

# NTST30120CT, NTSJ30120CTG, NTSB30120CT-1G, NTSB30120CTG, NTSB30120CTT4G



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

## Very Low Forward Voltage Trench-based Schottky Rectifier

Exceptionally Low  $V_F = 0.50$  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
- These are Pb-Free Devices

### Typical Applications

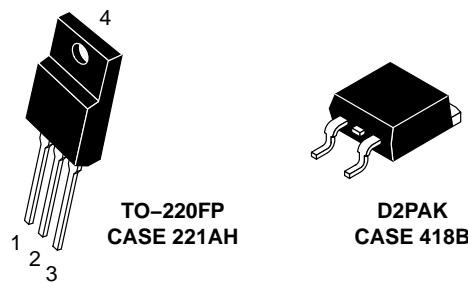
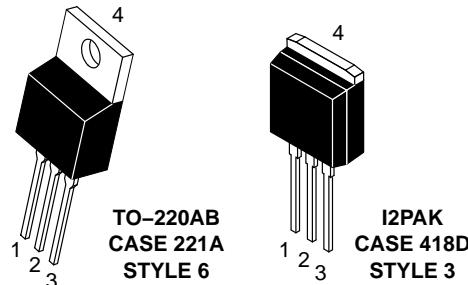
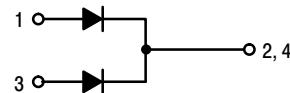
- Switching Power Supplies including Notebook / Netbook Adapters, ATX and Flat Panel Display
- High Frequency and DC-DC Converters
- Freewheeling and OR-ing diodes
- Reverse Battery Protection
- Instrumentation

### 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

VERY LOW FORWARD VOLTAGE, LOW LEAKAGE SCHOTTKY BARRIER RECTIFIERS 30 AMPERES, 120 VOLTS

### PIN CONNECTIONS



### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

**NTST30120CT, NTSJ30120CTG, NTSB30120CT-1G, NTSB30120CTG,  
NTSB30120CTT4G**

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	$V_{RRM}$ $V_{RWM}$ $V_R$	120	V
Average Rectified Forward Current (Rated $V_R$ , $T_C = 125^\circ\text{C}$ )	$I_{F(AV)}$ Per device Per diode	30 15	A
Peak Repetitive Forward Current (Rated $V_R$ , Square Wave, 20 kHz, $T_C = 130^\circ\text{C}$ )	$I_{FRM}$ Per device Per diode	60 30	A
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	$I_{FSM}$	150	A
Operating Junction Temperature	$T_J$	-40 to +150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40 to +150	$^\circ\text{C}$
Voltage Rate of Change (Rated $V_R$ )	$dv/dt$	10,000	V/ $\mu\text{s}$

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	NTST30120CTG NTSB30120CT-1G	NTSB30120CTG	NTSJ30120CTG	Unit
Maximum Thermal Resistance per Diode Junction-to-Case Junction-to-Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.5 70	1.14 46.6	4.05 105	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$

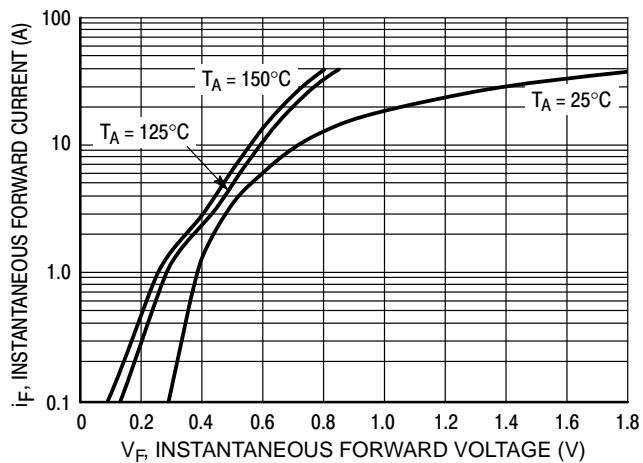
**ELECTRICAL CHARACTERISTICS** (Per Leg unless otherwise noted)

Rating	Symbol	Typ	Max	Unit
Maximum Instantaneous Forward Voltage (Note 1) ( $I_F = 5 \text{ A}$ , $T_J = 25^\circ\text{C}$ ) ( $I_F = 7.5 \text{ A}$ , $T_J = 25^\circ\text{C}$ ) ( $I_F = 15 \text{ A}$ , $T_J = 25^\circ\text{C}$ )  ( $I_F = 5 \text{ A}$ , $T_J = 125^\circ\text{C}$ ) ( $I_F = 7.5 \text{ A}$ , $T_J = 125^\circ\text{C}$ ) ( $I_F = 15 \text{ A}$ , $T_J = 125^\circ\text{C}$ )	$V_F$	0.56 0.71 0.90  0.50 0.60 0.68	— — 1.08  — — 0.76	V
Maximum Instantaneous Reverse Current (Note 1) ( $V_R = 90 \text{ V}$ , $T_J = 25^\circ\text{C}$ ) ( $V_R = 90 \text{ V}$ , $T_J = 125^\circ\text{C}$ )  (Rated dc Voltage, $T_J = 25^\circ\text{C}$ ) (Rated dc Voltage, $T_J = 125^\circ\text{C}$ )	$I_R$	16 11  — 25	— —  800 100	$\mu\text{A}$ $\text{mA}$  $\mu\text{A}$ $\text{mA}$

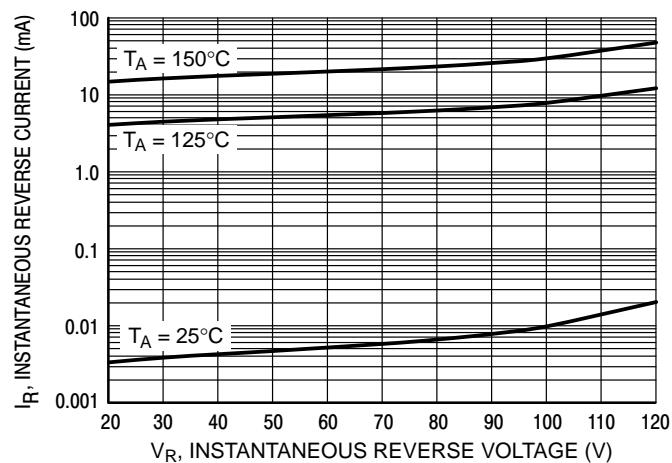
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

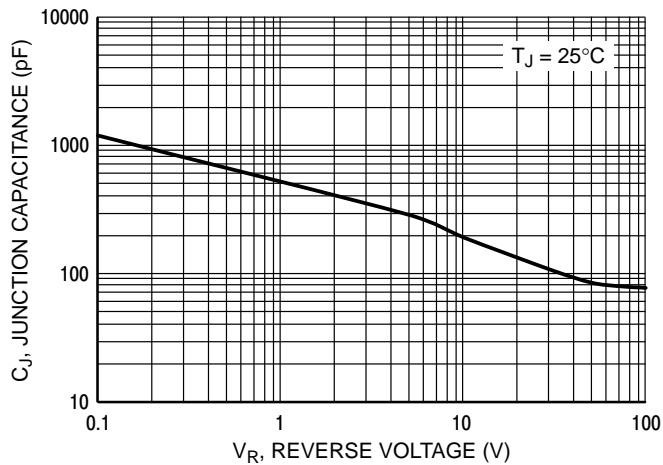
**NTST30120CT, NTSJ30120CTG, NTSB30120CT-1G, NTSB30120CTG,  
NTSB30120CTT4G**  
**TYPICAL CHARACTERISTICS**



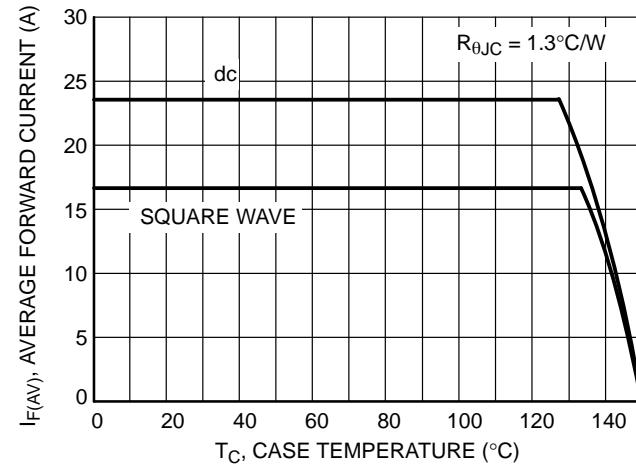
**Figure 1. Typical Instantaneous Forward Characteristics**



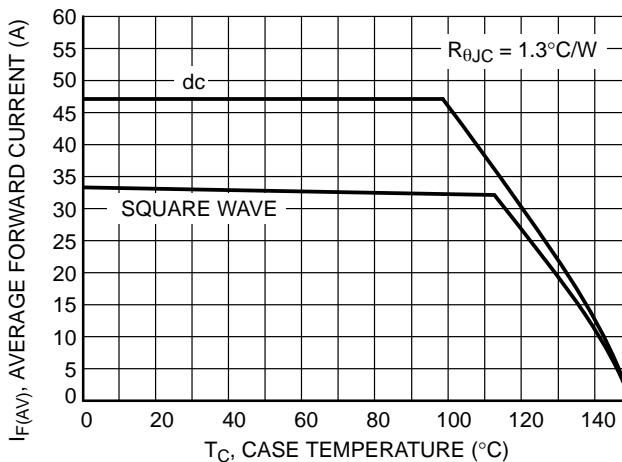
**Figure 2. Typical Reverse Current Characteristics**



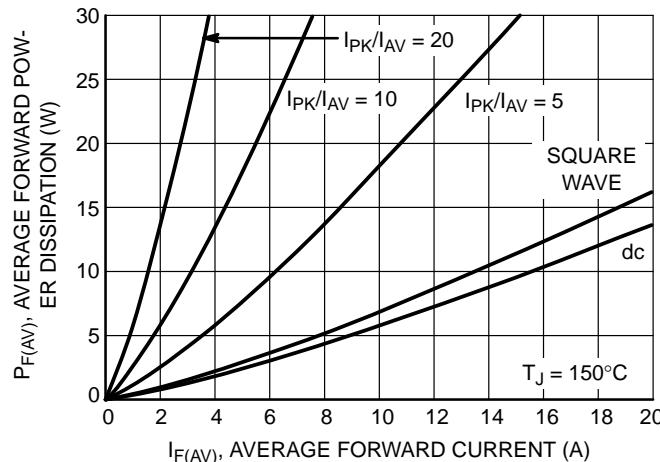
**Figure 3. Typical Junction Capacitance**



**Figure 4. Current Derating per Leg**



**Figure 5. Current Derating**



**Figure 6. Forward Power Dissipation**

**NTST30120CT, NTSJ30120CTG, NTSB30120CT-1G, NTSB30120CTG,  
NTSB30120CTT4G**  
**TYPICAL CHARACTERISTICS**

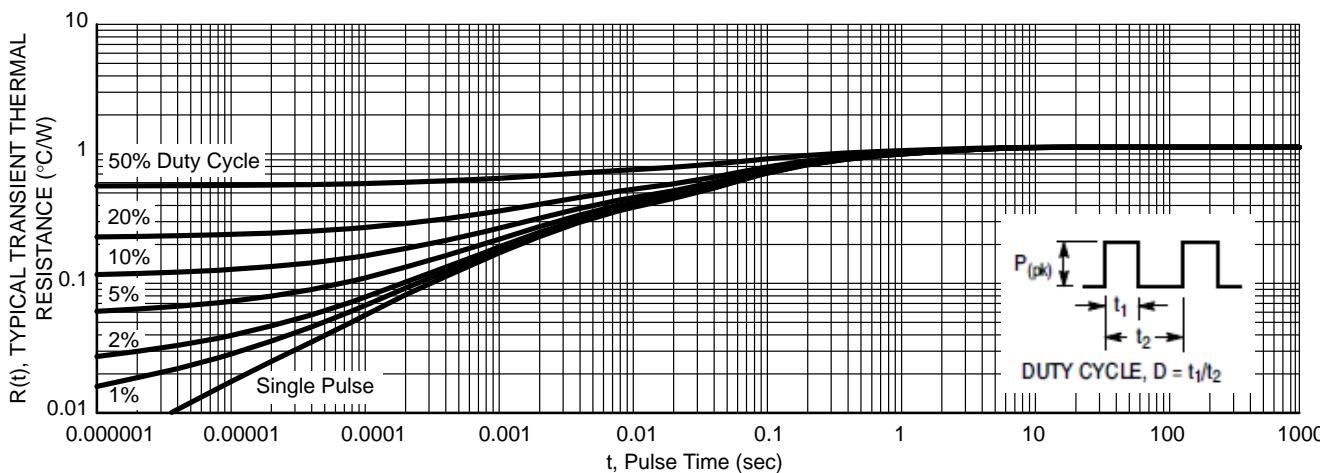


Figure 7. Typical Transient Thermal Response for NTST30120CT and NTSB30120CT-1G

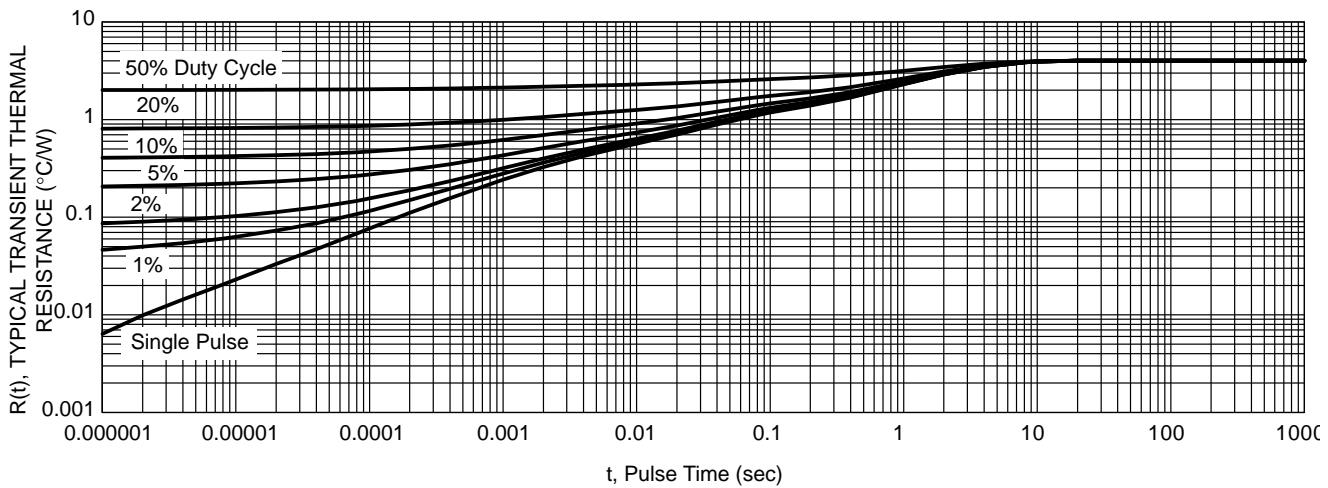


Figure 8. Typical Transient Thermal Response for NTSJ30120CTG

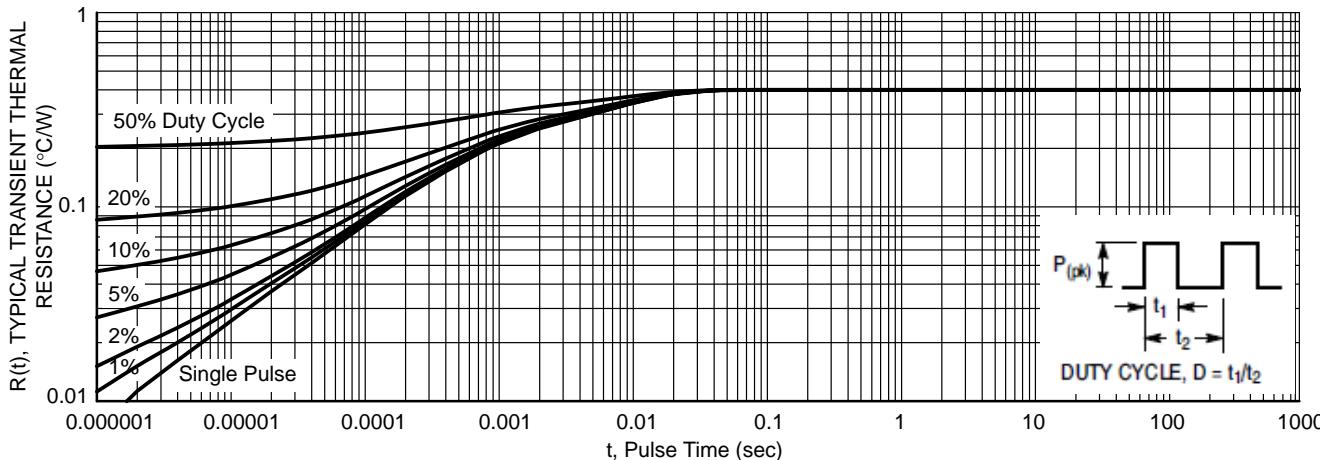


Figure 9. Typical Transient Thermal Response for NTSB30120CTG

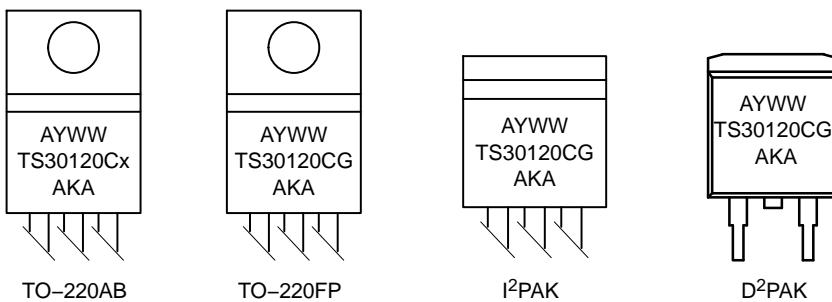
**NTST30120CT, NTSJ30120CTG, NTSB30120CT-1G, NTSB30120CTG,  
NTSB30120CTT4G**

**ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
NTST30120CTG	TO-220AB (Pb-Free)	50 Units / Rail
NTSJ30120CTG	TO-220FP (Halide-Free)	50 Units / Rail
NTSB30120CT-1G	I <sup>2</sup> PAK (Pb-Free)	50 Units / Rail
NTSB30120CTG	D <sup>2</sup> PAK (Pb-Free)	50 Units / Rail
NTSB30120CTT4G	D <sup>2</sup> PAK (Pb-Free)	800 / Tape & Reel

<sup>†</sup>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.

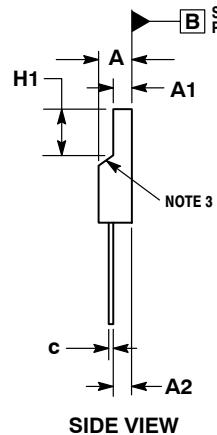
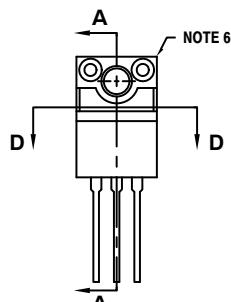
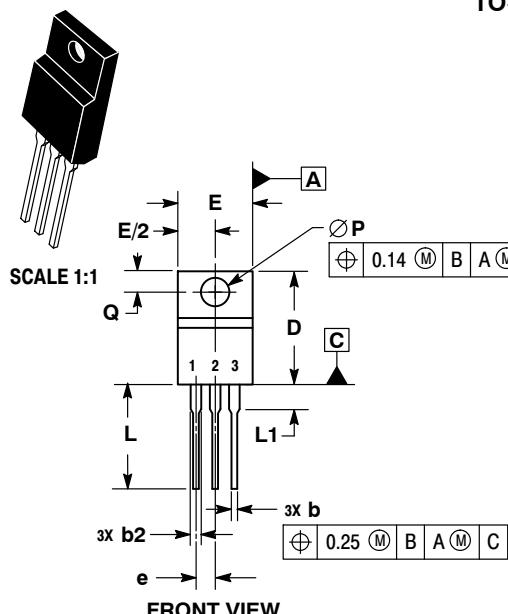
**MARKING DIAGRAMS**



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

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

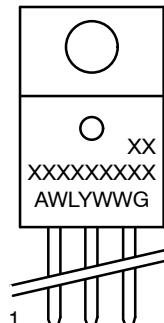
DATE 30 SEP 2014



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

GENERIC  
MARKING DIAGRAM\*

A = Assembly Location  
 WL = Wafer Lot  
 Y = Year  
 WW = Work Week  
 G = Pb-Free Package

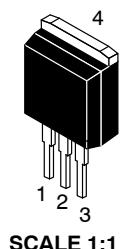
\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present.

STYLE 1:  
 PIN 1. MAIN TERMINAL 1  
 2. MAIN TERMINAL 2  
 3. GATE

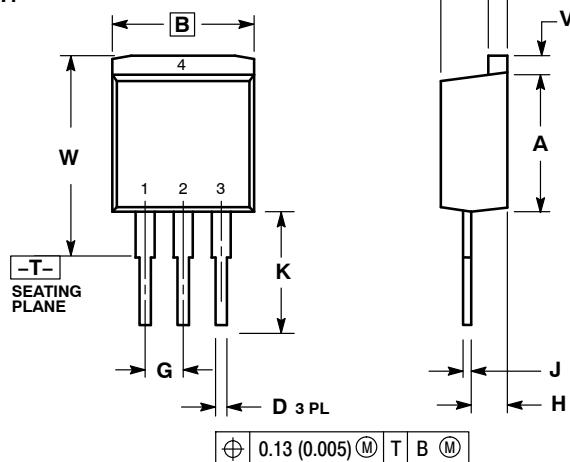
STYLE 2:  
 PIN 1. CATHODE  
 2. ANODE  
 3. GATE

DOCUMENT NUMBER:	98AON52577E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-220 FULLPACK, 3-LEAD	

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.



SCALE 1:1



## D2PAK, 3-LEAD, STRAIGHT

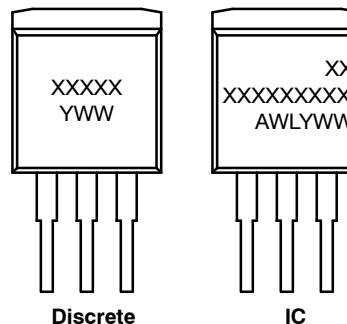
CASE 418  
ISSUE J

DATE 08 OCT 2003

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418-01 THRU -04 OBSOLETE, NEW STANDARD 418-05.

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
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	0.285	0.305	7.493	7.747
V	0.045	0.055	1.14	1.40
W	0.525	0.545	13.335	13.843

GENERIC  
MARKING DIAGRAMS\*

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

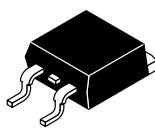
STYLE 4:  
PIN 1. GATE  
2. COLLECTOR  
3. Emitter  
4. COLLECTOR

XXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
Y = Year  
WW = Work Week

\*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. Some products may not follow the Generic Marking.

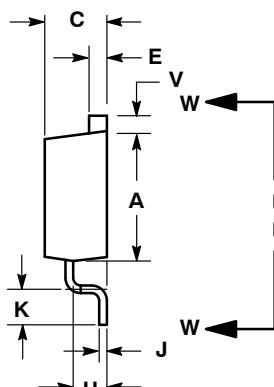
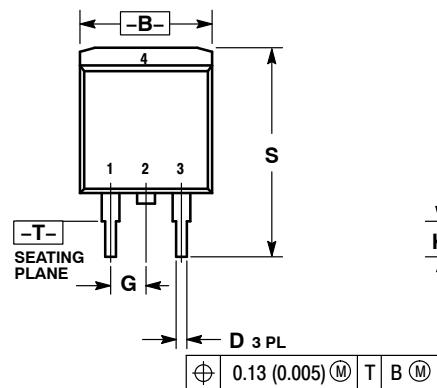
DOCUMENT NUMBER:	98ASB42759B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D2PAK, 3-LEAD, STRAIGHT	PAGE 1 OF 1

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.


**D<sup>2</sup>PAK 3**  
CASE 418B-04  
ISSUE L

DATE 17 FEB 2015

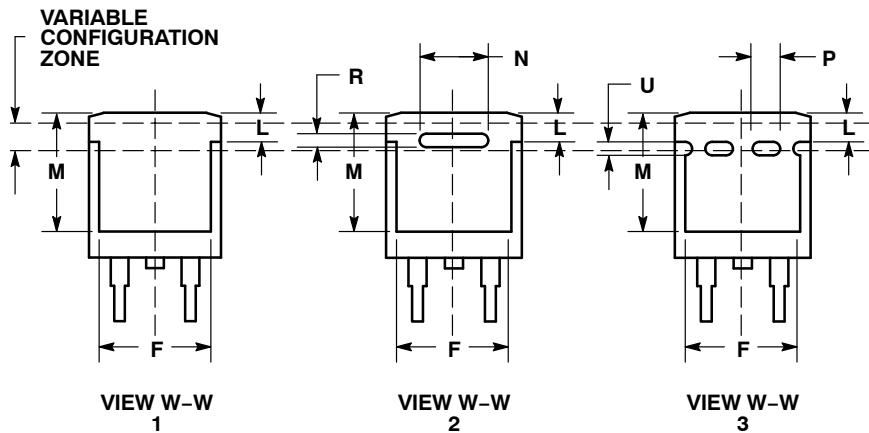
SCALE 1:1



## 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.

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



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

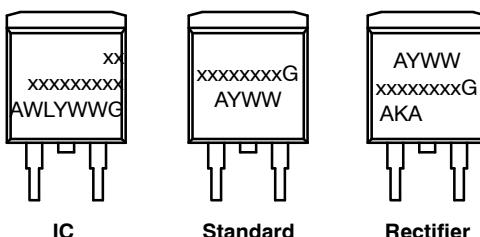
DOCUMENT NUMBER:	98ASB42761B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D <sup>2</sup> PAK 3	PAGE 1 OF 2

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**D<sup>2</sup>PAK 3**  
CASE 418B-04  
ISSUE L

DATE 17 FEB 2015

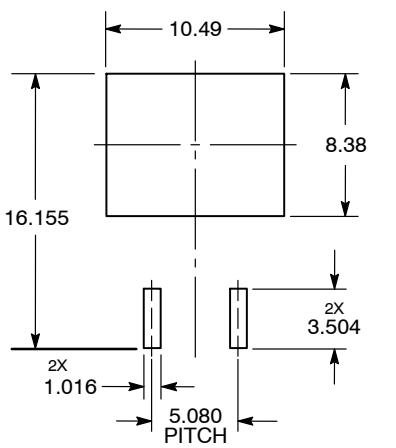
**GENERIC  
MARKING DIAGRAM\***



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. Some products may not follow the Generic Marking.

**SOLDERING FOOTPRINT\***



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

DOCUMENT NUMBER:	98ASB42761B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	D <sup>2</sup> PAK 3	PAGE 2 OF 2

**onsemi** and **ONSEMI** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

**onsemi**, **ONSEMI**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)

