

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

## Very Low Forward Voltage Trench-based Schottky Rectifier

Exceptionally Low  $V_F = 0.50\text{ V}$  at  $I_F = 5\text{ A}$

### 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

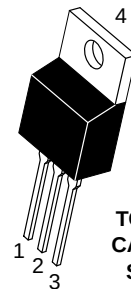
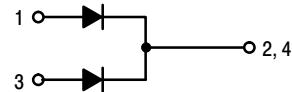


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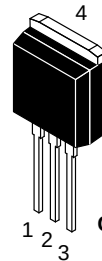
[www.onsemi.com](http://www.onsemi.com)

VERY LOW FORWARD VOLT-  
AGE, LOW LEAKAGE SCHOT-  
TKY BARRIER  
RECTIFIERS 30 AMPERES,  
120 VOLTS

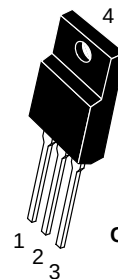
### PIN CONNECTIONS



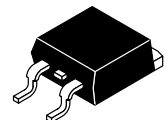
TO-220AB  
CASE 221A  
STYLE 6



I2PAK  
CASE 418D  
STYLE 3



TO-220FP  
CASE 221AH



D2PAK  
CASE 418B

### ORDERING INFORMATION

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

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

## 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>$V_R$        | 120         | V                |
| Average Rectified Forward Current<br>(Rated $V_R$ , $T_C = 125^\circ\text{C}$ )                            | $I_{F(AV)}$<br>Per device<br>Per diode | 30<br>15    | A                |
| Peak Repetitive Forward Current<br>(Rated $V_R$ , Square Wave, 20 kHz, $T_C = 130^\circ\text{C}$ )         | $I_{FRM}$<br>Per device<br>Per diode   | 60<br>30    | A                |
| Nonrepetitive Peak Surge Current<br>(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<br>NTSB30120CT-1G | NTSB30120CTG | NTSJ30120CTG | Unit                                     |
|---------------------------------------------------------------------------------|------------------------------------|--------------------------------|--------------|--------------|------------------------------------------|
| Maximum Thermal Resistance per Diode<br>Junction-to-Case<br>Junction-to-Ambient | $R_{\theta JC}$<br>$R_{\theta JA}$ | 2.5<br>70                      | 1.14<br>46.6 | 4.05<br>105  | $^\circ\text{C/W}$<br>$^\circ\text{C/W}$ |

## ELECTRICAL CHARACTERISTICS (Per Leg unless otherwise noted)

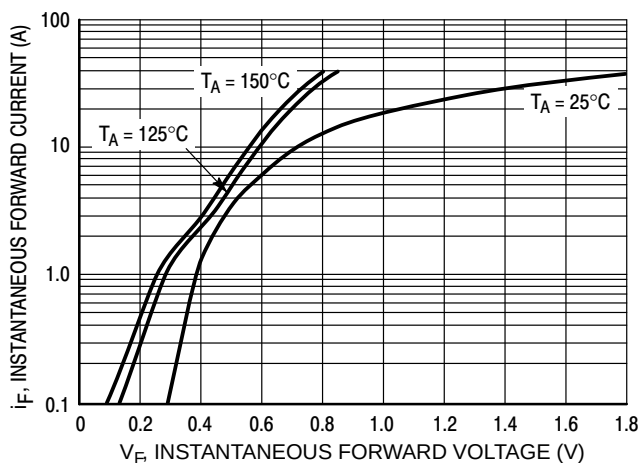
| Rating                                                                                                                                                                                                                                                                                                    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

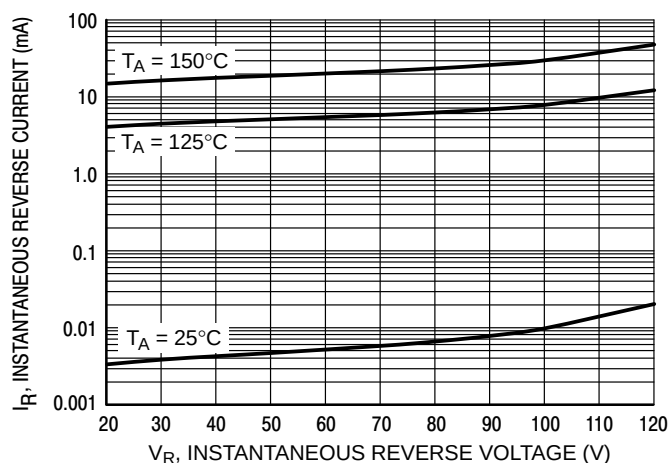
1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

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

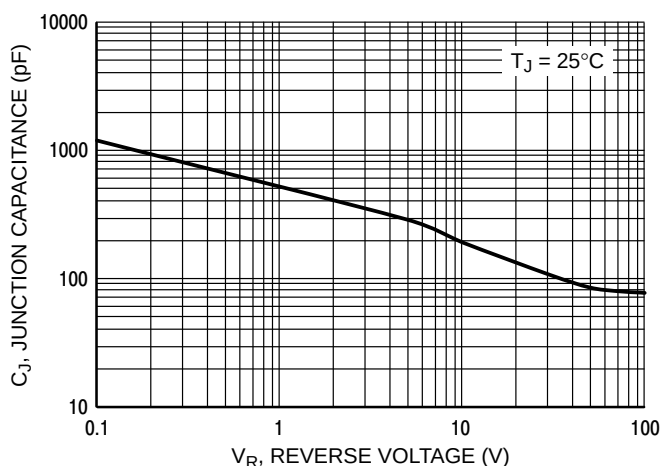
**TYPICAL CHARACTERISTICS**



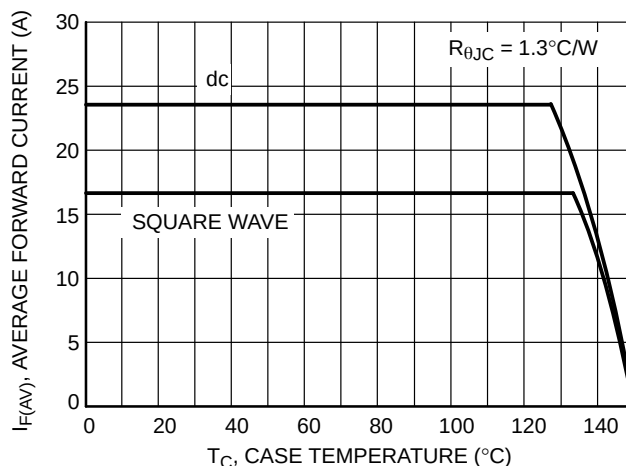
**Figure 1. Typical Instantaneous Forward Characteristics**



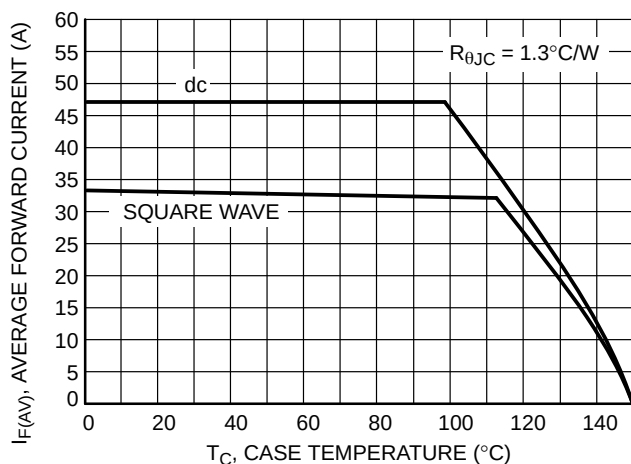
**Figure 2. Typical Reverse Current Characteristics**



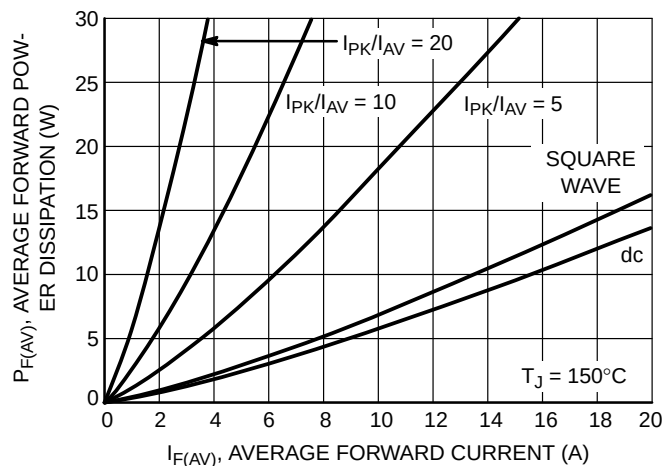
**Figure 3. Typical Junction Capacitance**



**Figure 4. Current Derating per Leg**



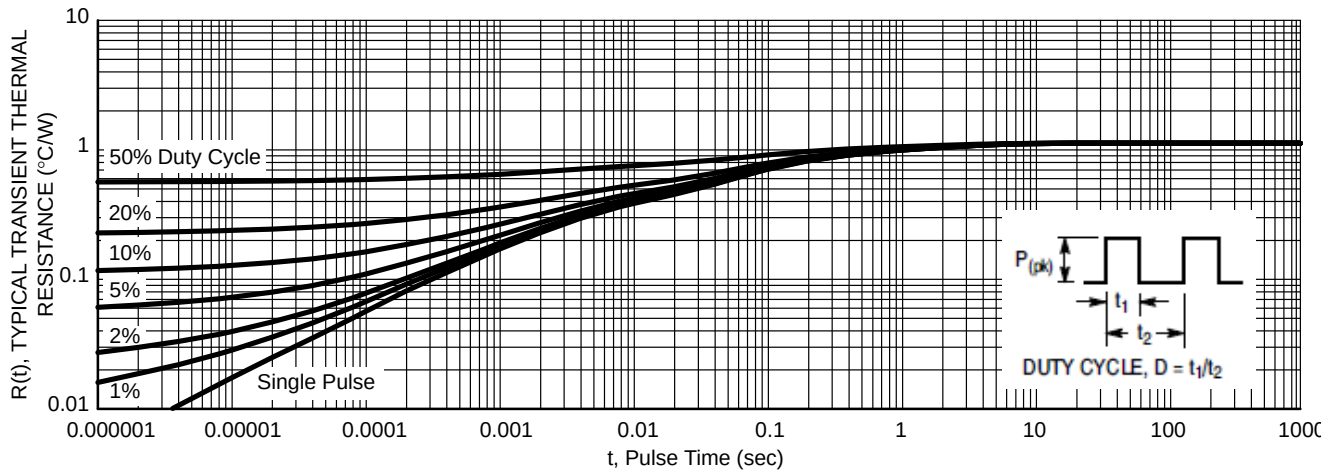
**Figure 5. Current Derating**



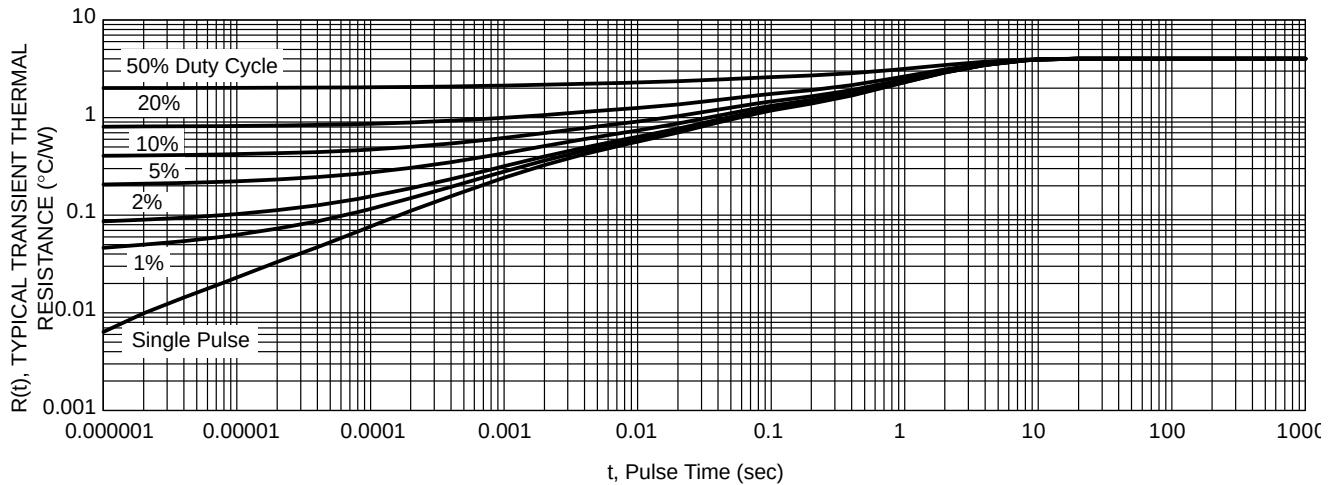
**Figure 6. Forward Power Dissipation**

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

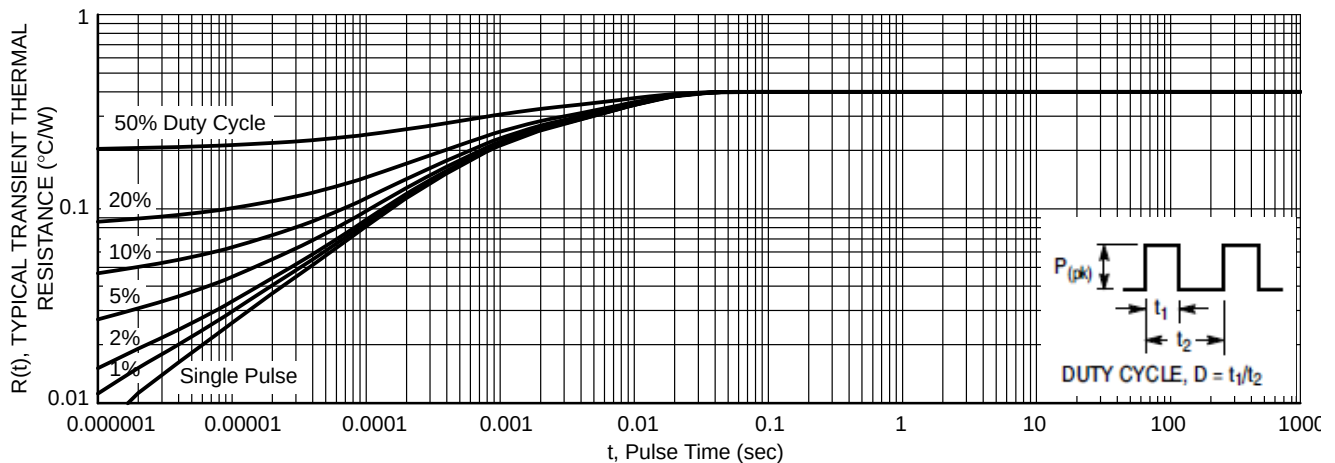
**TYPICAL CHARACTERISTICS**



**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**

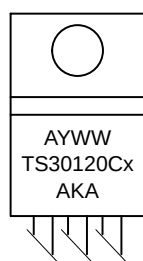
# NTST30120CT, NTSJ30120CTG, NTSB30120CT-1G, NTSB30120CTG, NTSB30120CTT4G

## ORDERING INFORMATION

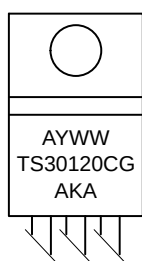
| Device         | Package                         | Shipping <sup>†</sup> |
|----------------|---------------------------------|-----------------------|
| NTST30120CTG   | TO-220AB<br>(Pb-Free)           | 50 Units / Rail       |
| NTSJ30120CTG   | TO-220FP<br>(Halide-Free)       | 50 Units / Rail 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

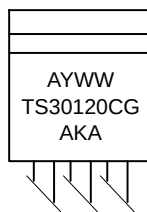
## MARKING DIAGRAMS



TO-220AB



TO-220FP



I<sup>2</sup>PAK



D<sup>2</sup>PAK

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

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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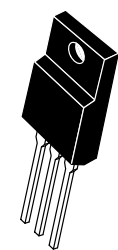


### TO-220 FULLPACK, 3-LEAD

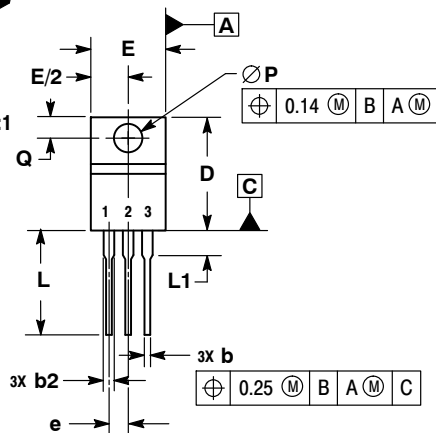
#### CASE 221AH

#### ISSUE F

DATE 30 SEP 2014

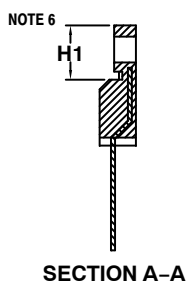
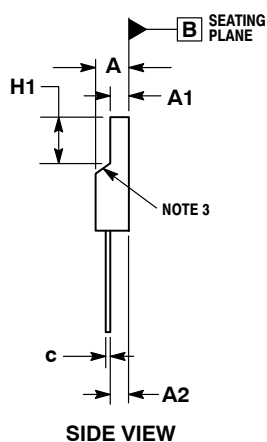
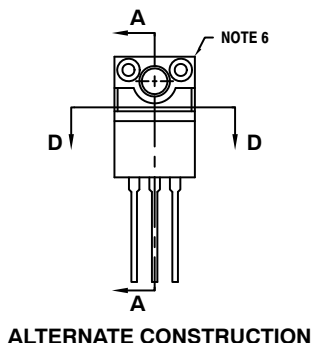


SCALE 1:1



FRONT VIEW

SECTION D-D

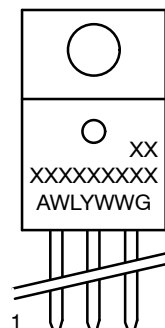


#### NOTES:

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.
6. CONTOURS AND FEATURES OF THE MOLDED PACKAGE BODY MAY VARY WITHIN THE ENVELOPE DEFINED BY DIMENSIONS A1 AND H1 FOR MANUFACTURING PURPOSES.

| 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

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DESCRIPTION: TO-220 FULLPACK, 3-LEAD

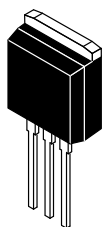
PAGE 1 OF 1

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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

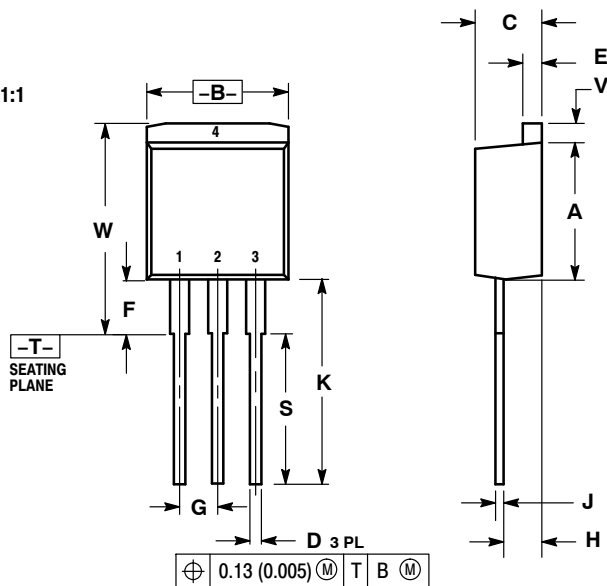
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SCALE 1:1

### I<sup>2</sup>PAK (TO-262) CASE 418D-01 ISSUE D

DATE 16 OCT 2007



#### NOTES:

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

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | 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 1:

- PIN 1. BASE
- COLLECTOR
- EMITTER
- COLLECTOR

#### STYLE 2:

- PIN 1. GATE
- DRAIN
- SOURCE
- DRAIN

#### STYLE 3:

- PIN 1. ANODE
- CATHODE
- ANODE
- CATHODE

#### STYLE 4:

- PIN 1. GATE
- COLLECTOR
- EMITTER
- COLLECTOR

DOCUMENT NUMBER: 98ASB16716C

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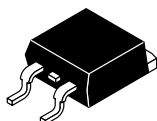
DESCRIPTION: I<sup>2</sup>PAK (TO-262)

PAGE 1 OF 1

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# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

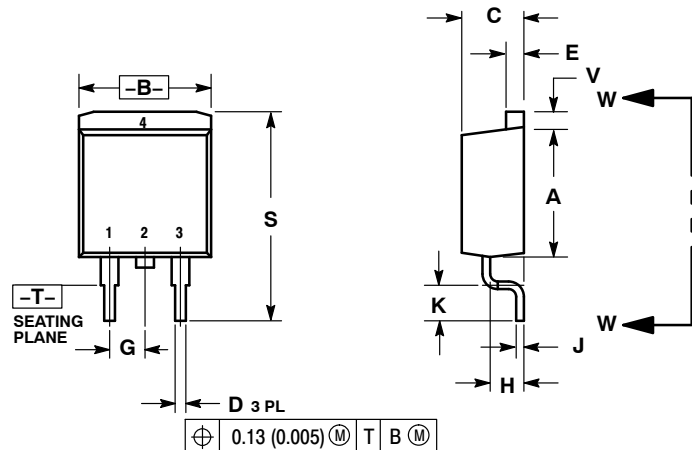
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**D<sup>2</sup>PAK 3**  
CASE 418B-04  
ISSUE L

DATE 17 FEB 2015

SCALE 1:1

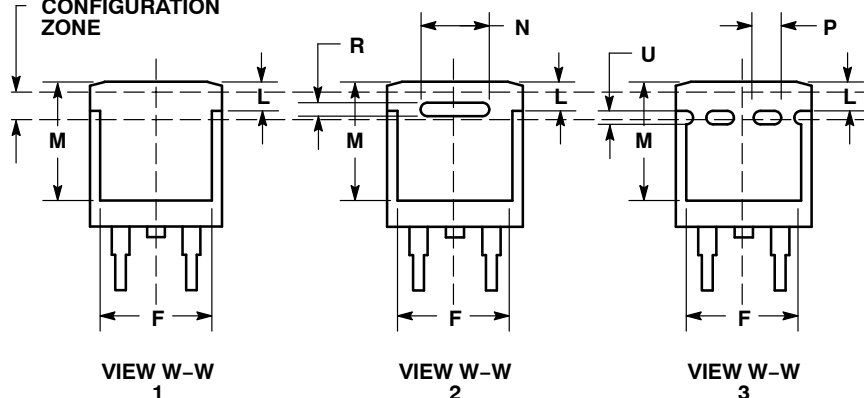


## NOTES:

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  |

## VARIABLE CONFIGURATION ZONE



### 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

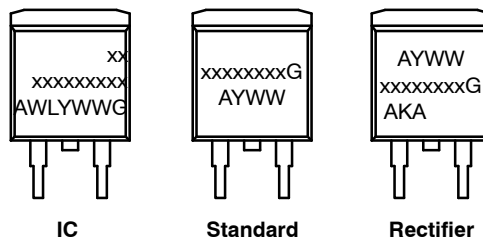
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| DESCRIPTION:     | D <sup>2</sup> PAK 3 | PAGE 1 OF 2                                                                                                                                                                         |

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DATE 17 FEB 2015

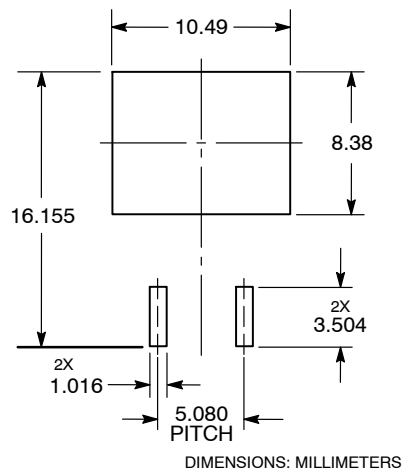
### GENERIC MARKING DIAGRAM\*



|     |                        |
|-----|------------------------|
| 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.

## 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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| <b>DESCRIPTION:</b>     | <b>D<sup>2</sup>PAK 3</b> | <b>PAGE 2 OF 2</b>                                                                                                                                                                  |

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