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HIGH EFFICIENCY ULTRAFAST DIODE

MAIN PRODUCT CHARACTERISTICS

| | |
|----------------|---------------|
| $I_{F(AV)}$ | Up to 2 x 10A |
| V_{RRM} | 200 V |
| T_j (max) | 175 °C |
| V_F (typ) | 0.78 V |
| t_{rr} (typ) | 21 ns |

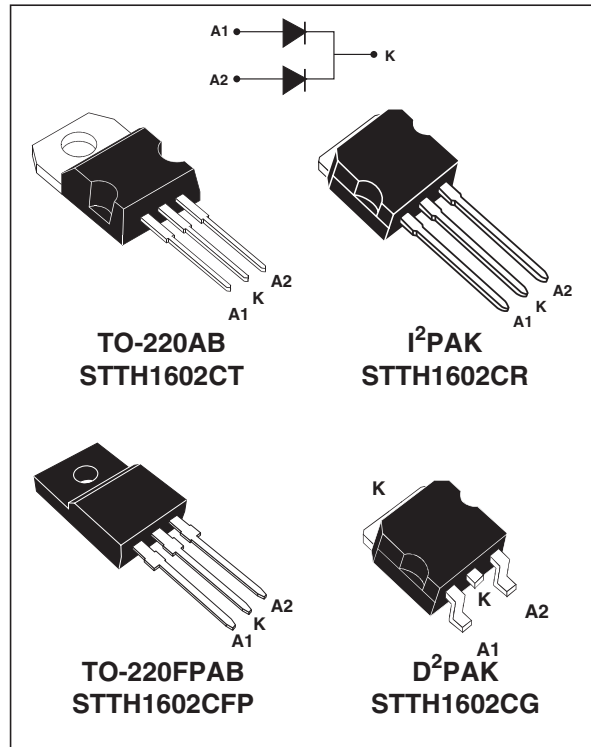
FEATURES AND BENEFITS

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- Low leakage current
- High junction temperature
- Insulated package: TO-220FPAB

DESCRIPTION

Dual center tap rectifier suited for Switch Mode Power Supplies and High frequency DC to DC converters.

Packaged in TO-220AB, D²PAK, TO-220FPAB and I²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.



ABSOLUTE RATINGS (limiting values, per diode)

| Symbol | Parameter | | Value | Unit | | |
|--------------|----------------------------------------|----------------------------------------------------|------------------------|------------|----|---|
| V_{RRM} | Repetitive peak reverse voltage | | 200 | V | | |
| $I_{F(RMS)}$ | RMS forward current | | 30 | A | | |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | TO-220AB / I ² PAK / D ² PAK | T _c = 150°C | Per diode | 8 | A |
| | | | T _c = 140°C | Per device | 16 | |
| | | | T _c = 140°C | Per diode | 10 | |
| | | | T _c = 130°C | Per device | 20 | |
| | | TO-220FPAB | T _c = 130°C | Per diode | 8 | |
| | | | T _c = 100°C | Per device | 16 | |
| | | | T _c = 110°C | Per diode | 10 | |
| | | | T _c = 75°C | Per device | 20 | |
| I_{FSM} | Surge non repetitive forward current | tp = 10 ms Sinusoidal | 80 | A | | |
| T_{stg} | Storage temperature range | | - 65 + 175 | °C | | |
| T_j | Maximum operating junction temperature | | 175 | °C | | |

STTH1602C

THERMAL PARAMETERS

| Symbol | Parameter | | Maximum | Unit | |
|----------------------|------------------|----------------------------------------------------|------------|------|------|
| R _{th(j-c)} | Junction to case | TO-220AB / I ² PAK / D ² PAK | Per diode | 3.0 | °C/W |
| | | | Per device | 1.9 | |
| | | TO-220FPAB | Per diode | 5.5 | |
| | | | Per device | 4.5 | |
| R _{th(j-c)} | Coupling | TO-220AB / I ² PAK / D ² PAK | 0.8 | °C/W | |
| | | TO-220FPAB | 3.5 | | |

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P(\text{diode1}) \times R_{th(j-c)} (\text{per diode}) + P(\text{diode2}) \times R_{th(c)}$$

STATIC ELECTRICAL CHARACTERISTICS (per diode)

| Symbol | Parameter | Tests conditions | | Min. | Typ. | Max. | Unit |
|-------------------|-------------------------|------------------------|-----------------------------------|------|------|------|------|
| I _R * | Reverse leakage current | T _j = 25°C | V _R = V _{RRM} | | | 6 | μA |
| | | T _j = 125°C | | | 4 | 60 | |
| V _F ** | Forward voltage drop | T _j = 25°C | I _F = 8 A | | | 1.1 | V |
| | | T _j = 25°C | I _F = 16 A | | | 1.25 | |
| | | T _j = 150°C | I _F = 8 A | | 0.78 | 0.89 | |
| | | T _j = 150°C | I _F = 16 A | | | 1.05 | |

Pulse test: * t_p = 5ms, δ < 2%

** t_p = 380μs, δ < 2%

To evaluate the maximum conduction losses use the following equation :

$$P = 0.73 \times I_{F(AV)} + 0.020 I_{F(RMS)}^2$$

DYNAMIC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Tests conditions | | Min. | Typ. | Max. | Unit |
|-----------------|--------------------------|------------------------|--------------------------------------------------------------------------------------------------|------|------|------|------|
| t _{rr} | Reverse recovery time | T _j = 25°C | I _F = 1 A V _R = 30V dI _F /dt = 100 A/μs | | 21 | 26 | ns |
| I _{RM} | Reverse recovery current | T _j = 125°C | I _F = 8 A V _R = 160V dI _F /dt = 200 A/μs | | 6.8 | 8.8 | A |
| t _{fr} | Forward recovery time | T _j = 25°C | I _F = 8 A dI _F /dt = 100 A/μs V _{FR} = 1.1 × V _{Fmax} | | | 160 | ns |
| V _{FP} | Forward recovery voltage | T _j = 25°C | I _F = 8 A dI _F /dt = 100 A/μs | | 2.4 | | V |

Fig. 1: Peak current versus duty cycle (per diode).

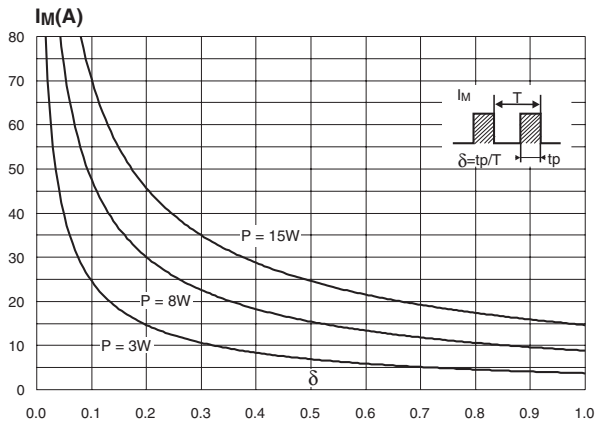


Fig. 2-1: Forward voltage drop versus forward current (typical values, per diode).

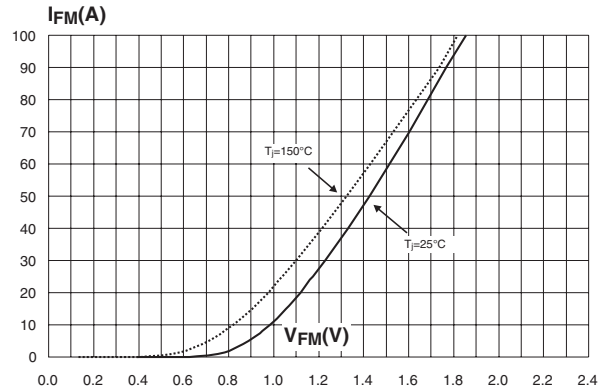


Fig. 2-2: Forward voltage drop versus forward current (maximum values, per diode).

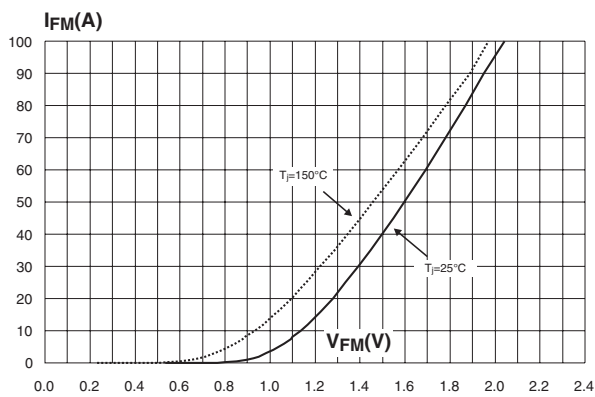


Fig. 3-1: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK, I²PAK).

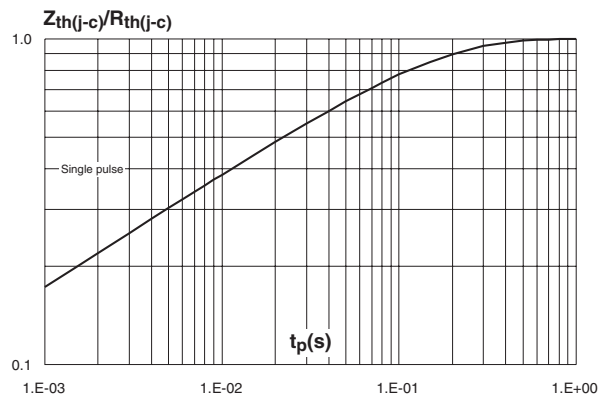


Fig. 3-2: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB).

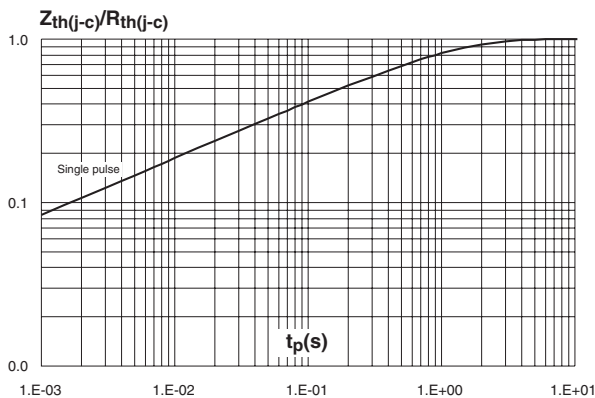


Fig. 4: Junction capacitance versus reverse voltage applied (typical values, per diode).

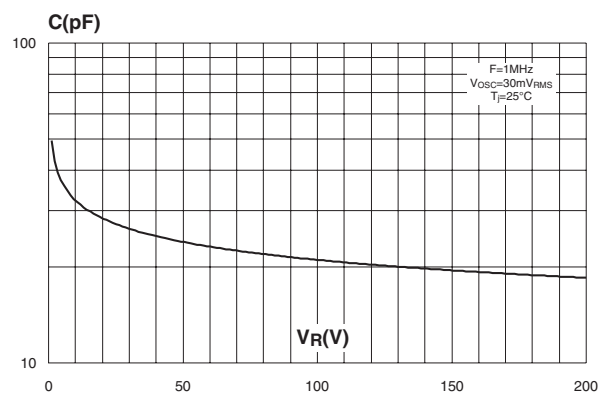


Fig. 5: Reverse recovery charges versus di_F/dt (typical values, per diode).

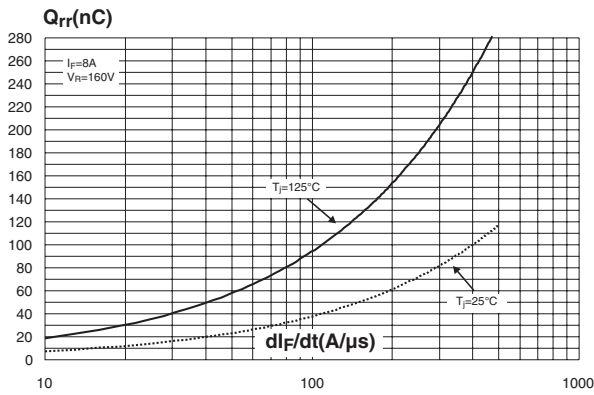


Fig. 6: Reverse recovery time versus di_F/dt (typical values, per diode).

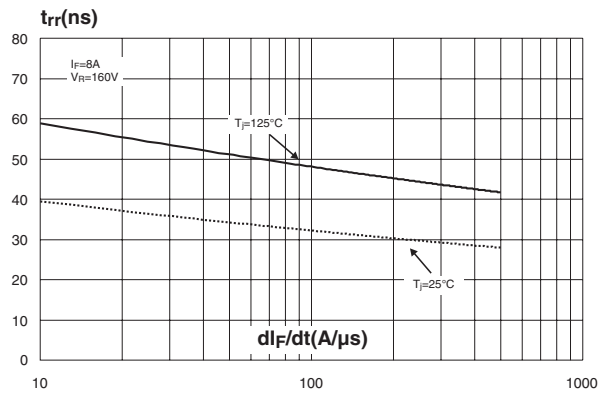


Fig. 7: Peak reverse recovery current versus di_F/dt (typical values, per diode).

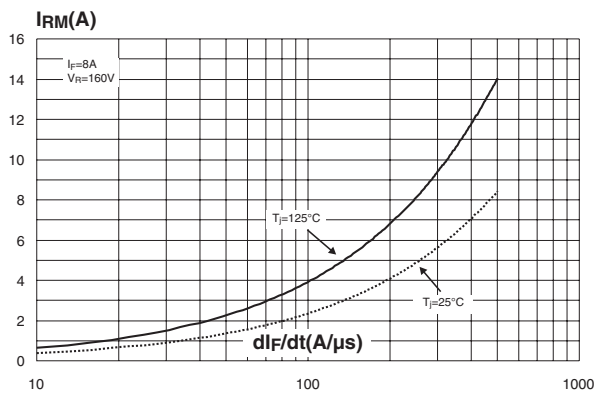


Fig. 8: Dynamic parameters versus junction temperature.

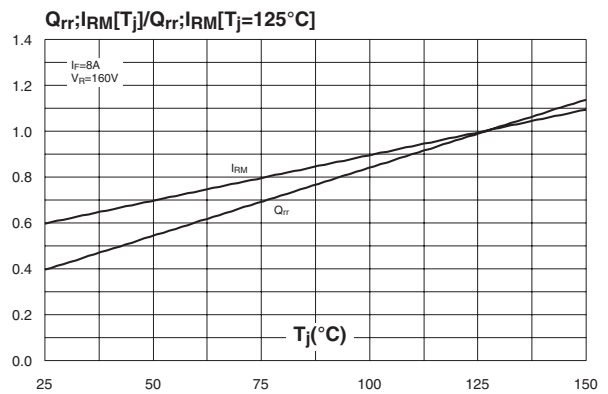
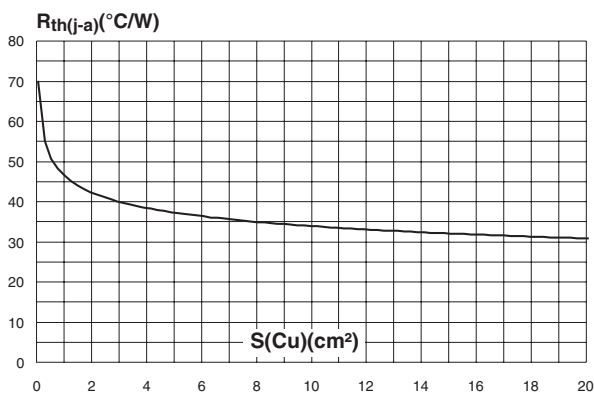


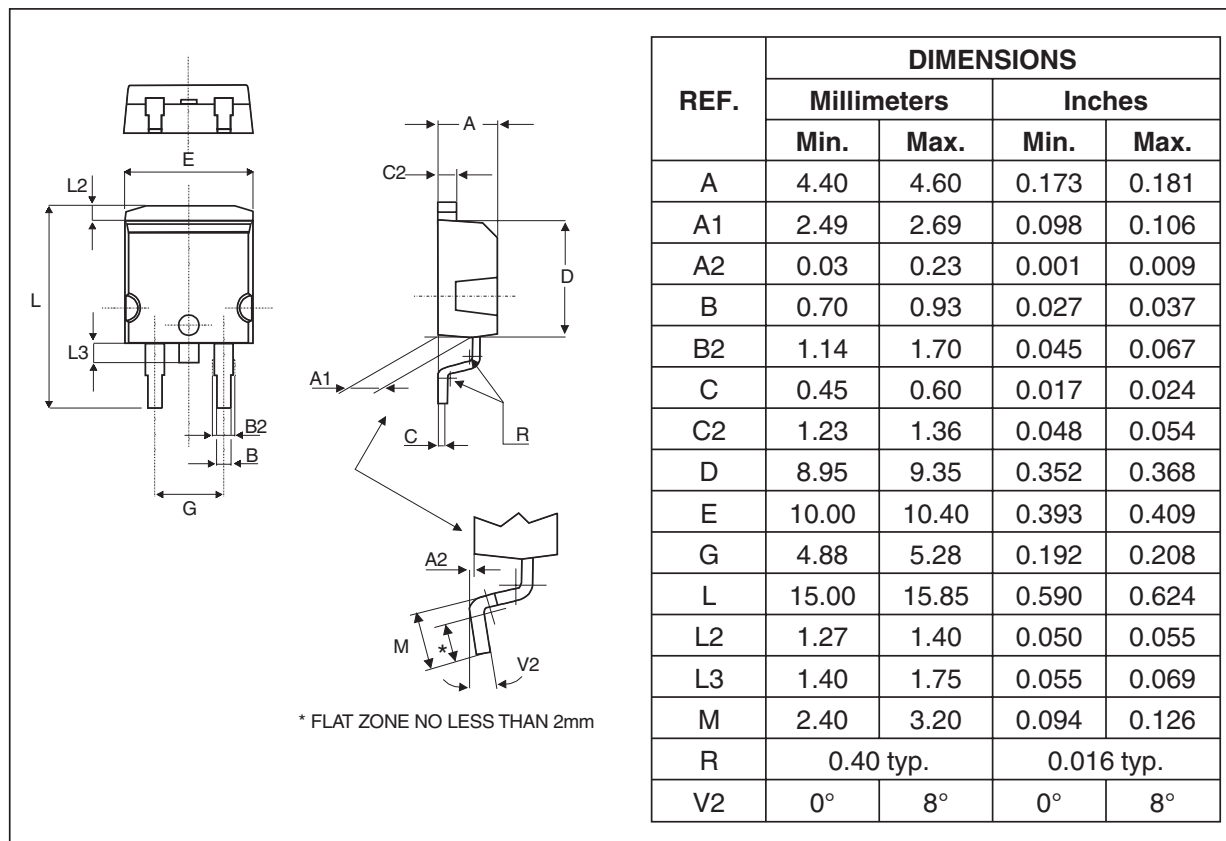
Fig. 9: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, ϵ_{cu} : 35 μ m) for D²PAK.



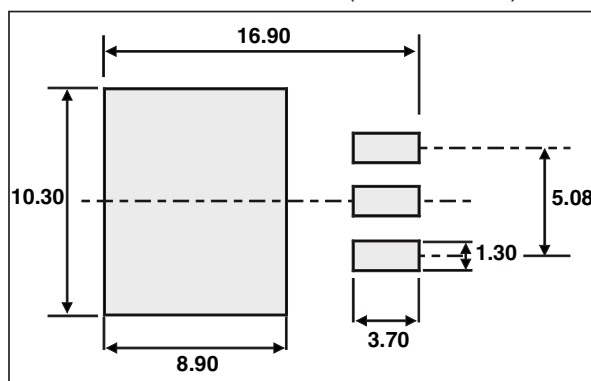
| Ordering code | Marking | Package | Weight | Base qty | Delivery mode |
|---------------|-------------|--------------------|--------|----------|---------------|
| STTH1602CT | STTH1602CT | TO-220AB | 2.23 g | 50 | Tube |
| STTH1602CG | STTH1602CG | D ² PAK | 1.48 g | 50 | Tube |
| STTH1602CG-TR | STTH1602CG | D ² PAK | 1.48 g | 1000 | Tape & reel |
| STTH1602CR | STTH1602CR | I ² PAK | 1.49 g | 50 | Tube |
| STTH1602CFP | STTH1602CFP | TO-220FPAB | 1.70g | 50 | Tube |

PACKAGE MECHANICAL DATA

D²PAK

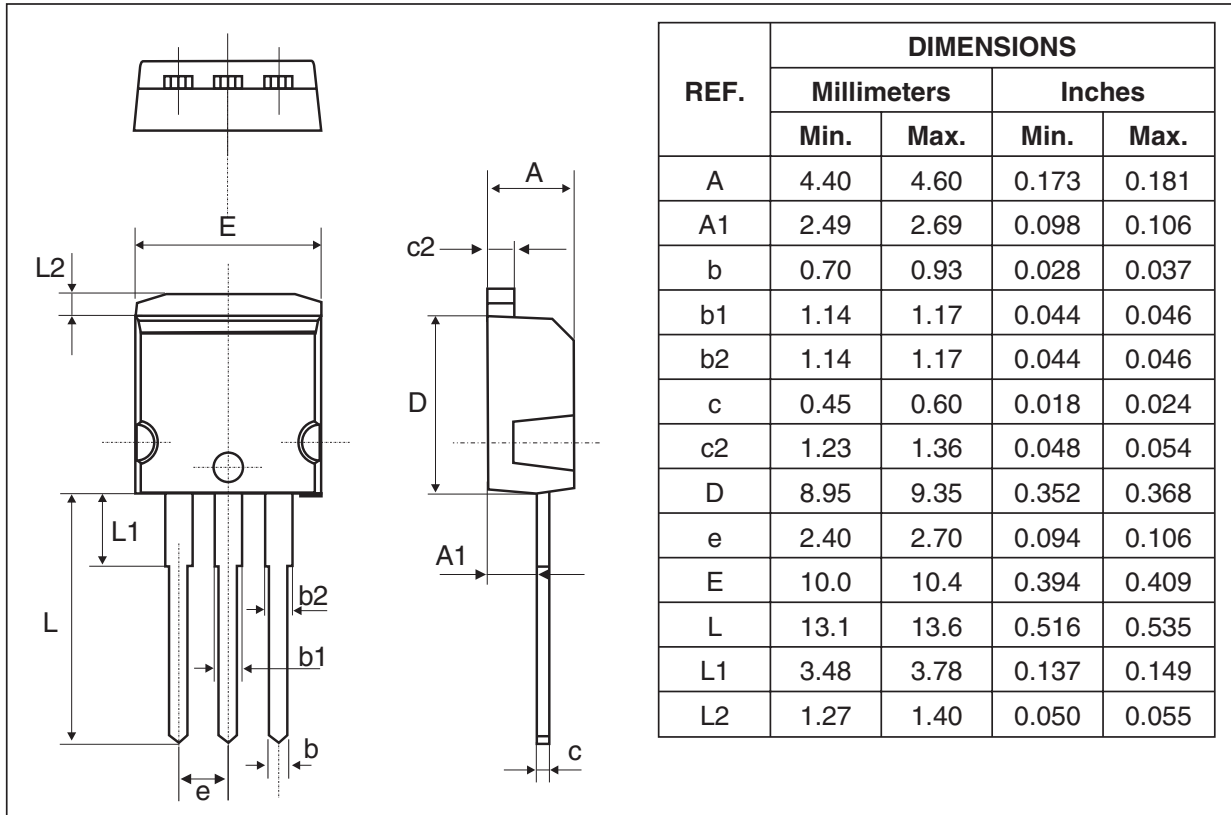


FOOTPRINT DIMENSIONS (in millimeters)

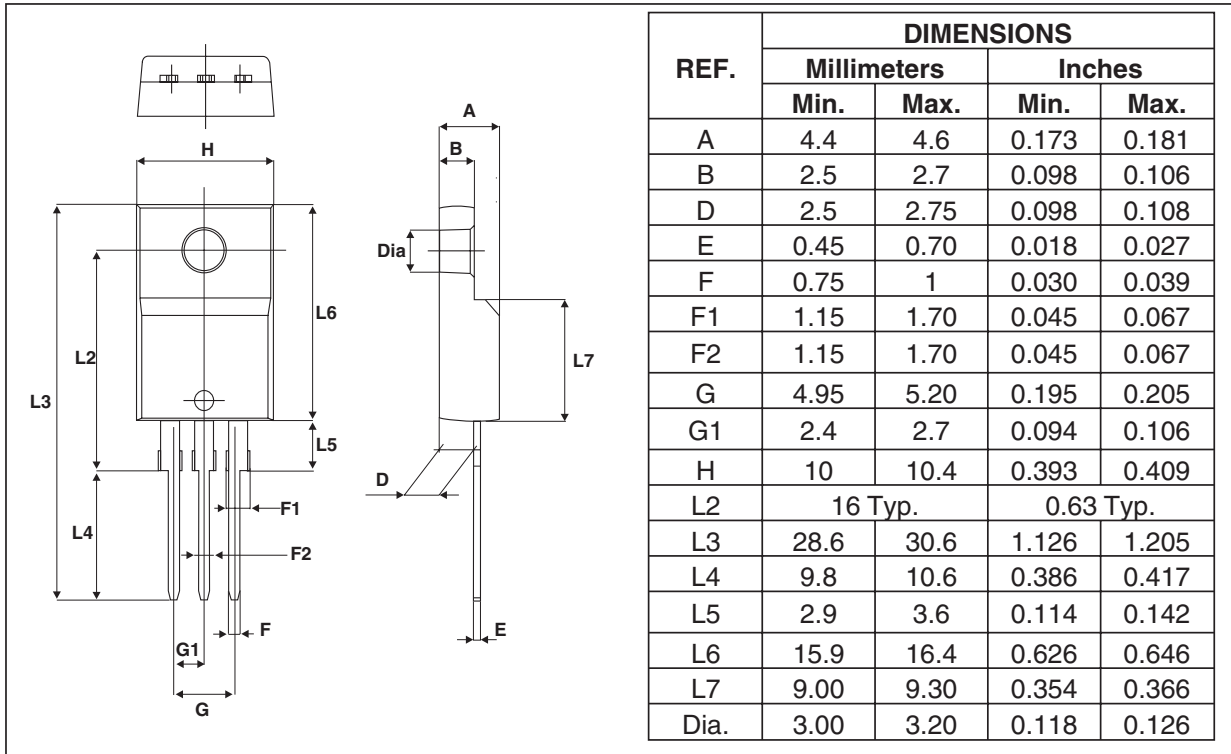


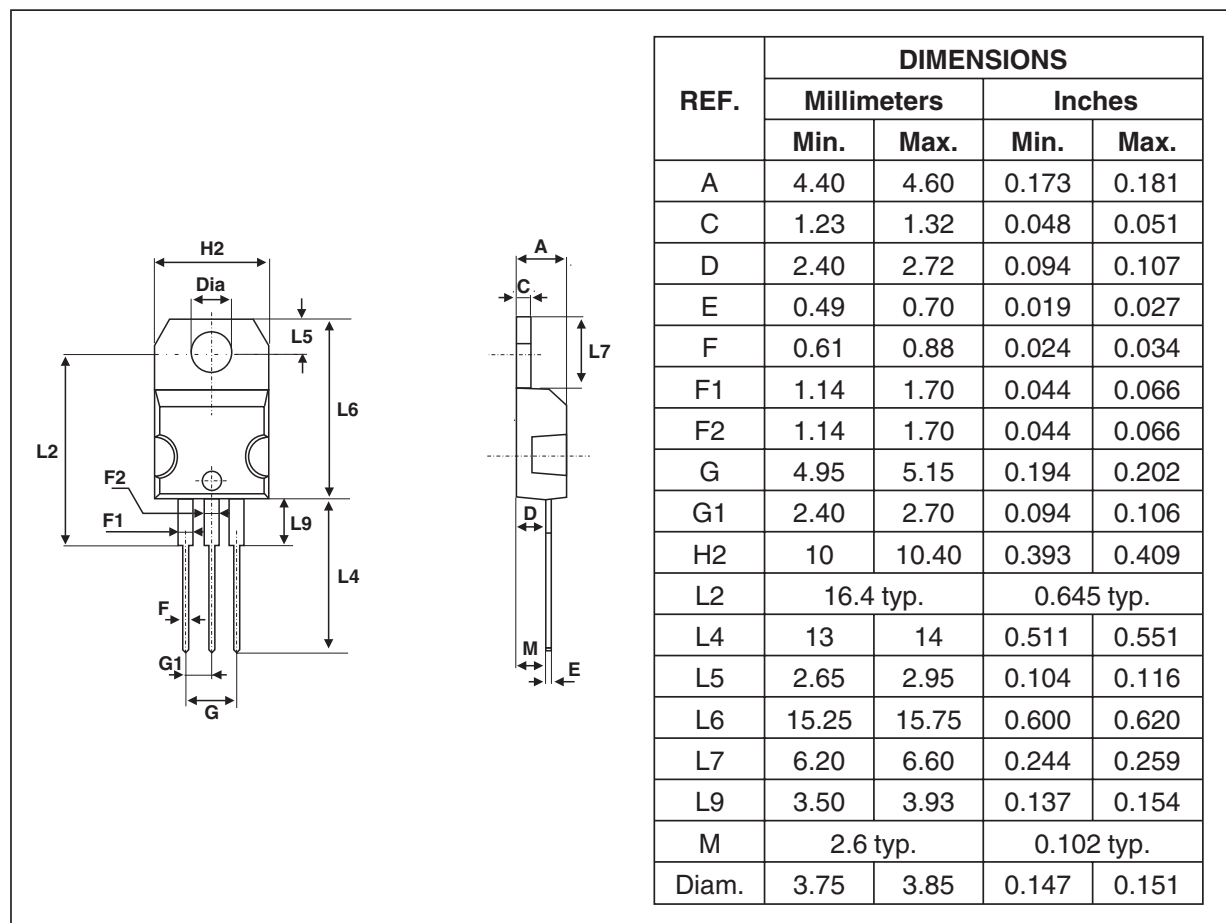
STTH1602C

PACKAGE MECHANICAL DATA
I²PAK



PACKAGE MECHANICAL DATA
TO-220FPAB



PACKAGE MECHANICAL DATA
TO-220AB


- Epoxy meets UL94,V0
- Cooling method: by conduction (method C)
- Recommended torque value (TO-220AB): 0.8 N.m.
- Maximum torque value (TO-220AB): 1.0 N.m.
- Recommended torque value (TO-220FPAB): 0.55 N.m.
- Maximum torque value (TO-220FPAB): 0.7 N.m.

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