# NTST30U100CT, NTSB30U100CT-1, NTSJ30U100CTG, NTSB30U100CTG

## Very Low Forward Voltage Trench-based Schottky Rectifier

### Exceptionally Low $V_F$ = 0.42 V at $I_F$ = 5 A

**Features**

- Fine Lithography Trench−based Schottky Technology for Very Low Forward Voltage and Low Leakage
- Fast Switching with Exceptional Temperature Stability
- Low Power Loss and Lower Operating Temperature
- Higher Efficiency for Achieving Regulatory Compliance
- Low Thermal Resistance
- High Surge Capability
- Pb−Free and Halide−Free Packages are Available

**Typical Applications**

- Switching Power Supplies including Notebook / Netbook Adapters, ATX and Flat Panel Display
- High Frequency and DC−DC Converters
- Freewheeling and OR−ing diodes
- Reverse Battery Protection
- Instrumentation

**Mechanical Characteristics**

- Case: Epoxy, Molded
- Epoxy Meets Flammability Rating UL 94−0 @ 0.125 in
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Maximum for 10 sec

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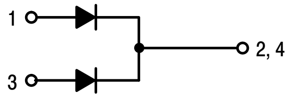
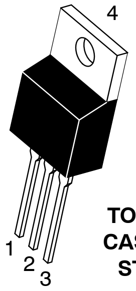
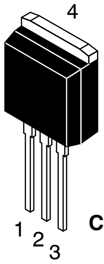
**VERY LOW FORWARD VOLTAGE, LOW LEAKAGE SCHOTTKY BARRIER RECTIFIERS 30 AMPERES, 100 VOLTS**

**PIN CONNECTIONS**

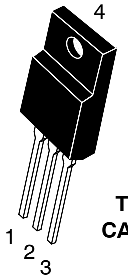




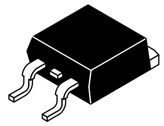
**TO−220AB**
**CASE 221A**
**STYLE 6**



**I2PAK**
**CASE 418D**
**STYLE 3**



**TO−220FP**
**CASE 221AH**



**D2PAK**
**CASE 418B**

**ORDERING INFORMATION**

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

July, 2012 − Rev. 5

## 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>$V_R$ | 100 | V |
| Average Rectified Forward Current<br>(Rated $V_R$, $T_C$ = 125°C) Per device<br>Per diode | $I_{F(AV)}$ | <br>30<br>15 | A |
| Peak Repetitive Forward Current<br>(Rated $V_R$, Square Wave, 20 kHz, $T_C$ = 120°C) Per device<br>Per diode | $I_{FRM}$ | <br>60<br>30 | A |
| Nonrepetitive Peak Surge Current<br>(Surge applied at rated load conditions halfwave, single phase, 60 Hz) | $I_{FSM}$ | 160 | A |
| Operating Junction Temperature | $T_J$ | −40 to +150 | °C |
| Storage Temperature | $T_{stg}$ | −40 to +150 | °C |
| Voltage Rate of Change (Rated $V_R$) | dv/dt | 10,000 | V/μs |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## THERMAL CHARACTERISTICS

| Rating | Symbol | NTST30U100CTG, NTSB30U100CT−1G | NTSB30U100CTG | NTSJ30U100CTG | Unit |
|---|---|---|---|---|---|
| Maximum Thermal Resistance per Diode<br>Junction−to−Case<br>Junction−to−Ambient | <br>$R_{\theta JC}$<br>$R_{\theta JA}$ | <br>2.5<br>70 | <br>0.93<br>46.5 | <br>3.81<br>105 | <br>°C/W<br>°C/W |

## ELECTRICAL CHARACTERISTICS (Per Leg unless otherwise noted)

| Rating | Symbol | Typ | Max | Unit |
|---|---|---|---|---|
| Maximum Instantaneous Forward Voltage (Note 1) | $v_F$ | | | V |
| ($I_F$ = 5 A, $T_J$ = 25°C) | | 0.47 | – | |
| ($I_F$ = 7.5 A, $T_J$ = 25°C) | | 0.52 | – | |
| ($I_F$ = 15 A, $T_J$ = 25°C) | | 0.66 | 0.80 | |
| ($I_F$ = 5 A, $T_J$ = 125°C) | | 0.42 | – | |
| ($I_F$ = 7.5 A, $T_J$ = 125°C) | | 0.48 | – | |
| ($I_F$ = 15 A, $T_J$ = 125°C) | | 0.60 | 0.65 | |
| Maximum Instantaneous Reverse Current (Note 1) | $I_R$ | | | |
| ($V_R$ = 70 V, $T_J$ = 25°C) | | 15 | | μA |
| ($V_R$ = 70 V, $T_J$ = 125°C) | | 12 | | mA |
| (Rated dc Voltage, $T_J$ = 25°C) | | 65 | 675 | μA |
| (Rated dc Voltage, $T_J$ = 125°C) | | 32 | 60 | mA |

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

## TYPICAL CHARACTERISITICS

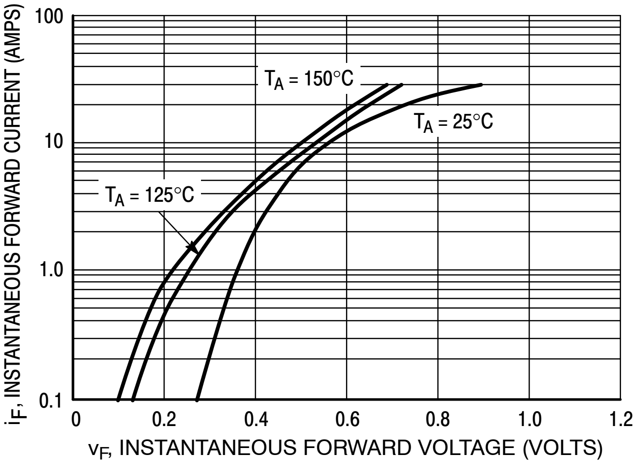


**Figure 1. Typical Forward Voltage**

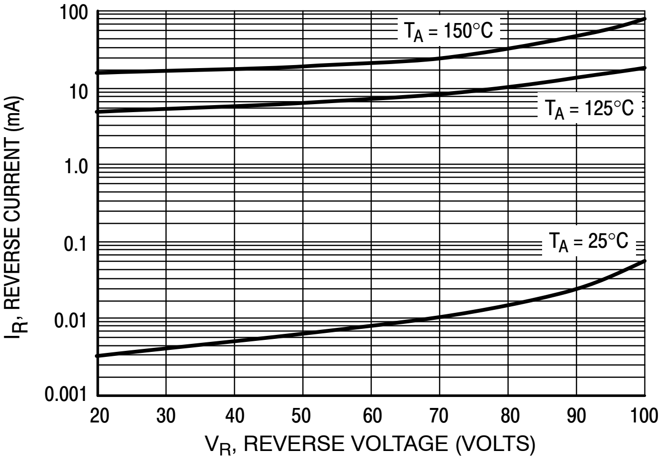


**Figure 2. Typical Reverse Current**

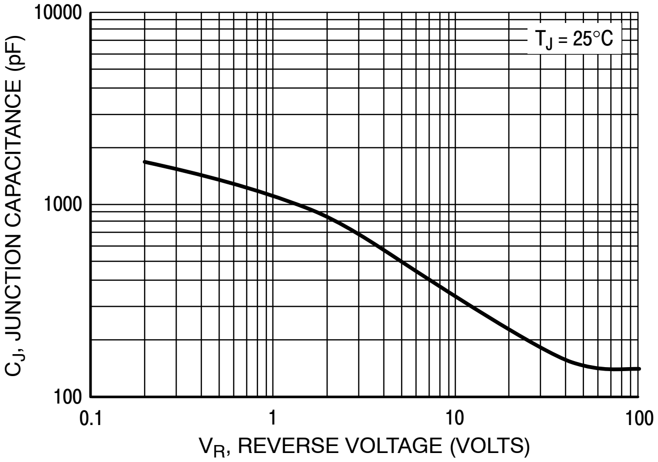


**Figure 3. Typical Junction Capacitance**

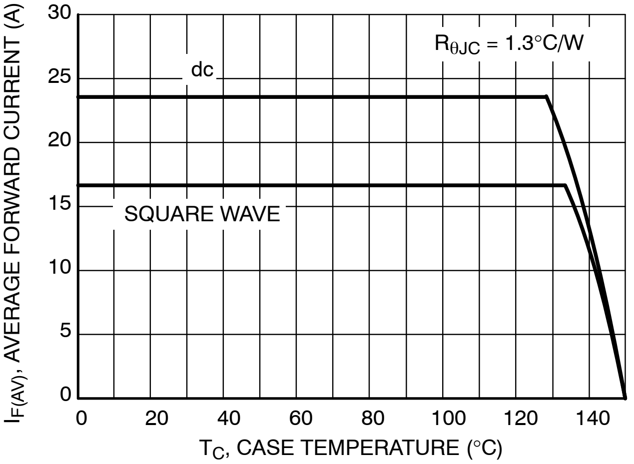


**Figure 4. Current Derating per Leg**

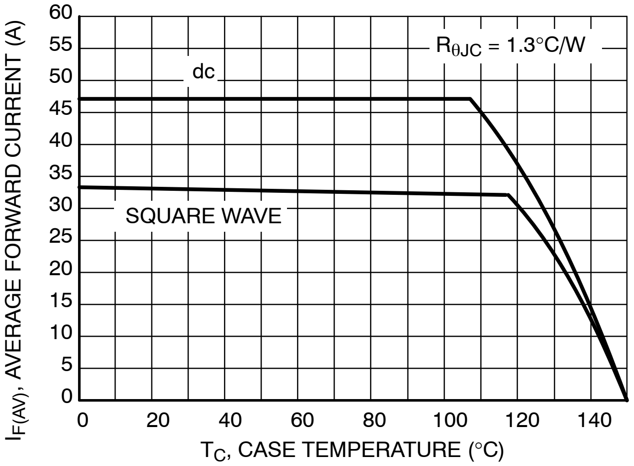


**Figure 5. Current Derating, Case**

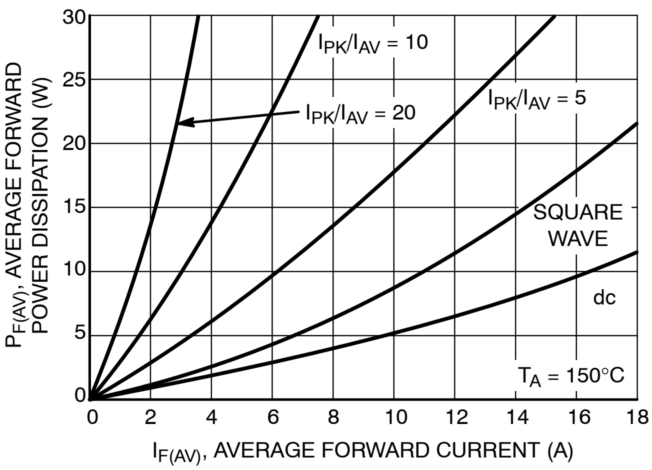


**Figure 6. Forward Power Dissipation**

## TYPICAL CHARACTERISITICS

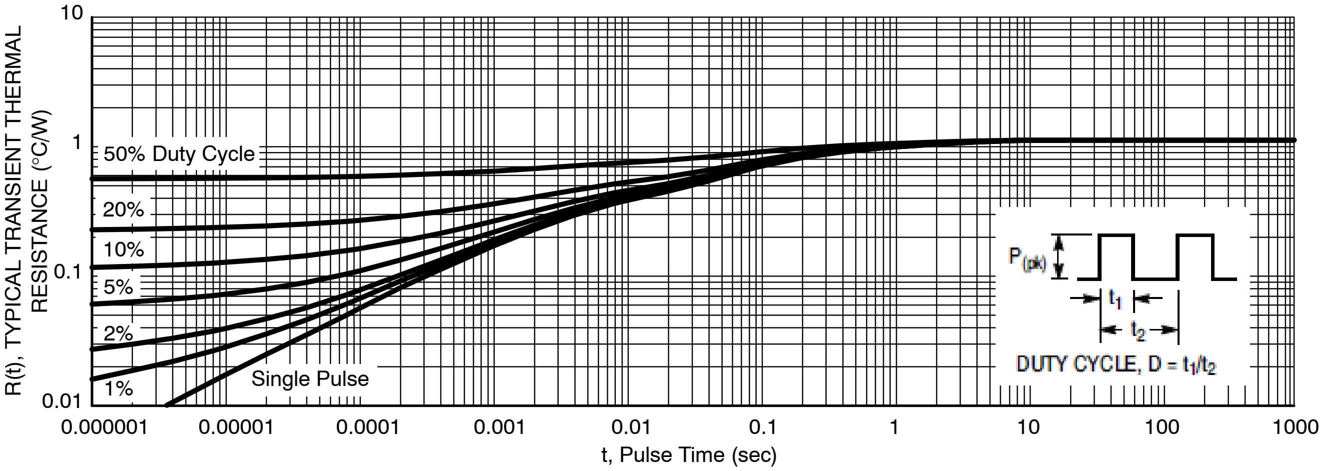


**Figure 7. Typical Transient Thermal Response, Junction−to−Case for NTST30U100CT and NTSB30U100CT−1G**

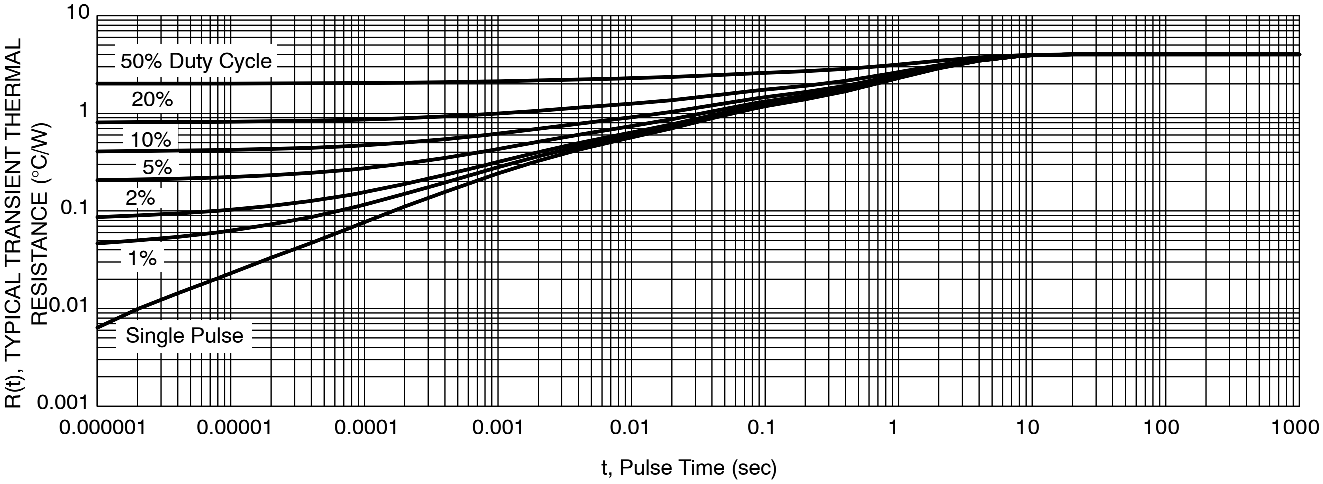


**Figure 8. Typical Transient Thermal Response, Junction−to−Case for NTSJ30U100CTG**

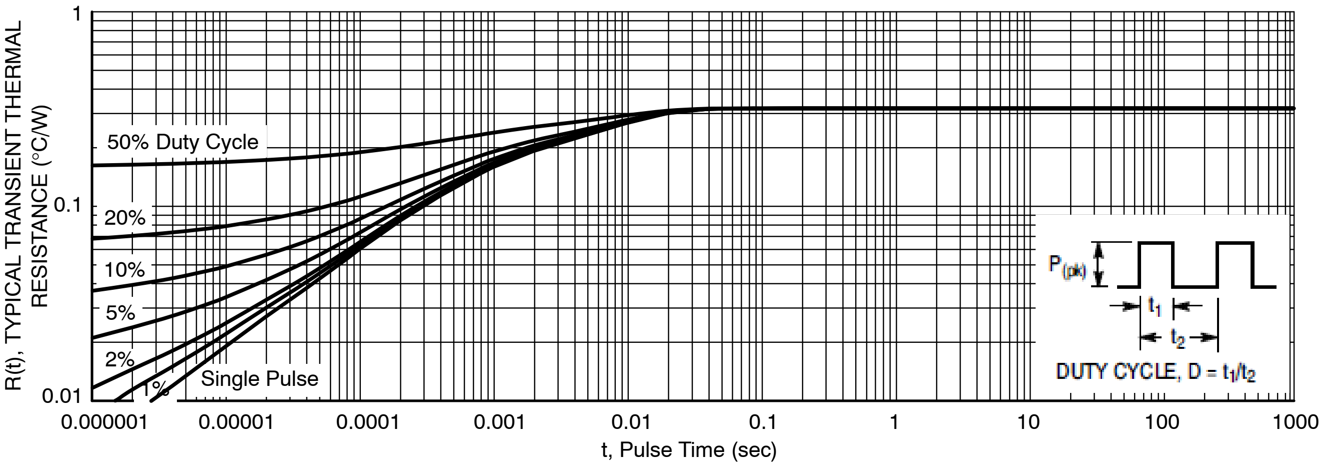
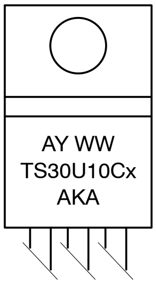


**Figure 9. Typical Transient Thermal Response, Junction−to−Case for NTSB30U100CTG**

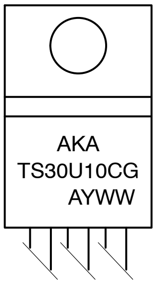
## ORDERING INFORMATION

| Device | Package | Shipping |
|---|---|---|
| NTST30U100CTG | TO−220AB<br>(Pb−Free) | 50 Units / Rail |
| NTSB30U100CT−1G | $I^2$PAK<br>(Pb−Free) | 50 Units / Rail |
| NTSJ30U100CTG | TO−220FP<br>(Halide−Free) | 50 Units / Rail |
| NTSB30U100CTG | $D^2$PAK<br>(Pb−Free) | 50 Units / Rail |
| NTSB30U100CTT4G | $D^2$PAK<br>(Pb−Free) | 800 / Tape & Reel |

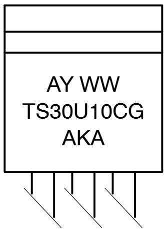
## MARKING DIAGRAMS



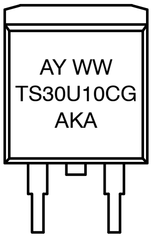
TO−220AB



TO−220FP



$I^2$PAK



$D^2$PAK

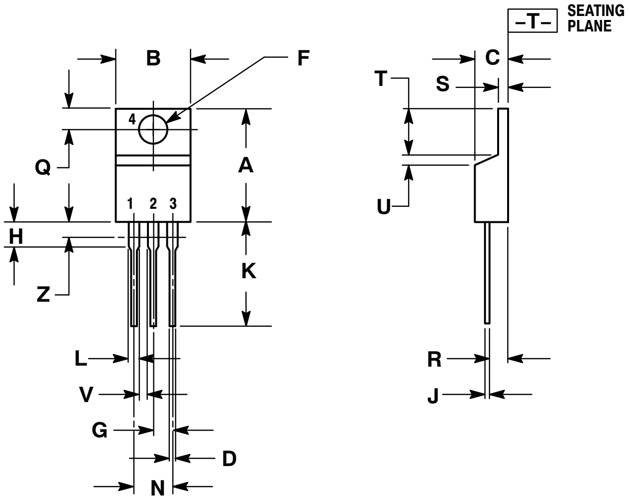
A = Assembly Location
Y = Year
WW = Work Week
AKA = Polarity Designator
x = G or H
G = Pb−Free Package
H = Halide−Free Package

## PACKAGE DIMENSIONS

### TO−220

CASE 221A−09

ISSUE AF



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.

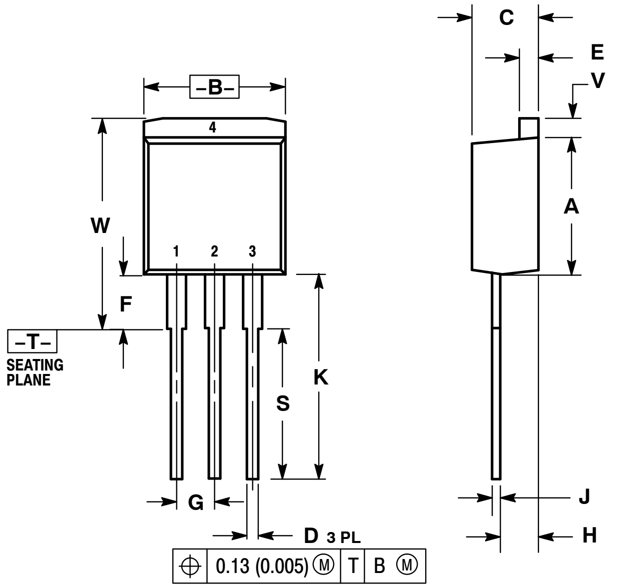
| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.570 | 0.620 | 14.48 | 15.75 |
| B | 0.380 | 0.405 | 9.66 | 10.28 |
| C | 0.160 | 0.190 | 4.07 | 4.82 |
| D | 0.025 | 0.035 | 0.64 | 0.88 |
| F | 0.142 | 0.161 | 3.61 | 4.09 |
| G | 0.095 | 0.105 | 2.42 | 2.66 |
| H | 0.110 | 0.155 | 2.80 | 3.93 |
| J | 0.014 | 0.025 | 0.36 | 0.64 |
| 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

### I²PAK (TO−262)

CASE 418D−01

ISSUE D



NOTES:

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

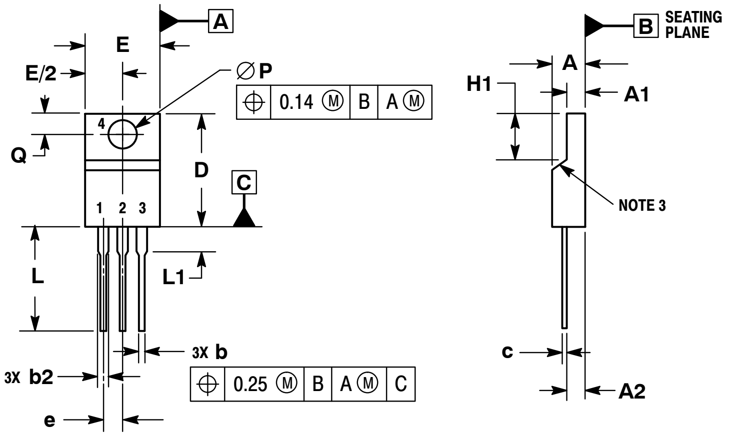
| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.335 | 0.380 | 8.51 | 9.65 |
| B | 0.380 | 0.406 | 9.65 | 10.31 |
| C | 0.160 | 0.185 | 4.06 | 4.70 |
| D | 0.026 | 0.035 | 0.66 | 0.89 |
| E | 0.045 | 0.055 | 1.14 | 1.40 |
| F | 0.122 REF | | 3.10 REF | |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.094 | 0.110 | 2.39 | 2.79 |
| J | 0.013 | 0.025 | 0.33 | 0.64 |
| K | 0.500 | 0.562 | 12.70 | 14.27 |
| S | 0.390 REF | | 9.90 REF | |
| V | 0.045 | 0.070 | 1.14 | 1.78 |
| W | 0.522 | 0.551 | 13.25 | 14.00 |

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

## PACKAGE DIMENSIONS

### TO−220 FULLPACK, 3−LEAD

CASE 221AH
ISSUE B

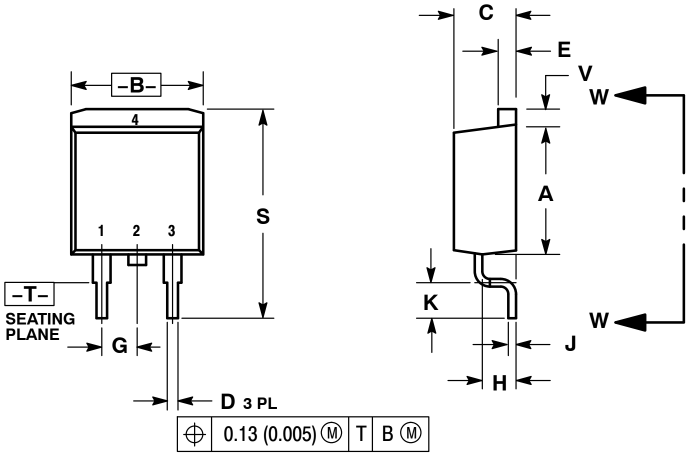


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR UNCONTROLLED IN THIS AREA.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH AND GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE TO BE MEASURED AT OUTERMOST EXTREME OF THE PLASTIC BODY.
5. DIMENSION b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 2.00.

| | MILLIMETERS | |
|---|---|---|
| DIM | MIN | MAX |
| A | 4.30 | 4.70 |
| A1 | 2.50 | 2.90 |
| A2 | 2.50 | 2.70 |
| 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 | 6.70 | 7.10 |
| L | 12.70 | 14.73 |
| L1 | --- | 2.80 |
| P | 3.00 | 3.40 |
| Q | 2.80 | 3.20 |

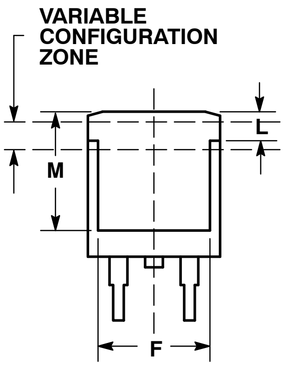
## PACKAGE DIMENSIONS

### D$^2$PAK 3
CASE 418B−04
ISSUE K

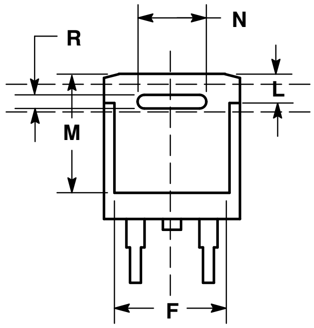


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B−01 THRU 418B−03 OBSOLETE, NEW STANDARD 418B−04.

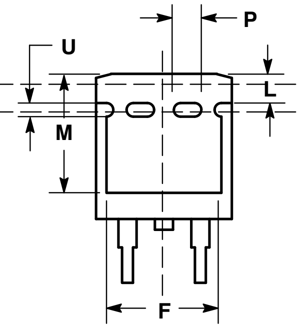
| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.340 | 0.380 | 8.64 | 9.65 |
| B | 0.380 | 0.405 | 9.65 | 10.29 |
| C | 0.160 | 0.190 | 4.06 | 4.83 |
| D | 0.020 | 0.035 | 0.51 | 0.89 |
| E | 0.045 | 0.055 | 1.14 | 1.40 |
| F | 0.310 | 0.350 | 7.87 | 8.89 |
| 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 |



VIEW W−W
1



VIEW W−W
2



VIEW W−W
3

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