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Very Low Forward Voltage Trench-based Schottky Rectifier

Exceptionally Low $V_F = 0.53\text{ V}$ at $I_F = 5\text{ A}$

NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

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
- NRV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and Halogen Free/BFR Free

Typical Applications

- Switching Power Supplies including Telecom AC to DC Power Stages, LED Lighting and ATX
- High Voltage DC-DC Converters
- Freewheeling and OR-ing Diodes
- Output Rectifier in Welding Power Supplies
- Industrial Automation

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 s

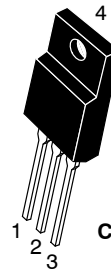
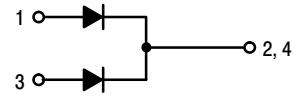


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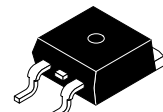
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**VERY LOW FORWARD
VOLTAGE, LOW LEAKAGE
SCHOTTKY BARRIER
RECTIFIERS 40 AMPERES,
200 VOLTS**

PIN CONNECTIONS



TO-220FP
CASE 221AH



D²PAK-3
CASE 418B

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

This document contains information on some products that are still under development. ON Semiconductor reserves the right to change or discontinue these products without notice.

NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---------------------------------|--------------------------|------------------|
| Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage | V_{RRM} V_{RWM} V_R | 200 | V |
| Average Rectified Forward Current (Rated V_R , $T_C = 125^\circ\text{C}$) NTSB40200CT, NRVTSB40200CT Per device (Rated V_R , $T_C = 130^\circ\text{C}$) NTSB40200CT, NRVTSB40200CT Per diode (Rated V_R , $T_C = 65^\circ\text{C}$) NTSJ40200CT Per device (Rated V_R , $T_C = 42^\circ\text{C}$) NTSJ40200CT Per diode | $I_{F(AV)}$ | 40 20 20 20 | A |
| Peak Repetitive Forward Current (Rated V_R , Square Wave, 20 kHz, $T_C = 115^\circ\text{C}$) NTSB40200CT, NRVTSB40200CT Per device (Rated V_R , Square Wave, 20 kHz, $T_C = 125^\circ\text{C}$) NTSB40200CT, NRVTSB40200CT Per diode (Rated V_R , Square Wave, 20 kHz, $T_C = 40^\circ\text{C}$) NTSJ40200CT Per device (Rated V_R , Square Wave, 20 kHz, $T_C = 25^\circ\text{C}$) NTSJ40200CT Per diode | I_{FRM} | 80 40 40 40 | A |
| Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz) | I_{FSM} | 250 | A |
| Operating Junction Temperature | T_J | -55 to +150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |
| ESD Rating (Human Body Model) | | 3A | |
| ESD Rating (Machine Model) | | M4 | |

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

| Rating | Symbol | NTSB40200CT NRVTSB40200CT | NTSJ40200CT | Unit |
|---|--|------------------------------|-------------------------|---------------------------|
| Typical Thermal Resistance Junction-to-Case Per Diode Junction-to-Case Per Device Junction-to-Ambient Per Device | $R_{\theta JC}$ $R_{\theta JA}$ | 1.29 0.79 40 | 6.94 6.05 105 | $^\circ\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS

| Rating | Symbol | Typ | Max | Unit |
|--|--------|--|--|--|
| Instantaneous Forward Voltage (Note 1) ($I_F = 5\text{ A}$, $T_J = 25^\circ\text{C}$) ($I_F = 10\text{ A}$, $T_J = 25^\circ\text{C}$) ($I_F = 15\text{ A}$, $T_J = 25^\circ\text{C}$) ($I_F = 20\text{ A}$, $T_J = 25^\circ\text{C}$) ($I_F = 5\text{ A}$, $T_J = 125^\circ\text{C}$) ($I_F = 10\text{ A}$, $T_J = 125^\circ\text{C}$) ($I_F = 15\text{ A}$, $T_J = 125^\circ\text{C}$) ($I_F = 20\text{ A}$, $T_J = 125^\circ\text{C}$) | V_F | 0.68 0.74 0.79 0.84 0.53 0.60 0.64 0.68 | - - - 1.45 - - - 0.80 | V |
| Instantaneous Reverse Current (Note 1) ($V_R = 180\text{ V}$, $T_J = 25^\circ\text{C}$) (Rated dc Voltage, $T_J = 25^\circ\text{C}$) ($V_R = 180\text{ V}$, $T_J = 125^\circ\text{C}$) (Rated dc Voltage, $T_J = 125^\circ\text{C}$) | I_R | 3 5 5.3 7 | - 100 - 30 | μA μA mA mA |

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 $\leq 2.0\%$

TYPICAL CHARACTERISTICS

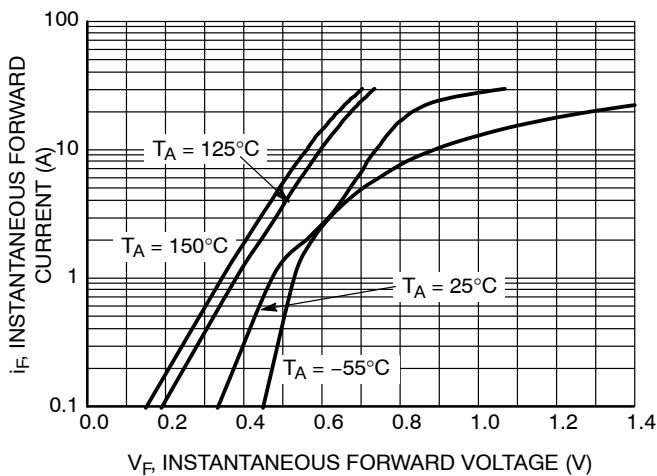


Figure 1. Typical Instantaneous Forward Characteristics

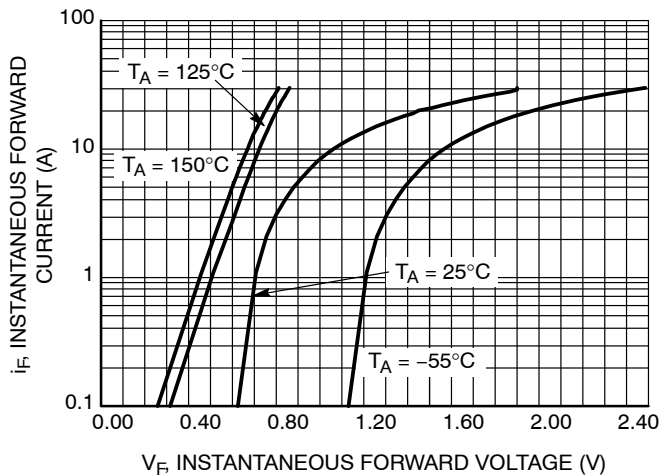


Figure 2. Maximum Instantaneous Forward Characteristics

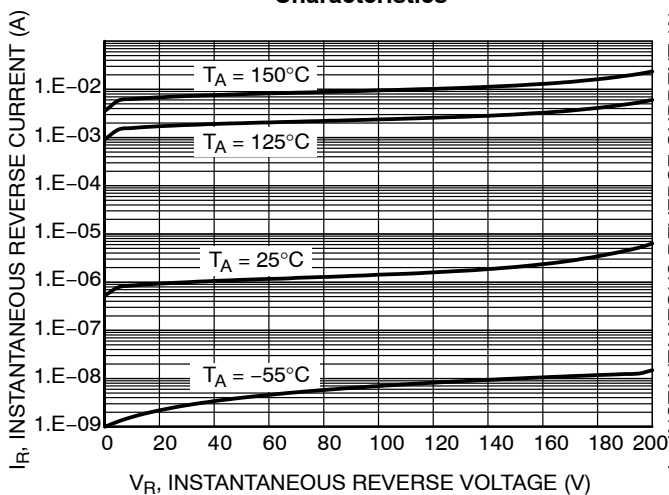


Figure 3. Typical Reverse Characteristics

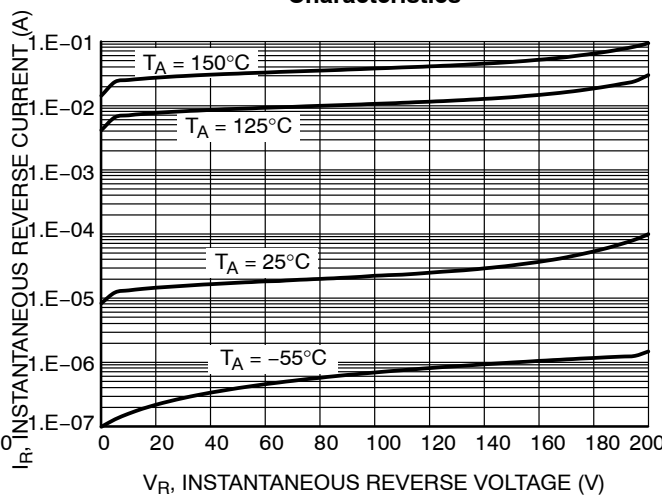


Figure 4. Maximum Reverse Characteristics

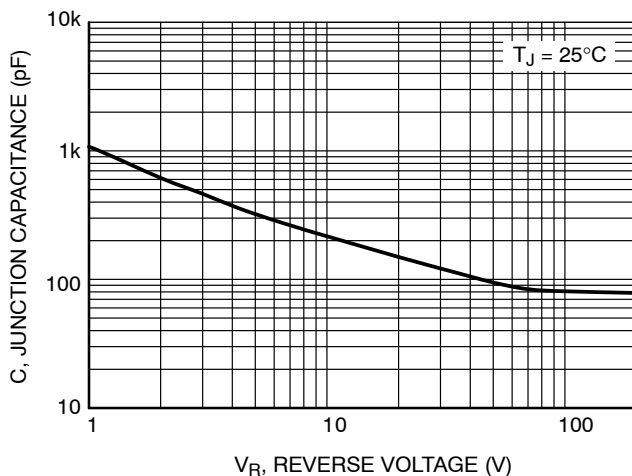


Figure 5. Typical Junction Capacitance

TYPICAL CHARACTERISTICS

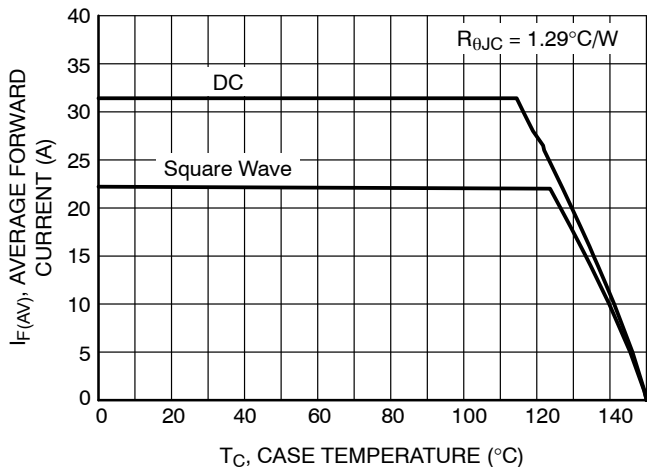


Figure 6. Current Derating per Diode (NTSB40200CT & NRVTSB40200CT)

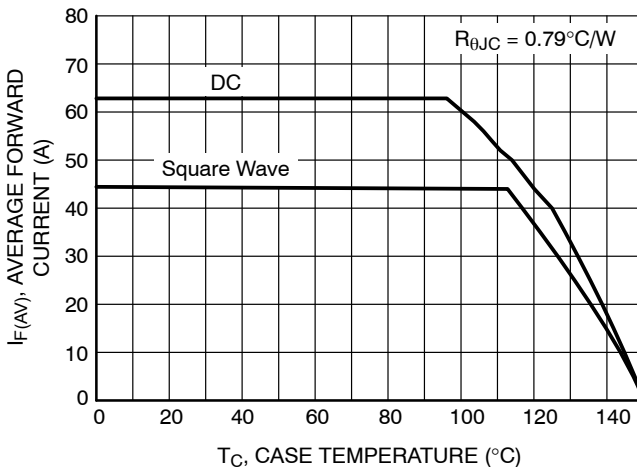


Figure 7. Current Derating per Device (NTSB40200CT & NRVTSB40200CT)

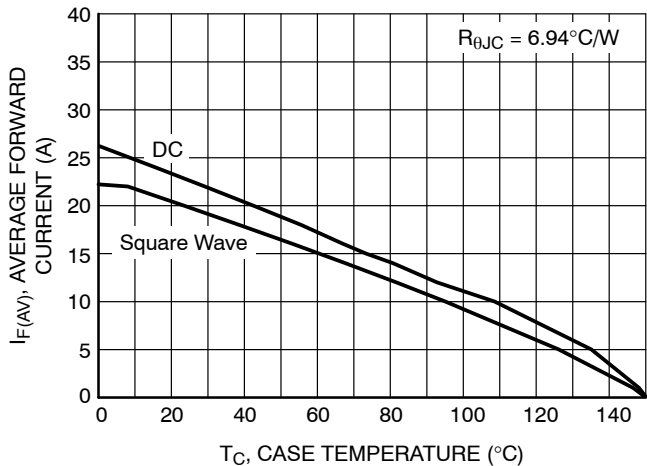


Figure 8. Current Derating per Diode (NTSJ40200CT)

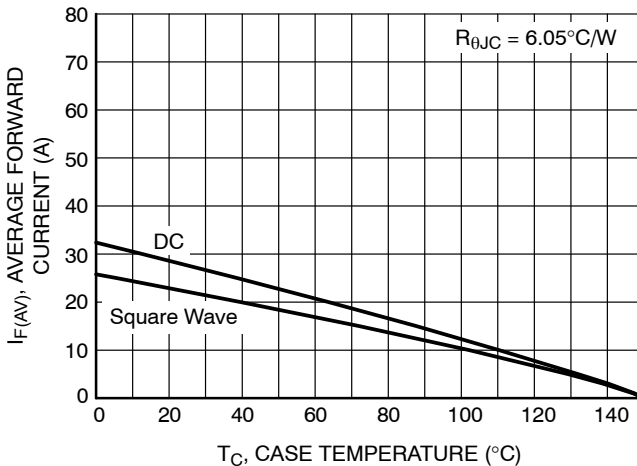


Figure 9. Current Derating per Device (NTSJ40200CT)

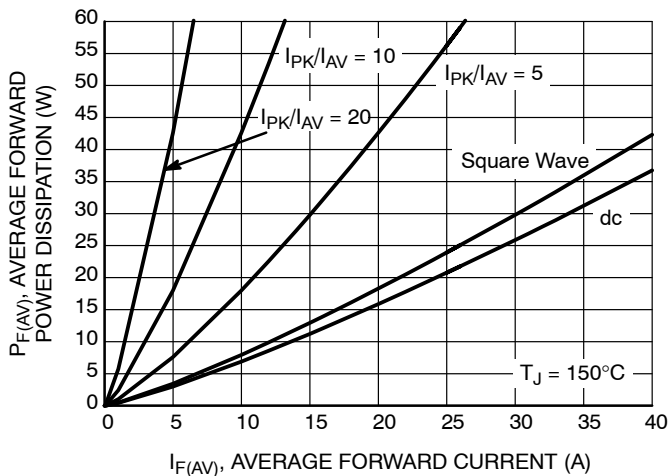


Figure 10. Forward Power Dissipation

TYPICAL CHARACTERISTICS

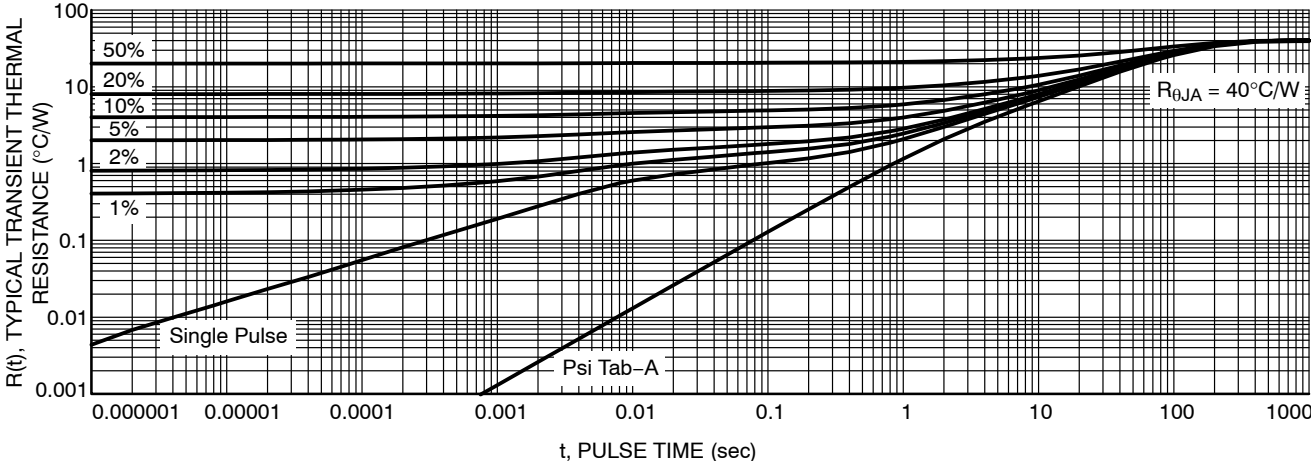


Figure 11. Typical Transient Thermal Response per Device (NTSB40200CTG)

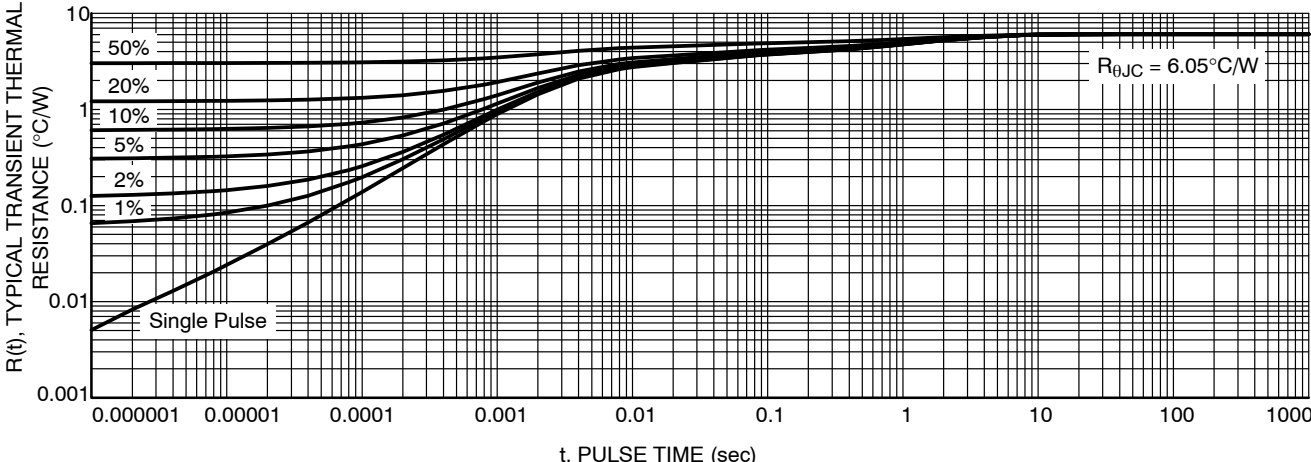


Figure 12. Typical Transient Thermal Response per Device (NTSJ40200CTG)

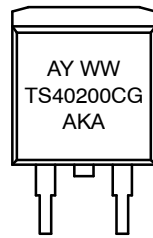
NTSB40200CT, NRVT SB40200CT, NTSJ40200CT

ORDERING INFORMATION

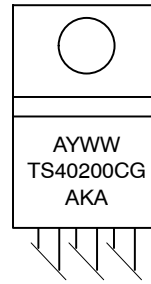
| Device | Package | Shipping |
|----------------------------------|-----------------------------------|-------------------|
| NTSB40200CTG | D ² PAK-3 (Pb-Free) | 50 Units / Rail |
| NTSB40200CTT4G | D ² PAK-3 (Pb-Free) | 800 / Tape & Reel |
| NRVT SB40200CTT4G* | D ² PAK-3 (Pb-Free) | 800 / Tape & Reel |
| NTSJ40200CTG (In Development) | TO-220FP (Halide-Free) | 50 Units / Rail |

*NRV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

MARKING DIAGRAMS



D²PAK-3



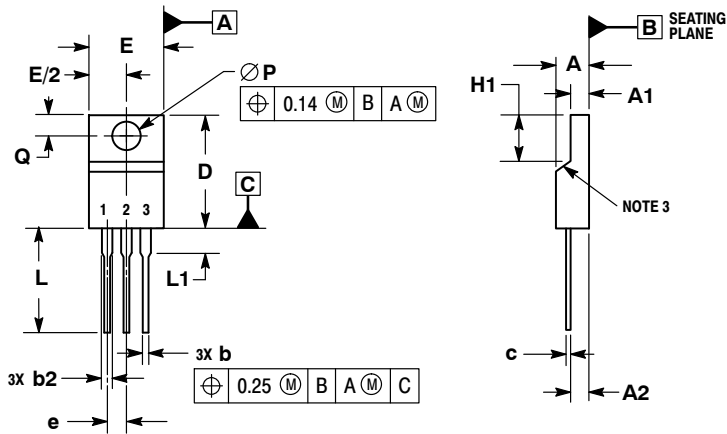
TO-220FP

- A = Assembly Location
- Y = Year
- WW = Work Week
- AKA = Polarity Designator
- G = Pb-Free Package

NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

PACKAGE DIMENSIONS

TO-220 FULLPACK, 3-LEAD
CASE 221AH
ISSUE D



NOTES:

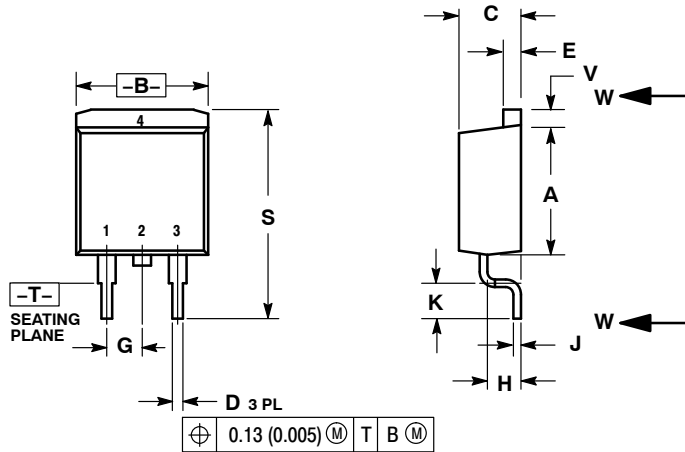
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR UNCONTROLLED IN THIS AREA.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH AND GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE TO BE MEASURED AT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

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | 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 | --- | 2.10 |
| P | 3.00 | 3.40 |
| Q | 2.80 | 3.20 |

NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

PACKAGE DIMENSIONS

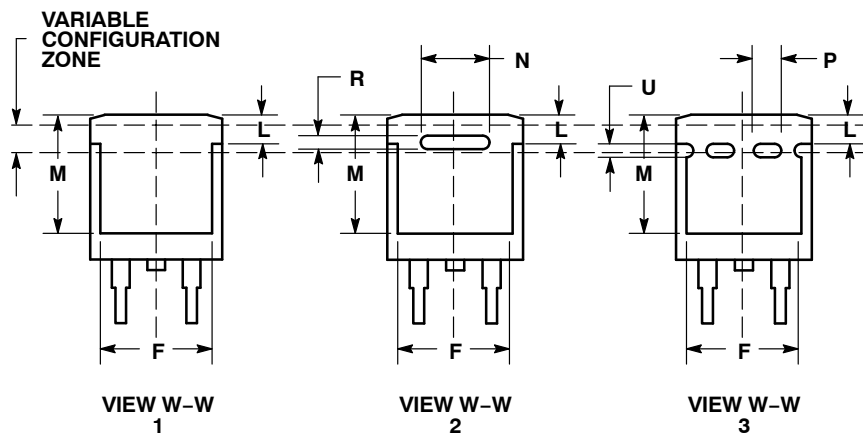
D²PAK 3 CASE 418B-04 ISSUE L



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.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | 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 |



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[54-02LRH E6327](#) [NSR05F40QNXT5G](#) [NTE555](#) [JANS1N6640](#) [SB07-03C-TB-H](#) [SB1003M3-TL-W](#) [SK310-T](#) [SK32A-LTP](#) [SK34B-TP](#)
[SS3003CH-TL-E](#) [GA01SHT18](#) [CRS10I30A\(TE85L,QM](#) [MA4E2501L-1290](#) [MBRB30H30CT-1G](#) [SB007-03C-TB-E](#) [SK32A-TP](#) [SK33B-TP](#)
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