



BYW51/F/G/FP/R-200

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

MAIN PRODUCT CHARACTERISTICS

| | |
|----------------------|----------|
| I _{F(AV)} | 2 x 10 A |
| V _{RRM} | 200 V |
| T _j (max) | 150 °C |
| V _F (max) | 0.85 V |
| trr (max) | 25 ns |

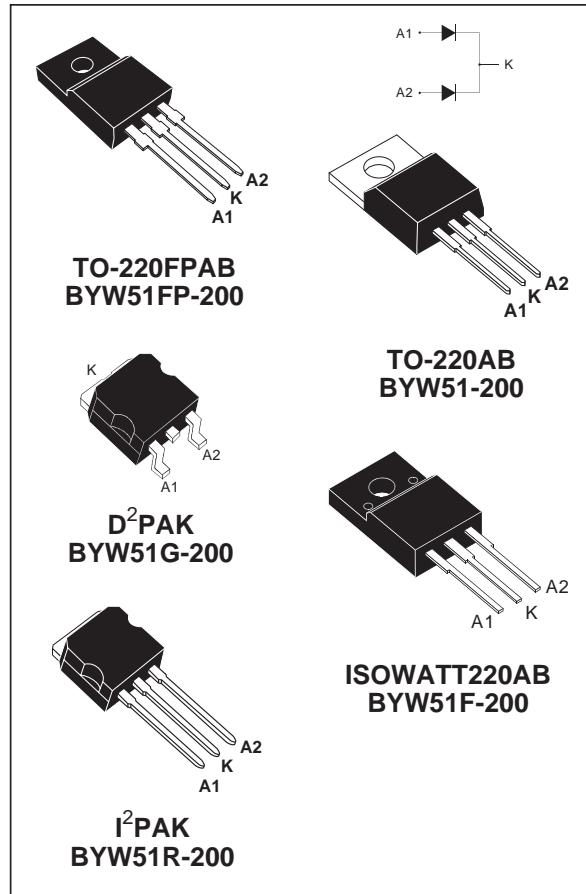
FEATURES AND BENEFITS

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- INSULATED PACKAGES (ISOWATT220AB / TO-220FP) :
Insulation voltage = 2000 V DC
Capacitance = 12 pF

DESCRIPTION

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

Packaged in TO-220AB, ISOWATT220AB, TO-220FP, D²PAK or 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 | | | 20 | A |
| I _{F(AV)} | Average forward current $\delta = 0.5$ | TO-220AB / D ² PAK | T _c =120°C | Per diode | 10 |
| | | | | Per device | 20 |
| | | I ² PAK | T _c =95°C | Per diode | 10 |
| | | | | Per device | 20 |
| | | ISOWATT220AB | T _c =85°C | Per diode | 10 |
| | | | | Per device | 20 |
| I _{FSM} | Surge non repetitive forward current | tp=10ms sinusoidal | | 100 | A |
| T _{stg} | Storage temperature range | | | - 65 to + 150 | °C |
| T _j | Maximum operating junction temperature | | | 150 | °C |

BYW51/F/G/FP/R-200

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 |
| | | | | Total | 1.4 |
| | | ISOWATT220AB | | Per diode | 5.1 |
| | | | | Total | 4.05 |
| | TO-220FPAB | TO-220FPAB | | Per diode | 5.7 |
| | | | | Total | 4.6 |
| $R_{th(c)}$ | Coupling | TO-220AB / D ² PAK / I ² PAK | | | 0.25 |
| | | ISOWATT220AB | | | 3.0 |
| | | TO-220FPAB | | | 3.5 |

When diodes 1 and 2 are used simultaneously :

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

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|----------|-------------------------|---------------------------|----------------------|------|------|------|---------------|
| I_R * | Reverse leakage current | $T_j = 25^\circ\text{C}$ | $V_R = V_{RRM}$ | | | 15 | μA |
| | | $T_j = 100^\circ\text{C}$ | | | | 1 | mA |
| V_F ** | Forward voltage drop | $T_j = 125^\circ\text{C}$ | $I_F = 8 \text{ A}$ | | | 0.85 | V |
| | | $T_j = 125^\circ\text{C}$ | $I_F = 16 \text{ A}$ | | | 1.05 | |
| | | $T_j = 25^\circ\text{C}$ | $I_F = 16 \text{ A}$ | | | 1.15 | |

Pulse test : * $t_p = 5 \text{ ms}, \delta < 2 \%$

** $t_p = 380 \mu\text{s}, \delta < 2 \%$

To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_F(AV) + 0.025 \times I_F^2(\text{RMS})$$

RECOVERY CHARACTERISTICS

| Symbol | Test Conditions | | | Typ. | Max. | Unit |
|-----------------|--------------------------|--|-------------------------------------|------|------|------|
| trr | $T_j = 25^\circ\text{C}$ | $I_F = 0.5\text{A}$ | $I_{rr} = 0.25\text{A}$ | | 25 | ns |
| | | $I_F = 1\text{A}$ $V_R = 30\text{V}$ | $dI_F/dt = -50\text{A}/\mu\text{s}$ | | 35 | |
| tfr | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{A}$ $V_{FR} = 1.1 \times V_F \text{ max}$ | $dI_F/dt = -50\text{A}/\mu\text{s}$ | 15 | | ns |
| V _{FP} | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{A}$ | $dI_F/dt = -50\text{A}/\mu\text{s}$ | 2 | | V |

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

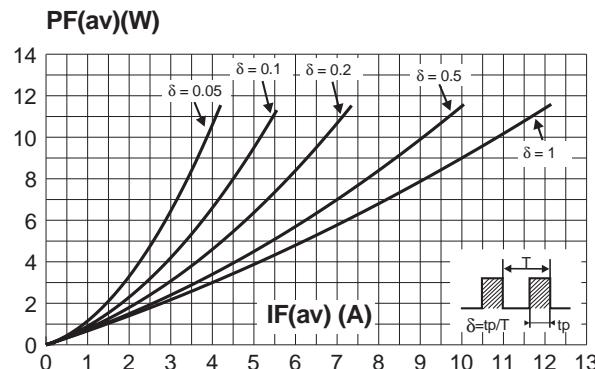


Fig. 3-1: Average forward current versus ambient temperature ($\delta = 0.5$, D²PAK, TO-220AB).

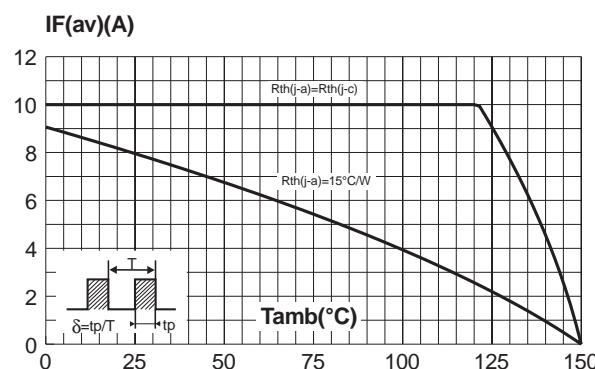


Fig. 4-1: Non repetitive surge peak forward current versus overload duration (D²PAK, TO-220AB)

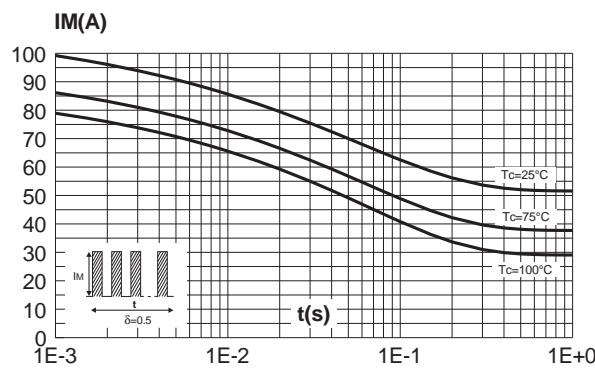


Fig. 2: Peak current versus form factor (per diode).

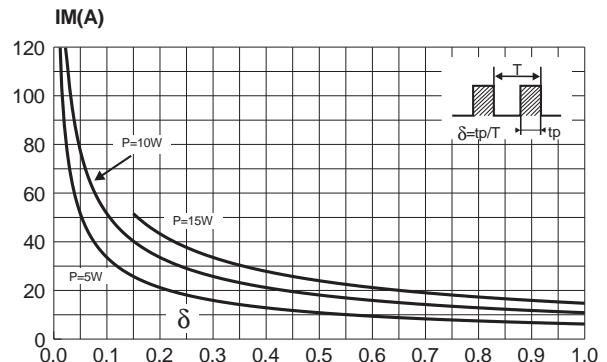


Fig. 3-2: Average forward current versus ambient temperature ($\delta = 0.5$, ISOWATT220AB, TO-220FPAB).

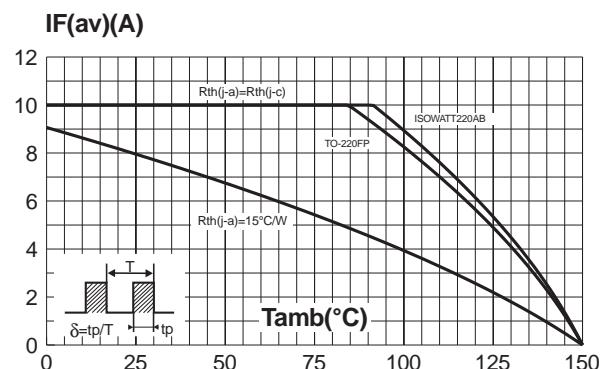
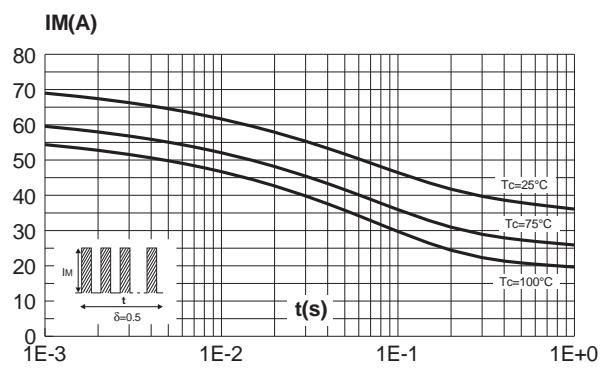


Fig. 4-2: Non repetitive surge peak forward current versus overload duration (ISOWATT220AB).



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

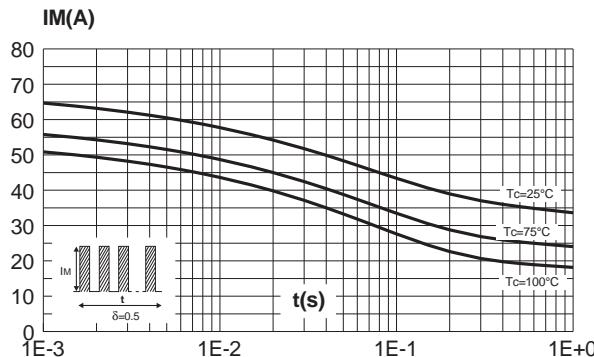


Fig. 5-2: Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB, TO-220FPAB).

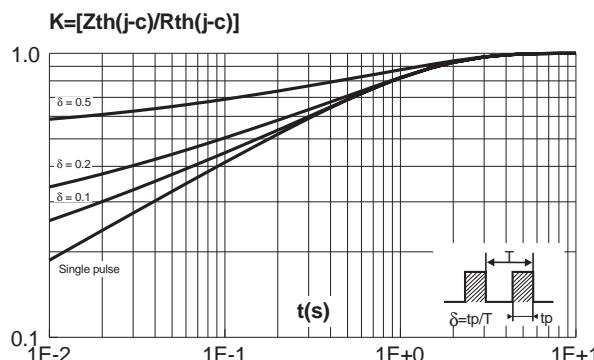


Fig. 7: Junction capacitance versus reverse voltage applied (typical values, per diode).

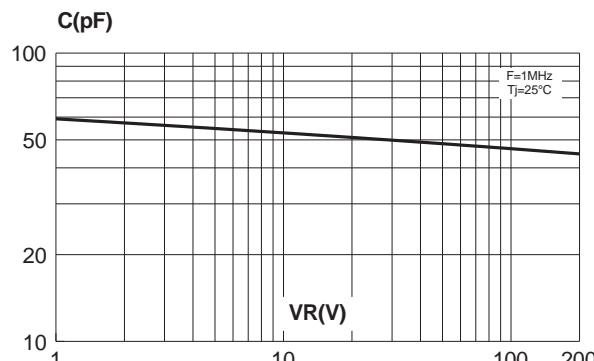


Fig. 5-1: Relative variation of thermal impedance junction to case versus pulse duration (D²PAK, TO-220AB).

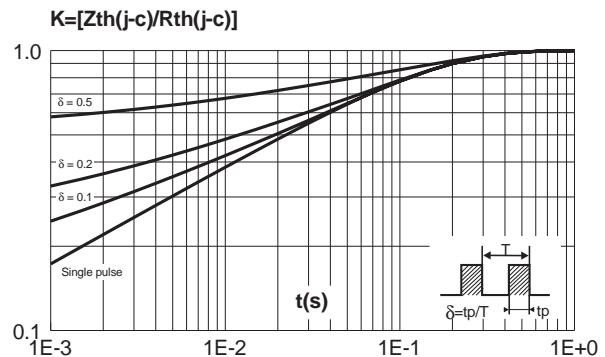


Fig. 6: Forward voltage drop versus forward current (maximum values, per diode).

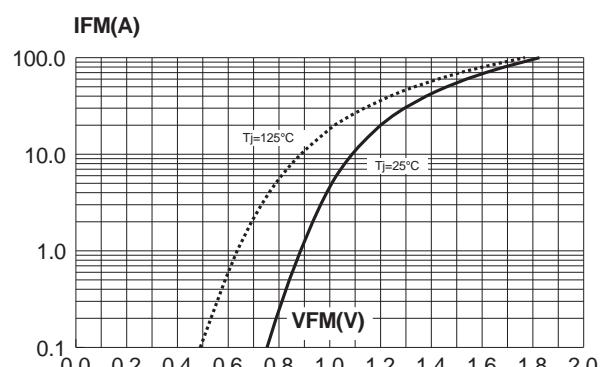


Fig. 8: Reverse recovery charges versus dI_F/dt (per diode).

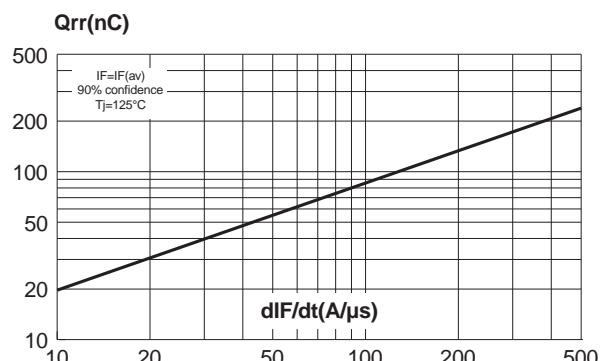


Fig. 9: Peak reverse recovery current versus dI_F/dt (per diode).

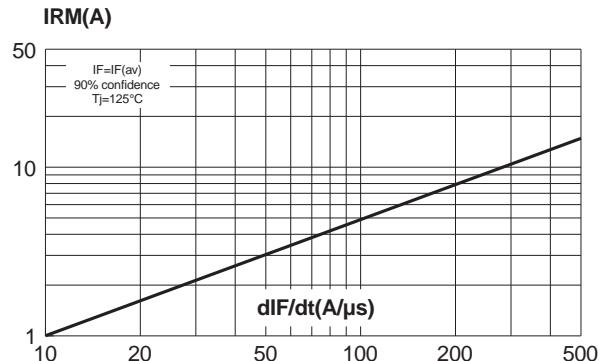


Fig. 10: Dynamic parameters versus junction temperature.

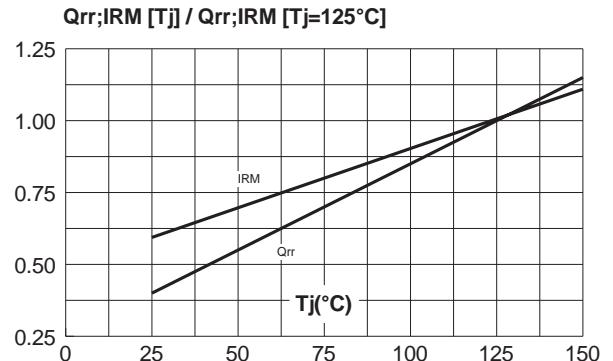
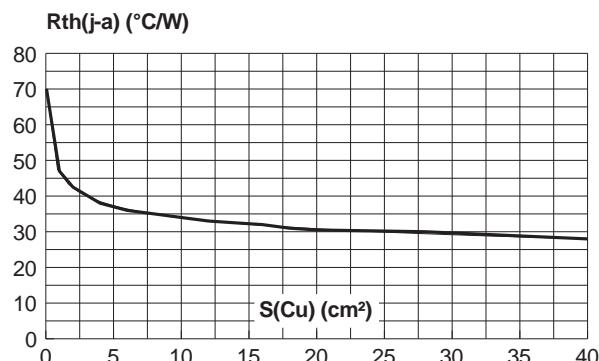
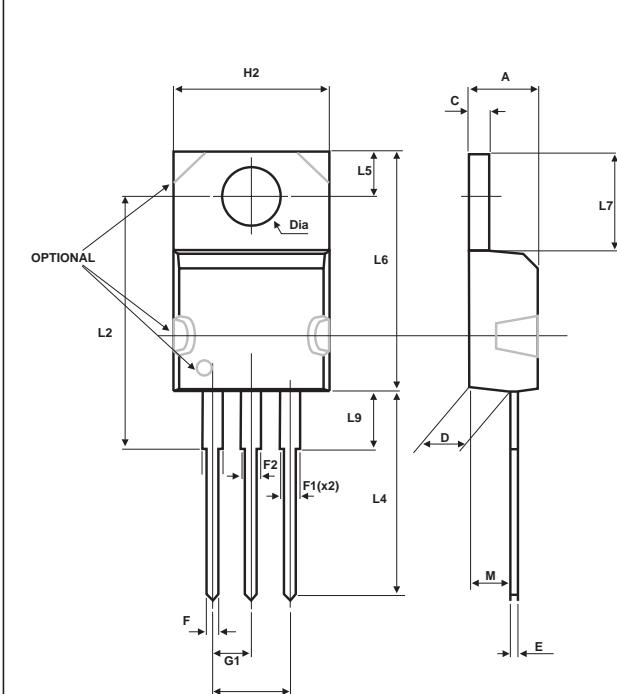


Fig. 11: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: $35\mu\text{m}$) (D^2PAK).

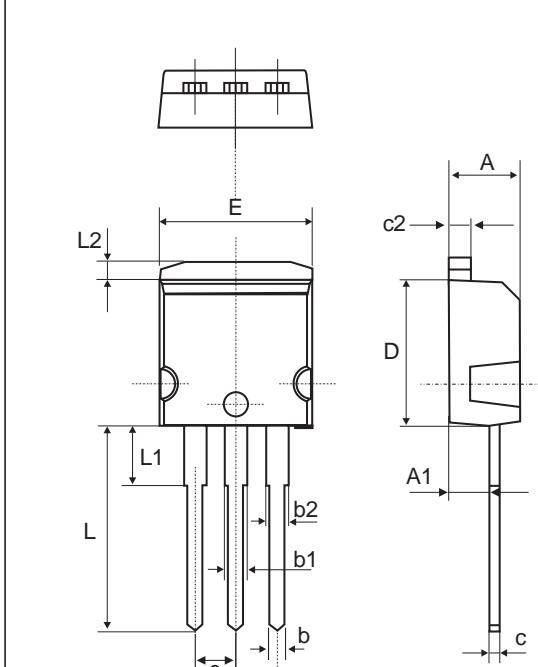


PACKAGE MECHANICAL DATA
TO-220AB (JEDEC compatible)



| REF. | DIMENSIONS | | | |
|------|-------------|-------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.30 | 4.60 | 0.169 | 0.181 |
| C | 1.22 | 1.32 | 0.048 | 0.052 |
| D | 2.40 | 2.72 | 0.094 | 0.107 |
| E | 0.33 | 0.70 | 0.013 | 0.028 |
| F | 0.61 | 0.93 | 0.024 | 0.037 |
| F1 | 1.14 | 1.70 | 0.045 | 0.067 |
| F2 | 1.14 | 1.70 | 0.045 | 0.067 |
| G | 4.95 | 5.15 | 0.195 | 0.202 |
| G1 | 2.40 | 2.70 | 0.094 | 0.106 |
| H2 | 10.00 | 10.40 | 0.394 | 0.409 |
| L2 | 16.00 | Typ. | 0.630 | Typ. |
| L4 | 13.00 | 14.00 | 0.512 | 0.551 |
| L5 | 2.65 | 2.95 | 0.104 | 0.116 |
| L6 | 14.80 | 15.75 | 0.583 | 0.620 |
| L7 | 6.20 | 6.60 | 0.244 | 0.260 |
| L9 | 3.40 | 3.94 | 0.134 | 0.155 |
| M | 2.60 | Typ. | 0.102 | Typ. |
| Dia. | 3.75 | 3.89 | 0.148 | 0.153 |

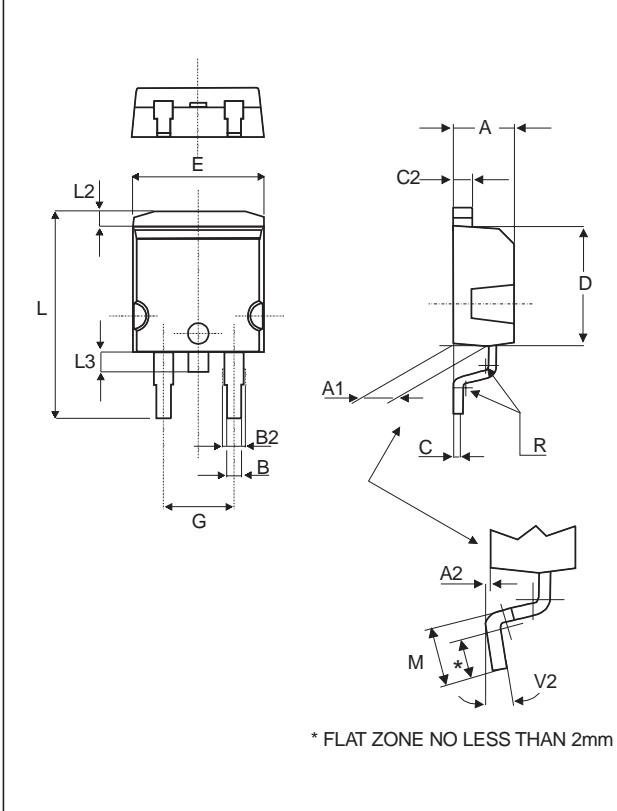
PACKAGE MECHANICAL DATA
I²PAK



| 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 |
| b | 0.70 | 0.93 | 0.028 | 0.037 |
| b1 | 1.14 | 1.17 | 0.044 | 0.046 |
| b2 | 1.14 | 1.17 | 0.044 | 0.046 |
| c | 0.45 | 0.60 | 0.018 | 0.024 |
| c2 | 1.23 | 1.36 | 0.048 | 0.054 |
| D | 8.95 | 9.35 | 0.352 | 0.368 |
| e | 2.40 | 2.70 | 0.094 | 0.106 |
| E | 10.0 | 10.4 | 0.394 | 0.409 |
| L | 13.1 | 13.6 | 0.516 | 0.535 |
| L1 | 3.48 | 3.78 | 0.137 | 0.149 |
| L2 | 1.27 | 1.40 | 0.050 | 0.055 |

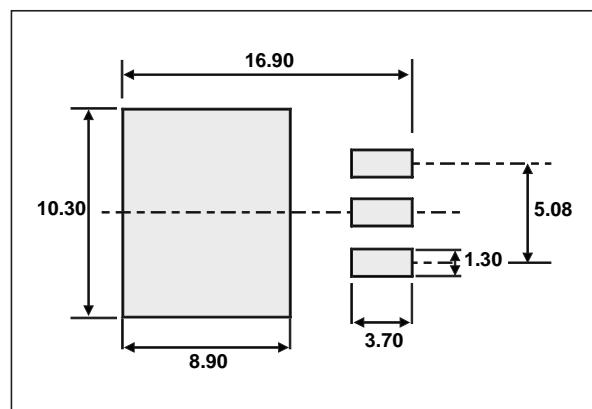
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PACKAGE MECHANICAL DATA D²PAK

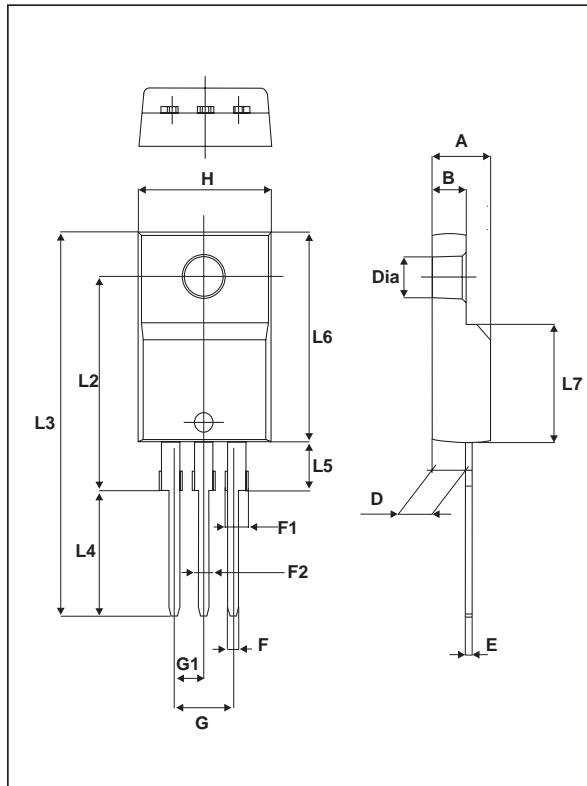


| REF. | DIMENSIONS | | | |
|------|-------------|-------|------------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.40 | 4.60 | 0.173 | 0.181 |
| A1 | 2.49 | 2.69 | 0.098 | 0.106 |
| A2 | 0.03 | 0.23 | 0.001 | 0.009 |
| B | 0.70 | 0.93 | 0.027 | 0.037 |
| B2 | 1.14 | 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 millimeters) D²PAK

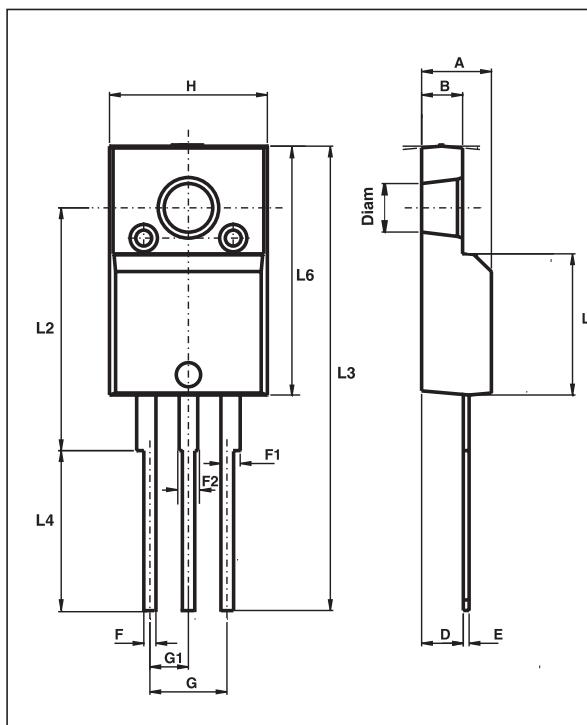


PACKAGE MECHANICAL DATA
TO-220FPAB



| REF. | DIMENSIONS | | | |
|------|-------------|------|-----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.4 | 4.6 | 0.173 | 0.181 |
| B | 2.5 | 2.7 | 0.098 | 0.106 |
| D | 2.5 | 2.75 | 0.098 | 0.108 |
| E | 0.45 | 0.70 | 0.018 | 0.027 |
| F | 0.75 | 1 | 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 | 2.4 | 2.7 | 0.094 | 0.106 |
| H | 10 | 10.4 | 0.393 | 0.409 |
| L2 | 16 Typ. | | 0.63 Typ. | |
| L3 | 28.6 | 30.6 | 1.126 | 1.205 |
| L4 | 9.8 | 10.6 | 0.386 | 0.417 |
| L5 | 2.9 | 3.6 | 0.114 | 0.142 |
| L6 | 15.9 | 16.4 | 0.626 | 0.646 |
| L7 | 9.00 | 9.30 | 0.354 | 0.366 |
| Dia. | 3.00 | 3.20 | 0.118 | 0.126 |

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 code | Marking | Package | Weight | Base qty | Delivery mode |
|----------------------|----------------|--------------------|---------------|-----------------|----------------------|
| BYW51-200 | BYW51-200 | TO220AB | 2.2 g. | 50 | Tube |
| BYW51F-200 | BYW51F-200 | ISOWATT220AB | 2.08 g. | 50 | Tube |
| BYW51G-200 | BYW51G-200 | D ² PAK | 1.48 g. | 50 | Tube |
| BYW51FP-200 | BYW51FP-200 | TO-220FPAB | 2g | 50 | Tube |
| BYW51R-200 | BYW51R-200 | I ² PAK | 1.49 g | 50 | Tube |

- Recommended torque value (TO-220AB): 0.8 N.m.
- Maximum torque value (TO-220AB): 1.0 N.m.
- Recommended torque value (ISOWATT220AB / TO-220FPAB): 0.55 N.m.
- Maximum torque value (ISOWATT220AB / TO-220FPAB): 0.70 N.m.
- Epoxy meets UL94,V0

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