



# STPR1020CB/CG/CT/CF/CFP

## ULTRA-FAST RECOVERY RECTIFIER DIODES

### MAIN PRODUCTS CHARACTERISTICS

|                        |         |
|------------------------|---------|
| $I_{F(AV)}$            | 2 x 5 A |
| $V_{RRM}$              | 200 V   |
| $T_j \text{ (max)}$    | 150°C   |
| $V_F \text{ (max)}$    | 0.99 V  |
| $t_{rr} \text{ (max)}$ | 30 ns   |

### FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- INSULATED PACKAGES: ISOWATT220AB / TO-220FP  
Insulation Voltage = 2000V DC  
Capacitance = 12 pF

### DESCRIPTION

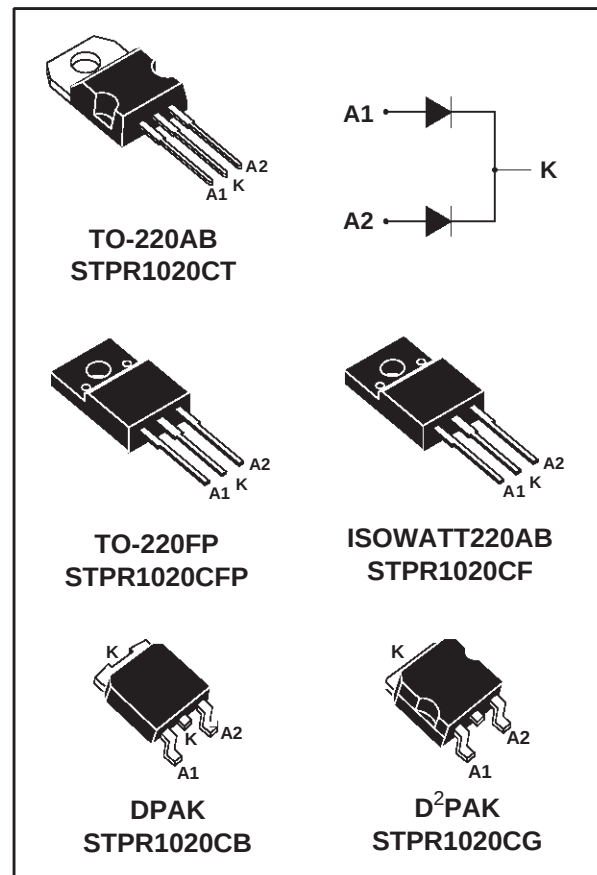
Dual center tap rectifier suited for Switched Mode Power Supplies and high frequency DC to DC converters.

Packaged in DPAK, D<sup>2</sup>PAK, TO-220AB, TO-220FP or ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

**ABSOLUTE MAXIMUM** (limiting values, per diode)

| Symbol              | Parameter                            |                                                         |                    |            | Value         | Unit |
|---------------------|--------------------------------------|---------------------------------------------------------|--------------------|------------|---------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage      |                                                         |                    |            | 200           | V    |
| I <sub>F(RMS)</sub> | RMS forward current                  | D <sup>2</sup> PAK / TO-220AB / ISOWATT220AB / TO-220FP |                    |            | 10            | A    |
|                     |                                      | DPAK                                                    |                    |            | 7             | A    |
| I <sub>F(AV)</sub>  | Average forward current<br>δ = 0.5   | D <sup>2</sup> PAK / DPAK TO-220AB                      | Tc=125°C           | Per diode  | 5             | A    |
|                     |                                      | ISOWATT220AB                                            | Tc=115°C           | Per device | 10            |      |
|                     |                                      | TO-220FP                                                | Tc=110°C           | Per device | 10            |      |
| I <sub>FSM</sub>    | Surge non repetitive forward current |                                                         | tp=10ms sinusoidal |            | 50            | A    |
| T <sub>stg</sub>    | Storage temperature range            |                                                         |                    |            | - 65 to + 150 | °C   |

### PRELIMINARY DATASHEET



**STPR1020CB/CG/CT/CF/CFP****THERMAL RESISTANCES**

| Symbol               | Parameter        |                                      |           | Value | Unit |
|----------------------|------------------|--------------------------------------|-----------|-------|------|
| R <sub>th(j-c)</sub> | Junction to case | TO-220AB / D <sup>2</sup> PAK / DPAK | Per diode | 4.0   | °C/W |
|                      |                  |                                      | Total     | 2.4   |      |
|                      |                  | ISOWATT220AB                         | Per diode | 6.0   |      |
|                      |                  |                                      | Total     | 4.0   |      |
|                      |                  | TO-220FP                             | Per diode | 6.5   |      |
|                      |                  |                                      | Total     | 5     |      |
| R <sub>th(c)</sub>   | Coupling         | TO-220AB / D <sup>2</sup> PAK / DPAK |           | 0.7   |      |
|                      |                  | ISOWATT220AB                         |           | 2.0   |      |
|                      |                  | TO-220FP                             |           | 3.5   |      |

When diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode } 1) = P(\text{diode } 1) \times R_{th(j-c)} (\text{Per diode}) + P(\text{diode } 2) \times R_{th(c)}$$

**STATIC ELECTRICAL CHARACTERISTICS (per diode)**

| Symbol            | Parameters              | Test conditions        |                                   | Min. | Typ. | Max. | Unit |
|-------------------|-------------------------|------------------------|-----------------------------------|------|------|------|------|
| I <sub>R</sub> *  | Reverse leakage current | T <sub>j</sub> = 25°C  | V <sub>R</sub> = V <sub>RRM</sub> |      |      | 50   | μA   |
|                   |                         | T <sub>j</sub> = 100°C |                                   |      |      | 0.6  | mA   |
| V <sub>F</sub> ** | Forward voltage drop    | T <sub>j</sub> = 125°C | I <sub>F</sub> = 5 A              |      | 0.8  | 0.99 | V    |
|                   |                         | T <sub>j</sub> = 125°C | I <sub>F</sub> = 10 A             |      | 0.95 | 1.20 |      |
|                   |                         | T <sub>j</sub> = 25°C  | I <sub>F</sub> = 10 A             |      |      | 1.25 |      |

Pulse test : \* tp = 5 ms, δ < 2 %

\*\* tp = 380 μs, δ < 2 %

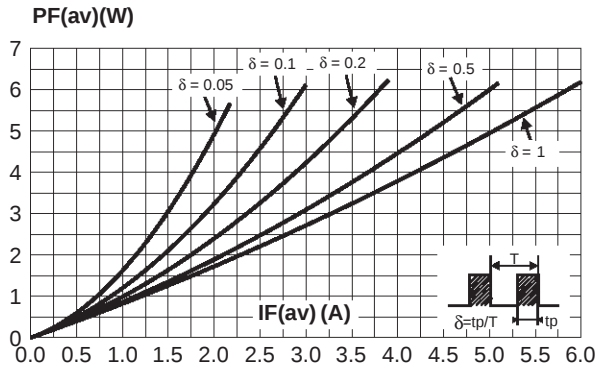
To evaluate the conduction losses use the following equation :

$$P = 0.78 \times I_{F(AV)} + 0.042 \times I_{F(RMS)}^2$$

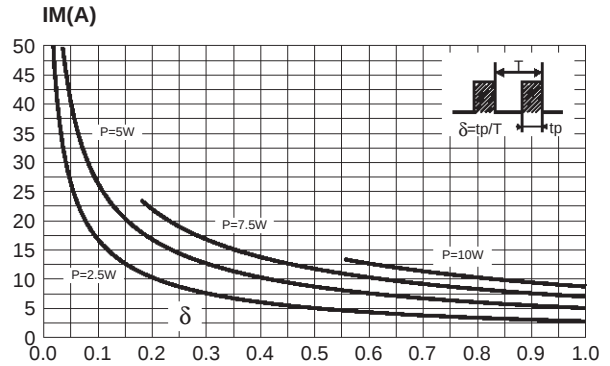
**RECOVERY CHARACTERISTICS**

| Symbol          | Test conditions       |                                                                   |                               | Min. | Typ. | Max. | Unit |
|-----------------|-----------------------|-------------------------------------------------------------------|-------------------------------|------|------|------|------|
| trr             | T <sub>j</sub> = 25°C | I <sub>F</sub> = 0.5A<br>I <sub>R</sub> = 1A                      | I <sub>rr</sub> = 0.25A       |      |      | 30   | ns   |
| tfr             | T <sub>j</sub> = 25°C | I <sub>F</sub> = 1A<br>V <sub>FR</sub> = 1.1 x V <sub>F</sub> max | dI <sub>F</sub> /dt = 50 A/μs |      | 20   |      | ns   |
| V <sub>FP</sub> | T <sub>j</sub> = 25°C | I <sub>F</sub> = 1A                                               | dI <sub>F</sub> /dt = 50 A/μs |      | 3    |      | V    |

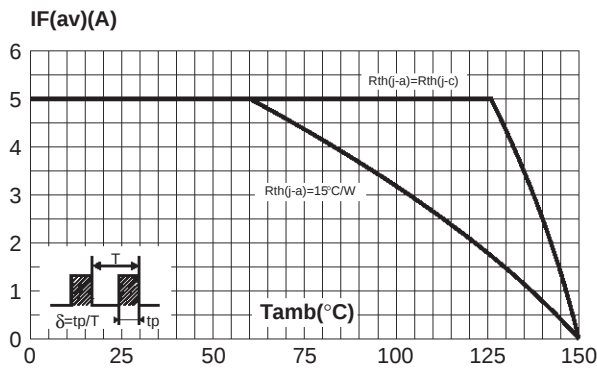
**Fig. 1:** Average forward power dissipation versus average forward current (per diode).



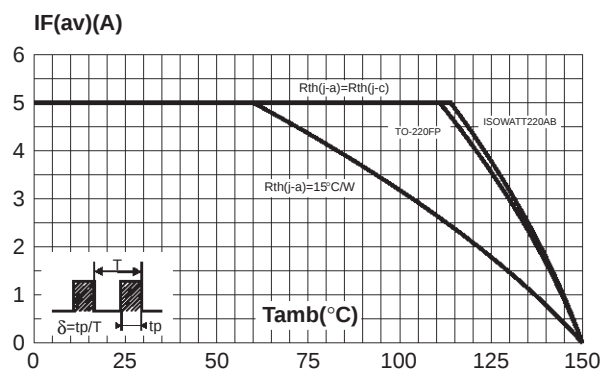
**Fig. 2:** Peak current versus form factor (per diode).



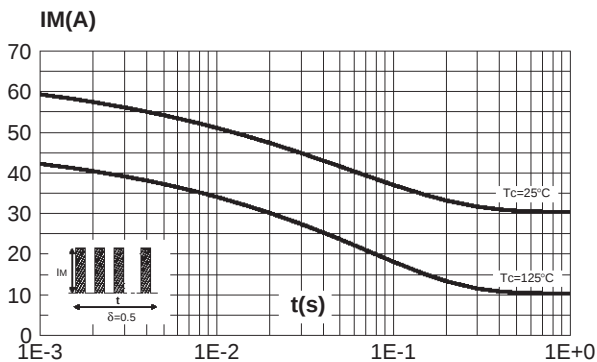
**Fig. 3-1:** Average forward current versus ambient temperature ( $\delta = 0.5$ , TO-220AB, DPAK, D<sup>2</sup>PAK).



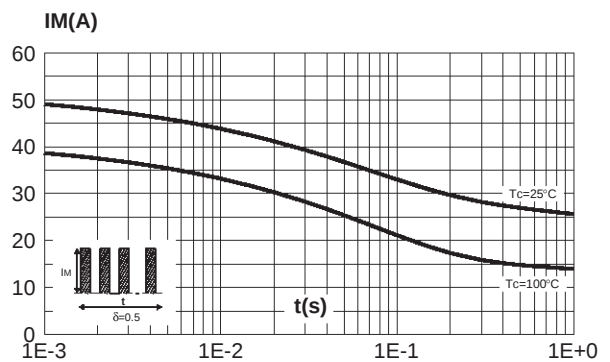
**Fig. 3-2:** Average forward current versus ambient temperature ( $\delta = 0.5$ , ISOWATT220AB, TO-220FP).



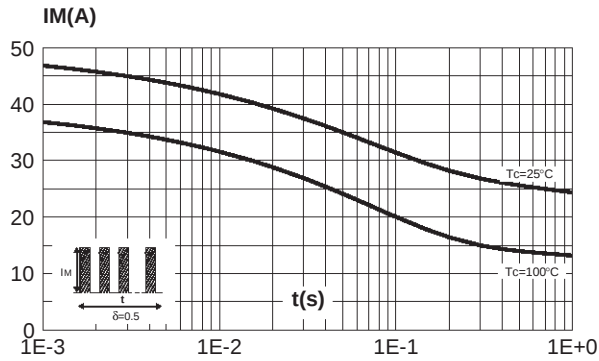
**Fig. 4-1:** Non repetitive surge peak forward current versus overload duration (TO-220AB, DPAK, D<sup>2</sup>PAK).



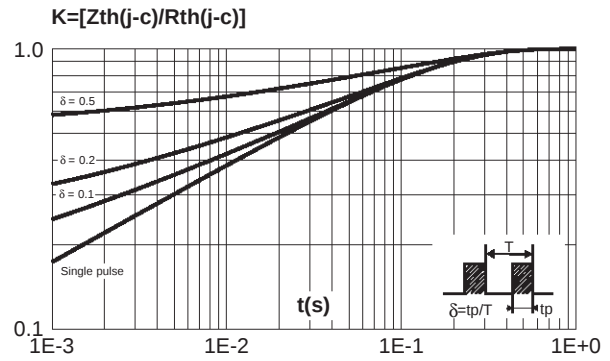
**Fig. 4-2:** Non repetitive surge peak forward current versus overload duration (ISOWATT220AB).



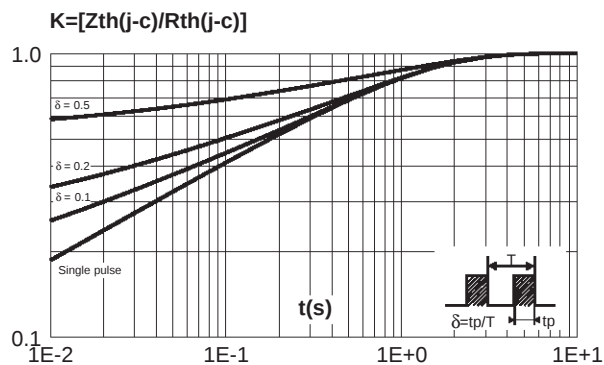
**Fig. 4-3:** Non repetitive surge peak forward current versus overload duration (TO-220FP).



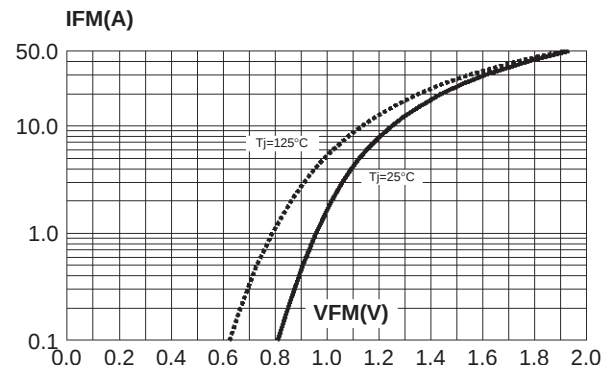
**Fig. 5-1:** Relative variation of thermal impedance junction to case versus pulse duration ( $D^2$ PAK, DPAK, TO-220AB).



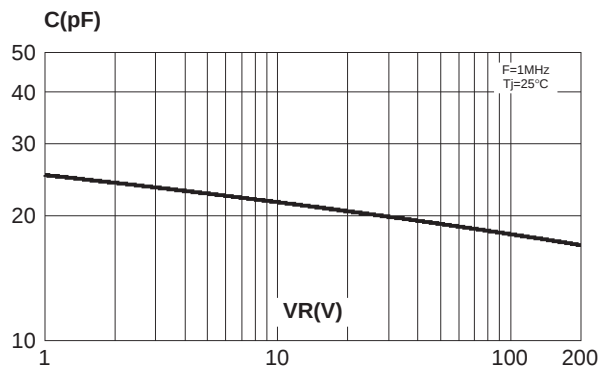
**Fig. 5-2:** Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB, TO-220FP).



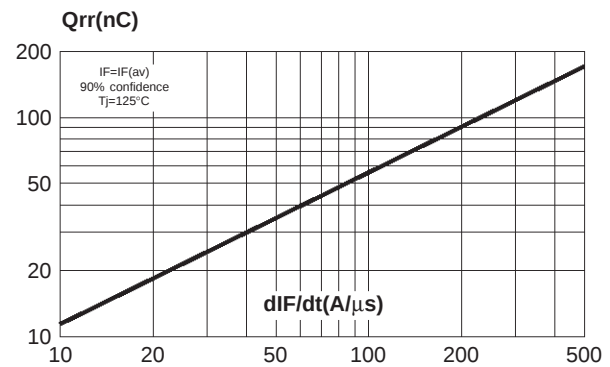
**Fig. 6:** Forward voltage drop versus forward current (maximum values, per diode).



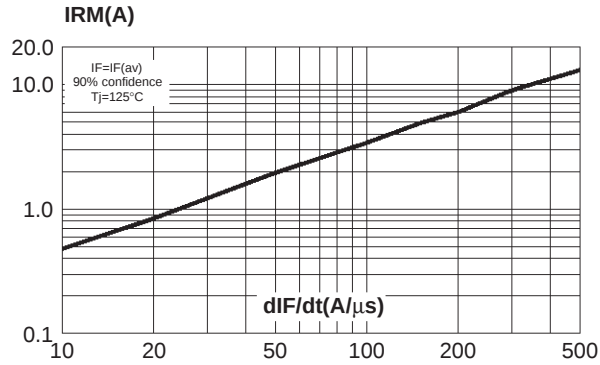
**Fig. 7:** Junction capacitance versus reverse voltage applied (typical values, per diode).



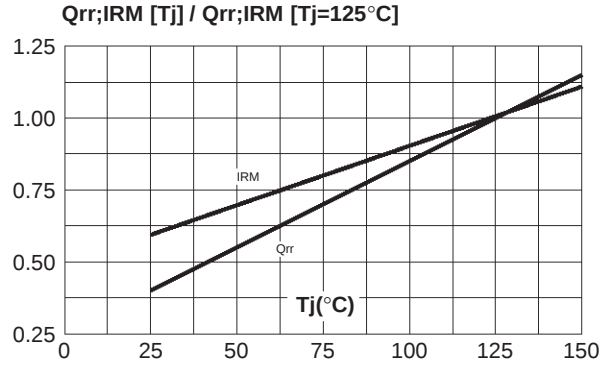
**Fig. 8:** Reverse recovery charges versus  $dIF/dt$  (per diode).



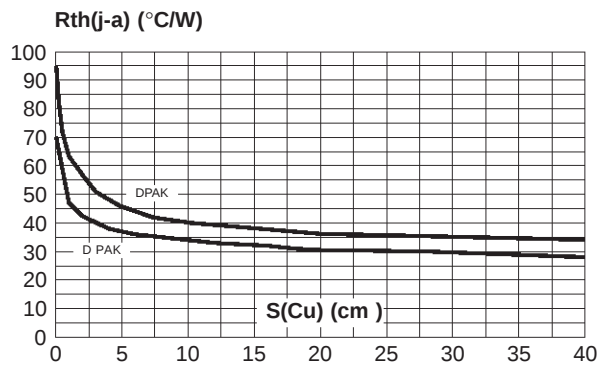
**Fig. 9:** Peak reverse recovery current versus  $dI_F/dt$  (per diode).



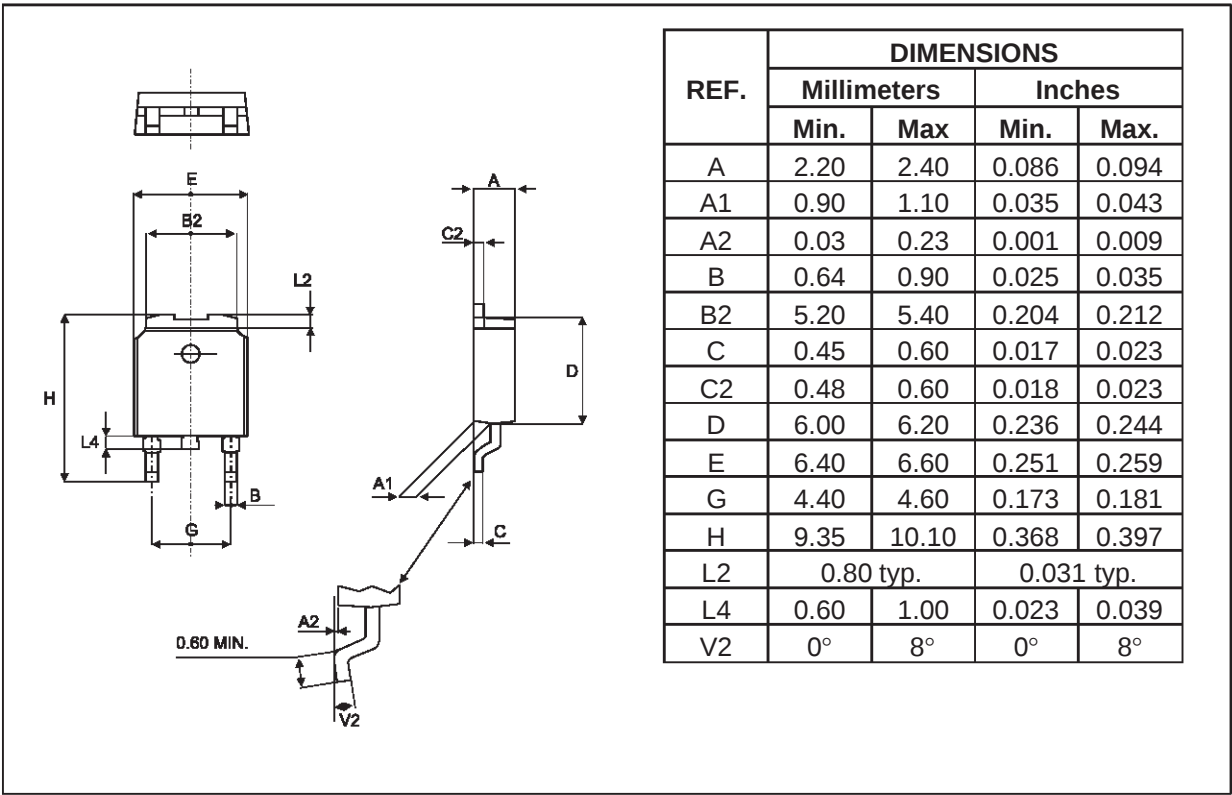
**Fig. 10:** Dynamic parameters versus junction temperature (per diode).



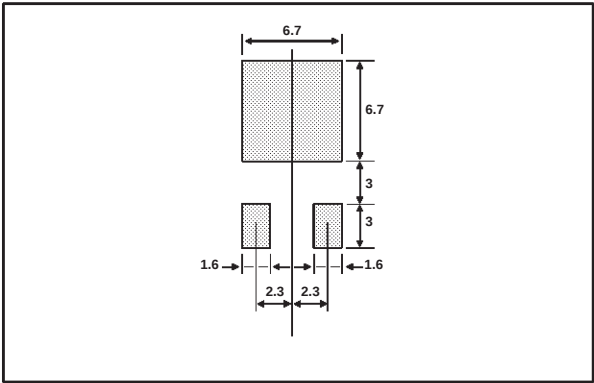
**Fig. 11:** Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35 $\mu m$ ).



PACKAGE MECHANICAL DATA  
DPAK

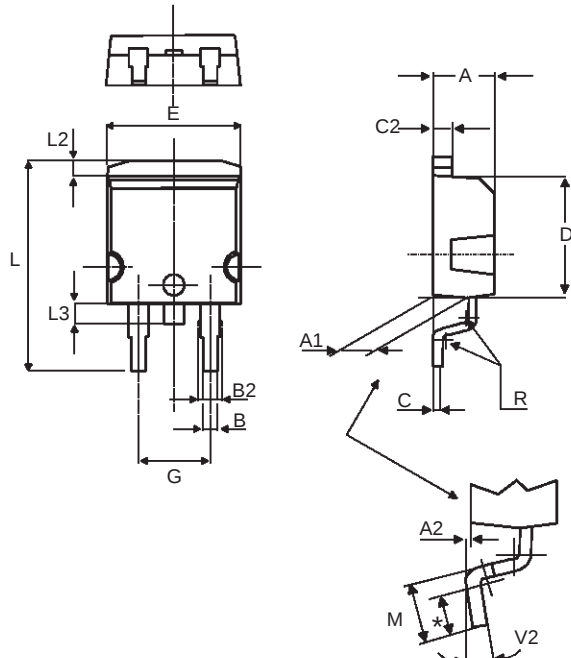


FOOT PRINT (in milliteters)  
DPAK



# PACKAGE MECHANICAL DATA

## D<sup>2</sup>PAK

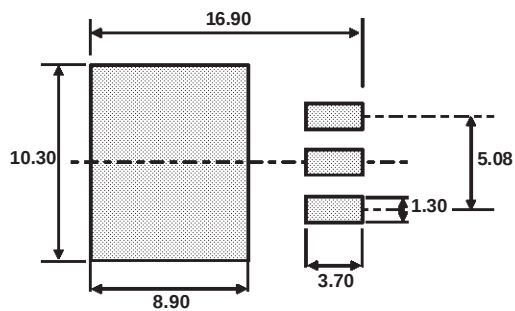


\* FLAT ZONE NO LESSTHAN 2mm

| REF. | DIMENSIONS  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 4.40        | 4.60  | 0.173      | 0.181 |
| A1   | 2.49        | 2.69  | 0.098      | 0.106 |
| A2   | 0.03        | 0.23  | 0.001      | 0.009 |
| B    | 0.70        | 0.93  | 0.027      | 0.037 |
| B2   | 1.14        | 1.70  | 0.045      | 0.067 |
| C    | 0.45        | 0.60  | 0.017      | 0.024 |
| C2   | 1.23        | 1.36  | 0.048      | 0.054 |
| D    | 8.95        | 9.35  | 0.352      | 0.368 |
| E    | 10.00       | 10.40 | 0.393      | 0.409 |
| G    | 4.88        | 5.28  | 0.192      | 0.208 |
| L    | 15.00       | 15.85 | 0.590      | 0.624 |
| L2   | 1.27        | 1.40  | 0.050      | 0.055 |
| L3   | 1.40        | 1.75  | 0.055      | 0.069 |
| M    | 2.40        | 3.20  | 0.094      | 0.126 |
| R    | 0.40 typ.   |       | 0.016 typ. |       |
| V2   | 0°          | 8°    | 0°         | 8°    |

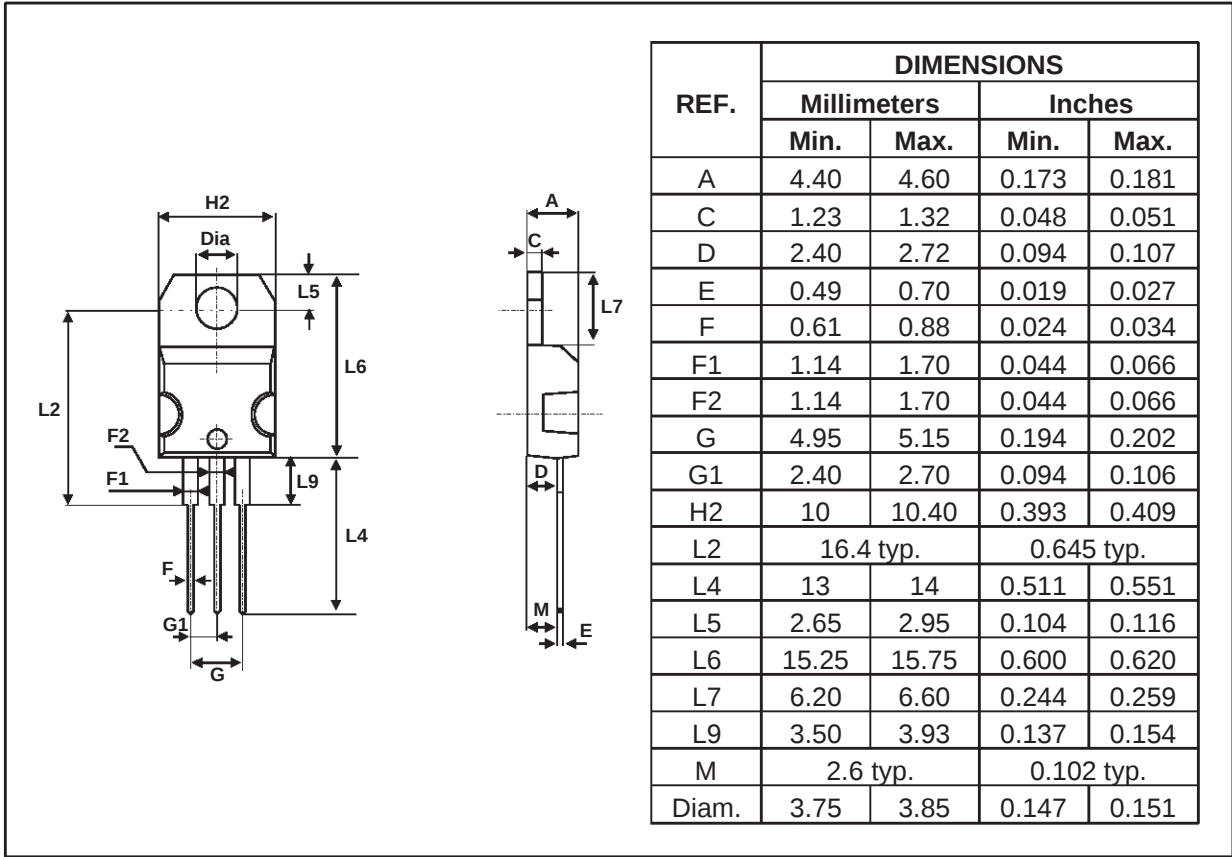
# FOOT PRINT (in milliteters)

## D<sup>2</sup>PAK



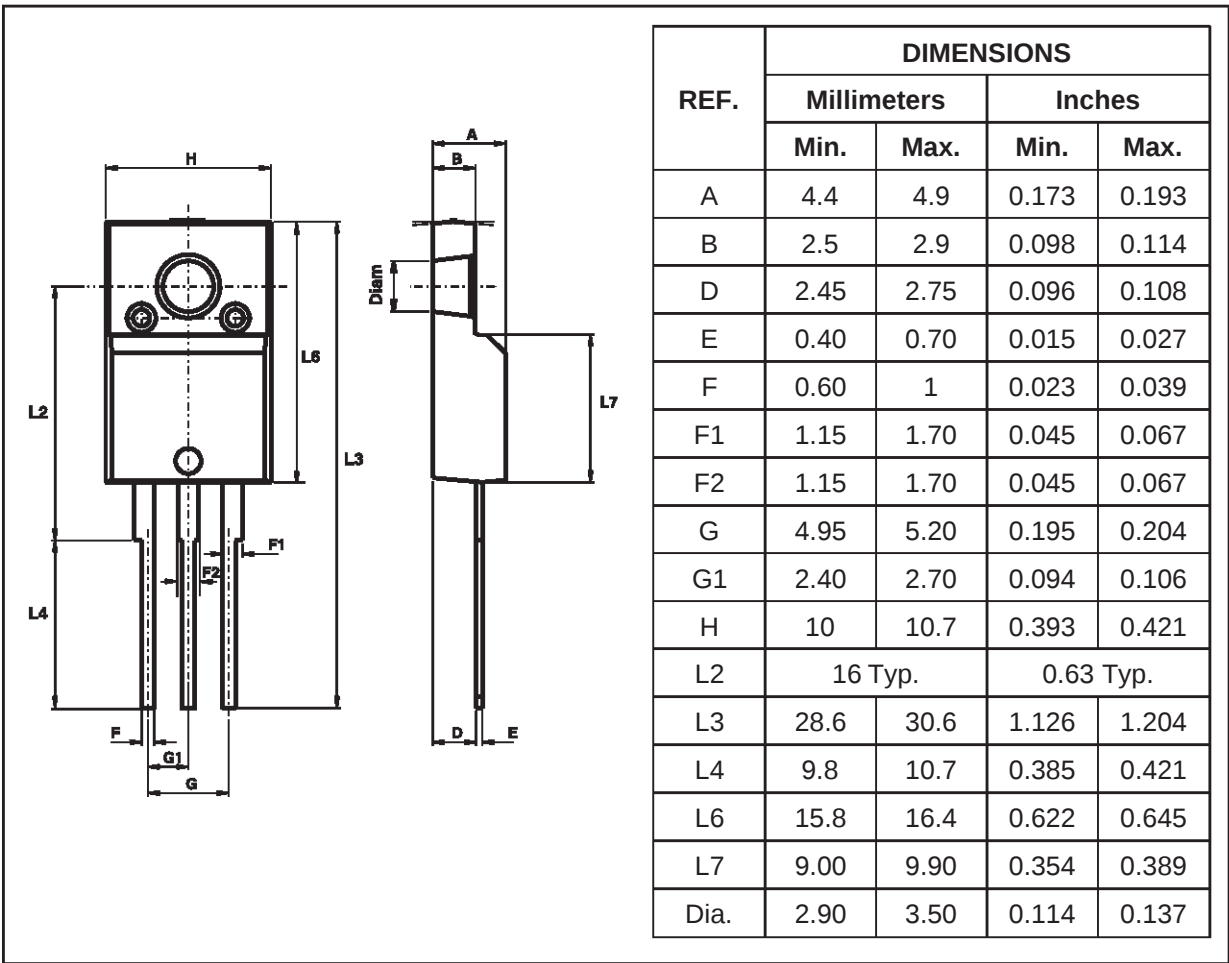
STPR1020CB/CG/CT/CF/CFP

PACKAGE MECHANICAL DATA  
TO-220AB (JEDEC compatible)



PACKAGE MECHANICAL DATA

TO-220FP



**PACKAGE MECHANICAL DATA**  
 ISOWATT220AB (JEDEC compatible)

| 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 |

| Ordering type | Marking     | Package            | Weight | Base qty | Delivery mode |
|---------------|-------------|--------------------|--------|----------|---------------|
| STPR1020CB    | STPR1020CB  | DPAK               | 0.3g   | 75       | Tube          |
| STPR1020CB-TR | STPR1020CB  | DPAK               | 0.3g   | 2500     | Tape & reel   |
| STPR1020CT    | STPR1020CT  | TO-220AB           | 2.23g  | 50       | Tube          |
| STPR1020CF    | STPR1020CF  | ISOWATT220AB       | 2.2g   | 50       | Tube          |
| STPR1020CG    | STPR1020CG  | D <sup>2</sup> PAK | 1.48g  | 50       | Tube          |
| STPR1020CFP   | STPR1020CFP | TO-220FP           | 2.0g   | 50       | Tube          |

- Cooling method : by conduction (C)
- Recommended torque value (ISOWATT220AB, TO-220FP): 0.55 N.m.
- Maximum torque value (ISOWATT220AB, TO-220FP): 0.70 N.m.
- Recommended torque value (TO-220AB): 0.8 N.m
- Maximum torque value (TO-220AB): 1.0 N.m.
- Epoxy meets UL94,V0

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