTICS

| | |
|----------------|-----------------|
| $I_{F(AV)}$ | 2 x 10 A |
| V_{RRM} | 300 V |
| T_j (max) | 175 °C |
| V_F (max) | 1 V |
| t_{rr} (max) | 35 ns |

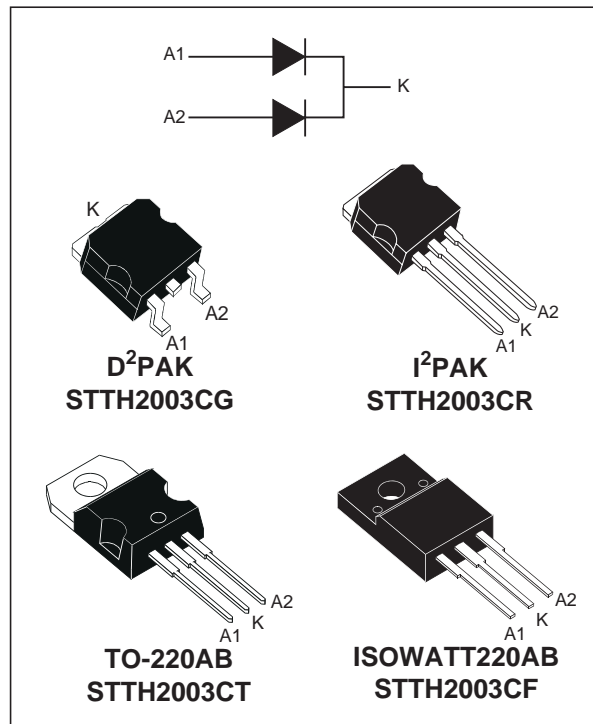
FEATURES AND BENEFITS

- COMBINES HIGHEST RECOVERY AND REVERSE VOLTAGE PERFORMANCE
- ULTRA-FAST, SOFT AND NOISE-FREE RECOVERY

DESCRIPTION

Dual center tap Fast Recovery Epitaxial Diodes suited for Switch Mode Power Supply and high frequency DC/DC converters.

Packaged in TO-220AB, ISOWATT220AB, I²PAK or D²PAK, this device is especially intended for secondary rectification.



ABSOLUTE RATINGS (limiting values, per diode)

| Symbol | Parameter | | | Value | Unit | |
|--------------|--|--|----------------------------------|-------------------------|----------|---|
| V_{RRM} | Repetitive peak reverse voltage | | | 300 | V | |
| $I_{F(RMS)}$ | RMS forward current | | | 30 | A | |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | TO-220AB / D ² PAK / I ² PAK | $T_c = 140^\circ\text{C}$ | Per diode Per device | 10 20 | A |
| | | ISOWATT220AB | $T_c = 125^\circ\text{C}$ | | | |
| I_{FSM} | Surge non repetitive forward current | | $t_p = 10 \text{ ms}$ sinusoidal | 110 | A | |
| I_{RSM} | Non repetitive avalanche current | | $t_p = 20 \mu\text{s}$ square | 5 | A | |
| T_{stg} | Storage temperature range | | | -65 + 175 | °C | |
| T_j | Maximum operating junction temperature | | | 175 | °C | |

THERMAL RESISTANCES

| Symbol | Parameter | | Value | Unit | |
|----------------------|------------------|--|-----------|------|------|
| R _{th(j-c)} | Junction to case | TO-220AB / D ² PAK / I ² PAK | Per diode | 2.5 | °C/W |
| | | | Total | 1.3 | |
| | | ISOWATT220AB | Per diode | 3.9 | |
| | | | Total | 3.2 | |
| R _{th(c)} | | TO-220AB / D ² PAK / I ² PAK | Coupling | 0.1 | |
| | | ISOWATT220AB | Coupling | 2.5 | |

STATIC ELECTRICAL CHARACTERISTICS (per diode)

| Symbol | Parameter | Tests conditions | | Min. | Typ. | Max. | Unit |
|------------------------------|-------------------------|------------------------|------------------------|------|------|------|------|
| I _R [*] | Reverse leakage current | V _R = 300 V | T _j = 25°C | | | 20 | μA |
| | | | T _j = 125°C | | 30 | 300 | |
| V _F ^{**} | Forward voltage drop | I _F = 10 A | T _j = 25°C | | | 1.25 | V |
| | | | T _j = 125°C | | 0.85 | 1 | |

Pulse test : * t_p = 5 ms, δ < 2 %

** t_p = 380 μs, δ < 2%

To evaluate the maximum conduction losses use the following equation :

$$P = 0.75 \times I_{F(AV)} + 0.025 I_{F(RMS)}^2$$

RECOVERY CHARACTERISTICS

| Symbol | Tests conditions | | Min. | Typ. | Max. | Unit |
|---------------------|--|------------------------|------|------|------|------|
| trr | I _F = 0.5 A I _{rr} = 0.25 A I _R = 1 A | T _j = 25°C | | | 25 | ns |
| | I _F = 1 A dI _F /dt = - 50 A/μs V _R = 30 V | | | | 35 | |
| tfr | I _F = 10 A dI _F /dt = 100 A/μs | T _j = 25°C | | | 230 | ns |
| V _{FP} | V _{FR} = 1.1 x V _F max. | | | | 3.5 | |
| S _{factor} | V _{CC} = 200V I _F = 10 A | T _j = 125°C | | 0.3 | | - |
| I _{RM} | dI _F /dt = 200 A/μs | | | | 8 | |

Fig. 1: Conduction losses versus average current (per diode).

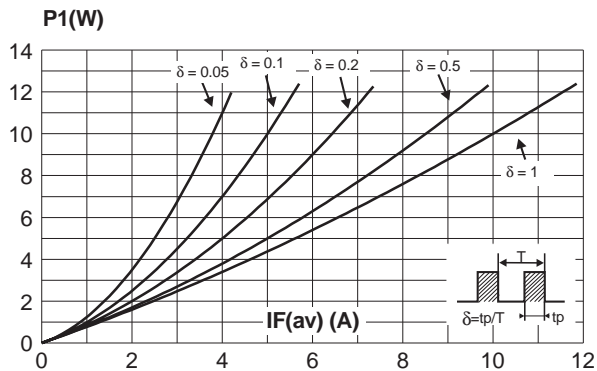


Fig. 2: Forward voltage drop versus forward current (maximum values, per diode).

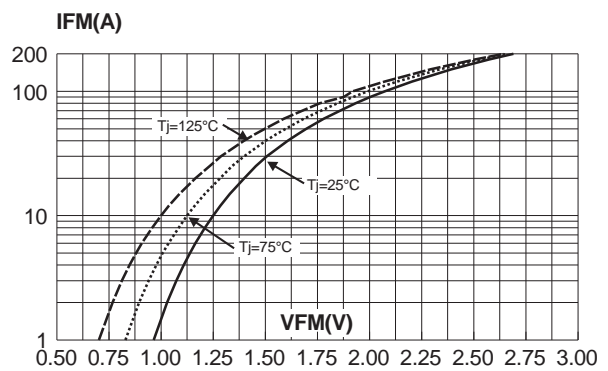


Fig. 3-1: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB / D²PAK / I²PAK).

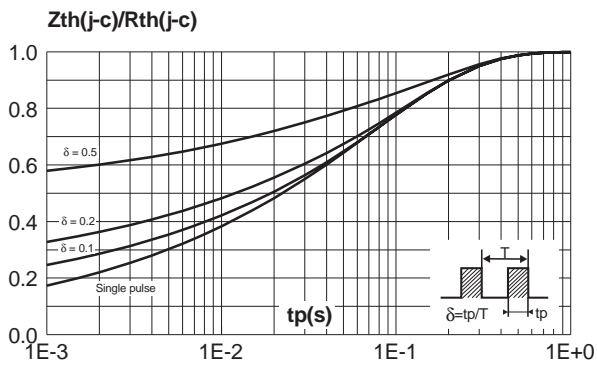


Fig. 3-2: Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB).

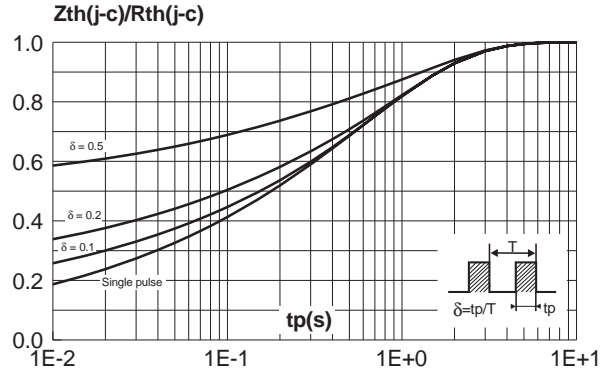


Fig. 4: Peak reverse recovery current versus di_F/dt (90% confidence, per diode).

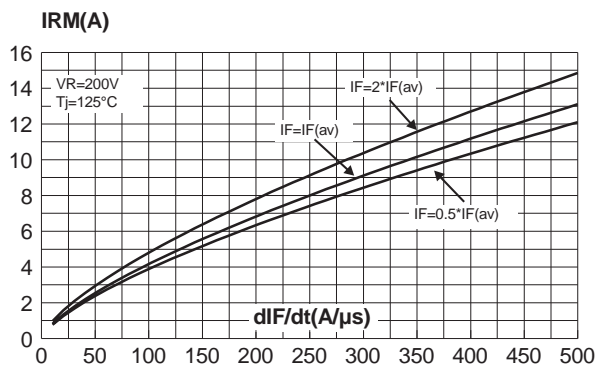


Fig. 5: Reverse recovery time versus di_F/dt (90% confidence, per diode).

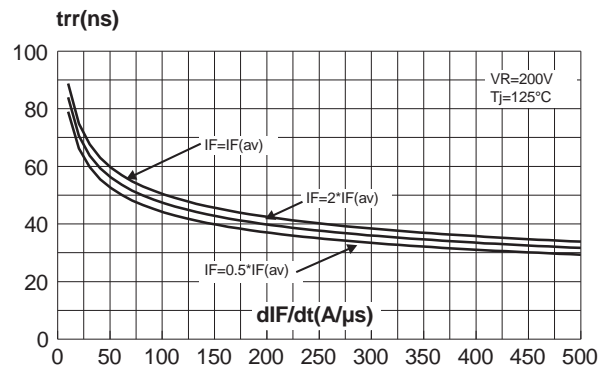


Fig. 6: Softness factor (tb/ta) versus dI_F/dt (typical values, per diode).

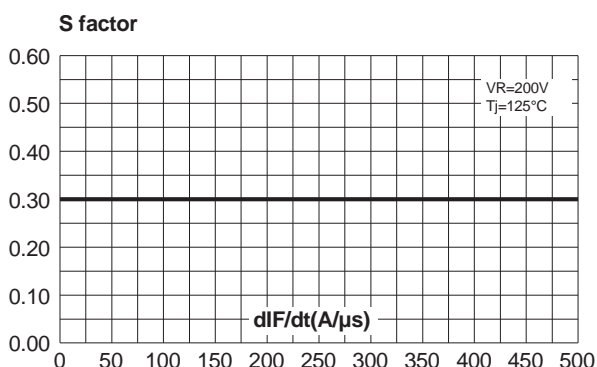


Fig. 7: Relative variation of dynamic parameters versus junction temperature (reference: $T_j = 125^\circ\text{C}$).

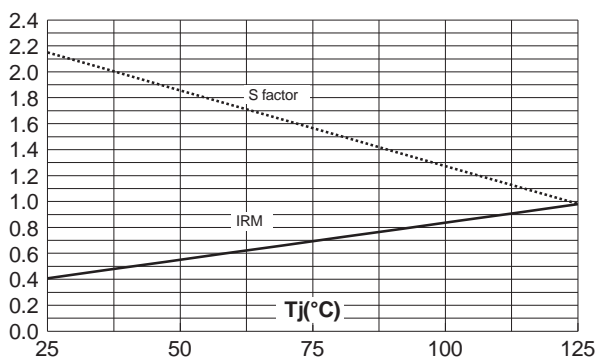


Fig. 8: Transient peak forward voltage versus dI_F/dt (90% confidence, per diode) (TO-220AB).

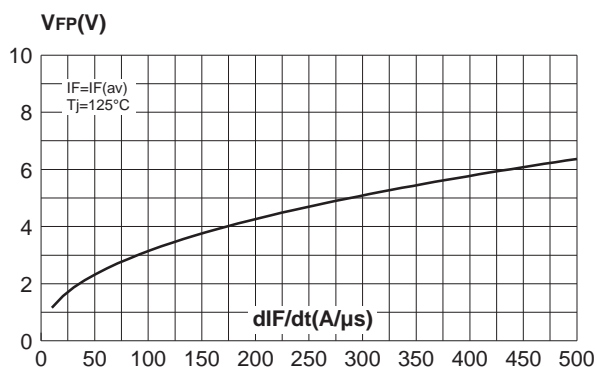


Fig. 9: Forward recovery time versus dI_F/dt (90% confidence, per diode).

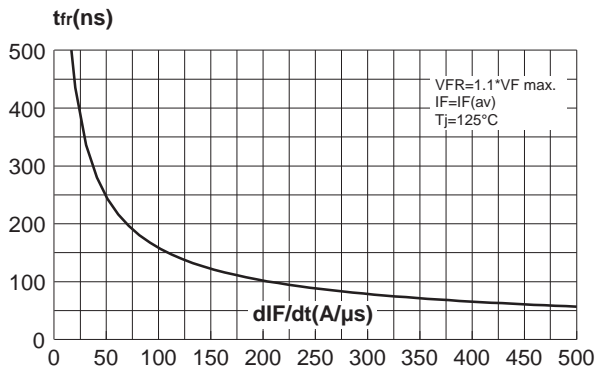
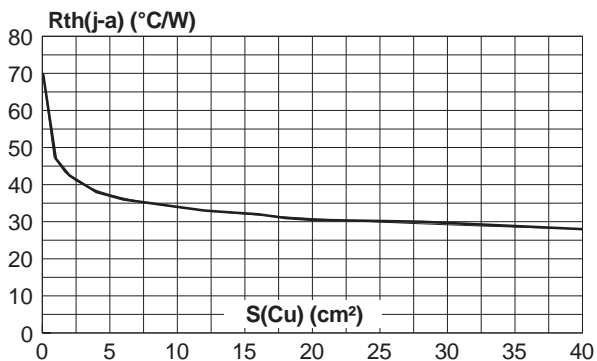
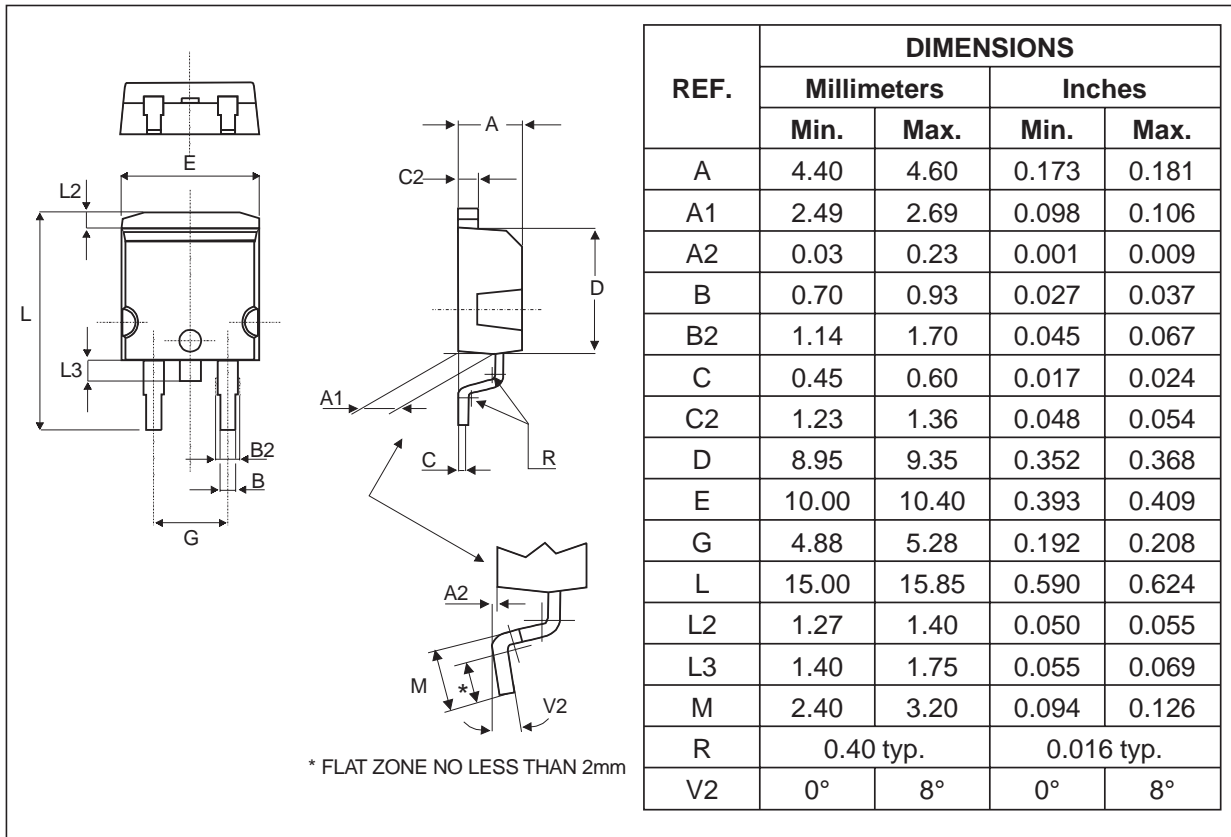


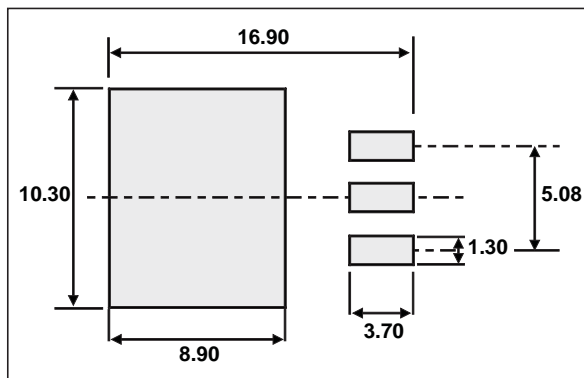
Fig. 10: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: $35\mu\text{m}$) ($D^2\text{PAK}$).



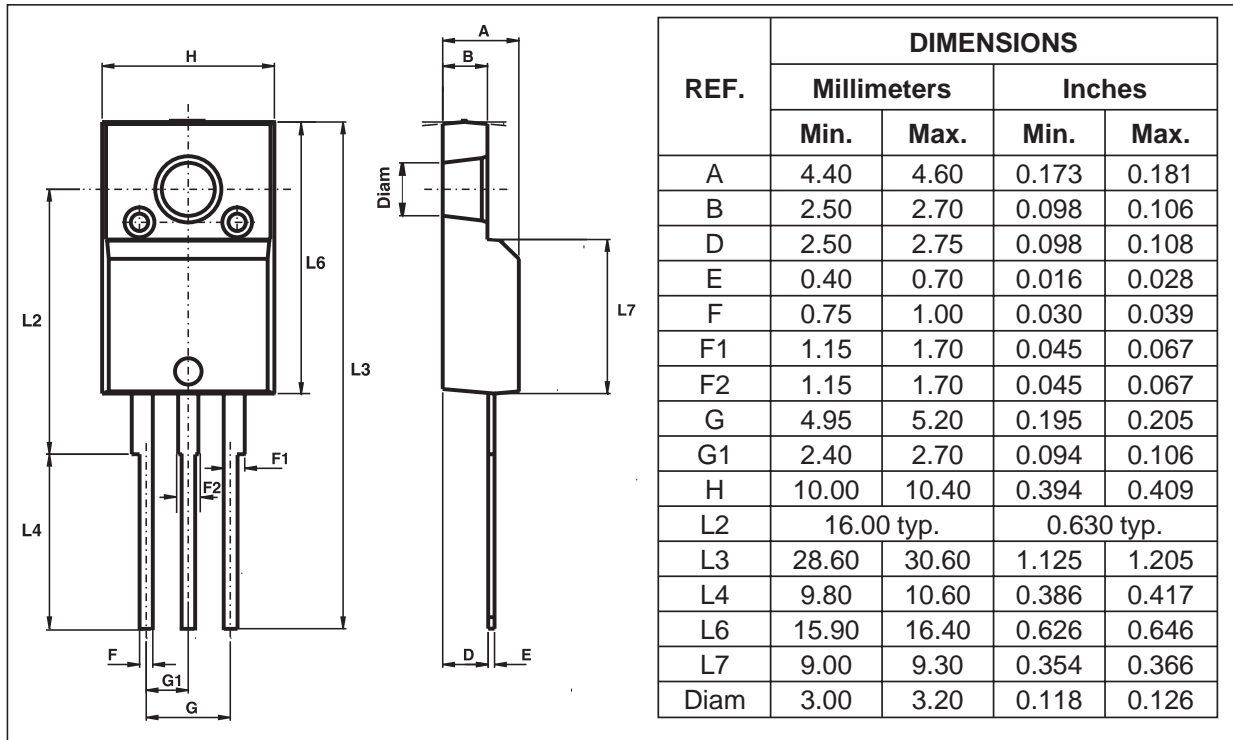
PACKAGE MECHANICAL DATA
D²PAK



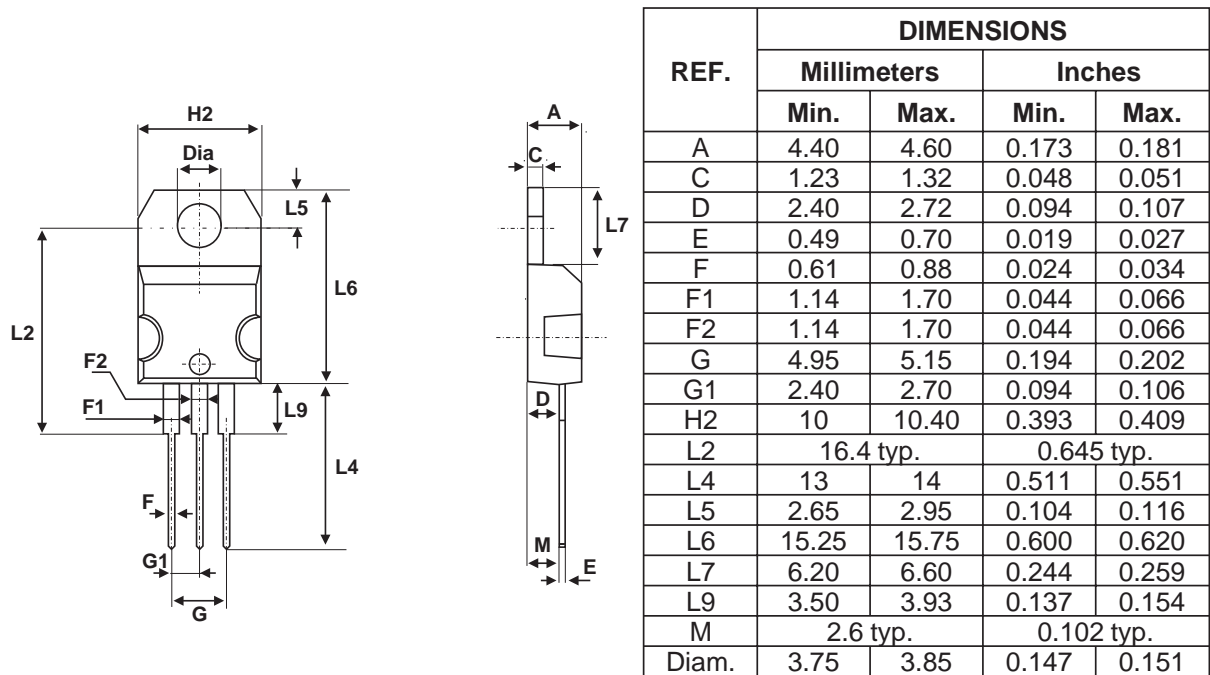
FOOT PRINT DIMENSIONS (in millimeters)
D²PAK

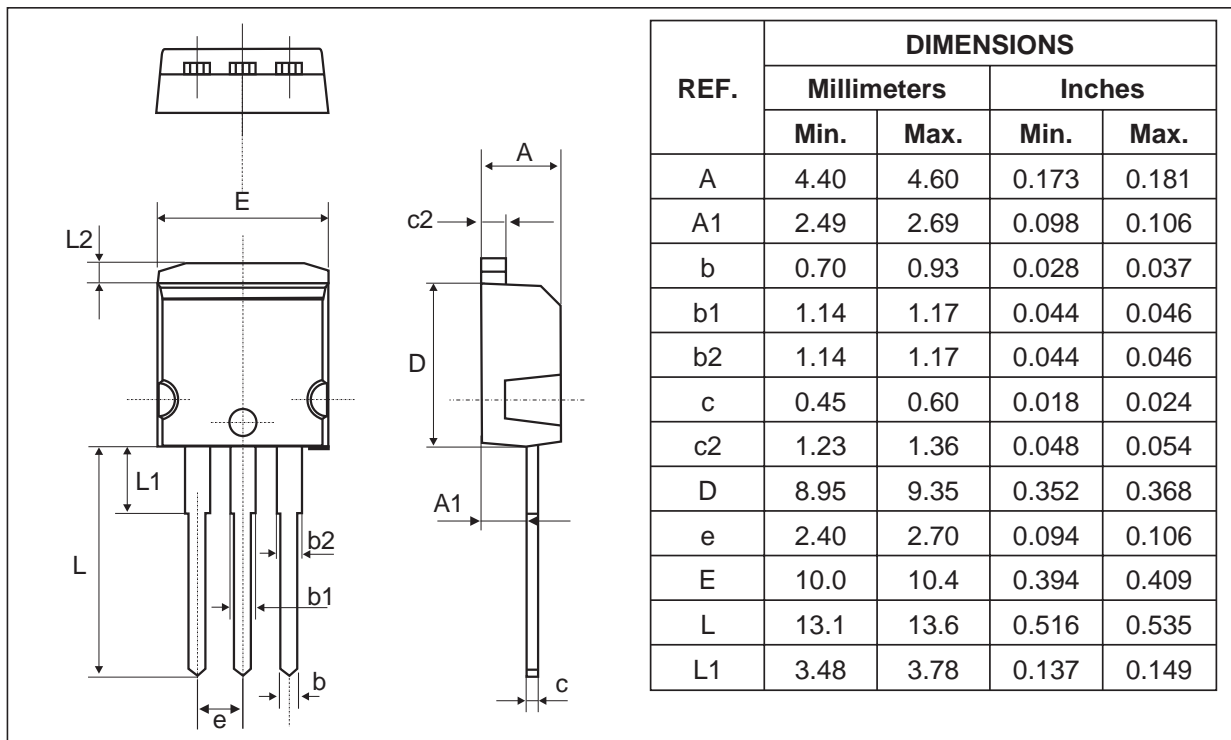


PACKAGE MECHANICAL DATA
ISOWATT220AB



PACKAGE MECHANICAL DATA
TO-220AB



PACKAGE MECHANICAL DATA
I²PAK


| Ordering code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|------------|--------------------|--------|----------|---------------|
| STTH2003CT | STTH2003CT | TO-220AB | 2.2 g | 50 | Tube |
| STTH2003CG | STTH2003CG | D ² PAK | 1.48 g | 50 | Tube |
| STTH2003CG-TR | STTH2003CG | D2PAK | 1.48 g | 500 | Tape & reel |
| STTH2003CF | STTH2003CF | ISOWATT220AB | 2.08 g | 50 | Tube |
| STTH2003CR | STTH2003CR | I ² PAK | 1.49 g | 50 | Tube |

- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N.m.
- Maximum torque value: 0.70 N.m.
- Epoxy meets UL 94,V0

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