# MBR40250G, MBR40250TG, MBRF40250TG, MBRB40250TG

# Switch-mode Schottky Power Rectifier 250 V, 40 A

ON Semiconductor®

www.onsemi.com

### Features

- 250 V Blocking Voltage
- Low Forward Voltage Drop, $V_F$ = 0.86 V
- Soft Recovery Characteristic, $T_{RR}$ < 35 ns
- Stable Switching Performance Over Temperature
- These Devices are Pb−Free and are RoHS Compliant

### Benefits

- Reduces or Eliminates Reverse Recovery Oscillations
- Minimizes Need for EMI Filtering
- Reduces Switching Losses
- Improved Efficiency

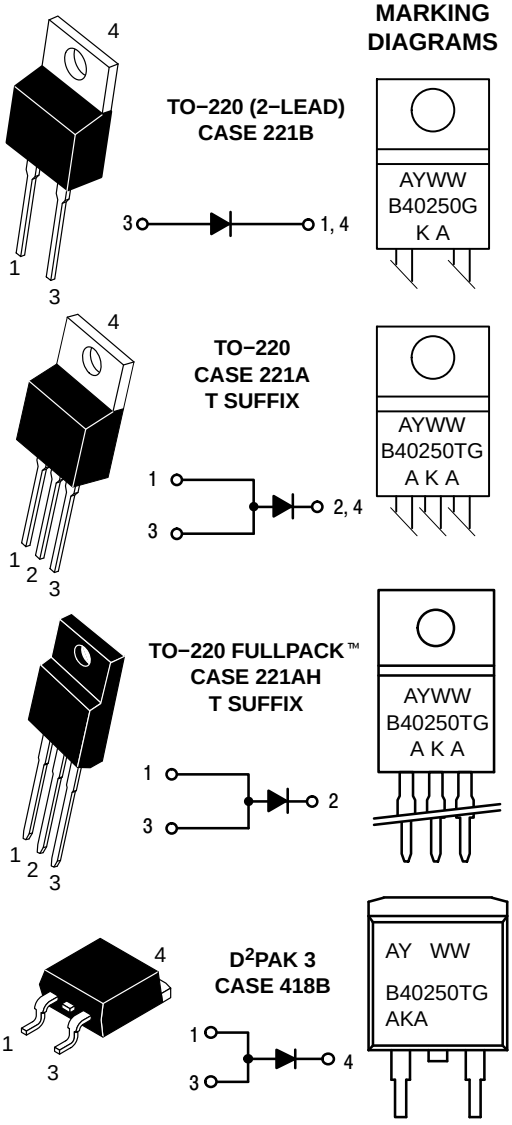
### Applications

- Power Supply
- Power Management
- Automotive
- Instrumentation

### Mechanical Characteristics

- Case: Epoxy, Molded
- Weight: 1.9 grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes:
  260°C Max. for 10 Seconds
- Epoxy Meets UL 94 V−0 at 0.125 in

### MARKING DIAGRAMS




B40250 = Device Code
T = 3 pins
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package
KA, AKA = Polarity Designator

### ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

## MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 250 | V |
| Average Rectified Forward Current<br>(Rated $V_R$) $T_C$ = 82°C MBR40250, MBR40250T, MBRB40250T<br>(Rated $V_R$) $T_C$ = 46°C MBRF40250T | $I_{F(AV)}$ | 40 | A |
| Peak Repetitive Forward Current<br>(Rated $V_R$, Square Wave, 20 kHz) $T_C$ = 82°C MBR40250, MBR40250T, MBRB40250T<br>(Rated $V_R$, Square Wave, 20 kHz) $T_C$ = 46°C MBRF40250T | $I_{FRM}$ | 80 | A |
| Nonrepetitive Peak Surge Current<br>(Surge applied at rated load conditions halfwave, single phase, 60 Hz) | $I_{FSM}$ | 150 | A |
| Storage Temperature | $T_{stg}$ | −65 to +175 | °C |
| Operating Junction Temperature | $T_J$ | −65 to +150 | °C |
| Voltage Rate of Change (Rated $V_R$) | dv/dt | 10,000 | V/μs |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Maximum Thermal Resistance | | | °C/W |
| Junction−to−Case | $R_{\theta JC}$ | | |
| MBR40250(T) and MBRB40250T | | 2.0 | |
| MBRF40250 | | 3.0 | |
| Junction−to−Ambient | $R_{\theta JA}$ | | |
| MBR40250(T) | | 60 | |
| MBRF40250 | | 50 | |
| MBRB40250T | | 50 | |

## ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Maximum Instantaneous Forward Voltage (Note 1) | $V_F$ | | V |
| $I_F$ = 20 A, $T_C$ = 25°C | | 0.86 | |
| $I_F$ = 20 A, $T_C$ = 125°C | | 0.71 | |
| $I_F$ = 40 A, $T_C$ = 25°C | | 0.97 | |
| $I_F$ = 40 A, $T_C$ = 125°C | | 0.86 | |
| Maximum Instantaneous Reverse Current (Note 1) | $I_R$ | | mA |
| Rated DC Voltage, $T_C$ = 25°C | | 0.25 | |
| Rated DC Voltage, $T_C$ = 125°C | | 30 | |
| Maximum Reverse Recovery Time | $t_{rr}$ | | ns |
| $I_F$ = 1.0 A, di/dt = 50 A/μs, $T_C$ = 25°C | | 35 | |

## DYNAMIC CHARACTERISTICS

| | | | |
|---|---|---|---|
| Capacitance | $C_T$ | | pF |
| $V_R$ = −5.0 V, $T_C$ = 25°C, Frequency = 1.0 MHz | | 500 | |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

## TYPICAL CHARACTERISTICS

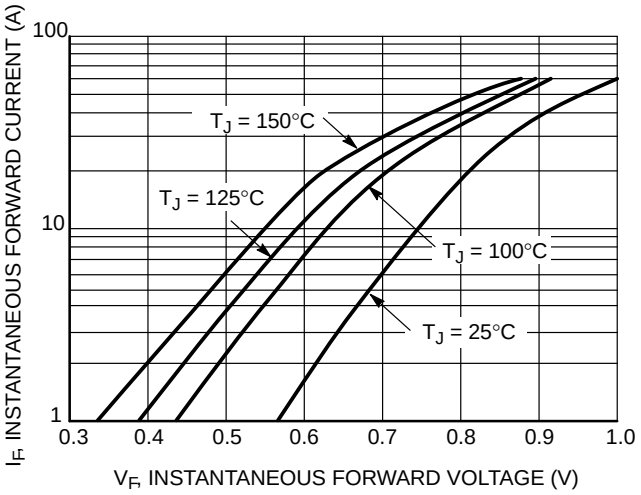



**Figure 1. Typical Forward Voltage**

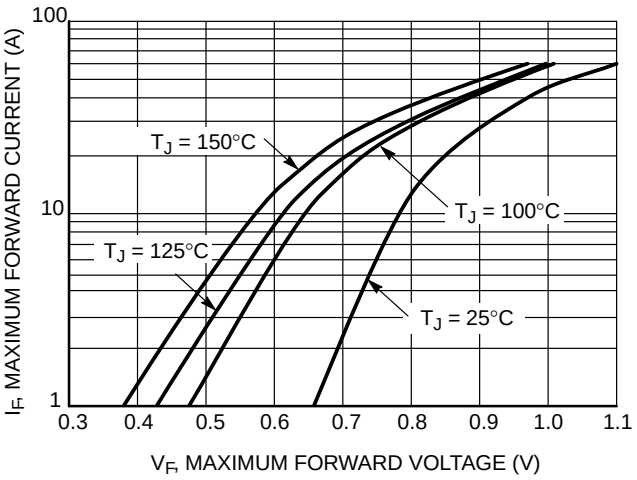



**Figure 2. Maximum Forward Voltage**

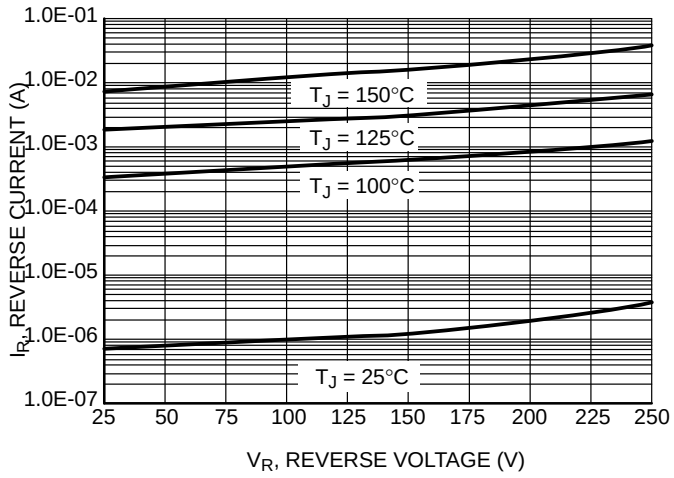



**Figure 3. Typical Reverse Current**

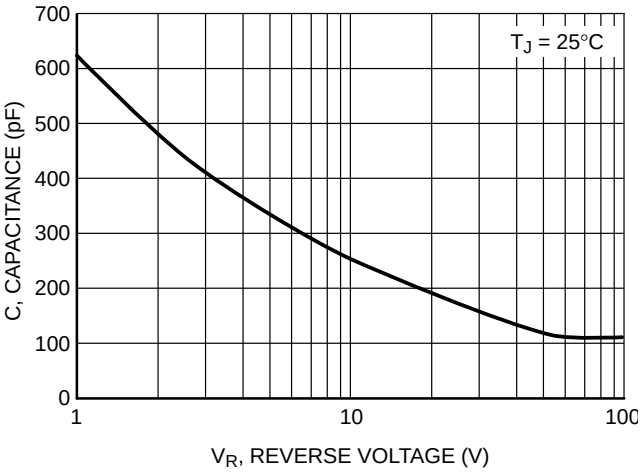



**Figure 4. Typical Capacitance**

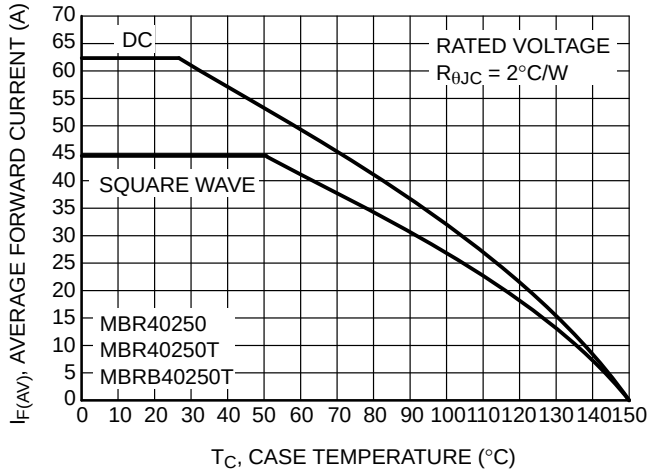



**Figure 5. Current Derating (Case) for MBR40250, MBR40250T and MBRB40250T**

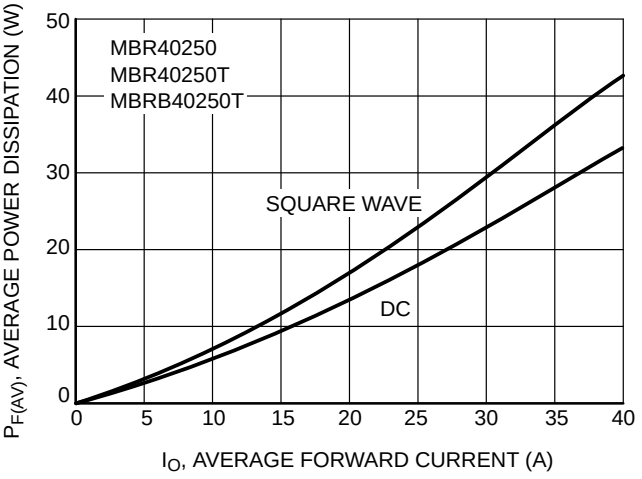



**Figure 6. Forward Power Dissipation for MBR40250, MBR40250T and MBRB40250T**

## TYPICAL CHARACTERISTICS

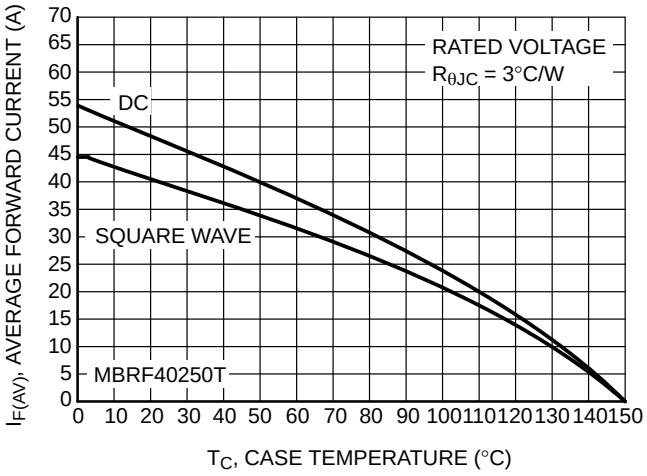



**Figure 7. Current Derating (Case) for MBRF40250T**

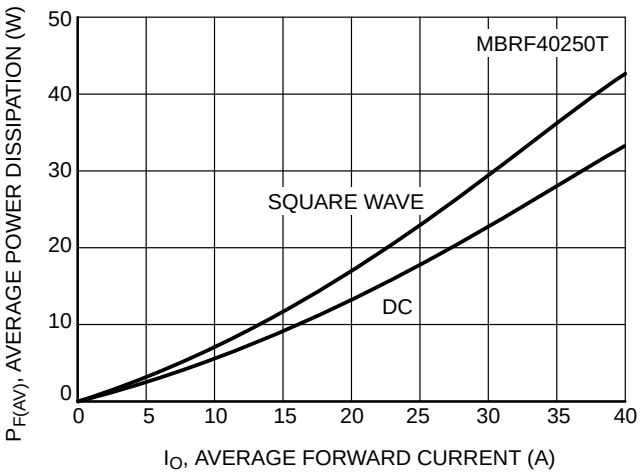



**Figure 8. Forward Power Dissipation for MBRF40250T**

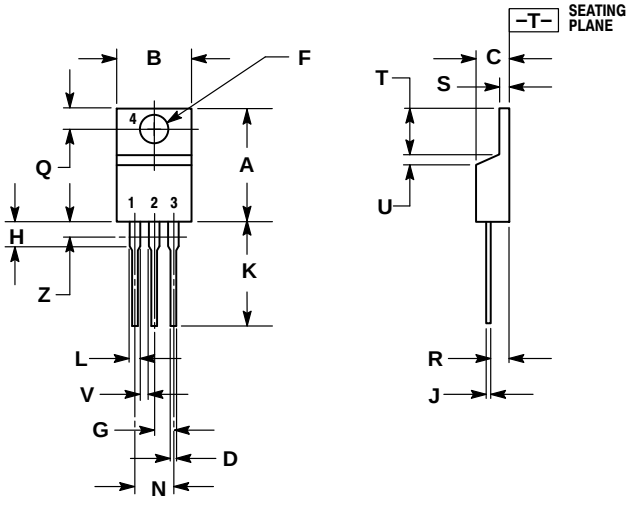
### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MBR40250G | TO−220 (2−LEAD) (Pb−Free) | 50 Units / Rail |
| MBR40250TG | TO−220 (Pb−Free) | 50 Units / Rail |
| MBRF40250TG | TO−220 FULLPACK (Pb−Free) | 50 Units / Rail |
| MBRB40250TG | $D^2$PAK 3 (Pb−Free) | 50 Units / Rail |
| MBRB40250TT4G | $D^2$PAK 3 (Pb−Free) | 800 Units / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## PACKAGE DIMENSIONS

**TO−220**
CASE 221A−09
ISSUE AH

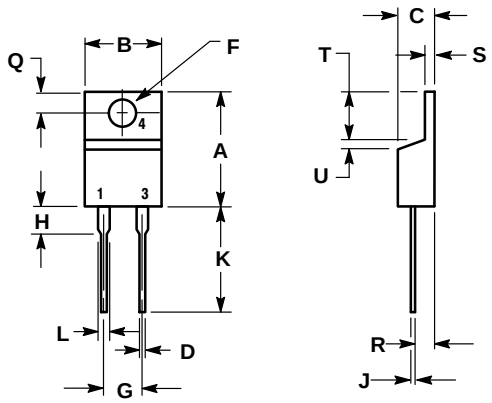



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.415 | 9.66 | 10.53 |
| C | 0.160 | 0.190 | 4.07 | 4.83 |
| D | 0.025 | 0.038 | 0.64 | 0.96 |
| F | 0.142 | 0.161 | 3.61 | 4.09 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.161 | 2.80 | 4.10 |
| J | 0.014 | 0.024 | 0.36 | 0.61 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.15 | 1.52 |
| N | 0.190 | 0.210 | 4.83 | 5.33 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.15 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.47 |
| U | 0.000 | 0.050 | 0.00 | 1.27 |
| V | 0.045 | --- | 1.15 | --- |
| Z | --- | 0.080 | --- | 2.04 |

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

**TO−220, 2−LEAD**
CASE 221B−04
ISSUE F



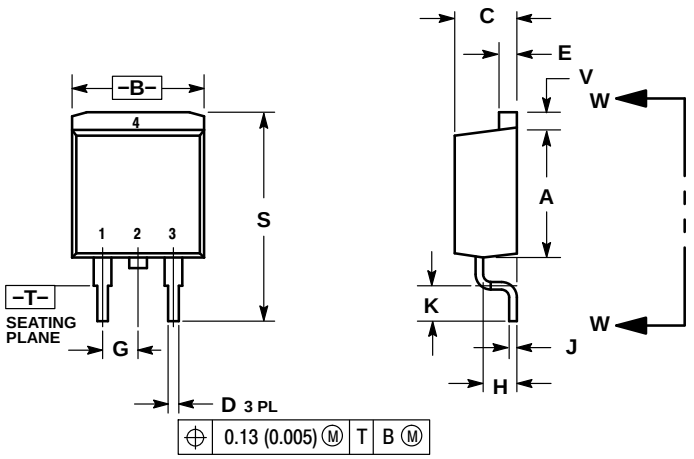

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.595 | 0.620 | 15.11 | 15.75 |
| B | 0.380 | 0.405 | 9.65 | 10.29 |
| C | 0.160 | 0.190 | 4.06 | 4.82 |
| D | 0.025 | 0.039 | 0.64 | 1.00 |
| F | 0.142 | 0.161 | 3.61 | 4.09 |
| G | 0.190 | 0.210 | 4.83 | 5.33 |
| H | 0.110 | 0.130 | 2.79 | 3.30 |
| J | 0.014 | 0.025 | 0.36 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| L | 0.045 | 0.060 | 1.14 | 1.52 |
| Q | 0.100 | 0.120 | 2.54 | 3.04 |
| R | 0.080 | 0.110 | 2.04 | 2.79 |
| S | 0.045 | 0.055 | 1.14 | 1.39 |
| T | 0.235 | 0.255 | 5.97 | 6.48 |
| U | 0.000 | 0.050 | 0.000 | 1.27 |

STYLE 1:
PIN 1. CATHODE
2. N/A
3. ANODE
4. CATHODE

## PACKAGE DIMENSIONS

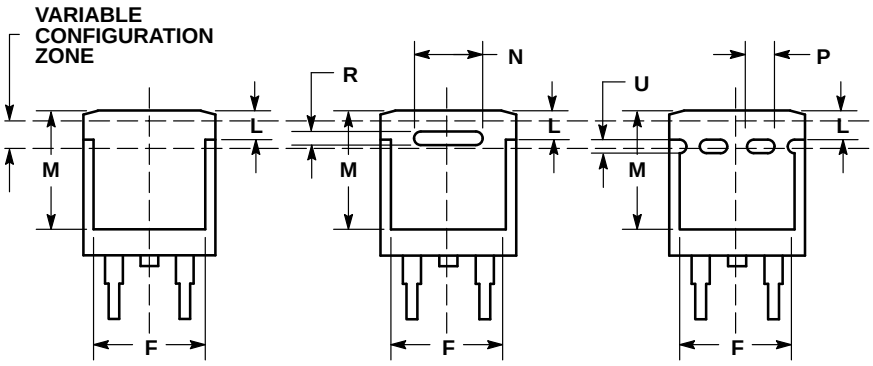
**D²PAK 3**
CASE 418B−04
ISSUE K




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B−01 THRU 418B−03 OBSOLETE, NEW STANDARD 418B−04.

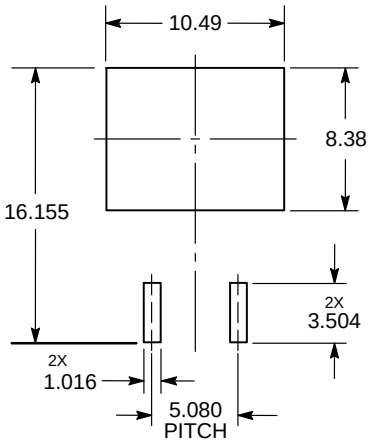
| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.340 | 0.380 | 8.64 | 9.65 |
| B | 0.380 | 0.405 | 9.65 | 10.29 |
| C | 0.160 | 0.190 | 4.06 | 4.83 |
| D | 0.020 | 0.035 | 0.51 | 0.89 |
| E | 0.045 | 0.055 | 1.14 | 1.40 |
| F | 0.310 | 0.350 | 7.87 | 8.89 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.080 | 0.110 | 2.03 | 2.79 |
| J | 0.018 | 0.025 | 0.46 | 0.64 |
| K | 0.090 | 0.110 | 2.29 | 2.79 |
| L | 0.052 | 0.072 | 1.32 | 1.83 |
| M | 0.280 | 0.320 | 7.11 | 8.13 |
| N | 0.197 REF | | 5.00 REF | |
| P | 0.079 REF | | 2.00 REF | |
| R | 0.039 REF | | 0.99 REF | |
| S | 0.575 | 0.625 | 14.60 | 15.88 |
| V | 0.045 | 0.055 | 1.14 | 1.40 |

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE




VIEW W−W 1 | VIEW W−W 2 | VIEW W−W 3

### SOLDERING FOOTPRINT*

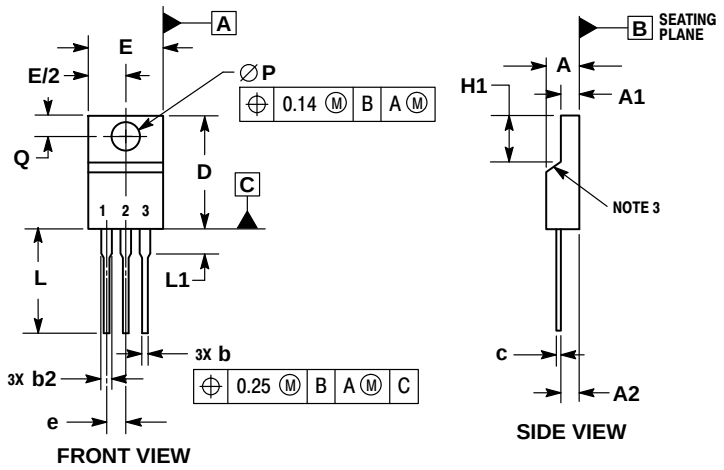



DIMENSIONS: MILLIMETERS

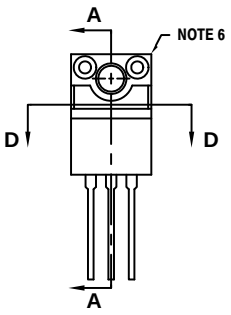
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

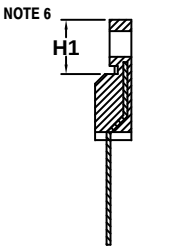
## PACKAGE DIMENSIONS

**TO−220 FULLPAK, 3−LEAD**
CASE 221AH
ISSUE F








NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR UNCONTROLLED IN THIS AREA.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH AND GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE TO BE MEASURED AT OUTERMOST EXTREME OF THE PLASTIC BODY.
5. DIMENSION b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 2.00.
6. CONTOURS AND FEATURES OF THE MOLDED PACKAGE BODY MAY VARY WITHIN THE ENVELOP DEFINED BY DIMENSIONS A1 AND H1 FOR MANUFACTURING PURPOSES.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 4.30 | 4.70 |
| A1 | 2.50 | 2.90 |
| A2 | 2.50 | 2.90 |
| b | 0.54 | 0.84 |
| b2 | 1.10 | 1.40 |
| c | 0.49 | 0.79 |
| D | 14.70 | 15.30 |
| E | 9.70 | 10.30 |
| e | 2.54 BSC | |
| H1 | 6.60 | 7.10 |
| L | 12.50 | 14.73 |
| L1 | --- | 2.80 |
| P | 3.00 | 3.40 |
| Q | 2.80 | 3.20 |

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE

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**PUBLICATION ORDERING INFORMATION**

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**MBR40250/D**