# Very Low Forward Voltage Trench-based Schottky Rectifier

## Exceptionally Low $V_F$ = 0.53 V at $I_F$ = 5 A

# NTSB40200CT, NRVTSB40200CT

### 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 Halide Free

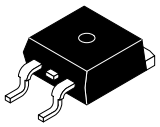
### Typical Applications

- 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

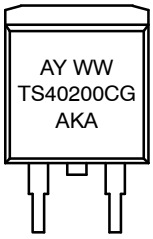
- Case: Epoxy, Molded
- Epoxy Meets Flammability Rating UL 94−0 @ 0.125 in
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Maximum for 10 s

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



**$D^2PAK$−3**
**CASE 418B**

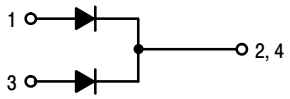
### MARKING DIAGRAM




$D^2PAK$−3

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

### PIN CONNECTIONS




### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NTSB40200CTG | $D^2PAK$−3 (Pb-Free/ Halide Free) | 50 / Units / Tube |
| NTSB40200CTT4G | $D^2PAK$−3 (Pb-Free/ Halide Free) | 800 / Tape & Reel |
| NRVTSB40200CTT4G* | $D^2PAK$−3 (Pb-Free/ Halide Free) | 800 / 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.

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## 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>$V_R$ | 200 | V |
| Average Rectified Forward Current<br>(Rated $V_R$, $T_C$ = 125°C) Per device<br>(Rated $V_R$, $T_C$ = 130°C) Per diode | $I_{F(AV)}$ | <br>40<br>20 | A |
| Peak Repetitive Forward Current<br>(Rated $V_R$, Square Wave, 20 kHz, $T_C$ = 115°C) Per device<br>(Rated $V_R$, Square Wave, 20 kHz, $T_C$ = 125°C) Per diode | $I_{FRM}$ | <br>80<br>40 | A |
| Nonrepetitive Peak Surge Current<br>(Surge applied at rated load conditions halfwave, single phase, 60 Hz) | $I_{FSM}$ | 250 | A |
| Operating Junction Temperature | $T_J$ | −55 to +150 | °C |
| Storage Temperature | $T_{stg}$ | −55 to +150 | °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 | Value | Unit |
|---|---|---|---|
| Typical Thermal Resistance<br>Junction−to−Case Per Diode<br>Junction−to−Case Per Device<br><br>Junction−to−Ambient Per Device | <br>$R_{\theta JC}$<br><br><br>$R_{\theta JA}$ | <br>1.29<br>0.79<br><br>40 | °C/W |

## ELECTRICAL CHARACTERISTICS

| Rating | Symbol | Typ | Max | Unit |
|---|---|---|---|---|
| Instantaneous Forward Voltage (Note 1)<br>($I_F$ = 5 A, $T_J$ = 25°C)<br>($I_F$ = 10 A, $T_J$ = 25°C)<br>($I_F$ = 15 A, $T_J$ = 25°C)<br>($I_F$ = 20 A, $T_J$ = 25°C)<br><br>($I_F$ = 5 A, $T_J$ = 125°C)<br>($I_F$ = 10 A, $T_J$ = 125°C)<br>($I_F$ = 15 A, $T_J$ = 125°C)<br>($I_F$ = 20 A, $T_J$ = 125°C) | $V_F$ | <br>0.68<br>0.74<br>0.79<br>0.84<br><br>0.53<br>0.60<br>0.64<br>0.68 | <br>−<br>−<br>−<br>1.45<br><br>−<br>−<br>−<br>0.80 | V |
| Instantaneous Reverse Current (Note 1)<br>($V_R$ = 180 V, $T_J$ = 25°C)<br>(Rated dc Voltage, $T_J$ = 25°C)<br><br>($V_R$ = 180 V, $T_J$ = 125°C)<br>(Rated dc Voltage, $T_J$ = 125°C) | $I_R$ | <br>3<br>5<br><br>5.3<br>7 | <br>−<br>100<br><br>−<br>30 | <br>μA<br>μA<br><br>mA<br>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 ≤ 2.0%

## TYPICAL CHARACTERISTICS

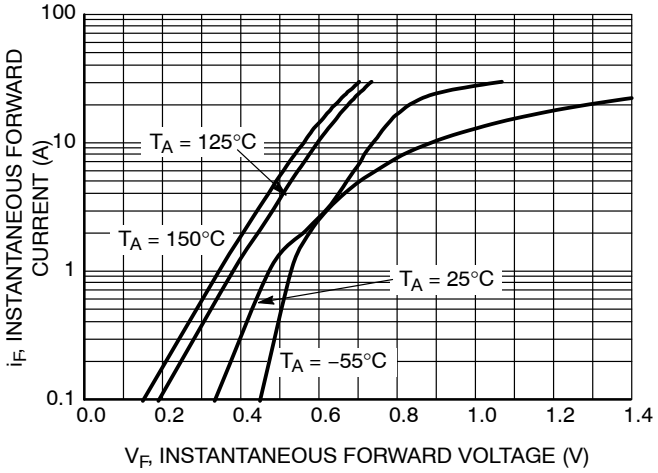



**Figure 1. Typical Instantaneous Forward Characteristics**

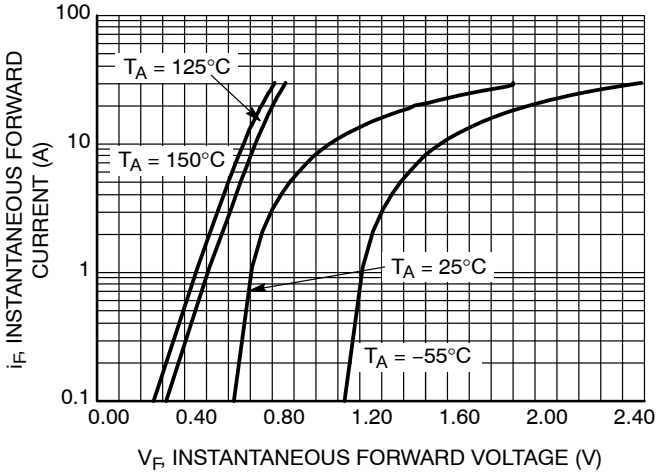



**Figure 2. Maximum Instantaneous Forward Characteristics**

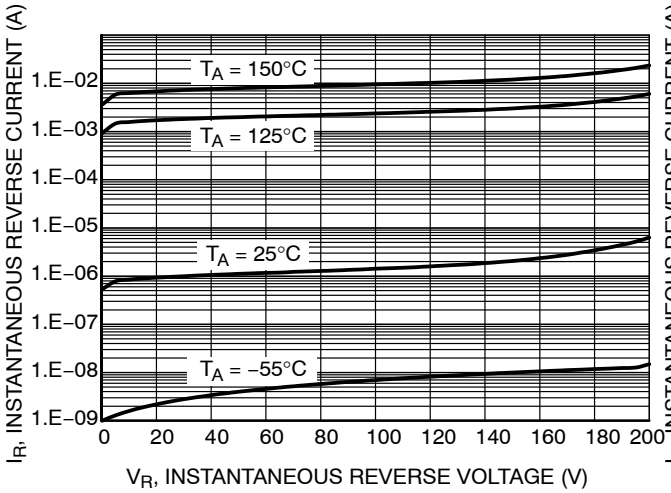



**Figure 3. Typical Reverse Characteristics**

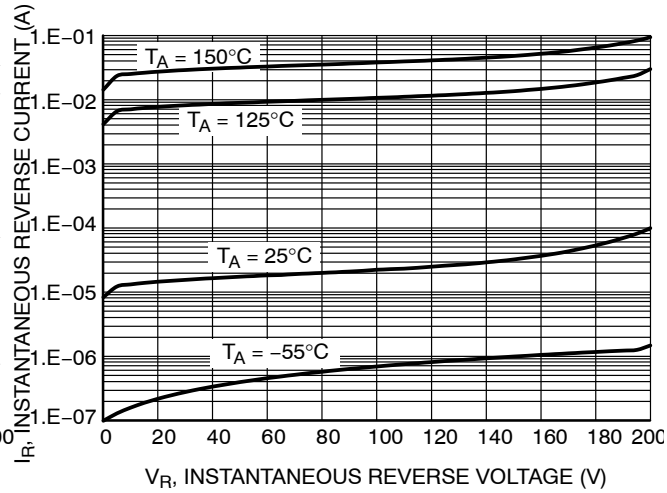



**Figure 4. Maximum Reverse Characteristics**

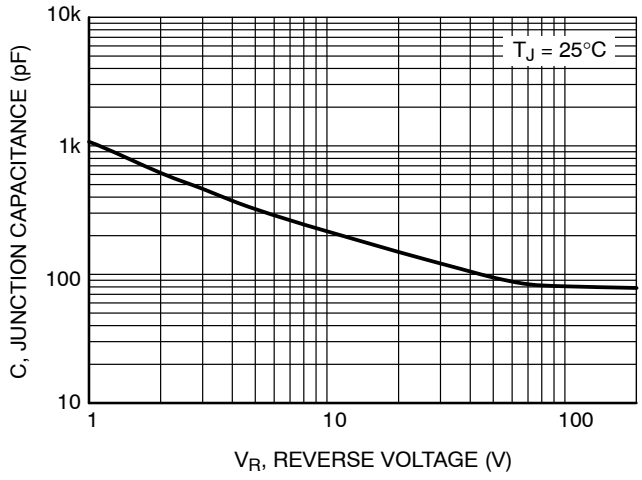



**Figure 5. Typical Junction Capacitance**

## TYPICAL CHARACTERISTICS

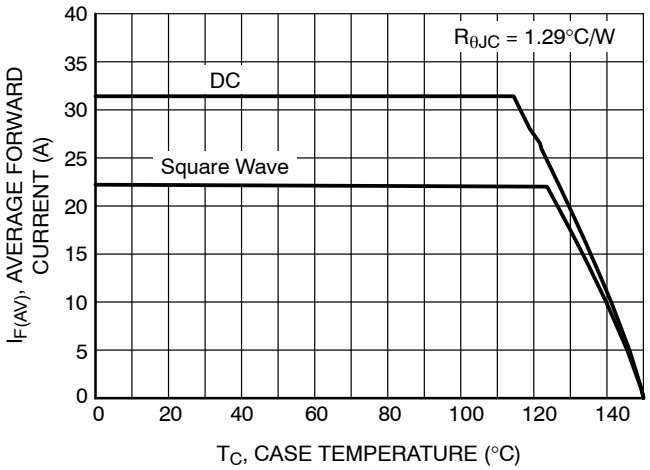



**Figure 6. Current Derating per Diode**

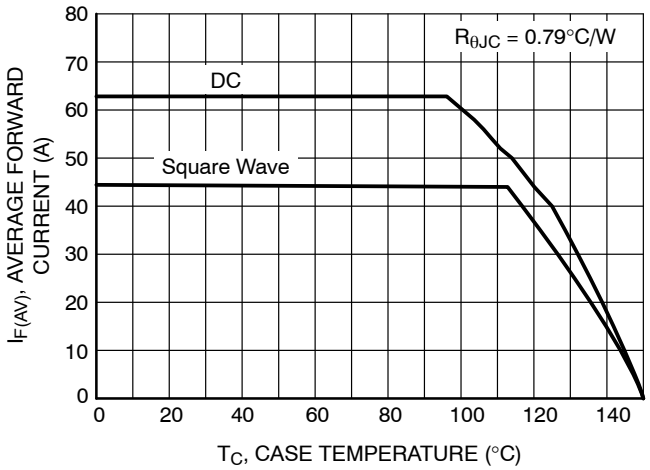



**Figure 7. Current Derating per Device**

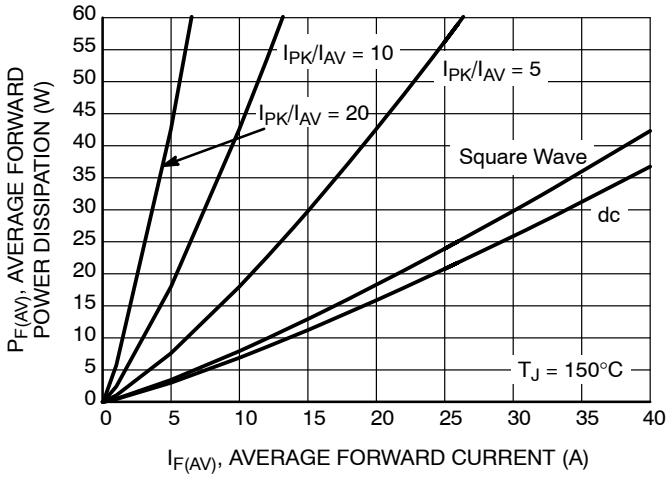



**Figure 8. Forward Power Dissipation**

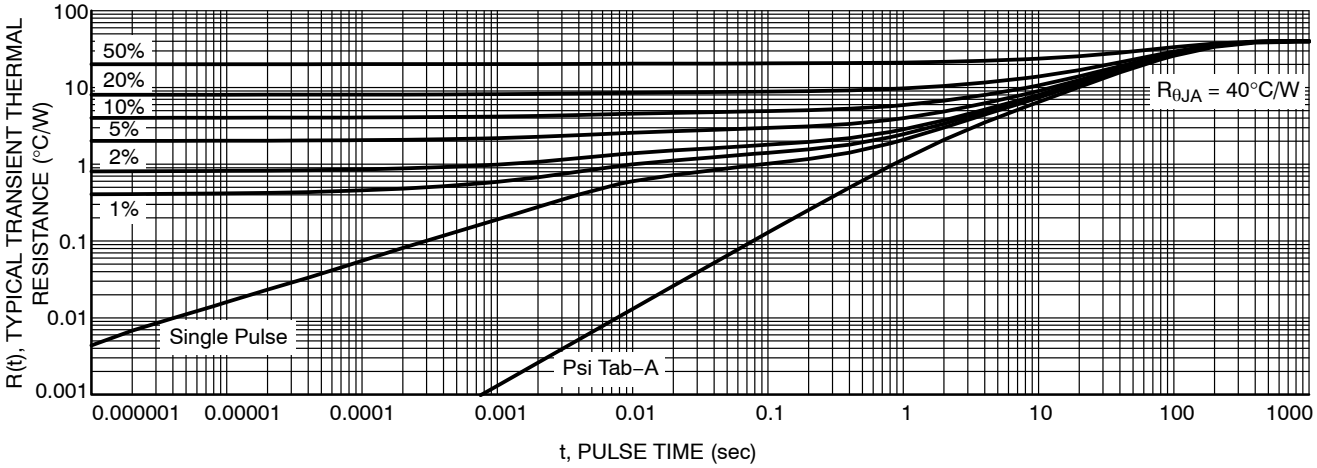
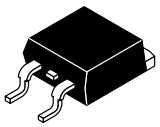


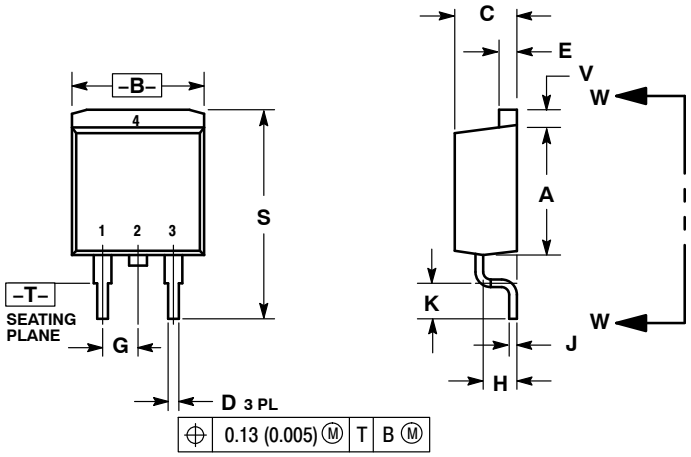

**Figure 9. Typical Transient Thermal Response per Device (NTSB40200CTG)**



**D²PAK 3**
CASE 418B–04
ISSUE L

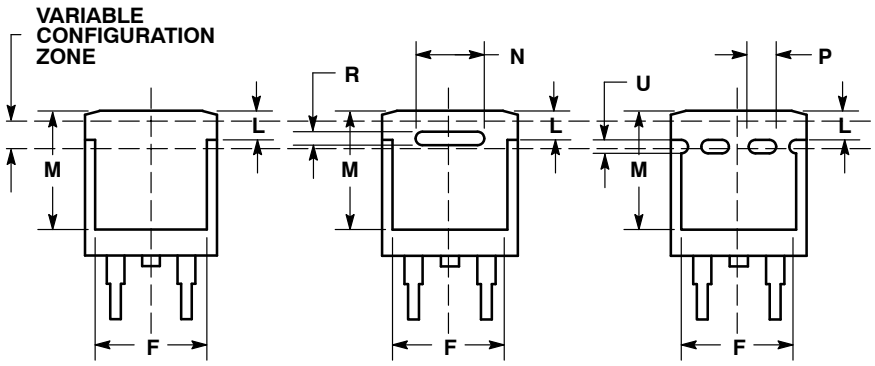
DATE 17 FEB 2015

**SCALE 1:1**




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

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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

STYLE 4:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 5:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 6:
PIN 1. NO CONNECT
2. CATHODE
3. ANODE
4. CATHODE


**MARKING INFORMATION AND FOOTPRINT ON PAGE 2**





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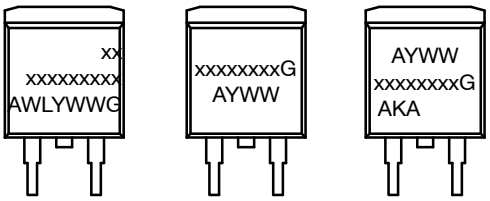
**D²PAK 3**
CASE 418B−04
ISSUE L

DATE 17 FEB 2015

**GENERIC**
**MARKING DIAGRAM***

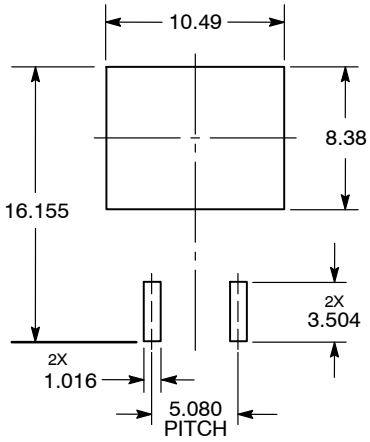



**IC** **Standard** **Rectifier**

| | |
|---|---|
| xx | = Specific Device Code |
| A | = Assembly Location |
| WL | = Wafer Lot |
| Y | = Year |
| WW | = Work Week |
| G | = Pb−Free Package |
| AKA | = Polarity Indicator |

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

**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.

| | | | |
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