

# ON Semiconductor

## Is Now

The logo for onsemi, featuring the word "onsemi" in a dark teal, lowercase, sans-serif font. The letter "i" is stylized with a white dot and a teal vertical bar. A small orange triangle is positioned above the top right of the "i". A trademark symbol (TM) is located to the right of the logo.

To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

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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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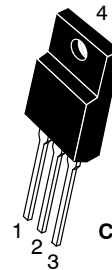
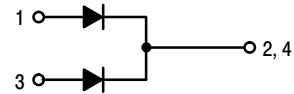


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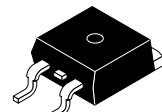
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**VERY LOW FORWARD  
VOLTAGE, LOW LEAKAGE  
SCHOTTKY BARRIER  
RECTIFIERS 40 AMPERES,  
200 VOLTS**

### 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.

# 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	$\mu\text{A}$ $\mu\text{A}$  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  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

TYPICAL CHARACTERISTICS

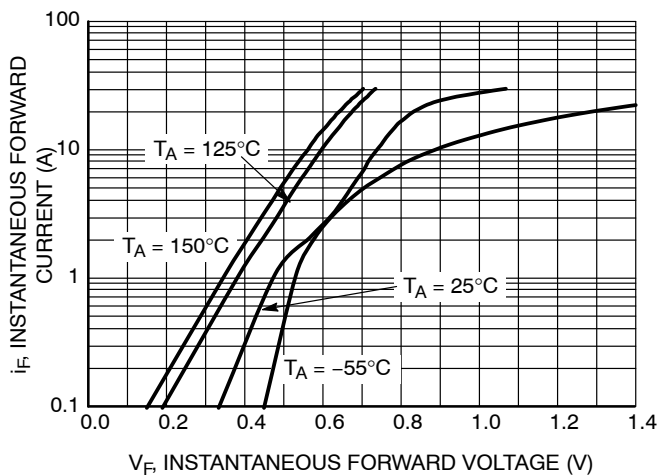


Figure 1. Typical Instantaneous Forward Characteristics

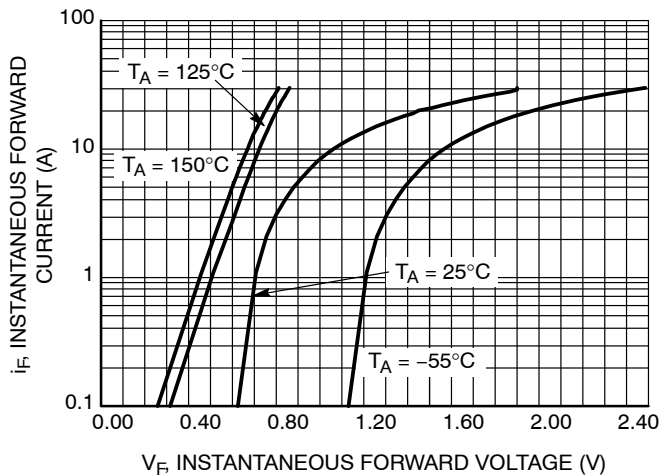


Figure 2. Maximum Instantaneous Forward Characteristics

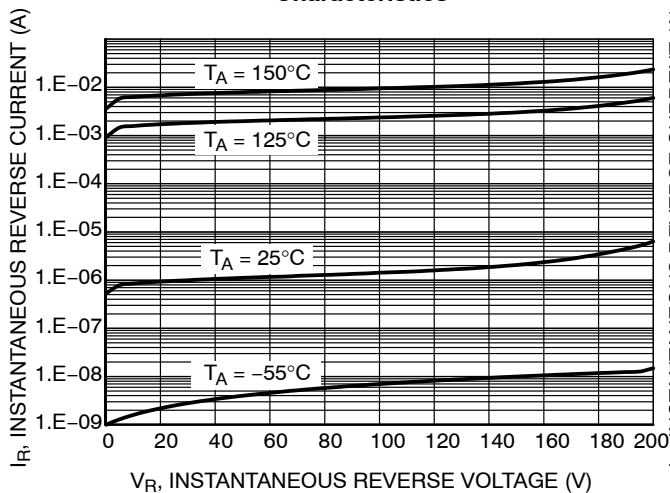


Figure 3. Typical Reverse Characteristics

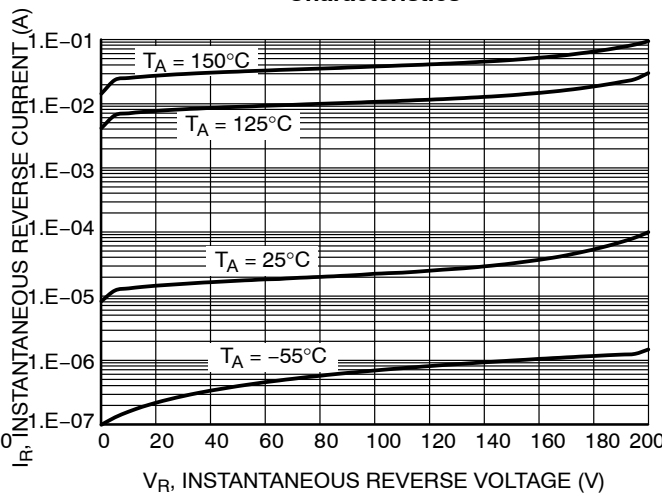


Figure 4. Maximum Reverse Characteristics

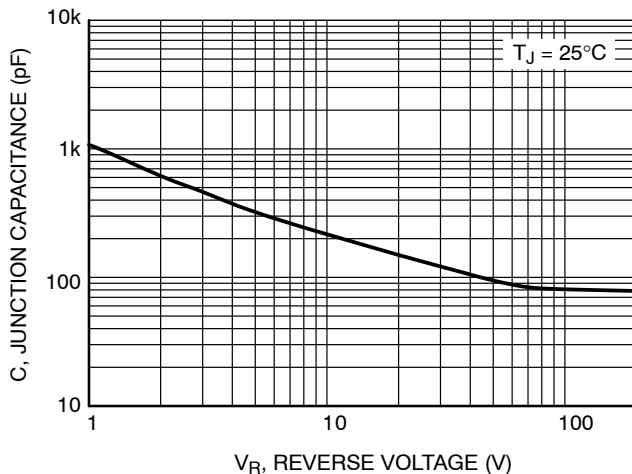
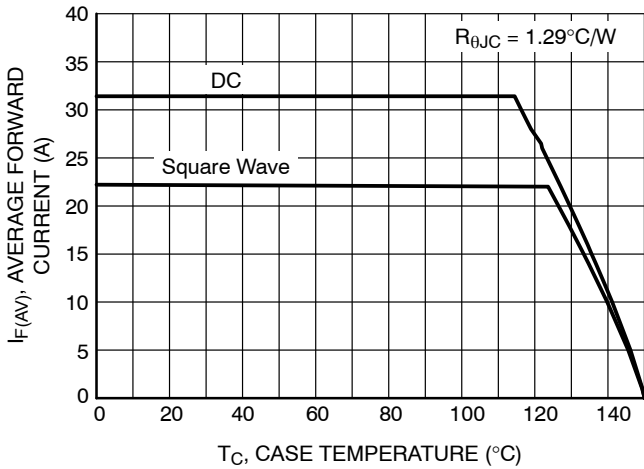


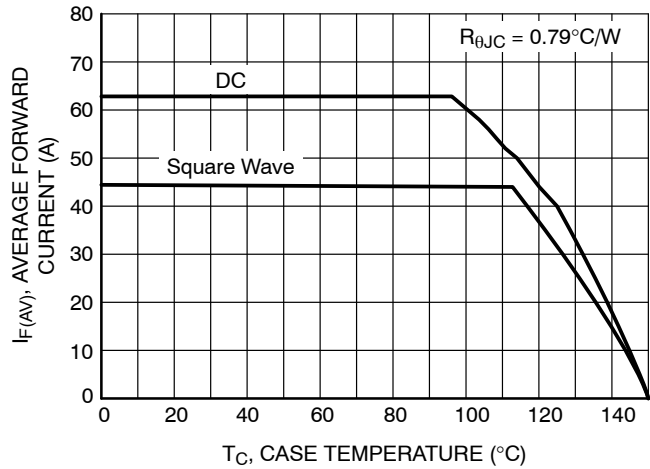
Figure 5. Typical Junction Capacitance

# NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

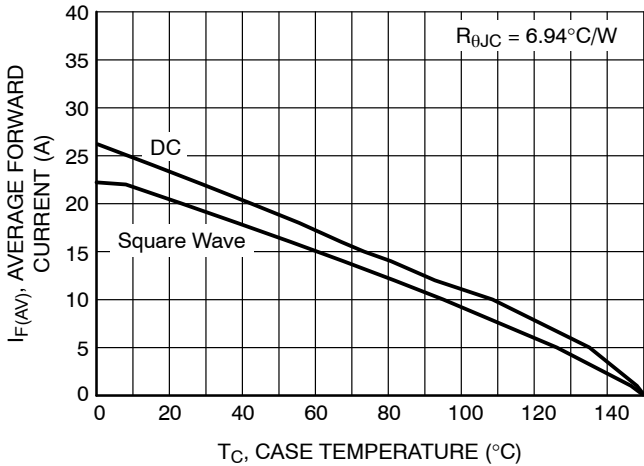
## TYPICAL CHARACTERISTICS



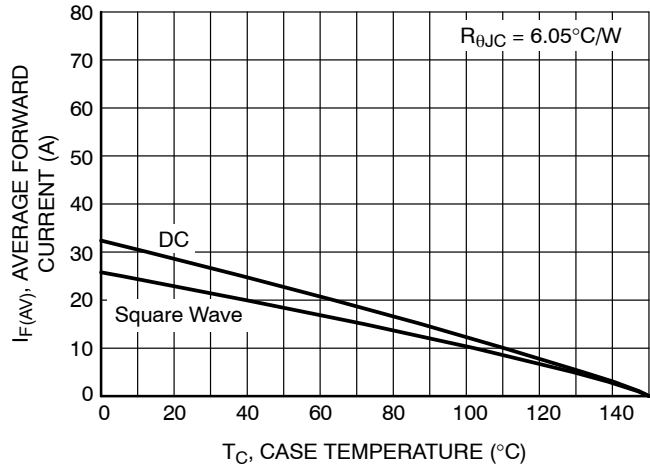
**Figure 6. Current Derating per Diode (NTSB40200CT & NRVTSB40200CT)**



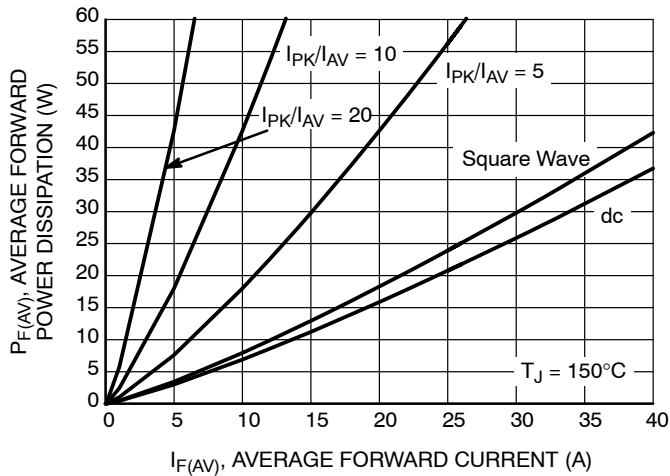
**Figure 7. Current Derating per Device (NTSB40200CT & NRVTSB40200CT)**



**Figure 8. Current Derating per Diode (NTSJ40200CT)**



**Figure 9. Current Derating per Device (NTSJ40200CT)**



**Figure 10. Forward Power Dissipation**

TYPICAL CHARACTERISTICS

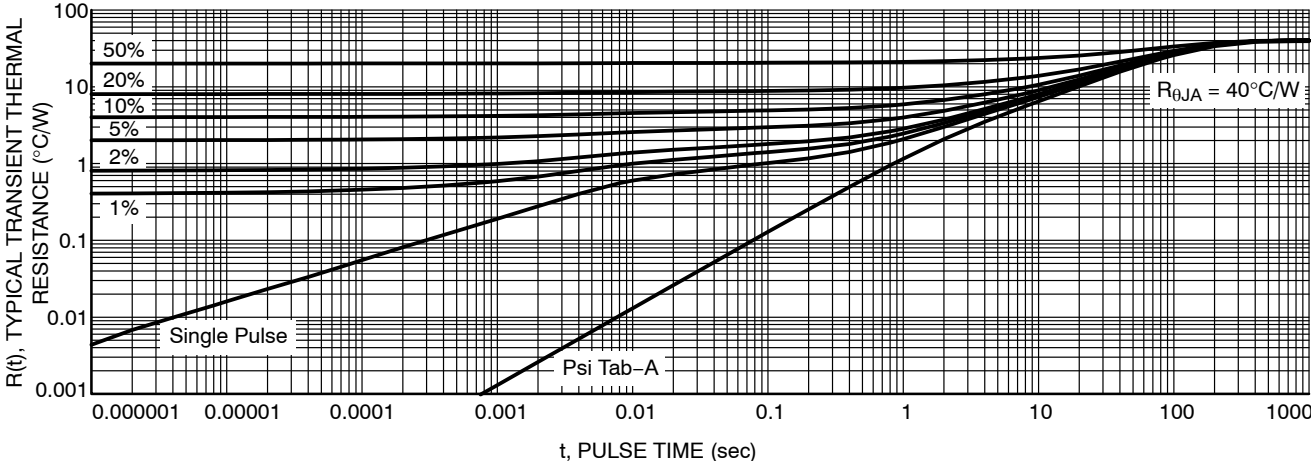


Figure 11. Typical Transient Thermal Response per Device (NTSB40200CTG)

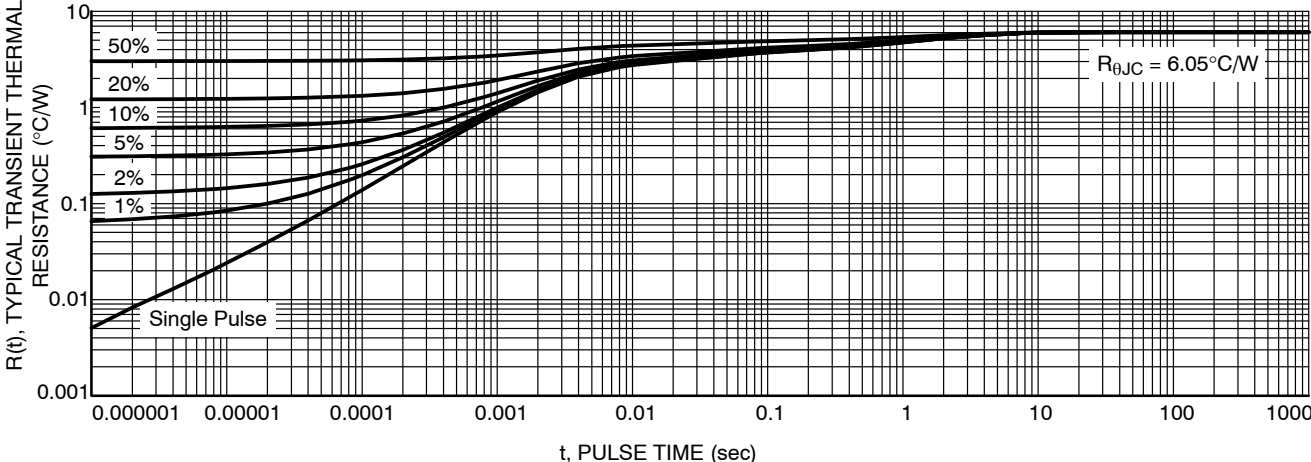


Figure 12. Typical Transient Thermal Response per Device (NTSJ40200CTG)

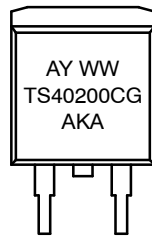
# NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

## ORDERING INFORMATION

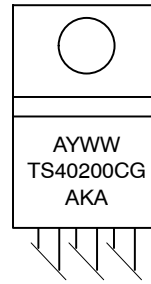
Device	Package	Shipping
NTSB40200CTG	D <sup>2</sup> PAK-3 (Pb-Free)	50 Units / Rail
NTSB40200CTT4G	D <sup>2</sup> PAK-3 (Pb-Free)	800 / Tape & Reel
NRVTSB40200CTT4G*	D <sup>2</sup> PAK-3 (Pb-Free)	800 / Tape & Reel
NTSJ40200CTG (In Development)	TO-220FP (Halide-Free)	50 Units / Rail

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

## MARKING DIAGRAMS



D<sup>2</sup>PAK-3



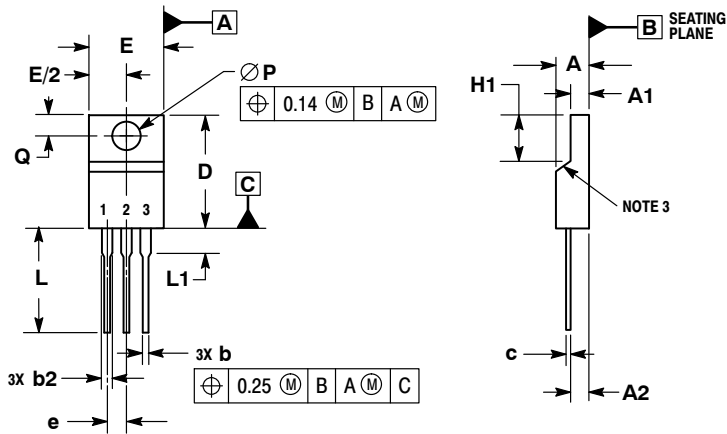
TO-220FP

- 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.

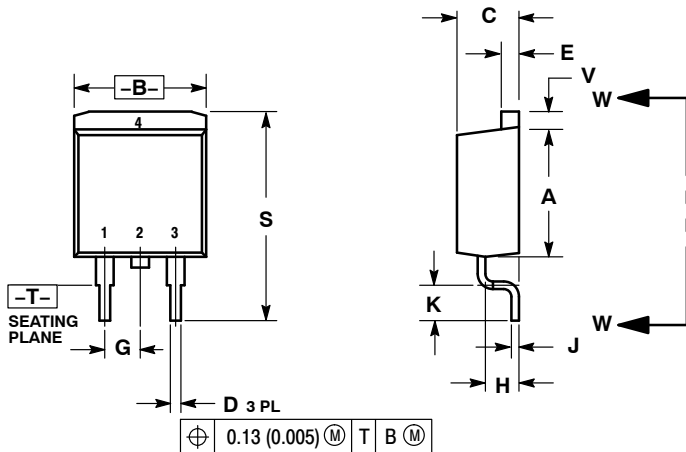
DIM	MILLIMETERS	
	MIN	MAX
A	4.30	4.70
A1	2.50	2.90
A2	2.50	2.70
b	0.54	0.84
b2	1.10	1.40
c	0.49	0.79
D	14.70	15.30
E	9.70	10.30
e	2.54 BSC	
H1	6.70	7.10
L	12.70	14.73
L1	---	2.10
P	3.00	3.40
Q	2.80	3.20



# NTSB40200CT, NRVTSB40200CT, NTSJ40200CT

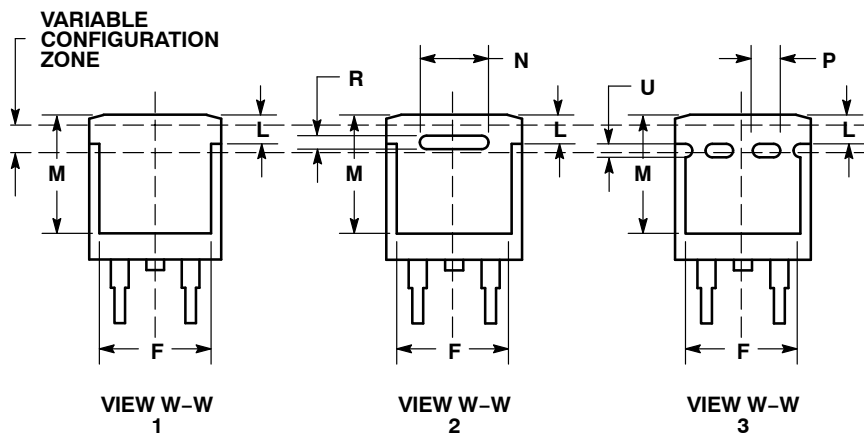
## PACKAGE DIMENSIONS

**D<sup>2</sup>PAK 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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