

# Complementary Power Transistors

## D<sup>2</sup>PAK for Surface Mount

### MJB44H11 (NPN), NJVMJB44H11 (NPN), MJB45H11 (PNP), NJVMJB45H11 (PNP)

Complementary power transistors are for general purpose power amplification and switching such as output or driver stages in applications such as switching regulators, converters and power amplifiers.

#### Features

- Low Collector-Emitter Saturation Voltage –  $V_{CE(sat)} = 1.0 \text{ V (Max) @ } 8.0 \text{ A}$
- Fast Switching Speeds
- Complementary Pairs Simplifies Designs
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V  
Machine Model, C > 400 V
- NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- Pb-Free Packages are Available

#### MAXIMUM RATINGS

| Rating                                                                                   | Symbol         | Value        | Unit      |
|------------------------------------------------------------------------------------------|----------------|--------------|-----------|
| Collector-Emitter Voltage                                                                | $V_{CEO}$      | 80           | Vdc       |
| Emitter-Base Voltage                                                                     | $V_{EB}$       | 5            | Vdc       |
| Collector Current – Continuous<br>– Peak                                                 | $I_C$          | 10<br>20     | Adc       |
| Total Power Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 50<br>0.4    | W<br>W/°C |
| Total Power Dissipation<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 2.0<br>0.016 | W<br>W/°C |
| Operating and Storage Junction<br>Temperature Range                                      | $T_J, T_{stg}$ | –55 to 150   | °C        |

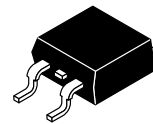
#### THERMAL CHARACTERISTICS

| Characteristic                          | Symbol          | Max | Unit |
|-----------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2.5 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 75  | °C/W |

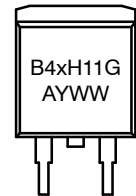
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## SILICON POWER TRANSISTORS 10 AMPERES, 80 VOLTS, 50 WATTS

#### MARKING DIAGRAM



D<sup>2</sup>PAK  
CASE 418B  
STYLE 1



- x = 4 or 5
- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package

#### ORDERING INFORMATION

| Device         | Package                      | Shipping <sup>†</sup> |
|----------------|------------------------------|-----------------------|
| MJB44H11G      | D <sup>2</sup> PAK (Pb-Free) | 50 Units / Rail       |
| MJB44H11T4G    | D <sup>2</sup> PAK (Pb-Free) | 800 / Tape & Reel     |
| NJVMJB44H11T4G | D <sup>2</sup> PAK (Pb-Free) | 800 / Tape & Reel     |
| MJB45H11G      | D <sup>2</sup> PAK (Pb-Free) | 50 Units / Rail       |
| MJB45H11T4G    | D <sup>2</sup> PAK (Pb-Free) | 800 / Tape & Reel     |
| NJVMJB45H11T4G | 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 Specification Brochure, [BRD8011/D](#).

# MJB44H11 (NPN), NJVMJB44H11 (NPN), MJB45H11 (PNP), NJVMJB45H11 (PNP)

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic                                                               | Symbol        | Min | Typ | Max | Unit          |
|------------------------------------------------------------------------------|---------------|-----|-----|-----|---------------|
| <b>OFF CHARACTERISTICS</b>                                                   |               |     |     |     |               |
| Collector-Emitter Sustaining Voltage ( $I_C = 30\text{ mA}$ , $I_B = 0$ )    | $V_{CE(sus)}$ | 80  | –   | –   | Vdc           |
| Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE} = 0$ ) | $I_{CES}$     | –   | –   | 10  | $\mu\text{A}$ |
| Emitter Cutoff Current ( $V_{EB} = 5\text{ Vdc}$ )                           | $I_{EBO}$     | –   | –   | 50  | $\mu\text{A}$ |

## ON CHARACTERISTICS

|                                                                                        |               |    |   |     |     |
|----------------------------------------------------------------------------------------|---------------|----|---|-----|-----|
| Collector-Emitter Saturation Voltage ( $I_C = 8\text{ Adc}$ , $I_B = 0.4\text{ Adc}$ ) | $V_{CE(sat)}$ | –  | – | 1.0 | Vdc |
| Base-Emitter Saturation Voltage ( $I_C = 8\text{ Adc}$ , $I_B = 0.8\text{ Adc}$ )      | $V_{BE(sat)}$ | –  | – | 1.5 | Vdc |
| DC Current Gain ( $V_{CE} = 1\text{ Vdc}$ , $I_C = 2\text{ Adc}$ )                     | $h_{FE}$      | 60 | – | –   | –   |
| DC Current Gain ( $V_{CE} = 1\text{ Vdc}$ , $I_C = 4\text{ Adc}$ )                     |               | 40 | – | –   |     |

## DYNAMIC CHARACTERISTICS

|                                                                                                                                                      |          |   |            |   |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|------------|---|-----|
| Collector Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $f_{\text{test}} = 1\text{ MHz}$ )<br>MJB44H11, NJVMJB44H11<br>MJB45H11, NJVMJB45H11              | $C_{cb}$ | – | 130<br>230 | – | pF  |
| Gain Bandwidth Product ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )<br>MJB44H11, NJVMJB44H11<br>MJB45H11, NJVMJB45H11 | $f_T$    | – | 50<br>40   | – | MHz |

## SWITCHING TIMES

|                                                                                                                              |             |   |            |   |    |
|------------------------------------------------------------------------------------------------------------------------------|-------------|---|------------|---|----|
| Delay and Rise Times ( $I_C = 5\text{ Adc}$ , $I_{B1} = 0.5\text{ Adc}$ )<br>MJB44H11, NJVMJB44H11<br>MJB45H11, NJVMJB45H11  | $t_d + t_r$ | – | 300<br>135 | – | ns |
| Storage Time ( $I_C = 5\text{ Adc}$ , $I_{B1} = I_{B2} = 0.5\text{ Adc}$ )<br>MJB44H11, NJVMJB44H11<br>MJB45H11, NJVMJB45H11 | $t_s$       | – | 500<br>500 | – | ns |
| Fall Time ( $I_C = 5\text{ Adc}$ , $I_{B1} = I_{B2} = 0.5\text{ Adc}$ )<br>MJB44H11, NJVMJB44H11<br>MJB45H11, NJVMJB45H11    | $t_f$       | – | 140<br>100 | – | ns |

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.

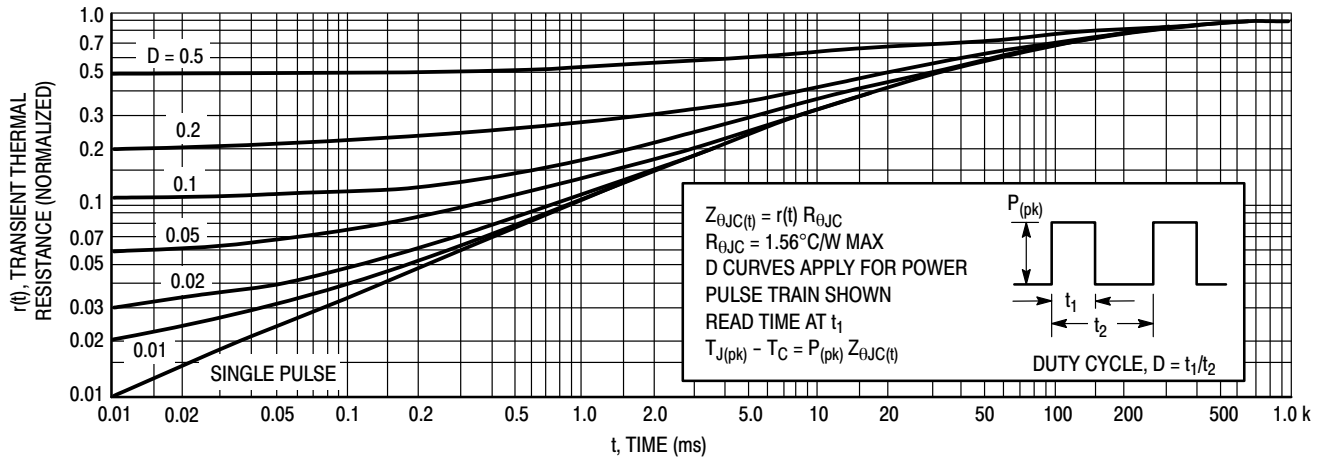
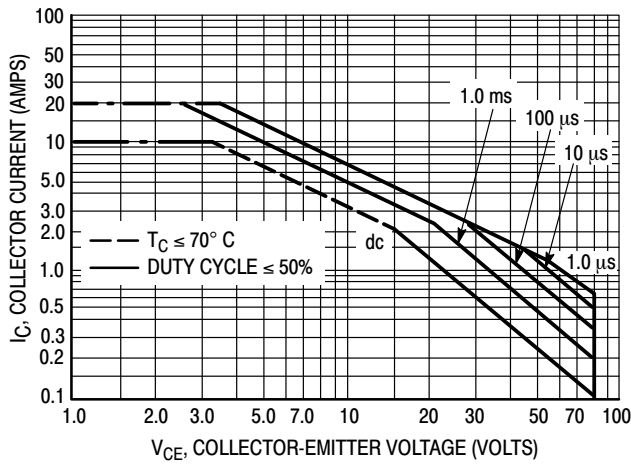
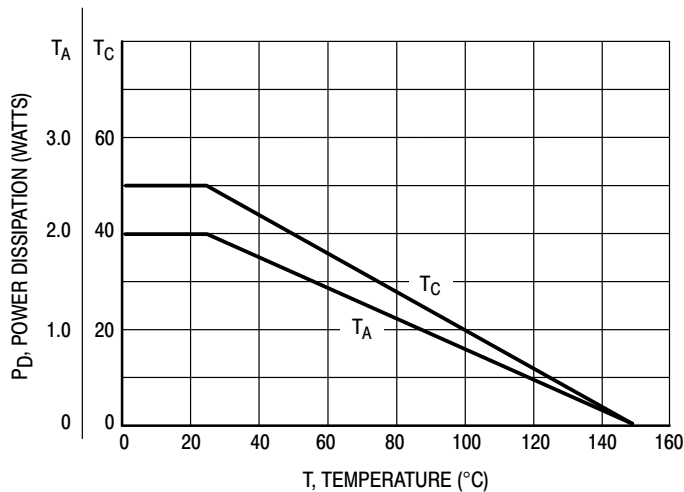


Figure 1. Thermal Response

## MJB44H11 (NPN), NJVMJB44H11 (NPN), MJB45H11 (PNP), NJVMJB45H11 (PNP)



**Figure 2. Maximum Rated Forward Bias Safe Operating Area**



**Figure 3. Power Derating**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 2 is based on  $T_{J(pk)} = 150^\circ \text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ \text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 1. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

# MJB44H11 (NPN), NJVMJB44H11 (NPN), MJB45H11 (PNP), NJVMJB45H11 (PNP)

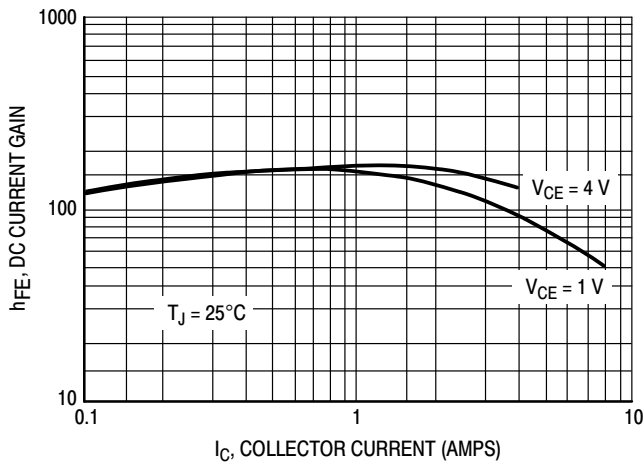


Figure 4. MJB44H11 DC Current Gain

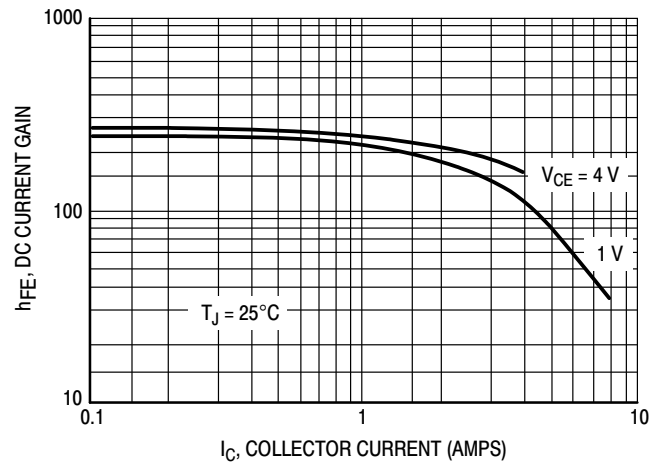


Figure 5. MJB45H11 DC Current Gain

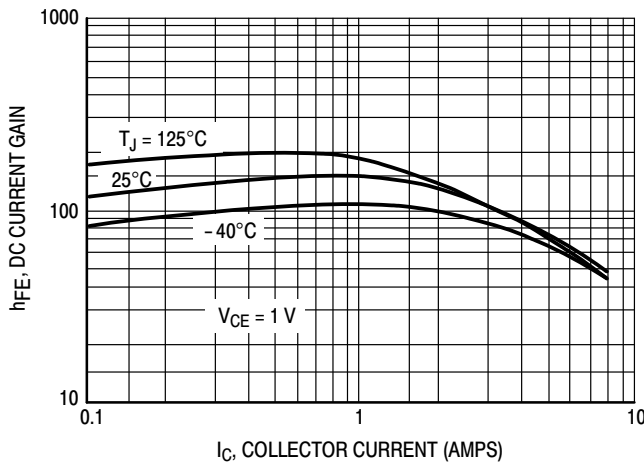


Figure 6. MJB44H11 Current Gain versus Temperature

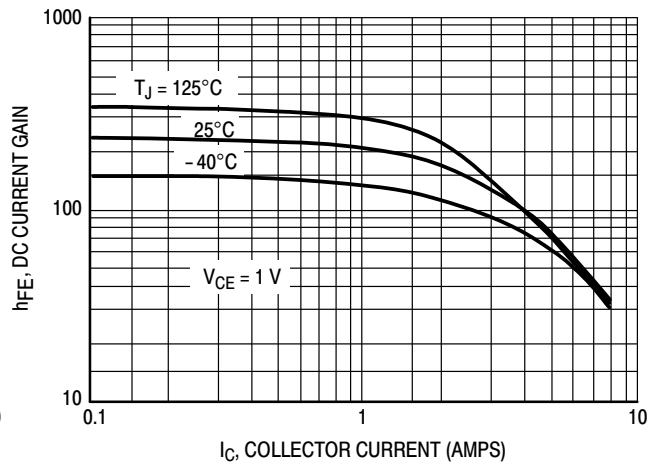


Figure 7. MJB45H11 Current Gain versus Temperature

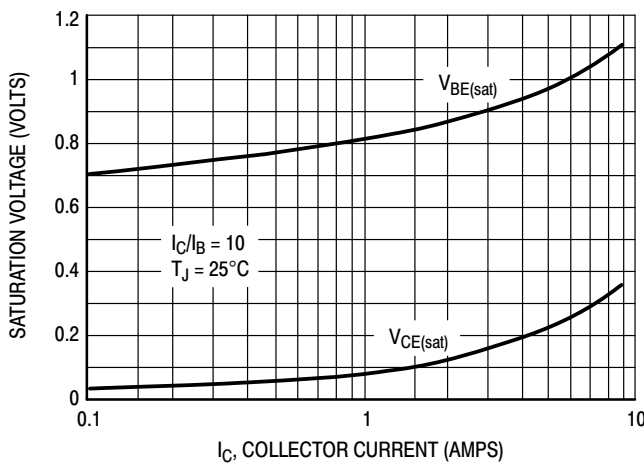


Figure 8. MJB44H11 On-Voltages

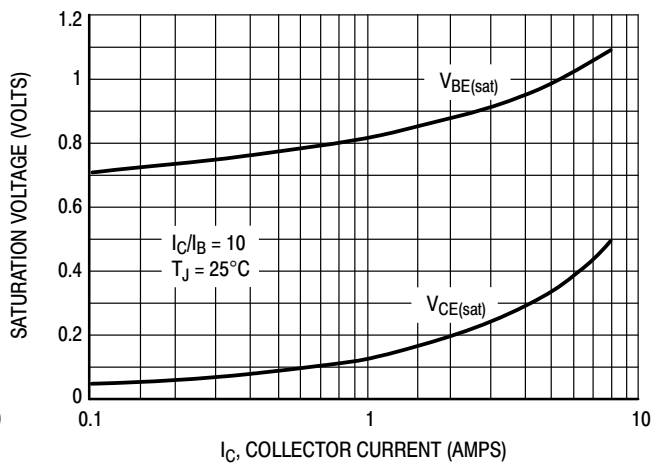


Figure 9. MJB45H11 On-Voltages

# MJB44H11 (NPN), NJVMJB44H11 (NPN), MJB45H11 (PNP), NJVMJB45H11 (PNP)

## REVISION HISTORY

| Revision | Description of Changes                            | Date       |
|----------|---------------------------------------------------|------------|
| 6        | Rebranded the Data Sheet to <b>onsemi</b> format. | 10/27/2025 |

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.





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

DATE 17 FEB 2015

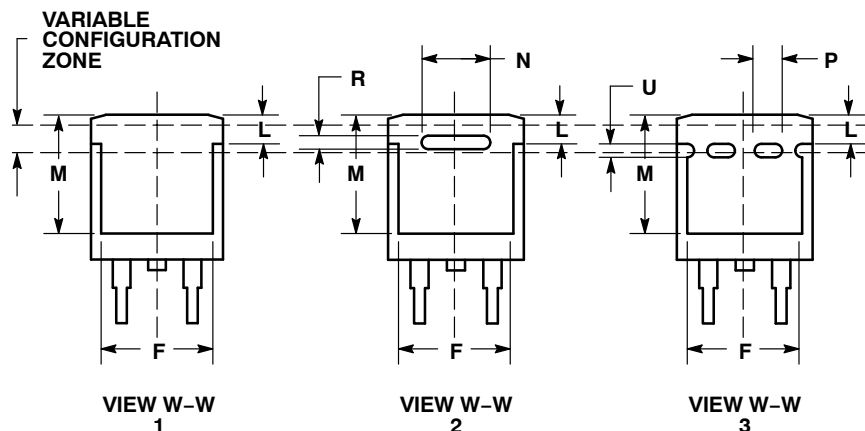
SCALE 1:1



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:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 2:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN | STYLE 3:<br>PIN 1. ANODE<br>2. CATHODE<br>3. ANODE<br>4. CATHODE | STYLE 4:<br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | STYLE 5:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE<br>4. ANODE | STYLE 6:<br>PIN 1. NO CONNECT<br>2. CATHODE<br>3. ANODE<br>4. CATHODE |
|-----------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|

MARKING INFORMATION AND FOOTPRINT ON PAGE 2

|                  |                      |                                                                                                                                                                                     |
|------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOCUMENT NUMBER: | 98ASB42761B          | Electronic versions are uncontrolled except when accessed directly from the Document Repository.<br>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

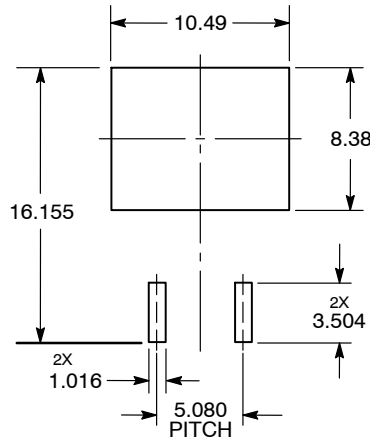
**GENERIC  
MARKING DIAGRAM\***



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\***



DIMENSIONS: MILLIMETERS

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

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

**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)